Tiverton Road, Cullompton Gradiometer Survey, November 2008

1.0 Introduction

The survey was carried out in the field (OS grid ref 301400 107600) next to the electricity sub station, north of Tiverton road, Cullompton on behalf of Context One Archaeological Services, as part of an evaluation of the field.

The field has a gentle undulating east-west slope, the geology of the area being Breccias, Sandstones and Mudstone and Exeter volcanics.

The work was carried out by Liz Caldwell and Nigel Harvey of GeoFlo.

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 area of the field covered by the survey was divided into 20m squares orientated according to the Ordnance Survey grid (Fig 1). Readings were logged at 0.25m intervals along north to south 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.

1.0 The survey area

The grid comprises 31 contiguous whole and partial squares covering the whole of the field. It was bounded on all sides by hedges and barbed wire fencing.

Visible ferrous magnetic disturbance was provided by the barbed wire fencing in the hedges, gates into the field in the middle of the south boundary and in the northeast corner, and a large sheet of corrugated iron in the southwest corner. There was also a large shed/stable beside the south gate. There was a line of old fence posts with nails attached running north-south across the middle of the field with the remains of an electric fence.

The north and east boundaries also had dumps of soil and rubble piled up along them. The field contained at least seven roughly rectangular pits which looked to have been dug and back filled recently.

2.1 Results *(Figs 2 & 3)*

Major dipolar anomalies F, G and H are due to pipelines. Dipolars along the east boundary of the field are most likely due to modern disturbance, reflecting magnetic material in the soil and rubble which has been dumped along the fence. Dipolars along the west boundary could be associated with the nearby electricity sub station. There is a general scatter of ferrous magnetic anomalies throughout the survey area most likely due to buried modern metal objects. The extent of modern disturbance limits confidence in analysis in the case of smaller isolated anomalies which might otherwise be interpreted as pits.

2.1(i) Positive anomalies

A Double linear anomalies both within a range of 2 to 4nT. Within normal range for ditches, suggestive of a double ditch trackway.

B Small curved linear anomaly within a range of 2 to 4nT. Within normal range for a small ditch or gully.

C Linear anomaly within a range of 1 to 4nT. Within normal range for a small ditch or gully.

D Small linear anomaly within a range of 1 to 3nT. Within normal range for a gully.

E Amorphous anomaly within a range of 2 to 4nT. Within normal range for a pit.

2.1(ii) Negative anomalies

I Strong negative linear anomaly with positive dipolar. Within a range of –2 to –5nT. Possible remanent of a rubble trackway but its narrow width suggests this to be unlikely. Could be a stone-filled land drain, or possible plastic pipeline.

J Small linear anomaly within a range of –2 to –6nT. Within normal range for a stone wall or stone-filled ditch or gully.

K and L Parallel linear anomalies within a range of –1 to –3nT. Within normal range for stone-filled or ceramic field drains.

M Linear anomaly within a range of –1.5 to –3nT. Within normal range for a stone-filled or ceramic land drain.

N, O and P Three parallel linear anomalies within a range of –1 to –3nT. Within normal range for stone-filled or ceramic land drains.

3.0 Conclusion

The degree of confidence in identified anomalies varies from low to moderately high. The scattering of modern metallic debris across the field makes the identification of any smaller archaeological anomalies uncertain. Apart from the negative linears and the more obvious positive anomalies in the southeast corner, the results for the rest of the field are inconclusive.

Report prepared by Liz Caldwell for GeoFlo
15th December, 2008
Report no: GF1004

Limitation of liability

To the full extent permissible by law GeoFlo shall have no liability for any damage or loss (including, without limitation, financial loss, loss of profits, loss of business, loss of goodwill, loss of reputation or any indirect or consequential loss), however it arises, resulting from the use of this report or any material appearing on it or from any action or decision taken as a result of using the report.

GeoFlo, 4 Mill Cottages, Longaller, Bishop's Hull, Taunton, Somerset, TA4 1AD

liz.caldwell@hotmail.co.uk (01823) 323551 mobile 0790 4418923