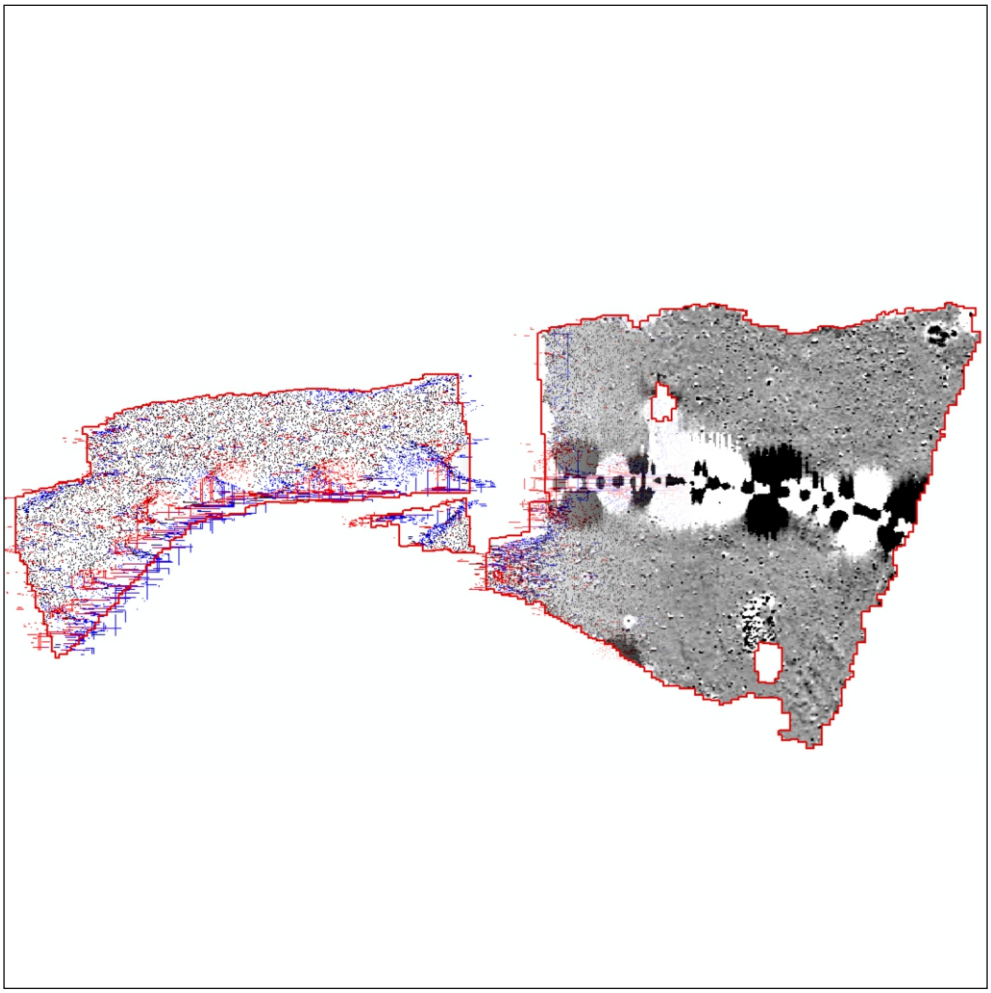
making sense of heritage

Land at Fields Farm
Rownhams, Hampshire

Detailed Gradiometer Survey Report



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geoservices

Land at Fields Farm, Rownhams, Hampshire

Detailed Gradiometer Survey Report

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Summary

Wessex Archaeology was commissioned by Rownhams Promotions Limited to undertake a detailed gradiometer survey of land at Fields Farm, Rownham, Hampshire (centred on NGR 438870, 116850). The aim of the work was to establish the presence, or otherwise, and nature of detectable archaeological features on the site as part of a programme of archaeological works ahead of proposed residential development at the Site.

The site is located on the eastern edge of the village of Rownhams, 3km south of the centre of North Baddesley and 5.8km northwest of the centre of Southampton. The site lies on a shallow, easterly sloping incline and comprises one field under pasture located to the east of Fields Farm, one arable field north of Bakers Drove and a small paddock in between the two.

Detailed gradiometer survey was undertaken over all accessible parts of the site, a total of 5.2ha. The southern portion of the survey area was unable to be surveyed, being covered by a mature wood. The geophysical survey has demonstrated the presence of a few anomalies of possible archaeological significance and numerous trends of uncertain, possibly agricultural, origin. Several spreads of superficial geology, ploughing trends and a large modern service run centrally through the site.

The survey was undertaken between the 8th and 9th December 2014.

Land at Fields Farm, Rownhams, Hampshire

Detailed Gradiometer Survey Report

Acknowledgements

The detailed gradiometer survey was commissioned by Rownham Promotions Limited and Wessex Archaeology is grateful to James Bromhead in this regard.

The fieldwork was carried out by Patrick Dresch and Alistair Salisbury. The geophysical data was processed and interpreted by Alistair Salisbury along with writing this report. The geophysical work was quality controlled by Ross Lefort and Dr Paul Baggaley. Illustrations were prepared by Alistair Salisbury and Karen Nichols. The project was managed on behalf of Wessex Archaeology by Caroline Budd.

Land at Fields Farm, Rownhams, Hampshire

Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project Background

1.1.1 Wessex Archaeology was commissioned by Rownhams Promotions Limited to carry out a programme of geophysical survey over land at Fields Farm, Rownhams, Hampshire (**Figure 1**) hereafter "the Site" (centred on NGR 438870, 116850). The survey forms part of an ongoing programme of archaeological works being undertaken ahead of proposed residential development at 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 Geophysical survey was recommended due to the potential for the presence of buried archaeological remains, in particular relating to the projected course of the Otterbourne-Stoney Cross Roman Road, and the Saxon to medieval parish boundary running along the northern boundary of the Site (Wessex Archaeology 2014).

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

1.2 Site Location and Topography

1.2.1 The Site comprises an irregular parcel of land surrounding the lane Bakers Drove off Rownhams Road North. It lies directly to the east of the village of Rownhams, Hampshire and is located approximately 700m south of the M27 and 5km northwest of the centre of Southampton (**Figure 1**). The survey area is bounded by field boundaries to the north with the village of Rownhams to the west with mature woodland defining the southern and eastern boundaries. Detailed gradiometer survey was undertaken over all accessible parts of the Site, a total of 5.2ha subdivided into three fields.

1.2.2 The survey area lies on a shallow, easterly sloping incline from an approximate elevation of 60m above Ordnance Datum (aOD) at the western extent to just under 50m aOD on the eastern boundary.

1.3 Soils and Geology

1.3.1 The bedrock geology under the Site is composed of a mix of clay, silt and sand deposits. The London Clay (LC) formation of the Thames Group (THAM) defines the western and central areas with the Nursling Sand (NS) member extending through the very eastern extent. The only superficial deposits noted on the Site are river traces of sand and gravel sediments that date to the Quaternary (BGS).

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

2 METHODOLOGY

2.1 Introduction

2.1.1 The detailed magnetometer survey was conducted using Bartington Grad601-2 dual fluxgate gradiometer systems. The survey was conducted in accordance with English Heritage guidelines (2008).

2.1.2 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team on the 8th and 9th December 2014. Field conditions at the time of the survey were mixed, ranging from firm to soft conditions under foot. In total the geophysical survey covered 5.2ha.

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 magnetometer 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 EH guidelines (2008). Data were collected in the zigzag method.

2.2.3 Data from the survey were subject to minimal data correction processes. These comprise a Zero Mean Traverse (ZMT) 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. The deslope function was used to account for errors in the ZMT function and to remove grid edge discontinuities. These three steps were applied to all survey areas, 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 gradiometer survey has identified a few anomalies of possible archaeological interest along with areas of magnetic disturbance and ploughing trends. Results are presented as a series of greyscale and 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 greyscales and ±25nT at 25nT per cm for the XY traces.

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 detailed survey dataset. These are presumed to be modern in provenance although they may relate to any historic agricultural activity in the area.

3.2 Gradiometer Survey Results and Interpretation

3.2.1 The Site is dominated by ferrous responses from a modern service running approximately east-west across the area from **4000** to south of **4006**; this service will be discussed in more detail below (Section 3.3). The spread of ferrous covering the modern service is

easily strong enough to mask any weaker archaeological features that may be present at the Site in this area.

3.2.2 In areas either side of the modern service where ferrous coverage is not total there are a small number of approximately circular anomalies that are interpreted as possible archaeology. These all come in the form of low, positively magnetised features which may resemble post holes or pits. Three have been identified and are located at **4000**, **4006** and **4007**. They are weak, isolated and relatively small and do not form any particular concentration or distribution.

3.2.3 There are numerous weak linear and curvilinear trends present across the Site, such as at **4002** and **4005**, it is unclear whether these are coincidental patterns in the data, from natural variations in the soil or if they represent the faded impression of more significant features such as ditches. They have been identified as of uncertain origin but are likely to relate to agricultural practices.

3.2.4 A number of weakly magnetised trends at **4000** and **4001** orientated parallel to the northern field boundary may be suggestive of past agricultural activity. Their regular spacing and common alignment both suggest that these are ploughing scars.

3.2.5 At **4002** the ploughing scars are seen to change direction from E-W to N-S following the eastern border.

3.2.6 **4003** is the location of pasture in a paddock with a small, modern breezeblock building located in the northwest corner, no anomalies of archaeological interest have been identified here only ferrous responses presumed to be of modern origin.

3.2.7 The easternmost field shows two main orientations of ploughing; NW-SE and NE-SW which can be seen most prominently at **4005** and **4006** respectively. These may be of modern or historic significance.

3.2.8 Large areas of increased magnetic response to the northeast of **4000** and at **4006** may indicate gravel deposits in the superficial geology or other activity in relation to the building of the modern service.

3.2.9 **4007** describes the lowest point above Ordnance Datum (aOD) in the survey area. The geological anomaly here may denote alluvial deposits.

3.3 Gradiometer Survey Results and Interpretation: Modern Services

3.3.1 A large modern service has been identified and it is orientated approximately E-W across the Site.

3.3.2 It should 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, if required, are excavated on Site.

4 DISCUSSION

4.1 Summary

4.1.1 The detailed gradiometer survey has been successful in detecting a few anomalies of possible archaeological interest in the form of three weakly magnetised post hole or pit features. It has also been successful in detecting spreads of increased magnetic response, superficial geology and a large modern service central to the Site.

4.1.2 The three possible archaeological anomalies identified are extremely small and it should be stressed that it is equally likely that these may be geological in origin.

4.1.3 The linear and curvilinear trends that are seen across the dataset are of uncertain origin but are likely to relate to agricultural practices.

4.1.4 The relative dimensions of the modern service, as identified by the gradiometer survey, are indicative of the strength of its magnetic response. This is dependent upon the materials used in its construction and the backfill of the associated service trench. The physical dimensions of the service indicated may therefore differ from their magnetic extent in plan; it is assumed that the centreline of service is coincident with the centreline of the anomaly, however. Similarly it is difficult to estimate the depth of burial of the service through gradiometer survey.

4.1.5 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 encountered than have been identified through geophysical survey.

5 REFERENCES

5.1 Bibliography

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

Wessex Archaeology 2014. *Land at Fields Farm, Rownhams, Hampshire: Archaeological Desk-Based Assessment* Report Reference 106930.01

5.2 Cartographic Sources

British Geological Survey
http://www.bgs.ac.uk/discoveringgeology/geologyofbritain/viewer.html

Soil Survey of England and Wales (SSEW), 1983: *Sheet 6, Soils of South West England*. Ordnance Survey: Southampton.

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:

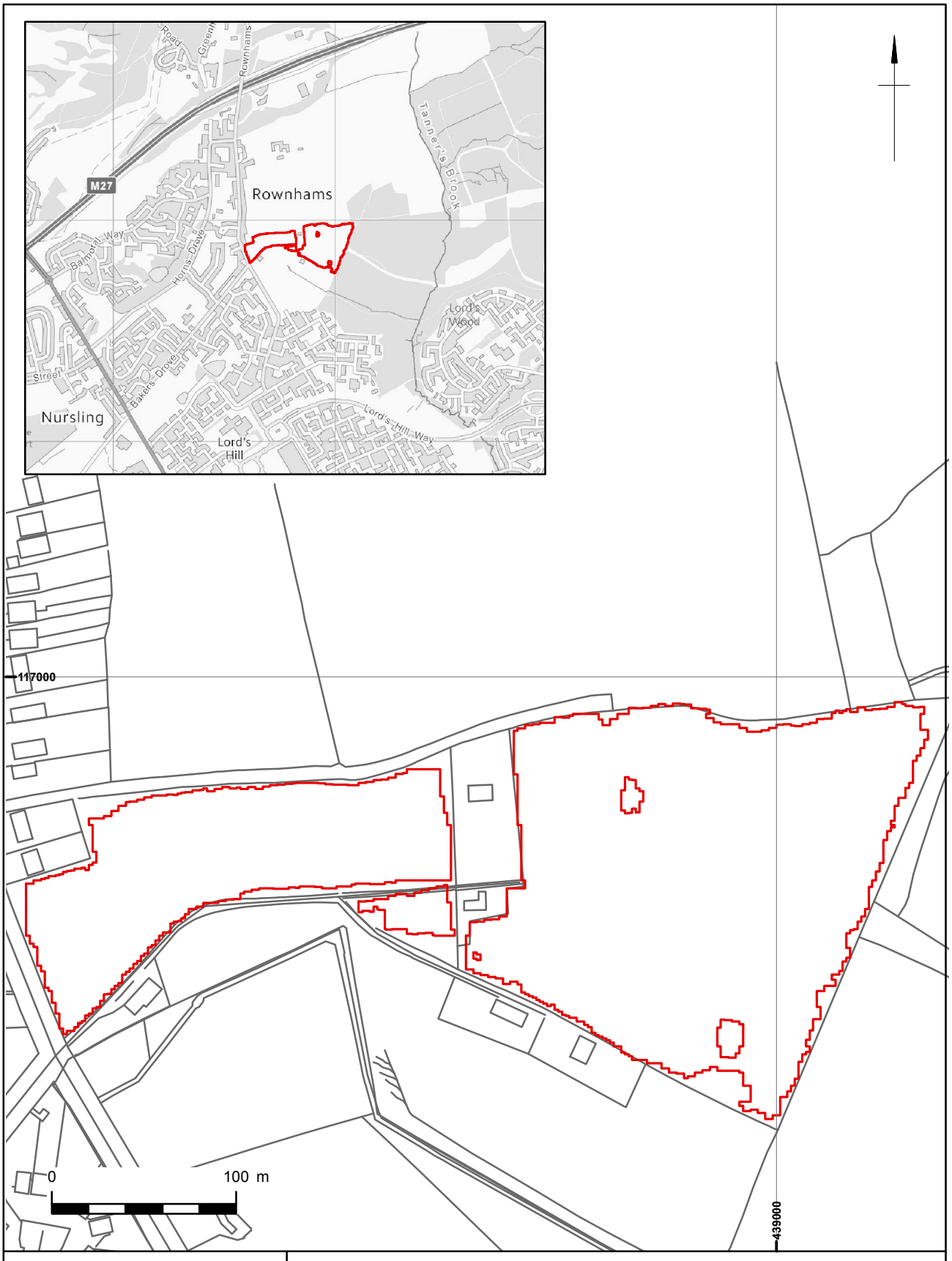
- Ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin.
- Modern service – used for responses considered relating to cables and pipes; most are composed of ferrous/ceramic material although services made from non-magnetic material can sometimes be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



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Site location and detailed survey extents

Figure 1

117000

116750

438750

439000

+3nT

-2nT

0 50 m

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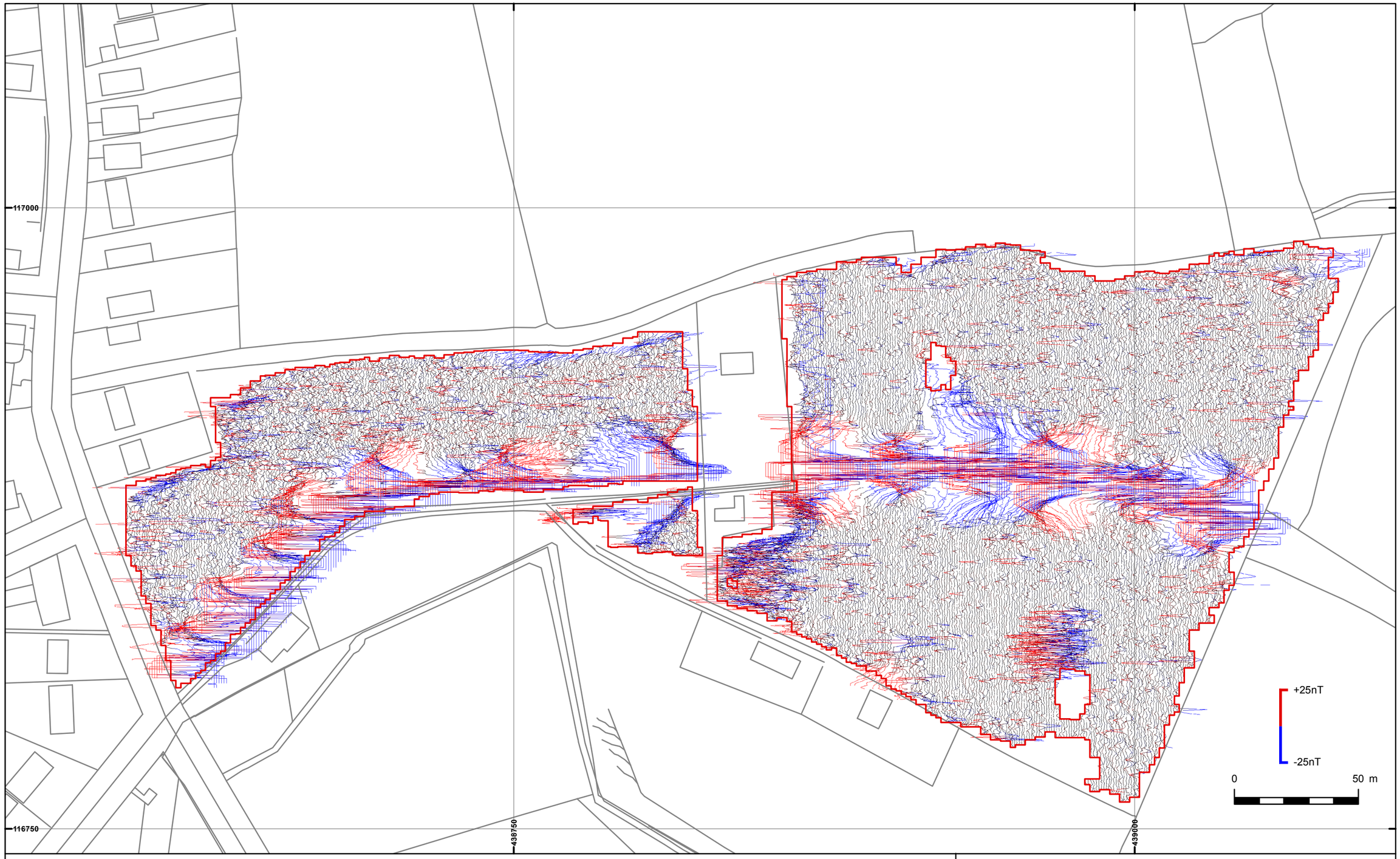
Greyscale plot

Figure 2



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XY trace

Figure 3

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Interpretation

Figure 4

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