

Appendix 13-8 Broken Brow Ecology Surveys

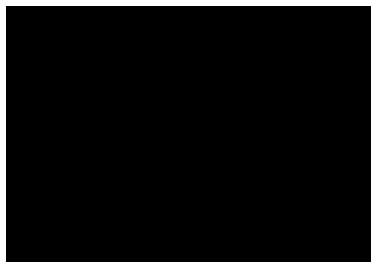


Ecology Surveys—Broken Brow

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Data contained within this report is considered most relevant during the season in which it was collected. For medium or high impact schemes or for multi-plot or phased developments, surveys should not be more than two years old.

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1 Summary

Proposal Outline	The current plans are for the development of 376 car parking spaces, along with bays for motorbikes and cycles, to support the Thames Valley Park (TVP) Park & Ride scheme.
Site Description	The site comprises a broadly triangular plot of land between the River Thames and the main railway line out of Reading. The land is currently unused and has been subject to scrub encroachment, such that much of the site is impenetrable.
Surveys Undertaken	Bat activity transects were undertaken across September 2015 including the deployment of static monitoring devices. A badger survey was carried out on all accessible parts of the site. A survey to establish the presence or likely absence of reptiles from the site was undertaken across September and October 2015. A habitat suitability assessment for great crested newts of all waterbodies within 500m was undertaken.
Results	The bat activity surveys confirmed that the site is regularly used by two common and soprano pipistrelle bats which are common and widespread species. Noctule bats were recorded flying over but not directly using the site. Myotis bats and Nathusius' pipistrelle bats were also recorded using the site occasionally. No badger setts or regularly used paths were recorded on site but a single scat was recorded on one occasion. A peak count of four slow worms was recorded on site. The nearest post has a HSI score of Good.
Limitations	The bat surveys were not equally spaced throughout the active season, the implications of which are discussed later in the report. Equally the reptile survey had some limitations of timing and spacing of surveys - this was overcome by completing additional checks so was not considered a significant limitation. The very dense nature of the scrub which covers the majority of the site meant that access to certain areas was restricted which affected primarily the badger and bat survey. For bats this is not considered a significant limitation as there were no inaccessible potential roosts and sampling was taken from across different areas of the site. For badgers this means setts and evidence of badgers is hard to detect and could be missed; recommendations given in this report reflect this.
Evaluation	The site can be considered significant at the local level for bats and without mitigation there would be a low negative impact on the local bat population. The site supports a medium population of slow-worms. There is a low risk that badgers use the site. There is a low risk of committing an offence during site clearance with regards to great crested newts

Potential Impacts	The proposed works without mitigation could result in the loss of all suitable bat habitat and lead to disturbance of a nearby roost. There is also a risk of killing, injury and habitat loss for reptiles and great crested newts during site clearance. There is a low risk that a badger sett will be exposed or destroyed during site clearance.
Recommendations	If direct impacts cannot be avoided, dusk emergence surveys of the Waterside Centre and the adjacent storage shed (B1) should be undertaken to ascertain the presence or likely absence of roosting bats. Appropriate mitigation will be required to retain some suitable commuting and foraging habitat for bats. A winter survey is planned for badgers to enable a more thorough search of the site once vegetation has died down, along with camera trapping to determine the level of use of the site by badgers. If further evidence of badgers is found, a watching brief during site clearance is recommended. A suitable receptor area for slow-worms will need to be identified and enhanced before slow-worms can be trapped and translocated from the site. An E-DNA test of the pond can be undertaken to determine the presence or likely absence of great crested newts. . The above measures should be included in an Ecological Mitigation and Monitoring Plan for the site and include recommendations for other species of conservation concern, so that a cohesive approach can be defined and followed.

Introduction

1.1 Site Information

- 1.1.1 The site comprises a broadly triangular plot of land approximately 1.9 hectares in size and known as Broken Brow. The southern boundary of the site is formed by the First Great Western railway line and associated rail estate and to the north by the River Thames and the Thames Path National Trail, which runs parallel to the southern bank of the river. Wokingham Waterside Centre lies immediately to the north of the site with a car-park to the northeast. The remainder of the eastern boundary is formed by Thames Valley Park (TVP) Drive, beyond which is the TVP Business Park. Between the river and the site there is also a boathouse and administration centre owned by Reading University. The site appears to be largely unmanaged except for grassy paths through the scrub which provide access to various services. The area is largely a former grassland plot but has become almost entirely overgrown with encroaching scrub. In recent years the site has been used by vagrants as a camp site. The grid reference for the centre of the site is SU733738, site plan is shown in Figure 1.
- 1.1.2 The site falls in Wokingham on the outskirts of Reading and forms part of a continuous strip of green space which runs through Reading and out to Sonning along the Thames. The area surrounding the site on three sides is highly urbanised, however to the north of the site and following the river is the Thames and Kennet Marina and a series of lakes, beyond which is a patchwork of woodland and farmland.

1.2 Development Proposals

- 1.2.1 A consultation process is currently underway for plans for a new Park & Ride. The scheme is being advanced by the unitary authority of Reading with the full support of Wokingham Borough Council. A planning application for the scheme is shortly to be submitted. The proposals include a facility with 360 standard car parking spaces and a further 16 disabled spaces, along with motorbike bays and cycle stands. A small toilet block and bus stop also form part of the proposals.

1.3 Ecology Background

- 1.3.1 It is understood that following a walkover of the site by WSP/Parsons Brinckerhoff that preliminary bat and bird surveys were commissioned.
- 1.3.2 A five visit breeding bird survey was planned. However, due to a number of health and safety constraints only a single visit to the site was made in March 2015, during which 24 species were recorded across the survey area. The survey confirmed one species breeding on the site, one species probably breeding on site and a further 14 species identified as possible breeders, including two species of Principal Importance. The report made recommendations for avoidance and mitigation including retention of trees and scrub where possible, especially on the boundaries of the site. It was also recommended that necessary site clearance take place outside of the breeding bird season along with compensation and enhancement measures and concluded that further survey for breeding birds was unlikely to be necessary.
- 1.3.3 A single session of remote monitoring was carried out in July 2015 which involved the deployment of a Song Meter 2 bat detector in situ between the 6th and the 9th of July. The detector was in place behind the Waterside Centre. Three species of bats were recorded and activity was dominated by soprano pipistrelle which accounted for over 80% of calls recorded.
- 1.3.4 CA Ecology was then commissioned to undertake a Preliminary Ecological Appraisal (PEA), including a desk study, in order to assess the habitat on site with a view to its suitability for a range of protected species. The site was found to comprise broadleaved woodland, dense scrub, calcareous grassland, amenity grassland, introduced shrub, hedgerow with trees, buildings and bare ground. The site has potential to support a range of protected and notable species including: badgers, bats, birds, great crested newts, common reptiles, hedgehogs, stag beetles and cinnabar moths.

1.4 Purpose and Scope

- 1.4.1 Following the walkover and initial surveys undertaken by WSP/Parsons Brinckerhoff, a PEA (see separate report) was commissioned alongside further surveys for certain species as follows:
- Bat activity surveys to ascertain the species present and level of use of the site by commuting and foraging bats.
 - A badger survey to look for evidence of setts or use of the site by badgers.
 - Surveys to establish the presence or likely absence of reptiles from the site.
 - In addition to the scope, a HSI of ponds within 500m was undertaken.

Prior to the commencement of the surveys it was noted that there were certain limitations to the surveys due to the dense nature of the scrub on site.

2 Methodology

2.1 Bats

Transects

- 2.1.1 A transect route was designed to cover as much of the site as possible. Given the access limitations it was not possible to walk a continuous route across the site, therefore six short legs with listening stops were chosen to allow time to be spent in all parts of the site. The survey commenced at sunset and continued for at least 2 hours. Surveyors spent 10 minutes on each leg/stop and visited each leg twice during the course of the survey, giving a total of 20 minutes in each leg. The order in which each leg was visited was reversed for the second half of the transect and varied across survey events.
- 2.1.2 Surveyors walked at a steady pace along the leg and aimed to have at least half the time in each leg at the listening stop. The species and activity of each bat was recorded and a note of the real time and track time was made, along with a note of the flight path recorded on a map of the site. A bat pass is defined as a stream of echolocation calls recorded as the bat passes in and out of the detectors range. Each surveyor was equipped with a frequency division or time expansion detector attached to a recording device and was able to listen to heterodyne calls to facilitate in the field identification. An Anabat linked to a GPS device was also used to record all bats encountered throughout the survey. All bat calls were retained for later analysis where necessary. Analysis of the results relied on those calls recorded by the surveyor with a check of the Anabat calls to ensure no species had been missed.
- 2.1.3 As each transect varied in length and the transects were altered throughout the course of the survey, an activity score has been calculated to allow comparison. The activity score is calculated by dividing the total number of bat passes recorded by the time in minutes spent in total surveying the transect. The resulting number is then multiplied by 10 to give a whole number.
- #### 2.1.4 Static Monitoring
- 2.1.5 Anabat Express remote monitoring devices were deployed in three separate locations. One location was chosen to the rear of the Water Sports Centre as the area is relatively secure and the monitoring device that was set out in July by WSP/ Parsons Brinckerhoff was also located in this area, allowing some comparison of data.

- 2.1.6 A second device was located at the other end of the site, in this area there were limited places in which to securely locate the device, so it was deployed for relatively short periods of time in two different locations.
- 2.1.7 The static monitoring detectors were set up to record all ultrasonic activity. For each night of monitoring, the maximum and minimum temperature was recorded using a thermometer built into the detector. Data from the nearest weather station can be used to determine the wind speed, cloud cover and precipitation during each night of survey.
- 2.1.8 Following collection of the static monitoring detectors, the sound files were uploaded and analysed using Analook to determine the species of bat present in each recording. For consistency filters were used to assign species to each call.
- 2.1.9 When all calls had been analysed, all recordings of Annex II species, rare species (e.g. Nathusius' pipistrelle), NSL guild bats (noctule, serotine or Leisler's bats) and unknown calls were checked by an ecologist for quality assurance purposes. In addition, a random selection of the total number of calls was checked, resulting in the overall total number of calls checked amounting to 5%.
- 2.1.10 Anabat detectors record all ultrasonic activity for a period of 15 seconds, or until no ultrasound is detected for a period of five seconds. Therefore a count of bat passes is a count of the number of 15 second files in which bats occur.

2.2 Badgers

- 2.2.1 A walkover of the site was undertaken to determine if habitat suitable for badgers is present on or within 30m of the site and define its extent specifically in relation to the development proposals. All accessible parts of the site were visited and features suitable for badgers were looked for, including but not limited to: sloping ground, scrub, woodland and hedgerows.
- 2.2.2 A systematic search was undertaken to look evidence of badgers. Evidence looked for included: Setts, prints, well used paths, latrines, hairs caught on fences and vegetation, feeding signs. A GPS location and photograph was recorded for any evidence found.
- 2.2.3 Where a sett was recorded it was classified as one of the following: main sett, annex sett, subsidiary sett or outlying sett. The degree of use of each entrance hole can then be defined as follows: well used holes, partially used holes or disused holes.

2.3 Reptiles

Habitat Assessment

- 2.3.1 A walkover of the site was undertaken to assess the suitability of the habitat on site for a range of reptile species. All accessible parts of the site were visited and features suitable for reptiles were looked for, including but not limited to: dry species rich undisturbed open habitat with a mix of sparse and dense vegetation, sunny hollows, gullies, disused rabbit burrows on south facing banks (which can be favoured hibernation sites), ponds, lakes and gravel pits, disused railway lines, sand pits, pylon lines crossing woodland, out of play areas of golf courses and areas of edge habitat.
- 2.3.2 In addition if suitable conditions prevail: existing refuges including natural objects such as logs and artificial objects such as debris and other discarded materials. The surveyor also looked for other evidence of use of the site by reptiles, including sloughed skins and tracks left in soft sand, in the case of sand lizards burrows with distinctively shaped entrances.
- 2.3.3 If appropriate, potential grass snake egg-laying sites where present were gently dismantled to search for eggs once hatched (this is only be undertaken during October or April to May when eggs will not be incubating nor the structure used for hibernation).
- 2.3.4 The areas of suitable habitat present were then classified as follows: poor, good or exceptional based on the following 12 criteria:
- Location in relation to species range
 - Vegetation structure
 - Insolation
 - Aspect
 - Topography
 - Surface geology
 - Connectivity to nearby good habitat
 - Prey abundance
 - Refuge opportunity
 - Hibernation habitat potential
 - Disturbance
 - Egg laying pot (grass snake and sand lizard only)

Presence or Likely Absence Surveys

- 2.3.5 Two methods for detecting reptiles were used: direct observation transects and refugia searching.

Direct Observation Transects

- 2.3.6 Using close focus binoculars, an intensive search of the site was made by walking slowly and stopping frequently along a defined transect line. Transects allow all areas of suitable habitat within the site to be searched and where possible existing paths will be followed to limit the amount of disturbance. The ecologist walked with their back to the sun and concentrated on likely basking spots (areas that provide insolation and that are close to cover), outside the area of shadow and as far ahead as possible. Particular attention was paid to the following areas:
- South facing slopes, banks, gullies, pits and tumuli
 - Log or rubble piles
 - Compost heaps
 - Boardwalks
 - Rides and paths through scrub
 - Interfaces between habitat types
- 2.3.7 If a reptile is disturbed before identification can be made, the ecologist will return after 10 minutes to attempt to identify the animal.
- 2.3.8 During direct observation other evidence of use of the site by reptiles is also looked for, including sloughed skins and tracks left in soft sand, in the case of sand lizards burrows with distinctively shaped entrances.

Number of Visits

- 2.3.9 The number of visits required to confirm presence or likely absence of reptiles from a site can vary from species to species and from site to site, the Herpetafora Workers' Manual suggests a minimum of five visits, while guidelines set down by Froglife suggest that between seven and twenty visits may be necessary. In practice, four to five visits are usually sufficient to detect 95% of occupied sites. In marginal habitats the number of visits will need to be increased to seven. For sand lizard, seven – ten visits are required (Sewell, 2012).
- 2.3.10 In the latest set of Reptile Mitigation guidelines issued by Natural England (NE) (which have now been withdrawn and are for information only), it is suggested that the minimum effort for each species likely to be present is calculated using a minimum standard effort divided by a survey effort weighting assigned to each month for each species.
- 2.3.11 Following the habitat assessment of the site it was considered that there was a reasonable likelihood of presence of slow worm, common lizard and grass snake based on site suitability, species range, and desk study records. Following the methodology set out in the NE Reptile Mitigation Guidelines, the minimum standard effort units for slow-worm is 25 and 30 for grass snake and common lizard. The number of days of survey required will be dependent on the months in which the survey is undertaken for each species. As the survey was partly undertaken in September, which has a monthly survey effort weighting of four for slow-worm and grass snake and five for common lizard, with the remainder of the survey undertaken in October which has a monthly survey effort weighting of two for slow-worm and grass snake and three for common lizard, the number of days of survey can be calculated as set out in Table 1 below.

Table 1: Number of days of survey

Month Species	Days of survey in September	Standard effort units	Days of survey October	Standard effort units	Total standard effort units achieved	Total standard effort units required
Slow worm	5 (plus 2 within one week of setting out mats)	20	4	8	28	25
Grass snake		20	4	8	28	30
Common lizard		25	4	12	37	30

Timing and Conditions

- 2.3.12 Visits are ideally spread across the survey season (March – October) with April, May and the first half of June being optimal. There were at least 2 days between visits and a minimum of 30 days between the first and last visits. Visits would usually be undertaken between 0700 and 1900 (typically 0900- 1100 and 1600 – 1900) during periods of suitable weather conditions.
- 2.3.13 Surveys were undertaken on warm sunny days with little or no wind and no rain with temperatures between 9^oc and 20^oc. Where possible, surveys are scheduled to take advantage of optimal conditions including: hot weather after spell of cold wet weather, periods of light summer rain if ambient temp high enough, after showers if there has been a prolonged dry spell and sultry thundery weather.
- 2.3.14 Initially a total of seven days of survey was carried out in September, but as surveys were not commissioned until the second week of September there were limitations which meant that there would not be a clear two days between surveys, surveys were not spread over 30 days and the first two were carried out within a week of setting out the mats. Therefore, additional surveys were commissioned and carried out in October to increase the robustness of results. With the additional surveys it was considered that there was no limitation to the survey.

2.4 Great Crested Newts

Habitat Suitability Assessment

- 2.4.1 A walkover was undertaken to assess the suitability of the habitat on site for great crested newts. All parts of the site were visited and features suitable for great crested newts were looked for and noted, including but not limited to: suitable foraging habitat such as rough grassland, scrubland and woodland along with daytime and winter refuge areas such as animal burrows, underground crevices, rubble piles, rocks, logs and discarded debris and the presence of waterbodies suitable for breeding, including garden ponds.
- 2.4.2 In addition, if suitable conditions prevail—existing refuges including natural objects such as logs and artificial objects such as debris and other discarded materials were checked for the presence of amphibians.
- 2.4.3 During the desk study, waterbodies on or within 500m of the site were identified. These were then visited to determine their suitability and where accessible and not separated from the site by a significant barrier to dispersal, such as a road with a high traffic volume, a fast flowing river or a dense urban area, a Habitat Suitability Index Assessment (HSI) of each waterbody was conducted.
- 2.4.4 The methodology for conducting the HSI used is based on that presented by Oldham et al (2000) and simplified by National Amphibian and Reptile Recording Scheme (NARRS). For each waterbody, ten different habitat characteristics important for great crested newts are assessed and assigned a Suitability Index (SI) factor score.
- 2.4.5 The following habitat characteristics were assessed; SI1 - Geographic location, SI2 - Pond area, SI3 - Permanence, SI4 - Water quality, SI5 - Shade, SI6 - Fowl, SI7- Fish, SI8- Pond count, SI9- Terrestrial habitat and SI10 - Percentage macrophyte cover. The following formula is then used to generate a HSI:
- $$HSI = (SI1*SI2* SI3*SI4*SI5*SI6*SI7*SI8*SI9*SI10)^{1/10}$$
- 2.4.6 The result is a HSI score of between 0 and 1: where 0 indicates unsuitable habitat and 1 represents optimal habitat. Whilst a HSI cannot be used to determine the presence or likely absence of great crested newts from any given waterbody, it is a useful indicator of the likelihood of finding great crested newts and is also an essential part of any licence application.

3 Survey Findings

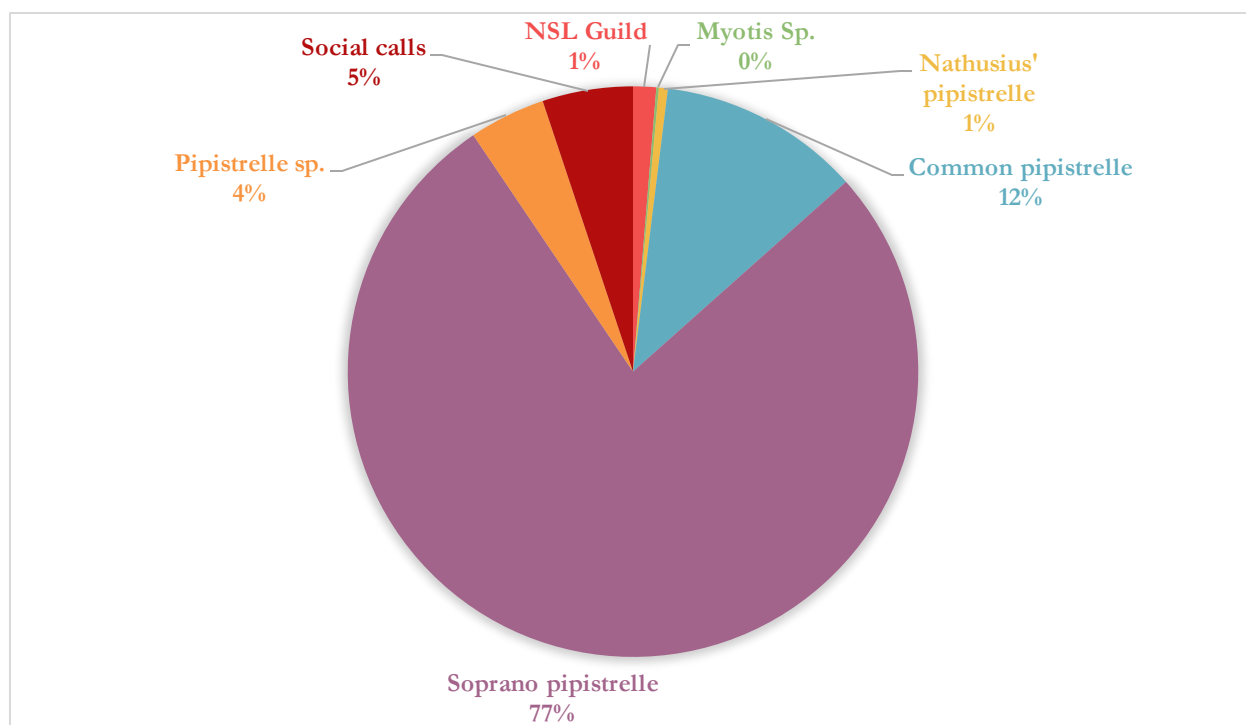
3.1 Bat Surveys

Transects

- 3.1.1 The transect was repeated a total of four times, three at dusk and once at dawn. Due to the location of rough sleepers on site, the transects varied slightly on each occasion and on the fourth visit legs 5 & 6 and 1&2 were combined to allow for a longer transect along the river. The changes are not considered a limitation to the survey.
- 3.1.2 Four species of bat were recorded and passes were dominated by soprano pipistrelle (*Pipistrellus pygmaeus*) totalling 64% of all calls and common pipistrelle (*Pipistrellus pipistrellus*) bats accounting for 33% of all calls. Both species were recorded in every leg of each transect and most bats were unseen. The first bat recorded on the first transect came from the direction of the Waterside centre, indicating that bats could be using this building as a roost. Myotis (*Myotis* sp.) bats were also recorded but accounted for less than 2% of all calls, in leg 1 these were recorded when surveyors were close to the river. Two myotis passes were also recorded in leg 6. Noctule (*Nyctalus noctula*) bats were recorded flying overhead in every survey visit in small numbers and accounting for less than 2% of calls.
- 3.1.3 Full results from the transects along with weather conditions are given in Appendix 1. The locations of the legs are shown on Figure 2.
- 3.1.4 Most bat activity was recorded on leg 4 in the area of amenity grassland behind the Waterside Centre and the majority of the passes were from soprano pipistrelle bats. The leg along the river also recorded relatively high levels of activity. The lowest levels of activity were seen in leg 5 and 6 in the area of calcareous grassland near to the railway.

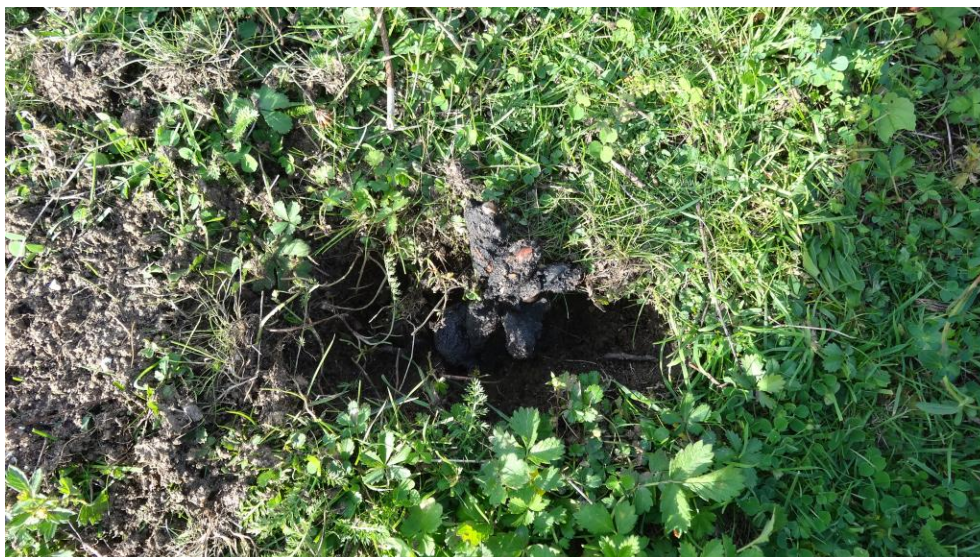
Static Monitoring

- 3.1.5 The devices were active for a total of 26 nights across September and bats were recorded every night. See Figure 2 for location of devices and results by location. Full results are given in Appendix 1.
- 3.1.6 A total of five species of bats were recorded with soprano pipistrelle bats accounting for 77% of all passes and common pipistrelle and pipistrelle spp. making up a further 16% of all calls, similar to that recorded in the transects. Low numbers of myotis bats were recorded, as were bats from the Eptesicus/Nyctalus guild (NSL). A small proportion of all calls at each location (1%) can be attributed to those of Nathusius 'pipistrelle' (*pipistrellus nathusii*) showing that these bats use the site to some extent.
- 3.1.7 Location A recorded the highest number of passes, on average there were 228 passes per night in comparison to 36 per night at location B and just 17 per night at Location C. The chart below shows overall proportions of bats recorded at all three locations.



3.2 Badgers

- 3.2.1 The site provides ample opportunities for badgers to both dig their setts and to forage. Animal paths are in evidence throughout the site but most of them are small and are likely to be attributed to rabbits. A single rabbit burrow was recorded but no sets were located within the accessible parts of the site. Hair traps placed across these paths on two occasions did not return any positive results. On one occasion (30.09.15) a fresh scat (see photo below) was recorded in a shallow depression within calcareous grassland near to the railway. No further droppings were recorded (6 visits across October & November) therefore it does not appear to be a regularly used latrine and may have been a single animal passing through.
- 3.2.2 Optimal habitat for badgers is a mixture of deciduous woodland and earthworm rich pasture (short grass). Setts can be located in a variety of situations including within scrub and hedgerows. It is possible that setts could be concealed within areas of dense and continuous scrub.



Possible badger dung in grassland

3.3 Reptiles

Habitat assessment

- 3.3.1 On the 15th September the site was visited by Claire Andrews BSc (Hons) MCIEEM, a surveyor with 10 years' experience of conducting reptile surveys. All parts of the site were accessed and assessed.
- 3.3.2 As set out in the PEA the site comprises a mixture of habitats including broadleaved woodland, dense scrub, calcareous grassland, amenity grassland, introduced shrub, hedgerow with trees, buildings and bare ground.
- 3.3.3 There were a number of existing refuges consisting of corrugated tin and construction debris, these were checked alongside the artificial refugia.
- 3.3.4 Overall the site was considered to have good potential to support reptiles, as connectivity is good and it is well within the range of three common reptile species. Furthermore, the site supports features used by reptiles for feeding and sheltering throughout their lifecycle.
- 3.3.5 Table 2 below shows how areas of suitable habitat on site were classified.

Table 2: Habitat Assessment Results.

Feature	Description	Classification
Location in relation to species range	National Range - Core Range for grass snake and slow-worm; other species not expected or recorded in this area.	Excellent
Vegetation structure	There is a variable structure with a mixture of vegetation heights, some tangled or thorny areas, a mosaic of bare patches and a variety of ecotones.	Good
Insolation	Some of site in sun for at least part of day with the exception of the interior of the wooded area.	Good - Excellent
Aspect	There are sunny and sheltered locations with a few shaded locations and a south facing bank.	Excellent
Topography	The topography is varied with undulations	Good
Surface geology	There is no free draining or sandy areas suitable for adder, smooth snake or sand lizard. However the site remains suitable for grass snake and slow worm.	Good

Patch size and connectivity to nearby good habitat	At least 50 % of site boundary is directly connected with adjacent suitable habitat	Excellent
Prey abundance	Preferred prey species frequently encountered within habitat patch.	Good
Refuge opportunity	Some logs and construction materials are present on site, creating refuge opportunities.	Good
Hibernation habitat potential	There is a disused animal burrow and numerous other opportunities.	Excellent
Disturbance	There is limited public access to the site	Good

Presence or Likely Absence Surveys

- 3.3.6 Slow-worms (*Anguis fragilis*) were encountered on six of the eleven visits. Refugia were set out in three main areas (see Figure 3 for locations). A peak count was one adult female and on another occasion, four juveniles were recorded meaning at least five individuals are present. The dates and weather conditions and summary of results are given in Appendix 3.

Slow-worm recorded by railway



3.4 Great Crested Newts

3.4.1 One pond was identified within 500m of the site which appears to have been created when the nearby office blocks were constructed. A HSI was conducted of the pond, the results of which are given in Table 3 below.

Table 3: HSI results

SI	Factor	Result	SI Score
1	Location	South East	1
2	Pond Area	1889Sqm	0.8
3	Permanence	Never dries	0.9
4	Water quality	Moderate	0.67
5	% Shade	15%	1
6	Fowl	Minor	0.67
7	Fish	Possible	0.67
8	Pond	9	1
9	Terrestrial	Moderate	.67
10	% macrophyte	0	0.3
HSI	/	/	0.730929174 - Good

Pond nearest
site



4 Evaluation, Potential Impacts and Recommendations

4.1 Bats

- 4.1.1 Bats and their roosts are fully protected. The surveys were carried out, except in their timing, in line with BCT Good Practice Guidelines (Hundt, 2012) and Natural England Bat Mitigation Guidelines (Mitchell-Jones, 2004).
- 4.1.2 The surveys were all carried out in September. Ideally transects should be spaced across the active season, March – September, with the optimal period being June to August. However good levels of activity were recorded and static monitoring results (in the level of activity and species recorded) were comparable with those recorded by WSP in June.
- 4.1.3 The first bat recorded on the first transect came from the direction of the Waterside Centre; this coupled with the very high level of activity in the vicinity of this building indicates that the centre or the adjacent storage shed support a roost of soprano pipistrelle bats. If the site layout cannot be altered to avoid any impact on this potential roost, further surveys may be necessary to identify the exact location of the roost to fully inform any mitigation measures. If building 1 is to be removed then further survey to establish the presence or likely absence of bats from this building should be undertaken.
- 4.1.4 The surveys have shown that the site is used primarily by foraging common and soprano pipistrelle bats. Noctule bats were also recorded, during the transects these bats were observed passing high overhead and although it is possible that noctules do feed on invertebrates that originate from the site, they are not directly feeding in this habitat. The rare Nathusius 'pipistrelle bat and light sensitive myotis bats have also been recorded commuting across the site. Commuting habitat is vital for bats in linking roosting sites and foraging habitat. The loss of important commuting routes could therefore impact on local bat populations by restricting movement within existing home ranges and also wider dispersal. Foraging habitat is essential as bats rely upon this habitat to hunt their insect prey. The loss of important areas of foraging habitat could also therefore impact upon the abundance of local bat populations. It is not possible to determine the size of a bat population using a site with acoustic data, but the activity level and range of species means that bats using this site can be considered as being significant at the local level and without mitigation there would be a low negative impact on the local population.

- 4.1.5 As the proposal involves removal of much of the habitat on site, efforts should be made to maintain connectivity across the area. There is part of a former hedgerow which runs along the northern edge of the site which should be retained and enhanced to create connectivity and where possible maintain a dark corridor. This can be included within the Environmental Mitigation and Management Plan for the site.

4.2 Badgers

- 4.2.1 Badgers receive protection under the Protection of Badgers Act 1992 (as amended). Under the act it is an offence to wilfully kill, injure, cruelly ill-treat or take any badger or attempt to do so. It also makes it an offence to intentionally or recklessly damage, destroy or obstruct access to any part of a badger sett. There is some evidence that badgers may use the site. Further survey over the winter months is planned to estimate the level of use, using camera traps and also to search the site for evidence of setts once the vegetation has died down a little. If no further evidence of badgers is discovered, scrub clearance should proceed with caution and under a watching brief conducted by a suitably qualified ecologist. If any evidence of a sett or other animal hole is discovered then works should cease until such time as the species and level of use can be determined. In the event that a sett was discovered during scrub clearance, work would need to cease until it could be determined whether the sett was active and a licence from Natural England may then be required to lawfully proceed. If other mammal species are discovered, the area would need to be dug by hand to avoid committing an offence under the animal welfare act. The methodology for site clearance along with measures to provide, retain and enhance habitat on site for badgers as necessary should be included within the Environmental Mitigation and Management Plan for the site.

4.3 Reptiles

- 4.3.1 All species of native UK reptile receive some protection under Section 9 of the Wildlife and Countryside Act, making it an offence to kill or injure these species. Further protection for smooth snake and sand lizard is provided which includes the offences of disturbance and damage, or destroying a breeding site or resting place. The surveys were carried out in line with good practice, with regard to guidance within the Herpetofauna Workers' Manual (HGBI, 1998) and the methodology within Froglife's Reptile Survey Advice Sheet 10 (Froglife, 1999).
- 4.3.2 Slow-worms were recorded on site with a peak count of four. This count, combined with good habitat suitability, means that the slow-worm population size class can be considered medium, as per Natural England's reptile mitigation guidelines. In the wider context the site is well within the known range for slow-worms. This population can be considered as being significant at the local level and without mitigation there would be a low – medium negative impact on the local population.

- 4.3.3 It is possible that during site clearance works slow-worms could be killed or injured and as this species is protected from killing or injury, this will need to be avoided. Other direct impacts include habitat loss and indirect impacts might also include disturbance and persecution. This is likely to lead to a low negative impact on the local population of slow-worms. Although slow-worms were found in four different locations, suitable habitat exists across the site which means that the site layout cannot be altered to completely avoid impacts on this species.
- 4.3.4 In order to avoid killing or injury of any slow-worms present, a programme of trapping and translocation will be required. This will involve capturing and excluding reptiles from the work area and relocating them to a receptor area either on or adjacent to the site, where the habitat has been enhanced.
- 4.3.5 The final scheme has not yet been decided, but there is scope to provide an onsite receptor area or possibly enhance areas surrounding the site. By taking this approach it should be possible to maintain the conservation status by retaining the population in-situ. Some potential areas that could be suitable receptor sites, if secured as part of the development and enhanced and correctly maintained, are identified on Figure 3. A method statement setting out the approach to trapping and translocation, along with habitat enhancement will be required but is likely to involve some or all of the following:
- Installation of reptile exclusion fencing around perimeter of work area in spring.
 - Refuges in place for two weeks of good conditions prior to main trapping period.
 - Trap and translocate reptiles (likely a minimum 20 day trapping period) in suitable conditions with five clear days required before cessation of trapping which should commence mid-April.
 - Habitat enhancement of receptor area(s) to include:
 - Creation of new reptile hibernacula
 - Creation of log piles
 - Creation of areas of suitable grassland
 - Cutting and maintenance regime to maintain the links to other habitats

4.4 Great Crested Newts

- 4.4.1 Great crested newts (GCN) and their habitat receive full legal protection under Regulation 41 of the Conservation of Habitats and Species Regulations (2010), as amended by the Conservation of Habitats and Species (Amendment) Regulations 2012.
- 4.4.2 Although some of the habitat on site is suitable for great crested newts during their terrestrial phase, there are no other suitable waterbodies on site. The nearest waterbody has a HSI score indicating that it has a good suitability for breeding great crested newts. There are no significant barriers between the pond and the site. If great crested newts do breed in the pond there would be a low risk of committing an offence during site clearance. To reduce the risk of committing an offence, an Environmental DNA (E-DNA) test should be undertaken to confirm the presence or absence of newts from the pond. Samples can be collected between 15th April and 30th June. If GCN are absent from the pond there will be no requirement for any further survey mitigation or compensation.
- 4.4.3 If the test confirms that GCN are present within the pond there is a likelihood of an offence being committed (based on Natural England's rapid risk assessment), to prevent this the avoidance and mitigation measures outlined below are likely to be required:
- Habitat clearance will be undertaken during April – July when newts are most likely to be in or close to ponds and away from terrestrial habitat.
 - Prior to any work taking place a destructive search of areas of suitable habitat will be carried out under a watching brief conducted by a suitably qualified ecologist (SQE).
- 4.4.4 If newts are present within the pond, the creation of an area on site of good quality habitat will be required and as scrub is of low quality a smaller area of high quality habitat should be sufficient to compensate for the loss of habitat on site. The reserved area should ideally be in one corner of the site against one of the boundaries with connectivity to the wider area. The following measures could be taken to create an area of habitat suitable for GCN.
- A log pile of native wood will be created and allowed to rot to provide damp, cool retreat in the heat of summer, and a frost-free hibernation site in winter.
 - A wildflower and grass mix will be seeded around the log pile. Seed selection will be based on soil type and purchased from a reputable seed trader that specialises in native plants (e.g. Emorsgate, Landlife or Habitat Aid). The mix will not contain grass seed and the soil will be prepared appropriately. This area will be left to grow long and cut no more than twice at an appropriate time of year. This will provide cover, damp resting places and support the invertebrate prey on which GCN feed.

5 References

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6 Appendix 1

Weather conditions during the bat surveys

Date	Precipitation	Wind (Beaufort Scale)	Temp at sunset/sunrise	Temp at start/end	Cloud	Overall conditions
08/09/15 Dusk	0	0	13	13	0/8	Optimal
09/09/15 Dawn	0	0	12	11	8/8	Optimal
15/09/15 Dusk	0	0	16	16	8/8	Optimal
29/09/15 Dusk	0	0	13	13	0/8	Optimal

Bat transect survey results

Transect Section	Species	Passes V1 Dusk 08.09.15	Passes V2 Dawn 09.09.15	Passes V3 Dusk 15.09.15	Passes V4 Dusk 29.09.15	Total passes		Activity Score
1	Pp	0	2	34	1	37	77	11
	Ppy	6	4	3	28	35		
	Msp	0	2	1	2	5		
2	Pp	1	0	4	Combined with 1	5	75	11
	Ppy	60	5	4		69		
	Nn	0	1	0		1		
3	Pp	1	0	14	1	16	60	8
	Ppy	31	2	5	4	42		
	Nn	0	1	1	0	2		
4	Pp	4	4	1	2	11	99	12
	Ppy	69	5	9	3	86		
	Nn	2	0	0	0	2		
5	Ppy	2	0	1	0	3	25	4
	Pp	8	0	8	4	20		
	Nn	1	0	1	0	2		
6	Pp	25	0	2	Combined with 5	27	37	5
	Ppy	2	1	4		7		
	Msp	1	0	1		2		
7 River	Pp	Not Surveyed	Not Surveyed	Not Surveyed	21	21	46	15
	Ppy				25	25		

Details of deployment of static monitoring device

Species Location	NSL	Msp	Pn	Pp	Ppy	Psp	Sc	Total	# nights deployed	nightly average
A	27	5	7	398	3165	75	191	3868	17	228
B	21	1	13	65	15	82	19	216	6	36
C	6	0	1	11	10	22	2	52	3	17
Total	54	6	21	474	3190	179	212	4136	26	94
WSP – Data	3	0	0	44	694	104	1	846	3	282

N.B. WSP data is not directly comparable as a different type of recording device was used.

Location	Dates Deployed	# nights active (batteries functioning)	# nights triggered
A	09.09.15 – 30.09.15	17	17
B	15.09.15 – 20.09.15	6	6
C	24.09.15 – 30.09.15	3	3

7 Appendix 2

Dates of reptile surveys and weather conditions

Date	Start time	End time	Temperature in shade (°C)	Wind (beaufort)	Rain	Cloud cover (oktas)
15.09.15	1700	1747	16	1	0	4
17.09.15	1100	1200	17	0	0	5
23.09.15	1005	1105	12	1	0	0
24.09.15	1630	1730	16	0	0	6
26.09.15	1052	1152	18	0	0	0
28.09.15	1510	1610	20	0	0	0
30.09.15	1400	1500	18	0	0	0
08.10.15	1400	1500	15	0	0	2
12.10.15	1500	1600	13	0	0	0
14.10.15	1100	1200	11	0	0	4
28.10.15	1500	1600	16	0	0	2

Direct observation and artificial refugia search results

Date	Survey Visit	Grass Snake		Notes
		Adult count	Juv sub-adult count	
08.09.15	Set out mats			
15.09.15	1	0	0	
17.09.15	2	0	1	Under existing refugia by railway
23.09.15	3	1	0	Under existing refugia by railway
24.09.15	4	0	4	Two by railway, one by Poplar
26.09.15	5	0	3	Both by railway
28.09.15	6	0	3	One in amenity
30.09.15	7	0	4	One by river, the rest by railway
08.10.15	8	0	0	
12.10.15	9	0	0	
14.10.15	10	0	0	
28.10.15	11	0	0	
	12	0	0	
	Peak Count (adults)	4 (1)		

Client	Wokingham Borough Council
Project	TVP Park & Ride
Title	Location Plan
Date	November 2014
Scale	Schematic Only

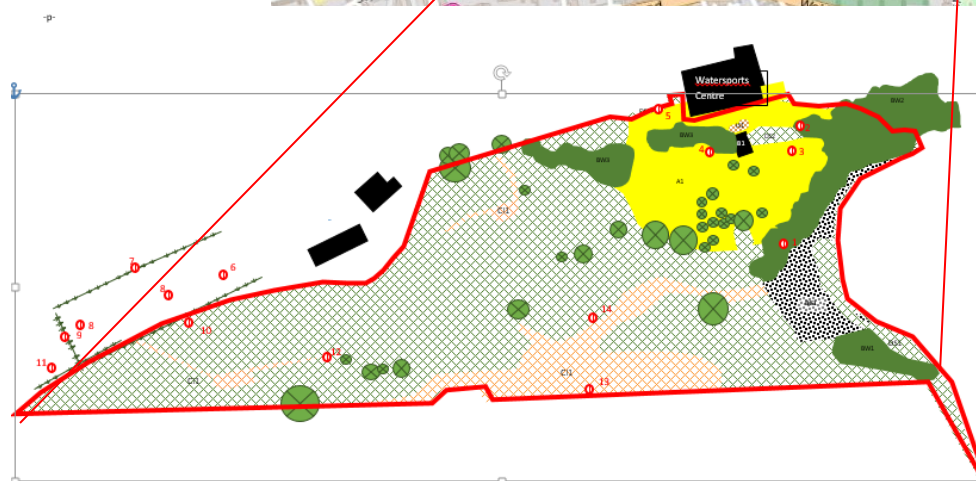
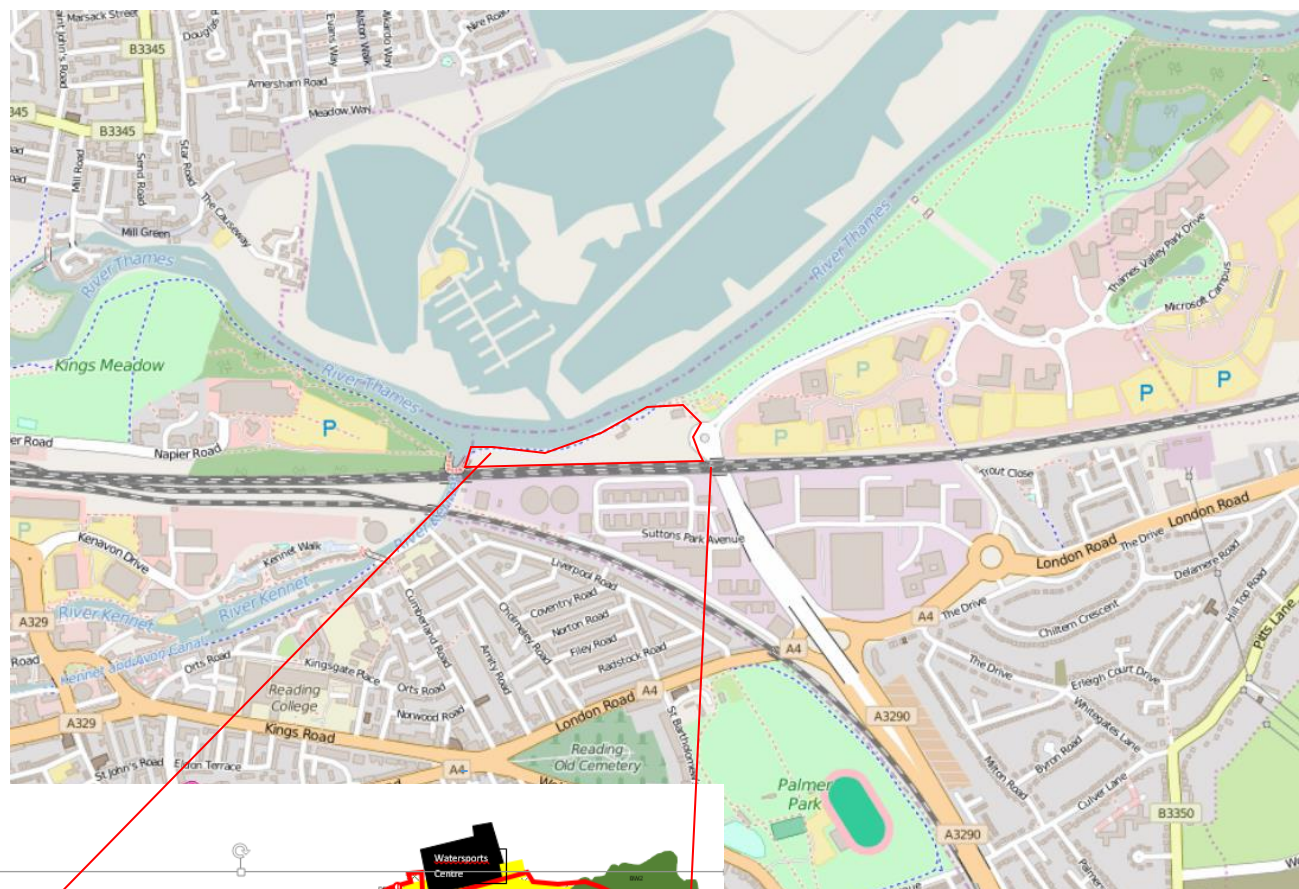
Figure 1



Location Information

Postcode: RG1 1PQ

GR At Centre:
SU 73477 73898



Client	Wokingham Borough Council
Project	TVP Park & Ride
Title	Bat Survey Results
Date	September 2015
Scale	Schematic Only

Figure 2

N ↑

Key

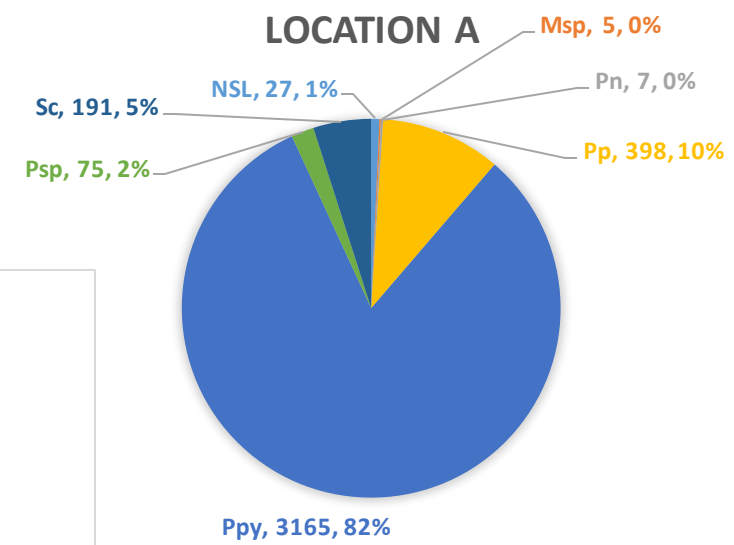
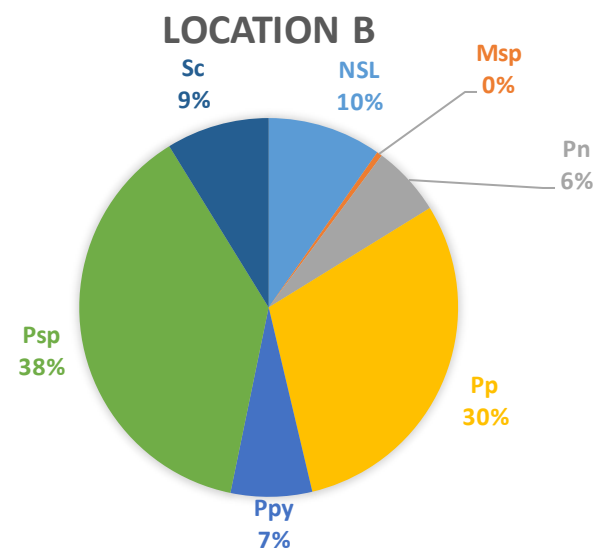
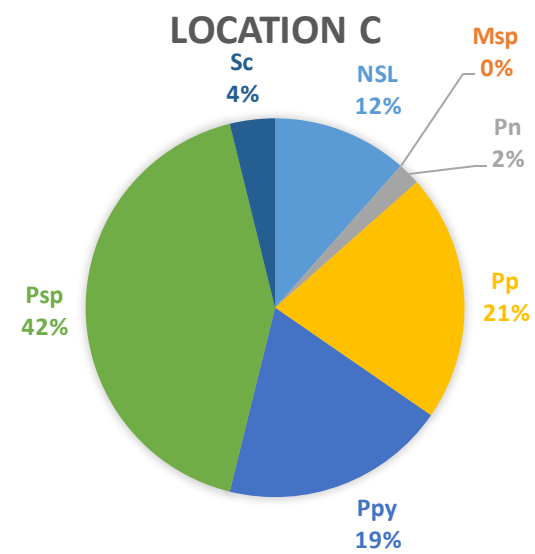
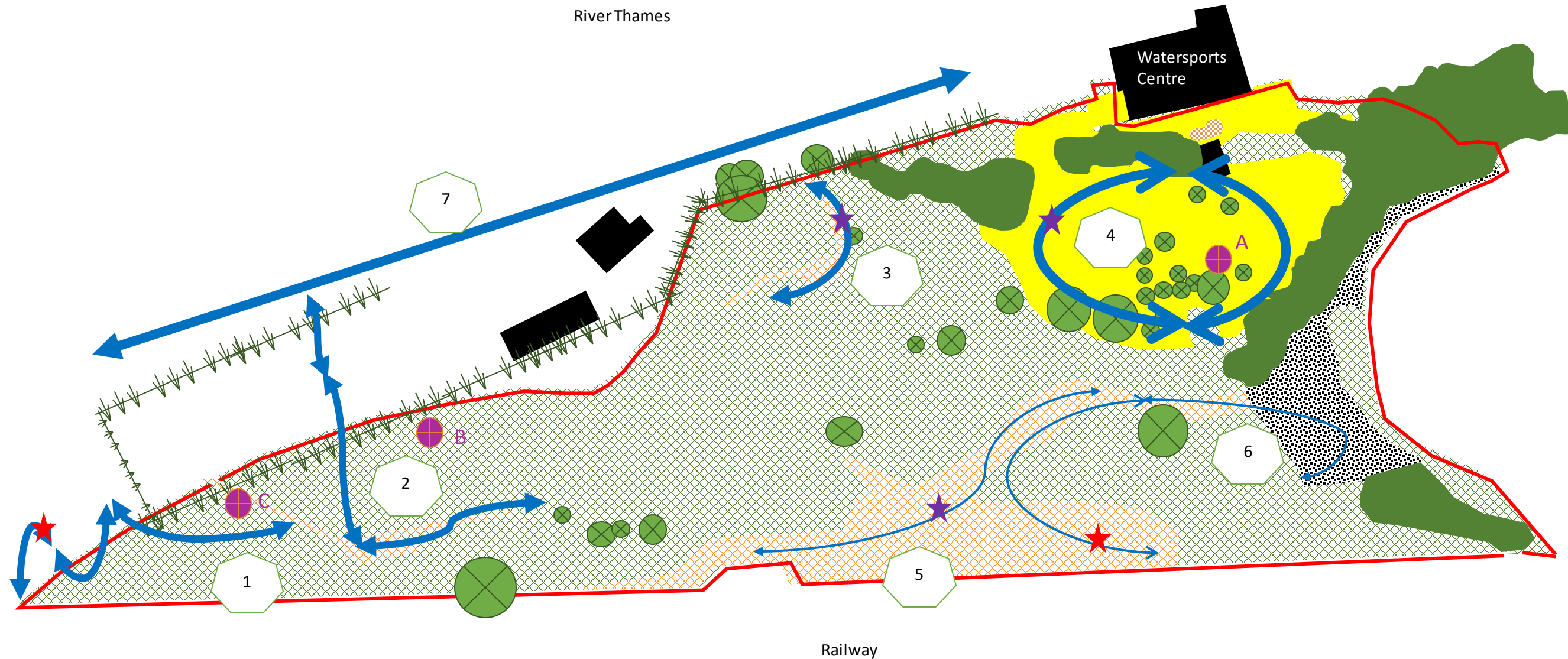
- ★ Noctule bat recorded in transect
- ★ Myotis bat recorded in transect

Activity score

- ↔ 0 – 3
- ↔ 4 – 7
- ↔ 8 – 11
- ↔ 12 – 15

Transect number

⊕ Location Of static monitoring device



Pie charts show species and proportions of bats at each static monitoring location.

Client	Wokingham Borough Council
Project	TVP Park & Ride
Title	Reptile Survey Results
Date	September 2015
Scale	Schematic Only

Figure 3

N ↑

Key

-  Juv slowworm
-  Female slowworm
-  Refugia
-  Existing refugia

