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FLUXGATE GRADIOMETER SURVEY REPORT

LAND AT GRANGE LE INGS, FALDINGWORTH, LINCOLNSHIRE

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Report prepared for Pre-Construct Archaeology (Lincoln) on behalf of Mr J Connor
by James Snee

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Contents

Figures

Summary

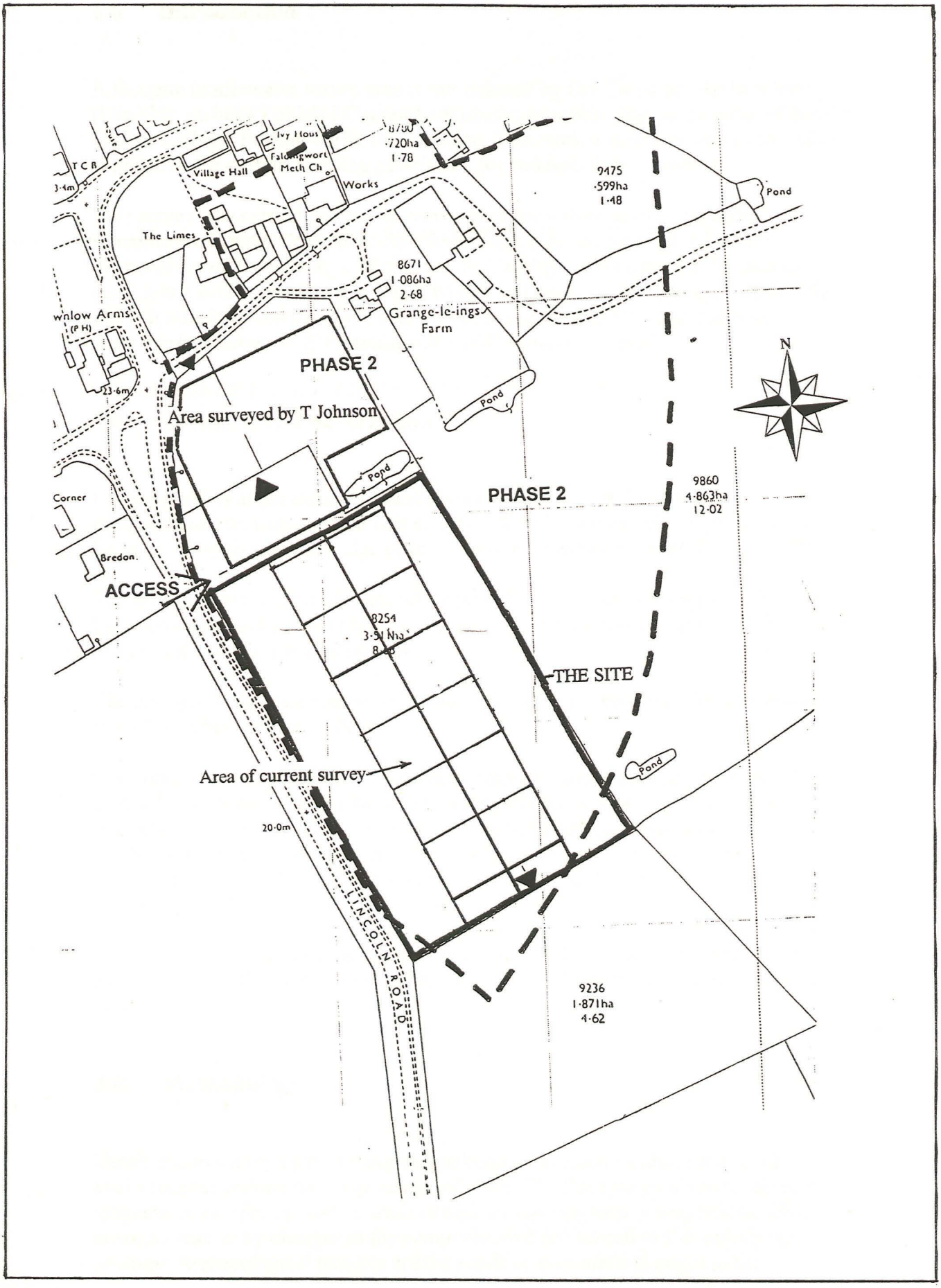
- *A fluxgate gradiometer survey was undertaken to evaluate the archaeological potential of land at Grange Le Ings, Faldingworth, Lincolnshire.*

- *The survey detected a pattern of magnetic variation, possibly associated with ploughing and land management.*

- *Two large magnetic anomalies and a number of diffuse linear anomalies were detected, some of which may have archaeological potential, and a number of small discrete positive anomalies could also be of some archaeological significance*

- *The overall results appear to support the view that more extensive positive magnetic anomalies identified further to the north-west become generally more dispersed towards the south-east: the survey does identify negative magnetic data in the extreme north, which could possibly translate to some form of building remains.*

Fig. 1. Site and survey location (Scale 1:2500)



1.0 Introduction

A fluxgate gradiometer survey was commissioned by Pre-Construct Archaeology (Lincoln), on behalf of Mr J Connor to evaluate the archaeological potential of land at Grange Le Ings, Faldingworth, Lincolnshire. This work was undertaken as part of an application for outline planning permission for residential development.

This survey was carried out in accordance with the guidelines set out in the Lincolnshire County Council Archaeology Section publication *'Lincolnshire Archaeological Handbook; A Manual of Archaeological Practice'*, 1998, and in accordance with a specification prepared by Pre-Construct Archaeology, dated July 1999. It also followed the guidelines set out in the English Heritage document *'Geophysical Survey in Archaeological Field Evaluation'*, 1995.

2.0 Location and description

Faldingworth is approximately 15km north-east of Lincoln. The proposed development site, a rectangular unit of agricultural land measuring approximately 2.5 hectares, is on the southern edge of the village and centres on NGR TF 5067 3846

The land is currently agricultural and supports hay (recently cut) vegetation. It is bounded by hedges and wire fences: the north-west boundary is electrified. Along the south-west boundary is a large drain.

The geology of the area consists of boulder clay and till and lies within the southern part of the Lindsey Clay Vale.

The area to the immediate north-west of the site contains a number of earthworks associated with the shrunken medieval village of Faldingworth. However a magnetometer survey did not identify any anomalies that corresponded to these remains (Johnson 1999). The survey did identify a range of anomalies including a possible enclosure type feature (tentatively dated to the Romano-British period) and a series of possible pits.

The purpose of the present survey was to establish whether or not the pattern of anomalies identified in the previous survey continued into the proposed development area.

3.0 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 will 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 by measuring out from the southern and western field boundaries. 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. The data 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). The data was clipped to reduce the distorting effect of extremely high or low readings caused by ferrous metals on the site, and the result was plotted as a greyscale image (smoothed on Fig. 2, unsmoothed on Fig. 3).

The survey was carried out by Mr D Bunn and the writer, on the 6th July 1999. The weather was hot with bright sunshine. The area surveyed was a transect through the centre of the site and measured approximately 1 hectare.

4.0 Results

An examination of the results presented as a greyscale image showed two faint patterns of lines or striations across the image. One was a regular pattern of north-east to south-west lines at approximately 6m intervals. These are most likely the result of ploughing (ie ridge & furrow). The second was less regular, forming a criss-cross pattern oriented north to south and east to west. These anomalies were interpreted as either an earlier pattern of ploughing, or possibly some form of land drainage.

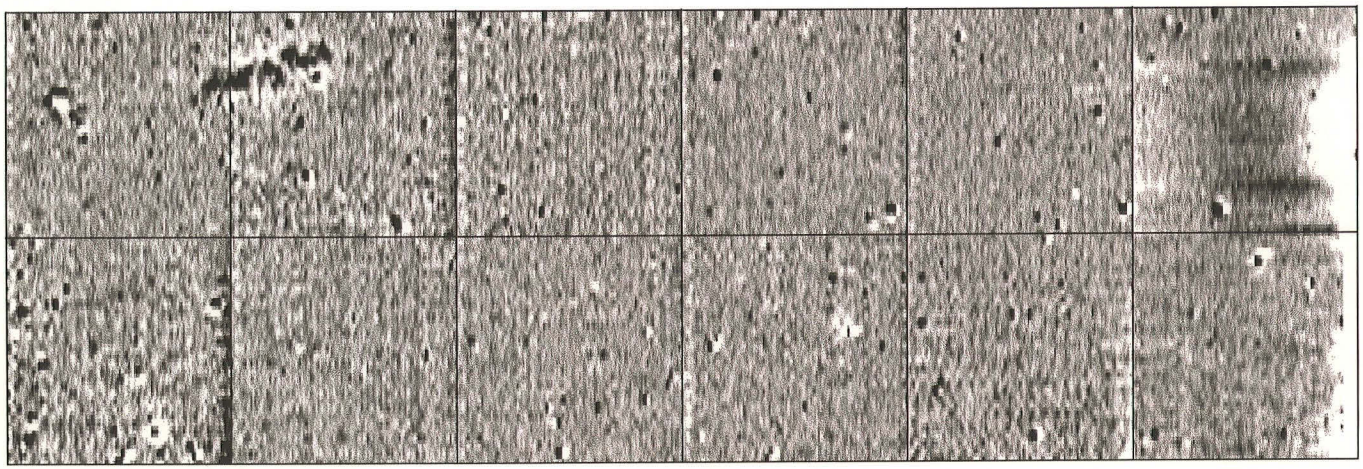
Neither of the above groups has been reproduced in Fig. 4, but they can be seen in the non-smoothed greyscale image, Fig. 3.

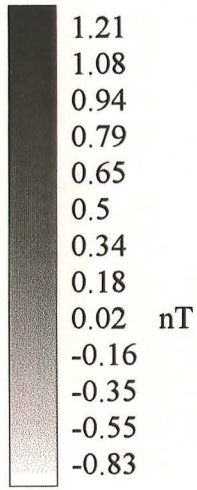
Two large magnetic anomalies were detected in the south corner. One sub-circular and approximately 6m in diameter (1), the other oval, 20m long and 8m wide (2). Both anomalies were very diffuse and irregular. They may be large pits, although anomaly (2) could be a pond.

To the north of the above were two broad diffuse linear anomalies oriented east to west (3) . These may reflect features associated with (?medieval) ploughing/land drainage, although this is not certain.

In the north corner of the survey was a series of negative linear anomalies (4 & 5). The strongest of these (4) forms a rectangle and may conceivably reflect building remains. The others (5) are weaker and are less open to interpretation.

Fig. 2 : Smoothed greyscale image. Scale 1:1000





40m

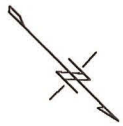


Fig. 3 : Unsmothed greyscale image. Scale 1:1000.

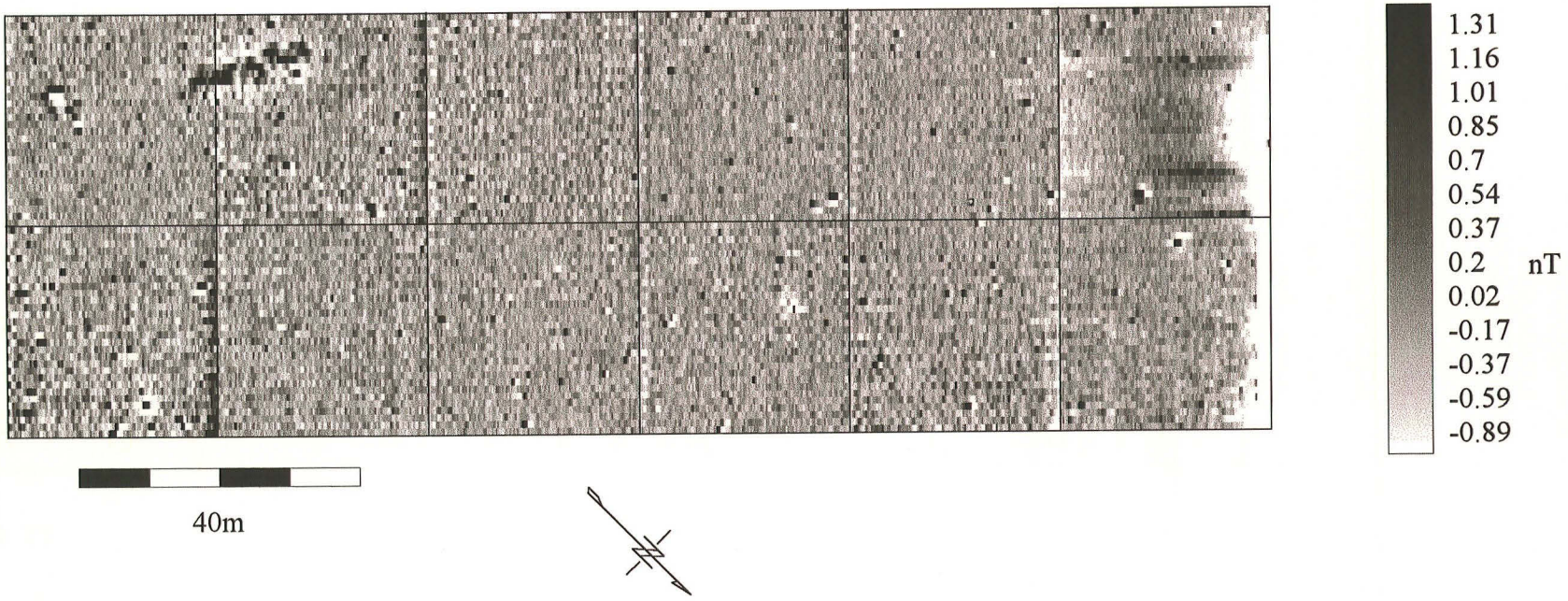
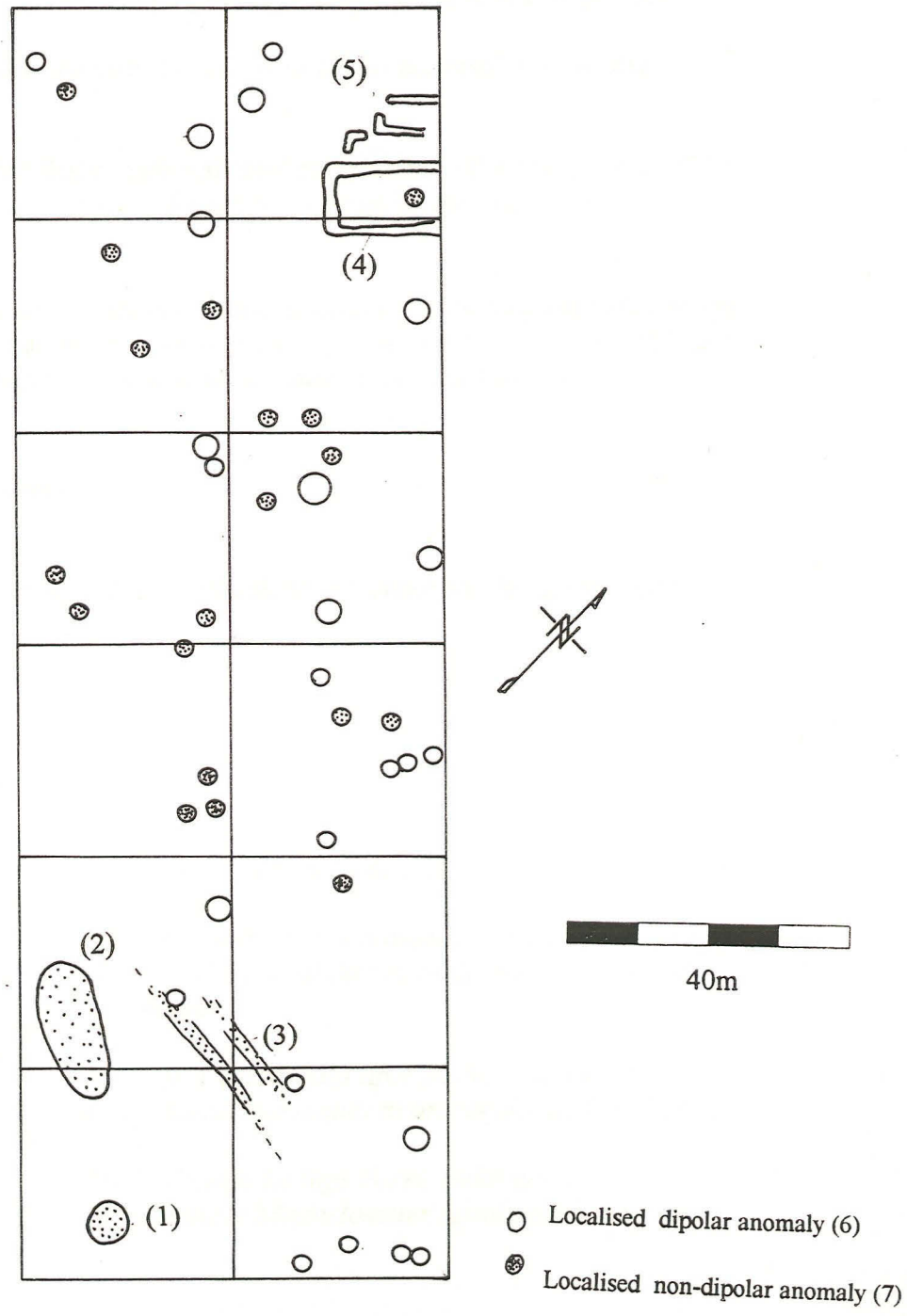


Fig. 4. Interpretation



Over most of the survey area, small discrete positive anomalies were detected. Some of these were dipolar (6) and were probably caused by the presence of ferrous objects. Others (7), however, were not dipolar and may be small pits.

5.0 Conclusions

The general pattern of anomalies detected in the survey to the north-west of the present survey (Johnson 1999) does not obviously continue southwards, although areas of potential archaeological significance have been identified. Much of the observed magnetic variation was probably the result of ploughing and land management for purely agricultural purposes (probably in the medieval period).

Two large anomalies were probably caused by ponds or pits (perhaps for clay extraction).

Tenuously, it is suggested that negative anomalies detected in the north corner of the survey may be of structural origin, although this cannot be established by geophysics alone.

The detection of dipolar anomalies is a common feature during magnetometer survey, as ferrous objects (litter) are often encountered in topsoil. That said, the possible pits detected during the survey may have some archaeological significance.

6.0 Acknowledgements

Pre-Construct Geophysics would like to thank Mr J Connor for this commission.

7.0 Appendices

7.1 References

Clark, AJ — 1990 *'Seeing beneath the soil.'*

David, A — 1995 *Research & Professional Services Guidelines No 1; 'Geophysical Survey in Archaeological Field Evaluation.'*

Gaffney, C, Gater, J & Ovenden, S — 1991 *IFA Technical Paper No 9; 'The use of Geophysical techniques in archaeological evaluations.'*

Johnson, A.E — 1999 *Grange Le Ings Farm, Faldingworth, Lincolnshire: Magnetometer (gradiometer) survey.*

7.2 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:	Zig-Zag