

ENY 3927  
SNY 11659

## Appendix 4: Geophysics Report (Archaeological Services WYAS)

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**Forcett Quarry**  
**Richmondshire**  
**North Yorkshire**

### Geophysical Survey

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#### Summary

*A geophysical (magnetometer) survey covering 4 hectares was carried out on land east of Forcett Quarry near East Layton, Richmondshire, where it is proposed to extend quarrying operations. Linear anomalies indicative of 19<sup>th</sup> century field boundaries and agricultural practice have been identified as has a probable geological boundary. No linear anomalies of probable archaeological origin have been identified although the presence of discrete anomalies means that archaeological activity on this site cannot be completely dismissed. Nevertheless, on the basis of the magnetometer survey, the site is considered to have a low archaeological potential.*

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## **1. Introduction and Archaeological Background**

- 1.1 Archaeological Services WYAS was commissioned by Paul Wheelhouse of Golder Associates (UK) on behalf of their client, Hanson Quarry Products Europe Limited, to undertake a geophysical (magnetometer) survey at Forcett Quarry, approximately 0.5km north of East Layton, to the north of Richmond in North Yorkshire (see Fig. 1).
- 1.2 The survey area, centred at NZ 164 105, comprises a broadly rectangular block of land, approximately 4ha in extent, which forms part of the proposed eastern quarry extension, immediately east of the current quarry workings and Hallmires Plantation; the plantation area, which could not be surveyed, forms the remaining part of the extension area (see Fig. 2).
- 1.3 At the time of the fieldwork (between December 11<sup>th</sup> and 12<sup>th</sup> 2006) the field was under rough pasture. No problems were encountered during the survey.
- 1.4 Topographically, the site lies between 140m and 150m Above Ordnance Datum (AOD), being situated on ground that rises up from Cadwell Beck to the north of the site. The site geology comprises Great Limestone and Four Fathom Limestone overlain by drift deposits of boulder clay. The soils, which are classified in the Dunkeswick association, are described as fine loams that are prone to seasonal waterlogging.
- 1.5 An archaeological assessment (Rathmell Archaeology 2005) undertaken to determine the character and extent of the archaeological resource identified seven sites within the search area in the immediate environs of the current quarry. However, none were within the proposed new extraction area. The assessment concluded that *'it is probable that additional, buried and unrecorded remains of archaeological significance survive across the proposed extraction area'*.

## **2. Methodology and Presentation**

- 2.1 Based on the identified archaeological potential of the site it was proposed that a magnetometer survey should be carried out as a first stage mitigation measure; the general aim of the survey would be to obtain information that would contribute to a greater understanding of the archaeological potential of the site.
- 2.2 As the site was relatively small (4ha) it was proposed that detailed (recorded) magnetometer survey would be carried out over the whole of the area amenable to survey and to be affected by the proposed extension (*i.e.* excluding Hallmires Plantation).
- 2.3 Detailed survey employs the use of a sample trigger to automatically take readings at predetermined points, typically at 0.25m intervals, on traverses 1m apart. These readings are stored in the memory of the instrument and are later downloaded to computer for processing and interpretation. Further details are given in Appendix 1. Detailed survey allows the visualisation of weaker anomalies that may not have been readily identifiable by magnetic scanning.
- 2.4 A Bartington Grad601 magnetic gradiometer was used during the survey with readings being taken at 0.25m intervals on zig-zag traverses 1m apart within

20m by 20m grids. The readings were stored in the memory of the instrument and later downloaded to computer for processing and interpretation using Geoplot 3 software.

- 2.5 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).
- 2.6 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 map base at a scale of 1:5000. The processed (greyscale) and unprocessed (XY trace plot) data, together with accompanying interpretation diagram, are presented in Figures 3, 4 and 5 at a scale of 1:1000.
- 2.7 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.

### **3. Results and Discussion**

- 3.1 Several dipolar discrete anomalies are present across the site. These anomalies are indicative of ferrous objects or other magnetic material in the topsoil/subsoil and, although archaeological artefacts may cause them, they are more often caused by modern cultural debris that has been introduced into the topsoil, often as a consequence of manuring. There is no apparent clustering to these anomalies and therefore they are not considered to be archaeologically significant.
- 3.2 A linear alignment of dipolar anomalies along a broad west/east axis across the centre of the site correlates with the alignment of a former field boundary shown on the 1857 first edition 6" to 1 mile Ordnance Survey map of the area (Sheet 24). Fifty metres to the north and on the same alignment is a linear trend anomaly. This is also interpreted as having an agricultural origin being due to ploughing or possibly representing another former boundary.
- 3.3 A former boundary (again shown on the 1857 mapping) has also been identified in the southern part of the site as a very weak linear trend aligned north/south. To the east of this boundary are a series of linear trend anomalies on the same alignment. These anomalies are caused by the practice of ridge and furrow ploughing and are due to the magnetic contrasts between infilled furrows and former ridges.
- 3.4 At 45° to these agricultural anomalies is a stronger, broader curvilinear anomaly aligned from north-west to south-east. This anomaly is interpreted as geological in origin as it marks the geological boundary between Great Limestone, north-east of the boundary, from Four Fathom Limestone to the south-west.
- 3.5 Several discrete anomalies (areas of magnetic enhancement) have been identified most notably in the south-eastern corner of the survey area. Prominent amongst these is the cluster of six anomalies. Any of these



anomalies could be due to an underlying archaeological feature such as an infilled pit. However, limestone is a comparatively 'soft' rock that is susceptible to erosion by water, ice or even tree root penetration. It is therefore considered equally likely that these anomalies have a natural origin, being due to naturally eroded features infilled with sub-soil. The absence of any linear (archaeological) anomalies within the survey area gives credence to this interpretation. Nevertheless, an archaeological cause should not be completely dismissed.

#### **4. Conclusion**

- 4.1 The prevailing soils and geology are generally favourable for the detection of archaeological features by magnetometry. It is therefore considered likely that the absence of any linear anomalies interpreted as archaeological in nature reflects an absence of enclosed settlement activity on this site; the fact that linear anomalies indicative of 19<sup>th</sup> century land division and agricultural practice have been identified suggests strongly that features indicative of archaeological activity (enclosures, trackways, field divisions) would have been readily detected. The presence of discrete anomalies means that the possibility of features associated with unenclosed settlement cannot be completely dismissed. Nevertheless, on the basis of the magnetometer survey and the archaeological assessment, the archaeological potential of the site is considered to be low.

*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.*

*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**

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- Gaffney, C., Gater, J. and Ovenden, S. 2002. *The Use of Geophysical Techniques in Archaeological Evaluations*. IFA Technical Paper No. 6
- Rees, T., 2005. *Forcett Quarry, Richmondshire: Archaeological Assessment*. Unpubl. Client Report

### **Acknowledgements**

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### **Figures**

- Figure 1 Site location (1:50000)
- Figure 2 Site location showing greyscale magnetometer data (1:5000)
- Figure 3 Processed greyscale magnetometer data (1:1000)
- Figure 4 XY trace plot showing unprocessed magnetometer data (1:1000)
- Figure 5 Interpretation of magnetometer data (1:1000)

### **Appendices**

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





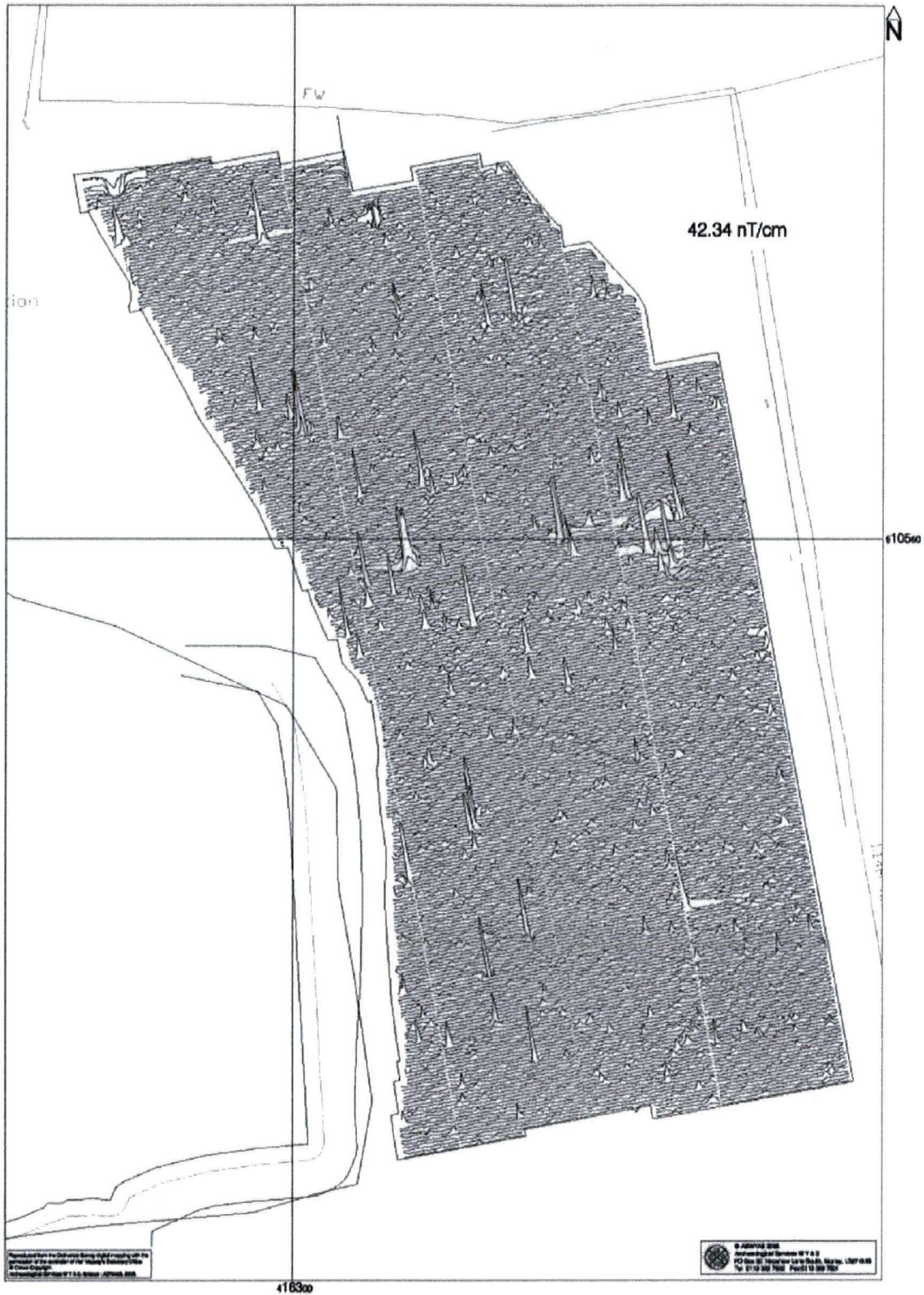


Fig. 4. XY trace plot showing unprocessed magnetometer data (1:1000 @ A3)



Fig. 5. Interpretation of magnetometer data (1:1000 @ A3)



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