

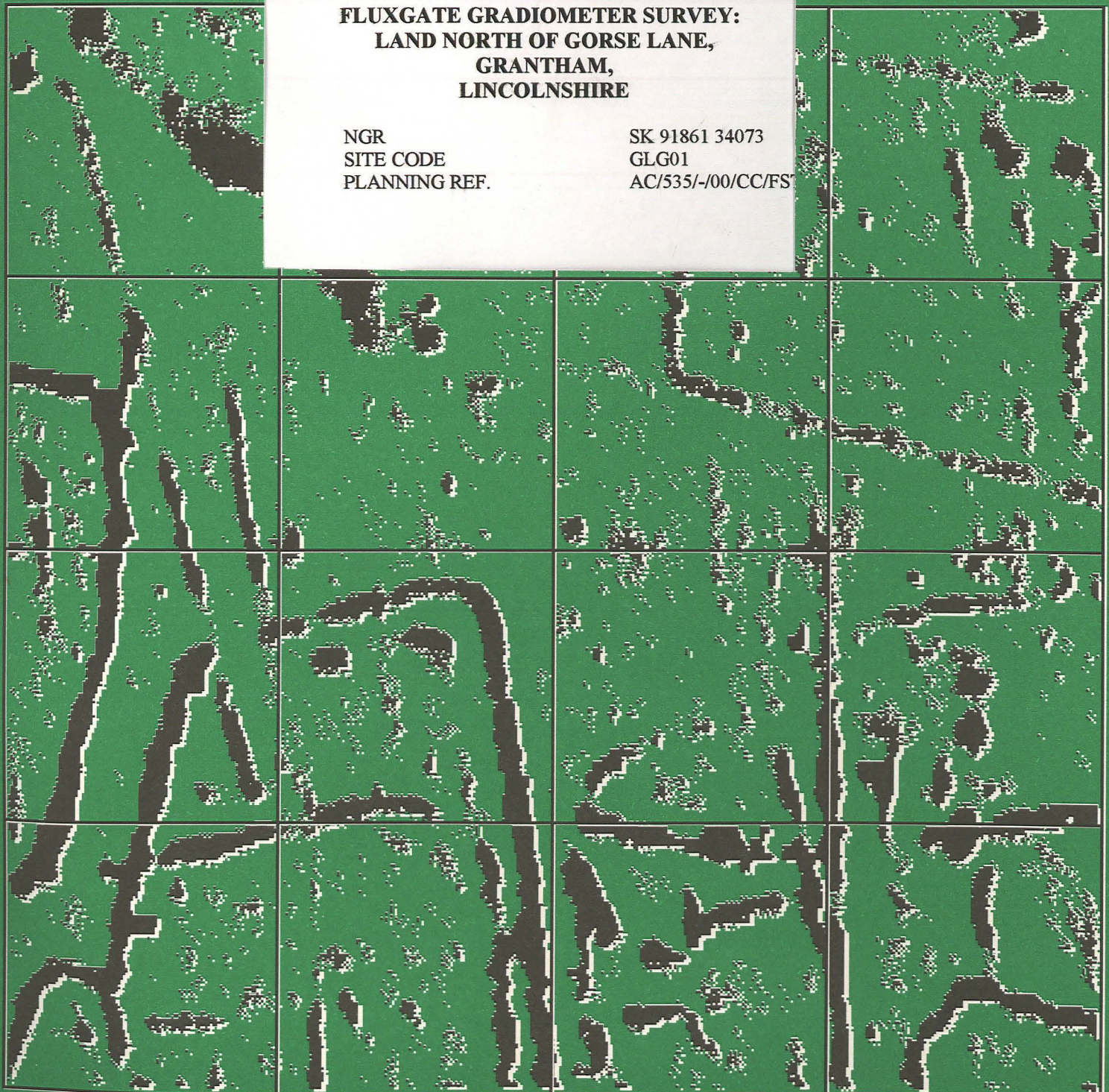
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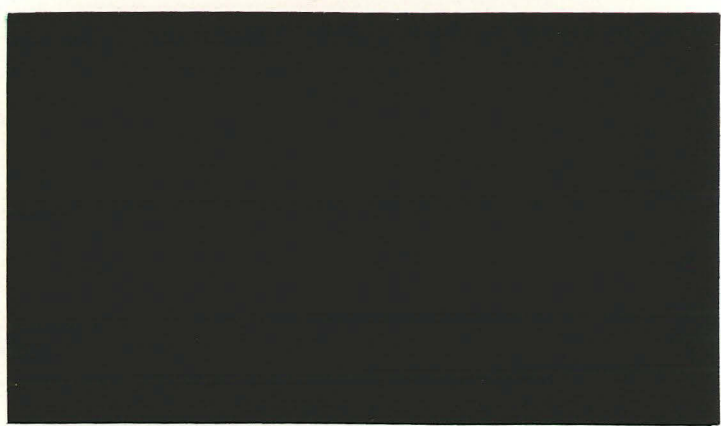


**FLUXGATE GRADIOMETER SURVEY:
LAND NORTH OF GORSE LANE,
GRANTHAM,
LINCOLNSHIRE**

NGR
SITE CODE
PLANNING REF.

SK 91861 34073
GLG01
AC/535/-/00/CC/FS





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SOURCE 416502
PRTS 35362 4181614
35363 4181615

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Report prepared for Bovis Lend Lease
David Bunn & Colin Palmer-Brown



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 3.0 hectares of land at Gorse Lane, Grantham, Lincolnshire*
- *The survey identified significant levels of magnetic variation across the site, and this variability can be resolved into a series of magnetic anomalies*
- *Some of the magnetically stronger anomalies are associated with modern recreational activities. Other anomalies almost certainly reflect sub-surface archaeological features*
- *Two well-defined rectilinear enclosures of probable prehistoric date have been defined. Further examples may exist within the site, however, the diffuse nature of the anomalies has impaired clarification of some features*
- *Small discrete anomalies distributed across the site suggest the presence of ferrous and ceramic debris in the topsoil*

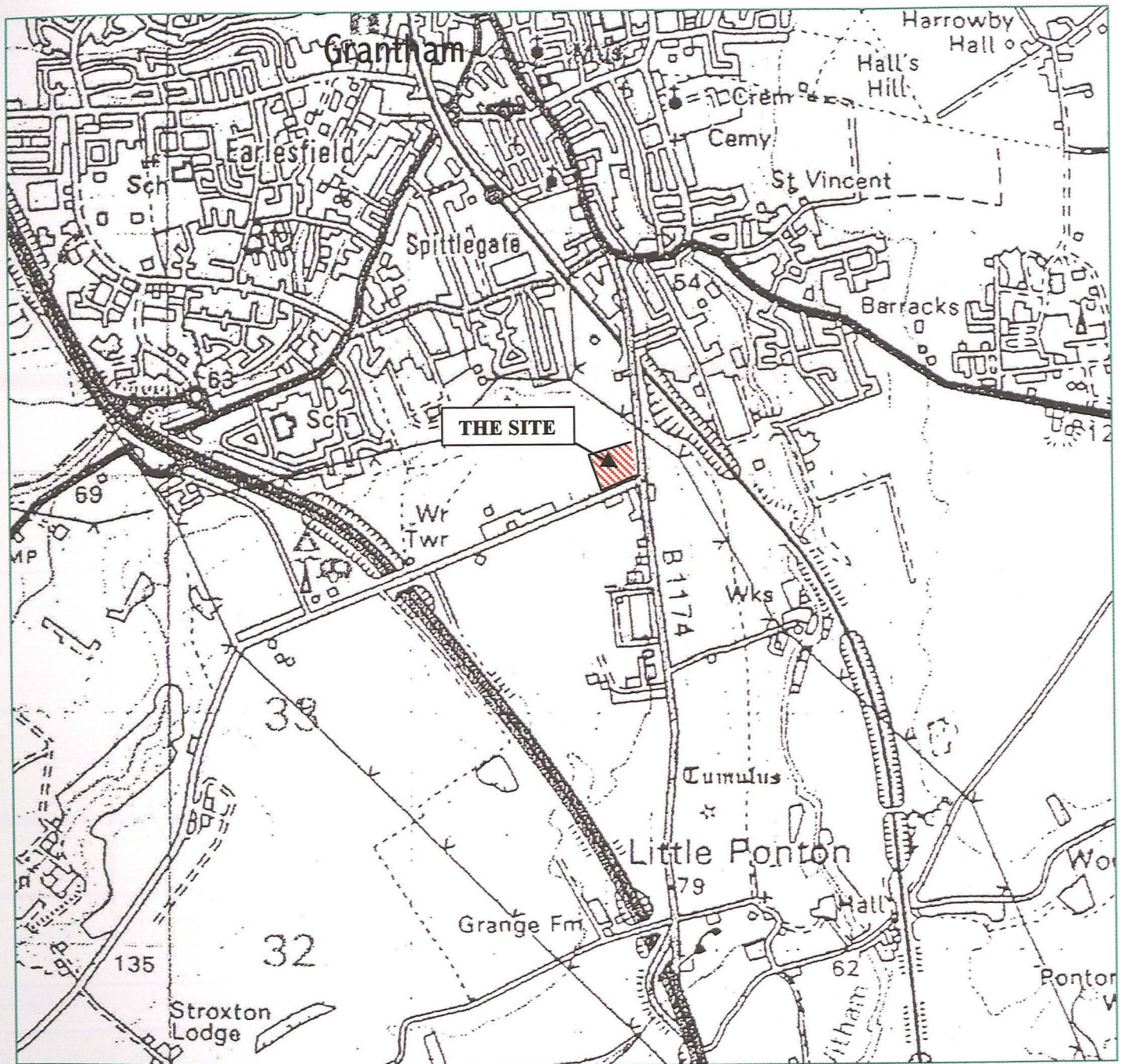


Fig.1: Location of site **Scale 1:25000**
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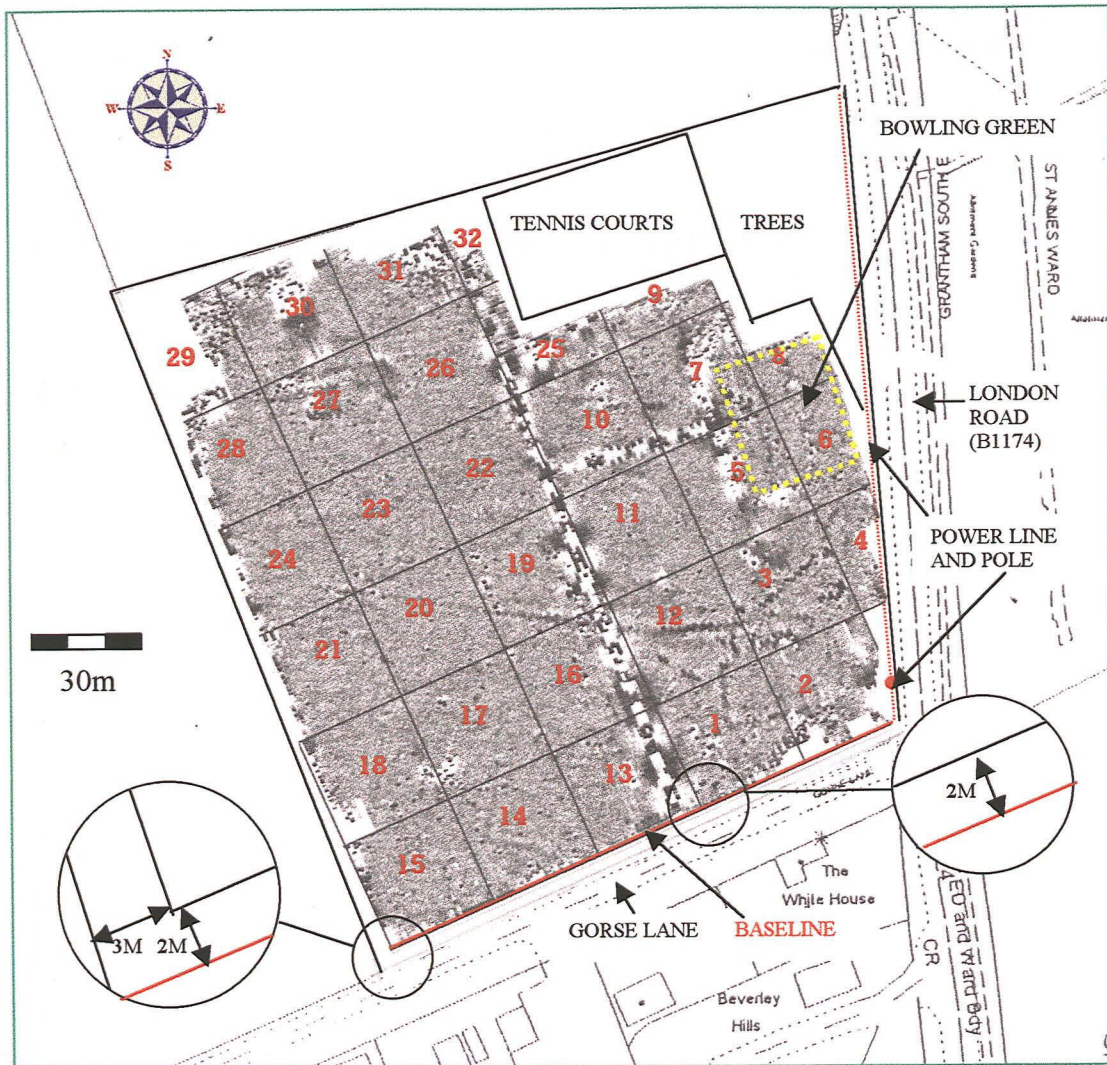


Fig.2: Location of survey Scale 1:2000

1.0 Introduction

Bovis Lend Lease commissioned Pre-Construct Geophysics to undertake a fluxgate gradiometer survey of land at Gorse Lane, Grantham, Lincolnshire. This work was carried out as part of an archaeological assessment of the site, conducted to discharge a requirement of Lincolnshire County Council Built Environment Section, which was placed upon a planning application for the construction of a Secondary School.

The survey was undertaken according to a specification prepared by Pre-Construct Archaeology (Palmer-Brown, 2001).

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

Grantham is approximately 14km south-west of Sleaford and 32km south of Lincoln.

The site is situated towards the southern periphery of the town, falling within the angle of Gorse lane and the B1174. It is a sub-rectangular unit of c. 3.0 ha that is currently grazed by horses. Formerly used for sports facilities, redundant tennis courts and a bowling green remain in the north-east corner of the site. The site of the tennis courts and an adjoining area of trees were not suitable for this survey technique. Consequently, a total area of c.2.5 ha was surveyed.

The site is bounded on all sides by metal chain link fencing and hedges. A low north-south ridge in the middle part of the site interrupts a predominately east-facing slope. Terracing, ground raising and levelling has resulted from the construction of the tennis courts and bowling green; the ground to the west and south of the latter is higher and lower respectively.

Traces of a demolished building were noted on the northern edge of the site.

Drift deposits have not been identified within the immediate vicinity of the site, while the uppermost formation of the solid geology is the Lower Lincolnshire Limestone, which comprises part of the Inferior Oolitic Series (B.G.S., 1971).

Central National Grid Reference SK 91861 34073.

3.0 Archaeological and historical background

The evidence for prehistoric activity in this part of the limestone uplands is well documented. The area appears to have been a favoured hunting ground during the Mesolithic (Middle Stone Age) period, and considerable quantities of artefactual remains, usually stone tools, have been recovered from the Grantham-Ancaster area.

Neolithic, Beaker, and Bronze Age period sites are also represented within the area of the later town.

The current site is in the vicinity of known cropmark and other remains. A number of Bronze Age barrows (burial monuments) are recorded in the County Sites and Monuments Record, and one such monument is indicated on the Ordnance Survey map, approximately 1.5km to the south of the site.

Given the density of recorded remains that lie in the vicinity of the proposed development, the Senior Built Environment Officer of Lincolnshire County Council has recommended the undertaking of a programme of archaeological evaluation. This report documents the first phase of the evaluation, which may be followed by a limited programme of trial excavation.

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 occurring features and the natural geology 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, 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 base line was established along the southern edge of the survey area (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 15th, 16th and 17th February 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	15 th and 17 th February: Sunny, warm 16 th February: Cooler, overcast
Area surveyed	c.2.5ha

Table 1: Summary of survey parameters

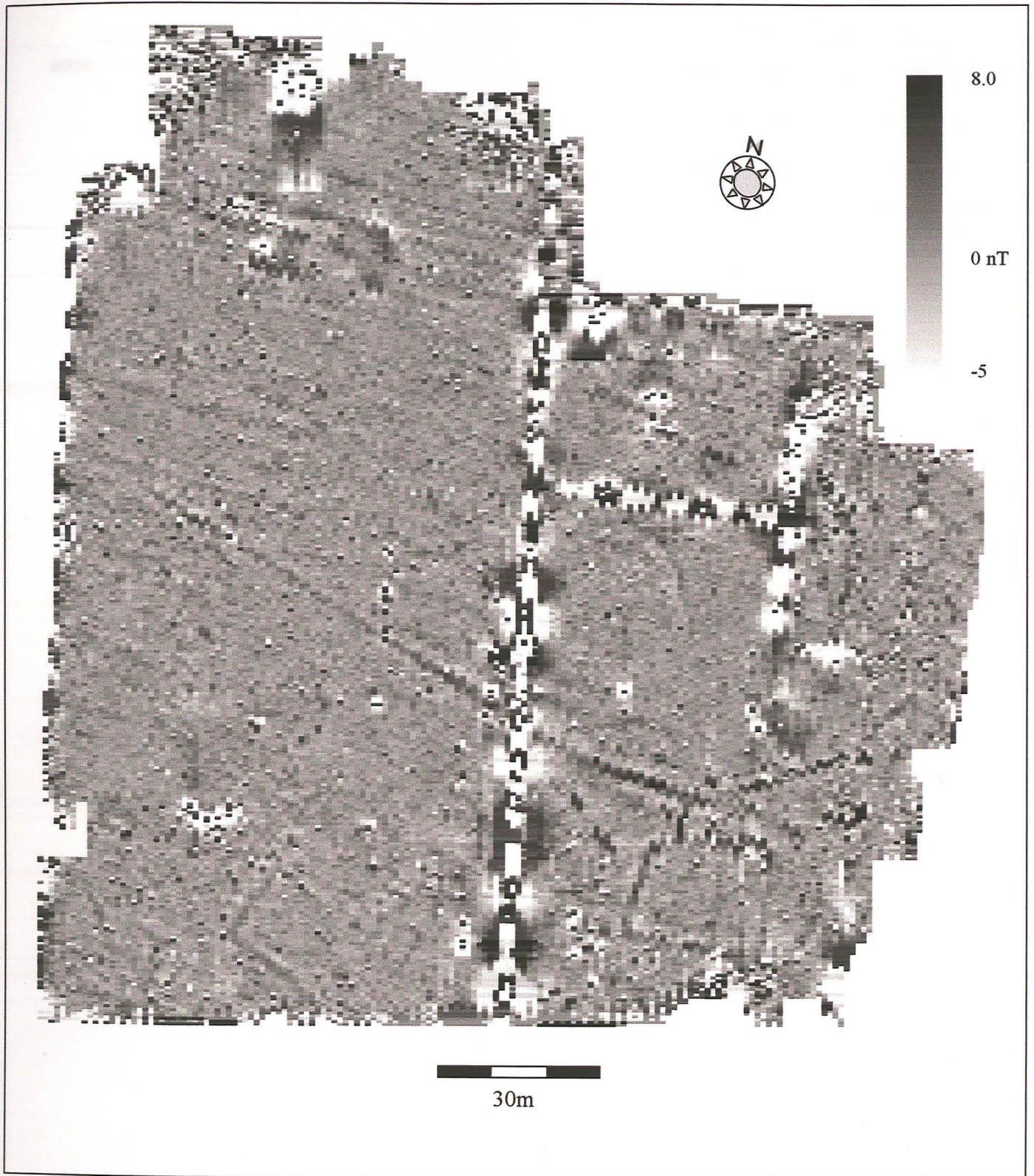


Fig.3: Clipped greyscale image Scale 1:1000

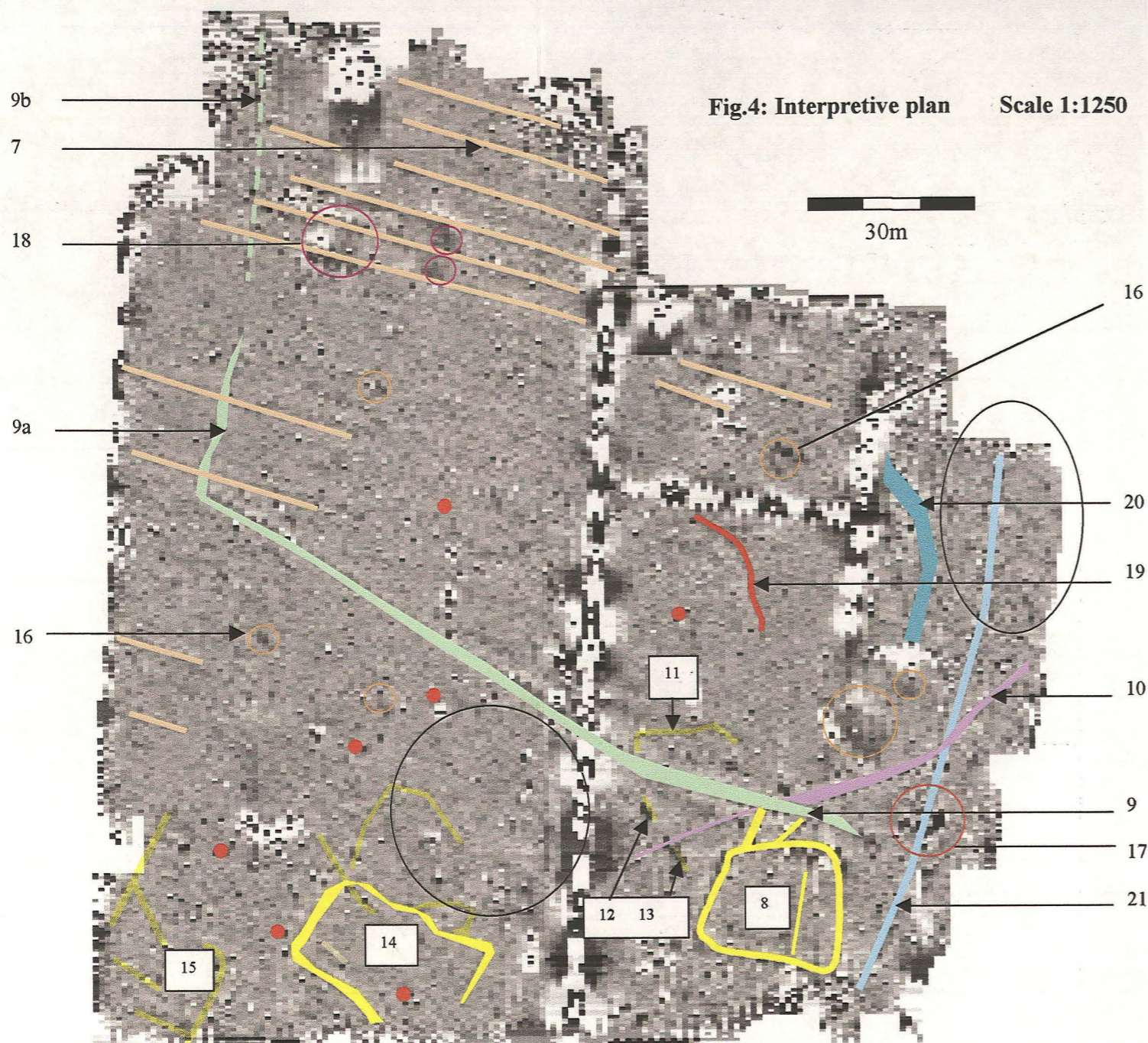
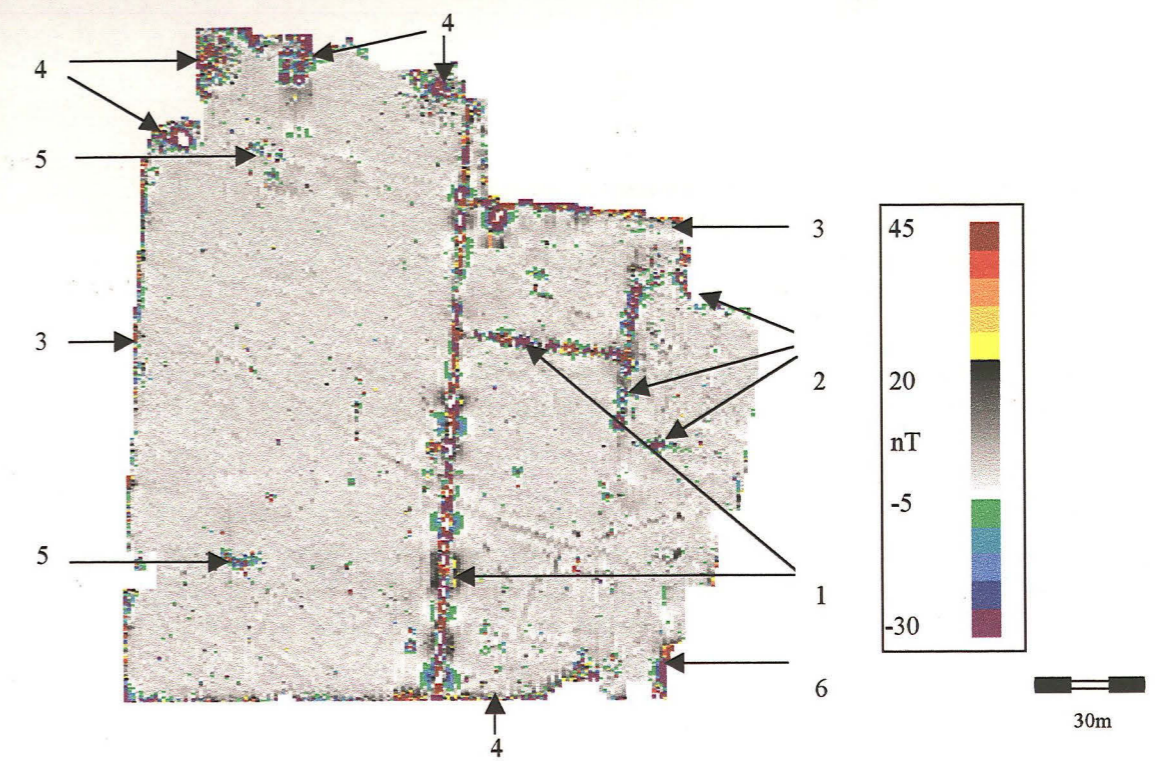


Fig.4: Interpretive plan Scale 1:1250

- Probable ridge and furrow
 - ? Boundaries
 - ? Traces of burning
 - ? Feature disturbed by ploughing
 - ? Pit (eg quarrying)
 - ? Areas of natural reticulation
 - Discrete anomaly (example)
-
- Enclosure features
 - Possible enclosure features



- 1: Services
- 2: Perimeter of bowling green
- 3: Chain link fence
- 4: Misc. debris
- 5: ? Rubble pit
- 6: Electricity pole/cable

Fig.5: Image of raw data showing strongest anomalies (in colour) Scale:1:2000

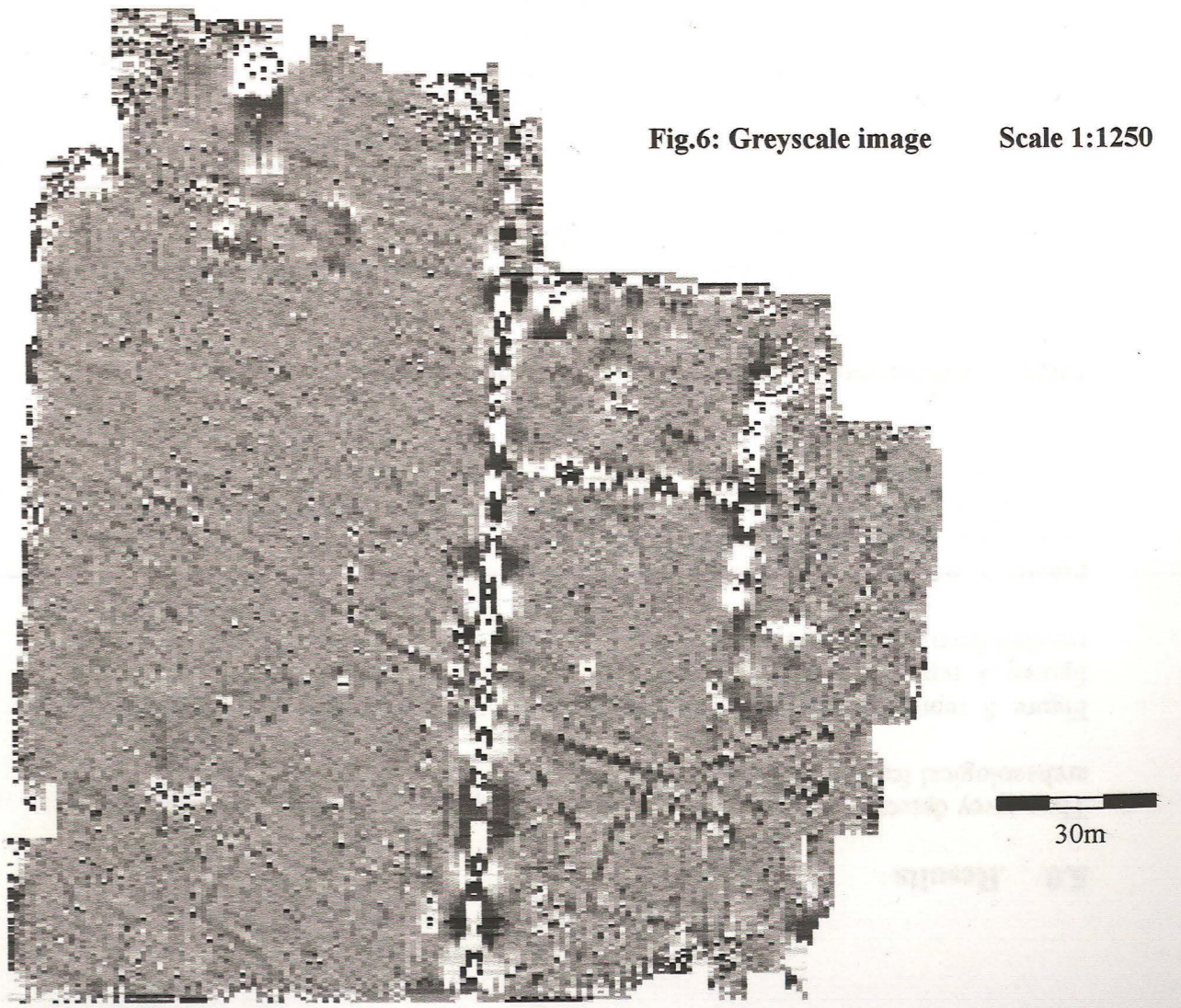


Fig.6: Greyscale image Scale 1:1250

5.0 Results

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

Figure 5 represents the raw data, with the strongest anomalies shown in colour; figures 3 represents an enhancement of magnetically weak anomalies, which has resulted from further processing.

Figure 5 and the trace plot of the raw data (Figure 7) graphically indicate the differences in magnetic variation across the survey area. Most of the strongest magnetic anomalies can be related to modern features. Linear anomaly group 1 is typical of the magnetic signature of modern services, in this instance, those serving the sports facilities.

Anomaly 2 represents the western and southern edges of the bowling green.

The magnetic disturbance along the northern, western and southern edges of the site has resulted from the proximity of the chain link fence (3), and miscellaneous debris and rubble that was noted during the survey (4).

Areas of strong magnetic disturbance away from the site boundary (example, 5) are probably the result of rubble/ferrous materials contained within filled pits. Smaller examples of this magnetic variation were detected across the site. These may mark the location of horseshoes and other discarded ferrous objects.

Anomaly 6 was detected in the south-east corner of the site, close to an electricity pole.

A range of comparatively subtle anomalies were detected over a wide area (Fig. 3), and an interpretation of these can be viewed on Figure 4.

Over much of the northern and western part of the survey, a series of faint parallel linear anomalies were detected (7); each orientated approximately east-west, perpendicular to London Road. These anomalies almost certainly reflect the remains of ridge and furrow of probable medieval date.

Anomalies of potentially greater significance and antiquity were identified on the south side of the survey. In the south-east corner, anomaly group 8 appears to represent several components of a relatively simple sub-rectangular enclosure. This feature may be contemporary with linear anomaly 9 to the north, although it could equally be attached to linear anomaly 10.

A diffuse curvilinear, 11 was detected to the north of 9, and anomalies 12 and 13 to the south may represent traces of a separate enclosure, although this interpretation is tentative.

Further to the west, there is a second enclosure, represented by anomaly group 14. This also appears to be a sub-rectangular feature of relatively simple form. There is a group of very weak and amorphous anomalies (circled) to the immediate north of the

principal enclosure, and these anomalies are difficult to resolve. They may be the result of natural reticulation in the bedrock (resulting from glacial ice wedging), or they could just reflect some form of organic development between enclosure 14 and anomaly 9 to the north. Similar magnetic variation was noted in the north-east corner of the survey (Fig.4).

A group of very weak curvilinear anomalies (15) in the extreme south-west of the survey may also represent components of an enclosure (or enclosures). These anomalies cannot be resolved as discrete features.

As noted above, enclosure 8 could be associated with either 9 or 10. Anomaly 9 originates in the south-east of the survey, and extends north-west for c. 130m, before turning an almost right angle and heading north-north-east for up to 80m (9a, and 9b). Although the anomaly is significantly weaker and broken over this part of the site, 9-9b appears to represent some form of significant boundary feature.

A number of localised amorphous anomalies were detected across the survey area (example, 16). These features are of varying size, and it is possible that they represent either pits or backfilled quarries. It is known that this area was extensively exploited in antiquity, both for its limestone and ironstone reserves.

The relatively strong magnetic signature of anomaly group 17 possibly indicates the presence of burnt materials.

A group of localised anomalies on the north-west side of the survey (18) has an almost smudged appearance. This smudging may be due to the effects of later ploughing (i.e. the ridge and furrow (7)).

Curvilinear anomaly 19 may be a remnant of a boundary feature. Anomaly 20 appears to share a parallel orientation and could possibly be related. However, 20 and the northern end of 21 lie within the bowling green. Groundwork for the latter may have compromised the survey results in this area.

The random distribution of small, discrete anomalies (22) probably reflect agricultural activities on the site such as burning and midden spreading, although the existence of potentially significant features on the site suggest that some of these anomalies may be of archaeological interest.

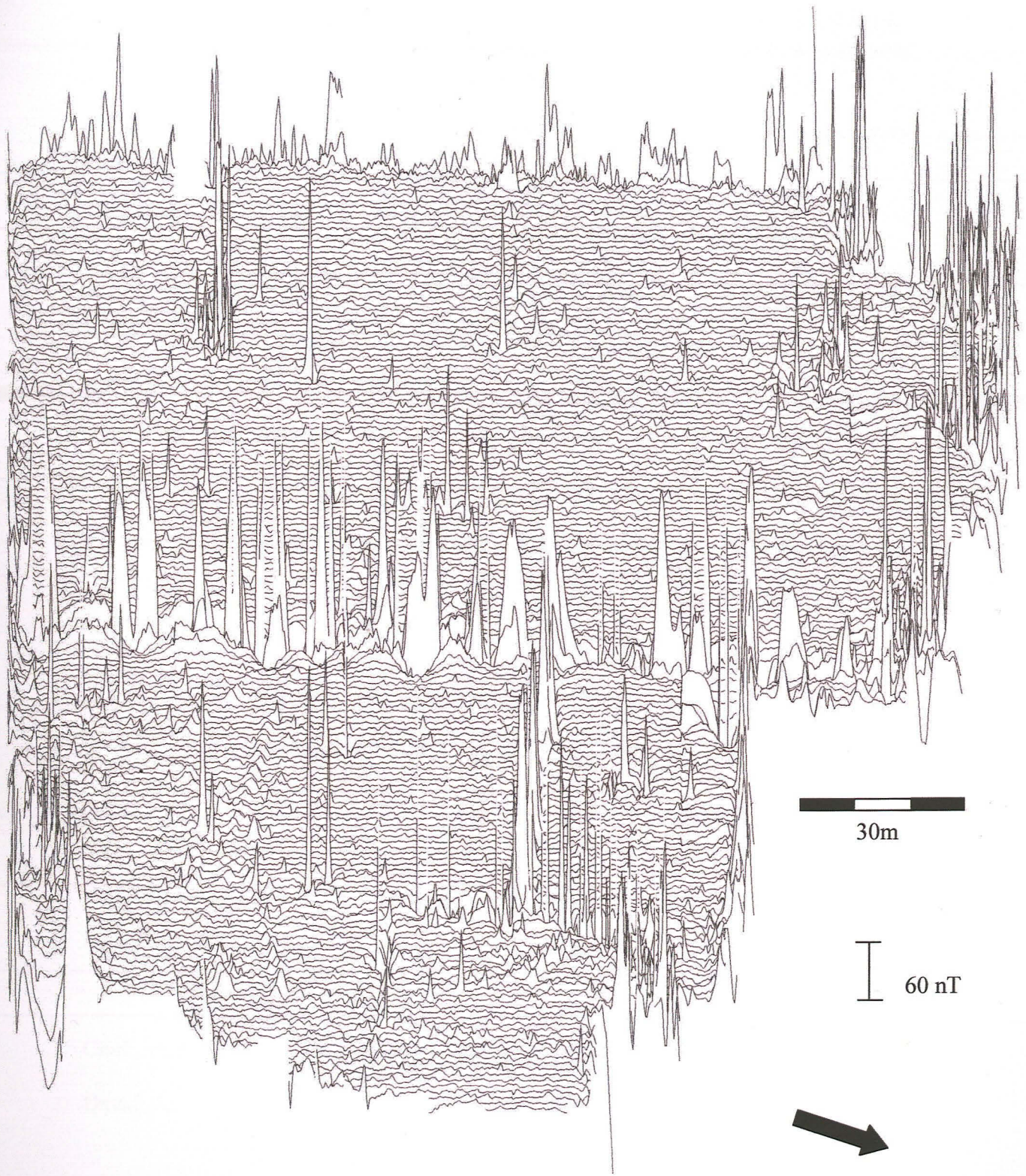


Fig.7: Trace plot of raw data

Scale 1:1000

6.0 Conclusions

The survey has identified significant levels of magnetic variation across the site. While some of this variation is definitely associated with modern activities, a number of anomalies are almost certainly of archaeological significance.

The site is located in an area of known Bronze Age activity, including funerary remains. No evidence of the latter has been detected by the current survey.

The enclosures 8 and 14 would appear to be of simple form. Although their morphology cannot necessarily date them, settlement enclosures of Bronze Age date are rare, and 'simple' enclosures in the Midlands, where these occur on aerial photographs, have been associated with Iron Age and/or early Romano-British activity (e.g. Winton 1998). There are, however, exceptions, such as the recently excavated enclosures at Kirmond-le-Mire (Field & Knight 1992), which may have originated in the later Bronze Age.

Enclosure 8 may be associated with linear ditches of potentially great extent, and these ditches may represent aspects of a more complex and widespread system of land division.

It is possible that further anomalies exist to the immediate north of enclosure (14), although the geophysical survey has been unable to resolve this. In part, this ambiguity is explained in terms of the natural geological reticulation that is common on limestone sites (e.g. areas defined by black circles).

7.0 Acknowledgements

Pre-Construct Geophysics would like to thank Bovis Lend Lease for this commission.

8.0 References

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