

**ARCHAEOLOGICAL EVALUATION REPORT:**

**GEOPHYSICAL SURVEY BY MAGNETOMETRY ON LAND AT TALBOT PLACE DONISTHORPE, LEICESTERSHIRE,  
DE12 7PU**

Planning Reference: 16/00102/OUTM  
NGR: 431269 313556  
AAL Site Code: DOTP 16  
OASIS Reference Number: allenarc1-249435



Report prepared for Geoff Tann Archaeological Researcher

By  
Allen Archaeology Limited  
Report Number AAL 2016079

May 2016



Allenarchaeology



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Version no.:	1.0	24/05/2016

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*Cover image: View of the site taken from the southwest edge, looking northeast*

## **Executive Summary**

- Allen Archaeology Limited was commissioned by Geoff Tann Archaeological Researcher, to undertake a geophysical survey using magnetometry on land at Talbot Place, Donisthorpe, Leicestershire, prior to the determination of a planning application for a residential development.
- Previous archaeological work immediately to the northwest of the site has identified a series of probable agricultural enclosures of Romano-British date.
- The survey has revealed a number of features of archaeological interest. The complex of linear and curvilinear features clearly represents a continuation of the known Romano-British field system previously recorded to the west of the site. There is also good evidence for medieval ridge and furrow cultivation across the entire field.

## **1.0 Introduction**

- 1.1 Allen Archaeology Limited (AAL) was commissioned by Geoff Tann Archaeological Researcher, to undertake a geophysical survey using magnetometry on land at Talbot Place, prior to the determination of 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*' (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 Donisthorpe is situated in the administrative district of North West Leicestershire, approximately 13km southeast of Burton upon Trent. The site is located c.0.4km to the southwest of the traditional village core, which is centred on the parish church of St. John the Evangelist. The site comprises a large rectangular field, centred on NGR 431269 313556. The ground cover at the time of surveying was stubble.
- 2.2 The bedrock geology comprises Moira Formation Breccia, with no superficial geology noted (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>).

## **3.0 Planning Background**

- 3.1 A planning application has been submitted for '*Residential development of up to 30 dwellings and associated infrastructure (outline – access and layout), Talbot Place, Donisthorpe DE12 7PU*' (Reference 16/00102/OUTM). Prior to the determination of the application, the Planning Archaeologist at Leicestershire County Council has advised that a programme of geophysical survey of the proposed development area should take place.
- 3.2 The approach adopted is consistent with the recommendations of the current 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 An archaeological desk-based assessment has previously been carried out for an area immediately to the northwest of the site, prior to a residential development (PCA 2014a). This assessment was followed by a programme of geophysical survey and then evaluation trenching (PCA 2014b and c). The works identified a series of enclosures of Romano-British date, with the limited artefactual evidence suggesting these were field systems away from centres of settlement.

## 5.0 Methodology

- 5.1 The geophysical survey consisted of a detailed gradiometer survey of the whole field, totalling 2.86ha, and included an area beyond the application boundary but also in the applicant's ownership. 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 over a period of two days, Thursday 14<sup>th</sup> April to Friday 15<sup>th</sup> April 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:	3.0.29.1
Surface Conditions:	A combination of short grass and stubble
Area Surveyed:	2.86 hectares
Date Surveyed:	Thursday 14 <sup>th</sup> to Friday 15 <sup>th</sup> April 2016
Surveyor:	Robert Evershed BSc (Hons)
Survey Assistant:	Emily Doe
Data Interpretation:	Robert Evershed BSc (Hons)

### **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 because the density collected along the traverse line is greater than that between traverses (Aspinall *et al.* 2008). On this occasion the data was collected on a northeast to southwest alignment due to the orientation of the field and the pre-programmed grids.

- 5.7 The data collected from the survey has been analysed using Terrasurveyor 3.0.29.1. 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.

- 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 -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 digit numbers in square brackets.

- 6.2 Along the northwest and northeast border of the site there is an area of magnetic noise [1], producing readings of -10 to 10 nT/m. This also includes an area producing much higher readings of 100 to 100 nT/m. The lower readings likely relate to modern ferrous litter, whilst the higher readings relate to a streetlight located just outside the survey area. The build-up of detritus along the field edge is a common occurrence especially with housing situated just outside the survey area.

- 6.3 There are a large number of positive linear features [2] aligned roughly northwest to southeast across the entire field, mostly c.10 –12m apart, although this does vary. These have produced readings of 2 to 3 nT/m, and are likely to relate to the ploughed-out remains of medieval ridge and furrow cultivation.

- 6.4 Within the centre of the field, aligned roughly north-northwest to south-southeast, are a number of linear and rectilinear positive features [3]. These have produced readings between 5 and 10 nT/m, and in some places as high as 20 nT/m. These form rectangular enclosures and most likely relate to Romano-British field systems.

- 6.5 There are a number of amorphous positive anomalies [4], 4 to 6 nT/m, across the site, that are likely to relate to activity associated with the field systems. These anomalies probably represent pits, soil-filled hollows or former ponds.
- 6.6 The linear positive anomaly [5], 4 to 7 nT/m, is likely to indicate an enclosure ditch, possibly relating to the field system to the northeast.
- 6.7 The negative parallel linear features [6], -5 to -3 nT/m, one at the southwest end of the field and one at the northeast end, likely represent modern tractor tracks.
- 6.8 Scattered randomly throughout the site are a number of strong and weak dipolar responses, examples of which are highlighted as [7]. 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. The complex of linear and curvilinear features is likely to represent a Romano-British field system, and corresponds closely with the results of the geophysical survey in the adjacent field to the west, which exposed two enclosures, either side of a trackway which widened to the northeast (Figure 6). Dating evidence from these features was sparse, but confirmed a Romano-British date. It is highly likely that results of a similar nature would be expected on the current site.
- 7.2 There is also good evidence for medieval ridge and furrow cultivation across the entire field, and this again was paralleled by the results of the survey in the adjacent plot.

## **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 Geoff Tann Archaeological Researcher, for this commission.

## **10.0 References**

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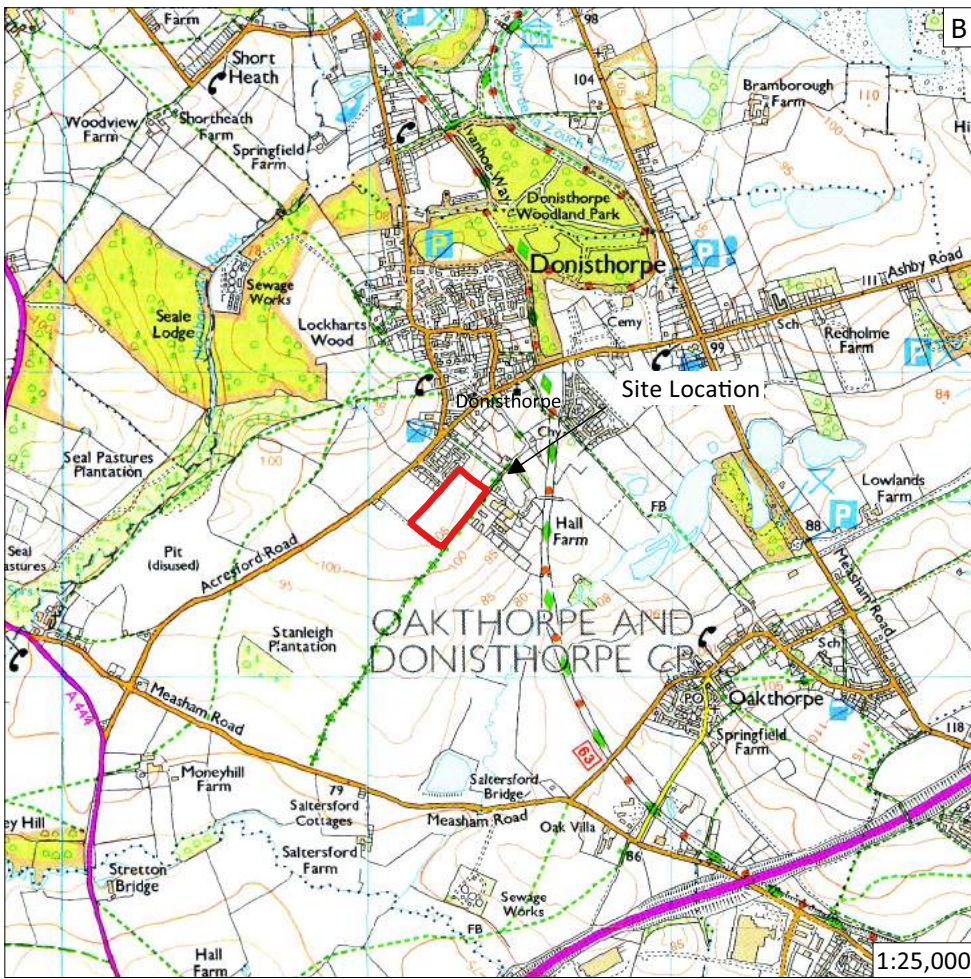
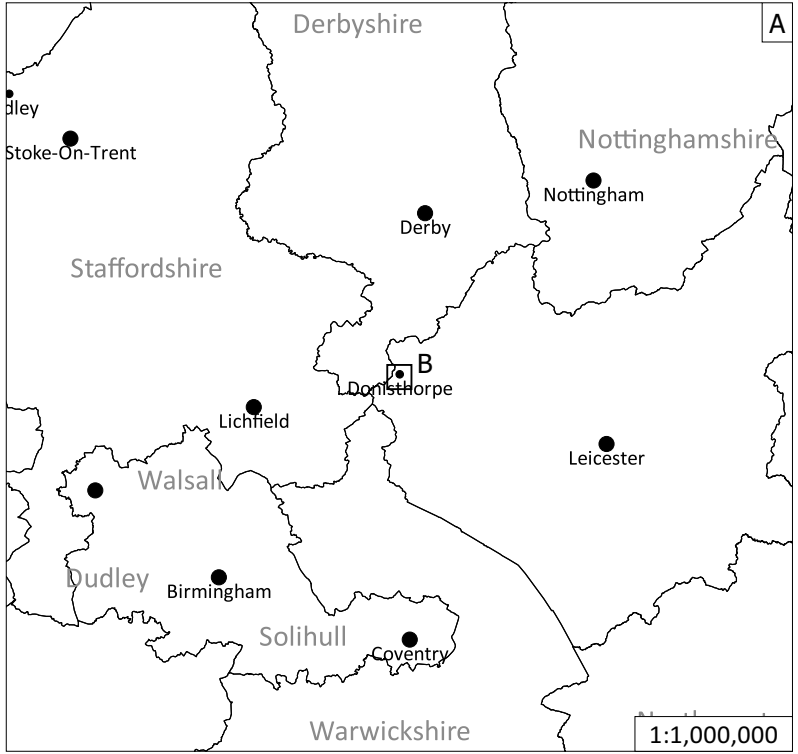
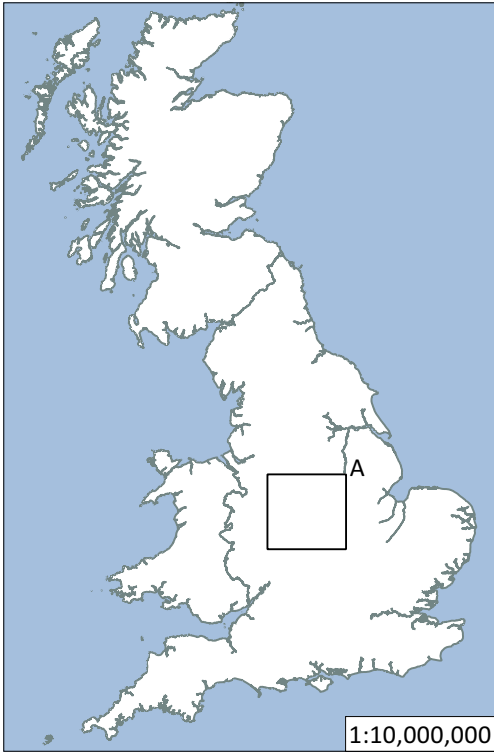
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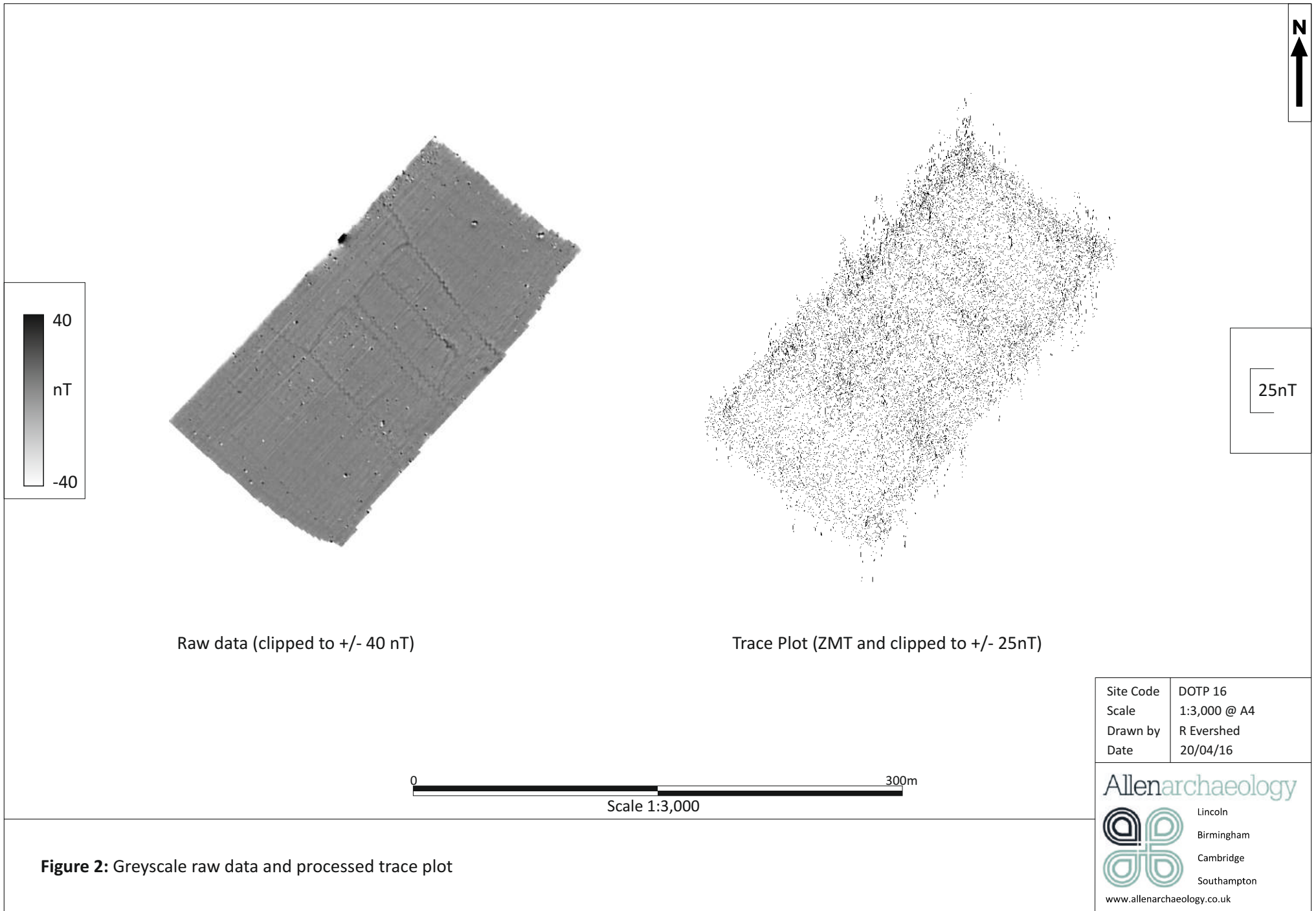


**Figure 1:** Site location outlined in red

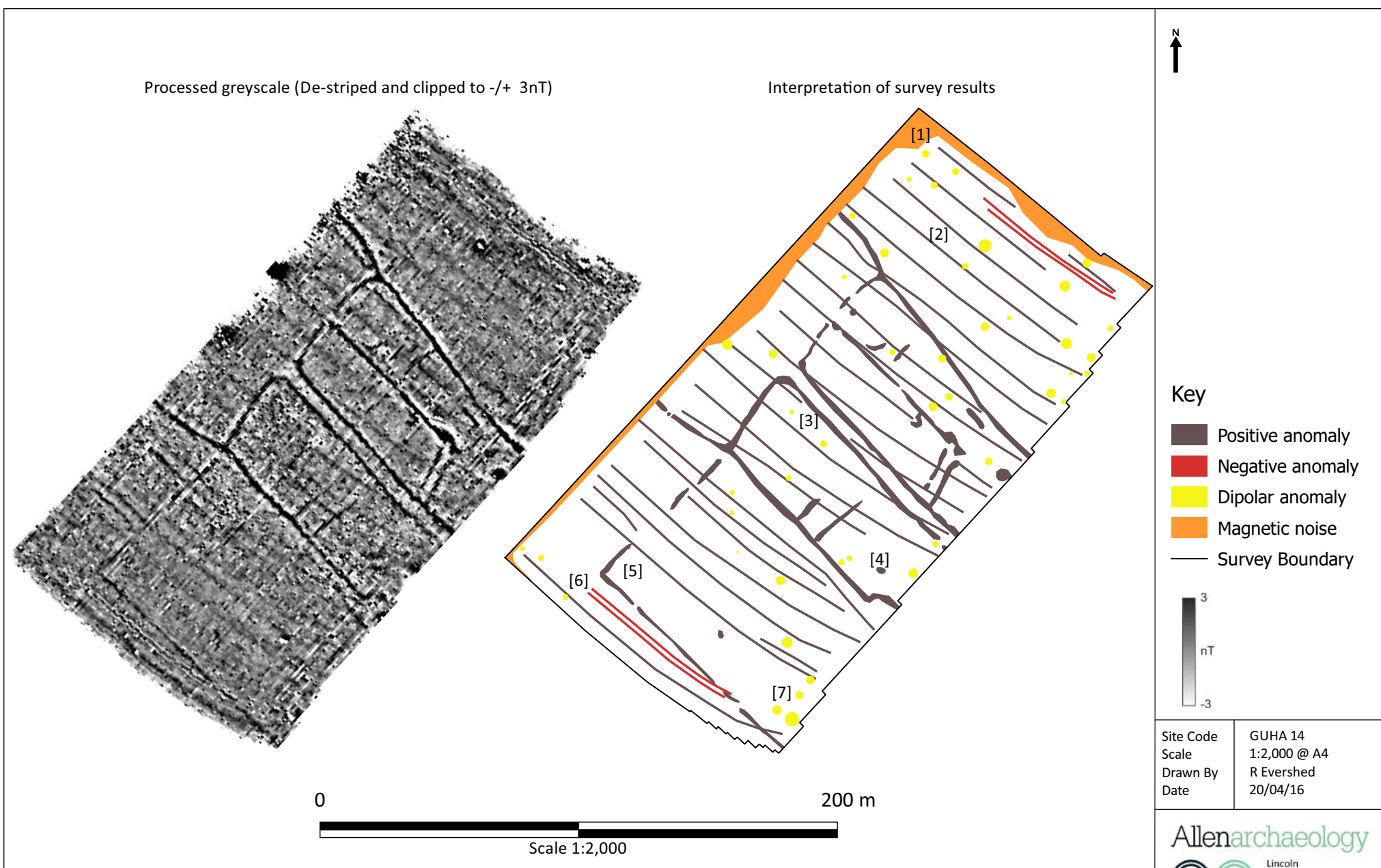
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Site Code	DOTP 16
Scale	1:10,000,000 1:1,000,000 1:25,000 @ A4
Drawn by	R Evershed
Date	20/04/16

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



**Figure 3:** Processed greyscale plot and interpretation



**Figure 4:** Location of geophysical survey



**Figure 5:** Geophysical interpretation location



Figure 6: Combined geophysical surveys, PCA 2014 and AAL 2016



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