Land South of Broom Road
LKH 368

Archaeological Evaluation Report

SCCAS Report No. 2014/100

Client: Plandescil Consulting

Author: Andy Beverton

07/2014

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Author: Andy Beverton

Illustrator: Beata Wieczorek-Olesky

Report Date: August 2014

HER Information

Site Code:	**LKH 368**
Site Name:	**Land South of Broom Road**
Report Number	**2014/100**
Planning Application No:	**Pre-Application**
Date of Fieldwork:	**05/08/2014 – 07/08/2014**
Grid Reference:	**TL 721 821**
Oasis Reference:	**suffolkc1-186010**
Curatorial Officer:	**Dr Matthew Brudenell**
Project Officer:	**Andy Beverton**
Client/Funding Body:	**Plandescil Consulting**

Digital report submitted to Archaeological Data Service:
http://ads.ahds.ac.uk/catalogue/library/greylit

Prepared By: Andy Beverton
Date: August 2014

Approved By: Andrew Tester
Position: Senior Project Officer
Date:
Signed:

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Summary

A scheme of archaeological evaluation was carried out across land to the south of Broom Road. Eleven trenches were excavated across *c.*6ha covering at least 1% of the Proposed Development Area (PDA).

A preceding stage of geophysical investigation (App. 5) identified sixteen discrete anomalies across the PDA and an area of weak positive linear anomalies towards the south-eastern portion of the site. A curvi-linear was also interpreted towards the northern end of area.

The evaluation trenches were predominantly located to target a number of the geophysical anomalies and determined that the majority were natural geological features. A single anomaly corresponded to two intercutting ditches in Trench 3. The earlier of which contained both later prehistoric and medieval pottery. No other archaeological features were recorded.

1. Introduction

Eleven evaluation trenches were excavated across an area of 6ha on land south of Broom Road, Lakenheath (Fig.1). The evaluation was carried out between the 5th and 6th of August 2014 and proceeded a scheme of geophysical investigation carried out in May 2014.

The project followed a Written Scheme of Investigation (WSI) written by Suffolk County Council Archaeology Service Field Team (App.1) issued in response to an Archaeological Brief supplied by Dr Mathew Brudenell (App.2).

2. Geology and topography

The development is situated towards the southern portion of Lakenheath adjacent to the southern edge of Broom Road west of RAF Lakenheath airfield. At the time of evaluation the site status was arable land that had been subjected to frequent ploughing to a depth of c.0.3m.

The character of the local geology varied across PDA; the southern portion of the area consisted of fairly solid Holywell Nodular and New Pit chalk formations which became increasingly scarred and patchy towards the north of the PDA. A large sub-aerial channel is noted by the British Geological Survey (BGS 2014) running east-west across the middle of the site. This channel is reflected in the local topography with the ground level declining gently from the northern and southern extents of the PDA (16.19m and 15.58m AOD respectively) towards the centre of the site at Trench 11 (14.26mm AOD).

3. Archaeology and historical background

The development is situated in an archaeologically rich multi-period landscape that contains evidence originating from the early prehistoric through to the post-medieval period as recorded by the County Historic Environment Record (CHER). In part this abundance of archaeology is due to Lakenheath's close proximity to the fens which provides a landscape amenable to occupation for all historic periods. The majority of records in close proximity to the site derive from finds-spots and metal detecting surveys although a good deal of archaeological investigation has also been carried out across Lakenheath;

Approximately 380m to the north-east of the PDA Maidscross Hill (LKH 036) is a major Lower Palaeolithic (500000 BC - 150000 BC) site. A number of lithic implements were recovered from gravel pits comprising seven hand axes and two flakes.

LKH 035 (Caudle Farm) also produced a Palaeolithic hand-axe of a flattish ovate form as well as two Iron Age urned cremations, one deposited inside the other.

Prehistoric worked flint was found at LKH 048 to the north of the site and comprised a Bronze Age barbed and tanged arrowhead and half a javelin head of a similar date.

A scatter of prehistoric burnt flint was found approximately 600m to the east of the PDA situated within a peat-filled hollow.

To the south of the site a scatter of Iron Age coins and Roman Iron work was recorded through metal detecting survey at LKH 303. This area was also evaluated (LKH 363) by Oxford Archaeology East (Moan 2013) but did not identify a surviving archaeological horizon.

630m north of the development metal detecting investigation (LKH 028) recovered a 'Third Brass' Roman coin identified as displaying Magentius (AD 350-353). Nearby (LKH 026) a Roman coin, probably depicting Decius (AD 249-251) was also revered through a scheme of metal-detecting investigation.

Repeated metal detecting surveys across LKH 103 to the south-west of the site have produced three Roman brooches, a Saxon dress fastener and a collection of medieval metal work from an area of approximately 100m². A Saxon disc brooch with interlace ornament was also recovered slightly further south (LKH 104).

Medieval horizons occur frequently in close proximity to the PDA. This is chiefly due to the presence of the Medieval core of Lakenheath (LKH 254) being situated less than 400m north-west of the site. The core contains numerous medieval and post medieval horizons with occasional examples (Windmill LKH 131 and pottery scatter LKH 057) being found just outside of the defined core.

LKH 043 and 047 are located slightly north-east of the development area and comprise a medieval stone cross and the find spot of 13th century coins respectively. The stone cross may be situated on top of a prehistoric barrow.

Hodskinsons 1783 map identifies a post-medieval windmill at LKH 129 slightly east of the core of Lakenheath town.

RAF Lakenheath (LKH 339) is situated approximately 200m east of the PDA and contains extensive prehistoric, Roman and Saxon horizons, particularly towards the western end of the base e.g. Bronze Age funerary monuments (ERL 148 and ERL 203), sequential Iron Age and Roman occupation (ERL 214 and ERL 217) and a large scale Saxon cemetery (ERL 104). Evidence of Palaeolithic activity has also been identified across the northern and north-eastern extents of the airfield.

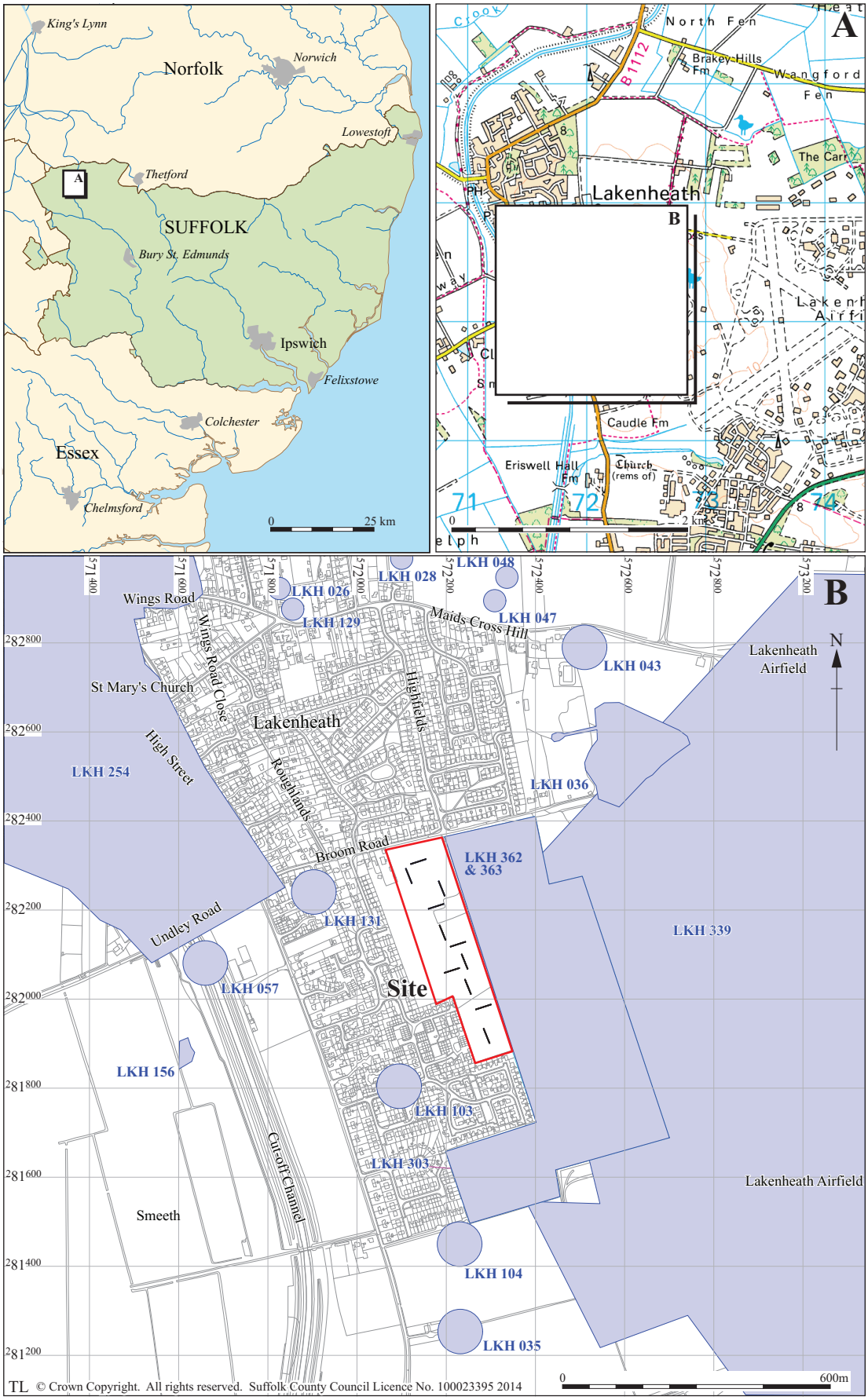

Figure 1. Location map with HER entries listed in text.

4. Methodology

The eleven trenches were aligned on north-west to south-east and north-east to south west alignments and arranged in a manner that targeted a number of the positive geophysical anomalies (Fig.3). The trenches were laid out using a Leica System 1200 RTK GPS and subsequently excavated with an eight ton mechanical excavator fitted with a 1.8m wide ditching bucket under the direction of a SCCAS/FT project Officer.

All trenches were excavated to the top of the undisturbed natural geology. Each trench was recorded on *pro forma* sheets that included the full dimensions of the trench profile and a brief description of the geology and archaeological horizons, where present.

Archaeological and geophysical features were investigated by hand with individual four digit context numbers being assigned to the archaeological events. The archaeological contexts were recorded according to the guidelines laid out by Gurney (2003). Plans and sections of the archaeological features were recorded by hand at scales of 1:20 and 1:50 respectively and photographed digitally.

A digital site archive has been completed under the HER code LKH 368 and includes an MS Access database containing all context recorded and registers, photographs (JPEG) and survey data.

An OASIS form was initiated ahead of the field work and will be completed with a digital submission of this report and a synopsis of the site and both physical and digital archives (App. 6).

The finds evidence has been subjected to cursory analysis in order to determine its date. Due to the small volume of finds (two sherds ~5g) a full report was deemed unnecessary.

5. Results

5.1 Introduction

Eleven trenches were excavated across the site opening a total area of 712.8m². The trenches were excavated to the top of the undisturbed geology which occurred between 0.31m (Trench 3) and 0.7m (Trench 4). Typically the soil profile across the PDA was identified as modern ploughsoil (0.22m and 0.49m deep) over a subsoil/interface layer (0.06m to 0.35m deep). Occasionally the ploughsoil was directly over the natural geology although this was only consistently the case in Trench 11 towards the northern end of the PDA.

Two parallel ditches (0002 and 0004) were identified in Trench 3, one of which contained two small, abraded sherds of pottery: Unprovenanced Glazed (UPG) medieval pottery (12th to 14th century) and handmade, sand tempered prehistoric pottery, likely to be Iron Age in origin.

A full breakdown of the trenches including dimensions and geological descriptions is attached as Appendix 3 of this report whilst a catalogue of contexts is included as Appendix 4.

5.2 Geophysical anomalies and geological trends

The geophysical investigation identified sixteen discrete positive anomalies that had archaeological potential and an area of weak positive linear trends (Appendix 5). Eight of the trial trenches were located in order to investigate nine of the anomalies and a portion of the linear trends.

The discrete anomalies targeted by Trenches 2, 5, 6, 7, 9, 10 and 11 (Fig.2) were determined to derived from geological solution hollows in the cases of trenches 2, 5 and 6 whilst the remaining anomalies could not be traced to specific features and are likely to have resulted from geological variations, specifically the large curvi-linear feature in Trench 9 appeared to have no observable cause despite providing a fairly large anomaly, or modern ferrous material within the plough soil.

The area of weak linear anomalies coincided with the observation of an increased quantity of peri-glacial scarring of the chalk natural across the corresponding trenches (Trenches 3, 4 and 5).

Trenches 6, 7, 8 and 9 contained an atypical geology that comprised uniform fluvially deposited sand with sorted, small gravel inclusions spread uniformly thought-out. In Trench 7 the sand was investigated to a depth of 2m and found to remain constant.

5.3 Archaeological features

Trench 3

Trench 3 contained the entirety of the identified archaeological horizon within the PDA; two ditches (0002 and 0004) were recorded running across the trench on an east-west alignment.

Ditch 0002

Ditch 0002 ran across the middle of the trench along a north-east to south-west alignment (Fig.3). The ditch had a 0.84m wide u-shaped concave profile consisting of steep breaks of slope, fairly straight sides and a smooth break of baser that lead to a narrow concave base. The ditch had a maximum depth of 0.43m and contained a single fill of friable light to mid orangey-brown silty-sand (0003) that contained two abraded, small sherds of pottery determined to be an Unprovenanced Glazed (UPG) medieval pottery (12th to 14th century) and a handmade, sand tempered prehistoric pottery, likely to be Iron Age in origin (Cathy Tester SCCAS curatorial Team, *pers.comm.*).

Ditch 0004

Ditch 0004 ran parallel to the northern edge of 0002 (Fig.3) and had a wider, shallower concave profile with average break of base, slightly concave sides and a smooth break of base that lead to a wide shallowly concave base. The ditch measured 1.2m wide with a maximum depth of 0.28m and was filled the same light to mid orangey-brown silty-sand (0005) as 0002. No finds evidence was recovered from the feature.

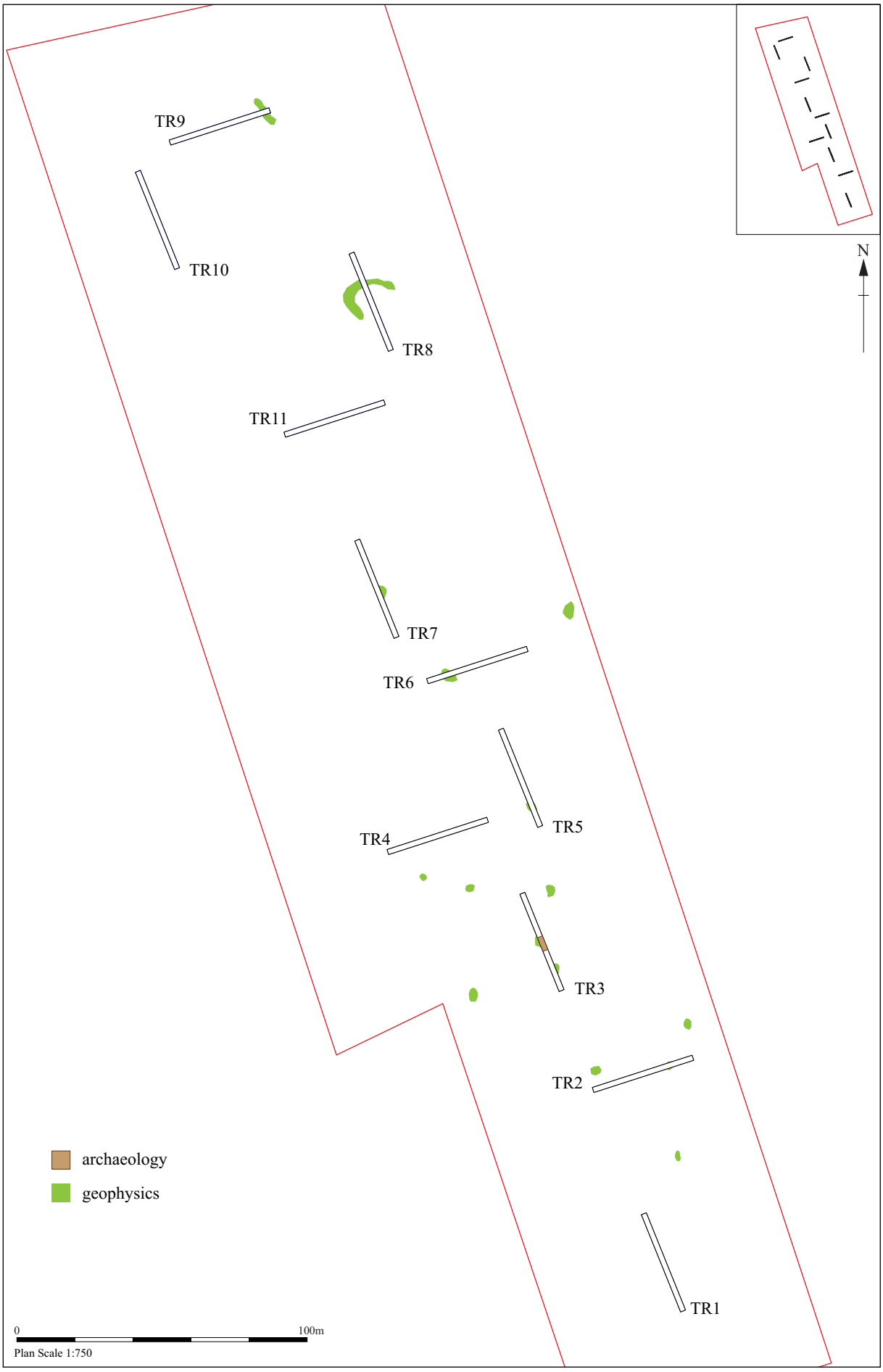

Figure 2. Overall trench plan with positive geophysical anomalies (green).

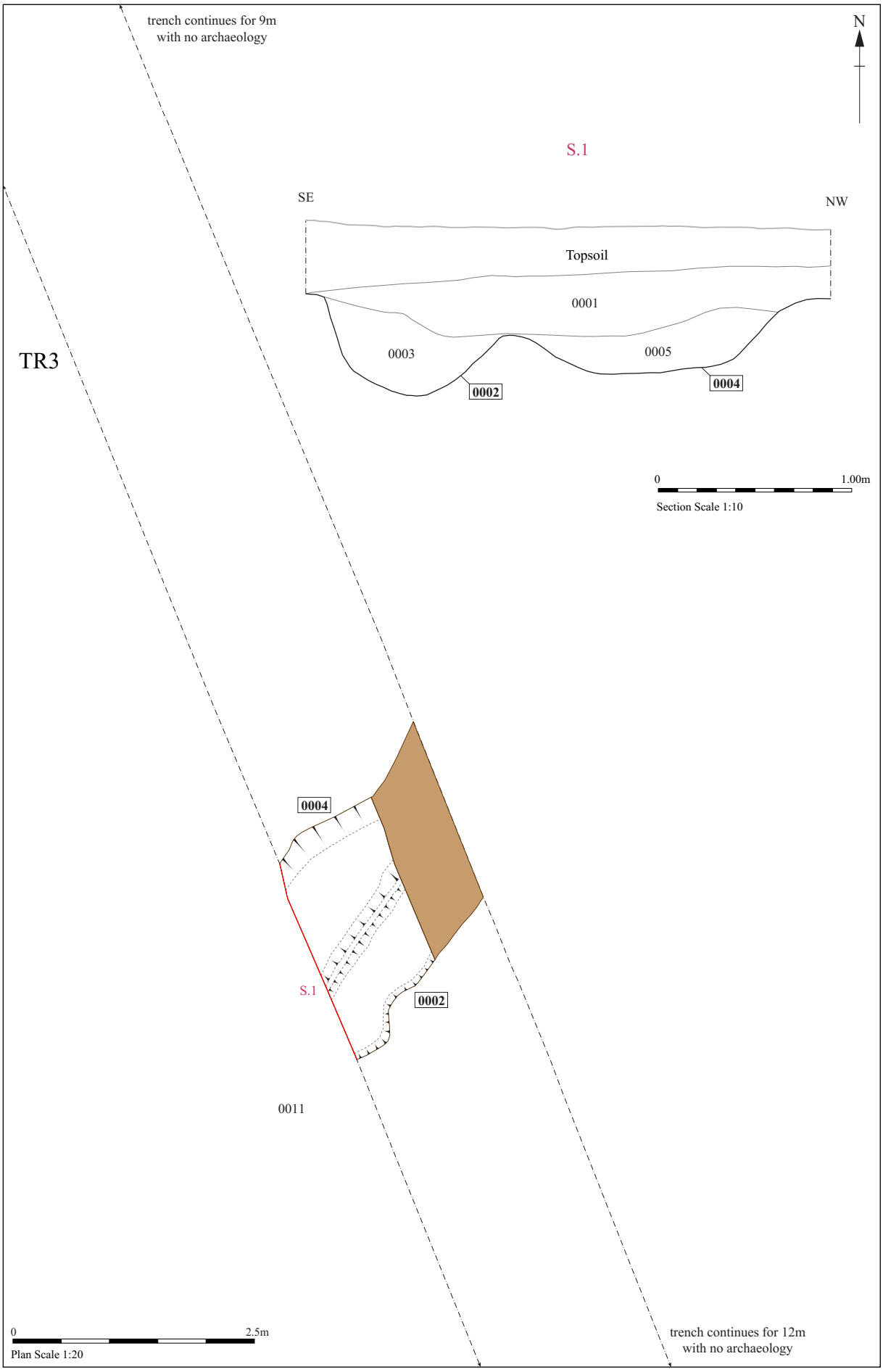

Figure 3. Trench 3 plan and section.

Plate 1. Trench 3: ditches 0002 and 0004, 2m scale looking south-west.

7. Discussion

The eleven evaluation trenches identified two ditch features (0002 and 0004) in a single trench (Trench 3). The ditches ran parallel to each other and are like to be a boundary ditch and recut. Dating evidence was recovered from one of the ditches (0002) and comprised two non-contemporary abraded pottery sherds determined to be medieval and prehistoric. The ditches are aligned, albeit do not coincide, with a boundary represented on the 1882 Ordnance Survey (Fig.4). The lack of further evidence of this boundary suggests that these ditches are the same boundary. The nature of the ditches fills was not considered conducive to producing significant environmental evidence.

The majority of the geophysical anomalies were attributed to either geological factors or the presence of modern ferrous materials in the ploughsoil. After investigation the area of 'patterned' ground towards the southern portion of the PDA was clearly derived from the presence of localised glacially scarred chalk geology. A similar phenomenon was identified during archaeological investigation at Fornham All Saints (FAS 050) where a large area of amorphous magnetic variation, appearing in the raw data as a series of stripes and 'patterned ground', was also observed to coincide with a notable increase in glacial and peri-glacial scarring of the natural chalk.

The sandy geology recorded in Trenches 7 and 8, and to a lesser extent 6 and 9 is likely to be the large sub-aerial channel noted by the British Geological Survey (see section 2).

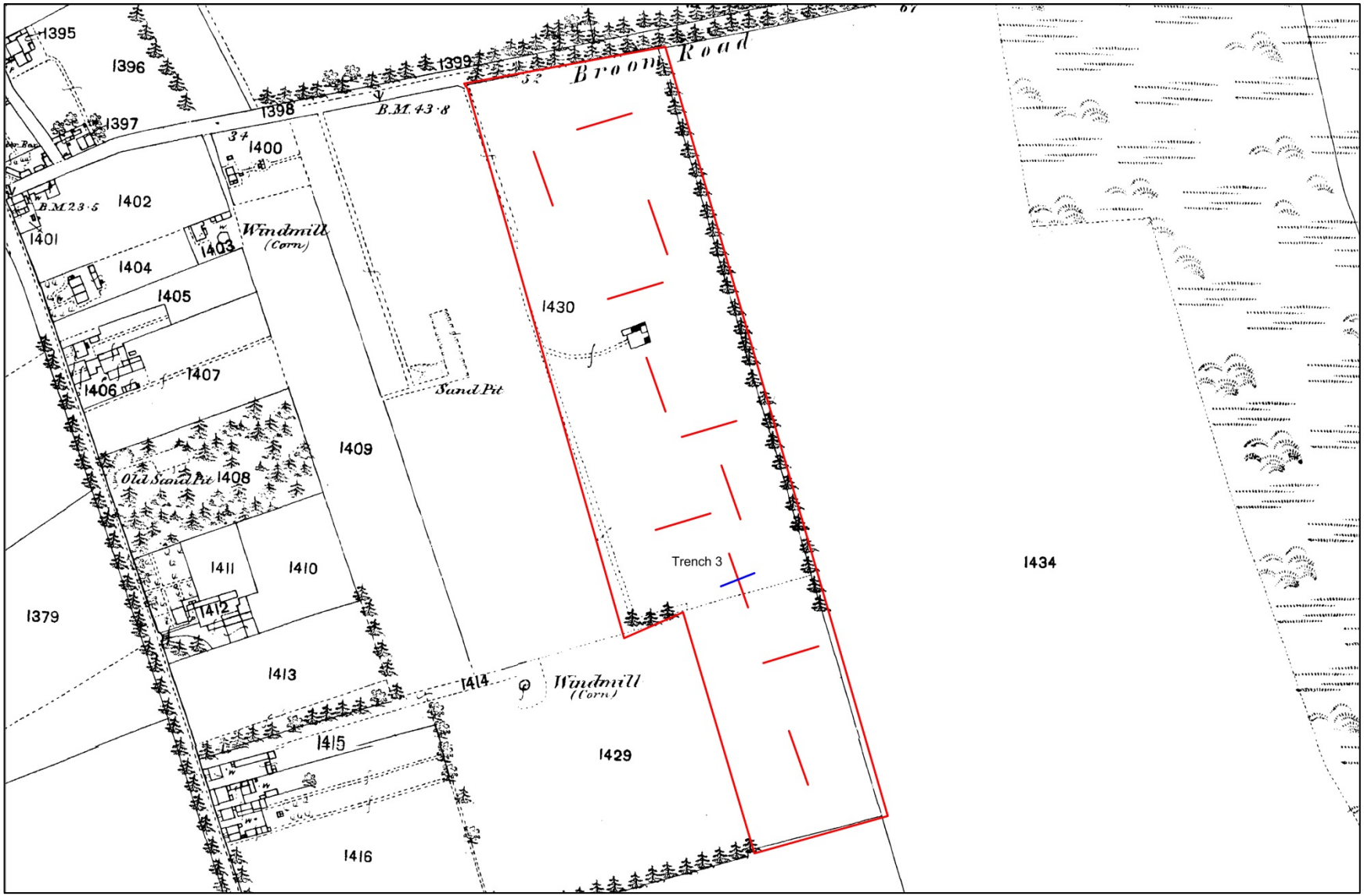

Figure 4. 1882 Ordnance Survey and overall trench plan

8. Conclusions and recommendations for further work

The project has demonstrated that a combination of variation in the local geology and the presence of ferrous materials within the ploughsoil are responsible for the majority of the positive anomalies.

Two ditches represent the entirety of the identified archaeological horizon and are likely to derive from a post medieval boundary system known to be in use during the late 19th century.

The presence of subsoil across the majority of the PDA suggests that any archaeological horizons are likely to have been protected, at least partially, from modern agricultural impact.

Given the sparse level of surviving archaeological horizons recorded to the north-east (LKH 362 and 363) it seems likely that there is only a limited horizon in the immediate vicinity. Any further work undertaken may want to focus on establishing the extent of the boundary ditches.

The two sherds of pottery recovered from ditch 0002 have been subjected to cursory analysis. Dependent on the results of the proceeding phase of work these sherds may be included in an overall finds report at a later stage.

9. Archive deposition

Paper and photographic archive: SCCAS Bury St Edmunds

Digital archive: SCCAS R:\Environmental Protection\Conservation\Archaeology\Archive\Lakenheath\LKH 368

Digital photographic archive: SCCAS R:\Environmental Protection\Conservation\Archaeology\Catalogues\Photos

10. Acknowledgements

The fieldwork was carried out by Andy Beverton, Timothy Carter and Rebecca Smart. Project management was undertaken by Andrew Tester.

The report illustrations were created by Beata Wieczorek-Olesky and the report was edited by Richenda Goffin.

11. Bibliography

Moan, P., 2013, *Land East of Eriswell Road, Lakenheath*, OA East Report No, 1556.

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Appendix1. Written Scheme of Investigation

Land South of Broom Road
LKH 368

Archaeological Evaluation through Trial Trenching

Written scheme of Investigation &

Safety Statement and Risk Assessment

Client: Plandescil Consulting

Author: Andy Beverton

July/2014

HER Information

Site Code: **LKH 368**

Site Name: **Land South of Broom Road**

Planning Application No: **Pre-Application**

Grid Reference: **TL 721 821**

Oasis Reference: **suffolkc1-186010**

Issued to: **Dr Matthew Brudenell**
Plandescil Consulting

Project Officer: **Andy Beverton**

Prepared By: Andy Beverton
Date: July 2014

Approved By: Andrew tester
Position: Senior Project Officer
Date: July 2014
Signed:

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Appendix 4. Geophysical Investigation Report

1. Background

1.1 The Field Team of the Suffolk County Council Archaeological Service (SCCAS) has been asked by the Plandescil Consulting to prepare documentation for a programme of archaeological evaluation by trial trench at the above site (Fig. 1). This Written Scheme of Investigation (WSI) covers the evaluation only. Any further stages of archaeological work that might be required in relation to the proposed development would be subject to new documentation.

1.2 The site covers c.6ha, located at NGR TL 721 821.

1.3 The work is to be undertaken pre-application for planning permission. This is at the request of the local planning authority, following guidance set out in the National Planning Policy Framework (paragraphs 128, 129 and 132).

1.4 The archaeological investigation will be conducted in accordance with the associated Brief produced Dr Matthew Brudenell of the SCCAS Conservation Team with an aim to assess the nature and significance of any below ground assets at this location through evaluation trenches covering 1% of the PDA (Fig.2).

1.5 The site lies in an area of high archaeological potential as recorded by the County Historic Environment Record (CHER) which lists activity from the Prehistoric, Roman, Saxon, Medieval and later periods in close proximity to the site. This continuous occupation is likely due to the sites location at the eastern edge of the Fens which provides a setting amenable to occupation for all historic periods.

The CHER lists numerous sites within a 500m radius; notably the medieval core of Lakenheath (LKH 254) to the north-west provides a locus for medieval and later activity whilst Lakenheath airfield, to the east, is known to contain a rich archaeological landscape including extensive Prehistoric, Roman and Saxon horizons.

1.6 A scheme of detailed geophysical investigation has been carried out by Britannia Archaeology (App.4) and identified a high degree of isolated dipolar responses interpreted as deriving from modern ferrous objects present within the upper soil layers. The investigation detected sixteen discrete anomalies, slightly concentrated towards the

southern portion of the PDA, that have been interpreted as possible archaeological features and worthy of further investigation. A large semi-circular curvi-linear feature towards the northern end of the feature may be a ring ditch and certainly deserves specific investigation given the known prehistoric horizons in close proximity to the Proposed Development Area (PDA).

1.2 The site outline and trench pattern are shown on Figure 2. Deposits in this area will be directly affected by the planned groundwork's associated with the development.

1.3 This WSI complies with the requirements of SCC's standard Requirements for a Trenched Archaeological Evaluation (2012 Ver 1.1), as well as the following national and regional guidance 'Standards and Guidance for Archaeological Excavation' (IFA, 1995, revised 2001) and 'Standards for Field Archaeology in the East of England (EAA Occasional Papers 14, 2003).

2. Research Aims

The research aims of this project, as set out in the Brief (App.3) are as follows:

RA 1: Determine the nature of the geophysical results, particularly the positive anomalies.

RA 2: Identify the depth, date, form and function of archaeological horzions and, if possible, determine their extent and degree of preservation.

RA 3: Assess the impact of past land uses and possible presence of fluvially deposited layers sealing archaeological deposits.

RA 4: Assess the potential for archaeological deposits to produce environmental evidence.

RA 5: Establish the suitability of the area for development.

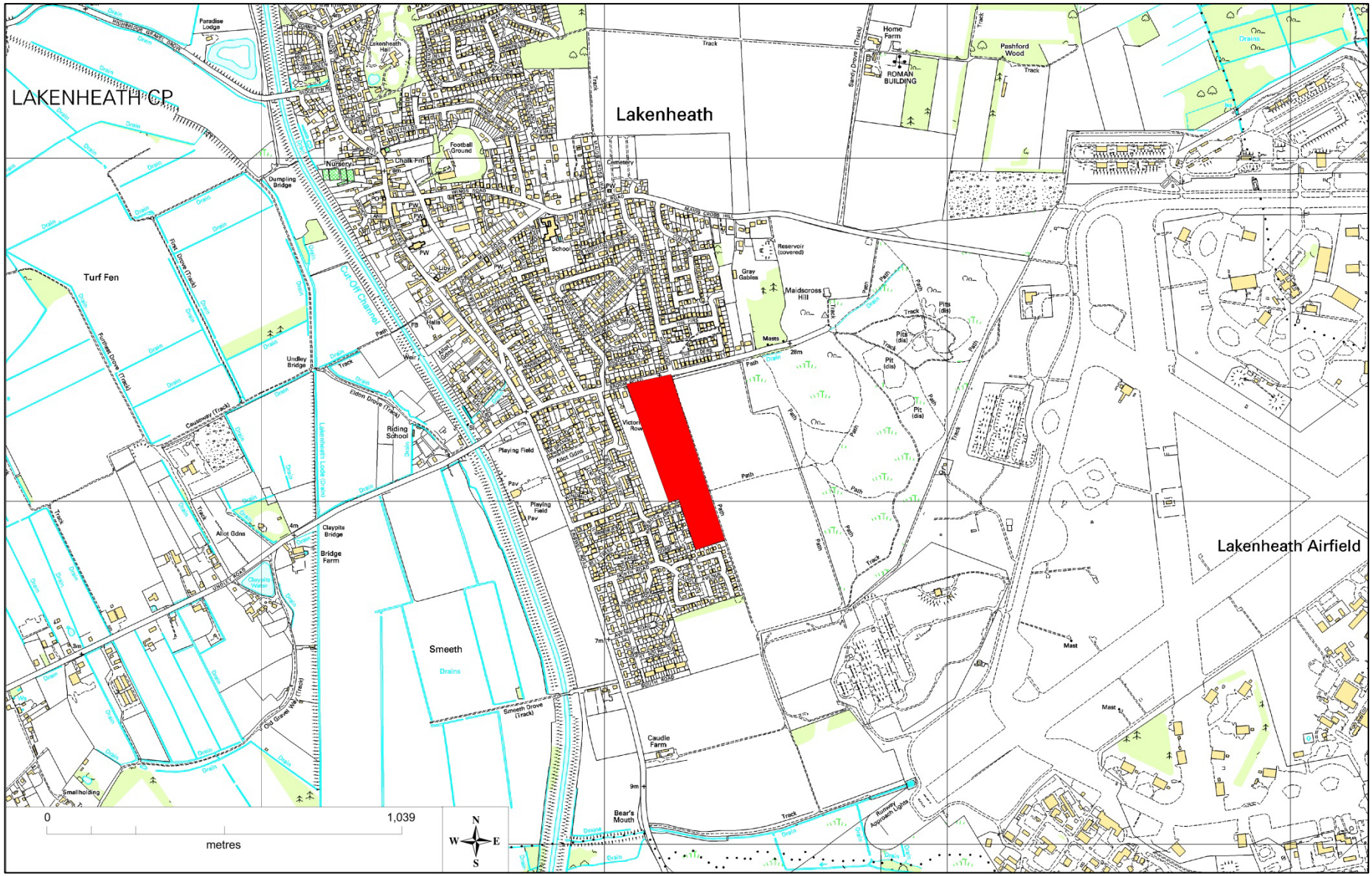


Figure 1. Site location.

Figure 2. Trench locations (blue) over geophysical investigation results.

2 Project details

Site Name	Land South of Broom Road
Site Location/Parish	Lakenheath
Grid Reference	TL 721 821
Access	Broom Road
Planning Application No	Pre-App
HER code	LKH 368
OASIS Ref	Suffolkc1-186010
SCCAS Job Code	LAKENBR001
Type	Evaluation
Area	6 ha.
Project start date	August 2014
Fieldwork duration	2 days (estimate)
Number of personnel on site	1-2
Percentage coverage	1%

Personnel and contact numbers

Contracts Manager	Rhodri Gardner	01473 581743
Project Officer (first point of on-site contact)	Andy Beverton	07704218396
Finds Dept	Richenda Goffin	01284 352447
Sub-contractors	/	
Curatorial Officer	Matt Brudenell	01284 741227
Consultant	Plandescil Consulting	
Site landowner	TBC	

Emergency contacts

Local Police	Mildenhall Police Station Kingsway Mildenhall IP28 7HS	01473 613500
Location of nearest A&E	Hardwick Lane Bury St. Edmunds Suffolk IP33 2QZ	01284 713000
Qualified First Aiders	SCC Project Officer attending	

Other Contacts

Suffolk Fleet Maintenance	01359 270777
Suffolk Press Office	01473 264395
SCC EMS (Jezz Meredith)	01473 583288
SCC H&S (Stuart Boulter)	01473 583290

3 Archaeological method statement

3.1 Evaluation by trial trench

3.1.1 The archaeological fieldwork will be carried out by members of the SCCAS field team led in the field by an experienced member of staff of Project Officer Grade. The excavation team will comprise up to 2 experienced excavators and surveyors (including the Project Officer) from a pool of suitable staff at SCCAS.

3.1.2 Evaluation of the development area will employ eleven 36m long (at 1.5m wide) trial trenches to sample 1% by area of the PDA, specifically targeting a number of anomalies detected through the preceding geophysical investigation (Fig.2).

3.1.3 The PDA covers an area of approximately 6ha. (Figs. 1 and 2).

3.1.4 Trenches occurring within 6m of the electric power lines crossing the northern portion of the PDA will be relocated by GPS to coincide with positive anomalies identified by the geophysical investigation.

3.2 General trial trench methodology

3.2.1 The trenches will be cut using a tracked mechanical excavator equipped with a toothless ditching bucket, under the constant supervision of an archaeologist. All overburden (topsoil and subsoil) will be removed stratigraphically until either the first archaeological horizon or natural deposits are encountered. Spoil will be stored adjacent to each trench and topsoil, subsoil and concrete/overburden will be kept separate for sequential backfilling if requested by the client prior to excavation.

3.2.2 Archaeological deposits and features will be sampled by hand excavation and the trench bases and sections cleaned as necessary in order to satisfy the project aims and in compliance with the SCCAS Requirements for Archaeological Evaluation, 2012.

3.2.3 Trenches requiring access by staff for hand excavation and recording will not exceed a depth of 1.2m. Any trench in which this depth is not sufficient to meet the archaeological requirements of the Brief will be brought to the attention of the client or their agent and the Archaeological Advisor to the LPA so that further requirements can be discussed (and costed).

3.2.4 Deeper excavation can be undertaken provided suitable trench support is used or, where practicable, the trench sides are stepped or battered.

3.2.5 A site plan, which will show all trench locations, feature positions and levels AOD will be recorded using an RTK GPS or TST of hand planned from known OS points, depending on the specific requirements of the project. A minimum of one section per trench will be recorded. Feature sections and plans will be recorded at 1:10 or 1:20 and trench and feature plans at 1:10, 1:20 or 1:50 as appropriate. Normal Field Team conventions, compatible with the County HER, will be used during the site recording.

3.2.6 The site will be recorded under HER site code LKH 368, acquired from the Suffolk HER Office and archaeological contexts will be recorded using standard SCCAS Context Recording sheets and inputted onto an associated database.

3.2.7 A digital photographic record will be made throughout the evaluation.

3.2.8 All pre-modern finds will be kept and no discard policy will be considered until all the finds have been processed and assessed.

3.2.9 All finds will be brought back to the SCCAS Bury St Edmunds office for processing, preliminary conservation and packing. Much of the archive and assessment preparation work will be done in house, but in some circumstances it may be necessary to send some categories of finds to specialists working in other parts of the country.

3.2.10 Bulk environmental soil samples (40 litres each) will be taken from suitable archaeological features and retained until an appropriate specialist has assessed their potential for palaeo-environmental remains. Decisions will be made on the need for further analysis following this assessment. If necessary advice will be sought from

English Heritage's Regional Advisor in Archaeological Science on the need for specialist environmental sampling.

3.2.11 In the event of human remains being encountered on the site, guidelines from the Ministry of Justice will be followed. The evaluation will attempt to establish the extent, depth and date of burials whilst leaving remains in situ. During the evaluation any exposed human remains will be securely covered and hidden from the public view at all times when they are not attended by staff. At the conclusion of the work backfilling will be carried out in a manner sensitive to the preservation of such remains.

3.2.12 If circumstances dictate that the lifting of human remains is unavoidable then a Ministry of Justice Licence for their removal will be obtained prior to their removal from site.

3.3 Reporting, archive and OASIS record

3.3.1 A unique HER number has been acquired from the Suffolk HER – LKH 368. This will be clearly marked on all documentation relating to the project.

3.3.2 All artefactual material recovered will be held by the SCCAS Contracting Team until their analysis of the material is complete. Ownership of all such archaeological finds will then be given over to the relevant authority. There is a presumption that this will be SCCAS/CT, who will hold the material in suitable storage to facilitate future study and ensure its proper preservation.

3.3.3 In the event that artefacts of significant monetary value are discovered separate ownership arrangements may be negotiated, provided they are not subject to Treasure Act legislation.

3.3.4 The project archive shall be compiled in accordance with the guidelines issued by the SCCAS/CT (2010). The client is aware of the costs of archiving and provision has been made to cover these costs in our agreement with them. The archive will be deposited with the County Archaeology Store unless another suitable repository is agreed with SCCAS/CT.

3.3.5 Specialist finds staff will be used, who are experienced in local and regional types and periods for their field.

3.3.6 All site data will be entered on a computerised database compatible with the County HER. All site plans and sections will be copied to form a permanent archive on archival stable material. Ordnance Datum levels will be on the section sheets. The photographic archive will be fully catalogued within the County HER photographic index.

3.3.7 All finds will be processed, marked and bagged/boxed to County HER requirements. Where appropriate finds will be marked with a site code and a context number.

3.3.8 Bulk finds will be fully quantified on a computerised database compatible with the County HER. Quantification will fully cover weights and numbers of finds by context with a clear statement for specialists on the degree of apparent residuality observed.

3.3.9 Metal finds on site will be stored in accordance with ICON guidelines, initially recorded assessed for significance before dispatch to a conservation laboratory within 4 weeks of the end of the excavation. All pre-modern silver, copper alloy and ferrous metal artefacts will be x-rayed and coins will be x-rayed if necessary for identification. Sensitive finds will be conserved if necessary and deposited in bags/boxes suitable for long term storage to ICON standards. All coins will be identified to a standard acceptable to normal numismatic research.

3.3.10 The site archive will meet the standards of SCCAS/CT.

3.3.11 The pottery will be recorded and archived to a standard consistent with the Draft Guidelines of the Medieval Pottery Research Group and Guidelines for the archiving of Roman Pottery, SGRP (ed. M.G. Darling, 1994) and to The Study of Later Prehistoric Pottery: General Policies and Guidelines for analysis and Publications, Occasional Papers No.1 and No. 2, 3rd Edition (Revised 2010, Prehistoric Ceramic Research Group).

3.3.12 Environmental samples will be processed and assessed to standards set by the Regional Environmental Archaeologist with a clear statement of potential for further analysis.

3.3.13 Animal and human bone will be quantified and assessed to a standard acceptable to national and regional English Heritage specialists.

3.3.14 An industrial waste assessment will cover all relevant material (i.e. fired clay finds as well as slag).

3.3.15 A report on the results of the evaluation will be completed c. 6 weeks after the completion of the fieldwork. A draft of the report will be submitted to SCCAS/CT for approval.

3.3.16 On receipt of approval of the report from SCCAS/CT hard and digital copies will be sent to the Suffolk HER.

3.3.17 The Suffolk HER is registered with the Online Access to Index of Archaeological Investigations (OASIS) project. The SCCAS Contracting Team will provide appropriate details relating to this project by completing the OASIS form at http://ads.ahds.ac.uk/project/oasis. The completed form (reference suffolkc1-185556) will be included as an appendix to the final report.

4 Risk assessment

4.1 General

4.1.1 The project will be carried out in accordance with the Suffolk County Council statement on Health and Safety at all times. Particular hazards to SCCAS staff and subcontractors identified with this project are as follows:

Outdoor working –hazards to staff from weather conditions and uneven ground.
Manual excavation – the main hazards are to staff from the use of tools, shallow holes and the resultant trip hazards, live services and ground contamination.

Mechanised excavation, site stripping etc. – the most significant hazard from this activity is working in close proximity with plant machinery.

4.1.2 Specific risk assessments for each are provided in Appendix 2.

4.1.3 All SCCAS staff are experienced in working under similar conditions and on similar sites to the present site and are aware of all SCCAS H&S policies. All staff will be issued with a copy of the project's risk assessment and will receive a safety induction from the Project Officer. All permanent SCCAS excavation staff are holders of CSCS cards.

4.1.4 It may be necessary for site visits by external specialists, SCCAS Conservation Team members and other SCC staff. All such staff and visitors will be issued with the appropriate PPE and will undergo the required inductions. PPE is not restricted to the list below – additional items will be provided if circumstances require it.

4.1.5 PPE required in this case includes:

- Hard Hat (to EN397)
- High Visibility Clothing (EN471 Class 2 or greater)
- Safety Footwear (EN345/EN ISO 20346 or greater – to include additional penetration-resistant midsole)

4.1.6 Other PPE that may be deployed as necessary includes:

- Gloves (to EN388)
- Eye Protection (safety glasses to at least EN 166 1F)

4.1.7 Site staff, official visitors and volunteers are all covered by Suffolk County Council insurance policies (available upon request).

4.1.8 A van will be available with fresh water and a first aid kit.

4.2 Environmental controls

4.2.1 Suffolk County Council is firmly dedicated to following an EMS policy. All our preferred providers and subcontractors have been issued with environmental guidelines.

4.2.2 On site the SCCAS Project Officer will police environmental concerns. In the event of spillage or contamination EMS reporting and procedures will be carried out in consultation with Jezz Meredith (SCCAS EMS Officer). All rubbish will be bagged and removed either to areas designated by the client or returned to SCC property for disposal.

4.3 Plant and equipment details

4.3.1 A 360° tracked mechanical excavator equipped with a full suite of buckets will be required for the trial trenching. The sub-contracted plant machinery will be accompanied by a fully qualified operator who will hold an up-to-date Construction Plant Competence Scheme (CPCS) card (approved by the Construction Industry Training Board).

4.3.2 The plant machinery will be well serviced and be as quiet a model as is practicable. It will come equipped with appropriate spill kit and drip trays. It will only refuel in a single designated area, as defined by the SCCAS. If required all refuelling, will be carried out using electrically operated pumps and will only be done when drip trays are deployed.

4.3.3 Other plant details and appropriate certification can be supplied by the machine provider.

4.4 Hazardous substances

4.4.1 No hazardous substances are specifically required in order to undertake the archaeological works.

4.5 Services

4.5.1 At the time of writing this WSI the architect had informed SCCAS Field Team of the approximate position of a sewer line, but not of any further services. Appropriate measures will be taken to avoid previously unidentified services.

4.6 Lighting

4.6.1 No trenches are to be excavated indoors and no special requirements are necessary.

4.7 Access/Egress

4.7.1 All movements to and from site will respect any existing perimeter fencing/hoarding with all points of entry returned to their locked condition (if applicable), with the site kept secure via any existing means at all times.

Site induction sign off sheet for LKH 368- Broom Road Evaluation

Name	Signature	Company/organisation	Date

Appendix 1. SCC Health and Safety Policy

Health & Safety Policy – HS04

Suffolk County Council

Health & Safety Policy
General Statement of Health and Safety Policy

Aim

Suffolk County Council aims to ensure that standards of health, safety and well-being for all our staff, service users and others who may be affected by what we do, are comparable with those of the best and most responsible organisations in the country.

We recognise that good health and safety management benefits our organisation and the community we serve.

- The County Council exists to provide quality services to the community of Suffolk. The delivery of these services relies on people throughout the organisation. The protection of our human resource is therefore essential to maintaining service delivery and contributing effectively to partnerships.

Objectives

To meet this aim, we will:

- Conduct all our activities safely and in compliance with legal requirements and good practice.
- Provide a safe and healthy working environment.
- Promote a positive culture towards health, safety and welfare issues. By the implementation of a Health and safety management system HSG65.
- Continuous Improvement will be measured and monitored across the organisation.

Working together

People, not regulations, are the key to safe and healthy workplaces. Everyone has a responsibility for health and safety.

- Achieving our aim and objectives requires everyone to play their part
- This depends on everyone having a common understanding of the identification, assessment and control of risks based on competence (i.e. knowledge, skill and behaviour). We will therefore ensure that all staff is appropriately trained to enable them to work safely
- We will have identified roles and responsibilities across the organisation on the implementation of the management system
- Managers and supervisors at all levels are directly responsible for ensuring that the council's health and safety policy is known and acted upon. This responsibility cannot be discharged by delegation
- Employees must take care of their own health and safety and that of others who may be affected by what they do, or fail to do, at work

Implementation

The Corporate Health and Safety Management Board will:

- Set the county council's strategy for effectively managing health and safety risks
- Promote high standards of health and safety throughout the organisation
- Monitor the implementation, operation and effectiveness of corporate health and safety management system and arrangements
- Receive from directorate's feedback on the progress against agreed plans for health and safety improvement.

All services will allocate sufficient time and resources to enable health and safety to be managed effectively, within operational parameters.

I am personally committed to making Suffolk County Council one of the safest and healthiest places to work, and I expect a similar level of commitment from all employees to help me achieve this goal.

Andrea Hill, Chief Executive, June 2010.

Appendix 2. Risk Assessments

Specific Risk Assessments for Archaeological Evaluation:

LKH 368 Broom Road

1 Working with plant machinery

2 Physical work in an outdoor setting

3 Deep excavations

4 Use of hand tools

5 Damage to services

1-5 = Low risk

6-12 = Medium risk

20-25 = High risk

Risk Assessment 1 Working with plant machinery

Activity	***Location***	***Hazard***	***Risks***	***Persons affected***	***Initial risk***	***Control measures***	***Residual risk***	***Name***	***Date***	***Rescue procedures***
Direction and supervision of tracked 360^0 excavator.	*Various.*	Staff in close proximity to excavation (operation of bucket & manoeuvre of boom).	*Accidental contact with boom or bucket or unexpected movement of machine.*	*Principally SPO/PO, but at times may involve others.*	*10*	*Only PO to supervise machinery.* *No personnel to be within radius of boom.* *All staff to wear high visibility clothing, hard hats and safety footwear at all times.*	*5*	*R Brooks*	*24/07/ 2014*	*Call emergency services.* *First Aid if required.*

	Likelihood				
Severity	1	*2*	*3*	*4*	*5*
1	*1*	*2*	*3*	*4*	*5*
2	*2*	*4*	*6*	*8*	*10*
3	*3*	*6*	*9*	*12*	*15*
4	*4*	*8*	*12*	*16*	*20*
5	*5*	10	*15*	*20*	*25*

Initial Risk

Residual Risk

Likelihood	***Severity***	**Risk (likelihood x severity)**
1. Highly unlikely	*1. Slight inconvenience*	*1-5 Low*
2. May occur but very rarely	*2. Minor injury requiring first aid*	
3. Does occur but only rarely	*3. Medical attention required*	*6-12 Medium*
4. Occurs from time to time	*4. Major injury leading to hospitalisation*	
5. Likely to occur often	*5. Fatality or serious injury leading to disablement*	*13-25 High*

Risk Assessment 2 Physical work in an outdoor setting

Activity	***Location***	***Hazard***	***Risks***	***Persons affected***	***Initial risk***	***Control measures***	***Residual risk***	***Name***	***Date***	***Rescue procedures***
Hand excavations of archaeological features.	*Various.*	Extremes of heat, cold and wet weather. Trip hazards.	Hypothermia, heat stroke, sunburn. Minor injuries.	*All field staff.*	*9*	*All staff provided with appropriate clothing for weather conditions.* *No staff to work alone in extreme conditions.* *Regular sweep for trip hazards.*	*2*	*R Brooks*	*24/07/ 2014*	*First Aid if required.* *Call emergency services if necessary.*

	Likelihood				
Severity	1	*2*	*3*	*4*	*5*
1	*1*	*2*	*3*	*4*	*5*
2	*2*	*4*	*6*	*8*	*10*
3	*3*	*6*	*9*	*12*	*15*
4	*4*	*8*	*12*	*16*	*20*
5	*5*	10	*15*	*20*	*25*

Initial Risk

Residual Risk

Likelihood	***Severity***	**Risk (likelihood x severity)**
1. Highly unlikely	*1. Slight inconvenience*	*1-5 Low*
2. May occur but very rarely	*2. Minor injury requiring first aid*	
3. Does occur but only rarely	*3. Medical attention required*	*6-12 Medium*
4. Occurs from time to time	*4. Major injury leading to hospitalisation*	
5. Likely to occur often	*5. Fatality or serious injury leading to disablement*	*13-25 High*

Risk Assessment 3 Deep excavations

Activity	***Location***	***Hazard***	***Risks***	***Persons affected***	***Initial risk***	***Control measures***	***Residual risk***	***Name***	***Date***	***Rescue procedures***
Excavation of trial trenches and archaeological features within.	*Various.*	Trench collapse, falls, and work in confined spaces.	Physical injury (minor to rare major examples), suffocation.	*All field staff.*	*12*	*No excavation beyond safe depth in any circumstances (not necessary for evaluation stage of works).* *No excavation of trenches beyond depth of 1.2m (or shallower where there is risk of collapse in the judgement of the PO if deposits are unconsolidated).*	*2*	*R Brooks*	*24/07/ 2014*	*Call emergency services.* *First Aid if required.*

	Likelihood				
Severity	*1*	*2*	*3*	*4*	*5*
1	*1*	*2*	*3*	*4*	*5*
2	*2*	*4*	*6*	*8*	*10*
3	*3*	*6*	*9*	*12*	*15*
4	*4*	*8*	*12*	*16*	*20*
5	*5*	10	*15*	*20*	*25*

Initial Risk

Residual Risk

Likelihood	***Severity***	**Risk (likelihood x severity)**
1. Highly unlikely	*1. Slight inconvenience*	*1-5 Low*
2. May occur but very rarely	*2. Minor injury requiring first aid*	
3. Does occur but only rarely	*3. Medical attention required*	*6-12 Medium*
4. Occurs from time to time	*4. Major injury leading to hospitalisation*	
5. Likely to occur often	*5. Fatality or serious injury leading to disablement*	*13-25 High*

Risk Assessment 4 Use of hand tools

Activity	***Location***	***Hazard***	***Risks***	***Persons affected***	***Initial risk***	***Control measures***	***Residual risk***	***Name***	***Date***	***Rescue procedures***
Excavation of archaeological features using shovels, mattocks, forks, wheelbarrows and small tools	*Various.*	Splinters from poorly maintained equipment, trip hazards from unused equipment, accidental striking of personnel in close proximity, some heavy lifting.	Minor injuries.	*All field staff.*	*8*	*Ensure all tools in serviceable condition.* *Careful policing of temporarily unused equipment (e.g. no discarded hand tools near trench edges).* *Ensure all tools carried appropriately.*	*4*	*R Brooks*	*24/07/ 2014*	*First Aid if required.*

	Likelihood				
Severity	1	*2*	*3*	*4*	*5*
1	*1*	*2*	*3*	*4*	*5*
2	*2*	*4*	*6*	*8*	*10*
3	*3*	*6*	*9*	*12*	*15*
4	*4*	*8*	*12*	*16*	*20*
5	*5*	10	*15*	*20*	*25*

Initial Risk

Residual Risk

Likelihood	***Severity***	**Risk (likelihood x severity)**
1. Highly unlikely	*1. Slight inconvenience*	*1-5 Low*
2. May occur but very rarely	*2. Minor injury requiring first aid*	
3. Does occur but only rarely	*3. Medical attention required*	*6-12 Medium*
4. Occurs from time to time	*4. Major injury leading to hospitalisation*	
5. Likely to occur often	*5. Fatality or serious injury leading to disablement*	*13-25 High*

Risk Assessment 5 Damage to services

Activity	***Location***	***Hazard***	***Risks***	***Persons affected***	***Initial risk***	***Control measures***	***Residual risk***	***Name***	***Date***	***Rescue procedures***
Machine cutting of trial trenches.	*Various.*	Accidental damage to cables or services (water, electrical etc.).	Electrocution, environmental damage/pollution, cost implications.	*Machine operator and PO.*	6	*Client to provide survey of any known services.* *Carefully observed machine excavation under full supervision.* *Use of CAT scanner.*	*2*	*R Brooks*	*24/07/ 2014*	*Call emergency services.* *First Aid if required.* *Any pollution to be reported to Environmental Manager immediately.*

	Likelihood				
Severity	1	*2*	*3*	*4*	*5*
1	*1*	*2*	*3*	*4*	*5*
2	*2*	*4*	*6*	*8*	*10*
3	*3*	*6*	*9*	*12*	*15*
4	*4*	*8*	*12*	*16*	*20*
5	*5*	10	*15*	*20*	*25*

Initial Risk

Residual Risk

Likelihood	***Severity***	**Risk (likelihood x severity)**
1. Highly unlikely	*1. Slight inconvenience*	*1-5 Low*
2. May occur but very rarely	*2. Minor injury requiring first aid*	
3. Does occur but only rarely	*3. Medical attention required*	*6-12 Medium*
4. Occurs from time to time	*4. Major injury leading to hospitalisation*	
5. Likely to occur often	*5. Fatality or serious injury leading to disablement*	*13-25 High*

Suffolk County Council

The Archaeological Service
Conservation Team

Economy, Skills and Environment
9–10 The Churchyard, Shire Hall
Bury St Edmunds
Suffolk
IP33 1RX

Appendix 2. Archaeological Brief

Brief for a Geophysical Survey and Trenched Archaeological Evaluation

AT

LAND SOUTH OF BROOM ROAD, LAKENHEATH

PLANNING AUTHORITY:	Forest Heath District Council
PLANNING APPLICATION NUMBER:	Pre-application
HER NO. FOR THIS PROJECT:	To be arranged with the Suffolk HER Officer (email james.rolfe@suffolk.gov.uk)
GRID REFERENCE:	TL 721 821
DEVELOPMENT PROPOSAL:	Housing
AREA:	c. 6 ha
CURRENT LAND USE:	Greenfield
THIS BRIEF ISSUED BY:	Matthew Brudenell Senior Archaeological Officer Conservation Team Tel. : 01284 741227 E-mail: matthew.brudenell@suffolk.gov.uk
Date:	08 April 2014

Summary

1.1 The applicant and Local Planning Authority (LPA) have been advised that the location of the proposed development could affect important archaeological deposits.

1.2 The applicant is required to undertake a preliminary archaeological field evaluation prior to consideration of the proposal, in accordance with a Written Scheme of Investigation. This information should be incorporated in the design and access statement, in accordance with the National Planning Policy Framework (paragraphs 128, 129 and 132), in order for the LPA to be able to take into account the particular nature and the significance of any below-ground heritage assets at this location.

1.3 This brief stipulates the minimum requirements for the archaeological investigation, and should be used in conjunction with the Suffolk County Council Archaeology Service Conservation Team's (SCCAS/CT) Requirements for Archaeological Evaluation 2012 Ver 1.1. These should be used to form the basis of the Written Scheme of Investigation (WSI).

1.4 The archaeological contractor, commissioned by the applicant, must submit a copy of their WSI to SCCAS/CT. Following acceptance by SCCAS/CT, it is the commissioning body's responsibility to submit the WSI to the LPA for formal approval. No fieldwork should be undertaken on site without the written approval of the LPA. Only the full implementation of the scheme, both completion of fieldwork and reporting (including the need for any further work following this evaluation), will enable SCCAS/CT to advise the LPA that requirement for this investigation have been met.

1.5 The WSI should be approved before costs are agreed with the commissioning client, in line with Institute for Archaeologists' guidance. Failure to do so could result in additional and unanticipated costs.

1.6 The WSI will *provide the basis for measurable standards* and will be used to establish whether the requirements of the planning condition will be adequately met. If the approved WSI is not carried through in its entirety (particularly in the instance of trenching being incomplete) the evaluation report may be rejected.

Archaeological Background

2.1 This large site lies in an area of high archaeological potential as recorded by information held by the County Historic Environment Record (HER). Its landscape setting overlooking the fen edge is topographically favourable for early occupation of all periods. There are sites recorded in close proximity, representing Prehistoric, Roman, Saxon, Medieval and later occupation (LKH 035, 103, 104, 110, 134, 303, 134, 110).

Planning Background

3.1 In June 2012, SCCAS/CT commented on the plot allocation (Site L/22) as part of the consultation for the Forest Heath District Council Strategic Housing Land Availability Assessment. The following response was given:

> 'This large option should be subject to pre-determination archaeological evaluation to allow for preservation *in situ* of any sites of national importance that might be defined (and which are currently unknown).'

3.2 <u>The applicant should be aware that the SCCAS/CT will seek to secure a further programme of evaluation trial trenching by condition (up to a further 4% sample of the development area) if consent is granted.</u>

Fieldwork Requirements for Archaeological Investigation

4.1 A geophysical survey and preliminary trenched evaluation is required of the development area to enable the archaeological resource, both in quality and extent, to be assessed prior to the determination of the planning application.

4.2 Trial Trenching is required to:

- 'Ground-truth' the geophysical results.
- Identify the date, approximate form and purpose of any archaeological deposit, together with its likely extent, localised depth and quality of preservation.
- Evaluate the likely impact of past land uses, and the possible presence of masking colluvial/alluvial deposits.
- Establish the potential for the survival of environmental evidence.
- Establish the suitability of the area for development.

4.4 Linear trial trenches are to be excavated to cover of total of 1% by area, which is *c*. 600m^2. These shall be positioned to sample geophysical anomalies and test 'blank' areas of the site. Trenches are to be a minimum of 1.80m wide unless special circumstances can be demonstrated; this will result in *c*. 333m of trenching at 1.80m in width.

4.5 When the geophysical survey results are available, a scale plan showing the trench design should be prepared for approval by the SCCAS/CT. No trenching should take place before the trench plan is approved.

Arrangements for Archaeological Investigation

5.1 The composition of the archaeological contractor's staff must be detailed and agreed by SCCAS/CT, including any subcontractors/specialists. Ceramic specialists, in particular, must have relevant experience from this region, including knowledge of local ceramic sequences. Metal detector uses must have experience.

5.2 All arrangements for the evaluation of the site, the timing of the work and access to the site, are to be defined and negotiated by the archaeological contractor with the commissioning body.

5.3 The project manager must also carry out a risk assessment and ensure that all potential risks are minimised, before commencing the fieldwork. The responsibility for identifying any constraints on fieldwork (e.g. designated status, public utilities or other services, tree preservation orders, SSSIs, wildlife sites and other ecological considerations rests with the commissioning body and its archaeological contractor.

5.4 The archaeological contractor will give SCCAS/CT ten working days notice of the commencement of ground works on the site, in order that the work of the archaeological contractor may be monitored, signed off as satisfactory and in accordance with the WSI.

Reporting and Archival Requirements

6.1 The project manager must consult the Suffolk HER Officer to obtain an event number for the work. This number will be unique for each project or site and must be clearly marked on all documentation relating to the work.

6.2 An archive of all records and finds is to be prepared, consistent with the principles of *MoRPHE*. It must be adequate to perform the function of a final archive for deposition in the Archaeological Store of SCCAS/CT or in a suitable museum in Suffolk (see Archaeological Archives Forum: a guide to best practice 2007).

6.3 Finds must be appropriately conserved and stored in accordance with guidelines from *The Institute of Conservation* (ICON).

6.4 The project manager should consult the intended archive depository before the archive is prepared regarding the specific requirements for the archive deposition and curation, and regarding any specific cost implications of deposition. The intended depository must be prepared to accept the entire archive resulting from the project (both finds and written archive) in order to create a complete record of the project. A clear statement of the form, intended content, and standards of the archive is to be submitted for approval as an essential requirement of the WSI.

6.5 For deposition in the SCCAS/CT's Archaeological Store, the archive should comply with SCCAS Archive Guidelines 2010. If this is not the intended depository, the project manager should ensure that a duplicate copy of the written archive is deposited with the Suffolk HER.

6.6 A report on the fieldwork and archive must be provided. Its conclusions must include a clear statement of the archaeological value of the results, and their significance. The results should be related to the relevant known archaeological information held in the Suffolk HER.

6.7 An opinion as to the necessity for further evaluation and its scope may be given, although the final decision lies with SCCAS/CT. No further site work should be embarked upon until the evaluation results are assessed and the need for further work is established.

6.8 An unbound hardcopy of the report clearly marked DRAFT, must be presented to SCCAS/CT for comment and approval. Where a report fails to meet the required standards, a revised draft report should be submitted to SCCAS/CT. Following approval of the report by SCCAS/CT, a single hard copy of the report as well as a digital .pdf version of the report should be sent to the archaeological officer, who will deposit both with the HER.

6.9 SCCAS/CT supports the OASIS project, to provide an online index to archaeological reports. Before fieldwork commences, an OASIS online record http://ads.ahds.ac.uk/project/oasis/ must be initiated and key fields completed on Details, Location and Creators forms. When the project is completed, all parts of the OASIS online form must be completed and a copy must be also included in the final report and also with the site archive.

6.10 Where positive results are drawn from a project, a summary report must be sent to the archaeological officer, suitable for inclusion in the annual 'Archaeology in Suffolk' section of the *Proceedings of the Suffolk Institute of Archaeology and History*. This summary should be included in the project report, or submitted to SCCAS/CT by the end of the calendar year in which the work takes place, whichever is the sooner.

Standards and Guidance

Further detailed requirements are to be found in our Requirements for Trenched Archaeological Evaluation 2011 Ver 1.3. This can be downloaded from: http://www.suffolk.gov.uk/libraries-and-culture/culture-and-heritage/archaeology/planning-and-countryside-advice/

Standards, information and advice to supplement this brief are to be found in *Standards for Field Archaeology in the East of England*, East Anglian Archaeology Occasional Papers 14, 2003. This can be downloaded from: http://www.eaareports.org.uk/Regional%20Standards.pdf

The Institute for Archaeologists' *Standard and Guidance for archaeological field evaluation* (revised 2001) should be used for additional guidance in the execution of the project and in drawing up the report. This can be downloaded from: http://www.archaeologists.net/codes/ifa

Notes

There are a number of archaeological contractors that regularly undertake work in the County and SCCAS will provide advice on request. SCCAS/CT does not give advice on the costs of archaeological projects. The Institute for Archaeologists maintains a list of registered archaeological contractors (http://www.archaeologists.net or 0118 378 6446).

This brief remains valid for one year. If work is not carried out in full within that time this document will lapse; the brief may need to be revised and re-issued to take account of new discoveries, changes in policy and techniques.

Appendix 3. Trench list

Trench Number	Width (m)	Length (m)	Orientation	Geology	Topsoil Depth (m)	Depth to Natural (m)	Description	Summary
01	1.8	36	NW - SE	Chalk with occassional patches of Silty Sand	0.3	0.45	Ploughsoil down to slightly silty mid orangy brown friable subsoil/ interface with natural chalk. Subsoil has occassional flecks of chalk.	None.
02	1.8	36	NE- SW	Chalk with occassional patches of silty sand.	0.29	0.41	Ploughsoil down to slightly silty mid orangy brown friable subsoil/ interface with natural chalk. Subsoil has occassional flecks of chalk. In some places of the trench there is no subsoil.	None
03	1.8	36	NW - SE	Chalk with occassional patches of silty sand	0.25	0.31	Ploughsoil down to slightly silty mid orange brown friable subsoil / interface with natural chalk. Subsoil has occassional flecks of chalk. Trench contains several geological anomalies.	2 ditches cut into natural chalk, [0002] and [0004], unable to distinguish which one cuts the other, they could possibly be contemporary.
04	1.8	36	NE - SW	Slightly silty sand with Chalk to NE end	0.35	0.70	Slightly silty sand with chalk to the NE end and chalk patches to SW end. Variable depth in middle (section taken in deepest part). Deep solutuion hollow to SW end (Max 1.25m to top of trench) down to chalk. Ploughsoil down to slightly silty mid orangy brown firable subsoil / interface with natural. Subsoil contains occassional flecks of chalk.	None
05	1.8	36	NW - SE	Chalk with large frequent patches of silty sand	0.22	0.42	Mainly Chalk with frequent patches of silty sand, deeper solution hollow to SE end, (Max 0.62m to sand natural). Similar depth throughout. Ploughsoil down to slightly silty mid orangy brown friable sand subsoil/ interface with natural chalk. Subsoil contains occassional flecks of chalk.	None
06	1.8	36	NE - SW	Mainly Silty sand with Occassional chlak patches	0.34	0.53	Ploughsoil down to slightly silty mid orangy brown friable subsoil/ interface with natural. Subsoil contains occassional flecks of chalk. Trench has a good horizon throughout	None

Trench Number	Width (m)	Length (m)	Orientation	Geology	Topsoil Depth (m)	Depth to Natural (m)	Description	Summary
07	1.8	36	NW - SE	Silty Sand	0.33	0.48	Natural mid yellowy brown slightly silty sand with large patches of slightly silty mid brown sand. Ploughsoil down to slightly silty mid orangy brown friable sand subsoil/ interface with natural.	
08	1.8	36	NW - SE	Slightly silty sand	0.33	0.50	Natural mid yellowy brown slightly silty sand with large patches of slightly silty mid brown sand. Ploughsoil down to slightly silty mid orangy brown friable sand subsoil/ interface with natural.	None
09	1.8	36	NE - SW	Slightly silty sand with occassional chalk flecks	0.26	0.37	Ploughsoil down to slightly silty mid orangy brown friable sand subsoil / interface with the natural. Subsoil contains occassional chalk flecks and has a clear horizon throughout.	None
10	1.8	36	NW - SE	Slightly silty sand with chalk flecks	0.30	0.46	Natural mid yellowy brown slightly silty sand with large patches of slightly silty mid brown sand and chalk flecks throughout. Ploughsoil down to slightly silty mid orangy brown friable sand subsoil / interface with natural. Subsoil contains occassional flecks of chalk.	None
11	1.8	36	NE - SW	Slightly silty sand with water lain sand deposists	0.49	0.49	Natural Mid Yellowy Brown slightly silty sand with large patches of water lain mid brown sand. Ploughsoil down to natural. No subsoil present.	None

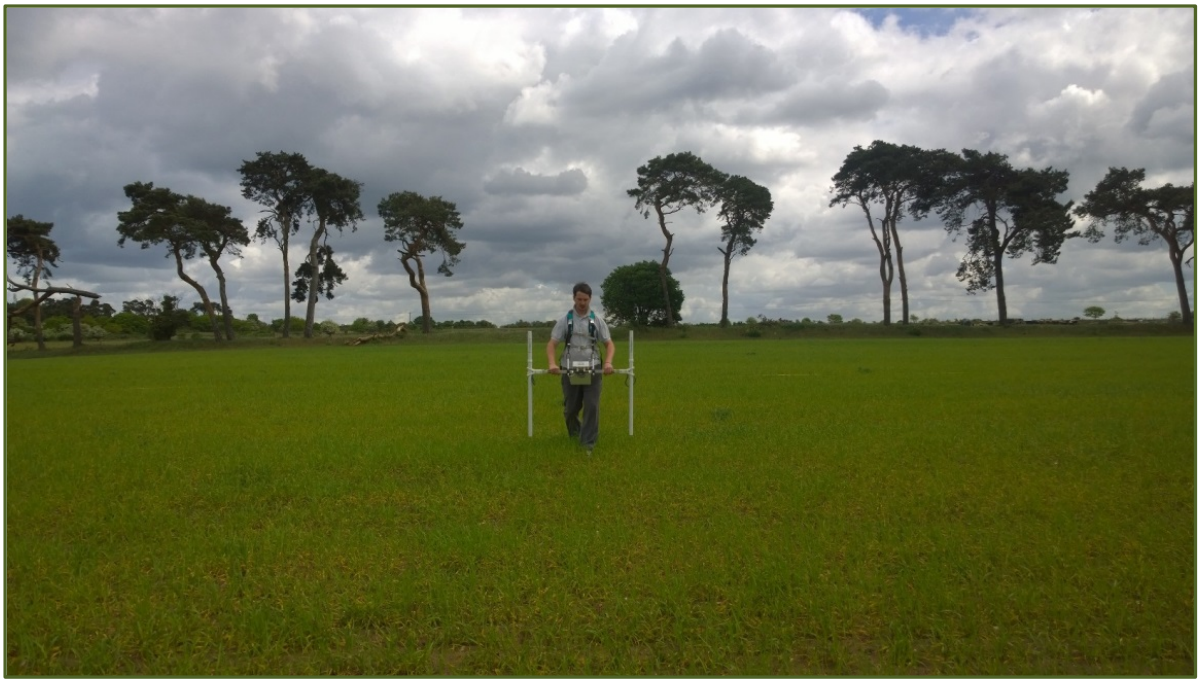
Appendix 4. Context list

Context Number	Feature Number	Trench	Feature Type	Category	Length (m)	Width (m)	Depth (m)	Description	Interpretation
0001		All	--	Layer	--	--	--	Subsoil: same across site, Slightly silty mid orangy brown friable sand with occassional chalk flecks.	--
0002	0002	03	Ditch	Cut	--	0.84	0.43	U shape ditch with sharp change of curve at the top of both the edges, almost straight adges with a sharp change of curve at the base, ditch has a concave base. Ditch cut into the natural chalk with a N-S alignment. Ditch Filled with (0003) Ditch [0004] runs alongside seperated by chalk ledge, cannot tell which cuts which so possibly contemporary.	Ditch [0004] runs alongside seperated by chalk ledge, cannot tell which cuts which so possibly contemporary.
0003	0002	03	Fill	Fill	--	0.84	0.43	Light- Mid Orangy brown slightly silty friable sand fill. Occassional small - mid pebble inclusions. Clear horizon with subsoil (0001)	Fill of [0002] Appears to be the same as (0005)
0004	0004	03	Ditch	Cut	--	1.2	0.28	U Shaped Ditch with a N-S alignment. SE edge has a sharp change of curve at top of ditch with a gental sloping edge and a gental change of curve at the base. The NW edge has a sharp change of curve at the top with a gentle sloped edge and a gentle change of curve at the base. The ditch has a concave base. Ditch cut out of the natural chalk and filled with (0005).	Ditch [0004] runs alongside seperated by chalk ledge, cannot tell which cuts which so possibly contemporary.
0005	0004	03	Fill of Ditch	Fill	--	1.2	0.28	Light- Mid Orangy brown slightly silty friable sand fill. Occassional small - mid pebble inclusions. Clear horizon with subsoil (0001)	Fill of [0004] Appears to be the same as (0003)

Appendix 5.
Geophysical
Investigation

LAND SOUTH OF BROOM ROAD, LAKENHEATH, SUFFOLK

DETAILED MAGNETOMETER SURVEY



Report Number: 1056

May 2014

LAND SOUTH OF BROOM ROAD, LAKENHEATH, SUFFOLK

DETAILED MAGNETOMETER SURVEY

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May 2014

Site Code	LKH 368	**NGR**	TL 722 821
Planning Ref.	-	**OASIS**	britanni1-179143
Approved By	Martin Brook	**DATE**	May 2014

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ABSTRACT

Detailed fluxgate gradiometer survey was undertaken by Britannia Archaeology Ltd over one agricultural field (c.5.89 hectares) on the 6th - 8th May 2014. Despite the sites high potential for encountering remains of a prehistoric origin, only a relatively narrow range of anomalies were recorded, of which only a few have a potential archaeological derivation.

Isolated dipolar responses were most numerous and probably relate to the introduction of modern ferrous cultural debris into the topsoil. Fourteen areas of magnetic disturbance were recorded, some of which were caused by ferrous material on the boundary, two electric pylons and magnetic material probably associated with a demolished abattoir.

A series of weak positive linear trends indicative of agricultural strip fields or periglacial 'patterned ground' geological surface features were recorded in the south-eastern half of the plot.

Sixteen positive discrete anomalies were recorded throughout the dataset that are indicative of archaeological rubbish pits, however a modern or geological derivation cannot be ruled out.

One positive curvilinear anomaly indicative of a potential ring ditch has been recorded to the north of the demolished abattoir, it may be of archaeological significance however a modern origin cannot be ruled out.

Further targeted trial trenching to ground- test the hypotheses given in this report would be prudent.

1.0 INTRODUCTION

On the 6th - 8th May 2014 Britannia Archaeology Ltd (BA) undertook a detailed fluxgate gradiometer survey over 5.89 hectares of one agricultural field in advance of a proposed residential development on land south of Broom Road, Lakenheath, Suffolk (NGR TL 722 821).

The survey was commissioned by Andrew Tester of Suffolk County Council Archaeological Service Field Team in response to a design brief issued by Suffolk County Council Archaeology Service/Conservation Team (SCCAS/CT), (Brudenell. M, dated 28/03/2014).

2.0 SITE DESCRIPTION

The site is located approximately 500m south-west of the medieval core of the village of Lakenheath, on the edge of the modern settlement and in the Forest Heath District of Suffolk. It lies south of Broom Road and is bounded to the west by residential development, to the north by Broom Road and an existing housing development and to the east by agricultural fields and a nature reserve on Maidcross Hill which is the site of a sandy warren described as an important remnant of the Brecks Heath (Natural England). The nature reserve falls within the Breckland SSSI, but the site itself does not.

The site is a roughly rectangular parcel of land covering 5.89ha at a height of between 15 and 18.5m AOD, sloping down in a south-westerly direction. It comprises the majority of a larger field currently used for agriculture that also extends further to the west.

The underlying bedrock comprises chalk described as Holywell Nodular Chalk Formation and New Pit Chalk Formation. The superficial geology varies across the site and is described as a mixture of Croxton sand and gravel deposits and also 'Head' (clay, silt, sand and gravel) deposits. Both were formed in the Quaternary period under glacial and sub-aerial slope conditions (BGS 2014).

2.1 Site visit

A site visit was undertaken by Matthew Adams on the 30th April 2014 to assess the ground conditions and to carry out a risk assessment. It was found to be suitable for survey with only one overhead power cable (DP1) worthy of note, present in the northern half of the field. A new crop had been sown and had grown to a height measuring less than 10cm which did not affect the survey.

DP1

Taken from the north-eastern corner, looking south-west.

3.0 PLANNING POLICIES

3.1 National Planning Policy Framework (NPPF, DCLG March 2012)

The NPPF recognises that 'heritage assets' are an irreplaceable resource and planning authorities should conserve them in a manner appropriate to their significance when considering development. It requires developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible. The key areas for consideration are:

- The significance of the heritage asset and its setting in relation to the proposed development;
- The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance;
- Significance (of the heritage asset) can be harmed or lost through alteration or destruction, or development within its setting. As heritage assets are irreplaceable, any harm or loss should require clear and convincing justification;
- Local planning authorities should not permit loss of the whole or part of a heritage asset without taking all reasonable steps to ensure the new development will proceed after the loss has occurred;
- Non-designated heritage assets of archaeological interest that are demonstrably of equivalent significance to scheduled monuments, should be considered subject to the policies for designated heritage assets.

3.2 Forest Heath Local Plan, (Policy 8.20, 1995)

Forest Heath's local plan development plan was adopted in 1995 and has undergone some revision since. A Core Strategy was released in 2010 and an updated assessment of their Heritage Policy is pending. The Council's position on heritage assets is summarised as follows:

- The District Council will seek provision to be made for the evaluation of archaeological sites of unknown importance and areas of high potential prior to the determination of development proposals. Where nationally or locally important sites, whether scheduled or not, and their settings, are effected by proposed development, there will be a presumption in favour of their preservation. On sites where there is no overriding case for preservation, development will not normally be permitted unless agreement has been reached to provide either for their preservation or for their recording and, where desirable, their excavation prior to development.

4.0 ARCHAEOLOGICAL BACKGROUND

The following archaeological background utilises data from the Suffolk Historic Environment Record, Suffolk Record Office, English Heritage PastScape (www.pastscape.org.uk) and the Archaeological Data Service (www.ads.ahds.ac.uk) (ADS).

There are no Scheduled Ancient Monuments, Designated Heritage Assets, Non-Designated Heritage Assets or Conservation Areas within the development area. However unknown Non-Designated Heritage Assets may exist on site.

No known archaeological work has been undertaken within the area, however a number of sites have been recorded on air photographs and isolated findspots are present within a 1km search radius centred on the proposed development.

Significant Lower Palaeolithic deposits have been noted during 19th century gravel workings located 350m north-east at Maidscross Hill (LKH 036). These contained numerous worked flint hand axes and flint artefact scatters associated with hominid migration routes along the Bytham River which flowed through this area before the Anglian Glaciation (approx. 500,000BC).

Later prehistoric sites are relatively well represented in a 1km radius around the centre of the site.

Mesolithic finds (LKH 127) have been recorded 1.1km to the north-east where a section cut through sand dunes on Lakenheath Warren in 1931 revealed microliths and worked flint. Five records dating to the Neolithic period are also noted and four of these (LKH 003, LKH 004, LKH 013 and LKH 044) relate to findspots located in two fields, around 1km to the north-east of the site. Neolithic Grooved Ware (LKH 013) and a single barbed, hollow base type arrowhead (LKH 003) were found as part of a larger multi-

period finds scatter. A polished greenstone axe (LKH 004) and a leaf-shaped arrow head (LKH 044) were found at Roman field which is also described as a multi-period site. This concentration suggests a possible focus of activity in this direction along the northern edge of the Fen.

Bronze Age pottery comprising 400 sherds of Beaker pottery (LKH 013) has been recovered to the north-east in the same location as the earlier Neolithic Groove ware.

Three further Bronze Age entries (LKH 041, LKH 048 & LKH 128) record find spots located to the north and north-east, in the same fields as the earlier Neolithic finds. The closest was located 600m to the north and comprised a barbed and tanged arrowhead and half a javelin head (LKH 048).

The remains of a possible Bronze Age round barrow (LKH 042) are also noted 500m north-east. This has been later associated with a medieval stone cross that stood on top, but is no longer extant.

The search results show a steady increase of activity into the Iron Age period with 11 records noted within the search area (LKH 014, LKH 020, LKH 029, LKH 041, LKH 076, LKH 108, LKH 156, LKH 181, LKH 202, LKH 211 and LKH 269). Two distinct areas of activity can be identified with significant finds and features recorded to the north and north-east, as with previous periods however the south-western Breckland/Fen boundary also seems to have been well used.

Five locations lying around 150 – 500m to the west (LKH 076, LKH 156, LKH 181, LKH 202 and LKH269), have provided evidence of Iron Age activity along the Fen Edge. Most notable is a burnt mound (LKH 156) containing a scatter of burnt flints, just inside the fenland area. A pit was also recorded close-by during an evaluation at Eriswell Drive (LKH 269) on the Breckland side of the margin, suggesting more substantial activity in the south-western area than just the finds scatters (LKH 076, LKH 181 and LKH 202) located to the north-west of the assessment site.

Romano-British activity in Lakenheath is focused in two areas. Dense activity is recorded over 1km to the north-east and finds and features have been noted 350m to the east. A Roman ditch was found adjacent to the High Street (LKH 076) and several finds (LKH 181) were also recovered at Bell meadow 800m north-east of the site.

Anglo-Saxon activity is well represented in the wider area with the famous warrior burial excavated at Lakenheath Airbase in 1996 lying 2km south. Five records (LKH 103, LKH 104, LKH 202 and LKH 315) are located within 300m – 1km north-west, west and south of site, and are once again located along the Fen Edge similar to the Roman and prehistoric records. The most notable record (LKH 315) relates to a long-maintained property boundary 700m west and in the modern settlement, which may be indicative of the early origins of the medieval and post-medieval settlement. Monitoring work at Anchor Lane (LKH 202 and LKH 322) also revealed middle to late Anglo-Saxon features. A Saxon bronze disc brooch with interlace ornamentation was also recovered 350m to the south.

The medieval core of Lakenheath is recorded in the SHER (LKH 254) and contains numerous medieval finds, sites and surviving buildings, it site lies approximately 300m to the north-west. Documentary evidence revels Lakenheath to have been a significant settlement during the medieval period with a small port linked to the River Little Ouse located somewhere on the Fen edge to the west. Several other medieval find spots (LKH 057, LKH 103 and LKH Misc) are located nearby, with a medieval banked rabbit warren (LKH 174) also recorded 550m to the east.

Numerous post-medieval and modern finds, features and buildings are located around the site, with the focus to the north-west. The most significant for this development is the site of a windmill (LKH 131) located 130m to the west. Documentary sources detailing land division prior to enclosure in the early 19th century suggest that the site was part of land set-aside for local agriculture. It formed part of a three field rotation system where by each field was subdivided into furlongs and strips and the populous farmed two fields per year leaving the third fallow. The site comprised a segment of 'field three' which was made up of the land south of Broom Road.

Given the above, the predominant archaeological potential is for anomalies indicative of medieval and post-medieval agricultural field systems, although those associated with Roman and Saxon occupation are also possible.

5.0 PROJECT AIMS

A non-intrusive field survey by geophysical prospection is required of the development to determine the extent and significance of subsurface anomalies.

6.0 METHODOLOGY

6.1 Instrument Type Justification

Britannia Archaeology Ltd employed a Bartington Dual Grad 601-2 fluxgate gradiometer to undertake the survey, because of its high sensitivity and rapid ground coverage. The surveyors noted that that the background magnetic susceptibility was relatively low, and therefore it was relatively simple to locate a suitable zero station.

6.2 Instrument Calibration

One hour was allowed in the morning for the magnetometers sensors to settle before the start of the first grid. The instrument was zeroed after every three to five grids to minimise the effect of sensor drift. An area with a relatively low magnetic reading was chosen to calibrate the instrument; this same point was used to zero the sensors throughout the survey providing a common zero point. The weather was changeable over the three days, with overcast conditions interspersed with long periods of sunshine on the first day causing sensor drift, and the characteristic parallel traverse 'striping' in the raw dataset (Figure 2) that is particularly prevalent in the eastern half of the dataset. Followed by overcast conditions on the second day and periods of rain on the final day.

6.3 Sampling Interval and Grid Size

The sampling interval was set at 0.25m along 1m traverse intervals, providing 4 readings a metre, the magnetometer survey was undertaken on 20 x 20m grids.

6.4 Survey Grid Location

The survey grid was set out to the Ordnance Survey OSGB36 datum to an accuracy of ±0.1m employing a Leica Viva Glonnass Smart Rover GS08 real time kinetic (RTK) survey system. Data were converted to the National Grid Transformation OSTN02 and the instrument was regularly tested using stations with known ETRS89 coordinates. The grids were positioned on a north-west to south-east alignment (Figure 1).

6.5 Data Capture

Instrument readings were recorded on an internal data logger that were downloaded to a laptop at lunchtime and then also at the end of the day. The grid order was recorded on a BA pro-forma to aid in the creation of the data composites. Data were filed in job specific folders. These data composites were checked for quality on site by BA, allowing grids to be re-surveyed if necessary. The data were backed up onto an external storage device in the office and finally a remote server at the end of the day. A five metre exclusion zone was left between the boundaries and the survey area to reduce the amount of field boundary magnetic disturbance, which slightly reduced the area available.

6.6 Data Presentation and Processing

Data are presented in both raw and processed data plots in greyscale format (Figures 2 and 3). An XY trace plot of the processed data has also been included (Figure 4).

The raw data is presented with no processing, and was clipped to produce a uniform greyscale plot, processed data schedules are also displayed below.

Raw Data:
Data Clipping: 1.00 standard deviation.
Display Clipping: +/- 3 standard deviations.

Processed Data:
De-spike: X diameter = 3, Y diameter = 3, Threshold = 1, centre value=mean, replace with = mean;
De-stripe: Median Traverse: All;
Data Clipping: 1.00 standard deviation;
Display Clipping: +/- 3 standard deviations.

Grid number 45 was *not* used.

An interpretation plan characterising the anomalies recorded can be found at Figure 5, drawing together the evidence collated from both greyscale and XY trace plots (Figures

2, 3 and 4). All figures are tied into the National Grid and printed at an appropriate scale.

6.7 Software

Raw data were downloaded using DW Consulting's Archeosurveyor v2.0 and will be stored in this format as raw data. The software used to process the data and produce the composites was also DW Consulting's Archeosurveyor v2.0. Datasets were exported into AutoCAD and placed onto the local survey grid. Interpretation plots were then produced using AutoCAD.

6.8 Grid Restoration

Britannia Archaeology Ltd positioned no reference stations within the field however the grids can be relocated using the geo-referenced stations presented in Figure 1; these co-ordinates can also enable the accurate targeting of geophysical anomalies.

7.0 RESULTS & DISCUSSION

Isolated dipolar ('iron spike') responses were most numerous throughout the dataset and were probably caused by the introduction of modern ferrous cultural debris into the topsoil through loss, rather than resulting from the presence of buried archaeological artefacts. These responses (yellow hatched circles) seem to be fairly evenly spaced throughout the field with no apparent concentration.

Fourteen areas of magnetic disturbance (yellow/pink hatching) were recorded that vary both in strength and shape. Those present on the sites periphery are caused by the location of ferrous material along the boundary. Two areas of magnetic disturbance (magenta hatching) located in the north-western third of the field demarcate the location of overhead electric pylons. The location of the demolished abattoir buildings have caused areas of magnetic disturbance to be recorded around the rectangular 'dummy readings', present in the centre of the dataset. It is likely that the smaller areas recorded nearby are also related to ferrous material associated with the abattoir. It may be prudent to further target some of these smaller areas to prove this theory.

A series of weak positive linear trends (green lines) have been recorded in the south-eastern half of the plot that are possibly indicative of agricultural strip fields. It is also possible however that they represent geological surface features found in periglacial environments and termed 'patterned ground', in this instance they take the form of stripes or polygons. Subsequent trial trenches could be targeted to test the hypotheses given above.

Sixteen positive discrete anomalies (orange hatching) have been recorded throughout the dataset that are indicative of archaeological rubbish pits, however a modern or geological derivation cannot be ruled out. Further archaeological investigations would be prudent.

One positive curvilinear anomaly (orange hatching) indicative of a potential ring ditch has been recorded to the north of the demolished abattoir. It is however close to the areas of magnetic disturbance and an electric pylon and therefore a modern origin cannot be ruled out. Targeted trenching could be used to further investigate this anomaly.

8.0 CONCLUSION

The site has a relatively low background magnetic susceptibility, due to the nature of the underlying superficial geology, this provided good clarity between the magnetic background and the more magnetically susceptible readings recorded in the anomalies. Despite the high potential for recording anomalies of an archaeological origin, only a small degree of those presented within this report are worthy of further archaeological investigation.

9.0 PROJECT ARCHIVE AND DEPOSITION

A full archive will be prepared for all work undertaken in accordance with guidance from the *Selection, Retention and Dispersion of Archaeological Collections,* Archaeological Society for Museum Archaeologists, 1993. Arrangements will be made for the archive to be deposited with the relevant museum/HER Office.

10.0 ACKNOWLEDGEMENTS

Britannia Archaeology Ltd would like to thank Mr Andrew Tester of Suffolk County Council Archaeological Service Field Team for commissioning the project, and to Dr Mr Matthew Brudenell of Suffolk County Council Archaeological Service/Conservation Team for his advice throughout.

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APPENDIX 1 METADATA SHEETS

Raw Data

Filename	LAK 1 Raw.xcp
Description	
Instrument Type	Grad 601 (Gradiometer)
Units	nT
Surveyed by	MB, MCA, TPS on 5/8/2014
Assembled by	TPS on 5/9/2014
Direction of 1st Traverse	45 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	32702.00
Dimensions	
Composite Size (readings)	480 x 520
Survey Size (meters)	120.00m x 520.00 m
Grid Size	20.00 m x 20.00 m
X Interval	0.25 m
Y Interval	1.00
Stats	
Max	8.14
Min	-6.94
Std Dev	2.53
Mean	0.71
Median	0.72
Composite Area	6.24 ha
Surveyed Area	4.89 ha
Program	
Name	ArcheoSurveyor
Version	2.5.16.0

Processed Data

Filename	LAK 1 Pro.xcp
Description	
Instrument Type	Grad 601 (Gradiometer)
Units	nT
Surveyed by	MB, MCA, TPS on 5/8/2014
Assembled by	TPSon 5/9/2014
Direction of 1st Traverse	45 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	32702.00
Dimensions	
Composite Size (readings)	480 x 520
Survey Size (meters)	120.00m x 520.00 m
Grid Size	20.00 m x 20.00 m
X Interval	0.25 m
Y Interval	1.00 m
Stats	
Max	5.58
Min	-5.66
Std Dev	1.69
Mean	0.03
Median	0.00
Composite Area	6.24 ha
Surveyed Area	4.89 ha
Program	

Name	ArcheoSurveyor
Version	2.5.16.0

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83	Col:3	Row:13	grids\81.xgd
84	Col:3	Row:14	grids\82.xgd
85	Col:3	Row:15	grids\83.xgd
86	Col:3	Row:16	grids\106.xgd
87	Col:3	Row:17	grids\107.xgd
88	Col:3	Row:18	grids\108.xgd
89	Col:3	Row:19	grids\109.xgd
90	Col:3	Row:20	grids\110.xgd
91	Col:3	Row:21	grids\131.xgd
92	Col:3	Row:22	grids\132.xgd
93	Col:3	Row:23	grids\133.xgd
94	Col:3	Row:24	grids\134.xgd
95	Col:3	Row:25	grids\135.xgd
96	Col:4	Row:1	grids\25.xgd
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98	Col:4	Row:3	grids\27.xgd
99	Col:4	Row:4	grids\28.xgd
100	Col:4	Row:5	grids\29.xgd
101	Col:4	Row:6	grids\55.xgd
102	Col:4	Row:7	grids\56.xgd
103	Col:4	Row:8	grids\57.xgd
104	Col:4	Row:10	grids\58.xgd
105	Col:4	Row:11	grids\84.xgd
106	Col:4	Row:12	grids\85.xgd
107	Col:4	Row:13	grids\86.xgd
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111	Col:4	Row:17	grids\112.xgd
112	Col:4	Row:18	grids\113.xgd
113	Col:4	Row:19	grids\114.xgd

114 Col:4 Row:20 grids\115.xgd
115 Col:4 Row:21 grids\136.xgd
116 Col:4 Row:22 grids\137.xgd
117 Col:4 Row:23 grids\138.xgd
118 Col:4 Row:24 grids\139.xgd
119 Col:4 Row:25 grids\140.xgd
120 Col:5 Row:1 grids\30.xgd
121 Col:5 Row:2 grids\31.xgd
122 Col:5 Row:3 grids\32.xgd
123 Col:5 Row:4 grids\33.xgd
124 Col:5 Row:5 grids\34.xgd
125 Col:5 Row:6 grids\59.xgd
126 Col:5 Row:7 grids\60.xgd
127 Col:5 Row:8 grids\61.xgd
128 Col:5 Row:9 grids\62.xgd
129 Col:5 Row:10 grids\63.xgd
130 Col:5 Row:11 grids\89.xgd
131 Col:5 Row:12 grids\90.xgd
132 Col:5 Row:13 grids\91.xgd
133 Col:5 Row:14 grids\92.xgd
134 Col:5 Row:15 grids\93.xgd
135 Col:5 Row:16 grids\116.xgd
136 Col:5 Row:17 grids\117.xgd
137 Col:5 Row:18 grids\118.xgd
138 Col:5 Row:19 grids\119.xgd
139 Col:5 Row:20 grids\120.xgd
140 Col:5 Row:21 grids\141.xgd
141 Col:5 Row:22 grids\142.xgd
142 Col:5 Row:23 grids\143.xgd

APPENDIX 2 – TECHNICAL DETAILS

Magnetometer Survey

The magnetometer differs from the 'active' magnetic susceptibility meter by being a 'passive' instrument. Rather than injecting a signal into the ground it detects slight variations in the Earth's magnetic field caused by cultural and natural disturbance (Clark).

Thermoremanent magnetism is produced when a material containing iron oxides is strongly heated. Clay for example has a high iron oxide content that in a natural state is weakly magnetic, when heated these weakly magnetic compounds become highly magnetic oxides that a magnetometer can detect.

The demagnetisation of iron oxides occurs above a temperature known as the Curie point; for example haematite has a Curie point of 675 Celsius and magnetite 565C. At the time of cooling the iron oxides become permanently re-magnetised with their magnetic properties re-aligned in the direction of the Earth's magnetic field (Gaffney and Gater). The direction of the Earth's magnetic field shifts over time and these subtle alignment differences can be recorded. Kilns, hearths, baked clay and ovens can reach Curie point temperatures, and are the strongest responses apart from large iron objects that can be detected. Other cultural anomalies that can be prospected include occupation areas, pits, ditches, furnaces, sunken feature buildings, ridge and furrow field systems and ritual activity (David, 2011). Commonly recorded anomalies include modern ferrous service pipes, field drainage pipes, removed field boundaries, perimeter fences and field boundaries.

Fluxgate Gradiometers

Fluxgate gradiometers are sensitive instruments that utilise two sensors placed in a vertical plane, spaced 1 metre apart. The sensor above reads the Earth's magnetic (background) response while the sensor below records the local magnetic field. Both sensors are carefully adjusted to read zero before survey commences at a 'zeroing' point, selected for its relatively 'quiet' magnetic background reading. When differences in the magnetic field strength occur between the two sensors a positive or negative reading is logged. Positive anomalies have a positive magnetic value and conversely negative anomalies have a negative magnetic value relative to the site's magnetic background. Examples of positive magnetic anomalies include hearths, kilns, baked clay, areas of burning, ferrous material, ditches, sunken feature buildings, furrows, ferrous service pipes, perimeter fences and field boundaries. Negative magnetic anomalies include earthwork embankments, plastic water pipes and geological features.

The instruments are usually held approximately 0.30m to 0.50m above the ground surface and can detect to a depth of between 1-2metres. Best practice dictates that the optimal direction of traverse in Britain is east to west.

Magnetic Anomalies

Linear trends
Linear trends can be both positive and negative magnetic responses. If they are broad, relatively weak or negative in nature they may be of agricultural or geological origin, for example periglacial channels, land drains or ploughing furrows. If the responses are strong positive trends they are more likely to be of archaeological origin. Archaeological settlement ditches tend to be rich in highly magnetic iron oxides that accumulate in them via anthropogenic activity and humic backfills. Conversely surviving banks will be negative in nature, the material is derived from subsoil deposits that is less likely to be positively magnetic. Curvilinear trends can also be recorded and are indicative of archaeological structures such as drip-gullies.

Discrete anomalies
Discrete anomalies appear as increased positive responses present within a localised area. They are caused by a general increase in the amount of magnetic iron oxides present within the humic back-fill of for example a rubbish pit.

'Iron spike' anomalies
These strong isolated dipolar responses are usually caused by ferrous material present in the topsoil horizon. They can have an archaeological origin but are usually introduced into the topsoil during manuring.

Areas of magnetic disturbance
An area of magnetic disturbance is usually associated with material that has been fired. For example areas of burning, demolition (brick) rubble or slag waste spreads. They can also be caused by ferrous material, e.g. close proximity to barbwire or metal fences and field boundaries, buried services, pylons and modern rubbish deposits.

APPENDIX 3 – OASIS FORM

OASIS ID: britanni1-179143

Project details	
Project name	Land South of Broom Road, Lakenheath, Suffolk; Detailed Magnetometer Survey.
Short description of the project	Detailed fluxgate gradiometer survey was undertaken by Britannia Archaeology Ltd over one agricultural field (c.5.9 hectares) on the 6th - 8th May 2014. Despite the sites high potential for encountering remains of a prehistoric origin, only a relatively narrow range of anomalies were recorded, of which only a few have a potential archaeological derivation. Isolated dipolar responses were most numerous and probably relate to the introduction of modern ferrous cultural debris into the topsoil. Fourteen areas of magnetic disturbance were recorded, some of which were caused by ferrous material on the boundary, two electric pylons and magnetic material probably associated with a demolished abattoir. A series of weak positive linear trends indicative of agricultural strip fields or periglacial 'patterned ground' geological surface features were recorded in the south-eastern half. Sixteen positive discrete anomalies were recorded throughout the dataset that are indicative of archaeological rubbish pits, however a modern or geological derivation cannot be ruled out. One positive curvilinear anomaly indicative of a potential ring ditch has been recorded to the north of the demolished abattoir, it may be of archaeological significance however a modern origin cannot be ruled out. Subsequent targeted trial trenching to ground- test the hypotheses given in this report would be prudent.
Project dates	Start: 06-05-2014 End: 08-05-2014
Previous/future work	Yes / Yes
Any associated project reference codes	P1058 - Contracting Unit No.
Any associated project reference codes	R1056 - Contracting Unit No.
Any associated project reference codes	LKH 368 - Sitecode
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 3 - Operations to a depth more than

	0.25m
Monument type	NONE None
Significant Finds	NONE None
Methods & techniques	''Geophysical Survey''
Development type	Rural residential
Prompt	Direction from Local Planning Authority - PPS
Position in the planning process	Not known / Not recorded
Solid geology (other)	Holywell Nodular Chalk Formation
Drift geology (other)	Croxton Sand and Gravel, Head Clay Silt Sand and Gravel
Techniques	Magnetometry
Project location	
Country	England
Site location	SUFFOLK FOREST HEATH LAKENHEATH Land South of Broom Road, Lakenheath, Suffolk
Study area	5.89 Hectares
Site coordinates	TL 722 821 52.4093341113 0.531968503938 52 24 33 N 000 31 55 E Point
Height OD / Depth	Min: 15.00m Max: 18.50m
Project creators	
Name of Organisation	Britannia Archaeology Ltd
Project brief originator	Local Planning Authority (with/without advice from County/District Archaeologist)
Project design originator	Matthew Adams
Project director/manager	Timothy Schofield
Project supervisor	Martin Brook
Type of sponsor/funding body	Archaeological Contractor
Name of sponsor/funding body	Suffolk County Council Archaeological Service
Project archives	
Physical Archive Exists?	No
Digital Archive recipient	Suffolk HER
Digital Contents	''Survey''

Digital Media available	''Geophysics'',''Images raster / digital photography'',''Survey''
Paper Archive recipient	Suffolk HER
Paper Contents	''Survey''
Paper Media available	''Report'',''Survey '',''Unpublished Text''
Project bibliography 1	
Publication type	Grey literature (unpublished document/manuscript)
Title	Land South of Broom Road, Lakenheath, Suffolk; Detailed Magnetometer Survey
Author(s)/Editor(s)	Schofield, T.P
Other bibliographic details	R1056
Date	2014
Issuer or publisher	Britannia Archaeology Ltd
Place of issue or publication	Stowmarket
Description	A4 Bound Report with A3 Fold-out Figures
URL	www.britannia-archaeology.com
Entered by	Tim Schofield (tim@britannia-archaeology.com)
Entered on	16 May 2014

STATION	EASTING	NORTHING
01	572111.187	282339.822
02	572284.253	281870.729

Site Boundary

NGR: TL 722 821

REPORT NUMBER: 1056

PROJECT:
LAND SOUTH OF BROOM ROAD, LAKENHEATH, SUFFOLK

CLIENT:
Suffolk County Council

DESCRIPTION:
GRID, REFERENCING INFORMATION & SITE LOCATION PLAN

BRITANNIA ARCHAEOLOGY LTD
115 OSPREY DRIVE, STOWMARKET, SUFFOLK
IP14 5UX
T: 01449 763034
E: info@britannia-archaeology.com
W: www.britannia-archaeology.com

SCALE: 1:2500 (0 – 100m)

PLOT:	APPROVED:	VERSION:
A3	MB	01
DATE:	AUTHOR:	FIGURE:
MAY 2014	TPS	01

N

+8.14nT

-6.84nT

Site Boundary

NGR: TL 722 821

REPORT NUMBER: 1056

PROJECT:
LAND SOUTH OF BROOM ROAD, LAKENHEATH, SUFFOLK

CLIENT:
Suffolk County Council

DESCRIPTION:
RAW MAGNETOMETER GREYSCALE PLOT

BRITANNIA ARCHAEOLOGY LTD

115 OSPREY DRIVE, STOWMARKET, SUFFOLK
IP14 5UX

T: 01449 763034
E: info@britannia-archaeology.com
W: www.britannia-archaeology.com

SCALE: 1:2000

0 80m

PLOT:	APPROVED:	VERSION:
A3	MB	01
DATE:	AUTHOR:	FIGURE:
MAY 2014	TPS	02

N

+5.58nT

-5.66nT

Site Boundary

NGR: TL 722 821

REPORT NUMBER: 1056

PROJECT: LAND SOUTH OF BROOM ROAD, LAKENHEATH, SUFFOLK

CLIENT: Suffolk County Council

DESCRIPTION: PROCESSED MAGNETOMETER GREYSCALE PLOT

BRITANNIA ARCHAEOLOGY LTD

115 OSPREY DRIVE, STOWMARKET, SUFFOLK
IP14 5UX

T: 01449 763034
E: info@britannia-archaeology.com
W: www.britannia-archaeology.com

SCALE: 1:2000 (0 – 80m)

PLOT:	APPROVED:	VERSION:
A3	MB	01
DATE:	AUTHOR:	FIGURE:
MAY 2014	TPS	03

N

40nT/cm	Scale Interval
	Site Boundary

NGR: TL 722 821

REPORT NUMBER: 1056

PROJECT:
LAND SOUTH OF BROOM ROAD,
LAKENHEATH, SUFFOLK

CLIENT:
Suffolk County Council

DESCRIPTION:
PROCESSED MAGNETOMETER
XY TRACE PLOT

BRITANNIA ARCHAEOLOGY LTD
115 OSPREY DRIVE, STOWMARKET, SUFFOLK
IP14 5UX

T: 01449 763034
E: info@britannia-archaeology.com
W: www.britannia-archaeology.com

SCALE: 1:2000 (0 – 80m)

PLOT:	APPROVED:	VERSION:
A3	MB	01

DATE:	AUTHOR:	FIGURE:
MAY 2014	TPS	04

N

	Positive Discrete Anomaly, Archaeology?
	Positive Curvilinear Anomaly, Archaeology?
	Weak Positive Linear Trend, Agricultural?
	Electric Pylon
	Area of Magnetic Disturbance
	Isolated Dipolar Response
	Site Boundary

NGR: TL 722 821

REPORT NUMBER: 1056

PROJECT:
LAND SOUTH OF BROOM ROAD, LAKENHEATH, SUFFOLK

CLIENT:
Suffolk County Council

DESCRIPTION:
INTERPRETATION PLOT OF MAGNETOMETER ANOMALIES

BRITANNIA ARCHAEOLOGY LTD

115 OSPREY DRIVE, STOWMARKET, SUFFOLK
IP14 5UX

T: 01449 763034
E: info@britannia-archaeology.com
W: www.britannia-archaeology.com

SCALE: 1:2000 (0 – 80m)

PLOT:	APPROVED:	VERSION:
A3	MB	01
DATE:	AUTHOR:	FIGURE:
MAY 2014	TPS	05

Appendix 6. OASIS form

Project details

Project name	LKH 368 Land South of Broom Road
Short description of the project	A scheme of archaeological evaluation was carried out across land to the south of Broom Road. Eleven trenches were excavated across c.6ha covering at least 1% of the Proposed Development Area (PDA). A preceding stage of geophysical investigation (App. 5) identified sixteen discrete anomalies across the PDA and an area of weak positive linear anomalies towards the south-eastern portion of the site. A curvi-linear was also interpreted towards the northern end of area. The evaluation trenches were predominantly located to target a number of the geophysical anomalies and determined that the majority were natural geological features. A single anomaly corresponded to two intercutting ditches in Trench 3. The earlier of which contained both later prehistoric and medieval pottery. No other archaeological features were recorded.
Project dates	Start: 05-08-2014 End: 07-08-2014
Previous/future work	No / Yes
Any associated project reference codes	LKH 368 - HER event no.
Type of project	Field evaluation
Current Land use	Cultivated Land 3 - Operations to a depth more than 0.25m
Monument type	DITCH Post Medieval
Significant Finds	POTTERY Late Prehistoric
Significant Finds	POTTERY Post Medieval
Methods & techniques	"Geophysical Survey","Targeted Trenches"
Development type	Housing estate
Prompt	Direction from Local Planning Authority - PPS
Position in the planning process	Pre-application
Solid geology	CHALK (INCLUDING RED CHALK)
Drift geology	GLACIAL SAND AND GRAVEL
Techniques	Magnetometry

Project location

Country	England
Site location	SUFFOLK FOREST HEATH LAKENHEATH Land South of Broom Road
Postcode	IP27 9AQ
Study area	6.00 Hectares
Site coordinates	TL 721 821 52.4093656916 0.530499694893 52 24 33 N 000 31 49 E Point

Height OD / Depth	Min: 14.26m Max: 16.19m

Project creators

Name of Organisation	Suffolk County Council Archaeological Service
Project brief originator	Local Authority Archaeologist and/or Planning Authority/advisory body
Project design originator	Dr Matthew Brudenell
Project director/manager	Andrew Tester
Project supervisor	A Beverton
Type of sponsor/funding body	Consultant
Name of sponsor/funding body	Plandescil Consulting

Project archives

Physical Archive Exists?	No
Digital Archive recipient	Suffolk County Council Archaeological Service
Digital Archive ID	LKH 368
Digital Contents	"Survey"
Digital Media available	"Database","Geophysics","Images raster / digital photography","Spreadsheets","Survey","Text"
Paper Archive recipient	Suffolk County Council Archaeological Service
Paper Archive ID	LKH 368
Paper Contents	"none"
Paper Media available	"Context sheet","Plan","Report","Section","Survey "

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	LKH 368 Land South of Broom Road, Lakenheath
Author(s)/Editor(s)	Beverton, A.V
Other bibliographic details	SCCAS Report No. 2014/100
Date	2014

Issuer or publisher	SCCAS
Place of issue or publication	Bury St Edmunds
Description	Ringbound report c.50 pages following SCCAS report template (2014 version).
Entered by	Andy Beverton (andy.beverton@suffolk.)
Entered on	14 August 2014

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