**ARCHAEOLOGICAL EVALUATION REPORT:**

# GEOPHYSICAL SURVEY BY MAGNETOMETRY ON LAND AT COLLEGE FARM, PINCHGATE LANE, BLETCHINGDON, OXFORDSHIRE

Planning Reference: 16/00116/PREAPP
NGR: SP 5287 1716
AAL Site Code: BLCF 16
OASIS Reference Number: allenarc1-257728


Report prepared for Ian Pick Associates on behalf of Mr Adrian Wilcox

By
Allen Archaeology Limited
Report Number AAL 2016107

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Allenarchaeology

REGISTERED ORGANISATION CIfA

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*Cover image: 1st Edition OS map with site boundary in red*

## Executive Summary


- Allen Archaeology Limited was commissioned by Ian Pick Associates on behalf of Mr Adrian Wilcox, to undertake a geophysical survey using magnetometry on land at College Farm, Pinchgate Lane, Bletchingdon, Oxfordshire, in support of a planning application for the construction of poultry sheds.

- The site lies in an area of some archaeological interest, with possible prehistoric or Roman cropmarks in the vicinity.

- The survey has revealed a large number of positive linear and curvilinear features. The features have all produced very similar magnetic readings across the field and are likely the result of periglacial striation. Some linear anomalies are noted as potentially reflecting human activity however.

- The survey has also revealed linear, dipolar features representing modern field drainage, and magnetic noise, which is likely to be the result of a build-up of modern waste or deliberate deposition.

## 1.0 Introduction

1.1 Allen Archaeology Limited (AAL) was commissioned by Ian Pick Associates on behalf of Mr Adrian Wilcox, to undertake a geophysical survey using magnetometry on land at College Farm, Pinchgate Lane, Bletchingdon, Oxfordshire, in support of a planning application from the construction of poultry sheds.

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'* (Gaffney *et al*. 2002), the Chartered Institute for Archaeologists '*Standard and guidance for archaeological geophysical survey'* (CIfA 2014) and a specification prepared by this company (AAL 2016).

## 2.0 Site Location and Description

2.1 Bletchingdon is located in the administrative district of Cherwell District Council, approximately 11km north of central Oxford. The site of the proposed poultry sheds comprises a c.5ha sub-rectangular block of agricultural land, approximately 2.6km to the east-southeast of the village, with a c.500m long access road extending east from the southeast end of Pinchgate Lane and crossing Gallos Brook. The site centres on NGR SP 5287 1716.

2.2 The bedrock geology comprises Peterborough Member mudstone, with no overlying superficial deposits recorded across much of the site, except where the access route crosses Gallos Brook, where superficial deposits of alluvium are recorded (http://mapapps.bgs.ac.uk/geologyofbritain/home.html).

## 3.0 Planning Background

3.1 A planning application is to be submitted for the *'erection of 6no poultry sheds and associated works'*. Prior to submission of the planning application, during pre-application discussions, the Oxfordshire County Council Archaeologist has advised a programme of archaeological evaluation, in order to provide further information concerning the archaeological potential of the proposed development area, and to inform any mitigation that may be required. This document deals solely with a geophysical survey of the site, any further non-intrusive or intrusive investigations requested by the planning authority will be dealt with as a separate stage of works.

3.2 The approach adopted is consistent with the recommendations of the National Planning Policy Framework (NPPF), with the particular chapter of relevance being '*Chapter 12: Conserving and enhancing the historic environment*' (Department for Communities and Local Government 2012).

## 4.0 Archaeological and Historical Background

4.1 The site lies in an area of archaeological interest, particularly for the later prehistoric and Roman periods. An extensive cropmark complex is recorded centred c.1km to the south of the site, and comprises a series of enclosures and linear features and at least two ring ditches (OHER Reference 13901). Approximately 750m to the southeast of the site, recent archaeological works, comprising evaluation trenching and archaeological monitoring, investigated probably related components of this complex, and exposed pits, ditches, gullies and postholes, producing small quantities of pottery of Early Iron Age to Roman date (OHER Reference 28548). A single Roman roof tile from the site hints at possible high status structures.

4.2 Approximately 1km to the northeast, monitoring of excavations for a new sewer pipe exposed a stone surface sealing a number of intercutting features of Early Iron Age date. The surface was subsequently cut by a number of later features (OHER Reference 26133).

## 5.0 Methodology

5.1 The geophysical survey consisted of a detailed gradiometer survey of the proposed development area, totalling approximately 5.5 hectares. The survey was undertaken in a series of 30m grids across the site.

5.2 The fieldwork was carried out by a team of two experienced geophysicists on Thursday 7th July 2016. The survey area was located using a Leica GS08 RTK NetRover GPS. This accurately 3D plotted the area of investigation and tied it into the National Grid.

5.3 The survey was carried out using a Bartington Grad601-2 Dual Fluxgate Gradiometer with an on-board 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 on-board data logger.

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

### *Summary of Survey Parameters*

5.5 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: | 0.01nT |
| Processing Software: | 3.0.29.3 |
| Surface Conditions: | Short grass |
| Area Surveyed: | 5.5 hectares |
| Date Surveyed: | Thursday 7th July 2016 |
| Surveyors: | George Bunn and Gareth Ward Stevens |
| Data Interpretation: | Robert Evershed BSc (Hons) |

### *Data Collection and Processing*

5.6 The grids were marked out using the Leica GS08 Netrover. Magnetic data was collected close to a north-south alignment for the large field. This traverse pattern is preferable as the fluxgate gradiometer is set up and balanced with respect to the cardinal points. Since the data is plotted as north-south traverses there is considerable merit sampling the north-south response of a magnetic anomaly with as many data points as is possible, this is accomplished as the density collected along

the traverse line is greater than that between traverses (Aspinall *et al*. 2008). For the two track areas the data was collected roughly on an east to west aligned due to the orientation of the tracks.

5.7 The data collected from the survey has been analysed using Terrasurveyor 3.0.29.3. 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-striping
- Clipping
- De-staggering

5.8 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 as it can sometimes have an adverse effect on linear features that run parallel to the orientation of the process.

5.9 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.

5.10 The de-staggering process compensates for data correction errors caused by the operator commencing the recording of each traverse too soon or too late. It shifts each traverse either forward or backwards by a specified number of intervals.

5.11 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 Results

6.1 For the purposes of interpreting the anomalies, the survey data has been processed to the values of -2 to 2 nT/m (Figure 3). This enhances faint anomalies that may otherwise not be noted in the data, with a number of anomalies identified across the data set, and these are discussed in turn and noted as single digit numbers in square brackets.

6.2 There is a large area of magnetic noise roughly halfway along the surveyed track area [1], producing readings of -100 to 100 nT/m. This is most likely related to the small building located in the corner of the field next to the track, but may well also represent a build-up of modern waste or highly fired material. The area of magnetic noise along the southern border of the survey area, up to -100 to 100 nT/m, could relate to a combination of a build-up of waste along the field edge and ferrous or highly fired objects within the field boundary.

6.3 There is an area of magnetic noise [2] around the point where the track joins with the larger site area. This produced readings of -20 to 50 nT/m, with some areas as high as -100 to 100 nT/m. This likely represents a build-up of modern waste around the field entrance. It could also represent a dump of modern material.

6.4 At the east end of the large site area there are a number of linear dipolar features [3] running roughly north-northwest to south-southwest and one aligned roughly north to south. These have produced readings of -3 to 5 nT/m and represent part of a field drainage system.

6.5 At the west end of the survey area is a potential positive linear feature [4] (or two closely related positive linear features), 1 to 2 nT/m. This may represent a former ditch, path or track.

6.6 The positive linear/curvilinear feature [5], 1 nT/m, may also represent a former ditch, path or track.

6.7 Extending from roughly the centre of the southern boundary of the large site area there is a linear positive feature [6] aligned roughly north to south. This has produced a readings of 1 to 2 nT/m and may be the remnants of a former ditch of uncertain date.

6.8 Across the larger site area there are a large number of positive linear and curvilinear features. Some of these, [7], appear roughly aligned northwest to southeast and produce readings of 1 to 2 nT/m. These could represent anthropogenic features, but are more likely the result of periglacial striation – a natural geological phenomenon. Towards the east end of the field the positive linear and curvilinear anomalies [8], 1 to 2 nT/m, appear to form a more complicated arrangement of linear and enclosure type features, possibly suggesting an anthropogenic component, although a geological origin still seems likely.

6.9 Scattered randomly throughout the site are a large number of strong and weak dipolar responses, examples of which are highlighted as [9]. The characteristic dipolar response of pairs of positive and negative 'spikes' suggest near-surface ferrous metal or other highly fired material in the ploughsoil.

## 7.0 Discussion and Conclusions

7.1 The survey has revealed a large number of positive linear and curvilinear features within the larger site area. The features have all produced very similar magnetic readings across the field and their general appearance is suggestive of a natural geological origin, although there are some anomalies, particularly in the eastern part of the field, which may have an archaeological origin.

7.2 There is magnetic noise along at the junctions between fields and alongside the track to the larger survey area. This noise is likely the result of modern waste build-up and potential deliberate deposition, there is also a small building which may have contributed to the noise level.

7.3 At the eastern end of the survey area there are linear dipolar features that represent a modern field drainage system.

## 8.0 Effectiveness of Methodology

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

## 9.0 Acknowledgements

9.1 Allen Archaeology Limited would like to thank Ian Pick Associates and their client Mr Adrian Wilcox for this commission.

## 10.0 References


AAL, 2016, *Specification for a Fluxgate Magnetometer Geophysical Survey: land at College Farm, Pinchgate Lane, Bletchingdon, Oxfordshire*, Allen Archaeology Limited

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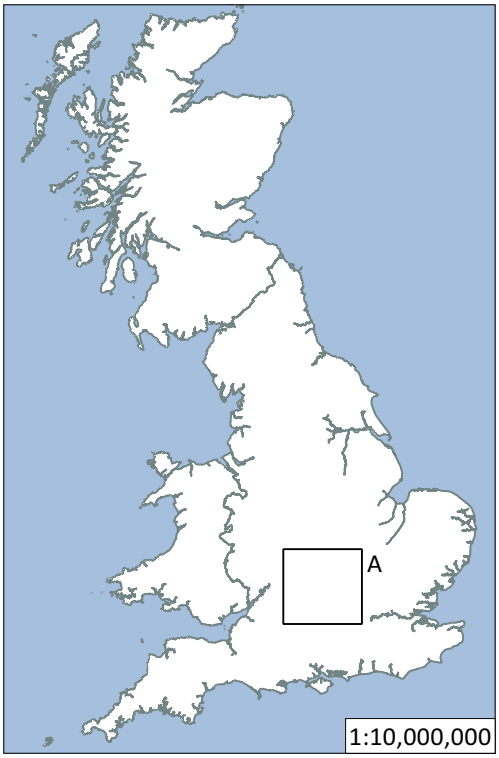


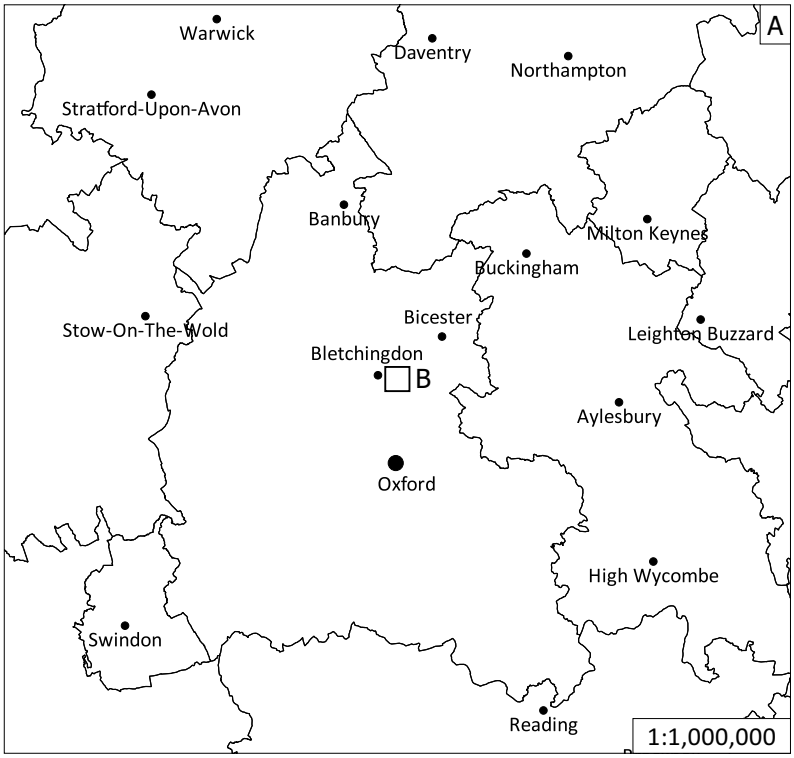


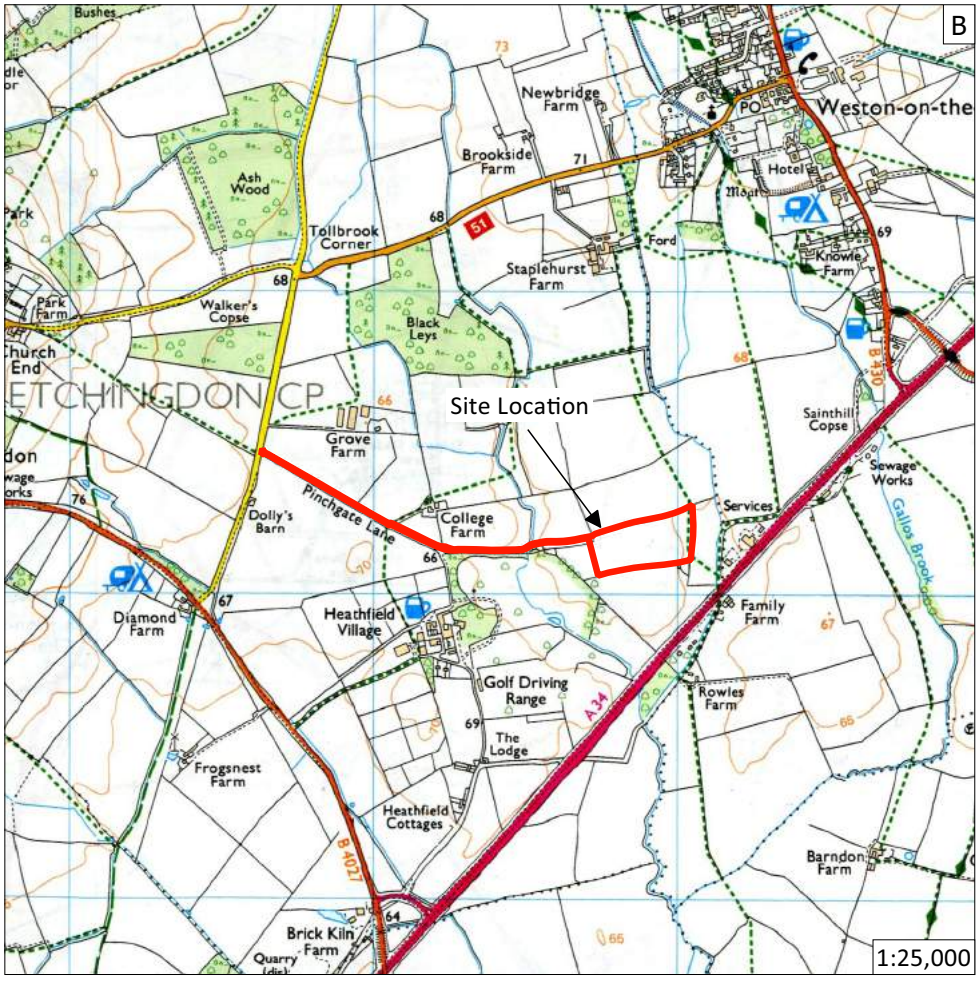


**Figure 1:** Site location outlined in red



| | |
|---|---|
| Site Code | BLCF 16 |
| Scale | 1:10,000,000<br>1:1,000,000<br>1:25,000 @ A4 |
| Drawn by | R Evershed |
| Date | 11/07/16 |

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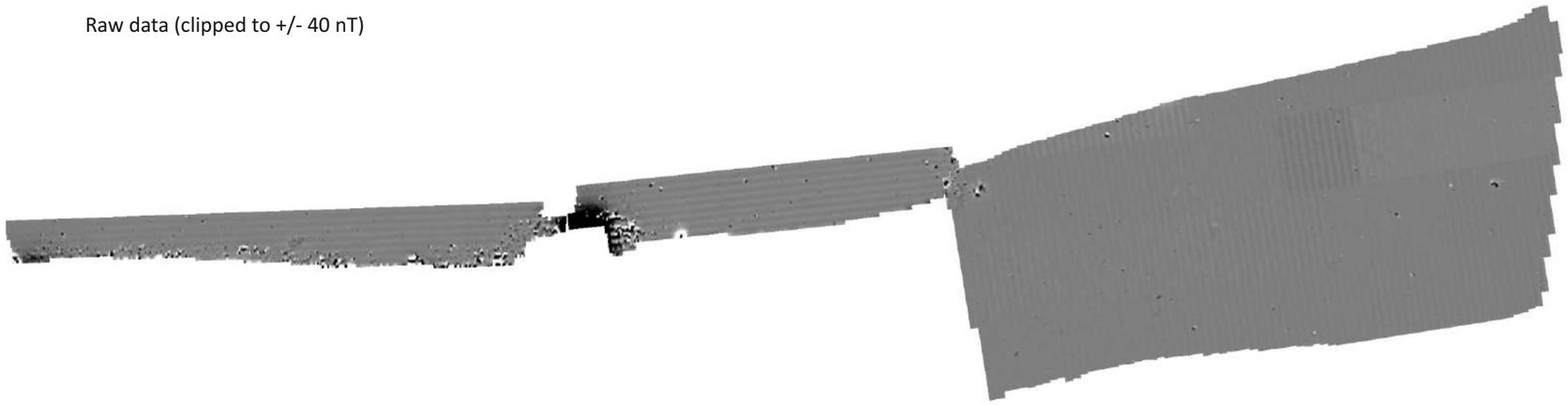
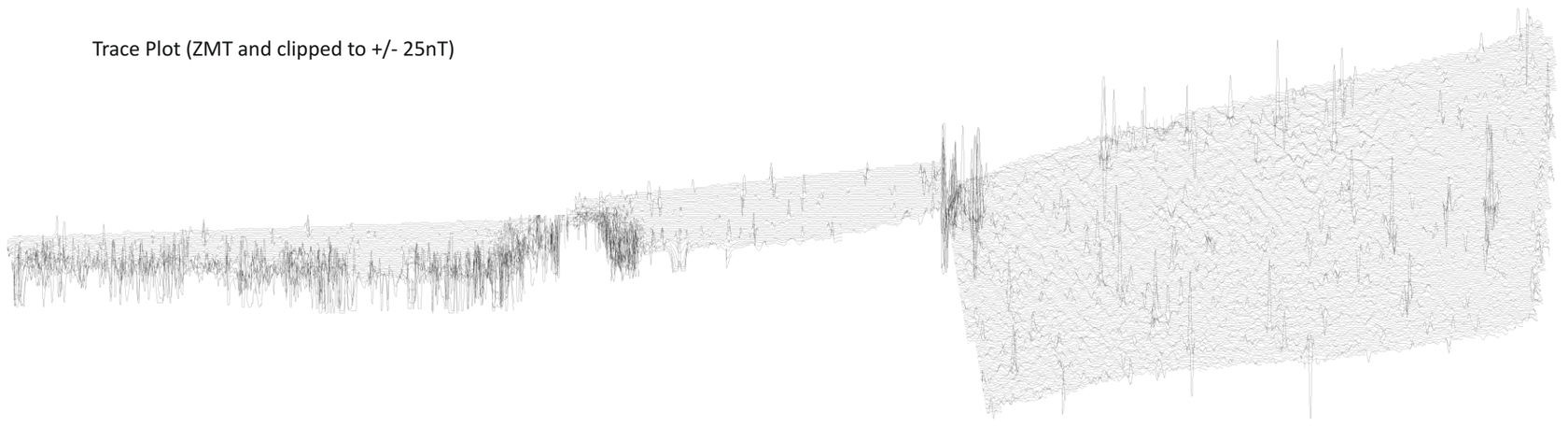
Raw data (clipped to +/- 40 nT)



40
nT
-40

Trace Plot (ZMT and clipped to +/- 25nT)



25nT

0 300m
Scale 1:3,000

| | |
|---|---|
| Site Code | BLCF 16 |
| Scale | 1:3,000 @ A3 |
| Drawn by | R Evershed |
| Date | 11/07/16 |

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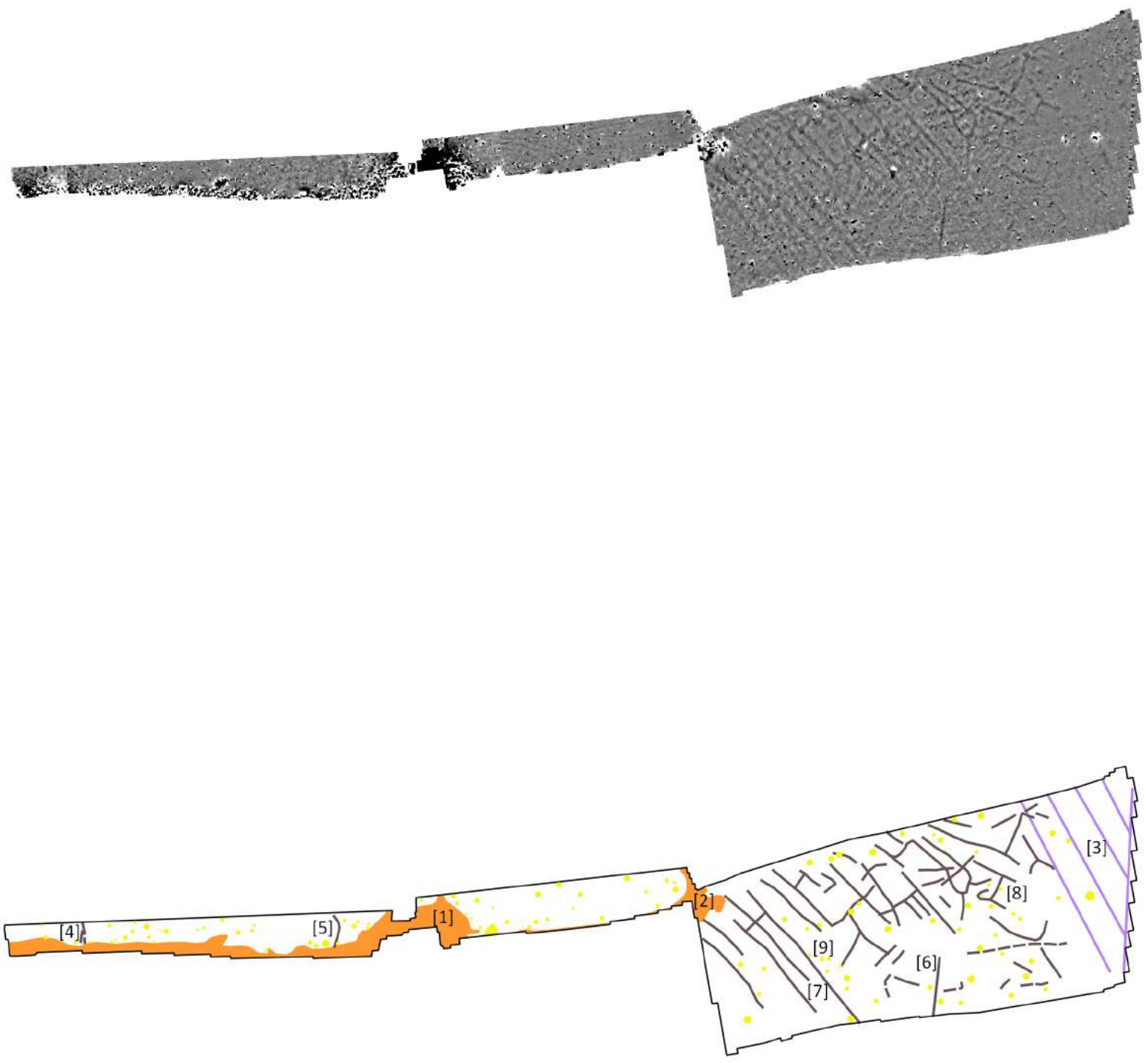
**Figure 2:** Greyscale raw data and processed trace plot




| | |
|---|---|
| Site Code | XXXX |
| Scale | 1:XXX @ A3 |
| Drawn By | X Xxxxxxx |
| Date | XX/XX/2016 |

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**Figure 3:** Processed greyscale and interpretation

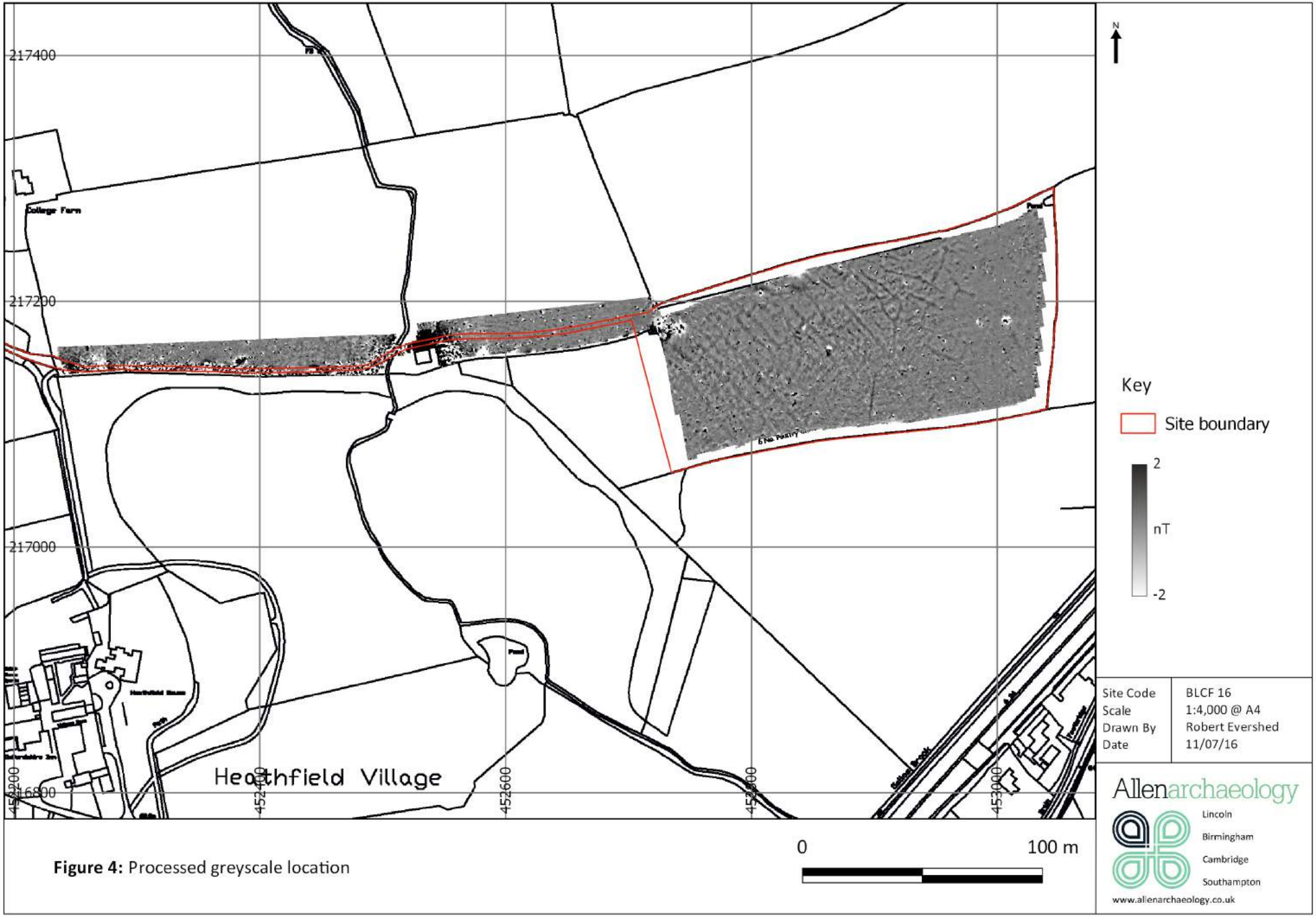


**Figure 4:** Processed greyscale location

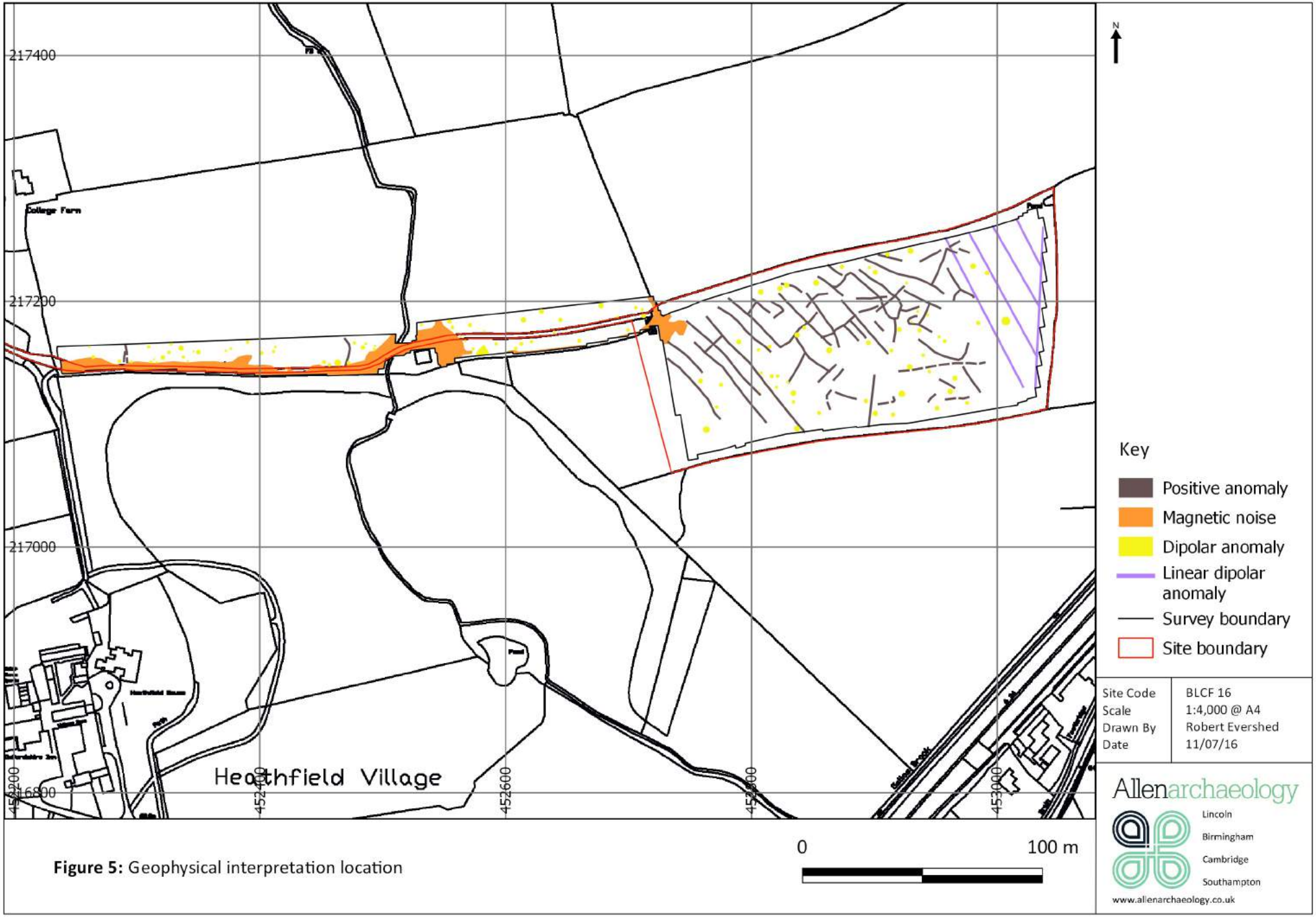


**Figure 5:** Geophysical interpretation location


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