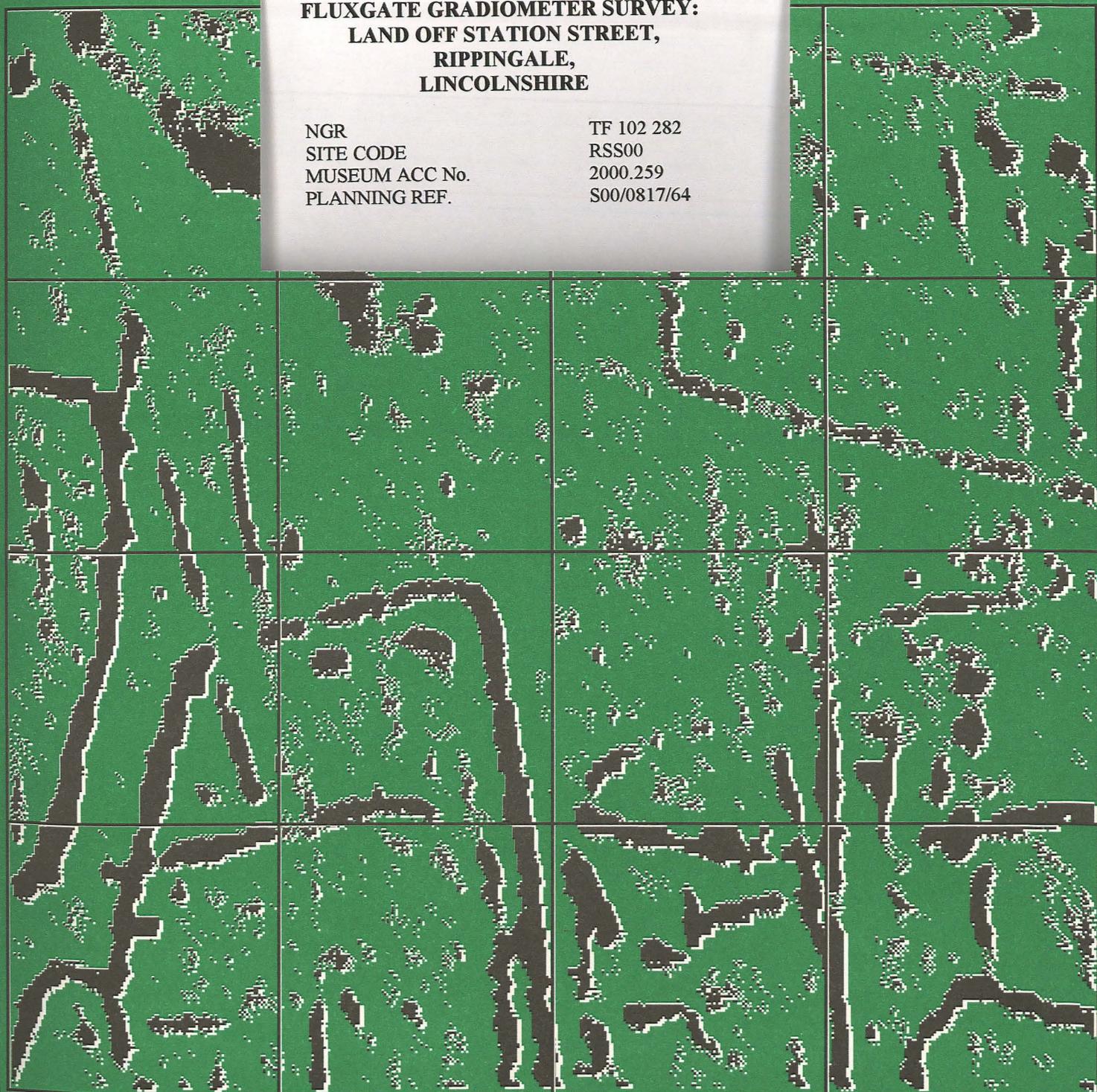




**FLUXGATE GRADIOMETER SURVEY:
LAND OFF STATION STREET,
RIPPINGALE,
LINCOLNSHIRE**

NGR
SITE CODE
MUSEUM ACC No.
PLANNING REF.

TF 102 282
RSS00
2000.259
S00/0817/64



EVENT L11480
SOURCES L16249 L16250
PNS 35344 L181512
35345 L181513

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Report prepared for Lindsey Archaeological Services
by Jim Rylatt & David Bunn



61 HIGH STREET
NEWTON ON TRENT
LINCOLN LN1 2JP
TEL&FAX:01777 228129

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Table 1 Summary of survey parameters.

Summary

- *A fluxgate gradiometer survey was undertaken on 1.5 hectares of land at Rippingale, Lincolnshire. The survey identified significant magnetic variation across the site, and this variation can be resolved into a series of magnetic anomalies*
- *Most of these anomalies have been interpreted as representing the rubble remains of buildings and an associated access track*
- *Traces of medieval ridge and furrow ploughing were detected*
- *A number of anomalies possibly reflect the presence of sub-surface archaeological features of greater significance, such as enclosures, although these have proved difficult to resolve due to the masking effects of modern activity*

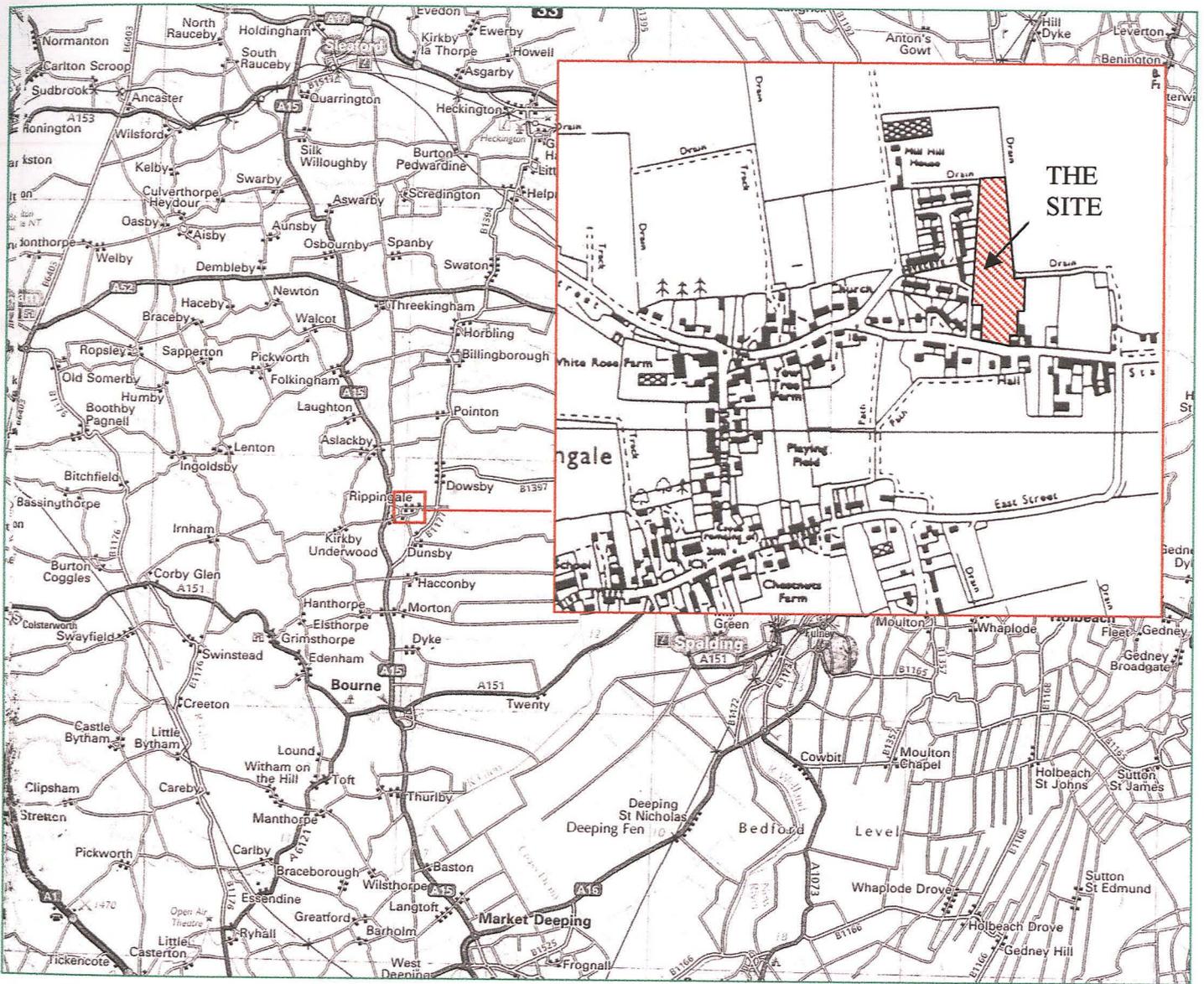


Fig.1: Location of site. Scale 1:50000 (Inset 1:10000)

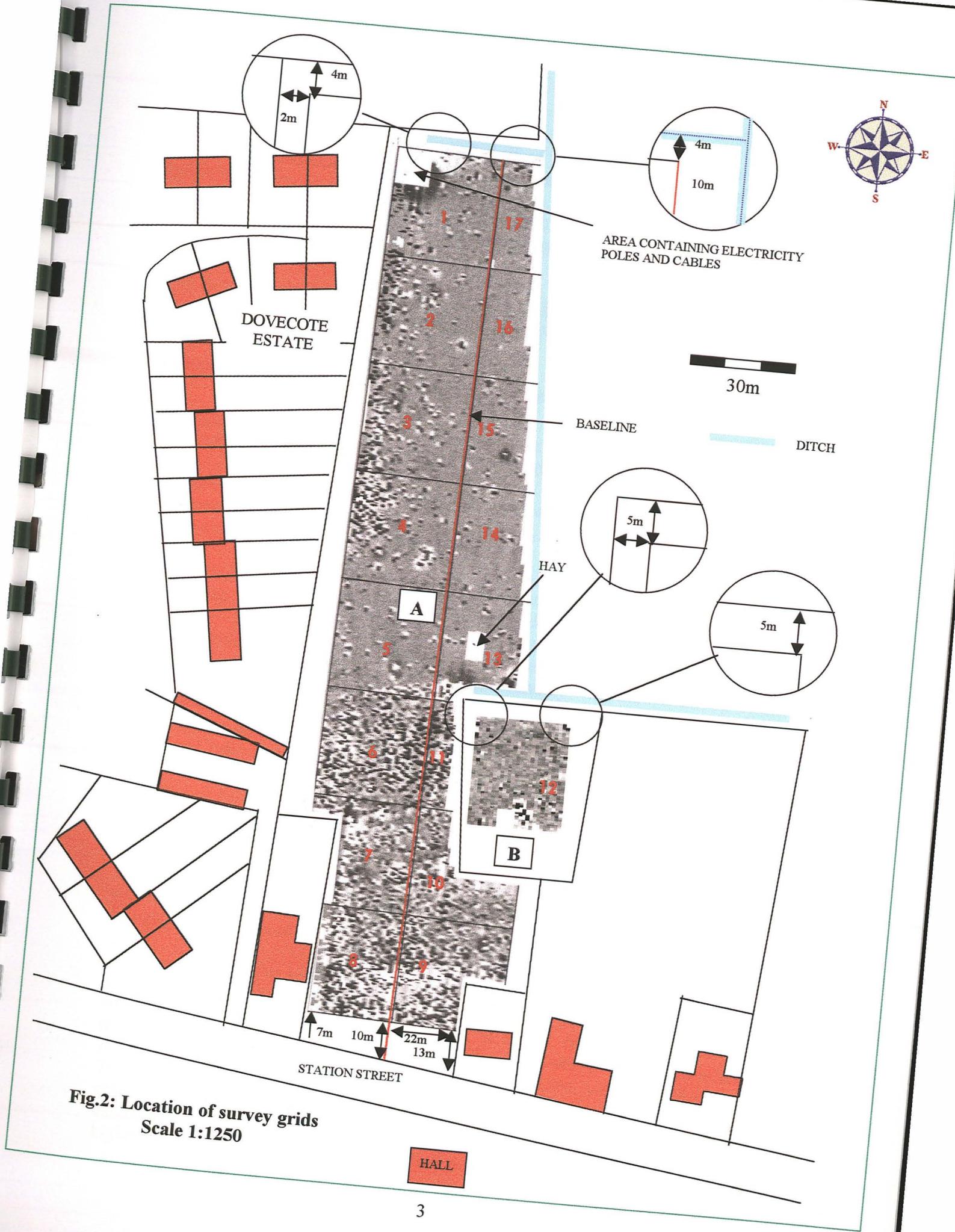


Fig.2: Location of survey grids
 Scale 1:1250

1.0 Introduction

Lindsey Archaeological Services, on behalf of Stamford Homes Ltd, commissioned Pre-Construct Geophysics to undertake a fluxgate gradiometer survey of land to the north of Station Street, Rippingale, Lincolnshire. This work was carried out as part of an archaeological assessment of the site, conducted to discharge a requirement of South Kesteven District Council, which was placed upon a planning application for residential development.

The survey methodology was based upon guidelines set out in the English Heritage document *'Geophysical Survey in Archaeological Field Evaluation'* (David, 1995).

2.0 Location and description

Rippingale is situated on the western edge of the Fens of south Lincolnshire, approximately 8km to the north of Bourne and 15km to the south of Sleaford.

The development site is situated on the north-eastern edge of the village, to the north of Station Street, and comprises two fields with an area of c. 1.35 and 0.15ha (fig.2: A and B respectively).

Field A, which currently supports rough grass, extends northwards from Station Street for c. 250m. The north-western perimeter is defined by a hedge, beyond which lies the 'Dovecote' housing estate. The south-western and south-eastern boundaries are defined by timber fences, beyond which lie residential properties. A hedge, within which is a metal chain-link fence, forms the boundary with Station Street. Ditches constitute the northern and north-eastern edges of the field.

An overhead power line extends along the southern edge of the site, and electricity poles and cables are situated within the north-west corner. The field has a gentle south-facing slope, broken by an east-west orientated ridge in the northern part of grid 6 (Fig.2). A small area in the eastern part of the field, to the north of Field B, was not surveyed, due to the presence of a heap of hay (Fig.2).

Field B comprises an enclosed area on the eastern side of the site, c. 60m to the north of Station Street. Generally level, and bounded on all sides by hedging and sections of barbed wire fencing, this area appears to have remained uncultivated in recent years. Rough grass, patches of brambles and nettles impeded the survey.

The site lies c. 300m to the west of the nearest Quaternary drift deposits of Fen Gravel, on slightly higher ground (G.S.G.B., 1972). The geological sequence of the site itself is relatively complex, as a number of Upper Jurassic strata have been exposed by a small stream; the latter has incised a small valley, the base of which is followed by Station Street, with the interface between strata running parallel to this. The southern perimeter represents the lowest point of the site, at 16.5m OD. The oldest deposit exposed, Cornbrash of the Great Oolite Series, lies in a strip of land extending from this boundary to a point c. 50m to the north. Above this, on slightly higher ground, is a c. 90m wide band of Kellaways Clay, which is itself succeeded by

a c. 70m wide exposure of Kellaways Sand. The mudstones of the Oxford Clay formation are exposed at the northern edge of the site.

Central National Grid Reference TF 102 282.

3.0 Archaeological and historical background

There has been little archaeological research conducted within the village of Rippingale, or its immediate environs, and consequently there is an absence of evidence for prehistoric activity. However, the Fenland Survey investigated Rippingale Fen, to the east, in 1982-3, uncovering residues of Neolithic, Bronze Age and Iron Age activity in the area (Hayes and Lane, 1992).

Romano-British occupation in the immediate area also remains to be identified, but can be inferred from the proximity of Mareham Lane, the Sleaford-Bourne road c. 0.5km to the west of the village, and the Car Dyke, probably a Roman watercourse, to the east (Whitwell, 1992). Romano-British pottery sherds were recovered during the Fenland Survey, from a location c. 1.5km to the east of the site.

A series of ten test pits were excavated during a recent geotechnical survey of the site. This work was not monitored by an archaeologist. However, a sherd of Romano-British greyware pottery, provisionally dated to the 2nd - 4th centuries AD, was subsequently recovered from the disturbed ground beside test pit 4 (Tann, 2000).

The name Rippingale, recorded as *Repinghale* in the *Domesday Book*, suggests that the origins of the modern settlement lie in the Saxon period. The components of the place-name are of Old English origin, meaning 'nook of the family or followers of a man called Hrepa' (Mills, 1993). An earlier reference, dated AD 806, cites the name as *Repingale* (*ibid*). The name *Hrepingas* occurs in the lists of possessions of *Medeshamstede* in a charter of AD 680, although it is more likely that this was a reference to Repton, in Derbyshire (Sawyer, 1998).

The deposition of freshwater silts across Rippingale Fen during the Saxon period would appear to have brought an end to habitation to the east of the present village, which lies near the edge of higher ground (Tann, 2000).

The medieval village appears to have developed around two foci, possibly reflecting the pattern of tenurial division following the Norman Conquest. The church and Manor Farm are situated in the southern focus, with the site being situated in the northern settlement cluster, which developed along Water Street (now Station Street).

4.0 Methodology

Detailed area survey using a fluxgate gradiometer is a non-intrusive method of evaluating the archaeological potential of a site. The fluxgate gradiometer detects magnetic anomalies created 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 result from man-made changes to the composition of the soil and the introduction of materials such as brick and stone. These features create detectable magnetic anomalies. In addition, activities that involve heating and burning will create magnetic anomalies, as will the presence of ferrous metal objects.

The anomalies detected by a fluxgate gradiometer survey can often be resolved into entities sharing morphological characteristics with features of known archaeological provenance. This enables the formulation of an informed, but subjective interpretation.

Magnetic variation between archaeological or naturally produced features and the natural background level can result from:

- different depth or density of fill, with respect to the depth or density of surrounding soils magnetically similar to the fill
- the magnetic properties of materials introduced as a result of human activity (e.g. rubble, stone, tile, ferrous metal, etc.) in contrast to those within surrounding natural deposits
- the magnetic susceptibility of areas of burning, as opposed to unburnt areas
- the magnetic properties of localised, naturally deposited minerals, such as occur in the fill of palaeo-channels, in contrast to those of the surrounding soils.

The area survey was conducted using a *Geoscan Research* fluxgate gradiometer, model FM36, with an electronic sample trigger set to take four 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 sensitivity of the machine was set to detect magnetic variation in the order of 0.1 nanoTesla. A north-south base line was established down the middle of the site (Fig.2). Pegs were placed at all grid corners to facilitate the relocation of the survey.

The data from the survey was processed using *Geoplot* (v. 3.0). It was desloped (a means of compensating for sensor drift during the survey) and clipped to reduce the distorting effect of extremely high or low readings caused by discrete pieces of ferrous metal. The results are plotted as greyscale and trace images.

The site was surveyed by David Bunn on the 8th and 10th December 2000.

Instrument	Geoscan Research fluxgate gradiometer FM36 Sample trigger ST1
Grid size	30m x 30m
Sample interval	0.25m
Traverse interval	1.0m
Traverse method	Zigzag
Sensitivity	0.1nT
Processing software	Geoplot (v. 3.0)
Weather conditions	Cool, blustery, sunny spells
Area surveyed	c.1.2ha

Table 1: Summary of survey parameters

5.0 Results

The survey detected a range of magnetic anomalies, some of which appear to indicate the presence of archaeological features.

Several areas of significant magnetic variation were detected, particularly along the western edge and in the southern part of the site. These are depicted in *figure 4* as coloured anomalies.

Anomaly 1 represents the magnetic distortion produced by the tension cables of two electricity poles that serve the Dovecote Estate, which lies to the immediate west of the site.

It seems likely that the area of magnetic disturbance, **2**, along the north-western edge of the survey, is a consequence of the close proximity of the Dovecote Estate. Traces of bonfires and the presence of miscellaneous construction and domestic debris were noted in this location during the survey. Although the more obvious examples of such disturbance were omitted from the survey to eliminate bias, it appears that the large quantities of similarly enhanced materials were situated beneath the ground surface, or were obscured by vegetation.

The magnetic anomalies along the south-western edge of the site, **3**, may have similar origins to **2**, as they occur in an area that is immediately accessible from the Dovecote estate. However, it is possible that a building may have existed within the general area of this disturbance, as a slightly terraced, square platform was noted during a site visit (Tann, 2000). Consequently, some of this magnetic variation may result from residues of an associated structure.

The strong magnetic signals, **4**, which were detected to the east of **3**, may mark the location of another structure. It is reported that farm buildings existed in the southern part of the site (Mr. Clark, Dovecote Estate resident, *pers comm.*). However, it is unclear whether this report equates to a building, depicted on the 1905, 1:10560 Ordnance Survey map. This structure replaced or incorporated the remains of a building shown on a late 19th century plan of the village; both were situated on the southern boundary of the site.

The abrupt change between the magnetic variation of the southern third of the site and that of the land to the north suggests that a boundary defines this interface. The clipped data image (Fig.3) appears to show a linear anomaly (Fig.5: 5) along the northern edge of the area of intense disturbance (3/4). This probably represents a continuation of the existing boundary that runs along the northern edge of paddock B, which is currently defined by a hedge and ditch. Anomaly 5 also has a close spatial correlation with a broad, east-west aligned ridge and adjacent backfilled section of ditch noted during a site visit (Tann, 2000).

A narrow band of strong magnetic variation, 6, runs along the western edge of the site and may extend into the adjoining property, as the latter was partitioned from the site in the 20th century. Consequently, anomaly 6 may have been generated by materials deposited during the creation of this boundary, or, as with 2, by debris associated with the construction and occupation of the house standing within the plot thus formed. However, it is notable that 6 is relatively homogenous and coherent in comparison to anomalies 2, 3 and 4. This raises the possibility that it represents a rubble-metalled track running along the boundary. This would run from Station Road at a point to the west of the building shown on the 1905 map. If this tentative interpretation proved correct, the northern objective of the access may have been the building/platform noted in the vicinity of 3 (see above). The relatively steep gradient from the road to this area of the site may have necessitated such an access, given the poor drainage and high clay content of the soil. The two buildings (shown on the late 19th century plan and the 1905 OS map) were situated at the mid point of the road frontage. The magnetic variation, 7, along the southern edge of the site probably reflects the remains of this building. This interpretation is supported by the brick rubble recovered from the geotechnical test pits 1 and 2, and the observation of rubble or foundations in the raised access area either side of the site entrance (Tann, 2000).

There are areas of strong magnetic disturbance, 8, to the north of anomaly 7, but this is more diffuse, less coherent, though still consistent with evidence of human activity in areas close to residential and agricultural buildings. This disturbance may have been generated by rubble, ferrous debris, and burning. Other strongly enhanced anomalies were detected elsewhere on the site for example anomaly 9, detected in the small field, B, which coincides with the site of a recent bonfire.

An examination of the less disturbed areas to the south of 5 suggests that there are a series of faint, diffuse anomalies, example shown as 10, running parallel to this putative boundary feature. While the interpretation remains tentative, the spacing between each is consistent with furrows separating the selions in a medieval open field. These may relate to a series of east-west orientated, linear cropmarks observed in this area of the site (*ibid.*).

The clipped data set (Fig. 3) appears to show a series of positively and negatively enhanced linear anomalies, example shown as 11, within the southern area of the site. These appear to form a series of sub-rectangular enclosures. However, this juxtaposition indicates that these weaker linears may be nothing more than 'phantom' anomalies, generated during data processing by the strength of the magnetic signatures of 3, 4, 6 and 7. Despite such considerations, it is possible that some of these linear disturbances relate to archaeological features, particularly in paddock B,

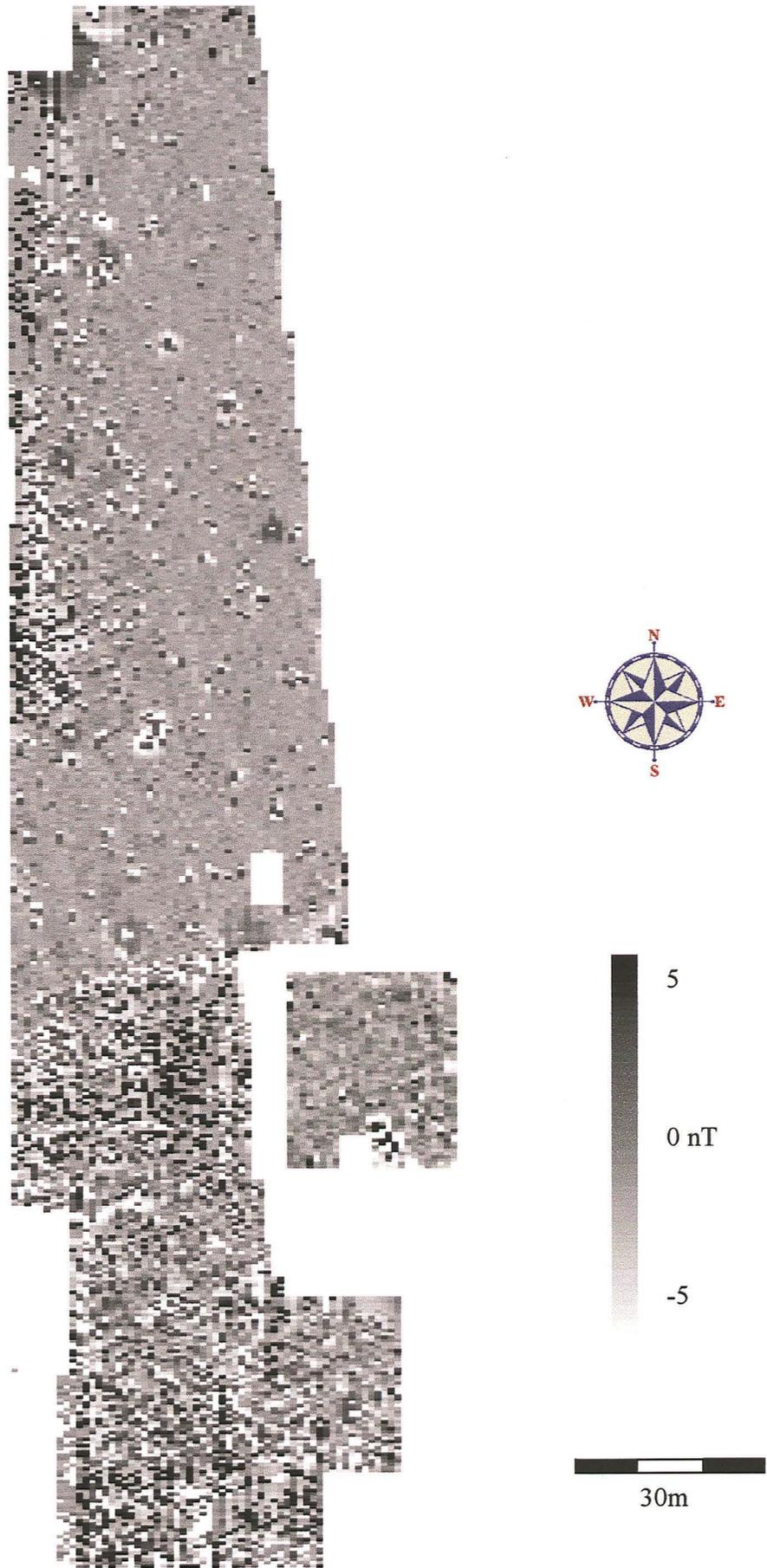


Fig.3: Greyscale image of clipped data.

Scale 1:1000

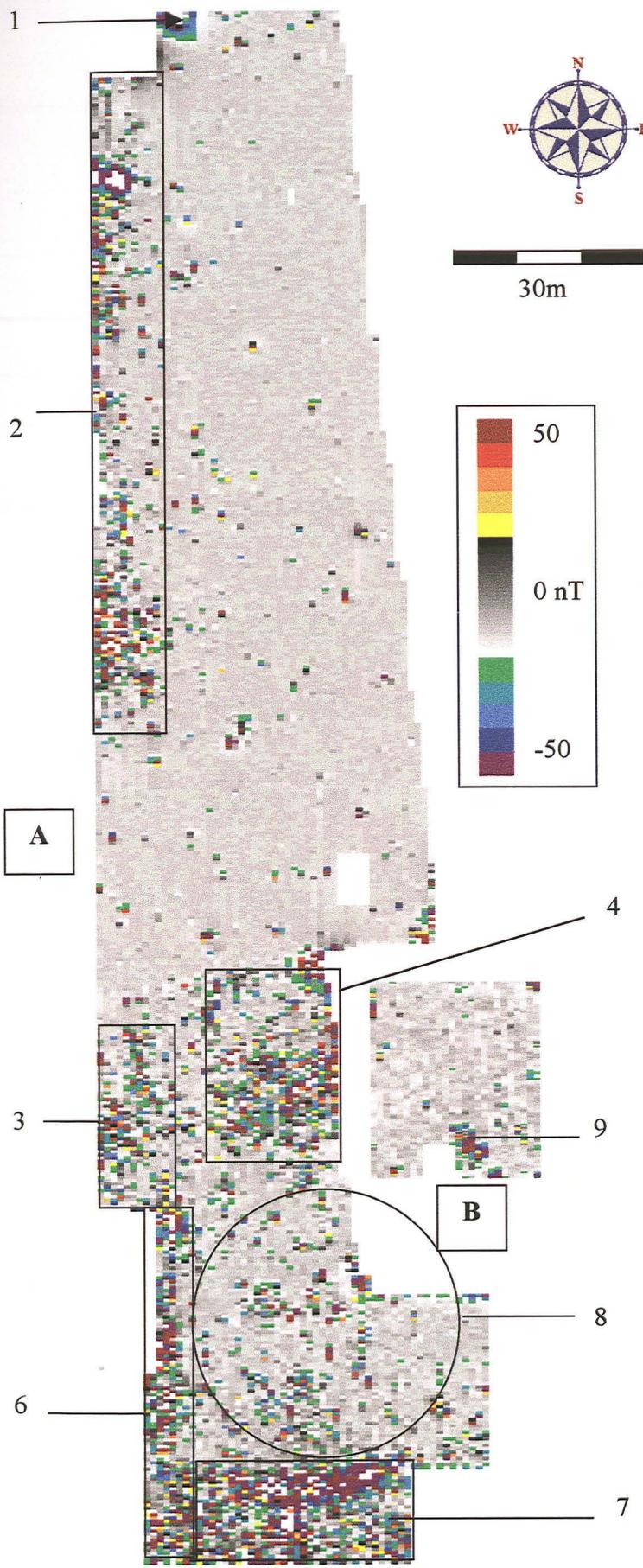


Fig.4: Image of raw data showing strong magnetic anomalies. Scale 1:1000

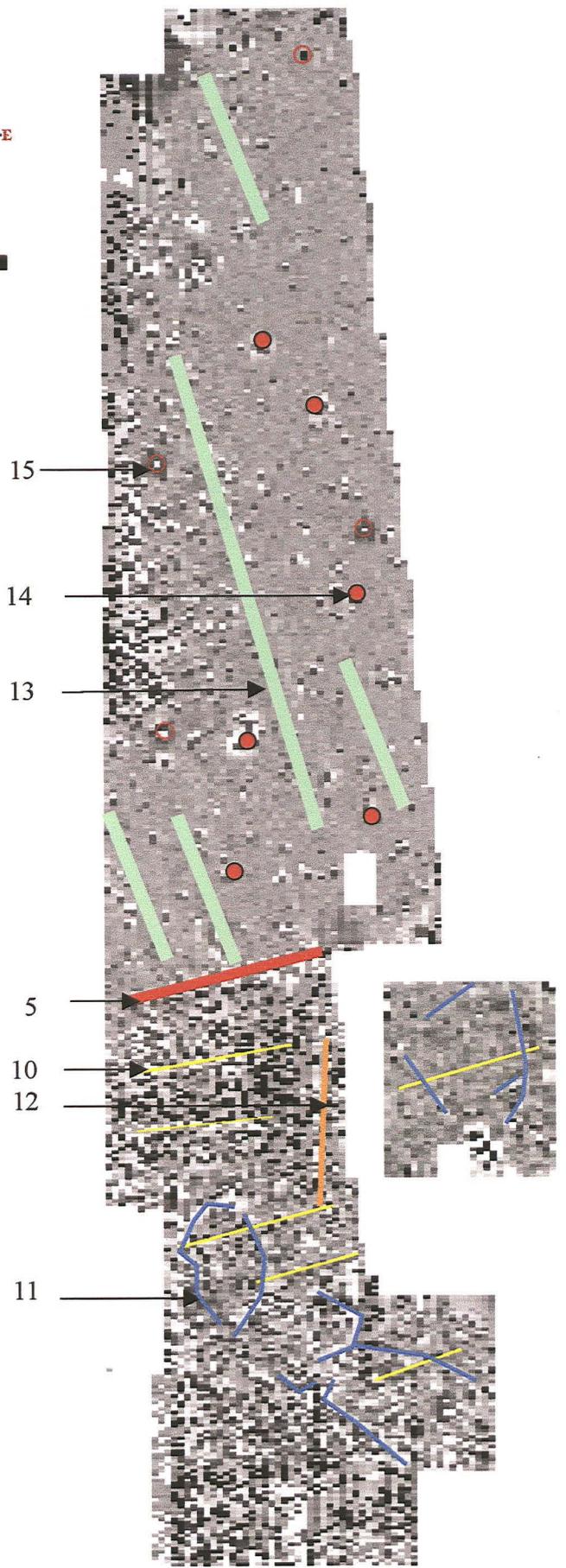


Fig.5: Interpretive image of clipped data.

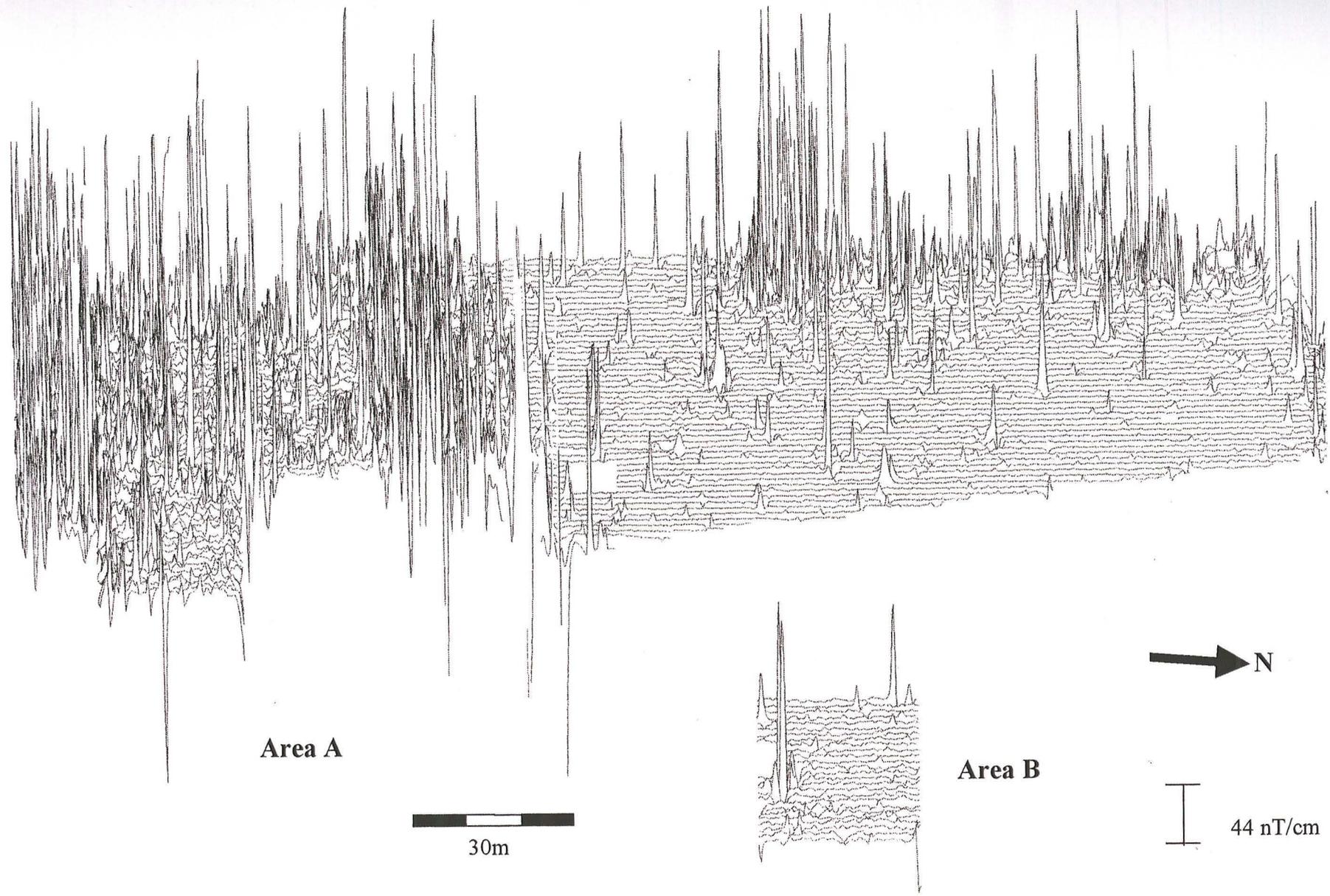


Fig.6: Trace plots of raw data. Scale 1:1000

where the magnetic disturbance is less pronounced. It should also be noted that a sherd of Romano-British pottery was recovered from test pit 4 near the north-western corner of paddock B, in this part of the site.

Linear anomaly 12, which runs parallel to the western boundary of paddock B, possibly signifies an earlier position of the latter.

The survey also detected a series of diffuse linear anomalies, example shown as 13, which are orientated on a south-south-east to north-north-west alignment in the quieter northern two-thirds of the site. The spatial relationships of the components of this group of anomalies suggest that they define another series of furrows.

There were also a number of discrete anomalies of varying size or magnitude in the northern part of the site (Fig.5: example, 14). Such anomalies often mark the location of *in-situ* burning, or burnt materials, the magnetically enhanced fills of pits, or pieces of ferrous or ceramic debris. The latter are often introduced as a result of agricultural activities, such as midden spreading. However, a number of these areas of disturbance can be more certainly correlated with known activity; 15 represents the probable location of geotechnical test pit 8. Pits 5, 6 and 9 may similarly have been detected (Fig.5). The location of the remaining pits has not been clearly defined.

6.0 Conclusions

The survey recorded significant magnetic variation across the site. Some of this can be related to modern activity by reference to elements of the surrounding landscape.

The most striking variation occurs between the areas to the north and south of anomaly 5, and is surely indicative of differential land use. This is borne out by the cartographic evidence, which shows that the southern area was part of a series of early enclosures flanking Station Street, while the northern area remained within the open field system (Tann, 2000). The location of 5 is approximately the same as that of a broad earth bank bisecting the site. The latter may in part derive from the upcast from a ditch, and from material along a hedge line defining the boundary shown on the maps. However, the presence of a series of linear anomalies, 13, to the north of, and roughly perpendicular to 5 may also be of significance. These linear features have spatial patterning suggesting that they represent a series of furrows. Consequently, the earth bank may represent a denuded headland, which later came to be utilised as a trackway to Dowsby (shown on the 1806 Enclosure Award, *ibid.*: 5). This interpretation receives further, tentative support from the possible presence of another series of faint, diffuse linear anomalies, 10, in the area to the south of 5. These may also represent furrows, which run parallel to the bank. The latter is more likely to have accumulated in a situation where it was flanked by furlongs ploughed at right angles to each other.

The track running along the boundary defined by 5 had been replaced by the late 19th century by another bisecting the northern part of the site. No evidence of the latter was detected by the gradiometer survey. However, its approximate location near the western boundary coincides with the rather abrupt southern termination of anomaly 2.

Whether these factors are coincidental, or a genuine relationship exists, is entirely conjectural.

The density and strength of the magnetic variation in the southern third of the site severely limits, or prevents interpretation. It is possible that this area has been subject to more concentrated and intense activity than that to the north. It appears to contain the remains of several buildings, but these seem to be represented by demolition deposits, their exact location remaining to be ascertained. It is possible that a series of enclosures were also detected within this general area, although lack of clear definition has prevented confident interpretation.

7.0 Acknowledgements

Pre-Construct Geophysics would like to thank Lindsey Archaeological Services for this commission, and Mr. Clark for information provided during the course of the survey.

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