F5 Arup Ecology Scoping Report 2013

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Homes and Communities Agency

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Ecology Report

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Contents

Tables

Figures

Appendices

European Bird Census Council Breeding Categories

1 Executive Summary

The Homes and Communities Agency (HCA) commissioned Ove Arup & Partners Limited (Arup) to undertake a range of ecology surveys to inform future planning applications for the proposed Northstowe new town in Cambridgeshire. It is currently expected that planning applications will start to be submitted in 2014. The site has been divided into the following areas that are referred to below: land north of Rampton Road (including Larksfield Nursery and Brookfield Farm); land to the west of Long Lane; Oakington Barracks and Airfield; and the Off-Site Infrastructure Area (OSIA). Two planning applications are due to be submitted in 2013, comprising Phase 2 in the northern half of Oakington Barracks and Airfield as well as associated infrastructure between Phase 2 and the A14.

A range of habitat and protected species surveys were conducted between May and November 2013 to supplement previous surveys carried out on the site. An extended Phase 1 habitat survey was conducted within the land north of Rampton Road and Oakington Barracks and Airfield. This survey identified habitats that have a potential to support bats, badger, reptiles and amphibians, although no additional ponds were recorded. However, it was not possible to access land at Larksfield Nursery, which should be subject to an extended Phase 1 habitat survey, badger and bat scoping survey and Hedgerow Regulations survey prior to submitting the planning application. This work should be carried out between March and April 2014.

A bat scoping survey was conducted on buildings and trees within the site, which identified the presence of 27 buildings that have a low or moderate potential to support roosting bats, as well as one confirmed roost within the bungalow at Brookfield Farm. Furthermore, 352 trees have a potential to support roosting bats, along with three woodlands. Bat activity and automated surveys were also carried out, which identified important foraging areas for bats along Long Lane, the lake at Oakington Barracks and Airfield (Pond 3), as well as the access road into the barracks, Oakington Brook and Wilson's Road. Bat emergence and return surveys should be conducted on trees and buildings that could be affected by the proposed developments. This work should be carried out between May and June 2014. A European Protected Species Mitigation licence will be required with respect to any bat roosts that have a potential to be affected as a result of the proposed developments. Mitigation will also be required to minimise disturbance to bats due to lighting. Suitable roosting, foraging and commuting habitat should be incorporated into the proposed developments.

A badger scoping survey was carried out and 31 setts were recorded, of which 25 were well-used, five were partially disused and one was disused. High levels of badger activity were recorded, in line with the results of the previous surveys, including four main setts. The badger setts should be retained where possible, particularly the main setts. A licence would be required to close any active setts and artificial setts would need to be created prior to the closure of main setts. It would be necessary to establish buffer zones around the setts to avoid disturbance, with a licence also required where works are required within these zones. The foraging habitat around the setts should also be retained and enhanced. Considering the complex nature of the badger activity within the site, the status of badger setts within the site and the territorial boundaries of the social groups should be confirmed by conducting a badger bait-marking survey, including

within suitable habitat 40m beyond the site boundary. This work should be undertaken between February and April 2014.

Two breeding bird surveys were carried out by Arup between May and June 2013 within the OSIA, land north of Rampton Road and land to the west of Long Lane, with two further surveys undertaken in March and April 2014. An additional survey was carried out within Oakington Barracks and Airfield and land north of Rampton Road in June 2013, to replicate the survey carried out by URS in 2012 when the conditions were suboptimal. A total of 73 species of birds were recorded at the site. Of these, 61 were either confirmed as breeding or probably breeding on the site. The site supports three Schedule 1 species – two confirmed as breeding (hobby and barn owl) and one non-breeding (fieldfare), plus 13 red list species and 21 amber list species, the majority of which were considered to be breeding at the site. The results indicate that the site is of local importance, with 42 species confirmed as breeding within the site. The inclusion of probable breeders would increase this count to 61, which would indicate that the site is of county importance. Habitat clearance should occur outside of the main breeding bird season (March to August inclusive) and where this is not possible, a suitably qualified ecologist will need to check for the presence of breeding birds prior to the commencement of clearance and demolition. Measures will also need to be implemented to avoid disturbance to breeding birds. Potential habitat loss associated with land clearance should be compensated for by the creation and enhancement of a range of habitat types. Nesting and foraging habitat for birds should be incorporated into the proposed development, including nest boxes for barn owl within the proposed buildings.

A great crested newt Habitat Suitability Indices (HSI) survey was carried out on eight ponds recorded within the site, with presence/absence surveys conducted on six of these ponds (Ponds 1-6). Ponds 2 and 5 fall within the good suitability category, Ponds 1, 4 and 7 into the average suitability category and Ponds 3, 6 and 8 into the poor suitability category. Great crested newt was recorded in Pond 4, with a maximum count of 1, which indicates that the site supports a small population. However, URS recorded great crested newt in Ponds 1, 2 and 4, with a peak count of 13, which indicates a medium population. Adopting a precautionary approach, it is concluded that a medium population of great crested newt is present on the site. An approved European Protected Species (EPS) Mitigation Licence will be required prior to the commencement of clearance of works. Where possible, Ponds 1, 2 and 4 should be retained, protected and enhanced during the future development of the site, as well as the surrounding terrestrial habitat. Where it is not possible to retain these ponds, further on or off-site ponds would need to be created. Pond 3 should also be retained, as it was found to provide valuable breeding habitat for common toad. Ponds 5 and 7 should be subject to a presence/absence survey between mid-March and mid-June 2014. Six ponds within 500m of the site should be subject to an HSI survey and presence/absence survey as appropriate, access permitting.

Four reptile surveys were undertaken across the site during September to complement the seven surveys carried out by URS in 2012 and inform population estimates. Grass snake and common lizard were recorded within the site, in line with the results of the previous surveys. A low population of common lizard was recorded within the OSIA. Furthermore, a low population of grass snake and a good population of common lizard were recorded within Oakington Barracks and Airfield. The proposed developments will be phased, thus providing an

opportunity to enhance certain areas of the site for reptiles that would act as receptor sites for any reptiles displaced by sensitive clearance works in other parts of the site. These enhancements should be implemented prior to the commencement of clearance works in other areas.

The important hedgerows within the site were surveyed in June 2013, to update the previous survey undertaken by WSP Environmental Ltd. in 2004. The hedgerows were re-evaluated for importance in accordance with the Wildlife or Landscape criteria of The Hedgerow Regulations 1997; the Section 41 list of habitats of principal importance in conserving biodiversity; the Cambridgeshire and Peterborough Biodiversity Action Plan; and within the site context. Since 2004, two hedgerows have been removed and one has been partially removed. A total of 29 important hedgerows were recorded, including one hedge along Long Lane that is 'Important' according to Wildlife and Landscape criteria of The Hedgerows Regulations 1997 because it supports more than seven 'woody' species. Hedgerow 102 is now located within the southeast corner of the site near to the A14. The other 28 important hedgerows remain unchanged since 2004. The retained hedgerows should be enhanced and opportunities should be sought to link the existing hedgerows with native species-rich hedgerows.

Further surveys are recommended prior to the submission of the planning applications in addition to those described above. This comprises an update fish survey along Oakington Brook, further invertebrate surveys between April and June 2014 and an arboricultural survey. It is also recommended that biodiversity offsetting is carried out to establish the baseline conditions of the site in terms of biodiversity units and the losses and gains to biodiversity as a result of the proposed development.

2 Introduction

2.1 Background

The Homes and Communities Agency (HCA) commissioned Ove Arup & Partners Limited (Arup) to undertake a range of ecology surveys to inform future planning applications for the proposed Northstowe new town in Cambridgeshire. It is currently expected that planning applications will start to be submitted in 2014.

The surveys are considered necessary to update previous surveys undertaken on the site by WSP Environmental Ltd (WSP) between July 2003 and November 2007 [1] and URS Infrastructure and Environment UK Limited (URS) between April and October 2012 [2] [3]. These surveys were carried out across the Northstowe site, including areas proposed for offsite infrastructure. Terence O'Rourke also completed ecology surveys in 2011 in support of the proposals that were subsequently approved for Phase 1 of the development at the northern end of the site.

2.1.1 The Site

The site is centred at Ordnance Survey grid reference TL 40101 65222, to the northwest of Cambridge. The site is bounded by Oakington to the southeast, Longstanton to the northwest, the A14 to the southwest and the Cambridgeshire Guided Busway (CGB) to the northeast. The site is shown in Figure 1 and has been divided into the following areas that are referred to in this report:

- Land north of Rampton Road, which contains Brookfield Farm and Larksfield Nursery;
- Land to the west of Long Lane, which is located to the west of Oakington Barracks and Airfield and is dominated by pasture fields;
- Oakington Barracks and Airfield, which comprises the majority of the northern part of the site, including cattle-grazed grassland, arable fields, plantation woodland and scattered buildings and hardstanding; and
- The Off-Site Infrastructure Area (OSIA) to the south of Oakington Barracks and Airfield, which is dominated by arable farmland. Longstanton and Oakington Brooks flow northeast through the OSIA. This part of the site lies adjacent to the Hatton's Road attenuation pond area that formed part of the Phase 1 planning application boundary.

2.1.2 Proposed Development

The planning application boundaries for Phase 2 and the associated access roads were unclear prior to the commencement of the ecology surveys and were potentially to include all or parts of the areas shown on Figure 1. Therefore all areas shown on Figure 1 have been included in our proposed scope of work. Certain details regarding these future planning applications have since been clarified, which are outlined below.

An outline planning application for Phase 2 of the proposed development is expected to be submitted in late spring 2014. The development will be located at

the northern half of Oakington Barracks and Airfield and is likely to comprise a mix of uses such as dwellings, employment areas primary and secondary schools and sports hubs [4], [5]. Interconnecting wildlife corridors and green buffers are expected to be incorporated, including 'ponds and ditches, meadows and scrub, retained landscape features, green links and linear parks to create a mosaic of habitats and green space utilising and emphasising water features' [5]. A green buffer is proposed between Longstanton and the built development. In conjunction with the above, it is expected that a separate detailed planning application will be submitted in conjunction with the Phase 2 planning application for a new access road between Phase 2 and Hatten's Road, as well as an extension to the CGB to provide connectivity to the site.

2.2 Scope of Work

2.2.1 Objectives

Arup was commissioned to complete a gap analysis of the existing baseline ecology reports relating to the site, to identify further work required to inform the future planning applications. The results of this work are outlined in a separate Ecology Scoping Report [6].

This report outlines the methods and results of the first tranche of surveys completed in 2013, in accordance with the recommendations made in the Ecology Scoping Report. It also provides recommendations for further survey work, mitigation and enhancement. Invertebrate surveys were also carried out on the site in 2013, the results of which are outlined in a separate report contained in Appendix A.

2.2.2 Habitat and Protected Species Surveys

A range of habitat and protected species surveys were carried out across the site between May 2013 and April 2014, as shown in Table 1. Further details regarding the methods of these surveys are provided in Section 3.

Table 1: Scope of Surveys Undertaken

Survey	Timing
Extended Phase 1 habitat survey	August
Bat scoping and inspection survey	July, September and November
Bat activity and automated survey	May to September
Badger survey	May to July
Breeding bird survey	May and June 2013 and March and April 2014
Great crested newt habitat suitability indices (HSI) and presence/absence surveys	May and June
Reptile survey	August and September
Hedgerow Regulations survey	June

2.3 Relevant Legislative and Biodiversity Context

2.3.1 Bats

All bat species are fully protected under the Wildlife and Countryside Act 1981 [7] (as amended) (WCA) and The Conservation of Habitats and Species Regulations 2010 [8] (as amended) (Habitats and Species Regulations), which together make it an offence to:

- Intentionally or recklessly capture, kill or injure bats;
- Deliberately disturb bats (including when they are outside their roosts) or intentionally or recklessly disturb roosting bats; or
- Damage or destroy their roosts or intentionally or recklessly obstruct access to their roosts (whether bats are present or not).

Under the Habitats and Species Regulations, disturbance includes in particular any disturbance which is likely to impair their ability to survive; breed or reproduce; rear or nurture their young; or hibernate or to affect significantly the local distribution or abundance of the species.

Some bat species are also listed under relevant Biodiversity Action Plans (BAP), which identify priorities for conservation as required under the Convention on Biological Diversity in 1992 [9]. The UK Post-2010 Biodiversity Framework [10] superseded the UK Biodiversity Action Plan [11], but the lists of priority species and habitats continue to provide valuable reference sources while a National Biodiversity Strategy and/or Action Plan (NBSAP) is being produced. Bat species listed under the former UK BAP that could be relevant to the site are barbastelle bat *Barbastella barbastellus*, noctule *Nyctalus noctula*, soprano pipistrelle *Pipistrellus pygmaeus* and brown long-eared bat *Plecotus auritus*. The UK BAP is relevant in the context of Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006 [12], meaning that Priority Species and Habitats are material considerations in planning. These species are also of principal importance in conserving biodiversity in England [13], as required under Section 41 of the NERC Act 2006.

Barbastelle bat is a particularly rare species of bat listed under Annex II of the Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora [14] (EC Habitats Directive). This Annex identifies species of community interest whose conservation requires the designation of Species Areas of Conservation (SACs). Eversden and Wimpole Woods SAC is designated on account of the presence of a maternity colony of barbastelle bat at Wimpole Woods, which is located approximately 12.5km southwest of the site.

Pipistrelle bats *Pipistrellus* sp. are also listed under the Cambridgeshire and Peterborough (Local) BAP [15].

2.3.2 Badgers

The Protection of Badgers Act 1992 [16] makes it an offence to wilfully kill, take, possess or cruelly ill-treat a badger, or attempt to do so; interfere with a sett by damaging or destroying it; obstruct access to, or any entrance of, a badger sett; or disturb a badger when it is occupying a sett.

2.3.3 Other Wild Mammals

The Wild Mammals (Protection) Act 1996 [17] makes it an offence to intentionally cause wild mammals' any unnecessary suffering by certain methods, including crushing and asphyxiation.

Furthermore, brown hare *Lepus europaeus* is listed under the former UK BAP and Local BAP and is on the Section 41 list of species of principal importance in conserving biodiversity.

2.3.4 Breeding Birds

All birds, their active nests and eggs are protected under the WCA. This legislation makes it an offence to kill, injure or take any wild bird or to take, damage or destroy the nest of any wild bird while that nest is in use or being built.

Special penalties are given for these offences when related to birds listed on Schedule 1. The WCA makes it illegal to intentionally disturb any wild bird listed in Schedule 1 of the Act while it is building a nest or is in, or near a nest containing eggs or young or to disturb the dependent young.

Various bird species are listed under the former UK BAP and are on the Section 41 list of species of principal importance in conserving biodiversity, including dunnock *Prunella modularis*, song thrush *Turdus philomelos*, European turtle dove *Streptopelia turtur* and grey partridge *Perdix perdix*. In addition, grey partridge, sky lark *Alauda arvensis* and song thrush are listed on the Local BAP.

Birds are also assigned a category according to the Birds of Conservation Concern criteria [18]. This defines birds as Red, Amber of Green listed considering their rarity and any declines in their status.

2.3.5 Amphibians

2.3.5.1 Great Crested Newt

Great crested newt *Triturus cristatus* is fully protected under the WCA and Habitats and Species Regulations, which together make it an offence to:

- Intentionally or recklessly capture, kill, injure or disturb great crested newts; and
- Damage or destroy a breeding site or resting place for great crested newt or intentionally or recklessly obstruct access to any structure or place used for shelter or protection.

Under the Habitats and Species Regulations, disturbance includes in particular any disturbance which is likely to impair their ability to survive; breed or reproduce; rear or nurture their young; or hibernate or to affect significantly the local distribution or abundance of the species.

Great crested newt is also listed under the former UK BAP and the Local BAP and is on the Section 41 list of species of principal importance in conserving biodiversity.

2.3.5.2 Common Amphibians

Common amphibians, including common toad *Bufo bufo*, common frog *Rana temporaria* and smooth newt *Lissotriton vulgaris*, are only protected from sale under the WCA. Common toad is also listed under the former UK BAP and is on the Section 41 list of species of principal importance in conserving biodiversity.

2.3.6 Reptiles

Common reptiles, including common lizard *Zootoca vivipara*, slow worm *Anguis fragilis* and grass snake *Natrix natrix*, are listed on Schedule 5 of the WCA, which makes it illegal to deliberately or recklessly injure or kill these species. These species are also listed under the former UK BAP and are on the Section 41 list of species of principal importance in conserving biodiversity.

2.3.7 Hedgerows

The Hedgerow Regulations 1997 [19] includes criteria for the identification of important hedgerows, the removal of which requires approval from the local planning authority. A hedgerow is important if it has existed for 30 years or more; and satisfies at least one of the criteria listed in the regulations. This includes archaeology and history and wildlife and landscape criteria, the latter of which is relevant to this report. These relate to the presence of protected species, as well as woody and woodland species within the hedgerow.

3 Methods

3.1 Extended Phase 1 Habitat Survey

The areas of the site that were not surveyed by URS in 2012 were subject to an extended Phase 1 habitat survey on 23rd August 2013, in accordance with the JNCC guidelines for Phase 1 habitat survey [20]. The survey area comprised the majority of the land north of Rampton Road and parts of Oakington Barracks and Airfield, where the former Barracks buildings were located (refer to Figure 1). This excluded Larksfield Nursery, as access was not permitted to this part of the site. This part of the site was mapped from aerial photography and is indicated on Figure 3.

The habitats were classified according to the Phase 1 habitat survey methodology, which informed updates to the Phase 1 Habitat Map prepared by URS in 2012 [2]. Higher plant species identified within each of the habitat parcels were recorded and their relative abundance was assessed using the DAFOR scale:

- D Dominant;
- A Abundant;
- F Frequent;
- O Occasional; and
- R Rare (meaning 'rarely encountered in the survey' rather than inherently uncommon as a species).

In addition 'locally' (L) was appended, where appropriate, to any of the above five categories in order to reflect a local distribution. It should be recognised that this scale represents relative abundance within each habitat type, rather than regional or national abundances. The Phase 1 survey was 'extended' to include an assessment of the potential of the surveyed areas to support notable and protected species. Incidental faunal observations were also recorded during the survey.

The survey included a search for invasive species listed on Part II of Schedule 9 of the WCA, such as Japanese knotweed *Fallopia japonica*.

3.2 Bat Surveys

3.2.1 Scoping and Inspection Survey

On 8th, 9th, 24th and 31st July, 30th September and 25th and 26th November 2013, a bat scoping and inspection survey was conducted across the site. The trees were inspected from the ground to assess their potential to support roosting bats and identify any signs to indicate their presence, particularly any staining that may be evident on tree trunks. This excluded the trees along Long Lane and around the fields to the west of Long Lane, as it is understood that that this part of the site will be retained as a buffer for the proposed Phase 2 development.

The buildings that were not surveyed by URS were inspected externally. Where these were deemed to have a potential to support roosting bats, for example due to the presence of an internal roof void, these were also inspected internally by a licensed bat worker (Natural England licence number 20123625) and an Arup

ecologist experienced in conducting internal inspections, with the aid of a ladder and high powered torch, access permitting. The only exceptions were the private house adjacent to Welney Farms Ltd (B35), which will not be affected by the proposed Phase 2 or infrastructure works. Larksfield Nursery (B80-90) (within the land north of Rampton Road) could not be inspected externally or internally due to a lack of access to this part of the site. The buildings were inspected using aerial photography.

The trees and buildings were assessed for their suitability to support roosting bats based on the current Bat Conservation Trust (BCT) Good Practice Guidelines [21] as follows:

- Negligible potential/Category 3 - No features that could be used by bats (for roosting, foraging or commuting);
- Low potential/Category 2 – A small number of potential roosting features, isolated habitat that could be used by foraging bats, e.g. a lone tree or patch of scrub but not parkland and an isolated site not connected by prominent linear features (but if suitable foraging habitat is adjacent it may be valuable if it is all that is available);
- Moderate potential/Category 1 - Several potential roosting features, habitat could be used by foraging bats e.g. trees, shrub, grassland or water and the site is connected with the wider landscape by linear features that could be used by commuting bats e.g. lines of trees and scrub or linked back gardens;
- High potential/Category 1* – Features of particular significance for roosting bats, habitat of high quality for foraging bats e.g. broadleaved woodland, tree-lined watercourses and grazed parkland and the site is connected with the wider landscape by strong linear features that would be used by commuting bats e.g. river/stream valleys or hedgerows, site is close to known roosts; and
- Confirmed roosting - Evidence indicates that roosting bats are present, e.g. bats seen roosting or observed flying from a roost or freely in the habitat; droppings, carcasses, feeding remains, etc. found; and/or bats heard ‘chattering’ inside on a warm day or at dusk and bats recorded/observed using an area for foraging or commuting.

The trees of at least Category 2 potential were labelled on a map of the site and located using 10-digit Ordnance Survey (OS) grid references. The buildings of at least low potential were also identified.

3.2.2 Activity Survey

Bat activity surveys were undertaken on the site between May and September 2013. With reference to the BCT guidelines, the site was considered to be large and of medium habitat quality and, as such, monthly surveys were undertaken within the site. The purpose of these surveys was to supplement the data obtained by URS in 2012 [3], as follows:

- The transects surveyed by URS within Oakington Barracks and Airfield between June and September 2012 were repeated in May 2013;
- The transects surveyed by URS within the OSIA between July and September 2012 were repeated in May and June 2013; and

- The areas of the site that were not previously surveyed by URS (land north of Rampton Road and west of Long Lane) were surveyed between May and September 2013.

Dusk activity surveys were carried out as above, in addition to a dawn activity survey in August. The dusk activity surveys commenced around sunset and transects were walked for approximately two hours, apart from the first survey that started and finished later. The dawn survey started two hours prior to sunrise and was completed at sunrise. The transect routes are shown in Figure 5. Stopping points were employed in key locations and the routes were alternated to avoid any bias in the data in terms of activity in different areas of the site at different times.

The surveyors were equipped with an Anabat SD1 or SD2 bat detector or a Batbox Duet attached to a Roland R-09 portable stereo recorder. The Roland data was analysed using BatSound and the Anabat data using Analook, with reference to current guidelines [22].

The transects walked during each survey, as well as the dates, times and weather conditions are shown in Table 2, with reference to Figure 5.

Table 2: Bat Activity Surveys on the Site

Date	Transects	Survey Type(s)	Sunset/ Sunrise Times	Start-End Times	Weather Conditions
29/05	1-3	Dusk activity	21:07	22:15 - 00:15	Minimum temperature 14.8°C, dry, 8/8 cloud, still
30/05	4-7	Dusk activity	21:08	21:25 – 23:30	Minimum temperature 13°C, dry start leading to light drizzle, 8/8 cloud, light to moderate wind
17/06	1-3 and 6	Dusk activity	21:24	21:45 – 00:00	Minimum temperature 11°C, dry to light drizzle, 1/8 cloud, light wind
08/07	6	Dusk activity	21:22	21:22 – 23:00	Minimum temperature 17.5°C, dry, 0/8 cloud, still
22/08	6	Dusk activity	20:08	20:25 – 22:50	Minimum temperature 18°C, dry, 3/8 cloud, light wind
23/08	6	Dawn activity	05:55	03:55 – 05:55	Minimum temperature 15.4°C, dry, 7/8 cloud, light wind
19/09	6	Dusk activity	19:05	19:20 – 21:45	Minimum temperature 13°C, dry, 7/8 cloud, still

3.2.3 Automated Survey

In conjunction with each activity survey, SM2BAT+ and Anabat SD2 bat detectors were located on the site to record bat passes. Their locations are shown in Figure 5. For consistency, the static detectors were located in approximately the same locations as per URS' survey in 2012.

In accordance with the requirements of the BCT guidelines with respect to large sites of medium habitat quality, two automated devices were employed along each transect. These were in situ each month that activity surveys were carried out

along those transects to supplement the data obtained by URS in 2012, with reference to Table 2. Up to five nights of data from each automated device were analysed using Analook.

3.2.4 Limitations

The bat scoping survey was predominantly undertaken between July and September 2013, which is not an ideal time to conduct this work as the leaves restrict the view of features that may provide roosting habitat for bats.

The bat activity survey within the OSIA in May started just over an hour late and therefore did not coincide with a peak in bat activity after sunset. This was not considered to be a significant constraint, considering that this data will be analysed in conjunction with extensive bat activity and automated survey data that will be used to assess the importance of the site for foraging and commuting bats. Transect route 1 had to be altered slightly when compared to the route walked by URS in 2012, due to suspected lamping along the planned route. The route that was walked is shown on Figure 5. Transect route 6 could not be completed during the surveys in June and July, as it was not possible to survey the fields at Brookfield Farm.

One of the static detectors (SD6) was relocated during the survey period. It was originally located further from the lake, at grid reference TL4045765421, but was relocated to the position shown on Figure 5 on 31st May to detect bat activity over the lake. Furthermore, SD11 was located further north than the location shown on Figure 5 during the survey in May, at grid reference TL 39152 65624. It is not thought that this would significantly affect the survey results as the data would likely be comparable to the location shown on Figure 5. In a few cases, less than five nights of automated survey data were obtained, due to technical problems with the static bat detectors. SD13 did not record any data during the June survey period. The survey periods for each static detector are identified in Appendix B. These factors are not considered to significantly affect the robustness of the results when considered in conjunction with the URS survey data.

Bats show great variety in their calls depending on the surrounding habitat and species call parameters overlap, meaning that it was not always possible to identify bats to species level. Bats identified as pipistrelle bats are either common or soprano pipistrelle bats; or common pipistrelle or Nathusius' pipistrelle *Pipistrellus nathusii*. Furthermore, noctule or Leisler's bat *Nyctalus leisleri* calls were identified as *Nyctalus* sp. and Leisler's bat or serotine *Eptesicus serotinus* calls as 'big bats'.

3.3 Badger Survey

On 30th and 31st May, 4th and 11th June and 30th July 2013, a badger *Meles meles* survey was carried out, which focussed on re-assessing the setts recorded during previous surveys by URS and WSP. Access was obtained to all areas apart from Larksfield Nursery. Any signs to indicate the presence of badgers were recorded, including sett entrances, hairs, latrines and tracks and the setts were classified in accordance with Harris *et al*. (1989) [23].

3.3.1 Limitations

Badger surveys should ideally be carried out in the spring or early autumn/winter [24], when dense vegetation is less likely to obscure sett entrances and other signs. Some of the surveys were carried out in the summer. This was not generally considered to affect the survey results considering the nature of habitats surveyed and since the majority of the survey effort involved confirming the status of setts that had already been mapped. The badger setts are predominantly located in plantation woodland and grazed grassland, where badger signs were readily identifiable and not obscured by dense scrub or tall ruderal vegetation. The only exception to this relates to sett 23 located along a ditch within the OSIA (refer to Table 9 and Figure 6), as the presence of dense vegetation made it difficult to confirm the status of the sett.

The setts have been characterised based on the field signs recorded during the survey. However, a badger bait marking survey would be required in order to verify the status of the setts at the site, particularly with respect to the main setts (refer to Section 6.4.3).

Badger surveys should ideally be carried out within 30m of the site boundary, in order to identify any setts located outside the site that could be affected by the proposed development. This was not possible as access was not granted beyond the boundaries of the site.

3.4 Breeding Bird Survey

The breeding bird surveys were undertaken to supplement surveys undertaken by URS between May and June 2012 [3]. URS conducted three breeding bird surveys, but it was recognised that the final survey in June was carried out during sub-optimal conditions, due to heavy showers. There is also no survey data from early in the survey season and some areas of the site were not surveyed.

The general principles of the Common Bird Census (CBC) methodology [25], [26] were employed during each of the survey visits. The CBC methodology was designed by the British Trust for Ornithology (BTO) to monitor populations of common breeding birds, particularly song birds, which are most vocally active during the early morning.

Set transect routes were walked on each occasion (Figure 2), with the surveyor able to walk to within at least 10m of all areas, ensuring all birds present could be seen and/or heard. Four breeding bird surveys were carried out by Arup between May and June 2013 and March and April 2014, covering areas of the site that were not previously surveyed, comprising the OSIA, land north of Rampton Road and land to the west of Long Lane (transects 1-3, Figure 2).

An additional survey was carried out within Oakington Barracks and Airfield and land north of Rampton Road (transects 4 and 5, Figure 2) in June 2013. Only one survey visit was carried out in this part of the site, as a repeat of the survey carried out by URS when the weather conditions were suboptimal.

Each survey was carried out over two mornings, with these visits commencing shortly after dawn and being completed by 9.00am. A pair of 8 x 32 binoculars was used for observations. During the surveys, all birds that were seen or heard, together with evidence of breeding behaviour, were recorded on large scale maps

using the standard CBC notation. Surveys were carried out by an experienced ornithologist, proficient in identifying bird species from sight and from their full repertoire of calls and songs. All surveys were conducted in suitable weather conditions and at the appropriate time of the year. The dates and times of the surveys and weather conditions recorded during the surveys are outlined in Table 3, which also shows the routes that were walked on each date.

Table 3: Breeding Bird Survey Visit Details

Date	Transects Walked	Time	Temp	Wind	Cloud	Rain
29th May 2013	Transect 1	04.45-08.15	10˚C	0-1	8/8	Light
3rd June 2013	Transect 2	04.45-08.00	6˚C	0-1	8/8	None
4th June 2013	Transect 3	04.45-08.00	7˚C	0-1	4/8	None
17th June 2013	Transect 4	04.45-09.00	16˚C	1-2	5/8	None
18th June 2013	Transect 5	04.45-09.00	17˚C	0-1	7/8	None
24th June 2013	Transect 2 and half of transect 1	04.45-08.00	12˚C	2-3	8/8	None
25th June 2013	Transect 3 and half of transect 1	04.45-08.15	13˚C	1-2	3/8	None
10th March 2014	Transect 2 and half of transect 1	06.30-10.00	6˚C	1-2	4/8	None
11th March 2014	Transect 3 and half of transect 1	06.30-10.00	8˚C	1-2	8/8	None
15th April 2014	Transect 2 and half of transect 1	06.00-10.30	4˚C	0-1	4/8	None
16th April 2014	Transect 3 and half of transect 1	06.30-10.30	6˚C	1-2	5/8	None

On completion of all survey visits, field maps were compared to determine where species had been recorded singing in the same location on multiple occasions, indicating the presence of a breeding territory. This information, combined with direct evidence of breeding, such as active nests and the presence of juveniles or adult birds carrying nesting material or food, have been used to produce territory maps. These maps provide an estimate of the number of breeding pairs of each species recorded at the site. The data gathered was also used to consider overall species diversity and abundance within the site, providing an indication of its importance as a resource for notable and protected bird species in general.

An inspection of the barn owl *Tyto alba* boxes on site was conducted on 24th June 2013 by a licensed surveyor (Natural England Licence Number: 20122018). The barn owl box at Brookfield Farm (target note 1, Figure 3) was not inspected, as this box was recorded after the inspection of the barn owl boxes, on 23rd August.

3.4.1 Limitations

Ideally, all surveys would have been carried out in the same year, but project timescales did not allow for this in this case. No surveys can produce a definitive list of species or population sizes. However, based on professional opinion, it is considered that the surveys have produced a robust assessment of the populations and species diversity within the areas surveyed and provided a full data set for Oakington Barracks and Airfield in conjunction with URS' survey data.

3.5 Great Crested Newt Surveys

3.5.1 Habitat Suitability Indices

In conjunction with the great crested newt presence/absence survey described in Section 3.5.2, the ponds within the site were assessed for their potential to support great crested newt in accordance with Oldham *et al*. (2000) [27]. The ponds were scored under ten categories. These categories each have a bearing on the suitability of waterbodies to support great crested newt. The scores were translated into Suitability Indices that were used to calculate a Habitat Suitability Index (HSI) for each pond.

3.5.2 Presence/Absence Survey

Between 20th May and 10th June 2013, a great crested newt presence/absence survey was undertaken on the ponds within the site by a licensed surveyor (Natural England licence number CLS001908 and CLS00709) and an assistant, with reference to the Great Crested Newt Mitigation Guidelines [28]. The exceptions to this are Ponds 7 and 8. Pond 7 was not surveyed as it was only recorded on 25th November. Pond 8 was not surveyed as it was dry throughout the survey period.

The aim of this work was to update survey work carried out by URS in 2012 [3], as only four survey visits were undertaken on ponds where great crested newt was recorded, although great crested newt was recorded in Ponds 1, 2 and 4 (refer to Figure 3). At least three methods were employed, selected out of bottle trapping, egg search, torching and netting.

Where possible, four survey visits were carried out on each pond where great crested newt was not recorded, increased to six where there was a positive result during the first four survey visits. There were deviations from the guidelines with respect to the timings of the surveys and number of surveys completed, which are discussed in Section 3.5.3.

The ponds are identified on Figure 3 and the dates and weather conditions during the surveys are outlined in Table 4. The weather conditions during each of the surveys were suitable for carrying out great crested newt surveys, with night-time air temperatures remaining well above 5°C.

Table 4: Great Crested Newt Surveys on the Site

Visit	Date	Ponds Surveyed	Weather Conditions
1	20-21/05	1-4 and 6	Air temperature 14.6°C, dry
2	21-22/05	1-4 and 6	Air temperature 11°C, dry
3	23-24/05	1-4 and 6	Air temperature 10.5°C, occasional light showers
4	03-04/06	1-6	Air temperature 10.2°C, dry
5	04-05/06	1-6	Air temperature 11°C, dry
6	10-11/06	1-4*	Air temperature 9°C, dry

*Pond 5 was dry and therefore could not be surveyed

3.5.3 Limitations

It is recognised that the presence/absence surveys were carried out later within the great crested newt survey season than recommended, meaning that half of the survey visits were not undertaken between mid-April and mid-May. Half of the surveys were undertaken only marginally later than the key survey season (20th to 24th May). It has also been suggested that the cold weather in early spring 2013 may have delayed the start of the amphibian breeding season [29]. However, higher numbers of great crested newt were recorded by URS in 2012 and in additional ponds [3] when compared to the results of the Arup surveys in 2013 (refer to Section 1.1.1). It is therefore considered possible that the late commencement of surveys may have adversely affected the survey results, by leading to an underestimation of the size of the population within the site. This is not considered to pose a significant constraint, as the results obtained during 2013 will be considered in conjunction with the URS' survey results from 2012.

It was not possible to torch Pond 2 on visits 5 and 6 due to the presence of cattle around the pond. This pond was also too dry to bottle trap on visit 6. Pond 5 was not surveyed during visits 1-3 and was only later recorded on visit 4. It was therefore surveyed on visits 4 and 5 and was dry on visit 6. URS' report indicates that this pond was dry on all surveys apart from visit 4. This decreases the suitability of this pond for great crested newt. In addition, no surveys could be carried out on Pond 7.

Further great crested newt surveys are proposed in 2014 to cover ponds that could not be surveyed within the site, as well as those located within 500m of the site (refer to Section 6.4.4). It is considered that the collation of this data will provide adequate information to estimate the population size within the site and inform requirements for mitigation.

3.6 Reptile Survey

URS conducted seven reptile survey visits between 18th June and 20th September 2013, which provided adequate data to determine the presence or likely absence of reptiles on the site. In order to compliment URS' suite of reptile surveys undertaken in 2012 and to inform population estimates, a further four reptile surveys were undertaken across the site during September 2013 in accordance with current guidelines [30].

In total 227 artificial refugia made of bituminous roofing felt tiles which measured approximately 0.5m by 0.5m and 0.5m by 1m were distributed across the site on

22nd August 2013. They were placed at a density of approximately three mats per hectare of suitable reptile habitat. The roofing felt tiles heat up, providing warm refuges for reptiles, preferential to the surrounding environment. For consistency, the reptile mats were generally laid in approximately the same locations as per the URS' survey, in addition to an area of long grassland and scrub in the northern part of Oakington Barracks and Airfield. The locations of the reptile mats are shown on Figure 9.

The artificial refugia were left in situ for at least two weeks before the first survey was undertaken. Natural refugia such as logs and sheets of wood were also inspected during each survey. During each survey any reptiles found were identified and recorded. The dates of the survey visits and weather conditions during each survey are shown on Table 5.

Table 5: Reptile Survey Visits

Visit	Date	Weather Conditions
1	17/09/13	10.4°C, 5/8 cloud cover, dry
	18/09/13	11.3°C, 2/8 cloud cover, dry
2	19/09/13	11.8°C, 8/8 cloud cover, dry
	25/09/13	17.6°C, 8/8 cloud cover, dry
3	25/09/13	17.6°C, 8/8 cloud cover, dry
	26/09/13	17.3°C, 3/8 cloud cover, dry
4	30/09/13	16.2°C, 5/8 cloud cover, dry

3.6.1 Limitations

The reptile mats were not located in some areas that were surveyed by URS in 2012, generally due to changes to the habitat. For example, thirteen artificial reptile refugia were placed along Oakington Brook within the OSIA, but were either removed or destroyed as a result of Environment Agency clearance works prior to the first survey visit. This was not believed to have a significant impact on results, as mats located further west along Oakington Brook were surveyed. Furthermore, the clearance works made the habitat less suitable for reptiles in the affected area. The land to the west of Long Lane was used to graze cattle during the period that the survey was undertaken, thus preventing the placement of reptile mats in these fields. However, this meant that the grass was shorter than during 2012 when URS conducted the survey and therefore less unsuitable for reptiles. The changes to the locations of the artificial reptile refugia were not thought to have had a significant impact on the survey results.

Artificial refugia were placed at a density of approximately three per hectare of suitable reptile habitat. Although current guidelines [30] recommend placing 5 to 10 mats per hectare, the density of the mats was considered to be sufficient to establish the population and distribution of reptiles on the site. Areas of the site were targeted that provide the most suitable habitat for reptiles, as surveys across all areas were not considered to be practically feasible.

3.7 Hedgerow Regulations Survey

All important hedgerows within the site boundary were surveyed on 6th June 2013 by an Arup ecologist who is experienced botanist.

The hedgerow methodology employed by WSP during 2004 [1] was used during 2013 in order to facilitate a better comparison between survey findings from different years. The hedgerow section numbers used by WSP were adopted during the 2013 survey.

The hedgerow survey was undertaken in accordance with the Hedgerow Survey Handbook [33] and the Wildlife and Landscape criteria of The Hedgerows Regulations 1997 [19].

The location, length, adjacent land use, associated features (including the presence of bank and/or ditch), shape, average height, average width, intactness and plant species composition of the hedgerows within the site boundary were confirmed.

The length of the hedgerow determined how many 30m stretches needed to be surveyed for The Hedgerow Regulations 1997 assessment purposes:

- Sections up to 100m long, one 30m stretch was recorded;
- Sections between 100m and 200m long, two 30m stretches were recorded; and
- If over 200m long, three 30m stretches were recorded.

One of these 30m lengths was randomly selected as a quadrat location to record all 'woody species' as well as ivy *Hedera helix* and bramble *Rubus fruticosus* agg. and non-native trees and shrubs. The abundance of species in the quadrat recorded using the DOMIN scale (see Table 6).

Table 6: DOMIN Scale used for Assessing Plant Cover Abundance

DOMIN Scale	Plant Cover (%)
10	91 to 100
9	76 to 90
8	51 to 75
7	34 to 50
6	26 to 33
5	11 to 25
4	4 to 10
3	Many individuals
2	Several individuals
1	Few individuals

Located within this quadrat were two smaller (2m x 1m) quadrats in which the herbaceous flora associated with the hedge was recorded. One of the quadrats was located at the 10m mark within the 30m woody species quadrat, with the second located at the 20m mark. The options available within the method for the locations of these quadrats were as follows: under the hedge canopy; on the hedge bank; in

the verge; or in the field edge and the location was noted on the recording form. Species in these quadrats were recorded using the DOMIN scale.

The hedgerows were evaluated for importance in accordance with the following:

- Wildlife or Landscape criteria of The Hedgerow Regulations 1997;
- Section 41 List of the NERC Act 2006;
- Local BAP; and
- Within the site context.

3.8 General Limitations

The findings presented in this report represent only the period within which the surveys were undertaken. Variations in these conditions can be expected to occur as a result of seasonal factors, population dispersal and changes in habitat over time. It should also be noted that fauna may travel over wide areas and can have large home ranges and could consequently be overlooked within a survey. Species that are absent at the time of the survey may also return to or colonise a site at any time in the future. However, professional judgement and experience allows for the likely presence of these species to be predicted with sufficient certainty so as to not significantly limit the validity of this report.

The lack of access to Larksfield Nursery during the surveys, including the extended Phase 1 habitat survey, bat scoping and inspection survey and badger survey, was considered to be a significant limitation and it is recommended that this area be surveyed prior to submitting the Phase 2 planning application (refer to Section 6.4.1).

4 Results

4.1 Extended Phase 1 Habitat Survey

4.1.1 Habitats and Flora

The Phase 1 habitat types that were recorded within the site are listed below, in addition to their associated alphanumeric reference codes, as detailed in the JNCC Phase 1 Habitat Survey Guidelines:

- Broadleaved semi-natural woodland (A1.1.1);
- Broadleaved plantation woodland (A1.1.2);
- Dense scrub (A2.1);
- Scattered scrub (A2.2);
- Broadleaved scattered trees (A3.1);
- Coniferous scattered trees (A3.2);
- Improved grassland (B4);
- Poor semi-improved grassland (B6);
- Tall ruderal (C3.1);
- Arable (J1.1);
- Amenity grassland (J1.2);
- Introduced shrub (J1.4);
- Intact species-poor hedge (J2.1.2);
- Native species-rich hedgerow with trees (J2.3.1);
- Native species-rich defunct hedge (J2.2.1);
- Fence (J2.4);
- Buildings (J3.6); and
- Bare ground (J4).

The Phase 1 Map that was produced by URS has been updated and is shown in Figure 3. This map excludes the target notes shown on URS' Phase 1 Map, as these were not described in the report [2]. The additional habitats recorded within the site are described below, which should be read in conjunction with URS' Phase 1 Ecology Report [2].

4.1.1.1 Broadleaved Plantation Woodland

Blocks of plantation woodland were recorded within Oakington Barracks and Airfield. The trees, mainly cherry *Prunus* sp. and beech *Fagus sylvatica*, have been densely planted and as such the ground flora was limited.

4.1.1.2 Scrub

There is an area of regenerating elm *Ulmus* sp suckers within Oakington Barracks and Airfield, which are likely associated with a stand of mature elm that has since succumbed to Dutch elm disease [31]. A variety of species were recorded in the understorey, dominated by stinging nettle *Urtica dioica* and cow parsley *Anthriscus sylvestris*.

Patches of scattered scrub were recorded at Brookfield Farm and around the buildings at Oakington Barracks and Airfield. This was dominated by bramble and ash *Fraxinus excelsior* saplings, with Norway maple *Acer platanoides* saplings also recorded rarely. Dense patches of bramble scrub were also noted.

4.1.1.3 Scattered Trees

Scattered trees were recorded throughout the areas surveyed, predominantly around the buildings at Oakington Barracks and Airfield. These were mainly broadleaved trees, including frequent sycamore *Acer pseudoplatanus*, cherry, rowan *Sorbus aucuparia*, Norway maple, horse chestnut *Aesculus hippocastanum* and poplar *Populus* sp. Screens of Leyland cypress *Cupressus x leylandii* trees were also noted rarely. At Brookfield Farm, aspen *Populus tremula*, crab apple *Malus sylvestris* and ash and silver birch *Betula pendula* were frequent.

4.1.1.4 Improved Grassland

The majority of the areas surveyed were dominated by improved grassland. These areas were grazed by sheep, cows and horses and supported a low diversity of species. Perennial rye-grass *Lolium perenne* was dominant, with frequent Yorkshire fog *Holcus lanatus* and smooth meadow grass *Poa pratensis* and occasional yarrow *Achillea millefolium*, ribwort plantain *Plantago lanceolata* and daisy *Bellis perennis*. Rarely noted species included mallow *Malva sylvestris* and bramble.

4.1.1.5 Poor Semi-Improved Grassland

Poor semi-improved grassland was noted in areas that were not grazed or frequently managed. A slightly different plant composition was recorded, dominated by cocksfoot, with locally dominant false oat-grass and occasional Yorkshire fog, perennial rye-grass, spear thistle and fescues *Festuca* sp.

4.1.1.6 Tall Ruderal

Small areas of tall ruderal vegetation were recorded, with locally dominant cotton thistle *Onopordum acanthium*, abundant stinging nettle and bristly oxtongue *Helminthotheca echioides* and frequent common ragwort *Jacobaea vulgaris*, false-oat grass and black nightshade *Solanum nigrum*.

4.1.1.7 Arable

The majority of the land at Larksfield Nursery appears to be horticultural land.

4.1.1.8 Amenity Grassland

The areas of amenity grassland recorded at Brookfield Farm were dominated by perennial rye-grass, with occasional creeping buttercup *Ranunculus repens* and bristly oxtongue and rarely recorded creeping cinquefoil *Potentilla reptans* and mallow. These were well-managed lawns.

4.1.1.9 Introduced Shrub

Ornamental shrubs, including roses *Rosa* sp., have been planted around the buildings at Oakington Barracks and Airfield.

4.1.1.10 Hedgerows

Hedges were recorded around the pasture fields at Brookfield Farm. The species-poor defunct hedge was dominated by blackthorn *Prunus spinosa* and hawthorn *Crataegus monogyna*, with occasional bramble. The species-poor hedges (with and without trees) were dominated by hawthorn, with abundant bramble and occasional dog rose *Rosa canina* and elder *Sambucus nigra*. Mature ash trees were noted in the hedgerows with trees.

At Oakington Barracks and Airfield, the species-poor hedges were comprised of single-species non-native hedging plants.

For further details regarding the hedgerows within the site, refer to the results of the Hedgerow Regulations survey in Section 5.6.

4.1.1.11 Buildings

Brief descriptions of the buildings are provided below. All of the buildings within the site, including those surveyed by URS, are described in detail in Table 7 with respect to their potential to support roosting bats.

A total of fourteen buildings were recorded at Oakington Barracks and Airfield, A total of five buildings associated with Oakington Barracks have been retained at the site (B2 to B6). These are constructed from bricks, have flat roofs and are generally in a good condition. Seven pillboxes (B7 to B13) were recorded, which are constructed from concrete and brick. They are brick-lined inside and have a concrete cap. There was an additional pillbox within the site [32], but this was not evident on the ground and has perhaps become overgrown with vegetation. An additional building was recorded in an arable field, which was a small concrete building with a flat roof (B14).

There are clusters of buildings within the OSIA. This includes warehouses and offices near to the A14 (B28 to B34) and warehouses, workshops and a two storey house at Welney Farms Ltd. (B35 to B54). There is also a two storey house along Hatten's Road (B22).

The buildings at Brookfield Farm (building (B55 to B79) were predominantly single storey sheds and warehouses, of breeze block, metal and wooden construction. A bungalow constructed from brick, with a pitched roof, was also recorded. Based on aerial mapping, there is thought to be a series of polytunnels at Larksfield Nursary, a bungalow constructed from bricks and with a pitched roof and a series of other pitched and flat-roofed buildings (B80 to B90).

4.1.1.12 Other Habitats

Fences subdivided the pasture fields at Brookfield Farm and areas of bare ground (including hardstanding) were recorded, including pavements and roads.

4.1.2 Target Notes

The target notes identified on Figure 3 are described below:

1. Owl box attached to a mature tree;
2. An area of emergent vegetation comprising entirely of bulrush *Typha latifolia*. There was no standing water present at the time of the survey and the substrate was bare and cracking in places. Areas of bare ground have been colonised by goosefoot *Chenopodium* sp. It is though that the bulrush is associated with a former pond and
3. Log pile, which provides potential refugia for reptiles, amphibians and invertebrates.

4.1.3 Potential for Protected Species

The survey identified a potential for trees and buildings to support roosting bats, as well as suitable habitat for badger setts around the edges of the pasture fields at Brookfield Farm. Suitable basking habitat and refugia for reptiles were recorded. No additional ponds were recorded, although there are areas of suitable terrestrial habitat for amphibians, including great crested newt, particularly the log pile (TN3) and areas of scrub and tall ruderal vegetation.

The extended Phase 1 habitat survey did not identify a potential for any protected or notable species that are not considered in this report, with the exception of the land at Larksfield Nursary, which could not be accessed. Further details regarding the requirement for further surveys in this part of the site are outlined in Section 6.4.

4.2 Bat Surveys

4.2.1 Scoping and Inspection Survey

4.2.1.1 Buildings

Table 7 provides a comprehensive list of the buildings recorded within the site, which incorporates the results of survey work conducted by Arup and URS [2]. The table is split into the following areas, with reference to Section 2.1.1:

- Oakington Barracks and Airfield;
- Land to the west of Long Lane;
- OSIA:
  - *a)* Buildings adjacent to the A14; and
  - *b)* Welney Farms Ltd.

- Land north of Rampton Road:
  a) Brookfield Farm; and
  b) Larksfield Nursary.

The buildings are described, including any features that could provide roosting habitat for bats. This table also defines the potential of the buildings to support roosting bats, in accordance with the criteria described in Section 3.2.1. The buildings are shown on Figure 3 and those buildings with a potential to support roosting bats are identified in Figure 4.

The buildings at Larksfield Nursery have been scoped based on an inspection of aerial photography. As such, the buildings within this part of the site should be inspected to verify the findings outlined in Table 7.

Table 7: Potential of Buildings within the Site to Support Roosting Bats

Building (B)	Description	Bat Potential
Oakington Barracks and Airfield		
1	Two single storey metal portacabins	Negligible
2	Brick built, flat-roofed building with two storeys. Windows boarded up and no roof voids. Dense vegetation on walls that provides potential roosting habitat. Opportunities for bats to access the basement through vents and airbricks. Basement was flooded and therefore not accessible for an inspection.	Moderate
3	Brick built, pitched roof building with a glass roof. Brickwork in a good condition and no roof void present.	Negligible
4	Brick built, flat-roofed building with one storey. Possible tawny owl *Strix aluco* perch in the porch. Roofing felt on roof and brickwork in a good condition and windows and doors boarded.	Negligible
5	Brick built, flat-roofed building with two storeys. Windows and doors boarded. Slots above windows and narrow gaps between concrete roof and bricks that provide crevices for roosting bats.	Low
6	Metal tower	Negligible
7	Concrete and brick pillbox with two doorways. Brickwork in a good condition. Butterfly wings recorded internally, which indicates previous use by bats as a feeding perch, although no signs of an active roost were recorded.	Moderate
8	Concrete and brick pillbox, of the same construction as B7, but with a large gap between the concrete cap and brick walls and one doorway. Brickwork in a good condition. Light inside and exposed.	Negligible
9	Concrete and brick pillbox, of the same construction as B8, but with four windows instead of open access between the cap and the wall. Swallow *Hirundo rustica* nest site. Crevice between the brick wall and concrete roof but covered with cobwebs and no signs of bats present. Light inside and exposed.	Negligible
10	Concrete and brick pillbox, with has been boarded up leaving narrow crevices for roosting bats between the wooden boards and surrounding concrete and brick. No access for an internal inspection. Adjacent to line of scrub along site boundary.	Moderate

11	Concrete and brick pillbox, of the same construction as B8, but covered with scrub on one side and not accessible for an internal inspection. Light and exposed.	Negligible
12	Concrete and brick pillbox, similar in construction to B8. Light inside and exposed and accessible to cattle.	Negligible
13	Concrete and brick pillbox, of the same construction as B7. Two butterfly wings recorded, although no signs of an active roost were recorded.	Moderate
14	Small concrete building with a flat roof. Brick-lined inside. No internal access, but brickwork appears secure.	Negligible
91	Small brick building with a concrete flat roof. There was an open door with a potential for birds to nest inside. Wooden boards and roofing felt coming away from the concrete roof on the southeast and southwest sides providing minor crevices.	Low
Land to the West of Long Lane		
15	Wooden stable with flat roof	Negligible
16	Wooden shed with flat roof	Negligible
17	Single-storey building with corrugated roof	Negligible
18	Wooden building with flat roof	Negligible
19	Temporary metal buildings	Negligible
20	Single-storey, pitched roof warehouse of metal construction	Negligible
OSIA		
21	Derelict brick building with flat roof	Negligible
22	Hazelwell Court. Occupied two-storey brick building with pitched roof with clay tiles. The clay tiles appeared to be in a good condition. Brown rat *Rattus norvegicus* droppings were recorded in the smaller void to the east and no opportunities were recorded for bats to gain access. The beams were all covered in cobwebs. Mouse droppings were recorded in the larger roof void and a draught was noted via a gap between the wall and the roof at the northern façade. A double layer of brickwork was also recorded, although it was not clear whether this had been filled. No signs to indicate the presence of bats were recorded.	Low
23	Metal shed with pitched roof	Negligible
24	Metal shelter	Negligible
25	Single-storey concrete building with flat roof. Swallow nest site.	Negligible
26	Single storey brick building in field. Flat bituminous roof in poor condition. Crevices between ceiling and roof and behind barge boards.	Low
27	Single storey brick building with flat concrete roof. Hole in wall. Damp interior.	Negligible
a) Buildings adjacent to the A14		
28	Portacabin	Negligible
29	Single-storey building with flat roof and wood cladding. Lifted wooden cladding, particularly on the southern façade, as well as a hole. Gap between B29 and B30 on the northern façade.	Low

30	Brick building with a single storey and a sloping roof. Brickwork and roof secure. Mouse droppings and a dead mouse recorded internally, but no access opportunities for bats.	Negligible
31	Pitched roof building with no roof void. Predominantly of metal construction, with some sheets of plastic on the roof. Opportunities for bats to access the warehouse internally. Butterfly wings and other insect remains recorded, which indicates a possible feeding perch; too light to provide any other roosting opportunities. Crevices under cladding on the northern façade.	Low
32	Metal shed with pitched roof and no roof void	Negligible
33	Metal shed with pitched roof	Negligible
34	Metal shed with flat roof	Negligible
b) Welney Farms Ltd		
35	Occupied, two-storey house with pitched roof and clay tiles. No obvious access to roof void.	Low
36	Wooden building with corrugated pitched roof. Weatherboarding lifted in places and some holes.	Low
37	Wooden building with pitched roof and weather-boarding lifted in places	Low
38	Wooden building with pitched roof. Weatherboarding secure. Crevice between B38 and B49. Swallow nest site.	Low
39	Single storey brick building with pitched roof and holes in the weatherboarding. Free-hanging, wooden loft space that may be accessible via holes in the weatherboarding. Cannot be accessed for an inspection.	Moderate
40	Single storey brick building with corrugated sloping roof. Crevice between the brick wall and wooden frame at the northeast corner.	Low
41	Single storey shed with weatherboarding and pitched metal roof. Crevices between fascia boards and wooden walls and lifted weatherboarding.	Low
42	Single storey breezeblock shed with curved roof	Negligible
43	Metal silo	Negligible
44	Metal and breezeblock warehouse	Negligible
45	Brick built stables with pitched corrugated roof. Crevices under fascias and lifted weatherboarding.	Low
46	Single storey building with weatherboarding and corrugated pitched roof. Weatherboarding in a good condition.	Negligible
47	Concrete chimney	Negligible
48	Single storey building attached to B49. Metal sloping roof and weatherboarding in good condition.	Negligible
49	Single storey brick building attached to B48. Pitched metal roof.	Negligible
50	Single storey, ivy covered building with pitched metal roof in good condition. Ivy may provide roost sites for bats.	Low
51	Single storey building with metal sloping roof and lifted weatherboarding.	Low

52	Single storey brick building with pitched roof. Crevices under wooden fascias. Crevice between brick wall and wooden roof.	Low
53	Portacabin	Negligible
54	Single storey brick building with a crevice between the fascia and brick wall.	Low
Land North of Rampton Road		
a) Brookfield Farm		
55	Brick-built bungalow with a pitched roof with clay roof tiles. Brickwork in a good condition. Minor crevices were recorded between the roof tiles. Internally, 50+ medium sized, fresh bat droppings and feeding remains (likely associated with brown long-eared bat) were recorded adjacent to the roof hatch inside the roof void, below the ridge beam. Parts of the ridge beam were clear of cobwebs and a hole was recorded in the geotextile membrane, where bats may access the roof void. Bats may also roost between the membrane and the roof tiles. NB – WSP recorded evidence to indicate the presence of roosting bats within this building during an inspection in 2007, as follows: '*Less than ten old small droppings were recorded at scattered locations throughout the roof space of the farmhouse. The cavities in the walls were filled but in the roof there was access into the geotextile membrane in a few places which may support bats between this and the roof tiles. The presence of suitable roosting features as well as droppings makes this a likely roost.'*	Confirmed roost
56	Single storey wooden building with a pitched roof but no roof void. Roofing felt is decaying on the southern façade, providing narrow crevices that may support roosting bats. Also access under floorboards on the eastern façade.	Low
57	Single storey wooden shed with a sloping metal roof	Negligible
58	Single storey breeze block building with a metal roof	Negligible
59	Single storey breezeblock building with a sloping roof and wooden fascias. Damage to underside of soffit on southern façade, providing an opportunity for bats to roost inside. Crevices below roof and under fascias.	Low
60	Dilapidated wooden shed	Negligible
61	Dilapidated wooden shed	Negligible
62	Single storey breeze block building with a metal pitched roof and no roof void. Nesting birds.	Negligible
63	Warehouse with a wooden frame and a sloping metal roof	Negligible
64	Warehouse with a wooden frame and a pitched metal roof. Crevices behind wooden cladding on the northern façade.	Low
65	Single-storey breeze block and wooden building with a sloping roof. Nesting birds.	Negligible
66	Brick building with a pitched roof and no roof void. Roofing felt slightly lifted.	Low
67	Wooden-framed warehouse with a sloping roof	Negligible
68	Wooden-framed warehouse with a sloping roof	Negligible
69	Wooden-framed warehouse with a sloping roof	Negligible
70	Wooden-framed warehouse with a sloping roof	Negligible

71	Metal shelter	Negligible
72	Metal/asbestos shed	Negligible
73	Metal/asbestos shed	Negligible
74	Wooden and metal shed	Negligible
75	Wooden-framed shed with a sloping roof	Negligible
76	Wooden shed with a pitched roof and no roof void.	Negligible
77	Wooden shed	Negligible
78	Single-storey breezeblock and wooden building. Weatherboarding in a good condition.	Negligible
79	Wooden shed	Negligible
b) Larksfield Nursery		
80	Brick-built bungalow with a pitched roof with clay roof tiles. No access possible for external or internal inspection. NB - WSP recorded evidence to indicate the presence of roosting bats within this building during an inspection in 2007: *'Four scattered, small, old bat droppings were recorded within the bungalow roof space, along with many rat and mouse droppings. All beams were heavily cobwebbed and the cavity walls were all filled. The presence of suitable roosting features as well as droppings makes this a likely roost.'*	Moderate
81	Polytunnels	Negligible
82	Polytunnels	Negligible
83	Polytunnels	Negligible
84	Flat roofed building	Unknown
85	Polytunnels	Negligible
86	Polytunnels	Negligible
87	Polytunnels	Negligible
88	Polytunnels	Negligible
89	Pitched roof buildings	Unknown
90	Pitched roof buildings	Unknown

Table 8 defines the potential of the trees within the site to support roosting bats, in accordance with the criteria described in Section 3.2.1. This table also identifies the trees that support bat boxes. These trees are shown on Figure 4.

Table 8: Potential of Trees within the Site to Support Roosting Bats

Tree	Species	X Coordinates	Y Coordinates	Description	Bat Potential
1	Horse chestnut	540393	266682	Flaking bark	2
2	Poplar	540573	266603	Two bat boxes	Bat box
3	Poplar	540573	266603	Adjacent tree with one bat box	Bat box
4	Cherry	540555	266499	Two northwest facing woodpecker holes	1
5	Horse chestnut	540460	266625	Downward-facing woodpecker hole	2

6	Horse chestnut	540398	266662	Flaking bark and potential northwest facing hole where branch was removed	2
7	Horse chestnut	540445	266636	Flaking bark	2
8	Lime *Tilia* sp.	540444	266633	Possible southeast facing hole	2
9	Horse chestnut	540438	266643	Flaking bark	2
10	Horse chestnut	540435	266655	Flaking bark and possible up-facing holes where branches removed	2
11	Lime	540479	266603	Four possible holes, two with cobwebs, facing northeast to south	2
12	Horse chestnut	540481	266602	Two possible southwest facing holes	2
13	Horse chestnut	540531	266536	Flaking bark	2
14	Cherry	540587	266512	Flaking bark	2
15	Apple *Malus* sp.	540717	266399	Two southwest facing, shallow woodpecker holes	2
16	Cherry	540736	266404	Shallow woodpecker hole	2
17	Cherry	540737	266379	Southeast facing woodpecker hole 2m above the ground leading down to cavity. Guano at entrance.	1
18	Apple	540785	266320	Two northwest facing holes, one up-facing	2
19	Silver maple *Acer saccharinum*	540771	266290	Flaking bark	2
20	Red horse chestnut *Aesculus × carnea*	540747	266296	Flaking bark	2
21	Silver maple	540753	266265	East facing bat box	Bat box
22	Silver maple	540753	266265	Two bat boxes (south and west facing) and flaking bark	2 (with bat box)
23	Silver birch	540624	266332	Southeast facing hole with access to cavity	1
24	Silver maple	540662	266409	Flaking bark	2
25	Norway maple	540789	266442	Bird box	2
26	Silver maple	540823	266373	Flaking bark	2
27	Sycamore	540824	266413	Southeast facing possible hole with cobwebs and a second shallow hole	2

28	Horse chestnut	540839	266399	Flaking bark	2
29	Poplar	540809	266463	Southeast facing bat box	Bat box
30	Poplar	540812	266468	Northwest facing bat box, chewed at entrance	Bat box
31	Poplar	540798	266474	Northeast facing woodpecker hole and southwest facing bat box. Line of trees providing foraging and commuting habitat.	2 (with bat box)
32	Cherry	540689	266454	Woodpecker hole only 1m above the ground	2
33	Cherry	540507	266649	East facing woodpecker hole, 1m above the ground, leading to cavity	2
34	Rowan *Sorbus aucuparia*	540488	266654	Northwest facing, sheltered, downward facing hole and flaking bark. Two further holes leading to a cavity. Holes 1-1.5m above the ground.	1
35	Horse chestnut	540469	266633	Flaking bark	2
36	Ash	540468	266636	West facing woodpecker hole	1
37	Ash	540459	266633	East facing possible hole where branch removed. Bird's nest.	1
38	Rowan	540472	266733	Shallow hole where branch removed	2
39	Swedish whitebeam *Sorbus lancastriensis*	540472	266731	East facing hole where branch removed about 1.5m above the ground, leading to narrow cavity	2
40	Almond *Prunus amygdalus*	540474	266739	Rotten with holes leading to cavity	1
41	Swedish whitebeam	540478	266742	Large woodpecker hole leading to cavity and a second northeast facing hole 2m above the ground	1
42	Poplar	540495	266780	Hollow dead tree stump with flaking bark and three woodpecker holes facing various directions	1*
43	Horse chestnut	540513	266789	Possible east facing hole	2
44	Horse chestnut	540574	266710	Flaking bark	2
45	Poplar	540580	266636	Flaking bark	2
46	Walnut *Juglans regia*	540498	266748	Furrowed bark and three possible holes	1

47	Apple	540707	266236	Two northwest facing woodpecker holes	1
48	Apple	540666	266282	Southeast facing hole where branch removed, about 2m from the ground, leaving to small cavity	1
49	Apple	540673	266257	Southeast facing hole about 2m above the ground leading to a cavity	1
50	Poplar	540751	266154	Flaking and furrowed bark and two possible up facing holes	2
51	Poplar	540750	266147	Flaking bark and possible up facing hole	2
52	Poplar	540754	266155	Three east to northeast facing woodpecker holes and one hole where branch removed. Wasps nest.	1*
53	Apple	540750	266134	Slightly up facing hole where branch removed	2
54	Poplar	540699	266137	Woodpecker hole about 10m from the ground	1
55	White poplar	540512	266070	Large southeast facing hole leading to a cavity up into the tree and second possible northwest facing hole	1*
56	Ash	540497	266087	Dense ivy covering	1
57	White poplar	540507	266105	Large hole to large cavity within trunk. Bee flying around hole.	1*
58	Norway maple	540517	266124	Flaking bark	2
59	Poplar	540757	265731	Three bat boxes facing various directions	Bat box
60	Poplar	540805	265836	Two woodpecker holes and flaking and furrowed bark. Dead branch with a possible cavity facing northwest. Also west facing hole.	1*
61	Poplar	540837	266137	Possible up facing hole	2
62	Cherry	540837	266137	Possible northwest facing hole where branch removed	2
63	Lime	540770	266760	Loose bark	2
64	Lime	540744	266855	Southwest facing woodpecker hole	1

65	White poplar	540723	266872	Up facing hole and a lateral split	1
66	White poplar	540717	266876	Northwest facing woodpecker hole at least 10m above the ground	1
67	White poplar	540721	266906	Northeast facing woodpecker hole	2
68	White poplar	540723	266913	Northwest facing woodpecker hole about 5m above the ground	1
69	White poplar	540718	266912	West facing shallow woodpecker hole about 2m above the ground	2
70	Poplar	541096	266586	Southwest facing woodpecker hole with possible urine staining. Tree line provides potential foraging and commuting habitat.	1*
71	Poplar	541095	266586	West facing woodpecker hole about 7m above the ground and a smaller possible hole	1
72	Dead tree trunk	541677	266512	Lateral split	2
73	Field maple	541555	265107	Dense ivy covering	2
74	Field maple	541555	265107	Dense ivy covering	2
75	Poplar	541618	265037	Southeast facing small woodpecker hole	1
76	Dead tree trunk	541060	264951	Two woodpecker holes about 1.5m above the ground, facing west and south, that lead to a cavity	2
77	Poplar	541059	264967	Two northwest facing woodpecker holes with possible urine and grease staining below and around top hole. Another northeast facing hole also with possible urine staining.	1*
78	Poplar	541076	264979	Three shallow woodpecker holes, facing northeast or northwest	2
79	Poplar	541078	264974	Large northeast facing woodpecker hole with possible urine staining	1
80	Poplar	541076	264964	East facing woodpecker hole with possible urine staining	1

81	Poplar	541081	264963	Hole with possible urine staining. Wasp flying around the entrance.	1
82	Cherry	541083	264963	Loose bark	2
83	Poplar	541083	264963	Large, northwest facing woodpecker hole, with evidence of possible urine staining	1
84	Dead tree trunk	541121	264910	Loose bark, hollow tree with woodpecker holes. Cavity exposed to the elements from above.	2
85	Ash	541116	264925	Two holes facing southeast and northwest up to 1.5m above the ground	2
86	Dead tree trunk	541148	264957	Loose bark	2
87	Dead tree trunk	541214	264952	Loose bark	2
88	Dead tree trunk	541224	264997	Loose bark	2
89	Ash	541204	265053	Furrowed bark and a west facing woodpecker hole approximately 3m above the ground and 3m from the woodland edge	1
90	Poplar	541225	265053	Loose bark	2
91	Poplar	541281	265045	At least 11 woodpecker holes: seven northeast facing holes with possible urine staining on the lowest hole; three southeast facing holes; and one southwest facing hole.	1*
92	Ash	541488	265000	Possible south facing hole with cobweb over entrance	2
93	Poplar	541464	264966	Dense ivy covering	2
94	Ash	541452	264968	Two trees with dense ivy covering	2
95	Ash	541452	264976	Mature tree with dense ivy covering	1
96	Poplar	541477	264978	Northeast facing possible woodpecker hole approximately 5m above the ground	2

97	Ash	541063	264940	South east facing possible woodpecker hole about 9m above the ground with possible urine staining	1
98	Dead tree trunk	541067	264933	Loose bark	2
99	Dead tree trunk	541070	264934	Loose bark on partially fallen tree	2
100	Dead tree trunk	541062	264930	Loose bark	2
101	Ash	541201	264836	Dense ivy covering	1
102	Ash	541198	264846	No access to inspect. Mature tree that may support features	2
103	Ash	541190	264808	Dense ivy covering	2
104	Weeping willow *Salix babylonica*	541155	264715	Furrowed bark. Inspection only possible from west side.	2
105	Weeping willow	541155	264723	Furrowed bark	2
106	Weeping willow	541144	264703	Furrowed bark and sheltered crevice in branch	1
107	Weeping willow	541135	264698	Furrowed bark	2
108	Apple	541103	264726	Hole approximately 1.5m above the ground to a cavity. Cobweb over entrance.	2
109	Pedunculate oak *Quercus robur*	541106	264673	Dense ivy covering. Adjacent to site boundary.	2
110	Ash	541106	264668	Dense ivy covering	2
111	Pedunculate oak	541075	264686	Dense ivy cladding and woodpecker hole. Adjacent to site boundary; inspection only possible from north side.	1
112	Poplar	541074	264686	Woodpecker hole. Adjacent to site boundary.	1
113	Apple	540864	266222	Woodpecker holes on branches above 3m from the ground, facing north and west	1
114	Sycamore	540863	266283	Lateral split in trunk facing south and west	2
115	Cherry	540924	266259	Flaking bark	2

116	Cherry	540881	266255	Woodpecker hole at about 2m above the ground and flaking bark	1
117	Rowan	540856	266202	Small east facing hole at about 4m above the ground	2
118	Cherry	540891	266148	Crack and flaking bark at 4-6m above the ground	2
119	Cherry plum *Prunus cerasifera*	540890	266145	Two west facing holes at about 3m above the ground	1
120	Cherry plum	540894	266133	South facing hole about 2m above the ground	1
121	Apple	540910	266151	Snapped branch leading to potential cavity	1
122	Apple	540909	266152	Several holes facing different directions	1
123	Cherry	540921	266157	Woodpecker hole and large cavity facing north and south	1
124	Apple	540934	266214	North facing woodpecker hole at about 2m above the ground	2
125	Poplar	540922	266473	Woodpecker hole about 2m above the ground and flaking bark above 6m. Fourth tree from west.	1
126	Poplar	540917	266502	South and east facing hole and cracks at around 9-10m. Fifth tree from west.	1
127	Lime	540706	266571	Two holes at about 4m and 7m facing east and north	1
128	Cherry	540760	266634	Possible rot hole at around 4m above the ground	2
129	Lime	540757	266631	Southwest facing woodpecker hole at about 4m from the ground	1
130	Poplar	541126	266343	Bat box with cobwebs over the entrance	Bat box
131	Poplar	541130	266351	Bat box	Bat box
132	Poplar	541131	266348	Bat box	Bat box
133	Ash	540963	267119	Large tree with no access to inspect	2
134	Poplar	541020	265643	Southeast and northwest facing holes at about 5m and 8m above ground	1

135	Poplar	541021	265641	Northwest facing hole at 3m above ground	1
136	Poplar	541101	265589	South facing hole at about 8m above the ground	1
137	Poplar	541098	265600	Southeast facing small hole about 7m above the ground	2
138	Poplar	541106	265605	West facing hole about 8m above the ground	1
139	Poplar	541105	265609	Northwest facing hole about 9m above the ground	1
140	Poplar	541101	265596	East facing hole about 9m above the ground	1
141	Poplar	541100	265588	Northeast facing hole about 6m above the ground	1
142	Poplar	541101	265583	At least two holes between about 6m and 8m above the ground and loose bark; south and southwest facing	1*
143	Poplar	541103	265588	Northeast facing hole about 8m above the ground	1
144	Poplar	541107	265588	North facing hole about 10m above the ground	1
145	Poplar	541106	265588	East facing hole about 10m above the ground	1
146	Poplar	541113	265571	Northwest facing hole about 6m above the ground	1
147	Poplar	541113	265575	North facing hole about 11m above the ground	1
148	Poplar	541133	265543	Three holes between about 8m and 10m above the ground facing various directions	1
149	Poplar	541130	265548	South facing hole with cobwebs over the entrance	2
150	Poplar	541129	265554	Southeast facing hole about 10m above the ground	1
151	Poplar	541132	265558	South facing hole about 11m above the ground	1
152	Poplar	541133	265556	Two holes facing southeast and west approximately 5m and 10m above the ground	1

153	Poplar	540966	264967	East facing hole about 1mm above the ground, with some possible urine staining	1
154	Poplar	540941	264912	Northeast facing hole about10m above the ground	1
155	Poplar	540933	265097	North facing hole about10m above the ground	1
156	Poplar	540677	265263	Northeast facing hole about 9m above the ground with some possible urine staining below	1
157	Poplar	540593	265147	Southeast facing hole about 11m above the ground	1
158	Willow *Salix* sp.	540560	265114	Two east facing holes and split trunk about 10m above the ground	1*
159	Willow	540562	265117	North facing hole about 8m above the ground	1
160	Willow	540572	265115	Southeast facing hole about 5m above the ground and loose bark	1
161	Willow	540567	265119	Small holes and loose bark facing various directions and at various heights	1
162	Willow	540565	265127	Split trunk and holes at various heights and facing various directions	1*
163	Willow	540565	265124	Split trunk and holes at various heights and facing various directions	1
164	Willow	540561	265138	Southeast facing holes at about 10m above the ground	1
165	Willow	540583	265134	Several holes at various heights and facing various directions	1*
166	Pedunculate oak	538781	263711	Dense ivy covering	2
167	Lime	538717	263776	Dense ivy covering	2
168	Pedunculate oak	539343	263745	Dense ivy covering	1
169	Elder	540548	266918	Branch cavity	2
170	Ash	540539	266920	Possible up facing hole where branch removed	2

171	Ash	540442	267093	Furrowed bark and crevices in rotting branch	2
172	Ash	540442	267101	Four woodpecker holes in trunk and hole in branch at various heights and facing various directions	1
173	Ash	540463	267177	Southeast facing woodpecker hole	1
174	Ash	540463	267176	Large teardrop-shaped woodpecker hole and up facing hole about 6m above the ground and facing southeast	1
175	Ash	540492	267195	West facing woodpecker hole about 6m above the ground	1
176	Ash	540494	267197	Loose bark	2
177	Hawthorn	540503	267205	Vertical split along trunk leading to crevice	2
178	Poplar	540841	264851	Northeast facing woodpecker hole about 6m above the ground	1
179	Poplar	540756	264864	East facing woodpecker hole about 7m above the ground	1
180	Poplar	540777	264843	Southeast facing woodpecker hole	1
181	Poplar	540801	264850	Southeast facing woodpecker hole	1
182	White willow *Salix alba*	540800	264864	Loose bark	2
183	Dead tree trunk	540753	264875	Possible holes	2
184	White willow	540762	264908	Northeast facing woodpecker hole approximately 2m above the ground and east facing crevices in hollowing trunk	2
185	Dead tree trunk	540764	264916	At least 10 woodpecker holes	1
186	White willow	540798	264899	Loose bark	2
187	White willow	540781	264922	Southeast facing vertical crevice, two holes and split	1
188	White willow	540773	264929	Southwest facing hole into possible cavity and northwest facing hole	1

189	White willow	540711	264981	Two woodpecker holes facing northwest and southeast	1
190	White willow	540712	264961	Hole into possible cavity	1
191	White willow	540697	264991	Northwest facing woodpecker hole	1
192	Willow	540704	265006	Southeast facing woodpecker hole	1
193	Willow	540681	265022	Southeast facing woodpecker hole	1
194	Willow	540680	265026	Loose bark and vertical crevice	2
195	Willow	540657	265025	Woodpecker hole with cobwebs over the entrance	2
196	Willow	540650	265024	Woodpecker hole and hollow trunk, likely wet	1
197	Willow	540659	265037	Large woodpecker hole and loose bark to the northeast	1
198	Willow	540666	265044	Southern facing woodpecker hole approximately 2m from the ground and a second, northwest facing hole branching upwards	2
199	Willow	540669	265044	Access up into trunk cavity	1*
200	Willow	540662	265050	Woodpecker hole	2
201	Willow	540662	265047	Two holes facing northwest approximately 3m and 6m above the ground and loose bark	1
202	Willow	540639	265062	Teardrop-shaped hole to the south east approximately 6m above the ground and large holes into dead wood orientated south west	1
203	Willow	540639	265063	Large hole on the north east side of the tree	1
204	Willow	540640	265063	Shallow hole leading upwards, covered in cobwebs, approximately 2m above the ground	2
205	Willow	540622	265072	Crevice and loose bark	2
206	White willow	540749	265618	Shallow hole leading upwards	2
207	Dead tree trunk	540753	265624	Dead tree with loose bark	2
208	White willow	540777	265649	Loose bark	2

209	Dead tree trunk	540777	265649	Dead tree with loose bark	2
210	Dead tree trunk	540789	265642	Dead tree with loose bark	2
211	White willow	540808	265686	Crevice which may lead up into a cavity	1
212	White willow	540842	265735	Hollow trunk with numerous large holes to the southwest and a large hole to the northeast, cobwebbed over at the entrance	1
213	Ash	540860	265751	Vertical crevice and a hole approximately 2m above the ground on the north east side	2
214	White willow	540879	265772	Shallow, cobwebbed hole	2
215	White willow	540874	265774	Loose bark	2
216	White willow	540872	265773	North westerly hole in tree stump approximately 10m above the ground which may lead to cavity, cobwebbed over	2
217	White willow	540876	265776	Woodpecker hole approximately 3m above the ground facing south east with a clear entrance and a easterly orientated hole	1
218	White willow	540878	265770	Large teardrop shaped hole with a clear entrance approximately 3m above the ground facing north east	1
219	Dead tree trunk	540872	265748	Dead tree with loose bark	2
220	White willow	540862	265746	Hole which may lead up into a cavity	2
221	White willow	540839	265712	Dead tree with holes leading into trunk cavity	1*
222	White willow	540594	265446	Southerly facing woodpecker hole approximately 5m above the ground, cluttered entrance	2
223	White willow	540591	265451	Northerly woodpecker hole approximately 3m above the ground	1
224	White willow	540589	265447	Large woodpecker hole facing north west, two other holes facing south	1

225	White willow	540595	265453	Large woodpecker hole on the northern aspect of the tree	1
226	White willow	540598	265451	Two small woodpecker holes on the northern aspect of the tree	1
227	White willow	540617	265422	Hole on the western aspect approximately 2.5m above the ground possibly leading into a cavity, possible holes on the eastern aspect	1
228	White willow	540614	265408	Loose bark	2
229	White willow	540611	265410	Hole approximately 3m above the ground leading up into the tree	1
230	White willow	540606	265427	Approximately Four small holes	2
231	White willow	540604	265430	South east facing holes leading up into tree at approximately 4m and 10m above the ground	1
232	White willow	540583	265432	Four holes leading up into dead wood on the south eastern aspect	1*
233	White willow	540582	265431	Two possible holes on the south eastern aspect	1
234	White willow	540562	265432	Hole on the south eastern aspect	2
235	White willow	540558	265436	Large hole on the western aspect leading up into tree	1
236	White willow	540552	265439	Hole on the south eastern aspect	1
237	White willow	540531	265412	Hollow trunk with a hole on the eastern aspect approximately 2.5 – 3m above the ground	1*
238	White willow	540470	265432	Dead tree with loose bark and two holes	2
239	White willow	540470	265440	Hole on the north eastern aspect covered with cobwebs, and a crevice on the south western aspect into hollow section of the tree	1
240	White willow	540446	265436	Possible westerly facing hole	2
241	Beech	540423	265705	Hole where a branch has been removed	1

242	Poplar	540505	265514	Hole on the north western aspect leading up into tree approximately 4m above the ground	1
243	Pedunculate oak	540476	265742	Woodpecker hole approximately 8m above the ground on the north eastern aspect	1
244	Ash	540497	266070	Four woodpecker holes and a cavity on the southern aspect	1*
245	Ash	540533	266034	Large hole and decaying branch on the south eastern aspect with an ivy covered split on the other side of the tree	1
246	Horse chestnut	540443	266612	Several holes where limbs have been cut off	1
247	Horse chestnut	540516	266530	Loose bark and two holes in trunk	1
248	Lime	540520	266526	Loose bark and one small cavity	1
249	Cherry	540545	266497	Two large woodpecker holes leading into large cavities	1
250	Weeping willow	540602	266268	Loose bark	2
251	Horse chestnut	540196	266620	Loose bark	2
252	Hawthorn	540197	266623	Dense ivy covering	2
253	Horse chestnut	540208	266636	Loose bark	2
254	Horse chestnut	540246	266653	Loose bark	2
255	Norway maple	540497	266745	Southeast facing hole where branch has been removed, 2m above the ground and an easterly facing hole approximately 1.75m above the ground	1
256	Norway maple	540399	266764	Two holes on narrow branches	2
257	Horse chestnut	540461	266809	Hole and dead wood where branch has been removed and a north west facing hole leading into a cavity	1
258	Horse chestnut	540467	266814	South east facing hole leading upwards	2
259	Horse chestnut	540491	266807	West facing hole leading upwards and flaking bark	2

260	Lime	540442	266787	Two holes leading up into the tree on the south eastern aspect	1
261	Ash	538886	265340	Two holes in trunk south and southwest facing approximately 5m above the ground	1
262	Hybrid black poplar	539530	263456	North east facing hole approximately 8m above the ground and furrowed bark	1
263	White willow	539478	263457	Crevices where bark is lifted, two woodpecker holes east facing and one west facing	1
264	White willow	539460	263457	Crevices in dead wood, woodpecker hole northwest facing leading up into tree	1
265	White willow	539447	263471	West facing woodpecker hole approximately 6m above the ground. Two north facing holes approximately 12m above the ground	1
266	White willow	539417	263498	Large northeast facing hole in trunk, peeling and decaying wood. Main stem ready to fall. Further holes.	1*
267	White willow	539405	263504	Furrowed bark and peeling dead wood. Northeast and north west facing holes.	1
268	White willow	539400	263512	Furrowed bark and northeast facing woodpecker hole. Crevice where branch has been removed.	1
269	White willow	539362	263524	Woodpecker holes on dead branch, furrowed bark and other holes.	1
270	White willow	539345	263529	Furrowed bark with east facing woodpecker hole in the broken branch approximately 4m above ground. Further holes on north and west sides of tree.	1
271	White willow	539290	263533	North west facing up hole approximately 2m above ground and crevices in branch	1

272	White willow	539240	263552	North east facing woodpecker hole and peeling bark	1
273	Beech	539190	263524	Dead tree, ivy covered	2
274	Horse chestnut	538665	263804	Southwest and northeast facing shallow holes	2
275	Pedunculate oak	538684	263813	Dead wood and flaking bark	2
276	Ash	538776	263926	Possible woodpecker hole on the northeast side	2
277	Ash	538779	263931	Northwest facing woodpecker hole	2
278	Ash	538780	263946	Two woodpecker holes where branch has been removed on the southwest side	1
279	Elm	538801	263951	Holes on the southwest side at the top of the tree	2
280	Ash	538795	263961	Hole on the southwest side where branch has been removed. Small holes on the northeast side.	2
281	Elm	538851	263983	Furrowed bark	2
282	Field maple	538816	263981	2 minor woodpecker holes holes on west and east sides	2
283	Elm	538850	264003	Woodpecker hole on northwest side	2
284	Elm	538870	264020	Low up hole facing east	2
285	Elm	538865	264012	East facing woodpecker hole	1
286	Pedunculate oak	539285	264188	Peeling and cracked bark on the south and north sides	1
287	Pedunculate oak	539265	264171	Hole into possible cavity	1*
288	Pedunculate oak	539188	264037	Hole approximately 1m above the ground up into cavity	2
289	Elm	540087	265712	Peeling bark with some north facing crevices	2
290	Ash	540203	265740	Peeling bark with crevices and holes in all directions	1*
291	Ash	540209	265727	Peeling bark with crevices and holes in all directions	1*

292	Pedunculate oak	540212	265711	Peeling bark with crevices and holes in all directions	1*
293	Ash	539501	265182	Peeling bark and holes on the west side	1*
294	Ash	539501	265182	Peeling bark and holes on the west side	1*
295	Ash	539487	265155	Peeling bark and west facing crevices	1
296	Ash	539474	265135	Peeling bark and west facing crevices	1
297	Sycamore	539467	265121	North facing holes and crevices approximately 11m above the ground	2
298	Ash	539457	265104	Woodpecker hole facing east approximately 6m above the ground, peeling bark	1
299	Ash	539452	265096	Large hole facing southeast approximately 6m above the ground	1*
300	Poplar	540342	265727	Ivy covered	2
301	Ash	540311	265760	Ivy covered	2
302	Ash	539877	265607	Woodpecker holes and cracks at approximately 4m and 6m above the ground facing east and southwest.	1
303	Ash	539869	265616	East facing cracks at approximately 2m and 7m above the ground	1
304	Ash	539864	265620	Cracks at various heights east and southeast facing, woodpecker hole at 12m	1
305	Ash	539860	265625	Holes at various heights and directions, a decaying limb	1
306	Ash	539850	265632	Multiple holes and crevices approximately 6m above the ground with most facing south or southeast	1*
307	Ash	539836	265648	At least six holes between 6 – 12m above the ground facing east or southeast	1*
308	Willow	539455	263436	Peeling bark and decaying limb, with holes and crevices on all sides between 3m and 6m	1*

309	Willow	539446	263420	Partially fallen tree with some peeling bark, and crevices between 2m and 3m	1
310	Pedunculate oak	539428	263400	Ivy covered	1
311	Poplar	539427	263397	Ivy covered	1
312	Oak	539429	263379	Decaying branches and some peeling bark	2
313	Oak	539414	263347	Peeling bark with crevices, one particularly significant one at approx. 7m on the south side	1*
314	Oak	539400	266309	Crevices at approximately 8m on the south side	1
315	Oak	539392	266309	Signs of decay and broken branches	1
316	Oak	529006	263805	Missing limb, crevices in all directions and heights	1*
317	Oak	539040	263845	Missing limb, crevices in all directions and heights	1*
318	Oak	539047	263853	Missing limb, crevices in all directions and heights	1*
319	Oak	539140	263978	Signs of decay and missing limbs	1
320	Oak	539170	263780	Cracks and crevices in the trunk between 6m and 10m on the northwest side of tree	1*
321	Oak	539197	263767	Some signs of decay, missing branches	1
322	Poplar	539633	263495	Cracks and crevices on the east side between 2m and 10m	1
323	Poplar	539640	263497	Limited loose bark and hole at approximately 7m on the west side of tree	1
324	Poplar	539713	263511	Limited loose bark and hole at approximately 12m on the north side of tree	2
325	Poplar	539723	263510	Limited loose bark, no obvious holes	2
326	Poplar	539764	263517	Cracks and holes between 6m and 8m above the ground on the north and east sides of tree	1*

327	Poplar	539765	263517	Cracks in various directions, woodpecker hole at 3m above the ground	1*
328	Poplar	539776	263523	Various crevices and holes, mostly east facing	1
329	Poplar	539776	263523	Various crevices and holes, mostly east facing	1
330	Poplar	539776	263523	Various crevices and holes, mostly east facing	1
331	Poplar	539833	263526	Hollow limb at approximately 10m and woodpecker hole at approximately 6m, both on the east side	1*
332	Poplar	539960	263583	Crevices at about 3m to 6m above the ground on the southeast side	1
333	Poplar	539966	263570	Large hole at approximately 3m on southeast side	1
334	Poplar	539990	263580	Holes and crevices low to the ground which appear to lead to hollow in trunk	2
335	Poplar	540064	263637	Several cracks and crevices, missing limbs, three woodpecker holes on the northeast side one of which shows potential urine staining	1*
336	Oak	540013	263692	Limited amount of cracked, peeling bark	2
337	Oak	539954	263741	Limited amount of cracked, peeling bark	2
338	Oak	539506	263966	Crevice on the southeast side between 5m and 7m	2
339	Ash	540247	262581	A few holes caused by missing branches on the east side between about 8m and 12m	2
340	Ash	540342	263667	Several holes and crevices in various directions and heights	1*
341	Ash	539897	264080	Several holes and crevices in various directions between 3m and 8m	1
342	Willow	540408	263863	Several cracks, peeling bark and holes in various directions and heights	1*

343	Willow	540443	263897	Woodpecker hole on the northwest side at approximately 6m high, minimal loose bark	1
344	Ash	540766	264202	Ivy-covered	2
345	Ash	540733	264116	Ivy-covered	2
346	Willow	539084	265368	Woodpecker hole about 10m above ground on the southeast side	1
347	Willow	539076	265353	Woodpecker hole at approximately 10m on the east side of tree, some loose bark	1
348	Willow	539052	265305	Cracks, crevices and holes at various heights and directions	1*
349	Ash	539052	265305	Cracks, crevices and holes at various heights and directions	1*
350	Willow	539037	265269	Cracks, crevices and holes at various heights and directions	1*
351	Ash	539021	265246	Cracks, crevices and holes at various heights and directions	1*
352	Ash	539001	265222	Numerous holes and loose bark at various heights and directions and possible hollow trunk	1*
W1	Mixed deciduous woodland	540391	265699	Dense ivy covering on many of the trees in the woodland	1
W2	Mixed deciduous woodland	538240	264113	Minor holes and ivy covering	2
W3	Mixed deciduous woodland	539661	263080	Minor holes and ivy covering	2

4.2.2 Activity Survey

The following species were recorded during the activity surveys:

- Common pipistrelle;
- Soprano pipistrelle;
- Noctule;
- Leisler's bat;
- Possible serotine;
- Probable Daubenton's bat; and

- Brown long-eared bat.

Bat activity recorded during each of the surveys is described below and key areas of foraging and commuting activity are shown on Figure 5.

4.2.2.1 Dusk Survey 29th May

Low levels of bat activity were recorded during this survey. Most activity was noted along transect 1, particularly along Oakington Brook. A probable Daubenton's bat social call was recorded at 22:30 alongside Oakington Brook, adjacent to the road to Welney Farms Ltd. At 22:31, common pipistrelle was recorded foraging along the track adjacent to the woodland, with brief passes also recorded while walking along this track towards the A14. At 23:02, common pipistrelle was recorded foraging along the line of trees leading to the trackway between Welney Farms Ltd. and New Close Farm Business Park. No further bat activity was recorded until 00:05, when common pipistrelle was recorded foraging along Oakington Brook for approximately 5 minutes. It was suspected that foraging activity continued as the surveyors completed the transect.

Along transect 2, common and soprano pipistrelle and probable Leisler's bat were recorded at 22:17 near to Longstanton Road, with soprano pipistrelle also recorded at 23:11 along the field edge.

Along transect 3, common pipistrelle was recorded foraging along Wilson's Road (track), where the path turns to the left at 23:11 and further towards Longstanton between 23:52 and 23:55.

4.2.2.2 Dusk Survey 30th May

Common and soprano pipistrelle were recorded, with most activity noted along transects 5 and 6. Along transect 5, common and soprano pipistrelle bats were recorded. Common pipistrelle was seen commuting across the site early during the survey, with two pipistrelle passes at 21:26 only 18 minutes after sunset, indicating that these were roosting on the site or nearby. They were seen flying north at grid reference TL40537 66476, near to B5 (refer to Figure 5). A few common pipistrelle passes were recorded near to the western boundary of Oakington Barracks and Airfield and common pipistrelle foraging activity was noted along a line of trees at TL4067066162, also near to the western boundary. A soprano pipistrelle pass was also noted in this part of the site. Common pipistrelle foraging activity also noted along the transect further south, also near to the western boundary. Common pipistrelle foraging activity was then noted along the road heading towards the lake and then also over the lake. Some common pipistrelle passes were also noted around the blocks of plantation woodland, as well as two soprano pipistrelle passes.

Along transect 6, common pipistrelle was recorded foraging along the access road into Oakington Barracks and Airfield just beyond the entrance gate, between around 21:30 and 21:54. Intense common and soprano pipistrelle foraging activity was also later noted along Long Lane, with common pipistrelle also foraging along the hedgerow along the northern boundary to the west of Larksfield Nursery.

Very little activity was recorded along transect 7, comprising six common pipistrelle passes, including four passes along the track between arable fields in

the northeast corner of the site between 22:58 and 23:02. A similar scenario was noted along transect 4, where two common pipistrelle passes were noted along the woodlands in the southeast corner of the site.

4.2.2.3 Dusk Survey 17th June

Along transect 1, a great diversity of species were recorded when compared to the previous surveys, comprising noctule, brown long-eared bat and common and soprano pipistrelle. Noctule was recorded foraging around the plantation woodland near to Oakington Business Park at 21:43 to 21:44. The remainder of the bat activity was recorded along Oakington Brook. This comprised a brown long-eared bat at 22:40 and soprano pipistrelle at 22:44, both along the track between the brook and plantation woodland, and occasional common pipistrelle foraging activity.

Along transect 2, common and soprano pipistrelle foraging activity was recorded. Two brief common pipistrelle passes were heard along the edge of the arable field to the east of Oakington Business Park, which may have been associated with activity outside the site. The remaining activity was noted along hedgerows between pasture fields and arable land further north, comprising common pipistrelle foraging activity over the adjacent field at 22:11, soprano pipistrelle foraging along the hedgerow for about a minute at 22:19 and common pipistrelle foraging along the hedgerow and over long grass at the corner of the field adjacent to the pasture fields and Longstanton Road between 22:22 and 22:25.

Three common pipistrelle passes were heard along transect 3 at 22:25 along Longstanton Brook.

Most bat activity was recorded along transect 6. Common pipistrelle was recorded foraging along the access road into Oakington Barracks and Airfield as per the dusk survey on 30th May. Foraging activity was recorded along Long Lane; a total of 37 calls were noted between 22:06 and 22:26. These were mainly common pipistrelle (with two bats recorded at the same time), although soprano pipistrelle was also present. Common pipistrelle and a ‘big bat’ were then recorded foraging along the hedgerow in the pasture field adjacent to Long Lane. Two common pipistrelle calls were recorded along hedgerows between these fields. Further common and soprano pipistrelle foraging activity was recorded along Long Lane. Two further common pipistrelle passes were noted along St. Michael’s Way, along with a noctule pass at 23:33. Common pipistrelle was also recorded foraging along the northern edge of the field to the west of Larksfield Nursery.

4.2.2.4 Dusk Survey 8th July

Common pipistrelle was recorded along the hedgerows around the fields to the west of Long Lane; these were mainly faint passes, although one was seen flying back and forth along the hedgerow alongside Rampton Road at 21:51. Two noctule passes were also recorded in this part of the site at 21:53 and 22:02, but were not seen.

Common pipistrelle, noctule and Leisler’s bat were recorded foraging along Long Lane, with common pipistrelle and soprano pipistrelle also foraging along St. Michael’s Way. A possible serotine was noted at 22:19 along Long Lane, but could not be confirmed due to overlapping call parameters with Leisler’s bat

foraging in cluttered habitats. Up to four pipistrelle bats were seen at any one time along Long Lane, with frequent pipistrelle foraging passes also noted along St. Michael's Way and over the fields to the northwest.

4.2.2.5 Dusk Survey 22nd August

A wide variety of species were recorded, although less bat activity was noted when compared to the July survey. Common and soprano pipistrelle calls were heard along the hedgerows around the fields near to Brookfield Farm, including some foraging activity. A *Nyctalus* sp. call was also recorded along Rampton Road. Occasional common and soprano pipistrelle passes were recorded along Long Lane. A probable Daubenton's bat was recorded at 21:43, along a field edge to the west of Long Lane (woodland edge to the east of western-most field), with brown long-eared bat (22:40), Leisler's bat (21:48) and common pipistrelle passes also noted in this part of the site. A probable Daubenton's bat was also recorded along St. Michael's Way at 22:34, with Leisler's bat also recorded at 22:46. A brown-long eared bat was also heard at the field edge that runs alongside Oakington Barracks and Airfield.

4.2.2.6 Dawn Survey 23rd August

Less bat activity was recorded during the dawn transect, with only common and soprano pipistrelle passes heard. This activity was noted along the hedgerows around the fields at Brookfield Farm, around the field edges to the west of Long Lane, as well as along Long Lane.

4.2.2.7 Dusk Survey 19th September

Pipistrelle calls were recorded along St. Michael's Lane, as well as Leisler's bat at 19:51. Common and soprano pipistrelle foraging activity was noted along Long Lane, particularly at the southern end. Common and soprano pipistrelle foraging activity was recorded around the field edges to the west of Long Lane, particularly the edge to the west of the woodland, which was also found to provide valuable foraging habitat during the dusk survey in August (refer to Figure 5). Common and soprano pipistrelle bats were also recorded foraging along the hedgerows around the field to the west of Larksfield Nursery, with common pipistrelle also noted along Rampton Road and field edges at Brookfield Farm. Noctule was also recorded along Rampton Road at 21:44.

4.2.3 Automated Survey

The following species were recorded by the static detectors, which excludes the species only identified to genus that would fall into one of the following:

- Common pipistrelle;
- Soprano pipistrelle;
- Nathusius' pipistrelle;
- Noctule;
- Leisler's bat;
- Probable serotine;

- Probable Daubenton's bat;
- Probable Natterer's bat;
- Brown long-eared bat; and
- Barbastelle.

Appendix B shows the data obtained by the static detectors at the site. These tables provide the bat activity indices, calculated as the number of passes per species for each survey period, divided by the number of nights within that survey period. No bats were recorded by SD4; therefore this static detector is excluded from Appendix B. The results are summarised in Table 9 below.

The highest levels of bat activity were recorded by SD13 (along Oakington Brook), principally associated with soprano pipistrelle foraging activity and social calls. The highest diversity of bat species was also recorded in this part of the site. Less than half as much activity was recorded by SD6 (adjacent to the lake at Oakington Barracks and Airfield), which was principally common pipistrelle foraging activity. Reasonably high levels of bat activity were also recorded by SD8 and SD9 (along the northern boundary of the site) and SD10 (on Long Lane), in each case principally associated with common pipistrelle foraging activity. Across the site, common pipistrelle was most frequently recorded, followed by soprano pipistrelle, pipistrelle species, noctule and then probable Daubenton's bat.

Table 9: Summary of Automated Survey Data within the Site

Species	Bat Activity Indices																
	SD1	**SD2**	**SD3**	**SD4**	**SD5**	**SD6**	**SD7**	**SD8**	**SD9**	**SD10**	**SD11**	**SD12**	**SD13**	**SD14**	**SD15**	**SD16**	**Site Averages**
Common pipistrelle	5	16.4	1.4		118	246.2	35.6	217	147.6	145.3	12.6	26	107.4	26.2	30	27.3	**1162**
Soprano pipistrelle	0.2	0.6			11.4	74.4	4.2	3	15.1	38.9	0.3	1	749.6	2	0.8	1.1	**902.6**
Nathusius' pipistrelle		0.2							0.3					0.1	0.7	1	**2.3**
Pipistrelle	0.8	0.6			18.2	4.8	62.8	23.6	7.3	8.2	0.2	4.2	0.6	1.7	4.1	0.8	**137.9**
Noctule					0.8	11.4	0.6	1.6	0.8	0.3	0.5	0.8		0.6		1.2	**18.6**
Leisler's bat						1.8			0.3			0.2				0.3	**2.6**
Probable Leisler's bat												0.1					**0.1**
Probable serotine													1.6				**1.6**
Nyctalus sp.	0.2				0.2	0.8	0.3	0.4			0.1		0.2			0.2	**2.4**
Big bat													0.2				**0.2**
Probable Daubenton's bat						13.4	3.4		0.2		0.1			0.9			**18**
Probable Natterer's bat													0.4				**0.4**
Myotis sp.						10.8	1.8	0.2		0.8		0.1	0.2			0.2	**14.1**
Brown long-eared bat									0.5	0.3							**0.8**
Probable brown long-eared bat										0.4						0.5	**0.9**
Barbastelle		0.6															**0.6**
Totals	**6.2**	**18.4**	**1.4**	**0**	**148.6**	**363.6**	**108.7**	**245.8**	**172.1**	**194.2**	**13.8**	**32.4**	**860.2**	**31.5**	**35.6**	**32.6**	**2265.1**

4.3 Badger Survey

The results of the badger survey are presented in Figure 6, which is contained in the Confidential Badger Appendix, along with a description of the setts.

A total of 31 setts were recorded, of which 25 were well-used, five were partially disused and one was disused at the time of the survey. High levels of badger activity were recorded within the site, including four main setts. Three of these were recorded within Oakington Barracks and Airfield, with the fourth recorded within the OSIA. Well-used setts with many entrance holes that are characteristic of main setts were recorded and it was clear that there are multiple social groups within the site. Considering the complex nature of the badger activity within the site, the status of badger setts within the site and the territorial boundaries of the social groups should be confirmed by conducting a badger bait-marking survey. Further details regarding this survey are outlined in Section 6.4.3.

4.4 Breeding Bird Survey

A total of 73 species of bird were recorded at the site during 2013 and 2014. Table 10 lists all species recorded and indicates their likely breeding status within the site. Breeding status at the site has been deduced by analysis of field survey data alongside the standard criteria recommended by the European Bird Census Council (please refer to Appendix C).

Table 10: All Bird Species Recorded and their Site Breeding Status

Common Name	Scientific Name	Site Breeding Status
Mute swan	*Cygnus olor*	Confirmed breeding
Greylag goose	*Anser anser*	Confirmed breeding
Canada goose	*Branta canadensis*	Confirmed breeding
Mallard	*Anas platyrhynchos*	Confirmed breeding
Cormorant	*Phalacrocorax carbo*	Non-breeding
Red-legged partridge	*Alectoris rufa*	Probable breeding
Grey partridge	*Perdix perdix*	Probable breeding
Pheasant	*Phasianus colchicus*	Probable breeding
Grey heron	*Ardea cinerea*	Non-breeding
Great crested grebe	*Podiceps cristatus*	Probable breeding
Sparrowhawk	*Accipiter nisus*	Probable breeding
Buzzard	*Buteo buteo*	Confirmed breeding
Kestrel	*Falco tinnunculus*	Confirmed breeding
Hobby	*Falco subbuteo*	Confirmed breeding
Moorhen	*Gallinula chloropus*	Confirmed breeding
Coot	*Fulica atra*	Confirmed breeding
Lapwing	*Vanellus vanellus*	Possible breeding
Snipe	*Gallinago gallinago*	Probable breeding
Black-headed gull	*Chroicocephalus ridibundus*	Non-breeding

Common Name	Scientific Name	Site Breeding Status
Common gull	*Larus canus*	Non-breeding
Lesser black-backed gull	*Larus fuscus*	Non-breeding
Herring gull	*Larus argentatus*	Non-breeding
Great black-backed gull	*Larus marinus*	Non-breeding
Feral pigeon	*Columba livia domesticus*	Confirmed breeding
Stock dove	*Columba oenas*	Confirmed breeding
Wood pigeon	*Columba palumbus*	Confirmed breeding
Collared dove	*Streptopelia decaocto*	Probable breeding
Turtle dove	*Streptopelia turtur*	Possible breeding
Barn owl	*Tyto alba*	Confirmed breeding
Little owl	*Athene noctua*	Probable breeding
Tawny owl	*Strix aluco*	Probable breeding
Long-eared owl	*Asio otus*	Possible breeding
Swift	*Apus apus*	Possible breeding
Green woodpecker	*Picus viridis*	Confirmed breeding
Great spotted woodpecker	*Dendrocopos major*	Confirmed breeding
Magpie	*Pica pica*	Confirmed breeding
Jay	*Garrulus glandarius*	Probable breeding
Jackdaw	*Corvus monedula*	Probable breeding
Rook	*Corvus frugilegus*	Probable breeding
Carrion crow	*Corvus corone*	Probable breeding
Blue tit	*Cyanistes caeruleus*	Confirmed breeding
Great tit	*Parus major*	Confirmed breeding
Skylark	*Alauda arvensis*	Confirmed breeding
Swallow	*Hirundo rustica*	Confirmed breeding
House martin	*Delichon urbicum*	Confirmed breeding
Long-tailed tit	*Aegithalos caudatus*	Confirmed breeding
Treecreeper	*Certhia familiaris*	Probable breeding
Chiffchaff	*Phylloscopus collybita*	Probable breeding
Willow warbler	*Phylloscopus trochilus*	Probable breeding
Blackcap	*Sylvia atricapilla*	Confirmed breeding
Garden warbler	*Sylvia borin*	Probable breeding
Lesser whitethroat	*Sylvia curruca*	Probable breeding
Common whitethroat	*Sylvia communis*	Confirmed breeding
Wren	*Troglodytes troglodytes*	Confirmed breeding
Starling	*Sturnus vulgaris*	Confirmed breeding
Blackbird	*Turdus merula*	Confirmed breeding
Song thrush	*Turdus philomelos*	Confirmed breeding

Common Name	Scientific Name	Site Breeding Status
Mistle thrush	*Turdus viscivorus*	Confirmed breeding
Fieldfare	*Turdus pilaris*	Non-breeding
Robin	*Erithacus rubecula*	Confirmed breeding
Dunnock	*Prunella modularis*	Confirmed breeding
House sparrow	*Passer domesticus*	Confirmed breeding
Yellow wagtail	*Motacilla flava*	Confirmed breeding
White wagtail/Pied wagtail	*Motacilla alba*	Confirmed breeding
Meadow pipit	*Anthus pratensis*	Confirmed breeding
Chaffinch	*Fringilla coelebs*	Confirmed breeding
Greenfinch	*Chloris chloris*	Confirmed breeding
Goldfinch	*Carduelis carduelis*	Confirmed breeding
Linnet	*Carduelis cannabina*	Confirmed breeding
Bullfinch	*Pyrrhula pyrrhula*	Probable breeding
Yellowhammer	*Emberiza citrinella*	Confirmed breeding
Reed bunting	*Emberiza schoeniclus*	Confirmed breeding
Corn bunting	*Emberiza calandra*	Confirmed breeding

Table 11 lists the key bird species recorded at the site. Key species are Schedule 1 species, appear on the BoCC red or amber lists, or are on the Section 41 list of species of principal importance in conserving biodiversity. Three Schedule 1 species (fieldfare *Turdus pilaris*, hobby *Falco subbuteo* and barn owl) were recorded, two of which were confirmed as breeding at the site in 2013 (hobby and barn owl). Fieldfares were only recorded on the March 2014 survey and had probably migrated back to their breeding grounds in Scandinavia and continental Europe by April. A total of 13 red list species were recorded along with 21 which are included on the amber list. In addition, 15 species listed as species of principal importance in conserving biodiversity and on the UK BAP were recorded at the site. Three Local BAP species were also recorded. Each key species is discussed in further detail in Sections 3.4.1, 4.4.2 and 4.4.3 below.

Table 11: Key Bird Species Recorded at the Site

Common Name	Scientific Name	BoCC Category	Other Designations
Greylag goose	*Anser anser*	Amber	-
Mallard	*Anas platyrhynchos*	Amber	-
Grey partridge	*Perdix perdix*	Red	NERC, UK BAP, LBAP
Kestrel	*Falco tinnunculus*	Amber	-
Hobby	*Falco subbuteo*	Green	Schedule 1
Lapwing	*Vanellus vanellus*	Red	NERC, UK BAP
Snipe	*Gallinago gallinago*	Amber	-
Black-headed gull	*Chroicocephalus ridibundus*	Amber	-
Common gull	*Larus canus*	Amber	-

Common Name	Scientific Name	BoCC Category	Other Designations
Lesser black-backed gull	*Larus fuscus*	Amber	-
Herring gull	*Larus argentatus*	Red	NERC, UK BAP
Great black-backed gull	*Larus marinus*	Amber	-
Stock dove	*Columba oenas*	Amber	-
Turtle dove	*Streptopelia turtur*	Red	NERC, UK BAP
Barn owl	*Tyto alba*	Amber	Schedule 1
Swift	*Apus apus*	Amber	-
Green woodpecker	*Picus viridis*	Amber	-
Skylark	*Alauda arvensis*	Red	NERC, UK BAP, LBAP
Swallow	*Hirundo rustica*	Amber	-
House martin	*Delichon urbicum*	Amber	-
Willow warbler	*Phylloscopus trochilus*	Amber	-
Common whitethroat	*Sylvia communis*	Amber	-
Starling	*Sturnus vulgaris*	Red	NERC, UK BAP
Song thrush	*Turdus philomelos*	Red	NERC, UK BAP, LBAP
Mistle thrush	*Turdus viscivorus*	Amber	-
Fieldfare	*Turdus pilaris*	Red	Schedule 1
Dunnock	*Prunella modularis*	Amber	NERC, UK BAP
House sparrow	*Passer domesticus*	Red	NERC, UK BAP
Yellow wagtail	*Motacilla flava*	Red	NERC, UK BAP
Meadow pipit	*Anthus pratensis*	Amber	-
Linnet	*Carduelis cannabina*	Red	NERC, UK BAP
Bullfinch	*Pyrrhula pyrrhula*	Amber	NERC, UK BAP
Yellowhammer	*Emberiza citrinella*	Red	NERC, UK BAP
Reed bunting	*Emberiza schoeniclus*	Amber	NERC, UK BAP
Corn bunting	*Emberiza calandra*	Red	NERC, UK BAP

Territory maps have been compiled which indicate the breeding territories of key species at the site. Species have been categorised by protection/rarity (e.g. BoCC red list, amber list) and are shown on Figure 7 and Figure 8. Please note that key species recorded but not deemed to be breeding at the site are not included in these figures, including gulls.

4.4.1 Schedule 1 Species

Two species listed on Schedule 1 of the WCA, were identified as breeding at the site in 2013. These were hobby and barn owl and are discussed in more detail

below. Fieldfare is also listed on Schedule 1, but was not breeding on the site and is therefore discussed in Section 4.4.2.3.

4.4.1.1 Hobby

Confirmation that this species was breeding on site in 2013 was gained from observations of a pair at an active nest in a mature tree within the OSIA. The pair was calling to one another and an adult bird was seen returning to the same tree with food on 25th June 2013. The nest site was in a mature tree in arable fields at grid reference TL 39191 63768. Previous surveys by URS have confirmed hobby breeding at Oakington Barracks and Airfield in 2012.

4.4.1.2 Barn Owl

The box close to the airfield landing strip (box 1673 [1] at grid reference: TL 41466 65927) was the only one found to contain breeding barn owls. A pair of adult barn owls and three juveniles were recorded in the box at this location. Previous surveys have also confirmed barn owl breeding at the site in 2003, 2006, 2007, 2011 [1] and 2012 [3]. During the 2012 URS bird surveys, two pairs of barn owl were recorded nesting on the site, including one pair nesting in a nest box.

4.4.2 Birds of Conservation Concern Red List Species

Thirteen BoCC red listed species were recorded at the site in 2013: grey partridge; lapwing; fieldfare; herring gull; turtle dove; skylark; starling; song thrush; house sparrow; yellow wagtail; linnet; yellowhammer; and corn bunting. Each species is discussed in more detail below:

4.4.2.1 Grey Partridge

During the 2013 surveys, a pair was recorded in an arable field within the OSIA, to the north of the A14 and again in March 2014. One other record was of a single bird calling in an arable field to the east of Wilson's Road. A further pair was recorded in a field margin north of Oakington Business Park in March 2014 and a single bird was flushed from a ditch edge in the same area. This species is likely to breed in small numbers at the site.

4.4.2.2 Lapwing

Lapwing was recorded in low numbers (maximum count of four) in the arable areas within the OSIA. Pairs were seen in suitable habitat during the breeding season during 2013 and 2014, suggesting this species possibly breeds at the site.

4.4.2.3 Fieldfare

Three flocks (86, 32 and 22 birds) of fieldfares were recorded feeding on farmland during the March survey. Fieldfare is a common winter migrant, with most birds returning to their main breeding grounds in Scandinavia and continental Europe by the end of March. A few pairs breed in Northern Britain. No further records of this species occurred during 2014 surveys and it is not a site breeding species.

4.4.2.4 Herring Gull

This species was recorded in low numbers (maximum count of two) flying overhead and is not considered to breed at the site.

4.4.2.5 Turtle Dove

An incidental record of a pair of turtle doves was obtained during a site visit connected to other protected species surveys. The pair was observed in an area of scrub at the north east section of Oakington Barracks and Airfield at approximate grid reference TL 41174 66673. This was the only observation of this species at the site but previous surveys [3] have recorded it as a probable breeding species and given this was a pair in suitable habitat during the breeding season it is considered possible this species also bred at the site in 2013.

4.4.2.6 Skylark

This species was numerous in the open grassland and arable areas around the Oakington Barracks and Airfield and in the arable areas within the OSIA. Estimated number of pairs totalled 55 for the site as a whole and breeding was confirmed by numerous observations of food carried by adults to active nests.

4.4.2.7 Starling

Starling was recorded in low numbers (maximum count of 15), mostly associated with buildings and open grassy areas used for foraging. Estimated breeding territories numbered 11 and breeding was confirmed with an observation of an adult carrying food to an active nest within the OSIA.

4.4.2.8 Song Thrush

This species was mostly associated with wooded areas and those with mature trees, adjacent gardens or scrub. An estimated eight breeding territories were recorded.

4.4.2.9 House Sparrow

House sparrows were recorded in low numbers at the site (maximum count of nine). Most observations were associated with residential areas at the site boundaries, particularly along Rampton Road near Brookfield Farm. A juvenile bird was also seen in this area, confirming breeding at the site.

4.4.2.10 Yellow Wagtail

Numerous observations were made of this species, particularly in the arable areas within the OSIA. At least 13 breeding territories were present across the site as a whole and breeding was confirmed by several observations of adults carrying food to nest sites.

4.4.2.11 Linnet

Several records of this species were obtained, mostly from hedgerows within the OSIA. There was a maximum count of 14 individuals and up to nine breeding territories at the site. Adults were seen carrying food to nest sites on two occasions.

4.4.2.12 Yellowhammer

An estimated 11breeding territories were held by this species at the site. Most records came from hedges and tree lines at the south of the site and from scrub within Oakington Barracks and Airfield. An adult was seen carrying faecal sac away from a nest site close to the CGB.

4.4.2.13 Corn Bunting

Corn bunting was only recorded singing within the OSIA, where two territories were recorded in arable areas south west of Oakington Business Park. An adult was seen carrying food to a nest site in this area on one occasion, confirming breeding. No records of this species were obtained during 2014 surveys.

4.4.3 Birds of Conservation Concern Amber List Species

Twenty-one BoCC amber listed species were recorded at the site in 2013: greylag goose; mallard; kestrel; snipe; black-headed gull; common gull; lesser black-backed gull; great black-backed gull; stock dove; barn owl; swift; green woodpecker; swallow; house martin; willow warbler; common whitethroat; mistle thrush; dunnock; meadow pipit; bullfinch; and reed bunting. Each species is discussed in more detail below:

4.4.3.1 Greylag Goose

Most sightings of this species were associated with the lake within Oakington Barracks and Airfield. A maximum count of 12 adults and 24 juveniles was recorded at the lake on 18th June 2013, confirming breeding at the lake. Mallard

As with the previous species, most records were associated with the lake and nearby area. Some occasional records of birds flying over and along ditches were also obtained. There was a maximum count of three pairs and seven juveniles on 18th June 2013, confirming breeding at the lake.

4.4.3.2 Kestrel

Several records of single birds were noted, mostly when they were observed hunting. Records were predominantly from Oakington Barracks and Airfield and the arable fields near the A14 boundary within the OSIA. In both areas, breeding was confirmed by locating active nests. At the airfield, a pair nested in a stack of straw bales, south east of the entrance road. Within the OSIA, a pair nested in an old carrion crow nest in a row of trees adjacent to arable fields, north of the A14.

4.4.3.3 Snipe

Two snipe were recorded during the March 2014 survey visit. One was seen flying onto rough grassland from the direction of the Airfield lake while a second was flushed from wet grassland at the edge of an arable field near Oakington Business Park. It is considered likely that, given the suitable breeding habitat present, this species will probably be breeding on site. An incidental record of two snipe drumming next to the Lake was recorded in May 2014.

4.4.3.4 Black-headed Gull

This species was recorded in low numbers (maximum count of four) flying overhead and is not considered to breed at the site.

4.4.3.5 Common Gull

This species was recorded in low numbers (maximum count of six) flying overhead and is not considered to breed at the site.

4.4.3.6 Lesser Black-backed Gull

This species was recorded in low numbers (maximum count of seven) flying overhead and is not considered to breed at the site.

4.4.3.7 Great Black-backed Gull

This species was recorded in low numbers (maximum count of two) flying overhead and is not considered to breed at the site.

4.4.3.8 Stock Dove

Two pairs were found to be nesting in owl boxes during the barn owl box inspection, confirming breeding at the site. A maximum count of 17 birds was recorded in April 2014 and a total of nine territories were mapped. Most records were associated with disused buildings at the site.

4.4.3.9 Barn Owl

This species was discussed in Section 4.4.1.2.

4.4.3.10 Swift

This species was recorded in low numbers foraging over the site (maximum count of ten) and is likely to nest in suitable roof spaces close to the site. An incidental record of two birds exiting Building 91 during June 2014 strongly suggests breeding occurred in this building.

4.4.3.11 Green Woodpecker

Numerous registrations of this species were recorded, particularly within Oakington Barracks and Airfield. Up to ten individuals and an estimated eight territories were recorded across the site.

4.4.3.12 Swallow

Most records of this species were of birds foraging over the site (maximum count of nine) but at least two territories were considered to exist at Brookfield Farm and a nest site was confirmed at a pill box close to the CGB at grid reference TL 41710 65676.

4.4.3.13 House Martin

Most records of this species were associated with Oakington Business Park within the OSIA, where at least six active nests were recorded. A further nest site was observed at New Close Farm Business Park, east of Hatton's Road.

4.4.3.14 Willow Warbler

This species was recorded in low numbers within the OSIA. Two territories were identified, both close to Oakington Brook, to the north west of Dry Drayton Road.

4.4.3.15 Common Whitethroat

Records of this species were numerous across the site, particularly in areas with scrub and hedges. A maximum count of twenty individuals and an estimated 31 breeding pairs were recorded across the site. Breeding was confirmed by several observations of juveniles.

4.4.3.16 Mistle Thrush

This species was recorded in low numbers at the site, with an estimated five territories at the site. Breeding was confirmed by the presence of a family group within Oakington Barracks and Airfield on 18th June 2013.

4.4.3.17 Dunnock

An estimated 20 territories were associated with this species across the site, mostly in areas with hedges and scrub at the perimeter of the site or around field boundaries.

4.4.3.18 Meadow Pipit

The majority of records of this species were from the open grassland areas around Oakington Barracks and Airfield and in grassy margins in the arable areas to the south of the site. An estimated 12 territories were recorded. Adults were seen carrying food to nest sites on three occasions.

4.4.3.19 Bullfinch

This species was recorded in low numbers (maximum count of three). One territory was recorded along Rampton Road, close to the CGB, and another was recorded in 2014 surveys along a hedge adjacent to the Longstanton to Oakington road.

4.4.3.20 Reed Bunting

Numerous observations were made of this species, the majority of which came from field ditches in the arable areas within the OSIA. A maximum count of 12 individuals and an estimated ten territories were recorded across the site.

4.4.4 Birds of Conservation Concern Green and Non-listed Species

There were an additional 39 species recorded, which have no specific nature conservation importance and have not experienced recent population declines and as such are listed on the green BoCC list [18] or are not listed at all where they have been introduced to the UK, e.g. Canada goose *Branta canadensis*. This includes a probable sparrowhawk nest within a band of plantation woodland at Oakington Barracks and Airfield, at grid reference TL 40844 65725.

4.5 Great Crested Newt Surveys

4.5.1 Habitat Suitability Indices

Table 12 details the HSI calculations for all eight ponds. Ponds 2 and 5 fall within the good suitability category and Ponds 1, 4 and 7 into the average suitability category. Ponds 3, 6 and 8 fall into the poor suitability category.

Table 12: Habitat Suitability Indices Results

HSI Factor	Criteria (HSI score)							
	Pond 1	**Pond 2**	**Pond 3**	**Pond 4**	**Pond 5**	**Pond 6**	**Pond 7**	**Pond 8**
Location	Optimal (1)	Optimal (1)	Optimal (1)	Optimal (1)	Optimal (1)	Optimal (1)	Optimal (1)	Optimal (1)
Pond area (m^2)	60 (0.05)	220 (0.35)	20,471 (0.01)	33 (0.05)	400 (0.8)	90 (0.2)	4 (0.05)	640 (1)
Pond drying	Rare (1)	Sometimes (0.5)	Never (0.9)	Rare (1)	Annually (0.1)	Never (0.9)	Rare (1)	Annually (0.1)
Water quality	Poor (0.33)	Moderate (0.67)	Moderate (0.67)	Moderate (0.67)	Moderate (0.67)	Moderate (0.67)	Moderate (0.67)	Moderate (0.67)
Shade	0% (1)	0% (1)	0% (1)	0% (1)	20% (1)	50% (1)	0% (1)	80% (0.6)
Fowl	Absent (1)	Absent (1)	Minor (0.67)	Absent (1)	Absent (1)	Absent (1)	Absent (1)	Absent (1)
Fish	Absent (1)	Absent (1)	Major (0.01)	Absent (1)	Absent (1)	Absent (1)	Absent (1)	Absent (1)
Ponds	1.91 (0.8)	1.91 (0.8)	1.91 (0.8)	1.91 (0.8)	1.91 (0.8)	0 (0.01)	0.58 (0.44)	0 (0.01)
Terrestrial habitat	Good (1)	Good (1)	Good (1)	Good (1)	Good (1)	Poor (0.33)	Moderate (0.67)	Moderate (0.67)
Macrophytes	30% (0.6)	40% (0.7)	8% (0.1)	100% (0.8)	90% (0.85)	50% (0.75)	20% (0.5)	100% (0.8)
HSI Score	0.62	0.76	0.28	0.68	0.72	0.44	0.60	0.43
Pond Suitability	Average	Good	Poor	Average	Good	Poor	Average	Poor

4.5.2 Presence/Absence Survey

Table 13 details the results of the great crested newt presence/absence surveys.

Great crested newts were only recorded in Pond 4, where common frog, common toad and smooth newt were also recorded. Smooth newt, common frog and/or common toad discovered in all the remaining ponds. The ponds are identified in Figure 3.

Table 13: Great Crested Newt Presence/Absence Survey Results

Pond	Results					
	Visit 1	**Visit 2**	**Visit 3**	**Visit 4**	**Visit 5**	**Visit 6**
1	0	0	0	1 froglet	0	0
2	1 smooth newt (F)	0	0	1 froglet	0	-
3	1 smooth newt	1 smooth newt (M) 1 toad tadpole	Numerous toad tadpoles	11 toad tadpoles	5 smooth newts (2M, 2F and 1 unknown)	3 smooth newts (2F and 1M)
4	**1 great crested newt (F)** 3 smooth newts (2F, 1M) Numerous tadpoles	3 smooth newts (M) 1 common frog	1 smooth newt (F) 1 toad (F)	**1 juvenile great crested newt (M)** 1 smooth newt (M)	4 smooth newts (2M, 1F and 1 unknown) 3 frogs	1 frog
5	-	-	-	0	Numerous tadpoles, including common frog	*
6	2 smooth newts (M)	0	0	0	-	-

*Pond was dry and therefore could not be surveyed

4.5.3 Population Estimate

The great crested newt population on site was categorised according to the peak number of individuals identified during a survey visit in accordance with current guidelines [28]. Great crested newt was only identified in Pond 4, with a peak count of 1 individual. This indicates that the great crested newt population on site can be categorised as ‘small’.

4.6 Reptile Survey

Consistent with the results of URS’ surveys during 2012 [3], the surveys conducted by Arup in 2013 identified the presence of grass snake and common lizard on site. In addition, common toad and great crested newt were recorded during the 2013 surveys. Table 14 presents the 2013 reptile survey results, as well as incidental records of amphibians.

Table 14: Reptile Survey Results

Survey Number	Date	Reptiles			Amphibians		
		Species	Life Stage	Number	Species	Life Stage	Number
1	17/09/13	Grass snake	Juvenile	0	Toad	Juvenile	1
			Adult	1			
		Common lizard	Juvenile	3		Adult	1
			Adult	2			
	18/09/13	-			Toad	Juvenile	11
2	19/09/13	Common lizard	Juvenile	3	Great crested newt	Adult	2
			Adult	3			
	25/09/13	-			Toad	Juvenile	6
3	25/09/13	Grass snake	Juvenile	2	Toad	Juvenile	2
		Common lizard	Juvenile	7			
			Adult	8			
	26/09/13	-			Toad	Adult	1
4	30/09/13	Grass snake	Juvenile	1	Great crested newt	Juvenile	2
			Adult	1			
		Common lizard	Juvenile	1	Toad	Juvenile	2

In addition, a water shrew *Neomys fodiens* was recorded at grid reference TL 41140 66602 during the survey on 30th September 2013.

The results are illustrated in Figure 9, which shows the peak counts for reptiles and amphibians recorded in any location within the site.

Most of the reptiles were recorded within Oakington Barracks and Airfield around the periphery of the site in areas of long grassland around the woodland edges and patches of scrub. Common lizard was identified in the greatest numbers in the north eastern corner of the site and further south along an area of dense scrub, close to the eastern boundary. All grass snakes were recorded within Oakington Barracks and Airfield along the edge of the woodland and scrub close to Longstanton Road (Figure 9).

Reptile numbers were low in the OSIA, with all three recordings of common lizard identified under the same mat between an arable field and private garden near to the top of Wilson's Track.

4.6.1 Population Estimate

Using the Froglife reptile survey guidelines [30], the reptile populations were categorised according to the peak count of individuals recorded during each survey. In order to calculate the peak count, the 2013 survey results were combined with URS' 2012 results (Table 15).

Populations of grass snake and common lizard were identified in both Oakington Barracks and Airfield and the OSIA, but it is believed these populations were likely to be distinct as Longstanton Road dissects the site, fragmenting the areas of suitable reptile habitat and limiting habitat connectivity between the north and south areas. As such, Table 15 provides the peak counts for reptiles recorded within Oakington Barracks and Airfield and the OSIA separately to inform population estimates for both areas.

Table 15: Combined Reptile Survey Results

Survey Date	Reptile Counts within Oakington Barracks and Airfield		Reptile Counts within the OSIA	
	Grass Snake	Common Lizard	Grass Snake	Common Lizard
18/06/12	1	0	0	0
31/08/12 – 01/09/12	0	2	0	2
04/09/12 – 05/09/12	2	0	0	0
05/09/12 and 17/09/12	2	1	0	2
18/09/12	0	0	0	3
19/09/12	3	0	0	0
20/09/12	2	2	0	0
17/09/13 – 18/09/13	1	3	0	0
19/09/13 and 25/09/13	0	6	0	0
25/09/13 – 26/09/13	2	12	0	3
30/09/13	2	1	0	0
Peak Count	3	12	0	3

Froglife [30] provides populations estimates for common lizard and grass snake, based on the peak counts, assuming that artificial reptile refugia are placed at a density of up to 10 per hectare. These criteria are set out in Table 16.

Table 16: Criteria for Estimating Common Lizard and Grass Snake Populations

Species	Low Population	Good Population
Common lizard	<5	5-20
Grass snake	<5	5-10

Mats were placed at a density of less than 10 per hectare of suitable reptile habitat in both areas of the site. Using the methods outlined in Table 16, this indicates that there is:

- A low population of common lizard within the OSIA; and
- A low population of grass snake and a good population of common lizard within Oakington Barracks and Airfield.

4.7 Hedgerow Regulations Survey

Since 2004, hedgerows 73 and 98 have been removed, as well as the northern part of hedgerow 59. Hedgerow 102 is now located within the current site boundary. A total of 29 important hedgerows were surveyed at the site (11, 15, 32, 34, 35, 38, 40, 42, 43, 45, 47, 50, 51, 52, 53, 54, 56, 58, 59, 63, 75, 77, 79, 80, 82, 84, 92, 95 and 102). The locations of the 29 important hedgerows are indicated on Figure 10.

Hedgerow 102 is located in the southeast corner of the site near to the A14 and is approximately 400m in length. It is surrounded by arable land and occurs alongside a ditch. Hedgerow 102 is untrimmed, with an average height and width of 2m and contains gaps. 'Woody' species present are blackthorn, elder, hawthorn, dog-rose and bramble. Details of the other 28 important hedgerows that were previously recorded were found to be unchanged during the survey.

The importance of hedgerows recorded at the site was assessed using various criteria, which are summarised in Table 17.

Table 17: Hedgerows of Importance

Importance Criteria	Hedgerow Number
Wildlife and Landscape criteria of The Hedgerow Regulations 1997	43
Section 41 of the NERC Act 2006	11, 15, 32, 34, 35, 38, 40, 42, 43, 45, 47, 50, 51, 52, 53, 54, 56, 58, 59, 63, 75, 77, 79, 80, 82, 84, 92, 95 and 102
Local BAP	11, 15, 32, 34, 35, 38, 40, 42, 43, 45, 47, 50, 51, 52, 53, 54, 56, 58, 59, 63, 75, 77, 79, 80, 82, 84, 92, 95 and 102
Within site context: English elm *Ulmus procera* locally dominant	15, 45, 47, 51 and 77
Within site context: old pollarded trees	43 (ash) and 47 (Dutch elm *Ulmus* × *hollandica*)
Within site context: high density of trees	15, 32, 34, 35, 42, 43, 50, 59 and 63
Within site context: 'woodland' plant species	42 and 43
Within site context: locally notable plant species	38 (greater burnet-saxifrage) and 40 (greater burnet-saxifrage)

Hedgerow 43 is 'Important' according to Wildlife and Landscape criteria of The Hedgerows Regulations 1997 because it supports more than seven 'woody' species.

All 29 hedgerows surveyed contain at least 80% cover of native 'woody' species are hence are of importance according to Section 41 of the NERC Act 2006 and the Local BAP.

A total of 19 hedgerows are considered to be important within the site context because they support features of ecological value (15, 32, 34, 35, 38, 40, 42, 43, 45, 47, 50, 51, 52, 59, 63, 75, 77, 92 and 95). The features of interest associated with the aforementioned hedgerows are described below.

Most of the hedgerows at the site are dominated by hawthorn and typically species-poor (contain less than five woody species). English elm, which is characteristic of this part of Cambridgeshire, is locally dominant in five

hedgerows (15, 45, 47, 51 and 77). Other elm species present in the aforementioned hedgerows are wych elm *Ulmus glabra* and Dutch elm.

Old pollarded trees comprise: a mature ash within Hedgerow 43 and a semi-mature Dutch elm within Hedgerow 47.

Nine hedgerows contain a high density of trees (15, 32, 34, 35, 42, 43, 50, 59 and 63).

The two hedgerows either side of Long Lane support 'woodland' plant species that are listed in the Wildlife and Landscape criteria of The Hedgerows Regulations 1997 (42 and 43). Hedgerow 42 supports sweet violet *Viola odorata*, wood avens *Geum urbanum* and false brome *Brachypodium sylvaticum*. Hedgerow 43 supports wood avens, herb-Robert *Geranium robertianum*, and false brome.

Hedgerows 38 and 40 support greater burnet-saxifrage *Pimpinella major*, which has a localised distribution in Cambridgeshire [34], [35].

5 Discussion

5.1 Bats

5.1.1 Potential and Confirmed Roosts

A confirmed roost was recorded within the roof void of the bungalow at Brookfield Farm (B55, Figure 4). The presence of fresh droppings and feeding remains, as well as the nature of roosting habitat indicate that this building supports a brown long-eared bat roost, although further emergence/return surveys are required to confirm this, as well as the nature of the roost (refer to Section 6.4.2). It was unclear where bats were gaining access into the roof void, although it is most likely that they access via crevices between the roof tiles and then via holes in the geotextile lining within the roof. There are also opportunities for bats to roost between the lining and the roof tiles, as well as between the roof tiles. Although no small bat droppings exhibiting characteristics of pipistrelle bats were recorded during the survey in 2013, it is also considered possible that pipistrelle bats also roost within this building, particularly since small bat droppings were recorded during internal inspection conducted in 2007.

Further buildings across the site were found to have a potential to support roosting bats, along with numerous trees, particularly within the belts of plantation woodland at Oakington Barracks and Airfield. Further emergence/return survey work is required to confirm the presence or likely absence of roosting bats, where these are likely to be affected as a result of the proposed Phase 2 and infrastructure developments (refer to Section 6.4.2).

5.1.2 Commuting and Foraging Activity

The most intense foraging activity was noted along Long Lane during the June and July bat activity surveys, where common and soprano pipistrelle, noctule, Leisler's bat, possible serotine and probable Daubenton's bat were recorded. Brown long-eared bat was also recorded by the static detector in this part of the

site (SD6). This part of the site supports a relatively high diversity of bats. This dark corridor flanked by trees along both sides provides ideal sheltered foraging habitat for bats. However, the highest levels of bat activity recorded by the static detectors were not recorded in this part of the site.

The static detector located along Oakington Brook, adjacent to the plantation woodland (SD13), recorded the highest levels of bat activity. The track between the plantation woodland and Oakington Brook was also found to support high levels of common pipistrelle foraging activity during the activity survey. The high bat activity indice calculated for soprano pipistrelle, as well as the social calls recorded, indicate that there is a soprano pipistrelle roost in this part of the site, either on the tree where the static detector was located, or another willow tree along Oakington Brook nearby. Many of these trees provide suitable roosting habitat for bats (Figure 3). A relatively high diversity of bat species were recorded in this part of the site, comprising probable serotine, *Nyctalus* sp and probable Daubenton's and probable Natterer's bat, as well as the species identified above.

The lake at Oakington Barracks and Airfield was found to provide important foraging habitat for common pipistrelle during the bat activity survey, where the level of bat activity recorded by the static detector (SD6) was second to SD13. Other species recorded here comprised soprano pipistrelle, noctule, Leisler's bat and probable Daubenton's bat. These results are in line with the results obtained by URS in 2012 [3], although brown long-eared bat was also recorded in 2012.

The road heading into the barracks just beyond the entrance gate, which is flanked by mature trees, was also a key foraging area for common pipistrelle and was also thought to provide a commuting corridor. One of the static detectors along the northern boundary of the site (SD8) also recorded high levels of bat activity, primarily associated with common pipistrelle foraging activity.

Wilson's Road (track) was found to provide important foraging habitat for common pipistrelle bats during the activity survey, although the static detector located at the southern end of this track recorded very little activity (SD12).

A total of 10 bat species were recorded during the bat surveys (including serotine, Daubenton's bat and Natterer's bat which were recorded as probable), of the 12 species that have been recorded in Cambridgeshire. The other species that have been recorded in Cambridgeshire are Whiskered and Brandt's bats. Due to the difficulties in identifying *Myotis* sp. bats to species level, it is possible that these species were also recorded.

The most significant species record was barbastelle, which was recorded by SD2 in the northern part of Oakington Barracks and Airfield. Only three calls were recorded at 00:10 on 2nd June within 15 seconds and are therefore likely to relate to a pass over the site rather than any activity within the site. This record is unsurprising though, considering that there is a maternity colony of barbastelle at Eversden and Wimpole Woods SAC. The site is therefore not considered to provide important habitat for barbastelle. A similarly low level of barbastelle activity was also recorded by URS in 2012 [3].

A low number of Leisler's bat calls were recorded within the site by four of the static detectors (SD6, SD9, SD12 and SD16). However, of particular note, Leisler's bat was recorded foraging along Long Lane and around the field edges to the west of Long Lane. Leisler's bat is considered to be rare in Cambridgeshire [36], with only four records of roosts.

Serotine is considered uncommon in Cambridgeshire [36] and indeed very few probable records of serotine were recorded by one of the static detectors located along Oakington Brook (SD13). These cannot be confirmed as serotine calls due to overlapping call parameters with Leisler's bat in cluttered habitats.

Cambridgeshire bat group has only collected a few records of Nathusius' pipistrelle [36]. This species is considered to be a rare bat in the UK, but there have been an increase in the number of records in Britain, which may be associated with expansions to their range [37] or confusion with common pipistrelle. Only low levels of Nathusius' pipistrelle activity were recorded by the static detectors located at Oakington Barracks and Airfield and the OSIA (SD2, SD9, SD14 and SD15).

The areas that were found to be of most value to foraging bats were the sheltered and vegetated areas that support abundant insect prey. Of particular note was Long Lane, where a wide variety of species utilise this corridor for feeding.

5.2 Badgers

The presence of 31 setts across the site indicates high levels of badger activity, principally in the southern part of Oakington Barracks and Airfield, where three main setts were recorded. An additional main sett was recorded in the OSIA. The 31 setts recorded included five partially disused setts and another disused sett; however it is possible that they may be occupied again in the future. As indicated previously, considering the levels of badger activity recorded, a badger bait-marking survey should be undertaken to verify status of badger setts within the site and the territorial boundaries of the social groups (refer to Section 6.4.3).

Only outlier and subsidiary setts were recorded within northern part of the site that falls within the Phase 2 planning application boundary. However, the proposed road down to Longstanton Road and Hatton's Road would bisect Oakington Barracks and Airfield, which would have a potential to fragment the setts and foraging habitats in the southern part of the barracks.

With reference to the results of previous badger surveys undertaken in 2007 [1] and 2012 [3], the number and distribution of setts across the site remain broadly similar when compared to these previous surveys. There have been changes to the status of badger setts across the site, as well as some additional setts recorded. It is noted that a main sett was recorded in the southeast corner of Oakington Barracks and Airfield in 2013, which is contrary to the results of the survey conducted by WSP in August 2007 [1]. Although WSP did not record a main sett in this part of the site, a main sett was recorded beyond the southeast boundary of the site, which could not be accessed during the survey in 2013. Based on a review of aerial mapping, it is possible that residential development beyond the southeast boundary of the site may have affected badger activity in the southeast corner of the site. However, the status of this sett should be verified should access be possible (refer to Section 6.4.3).

The grassland around the southern edges of the site provide valuable foraging habitat for badgers. The majority of foraging activity was noted along the edges of the woodlands, which provide cover near to the setts within the plantation woodland. Other setts were located along the field boundaries within in the OSIA, but at a lower density, indicating that the habitat is less suitable for badger compared to Oakington Barracks and Airfield.

The results indicate that more than one social group is present within the site, however the number of territories and locations of the boundaries of the territories can only be confirmed through the completion of a badger bait marking survey (refer to Section 6.4.3).

5.3 Breeding Birds

A total of 73 species of birds were recorded at the site during 2013. Of these, 61 were either confirmed as breeding or probably breeding on the site. A further four species were considered as possibly breeding at the site. The remaining eight species were considered non-breeding and were utilising the site in other ways, including for roosting and/or foraging. Overall, the diversity of birds at the site was good and included a range of species typically found in similar habitats in lowland Britain. These included passerines, raptors, game birds, corvids and waterfowl.

Fuller (1980) [38] devised standard procedures for evaluating breeding bird communities on sites. Recording the number of species on a site can provide a simple measure of species diversity from which to confer a level of conservation importance to a site. The standard qualifying levels provided by Fuller are as follows:

- National Importance: 85+ species;
- Regional Importance: 70-84 species;
- County Importance: 50-69 species; and
- Local Importance: 25- 49 species.

The confirmed breeding species list for the whole site numbered 42, which falls inside the range for Local Importance. It may be argued that proof of breeding was not achieved for some species which may have been breeding on the site. As such, this figure could well be higher. For example, if those species considered as probably breeding at the site were included, this figure would increase to 61 and the site would be considered of County level of importance.

The site supports two Schedule 1 species confirmed as breeding, one non-breeding, 13 red list species and 21 amber list species, the majority of which were considered to breed at the site. Oakington Barracks and Airfield currently provides a relatively diverse range of habitats which are beneficial to a significant number of bird species. Some of the habitats, for example the areas of open and largely undisturbed grassland, are scarce elsewhere in the local area. The areas of rough grassland, scrub and mature trees around the site boundary were particularly important for many bird species. The open water provided by the lake increased the species diversity at the site by attracting species such as great crested grebe, coot, mute swan and greylag goose. The site therefore certainly represents an area of Local Importance to birds and it could be argued it is important at a County Level, given the general lack of similar sites in the surrounding area.

The key areas for breeding birds within the OSIA were ditches, hedges, scrub and tree lines. Young plantation woodland with associated rough grassland was also important for some species, including meadow pipit, and the open arable areas were important for species such as skylark and yellow wagtail.

URS recorded 56 species of birds during the 2012 breeding bird surveys. The additional 17 species recorded at the site during the 2013 surveys probably reflect that the OSIA and land to the west of Long Lane were also surveyed, which diversified the habitat types that were surveyed. However, many of the species were recorded on both surveys and in similar numbers. For example, URS recorded an estimated 14 skylark territories at the Oakington Barracks and Airfield part of the site in 2012. The 2013 surveys of the same area estimated that 13 skylark territories were present.

Scarcer species such as quail and spotted flycatcher were recorded in low numbers by URS in 2012 but were not recorded at all during 2013. Similarly, the 2012 surveys did not note any records of long-eared owl or reed bunting whereas the 2013 surveys did. These small differences probably reflect the lower chances of seeing scarce or secretive species such as these, making them less likely to be recorded on every survey visit.

Taken as a whole, the results from the two survey seasons are likely to represent good overall indication of the types of species present and the numbers of pairs and individuals which currently utilise the site for breeding and/or foraging. The results from the two surveys are therefore likely to provide a robust set of data for the site as a whole.

5.4 Amphibians

URS conducted great crested newt presence/absence surveys on five ponds in 2012, revealing the presence of great crested newts in Ponds 1, 2 and 4 [3] (Figure 3). These ponds were surveyed by Arup in 2013, although great crested newt was only recorded in Pond 4 and in lower numbers (peak count of one compared to 13). A sixth pond was incorporated into the surveys by Arup in 2013, which is located within the OSIA, but no great crested newts were recorded.

It should also be noted that a peak count of two great crested newts were recorded under artificial reptile refugia during the reptile survey. This provides valuable information regarding the distribution of great crested newt across the terrestrial habitat within the site (Figure 9). As expected, great crested newt was recorded in areas of grassland and plantation woodland within the southern half of Oakington Barracks and Airfield, where the ponds are located that have been found to support great crested newt. The long grassland, scrub and woodland habitats within the site provide important habitat for great created newt outside the breeding season.

During 2013, fewer great crested newts were recorded in fewer ponds when compared to the results of the 2012 surveys [3]. This could be because the surveys commenced too late in the survey season, or as a result of natural variations in species populations over time.

A population estimate was calculated from the 2013 results, indicating that a small population of great crested newt was present on site. However analysis of the 2012 results reveals a peak count of 13 individuals recorded during the survey on 10th to 11th May 2012. These were recorded in Pond 4, which, taken in conjunction with the results of the 2013 survey, indicates that this pond provides the most important breeding habitat for great crested newt on the site. As outlined above, great crested newt was also recorded in Ponds 1 and 2, with peak counts of three and one respectively. A peak count of 13 recorded in 2012 indicates a

medium population of great crested newt. This peak count is at the lower end of this category, which falls between 11 and 100. Taking the 2012 and 2013 results in combination and adopting a precautionary approach, it is concluded that a medium population of great crested newt is present on the site.

Ponds 1, 2 and 4 are connected by suitable habitat (grassland and woodland) and are thought to support a metapopulation of great crested newts. As such, the retention and/or creation of multiple, interconnecting ponds that provide suitable breeding habitat for great crested newts will be vital to ensuring their long-term presence at the site.

Smooth newts, common toads and/or common frogs were also recorded within all of the surveyed ponds. Pond 3 was found to support large numbers of common toad tadpoles during the surveys and is therefore considered to provide important breeding habitat for this species. As indicated above with respect to great crested newt, the grassland, scrub and woodland habitat provide valuable terrestrial habitat. This species is of conservation importance as it is listed on the UK BAP and is a species of principal importance in conserving biodiversity.

5.5 Reptiles

Parts of Oakington Barracks and Airfield provides particularly suitable habitat for reptiles, including a mosaic of long grassland, scrub and woodland where reptiles can bask, forage, shelter and hibernate. A low population of grass snake and a good population of common lizard were recorded within Oakington Barracks and Airfield. A key area of the site for common lizard and grass snake comprised the southern part of the barracks, with the areas of scrub and grassland in the northern and eastern parts of the site providing important habitat for common lizard.

Although the OSIA presents limited opportunities for reptiles, being dominated by large expanses of intensively managed, arable land, common lizard exists in low numbers along Wilson's Road track and connecting habitats, including Longstanton Brook, equating to a low population. Common lizard was recorded in more locations within the OSIA by URS in 2012 than by Arup in 2013, although the peak count was the same (3). This is likely to be on account of the low population of common lizard in this part of the site and since fewer visits were completed, rather than any changes to their distribution.

5.6 Hedgerows

A total of 29 hedgerows were recorded at the site which have a combined total length of approximately 8km. All of the hedgerows are of importance according to Section 41 of the NERC Act 2006 and the Local BAP.

A total of 19 hedgerows are intrinsically important within the site context because they support features of ecological value (15, 32, 34, 35, 38, 40, 42, 43, 45, 47, 50, 51, 52, 59, 63, 75, 77, 92 and 95). Hedgerow 43 is also 'Important' (according to Wildlife and Landscape criteria of The Hedgerows Regulations 1997), because it supports seven 'woody' species.

Certain hedgerows at the site are also of importance because they support a species of nature conservation importance. For example, white-spotted pinion moth, which is nationally scarce species, was recorded alongside hedgerows where English elm is locally dominant (15, 45, 47, 51 and 77).

The hedgerows are also of importance because they facilitate species dispersal across the site and to adjacent semi-natural habitats. For example, the hedgerows along Long Lane (hedgerows 42 and 43) provide an important foraging habitat for common and soprano pipistrelle, Leisler's bat and noctule.

The majority of hedgerows at the site are species-poor and are in the need of sympathetic management to enhance their biodiversity potential. A few hedgerows support features of intrinsic importance, such as old pollarded trees, or support species of nature conservation importance, such as white-spotted pinion moth. Overall, for the aforementioned reasons the 8km hedgerow network at the site is of district/borough value.

6 Recommendations

This section outlines recommendations for mitigation, enhancements and further survey work with respect to the proposed Phase 2 and infrastructure planning applications.

6.1 General Approach

In parallel with the masterplanning for Phase 2, it is recommended that an ecologist works closely with the planners and landscape architects to develop a masterplan that incorporates appropriate mitigation and enhancements. The purpose would be to ensure that appropriate mitigation, compensation and enhancements are incorporated into the proposed development.

An ecological management plan should also be prepared, which would describe the retained habitats and proposed landscaped areas within the site and how these will be managed to mitigate impacts and maximise the biodiversity potential of the site. It is expected that the preparation of this document would be a condition of planning permission.

6.2 Mitigation

6.2.1 Bats

6.2.1.1 European Protected Species Licencing

Should B55 have a potential to be affected as a result of the proposed developments, a European Protected Species (EPS) Mitigation licence would need to be issued to and approved by Natural England once planning permission is granted but prior to the commencement of the work. This would include any work that could cause an offence under the WCA and Habitats and Species Regulations (refer to Section 2.3.1), which could include temporary or permanent disturbance as well as the loss of the roost. The same would apply to any other bat roosts recorded on the site during the recommended further surveys (refer to Section 6.4.2).

Natural England would have up to 30 working days to determine a licence application. Should the licence application be declined, the 30-day decision period would restart. It is therefore recommended that the licence application is submitted as soon as possible once planning permission is granted, to avoid delays to the programme.

This licence application would need to include a full Method Statement, describing the surveys undertaken and potential impacts of the proposed development. It would need to contain sufficient evidence to allow Natural England to reach the conclusion that ‘the action authorised will not be detrimental to the maintenance of the species concerned at a favourable conservation status in their natural range’ [39]. Therefore, adequate mitigation and compensation measures would also need to be outlined to minimise impacts and account for the loss of roosting and foraging habitat as a result of the proposed development.

The specific requirements for mitigation and compensation would be developed considering the nature of the roost and specifics of the proposed development, including the scale of impacts, timescales and works involved. However, this may include programming the works to avoid the most sensitive times of year (which would depend on the nature of the roost), excluding bats from the roost and/or conducting a soft-strip or soft felling under the guidance of a licensed bat worker. With respect to compensation for the loss of bat roosts, this could include installing bat boxes and bespoke roosting habitat for bats within the proposed development. This may comprise a 'bat house' or features, such as voids and crevices, within the proposed buildings. It is possible that some of the pillboxes could be altered to provide suitable roosting habitat for bats and therefore provide compensation for the loss of roosting habitat elsewhere. It should be noted, however, that three of these have a moderate potential to support roosting bats; some historic feeding remains were recorded within B7 and B13; and B10 could not be inspected. An EPS Mitigation licence would be required to undertake works on these structures if they are found to support roosting bats.

A Reasoned Statement would need to be submitted with the licence application, which would need to demonstrate that there are no satisfactory alternatives to the proposed works. It also needs to provide a 'planning' case for the proposed work, in terms 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'[39]. This document should be prepared by a planning consultant.

6.2.1.2 Lighting

Appropriate measures should be implemented to avoid the disturbance of roosting, foraging and commuting bats during the construction and operation of the proposed Phase 2 and infrastructure developments, in line with the BCT's guidelines. Lighting should not be directed towards Long Lane, other retained habitats or landscaped areas or purpose-built bat houses or bat boxes installed at the site. The following general measures should also be employed:

- Low or high pressure sodium lamps should be used where possible instead of mercury or metal halide lamps. Light Emitting Diodes (LEDs) are also preferable to mercury or metal halide lamps, as these are more directional with low spill;
- Lighting should be directed to where it is needed and accessories such as hoods, cowls, louvres and shields used to minimise spillage. The lighting strategy should be developed in consultation with an ecologist to ensure that lights are not directed towards potential flight lines or foraging areas that are created or retained as part of the proposed developments;
- The height of lighting columns should be minimised to limit the visibility of lighting and light spill to bats; and
- Light levels should be as low as guidelines permit and be turned off when not required.

6.2.2 Badgers

The badger setts should be retained where possible, particularly the main setts. In order to prevent disturbance to active badger setts (which would cause an offence under the Protection of Badgers Act 1992), it would be necessary to establish buffer zones around the setts. An indicative guide as to the extent of buffer zones that would likely need to be established is provided below [41]:

- No heavy machinery (generally tracked vehicles) within approximately 30 metres of any entrance to an active sett;
- No lighter machinery (generally wheeled vehicles), particularly for any digging operation, within 20m; and
- No light work such as hand digging or scrub clearance within 10m.

The completion of any of the above works within the specified zones may need to be undertaken under a licence. A licence would also be required to close any active setts. Furthermore, artificial setts would need to be created prior to the closure of main setts, to compensate for the loss of habitat.

It is not expected that any main setts would need to be closed in order to facilitate the Phase 2 and infrastructure developments, with the exception potentially of sett 19, due to works required to connect to the CGB. Although the future planning application(s) relating to the southern part of Oakington Barracks and Airfield could result in the most significant impacts on badger populations within the site, it is recommended that the design of the proposed development incorporates the existing main setts, as it may prove difficult to gain a licence to close them. The licence would need to demonstrate that interference is both unavoidable and will not adversely affect the population [40].

Sett closure would involve fitting a one-way gate to each entrance hole to be closed with associated weld-mesh fixed to the ground. The setts would be monitoring to check if any badgers remain. Sett interference should be avoided when dependant young may be present and badgers are particularly vulnerable (December to June inclusive).

The woodland, grassland, tall ruderal and scrub habitats that surround the setts provide foraging habitat and cover for badgers. In order to sustain the main setts within the site, this habitat would need to be retained and enhanced, maintaining connectivity across the site (refer to Section 6.3.3). It would also be necessary to maintain connectivity between the setts occupied by the same social group.

The proposed Phase 2 and infrastructure developments should incorporate suitable foraging habitat for badgers, to compensate for the loss of habitat. With respect to future planning applications within the southern part of Oakington Barracks and Airfield, the areas of grazed grassland within the southern part of the site provide ideal foraging opportunities for badgers and the loss of this habitat can be compensated through the enhancement of retained and landscaped areas around the periphery of the site. The extent of foraging habitat that should be provided will depend on the value of the habitats to badgers, in terms of the density of invertebrate prey and other food sources. However, there should be no net loss in foraging habitat, taking into consideration any increases in the carrying capacity of the habitats resulting from habitat enhancements (refer to Section 6.3.3).

6.2.3 Breeding Birds

It is recommended that the following mitigation principles are followed, with the aim of retaining the current species diversity at the site as a minimum requirement and to avoid contravention of the legislation outlined in Section 2.3.4.

Clearance works will be required prior to the commencement of construction work on the site. This is likely to entail the removal of vegetation and should therefore be preceded by various species mitigation works. Habitat clearance should occur outside of the main breeding bird season (March to August inclusive) to reduce the risk of any breeding birds, their active nests or young being harmed during construction. If this is not possible, a suitably qualified ecologist/ornithologist will need to attend the site to check for the presence of breeding birds prior to the commencement of any clearance or construction activities. Where any active nests are found during clearance, a buffer zone would need to be cordoned off around the nest to ensure the safeguarding of the nest and young. This would need to remain in place until the young had all fledged and left the immediate area around the nest site. It should be noted that whilst the main breeding season is between the periods stated above, nesting does occur at other times of the year and vigilance needs to be applied.

The mitigation strategy will also need to consider the potential effects of indirect disturbance events to breeding bird populations within the site and in the vicinity of clearance, earthworks and construction work. For example, certain construction activities could have indirect disturbance effects such as those caused by increased human presence or particularly noisy construction activities. This would particularly apply to any Schedule 1 species nesting at the site, as it is illegal to intentionally disturb any wild bird listed in Schedule 1 of the WCA while it is building a nest or is in, or near a nest containing eggs or young or to disturb the dependent young. Larger buffer zones would need to be implemented and applied around breeding sites for Schedule 1 species until all young had fledged and left the nest and immediate area.

Potential habitat loss associated with land clearance should be compensated for by the creation and enhancement of a range of habitat types. These habitats should reflect the breeding species present at the site, and therefore the habitats which currently exist at the site. Detailed enhancement recommendations are outlined in Section 6.3.4.

Specific measures for barn owls have previously been implemented at the site. Four barn owl ‘pole boxes’ were erected across Oakington Barracks and Airfield to mitigate for the loss of nest sites associated with the demolition of the disused aircraft hangers and other buildings. Three of these have since become unusable, which should be repaired or replaced. In the long-term, the preferred option would be to incorporate barn owl nesting opportunities within new buildings. This would ensure a longer term provision of nest sites. A plan should be developed to define the numbers, locations and designs of artificial nest sites for this species.

6.2.4 Amphibians

Suitable terrestrial habitat within 500m of breeding ponds is considered to have a potential to support great crested newt [28]. Ponds 1, 2 and 4 are located beyond 500m from the Phase 2 development boundary, but within 500m of the proposed access road to Longstanton Road. There is also a potential for great crested newt

to breed in Pond 7, which falls within the Phase 2 planning application boundary. As such, the proposed infrastructure development, as well as the future development of the southern part of Oakington Barracks and Airfield, will inevitably result in the loss of suitable terrestrial habitat for great crested newt, even if it were possible to retain Ponds 1, 2 and 4.

Due to the potential for the proposed developments to result in a loss of terrestrial habitat for great crested newt, an approved European Protected Species (EPS) Mitigation Licence will be required prior to the commencement of clearance of works that could otherwise result in an offence under the WCA and Habitats and Species Regulations. This can only be obtained once planning permission has been granted. The EPS Mitigation Licence would include a mitigation strategy for great crested newt, the details of which would be dependent on the proposed development design and results of further surveys recommended in Section 6.4.4. However, the general principles that would be applied are outlined below.

Where possible, Ponds 1, 2 and 4 should be retained, protected and enhanced during the future development of the site. As indicated in Section 5.4, it will also be essential to maintain and/or create suitable interconnecting terrestrial habitat to ensure the interchange of individuals between the ponds and maintain genetic diversity and viability. This could be achieved through the creation of tunnels for great crested newt beneath main roads that fragment breeding ponds or foraging habitat.

Should it be necessary to remove Ponds 1, 2 and 4, further ponds (off site or on site) would need to be created to act as receptor sites for the translocation of the great crested newts from the ponds to be lost. These would need to more than compensate for those to be lost to provide a net gain for great crested newts. The receptor site(s) (including the ponds and terrestrial habitat) should be more than capable of supporting the population of great crested newts being translocated through appropriate landscaping and management. Suitable enhancements are outlined in Section 6.3.5. Ponds should be located within 250m of each other and be connected by suitable habitat. Pond creation should take place well in advance of translocation (6 months as a minimum, ideally 1 to 2 years) in order to enable the establishment of plant and invertebrate populations. Following translocation, the habitats would need to be cleared sensitively under an ecological watching brief. All works should be undertaken between February and October inclusive, to avoid the period when amphibians are hibernating and are therefore more vulnerable to injury. Post-development monitoring will also be a requirement of an EPS Mitigation licence.

Smooth newts, toads and/or frogs were recorded in all surveyed ponds. The retention of the ponds on the site would benefit common amphibians as well as great crested newt. Of particular note was Pond 3. Although this pond was not found to support great crested newt, it provides valuable breeding habitat for common toads, with smooth newt also recorded breeding. It is understood that this pond is due to be retained during the future development of the site.

Common amphibians are only protected from sale under the WCA. However, appropriate mitigation measures should be employed to avoid unnecessary killing or injury. Any ponds that need to be removed should ideally be drained outside the amphibian breeding season; the implementation of the measures described above under an EPS Mitigation Licence would also protect common amphibians.

This would also involve the sensitive clearance of suitable terrestrial habitat under an ecological watching brief.

6.2.5 Reptiles

The implementation of development proposals will be likely to result in the loss and degradation of reptile habitat and features on site. It is therefore recommended that a mitigation strategy is developed in order to alleviate the impact of the development proposals on common lizards and grass snakes and ensure compliance with legislation.

The proposed developments will be phased, thus providing an opportunity to enhance certain areas of the site for reptiles to increase the carrying capacity. These areas would act as receptor sites for any reptiles displaced by works in other parts of the site. These enhancements should be implemented prior to the commencement of clearance works in other areas. Enhancements are discussed in Section 6.3.6.

This strategy should include the sensitive clearance of any reptile habitat, including woodlands, long grassland, tall ruderal vegetation and scrub, under an ecological watching brief, with such work being carried out between March and October when reptiles are active. Any potential hibernacula within the works area should be subject to a destructive search by an ecologist and the vegetation should be cleared in stages to allow any reptiles which may be present to escape. Following clearance, these areas should be managed such as to prevent any reptiles from returning to the work areas, by keeping the vegetation short and avoiding the creation of suitable hibernacula, such as log and stone piles. Undertaking clearance works sensitively will, in most cases, encourage reptiles to move out of harm's way. Any reptiles that are captured during sensitive clearance or the destructive search should be translocated to the receptor sites.

6.2.6 Hedgerows

There are 20 hedgerows at the site that are either of intrinsic importance or support a nationally scarce species (11, 15, 32, 34, 35, 38, 40, 42, 43, 45, 47, 50, 51, 52, 62, 63, 75, 77, 92 and 95) that should be protected and sympathetically managed. These actions would contribute to the Local BAP objectives.

Through the master planning design process, opportunities to link together retained hedgerows by planting native species-rich hedgerows should be sought to facilitate ecosystem functioning across the site. The former airfield is virtually devoid of hedgerows and offers potential for hedgerow creation to facilitate species dispersal across this part of the site. These hedgerows should include whips and standards of native tree and shrub species that are characteristic of this part of Cambridgeshire, which would contribute to the Local BAP targets.

6.3 Enhancements

6.3.1 General Principals

The following general principals should be adhered to when developing the ecological masterplan for the site:

- Appropriate enhancements should be incorporated within the site to benefit species that currently occur on the site, including great crested newt, bats, reptiles, badger and barn owl, as well as notable and protected species that have a potential to colonise the site. Consideration should be given to the UK and Local BAPs. These enhancements should ensure a net gain in biodiversity, in accordance with the National Planning Policy Framework [42];
- Native planting should be incorporated where possible, including berry-bearing species. Native species support higher levels of biodiversity;
- Connectivity should be ensured through habitat creation and retention, to ensure linkage through the site with other adjacent habitats and thus provide corridors for wildlife movement across the site;
- Landscaped areas should be developed with a variety of species in mind to bring multiple benefits. For example, the provision of wooded areas and hibernacula could bring benefits to mammals, birds, reptiles, amphibians and invertebrates; and
- A long-term management plan should be developed and adhered to (refer to Section 0) in order to ensure that the enhancement measures are appropriately managed.

6.3.2 Bats

The ecological masterplan should incorporate suitable foraging and commuting habitat for bats and the built development should incorporate suitable roosting habitat (refer to Section 6.2.1.1). Native trees, shrubs and flowering plants should be planted that attract insects that bats feed upon. Sheltered wildflower meadows and ponds also provide excellent foraging habitat for bats. Lines of trees and hedgerows should also be incorporated, ideally comprising a double line of vegetation that would create sheltered corridors across the site. These habitats would create foraging opportunities and improve connectivity.

The lake currently provides valuable foraging habitat for bats, but could be enhanced by incorporating riparian and aquatic planting, as well as trees and scrub around the edges of the lake to provide habitat for invertebrates and shelter from the wind.

6.3.3 Badgers

Ideally, the habitats that fall within the existing badger territories should be enhanced to provide improved foraging opportunities, to compensate for the inevitable loss of foraging habitat as a result of development, particularly within the southern part of Oakington Barracks and Airfield. Habitat retention and creation should favour short grazed or mown grassland and secondly broadleaved woodland, which support a high density of invertebrate prey [43]. The woodlands also provide important cover for the setts. Fruiting trees and shrubs provide an alternative source of food.

Ideally, adequate compensation for the loss of foraging habitat should be provided within the site. However, depending on the extent of habitat that can be retained and created within the site, it may be necessary to enhance adjacent habitats that fall within their territories, in order to compensate for habitat loss within the site.

6.3.4 Breeding Birds

Sufficient foraging habitat and habitat connectivity should be provided, both across the site and linking with the habitats at site boundaries where appropriate. In addition, provision of suitable artificial nesting opportunities should be included in the design of new buildings and be an integral part of their design. For example, the use of swift bricks and provision of barn owl nesting spaces within roof cavities should be included in new buildings.

Some areas of higher quality habitat which support denser populations and diversity of birds should be maintained and enhanced, including woodland areas, the lake, scrub, rough grassland, mature trees and hedgerows. The trees, hedgerows and scrub around the site boundaries are particularly important areas for many species and should be retained and enhanced. The provision of a 'buffer strip' of rough grassland and native planting (at least six metres wide) around these areas would provide improved foraging opportunities. The lake should be retained and the adjacent habitats enhanced by restricting public access and allowing vegetation to regenerate. Some additional riparian planting around the lake would also be beneficial by providing shelter, foraging opportunities and nesting habitat for birds.

Appropriately sized areas of compensatory land should be considered off-site for species such as skylark, meadow pipit and yellow wagtail. The areas of open grassland within Oakington Barracks and Airfield will be lost and these species will be forced to disperse to suitable habitats nearby. With appropriate funding in place, areas of farmland adjacent to the site could be enhanced for these species.

6.3.5 Great Crested Newts

As outlined in Section 6.2.4, it will be a requirement of the EPS Mitigation Licence to ensure that the future developments provide a net gain for great crested newt. This would also meet planning policy requirements.

The ecological masterplan for the site should incorporate suitable enhancements to retained breeding and terrestrial habitats within the site, as well as plans for habitat creation, to more than compensate for the habitats lost during the course of development. To achieve a net gain for great crested newt, larger areas of more suitable habitat should be provided, to increase the carrying capacity of the site for great crested newts. Ideally, this should be achieved within the site, rather than delivered as off-site mitigation, which would require that sufficient land is set-aside to accommodate these enhancements. It would also be beneficial to improve connectivity to any ponds supporting great crested newt within 500m. The results of further presence/absence surveys recommended on ponds located outside the site would help to achieve this aim (refer to Section 6.4.4).

Suitable features to incorporate into retained and new ponds include native marginal, floating and submerged vegetation, with some areas of open water and good invertebrate populations. Ponds should be created in clusters, interspaced with suitable terrestrial habitat. This should include long grassland, tall ruderal vegetation, scrub and woodland that provide foraging opportunities and shelter. Hibernacula should be created close to the ponds from rubble and log piles and earth banks.

6.3.6 Reptiles

A network of habitat corridors should be created around the site to allow reptiles to move between areas of suitable habitat. This will be developed through a mixture of ecological enhancements and an appropriate management plan involving the planting of native woodland and scrub areas, allowing grassland swathes to develop where grasses are left to grow rather than cut, and the creation of artificial hibernacula.

6.3.7 Hedgerows

Sections of retained hedgerows with greater than 5% gaps should be planted with whips. Also, standards of native tree and shrub species that are characteristic to this part of Cambridgeshire should be planted. Retained hedgerows should be trimmed (using a tractor mounted cutter) during late winter on a three year basis enhance their biodiversity potential. These actions would contribute to the Local BAP objectives.

6.4 Further Work

6.4.1 Larksfield Nursery

An extended Phase 1 habitat survey should be conducted at Larksfield Nursery, due to the lack of access to this part of the site. This survey would identify any alterations required to the Phase 1 Habitat Map (Figure 3) and assess the potential of this part of the site to support notable and protected species.

Based on aerial photography, it is evident that trees and buildings at Larksfield Nursery could support roosting bats and that there is a potential for badger setts to occur along the field boundaries. As such, bat scoping and inspection and badger scoping surveys should also be undertaken, which could be completed in conjunction with the extended Phase 1 habitat survey. The hedgerows should also be checked to update the Hedgerow Regulations survey conducted in 2004 [1].

Considering the timing for submitting a planning application in spring 2014, it is recommended that this work is carried out in March to April 2014, when badger setts are less obscured by vegetation, but also allowing time to conduct any necessary bat emergence and return surveys in May and June 2014.

6.4.2 Emergence/Return Surveys

Emergence/return surveys should be carried out on the buildings and trees that could be affected by the proposed development and have a potential to support roosting bats. In accordance with the BCT guidelines [21], this should include the buildings with at least a low potential to support roosting bats and the Category 1* and Category 1 trees.

Between one and three surveys should be undertaken on each feature, including a dawn survey with respect to moderate to high potential buildings or Category 1* trees. This survey work can be conducted between May and August (and September weather permitting), but should also be completed prior to the submission of the planning application. Considering the timing of the planning

application in late spring 2014, it may be necessary to conduct some of these surveys post-application.

6.4.3 Badger Bait-Marking Survey

Badger bait marking surveys aim to confirm the status of setts, as well as the territorial boundaries between social groups. A badger bait marking survey should be carried out when badger scoping surveys indicate that there are two or more main setts within 1km of a proposed development area [44]. The scoping survey confirmed the presence of multiple setts across the site. In addition, it will be important to confirm the status of the setts and territorial boundaries in the southern part of Oakington Barracks and Airfield, as the road proposed in this part of the site has a potential to prevent access to territories associated with multiple social groups.

It is therefore considered that a badger bait marking survey should be undertaken prior to submitting the planning application. This work should be undertaken between February and April 2014, to coincide with a peak in territorial activity and when vegetation cover is at a minimum. This work should be undertaken within 40m of the site boundary, where access is possible, and should also include the main sett recorded by WSP beyond the southeast boundary of the site.

6.4.4 Amphibian Surveys

Prior to visit four of the great crested newt presence/absence survey, an additional pond was identified (Pond 5, Figure 3), which was only subject to two surveys in early June 2013. Furthermore, no presence/absence surveys were carried out on Pond 7. These were found be of good and average suitability for great crested newt respectively (refer to Table 12). These ponds should be subject to four surveys between mid-March and mid-June 2014, including two surveys between mid-April and mid-May. An additional two surveys should be carried out if great crested newt is recorded, including one between mid-April and mid-May. No presence/absence surveys are required on Pond 8, as it was dry at the time of the survey and found to be of poor suitability for great crested newt.

Only the ponds located within the boundaries of the site were assessed for their suitability to support great crested newt and subject to presence/absence surveys. However, great crested newts typically travel up to 500m from their breeding ponds [28]. It is therefore important to survey the ponds within 500m of the site that are connected to the site by suitable habitat support great crested newt, to provide an accurate assessment of their population and inform requirements for mitigation. This work should be carried out within the timeframes outlined above.

The ponds within Cambridge Golf Course were surveyed in 2011 to inform the planning application for Phase 1 of Northstowe development and great crested newt was not recorded [45]. It is also thought likely that the CGB provides a barrier to the movement of great crested newt onto the site from the east. Based on a review of O.S mapping, there appear to be a total of six additional ponds outside the site that could support great crested newt, which should be surveyed subject to permission to access. This includes one pond that was proposed as mitigation for the CGB.

A survey should also be carried out to assess the size of the breeding population of common toad within Pond 4, in accordance with current guidelines [46].

6.4.5 Terrestrial Invertebrate Survey

A butterfly survey targeting white-letter hairstreak *Satyrium w-album* was undertaken during July 2013, to complement URS' butterfly survey that did not capture this survey period. A beating tray was employed in order to record any other invertebrates of elm during these surveys. Moth trapping was also conducted during August 2013, targeting white-spotted pinion moth *Cosmia diffinis*. The results of this survey work are outlined in a separate report (refer to Appendix A), which includes recommendations for further survey work. For completeness, the details regarding our recommended scope of additional survey work are provided below.

Further invertebrate survey work should be carried out between April and June 2014 to assess the conservation importance of the arable margins, weedy disturbed ground, pasture with herbivore dung and wetlands within the site to invertebrates. The targeted surveys indicated that these habitats have a potential to support notable invertebrates. This work should also incorporate an additional butterfly survey targeting grizzled skipper *Pyrgus malvae* in May 2013.

6.4.6 Fish Survey

In February 2007, Oakington Brook and Longstanton Brook were sampled using electrofishing [1]. This survey was conducted six years ago and is therefore out of date to inform any future planning applications. Since fish populations along Oakington Brook may be impacted by the proposed new access road, it is recommended that an update fish survey is carried out.

6.4.7 Arboricultural Survey

An update arboricultural survey should be undertaken to verify the findings of previous surveys carried out on the site between 2003 and 2007 [1], as this survey information would now be out of date to inform the planning applications.

The trees should be reassessed in accordance with the guidelines set out in British Standard (BS) 5837:2012 'Trees in Relation to Design, Demolition and Construction – Recommendations' [47]. This survey should ideally be undertaken between April and September inclusive. It is recommended that the content of the Arboricultural Reports to be submitted in support of the planning applications is agreed with South Cambridgeshire District Council Tree and Landscape officers, in terms of the level of detail required with respect to tree removal and retention.

6.4.8 Biodiversity Offsetting

Biodiversity offsets are nature conservation activities designed to deliver biodiversity benefits in compensation for losses from development activity [48]. There is a formal requirement for a quantitative calculation to demonstrate the loss and gain in biodiversity during the course of a development, which is then expressed as a simple ratio. Losses (from the development footprint) and gains (from habitats created or enhanced as part of the development) are each measured

in the same way using a metric system. This allows for a direct comparison to be made between the level of biodiversity lost to a development footprint and the biodiversity gained, usually in terms of newly created or enhanced habitat areas. When retained areas are factored in, a ratio is derived. From this ratio it can be clearly seen whether there is going to be a loss in biodiversity on the site and hence if biodiversity offsetting is required.

A biodiversity offsetting assessment of the proposed developments would establish the baseline condition of the site in terms of biodiversity units and the losses and gains to biodiversity as a result of the proposed development. This quantitative assessment will identify if off-site offsetting will be required should on-site mitigation not fully compensate for any biodiversity loss and how many biodiversity units will be needed to fully compensate for the development. Through the course of the current pilot schemes already underway across the country, it has become clear that the biodiversity offsetting assessment is viewed as a particularly useful planning tool with councils lying outside the pilot areas requesting this methodology be undertaken for planning applications.

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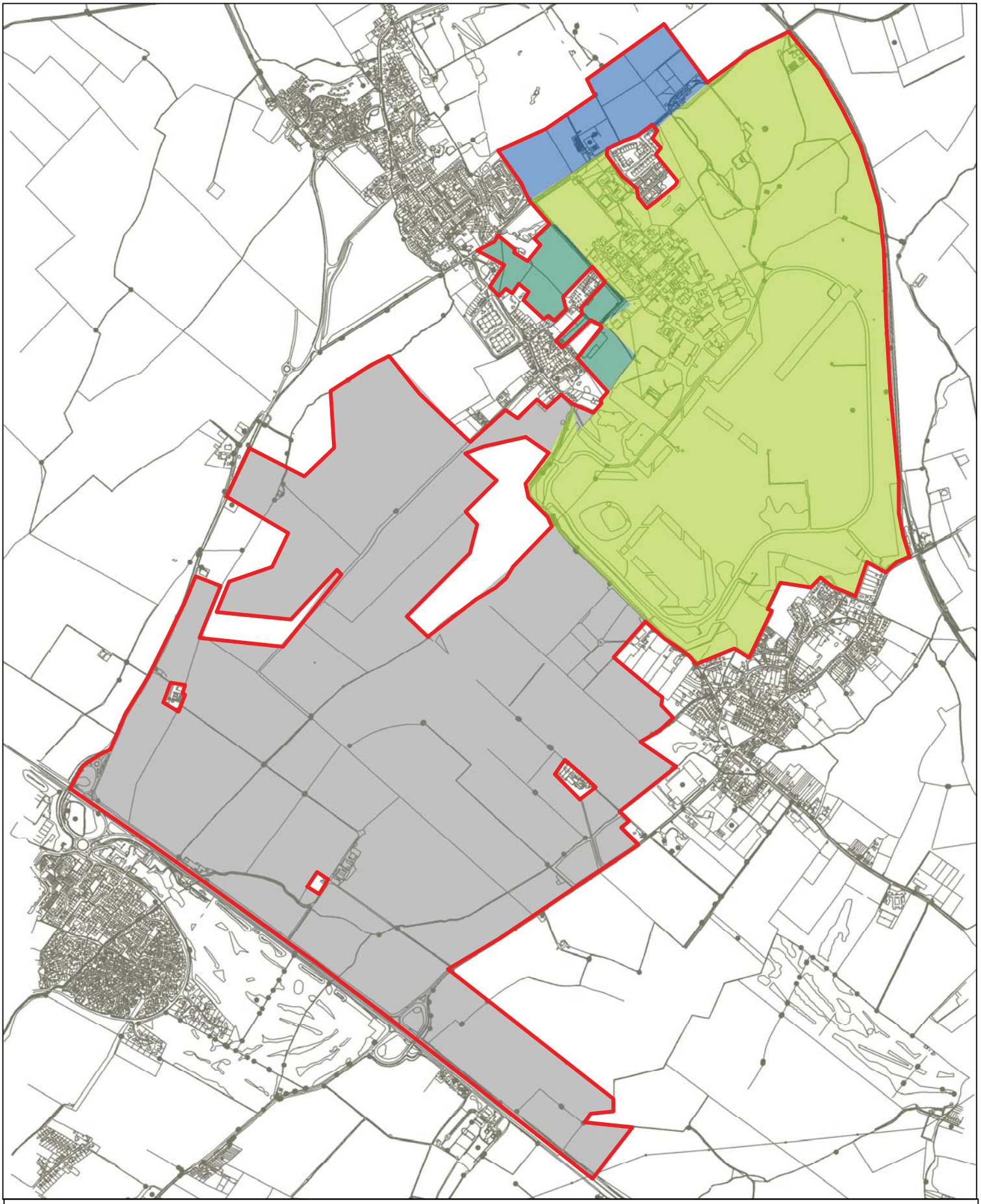
Figures



Legend

Site Boundary

Site Use

- Land North of Rampton Road
- Land West of Long Lane
- Oakington Barracks and Airfield
- Off-Site Infastructure Area

Issue	Date	By	Chkd	Appd
P1	5/8/2013	EBE	AB	NW

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0 187.5 375 750

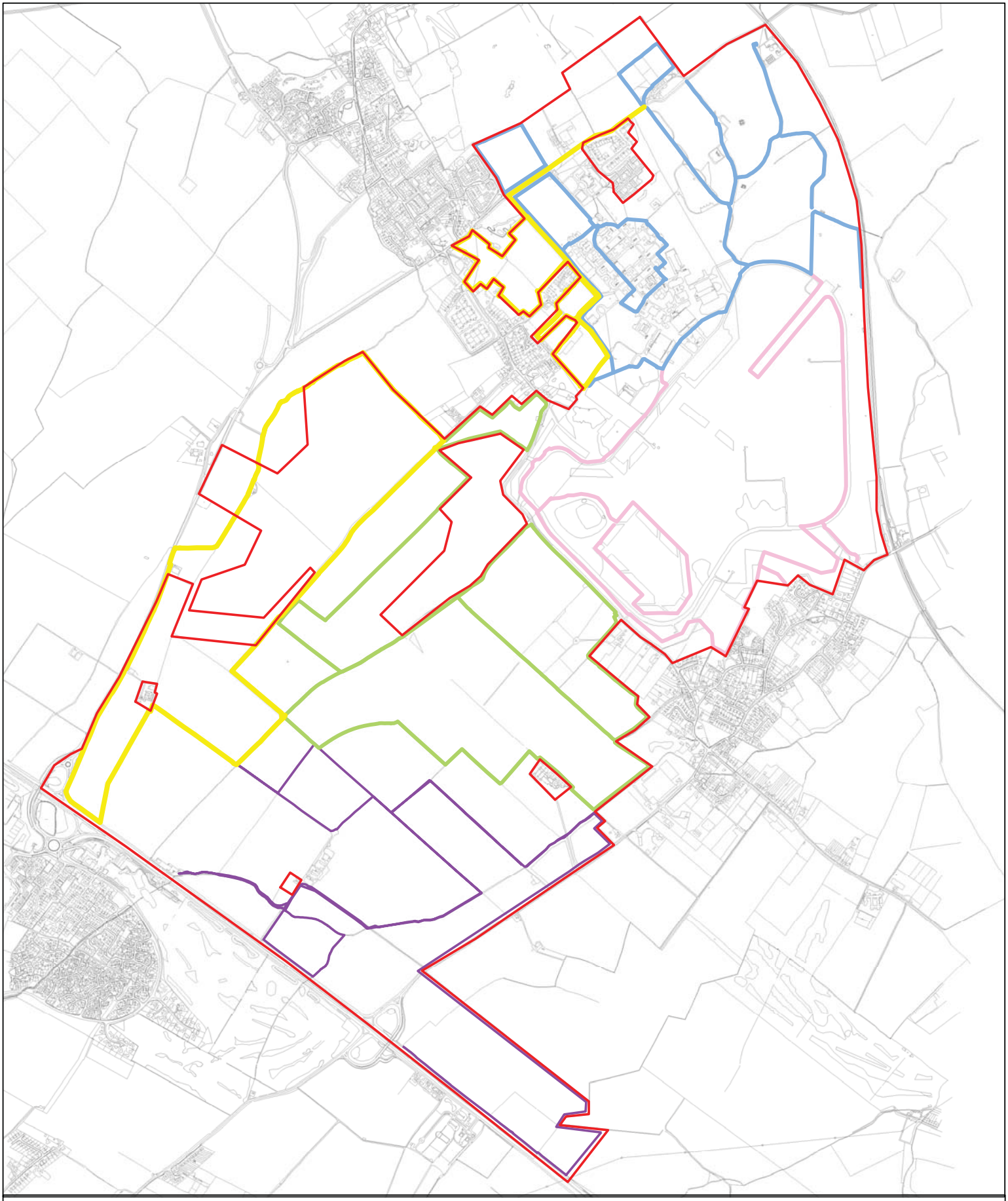
Figure 1:
Site Layout

Scale at A3
1:15,000

Job No	Drawing Status
230781-05	**Issue**

Drawing No	Issue
001	**P1**

MXD Location



Legend

- Site Boundary
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 5

Issue	Date	By	Chkd	Appd
P1	04/11/2013	ZW	GR	NW

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Figure 2:
Breeding Bird Transect Routes

Scale at A3
1:15,000

Job No	Drawing Status
230781-05	**Issue**

Drawing No	Issue
001	**P1**

Legend

- Site boundary
- Target Note
- Coniferous Parkland/scattered trees
- Parklands/scattered trees, broad-leaved
- Running water
- Intact hedge - species-poor
- Hedge with trees - native species-rich
- Hedge with trees - species-poor
- Defunct hedge, Species-poor (J2.2.2)
- No access
- Woodland, coniferous, plantation
- Scrub, scattered
- Marshy grassland
- Bare ground
- Boundaries, buildings
- Cultivated/disturbed land, amenity grassland
- Cultivated/disturbed land, arable
- Cultivated/disturbed land, ephemeral/short perennial
- Cultivated/disturbed land, introduced shrub
- Improved grassland
- Neutral grassland, semi-improved
- Other, tall ruderal
- Poor semi-improved grassland
- Scrub, dense/continuous
- Standing water
- Woodland, broad-leaved, plantation
- Woodland, broad-leaved, semi-natural
- Woodland, mixed, plantation

Issue	Date	By	Chkd	Appd
P1	22-11-13	HC	GR	

Meters
0 125 250 500 750 1,000

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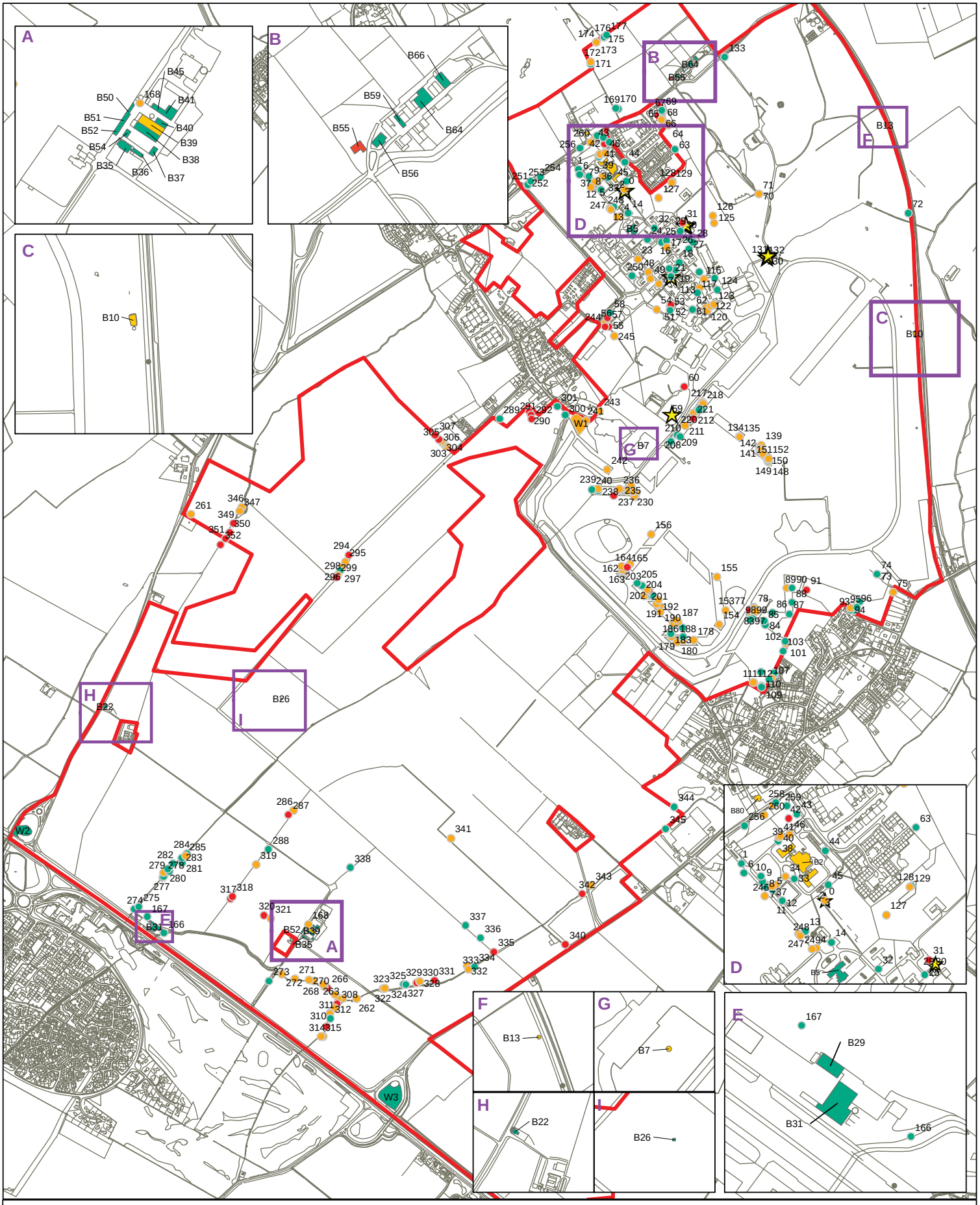
Figure 3 : Phase 1 Habitat Map

Scale at A3

1:19,000

Job No	Drawing Status
230781-05	**Draft**

Drawing No	Issue
001	**P1**



Legend

Tree categories

- 1*
- 1
- 2
- Bat box

Buildings

- Confirmed
- Moderate
- Low
- Site Boundary

Issue	Date	By	Chkd	Appd
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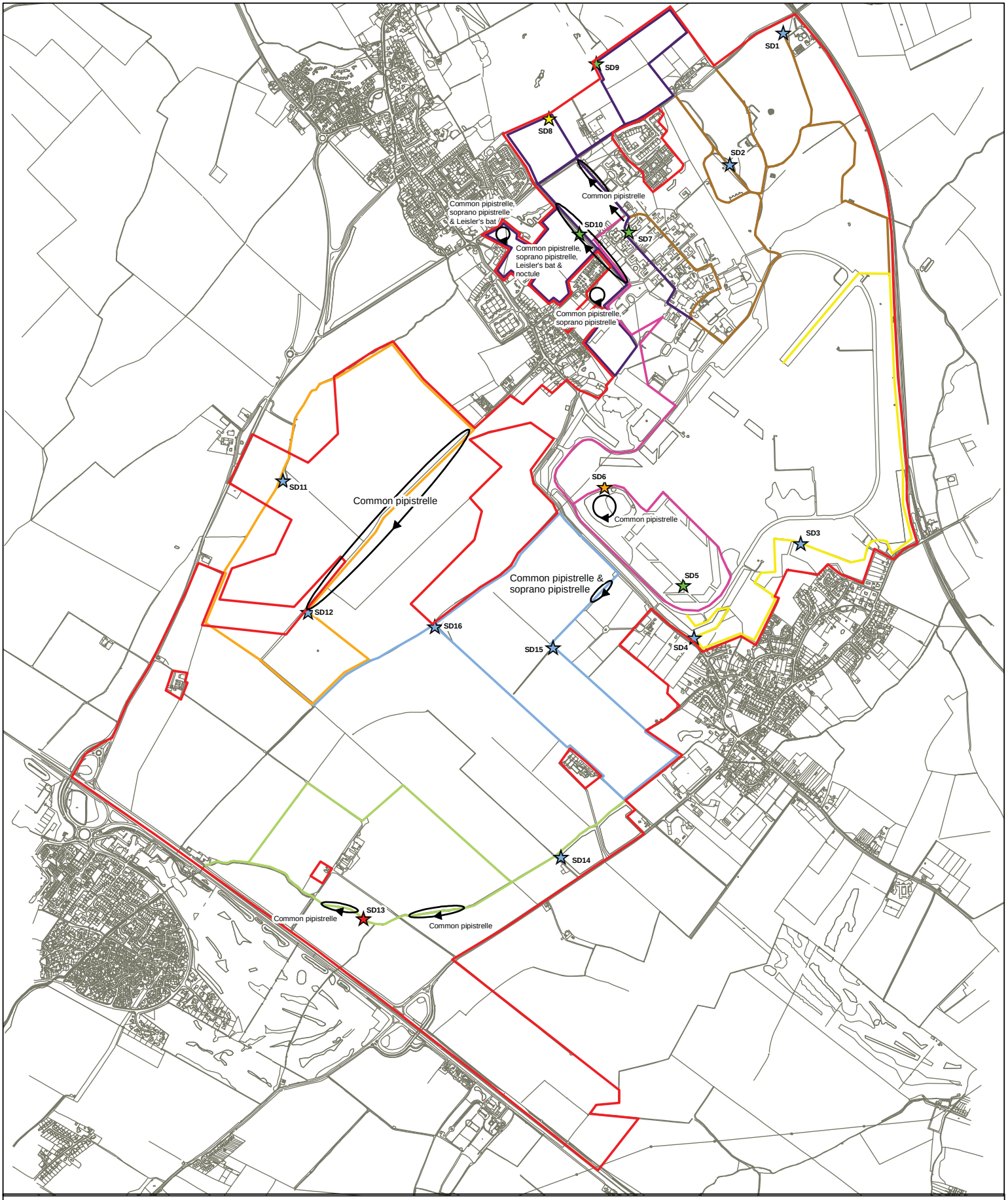
Figure 4
Bat Roost Potential

Scale at A3
1:2,041

Job No	Drawing Status
230781-05	Draft

Drawing No	Issue
001	P1



Legend

- Site Boundary
- Static Detector Location
- Bat Activity Indices 0 - 100
- Bat Activity Indices 100 - 200
- Bat Activity Indices 200 - 300
- Bat Activity Indices 300 - 400
- Bat Activity Indices 400+
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Transect 5
- Transect 6
- Transect 7
- Commuting
- Foraging

Issue	Date	By	Chkd	Appd
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Figure 5:
Bat Activity Survey
Methods and Results

Scale at A3
1:15,000

Job No	Drawing Status
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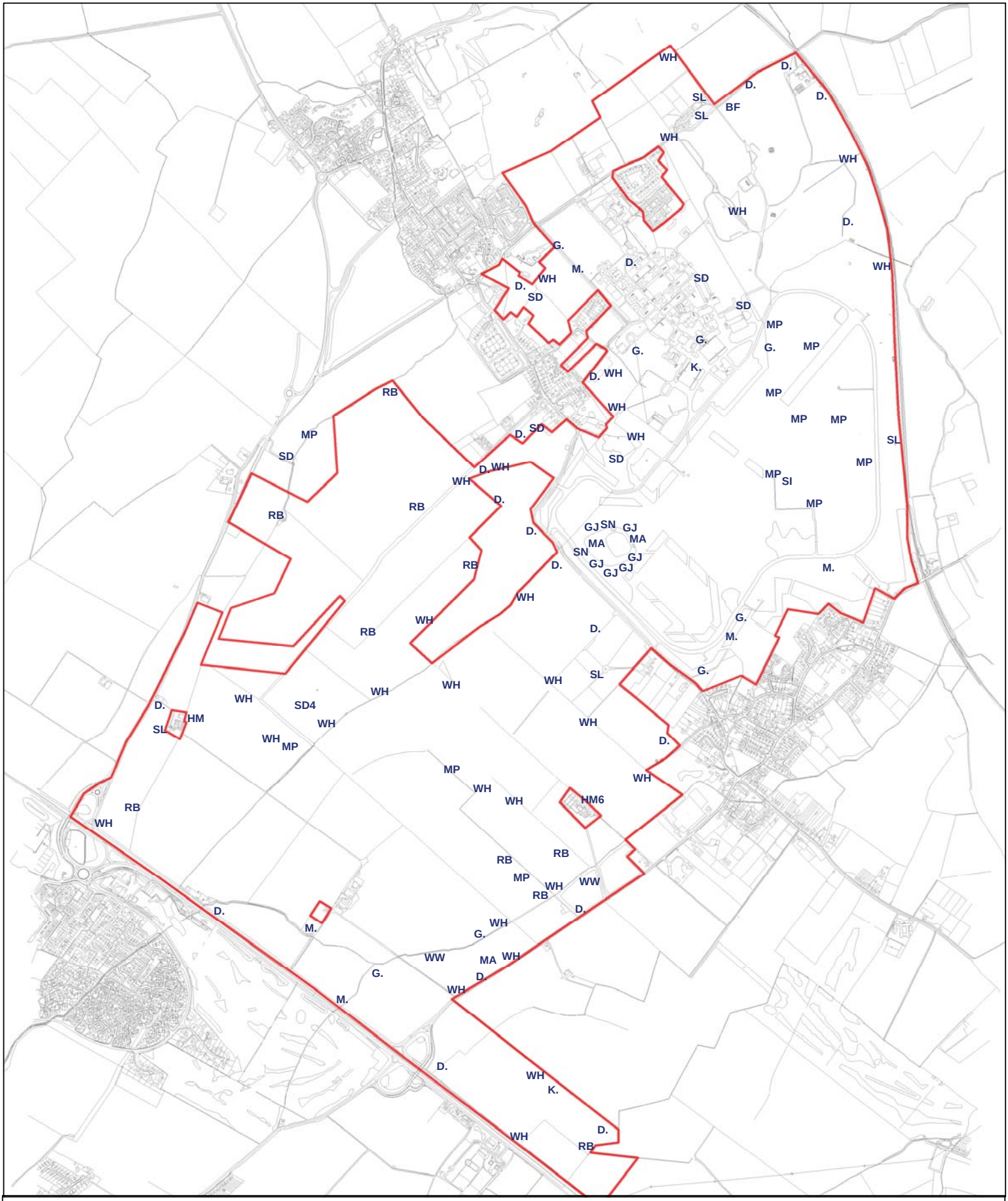
Drawing No	Issue
001	**P1**



Legend

Site boundary

BF	Bullfinch	K.	Kestrel	SI	Swift
D.	Dunnock	M.	Mistle Thrush	WH	Whitethroat
G.	Green Woodpecker	MA	Mallard	WW	Willow Warbler
GJ	Greylag Goose	MP	Meadow Pipit		
HM	House Martin	RB	Reed Bunting		
		SL	Swallow		
		SD	Stock Dove		

Where two or more territories were recorded in close proximity, the appropriate number has been indicated alongside the species.

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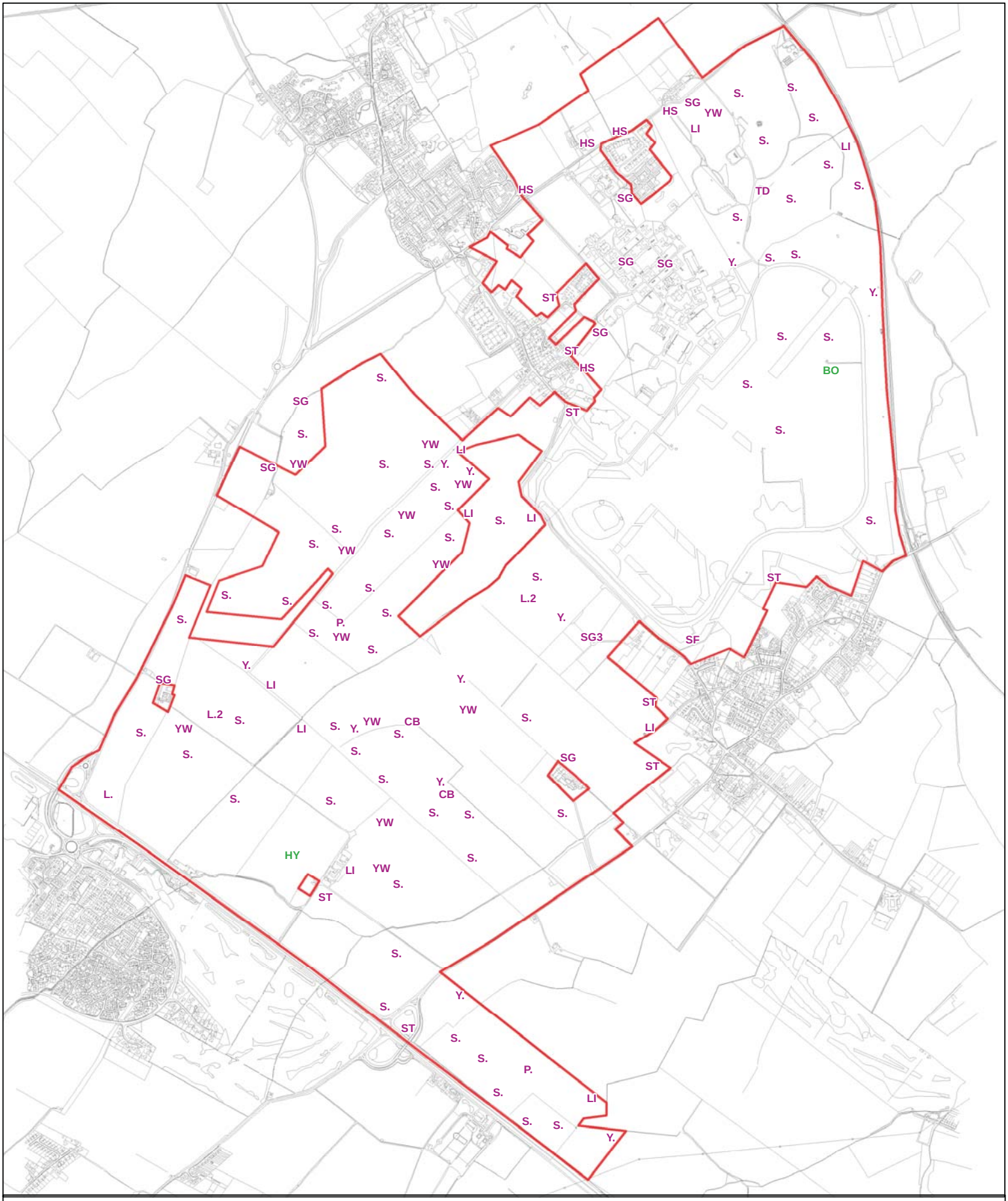
Figure 8:
Territory Map of Amber List Bird Species

Scale at A3
1:15,000

Job No	Drawing Status
230781-05	**Issue**

Drawing No	Issue
001	**P1**



Legend

Site boundary

Schedule 1 species

BO Barn Owl

HY Hobby

Red list species

CB Corn Bunting

HS House Sparrow

L. Lapwing

LI Linnet

P. Grey Partridge

S. Skylark

SG Starling

ST Song Thrush

TD Turtle dove

Y. Yellowhammer

YW Yellow Wagtail

Where two or more territories were recorded in close proximity, the appropriate number has been indicated alongside the species.

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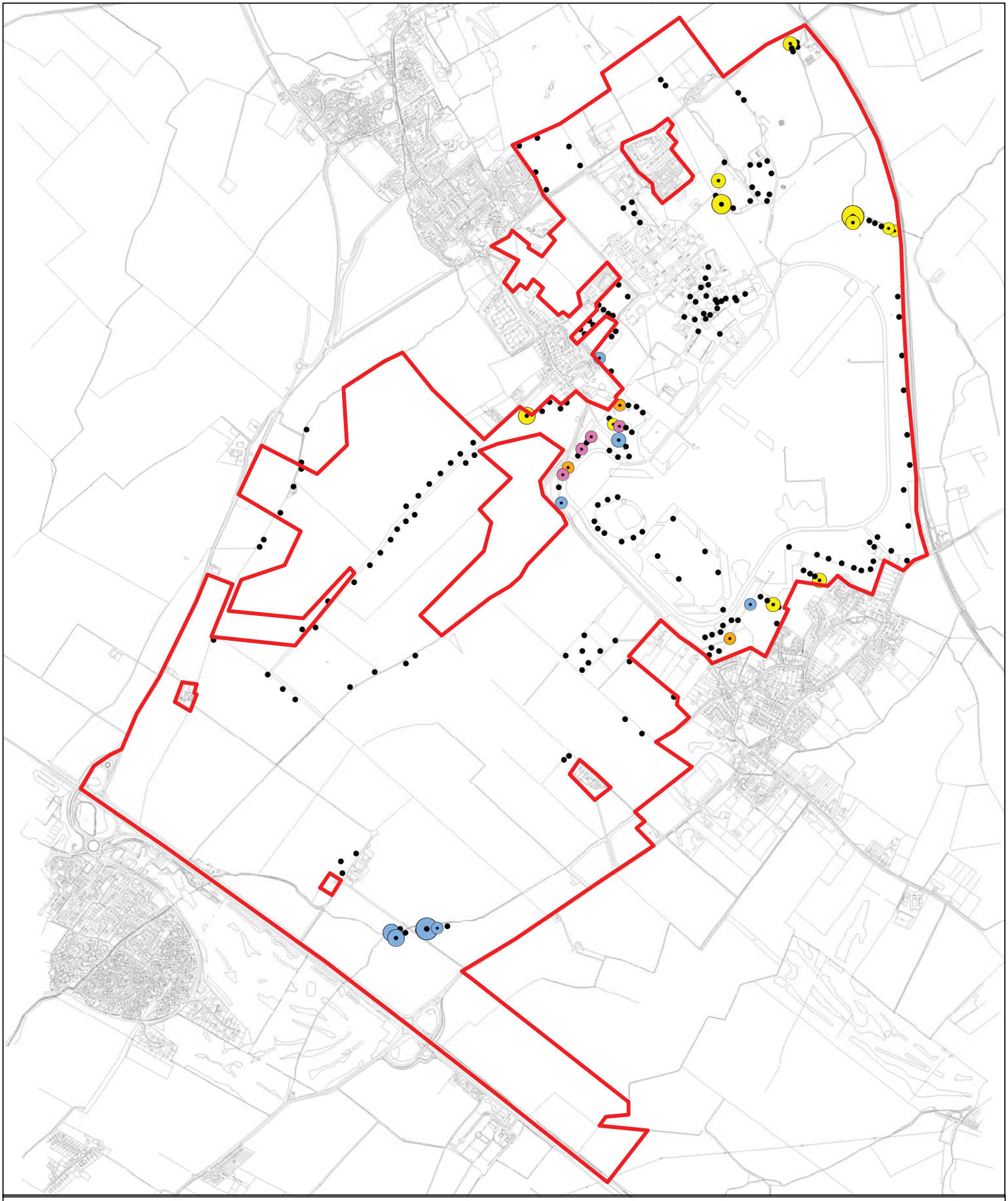
Figure 7:
Territory Map of Schedule 1 and Red List Bird Species

Scale at A3
1:15,000

Job No	Drawing Status
230781-05	**Issue**

Drawing No	Issue
001	**P1**



Legend

- Site Boundary
- Reptile mats
- Common lizard
- Grass snake
- Great crested newt
- Common toad

- 1 individual
- 2 individuals
- 3 individuals
- 4 individuals
- 5 individuals

Issue	Date	By	Chkd	Appd
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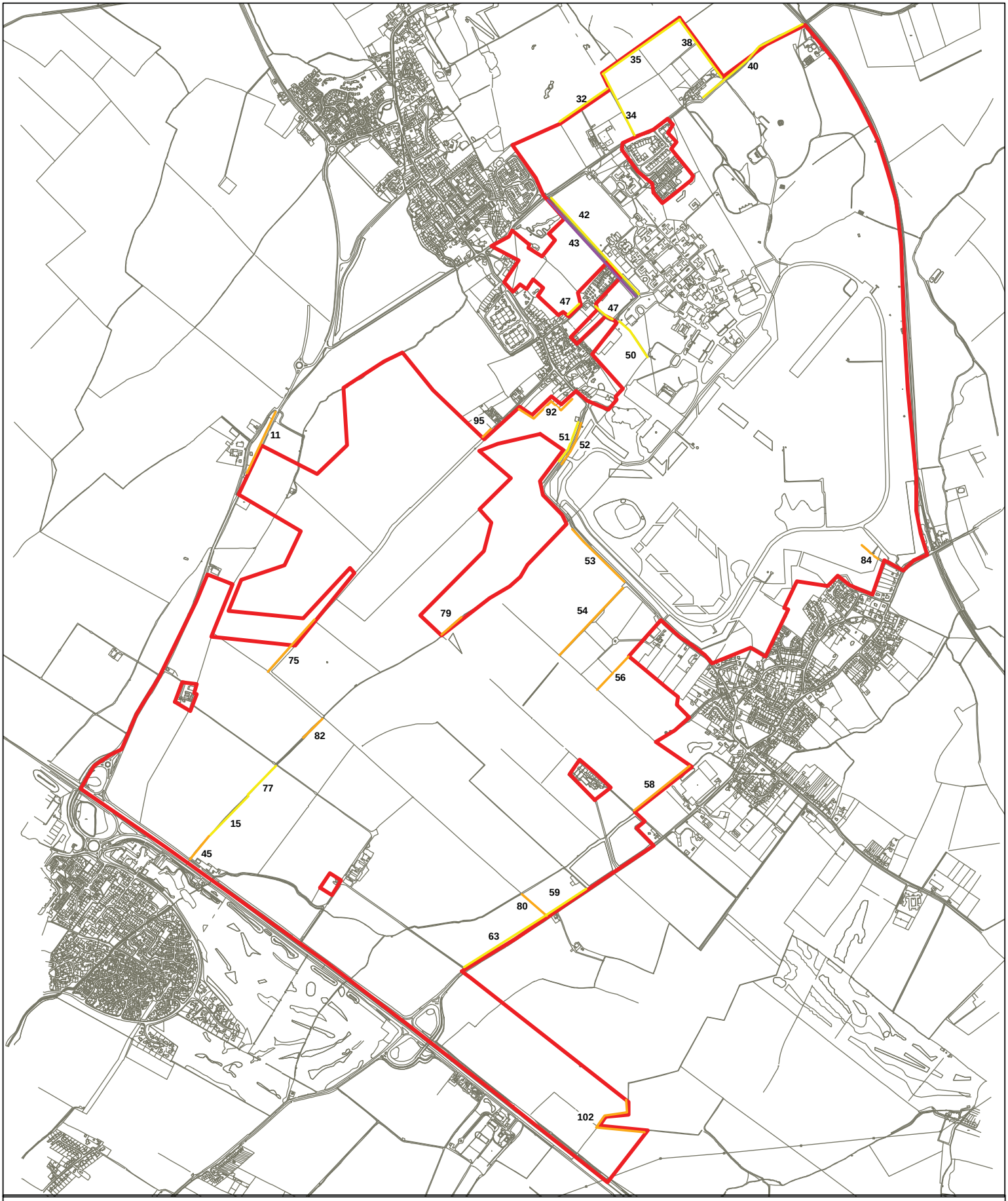
Figure 9:
Locations of Artificial Reptile Refugia and Results

Scale at A3
1:15,000

Job No	Drawing Status
230781-05	**Issue**

Drawing No	Issue
001	**P1**



Legend

- Site Boundary
- NERC Act 2006 & Local BAP
- NERC Act 2006, Local BAP & within site context
- Hedgerow Regs., NERC Act 2006, Local BAP & within site context

Issue	Date	By	Chkd	Appd
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Job Title
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Figure 10:
Important Hedgerows Location Map

Scale at A3
1:15,000

Job No	Drawing Status
230781-05	**Issue**

Drawing No	Issue
001	**P1**