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South West Milton Keynes

BAT SURVEY REPORT

November 2014

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1.0 INTRODUCTION

1.1 This report has been produced by FPCR Environment & Design Ltd. on behalf of Hallam Land Management Ltd. and presents the results of a series of bat surveys undertaken at a site located on the southwestern edge of the residential development of Bletchley, Milton Keynes (Central OS Grid Ref: SP 835 324).

1.2 This study follows on from previous survey work undertaken by Aspect Ecology in 2008[1] and Phase 1 surveys undertaken by FPCR in 2013 and provides a detailed ecological baseline with regards to bats and an evaluation of the overall importance of the site for these species. Any potential impacts to these species from the proposed mixes-use development are detailed along with an appropriate recommendations/mitigation where deemed necessary

Site Description

1.3 The majority of the application site comprises heavily-managed arable farmland and a small number of poor semi-improved grassland fields. Hedgerows form the predominant boundary type and support a good resource of mature trees whilst a small woodland compartment and wooded belt is located in the northern section of the site. Buildings within the site are limited to agricultural sheds and derelict structures without features suitable for roosting bats (full details below).

1.4 Surrounding land-use comprises residential, heavily-used roads and farmland. Suitable linear bat features with good links to the surrounding landscape include the disused railway abutting the southern site boundary and Weasel Lane (Track) which bisects the site.

Development Proposals

1.5 The current application is for mixed residential, employment and public service provision with the majority of the site comprising residential development. Substantial areas of green space will be provided as open space.

[1] Aspect Ecology (2010) *Salden Chase North East Aylesbury Vale Environmental Statement*, David Lock Associates.

2.0 LEGISLATION

2.1 All bats and their roosts are afforded full legal protection under the Conservation of Habitats and Species Regulations 2010 (as amended) and the Wildlife & Countryside Act 1981 *(*as amended). The purpose of the legislation is to maintain and restore protected species to a situation where their populations are favourable.

2.2 Under Regulation 41 of the Conservation of Habitats and Species Regulations 2010 (*as amended*) it is illegal to deliberately capture, injure or kill; deliberately disturb (including intentionally or recklessly) all UK bat species. This includes disturbance which impairs their ability to: breed and rear young; migrate; and hibernate; or affects their local distribution and abundance.

2.3 Under the Wildlife and Countryside Act 1981 (as amended) it is illegal to:

- Recklessly or intentionally kill, injures or take any wild animals included in Schedule 5.
- Recklessly or intentionally damage or destroy, or obstruct access to any structure or place which any wild animal included in Schedule 5 uses for shelter or protection,
- Recklessly or intentionally disturb any such animal while it is occupying a structure or place which it uses for shelter or protection.

2.4 If bats are using a structure as a roost on site and impacts upon the species cannot be avoided a European Protected Species Licence from Natural England is required in order to allow proposals to derogate from the Legislation (Licenses cannot be obtained to provide protection against offences under the Wildlife & Countryside Act 1981 (as amended)). As part of the application process three 'Tests' have to be met by the application.

2.5 "In determining whether or not to grant a licence Natural England must apply the requirements of Regulation 53 of the Regulations and, in particular, the three tests set out in sub-paragraphs (2)(e), (9)(a) and (9)(b)6.

(1) ***Regulation 53(2)(e****) states: a licence can be granted for the purposes of "preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment".*

(2) ***Regulation 53(9)(a)*** *states: the appropriate authority shall not grant a licence unless they are satisfied "that there is no satisfactory alternative".*

(3) ***Regulation 53(9)(b)*** *states: the appropriate authority shall not grant a licence unless they are satisfied "that the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range."*

2.6 Conservation status is defined as *"the sum of the influences acting on the species concerned that may affect the long term distribution and abundance of its population within its territory*". It is assessed as favourable when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long term basis as a viable component of its natural habitats, and
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and

- There is, or will probably continue to be, a sufficiently large habitat to maintain its populations on a long term basis.

2.7 These tests must not only reach agreement with Natural England when assessing a Licence application they must also be assessed by the planning authority when determining a planning application.

2.8 All British bats are listed as species of principal importance for the purpose of conserving biodiversity under the Natural Environment and Rural Communities (NERC) Act 2006. These are recognised in the National Planning Policy Framework which advises that when determining planning applications, Local Planning Authorities should aim to conserve and enhance biodiversity by applying a set of principles including:

- *If significant harm resulting from a development cannot be avoided……, adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;*
- *Development proposals where the primary objective is to conserve or enhance biodiversity should be encouraged.*

3.0 METHODOLOGY

Desktop Study

3.1 Buckinghamshire and Milton Keynes Environmental Records Centre (BMERC) was consulted in December 2012 for records of any roosts, grounded bats or any other incidental sightings of bats within 1km of the application site boundary.

3.2 In addition data from the previous assessment by Aspect Ecology (2008) has been included in a summary form within this document.

Internal / External Building Assessment

3.3 Buildings within the site were inspected for their potential to support roosting bats by an experienced bat ecologist on 4th and 27th September 2012.

3.4 The exterior of the buildings were visually assessed for features such as small gaps under barge/soffit/fascia boards, raised or missing ridge tiles and gaps at gable ends, which have the potential to provide access points for bats. Evidence that bats actively use potential access points includes staining within gaps and bat droppings or urine staining under gaps, a note being made wherever these were present. Indicators that potential access points had not recently been used include the presence of cobwebs and general detritus within potential access points. The visual assessment was carried out following periods of dry weather to maximise recording of visible evidence.

3.5 The interior of any accessible buildings, including roof voids (where present), were visually assessed for evidence of bat activity and/or for the potential to be used by bats. Evidence of a roost could be determined as the presence of a dead or live bat(s), concentrated piles or scattered droppings, food remains such as insect wing fragments as well as scratch marks and/or staining.

Assessment of Trees

3.6 An experienced ecologist from FPCR completed an assessment of mature trees within the site on 4th and 27th September, 17th October and 21st November 2012 to assess their potential to support roosting bats. Trees were examined from ground level, with the aid of binoculars for features that could provide suitable roosting opportunities:

- Trunk cavity – Large hole in trunk caused by rot or injury.
- Branch cavity - Large hole in branch caused by rot or injury.
- Trunk split – Large split / fissure in trunk caused by rot or injury.
- Branch spilt – Large split / fissure in branch caused by rot or injury.
- Branch socket cavity – Where a branch has fallen from the tree and resulted in formation of an access point in to a cavity.
- Woodpecker hole – Hole created by nesting birds suitable for use by roosting bats.
- Lifted bark – Areas of bark which has rotted / lifted to form suitable access point/roost site for bats.
- Hollow trunk – Decay in heartwood leading to internal cavity in trunk.

- Hazard beam failure- Where a section of the tree stem/branch has failed causing collapse and leading to longitudinal fractures / splits / cracks along its length.
- Ivy cover – Dense / mature ivy cover where the woody stems could create small cavities / crevices.

3.7 The trees were classified into general bat roost potential groups based on the presence of features listed above. Table 1 below classifies the potential categories as accurately as possible. This table is based upon Table 8.4 in Bat Surveys - Good Practice Guidelines 2nd Edition (Bat Conservation Trust, 2012)

Table 1: Bat survey protocol for trees

Tree category and description	**Survey requirements prior to determination.**	**Recommended mitigation works and / or further surveys.**
Category 1 Confirmed bat roost with field evidence of the presence of bats, e.g. live / dead bats, droppings, scratch marks, grease marks and / or urine staining.	Identified on map and on the ground. Further assessment such as climb and inspect and / or dusk / dawn surveys should be undertaken to provide an assessment on the likely use of the roost, numbers and species of bat present.	Avoid disturbance where possible. Felling or other works that would affect the roost would require an EPS licence with like for like roost replacement as a minimum. Works may also be subject to timing constraints.
Category 2a Trees that have a high or significant potential to support bat roosts.	Identified on map and on the ground to assess the potential use of suitable cavities, based on the habitat preferences of bats. Further assessment such as climb and inspect and / or dusk / dawn surveys should be undertaken to ascertain presence / absence of roosting bats. Trees may be upgraded if presence of roosting bats is confirmed or downgraded following further surveys if features present are of low suitability.	Trees where no bat roost confirmed after further surveys: Avoid disturbance where possible. Further nocturnal surveys during the active bat season immediately prior to felling and / the use of non-return valves may be required. Use “soft felling” techniques and avoid cutting through tree cavities.
Category 2b Trees with a low or limited potential to support bat roosts.	None.	Avoid disturbance where possible. Trees would be felled using reasonable avoidance measures such as soft felling, removing ivy cover by hand etc.
Category 3 Trees with negligible potential to support bat roosts.	None.	None.

3.8 An assessment of bat potential trees was made in the Ecological Appraisal (FPCR, December 2012) and full details are repeated here for completeness.

General Habitat Suitability

3.9 This assessment was carried out on 4th September, 27th September, 17th October, 21st November 2012 prior to any bat nocturnal surveys being undertaken. A site walk-over in conjunction with aerial photographs were used to assess the potential usage of the site by bats, including what species may be present, what habitat was suitable for bats, any potential roosting location, potential foraging and commuting areas along with the presence of any suitable off-site habitats..

3.10 This assessment aimed to provide a guide to the amount of required survey effort, which should be proportional to:

- The type and scale of the proposed development and its predicted impacts on bats
- The size, nature and complexity of the development site,
- The likelihood of bats being present or affected,
- The species and numbers of individuals concerned, and
- The type of roost and/or habitat affected.

Nocturnal Surveys

Transect Survey

3.11 A bat activity (transect) survey was undertaken each month from April to September 2013 (inclusive) with the site area split over two transects for May to September (inclusive) with a dusk and pre-dawn survey undertaken in the same 24 hour period in September (see Table 2 for conditions and timings). For May and August the site was split into two with one transect route covering half the site at dusk with the remainder of the site surveyed at dawn. With the exception of the April transect when a single route covered the entire site and the September dawn transects when the temperature was 9°C all surveys where undertaken in accordance with current best statutory and best practice guidelines (Natural England[2], Bat Conservation Trust[3] and JNCC[4]). The primary objective of transects completed was to identify foraging areas, commuting routes and species utilisation of the site.

3.12 The dusk surveys commenced 15 minutes before sunset and continued for at least 2 hours after sunset with dawn surveys commencing 2 hours before sunrise and finishing at sunrise.

3.13 The transect routes were determined prior to survey in order to ensure appropriate coverage of all areas of the site and included point count stops to identify activity levels around features of potential value to bats (including features likely to be affected by development).

3.14 Each transect was walked at a steady pace and when a bat passed by, the species, time and behaviour was recorded on a site plan. This information provides a general view of the bat activity present on site and identifies the key foraging areas and commuting routes. Bat Box Duet bat detectors were utilised in conjunction with MP3 recorders to provide back-up information and enable identification of bats encountered, if necessary. The results of these surveys were used to assess the level of bat activity across the site in relation to the abundance of individual species foraging and commuting.

[2] English Nature (2004) Bat Mitigation Guidelines
[3] Bat Conservation Trust (2012) Bat Surveys 2nd Edition - Good Practice Guidelines
[4] JNCC (1999) Bat Workers Manual

3.15 All transects surveys (bar the dawn survey on the 10th September 2013 when the temperature was 9°C) were undertaken by licenced or experienced bat workers during suitable conditions (i.e. when the ambient air temperature exceeded 10ºC and there was little wind and no rain).

3.16 Where necessary bat calls were analysed post survey using BatSound (version 4), by taking measurements of the peak frequency, inter-pulse interval, call duration and end frequency. Analysis was undertaken by experienced and/or licensed bat ecologists from FPCR.

3.17 A summary of the timings and conditions for each survey are shown in Table 2 below:

Table 2: Summary of transect survey conditions

Date	Survey Start Time	Survey End Time	Survey Type	Sunrise / Sunset	Temperature (°C)	Rain (0-5, 5=heavy rain)	Wind (0-5, 5=strong wind)	Cloud %
23.04.13	20:00	23:28	Dusk	20:15	14°C	0	1	0
30.05.13	20:55	23:40	Dusk	21:11	13°C	0	1	100
31.05.13	02:50	05:07	Dawn	04:50	11°C	0	1	100
26.06.13	21:14	24:05	Dusk	21:27	18°C	0	2	30
08.07.13	21:31	23:32	Dusk	21:22	16°C	0	2	40
22.08.13	20:04	22:16	Dusk	20:11	18°C	0	1	40
23.08.13	03:58	06:13	Dawn	06:01	16°C	0	1	75
09.09.13	19:15	21:38	Dusk	19.32	10°C	1	1	20
09.09.13	19:25	21:40	Dusk	19.32	9oC	0	3	20

Static Bat Detector Survey

3.18 Passive monitoring was undertaken using an automated logging system (AnaBat™ SD1 (Titley™ Scientific)) with its output saved to an internal storage device. A single static unit was deployed on site for 5 consecutive nights on a monthly basis between April and June 2013 (inclusive) with two static detectors used between July and September 2013 (inclusive). Table 3 provides full details of the survey timings and conditions. This information was used to supplement transect survey data and derive an index of activity and species composition at different points within the site.

3.19 Static bat detectors was placed along features considered to be of value to bats, such as hedgerows junctions, woodland edge and tree lines (Figure 1 for locations) including areas likely to be affected by the development proposals. Devices were placed in each location for a period of 5 days. Detectors were programmed to activate 30 minutes before dusk and recorded continuously until 30 minutes following sunrise. The output from detectors was subjected to computer analysis using the AnalookW software package (Titley Electronics).

3.20 The AnaBat records sound files of up to 12 seconds in length before a new file is created. The analysis of the recorded files can highlight the presence of more than one bat if they are recorded simultaneously on the same sound file. However, it is not possible to determine whether consecutive sound files have been recorded as the result of a single bat passing the detector as it commutes across the landscape or by one bat repeatedly triggering the detector as it forages in close proximately for an extended period. Therefore, each sound file is counted as a single bat pass. The number of bat passes does however reflect the relative importance of the location of the detector by calculating the bat passes per hour.

Table 3: Summary of static survey conditions

Dates	Temperature average/minimum (°C)	Weather conditions	Location (see Figure 1)
16th-20th April 2013	13/8	Rainfall, wind and cloud cover varied over the period	H27 (north)
1st-6th May 2013	13/12	Rainfall, wind and cloud cover varied over the period	H8 (south)
26th-30th June 2013	19/17	Rainfall, wind and cloud cover varied over the period	H8 (South)
24th-29th July 2013	19/13	Rainfall, wind and cloud cover varied over the period	2 detectors H27 (north) H7/H8 junction (south)
23rd-27th August 2013	17/13	Rainfall, wind and cloud cover varied over the period	2 detectors H31/H32 junction (north) H3 adjacent disused railway (south)
11th-16th September 2013	14.5/10	Rainfall, wind and cloud cover varied over the period	2 detectors H32 (north) H13/H7 junction (south)

Constraints

3.21 All surveys were undertaken during appropriate weather conditions within the appropriate survey period by suitably experienced ecologists (including licensed bat workers), with the exception of the dusk transect in September when the temperature dropped to 9^{o}C. However,

this is not considered to be a constraint to the overall data set due to the large amount of nocturnal survey data throughout the survey period.

3.22 For the first transect survey a single transect covered the entire site and so not all features with the potential to be used by bats were covered within 3 hours following sunset as recommended in the guidance. Owing to the thorough coverage of the site in successive months through 2013 sufficient data has been collected to allow a robust assessment and the timing of the April transect is not considered to represent a constraint.

3.23 Where calls could not be identified to species level, for example due to the lower quality of those recordings or where there are similarities between species echolocation calls (particularly for *Myotis* and *Nyctalus* species) making a definite identification difficult, a likely species identification is provided. This is based on the features displayed by the calls when analysed using the AnaLookW data analysis software package and taking into account the geographical location of the site and the habitats present.

4.0 RESULTS

4.1 Desk based studies were undertaken in 2012 and a number of bat records were returned by BMRC for the vicinity of the site.

4.2 Common pipistrelle *Pipistrellus pipistrellus*, Daubenton's bat *Myotis daubentonii* and unidentified bats have been recorded southeast of the site in Newton Longville in 2007, 2006 and 2002 respectively between 100m and 650m from the site. Natterer's bat *Myotis nattereri*, common pipistrelle, brown long-eared *Plecotus auritus*, Daubenton's bat and Noctule *Nyctalus noctula* have been recorded between 300m and 350m north of the site between 2006 and 2010.

4.3 Previous survey information from Aspect ecology indicated that trees and hedgerows offered suitable potential foraging habitat and navigational corridors for bats and the large open areas offered fewer opportunities. Activities throughout nocturnal surveys noted generally limited activity from more common species such as common pipistrelle.

General Site Observations

4.4 The central field compartments, most notably the arable and managed semi-improved grassland were considered to be of limited/negligible value for bats due to the lack of suitable features. However, the field boundaries and linear features such as treelines, hedges and Weasel Lane (Track) were considered to be of greater value for connectivity and foraging purposes.

Tree Assessment

4.5 None of the trees assessed were found to have any evidence of use by bats though a number were considered to provide features with potential to be used by bats. Table 4 below summarises the full assessments, with full details provided in Appendix A.

Table 4: Tree inspection summary

Potential category	Number of trees identified	Tree ref./ categorisation after initial assessment	Typical features recorded	Aerial inspection?	Recommendations
Cat 1 / Confirmed roost	0	n/a	n/a	-	-
Cat 2a / High or significant roost potential	18	T2, T8, T10, T11, T13, T14, T16-T20, T22, T24, T27-T30 and T32.	Woodpecker holes, large cavities, large areas of lifted bark, rotten branches.	-	More detailed assessment should they be affected by proposals
Cat 2b / Low or limited roost potential	18	T1, T4, T5, T6, T7, T9, T12, T15, T21, T26, T31, T33, T34, T35, T36, T37, T38, T39	Shallow branch socket cavities, woodpecker	T5, T6, T7, T12, T15, T26, T31, T33, T34, T35, T36, T39	Scheduled for removal: T15 and T35 - sectional felling T34, T39 – no further

			holes, bird evidence, ivy cover, torn out branches, small areas of lifted bark.		surveys required. In the event that any other trees in this category are to be affected by the proposals the following is recommended T4, T38 – nocturnal prior to felling. T5, T6, T7, T26, T31, T33, T36 - sectional felling T1, T9, T12, T21 - remove Ivy by hand
Cat 3 / Negligible or no potential*	3	T3, T23, T40	Small crevices, stag-heading.	T3, T23, T40	None

**Please note, in this assessment, trees with category 3 potential were not noted due to the negligible potential which this category exhibits.*

Building Assessment

4.6 Two agricultural sheds were noted at the south west site boundary adjacent to Whaddon Road. One was of breeze block and corrugated asbestos construction with a small lean-to housing a generator and supported by an metal frame. The second was of corrugated metal construction also supported by a metal frame. No internal access was available but due to construction features noted externally these buildings are considered highly unlikely to support roof voids or other internal features suitable for roosting bats.

4.7 A third structure in the north-west of the site comprised derelict cattle sheds constructed of a single-skin of corrugated metal, brick and wood over timber frames. Internally exposed timber posts and tie beams supported timber rafters. .

4.8 No evidence of roosting bats was recorded in association with any of the units and all were considered to have negligible potential for roosting bats.

Nocturnal Survey Results

Transect Survey

4.9 The following is a summary of the data collected over the survey period. In the context of this section of the results, a bat 'contact' refers to what the ecologist considered to be a single bat (or occasionally multiple bats in same location), rather than a single pass of the detector by a bat, so some bat passes have been grouped as one single bat contact.

4.10 Please refer to Appendix B and plans (reference as indicated) for full results of the surveys.

Dusk Transect (whole site) 23rd April 2013 (see figure 2)

4.11 During the survey a total of 10 contacts were recorded, 2 of which were present during point counts. Three bat species were present including common pipistrelle *Pipistrellus pipistrellus*, which made up the majority of the bat activity (8 contacts), and Noctule *Nyctalus noctula* and an unidentified *Myotis* species bat. The activity was a mix of foraging and commuting only. The areas of peak activity (more than 3 contacts in one relatively small area) comprised the north central compartment with 5 of the bat contacts recorded on the hedges in this area (specifically H16, H26, H27 and H28).

Dusk Transect (north) 30th May 2013(see figure 3)

4.1 During the survey a total of 14 bat contacts were recorded, 5 of which were noted during point counts. Three different species were recorded including; common pipistrelle (the most abundant), soprano pipistrelle *Pipistrellus pygmaeus* and brown long-eared bat *Plecotus auritus*. The majority of activity was foraging, with some commuting and one record of social calling to the south of H27. Bat activity was generally concentrated down Weasel Lane in the centre of the site along H16, H17 and H23. The remaining activity was distributed more sporadically throughout the survey route.

Dawn Transect (south) 31st May 2013 (see figure 3)

4.2 During the survey, only 3 bat contacts were recorded, 1 of which was on the point count element of the route. All contacts comprised foraging common pipistrelle bats with the area of peak activity comprised the eastern extent of H3 only.

Dusk Transect (north) 26th June 2013 (see figure 4)

4.3 During the June survey of the northern route, a total of 11 bat contacts were present, only 1 of which was during a point count. Common pipistrelle was the only species recorded, and all the bats were exhibiting foraging behaviour. The area of peak activity comprised the centre of the route in the area of H31 and H27 and scattered along the northern boundary along a number of hedges.

Dusk Transect (south) 26th June 2013 (see figure 4)

4.4 During the June transect of the southern route, a total of 17 bat contacts were recorded in association with the site. The majority of which were recorded during the walked portion of the site with only 1 bat noted during the point count portion of the survey. Three different species were recorded comprising; common pipistrelle (the most abundant), noctule and soprano pipistrelle. The majority of bats were recorded forging with a small number commuting. Areas of peak activity included; the south eastern boundary along H2 and the disused railway line and along H7 in the centre of the route. However continuous foraging for up to 10 minutes was recorded from multiple common pipistrelle bats on the south west of Weasel lane at H18.

Dusk Transect (north) 8th July 2013 (see figure 5)

4.5 During this northern transect, 15 bat contacts were recorded, only 1 of which was during point counts. The 2 bat species present comprised common pipistrelle (the most abundant) and soprano pipistrelle. In terms of behaviour all bats were noted foraging with no other activity

recorded. The peak activity was in association with H27 in the centre of the route. The other contacts were generally distributed throughout the route.

Dusk Transect (south) 8th July 2013 (see figure 5)

4.6 A total of 13 bat contacts were recorded in association, 2 of which during the point counts. Only common pipistrelle was present with all bats either forging or commuting. The peak activity was in association with H20 and H21 to the north east of the route/site, with other contacts distributed throughout the walked route.

Dusk Transect (north) 22nd August 2013 (see figure 6)

4.7 During this transect a total of 19 contacts were recorded, 2 of which were during point counts. The species recorded comprise; common pipistrelle (the most abundant), soprano pipistrelle and an unidentified *Nyctalus* species. All of the contacts were foraging bats and the areas of peak activity were concentrated within the central/northern sections of the route along H27, H31 and H33.

Dawn Transect (south) 23rd August 2013 (see figure 6)

4.8 During this transect a total of 17 contacts were recorded, only 1 of which was during point counts. The species recorded comprise; common pipistrelle (the most abundant), and a further unidentified pipistrelle species *Pipistrellus sp*. In terms of behaviour bat contacts were foraging, commuting with a small number of quick passes with no other types of activity recorded. The areas of peak activity comprised H3 in the south of the route.

Dusk Transect (north) 9th September 2013 (see figure 7)

4.9 During the dusk portion of the dusk/dawn transect of this route, only 2 bats contacts were recorded, both of which were during the walked route rather than point counts. The bat contacts comprised two foraging common pipistrelle bats in association with the centre and south of the route.

Dusk Transect (south) 9th September 2013 (see figure 7)

4.10 During the dusk portion of this dusk/dawn survey, a total of 5 bat contacts were recorded 3 of which were during the walked route with a further 2 on the point counts. The species present comprised a mix of common and soprano pipistrelle with all bats foraging or commuting. The only area of significant activity was H9 along the Weasel Lane hedgerows.

Dawn Transect (north) 10th September 2013 (figure n/a)

4.11 No bats were recorded in the north during this survey.

Dawn Transect (south) 10th September 2013 (figure n/a)

4.12 No bats were recorded in the south during this survey.

Summary

4.13 During the extensive on site surveys, activity levels ranged from no recorded bats during either of the dawn surveys to a maximum of only 19 contacts during the August survey of the northern half of the site. Overall there was no significant difference in activity levels between the northern and southern portions of the site. A total of 5 bat species were present during the entire survey period comprising; common pipistrelle, soprano pipistrelle, a further unidentified pipistrelle species, noctule and a further unidentified *Nyctalus* species. Common pipistrelle made up the majority of recorded bats with soprano pipistrelle (14 contacts) and noctule bats (2 contacts) the second most abundant. All types of activity were recorded, though the majority was foraging and commuting, with only small numbers of social calling (recorded along the Weasel Lane hedgerows).

4.14 Although bats were recorded in almost all areas of the site during the 2013 period, the following represented the general areas of peak activity where 3 contacts or more were in reasonably close proximity;

- the central north section around H16, H27, H28,
- along Weasel lane on both the north and south including H9, H17 and H16,
- H20, H21 and H29 on the northern boundary,
- H7 in the centre of the southern route,
- H1 and H2 on the eastern boundary
- and H3 on the southern boundary.

Static AnaBat™ Detector Survey

4.15 The following details the results of static monitoring of bat activity throughout 2013. In this circumstance, as the static detectors cannot differentiate between individual bats easily, the term 'contact' or 'pass' refers to a unique created sound file created over the course of a number of seconds. Based on this, one contact does not necessarily refer to one bat, as one bat can create a number of contacts, for example a bat foraging in the vicinity of a static detector.

4.16 A summary is provided at the rear of this section and with Table 5 below displaying a breakdown of the data from each unit with the locations shown on Figure1.

16th to 20th April 2013

4.17 The detector was located within trees at the junction of H27 and H31 bordering arable and semi-improved grassland. Three species / species groups (common pipistrelle, *Myotis* species and noctule) were recorded in this period with a total of 40 bat passes. The most frequently recorded species was common pipistrelle (87.5% of total passes recorded), with only one pass of an unidentified *Myotis* species bat noted.

1st to 5th May 2013

4.18 The static detector was located within H8 bordering arable planting in the south of the site and in close proximity to the hedgerows and mature trees of Weasel Lane. Three species (common pipistrelle, an unidentified *Myotis* species and a single Nathusius pipistrelle) were recorded with a total of 23 bat passes recorded including a single unidentified species. Again the most

frequently recorded species was common pipistrelle (78.2% of total passes recorded). Three unidentified *Myotis* species bats and one noctule were also recorded.

26th to 30th June 2013

4.19 The static detector was located in the middle of Weasel Lane within the mature tree line of H16. Three species/two species groups (noctule, common pipistrelle, soprano pipistrelle and pipistrelle species) were recorded with a total of 19 passes. The most frequently recorded was common pipistrelle (63.1% of total passes recorded). Three passes from noctule; one soprano pipistrelle; and three unidentified pipistrelle species were also recorded.

24th to 29th July 2013

4.20 The static detector in the north was located in the mature trees of H27 bordering semi-improved grassland. Three species/two species groups (common pipistrelle, soprano pipistrelle, an unidentified pipistrelle species, noctule and an unidentified *Nyctalus* species) were recorded with a total of 5425 passes. The majority were common pipistrelle (99.2% of total passes recorded). Three passes from noctule; 4 unidentified *Nyctalus* species; 14 soprano pipistrelle and 22 passes of unidentified pipistrelle species were also recorded.

4.21 The static detector in the south was located at the junction of H8 and H7 within arable planting. Three species and one species group (common pipistrelle, soprano pipistrelle, noctule and unidentified pipistrelle species) were recorded with a total of 734 passes. The most frequently recorded was common pipistrelle (87% of total passes recorded). 1Ten passes from noctule; 18 soprano pipistrelle and 67 passes of unidentified pipistrelle species were also recorded.

4.22 The peak record for common pipistrelle, indeed any single species was recorded in July in the north of the site.

23rd to 27th August 2013

4.23 The static detector in the north was located at the junction of H31, H32 and H42 within arable and semi-improved grassland. Four species and four species groups (common pipistrelle, soprano pipistrelle, unidentified pipistrelle species, noctule, unidentified *Nyctalus* and *Myotis* species and brown long-eared) were recorded with a total of 1869 passes. Common pipistrelle was the most frequently recorded (97.6% of total bat passes recorded). Three passes from noctule; one unidentified *Nyctalus* species; 5 unidentified *Myotis* species; one brown long-eared; 29 soprano pipistrelle; and 6 unidentified pipistrelle species were also recorded.

4.24 The static detector in the south was located at the junction of H12 and H3 at the site boundary adjacent to the scrub and tree cover of the disused railway line. Two species and three species groups (common pipistrelle, soprano pipistrelle, pipistrelle species, unidentified *Myotis* species and unidentified *Nyctalus* species) were recorded with a total of 910 passes. The most frequent was common pipistrelle (64.6% of the total passes recorded). Two unidentified *Nyctalus* passes; 304 soprano pipistrelle; three unidentified *Myotis* species; and 13 pipistrelle species were also recorded.

11th to 15th September

4.25 The static detector in the north was located in H32 bordering semi-improved grassland and arable and with connectivity to plantation woodland at the north site boundary. Two species / one species group (common pipistrelle, soprano pipistrelle and pipistrelle species) were recorded with a total of 2695 passes. The most frequent was common pipistrelle (97.7% of total passes recorded). Passes from 37 soprano pipistrelle and 33 pipistrelle species were also recorded.

4.26 The static detector in the south was located at the junction of H13, H12 and H7 within arable farmland. Three species / two species groups (common pipistrelle, soprano pipistrelle, pipistrelle species, noctule and unidentified *Nyctalus* species) were recorded with a total of 1473 passes. The most frequent was common pipistrelle (95.3% of total passes recorded). Passes from one noctule pass; one unidentified *Nyctalus* species; 56 soprano pipistrelle; and 10 pipistrelle species were also recorded.

Summary

4.27 During the static survey period, a total of 8 bat species/species groups were recorded comprising; common pipistrelle, unidentified *Myotis* species, combined noctule/unidentified *Nyctalus* species, soprano pipistrelle, brown long-eared, an unidentified pipistrelle species, nathusius pipistrelle and one unidentified bat species. The data was dominated by pipistrelle species with common pipistrelle making up c.95% of the total contacts, soprano pipistrelle comprising c.3% and unidentified pipistrelle species c.1%. The other species made up the small remaining percentage of bat activity recorded and with Nathusius pipistrelle bats limited to a single contact during the entire period.

4.28 The highest activity was recorded by the southern unit in July 2013, at the junction of H8 and H7 within arable habitat. During this occasion, over 5000 common pipistrelle contacts were recorded, an average per hour of c.131, the highest during the entire period. The other peaks in activity comprised; 2625 common pipistrelle contacts at a rate of c.48 per hour during the static survey of the northern area and 304 soprano pipistrelle contacts during the August survey of the northern area of the site but this still only represented a low hourly average of c.6%. These notable activity areas have been marked in bold in table 5. All the other bat activity was generally low, given the extensive period the units were placed on site.

Note

4.29 In respect to unidentified species on both the transect and static surveys, after consideration of the relevant factors, It was considered that:

- Pipistrelle species were either common or soprano pipistrelle bats;
- Myotis species were likely to be whiskered / Brandt's *Myotis mystacinus* / *Brandtii* bats

Table 5 – Data Collected from Static Detectors

Location	Recording period (2013)	Species Recorded and Data Analysis (in order of peak numbers recorded)																								
		No. of hours analysed	Common Pipistrelle			Myotis sp.			Noctule and Nyctalus species			Unknown species			Soprano pipistrelle			Brown long-eared			Pipistrelle species			Nathusius Pipistrells		
			Period total	Peak nightly count	Av.per hour	Period total	Peak nightly count	Av.per hour	Period total	Peak nightly count	Av.per hour	Period total	Peak nightly count	Av.per hour	Period total	Peak nightly count	Av.per hour	Period total	Peak nightly count	Av.per hour	Period total	Peak nightly count	Av.per hour	Period total	Peak nightly count	Av.per hour
April	16th-20th April	48	35	35	0.73	1	1	0.02	0	0	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
May	1st-5th May	43.5	18	10	0.41	3	2	0.07				1	1	0.02	-	-	-	-	-	-	-	-	-	1	1	0.02
June	26th-30th June	36.5	12	5	0.33	-	-	-	3	2	0.08	-	-	-	1	1	0.03	-	-	-	3	1	0.08	-	-	-
July-north	24th-29th July	41	639	199	15.6	-	-	-	10	5	0.24	-	-	-	18	7	0.44	-	-	-	67	37	1.6	-	-	-
July-South	24th-29th July	41	5382	1305	131.3	-	-	-	7	7	0.17	-	-	-	14	14	0.34	-	-	-	22	22	0.54	-	-	-
August-north	23rd-27th August	49	588	209	12	3	2	0.06	2	2	0.04	-	-	-	304	127	6.2	-	-	-	13	8	0.27	-	-	-
August-south	23rd-27th August	49	1869	958	38.1	5	4	0.1	3	2	0.06	-	-	-	29	23	0.59	1	1	0.02	6	4	0.12	-	-	-
September-north	11th-15th September	55	2625	1598	47.7	-	-	-	-	-	-	-	-	-	37	18	0.67	-	-	-	33	24	0.6	-	-	-
September-south	11th-15th September	55	1405	1242	25.5	-	-	-	2	1	0.04	-	-	-	56	56	1.02	-	-	-	10	10	0.18	-	-	-

Please note, Bold text indicates activity of note.

5.0 DISCUSSION AND CONCLUSIONS

Trees

5.1 During the survey visits, no bats roosts were confirmed within any of the trees on site.

5.2 Eighteen trees (T2, T8, T10, T11, T13, T14, T16-20, T22, T24, T27-T30 and T32) were recorded with significant potential for roosting bats (Category 2a). In general these trees had features of greater significance for roosting bats including woodpecker holes, trunk cavities which appeared to access larger space within the wood and dead wood.

5.3 Eighteen trees were recorded with low potential (category 2b) to support roosting bats including woodpecker holes and branch socket cavities. Following aerial inspection none of the features identified were found to support roosting bats or any evidence of their presence. Two trees T4 and T38 were dead, very degraded and considered unsafe to climb.

5.4 Four of the above trees are scheduled for removal under the proposed development (T34, T35, T15 and T39) in accordance with the Parameters Plan (SWMK03/074). Seven trees are recommended for removal in accordance with the arboricultural report[5]. Following the aerial inspection it is recommended that of those four trees scheduled for removal trees T15 and T35 be section felled following the methodology detailed in Appendix C, no further surveys are recommended for T34 and T39.

5.5 All other trees are to be retained as part of the proposals, however, in the event that any pruning or felling of these trees is deemed to be necessary it is recommended that those recommendations detailed in Table 4 above are followed in order to ensure compliance with the relevant legislation.

5.6 However, because of the ephemeral nature of bat tree roosts, particularly where, as identified the whole tree/ large branch sections were in a very degraded state it is recommended that prior to the commencement of each phase of development ground-based/aerial inspections are undertaken as appropriate in order to ensure the status of the trees has not altered in the interim.

5.7 Three individual trees (T3, T23, and T40) supported negligible potential (category C) for roosting bats and no further surveys are recommended here.

5.8 The remainder of the trees within the site/on the site boundary were considered to have no potential for roosting bats after inspection.

5.9 Overall the trees on site are considered to represent **Local value** to the bat populations in the area.

Buildings

5.10 During the survey, three structures were recorded within the site boundary, two of which were agricultural sheds of breeze block and corrugated asbestos construction with a small lean-to housing a generator and the second of corrugated metal construction. The third building comprised derelict cattle sheds constructed of corrugated metal, brick and wood. None of the

[5] FPCR (2012) SWMK, Milton Keynes Arboricultural Assessment, David Lock Associates.

units present on site had any bat roosts confirmed within and they were all considered to have negligible potential for roosting bats..

5.11 Based on the above, no further survey is required and it is considered that there are no constraints to any of the on-site structures.

5.12 Overall the buildings are considered to represent **Negligible** value for bats.

Site Habitats

5.13 Initial walkovers identified features such as Weasel Lane and liner habitats such as hedgerows and treelines as being of value for foraging and commuting bats with the central field compartments being of more limited value, especially in the south where arable land was more prevalent.

5.14 Nocturnal transects conducted over the entire survey area on a monthly basis throughout 2013 in accordance with best practice/guidance, indicated that bat activity levels were generally low, with the total number of bat contacts ranging from 0 (when?) to 19 (when?). In total, 5 bat species were present during the entire transect period comprising common pipistrelle, soprano pipistrelle, an unidentified pipistrelle species, noctule and anunidentified *Nyctalus* species. The most frequently recorded species was common pipistrelle, which made up the majority of recorded bats with soprano pipistrelle and noctule bats the second most frequently recorded (14 contacts and 2 contacts respectively). In terms of behaviour, foraging, commuting, quick passes and social calling were recorded, however the majority were foraging and commuting, with only small numbers of other activity. The social calling was recorded along the Weasel Lane hedgerows in the centre of the site.

5.15 The data from the static detector recorded a total of 8 bat species and species groups were comprising common pipistrelle, an unidentified *Myotis* species, combined noctule/unidentified *Nyctalus* species, soprano pipistrelle, brown long-eared, an unidentified pipistrelle species, *Nathusius* pipistrelle and one unidentified bat species. The majority of activity comprised pipistrelle species with c.95% of the total contacts being common pipistrelle, with soprano pipistrelle comprising c.3% and general pipistrelle species c.1%. The other species were recorded only in limited numbers (approximately 15 for all contacts) with only a single Nathusius pipistrelle bat contact during the entire period.

5.16 The highest activity period comprised the southern unit in July 2013, within arable habitat at the confluence of H8 and H7 with over 5000 common pipistrelle contacts recorded, an average per hour of c.131. Other notable activity comprised 2625 common pipistrelle contacts at a rate of c.48 per hour during the static survey of the northern area and 304 soprano pipistrelle contacts during the August survey of the northern area of the site, however it should be noted but this still only represented a low hourly average of c.6%. All the other bat activity was generally low and the data indicates that bat activity is generally consistent across all site areas.

5.17 Given this assemblage of bat species and the levels of activity recorded, overall, the site is considered to be of **Local value** for foraging and commuting bats. The areas of greater interest for bats comprise the more established hedgerows and linear features.

Potential Impacts upon Foraging/Commuting Habitat

5.18 The likely impacts from the proposed site works are as following:

- Loss/disturbance of features used by foraging and commuting bats, particularly where infrastructure and access routes breach hedges or linear features. Potential impacts are likely to be in association with small sections of H9, H17, H23, H22 and H15 along Weasel Lane, H20 to the north for a larger road and junction, H33 to the north where a larger section will be lost, and sections of hedge removal in association with H7, H26, H27, H30 and H32 throughout the site. Features such as H3 in the south are not to be lost and will be buffered by additional habitat such as attenuation waterbodies and landscape planting.
- Loss of the central field compartments are unlikely to result in significant impacts due to their low suitability, especially the arable areas.
- Unmitigated lighting of any inter-connected habitats both within and adjacent to the proposed development, such as the tree/hedgelines which may indirectly impact upon the faunal species that are dependent on them.

5.19 It is therefore recommended that habitat enhancement should take the form of a number of different measures, to increase the likelihood of the features being used. The following section summarises the various measures recommended.

Mitigation

Foraging Habitat

5.20 To minimise potential impacts of development, proposals should seek to retain as many areas of suitable habitat, such as hedgerows and treelines, which provide connectivity through the site and into the surrounding area. Any unavoidable removal of such areas should be compensated through the use of replacement habitats, such as woodland planting or suitable linear habitats and 'hop-overs'.

Landscaping & Lighting

5.21 To minimise impacts arising from light disturbance it is recommended that directional and low impact in used accordance with existing guidelines, Bat Conservation Trust & Institute of Lighting Engineers '*Bats and Lighting in the UK – Bats and Built Environment Series*' and the Bat Conservation Trust *'Statement on the impact and design of artificial light on bats'*. Recommended measures to avoid the unnecessary lighting of retained or newly created habitats include the following:

- The strategic use of landscaping and planting to avoid light spill on sensitive habitats
- The avoidance of direct lighting of retained habitat or proposed areas of habitat creation / landscape planting
- Where appropriate the road and flood lighting should use low pressure sodium or high pressure sodium instead of mercury or metal halide lamps
- Unnecessary light spill should be controlled through a combination of directional lighting, low lighting columns, hooded / shielded luminaires or strategic planting
- Lighting levels would be as low as guidelines permit and only used where required for public safety
- Where possible the use of timed lighting, i.e. switched off during periods of limited usage

5.22 The strategic implementation of these measures would be considered sufficient to ensure that the potential for any indirect impacts upon foraging and commuting habitat used by the local bat population is reduced to negligible.

Enhancement

Buffer planting

5.23 The boundary features, notably the north west, the western, southern and eastern boundary will all be enhanced by provision of buffer planting and features such as attenuation waterbodies. These features will provide a suitable mosaic of habitats types for foraging and commuting which are not currently represented on site.

5.24 Where possible any landscape planting should include scenting/fruit bearing species which will attract insects and provide food sources for bat populations.

5.25 A majority of the garden plots within the development will contain planted trees, providing structure and diversity to the development and it is considered reasonable to assume that a good proportion of gardens will be of biodiversity value. The importance of urban gardens has been highlighted in a number of recent publications such as: 'Scaling up from gardens: biodiversity conservation in urban environments'[6], and' A national scale inventory of resource provision for biodiversity within domestic garden'[7].

5.26 Further to this, a number of research papers published by the Biodiversity in Urban Gardens in Sheffield project (BUGS) show that neither the small size of urban gardens nor their isolation from countryside prevent them supporting biodiversity. Key findings from this range of garden studies are that, in addition to the high cultivated floral diversity, the three dimensional structure and complexity of garden vegetation is an important factor of vertebrate and invertebrate abundance and diversity. The planting and management by owners is the overwhelming influence on garden vegetation, as evidenced by the similarity in plant species richness and composition in gardens across five contrasting UK cities. Gardens and their management create considerable habitat; in UK gardens, there are estimated to be a total of 28.7 million trees, at least 4.7 million nest boxes and up to 3.5 million ponds. This wide provision of resources displays the public's enthusiasm towards wildlife gardening, with a questionnaire survey across five UK cities finding that significant numbers of households participate in some form of wildlife gardening and/or management.

Bat boxes on buildings

5.27 The currently low availability of suitable roosting opportunities on site will be greatly enhanced by the provision of 30 bat boxes, to be installed on suitable existing trees. Boxes will be installed at varying heights between 3 and 6m on the southern, south eastern and south western aspects of the trees, with a variety of box types providing roosting opportunities for a wide range of species.

[6] Goddard MA, Dougill AJ & Benton TG. (2010) *Scaling up from gardens: biodiversity conservation in urban environments* Trends in Ecology and Evolution Feb;25(2):90-8

[7] Davies, Z.G. et al. (2009) *A national scale inventory of resource provision for biodiversity within domestic gardens*. Biological Conservation, 142 (4), pp. 761-771.

5.28 Where possible bat-suitable features could be installed within proposed garage units (suitably located). Such features could include the provision of ridge/roof tile access points and the creation of roof voids in the garage units. This will also increase the number and variety of potential roosting opportunities for bats as a result of the development.

5.29

5.30 It is considered that the implementation of these measures will ensure the enhancement of the Favourable Conservation Status of bat species within the local area.

Figures

Figure 1: Phase 1 Habitat Plan and Static Detector Location

Figure 2: April 2013 Transect Data

Figure 3: May 2013 Transect Data

Figure 4: June 2013 Transect Data

Figure 5: July 2013 Transect Data

Figure 6: August 2013 Transect Data

Figure 7: September 2013 Transect Data

APPENDIX A – Tree Assessment Table

Tree reference number	Species	Potential bat roost features (distance above ground and aspect)	Potential for roosting bats (Category 1, 2a, 2b, 3)	Evidence of roosting bats?	Aerial Inspection?	Further action required (in the event that pruning works/felling are required to the tree)
1	Ash	Dense ivy growth possibly obscuring potential bat roost features	2b	No	No	Ivy should be removed by hand prior to felling.
2	Ash	Large rot hole and loose bark	2a	No	No	More detailed assessment by a licensed bat worker using rope access.
3	Ash	Flaking bark on failed main leader. 5m up, north aspect tear-out 20cm deep .	3	No	Yes	None
4	Poplar species	Broken limb and small fissures Numerous woodpecker holes throughout tree. Not safe to climb	2b	No	No	Nocturnal survey prior to felling.
5	Poplar species	Woodpecker hole 5m up, south aspect. Small opening in stub- 5 cm deep. Branch socket cavity 4m up, north aspect, exposed heartwood extends 4 cm.	2b	No	Yes	Sectional felling of bat potential areas, sections gently lowered to ground and left in-situ for 24 hours.

		4m up, north aspect. Branch socket cavity, exposed heartwood extends 20cm. Branch socket cavity 8m up, north aspect, 10 cm deep exposed heartwood.				
6	Ash	Terminal branch socket cavity, exposed heartwood open above to element. Crack in bark. On same branch 3m up west aspect large plate with small cavity behind.	2b	No	Yes	Sectional felling of bat potential areas, sections gently lowered to ground and left in-situ for 24 hours.
7	Ash	Branch socket cavity 3.5m up, south aspect, 15cm by 10cm 30cm deep half full of water. Woodpecker hole 5m up; east aspect; in stub of failed main leader, extends 15cm. Loose flaky bark on main leader. 50cm up plate 5cm wide. Terminal cavity on failed main leader 5cm deep upwards facing.	2b	No	Yes	Sectional felling of bat potential areas, sections gently lowered to ground and left in-situ for 24 hours.
8	Ash	Woodpecker hole, hollow trunk, dead branches and peeling bark	2a	No	No	More detailed assessment by a licensed bat worker using rope access.
9	Ash	Moderate ivy cover	2b	No	No	Ivy should be removed by hand prior to felling.

	group					
10	Ash group of 3	Woodpecker holes, hollow trunk	2a	No	No	More detailed assessment by a licensed bat worker using rope access.
11	Ash	Broken upper branch and dense ivy cover possibly obscuring potential bat roost features	2a	No	No	More detailed assessment by a licensed bat worker using rope access.
12	Field Maple	Dense ivy cover possibly obscuring potential bat roost features	2b	No	No	Ivy should be removed by hand prior to felling.
13	Ash	Hollow stem and partially healed rot hole	2a	No	No	More detailed assessment by a licensed bat worker using rope access.
14	Ash	Broken upper stem and hollow trunk	2a	No	No	More detailed assessment by a licensed bat worker using rope access.
15	Dead Horse Chestnut	Numerous rot holes throughout canopy between 2 and 7 m up. Rot hole 4m up east aspect 50cm deep exposed heartwood upwards facing. Branch socket cavity upwards facing extends 20cm. Cavity in northern main leader extends 15cm exposed heartwood. Large open wound in branch	2b	No	Yes	Sectional felling of bat potential areas, sections gently lowered to ground and left in-situ for 24 hours.

		3m up north aspect open both sides exposed heartwood.				
16	Ash group	Small rot hole, adjacent trees ivy cover possibly obscuring potential bat roost features	2a	No	No	More detailed assessment by a licensed bat worker using rope access.
17	Ash	Several rot holes and woodpecker hole	2a	No	No	More detailed assessment by a licensed bat worker using rope access.
18	Ash group	Woodpecker hole, adjacent trees dense ivy cover possibly obscuring potential bat roost features	2a	No	No	More detailed assessment by a licensed bat worker using rope access.
19	Ash	Two cavities south east aspect	2a	No	No	More detailed assessment by a licensed bat worker using rope access.
20	Horse Chestnut	Loose bark, 20mm cavities, split branch	2a	No	No	More detailed assessment by a licensed bat worker using rope access.
21	Ash	Moderate ivy cover possibly obscuring potential bat roost features	2b	No	No	Ivy should be removed by hand prior to felling.
22	Ash	Several woodpecker holes south east aspect, broken branches, large rot hole	2a	No	No	More detailed assessment by a licensed bat worker using rope access.
23	Ash	Loose flaking bark on dead branches, small crevices. Shallow hole 4cm deep.	C	No	Yes	None
24	Ash	6m high rotten stump	2a	No	No	More detailed assessment by a licensed bat worker

						using rope access.
25	Pedunculate Oak	Stag headed with flaking bark in small pieces.	C	No	Yes	None
26	Ash	Branch socket cavity 4m up, west aspect, bird evidence 15cm deep. Very small branch socket cavity 5m up, west aspect; extends in 15cm.	2b	No	Yes	Sectional felling to below feature, sections gently lowered to ground and left in-situ for 24 hours.
27	Ash	Rotten branches, loose bark, holes	2a	No	No	More detailed assessment by a licensed bat worker using rope access.
28	Ash	Large cavity and fissures south east aspect	2a	No	No	More detailed assessment by a licensed bat worker using rope access.
29	Ash	Many woodpecker holes north east aspect	2a	No	No	More detailed assessment by a licensed bat worker using rope access.
30	Pedunculate Oak	Two large rot holes facing skyward and north east aspect	2a	No	No	More detailed assessment by a licensed bat worker using rope access.
31		Woodpecker holes 5m up, south aspect. Loose flaking bark from base to 4m.	2b	No	Yes	Sectional felling of bat potential areas, sections gently lowered to ground and left in-situ for 24 hours.

32	Peduncculate Oak	Single rot hole north facing	2a	No	No	More detailed assessment by a licensed bat worker using rope access.
33	Ash	Failed main leader. Woodpecker holes 6m up, east aspect. 3 holes join in. Birds evidence. Woodpecker hole 5m up, south aspect 35cm deep. Birds evidence.	2b	No	Yes	Sectional felling of bat potential areas, sections gently lowered to ground and left in-situ for 24 hours.
34	Ash	Whole tree covered in dense ivy. Terminal branch socket cavity 4m up, east aspect extends 3cm. Woodpecker hole 8m up, east aspect 5cm deep.	2b	No	Yes	None
35	Ash	Large open cavity on main stem; failed main leader exposed heartwood. Branch socket cavity 6m up, northwest aspect, 4cm deep.	2b	No	Yes	Sectional felling of bat potential areas, sections gently lowered to ground and left in-situ for 24 hours.
36	Hybrid Black Poplar	Branch tear out 12m up, south aspect, under side of large branch; open 30cm x 5cm; extends upwards 75cm, downwards 10cm. 15cm wide along hole length. Exposed heartwood. Healed failed limb with woodpecker hole in cavity 8m up, south aspect. Hole 5cm diameter; extends	2b	No	Yes	Sectional felling of bat potential areas, sections gently lowered to ground and left in-situ for 24 hours.

		30cm downwards, 20cm deep. Hole in exposed heartwood 4m up, north aspect, extend upwards 15cm flaking bark around entrance, open on both side. Branch socket cavity 2.5m up, west aspect, on main stem; wet staining below hole, extends 15cm down and full of water.				
37	Ash	Ivy cover possibly obscuring potential bat roost features	2b	No	No	Ivy should be removed by hand prior to felling.
38	Horse Chestnut	Large plates of flaking bark woodpecker hole in branch stub 3.5m up east aspect. Not safe to climb.	2b	No	No	Nocturnal survey prior to felling.
39	Horse Chestnut	Large upwards facing pruning wound 4m up, west aspect. 30 cm deep cone shaped, 25cm wide full of water Exposed heartwood with fissure 5 cm deep. Large upwards facing pruning wound 3m up west aspect. 15cm diameter, 15cm deep exposed heartwood.	2b	No	Yes	None
T40	Ash	Woodpecker hole 3cm deep.	C	No	Yes	None

APPENDIX B: Transect Activity Tables

April Dusk Transect North

Reference	Time	Bat Species	Behaviour	Passes
Start	20:00	-	-	-
Point Count 1	20:22-20:27	-	-	-
1	21:00	Ppi	Foraging	3
2	21:12	Nn	Commuting	1
Point Count 2	21:25-21:30	-	-	-
	21:29	Myotis species	Foraging	1
Point Count 3	21:43-21:48	-	-	-
	21:43	Ppi	Foraging	1
3	21:52	Ppi	Foraging	1
Point Count 4	22:18-22:23	-	-	-
	22:22	Ppi	Foraging	2
4	22:35	Ppi	Foraging	1
5	22:53	Ppi	Foraging	3
6	23:00	Ppi	Foraging	2
7	23:05	Ppi	Foraging	1
Point Count 5	23:08-23:13	-	-	-
8	23:14	Ppi	Foraging	1
Finish	23:28	-	-	-

Key: *Pau – Brown Long-eared Bat, Nn – Noctule , Ppi – Common Pipistrelle, Ppy – Soprano Pipistrelle.*

May Dawn Transect North

Reference	Time	Bat Species	Behaviour	Passes
Start	02:50	-	-	-
Point Count 1	03:15-03:20	-	-	-
Point Count 2	03:46-03:51	-	-	-
1	04:00	Ppi	Foraging	3
Point Count 3	04:01-04:06	-	-	-
	04:01	Ppi	Foraging	1
2	04:14	Ppi	Foraging	1
Point Count 4	04:31-04:38	-	-	-
Point Count 5	04:50-04:55	-	-	-
Finish	05:07	-	-	-

Key: *Pau – Brown Long-eared Bat, Nn – Noctule , Ppi – Common Pipistrelle, Ppy – Soprano Pipistrelle.*

May Dusk Transect North

Reference	Time	Bat Species	Behaviour	Passes
Start	20:55	-	-	-
Point Count 1	21:30-21:35	-	-	-
1	21:53	Ppi	Commute	1
Point Count 2	21:54-21:59	-	-	-
	21:54	Ppi	Foraging	1
	21:55	Pau	Foraging	1
	21:58	Pau	Foraging	3
2	22:04	Ppi	Foraging	1
3	22:16	Ppi	Foraging	1

4	22:22	Ppi	Foraging	1
Point Count 3	22:40-22:45	-	-	-
	22:54	Ppi	Foraging	1
Point Count 4	22:58	-	-	-
5	23:06	Ppy	Foraging	1
6	23:15	Ppy	Foraging	2
7	23:17	Ppi	2 bats foraging and social call	3
8	23:23	Ppi	2 bats foraging	3
9	23:24	Ppi	Foraging	1
Finish	23:40	-	-	-

Key: *Pau – Brown Long-eared Bat, Nn – Noctule , Ppi – Common Pipistrelle, Ppy – Soprano Pipistrelle.*

June Dusk Transect North

Reference	Time	Bat Species	Behaviour	Passes
Start	21:14	-	-	-
Point Count 1	21:21-21:26	-	-	-
Point Count 2	21:52-21:57	-	-	-
1	22:12	Ppi	foraging	1
Point Count 3	22:15-22:20	-	-	-
2	22:22	Ppi	Foraging	1
3	22:25	Ppi	Foraging	1
4	22:32	Ppi	Foraging	1
5	22:40	Ppi	Foraging	1
6	22:41	Ppi	Foraging	6
Point Count 4	22:45-22:50	-	-	-
	22:45	Ppi	Foraging	6
7	22:59	Ppi	Foraging	8
8	23:07	Ppi	Foraging	1
Point Count 5	23:08-23:13	-	-	-
9	23:23	Ppi	Foraging	1
10	23:27	Ppi	Foraging	1
Finish	24:05	-	-	-

Key: *Pau – Brown Long-eared Bat, Nn – Noctule , Ppi – Common Pipistrelle, Ppy – Soprano Pipistrelle.*

June Dusk Transect South

Reference	Time	Bat Species	Behaviour	Passes
Start	21:10	-	-	-
Point Count 1	21:23-21:28	-	-	-
Point Count 2	21:38-21:43	-	-	-
1	21:50	Ppi	Constant foraging	Multiple
Point Count 3	21:58-22:03	-	-	-
2	22:27	Ppi	Commuting	1
Point Count 4	22:40-22:45	-	-	-
	22:40	Nn	Commuting	1
3	22:56	Ppi	Constant foraging	Multiple
3	22:57	Ppy	Foraging	1
4	22:59	Ppi	Constant foraging	Multiple
5	23:03	Ppi	Foraging	4
5	23:04	Ppy	Commuting	1

Point Count 5	23:10-23:15	-	-	-
6	23:23	Nn	Foraging	1
7	23:38	Ppi	2 bats foraging	2
8	23:39	Ppi	Foraging	2
9	23:43	Ppi	Foraging	3
Point Count 6	23:44-23:49	Ppi	Constant foraging	Multiple
10	23:50	Ppi	Constant foraging	Multiple
11	23:52	Ppi	Foraging	2
12	23:57	Ppi	Foraging	1
13	24:00	Ppi	Foraging	1
Finish	23:30	-	-	-

Key: *Pau – Brown Long-eared Bat, Nn – Noctule , Ppi – Common Pipistrelle, Ppy – Soprano Pipistrelle.*

July Dusk Transect North

Reference	Time	Bat Species	Behaviour	Passes
Start	21:31	-	-	-
Point Count 1	21:34-21:39	-	-	-
Point Count 2	21:46-21:51	-	-	-
1	22:00	Ppi	Foraging	1
Point Count 3	22:07-22:12	-	-	-
	22::10	Ppi	Foraging	2
2	22:21	Ppi	Constant foraging	Multiple
Point Count 4	22:21-22:26	-	-	-
	22:23	Ppy	Foraging	1
3	22:27	Ppi	Foraging	1
4	22:30	Ppi	Foraging	2
5	22:39	Ppy	Constant foraging	Multiple
6	22:44	Ppy	Foraging	1
7	22:50	Ppi	Foraging	1
8	22:56	Ppi	Foraging	1
Point Count 5	23:09-23:19	-	-	-
9	23:19	Ppi	Foraging	1
10	23:23	Ppy	Foraging	1
11	23:27	Ppy	Foraging	1
12	23:32	Ppy	Foraging	1
Finish	23:32	-	-	-

Key: *Pau – Brown Long-eared Bat, Nn – Noctule , Ppi – Common Pipistrelle, Ppy – Soprano Pipistrelle.*

July Dusk Transect South

Reference	Time	Bat Species	Behaviour	Passes
Start	21:26	-	-	-
Point Count 1	21:40-21:46	-	-	-
Point Count 2	22:02-22:07	-	-	-
Point Count 3	22:22-22:29	-	-	-
1	22:36	Ppi	Foraging	2
2	22:37	Ppi	Foraging	1
3	22:43	Ppi	Foraging	1
Point Count 4	22:52-22:58	-	-	-
	22:55	Ppi	Foraging	3
4	23:10	Ppi	constant foraging	Multiple

5	23:13	Ppi	Foraging	6
Point Count 5	23:15-23:20	-	-	-
6	23:26	Ppi	Foraging	1
7	23:34	Ppi	Foraging	1
8	23:40	Ppi	Foraging	1
9	23:42	Ppi	Foraging	5
10	23:45	Ppi	Foraging	4
11	23:48	Ppi	Foraging	5
Finish	23:55	-	-	-

Key: Pau – Brown Long-eared Bat, Nn – Noctule , Ppi – Common Pipistrelle, Ppy – Soprano Pipistrelle.

August Dusk Transect North

Reference	Time	Bat Species	Behaviour	Passes
Start	20:04	-	-	-
Point Count 1	20:14-20:19	-	-	-
Point Count 2	20:28-20:33	-	-	-
1	20:38	Nyctalus species		1
Point Count 3	20:46-20:51	-	-	-
2	21:02	Ppy	Foraging	2
3	21:06	Ppi	Foraging	3
Point Count 4	21:12-21:17	Ppi	Foraging	4
4	21:21	Ppi	Foraging	1
4	21:26	Ppi, Ppy	Constant foraging 2-3 individuals	Multiple
5	21:34	Ppi	Foraging	Multiple
6	21:39	Ppi	Foraging	3
7	21:48	Ppy	Pass	1
8	21:51	Ppi	Foraging	1
Point Count 5	21:52-21:57			
	21:52	Ppi	Foraging	6
9	22:00	Ppi	Foraging	1
9	22:03	Ppi, Ppy	Constant foraging	5
10	22:11	Ppi	Pass	1
10	22:16	Ppi	Foraging	1
Finish	22:16	-	-	-

Key: *Pau – Brown Long-eared Bat, Nn – Noctule , Ppi – Common Pipistrelle, Ppy – Soprano Pipistrelle.*

August Dawn Transect South

Reference	Time	Bat Species	Behaviour	Passes
Start	03:58	-	-	-
1	04:05	Ppi	Pass	1
2	04:10	Ppi	Pass	1
3	04:14	Pipistrelle species	Distant	1
4	04:18	Ppi	Foraging	2
Point Count 1	04:21-04:30	Ppi	Foraging	6
5	04:31	Ppi	Foraging	2
6	04:40	Ppi	Foraging	3
7	04:46	Ppi	Foraging	1
Point Count 2	04:46-04:51	-	-	-

	04:48	Ppi	2 bats foraging	2
8	04:56	Ppi	Foraging	2
9	05:01	Ppi	Distant	1
10	05:01	Ppi	Foraging	2
11	05:02	Ppi	Foraging	2
12	05:09	Ppi	Commuting	1
13	05:16	Ppi	Commuting	1
Point Count 3	05:23-05:28	-	-	-
Point Count 4	05:43-05:50	-	-	-
Finish	06:13	-	-	-

Key: *Pau – Brown Long-eared Bat, Nn – Noctule , Ppi – Common Pipistrelle, Ppy – Soprano Pipistrelle.*

September Dusk Transect North

Reference	Time	Bat Species	Behaviour	Passes
Start	19:15	-	-	-
Point Count 1	19:45-19:50	-	-	-
Point Count 2	20:18-20:23	-	-	-
Point Count 3	20:14-20:46	-	-	-
Point Count 4	21:13-21:18	-	-	-
1	21:18	Ppi	Foraging	4
2	21:21	Ppi	Foraging	2
Point Count 5	21:24-21:29	-	-	-
Finish	21:38	-	-	-

Key: *Pau – Brown Long-eared Bat, Nn – Noctule , Ppi – Common Pipistrelle, Ppy – Soprano Pipistrelle.*

September Dusk Transect South

Reference	Time	Bat Species	Behaviour	Passes
Start	19:25	-	-	-
Point Count 1	19:41-19:46	-	-	-
Point Count 2	20:03-20:08	-	-	-
Point Count 3	20:26-20:31	-	-	-
Point Count 4	20:41-20:46	-	-	-
Point Count 5	20:54-21:59	-	-	-
1	21.15	Ppi	Foraging	3
Point Count 6	21:17-21:22	-	-	-
	21:17	Ppi	Foraging	3
	21:21	Ppy	Foraging	3
2	21:25	Ppi	Foraging	3
3	21:32	Ppi	Commuting	1
Finish	21:40	-	-	-

Key: *Pau – Brown Long-eared Bat, Nn – Noctule , Ppi – Common Pipistrelle, Ppy – Soprano Pipistrelle.*

Appendix C: Method Statement for Tree Works

This method statement applies to the felling operations conducted as part of the proposals for development for the Salden Chase site.

The statement applies only to those trees whose suitability for roosting bats have been classified as Category 2b according to criteria of The Bat Conservation Trust (2012) Bat Surveys: Good Practice Guideines (2nd Edition)

Prior to any felling / pruning operations the contractors should undertake a pre-felling climbing inspection using an endoscope and inspection mirrors. This will be carried out by a tree surgeon, preferably one with previous experience of identifying evidence of bats. The tree surgeon will move around the tree to inspect all features that may have potential to support roosting bats. If the contractor identifies the presence of a bat or bat droppings all works will be delayed until further advice has been sought from a Licensed Bat Worker.

Providing no bats are discovered, felling will commence.

Felling will be undertaken in sections beginning with those parts of the tree that do not contain any such features to support bats. All sections will be lowered to the ground using ropes as to avoid any damage and disturbance to surrounding trees.

Finally those parts of the tree where potential roost sites were confirmed will be removed and carefully lowered to the ground using ropes. To ensure that no bats are present, the piece of timber will be left on the ground for a minimum of 24 hours prior to disposal to allow any bats to escape. Bat boxes will be carefully removed by hand and replaced at an appropriate location on a retained tree.

AT ANY TIME DURING THE ABOVE PROCESSES, SHOULD A BAT BE FOUND ALL WORKS WILL CEASE AND THE LICENSED BAT WORKER WILL ADVISE ON WHAT MITIGATION / POSSIBLE LICENSING WOULD BE REQUIRED TO ENABLE WORKS TO CONTINUE.

Legend

- Site Boundary
- April
- May
- June
- July
- August
- September

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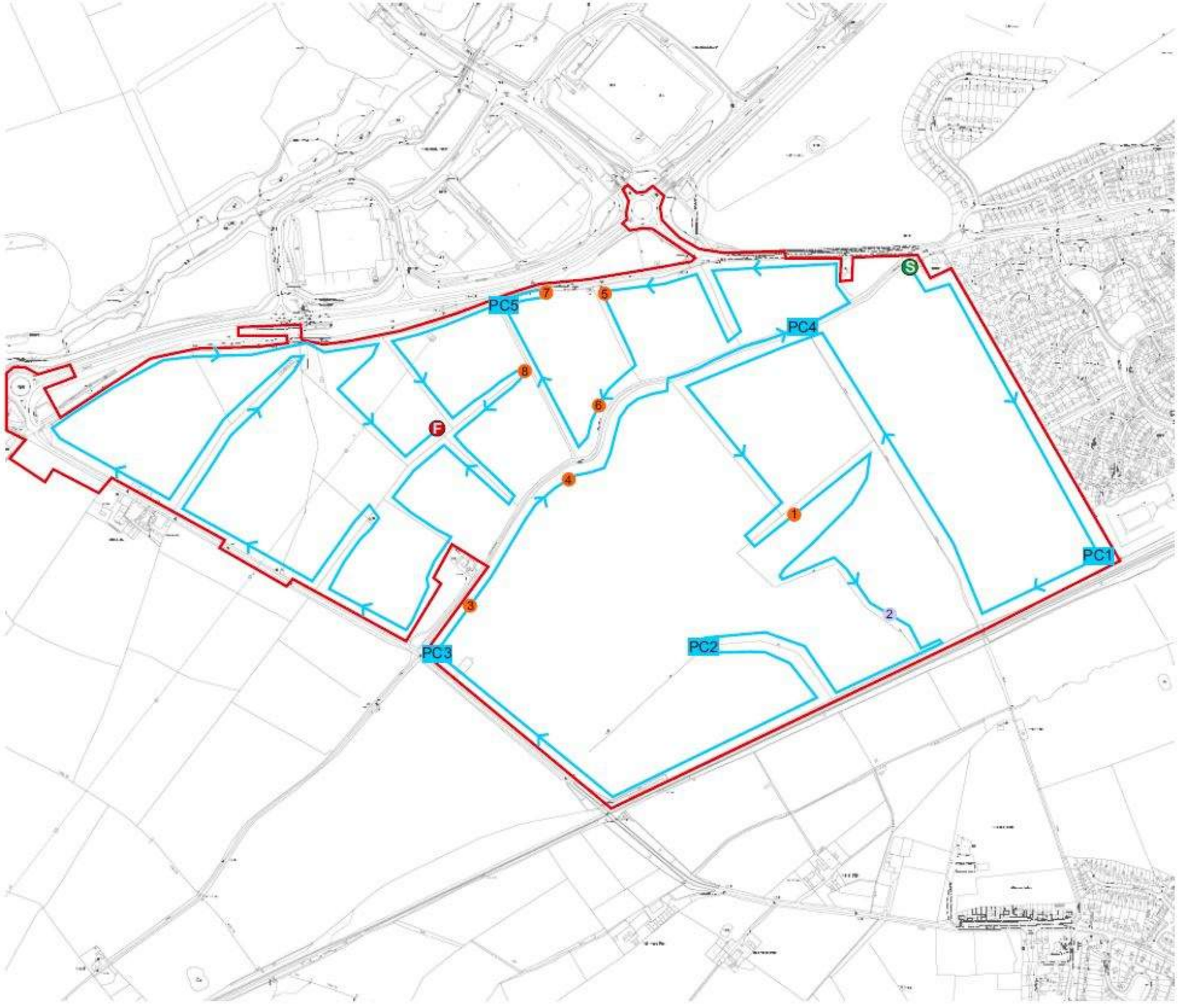
PHASE 1 HABITAT PLAN AND
STATIC DETECTOR LOCATIONS

sja Date: 25/11/2014

1:12,000 **Figure 1**



Site Boundary

Transect Route

Start / Finish Point

PC# Point Count (with ref. number)

Common Pipistrelle (direction of flight if indicated)

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Figure 2

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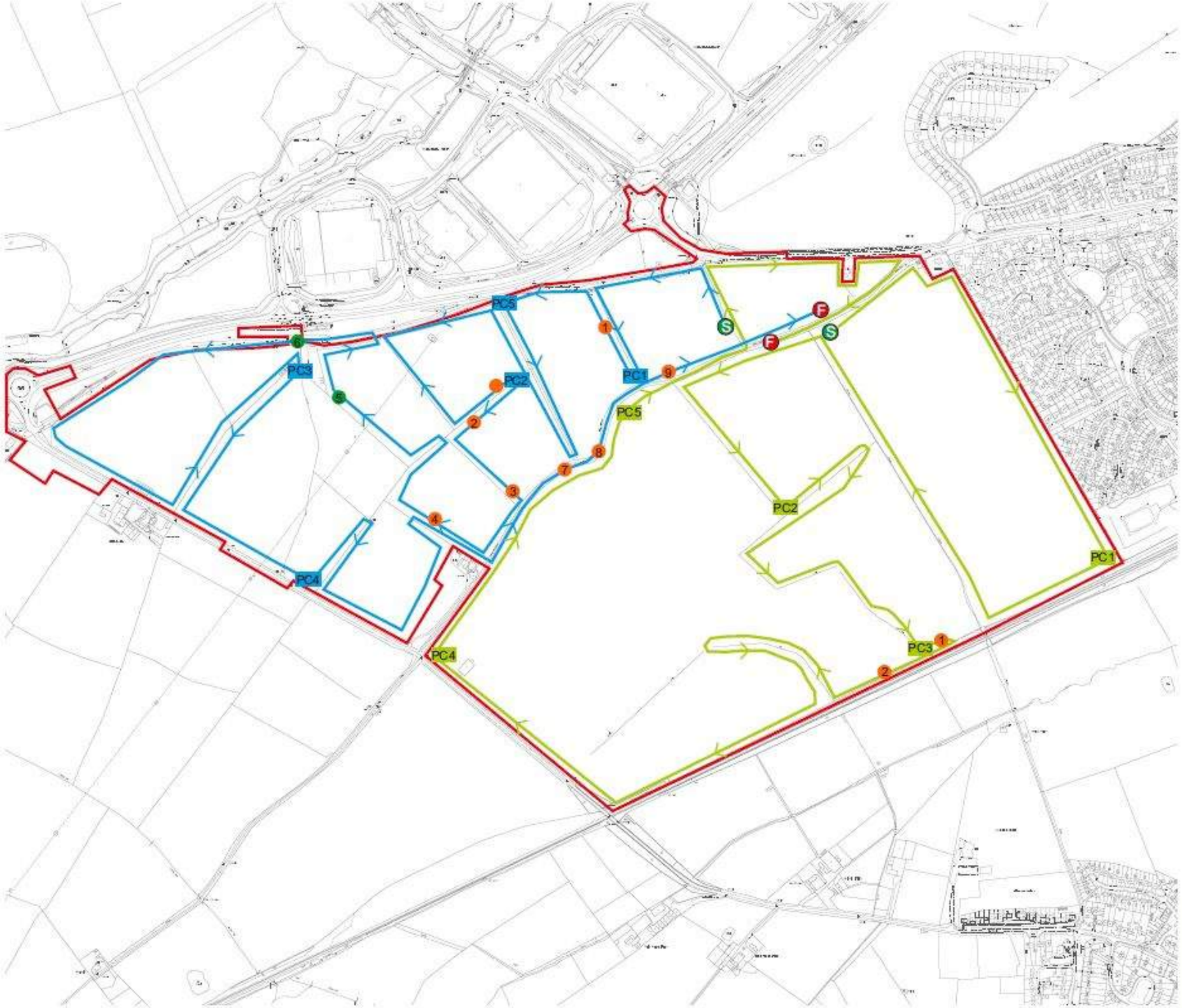
J:\3100\3126\ECOM\dwg\3126- April Transect.cdr



Development Boundary

Transect Route 1

Transect Route 2

Start / Finish Point

PC# Point Count (with ref. number)

Common Pipistrelle (direction of flight if indicated)

Soprano Pipistrelle (direction of flight if indicated)

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MAY TRANSECT DATA

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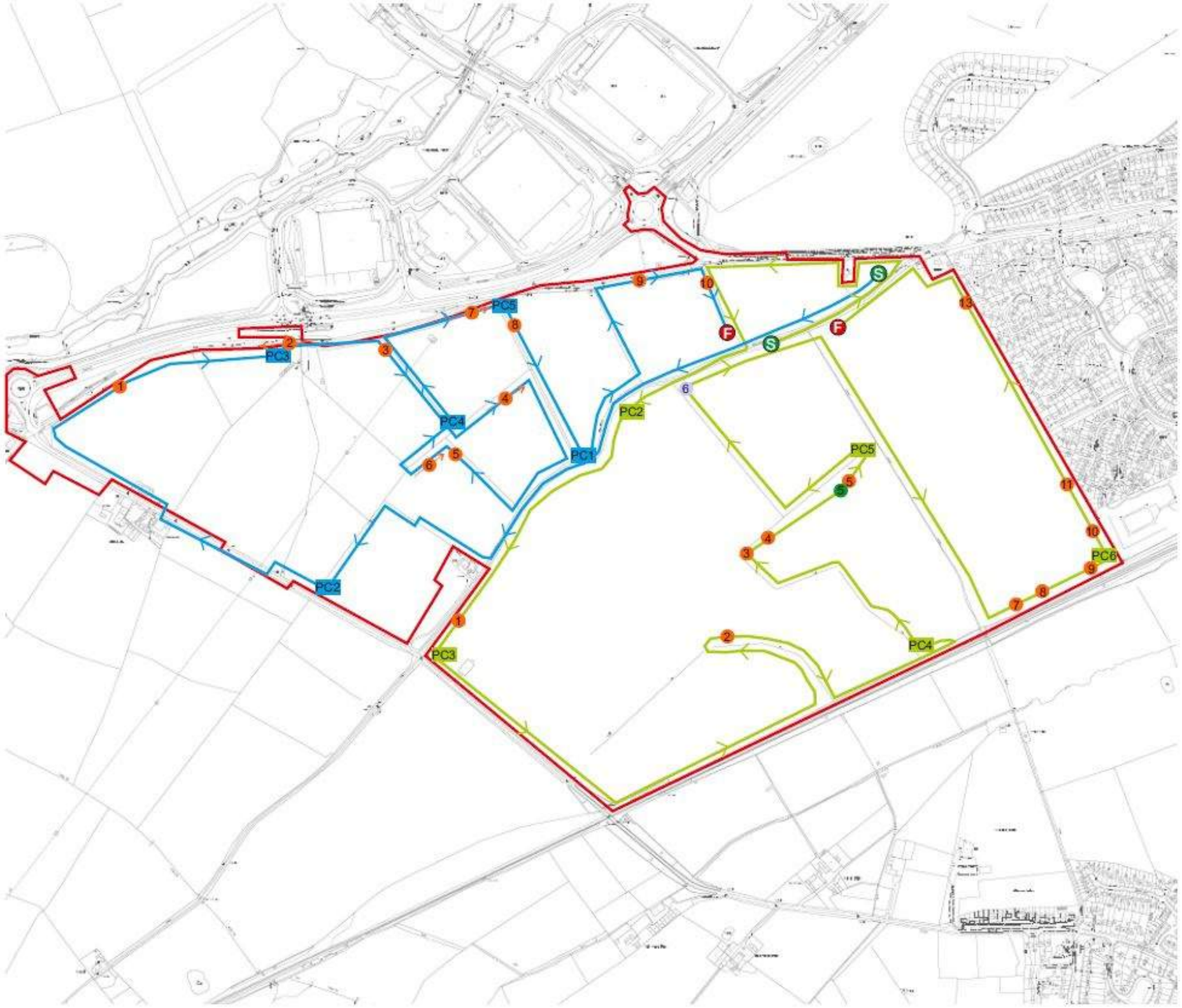
Figure 3



Development Boundary

Transect Route 1

Transect Route 2

Start / Finish Point

PC# Point Count (with ref. number)

Common Pipistrelle (direction of flight if indicated)

Soprano Pipistrelle (direction of flight if indicated)

Noctule (direction of flight if indicated)

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Figure 4

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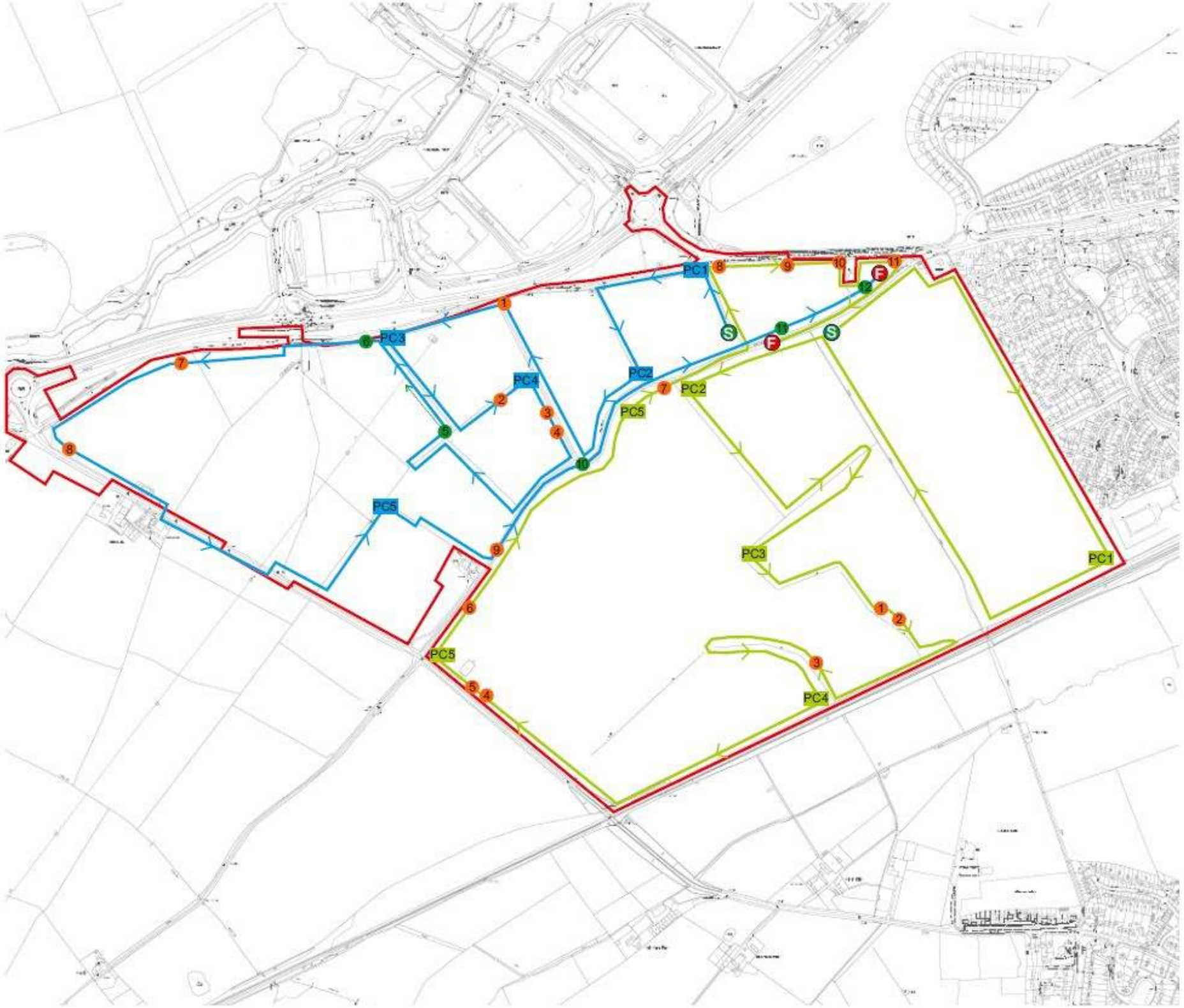

Development Boundary

Transect Route 1

Transect Route 2

Start / Finish Point

PC# Point Count (with ref. number)

Common Pipistrelle (direction of flight if indicated)

Soprano Pipistrelle (direction of flight if indicated)

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JULY TRANSECT DATA

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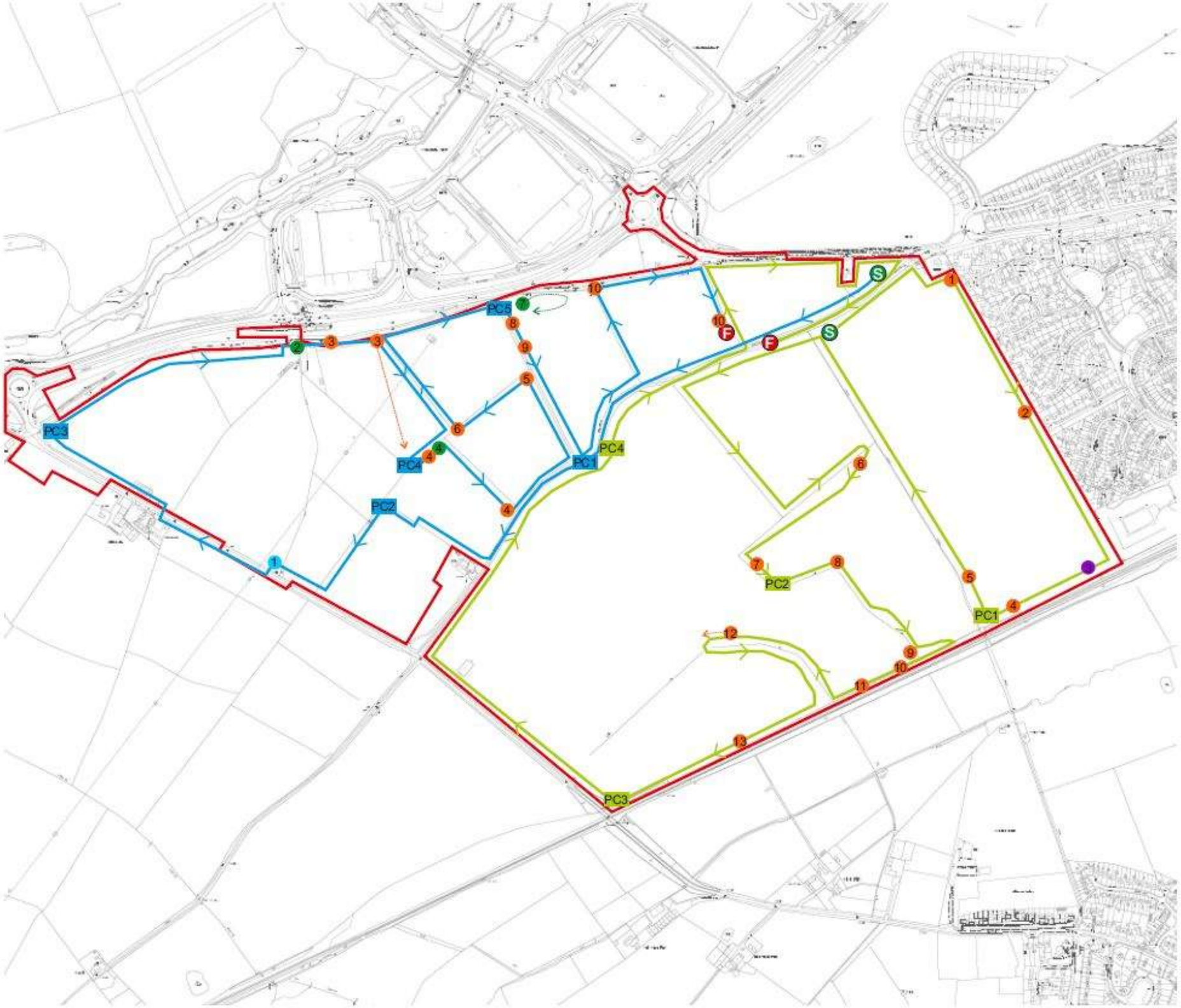
Figure 5



Development Boundary

Transect Route 1

Transect Route 2

Start / Finish Point

PC# Point Count (with ref. number)

Common Pipistrelle (direction of flight if indicated)

Soprano Pipistrelle (direction of flight if indicated)

Pipistrelle Species (direction of flight if indicated)

Nyctalus Species (direction of flight if indicated)

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AUGUST TRANSECT DATA

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Figure 6

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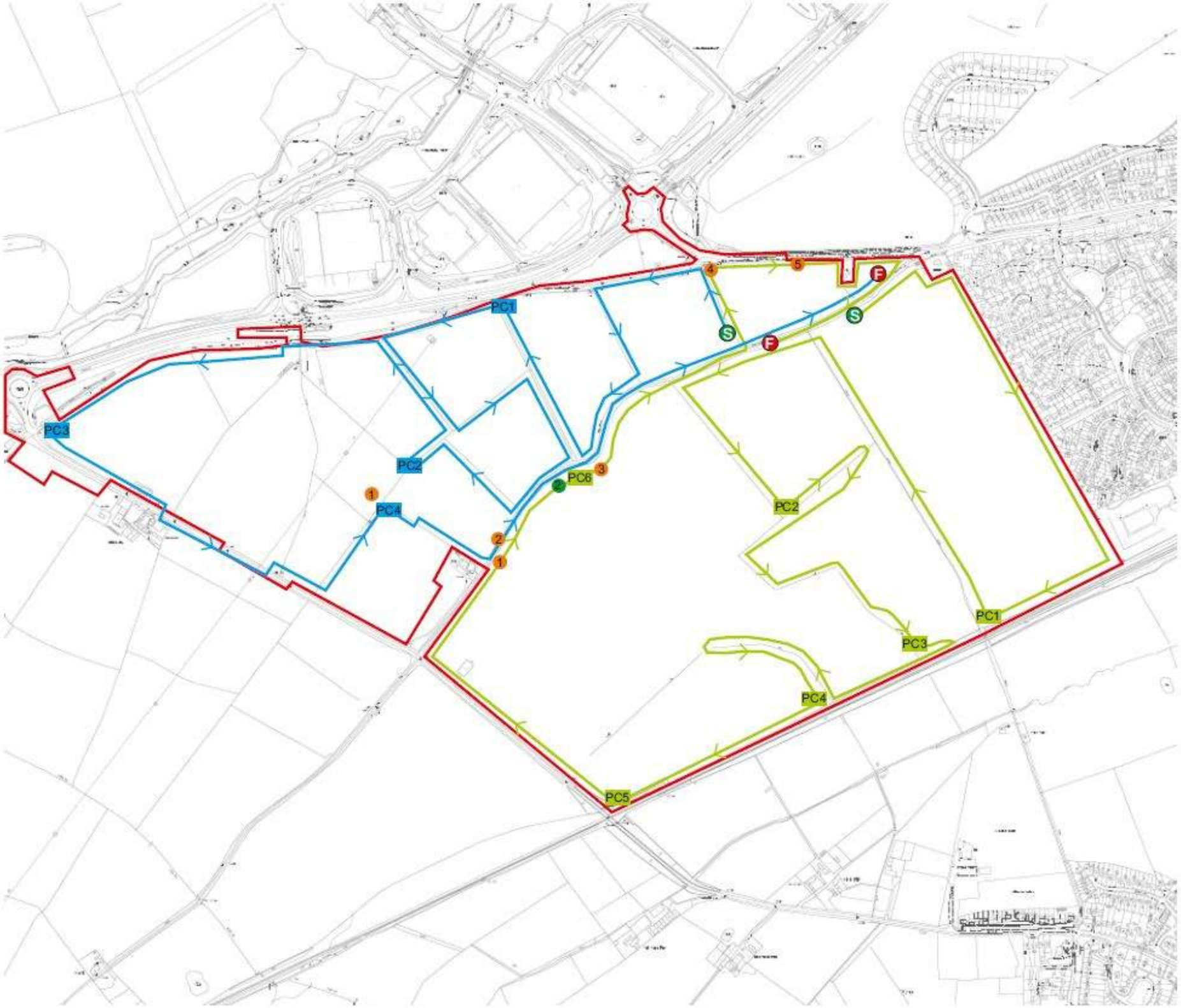

Development Boundary

Transect Route 1

Transect Route 2

Start / Finish Point

PC# Point Count (with ref. number)

Common Pipistrelle (direction of flight if indicated)

Soprano Pipistrelle (direction of flight if indicated)

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SEPTEMBER TRANSECT DATA

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Figure 7

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