LAND AT SCHOOL AYCLIFFE FARM NEWTON AYCLIFFE, DURHAM

Archaeological Geophysical Survey 2015

Report by:

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Land at School Aycliffe Farm, School Aycliffe Lane, Newton Aycliffe, Durham

Geophysical Survey 2015

Abstract

This geophysical survey was undertaken as part of an archaeological field evaluation of an area of land being considered for development as a solar farm at School Aycliffe near Newton Aycliffe, County Durham.

Findings from the survey consist mainly of drains and pipes, together with some indeterminate ground disturbances of probably non-archaeological origin. These findings are unlikely to be of archaeological relevance with the possible exception of a ditch-like feature which may indicate part of a former field boundary.

1. Introduction

The survey was commissioned from Bartlett Clark Consultancy, Specialists in Archaeogeophysics of Oxford, by CgMs Consulting of Cheltenham on behalf of Lightsource Renewable Energy Ltd. Fieldwork for the survey was done on 13-15 January 2015. Plans showing the survey findings have previously been supplied to CgMs, and are now included in this report.

2. Objectives of the Survey

The purpose of the survey was to test for evidence of archaeological sites or remains, and to provide information which may inform further stages of the archaeological evaluation.

A geophysical survey is usually able to identify the extent and character of any archaeological remains capable of producing a magnetic response. The magnetometer will detect cut features such as ditches and pits when they are silted with an increased depth of topsoil, which usually responds more strongly than the underlying natural subsoil. Fired materials, including baked clay structures such as kilns or hearths are also likely to produce a localised enhancement of the magnetic field strength, and the survey therefore responds preferentially to the presence of ancient settlement or industrial remains. The survey is also strongly affected by ferrous and other debris of recent origin.

3. The Site

Some initial comments on the location and condition of the site were included in the Written Scheme of Investigation for the project, which was submitted to CgMs in advance

of the survey [1]. The following notes are reproduced in part from this document.

Topography and geology

The proposed development is to occupy two fields linked by an access track across an intermediate field, as indicated on the attached site plan. (The fields are numbered 1-3 for identification on the attached plans.) The northern field is arable and located at NGR NZ264237 to the south of School Aycliffe Lane between School Aycliffe and Newton Aycliffe. The line of the access track between the two fields was surveyed to 20m width. The total site area (as indicated by a red outline on the location plan, figure 1) amounts to approximately 11ha. This excludes a wooded area to the east of the southern field.

The geology of the site is shown (on the BGS website) as Ford Formation Dolostone (Magnesian Limestone) beneath a drift deposit of Diamicton Till (glacial sand and mud). These conditions should not present any unusual difficulties for a magnetometer survey, although the survey response may include natural magnetic anomalies if small stones of igneous origin are present in the Till.

Topsoil magnetic susceptibility values (which indicate the potential strength of magnetic response from a site, and may be enhanced in the vicinity of an archaeological site) were measured in each of the fields. Readings were relatively high (30-37 m^3 kg^{-1}) in the northern fields (fields 1 and 2), but low (8.3) in field 3. These readings suggest that ground conditions at the site should be favourable for the magnetic detection of archaeological features, but the soil may contain variable proportions of clay (which gives low susceptibility readings) in different parts of the site.

Archaeological background

We have not been told of any specific previously recorded archaeological findings from the site or its immediate surroundings. The survey will therefore serve as a prospecting exercise with the purpose of testing for the presence of previously unknown archaeological sites or features.

4. Survey Procedure

The procedure used for the investigation was a fluxgate gradiometer survey across the evaluation area. Results are presented as described below.

A survey grid was set out at the required locations, and tied to the OS grid using a GPS system with Omnistar correction to provide 0.1m or greater accuracy. The plans are therefore geo-referenced, and OS co-ordinates of map locations can be read from the AutoCAD version of the plans.

The magnetometer readings were collected along transects 1m apart using Bartington 1m fluxgate gradiometers, and are plotted at 25cm intervals along each transect. The results of the survey are presented as grey a scale plot (at 1:2000 scale) in figures 2-3, and as a graphical (x-y trace) plot in figures 4-5 (at 1:1500 at A3). Inclusion of both types of presentation allows the detected magnetic anomalies to be examined in plan and profile respectively.

The graphical (x-y) plot represents minimally pre-processed magnetometer readings, as recommended for initial presentation of survey data in the 2008 English Heritage geophysical guidelines document [2]. Adjustments are made for irregularities in line spacing caused by variations in the instrument zero setting (as is required for legibility in gradiometer data), but no further filtering or other process which could affect the anomaly profiles or influence the interpretation of the data has been applied. A weak additional 2D low pass filter has been applied to the grey scale plot to adjust background noise levels.

An interpretation of the findings is shown in figures 4-5, and is reproduced separately to provide a summary of the findings in figure 6. Colour coding has been used in the interpretation to distinguish different effects. The interpretation is intended to categorize most of the identifiable magnetic anomalies, but cannot reproduce the detail of the grey scale plots.

Features as marked include magnetic anomalies which may show characteristics to be expected from features of potential archaeological significance (in red), and stronger (perhaps recent or natural) disturbances in brown. Small (and mainly natural) background magnetic anomalies are outlined in light brown. Broad irregular magnetic anomalies of a kind commonly seen in wetland soils are indicated in a light green. Some of the more conspicuous ferrous objects (identifiable as narrow spikes in the graphical plots) are outlined in light blue, and probable land drains and pipes are also marked.

5. Results

Findings visible in the survey plots include clusters of small magnetic anomalies (as marked in brown at A, B, C, D in figure 6). These are slightly stronger or more concentrated than the overall level of background magnetic activity (indicated by small background magnetic anomalies outlined in light brown). These areas of increased activity could include recent debris or disturbances (particularly at B in field 1, which is near to a pipe), but could otherwise indicate localised outcrops or deposits of gravel (which often contains small magnetic stones) within the glacial till. The disturbances are not associated with any identifiable ditches or enclosure boundaries of a kind which could suggest they represent scatters of archaeological debris within an occupation site.

One additional feature visible immediately to the east of the magnetic disturbances at B is a larger pit-like magnetic anomaly outlined in light green. Similar magnetic anomalies are visible also at other locations (including to the north and east of C in field 3). These magnetic anomalies are characterised by rounded profiles (as seen in the graphical plot in figures 4 and 5), and are typically found on clay or wetland soils, where they appear to represent naturally silted hollows in the subsoil.

Other findings include iron pipes (indicated, together with associated magnetic disturbances) in blue, and linear sequences of small magnetic anomalies which must represent non-ferrous pipes or land drains in field 3 (as labelled at E).

A number of parallel linear markings, which are likely to be cultivation effects, are visible in the grey scale plots. The orientations of these markings are indicated by green broken lines in the interpretation. They are most clearly visible in field 1 (where susceptibility readings are higher), and are less distinct elsewhere. The linear features in field 1 are aligned in at least two directions, which suggests there has been ploughing in varying directions at different times.

One remaining finding, which does not conform to the previous categories, is an irregular ditch-like linear feature (which is stronger than the cultivation effects) outlined in red at F in field 2. This is close to a pipe and other disturbances, but could perhaps indicate an infilled ditch. It could if so represent part of a former field boundary.

6. Conclusions

The survey has detected various sub-surface features and disturbances, but there are no findings which strongly suggest the presence of any groups or concentrations of archaeological features.

The detection of cultivation effects suggests that a magnetic response should be obtained, at least from groups or concentrations of archaeological features, if any were present, but only one possible ditch-like feature (F in field 2) has been detected. Findings are otherwise limited to clusters of small magnetic anomalies (A-D) which are probably mainly of natural origin, together with pipes and drains.

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29 January 2015

The fieldwork for this project was done by N. Paveley and P. Heykoop.

References

[1] *Land off School Aycliffe Lane, Newton Aycliffe, Durham: Written Scheme of Investigation for Archaeological Geophysical Survey 2015.* Document submitted to CgMs by Bartlett Clark Consultancy; 8 January 2015

[2] English Heritage 2008 *Geophysical Survey in Archaeological Field Evaluation* [online facsimile] (English Heritage: Swindon, 2008), English Heritage Research.

Background mapping based on site plan by
Lightsource Renewable Energy Ltd.

524000N

426000E

427000E

N

Proposed survey area

Location of 1:2000 figures (2-3)

Location of 1:1500 figures (4-5)

Location of 1:2500 summary plan (6)

Field 1

Field 2

Field 3

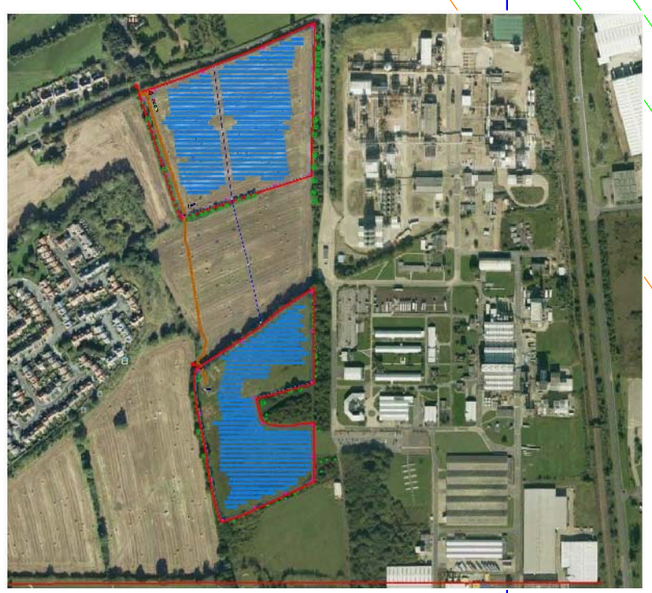
2

3

4

5

6



523000N

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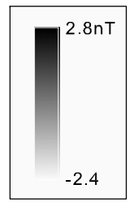
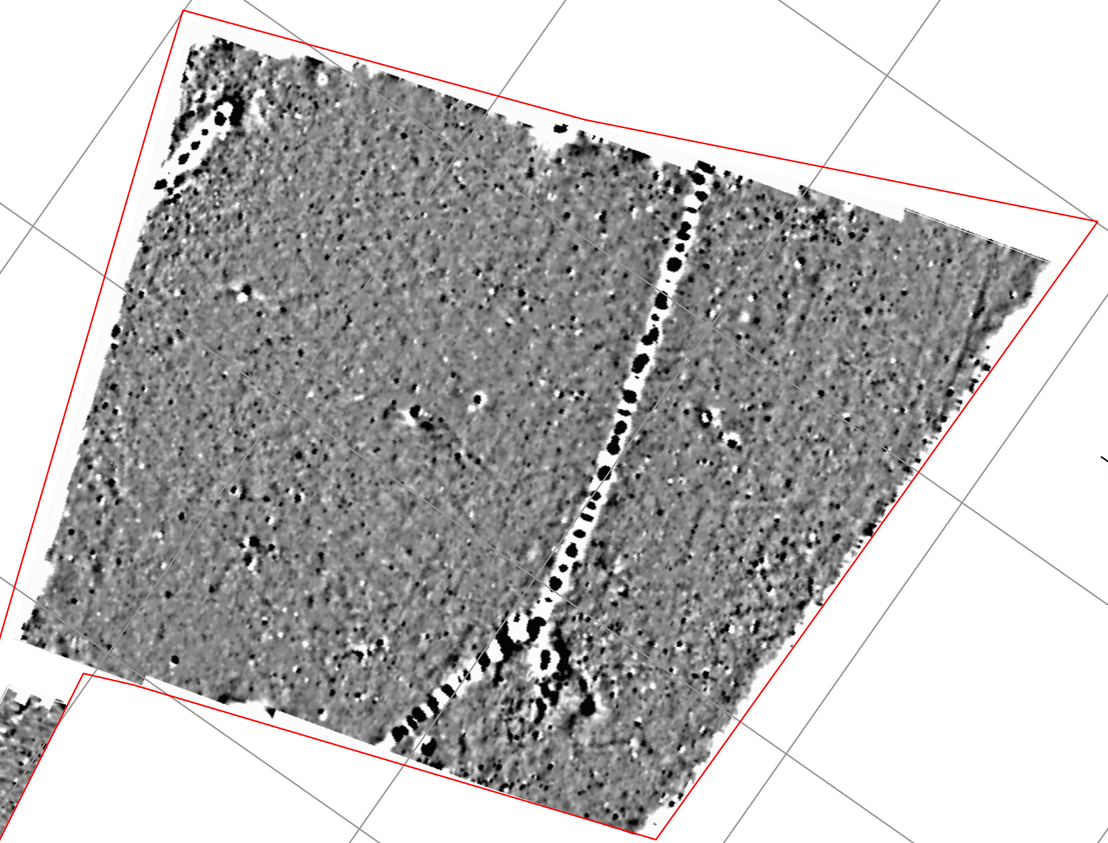
Figure 1: Location of survey
(and figures 2-6)

Scale 1:4000 @ A3

0 200m





N

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Figure 2: Magnetometer survey
(grey scale plot)

Scale 1:2000 @ A3
0 100m

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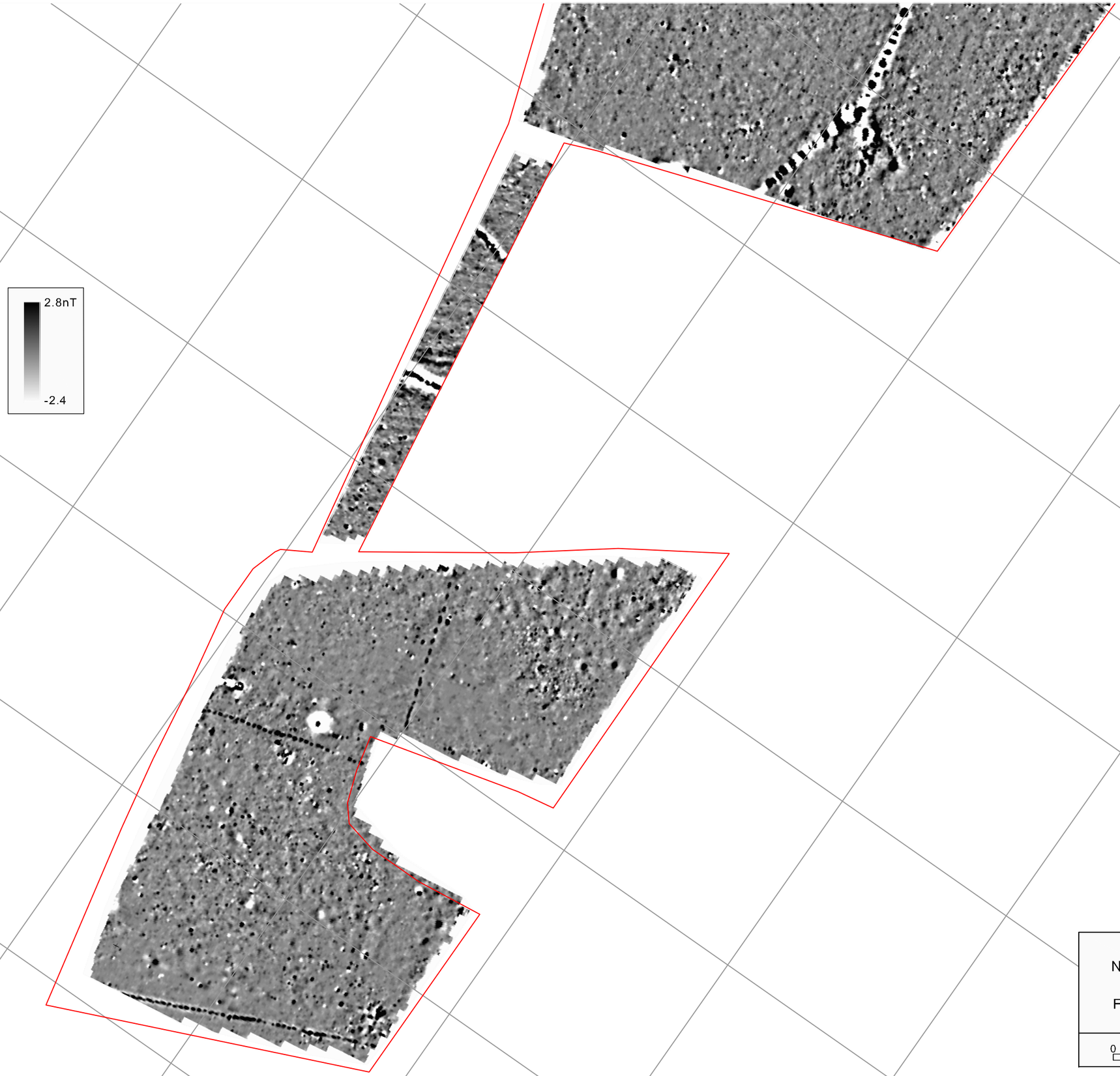

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Figure 3: Magnetometer survey
(grey scale plot)

Scale 1:2000 @ A3
0 100m

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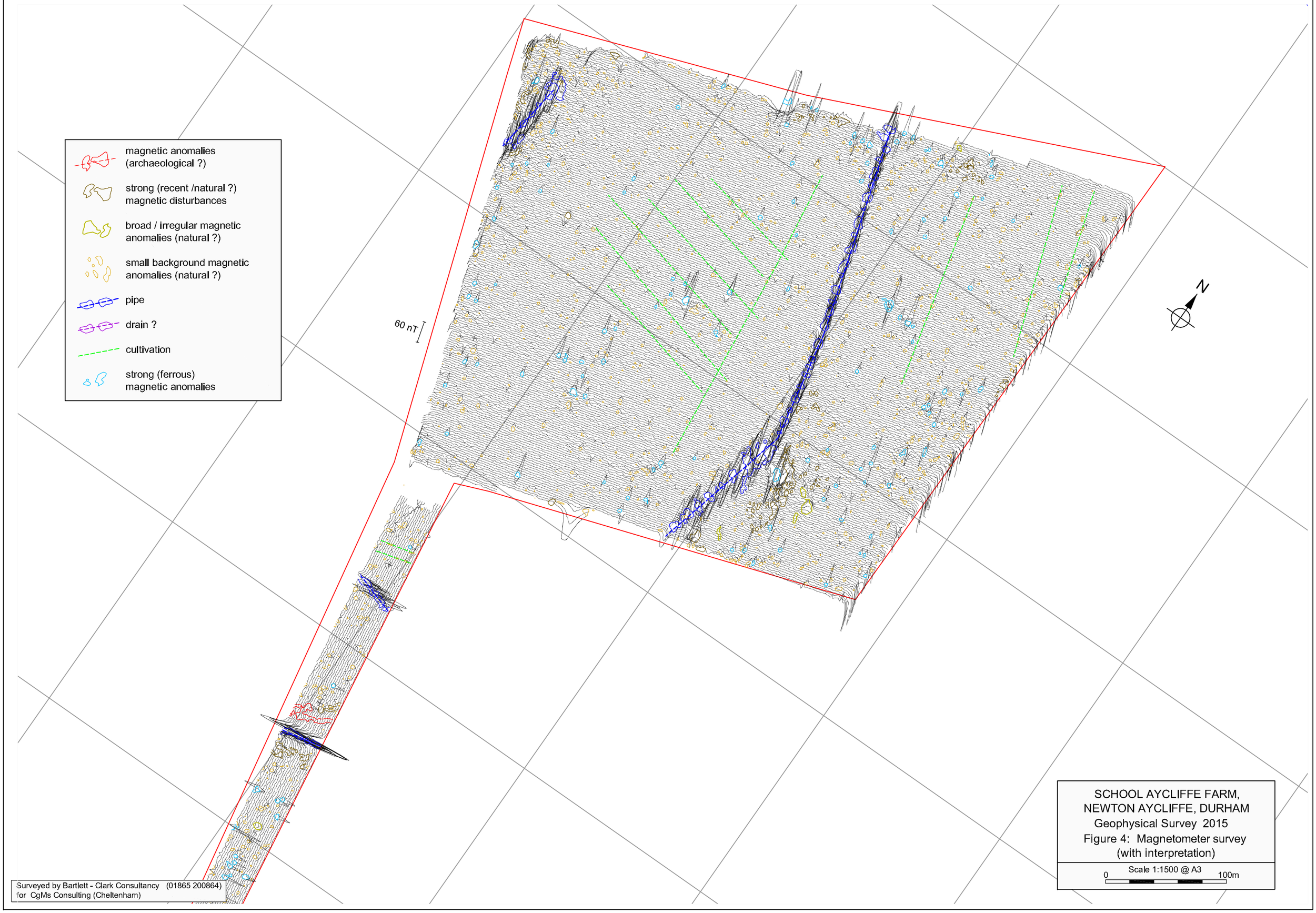
magnetic anomalies (archaeological ?)
strong (recent /natural ?) magnetic disturbances
broad / irregular magnetic anomalies (natural ?)
small background magnetic anomalies (natural ?)
pipe
drain ?
cultivation
strong (ferrous) magnetic anomalies
60 nT
N
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Figure 4: Magnetometer survey
(with interpretation)
Scale 1:1500 @ A3
0
100m

magnetic anomalies (archaeological ?)

strong (recent /natural ?) magnetic disturbances

broad / irregular magnetic anomalies (natural ?)

small background magnetic anomalies (natural ?)

pipe

drain ?

cultivation

strong (ferrous) magnetic anomalies

60 nT

N

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Figure 5: Magnetometer survey (with interpretation)

Scale 1:1500 @ A3

0 100m

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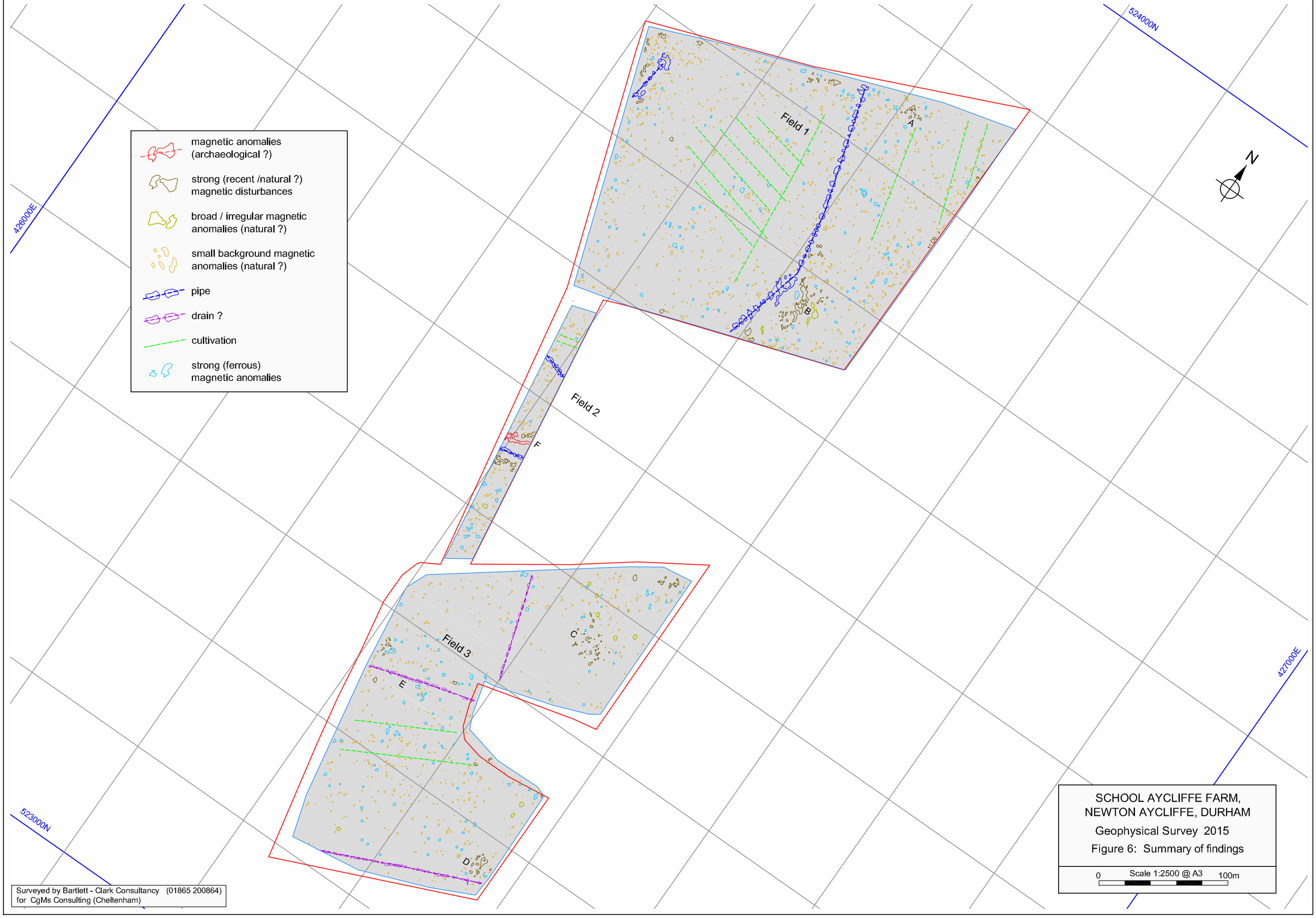

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Figure 6: Summary of findings

0 Scale 1:2500 @ A3 100m