THE ENVIRONMENT PARTNERSHIP

HARRAS MOOR

CUMBRIA

BAT APPENDIX

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1.0 Introduction

1.1 TEP was commissioned by Homes England in September 2017 to undertake bat activity surveys at a site called Harras Moor in Cumbria. The bat activity surveys are required to inform future decisions regarding residential development.

1.2 The objectives of this report are to:

- Identify if bats are using habitats on site for commuting and foraging;
- Identify what bat species are present and what habitat features they are using;
- Advise of mitigation requirements that may be needed prior to development of the site; and
- Outline appropriate opportunities to provide biodiversity enhancement within site proposals.

Site Description

1.3 The site is an approximate 24.6ha parcel of land located adjacent to Harras Road, Whitehaven to the east (Grid reference NX 98729 18070). The land in bounded by the A595 to the west and residential developments to the north and south.

1.4 The site consists of a large, open, semi-improved grassland fields used for grazing. A number of these fields are currently unmanaged and overgrown. There are smaller areas of marshy grassland within these fields. A small area of woodland is located in the west of site, adjacent to the southwest development boundary. Scattered scrub and trees, stone walls and hedgerows are present throughout the development site in the form of field boundaries.

1.5 Beyond the site, the wider landscape includes arable farmland, residential developments and the west coast 1.6km west. The site context is shown in Figure 1 below and is identified by the solid redline boundary.

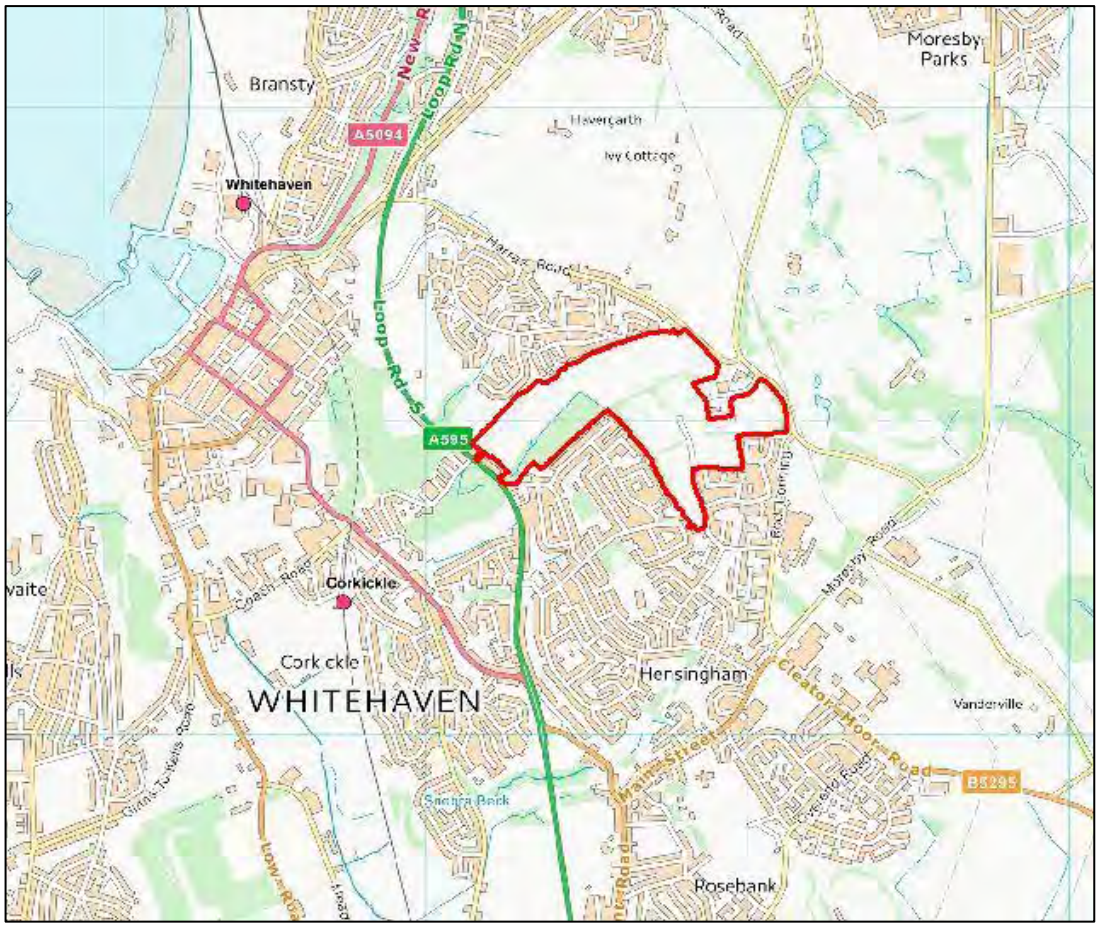


Figure 1: Site Location within Wider Landscape

(Contains Ordnance Survey data © Crown copyright and database right 2016.)

2.0 Methods

Transect Surveys

2.1 The site was covered by one transect route (Drawing G5810.66.004). The transect route was devised to cover the whole working area, incorporating a variety of habitats suitable for bat foraging, commuting and dispersal.

2.2 A pair of surveyors walked the route using heterodyne (Pettersson D230) and frequency division (Anabat) detectors. The surveys commenced before sunset and continued for at least 120 minutes after sunset. Number of bat passes, species, and behaviour and flight direction were noted at each pre-determined four-minute stop and the intervening walks.

2.3 Standardised methods of measuring and recording weather parameters were used e.g. cloud cover (oktas) and wind (Beaufort scale). Survey details for each visit is given in table 1 below:

Table 1: Transect survey details

Date	Visit	Sunset	Start time	End time	Temp ^{0}C	Rain	Cloud	Wind
18/06/2018	1	21:53	21:30	00:25	14	0	8	3
16/07/2018	2	21:40	21:30	23:50	12	0	7	2
13/08/2018	3	20:50	20:30	23:17	13	0	3	2

Static Monitoring

2.4 The static detector locations are shown in Drawing G5810.66.004. These locations were chosen as the features monitored (e.g. woodland edge and hedgerow) are considered valuable foraging/commuting habitat for bats and are likely to be impacted by the proposals.

2.5 The statics were left for a minimum of five nights during favourable weather conditions to monitor bat activity in accordance with the Bat Conservation Trust (BCT) Guidance (Collins, 2016[1]). Weather conditions and details of the static deployment are summarised in Table 2.

Table 2: Static monitoring details

Date	Visit	Comments	Rain
18/06/2018-25/06/2018	1	Weather conditions were good. Lots of bat activity was recorded despite the light rain, therefore is not considered to be a significant constraint.	Light rain
16/07/2018-24/07/2018	2	Weather conditions were good. Lots of bat activity was recorded despite the light rain, therefore is not considered to be a significant constraint.	Light rain

[1] Collins, J. (ed.) (2016) Bat surveys for professional ecologists: Good Practice Guidelines (3rd edn). Bat Conservation Trust.

Date	Visit	Comments	Rain
13/08/2018-19/08/2018	3	Weather conditions were good. Lots of bat activity was recorded despite the light rain, therefore is not considered to be a significant constraint.	Light rain

Sonogram Analysis

2.6 Recorded sonograms were analysed using Analook W4.2.4 software by Stephanie Davies.

2.7 For transect data, bat calls were manually verified. Calls were geo-referenced, automatically where possible, and digitally mapped using GIS. Each species is colour coded and flight direction is provided where this was observed.

2.8 The static monitoring data was scanned using an automated *Pipistrellus sp.* filter (developed by TEP) and all non-pipistrellus calls then manually verified. Data is presented as an activity index of average bat passes per night (total number of passes divided by the number of nights monitored).

Limitations

2.9 Brown long-eared bats *Plecotus auritus* were recorded during the surveys. This species can be relatively difficult to detect due to the low amplitude (i.e. quiet) calls. The activity of this species may therefore be underestimated. The conclusions and interpretation in this report takes this into consideration.

2.10 Bats vary their calls dependent on the habitats they fly in and on their activity (commuting, foraging, social interaction, etc). It is not always possible to identify bat calls to species level owing to the overlap of call parameters between some species and/or poor quality recordings (e.g. brief and distant passes). In these cases, it is accepted that species are identified to genus level or group level (e.g. Myotis, Myotis/Plecotus and Nyctalus/Eptesicus) (Russ, 1999). Where call parameters are inconclusive the species has been labelled as 'unknown'. This ensures the dataset is interpreted accurately and transparently.

2.11 During the June transect survey (visit 1) no recordings were made and GPS was disabled due to equipment error. As such, bat activity during this visit was digitally mapped based on surveyor observations only. However, as transect surveys were successful in visits 2 and 3 and the June (visit 1) static monitoring was successful, it is considered that overall species assemblages and activity onsite has been identified effectively despite this limitation.

2.12 During the static monitoring surveys there was some light rain. Despite this, the species assemblage recorded during static monitoring was greater than that recorded during the transect surveys, which were unconstrained by weather conditions. As such, it is considered that overall species assemblages and activity onsite has been identified effectively despite this limitation.

2.13 Transect surveys commenced prior to sunset, however this did not affect the findings of the survey in terms of species assemblage and determining foraging and commuting habitats used by bats across the site.

3.0 Results

Transect Surveys

3.1 The activity transects revealed at least three confirmed species of bat across the site;

- Common pipistrelle *Pipistrellus pipistrellus*;
- Soprano pipistrelle *Pipistrellus pygmaeus*;
- Brown long-eared bat *Plecotus auritus;*
- Unidentified Pipistrelle species.

3.2 Common pipistrelle activity was distributed across the site and recorded during every survey visit. Common pipistrelle were most commonly recorded using woodland edge (stop 4, 5, 6 and 7; walks 5, 6, 7 and 8) for commuting and foraging.

3.3 Soprano pipistrelle activity was distributed across the site and was recorded during every survey. Soprano pipistrelle activity was concentrated around woodland edge (stope 4, 5, 6 and 11) for commuting and foraging.

3.4 Brown long-eared was recorded in August (visit 3) only. Overall brown long-eared activity was low and was recorded using woodland edge for commuting and foraging (walk 12 and stop 7).

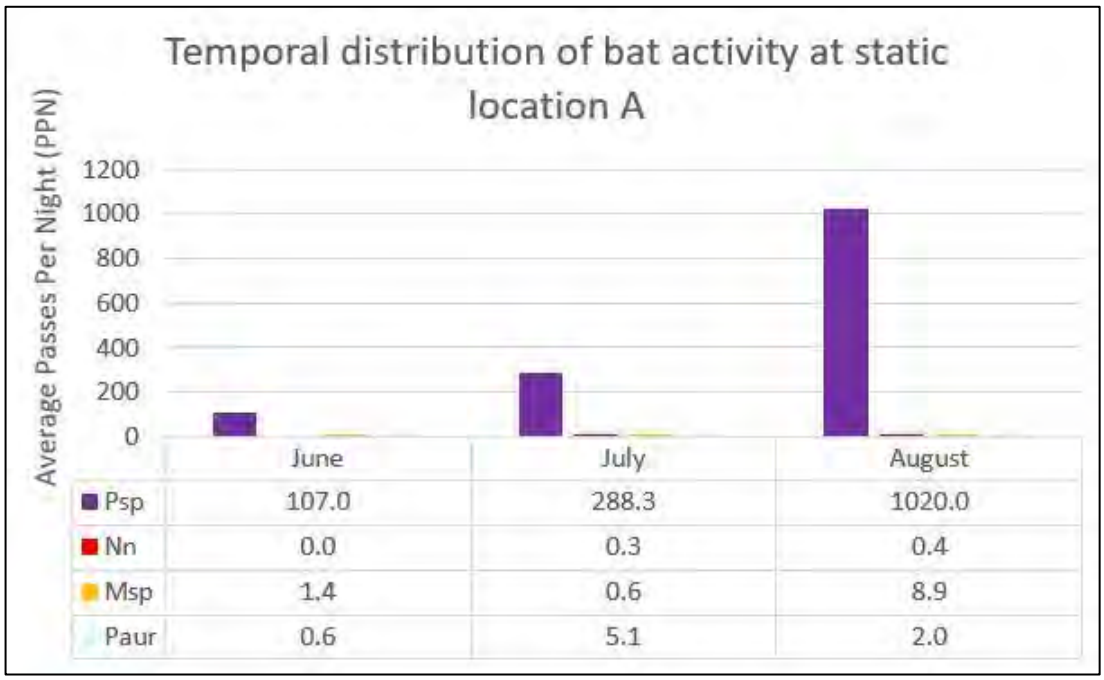
Static Monitoring

3.5 Pipistrelle species were the most predominantly recorded bats at all static locations during every month; sonograms that could be confidently identified to species level comprised common pipistrelle and soprano pipistrelle. Pipistrelle activity was greatest at location C in June (377.6ppn) and July (642.4ppn). In August, pipistrelle activity was greatest at location A (1020ppn).

3.6 Generally, noctule activity was low. Noctule activity was the greatest at static location B (19.1ppn) in June. Similarly Myotis and brown long-eared bat activity was low over each monitoring period. Myotis activity was greatest at static location C in August (9.9ppn). Brown long-eared bat activity was greatest at static location A in July (5.1ppn).

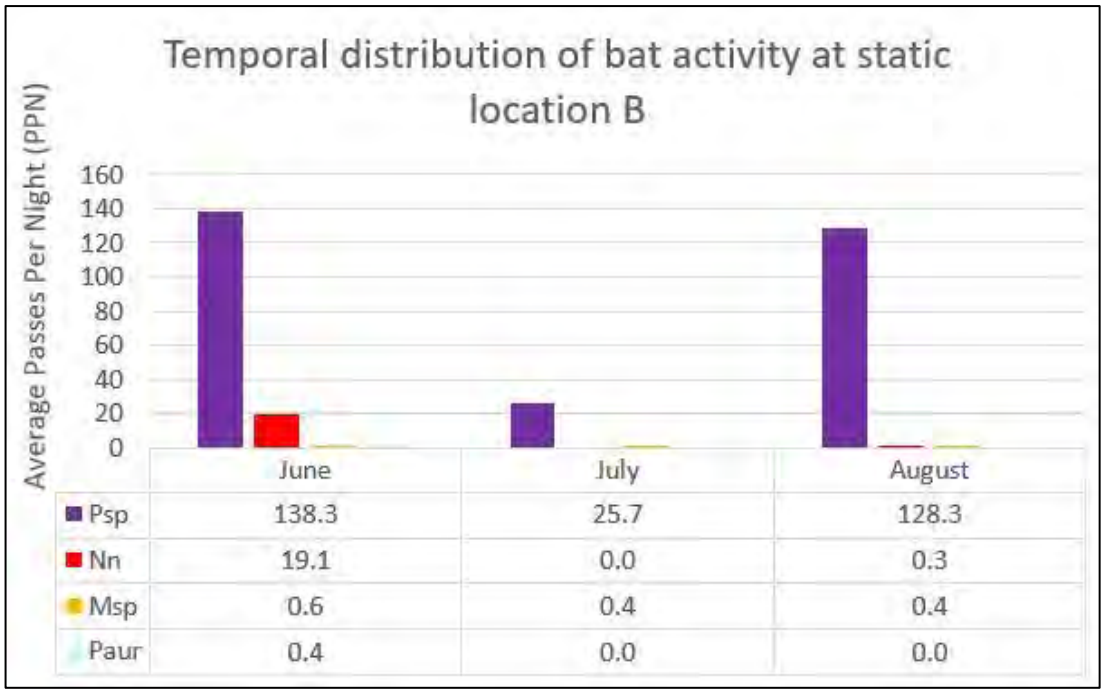
3.7 Figures 2-4 summarise the temporal distribution of bat activity recorded during the static deployment. Figures 5-7 summarise the spatial distribution of bat activity during the static deployment in each month.

Temporal Distribution



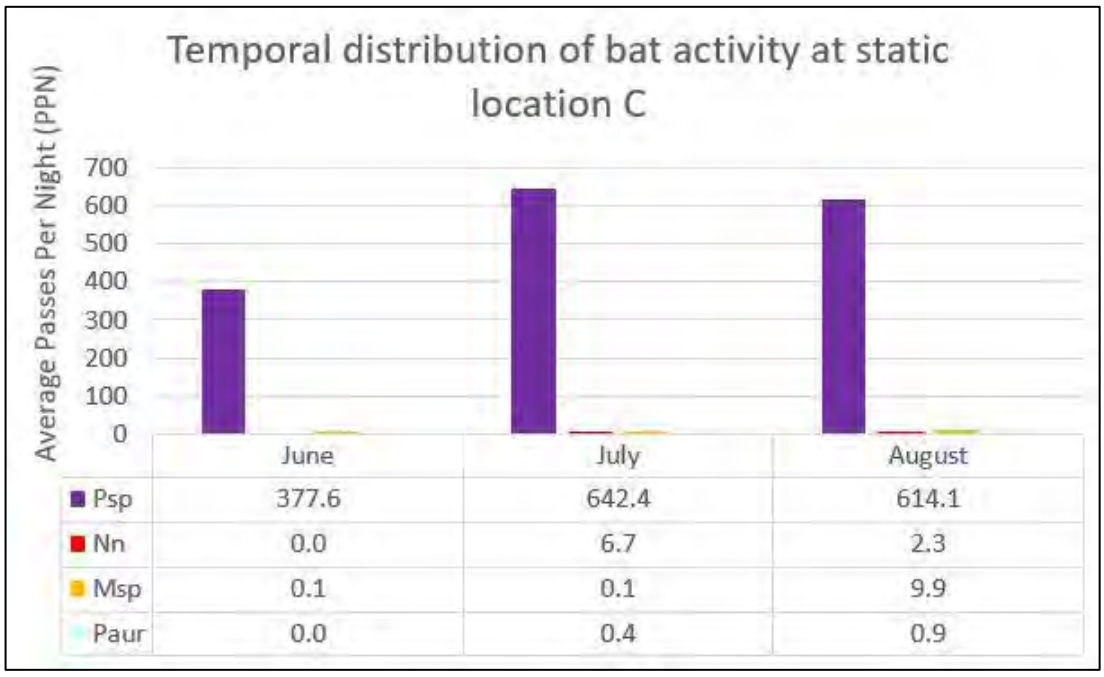
	June	July	August
Psp	107.0	288.3	1020.0
Nn	0.0	0.3	0.4
Msp	1.4	0.6	8.9
Paur	0.6	5.1	2.0

Figure 2: Average bat activity at static location A over time



	June	July	August
Psp	138.3	25.7	128.3
Nn	19.1	0.0	0.3
Msp	0.6	0.4	0.4
Paur	0.4	0.0	0.0

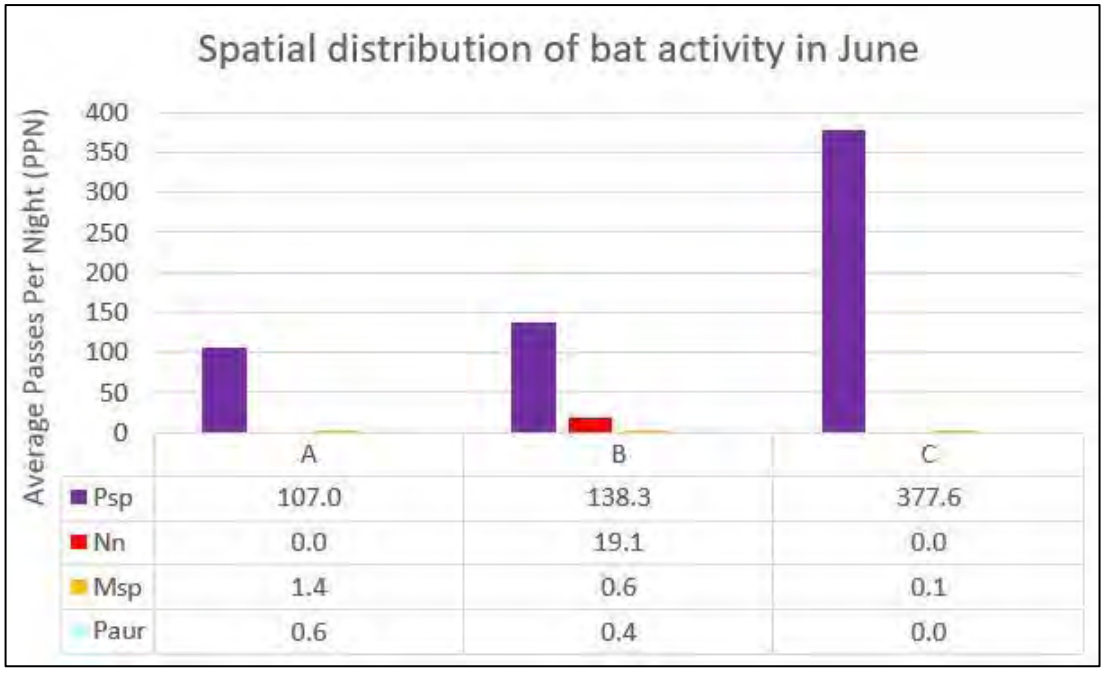
Figure 3: Average bat activity at static location B over time



	June	July	August
Psp	377.6	642.4	614.1
Nn	0.0	6.7	2.3
Msp	0.1	0.1	9.9
Paur	0.0	0.4	0.9

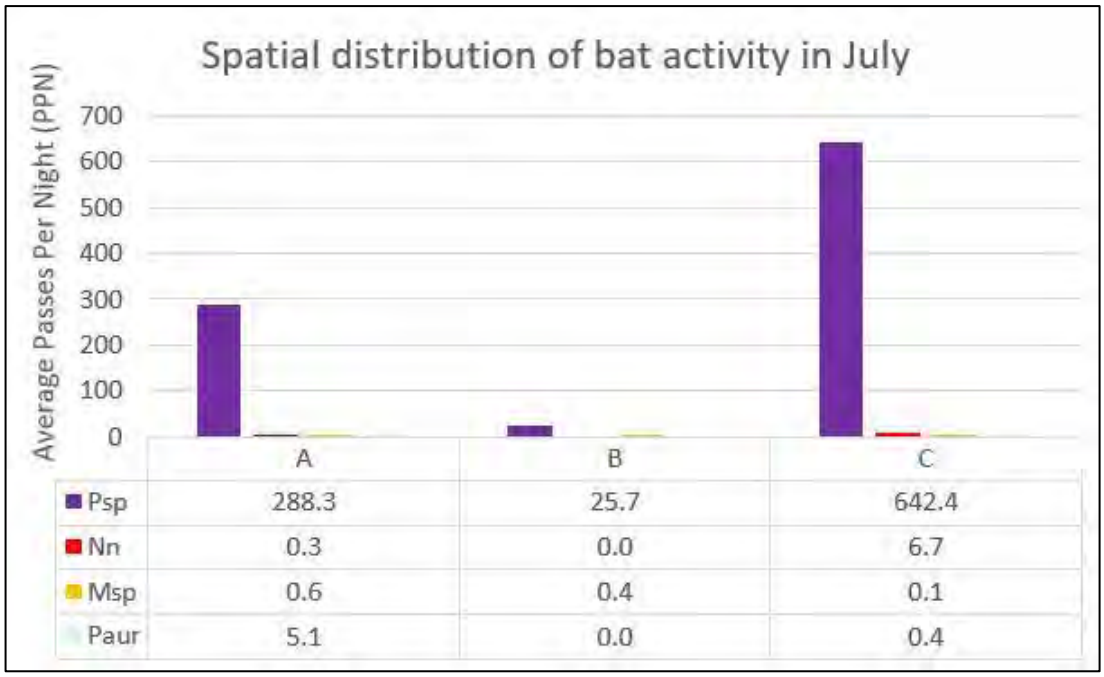
Figure 4: Average bat activity at static location C over time

Spatial Distribution



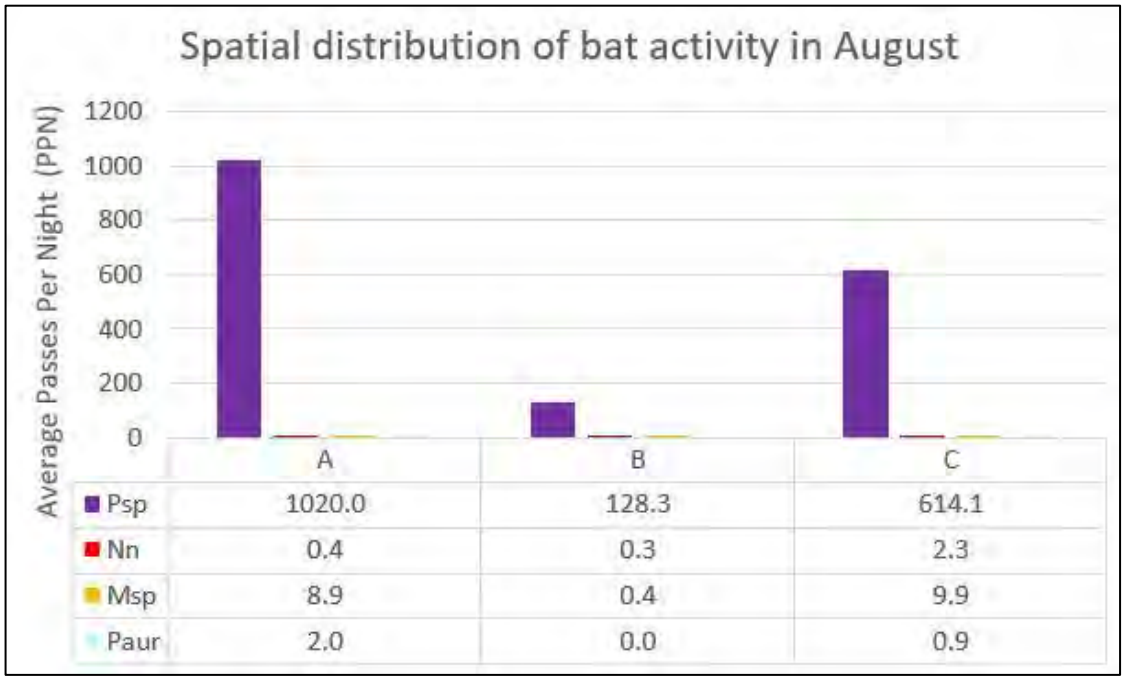
	A	B	C
Psp	107.0	138.3	377.6
Nn	0.0	19.1	0.0
Msp	1.4	0.6	0.1
Paur	0.6	0.4	0.0

Figure 5: Average bat activity at all static locations in June



	A	B	C
Psp	288.3	25.7	642.4
Nn	0.3	0.0	6.7
Msp	0.6	0.4	0.1
Paur	5.1	0.0	0.4

Figure 6: Average bat activity at all static locations in July



	A	B	C
Psp	1020.0	128.3	614.1
Nn	0.4	0.3	2.3
Msp	8.9	0.4	9.9
Paur	2.0	0.0	0.9

Figure 7: Average bat activity at all static locations in August

4.0 Evaluation

4.1 Applying Wray *et. al*. (2010)[2], the site is valued as of county importance for pipistrelle species and local importance for noctule, brown long-eared and Myotis species. Table 3 summarises the evaluation of the site for each species recorded.

Table 3: Species rarity in England

Species	Number of bats	Roosts/ potential for roost suitability	Linear features		Foraging habitat	
			Character	Score	Character	Score
Pipistrelle species (2)	Large number of bats (20)	Unknown (4)	Well-grown and well-connected linear features, small field sizes (4)	30	Isolated woodland patches, less intensive, small towns & villages (3)	29
Noctule (5)	Individual bats (5)	Unknown (4)	Well-grown and well-connected linear features, small field sizes (4)	18	Isolated woodland patches, less intensive, small towns & villages (3)	17
Myotis species (5)	Individual bats (5)	Unknown (4)	Well-grown and well-connected linear features, small field sizes (4)	18	Isolated woodland patches, less intensive, small towns & villages (3)	17
Brown long-eared (2)	Individual bats (5)	Unknown (4)	Well-grown and well-connected linear features, small field sizes (4)	15	Isolated woodland patches, less intensive, small towns & villages (3)	14

4.2 It should be noted that, where available historic desktop data has been used, and a precautious approach has been applied in respect to numbers of bats and potential for roosts nearby.

[2] Wray, S., Wells, D., Long, E. and Mitchell-Jones, T. (2011). Valuing bats in ecological impact assessment. In practice. pg. 23-27.

4.3 Overall, considering the site location, small assemblage and the wider landscape, the site is considered to be of local value to bats.

5.0 Recommendations

5.1 This sections concludes the assessment of potential impacts on bats and recommends appropriate mitigation thereof.

Bats

5.2 Species diversity is predominantly consists of Pipistrelle species (common and soprano pipistrelle) with noctule bat, brown long-eared bat and Myotis species. The habitats of commuting and foraging value, supporting moderate numbers of bat passes, are primarily associated with woodland edge.

5.3 The majority of the woodland on site will be retained in the current development proposals (Drawing no: A090070-410 004). An unlit buffer should be maintained, where possible, between the proposed development and retained woodland for it to continue to provide commuting and foraging opportunities for bats. Where an unlit buffer cannot be maintained a sensitive lighting strategy should be adopted to reduce light spill on to tree canopies.

5.4 To compensate for the small loss of woodland, replacement planting of native trees will be provided within the scheme. Provision of newly created grassland habitat, including planting wildflower seeds, will encourage insect assemblage and abundance and create eco-passages for foraging bats.

5.5 Brown long-eared bat and Myotis species are present on site. These are generally woodland specialist species and known to be highly light sensitive. Indirect impacts on bats are possible as a result of light pollution of the woodland and will need to be minimised through sensitive design of the lighting scheme. The following should be considered when choosing luminaires:

Use of unnecessary lighting will be avoided.

- Spatial spread of lighting – Column heights should be carefully considered to minimise light spill. Only luminaires with an upward light ratio of 0% and with good optical control should be used. Luminaires should always be mounted on the horizontal, i.e. no upward tilt. As a last resort, accessories such as baffles, cowls or louvres can be used to reduce light spill and direct it only to where it is needed. The use of specialist bollard or low-level downward directional luminaires to retain darkness above can be considered. Internal luminaires can be recessed where installed in proximity to windows to reduce glare and light spill.
- Timing and duration of lighting – timers and bespoke dimming regimes may be used to ensure that luminaires are reduced to 1-5 lux at times of predicted low use. Any external security lighting should be set on motion-sensors and short (1min) timers. These can also be set to change with the seasons and therefore reflect the shifting time of dusk and dawn throughout the year. Motion sensors provide further control to ensure that areas are illuminated only when required.
- Intensity and colour of lighting – light intensity will be as low as possible whilst meeting the objectives of the intended function. All luminaires should lack UV elements when manufactured LED luminaires should be used

where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability. A warm white spectrum (ideally <2700Kelvin) should be adopted to reduce blue light component. Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.

Habitat Enhancements

5.6 Bat boxes should be installed on mature trees that are retained on site (Schwegler 2F Bat Box or similar) to provide roosting opportunities for bats.

DRAWINGS

G5810.66.004 Bat Activity Transect and Static Detector Locations

G5810.66.007 Bat Activity Transect Visit 1 18.06.2018

G5810.66.005 Bat Activity Transect Visit 2 16.07.2018

G5810.66.006 Bat Activity Transect Visit 3 13.08.2018

298500 299000

518000 518000

517500 517500

Harras Road

Caldbeck Road

W1 W2 W3 W4 W5 W6 W7 W8 W9 W10 W11 W12 W13 W14

SA SB SC

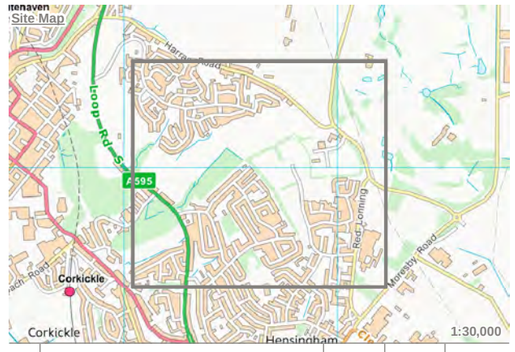
1 2 3 4 5 6 7 8 9 10 11 12 13

Metres
0 50 100 200

KEY

- Site boundary
- Static detector location
- 1 Survey stop
- W1 Transect route

Site Map



Rev	Description	Drawn	Approved	Date

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Project
Harras Moor, Ecology

Title
Bat Activity Transect and Static Detector Locations

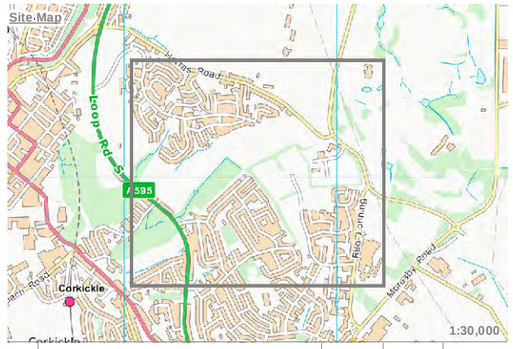
Drawing Number
G5810.66.004

Drawn	Checked	Approved	Scale	Date
RE	MK	SD	1:4,000 @ A3	05/10/2018

KEY

- Site boundary
- Soprano pipistrelle
- Common pipistrelle
- Pipistrelle species
- Bat flightline (colour denotes bat species)

Site Map



Rev	Description	Drawn	Approved	Date

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Project
Harras Moor, Ecology

Title
Bat Activity Transect
Visit 1 - 18th June 2018

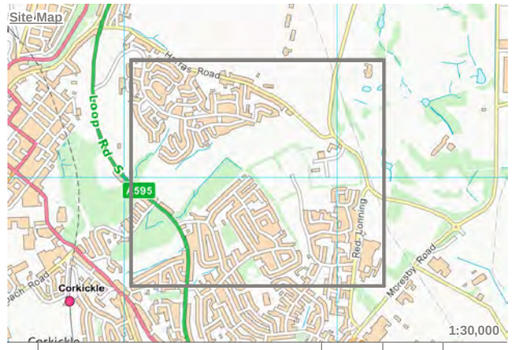
Drawing Number
G5810.66.007

Drawn	Checked	Approved	Scale	Date
MK	PA	SD	1:4,000 @ A3	29/10/2018

KEY

- Site boundary
- Soprano pipistrelle
- Common pipistrelle
- Pipistrelle species
- Bat flightline (colour denotes bat species)

Site Map



Rev	Description	Drawn	Approved	Date

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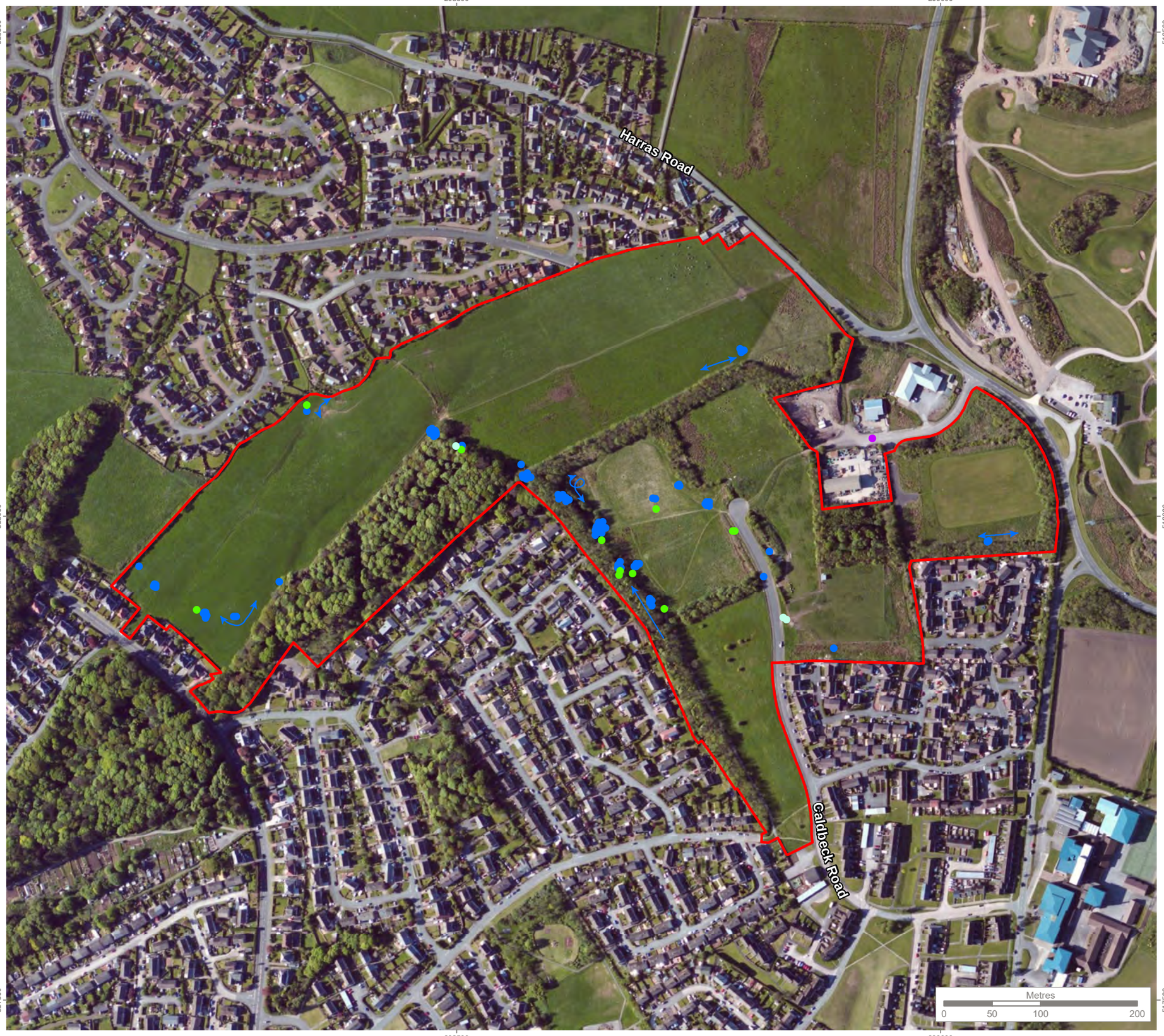
Project
Harras Moor, Ecology

Title
Bat Activity Transect
Visit 2 - 16th July 2018

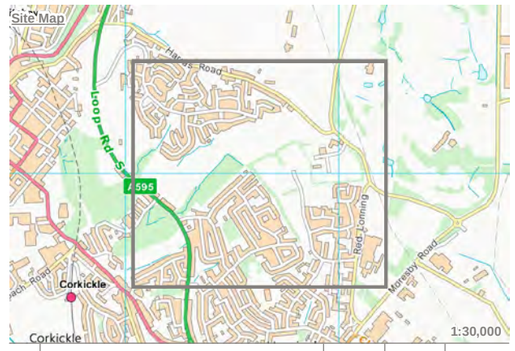
Drawing Number
G5810.66.005

Drawn	Checked	Approved	Scale	Date
CR	MK	SD	1:4,000 @ A3	16/10/2018



KEY

- Site boundary
- Brown long-eared
- Soprano pipistrelle
- Common pipistrelle
- Pipistrelle species
- Bat flightline (colour denotes bat species)



Rev	Description	Drawn	Approved	Date

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Project
Harras Moor, Ecology

Title
Bat Activity Transect
Visit 3 - 13th August 2018

Drawing Number
G5810.66.006

Drawn	Checked	Approved	Scale	Date
CR	MK	SD	1:4,000 @ A3	16/10/2018

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