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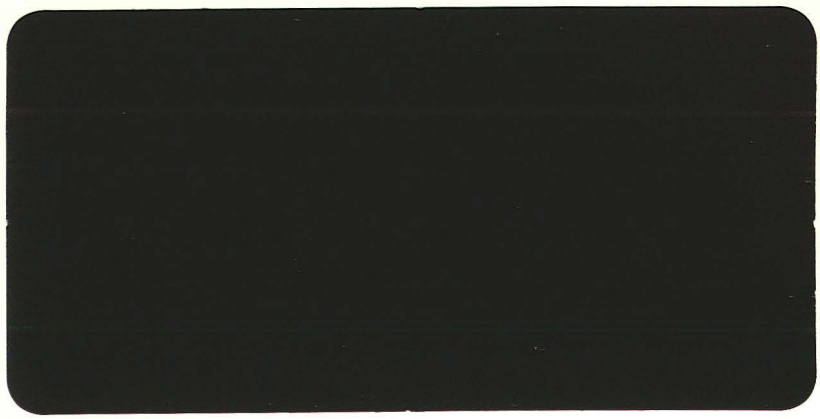
WEST DEEPING QUARRY, LINCOLNSHIRE

Windmill Field Extension

Report on Archaeogeophysical Survey 2000



WEST DEEPING QUARRY, LINCOLNSHIRE

Windmill Field Extension

Report on Archaeogeophysical Survey 2000

A.D.H. Bartlett

Surveyed by:

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for:

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on behalf of:

Lafarge Redland Aggregates Limited

WEST DEEPING QUARRY, LINCOLNSHIRE

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Introduction

This survey forms part of an archaeological evaluation which is being undertaken and co-ordinated on behalf of Lafarge Redland Aggregates Ltd by Phoenix Consulting Archaeology Ltd. The fieldwork for the survey was carried out on 19 October 2000.

The area under investigation is a field of rough pasture adjacent to the existing quarry, and located to the north of the A16 at NGR TF 102091. The site is in an area of high archaeological potential, and archaeological features including circular and linear cropmarks have been identified nearby. The specification for the survey as agreed with Lincolnshire County Council required a magnetic susceptibility survey to be undertaken across the full application area (c. 2.7 ha), and for this to be followed by a detailed magnetometer survey of sample areas amounting to 1 ha. One main purpose of the survey was to identify subsurface features or disturbances which could be investigated further by trial trenching.

Survey Procedure

The procedures employed for the initial and final stages of the survey were as follows.

Susceptibility Survey

Magnetometer and susceptibility surveys provide related but complementary information. The magnetometer responds to small localised anomalies in the earth's magnetic field caused when cut features such as ditches or pits are silted with topsoil, which usually has a higher magnetic susceptibility than the underlying subsoil. This contrast in susceptibility values and the corresponding strength of the magnetic anomalies will in general be greater in areas where burnt material derived from past human occupation or industry has become dispersed in the soil. The resulting susceptibility enhancement can also be detected by means of direct measurements of topsoil magnetic susceptibility values, as was done in the initial assessment here.

Soil magnetic susceptibility values may be influenced by a number of variables including geology, past land use and interference from recent or present-day activities, in addition to

archaeological factors. Comparisons with detailed magnetometer survey data are therefore helpful in assessing their significance.

Magnetic susceptibility readings were taken at 10m intervals using a Bartington MS2 meter and MS2D field measuring coil. The initial results are presented on figure 1 in the form of a plot of shaded squares, each corresponding to the area on the ground from which the reading was taken. High readings are represented by dark shading.

Some alternative representations of the susceptibility readings are also shown on figure 1. The graphical plot (1ii) shows the amplitude of the readings more clearly than the grey scale plot (1i). Plot 1iii shows the results after treatment with a median filter (in which the median value in the surrounding 3x3 neighbourhood is substituted for each reading in turn). This emphasises any potentially significant larger scale trends in the data, rather than variations in individual readings. Figure 3 is a contour plot of the filtered data, with outlines showing the location of the magnetometer survey areas superimposed for comparison.

Magnetometer Survey

Areas for the magnetometer survey were selected to allow examination of those parts of the site which gave relatively high magnetic susceptibility readings, and also to provide representative overall coverage of the evaluation area.

Readings were recorded along lines 1m apart using Geoscan fluxgate magnetometers. The x-y plots as reproduced on figure 3 represent the initial data after preliminary smoothing and correction for irregularities in line spacing caused by variations in the instrument zero setting. Additional 2D low pass filtering has been applied to the grey scale plots (figure 2) to reduce background noise levels and emphasise the broader features which may be archaeologically significant. Outlines indicating the location of selected magnetic anomalies are shown superimposed on the x-y survey plots (figure 3).

Both the susceptibility survey and the magnetometer survey were located by reference to a site grid set out by EDM and with markers placed at national grid intersections.

Results

Magnetic Susceptibility Survey

The susceptibility survey produced comparatively uniform readings across much of the site, with the exception of high readings corresponding to the trackways along the eastern and southern boundaries. These raised values are probably an effect of the compressed soil, and may also indicate the presence of hardcore in the track surfacing.

The readings otherwise fall slightly towards the west, with intermediate areas of slightly raised values which can be seen most clearly in the filtered contour plot (1iii). These

areas of raised readings are not sufficiently distinct to provide strong evidence for archaeological activity, but were examined further in areas 1 and 2 of the magnetometer survey. Area 3 was located to provide more extensive magnetometer coverage of the site, and also takes in individual high susceptibility readings (which can be seen in the initial data plots 1i and 1ii, rather than in the median filtered plot).

It has been mentioned to us since the survey that spoil from the adjacent fish pond and quarry may have been spread across parts of the site. This does not, if so, appear to have caused any great disturbance or contamination of the site, but it would limit the validity of any detailed interpretation of the susceptibility survey.

Magnetometer Survey

The susceptibility survey, as described above, gave readings which are sufficiently high (mean volume susceptibility value = 34 x 10^{-5} SI) to suggest that conditions at the site should be reasonably favourable for magnetometer surveying. Gravel soils are, however, variable in their response, and the quality of the findings will be affected by the physical composition of any subsurface features, and by such factors as the relative proportions of topsoil and gravel in the fill, as well as by the topsoil susceptibility values.

The magnetometer survey plots (figures 2 and 3) show only limited findings. There are faint linear markings which could indicate either traces of ridge and furrow, or more recent ploughing. Most of these lie parallel to the field boundaries, but others in area 2 lie at a right angle to the western boundary. These anomalies are very weak, but leave open the possibility that ditches could be present. There are also strong and probably recent disturbances in area 2, as well as an area of more weakly disturbed ground (red cross hatching on figure 3). This is not associated with any identifiable individual magnetic anomalies that would suggest the presence of archaeological features.

A number of individual magnetic anomalies of the kind which could indicate silted pits are outlined on figure 3, of which those indicated in area 3 are the most distinct.

Conclusions

The extent to which the survey response may have been affected by the presence of spoil from nearby excavations remains unclear. The susceptibility survey does not appear to indicate that the site has been greatly disturbed, and the fact that some magnetic anomalies have been detected suggests that the former ground surface has not been deeply buried.

The magnetometer findings are not fully conclusive, and may simply reflect superficial disturbances associated with recent activities. They do not, however, exclude the possible presence of such archaeological features as ditches or pits, and these could be tested for by trenching. Features to be given priority in any further examination could include the

weakly disturbed area as shaded red in area 2, and the pit-like individual anomalies which have been outlined in area 3.

Report by:

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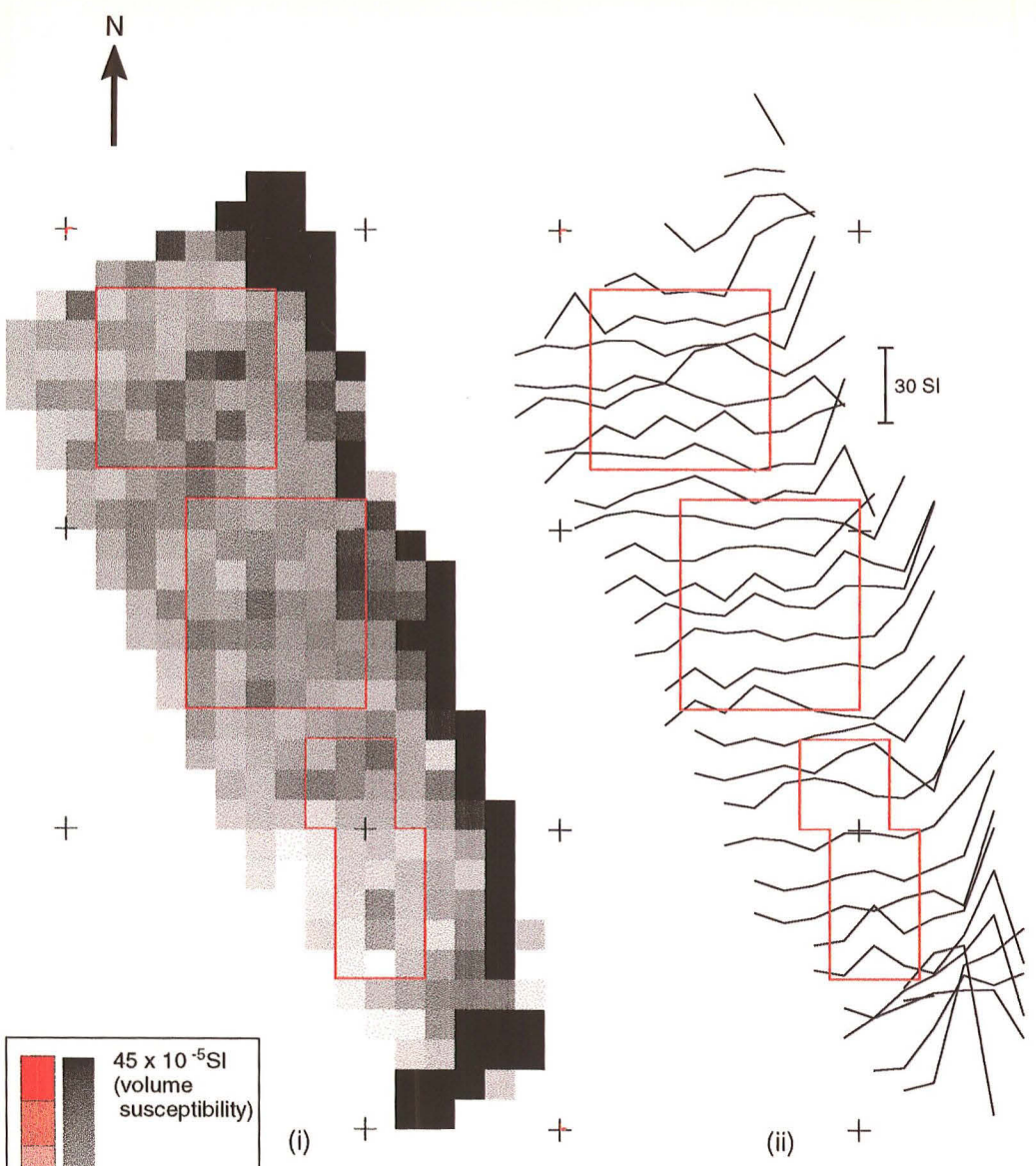
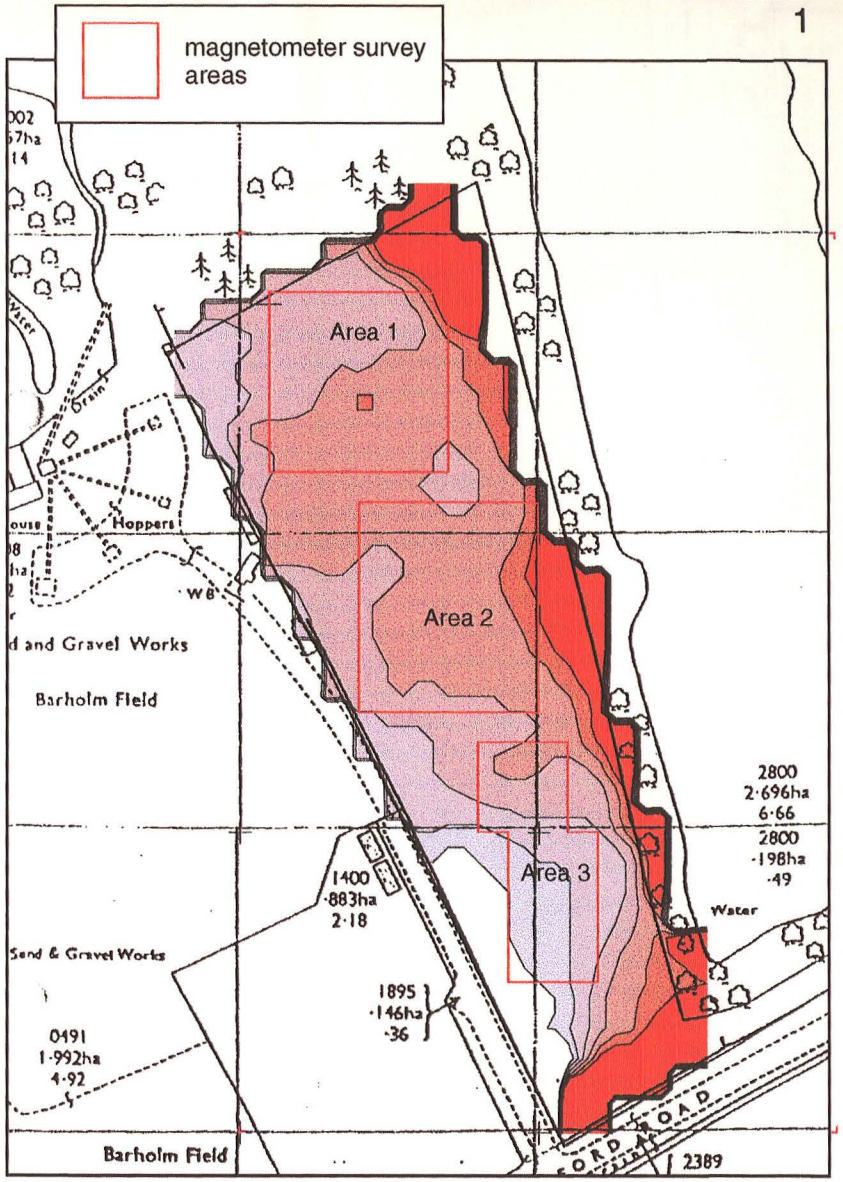
8 November 2000



Magnetic susceptibility survey: initial data



(iii) Magnetic susceptibility data x median filter

1:2500

0 100m

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Figure 1: Magnetic Susceptibility Survey

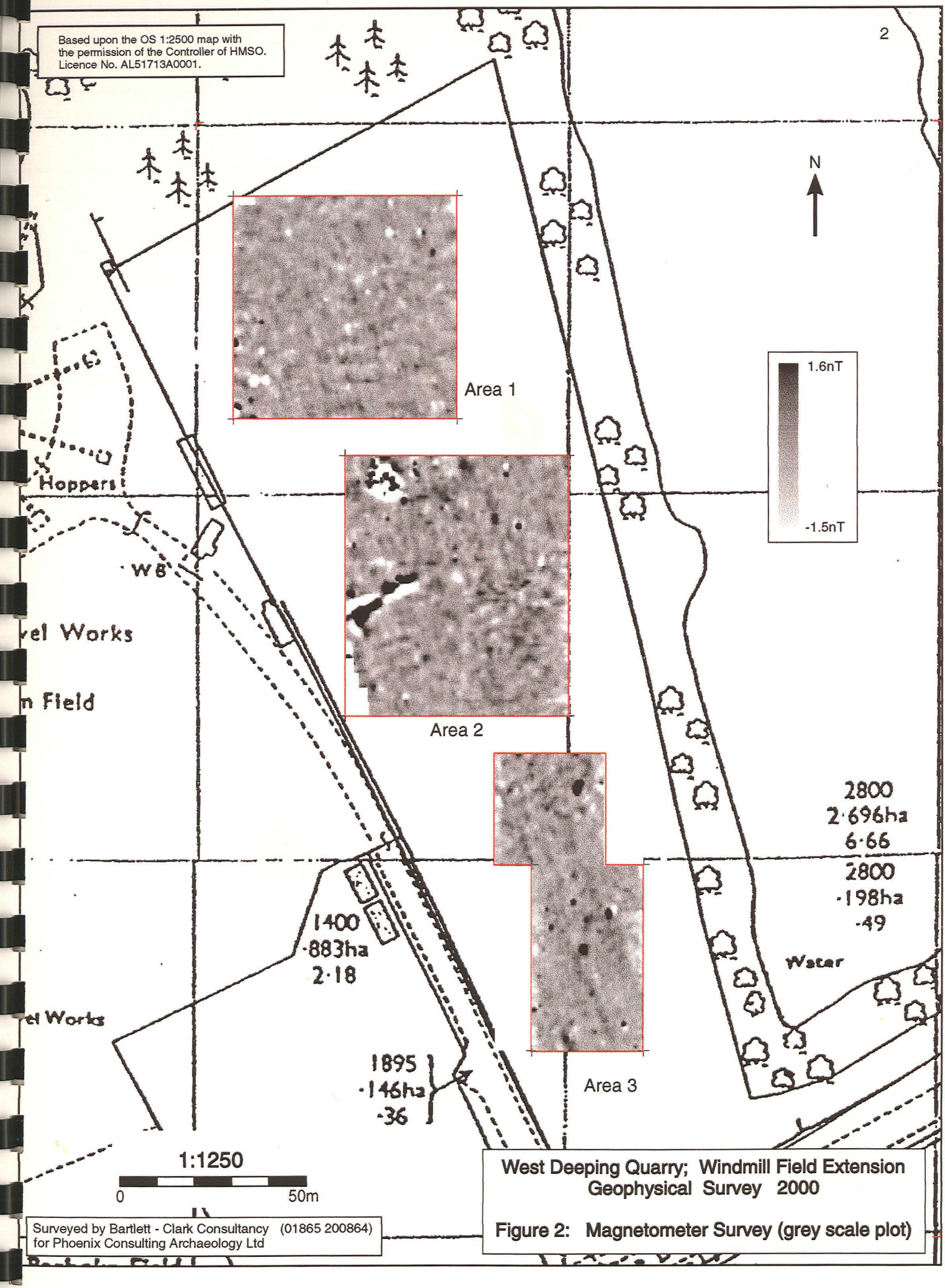

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Figure 2: Magnetometer Survey (grey scale plot)

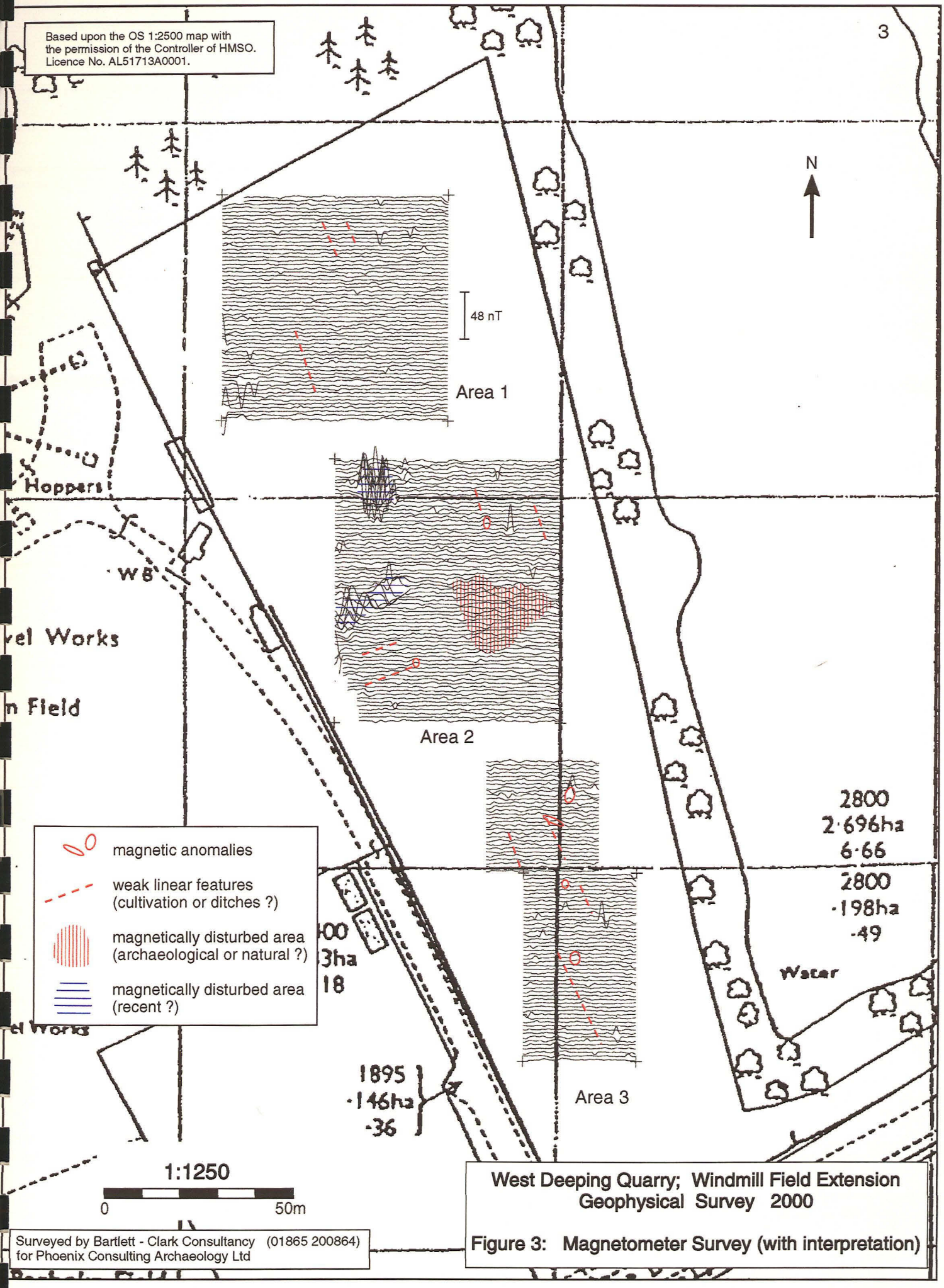
Based upon the OS 1:2500 map with the permission of the Controller of HMSO. Licence No. AL51713A0001.
3
N
48 nT
Area 1
Area 2
Area 3
Hoppers
W8
vel Works
n Field
2800
2·696ha
6·66
2800
·198ha
·49
Water
1895
·146ha
·36
magnetic anomalies
weak linear features (cultivation or ditches ?)
magnetically disturbed area (archaeological or natural ?)
magnetically disturbed area (recent ?)
1:1250
0
50m
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Figure 3: Magnetometer Survey (with interpretation)