

**Archaeological evaluation  
by geophysical survey and trial-trenching:  
land west of Marlesford Road,  
Campsea Ashe, Suffolk**

**August 2013**



**report prepared by Ben Holloway and Howard Brooks,  
with a contribution by Dr Tim Dennis**

**on behalf of Mr Guy Hayward**

Planning reference: C/12/0880

SHER Project ref: CAA 033

NGR: TM 323 568.

CAT project ref.: 13/08c



**Colchester Archaeological Trust**

Roman Circus House,  
Circular Road North,  
Colchester,  
Essex CO2 7GZ

*tel.:* 07436273304

*email:* [archaeologists@catuk.org](mailto:archaeologists@catuk.org)

**CAT Report 721**  
September 2013

## Contents

1	Summary	1
2	Introduction	1
3	Archaeological background	2
4	Aims	3
5	General methodology	3
6	Results of geophysical survey	3
7	Results of trial-trenching evaluation	3
8	Finds, <i>by Adam Wightman</i>	5
9	Conclusions	6
10	Acknowledgements	6
11	References	6
12	Abbreviations and glossary	7
13	Archive deposition	7
14	Contents of archive	7

Figures after p 8

Appendix 1: SCCAS Brief

Appendix 2: CAT WSI

Appendix 3: Geophysical Survey Report, *by Dr Tim Dennis*

Appendix 4: OASIS record

## List of plates and figures

Cover: general site shot across Trench 1

Plate 1: Site location	2
Plate 2: the site in relation to enclosure or ring-ditch MRF 007	3
Plate 3: T7, view north-east	5
Plate 4: T9, view north-west	5
Plate 5: T4, view north-west	6
Plate 6: Typical trench section (T2)	6

Fig 1 Trench plan.

Fig 2 T4, T7, T8: representative sections

## 1 Summary

This site west of Marlesford Road, Campsea Ashe, lies 0.6km south of an unexcavated cropmark enclosure and ring-ditch (SCCAS reference MRF 007). An evaluation by geophysical survey and 5% trial trenching revealed no archaeological features or deposits. There were four unstratified prehistoric flints in the ploughsoil.

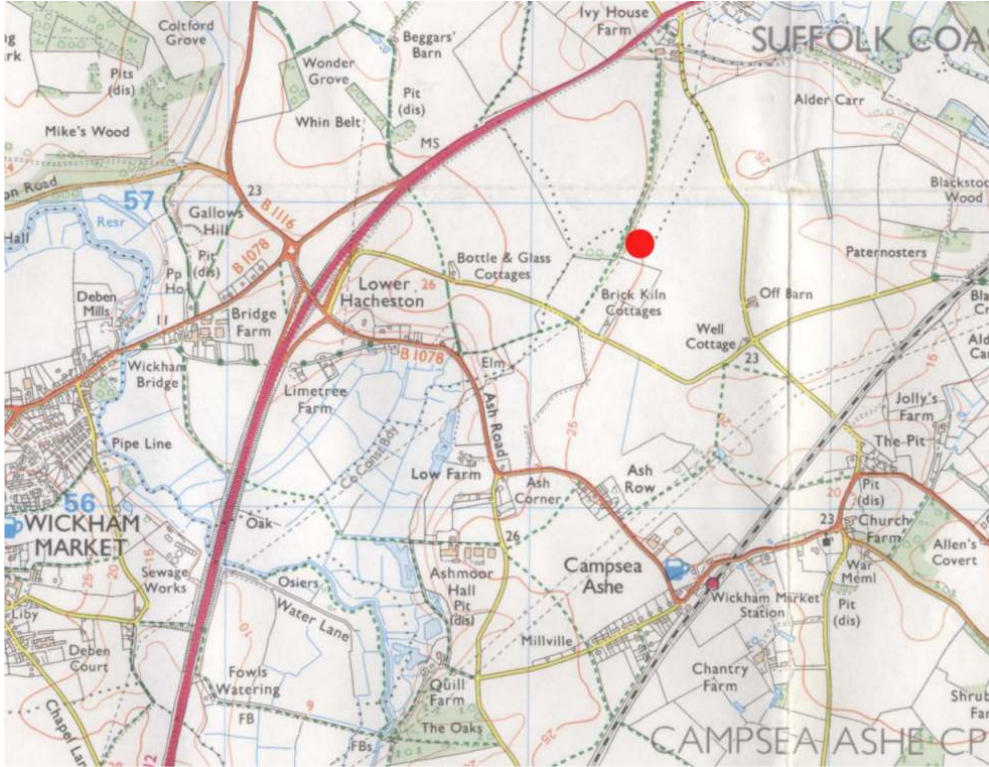


Plate 1: site location

© Crown copyright. All rights reserved. Licence number 100039294.

## 2 Introduction and planning background

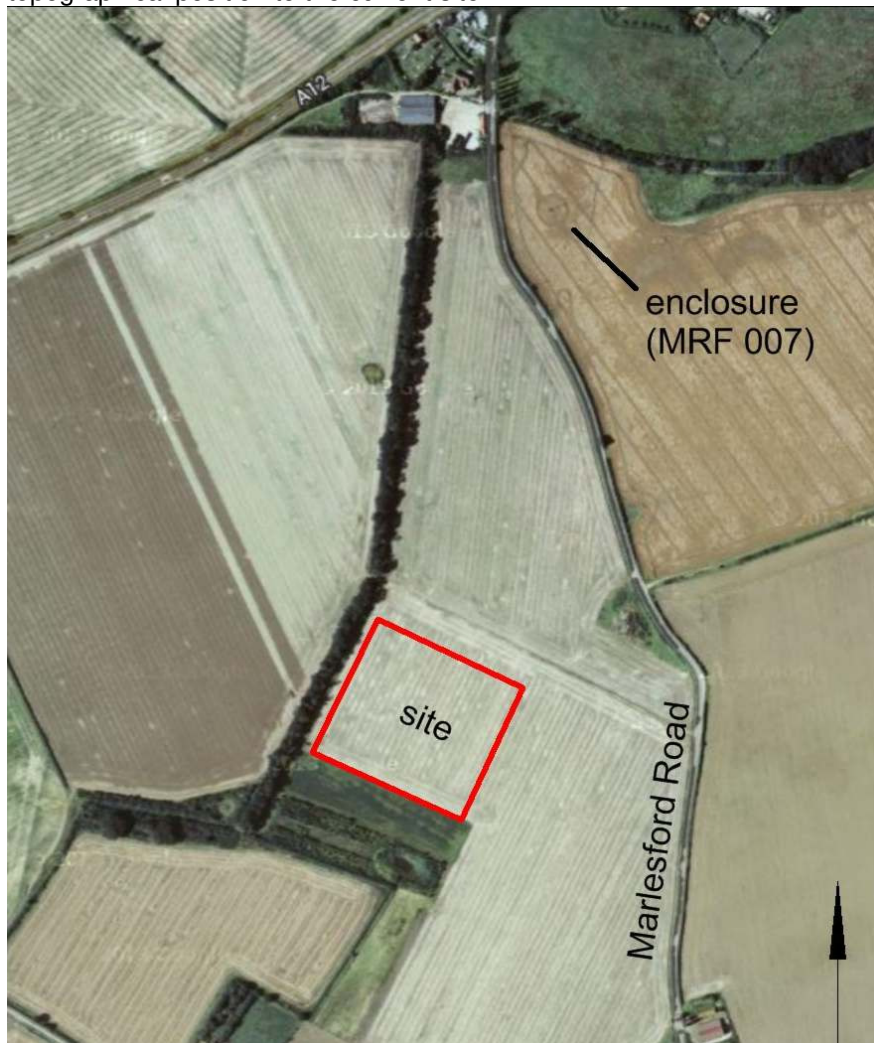
- 2.1 This is the report on the archaeological evaluation by geophysical survey and trial-trenching carried out by Colchester Archaeological Trust on land west of Marlesford Road, Campsea Ashe, Suffolk (site centre TM 323 568).
- 2.2 The evaluation was carried out by Colchester Archaeological Trust on behalf of Mr Guy Hayward.
- 2.2 Proposed work is the construction of an agricultural reservoir on arable land 300m west of the Marlesford Road, and 400m north of the Station Road, Campsea Ashe.
- 2.3 The LPA were advised by Suffolk County Council Archaeology Service (SCCAS) that this proposal lies in an area of high archaeological importance, and that, in order to establish the archaeological implications of this application, the applicant should be required to commission a scheme of archaeological investigation in accordance with paragraphs 128 and 129 of the *National Planning Policy Framework* (DCLG 2012). As a consequence, Suffolk Coastal District Council granted planning with the following condition: *The reservoir shall not be used until the site investigation and post-investigation assessment has been completed in accordance with the programme set out in the brief for Geophysical Survey and a Trenched Archaeological Evaluation dated 13 June 2012 and the provision made for analysis, publication and dissemination of results and archive deposition has been secured. Reason: To ensure the proper recording of archaeological artefacts.*
- 2.4 This scheme of archaeological investigation would consist of a geophysical survey followed by an evaluation by trial-trench.

- 2.5 The results of this evaluation would enable the archaeological resource, both in quality and extent, to be accurately quantified, informing both development methodologies and mitigation measures, and the scope of any further work (should there be any archaeological finds of significance).
- 2.6 A Brief describing the required work was originally produced by Dr Jess Tipper of SCCAS (SCCAS 2011a: Appendix 1). This was amended in discussion with Dr Matthew Brudenell, and with SCCAS Requirements for Trenched Archaeological Evaluation (SCCAS 2011).
- 2.7 In response to the Brief, CAT produced a WSI (Written Scheme of Investigation: CAT 2013: Appendix 2) setting out proposals for the geophysical survey and trial-trench evaluation, leading to post-excavation work and the production of archive and (if necessary) publication texts.

### 3 Archaeological background (plate 2).

This section is based on records held at the Suffolk County Historic Environment Record (SCHER).

The site of the proposed reservoir has high potential for the discovery of important hitherto unknown heritage assets of archaeological interest. This is due to its location to the south of a large undated enclosure or ring-ditch recorded by air photography (HER no. MRF 007), as well as various enclosures to the west (HCH 008, HCH 019 and HCH 020). The Suffolk Historic Environment Record also lists scattered find spots in a similar topographical position to the current site.



**Plate 2: the site in relation to enclosure or ring-ditch MRF 007.**

Imagery ©2013 DigitalGlobe, Getmapping plc, Infoterra & Bluesky Map data ©2013 Google

## 4 Aims of the evaluation

- to fulfill the conditions of the Brief and WSI
- to establish the absence/ presence of archaeological deposits, with particular regard to any of sufficient importance to merit preservation in situ.
- to identify the date, approximate form and purpose of any archaeological deposit, together with its likely extent, localised depth and quality of preservation.
- to evaluate the likely impact of past land uses, and the possible presence of masking colluvial/alluvial deposits.
- to establish the potential for the survival of environmental evidence.
- to provide sufficient information to construct an archaeological conservation strategy, dealing with preservation, the recording of archaeological deposits, working practices, timetables and orders of cost.

## 5 General methodology

- 5.1 This project was carried out to satisfy the conditions of the Brief and WSI, and was consistent with *Standards and guidance for archaeological field evaluation* (IfA 2008a), and the IfA Code of Conduct.
- 5.2 For other details of methodology, see attached SCCAS Brief (SCCAS 2011) and the CAT WSI (CAT 2013). These are Appendices 2 and 3.

## 6 Results of Geophysical survey

The survey, carried out by Dr Tim Dennis in compliance with SCCAS requirements for geophysical survey (SCCA 2011c), revealed no archaeological features. The full report is Appendix 3 of this report.

## 7 Results of trial-trenching evaluation (Figs 1-2, plates 3-6)

- 7.1 The evaluation was compliant with the SCCAS Brief by Dr Jess Tipper (SCCAS 2011), as amended in discussion with Dr Matthew Brudenell, and with SCCAS Requirements for Trenched Archaeological Evaluation (SCCAS 2011b).
- 7.2 The 5% evaluation requirement on this 1.23ha site was 615m<sup>2</sup>, or 342m of 1.8m-wide trench. In fact, 12 trenches each 30m long gave 360m of trench. See accompanying Fig 1 for the trench plan.
- 7.3 A mechanical excavator equipped with a toothless bucket under constant archaeological supervision was used to progressively strip the ploughsoil topsoil down to the uppermost surviving level where archaeological deposits (had they been present) would have shown. All further investigation was carried out by hand. For more detail of methodology, see attached Brief and WSI.
- 7.4 The evaluation trenches measured 1.8m wide and 30m long, and were positioned in a regular grid (as shown on Fig 1 to correspond with the area of the proposed reservoir).
- 7.5 The trenches were cut through ploughsoil L1, 450mm thick. This masked natural ground (L2). There was no indication of masking despoils, whether made ground (ie, dumped soil), alluvial or colluvial deposits.





Plate 3: T7 view NE. T4 is behind



Plate 4: T9, view NW. T8 is behind.





Plate 5: T4, view NW. T3 and T2 behind.

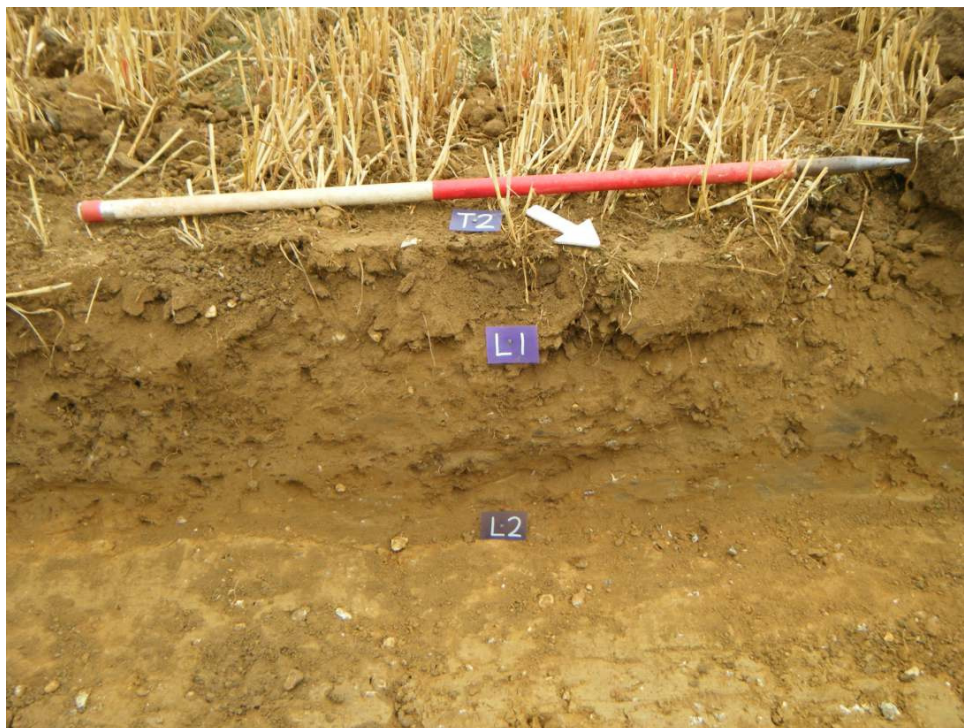


Plate 6: typical trench section. L1 - 450mm of topsoil over natural L2 (in T2).

## 8 Finds

*by Adam Wightman*

There were no finds from the evaluation trenches, but four worked flints were recovered from the plough-soil. These were a primary flake with some edge damage (probably post-depositional), a flake core with a small area of cortex remaining and two broken/snapped blade fragments, one of which had long invasive retouch along one

lateral edge. The retouched blade fragment was produced on a very light brown flint whereas the others were all a medium/dark grey flint.

The two broken/snapped blade fragments probably date to the early Neolithic period and the other two pieces are undated

## 9 Conclusions

Despite the presence of cropmark sites in the nearby parish of Hacheston and particularly the enclosure 0.6km to the north in Marlesford (MRF 007), there were no archaeological features or deposits (colluvial and alluvial) on this site.

## 10 Acknowledgements

CAT is grateful on behalf of Mr Guy Hayward for commissioning this project. Thanks to Prime Irrigation Ltd for advice and plans supplied. Site work was managed by B Holloway, and undertaken by BH, C Lister and M Baister. Geophysical survey was carried out by Dr T. Dennis and N Griggs.

The project was monitored by Dr Matt Brudenell for Suffolk County Council Archaeological Services.

## 11 References

**Note: all CAT reports, except for DBAs, are available online in .pdf format at <http://cat.essex.ac.uk>**

CAT	2013	<i>Written Scheme of Investigation for an archaeological evaluation by geophysical survey and a trial-trenching on part land west of Marlesford Road, Campsea Ashe, Suffolk.</i> By H Brooks, August 2013.
DCLG	2010	Planning Policy Statement 5: Planning for the Historic Environment (PPS 5), Dept of Communities and Local Government, March 2010
EAA 14	2003	<i>Standards for field archaeology in the East of England</i> , East Anglian Archaeology, Occasional Papers, 14, ed by D Gurney
IfA	2008a	<i>Standard and guidance for archaeological field evaluation</i>
IfA	2008b	<i>Standard and guidance for the collection, documentation, conservation and research of archaeological materials</i>
MoRPHE	2006	<i>Management of Research Projects in the Historic Environment</i> (English Heritage)
SCCAS	2011a	<i>Brief for Geophysical Survey and a Trenched Archaeological Evaluation at part land west of Marlesford Road, Campsea Ashe, Suffolk</i> , by Dr Jess Tipper
SCCAS	2011b	<i>Requirement for Trenched Archaeological Evaluation.</i> Suffolk County Council Archaeological Service
SCCAS	2011c	<i>Requirement for Geophysical Survey.</i> Suffolk County Council Archaeological Service



## 12 Abbreviations and glossary

AOD	above Ordnance Datum
CAT	Colchester Archaeological Trust
context	specific location of finds on an archaeological site
feature (F)	identifiable thing like a pit, a wall, can contain 'contexts'
IfA	Institute for Archaeologists
layer (L)	distinct or distinguishable deposit of soil
medieval	period from AD 1066 to Henry VIII
modern	period from c AD 1800 to the present
natural	geological deposit undisturbed by human activity
NGR	National Grid Reference
post-medieval	after Henry VIII to around the late 18th century
prehistoric	pre-Roman
Roman	the period from AD 43 to c AD410
SCCAS	Suffolk County Council Archaeological Service
SCHER	Suffolk County Historic Environment Record
section	(abbreviation sx or Sx) vertical slice through feature/s or layer/s
U/S	unstratified, ie without a well-defined context
WSI	Written Scheme of Investigation

## 13 Archive deposition

The paper archive and finds are currently held by CAT at Roman Circus House, Circular Road North, Colchester, Essex, but will be permanently deposited with SCCAS under project code CAA 033.

## 14 Contents of archive

### Finds

No finds

### Paper and digital record

One A4 document wallet containing:  
The report (CAT Report 721)  
SCCAS Evaluation Brief and Specification  
CAT Written Scheme of Investigation  
Original site record (context sheets, finds record)  
Digital photographic log  
Digital photographs on CD  
Risk assessment  
Attendance register

© Colchester Archaeological Trust 2013

### Distribution list:

Guy Hayward  
Dr Matt Brudenell, SCCAS  
Suffolk County Historic Environment Record



**Colchester Archaeological Trust**

Roman Circus House,  
Circular Road North,  
Colchester,  
Essex CO2 7GZ

tel.: 07436273304

email: [archaeologists@catuk.org](mailto:archaeologists@catuk.org)

checked by: *Howard Brooks*

date: 30.09.13

*HB/2013/Campsea Ashe/report 721.doc*

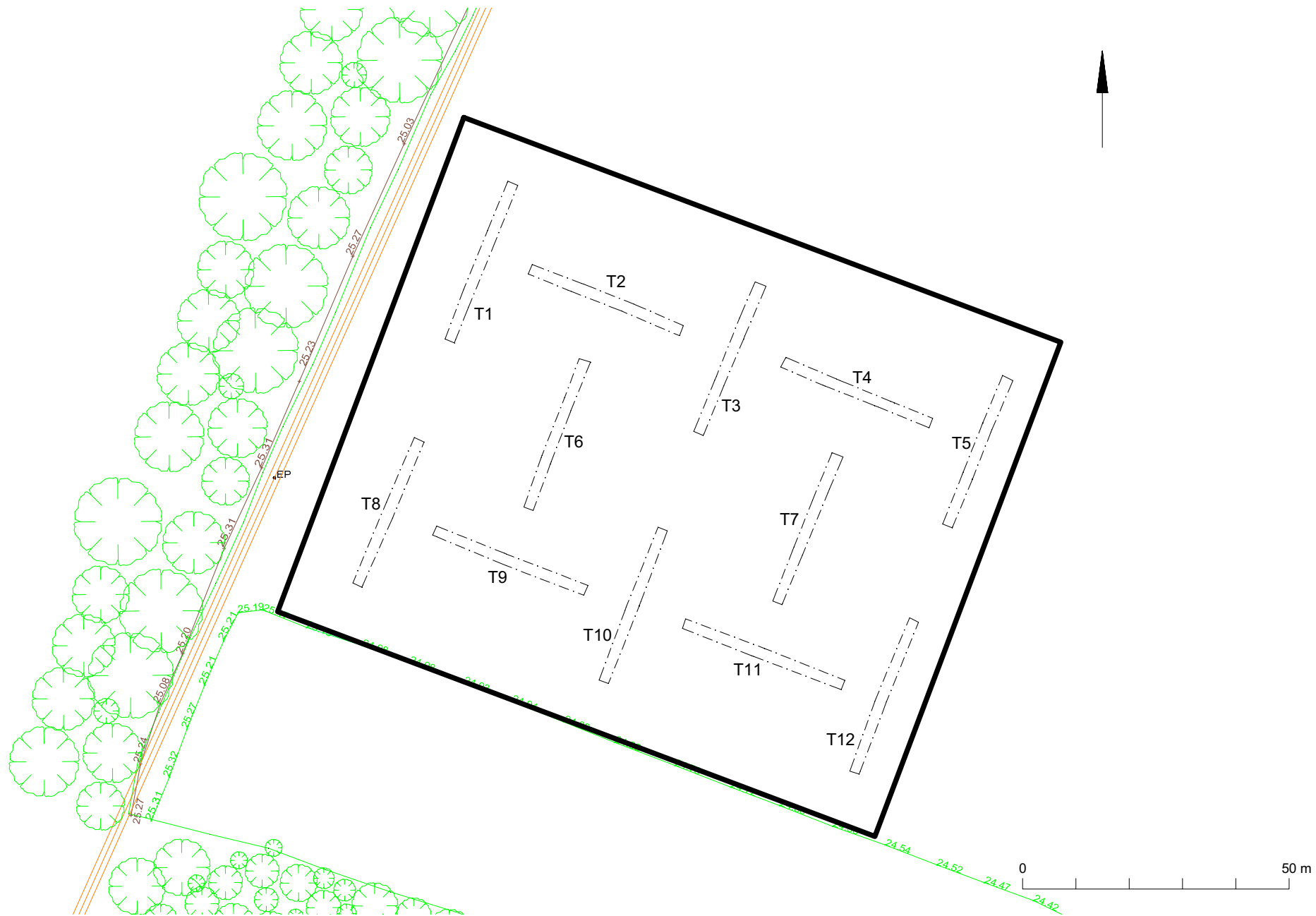


Fig 1 Evaluation results.



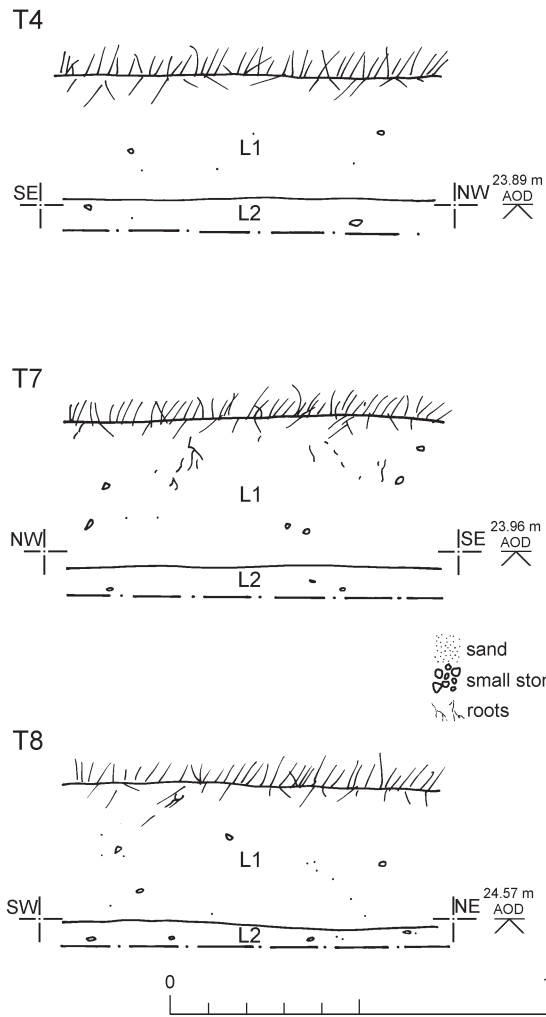


Fig 2: Trenches 4, 7, 8: representative sections

Appendix 1 (following pages)

## **SCCAS Brief**

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

## Brief for a Geophysical Survey and a Trenched Archaeological Evaluation

AT

Part land west of Marlesford Road, Campsey Ashe

**PLANNING AUTHORITY:** Suffolk Coastal District Council

**PLANNING APPLICATION NUMBER:** C/12/0880

**HER NO. FOR THIS PROJECT:** To be arranged

**GRID REFERENCE:** TM 323 568

**DEVELOPMENT PROPOSAL:** Irrigation reservoir

**AREA:** c.1.23 ha.

**CURRENT LAND USE:** Greenfield

**THIS BRIEF ISSUED BY:** Jess Tipper  
Archaeological Officer  
Conservation Team  
Tel. : 01284 741225  
E-mail: [jess.tipper@suffolk.gov.uk](mailto:jess.tipper@suffolk.gov.uk)

**Date:** 13 June 2012

### Summary

- 1.1 The Local Planning Authority (LPA) has been advised that the location of the proposed development could affect important below-ground heritage assets of archaeological importance.
- 1.2 The applicant is required to undertake an archaeological field evaluation prior to consideration of the proposal (for the cut area), in accordance with a Written Scheme of Investigation. This information should be incorporated in the design and access statement, in accordance with paragraphs 128 and 129 of the National Planning Policy Framework, 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 It has been agreed that the areas around and to the north of the main hospital block will all require archaeological evaluation, but this can be undertaken by a condition attached to the planning permission (should it be granted).



- 1.4 The archaeological contractor must submit a copy of their Written Scheme of Investigation (WSI) or Method Statement, based upon this brief of minimum requirements (and in conjunction with our standard Requirements for a Trenched Archaeological Evaluation 2011 Ver 1.3 and Requirements for a Geophysical Survey 2011 Ver 1.1), to the Conservation Team of Suffolk County Council's Archaeological Service (SCCAS/CT) for scrutiny; SCCAS/CT is the advisory body to the LPA on archaeological issues.
- 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 Following acceptance, SCCAS/CT will advise the LPA that an appropriate scheme of work is in place.
- 1.7 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 The site of the proposed reservoir has high potential for the discovery of important hitherto unknown heritage assets of archaeological interest in view of its location to the south of a large undated enclosure or ring ditch recorded by air photography (HER no. MRF 007), various enclosures to the west (HCH 008, HCH 019 and HCH 020), as well as scattered find spots, in a similar topographical position recorded in the Suffolk Historic Environment Record. The proposed reservoir will cause total destruction to any underlying archaeological deposits. However, the site has not been the subject of previous systematic investigation.

### **Fieldwork Requirements for Archaeological Investigation**

- 3.1 A geophysical survey and linear trenched evaluation is required of the development area to enable the archaeological resource, both in quality and extent, to be accurately quantified.
- 3.2 A systematic geophysical survey is to be undertaken across the site, which is 1.23ha. in area.
- 3.2 Trial Trenching is required to:
  - 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.
  - Provide sufficient information to construct an archaeological conservation strategy, dealing with preservation, the recording of archaeological deposits, working practices, timetables and orders of cost.

- 3.3 Trial trenches are to be excavated to cover 5% by area of the site, which is c.615.00m<sup>2</sup>. These shall be positioned to sample all parts of the site, although the trench layout should be reviewed once the results of the geophysical survey are reported; the layout may need to be adjusted to test geophysical anomalies. Linear trenches are thought to be the most appropriate sampling method, in a systematic grid array. Trenches are to be a minimum of 1.80m wide unless special circumstances can be demonstrated; this will result in c.342.00m of trenching at 1.80m in width.
- 3.4 A scale plan showing the proposed location of the trial trenches should be included in the WSI and the detailed trench design must be approved by SCCAS/CT before fieldwork begins.

### **Arrangements for Archaeological Investigation**

- 4.1 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.
- 4.2 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.
- 4.3 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.

### **Reporting and Archival Requirements**

- 5.1 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.
- 5.2 An archive of all records and finds is to be prepared and must be adequate to perform the function of a final archive for deposition in the Archaeological Service's Store or in a suitable museum in Suffolk.
- 5.3 It is expected that the landowner will deposit the full site archive, and transfer title to, the Archaeological Service or the designated Suffolk museum, and this should be agreed before the fieldwork commences. The intended depository should be stated in the WSI, for approval.
- 5.4 The project manager should consult the intended archive depository before the archive is prepared regarding the specific requirements for the archive deposition and curation (including the digital archive), and regarding any specific cost implications of deposition.
- 5.5 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.

- 5.6 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.
- 5.7 Following approval of the report by SCCAS/CT, a single copy of the report should be presented to the Suffolk HER as well as a digital copy of the approved report.
- 5.8 All parts of the OASIS online form <http://ads.ahds.ac.uk/project/oasis/> must be completed and a copy must be included in the final report and also with the site archive. A digital copy of the report should be uploaded to the OASIS website.
- 5.9 Where positive results are drawn from a project, a summary report must be prepared for the *Proceedings of the Suffolk Institute of Archaeology and History*.
- 5.10 This brief remains valid for 12 months. 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.

### **Standards and Guidance**

Detailed requirements are to be found in our Requirements for a Trenched Archaeological Evaluation 2011 ver 1.3, Requirements for a Geophysical Survey 2011 ver 1.1 and in SCCAS Archive Guidelines 2010

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.

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.

### **Notes**

The Institute for Archaeologists maintains a list of registered archaeological contractors ([www.archaeologists.net](http://www.archaeologists.net) or 0118 378 6446). 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.



Appendix 2 (following pages)

## **CAT Written Scheme of Investigation**

# Written Scheme of Investigation

for an archaeological evaluation by geophysical survey  
and trial-trenching on:

**Part land west of Marlesford, Campsea Ashe, Suffolk**

August 2013

NGR TM 323 568 (c)  
Planning Application ref. C/12/0880

Commissioned by Edward Gittins Associates  
on behalf of Bridge & Ivy Farm Ltd



COLCHESTER ARCHAEOLOGICAL TRUST,  
Roman Circus House,  
Circular Road North,  
COLCHESTER,  
ESSEX C02 7GZ  
tel: 07415 952 891  
email: [archaeologists@catuk.org](mailto:archaeologists@catuk.org)

## **1 Introduction**

- 1.1 This is a Written Scheme of Investigation (WSI) for an archaeological evaluation by geophysical survey and trial-trenching on part land west of Marlesford, Campsey Ashe, Suffolk, to be carried out on behalf of clients by Colchester Archaeological Trust.
- 1.2 The proposed development site is located on arable land 300m west of the Marlesford Road, and 400m north of the Station Road. Proposed work is the construction of an agricultural reservoir (site centre TM 323 568 (c)).
- 1.3 The LPA were advised by Suffolk County Council Archaeology Service that this proposal lies in an area of high archaeological importance, and that, in order to establish the archaeological implications of this application, the applicant should be required to commission a scheme of archaeological investigation in accordance with paragraphs 128 and 129 of the *National Planning Policy Framework* (DCLG 2012).
- 1.4 This scheme of archaeological investigation will consist of the following elements:
- A geophysical survey of the site
  - An evaluation by trial-trench on the site (the cut area).
- 1.5 The results of this evaluation will enable the archaeological resource, both in quality and extent, to be accurately quantified, informing both development methodologies and mitigation measures. Decisions on the need for, and scope of, any further work should there be any archaeological finds of significance, will be based upon the results of the evaluation and will be the subject of an additional specification.
- 1.6 This WSI sets out proposals for the linear trench evaluation, leading to post-excavation work and the production of archive and (if necessary) publication texts.
- 1.7 Any variations in this WSI will be agreed beforehand with the Suffolk County Council Archaeology Service (SCCAS).
- 1.8 The developer will give CAT at least five working days notice of the commencement of ground works on the site, in order that the work of the archaeological contractor may be monitored and that the SCCAS/CT monitor can be notified.

## **2 Archaeological background**

The site of the proposed reservoir has high potential for the discovery of important hitherto unknown heritage assets of archaeological interest in view of its location to the south of a large undated enclosure or ring ditch recorded by air photography (HER no. MRF 007), various enclosures to the west (HCH 008, HCH 019 and HCH 020), as well as scattered find spots, in a similar topographical position recorded in the Suffolk Historic Environment Record. The proposed reservoir will cause total destruction to any underlying archaeological deposits. However, the site has not been the subject of previous systematic investigation.

## **3 Aims of the evaluation**

- Establish whether any archaeological deposit exists in the area, with particular regard to any which are of sufficient importance to merit preservation *in situ*.
- Identify the date, approximate form and purpose of any archaeological deposit within the application area, 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.
- Provide sufficient information to construct an archaeological conservation strategy, dealing with preservation, the recording of archaeological deposits, working practices, timetables and orders of cost.

## **4 General methodology**

- 4.1 This project will be carried through in a manner broadly consistent with English Heritage's *Management of Archaeological Projects*, 1991 (MAP2). In addition, the

relevant document of the Institute for Archaeologists will be followed, i.e. *Standards and guidance for archaeological field evaluation* (IfA 2008a), and the IfA Code of Conduct. Other guidelines followed are EAA 14.

- 4.2 All work will be undertaken by professional archaeologists employed by CAT. The field officer(s) will have a level of experience appropriate to the work.
- 4.3 Prior to site work, CAT will seek information about existing service locations and contaminated ground.
- 4.4 All the latest Health and Safety guidelines will be followed on site. CAT has a standard health and safety policy, which will be adhered to (CAT 1999 updated 2012).
- 4.5 For purposes of deposition of the archive, a project code will be obtained from County HER Officer. This number will be clearly marked on any documentation relating to the work and in any reports arising from the work.
- 4.6 Prior to the start of fieldwork an online OASIS record sheet will be completed.
- 4.7 CAT will give SCCAS five days notice of the commencement of the various phases of this evaluation, in order that the work of the archaeological contractor may be monitored.

## **5 Geophysical survey methodology**

- 5.1 Survey will be carried out by Dr Tim Dennis.
- 5.2 Survey equipment will be a Geoscan FM256 magnetometer.
- 5.3 Survey will be done in sufficient 30x30 m blocks to cover the site (14 blocks?).
- 5.4 Instruments will be operated at 0.1 nT sensitivity.
- 5.5 In each 30m block, there will be 30 tracks spaced at 1 m intervals, and there will be 8 samples per metre along each track.
- 5.6 The report will include images of unprocessed and processed data, and interpretative plans with full keys.
- 5.7 The results will be presented to Suffolk HER in a digital format of their choosing.
- 5.8 Survey grid will be tied to Ordnance Survey National Grid, and to the grid used for the later evaluation.

## **6 Trial-trenching evaluation methodology**

- 6.1 The evaluation will be compliant with SCCAS documentation: this includes the original site Brief by Dr Jess Tipper (SCCAS 2012), as amended in discussion with Dr Matthew Brudenell, and with SCCAS requirements for Geophysical Survey (SCCAS 2011a) and Trenched evaluation (SCCAS 2011b).
- 6.2 The requirement is for a 5% evaluation. On a site of 1.23 ha, this is 615m<sup>2</sup>, or 342m of 1.8m-wide trench (see accompanying figure for location of trenches). This coverage will be achieved by cutting twelve 30m-long trenches.
- 6.3 A mechanical excavator under constant archaeological supervision equipped with a toothless bucket will be used to progressively strip the topsoil down to the uppermost surviving level of archaeological significance. Horizontal archaeological deposits will not be removed or sampled by machine – they will be excavated by hand.
- 6.4 All further investigation will be carried out by hand to an extent necessary to achieve the aims set out in this WSI.
- 6.5 Fast excavation techniques involving (for instance) picks, forks and mattocks will not be used on complex stratigraphy.
- 6.6 If no archaeologically significant deposits are exposed, machine excavation will continue until natural subsoil is reached.
- 6.7 There will be sufficient excavation to give clear evidence for the period, depth and nature of any archaeological deposit. The depth and nature of colluvial or other masking deposits will be established across the site.
- 6.8 Sampling of features in trenches will be as follows: ditches – full excavation of all terminals and junctions, and 10% of length of ditch exposed in trench, or a 1m length of ditch (whichever is greater): discrete pits - 50% (half section) or full excavation if specifically requested by SCCAS; post holes and structural slots – 100%.
- 6.9 Complex archaeological structures such as walls, kilns, or ovens will be sufficiently defined for recording, but will not be removed.

- 6.10 An experienced metal detector user will check the topsoil from each trench, and will recover metal finds.
- 6.11 Individual records of excavated contexts, layers, features or deposits will be entered on CAT pro-forma record sheets. Registers will be compiled of finds and samples.
- 6.12 The normal recording scale will be feature plans at 1:20 or 1:50 and sections at 1:10 or 1:20, depending on complexity.
- 6.13 The photographic record will consist of general site shots, and shots of all archaeological features and deposits taken on a high-resolution digital camera (6 megapixels).
- 6.14 The trench location and prominent landscape features (e.g., boundaries) will be surveyed using an EDM/Total Station and will be tied into the OS National Grid. All archaeological features and deposits will be levelled in as part of the site survey.
- 6.15 **Environmental sampling strategies**
- 6.15.1 The number and range of samples collected will be adequate to determine the potential of the site, with particular focus on palaeoenvironmental remains including both biological remains (e.g. plants, small vertebrates) and small sized artefacts (e.g. smithing debris), and to provide information for sampling strategies on any future excavation. Samples should also be collected for potential micromorphological and other pedological sedimentological analysis.
- 6.15.2 Sampling strategies will address questions of:
- the range of preservation types (charred, mineral-replaced, waterlogged), and their quality
  - concentrations of macro-remains
  - and differences in remains from undated and dated features
  - variation between different feature types and areas of site
- 6.15.3 CAT has an arrangement with Val Fryer (ex at the University of East Anglia, now based at Loddon) whereby any potentially rich environmental layers or features will be appropriately sampled as a matter of course. Val Fryer will do any processing and reporting. If any complex or outstanding deposits are encountered VF will be asked onto site to advise. Helen Chappell of EH is available for further advice.
- 6.15.4 Should any complex, or otherwise outstanding deposits be encountered, VF will be asked onto site to advise. Waterlogged 'organic' features will always be sampled. In all cases, the advice of VF and/or RSA on sampling strategies for complex or waterlogged deposits will be followed, including the taking monolith samples.
- 6.16 The trenches will not to be backfilled without prior agreement with SCCAS.

## 7 Finds

- 7.1 Human remains must be left *in situ* except in those cases where damage or desecration are anticipated, or where analysis of the remains is considered to be a necessary requirement for satisfactory evaluation of the site. In these instances, if it is clear, from their position, context, depth, or other factors that the remains are ancient, then normal procedure is to apply to the Home Office (Department of Justice) for a licence to remove them. In that case, conditions laid down by the license will be followed. If it seems that the remains are not ancient, then the coroner, the client, and SCCAS will be informed, and any advice and/or instruction from the coroner will be followed. **Note: As the relevant legislation is currently in a state of flux, advice will be sought from SCCAS and DCA on best practice.**
- 7.2 All finds of archaeological relevance will be retained. Policies for later disposal of any finds will be agreed with SCCAS officer and the site owner.
- 7.3 All sensitive finds will be properly conserved.
- 7.4 All finds, where appropriate, will be washed.
- 7.5 A policy of marking for pottery and other finds will be agreed with SCCAS. Marking will include the site code and context number.
- 7.6 All finds of potential treasure will be removed to a safe place, and the coroner informed immediately, in accordance with the rules of the Treasure Act 1996. The

definition of treasure is given in pages 3-5 of the Code of Practice of the above act. This refers primarily to gold or silver objects.

- 7.7 Finds work will be to accepted professional standards as presented in *Standard and guidance for the collection, documentation, conservation and research of archaeological materials* (IfA 2008b).
- 7.8 A list of specialists available for consultation is given at the end of this WSI.

## **8 Results**

- 8.1 Notification will be given to SCCAS officer when each stage of the fieldwork has been completed.
- 8.2 A suitable evaluation report will be prepared. This will initially be the geophysical survey report in sufficient form (draft?) as will be acceptable to SCCAS for the purposes of agreeing the evaluation trenching plans, and if a draft report is acceptable at that point, then a full geophysical report will be prepared as part of the full evaluation trenching report.
- 8.3 The report(s) will reflect the aims of the WSI.
- 8.4 The report(s) will include:
- A concise non-technical summary of the project results.
  - The methodology, aims & methods adopted in the course of each stage of the evaluation.
  - Plots of the geophysical survey as above in Section 5.
  - Location plan of the trial-trenches, with 10-figure grid references at two points.
  - Section drawings showing the depth of deposits including present ground level.
  - Evaluation results with a suitable conclusion and discussion, relating the results to the relevant known archaeological information held in the County Historic Environment Record (HER).
  - Combined interpretive plans of geophysical survey and trenching evaluation.
  - A statement of the archaeological potential of the site, and the significance of that potential in the context of the Regional Research Framework (*East Anglian Archaeology*, Occasional Papers 3 & 8, 1997 and 2000).
  - All specialist reports and assessments.
- 8.5 A copy of the WSI will be included as an appendix to the report.
- 8.6 An unbound copy of the evaluation report, clearly marked DRAFT, will be presented to SCCAS/CT for approval within six months of the completion of fieldwork unless otherwise negotiated with SCCAS/CT. Following acceptance, two copies of the report should be submitted to SCCAS/CT together with a digital .pdf version.
- 8.7 Where positive conclusions are drawn from a project, a summary report, in the established format, suitable for inclusion in the annual 'Archaeology in Suffolk' section of the *Proceedings of the Suffolk Institute for Archaeology*, will be prepared and submitted to SCCAS/CT, by the end of the calendar year in which the evaluation work takes place, whichever is the sooner.
- 8.8 Every effort will be made to get the agreement of the landowner/developer to the deposition of the finds and full site archive with the County HER. If this is not achievable for all or parts of the finds archive then provision must be made for additional recording (e.g. photography, illustration, analysis) as appropriate.

## **9 Archive deposition**

- 9.1 An appropriate archive will be prepared to minimum acceptable standards outlined in *Management of archaeological projects 2* (English Heritage 1991) and SCC Archive Guidelines (2008). The County HER Officer will be consulted regarding the requirements for the deposition of the archive (conservation, ordering, organisation, labelling, marking and storage) of excavated material and the archive.
- 9.2 The site archive will be deposited with the County HER within six months of the completion of fieldwork. It will then become publicly accessible.
- 9.3 HER sheets will be completed, as per the County HER manual (if finds and/or features are located).



- 9.4 A Drawing Interchange File (.dxf) will be supplied to SCCAS for integration in the County HER. AutoCAD files will also be exported and saved into a format that can be imported into MapInfo.

## 10 Monitoring

- 10.1 SCCAS will be responsible for monitoring progress and standards throughout the project, and will be kept regularly informed during fieldwork, post-excavation and publication stages.
- 10.2 Notification of the start of work will be given to SCCAS officer in advance of its commencement.
- 10.3 Any variations of the WSI shall be agreed with SCCAS officer in writing prior to them being carried out.
- 10.4 SCCAS will be notified when the fieldwork is complete.
- 10.5 The involvement of SCCAS shall be acknowledged in any report or publication generated by this project.

## 11 References

Brown N, and Glazebrook J	2000	<i>Research and Archaeology: a frame work for the Eastern Counties 2 Research agenda and strategy</i> , East Anglian Archaeological, occasional papers 8 ( <b>EAA 8</b> )
CAT	2012	<i>Health and Safety Policy</i>
DCLG	2012	<i>National Planning Policy Framework</i>
English Heritage	1991	<i>Management of archaeological projects, 2nd edition</i> (MAP 2)
Glazebrook J	1997	<i>Research and Archaeology: a frame work for the Eastern Counties 1 resource assessment</i> , East Anglian Archaeological, occasional papers 3 ( <b>EAA 3</b> )
Gurney D	2003	<i>Standards for field archaeology in the East of England</i> East Anglian Archaeological, occasional papers 14 ( <b>EAA 14</b> )
IfA	2008a	<i>Standard and Guidance for archaeological field evaluation.</i>
IfA	2008b.	<i>Standard and Guidance for the collection, documentation, conservation and research of archaeological materials.</i>
SCCAS	2008	Archive Guidelines (2008).
SCCAS	2011a	Requirements for geophysical survey
SCCAS	2011a	Requirements for trenched archaeological evaluation
SCCAS	2012	Brief for geophysical survey and trenched archaeological evaluation: at part land west of Marlesford Road, Campsea Ashe, Suffolk

Howard Brooks 16/08/2013  
[hb@catuk.org](mailto:hb@catuk.org)

COLCHESTER ARCHAEOLOGICAL TRUST,  
 Roman Circus House,  
 Circular Road North,  
 COLCHESTER,  
 ESSEX C02 7GZ  
 tel: 07415 952 891  
 email: [archaeologists@catuk.org](mailto:archaeologists@catuk.org)

## **Appendix - team structure and details**

### **List of team members**

#### **Site supervision and Recording**

Adam Wightman/Ben Holloway/Chris Lister

#### **Assistants**

TBC

#### **Finds consultants**

Stephen Benfield (CAT/SCCAS): prehistoric, Roman, medieval pottery

Francesca Boghi (NAU): Human bone

Ernest Black (Colchester): Roman brick/tile

Howard Brooks (CAT): medieval and post-medieval pottery

Nina Crummy (Colchester): Small finds

Julie Curl (NAU): Animal bone

Val Fryer (Loddon): Environmental

Hazel Martingell (Bocking): Lithics

Adam Wightman (CAT): animal bone and flints

#### **Graphics**

E Spurgeon

#### **Report writing**

Adam Wightman/BH/CL/Howard Brooks

### **Senior Site and Post-Excavation Staff**

#### **Adam Wightman BSc, MA**

After graduating from the University of Sheffield in 2004 with a BSc Hons in Archaeology and Prehistory, Adam worked for CAT during the Roman Circus excavations at Colchester Garrison in 2004/5. He then went on to work for Cambridge Archaeological Unit before completing a Masters in the Archaeology of Human Origins at the University of Southampton where he focused on lithic and animal bone analysis. Since returning to CAT in 2006 Adam has carried out evaluations and excavations at the Great Dunmow Salesrooms, 143-147 High Street Maldon, Firstsite Newsite in Colchester town centre, and at 21 St Peters Street adjacent to Colchester's Roman wall. He now completes assessments and full reports on small assemblages of animal bone and lithics for CAT.

#### **Ben Holloway BSc AIFA**

Ben joined CAT staff in June 2000, a graduate in Archaeology from Bournemouth University. Ben has conducted fieldwork in Scotland and the Isle of Man. Since joining the Trust Ben has carried out extensive work in Colchester at various supervisory and project positions including evaluations and excavations at Colchester Garrison PFI (including the circus), St Marys Hospital and Colchester 6th Form College. His work in Essex includes the Sandon Park and Ride Site, Skyline 120 Business Park at Great Notley, Dry Street, Basildon and the Stanhope industrial park Stanford-le-hope.

#### **Chris Lister BA**

Chris joined CAT in June 2000 working on the Head Street excavation. He studied Ancient History and Civilization at the University of Wales, College of Swansea, graduating in 1997. He is now the unit surveyor responsible for the site recording of the majority of works undertaken by CAT. In addition to his survey work Chris has supervised excavations at Colchester Zoo and Colchester Garrison, and carried out evaluations and watching briefs throughout the county, including surveys of Twentieth century military structures.

### **Emma Spurgeon BA, PIFA**

Emma first joined CAT in 2000 to work on the Head Street excavations, and returned in 2002 after graduating from Reading University with a BA Hons in Ancient History and Archaeology. Emma has worked on many large sites and reports including St Marys Hospital, Handford House, Stanway and many Garrison excavations, including supervising the drawn record of the cemetery and Roman circus discovered in 2004-5, as well as evaluations and watching briefs. Emma became a permanent member of staff since 2003 when she became the trust draughtsperson with particular interest in finds illustration and has since become the small finds assistant. She has licentiate level membership of the Association of Archaeological Illustrators and Surveyors.

### **Howard Brooks BA, FSA, MIFA, (CAT) Medieval and Post-Medieval pottery**

Howard's involvement in Essex archaeology goes back to 1970 when he dug at Sheepen, Colchester with Rosalind Dunnott (now Niblett). He studied archaeology at the University of Wales, and graduated in 1975. He worked for Colchester Archaeological Trust between 1976 and 1981, and again in 1985, where he was involved at various levels of responsibility (up to Co-Director) in the excavation of deeply stratified urban remains in Roman Colchester and suburbs (*Colchester Archaeological Report 3* [1994]). Between 1992 and 1995 he worked for Essex County Archaeology Section, first in directing the fieldwalking and excavation project at Stansted Airport (*East Anglian Archaeology* 107, 2004), and then in Development Control. Howard then left ECC to set up and run HBAS, the county's smallest contracting team, in which capacity he carried out over twenty field projects and wrote a dozen consultancy reports. He rejoined CAT in 1997. He regularly contributes to *Essex Archaeology & History*, and teaches University evening classes on archaeology.

### **Finds Specialists**

#### **Stephen Benfield BA, Cert Archaeol (Oxon) (CAT) Roman pottery**

Steve works for both SCCAS and CAT. His first involvement with Colchester archaeology was in 1985, working on a Manpower Services Commission sponsored project to assist in processing the enormous collection of Roman pottery from excavations in the town. He graduated from Reading University with a degree in archaeology and subsequently studied for his post-graduate Certificate in Archaeology at Oxford. Returning to CAT, he has since worked on many CAT projects at various supervisory and directorial positions, including the major projects at Stanway Iron Age burial site and Gosbecks Roman temple/theatre complex. Stephen has also, through much hands-on experience, built up a considerable working knowledge of LIA and Roman ceramics. He now completes ceramic assessments and full reports for CAT, drawing on the unrivalled catalogues provided by the standard Colchester works *Camulodunum* (Hawkes & Hull 1947), *Roman Colchester* (Hull 1958) and now *CAR 10*, and by examining the fabric series held at CAT headquarters.

#### **Francesca Boghi MSc (Norfolk Archaeological Unit) Human bone**

Francesca has been the Norfolk Archaeological Unit's human bone specialist since 1998. Her previous experience includes work for the Calvin Wells laboratory at the University of Bradford, where she undertook the analysis of 79 skeletons from the medieval cemetery of Pennell Street, Lincoln, Lincolnshire and of a group of Romano-British cremations from Kempston, Bedfordshire. Since joining Norfolk Archaeological Unit she has analysed the medieval assemblage from the parish church of Brettenham, Norfolk (89 skeletons), the human remains from Norwich Whitefriars (thirty-three skeletons from the Carmelite Friary and thirty-seven from the Baptist Chapel of Friary Yard), the skeletal remains from a medieval well in Norwich and numerous other smaller assemblages of inhumations and cremated human remains from the county. In addition she contributes to local education programmes by providing short sessions on skeletal analysis and interpretation. Her professional qualification is an MSc from the University of Sheffield and Bradford in Osteology, Paleopathology and Funerary Archaeology. She is a member of the British Association of Biological Anthropologists and Osteoarchaeologists (BABA0).

#### **Ernest Black (Colchester) Roman brick/tile**

Ernest is a Colchester schoolteacher with a wide interest in archaeology and the classical world. In this sense, he is following in the footsteps of A.F. Hall, and Mike Corbishley who were also local schoolmasters. He has developed his specialism by large scale hands-on experience with Roman brick and tile, and has contributed to the *Arch J*, *CAR 6: Excavations at Culver Street, the Gilbert School, and other sites in Colchester 1971-1985*.

#### **Dr Hilary Cool FSA MIFA (Nottingham) Roman glass**

Another graduate of the University of Wales, Hilary is now a freelance glass and finds specialist, and has written many reports on glass from Colchester sites, including contributions to *Colchester Archaeological Report 6: Excavations at Culver Street, the Gilbert School, and other sites in Colchester 1971-85*, and *Colchester Archaeological Report 9: Excavations on Roman and later cemeteries, churches and monastic sites in Colchester 1971-88* (1993). Among her major works is the internationally

selling *Colchester Archaeological Report 8: Roman vessel glass from excavations in Colchester 1971-85*.

**Nina Crummy FSA (Colchester) Small finds**

Nina first worked in the early 1970s as finds assistant on the major urban excavations in Colchester for the Colchester Excavation Committee (later the Trust). Over the next twenty years she built up an unrivalled working knowledge of small finds of all types. She has collaborated in most of the *Colchester Archaeological Reports*, and was principal author of the best-selling *Colchester Archaeological Reports 2* (Roman small finds), 4 (*The coins from excavations in Colchester 1971-9*) and 5 (*The post-Roman small finds from excavations in Colchester 1971-85*). She recently worked for the Museum of London, and was instrumental in the recent transfer of and the massive improvement in accessibility to archaeological archives in London. She now works freelance on small finds reports for CAT, HBAS, and other bodies including Winchester Excavation Committee.

**Julie Curl (Sylvanus: Archaeological, Natural History and Illustration Services) Human and Animal Bone**

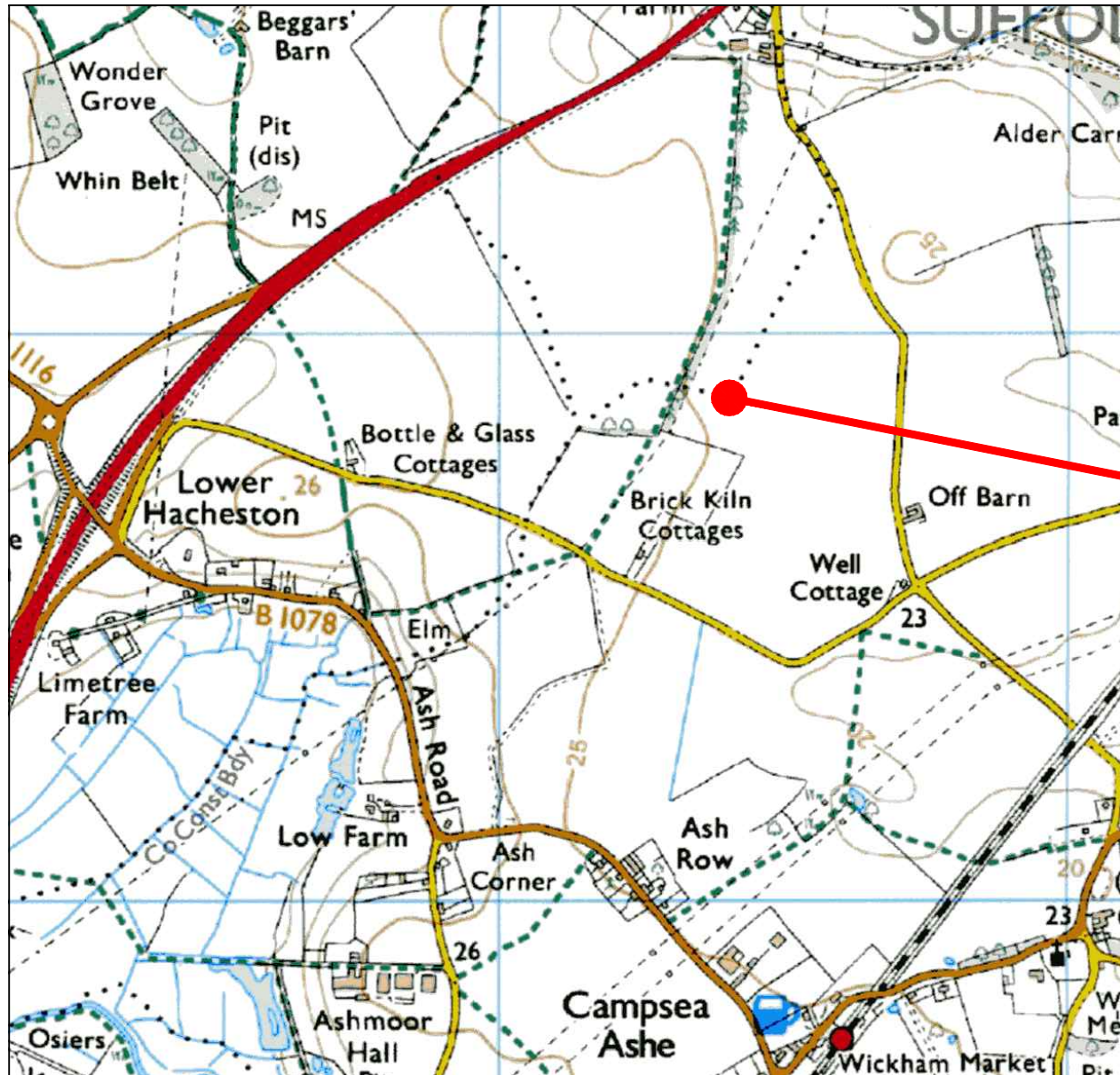
Julie has over 16 years of experience in archaeology and in particular finds for the Norfolk Archaeological Unit and Norfolk Museums Service. Currently working as a freelance specialist in both human and animal bone and Illustration. She has been producing faunal and Human remains reports for many years and produces assessment and analysis reports for clients across the East Anglian region. She has her own extensive bone reference collection built up over many years. Her particular interests in faunal remains are animal husbandry and pathologies. She has also worked as a conservator, particularly on Pleistocene vertebrates and a wide variety of archaeology and natural history projects at the Norwich Castle Museum. Julie is also an extra-mural lecturer with the University of East Anglia, teaching Animal bones in Archaeology.

**Val Fryer (Norfolk) Environmental Archaeologist BA, MIFA**

Val has fifteen years experience in environmental archaeology, working for English Heritage, County Units and independent archaeological bodies across the United Kingdom and Southern Ireland. She has published reports in *East Anglian Archaeology* (including occasional papers), *Proceedings of the Prehistoric Society*, *Medieval Archaeology* and *Norfolk Archaeology*. Specialist work for various police authorities across England and Northern Ireland. Val is a Member of the Institute of Field Archaeologists with special accreditation for environmental archaeology and she is also a Member of the Association of Environmental Archaeologists.

**Hazel Martingell BA, FAAIS (Braintree): Lithics**

Hazel has for many years worked as a lithics specialist and illustrator, undertaking work for The British Museum, ECC Field Archaeology Unit and for London and Cambridge Universities, to name but a few. Since 1987 she has been self-employed and has excavated at a Middle Stone Age site at Gorham's Cave, Gibraltar as well as writing and illustrating worked flint reports for CAT, ECC FAU, and the British Museum. Her impressive publication record includes reports on sites from around the globe. Closer to home she has published work in *Essex History and Archaeology*, *The East Anglian Archaeology Monograph series*, *Antiquity* and *British Museum Occasional Papers*. Hazel is a fellow of the Association of Archaeological Illustrators and Surveyors and a founder member of the Lithics Study Group, London.



**THE SITE**

**Crown copyright. All rights reserved.  
Licence number WL6170**

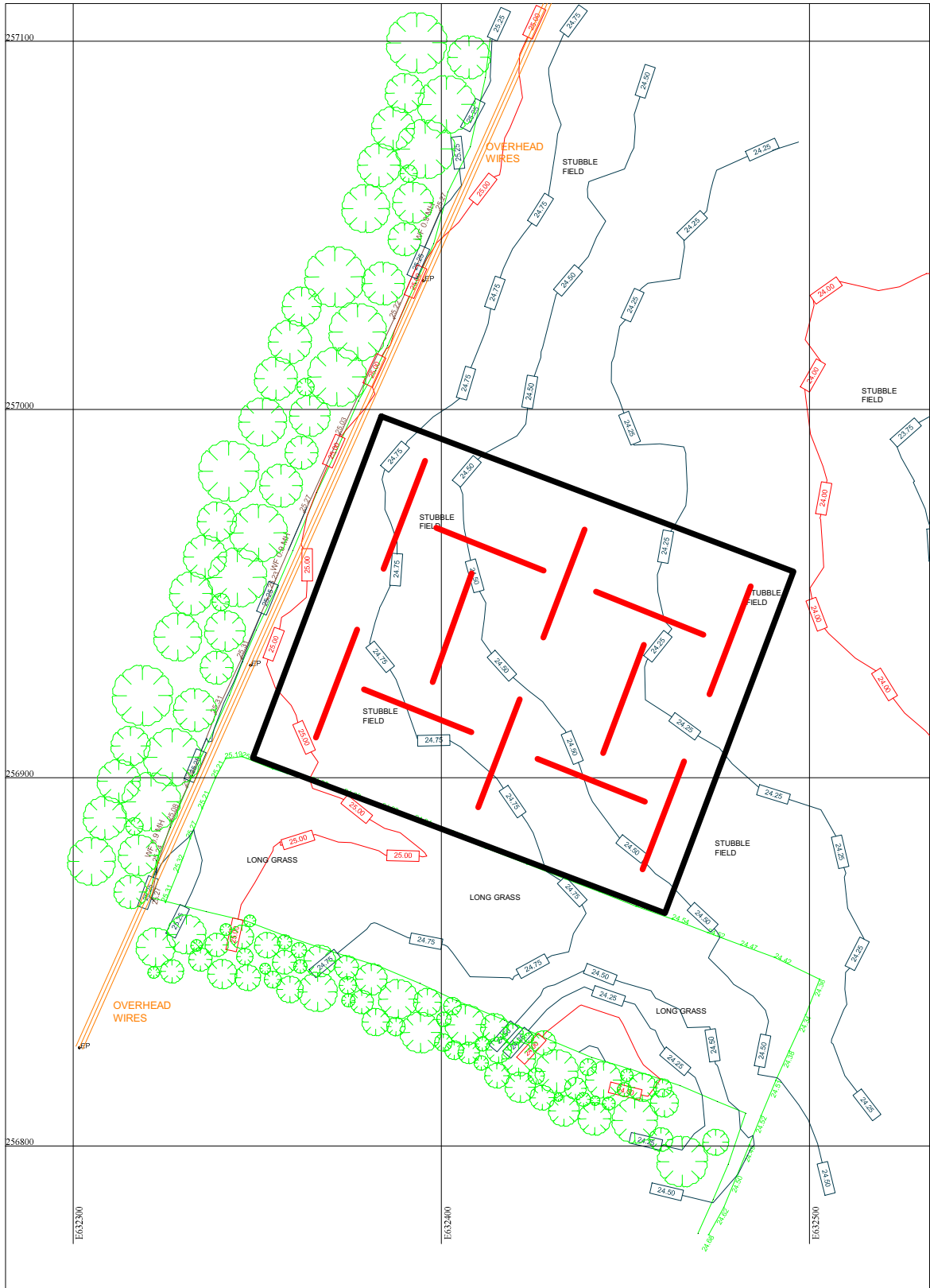


Fig 2 Trenching plan (trenches red, site outline black)



Appendix 3 (following pages)

## **Geophysical survey report by Dr Tim Dennis**

# Geophysical Survey on land west of Marlesford, Campsea Ashe, Suffolk

NGR TM323568

Planning Application ref. C/12/0880

August 2013

Dr T J Dennis  
Byrches, Craxes Green, Birch, Colchester CO2 0NS  
tim@essex.ac.uk

## Abstract

A magnetometer survey was conducted in August 2013 on the planned location of a reservoir in Campsea Ashe, Suffolk, NGR TM323568. The results show some low-level linear features towards the northwest corner of the area, with a set of small-area anomalies to the northeast but outside the formal area of the planning application. Other high-contrast spot anomalies typical of agricultural land are due to ferrous debris. There appears to be nothing of archaeological significance.

## Introduction

A magnetometer survey was carried out on behalf of Colchester Archaeological Trust (CAT) over the site of a planned reservoir. CAT staff subsequently carried out trial trenching over a specified area of the site, reported elsewhere. Because it is convenient to work in survey blocks of 30 x 30 m, the magnetometer survey covered an area of 120x120 m (1.44 ha), slightly larger than the trenched area – see Fig. 4.

The work was carried out over two sessions on 19 and 21 August 2013. Climatic conditions on 19 August were alternating periods of clear sun and cloud, leading to fluctuating ambient temperature. On 21 August conditions were unbroken but hazy sun, with more stable temperatures. The magnetometer is sensitive to changes of temperature, leading to spurious signal amplitude variations on a timescale of minutes that can mostly be offset by appropriate post-processing.

## Methodology

Two instruments were used, identical types FM256 from Geoscan Research. The FM256 is a gradiometer type, meaning that the output is the *difference* in the magnitude of the vertical component of the local Earth's magnetic field taken between sensors 0.5 m apart vertically. The output is in nanotesla, nT, and the instruments were operated on their most sensitive range where the minimum detectable difference is 0.05 nT (for comparison, the vertical component of the Earth's field at latitudes in the UK is in the region of 44000 nT<sup>1</sup>). For detailed information on sources of magnetic anomalies in the landscape, see for example Clark's *Seeing Beneath the Soil*<sup>2</sup>.

---

1 Source: [http://www.geomag.bgs.ac.uk/data\\_service/data/bulletins/bulletins.html](http://www.geomag.bgs.ac.uk/data_service/data/bulletins/bulletins.html)

2 *Seeing Beneath the Soil prospecting methods in archaeology*, A. Clark, Routledge, London, 2000. ISBN 0-415-21440-8 or later editions.

The instruments were operated in the standard way recommended by Geoscan Research<sup>3</sup>, which means a guide string with markers at 1 m intervals is set up between tape measures on the edges of each block, perpendicular to the traverse direction. The operator initiates the recording process then walks parallel to the string and 0.5 m from it at such a speed that its 1 second timing beeps synchronise with the markers. The zig-zag traverse method was used. Block size was 30 x 30 m, but in our case the guide string was 60 m long: operators walk towards each other with a 5 second start delay so they do not actually meet, then return to the ends of the guide string on its other side where they move it by 2 m for the next pair of tracks. This avoids the need for additional assistants.

Although the nominal block size was 30 x 30 m, in practice output quality is improved if pairs of blocks can be combined and processed as one, so when possible the areas were covered in sections of 60 traverses of 30 m.

Fig. 1 is a panoramic view of the site.

Fig. 2 shows one of the instruments in use.

Fig. 3 is the layout and sequencing of the survey blocks

### Parameters summary

Traverse length	30 m
Traverse spacing	1 m
Sample density in traverse direction	8 m <sup>-1</sup>
Traverse speed	1 m.s <sup>-1</sup> .
Instrument sensitivity	0.1 nT

### Signal Processing

The raw data samples are stored in the magnetometers, and subsequently downloaded. Data are saved in a single file in the order of capture, irrespective of the block structure of a survey. (The data format as saved is given in the Appendix). Software is Unix-based, and supports a range of geophysical survey data types with signal processing methods developed since the early 2000s from experience with practical survey datasets.

Processing uses some or all of the following stages.

1. Extract data for individual survey block from instrument dump file.
2. Alternate track reversal. Essential to correct for the zig-zag scanning format of the survey. Assuming tracks are numbered from zero, tracks 1, 3... are reversed. 'B' data blocks (Fig.3) are in addition reversed in the track direction to compensate for the 'mirror image' survey technique.

---

<sup>3</sup> FM256 Instruction Manual Version 1.6, Geoscan Research, May 2004

3. 'Destagger'. Usually required to correct for systematic operator- and direction-dependent longitudinal positional offsets.
4. A form of mean level subtraction. Essential. The instrument outputs the difference in signal amplitude from its two fluxgate sensors; after initial alignment<sup>4</sup> and 'Set Zero', this should be zero, but there is typically a drift with time, usually a result of change in ambient air temperature, or differential heating, and hence distortion, of the instrument casing from exposure to sunlight.

A range of options is available:

- i. Overall mean level subtraction. The minimum necessary. Guarantees the mean level of each data block will be zero, but unwanted variations within a block remain.
  - ii. Direction-dependent mean level subtraction. Odd and even track set averages computed and subtracted independently. This largely removes direction- and operator-dependent signal offsets.
  - iii. Direction-dependent smoothed track average mean level subtraction. Individual track averages are calculated, then the sets of values for odd and even tracks separately smoothed with a Gaussian lowpass filter, the 'standard deviation' of which specifies the width of the smoothing window. Values up to 2 are typical. A value of zero does no smoothing, so defaults to individual track average subtraction. This removes nearly all track-dependent variation, but also suppresses any 'real' feature that happens to be parallel to and longer than a track. A value of 1 is the typical compromise choice.
5. **Post filtering.** Optional, but useful in situations where 'genuine' anomalies have very low amplitude, which is common on gravel soils. The final output image for a block is generated from a weighted average of heavily smoothed and original pictures. The smoothing is done with circular-footprint Gaussian filters, where the 'standard deviation' measure is equivalent to 1 to 2 m. on the ground. Very approximately, the diameter of the smoothing window is hence 2-4 m.

$$\text{Output} = \text{A.original} + \text{B.smoothed}$$

In normal usage,  $A + B = 1$ , but not required. For smoothing applications, typical values are  $A=0.3$ ,  $B=0.7$ . These values mean that the video dynamic range for 'large' features ( $> 2\text{-}4$  m in extent) is unaffected, but for small ones ( $\approx 1$  m) has amplitude multiplied by 0.3.

6. **Output video level.** Essential. A processed block is output as an uncompressed greyscale image, where video levels are represented in 8 bit. Hence black is represented as 0, white 255. Internally, the signals are represented in signed double precision floating point. To convert to 8-bit video, the desired overall range is specified, e.g. 10 nT. This would be interpreted as  $-5\text{nT}$  to  $+5\text{nT}$ , with hard-limiting of values outside this range. This is then

---

<sup>4</sup> Full procedure in FM256 manual, *op. cit.*

scaled to -128.0 to +127.0, and an offset of +128.0 added, which gives the normal video range in which magnetometer zero level is represented on the picture as mid grey. The values are converted to 8-bit unsigned integers in the range 0 to 255 for video. Specifying -10 nT range reverses the output contrast to what is usual for magnetometer imagery where +ve anomalies are typically black, -ve white.

7. **Mosaic layout.** Essential. Individual 'tiles' of the survey are assembled on a background which can contain a graticule, labelled axes, captions and other images. The tiled area can be lowpass filtered as well, which helps conceal block boundaries. Postfilter not used here.

## Results

Fig. 4 shows one of the magnetometer images overlaid on the site plan with its trenching pattern as implemented by Colchester Archaeological Trust.

Remaining results images are on a site-centred coordinate system which has point (100, 100) at the southwest corner. Axes units are metres.

Fig. 5 is the magnetometer output minimally processed: zig-zag restoration and overall mean level subtraction – option 4(i) above. Nominal dynamic range -5 nT (video white) to +5 nT (video black). The blocks in the lower half of the picture were surveyed on the first day (19 August) in non-ideal weather conditions, with alternating clear sun and cloud. This is reflected in the broad vertical stripes, which largely correlate, but in opposite senses, between the two instruments. The time to survey one 60 x 30 m block is about 45 minutes. The second day had improved climatic conditions with unbroken hazy sun, shown especially by the relatively clean blocks at upper right which were surveyed during the afternoon when temperature was stable. Residual direction-dependent signal offsets cause the regular stripe pattern that has cycle width 2 m.

Fig. 6 uses instead the track mean subtraction process, option 4(iii). Dynamic range -5 nT (video white) to +5 nT (video black). This removes most of the thermal and direction-dependent artifacts, whilst not severely attenuating 'genuine' track-parallel features.

Fig. 7 is the same as Fig. 6, but with dynamic range -2.5 nT to +2.5 nT. The principal artifact is horizontal striping caused by the operators' stride patterns which tends to mask features of potential archaeological interest.

Fig. 8 is the same as Fig. 7 and introduces the selective postfilter, option 5. The basic filter is Gaussian with a circular footprint, sdev 1 m, meaning the diameter of the smoothing window is approximately 2 m. The stride patterns of Fig. 7 are suppressed, while features on a scale or 1 m or more are relatively enhanced.

Fig. 8a is an annotated version of Fig. 8.

## Discussion

The principal observation from the magnetometer results is that the site appears to contain no obvious features of archaeological interest. These would typically take the form of positive (black on the video) structured anomalies, such as: linear, circular or area features due for example to backfilled ditches, ringditch burials, patterns of post holes, building foundations and rubbish pits. An important caveat applicable especially to the gravel soils in East Anglia is that features known to exist from other sources (for example cropmarks) may produce little or no response<sup>5</sup>, so the absence of geophysical evidence cannot be interpreted as confirmation of absence.

The principal anomalies on the pictures are of the high-contrast bipolar (black/white) 'spot' type.

---

<sup>5</sup> **Archaeological Geophysics in East Anglia, UK.** P. J. Cott, *Archaeol. Prospect.* 9, 157 – 161 (2002)  
Published online 31 July 2002 in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/arp.189



These are typical of agricultural land, and are due to residual ferrous debris probably lying on or near the soil surface. Examples include: lost horseshoes; pieces of agricultural machinery like broken ploughshares; bolts; nails and 12-bore cartridge case caps. Some of the spot anomalies do appear to follow a weak northwest to southeast alignment (e.g. A-A, Fig. 8a); the reason is unknown, but could be due for example to placement of guns across the field during game shooting: spent 12-bore cartridges were noted on the site.

There are low-contrast east-west linear features at regular intervals across the pictures, due to recent (2012-13 cultivation season) tractor wheel tracks (e.g. B-B). Other sets of small (sub-metre) linear features run northwest to southeast. These can be seen on Fig. 6 and as a general trend in Fig. 8, (C-C) and are likely to be due to a former cultivation pattern on the field, age unknown.

A set of very low contrast larger-scale features towards the northwest corner of the plots, but especially visible in Fig. 8 (D-D), have a northeast-southwest alignment, and may have significance as former boundaries. However, they are as likely to be of natural origin, the principal cause of which can be the most recent glaciation. A set of diffuse features (E), diameter 2-4 m, in the northeast corner of the plots may represent backfilled pits or ponds, but these lie outside the area subject to the planning application. The origin of non-bipolar high-contrast features F is unknown, but could also be ferrous debris buried at greater depth than A.

## **Conclusion**

There is little evidence from the magnetometer survey of features of archaeological interest or significance on the site.

## Appendix

**FM256 data dumps.** The raw data files that accompany this report are as follows (from a Unix directory listing):

<u>Size (bytes)</u>	<u>Date of download</u>	<u>Name</u>
288000	20 Aug 14:09	ca_190813_A.dat
288000	20 Aug 13:11	ca_190813_B.dat
288000	21 Aug 14:37	ca_210813_A.dat
288000	21 Aug 14:47	ca_210813_B.dat

A and B in the filenames refer to the two instruments (and their respective operators). The 'A' files refer to the southernmost of each pair of blocks as they were simultaneously surveyed – see Fig. 3.

File format (sample as output by the instrument)

```
-0017  
0  
-0039  
0  
-0045  
0  
-0036  
0  
-0005  
0  
+0019  
0  
+0020  
0  
+0022  
0  
.  
.  
.
```

Each data point is represented as a signed 4-digit decimal number followed by a range code. The manufacturer specifies that if range is  $R$ , where  $0 \leq R \leq 2$ , data  $D$ , then the actual sample value,  $V$ , in nanotesla is computed from:

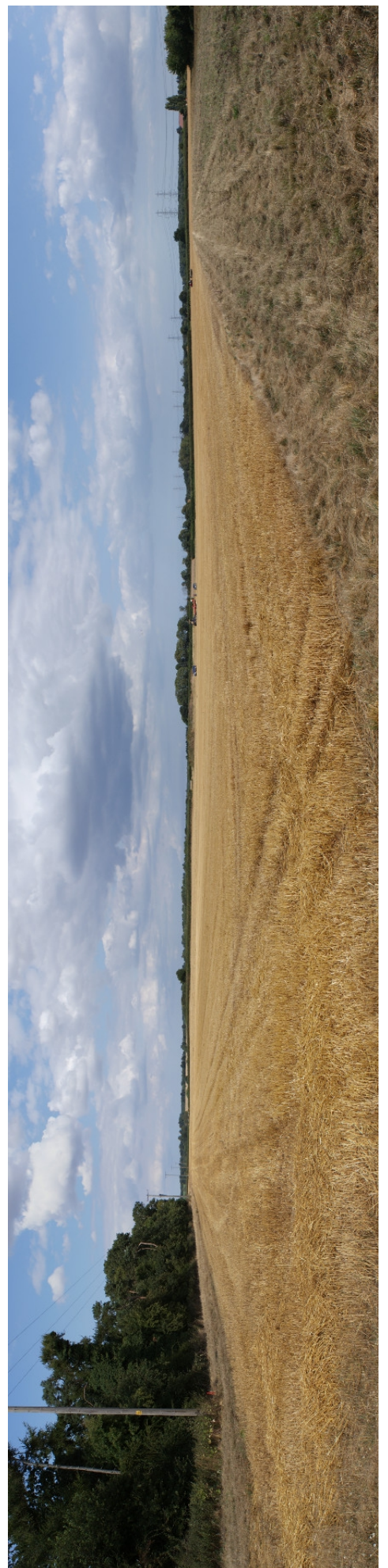
$$V = D \times 0.5 \times 10^{R-1}.$$

The first data value/range pair -17/0 hence represent 0.85 nT.

For valid data,  $-4000 \leq D \leq +4000$ . For range 0, the maximum signal range that can be recorded without overload is  $\pm 200$  nT. In addition, the instrument represents unsampled data points (for example an uncompleted survey block or dummy points/tracks inserted manually) with  $D = +4095$ .

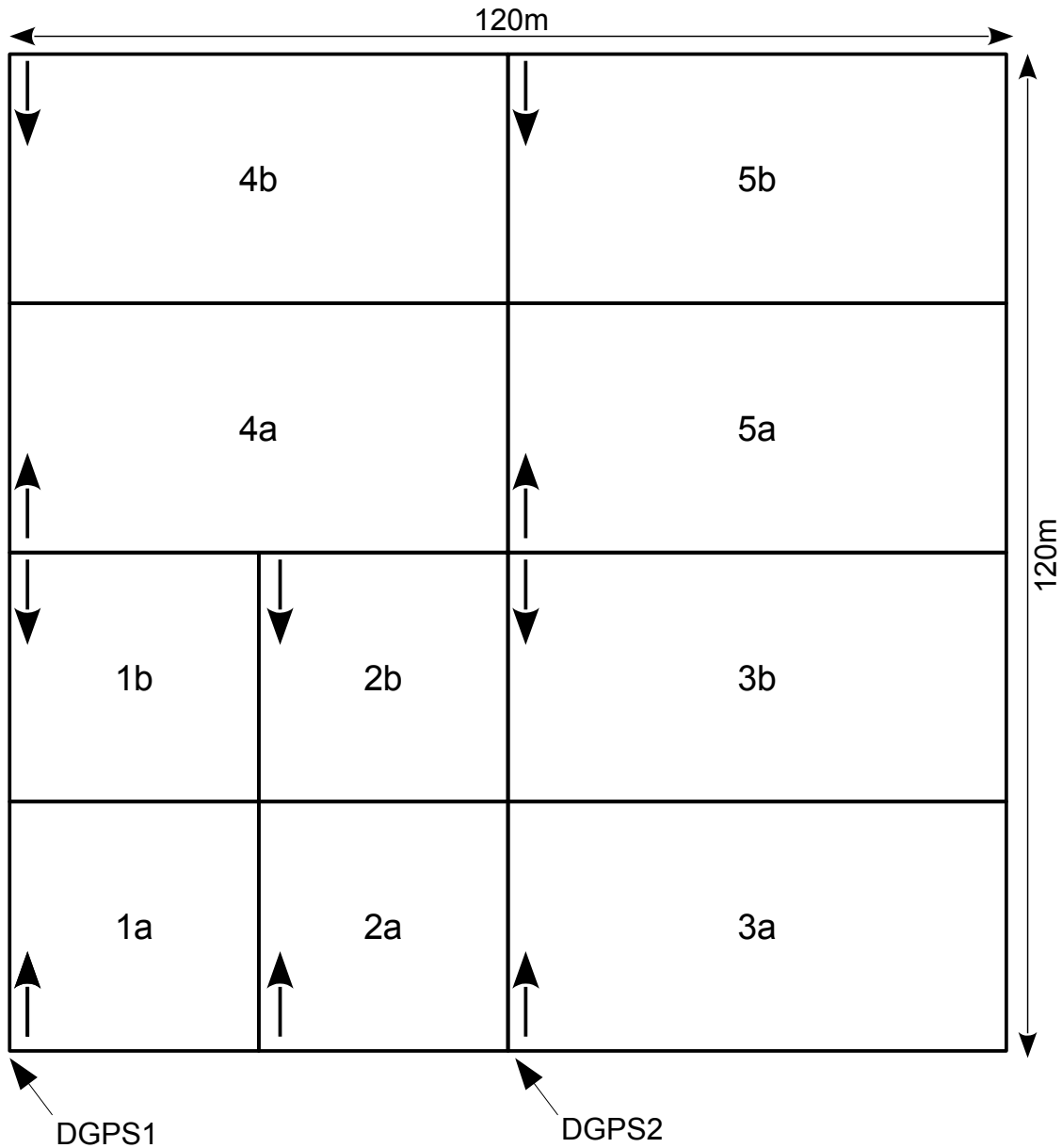
**Figure 1.**

Campsea Ashe site, panoramic view from southwest corner of the survey area.





**Figure 2.** FM256 magnetometer in use.



**Figure 3. Magnetometer survey layout**

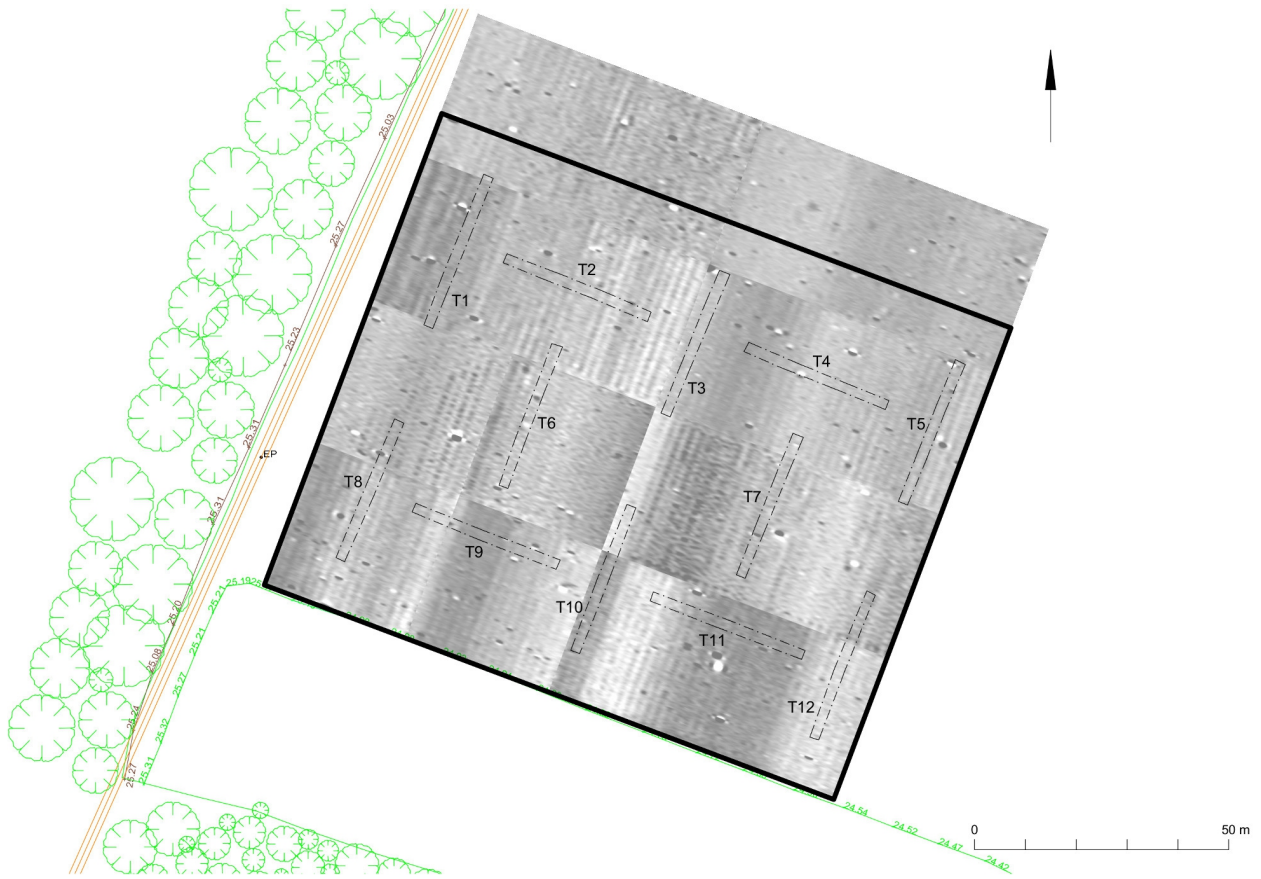
Block number identifies sequencing, with a and b areas surveyed simultaneously using a single 60 m guide string. Blocks 1-3 were surveyed on 19 August 2013, 4-5 on 21 August.

Arrows indicate start positions and direction. Long-average DGPS readings were taken at the identified locations, using a Garmin GPS-MAP62 EGNOS-enabled receiver. Results were:

DGPS1        632350.78, 256905.69 (52.161505, 1.395785)  
 DGPS2        632405.74, 256884.13 (52.161288, 1.396542)

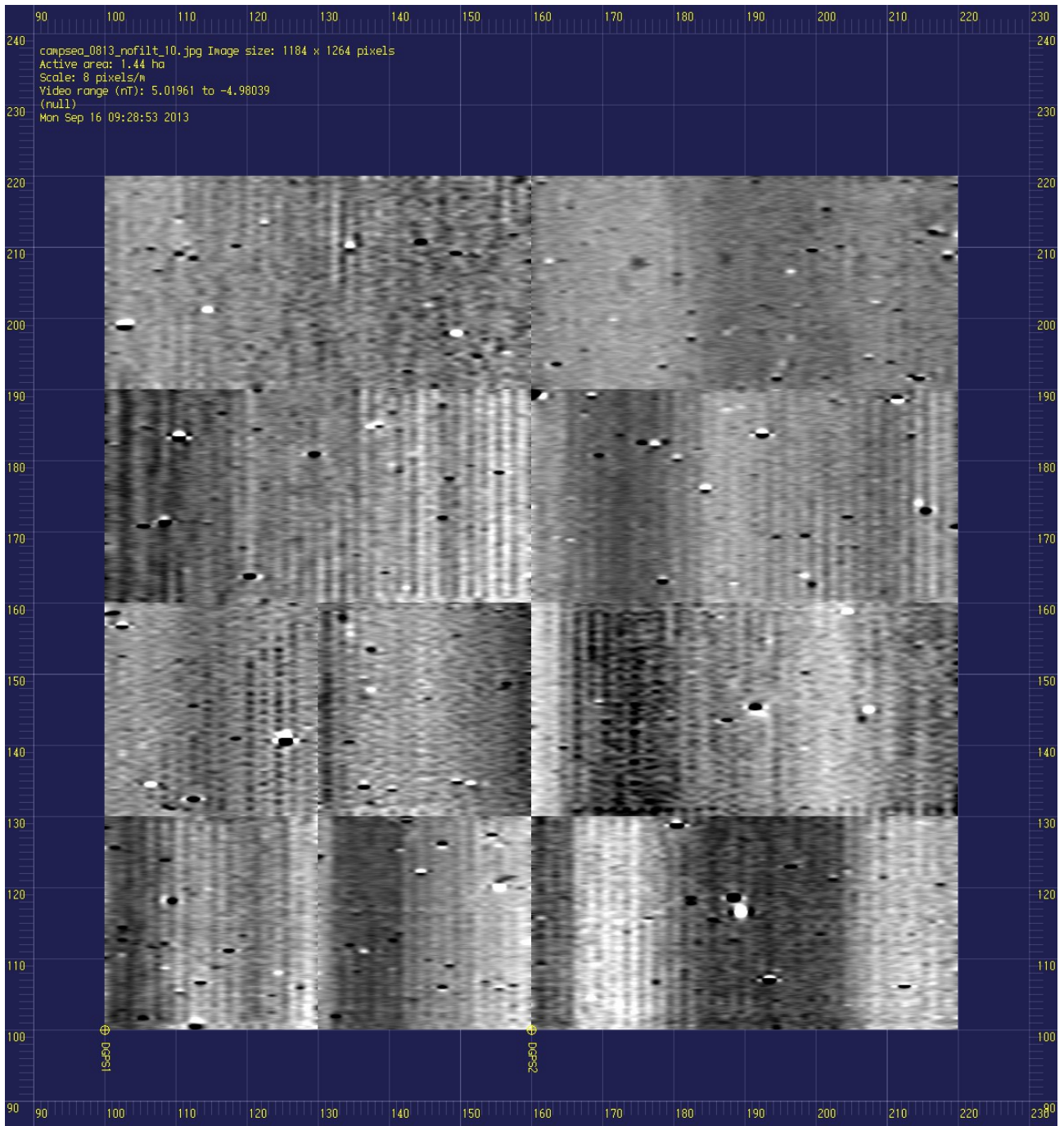
Ordnance Survey Grid. (WGS84 Latitude/Longitude, degrees.)



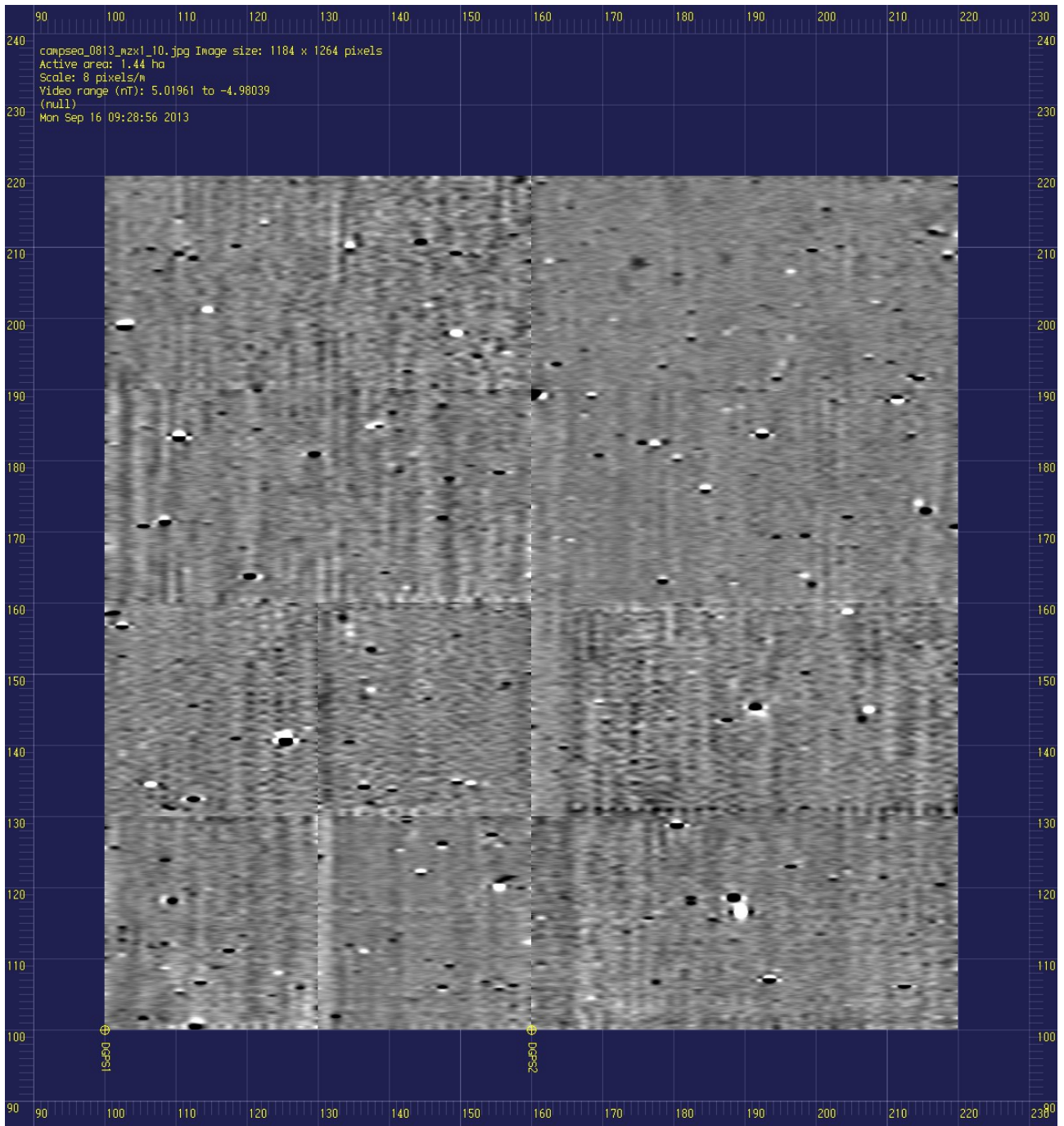


**Figure 4.** Relationship of area surveyed to CAT trenching pattern.

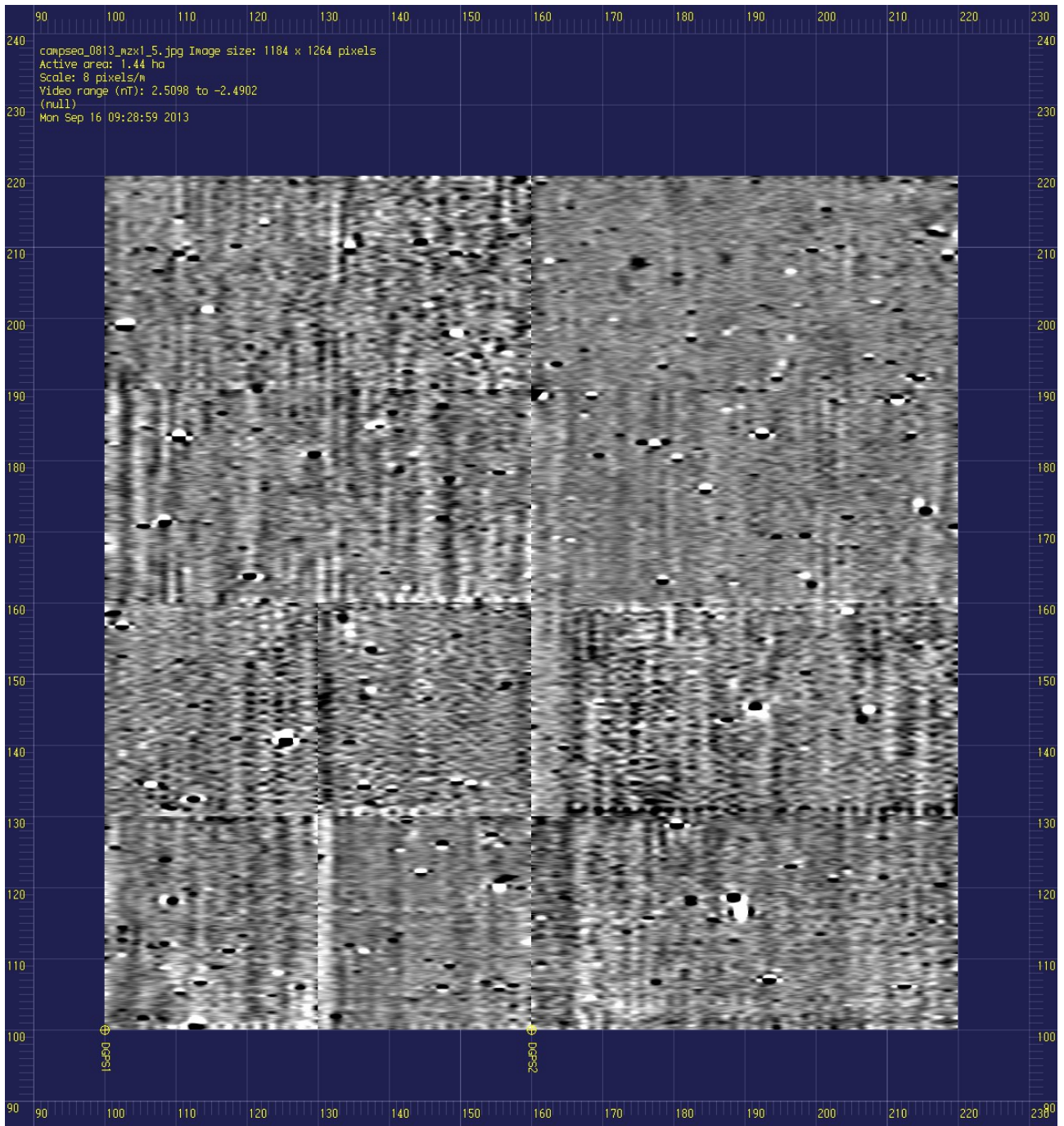




**Figure 5.** Magnetometer output as greyscale image, dynamic range +5 nT (video black) to -5 nT (white). Survey-centred coordinate system, metres, origin (100,100), including differential GPS record locations. Minimal signal processing: overall survey block mean subtraction.

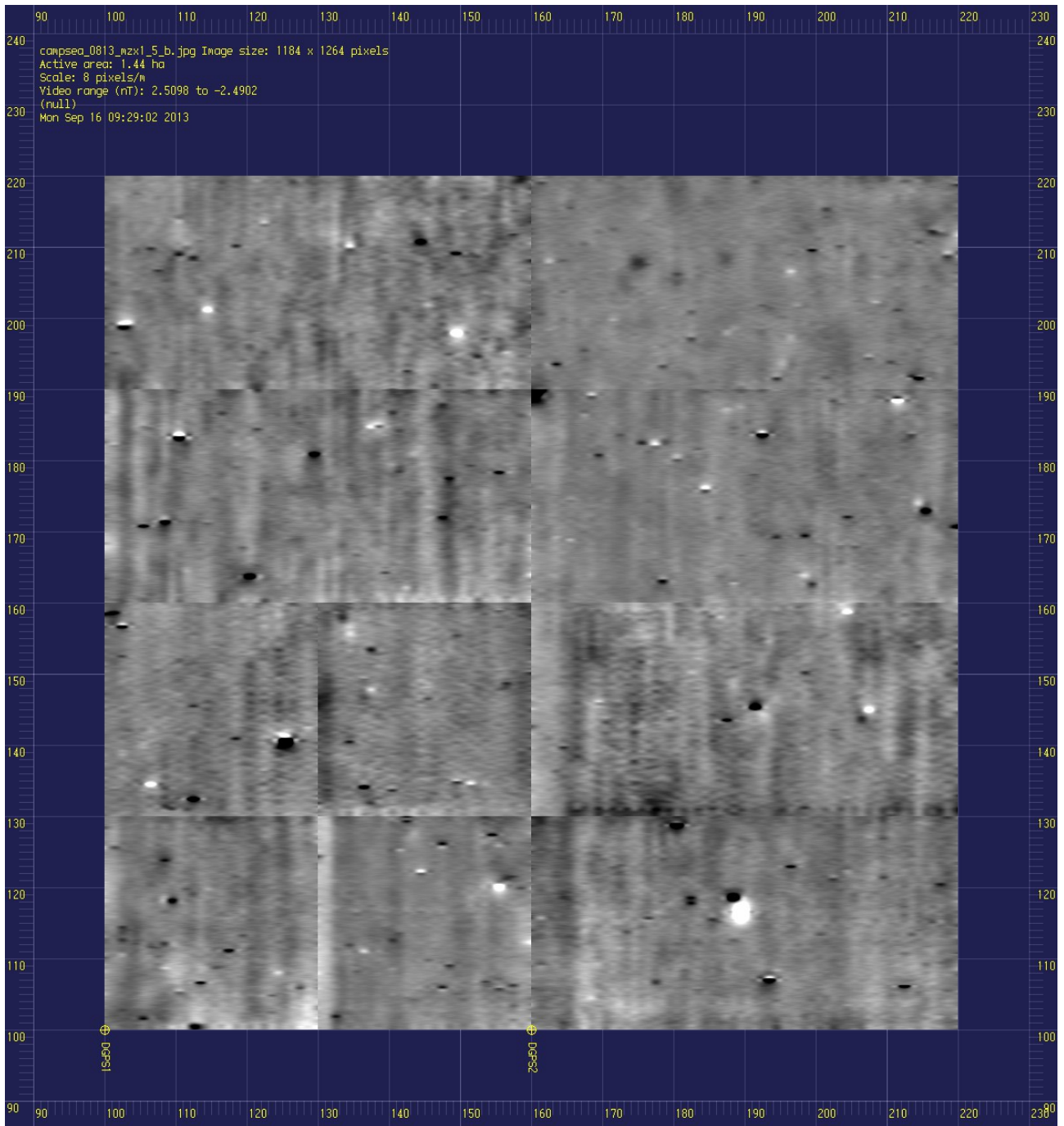


**Figure 6.** Track mean level correction, dynamic range  $\pm 5$  nT.

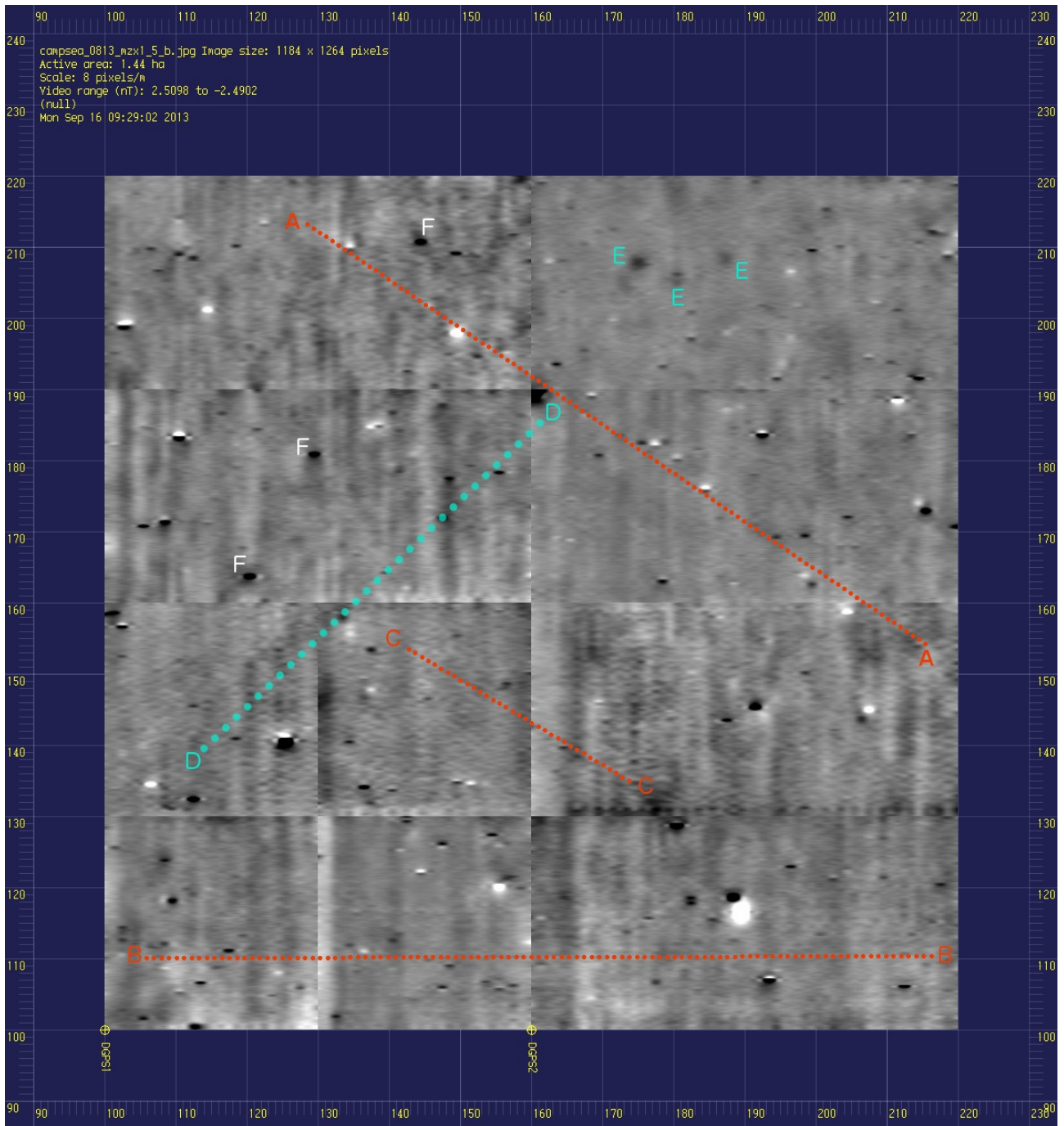


**Figure 7.** Based on Fig. 6. Dynamic range  $\pm 2.5$  nT.





**Figure 8.** Based on Fig. 7. Selective Gaussian smoothing, diameter 2 m approximately. Filter weighting: 0.2 (unfiltered), 0.8 (filtered).



**Figure 8a.** Annotated version of Fig. 8. See text for identifications.

Appendix 4 (following pages)

## **OASIS sheet**

# OASIS DATA COLLECTION FORM: England

[List of Projects](#) | [Manage Projects](#) | [Search Projects](#) | [New project](#) | [Change your details](#) | [HER coverage](#) | [Change country](#) | [Log out](#)

## Printable version

**OASIS ID: colchest3-158607**

### Project details

Project name	Evaluation by trial trenching at Marlesford Road, Campsey Ashe, Suffolk
Short description of the project	This site west of Marlesford Road, Campsea Ashe, lies 0.6km south of an unexcavated cropmark enclosure and ring-ditch (SCCAS reference MRF 007). An evaluation by geophysical survey and 5% trial trenching revealed no archaeological features or deposits. There were four unstratified prehistoric flints in the ploughsoil.
Project dates	Start: 19-08-2013 End: 23-08-2013
Previous/future work	No / No
Any associated project reference codes	13/08c - Contracting Unit No.
Any associated project reference codes	CAA033 - HER event no.
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 2 - Operations to a depth less than 0.25m
Monument type	N/A None
Significant Finds	LITHIC IMPLEMENT Early Neolithic
Methods & techniques	""Geophysical Survey"" , ""Metal Detectors"" , ""Photographic Survey"" , ""Sample Trenches"" , ""Visual Inspection""
Development type	Farm infrastructure (e.g. barns, grain stores, equipment stores, etc.)

Prompt	Direction from Local Planning Authority - PPS
Position in the planning process	After full determination (eg. As a condition)
Solid geology	Unknown
Drift geology	BOULDER CLAY AND MORAINIC DRIFT
Techniques	Magnetometry

### Project location

Country	England
Site location	SUFFOLK SUFFOLK COASTAL CAMPSEY ASH Marlesford Road
Postcode	IP13 0QL
Study area	1.23 Hectares
Site coordinates	TM 323 568 52 1 52 09 35 N 001 23 48 E Point
Height OD / Depth	Min: 49.09m Max: 49.47m

### Project creators

Name of Organisation	Colchester Archaeological Trust
Project brief originator	Suffolk County Council Archaeological Service
Project design originator	Colchester Archaeological Trust
Project director/manager	Howard Brooks
Project supervisor	Ben Holloway
Type of sponsor/funding body	Developer

### Project archives

Physical Archive recipient	Suffolk County Council Archaeology Service
Physical Archive ID	CAA033



Physical Contents	"Worked stone/lithics"
Digital Archive recipient	Suffolk County Council Archaeology Service
Digital Archive ID	CAA033
Digital Contents	"Survey","other"
Digital Media available	"Geophysics","Images raster / digital photography","Survey","Text"
Paper Archive recipient	Suffolk County Council Archaeology Service
Paper Archive ID	CAA033
Paper Contents	"Survey","other"
Paper Media available	"Context sheet","Correspondence","Diary","Drawing","Photograph","Plan","Report","Section","Survey "

### Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Archaeological evaluation by geophysical survey and trial-trenching: land west of Marlesford Road, Campsea Ashe, Suffolk
Author(s)/Editor(s)	Holloway, B
Other bibliographic details	CAT Report 721
Date	2013
Issuer or publisher	Colchester Archaeological Trust
Place of issue or publication	Colchester
Description	A4 bound with plastic cover.
URL	<a href="http://cat.essex.ac.uk/summaries/CAT-0721.html">http://cat.essex.ac.uk/summaries/CAT-0721.html</a>
Entered by	Ben Holloway (bh@catuk.org)
Entered on	1 October 2013

**OASIS:**

Please e-mail [English Heritage](#) for OASIS help and advice

© ADS 1996-2012 Created by [Jo Gilham](#) and [Jen Mitcham](#), email Last modified Wednesday 9 May 2012

Cite only: `/export/home/web/oasis/form/print.cfm` for this page