GEOPHYSICAL SURVEY 90/15

Abbot's Grange, Broadway

February 1990

CLIENT: Hereford and Worcester County Council

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GEOPHYSICAL SURVEYS
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REPORT ON GEOPHYSICAL SURVEY

Site: Abbot's Grange, Broadway

Survey Number: 90/15

Date: February 1990

SMR: HWCM 1292

NGR: SP 093 374

Location & Topography:
The site under investigation is is situated around the main building of the medieval grange of Pershore Abbey, and consists of slight earthworks. The area was under lawn. The soil is well drained calcareous and non calcareous fine loam.

Archaeology:
The site is registered as a medieval grange of Pershore Abbey. The main building is listed. Earthworks, relating to the medieval grange are apparent to the west of the building, and those relating to later formal gardens exist to the east.

Aim of Survey:
To examine and establish the extent or the buried archaelogical remains associated with the grange.

Instrumentation:

Resistance Meter: Geoscan RM4 with DL10 data logger

Survey Method:
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 HP 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.

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(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-meter.

(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.

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(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 choosen. 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 dependant on its position on the survey grid, within which the numbers of the dots is randomly placed.

(c) Contour - This display joints 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 occassionally 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.

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(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.

Report on the geophysical survey at Abbots Grange, Broadway

Introduction

The aim of the survey was to identify possible areas of archaeological importance within the modern landscaped gardens. Initial tests revealed that the resistance method indicated variations in response that could be archaeological. Following these tests, the whole of the available area was surveyed using the resistance technique.

Results

The data from this survey are displayed in dot-density format in Figure 2. It is clear that there is a gradual increase in the resistance from west to east. This may reflect the greater level of landscaping in the eastern part of the survey. The individual anomalies of note are shown in the grey scale in Figure 3.

The anomalies (A) in the eastern part of the survey area are amorphous high resistance spreads. These could easily represent the make up of the modern lawn. The very high resistance anomaly (B) is close to the present house, and may be due to the building, or services associated with it.

The anomalies at (C) and (D) are approximately aligned east-west. It is possible that these anomalies are due to structural elements. The most northern anomaly at (C) is the only low resistance anomaly located during the survey. This should represent a broad (circa 3m) ditch/drain.

The broad high resistance anomaly at (E) lies next to the pond. It could be interpreted as disturbance due to the building of the pond. There is no clear evidence to suggest that this area has any structural anomalies within the spread of higher readings. The high resistance anomalies at (F), however, are very strong, and certainly suggest either structural or landscaping features. Anomaly (F) partially coincided with slight earthworks. Anomaly (G) is an isolated high resistance anomaly, which may indicate a rubble spread.

Conclusions

The resistance survey has indicated a number of anomalies that are of considerable archaeological potential. In particular, the linear anomalies at (C) and (D), and the high resistance anomaly at (F) are the most promising.

Fieldwork: C Gaffney and V Gaffney
Report: J Gater and C Gaffney
26 February 1990

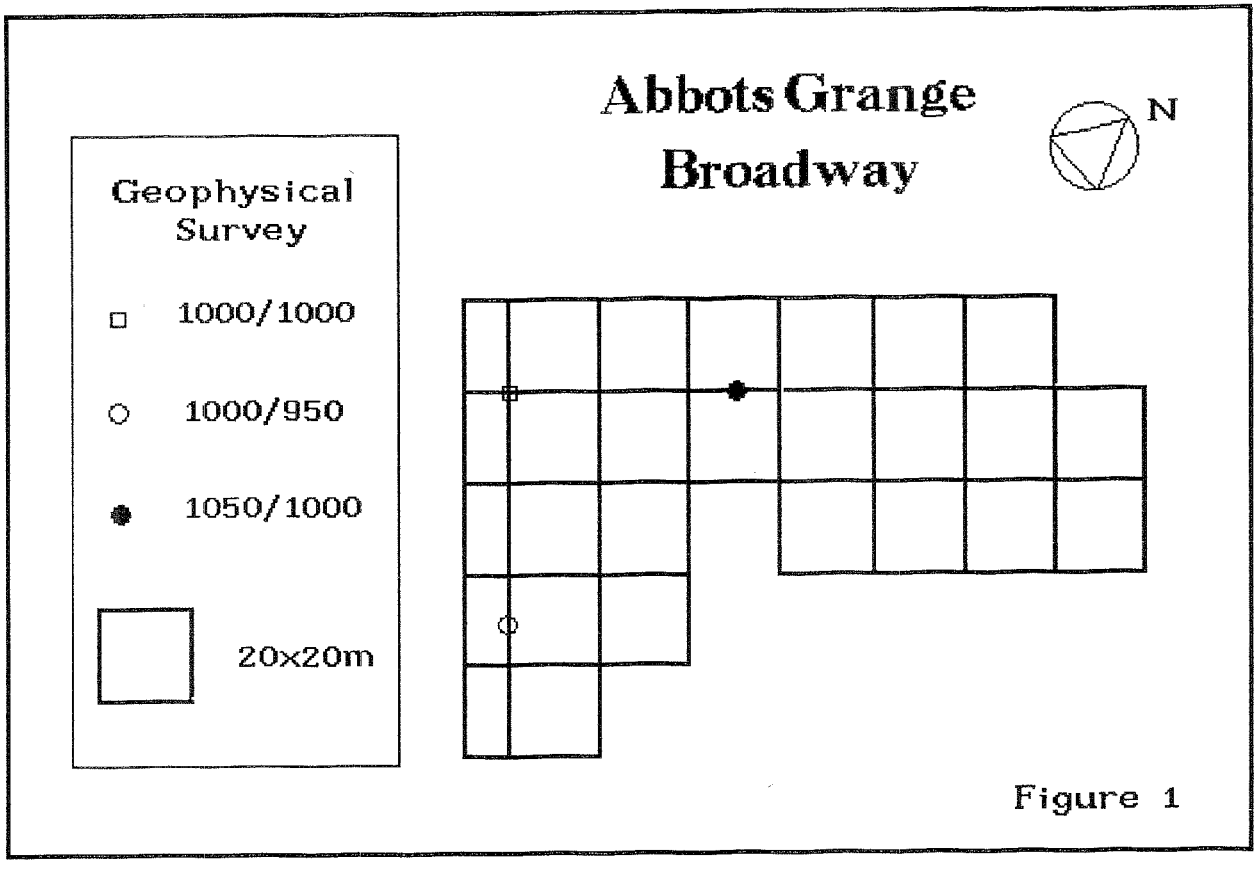
Abbots Grange
Broadway
N
Geophysical Survey
1000/1000
1000/950
1050/1000
20x20m

Figure 1

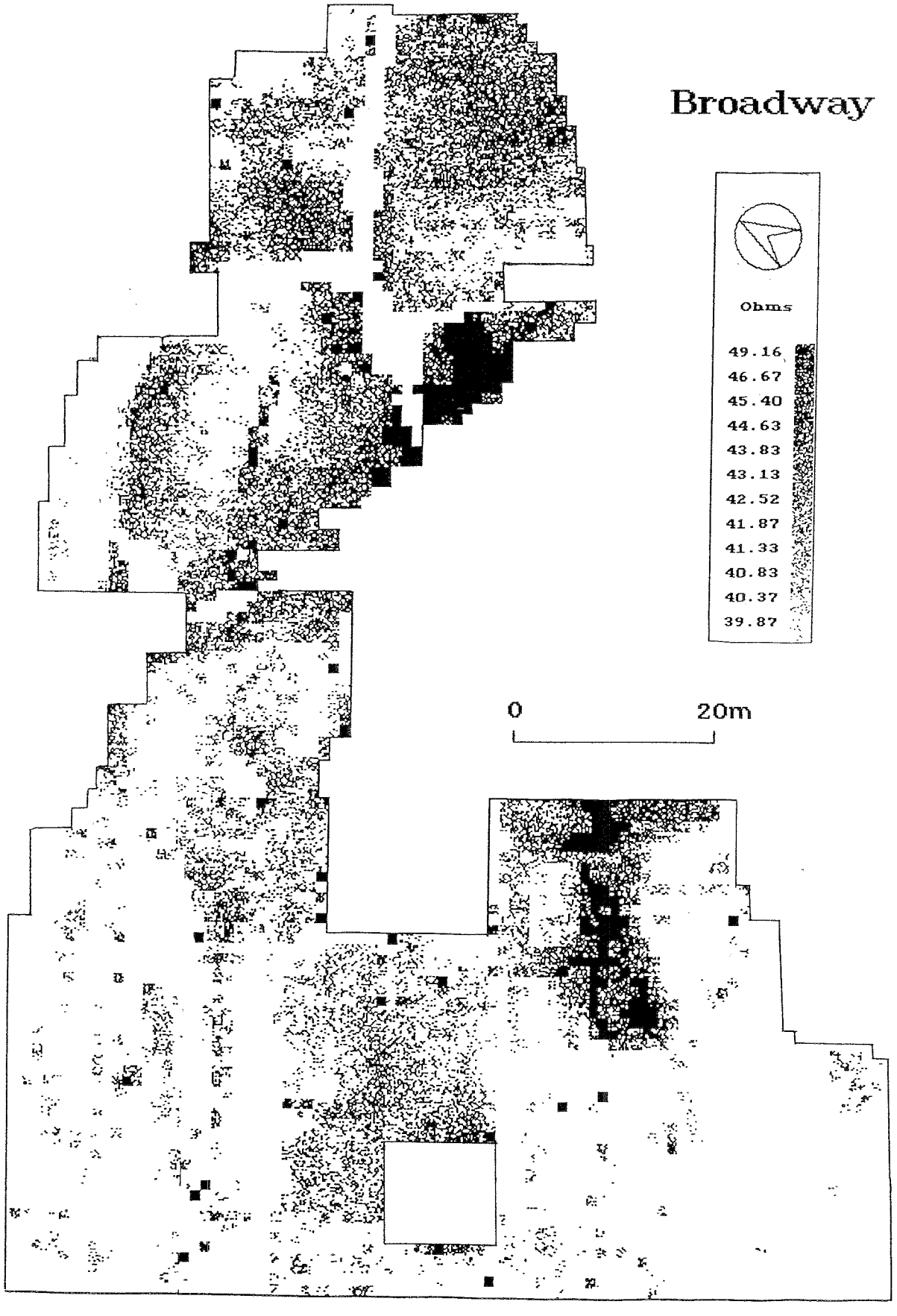
Broadway
Ohms
49.16
46.67
45.40
44.63
43.83
43.13
42.52
41.87
41.33
40.83
40.37
39.87
0
20m

Figure 2

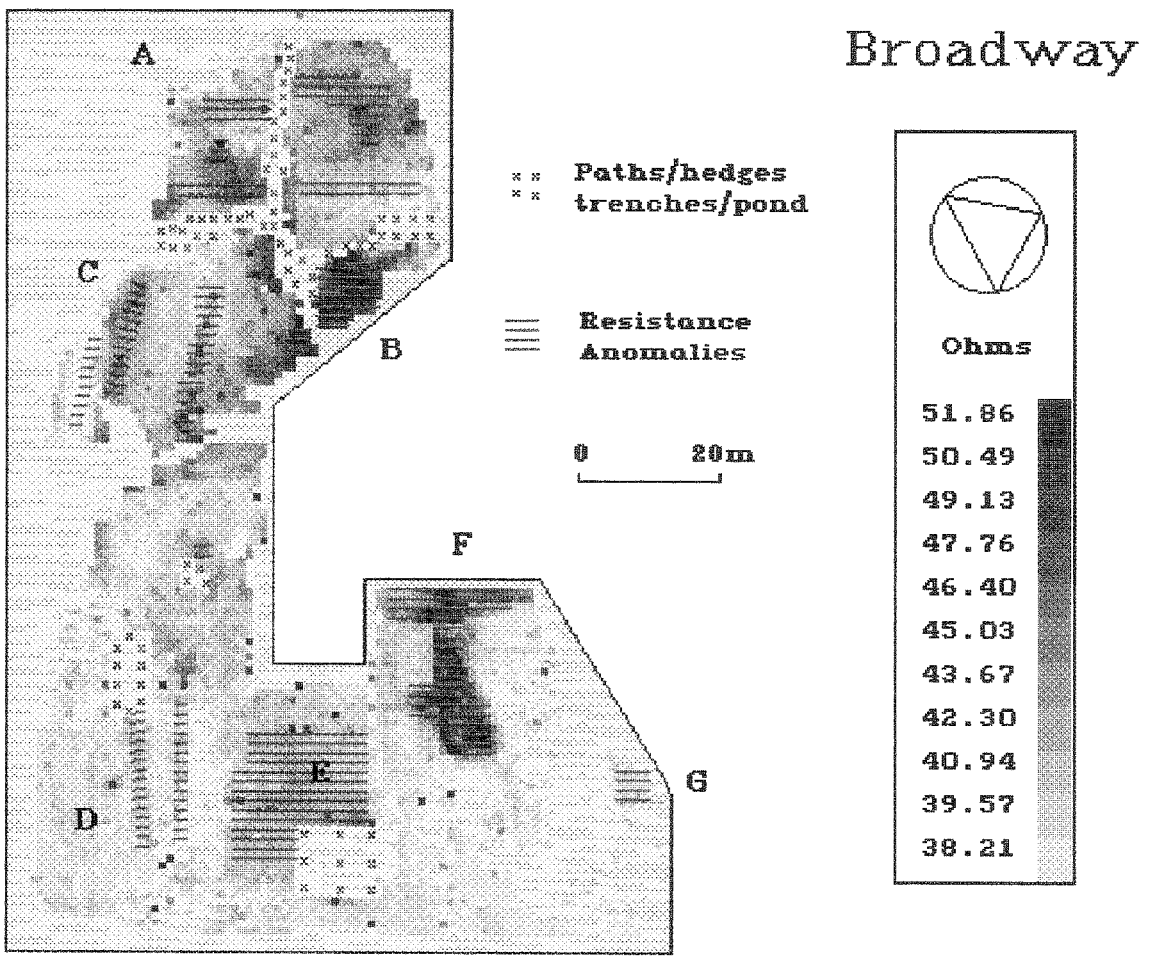
Broadway
A
B
C
D
E
F
G
Paths/hedges
trenches/pond
Resistance
Anomalies
0
20m
Ohms
51.86
50.49
49.13
47.76
46.40
45.03
43.67
42.30
40.94
39.57
38.21

Figure 3