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**Report on a fluxgate gradiometer survey
carried out over land at Killinghall, North Yorkshire**



on behalf of CS Archaeology

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2 Report information

Client	CS Archaeology
Report type	Fluxgate gradiometer survey
Town	Killinghall
County	North Yorkshire
Central grid reference	SE 28710 58586
Report number	GB 057
Site code	Site 1601
Dates of fieldwork	05-06 & 08/01/2018
Date of report	11/01/2018
Fieldwork personnel	James Lyall MA (Hons), MSc
Report by	James Lyall MA (Hons), MSc
Produced by	Geophiz.biz

3 Summary

3.1.1 James Lyall (of Geophiz.biz) was engaged by Chris Scurfield (of CS Archaeology) to undertake a fluxgate gradiometer survey over land at Killingham, North Yorkshire. The survey detected 9 anomalies, most of which are of a modern or recent origin. Possible Medieval ridge and furrow was noted on site, but not detected by the magnetic survey.

4 Methodology

4.1 Technique

- 4.1.1 The survey was conducted using a *Geoscan Research* FM36 fluxgate gradiometer. The zigzag traverse method of survey was used. The survey was carried out by taking readings every 25cm along the traverse (walking) axis and every metre along the grid axis (thus 3600 readings for each 30m by 30m grid). The sensitivity of the machine was set to detect magnetic variation in the order of 0.1 nanoTesla (nT).
- 4.1.2 Survey in the field, report production and archiving were conducted and prepared using the most up to date guidelines, as laid out in David et al (2008) and Schmidt (2013). The survey grid location was logged using a Leica 530 RTK GPS system.
- 4.1.3 The data from the magnetometer has been processed and presented using G-Sys (a proprietary Geographic Database Management program which can also display, process and present digitised plans and images). This report was produced using Microsoft Word 2010 and Adobe Photoshop 7 for further image manipulation. All maps have north pointing to the top of the page, and Google Earth images are used for some of the background map locations.



Figure 1 Showing the ground conditions at the time of the survey

4.2 Area surveyed

4.2.1 The site requested for survey was composed of five fields (see Figure 4) currently utilised as pasture, apart from the largest area (Area 1 on Figure 4) which was the old cricket field located in the village of Killinghall, North Yorkshire (see Figure 2).



Figure 2 Area surveyed (shaded in red) on a Google Earth background, with Killinghall to the west

5 Geology

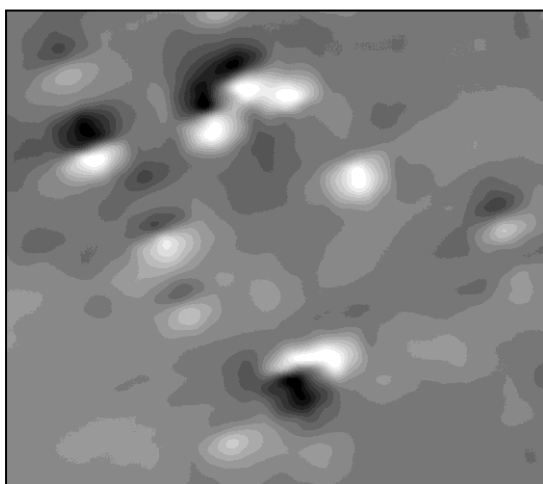
5.1.1 The underlying solid geology is part of the Lower Plompton Grit. This is a sandstone formed approximately 322 million years ago in the Carboniferous Period. Superficial deposits are sands, gravels and clays of the Harrogate Till Formation.

(source <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>).

6 Gradiometer results and interpretation

6.1 Magnetic anomalies

6.1.1 Features discovered by magnetic survey techniques are referred to as "anomalies", defined as such because they are different from the background magnetic norm. All magnetic survey plots relating to the current survey are plotted with a scale of ± 5 nanoTesla (nT).



6.1.2 The large and small black and white areas in the greyscale images (see Figure 3) are dipoles (iron spikes), which indicate the presence of iron or steel objects. These are generally found in the topsoil, and although they could signify the presence of archaeological objects, it is much more likely that they relate to more modern detritus, such as broken ploughshares, iron horseshoes, shotgun cartridges etc.

Figure 3 Dipolar anomalies in magnetic data

6.2 Interpretation and discussion of anomalies

6.2.1 The survey data is plotted as a greyscale image on Figure 4 (with a larger scale version on Figure 7) and as a digitised interpretation of anomalies on Figure 5.

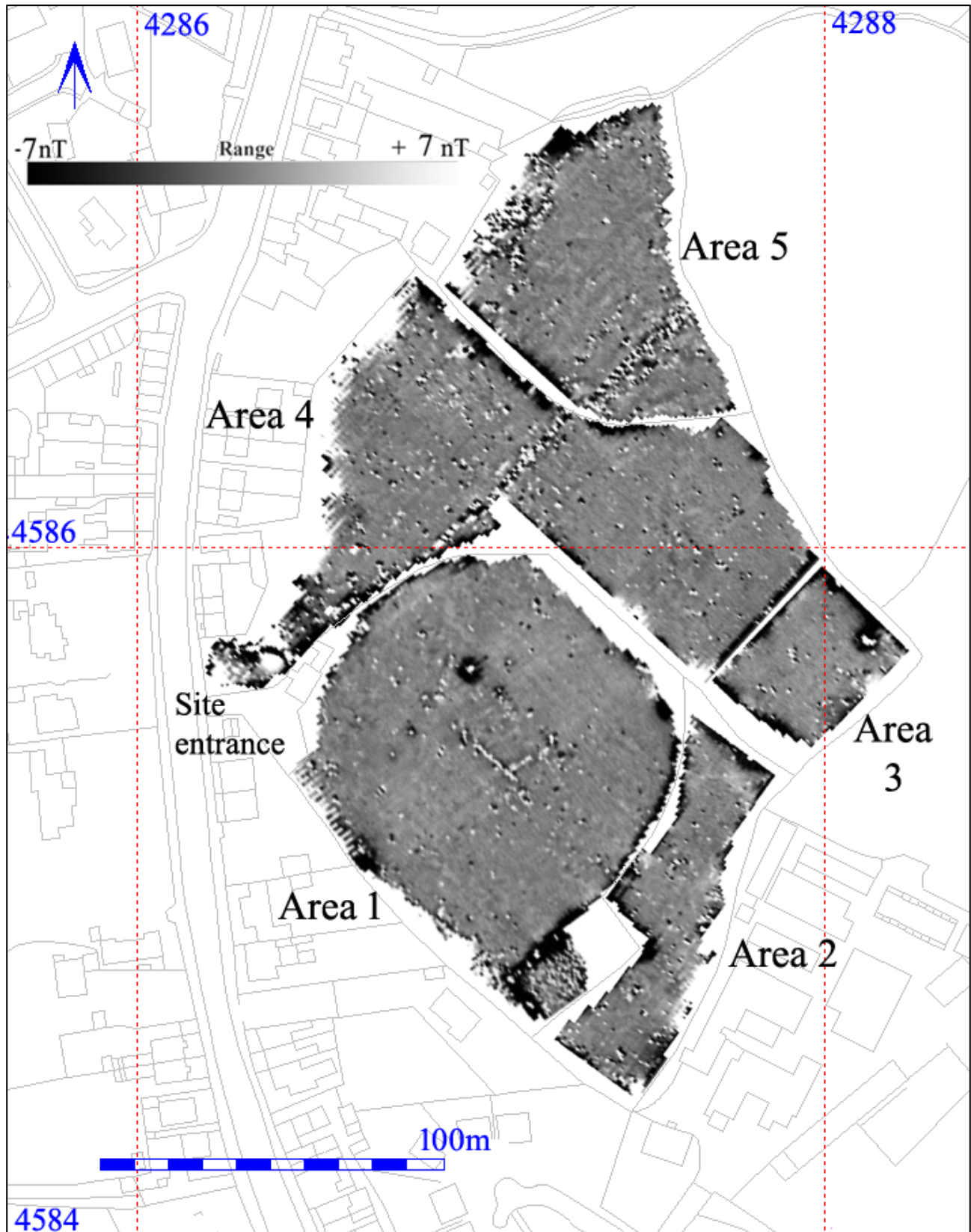


Figure 4 Greyscale image of the magnetometer data superimposed on Ordnance Survey grid

6.3 Modern anomalies

6.3.1 The most obvious anomalies caused by modern activity are the very high readings along the western and southern edges of the surveyed area. These are caused by an

iron fence in a hedge in the central east of area 1, and by metal fencing along the western edges of areas 4 and 5. In addition, there were a number of dipolar signals along the western edge of area 5, which are probably the result of modern disturbance of some type.

6.3.2 Anomalies 1 (area 1) and 2 (area 3) are both large localised signals, and it seems most likely that these relate to a large lump of iron or steel buried in those locations.



Figure 5 Interpreted anomalies

6.3.3 Anomaly 3 is a strong dipolar linear, which turns a right angle in the south-eastern corner of area 1. This is most likely to indicate the presence of a metal pipe, although there is no indication as to where it is leading to in the field.

6.3.4 Linear anomaly 4 (area 4) is also a strong linear, and is probably also caused by the presence of a pipe. It could relate to anomaly 5, which is located just to the north-east.

- 6.3.5 Anomaly 5 is another dipolar linear (areas 4 and 5) and extends along the eastern boundary of area 4, crossing the open field before heading north-east across area 5. Again, this feature could indicate the presence of a metal pipe or drain.

6.4 Anomalies of a possible modern origin

- 6.4.1 Anomalies 6 and 7 are two quite strong linear features, located in the centre of area 1. While their function is unclear, it may be significant that they are located around where the cricket wicket was situated (see Figure 6, where the location of the wicket is outlined in red). A number of fainter anomalies are also to be seen here (arrowed in black on Figure 6), perhaps indicating attempted drainage of the wicket.

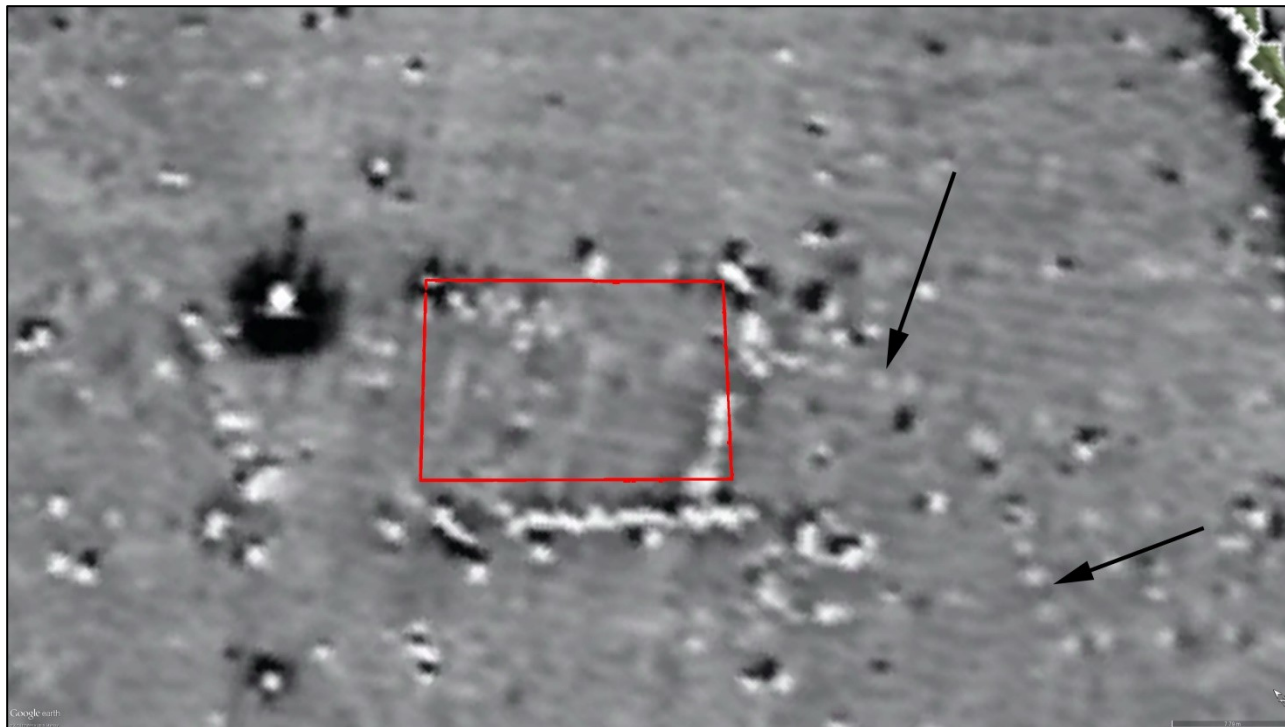


Figure 6 Location of the cricket wicket area indicated in red

6.5 Anomalies of a possible archaeological origin

- 6.5.1 The only other anomalies detected were two faintly positive linear features (numbered 8 and 9 and coloured red on Figure 5). They appear to be part of the same feature, as they juxtapose at the fence between areas 1 and 2.
- 6.5.2 Although classified as potentially of archaeological significance, the very straight alignment of these anomalies is more likely to indicate a feature of more recent origins. The function of the feature is not certain, but it seems that it does not extend through into area 4 to the west.

7 Features not detected by the magnetic survey

- 7.1.1 When conducting the survey, the surveyor noted a number of slightly raised linear earthworks (these can be seen in Figure 1), in areas 2 and 3. Although not certain, the most likely explanation for these is that they are the remains of Medieval ridge and furrow ploughing. Despite being visible on the ground, they were not detected by the magnetic survey, which indicates that the soils in the immediate area are not particularly conducive to this form of survey.

8 Conclusions

- 8.1.1 In conclusion, it can be stated that the geophysical survey was successful in identifying 9 anomalies, 7 of which are of a clearly modern or recent origin. The remaining 2 anomalies may also be relatively recent, though this cannot be ascertained from the geophysical evidence alone
- 8.1.2 Possible ridge and furrow ploughing was not detected by the magnetic survey, despite being visible on the ground in two of the five areas surveyed.

9 Bibliography

David, A. et al, 2008. Geophysical Survey in Archaeological Field Evaluation (2nd edition). English Heritage Publishing.

Schmidt, A. 2013. Geophysical Data in Archaeology: A Guide to Good Practice (2nd edition).

10 Appendix One - A3 geophysical survey plot



Figure 7 Geophysical survey plotted as a greyscale image