

**ARCHAEOLOGICAL EVALUATION REPORT:  
GEOPHYSICAL SURVEY BY MAGNETOMETRY ON LAND OFF MERE ROAD, WALTHAM ON THE WOLDS,  
LEICESTERSHIRE**

Planning Reference: pre-application  
NGR: SK 8051 2533  
AAL Site Code: WAMR 16  
OASIS Reference Number: allenarc1-266908



Report prepared for The Belvoir Estate

By  
Allen Archaeology Limited  
Report Number AAL 2016163

November 2016



Allenarchaeology



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*Cover image: General view of the site looking west*

## Executive Summary

- Allen Archaeology Limited was commissioned by The Belvoir Estate to undertake an archaeological evaluation by geophysical survey on land off Mere Road, Waltham on the Wolds, Leicestershire prior to submission of a planning application for a residential development.
- The site is within an area of archaeological interest, with Roman finds scatters to the south and southeast. Recent geophysical surveys around the village have identified enclosures and linear features of a potential later prehistoric or Roman date.
- Recent works immediately to the west of the site has identified the presence of late Iron Age to early Roman archaeology, including boundary ditches, a partial ring gully and pits. This potentially appears to be extending east into this site.
- The survey has revealed a number of features of potential archaeological interest. Within the western half of the site there are a large number of positive linear and curvilinear features that likely represent enclosure ditches and potentially settlement activity, which is likely to be of an Iron Age to Roman date based on recent investigations immediately to the west of the site
- Across the site there are also positive linear features representing the modern cultivation trend, however just visible at the west edge of the site are potential signs of former ridge and furrow agriculture.

## **1.0 Introduction**

- 1.1 Allen Archaeology Limited (AAL) was commissioned by The Belvoir Estate to undertake an archaeological evaluation by geophysical survey on land off Mere Road, Waltham on the Wolds, Leicestershire prior to submission of a planning application for a residential development.
- 1.2 The site works and reporting conformed 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) and the Chartered Institute for Archaeologists '*Standard and guidance for archaeological geophysical survey*' (CIfA 2014).

## **2.0 Site Location and Description**

- 2.1 The proposed development site (hereafter referred to as 'the site') is located in Waltham on the Wolds, in the administrative district of Melton Borough Council in Leicestershire. It is situated 8.0km northeast of Melton Mowbray and 18.0km southwest of Grantham. The site comprises an irregular shaped block of land of approximately 3.5ha, which is currently agricultural land, and is centred on NGR SK 8051 2533.
- 2.2 The bedrock geology of the site comprises limestone belonging to the Lower Lincolnshire Limestone Member to the east, and sandstone of the Northampton Sand Formation to the west, with no superficial geological deposits recorded (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>). Jurassic limestones such as the Lincolnshire Limestone, and the Northamptonshire sandstones generally give a good response to magnetometry (English Heritage 2008).

## **3.0 Planning Background**

- 3.1 A planning application is to be submitted for a residential development of the site. Prior to the submission of a planning application, the client has commissioned a geophysical survey, in order to provide further information concerning the nature and extent of the archaeological resource, and to provide information to allow the planning authority to make a reasoned decision as to whether any further intrusive investigations will be required to allow for the determination of the planning application, and to establish any mitigation measures that may be appropriate.
- 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 A desk-based assessment was prepared in support of the proposed planning application, and the information below is a summary of this report (AAL 2016).
- 4.2 There is no evidence for prehistoric activity in the vicinity of the site. Roman activity is represented by a number of finds scatters to the south and southeast of the site. Recent geophysical surveys around the village have identified enclosures and linear features of a potential later prehistoric or Roman date.
- 4.3 Waltham on the Wolds was a fairly large settlement in the Domesday Book of 1086, and the core of medieval settlement is to the south of the current site. Earthworks and finds scatters of medieval

date have been recorded at several locations around the village, including ridge and furrow in the immediate vicinity of the site, which is likely to extend into the proposed development area. The village continued to develop and expand through the post-medieval period and beyond, but the current site appears to have remained as open agricultural land.

## 5.0 Methodology

- 5.1 The geophysical survey consisted of a detailed gradiometer survey of the entire development area, extending to approximately 3.5ha.
- 5.2 The fieldwork was carried out by a team of two experienced geophysicists from AAL over a period of two working days, Thursday 13<sup>th</sup> to Friday 14<sup>th</sup> October 2016. The survey areas were accurately located using a Leica GS08 RTK NetRover GPS. This accurately 3D located 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 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.
- 5.4 Data collection was undertaken in a zig-zag 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:	3.0.31.0
Surface Conditions:	A combination of short grass and stubble
Area Surveyed:	3.38 hectares
Date Surveyed:	Thursday 13 <sup>h</sup> to Friday 14 <sup>th</sup> October 2016
Surveyor:	Robert Evershed BSc (Hons)
Survey Assistant:	Fabian Danielsson
Data Interpretation:	Ryan Godbold

### *Data Collection and Processing*

- 5.6 The grids were marked out with tape measures and were recorded using the Leica GS08 Netrover. A north-south alignment 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). On this occasion the grids were set up close to a north – south alignment due to the layout of the field.

- 5.7 The data collected from the survey has been analysed using Terrasurveyor 3.0.31.0. 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-stripping
- 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. However, 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 forward or backwards by a specified number of intervals.

## 6.0 Results

- 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 number of anomalies identified across the data set, and these are discussed in turn and noted as single or double digit numbers in square brackets.

- 6.2 Along the western border of the site there is a thin intermittent band of magnetic noise [1], producing readings of -15 to 10 nT/m, which is likely to be the result of a build-up of modern waste along the field edge.

- 6.3 Along the southern border of the site, [2] and [3] are areas of magnetic noise producing readings of -10 to 20 nT/m and -4 to 10 nT/m respectively. These are likely to be due to a combination of a natural build-up of waste along the field edge and detritus from the construction of the houses that are located immediately to the south of the site.

- 6.4 Towards the northeast corner of the survey area is an area of geological anomalies [4]. This has produced readings of -3 to 3 nT/m. This is most likely due to water action across this area, and possibly relating to the adjacent pond. Wet and boggy ground around the pond resulted in an area that could not be surveyed.

- 6.5 At the southwest corner of the site there is a small group of linear/curvilinear positive features [5], 4 to 6 nT/m. These are likely to represent ditches and probably form part of an enclosure system.

- 6.6 Slightly to the north of [5] are a number of positive linear features and positive amorphous areas [6], 1 to 2 nT/m and 5 to 10 nT/m respectively. These are likely to represent ditches, pits or former ponds.
- 6.7 The amorphous positive anomaly [7], 5 to 10 nT/m, is likely to represent a pit, soil-filled hollow or former pond.
- 6.8 The potential linear, parallel positive features [8], 4 to 8 nT/m, may represent ditches either side of a trackway.
- 6.9 Across most of the western two thirds of the site there are linear positive features [9], 2 to 3 nT/m. These represent modern cultivation trends.
- 6.10 At the west edge of the site there are some faint parallel positive linear features aligned roughly northwest to southeast [10], 1 to 2 nT/m. This is likely to represent earlier agricultural activity, such as ridge and furrow cultivation.
- 6.11 At the east end of the site there are parallel, linear positive features [11] and [12], 1 to 3 nT/m, aligned roughly northeast to southwest. These are likely to represent modern cultivation trends.
- 6.12 The linear positive feature [13], 1 to 2 nT/m, running from the edge of the pond southeast to the edge of the site, is probably a drainage ditch related to the pond at its northwestern end.
- 6.13 The large dipolar area [14], -100 to 100 nT/m, represents a telegraph pole.
- 6.14 The large dipolar area [15], -10 to 25 nT/m, likely represents a dump of modern waste- probably highly fired or ferrous material.
- 6.15 Scattered randomly throughout the site are a number of strong and weak dipolar responses, examples of which are highlighted as [16]. 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 number of features of potential archaeological interest. Within the western half of the site there are a large number of positive, linear and curvilinear features that are likely to represent enclosure ditches, trackways and potentially settlement activity. Pottery sherds of a probable Roman date were noted in the topsoil, and recent work immediately to the west of the site has identified the presence of late Iron Age to early Roman features, including boundary ditches, a partial ring gully and pits (Richard Clarke, *pers.comm.*).
- 7.2 In the the northeastern part of the site is a large area of geological variation that could represent waterlogging associated with a pond in this area, shown on historic mapping from at least
- 7.3 Across the site there are positive linear features representing the modern cultivation trend, however just visible are potential signs of former ridge and furrow agriculture.

## **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 The Belvoir Estate for this commission.

## **10.0 References**

AAL, 2016, *Archaeological Desk-Based Assessment: Land off Mere Road, Waltham on the Wolds, Leicestershire*, AAL report number 2016131

Aspinall, A, Gaffney, C, and Schmidt, A, 2008, *Magnetometry for Archaeologists*, Plymouth: Altamira Press

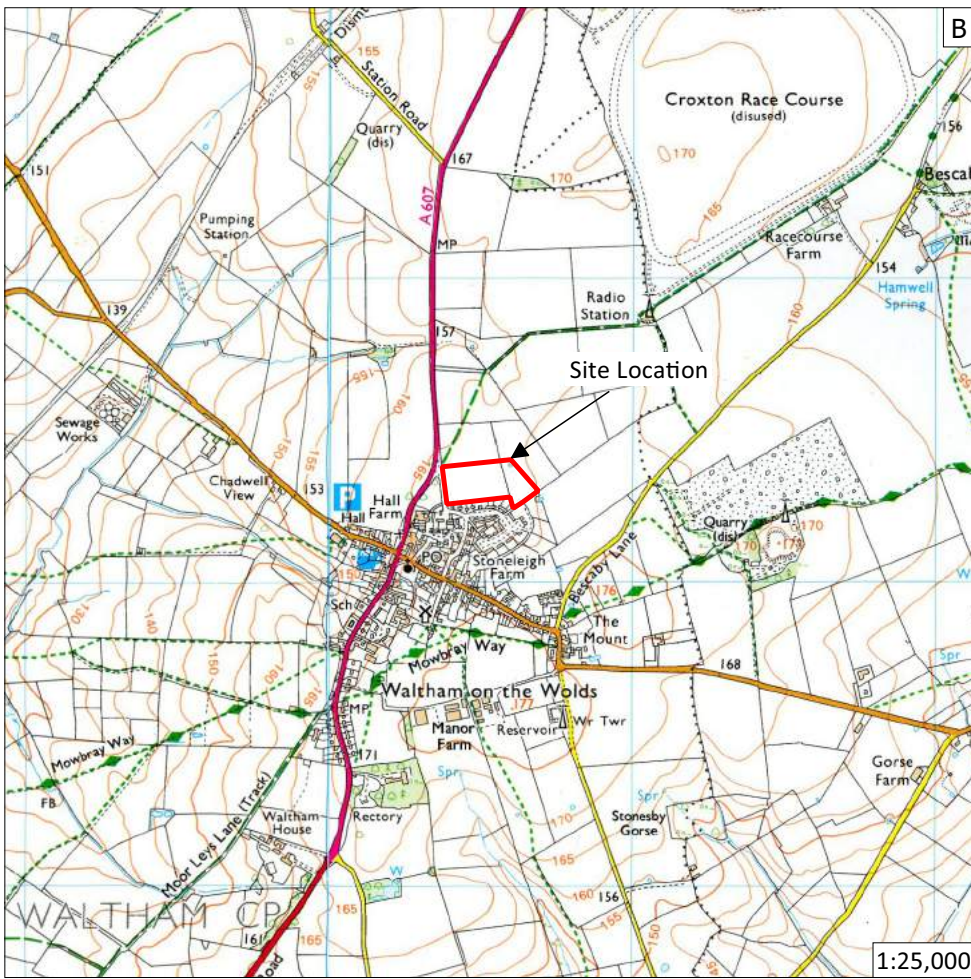
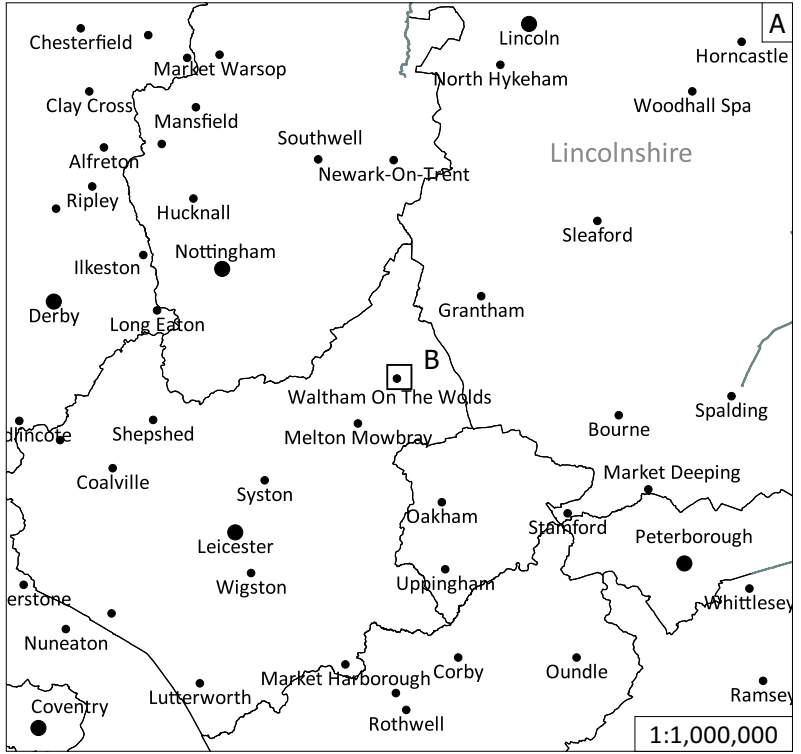
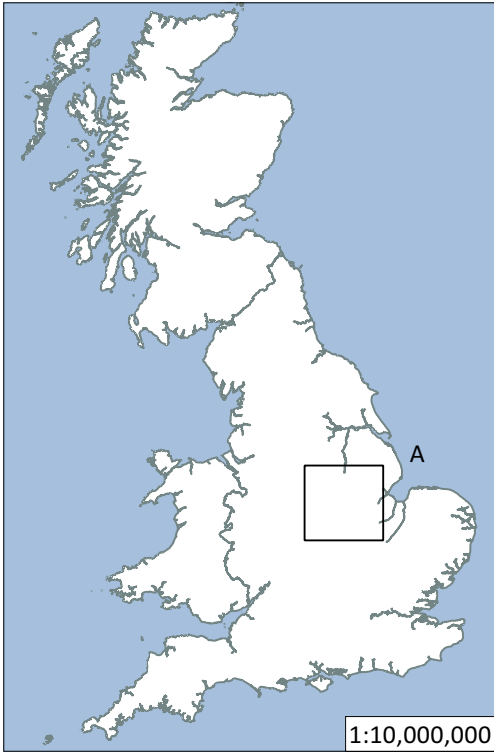
CIfA, 2014, *Standard and guidance for archaeological geophysical survey*, Chartered Institute for Archaeologists, Reading

Department for Communities and Local Government, 2012, *National Planning Policy Framework*, London: Department for Communities and Local Government

English Heritage, 2008, *Geophysical Survey in Archaeological Field Evaluation*, Swindon: English Heritage

Gaffney, C, Gater, J, and Ovenden, S, 2002, *The Use of Geophysical Techniques in Archaeological Evaluations*, IFA Paper No. 6, Reading: The Institute for Archaeologists





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

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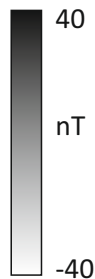
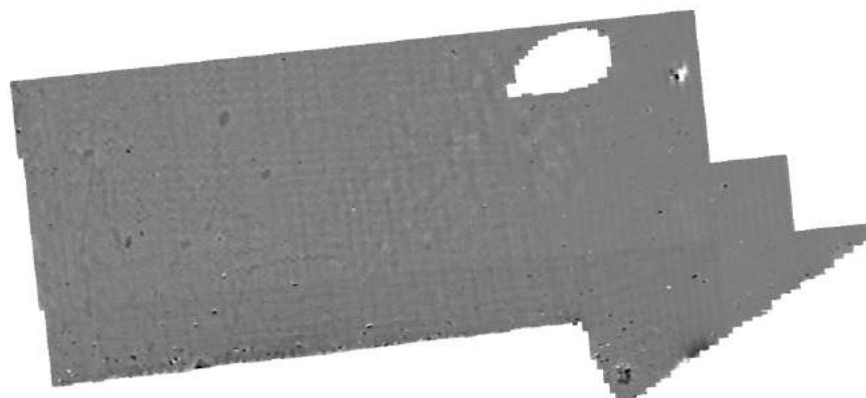
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Drawn by	R Godbold
Date	20/10/16

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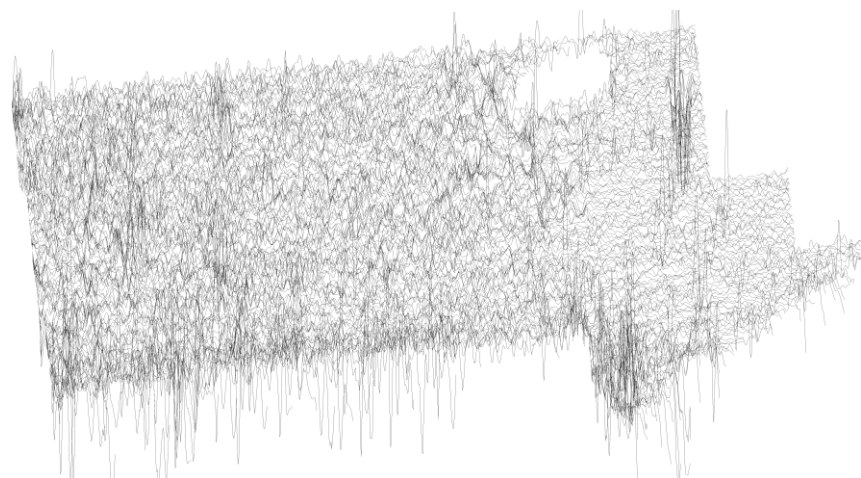
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Raw data (clipped to +/- 40 nT)



25nT

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



Site Code	WAMR 16
Scale	1:3,000 @ A4
Drawn by	R Godbold
Date	20/10/16

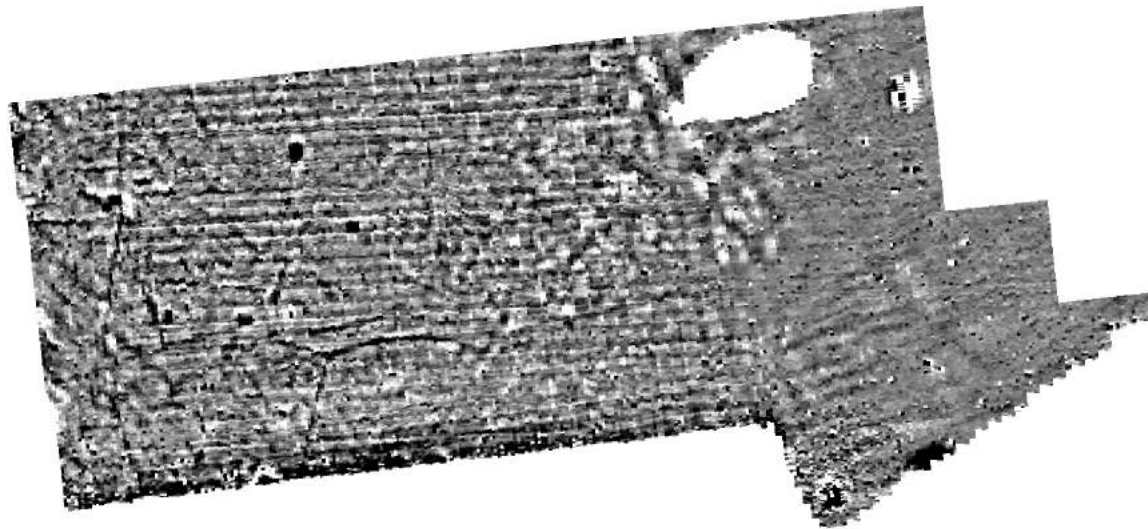
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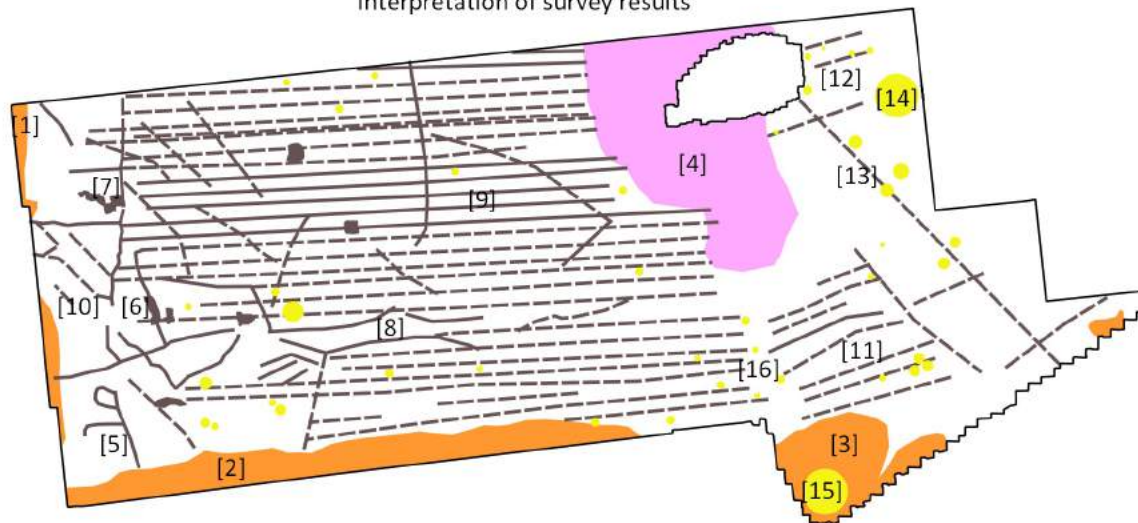
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Figure 2: Greyscale raw data and processed trace plot






Processed greyscale (De-striped and clipped to  $\pm 3nT$ )



Interpretation of survey results



Key

-  Positive Anomaly
-  Magnetic Noise
-  Geological Anomaly
-  Dipolar Anomaly
-  Survey Boundary



Site Code	WAMR 16
Scale	1:1,000 @ A4
Drawn By	R Godbold
Date	19/10/16

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Figure 3: Processed greyscale plot and interpretation



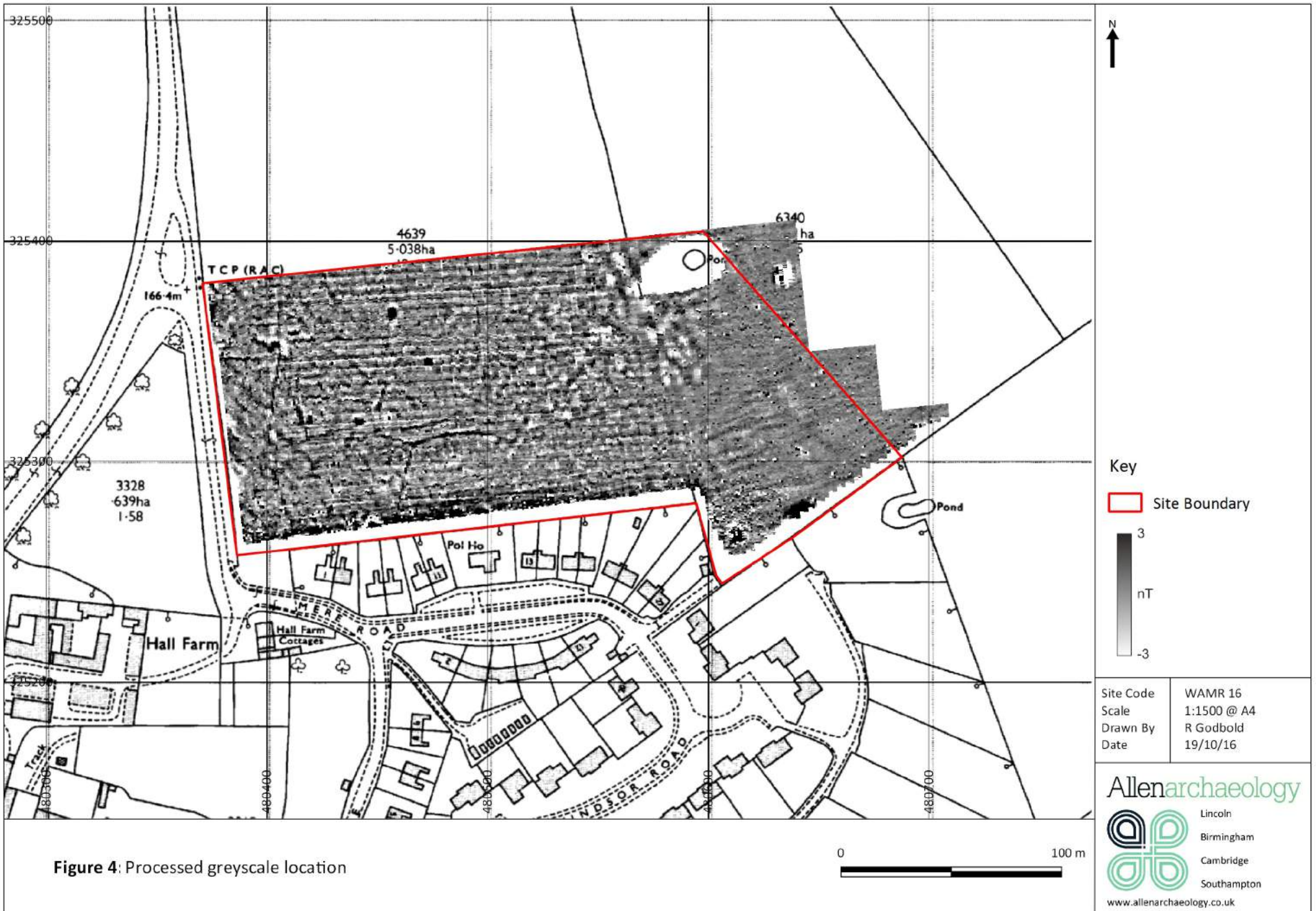


Figure 4: Processed greyscale location



Key

Site Boundary

3

nT

-3

Site Code	WAMR 16
Scale	1:1500 @ A4
Drawn By	R Godbold
Date	19/10/16

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- Key
- Positive Anomaly
  - Magnetic Noise
  - Geological Anomaly
  - Dipolar Anomaly
  - Survey Boundary
  - Site Boundary

Site Code	WAMR 16
Scale	1:1,000 @ A4
Drawn By	R Godbold
Date	19/10/16

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Figure 5: Geophysics interpretation location





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