

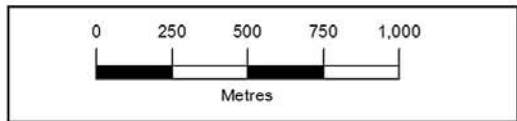

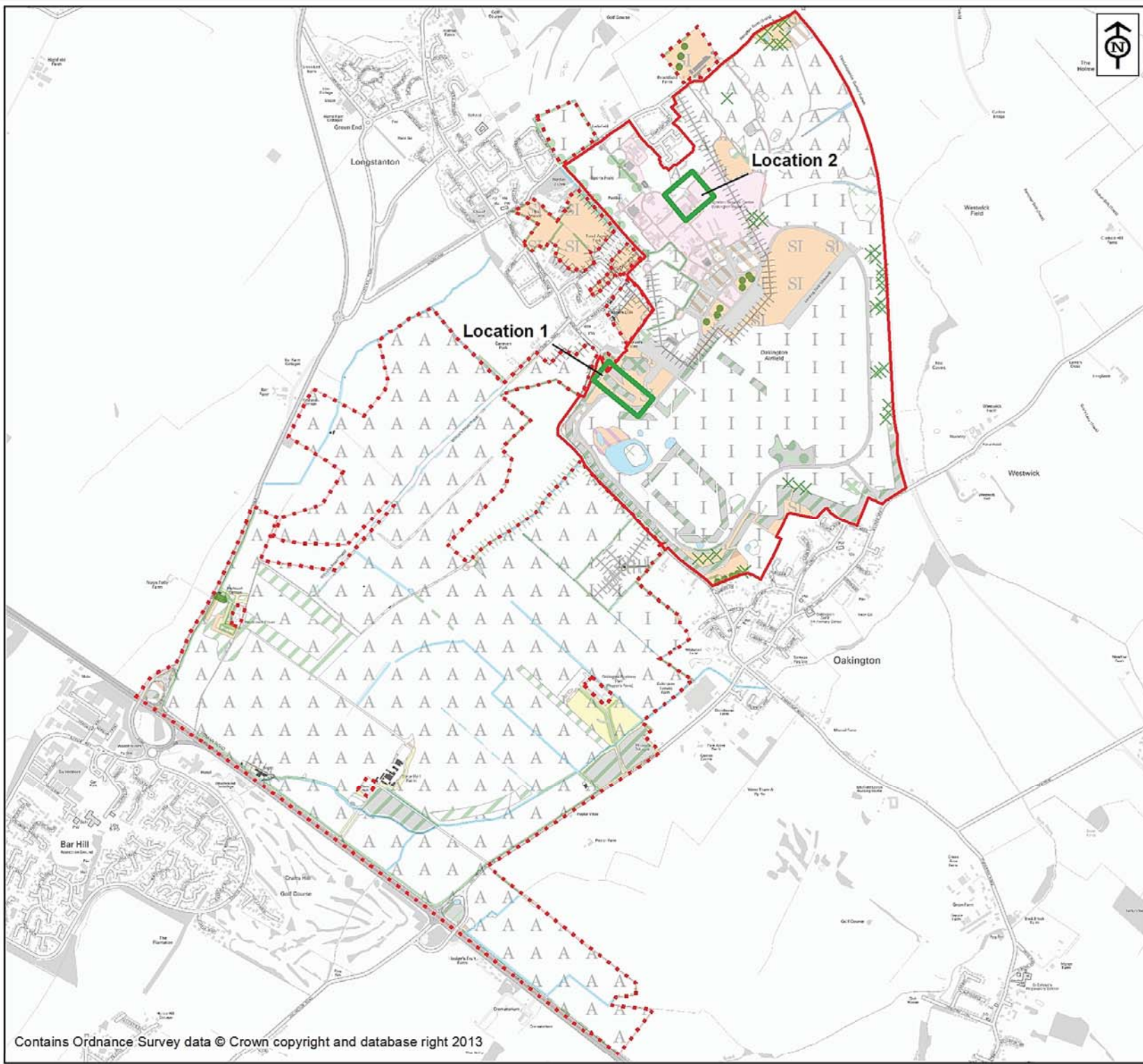


- Key:**
- 1 Locations of Reptile Records
 -  Locations of Reptile Felts
 -  Site Boundary

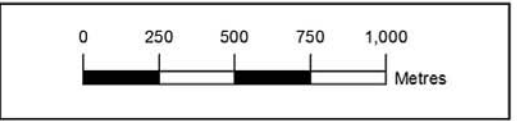


Title Locations of Reptile Records
 Project Northstowe
 Client Homes and Communities Agency

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

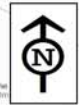
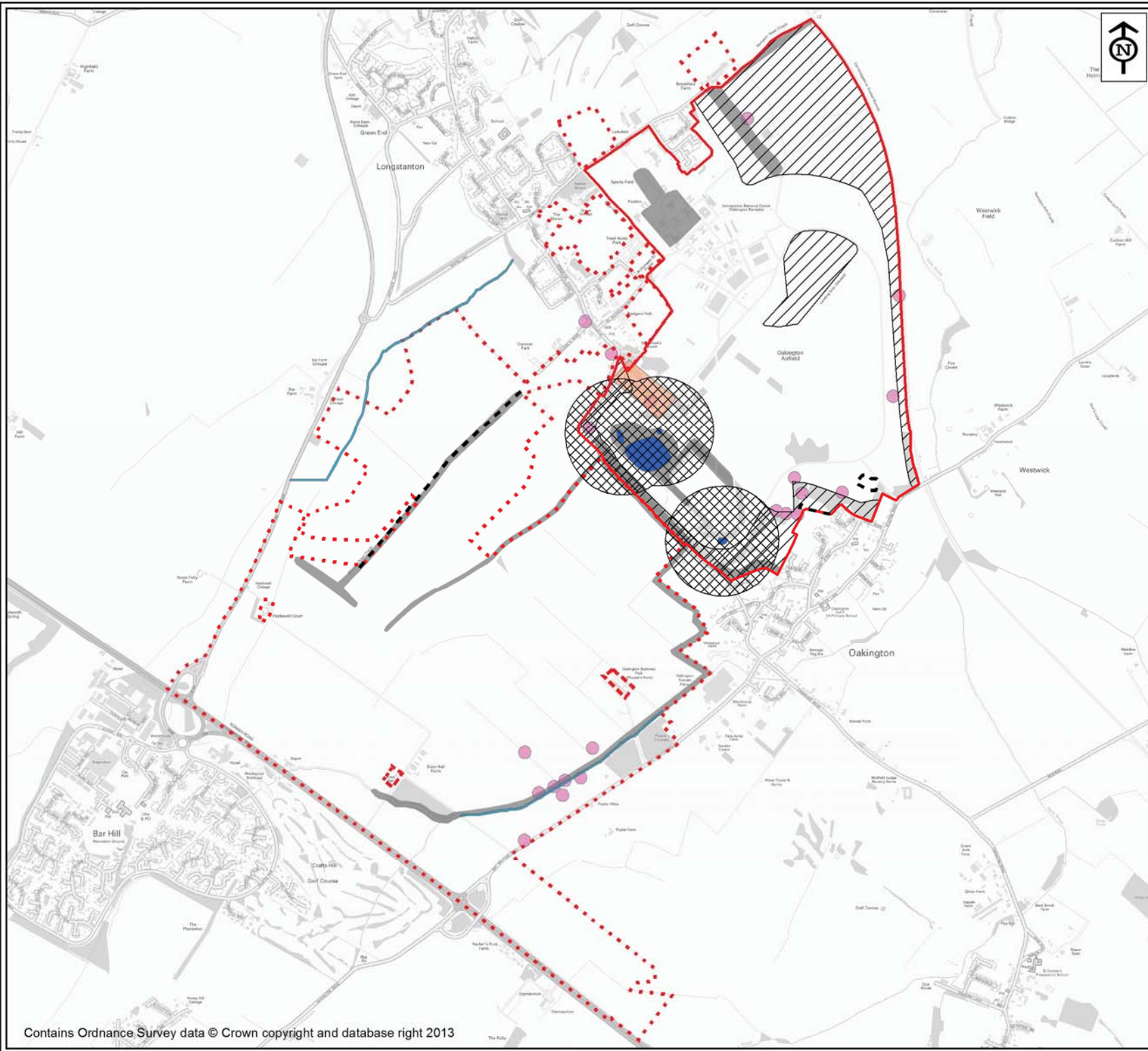


- Key:**
- Site Boundary
 - Former Oakington Barrack Site Boundary
 - Broad-leaved Scattered Trees (A3.1)
 - × Scrub, Scattered (A2.2)
 - Boundaries, Defunct hedge, Species-poor
 - Boundaries, Intact hedge, Species-poor
 - Parkland/scattered trees, Broad-leaved,
 - Running water, ,
 - To Update
 - Hardstanding
 - 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
 - Elm Survey Locations

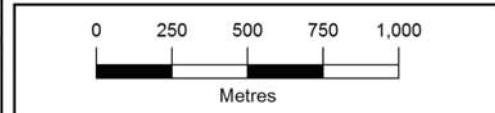


Title Location of Elm Trees
 Project Northstowe
 Client Homes and Communities Agency

URS	App'd: RH	Drawn: SB	Ch'kd: RH	Drg.Size: A3
	Version: 1	Ref: 01/SB/LON		
	Scale: 1:25,000	Job No: 47062979		
	Date: NOV 2012			

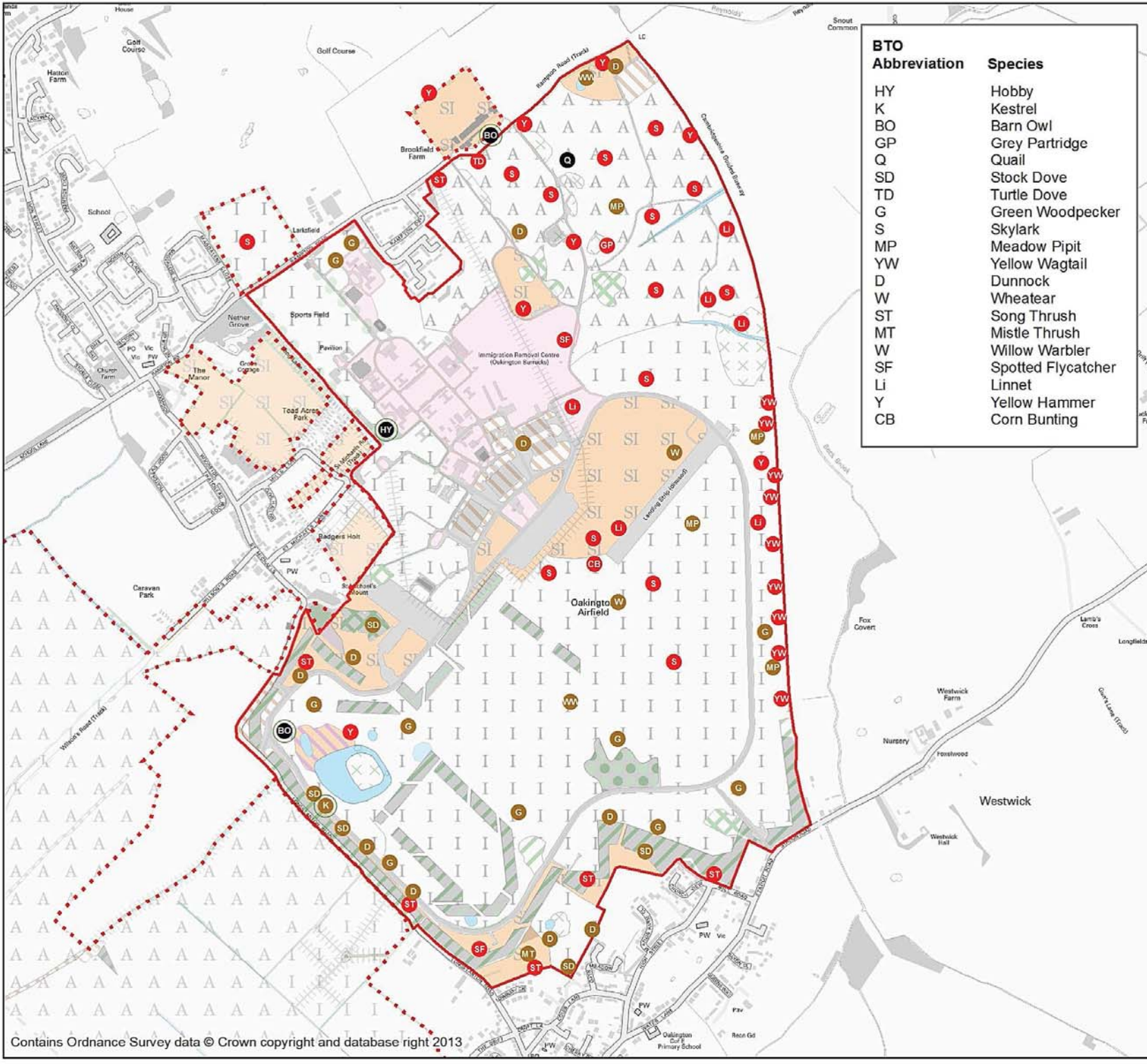


- Key:**
- Site Boundary
 - Former Oakington Barracks Site Boundary
 - Key Areas for Breeding Birds
 - Key GCN Habitat
 - Key Butterfly and Moth Areas
 - Water Vole 5m Buffer
 - Aquatic Invertebrates Key Areas
 - Key Bat Activity Areas
 - Potential White Spotted Moths Areas
 - Badger Sett 30m Buffer



Title Summary Map of Key Areas for Rare and Protected Species
 Project Northstowe
 Client Homes and Communities Agency

URS	App'd:	Drawn:	Ch'kd:	Drg.Size:
	Version:	2	Ref:	01/SS/LON
	Scale:	1:25,000	Job No:	47062979
	Date:	July 2013	Figure 15	



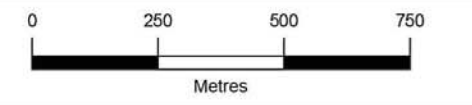
BTO Abbreviation	Species
HY	Hobby
K	Kestrel
BO	Barn Owl
GP	Grey Partridge
Q	Quail
SD	Stock Dove
TD	Turtle Dove
G	Green Woodpecker
S	Skylark
MP	Meadow Pipit
YW	Yellow Wagtail
D	Dunnock
W	Wheatear
ST	Song Thrush
MT	Mistle Thrush
W	Willow Warbler
SF	Spotted Flycatcher
Li	Linnet
Y	Yellow Hammer
CB	Corn Bunting

Key:

- Red List
- Amber List
- Schedule 1
- Nest Site

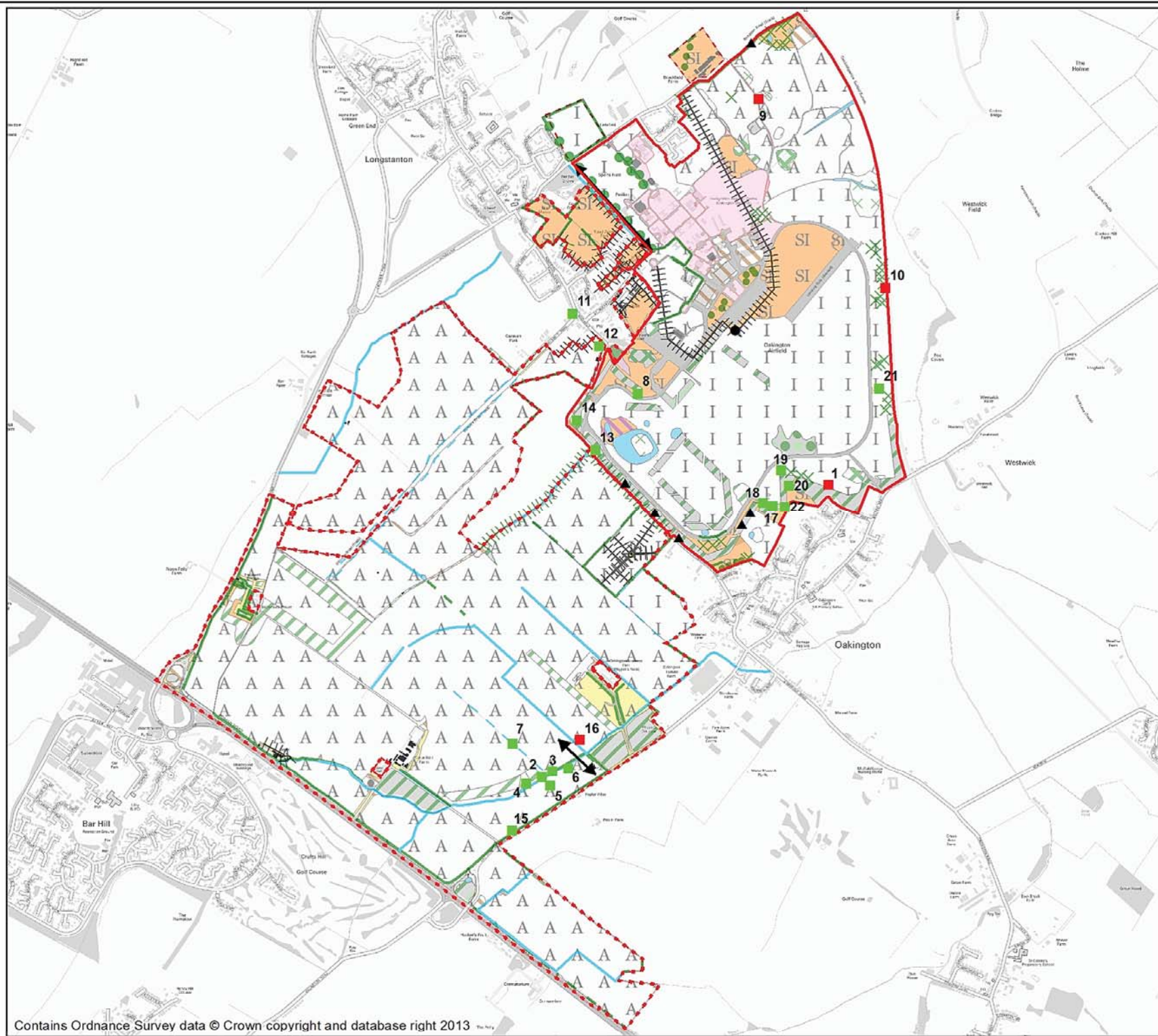
Site Boundary
 Former Oakington Barrack Site Boundary

- Broad-leaved Scattered Trees (A3.1)
- x Scrub, Scattered (A2.2)
- Boundaries, Defunct hedge, Species-poor
- Boundaries, Fence,
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- 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



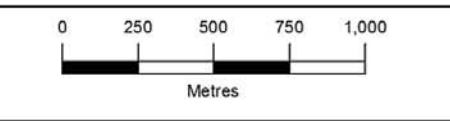
Title Bird Territory Map
 Project Northstowe
 Client Homes and Communities Agency

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	Version:	1	Ref:	A4
	Scale:	1:15,000	Job No:	01/SB/LON
	Date:	Jan 2013		47062979



- 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,
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 - Parkland/scattered trees, Broad-leaved,
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 - Cultivated/disturbed land, Arable,
 - Improved grassland, ,
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 - 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

- Badger Field Signs**
- Foraging Sign
 - ▲ Latrine
 - Main Sett
 - Outlier Sett
 - ↔ Badger Mammal Path



Title **Badger Survey Results**

Project **Northstowe**

Client **Homes and Communities Agency**

URS	App'd: RH	Drawn: SB	Ch'kd: RH	Org. Size: A4
	Version: 1	Ref: 01/SB/LON		
	Scale: 1:25,000	Job No: 47062979		
	Date: Jan 2013			

Appendix 3: Consultation Log

Organisation	Contact	Date	Communication	Notes
Buglife	Sarah Henshall	17/09/12	Telephone	<p>URS described the habitats on site and confirmed that they had surveyed for aquatics invertebrates and butterflies.</p> <p>Buglife's primary concern was the scale of the development - rather than the need for detailed surveys. It was agreed that a habitat based assessment would be adequate, if it showed limited potential for invertebrates.</p> <p>Buglife expressed an interest in having some input to the mitigation plan.</p>
South Cambridgeshire District Council	Rob Mungovan (Ecology Officer)	30/08/2012	Email	<p>South Cambridgeshire District Council stated that previously, four badger social groups had been recorded for the whole Northstowe area and the creation of badger habitat on the triangular piece of land was considered to be appropriate to provide for the "yellow" group. They wished to have this mitigation proposal included within the Northstowe Phase 2 project.</p>
Cambridgeshire Bird Recorder	Bruce Martin	20/08/2012	Email	<p>The Cambridgeshire Bird Recorder confirmed that there were no records of large flocks of wintering waterbirds for the site. Herons such as bitterns are not breeding or over-wintering in the target area, and the site is not suitable for wading birds such as shanks and sandpipers.</p> <p>In addition to the actual records on the database, anecdotal evidence from some county birders also suggests that there are no significant activities of the above bird groups in the area concerned.</p>
Cambridgeshire Bat Group	Val Perrin	14/08/2012	Email	<p>Cambridgeshire Bat Group provided bat records for the Longstanton and Oakington area.</p>
Cambridgeshire	Peter Pilbeam	19/07/2012	mail	<p>Cambridgeshire Mammal Group provided details of badger sightings and sett locations for</p>

Mammal Group				land within 2km of TL404 651 (Longstanton Road).
South Cambridgeshire District Council	Rob Mungovan (Ecology Officer)	19/07/2012	Email	South Cambridgeshire District Council confirmed that bait marking would not be necessary to survey badger activity.
South Cambridgeshire District Council	Rob Mungovan (Ecology Officer)	16/07/2012	Email	Initial email to confirm that the scope of ecology surveys required for the proposed development site was appropriate.
Terrance O'Rouke	Jeff Picksley	04/07/2012	Meeting	Terrance O'Rouke informed URS that Buglife had objected to the application for Phase 1 of the project on the grounds of insufficient invertebrate surveys. Buglife then withdrew their comments after meeting Terrance O'Rouke on the site and clarifying a number of issues.
South Cambridgeshire District Council	Rob Mungovan (Ecology Officer)	08/06/12	Email	South Cambridgeshire District Council confirmed that the level of survey effort required for bats should meet the Bat Conservation Trust Guidelines which were updated in 2012. The implication of this was that more surveys would be required than under the 2007 guidelines.
Cambridgeshire & Peterborough Environmental Records Centre	Louise Bacon	08/05/2012	Email	Cambridgeshire & Peterborough Environmental Records Centre provided records of protected/ notable species and nature conservation sites within 2km of the proposed development site.

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^{xxiv} Wilson, J.D., Evans, J., Browne, S.J., & King, J.R. (1997) Territory Distribution and Breeding Success of Skylarks *Alauda arvensis* on Organic and Intensive Farmland in Southern England. Journal of Applied Ecology, 34, 1462-1478.


^{xxv} Grynderup Poulsen, J., Sotherton, N.W., & Aebisher, N.J. (1998) Comparative Nesting and Feeding Ecology of Skylarks *Alauda arvensis* on Arable Farmland in Southern England with Special Reference to Set Aside. Journal of Applied Ecology, 35, 131-147.

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Homes and Communities Agency
Northstowe Phase 2
Ecology Scoping Report

Issue | 16 January 2014



This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 230781-05

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1 Introduction

1.1 Background

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

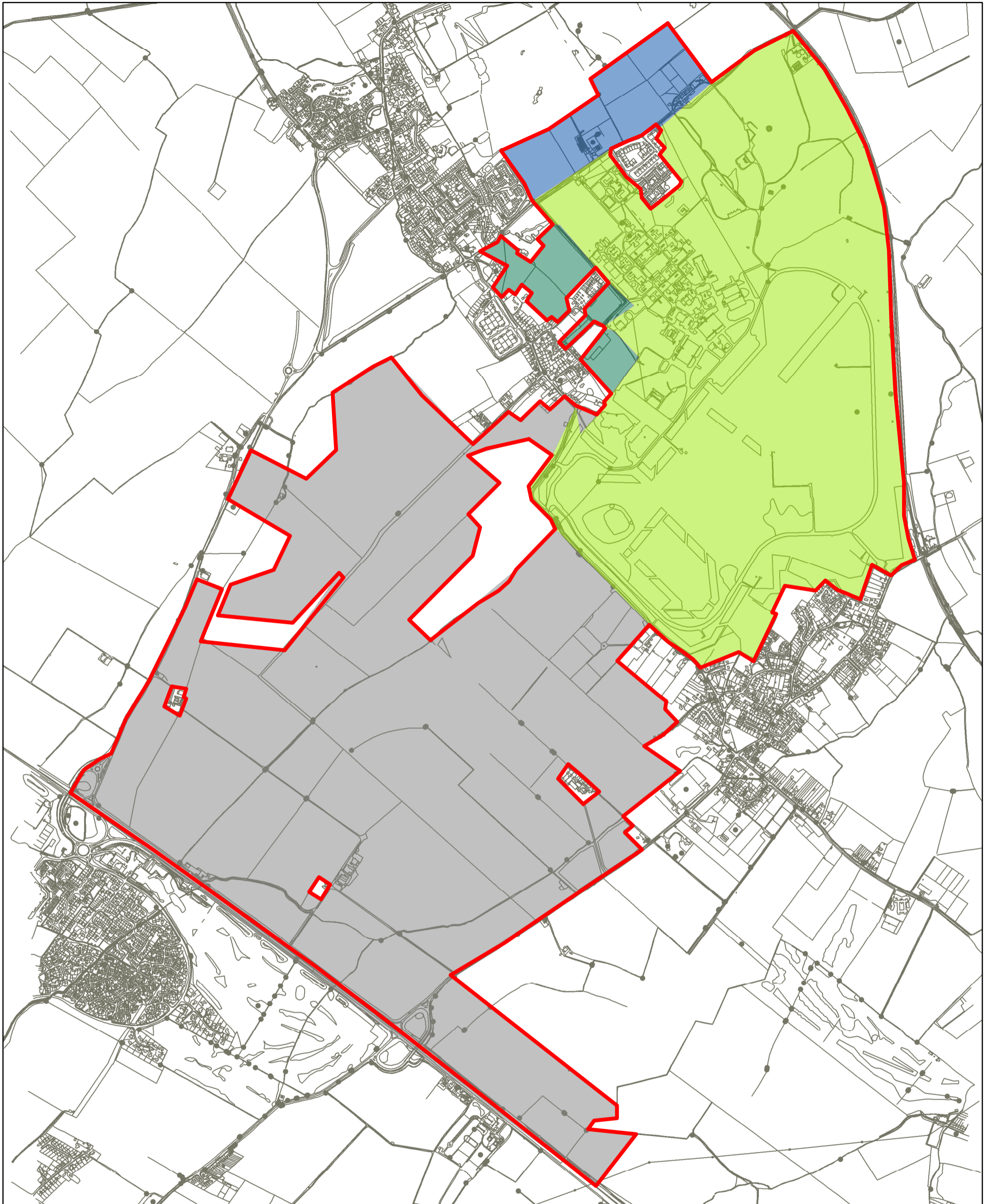
The surveys are considered necessary to update previous surveys undertaken on the site by WSP Environmental Ltd (WSP) between July 2003 and November 2007 and URS Infrastructure and Environment UK Limited (URS) between April and October 2012. These surveys were carried out across the Northstowe site,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

1.2 The Site

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

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

The first three areas described above are herein collectively termed the Core Area, to differentiate from the OSIA to the south.



Legend

- Site Boundary
- Site Use**
- Land North of Rampton Road
- Land West of Long Lane
- Oakington Barracks and Airfield
- Off-Site Infrastructure Area

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

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Client
Homes and Communities Agency

Job Title
Northstowe

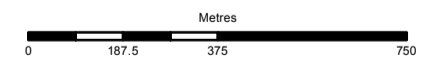


Figure 1:
Site Layout

Scale at A3
1:15,000

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1.3 The Proposed Development

The planning application boundary for the next phase is unclear at this stage and may or may not include all or parts of the areas shown on Figure 1. Therefore all areas shown on Figure 1 have been included in our proposed scope of work.

The next phase of development is likely to comprise a mix of uses such as dwellings, employment areas primary and secondary schools and sports hubs [1], [2]. Interconnecting wildlife corridors and green buffers are expected to be incorporated, including 'ponds and ditches, meadows and scrub, retained landscape features, green links and linear parks to create a mosaic of habitats and green space utilising and emphasising water features' [2]. A green buffer is proposed between Longstanton and the new development.

2 Previous Ecology Work

The relevant ecology survey reports relating to the site were reviewed to identify the requirements for additional survey work. This comprised the following:

- Ecology and Nature Conservation chapter and appendices of the outline planning application for Northstowe new town, dated December 2007 [3], [4];
- Natural Heritage chapter [5] and appendix [6] of the Environmental Statement for the outline planning application for Phase 1 of Northstowe new town (planning application reference S/0388/12/OL), dated February 2012; and
- Phase 1 Ecology Report [7] and Protected Species Report [8] prepared by URS following the completion of survey work during 2012.

WSP carried out a suite of habitat and protected species surveys between July 2003 and November 2007, to inform outline planning applications submitted in July 2005 and December 2007. The survey area comprised the land within the outline planning application boundary, which is shown in **Figure 2**.

Update surveys were carried out by URS during 2012. These surveys were carried out within the land surveyed by WSP, with the exception of the Phase 1 application area to the north. The proposed layout of the infrastructure connecting the Core Area with the A14 has not been defined. As such, the survey area included an extensive area of farmland to the south of the Core Area, parts of which will fall outside the future planning application boundary.

The relevant ecology surveys that have been undertaken on the site are listed in **Table 1**. This table does not include the surveys that were fully superseded by subsequent surveys, including those updated by URS in 2012.

The dates of the surveys are provided, as well as a brief synopsis of the methods and the results, excluding results relating to Phase 1 that fall outside the site. This table provided the basis for determining the scope of further surveys required on the site.

Figure 2: Outline Planning Application Boundary (2007)

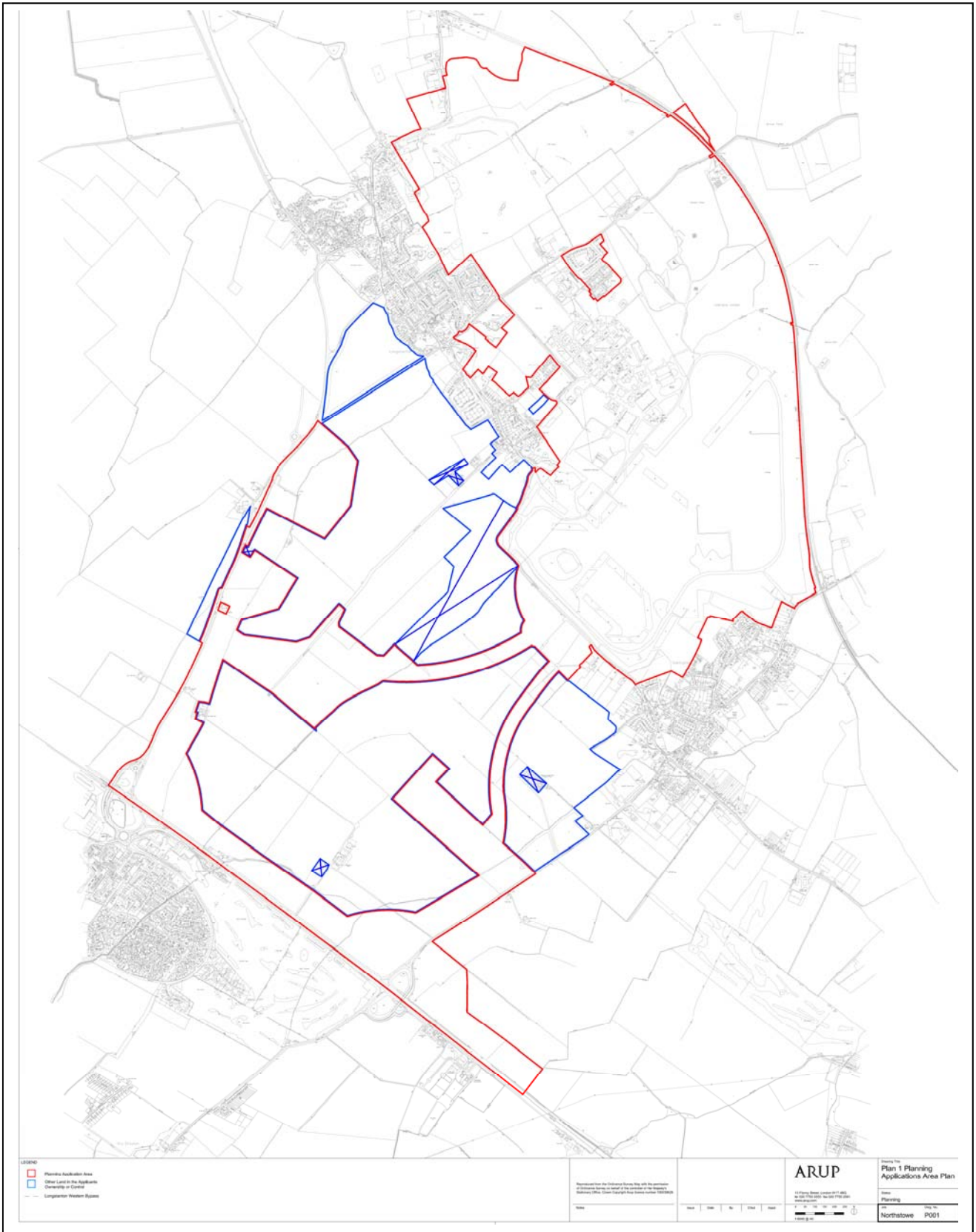


Table 1: Previous Surveys Undertaken

Survey	Dates	Scope of Work and Methods	Key Findings and Recommendations
Desk Study and Extended Phase 1 Habitat Survey	April - July 2012 (URS)	<p>The desk study involved a search for records within 2km, which was increased to 5km for bat species. Records were provided by Cambridgeshire & Peterborough Environmental Records Centre (CPERC) (including badger (<i>Meles meles</i>) records from the Cambridgeshire Mammal Group), Cambridgeshire Bat Group and Cambridge Bird Club.</p> <p>The survey was carried out in accordance with the Joint Nature Conservation Committee (JNCC) guidelines (1993) [14]. Not all areas of the site were surveyed, including the Ely Diocese land to the north of Rampton Road.</p>	<p>The following provides a brief resume of data records, where these are relevant to defining the scope of additional surveys on the site. There were no otter (<i>Lutra lutra</i>) records within 2km of the site. The Cambridge Bird Club provided their 2010 Annual Bird Report and confirmed that there were no key winter waterbird roost sites within 1km of the site. Grizzled skipper (<i>Pyrgus malvae</i>), white-letter hairstreak (<i>Satyrrium w-album</i>) and wall (<i>Lasiommata megera</i>) butterflies had been recorded within 2km of the site.</p> <p>The majority of the site was used for mixed farming. The main habitats were improved grassland and arable land, which were interspersed with areas of scrub and plantation. 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 and structures were recorded, as well as several permanent and temporary waterbodies.</p> <p>URS recommended further surveys for bats, badger, reptiles, great crested newt (<i>Triturus cristatus</i>), breeding birds and invertebrates.</p>
Bat Building Inspection	January 2007 (WSP)	<p>External and internal inspections of buildings at Oakington Airfield and Barracks, Larksfield Nursery, Brookfield Farm and various agricultural buildings were carried out. Not all of the buildings within the site were inspected, including Hazelwell Court and the buildings associated with Welney Farms Ltd within the OSIA.</p>	<p>Bat roosts was recorded within ten buildings (five within Oakington Barracks and Airfield, four in Brookfield Farm (bungalow and agricultural buildings) and one at Larksfield (bungalow)), although some of the buildings at the Barracks and Airfield have now been demolished. A further 18 buildings within the Oakington Barracks and Airfield supported features considered to be suitable for roosting bats (both for summer and hibernation roosts). Again, most of these have now been demolished.</p> <p>WSP considered that further bat survey work was necessary to evaluate the field signs and roosting opportunities recorded, comprising emergence and return surveys and activity surveys (see below). Inspections of previously inaccessible buildings were also recommended.</p>
Bat Emergence Survey	June and July 2007 (WSP)	<p>Emergence and return surveys were carried out on buildings within Oakington Barracks and Airfield, Brookfield Farm and Larksfield. Where possible, the surveys were carried out in accordance with the Bat</p>	<p>Bats were observed emerging from 11 roosts within 10 of the structures during the surveys, but these have all since been demolished. These structures were found to support pipistrelle (<i>Pipistrellus</i> sp.) bats, apart from one which was found to support brown long-eared bat (<i>Plecotus auritus</i>).</p>

		Conservation Trust (BCT) Bat Survey Guidelines (2007) [10] and Bat Mitigation Guidelines (2004) [14].	<p>Based on the results of the bat inspections and bat emergence surveys, a total of 19 buildings were confirmed as bat roosts and four buildings were considered to be likely roosts. The majority of these (18/23) were located within Oakington Barracks and Airfield. One of these buildings has not been demolished, which is identified as TN16 on Figure 3. Bat droppings were recorded on a window in winter and this building was identified as a hibernation roost. The other roosts were recorded at Larksfeld Nursery (bungalow) and Brookfield Farm (farmhouse and three dog kennels).</p> <p>The report states that a European Protected Species (EPS) Mitigation Licence would need to be obtained to cover any redevelopment or demolition work and indeed an approved licence was gained with respect to the demolition of five buildings within Oakington Barracks and Airfield [14]. It was suggested that further surveys should focus on trees that will be significantly affected by development proposals.</p>
Bat Activity Survey	June to September 2012 (URS)	<p>Monthly bat activity surveys were carried out at Oakington Barracks and Airfield and within some of the fields north of Rampton Road between June and September 2012, in accordance with the BCT Bat Survey Guidelines (2012) [14]. These surveys also covered the OSIA, but only between July and September inclusive. Static bat detectors were employed during these periods, varying between one and three per transect.</p> <p>Not all areas of the site were surveyed, including the Ely Diocese land to the north of Rampton Road.</p>	<p>Nine species of bat were recorded: common pipistrelle; soprano pipistrelle; Nathusius' pipistrelle (<i>Pipistrellus nathusii</i>), serotine, Leisler's bat (<i>Nyctalus leisleri</i>), <i>Myotis</i> sp. (possibly daubenton's bat (<i>Myotis daubentonii</i>)), brown long-eared bat, noctule and barbastelle (<i>Barbastelle barbastellus</i>). Four of these are listed on the former UK Biodiversity Action Plan (BAP) [14] (soprano pipistrelle, noctule, barbastelle and brown long-eared bat) and three are covered by a SAP in the Cambridgeshire BAP (all pipistrelles) [15].</p> <p>Only low numbers of bat passes were recorded for barbastelle, Leisler's bat and Nathusius' pipistrelle. The fishing pond was found to provide important foraging habitat for bats. Barbastelle (one pass) was recorded in the southern area, although the site was not considered to provide important habitat for this species.</p>
Badger Activity Survey and consultation	August 2007 (WSP)	The badger report was contained in a confidential appendix, which could not be obtained. However, a 'Detailed Drawing Of Badger Setts And Protection Zones' was obtained. This figure indicates that the setts were mapped and defined as main setts and other setts. The level of badger activity associated with the setts was also assessed.	A total of 33 setts were recorded within the site, including 11 'currently active' setts and two main setts. The majority of the setts were recorded within the Core Area, although additional setts were noted within the OSIA, mainly along Oakington Brook.

	June and August 2012 (URS)	The site was surveyed in accordance with Harris, Cresswell & Jefferies (1989) [16]. The site was systematically searched for signs of badgers and the status of setts was assessed according to Neal and Cheeseman (1996) [17]. Furthermore, all setts identified by WSP in 2007 were checked to determine their status.	<p>A total of 21 active badger setts and one in-active sett were recorded, as well as several latrines, paths and foraging signs. The majority of these were located within Oakington Barracks and Airfield, around the boundaries of the site. Whilst the survey findings indicated that the distribution of badgers had changed since 2003, activity levels had remained high.</p> <p>It was recommended that an update badger survey be conducted if the development of the site is not undertaken within a year of the issue of URS' report.</p> <p>The Consultation Log in Appendix 3 of URS' report states that South Cambridgeshire District Council confirmed that badger bait marking would not be necessary.</p>
Badger Bait Marking Study	Autumn 2003 – February 2004; April 2005, 2006 and April 2007 (WSP)	The report was contained in a confidential appendix and could not be obtained.	The report was contained in a confidential appendix and could not be obtained.
Otter And Water Vole Survey	May 2003 and September 2006 (WSP)	A desk study and survey were undertaken in May 2003, with the survey updated in September 2006. Longstanton and Oakington Brooks were surveyed for otter and water vole (<i>Arvicola amphibius</i>) in accordance with the Water Vole Conservation Handbook (2006) [18] and Otters and River Habitat Management (Environment Agency, 1999) [19].	<p>A water vole record was provided from Swavesey main drain, which is located (at its southernmost point) approximately 500m north-west of the study area. Evidence of otter (spraints and prints) and water vole (prints, burrows and feeding signs) were identified along both watercourses during the survey, within the OSIA. It was concluded that these linear habitats were utilised by otter for commuting between more ideal habitats, such as the River Great Ouse. Where suitable habitat for water vole was identified, evidence recorded during the 2006 shows comparable levels of usage to those seen in the 2003 survey.</p> <p>WSP recommended that repeat surveys for water vole and otter be undertaken.</p>
	May and August 2012 (URS)	The banks of both brooks were walked to search for signs of otter and water vole. Any signs were recorded on a scale map of the site.	Evidence of water voles was recorded on Longstanton and Oakington Brooks (droppings, burrows and footprints) within the OSIA. No signs of otter were recorded during the survey and it was concluded that this species was not utilising these habitats at the time of the survey.

Amphibian Survey	May 2012 (URS)	Four survey visits were carried out on five ponds within the site, in accordance with English Nature's (Natural England's) Great Crested Newt Mitigation Guidelines (2001) [20].	A total of 20 great crested newts (13 males and 7 females) were recorded in three ponds located in the Core Area, near to the fishing lake. Since great crested newt was recorded, but only four survey visits were undertaken, URS recommended that two further survey visits be undertaken in 2013 to inform a population assessment.
Reptile Survey	July to September 2012 (URS)	A presence/absence reptile survey was undertaken in accordance with Froglife's Advice Sheet 10 for Reptile Surveys (1999) [21] and Natural England's Standing Advice Species Sheet for Reptiles (2011) [22]. A total of 175 artificial refugia, comprising bituminous roofing felt tiles measuring approximately 0.5 metres (m) by 1m, were placed within areas of the site that provide suitable habitat for reptiles, with only small parcels of land within the site not being covered. These refugia were checked on seven occasions to ascertain presence/absence. Further visits are required to provide a population estimate.	Low populations of grass snake (<i>Natrix natrix</i>) and common lizard (<i>Lacerta vivipara</i>) were recorded. These species were mainly seen around the periphery of Oakington Barracks and Airfield, within areas of scrub and rough grassland, although they were also noted along field boundaries and Longstanton Brook in the northwestern part of the OSIA.
Breeding Bird Survey	May and June 2012 (URS)	A three visit Common Bird Census [23] territory mapping methodology was employed, whereby all birds within the site were identified and recorded on a map using standard British Trust for Ornithology (BTO) species codes. The survey was undertaken within Oakington Barracks and Airfield and fields north of Rampton Road. Not all areas of the site were surveyed, including the OSIA and Ely Diocese land, and the final survey visit was undertaken in sub-optimal conditions, due to heavy showers. In addition, no surveys were undertaken early in the breeding bird survey season (March to April).	Fifty-six species of birds were recorded, of which 49 were either confirmed as breeding or probably breeding on the site. A further six species were possibly breeding. Given the size of the site, it was considered likely that many birds are wholly dependent on the site for nesting and foraging during the breeding season. The key areas were the arable farmland, areas of scrub and the mature trees around the site boundary. Of the species that were probably or confirmed as breeding on the site, hobby (<i>Falco subbuteo</i>), quail (<i>Coturnix coturnix</i>) and barn owl (<i>Tyto alba</i>) are listed on Schedule 1 of the Wildlife and Countryside Act 1981 [24] (as amended) (WCA).
Barn Owl Survey	July 2007 (WSP)	The contents of six nest boxes installed across Oakington Barracks and Airfield in December 2005 were inspected in order to determine the presence or absence of breeding barn owls.	Barn owls were found breeding in one of the boxes (WCP1672, located at the southern corner of the site). No adults were present but three young, aged 53, 57 and 61 days, were ringed. One dead young owl was also found in the same nest box.

Butterfly and Dragonfly Survey and data search	May to August 2004 (WSP)	A search for butterfly and dragonfly records from the Cambridgeshire Butterfly Conservation branch database was undertaken within a 2km radius. Oakington Barracks and Airfield was visited twice, once in July and once in August. The disused railway line bordering the Barracks and Airfield to the east (Over Railway Cutting Country Wildlife Site (CWS)) was surveyed in May. Butterflies and dragonflies recorded during each visit. Certain areas of the site were not surveyed, including the OSIA.	A total of 17 species of butterfly and 9 dragonfly species were identified on Oakington Barracks and Airfield, including small heath (<i>Coenonympha pamphilus</i>), which is listed on the former UK BAP. Small red-eyed damselfly (<i>Erythromma viridulum</i>) was recorded on the fishing lake, which is a recent UK colonist. Grizzled skipper was recorded at Over Railway Cutting CWS, which is also listed on the former UK BAP. This designated site was subject to works associated with the CGB at the time of the survey and is located outside the site.
Butterfly Survey	August and September 2012 (URS)	A total of 19 transect routes were walked slowly three times between early August and early September and butterflies and moths were identified and recorded, with moths only generally recorded to family level.	Areas of suitable habitat for butterfly across the site were surveyed and 18 species of butterfly were recorded, comprising similar species to those recorded in 2004. Additional species noted were marbled white (<i>Melanargia galathea</i>), large skipper (<i>Ochlodes sylvanus</i>) and red admiral (<i>Vanessa atalanta</i>), which are widespread in the UK. Brown argus (<i>Aricia agestis</i>) and clouded yellow (<i>Colias croceus</i>) were not noted, but were recorded in 2004.
Elm Survey (habitat assessment for white-potted pinion moth (<i>Cosmia diffinis</i>))	October 2012 (URS)	A survey for <i>Ulmus</i> species was undertaken across the site to provide an assessment of the likelihood of white-potted pinion moth occurring on the site.	Two locations supporting elm trees were recorded within Oakington Barracks and Airfield, comprising a block of saplings and semi-mature elm which are probably semi-natural in origin and two elm trees that were recorded during an arboricultural survey. It was suggested that 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.
Aquatic Macro-Invertebrate Survey	October 2006 (WSP)	A desktop study was completed, consisting of a request for data from the Cambridgeshire Biological Records Centre, the national aquatic Coleoptera recording scheme organiser and the national aquatic Hemiptera-Heteroptera recording scheme organiser. An arable pond and ditch, a pond on the Oakington roundabout and Longstanton and Oakington Brooks were sampled, which are all located within the OSIA. The ponds within Oakington Barracks and Airfield were not	No relevant aquatic invertebrate records were available for the site. No protected or BAP species of invertebrate were identified during the survey, although a diverse aquatic invertebrate fauna was recorded including Nationally Scarce species, focused within Oakington and Longstanton Brooks. White-clawed crayfish (<i>Austropotamobius pallipes</i>) was not seen during non-specific visual searches at the brooks within the site. It was concluded to be highly unlikely that this species was present at the site.

		surveyed.	
	June and August 2012 (URS)	The survey was carried out on waterbodies at Oakington Barracks and Airfield (fishing lake, ponds and ditches) and Oakington and Longstanton Brooks within the OSIA. Sampling methods were based on the Environment Agency's and National Pond Survey's 3-minute "kick" or "sweep" protocols [25], [26].	The fishing lake and nearby ponds, as well as Oakington and Longstanton Brooks, were found to support diverse invertebrate communities. The most notable species recorded was water scavenger beetle (<i>Helochaeres lividus</i>), which was noted in the fishing lake within the Barracks and Airfield and is a Notable species.
Fish Survey	February 2007 (Windrush AEC Ltd)	Two watercourses, Oakington Brook and Longstanton Brook were sampled using electrofishing.	Common eel (<i>Anguilla Anguilla</i>) was present in Longstanton Brook. This species is listed on the UK BAP and is Critically Endangered on the International Union for Conservation of Nature and Natural Resources (IUCN) Red List [27]. No other fish of conservation importance were identified. It was recommended that mitigation for common eel be included as part of the development, including the provision of suitable eel passes at any obstructions within the channels, and the retention of large woody debris in the channel in order to provide habitat for the fish. No further surveys were recommended.
Hedgerow Survey	July 2004 (WSP)	A hedgerow survey was conducted throughout the site in accordance with Bickmore (2002) [28]. A total of 101 hedges were surveyed and classified as 'Important' hedgerows for wildlife or landscape under the Hedgerow Regulations 1997 [29]; important in accordance with the former UK BAP; important within a site context; and important for Cambridgeshire biodiversity.	One hedge was considered to be important under the Hedgerow Regulations for wildlife and landscape, which was located within Oakington Barracks and Airfield. A total of 10 hedgerows were considered to be important for UK biodiversity; many at a site context; and all the hedgerows were of Cambridgeshire biodiversity interest.

3 Scope of Further Ecology Work

This section outlines the scope of additional surveys that are currently underway at the site and are due to take place in 2013 and 2014 to inform future planning applications. The scope of further surveys was defined based on the scope and results of previous surveys undertaken on the site, which are summarised in Table 1 above.

3.1 Extended Phase 1 Habitat Survey

The areas of the site that were not surveyed by URS in 2012 will be subject to an extended Phase 1 habitat survey, in accordance with the JNCC guidelines for Phase 1 habitat survey, access permitting. This comprises the majority of the land north of Rampton Road and parts of Oakington Barracks and Airfield, where the former Barracks buildings were located (refer to Figure 1).

A Phase 1 Habitat Map for the site will be prepared, incorporating areas that have already been mapped. Any changes to the habitats on the site that are noted during the survey will also be recorded and updated on the Phase 1 Habitat Map.

The survey will include an assessment of the potential of these areas to support protected species, to identify any additional surveys that are required in addition to those outlined below. However, it is envisaged that no additional surveys will be required.

3.2 Bat Survey

Bat surveys will be undertaken in accordance with the BCT Bat Survey Guidelines (2012), comprising activity, roost scoping and inspection (external and internal) and emergence and return surveys. Further details regarding the scope of these surveys are outlined below.

3.2.1 Activity Survey

An activity surveys will be completed throughout the site in May, to complement the surveys conducted by URS in 2012. The surveyors will use bat detectors to record bat activity along the route and two static detectors will be employed along each transect to collect additional data for five consecutive nights.

The areas of the site that were not surveyed by URS will also be surveyed on a monthly basis between June and September 2013. One of these surveys will comprise a dusk and dawn survey and the others only a dusk survey. Two static detectors will be employed along each transect, as outlined previously for the surveys during April and May.

The bat data recorded during the surveys and by the static detectors will be analysed on computer using appropriate software to determine the species recorded and type of activity.

3.2.2 Scoping and Inspection Survey

A bat scoping survey will be carried out on the site, to identify trees and buildings and have a potential to support roosting bats. The survey will focus on features that could be affected by the proposed development and will include internal inspections of the buildings, health and safety permitting.

The surveyors will use binoculars, a ladder, endoscope and high-powered torch to complete the inspections. The buildings will be identified as negligible, low, moderate, or high potential, or as a confirmed roost. The trees will be defined as confirmed roosts, or Category 1*, 1, 2 or 3 trees in accordance with Table 8.4 in the BCT Guidelines. This work will inform requirements for emergence/return surveys (see below).

3.2.3 Emergence and Return Surveys

Emergence/return surveys will be carried out on buildings and trees that could be affected by the proposed development. This will include buildings identified as having at least a low potential to support roosting bats. Furthermore, surveys will be carried out on any trees found to support confirmed roosts, as well as Category 1* and Category 1 trees.

Between one and three surveys will be undertaken on each feature, including a dawn survey with respect to moderate to high potential buildings or Category 1* trees. This work will be undertaken in August 2013 and between May and August 2014. Surveys may be undertaken in September, weather permitting.

3.3 Badger Survey

3.3.1 Scoping Survey

The badger setts recorded during the previous surveys have been re-evaluated to determine their status, in accordance with Harris *et al.* (1989). Any new signs to indicate the presence of badgers were mapped. The accessible areas of land to the north of Rampton Road that were not covered in 2012 were also surveyed. A figure will be produced identifying the locations and status of the setts and any other signs recorded.

3.3.2 Bait-Marking

Badger bait marking surveys are essential when initial surveys indicate that two or more main setts are recorded [30]. The scoping survey confirmed the presence of multiple setts across the site and it is therefore considered that a badger bait marking survey should be undertaken prior to submitting the planning application, contrary to the outcome of URS' consultation with South Cambridgeshire District Council in 2012 (Table 1). This work is due to be undertaken between February and April 2014. The results of this survey will inform the design for the development and the requirements for sett closure and creation under a Natural England licence.

3.4 Bird Surveys

3.4.1 Breeding Bird Survey

Breeding bird surveys have been conducted across the site and are planned for spring 2014, employing the Common Bird Census territory mapping methodology.

Two breeding bird surveys were carried out in 2013, across the OSIA and areas of the Core Area that were not surveyed in 2012. The first was conducted in early June and the second in late June. The late June survey incorporated the previously surveyed areas within the Core Area, due to poor weather conditions during the 2012 survey.

Two additional surveys will be carried out between March and May 2014, within the parcels of land that were not surveyed in 2012, to complete the dataset with respect to surveys that commenced in early June 2013.

3.4.2 Inspection of Barn Owl Boxes

In 2003, barn owl was found to be nesting in one of four former aircraft hangers located at Oakington Barracks and Airfield. These structures were proposed for demolition as part of the proposed Northstowe development. A further seven active roost sites were located elsewhere in the survey area.

To provide temporary mitigation for the demolition of the aircraft hangers, six barn owl nest boxes were mounted on poles in December 2005. Four of these were installed across Oakington Barracks and Airfield and the other two were located outside the site to the north. It was intended that these remain in situ until development of the wider site commences and permanent mitigation can be provided.

The barn owl boxes within the site were inspected on 24th June 2013, to assess any requirements for repair works and identify the presence of any nesting barn owls.

3.5 Great Crested Newt Survey

The ponds within the site were subject to Habitat Suitability Indices (HSI) surveys, to assess their suitability to support great crested newt. Presence/absence surveys were also conducted on ponds across the site in accordance with English Nature's Great Crested Newt Mitigation Guidelines (2001).

Six presence/absence surveys were carried out on the ponds within the Core Area between 20th May and 10th June 2013, as great crested newt was recorded during two of these first four visits (one on each occasion). In addition, four surveys were carried out on a pond within the OSIA between 20th May and 3rd June 2013, with the additional two surveys not carried out as great crested newt was not recorded. In each case, half of the survey visits were conducted between 20th May and 23rd May 2013.

Prior to visit four, an additional pond was recorded. Only two surveys were conducted on this pond on 3rd and 4th June 2013. The pond was dry during the final survey on 10th June 2013. As such, this pond will be subject to four surveys between mid-March and mid-June 2014, with two between mid-April and mid-

May. The ponds within 500m that are connected to the site via suitable habitat will also be surveyed within this timeframe, access permitting and as appropriate considering the works associated with delivery of the first phase of development on Cambridge Golf Course and Driving Range.

3.6 Reptile Survey

In order to complement URS' survey and inform a population estimate, additional reptile survey visits will be carried out, in accordance with Froglife (1999). Four additional surveys will be undertaken during September 2013. Artificial refugia will be placed in areas of suitable habitat within the site, which will be left for at least two weeks before being checked for the presence of reptiles. Any natural refugia will also be inspected, such as logs and sheets of wood.

3.7 Hedgerow Survey

A survey has been carried out to identify any hedges that meet the wildlife and landscape criteria for 'important' hedgerows under the Hedgerow Regulations 1997. A figure will be produced incorporating any updates to the results of the WSP's survey in 2004.

3.8 Invertebrate Surveys

A butterfly survey was undertaken during July 2013, to complement URS' survey. This survey targeted white-letter hairstreak, focusing on elm hedgerows across the site, as well as elm woodland within Oakington Barracks and Airfield. A beating tray was employed in order to record any other invertebrates of elm during these surveys. Any other invertebrate that can be readily identified in the field were also recorded.

Moth trapping will also be conducted during August 2013, targeting white-spotted pinion moth. Moth traps will be set at various locations at elm hedgerows and the elm woodland and the species trapped throughout the night will be recorded.

An additional butterfly survey will be conducted in May 2013, targeting grizzled skipper. Suitable habitats for grizzled skipper will be surveyed, although other butterfly species will also be recorded.

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