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FLUXGATE GRADIOMETER SURVEY
LAND AT WRANGLE
BOSTON

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FLUXGATE GRADIOMETER SURVEY
LAND AT WRANGLE
BOSTON

Report prepared for Lincolnshire County Council
Highways and Planning Directorate
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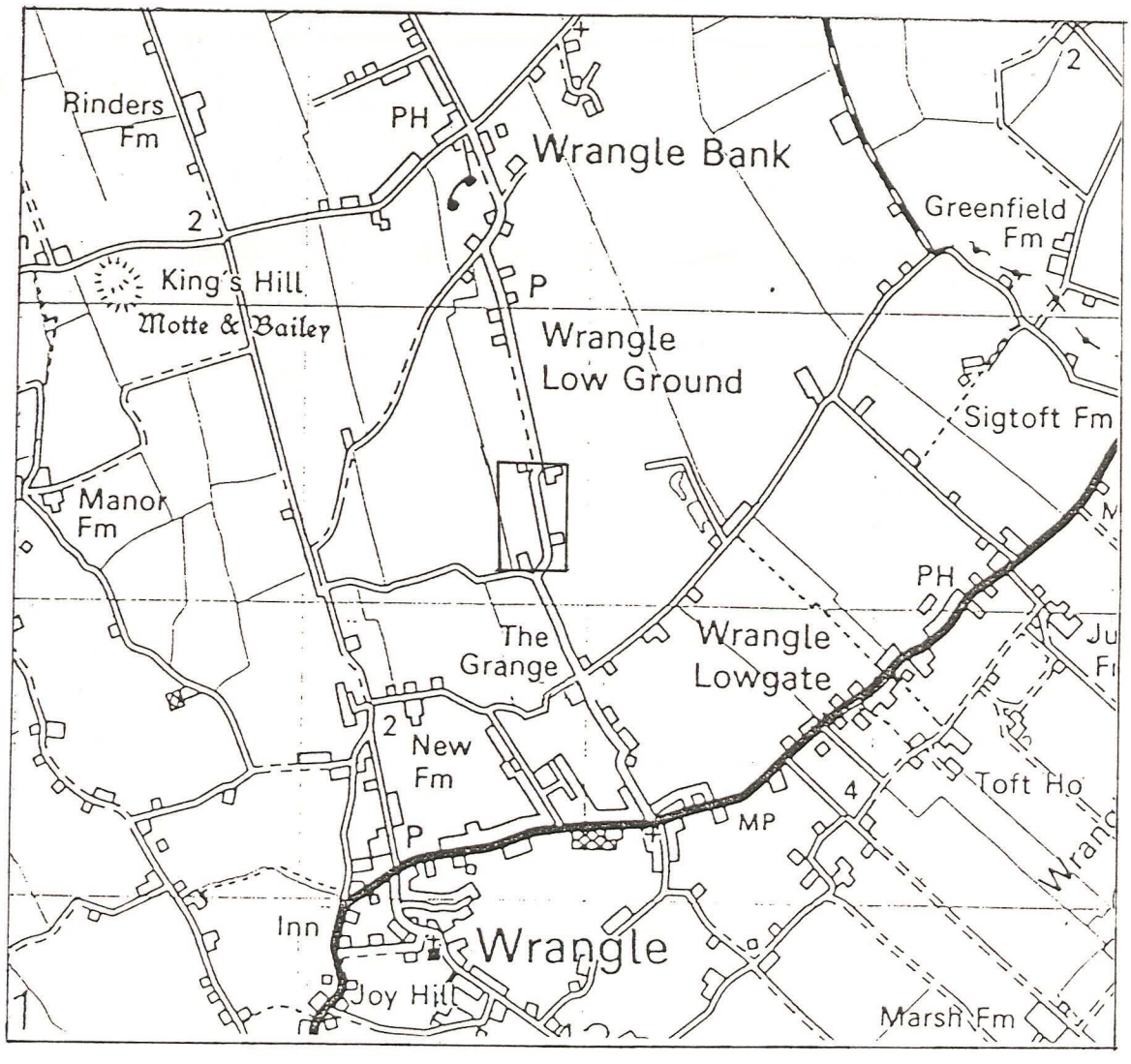
Summary

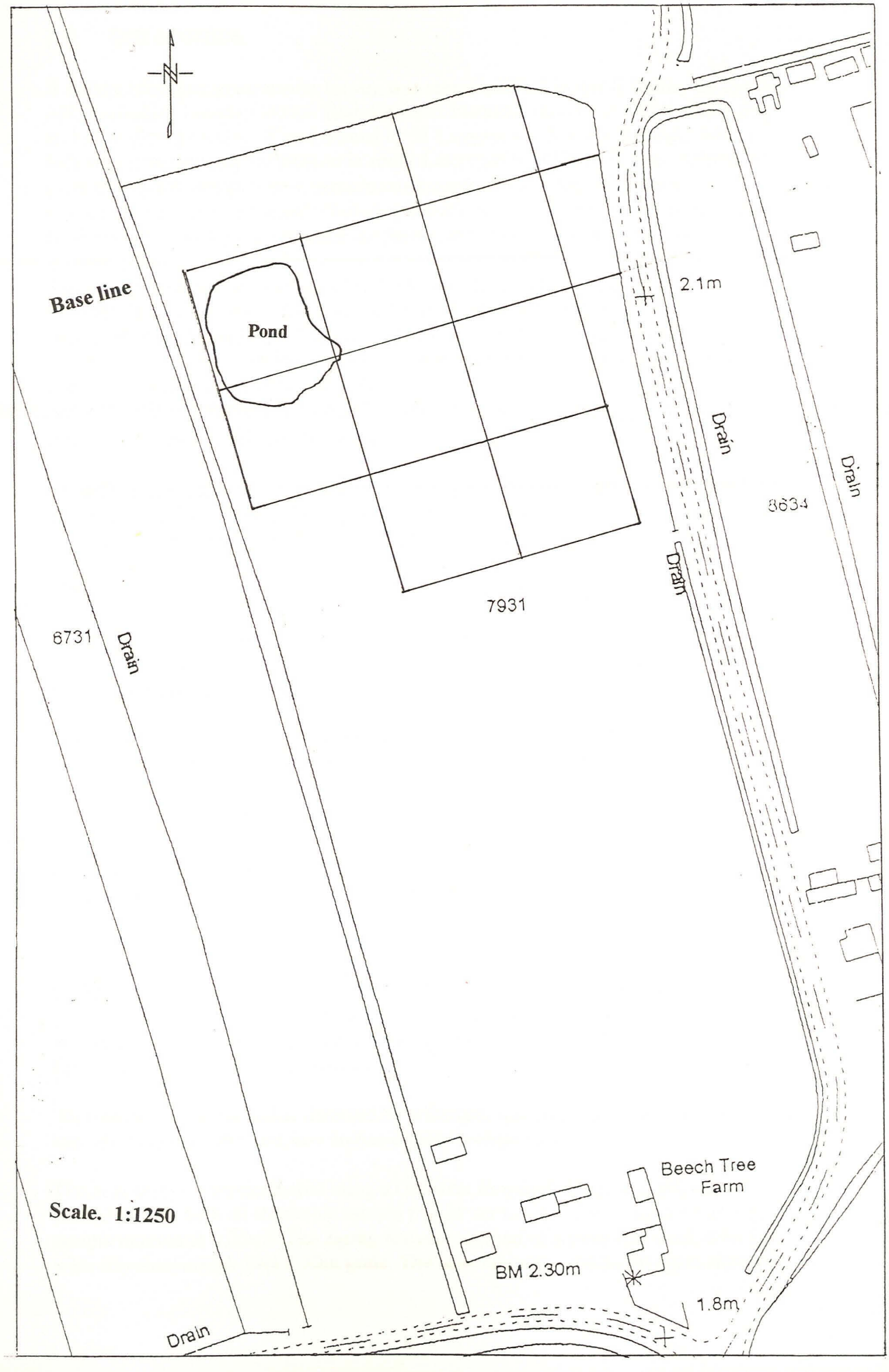
- *A detailed fluxgate gradiometer survey took place to evaluate the archaeological potential of land at Wrangle, Lincolnshire.*
- *The survey detected magnetic variation, predominantly of a geological nature.*
- *A number anomalies were detected, mainly localised dipolar, indicating the presence of ferrous-based material of probable modern origin.*
- *It is concluded on the basis of magnetic data that the site is probably of limited archaeological potential*

Fig.1 Location of site.



Scale. 1:25000.

Fig.2 Survey location.



1.0 Introduction

A detailed fluxgate gradiometer survey was commissioned by Mr S Catney on behalf of Lincolnshire County Council Highways and Planning Directorate, to evaluate the archaeological potential of land owned by M Leggate and Sons at Wrangle, which falls within the borough of Boston in south Lincolnshire. This work was undertaken prior to a pond enlargement scheme located north of the village. Previous investigations within the locality have produced evidence of salt manufacture dating from the late Iron Age and possible medieval settlement remains (Lane 1993).

The gradiometer survey was undertaken 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 the guidelines set out in the English Heritage document *'Geophysical Survey in Archaeological Field Evaluation'*, 1995.

2.0 Location and description

Wrangle is approximately 6km northeast of Boston. The site is located 1km north of the village, on land south of Wrangle Low Ground, centred on NGR TF4275/5235. It comprises an irregular unit of approximately 1 hectare.

The surveyed area is made up of grassland of varying length, with residential development to the north, a drain and road to the west and east respectively. The site, which incorporates a pond (Fig.2), has been landscaped to include raised and planted areas. These features limited the extent of the survey, but a large area to the east of the pond was successfully covered.

The geology of the area consists primarily of Flandrian deposits that overlie Devensian Till and post-glacial alluvial sands and gravel (Robson 1985).

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 (often discrete) 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, charcoal and pottery. These features will create detectable magnetic variability. 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 approximately

parallel to the property boundary to the west, extending along and beyond the north edge of the pond. Pegs were left in the ground indicating the position of the base line.

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). The data was clipped to reduce the distorting effect of extremely high or low readings caused by ferrous metals on the site, and the results were plotted as a number of greyscale images.

The survey was carried out by James Snee and David Bunn on the 13th September 1999. The weather was sunny, warm and calm. The area surveyed measured approximately 0.5 hectares.

4.0 Results

Several discrete positive and dipolar anomalies were noted over the north and west sides of the survey. These were predominantly sub-surface features and are thought to reflect buried rubble and iron objects in the topsoil (see 1-11, Fig.5).

An exceptionally strong positive anomaly corresponded with the northern site boundary, consisting of a hedge (see12, Fig.5). The strength of the anomaly suggests the presence of significant quantities of brick rubble or possibly buried metal fencing. It is suggested that this is a modern feature of limited archaeological significance.

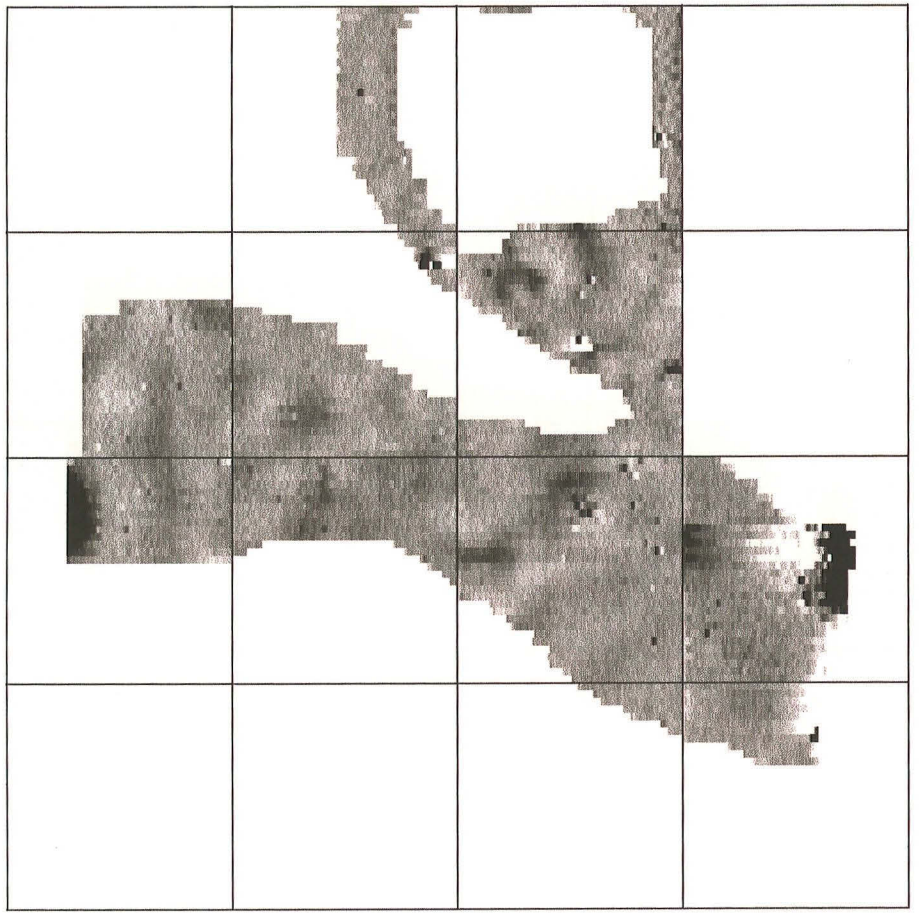
A discrete positive anomaly on the east side of the pond corresponded with the site of a modern boat (see13, Fig.5).

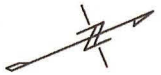
A strong positive anomaly (see 14, Fig.5) on the extreme south side of the survey was caused by the presence of a vehicle (not belonging to the survey team).

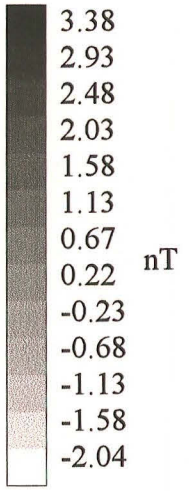
The greyscale image (Fig: 3) is characterised by a widespread and unusual mottling, an effect seen elsewhere on the Lincolnshire fenland (Lyall 1995). A survey undertaken on land off Whitehouse Lane in Fishtoft identified a similar backdrop, where it was conjectured that the ' leopard spot' patterning was probably caused by iron panning resulting from the leaching of salts following periods of flooding. The response at Wrangle is less pronounced, but the irregularity of the mottling suggests a geological rather than archaeological interpretation. The darker areas would appear to indicate higher concentrations of iron.

5.0 Conclusions

The site has produced few anomalies of potential archaeological significance. The majority of the magnetic variation detected was the result of natural processes or modern activity. Some of the small discrete positive anomalies may be of some archaeological significance (e.g. as artefacts in the topsoil or subsoil), although this cannot be proved on present evidence.







40m

Fig.3 Unsmoothed greyscale image.

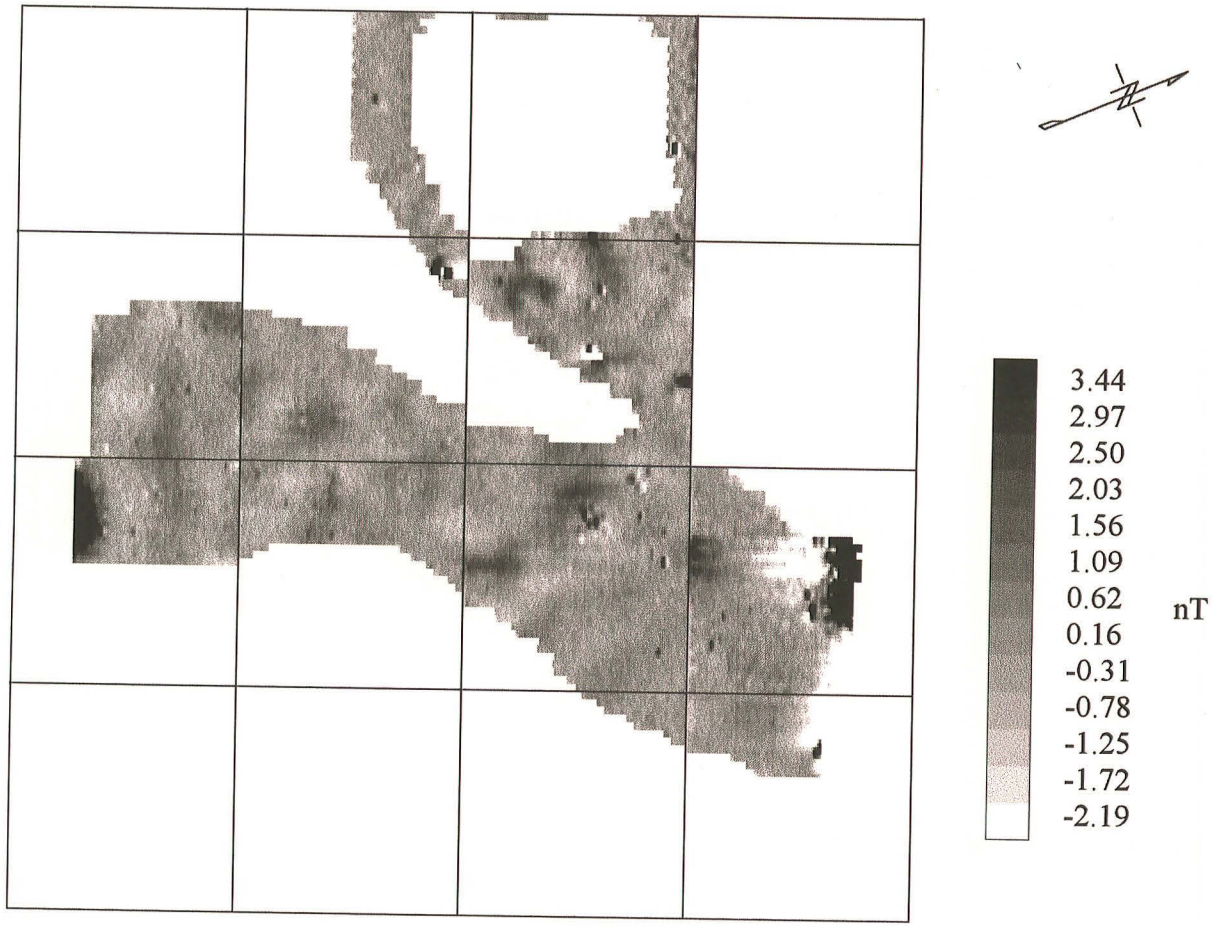
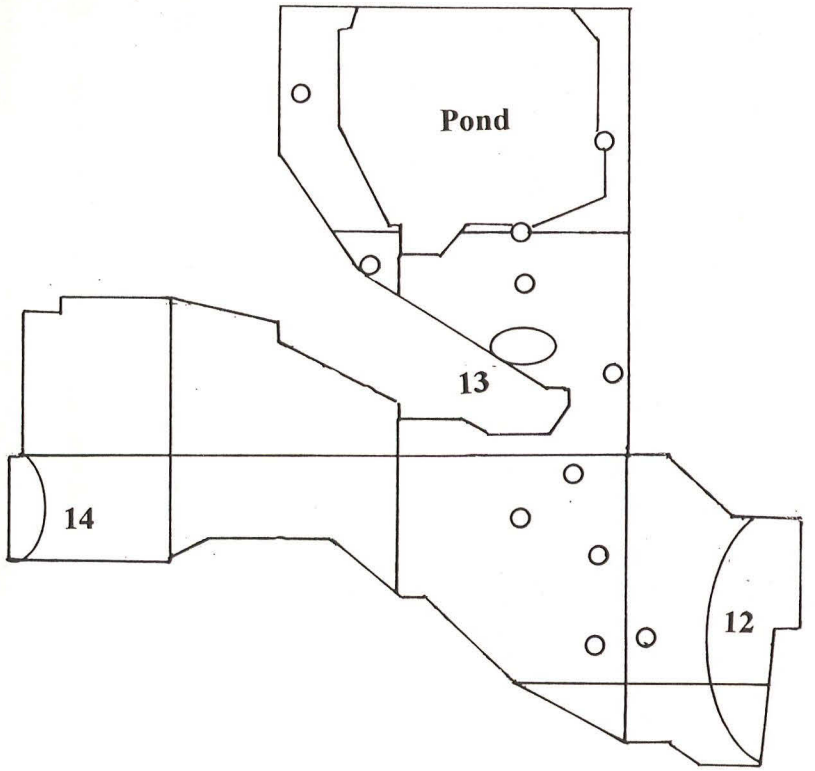
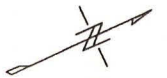


Fig.4 Smoothed greyscale image.





Discrete positive/dipolar anomalies (1-11).

40m

Fig. 5 Interpretive plan

It is concluded on the basis of the survey carried out that the site is probably of limited archaeological potential. If important remains are located on the site, then they are probably either:

a) not responsive to magnetic survey or
b) too deeply buried beneath post-glacial deposits to be detected by detailed gradiometry.

Detailed survey by fluxgate gradiometer is only capable of detecting features that alter the magnetic susceptibility of soils or are magnetically different to the soils 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 Lincolnshire County Council Highways and Planning Directorate for this commission.

7.0 Appendices

7.1 Bibliography

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Lane T W — 1993 *The Fenland Project Number 8: Lincolnshire Survey, The Northern Fen Edge.*

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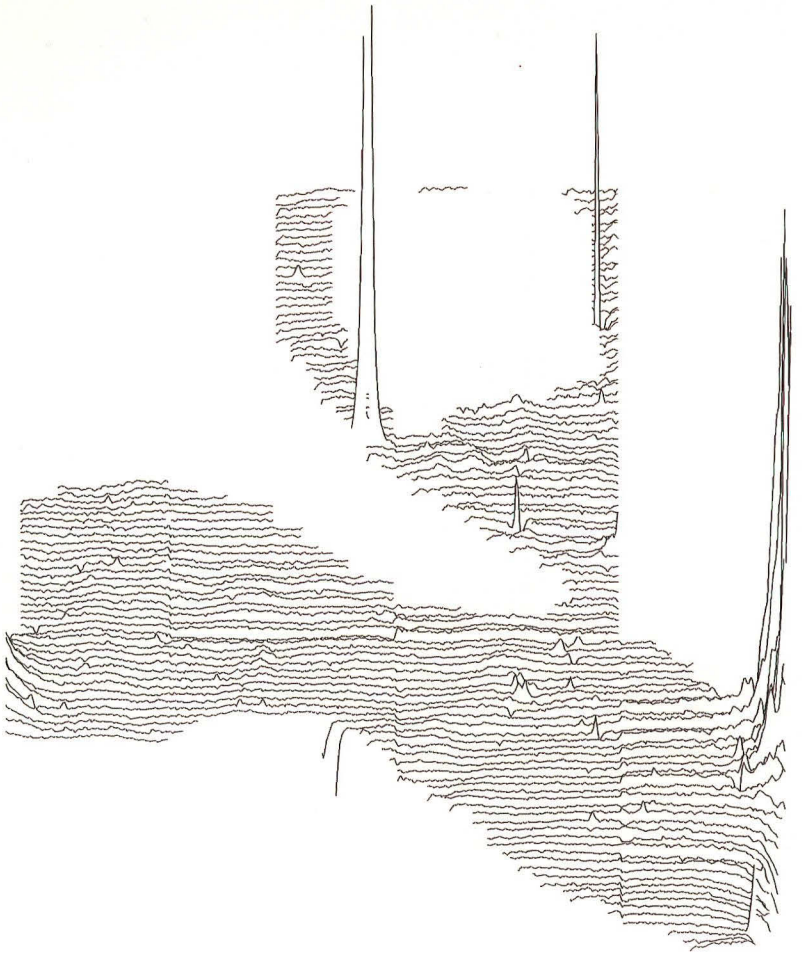
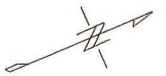
7.2 Summary of survey parameters

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

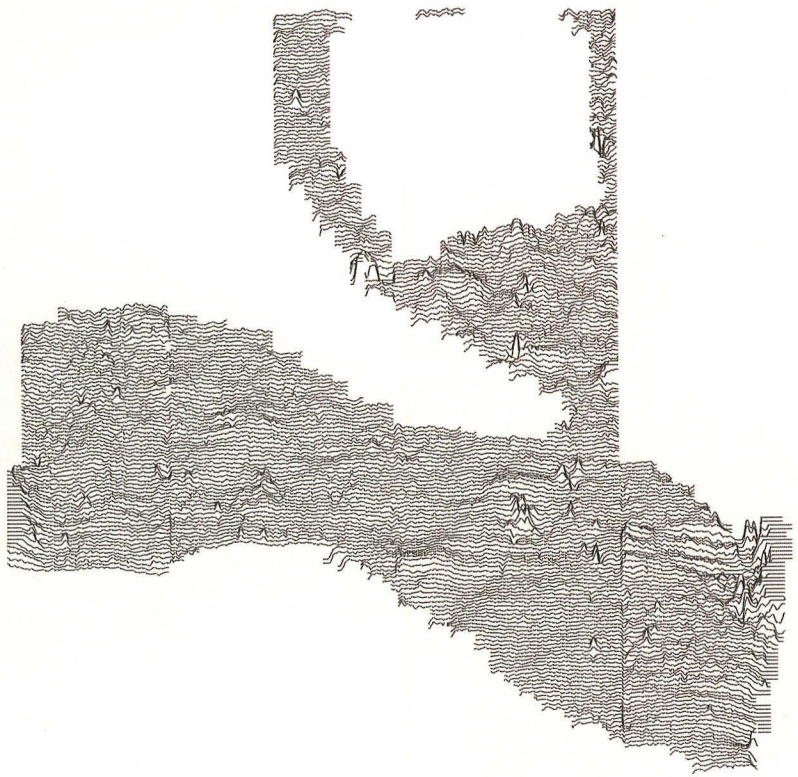


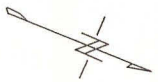


26.61275nT/cm

40m

Fig.6 Trace image of raw data.





22.52nT/cm

40m

Fig.7 Trace plot of clipped data.