

Bat Survey

Land at Water Lane,

Angmering,

West Sussex

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LIABILITIES:

Whilst every effort has been made to guarantee the accuracy of this report, it should be noted that living creatures are capable of migration and whilst protected species may not have been located during the survey duration, their presence may be found on a site at a later date.

The views and opinions contained within this document are based on a reasonable timeframe between the completion of the survey and the commencement of any works. If there is any delay between the commencement of works that may conflict with timeframes laid out within this document, or have the potential to allow the ingress of protected species, a suitably qualified ecologist should be consulted.

It is the duty of care of the landowner/developer to act responsibly and comply with current environmental legislation if protected species are suspected or found prior to or during works.

1.0 Introduction

Background

- 1.1 The Ecology Partnership Ltd was commissioned by Rydon Homes and Gleeson Strategic Land Ltd. to undertake a bat survey at Water Lane, Angmering.
- 1.2 Section 2 of this report sets out the methodology of The Ecology Partnership's survey and the results in Section 3 and the implications discussed in Section 4. Conclusions are provided for in chapter 5 of this report.
- 1.3 The site is situated to the east of the West Sussex village of Angmering. The site is set within a semi-rural landscape with agricultural land to the east and housing to the west. The majority of the site is currently comprised of semi-improved grassland.
- 1.4 Following an initial preliminary ecological appraisal in August 2015, a series of bat surveys were undertaken on the eastern fields. Bat activity was limited to a low number of passes from common species utilising the boundary features. The results of these surveys are included as part of the preliminary ecological appraisal.
- 1.5 The red line boundary of the site has since been altered to include two fields to the west of the site (See figure 1 below); as such these fields have not been surveyed for bat activity.



Figure 1: Approximate location of previously surveyed area indicated by green polyline, yellow polyline indicates additional fields added as part of updated proposals. This is not indicative of the true redline boundary.

Description of Proposed Development

- 1.6 It is understood the proposed development is to include the construction of a new housing development within the boundary, however the plans are yet to be finalised and will be influenced by a number of surveys, of which ecology is one.

2.0 Methodology

Bat Transect Activity Surveys

- 2.1 A total of three dusk transect activity surveys were carried out on 20th June, 19th July and 9th August 2016. The surveys followed BCT guidelines (2016). A predetermined transect route was agreed and followed for the duration of the survey, during which bat flyovers and activity were recorded. The route was designed to follow linear features such as hedgerows and tree lines which bats are known to use as commuting corridors. These habitats also provide the most suitable habitat on site for foraging. Figure 2 below displays the layouts of the transect route.



Figure 2: Site boundary at Water Lane, Angmering outlined by yellow polyline, location of transect route outlined in blue.

- 2.2 The dusk surveys started 30 minutes before sunset and observations were maintained until 2 hours after sunset. Bats usually emerge about twenty minutes after sunset

depending on the species, light level, weather conditions and time of year. Peak activity will normally last for about two hours after sunset, during times of peak insect activity.

- 2.3 The surveyors were equipped with Wildlife Acoustics Echo Meter Touch recording devices.
- 2.4 Two Anabat Express remote recording devices were also deployed for at least five consecutive nights in May and July. These were placed along hedgerows that were considered suitable for use by commuting or foraging bats in order to gauge activity levels and species diversity on site, the locations are indicated below, in figure 3. The subsequent recordings from the Anabat Express device were analysed using Analog software.

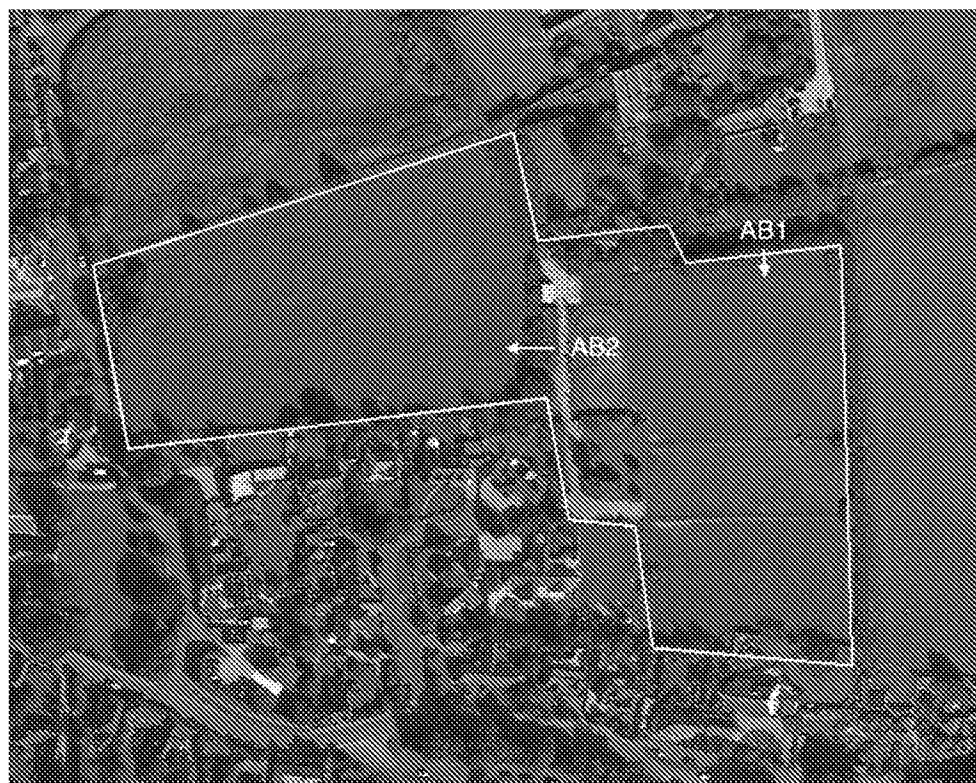


Figure 3: Location of the two Anabat Express static recording devices at Water Lane, arrows indicate direction of microphone.

- 2.4 The Anabat Express recording devices were established on site for at five consecutive nights in spring from the 16th May to the 21st May and in summer from the 19th July to the 24th July.

Limitations

- 2.5 It should be noted that whilst every effort has been made to provide a comprehensive description of the site, no single investigation could ensure the complete characterisation and prediction of the natural environment.

3.0 Results

Bat Transect Surveys

- 3.1 Bat activity transect surveys were carried out across the site during May, July and August.
- 3.2 Two bat surveyors followed the predetermined route illustrated in figure 2 above. Activity levels, foraging and commuting behaviour were recorded and species were identified using bat detectors. Surveyors were on site 30 minutes before sunset until 2 hours after sunset.
- 3.3 The first survey was conducted at dusk on the 20th June 2016. Sunset was at 21:19 and the temperature was 16 degrees with some slight breeze and scattered clouds. Access on this survey was limited to the west most field only.
- 3.4 The first bat was observed at 21:34, a common pipistrelle (*Pipistrellus pipistrellus*) commuting east along the southern hedgerow boundary in the west field. Another common pipistrelle was recorded at 22:01, commuting along the west hedgerow boundary in the west field. Two further bats were recorded but not seen at 22:13 and

22:33, both common pipistrelles in the northeast corner of the west field. No other bats were recorded.

- 3.5 The second survey was undertaken on the 19th July 2016. The temperature at the start and end of the survey was 26 degrees; the weather was dry and clear. Sunset was at 21:04.
- 3.6 The first bat was recorded at 21.33 in the southeast corner of the site of the horse paddocks and was a common pipistrelle commuting along the hedgerow. Two common pipistrelles were observed commuting across the site along the central hedgerow at 21.39 and 21.51 and a third was heard but not seen along the eastern hedgerow boundary of the horse paddocks at 22.05. Four passes from a common pipistrelle were recorded at 22.10 to the west of the horse paddocks. A noctule was recorded at 22.21 to the west of the central hedgerow. The last bat was recorded at 22.27, a common pipistrelle. No other bats were recorded during the survey period.
- 3.7 The final bat survey was undertaken on the 9th August 2016. Sunset was at 20.34 with the temperature mild and overcast at 16 degrees with some light wind.
- 3.8 The first bat was recorded at 21.35 and was a common pipistrelle, which was recorded faintly along the southern edge of the western field, adjacent to the houses and the more mature vegetation. A second common pipistrelle was recorded along this edge at 21.42. No bats were recorded during the transect within the paddock grazed fields, however, one final common pipistrelle was recorded along the central tree line between the paddocks and the western field at 21.45. No further bats were recorded during the survey period.

Anabat Remote Recording

3.9 Anabat Express remote recording devices were deployed on the western aspect of the central hedge line between the two fields (AB1) and on the southern facing hedgerow to the north of the paddocks (AB2).

3.10 Figure 4 below shows the analysis of the anabat that was located along the western facing hedgeline.

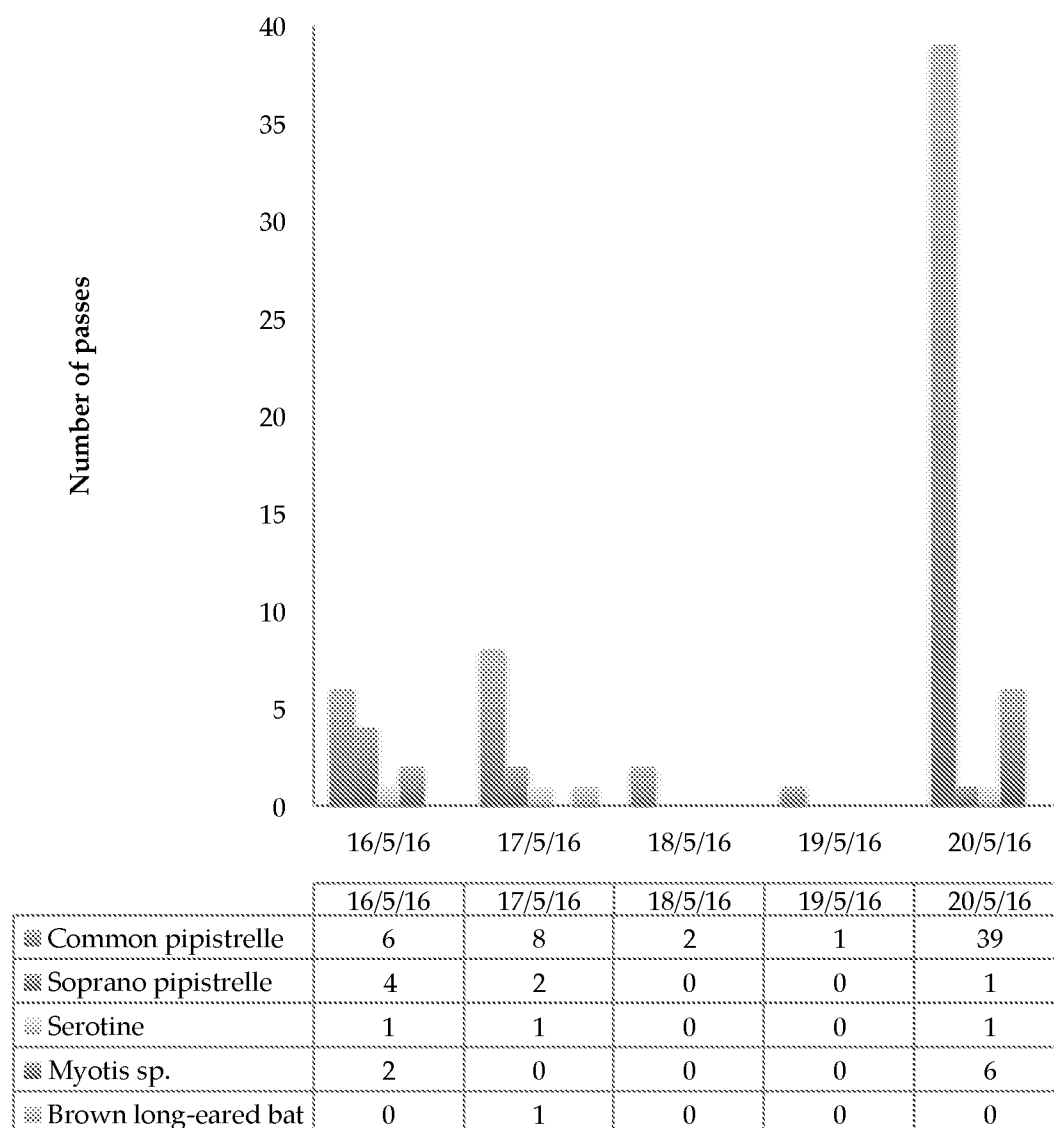


Figure 4: Graph and table of results from AB1, left on site for five nights in May 2016.

- 3.11 A total of 75 passes were recorded during this time, the dominant species was the common pipistrelle, making up approximately 56% of the passes recorded (See figure 4). Four other species were recorded in low numbers, the soprano pippistrelle (7%), serotine (3%), myotis sp. (11%) and brown long eared bat (1%).
- 3.12 The most activity was recorded on the 20th of May, where 47 passes were recorded; the lowest activity was recorded on the 19th of May, with only a single common pipistrelle pass recorded.

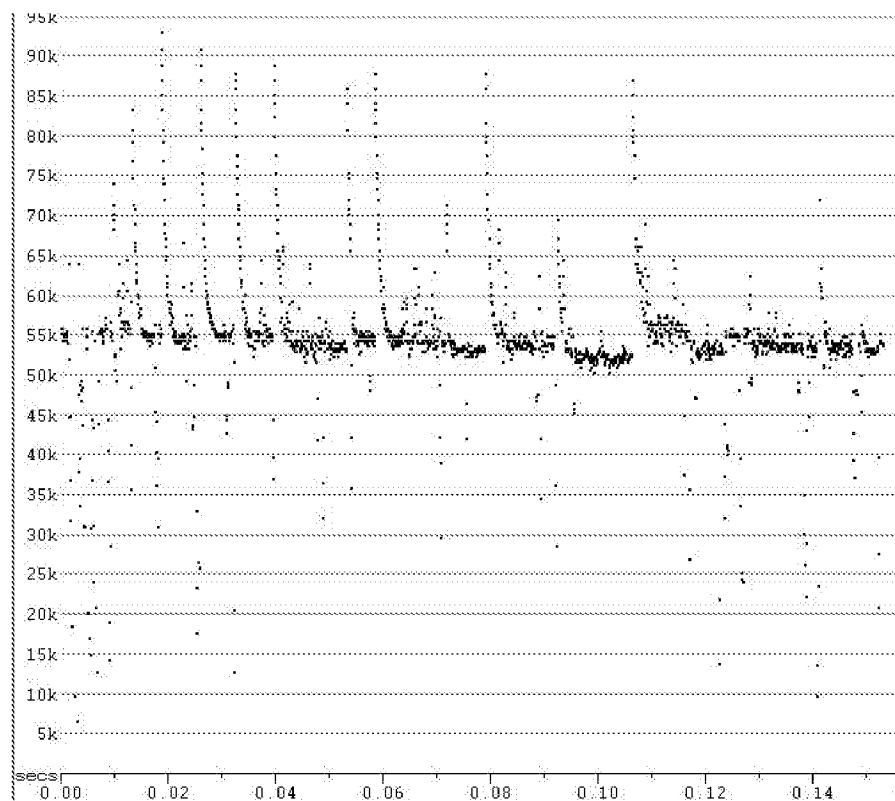


Figure 5: Example of soprano pipistrelle (*Pipistrellus pygmaeus*), note characteristic 'hockey stick' call, with quasi-constant component over 50kHz.

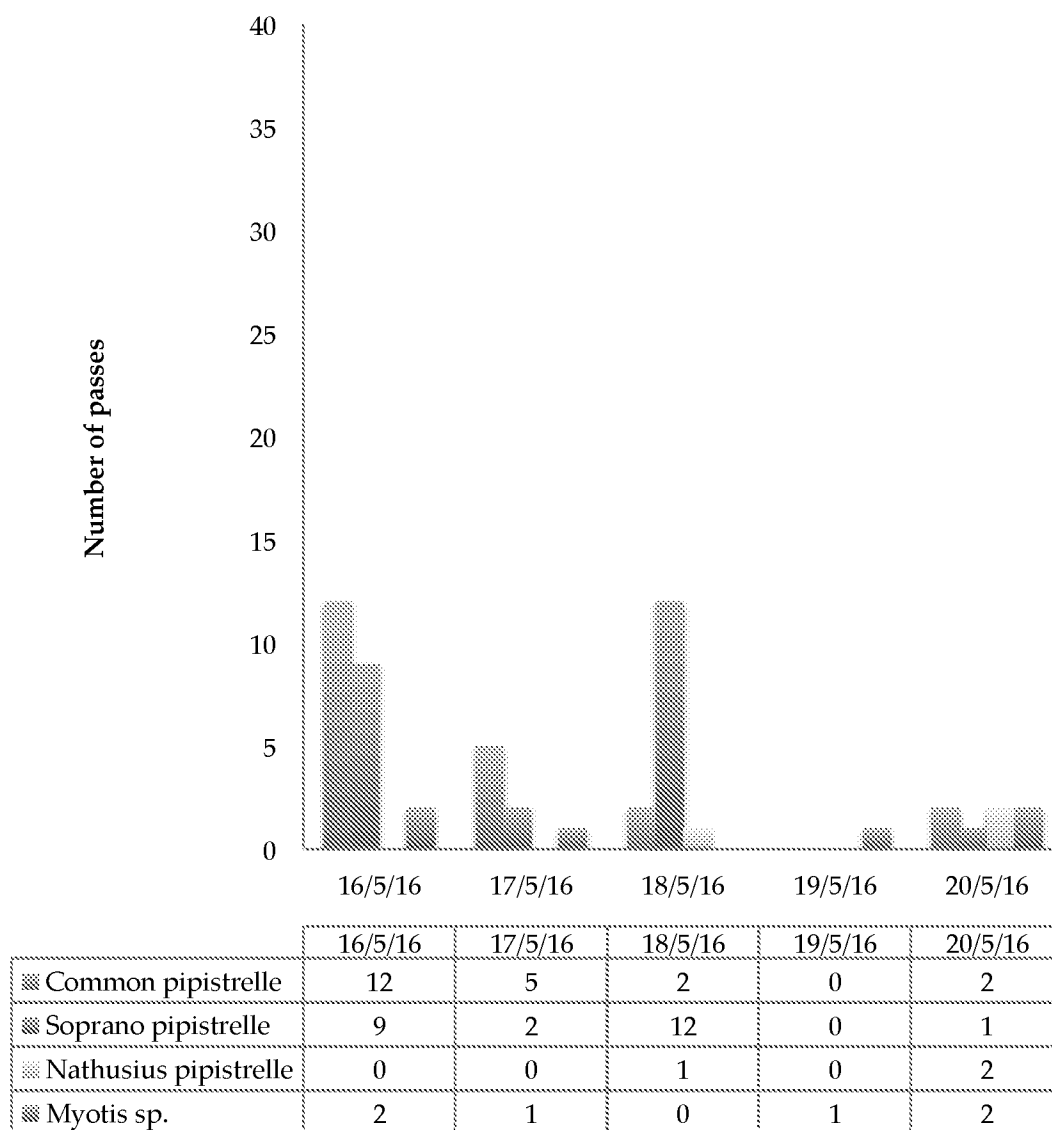


Figure 6: Graph and table of results from AB2, left on site for five nights in May 2016.

3.13 Figure 5 above shows the analysis of the anabat that was located to the north of the horse paddocks in the centre of the site. The anabat was established along a mature hedgerow consisting of hawthorn, blackthorn and field maple, the vegetation along the top of the hedgerow was overhanging.

3.14 A total of 54 passes were recorded across the five nights, this is considered to be a low number. The most frequently species recorded was the soprano pipistrelle, accounting

for 44% of passes, common pipistrelles accounted for approximately 39% of passes. A small number of *Nathusius pipistrelle* and *myotis* sp. were also recorded.

3.15 The most activity was recorded on the 16th of May, with a total of 23 passes recorded; the lowest activity was recorded on the 19th of May with only a single *myotis* species was recorded.

3.16 Figure 6 below displays a recorded pass of a common pipistrelle, one of the more frequently recorded species on this section.

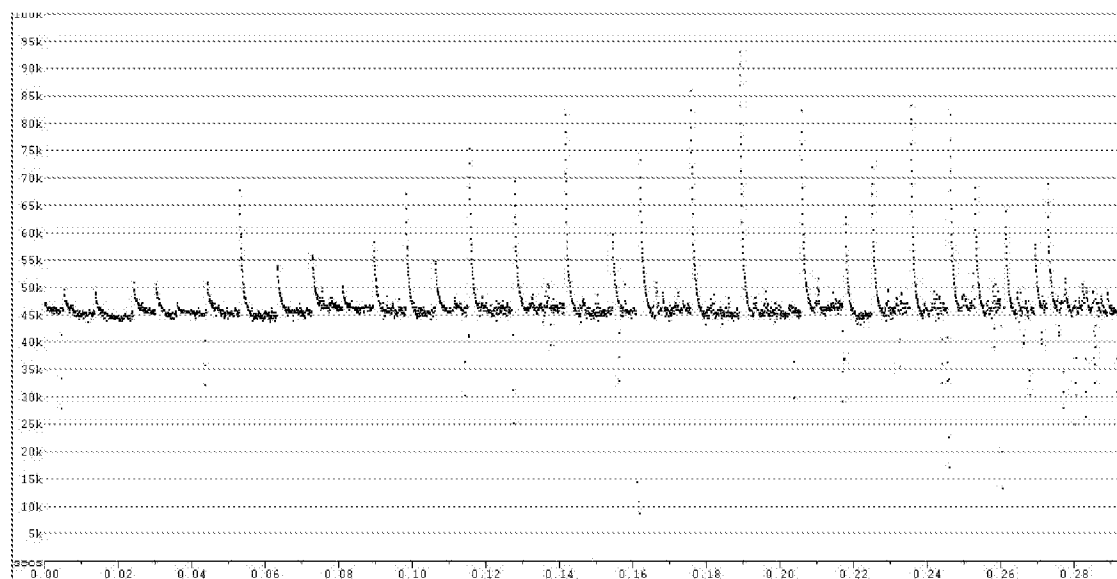


Figure 7: Pass recorded from a common pipistrelle, featuring characteristic 'hockey stick' call shape with sweeping frequency-modulated component.

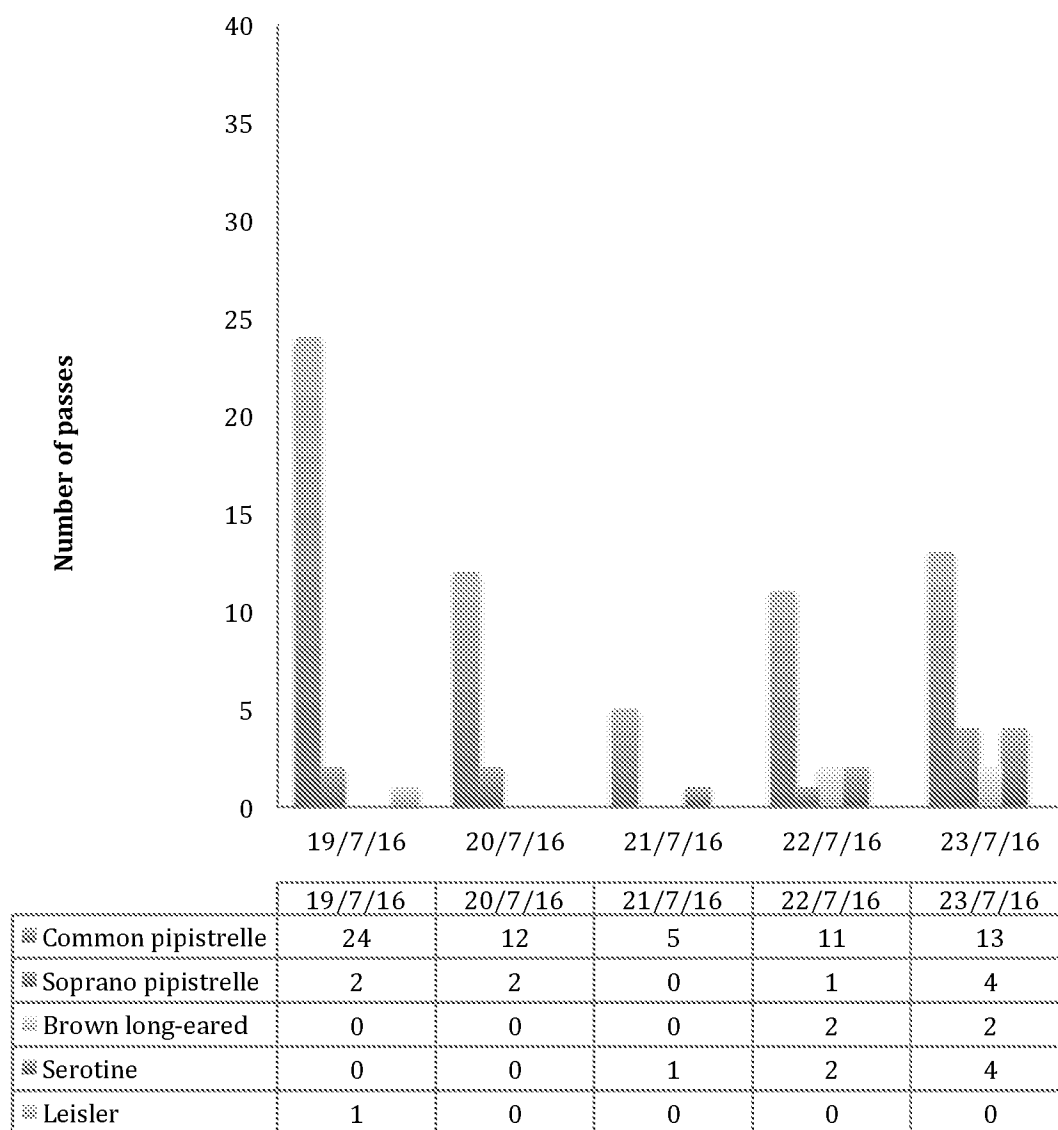


Figure 8: Graph and table of results from AB1 established on the central hedgerow, left on site for five nights in July 2016.

- 3.17 The anabat left on the central hedgerow between the two southern fields recorded a total of 86 passes over the five nights left on site. Again the common pipistrelle was the most commonly recorded species, accounting for 65% of calls. A low number of calls from soprano pipistrelles (10%), brown long-eared (5%) and serotines (8%) were recorded. Additionally, a single pass from Leisler's bat was recorded on the 19th of July.

3.18 Activity was greatest on the night of the 19th July, with a total of 27 passes over the duration of the night; the lowest activity was recorded on the 6th of July, with only six passes recorded.

3.19 At least one of the *Myotis* calls recorded on this anabat was believed to be a natterers (*Myotis nattereri*). The majority of the calls did not contain a significant number of clean pulses for confident identification beyond genus level.

3.20 Figures below display examples of calls taken from this Anabat Express.

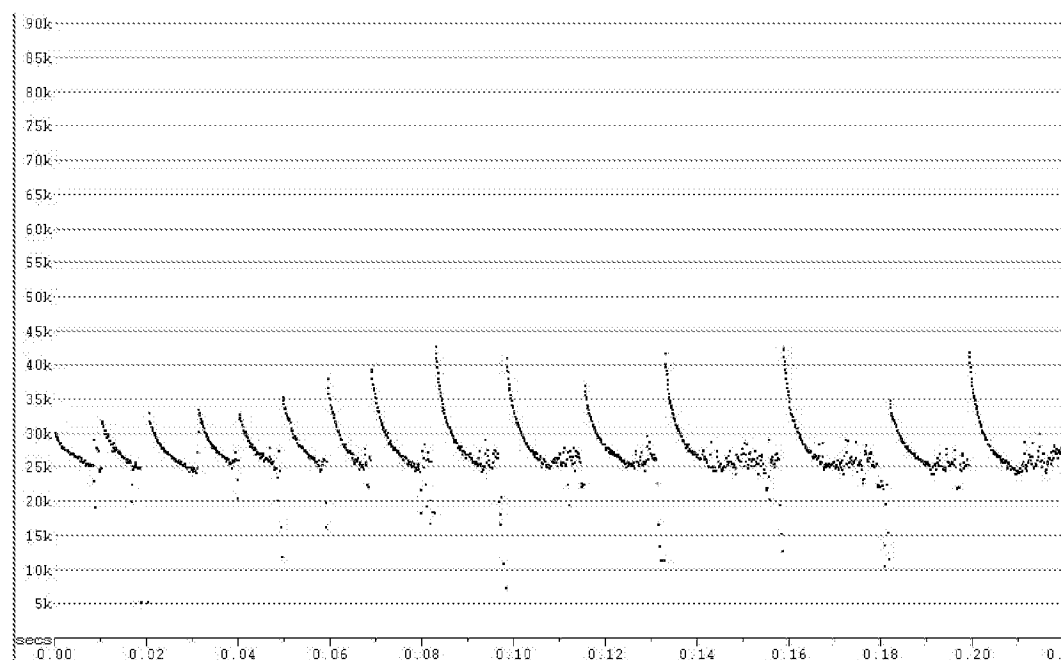


Figure 9: Serotine pass recorded on Anabat Express remote recording device. Featuring characteristic low frequency modulated pulses.

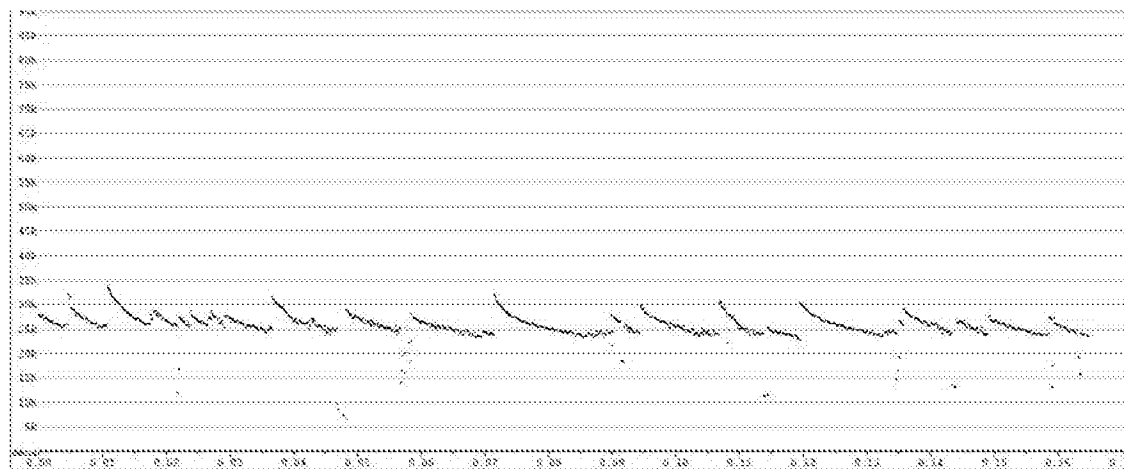


*Figure 10: Leisler pass recorded along the horse paddock hedgerow. Note two-part quasi-constant frequency call, typical of bats in the genus *Nyctalus**

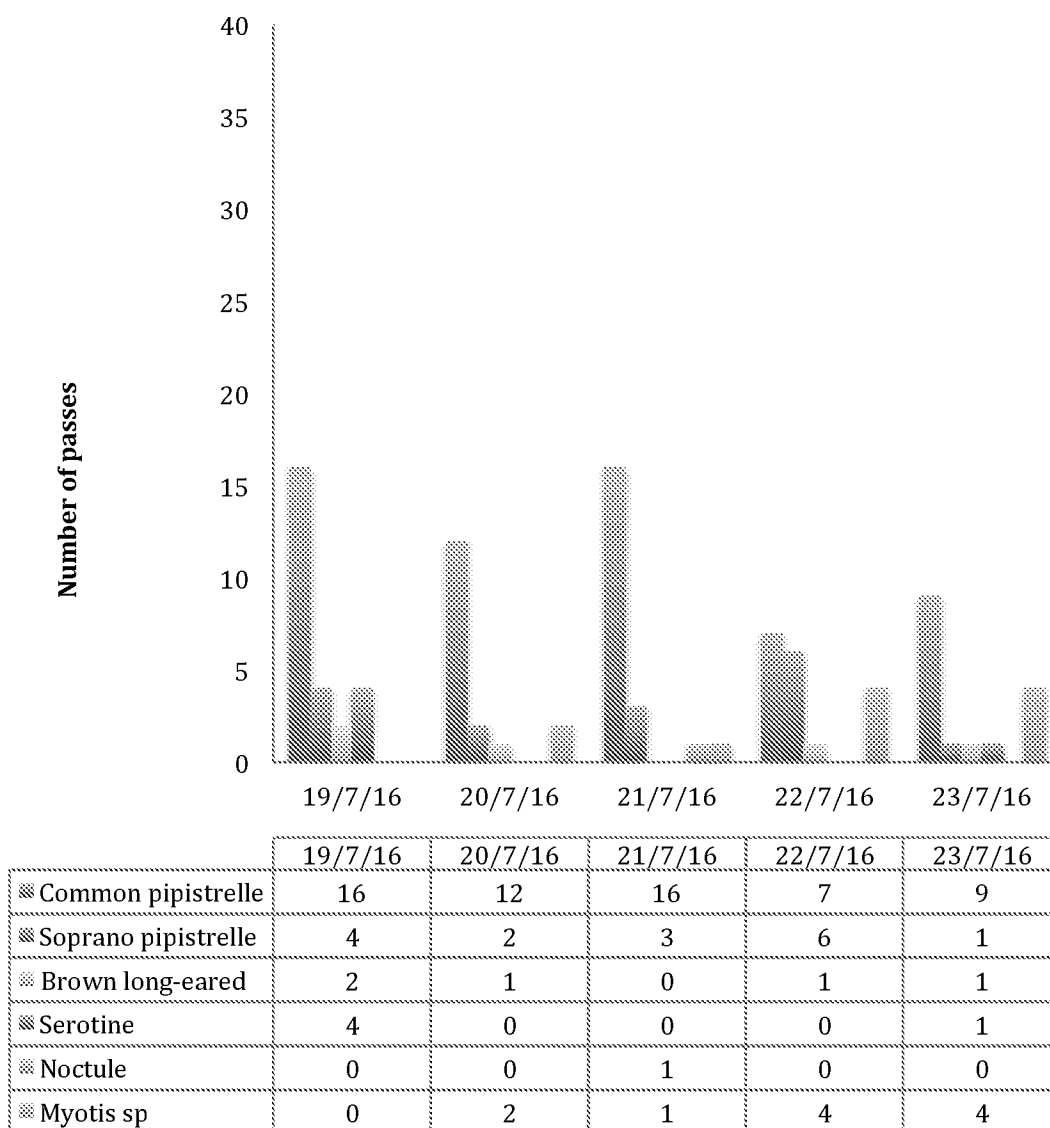


Figure 11: Graph and table of results from AB2 established on the hedgerow at the north of the horse paddocks, left on site for five nights in July 2016.

3.21 Figure 6 above shows the analysis of the anabat that was located on the horse paddock hedgerow for five nights from the 19th to 23rd of July.

3.22 A total of 98 passes were recorded across the five nights, this is considered to be a low number. The most frequent species recorded was the common pipistrelle, accounting for 60% of passes, soprano pipistrelles accounted for approximately 16% of passes. A

low number of passes from brown long-eared bats, *Myotis* sp., noctule and serotines were also recorded.

- 3.23 Activity for this section was consistent across the duration of the five nights, the most activity was recorded on the 19th of July, with a total of 26 passes recorded; the lowest activity was recorded on the 23rd of July with 18 passes recorded.
- 3.24 At least one of the myotis species recorded at this location was considered to be a Daubentons bat, the rest of the *Myotis* calls were too fragmented to identify beyond genus level. Figure 12 below displays an example of one of the Daubenton calls recorded.

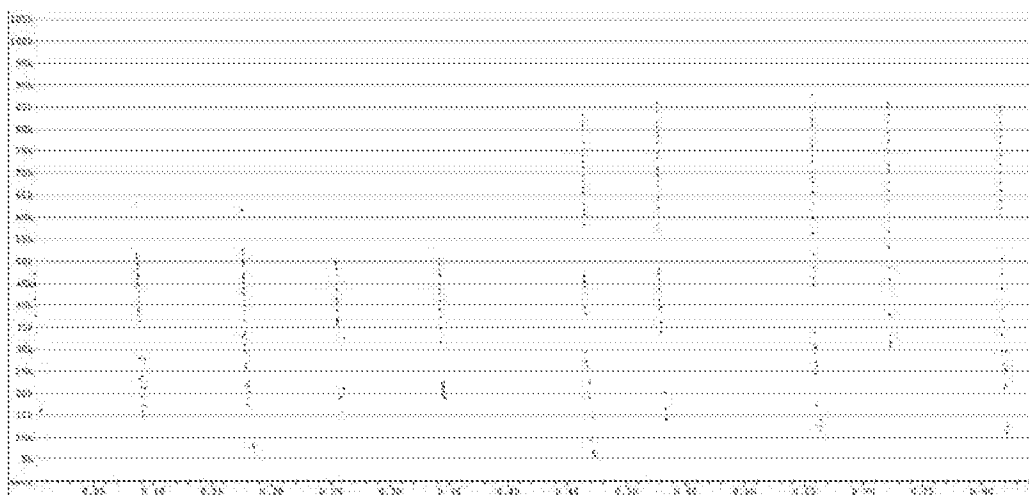


*Figure 12: Example of Myotis call recorded along the horse paddocks hedgerow, considered to be a Daubentons (*Myotis daubentonii*), featuring characteristic frequency gaps.*

- 3.25 Overall across the entirety of the recording period, the common pipistrelle was the most frequently recorded species, accounting for 65% of passes (See figure 13 below). The second most common was the soprano pipistrelle, with 18% of passes. *Myotis* (8%), serotine (5%), brown long-eared (3%), noctule (1%), leisler (1%) and nathusius (1%) featured occasionally.

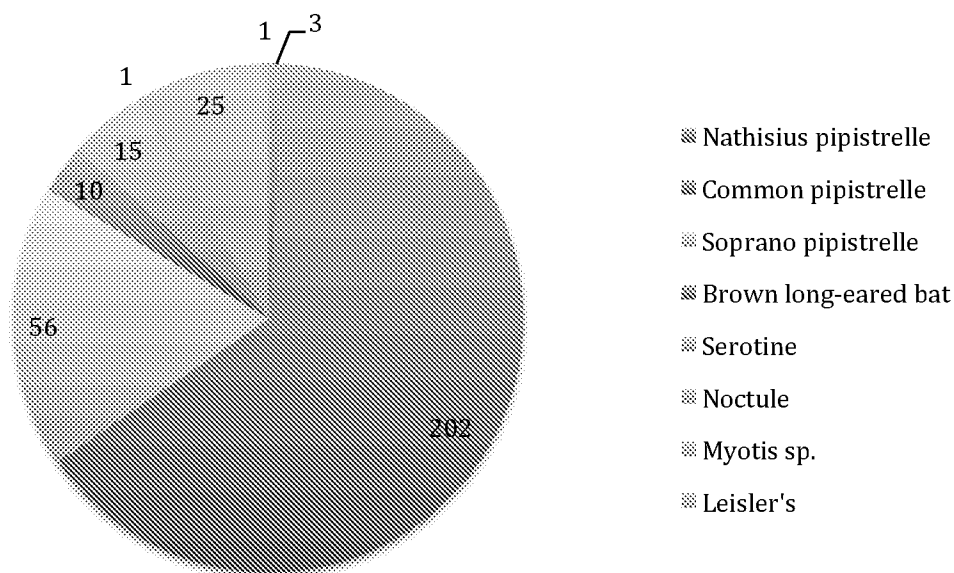


Figure 13: Graph displaying total number of passes for each species from the anabat express recording devices.

4.0 Discussion

Bat Species and Activity

4.1 During the bat transect activity surveys; low levels of activity were recorded throughout the site, with the majority of passes from common pipistrelles. The common pipistrelle is the most common and widespread species in the UK and these were observed commuting along the hedgerows and boundary features.

4.2 Only one other species was recorded on the activity transects, a single pass from a noctule along the central hedgerow, a species common across much of the country. Whilst the bat could not be observed due to low light at the time of recording, it was

believed to be commuting across the site although the direction could not be discerned.

4.3 These results are similar to those of the activity transects performed in the eastern fields in 2015, where a low number of common species were observed commuting across the site.

4.4 Remote recorders in the form of anabat Express bat detectors were deployed for a series of consecutive nights in May and July 2016. These give a good indicator of the level of use on site by bat species.

4.5 The anabat surveys displayed evidence of slightly greater use of the site by bats than the activity transects suggest. A greater diversity of species was recorded with the anabat surveys, as well as higher levels of activity than the activity transects. Although in general, the activity was consistently low across the recording nights. Additionally, much of the activity was spread over the duration of the nights, suggesting much of the activity recorded is from bats passing across the site rather than foraging extensively within the on-site habitat.

4.6 When considering the site, as whole, common pipistrelles were by far the dominant species, accounting for approximately 65% of total passes. The next most recorded species was the soprano pipistrelle, accounting for 18% of passes. Both species are widespread and common across much of the country. In general the activity was low, with the majority of the calls from all species spread across the duration of the night, suggesting the site is used as a commuting corridor as opposed to foraging habitat.

4.7 A low number of Nathusius pipistrelle passes were recorded, a rare species in the UK, although it is recognised this may be in part due to under recording. The majority of their diet consists of medium sized flying insects, including caddis flies and mayflies; they are also strongly associated with freshwater habitats, where prey species may be more abundant. In the context of this site, it is considered possible they utilise the

central hedgerow onsite as a commuting corridor to the fishing lakes located immediately offsite, where many of the invertebrate species they forage may be abundant.

- 4.8 A single pass from a leisler's bat was also recorded. Leisler's bat is a widespread but rare species of larger bat. Given the low number of passes it is considered the site is only used to commute across on an occasional basis. It should also be noted that recent research by Mathews et al. (2015) found Leisler's bats to be the only species to benefit from artificial lighting. This would suggest that additional lighting brought about by the proposals should not significantly impact the few individuals commuting across the site on an infrequent basis.
- 4.9 Much of the habitat to the west and south of the site consists of medium to high-density housing, generally considered as sub-optimal habitat for foraging bats. It is therefore considered likely that bats are commuting across the site across the site to the wooded area around the fishing lakes adjacent to the site boundary and possibly further afield to the small areas of woodland to the north of the site. This also fits in with the majority of the bats observed on the walked transects, most of which were travelling north across the site.
- 4.10 It is considered that level of activity on site is not unusual for a green field site and the species making most use of the site are considered to be largely the more common and widespread species present within the UK, with a small number of passes from rarer species. However, all UK bat species are strictly protected by European and UK legislation bats will need to be considered with regard to the design of the development.

Recommendations and Enhancements

- 4.11 It is recommended that as much of the habitat on site, mature trees and tree lines and hedgerows are retained as possible as part of the proposals.

4.12 The current proposals involve the planting of new hedgerows around the site boundaries. This will improve the connectivity of the site for bats and other wildlife, particularly in areas where either no linear habitat features currently exist or wooden fence lines are used that do not provide the same benefits to foraging and commuting bats that can be provided by a well-managed hedgerow.

4.13 Hedgerows provide rich opportunities for invertebrates that provide important food resources for bats. As such these should be managed sensitively to maintain and enhance their diversity. As different bat species forage in different ways, it is important to maintain structural diversity of the hedgerows on site to facilitate a diverse range of invertebrate prey. This can be achieved planting a diverse mix of woody species, a typical mix consists of 50% hawthorn, 25% blackthorn, 15% field maple and a number of shrubby species such as buckthorn and holly to fill remaining gaps.

4.14 Increasing the density of tall trees in hedgerows can also create structural diversity within the hedgerow; this can benefit species that prefer to forage in cluttered environments, such as Natterer's and brown long-eared bats, both of which were recorded on site. It is recommended a number of the follow native tree species are planted and left to mature in the hedgerows, these species are also suitable to plant as part of the proposed treelines:

- Oak (*Quercus robur*)
- Rowan (*Sorbus aucuparia*)
- Elder (*Sambucus nigra*)
- Goat willow (*Salix caprea*)
- Hazel (*Corylus avellana*)
- Hornbeam (*Carpinus betulus*)
- Common alder (*Alnus glutinosa*)

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- 4.15 Maintaining and enhancing hedgerows and tree lines, providing enhanced edge habitats associated with the features, and creating new links within the red line boundary, would be considered an appropriate strategy to ensure that bats would not be adversely effected by the proposals. Much of the habitat is species poor, grazed and provides limited opportunities for biodiversity. It is considered that the use of enhanced planting, swales, hedgerow creation and wildlife mixtures would enhance habitats for foraging bats, as well as other species.
- 4.16 As bat species are using the hedgerows and tree lines on site, it is recommended that a sensitive lighting scheme be conditioned as part of the permission. Lighting may affect bats in several different ways. As all bat species are nocturnal and tend to light sample prior to emerging from their roost, directing lighting onto a roost may disturb bats and cause them to desert the roost. Direct lighting onto any roosts that may be in close proximity may also disrupt bat emergence times and therefore shorten the time available to them for foraging. Artificial lighting may also disrupt the feeding behaviour of bats. There are two aspects to this. One is the attraction that light from certain types of lamps has to a range of insects; the other is the presence of lit conditions. Furthermore, artificial lighting is thought to increase the chances of bats being preyed upon.
- 4.17 It is therefore considered that light should be directed away from features, which may be used by bats, such as trees around the site, maintaining these and 'dark corridors'. Indeed The Bat Conservation Trust advises the following which should be considered as part of the proposals:
- The impact on bats can be minimised by the use of low-pressure sodium lamps or high-pressure sodium instead of mercury or metal halide lamps where glass glazing is preferred due to its uv filtration characteristics. Lighting should be directed to where it is needed and light spillage avoided.
 - This can be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only.

Planting can also be used as a barrier or manmade features that are required within the build can be positioned so as to form a barrier.

4.18 The majority of the trees on site were either immature or species such as blackthorn or hawthorn which feature dense scrubby growth, this limits potential locations for additional roost provision in the form of traditional bat boxes. It is therefore recommended that Schwegler 2FR Bat Tubes are included along with the construction of the new developments. The 2FR is suitable for bat species that inhabit buildings, such as pipistrelle species. They are unobtrusive and can fit flush into masonry of a wall during the construction phase. It is recommended that six of these be placed on the walls of houses close to the central hedge line, preferably on unlit south or west facing walls.

4.19 A sustainable urban drainage system (SUDs) is proposed for the northeast field. Open water bodies provide benefits to bats, attracting prey species such as midges, providing an opportunity to rehydrate and for some species such as Daubenton's bat, forming the key component of their foraging habitat. These benefits can be increased further by sensible placement, creation of water bodies close to hedgerows and trees are more accessible to foraging and commuting bats. In this instance, the proposed SUDs will be sited next to an existing hedgerow and a proposed treeline.

4.20 In order to maximise the benefits of the SUDs to bats and other wildlife, it is recommended the area in the local vicinity of the swale be managed in a way that encourages a diverse range of wildflower species. Planting with a mix of wildflower species can attract invertebrate prey, which in turn can attract bats and other insectivorous wildlife. A mix of the following native species is recommended to be planted around the edge of the SUDs:

- Flowering-rush (*Butomus umbellatus*)
- Gipsywort (*Lycopus europaeus*)
- Great water-dock (*Rumex hydrolapathum*)

-
- Hemp agrimony (*Eupatorium cannabinum*)
 - Lesser reedmace/lesser bulrush (*Typha angustifolia*)
 - Marsh woundwort (*Stachys palustris*)
 - Pendulous sedge (*Carex pendula*)
 - Purple loosestrife (*Lythrum salicaria*)
 - Rush (*Juncus spp.*)
 - Yellow iris (*Iris pseudacorus*)
 - Marsh marigold (*Caltha palustris*)
 - Water forget-me-not (*Myosotis scorpioides*)
 - Amphibious bistort (*Persicaria amphibia*)
 - Brooklime (*Veronica beccabunga*)

4.21 To promote a more diverse species rich sward in this area it is recommended that frequent mowing be used in the first year to speed up establishment. Following establishment, an annual cut should be performed, the timing of this cut will depend upon the choice of either a spring or summer flowering meadow. Cuttings should be removed after mowing, these can be used to form grass piles nears the SUDs that may be utilised by reptiles or amphibians.

4.22 Gardens and similar green spaces in developed areas can provide suitable foraging habitat for bats, in particular for pipistrelle species. It is recommended that post development gardens and amenity grasslands on site are planted with wildflower species. Of particular benefit to bats are night-flowering species that attract night-flying invertebrate prey. The following native species are considered suitable:

- Nottingham catchfly (*Silene nutans*)
- Night-flowering catchfly (*Silene noctiflora*)
- Bladder campion (*Silene vulgaris*)
- Soapwort (*Saponaria officinalis*)
- Wild marjoram (*Origanum vulgare*)
- Borage (*Borago officinalis*)

-
- Yarrow (*Achillea millefolium*)
 - Primrose (*Primula vulgaris*)
 - Corn marigold (*Glebionis segetum*)
 - Perforate St John's-wort (*Hypericum perforatum*)
 - Wood forget-me-not (*Myosotis sylvatica*)
 - Ox-eye daisy (*Leucanthemum vulgare*)
 - Corncockle (*Agrostemma githago*)
 - Cornflower (*Centaurea cyanus*)

5.0 Conclusions

- 5.1 Bat activity transects were performed in May, July and August 2016, the route used was designed to incorporate habitat features considered suitable for foraging and commuting bats. A very low number of common pipistrelles were recorded making infrequent use of the hedgerows and boundary features on site to commute north. In addition, a single noctule pass was recorded.
- 5.2 Remote recording devices were set up in two locations in the west and east fields, these devices recorded for at least five consecutive nights in both May and July. Again common pipistrelle was the most abundant species on site, along with a low number of soprano pipistrelles. A handful of nathusius pipistrelle, serotine, noctule, leislars, long eared bat and myotis passes were also recorded. These passes were considered to be low in frequency.
- 5.3 The results of the static surveys highlight the use of hedgerow features by bats. A low level of commuting bats also used the hedgerow to the north of the horse paddocks. It is recommended that these features be maintained and enhanced as part of the application and master planning.
- 5.4 The activity across the site is considered to be typical of a green field site, with a low level of activity across the night, the majority considered to be from individuals

commuting across the site to more suitable foraging areas immediately adjacent and further to the north.

- 5.5 It is recommended that the existing hedgerows on site be maintained and enhanced as part of the proposals to ensure bats can continue to utilise the site to opportunistically forage as well as commute to the nearby lakes. If sections are to be lost then new features should be created within the design of the site, associated with careful planning, seeking habitat connection between areas of habitat of high value for bats.
- 5.6 A sustainable urban drainage system is proposed for the northeast field, a number of recommendations for planting and subsequent management that may be of benefit to bats and other wildlife have been suggested in sections 4.19 – 4.21.
- 5.7 Considering the low levels of activity recorded across the site and provided the plans maintain and enhance the edge features where possible, it is considered that the favourable conservation status of bats in the local area are not affected by proposals.

6.0 References

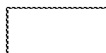
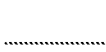
Mathews, Fiona, et al. (2015) "Barriers and benefits: implications of artificial night-lighting for the distribution of common bats in Britain and Ireland."

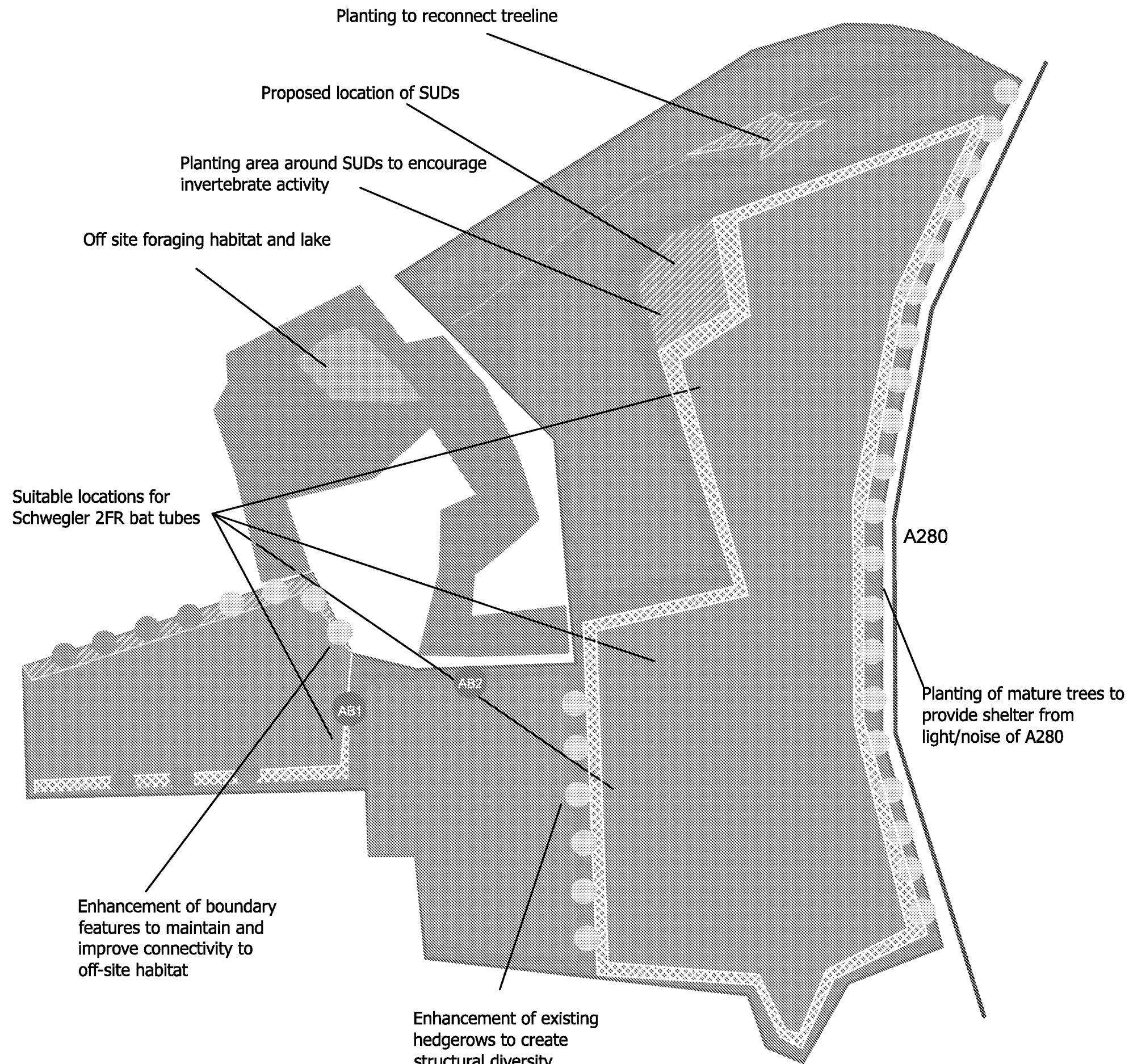
Mitchell-Jones, A.J. (2004) *Bat Mitigation Guidelines*. English Nature, Peterborough.

Bat Conservation Trust (2012). *Bat Surveys – Good Practice Guidelines Second Edition*. Bat Conservation Trust, London.

Appendix 1: Recommended Enhancements

Key

-  Semi-improved grassland/open space
-  Existing hedgerows and trees
-  Enhancement/planting areas
-  Lighting buffer zones
-  Water body
-  Survey boundary



Site: Water Lane, Angmering

Client: Rydon Homes

Surveyor: J.B

Survey Date: 19th August 2016

Drawing Title: Bat enhancement map

the
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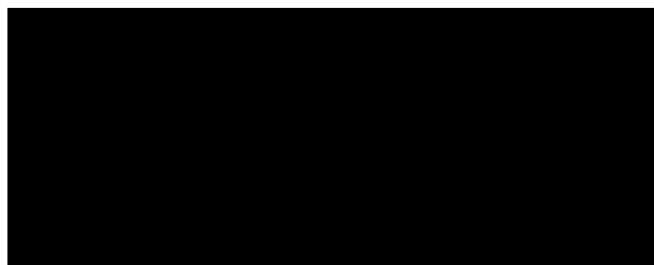
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