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FLUXGATE GRADIOMETER SURVEY
LAND OFF HOLT LANE & BANOVALLUM GARDENS, HORNCASTLE, LINCOLNSHIRE

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Report prepared for Pre-Construct Archaeology (Lincoln).

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May 1999

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Illustrations

Summary

- *A fluxgate gradiometer survey was undertaken to evaluate the archaeological potential of land off Holt Lane and Banovallum Gardens, Horncastle, Lincolnshire.*

- *The survey detected twenty-three magnetic anomalies, most of which are probably the result of modern disturbance and recent agricultural activity (land drainage, ploughing etc.), and therefore of limited archaeological significance.*

- *It is suggested that four of the anomalies may be of greater archaeological significance.*

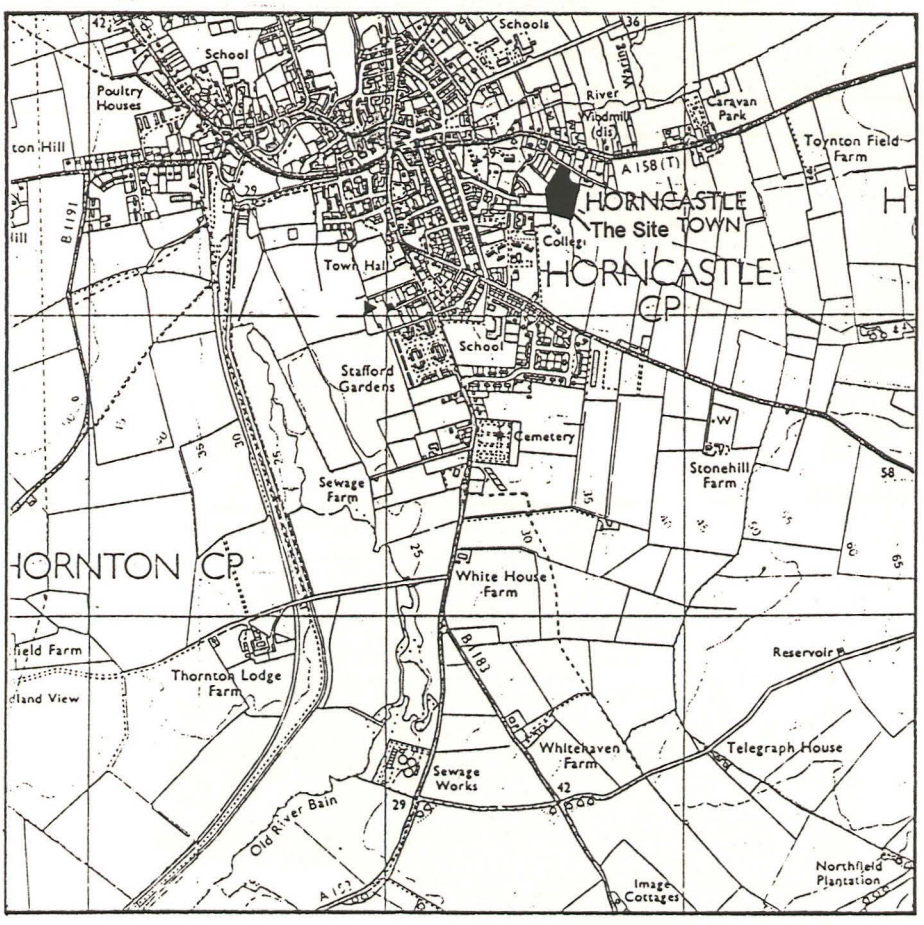


Fig. 1 Site location. Scale 1: 25,000.

Fig. 2 Fluxgate Gradiometer Survey Off Holt Lane / Banovallum Gardens, Horncastle. Smoothed Greyscale image

Scale 1:750

0 25 m.

6950

69400

6500

526600

1.0 Introduction

A fluxgate gradiometer survey was commissioned by Pre-Construct Archaeology (Lincoln), on behalf of Robert Bell & Company, as part of an archaeological field evaluation on land off Holt Lane / Banovallum Gardens, Horncastle, Lincolnshire. These works are being undertaken in advance of a possible outline planning application 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 March 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

Horncastle is in east Lincolnshire at the south-west tip of the Lincolnshire Wolds. The town lies 28km east of Lincoln, 30km west of the coast. The proposed development site, an irregular unit measuring approximately 1.3 hectares, is on the eastern periphery of the town and centres on NGR TF 2660 6940.

The area of the proposed development is currently untended pasture, with tall uncut hawthorn hedges along the perimeter. It is traversed north-west to south-east by the Thunker Drain which joins the River Waring close to the town centre. This drain is tree-lined for most of its length. The site is on a sand and gravel subsoil with very sandy organic topsoil covered in thick vegetation, mainly tussocks of grass between 30cm and 75cm high. There has been a certain amount of disturbance to the land; modern rubbish - including ferrous metal objects, building debris and cut down vegetation - has been dumped in some areas of the site, and in other areas recent fires have been lit.

The land lies at an altitude approximately 35m OD.

The area on which the modern town lies was an important Iron Age settlement and Roman town. Archaeological remains dating from the Mesolithic period onwards have been found in the area of the town, and scatters of Roman pottery and cremation burials have been recorded close to the proposed development.

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 in 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, which is 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 a range of +/- 3 nT to reduce the distorting effect of extremely high or low readings caused by ferrous metals on the site. The result was plotted as a greyscale image without any smoothing or interpolation (the creation of additional 'virtual' readings between the existing readings to create a smoother image).

The survey was carried out by Mr D Bunn and the writer, on the 26th April 1999. The weather was changeable with patchy cloud, occasional sunny spells, occasional light showers and a slight easterly wind. The area surveyed was 0.7 hectares (the remaining area was unsuitable due to the presence of modern debris, the Thunker drain and trees).

4.0 Results

4.1 Strong macula anomalies

The survey detected a number of strong macula (amorphous) anomalies (Fig. 3, 1 to 8, see also Fig. 4). These were mainly caused by modern disturbance or the presence of ferrous (iron rich) rubbish (e.g. 6 was the remains of a fire, 4 was the rusted remains of an old mattress). It is unlikely that any of these anomalies are caused by the presence of archaeological features.

4.2 Weak linear anomalies

A series of week regular linear anomalies were detected. Some were oriented north-west to south-east, and others were oriented approximately perpendicular to them. (See Fig. 3, 9 to 23, see also Fig. 4)

The most prominent is linear 9 which gave a relatively strong positive signal through grids 3, 8, 9 and 13. Linear 10 and the group of four linears numbered 13 are very weak and appear to terminate where they meet linear 9. This group of features is

Fig. 3 Plan showing interpretation of anomalies. Scale 1:1000.

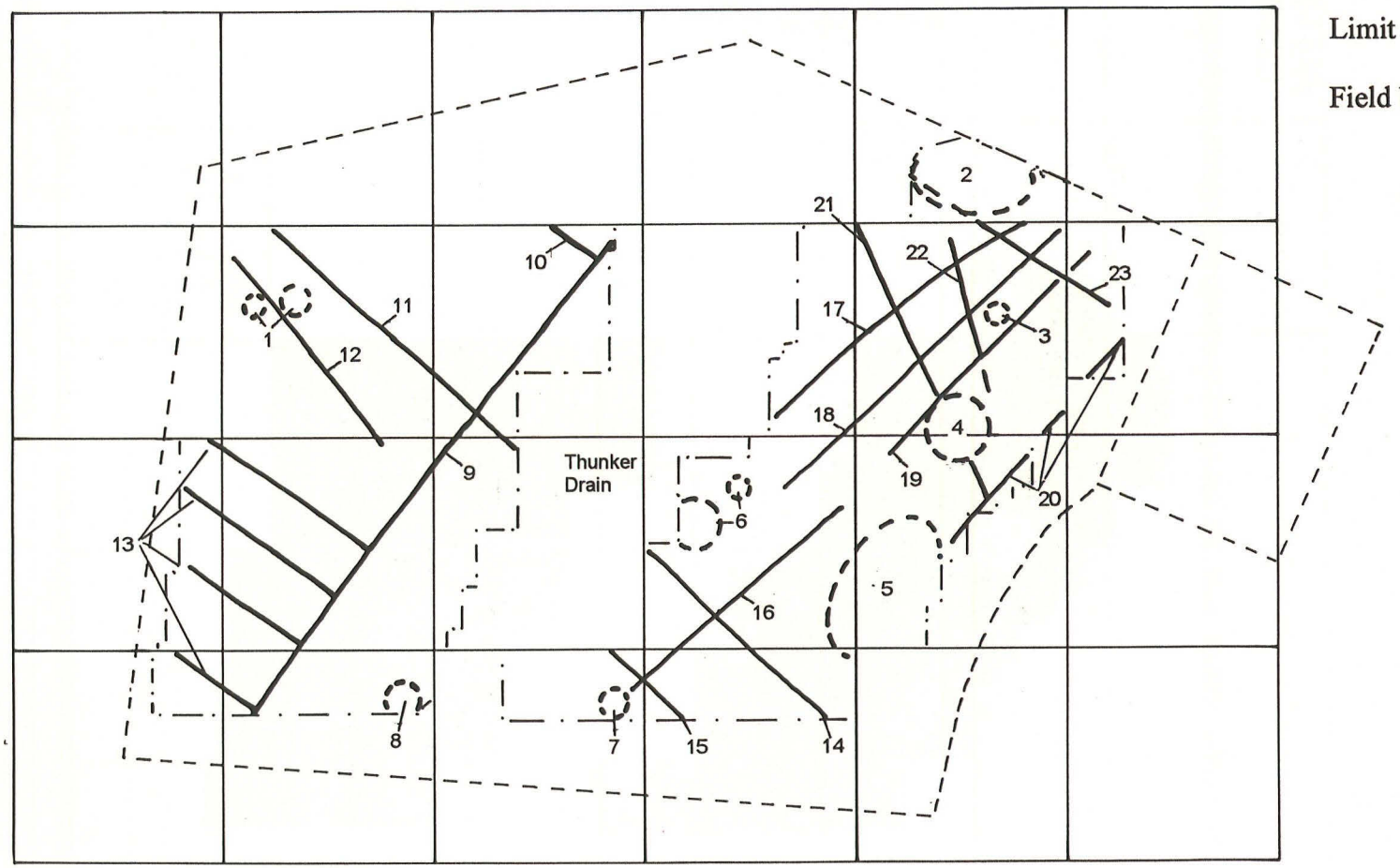
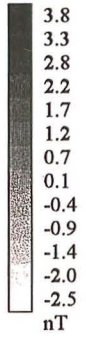
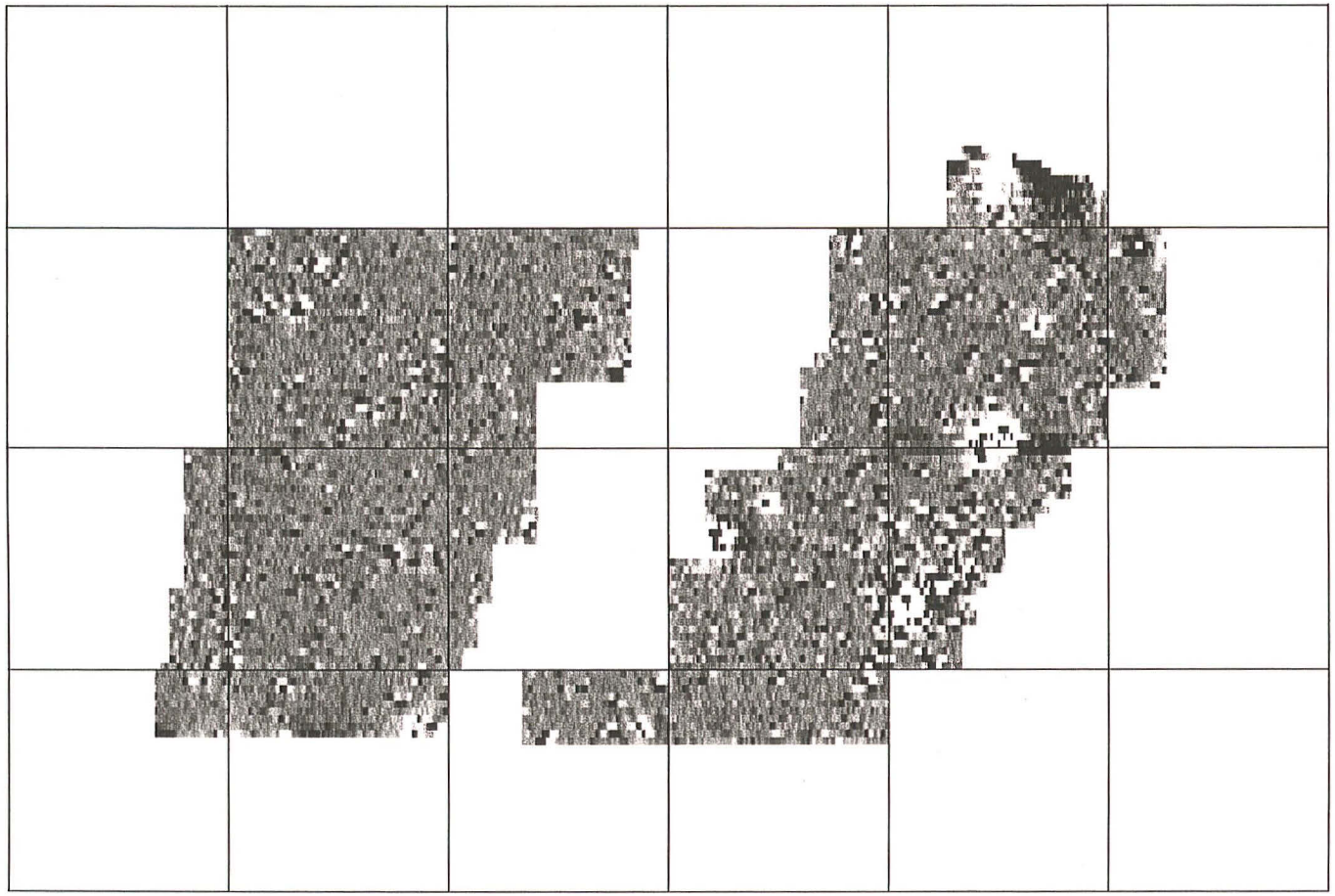


Fig. 4 Shade plot of processed data.

Data Set:
Top Left Corner X,Y: 1, 1
Bottom Right Corner X,Y: 720, 120

Display Parameters
Shade Plot (Clip)
Minimum: -2
Maximum: 3
Contrast: 1
Units: Std Dev
Palette: grey13.ptt
Palette Option: Normal
Plotting Scale: 1:1000
Printer Resolution (X): 300dpi
Printer Resolution (Y): 300dpi





possibly the remains of a field drain system, or evidence of previous agriculture on the site (i.e. plough furrow). Linear 11 is also probably part of a field drainage system, although it does not terminate at linear 9. Linear 12 may also be part of a drainage system, although it does not follow the same alignment as the other linears and may be archaeologically significant.

Linears 16, 18, 19 and 20 have a similar orientation to linear 9, but are weaker and not as regular. They may form part of a land drainage system, or they could be a pattern of plough furrows. Linears 14, 15 and 23 are perpendicular to the former pattern and are probably field drains. It is possible that 14 is a continuation of 11.

Linear 17 is on a similar alignment to linear 18 but curves towards the north. It is possible that this is an archaeological feature, but it remains possible that it is an agricultural feature. Linears 21 and 22 are on a slightly different orientation to the bulk of the anomalies. It is possible that they are archaeological features, but they may also be land drains or something similar.

5.0 Conclusions

Although a large number of magnetic anomalies were detected within a small area, the majority of these are unlikely to represent important archaeological features. Most of the anomalies appear to represent modern disturbance and debris, or agricultural features such as field drains and plough furrows. Only four anomalies (12, 17, 21 and 22) represent archaeological features of possible significance.

6.0 Acknowledgements

Pre-Construct Geophysics would like to thank Robert Bell & Company for this commission. PCG would also like to thank Mr James Lyall for his advice and his assistance with the digital georeference plot.

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.'*

Palmer-Brown, CPH 1999 *Specification for an archaeological field evaluation; 'Land off Holt Lane / Banovallum Gardens, Horncastle, Lincolnshire.'*

7.2 Summary of survey parameters

Instrument:	Geoscan Research Fuxgate 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

7.3 Shade plot of raw data.

Data Set:
Top Left Corner X,Y: 1, 1
Bottom Right Corner X,Y: 720, 120

Display Parameters
Shade Plot (Clip)
Minimum: -2
Maximum: 3
Contrast: 1
Units: Std Dev
Palette: grey13.ptt
Palette Option: Normal
Plotting Scale: 1:1000
Printer Resolution (X): 300dpi
Printer Resolution (Y): 300dpi