PRN 3137

REPORT ON GEOPHYSICAL SURVEY

Site: Caer Leb, Llanidan, Anglesey

Report: 90 / 99

Autumn 1990

Client: Cadw

GEOPHYSICAL SURVEYS

12 Reservoir View Thornton Bradford BD13 3NT England
Telephone (0274) 835016
Fax (0274) 830212

REPORT ON GEOPHYSICAL SURVEY

Survey Number: 90 / 99

Site: Caer Leb Llanidan, Anglesey

Date: Autumn 1990

NGR: SU 473674

Location, and topography.
This enclosure is situated to the west of Brynsiencyn, Anglesey. The site over lies a heavy clay subsoil which can be waterlogged in winter.

Archaeology
This Romano-British Enclosure was excavated in 1866, but was only inadequately recorded.

Aim of Survey
To locate the features described in 1866 and compare these with anomalies from the remainder of the site.

Instrumentation

Magnetometer : Geoscan FM36 with ST1 automatic trigger

Resistance Meter : Geoscan RM4 with DL10 datalogger

Survey Method

Magnetic readings are logged at 0.5m intervals along one axis (in 1.0m traverses, 800 readings per 20m x 20m grid) over the survey area. Resistance readings are logged at 1.0m intervals (400 per grid). The data are then transferred to a Compaq SLT/286 and stored on 3.5" floppy discs. Field plots are produced on a portable Hewlett Packard Thinkjet. Further processing is carried out back at base on a Mission 386 linked to appropriate printers.

The location of the survey area is shown in Figure 1.

TECHNICAL AND DISPLAY INFORMATION

The following is a description of the equipment and display formats used in GEOPHYSICAL SURVEYS' reports. It should be emphasised that whilst all of the display options are regularly used, the diagrams produced in the final reports are the most suitable to illustrate the data from each site. The choice of diagrams results from the experience and knowledge of the staff of GEOPHYSICAL SURVEYS.

(1) Instrumentation

(a) Fluxgate Gradiometer

This instrument comprises two fluxgates mounted vertically apart, at a distance of 500mm. The gradiometer is carried by hand, with the bottom sensor some 100-300mm from the ground surface. At each survey point, the difference in magnetic field between the two fluxgates is conventionally measured in nanoTesla (nT) or gamma. The fluxgate gradiometer suppresses any diurnal or regional effects. If multiple readings are logged, then unless specified elsewhere in the report, it may be assumed that they are taken in the direction of grid north.

(b) Resistance meter

This measures the electrical resistance of the earth, using a system of four electrodes (two current, two potential). Depending on the arrangement of these electrodes, an exact measurement of a similar volume of earth may be acquired. In such a case the amount measured may be used to calculate the earth resistivity. Using a 'Twin-Probe' arrangement the terms 'resistance' and 'resistivity' may be interchanged. This arrangement involves the pairing of electrodes (one current and one potential), with one pair remaining in a fixed position whilst the other measures the resistivity variation across a fixed grid. Resistance is measured in ohms, whilst resistivity is measured in ohm-meters.

(c) Magnetic susceptibility

The instrument employed for measuring this culturally enhanced phenomenon is a laboratory based susceptibility bridge. Standard 50g soil samples are collected in the field.

(2) Display Options

The following is a description of the display options used. Unless specifically mentioned in the text, it may be assumed that no filtering or smoothing has been used to enhance the data. For any particular report only one type of display mode may be used, although where necessary a number of the options may be presented.

(a) X-Y Plot

This involves a line representation of the data. Each succesive row of data is equally incremented in the Y axis, to produce a 'stacked' profile effect. This display may incorporate a 'hidden-line removal' algorithm, which blocks out lines behind the major peaks and can aid interpretation.

(b) Dot-Density

In this display, minimum and maximum cut-off levels are chosen. Any value that is below the minimum cut- off value will appear 'white', whilst any value above the maximum cut - off value will appear 'black'. Any value that lies between these two cut-off levels will have a specified number of dots depending on the relative position between the two levels. The focus of the display may be changed using different levels and a contrast factor (C.F.). When the contrast is equal to 1, then the scale between the two cut-off levels is linear. A C.F.>1 helps to enhance the higher readings. To assess lower than normal readings involves the use of an inverse plot. This plot simply reverses the minimum and maximum values, resulting in the lower values represented by more dots. In either representation, each reading is allocated a unique area dependent on its position on the survey grid, within which the numbers of the dots is randomly placed.

(c) Contour

This display joins data points of an equal value by a contour line. Displays are either generated on the computer screen or plotted directly on a flat bed plotter / inkjet printer. The former will generate either colour or black and white copies depending on the printer used.

(d) 3-D Mesh

This display joins the data values in both the X and Y axis. The display may be changed by altering the horizontal viewing angle and the angle above the plane. Again, the output may be either colour or black and white. A hidden line option is occasionally used (see (a) above).

(e) Grey-Scale

This format divides a given range of readings into a set number of classes. These classes have a predefined arrangement of dots, the intensity increasing with value. This gives an appearance of a toned or grey scale.

(3) Interpretation

This is the most important part of the report and is based on a consideration of not only the display plots , but also a study of the raw data. It should be emphasised that the final interpretation is not based only on the diagrams reproduced in this report.

In some instances geological and pedological anomalies may arise which are impossible to distinguish from those normally associated with archaeological features - in all cases of doubt trial excavation work is recommended to ascertain the nature of the observed anomalies.

All survey reports are prepared and submitted on the basis that whilst they are based on a thorough survey of the site, no responsibility is accepted for any errors or omissions.

Report on the Geophysical Survey at Caer Leb, Anglesey

Introduction

This report details the magnetometer and resistivity surveys conducted on behalf of Cadw at the Romano-British enclosure at Caer Leb.

The resistance survey covered the whole of the gridded area shown in Figure 1. Although the proposed survey area at this site was much larger, part and even whole grids were not surveyed due to ground water lying at the edges of the guardianship area.

The site itself was under pasture, with prominent extant earthworks across the majority of the surveyed area (see Figure 1).

Results

Resistance (Figure 2-5)

The resistance data have proved to be extremely clear at defining the limits of the site, as suggested by the earthworks. Also the survey has provided much detail within the enclosure itself.

The most interesting, and obvious anomaly within the enclosure is the general high resistance platform within the northern earthwork. This anomaly corresponds with an earthwork within the enclosure. The greatest resistance values are at the western edge of the platform. This suggests that it may contain building rubble.

Other areas of interest, particularly of high resistance, can be seen within the enclosure. It is possible that these also indicate house platforms, or farmyard surfaces.

The evidence for low resistance anomalies is largely a product of the water logging of part of the site. This has highlighted the ditches associated with the upstanding banks.

Magnetic Data (Figures 6-10)

The area of the magnetic survey was more restricted by the areas of flooding than the resistance.

The magnetic data again clearly show the limits of the monument at the northern edge of the enclosure. It is not certain if this is due to the response from the ditch fill, or some topographical effect due to the size of the enclosure banks at these points. Close examination of the combined resistance and magnetic results suggest that the latter is correct.

Contained by the enclosure is a sharply defined area of noise. The individual anomalies are relatively broad, and few of them represent individual iron peaks.

The interpretation of this disturbed area probably pertains to a spread of burnt material. This could be due to burnt stones from a domestic context, or midden material in a farmyard disposal area. A further interpretation could be that the area contains slag debris. However, whilst the strength and amplitude of the anomalies is consistent with a concentration of slag debris, the lack of ferrous peaks seems rather unusual. It is interesting to note that this area of disturbance largely coincides with a general concentration of high resistance anomalies identified above.

Conclusions

The surveys at Caer Leb clearly indicate increased activity within the enclosed monument. Beyond the confines of the monument, in the areas that were not submerged, very few anomalies of archaeological interest were noted.

Project Co-ordinator: C F Gaffney

Project Assistants: S Gaffney and P Spoerry

Geophysical Surveys of Bradford
27 February 1991

CAER LEB

Resistance Data

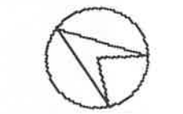
Range 70 - 95 ohms

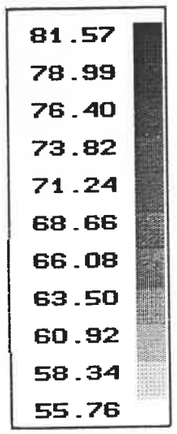
1:500

Figure 2

CAER LEB

Resistance Data





1:500

Figure 3

CAER LEB

Interpretation Diagram

Resistance Data

1:500

High Resistance

Figure 4

CAER LEB

Resistance Data

Range 70 - 95 ohms

Figure 5

CAER LEB

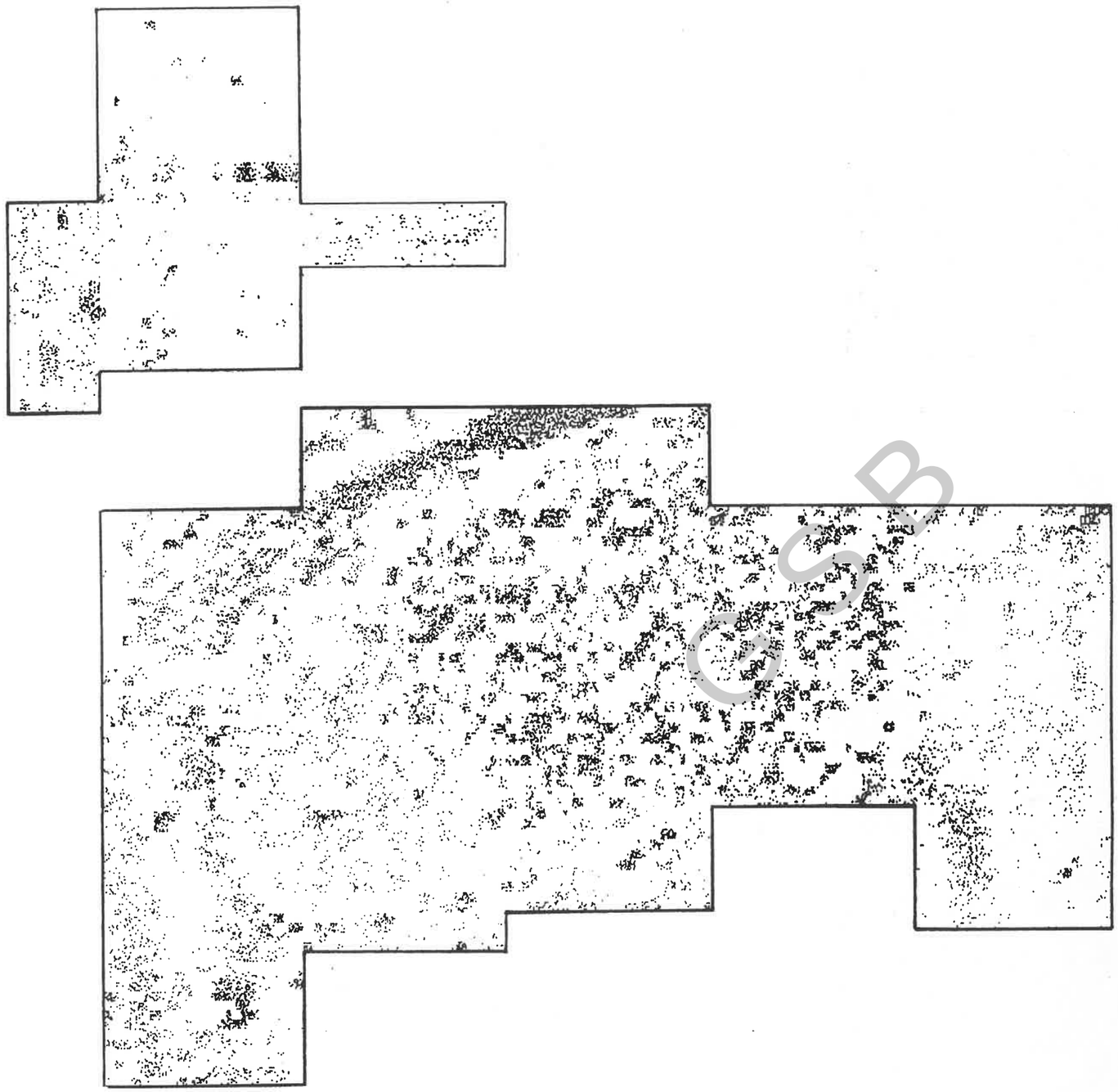
Resistance Data

Range 70 - 95 ohms

Figure 5

CAER LEB

Magnetometry Data



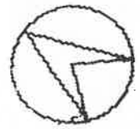


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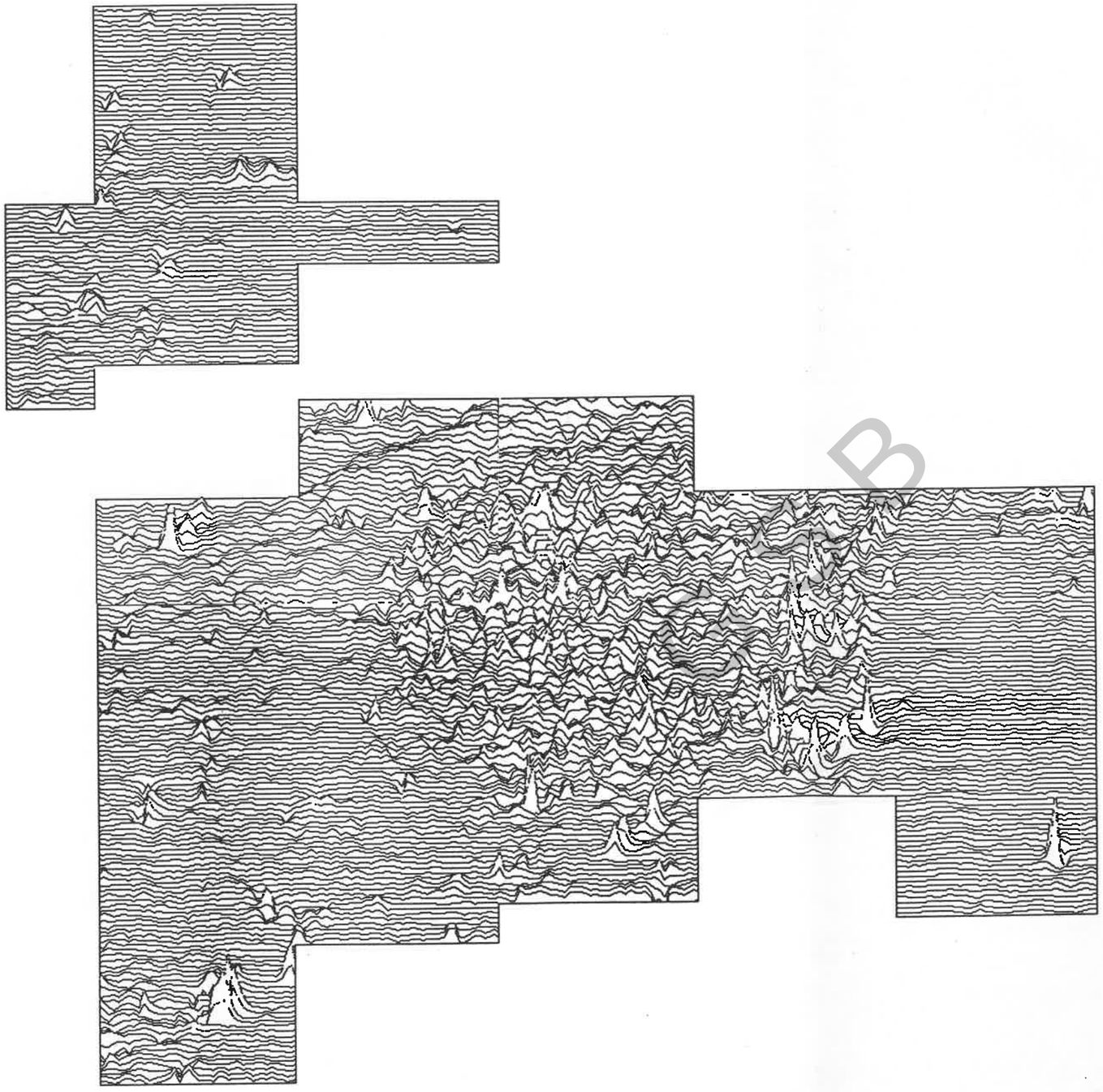
Figure 6

CAER LEB

Magnetometry Data



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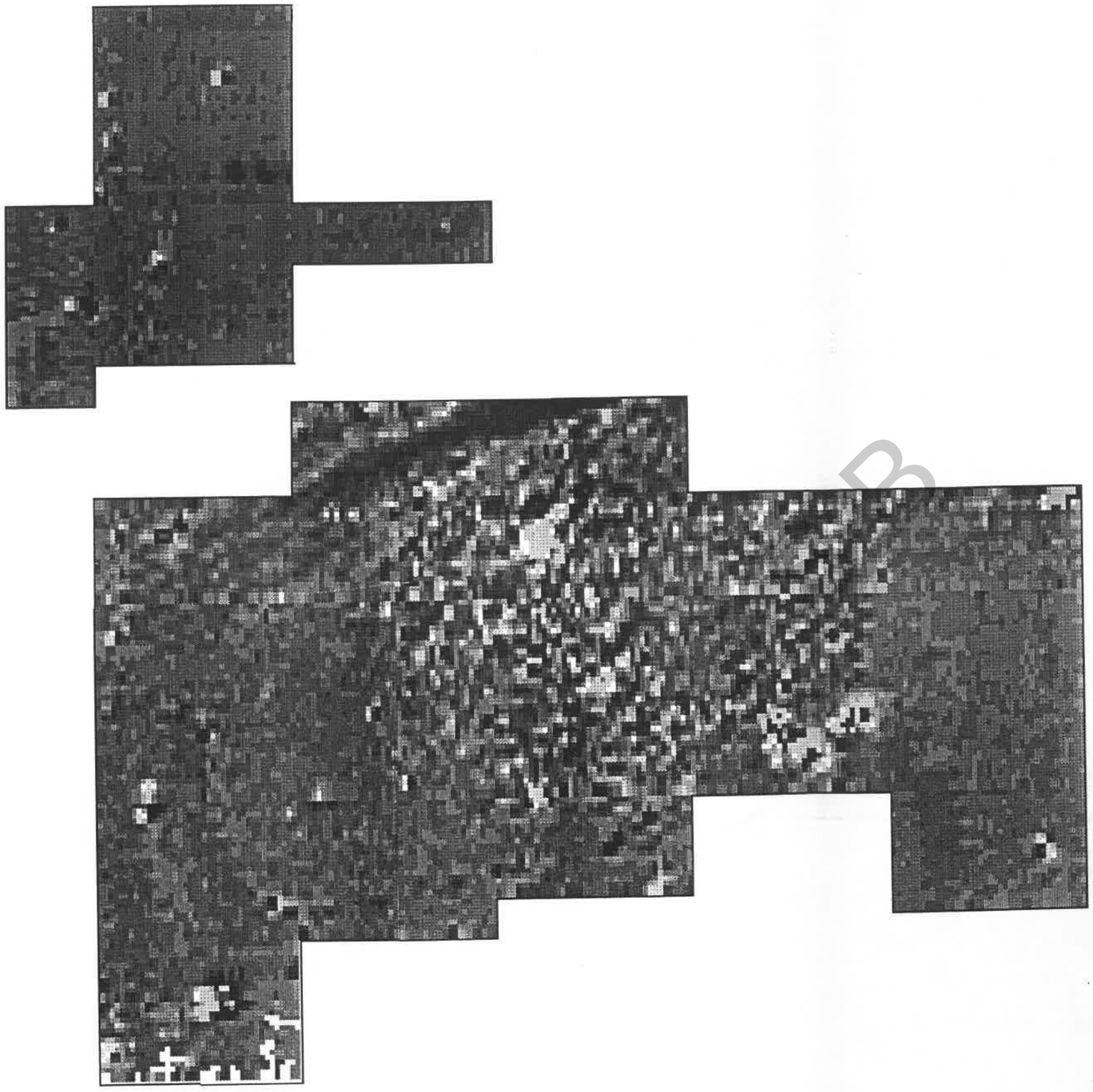
Scale in nT

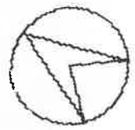
1 3 5 10

Figure 7

CAER LEB

Magnetometry Data





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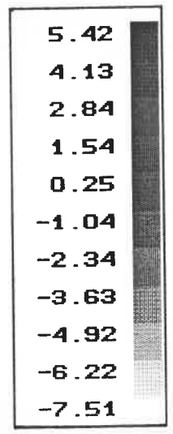
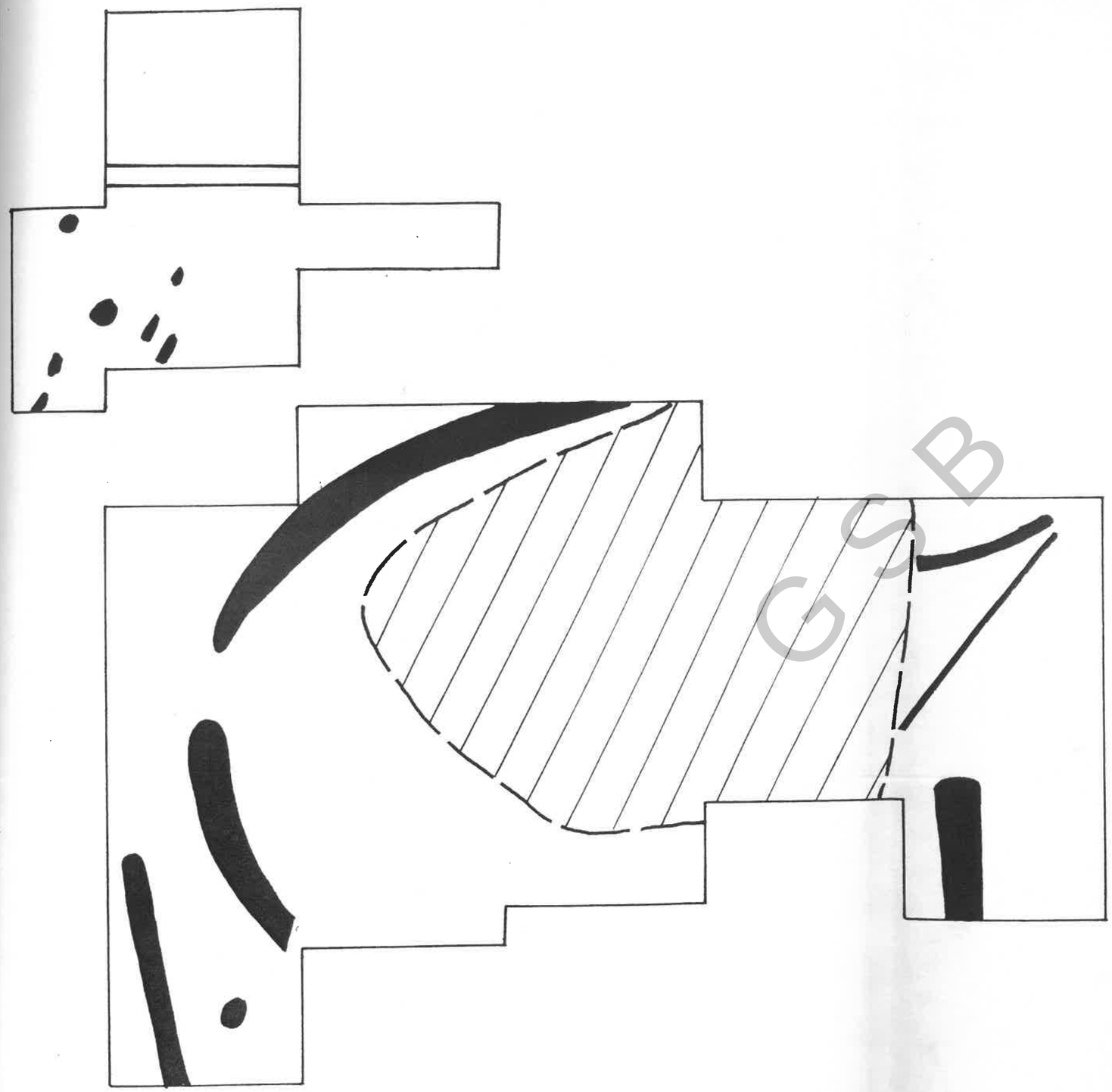


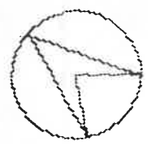
Figure 8



CAER LEB

Interpretation Diagram

Magnetometry Data



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Positive Magnetic Anomalies

Area of Disturbance

Figure 9

CAER LEB

Magnetometry Data

Positive Magnetic Anomalies

Area of Disturbance

Figure 10

CAER LEB

Magnetometry Data

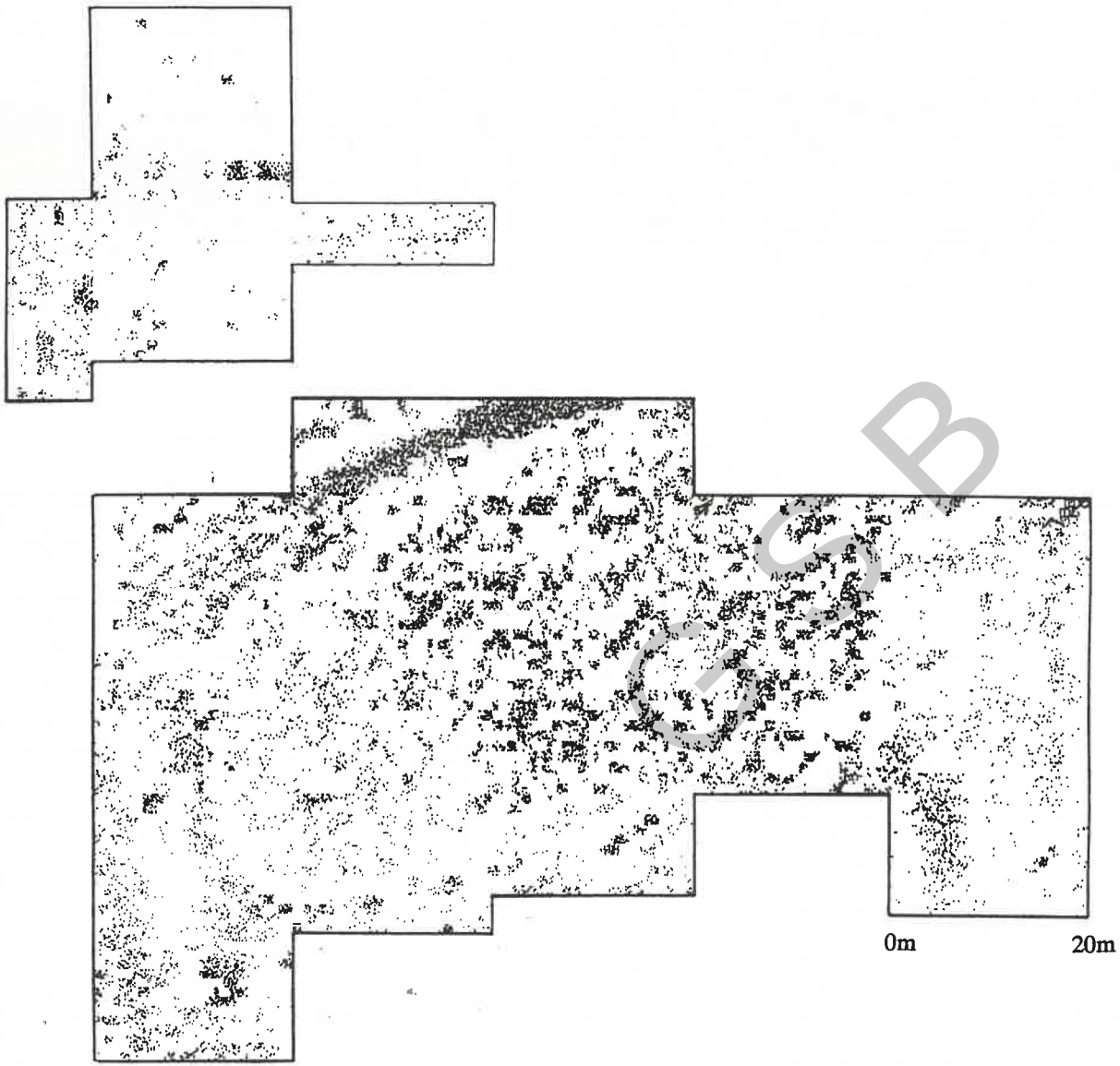

Figure 10

CAER LEB

Location Plan

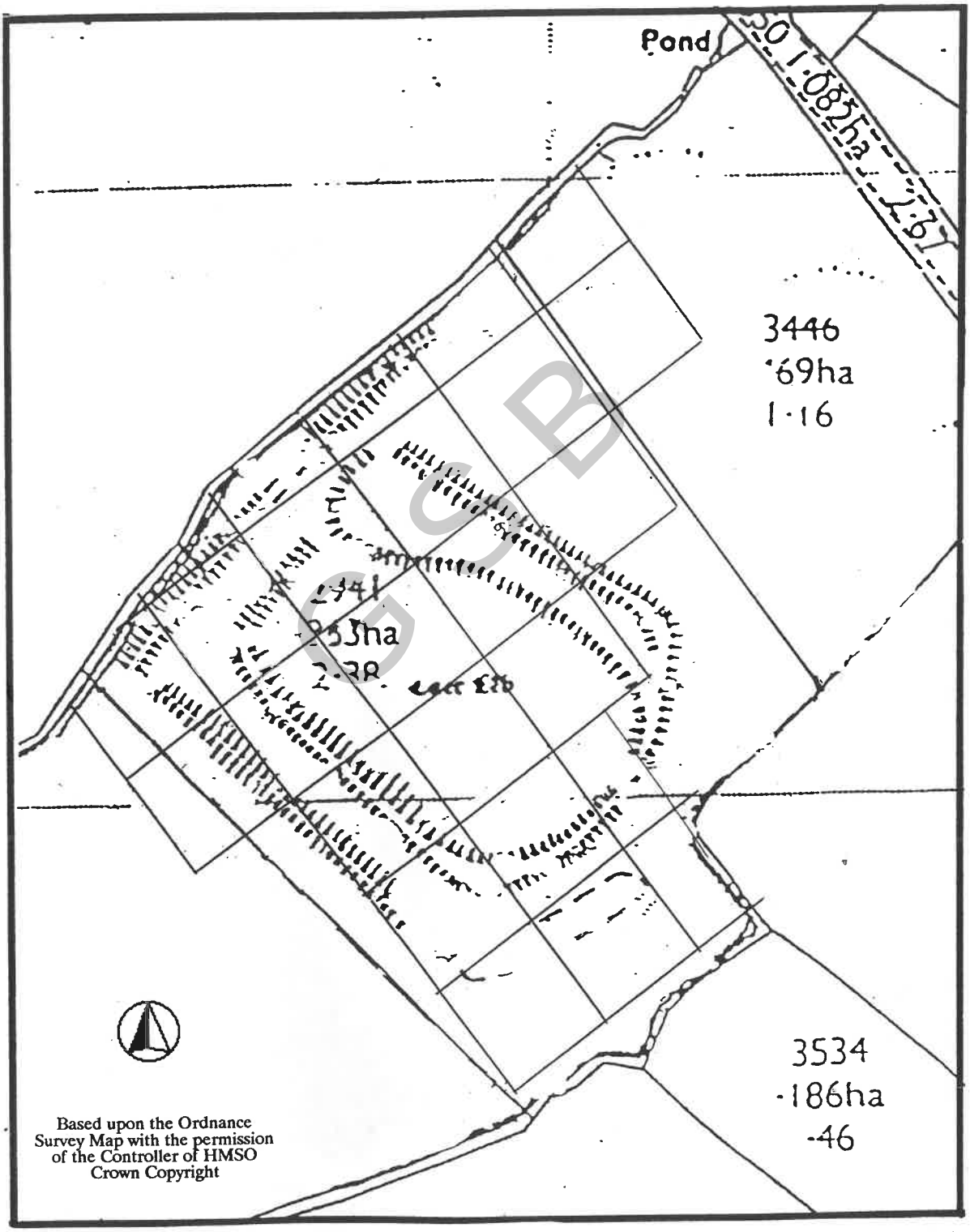

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Figure 1