Elton Reservoir, Bury

GM Allocation 7

BAT ACTIVITY SURVEYS AND ASSESSMENT

March 2019

[ERAP (Consultant Ecologists) Ltd ref: 2017-001e]

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Repetition 2	21st August 2017	AP, MP, CS & Charlotte Harrison (CH)
Repetition 3	6th September 2017	Jordan Prendergast (JP), Darren Graham (DG), CS & Rebecca Whitmore (RW)
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Reporting	**Personnel**	**Date**
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1.0 INTRODUCTION

1.1 Rationale

1.1.1 As part of the on-going ecological assessment of the Elton Reservoir (hereafter referred to as the 'site'), ERAP (Consultant Ecologists) Ltd was commissioned by Peel Holdings (Land and Property) Ltd. to carry out activity surveys for bats. The Ordnance Survey (OS) grid reference at the centre of the site is SD 786 089.

1.1.2 The surveys were requested in connection with proposals to promote the site for development within the Greater Manchester Spatial Framework (GMSF) and progress to a planning application.

1.2 Survey Objectives

1.2.1 The objective of the survey and assessment was to determine the ecological baseline at the Elton Reservoir area and inform the iterative process of the preparation of the Sketch Masterplan.

1.2.2 The aims were to:

a. Carry out an appropriate scope of bat activity survey to determine the diversity of bat species using the relevant areas of the site / survey area and determine, where possible, any temporal or spatial patterns of behaviour which can be identified from the data;

b. Provide guidance in accordance with wildlife legislation, the *National Planning Policy Framework* (Ministry of Housing, Communities and Local Government, February 2019), the *Bat Workers' Manual* (Mitchell-Jones & Mcleish, 2004) and with reference to the *Bat Mitigation Guidelines* (Mitchell-Jones, 2004), the *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)* (Collins, J. (ed), 2016) publication and best practice in relation to the masterplanning process and development proposals; and

c. Identify the scope of any further actions, if necessary, that may be required prior to the preparation of a planning application.

1.2.3 At the time of completion of the surveys no buildings or other man-made structures lie within the scope of the surveys and the extent of removal of any trees is not known.

1.2.4 The following surveys are likely to be required to form part of a future and more detailed assessment of the impacts of the proposals and progress a planning application:

a. Licensed daylight bat survey and assessment of any buildings, structures, trees, bridges and culverts likely to be affected by the proposals;

b. Dusk emergence and dawn re-entry surveys for bat activity;

c. Bat activity transects at specific areas of the site (once the proposals are confirmed).

2.0 METHOD OF SURVEY

2.1 Assessment of Habitats and Survey Rationale

2.1.1 The large (approximately 248 hectares) site is located to the south-east of Bury and is characterised by fields of improved and poor semi-improved grassland, semi-improved grassland and areas of marshy grassland and amenity grassland, Elton Reservoir and Withins Reservoir, tree lines, a section of the

Manchester, Bolton and Bury Canal (disused), field boundary hedgerows, broad-leaved tree lines and scattered clusters of ponds.

2.1.2 The scope of survey carried out has not sought to survey the entire site, but has been informed by the results of the desktop study and data search (ERAP (Consultant Ecologists) Ltd, March 2019), the Phase 1 Habitat Survey (ERAP (Consultant Ecologists) Ltd, March 2019) and consultation comments provided by the Greater Manchester Ecology Unit (GMEU).

2.1.3 The survey area has concentrated on areas at which development (including road networks) is considered *and* where the habitats are assessed to be of moderate or high suitability for use by foraging and commuting bats (as advised by Table 4.1 and paragraph 8.2.4.1 of the *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)* (Collins, J. (ed), 2016). The transect routes have primarily focussed on the proposed route of the access road through the site and the habitats either side.

2.1.4 Surveys have been conducted with reference to *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)* (Collins, J. (ed), 2016), (hereafter referred to as the 'Guidelines'). However the level of survey effort[1] recommended in the Guidelines has not been considered necessary at this early stage; this study will be used to inform further, targeted studies, if needed, once development proposals have been further considered.

2.1.5 As detailed in this assessment, it is concluded that the site supports areas of low quality habitat, with further areas of habitat of moderate suitability for use by bats. As such, the level of survey effort completed at the site has been considered appropriate to the habitats present and is considered sufficient to complete the aims of the survey.

2.2 Transect Surveys

2.2.1 Four transect surveys have been conducted at the site in August and September 2017. Two transect routes were walked on each survey occasion. This time of year was considered appropriate to detect the maximum number of bats at the site as the juvenile bats, typically born in June, are flying.

2.2.2 Two transect routes, as shown on **Figure 6.1**, were plotted to meet the requirements of paragraph 2.1.3 and surveyor access and safety. Transect Route 1 is approximately 1700 metres long and Transect Route 2 is 2500 metres long.

2.2.3 The walked transect surveys were conducted from just after sunset until 2 to 2.5 hours after sunset. All bat activity was recorded throughout the transect surveys by Anabat Express units. Surveyors noted areas of frequent or high levels of bat activity during the walked transects.

2.2.4 Five point counts were conducted at each transect route (labelled A, B, C, D and E). Point count locations were roughly equidistant from each other, and located within a variety of habitats along the transect routes.

2.2.5 During the point counts, all bat activity was recorded over five minute intervals. A measure of bat activity at each location was taken via counting the number of bat passes by each species detected. In order to ensure consistency of recording, a bat 'pass' has been defined as any bat activity detected within each ten second interval of the five minute spot count.

[1] i.e. between one and two survey visits per month (April to October) in appropriate weather conditions, with at least one survey comprising a dusk and pre-dawn survey within a 24 hour period, and between two and three static detectors at each transect for each month between April and October).

2.2.6 The total number of bat passes which could therefore be recorded during one point count location is 30[2]. Heterodyne detectors and recording detectors (Anabat Express units) were used to detect bats and identify to species (where possible). The dates, times, weather conditions and personnel of each transect survey are presented below.

Table 2.1: Transect Survey Dates, Weather Conditions and Surveyors

Date	3rd August 2017	21st August 2017	6th September 2017	21st September 2017
Sunset	21:05	20:25	19:45	19:10
Start Time	21:10	20:30	20:00	19:15
End Time	23:40	23:00	22:20	21:30
Weather	Gentle breeze (Beaufort Scale (BFS) 2), dry, 16°C	Calm (BFS 0), dry, 15°C	Gentle breeze (BFS 2), dry, 15°C	Light air (BFS 1), dry, 11°C
Transect Number	**Surveyor Information[1]**	**Surveyor Information[1]**	**Surveyor Information[1]**	**Surveyor Information[1]**
1	Marie Pickering & Aiden Pickering Batbox Duets	Marie Pickering & Chris Schofield Batbox Duets	Jordan Prendergast & Darren Graham Elekon Batscanners	Jordan Prendergast & Darren Graham Elekon Batscanners
2	Amy Sharples & Chris Schofield Batbox Duets	Chris Schofield & Charlotte Harrison Anabat Walkabout	Chris Schofield & Rebecca Whitmore Batbox Duets	Chris Schofield Batbox Duets
[1]Anabat Express detectors also were used at each transect on each transect repetition				

2.2.7 The transect survey data have been used to determine species distribution across the two transects, and levels of bat activity across different habitats over the two transects.

Static Detector Surveys

2.2.8 Anabat Express detectors were deployed at four locations to detect bat activity remotely for five nights in August, September and October 2017. The locations of the four remote detectors are annotated at **Figure 6.1**. The OS grid references for each detector location are as follows:

a. Location A: SD 78106 09250;

b. Location B: SD 78611 09081;

c. Location C: SD 78676 08692; and

d. Location D: SD 79064 08829

2.2.9 The Anabat Express units were placed at distinct points to provide coverage of a range of habitats within the site.

2.2.10 Four repetitions, each of five days, were completed between August and October on the following dates:

a. Repetition 1: 28th July to 2nd August 2017;

b. Repetition 2: 9th August to 14th August 2017;

c. Repetition 3: 1st September to 6th September 2017; and

d. Repetition 4: 5th October to 10th October 2017.

[2] 5 minutes = 300 seconds.
300 seconds ÷ 10 second intervals = 30.
30 is the maximum number of bat passes which can be recorded at any spot count location during that spot count repetition.

2.2.11 The survey was conducted across important timings within the annual cycle of bat activity, including the maternity season (i.e. mid-June to mid-August) and the period in which bats are mating, storing fat for winter and Autumn swarming occurs.

2.2.12 The aims of the survey were to:

a. Determine the diversity of bat species which use the surveyed areas of the site and its surroundings; and

b. Determine the frequency of that usage (i.e. each night, occasional usage, very occasional usage)[3].

2.2.13 The data collected by the Anabat Express units have been analysed as follows:

a. Determining presence: i.e. to collate a bat species list for the survey area. Recorded bat calls were identified to species level (where possible) to determine the range of species at the four locations;

b. Measuring presence to give an activity index: bat call data was used to give an indication of the relative level of species presence at the four locations; and

c. Determining when calls occurred in relation to sunrise and sunset. Activity close to sunrise or sunset could indicate a roost is nearby, where-as less activity close to sunrise or sunset could indicate the site is used for foraging, but any roosts are likely to be further from the site.

2.2.14 In order to achieve point 'b', above, the frequency of Anabat recordings was counted by night, and the total amount of activity detected between the four locations compared.

2.2.15 In order to achieve point 'c', above, the number of Anabat recordings detected within set time periods either side of sunset and sunrise were found. A different time period has been used for different species to accommodate the behavioural characteristics of individual species. Species known to (typically) emerge earlier in the evening (and return to roosts closer to sunrise) include pipistrelle species and noctule bats. Species known to (typically) emerge later in the evening include *Myotis* species and brown long-eared bat. For this study, an analysis period of 20 minutes before and after sunrise and sunset (total time period 40 minutes) was used for pipistrelle species and noctules. A period of 40 minutes before and after sunrise and sunset (total time period 80 minutes) was used for *Myotis* species and brown long-eared bats.

Analysis of Anabat Data (Both Transect and Static Surveys)

2.2.16 Anabat files have been initially analysed using species-specific filters for common and soprano pipistrelle (*Pipistrellus pipistrellus* and *P. pygmaeus*), noctule (*Nyctalus noctula*), *Myotis* species and brown long-eared bat (*Plecotus auritus*). The files have subsequently been checked individually to ensure the accuracy of the analysis and to locate and determine any calls of rarer or unusual species, such as Nathusius' pipistrelle.

2.2.17 The analysis has been informed by ERAP (Consultant Ecologists) Ltd's knowledge of the area, the results of the desktop study which includes data provided by South Lancashire Bat Group (SLBG) and the known distribution of bat species within the UK, as well as the limitations of identifying bats to species from their recorded echolocation calls.

[3] In accordance with *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)* (Collins, J. (ed), 2016), *'it is important to acknowledge that a bat pass or bat pulse is a measure of activity rather than a measure of the number of individuals in a population*' and *'bat activity indices can be more accurately described as indices of the amount of use bats make of an area, and should be used to quantify bat activity, not abundance.*

2.2.18 Noctule, Leisler's (*Nyctalus leisleri*) and serotine all emit similar echolocation calls, however only noctule are of known occurrence in the Bury area; therefore all bat calls resembling a noctule, Leisler's or serotine call have been assumed to be noctule bats.

2.2.19 *Myotis* species known to be present in the local area comprise whiskered and Brandt's bats (*Myotis mystacinus* and *M. brandtii*), Daubenton's bat (*Myotis daubentonii*) and Natterer's bat (*Myotis nattereri*). Identification of *Myotis* bats to species level is not typically possible from echolocation calls, and it has been considered more accurate to term all calls which match the typical sonogram of a *Myotis* bat 'Myotis species'.

2.2.20 Two species of long-eared bat are native to the UK, namely the brown long-eared (*Plecotus auritus*) and grey long-eared bat (*Plecotus austriacus*). Both species have similar echolocation calls, however the grey long-eared bat is '*primarily confined to the extreme south of the British Isles, from Sussex to Devon, including Somerset, the Isle of Wight and the Channel Islands. Recently, a grey long-eared bat roost was found in Pembrokeshire, indicating that the species may be also present in south-west Wales*' (Bat Conservation Trust, 2012); the site is sufficiently distant from the known range of the grey long-eared bat that all calls resembling long-eared bats have been considered to be those of the brown long-eared bat.

2.3 Survey Limitations

2.3.1 As detailed at **Section 2.1** above, the scope of the survey has been to provide an initial study from which further, more detailed surveys can be completed if required. The surveys completed are not strictly in accordance with the guidance presented in *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)* (Collins, J. (ed), 2016), however the purpose of the studies is to inform an initial assessment to guide the masterplanning process.

2.3.2 Transect survey routes were limited to areas where safe and approved access could be arranged during the nocturnal surveys, and were therefore restricted to footpaths within the site. Areas of the site, such as close to the northern edge of Withins Reservoir, could not be safely accessed during dark conditions.

2.3.3 During the third static survey repetition, on the 3rd and 4th September, the Anabat Express at Location D failed and no bats were recorded. The absence of two nights data has been taken into account in the analysis of the static survey results.

2.3.4 Surveys using static detectors and bat detectors generally are likely to under-record species which may echolocate quietly, such as brown long-eared and Natterer's bats. This has been taken into account during the evaluation of the bat activity within the site.

2.3.5 Despite these limitations, it is considered that an initial assessment of patterns of bats behaviour at the transects and spot count locations can be drawn, and that this assessment is suitable to direct further, targeted studies in relation to bat activity at the site, as required.

3.0 SURVEY RESULTS

3.1 Transect Surveys

Transect Descriptions

3.1.1 The transect locations and point count locations are presented at **Figure 6.1**.

Transect 1

3.1.2 Transect 1 is located at the northern end of the site, and is approximately 1.7 kilometres in length. It encompasses the western margin of the Spen Moor Ponds Site of Biological Importance (SBI) fields of improved, poor semi-improved and semi-improved grassland with field boundary hedgerows, a row of mature trees and the southern end of Elton Reservoir SBI. The habitats present at the point count locations of the transect are as follows:

a. Point 1.A is located within a field of improved grassland to the south of Bolton Road.

b. Point 1.B is located within a field of improved grassland and to the immediate north of a strip of poor semi-improved grassland.

c. Point 1.C is located at the northern end of a tributary to Withins Reservoir and at the eastern end of a hedgerow-lined track.

d. Point 1.D is located within fields of poor semi-improved grassland to the south of farm buildings.

e. Point 1.E is located at the southern end of Elton Reservoir.

Transect 2

3.1.3 Transect 2 is located at the southern end of the site, and is approximately 2.5 kilometres in length. It encompasses fields of improved, poor semi-improved and semi-improved grassland with field boundary hedgerows, a section of the Manchester, Bolton and Bury Canal (disused) SBI, an area of marshy grassland at the Elton Goyt SBI, the southern end of Withins Reservoir SBI and the northern end of East Lancashire Crematorium and Cemetery and Marl Pits at Black Lane SBI. The habitats present at the point count locations of the transect are as follows:

a. Point 2.A is located on Warth Fold Road, between fields of poor semi-improved grassland and to the north of housing.

b. Point 2.B is located adjacent to the Manchester, Bury and Bolton Canal (disused).

c. Point 2.C is located at a boundary between a field of semi-improved grassland to the west and an area of marshy grassland at the Elton Goyt SBI to the east.

d. Point 2.D is located at a boundary between a field of poor semi-improved grassland to the south, and an area of marshy grassland and tall-herb vegetation to the north, with an outflow from Within s Reservoir also to the north and east.

e. Point 2.E is located on a footpath to the north of East Lancashire Crematorium with Withins Reservoir to the north.

Summary of Results by Species at Each Transect

3.1.4 Survey data from each repetition and transect are appended at **Figures 6.2** to **6.5** and **Tables 6.1** to **6.4**.

3.1.5 The survey results from each transect survey conducted between August and October 2017 are summarised at **Table 3.1** below. These data show the total number of Anabat files recorded during the whole transect in terms of the number of individual files made, and therefore show different totals to the point count locations presented further on.

Table 3.1: Summary of Survey Results at Transects 1 and 2

Repetition 1: 3rd August 2017	**Transect 1**	**Earliest Call**	**Latest Call**	**Total No. Anabat Files**	*Sunset time: 21:05.* The earliest call at Transect 1 was 26 minutes after sunset. The earliest call at Transect 2 was 24 minutes after sunset. Both were common pipistrelle.
	Common pipistrelle	21:31:03	23:56:06	184	
	Myotis species	-	-	0	
	Noctule	21:42:16	23:36:34	20	
	Transect 2	**Earliest Call**	**Latest Call**	**Total No. Anabat Files**	
	Common pipistrelle	21:29:52	23:28:26	98	
	Myotis species	-	-	0	
	Noctule	-	-	0	
Repetition 2: 21st August 2017	**Transect 1**	**Earliest Call**	**Latest Call**	**Total No. Anabat Files**	*Sunset time: 20:25.* The earliest call at Transect 1 was 25 minutes after sunset. The earliest call at Transect 2 was 11 minutes after sunset. Both were common pipistrelle.
	Common pipistrelle	20:50:49	23:08:15	200	
	Myotis species	21:49:52	21:49:52	1	
	Noctule	-	-	0	
	Transect 2	**Earliest Call**	**Latest Call**	**Total No. Anabat Files**	
	Common pipistrelle	20:36:11	23:03:10	179	
	Myotis species	-	-	0	
	Noctule	-	-	0	
Repetition 3: 6th September 2017	**Transect 1**	**Earliest Call**	**Latest Call**	**Total No. Anabat Files**	*Sunset time: 19:45.* The earliest call at Transect 1 was 31 minutes after sunset (a common pipistrelle). The earliest call at Transect 2 was 26 minutes after sunset and was from a noctule.
	Common pipistrelle	20:16:33	22:05:41	170	
	Myotis species	-	-	0	
	Noctule	-	-	0	
	Transect 2	**Earliest Call**	**Latest Call**	**Total No. Anabat Files**	
	Common pipistrelle	20:26:47	22:17:57	144	
	Myotis species	-	-	0	
	Noctule	20:11:20	20:56:14	4	
Repetition 4: 21st September 2017	**Transect 1**	**Earliest Call**	**Latest Call**	**Total No. Anabat Files**	*Sunset time: 19:10.* The earliest call at Transect 1 was 21 minutes after sunset. The earliest call at Transect 2 was 29 minutes after sunset. Both were from common pipistrelle.
	Common pipistrelle	19:31:57	21:33:16	73	
	Myotis species	-	-	0	
	Noctule	19:51:27	19:51:42	4	
	Transect 2	**Earliest Call**	**Latest Call**	**Total No. Anabat Files**	
	Common pipistrelle	19:39:03	21:37:17	74	
	Myotis species	21:22:32	21:22:32	1	
	Noctule	19:42:14	19:45:03	4	

3.1.6 Three bat species were detected during the transect surveys, namely common pipistrelle (*Pipistrellus pipistrellus*), noctule (*Nyctalus noctula*) and Myotis species[4].

[4] In this instance, both calls are most characteristic of whiskered / Brandt's bats.

Bat Activity at Each Transect By Species

3.1.7 The total amount of bat activity is presented in terms of the number of Anabat recordings made for each species at the two transects at **Table 3.2**, below.

Table 3.2: Overall Levels of Bat Activity by Species and Transect

	Total Anabat Files Recorded (and Percentage) at Both Transects by Species		
	Common Pipistrelle	**Myotis Species**	**Noctule**
Transect 1	627 (56%)	1 (50%)	24 (75%)
Transect 2	495 (44%)	1 (50%)	8 (25%)
Total	*1122 (100%)*	*2 (100%)*	*32 (100%)*

3.1.8 A total of 1156 Anabat recordings were made at both transects during all four survey repetitions. 97% of all recordings were of common pipistrelle, with the remaining 3% comprising noctule calls. The two recordings of Myotis species comprise less than 1% of the total number of bat recordings made.

3.1.9 The high proportion (97%) of common pipistrelle calls is such that general statements about the distribution and frequency of the bat activity detected within the site will apply to this species.

3.1.10 In accordance with **Table 3.2**, above, common pipistrelle activity was evenly spread between Transects 1 and 2. Equal amounts of Myotis species activity was detected at the two transects (although the number of calls recorded is so low that it is not considered suitable to draw conclusions about relative behavioural patterns of these species at the site), and greater levels of noctule activity were detected at Transect 1 than Transect 2 over the course of all transect repetitions.

Activity Levels at Each Spot Count Location

3.1.11 Bat passes (i.e. any activity within 10 second intervals for five minutes) at each spot count location have been summarised for Transects 1 and 2 below. The table gives the summed total of point count surveys undertaken and number of bat passes recorded over all transect repetitions.

Table 3.3: Bat Activity at Spot Count Locations at Transects 1 & 2

Spot Count Location	No. Spot Counts Completed	No. Spot Count Repetitions Bats were Recorded	Total Passes (%[1])	Results by Species[2]		
				P45	Myotis	Nn
Transect 1 All	***45***	***35 (78%)***	***254***	***240***	***1***	***13***
1.A	8	2 (25%)	4 (2%)	4	0	0
1.B	11	9 (82%)	35 (14%)	33	1	1
1.C	10	8 (80%)	49 (19%)	49	0	0
1.D	10	10 (100%)	88 (35%)	76	0	12
1.E	6	6 (100%)	78 (31%)	78	0	0
Transect 2 All	***38***	***29 (76%)***	***151***	***149***	***1***	***1***
2.A	7	3 (43%)	21 (8%)	21	0	0
2.B	9	7 (78%)	46 (18%)	46	0	0
2.C	8	8 (100%)	42 (17%)	42	0	0
2.D	9	8 (89%)	13 (5%)	11	1	1
2.E	5	3 (60%)	29 (11%)	29	0	0

[1] The percentage of all bat passes recorded on that transect has been given to help indicate levels of bat activity across each transect: a transect where bat activity was evenly distributed across each point count location would have a percentage score of 20% at each (100% ÷ 5 spot count locations = 20%)

[2] P45 = Common Pipistrelle, Nn = *Nyctalus noctula* (noctule)

3.1.12 In terms of the spot count locations, the lowest frequency of bat activity detected for Transect 1 was at location 1.A, where bats were only detected during 25% of spot counts conducted. Whilst the number of bat passes detected is likely to have been affected by the fact that this spot count was completed first during each transect repetition, low numbers of bat passes were also typically detected during the second repetition of the spot count, later in the evening.

3.1.13 The greatest frequency of activity was detected at locations 1.D and 1.E[5], near to and between Withins and Elton Reservoirs; bats were recorded during all spot counts.

3.1.14 The lowest frequency of bat activity detected at Transect 2 was at location 2.A, where bats were detected during 43% of the spot counts conducted. Activity was otherwise evenly spread throughout the spot count locations, however the greatest frequency of detections again occurred between Withins and Elton Reservoir.

3.1.15 Single Myotis species passes were recorded at locations 1.B and 2.D. It is considered there is insufficient information to draw any conclusions from this.

3.1.16 Twelve noctule passes were recorded at 1.D; all these passes were recorded during the first survey repetition, between 21:41 and 21:46, indicating that this area is used occasionally by foraging noctule, which are highly likely to forage over Withins and Elton Reservoir.

Summary of Observational Data Collected by Surveyors During Transect Surveys

3.1.17 The following *observational* data was made at the spot locations and during the transects generally during the survey repetitions:

Transect 1

a. Spot Count 1.A: Low levels of common pipistrelle activity detected only.
b. Spot Count 1.B: Low levels of common pipistrelle activity detected only.
c. Spot Count 1.C: Common pipistrelle observed foraging along track. Bats frequently detected.
d. Spot Count 1.D: Common pipistrelle and noctule observed foraging over field. Bats frequently detected, and high levels of activity near Elton Reservoir.
e. Spot Count 1.E: Almost constant common pipistrelle foraging activity at the southern end of Elton Reservoir.

Transect 2

a. Spot Count 2.A: Low levels of common pipistrelle activity detected only.
b. Spot Count 2.B: Common pipistrelle observed foraging over the canal on each survey repetition, and frequent activity detected along the length of the canal.
c. Spot Count 2.C: Frequent common pipistrelle foraging activity observed.
d. Spot Count 2.D: Low levels of common pipistrelle activity detected, all heard not seen. Bats frequently detected between points D and E, at the southern end of Within Reservoir.
e. Spot Count 2.E: Frequent to continuous common pipistrelle activity detected, all heard not seen.

[5] Taking into account that fewer spot counts were completed at Spot Count Location 1.E; bats were regularly detected (100% of the spot counts recorded bats) and a high frequency of bat activity was recorded relative the other spot count locations (31% of the total bat passes recorded at the transect spot counts).

3.1.18 These observations are presented at **Figures 6.2** to **6.5**, appended, and are considered further at **Section 4.0**, below.

3.2 Automated/Static Surveys

Anabat Express Unit Locations

3.2.1 The four Anabat Express Units were placed at the following locations:

a. Location A: At a field boundary with a strip of poor semi-improved grassland to the north and fields of improved grassland to the south.

b. Location B: Next to a broad-leaved tree line which links to Elton Reservoir at its eastern end.

c. Location C: At the eastern end of Withins Reservoir

d. Location D: At a field boundary with semi-improved grassland to the west and marshy grassland to the east and south.

3.2.2 The locations of the detectors are annotated at **Figure 6.1**.

Results of Survey by Species and Area

3.2.3 Five species were recorded by the static detectors (two more than during the transect surveys), namely common pipistrelle, soprano pipistrelle, Myotis species[6], noctule and brown long-eared bats.

3.2.4 The total number of Anabat recordings made for each species and at each survey location is presented below.

Table 3.4: Total Number of Anabat Recordings at Each Static Survey Location by Species

Species	All	A	B[1]	C	D
Common pipistrelle	21534 (97%)	6649 (31%)	7745 (36%)	3704 (17%)	3436 (16%)
Soprano pipistrelle	8 (<1%)	0 (0%)	0 (0%)	1 (13%)	7 (88%)
Myotis species	452 (2%)	2 (0%)	13 (3%)	20 (4%)	417 (92%)
Noctule	236 (1%)	2 (1%)	214 (91%)	3 (1%)	17 (7%)
Brown long-eared bat	6 (<1%)	0 (0%)	1 (17%)	3 (50%)	2 (33%)
Total	***22236 (100%)***	***6653 (30%)***	***7973 (36%)***	***3731 (17%)***	***3879 (17%)***
No recordings were made at Location D on 3rd and 4th September 2017 due to an error with the Anabat Express unit.					

3.2.5 The above table demonstrates that the greatest proportion of passes recorded were of common pipistrelle (97%) with calls of Myotis species and noctule bats comprising 2% and 1% of all calls detected respectively, and calls of soprano pipistrelle and brown long-eared bats comprising less than 1% of all bat activity detected.

3.2.6 The greatest frequency of common pipistrelle passes were detected at Locations A and B, with fewer detected at Locations C and D.

3.2.7 Soprano pipistrelle were detected at Locations C and D only and only by a low number of call contacts.

[6] In this instance some Myotis species calls are indicative of whiskered / Brandt's bats, and other show similarities to Daubenton's bats, however it is not possible to regularly or reliably discern which species most calls could be attributed to, and therefore it is not possible to draw reliable conclusions about any individual Myotis species.

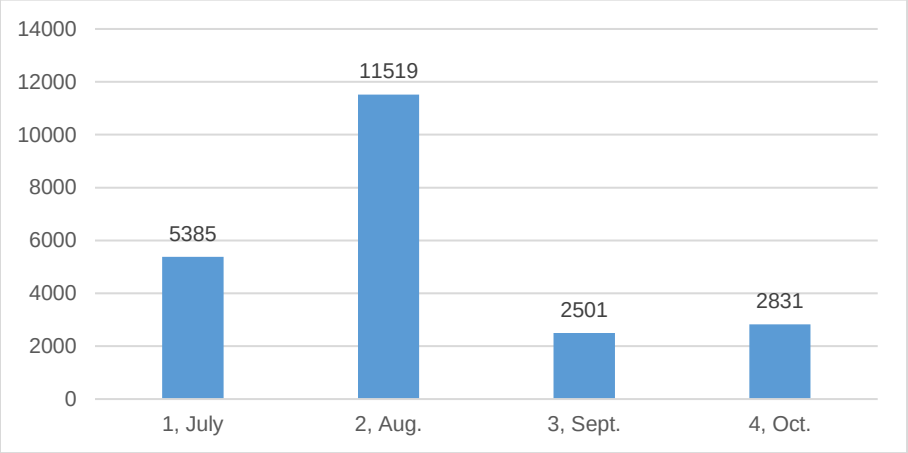
3.2.8 Myotis species were detected at all four locations, however passes were only recorded low numbers at Locations A, B and C. The majority of Myotis activity (92%) was detected at Location D.

3.2.9 A low number of brown long-eared bat contacts were detected at Locations A, B, C and D, although it is recognised that the low amplitude of the echolocation calls from this species is such that these bats are not reliably detected by surveys such as these; the low numbers of calls/contacts recorded do not necessarily indicate that only low numbers of brown long-eared bats use the site, or do not use the site on a regular basis.

3.2.10 Overall the highest frequency of bat activity was detected at Locations A and B, however activity from a greater diversity of bat species was associated with Locations B, C and D rather than at A. Noctule bat activity was strongly associated with Location B, and Myotis species activity was strongly associated with Location D.

Results of Survey by Species and Date

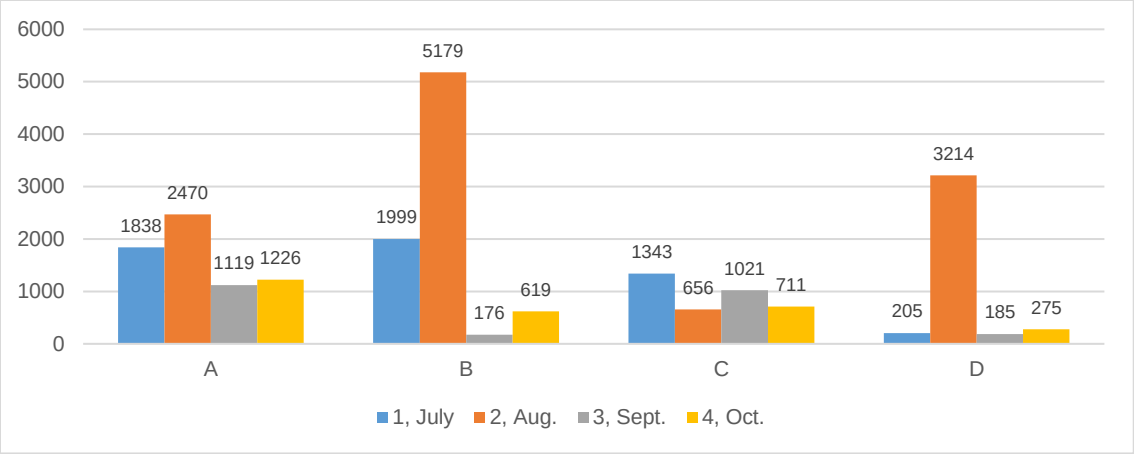
3.2.11 **Graph 3.1**, below show the overall levels of bat activity (i.e. number of bat passes recorded) detected across the whole site during the four repetitions of surveys conducted.



Graph 3.1: Levels of All Bat Activity Across Whole Site by Survey Repetition

3.2.12 The graph demonstrates that the greatest amount of bat activity (52%) was detected during the survey completed in August, with 24% of activity detected in July, 13% of activity detected in October and 11% of activity detected in September.

3.2.13 **Graph 3.2**, below shows the overall levels of activity detected (i.e. number of bat passes recorded) at each survey location.



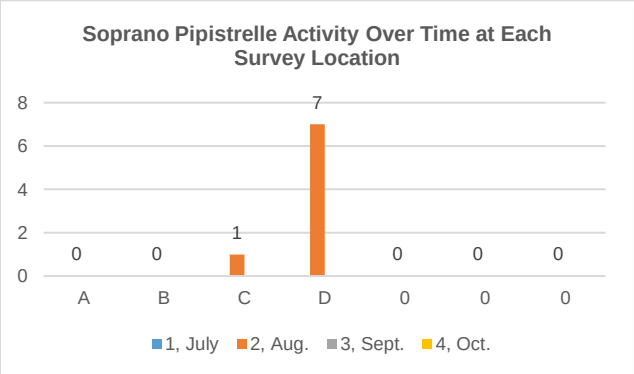
Graph 3.2 Bat Activity at Each Survey Location During Each Survey Repetition

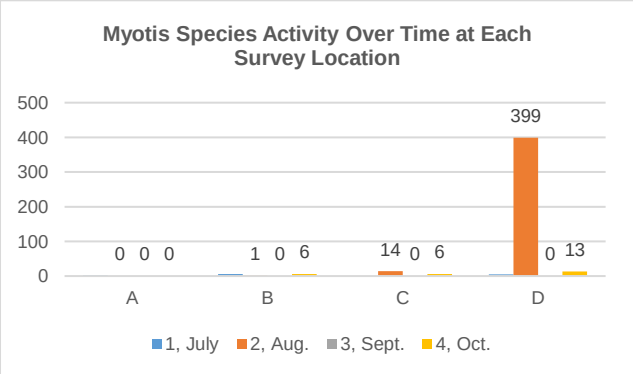
3.2.14 The graph demonstrates that activity levels were not constant throughout the site, with higher peaks of activity associated with Locations B and C in August, and no such peak of activity detected at Location C, where activity remained similar throughout.

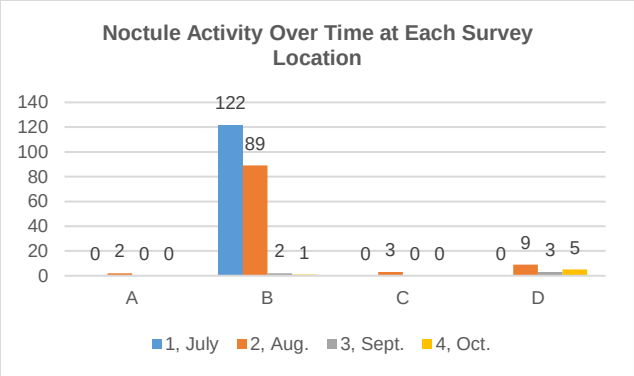
3.2.15 This may indicate that favourable seasonal foraging habitats are associated with Locations B and D (such as a hatch of invertebrates typically associated with the habitats present at this / these locations, and / or that these locations provide important foraging habitat for maternity colonies of bats associated with the wider area. For example, 9th to 14th August is within the timeframe in which maternity colonies and roosts are still present, and juvenile bats are starting to fly and feed.

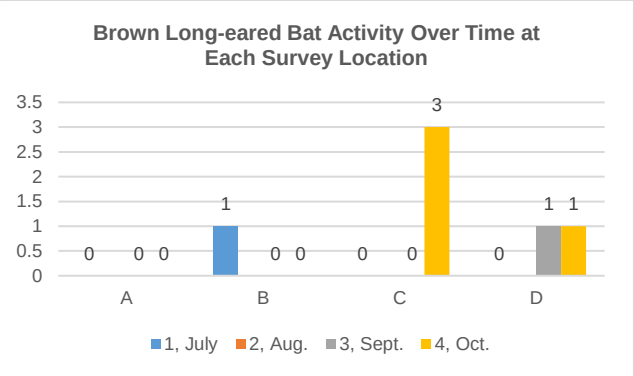
3.2.16 The above data are sufficiently similar to those of the common pipistrelle activity detected at the site (due to the high proportion of passes recorded being of common pipistrelle) that it is not considered necessary to provide a graph of common pipistrelle activity at the site by area in this report; the graph would be the same as **Graph 3.2**, above.

3.2.17 Graphs of the other species activity detected at the site are presented below.









Graph 3.3 Bat Activity at Each Survey Location During Each Survey Repetition by Species

3.2.18 The data above show that the highest proportion of soprano pipistrelle calls were detected at Location D in August, although the low number of calls detected is such that it is not feasible to draw any observations from this; similarly no observations can be made from the low numbers of brown long-eared bat passes detected, other than to note the presence of this species at the site.

3.2.19 Myotis activity is characterised by a large peak at Location D during the second survey repetition (i.e. 9th to 14th August). Peaks of noctule activity are detected at Location B during the first (i.e. 28th July to 1st August) and second survey repetitions, with the majority of all passes detected from this location at these two survey repetitions.

Bat Activity In Relation to Time Per Night

Levels of Activity Near Sunrise / Sunset and Close to the Survey Locations

3.2.20 To explore the data further a crude analysis was completed to discern whether or not bat roosts might be located in proximity to the survey locations by noting the maximum number of passes at any survey location within a set time period after sunset or before sunrise.

3.2.21 **Table 3.5** below shows the results of this analysis number of bat passes detected at each survey location before a set time after sunset and between a set time and sunrise.

Table 3.5: Bat Activity Within Defined Periods Before Sunrise and After Sunset

Species	Minutes After Sunset / Before Sunrise		Nights Detected (Maximum Number of Passes During any One Survey Repetition)			
			A	B	C	D
Common pipistrelle	20	Sunrise	0 (0)	0 (0)	0 (0)	0 (0)
		Sunset	**2 (7)**	**3 (4)**	**1 (1)**	**2 (13)**
Soprano pipistrelle	20	Sunrise	0 (0)	0 (0)	0 (0)	0 (0)
		Sunset	0 (0)	0 (0)	0 (0)	0 (0)
Myotis species	40	Sunrise	0 (0)	0 (0)	0 (0)	0 (0)
		Sunset	0 (0)	0 (0)	0 (0)	0 (0)
Noctule	20	Sunrise	0 (0)	**1 (1)**	0 (0)	0 (0)
		Sunset	0 (0)	**2 (2)**	0 (0)	**3 (1)**
Brown long-eared bat	40	Sunrise	0 (0)	0 (0)	0 (0)	0 (0)
		Sunset	0 (0)	0 (0)	0 (0)	0 (0)

3.2.22 As summarised by Table 3.5, common pipistrelle bats were detected within 20 minutes of sunset on two occasions at location A (10th August and 10th October, with a maximum number of seven detected on 10th October), three occasions at Location B (6th, 8 and 9th October, with a maximum of four passes detected

on 8th October), on one occasion at Location C (one pass on 9th October) and on two occasional at Location D (on 6th and 9th October, with a maximum count of 13 passes on 6th October).

3.2.23 One noctule pass was detected at Location B close to sunrise on 3rd September at Location B. Noctule were recorded close to sunset at Location B on 10th August and 2nd September, with a maximum of two passes detected, and on three occasions close to Location D, on 1st September, 5th September[7] and 8th October. Single passes were recorded on each occasion.

3.2.24 None of the above results indicate that a regularly-used roost is present close to any of the survey locations. Of the four locations, Location B was most regularly used by bats early in the evening, followed by Location D.

3.2.25 Further analysis of the existing data can be completed if it is considered necessary, however in light of the above it is considered reasonable to assume that the majority of bat behaviour associated with the site is related to foraging.

4.0 EVALUATION AND GUIDANCE

4.1 Bat Species Diversity

4.1.1 The results of the transect and automated surveys confirm the areas surveyed within the site are regularly utilised by foraging common pipistrelle, noctule bats and Myotis species, and occasionally used by soprano pipistrelle.

4.1.2 Brown long-eared bats are present, however no further conclusions can be drawn regarding the extent or distribution of brown long-eared bats at the site as this type of survey will typically under-represent their abundance due to the low amplitude of their echolocation calls.

4.2 Spatial and Temporal Distribution of Bat Activity

4.2.1 Observations from the transect surveys (refer to **Figures 6.2** to **6.5**) demonstrate that activity, of the areas surveyed, was most frequently detected close to the large water features (i.e. the reservoirs and canal), although bat activity was detected throughout the survey area.

4.2.2 Importantly a greater diversity of species was associated with the habitats present at Locations B, C and D than at A, indicating that the habitats in these areas are of greater value to bat species as a whole than those at Location A. This is to be expected, as the tree lines, water bodies and water courses, semi-improved grassland and marshy grassland found at these locations will provide a greater abundance and diversity of invertebrate prey than the open, improved grassland and poor semi-improved grassland fields present at Location A.

4.2.3 Peaks of activity were detected for common pipistrelle, noctule bats and Myotis species in August; common pipistrelle activity was greatest at Locations B and D, noctule activity was greatest at Location B and Myotis species activity was greatest at Location D for this month.

4.2.4 These areas may therefore form part of important foraging habitat for bat species at an important time of year in the bat cycle; when bats are feeding their young and juvenile bats are learning to fly and feed. It is also surmised that the habitats at Locations B and D (but particularly the marshy grassland and

[7] This detector failed on the 3rd and 4th September, and data are therefore not available between these two dates.

wetland habitats at Location D) may support invertebrate prey that became / becomes abundant in August.

4.2.5 The following statements can be made following the extent of study conducted to date:

a. The site is used for foraging by all bat species typically found within the local area[8];

b. The initial assessment of the value of the habitats present to foraging bats is broadly accurate, in that the water bodies, water courses, tree lines and marshy grassland appear to provide habitat of greater value than the improved pasture fields (although foraging activity was detected at the improved pasture fields included within the survey area a greater abundance of species and level of activity was detected at the other habitats);

c. A variety of bat species were regularly detected in the areas close to water bodies, water courses and tree lines within the site, and these areas are likely to provide the highest quality habitat for bat species; and

d. Whilst bat activity is likely to be found throughout the active season, peaks of activity were detected in August, which are likely to be related to prey abundance and important times within the annual bat lifecycle.

4.3 Guidance

4.3.1 The bat activity surveys support the following generic and specific guidance to be applied during the masterplanning and ultimately the detailed design process.

4.3.2 The masterplan for the site must consider the presence of five species of foraging bats and the broad principles outlined below. To ensure a consistent approach throughout the scheme, as the scheme progresses into development phases and parcels, an '*Elton Area Biodiversity Design Code'* or similar document, for the protection of habitats and creation of opportunities for biodiversity which takes into account the specifications below should be adhered to by each development parcel, where relevant.

4.3.3 The specifications of relevance to bats comprise:

a. Conservation of habitats regarded as high or moderate suitability for use by foraging bats particularly open water (reservoirs and canals) trees, scrub, ponds, species-rich grassland, ditches, hedgerows, where feasible, and concentration of the bulk of development on the large fields of improved pasture;

b. Maintaining the current conditions at the improved pasture up until the commencement of soil stripping and construction (i.e. not permitting the identified development parcels to lie fallow);

c. Maximising the Green Infrastructure and habitat connectivity through and around the site *and* between the centre of the site and habitats in the wider area for use by wildlife, including foraging bats. This will involve retention of habitat connectivity between retained habitats / areas of moderate and high suitability for use by foraging bats *and* creation of habitats and implementation of appropriate management of new links and corridors as mitigation if needed;

d. Implementation of a sensitive design and restricted use of lighting throughout the site, including mitigation in form of selection of appropriate light products and screening, as appropriate, where lighting is essential[9];

[8] Notwithstanding the fact that Myotis species calls could not be identified to species.

[9] The lighting scheme will be designed with reference to current guidance, namely:

e. Provision of a net gain for biodiversity by installation of a range of types of new roosting opportunities within the built environment, including at the culverts / bridges associated with the watercourses;

f. Commitment to additional enhancement measures such as the installation of features designed specifically for the range of bat species recorded at the site (rather than just pipistrelle species). This may involve the construction of a specific 'bat barn' within favourable habitat;

g. Avoidance of severance of favourable habitats such as the land between the two reservoirs and creation of additional areas of favourable habitat, as appropriate;

h. Where the loss of habitat namely a portion of the marshy grassland and wetland habitats at Elton Goyt SBI has been identified as unavoidable owing to other constraints, the following measures must be secured and delivered as part of the scheme:

- Creation of additional wetland to ensure there is no net loss of wetland habitat resource and favourable opportunity for foraging bats at the site;
- Siting of the new wetland habitats adjacent to the existing habitats to ensure a similar soil type and condition (including a local source of plant seed) with the aim that the area would act as an extension to the existing wetland and bat species would be displaced to the nearby extended habitats, ideally before loss of the existing habitats (rather than deterred from using the local area entirely); and
- Completion of appropriate studies (e.g. hydrological studies and modelling) to demonstrate that the extension to the wetland habitats is functional and the habitat is sustainable in the long-term.

5.0 REFERENCES

Bat Conservation Trust, 2012. *Grey Long-eared bat.* [Online]
Available at: http://www.bats.org.uk/pages/grey_long-eared_bat.html
[Accessed 6 November 2017].

Bat Conservation Trust, 2014. *Artificial Lighting and Wildlife: Interim Guidance: Recommendations to help minimise the impact of artificial lighting.* [Online]
Available at: http://www.bats.org.uk/pages/bats_and_lighting.html

CIEEM, 2013. *Technical Guidance Series Competencies for Species: Bats.* Winchester: Chartered Institute of Ecology and Environmental Managenent.

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

ERAP (Consultant Ecologists) Ltd, March 2019. *Elton Reservoir, Bury. Phase 1 Habitat Survey,* Preston: ERAP (Consultant Ecologists) Ltd.

ERAP (Consultant Ecologists) Ltd, March 2019. *Results of Desktop Study and Scope of Ecological Survey,* Preston: ERAP (Consultant Ecologists) Ltd.

Great Britain, 1981. *Wildlife and Countryside Act.* London: H.M.S.O.

Great Britain, 2006. *Natural Environment and Rural Communities Act.* London: H.M.S.O.

Great Britain, 2010. *The Conservation of Habitats and Species Regulations.* London: H.M.S.O.

Artificial lighting and wildlife. Interim Guidance: Recommendations to help minimise the impact of artificial lighting. (Bat Conservation Trust, 2014); and Bats and lighting: Overview of current evidence and mitigation guidance (Stone, 2014).

Ministry of Housing, Communities and Local Government, February 2019. *National Planning Policy Framework.* London: H.M.S.O.

Mitchell-Jones, A., 2004. *Bat Mitigation Guidelines.* Peterborough: English Nature.

Mitchell-Jones, A. J. & Mcleish, A. P., 2004. *Bat Workers' Manual, 3rd Edition.* Peterborough: Joint Nature Conservation Committee.

Stone, E. L., 2014. *Bats and Lighting: Overview of current evidence and mitigation guidance.* Bristol: University of Bristol.

6.0 APPENDIX: TABLES AND FIGURES

6.1 Transect Survey Data

Table 6.1: Repetition 1: 3rd August 2017

Transect	Point Count Location	Time	Number of Bat Passes Recorded by Species[1]				
			P45	P55	Myotis	Nn	BLE
Transect 1	1.A	21:03	0	0	0	0	0
	1.B	21:16	0	0	0	0	0
	1.C	21:33	**1**	0	0	0	0
	1.D	21:41	**6**	0	0	**12**	0
	1.E	21:53	**13**	0	0	0	0
	1.D	22:03	**14**	0	0	0	0
	1.C	22:11	**9**	0	0	0	0
	1.B	22:28	**9**	0	0	**1**	0
	1.A	22:41	**1**	0	0	0	0
	1.B	22:55	**4**	0	0	0	0
	1.C	23:12	**5**	0	0	0	0
	1.D	23:21	**9**	0	0	0	0
	1.E	23:30	**12**	0	0	0	0
Total passes at each spot count location			***83***	*0*	*0*	***13***	*0*
No. Anabat recording over whole transect			***184***	*0*	*0*	***20***	*0*
Transect 2	**Point Count Location**	**Time**	**P45**	**P55**	**Myotis**	**Nn**	**BLE**
	2.A	21:10	0	0	0	0	0
	2.B	21:27	**2**	0	0	0	0
	2.C	21:47	**9**	0	0	0	0
	2.D	22:08	**2**	0	0	0	0
	2.E	22:19	**5**	0	0	0	0
	2.D	22:29	**1**	0	0	0	0
	2.C	22:50	**2**	0	0	0	0
	2.B	23:09	0	0	0	0	0
	2.A	23:30	0	0	0	0	0
Total passes at each spot count location			***21***	*0*	*0*	*0*	*0*
No. Anabat recording over whole transect			***98***	*0*	*0*	*0*	*0*

[1]**Key to Species Codes**: P45 = common pipistrelle, P55 = soprano pipistrelle, Myotis = Myotis species, Nn= Noctule and BLE = Brown long-eared
Observations of bat activity noted during the transect surveys and between spot count locations have been added to **Figure 6.2**.

Table 6.2: Repetition 2, 21st August 2017

Transect	Point Count Location	Time	Number of Bat Passes Recorded by Species[1]				
			P45	P55	Myotis	Nn	BLE
Transect 1	1.A	20:17	0	0	0	0	0
	1.B	20:30	0	0	0	0	0
	1.C	20:47	**2**	0	0	0	0
	1.D	20:56	**6**	0	0	0	0
	1.E	21:07	**19**	0	0	0	0
	1.D	21:18	**17**	0	0	0	0
	1.C	21:28	**14**	0	0	0	0
	1.B	21:45	**1**	0	1	0	0
	1.A	22:00	**0**	0	0	0	0
	1.B	22:14	**3**	0	0	0	0
	1.C	22:30	**14**	0	0	0	0
	1.D	22:40	**2**	0	0	0	0
	1.E	22:51	**4**	0	0	0	0
Total passes at each spot count location			***82***	*0*	***1***	*0*	*0*
No. Anabat recording over whole transect			***200***	*0*	***1***	*0*	*0*
Transect 2	**Point Count Location**	**Time**	**P45**	**P55**	**Myotis**	**Nn**	**BLE**
	2.A	20:31	0	0	0	0	0
	2.B	20:44	**2**	0	0	0	0
	2.C	21:00	**2**	0	0	0	0
	2.D	21:18	**3**	0	0	0	0
	2.E	21:28	**16**	0	0	0	0
	2.D	21:39	**3**	0	0	0	0
	2.C	21:58	**1**	0	0	0	0
	2.B	22:16	**14**	0	0	0	0
	2.A	22:31	**4**	0	0	0	0
	2.B	22:48	**12**	0	0	0	0
Total passes at each spot count location			***57***	*0*	*0*	*0*	*0*
No. Anabat recording over whole transect			***179***	*0*	*0*	*0*	*0*

[1]**Key to Species Codes**: P45 = common pipistrelle, P55 = soprano pipistrelle, Myotis = Myotis species, Nn= Noctule and BLE = Brown long-eared
Observations of bat activity noted during the transect surveys and between spot count locations have been added to **Figure 6.3**.

Table 6.3: Repetition 3, 6th September 2017

Transect	Point Count Location	Time	Number of Bat Passes Recorded by Species[1]				
			P45	P55	Myotis	Nn	BLE
Transect 1	1.A	19:50	0	0	0	0	0
	1.B	20:04	0	0	0	0	0
	1.C	20:24	**3**	0	0	0	0
	1.D	20:32	**6**	0	0	0	0
	1.E	20:43	**17**	0	0	0	0
	1.D	20:52	**12**	0	0	0	0
	1.C	21:00	0	0	0	0	0
	1.B	21:14	**9**	0	0	0	0
	1.A	21:26	**3**	0	0	0	0
	1.B	21:42	**6**	0	0	0	0
Total passes at each spot count location			***56***	*0*	*0*	*0*	*0*
No. Anabat recording over whole transect			***170***	*0*	*0*	*0*	*0*
Transect 2	**Point Count Location**	**Time**	**P45**	**P55**	**Myotis**	**Nn**	**BLE**
	2.A	20:01	0	0	0	0	0
	2.B	20:15	0	0	0	0	0
	2.C	20:36	**4**	0	0	0	0
	2.D	20:56	**1**	0	0	**1**	0
	2.E	21:07	**8**	0	0	0	0
	2.D	21:16	0	0	0	0	0
	2.C	21:36	**9**	0	0	0	0
	2.B	21:56	**14**	0	0	0	0
	2.A	22:10	**14**	0	0	0	0
Total passes at each spot count location			***50***	*0*	*0*	***1***	*0*
No. Anabat recording over whole transect			***144***	*0*	*0*	***4***	*0*

[1]**Key to Species Codes**: P45 = common pipistrelle, P55 = soprano pipistrelle, Myotis = Myotis species, Nn= Noctule and BLE = Brown long-eared
Observations of bat activity noted during the transect surveys and between spot count locations have been added to **Figure 6.4**.

Table 6.4: Repetition 4, 21st September 2017

Transect	Point Count Location	Time	Number of Bat Passes Recorded by Species[1]				
			P45	P55	Myotis	Nn	BLE
Transect 1	1.A	19:22	0	0	0	0	0
	1.B	19:38	**1**	0	0	0	0
	1.C	19:58	**1**	0	0	0	0
	1.D	20:08	0	0	0	0	0
	1.E	20:19	**13**	0	0	0	0
	1.D	20:30	**4**	0	0	0	0
	1.C	20:48	0	0	0	0	0
	1.B	21:01	0	0	0	0	0
	1.A	21:15	0	0	0	0	0
Total passes at each spot count location			***19***	*0*	*0*	*0*	*0*
No. Anabat recording over whole transect			***73***	*0*	*0*	*4*	*0*
Transect 2	**Point Count Location**	**Time**	**P45**	**P55**	**Myotis**	**Nn**	**BLE**
	2.E	19:22	0	0	0	0	0
	2.D	19:32	0	0	0	0	0
	2.C	19:46	**14**	0	0	0	0
	2.B	20:03	**1**	0	0	0	0
	2.A	20:16	**3**	0	0	0	0
	2.B	20:29	**1**	0	0	0	0
	2.C	20:46	**1**	0	0	0	0
	2.D	21:01	**1**	0	0	0	0
	2.E	21:10	0	0	0	0	0
	2.D	21:20	0	0	**1**	0	0
Total passes at each spot count location			***21***	*0*	***1***	*0*	*0*
No. Anabat recording over whole transect			***74***	*0*	***1***	***4***	*0*

[1]**Key to Species Codes**: P45 = common pipistrelle, P55 = soprano pipistrelle, Myotis = Myotis species, Nn= Noctule and BLE = Brown long-eared
Observations of bat activity noted during the transect surveys and between spot count locations have been added to **Figure 6.5**.

6.2 Static Recorder Data

Table 6.5: Total Number of Recordings at Each Location By Species By Night

Repetition & Date	Location and Species[1]																			
	A					B					C					D				
1, July	**P45**	**P55**	**My.**	**Nn**	**BLE**	**P45**	**P55**	**My.**	**Nn**	**BLE**	**P45**	**P55**	**My.**	**Nn**	**BLE**	**P45**	**P55**	**My.**	**Nn**	**BLE**
28/07/2017	**82**	0	0	0	0	**202**	0	1	0	0	**198**	0	0	0	0	0	0	0	0	0
29/07/2017	**314**	0	**1**	0	0	**219**	0	1	98	0	**242**	0	0	0	0	**71**	0	**1**	0	0
30/07/2017	**587**	0	0	0	0	**523**	0	2	6	1	**162**	0	0	0	0	**26**	0	0	0	0
31/07/2017	**433**	0	**1**	0	0	**590**	0	0	1	0	**313**	0	0	0	0	**48**	0	**1**	0	0
01/08/2017	**420**	0	0	0	0	**336**	0	2	17	0	**428**	0	0	0	0	**55**	0	**3**	0	0
2, Aug.																				
09/08/2017	**349**	0	0	**1**	0	**1054**	0	0	12	0	**71**	0	**2**	**1**	0	**412**	**4**	**162**	0	0
10/08/2017	**155**	0	0	0	0	**700**	0	0	14	0	**51**	0	**1**	**1**	0	**252**	0	0	**2**	0
11/08/2017	**1162**	0	0	0	0	**1245**	0	1	2	0	**215**	1	0	0	0	**737**	0	**123**	0	0
12/08/2017	**332**	0	0	0	0	**850**	0	0	4	0	**87**	0	**4**	**1**	0	**419**	0	0	**5**	0
13/08/2017	**470**	0	0	**1**	0	**1240**	0	0	57	0	**214**	0	**7**	0	0	**979**	**3**	**114**	**2**	0
3, Sept.																				
01/09/2017	**273**	0	0	0	0	**34**	0	0	0	0	**47**	0	0	0	0	**86**	0	0	**1**	0
02/09/2017	**248**	0	0	0	0	**63**	0	0	2	0	**43**	0	0	0	0	**26**	0	0	**1**	**1**
03/09/2017	**117**	0	0	0	0	**67**	0	0	0	0	**55**	0	0	0	0	-	-	-	-	-
04/09/2017[2]	**449**	0	0	0	0	0	0	0	0	0	**322**	0	0	0	0	-	-	-	-	-
05/09/2017	**32**	0	0	0	0	**10**	0	0	0	0	**554**	0	0	0	0	**69**	0	0	**1**	0
06/09/2017[2]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4, Oct.																				
05/10/2017	**38**	0	0	0	0	**1**	0	0	0	0	**5**	0	0	0	0	**17**	0	**4**	0	0
06/10/2017	**235**	0	0	0	0	**117**	0	3	0	0	**12**	0	0	0	0	**91**	0	**3**	0	0
07/10/2017	**219**	0	0	0	0	**20**	0	2	0	0	**32**	0	**3**	0	0	0	0	0	0	0
08/10/2017	**533**	0	0	0	0	**270**	0	1	1	0	**515**	0	**1**	0	**3**	**98**	0	**5**	**3**	0
09/10/2017	**201**	0	0	0	0	**204**	0	0	0	0	**138**	0	**2**	0	0	**50**	0	**1**	**2**	**1**
10/10/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Sum totals of Anabat recordings for each survey evening are highlighted in **bold** for ease of reference.

[1] **Key to Species Codes:** P45 = common pipistrelle. P55 = soprano pipistrelle. My. = Myotis species. Nn = noctule. BLE = brown long-eared bat.

[2] On 3rd and 4th September 2017 at Location D no bats were recorded due to a fault with the Anabat Express unit.

6.3 Figures

Please note the Phase 1 Habitat Survey base plans presented in Figures 6.1 to 6.5 are for reference only. The Phase 1 Habitat Survey report (ERAP (Consultant Ecologists) Ltd, March 2019) should be referred to for an up to date Phase 1 Habitat Survey map.

Figure 6.1: Static Detector and Transect Locations

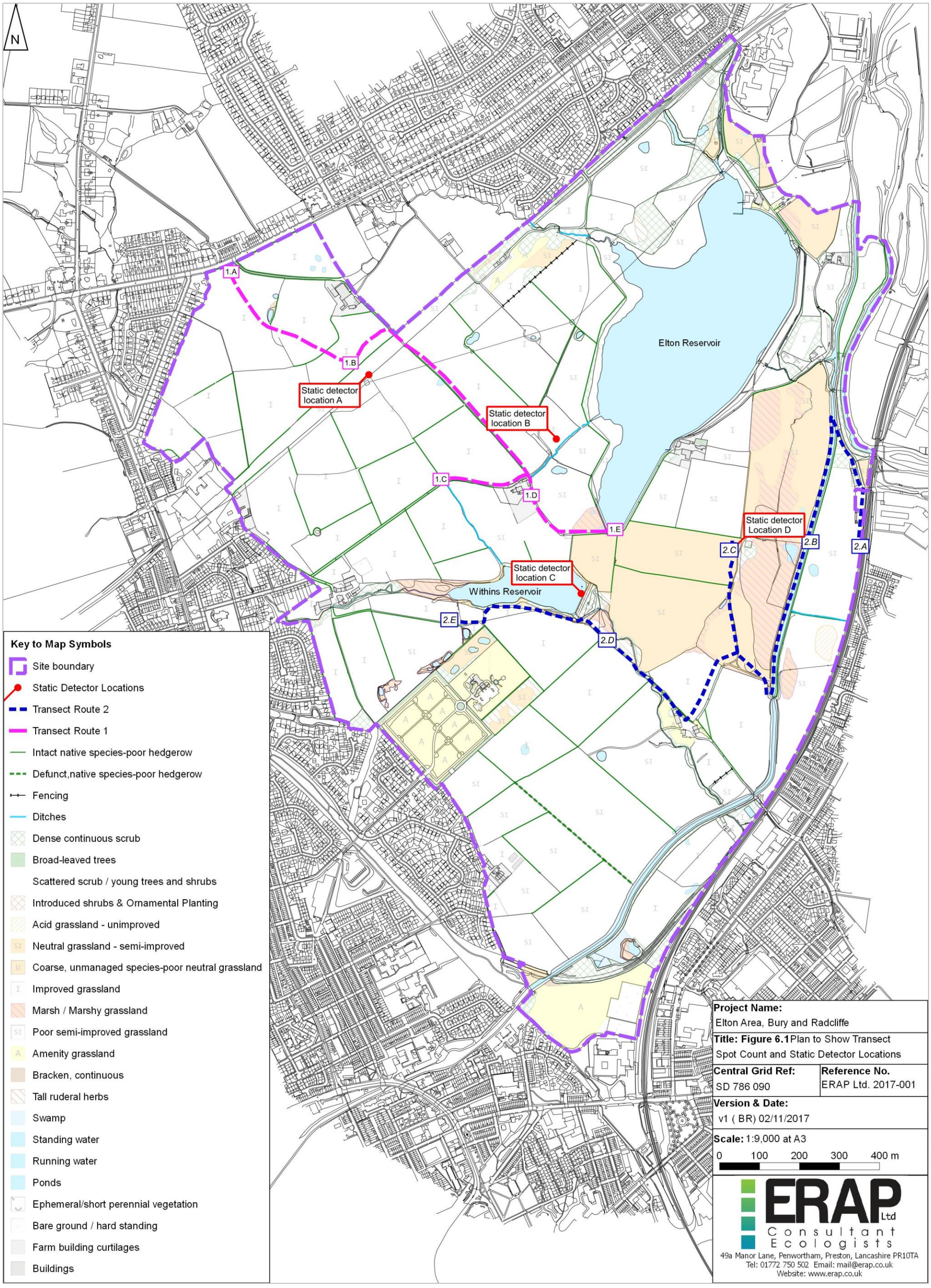


Figure 6.2: Results of First Transect Survey, 3rd August 2017

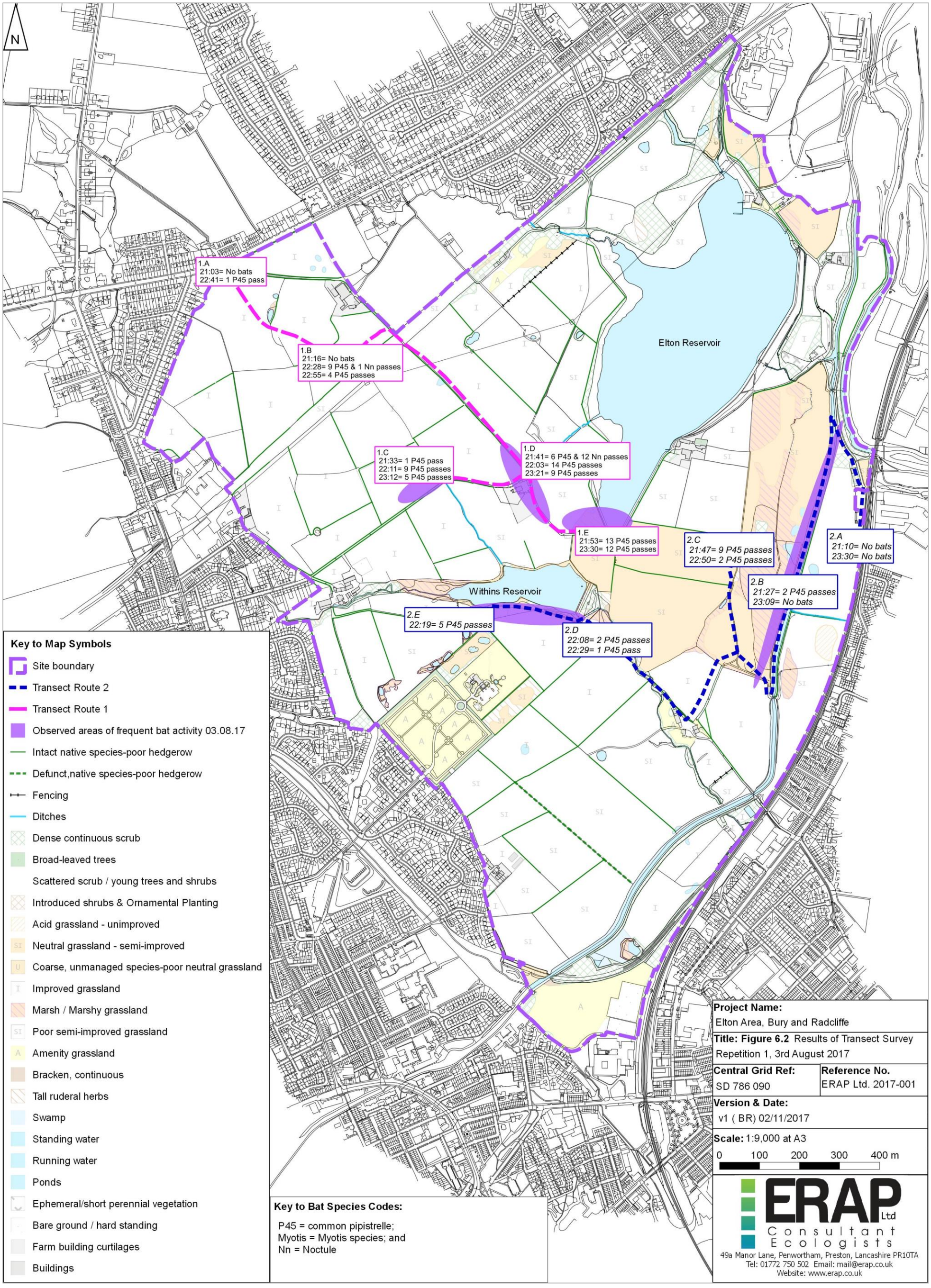


Figure 6.3: Results of Second Transect Survey, 21st August 2017

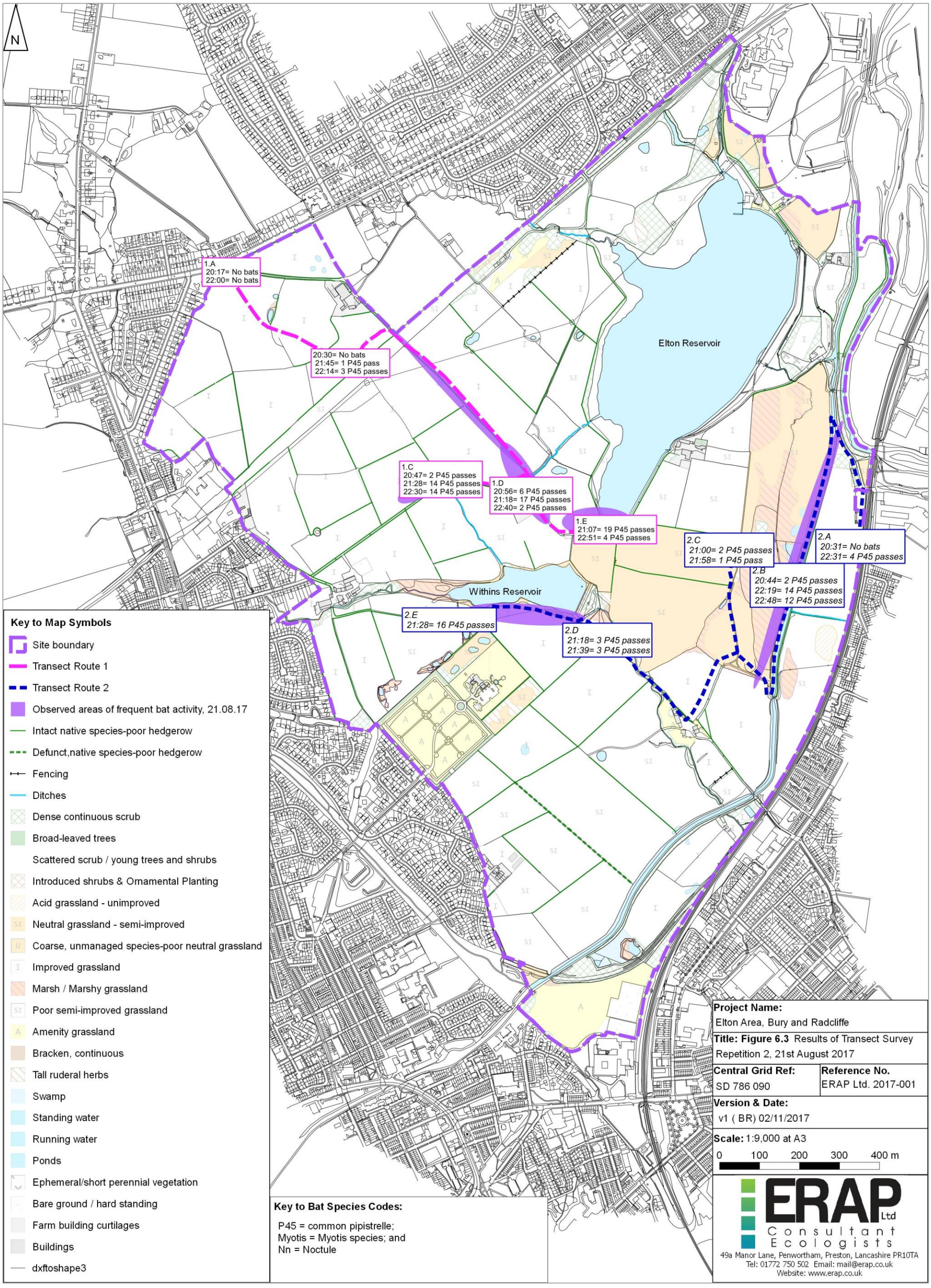


Figure 6.4: Results of Third Transect Survey, 6th September 2017

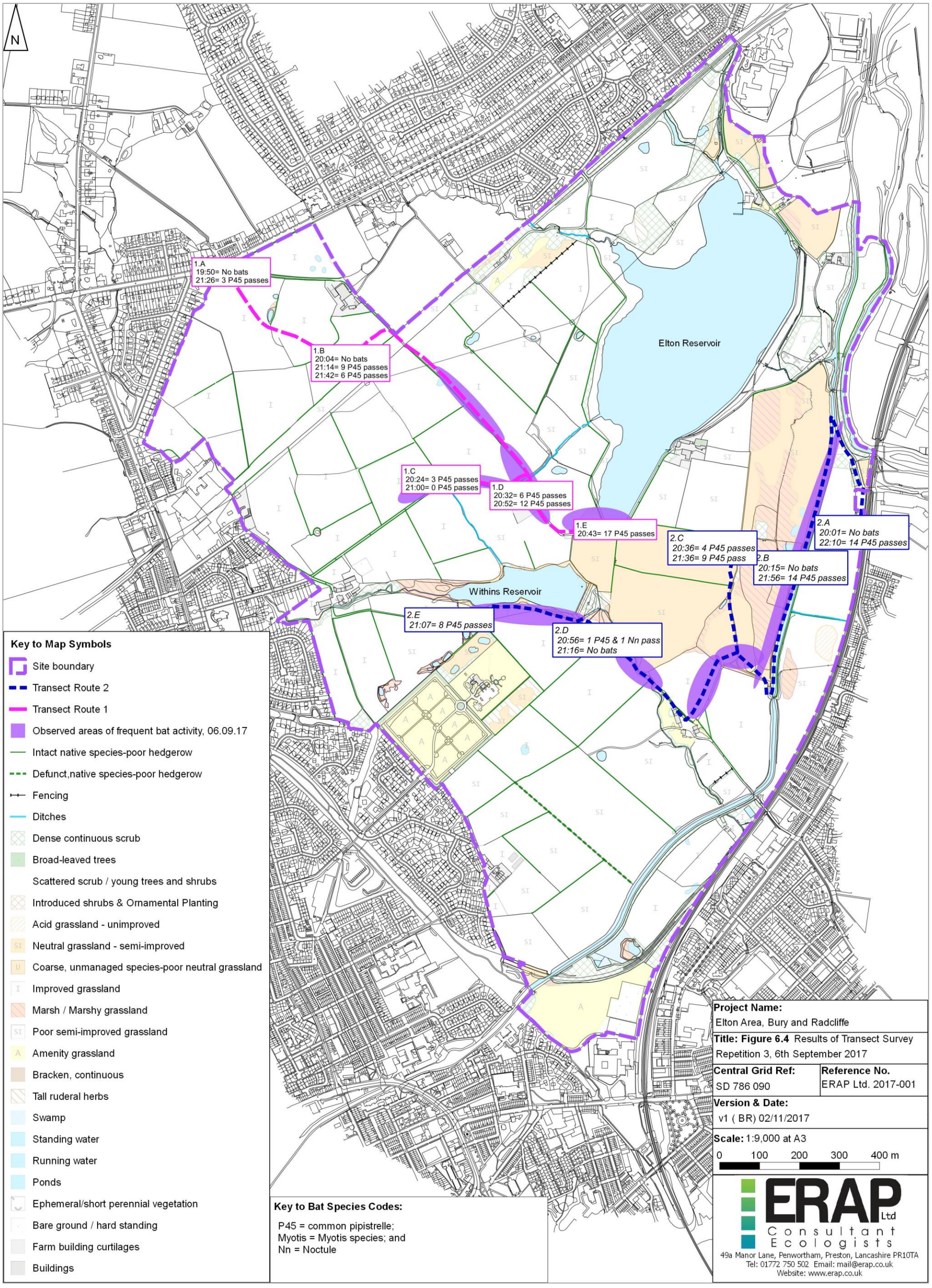


Figure 6.5: Results of Fourth Transect Survey, 21st September 2017