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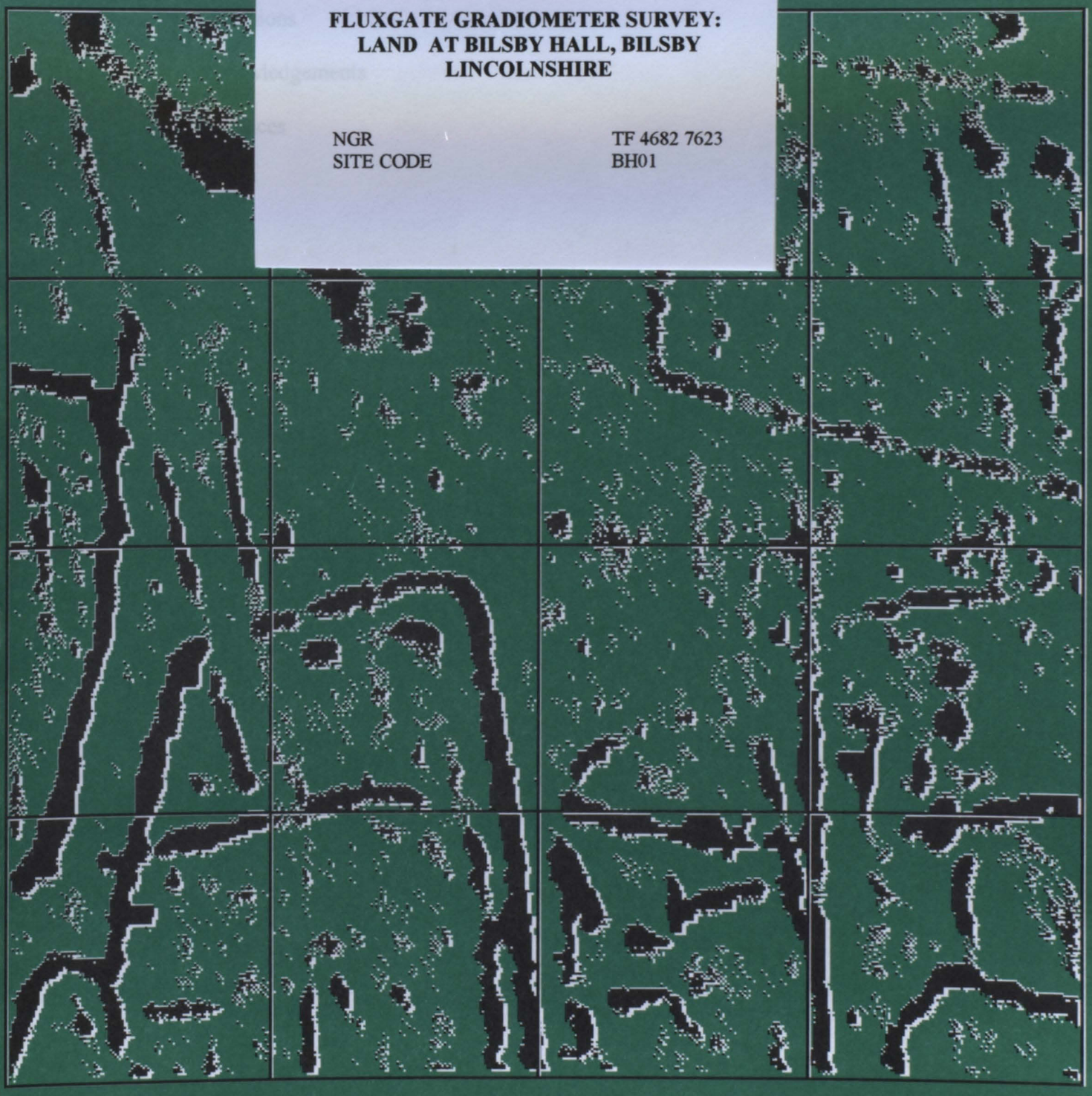
PRE-CONSTRUCT GEOPHYSICS

FLUXGATE GRADIOMETER SURVEY: LAND AT BILSBY HALL, BILSBY LINCOLNSHIRE

NGR	TF 4682 7623
SITE CODE	BH01



FLUXGATE GRADIOMETER SURVEY: LAND AT BILSBY HALL, BILSBY LINCOLNSHIRE

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Report prepared for Neil Dowlman Architecture
By David Bunn & Colin Palmer-Brown

PRE-CONSTRUCT GEOPHYSICS

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Illustrations

Summary

- *A fluxgate gradiometer survey was undertaken on 0.5 ha of land within a moated enclosure at Bilsby, Lincolnshire*
- *The survey identified significant levels of magnetic variation, and this variability can be resolved into a series of magnetic anomalies*
- *Several anomaly groups may indicate the presence of building remains, including possible traces of the original Bilsby hall*
- *A series of linear anomalies were detected, and the origin and nature of some of these remain unresolved. One may relate to a known trackway that is depicted on the 1906 Ordnance Survey map*
- *Areas of random magnetic variation appear to indicate the presence of ceramic materials, such as brick and tile*

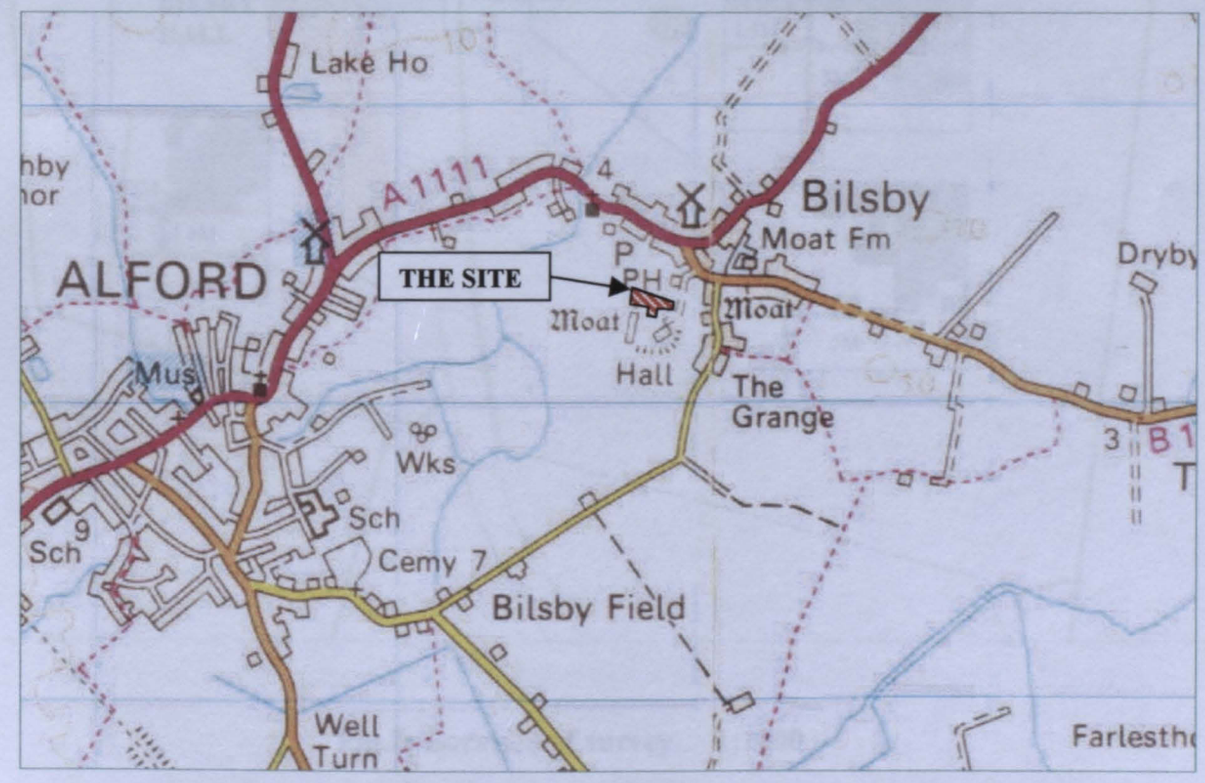

Fig.1: Location of the site 1:25000

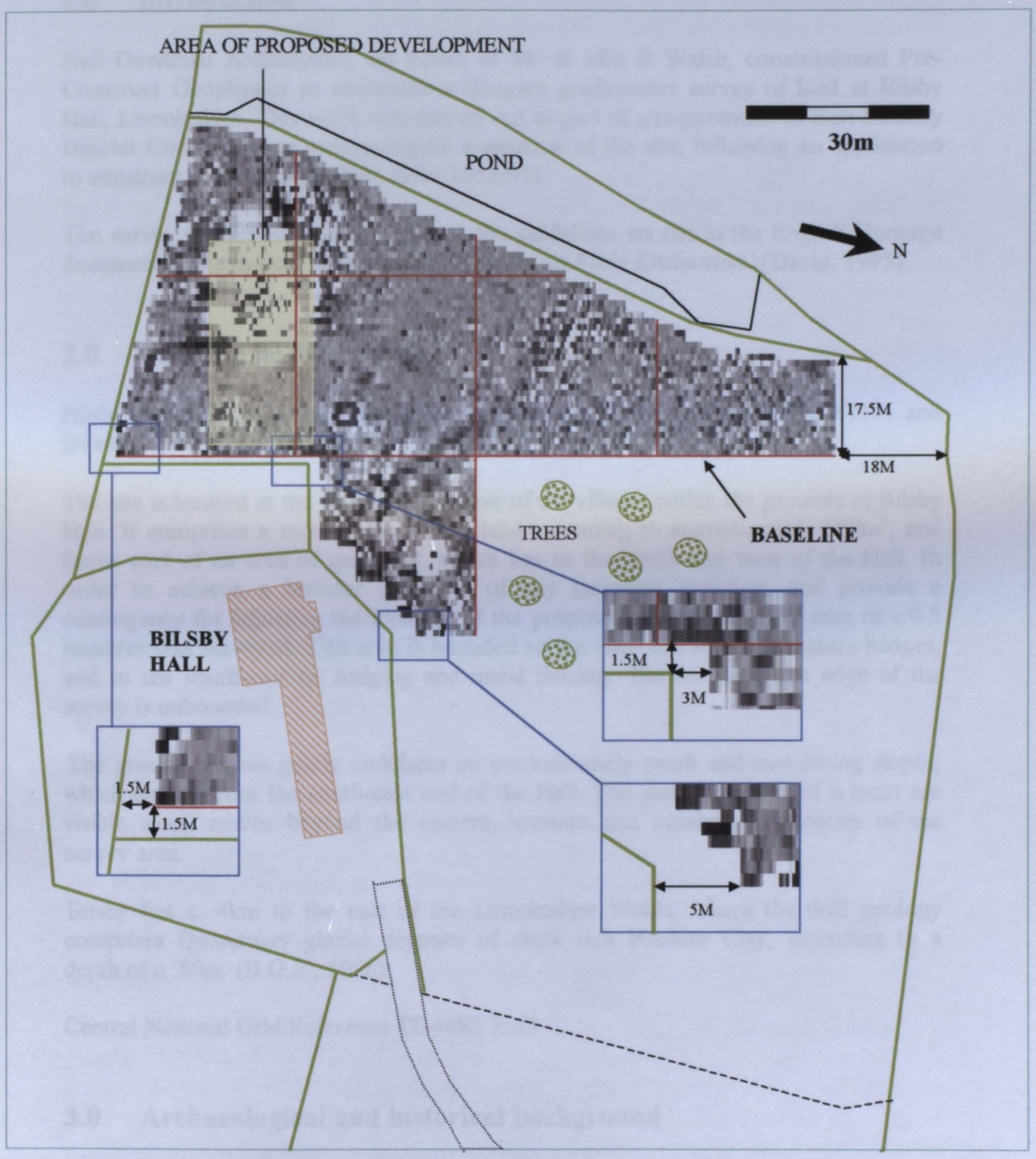

Fig.2: Location of survey 1:1000

1.0 Introduction

Neil Dowlman Architecture, on behalf of Mr & Mrs R Walsh, commissioned Pre-Construct Geophysics to undertake a fluxgate gradiometer survey of land at Bilsby Hall, Lincolnshire. This work was carried out as part of a requirement of East Lindsey District Council for an archaeological evaluation of the site, following an application to construct a tennis court (Ref. N/16/1058/01).

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

2.0 Location and description

Bilsby is situated approximately 1km east of Alford at the junction of the A1111 and B1449.

The site is located at the south-west corner of the village, within the grounds of Bilsby Hall. It comprises a rectangular unit of land extending to approximately 600m^2, and forms part of an area of grassland, which lies to the south and west of the Hall. In order to achieve a broader overview of any magnetic variation, and provide a contingency for adjusting the location of the proposed development, an area of c.0.5 hectares was surveyed. This area is bounded to the west and south by mature hedges, and to the south-east by hedging and metal fencing. The north-eastern edge of the survey is unbounded.

The ground surface gently undulates on predominately south and east-facing slopes, which extend from the south-east end of the Hall. The partial remains of a moat are visible along and/or beyond the eastern, western and southern boundaries of the survey area.

Bilsby lies c. 4km to the east of the Lincolnshire Wolds, where the drift geology comprises Quaternary glacial deposits of chalk rich Boulder Clay, extending to a depth of c. 50m. (B.G.S., 1996).

Central National Grid Reference TF 4682 7623.

3.0 Archaeological and historical background

The origin of the place name Bilsby can be traced to the *Domesday Book*, where it appears as *Billesbi*. (Cameron, 1998). This suggests that the origins of the settlement may be sought in the late Saxon period, the components of the name deriving from the Old Norse *Billi* (pers. name) and the Old Danish *by*, translated as *'Billi's farmstead, village'*.

Archaeological information for the village is limited. The site lies within the grounds of a moated homestead. Traces of the moat survive, although the current hall dates from the 19th century. It is believed that the foundations of an earlier castellated mansion, with adjacent fishpond, lie within the moated area (Lincolnshire Sites and

Monuments Record No: 41481). It has been suggested that fragments of Roman pavement and many sculptured stones were imported and used as part of the fabric of the earlier hall (SMR No: 41482).

4.0 Methodology

Detailed area survey using a fluxgate gradiometer is a non-intrusive method of evaluating the archaeological potential of a site. The gradiometer detects magnetic anomalies created by areas of high or low magnetic susceptibility. These variations are caused by changes in the composition of the subsoil or the underlying geology. Archaeological features result from man-made alterations to the soil and they may also incorporate intrusive materials such as brick and stone. These features can create detectable magnetic anomalies. In addition, activities that involve heating and burning can generate 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 occurring features and natural geological strata can result from:

- their relative depth or density of fill
- the magnetic properties of materials introduced as a result of human activity (e.g. rubble, stone, brick/tile, ferrous metal etc.) in contrast to those within surrounding natural deposits
- magnetic enhancement associated with areas of burning
- the magnetic properties of localised, naturally deposited minerals, such as those occurring in the fills of palaeo-channels.

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 base line was established along the eastern edge of the survey area (Fig.2). Pegs were placed at all grid corners to facilitate relocation of the survey.

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 colour, greyscale and trace images.

The site was surveyed by David Bunn on 21st August 2001.

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	Warm and sunny
Area surveyed	c.0.5ha

Table 1: Summary of survey parameters

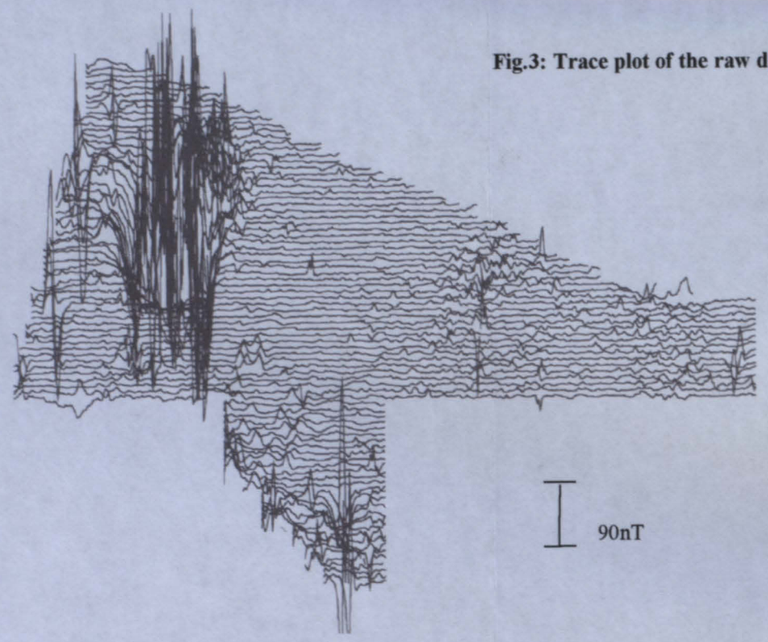

Fig.3: Trace plot of the raw data.

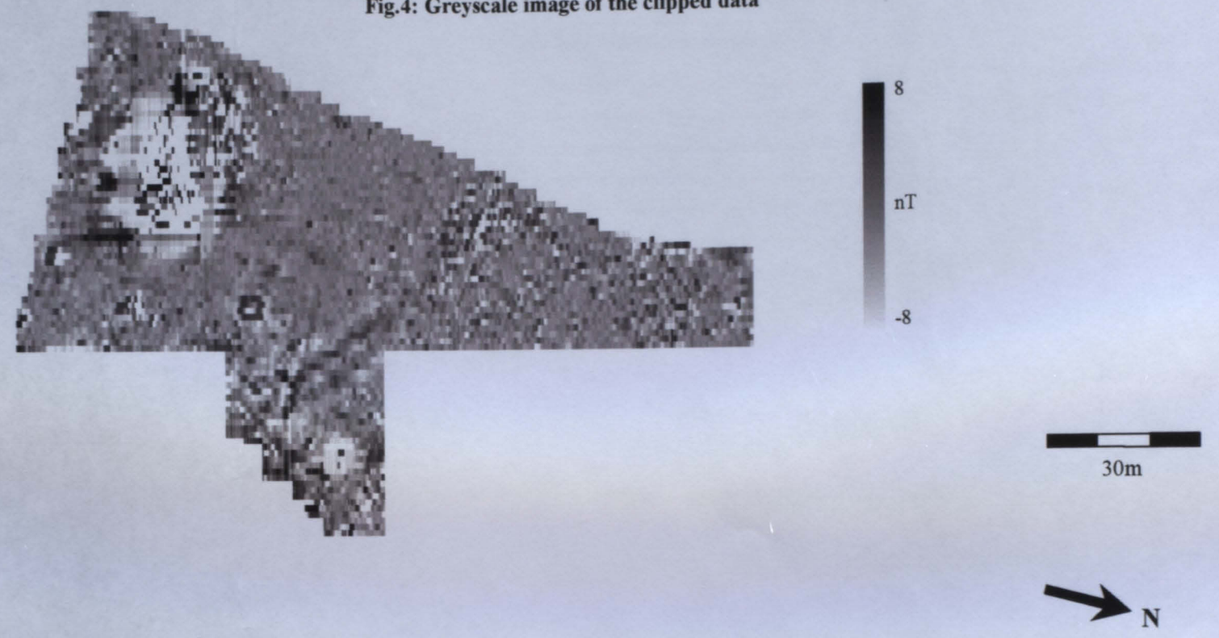

Fig.4: Greyscale image of the clipped data

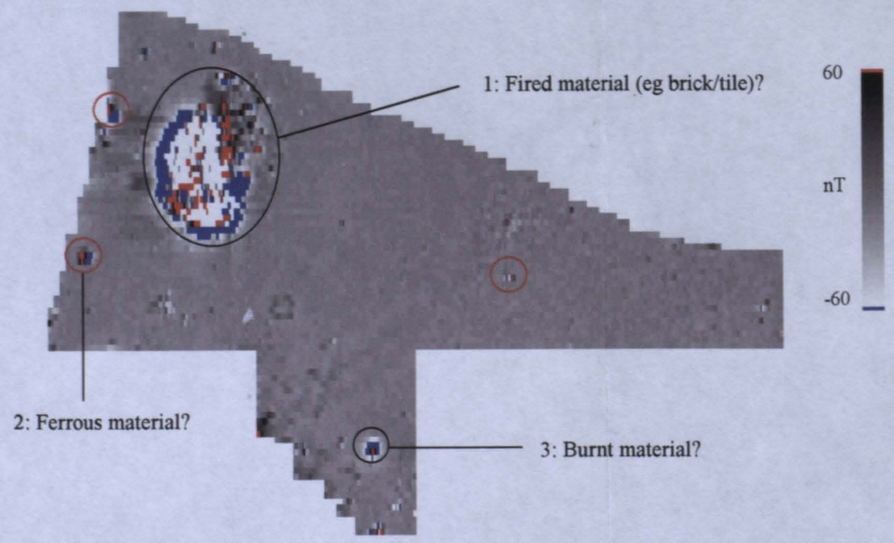

Fig.5: Image of the raw data (strongest anomaly in colour)

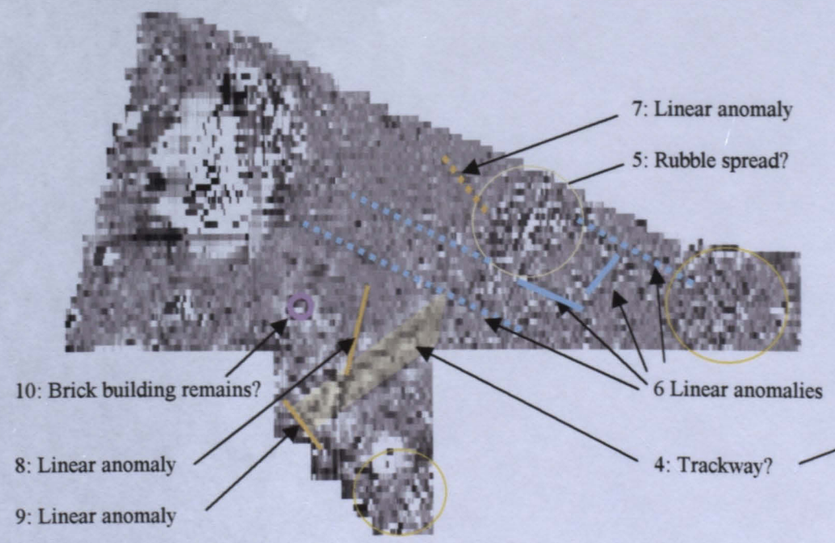

Fig.6: Interpretive plan

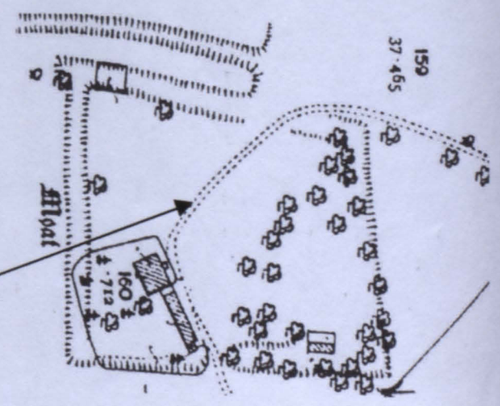

Fig.7: Extract from O.S. map (2nd ed. 1906)

5.0 Results

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

The raw data is presented as a trace plot (Fig.3), a greyscale image (Figs. 4), and as an image showing the strongest anomalies highlighted in colour (Fig. 5). Figure 6 represents an interpretive plan.

A relatively large area (c.30m x 30m) of strong disturbance (Fig.5: **1**) was detected in the southern part of the survey. The magnetic properties of this anomaly group suggest that large amounts of brick and/or tile may be present, although none was visible on the surface. These may be traces of a building, possibly the earlier hall, the exact footprint of which was not determined by the survey.

Several discrete areas of extreme magnetic variation were recorded elsewhere. These may mark the location of ferrous materials (**2**:circled in red), or burning (**3**).

Further processing has improved the resolution of weak anomalies (Fig.4).

Several linear features were detected. Of these, linear **4** probably relates to a track that appears on the 1906 Ordnance Survey Map (Fig.7). The north-western end of **4** is less clearly defined (anomaly group **5** seems to respect the orientation of the track, but may be the result of a separate phase of activity). The magnetic properties of **5** (circled in yellow) differ slightly, and may indicate a random scatter of ceramic debris. Similar areas were detected on the northern and eastern edges of the survey. Smaller, discrete examples appear across most of the site.

Anomaly group **6** comprises three parallel features arranged (almost) perpendicular to a fourth. The north-south orientated elements of **6** appear to respect the western component of the moat.

A number of other linear features were detected (**7**,**8**,**9**). No obvious relationship between these and anomalies **1-6** has been established. Anomaly **9** possibly relates to an earlier alignment of a boundary that currently lies c.5m to the south-east.

Anomaly **10**, situated between **1** and **4**, appears to reflect a sub-circular feature, approximately 3-4m in diameter. It is possible this represents the footprint of a small, brick structure.

6.0 Conclusions

The archaeological significance of the site is known from existing sources of information. It falls within the grounds of a moated homestead that was supposed to have been the seat of the Bilsby family.

One anomaly (**4**) can be resolved as a trackway that is depicted on the 1906 Ordnance Survey map. Anomaly **1** appears to reflect a substantial quantity of rubble and/or tie. This may represent a precursor to the existing (i.e. 19th century) Bilsby Hall. Anomaly

10 may also be structural. Fainter anomalies that occupy the central and northern parts of the survey are less easy to resolve, although their alignments appear to respect the principal alignments of the moated enclosure itself.

7.0 Acknowledgements

Pre-Construct Geophysics would like to thank Neil Dowlman Architecture for this commission.

8.0 References

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