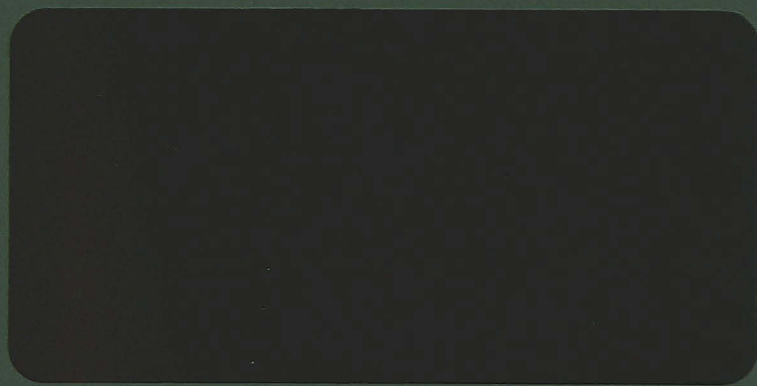


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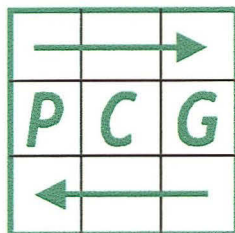
**FLUXGATE GRADIOMETER SURVEY
LAND OFF NORTH LANE
NAVENBY
LINCOLNSHIRE**



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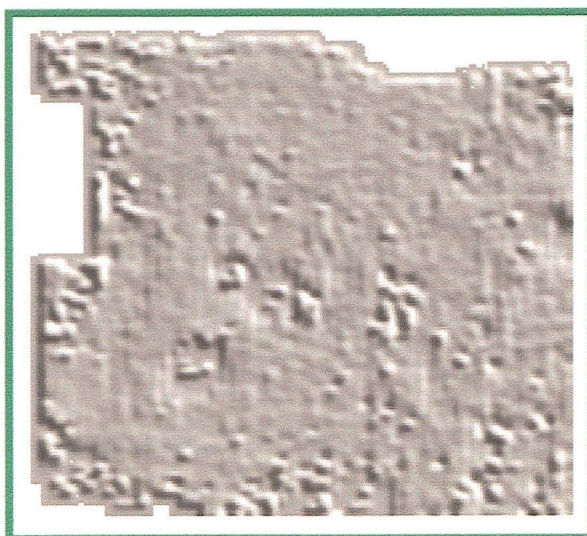
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**FLUXGATE GRADIOMETER SURVEY
LAND OFF NORTH LANE
NAVENBY
LINCOLNSHIRE**



Report prepared for Mrs A Heard
by David Bunn BSc
February 2000

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Contents

	<i>Summary</i>	1
1.0	Introduction	2
2.0	Location and description	2
3.0	Methodology	3
4.0	Results	4
5.0	Conclusions	7
6.0	Acknowledgements	7
7.0	Appendices	7
	7.1 References	7
	7.2 Summary of survey parameters	7

Illustrations

- Fig.1 Site location. Scale 1:10000.
- Fig.2 Location of survey. Scale 1:1000.
- Fig.3 Greyscale image. Scale 1:500.
- Fig.4 Trace plot. Scale 1:500.
- Fig.5 Interpretive image. 1:500.
- Fig.6 Linear trend of anomalies. Scale 1:500.
- Fig.7 Greyscale image: Chapel Heath, Navenby. Scale 1:1250.



Summary

- A fluxgate gradiometer survey was undertaken to evaluate the archaeological potential of land north of North Lane, Navenby, Lincolnshire
- The survey detected strong magnetic variation, the majority of which was caused by modern activity
- Several features of potential archaeological significance were detected, although the effect of natural processes may be a contributing factor

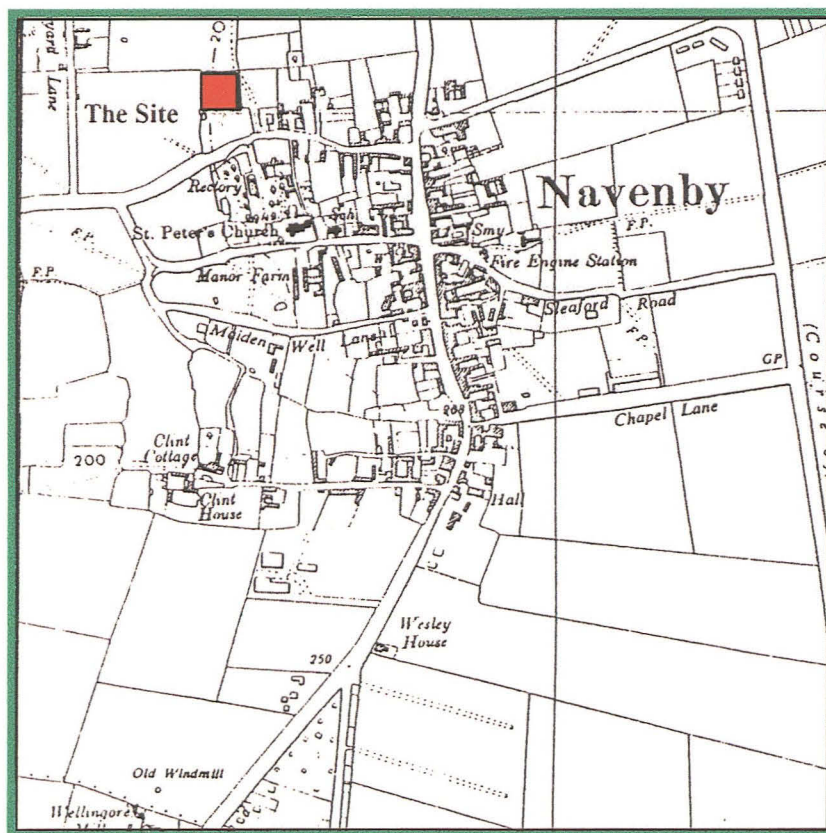


Fig. 1: Site location, 1:10,000

1.0 Introduction

A fluxgate gradiometer survey was commissioned by Mrs A Heard to evaluate the archaeological potential of land adjoining 17, North Lane, Navenby, Lincolnshire.

The survey followed the guidelines set out in the English Heritage document '*Geophysical Survey in Archaeological Field Evaluation*', 1995. Consideration was taken of the recommendations set out in the Lincolnshire County Council Archaeology Section publication '*Lincolnshire Archaeological Handbook; A Manual of Archaeological Practice*', 1998.

2.0 Location and description



Fig.2 Location of survey. Scale 1:1000

Navenby is in the administrative district of North Kesteven approximately 10km south of Lincoln. The site, a rectangular unit of 0.25 hectares, is in the north-west of the village and centres on NGR SK9855 5803.

The geology of the area consists of Oolitic limestone bedrock overlying sand and ironstone.

The site, which is gently undulated and falls away steeply to the west, is perched on the edge of the limestone escarpment. The land currently supports permanent pasture and is bounded by stone walls/hedging to the north and south, hedging to the east and west. Barbed wire fencing also extends along the southern and eastern boundaries. A dew pond is located in the north-west corner at the foot of a 'scalloped' area of the slope.

Navenby has been subject to a number of archaeological investigations of varying types, from the mid 1990's onwards. Late Iron Age and Roman settlement remains appear to cluster on land which lies east of the traditional (medieval) market town – closer to the Roman road, Ermine Street. The core of the medieval settlement was c. 400m west of Ermine Street in an area chosen for its proximity to a reliable water supply, as opposed to a strategic/military route. In 1995, a watching brief on a site close to St. Peter's Church revealed substantial Saxon remains (Palmer-Brown 1995).

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 eastern field boundaries: 4m west, 5m north from the south-east corner. Pegs were at grid corners to facilitate re-location of the survey area. 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 number of greyscale images.

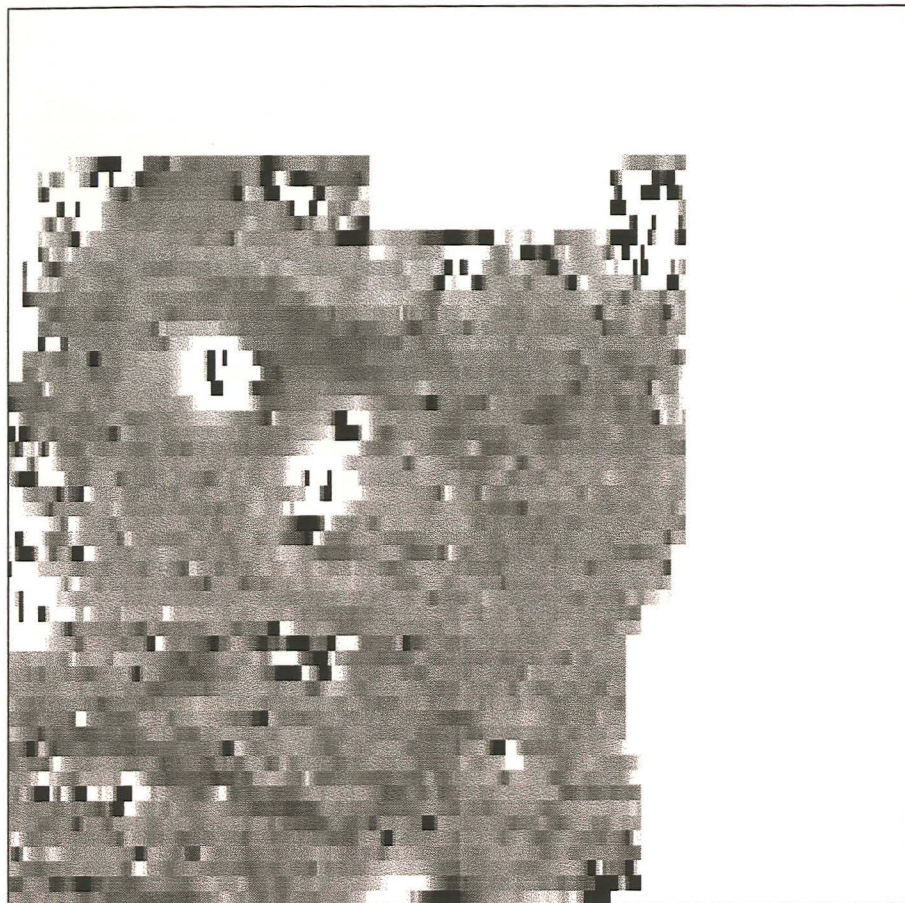


Fig.3 Greyscale image

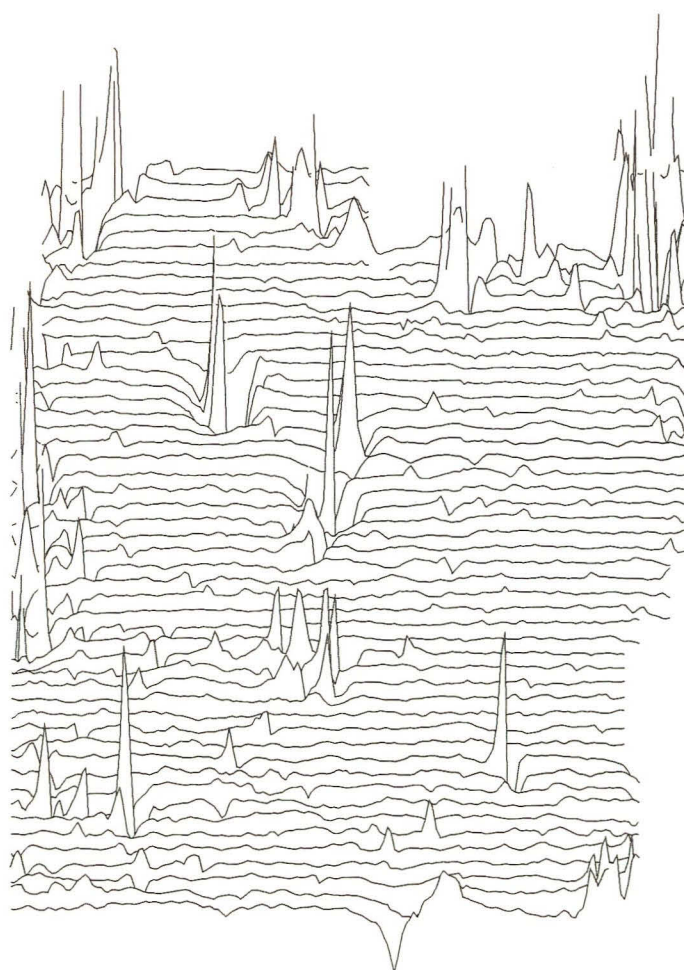
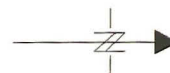
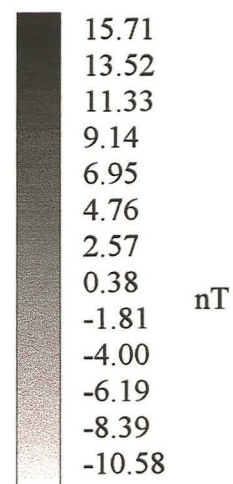


Fig.4 Trace plot



Scale 1:500

The survey was carried out by David Bunn and Mr and Mrs Heard on the 31st January 2000. The weather was overcast, cool and blustery. The area surveyed measured approximately 0.25 hectares.

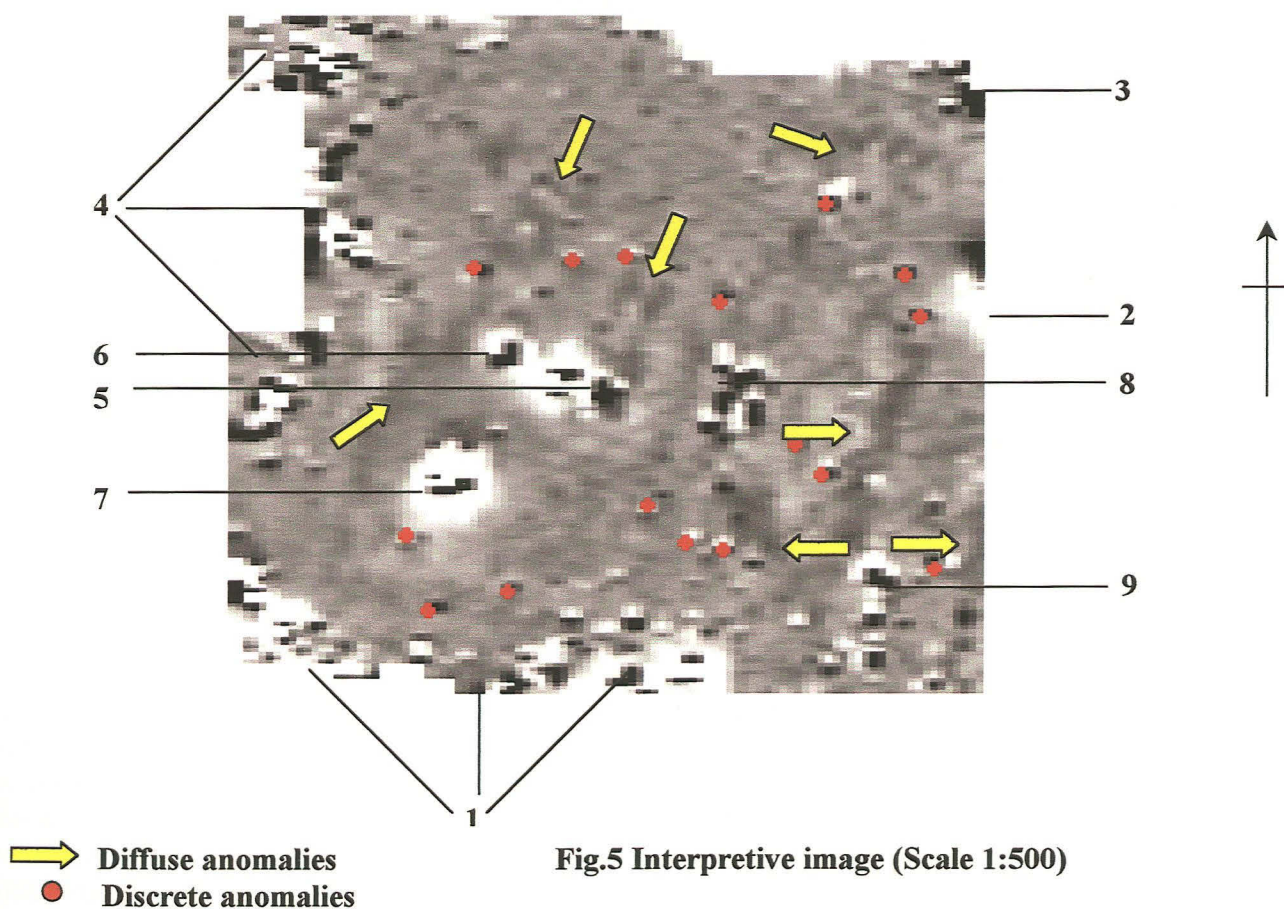
3.0 Results

The site displayed a significant degree of magnetic variation (Figs. 3, 4, 5), predominately of modern origin but containing areas of possible archaeological potential.

Anomalies 1,2 and 3 (Fig.5) were the result of the barbed wire fence that extends the eastern and southern edges of the site.

The area around the pond produced significant magnetic variation, probably caused by modern rubble that was noted on the surface (Fig.5: 4).

Anomaly 5, located in the hollowed feature (possibly an earlier dew pond), corresponds to an area of recent burning. To the west and south-west, two more, similar, anomalies were detected (Fig.5: 6,7) although nothing was noted on the surface.



Further east, the survey revealed a dense cluster of dipolar anomalies (Fig.5: 8) of probable modern origin, like the anomalies in the south-east corner of the site (Fig.5: 9). Other discrete anomalies scattered across the site are labelled in red (Fig.5).

The site contains subtler features of possible archaeological significance (examples Fig.5: yellow arrows). These anomalies appear to exhibit some regularity, and may have archaeological potential. However, given that the survey area is small and provides a limited overview, coupled with evidence of natural processes recorded elsewhere in and around Navenby (Lyll 1996, Snee and Bunn 1999), interpretation of these features can only be tentative. The anomalies may reflect the effects of topography: it should be noted that the land gently undulates and falls away steeply to the west (indicating the limit of the escarpment) and that the linear characteristics of some of the anomalies (Fig. 6) may reflect soil movement, either natural or as the result of human activity.

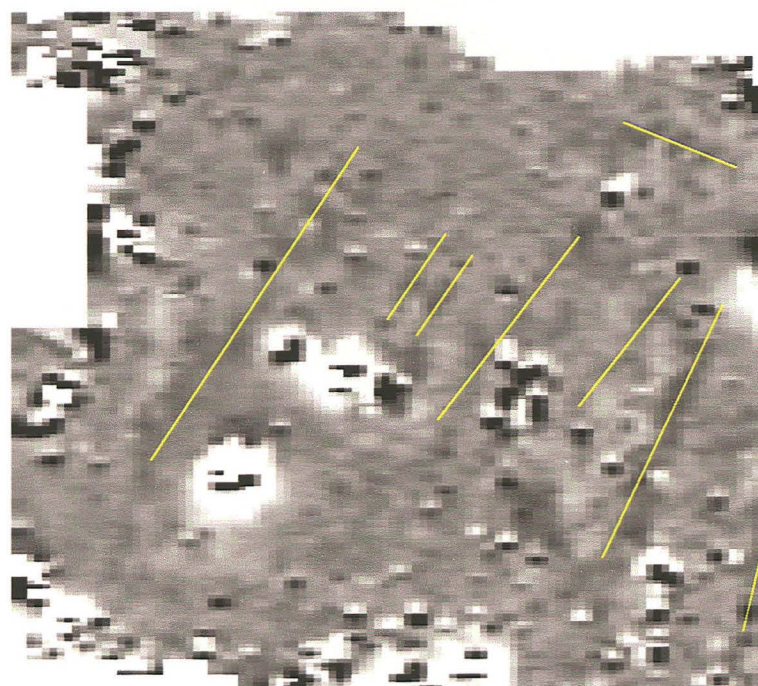
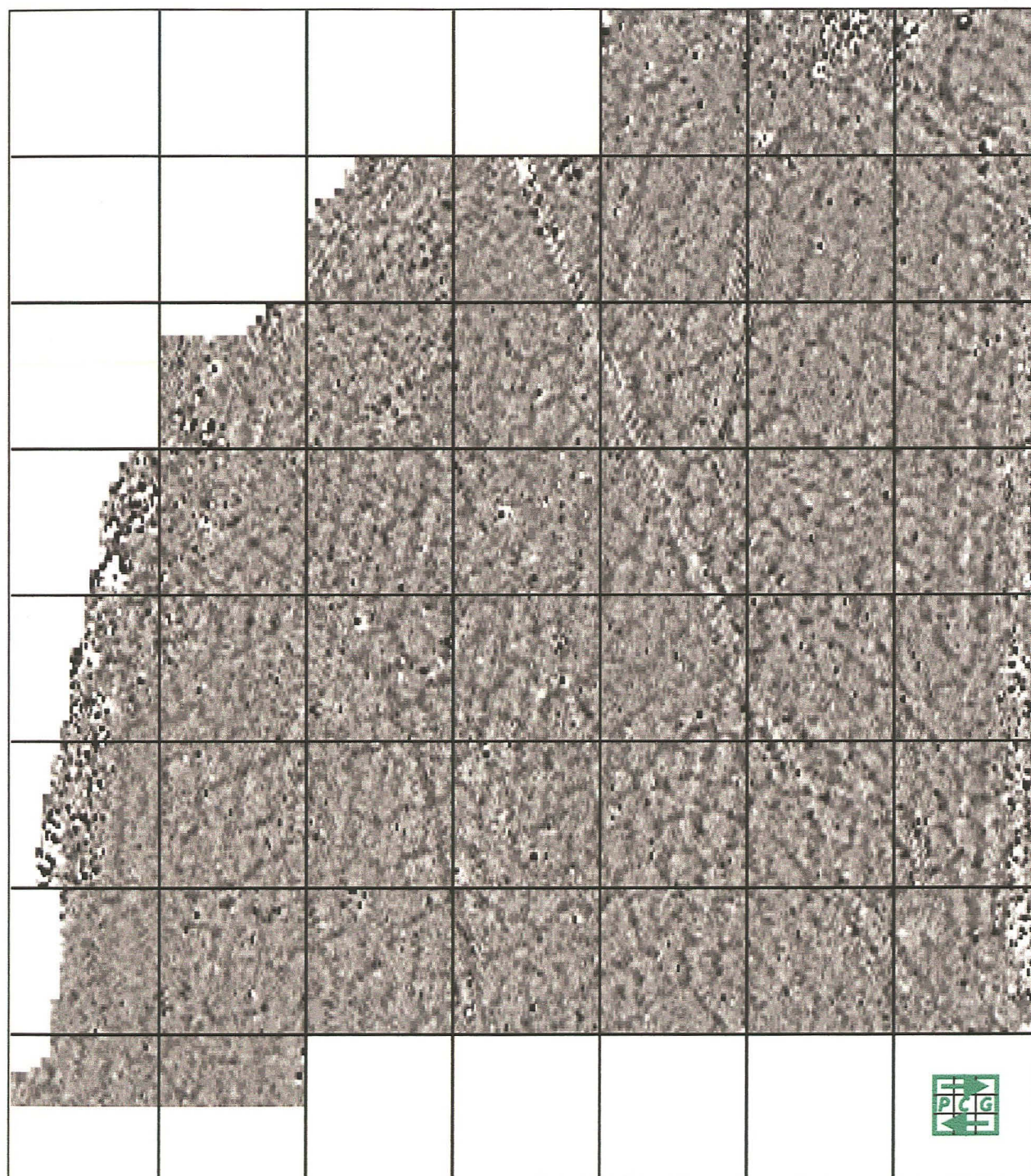


Fig.6 Greyscale showing linear trend. Scale 1:500

An alternative interpretation could be the geological phenomenon known as 'ice-wedging' or reticulation. Fig.7 shows glacial fracturing of the limestone bedrock on land to the south-east of the village (Snee and Bunn 1999), later confirmed by excavation (Palmer-Brown and Rylatt 1999): small areas, taken in isolation can contain anomalies that could be interpreted as anthropogenic. Only when larger areas are examined does the correct interpretation emerge.

The less eroded, eastern, part of the site is geologically similar to Chapel Heath (Fig.7) although further (perhaps intrusive) investigation would be required to establish the nature of these features.



Scale 1:1250

Fig.7 Natural reticulation at Navenby Heath. (Not this site)

5.0 Conclusions

The site contains magnetic anomalies that reflect modern activity (wire, rubble etc.). The weaker, diffuse positive anomalies may similarly be of human origin and have archaeological potential. However, the geology and topography of the site may be contributory factors, possibly in the form of reticulation and/or natural movement.

Detailed survey by gradiometry is only capable of detecting features that alter the magnetic susceptibility of soils or are magnetically different to the soils or features around them. It remains a possibility that there are archaeological features within the survey area that are not detectable.

6.0 Acknowledgements

Pre-Construct Geophysics would like to thank Mrs A Heard for this commission.

7.0 Appendices

7.1 References

- | | |
|-----------------------------------|--|
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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:	Zigzag