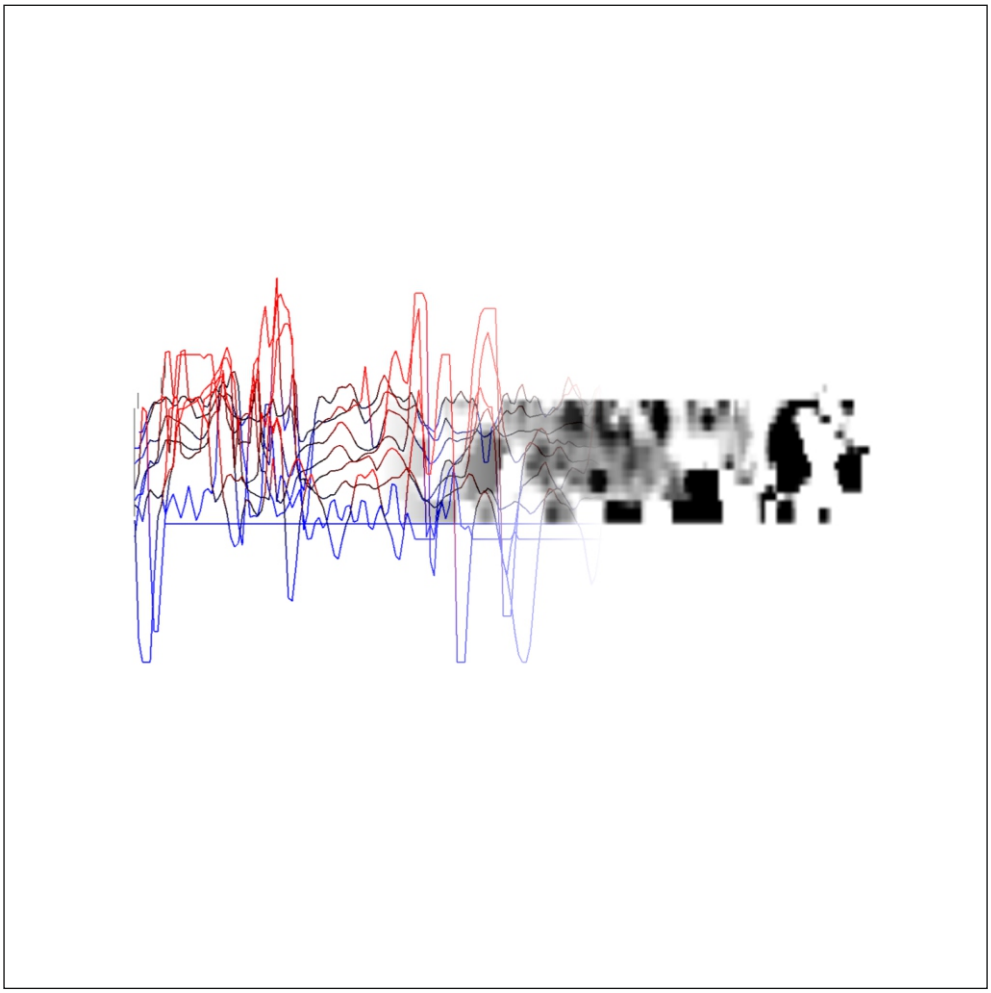
making sense of heritage

Land West of St Marys Church Kingston Deverill, Wiltshire

Detailed Gradiometer Survey Report



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geoservices

Land West of St Marys Church
Kingston Deverill, Wiltshire

Detailed Gradiometer Survey Report

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Summary

Wessex Archaeology was commissioned by the Parochial Church Council of the Deverills & Horningsham to undertake a detailed gradiometer survey of land west of St Marys Church, Kingston Deverill, Wiltshire (centred on NGR 384550, 137050). 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 the proposed expansion of the adjacent cemetery.

The survey was undertaken on 13th June 2014 and the site is located approximately 8.5km SSW of the centre of Warminster. The site comprises one small grass field located on the north side of an unnamed road close to the B3095.

Detailed gradiometer survey was undertaken over all accessible parts of the site, a total of 0.1ha, and has demonstrated the presence of a couple of small anomalies of possible archaeological significance along with several ferrous responses. It is considered that the ferrous responses detected are not concentrated enough to obscure large archaeological features.

The survey was undertaken on 13th June 2014.

Land West of St Marys Church
Kingston Deverill, Wiltshire

Detailed Gradiometer Survey Report

Acknowledgements

The detailed gradiometer survey was commissioned by the Parochial Church Council of the Deverills & Horningsham. The assistance of Bill Knowles and Rev. Norma Payne is gratefully acknowledged in this regard.

The fieldwork was carried out by Ross Lefort and Alistair Salisbury. The geophysical data was processed and interpreted by Ross Lefort who also wrote this report. The geophysical work was quality controlled by Dr. Paul Baggaley and Ben Urmston. Illustrations were prepared by Ross Lefort and Karen Nichols. The project was managed on behalf of Wessex Archaeology by Paul Baggaley.

Land West of St Marys Church
Kingston Deverill, Wiltshire

Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project Background

1.1.1 Wessex Archaeology was commissioned by the Parochial Church Council of the Deverills & Horningsham to carry out a programme of geophysical survey over a strip of land to the west of St. Mary's Church in Kingston Deverill, Wiltshire (**Figure 1**) hereafter "the Site" (centred on NGR 384550, 137050). The survey forms part of an ongoing programme of archaeological works being undertaken ahead of the proposed extension of the nearby cemetery.

1.1.2 A method statement has been prepared by Wessex Archaeology that sets out the methodology and the aim of the geophysical survey (Wessex Archaeology 2014). 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, the detailed survey results and the archaeological interpretation of the geophysical data.

1.2 Site Location and Topography

1.2.1 The survey area comprises an area of lawn to the West of St Marys Church, Kingston Deverill, some 8.5km SSW of Warminster in Wiltshire (**Figure 1**). The survey area is bounded by a pasture field to the west, the existing graveyard to the east a road to the south and residential properties to the north. The survey area lies on fairly flat land at the base of a river valley at a height of 135m above Ordnance datum. The River Wylye flows past the site to the north

1.3 Soils and Geology

1.3.1 The bedrock geology under the Site is composed of a mix of Cretaceous chalk deposits including West Melbury Marly chalk formation and Zag chalk formation. There are superficial deposits of head and alluvium recorded at the base of this valley that date to the Quaternary period (BGS).

1.3.2 The soils underlying the Site are likely to be typical brown calcareous earths of the 511f (Coombe 1) 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

1.4 Archaeological Background

1.4.1 The following information is summarized from the Heritage Gateway and the Wiltshire Historic Environment Record (HER) websites (www.heritagegateway.org.uk and http://www.wiltshire.gov.uk/artsheritageandlibraries/museumhistoryheritage/wiltshireands

windonhistoricenvironmentrecord.htm), a search was performed for all heritage assets within 1km of the Site.

1.4.2 There are no recorded heritage assets recorded within the Site. The most significant recorded heritage asset outside of the survey area is a scheduled bowl barrow located around 25m to the west of the Site. The mound is 12m in diameter and stands 0.9m in height; a 2m ditch was visible in 1955 when scheduled but has silted up in recent years (NHLE 1010404).

1.4.3 The other significant feature is the Grade II listed Anglican Church of St. Mary located immediately to the east of the Site. The church dates to the 15th century and was subject to restoration in 1846 by Manners and Gill (NHLE 1364367). The former rectory named Kingston House (Grade II listed) is located to the north of the church and was altered by Manners in 1858 (NHLE 1036402).

1.4.4 An oval shaped mound measuring 7.5m x 5.5m with a height of 1.5m is situated in the northeast corner of the churchyard; the date and function of this mound is unclear (EH 207056). Two sarsen stones are recorded in a paddock to the east of the churchyard and this mound that are arranged in an inverted V-configuration. There is some evidence of a former associated mound and the stones stand at a height of around 1.5m. Local legend attributes the placing of the stones to King Alfred (EH 207053).

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 13th June 2014. Field conditions at the time of the survey were good, with firm conditions under foot and short vegetation. In total the geophysical survey covered 0.1ha.

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 function (±10nT 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 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 few anomalies of archaeological interest; there are some ferrous responses but these do not cover the entire Site. Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:1000 (**Figure 2**). 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 2**). 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 many may relate to the twentieth century military occupation in the area.

3.2 Gradiometer Survey Results and Interpretation

3.2.1 The geophysical survey covered a very small area and revealed only a few anomalies of possible archaeological interest; these include three sub-oval shaped positive anomalies south of **4000**. These anomalies measure between 2m and 2.5m in length and have magnetic values around +3nT. These anomalies could represent cut archaeological features such as pits but could equally relate to a natural feature such as a tree throw. Due to the uncertainty in their interpretation these anomalies have been classed as possible archaeology.

3.2.2 The remaining anomalies include a couple of trends that may be indicative of ploughing scars and ferrous responses along the field boundaries that are likely to be modern.

3.3 Gradiometer Survey Results and Interpretation: Modern Services

3.3.1 No modern services have been identified in the geophysical data however 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 are opened on Site.

4 DISCUSSION

4.1 Summary

4.1.1 The detailed gradiometer survey has been successful in detecting a few of small anomalies of possible archaeological interest, in addition to some ferrous responses.

4.1.2 The geophysical data revealed only a few positive anomalies that may be related to small cut features although it is possible that these anomalies may also relate to natural features such as tree throws. There are some ferrous responses visible in the data with the largest noted along field boundaries. These ferrous responses are not considered dense enough to obscure large archaeological features.

4.1.3 The greatest area of uncertainty in the assessment of this data lies in the interpretation of the few small positive anomalies interpreted as possible archaeology. Geophysical surveys carried out by Wessex Archaeology nearby have revealed similar anomalies and follow up excavation has shown that most are tree throws although a very small number were revealed to be of archaeological significance (Wessex Archaeology 2012 and 2013). It is not possible to differentiate with any confidence between natural tree throws, tree throws from human deforestation or pits that happen to possess similar dimensions in this particular geological setting from geophysical data alone.

4.1.4 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 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 West of St Marys Church, Kingston Deverill, Wiltshire: Methodology for Geophysical Survey.* Unpublished report. Report ref. T18668.01.

Wessex Archaeology, 2013. *Amesbury, Phase 4: King's Gate (658 Unit) Area: Archaeological Evaluation Report*. Report reference: 65537.04

Wessex Archaeology, 2012. *Amesbury, Phase 4: King's Gate (658 Unit) Area: Recorded Scanning and Detailed Gradiometer Survey Report.* Report reference: 65537.01

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 5, Soils of South West England. Ordnance Survey: Southampton.

5.3 National Heritage List for England (NHLE) Records Consulted

1010404 – Bowl barrow 50m west of St Mary's Church

1036402 – Kingston House

1364367 – Church of St Mary

5.4 English Heritage PastScape Records Consulted

EH 207053 – Saxon stones

EH 207056 – Oval-shaped mound

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

Detailed Survey Extents

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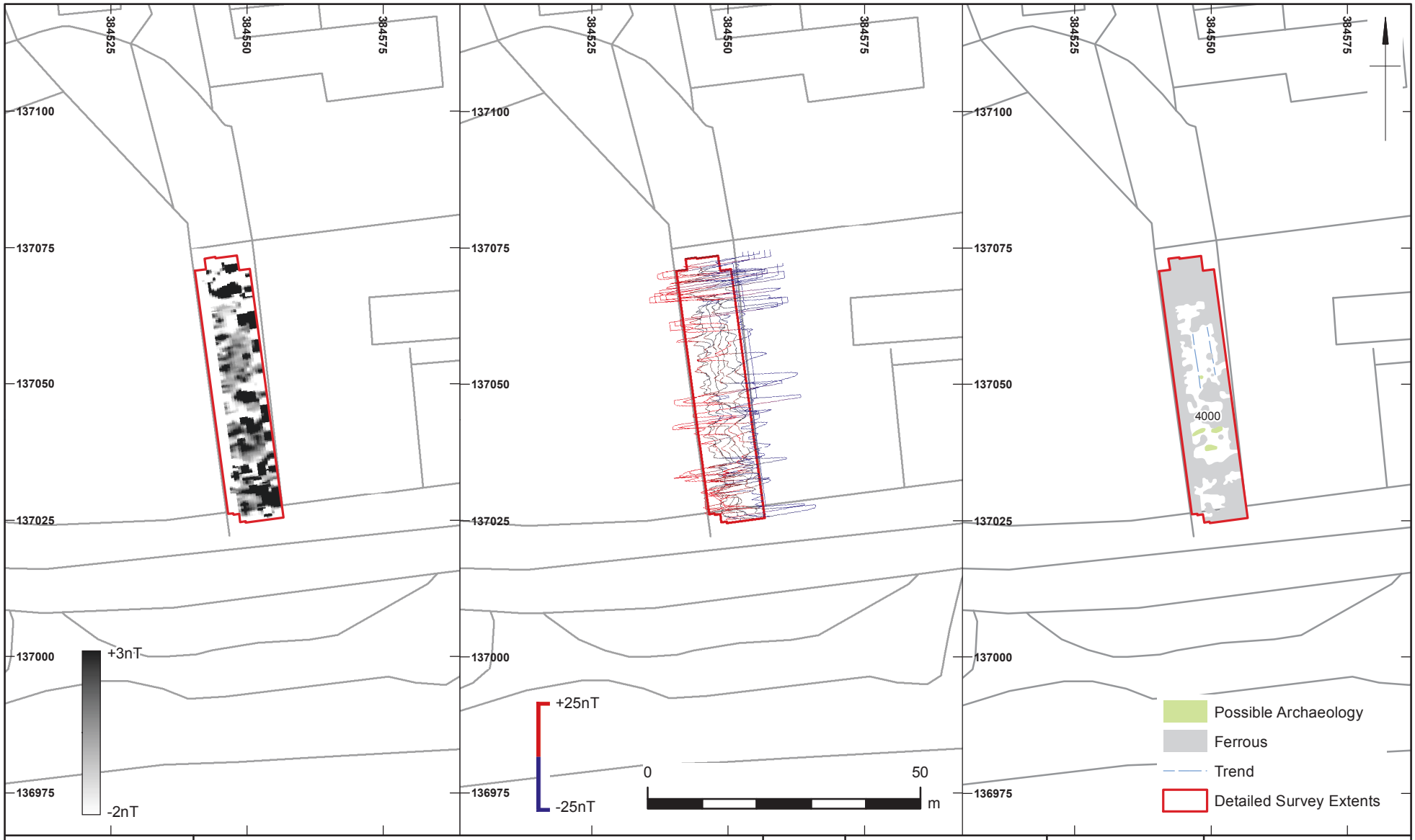
Site location map and detailed survey extents

Figure 1



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Greyscale plot, XY trace plot and interpretation

Figure 2

wessex archaeology

salisbury rochester sheffield edinburgh

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