# F4 URS Protected Species Report 2012

URS

# Northstowe

## Protected Species Report

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# 1. INTRODUCTION

## 1.1 Background

The site comprises an area of approximately 740ha of land at Longstanton, Cambridgeshire (hereafter referred to as 'the site') and is centred on Ordnance Survey (OS) grid reference TL404651. The site is a complex of green field and previously developed land, part of which was formerly used as a military barracks and airfield known as Oakington Barracks; however, the majority of buildings associated with the barracks have been demolished. There are two parcels of land to the north of Rampton Road, known as Magdalene Road and Brookfield Farm. The remainder of the site, the southern area, comprises a large area of farmland, primarily used for arable crops. A range of buildings and structures are present in this area (see Figure 1 for site layout).

The Homes and Communities Agency intends to seek planning permission for Phase 2 of the new town of Northstowe. The application will comprise a residential led development (hereafter referred to as the 'proposed development') with associated employment areas, schools, town and local centres and sports and community facilities, associated infrastructure and landscaping.

This protected species report has been prepared by URS Infrastructure & Environment UK Limited (URS) to inform a planning application for Phase 2 of the new town of Northstowe.

### *1.1.1 Previous Ecology Surveys*

Ecology surveys have been undertaken at the site since 2003 and the historic ecology reports have informed the scope of works undertaken in respect of protected species. Whilst it should be noted that the site boundary has changed between these surveys and the 2012 URS survey, and some of the records in the historical reports are outside of the current site boundary, the results of these surveys are of some relevance to the current planning application.

Bat activity surveys undertaken in 2007 identified at least six species of bat using the site and its immediate surrounds, these were; common pipistrelle *Pipistrellus pipistrellus*, noctule *Nyctalus noctula*, serotine *Eptesicus serotinus*, brown long-eared *Plecotus auritus*, Myotis *Myotis* sp., soprano pipistrelle *Pipistrellus pygmaeus* and possibly Leisler's *Nyctalus leisleri*.

Several common pipistrelle and brown long-eared roosts were recorded within buildings on the site. The majority of these buildings have since been demolished. However, buildings at Brookfield Farm, which are still present, held roosting bats in 2007.

Ongoing monitoring of badgers *Meles meles*, which started in 2003, has identified four social groups of badgers in the wider area, and two using the site itself. A survey of Oakington Barracks in 2011, confirmed that badger activity was still high in the area.

Evidence of water voles *Arvicola Terrestris* was identified in Longstanton Brook and Oakington Brook, in 2007. No otter *Lutra lutra* holts were recorded and it is likely that otters only used the watercourses for commuting at the time of survey.

A breeding bird survey was undertaken in 2003. Sixty-five species of birds were recorded including a number of birds of conservation concern. Furthermore, the Schedule 1 species barn owl *Tyto alba* was recorded breeding at Oakington Barracks. A further survey of Oakington Barracks in 2011, confirmed barn owl breeding activity in aircraft hangars, which have since been demolished.

Common lizard *Lacerta vivipara* and grass snake *Natrix natrix* were identified during surveys in 2003 and 2006.

During 2003 and 2006 smooth newt *Triturus vulgaris*, common frog *Rana temporaria* and common toad *Bufo bufo* were recorded and a single great crested newt *Triturus cristatus* was recorded at Oakington Barracks, in 2006. Furthermore, great crested newts were recorded in 2007 at Oakington Barracks near to the Military Lake (Pond 3).

Fish surveys carried out in 2007 revealed that common eel *Anguilla Anguilla* was present in Longstanton Brook, to the west of the site.

Ponds surveyed in 2006, on land adjacent to the site, recorded a range of Nationally Scarce water beetles. Subsequent surveys reported in 2011, which were undertaken during drought conditions, also indicated that the ponds in the area were of high conservation value for aquatic macro-invertebrates.

Butterfly surveys undertaken in both 2006 and 2011 indicated that there was a moderate to high diversity of butterflies and day-flying moths occurring in the area.

There are incidental records of brown hare *Lepus europaeus* using rough grassland on the site.

The scope of protected species surveys undertaken by URS was based on the species recorded during previous surveys, the habitats present on the site and consultations with South Cambridge District Council and Buglife (see Appendix 3 for details of consultations undertaken).

## 1.2 Scope of Work

An extended Phase 1 habitat survey was undertaken at the site between April and July, 2012[i]. The results of this survey indicated that the majority of the site was mixed agricultural land, including improved grassland and arable land. The agricultural land was interspersed with areas of scrub, hedgerows and plantations. There was a substantial amount of hardstanding on the site in the form of roads and the footprints of demolished buildings. A range of buildings (both occupied and unoccupied) were also present on the site. Several permanent and temporary waterbodies were also recorded. The locations and extents of habitats recorded within the site during the extended Phase 1 habitat survey are presented on Figure 1.

The habitats that were present on the site had the potential to support a range of rare, notable and protected species and a suite of further surveys was recommended to determine whether these species were present. These surveys were undertaken between April and September, 2012, and include:

- Breeding bird survey;
- Barn owl survey;
- Bat activity survey;
- Water vole and otter survey;
- Badger survey;
- Great crested newt survey;
- Reptile survey;
- Aquatic macro-invertebrate survey;
- Butterfly survey; and
- Moth habitat assessment.

## 1.3 Relevant Legislative and Biodiversity Context

### *1.3.1 Biodiversity Action Plans (BAP)*

A key outcome of the Convention on Biological Diversity in 1992 was a commitment from the UK government to halt, and if possible reverse, the steady decline of species and natural

habitats. To this end, Biodiversity Action Plans have been produced at national and local levels. They contain plans to protect and enhance species and habitats. Relevant national and local BAPs are described below.

***UK Biodiversity Action Plan***

The UK BAP[ii] reviews the status of species and habitats on a national scale. It sets out targets for a number of Priority Species and Habitats as well as for broad habitat types.

***Cambridgeshire and Peterborough Biodiversity Action Plan***

The Cambridgeshire and Peterborough BAP[iii] includes a number of action plans for habitats and species considered a priority for conservation within the region.

### *1.3.2 Breeding Birds*

All birds, their active nests and eggs are protected under the Wildlife and Countryside Act, 1981 (as amended)[iv] (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. The WCA also makes it illegal to intentionally disturb any wild bird listed in Schedule 1 of the act, which includes barn owl, while it is building a nest or is in, or near a nest containing eggs or young or to disturb the dependent young.

Priority Species that could be relevant to the site include bird species typically associated with farmland and parkland habitats such as skylark *Alauda arvensis*, yellowhammer *Emberiza citrinella*, spotted flycatcher *Muscicapa striata*, grey partridge *Perdix perdix*, turtle dove *Streptopelia turtur*, northern lapwing *Vanellus vanellus,* and dunnock *Prunella modularis*,

The following species of bird are listed on the Cambridgeshire and Peterborough BAP, skylark, song thrush and grey partridge.

***Birds of Conservation Concern (BoCC)[v]***

Leading governmental and non-governmental conservation organisations in the UK reviewed the population status of 247 bird species regularly found in Britain, and placed them on one of three lists - Red, Amber or Green. Although these listings offer no legal protection, they guide conservation action for individual species.

Red List Species are species of high conservation concern. These species are Globally Threatened according to International Union for the Conservation of Nature (IUCN) criteria, and include:

- those whose population or range has declined rapidly in recent years; and
- those that have declined historically and not shown a substantial recent recovery.

Amber List Species are species of medium conservation concern. They have an unfavourable conservation status in Europe, and include:

- those whose population or range has declined moderately in recent years;
- those whose population has declined historically but made a substantial recent recovery;
- rare breeders; and
- those with internationally important or localised populations.

Green List Species are the remaining species with stable or increasing populations and that are presently not of conservation concern.

### *1.3.3 Bats*

All bat species are fully protected under the WCA and The Conservation of Habitats and Species Regulations 2010[vi], which together make it an offence to intentionally or deliberately capture, kill or injure or disturb bats (whether in a roost or not), and intentionally or recklessly damage, destroy or obstruct access to their roosts.

The following species of bat are listed on the UK BAP: noctule, barbastelle *barbastella barbastellus*, bechstein *Myotis bechsteinii*, soprano, brown long-eared*, lesser horseshoe Rhinolophus hipposideros* and greater horseshoe *Rhinolophus ferrumequinum*. Pipistrelle bats *Pipistrellus spp.* are listed on Cambridgeshire and Peterborough BAP.

### *1.3.4 Water Vole and Otter*

Water voles receive full protection under Section 9 of the WCA making it an offence to kill, take, injure, possess or sell any individual. It is also an offence to intentionally or recklessly damage, destroy or obstruct access to any structure or place which water voles use for shelter or protection or to intentionally or recklessly disturb a water vole while occupying a structure or place which it uses for that purpose.

Water vole is a species of high conservation concern nationally and as such is listed in the UK BAP and Cambridgeshire and Peterborough BAP.

The otter has full legal protection under the WCA and The Conservation of Habitats and Species Regulations 2010. Furthermore, this species is also included in the UK BAP and Cambridgeshire and Peterborough BAP.

### *1.3.5 Badger*

The Protection of Badgers Act 1992[vii] makes it an offence to destroy or damage a badger sett and to disturb a badger whilst it is in a sett.

### *1.3.6 Great Crested Newt*

Great crested newts are fully protected under Schedule 5 of the WCA and under Schedule 2 of The Conservation of Habitats and Species Regulations 2010. This legislation protects the animals themselves as well as their places of shelter, which include breeding ponds/ditches and shelters on dry land. Great crested newts can use land within 500m of breeding ponds for dispersal or migration, but normally remain within 250m of the breeding pond[viii]. This species is also included on the UK and Cambridgeshire and Peterborough BAP.

### *1.3.7 Reptiles*

Common lizard *Zootoca vivipara*, slow worm *Anguis fragilis* and grass snake are listed on Schedule 5 of the WCA, which makes it illegal to deliberately or recklessly injure or kill these species. They are also listed on the UK BAP.

### *1.3.8 Invertebrates*

A number of invertebrate species are protected by European and UK legislation including those listed on Schedule 5 of the WCA and The Conservation of Habitats and Species Regulations 2010. As a result, some species are protected from some or all of the following (amongst others): (i) killing, injuring or taking; (ii) possession or control; (iii) damage to, destruction of or obstruction of access to any places used for shelter or protection; and (iv) disturbance while using such a structure. The current UK BAP now lists 411 invertebrate species.

### *1.3.9 Plants*

A number of rare plant species receive legal protection under The Conservation of Habitats and Species Regulations 2010 and/or the WCA. Furthermore, Section 42 of the Natural Environment & Rural Communities (NERC) Act 2006[ix], places a duty on all public bodies, to conserve the habitats and species which are of principal importance for the purpose of conserving biodiversity. UK BAP habitats and species constitute this list. Whilst not necessarily legally protected, species listed on the UK and Cambridgeshire and Peterborough BAPs can be a material consideration in any planning decision as reasonable steps must be taken to further their conservation.

*Invasive non-native species*
Japanese knotweed *Fallopia japonica*, giant hogweed *Heracleum mantegazzanium* and Australian swamp stonecrop *Crassula helmsii* are listed on Schedule 9 of the WCA. This makes it an offence to plant them in the wild or otherwise cause them to grow. The Environmental Protection Act 1990[x] also lists them as "controlled waste" to be disposed of properly. These provisions mean that if these species occur on a site proposed for development or other work which may disturb the ground, control of these species is likely to be required.

### *1.3.10 Other Mammals*

Under the Wild Mammals (Protection) Act 1996[xi]. It is an offence to intentionally cause all wild mammals' unnecessary suffering by certain methods, including crushing and asphyxiation. Brown hare is listed on the Cambridgeshire and Peterborough BAP.

# 2 METHODOLOGY

## 2.1 Breeding Bird Survey

A breeding bird survey was undertaken of the former Oakington Barracks, Magdalene Road and Brookfield Farm between May and June, 2012 (the southern area of the site was not surveyed for breeding birds because access to this land could not be arranged until after the breeding bird survey period). During this time the site was walked on three occasions and all bird activity was recorded using a three visit Common Bird Census[xii] territory mapping methodology, whereby all birds within the site were identified and recorded on a map using standard British Trust for Ornithology (BTO) species codes (see Figure 2 for transect routes). The activity of each bird was also recorded. Once all of the visits were completed the information for each species was transferred to a species map and territories were identified.

Due to the large size of the site, each survey visit was undertaken over two mornings. The survey was undertaken during the optimum survey period; however, the weather conditions during the summer of 2012 were poor, with frequent periods of heavy rain and low temperatures. The final survey visit was undertaken in sub-optimal conditions for recording breeding bird activity, due to heavy showers (see Table 1 for survey dates and weather conditions). Such poor weather conditions may have curtailed bird activity and resulted in an under-recording of birds using the site on this occasion; however the first two survey visits were undertaken in suitable survey conditions. Furthermore, frequent visits to the site to survey for other species produced a number of anecdotal bird registrations which also informed this report. It is concluded that the data presented in this report provides good baseline data on the bird assemblage for the survey area.

**Table 1: Dates and weather of the breeding bird survey visits**

| Area | Visit | Date | Start Time | Weather Conditions |
|---|---|---|---|---|
| Oakington Barracks/ Magdalene Road/ Brookfield Farm | 1 | 01/05/12 and 02/05/12 | 06:00 06:00 | 12-14°C, dry, overcast, light breeze 14°C, dry, overcast, light breeze |
| Oakington Barracks/ Magdalene Road/ Brookfield Farm | 2 | 22/05/12 and 23/05/12 | 06:00 06:00 | 9°C, dry, overcast, moderate wind 12°C, dry, overcast, still |
| Oakington Barracks/ Magdalene Road/ Brookfield Farm | 3 | 19/06/2012 and 1/06/12 | 06:00 | 10-20°C, 20-80% cloud, still, heavy showers |

## 2.2 Bat Activity Survey

Bat activity surveys were undertaken each month between June and September 2012 and followed Bat Conservation Trust (BCT) (2012) guidelines. On each occasion pre-designated transect routes were walked at dusk and all bat activity was identified with the aid of electronic bat detectors and recorded on a scale map of the site. Furthermore, a dawn survey was conducted on 29th August 2012. The locations, dates, times and weather conditions for each survey visit are presented on Table 2.

In addition to the transect surveys, static bat detectors (Song Meter 2s and Anabats) were left at between eight and twelve locations for between four and twelve consecutive nights each month. The detectors were programmed to record all bat activity at their locations between dusk and dawn during the survey period. At the end of the survey, all bat registrations were up loaded and analysed using the bat sound analysis software Analook. Table 3 presents the dates and locations of the static bat detector survey.

Transect routes and static detector locations are presented on Figure 3.

**Table 2: Locations, dates and weather of the bat activity survey visits**

| Area | Visit | Date | Sunset/ Sunrise | Start | Finish | Weather |
|---|---|---|---|---|---|---|
| Oakington Barracks/ Magdalene Road/ Brookfield Farm | 1 | 18/06/12 | 21:24 | 21:00 | 23:30 | Dry, light breeze, 15°C |
| Southern area | Not Surveyed | - | - | - | - | - |
| Oakington Barracks/ Magdalene Road/ Brookfield Farm | 2 | 18/07/12 | 21:10 | 20:55 | 23:30 | Showers, still, 16°C |
| Southern area | 2 | 25/07/12 | 21:01 | 20:55 | 23:30 | Dry, still, 18°C |
| Oakington Barracks/ Magdalene Road/ Brookfield Farm | 3 | 28/08/12 | 20:02 | 19:50 | 22:30 | Dry, still, 21°C |
| Southern area | 3 | 28/08/12 | 20:02 | 19:50 | 22:30 | Dry, still, 21°C |
| Oakington Barracks/ Magdalene Road/ Brookfield Farm | 4 | 29/08/12 | 06:06 | 04:06 | 06:06 | Dry, breeze, 14°C |
| Southern area | 4 | 29/08/12 | 06:06 | 04:06 | 06:06 | Dry, breeze, 14°C |
| Oakington Barracks/ Magdalene Road/ Brookfield Farm | 5 | 20/09/12 | 19:02 | 18:50 | 21:30 | Dry, moderate breeze, 14°C |
| Southern area | 5 | 20/09/12 | 19:02 | 18:50 | 21:30 | Dry, moderate breeze, 14°C |

**Table 3: Dates and locations of static detector bat detectors**

| Month | Area | Start Date | Finish Date | Locations |
|---|---|---|---|---|
| June | Oakington Barracks/ Magdalene Road/ Brookfield Farm | 18/06/12 | 25/06/12 | 1-8 |
| July | Oakington Barracks/ Magdalene Road/ Brookfield Farm | 11/07/12 | 19/07/12 | 1-8 |
| July | Southern area | 26/07/12 | 31/07/12 | 9-12 |
| August | Oakington Barracks/ Magdalene Road/ Brookfield Farm | 09/08/12 | 16/08/12 | 2,3,6,7 |
| August | Oakington Barracks/ Magdalene Road/ Brookfield Farm | 17/08/12 | 29/08/12 | 1,4,5,8 |
| August | Southern area | 01/08/12 | 09/08/12 | 9-12 |
| September | Oakington Barracks/ Magdalene Road/ Brookfield Farm | 20/09/12 | 25/09/12 | 2,6 |
| September | Oakington Barracks/ Magdalene Road/ Brookfield Farm | 25/09/12 | 28/09/12 | 8,4,5,3,1,7 |
| September | Southern area | 28/09/12 | 02/10/12 | 9,10,11,12 |

## 2.3 Water Vole and Otter Survey

A water vole and otter survey was undertaken at Oakington Barracks on 22nd May 2012, and Oakington Barracks and the southern area 9th August 2012. The banks of all waterbodies were walked to search for signs of these animals. Any signs of water voles such as burrows, latrines, feeding remains, paths or the animals themselves were recorded on a scale map of the site. Furthermore, signs of otters such as holts, spraints, footprints or the animals themselves were also mapped.

## 2.4 Badger Survey

A badger survey was conducted at Oakington Barracks, Magdalene Road and Brookfield Farm on 18th June 2012, and on the entire site on 9th August 2012. The site was surveyed following the methodologies of Harris, Cresswell & Jefferies (1989)[xiii], whereby the site was systematically searched, for signs of badgers, including setts, latrines, signs of foraging, tracks, paths and hair on fencing. The status of the entrances of any setts was assessed according to Neal and Cheeseman (1996)[xiv]. Furthermore, all setts identified by WSPE during their survey in 2007[xv] were checked to determine their status.

## 2.5 Great Crested Newt Survey

A great crested newt presence/ absence survey was carried out at Oakington Barracks during May 2012 following the great crested newt guidelines[xvi]. Table 4 presents the dates and

weather conditions of the survey visits. Four survey visits were made to the wet ditches and ponds to search for great crested newts. Three survey methods were attempted where possible; however, vegetation cover, shallow water, and access dictated which methods could be deployed in each pond. The following methods were used where possible:

- Bottle-trapping was undertaken over four nights. A record was made of the minimum overnight temperature and traps were only set when the temperature was above 5ºC. Traps constructed from 2 litre plastic bottles were secured around the pond and ditch margins, where access allowed. Traps were set in the evening and retrieved the following morning. Any newts found were identified, counted and recorded before being released.

- A search of the waterbodies was conducted by torch light on four nights. All accessible stretches of the waterbodies were walked slowly. Approximately 2m sections of the ponds/ditches were surveyed at any one time using a high-powered torch (500,000 candlepower).

- Submerged aquatic vegetation was searched for evidence of wrapped great crested newt eggs on four occasions. The search was undertaken where suitable vegetation was accessible.

Due to the presence of livestock, not all ditches could be surveyed. Furthermore, dense reedbeds restricted access to parts of the margins of Pond 3. The waterbodies could only be surveyed when water was present in them, and so the temporary waterbodies were surveyed when possible. Up to 70 bottle-traps were deployed on each occasion. The survey areas are presented on Figure 4.

Due to the presence of great crested newts two further surveys will be conducted in 2013 to collect further information on the population of great crested newts on the site.

**Table 4: Dates and weather of the great crested newt survey visits**

| Visit | Date | Weather |
|---|---|---|
| 1 | 10-11/05/12 | Clear, dry, 16$^{o}$C |
| 2 | 16-17/05/12 | Clear, dry, 8$^{o}$C |
| 3 | 17-18/05/12 | Overcast, 8$^{o}$C |
| 4 | 21-22/05/12 | Clear, dry, 11$^{o}$C |

## 2.6 Reptile Survey

A reptile survey was undertaken on the entire site between July-September 2012, in accordance with Froglife's Advice Sheet 10 for Reptile Surveys[xvii] and Natural England's Standing Advice Species Sheet for Reptiles[xviii].

A total of 175 artificial refugia, comprising bituminous roofing felt tiles measuring approximately 0.5 metres (m) by 1 m, were placed within areas of the site that provide suitable habitat for reptiles. These areas were identified during the extended Phase 1 habitat survey and comprised the vegetated embankments, tall ruderal vegetation, grassland and scattered scrub. Due to the site being used to graze cattle, certain areas could not be surveyed. See Figure 5 for reptile mat locations.

The artificial refugia were left in situ for at least four weeks before being checked on seven separate occasions. On each occasion, all reptiles found were identified and recorded. Existing refugia, including pieces of wood and debris, were searched for reptiles and the surveyor was vigilant to record any reptiles seen incidentally during the visits. Surveys were

undertaken under suitable weather conditions on warm, dry days when the temperature was between 17°C and 20°C.

## 2.7 Aquatic-Invertebrate Survey

Consultations were undertaken with Buglife to agree appropriate survey methods for invertebrates (Appendix 3). A habitat-based approach was devised to sample those habitats suitable for rare and notable invertebrates. The aquatic habitats on the site were considered suitable to support a range of invertebrates, including water beetles and an aquatic invertebrate survey was recommended.

The aquatic invertebrate survey was carried out at Oakington Barracks on the 25th June 2012 and in the southern area on 8th August 2012 (see Figure 6 for locations).

Sampling methods were based on the Environment Agency's and National Pond Survey's 3-minute "kick" or "sweep" protocols[xix,xx]. The sampling method allows characterisation of the invertebrate communities present and allows for a comparative appraisal of importance for nature conservation. It does not provide a comprehensive list of every species present.

The samples were initially sorted on site and examined for dead specimens, before being preserved in industrial methylated spirit. Sorting of preserved samples was carried out in the laboratory by a trained and experienced aquatic biologist, to gain a comparable list of taxa. Using a binocular microscope and identification keys, animals were identified to species level where practicable. All samples were preserved and will be stored until they are no longer required.

The Community Conservation Index (CCI) score[xxi] classifies many groups of freshwater invertebrates according to their scarcity and nature conservation value in England. The scores range from 1 to 10, with 1 being very common and 10 being endangered. These classifications relate closely to the categories in the Red Data Books (RDB)[xxii,xxiii]. This score system is still under development, but represents the best available system for assessing together data on the nature conservation value of aquatic invertebrates.

## 2.8 Butterfly Survey

The entire site was surveyed in 2012. The site walked to identify areas and features within the landscape that would provide suitable habitat for butterflies and moths, but that also reflected the overall habitat within the site boundary. A total of 19 transect routes were then planned (see Figure 7 for transect routes)

Each transect was walked slowly three times between early August and early September and all butterflies and moths on either side of the transect line were identified and recorded. Where possible transects were walked during periods of suitable weather (warm and sunny with little or no breeze); however the weather during 2012 was particularly poor, and on occasions transects were walked in overcast and slightly breezy conditions. Survey times, weather conditions are presented in Table 5.

Where possible all butterflies were identified to species level. When this was not possible species were grouped together. Moths where recorded by family, rather than to species level on site, but, where possible, specimens were netted and fully identified later.

**Table 5. Dates and temperatures for butterfly surveys**

| Transect Number | Date | Temperature |
|---|---|---|
| 14-19 | 13/07/12 | 17°C |
| 14-19 | 02/08/12 | 20°C |
| 14-19 | 31/08/12 | 20°C |
| 1-13 | 03/08/12 | 18°C |
| 1-13 | 17/08/12 | 24°C |
| 1-13 | 01/09/12 | 20°C |

### 2.9 Moth Survey

The white-spotted pinion moth *Cosmia diffinis* is a species of particular concern as it is a rare species which is known to occur in the area. White-spotted pinion moth larvae feed on the foliage of English elm *Ulmus procera* and have also been reported to feed on wych elm *U. glabra*. The larvae are thought to prefer the epicormic side shoots on the trunks of mature trees, but a larva has also been found on the epicormic foliage of a stump shoot of English elm. A survey for *Ulmus* species was undertaken across the entire site in October 2012, to provide an assessment of the likelihood of this species occurring on the site.

## 3 RESULTS

### 3.1 Breeding Bird Survey

Fifty-six species of birds were recorded during the breeding bird survey. Table 6 below provides a summary of the registrations.

The site supported a diverse range of birds including passerines, waterbirds, corvids, game birds and raptors typical of lowland farmland, woodland edge and aquatic habitats.

Of the 56 species recorded, 49 species were either confirmed as breeding or probably breeding on the site. A further six species were possibly breeding on the site and the remainder of the species were not breeding, but used the site for foraging or roosting during the breeding season. Given the size of the site, it is likely that many birds are wholly dependent on the site for nesting and foraging during the breeding season.

The key areas of Oakington Barracks for breeding birds were the arable farmland, areas of scrub and the mature trees around the site boundary. Enclosed areas, where suitable nesting habitats were in proximity to good foraging habitat, were particularly preferred by passerines, with the exception of skylark which were associated with more open habitats. The open grassland in the centre of the site and areas of demolished buildings were of lower value to birds.

**Table 6: Summary of breeding bird survey results**

| Species | Conservation Status | Breeding Status | Comments | Estimated Pairs |
|---|---|---|---|---|
| Mute swan *Cygnus olor* | Green list | Confirmed breeding | On pair nesting on Pond 3 | 1 |
| *Greylag goose* *Anser anser* | Amber list | Non-breeding | Birds recorded on Pond 3 on one occasion | |
| Canada goose *Branta canadensis* | Introduced | Non-breeding | Birds recorded on Pond 3 on one occasion | |
| Mallard *Anas platyrhynchos* | Green list | Confirmed breeding | Two pairs nesting on Pond 3 | 2 |
| Buzzard *Buteo buteo* | Green list | Confirmed breeding | One pair nesting in mature tree | 1 |
| Kestrel *Falco tinnunculus* | Amber list | Confirmed breeding | One pair nesting in barn owl box | 1 |
| Hobby *Falco subbuteo* | Green list Schedule 1 | Confirmed breeding | One pair recorded nesting in mature trees | 1 |
| Red-legged partridge *Alectoris rufa* | No status | Probably breeding | Pairs recorded in arable fields | 3 |
| Grey partridge *Perdix perdix* | Red status UK BAP L BAP | Probably breeding | Male seen in arable field | 1 |
| Quail *Coturnix coturnix* | Amber status Schedule 1 | Probably breeding | Male heard in arable field | 1 |
| Pheasant *Phasianus colchicus* | Introduced | Probably breeding | Several birds recorded on site | 3 |
| Coot *Fulica atra* | Green list | Confirmed breeding | Four pairs recorded on Pond 3 | 4 |
| Moorhen *Gallinula chloropus* | Green List | Confirmed breeding | One pair nesting on Pond 3 | 1 |
| Lapwing *Vanellus vanellus* | Red list UK BAP | Possibly breeding | One bird recorded on grassland | |
| Stock dove *Columba oenas* | Amber list | Probably breeding | Numerous birds recorded throughout the site | At least 5 |
| Woodpigeon *Columba palumbus* | Green list | Probably breeding | Over 300 recorded using the site. Several pairs recorded nesting in buildings. | At least 20 |
| Collared dove *Streptopelia decaocto* | Green list | Probably breeding | Several birds recorded around site boundary | At least 5 |

| | | | | |
|---|---|---|---|---|
| Turtle dove *Streptopelia turtur* | Red list<br>UK BAP | Probably breeding | Four males recorded in suitable breeding habitat | 4 |
| Barn owl *Tyto alba* | Amber list<br>Schedule 1 | Confirmed breeding | Two active nests recorded in barn owl boxes | 2 |
| Little owl *Athene noctua* | Introduced | Confirmed breeding | Active nest in barn owl box | 1 |
| Green woodpecker *Picus viridis* | Amber list | Probably breeding | Numerous birds seen and heard around grassland | At least 10 |
| Great spotted woodpecker *Dendrocopos major* | Green list | Probably breeding | One bird recorded on each visit | 1 |
| Skylark *Alauda arvensis* | Red list<br>UK BAP<br>L BAP | Confirmed breeding | Numerous records of birds in arable fields and open grassland around the airstrip | 14 |
| Meadow pipit *Anthus pratensis* | Amber list | Probably breeding | Birds recorded on all survey visits on grassland around airstrip | 4 |
| Yellow wagtail *Motacilla flava* | Red list<br>UK BAP | Probably breeding | Ten pairs recorded in ditch near to guided busway | 10 |
| Pied wagtail *Motacilla alba* | Green list | Probably breeding | Numerous birds recorded throughout the site | At least 10 |
| Wren *Troglodytes troglodytes* | Green list | Probably breeding | Numerous birds recorded throughout the site | At least 10 |
| Dunnock *Prunella modularis* | Amber list<br>UK BAP | Probably breeding | Numerous birds recorded throughout the site | At least 10 |
| Robin *Erithacus rubecula* | Green list | Probably breeding | Numerous birds recorded throughout the site | At least 15 |
| Chiffchaff *Phylloscopus collybita* | Green list | Probably breeding | Numerous birds recorded around the site boundary | At least 10 |
| Wheatear *Oenanthe oenanthe* | Amber list | Probably breeding | Two pairs recorded on grassland near to the airstrip | 2 |
| Blackbird *Turdus merula* | Green list | Probably breeding | Numerous birds recorded throughout the site | At least 15 |
| Song thrush *Turdus philomelos* | Red list<br>UK BAP<br>L BAP | Probably breeding | Birds recorded on all survey visits around site boundary | 6 |
| Mistle thrush *Turdus viscivorus* | Amber list | Probably breeding | One pair recorded around buildings | 1 |

| | | | | |
|---|---|---|---|---|
| Reed warbler *Acrocephalus scirpaceus* | Green list | Confirmed breeding | One pair recorded on island in Pond 3 | 1 |
| Whitethroat *Sylvia communis* | Green list | Probably breeding | Numerous birds recorded around the site boundary | At least 15 |
| Garden warbler *Sylvia borin* | Green list | Probably breeding | Bird recorded near site boundary | 1 |
| Blackcap *Sylvia atricapilla* | Green list | Probably breeding | Numerous birds recorded around the site boundary | At least 15 |
| Willow warbler *Phylloscopus trochilus* | Amber list | Probably breeding | Two pairs recorded on two occasions | 2 |
| Spotted flycatcher *Muscicapa striata* | Red list UK BAP | Probably breeding | Two bird seen on two occasions | 2 |
| Long-tailed tit *Aegithalos caudatus* | Green list | Probably breeding | Numerous birds recorded around site | At least 10 |
| Blue tit *Parus major* | Green list | Probably breeding | Numerous birds recorded around site | At least 15 |
| Great tit *Parus major* | Green list | Probably breeding | Numerous birds recorded around site | At least 15 |
| Jay *Garrulus glandarius* | Green list | Probably breeding | One bird seen around buildings | 1 |
| Magpie *Pica pica* | Green list | Probably breeding | Numerous birds recorded around site | At least 10 |
| Jackdaw *Corvus monedula* | Green list | Probably breeding | Numerous birds recorded around site | At least 10 |
| Rook *Corvus frugilegus* | Green list | Possibly breeding | Up to 500 birds recorded using the site. Nest recorded on adjacent land | |
| Carrion crow *Corvus corone* | Green list | Possibly breeding | Numerous birds recorded around site | |
| Starling *Sturnus vulgaris* | Red list UK BAP | Possibly breeding | Numerous birds recorded around site | |
| House sparrow *Passer domesticus* | Red list UK BAP | Possibly breeding | Up to 21 birds using the site. Probably nesting in buildings on adjacent land. | |
| Chaffinch *Fringilla coelebs* | Green list | Probably breeding | Numerous birds recorded around the site boundary | At least 20 |
| Greenfinch *Carduelis chloris* | Green list | Probably breeding | Numerous birds recorded around the site boundary | At least 10 |

| | | | | |
|---|---|---|---|---|
| Goldfinch *Carduelis carduelis* | Green list | Probably breeding | Numerous birds recorded around the site boundary | At least 10 |
| Linnet *Carduelis cannabina* | Red list UK BAP | Probably breeding | Numerous birds recorded around the arable fields | 7 |
| Yellowhammer *Emberiza citrinella* | Red list UK BAP | Probably breeding | Several birds recorded around site | 8 |
| Corn bunting *Miliaria calandra* | Red list UK BAP | Probably breeding | One pair recorded around airstrip | 1 |

Of the species that are probably or confirmed as breeding on the site, hobby, quail and barn owl are listed on Schedule 1 of the WCA. Nine species are on the Red list of BoCC (grey partridge, turtle dove, song thrush, yellowhammer, skylark, spotted flycatcher, linnet, yellow wagtail and corn bunting) and ten are on the Amber list of BoCC (quail, stock dove, barn owl, meadow pipit, wheatear, kestrel, green woodpecker, dunnock, mistle thrush and willow warbler). A number of UK BAP and Cambridge and Peterborough BAP were also recorded. The locations of the Red and Amber list BoCC and the Schedule 1 species are presented on Figure 8.

In 2003, the Wildlife Conservation Partnership undertook a barn owl survey of Oakington Barracks and its immediate surrounds. Barn owls were recorded breeding within one of the aircraft hangers and on adjacent land. To mitigate for the demolition of the hanger, a number of barn owl nest boxes were installed across the site to provide alternative nest sites for these birds. 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 (see Figure 8 for nest site locations). There were also several incidental records of foraging barn owls, which suggests that the site provides a large proportion of the home range of these birds. Barn owls require holes in trees or structures to nest in and small mammals to feed on and the site provides both of these requirements.

Kestrel and little owl were also recorded nesting in the barn owl boxes on the site (Figure 8). Hobby was also recorded nesting in trees within the site. The presence of such species suggests that the habitats support good population of small mammals and invertebrates that these birds feed on.

**The development of the site could result in the loss of a large area of bird nesting and foraging habitat. Due to the number and diversity of bird species using the site, both on-site and off-site mitigation are likely to be required. It is recommended that the trees, hedgerows and scrub around the boundary of Oakington Barracks are retained and buffered from the development by grass margins of at least six meters to provide foraging habitat for nesting birds adjacent to their nest sites. Furthermore, the Military Lake (Pond 3), should be retained and enhanced for birds by restricting public access to parts of the bank and allowing bankside vegetation to regenerate.**

**Open field birds, such as skylark, are unlikely to use the site post-development as these birds require large expanses of open countryside. Funding could be provided to allow areas of farmland adjacent to the site to be managed less intensively as set aside or organically farmed land. Such management has been shown to support higher densities of skylark than intensively managed crops[xxiv]. Reverting to these regimes would increase the number of birds that these areas can support, thus providing alternative habitat for the displaced birds. Set aside land supports the highest densities of skylarks, with territories averaging 1.7ha[xxv]. Fourteen skylark territories were recorded at Oakington Barracks in 2012 and therefore 23.4 ha of new set aside land**

**could accommodate these birds, assuming that no skylarks were already present at the recipient site.**

**Should barn owl nest sites be lost, then suitable alternative nest sites should be incorporated into the scheme, either by providing access to the roof spaces of new buildings or by installing barn owl boxes in suitable locations around the site.**

**The southern area of the site was not surveyed for breeding birds due to access restrictions during the survey period. Should this area be impacted by the proposed development, a breeding bird survey should be undertaken to inform any planning application.**

## 3.2 Bat Activity Survey

Nine species of bats were recorded across the entire site, these were; common pipistrelle, soprano pipistrelle, nathusisus pipistrelle *Pipistrellus nathusii,* serotine, Leisler's *Nyctalus leisleri*, *Myotis* sp. (possibly daubenton's *Myotis daubentonii*), brown long-eared bat, noctule*,* and barbastelle *Barbastelle barbastellus*. Only six species of bats were recorded during the 2003, 2004 and 2007 surveys carried out by WSPE. It should also be noted that only low numbers of bat passes were recorded for barbastelle, Leisler's and nathusius pipistrelle, which were the species not recorded in previous surveys. Records of these species is likely to be due to the increased survey effort undertaken in 2012, which were required to meet the new BCT survey guidelines (issued in 2012), rather than an actual increase in bat activity at the site.

Approximately 68% of bat passes recorded were from common pipistrelle and 27% were soprano pipistrelle (as recorded by static bat detectors). Both of these bats are common and widespread; however, all pipistrelle species are listed on the Cambridge and Peterborough BAP.

The highest number of bat species was recorded around Pond 3 (Figure 9). Species recorded here include common pipistrelle, soprano pipistrelle, *Myotis* sp., brown long-eared bat and noctule. These species of bats were recorded foraging here, and Pond 3 appears to be a key feeding site for bats. Other key foraging areas were around the retained buildings at Oakington Barracks and along Oakington Brook in the southern area.

Bats were recorded using the hedgerows, paths and ditches as commuting routes through the site. The most frequently used routes were along tree lines through Oakington Barracks and along Oakington Brook, Wilsons Road and a parallel hedge line in the southern area. Relatively little bat activity was recorded in the centre of the southern area or along Longstanton Brook (Figure 9).

A barbastelle was recorded in the southern area. Barbastelle bats are UK BAP species and are very rare in the UK. Only one barbastelle pass was recorded during all the surveys and the site is not considered to be of value to this species. Barbastelles prefer deciduous woodland and wet meadows which are not present on site, and the Cambridgeshire Bat Group confirmed that there are no known roosts of barbastelle near Long Stanton (Cambridgeshire Bat Group pers. Comm.). Barbastelles have been recorded travelling up to 18km to forage and it is likely that the pass recorded was of a single bat commuting over the site to forage elsewhere.

Low numbers of passes of Leisler's bat were recorded. Leisler's bat is considered to be very scarce in Cambridge[xxvi]. Leisler's are mobile species that use transitional roost which could explain why they occasionally use the site. They prefer open woodland habitat which is scarce on the site.

A total of 17 nathusius pipistrelles passes were recorded by static detectors. All records were made around the northern section of Oakington Barracks. Nathusius pipistrelles are considered a rare bat, but are known to be under recorded due to their call being mistaken for other pipistrelle species. Nathusius pipistrelles are associated with woodland habitats which are scarce on the site and the low number of passes reflects the sub-optimal nature of the site for this species.

Results from the static bat detector surveys revealed spatial and temporal variations in bat activity. Four areas of the site had exceptionally high levels of bat activity (with an average of over 700 bat passes a night) these were around the retained buildings and Pond 3 at Oakington Barracks and along a tree line and Oakington Brook in the southern area (Location I on Figure 10).

Both common pipistrelle and noctule were recorded shortly after sunset around the retained buildings at Oakington Barracks and it is likely that these bats roosted on or close to the site.

**Developing the site could result in a loss of foraging habitat and commuting routes for bats. The site supports a wide range of bat species which use the site for foraging, commuting.**

**The main foraging areas were around the buildings at Oakington Barracks, the Military Lake (Pond 3) and Oakington Brook in the southern area. It is recommended that the trees, hedges and ponds in these areas are retained and enhanced to support foraging bats and to encourage roosting. This could be done by creating and enhancing native species-rich hedgerows and placing bat boxes in mature trees and on buildings.**

**Commuting links for bats were present across the site. These continuous corridors (in the form of tree lines and hedgerows) provide routes from roost sites to foraging areas. These should be retained to prevent fragmentation of these routes. These areas also provide foraging areas for common, soprano and nathusius pipistrelles which hunt along linear features and to promote foraging on the site, mixtures of flowering plants, grasses, trees and shrubs should be used to strengthen these corridors and attract more invertebrates to the site. Wildflower seed mixes could be incorporated into landscaped areas to create suitable foraging habitats for bats.**

**Sensitive lighting should be implemented during construction to ensure that any adjacent commuting routes and foraging habitat for bats are not disturbed. In addition, lighting should only be used where necessary and levels switched off when not needed. The height of columns should be minimised and lights be directed away from potentially sensitive habitats. Furthermore, low-pressure sodium lamps should be selected over high-pressure sodium or mercury.**

**If any trees or buildings are to be impacted by the development then they should be subject to further surveys to determine whether they support roosting bats. If bat roosts are located then a Natural England licence would be required to undertake any works that would impact them.**

### 3.3 Water Vole and Otter Survey

Consistent with surveys undertaken by WSPE in 2006, evidence of water voles was recorded on Longstanton and Oakington Brooks (Figure 11). The results suggest that parts of the site provide habitat for several groups of water voles with the brooks in the southern area being of particular value to this animal; however, the majority of the site was not used by water voles.

No signs of otter were recorded during the survey and it appears that this species is not present on the site. This species was not recorded in previous surveys of the site undertaken by WSPE.

**Water voles and their habitats are protected by law, and a Natural England licence would be required to undertake any works that would impact them. All water vole habitats should be retained and enhanced within the development. It is recommended that a five meter buffer is instated along both banks of Oakington and Longstanton Brooks. This buffer should be maintained as species-rich grassland to provide additional foraging habitat for water voles.**

### 3.4 Badger Survey

A number of surveys for badger have been undertaken since 2003. Badger activity on the site has been high during this period. During the 2012 survey reported here, twenty-one active badger setts were recorded across the entire site and one inactive sett (see Figure 12 for sett locations). Furthermore, several latrines, paths and foraging signs were noted. Whilst it is clear that the distribution of badgers has changed 2003, activity levels remain high and any scheme will need to consider the retention of badger sett, commuting routes and key foraging areas in order to accommodate this species.

The site appears ideal for badgers as it offers open grassland where badgers can forage for invertebrates as well as scrub and woodland blocks for sett building. Badger activity was clustered around Oakington Brook in the southern area and around the boundary of Oakington Barracks. Table 7 below provides a summary of the statuses of the setts.

**Table 7 Descriptions of badger setts**

| Sett Number | Classification | Status |
|---|---|---|
| 1 | Main sett | Fifteen hole active main sett, latrines and bedding |
| 2 | Outlier sett | Recently excavated single hole active sett |
| 3 | Outlier sett | Two hole active sett |
| 4 | Outlier sett | Three hole active sett |
| 5 | Outlier sett | Single hole active sett |
| 6 | Outlier sett | Single hole active sett |
| 7 | Outlier sett | Single hole sett possibly disused |
| 8 | Outlier sett | Two hole active sett |
| 9 | Main sett | At least ten hole active main sett under concrete base of building within scrub in arable field just south of Rampton Road |
| 10 | Main sett | Fifteen hole active main sett |
| 11 | Outlier sett | Two hole active sett |
| 12 | Main sett | Nine hole active main sett |
| 13 | Outlier sett | Inactive four hole sett |
| 14 | Outlier sett | Two hole active sett |
| 15 | Outlier sett | Three hole active sett |
| 16 | Main sett | Active fifteen hole main sett |
| 17 | Outlier sett | Five hole active sett |
| 18 | Outlier sett | Two hole active sett |
| 19 | Outlier sett | Six hole sett with three active entrances |
| 20 | Outlier sett | Six hole active sett |
| 21 | Outlier sett | Two hole active sett |
| 22 | Outlier sett | Four hole active sett |

**All main badger setts should be retained within the development and outlier setts that are closed should be replaced by artificial setts in appropriate locations. It should be noted that any works which could impact occupied badger setts should be undertaken under a Natural England licence. All setts, retained and new, should be buffered by at least twenty meters of undeveloped land. Furthermore, green corridors should be provided between the setts and water and foraging land.**

**Badgers use the woodland and grassland for foraging and much of this land is likely to be lost to land take. It is recommended that areas of new, high quality, badger foraging habitat, in the form of rough grassland, should be created around the periphery of the site or on adjacent land to replace this. It is important that these new foraging areas are not severed from the site by busy roads, as road traffic is a major cause of badger mortality.**

### 3.5 Great Crested Newts

The great crested newt survey demonstrated that this species is present on the site and further surveys will be required to provide an estimate of the size of the population. Great crested newts were recorded in Ponds 1, 2 and 4. Smooth newts were recorded in all of the ponds surveyed and palmate newts were recorded in Pond 3. No great crested newt eggs were recorded. Table 8 presents a summary of the results of the great crested newt survey.

Whilst the site has some suitable aquatic habitat, the presence of fish in Pond 3 (The Military Lake) may have prevented great crested newts from colonising the largest waterbody on the site. The results are consistent with surveys undertaken in 2006 and 2007, which both recorded that great crested newt were present on the site.

It should be noted that great crested newts may use different waterbodies for breeding in different years and other suitable waterbodies in the area may be used in future years.

**URS undertook four visits to survey for great crested newts at Oakington Barracks in 2012 to confirm the presence of this species. A further two survey visits are scheduled for 2013 to undertake a population assessment. The southern area of the site was not surveyed for great crested newts due to access restrictions during the survey period. Should this area be impacted by the development, surveys of any suitable waterbodies should be undertaken.**

**Habitats within 250m of Ponds 1, 2 and 4 (or other waterbodies where this species is recorded in 2013) should be retained within the scheme to protect the population of great crested newts. Habitats should be enhanced to maximise the potential to support great crested newts by controlling public access and allowing natural vegetation to regenerate around the ponds, whist maintaining areas of open water.**

**Any works which may impact on great crested newt or their habitats should be undertaken under a Natural England licence.**

**Table 8: Summary of great crested newt survey**

| | Visit Number | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | | 2 | | 3 | | 4 | |
| Pond Number | Great Crested Newt | Smooth Newt | Great Crested Newt | Smooth Newt | Great Crested Newt | Smooth Newt | Great Crested Newt | Smooth Newt |
| Pond 1 | 0 | 0 | 3 (1m, 2f) | 3 | 0 | 1 | 0 | 1 |
| Pond 2 | 0 | 0 | 1 (m) | 1 | 1 (m) | 3 | 0 | 0 |
| Pond 3 | 0 | 21 | 0 | 25 | 0 | 28 | 0 | 1 smooth newt, 1 palmate newt |
| Pond 4 | 13 (8m,5f) | 1 | 1 (m) | 1 | 1 (m) | 2 | 0 | 0 |
| Pond 5 | - | - | - | - | - | - | 0 | 2 |

- Survey not possible due to insufficient water

## 3.6 Reptiles

Consistent with surveys carried out by WSPE in 2003 and 2006, the URS reptile survey revealed that grass snake and common lizard are present on the site.

Froglife reptile survey guidelines[xvii] provide a method of categorising reptile populations by the maximum number of adult reptiles recorded during one survey visit. The populations of grass snake and common lizard recorded during 2012 fall within the low population categories because the peak count of each species was below 5 animals. Whilst this is generally in line with previous surveys, WSPE recorded moderate and high populations of grass snakes in 2006; however, the higher populations of reptiles were recorded on the Cambridge Golf Course and Driving Range, which is outside of the current site boundary. Furthermore, the golf course lies to the north of Rampton Road and the road is likely to form a barrier to the movement of reptiles between this area and the site.

Table 9 presents a summary of the reptile survey results. The locations of all reptiles recorded are shown on Figure 13. The majority of habitats suitable for reptiles lies around the periphery of Oakington Barracks within areas of scrub and rough grassland. The large expanses of arable land found in the southern area are too intensively managed to provide habitats for reptiles.

**Most of the reptiles recorded were located within Oakington Barracks and along watercourses and Wilsons Road in the southern area. The reptiles were generally limited to marginal areas where scrub and ruderal plants has colonised. Where possible these areas should be retained and enhanced within the development scheme. Enhancement could include linking up areas of suitable vegetation to allow reptiles to move through the site and into the wider countryside. Encouraging a diverse sward of tussock grasses and herbs would further attract the invertebrates that reptiles feed on. These measures would increase the carrying capacity of the land in respect of reptiles and allow these areas to act as recipient sites for any reptiles displaces by works on other parts of the site.**

**Table 9. Summary of reptile survey results**

| Date | Weather | Reptiles Recorded | Location |
|---|---|---|---|
| 18/06/12 | Sunny, still, 17°C | 1 grass snake | 15 |
| 31/08/12 | Overcast, light breeze, with frequent sunny spells | 2 grass snake | 1, 12 |
| 01/09/12 | Overcast, light breeze, getting warmer throughout day | 2 common lizard | 13,14 |
| 04/09/12 | Dry, still, 20% cloud, 22-23°C | | |
| 05/09/12 | Dry, 13.5-20°C, 10% cloud | 2 grass snake | 1,2 |
| 05/09/12 | Dry, 10% cloud, 20°C | 2 common lizard | 3,4 |
| 17/09/12 | Dry, 14-20°C, 20-70% cloud | 2 grass snake<br>1 common lizard | 5,6<br>7 |
| 18/09/12 | Dry, 11.5-15°C, 0-70% cloud | 3 common lizard | 8,4,4 |
| 19/09/12 | Dry 10.5-15°C, 50-60% cloud | 3 grass snake | 1,6,9 |
| 20/09.12 | Dry 11.5-17°C, 100% cloud | 2 common lizard<br>2 grass snake | 6,10<br>2,11 |

## 3.7 Aquatic Macro-Invertebrates

Tables 10 presents the results of the aquatic macro-invertebrate survey of a number of water bodies on the site.

The composition of the invertebrate samples demonstrates that all the waterbodies, with the exception of the Ditch 1 and Pond 3, have a moderately high diversity of invertebrates.

Seventeen taxa were recorded in Pond 1. The groups dominating the assemblage here were beetle larvae (notably diving beetles, *Dytiscidae*), non-biting midge larvae (*Chironomidae*) and microcrustaceans (*Ostracoda*). Most of the species present were typical of temporary waterbodies. The species with the highest CCI score was *Callicorixa praeusta*, a species of lesser water boatman rated as 'Local' (CCI score 5), which is of limited conservation interest[xxi].

Twenty-one taxa were recorded in Pond 2. Microcrustaceans were present in very high abundances (*Daphnidae*, and *Ostracoda*), suggesting a good water quality. *Daphnidae* are commonly used for ecotoxicity tests. The presence of the highly pollution sensitive caddis *Agrypnia pagenata* (*Phryganeidae*) confirm that the water quality was good in the pond. In terms of abundances, and apart from microcrustaceans, the sample was dominated by truefly larvae (*Chaoboridae, Culicidae* and *Chironomidae*), beetles (*Dytiscidae* larvae, *Hydrophilidae* larvae, *Helophorus brevipalpis*), and lesser waterboatmen (*Corixidae*). No species of nature conservation importance was recorded in the pond, with the exception of *Callicorixa praeusta, Agrypnia pagenata* and *Gerris lateralis*, all rated as 'Local' (CCI score 5), indicating a species restricted to a specific habitat, or uncommon, but not considered as 'Notable'. *Agrypnia*

*pagenata* is a widely distributed lowland species that is found in ponds and lakes with emergent vegetation.

Pond 3 was characterised by high diversity, with 22 and 25 taxa recorded at the two sampling points, respectively. Pond 3 was the most diverse of the waterbodies sampled and the presence of pollution sensitive animals (*Phryganeidae: Agrypnia pagenata, Caenidae: Caenis robusta, Caenis luctosa and Aeshnidae: Aeshna mixta, Sympetrum sanguineum and Sympetrum striolatum*) indicates that the water in Pond 3 is of good quality. In terms of species of conservation interest, the presence of *Helochares lividus* (a species of water scavenger beetle, typical of still freshwaters) is 'Notable' (CCI score 7). This species does not have a RDB status, but CCI score 7 species are considered scarce in Great Britain and occur in less than 100 10 km squares of the National Grid. The species of lesser water boatman *Micronecta scholtzi* is considered as being as 'Regionally Notable' (CCI score 6) in terms of its distribution. All other species recorded in Pond 3 were relatively common.

Pond 5 held relatively low diversity in comparison with the other waterbodies sampled, with only eight taxa recorded. The sample was dominated by *Oligochaeta, Ostracoda* (microcrustaceans), beetles (*Helophorus sp.*) and non-biting midge larvae (*Chironomidae*). No pollution sensitive taxa or species of nature conservation interest were sampled in the pond, suggesting that it is a temporary and/or recent waterbody.

Thirteen taxa were recorded in Pond 4, which is considered moderately diverse. The sample was dominated in terms of abundance by non-biting midge (*Chironomidae*), snails (*Galba truncatula*), beetles (*Helophorus sp.*, *Dytiscidae* larvae) and true bugs (*Corixidae*). The only species of interest was the lesser water boatman *Micronecta scholzi* (CCI score 6), which is considered a 'Regionally Notable' species.

The invertebrate assemblage sampled in the Ditch 1 was characterised by a low diversity (nine taxa with only 7 BMWP scoring families) and the absence of pollution sensitive taxa. Furthermore, no species of nature conservation interest were identified in the sample, which was dominated by the very common *Gammarus pulex*, *Asellus aquaticus*, *Psychodidae* and *Chironomidae.* The characteristics of the watercourse (the substrate comprised silt and woody debris), as well as run off from the road are likely to affect the water quality.

Oakington Brook was characterised by high diversity at sampling points 1 and 2, with 24 and 26 taxa recorded, respectively. The invertebrate assemblages sampled at these locations were indicative of good water quality, with the presence of pollution sensitive taxa, such as caddislfy larvae (*Limnephilidae, Beraeidae, Psychomyidae*). However, at point 3 the absence of the taxa named above might indicate a decrease in the water quality at this location. In terms of nature conservation importance, no species of interest were identified, with most of the animals present being 'Common' and 'Very Common' (having a CCI score between 1 and 2). The only exception was *Anisus Leucostoma*, recorded at point 3 which is 'Local' (with a CCI score of 5). However, *A. leucostoma* is widespread across Britain.

The invertebrate assemblage in Longstanton Brook was characterised by a high diversity (24 taxa) and the presence of a few pollution sensitive taxa, including *Hydropsychidae*. In terms of nature conservation importance, the sample was dominated by 'Very Common' or 'Common' species (CCI scores 1 and 2) only, and no species of interest were identified.

**In summary, the invertebrate samples taken on the various waterbodies at the site indicated that Ponds 1, 2 and 3 were characterised by the presence of diverse invertebrate communities. These ponds had good water quality. Some species of interest ('Notable', 'Regionally Notable' or 'Local') were recorded in these ponds. The most notable species recorded was the water scavenger beetle *Helochares lividus* (CCI 7, 'Notable'). Pond 4 was characterised by a moderate diversity and the absence of pollution sensitive taxa. However, *Micronecta scholzi* (CCI 6, 'Regionally Notable') was recorded here. Pond 5 and Ditch 1 were characterised by low diversity invertebrate assemblages and by the absence of pollution sensitive animals, or by any species of**

**conservation interest. Oakington Brook and Longstanton Brook were characterised by diverse invertebrate assemblages, and the presence of pollution sensitive taxa, indicative of good water quality (although a decrease in biological quality was observed at the most downstream site sampled on Oakington Brook). It is anticipated that the water quality will improve due to the cessation of farming at the site. To maximise the benefits to aquatic invertebrates it is recommended that the waterbodies are buffered by five meter wide grass margins. This will protect the bank side vegetation and water from degradation from trampling and pollution and improve connectivity throughout the site.**

**Table 10: Composition of the aquatic macro-invertebrate samples**

| Group | Species | CCI Score | Pond 1 | Pond 2 | Pond 3 (1) | Pond 3 (2) | Pond 4 | Pond 5 | Ditch 1 | Oakington Brook (1) | Oakington Brook (2) | Oakington Brook (3) | Longstanton Brook |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Snails | | | | | | | | | | | | | |
| Hydrobiidae | *Potamopyrgus antipodarum* | 1 | | | | 54 | | 4 | | | | 7 | 18 |
| Lymnaeidae | *Galba truncatula* | 3 | 6 | | | | 64 | | | | | | |
| | *Radix balthica* | 1 | | 11 | 31 | 41 | | | | | | | |
| | *Lymnaea auricularia* | 2 | | | | 2 | | | | | | | |
| | *Lymnaea peregra* | 1 | | | | | | | | 1 | 2 | 8 | 2 |
| Planorbidae | | | | | 1 | | | | | | | | |
| | *Gyraulus crista* | 2 | | | 10 | 22 | | | | | 3 | | |
| | *Hippeutis complanatus* | 3 | | | | 21 | | | | | | | |
| | *Anisus vortex* | 1 | | | | | | | | 22 | 18 | 10 | 13 |
| | *Anisus leucostoma* | 5 | | | | | | | | | | 1 | |
| | *Planorbis albus* | 1 | | | | | | | | | 2 | | |
| Succineaidae | *Succinea sp.* | | | | 5 | 2 | | 1 | | | 1 | | |
| Physidae | *Physa fontinalis* | 1 | | | | | | | | | | 2 | |
| Mussels | *Sphaeriidae* | | | | | | | | 5 | 5 | | 18 | 1 |
| Worms | *Oligochaeta* | | | | 19 | 15 | | 50 | | 42 | 5 | 7 | 13 |
| Leeches | | | | | | | | | | | | | |
| Glossiphonidae | *Helobdella stagnalis* | 1 | | | 12 | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Alboglossiphonia heteroclita* | 4 | | | | 1 | | | | 5 | 4 | | 4 |
| | *Glossiphonia complanata* | 1 | | | | | | | | | | 2 | |
| Erpobdellidae | *Erpobdella octoculata* | 1 | | | | | | | 1 | | | | 1 |
| Crustaceans | | | | | | | | | | | | | 3 |
| Microcrustaceans | *Daphnidae* | | | 2140 | | | | | | | | | |
| | *Ostracoda* | | 88 | 968 | 5 | 13 | | 62 | | | 1 | 1 | 7 |
| Asellidae | *Asellus aquaticus* | 1 | | | | | | | 17 | 63 | 89 | 5 | 2 |
| Crangonyctidae | *Crangonyx pseudogracilis* | 1 | | 1 | 112 | 99 | | | | 1 | | | |
| Gammaridae | *Gammarus pulex* | 1 | | | | | | | 35 | 5 | 16 | | |
| Mayflies | *Nymph* | | | | | | | | | | | | 1 |
| Baetidae | *Baetidae* | | | | 2 | 2 | | | | | | | |
| | *Baetis rhodani* | 1 | | | | | | | | | | | 3 |
| | *Cloeon dipterum* | 1 | | 3 | | | | | | | | | |
| | *Procleon pennulatum* | 5 | | | | 4 | | | | | | | |
| Caenidae | *Caenis luctuosa* | 1 | | | 2 | 5 | | | | | | | |
| | *Caenis robusta* | 5 | | | | 4 | | | | | | | |
| Damselflies | | | | | | | | | | | | | |
| Coenagrionidae | *Enallagma cyathigerum* | 2 | | | | 10 | | | | | | | |
| Dragonflies | | | | | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aeshnidae | *Aeshna mixta* | 3 | | | 4 | | | | | | | | |
| | *Sympetrum sanguineum* | 5 | | | | 1 | | | | | | | |
| | *Sympetrum striolatum* | 1 | | | | 1 | | | | | | | |
| Alderflies | *Sialis lutaria* | 1 | | | | | | | | 1 | | | |
| Hemiptera | | | | | 3 | | | | | | | | |
| Gerridae | *Gerridae* | | | | | | | | | | | | |
| | *Gerridae nymph* | | 4 | 1 | | | 4 | | | | | | |
| | *Gerris thoracicus* | 4 | 3 | 2 | | | | | | | | | |
| Nocauridae | *Nocauridae nymph* | | | | 2 | | | | | | | | |
| Notonectidae | *Notonectidae nymph* | | 9 | 2 | | | | | | | | | |
| Pleidae | *Plea minutissima* | 4 | | | | 3 | | | | | | | |
| Corixidae | *Corixidae nymph* | | 12 | 55 | 8 | | 15 | | | | 1 | | |
| | *Micronecta scholtzi* | 6 | | | 87 | 44 | 1 | | | | | | |
| | *Callicorixa praeusta* | 5 | 6 | 6 | | | | | | | | | |
| | *Sigara dorsalis* | 1 | | | | | | | | | 1 | | |
| Mites | *Hydracnhidia* | | | | | | | | | 23 | 7 | 10 | |
| Beetles | *Coleoptera Larvae* | | | | 1 | 1 | 4 | 1 | | | | | |
| Haliplidae | *Haliplus flavicollis* | 4 | | | 1 | 2 | | | | | | | |
| | *Haliplus lineaticollis* | 1 | | | | | | | | 2 | | | |
| | *Larvae* | | | | | | | | | 3 | 9 | 2 | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Noteridae | *Noterus clavicornis* | 2 | | | 1 | | | | | | | | |
| Dytiscidae | *Dytiscidae larvae* | | 67 | 33 | | | 5 | | | 1 | 16 | 2 | 1 |
| | *Hydroporus planus* | 2 | 1 | | | | | 1 | | | | | |
| | *Nebrioporus elegans* | 1 | | | | | | | | 7 | 8 | 1 | 1 |
| | *Ilybius fuliginosus* | 1 | | | | | | | | 1 | | 1 | |
| Hydrophilidae | *Helophorus sp.* | | | 20 | | | | 50 | | | | | |
| | *Helophorus (brevipalpis)* | 1 | | | | | 15 | | | | | | |
| | *Hydrophilidae larvae* | | 8 | 17 | | | | | | | | | |
| | *Anacaena globulus* | 1 | | | | | | | 2 | | | | |
| | *Helochares lividus* | 7 | | | | 1 | | | | | | | |
| Elmidae | *Oulimnius sp. (Larvae)* | | | | | | | | | 51 | 18 | 28 | 30 |
| | *Oulimnius sp. (Adult)* | | | | | | | | | 42 | 8 | 37 | 42 |
| Dryopidae | *Dryopidae Larvae* | | 5 | 1 | | | | | | | 1 | | |
| Caddisflies | | | | | | | | | | | | | |
| Phryganeidae | *Agrypnia pagenata* | 5 | | 2 | 3 | 2 | | | | | | | |
| Psychomyidae | *Tinodes waeneri* | 1 | | | | | | | | 2 | | | |
| Limnephilidae | *Limnephilus lunatus* | 1 | | | | | | | | | 2 | | |
| Hydropsychidae | *Hydropsyche augustipennis* | 1 | | | | | | | | | | | 3 |
| Beraeidae | *Beraea sp.* | | | | | | | | | 3 | 1 | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lepidoptera | *Lepidoptera* | | 6 | 2 | | 1 | 5 | | | 1 | | | |
| Trueflies | *Diptera pupea and larvae* | | 35 | 75 | | | 3 | 1 | | 2 | | | 12 |
| Tipulidae | *Tipulidae* | | | | 1 | | | | 1 | | 1 | | |
| Limoniidae | *Limoniidae* | | | | 1 | | | | | | | | |
| Psychodidae | *Psychodidae* | | | | | | | | 18 | | | | 1 |
| Dixidae | *Dixidae* | | | 2 | | | 1 | | | | | | |
| Chaoboridae | *Chaoboridae* | | 7 | 51 | | | 1 | | | | | | |
| Culicidae | *Coquilletida richardii* | | | | | | 2 | | | | | | |
| | *Culex sp.* | | 4 | 35 | | | | 4 | | | | | |
| | *Culex territans ?* | | | 47 | | | | | | | | | |
| Ceratopogonidae | *Ceratopogonidae* | | | | | | | | 2 | | | | 1 |
| Chironomidae | *Chironomidae* | | 234 | 215 | 66 | 55 | 112 | 181 | 46 | 46 | 16 | 20 | 72 |
| Syrphidae | *Syrphidae* | | | | | | | 3 | | | | | |
| Pediciidae | *Pediciidae* | | | | | | | | | 13 | 2 | | 4 |
| Simuliidae | | | | | | | | | | | 2 | | 67 |
| Stratiomyidae | | | | | | | | | | | 1 | | |
| Muscidae | | | | | | | | | | | | | 4 |
| Number of taxa | | | 16 | 22 | 22 | 25 | 13 | 11 | 9 | 24 | 26 | 18 | 24 |

### 3.8 Butterfly Survey

Eighteen species of butterfly were recorded on the site. Moth family groups recorded included *Pyralidae, Noctuidae* and *Geometridae* with four moth species identified to species level.

Table 11 below lists the species of butterfly and moth identified during the survey along with their International Union for Conservation of Nature and Natural Resources (IUCN) (adapted from IUCN (2001)) and UK BAP status. None of the species identified were listed on the local Cambridgeshire and Peterborough BAP. One butterfly, the small heath *Coenonympha pamphilus* and two moth species recorded, including the shaded broad-bar *Scotopteryx chenopodiata* and cinnabar *Tyria jacobaeae,* are listed on the UK BAP, but for research purposes only, as these species are still widespread and common, but have been shown to be declining.

All species of butterfly recorded are listed as 'Least Concern' in the IUCN Red List categories, with exception to the small heath which is listed as 'Nationally Threatened' and the cinnabar and shaded broad-bar moth are listed as 'Vulnerable'.

**Table 11. Butterfly and moth species identified during the survey with their IUCN Red List categories (adapted from IUCN (2001)) and UK BAP status.**

| Latin Name | Common Name | Status (UK) 2010 | UK BAP species |
|---|---|---|---|
| Butterflies | | | |
| *Melanargia galathea* | Marbled white | LC | |
| *Pieris napi* | Green veined white | LC | |
| *Pieris brassicae* | Large white | LC | |
| *Pieris rapae* | Small white | LC | |
| *Thymelicus lineola* | Essex skipper | LC | |
| *Thymelicus sylvestris* | Small skipper | LC | |
| *Ochlodes venata* | Large skipper | LC | |
| *Aglais urticae* | Small tortioseshell | LC | |
| *Pyromnia tithornus* | Gatekeeper | LC | |
| *Maniola jurtina* | Meadow brown | LC | |
| *Coenonympha pamphilus* | Small heath | NT | Yes (Research only) |
| *Inachis io* | Peacock | LC | |
| *Lycaena phlaeas* | Small copper | LC | |
| *Polygonum calbum* | Comma | LC | |
| *Aphantopus hyperantus* | Ringlet | LC | |
| *Polyonmmatus icarus* | Common blue | LC | |
| *Vanessa atalanta* | Red admiral | LC | |
| *Pararge aegeria* | Speckled wood | LC | |
| Moths | | | |
| *Tyria jacobaeae* | Cinnabar | VU | Yes (Research only) |
| *Pyralidae* | Pyralidae family | | |
| *Noctuidae* | Noctuidae family | | |
| *Scopula imitaria* | Small blood vein | | |
| *Autographa gamma* | Silver Y | | |
| *Geometridae* | Geometridae family | | |
| *Scotopteryx chenopodiata* | Shaded broad-bar | VU | Yes (Research only) |
| *Sphinx ligustri* | Privet hawk moth | | |

LC = Least Concern, NT = Near Threatened, VU = Vulnerable

Table 12 presents number of individual specimens recorded and the number of species recorded within each transect over the three visits.

Whilst it is difficult to compare transects due to their different lengths, some general comparisons can be made. Within the southern area, Transects 7, 8, 9, and 10 had low species diversity, this is possibly associated with the intensive management of the habitats including very shortly mown grassland, immaturity of the newly planted broad-leaved trees and lack of plant species diversity.

Transect 11 held the highest number of butterflies and moths (12) in the southern area and the highest number of individual butterflies and moths overall. This habitat remained undisturbed throughout the surveys, provided frequent areas for shelter, a varied plant assemblage and a mosaic of habitat types (bare ground, scrub, grassland and mature trees). This habitat continually supported high numbers of individuals and was one of the most diverse areas.

Transects 5 and 6 supported a relatively high number of species and individuals despite being surrounded by less favoured habitats (large arable fields) and it is likely that the ditch created a corridor for butterfly foraging and migration.

Transects 1 to 3 were located within an arable setting and were affected by the cutting of grass during the surveys. Generally, these habitats were intensively managed (Transect 3 was maintained short mown grassland and Transects 1 and 2 were affected by the cutting of grass along the field boundaries and within ditches). Transect 3, was more frequently used by butterflies and moths during the first visit when the ditch vegetation was in flower.

Transects 14 to 19 were located within Oakington Barracks and largely surrounded by grazed fields. The majority of these transects exhibited a mosaic of habitats (woodland edge, scrub, grassland, herbs and bare ground) and as a result, exhibited a higher species diversity and recorded larger numbers of individuals. Transect 14 supported high numbers of common blue butterfly due to the presence of common bird's-foot trefoil *Lotus corniculatus* and black medic *Medicago lupulina*, which supports the caterpillars of this species.

Overall, the habitats within Oakington Barracks held the most diverse butterfly and moth fauna. This was probably due to the mosaic of habitats found within this part of the site and the less intensive habitat management regime. The southern area did provide corridors of suitable habitat which were important for the butterfly population, but these habitats were frequently affected by the cutting of grass within the ditches and along field boundaries.

Bird's-foot trefoil within Transect 14 provided foraging habitat for species such as grizzled skipper *Pyrgus malvae* and dingy skipper *Erynnis tages* (both UK BAP Priority Species and IUCN Red List 'Vulnerable'), but the main flight period for these species is earlier in the year. Whilst, second broods are often recorded in August, they were not identified during the survey and it is considered that the poor weather in 2012 may have depressed the numbers of these species.

**The majority of species identified are not considered to be of conservation concern, and those listed as 'Vulnerable' are still relatively widespread within the UK. None of the moths or butterflies recorded are listed on Schedule 5 of the WCA, and therefore there is no legal requirements to protect these species. However, providing suitable habitats to maintain populations of the BAP Priority Species should be considered within the proposed scheme. This could be achieved by creating green corridors throughout the site which are maintained as species-rich grassland and include the key food plants of butterflies and moths i.e. birds-foot trefoil, black medic, bent grasses (*Agrostis* sp.), fescue grasses (*Festuca* sp.), meadow grasses (*Poa* sp.), campions (*Silene* sp.) and nettles (*Urtica* sp.). Such corridors could be established along river banks, road verges**

**and existing hedgerows to provide a green network to allow butterflies and moths to move through the site.**

**Table 12: Total number of individual butterflies and moths and species/ families recorded within each transect over the three visits**

| Transect Number | Total Number of individual butterflies and moths | Total Number of Species |
|---|---|---|
| 1 | 18 | 5 |
| 2 | 23 | 4 |
| 3 | 48 | 9 |
| 4 | 40 | 6 |
| 5 | 52 | 7 |
| 6 | 32 | 7 |
| 7 | 4 | 2 |
| 8 | 4 | 3 |
| 9 | 4 | 2 |
| 10 | 6 | 3 |
| 11 | 88 | 12 |
| 12 | 34 | 8 |
| 13 | 40 | 10 |
| 14 | 49 | 10 |
| 15 | 58 | 13 |
| 16 | 72 | 13 |
| 17 | 59 | 8 |
| 18 | 67 | 10 |
| 19 | 43 | 10 |

## 3.9 Moth Survey

Species of elm trees, which are the host plant of white-spotted pinion moths, were recorded at two locations on the site (Figure 14).

Location 1 (TL405654) supported a block of saplings and semi-mature elm which are probably semi-natural in origin. It is likely that this stand represents the remains of a stand of mature elm which has, over time, succumbed to Dutch elm disease. The stand comprises up to 100 specimens, approximately 4-6m in height with the age of the oldest trees no more than 10 years old. The very young specimens are in good condition although the older ones are beginning to show signs of Dutch elm disease. This stand did not provide mature trees with epicormic growth, which are the preferred habitat for the larvae; however, it did include

suckering young growth, which may provide some sub-optimal habitat for the white-spotted pinion moth.

Location 2 (TL407664) supported two elm trees which were recorded during an arboricultural survey of the site. Access to their location was not possible during the survey, but they were listed as part of a tree group, rather than standard trees, and therefore unlikely to be of significant age or size. These trees were isolated from other stands of elm which would make colonisation and exploitation of this resource by the moth difficult.

**The presence of small and intermittent breeding populations of white-spotted pinion cannot be completely ruled out. However, its long-term presence on the site is considered unlikely due to lack of previous records in the area and sub-optimal (i.e. young and isolated tree groups) habitat within the site. A search for the caterpillars of white-spotted pinion moth could be undertaken between April and June to confirm presence or likely absence of this species.**

### 3.10 Other Mammals

Brown hare were recorded using the arable fields and areas of longer grass at Oakington Barracks and the southern area. This species is likely to breed on the site.

**Brown hare are listed as a Priority Species on both the UK and Cambridge and Peterborough BAPs and are a material consideration in planning decisions, as such compensatory habitat, in the form of rough grassland, should be provided for this species to replace the areas of grassland lost to the scheme.**

## 4 SUMMARY

Figure 15 presents a summary of the key areas for each of the species or taxa surveyed.

European protected species which occur on the site include bats, water voles and great crested newts. These species and their habitats (including bat roosts, but not bat foraging/ commuting habitat) are protected by law. The protected habitats of these species represent a small proportion of the total area of the site and are largely confined to the aquatic habitats. These aquatic habitats should be retained within the scheme with an appropriate buffer (5m for water vole habitats and 250m for great crested newts). Furthermore, there is an opportunity to enhance these habitats for wildlife through the cessation of farming, which would reduce disturbance and pollution, and through the planting of appropriate bankside vegetation. These measures would contribute to the objectives of the Local BAP in line with national planning policy.

Twenty-one active badger setts were recorded, and it is apparent that levels of badger activity are high, particularly at Oakington Barracks, and new setts could be constructed in the future. As all active badger setts are protected by legislation an update badger survey should be conducted if the development of the site is not undertaken within a year of the issue of this report. This will ensure that any new setts can be protected. Main badger setts, key commuting corridors and foraging areas should be retained within the proposed scheme.

Three birds listed on Schedule 1 of WCA (hobby, quail and barn owl) were recorded nesting on the site and these species are protected from disturbance whilst breeding. Other key bird species including, turtle dove, spotted flycatcher and corn bunting, are largely associated with arable farmland and field margin habitats, such as hedgerows and trees. New habitats should be created on and off site to provide alternative feeding and nesting opportunities for the diverse range of birds recorded.

Low numbers of common reptiles were recorded throughout the site. Whilst reptiles are protected from killing and injury, the low number on the site are not considered to be a constraint to development.

The invertebrate interest of the site was limited to sections of Longstanton and Oakington Brooks, Ponds 1-3 and sheltered areas of habitats around hedgerows and tree belts. Whilst white-spotted pinion moths may occur in the stand of elm on the northwest boundary of Oakington Barracks, there is no suitable habitat for them on the rest of the site. Elm trees should be retained, where possible, to provide habitat for white-spotted pinion moths in the future.

Areas of habitats suitable for pollen and nectar feeding invertebrates, reptiles, small mammals and foraging barn owls should be incorporated into the landscaping scheme though the creation of new areas of interlinked rough grassland and wildflower habitats. New nesting opportunities for barn owls could be provided within this habitat by installing barn owl boxes.

South Cambridge District Council were consulted regarding the displacement of species associated with the site (Appendix 3). As many of the species currently using the site are associated with open farmland (such as farmland birds, brown hare and badgers), it is unlikely that their populations can be retained in their entirety within the development and compensatory habitat should be considered off site to mitigate for the scheme. Such measures are likely to include funding the enhancement of adjacent farmland to increase the carrying capacity of this land. It is suggested that converting nearby intensively managed arable fields to set aside would provide suitable habitat for displaced farmland birds and approximately 23.4 ha would accommodate the skylarks which currently hold territory at Oakington Barracks. However, this assumption may need to be revised in the light of any bird surveys undertaken in the southern area. Brown hares and badgers would benefit from the provision of new areas of rough grassland, if they were created immediately adjacent to the site.

In summary, with a comprehensive package of habitat retention and enhancement, and off site mitigation, it should be possible to develop the site in accordance with current legislation and planning policy. A detailed construction method statement, and a landscape and ecology strategy should be developed to ensure that biodiversity is retained within the locality of the site.

## APPENDIX 1. FIGURES

Figure 1. Site Layout

Figure 2. Breeding Bird Transect Routes

Figure 3. Bat Transect Routes and Static Bat Detector Locations

Figure 4. Great Crested Newt Survey Areas

Figure 5. Reptile Survey Locations

Figure 6. Aquatic Macro-Invertebrate Survey Locations

Figure 7. Butterfly Transect Routes

Figure 9. Bat Activity Map (Transect Data)

Figure 10. Bat Activity Map (Static Bat Detector Data)

Figure 11. Water Vole Survey Results

Figure 13. Locations of Reptile Records

Figure 14 Locations of Elm Trees

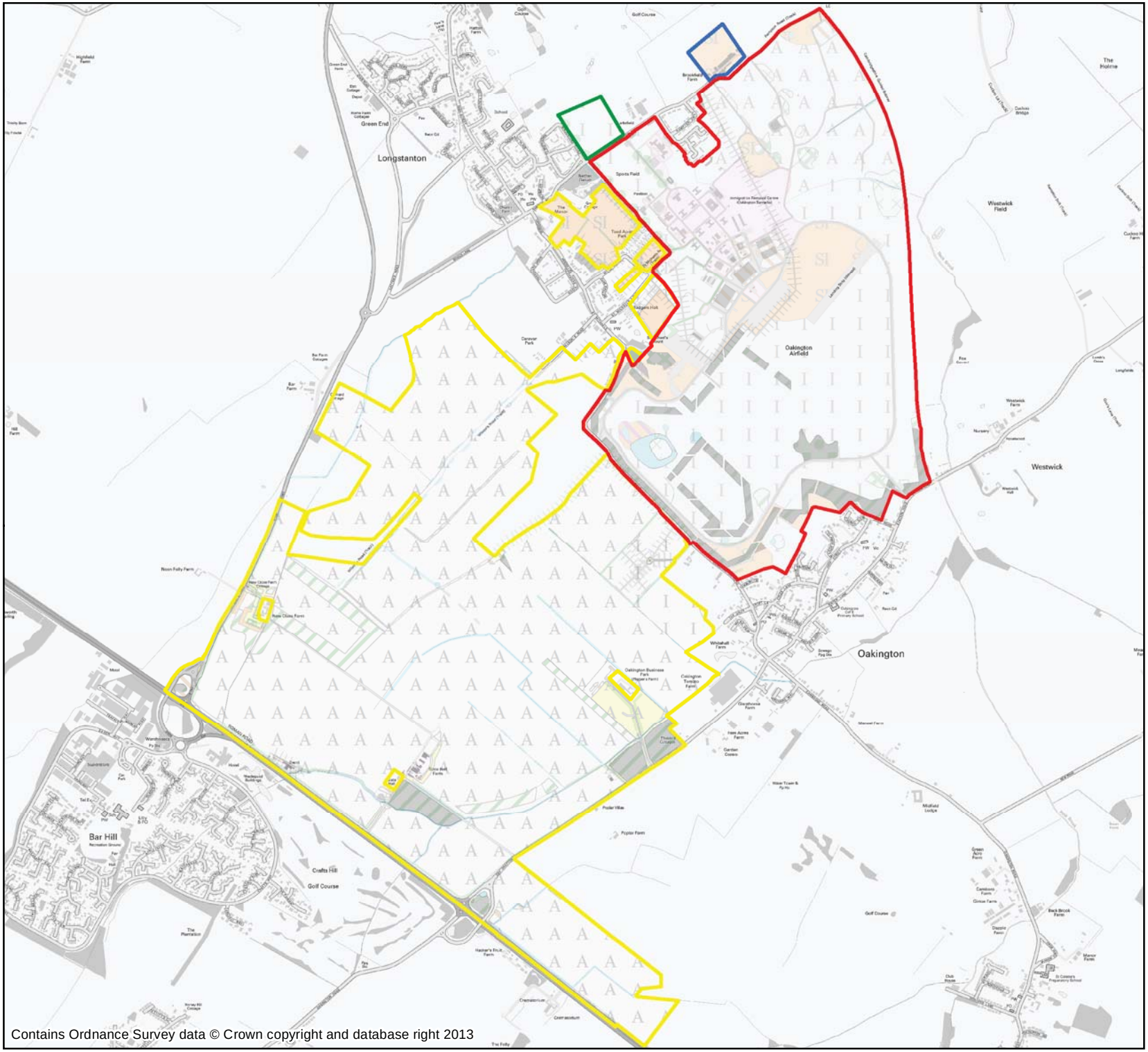
Figure 15. Summary Map of Key Areas for Rare and Protected Species

## APPENDIX 2. CONFIDENTIAL FIGURES

Figure 8. Bird Territory Map

Figure 12. Badger Survey Results

## APPENDIX 3. CONSULTATION LOG






**Key:**

- Oakington Barracks
- Southern Site
- Magdalene Close
- Brookfield Farm

0 250 500 750 1,000

Metres

| | |
|---|---|
| Title | Site Layout |
| Project | Northstowe |
| Client | Homes and Communities Agency |

URS

| App'd: | Drawn: SB | Ch'kd: RH | Drg.Size: A4 |
|---|---|---|---|
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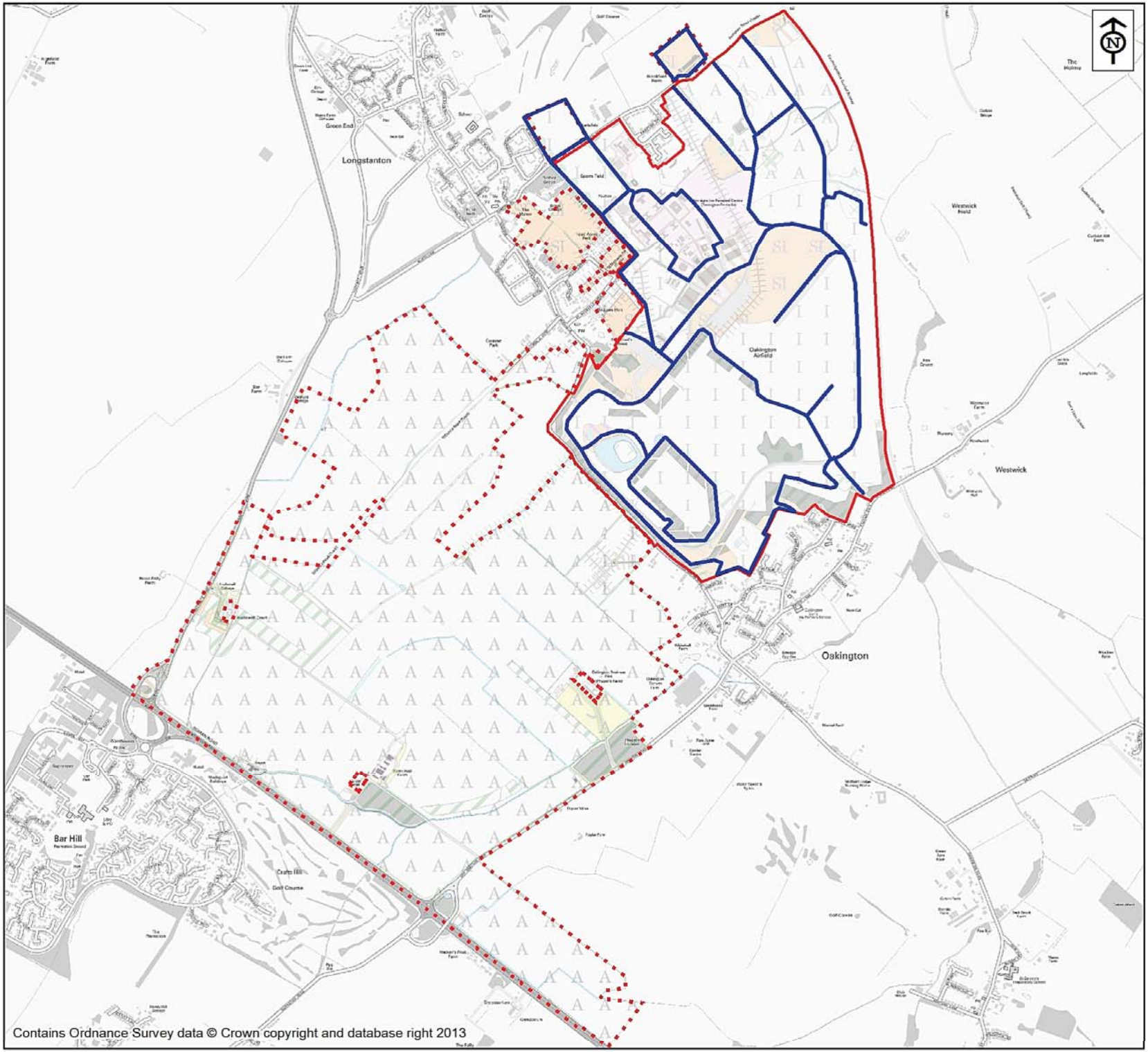
| Scale: 1:25,000 | | Job No: 47062979 | |
| Date: NOV 2012 | | | |




Key:

- Bird Transect Route
- Site Boundary
- Former Oakington Barrack Site Boundary

0 250 500 750 1,000

Metres

| | |
|---|---|
| Title | Breeding Bird Transect Route |
| Project | Northstowe |
| Client | Homes and Communities Agency |

URS

| App'd: | Drawn: | Ch'kd: | Drg.Size: A4 |
|---|---|---|---|
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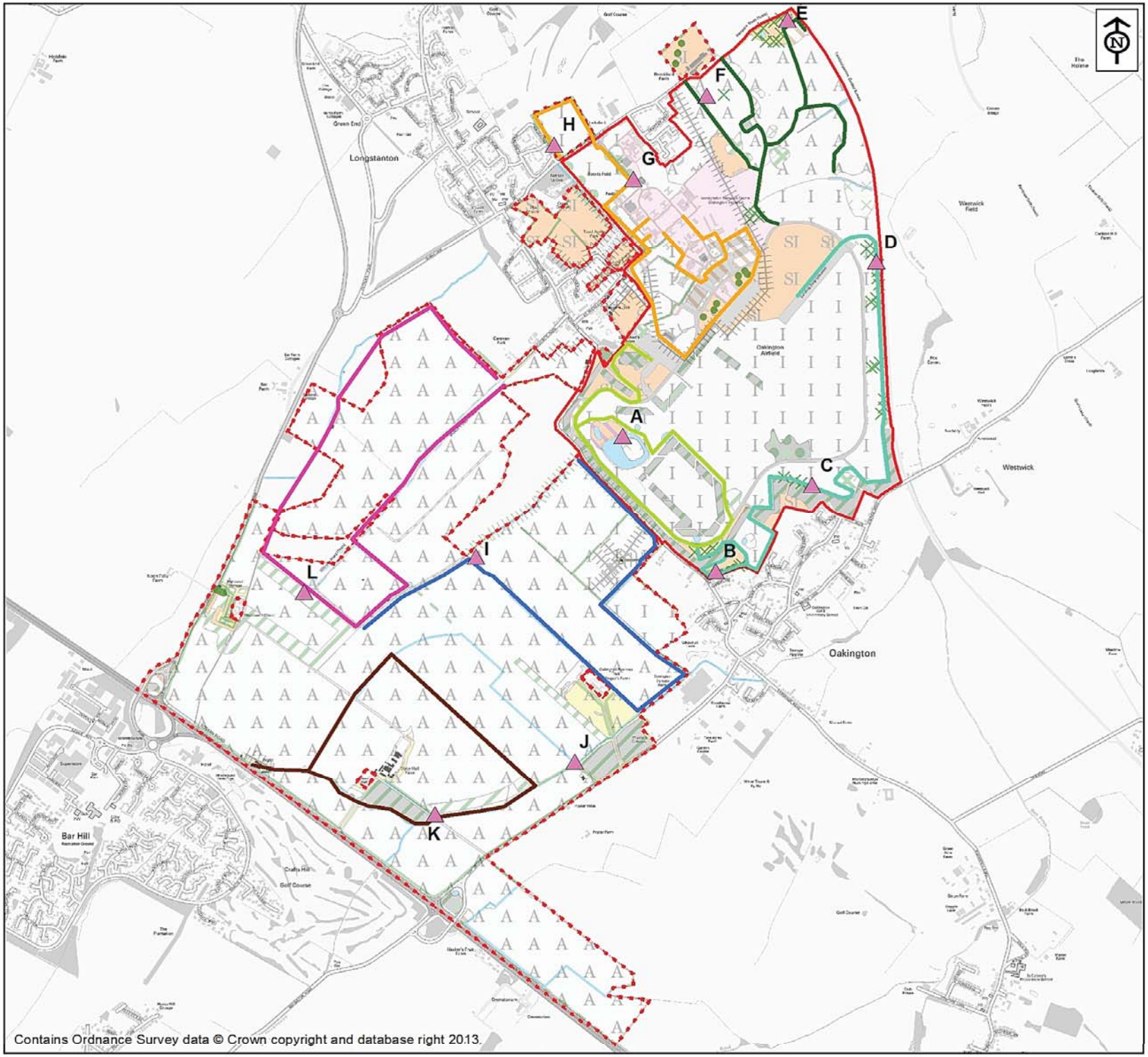
| Scale: 1:25,000 | | | Job No: 47062979 |
| Date: NOV 2012 | | | |




Key:

- Site Boundary
- Former Oakington Barrack Site Boundary
- Broad-leaved Scattered Trees (A3.1)
- Scrub, Scattered (A2.2)
- Boundaries, Defunct hedge, Species-poor
- Boundaries, Fence,
- Boundaries, Intact hedge, Species-poor
- Parkland/scattered trees, Broad-leaved,
- Running water, ,
- To Update
- Hardstanding
- Boundaries, Buildings,
- Cultivated/disturbed land, Arable,
- Improved grassland, ,
- Marshy grassland, ,
- Neutral grassland, Semi-improved,
- Other, Tall ruderal,
- Parkland/scattered trees, Mixed,
- Poor semi-improved grassland, ,
- Scrub, Dense/continuous,
- Scrub, Scattered,
- Standing water, ,
- Woodland, Broad-leaved, Plantation
- Woodland, Coniferous, Plantation
- Woodland, Mixed, Plantation

**Bat Survey**

- Static Bat Detector

**Bat Transect**

- 1
- 2
- 3
- 4
- 5
- 6
- 7

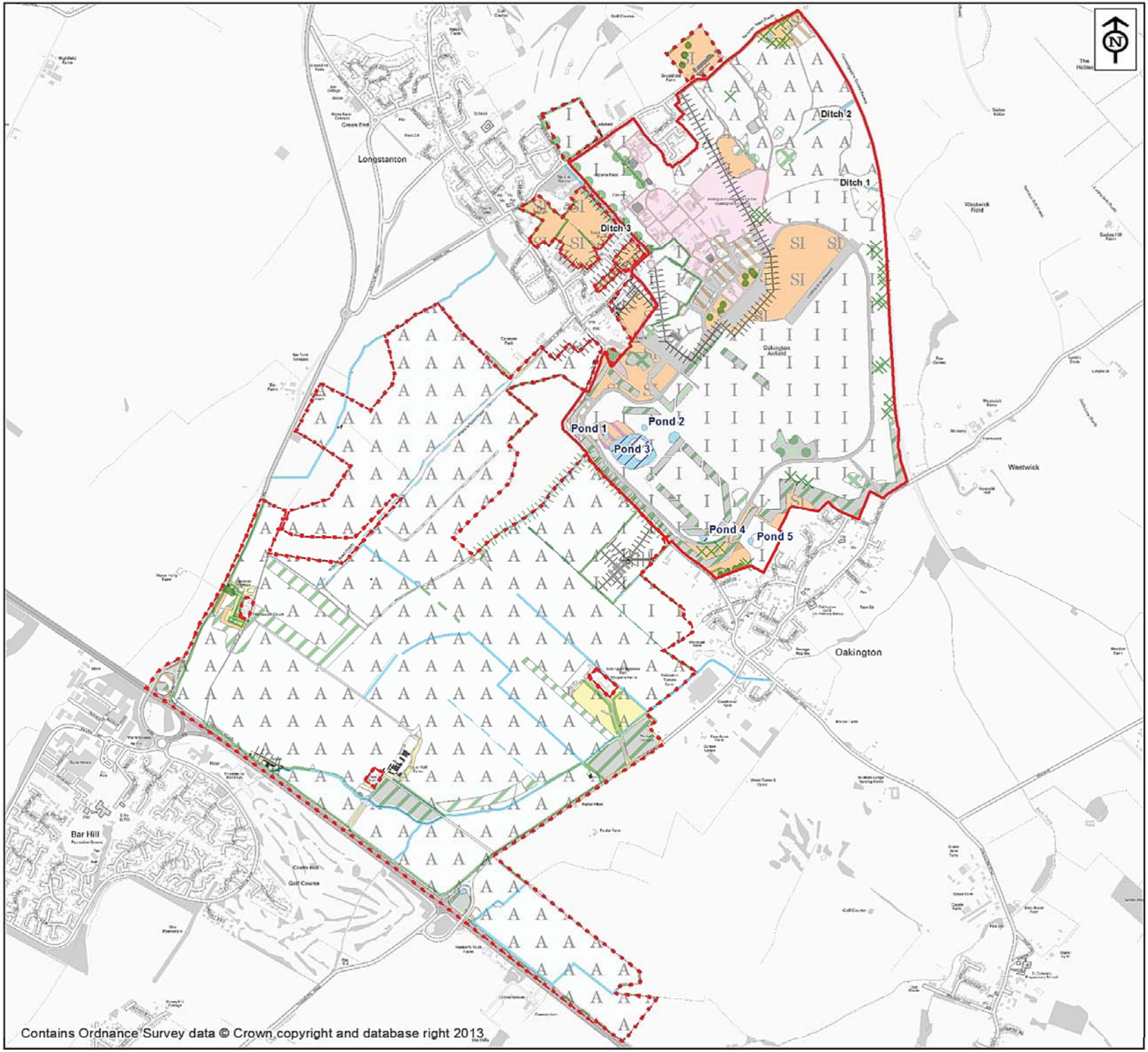
0 250 500 750 1,000

Metres

| | |
|---|---|
| Title | Bat Transect Routes and Static Bat Detector Locations |
| Project | Northstowe |
| Client | Homes and Communities Agency |

URS

| App'd: | Drawn: | Ch'kd: | Drg.Size: |
|---|---|---|---|
| RH | SB | RH | A4 |
| Version: 1 | | Ref: 01/SB/LON | |
| Scale: 1:25,000 | | Job No: 47062979 | |
| Date: NOV 2012 | | | |




## Key:

- Site Boundary
- Former Oakington Barrack Site Boundary
- Broad-leaved Scattered Trees (A3.1)
- Scrub, Scattered (A2.2)
- Boundaries, Defunct hedge, Species-poor
- Boundaries, Fence,
- Boundaries, Intact hedge, Species-poor
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- Hardstanding
- Boundaries, Buildings,
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- Improved grassland, ,
- Marshy grassland, ,
- Neutral grassland, Semi-improved,
- Other, Tall ruderal,
- Parkland/scattered trees, Mixed,
- Poor semi-improved grassland, ,
- Scrub, Dense/continuous,
- Scrub, Scattered,
- Standing water, ,
- Woodland, Broad-leaved, Plantation
- Woodland, Coniferous, Plantation
- Woodland, Mixed, Plantation
- Pond/ Ditch 1 — Pond or ditch location
- Pond 1 — Newt Survey Locations

0 250 500 750 1,000

Metres

| | |
|---|---|
| Title | Great Crested Newt Survey Locations |
| Project | Northstowe |
| Client | Homes and Communities Agency |

URS

| App'd: | Drawn: | Ch'kd: | Drg.Size: |
|---|---|---|---|
| RH | SB | RH | A4 |
| Version: 1 | | Ref: 01/SB/LON | |
| Scale: 1:25,000 | | Job No: 47062979 | |
| Date: NOV 2012 | | | |


## Key:

- Site Boundary
- Former Oakington Barrack Site Boundary
- Broad-leaved Scattered Trees (A3.1)
- Scrub, Scattered (A2.2)
- Boundaries, Defunct hedge, Species-poor
- Boundaries, Fence,
- Boundaries, Intact hedge, Species-poor
- Parkland/scattered trees, Broad-leaved,
- Running water, ,
- To Update
- Hardstanding
- Boundaries, Buildings,
- Cultivated/disturbed land, Arable,
- Improved grassland, ,
- Marshy grassland, ,
- Neutral grassland, Semi-improved,
- Other, Tall ruderal,
- Parkland/scattered trees, Mixed,
- Poor semi-improved grassland, ,
- Scrub, Dense/continuous,
- Scrub, Scattered,
- Standing water, ,
- Woodland, Broad-leaved, Plantation
- Woodland, Coniferous, Plantation
- Woodland, Mixed, Plantation

**Reptile Survey**

- Reptile Mat Location

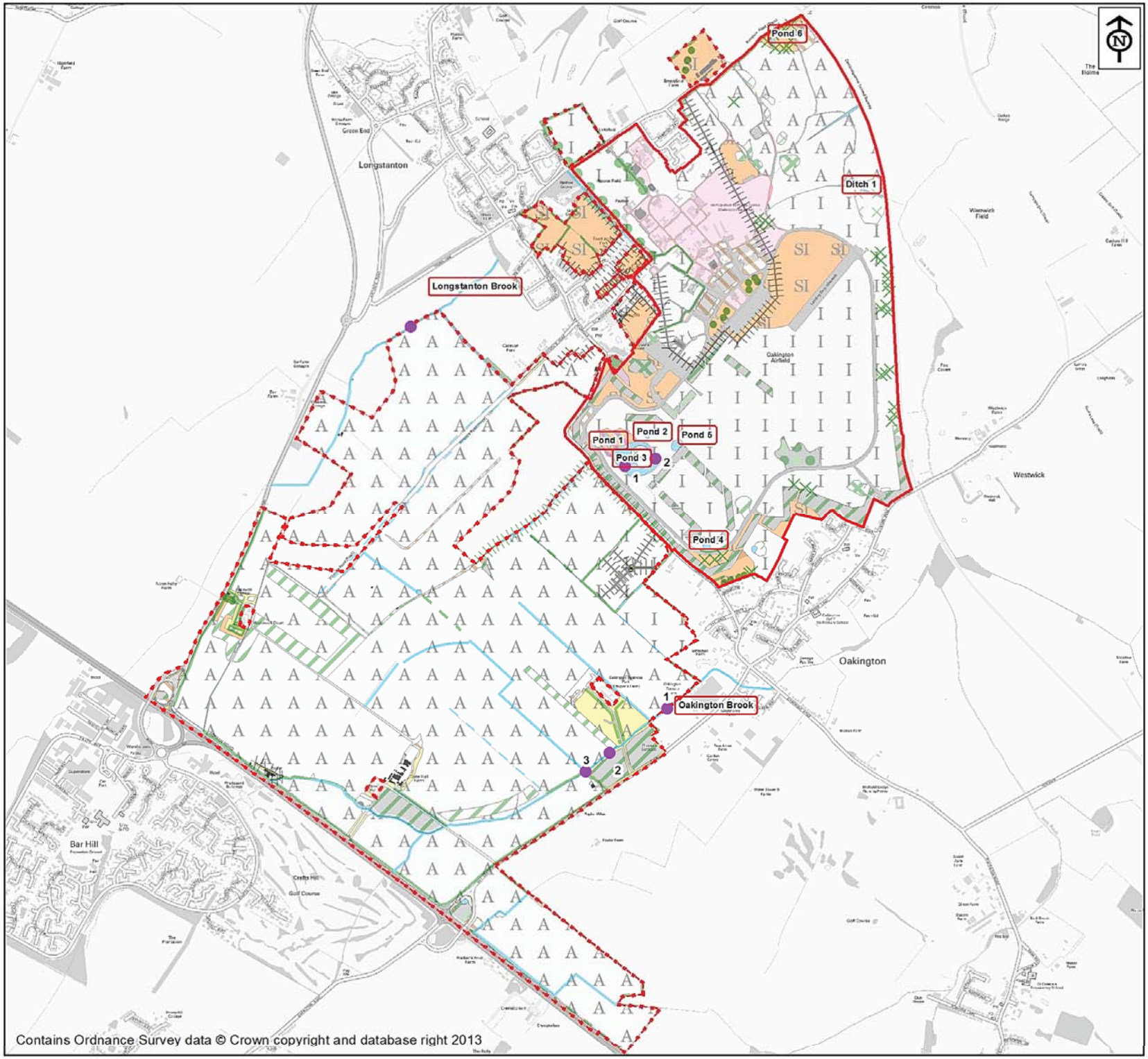
0 250 500 750 1,000

Metres

| | |
|---|---|
| Title | Reptile Survey Locations |
| Project | Northstowe |
| Client | Homes and Communities Agency |

URS

| App'd: | Drawn: | Ch'kd: | Drg.Size: |
|---|---|---|---|
| RH | SB | RH | A4 |
| Version: 1 | | Ref: 01/SB/LON | |
| Scale: 1:25,000 | | Job No: 47062979 | |
| Date: NOV 2012 | | | |




## Key:

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- Boundaries, Intact hedge, Species-poor
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- Running water, ,
- To Update
- Hardstanding
- Boundaries, Buildings,
- Cultivated/disturbed land, Arable,
- Improved grassland, ,
- Marshy grassland, ,
- Neutral grassland, Semi-improved,
- Other, Tall ruderal,
- Parkland/scattered trees, Mixed,
- Poor semi-improved grassland, ,
- Scrub, Dense/continuous,
- Scrub, Scattered,
- Standing water, ,
- Woodland, Broad-leaved, Plantation
- Woodland, Coniferous, Plantation
- Woodland, Mixed, Plantation
- Pond/ Ditch 1 — Sampled Waterbodies
- Sample Points

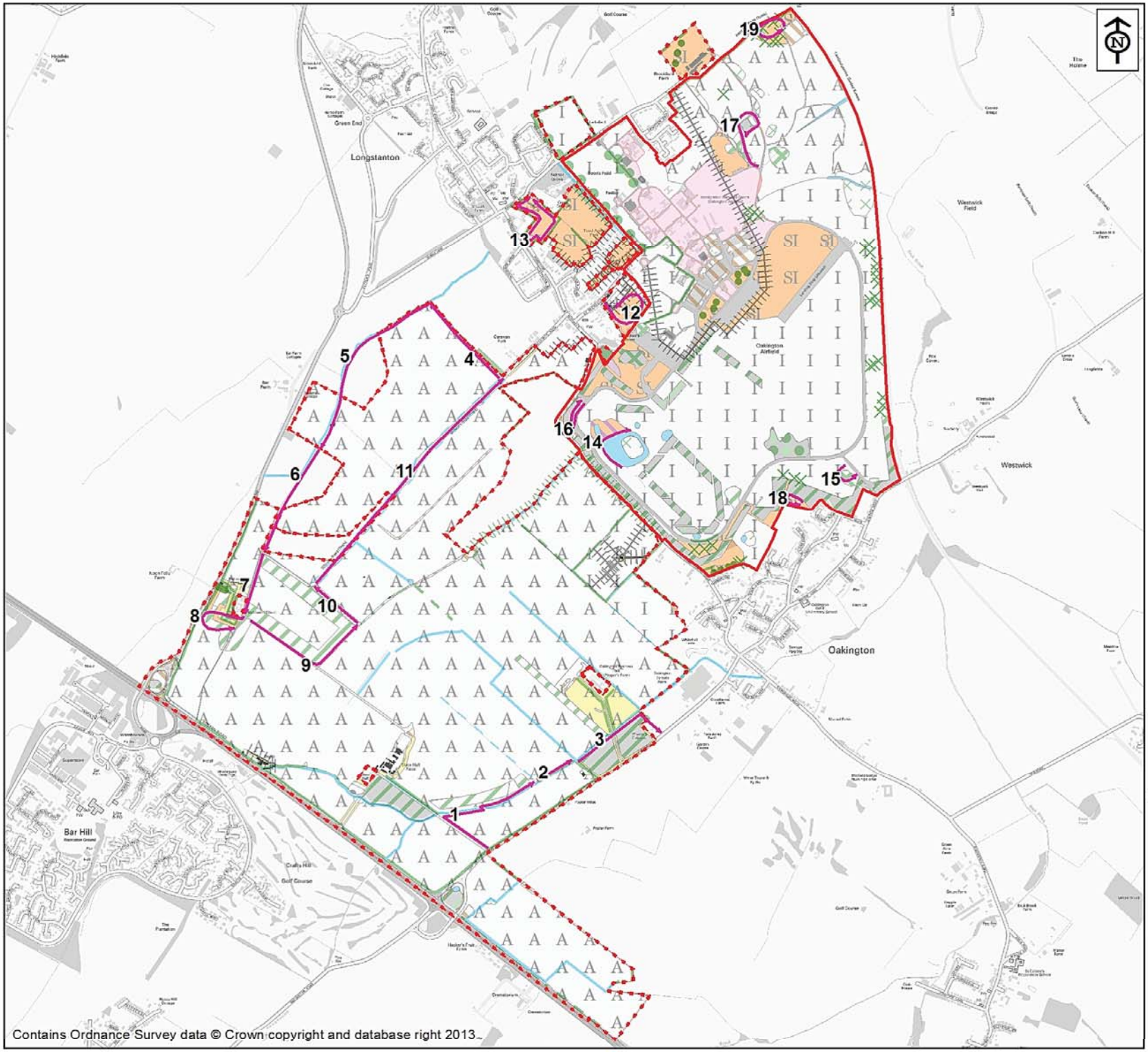
0 250 500 750 1,000

Metres

| | |
|---|---|
| Title | Aquatic Macro-Invertebrate Survey Locations |
| Project | Northstowe |
| Client | Homes and Communities Agency |

URS

| App'd: | Drawn: | Ch'kd: | Drg.Size: |
|---|---|---|---|
| RH | SB | RH | A4 |
| Version: 1 | | Ref: 01/SB/LON | |
| Scale: 1:25,000 | | Job No: 47062979 | |
| Date: NOV 2012 | | | |



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- Running water, ,
- To Update
- Hardstanding
- Boundaries, Buildings,
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- Improved grassland, ,
- Marshy grassland, ,
- Neutral grassland, Semi-improved,
- Other, Tall ruderal,
- Parkland/scattered trees, Mixed,
- Poor semi-improved grassland, ,
- Scrub, Dense/continuous,
- Scrub, Scattered,
- Standing water, ,
- Woodland, Broad-leaved, Plantation
- Woodland, Coniferous, Plantation
- Woodland, Mixed, Plantation

**Butterfly Survey**

- Butterfly Transect

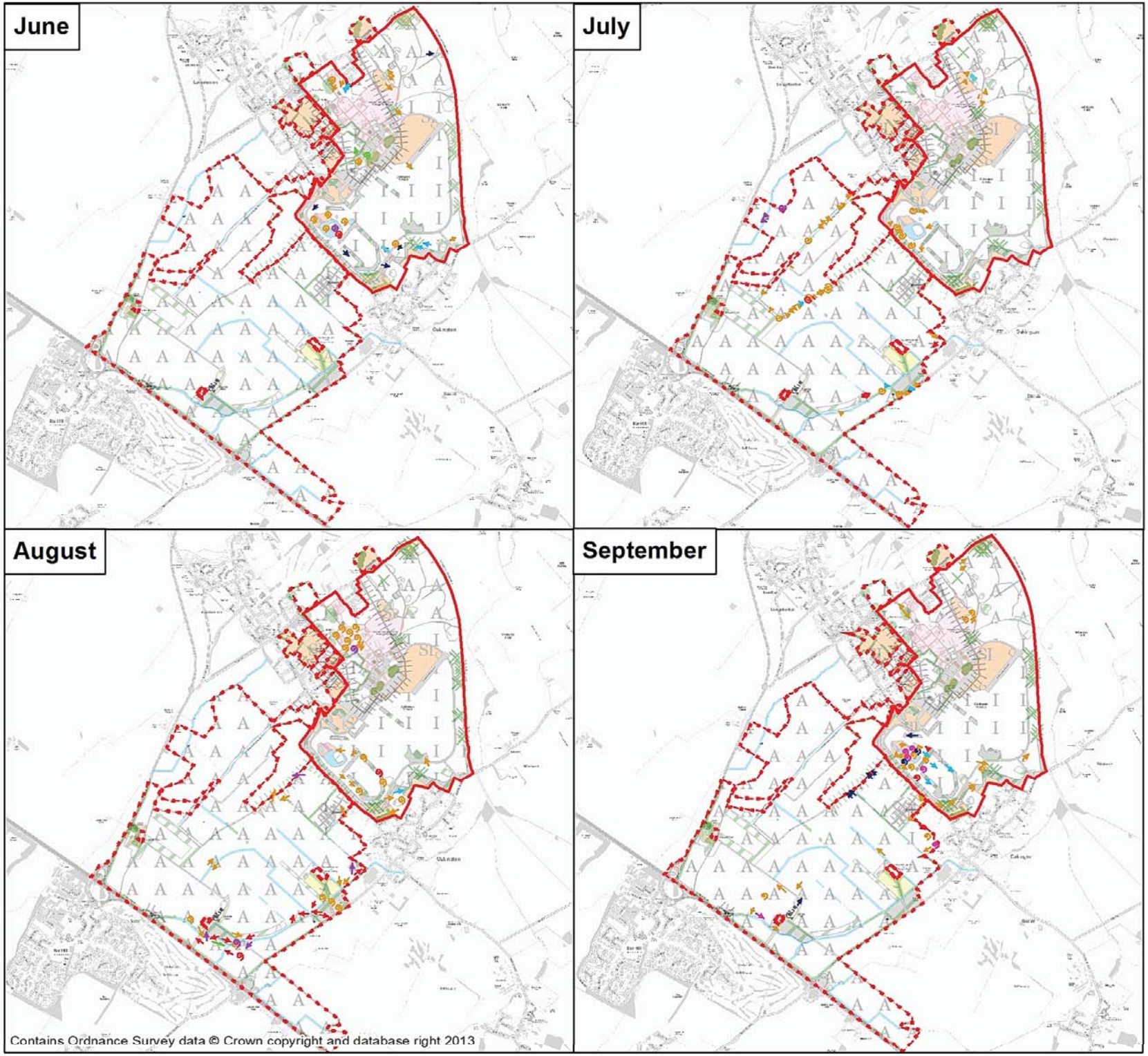
0 250 500 750 1,000

Metres

| | |
|---|---|
| Title | Butterfly Transect Routes |
| Project | Northstowe |
| Client | Homes and Communities Agency |

URS

| App'd: | Drawn: | Ch'kd: | Drg.Size: |
|---|---|---|---|
| RH | SB | RH | A4 |
| Version: 1 | | Ref: 01/SB/LON | |
| Scale: 1:25,000 | | Job No: 47062979 | |
| Date: NOV 2012 | | | |




**Key:**

- Site Boundary
- Former Oakington Barrack Site Boundary
- Broad-leaved Scattered Trees (A3.1)
- Scrub, Scattered (A2.2)
- Defunct hedge, Species-poor (J2.2.2)
- Fence (J2.4)
- Intact hedge, Species-poor (J2.1.2)
- Running water (G2)
- To Update
- Hardstanding
- Buildings (J3.8)
- Arable (J1.1)
- Improved grassland (B4)
- Marshy grassland (B5)
- Neutral grassland, Semi-improved (B2.2)
- Other, Tall ruderal (C2.1)
- Scattered trees, Mixed (A3.3)
- Scrub, Dense/continuous (A2.1)
- Scrub, Scattered (A2.2)
- Standing water (G1)
- Woodland, Broad-leaved, Plantation (A1.1.2)
- Woodland, Coniferous, Plantation (A1.2.2)
- Woodland, Mixed, Plantation (A1.3.2)
- Ephemeral/short perennial (J1.3)
- Bare ground (J4)
- Amenity grassland (J1.2)
- Introduced shrub (J1.4)

Bat Activity

- Foraging
- Commuting
- Nodule
- Pipistrelle
- Soprano Pipistrelle
- Leislers
- Serotine
- Myotis
- Barbastelle

0 500 1,000 1,500 2,000

Metres

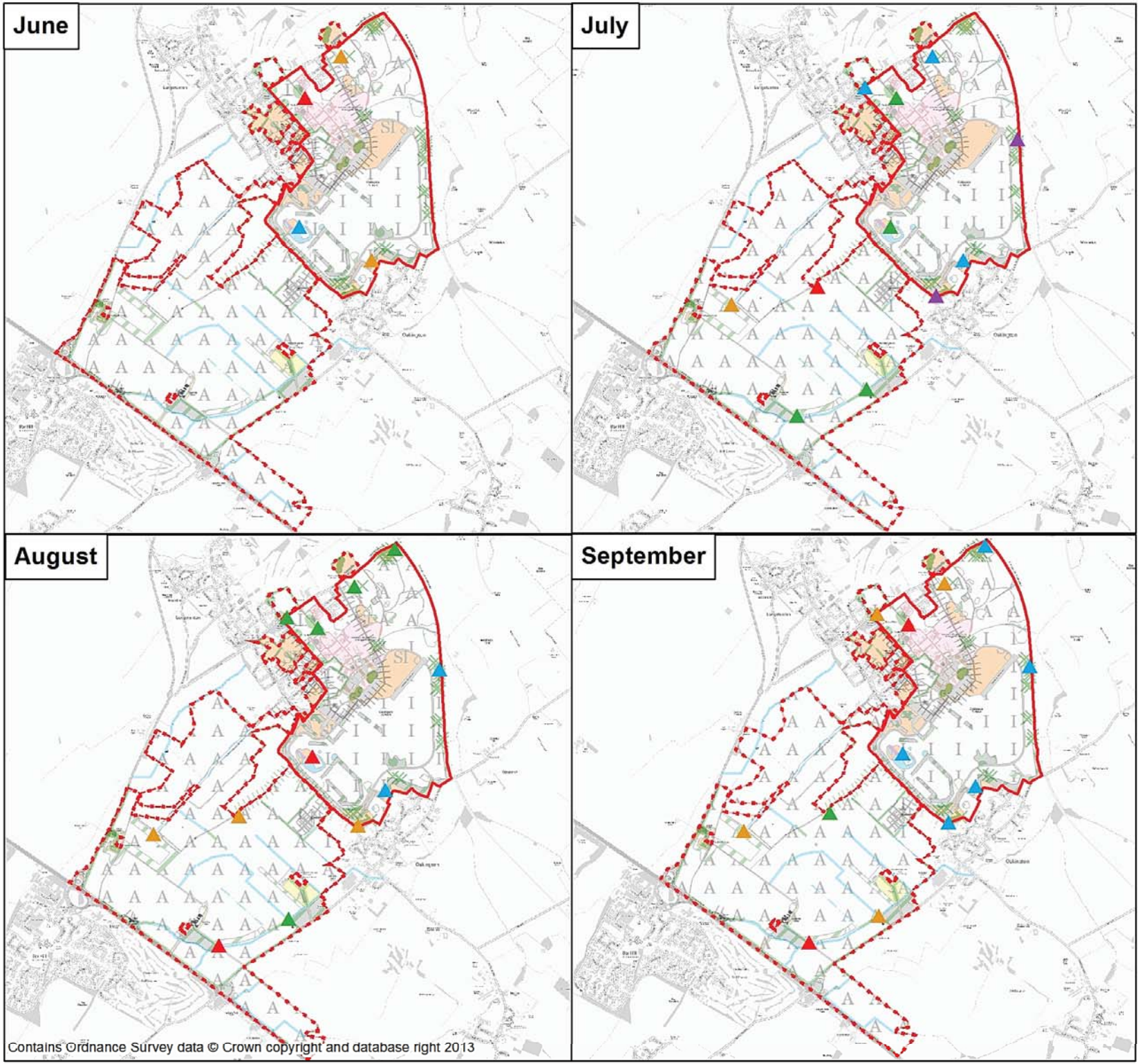
Title: Bat Activity Map (Transect Data)

Project: Northstowe

Client: Homes and Communities Agency

URS

| App'd: | Drawn: | Ch'kd: | Drg.Size: |
|---|---|---|---|
| RH | SB | RH | A4 |
| Version: 1 | | Ref: 01/SB/LON | |
| Scale: 1:50,000 | | Job No: 47062979 | |
| Date: NOV 2012 | | | |



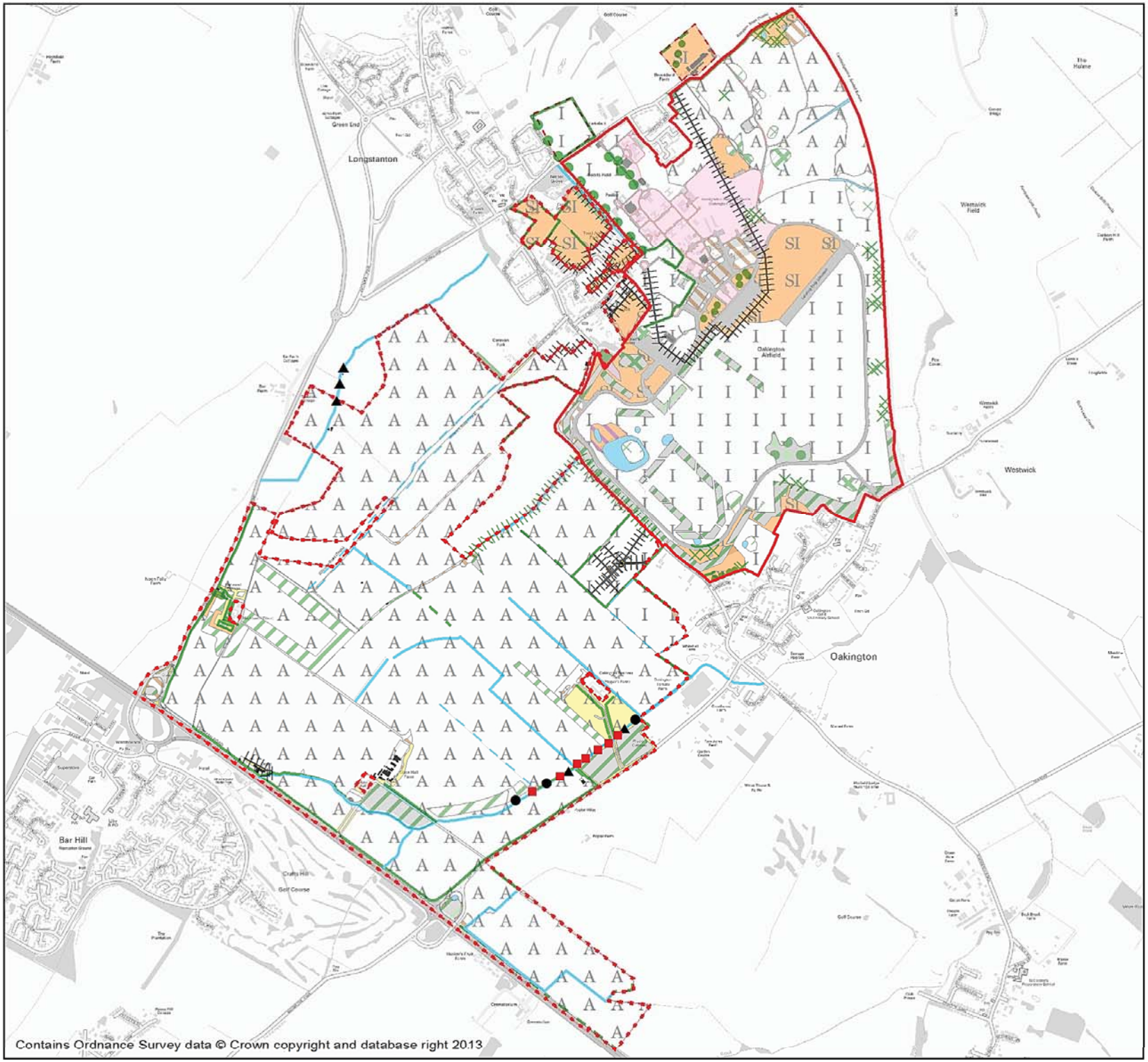

Title: Bat Activity Map (Static Bat Detector Data)

Project: Northstowe

Client: Homes and Communities Agency

URS

| App'd: | Drawn: | Ch'kd: | Drg.Size: |
|---|---|---|---|
| RH | SB | RH | A4 |
| Version: 1 | | Ref: 01/SB/LON | |
| Scale: 1:50,000 | | Job No: 47062979 | |
| Date: NOV 2012 | | | |

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- Scrub, Scattered,
- Standing water, ,
- Woodland, Broad-leaved, Plantation
- Woodland, Coniferous, Plantation
- Woodland, Mixed, Plantation

### Water-vole Field Signs

- Footprint
- Latrine
- Burrow

0 250 500 750 1,000

Metres

Title: Water Vole Survey Results

Project: Northstowe

Client: Homes and Communities Agency

URS

| App'd: | Drawn: | Ch'kd: | Drg.Size: |
|---|---|---|---|
| RH | SB | RH | A4 |
| Version: 1 | | Ref: 01/SB/LON | |
| Scale: 1:25,000 | | Job No: 47062979 | |
| Date: NOV 2012 | | | |