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**GEOPHYSICAL SURVEY OF
LAND AT LEEMING LANE
CATTERICK, NORTH YORKSHIRE**

A PROGRAMME OF RESEARCH CARRIED OUT
ON BEHALF OF

YORK ARCHAEOLOGICAL TRUST

By

GeoQuest Associates

INTRODUCTION

This report presents the results of a geophysical survey of an area of land at Catterick, North Yorkshire, where it is proposed to construct housing (Figure 1). The research was carried out on behalf of York Archaeological Trust.

The geophysical surveys were conducted by GeoQuest Associates using methodology agreed through discussion with David Brinklow for York Archaeological Trust. Geophysical survey was judged desirable to test for archaeological potential indicated by the presence of earthworks, field systems and other features of probable Romano-British date in this locality.

GEOLOGY, TOPOGRAPHY AND LANDUSE

The study site comprises a grassed field of approximately 1.0ha, situated in the angle formed by Slessor Road and Leeming Lane in the village of Catterick, North Yorkshire. The site is generally level although a number of low earthworks are visible, the most prominent of which is a curvilinear rise which is aligned approximately NE-SW through the central part of the field. In diffuse daylight this feature was too indistinct to sketch with sufficient accuracy.

The solid geology beneath the study area comprises Carboniferous (Namurian) Millstone Grits and Permian Magnesian Limestone. These strata are almost certainly obscured by the fluvial deposits (sands and gravels) revealed in recent excavations on Catterick Airfield (GeoQuest Associates, *in prep.*).

THE GEOPHYSICAL SURVEY

Geophysical surveying provides a rapid method for the detection of subsoil features within archaeological landscapes. Two methods are most frequently used. *Geomagnetic* surveying employs a portable magnetometer to detect small perturbations in the Earth's magnetic field caused by changes in soil magnetic susceptibility or permanent magnetisation. The *resistivity* method, on the other hand, maps differences in soil electrical resistance which mainly reflect variations in water content.

The primary aim of the geophysical survey at Catterick was to prospect for the remains of Romano-British field system ditches and related features which might comprise stone and timber buildings, trackways and pits. Such archaeological remains should be characterised by significant contrasts in magnetic susceptibility which, under favourable conditions, will give rise to measureable geomagnetic anomalies. It was therefore considered that magnetic area survey would be a suitable technique for effective site evaluation.

Measurements of vertical geomagnetic field gradient were made over a regular grid using a Geoscan FM36 fluxgate gradiometer with ST1 sample trigger. A zig-zag traverse scheme was employed and data were logged in units of 20x20m at 1.0x0.5m intervals. Positional errors in the geophysical survey were constrained to within 1m and wooden peg markers at grid nodes were left in situ to aid the relocation of significant geophysical anomalies (circles in Figure 1 *etc.*). Appendix A provides further information about the techniques employed.

The geophysical results were processed into a grey-scale image showing the residual geomagnetic anomalies and this is shown in Figure 2 on a basemap digitised from the 1:2500 OS sheet. Appendix B describes the computer processing of the field data in more detail.

DISCUSSION

General

The study area is characterised by moderately intense geomagnetic anomalies with the strongest disturbances being detected along the eastern and western edges of the field where an iron pipe and ferrous debris are present. However, the majority of the field is seen to be remarkably free from serious contamination by ferrous litter and this has facilitated the discrimination of subtle anomalies of archaeological interest.

As a first stage in the interpretation, the geomagnetic map has been classified into characteristic styles of geophysical terrain as follows:

- 1 Significant regions of anomalously *high magnetic field gradient* which might be associated with high susceptibility, soil-filled structures such as *pits or field ditches*.
- 2 Areas of anomalously *low magnetic field gradient*, corresponding to features of low magnetic susceptibility, such as *concentrations of sandstone or limestone rubble*.
- 3 Scattered *dipolar anomalies* (paired positive-negative) whose most probable source in this context are objects with very high susceptibility, such as *ferrous litter or buried iron pipes*.

A geophysical interpretation is presented in Figure 3 which includes a key defining the colour used for each class of anomaly.

Interpretation

Numerous geomagnetic anomalies of archaeological interest have been detected (Figures 2, 3 & 4):

- 1 The most prominent geophysical features comprise a complex set of linear and curvilinear, positive magnetic lineations which are most prominent in the central 2/3 of the study area. The majority of these anomalies intersect orthogonally and their general morphology is inconsistent with structures of geological or pedological origin. It seems likely, therefore, that the anomalies reflect a network of drainage or enclosure ditches, containing material with enhanced susceptibility, which are preserved in the subsoil.
- 2 A strong negative magnetic lineation, approximately 3m wide, has been detected traversing the centre of the study area. This anomaly appears to have a well-defined NW termination or angle and is respected by the positive lineations (field ditches?) referred to in 1 above. This anomaly almost certainly reflects a linear concentration of stoney material in the subsoil, possibly in the form of the headland or trackway suggested in Figure 4. The geophysical data indicate that this trackway may have lateral ditches.
- 3 Two additional linear, negative magnetic lineations of lesser width have been detected traversing the western and northern thirds of the study area. These features possibly reflect minor stone field banks or trackways, although the former anomaly is not inconsistent with a stone or plastic field drain.
- 4 Two connected chains of intense magnetic dipoles are seen to traverse the eastern margin of the study area, providing strong evidence for buried iron pipes.
- 5 A broad band of short wavelength magnetic dipoles within the western half of the study area (Figures 2 & 3) almost certainly reflect rubble and ferrous debris beneath a recent trackway.
- 6 The geophysical survey has revealed a weak WSW-aligned texture with a mean wavelength of about 5m in much of the study area, possibly providing evidence for Medieval ridge and furrow cultivation ('r&f'; Figure 4).

CONFIDENCE RATINGS

The percentage levels of confidence which we assign to the features interpreted from the geophysical survey data are as follows:

Ditches:	Most 80%.
Tracks/Banks:	Main 80%; Others 50%.
Pipes:	All 95%.
R. & Furrow:	In central part of area 30%.

SUMMARY AND CONCLUSIONS

The results of this research can be summarised as follows:

- 1 Geomagnetic anomalies in the study area were moderately intense, reflecting reasonable susceptibility contrasts between subsoil features and their surroundings. The geophysical data in most of the study area were not degraded significantly by the effects of surface iron contamination.
- 2 The geophysical survey provides good evidence that a network of ditches, of uncertain date, survives in the central part of the study area.
- 3 Several stoney trackways or field banks have been detected by the geophysical survey.
- 4 A pair of buried iron pipes are present near the eastern limit of the surveyed area.

Credits *Field survey:* D.N. Hale, C. Lambert
Report: M.J. Noel
Date: 4/1/95

Note Whilst every effort has been taken in the preparation and submission of this report in order to provide as complete an assessment as possible within the terms of the brief, GeoQuest Associates cannot accept any responsibility for consequences arising as a result of unknown and undiscovered sites or artifacts.

FIGURE 1

Map showing the location of the area surveyed at Leeming Lane, Catterick, North Yorkshire (yellow). Digitised from the 1:2500 O.S. map. Circles mark the positions of peg markers.

LEEMING LANE, CATTERICK
LOCATION OF GEOPHYSICAL SURVEY

0 1:1000 50m

SURVEY BY



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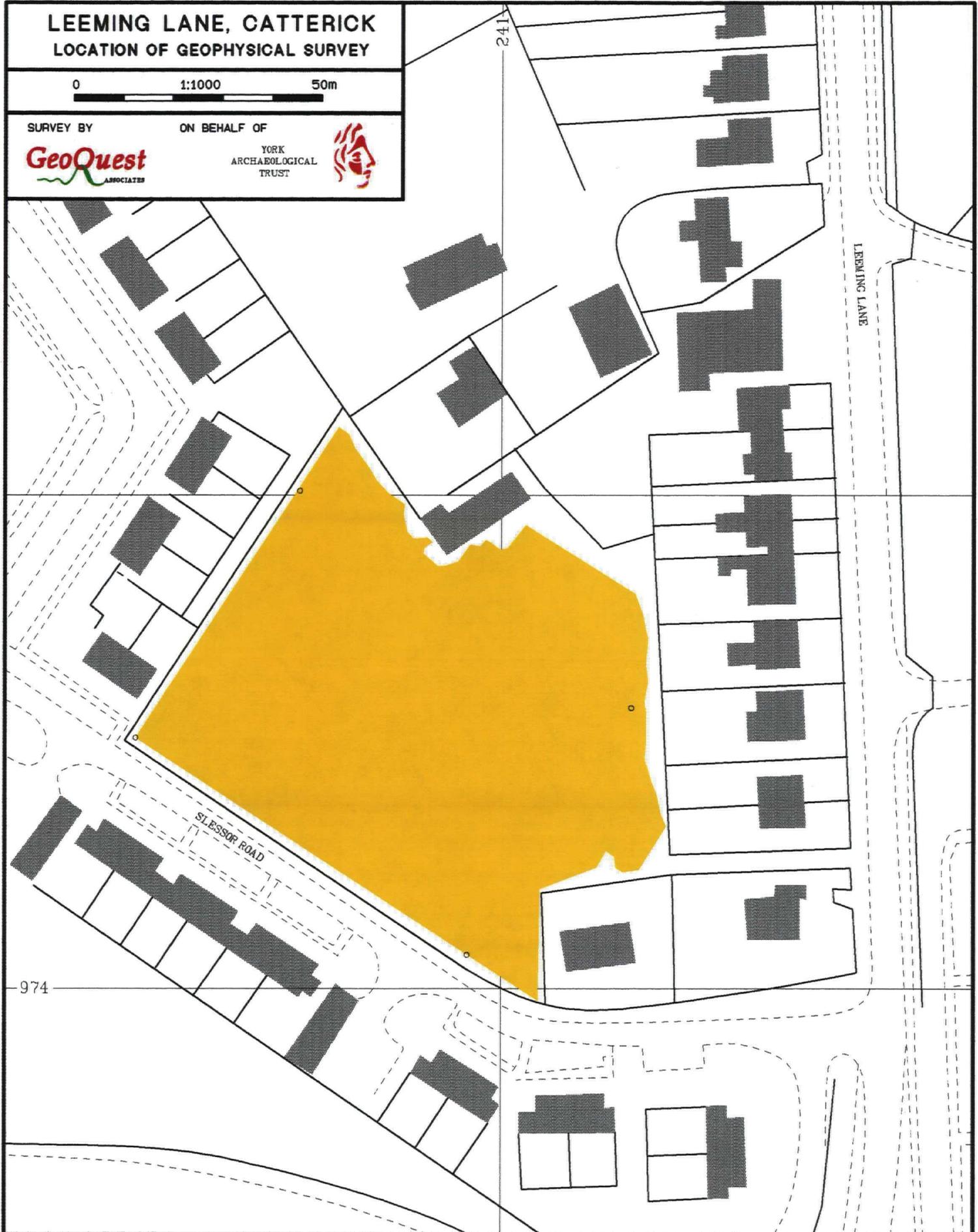


FIGURE 2

Results of the geomagnetic survey at Leeming Lane. Refer to the scale below for absolute values.



LEEMING LANE, CATTERICK
RESULTS OF GEOMAGNETIC SURVEY

0 1:740 50m

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SNY 19274. FIGURES 3 & 4 TOO LARGE TO SCAN SEE ORIGINALS.