



Harworth Estates

Rockingham Business Park, Barnsley

Bat Survey Report

August 2016

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1.0 INTRODUCTION

- 1.1 FPCR Environment and Design Ltd were commissioned by Harworth Estates to undertake a suite of bat surveys on land to the north and south of Dearne Valley Parkway (A6195). The objective of the study was to assess the potential implications to any bat populations using the site with development of a business park.

Site Location and Context

- 1.2 The subject site is located adjacent to the west of Shortwood Business Park and comprises a parcel of land to the north and south across the A6195 dual carriageway, approximately 5km from Barnsley town centre, South Yorkshire (Central grid ref SE 352 009).
- 1.3 To the north / northwest lies arable farmland beyond which the existing residential development of Birdwell, to the northeast, Short Wood, to the east lies the existing development of Short Wood Business Park, to the south the more extensive residential area of Hoyland and to the east is an industrial development currently under construction. Junction 36 of the M1 Motorway lies around 800m to the west. The subject site consists of a former quarry restored to arable and improved pasture with associated native hedgerows and mixed plantation woodland. Two attenuation bodies, a drainage channel (partially culverted) and areas of associated semi-improved grassland are in the southwest and further limited parcels of semi-improved grassland are associated with plantation margins. The surrounding land use comprised largely arable and pasture with an area of broadleaved semi-natural woodland to the north.

Proposals

- 1.4 Proposals are for a business park development comprising warehousing with associated parking, lorry compounds and infrastructure.

2.0 METHODOLOGY

Desk Study

- 2.1 Rotherham Biological Records and Parks and Countryside Sheffield were consulted regarding bat records within 1km of the site. In addition to this, all statutory sites designated within 10km of the site were investigated to identify whether or not they were designated for their assemblage of bats.

Field Survey

Building Assessment

- 2.2 The exterior of any buildings present was visually assessed for potential access points and evidence of bat activity. Features such as small gaps under barge / soffit / fascia boards, raised or missing ridge tiles and gaps at gable ends, which have potential as access points / roost sites, were sought and the abundance of these access points was recorded. Evidence that bats actively used potential access points / roost sites includes staining within gaps and bat droppings or urine staining under gaps, a note being made wherever these were present. Indicators that potential access points / roost sites had not recently been used included the presence of cobwebs and general detritus within potential access points. The visual assessment was carried out following periods of dry weather to maximise recording of visible evidence.
- 2.3 The interior of the buildings, including its roof voids, was also visually assessed for evidence of bat activity and / or for the potential to be used by bats. Evidence of a roost was determined as the presence of a dead or live bat(s), concentrated piles or scattered droppings, food remains such as insect wing fragments as well as scratch marks and/or staining. In addition, any basement / cellar areas were also inspected for the above features.

Tree Assessment

- 2.4 Tree assessments were undertaken from ground level, with the aid of a torch and binoculars (where appropriate). During the survey Potential Roosting Features (PRF) for bats such as the following were sought (Based on P16, British Standard 8596:2015 *Surveying for bats in trees and woodland*, October 2015):
- Natural holes (e.g. knot holes) arising from naturally shed branches or branches previously pruned back to a branch collar.
 - Man-made holes (e.g. cavities that have developed from flush cuts or cavities created by branches tearing out from parent stems).
 - Woodpecker holes.
 - Cracks / splits in stems or braches (horizontal and vertical).
 - Partially detached, loose or bark plates.
 - Cankers (caused by localised bark death) in which cavities have developed.
 - Other hollows or cavities, including butt rots.
 - Compression of forks with included bark, forming potential cavities.

- Crossing stems or branches with suitable roosting space between.
 - Ivy stems with diameters in excess of 50mm with suitable roosting space behind (or where roosting space can be seen where a mat of thinner stems has left a gap between the mat and the trunk).
 - Bat or bird boxes.
 - Other suitable places of rest or shelter.
- 2.5 Certain factors such as orientation of the feature, its height from the ground, the direct surroundings and its location in respect to other features may enhance or reduce the potential value.
- 2.6 Trees were classified into general bat roost potential groups based upon the presence of these features. Table 1 (overleaf) broadly classifies the potential categories as accurately as possible as well as discussing the relevance of the features. This table is based upon Table 4.1 and Chapter 6 in *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (Bat Conservation Trust 2016).
- 2.7 Although the British Standard 8596:2015 document groups trees with moderate and high potential, these have been separated below (as per Table 4.1 in The Bat Conservation Trust Guidelines) to allow more specific survey criteria to be applied.

Table 1: Classification and Survey Requirements for Bats in Trees

Classification of Tree	Description of Category and Associated Features (based on Potential Roosting Features listed above)	Likely Further Survey work / Actions
Confirmed Roost	Evidence of roosting bats in the form of live / dead bats, droppings, urine staining, mammalian fur oil staining, etc.	A Natural England derogation licence application will be required if the tree or roost site is affected by the development or proposed arboricultural works. This will require a combination of aerial assessment by roped access bat workers (where possible, health and safety constraints allowing) and nocturnal survey during appropriate periods (e.g. nocturnal survey - May to August) to inform on the licence. Works to tree undertaken under supervision in accordance with the approved good practice method statement provided within the licence. However, where confirmed roost site(s) are not affected by works, work under a precautionary good practice method statement may be possible.

Classification of Tree	Description of Category and Associated Features (based on Potential Roosting Features listed above)	Likely Further Survey work / Actions
High Potential	A tree with one or more Potential Roosting Features that are obviously suitable for larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter protection, conditions (height above ground level, light levels, etc). Examples include (but are not limited to); woodpecker holes, larger cavities, hollow trunks, hazard beams, etc.	Aerial assessment by roped access bat workers (if appropriate) and / or nocturnal survey during appropriate period (May to August). Following additional assessments, tree may be upgraded or downgraded based on findings. If roost sites are confirmed and the tree or roost is to be affected by proposals a licence from Natural England will be required. After completion of survey work (and the presence of a bat roost is discounted), a precautionary working method statement may still be appropriate.
Moderate Potential	A tree with Potential Roosting Features which could support one or more potential roost sites due to their size, shelter protection, conditions (height above ground level, light levels, etc) and surrounding habitat but unlikely to support a roost of high conservation status (i.e. larger roost, irrespective of wider conservation status). Examples include (but are not limited to); woodpecker holes, rot cavities, branch socket cavities, etc.	A combination of aerial assessment by roped access bat workers and / or nocturnal survey during appropriate period (May to August). Following additional assessments, tree may be upgraded or downgraded based on findings. After completion of survey work (and the presence of a bat roost is discounted), a precautionary working method statement may still be appropriate. If a roost site/s is confirmed a licence from Natural England will be required.
Low Potential	A tree of sufficient size and age to contain Potential Roosting Features but with none seen from ground or features seen only very limited potential. Examples include (but are not limited to); loose/lifted bark, shallow splits exposed to elements or upward facing holes.	No further survey required but a precautionary working method statement may be appropriate.
Negligible/No potential	Negligible/no habitat features likely to be used by roosting bats	None.

* The Conservation of Habitats & Species Regulations 2010 (as amended) affords protection to “breeding sites” and “resting places” of bats. The EU Commission’s Guidance document on the strict protection of animal species of Community interest under the Habitats Directive 92/43/EEC, February 2007 states that these are places “where there is a reasonably high probability that the species concerned will return”.

- 2.8 The assessment of trees and buildings was completed by a suitably experienced bat worker on the 8th of June 2015.

Transect Survey

- 2.9 The site was assessed as having a low/moderate potential to bats, and therefore monthly surveys were proposed as recommended by Bat Conservation Trust (2012) Bat Surveys- Good Practice Guidelines 2nd edition¹. Dusk surveys were therefore completed within the site boundary in April, May, June, July, August and September with a pre-dawn survey also undertaken in September.
- 2.10 The transect routes were determined prior to the surveys being completed, paying particular attention to linear features. Such features included hedgerows / tree lines, and natural features such as watercourses and areas of scrub, which are often used by foraging and commuting bats. Suitable habitats within the survey area included grassland, plantation woodland, hedgerows and waterbodies. To cover the habitats within the site, a single transect route was walked by licensed/experienced bat workers. On each of the survey occasions the transect was either started at least 15mins prior to sunset and continued until at least 2hr following sunset or began 2 hours prior to sunrise and continued until at least 15mins following sunrise.
- 2.11 The transects were walked at a steady pace and when a bat passed by, the species, time and behaviour was recorded on a site plan. Bat box[®] Ltd Duet bat detectors were utilised in conjunction with MP3 recorders to provide back-up information and enable field identification of bats encountered.
- 2.12 The transect surveys included a number of point counts. Each point count was 5 minutes in duration during which time all bat activity was recorded. The point counts were strategically located throughout the site to ensure a comprehensive coverage of habitats present.
- 2.13 Post-survey, bat calls were analysed using BatSound[®] (version 4.1.4), by taking measurements of the peak frequency, inter-pulse interval, call duration and end frequency. From this, the level of bat activity across the site in relation to the abundance of individual species foraging and commuting along habitats was assessed.
- 2.14 These transects were undertaken in periods of good weather i.e. an ambient temperature of at least 10°C, with little/no wind and rain.
- 2.15 A summary of the conditions for each survey is shown in Table 2 below:

¹ Bat Conservation Trust, Bat Surveys (2012) Good Practice Guidelines 2nd Edition.

Table 2: Summary of Transect Survey Dates and Conditions

Date (dusk survey unless otherwise stated)	Sunset/Sunrise	Start / finish time	Temperature	Rain	Wind (Beaufort)	% Cloud Cover
Survey 1- 21/05/2015	21:09	20:54	13°C	1	0	100
Survey 2 - 18/06/2015	21:31	21:16	15°C	0	2	60
Survey 3- 16/07/2015	21:26	21:11	14°C	0	1	20
Survey 4 - 06/08/2015	20:53	20:38	16°C	0	1	0
Survey 5a - 21/09/2015	19:08	18:53	12°C	0	1	30
Survey 5b- 22/09/2015	06:08	04:08	10°C	0	0	50

(Wind levels were assessed using the Beaufort scale – B0 – less than 1 mph, B1 – 1-3mph, B2 – 4-7mph, B3 – 8-12mph, B4 – 13-18mph, B5 – 19-24mph)

Static Detector Survey

- 2.16 A number of static passive recording broadband detectors were deployed on site to supplement the manual transect surveys through passive recording as recommended in the guidance document Bat Conservation Trust (2012) Bat Surveys- Good Practice Guidelines 2nd edition² and in the European Guidelines (Rodrigues *et al.* 2008). This information was used to derive an index of activity at different points within the site.
- 2.17 The model of automated detectors used were AnaBat™ SD1 (Titley™ Scientific). Detectors were programmed to activate 30 minutes before dusk and recorded continuously until 30 minutes following sunrise.
- 2.18 In accordance with the guidance a static detector was placed on-site monthly (in May, June, July, August and September). See Table 3 for survey conditions and deployment dates and Figure 3 for static location each month (locations chosen to provide an appropriate representation of the on-site habitats).
- 2.19 The recorded data was analysed using AnaLookW® software (Titley™ Scientific) to assess the amount of bat activity on site by recording the number of bat registrations.

² Bat Conservation Trust, Bat Surveys (2012) Good Practice Guidelines 2nd Edition.

Table 3: Static Detector Survey Conditions

Survey Ref & Date	Area	Conditions
Static Detector Survey 1 - 21 st – 25 th May	Two locations / units – the first located centrally within the northern part of the site at the edge of semi-mature woodland bordering an arable field with the second situated centrally within the southern compartment in a small gap between two areas of semi-mature woodland within bovine grazed pasture.	Desktop data indicates that there was no rain during this period and although temperatures did occasionally drop and wind sometimes got a little high, the majority of the survey period was suitable
Static Detector Survey 2 - 9 th – 14 th June	Two locations / units – the first located just north of the centre of the northern compartment at the end the edge of semi-mature woodland bordering an arable field with the second located centrally within the southern compartment on the edge of semi-mature woodland / bovine grazed pasture.	Desktop data indicates that there was very light rain during this period with occasional moderate rain and temperatures whilst occasionally dropping to below optimum, were predominantly suitable.
Static Detector Survey 3 - 8 th -12 th July	Two locations / units – the first located on the edge of semi-mature woodland towards the south of the site bordering bovine grazed pasture, the second situated along the western edge of site on the edge of semi-mature woodland bordering rank grassland.	Desktop data indicates that there was occasional light rain during this warm period and whilst occasional high wind was present, this was not considered to be a limiting factor.

Survey Ref & Date	Area	Conditions
Static Detector Survey 4 - 4 th – 9 th August	Two locations / units – the first located at the extreme northern end of the site located on the edge of semi-mature woodland adjacent to a previously developed area with the second located centrally towards the northern boundary of the southern part of the site on the edge of semi-mature woodland / bovine grazed pasture.	Desktop data indicates that there was no rain during this period with occasional moderate winds with overall warm temperatures.
Static Detector Survey 5 - 15 th – 19 th September	Two locations / units – the first located along the north western boundary within an area of semi-mature woodland / scrub with the second located along the north eastern boundary on the edge of semi-mature woodland / bovine grazed pasture.	Desktop data indicates that there was occasional very light rain, occasional low winds and a moderate average temperature during this period.

Survey Limitations

- 2.20 Many of the surveys conducted on site were undertaken under guidance (BCT 2012) which has since been superseded (BCT, 2016). Where appropriate (such as trees) methods have been retrospectively altered, but in some cases this was not possible (transects, statics). However although minor variations are present within the methodologies, given the broad similarities in working methods between the two editions, the current data is considered to be an accurate representation of the local bat population.
- 2.21 In departure from guidance and after consultation with the Local Authority Ecologist, only 5 visits for statics and transects were undertaken monthly between May and September. The rationale was based on the data recorded on previous surveys, the sites location and conditions, which meant an October survey was considered to be of low value and therefore not undertaken. However although 1 survey is missing from the data set, this is not considered to be a constraint.
- 2.22 During the June static detector survey one of the units failed due a to technical fault. It was considered however that the lack of data resulting from this did not affect the overall assessment of the bat assemblage using the site due to all other units being successful as well as a comprehensive suite of transect surveys all undertaken under suitable conditions.
- 2.23 The passive recording units do not discern between individual bats or a single bat passing the microphone several times and therefore the data recorded can only provide an indication of bat activity as bat registrations per unit time.

3.0 RESULTS & EVALUATION

Desk Study (Figure 1)

- 3.1 Rotherham Biological Records provided details of several bat sightings within the local area including soprano pipistrelle *Pipistrellus pygmaeus*, brown long-eared *Plecotus auritus*, Leislars *Nyctalus leisleri* and noctule *Nyctalus noctula* along with unidentified *Pipistrelle* and *Nyctalus* species. Two records for soprano pipistrelle bat roosts (possibly the same roost) were identified within the consultation results however both of these were 15 years old and located at Worsborough Hall situated around 1.5km north from site where a single brown long-eared and an unidentified bat species were also recorded. Records exist for individual species closer to the site for a common pipistrelle and a noctule with both of these records being from 2004 located at Shortwood Business Park, around 50m to the east of the site boundary. Other historic records exist however none of these are considered to be pertinent due to both the age of the record and the distance from site.

Field Surveys

General Site Assessment (See Figure 2 – Phase 1 Plan)

- 3.2 Habitats within the site boundary were considered to provide 'low-medium' quality in relation to value for bat commuting and foraging (following BCT's assessment methodology) comprising predominantly of open pasture with areas of immature plantation woodland and two small waterbodies which were considered to provide sub-optimal foraging habitat for species often associated with water such as Daubenton's and Natterer's. Connectivity through the site was considered to be poor due to the well-lit A6195 centrally bisecting the site which is largely considered to prevent commuting in a north / south direction apart from by high flying species, chiefly noctule. Commuting within the northern and southern portions was considered to be good however due to the reasonably well connected linear features of the plantation and occasional hedgerows.

Building Assessments

- 3.3 A total of four buildings B1, B2, B3 and B4 were present within an area of horse grazed pasture to the extreme south of the site, all of which were predominantly corrugated metal horse shelters none of which offered any potential to support roosting bats beyond perhaps occasional feeding roosts however the lack of prey remains suggested that they were not used for this purpose.

Assessment of Trees

- 3.4 No trees were present on site that offered any roosting potential for bats, due to the relatively young age of all of the trees and consequent lack of features.

Transect Surveys

- 3.5 The following sections are a summary of the data recorded during the activity surveys in 2015. Further detail is provided in the attached Figures (Figures 3-9) and appendices (Appendix A)

Survey 1 - Dusk Transect 21st May 2015 (Figure 4 and Appendix A&C)

- 3.6 During the survey a total of 17 bat contacts were recorded with 15 of these being recorded during the walked part of the survey and the remaining 2 during point counts. Only 1 species was accurately identified, this being common pipistrelle *Pipistrellus pipistrellus* and an unknown *Nyctallus* species, most probably noctule *Nyctalus noctula*. All bats were recorded evenly throughout the southern part of the site however only 2 passes were recorded within the northern part of the site.
- 3.7 No bats were recorded in the location of PC1 – PC8.

Survey 2 - Dusk Transect 18th June 2015 (Figure 5 and Appendix A&C)

- 3.8 During the survey a total of 3 bat contacts were made with 2 of these being recorded during the walked part of the transect with the other, of the *Myotis* genus which couldn't be identified to species level recorded during PC8.
- 3.9 All three passes were recorded within the southern part of the site however given such a low number of contacts it is not considered that any conclusions can be drawn from this.

Survey 3 - Dusk Transect 16th July 2015 (Figure 6 and Appendix A&C)

- 3.10 During the survey a total of 14 bat passes were recorded with 13 of these being passes from common pipistrelle bats and a single pass from a *Nyctalus* species believed to be a noctule.
- 3.11 Passes were reasonably evenly distributed through the site however there was a slight concentration in the southernmost cattle grazed field from an unknown *Nyctalus* and two passes from common pipistrelles.

Survey 4 - Dusk Transect 6th August 2015 (Figure 7 and Appendix A&C)

- 3.12 Four bat passes were recorded, all of which were from common pipistrelles with two of these being recorded during the transect and another two during point counts.
- 3.13 Although such low number of bats prevented an accurate assessment of distribution impossible, three of the contact were centred around PC7 however this may have been the same bat due to the timings being very close together and all from common pipistrelle.

Survey 5 - Dusk Transect 21st September 2015 (Figure 8 and Appendix A&C)

- 3.14 During the dusk transect 4 bat passes were recorded, all from common pipistrelles. All passes were again recorded within the southern section of the site however as previously mentioned, such low numbers of recordings from common species do not provide useable data in identifying areas of high activity.

Survey 6 - Dawn Transect 22nd September (Figure 9 and Appendix A&C)

- 3.15 No bats were recorded during this survey despite conditions being considered to be suitable. No explanation can be given for the complete lack of passes with equipment checked post survey and found to be in perfect working order.
- 3.16 Given the previously low – very low number of registrations, no passes is not considered to be particularly notable.

Summary

- 3.17 During the surveys bat activity ranged from between 17 passes during the first, May, survey and 0 during the final September Dawn Survey. Overall only common pipistrelle was identified to species level however passes from *Nyctalus* and *Myotis* species were also recorded. Whilst they couldn't be identified to species level they were strongly believed to be noctule and Daubenton's *Myotis daubentonii*. Although such low numbers of bats were recorded to render the peak areas of activity to be largely academic, the southernmost cattle grazed area had the highest number of contacts whilst the whole of the site north of the road presented very little bat activity.

Static Detector Survey

- 3.18 The following text summarises the results of the static detector recording devices. Two static detectors were deployed during each survey occasion. The locations of the detectors can be seen on the Static Detector Location Plan (Figure 10).

Static survey 1 - 21st - 26th May – Detectors 1&2

- 3.19 During the May static survey period static unit 1 recorded a total number of 1237 registrations with species / species groups including common pipistrelle (1117 registrations), soprano pipistrelle (2 registrations) and Noctule (14 registrations).
- 3.20 During this period static unit 2 recorded a total of 278 registrations with species / species groups including common pipistrelle (241 registrations), soprano pipistrelle (1 registrations) and Noctule (5 registrations).
- 3.21 Unidentifiable *Nyctalus* species and a single pass from an unidentifiable (due to the low quality of the recording) pipistrelle species but believed to be either a common or a soprano pipistrelle were also recorded.

Static survey 2 - 9th - 15th June – Detectors 3&4

- 3.22 During the June survey one of the units deployed, unit 4, failed to record any bat passes however following retrieval no technical errors were identified with the unit. The second unit recorded 317 registrations from common pipistrelle (295), noctule (2) and a single pass from a soprano pipistrelle. A number of passes from unidentifiable *Nyctallus*, *myotis* and pipistrelle species were recorded.

Static survey 3 - 8th - 13th July Detectors 5&6

- 3.23 During the July static survey period, static unit 5 recorded a total of 356 registrations with species / species groups including common pipistrelle (326 registrations), soprano pipistrelle (15 registrations) along with 2 unknown *Myotis* species and a single unknown pipistrelle species.

- 3.24 Unit 6 recorded a total of 47 registrations with species / species groups including common pipistrelle (36 registrations) and 11 unknown *Nyctalus* registrations. No other species / unidentifiable records were recorded.

Static survey 4 - 4th - 10th August Detectors 7&8

- 3.25 During the August static survey period, static unit 7 recorded a total of 696 registrations with species / species groups including common pipistrelle (652 registrations), soprano pipistrelle (12 registrations), two noctule, a single brown long-eared *Plecotus auritus*, 21 unidentifiable *Nyctalus* species, 4 *Myotis* species and 3 unknown pipistrelle species.
- 3.26 During the August static survey period, static unit 8 recorded a total of 276 registrations with species / species groups including common pipistrelle (268 registrations) and 8 unidentifiable *Nyctalus* species.

Static survey 5 - 15th – 20th September Detectors 9&10

- 3.27 During the September static survey period, static unit 9 recorded a total of 170 registrations with species / species groups including common pipistrelle (128 registrations), soprano pipistrelle (27 registrations), 9 unidentifiable *Nyctalus* species and 6 *Myotis* species.
- 3.28 During the September static survey period, static unit 10 recorded a total of 580 registrations with species / species groups including common pipistrelle (460 registrations), soprano pipistrelle (9 registrations), 107 unidentifiable *Nyctalus* species, 3 *Myotis* species and a single unknown pipistrelle species.

Summary

- 3.29 During the surveys the greatest levels of activity were recorded on static detector number 1 during the first, May, survey with a total of 1237 registrations with the lowest, aside from detector 4 in June which did not register a single pass, being recorded from detector 6 in July which received 47 registrations.
- 3.30 The total numbers of bats recorded during the survey period from all species is as follows:
- Common pipistrelle – 3523
 - *Nyctalus* species – 318
 - Soprano pipistrelle – 67
 - Noctule – 24
 - *Myotis* species – 15
 - Pipistrelle species – 9
 - Brown long-eared – 1

Notes

- 3.31 Where calls could not be identified to species level, for example due to the lower quality of those recordings or where there are similarities between species echolocation calls (particularly for *Myotis* and *Nyctalus* species) making a definite identification difficult, a likely species identification is provided. This is based on the features displayed by the calls when analysed using the Ana look data analysis software package and taking in to account the geographical location of the site and the habitats present. It was therefore considered that:
- *Pipistrelle* species were either common or soprano pipistrelle bats;
 - *Myotis* species were likely to be largely Daubenton's bats either foraging or commuting
 - *Nyctalus* species bats were likely to be noctule bats however although reasonably unlikely, Leislars could not categorically be ruled out.
- 3.32 It should be noted that individual bats cannot be identified and it is impossible to ascertain whether a set of results from the same species has been obtained from numerous individual bat registrations or from a single bat repeatedly calling in the vicinity of the detector therefore the results should be considered as a relative measure of abundance.

Tables 4 – Static Detector Results

Recording Period	Unit Number	Survey Dates	Survey Hours	Total Avg.per hour	Total Registrations	Common Pipistrelle			Nyctalus Species			Soprano Pipistrelle		
						Avg.per hour	Peak Count	Period Total	Avg.per hour	Peak Count	Period Total	Avg.per hour	Peak Count	Period Total
May	3	21/05/2015 - 26/05/2015	46	26.59	1237	24.01	622	1117	2.17	62	101	0.04	2	2
May	4	21/05/2015 - 26/05/2015	46	5.98	278	5.18	159	241	0.67	19	31	0.02	1	1
Jun	7	09/06/2015 - 15/06/2015	50	6.27	317	5.83	114	295	0.36	9	18	0.02	1	1
Jun	0		0	0.00	0	0.00	0	0	0.00	0	0	0.00	0	0
Jul	1	08/07/2015 - 13/07/2015	45	7.91	356	7.24	114	326	0.27	6	12	0.33	7	15
Jul	7	09/07/2015 - 13/07/2015	37	1.26	47	0.97	18	36	0.30	4	11	0.00	0	0
Aug	4	04/08/2015 - 10/08/2015	61	11.36	696	10.64	178	652	0.34	9	21	0.20	7	12
Aug	5	04/08/2015 - 07/08/2015	34	8.07	276	7.84	216	268	0.23	4	8	0.00	0	0
Sep	6	15/09/2015 - 20/09/2015	68	2.50	170	1.88	47	128	0.13	4	9	0.40	15	27
Sep	7	15/09/2015 - 20/09/2015	68	8.53	580	6.76	213	460	1.57	86	107	0.13	5	9
Total			458	8.63	3957	7.68	622	3523	0.69	86	318	0.15	15	67

Recording Period	Unit Number	Survey Dates	Survey Hours	Total Avg.per hour	Total Registrations	Noctule			Myotis Species			Pipistrelle Species			Brown Long-eared		
						Avg.per hour	Peak Count	Period Total	Avg.per hour	Peak Count	Period Total	Avg.per hour	Peak Count	Period Total	Avg.per hour	Peak Count	Period Total
May	3	21/05/2015 - 26/05/2015	46	26.59	1237	0.30	13	14	0.00	0	0	0.06	1	3	0.00	0	0
May	4	21/05/2015 - 26/05/2015	46	5.98	278	0.11	3	5	0.00	0	0	0.00	0	0	0.00	0	0
Jun	7	09/06/2015 - 15/06/2015	50	6.27	317	0.04	1	2	0.00	0	0	0.02	1	1	0.00	0	0
Jun	0		0	0.00	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0
Jul	1	08/07/2015 - 13/07/2015	45	7.91	356	0.00	0	0	0.04	2	2	0.02	1	1	0.00	0	0
Jul	7	09/07/2015 - 13/07/2015	37	1.26	47	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0
Aug	4	04/08/2015 - 10/08/2015	61	11.36	696	0.05	2	3	0.07	2	4	0.05	1	3	0.02	1	1
Aug	5	04/08/2015 - 07/08/2015	34	8.07	276	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0
Sep	6	15/09/2015 - 20/09/2015	68	2.50	170	0.00	0	0	0.09	2	6	0.00	0	0	0.00	0	0
Sep	7	15/09/2015 - 20/09/2015	68	8.53	580	0.00	0	0	0.04	2	3	0.01	1	1	0.00	0	0
Total			458	8.63	3957	0.05	13	24	0.03	2	15	0.02	1	9	0.00	1	1

4.0 DISCUSSION AND CONCLUSIONS

Site Habitats

Assessment

Trees

- 4.1 Ground based assessments of the trees were made, during which no features suitable to support bats were recorded largely due to the species of trees and their immaturity.
- 4.2 As such bats within trees need not be considered further and arborecultural works can take place without the need for further survey nor supervision of works.
- 4.3 In terms of other activity, the majority of bat contacts both visual and audible were made in the vicinity of the trees and so this should be considered during masterplanning.
- 4.4 It should be noted that the trees on-site were considered to potentially provide commuting routes for bats and as such where possibly linear tree lines should be retained. Where such features cannot be incorporated into the masterplan, replacing them within the development to provide commuting features of the same orientation should be considered.

Buildings

- 4.5 A total of four buildings B1, B2, B3 and B4 were present within an area of horse grazed pasture to the extreme south of the site, all of which were predominantly corrugated metal horse shelters none of which offered any potential to support roosting bats beyond perhaps occasional feeding roosts however the lack of prey remains suggested that they were not used for this purpose.
- 4.6 During the building inspections no evidence of bats was recorded nor was there considered to be any potential for the structures to support roosting bats.
- 4.7 As such bats are not considered to pose a constraint to the removal of any of the on-site buildings.

Bat Activity

Transects

- 4.8 In accordance with BCT best practice, monthly transects were undertaken upon the site and due to the size of the survey area, a single transect route was able to adequately cover all habitats.
- 4.9 During the extensive survey effort, bat levels of activity ranged from no contacts during the September dawn survey to a maximum of 17 bat contacts during the May survey with an average number of bats recorded per transect being 7 passes, all from common and wide spread species.
- 4.10 The southern section of the site returned the highest number of bat passes most probably due to the southern area being larger and having greater foraging resources owing to the proximities of waterbodies as well as large numbers of cattle which attract invertebrate prey.
- 4.11 Given the time length of the transects and the amount of survey time per transect, the levels of activity on-site were not considered to be significant.

- 4.12 A single species of bat was accurately recorded during the transect surveys, common pipistrelle which totalled 38 passes. A single pass from a *Myotis* species was also recorded, believed to be a Daubenton's bat along with 3 *Nyctalus* species all of which were believed to be Noctule.
- 4.13 The surveys were undertaken in an attempt to identify areas of peak activity however due to the scarcity of records and their even distribution through the site, no areas were considered notable due to the high levels of bat passes.
- 4.14 Based upon the transect findings it is considered that the majority of the habitats on-site have some limited potential to support foraging and commuting bats however the lack of areas of peak activity and low overall contacts indicate generally a low usage of the site by bats, both in terms of overall numbers of bats as well as the individual species.
- 4.15 No rare or notable species were recorded during the transect surveys.
- 4.16 Following on from discussions with Barnsley Metropolitan Borough Council Biodiversity Officer, Trevor Mayne, it was proposed that due to the very low levels of activity recorded during both transect and static detector surveys, survey effort (both transect and static) could be reduced to 5 survey occasions for each as it was believed that very little if any additional information would be gained from additional survey effort.

Statics

- 4.17 The static dataset broadly supports the findings of the transects with the highest number of registrations also being made in May with 1515 registrations between the two detectors. The lowest number of passes was during the June transect with 317 passes.
- 4.18 During the static detector surveys, 4 species of bat were recorded and identified from 3,957 passes. Common pipistrelle with 622 passes, 67 soprano pipistrelle, 24 noctule and a single brown long-eared. The remaining passes were from three groups of bats (which couldn't be identified to species level), *Nyctalus*, *Myotis* and *Pipistrelle* with 318, 15 and 9 passes respectively.
- 4.19 The highest levels of data were recorded from detectors 1 and 2 which were roughly central within each of the northern and southern compartments. The lowest levels of data were returned from the June recording located at points 3 and 4 which were roughly in similar places to units 1 and 2. As conditions were suitable during the June survey period the most plausible explanation for the discrepancies between the number of bats is that units 1 and 2 were placed upon commuting routes / areas of high insect populations whereas units 3 and 4 were not placed in the vicinity of such features.
- 4.20 No rare or notable species were recorded during the automated detector surveys and it should be noted that registrations recorded on static bat detectors could potentially relate to either several registrations of one bat or single registrations of several bats and cannot be distinguished due to the method of data collection. Therefore, the static detector data results need to be interpreted with reference to other survey occasions and methods. The levels of activity recorded during all static detector surveys were somewhat higher than that of the transect surveys however it was noted that on the transect surveys there was relatively high levels of activity from small numbers of bats constantly foraging along certain features, hedgerows for example. As such, it is likely that the bats recorded during the static detector periods were also small numbers of bats foraging

for a prolonged period of time and therefore producing many registrations on the detector recordings.

Summary

- 4.21 Taking into account the above data collected from both transect and static surveys, the features considered to be of greatest value to bats is the southernmost field compartment of the southern part of the main site. That being said, even the peak levels of activity were considered to be so low as to raise doubt as to the value of these areas and it is considered more likely that the higher levels of bats has arisen by chance as opposed to numbers of bats regularly using the same routes. The species recorded during both surveys is considered to be unremarkable both in terms of overall bat numbers and the species recorded with both the levels of activity and individual species present being typical of both the local and wider area. That being said, an assemblage of bats was recorded and the site did hold value for this group, albeit limited.

Potential Impacts

- 4.22 As a result of the proposals the following will likely result in
- Clearance of on-site compartments to make room for developments;
 - Removal of larger sections of hedge to facilitate main infrastructure roads;
 - Potential disturbance from inappropriate lighting schemes onto linear features of interest;

Mitigation and Enhancement

- 4.23 The following section outlines the recommendations for mitigation, compensation and enhancement.
- 4.24 The National Planning Policy Framework (NPPF) places emphasis on sustainable development, and minimising impacts on biodiversity whilst providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity. Opportunities to incorporate biodiversity in and around developments should therefore be encouraged.
- 4.25 Proposals should therefore focus on ensuring that as little foraging habitat as possible is removed, lighting and noise are both kept to a minimum and where possible habitats are enhanced to improve their ability to support invertebrates. Connectivity through the site should be maintained and enhanced where possible, particularly the boundary habitats and hedgerows which should not be breached if possible. Lighting will be implemented as part of the development. All species of bats are sensitive to artificial light and will avoid well lit areas.
- 4.26 Although no trees within the site offered any potential to support roosting bats, some invertebrate prey will be created by them as well as the foraging and commuting potential they offer.
- 4.27 As such linear tree lines should be retained in-tact where possible to allow the passing of bats along such features. These measures listed in *Highways Agency Interim Advice Note Nature*

Conservation Advice in Relation to Bats are commonly used and are considered suitable for the bat species recorded within the site and broadly comprise as follows: Where breaches have to be made, to minimise potential impacts to foraging routes, when hedgerows are to be breached, retained hedgerows will be re-enforced with native species planting. Where a proposed breach of the hedgerow exceeds 7m in length, where possible the planting will also include the implementation of standard trees adjacent to the road/footpath which will grow above the level of vehicle movement. The lower branches of such trees should be regularly pruned back to the trunk in order to ensure that the most suitable flight line is above the maximum traffic height (where applicable, low level lighting columns may also be used in this instance to reduce the likelihood of bats using the lower tree regions). The implementation of such hop-overs will allow continued echolocation across the break thereby allowing continued usage of the hedgerow as a foraging/commuting area. It will also reduce the chances of road traffic collisions for bats as well as birds.

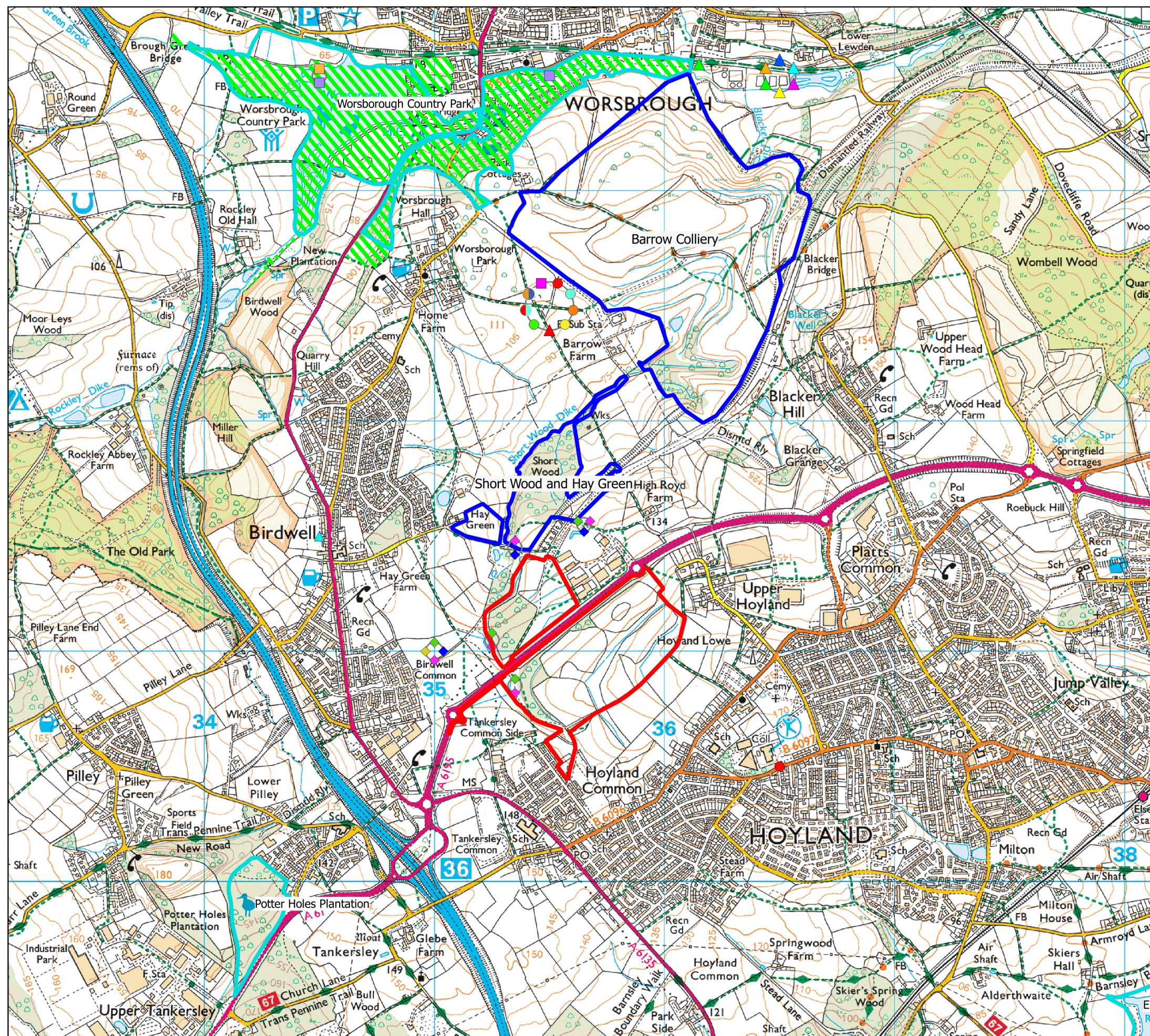
- 4.28 Whilst the hop overs will take a little while to establish, the tree standards to be used shall be of an appropriate size and will be planted early in the development cycle. Whilst the breach will be present during the construction period until the hop over is established due to the small size of the proposed breaches the impacts upon the bats potentially commuting along them is considered to be minor.

Lighting

- 4.29 In addition, where lighting impacts cannot be off-set by planting, lighting of the site should be implemented under good practice and in accordance with existing guidelines to minimise the impacts arising from light disturbance. (BCT, 2011) Recommended measures to avoid the unnecessary lighting of newly created or retained habitats including the following
- Avoiding unnecessary lighting / turning off when not required
 - The use of low level and / or hooded lamps to minimise light spill
 - Application of low-intensity (sodium lamps or similar) lighting where possible
 - Strategic planting or landscaping to shield sensitive areas
- 4.30 Additional enhancement in the form of bat boxes on suitable semi-mature/ mature trees around the site, especially in association with linear features or woodland and edge habitats would also create additional opportunities for roosting bats.

Summary

- 4.31 The strategic implementation of these measures is considered sufficient to ensure that there will be no significant adverse impacts upon the potential foraging and commuting habitats used by the local bat population. In addition, due to the overall nature the planting proposals a net gain to bat suitable habitats on-site may be achieved.
- 4.32 In the unlikely event that any bats are encountered during works, a licenced bat worker should be contacted immediately for further advice.
- 4.33 Although the exact masterplan has yet to be finalized, it is expected that some areas of potential commuting / foraging routes will be lost / severed. This is to be compensated for by extensive areas of suitable native landscape planting.



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Key

- Site Boundary
- Local Wildlife Sites (LWS)
- Local Nature Reserves (LNR)
- Country Parks
- Soprano Pipistrelle
- Bats
- Brown Long-Eared Bat
- Leisler's Bat
- Noctule
- Nyctalus Bat species
- Pipistrelle Bat species
- Common Frog
- Common Toad
- Great Crested Newt
- Smooth Newt
- Black-Tailed Godwit
- Brambling
- Fieldfare
- Firecrest
- Green Sandpiper
- Kingfisher
- Redwing
- Harvest Mouse
- Hedgehog
- Water Vole

client
Harworth Estates Ltd.

project
Rockingham Business Park, Barnsley

drawing title
SITE LOCATION AND COSULTATION RESULTS PLAN

scale
1:17,245

drawn
ABS / TM

issue
20/9/2016

drawing / figure number
Figure 1

rev
6424-E-01

Legend

- Buildings
- Broadleaved woodland - semi-natural
- Broadleaved woodland - plantation
- Standing water
- Improved grassland
- Poor semi-improved grassland
- Cultivated/disturbed land - arable
- Standing water
- Intact hedge - species-poor
- Fence
- Dry ditch
- Scrub - scattered
- Static Detectors



Harworth Estates
Rockingham Business Park, Barnsley

PHASE 1 HABITAT PLAN



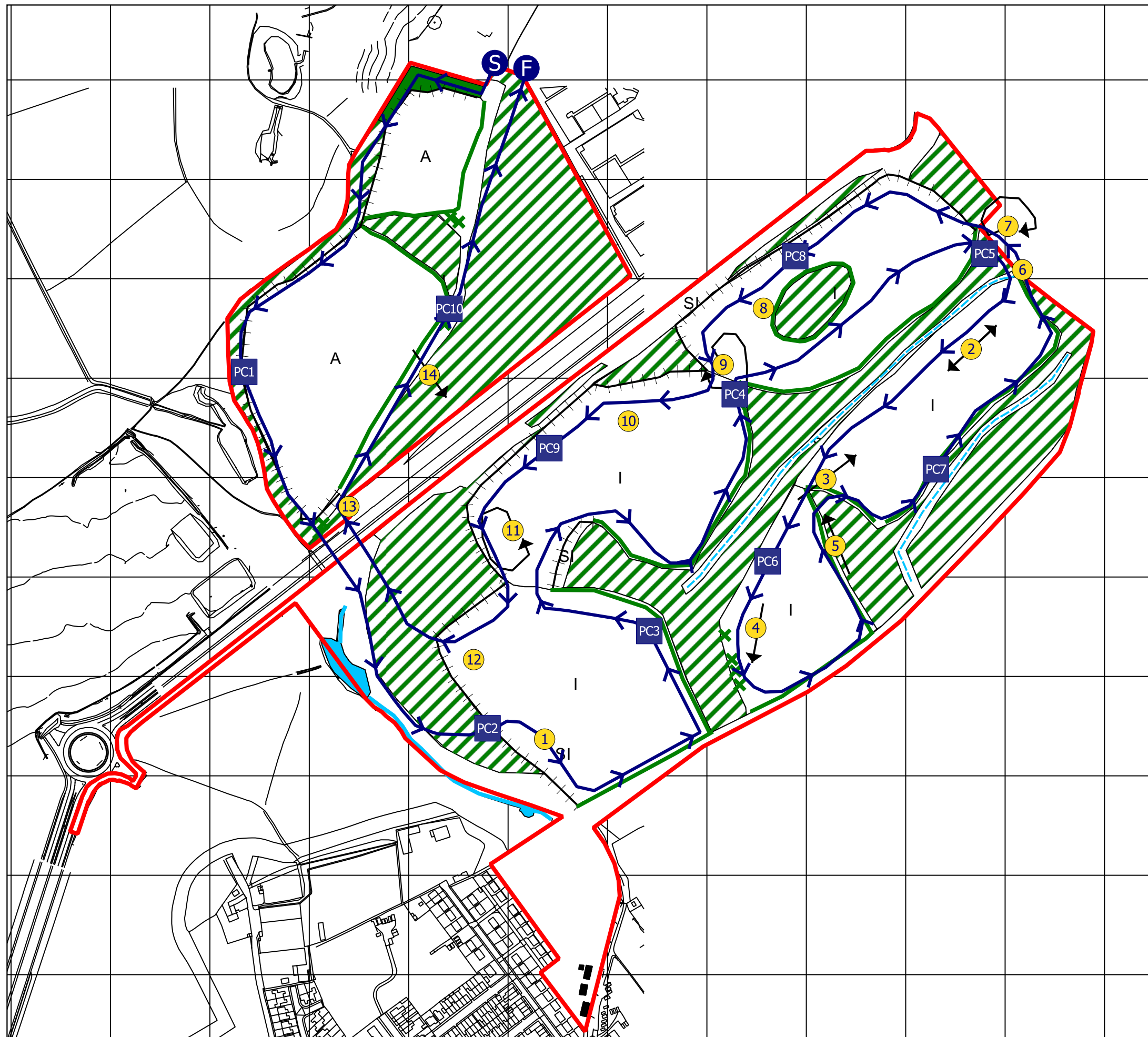
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OGJ / JD

11/8/2016

Figure 2

6424-E-02



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Key

- Site Boundary
- ➔ Transect Route
- Transect Start/Finish location
- Location of Bat Contact (with reference)
- Point Count Location (with reference)
- ➔ Direction of Flight of Observed Bat



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BAT ACTIVITY RESULTS PLAN - MAY



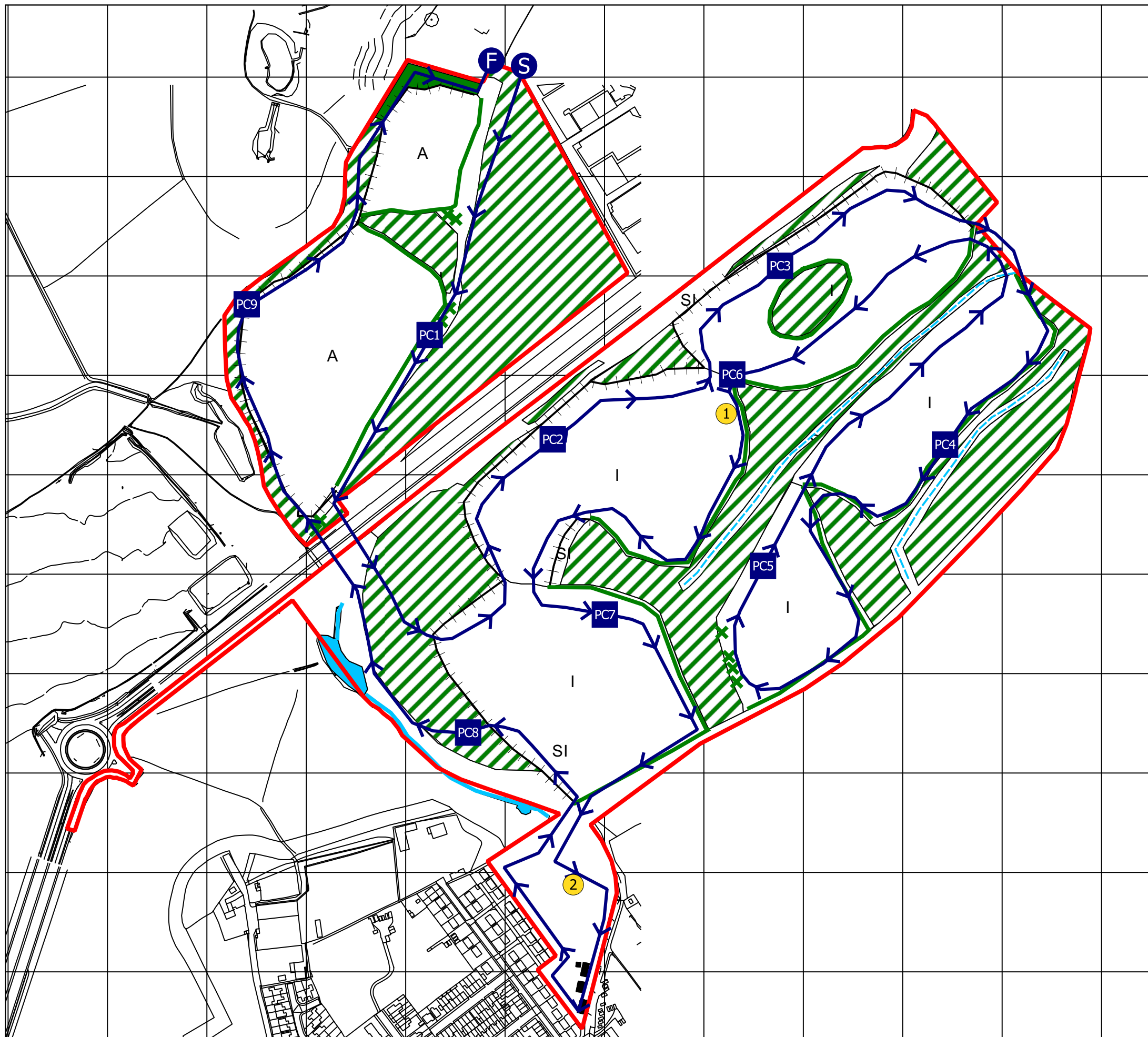
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Figure 3

6424-E-04



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Key

- Site Boundary
- ➔ Transect Route
- Transect Start/Finish location
- Location of Bat Contact (with reference)
- Point Count Location (with reference)



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BAT ACTIVITY RESULTS PLAN - JUNE



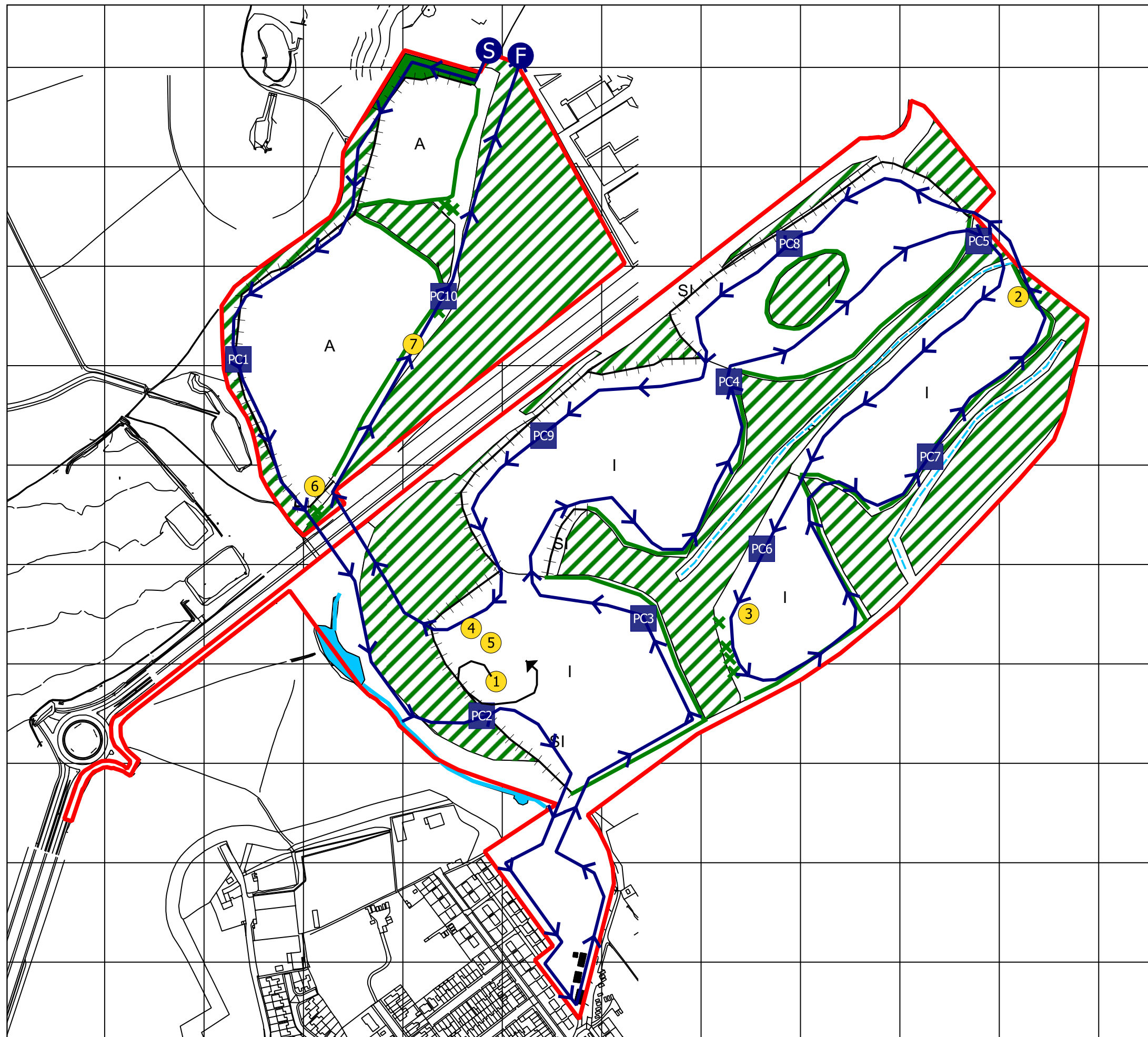
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Figure 4

6424-E-05



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Key

- Site Boundary
- ➔ Transect Route
- Transect Start/Finish location
- Location of Bat Contact (with reference)
- Point Count Location (with reference)
- ➔ Direction of Flight of Observed Bat



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BAT ACTIVITY RESULTS PLAN - JULY



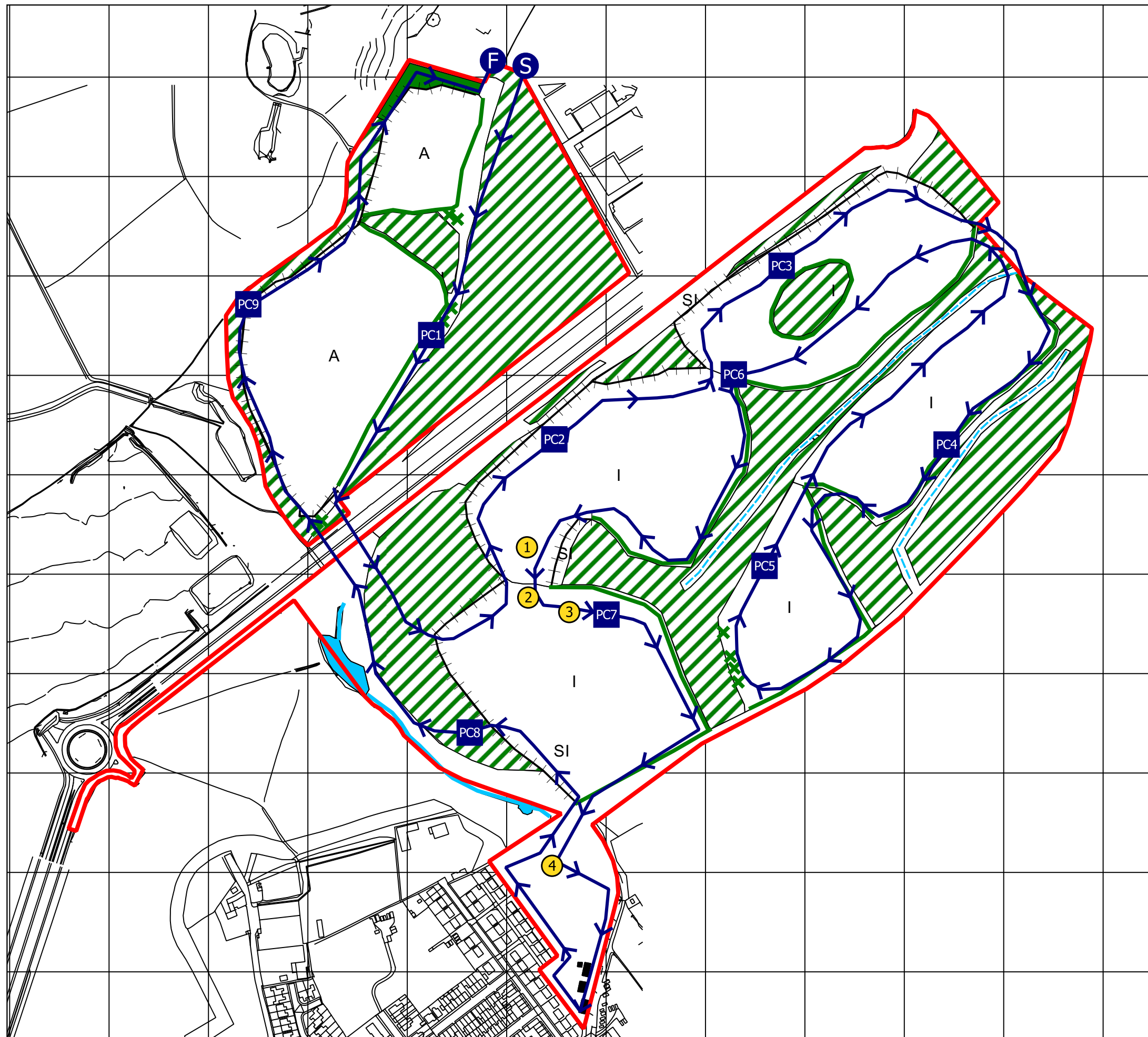
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Figure 5

6424-E-06



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Key

- Site Boundary
- ➔ Transect Route
- Transect Start/Finish location
- Location of Bat Contact (with reference)
- Point Count Location (with reference)



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BAT ACTIVITY RESULTS PLAN - AUGUST



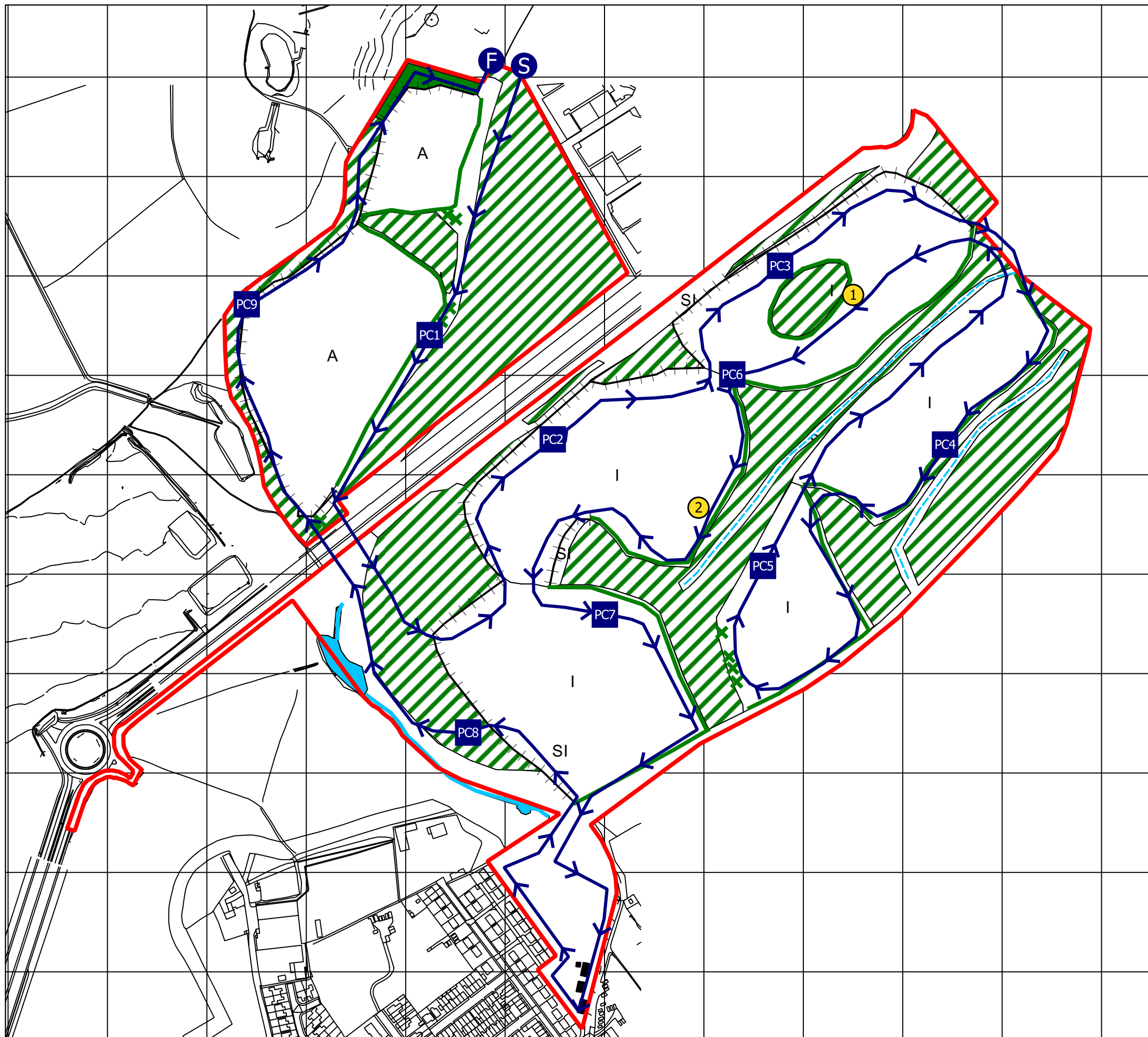
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Figure 6

6424-E-07



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Key

- Site Boundary
- ➔ Transect Route
- Transect Start/Finish location
- Location of Bat Contact (with reference)
- Point Count Location (with reference)



Harworth Estates Ltd.
Rockingham Business Park, Barnsley

BAT ACTIVITY RESULTS PLAN - SEPTEMBER (DUSK)



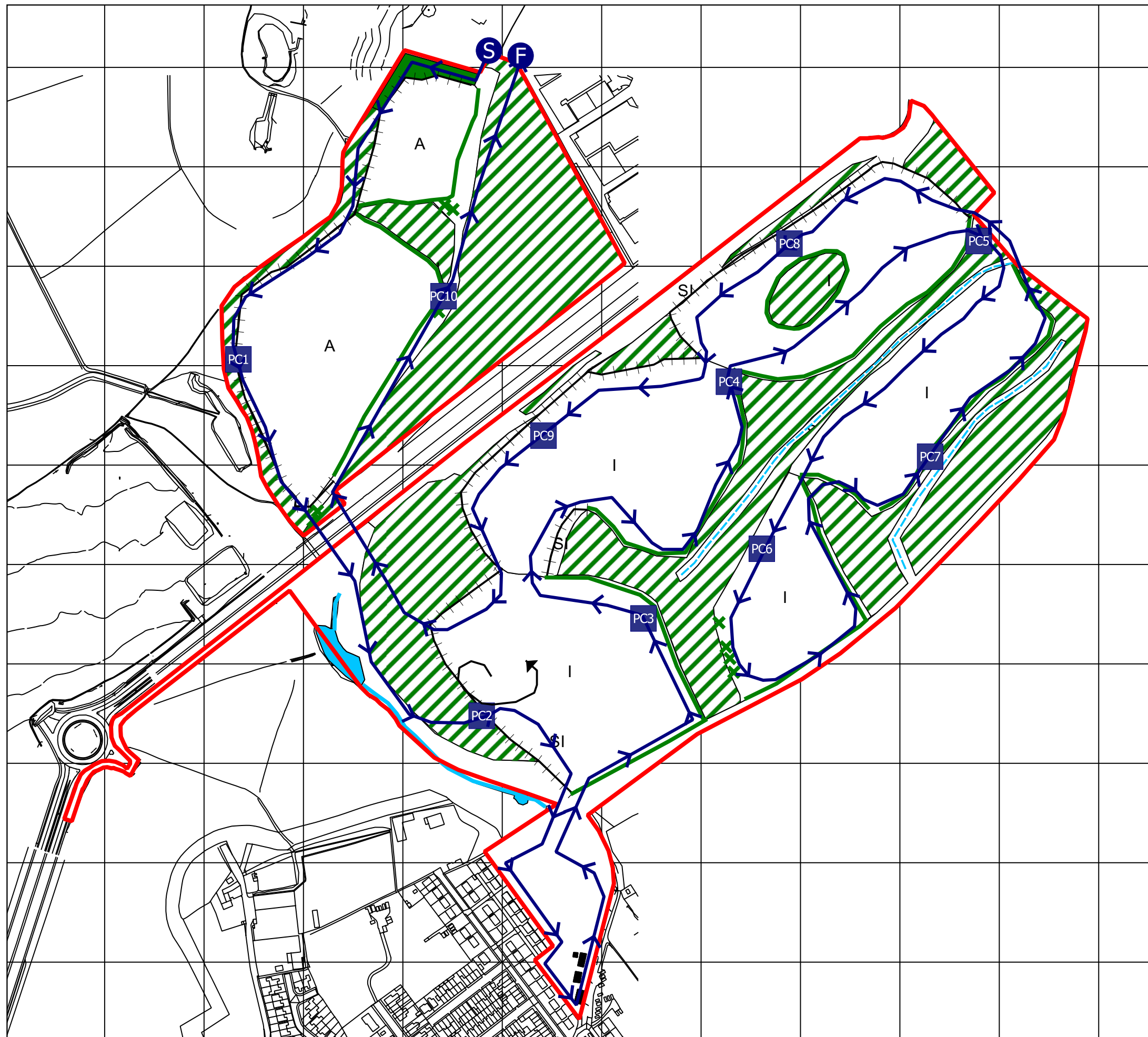
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OGJ / JD

20/9/2016

Figure 7

6424-E-08



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Key

- Site Boundary
- ➔ Transect Route
- Transect Start/Finish location
- Location of Bat Contact (with reference)
- Point Count Location (with reference)



Harworth Estates Ltd.
Rockingham Business Park, Barnsley

BAT ACTIVITY RESULTS PLAN - SEPTEMBER (DAWN)



Scale: 1:4,000

OGJ / JD

20/9/2016

Figure 8

6424-E-09

Appendix 1 – Summary Transect Survey Results

Month	Total contacts (point count number in bracket)	Species recorded (in abundance order, most to least)	Activity Summary
Survey 1: Dusk Transect 21 st May	17(2)	2: Common pipistrelle and Nyctalus spp.	The area of peak activity comprised of improved grassland in the centre of the site with 4 foraging common pipistrelle contacts. Other contacts from this species were evenly scattered across the southern section of the site. Both Nyctalus contacts were in the southern area of the site.
Survey 2: Dusk Transect 18 th June	3(1)	2: Common pipistrelle and Myotis spp.	The south area of the site had 2 bat contacts comprising a common pipistrelle foraging over improved grassland and a Myotis species foraging over plantation woodland. A common pipistrelle was recorded foraging along H11.
Survey 3: Dusk Transect 16 th July	14(7)	2: Common pipistrelle and Nyctalus spp.	The area of peak activity occurred in the south area of the site over improved grassland and plantation woodland with 4 contacts comprising of 3 contacts with foraging common pipistrelles and 1 foraging Nyctalus species. The rest of the contacts were scattered over the site.
Survey 4: Dusk Transect 4 th August	4(2)	1: Common pipistrelle	All contacts were recorded over improved grassland bordering plantation woodland adjacent to H11 and H12.
Survey 5: Dusk Transect 21 st September	4(2)	1: Common pipistrelle	The area of peak activity occurred in the centre of the site along H9-H12 adjacent to plantation woodland.
Survey 6: Dawn Transect 22 nd September	0	N/A	No activity recorded

Appendix 2 – Summary Static Survey Results

Survey period	Activity range with unit ref	Total registrations over (period)	Species recorded (in order of abundance and total number of registrations)
May	6(S2) to 700 registrations (S1), average of approximately 303 registrations. S1 located on H2 north of site in scattered scrub. S2 located centre of site in plantation woodland near dry ditch	1515(5 nights)	5: Common pipistrelle (1358), <i>Nyctalus</i> species (132), noctule (19), pipistrelle species (3) and soprano pipistrelle (3)
June	9 to 116 registrations (S4), average of approximately 53 registrations S3 located north of site on H1 S4 located centre of site on H4	317(6 nights)	5: Common pipistrelle (295), <i>Nyctalus</i> spp. (18), noctule (2), soprano pipistrelle (1) and pipistrelle spp. (1)
July	1(S6) to 149 registrations (S5), average of approximately 80 registrations S5 located south of site bordering plantation woodland S6 located outside of site boundary to the north west	403(5 nights)	5: Common pipistrelle (362), <i>Nyctalus</i> spp. (23), soprano pipistrelle (15), <i>Myotis</i> spp. (2) and pipistrelle spp. (1)
August	24 to 219 registrations (S8), average of approximately 162 registrations S7 located north of site in plantation woodland on site boundary S8 located in centre of site bordering plantation woodland	972(6 nights)	7: Common pipistrelle (920), <i>Nyctalus</i> spp. (29), soprano pipistrelle (12), <i>Myotis</i> spp. (4), noctule (3), pipistrelle spp. (3) and Brown long-eared (1)

Survey period	Activity range with unit ref	Total registrations over (period)	Species recorded (in order of abundance and total number of registrations)
September	14(S9) to 117 registrations (10), average of approximately 150 registrations S9 located on site boundary to the north west of site S10 located on site boundary to the north east of site.	750(5 nights)	5: Common pipistrelle (588), <i>Nyctalus</i> spp. (116), soprano pipistrelle (36), <i>Myotis</i> spp. (9) and pipistrelle spp. (1)

Appendix 3 – Detailed Transect Tables

Table 1: May Dusk

Contact ref no. or point count no.	Time	Species	Behaviour	Habitat	Description (visual/ non-visual)
Pc1	21:15 to 21:20	No bats	n/a	n/a	n/a
Pc2	21:09 to 21:11	No bats	n/a	n/a	n/a
1	21:14	Nyctalus	Commuting	Improved Grassland	Non-visual
Pc3	21:20 to 21:22	No bats	n/a	n/a	n/a
Pc4	21:31 to 21:33	No bats	n/a	n/a	n/a
Pc5	21:39 to 21:41	No bats	n/a	n/a	n/a
2	a) 21:42	Nyctalus	Commuting	Improved Grassland/Plantation Woodland	Non-visual
	b)21:43	Common Pipistrelle	Foraging	Improved Grassland/Plantation Woodland	Constant foraging along plantation boundary
3	21:48	Common Pipistrelle	Foraging	Plantation Woodland	Flying eastwards along plantation boundary
Pc6	21:51 to 21:53	No bats	n/a	n/a	n/a
4	21:54	Common Pipistrelle	Commuting	Plantation Woodland	Flying south-westwards along planation boundary
5	21:59	Common Pipistrelle	Commuting	Plantation Woodland	Non-visual
Pc7	22:03 to 22:05	No bats	n/a	n/a	n/a
6	22:11	Common Pipistrelle	Foraging	Improved Grassland	Non-visual
7	22:12	Common Pipistrelle	Foraging	Improved Grassland	Circling eastwards offsite
Pc8	22:18 to 22:20	No bats	n/a	n/a	n/a
8	22:21	Common Pipistrelle	Foraging	Improved Grassland	Non-visual
9	22:24	Common Pipistrelle	Foraging	Improved Grassland	Circling around the edge of improved grassland field
10	22:26	Common Pipistrelle	Foraging	Improved Grassland	Non-visual
11	22:13	Common Pipistrelle	Foraging	Improved Grassland	Circling around the centre of improved grassland field
Pc9	22:32 to 22:34	Common Pipistrelle	Foraging	Improved Grassland	Non-visual
12	22:40	Common Pipistrelle	Foraging	Improved Grassland	Non-visual

13	22:45	Common Pipistrelle	Foraging	Plantation Woodland	Non-visual
14	22:49	Common Pipistrelle	Foraging	Plantation Woodland	Flying south-eastwards
Pc10	22:51 to 22:53	Common Pipistrelle	Foraging	Plantation Woodland/Hedgerow	Non-visual

Table 2: June Dusk

Contact ref no. or point count no.	Time	Species	Behaviour	Habitat	Description (visual/ non-visual)
Pc1	21:20 to 21:25	No bats	n/a	n/a	n/a
Pc2	21:37 to 21:42	No bats	n/a	n/a	n/a
Pc3	21:48 to 21:53	No bats	n/a	n/a	n/a
Pc4	22:02 to 22:07	No bats	n/a	n/a	n/a
Pc5	22:18 to 22:23	No bats	n/a	n/a	n/a
Pc6	22:36 to 23:41	No bats	n/a	n/a	n/a
1	22:43	Common Pipistrelle	Foraging	Improved Grassland/Plantation Woodland	Non-visual
Pc7	22:51 to 22:56	No bats	n/a	n/a	n/a
2	23:03	Common Pipistrelle	Foraging	Improved Grassland	Non-visual
Pc8	23:10 to 23:15	Myotis	Foraging	Improved Grassland	Non-visual
Pc9	23:24 to 23:29	No bats	n/a	n/a	n/a

Table 3: July Dusk

Contact ref no. or point count no.	Time	Species	Behaviour	Habitat	Description (visual/ non-visual)
Pc1	21:15 to 21:20	No bats	n/a	n/a	n/a
1	21:34	Nyctalus	Foraging	Plantation Woodland	Circling above plantation boundary
Pc2	21:37 to 21:42	No bats	n/a	n/a	n/a
Pc3	21:51 to 21:56	21:54: Common Pipistrelle	Commuting	Plantation Woodland	Non-visual
Pc4	22:05 to 22:10	22:05: Common Pipistrelle	Commuting	Plantation Woodland	Non-visual
		22:09: Common Pipistrelle	Foraging	Plantation Woodland	Circling around plantation boundary
Pc5	22:16 to 22:21	No bats	n/a	n/a	n/a
2	22:26	Common Pipistrelle	Foraging	Improved Grassland	Circling around edge of field
Pc6	22:30 to 22:35	22:34: Common Pipistrelle	Foraging	Plantation Woodland	Circling along edge of plantation
3	22:42	Common Pipistrelle	Foraging	Plantation Woodland	Non-visual
Pc7	23:01 to 23:06	23:03: Common Pipistrelle	Foraging	Improved Grassland	Non-visual
		23:04: Common Pipistrelle	Foraging	Improved Grassland	Non-visual
4	23:10	Common Pipistrelle	Foraging	Plantation Woodland	Non-visual
5	23:13	Common Pipistrelle	Foraging	Plantation Woodland	Non-visual
Pc8	23:14 to 23:19	23:15: Common Pipistrelle	Foraging	Hedgerow	Non-visual
6	23:24	Common Pipistrelle	Foraging	Scrub	Non-visual
7	23:29	Common Pipistrelle	Foraging	Scrub	Non-visual

Table 4: August Dusk

Contact ref no. or point count no.	Time	Species	Behaviour	Habitat	Description (visual/ non-visual)
Pc1	18:51 to 19:01	No bats	n/a	n/a	n/a
Pc2	19:15 to 19:20	No bats	n/a	n/a	n/a
Pc3	19:27 to 19:31	No bats	n/a	n/a	n/a
Pc4	19:38 to 19:42	No bats	n/a	n/a	n/a
Pc5	22:16 to 22:21	No bats	n/a	n/a	n/a
Pc6	20:08 to 20:12	20:09: Common Pipistrelle	Foraging	Plantation Woodland	Non-visual
1	20:13	Common Pipistrelle	Foraging	Plantation Woodland/Improved Grassland	Non-visual
Pc7	20:18 to 20:23	20:20: Common Pipistrelle	Foraging	Plantation Woodland/Improved Grassland	Non-visual
2	20:28	Common Pipistrelle	Foraging	Plantation Woodland/Improved Grassland	Non-visual
Pc8	20:32 to 20:27	No bats	n/a	n/a	n/a
Pc9	20:46 to 20:50	No bats	n/a	n/a	n/a
Pc10	20:58 to 21:02	No bats	n/a	n/a	n/a

Table 5: September Dusk

Contact ref no. or point count no.	Time	Species	Behaviour	Habitat	Description (visual/ non-visual)
Pc1	18:57 to 19:01	No bats	n/a	n/a	n/a
Pc2	19:15 to 19:29	No bats	n/a	n/a	n/a
Pc3	19:27 to 19:31	No bats	n/a	n/a	n/a
Pc4	19:38 to 19:42	No bats	n/a	n/a	n/a
Pc5	19:52 to 19: 56	No bats	n/a	n/a	n/a
Pc6	20:08 to 20:12	20:09: Common Pipistrelle	Foraging	Plantation Woodland	Non-visual
n/a	20:13	Common Pipistrelle	Foraging	Improved Grassland	Non-visual
Pc7	20:18 to 20:22	20:20: Common pipistrelle	Foraging	Plantation Woodland	Non-visual
n/a	20:28	Common Pipistrelle	Foraging	Plantation Woodland	Non-visual
Pc8	20:32 to 20 36	No bats	n/a	n/a	n/a
Pc9	20:46 to 20:49	No bats	n/a	n/a	n/a
Pc10	20:58 to 21:02	No bats	n/a	n/a	n/a

Table 6: September Dawn

Contact ref no. or point count no.	Time	Species	Behaviour	Habitat	Description (visual/ non-visual)
Pc1	04:42 to 04:46	No bats	n/a	n/a	n/a
Pc2	04:52 to 04:56	No bats	n/a	n/a	n/a
Pc3	05:02 to 05:06	No bats	n/a	n/a	n/a
Pc4	05:11 to 05:15	No bats	n/a	n/a	n/a
Pc5	05:18 to 05:22	No bats	n/a	n/a	n/a
Pc6	05:27 to 05:31	No bats	n/a	n/a	n/a
Pc7	05:35 to 05:39	No bats	n/a	n/a	n/a
Pc8	05:44 to 05:49	No bats	n/a	n/a	n/a
Pc9	05:53 to 05:57	No bats	n/a	n/a	n/a
Pc10	06:02 to 06:04	No bats	n/a	n/a	n/a