ARCHAEOLOGICAL EVALUATION REPORT:

GEOPHYSICAL SURVEY BY MAGNETOMETRY ON LAND OFF HIGH STREET, HONEYBOURNE, WORCESTERSHIRE

Planning Reference: W/13/0719
NGR: SP 1157 4401
AAL Site Code: HOHI 13
Oasis Number: allenarc1-156288

Report prepared for Archaeology Wales

By
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Cover image: View of site taken from southwestern corner looking east

Executive Summary

- A geophysical survey by magnetometer was undertaken by Allen Archaeology Limited on behalf of Archaeology Wales on land off High Street, Honeybourne, Worcestershire to support a planning application for a residential development.

- The survey has revealed some anomalies likely to be of archaeological interest, representing a possible rectilinear enclosure and other possible linear features, as well as several discrete pit-like anomalies. However there is a large amount of magnetic noise caused by modern activity, including an electric cable, farm machinery and a modern service that may have obscured more subtle archaeological remains.

- There are a number of dipolar responses that are likely to be ferrous or highly fired material within the topsoil, as well as one representing a modern inspection chamber.

1.0 Introduction

1.1 A geophysical survey using magnetometry was undertaken by Allen Archaeology Limited for Archaeology Wales on land off High Street, Honeybourne, Worcestershire, to support a planning application for a residential development.

1.2 The site works and reporting conform to current national guidelines, as set out in '*Geophysical Survey in Archaeological Field Evaluation*' (English Heritage 2008), '*The Use of Geophysical Techniques in Archaeological Evaluations*' (IFA Paper 6), the Institute for Archaeologists '*Standard and guidance for archaeological geophysical survey*' (IfA 2010) and local guidelines as set out in '*Standards and Guidelines for Archaeological Projects in Worcestershire'* (WCC 2010).

1.3 The site is archaeologically sensitive, lying in an area of archaeological interest and potential.

2.0 Site Location and Description

2.1 The village of Honeybourne is situated approximately 8km east of Evesham and 13km southwest of Stratford-upon-Avon in Worcestershire. The site comprises an L-shaped block of land of c.0.8 hectares, located just to the west of High Street. The site is centred on NGR SP 1157 4401 and lies at approximately 46m above Ordnance Datum.

2.2 The local geology comprises a bedrock geology of Blue Lias Formation and Charmouth Mudstone Formation (undifferentiated), with a superficial geology of Head comprising clay, silt, sand and gravel (http://mapapps.bgs.ac.uk/geologyofbritain/home.html). The ground cover is currently a mix of ploughed land, crop cover and overgrown vegetation, with assorted farm machinery and other detritus in the southern part of the field.

3.0 Planning Background

3.1 An outline planning application has been submitted to Wychavon District Council, (Reference W/13/0719), for a residential development comprising up to 15 dwelling houses, access road, area of open space and drainage improvements. The purpose of the current works is to provide detailed information that will aid the determination of the nature and extent of the potential archaeological resource within the proposed development area.

3.2 The approach adopted is consistent with the guidelines that are set out in the National Planning Policy Framework (Department for Communities and Local Government 2012).

4.0 Archaeological and Historical Background

4.1 The site lies adjacent to the historic Gate Inn Brook crossing. Prehistoric and Romano British remains have previously been investigated adjacent to the brook (Glyde 2013).

5.0 Methodology

5.0.1 The geophysical survey consisted of a detailed gradiometer survey of all of the proposed development area that was available for survey, totalling approximately 0.8 hectares. An initial site visit on Monday 29th July 2013 identified crop cover that prevented survey of the development area. This was subsequently cut by the landowner, and the survey team returned to undertake the survey on Wednesday 31st July. Accumulations of old farm machinery at the south end of the site and overgrown vegetation around the site boundaries (particularly in the northern part of the site area) precluded survey of the entire site however.

5.0.2 The fieldwork was carried out by a team of two experienced geophysicists from AAL over a period of one working day. The survey area was located using a Leica GS08 RTK NetRover GPS receiving RTK corrections. This accurately 3D plotted the survey area and allowed it to be tied in to Ordnance Survey mapping.

5.0.3 The survey was undertaken using a Bartington Grad601-2 Dual Fluxgate Gradiometer with an onboard automatic DL601 data logger. This instrument is a highly stable magnetometer which utilises two vertically aligned fluxgates, one positioned 1m above the other. This arrangement is then duplicated and separated by a 1m cross bar. The 1m vertical spacing of the fluxgates provides for deeper anomaly detection capabilities than 0.5m spaced fluxgates. The dual arrangement allows for rapid assessment of the archaeological potential of the site. Data storage from the two fluxgate pairs is automatically combined into one file and stored using the onboard data logger.

5.0.4 Data collection was undertaken in a zigzag traverse pattern, using a sample interval of 0.25m and a traverse interval of 1m.

5.1 Summary of Survey Parameters

5.1.1 Fluxgate Magnetometer

Instrument:	Bartington Grad601-2 Dual Fluxgate Gradiometer
Sample interval:	0.25m
Traverse interval:	1.00m
Traverse separation:	1.00m
Traverse method:	Zigzag
Resolution:	0.1 nT
Processing software:	Terrasurveyor 3.0.21
Surface conditions:	Ploughed land, crop cover and overgrown vegetation
Area surveyed:	0.8 ha
Date surveyed:	Wednesday 31st July 2013
Surveyor:	Robert Evershed
Survey assistant:	Aaron Chapmen
Data interpretation:	Robert Evershed

5.2 Data Collection and Processing

5.2.1 The grids were marked out using tapes from the southwest corner of the site. The collection of magnetic data using a north – south traverse pattern is preferable for a magnetic survey, as enhancements to the magnetic field caused by buried features is mapped increasingly stronger the closer the traverse direction can get to a magnetic north – south direction (Scollar et al. 1990). On this occasion magnetic data was collected on a northeast to southwest alignment due to the orientation of the survey grids. Data was collected by making successive parallel traverses across each grid in a zigzag pattern.

5.2.2 The data collected from the survey has been analysed using the current version of Terrasurveyor 3.0.21. The resulting data set plots are presented with positive nT/m values and high resistance as black and negative nT/m values and low resistance as white.

The data sets have been subjected to processing using the following filters:

- De-stripe (also known as Zero Mean Traverse or ZMT)
- Clipping

5.2.3 The de-stripe process is used to equalise underlying differences between grids or traverses. Differences are most often caused by directional effects inherent to magnetic surveying instruments, instrument drift, instrument orientation (for example off-axis surveying or heading errors) and delays between surveying adjacent grids. The de-stripe process is used with care however as it can sometimes have an adverse effect on linear features that run parallel to the orientation of the process.

5.2.4 The clipping process is used to remove extreme data point values which can mask fine detail in the data set. Excluding these values allows the details to show through.

5.2.5 Plots of the data are presented in processed linear greyscale (smoothed) with any corrections to the measured values or filtering processes noted, and as separate simplified graphical interpretations of the main anomalies detected.

6.0 **Magnetometer Survey Results** (Figures 2 – 5)

6.1 For the purposes of interpreting the anomalies, the survey data has been processed to the values of -3 to 3 nT/m (Figure 3). This enhances faint anomalies that may otherwise not be noted in the data; however it also includes all ferrous and other magnetically enhanced material within the study area, making the resulting greyscale image particularly 'noisy'. The survey results revealed a number of anomalies across the data set, and these are discussed in turn and noted as numbers in square brackets.

6.2 Immediately noticeable is the large area of magnetic noise [1] running along the southeastern and southwestern borders of the site. The noise along the south-western border is due to modern detritus including derelict farm machinery affecting the surveying. Along the south-western border some of the noise will be due to detritus associated with the construction of the houses that back onto the site, however the major cause of magnetic interference in this area is an electricity cable running between telegraph poles along the length of that boundary.

6.3 Approximately half way along the south-eastern border the survey identified three sides of a potential rectilinear anomaly [2]. The feature produced magnetic readings of 2 – 3nT/m and may represent part of an enclosure feature, the remainder extending below the houses to the east.

6.4 From the northwestern corner of [2] running broadly northeast is a large, irregular positive linear anomaly [3], which produced a magnetic reading of 2 – 7nT/m. This could relate to [2], possibly being part of a larger enclosure ditch or may represent a track, path or hollow way.

6.5 There is another possible linear anomaly running roughly west-northwest to east-southeast [4] in the northern part of the site. This anomaly produced magnetic readings of 2 – 4nT/m and may join together with [2] and [3] to form a single episode of linear landscape division.

6.6 Anomalies [5] and [6] are amorphous negative anomalies, producing readings of -20 to -12nT/m. These may represent pits, ponds or soil-filled hollows, with the fills being magnetically weaker than the surrounding soil.

6.7 [7] and [8] are small amorphous positive anomalies, with [7] producing readings of 2 – 4nT/m and [8] producing readings of 10 – 15nT/m. These may also represent pits, ponds or soil-filled hollows, on this occasion with the fills being magnetically stronger than the surrounding soil.

6.8 Running across the site on a roughly northeast to southwest alignment are what appear to be a series of linear anomalies [9]. These anomalies follow the existing plough marks in the field and are almost certainly modern cultivation trends.

6.9 Anomaly [10] is a very large dipolar spike, with a magnetic reading of -1000 to +1000nT/m. This represents an inspection chamber noted during the survey.

6.10 There were also a large number of smaller dipolar responses scattered across the site, which are likely to be ferrous or highly fired material within the ploughsoil.

7.0 Discussion and Conclusions

7.1 The site conditions proved reasonably receptive to geophysical surveying, although areas around the margins of the field could not be surveyed due to vegetation and scattered farm detritus. The survey has however revealed a number of features representing possible archaeological activity. Anomaly [2] represented three sides of a possible rectilinear enclosure. A larger anomaly [3] to the north of this, and a faint anomaly [4] may also form part of a related landscape division system, although the features may also be unrelated. It should be noted that anomaly [3] also closely followed the line of the modern cultivation trend and may merely represent slightly more magnetic material being dragged across the field by the plough.

7.2 A number of isolated positive and negative anomalies around the margins of the field may represent infilled pits or ponds, but are of uncertain date.

7.3 A large dipolar response represented a modern inspection chamber whilst smaller dipolar responses are likely to be ferrous or highly fired material within the ploughsoil.

8.0 Effectiveness of Methodology

8.1 The non-intrusive evaluation methodology employed was appropriate to the scale and nature of the site to be surveyed. Magnetometry surveying was the prospection technique best suited to the identification of archaeological remains on the site. Other techniques would have required justification and may have proved too time consuming or cost-prohibitive.

9.0 Acknowledgements

9.1 Allen Archaeology would like to thank Archaeology Wales for this commission.

10.0 References

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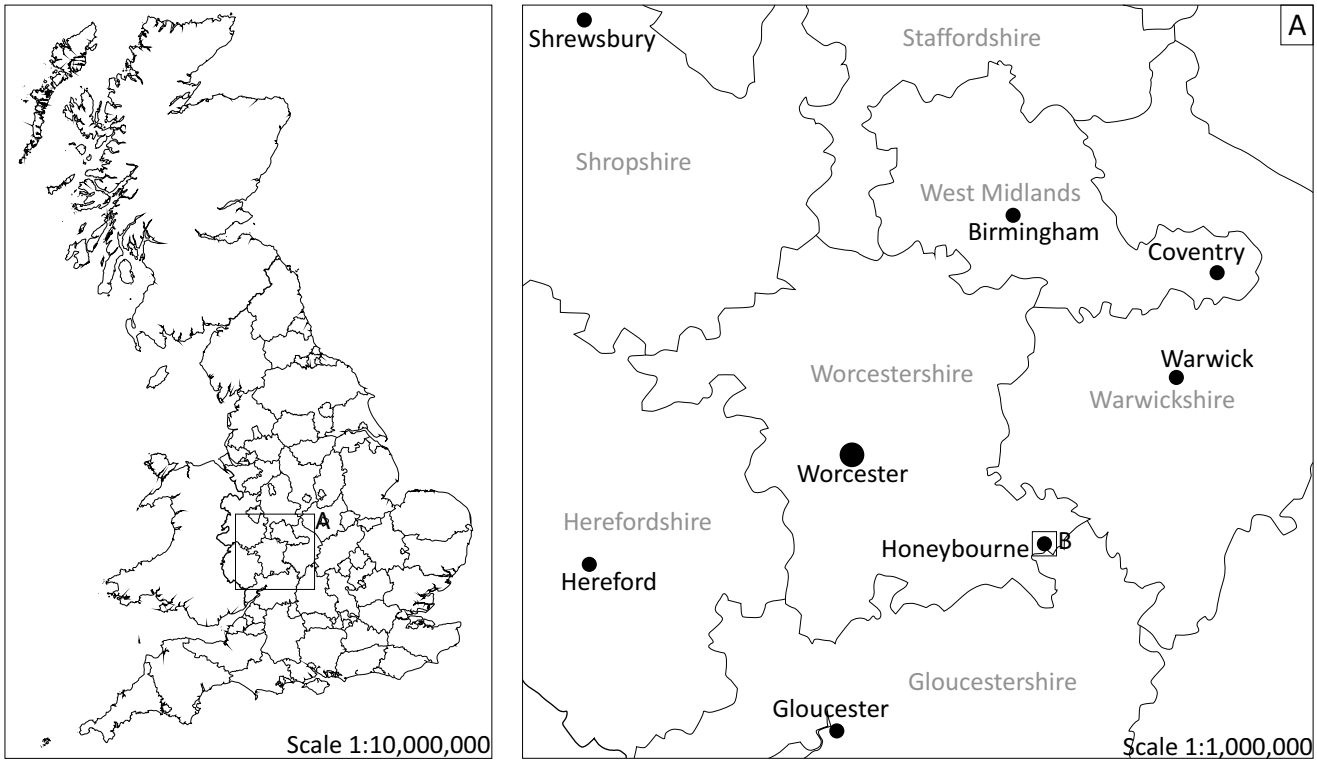

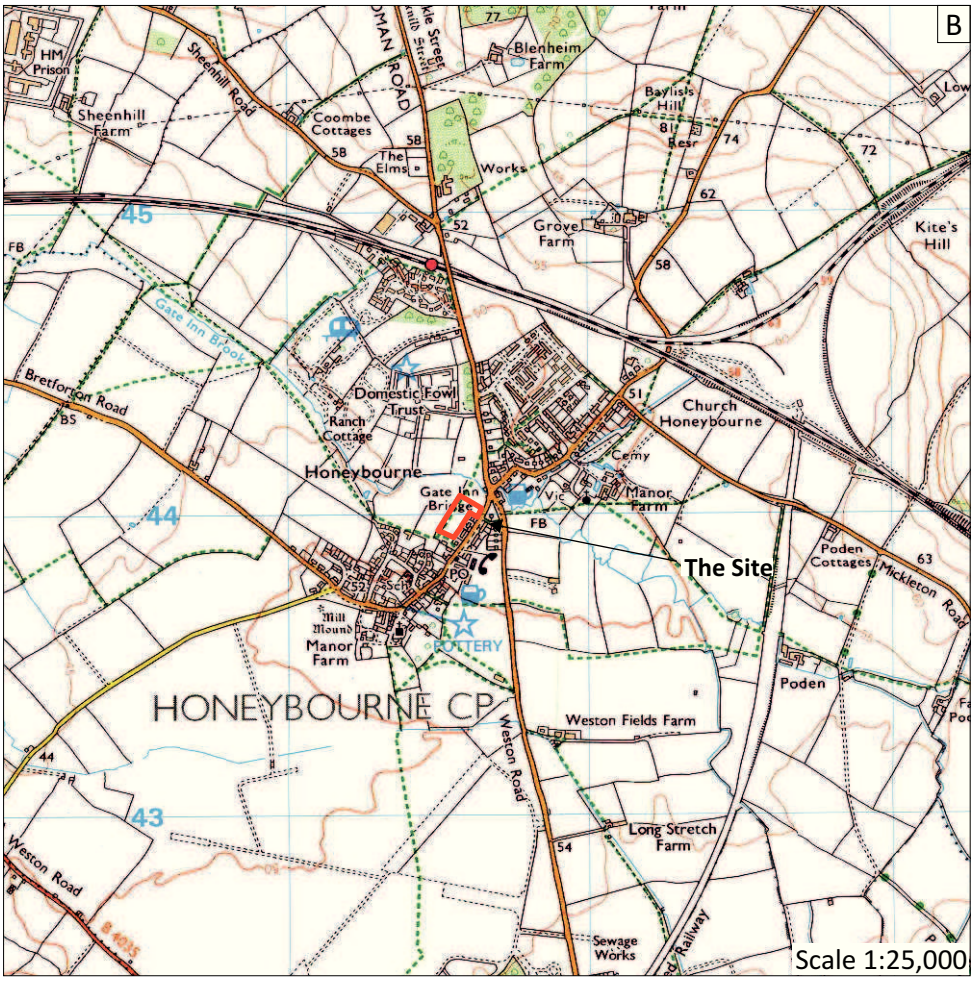

Figure 1: Site location outlined in red

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Site Code	HOHI 13
Scales	1:10,000,000 1:1,000,000 1:25,000 @ A4
Drawn by	R Eversheed
Date	01/08/13

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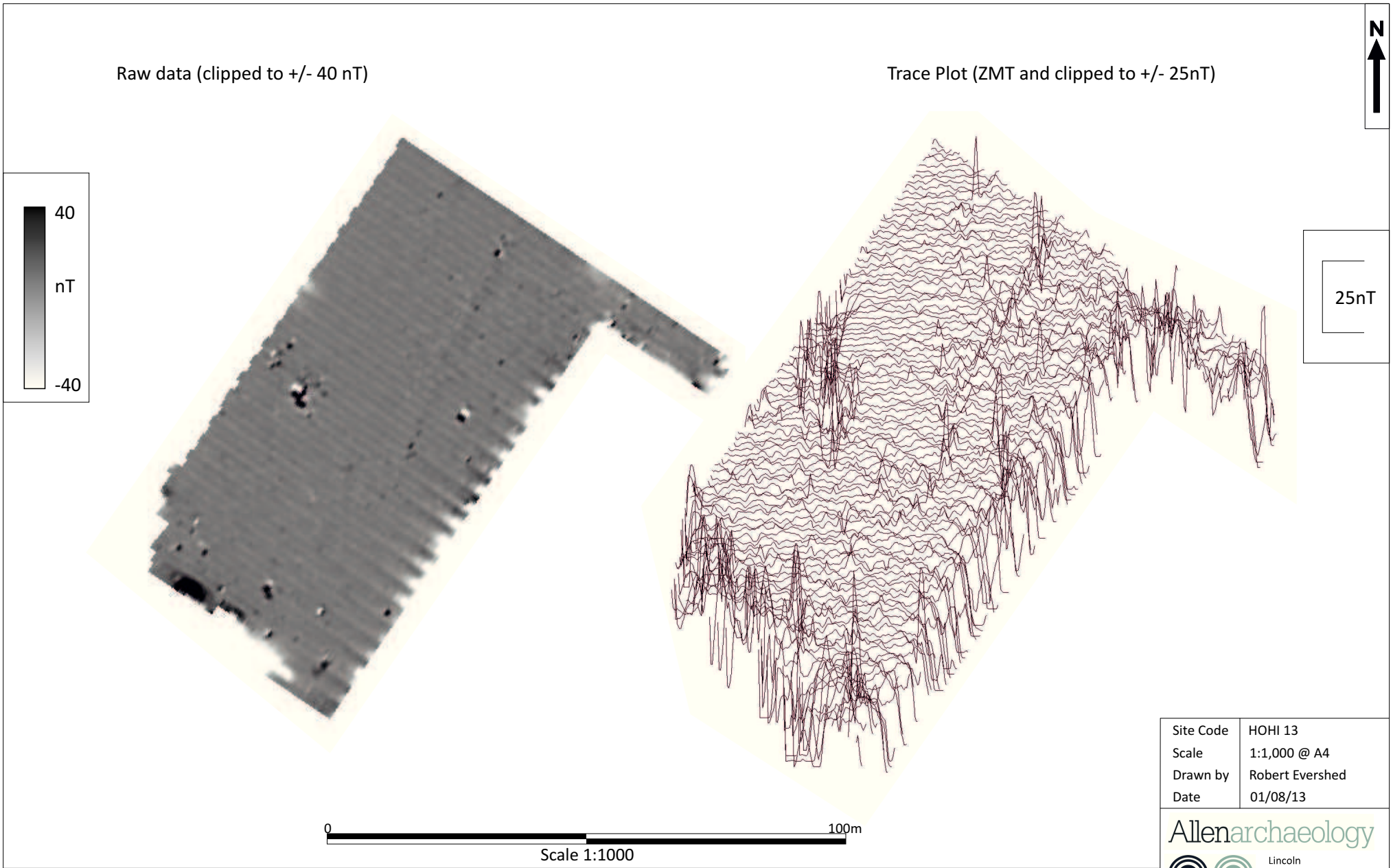

Site Code	HOHI 13
Scale	1:1,000 @ A4
Drawn by	Robert Evershed
Date	01/08/13

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Figure 2: Greyscale raw data and processed trace plot

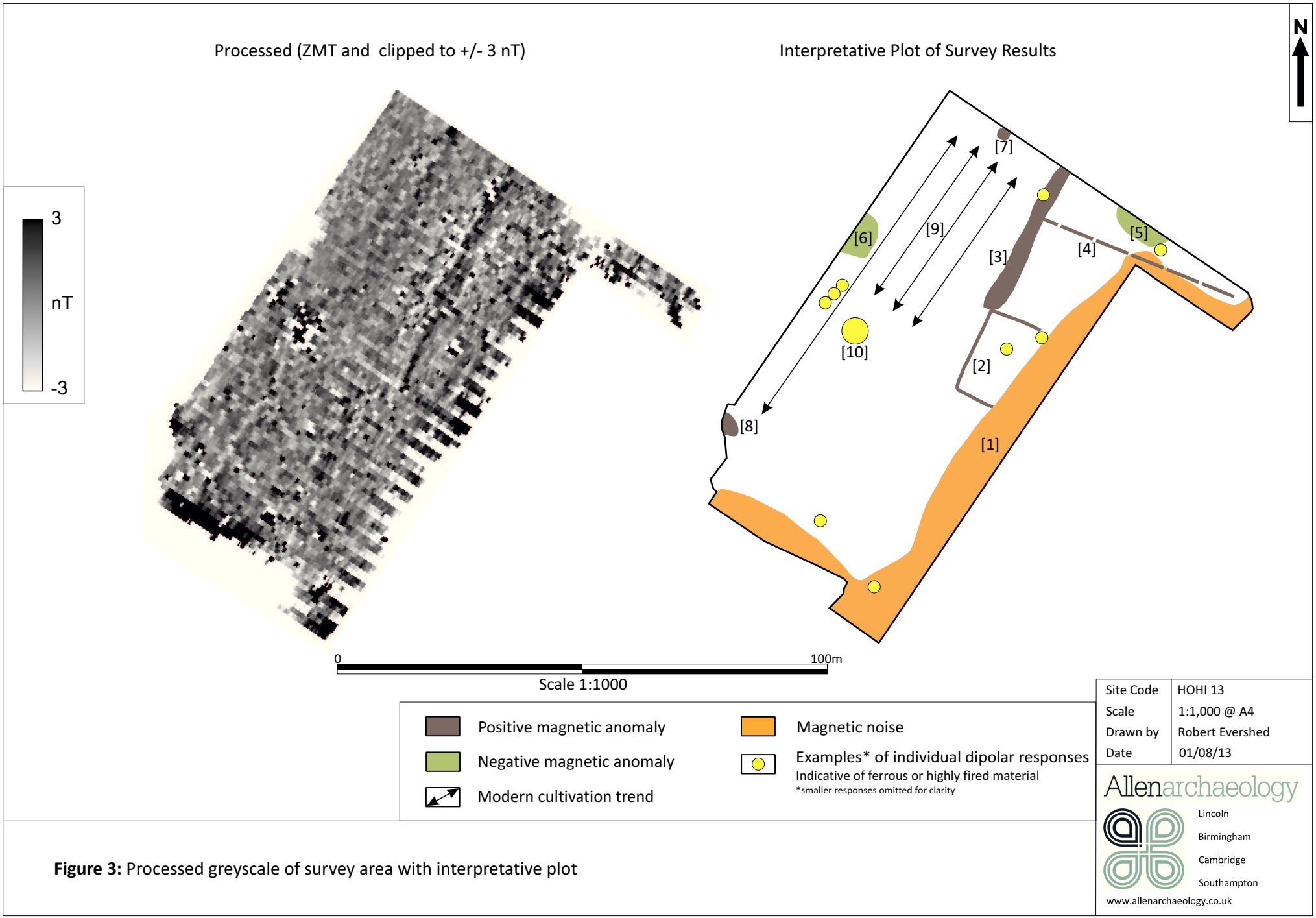

Figure 3: Processed greyscale of survey area with interpretative plot

Figure 4: Greyscale image in real space

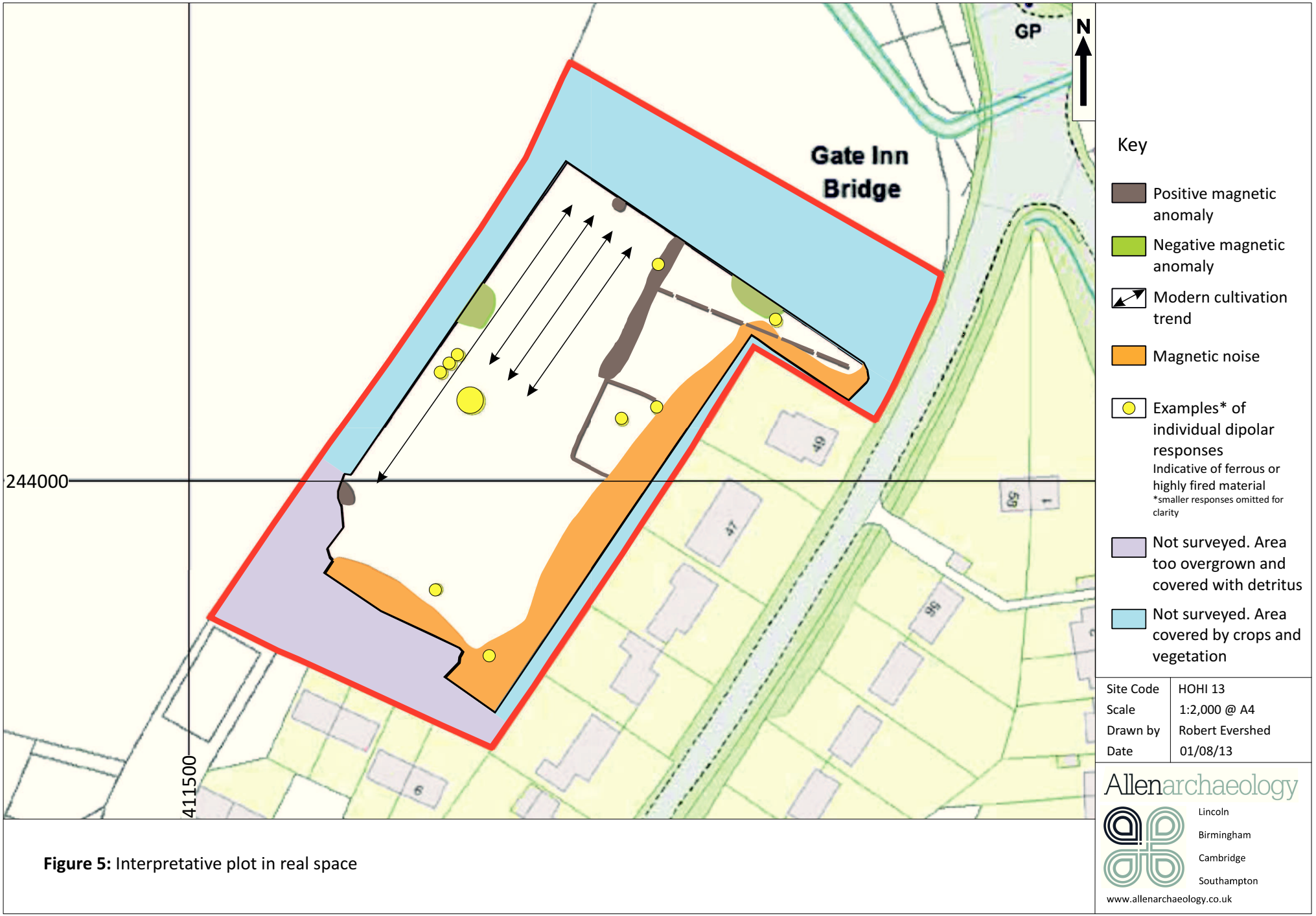

Figure 5: Interpretative plot in real space

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