

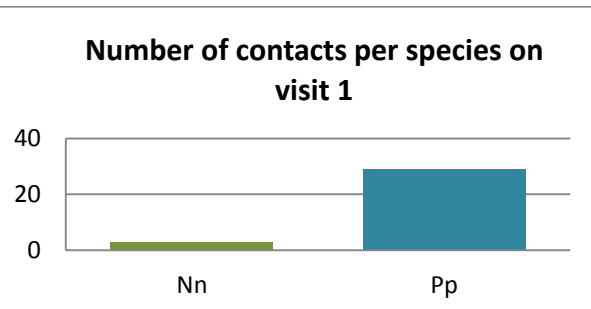
1.0 GENERAL DETAILS

Site Name	Wrexham Technology Park		
Job Number	4571	Doc. Ref	4571.005
Site Location	Wrexham		
Survey Location	Off Croesnewydd Road		
Date(s)	19/06/14, 24/07/14, 03/08/14 completed.		
Constraints	Surveys undertaken in Spring, Summer and Autumn. Bat activity indices and representations do not represent the number of bats on site but an indication or sample of their abundance and activity levels. Bat detectors have limitations in the likelihood of acoustically detecting all bat species present. Due to the variation in bat calls, some species are less likely to be detected due to low amplitude, e.g. brown long eared or high frequency, e.g. Horseshoe bats. Horseshoe bats and brown long eared bats are relatively common in the geographical area of the site and therefore lack of recorded brown long eared and horseshoe bat calls does not preclude absence on site. Echolocation calls were analysed using AnalookW 4.1d software by Candice Howe, trained to Analook Analysis Level 3.		
Methods	Three walking transects of the site area were undertaken for three consecutive months from June to August to sample bat activity during the peak season of spring and summer. A pair of surveyors with heterodyne & frequency division recorders walked the transect route and the number of bat passes was counted for three minutes at each designated transect stop. Bat passes were recorded for the route sections in-between stops (walks). Calibrated bat detectors of the same model were used on each transect. Standardised methods of measuring and recording weather parameters were used e.g. cloud cover in oktas and wind on the Beaufort scale. Transect direction reversed on third visit.		
Surveyors	Candice Howe <i>GradCIEEM</i> (Bat Survey Class Level 2 CL8: Registration number CLS03471), experienced bat surveyors Paul Hill and Katy Allen with respective assistants.		
Drawing Ref(s):	G4571.005; G4571.006; G4571.007, G4571.008		

2.0 TRANSECT ROUTE

Description of Habitats
One transect route was sufficient to cover the site. Within this transect area there are elements of overgrown grassland, short grassland, arable grassland and mature tree lines and hedges. Most of which create good foraging and commuting routes. A number of rough paths run through the site, with a hardcore path running along the northern boundary of the site which has a mature tree line/hedge on either side.

3.0 TRANSECT RESULTS

Season:	Spring 1	Location	Transect route covered whole site		Habitat	Grassland/ Hedges						
Date:	19/06/14	Start	21:25		Finish	23:15						
Min. Air Temp.	13°C	Rain	No		Detectors	Anabat SD2/Magenta						
Start cloud cover/Finish cloud cover (oktas)	8/8; 8/8	Start wind/finish wind (Beaufort scale)	0/12; 0/12		sunset	21:40						
Species present	Noctule <i>Nyctalus noctula</i> (Nn) Common pipistrelle <i>Pipistrellus pipistrellus</i> (Pp)			Number of contacts per species on visit 1  <table border="1"><thead><tr><th>Species</th><th>Number of contacts</th></tr></thead><tbody><tr><td>Nn</td><td>1</td></tr><tr><td>Pp</td><td>29</td></tr></tbody></table>			Species	Number of contacts	Nn	1	Pp	29
Species	Number of contacts											
Nn	1											
Pp	29											
Species	Pp			Nn								
Bats/Hr	16.57	1.7										
Bats/night	29	3										
Overall bat activity index for Transect					18.3	bats/hr						

Spatial Representation: see Drawing G4571.005

Season:	Spring/Summer 2	Location	Transect route covered whole site		Habitat	Grassland/Hedges										
Date:	24/07/14	Start	20:50	Finish	23:20											
Min. Air Temp.	18°C	Rain	No	Detector	Anabat SD2/Magenta											
Start cloud cover/Finish cloud cover (oktas)	3/8; 0/8	Start wind/finish wind (Beaufort scale)	0/12; 0/12	sunset	21:20											
Species Present	Common pipistrelle (Pp) Noctule (Nn) Soprano pipistrelle <i>Pipistrellus pygmaeus</i> (Pg) <i>Myotis</i> sp. (My)		Number of contacts per species on visit 2 <table><thead><tr><th>Species</th><th>Number of contacts</th></tr></thead><tbody><tr><td>Pp</td><td>28</td></tr><tr><td>Pg</td><td>9</td></tr><tr><td>My</td><td>1</td></tr><tr><td>Nn</td><td>15</td></tr></tbody></table>				Species	Number of contacts	Pp	28	Pg	9	My	1	Nn	15
			Species	Number of contacts												
			Pp	28												
			Pg	9												
			My	1												
Nn	15															
Species	Pp	Nn	Pg	My												
Bats/Hr	11.2	6	3.6	0.4												
Bats/night	28	15	9	1												
Overall bat activity for location					21.2	bats/hr										

Spatial Representation: see Drawing G4571.006

Season:	Summer 3	Location	Transect route covered whole site		Habitat	Grassland/ Hedges								
Date:	03/08/14	Start	21:14	Finish	22:46									
Min. Air Temp.	12°C	Rain	No	Detector	Anabat SD2/ Magenta									
Start cloud cover/Finish cloud cover (oktas)	3/8; 0/8	Start wind/finish wind (Beaufort scale)	1/12; 1/12	sunset	21:02									
Species Present	Common pipistrelle (Pp) Noctule (Nn) Soprano pipistrelle (Pg)		Number of contacts per species on visit 3 <table><thead><tr><th>Species</th><th>Number of contacts</th></tr></thead><tbody><tr><td>Nn</td><td>1</td></tr><tr><td>Pg</td><td>28</td></tr><tr><td>Pp</td><td>12</td></tr></tbody></table>				Species	Number of contacts	Nn	1	Pg	28	Pp	12
			Species	Number of contacts										
Nn	1													
Pg	28													
Pp	12													
Species	Pp	Nn	Pg											
Bats/Hr	8	0.67	19.3											
Bats/night	12	1	29											
Overall bat activity for location					28	bats/hr								

Spatial Representation: see Drawing G4571.007

Season:	Summer Visit 4	Location	Transect route covered whole site	Habitat	Grassland/ Hedges						
Date:	11/08/14	Start	20:18	Finish	22:40						
Min. Air Temp.	13°C	Rain	No	Detector	Anabat SD2/ Magenta						
Start cloud cover/Finish cloud cover (oktas)	4/8; 4/8	Start wind/finish wind (Beaufort scale)	1/12; 1/12	sunset	20:48						
Species Present	Common pipistrelle (Pp)	Number of bat contacts on visit 4 <table><thead><tr><th>Species</th><th>Contacts</th></tr></thead><tbody><tr><td>Pp</td><td>1</td></tr><tr><td>Pg</td><td>1</td></tr></tbody></table>				Species	Contacts	Pp	1	Pg	1
Species	Contacts										
Pp	1										
Pg	1										
Species	Pp	Pg									
Bats/Hr	1	1									
Bats/night	1	1									
Overall bat activity for location				2	bats/hr						

Spatial Representation: see Drawing G4571.008

4.0 Static monitoring

Description of Location
The tree-lined corridor running along the northern boundary of the site was considered to provide good potential foraging and commuting habitat for bats and therefore static monitoring of this feature was undertaken. A static detector was installed within the corridor to monitor bat activity for 3-4 nights on three consecutive months. An Anabat Express was used as a static, set on 'night only' which relies on GPS signal to automatically switch the detector on from dusk until dawn.

Species

Pp: Common pipistrelle Pg: Soprano Pipistrelle Psp: unknown pipistrelle
My: Myotis species Es: Serotine *Eptesicus* Nn: Noctule Lei: Leislers
serotinus

Season:	Spring	Location	Northern corridor	Habitat	Mature tree-lined corridor	
Start Date:	19/06/14	Finish Date	22/06/14	Nr. Nights	4 (27 hours of survey)	
Air Temp. (recorded)	19 - 13°C	Rain	No	Detector	Anabat Express	
Species	Es	My	Nn	Pp	Pg	Psp
Bats/Hr	0.03	0.07	1.44	0.59	0.00	0.03
Overall bat activity for location				2.18	bats/hr	

Season:	Spring/Summer	Location	Northern corridor	Habitat	Mature tree-lined corridor	
Start Date:	24/07/14	Finish Date	27/07/14	Nr. Nights	4 (32.5 hours of survey)	
Min. Air Temp.	21 - 18°C	Rain	No	Detector	Anabat Express	
Species	Es	My	Nn	Pp	Pg	Psp
Bats/Hr	0.06	0.03	1.23	1.01	0.03	0.00
Overall bat activity for location				2.34	bats/hr	

Season:	Summer	Location	Northern corridor	Habitat	Mature tree-lined corridor	
Start Date:	03/08/14	Finish Date	05/08/14	Nr. Nights	3 (23.5 hours of survey)	
Min. Air Temp.	19 - 11°C	Rain	No	Detector	Anabat Express	
Species	Es	My	Nn	Pp	Pg	Psp
Bats/Hr	0.26	0.34	2.00	4.63	0.77	0.00
Overall bat activity for location				8.0	bats/hr	

Season:	Summer	Location	Northern corridor	Habitat	Mature tree-lined corridor		
Start Date:	18/08/14	Finish Date	20/08/14	Nr. Nights	3 (23.5 hours of survey)		
Min. Air Temp.	19 - 11°C	Rain	No	Detector	Anabat		
Species	Es	My	Nn	Pp	Pg	Psp	Lei
Bats/Hr	0.00	0.00	0.63	0.03	0.03	0.00	0.51
Overall bat activity for location				1.2	bats/hr		

Figure 1: Static Monitoring Results of Corridor

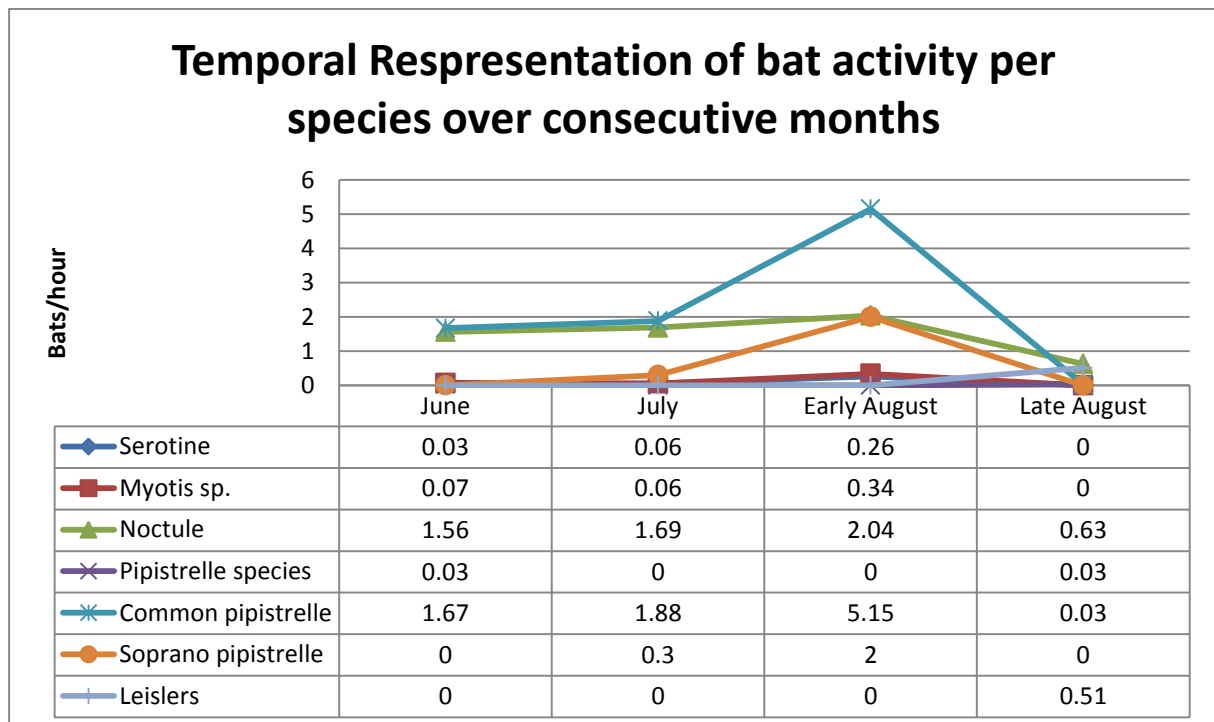


Figure 2: Temporal Representation over seasons of all data

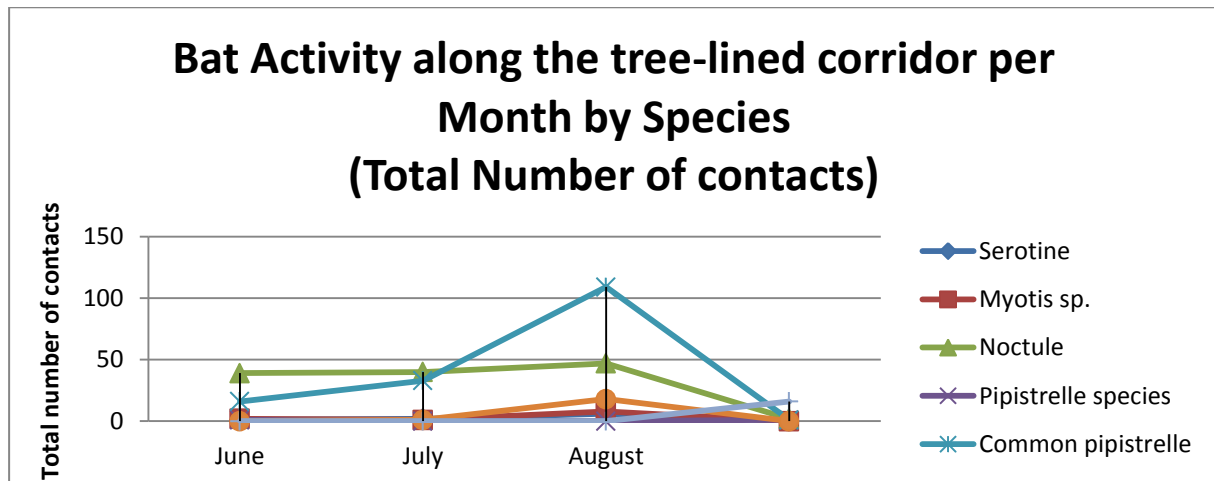
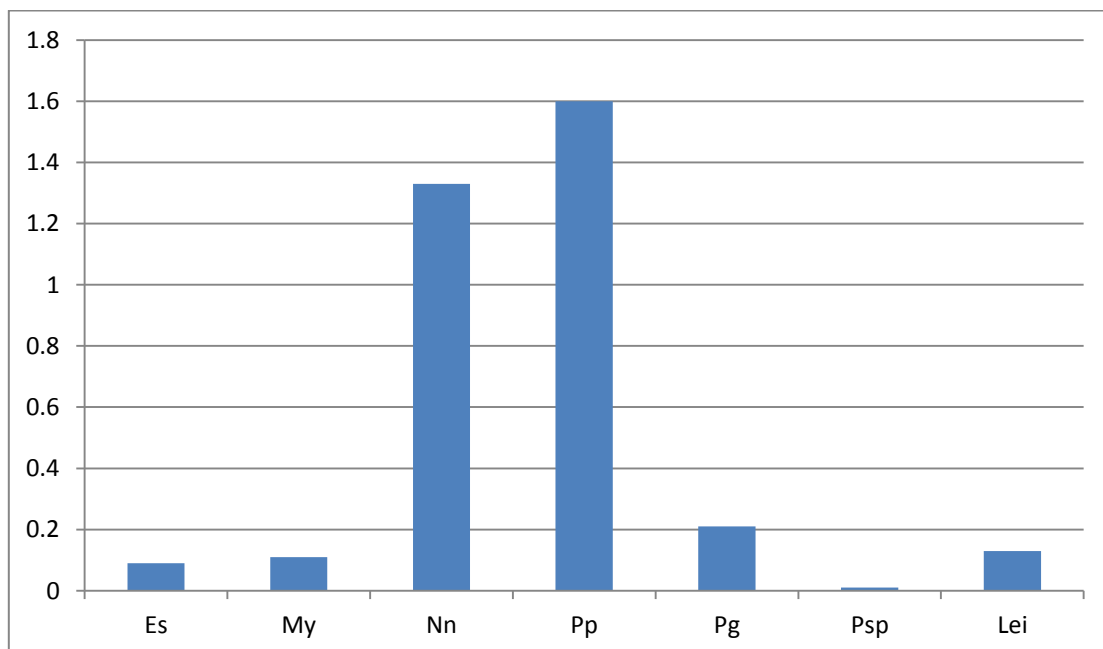


Figure 3: Temporal Representation of bats per hour across the whole survey period



5.0 EVALUATION

Bat Presence/Species Composition

Common pipistrelle, soprano pipistrelle, noctule, serotine, probable leislers and species of myotis bats were recorded on site during the duration of the surveys. The data suggests that while soprano pipistrelles, common pipistrelles and noctules are relatively abundant on site, serotine, leislers and myotis species are a much rarer occurrence.

The myotis species are suspected to comprise of at least two separate species of myotis bats. The myotis calls recorded were very brief and therefore confidence level to confirm individual species is reduced. The slope analysis (derived from the sound waves/sonogram) of the myotis species recorded in June is similar to that of Natterer's *Myotis nattereri*, whereas the slope analysis of the myotis species recorded in August was similar to that of Whiskered/brandts *Myotis mystacinus/Myotis brandtii* and Daubenton's *Myotis daubentonii*.

Spatial Hotspots

During the June activity transect the bat activity was concentrated in the south-western section of site, particularly the tree-line along the south west boundary. Common pipistrelle and noctule bats were recorded along the western tip. The first bat was recorded at 22:03 (23 minutes after sunset) which was a noctule, suggesting that the treeline containing the mature oak is used as a commuting line for noctules. Bat activity was concentrated towards the end of the survey, suggesting that the south western section of site provides foraging habitat.

In July, a greater number of bat species were recorded in the north, with moderate to high levels of common pipistrelle activity along the northern corridor. High levels of common pipistrelle foraging activity was recorded along the western tree line (walk 10 in-between stop 10 and 11). The first bat recorded was common pipistrelle at 21:48 (28 minutes after sunset) flying along the hedge line indicating this is used as a commuting feature.

In August, the south west tree line supported high levels of soprano pipistrelle foraging activity with moderate levels of activity along the south west border. The highest levels of activity were along the northern boundary and north-western tip near to the underpass. Soprano pipistrelles were the most abundant species with common pipistrelles also present. The first bat was recorded at 21:44 (42 minutes after sunset) which indicates the site is more important for foraging bat rather commuting during high summer.

During the late august survey, very low levels of bat activity were recorded, a single pass by a common pipistrelle and soprano pipistrelle in the north of the site. The first bat was recorded at 22:15 (88 minutes after sunset) which indicates the site is more important for foraging bat rather commuting during late summer.

Important temporal peaks in activity

The level of overall bat activity from the transect visits did increase from June to August, (18.3 to 28 bats/hour). The bat activity index from static data increased from 2.18 bats/hour in June to 8.0 bats/hour in August. Common pipistrelle and soprano pipistrelle activity increased in August compared to June and July. The transect in June recorded the lowest species assemblage with only common pipistrelle and noctules, whereas the static monitoring did record a species of myotis, serotine and soprano pipistrelle in addition to common pipistrelles and noctules. The July and August transect visits recorded a larger species assemblage with serotine bats only recorded on the static detector. A bat species likely to be *Myotis* was recorded on the late august visit. Thus suggesting that the species composition does not change seasonally but spatially across the site. The corridor in the north of the site has the most varied species composition, with the field in the northern section supporting the lowest species assemblage of bats.

From static monitoring of the northern corridor, peak activity seemed to be nearest to sunset and sunrise times, suggesting this route is used for commuting with low levels of foraging activity throughout the night. The transects in July and August showed low to moderate levels of foraging activity along this corridor.

6.0 IMPLICATIONS

Current survey results show that the site is used by a number of bat species for foraging and commuting. The mature tree-line along the northern boundary provides foraging and commuting habitat. The tree-line bisecting the site was used as a commuting feature by noctules and pipistrelles. The mature tree-line edge along the south west boundary provides foraging habitat for a number of bat species.

These areas should be retained where possible so as not to negatively impact on the local bat population.

Sensitive lighting schemes should be adopted near these features to avoid unnecessary light spill and the displacement of insect abundance which can negatively affect bat foraging habitat.

During the transect surveys a number of trees within the site and along the site boundaries appeared to have potential to support roosting bats due to the presence of features such as holes/cracks crevices or dense ivy. Prior to works commencing a ground based assessment of the trees should be undertaken by a suitably qualified bat consultant. Following this assessment it is possible that further surveys may be required of any trees with bat potential that will be affected by works.



Key

Transect stops:
 Pie charts show percentage of bat species recorded during stop interval

△ Stop reference

- No bat activity
- Low level of activity
01 to 25 bat contacts/hour
- Medium level of activity
26 to 50 bat contacts/hour
- High level of activity
over 51 bat contacts/hour

Transect walks:
 Showing levels of bat activity recorded during walk interval

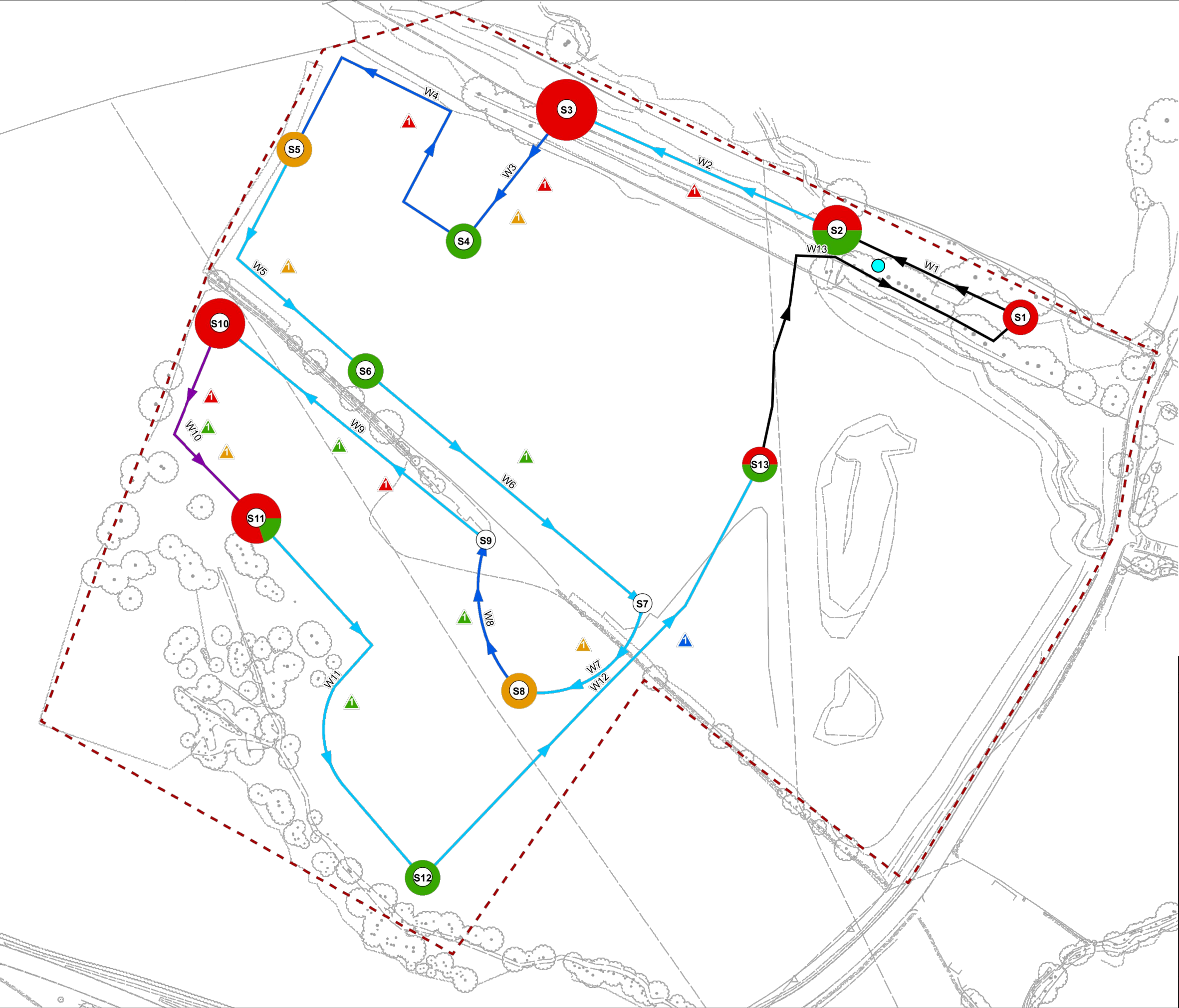
- ➡➡➡ No bat activity
- ➡➡➡ Number of bats & flight direction (colour indicates species)

Bat species identification

- Pip pip - Common pipistrelle
- Nyc noc - Noctule
- Static recorder location

↑

Rev	Description	Dwn	Appvd	Date
 Genesis Centre Birchwood Science Park Warrington WA3 7BH Tel 01925 844004 Fax 01925 844002 email tep@tep.uk.com				
Project: Wrexham Technology Park				
Title: Bat transect survey Visit 1 - 16/06/14				
Map No.		G4571.005		
Scale: 1:1,500 @ A3		Date: 07/08/2014		
Drawn: GAR	Checked: IH	Approved: TR		



Key
Transect stops:
Pie charts show percentage of bat species recorded during stop interval

S#

Stop reference

No bat activity

Low level of activity
01 to 25 bat contacts/hour

Medium level of activity
26 to 50 bat contacts/hour

High level of activity
over 51 bat contacts/hour

Transect walks:
Showing levels of bat activity recorded during walk interval

No bat activity

Low level of activity
01 to 25 bat contacts/hour

Medium level of activity
26 to 50 bat contacts/hour

High levels of activity
over 51 bat contacts/hour

Number of bats & flight direction
(colour indicates species)

Bat species identification

Pip pip - Common pipistrelle

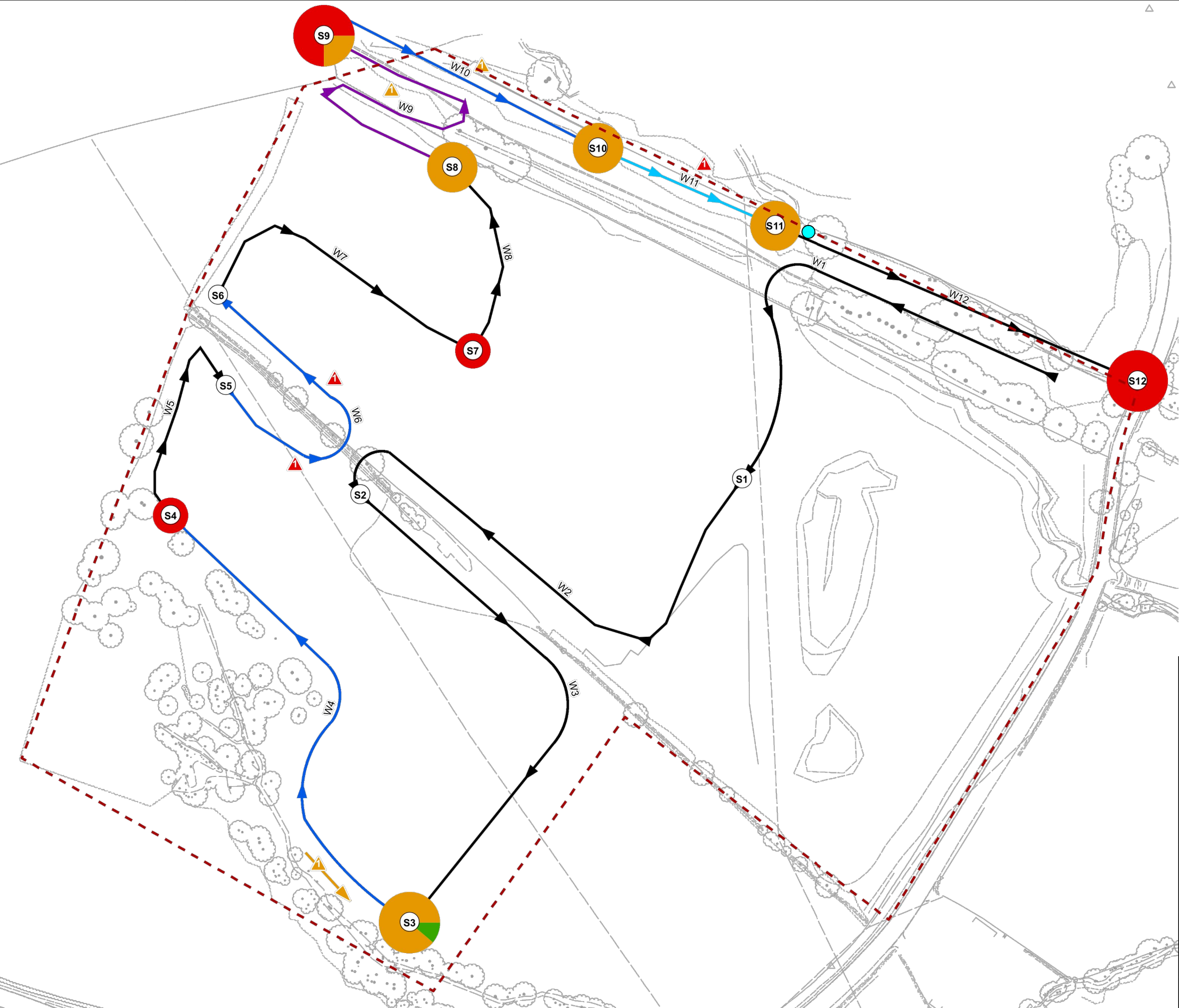
Pip pyg - Soprano pipistrelle

Nyc noc - Noctule

Myo sp - Myotis species

Static recorder location

Rev	Description	Dwn	Appvd	Date
Genesis Centre Birchwood Science Park Warrington WA3 7BH Tel 01925 844004 Fax 01925 844002 email tep@tep.uk.com				
Project: Wrexham Technology Park				
Title: Bat transect survey Visit 2 - 24/07/14				
Map No.		G4571.006		
Scale:		1:1,500 @ A3		Date: 07/08/2014
Drawn:	GAR	Checked:	IH	Approved: TR



Key
Transect stops:
Pie charts show percentage of bat species recorded during stop interval

△ S# Stop reference

○ No bat activity

01 to 25 bat contacts/hour

Medium level of activity
26 to 50 bat contacts/hour

High level of activity
over 51 bat contacts/hour

Transect walks:
Showing levels of bat activity recorded during walk interval

No bat activity

Low level of activity
01 to 25 bat contacts/hour

Medium level of activity
26 to 50 bat contacts/hour

High levels of activity
over 51 bat contacts/hour

Number of bats & flight direction
(colour indicates species)

Bat species identification

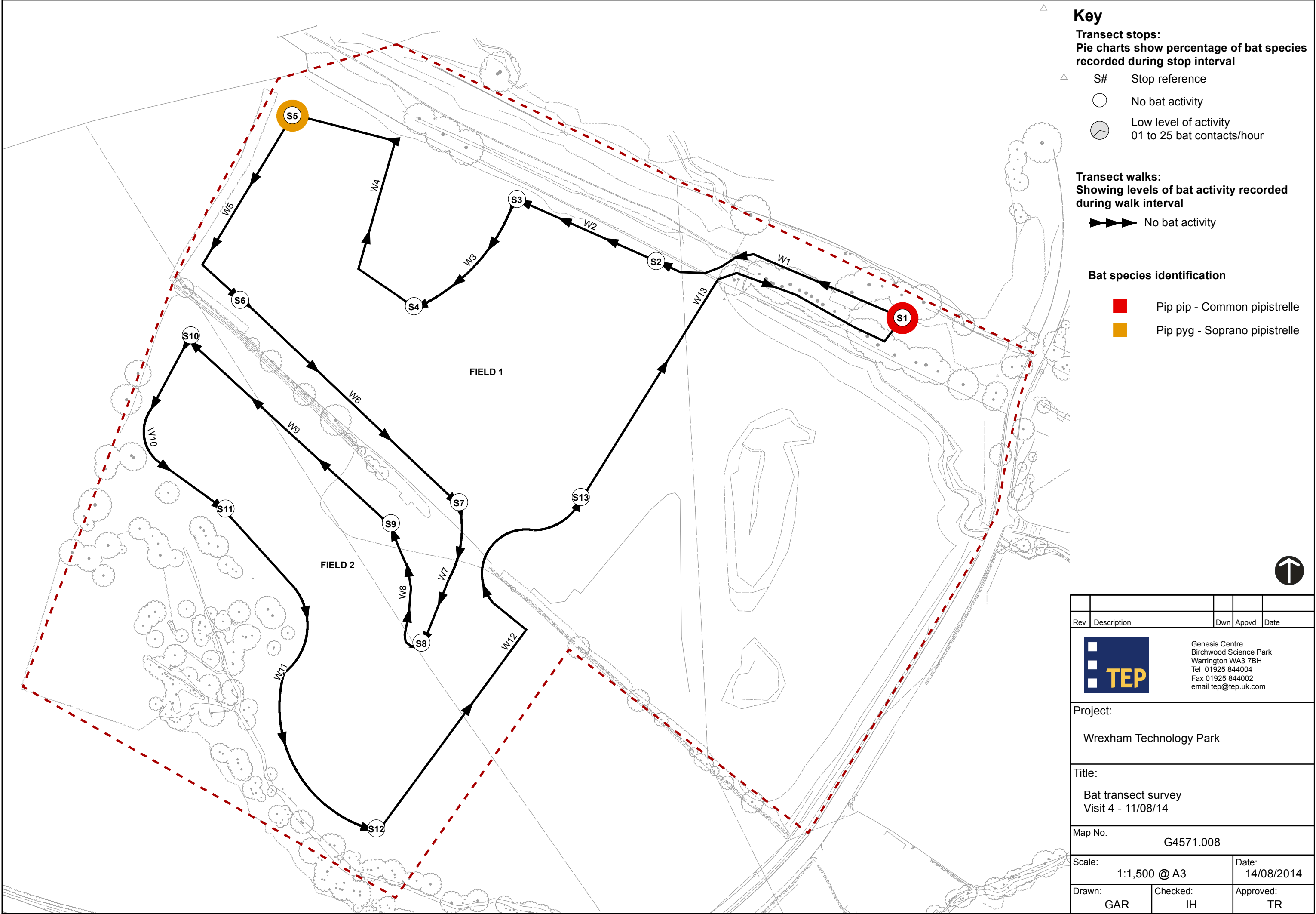
Pip pip - Common pipistrelle

Pip pyg - Soprano pipistrelle

Nyc noc - Noctule

Static recorder location

Rev	Description	Dwn	Appvd	Date
		Genesis Centre Birchwood Science Park Warrington WA3 7BH Tel 01925 844004 Fax 01925 844002 email tep@tep.uk.com		
Project: Wrexham Technology Park				
Title: Bat transect survey Visit 3 - 03/08/14				
Map No.		G4571.007		
Scale: 1:1,500 @ A3			Date: 07/08/2014	
Drawn: GAR		Checked: IH		Approved: TR



Rev	Description	Dwn	Appvd	Date
		Genesis Centre Birchwood Science Park Warrington WA3 7BH Tel 01925 844004 Fax 01925 844002 email tep@tep.uk.com		
Project:				
Wrexham Technology Park				
Title:				
Bat transect survey Visit 4 - 11/08/14				
Map No.		G4571.008		
Scale:			Date:	
1:1,500 @ A3			14/08/2014	
Drawn:		Checked:		Approved:
GAR		IH		TR