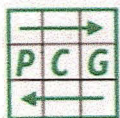


**FLUXGATE GRADIOMETER SURVEY
LAND AT LUDFORD, LOUTH
LINCOLNSHIRE**



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Archaeology Section

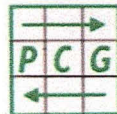
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**FLUXGATE GRADIOMETER SURVEY
LAND AT LUDFORD, LOUTH
LINCOLNSHIRE**



00/32



Report prepared for Lincolnshire County Council Built Environment Section
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Illustrations

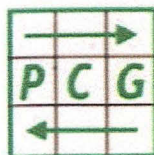
Fig.1 Location of site. Scale 1:12500.

Fig.2 Location of survey. Scale 1:2500.

Fig.3 Trace plot: raw data. Scale 1:1250.

Fig.4 Greyscale image: clipped data. Scale 1250.

Fig.5 Greyscale image: smooth. Scale 1:1250.

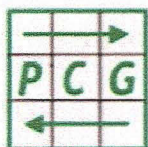


Summary

- *A Fluxgate Gradiometer survey was carried out at Ludford, near Louth in Lincolnshire*
- *The survey detected anomalies which represent features of almost certain archaeological significance: believed to be part of a Late Iron Age/Romano-British settlement complex*
- *An apparent variation in the density of remains from east to west is more likely to represent geological differences than a true variation in archaeological density*



Fig.1: Location of site Scale: 1:12500



Site: Ludford NGR:TF2077/8963 Area:1.08ha Scale 1:2500

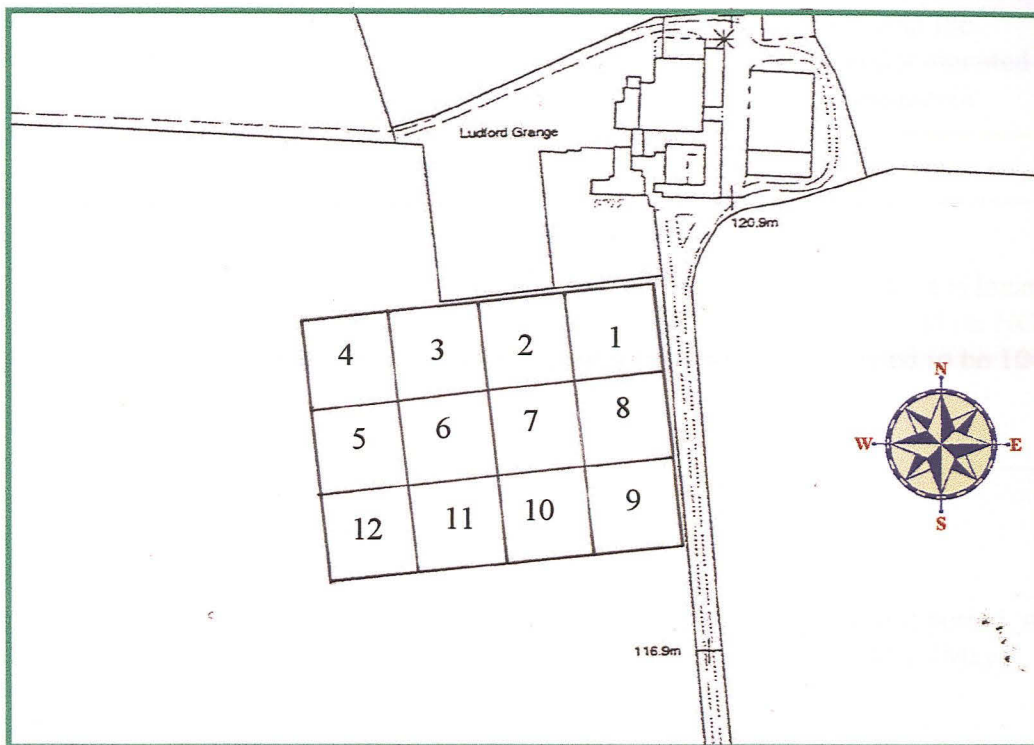


Fig.2 Location of survey



1.0 Introduction

A fluxgate gradiometer survey was undertaken by Pre-Construct Geophysics on behalf of the County Archaeologist for Lincolnshire. The work was undertaken as part of an archaeological assessment of land at Ludford, near Louth, which falls within the administrative district of East Lindsey. The methodology used, which is documented below, broadly followed the guidelines set out in the English Heritage document '*Geophysical Survey in Archaeological Field Evaluation*', 1995.

2.0 Location and description

Ludford is approximately 12 km west of Louth on the A631. The survey area is located 1.5 km east-north-east of the village, south of Ludford Grange, and is centred on NGR: TF2077 8963. The size of the field (containing the survey area) is estimated to be 10-12 ha, of which 1.08 ha was surveyed.

At the time of the survey, the site supported a young cereal crop.

3.0 Archaeological Background (basic summary)

The area is known to have been extensively occupied in the later prehistoric period, and is one of the major late Iron Age settlements in Lincolnshire defined by May (May 1984, 19).

Aerial photographic evidence (incorporated as part of the Lincolnshire County Sites and Monuments Record) indicates widespread and dense cropmarks in the vicinity of the site. These have been recorded to the north-west, east, south-east, south and west of the area surveyed. Superficial assessment of these features suggests that they form part of a widespread, multi-phased, archaeological landscape dating to the Iron Age/Romano-British periods.

No cropmarks have been reported within the study area, suggesting: a) that the settlements did not extend into this area; b) that that conditions at the site were not suited to the production of cropmarks when the aerial photographs were taken, or c) that the archaeology in this area has been somehow masked (eg surface geological cover).

4.0 Methodology

Detailed area survey using a fluxgate gradiometer is a non-intrusive means of evaluating the archaeological potential of a site. The fluxgate gradiometer detects magnetic anomalies caused by areas of high or low magnetic susceptibility. These areas are caused by changes in the composition of the subsoil or the underlying geology. Archaeological features are the result of man-made changes to the composition of the soil and the introduction of intrusive materials such as brick and stone. These features create detectable magnetic anomalies. In addition, activities which involve heating and burning will create magnetic anomalies, as will the presence of ferrous metal objects. By examining the anomalies detected by a fluxgate gradiometer survey, geophysicists can often translate the data into archaeological interpretation.

The area survey was conducted using a *Geoscan Research* fluxgate gradiometer (model FM36) with an electronic sample trigger set to take 4 readings per metre (a sample interval of 0.25m). The zigzag traverse method of survey was used, with 1m wide

traverses across 30m x 30m grids. The base line was established along the north edge of the survey 2m west of the track and 2m south of the hedge bordering Ludford Grange. The sensitivity of the machine was set to detect magnetic variation in the order of 0.1 nanoTesla.

The data from the survey was processed using *Geoplot* version 3.0. It was desloped (a means of compensating for sensor drift during the survey by subjecting the data to a mathematical bias sloping in the opposite direction of the bias created by sensor drift), and clipped to reduce the distorting effect of extremely high or low readings caused by ferrous metals on the site. The results are plotted as greyscale and trace images.

The survey was carried out by David Bunn and James Snee on 6th May 1999. The weather was fine and sunny.

5.0 Results (Figs.3-5)

The site displayed a wide range of magnetic variability, and the majority of anomalies detected are of almost certain archaeological significance (a modern service extends across the site from north to south, and this was also detected as a strong magnetic anomaly).

The greatest magnetic response occurred to the west of the survey; possibly reflecting the topography of the site. The slope (west-east) has probably influenced differing topsoil depths - greater to the east due to the movement of soil by ploughing and natural erosion. Consequently, a greater concentration of potential archaeological features on the higher (westerly) part of the site may not be a true reflection of archaeological density.

The complex arrangement of linear, curvilinear, sub-rectangular and amorphous anomalies appear to reflect several phases of activity, largely in the form of enclosures. These enclosures are presumed to be of Iron Age or Romano-British date.

Although the archaeological remains are very positively defined on the west side of the survey, there are clear indications that the archaeology continues towards the east: linear and localised anomalies can be seen, although these are much more diffuse. As noted above, this diffusion may be the result of soil masking; a situation that cannot be tested without the use of intrusive means.

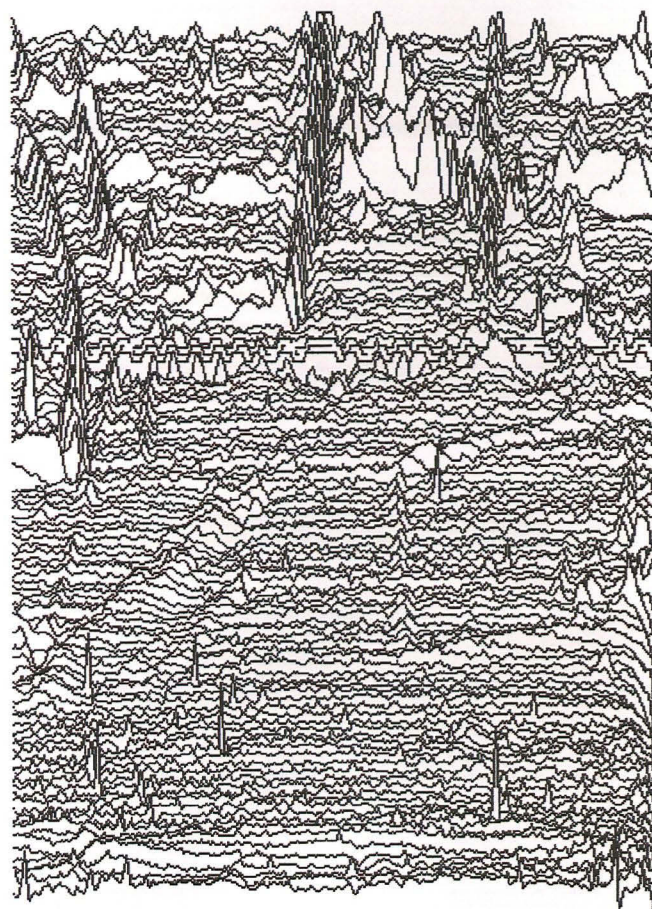


Fig.3: Trace plot of raw data (modern service clipped)
Scale 1:1250

Fig.4: Greyscale (clipped)



-4.00

nT

7.00



Service

Fig.5: Greyscale (smoothed)

Scale 1:1250



6.0 References

- | | |
|-----------------------------------|--|
| Clark, A J | 1990 <i>Seeing beneath the soil</i> . London. |
| David, A | 1995 Geophysical Survey in Archaeological Field Evaluation. <i>London, English Heritage, Research & Professional Services Guidelines No 1</i> . |
| Gaffney, C, Gater, J & Ovenden, S | 1991 The use of Geophysical techniques in archaeological evaluations. <i>Institute of Field Archaeologists, Technical Paper, No 9</i> . |
| LCC | 1998 <i>Lincolnshire Archaeological Handbook: A Manual of Archaeological Practice</i> . Lincoln, Built Environment Section, Lincolnshire County Council. |
| May, J | 1984 'The Major Settlements of the Later Iron Age in Lincolnshire', in Field & White (eds.) <i>A Prospect of Lincolnshire</i> , 18 - 22. |

7.0 Summary of survey parameters

Instrument:	Geoscan Research Fluxgate Gradiometer FM 36 with Sample Trigger ST1
Resolution:	0.1 nT
Grid size:	30m x 30m
Sample interval:	0.25m
Traverse interval:	1m
Traverse method:	Zigzag