

**ARCHAEOLOGICAL EVALUATION REPORT:  
GEOPHYSICAL SURVEY BY MAGNETOMETRY ON LAND OFF  
TURNERS HILL ROAD, TURNERS HILL, WEST SUSSEX**

NGR: TQ 3249 3628  
AAL Site Code: THTH 15  
Planning Reference: Pre-planning  
OASIS Reference Number: allenarc1-211071



Report prepared for Haymaker Energy Limited

By  
Allen Archaeology Limited  
Report Number 2015069

May 2015



Allenarchaeology



## Contents

Executive Summary .....	1
1.0 Introduction.....	2
2.0 Site Location and Description.....	2
3.0 Planning Background.....	2
4.0 Archaeological and Historical Background.....	2
5.0 Methodology .....	3
5.1 Summary of Survey Parameters.....	3
5.2 Data Collection and Processing.....	4
6.0 Results .....	5
7.0 Discussion and Conclusions.....	5
8.0 Effectiveness of Methodology.....	5
9.0 Acknowledgements.....	5
10.0 References.....	6

## List of Figures

Figure 1: Site location outlined in red .....	7
Figure 2: Greyscale raw date and processed trace plot.....	8
Figure 3: Processed greyscale plot and interpretation .....	9
Figure 4: Location of processed greyscale.....	10
Figure 5: Location of geophysics interpretation.....	11

## Document Control

Element:	Name:	Date:
Report prepared by:	Robert Evershed BSc (Hons)	15/05/2015
Illustrations prepared by:	Robert Evershed BSc (Hons)	12/05/2015
Report edited by:	Chris Clay BA MA (Hons)	16/05/2015
Report reviewed by:	Mark Allen MCIfA BSc (Hons)	16/05/2015
Report version:	1.0	16/05/2015

Allen Archaeology reports are printed double sided on 100% recycled paper to reduce our carbon footprint

## **Executive Summary**

- A geophysical survey by magnetometry was undertaken by Allen Archaeology Limited (AAL) for Haymaker Energy Limited to support a planning application for a proposed solar farm on land off Turners Hill Road, Turners Hill, West Sussex.
- The survey has identified no deposits of archaeological interest within the site. There is a modern gas pipe running east to west across the southern end of the site, a large number of small amorphous positive anomalies that likely represent minor changes in the natural geology and a large dipolar area which likely represents a buried modern metallic object or objects.
- The survey results suggest that the archaeological potential for the site is negligible.

## **1.0 Introduction**

- 1.1 A geophysical survey by magnetometry was undertaken by Allen Archaeology Limited (AAL) for Haymaker Energy Limited to support a planning application for a proposed solar farm on land off Turners Hill Road, Turners Hill, West Sussex.
- 1.2 The document has been completed with reference 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) and the Chartered Institute for Archaeologists '*Standard and guidance for archaeological geophysical survey*' (ClfA 2014).

## **2.0 Site Location and Description**

- 2.1 Turners Hill is located in the administrative district of Mid Sussex District Council, approximately 7km east-southeast of central Crawley. The proposed development area comprises a sub-rectangular block of approximately 1.8ha of agricultural land just under 2km northwest of the village, east of Turners Hill Road. The site lies at approximately 125m above Ordnance Datum, and is centred on NGR TQ 3249 3628.
- 2.2 The local geology comprises a bedrock of interbedded siltstone and sandstone of the Upper Tunbridge Wells Sand Formation with no overlying superficial deposits recorded (<http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html>).

## **3.0 Planning Background**

- 3.1 A planning application has not yet been submitted for the scheme, which is for a proposed 1MW solar farm. Prior to submission of the application, a programme of geophysical survey has been undertaken in order to provide further information concerning the archaeological potential of the site. The results of this survey will be used to inform any decision on further archaeological works by the advising local authority archaeologist.
- 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 A heritage statement has been prepared for the proposed development, and the information presented below is a summary of this data.
- 4.2 Prehistoric activity is well represented in the area, with scatters of Mesolithic to Neolithic flints recorded to the west and southwest of the site.
- 4.3 There is no evidence for Roman activity in the study area, although a Roman road from London to Brighton passes through the eastern part of the village, some distance east of the current site.
- 4.4 There is no evidence for Anglo-Saxon activity in the vicinity of the site, and medieval activity is also sparse, although a medieval forge is recorded to the northwest of the site, and to the west of Rowfont House, the earliest component of which is the 15<sup>th</sup> century timber framed west end of the

south front, probably refaced with ashlar in the late 16<sup>th</sup> century by Robert Whitfield, then master of Rowfont Forge.

- 4.5 Post-medieval brick pits are recorded 400m to the southeast of the site and ironstone quarry pits 500m to the south, but otherwise the context of the site and its surroundings are largely agricultural in nature.
- 4.6 Approximately 500m to the west is the Grade II Listed Worth Hall, a large L-shaped house of c.1840, with surrounding parkland and the remains of an Ice House.
- 4.7 Ordnance Survey mapping indicates that the current boundaries of the site and most of the surroundings had developed prior to 1875, and that the site has remained as open arable land or pasture, surrounded by extensive woodland, since this time.

## 5.0 Methodology

- 5.0.1 The geophysical survey consisted of a detailed gradiometer survey of the maximum available area of the proposed development, totalling approximately 1.6 hectares.
- 5.0.2 The survey was undertaken in a series of 20m grids across the site. The fieldwork was carried out by two experienced geophysicists from AAL over a period of two working days, Thursday 30<sup>th</sup> April and Friday 1<sup>st</sup> May 2015. The survey area was accurately located using a survey grade Leica GS08 Netrover receiving RTK corrections.
- 5.0.3 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 onboard data logger. Data collection in the northern area was undertaken in a zigzag traverse pattern, using a sample interval of 0.25m and a traverse interval of 1m.
- 5.0.4 The fieldwork and reporting was carried out in accordance with the procedures in 'Geophysical Survey in Archaeological Field Evaluation' (English Heritage 2008) and 'The Use of Geophysical Techniques in Archaeological Evaluations: IfA Paper 6' (Gaffney et. al. 2002).

### 5.1 Summary of Survey Parameters

#### 5.1.1 Fluxgate Magnetometers

Instrument 1:	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 3.0.25
Surface conditions:	Short grass
Area surveyed:	1.6 ha

Date surveyed:	Thursday 30 <sup>th</sup> April and Friday 1 <sup>st</sup> May 2015
Surveyor:	Iain Pringle
Survey assistants:	Owen Batchelor
Data interpretation:	Robert Evershed

## **5.2 Data Collection and Processing**

5.2.1 The grids were marked out using pre-programmed coordinates on the Leica GS08 Net rover. The collection of magnetic data using a north-south 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 2008). On this occasion magnetic data was collected on a north – south alignment due to the orientation of the pre-programmed survey grids and the field.

5.2.2 The data collected from the survey has been analysed using the current version of Terrasurveyor (version 3.0.25). 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
- Clipping
- De-staggering

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 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.

5.2.6 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. The survey results revealed a number of anomalies across the data set, and these are discussed in turn and noted as single digit numbers in square brackets.
- 6.2 Immediately noticeable is the large linear dipolar [1] and associated magnetic noise, running east to west across the southern end of the site. Producing readings of -3000 to 3000 nT/m, this represents a modern gas pipe, as identified by the gas pipeline boundary marker posts.
- 6.3 The amorphous positive anomalies [2], 4 to 6 nT/m, extending across much of the site may represent pits, former ponds or soil-filled hollows, but are far more likely to represent minor changes in the natural geology. They appear to form a slightly linear formation orientated roughly northeast to southwest; this may relate to the sloping nature of the topography of the site and natural depositional changes in the geology.
- 6.4 The large dipolar area [3], -3000 to 3000 nT/m, likely represents a large modern metallic object or objects dumped within the field. There are other smaller dipolar responses within the site, including [4], -15 to 15 nT/m, that relates to large metal containers outside of the site area next to the field boundary in the adjacent field.
- 6.5 Scattered randomly throughout the site are a number of other strong and weak dipolar responses [5], examples of which are highlighted as yellow circles. The characteristic dipolar response of pairs of positive and negative 'spikes' suggest near surface ferrous metal or other highly fired material in the topsoil.

## 7.0 Discussion and Conclusions

- 7.1 The survey has identified no features of archaeological interest within the site. There is a modern gas pipe running across the southern end of the survey area, a large number of small amorphous positive anomalies that are likely represent minor changes in the natural geology and a large dipolar area which likely represents a buried modern metallic object or objects.
- 7.2 The survey results suggest that the archaeological potential for the site is negligible.

## 8.0 Effectiveness of Methodology

- 8.1 The non-intrusive evaluation methodology employed was appropriate to the scale and nature of the proposed development and indicates a negligible archaeological potential for the site.

## 9.0 Acknowledgements

- 9.1 Allen Archaeology Limited would like to thank Haymaker Energy Limited for this commission.

## 10.0 References

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

CIfA, 2011, *Standard and Guidance for Archaeological Geophysical Survey*, Institute for Archaeologists, Reading

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

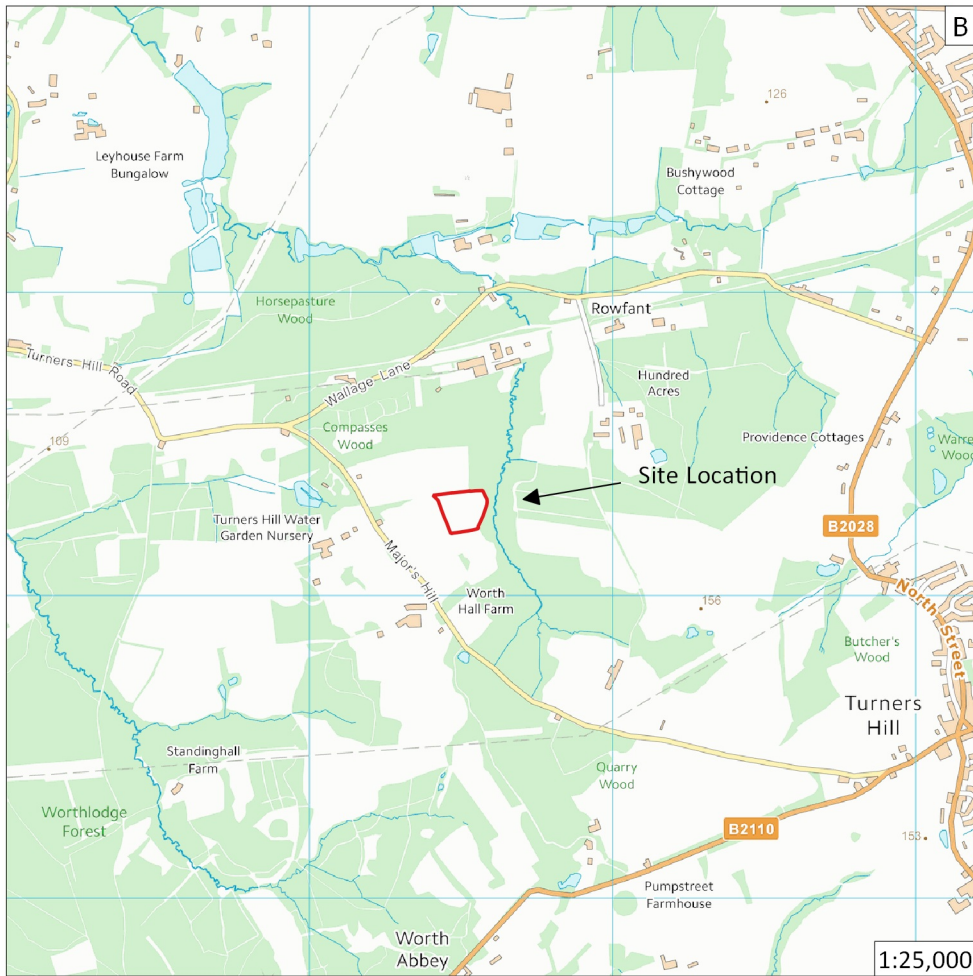
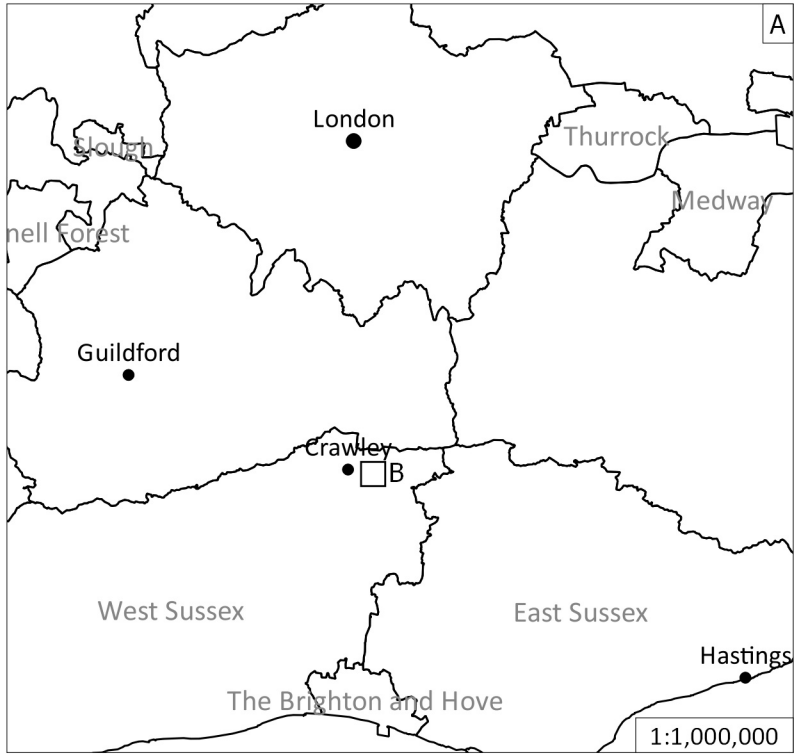
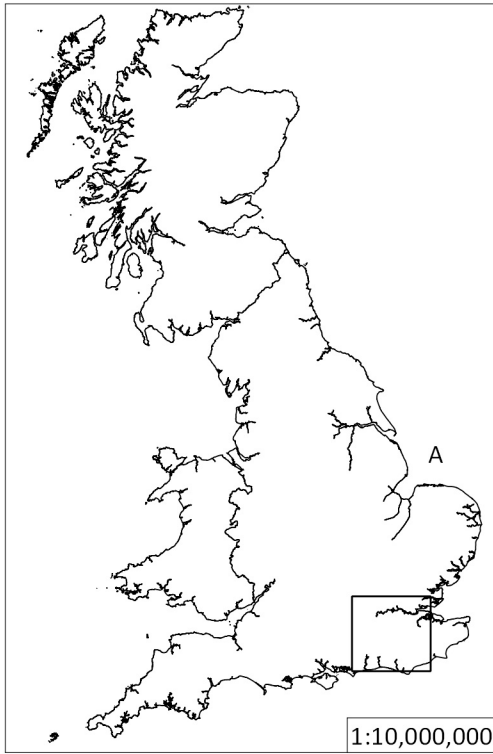
English Heritage, 2008, *Geophysical Survey in Archaeological Field Evaluation*. English Heritage

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

THPC, 2001, *Turners Hill Village Design Statement*, Turners Hill Parish Council

Williams A. & Martin G. H., 2002, *Domesday Book: A complete translation*, Alecto Historical Editions, London





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

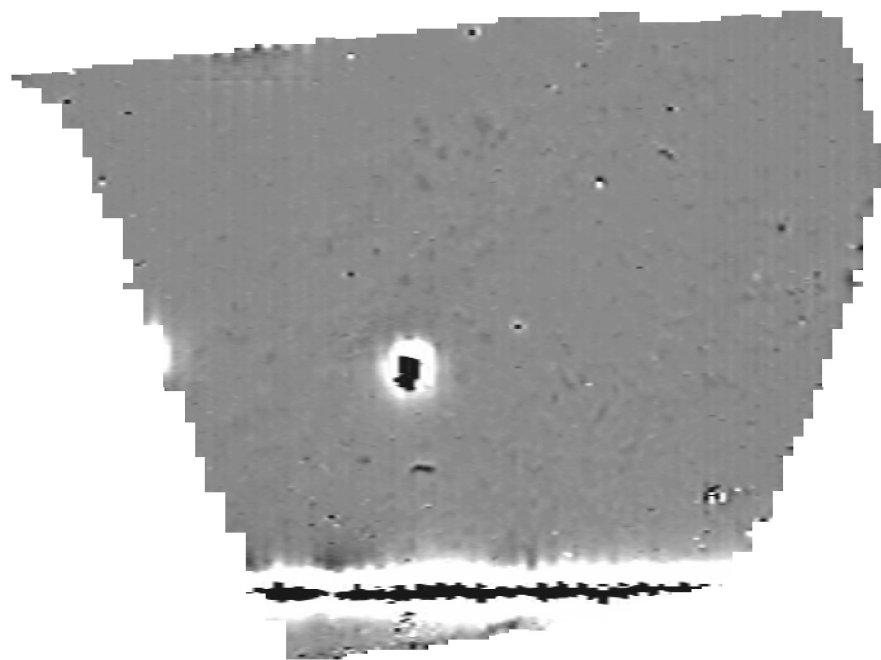
© Crown copyright 2000. All rights reserved. Licence Number 100047330

Site Code	THTH 15
Scale	1:10,000,000 1:1,000,000 1:25,000 @ A4
Drawn by	R Evershed
Date	12/05/15

**Allenarchaeology**

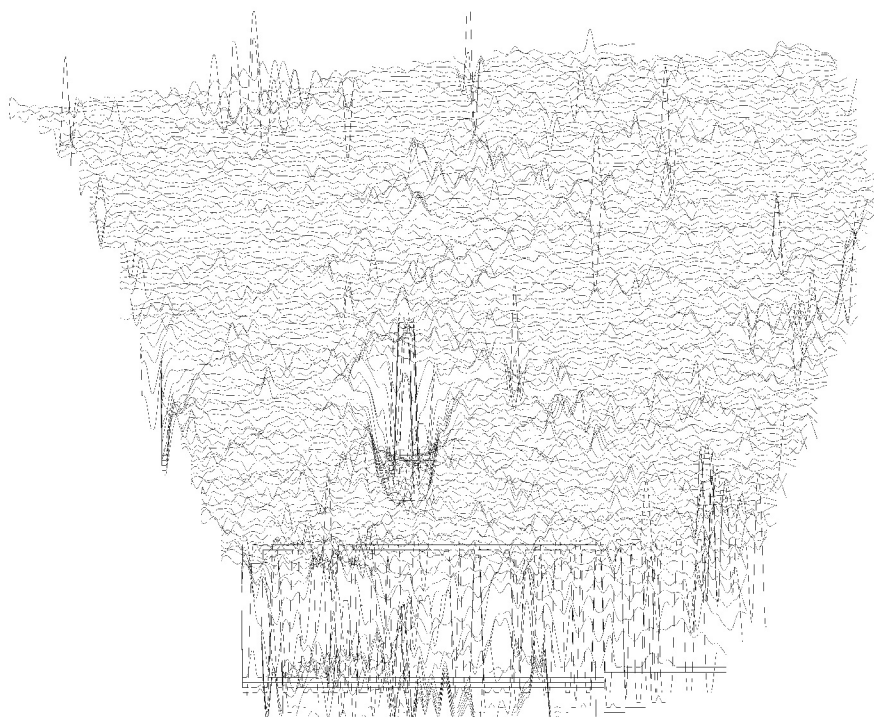
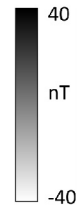
- Lincoln
- Birmingham
- Cambridge
- Southampton

www.allenarchaeology.co.uk

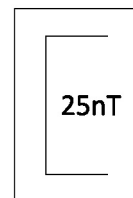


N  
↑

Key



Key



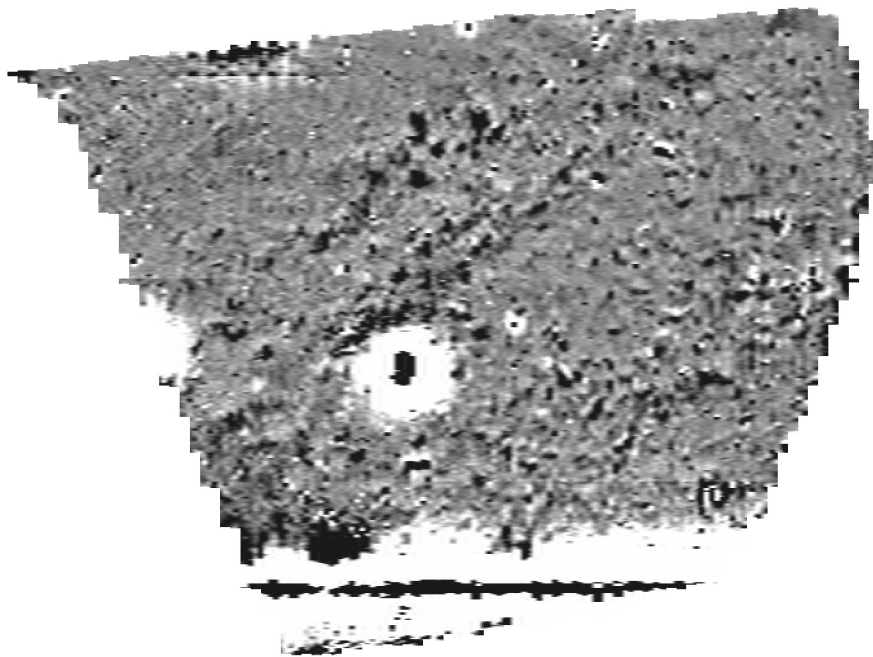
Site Code	THTH 15
Scale	1:1,500 @ A4
Drawn By	Robert Evershed
Date	12/05/2015

Allenarchaeology

-  Lincoln
- Birmingham
- Cambridge
- Southampton

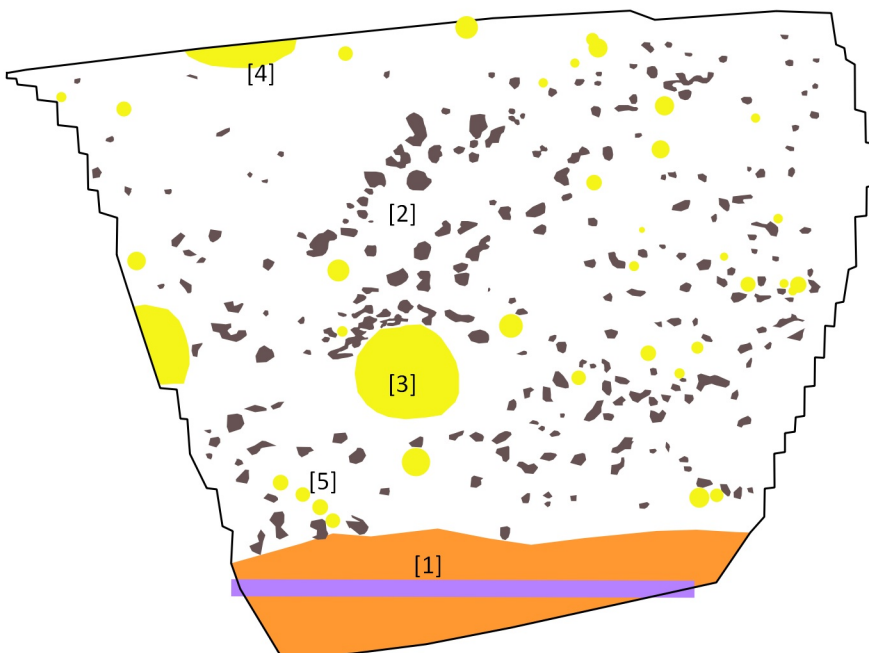
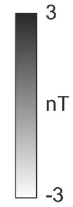
[www.allenarchaeology.co.uk](http://www.allenarchaeology.co.uk)

Figure 2: Greyscale raw data and processed trace plot



N  
↑

Key



Key

- Positive anomaly
- Magnetic noise
- Dipolar anomaly
- Linear dipolar anomaly
- Survey Boundary

Site Code	THTH 15
Scale	1:1,500 @ A4
Drawn By	Robert Evershed
Date	12/05/2015



Figure 3: Processed greyscale plot and interpretation

Allenarchaeology



Lincoln  
Birmingham  
Cambridge  
Southampton

www.allenarchaeology.co.uk

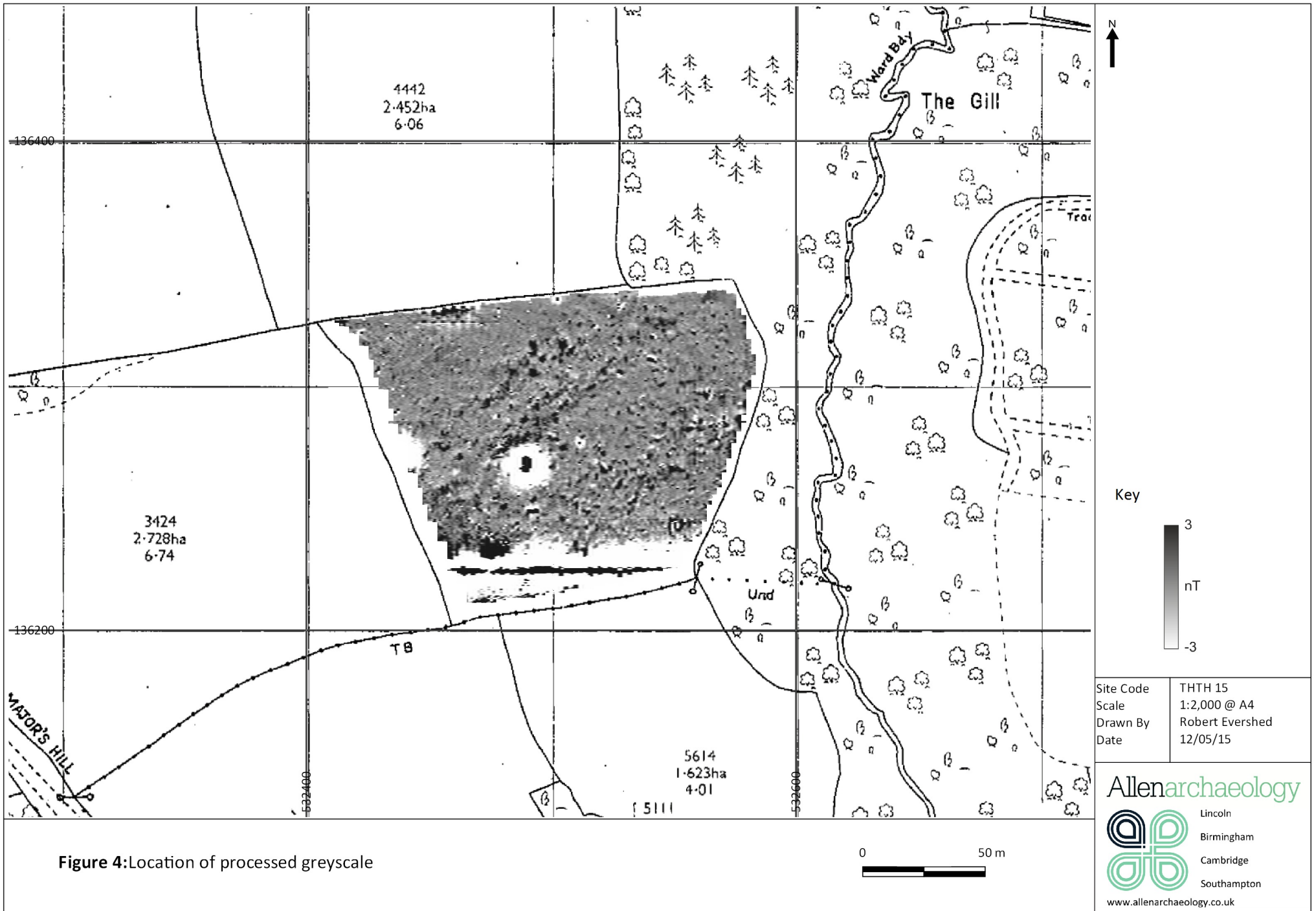


Figure 4: Location of processed greyscale

Site Code	THTH 15
Scale	1:2,000 @ A4
Drawn By	Robert Evershed
Date	12/05/15

**Allenarchaeology**

- Lincoln
- Birmingham
- Cambridge
- Southampton

www.allenarchaeology.co.uk



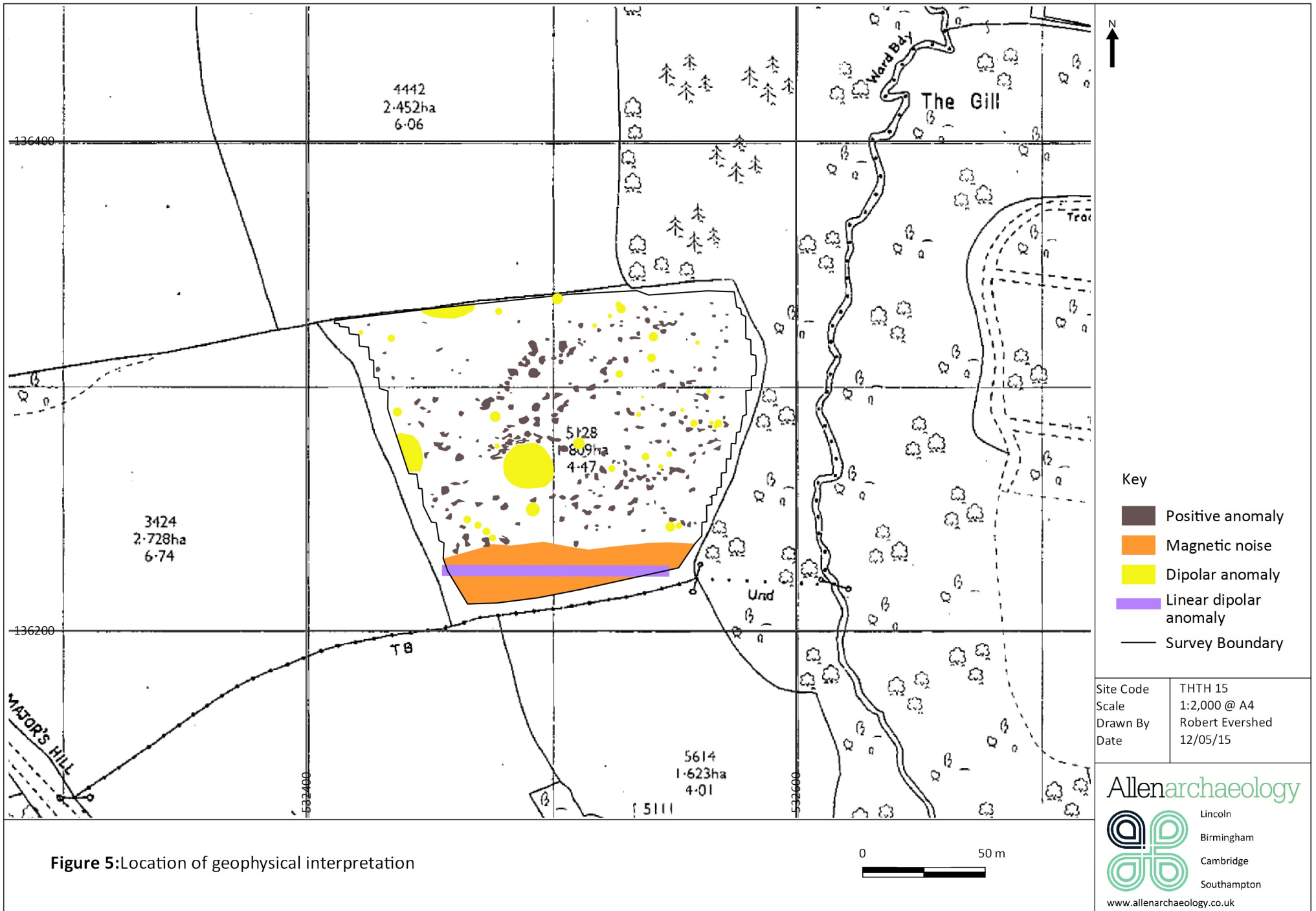


Figure 5: Location of geophysical interpretation

0 50 m



Allen Archaeology Limited  
Website: [www.allenarchaeology.co.uk](http://www.allenarchaeology.co.uk)

Company Registered in England and Wales No: 6935529

**Lincoln**  
**Whisby Lodge**  
**Hillcroft Business Park**  
**Whisby Road**  
**Lincoln**  
**LN6 3QL**

**Birmingham**  
Arion Business Centre  
Harriet House  
118 High Street  
Birmingham  
B23 6BG

**Cambridge**  
Wellington House  
East Road  
Cambridge  
CB1 1BH

**Southampton**  
International House  
Southampton International Business Park  
George Curl Way  
Southampton  
SO18 2RZ

Tel/Fax: +44 (0) 1522 685356  
Email: [info@allenarchaeology.co.uk](mailto:info@allenarchaeology.co.uk)

Tel/Fax: +44 (0) 800 610 2545  
Email: [birmingham@allenarchaeology.co.uk](mailto:birmingham@allenarchaeology.co.uk)

Tel/Fax: +44 (0) 800 610 2550  
Email: [cambridge@allenarchaeology.co.uk](mailto:cambridge@allenarchaeology.co.uk)

Tel: +44 (0) 800 610 2555  
Email: [southampton@allenarchaeology.co.uk](mailto:southampton@allenarchaeology.co.uk)