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WOODCROFT FARM, WECOCK

Bat Surveys

Grainger Plc

17/05/2013

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Bat Surveys

17/05/2013

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Executive Summary

Woodcroft Farm (hereafter known as the Site) comprises six horse grazed fields on the edge of Waterlooville, Hampshire, separated by field boundaries comprising hedgerows with mature standard trees. Buildings on the Site include a farmhouse, horse stabling units and sheds. The Site has been allocated for mixed-use development within Havant Borough Council's Core Strategy (2011).

WSPE were commissioned by Savills L&P on behalf of Grainger plc to complete bat surveys of the Site, to support the planning application for an approximately 300 unit residential led development. This development primarily comprises residential properties and also includes a new playing field for the adjacent primary school and retention of the majority of the existing mature trees and hedgerows. These proposals are hereafter known as the 'Proposed Development'.

Surveys at the Site completed during 2011 and 2012 have identified one current summer/transitional roost used by small numbers of common pipistrelle *Pipistrellus pipistrellus* bats (Building G), which may also have been used historically or be used occasionally by small numbers of long eared bats *Plecotus* spp.; and one historic long eared bat roost (Building A), within the buildings present. In addition, three confirmed tree roosts (T83, T26 and G51c) and twelve further trees with high potential (BCT category 2a¹) to be used as roosts have been identified. As a result the Site is considered of Local value for roosting bats.

Activity surveys completed during 2011 and 2012 showed the Site is a foraging and commuting resource of District value for bats; with at least six species recorded, including common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, noctule *Nyctalus noctula*, serotine *Eptesicus serotinus*, long eared *Plecotus* spp. and myotis *Myotis* spp. bats. High levels of pipistrelle activity were recorded, with myotis and long eared bats also recorded on the majority of surveys, though at lower levels and largely in association with treelines and hedgerows running around the Site boundary, or across the Site. Noctule and serotine activity on the Site was much less frequently recorded and at lower levels.

Recommendations have been included in Section 6 to avoid, mitigate and compensate for likely impacts upon bats resulting from the Proposed Development and promote compliance with relevant legislation and planning policy (see Section 5). These include obtaining an European Protected Species (EPS) licence from Natural England to enable removal of Building G and the likely reduction in viability of the historic roost in Building A and the tree roost within tree group G51. This licence application will require a robust mitigation strategy demonstrating how replacement roost resource will be included within the Proposed Development; it is recommended this comprises a combination of bat boxes within buildings and on retained trees and a newly created long eared bat loft. In addition the retention of the majority of mature tree and hedgerow habitat, with an associated sensitive lighting scheme will be essential to enable continued use of the Site by foraging and commuting bats. Inclusion of some standing water within swale attenuation areas is also encouraged where possible.

Recommendations have also been included to encourage long term enhancement in accordance with the National Planning Policy Framework (NPPF) (DCLG, 2012), comprising inclusion of new oak trees within the design of new landscaped areas to create in the long term roosting and foraging resource of similar value to that present at the current time (which will age and likely gradually deteriorate naturally over time) and inclusion of bat boxes on retained trees above and beyond those required as compensation for reduced roost viability.

¹ Categorisation of high potential trees as Category 2a follows the 2007 BCT guidelines, which were those applicable at the time of survey.

1 Introduction

1.1 Project Background

- 1.1.1 Woodcroft Farm (hereafter known as the 'Site') is located in an agricultural landscape, adjacent to the residential area of Wecock in the Borough of Havant, Hampshire. Approximately 9.7 hectares in size it comprises six fields of close-grazed semi-improved grassland, separated by mature hedgerows; an occupied house and associated gardens; and an area of hard standing with a number of stable blocks and sheds. There is also a small area behind the sheds filled with old cars and other disused vehicles. A surfaced lane runs along the southern boundary of the Site, providing access to the buildings, whilst in the southern corner of the north western field there is a small sand riding arena. The Site boundary is shown on Figure 1.
- 1.1.2 The Site is accessible from Woodcroft Lane to the east, with a public bridleway running along the southern and western boundaries of the Site. The southern boundary of the Site runs parallel to the edge of the Wecock residential area whilst Lovedean residential area lies to the east. Immediately to the west lies an arable field, whilst to the north lie further horse pastures and James's Copse, which is an ancient semi-natural woodland.
- 1.1.3 The Site is allocated as a strategic site within Havant Borough Council's Core Strategy (HBC, 2011) for a 340 unit mixed use development. It is also listed within the Strategic Housing Land Availability Assessment (HBC, 2012) as an allocated strategic site for 320 dwellings. Grainger plc's proposals for the Site comprise development of 293 dwellings and include retention of the locally listed farmhouse, with the remaining outbuildings to be demolished. A replacement playing field for the school located immediately to the south will be created within the most easterly field; and a bridleway will be diverted, likely running adjacent to one of the existing hedges. Proposals include retention of the majority of the hedges and mature treelines. The proposals are hereafter referred to as the 'Proposed Development'.

1.2 Ecological Background

- 1.2.1 An extended Phase 1 habitat survey (WSPE, 2011) incorporating an ecological desk study was completed in June 2011 to record the habitats present and identify the presence, or potential presence, of protected habitats or species which could pose legal and / or planning constraints to the Proposed Development. The subsequent report (WSPE, 2011) identified suitable habitat for bats on the Site, including trees with numerous potential roost features, buildings with potentially suitable roost features and foraging habitat comprising grazed pastures separated by hedgerows containing mature oak trees.
- 1.2.2 The ecological desk study (WSPE, 2011) highlighted records of a maximum of ten² bat species within 5km of the Site, (records dated within the last 10 years). These species are serotine *Eptesicus serotinus*, Bechstein's *Myotis bechsteinii*, whiskered/Brandt's/Alcathoe's *Myotis mystacinus/brandtii/alcathoe's*, Natterer's *Myotis nattererii*, noctule *Nyctalus noctula*, common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, and brown long-eared bat *Plecotus auritus*. These records are deemed sensitive and do not distinguish between roosts and individual sightings of bats (for example in flight), but do include records of larger numbers (>20) of bats for noctule, brown long eared, common pipistrelle and Bechstein's bats, which could be roost

² Between eight and ten species may have been recorded. It is not possible to differentiate between whiskered, Brandt's and Alcathoe's bat using sonogram analysis; therefore, it is possible that records for whiskered/Brandt's bats (Alcathoe's bat was only found to be present in this country in 2011 but it is considered that it has been present all along) may be of for any one or more of these species.

records. The desk study also considered previous ecological survey completed on this Site, Bioscan (2009) states common pipistrelle, soprano pipistrelle, Myotis spp. and serotine were recorded on the Site.

- 1.2.3 In addition to the bat surveys described within this report, detailed at height inspections were completed of the twenty three trees identified as having high potential (Category 2a) to support bats, as a result of survey work reported within this document. These surveys were completed in accordance with the BCT (2007) good practice guidelines, which were current at the time of survey (2011). The at height surveys confirmed the presence of roosts within three trees (WSPE, 2011a). Twelve other trees remained classified as Category 2a following at height inspection, whilst seven trees were downgraded to Category 2b (low/moderate) and one was downgraded to Category 3 (negligible). These surveys are reported separately (WSPE, 2011a) but are referred to for completeness within this report.

1.3 Brief and Objectives

- 1.3.1 WSP Environmental Limited (WSPE) was instructed, in August 2011, by Savills L&P Ltd on behalf of Grainger plc. to undertake bat surveys of Woodcroft Farm, Wecock, Hampshire (central Ordnance Survey Grid Reference: SU 681 120), hereafter referred to as 'the Site'. These surveys comprised preliminary daytime assessments of the suitability of buildings and trees for roosting bats, a bat emergence and re-entry survey of potentially suitable buildings, and bat activity (manual and automated) surveys of the Site.
- 1.3.2 Further to changes in good practice guidelines (Hundt, 2012), in May 2012, again on behalf of Grainger plc. Savills L&P Ltd commissioned WSPE to complete further survey to comprise additional activity survey visits during the 2012 season, and automated surveys of Buildings A & G (see Figure 2). This report is a revised and updated version of the report previously issued following the surveys in 2011; the updates include the addition of the 2012 survey results and amendments to the recommendations in light of these results.
- 1.3.3 The aims of the preliminary bat survey of trees and buildings, the bat emergence and re-entry survey of buildings, and automated surveys of Buildings A & G were to determine:
- The presence/likely absence of bat roosts, and the status of roosts if present; and
 - If roosts are present, to make appropriate recommendations.
- 1.3.4 The aims of the bat activity surveys (manual and automated) of the Site were to:
- Record the species assemblage present and level of bat activity, including the location of important flight corridors and swarming locations (if present) and foraging habitats; and
 - If possible, gather data on the likely presence of bat roosts in trees on the Site.
- 1.3.5 In combination, the surveys aim to provide sufficient data to enable an assessment of the conservation value of the Site for bats and determination of the likely impacts of the Proposed Development upon bats. The survey results will be used to inform the extent and design of mitigation measures (if any) that are considered appropriate for the Site.

2 Methods

2.1 Overview

- 2.1.1 Field surveys were completed to inform an evaluation of the on-site habitats for bat species. These included detailed bat building inspections, followed by emergence and re-entry surveys as appropriate, ground level tree inspections and activity surveys; the latter comprising both static data collection and walked transects.

2.2 Detailed external and internal inspection of buildings

- 2.2.1 All buildings on the Site were surveyed on 16th August 2011 by a licensed bat ecologist (Natural England Licence Number: 20104259) from Keystone Environmental Ltd, on behalf of WSPE. Building locations are shown on Figure 2.
- 2.2.2 The buildings were inspected externally and internally, where access was available, for bats and signs of bat activity (e.g. droppings, feeding remains, urine stains, and grease marks). Equipment used to aid the survey included high-powered torches and ladders.
- 2.2.3 In accordance with Bat Conservation Trust survey guidelines current at the time of survey (BCT, 2007) which remain largely unchanged with respect to building inspections (Hundt, 2012), notes were made on the following:
- Type and age of building;
 - Type of construction;
 - Presence of potential roost features (e.g. hanging tiles, raised tiles, roof voids);
 - Information or evidence of work having been undertaken that could affect use of the structure by bats; and
 - Amount and location of evidence of roosting bats (e.g. presence of live or dead bats, droppings, feeding remains, urine stains, grease marks).
- 2.2.4 Where feasible, given the evidence collected, any structures with evidence of bats were evaluated to assess which of the following roost categories they support:
- Maternity or Nursery Roost - used for breeding, where young are born and raised to independence;
 - Hibernation site, where bats may be found during the winter;
 - Daytime Summer Roost - used by males and/or non-breeding females;
 - Night Roost - where bats rest between feeding bouts during the night but are rarely present during the day;
 - Feeding perch - where bats temporarily hang up to devour an item of prey;
 - Transitional (or swarming) site - where bats may be present during the spring or autumn.
- 2.2.5 In the absence of any evidence, structures have been assigned a rating of suitability from negligible to high potential for supporting bats. The rating is based primarily on the location of the structure in the wider landscape (proximity to suitable foraging habitats and/or commuting routes) and the number and type of features suitable for use by bats, with other factors considered including the age of the structure and the level of disturbance.

- 2.2.6 For example, a structure with a high level of regular disturbance and few opportunities for access by bats that is in a highly urbanised area with few or no mature trees, parkland, woodland or wetland would have negligible potential. Conversely, a pre 20th century or early 20th century building with many features suitable for use by bats close to good foraging habitat would have high potential.

2.3 Ground level bat survey of trees

- 2.3.1 All trees on the Site were surveyed on 16th August 2011 by a licensed bat ecologist (Natural England Licence Number: 20103652) from Keystone Environmental Ltd, on behalf of WSPE. Tree locations are shown on Figure 3.
- 2.3.2 In accordance with good practice guidelines current at the time of survey (BCT, 2007) which remain largely unchanged with respect to tree inspections (Hundt, 2012), the trees were visually inspected from the ground (with the aid of binoculars) to search for signs indicating the presence or potential presence of bat roosts, such as:
- Obvious holes, cavities and splits;
 - Dark staining on the tree below holes;
 - Staining around holes caused by natural oils in bats' fur;
 - Scratch marks around holes from claws;
 - Droppings below/inside holes; and
 - Noise (e.g. squeaking and chittering).
- 2.3.3 Based on the signs present and the location of the tree in relation to other trees and suitable foraging/commuting habitats in the surrounding landscape, each tree was placed into one of the following categories (BCT, 2007):
- 1 - Confirmed roost
 - 2a - High roost potential
 - 2b - Moderate/Low roost potential
 - 3 - Negligible roost potential
- 2.3.4 For example, an immature tree with few or no suitable roost features and poor connectivity to foraging habitat would have negligible potential, whereas a veteran tree with numerous potential roost features in a parkland setting would have high potential.

2.4 Bat Emergence/Re-entry Survey of Buildings

- 2.4.1 One dusk emergence survey and one dawn re-entry survey of Buildings A, C (Ca and Cb), D & G was undertaken within the main bat activity season of 2011. These buildings were considered to have low potential to support roosting bats and therefore only one dusk/dawn survey visit was considered appropriate, in accordance with good practice guidelines at the time of survey (BCT, 2007). The approach is also in line with current guidelines updated since completion of the survey (Hundt, 2012). Buildings B, E, F & H were not subject to emergence survey due to their negligible potential to support roosting bats. Details of the survey dates and times are provided in Table 1.

Table 1: Dates of Emergence/Re-entry Survey of Buildings (2011)

Survey Type	Date	Sunset/Sunrise	Start Time	End Time
Dusk	30/08/2011	19:57	19:27	21:57
Dawn	31/08/2011	06:14	04:44	06:14

- 2.4.2 Each survey involved the use of six surveyors, strategically positioned around the buildings so as to be able to monitor all potential roost egress/entry points. The surveyor locations are shown on Figure 2. All surveys were orchestrated and led by a Licensed Bat Ecologist (Natural England Licence Number: 20104259) from Keystone Environmental, on behalf of WSPE.
- 2.4.3 The surveyors were equipped with Batbox Duet (Stag Electronics, Steyning, West Sussex) combined frequency division/heterodyne bat detectors. The time and location of all emerging/re-entering bats was recorded on a detailed site plan. Bat echolocation calls were saved onto digital audio recorders. Where it was not possible to identify a bat to species level on site, the audio recordings were later analysed using BatScan sonogram analysis software (Version: 8.7, 2003, Visualization Software LLP for Stag Electronics).

2.5 Automated Surveys of Buildings A & G

- 2.5.1 To provide supplementary information on potential roosting activity associated with the interior of Buildings A & G, a Song Meter SM2BAT 192kHz Ultrasonic Recorder (Wildlife Acoustics, Inc.) automated bat detector unit was deployed within the roof spaces of each of these buildings for at least two 2 week periods (28 days) during 2012. Details of the survey dates are provided in Table 2. Automated detector unit locations are shown on Figure 2. All surveys were orchestrated and led by a Licensed Bat Ecologist (Natural England Licence Number: 20114165) from Keystone Environmental, on behalf of WSPE.

Table 2: Dates of Automated Surveys of Buildings A & G (2012)

Building	Dates	Number of Days
A	13/06/2012 to 23/07/2012 (excluding 21-25 June)	33
G	13/06/2012 to 18/07/2012 (excluding 23-25 June)	36

- 2.5.2 Each device was positioned on beams within each roof space (within the eaves of Building G as the roof space is open to the rooms below, and inside the roofing hatch of Building A) with the microphone pointing upwards at an angle of approximately 45 degrees. The Song Meters were programmed to record bat echolocation calls from 30 minutes before local sunset to 30 minutes after local sunrise each night during the survey period.
- 2.5.3 After retrieval of the recording devices the data files were downloaded and converted to ZCA (zero crossing analysis) format using WAC2WAV audio conversion software (Version 3.0.1, Wildlife Acoustics, Inc.). The converted files were then analysed using AnalookW sonogram analysis software (Version 3.8m, 2010, Chris Corben).

2.6 Manual Bat Activity Survey

- 2.6.1 In accordance with good practice guidelines at the time of survey (BCT, 2007) for moderate to high value sites, three activity surveys were undertaken during August and September 2011 (within the

appropriate survey season which runs from March to September). One of the surveys comprised dusk and dawn surveys within a single 24-hour period and the other two surveys comprised dusk surveys alone.

- 2.6.2 Subsequently, in order to update the survey effort and in relation to revisions in good practice guidelines (Hundt, 2012), an additional three activity survey visits were undertaken during the period June to July 2012, again with one of the surveys comprising a dusk and dawn survey session within a single 24-hour period.
- 2.6.3 During each survey session two surveyors walked two transect routes, commencing up to 0.5 hours before sunset and continuing until 2 hours after sunset, and commencing 1.5 hours before sunrise and continuing until sunrise on each occasion. Sample points were established along each transect, dividing the routes into approximately equal length sections. Transect routes and sample point locations are illustrated on Figure 4. The surveyors spent 5 minutes at each sample point and tallied all bat passes detected during that time. The surveyors also recorded the start and end times between which each transect section between sample points was surveyed and tallied all bat passes³ recorded along each individual transect section.
- 2.6.4 Additional notes were made on location and direction of flight where bats were deemed to be commuting, and on the time the first bat of each species was recorded, including its location. Details of the survey dates and times are provided in Table 3.

Table 3: Dates of Manual Bat Activity Survey (2011-12)

Survey Type	Date	Sunset/Sunrise	Start Time	End Time
Dusk	16/08/2011	20:30	20:00	22:30
Dawn	17/08/2011	05:50	04:20	05:50
Dusk	22/08/2011	20:14	19:44	22:14
Dusk	13/09/2011	19:29	18:59	21:29
Dusk	13/06/2012	21:19	20:49	23:19
Dusk	26/06/2012	21:21	20:51	23:21
Dawn	27/06/2012	04:51	03:21	04:51
Dusk	17/07/2012	21:10	20:40	23:10

- 2.6.5 The surveyors were equipped with Batbox Duet (Stag Electronics, Steyning, West Sussex) combined frequency division/heterodyne bat detectors. Bat echolocation calls were saved onto digital audio recorders. Where it was not possible to identify a bat to species level on site, the audio recordings were later analysed using BatScan sonogram analysis software (Version: 9.8, 2006, Visualization Software LLP for Stag Electronics). In 2012 an AnaBat SD2 with built in recording device (Titley Scientific, Cardiff) was utilised by one of the surveyors on the 26th & 27th June and 17th July surveys of Transect 2.
- 2.6.6 The surveys were carried out by licensed bat ecologists from Keystone Environmental, on behalf of WSPE in 2011 (Natural England Licence Number: 20104259 and 20103652) and in 2012 (Natural England Licence Number: 20114165, 20114071 and 20113906).

³ For the purpose of this survey, a single bat pass is defined as up to 10 seconds of echolocation calls. The maximum number of passes that can be recorded in a single minute is therefore 6.

2.7 Automated Bat Activity Survey

- 2.7.1 To provide supplementary information on bat activity within the Site over an extended period (one full night per location), three Song Meter SM2BAT 192kHz Ultrasonic Recorder (Wildlife Acoustics, Inc.) and one Anabat (SD1 detector with ZCAIM) automated bat detector units were deployed on site during 2011 to provide one full night of data at twelve separate site locations (the Anabat was located at SD4, SD7 and SD9, with Song Meters used at the remainder of locations). Each device was positioned on the ground with the microphone pointing upwards at an angle of approximately 45 degrees. The Song Meters were programmed to record bat echolocation calls from 30 minutes before local sunset to 30 minutes after local sunrise each night during the survey period. The Anabat was turned on at deployment up to 30 minutes before local sunset and turned off at retrieval after sunrise.
- 2.7.2 Subsequently, in order to update the survey effort, as for the manual bat activity surveys, two Song Meter SM2Bat 192kHz Ultrasonic Recorder (Wildlife Acoustics, Inc.) automated bat detector units were deployed for a period of at least three nights on three separate occasions at two locations on Site (one location on Transect 1, SD8, and one on Transect 2, SD1, see Figure 4).
- 2.7.3 Details of the survey dates are provided in Table 4. Automated detector unit locations are shown on Figure 4. All surveys were orchestrated and led by a Licensed Bat Ecologist (Natural England Licence Number: 20104259) in 2011, and (Natural England Licence Number: 20114165) in 2012 from Keystone Environmental, on behalf of WSPE.

Table 4: Survey timing for automated bat detectors

Location	Dates	No. Nights
SD1	16/08/2011 to 17/08/2011	1
SD2	16/08/2011 to 17/08/2011	1
SD3	16/08/2011 to 17/08/2011	1
SD4	16/08/2011 to 17/08/2011	1
SD5	22/08/2011 to 23/08/2011	1
SD6	22/08/2011 to 23/08/2011	1
SD7	22/08/2011 to 23/08/2011	1
SD8	22/08/2011 to 23/08/2011	1
SD9	13/09/2011 to 14/09/2011	1
SD10	13/09/2011 to 14/09/2011	1
SD11	13/09/2011 to 14/09/2011	1
SD12	13/09/2011 to 14/09/2011	1
SD1	13/06/2012 to 19/06/2012	6
SD8	13/06/2012 to 20/06/2012 (stopped midnight)	6.5
SD1	17/07/2012 to 20/07/2012	3
SD8	06/07/2012 to 09/07/2012	3
SD1	20/07/2012 to 23/07/2012	3
SD8	17/07/2012 to 23/07/2012	6

- 2.7.4 After retrieval of the recording devices the data files were downloaded and converted to ZCA (zero crossing analysis) format using WAC2WAV audio conversion software (Version 3.0.1, Wildlife Acoustics, Inc.). The converted files were then analysed using AnalookW sonogram analysis software (Version 3.8m, 2010, Chris Corben).

2.8 Evaluation of Results

- 2.8.1 Evaluation of the activity survey results was completed by WSPE using the data provided by Keystone Environmental. The evaluation of the bat populations using the Site was based on IEEM (2006) guidance. This guidance recommends that the evaluation is made with reference to a geographical frame of reference as follows:
- International;
 - UK;
 - National (England);
 - Regional (South-east England);
 - County (Hampshire);
 - District (Havant Borough);
 - Local (around Wecock/Waterlooville); and
 - Within zone of influence only (i.e. at a Site level - within the confines of the Site boundary).
- 2.8.2 To inform the assessment in this report, the level of activity of each bat species identified, the frequency of records made during the surveys, the abundance of the species at the national level, the quality of the habitat present and the geographical range of the species concerned have been considered, based on published accounts.
- 2.8.3 The value of roost resource within the Site was also assessed using IEEM (2006) guidance; with roost features considered with regard for the availability of similar features in the wider area.

2.9 Notes and Limitations

- 2.9.1 Trees were only surveyed from ground level during the preliminary surveys reported within this report; hence it is possible that potential roost features were under recorded because trees were in full leaf. However, a precautionary approach was adopted where uncertainty existed, so this is not considered to place constraints upon interpretation of these results. In addition, at height inspections of suitable trees have subsequently been completed (WSPE, 2011a) and are reported separately; therefore this is not considered to place limitations upon interpretation within this report.
- 2.9.2 There is no roof hatch within the false ceiling of Building D; hence this was not inspected internally. However, as this building was subsequently subject to an emergence and return survey, which did not identify any bats emerging from or entering the building the lack of internal inspection of the false ceiling is not considered to place constraints upon the overall conclusions drawn.
- 2.9.3 The western aspect of Building D and eastern aspect of G could not be fully observed during the dusk emergence and dawn re-entry survey due to the presence of stacked scrapped cars and dense vegetation respectively. However, survey effort was considered sufficient to draw robust conclusions; particularly in the case of Building G which was also subject to automated detector survey.
- 2.9.4 The automated detector employed within Building G could have picked up bat registrations from outside the building through the roofing structure; however, in combination with the emergence/return

survey data it is considered the interpretation that the bat registrations are likely to reflect use of Building G is most appropriate.

- 2.9.5 There were problems with two static detectors during 2011. The Song Meter deployed at location 12 on the 13th September failed to record any bat data due to damage of the microphone, which given the total absence of data compared to all other locations, appears to have been inflicted soon after deployment. However, in combination with the manual transect surveys, the number of other points across the Site which were sampled (12) and the total number of nights on which static survey was completed (three in 2011 and twelve to fifteen in 2012) this is not considered to place constraints upon evaluation of bat foraging and commuting activity on the Site. The Song Meter deployed at location 11 on the 13th September ran out of power 1 hour prior to sunrise due to the sheer volume of bat passes recorded; however, as 10 hours of data had been collected prior to the loss of power this is not considered to place constraints upon the subsequent evaluation.
- 2.9.6 There were occasional problems with power of automated detectors in 2012. These affected the automated detector within Building A between the 23rd and 25th June 2012, and the automated detector within Building G between the 21st and 25th June 2012 and the automated detector at SD8 after midnight on the 20th June 2012. However, as 33 and 36 nights of data were collected respectively this is not considered to place constraints upon interpretation of the results.
- 2.9.7 The following limitations are also applicable to all bat surveys and are therefore not specific to the Site:
- Once light levels drop below a given point it is easy to miss bats emerging from egress points. While every effort is made to detect emerging bats, it cannot be guaranteed that all emerging bats will be detected.
 - It should be noted that long-eared bats in particular echolocate more quietly than other bat species and so can sometimes be more difficult to detect and often go unrecorded.
 - *Myotis* and *Nyctalus* species are notoriously difficult to distinguish from other species within the same genus in the field and from recorded sonograms, as there is considerable overlap in their range of echolocation frequencies. Where the species cannot confidently be determined only the genus is stated.

3 Results and Evaluation

3.1 Overview

- 3.1.1 Results obtained are set out separately below for each element of the surveys.
- 3.1.2 Surveys identified that Building G is a summer/transitional common pipistrelle roost used by a small number of individuals and may also be used by long eared bats, whilst Building A is a historic long eared bat roost, but there is no evidence of current use of this building. Trees containing potential roost features were also identified and at least six species of bat were recorded commuting or foraging over the Site, common pipistrelle, soprano pipistrelle, *Myotis* spp., long eared spp. noctule and serotine.

3.2 Detailed internal and external inspection of buildings

- 3.2.1 Table 5 provides a description of each building surveyed in 2011, along with details of any bat signs and potential roost features that were found and the resulting assessment of bat roost potential. Where evidence of roosting bats was identified this is displayed on Figure 2, with buildings identified as confirmed roosts.

Table 5: Results of detailed building inspection

Building Reference	Photo & Description	Bat Signs & Potential Roost Features	Roost Status/ Potential
A	 Two-storey former farm house constructed from brick and flint with a slate pitched roof. Old wooden beams throughout roof space (with newer repairs) with exposed central ridge. Felt bitumen lining and old fiber glass insulation throughout.	Single old bat dropping approximately 3 mm in diameter by 6-8 mm in length with a medium to coarse particle size, was recorded within the roof space below the exposed ridge beam, suggesting the presence of bat species such as long-eared (Stebbins R E, 2007). Potential roost features include: the enclosed roof space with exposed ridge beam (accessible through gaps between the soffits and walls, via gaps around the chimney breast and under raised ridges), and cavities between external slates and internal felt bitumen (accessible via raised slates).	Potential long-eared bat roost (see also Sections 4.3 and 4.4). Status unknown following internal inspection, although very unlikely to be high level of usage (e.g. not a maternity roost) due to just a single old dropping found – despite good access to the roof space and ridge beam (these species are not typically crevice dwelling). Low summer, transitional, night roost potential, also hibernation roosting potential between slates and felt bitumen for species such as pipistrelle bats that tend to hibernate in crevices on the exterior of buildings to take advantage of warm winter days to forage (BCT, 2007).
B	 Old barn (now horse stables) constructed from brick and flint with a modern corrugated metal roof and metal girders. Open from floor to the underside of roofing materials throughout.	No evidence of roosting bats. No potential roosting features identified throughout. The interior is open and exposed to the elements and well lit during the day.	Negligible

Building Reference	Photo & Description	Bat Signs & Potential Roost Features	Roost Status/ Potential
C(a)	 Garden sheds constructed from brick with a slate pitched roof. Modern wooden roofing trusses with new felt bitumen lining throughout (covers ridge beam). Interior open to underside of roofing materials throughout.	No evidence of roosting bats. Potential roost features include: closed interior of the building (accessible through gaps beneath the eaves), and cavities between external slates and internal felt bitumen (accessible via raised slates and raised ridges).	Low summer, transitional or night roost potential within interior for long-eared bat species. Low summer, transitional or night roost potential for pipistrelle bats. Also hibernation potential between slates and felt bitumen for species such as pipistrelle bats that tend to hibernate in crevices on the exterior of buildings to take advantage of warm winter days to forage (BCT, 2007).
C(b)	 Stables constructed from wooden paneling with a pitched slate roof.	No evidence of roosting bats. Potential roost features include cavities between external slates and internal wooden supports and between internal and external wooden wall paneling (accessible via open stable doors).	Low summer, transitional, night roost potential between slates and wooden supports and between wooden paneling. Also hibernation potential for species such as pipistrelle bats that tend to hibernate in crevices on the exterior of buildings to take advantage of warm winter days to forage (BCT, 2007).

Building Reference	Photo & Description	Bat Signs & Potential Roost Features	Roost Status/ Potential
D	 Dilapidated store room/office block constructed from corrugated metal with a corrugated concrete shallow pitched roof. Internal roof space sealed by false ceiling (no access).	No evidence of roosting bats (exterior only). Potential roost features include the enclosed roof space (accessible via gaps under corrugated concrete).	Low summer, transitional or night roost potential within enclosed roof space for long-eared species. Low summer, transitional or night roost potential for crevice dwelling species such as pipistrelle. Also hibernation potential beneath roofing materials for species such as pipistrelle bats that tend to hibernate in crevices on the exterior of buildings to take advantage of warm winter days to forage (BCT, 2007).
E	 Stable blocks constructed from breeze block foundations with upper corrugated metal/wood paneling and corrugated concrete roof. Open from floor to the underside of roofing materials throughout.	No evidence of roosting bats. No potential roosting features identified.	Negligible

Building Reference	Photo & Description	Bat Signs & Potential Roost Features	Roost Status/ Potential
F	 Stable blocks constructed from breeze block foundations with upper corrugated metal and corrugated concrete roof. Open from floor to the underside of roofing materials throughout.	No evidence of roosting bats. No potential roosting features identified.	Negligible
G	 Former stable block now used for storage. Constructed from brick with pitched slate roof. Wooden soffit boxing beneath the eaves. Exposed wooden ridge and purlins with felt bitumen lining throughout. Open from floor to the underside of roofing materials throughout.	Three old bat droppings approximately 3 mm in diameter by 6-8 mm in length with a medium to coarse particle size were recorded on top of storage materials below the exposed ridge beam, suggesting the presence of bat species such as long-eared (Stebbins R E, 2007). Potential roost features include the enclosed roof space with exposed ridge beam (accessible through gaps beneath the eaves within the soffits and via open stable doors), and cavities between external slates and internal felt bitumen (accessible via raised slates, raised ridges, and at gable apexes where mortar is missing).	Potential long-eared roost (see also Sections 4.3 and 4.4). Low summer, transitional and night roost for crevice dwelling species such as pipistrelle. Also hibernation potential between slates and felt bitumen for species such as pipistrelle bats that tend to hibernate in crevices on the exterior of buildings to take advantage of warm winter days to forage (BCT, 2007).

Building Reference	Photo & Description	Bat Signs & Potential Roost Features	Roost Status/ Potential
H	 Modern metal and fibre glass porta-cabins forming part of a phone mast. Interior not accessible although apparently no roof space or enclosed cavities.	No evidence of roosting bats (exterior only). No potential roosting features identified.	Negligible

3.3 Emergence and Re-entry Survey (2011)

- 3.3.1 No bats were observed emerging from or entering any of the buildings surveyed. However, a single long-eared bat (either brown or grey long-eared) and two pipistrelle bats (species unconfirmed) were recorded very close to aspects of Building G during one of the survey visits. The emergence and re-entry survey results are summarised in Table 6. Detailed survey results including weather conditions can be found in Appendix A.

Table 6: Emergence and re-entry survey summary

Building Reference	Evidence	Status
A	No bats recorded emerging or entering	Likely absence of current roost
C(a)	No bats recorded emerging or entering	Roost likely absent
C(b)	No bats recorded emerging or entering	Roost likely absent
D	No bats recorded emerging or entering	Roost likely absent
G	No bats recorded emerging or entering. Single long-eared bat (species unconfirmed) observed swarming around the apex of the northern gable, 65 minutes before sunrise during one survey visit). Two pipistrelle bats (species unconfirmed) observed flying very close to northern end (possibly entered open stable door) 20 minutes before sunrise during one survey visit.	The emergence and re-entry survey did not yield enough evidence to conclusively determine presence/likely absence of a roost. Evidence collected suggests possible roost of low numbers of long eared and pipistrelle bats.

3.4 Automated Surveys of Buildings A & G

- 3.4.1 No bats were detected within Building A during the monitoring period. However, several registrations of common pipistrelle were recorded by the detector within the roof space of Building G. One to seven registrations were detected on half (eighteen of thirty six) of the surveyed nights (particularly through late-July). Of these, registrations on eleven nights were recorded between 16 and 35 minutes after sunset, around the typical emergence time for common pipistrelle (20-35 minutes after sunset, Russ (2012)). The automated survey results are summarised in Table 7. Detailed survey results can be found in Appendix B.

Table 7: Automated survey summary

Building Reference	Evidence	Status
A	No bats recorded	Likely absence of current roost
G	One to seven registrations of common pipistrelle on individual nights, with registrations around the typical emergence time for this species on eleven of the eighteen nights on which bats were recorded.	Common pipistrelle roost (utilised by a small number of individuals). Number and regularity of registrations not indicative of a maternity roost and therefore considered to be a summer/transitional roost used by low numbers of bats.

3.5 Summary of Building Internal and External Inspections, Emergence/Re-entry Survey and Automated Surveys

- 3.5.1 Accumulated evidence indicates that Building G supports a summer/transitional common pipistrelle roost (utilised by a small number of individuals) and a historic long-eared roost (likely utilised by a small number of bats only), whilst Building A contains a historic long-eared roost (likely utilised by a small number of bats only) which is not currently used. A summary of roost presence, combining data from the building external and internal inspections, emergence/re-entry surveys, and automated surveys, is given in Table 8 below.

Table 8: Summary of building survey results

Building reference	Evidence	Status
A	Potential roost features present, one old long eared bat dropping present, no bats emerging from or entering building. No bats recorded during automated surveys.	Likely to have been used historically as a roost by small numbers of long eared bats. Bats currently likely absent.
B	No potential roost features present, no evidence of roosting bats.	No roost present.
C	Potential roost features present, no evidence of roosting bats, no bats emerging from or re-entering building.	Roost likely absent.
D	Potential roost features present, no evidence of roosting bats, no bats emerging from or re-entering building.	Roost likely absent.
E	No potential roost features present, no evidence of roosting bats.	No roost present.
F	No potential roost features present, no evidence of roosting bats.	No roost present.
G	Potential roost features present, three old long eared bat droppings present, one long eared bat prospecting 65 minutes before sunrise, two pipistrelles (species unconfirmed) possibly entered 20 minutes before sunrise. One to seven registrations of common pipistrelle on eleven individual nights recorded around the typical emergence time for this species, on static detector within building.	Summer/transitional common pipistrelle roost utilised by a small number of individuals. Likely to have been used historically as a roost by small numbers of long eared bats, which may still be used occasionally. Unlikely to be a maternity roost for either species based on the low level of evidence recorded.
H	No potential roost features present, no evidence of roosting bats.	No roost present.

3.6 Ground level Bat Survey of Trees

- 3.6.1 During the course of the ground level tree survey, 24 groups of trees, 88 individual trees and 5 hedgerows were surveyed within and along the Site boundary. Excluding the mixed groups of trees and hedgerows, these comprised pedunculate oak *Quercus robur* (68%), ash *Fraxinus excelsior* (14%), beech *Fagus sylvatica* (3%), cherry sp. *Prunus* sp. (1%), crab apple *Malus sylvestris* (1%), field maple *Acer campestre* (2%), hawthorn *Crataegus monogyna* (3%), holly *Ilex aquifolium* (1%), Monterey cypress *Cupressus macrocarpa* (2%), pear sp. *Pyrus* sp. (1%), walnut *Juglans regia* (1%), weeping willow *Salix alba x babylonica* (1%), wild service tree *Sorbus torminalis* (1%) and yew *Taxus baccata* (2%). No confirmed tree roosts were identified, however 23 trees had features with high

potential to be used as roosts (Category 2a), 65 had moderate to low potential (Category 2b) whilst 34 had negligible potential (Category 3). The results of the tree survey are summarised in Table 9 below. Preliminary descriptions of specific roost features are provided in Appendix C. Further at height survey of trees with high potential has been completed, with some re-classification⁴ following close inspection of features at height; these surveys have been reported separately (WSPE 2011a) but are summarised for information in Table 10 below. Classifications within Table 9 and details in Appendix C are preliminary only and the 2011a Report should be referred to for further details. For the benefit of the reader the figure from the 2011a Report has been reproduced within this report as Figure 3.

Table 9: Summary of ground level tree survey results

Roost Potential	Total Number of Trees/Tree Groups in Category	Tree Numbers
1 – Confirmed Roost	0	n/a
2a – High Potential	23	Trees C & D in G6a, T12, T16, Tree E in G23, T26, T28, T31, T41, T50, G51 (3 trees), T62, T81, T83, T85, T88, T95, T98, T101, T107, T108
2b – Moderate/Low Potential	65	T1, G3, T5, G6, G6a, G8a,b &c, G10, G11, T13 – 15, T17 – 21, G23, T27, T36, H37, G38, T39, T40, T42 – 45, T47 – 49, T52, T53, G57, T58 – 61, G64, T65 – 67, T69, T72, T75, T77, T78a, G79, T80, T86, T87, T89, T91, T93, G94, T96, T103 – 106, T109, T110, Trees A & B
3 – Negligible Potential	34	G2, T4, T7, G9, T22, G24, T25, T29, T30, G32, T33, G34, T35, G46, T54, T55, T56, T63, H68, T70, T71, T73, T74, T76, G78, G79a, T82, H84, T90, T92, H97, H99, T100, T102

- 3.6.2 Trees listed above as Category 2a – High potential were surveyed at height (WSPE, 2011a). Detailed inspection at height enables features to be fully explored and resulted in the reclassification of Category 2a trees listed above in Table 9 to that given in Table 10 below.

Table 10: Summary of at height tree survey results

Roost Potential	Total Number of Trees/Tree Groups in Category	Tree Numbers
1 – Confirmed Roost	3	T26, T83, G51c ⁵ .
2a – High Potential	12	Tree C in G6a, Tree E in G23, T16, T31, T41, G51a and b, T62, T81, T88, T98, T108.
2b – Moderate/Low Potential	7	T12, T28, T50, T85, T101, T107, Tree D in G6a.

⁴ Three confirmed roosts were identified, whilst some Category 2a trees were downgraded to Category 2b following inspection at height.

⁵ Evidence found comprised pipistrelle type droppings within splits within tree limbs in trees T26 and T83, whilst G51c had a substance smelling of ammonia being secreted from the base a crack in the tree, which was considered to be of bat origin.

Roost Potential	Total Number of Trees/Tree Groups in Category	Tree Numbers
3 – Negligible Potential	1	T95.

3.7 Bat Activity Survey

3.7.1 Automated Activity Survey Data

3.7.2 The location of static detectors is shown on Figure 4, with raw data from automated activity surveys included within Appendix D. In addition, spatial comparison across the Site of the mean numbers of registrations of each species per hour at automated detector locations is illustrated on Figures 5 to 9.

3.7.3 Figures displaying the results of the automated activity surveys (overleaf) illustrate that pipistrelle spp. has been recorded across the Site, on the majority of survey dates, but that the number of registrations per hour is very variable (0 to 590). Far fewer (<8, usually <3) registrations per hour of other species were recorded, though Myotis spp. was also recorded on the majority of survey dates; particularly at SD8 on the southern boundary, where long eared bats were also recorded on the majority of surveyed nights. Serotine was recorded at low frequency across the Site in 2011, whilst little noctule activity was recorded by the static detectors.

3.7.4 The following figures illustrate the number of bat registrations recorded per hour during automated detector survey in 2011 and 2012. Pipistrelle bat data have been presented within separate figures for ease of visual interpretation as the number of registrations is much greater than that of other species. Figure 10 and Figure 11 compare the relative frequency at which species were recorded across twelve locations on the Site in 2011, whilst Figure 12, Figure 13, Figure 14 and Figure 15 compare a greater number of nights data for two locations (SD1 and SD8). It should be noted that automated detectors cannot distinguish between a small number of bats calling continuously in the vicinity of the detector and a larger number of bats passing the detector; therefore, high numbers of registrations per hour could fall into either category.

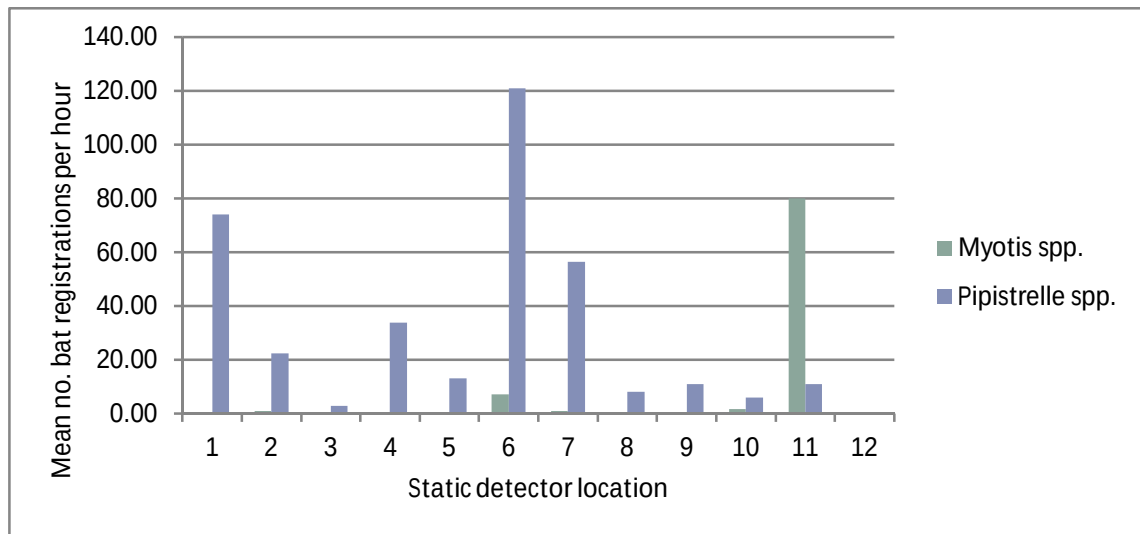


Figure 10: Mean number of bat registrations (Pipistrelle spp. and Myotis spp.) per hour at each static detector location (2011)

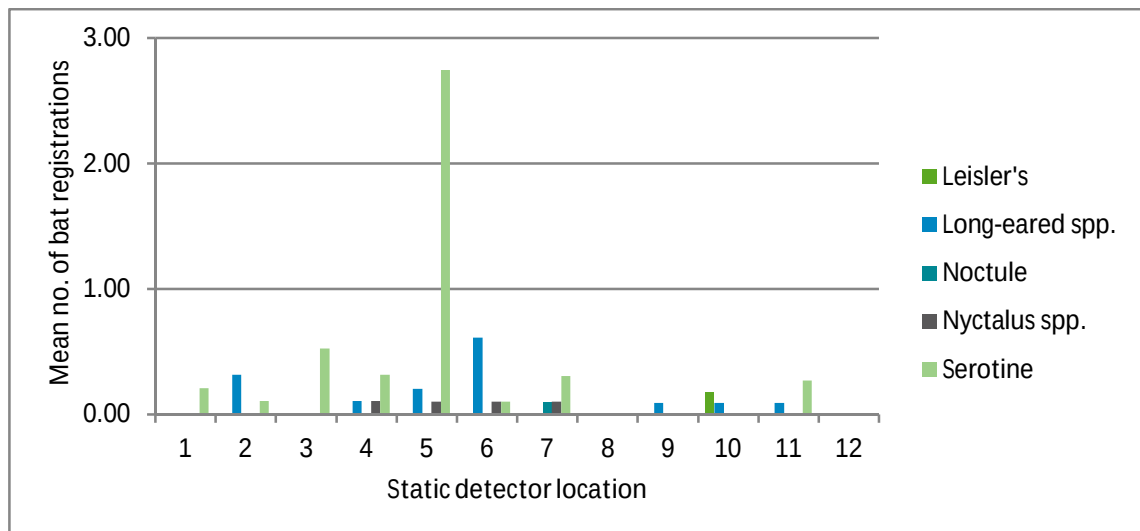


Figure 11: Mean number of bat registrations (other recorded species) per hour at each static detector location (2011)

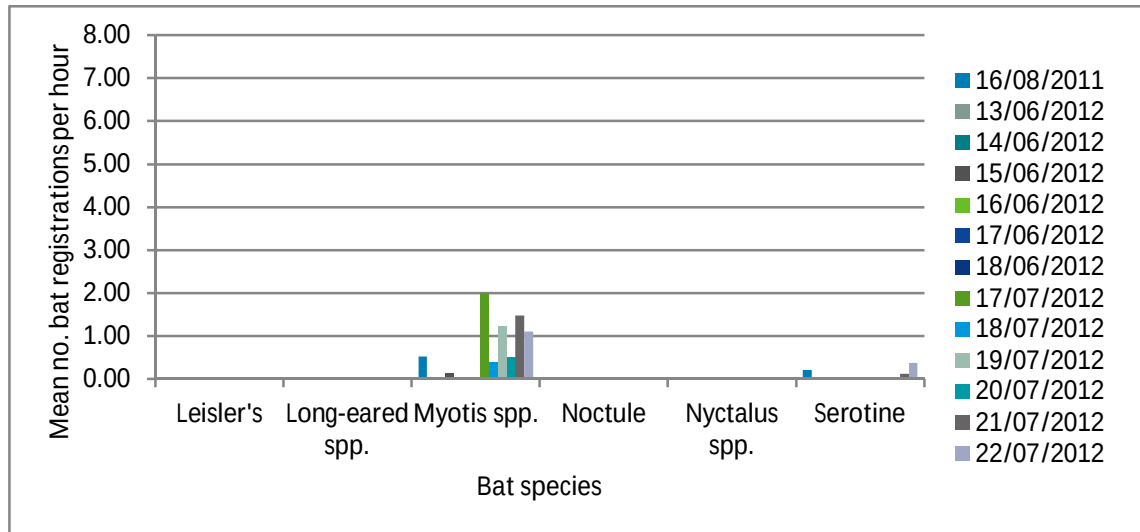


Figure 12: Static Location 1: (2011 and 2012) Mean number of bat registrations per hour (excluding pipistrelle spp.)

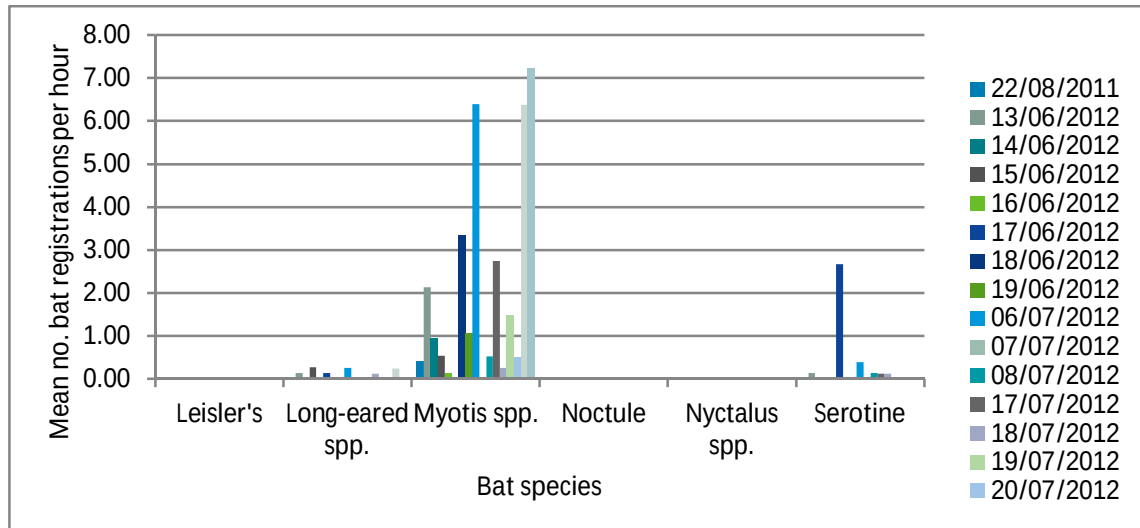


Figure 13: Static Location 8 (2011 and 2012) Mean number of bat registrations per hour (excluding pipistrelle spp.)

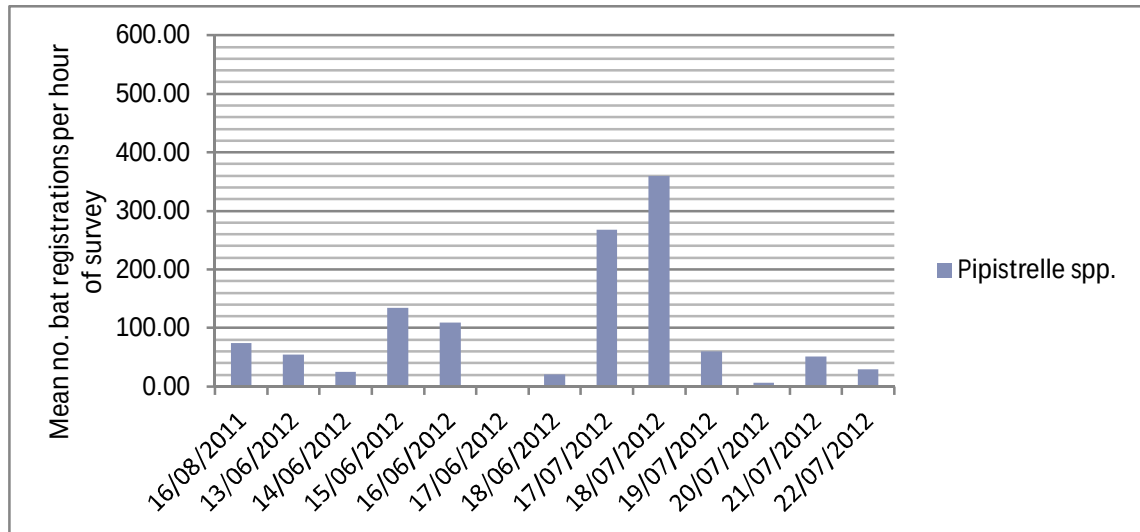


Figure 14: Static Location 1 (2011 and 2012) Mean number of pipistrelle bat registrations per hour

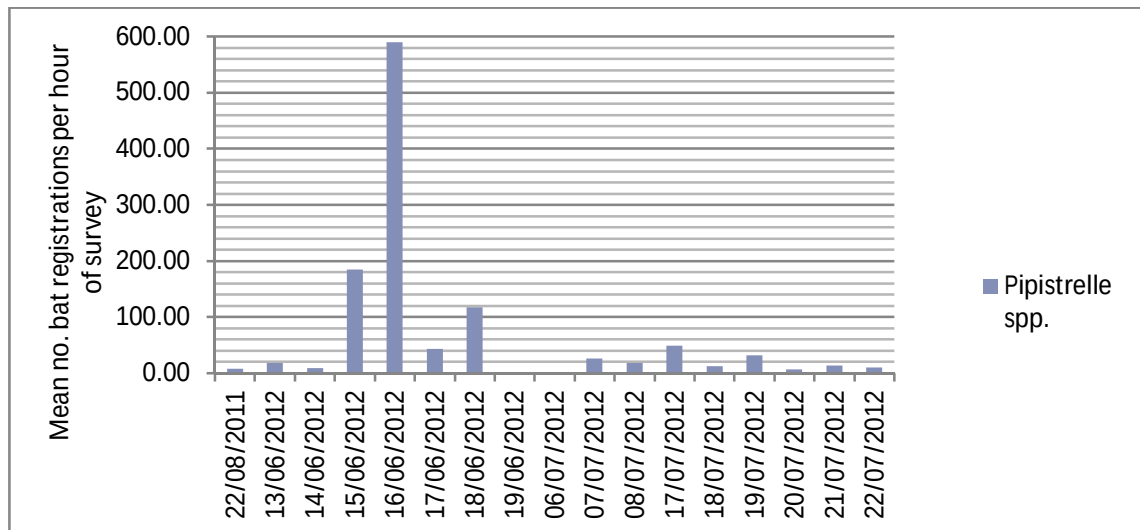


Figure 15: Static location 8 (2011 and 2012) Mean number of pipistrelle bat registrations per hour

- 3.7.5 In addition Table 11 (below) shows the earliest time a species was recorded after sunset. With the exception of Leisler's bat, all species have been recorded within, or earlier than the typical emergence times; suggesting roosting in the vicinity of the Site. In the case of pipistrelle this correlates with the identification of pipistrelle type droppings within two trees on the Site during the at-height inspections and evidence of roosting within Building G. Other species could also be using the suitable features identified within the mature trees on the Site, whilst Buildings G and A also contain evidence of past use by small numbers of long eared bats.

Table 11: Time after sunset first bat recorded (static detector data, earliest record per species across entire recording period)

	Leisler's	Long-eared spp.	Myotis spp.	Noctule	Nyctalus spp.	Pipistrelle spp.	Serotine
Minutes after sunset first bat recorded	299	16	22	-15	72	-4	20
Emergence times quoted in Hundt 2012	From approximately 15 minutes after sunset	When completely dark, from approximately 1 hour after sunset	Variable, 30 minutes to an hour after sunset depending on species	From approximately sunset	(See Noctule and Leisler's)	From approximately 30 minutes after sunset	From approximately 15 minutes after sunset
Emergence times quoted in Russ 2012	5-15 minutes after sunset	40-60 minutes after sunset	25-60 minutes after sunset depending on species	4-9 minutes after sunset		20-35 minutes after sunset	20-25 minutes after sunset

3.7.6 Manual Activity Survey

3.7.7 The transect routes and sample points are shown on Figure 4, with raw data from the manual activity surveys included in Appendix E.

3.7.8 Data from the manual activity survey was used to consider the frequency with which bats were recorded during walked transect surveys and the distribution of bats across the Site (using comparison between point count data points, as illustrated on Figures 5 to 9). Figures 5 to 9 show distribution in relation to Site features for each species recorded during walked transect surveys (pipistrelle spp. noctule, serotine, Myotis spp. and long eared bat spp respectively), illustrating at which sample points a species was more frequently recorded. Figure 16 (Pipistrelle spp), Figure 17 (noctule), Figure 18 (serotine), Figure 19 (Myotis spp.) and Figure 20 (long eared bat spp) below illustrate the percentage of 10 second intervals per hour in which the species was recorded during walked transects, whilst figures 21 to 28 within Appendix F allow comparison of how frequently a species was recorded both between surveyed dates at one sample point and between sample point locations.

3.7.8.1 Pipistrelle spp.

3.7.9 Pipistrelle spp. was typically recorded during less than 20% of the 10 second intervals available in an hour (see Figure 16). This species group was recorded across the Site on the majority of survey dates (see Figure 21 and Figure 22 in Appendix F).

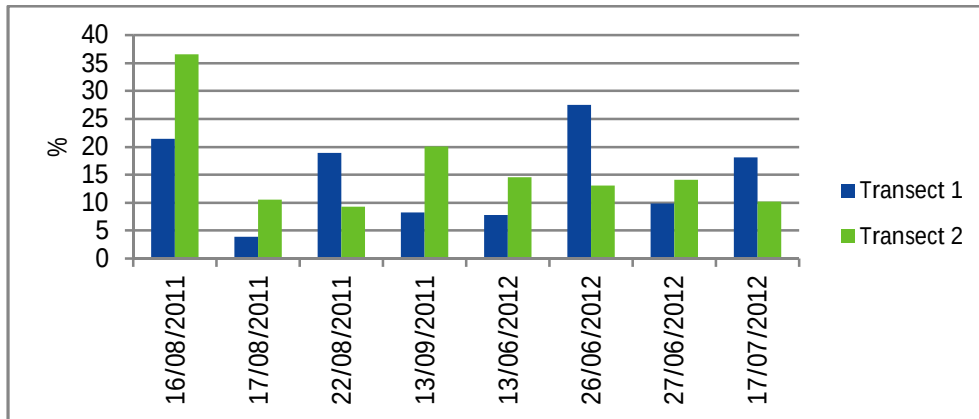


Figure 16: Percentage of 10second intervals per hour in which Pipistrelle spp. recorded

3.7.9.1 Noctule bat

3.7.10 Noctule bat was typically recorded during less than 1% of the 10 second intervals available per hour; on only 50% of the walked transect surveys (see Figure 17 below). Noctule was recorded slightly more frequently on Transect 1, located in the western half of the Site, than Transect 2 (see Figure 22 and Figure 23 in Appendix F).

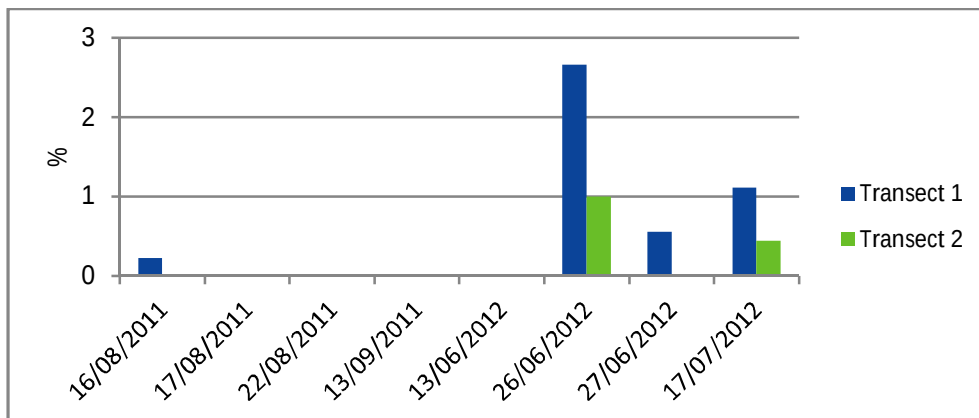


Figure 17: Percentage of 10 second intervals per hour in which noctule bat recorded

3.7.10.1 Serotine bat

3.7.11 Serotine was recorded from less than 3% (typically less than or close to 1%) of the 10 second intervals available per hour on any walked transect (see Figure 18 below). Figure 25 and Figure 26 (Appendix F) suggest serotine is recorded across the Site, albeit at low frequency.

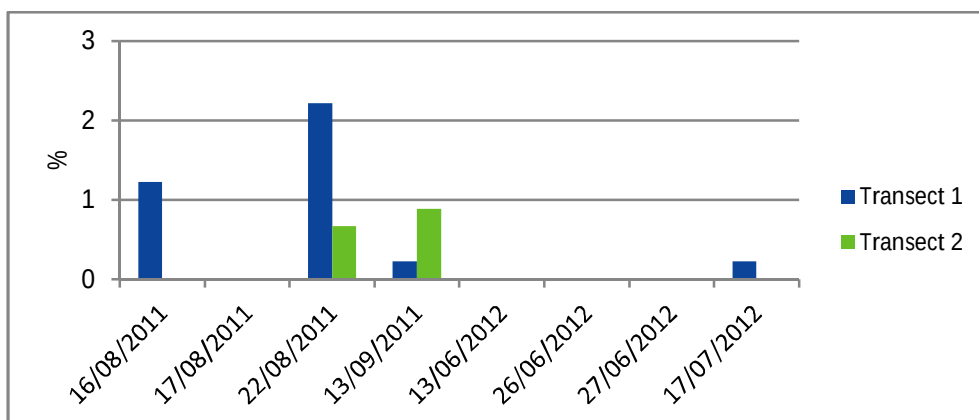


Figure 18: Percentage of 10 second intervals per hour in which serotine recorded

3.7.11.1 Plecotus spp.

3.7.12 Plecotus spp. was recorded from less than 1% of the available 10 second intervals per hour on walked transect surveys (Figure 19). The distribution of point count locations on the walked transects at which long eared bats are recorded is illustrated on Figure 27 and Figure 28 in Appendix F. This suggests greater use is being made of the boundaries of the Site (with long eared bats recorded at locations 2, 3, 4 and 7 on Transect 1 and 8, 9 and 11 on Transect 2); and the north-south hedge in the centre of the Site (recorded at locations 1, 2 and 3 on Transect 2) compared to more open habitats in the centre of fields.

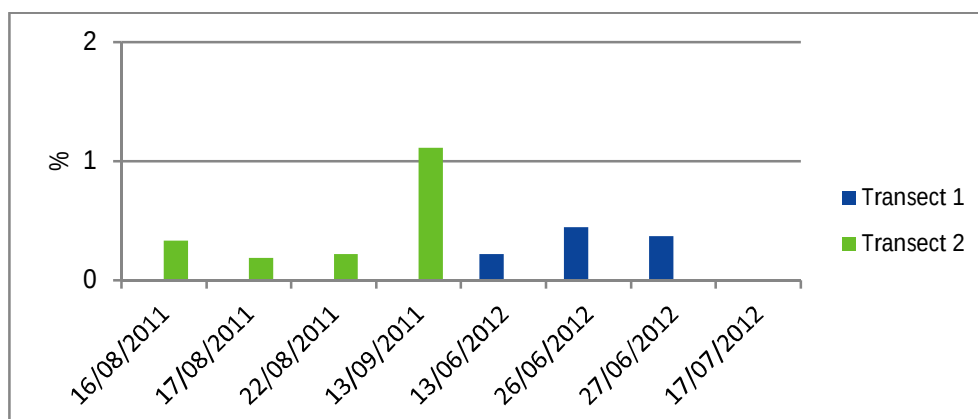


Figure 19: Percentage of 10 second intervals per hour in which Plecotus spp. recorded

3.7.12.1 Myotis spp.

3.7.13 Myotis bats were recorded from 3% or less of the 10 second intervals per hour on walked transects; with no Myotis recorded on three of eight surveys (see Figure 20). Figure 29 and Figure 30 (Appendix F) suggest that this species group is not evenly distributed across the Site, or uses parts of the Site only periodically. Point count locations in which this species was recorded during walked transects are located on the south western boundary (Transect 1 (2 and 3)), northern boundary (Transect 1 (6, 7) Transect 2 (3)) and easternmost central hedgeline (Transect 2, (4)). Of these the majority of point count locations recorded Myotis during <5% of the total 10 second intervals available, however occasionally a greater number of passes were recorded; on one occasion Myotis were recorded within all 10 second intervals spent at the point count location (Transect 1 (2), 22/08/2011).

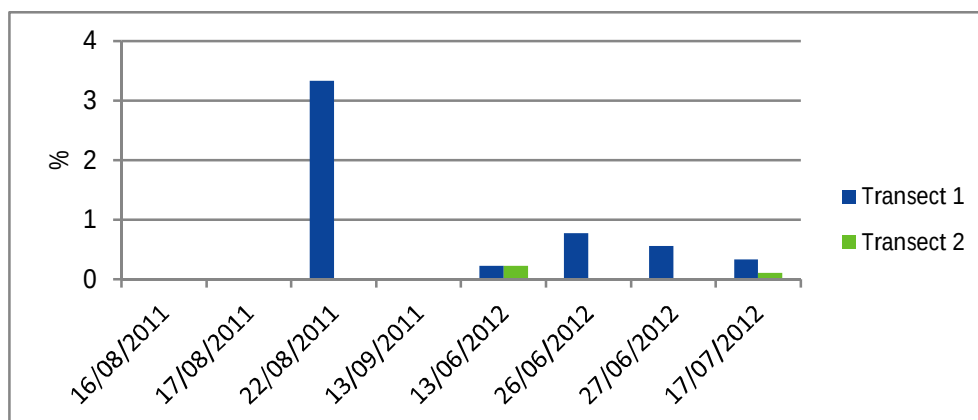


Figure 20: Percentage of 10 second intervals per hour in which *Myotis* spp. recorded

3.8 Evaluation of the Site for Bats

3.8.1 Roosts

- 3.8.2 The evidence recorded on the Site suggests that Building G supports a common pipistrelle roost, with one to seven registrations recorded (by the automated detector placed within the roof space) around the typical emergence time for this species on eleven of the thirty six nights surveyed, and two pipistrelle bats seen flying close to the southern end (and potentially entering the open stable door) shortly before dawn. Additionally, the presence of a few old long eared droppings, with one long eared bat seen prospecting at the gable during the dawn re-entry survey indicates the likely presence of a historic roost used by small numbers of this species, which may still be used occasionally. It is considered highly unlikely that this building supports a maternity roost for either species, based on the low level of evidence recorded. The data recorded is more typical of an occasional daytime summer and/or transitional roost, which could also be used as a night feeding perch.
- 3.8.3 Building A is likely a historic summer, and/or transitional roost for long eared bats. One old dropping of shape and size characteristic of long eared bats was found within the roof space; but no bats were observed emerging from or re-entering the building, no registrations were recorded by the automated detector placed within the roof space, nor was significant activity noted close to the building.
- 3.8.4 No evidence of roosting bats was recorded within Buildings B, C, D, E, F & H; therefore it can be concluded roosts are likely absent from these buildings.
- 3.8.5 The preliminary tree survey identified 23 trees with high potential to be used as roosts (Category 2a). This was refined during the at height tree survey (WSPE, 2011a) to three confirmed roosts (two comprising pipistrelle roosts, with the third not identifiable to species level) and twelve trees with high potential to be used as roosts. The majority of the qualifying features within these trees were large dead limbs with major splits at height at various aspects; though major rot cavities and woodpecker holes were also present in some trees. Noctule, pipistrelle, *Myotis*, and long eared bats have all been recorded within or earlier than their typical emergence times and could use suitable features within the trees present, however, the manual transects at dusk or dawn did not identify swarming or directional commuting behaviour (though it should be noted confirming presence or absence of roosts is not the primary purpose of activity surveys and such surveys will not necessarily pick up such behaviour as it would be dependent upon the location of the surveyors within the Site coinciding with such behaviour, should it occur). Though the Site supports good numbers of mature oaks with

suitable features, this type of resource is also available in the wider landscape in the local area, which includes other similar hedgerows with mature trees.

- 3.8.6 Overall, supporting a summer/transitional roost used by low numbers of common pipistrelle, which may also be used occasionally by long eared bats and a further building with evidence of past use by low numbers of long eared bats, three confirmed tree roosts and 12 further trees with high potential; the Site is considered of Local value for roosting bats, with probable certainty. If myotis bats roost within the trees present on the Site, the Site could be considered of greater value, dependent upon the species present; but no evidence of roosting has been recorded.

3.8.7 Commuting and Foraging Habitat

3.8.7.1 Pipistrelle spp.

- 3.8.8 Pipistrelle spp. was the most commonly recorded species group on the Site; records comprise both soprano and common pipistrelle bats, with no positive records of rarer pipistrelles (such as *Nathusius pipistrelle*) (D. Allan pers comm 2nd November 2012).
- 3.8.9 Pipistrelles were recorded on both walked transect routes completed during 2011 and 2012, with passes recorded within around 10-20% of the potential 10 second time intervals available on the majority of surveys, with the exception of 16th August 2011 when more frequent activity was recorded (pipistrelles were detected during around 35% of available 10 second time intervals) (see Figure 16, Section 4.6). Pipistrelles were recorded at all point count locations, and on the majority of survey dates. The percentage of 10 second intervals in which pipistrelles were recorded at point counts was very variable, with recording frequency at the majority falling below 20%; though on one third of survey dates the frequency with which pipistrelles were recorded at point counts was >20% (see Figure 21 and Figure 22, Appendix F). The number of bat registrations at static locations was also very variable, with between 2 and 360 registrations per hour at static location 1 and between 0 and 590 registrations per hour at static location 8 on different dates within 2012 (see Figure 14 and Figure 15, Section 4.6). However, on the majority of survey dates around 50 or fewer registrations were recorded per hour. The frequency at which bats are recorded varies across the Site, of the locations sampled in 2011 the number of bat registrations was higher at static locations 6, 7 and 1; suggesting the northern site boundary (SD1 and SD7) and westernmost central hedgerow (SD6) may be more frequently used by pipistrelle bats than other parts of the Site (see Figure 5 and Figure 10). The static data from 2012 also reflects this, with consistently higher numbers of bat registrations at static location 1 than static location 8 (towards the western end of the southern boundary).
- 3.8.10 Overall, the survey data suggests that the Site is used frequently by common pipistrelle; with activity levels at times very high in some parts of the Site; though it is not possible to tell from the static detector data whether the high numbers of registrations are a result of continual presence of a small number of bats within the vicinity of the static, or passage of larger numbers of individuals. As common and soprano pipistrelles are widespread and common species (Russ, 2012), which make use of many habitat types; overall the Site is considered of District value for foraging pipistrelle bats.

3.8.10.1 Noctule

- 3.8.11 Noctule bat was recorded at low levels on both walked transect routes, primarily during surveys in the 2012 season (see Figure 17). This species was recorded during <3% of the possible 10 second periods available within an hour on any given transect. Comparing point count data across the Site (see Figure 23 and Figure 24) illustrates a slightly higher incidence of noctule recording on Transect 1 (western half of Site) than on Transect 2 (eastern half of Site), with the species recorded on four

survey visits as opposed to two. This species was not recorded at static locations 1 or 8 in 2012, but static data from 2011 indicates less than one bat registration per hour at detectors located in the centre of the Site (SD4, SD5, SD6, SD7 – see Figure 6 and Figure 11). Collectively, this suggests low frequency use of the Site by noctule bats, most likely to be commuting over the Site or foraging at height above the horse fields. As a widespread but relatively uncommon species in southern England (NMBP, 2011) the Site is considered of Site value for this species.

3.8.11.1 Serotine

- 3.8.12 Serotine was recorded at both static locations 1 and 8 in 2012; primarily with less than 1 registration per hour, though up to 3 registrations per hour on one occasion (17/06/2012) (see Figure 12 and Figure 13). This species was also recorded at low frequency (less than 3 registrations per hour) across the Site in 2011 (locations SD1-SD7 and SD11, see Figure 7 and Figure 11). On any walked transect, serotine was recorded during <3% of the possible 10 second periods available within an hour (see Figure 18). The distribution of point count locations at which this species was recorded suggests it occurs across the Site, albeit at low frequency (see Figure 25 and Figure 26, Appendix F). As an uncommon species at a UK scale (NBMP, 2011), the Site is considered of Local value for this species.

3.8.12.1 Long eared bats

- 3.8.13 Long eared bats were recorded at only one of the static locations during 2012, at location SD8, which lies on the treeline on the southern Site boundary. This species was recorded at less than 1 registration per hour on 6 of the 16 nights surveyed (see Figure 13), (no registrations were recorded at static location SD1, see Figure 12). During 2011 long eared bats were recorded at a greater number of locations (reflecting the slightly different approach to survey); static locations SD2 (north western boundary), SD4, SD5, SD6 and SD9 in the centre of the Site and SD10 and SD11 in the northwest of the Site all recorded long eared bats; with <1 registration per hour, suggesting low levels of activity occur across the Site (see Figure 11). Long eared bats were also recorded during <1 % (or close to 1%) of the 10 second intervals per hour of walked transect surveys completed in 2011 and 2012. The distribution of point count locations on the walked transects at which long eared bats are recorded suggests greater use is being made of the boundaries of the Site (with long eared bats recorded at locations 2, 3, 4 and 7 on transect 1 and 8, 9 and 11 on transect 2); and the western north-south hedge in the centre of the Site (recorded at locations 1, 2 and 3 on transect 2) compared to more open habitats (see Figure 8, Figure 27 and Figure 28). When recorded long eared bat was recorded within between 1 and 10% of the available 10 second intervals spent at the point count locations.
- 3.8.14 This species group contains two species, the brown long eared bat which is relatively widespread and common, and the grey long eared bat which is thought to be relatively rare and has a restricted distribution. It is considered most likely that the *Plecotus* spp. records on Site represent brown long eared bats foraging and commuting on Site. On this basis, with records regularly recorded, but at fairly low levels across the Site, overall the Site is considered of Local value for this species group, with probable confidence (due to the potential for under-recording of *Plecotus* and the limited potential that grey long eared bats may use the Site).

3.8.14.1 Myotis spp.

- 3.8.15 Myotis bats were generally recorded during <1% (up to 3%) of the 10sec intervals per hour on the majority of walked transects, with no myotis bats recorded on three of the eight walked transects completed (see Figure 20). Myotis bats were recorded on the majority of static detector surveys at

both static location SD1 and static location SD8 in 2012 (see Figure 12 and Figure 13). A mean of <2 registrations per hour was recorded at static location SD1 (northern boundary); whilst the number of registrations at static location SD8 was more variable, with from <1 to 7 per hour on different dates. In addition, this species group was also recorded at static locations SD1, SD2, SD4, SD6, SD7, SD10 and SD11 during 2011, indicating presence across the Site (see Figure 9 and Figure 10). The majority of the static locations recorded <10 registrations per hour, with the exception of static location SD11 at which 80 registrations per hour were recorded in September 2011; this lies on the western boundary of the Site.

- 3.8.16 The data suggests that this species group is not evenly distributed across the Site, or uses parts of the Site only periodically. Point count locations in which this species was recorded during walked transects are located on the south western boundary (Transect 1 (2 and 3)), northern boundary (Transect 1 (6, 7) Transect 2 (3)) and easternmost central hedgerow (Transect 2, (4)) (see Figure 9). Of these the majority of point count locations recorded *Myotis* during <5% of the total 10 second intervals available, however occasionally a greater number of passes were recorded; on one occasion *Myotis* were recorded within all 10 second intervals spent at the point count location (Transect 1 (2), 22/08/2011).
- 3.8.17 Overall, the results show *Myotis* bats make regular use of the Site; but that levels of activity are largely fairly low. The data indicates that occasionally, *Myotis* bats are more active over parts of the Site, but that this is likely to be infrequent (noting high number of registrations at static location 11 during the one night in September, 2011). On consideration, the combination of largely low activity levels with occasional increases means the Site is considered to be of District value for *Myotis* bats.
- 3.8.18 The survey data does not enable *Myotis* species records to be identified to species level therefore, the species composition is unclear; however, it is considered most likely that records represent commoner species such as Natterer's bat. The large numbers of mature oaks in the hedgerows at the Site provide similar conditions to open parkland and treeline habitat favoured by Natterer's bat, whilst Bechstein's bat is primarily a forest species and Alcaho's bat is usually associated with watercourses (Russ, 2012). Therefore, these rarer species are considered unlikely to make regular use of the Site.

3.8.18.1 Leisler's and *Nyctalus* spp.

- 3.8.19 Leisler's bat was recorded on one occasion, with two registrations towards the north-western (SD10) part of the Site in September 2011. This is likely to be one bat overflying the Site. Some static registrations in 2011 could not be identified to species level and hence are recorded as *Nyctalus* spp. Considered with regard to the walked activity transect data (including point counts), it is most likely these were noctule bat, rather than Leisler's bat. Therefore, the Site is considered of negligible value for this species.

3.8.19.1 Overall Evaluation

- 3.8.20 Considering the species assemblage present and frequency of use of the Site by each species, as a whole the Site is considered of **District** value for foraging bats.

3.9 Assessment of Effects in the Absence of Mitigation

- 3.9.1 Without mitigation, the scheme would be likely to result in the loss of roosting, foraging and commuting habitat for bats. Section 5 of this report identifies the requirements and recommendations of planning and biodiversity policy and legislation that are relevant to the Site. Recommendations with regard to appropriate avoidance, mitigation and compensation measures to enable coherency

with these policies and avoidance of contravention of legislation are identified in Section 6, along with potential Site enhancement measures.

4 Legislation and Planning Issues

4.1 Legislation

4.1.1 Bats are a European protected species meaning that they are protected under Conservation of Habitats and Species Regulations 2010 (as amended), in addition to the Wildlife and Countryside Act 1981 (as amended). Under Regulation 41 of The Habitat Regulations (2010), it is an offence to;

(1) deliberately capture, injure or kill any wild animal of a European protected species;

(2) deliberately disturb animals of any such species. Disturbance of animals includes in particular any disturbance which is likely—

- (a) to impair their ability—

- (i) to survive, to breed or reproduce, or to rear or nurture their young; or
- (ii) in the case of animals of a hibernating or migratory species, to hibernate or migrate; or

- (b) to affect significantly the local distribution or abundance of the species to which they belong

(3) deliberately take or destroy the eggs of such an animal; or

(4) damage or destroy a breeding site or resting place of such an animal (including sites that are currently unoccupied).

4.1.2 The protection for European protected species (EPS, such as bats), is supplemented by the Wildlife and Countryside Act (1981). In addition to the above offences it is an offence to:

- Intentionally or recklessly disturb a EPS while it is occupying a structure or place of shelter or protection.
- Intentionally or recklessly obstruct access to a structure or place used by a EPS for protection or shelter.

4.1.3 European Protected Species (EPS) licenses can be granted by Natural England in respect of development to permit activities that would otherwise be unlawful under the Habitats Regulations, providing that favourable conservation status can be maintained, the activity is justified (i.e. meets one of the scenarios under which licences can be granted), and there is no satisfactory alternative.

4.1.4 Foraging Areas and Commuting Routes

4.1.5 Bat foraging areas and commuting routes are not specifically protected under the wildlife protection legislation described above. However, loss of important foraging areas and/or commuting routes could potentially constitute a disturbance offence, as defined by the Habitats Regulations. The loss of a commuting route providing the only access to a roost could also potentially constitute indirect damage/destruction of a breeding site/resting place under the Habitats Regulations and damage/destruction/obstruction of a place used for shelter/protection under the Wildlife and Countryside Act 1981.

4.1.6 Even where loss of foraging habitats and commuting routes does not constitute an offence under the wildlife protection legislation, the presence of such habitats can still form a material consideration under NPPF and planning authorities are legally obliged to have regard for such habitats, with respect to Priority species, under the NERC Act 2006.

4.2 Planning Policy

- 4.2.1 The National Planning Policy Framework (NPPF) (Department for Communities and Local Government (DCLG), 2012) sets out government policy regarding consideration of biodiversity in planning decisions. Under the NPPF the presence of a protected species is a material consideration when a planning authority is considering a development proposal that, if carried out, would be likely to result in harm to the species or its habitat.
- 4.2.2 The NPPF states that:
- *'When determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principles:*
 - *if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;*
 - *proposed development on land within or outside a Site of Special Scientific Interest (SSSI) likely to have an adverse effect on a SSSI (either individually or in combination with other developments) should not normally be permitted. Where an adverse effect on the site's notified special interest features is likely, an exception should only be made where the benefits of the development, at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of SSSIs;*
 - *development proposals where the primary objective is to conserve or enhance biodiversity should be permitted;*
 - *opportunities to incorporate biodiversity in and around developments should be encouraged;*
 - *the following wildlife sites should be given the same protection as European sites: potential Special Protection Areas (SPA) and possible Special Areas of Conservation (SAC); listed or proposed Ramsar sites; and sites identified, or required, as compensatory measures for adverse effects on European sites, potential SPAs, possible SACs, and listed or proposed Ramsar sites.'*
- 4.2.3 Under Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006 public bodies, including Local and Regional Planning Authorities have a duty to 'have regard' to the conservation of biodiversity when carrying out their normal functions, which includes consideration of planning applications. In compliance with Section 41 of the Act, the Secretary of State has published a list of species considered to be of principal importance for conserving biodiversity in England. Regional Planning Bodies and Local Planning Authorities will use it to identify the species that should be afforded priority when applying the requirements of the NPPF to promote the protection and recovery of priority species populations, linked to national and local targets.
- 4.2.4 Seven bat species are UK BAP (2007) Priority Species. These are:
- Barbastelle *Barbastella barbastellus*
 - Bechstein's
 - Noctule
 - Soprano pipistrelle
 - Brown long-eared
 - Greater horseshoe
 - Lesser horseshoe
- 4.2.5 Of these, three have been recorded within the Site, noctule, soprano pipistrelle and brown long eared bat. Myotis bats were not identified to species level, therefore it is possible Bechstein's bat are

present, though this is considered unlikely to occur frequently as this species favours closed canopy woodland with a well-developed understorey (Russ, 2012), which is absent from the Site.

4.2.6 Five bat species are listed on the Hampshire Local Biodiversity Action Plan (Hampshire Biodiversity Partnership). These are:

- Barbastelle
- Bechstein's
- Greater Horseshoe
- Pipistrelle
- Serotine

4.2.7 Of these serotine and pipistrelle have been recorded within the Site; Bechstein's are considered unlikely to be present (see paragraph 5.2.5).

5 Recommendations

5.1 Avoidance, Mitigation and Compensation Measures

5.1.1 Roosts

5.1.2 It is understood the Proposed Development will require the removal of Building G and is also likely to reduce the viability (as a roost) of Building A and the confirmed roost within tree group G51; as whilst retained these will be surrounded by houses and therefore less well connected to suitable foraging habitat in the wider landscape. Therefore, a European Protected Species (EPS) licence must be obtained from Natural England in advance of works. To achieve an EPS licence, the proposed works must be justifiable under the clauses which allow Natural England to issue licences and ensure that the favourable conservation status of the species concerned will be maintained and/or enhanced. This will require an appropriate mitigation strategy to be devised, which should include incorporation of replacement roosting features into new buildings on the Site and provision of alternative tree roost resource in the form of bat boxes. The mitigation strategy should include monitoring of bat use of newly created roosts in the long term. Further detail is provided in paragraphs 6.1.3 to 6.1.6 below.

5.1.3 It is recommended the incorporation of new roosting features on the Site comprises both the inclusion of bat boxes within a significant proportion of houses in the Proposed Development and inclusion of a new roost designed to an appropriate specification for use by long eared bats. Replacement of Building G with a new loft is recommended as whilst pipistrelle bats frequently use bat boxes (and as such providing a number of these within the Proposed Development would provide a range of roosting conditions for this species for use as a summer or transitional roost), long eared bats require conditions which cannot be readily replicated within a bat box, as this species needs room to fly within a roof void. Therefore, it is recommended a new roost is created which has an apex height of at least 2.8m and a length and width of 5m or more. This should be orientated so one side of the pitched roof faces south to catch the sun and ensure the internal roost temperature is suitably warm. In addition, this roost should be located close to retained vegetation corridors, so bats can emerge directly into dark areas. If it is not possible to include such a feature on one of the properties it is recommended it is included on a garage or utility building. Newly created roosts would need to be maintained and monitored in the long term.

5.1.4 Full details of the mitigation strategy (including architectural plans showing incorporated roost features), as would be included in an EPS licence application Method Statement, should be submitted with the forthcoming planning application so that Havant Borough Council can determine whether the favourable conservation status criterion is likely to be met before granting planning permission. Information will also need to be provided to show that the Proposed Development will meet the other two Habitats Directive tests (i.e. there is an overriding public interest and no satisfactory alternative - see Section 5: Legislation, Planning Context and Status).

5.1.5 No constraints are placed upon Buildings B, C, D, E, F or H.

5.1.6 In addition to the above it is considered that tree group G51, which contains a confirmed roost and two trees with high potential features may become less viable as a result of the Proposed Development. Whilst retained, this tree group will be surrounded by properties, which may discourage bat use of these features. Therefore, it is recommended mitigation is included in the form of bat boxes on retained trees which will remain better connected to the wider landscape. These could be located on trees on the western site boundary, and should also be monitored in the long term.

5.1.7 The remaining two confirmed roosts lie within retained vegetation, as do the other ten trees with high potential. Avoidance of impacts upon these should comprise avoidance of lighting of these trees and their surroundings. In addition, it is recommended the two high potential trees (T31 and G23 E) which currently lie in the centre of open fields are linked to the retained hedgerow corridors with unlit landscaped areas, to ensure availability of this potential roost resource in the long term. If it is not possible to retain high potential trees it is recommended further survey is completed to ensure appropriate mitigation can be incorporated should a further roost be identified.

5.1.8 Foraging and Commuting Habitats

5.1.9 The Site's bat foraging/commuting habitats have been assessed as being of District value; as a result of the number of species present and the high levels of pipistrelle bat activity recorded. Therefore, significant levels of mitigation and compensation are likely to be required.

5.1.10 It is recommended the mature trees and hedgerows on the Site are retained within the Proposed Development wherever possible, to form the basis of green corridors running around and across the Site. These would be of greatest value to bats if they incorporated a broad adjacent grassland margin.

5.1.11 Landscaped areas should be incorporated to connect isolated tree groups to existing hedgerows wherever possible.

5.1.12 The lighting strategy design should be designed with sensitivity to bat use of the Site. Whilst some bats, including pipistrelle bats, are not especially light-sensitive, Myotis bat species are and therefore, where possible, the lighting strategy should involve the retention or creation of dark, vegetated corridors to facilitate movement of light-sensitive species through the Site and to encourage foraging by such species within certain parts of the Site. In particular, the lighting strategy should avoid any light spill into the adjacent lanes and woodland, or illumination of retained hedgerow and mature tree corridors. If lighting cannot be avoided adjacent to all treelines or hedgerows consideration should be given to installation of low level bollard lighting, which automatically turns off during the night at times when little use is required of areas by pedestrians, or is activated by a sensor and only illuminates the area when a pedestrian is present.

5.1.13 Creation of standing water bodies should be considered to compensate for loss of foraging area, as these are frequently used by some species, such as Myotis species and pipistrelle bats. These could be incorporated within swales forming part of the Sustainable Urban Drainage System (SUDS). Dry swales throughout the wider Site could also comprise commuting and foraging corridors for bats if lighting of these features is avoided.

5.2 Enhancement

5.2.1 NPPF (2012) encourages biodiversity enhancement in association with development, therefore the objective of any new landscaping should be to seek to increase the diversity of habitat available across the Site. In addition to the above recommendations it is recommended the following are considered to enhance the Site in conjunction with the Proposed Development:

- Inclusion of oaks within new planting which in the long term will mature to provide similar foraging and roosting resource as provided by the existing mature tree stock on the Site; as this naturally dies or deteriorates with age.
- Inclusion of bat boxes within retained trees on the Site, to enhance the roosting resource available to tree roosting species.

- Long term management for biodiversity of all landscaping, and monitoring of habitats and species to enable maintenance of available foraging resource for bats in the long term.

6 Conclusion

- 6.1.1 Surveys completed in the 2011 and 2012 seasons at the Site have identified the presence of one current and one historic roost within the Site, in addition to three confirmed tree roosts and 12 further trees with high potential to be used as roosts. In addition, the foraging and commuting resource present is of District value for bats; with at least six species recorded, including common pipistrelle, soprano pipistrelle, noctule, serotine, long eared and myotis bats.
- 6.1.2 Recommendations have been included in Section 6 to avoid, mitigate and compensate for likely impacts upon bats resulting from the Proposed Development and promote compliance with relevant legislation and planning policy (see Section 5). These include application for an EPS licence from Natural England to enable removal of Building G and the likely reduction in viability of the historic roost in Building A and the tree roost within tree group G51. This licence application will require a robust mitigation strategy demonstrating how replacement roost resource will be included within the Proposed Development; it is recommended this comprises a combination of bat boxes within buildings and on retained trees and a long eared bat loft. In addition the retention of mature tree and hedgerow habitat, with an associated sensitive lighting scheme will be essential to enable continued use of the Site by foraging and commuting bats.
- 6.1.3 Recommendations have also been included to encourage long term enhancement in accordance with NPPF, comprising inclusion of new oak trees within the design of new landscaped areas to create in the long term roosting and foraging resource of similar value to that present at the current time (which will age and likely gradually deteriorate naturally over time) and inclusion of bat boxes on retained trees above and beyond those required as compensation for reduced roost viability.

7 References

7.1 Project References

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7.2 Technical References

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8 Figures

8.1 Figure 1 – Site Location Plan

8.2 Figure 2 - Building Location Plan, including Emergence Surveyor and Automated Detector Locations and Results

8.3 Figure 3 - Tree Location Plan and Preliminary Tree Classifications

8.4 Figure 4 - Transect Routes, Sample Points and Automated Detector Locations

8.5 Figure 5 – Comparison of distribution of pipistrelle activity

8.6 Figure 6 – Comparison of distribution of noctule activity

8.7 Figure 7 – Comparison of distribution of serotine activity

8.8 Figure 8 – Comparison of distribution of long eared bat activity

8.9 Figure 9 – Comparison of distribution of Myotis activity



Key

Site Boundary

Location of Automated Detector

Emergence/Re-Entry Surveyor Locations

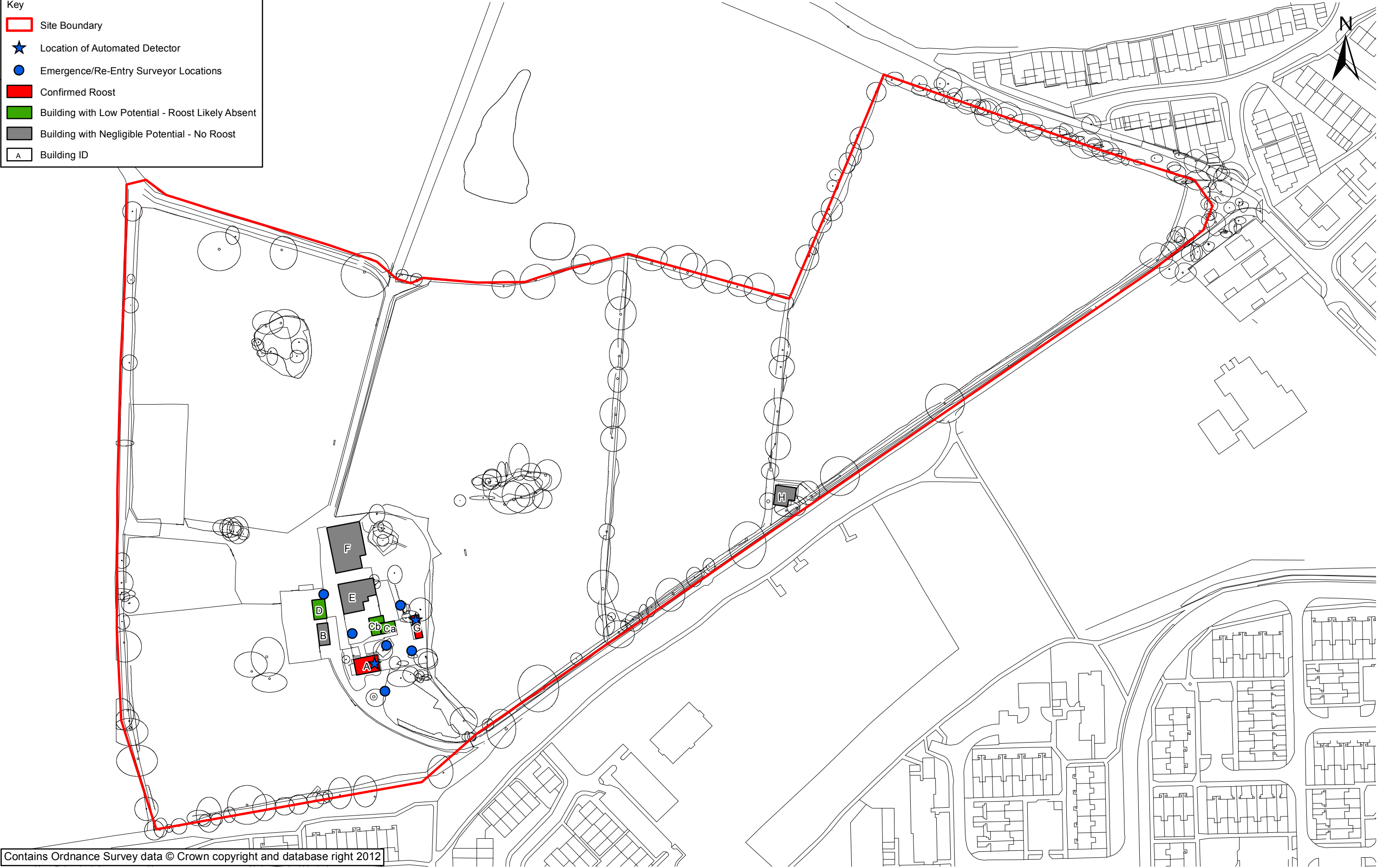
Confirmed Roost

Building with Low Potential - Roost Likely Absent

Building with Negligible Potential - No Roost

A

Building ID



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Key

Site Boundary

Category 1 Tree (ID Displayed)

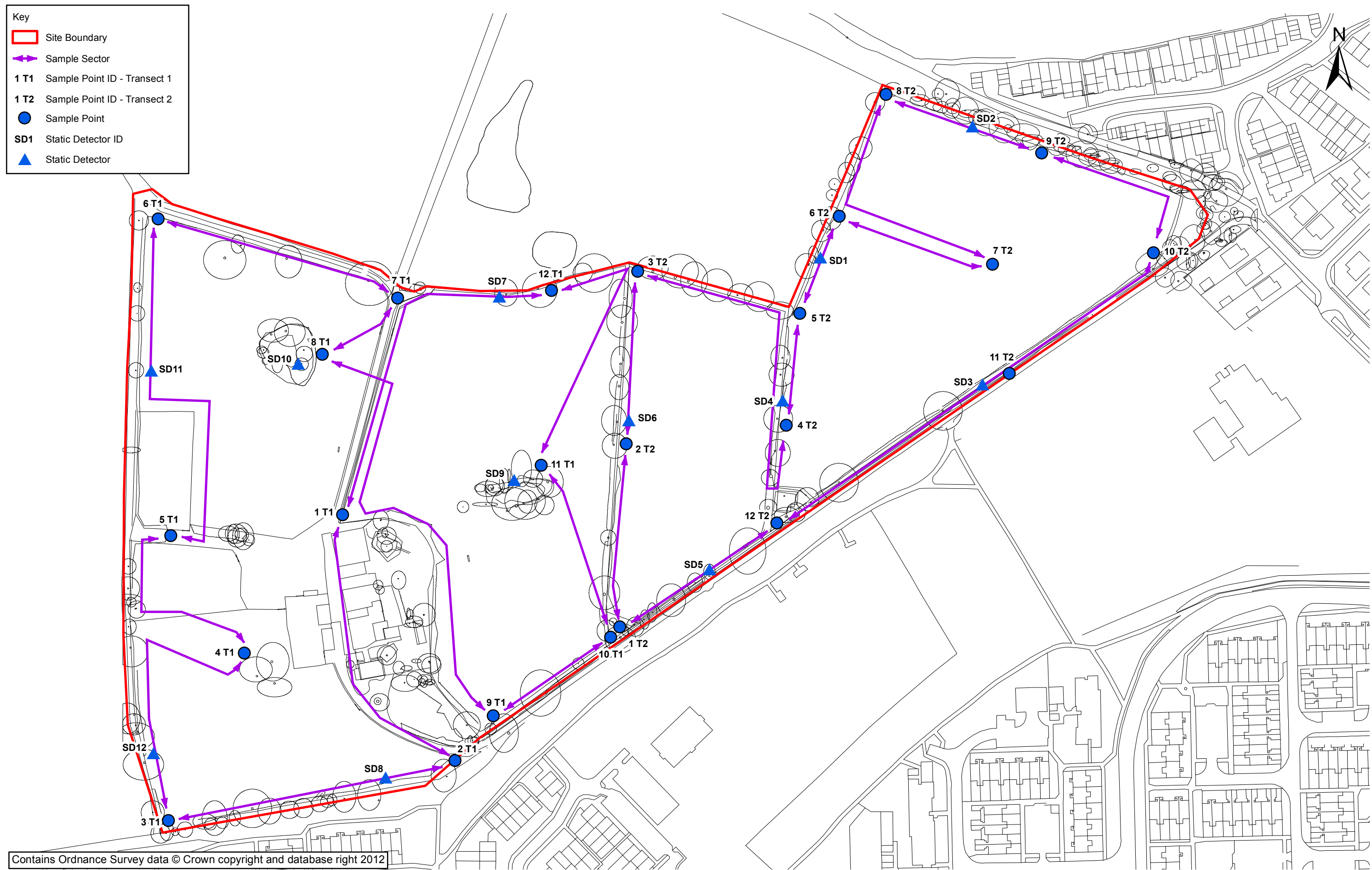
Category 2a Tree (ID Displayed)

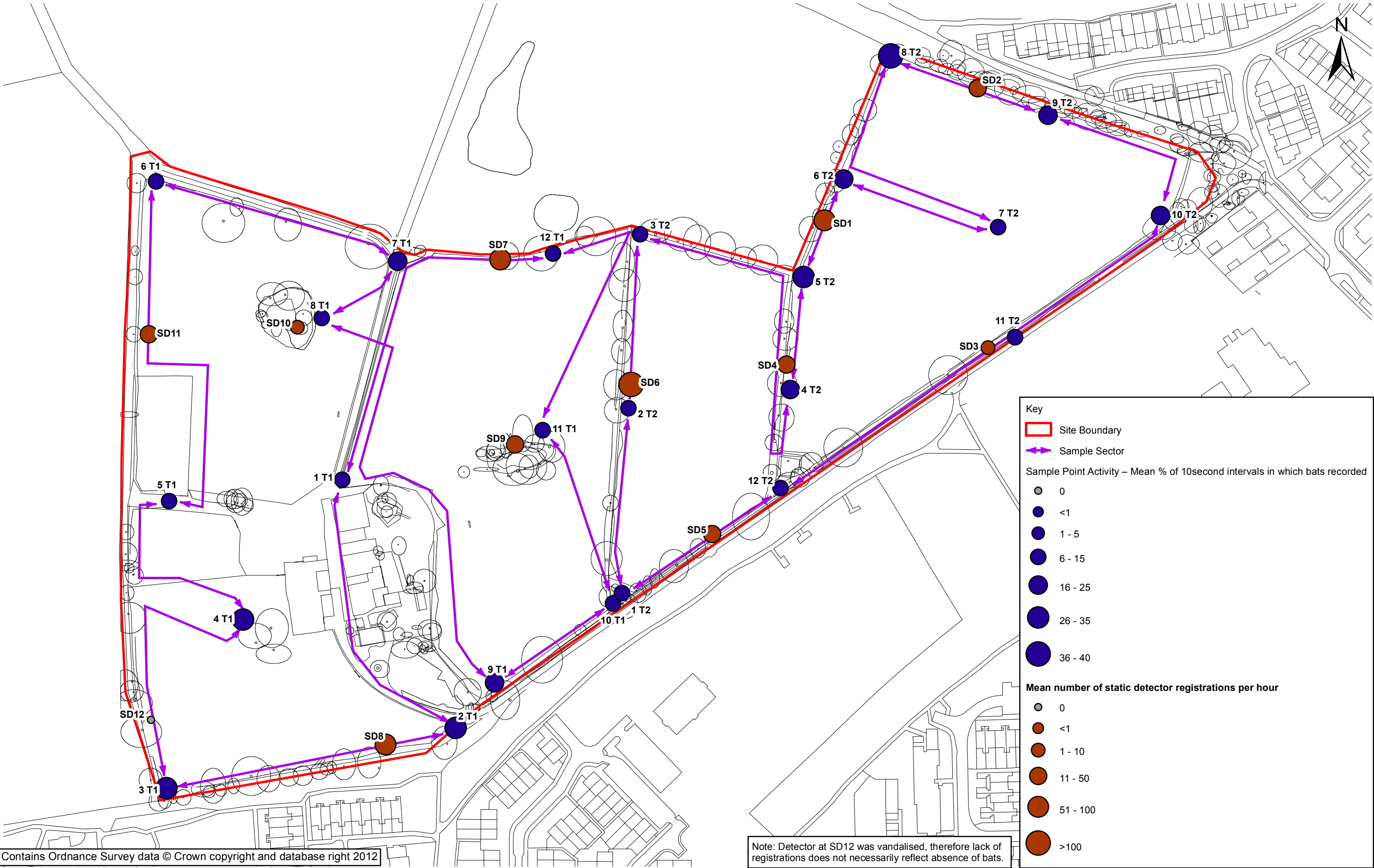
Category 2b Tree (ID Displayed)

Category 3 Tree (ID Displayed)

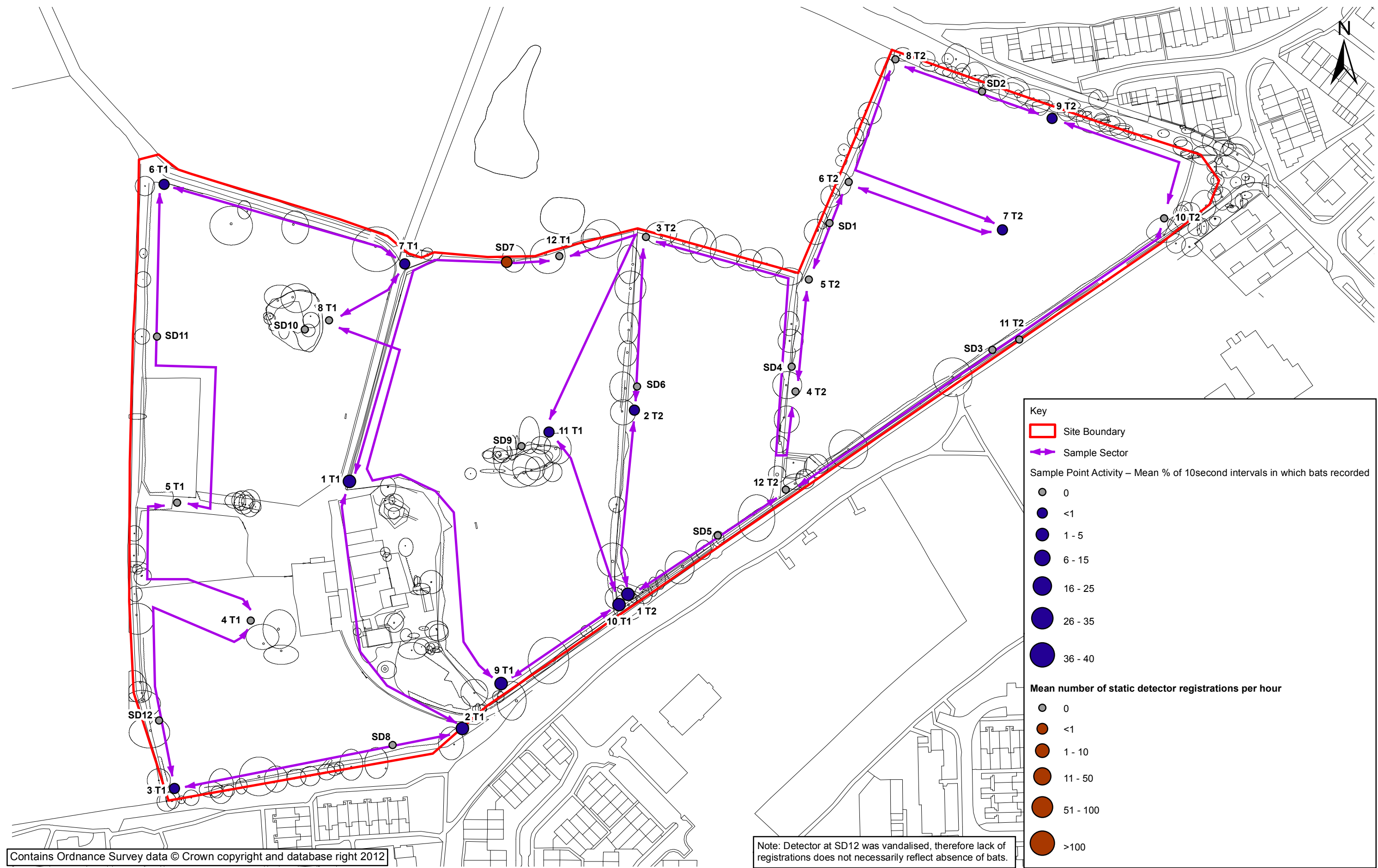


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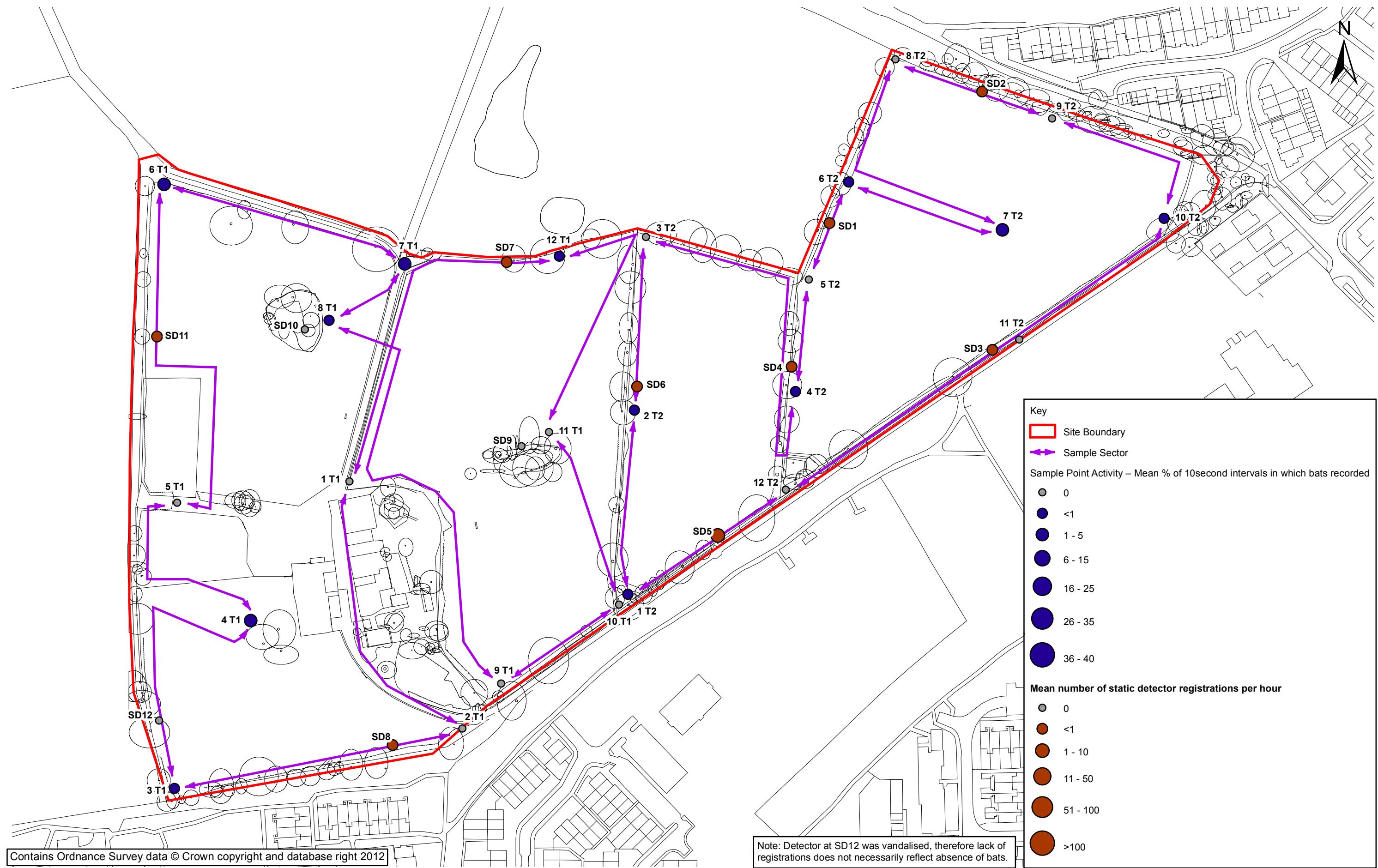




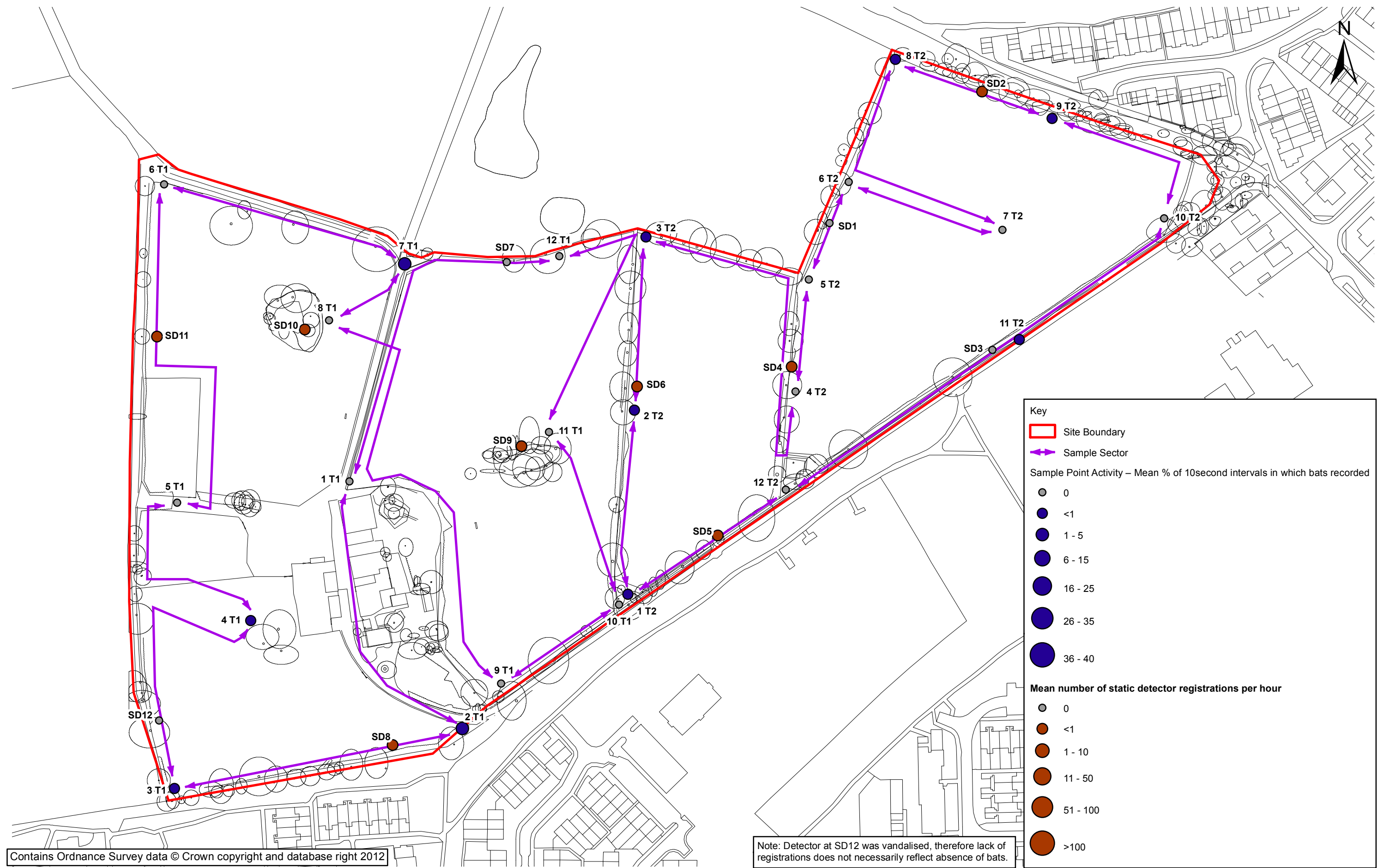
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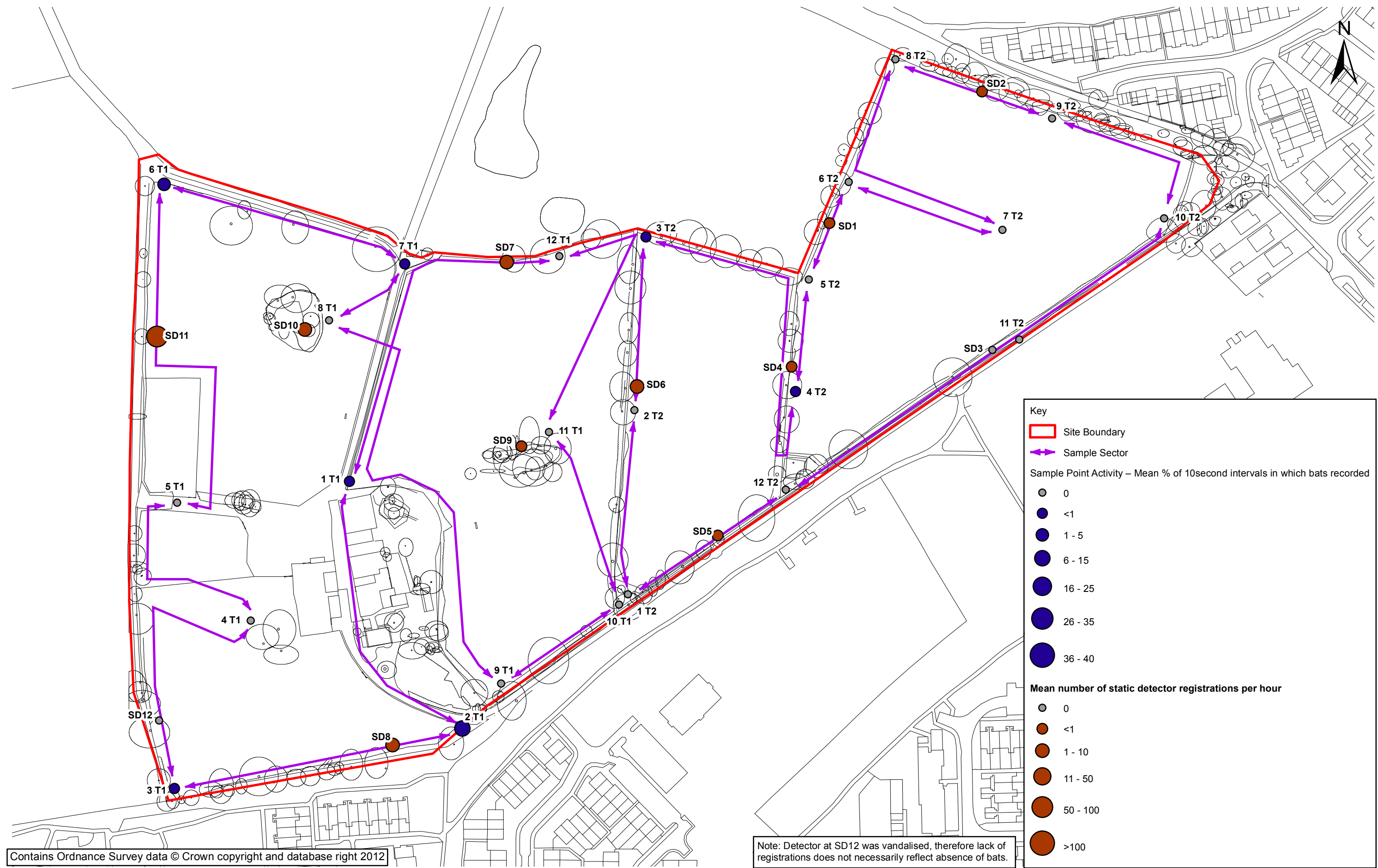
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9 Appendices

9.1 Appendix A: Emergence survey results

Keystone Environmental Ltd
Bat Dusk Emergence and Dawn Re-entry Survey 2011
Emergence Survey Results

Date	Surveyor	Surveyor Position	Building Surveyed	Species	Time	Activity	Comments
30/08/2011	SB	1	A	-			No emerging bats
31/08/2011	SB	1	A	-			No bats entered
30/08/2011	JM	2	G	-			No emerging bats
31/08/2011	JM	2	G	Pipistrelle sp.	05:54	Commuting	2 bats possibly entered into far end of building, near open door but impossible to confirm
30/08/2011	DA	3	Ca & G	-			No emerging bats
31/08/2011	DA	3	Ca & G	Long-eared sp.	05:09	Swarming	1 bat swarming by ridge at gable. No bat entered
30/08/2011	DI	4	A & Cb	-			No emerging bats
31/08/2011	DI	4	A & Cb	-			No bats entered
30/08/2011	JC	5	D	-			No emerging bats
31/08/2011	JC	5	D	-			No bats entered
30/08/2011	OT	6	Ca & Cb	-			No emerging bats
31/08/2011	OT	6	Ca & Cb	-			No bats entered

Weather Conditions

Date	Temp (°C)	Wind Speed	Wind Direction	Cloud Cover (%)	Precipitation
30/08/11	17	None	-	100	Dry
31/08/11	15	None	-	100	Dry

Date	Sunset/Sunrise
30/08/11	19:57
31/08/11	06:14

9.2 Appendix B: Automated Building Survey Results

Keystone Environmental Ltd
Bat Activity Survey 2011-2012
Building G Static Activity Survey Results 2012

Date	First Common Pipistrelle registration	Sunset	Difference between Sunset and first Common Pipistrelle registration
19/06/2012	02:42	21:21:44	05:20:16
28/06/2012	23:13	21:22:10	01:50:50
01/07/2012	23:35	21:21:24	02:13:36
02/07/2012	02:00	21:21:02	04:38:58
03/07/2012	21:44	21:20:38	00:23:22
05/07/2012	01:41	21:19:40	04:21:20
07/07/2012	21:47	21:18:30	00:28:30
07/07/2012	21:48	21:18:30	00:29:30
08/07/2012	00:08	21:17:50	02:50:10
10/07/2012	21:33	21:16:23	00:16:37
13/07/2012	21:36	21:13:51	00:22:09
14/07/2012	21:36	21:12:55	00:23:05
14/07/2012	21:36	21:12:55	00:23:05
17/07/2012	21:39	21:09:50	00:29:10
17/07/2012	21:40	21:09:50	00:30:10
17/07/2012	21:40	21:09:50	00:30:10
17/07/2012	21:40	21:09:50	00:30:10
17/07/2012	21:41	21:09:50	00:31:10
17/07/2012	21:42	21:09:50	00:32:10
17/07/2012	21:45	21:09:50	00:35:10
18/07/2012	21:36	21:08:44	00:27:16
19/07/2012	21:43	21:07:35	00:35:25
19/07/2012	21:43	21:07:35	00:35:25
19/07/2012	21:44	21:07:35	00:36:25
20/07/2012	21:31	21:06:23	00:24:37
20/07/2012	21:32	21:06:23	00:25:37
20/07/2012	21:32	21:06:23	00:25:37
21/07/2012	21:34	21:05:09	00:28:51
21/07/2012	21:39	21:05:09	00:33:51
21/07/2012	21:40	21:05:09	00:34:51
21/07/2012	21:40	21:05:09	00:34:51
21/07/2012	21:53	21:05:09	00:47:51
22/07/2012	21:36	21:03:53	00:32:07
22/07/2012	21:37	21:03:53	00:33:07
22/07/2012	21:37	21:03:53	00:33:07
22/07/2012	21:38	21:03:53	00:34:07
22/07/2012	23:29	21:03:53	02:25:07
23/07/2012	01:41	21:02:35	04:38:25

Building A Static Activity Survey Results 2012

Date	First Common Pipistrelle registration	Sunset	Difference between Sunset and first Common Pipistrelle registration
13/06/2012	None	21:19:13	n/a
14/06/2012	None	21:19:46	n/a
15/06/2012	None	21:20:15	n/a
16/06/2012	None	21:20:42	n/a
17/06/2012	None	21:21:06	n/a
18/06/2012	None	21:21:26	n/a
19/06/2012	None	21:21:44	n/a
20/06/2012	None	21:21:59	n/a
26/06/2012	None	21:22:26	n/a
27/06/2012	None	21:22:20	n/a
28/06/2012	None	21:22:10	n/a
29/06/2012	None	21:21:58	n/a
30/06/2012	None	21:21:42	n/a
01/07/2012	None	21:21:24	n/a
02/07/2012	None	21:21:02	n/a
03/07/2012	None	21:20:38	n/a
04/07/2012	None	21:20:10	n/a
05/07/2012	None	21:19:40	n/a
06/07/2012	None	21:19:06	n/a
07/07/2012	None	21:18:30	n/a
08/07/2012	None	21:17:50	n/a
09/07/2012	None	21:17:08	n/a
10/07/2012	None	21:16:23	n/a
11/07/2012	None	21:15:35	n/a
12/07/2012	None	21:14:44	n/a
13/07/2012	None	21:13:51	n/a
14/07/2012	None	21:12:55	n/a
15/07/2012	None	21:11:56	n/a
16/07/2012	None	21:10:54	n/a
17/07/2012	None	21:09:50	n/a
18/07/2012	None	21:08:44	n/a
19/07/2012	None	21:07:35	n/a
20/07/2012	None	21:06:23	n/a
21/07/2012	None	21:05:09	n/a
22/07/2012	None	21:03:53	n/a
23/07/2012	None	21:02:35	n/a

9.3 Appendix C: Preliminary Tree Survey Results

Keystone Environmental Ltd

Preliminary Tree Survey Results

Categories

- 1 - confirmed roost
 2a - high potential
 2b - low/moderate potential

- 3 - negligible potential

Note 1: Where two or more trees were assessed as a group tree numbers are preceded by G

Note 2: Trees on site with a small height (< 5 m) and girth are not included in the list below

Weather Conditions

Date	Temp (°C)	Wind Speed	Cloud Cover (%)	Precipitation
16/08/11	16	Light	100	Dry

Tree No.	Tree Species	Age of Tree	Features Suitable for Bats	Feature Description	Signs of Bats	Features Inspected	Category	Emergence Survey required
T1	Oak	Mature	Y	Minor amounts of ivy & split limbs	-	No	2b	No
G2	Group of Oak, Ash & Hawthorn	Immature	N	-	-	No	3	No
G3	Ash & Oak	Mature	Y	Minor splits & flaking bark	-	No	2b	No
T4	Oak	Mature	N	-	-	No	3	No
T5	Oak	Mature	Y	Minor ivy & splits	-	No	2b	No
G6	Oak group	Mature	Y	Ivy and various minor split limbs	-	No	2b	No
G6a	Oak group	Mature	Y	Tree group is 2b, apart from tree C and D which are 2a. Tree C has south facing dead limbs at 5m, minor ivy & splits in bark. Tree D has south facing dead split limbs at 5m.	-	No	2a & 2b	Yes
T7	Oak	Dead	N	-	-	No	3	No
G8a	Oak	Mature	Y	Moderate amounts of ivy. Split limbs.	-	No	2b	No
G8b	Oak	Mature	Y	Minor amounts of ivy on truck	-	No	2b	No
G8c	Oak	Mature	Y	Minor amounts of ivy on trunk	-	No	2b	No
G9	2 Oak	Immature	N	-	-	No	3	No
G10	2 Oak	Mature	Y	Moderate Ivey & split limbs	-	No	2b	No
G11	2 Oak	Mature	Y	Minor Ivy & split limbs	-	No	2b	No
T12	Oak	Over Mature	Y	North facing major dead limbs 2 - 6m height.	-	No	2a	Yes
T13	Oak	Mature	Y	Minor amounts of ivy	-	No	2b	No
T14	Oak	Mature	Y	Minor amounts of ivy	-	No	2b	No
T15	Oak	Mature	Y	Minor amounts of ivy and split limbs	-	No	2b	No
T16	Oak	Mature	Y	Major split limbs at various heights & aspects with good clear flight lines	-	No	2a	Yes
T17	Oak	Mature	Y	Minor split limbs at various heights & aspects	-	No	2b	No
T18	Oak	Mature	Y	Minor split limbs at various heights & aspects	-	No	2b	No

Tree No.	Tree Species	Age of Tree	Features Suitable for Bats	Feature Description	Signs of Bats	Features Inspected	Category	Emergence Survey required
T19	Oak	Mature	Y	Minor splits at various heights	-	No	2b	No
T20	Oak	Mature	Y	Shallow rot holes	-	No	2b	No
T21	Oak	Mature	Y	Minor flaking bark, dead limbs & ivy	-	No	2b	No
T22	Oak	Mature	N	-	-	No	3	No
G23	Group of Oak & Ash	Mature	Y	Tree group is 2b, apart from tree E. Tree E is an Oak with north facing large rotten limbs and other limbs with ivy	-	No	2a & 2b	Yes
G24	Group of Ash & Hawthorn	Mature	N	-	-	No	3	No
T25	Ash	Immature	N	-	-	No	3	No
T26	Oak	Mature	Y	North facing dead limbs at 4m. Other split limbs and holes.	-	No	2a	Yes
T27	Oak	Mature	Y	Minor amounts of ivy & splits in bark	-	No	2b	No
T28	Oak	Mature	Y	Major dead split limbs and flaking bark	-	No	2a	Yes
T29	Oak	Mature	Y	-	-	No	3	No
T30	Oak	Mature	N	-	-	No	3	No
T31	Ash	Mature	Y	Major rot hole at 4m. West and east facing rot holes.	-	No	2a	Yes
G32	Hawthorn	n/a	N	-	-	No	3	No
T33	Crab apple	Mature	N	-	-	No	3	No
G34	Hawthorn & Elder	n/a	N	-	-	No	3	No
T35	Ash	Immature	N	-	-	No	3	No
T36	Holly	Immature	Y	Major amounts of ivy	-	No	2b	No
G38	Group of Ash	Young and mature	Y	Ivy on trunk	-	No	2b	No
T39	Ash	Mature	Y	Ivy on trunk	-	No	2b	No
T40	Hawthorn	Mature	Y	Ivy on trunk	-	No	2b	No
T41	Ash	Mature	Y	Dense ivy on trunk	-	No	2a	Yes
T42	Oak	Mature	Y	Ivy on trunk	-	No	2b	No
T43	Ash	Mature	Y	Ivy on trunk	-	No	2b	No
T44	Field maple	Mature	Y	Ivy on trunk	-	No	2b	No
T45	Oak	Mature	Y	Ivy on trunk & east facing limbs with peeling bark at 6m	-	No	2b	No
G46	Group of Hazel & Holly	Shrubs	N	-	-	No	3	No
T47	Oak	Mature	Y	Ivy on trunk	-	No	2b	No
T48	Oak	Mature	Y	Ivy on trunk	-	No	2b	No
T49	Beech	Mature	Y	Ivy on trunk	-	No	2b	No
T50	Oak	Mature	Y	Dense amounts of ivy & various split limbs	-	No	2a	Yes
G51	Group of Oak	Mature	Y	Each has at least 1 large dead limb with cracks, splits & clear flight lines	-	No	2a	Yes
T52	Beech	Mature	Y	Ivy on trunks	-	No	2b	No

Tree No.	Tree Species	Age of Tree	Features Suitable for Bats	Feature Description	Signs of Bats	Features Inspected	Category	Emergence Survey required
T53	Oak	Mature	Y	Split dead limbs at various heights	-	No	2b	No
T54	Beech	Mature	N	-	-	No	3	No
T55	Ash	Dying	N	-	-	No	3	No
T56	Yew	Mature	N	-	-	No	3	No
G57	Group of Oak	Mature	Y	Ivy on trunks	-	No	2b	No
T58	Oak	Mature	Y	One north facing split limb for single bat at 7m	-	No	2b	No
G59	Group of Oak	Mature	Y	Ivy on trunk	-	No	2b	No
T60	Oak	Mature	Y	Split dead limbs at various heights, but more large enough for roost	-	No	2b	No
T61	Oak	Mature	Y	Ivy on trunk	-	No	2b	No
T62	Oak	Mature	Y	Dense ivy on trunk	-	No	2a	Yes
T63	Oak	Mature	N	-	-	No	3	No
G64	Group of Oak	Mature	Y	Ivy on trunk	-	No	2b	No
T65	Oak	Mature	Y	Ivy on trunk	-	No	2b	No
T66	Oak	Mature	Y	Ivy on trunk. North facing rot hole on limb at 5m	-	No	2b	No
T67	Oak	Mature	Y	Ivy on trunk	-	No	2b	No
T69	Oak	Mature	Y	Ivy on trunk	-	No	2b	No
T70	Monterey Cypress	Mature	N	-	-	No	3	No
T71	Ash	Pollard	N	-	-	No	3	No
T72	Yew	Mature	Y	Ivy on trunk	-	No	2b	No
T73	Pear sp.	Mature	N	-	-	No	3	No
T74	Monterey Cypress	Mature	N	Ivy on tree, but too thin to be used by bats	-	No	3	No
T75	Walnut tree	Mature	Y	Ivy on the trunk	-	No	2b	No
T76	Weeping Willow	Mature	N	-	-	No	3	No
T77	Cherry sp.	Mature	Y	Ivy covering trunk	-	No	2b	No
G78	Group of Shrubs	Shrubs	N	-	-	No	3	No
T78a	Ash	Mature	Y	Ivy on trunk	-	No	2b	No
G79	Group of Ash	Mature	Y	Ivy on trunk	-	No	2b	No
G79a	Group of Ash & Hawthorn	Immature	N	-	-	No	3	No
T80	Ash	Mature	Y	Ivy on trunk	-	No	2b	No
T81	Oak	Mature	Y	Various split limbs	-	No	2a	Yes
T82	Oak	Mature	N	-	-	No	3	No
T83	Oak	Mature	Y	North-west facing woodpecker hole at 6m	-	No	2a	Yes
T85	Oak	Mature	Y	West facing rot hole on trunk. East facing dead limbs at 4m.	-	No	2a	Yes
T86	Oak	Mature	Y	Ivy on the trunk	-	No	2b	No
T87	Oak	Mature	Y	Ivy on the trunk	-	No	2b	No
T88	Oak	Mature	Y	Several dead split limbs at various aspects at 6m height	-	No	2a	Yes

Tree No.	Tree Species	Age of Tree	Features Suitable for Bats	Feature Description	Signs of Bats	Features Inspected	Category	Emergence Survey required
T89	Oak	Mature	Y	Major splits at various heights	-	No	2b	No
T90	Oak	Mature	Y	-	-	No	3	No
T91	Oak	Mature	Y	Minor splits at various heights & aspects	-	No	2b	No
T92	Oak	Mature	Y	Ivy on trunk & major splits on limbs at various heights	-	No	3	No
T93	Wild Service Tree	-	Y	Major amounts of ivy	-	No	2b	No
G94	Group of Ash	Immature	Y	Major amounts of ivy	-	No	2b	No
T95	Oak	Mature	Y	Major ivy & dead limbs at least 2 with major splits	-	No	2a	Yes
T96	Ash	Mature	Y	Major amounts of ivy	-	No	2b	No
T98	Oak	Mature	Y	Major splits at various heights and aspects	-	No	2a	Yes
T100	Field maple	Mature	N	-	-	No	3	No
T101	Oak	Over Mature	Y	Major dead limbs at all aspects at crown	-	No	2a	Yes
T102	Oak	Mature	N	-	-	No	3	No
T103	Oak	Mature	Y	Minor amounts of ivy	-	No	2b	No
T104	Oak	Mature	Y	Minor amounts of ivy	-	No	2b	No
T105	Oak	Mature	Y	Minor amounts of ivy	-	No	2b	No
T106	Oak	Mature	Y	Minor ivy & split limbs	-	No	2b	No
T107	Oak	Mature	Y	Major south facing split limbs at 5m & moderate amounts of ivy	-	No	2a	Yes
T108	Oak	Mature	Y	South facing woodpecker hole at 5m. Major splits & moderate amounts of ivy.	-	No	2a	Yes
T109	Oak	Mature	Y	Moderate amounts of ivy	-	No	2b	No
T110	Oak	Mature	Y	Major ivy	-	No	2b	No
A	Ash	Immature	Y	Ivy on trunk	-	No	2b	No
B	Oak	Immature	Y	Minor amounts of ivy	-	No	2b	No

9.4 Appendix D: Static Activity Survey Results

Keystone Environmental Ltd
Bat Activity Survey 2011-2012
Site Static Activity Survey Results

		Number of Registrations						
Date	Static Detector ID	Leisler's	Long-eared spp.	Myotis spp.	Noctule	Nyctalus spp.	Pipistrelle spp.	Serotine
16/08/2011	1			5			704	2
16/08/2011	2		3	8			213	1
16/08/2011	3						27	5
16/08/2011	4		1	4		1	321	3
22/08/2011	5		2	1		1	128	27
22/08/2011	6		6	71		1	1190	1
22/08/2011	7			10	1	1	554	3
22/08/2011	8			4			79	
13/09/2011	9		1	3			122	
13/09/2011	10	2	1	19			67	
13/09/2011	11		1	892			122	3
13/09/2011	12							
06/07/2012	8		2	49			9	3
07/07/2012	8						197	
08/07/2012	8			4			139	1
13/06/2012	1						410	
13/06/2012	8		1	16			138	1
14/06/2012	1						192	
14/06/2012	8			7			64	
15/06/2012	1			1			1006	
15/06/2012	8		2	4			1384	
16/06/2012	1						820	
16/06/2012	8			1			4422	
17/06/2012	1						18	
17/06/2012	8		1				321	20
17/07/2012	1			16			2144	
17/07/2012	8			22			392	1
18/06/2012	1						158	
18/06/2012	8			25			882	
18/07/2012	1			3			2881	
18/07/2012	8		1	2			104	1
19/06/2012	8			8			0	
19/07/2012	1			10			494	
19/07/2012	8			12			259	
20/07/2012	1			4			56	
20/07/2012	8			4			51	
21/07/2012	1			12			423	1
21/07/2012	8		2	52			108	
22/07/2012	1			9			243	3
22/07/2012	8			59			85	

	Leisler's	Long-eared spp.	Myotis spp.	Noctule	Nyctalus spp.	Pipistrelle spp.	Serotine
Minutes after Sunset of First Bat Recorded (Per Species)	299	16	22	-15	72	-4	20

9.5 Appendix E: Manual Activity Survey Results

Keystone Environmental Ltd
Bat Activity Survey 2011-2012
Manual Activity Survey Results

Note, the results shown below represent positive survey results only, excluding all negative survey results. The specific transect route for each survey is detailed below.

Survey Date	Sample Route	
	Transect Route 1	Transect Route 2
16/08/2011	1 to 12, 1 to 6	1 to 12, 1 to 12
17/08/2011	1 to 12, 1	1 to 12, 1 to 6
22/08/2012	12 to 1, 12 to 7	12 to 1, 12 to 1
13/09/2011	1 to 12, 1 to 6	1 to 12, 1 to 12, 1
13/06/2012	1 to 12, 1 to 8	1 to 12, 1 to 6
26/06/2012	1 to 12, 1 to 5	1 to 12, 1 to 8
27/06/2012	1 to 12	1 to 12, 1
17/07/2012	12 to 1, 12 to 8	1, 12 to 1, 12 to 6

Weather Conditions at Start of Survey					
Date	Temp (oC)	Wind Speed	Wind Direction	Cloud Cover (%)	Precipitation
16/08/2011	16	Light	-	100	Dry
17/08/2011	11	None	-	70	Dry
22/08/2011	19	None	-	100	Dry
13/09/2011	16	None	-	10	Dry
13/06/2012	14	None	-	5	Dry
26/06/2012	17	None	-	100	Dry
27/06/2012	15	None	-	100	Dry
17/07/2012	16	Light	-	35	Dry

Time of Sunset/Sunrise	
Date	Sunset/Sunrise
16/08/11	20:30
17/08/11	05:50
22/08/11	20:14
13/09/11	19:29
13/06/12	21:19
26/06/12	21:21
27/06/12	04:51
17/07/12	21:10

			Number of Passes (10 second intervals)				
Date	Transect	Sample Sector	Long-eared sp.	Pipistrelle sp.	Myotis sp.	Noctule	Serotine
16/08/2011	1	1 to 2		5			
16/08/2011	1	2		2			
16/08/2011	1	3		4			
16/08/2011	1	3 to 4		1			1
16/08/2011	1	4					9
16/08/2011	1	4 to 5		2			
16/08/2011	1	5		5			
16/08/2011	1	5 to 6		5			1
16/08/2011	1	6		4			
16/08/2011	1	6 to 7		6			
16/08/2011	1	7		30			
16/08/2011	1	7 to 8		30			
16/08/2011	1	8 to 9		3			
16/08/2011	1	9 to 10		1			
16/08/2011	1	10 to 11		1			
16/08/2011	1	11		3			
16/08/2011	1	11 to 12				1	
16/08/2011	1	12		2			

			Number of Passes (10 second intervals)				
Date	Transect	Sample Sector	Long-eared sp.	Pipistrelle sp.	Myotis sp.	Noctule	Serotine
16/08/2011	1	1		20			
16/08/2011	1	1 to 2		2			
16/08/2011	1	2		17			
16/08/2011	1	2 to 3		6			
16/08/2011	1	3				1	
16/08/2011	1	3 to 4		6			
16/08/2011	1	4		30			
16/08/2011	1	5		3			
16/08/2011	1	6		5			
16/08/2011	2	1		6			
16/08/2011	2	2		1			
16/08/2011	2	2 to 3		1			
16/08/2011	2	3		30			
16/08/2011	2	3 to 4		2			
16/08/2011	2	4		30			
16/08/2011	2	4 to 5		2			
16/08/2011	2	5		30			
16/08/2011	2	5 to 6		3			
16/08/2011	2	6		30			
16/08/2011	2	7		3			
16/08/2011	2	7 to 8		3			
16/08/2011	2	8		30			
16/08/2011	2	9		30			
16/08/2011	2	10		15			
16/08/2011	2	11		1			
16/08/2011	2	12		1			
16/08/2011	2	3		1			
16/08/2011	2	3 to 4		2			
16/08/2011	2	4		3			
16/08/2011	2	4 to 5		2			
16/08/2011	2	5		30			
16/08/2011	2	6		30			
16/08/2011	2	7		20			
16/08/2011	2	7 to 8		3			
16/08/2011	2	8		10			
16/08/2011	2	9	1				
16/08/2011	2	9 to 10		1			
16/08/2011	2	10		7			
16/08/2011	2	10 to 11		1			
16/08/2011	2	11	1				
16/08/2011	2	11 to 12		1			
16/08/2011	2	12 to 1	1				
17/08/2011	1	2		12			
17/08/2011	1	3		1			
17/08/2011	1	4		1			
17/08/2011	1	4 to 5		1			
17/08/2011	1	5		1			
17/08/2011	1	6		1			
17/08/2011	1	8		1			
17/08/2011	1	10		1			
17/08/2011	1	11		2			
17/08/2011	2	1		3			
17/08/2011	2	2		1			
17/08/2011	2	3	1	2			
17/08/2011	2	3 to 4		2			
17/08/2011	2	4		1			
17/08/2011	2	5		4			
17/08/2011	2	6		5			
17/08/2011	2	8		4			
17/08/2011	2	9		1			
17/08/2011	2	10		6			
17/08/2011	2	10 to 11		2			
17/08/2011	2	11		15			
17/08/2011	2	11 to 12		3			
17/08/2011	2	12		4			
17/08/2011	2	1		3			
17/08/2011	2	3		1			

			Number of Passes (10 second intervals)				
Date	Transect	Sample Sector	Long-eared sp.	Pipistrelle sp.	Myotis sp.	Noctule	Serotine
22/08/2011	1	10		4			
22/08/2011	1	10 to 9		4			
22/08/2011	1	9		30			
22/08/2011	1	9 to 8		5			
22/08/2011	1	8		1			4
22/08/2011	1	8 to 7		1			
22/08/2011	1	7		9			3
22/08/2011	1	7 to 6		4			4
22/08/2011	1	6		4			4
22/08/2011	1	6 to 5		3			4
22/08/2011	1	5		7			
22/08/2011	1	5 to 4		5			
22/08/2011	1	4		30			
22/08/2011	1	4 to 3		4			
22/08/2011	1	3		8			
22/08/2011	1	3 to 2		4			
22/08/2011	1	2		2	30		
22/08/2011	1	2 to 1		3			
22/08/2011	1	1		2			
22/08/2011	1	12		1			1
22/08/2011	1	10		1			
22/08/2011	1	8		30			
22/08/2011	1	8 to 7		2			
22/08/2011	1	7		6			
22/08/2011	2	11		1			
22/08/2011	2	10		6			
22/08/2011	2	9		1			
22/08/2011	2	9 to 8		1			
22/08/2011	2	8		20			
22/08/2011	2	7					3
22/08/2011	2	6		2			
22/08/2011	2	5		30			
22/08/2011	2	4		4			2
22/08/2011	2	3		2			
22/08/2011	2	1		1			
22/08/2011	2	10		2			
22/08/2011	2	10 to 9		1			
22/08/2011	2	9		3			
22/08/2011	2	8		7			
22/08/2011	2	7					1
22/08/2011	2	4 to 3		2			
22/08/2011	2	1		1			
22/08/2011	2	1 to 12	2				
13/09/2011	1	5		1			
13/09/2011	1	5 to 6		1			
13/09/2011	1	6		5			1
13/09/2011	1	7		3			
13/09/2011	1	8		2			
13/09/2011	1	8 to 9		3			
13/09/2011	1	9		12			
13/09/2011	1	10		7			
13/09/2011	1	11		4			
13/09/2011	1	12		3			
13/09/2011	1	1		2			
13/09/2011	1	2		2			
13/09/2011	1	2 to 3		4			
13/09/2011	1	3		13			
13/09/2011	1	3 to 4		2			
13/09/2011	1	4 to 5		2			
13/09/2011	1	5		4			
13/09/2011	1	5 to 6		2			
13/09/2011	1	6		2			1
13/09/2011	2	5 to 6		1			
13/09/2011	2	6		2			
13/09/2011	2	7 to 8		2			
13/09/2011	2	8		20			

			Number of Passes (10 second intervals)				
Date	Transect	Sample Sector	Long-eared sp.	Pipistrelle sp.	Myotis sp.	Noctule	Serotine
13/09/2011	2	8 to 9		3			
13/09/2011	2	9		15			
13/09/2011	2	9 to 10		2			
13/09/2011	2	10		20			1
13/09/2011	2	10 to 11		3			
13/09/2011	2	11		7			
13/09/2011	2	11 to 12		3			
13/09/2011	2	12		3			
13/09/2011	2	1	1				1
13/09/2011	2	2	3	5			1
13/09/2011	2	2 to 3		3			
13/09/2011	2	3		6			
13/09/2011	2	3 to 4		2			
13/09/2011	2	4		4			
13/09/2011	2	5		10			
13/09/2011	2	6		20			2
13/09/2011	2	7		5			3
13/09/2011	2	7 to 8		1			
13/09/2011	2	8	2	15			
13/09/2011	2	9		4			
13/09/2011	2	10		3			
13/09/2011	2	10 to 11	4				
13/09/2011	2	12		3			
13/09/2011	2	12 to 1		1			
13/09/2011	2	1		18			
13/06/2012	1	5 to 6		1			
13/06/2012	1	6		2			
13/06/2012	1	8		1			
13/06/2012	1	9		5			
13/06/2012	1	10		11			
13/06/2012	1	10 to 11		1			
13/06/2012	1	11 to 12		2			
13/06/2012	1	12		1			
13/06/2012	1	1		1	1		
13/06/2012	1	1 to 2		1			
13/06/2012	1	2		30			
13/06/2012	1	2 to 3		4			
13/06/2012	1	3		6	1		
13/06/2012	1	4	1	1			
13/06/2012	1	7	1	2			
13/06/2012	1	8		1			
13/06/2012	2	4		1			
13/06/2012	2	5		5			
13/06/2012	2	6 to 7		2			
13/06/2012	2	7 to 8		7			
13/06/2012	2	8		16			
13/06/2012	2	8 to 9		4			
13/06/2012	2	9		6			
13/06/2012	2	9 to 10		2			
13/06/2012	2	10		6			
13/06/2012	2	10 to 11		6			
13/06/2012	2	11		6			
13/06/2012	2	11 to 12		8			
13/06/2012	2	12		11			
13/06/2012	2	1 to 12		5	1		
13/06/2012	2	1		5			
13/06/2012	2	2 to 3		4			
13/06/2012	2	3		12	1		
13/06/2012	2	3 to 4		8			
13/06/2012	2	4		1			
13/06/2012	2	4 to 5		1			
13/06/2012	2	5		8			
13/06/2012	2	5 to 6		4			
13/06/2012	2	6		3			
26/06/2012	1	1				12	
26/06/2012	1	2		30		6	
26/06/2012	1	2 to 3		6	6		
26/06/2012	1	3		30		3	

			Number of Passes (10 second intervals)				
Date	Transect	Sample Sector	Long-eared sp.	Pipistrelle sp.	Myotis sp.	Noctule	Serotine
26/06/2012	1	3 to 4		3			
26/06/2012	1	4		1			
26/06/2012	1	4 to 5		1			
26/06/2012	1	5		30			
26/06/2012	1	5 to 6		10			
26/06/2012	1	6		3		1	
26/06/2012	1	6 to 7		11			
26/06/2012	1	7	2	8			
26/06/2012	1	8		1			
26/06/2012	1	8 to 9		2			
26/06/2012	1	9		8			
26/06/2012	1	10		3			
26/06/2012	1	10 to 11		3			
26/06/2012	1	11		20		1	
26/06/2012	1	11 to 12		3		1	
26/06/2012	1	12		4			
26/06/2012	1	12 to 1		3			
26/06/2012	1	1		7	1		
26/06/2012	1	1 to 2		2			
26/06/2012	1	2	1	5			
26/06/2012	1	2 to 3		11			
26/06/2012	1	3	1	1			
26/06/2012	1	4		30			
26/06/2012	1	4 to 5		2			
26/06/2012	1	5		10			
26/06/2012	2	1				3	
26/06/2012	2	1 to 2				4	
26/06/2012	2	2 to 3				1	
26/06/2012	2	3		4			
26/06/2012	2	4		1			
26/06/2012	2	6		1			
26/06/2012	2	7 to 8		7			
26/06/2012	2	8		25			
26/06/2012	2	8 to 9		3			
26/06/2012	2	9		9		1	
26/06/2012	2	9 to 10		6			
26/06/2012	2	10		3			
26/06/2012	2	11		3			
26/06/2012	2	11 to 12		10			
26/06/2012	2	1		5			
26/06/2012	2	2		1			
26/06/2012	2	3		1			
26/06/2012	2	3 to 4		1			
26/06/2012	2	4		19			
26/06/2012	2	4 to 5		7			
26/06/2012	2	5		3			
26/06/2012	2	5 to 6		1			
26/06/2012	2	6		3			
26/06/2012	2	7		3			
26/06/2012	2	7 to 8		2			
27/06/2012	1	2	2	2			
27/06/2012	1	2 to 3		12	2		
27/06/2012	1	3		25			
27/06/2012	1	3 to 4		1			
27/06/2012	1	4		3			
27/06/2012	1	5		1			
27/06/2012	1	5 to 6		3			
27/06/2012	1	7		3	1	1	
27/06/2012	1	8		1			
27/06/2012	1	8 to 9		1			
27/06/2012	1	9		1			
27/06/2012	1	10				2	
27/06/2012	2	1		5			
27/06/2012	2	1 to 2		2			
27/06/2012	2	2		6			
27/06/2012	2	3		3			
27/06/2012	2	3 to 4		1			
27/06/2012	2	4		8			

			Number of Passes (10 second intervals)				
Date	Transect	Sample Sector	Long-eared sp.	Pipistrelle sp.	Myotis sp.	Noctule	Serotine
27/06/2012	2	4 to 5		1			
27/06/2012	2	5		7			
27/06/2012	2	5 to 6		2			
27/06/2012	2	6		4			
27/06/2012	2	7 to 8		2			
27/06/2012	2	8		6			
27/06/2012	2	8 to 9		1			
27/06/2012	2	9 to 10		6			
27/06/2012	2	10		14			
27/06/2012	2	10 to 11		5			
27/06/2012	2	11		3			
17/07/2012	1	10				1	
17/07/2012	1	9				6	
17/07/2012	1	6		17	3		
17/07/2012	1	6 to 5		2			
17/07/2012	1	5		5			
17/07/2012	1	5 to 4		3			
17/07/2012	1	4		9			
17/07/2012	1	4 to 3		12			
17/07/2012	1	3		8			2
17/07/2012	1	3 to 2		6			
17/07/2012	1	2		8			
17/07/2012	1	2 to 1		12			
17/07/2012	1	1		8		2	
17/07/2012	1	1 to 12		3		1	
17/07/2012	1	12		23			
17/07/2012	1	12 to 11		12			
17/07/2012	1	11		3			
17/07/2012	1	11 to 10		6			
17/07/2012	1	10		2			
17/07/2012	1	9		4			
17/07/2012	1	9 to 8		6			
17/07/2012	1	8		10			
17/07/2012	1	8 to 7		4			
17/07/2012	2	6		1			
17/07/2012	2	4		3	1		
17/07/2012	2	4 to 3		7			
17/07/2012	2	3		3			
17/07/2012	2	2		5		1	
17/07/2012	2	2 to 1		7			
17/07/2012	2	1		5		1	
17/07/2012	2	1 to 12		3		1	
17/07/2012	2	9 to 8		5			
17/07/2012	2	8		14			
17/07/2012	2	8 to 7		9			
17/07/2012	2	7		13		1	
17/07/2012	2	6		17			

9.6 Appendix F: Comparison of Manual Transect Sample Point Data

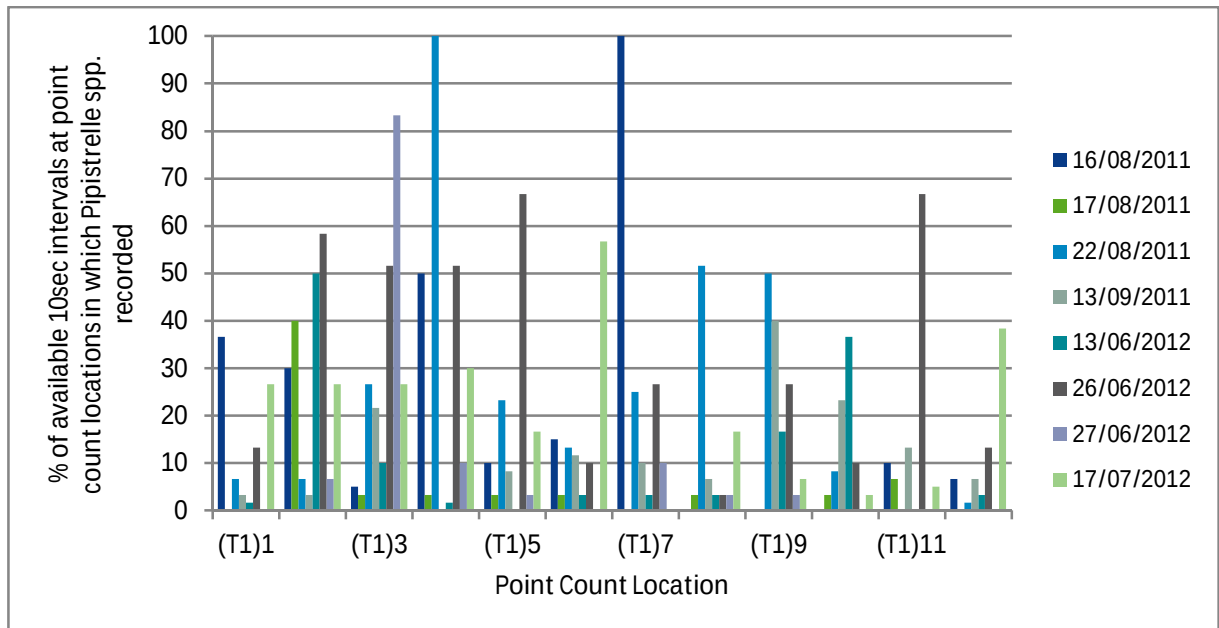


Figure 21: Transect 1: percentage of 10 second intervals at point count locations at which pipistrelle spp. recorded

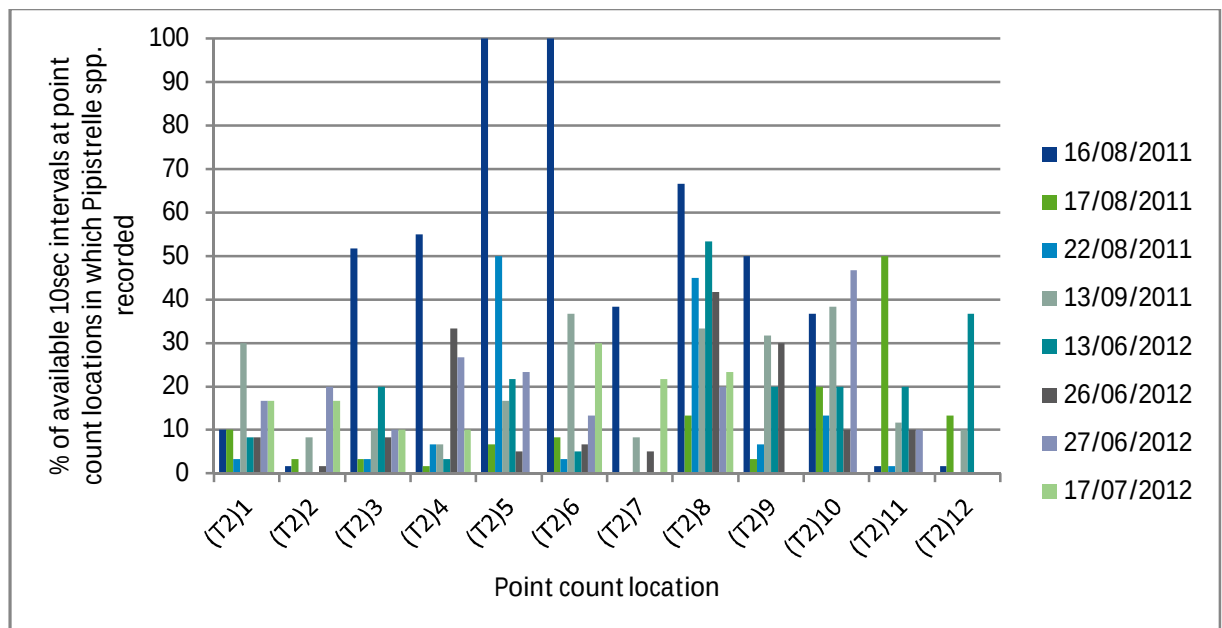


Figure 22: Transect 2 - Percentage of 10 second intervals at point counts in which pipistrelle spp. recorded

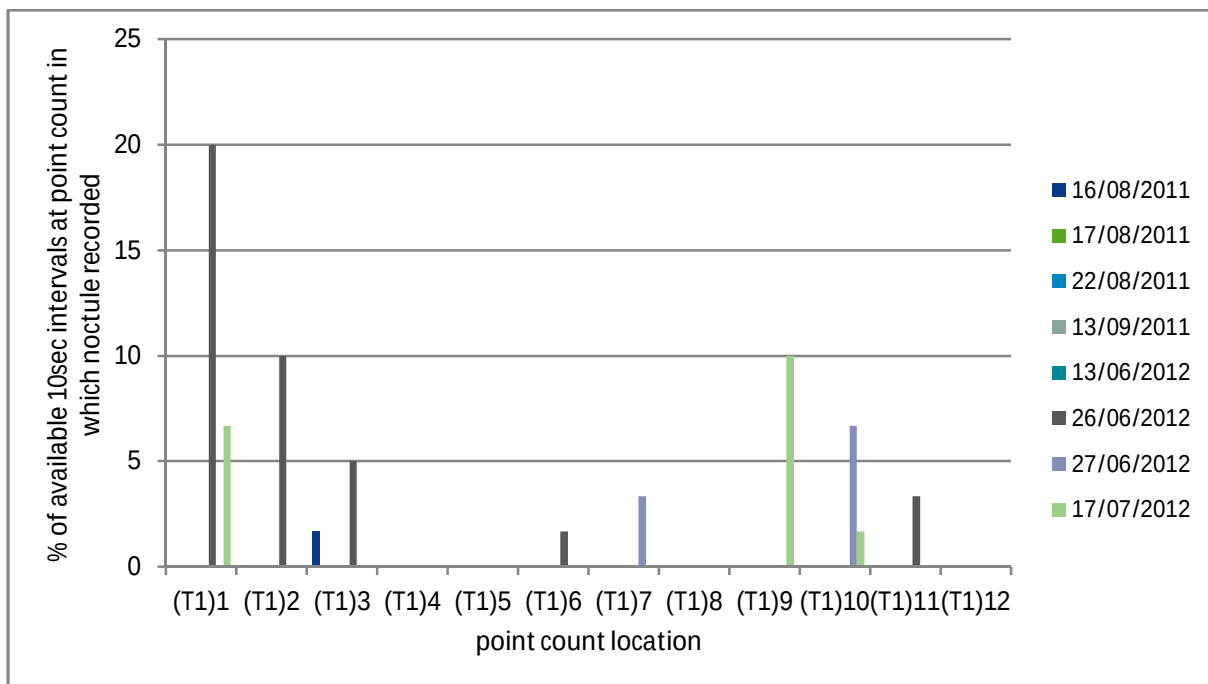


Figure 23: Transect 1 - Percentage of 10 second intervals at point counts in which noctule recorded

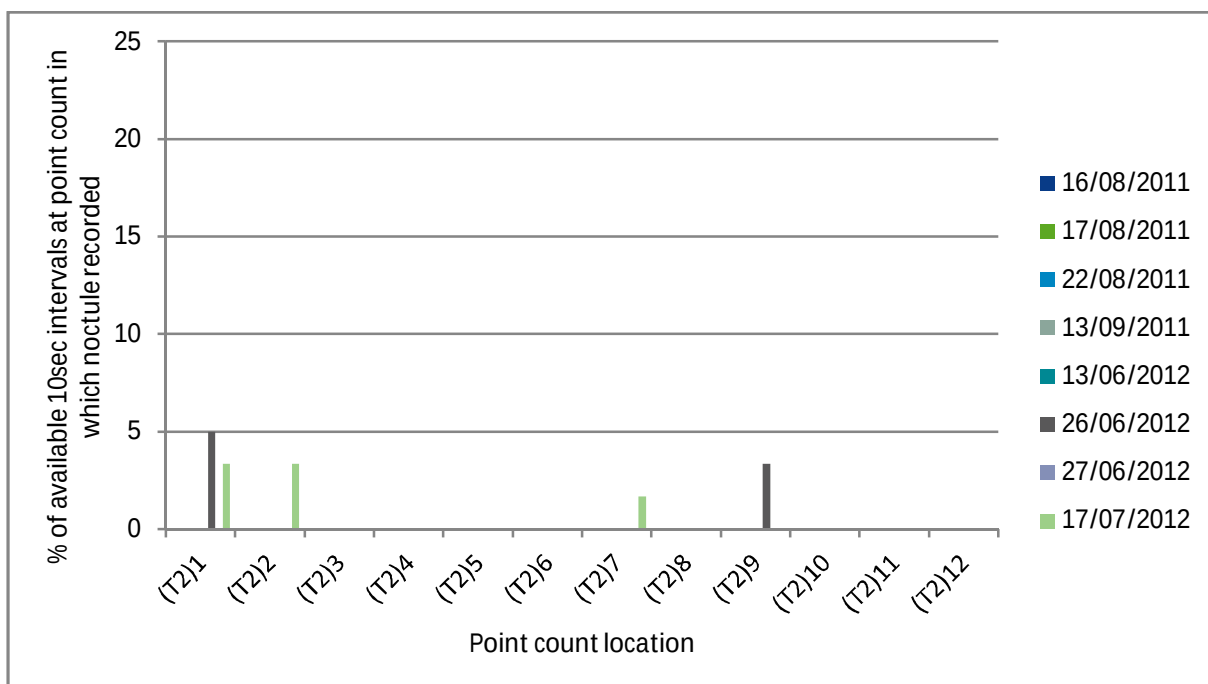


Figure 24: Transect 2: Percentage of 10 second intervals at point counts in which noctule recorded

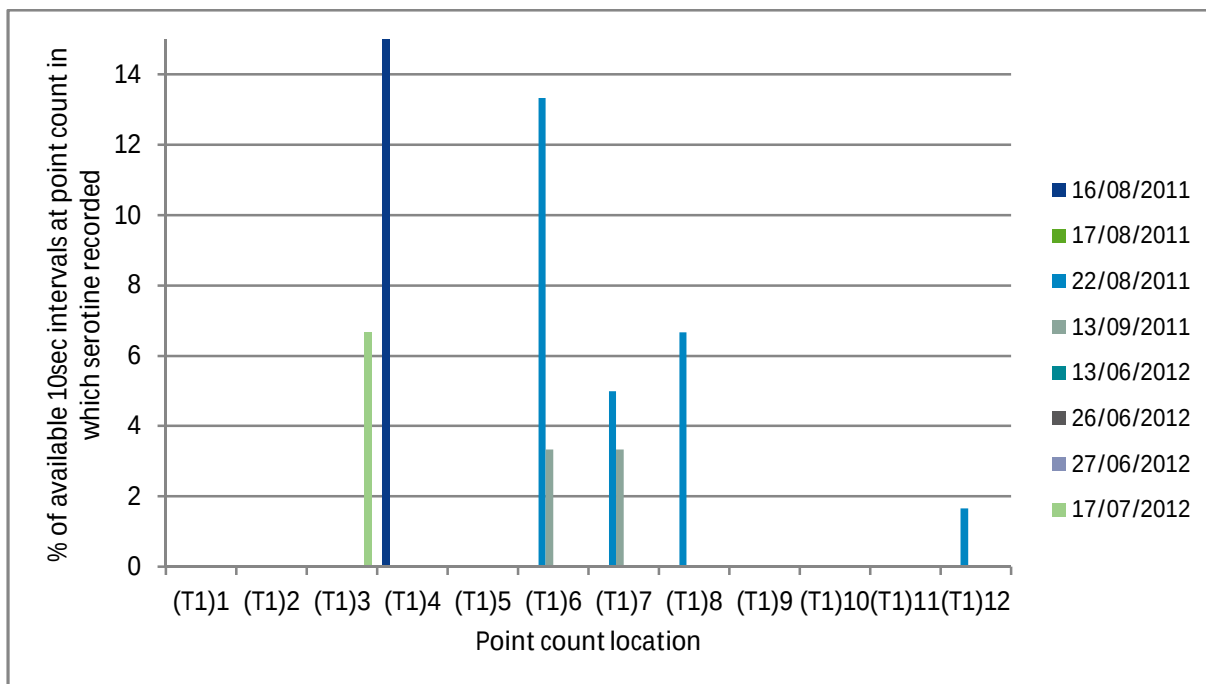


Figure 25: Transect 1: Percentage of 10 second intervals at point counts in which serotine recorded

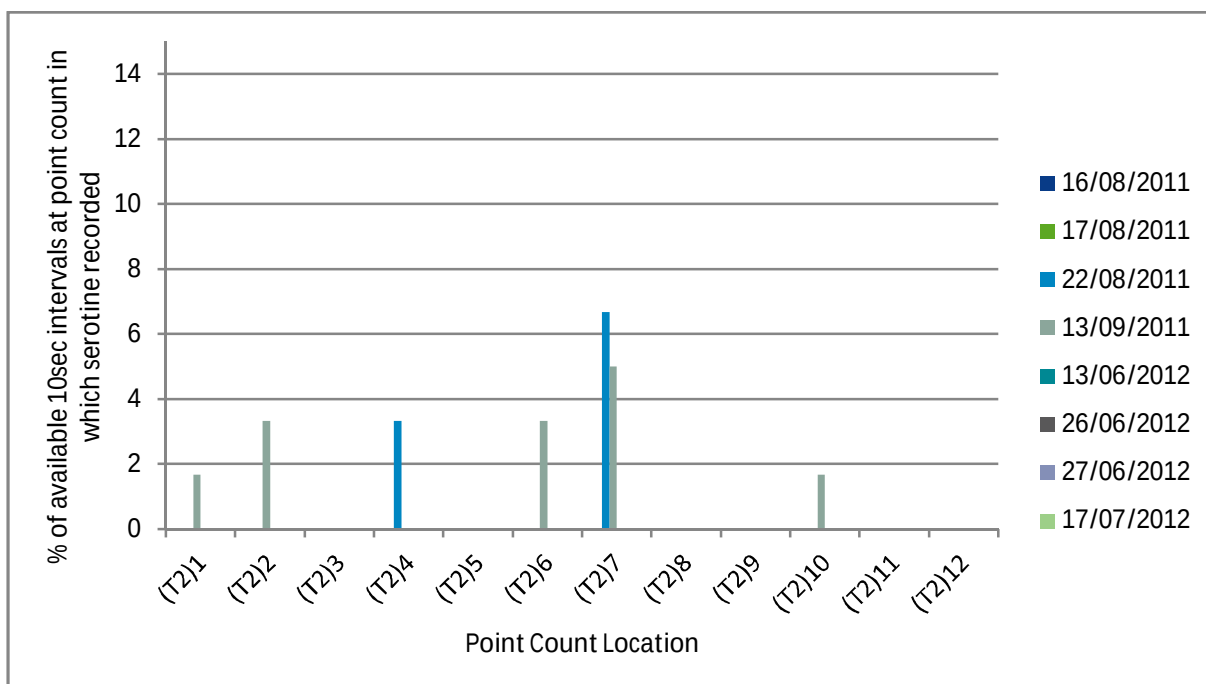


Figure 26: Transect 2 - Percentage of 10 second intervals at point counts in which serotine recorded

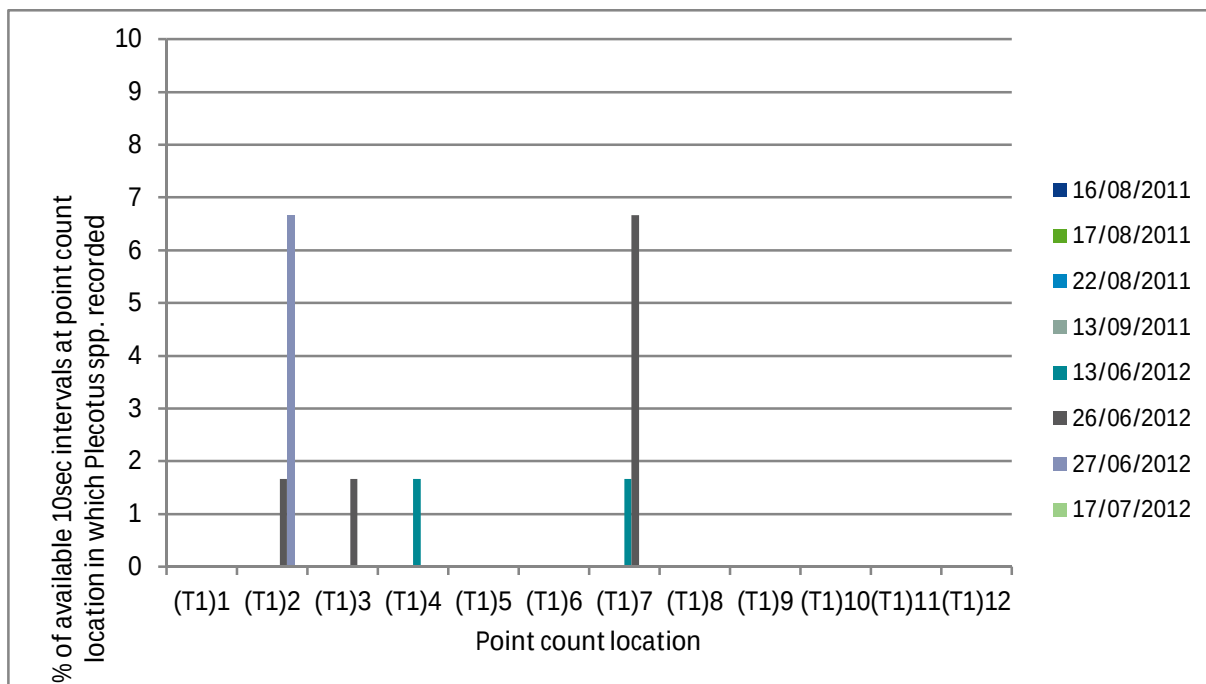


Figure 27: Transect 1 - Percentage of 10 second intervals at point counts in which Plecotus spp. recorded

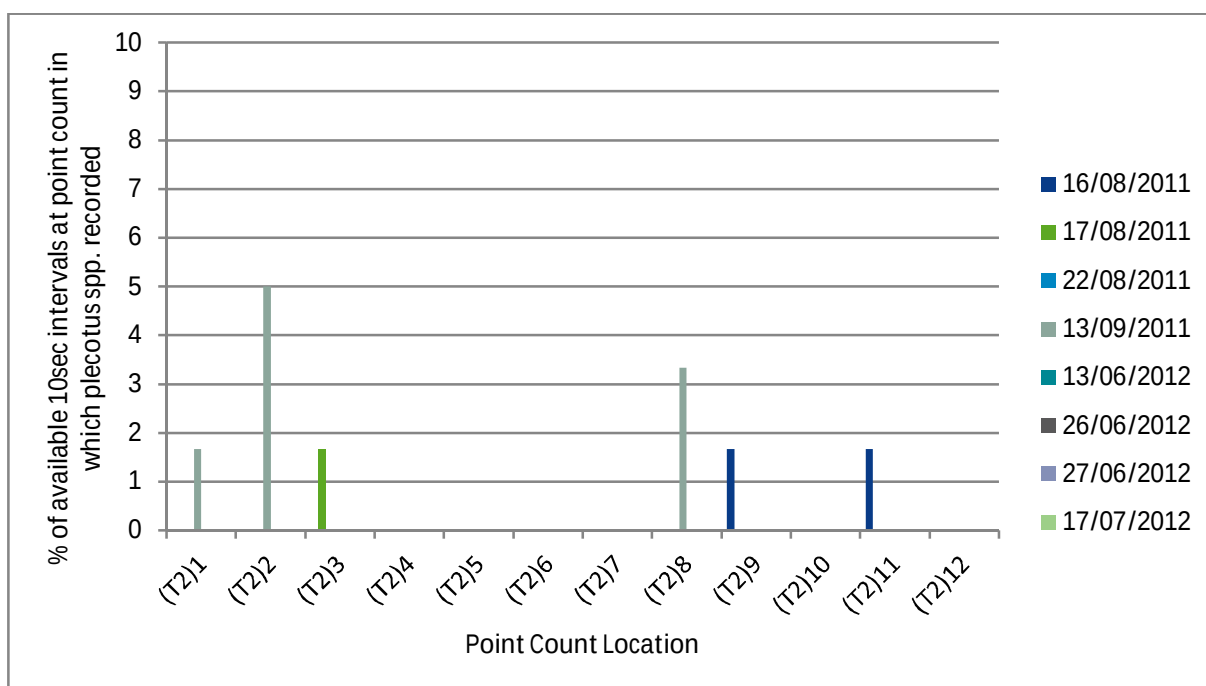


Figure 28: Transect 2 - Percentage of 10 second intervals at point counts in which Plecotus spp. recorded

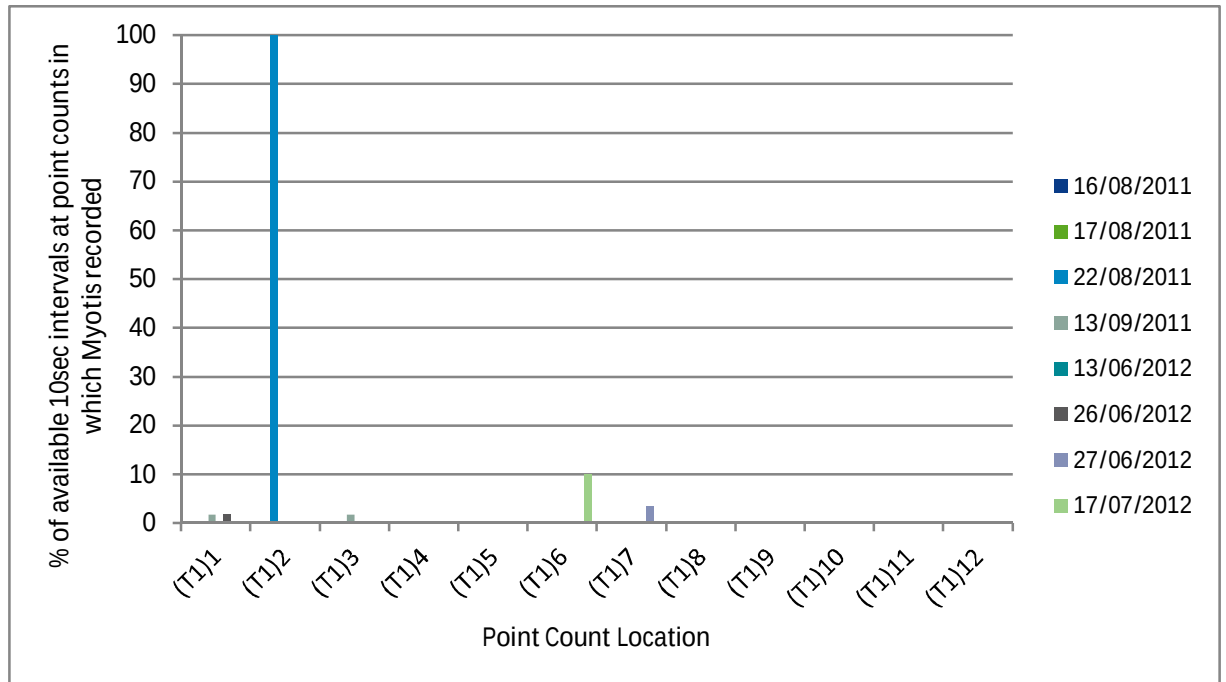


Figure 29 - Transect 1: Percentage of 10 second intervals at point count locations in which Myotis spp. recorded

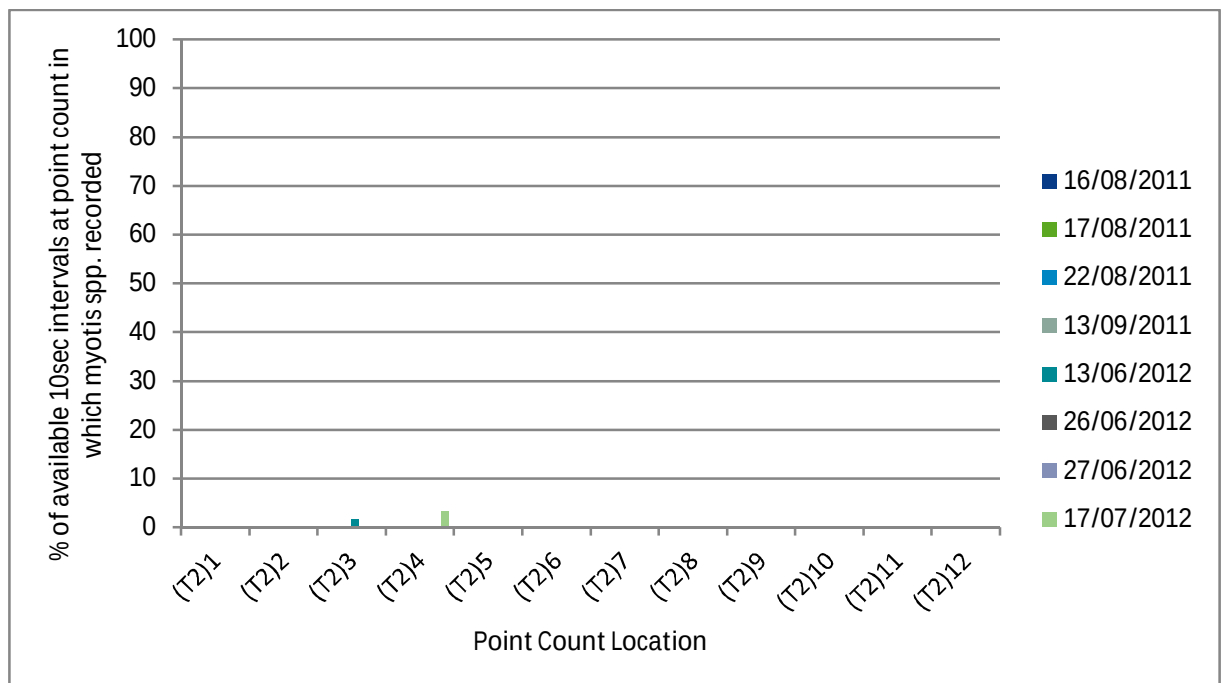


Figure 30 - Transect 2: Percentage of 10 second intervals at point count locations in which Myotis spp. recorded

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