Millhaugh Geophysical Survey

Data Report

October 2016

Tessa Poller & Gert Petersen

Table of Contents

List of Illustrations

Summary

As part of the Strathearn Environs and Royal Forteviot (SERF) project a geophysical survey, using gradiometric techniques, was conducted at Millhaugh Farm (MH14.4), immediately N of an area where cropmark enclosures have been recorded. The survey was undertaken between 15th and 16th of August 2016. The main aim of the survey was to help further define the archaeological features associated with the cropmarks. Two areas of archaeological potential were identified, but specific features were not discernible.

1.0 Introduction

A geophysical survey was carried out at Millhaugh (MH14.4) by Gert Petersen on the 15th and 16th of August, 2016 as part of the SERF research project. Permission for this survey was granted by the landowner, farmer and Historic Environment Scotland. This work was undertaken as part of Phase 2 of the SERF Project (see Driscoll et. al. 2010 for an overview of phase 1). Based on the response from the survey at MH14.1 only a gradimetric survey was carried out (Wright 2015).

1.1 Aims

The aims of the geophysical survey were to use geophysical techniques:

- To attempt to locate the northern boundaries of an interrupted ditched enclosure detected in an adjacent field,
- to detect and characterise any other potential archaeological features,
- to further test the response of gradiometry within this landscape,
- to compare the geophysical results with the aerial photographic data in order to build a more complete picture of the character of the archaeology.

1.2 Archaeological Description & Background

In the field MH14.4 of Millhaugh aerial photography by the RCAHMS were first recorded in 1977 & 1978, at NGR 01128 14149 (NO 01SW28) and NGR NO 01195 14087 (NO 01SW43). The cropmarks are described in the National Monuments Record as a settlement comprising of an interrupted ditched enclosure, putative pit enclosure and pit alignment. The cropmarks were scheduled and taken into care in 1993 (SM5776). A recent transcription of the archaeological features by Cathy MacIver can be seen in Figure 1.

Figure 1: Transcription of the archaeological cropmark features overlain on a rectified aerial photograph, by Cathy MacIver, photo © HES

1.2.1 SERF Excavations

Excavations were conducted under the direction of Dr Dene Wright between the 18th of June and the 10th of July at Millhaugh (MH14.4) with the site code of CB16. These excavations were part of the second phase of work of the SERF programme. The aims of the excavation were to characterise some of the cropmarks identified on the aerial photographs, including a part of the interrupted enclosure and the pits, to identify any other archaeological features and to situate this evidence in a wider understanding of the landscape.

The evidence from the excavations at CB16 suggested there was settlement and activity at this location at different times in prehistory; from the Early Neolithic, Late Neolithic, Bronze Age and Iron Age (Wright 2016). The large interrupted enclosure may date from the later prehistoric period, perhaps enclosing at least one roundhouse. Outside the enclosure several pits contained a significant amount of Neolithic pottery mixed with hearth debris, suggesting earlier prehistoric occupation. The truncated remains of a small stone box cist may also indicate Bronze Age activity. Numerous other features, so far undated, were also discovered. These included sub-circular palisade enclosures, post alignment, post-defined palisades, slot defined palisades, fire pits, midden pits and many other postholes and pits. The preliminary phasing of the site is based on the typology of material culture recovered. The prehistoric pottery assemblage amounts to more than 650 sherds from across those archaeological, although the majority are Early Neolithic.

1.3 Geology, Topography & Vegetation

The underlying solid geology of this field is Sheriffmuir Sandstone overlain by glacial till deposits (Figure 2). The geological survey also records the presence of alluvium and river terrace deposits are also noted in the north-east of MH14.4 (Digimap® ED*i*NA Geology Roam). From the aerial photographs banding in the drift geology can be identified across the field, visible below the archaeological features as a change in light and dark crop response (see Figure 1).

The geophysical survey was undertaken after the field had been harvested of barley in August. The survey area stretched along a low ridge running roughly SW to NE, immediately N of the excavation trench.

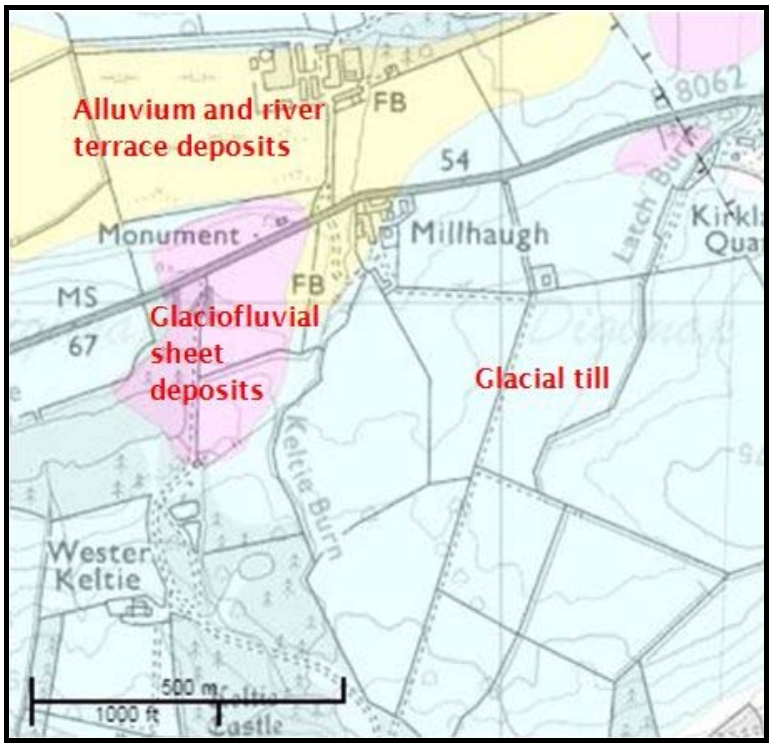

Figure 2: Drift geology at Millhaugh (Digimap® EDiNA Geology Roam online resource; © NERC/Crown copyright database right).

2.0 Methodology

2.1 Survey Methodology

The gradiometry survey was conducted using a dual sensor Bartington Grad 601. Readings were recorded within 20m by 20m grids and taken every 0. 5m (traverse) by 0. 25m (sample). The total area surveyed by gradiometry was 6000m^2 (*Figure 3*).

The location of the survey grids were recorded using a Leica differential Global Positioning System (dGPS) and then georeferenced in ArcGIS.

2.2 Processing Methodology

All the gradiometry survey data was downloaded using Grad 601 software and then imported into GeoPlot v3 for processing. Results were produced as grayscale images.

In order to reduce the effect of the very high magnetic readings the data was processed by setting the absolute readings to a minimum of -10nT and a maximum of +10nT. Furthermore, to compensate for the slight discrepancy between the 'balancing' of the two sensors of the Bartington Grad 601, which produced a 'striped' appearance, a 'zero mean' process was applied to all the grids. Also there was a staggered effect between the readings of individual lines due to the large number of measurements taken every metre and the difficulty of absolute consistency in the surveyor's walking pace. Therefore a 'destagger' was applied to the data.

3.0 Results

3.1 Gradiometry Survey

(*Figures 4 & 5)*

The results of the gradiometry survey largely reflect the topography and banding of the underlying geology. The edge of the contour of the ridge, or a change in the geology, can be identified as a narrow discontinuous line of negative and positive magnetism, running SW to NE. To the S of this line, particularly towards the E, the strongest magnetic signatures were detected. Here there the positive anomalies have associated negative readings and therefore are highly magnetic. Overall there are several amorphous clusters of these paired readings; however, one of them forms a rough right angle and may represent an archaeological feature such as a structure. In any case, this evidence suggests an area of activity that may contain heated or burnt material or a spread of iron deposits.

Also running parallel to the ridge towards the southern end of the surveyed area is another notable change in magnetism. Running SW-NE this band of magnetism can be characterised as 'noisy', graphically represented by a scatter of small dots of positive and negative magnetism. Within this 'noisy' magnetic band it is difficult to clearly pick out any possible archaeological features. Nonetheless, there does appear to be a greater concentration of small positive magnetic anomalies towards the SW corner, some of which follow a rough alignment from NW to SE. This may be a collection of possible pit-defined or post-hole features.

The subtle line, running from SW to NE in the SE corner of the survey area is the edge of the spoil heap from the excavations in June and July 2016.

4.0 Discussion & Conclusions

The results of the gradiometry survey have highlighted two particular areas of potential archaeological activity, but no specific archaeological features were clearly discernible.

In the S end of the survey area the 'noisy' magnetic responses may suggest a density of activity of archaeological interest, but which has been disturbed by the ploughing. The rough alignment of positive features (perhaps pits or post-holes) may be a continuation of a line of pit features identified both in the aerial photographs and during excavation (see Figure 5).

The second area of potential archaeological significance is noted in the centre of the survey area towards the E. This area may be a large concentration of activity, perhaps reflecting burning of structures or metalworking.

Recommendations for future geophysical work in this area would be to expand the survey area, covering the excavated area as well as the ground to the W.

5.0 Acknowledgements

The author would first like to thank Calum Rollo (landowner) and John Neil (farmer) for kindly giving us permission to conduct this survey. Thanks to Dene Wright for organising students and being on site. The survey was undertaken by Gert Petersen and would not have been a success without out the help of students Katie McDermott, Scott Morton, Jennifer Rees, Fionnuala Reilly and Clare Shelley. Thanks to Lorraine McEwan for surveying the location of the grids. SERF is sponsored by Historic Enivronment Scotland.

6.0 References

BGS (British Geological Survey) 1:50,000 solid geology maps: sc048w_perth_v6_bedrock_geology, accessed digitally through EDINA Digimap October 2016.

BGS (British Geological Survey) 1:50,000 superficial geology maps: sc048w_perth_v6_superficial_geology, accessed digitally through EDINA Digimap October 2016

Driscoll, S T, Brophy, K & Noble, G 2010 The Strathearn Environs and Royal Forteviot Project (SERF), *Antiquity 84 Project Gallery*, www.antiquity.ac.uk/projgall/driscoll323/

Wright, A. D. 2015. Millhaugh 2015: Fieldwalking, test pitting and geophysical survey at MH14.1. Unpublished SERF Report: University of Glasgow.

Wright, A. D. 2016. Millhaugh 2016: Data Structure Report: CB16. Unpublished SERF Report: University of Glasgow.

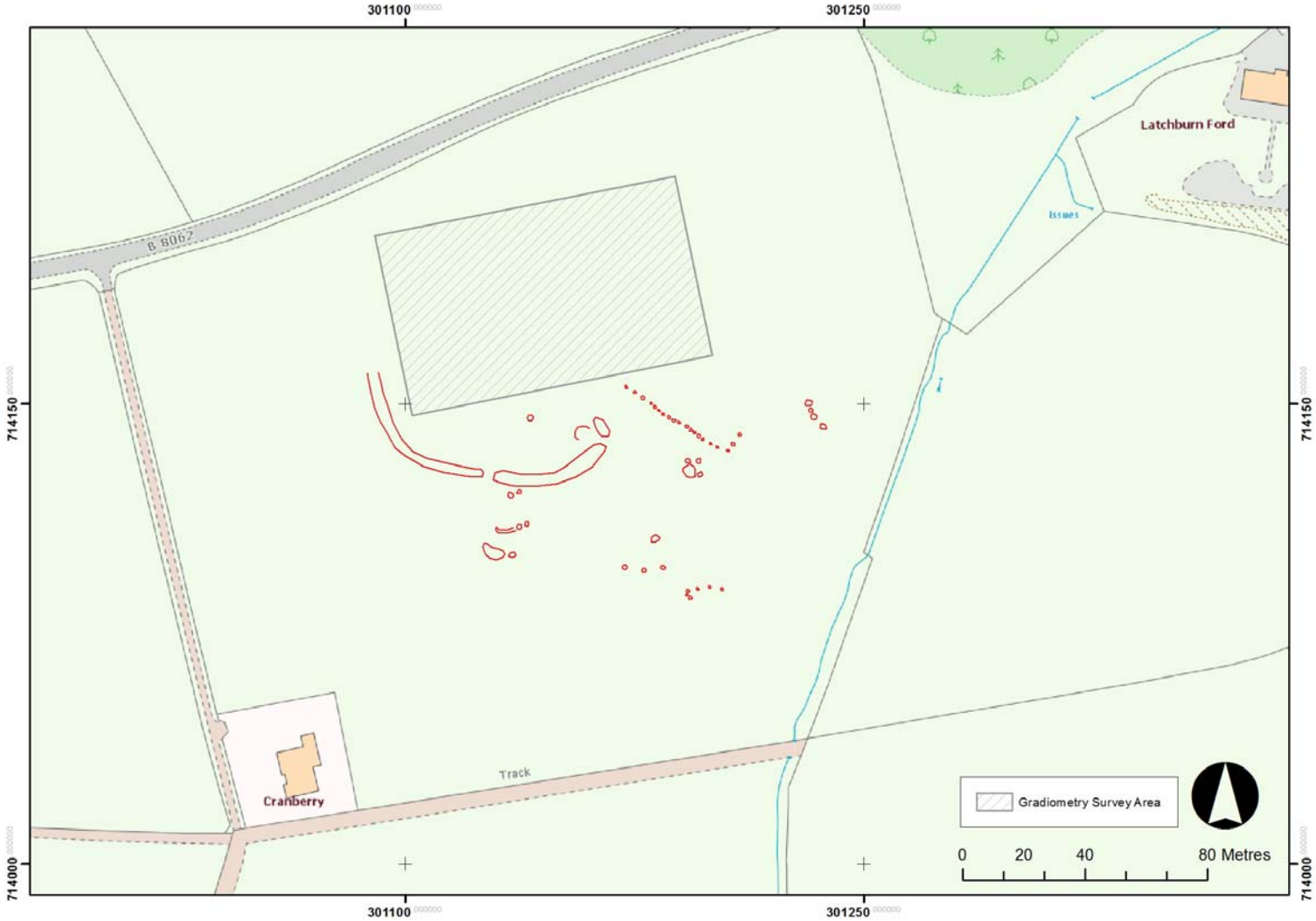

*Figure 3: Location of the geophysical survey area overlain on Ordnance Survey mapping data (*Digimap® EDiNA*) with the transcription of the aerial photograph (Cathy MacIver).*

#

#

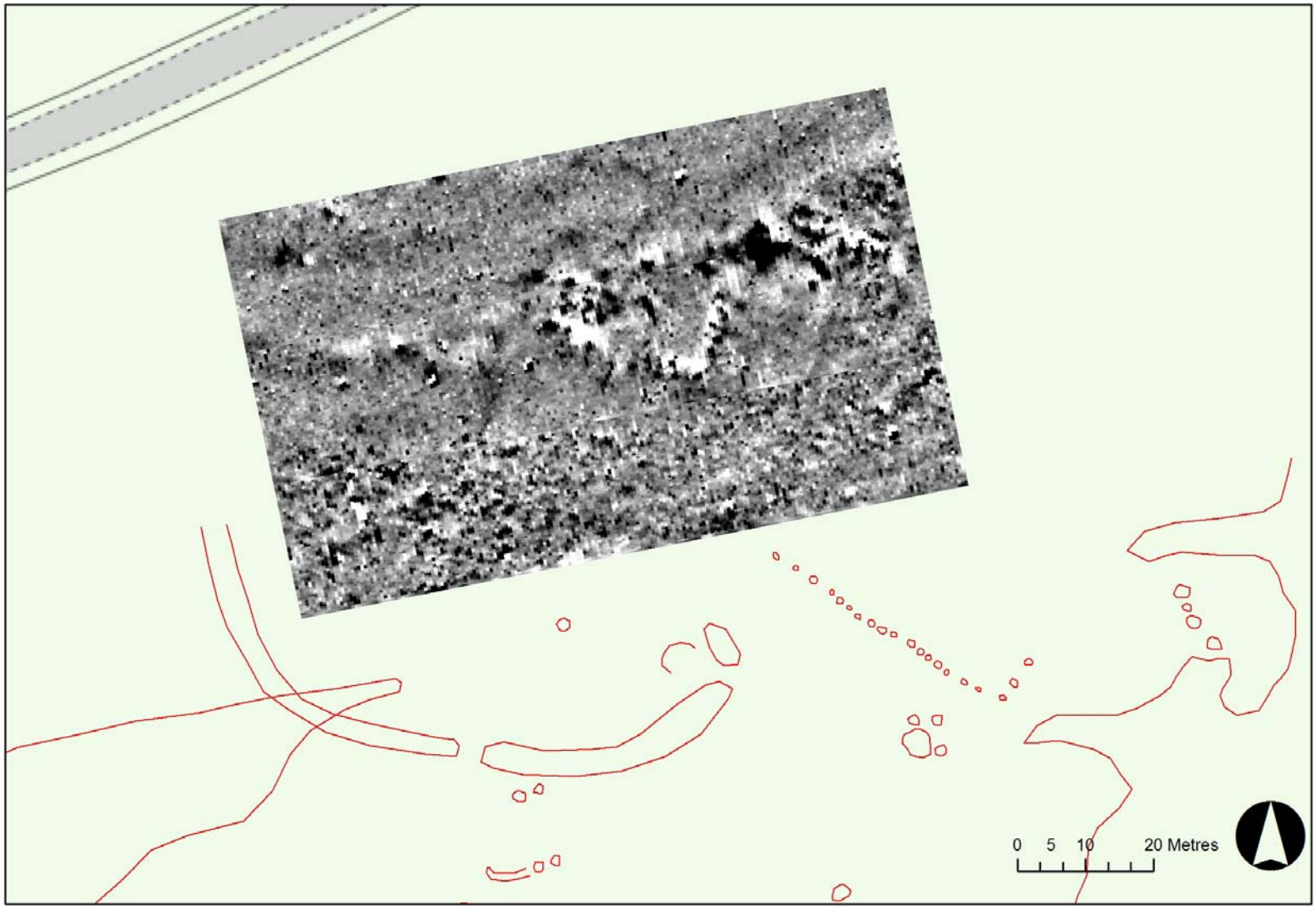

Figure 4: Processed gradiometry data with transcription of archaeological features from aerial photography in red (Cathy MacIver)

#

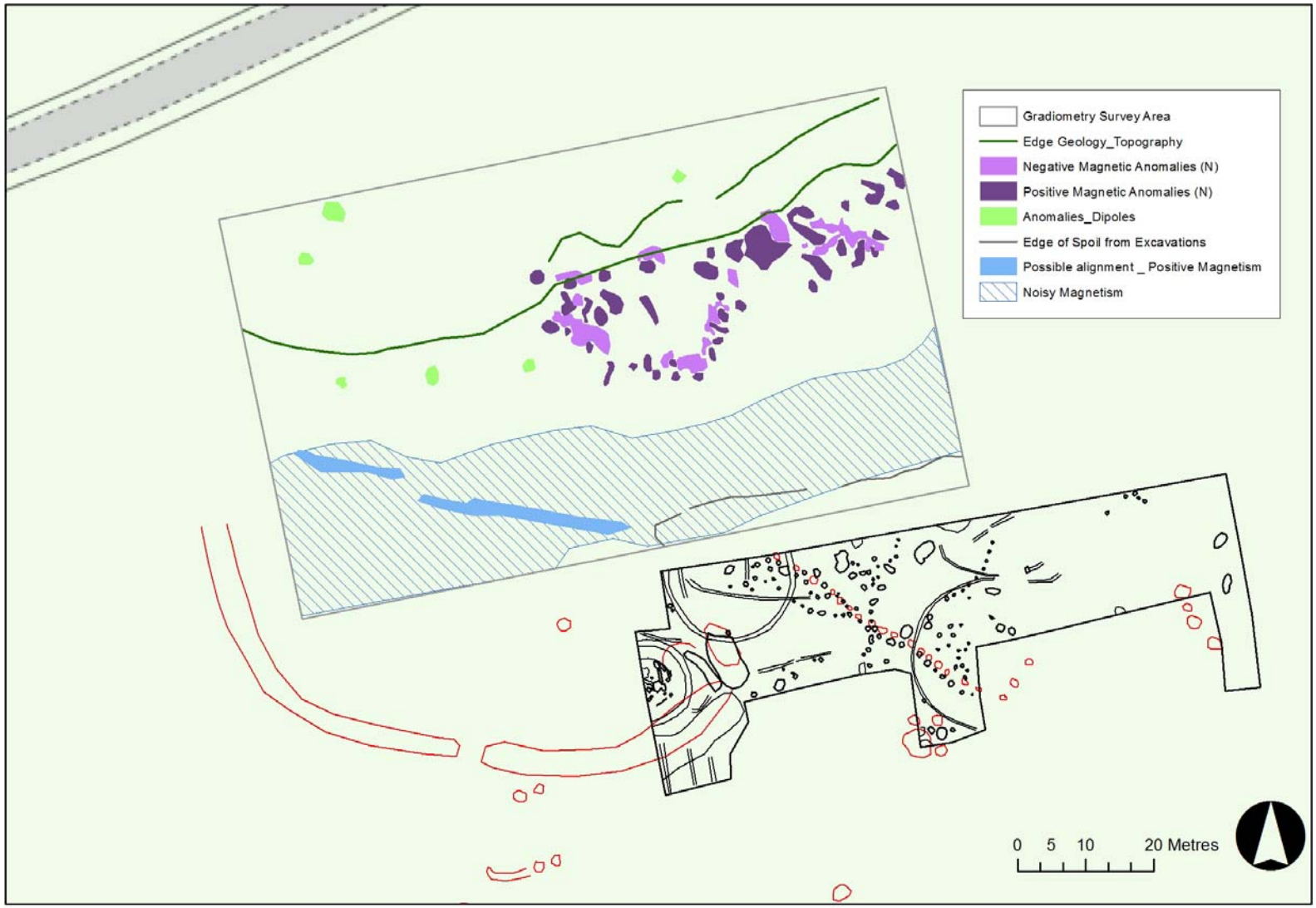

Figure 5: Interpretation of processed gradiometry data with transcription of archaeological features from aerial photography in red and outline of the excavation trench and archaeological features in black.