

LAND ADJACENT TO 80 COATES ROAD EASTREA CAMBRIDGESHIRE

GEOPHYSICAL SURVEY

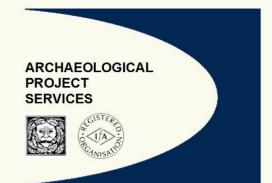
Work undertaken for The Robert Doughty Consultancy and Rose Homes (EA) Ltd

September 2009

Report produced by S J Malone BSC PhD MIFA

National Grid Reference: TL 2969 9725

APS Report No: 102/09



CONTENTS

1.	SUMMARY	1
2.	INTRODUCTION	1
2.1	BACKGROUND	1
2.2	TOPOGRAPHY AND GEOLOGY	1
3.	AIMS	1
4.	METHODS	1
5.	RESULTS	2
6.	DISCUSSION	3
7.	ACKNOWLEDGEMENTS	3
8.	PERSONNEL	3
9.	BIBLIOGRAPHY	3
10.	ABBREVIATIONS	3

List of Figures

Figure 1	Site location map
Figure 2	Site location showing survey area
Figure 3	Unprocessed data: greyscale and trace plot
Figure 4	Processed data greyscale plot
Figure 5	Processed greyscale with basemap
Figure 6	Interpretative plot

Appendix 1 Method Statement for Geophysical Survey

1. SUMMARY

Detailed gradiometer survey was undertaken over the area of a proposed residential development at Coates Road, Eastrea, Cambridgeshire.

The site lies in proximity to areas of significant prehistoric and later settlement. However, no clearly archaeological features were noted. A number of linear features are of possible archaeological origin and a series of parallel linears possibly indicate medieval ridge and furrow cultivation, but much of the variation within the survey data probably relates to modern disturbance and agricultural activities on the site.

2. INTRODUCTION

2.1 Background

Archaeological Project Services was commissioned by The Robert Doughty Consultancy, on behalf of Rose Homes (EA) Ltd, to undertake detailed gradiometer survey over the area of a proposed residential development at Coates Road, Eastrea, Cambridgeshire.

2.2 Topography and Geology

Eastrea lies 10km east of Peterborough in the Fenland district of Cambridgeshire. The proposed development area lies on the eastern edge of the village comprising a block of land of c. 7500m² on the south side of Coates Road, centred on TL 2969 9725 (Fig. 1).

The site lies at c. 5m O.D. on the island of gravel south of the River Nene that gives the village its name, 'east' in relation to the larger island of Whittlesey to the west

3. AIMS

The aim of the survey was to locate any features of possible archaeological significance within the area in order to assess the impact of the proposed development on potential archaeological remains.

4. METHODS

The fieldwork was carried out on 29th September 2009. Location and layout of survey area is shown in Figure 2. Weather and ground conditions during the survey were dry. The ground was covered with low stubble and in good condition for survey.

Survey was undertaken in accordance with English Heritage (2008) and IfA (2002) guidelines and codes of conduct.

The magnetic survey was carried out using dual sensor Grad601-2 Magnetic а Gradiometer manufactured by Bartington Instruments Ltd. Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.2 nanoTesla (nT) in an overall field strength of 48,000nT can detected be accurately using this instrumentation.

The mapping of anomalies in a systematic manner allows an estimate of the type of material present beneath the surface. Strong magnetic anomalies will be generated by buried iron-based objects or by kilns or hearths. More subtle anomalies such as pits and ditches can be seen if they contain more humic material which is normally rich in magnetic iron oxides when compared with the subsoil (but this can be variable depending on the nature of the underlying deposits). Wall foundations can show as negative anomalies where the stone is less magnetic than the surrounding soil, or as stronger positive and negative anomalies if of brick, but are not always responsive to the technique.

Readings relate to the difference in localised magnetic anomalies compared with the general magnetic background. The Grad601-2 consists of two high stability fluxgate gradiometers suspended on a single frame. Each gradiometer has a 1m separation between the sensing elements so enhancing the response to weak anomalies.

Sampling interval and data capture

Readings were taken at 0.25m centres along traverses 1m apart. This equates to 3600 sampling points in a full 30m x 30m grid. The Grad 601 has a typical depth of penetration of 0.5m to 1.0m although a greater range is possible where strongly magnetic objects have been buried in the site.

Readings are logged consecutively into the data logger which is downloaded daily either into a portable computer whilst on site or directly to the office computer. At the end of each job, data is transferred to the office for processing and presentation.

Processing and presentation of results

Processing is performed using specialist ArchaeoSurveyor software. This can various emphasise aspects contained within the data but which are often not easily seen in the raw data. Basic processing of the magnetic data involves 'flattening' the background levels with respect to adjacent traverses and adjacent grids. 'Despiking' is also performed to remove the anomalies resulting from small iron objects often found on agricultural land. Once the basic processing has flattened the background it is then possible to carry out further processing which may include low pass filtering to reduce 'noise'

in the data and hence emphasise the archaeological or man-made anomalies.

The following shows the basic processing carried out on all processed gradiometer data used in this report:

1. DeStripe (sets the background mean of each traverse within a grid to zero and is useful for removing striping effects)

2. Despike (useful for display and allows further processing functions to be carried out more effectively by removing extreme data values)

Parameters: X radius = 1; Y radius = 1; Threshold = 3 std. dev.; Spike replacement = mean

3. Clip (excludes extreme values allowing better representation of detail in the mid range): -4 to 4nT.

5. **RESULTS**

The presentation of the data for the site involves a print-out of the raw data as greyscale and trace plots (Fig. 3), together with a greyscale plot of the processed data (Figs 4, 5). Magnetic anomalies have been identified and plotted onto interpretative drawing (Fig. 6) and are described below.

Positive linear anomalies of possible archaeological origin

Few positive anomalies are sharply defined or consistent enough to be confidently identified as of archaeological origin. Possible linear features can be identified running east-west in the northern part of the survey area. A large roughly rectangular area of slightly elevated readings lies just to the south. However, all of these responses parallel Coates Road and the direction of ploughing along this northern field edge and may merely reflect modern agricultural use of the land.

Discrete positive anomalies

Discrete positive responses are difficult to interpret owing to the variability of the background. Most are small with weak positive responses and many have a slight negative halo that suggests they might also derive from ferrous responses. A few have been highlighted as of possible archaeological origin.

Agricultural features

A series of regular linear anomalies are evident on a NNW-SSE alignment, spaced at 8.5m to 9.5m apart. These are somewhat intermittent and variable in intensity. They may represent former ridge and furrow ploughing on this alignment.

Iron spikes (discrete bipolar anomalies)

Iron items within the topsoil/ploughsoil give a distinctive localised bipolar (strong negative and positive) response. Such items usually derive from relatively recent agricultural use of the land – broken or discarded pieces of agricultural machinery etc. – and in this case debris discarded along the roadside. These are fairly widely distributed across the survey area.

Modern disturbance

Elevated positive and negative readings are evident along the roadside where there are lighting poles and buried services, as well as modern debris. The western and, to a lesser extent, eastern field boundaries showed similar magnetic disturbance.

Natural variation

Background magnetic variation is evident as a WSW-ENE trend within the data.

6. **DISCUSSION**

Magnetic survey was of limited success with strong responses only from agricultural features, including possible medieval ridge and furrow. A series of east-west linears and area of elevated readings in the north of the field may be of archaeological significance. However, it is notable that these responses parallel Coates Road and the direction of ploughing on the northern edge of the field.

7. ACKNOWLEDGEMENTS

Archaeological Project Services wishes to acknowledge the assistance of Lewis Smith of Robert Doughty Consultancy who commissioned the project and arranged access and of the landowner Mr Garner for providing facilities at the farm. Gary Taylor and Tom Lane edited the report.

8. PERSONNEL

Project coordinator: Gary Taylor

Field survey: Steve Malone, Jonathon Smith

Survey processing and reporting: Steve Malone

9. **BIBLIOGRAPHY**

Clark, A., 1996 Seeing Beneath the Soil, London, 2nd edn

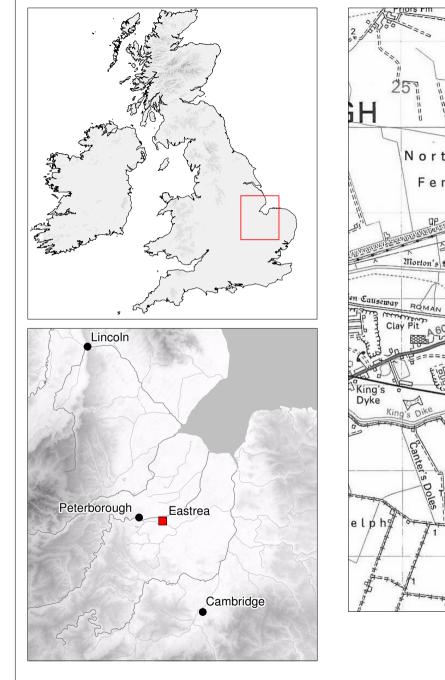
English Heritage, 2008 Geophysical Survey in Archaeological Field Evaluation

IFA, 2002 The use of Geophysical Techniques in Archaeological Evaluations, IFA Paper No. 6

10. ABBREVIATIONS

- APS Archaeological Project Services
- BGS British Geological Survey

- EH English Heritage
- IfA Institute for Archaeologists
- OS Ordnance Survey



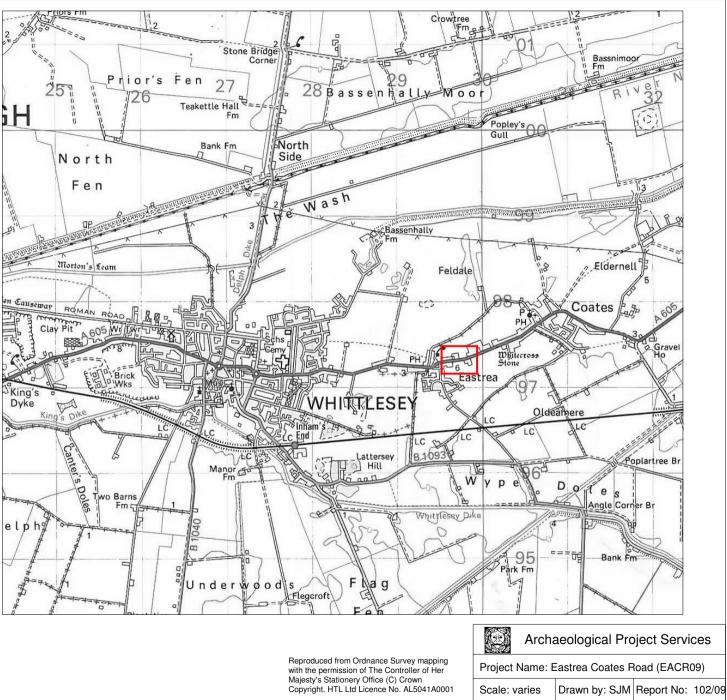


Figure 1 Site location map



Figure 2 Site Location showing survey area

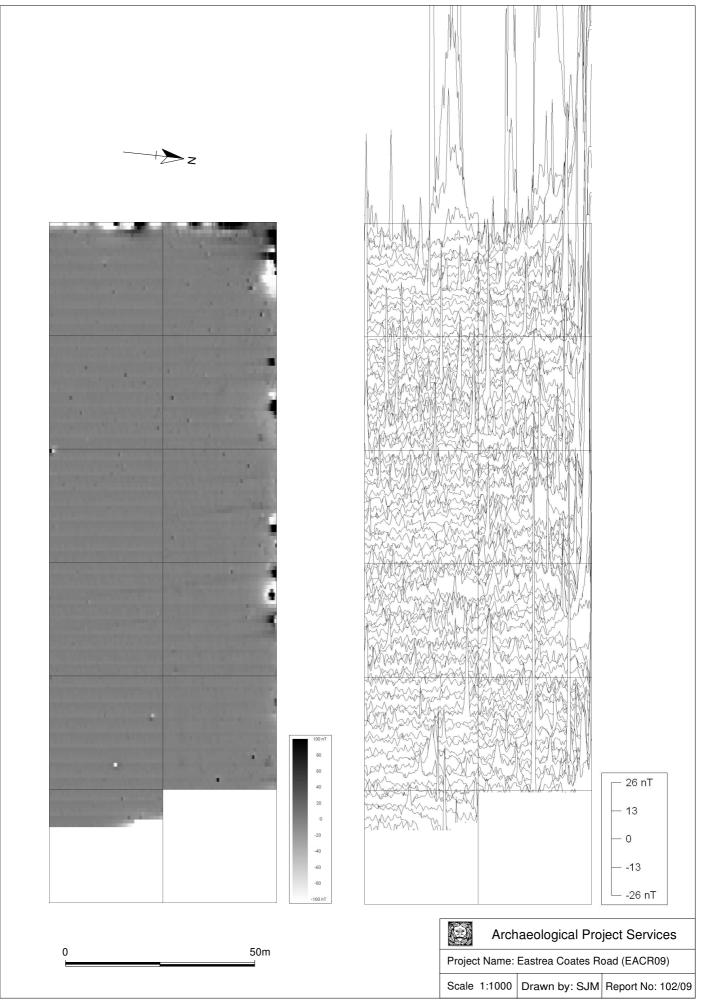


Figure 3 Unprocessed data: greyscale and trace plots

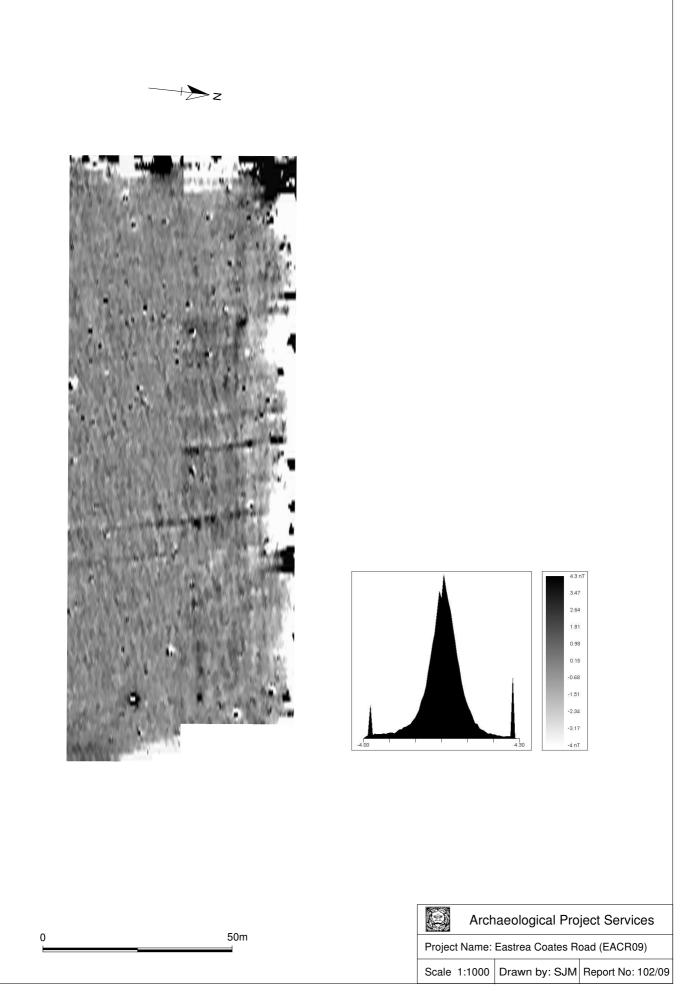


Figure 4 Processed data greyscale plot



Figure 5 Processed greyscale with basemap



Figure 6 Interpretative plot

Appendix 1 Method Statement for Geophysical Survey

1 DESCRIPTION OF THE WORKS

The works consists of a geophysical survey over an area of a proposed residential development at Coates Road, Eastrea, Cambridgeshire. It comprises approximately 0.75ha of land centred on TF 2969 9725. The purpose of the survey is to locate any anomalies that may be archaeological in origin.

Detailed magnetic gradiometry has been chosen as the most suitable technique, as it is relatively quick and can detect cut features and thermoremnant anomalies associated with a wide range of archaeological remains.

2 METHOD

Survey will be undertaken with adherence to English Heritage guidelines: *Geophysical Survey in Archaeological Field Evaluation* (2008) and IFA guidelines and codes of conduct.

30m survey grids will be set out using a total station and tied in to permanent features to allow the grid to be exactly re-located if necessary. The magnetic gradiometry data will be collected across these grids using a Bartington GRAD 601-2 gradiometer, collecting readings at 0.25m intervals along traverses separated by 1m. The data is stored internally in the instrument until it is downloaded onto a laptop computer. When all surveying has been finished survey pegs will be removed.

3 **PROGRAMME**

The fieldwork will be conducted from the 28th September 2009. Any major changes to the schedule will be agreed with the client and curator.

4 PERSONNEL

List of personnel:

Gary Taylor – Project Manager based at APS Main Office Steve Malone – Geophysical Survey Jonathon Smith - Survey Assistant

5 EQUIPMENT

Bartington GRAD 601-2: The fluxgate gradiometer operates off a sealed battery mounted internally. Foif OTS 635L total station: The instrument operates off a 7.2V ni-cad battery attached to the instrument

6 RISK ASSESSMENT

Gradiometry surveys preclude the wearing of any clothing containing any metal (zips, studs, etc.). For this reason operatives are supplied with non-magnetic safety footwear. However, Scotchlite reflective material is also metallic, so ordinary high visibility jackets cannot be worn once survey is under way.

For details of risks associated with the geophysical surveys refer to Appendix 1 - Risk Assessment.

7 INSURANCES

Archaeological Project Services, as part of the Heritage Trust of Lincolnshire, maintains Employers Liability insurance to £10,000,000. Additionally, the company maintains Public and Products Liability insurances, each with indemnity of £5,000,000. Copies of which can be made available on request.

8 EMERGENCY PROCEDURE

All field teams are equipped with mobile phones for use in an emergency. In the event of an emergency the team will immediately stop work and report the incident to the relevant emergency services, APS head office, and the client. If it is safe to do so they will administer first-aid and render assistance to any emergency teams on site.

APS will monitor the general safety arrangements and will communicate any further requirements / short falls to the client.

9 ENVIRONMENT

The environmental impact of the geophysical survey should be minimal. Ground disturbance will be limited to the installation of survey pegs over areas to be surveyed. The Bartington GRAD 601-2 is a passive instrument, and does not emit any form of radiation. The instruments do not emit noise at a level considered as noise pollution. No materials will need storing on site, although survey pegs will be in the ground for the duration of the works.

10 PROCESSING, ANALYSIS, PRESENTATION AND INTERPRETATION OF THE DATA

Processing of the data will be carried out using ArchaeoSurveyor. Basic processing of the magnetic data involves 'flattening' the background levels with respect to adjacent traverses and adjacent grids. 'Despiking' is also performed to remove the anomalies resulting from small iron objects often found on agricultural land.

Once the basic processing has flattened the background it is then possible to carry out further processing which may include low pass filtering to reduce 'noise' in the data and hence emphasise the archaeological or manmade anomalies.

The presentation of the data for the survey will be a print-out of minimally processed data both as grey scale and trace plots together with a grey scale plot of the fully processed data. Magnetic anomalies will be identified and plotted onto the interpretative drawings for the site.

11 **REPORTING**

Reporting will be undertaken in accordance with the English Heritage guidelines: *Geophysical Survey in Archaeological Field Evaluation* (2008). The report for the survey will comprise a written section describing the background to the survey, the methodologies used and a discussion of the results. The text will be illustrated using plots of the results using CAD to overlay the results and interpretations over the base mapping.

12 COPYRIGHT

Archaeological Project Services shall retain full copyright of any commissioned reports under the Copyright, Designs and Patents Act 1988 with all rights reserved; excepting that it hereby provides an exclusive licence to the client for the use of such documents by the client in all matters directly relating to the project as described in the Project Specification.

Licence will also be given to the archaeological curators to use the report for educational, public and research purposes.

In the case of non-satisfactory settlement of account then copyright will remain fully and exclusively with Archaeological Project Services. In these circumstances it will be an infringement under the Copyright, Designs and Patents Act 1988 for the client to pass any report, partial report, or copy of same, to any third party.