

Land north of Broach Lane

Hensall

North Yorkshire

Geophysical Survey

NYCC HER	
SNY	10908
ENY	2952
CNY	4501
Parish	8038
Rec'd	15/11/2005

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Summary

A geophysical (magnetometer) survey covering 6 hectares was carried out at the proposed site of a new quarry south of Hensall. No anomalies indicative of archaeological activity have been identified in the sampled areas although a single linear anomaly may correspond with a previously identified cropmark. However, it is considered possible that the combination of prevailing soils and drift geology could mean that any surviving archaeological features are extremely difficult or impossible to detect. Therefore, in this case, it is considered that the apparent 'negative' result should be treated with a degree of caution.

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1. Introduction and Archaeological Background

- 1.1 Archaeological Services WYAS was commissioned by Elizabeth Simmons of White Young Green/Robert Long Consultancy on behalf of their clients Darrington Quarries Ltd to carry out a geophysical evaluation at the proposed site of a new mineral extraction quarry, centred at SE 588 225, about 1km south of Hensall, North Yorkshire (see Fig. 1).
- 1.2 The site comprised an irregular shaped block of land, planted with a young arable crop, covering approximately 11.5 hectares bounded to the south by the A645 (Broach Lane), arable fields to the west and east with a railway line running along the northern boundary. The fieldwork was carried out between October 31st and November 2nd 2005. No problems were encountered during the survey.
- 1.3 Topographically the site lies on gently undulating ground between 8m and 10m Above Ordnance Datum. The soils are classified in the Sessay association and are comprised of fine and coarse loam. The underlying geology is glacial sand and gravel drift over Bunter sandstone with significant local variation (see Fig. 2).
- 1.4 Hensall lies within the bed of the post-glacial Lake Humber that is thought to have drained approximately 12000 years ago. This resulted in the creation of an area of low-lying marsh and swamp interspersed with raised sand and gravel 'islands'. The majority of the survey area is situated on just such an 'island' centred about the 10m contour line (see Fig. 1). From Figure 2 it can be seen that this sand and gravel island will be the focus of the extractive process. In an otherwise unsuitable landscape for settlement these slightly elevated areas became foci for occupation. Although there are no known archaeological remains within the proposed development area this is thought to be more likely a reflection of the previous lack of archaeological work undertaken in the area rather than an absence of such activity. Significantly linear cropmarks (part of a much more extensive cropmark complex located approximately 1km to the south-east) can be seen terminating at the eastern edge of the site. These cropmarks are indicative of infilled archaeological ditches forming a pattern of land division and enclosure that is thought likely to date to the late Iron Age or Romano-British period. In favourable conditions these linear features should be readily identifiable by magnetometer survey.

2. Objectives and Methodology

- 2.1 The general objectives of the geophysical evaluation were to:
 - to provide information about the nature and possible interpretation of any magnetic anomalies identified by the survey and thereby:-
 - to establish the presence, absence and extent of any sub-surface archaeological remains within the defined survey area.
- 2.2 The Senior Archaeologist at the North Yorkshire County Council Heritage Unit recommended that a sample area of 6 hectares be subject to detailed magnetometer survey. This sample was focused on the proposed extraction area although a second smaller area to the west was also covered. This latter

area is provisionally set aside for topsoil storage. Specific attention was placed on the area along the eastern edge of the site where two linear cropmarks, indicative of the continuation of possible Iron age/Romano-British activity further to the south-east, appear to terminate.

- 2.3 During the detailed survey readings were taken on the 0.1nT range, at 0.25m intervals on zig-zag traverses 1m apart within 20m by 20m square grids using a Bartington Grad601 magnetic gradiometer. The instrument was checked for electronic and mechanical drift at a common point and calibrated as necessary.
- 2.4 The survey methodology, report and any recommendations comply with guidelines outlined by English Heritage (David 1995) and by the IFA (Gaffney, Gater and Ovenden 2002). All figures reproduced from Ordnance Survey mapping are done so with the permission of the controller of Her Majesty's Stationery Office. © Crown copyright.
- 2.5 A general site location plan, incorporating the 1:50000 Ordnance Survey mapping, is shown in Figure 1. Figure 2 shows the processed magnetometer data superimposed onto a digital map base supplied by the client at a scale of 1:5000. The processed (greyscale) and unprocessed (XY trace plot) data, together with an accompanying interpretation diagram, are presented in Figures 3, 4 and 5 at a scale of 1:1250.
- 2.6 Technical information on the equipment used, data processing and magnetic survey methodology is given in Appendix 1. Appendix 2 details the survey location information and Appendix 3 describes the composition and location of the site archive.

The figures in this report have been produced following analysis of the data in 'raw' and processed formats and over a range of different display levels. All figures are presented to most suitably display and interpret the data from this site based on the experience and knowledge of Archaeological Services staff.

3. Results and Discussion

- 3.1 Isolated dipolar anomalies ('iron spikes' - see Appendix 1) have been identified throughout the site. These 'iron spike' anomalies are caused by ferrous objects or other magnetic material on the ground surface or contained within the upper soil horizons. Although archaeological artefacts may cause these anomalies they are more often caused by modern cultural debris that has been introduced into the topsoil usually as a consequence of manuring, especially in fields that have been under an arable regime for a considerable period of time. There is no apparent clustering to these responses and consequently they are not thought to be of any archaeological significance.
- 3.2 Running parallel with the northern edge of the survey block in Area 2 is a linear anomaly. This corresponds with a former field boundary shown on the First Edition Ordnance Survey map.
- 3.3 Other very weak linear trends in the data can be seen across both Area 1 and Area 2 aligned from north-north-east to south-south-west, parallel with the extant field boundaries to the east and west. These anomalies are caused by recent agricultural activity.

- 3.4 Several areas where the magnetic background is excessively variable have been identified, the most extensive being in the western half of Area 2. The level of the magnetic readings is relatively low without a significant ferrous component and it is therefore thought likely that these anomalies have an underlying geological origin although modern activity cannot be discounted as a possible cause.
- 3.5 Numerous, much smaller, areas of magnetic enhancement are also present across all parts of the site. Only those anomalies where the enhanced reading occurs in two or more successive traverses (see Fig. 5) have been shown on the interpretation figure. These small discrete anomalies could be caused by underlying archaeological features such as pits, truncated linear features or areas of burning. However, it is again considered probable that these anomalies have an underlying natural cause being due to variations in the magnetic properties of the materials making up the topsoil and subsoil. It is now recognised that natural deposits can produce anomalies similar in strength and character to archaeological anomalies, this variation being caused by the presence of bands or pockets of, particularly, magnetic sands and gravels.
- 3.6 An extremely weak, linear anomaly aligned from south-east to north-west has been tentatively identified in the north-eastern corner of Area 2. This anomaly is in approximately the right location and on roughly the same orientation as the most northerly of the two cropmarks located immediately to the east of the site boundary. The extremely weak nature of the response means that it is impossible to give a confident interpretation but the anomaly could be due to an infilled archaeological ditch.

4. Conclusions

- 4.1 No anomalies of probable archaeological potential have been identified during the current survey although a single linear anomaly in the north-eastern corner of the site could mark the continuation of the feature identified as a cropmark immediately to the east of the site boundary. However, it is still not clear whether the apparent absence of obvious archaeological activity within the site is due to a lack of such activity or whether the effects of the prevailing drift geology and modern agricultural practice have combined to produce the 'negative' result.

The results and subsequent interpretation of data from geophysical surveys should not be treated as an absolute representation of the underlying archaeological and non-archaeological remains. Confirmation of the presence or absence of archaeological remains can only be achieved by direct investigation of sub-surface deposits.

Bibliography

David, A., 1995. *Geophysical Survey in Archaeological Field Evaluation: Research and Professional Services Guidelines* No. 1. English Heritage

Gaffney, C., Gater, J. and Ovenden, S. 2002. *The Use of Geophysical Techniques in Archaeological Evaluations*. IFA Technical Paper No. 6

Acknowledgements

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Figures

- Figure 1 Site location (1:50000)
Figure 2 Site location showing greyscale magnetometer data and approximate location of drift geological boundaries (1:5000)
Figure 3 Greyscale plot of magnetometer data; Areas 1 and 2 (1:1250)
Figure 4 Interpretation plot of magnetometer data; Areas 1 and 2 (1:1250)
Figure 5 XY trace plot of magnetometer data; Areas 1 and 2 (1:1250)

Appendices

- Appendix 1*** Magnetic Survey: Technical Information
Appendix 2 Survey Location Information
Appendix 3 Geophysical Archive