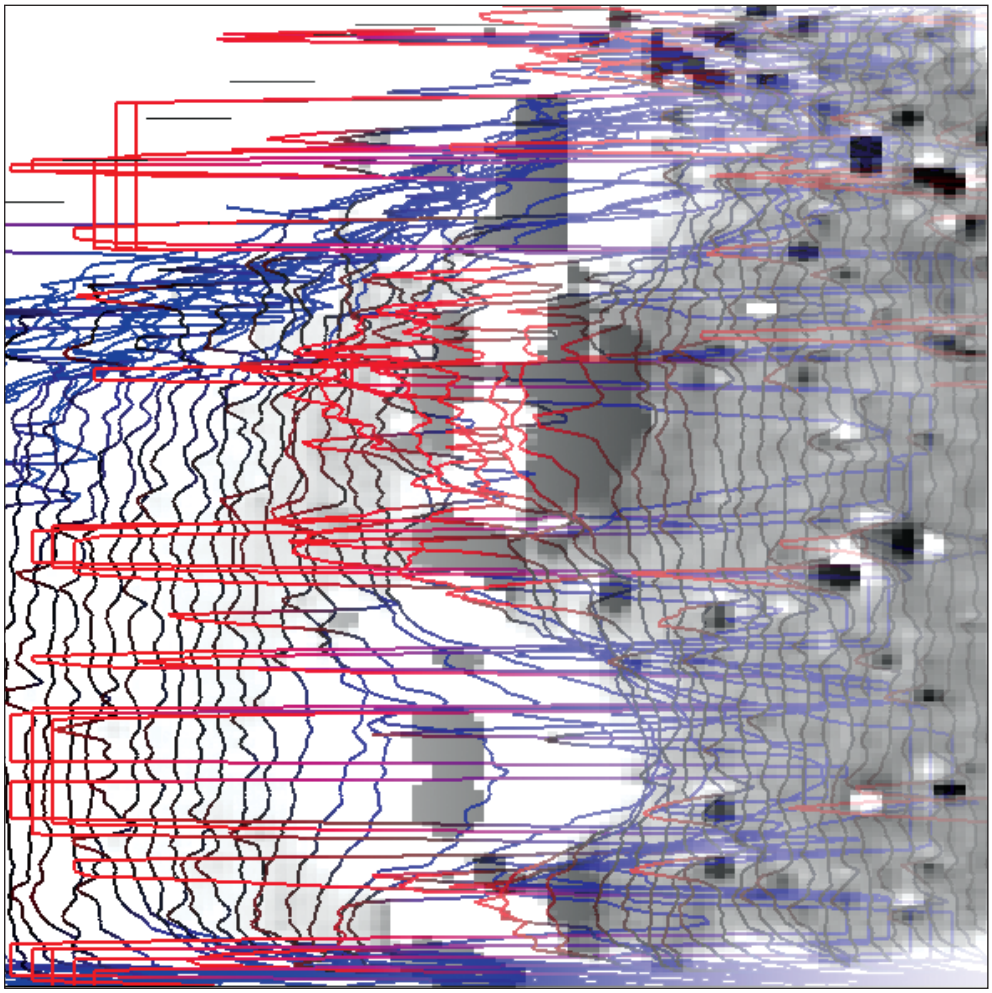
making sense of heritage

Dogs Trust Rehoming Centre, Newbury, Berkshire

Detailed Gradiometer Survey Report



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heritage

Dogs Trust Rehoming Centre
Newbury, Berkshire

Detailed Gradiometer Survey Report

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* I= Internal Draft; E= External Draft; F= Final

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Dogs Trust Rehoming Centre
Newbury, Berkshire

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Summary

A detailed gradiometer survey was conducted over land at The Dogs Trust Rehoming Centre, Newbury, Hamstead Marshall Berkshire (centred on NGR 441400, 165300). The project was commissioned by The Dogs Trust with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features in support of a planning application (14/03366/FULMAJ).

The Site comprises of training and exercise fields surrounding The Dogs Trust Centre, covering an area of 2.8ha of which 1.3ha was surveyed due to adverse field conditions and a large proportion taken up by the buildings of The Dogs Trust. The geophysical survey was undertaken on 9th July 2015. The detailed gradiometer survey has demonstrated the presence of few anomalies of potential archaeological interest across the site.

The survey area is heavily dominated by areas of increased magnetic response and strong ferrous readings; however a small number of responses of possible archaeological interest can be identified. Those responses of archaeological interest include four possible pits and a single linear feature. Additionally a modern service has also been detected in the survey results.

Dogs Trust Rehoming Centre
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Detailed Gradiometer Survey Report

Acknowledgements

Wessex Archaeology would like to thank The Dogs Trust Limited for commissioning the geophysical survey. The assistance of Paul Wass is gratefully acknowledged in this regard. The Dogs Trust has commissioned this work as an additional component of investigation to augment the archaeological condition. The detailed gradiometer survey is not required as a component of the archaeological condition. The forthcoming programme of archaeological watching brief will benefit from this geophysical survey and, the additional survey data will add valuable insights to the Historic Environment Record (HER). Wessex Archaeology would like to thank The Dogs Trust in this regard.

The fieldwork was undertaken by Diana Chard and Elizabeth Richley. Jen Smith processed the geophysical data. Alistair Salisbury interpreted the dataset and wrote the report. The geophysical work was quality controlled by Paul Baggaley. Illustrations were prepared by Rob Goller. The project was managed on behalf of Wessex Archaeology by Simon Cleggett.

Dogs Trust Rehoming Centre
Newbury, Berkshire

Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by The Dogs Trust to carry out a geophysical survey at The Dogs Trust Rehoming Centre, Plumb Farm, Hamstead Marshall, Newbury, Berkshire (hereafter "the Site", centred on NGR 441400, 165300) (**Figure 1**). The survey forms part of an ongoing programme of archaeological works being undertaken in support of a planning application for the development of the Site.

1.1.2 The aim of the geophysical survey was to establish the presence/absence, extent and character of detectable archaeological remains within the survey area.

1.1.3 This report presents a brief description of the methodology followed by, the detailed survey results and the archaeological interpretation of the geophysical data.

1.2 Site location and topography

1.2.1 The Site is located in the centre of the village of Hamstead Marshall and 6km southwest of Newbury, in Berkshire.

1.2.2 The Site occupies an area of 2.8ha containing small parcels of land used for the training and exercise of dogs kept at The Trust. The Site is bounded by Holt Road to the northeast, agricultural land to the south and west with the buildings of The Dogs Trust central to the Site.

1.2.3 The Site is on a slight incline sloping from 110m above Ordnance Datum (aOD) at the south-western edge to approximately 100m aOD at the northern edge.

1.3 Soils and geology

1.3.1 The solid geology comprises Clays, Silts and Sands of the Lambeth Group with overlying superficial geological deposits of Beenham Grange Gravels and Sands (BGS 2015).

1.3.2 The soils underlying the Site are likely to consist of Drift over Mesozoic and Tertiary clay and loam of the 711g (Wickham 3) association (SSEW SE Sheet 6 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through gradiometer survey.

2 METHODOLOGY

2.1 Introduction

2.1.1 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team on the 9th July 2015. Field conditions at the time of the survey were good, with dry conditions throughout the period of survey. An overall coverage of 1.3 ha was achieved.

2.1.2 The survey was conducted in accordance with current best practice and to the guidance outlined in Management of Research Projects in the Historic Environment ('MoRPHE') (English Heritage 2008), the Chartered Institute for Archaeologists' Standards and Guidance for archaeological geophysical survey (CIfA 2014) and English Heritage's Guidelines Geophysical Survey in Archaeological Field Evaluation (English Heritage 2008) and Thesauri (2013)..

2.2 Method

2.2.1 Individual survey grid nodes were established at 30m x 30m intervals using a Leica Viva RTK GNSS instrument, which is precise to approximately 0.02m and therefore exceeds English Heritage recommendations (2008).

2.2.2 The detailed gradiometer survey was conducted using a Bartington Grad601-2 fluxgate gradiometer instrument, which has a vertical separation of 1m between sensors. Data were collected at 0.25m intervals along transects spaced 1m apart with an effective sensitivity of 0.03nT, in accordance with English Heritage guidelines (2008). Data were collected in the zigzag method.

2.2.3 Data from the survey was subject to minimal data correction processes. These comprise a zero mean traverse function (±5nT thresholds) applied to correct for any variation between the two Bartington sensors used, and a de-step function to account for variations in traverse position due to varying ground cover and topography. These two steps were applied throughout the survey area, with no interpolation applied.

2.2.4 Further details of the geophysical and survey equipment, methods and processing are described in **Appendix 1**.

3 GEOPHYSICAL SURVEY RESULTS AND INTERPRETATION

3.1 Introduction

3.1.1 The detailed gradiometer survey has identified magnetic anomalies across the Site, along with areas of increased magnetic response and a large amount of ferrous. Results are presented as a series of greyscale plots, XY plots and archaeological interpretations at a scale of 1:1500 (**Figures 2** to **4**). The data are displayed at -2nT (white) to +3nT (black) for the greyscale image and ±25nT at 25nT per cm for the XY trace plots.

3.1.2 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (**Figure 4**). Full definitions of the interpretation terms used in this report are provided in **Appendix 2**.

3.1.3 Numerous ferrous anomalies are visible throughout the dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.

3.1.4 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be present than have been identified through geophysical survey.

3.2 Gradiometer survey results and interpretation

3.2.1 A cluster of sub-circular positive anomalies have been identified on the north-eastern extent of the Site at **4000**. These have been interpreted as being possible pits or post-hole features due to their shape, form and magnetic signature. It is possible, however, that these anomalies are of natural geological origins.

3.2.2 A positive right-angled linear response has been identified to the south-west at **4001**. The anomaly extends briefly before appearing to terminate into a large mass of strong ferrous readings to the west and at the survey boundary to the south. It is not possible to ascertain whether it extends beyond the boundaries defined by the geophysical survey.

3.2.3 The linear trend seemingly connecting **4000** with **4001** is of uncertain origin and not coherent enough to interpret as possible archaeology. The trend at **4002** may be a continuation of this but it is not possible to be certain. However a clear linear depression in the grass was observed at this location.

3.2.4 **4003** shows the northernmost survey area. This is dominated by a strong band of ferrous readings that extend from the south-west to the north-east.

3.2.5 A further two sub-circular anomalies can be observed in the dataset at **4004** and **4006**. There appears to be no association with the other potential archaeology seen on the Site but they do have similar attributes to those seen at **4000** so can be interpreted as possible pits. It is possible, however, that these anomalies are of natural geological origins.

3.2.6 In the south-east of the Site at **4005**, a number of linear trends of uncertain origin are recorded. It is likely that the majority of these are the result of the current land use and occupation, or other modern activities, on the Site.

3.2.7 Areas of increased magnetic response at **4007** are of unknown provenance. Due to the proximity to modern buildings on the eastern extent of the anomaly it is possible that it is related to the construction of these structures.

3.3 Modern Services

3.3.1 Modern service **4006** is aligned NNE - SSW. The service appears to be ferrous pipe and both ends of the anomaly continue beyond the limits of the geophysical survey area. Any archaeology in the immediate vicinity may be obscured by this.

3.3.2 It is not clear from the geophysical data whether the service identified is in active use or not. It should also be noted that gradiometer survey may not detect all services present on Site. This report and accompanying illustrations should not be used as the sole source for service locations and appropriate equipment (e.g. CAT and Genny) should be used to confirm the location of buried services before any trenches are opened on Site.

4 CONCLUSION

4.1.1 The detailed gradiometer survey has been successful in detecting a small number of responses of potential archaeological interest in both the south and the central fields. However the presence of metal fencing and other modern interference, as well as dense undergrowth have limited the potential of this survey, with the majority of the survey area dominated by strong ferrous responses, areas of increased magnetic response and a modern service.

4.1.2 The anomalies of archaeological interest are primarily at **4000**, **4001**, **4004** and **4006** and may represent pit-like features. The right-angular feature at **4001** may represent a former field boundary or, conceivably, a corner of an enclosure, but without excavation we cannot be completely certain as to the nature of any of these features.

4.1.3 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be present than have been identified through geophysical survey.

5 REFERENCES

5.1 Bibliography

Chartered Institute for Archaeologists, 2014. Standard and Guidance for archaeological geophysical survey.

English Heritage, 2013. *English Heritage Thesauri,* [Online], Available: http://thesaurus.english-heritage.org.uk/frequentuser.htm [7th April 2015].

English Heritage, 2008.*Geophysical Survey in Archaeological Field Evaluation*. Research and Professional Service Guideline No 1, 2nd edition. Swindon: English Heritage.

English Heritage, 2009. *Management of Research Projects in the Historic Environment: The MoRPHE Project Manager's Guide.* Version 1.1. Swindon: English Heritage.

5.2 Cartographic and documentary sources

Soil Survey of England and Wales, 1983.*Sheet 6, Soils of South East England*. Ordnance Survey: Southampton.

5.3 Online resources

British Geological Survey, http://www.bgs.ac.uk [accessed July 2015]

APPENDIX 1: SURVEY EQUIPMENT AND DATA PROCESSING

Survey methods and equipment

The magnetic data for this project was acquired using a Bartington 601-2 dual magnetic gradiometer system. This instrument has two sensor assemblies fixed horizontally 1m apart allowing two traverses to be recorded simultaneously. Each sensor contains two fluxgate magnetometers arranged vertically with a 1m separation, and measures the difference between the vertical components of the total magnetic field within each sensor array. This arrangement of magnetometers suppresses any diurnal or low frequency effects.

The gradiometers have an effective resolution of 0.03nT over a ±100nT range, and measurements from each sensor are logged at intervals of 0.25m. All of the data are stored on an integrated data logger for subsequent post-processing and analysis.

Wessex Archaeology undertakes two types of magnetic surveys: scanning and detail. Both types depend upon the establishment of an accurate 20m or 30m site grid, which is achieved using a Leica Viva RTK GNSS instrument and then extended using tapes. The Leica Viva system receives corrections from a network of reference stations operated by the Ordnance Survey and Leica Geosystems, allowing positions to be determined with a precision of 0.02m in real-time and therefore exceed the level of accuracy recommended by English Heritage (2008) for geophysical surveys.

Scanning surveys consist of recording data at 0.25m intervals along transects spaced 10m apart, acquiring a minimum of 80 data points per transect. Due to the relatively coarse transect interval, scanning surveys should only be expected to detect extended regions of archaeological anomalies, when there is a greater likelihood of distinguishing such responses from the background magnetic field.

The detailed surveys consist of 20m x 20m or 30m x 30m grids, and data are collected at 0.25m intervals along traverses spaced 1m apart. These strategies give 1600 or 3600 measurements per 20m or 30m grid respectively, and are the recommended methodologies for archaeological surveys of this type (EH, 2008).

Data may be collected with a higher sample density where complex archaeological anomalies are encountered, to aid the detection and characterisation of small and ephemeral features. Data may be collected at up to 0.125m intervals along traverses spaced up to 0.25m apart, resulting in a maximum of 28800 readings per 30m grid, exceeding that recommended by English Heritage (2008) for characterisation surveys.

Post-processing

The magnetic data collected during the detail survey are downloaded from the Bartington system for processing and analysis using both commercial and in-house software. This software allows for both the data and the images to be processed in order to enhance the results for analysis; however, it should be noted that minimal data processing is conducted so as not to distort the anomalies.

As the scanning data are not as closely distributed as with detailed survey, they are georeferenced using the GPS information and interpolated to highlight similar anomalies in adjacent transects. Directional trends may be removed before interpolation to produce more easily understood images.

Typical data and image processing steps may include:

- Destripe – Applying a zero mean traverse in order to remove differences caused by directional effects inherent in the magnetometer;
- Destagger – Shifting each traverse longitudinally by a number of readings. This corrects for operator errors and is used to enhance linear features;
- Despike – Filtering isolated data points that exceed the mean by a specified amount to reduce the appearance of dominant anomalous readings (generally only used for earth resistance data)

Typical displays of the data used during processing and analysis:

- XY Plot – Presents the data as a trace or graph line for each traverse. Each traverse is displaced down the image to produce a stacked profile effect. This type of image is useful as it shows the full range of individual anomalies.
- Greyscale – Presents the data in plan view using a greyscale to indicate the relative strength of the signal at each measurement point. These plots can be produced in colour to highlight certain features but generally greyscale plots are used during analysis of the data.

APPENDIX 2: GEOPHYSICAL INTERPRETATION

The interpretation methodology used by Wessex Archaeology separates the anomalies into four main categories: archaeological, modern, agricultural and uncertain origin/geological.

The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided into three groups, implying a decreasing level of confidence:

- Archaeology – used when there is a clear geophysical response and anthropogenic pattern.
- Probable archaeology – used for features which give a clear response but which form incomplete patterns.
- Possible archaeology – used for features which give a response but which form no discernible pattern or trend.

The modern category is used for anomalies that are presumed to be relatively modern in date:

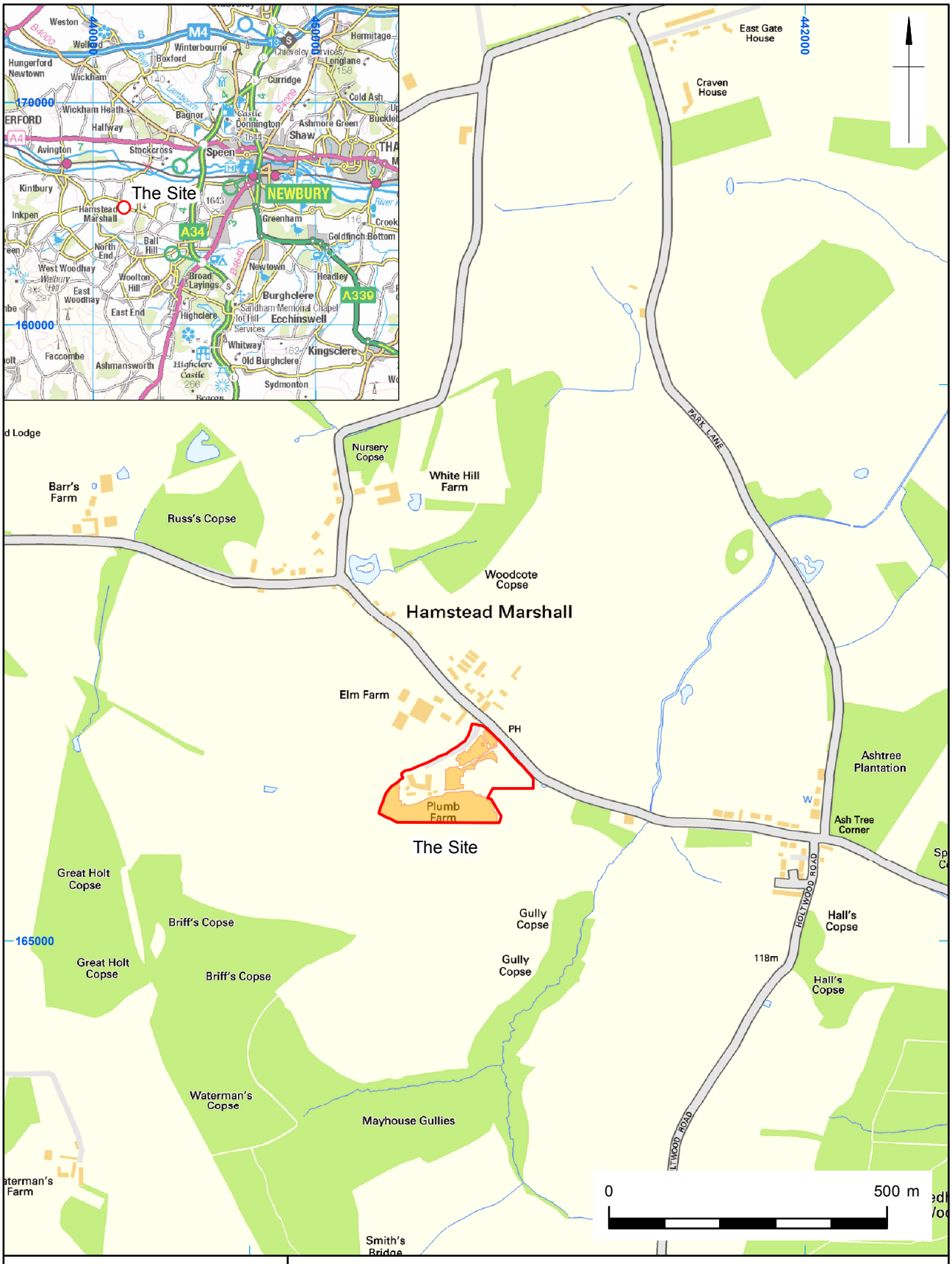
- Ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin.
- Modern service – used for responses considered relating to cables and pipes; most are composed of ferrous/ceramic material although services made from non-magnetic material can sometimes be observed.

The agricultural category is used for the following:

- Former field boundaries – used for ditch sections that correspond to the position of boundaries marked on earlier mapping.
- Agricultural ditches – used for ditch sections that are aligned parallel to existing boundaries and former field boundaries that are not considered to be of archaeological significance.
- Ridge and furrow – used for broad and diffuse linear anomalies that are considered to indicate areas of former ridge and furrow.
- Ploughing – used for well-defined narrow linear responses, usually aligned parallel to existing field boundaries.
- Drainage – used to define the course of ceramic field drains that are visible in the data as a series of repeating bipolar (black and white) responses.

The uncertain origin/geological category is used for features when the form, nature and pattern of the anomaly are not sufficient to warrant a classification as an archaeological feature. This category is further sub-divided into:

- Increased magnetic response – used for areas dominated by indistinct anomalies which may have some archaeological potential.
- Trend – used for low amplitude or indistinct linear anomalies.
- Superficial geology – used for diffuse edged spreads considered to relate to shallow geological deposits. They can be distinguished as areas of positive, negative or broad bipolar (positive and negative) anomalies.



Site boundary

Survey extent

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Site location and survey extents

Figure 1

441300

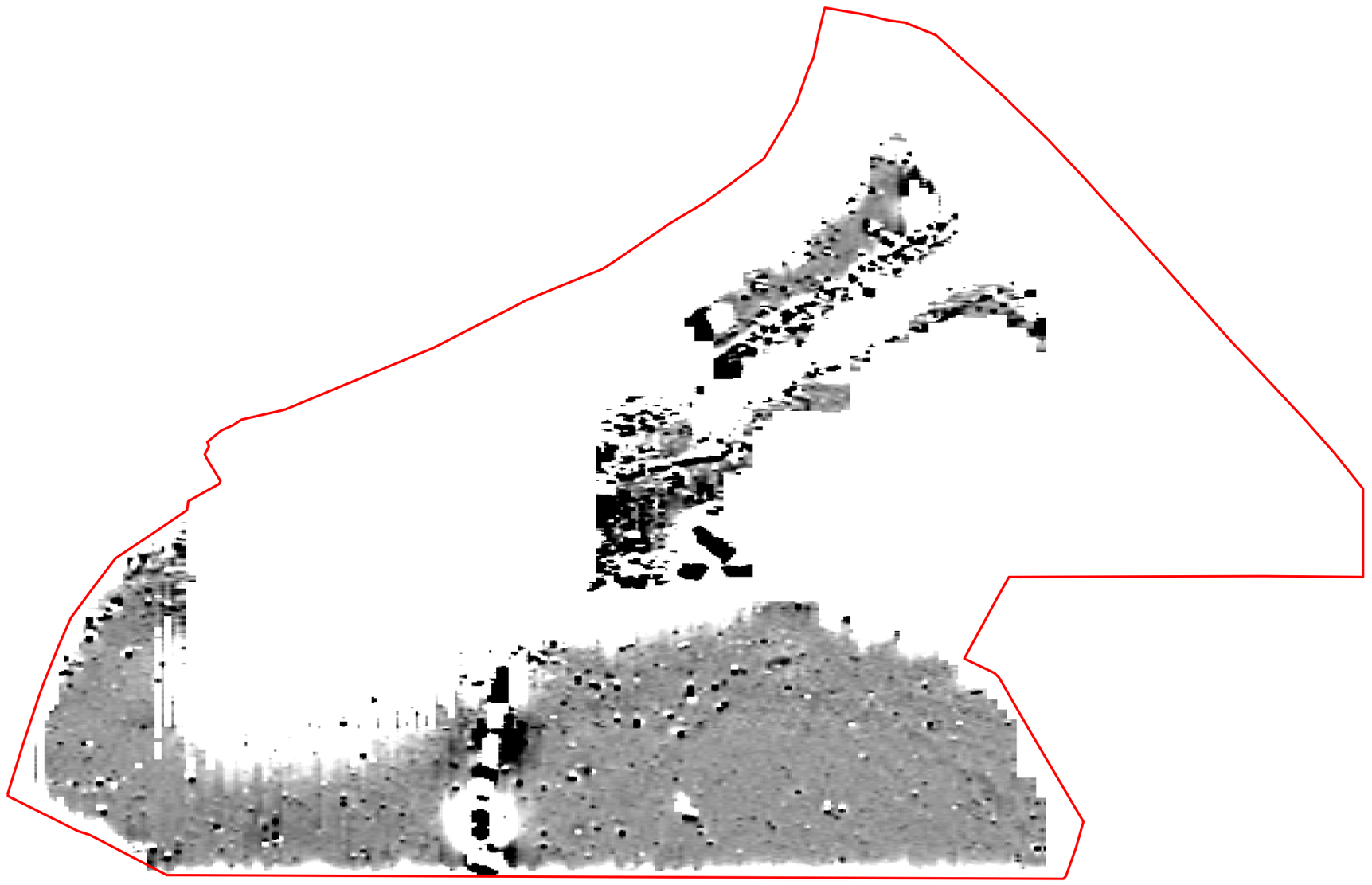
441400

441500

165400

165300

165200



Site_Boundary

+3nT

-2nT

0 50 m

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Greyscale plot

Figure 2

441300

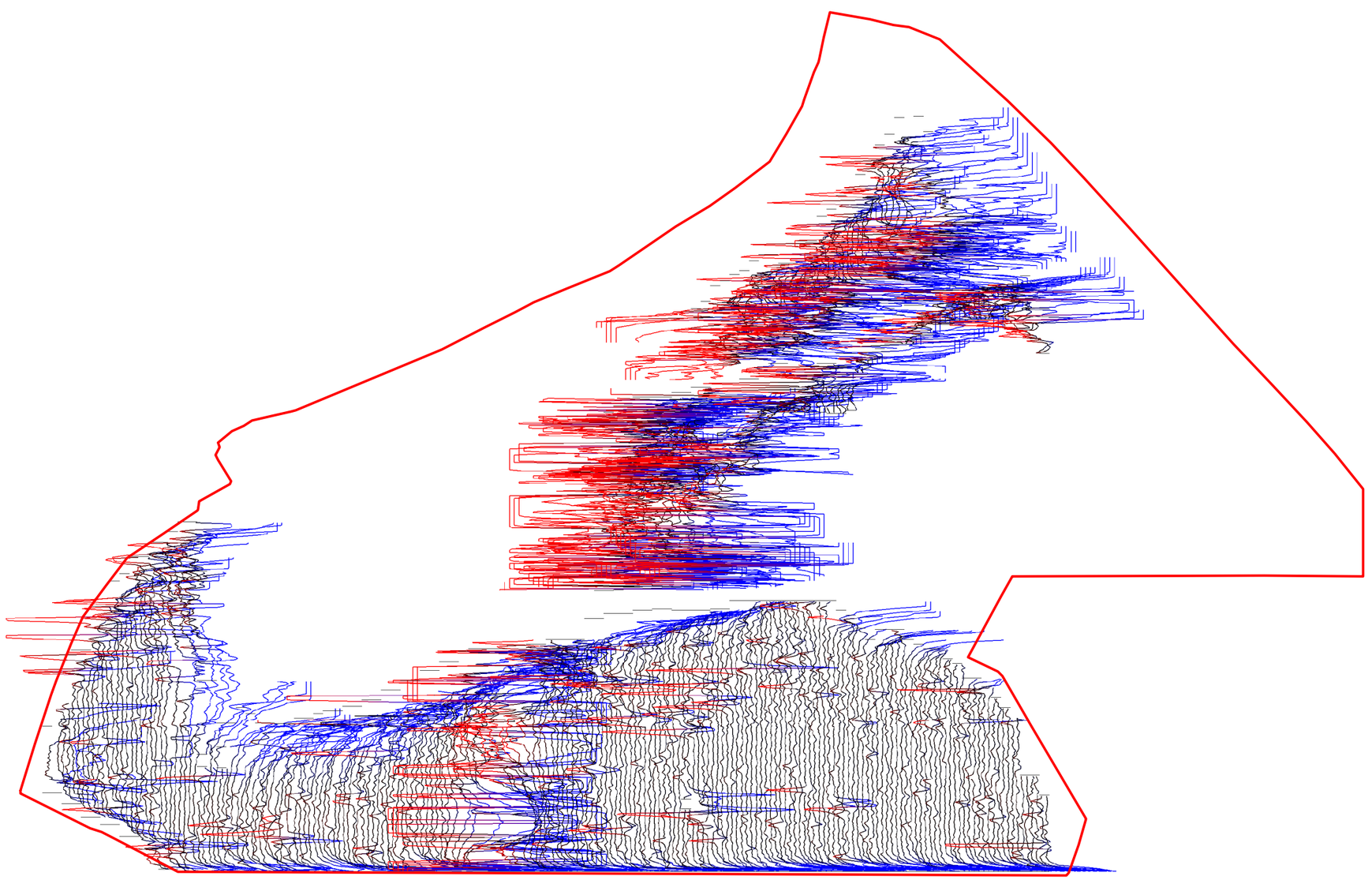
441400

441500

165400

165300

165200



0 50 m

Site_Boundary

+25nT

-25nT

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MXD\2015_07_27\T20536_Geophys_Fig02.mxd	

XY Trace plot

Figure 3

441300
441400
441500
165400
165300
165200
4003
4000
4001
4002
4007
4004
4006
4005
0
50 m
Site_Boundary
Survey extents
Possible archaeology
Modern service
Trend
Ferrous
Increased magnetic response

Date:	27/07/2015
Revision Number:	0
Scale:	1:1000 at A3
Illustrator:	RG
Path:	X:\TENDERS\T20536\GIS\Figs
MXD\2015_07_27\T20536_Geophys_Fig02.mxd	

Archaeological Interpretation

Figure 4

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