ARCHAEOLOGICAL EVALUATION REPORT:

GEOPHYSICAL SURVEY BY MAGNETOMETRY ON LAND AT BLEU RAYE FARM, MILLGATE, WHAPLODE, LINCOLNSHIRE

Planning Reference: H-23-0471-23
NGR: TF 3240 2100
AAL Site Code: WHAM 23
Museum Accession Number: LCNCC:2023.108
OASIS Reference Number: allenarc1-517647



Report prepared for Mr Vahdet Mustafa

By
Allen Archaeology Limited
Report Number AAL2023095

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Allenarchaeology

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Cover image: View from the northeast corner of the site looking south-southwest

Executive Summary

- Mr Vahdet Mustafa commissioned Allen Archaeology Limited to undertake a geophysical survey using magnetometry on land at Bleu Raye Farm, Millgate, Whaplode, Lincolnshire, to support a planning application for the erection of nineteen holiday lodges, reception building, facility managers accommodation and maintenance shed, two fishing lakes, and associated hard and soft landscaping.

- The proposed development area is located close to a number of undated cropmarks, potentially representing Romano-British activity, with two Roman settlements within 0.8km the site to the southeast and southwest.

- The survey revealed very little of archaeological interest, with former field boundaries and drainage identified. The survey also revealed the likely location of palaeochannels running across the site. The evidence suggests limited archaeological potential for the proposed development area.

1.0 Introduction

1.1 Mr Vahdet Mustafa commissioned Allen Archaeology Limited (AAL) to undertake a geophysical survey using magnetometry on land at Bleu Raye Farm, Millgate, Whaplode, Lincolnshire, to support a planning application for the erection of nineteen holiday lodges, reception building, facility managers accommodation and maintenance shed, two fishing lakes, and associated hard and soft landscaping.

1.2 The site works and reporting conform to current national guidelines as set out in '*EAC Guidelines for the Use of Geophysics in Archaeology*' (EAC 2016), '*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 2020), the '*Lincolnshire Archaeological Handbook'* (LCC 2019) and a specification by this company (AAL 2023).

2.0 Site Location and Description

2.1 The proposed development site is located c.7.8km east of the centre of Spalding and c.5.1km southwest of the centre of Holbeach, in the administrative district of South Holland. The site is approximately 2.28 ha and is centred at National Grid Reference (NGR) TF 3240 2100, *c*.3m above Ordnance Datum.

2.2 The bedrock geology of the site comprises West Walton Formation – mudstone and siltstone, with superficial tidal flat deposits – clay and silt (https://www.bgs.ac.uk/map-viewers/geoindex-onshore/). The mudstone and siltstone bedrock is considered to give a poor but very variable response to magnetometry with the tidal flat deposits giving an average to poor response (English Heritage 2008).

3.0 Planning Background

3.1 A planning application for the '*erection of 19 holiday lodges, reception building, facility managers accommodation and maintenance shed, 2 fishing lakes and associated hard and soft landscaping'* has been submitted to South Holland District Council (Planning Reference H-23-0471-23). The geophysical survey is the first stage of archaeological investigation which together with forthcoming trial trenching is intended to provide detailed information that will allow the planning authority to make an informed decision as to whether further archaeological investigations will be required following the determination of a planning application for the proposed development.

3.2 The approach adopted is consistent with the recommendations of the National Planning Policy Framework (NPPF), with the chapter of relevance being '*Section 16. Conserving and enhancing the historic environment'* (Department for Levelling Up, Housing and Communities 2021).

4.0 Archaeological and Historical Background

4.1 Approximately 200m to the south of the site, seen on aerial photographs, are a number of undated (possibly Romano-British) cropmarks likely representing a drove road, linear features and old watercourses (Lincolnshire Historic Environment Number (hereafter LHER) MLI20384). Just east of these features are more undated cropmarks, likely of a Romano-British date (LHER MLI20385).

4.2 A Romano-British settlement at Whaplode St Catherine (LHER MLI20382) is located approximately 0.75km to the southeast of the site with another settlement of similar date at Hurdletree Bank, Sycamore Farm (LHER MLI20380), 0.8km to the southwest of the site.

4.3 The name Whaplode comes from the Old English '*Cwappa*' and '*lad*' meaning 'watercourse where eelpouts are found' (Mills 1991). It is mentioned in the Domesday Book as '*Copelade*' or '*Copolade*' in the hundred of 'Elloe' with a recorded population of 20 households in 1086 and listed under 5 owners (Morgan and Thorn 1986).

4.4 Rising sea levels in the post-Roman period made much of the low-lying fenland landscape unsuitable for permanent habitation. Whaplode lay on a slightly higher ridge of land between Spalding and Long Sutton. Extensive land drainage and reclamation during the 11th and 12th centuries led to the rise of numerous new settlements to the north and south of this area.

4.5 The farmhouse at Blue Raye Farm (previously Home Farm) is a the only surviving historic part of a 19th century farmstead (LHER MLI123271). There are a few 19th century farmsteads within 0.5km of the site: Mill Gate Cottage (LHER MLI123262), located 300m north; Crossways (LHER MLI123270), located 0.25km west; and an unnamed farmstead (LHER MLI123272), located 0.15m southwest.

5.0 Geophysical Survey Methodology

5.1 The geophysical survey consisted of a detailed gradiometer survey of as much of the development area as was suitable, coming to approximately 2.14 hectares. The survey was undertaken in a series of 30m grids across the site.

Summary of Survey Parameters

5.2 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:	Terrasurveyor 3.0.37.30
Surface Conditions:	Pasture
Area Surveyed:	2.14 hectares
Date Surveyed:	Monday 17th July 2023
Surveyor:	Robert Evershed BSc (Hons) and Ben Jenkins BSc (Hons)
Data Interpretation:	Robert Evershed BSc (Hons)

Data Collection and Processing

5.3 The grids were marked using pre-programmed grids on the Leica GS08 Netrover. Magnetic data was collected on a north-northwest to south-southeast alignment due to the layout of the site boundaries. A traverse pattern close to north – south 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).

5.4 The data collected from the survey has been analysed using Terrasurveyor 3.0.37.30. 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

5.5 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.

5.6 The Bartington Grad 601-2 is set to record data within the range between -100 and 100 nT/m. 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.

5.7 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.

5.8 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 **Geophysical Survey Results** (Figures 2 – 6)

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, with a few anomalies identified across the data set. These are discussed in turn and noted as single- or double-digit numbers in square brackets. Positive anomalies represent material that is more magnetically susceptible than the surrounding material, with negative anomalies representing material that is less magnetically susceptible.

6.2 Within the site there were a number of small areas which could not be surveyed due to the presence of trees and bushes.



Plate 1: View of trees corresponding with unsurveyed areas [1], looking east



Plate 2: View of trees and bushes corresponding with unsurveyed areas [2], looking northeast

6.3 The area of magnetic noise [4] extending down the eastern edge of the site, producing readings of between -100 to 10 nT/m, likely corresponds with a combination of a build-up of modern waste along the field edge and the metal fence along that edge of the site.



Plate 3: View of the metal and wooden fences along the eastern edge of the site [4], looking southeast

6.4 To the south of [4], the area of magnetic noise [5], -100 to 100 nT/m, corresponds to modern structures and overgrown areas.



Plate 4: View of modern structures/sheds and overgrown areas, looking south

6.5 The area of magnetic noise [6], -100 to 100 nT/m, corresponds with a slight raise in the ground level with slight depression either side, seen in the Lidar data (Figure 6), which relates to a former modern track into the site. This can be seen on historic Google Earth images.



Plate 5: View along the former modern track, looking east

6.6 The area of magnetic noise [7], -100 to 100 nT/m, corresponds to a combination of a small area for a bonfire and the location of vehicle.



Plate 6: Small bonfire area, looking west-southwest



Plate 7: Modern vehicle within survey area, looking north

6.7 The area of magnetic noise [8] along the southern edge of the site, -25 to 5 nT/m, likely represents ferrous material within the hedge along the field edge.

6.8 The linear dipolar feature [9], aligned close to north to south within the middle of the field, -100 to 100 nT/m, corresponds with a former field boundary/drain seen on historic OS mapping (Figure 7).

6.9 The positive linear feature [10], aligned roughly east to west, 1 to 2 nT/m, relates to a former field boundary seen on historic OS mapping (Figure 7).

6.10 The positive linear features [11] and [12], aligned roughly east to west, 1 nT/m, likely represent modern drainage features. On the Lidar data (Figure 6) they run either side of a slightly raised bank within slight depressions, which would be very suitable for drainage features. The slightly raised bank, not visible on the geophysical survey results, could represent former cultivation or a former boundary feature.

6.11 Close to and running parallel to the southern edge of the site is a potential long positive linear feature [13], 1 nT/m. This corresponds with a long linear shallow bank seen on the Lidar data (Figure 6), and may represent a former boundary or enclosure feature.

6.12 Within the northeast corner of the site there are a couple of positive curvilinear features [14], 1 to 2 nT/m, which could represent ditches, but most likely represent geological variation, probably relating to palaeochannels.

6.13 The potential positive linear feature [15], 1 to 2 nT/m, likely represents the continuation of a likely palaeochannel seen within the northeast corner of the site [14]. The potential positive linear feature [16], 0.5 nT/m, likely also represents a palaeochannel.

6.14 Within the northwest corner of the site there are a couple of amorphous positive features and likely associated potential linear/curvilinear positive features [17], 2 to 4 nT/m, which likely represent former ponds or soil-filled hollows and former stream channels or palaeochannels.

6.15 Scattered throughout the entire site are many weak and strong dipolar responses, examples of which are highlighted as [18]. The characteristic dipolar response of pairs of positive and negative 'spikes' suggest near-surface ferrous metal or other highly fired material in the topsoil, which could represent small pieces of metal such as nails, horseshoes, or parts of a tractor.

7.0 Discussion and Conclusions

7.1 The survey has revealed very little of archaeological interest, with former field boundaries and drainage features identified. The survey also revealed a number of possible palaeochannels running across the site. The evidence suggests a limited archaeological potential for the proposed development area.

8.0 Effectiveness of Methodology

8.1 The non-intrusive evaluation methodology employed is appropriate to the scale and nature of the site. 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 Mr Vahdet Mustafa for this commission.

10.0 References

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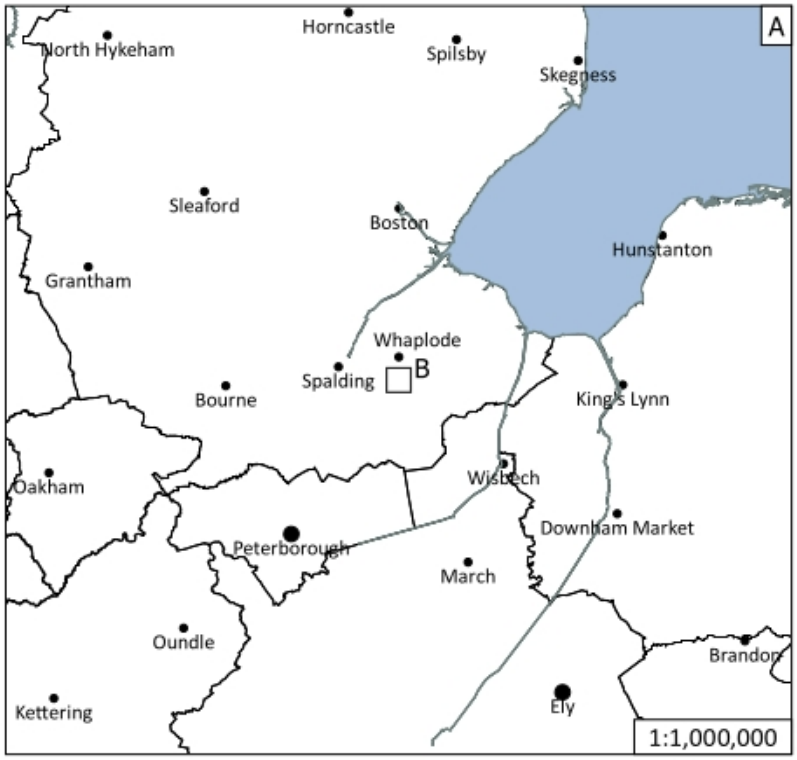
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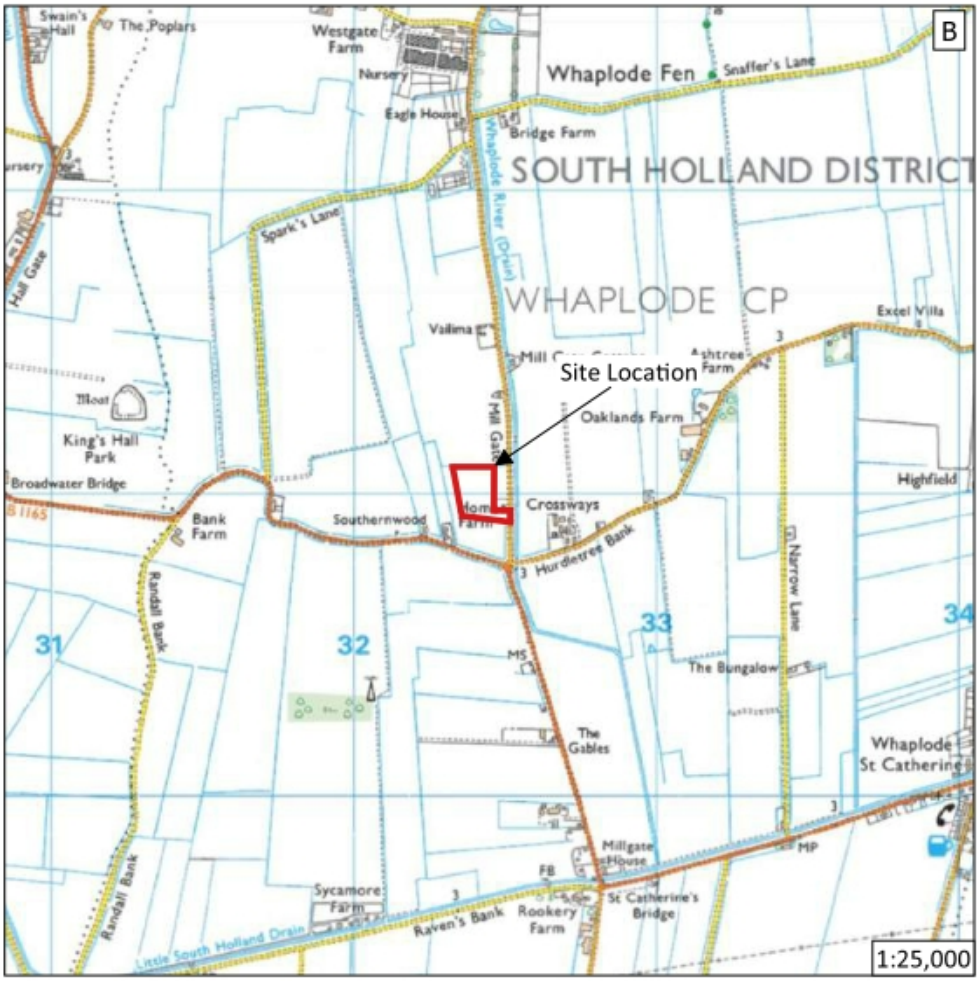


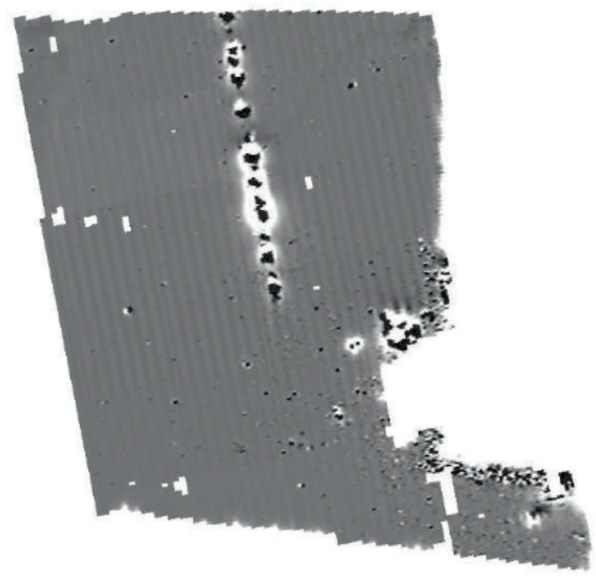
Figure 1: Site location outlined in red

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Site Code	WHAM 23
Scale	1:10,000,000 1:1,000,000 1:25,000 @ A4
Drawn by	R Evershed
Date	21/07/2023

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Raw data (clipped to +/- 40 nT)

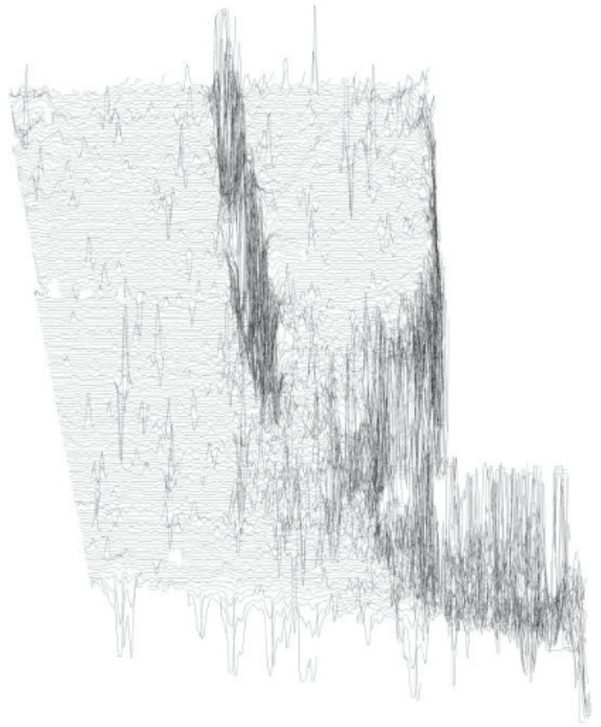


40

nT

-40

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



25nT

N

0 200m

Scale 1:2,000

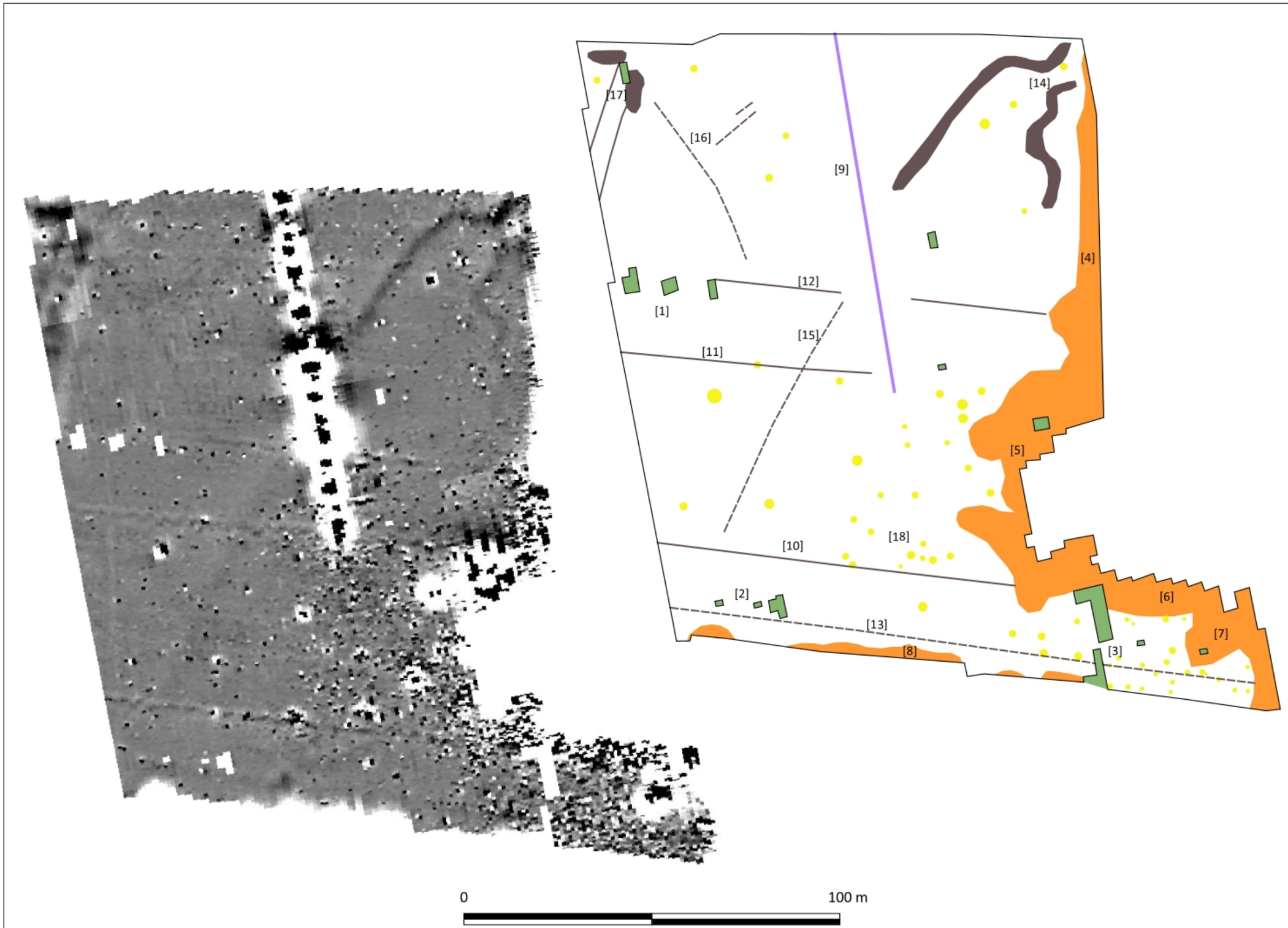
Site Code	WHAM 23
Scale	1:2,000 @ A3
Drawn by	R Evershed
Date	18/07/23

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Figure 2: Greyscale raw data and processed trace plot



N

Key

- Positive anomaly
- Magnetic noise
- Dipolar anomaly
- Linear dipolar anomaly
- Survey boundary
- Unsurveyed

3
nT
-3

Site Code	WHAM 23
Scale	1:1,000 @A3
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Figure 3: Processed greyscale plot and interpretation

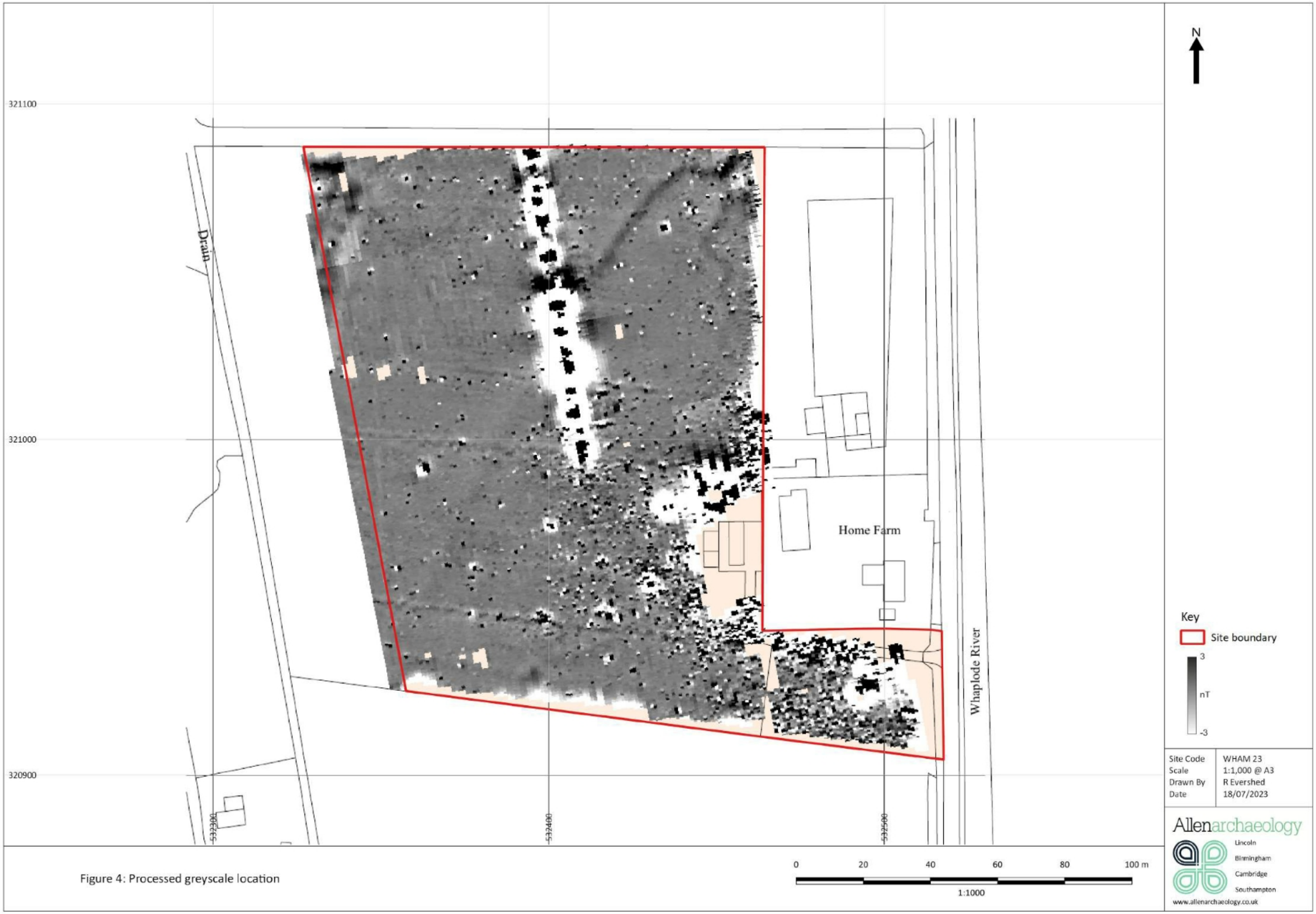


Figure 4: Processed greyscale location

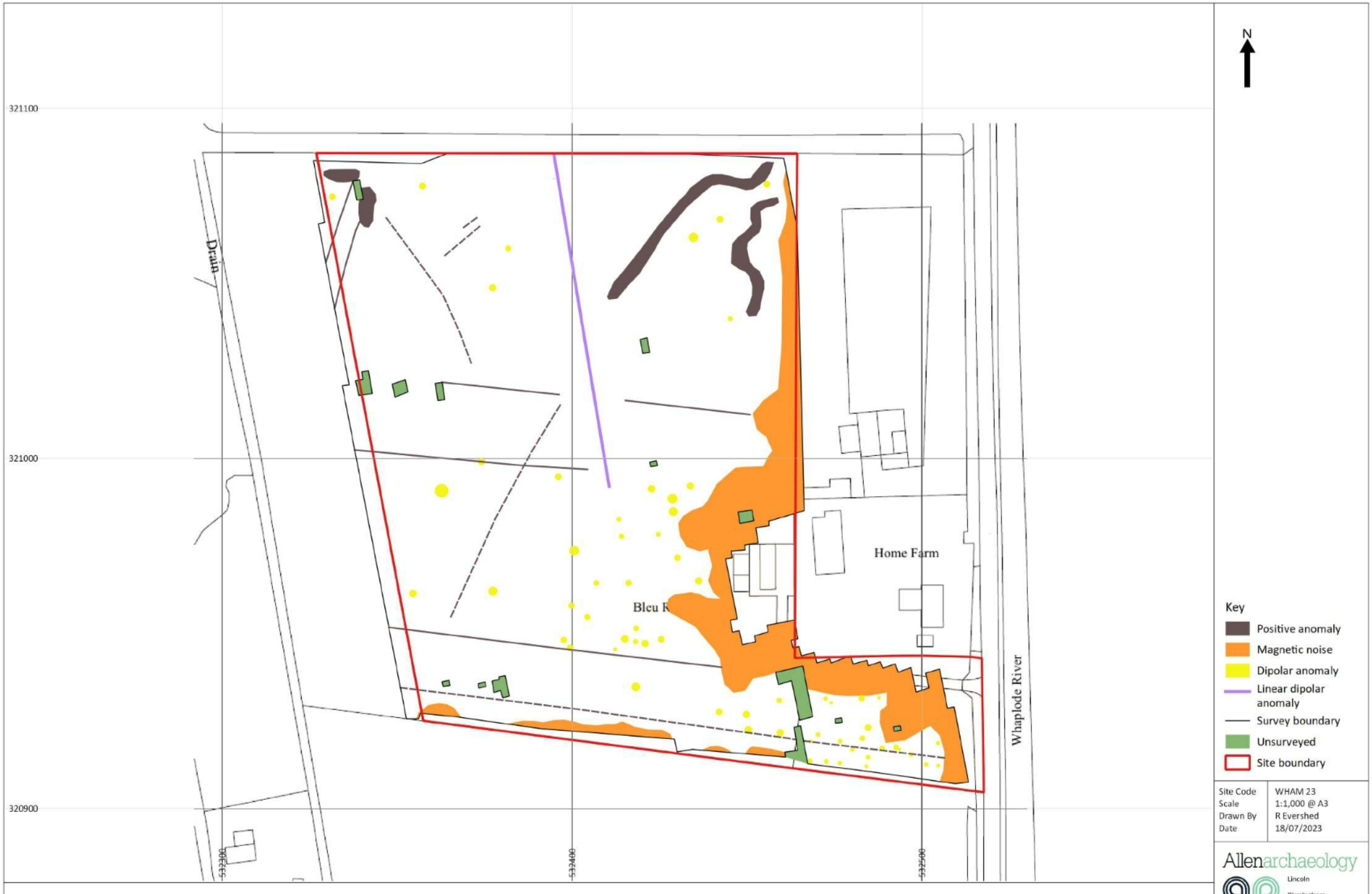


Figure 5: Geophysical interpretation location



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Figure 6: Site boundary superimposed over Lidar data

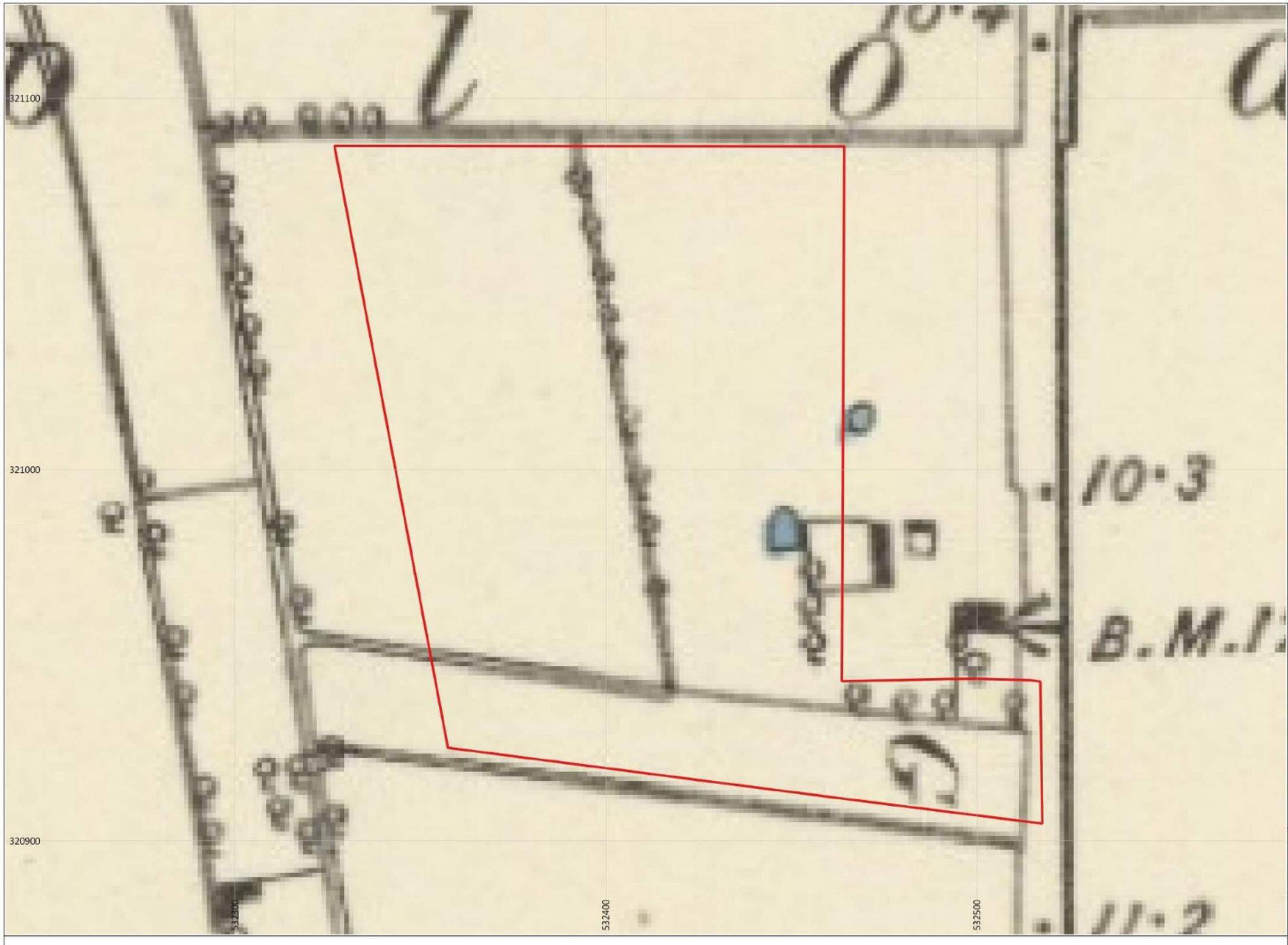


Figure 7: Site boundary superimposed over 1st Edition OS map

Key

Site boundary

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