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FLUXGATE GRADIOMETER SURVEY
LAND EAST OF OLD MAIN ROAD, SIBSEY
LINCOLNSHIRE

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LAND EAST OF OLD MAIN ROAD, SIBSEY
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Report prepared for Chestnut Homes Ltd
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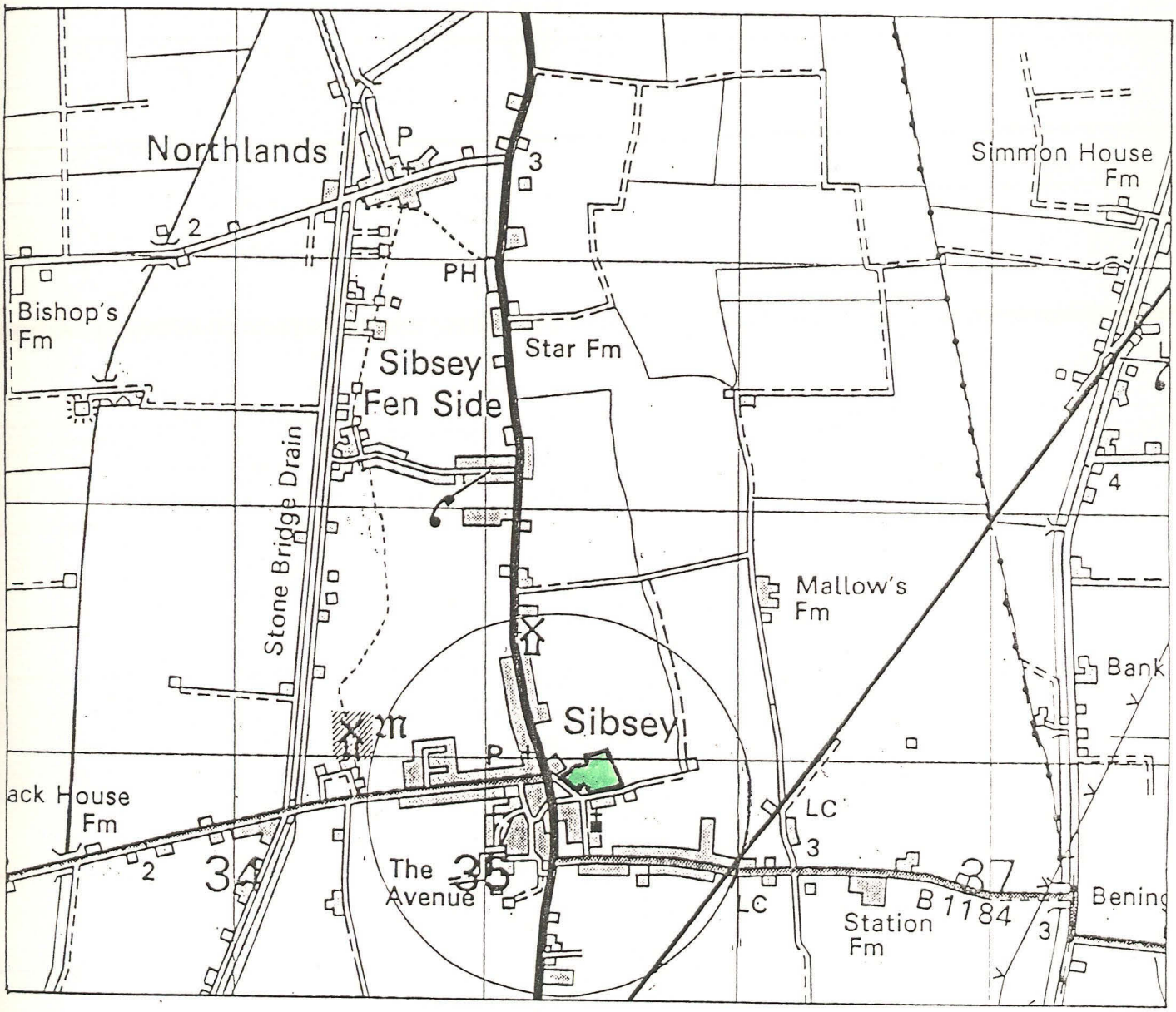
Summary

- *A fluxgate gradiometer survey was undertaken to evaluate the archaeological potential of land at Old Main Road, Sibsey, Lincolnshire.*

- *A large degree of magnetic variation was detected on the site, the majority of which appears to be the result of past human activity.*

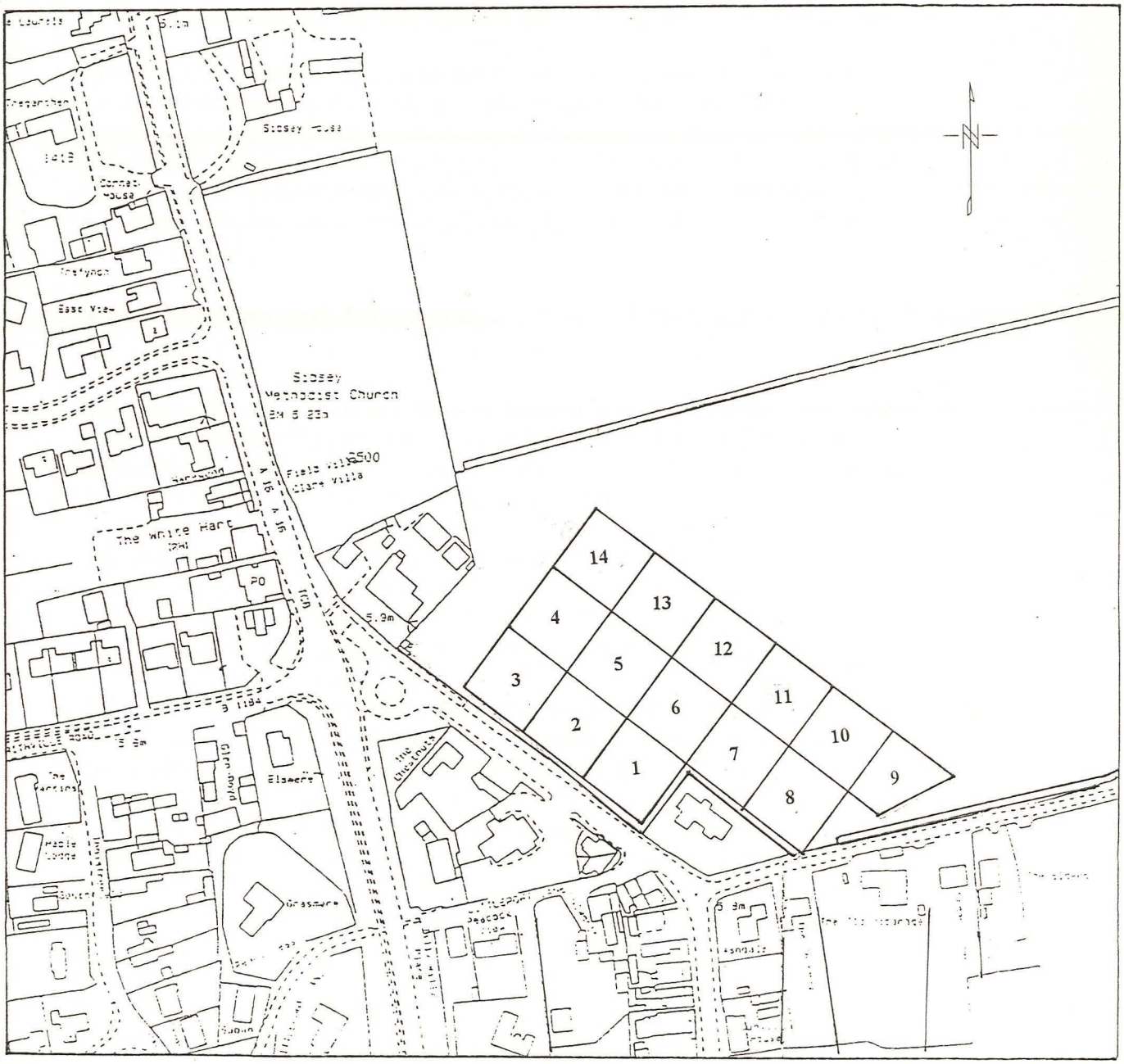
- *A large area of probable settlement remains were detected in the west and south; linear anomalies, possibly land boundaries relating to the settlement, were also detected to the north and east.*

- *One large anomaly has some of the characteristics of a kiln, although alternative interpretations are possible.*



Scale 1:25000

Fig.1 Location of site.



Scale 1:2500

Fig.2 Location of survey grids.

1.0 Introduction

A fluxgate gradiometer survey was commissioned by Pre-Construct Archaeology (Lincoln), on behalf of Chestnut Homes Ltd. to evaluate the archaeological potential of land off Old Main Road, Sibsey, Lincolnshire. This work was undertaken as part of a mitigation strategy for the site, which is in the ownership of Chestnut Homes Ltd.

The 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 October 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

Sibsey is in the administrative district of East Lindsey, approximately 6km north-west of Boston. The development site, an irregular unit of agricultural land measuring approximately 2.8 hectares, is in the north-east of the village and centres on NGR TF 35374/50920. The surveyed area extended to 1.25ha.

The land is currently agricultural and covered with low stubble. It is bounded by a hedge to the south-west, with recently constructed semi-detached houses in the south corner. To the north-west is a school, to the south is a single track lane with an associated open drain, and to the north-east is an open field of stubble.

The site is believed to lie close to the medieval frontage of the village. It is close to St Margaret's church, which contains some Norman elements. Sibsey is mentioned in the Domesday book which indicates an early occupation.

A site inspection in 1999 recovered a small amount of late medieval or early post medieval pottery.

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 south-west field boundary and the property boundary to the south. A marker peg was left in the south corner, 3m from the south-west boundary and 2.5m from the southern property boundary. A second peg was placed at the north-west end of the baseline to show the orientation of the baseline. 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 (smoothed on Fig. 3, unsmoothed on Fig. 4).

The survey was carried out by Mr D Bunn and the writer, on the 22nd October 1999. The weather was overcast but calm and dry. The area surveyed measured approximately 1.3 hectares.

4.0 Results

The site displayed a large degree of magnetic variation, almost all of which appears to be the result of human activity.

Faint, diffuse striations across the site oriented east to west may reflect modern ploughing, or medieval/post-medieval ridge and furrow agriculture (see figs.3,4).

The largest variation occurred close to the south-west boundary (adjoining Old Main Road) and the south corner of the site (see figs.3,4,5). The random pattern of positive and negative anomalies along the south-west boundary is consistent with a spread of rubble or building debris. Although it is not uncommon to find small areas of debris close to modern buildings (such as the houses to the south), the nature of the magnetic variation suggests a potentially more significant interpretation. Within the otherwise random pattern are short linear anomalies aligned either east/west or north/south (Fig.5:pale green, yellow). These may represent building remains, particularly to the south-west, where they are more clearly defined.

In the south corner were a group of short positive linear anomalies and discrete irregularly shaped positive anomalies (Fig. 5 : 11). These fall within the area of the probable rubble spread and are difficult to resolve into specific patterns, however the strong irregularly shaped anomalies could be either concentrations of fired building materials or areas of burning. In either case it is probable that these anomalies relate

Fig. 3 Smoothed greysacale image.

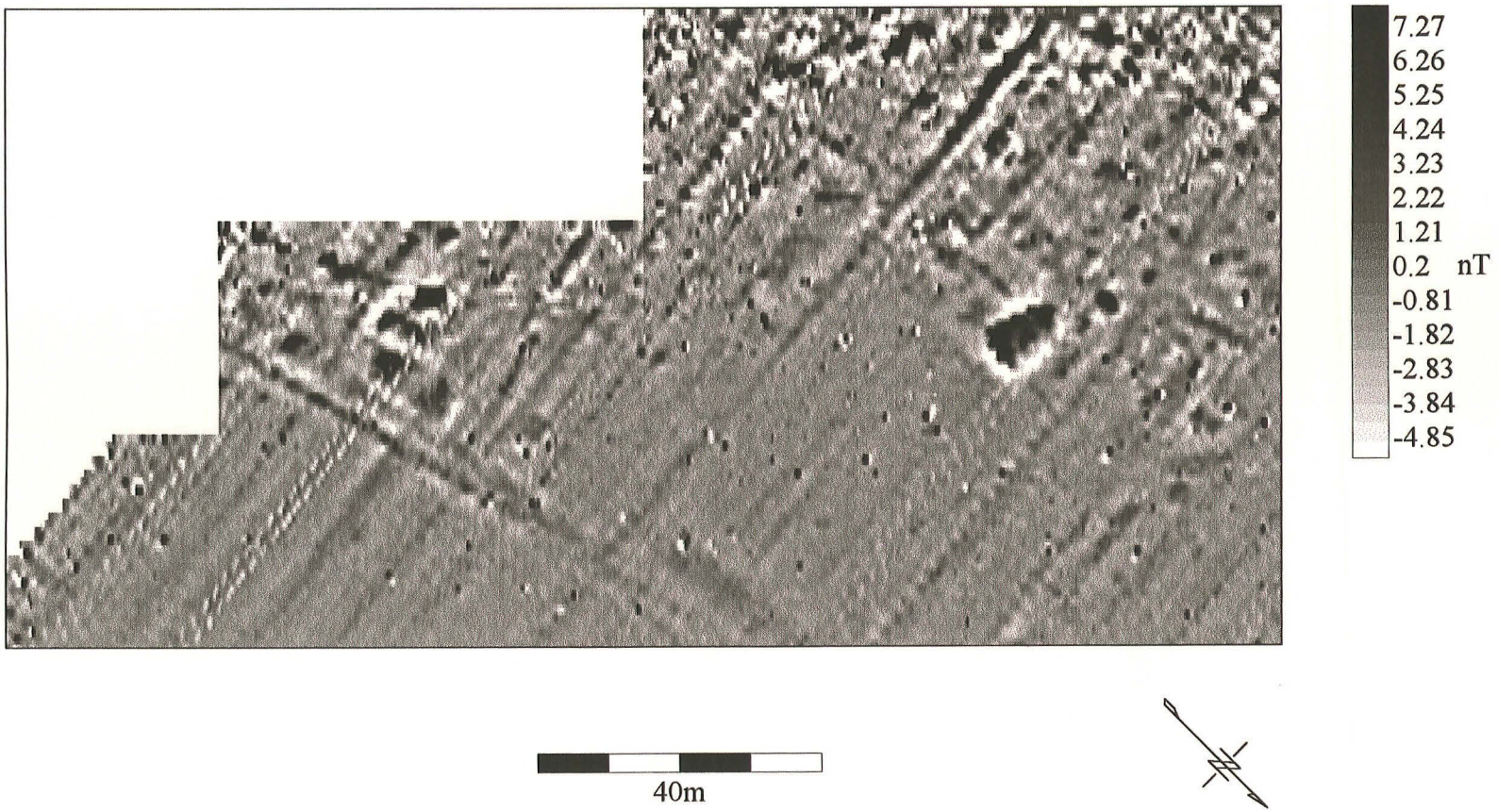


Fig. 4 Clipped greyscale image.

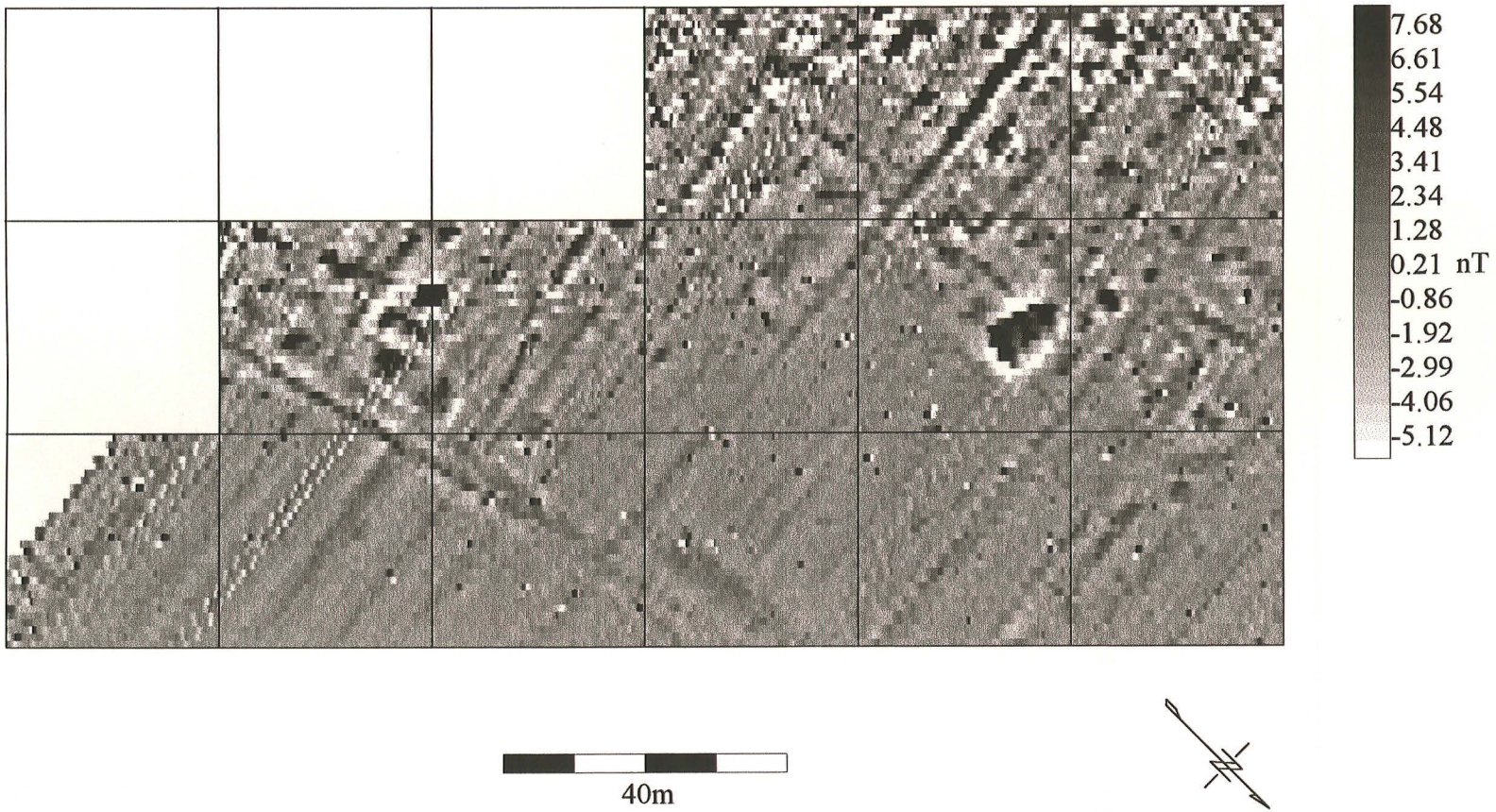
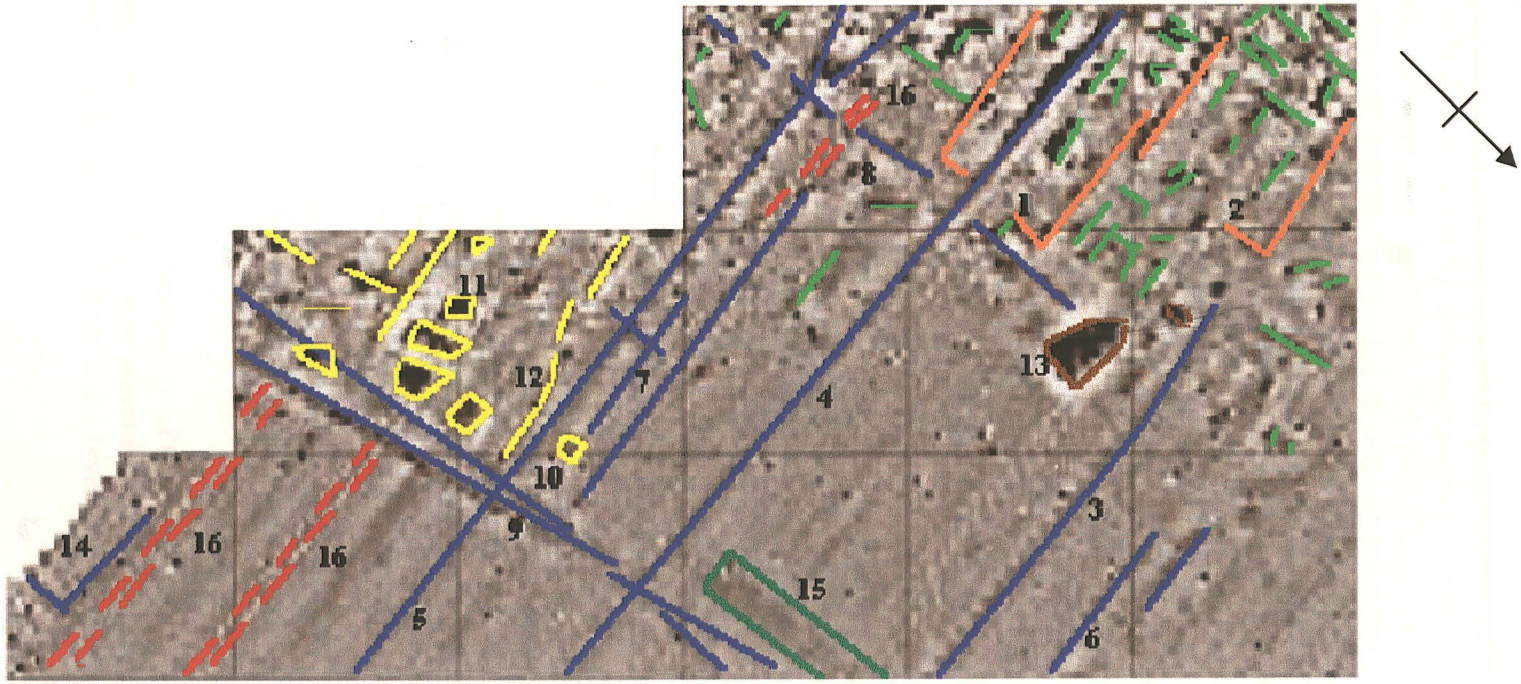


Fig. 5 Interpretative greyscale image. Scale 1:1000.



Note on use of colour:

Orange – possible enclosures.
Yellow – possible settlement expansion.
Red – machine tracks.
Pale green – unresolved linear anomalies.
Brown – possible kiln.
Blue – resolved linear anomalies.
Dark green – possible quarry.

to structures which may be of archaeological significance. To the north of this group was a curvilinear anomaly (Fig. 5 : 12) which may represent an earlier phase.

Two groups of anomalies identified in the north corner may represent property boundaries (Fig.5 : 1 & 2). The southern extremes of these anomalies were detectable as positive rectilinear enclosures oriented east to west; within these were smaller positive anomalies which could not be defined. The northern ends of these features were obscured by the rubble spread.

Across the whole site were a series of large positive linear anomalies oriented east/west (Fig.5 : 3,4 & 5). Although possibly of different ages they are roughly parallel and may represent former field boundaries. Linear anomaly 3 appears to continue east from the north edge of property boundary 2 (Fig.5) and could be contemporary. Linear anomaly 4 traverses the middle of property boundary 1 and may be of a different age. It may represent a ditch (rubble-filled and stronger to the west; earth-filled and weaker to the east). Linear anomaly 5 is similar, possibly for the same reasons. In the west it appears to diverge, although this may be caused by the presence of other overlapping features filled with rubble. Mid-way along feature 5 are two small, weaker, anomalies that may relate to it; a north/south linear anomaly bisecting anomaly 5 and an east/west parallel anomaly. These may be ditches related to the field boundary or to drainage.

In addition to these large east/west linear anomalies there were two smaller parallel anomalies (Fig.5 : 6 & 7). These are probably the result of short ditches.

Traversing the site on a north/south axis were three large linear anomalies (Fig, 5 : 8,9 & 10). Anomaly 8 was discontinuous, although this was probably the result of rubble spread. Linear anomalies 9 and 10 were adjacent and converge, although the point at which they cross showed the presence of a possible third anomaly. It is possible that these features are ditches dug at different times to delimit the same boundary.

A large positive anomaly was detected in the north-west of the survey area (Fig. 5 : 13).The trace profile (Appendix 7.3) of this feature displays characteristics that are sometimes representative of kilns (Clark 1990) However, the large size (approximately 10m long) makes this interpretation tentative and unconfirmed by gradiometry alone. Pottery kilns are generally smaller, although tile or brick production is a possibility. A smaller, similar anomaly detected immediately to the west may be associated with it. Alternative interpretations include the sites of bonfires or burnt structures (although metal debris is noticeably absent).

An L-shaped linear anomaly (Fig. 5 : 14) was detected along the south boundary. This may relate to the large open drain situated immediately to the south, or to some form of road side property boundary.

In the centre of the north-east edge of the survey was a large, diffuse rectangular anomaly (Fig. 5 : 15). This may represent ground disturbance; possibly by quarrying, but the full extent of the feature is not revealed by the survey.

A number of deep machine ruts showed up as pairs of parallel negative anomalies (Fig. 5 : 16).

Across the whole of the survey were a number of small discrete positive or dipolar (positive and negative) anomalies. It is likely that the majority of these are caused by pieces of ferrous debris in the topsoil (particularly the dipolar anomalies) but it is possible that some may represent small pits.

5.0 Conclusions

The magnetic variation detected on the site was almost entirely the result of man made features. Some of these comprised a pattern of ridge and furrow and modern disturbance. However, the majority of the anomalies and magnetic variation detected were caused by the presence of potential archaeological remains.

Individually, these features are difficult to resolve purely on the results of this survey, but the general pattern can be interpreted as an area of occupation (probably medieval and post-medieval) along a north/south road somewhere to the west. This occupation appears to have been limited by boundaries 8,9 and 10. To the east and north-east there is less magnetic variation and a smaller number of anomalies that probably represent field boundaries.

The large positive anomaly (13) is difficult to interpret; it has characteristics similar to those of a kiln and is almost certainly the result of burning. However its large size reduces this possibility (unless working on an industrial scale) and it may reflect the remains of a structure that has burned down.

The detection of dipolar anomalies is a common feature during magnetometer survey, as ferrous objects (litter) are often encountered in topsoil. That said, it remains a slight possibility that some of these are significant.

Detailed survey by fluxgate magnetometer 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 PCA and Chestnut Homes Ltd. for this commission.

7.0 Appendices

7.1 Bibliography

Clark, A J — 1990 *'Seeing beneath the soil.'*

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

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

Palmer-Brown, C P H — 1999 *Land off Old Main Road, Sibsey, Lincolnshire: Preliminary field evaluation in advance of residential development.*

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

7.3 Trace plot of raw data.

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