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FLUXGATE GRADIOMETER SURVEY: LAND OFF ST. PETER'S ROAD, SCOTTER, LINCOLNSHIRE

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Report prepared for Lindsey Archaeological Services
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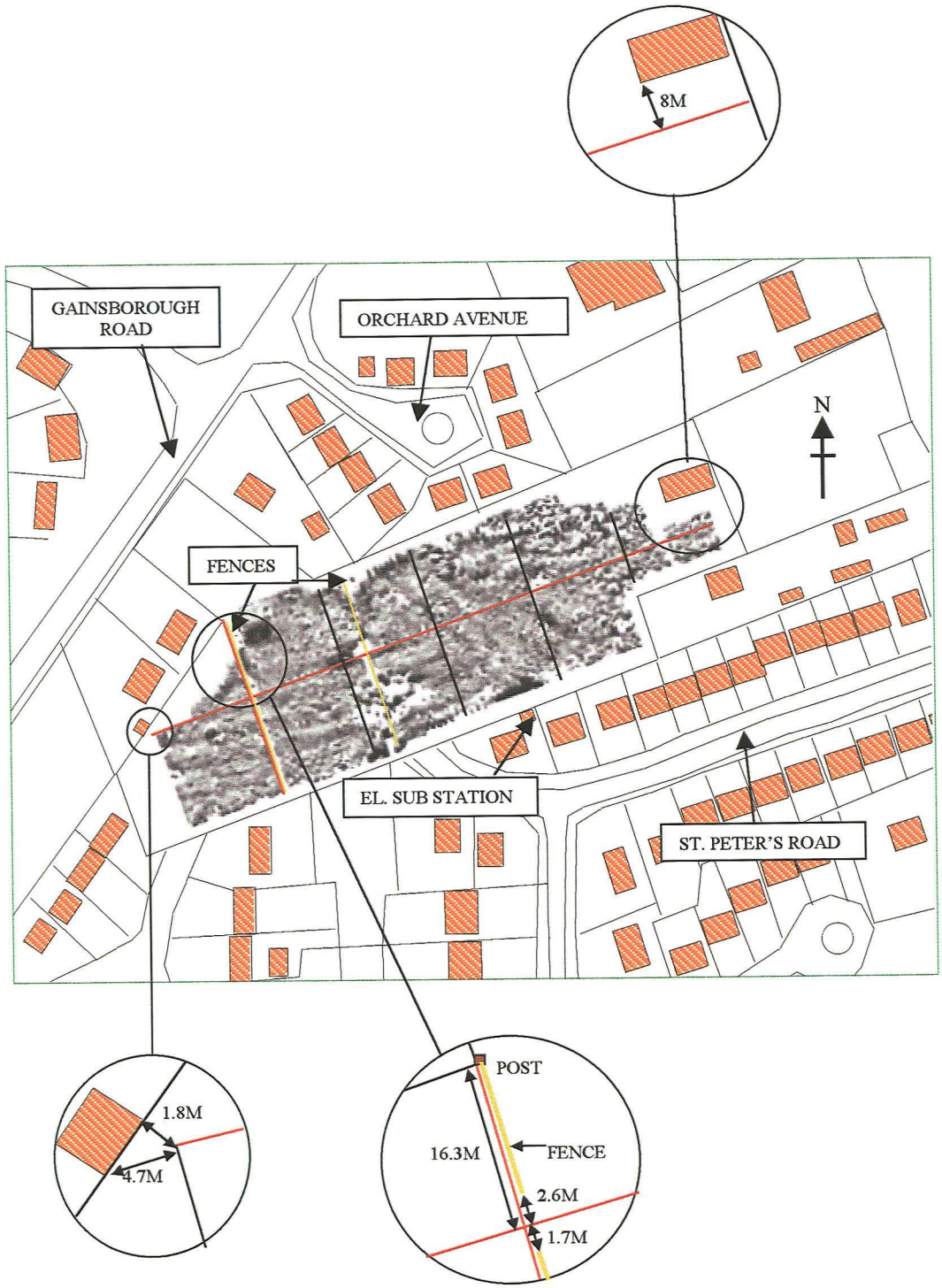
Illustrations

Summary

- *A fluxgate gradiometer survey was undertaken on land at Scotter, Lincolnshire*
- *The survey identified areas of strong magnetic variation, most of which relates to known or suspected modern features*
- *A series of linear anomalies probably reflect traces of ridge and furrow ploughing. Others, which were detected in an area of relatively strong magnetic variation, could be related. However, it is possible some anomalies, situated towards the north-east edge of the survey, are more closely associated with some form of domestic activity*

Fig.1: Location of site 1:25000



Location of survey 1:2000

1. 0 Introduction

Lindsey Archaeological Services commissioned Pre-Construct Geophysics to undertake a fluxgate gradiometer survey of land at Scotter, Lincolnshire. This work was carried out to fulfil part of a recommendation by Lincolnshire County Council Conservation Services for an archaeological evaluation of the site. Full planning permission is sought for residential development (Planning Ref.: M01/P/1180).

The survey methodology described in this report was based on the guidelines set out in the English Heritage document *'Geophysical Survey in Archaeological Field Evaluation'* (David, 1995).

2.0 Location and description

Scotter lies approximately 12km to the north-east of Gainsborough, in the administrative district of West Lindsey, and on the western bank of the River Eau. The proposed development site, a sub-rectangular unit of c. 0.8ha, is situated to the south-east of Gainsborough Road, to the north of St. Peter's Road, and to the west of High Street.

The site is bordered to the west, north and south by residential developments and to the east by waste land. Two low timber fences divide the site into three units. The western and units form the higher ground, particularly the latter, where a substantial west-facing slope dominates the landscape.

The solid geology of the area comprises beds of Triassic Mercia Mudstone overlain by drift deposits of blown sand on gravel. (B.G.S., 1982).

3.0 Archaeological and historical background

The Lincolnshire Sites and Monuments Record includes references to a number of prehistoric implements and other artefacts that have been recovered within 700m of the site. Among these, perhaps the most significant is a dug-out boat, which was discovered close to the river Eau (SMR 50080).

The Domesday Survey of 1086 includes the place names *Scotere* and *Scotre*, which suggests that the settlement was established by at least the late Saxon period (Cameron 1998). It is thought that human remains (SMR 50065) uncovered close to the Green (c. 100 to the north-east) may date from this period. To the east, a mass grave, discovered in 1892, may contain victims of the Black Death.

4.0 Methodology

Detailed area survey using a fluxgate gradiometer is a non-intrusive method of evaluating the archaeological potential of a site. The gradiometer detects magnetic anomalies created by areas of high or low magnetic susceptibility. These variations are caused by changes in the composition of the subsoil or the underlying geology. Archaeological features result from man-made alterations to the soil and they may also incorporate intrusive materials such as brick and stone. These features can create detectable magnetic anomalies. In addition, activities that involve heating and burning can generate magnetic anomalies, as will the presence of ferrous metal objects.

The anomalies detected by a fluxgate gradiometer survey can often be resolved into entities sharing morphological similarities with features of known archaeological provenance. This enables the formulation of an informed, but subjective, interpretation.

Magnetic variation between archaeological or naturally occurring features and natural geological strata can result from:

- their relative depth or density of fill
- the magnetic properties of materials introduced as a result of human activity (e.g. rubble, stone, brick/tile, ferrous metal, etc.)
- magnetic enhancement associated with areas of burning
- the magnetic properties of localised, naturally deposited minerals, such as those occurring in the fills of palaeo-channels.

An area of c. 0.5 hectare was surveyed.

The area survey was conducted using a *Geoscan Research* fluxgate gradiometer (model FM36) with an electronic sample trigger set to take four 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 sensitivity of the machine was set to detect magnetic variation in the order of 0.1 nanoTesla. Baselines were established as detailed in figure 2.

Data from the survey was processed using *Geoplot* (*v. 3.0*). It was desloped (a means of compensating for sensor drift during the survey) and clipped to reduce the distorting effect of extremely high or low readings caused by discrete pieces of ferrous metal. The results are presented as greyscale and colour images, a trace plot, and an interpretive plan (Figures 3-6).

Instrument	Geoscan Research fluxgate gradiometer FM36 Sample trigger ST1
Grid size	30m x 30m
Sample interval	0.25m
Traverse interval	1.0m
Traverse method	Zigzag
Sensitivity	0.1nT
Processing software	Geoplot (*v. 3.0*)
Weather conditions	Warm, sunny
Area surveyed	c. 0.7 ha
Date of survey	23rd March 2002
Survey personnel	David Bunn
Central National Grid Reference	SE 88466 00784

Table 1: Summary of survey parameters

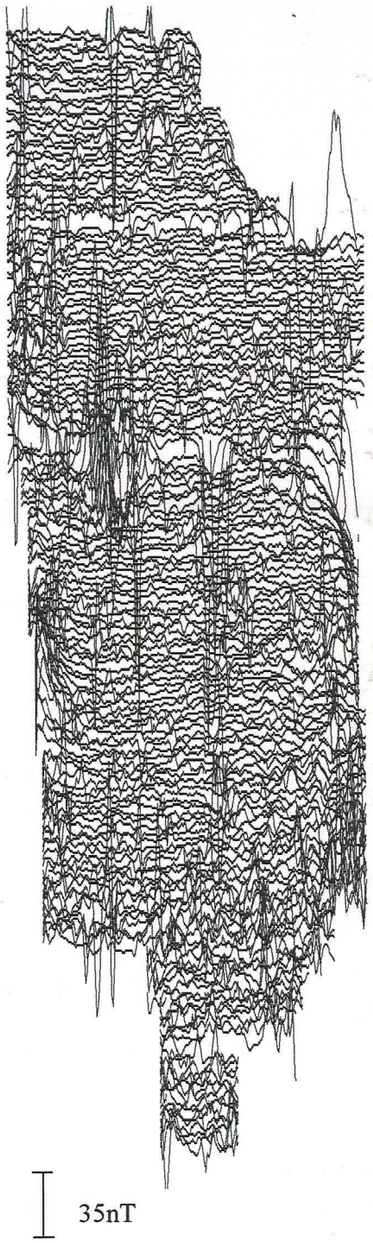


Fig.3: Trace plot of the raw data

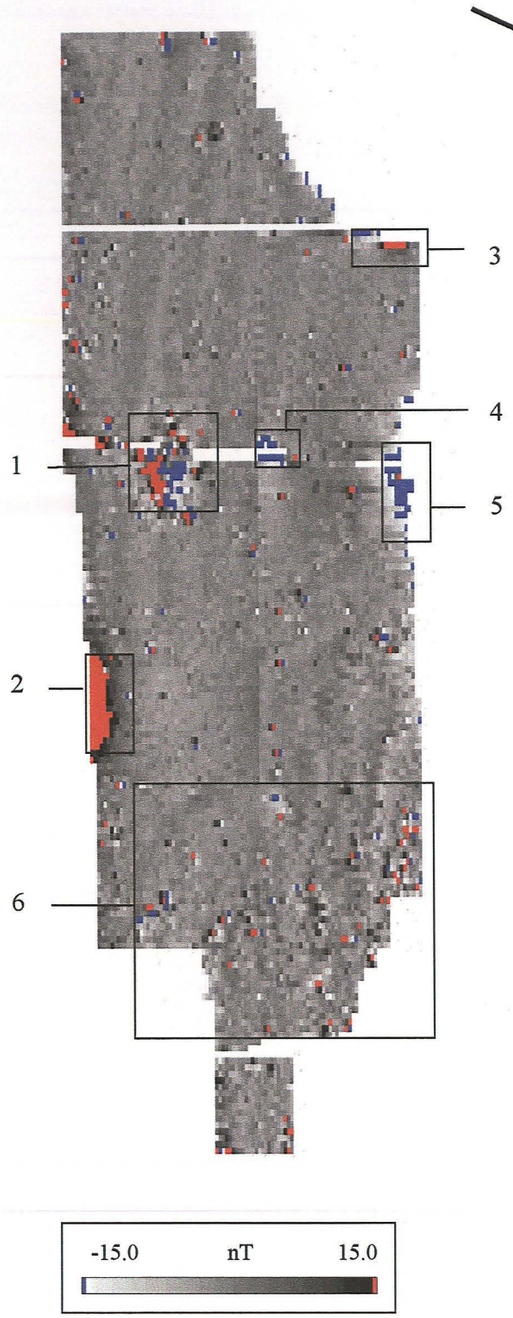


Fig.4: Strongest anomalies in colour

Fig.5: Greyscale image of clipped data

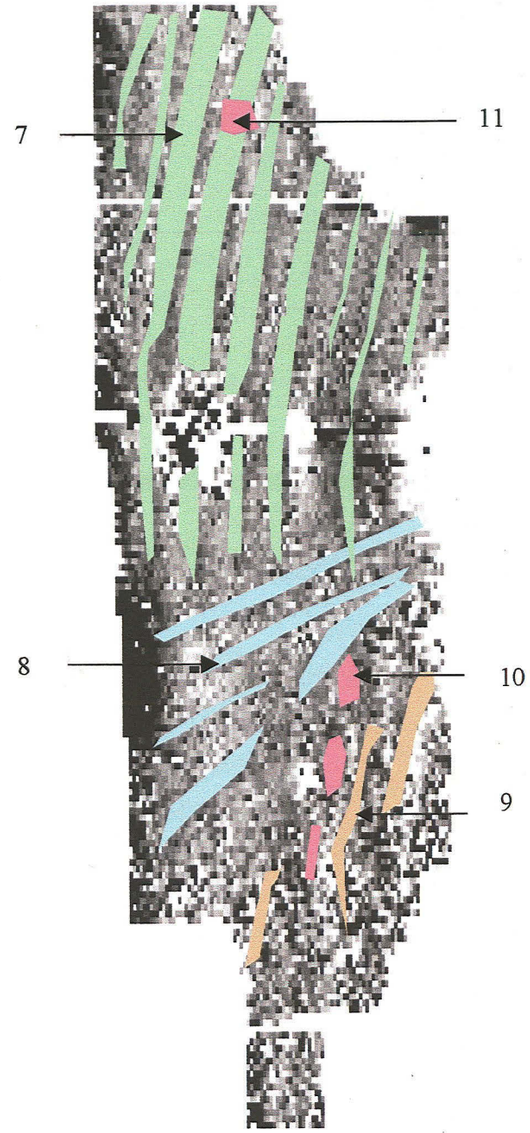


Fig.6: Interpretive plan

5.0 Results (Figs. 3-6)

The results are presented graphically in figures 3-6 (1:1000):

- Figure 3: Trace plot of the raw data
- Figure 4: Image of the unclipped data, with the strongest anomalies shown in colour (annotated for interpretive purposes)
- Figure 5: Greyscale image of the enhanced (clipped) data
- Figure 6: Interpretive plan of enhanced data

The strongest magnetic variation is represented in figure 4. This almost certainly relates to known or suspected modern features.

A group of densely distributed anomalies (**1**) was detected in the lowest part of the site, an area known to have contained a pit (*pers. comm.* Mrs. Woods). Anomaly group **1** probably reflects rubble and ferrous material within the backfill.

Anomaly **2** occurred close to an electricity sub station, **3** adjacent to a wire fence surrounding a tree and **4** to discarded barbed wire. Anomaly **5** was detected close to an electric fence and the rear of residential properties.

Scatters of discrete anomalies (example: **6**) were detected across the site. The highest numbers occurred at the eastern end of the site, which lies close to a derelict building. Miscellaneous rubble and ferrous debris probably account for this variation.

Enhancement of the data (Fig.4) amplified the resolution of weaker magnetic anomalies.

A series of linear anomalies (**7** and **8**) extend across much of the survey area. Their alignment and morphology suggests that **7** represent ridge and furrow selions that extend eastwards to a headland, **8**. Indeed, slight earthworks in the south-western part of the site appear to support this interpretation.

A group of linear anomalies (**9**) may be related to **7** and **8**. However, the topography and magnetic characteristics at the eastern end of the survey area suggests that this area has been subject to more than agricultural activity. The survey has not determined the nature of this activity.

Discrete areas of magnetic variation (**10**) were detected close to **9**. The alignment of **10** appears to respect that of anomaly group **9**, and it is possible that they represent similar features.

Anomaly **11** occurs within a component of **7**. The relatively high magnetic strength of **11** suggests that it may represent a pit or area of burning.

6.0 Conclusions

The survey detected a series of linear anomalies that appear to represent elements of ridge and furrow ploughing, including a headland. This interpretation corresponds with extant earthworks on the site, particularly on its western side.

Linear anomalies in the eastern half of the site are more difficult to resolve. It is possible that they, and adjacent areas of discrete magnetic variation, reflect activities more closely associated with the early (i.e. domestic) settlement.

7.0 Acknowledgements

Pre-Construct Geophysics would like to thank Lindsey Archaeological Services for this commission.

8.0 References

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