

ARCHAEOLOGICAL EVALUATION REPORT:
GEOPHYSICAL SURVEY BY MAGNETOMETRY
ON LAND WEST OF CHURCH COTTAGES, BRIGHTWELL STREET, BRIGHTWELL, SUFFOLK

Planning Reference: C/12/1628
NGR: TM 246 434
Historic Environment Record Site Code: BGL 048
AAL Site Code: BRCC 13
OASIS Reference Number: allenarc1-141034



Report prepared for Prime Irrigation Ltd

By
Allen Archaeology Limited
Report Number 2013005

January 2013



Allenarchaeology



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Cover image: General shot of site, facing east

Executive Summary

- A geophysical survey by magnetometer was undertaken by Allen Archaeology Limited on land west of Church Cottages, Brightwell Street in Brightwell, Suffolk for Prime Irrigation Limited to support a planning application for a proposed irrigation reservoir.
- The site lies within a landscape containing probable later prehistoric/Romano-British enclosures or field systems to the north and south of the site. In addition prehistoric artefacts have been recovered from the development area.
- The magnetometer survey has identified a number of linear anomalies across the study area following a broadly north – south direction but with sufficient variation in orientation to suggest a multi-phase landscape. A number of these are likely to relate to the later prehistoric/Romano-British cropmarks noted to the north and south of the site. A review of former Ordnance Survey mapping for the area shows the linears do not correlate with any known boundaries from the late 19th century onwards.
- There are a small number of irregularly-shaped positive anomalies that may represent earth-filled hollows, large pits or ponds, or possibly discrete dumps of magnetically-enhanced material in further linear features.
- Scattered randomly throughout the site are a number of strong and weak dipolar responses. The characteristic dipole response of pairs of positive and negative ‘spikes’ suggests near-surface ferrous metal or other highly fired material.
- The survey has identified a number of anomalies of potential archaeological interest, likely to reflect former landscape boundaries of an unknown date. Based on the results of the survey it is deemed likely that a programme of evaluation trenching will be necessary to intrusively investigate the site prior to development; however this could be undertaken post-determination of the planning application.

1.0 Introduction

- 1.1 A geophysical survey by magnetometer was undertaken by Allen Archaeology Limited on land west of Church Cottages, Brightwell Street in Brightwell, Suffolk. The works were commissioned by Prime Irrigation Limited to support a planning application for a proposed irrigation reservoir.
- 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*' (IFA Paper 6) and the Institute for Archaeologists '*Standard and guidance for archaeological geophysical survey*' (IfA 2011). Regional guidance and research frameworks was also followed, namely '*Research and Archaeology: A Framework for the Eastern Counties*' (Glazebrook 1997 and Brown and Glazebrook 2000), and '*Standards for field archaeology in the East of England*' (Gurney 2003), and a brief for the works (Tipper 2012).
- 1.3 The site is archaeologically sensitive, lying in an area of archaeological interest and potential.

2.0 Site Location and Description

- 2.1 Brightwell is located in Suffolk approximately 8.6km to the west of the centre of Ipswich, in the administrative district of Suffolk Coastal District Council. The proposed development area itself (hereafter referred to as 'the site') is c.2 hectares and is centred 0.52km northwest of the historic core of Brightwell, centred on NGR TM 246 434. The site is bordered by field boundaries to the north, west and south and open land and track to the east.
- 2.2 The bedrock geology comprises Red Crag Formation Sand, with no superficial deposits recorded (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>). The site slopes down to the south and lies at maximum height of c.23m above Ordnance Datum.

3.0 Planning Background

- 3.1 A planning application has been submitted to Suffolk Coastal District Council for a proposed irrigation reservoir (Reference C/12/1628). Due to the archaeological potential of the site, the Conservation Team at Suffolk County Council Archaeological Service (hereafter SCCAS/CT) has requested that a programme of archaeological evaluation be undertaken prior to determination of the application. The geophysical survey is the first, non-intrusive stage of that investigation, intended to inform the nature and extent of any further intrusive investigations that may be required to further characterise the archaeological resource.
- 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 brief prepared for the site states that the proposed development area has a high potential for archaeological remains of significance, with prehistoric artefacts noted within the development area, and undated but probable later prehistoric/Romano-British enclosures or field systems noted to the north and south of the site (Tipper 2012).

5.0 Methodology

5.0.1 The geophysical survey consisted of a detailed gradiometer survey of the entirety of the proposed development area that is available for survey, totalling approximately 2 hectares.

5.0.2 The fieldwork was carried out by a team of two experienced geophysicists from AAL over a period of two working days, Thursday 10th and Friday 11th January 2013. The site was divided into 30m by 30m grids, established on site with reference to local fixed boundaries and accurately tied into the National Grid with Ordnance Survey base mapping using a Leica GS08 Netrover receiving RTK corrections.

5.0.3 The survey was undertaken 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.

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

5.1 Summary of Survey Parameters

5.1.1 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:	0.1 nT
Processing software:	ArchaeoSurveyor 2.5
Surface conditions:	Wheat stubble and straw
Area surveyed:	2.1 ha
Date surveyed:	Thursday 10 th and Friday 11 th January 2013
Surveyor:	Robert Evershed
Survey assistants:	Iain Pringle
Data interpretation:	Robert Evershed and Mark Allen

5.2 Data Collection and Processing

5.2.1 The grids were marked out using tapes from the south-western edge of the copse on the northern boundary of the site. The collection of magnetic data using a north – south traverse pattern is preferable for a magnetic survey, as enhancements to the magnetic field caused by buried features is mapped increasingly stronger the closer the traverse direction can get to a magnetic north – south direction (Breiner 1999). On this occasion magnetic data was collected close to the preferred alignment due to the orientation of the survey grids. Data was collected by making successive parallel traverses across each grid in a zigzag pattern. Several key points of the survey grids were accurately tied into the National Grid with Ordnance Survey base mapping using a Leica GS08 Net rover receiving RTK corrections.

5.2.2 The data collected from the survey has been analysed using the current version of ArchaeoSurveyor 2.5. 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 (also known as Zero Mean Traverse or ZMT)
- Clipping

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 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 Magnetometer Survey Results (Figures 3 – 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; however it also includes all ferrous and other magnetically enhanced material within the study area, making the resulting greyscale image particularly 'noisy'. 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 The survey shows a broadly east-northeast to west-southwest trend across the entire site (example areas are shown as double-ended arrows on Figure 3), and these reflect the current ploughing regime.
- 6.3 Immediately noticeable in the data set are the numerous linear positive magnetic anomalies, with three main concentrations apparent [1] – [3], exhibiting various orientations across the site. These are likely to reflect anthropogenic activity within the field, possible former field systems or other boundaries, possibly including former trackways. The majority of the linear anomalies produced a low magnetic reading of 0 – 4nT/m.
- 6.4 There are a few amorphous positive anomalies within the data set, [4]. These have slightly larger magnetic signatures, -5 – 10nT/m, than the surrounding deposits, and are likely to be indicative of soil-filled hollows, large pits or former ponds. Some of the anomalies are relatively linear in form however, so may also reflect specific magnetically-enhanced dumps within further linear features.
- 6.5 An area of very high magnetic interference along part of the northern edge of the survey area, [5], is the result of metal fencing running around the copse to the north of the site.
- 6.6 There appears to be some geological variation apparent, leading to a change in the general magnetic background of the site. The contrasting variation has been shown by areas [6] (grey) and [7] (white).
- 6.7 A number of dipolar responses were detected across the survey area, with some examples highlighted as yellow circles on the interpretative plot (Figure 3). These are likely to be associated with ferrous waste or highly fired material within the ploughsoil.

7.0 Discussion and Conclusions

- 7.1 The site conditions proved receptive to geophysical surveying, and evidence for anthropogenic activity was forthcoming from across the survey area.
- 7.2 The magnetometer survey has identified a number of linear anomalies across the study area following a broadly north – south direction but with sufficient variation in orientation to suggest a multi-phase landscape. A number of these are likely to relate to the later prehistoric/Romano-British cropmarks noted to the north and south of the site. A review of former Ordnance Survey mapping for the area shows the linears do not correlate with any known boundaries from the late 19th century onwards.

- 7.3 There are a small number of irregularly-shaped positive anomalies that may represent earth-filled hollows, large pits or ponds, or possibly discrete dumps of magnetically-enhanced material in further linear features.
- 7.4 Scattered randomly throughout the site are a number of strong and weak dipolar responses. The characteristic dipole response of pairs of positive and negative 'spikes' suggests near-surface ferrous metal or other highly fired material.
- 7.5 The survey has identified a number of anomalies of potential archaeological interest, likely to reflect former landscape boundaries of an unknown date. Based on the results of the survey it is deemed likely that a programme of evaluation trenching will be necessary to intrusively investigate the site prior to development; however this could be undertaken post-determination of the planning application.

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 surveying was the prospection technique best suited to the identification of archaeological remains on the site. Other techniques would have required justification and may have proved too time consuming or cost-prohibitive.

9.0 Acknowledgements

- 9.1 Allen Archaeology would like to thank Prime Irrigation Limited for this commission.

10.0 References

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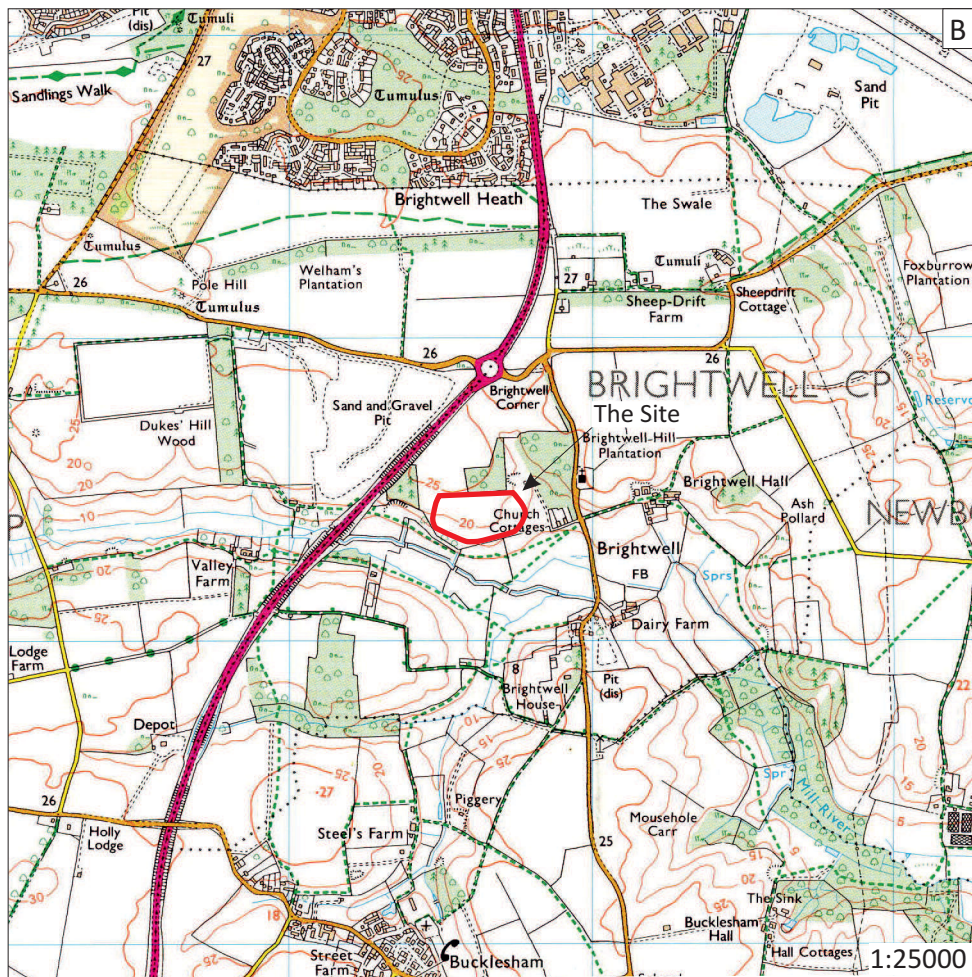
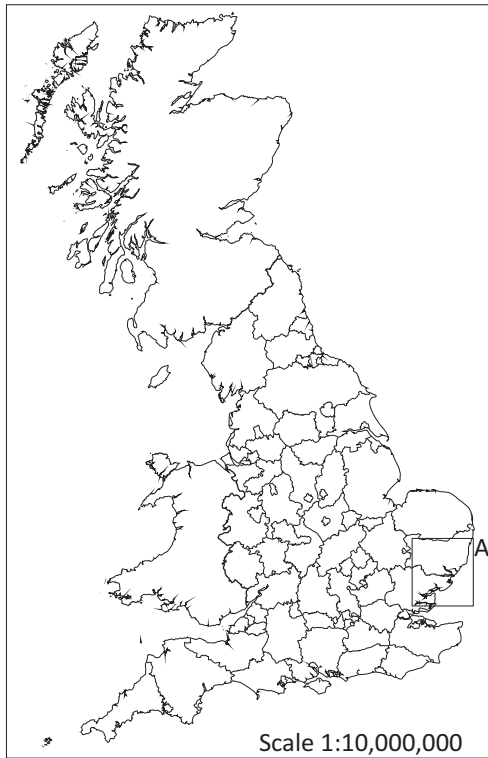


Figure 1: Site location outlined in red
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Site Code	BRCC 13
Scales	1:10,000,000 1:1,000,000 1:25,000 @ A4
Drawn by	R Evershed
Date	14/01/13

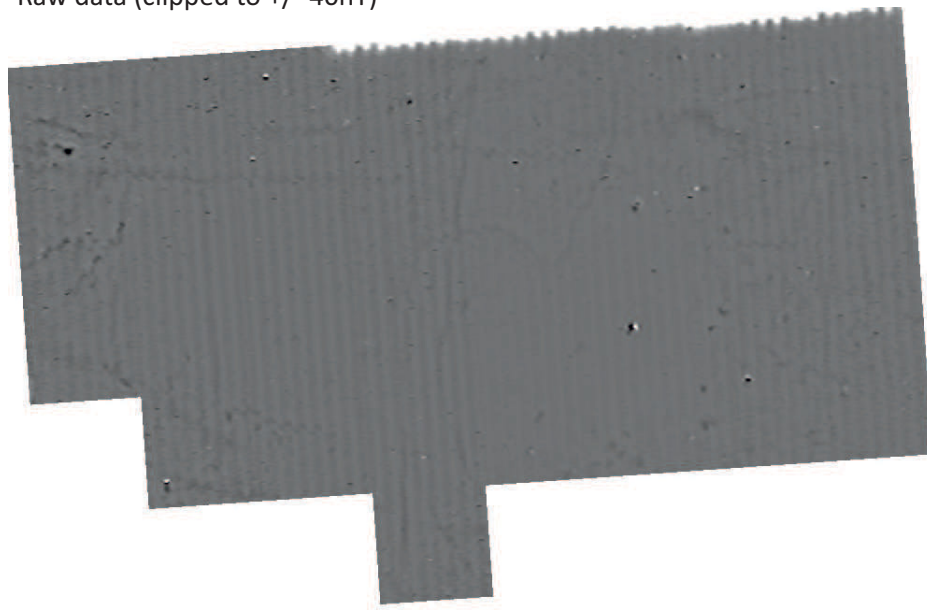
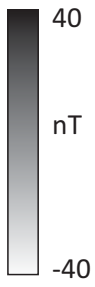
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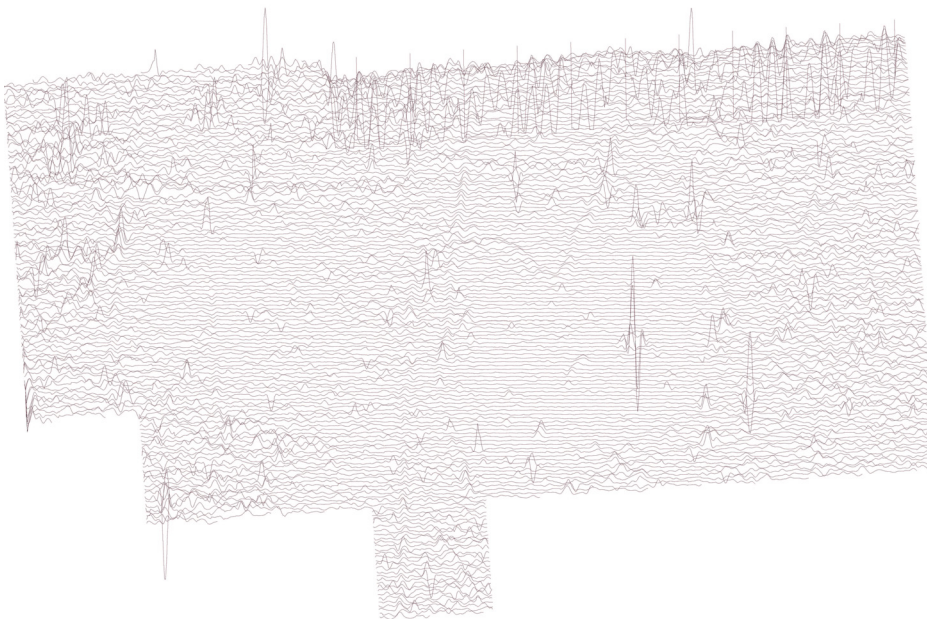


Raw data (clipped to +/- 40nT)



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

25nT



Site Code	BRCC 13
Scale	1:2000 @A4
Drawn by	Robert Evershed
Date	14/01/13

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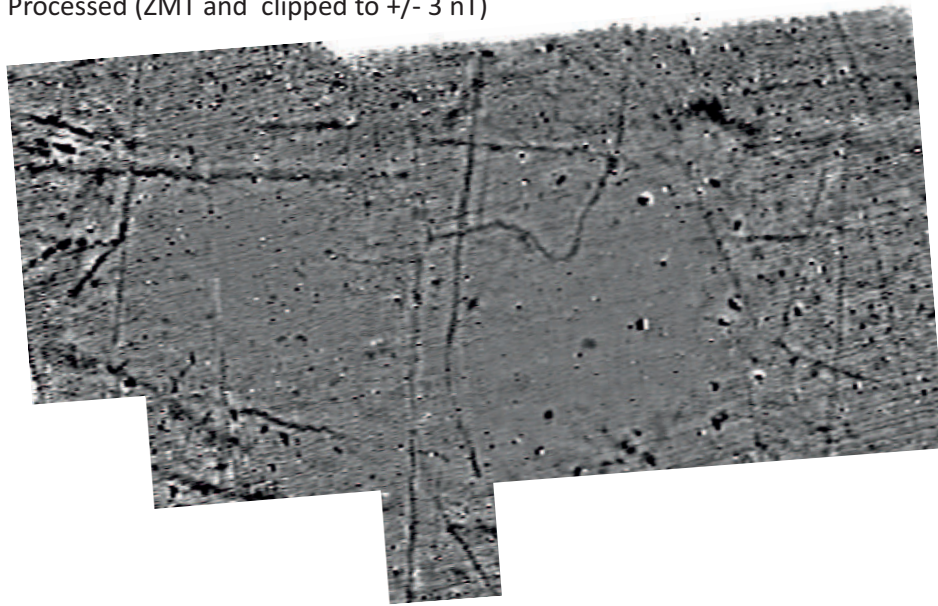
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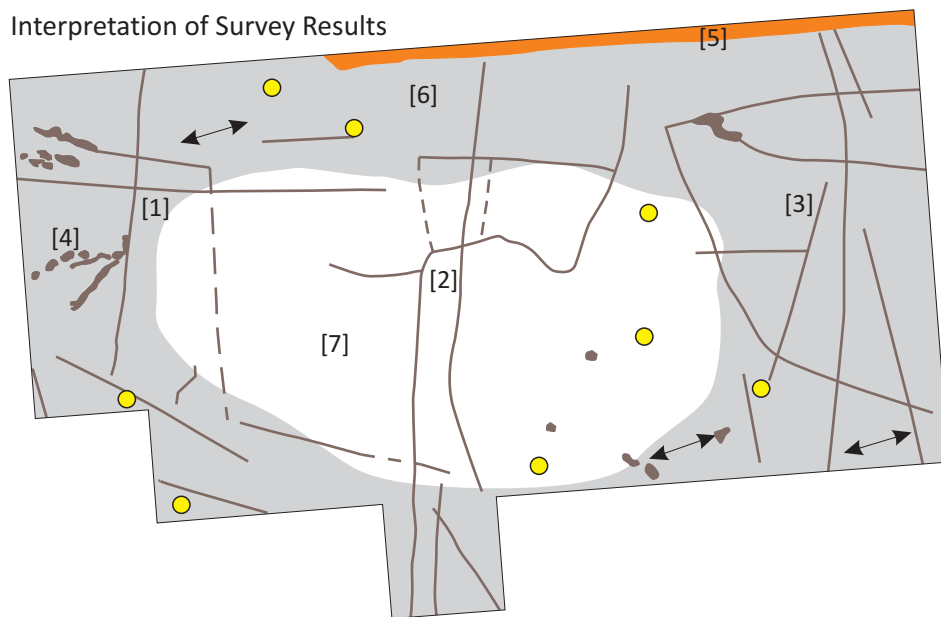
Figure 2: Greyscale raw data and processed trace plot








Processed (ZMT and clipped to +/- 3 nT)



Interpretation of Survey Results



- | | |
|---|--|
|  Area of magnetic interference |  Area of geological variation |
|  Positive magnetic anomaly |  Examples* of individual dipolar responses
Indicative of ferrous or highly fired material
<small>*smaller responses omitted for clarity</small> |
|  Current ploughing trend | |

Site Code	BRCC 13
Scale	1:2000 @A4
Drawn by	Robert Evershed
Date	14/01/13

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Figure 3: Processed greyscale plot of survey area with interpretation outlined in black

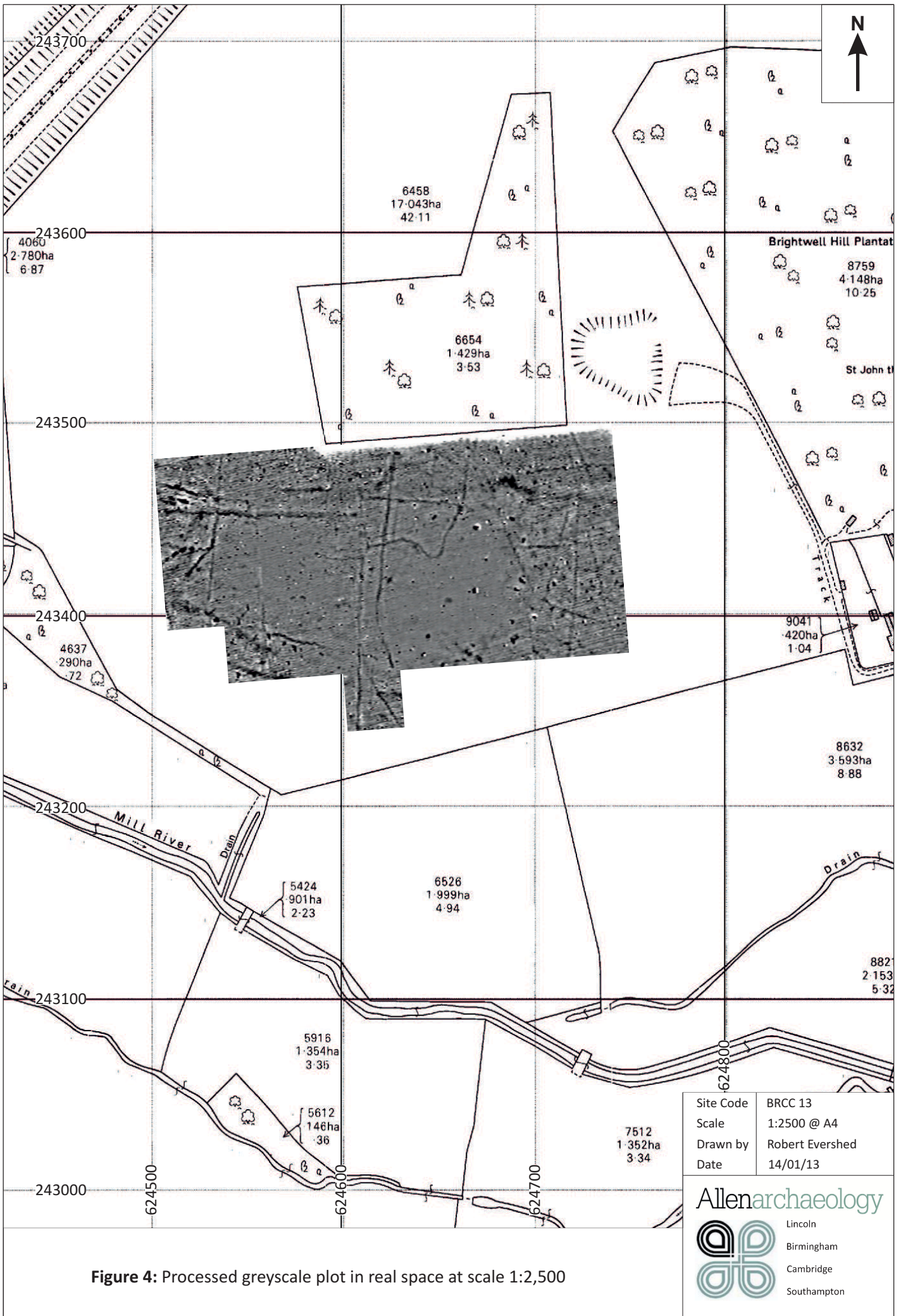


Figure 4: Processed greyscale plot in real space at scale 1:2,500

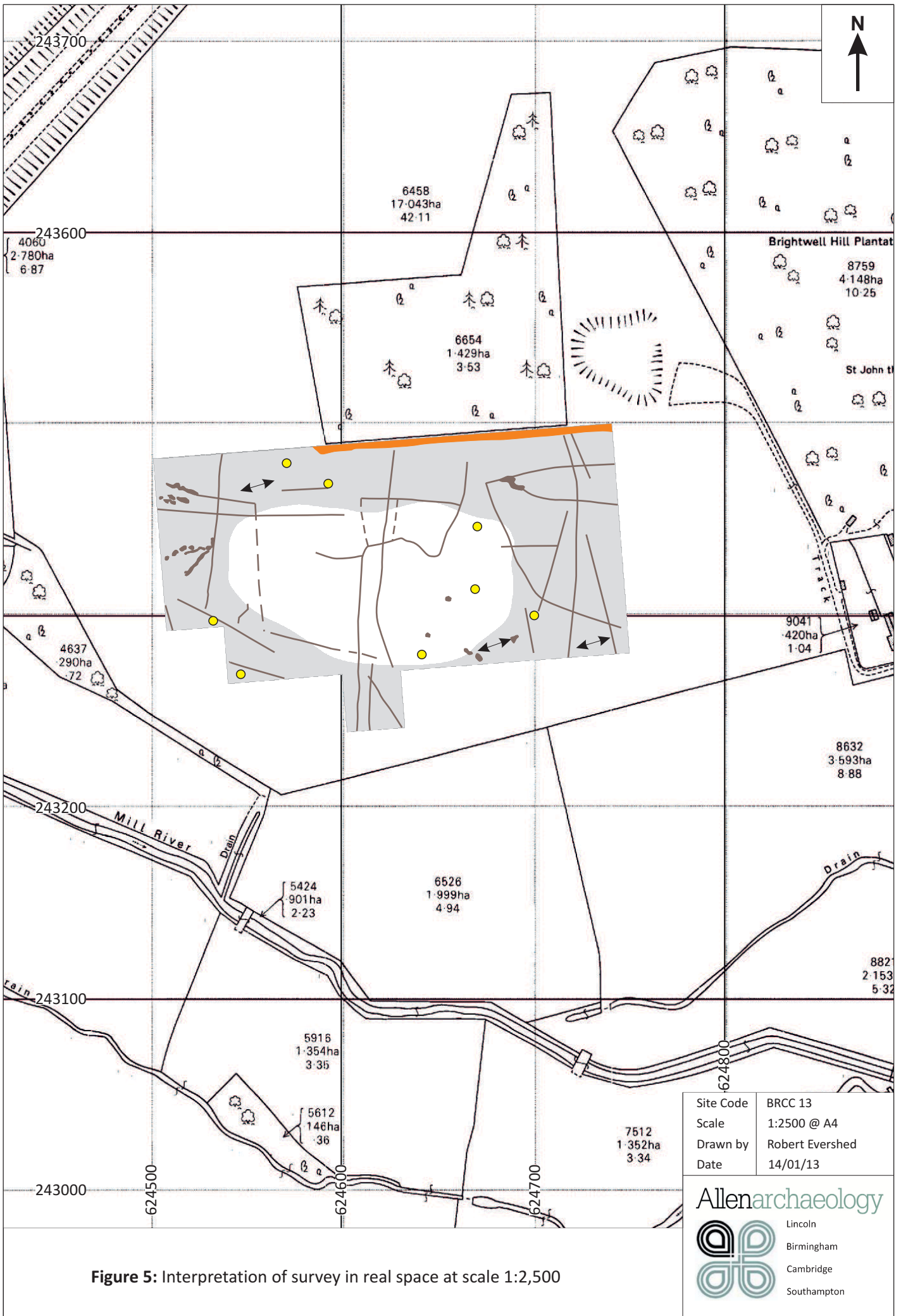


Figure 5: Interpretation of survey in real space at scale 1:2,500



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