Hazlegrove School, Sparkford, Somerset

Gradiometer survey, August 2008

1.0 Introduction

The survey was carried out at Hazlegrove Preparatory School, Sparkford as part of the South Cadbury Environs Project, an archaeological landscape project centred on South Cadbury Castle Hillfort. The school falls within the Project survey area and is situated 3.25km north west of the Hillfort in the parish of Queen Camel, on lower lias clay.

The work was carried out by members of the South Cadbury Environs Project.

1.1 Equipment

Fluxgate gradiometer – Bartington Grad 601-2

The Bartington Grad 601-2 is a dual system gradiometer, a form of magnetometer. It comprises two sensor rods carried on a rigid frame, each sensor including two fluxgates aligned at 90° to each other, one set 1m above the other. It measures variations in the magnetic field between the two fluxgates, recorded in *nanoTesla* (nT) at each sampling point within a grid. The manufacturer claims a depth range of approximately three metres. The instrument is most effective when carried at a consistent height, not exceeding 0.3m above the ground.

Magnetometers are especially effective for discovering thoroughly decayed organic materials, such as those which accumulate in ditches and pits, and matter exposed to intensive firing, including industrial areas, hearths and larger ceramics. All of these are likely to give a positive magnetic response, sometimes with a negative halo, giving a dipolar effect. Non-igneous stone features, such as walls and banks, are usually perceived as negative anomalies against a background enhanced by decayed organics.

Software – Geoscan Geoplot 3.00p

Geoplot 3.00p allows the presentation of data in four graphical forms: dot-density, grey scale, pattern and X-Y (or *trace*) plots. The latter are particularly effective when used in conjunction with other graphical modes to emphasise ferrous magnetic anomalies or other distortions which show as accentuated peaks or troughs. The programme supports statistical analysis and filtering of the data.

1.2 Field method

The field was divided into 20m squares orientated according to the Ordnance Survey grid (Fig 1). Readings were logged at 0.25m intervals along west to east traverses set 1m apart, in a zig zag pattern.

1.3 Processing method

Preliminary processing revealed extensive impact from modern ferrous magnetic features, characterised by sharp dipolar fluctuations ranging from approximately 15nT to over 3000nT. Two processing sequences were carried out to mitigate the impact of modern ironwork.

1) Readings exceeding 30nT either side of 0 were replaced by null (dummy) entries.
2) Any anomalous isolated readings were similarly replaced.
3) Typical regular error due to the zig zag operation of the gradiometer was removed.
4) The mean reading for every traverse was reset to 0.
5) The asymmetric data collection pattern was mitigated by the positive interpolation of data points along the Y axis using the calculation of sinX/X.

2.0 The survey area

The grid comprised of 139 contiguous whole and partial squares covering the school playing fields (Fig 1). It was bounded on the west by the road leading up to the school and an area of Astro Turf, and to the north, east and south by hedges around the school grounds.

Visible ferrous magnetic disturbance was provided by the tennis courts surrounded by metal fencing in the centre of the field, sheds to the west and south of the tennis courts, fencing around the Astro Turf to the west, and six rugby goal posts.

2.1 Results *(Figs 2, 3 & 4)*

Major dipolar anomalies **W**, **X** and **Y** are due to pipelines. There is a general scatter of ferrous magnetic anomalies throughout the survey area mainly due to the above mentioned visible structures. Others are most likely due to buried modern metal objects or man made surfaces.

The survey results show two major areas of ridge and furrow, one running northeast to southwest, and the other northwest to south east. There also appears to be a major drainage system running northeast to southwest across the whole of the survey area (Fig 4), incorporating stone filled or ceramic field drains with associated typical "herring bone" pattern of drainage ditches.

2.1(i) Positive anomalies

A Strong linear anomaly generally within a range of 3 to 8nT but peaking as high as 15nT towards the southeast end, suggesting either ferrous magnetic interference or strong thermo remanent local deposit.

B Slightly diffuse linear with a range of 1 to 2.5nT. Within normal range for a ditch.

C Linear with a range of 1 to 1.5nT. Within normal range for a gully.

D Circular anomaly with a range of 1 to 2.5nT. Within normal range for a small gully, possibly a drip gully for a small structure.

E Curved linear with a range 1.5 to 3.5nT, stronger towards the southwest end. Within normal range for a ditch.

F Irregular linear within a range of 1.5 to 3nT. Within normal range for a ditch.

G Linear within a range of 2.5 to 3nT. Within normal range for a ditch.

H Small linear within a range of 1 to 2nT. Within normal range for a gully.

I Linear within a range of 1.5 to 3nT. Within normal range for a ditch.

J Linear within a range of 1 to 2.5nT. Within normal range for a ditch.

K Curved linear abutting linear **L**. Within a range of 1 to 3.5nT and within normal range for a ditch.

L Long linear within a range of 1.5 to 3.5nT. Within normal range for a ditch. On a slightly different alignment to what appears to be the overall drainage system.

M Three contiguous linears, within a range of 1 to 3nT. Within normal range for ditches. Their shape is suggestive of an enclosure associated with **L,** with a gateway to the northwest. The two linears which comprise the south easterly enclosure terminate at the eastern corner in two roughly circular anomalies, the north one with a reading of 8nT and the south with a reading of 4nT, both within the higher range for pits and lower range thermo remanence.

N Three parallel linears within a range of 1 to 2nT. Within normal range for gullies.

O Group of small, roughly circular anomalies within a range of 2 to 5nT. Within normal range for pits and lower range thermo remanence.

P Roughly circular small anomaly within a range of 3 to 5nT. Within normal range for a pit with lower range thermo remanance.

Q Two parallel linears generally ranging from 1 to 3nT. Both within normal range for ditches, suggestive of a double ditch trackway.

R and **S** Two converging linears within a range of 5 to 11nT. Within normal range for ditches and higher range thermo remanence.

T Curved linear within range of 1.5 to 2.5nT. Within normal range for a ditch.

2.1(ii) Negative anomalies

U Linear with a range of –1 to –1.5nT. Within normal range for stone-filled or ceramic land drain.

V Two parallel linears within a range of –1.5 to –2.5nT. Within normal range for stone filled or ceramic land drains.

3.0 Conclusion

The degree of confidence in identified anomalies varies from moderate to high. The ridge and furrow which dominates the survey most likely dates back to the Medieval period, and the subsequent field drainage system generally follows the same alignment suggesting that the ridge and furrow was still evident as earthworks when the field drains were put in. Indeed surviving earthworks of the ridge and furrow can still be seen in the field today, particularly in the southwest corner. Away from the ridge and furrow, particularly to the north of the survey area, are anomalies which are of a different alignment and suggestive of older archaeological features.

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