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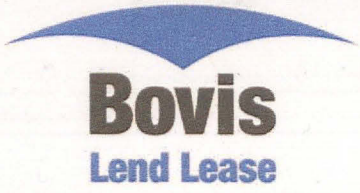

FLUXGATE GRADIOMETER SURVEY: LAND AT SOUTH PARK, LINCOLN

NGR SK 4975 3698

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

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Event 413481
Source 418198

PRN 70477 Undated
PRN 70479 Post Medieval

Contents

Illustrations

Summary

- *A fluxgate gradiometer survey was undertaken for Bovis Lend Lease Ltd. on land at South Park, Lincoln*

- *A range of magnetic anomalies have been identified, some of which reflect known services and former land divisions*

- *A series of non-random, localised and strong anomalies have been identified over much of the survey area. These anomalies could be of some considerable archaeological significance, or they could betray bonfire sites associated with allotment gardens that were in existence during the earlier part of the 20th century*

- *Several ephemeral linear anomalies were identified across the central and eastern part of the survey: these features are extremely weak, and are treated with caution*

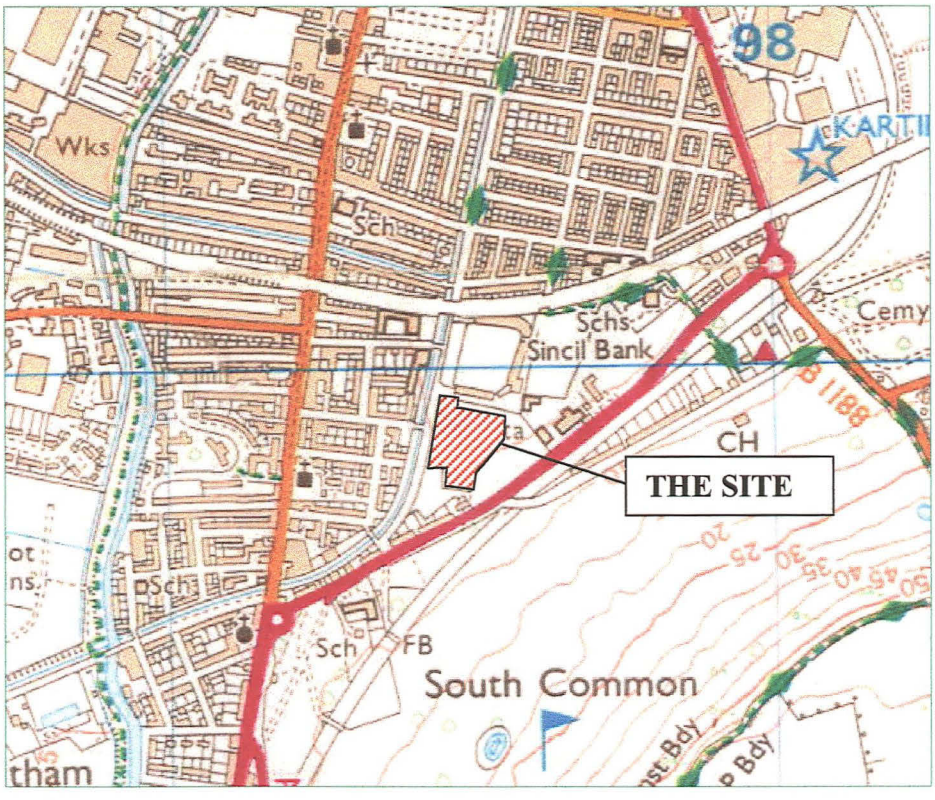


Fig.1: Location of site **1:12500**

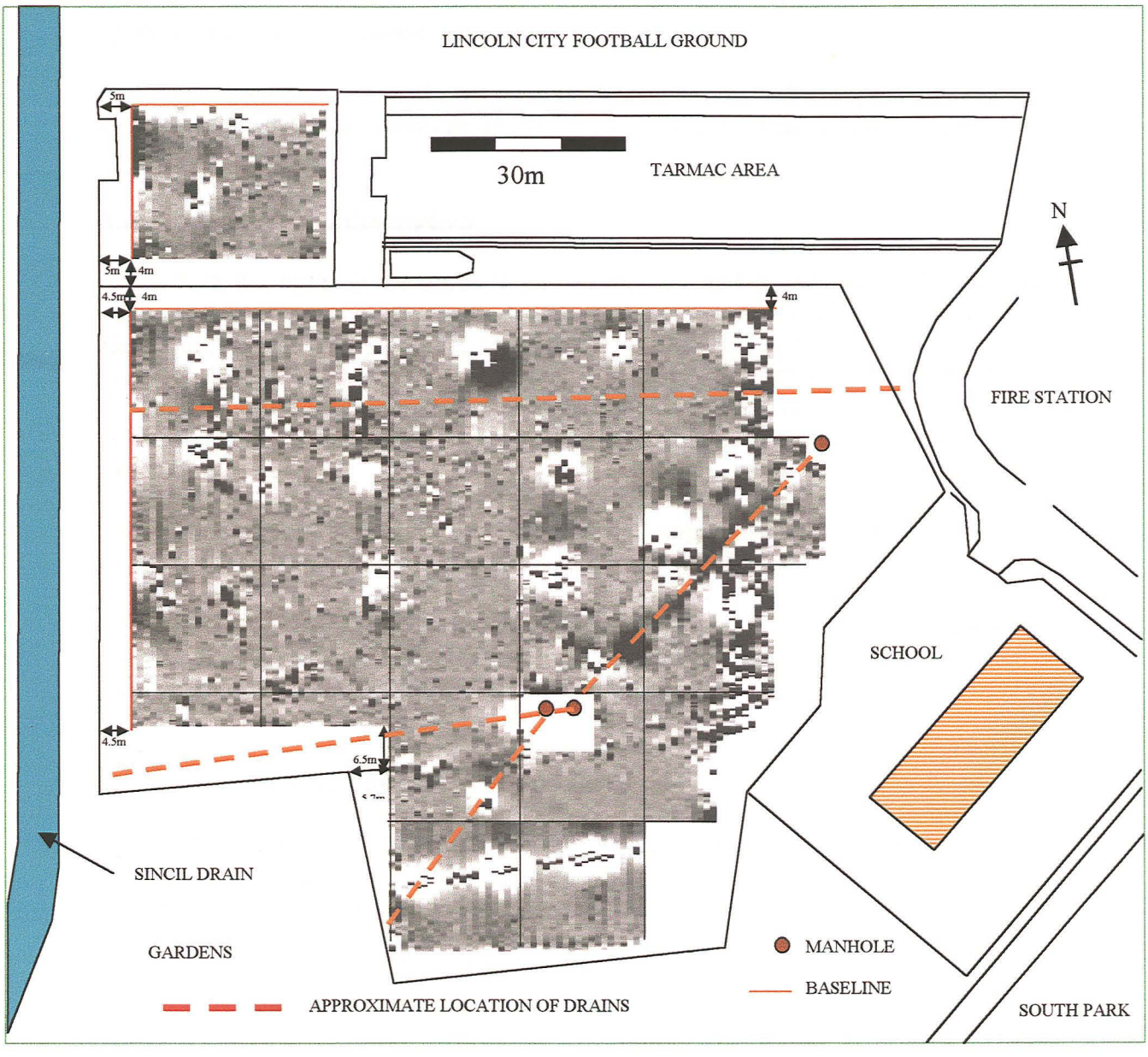


Fig.2: Location of Survey 1:1000

1.0 Introduction

Bovis Lend Lease Ltd. commissioned Pre-Construct Geophysics to undertake a fluxgate gradiometer survey of land at South Park, Lincoln. This work was undertaken as part of an archaeological assessment of the site, conducted to discharge a requirement of Lincolnshire County Council, which was placed upon a planning application for the construction of a new school.

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

South Park lies towards the southern part of the city, and extends along the northern edge of South Common. The site, situated to the east of Sincil Drain, is bordered to the north by Lincoln City Football Club, to the east by the City Fire Station, and to the south by houses and a school. Iron railings or hedges enclose most of the proposed development area. The ground surface is predominately level and is currently grassed. A raised terrace in the southern part of the site marks the location of a former tennis ground.

Information provided by the client indicates the approximate location of a number drains (and related manholes) that extend across the site (Fig.2).

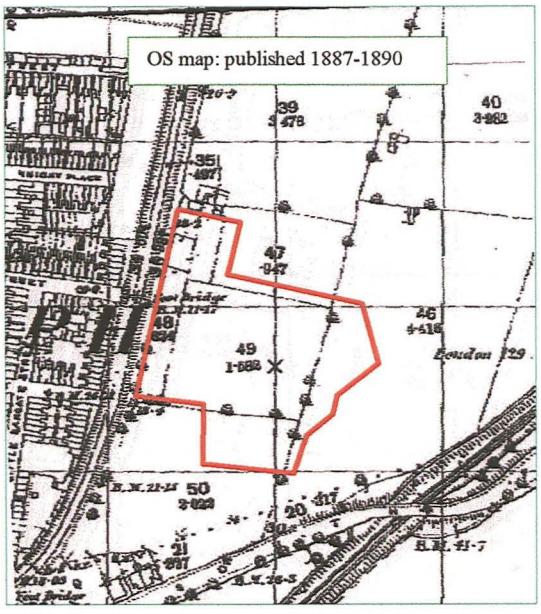
The site is situated within the River Witham valley, and, as such, drift deposits are alluvial. In this instance, they comprise undifferentiated river terrace sand and gravel, overlying Lower Lias clay, shale and rare limestone (BGS, 1973).

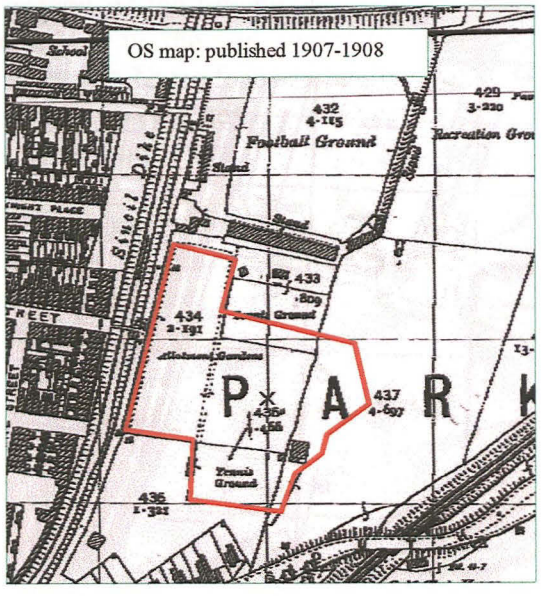
3.0 Archaeological and historical background

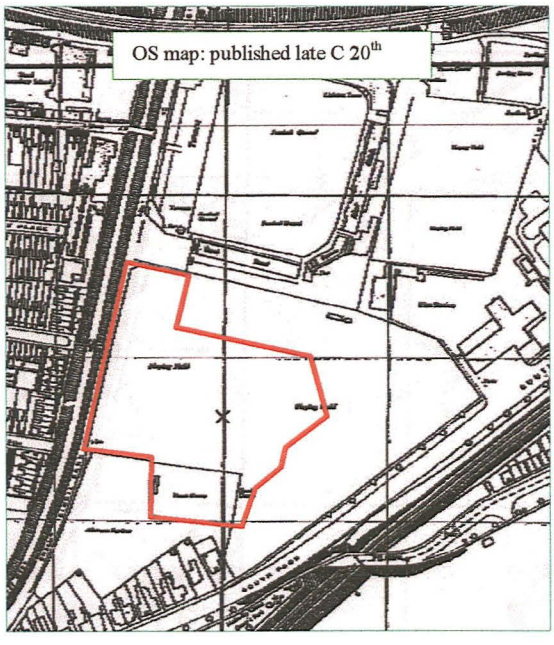
Although there is no recorded evidence of archaeological activity at the site, it is its proximity to Sincil Drain and Little Bargate that is of significance. During the medieval period, the latter provided a south-eastern access to the city, and was located towards the northern end of a wall that extended east from Great Bargate (Hill, 1965). Sincil Drain dates from at least the medieval period and is possibly of Roman origin. It was established to provide improved drainage and flood protection for settlements along Ermine Street and the Fosse Way (*ibid*). This suggests that land to the east of the Drain (which includes the current site) was prone to flooding and was unsuitable for habitation. The extent of Roman occupation and activity in this area is uncertain, although the discovery of military burials may be evidence of a fortification to the south of the walled city, and possibly close to the development area.

A series of map extracts dating from the 19th century onwards have been provided by the client company (Fig.3). These have been examined on a regressive basis: the earliest shows the site sub-divided into a number of small fields. The second, which post-dates the appearance of the football ground, shows the use of the area as allotment gardens and tennis grounds, with fewer field divisions, and a track running north to south across the centre of the site. The latest map shows the site before the

construction of the iron railings that form the northern and eastern edges; most of the area is designated as playing fields, separated from the southern tennis grounds by a boundary, since removed.







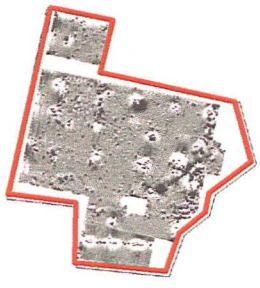


Fig.3: Series of maps showing various uses of the site since the 19th century, with incorporated geophysical greyscale image (Nominal scale)
This figure is also presented with the interpretive image

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 similarities 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 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.)
- 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 20m x 20m and 30 x30m grids. The sensitivity of the machine was set to detect magnetic variation in the order of 0.1 nanoTesla. Baselines are recorded on figure 2.

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 presented as greyscale/colour images, trace plots, and an interpretive plan (Figures 4-7).

Instrument	Geoscan Research fluxgate gradiometer FM36 Sample trigger ST1
Grid size	20m x 20m, 30 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, occasional showers
Area surveyed	c. 0.9 ha
Date of survey	6th September 2002
Survey personnel	David Bunn, Alex Osinski
Central National Grid Reference	SK 4975 3698

Table 1: Summary of survey parameters

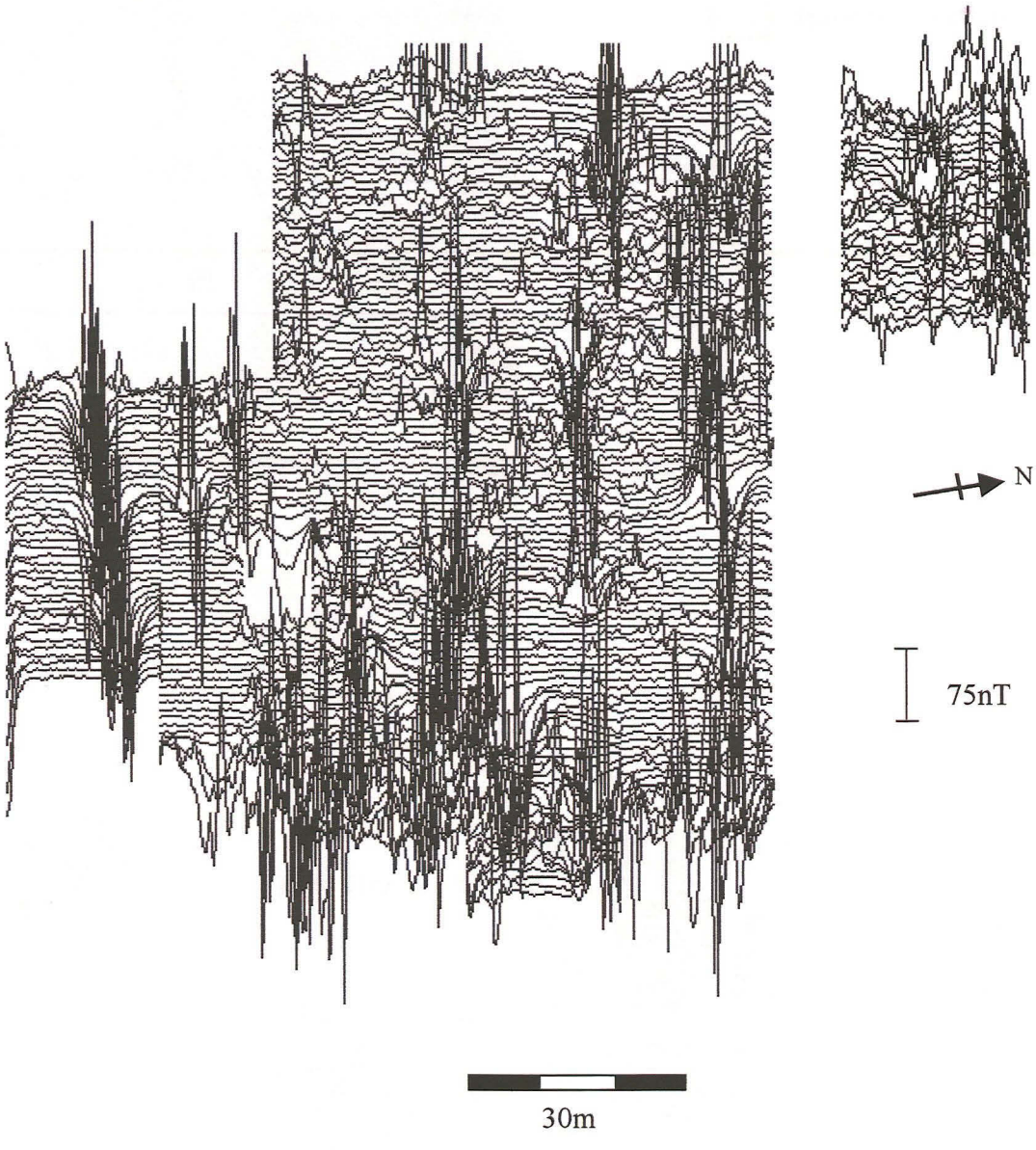


Fig.4: Trace plots of the raw data 1:1000

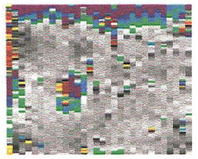
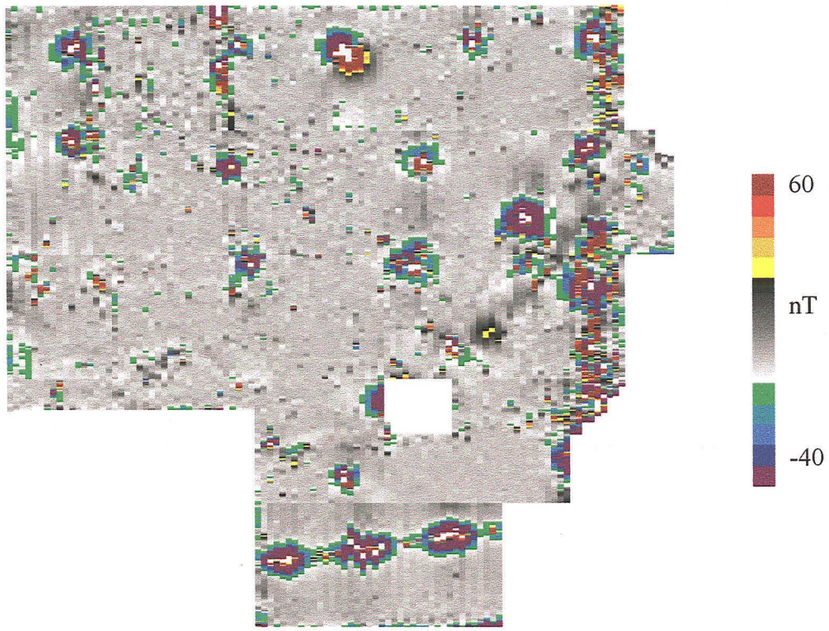


Fig.5: Images of raw data showing strongest anomalies in colour



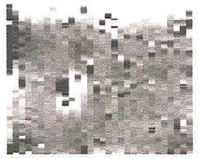
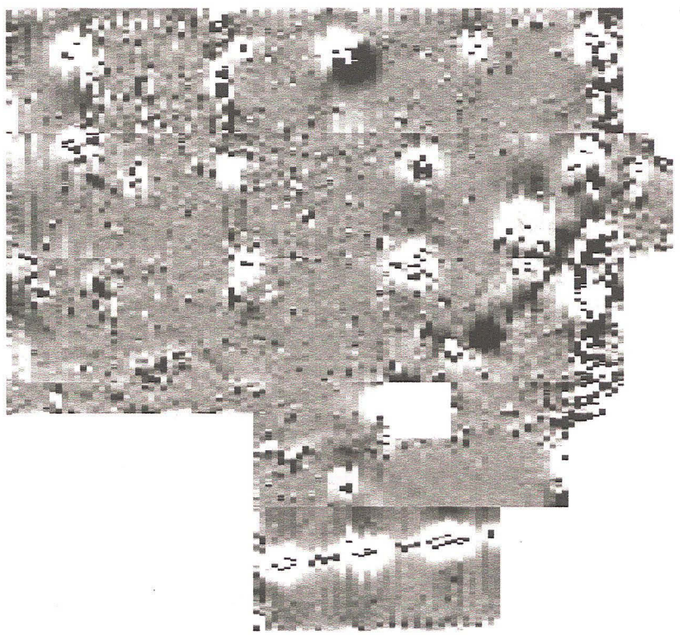
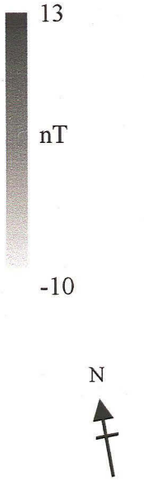


Fig.6: Greyscale images





1:1000

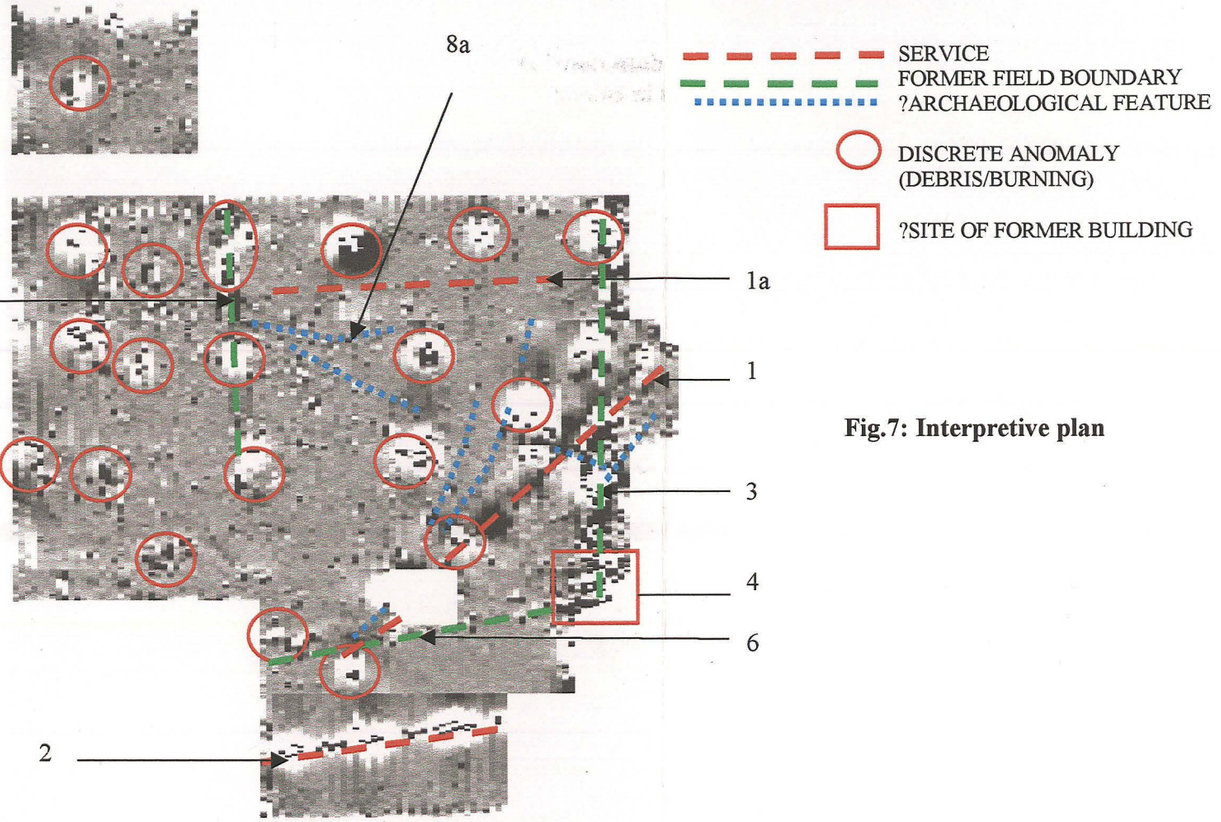
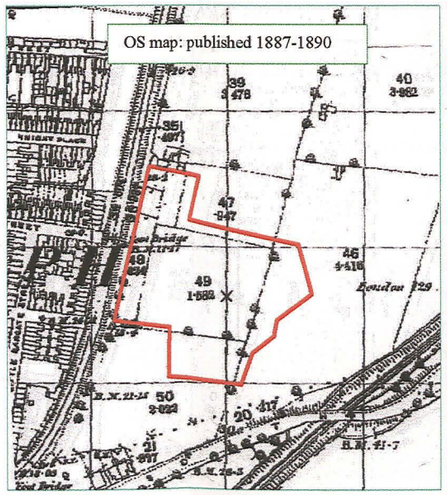
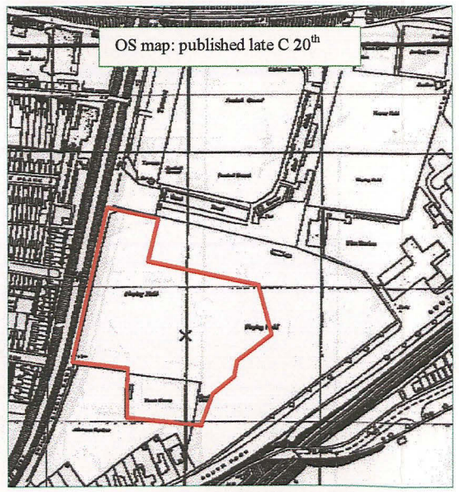


Fig.7: Interpretive plan





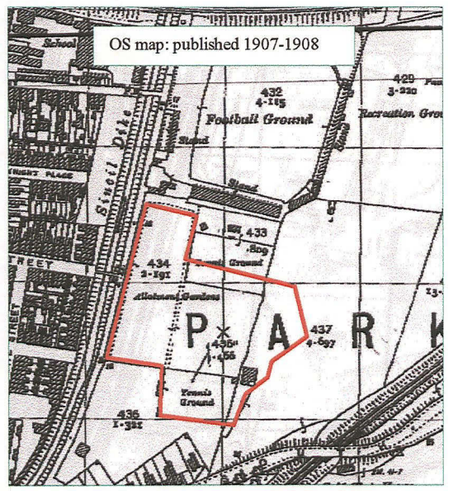
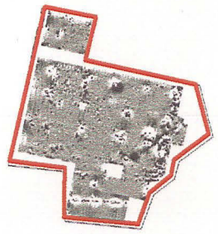


Fig.3



5.0 Results

The results are presented graphically in figures 4-7 (1:1000):

- Figure 4: Trace plots of the raw data
- Figure 5: Images of the unclipped data (strongest anomalies shown in colour)
- Figure 6: Greyscale images of the enhanced (clipped) data
- Figure 7: Interpretive plan of enhanced data

The survey detected areas of strong magnetic variation, some of which appears to reflect existing and relatively recent features. Information provided by the client includes the location of a series of drains that extend across the site (Fig.2). The survey has identified at least one (possibly two) of these services (Fig.7: **1**, **1a**). A more recent service was also identified (**2**). The latter extends across the southern part of the site, on land formerly used as tennis ground.

A zone of strong variation (**3/4**) was detected along the eastern edge of the survey. This corresponds to a former field boundary, which is depicted on earlier maps of the area (Fig.3). It is possible that the southernmost element of this variation (**4**) incorporates dispersed building remains (Fig. 3: 1907-8 OS edition).

Diffuse linear anomaly **5** and (possible) linear anomaly **6** could also reflect previous field boundaries, as depicted on the 1907/08 OS.

The majority of the survey area is dominated by a series of discrete and (for the most part) relatively strong anomalies (Fig.7: example, **7**, circled in red.). These anomalies may represent areas of ceramic/ferrous debris and/or areas of burning. Their archaeological potential is increased by the close proximity of Sincil drain and Little Bargate. However, the relatively even distribution of the anomalies across the survey area may reflect the former use of the site as allotment gardens (Fig.3) - a formal arrangement of intensively cultivated plots, including bonfires, sheds and miscellaneous gardening paraphernalia. However, this interpretation is itself tempered by the occurrence of such anomalies in the north-east corner of the site, on land previously used for tennis (Fig.3) - it is always possible that allotments in this area were removed for this purpose.

The survey has identified a number of very diffuse linear and curvilinear anomalies (Fig.7: **8**, shown as blue). **8a** is the clearest of these. Some are extremely diffuse and barely discernable, but, given the archaeological potential attached to this site, the possibility that they reflect real features cannot be discounted

6.0 Conclusions

The survey has identified services, known land divisions and the possible remains of a building.

A scatter of discrete anomalies (7) could relatively recent activities, or they could be of greater archaeological significance. A series of very faint linear anomalies have also been identified.

The close proximity of Sincil Drain (which dates from at least the medieval period, and possibly earlier) and the southern parts of the city enhance the archaeological potential of the site. However, to establish the true nature of these anomalies, further investigation would be required.

7.0 Acknowledgements

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

8.0 References

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