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pre-construct geophysics

FLUXGATE GRADIOMETER SURVEY:
LAND AT HORNCASTLE
LINCOLNSHIRE

CNGR: TF 2578 6910

REPORT PREPARED FOR LINDSEY ARCHAEOLOGICAL SERVICES

BY DAVID BUNN

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Unit G, William Street Business Park, Saxilby, Lincoln, LN1 2LP
Tel/Fax: 01522 704900 e-mail: pcgeophysics@tiscali.co.uk
www.geofizz.net

Summary

- *A fluxgate gradiometer survey took place along the route of a proposed water pipeline at Horncastle in Lincolnshire.*
- *The survey recorded widespread linear and discrete magnetic anomalies that almost certainly reflect buried archaeological remains, including ditches and pits. These probably indicate traces of former settlement dating from the Iron Age and/or the Romano-British periods.*
- *Less significant magnetic variation relates to modern features, including rugby goalposts and boundary fencing.*

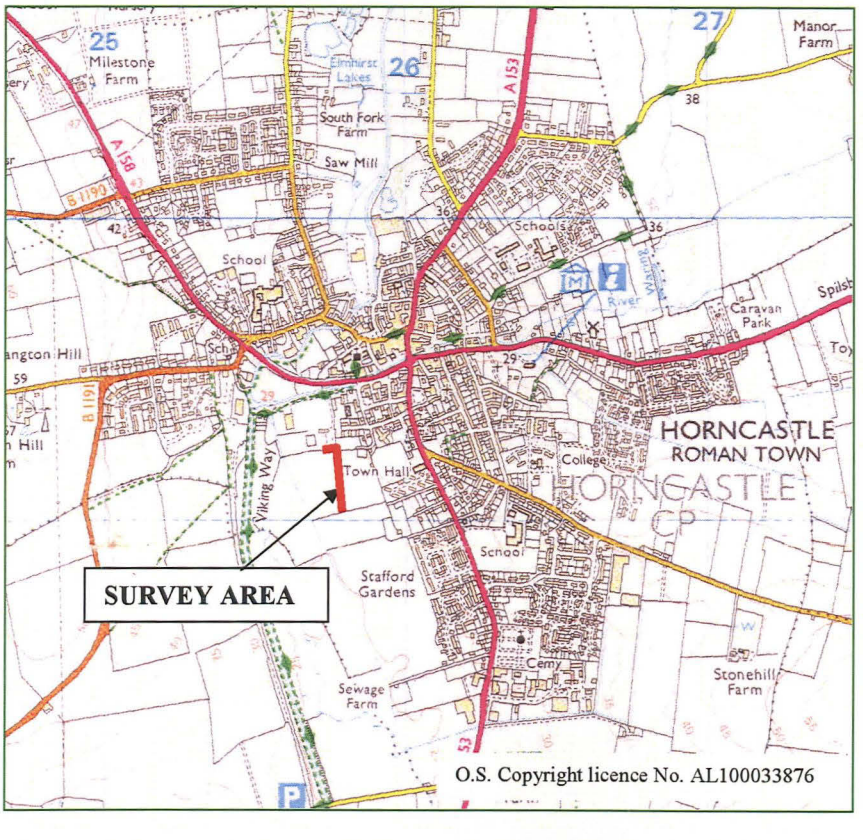

Fig.1: General site location 1:25,0000

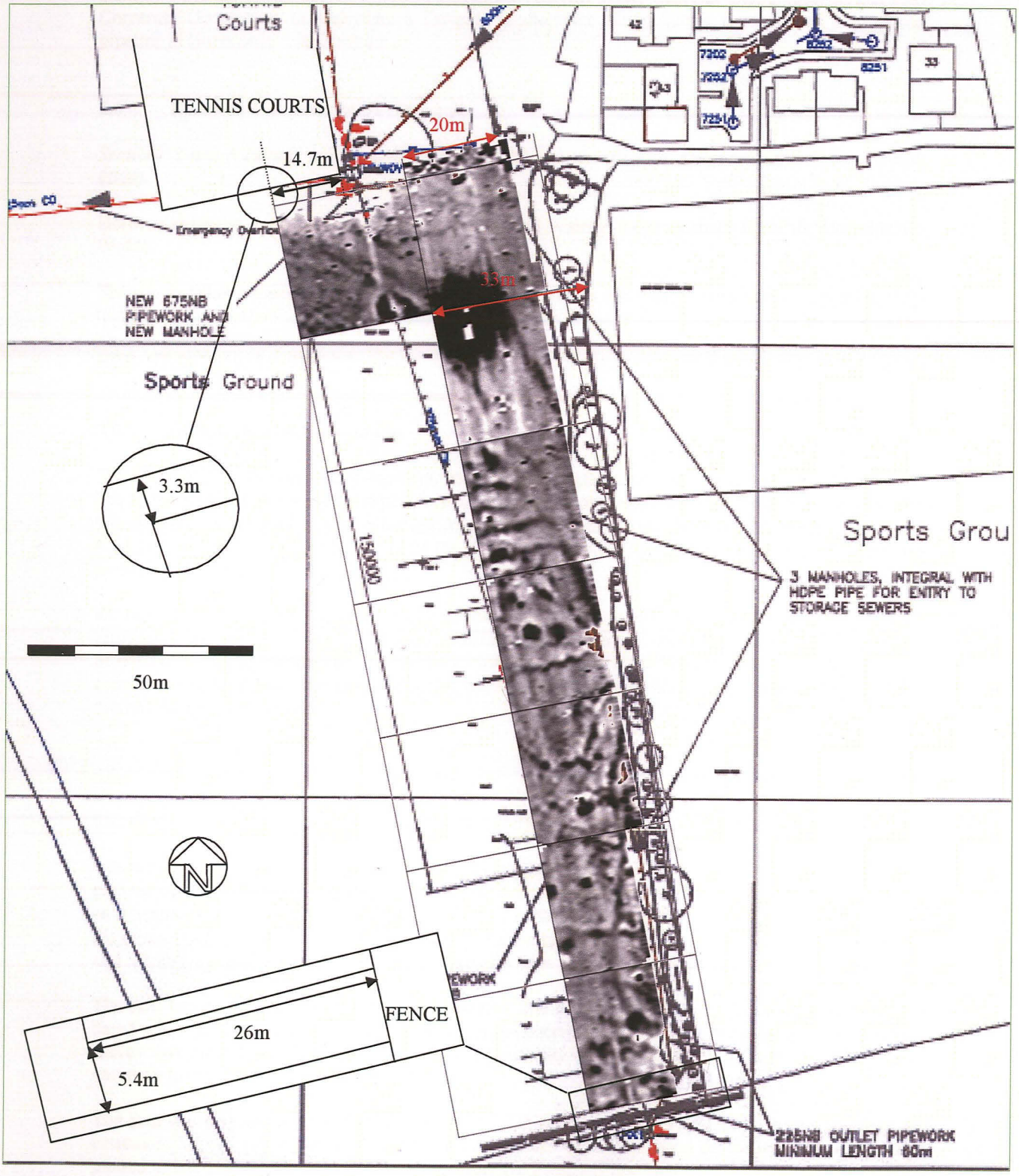

Fig.2: Location of survey
1:1250

1.0 Introduction

Lindsey Archaeological Services (LAS), acting for Anglian Water Services Ltd, commissioned Pre-Construct Geophysics to undertake a fluxgate gradiometer survey along the route of a proposed pipeline at Horncastle, Lincolnshire.

2.0 Location and description (Figs 1-2)

Sections 2 and 3 include information contained within a specification for geophysical survey (Field, 2006).

Horncastle lies at a confluence of the Rivers Bain and Waring at the southern tip of the Lincolnshire Wolds.

The route of the proposed c. 150m long water pipeline extends along the eastern edge of a playing field that lies to the south of town centre and to the west of The Wong.

NGR: TF 2578 6910

3.0 Archaeological background

There is evidence relating to extensive Romano British settlement in Horncastle, and a late Roman fort lies to the north of the proposed pipeline route. The Saxon and medieval settlement was concentrated within walls of the Roman fort, although recent finds of early Saxon burials were made outside the Roman walls. In the post-medieval period the settlement expanded again to the south of the Waring and possibly to the east.

At the south end of the proposed pipeline route there are extensive cropmarks, which appear to represent elements of the known unwalled settlement of Iron Age to Late Roman date. To the northeast of the route, during construction of the High Dependency Unit in the Wong in the 1980s, five Roman cremations in urns were found. More recent evaluation in Selwood Gardens has revealed part of the ditched enclosure systems.

4.0 Methodology

The survey methodology was based upon English Heritage guidelines (David, 1995).

Gradiometry is a non-intrusive scientific prospecting technique that is used to determine the presence/absence of some classes of sub-surface archaeological remains (eg pits, ditches, kilns, and occasionally stone walls). By scanning the soil surface, geophysicists identify areas of varying magnetic susceptibility and can interpret such variation by presenting data in various graphical formats and identifying images that share morphological affinities with diagnostic archaeological remains.

The area survey was conducted using a Bartington Grad 601 dual fluxgate gradiometer with a DL601 data logger set to take 4 readings per metre (a sample interval of 0.25m). The zigzag traverse method of survey was used, along 1m wide traverses. The sensitivity of the machine was set to detect magnetic variation in the order of 0.1 nanoTesla.

The data was processed using *ArcheoSurveyor 1.3.2.7*. It was clipped to reduce the distorting effect of extremely high or low readings caused by discrete pieces of ferrous metal on the site. The results are plotted as trace, colourscale, greyscale and interpretive images (Figs. 3-6).

Instrument	Bartington Grad-601
Grid size	30m x30m
Sample interval	0.25
Traverse interval	1.0m
Traverse method	Zigzag
Sensitivity	0.1nT
Processing software	*ArcheoSurveyor 1.3.2.7.*
Weather conditions	Fine
Area surveyed	C.0.6ha
Date of survey	6/10/2006
Survey personnel	Peter Heykoop
National Grid Reference	TF 2578 6910

Table 1: Summary of survey parameters

5.0 Results and discussion (Figs. 2-6)

The survey recorded a relatively dense array of magnetic anomalies (Figs. 3-6). For the most part, these occur in the mid and southern part of the pipeline route and appear to indicate traces of buried ditches and pits/discrete deposits of burnt materials (Fig.6: highlighted in red); Iron Age and Roman-British settlement remains are known in this general area and it would appear to be very likely that the survey has detected traces of this activity.

An existing water pipeline may have been partially recorded by the survey as a magnetically depleted linear anomaly (blue line). A similar anomaly is possibly a reflection of cultivation (orange line).

Strong magnetic variation relates to rugby posts and ferrous materials within/along existing boundaries, including tennis court fencing that lies to the immediate north of the survey (all highlighted in pink).

6.0 Conclusions

The survey has detected magnetic anomalies that almost certainly reflect buried ditches and pits/areas of burning. These predominate in the mid and southern parts of the site, within and adjacent to the pipeline corridor. Existing evidence suggests that this general locality contains Iron Age and Romano-British settlement remains and it seems likely that elements of this activity have been registered.

7.0 Acknowledgements

Pre-Construct Geophysics would like to thank Lindsey Archaeological Services for this commission.

8.0 References

Clark, A. J. 1990 *Seeing beneath the soil.* London, Batsford.

David, A. 1995 Research & Professional Services Guidelines No **1**: *Geophysical Survey in Archaeological Field Evaluation. London*

Field, N. 2006 *Horncastle Sports Ground CSO, Archaeological Geophysical Survey, Project Design and Estimate.* Lindsey Archaeological Services, unpublished document.

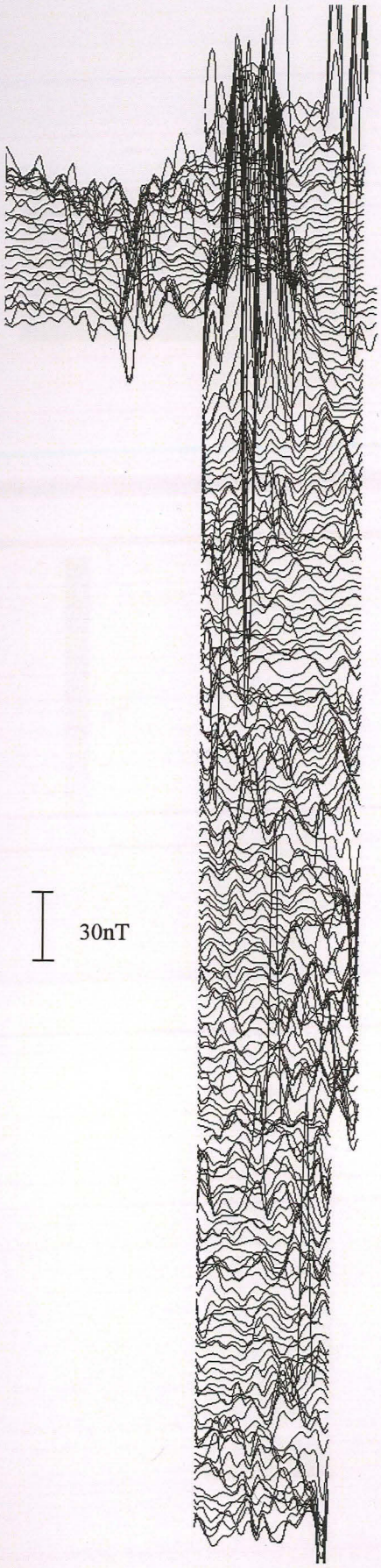

Fig.3: Trace plot
(data clipped to +/-100nT)

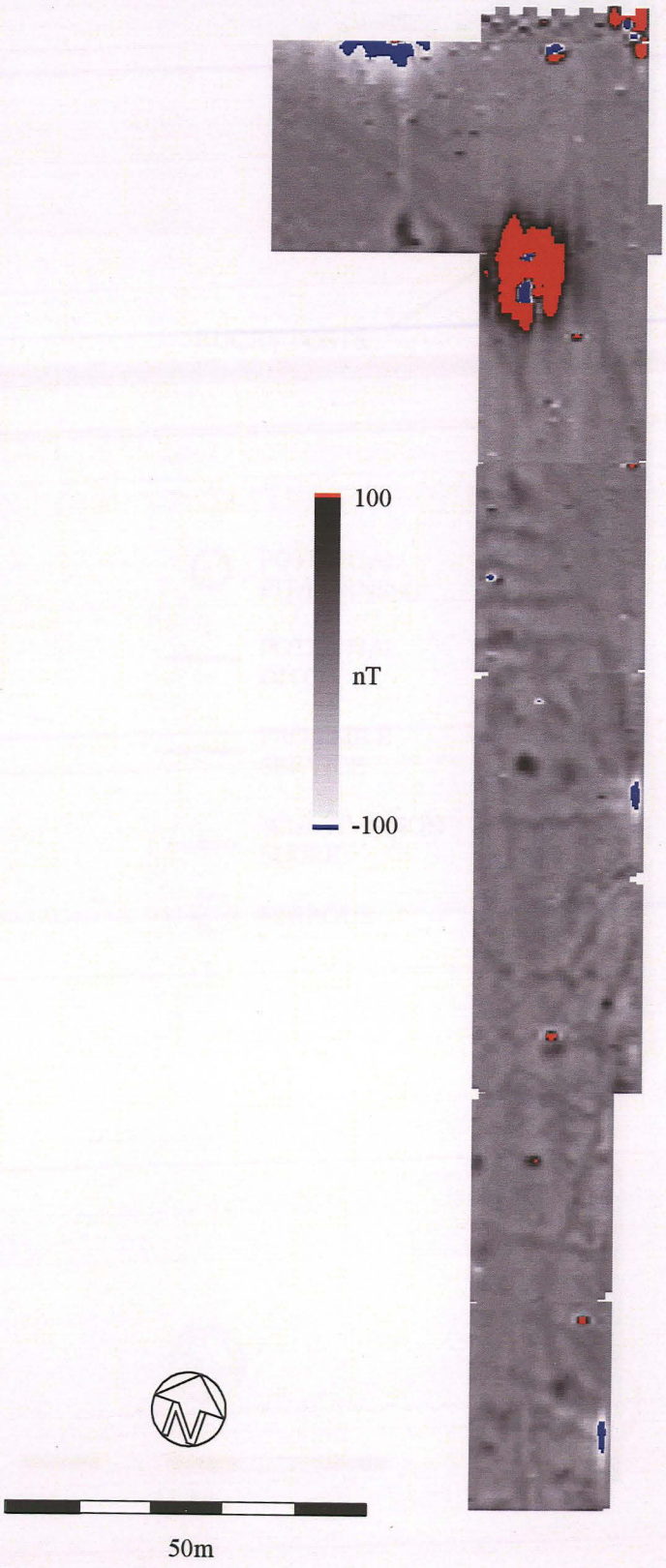

Fig.4: Colourscale image
(data clipped to +/-100nT)

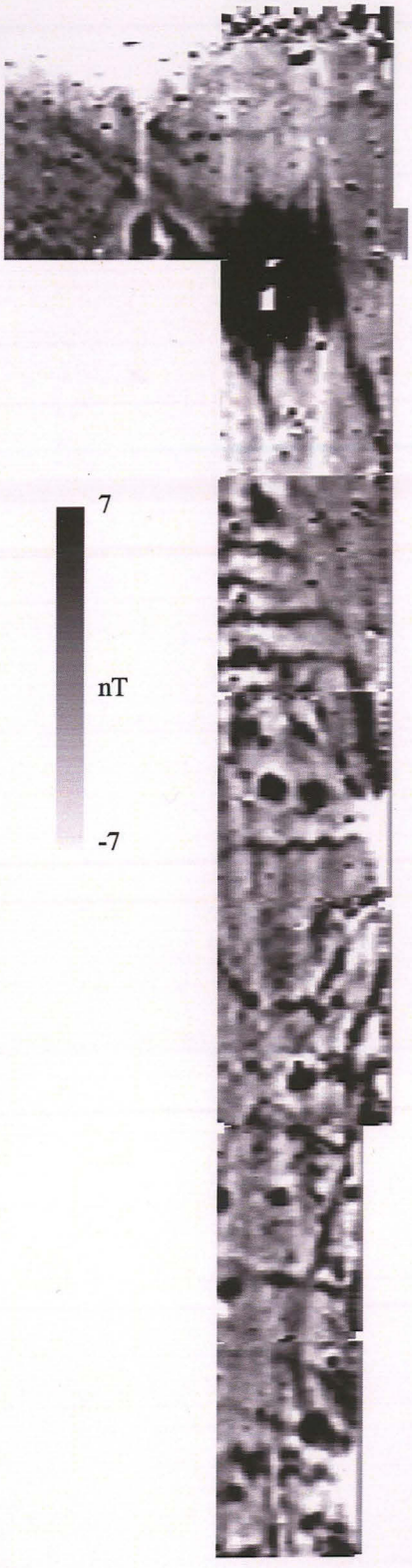

Fig.5: Greyscale image (data clipped to +/-7nT)

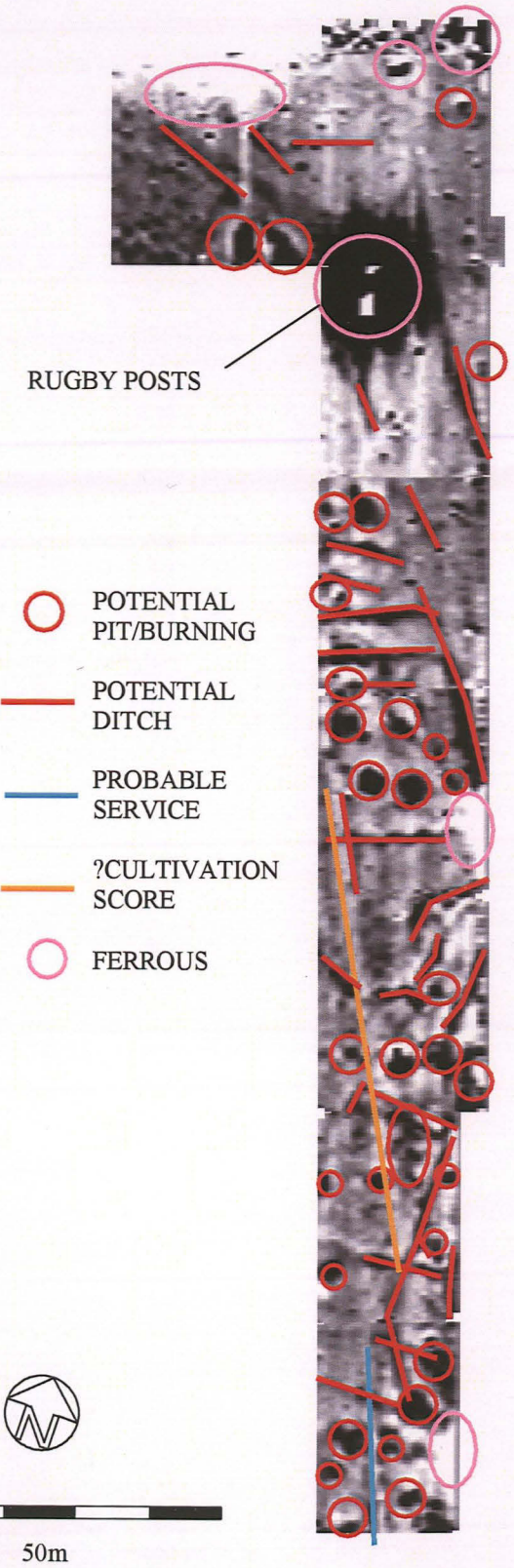

Fig.6: Interpretive image