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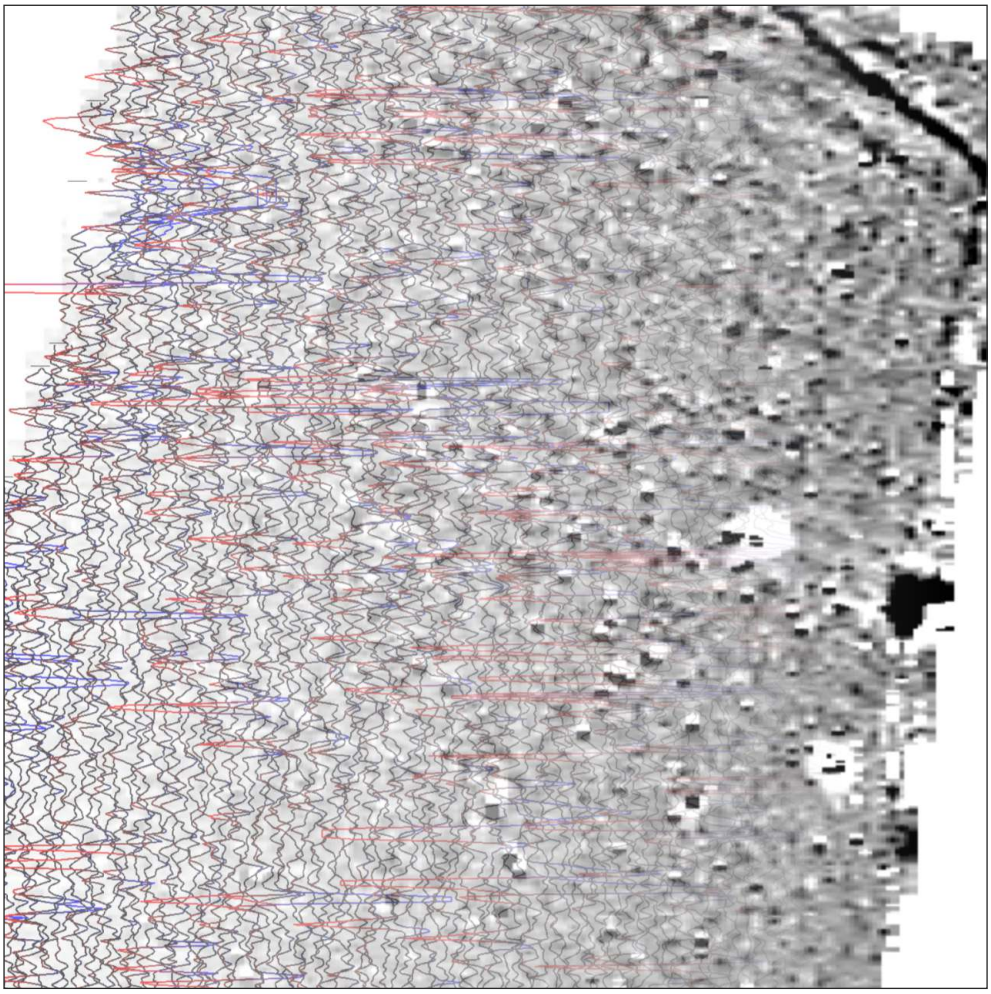
# Land South of The Ridge, Holmhurst St. Mary, Hastings, East Sussex

## Detailed Gradiometer Survey Report



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geoservices

# Land South of The Ridge
# Holmhurst St. Mary, Hastings, East Sussex

## Detailed Gradiometer Survey Report

Prepared for:
**Entran Ltd.**
12 Greenway Farm
Bath Road
Wick
Bristol
BS30 5RL

Prepared by:
**Wessex Archaeology**
Portway House
Old Sarum Park
Salisbury
SP4 6EB

www.wessexarch.co.uk

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

# Land South of The Ridge
# Holmhurst St. Mary, Hastings, East Sussex

## Detailed Gradiometer Survey Report

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# Land South of The Ridge
# Holmhurst St. Mary, Hastings, East Sussex

## Detailed Gradiometer Survey Report

**Summary**

A detailed gradiometer survey was conducted over land South of The Ridge in Holmhurst St. Mary, near Hastings, East Sussex. The project was commissioned by Entran Ltd. with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features on the site ahead of a proposed development.

The site comprises several pasture fields to the south of the Ridge (B2093), approximately 3.6km north of Hastings. The site occupies an area of sloping land close to the summit of a ridge. The gradiometer survey covered 3.5ha and was undertaken between 4th and 5th November 2013. It has demonstrated the presence of a few anomalies of likely, probable and possible archaeological interest within the survey area, along with numerous linear and curvilinear trends.

Only one anomaly likely to be of archaeological interest was identified, comprising a ditch segment located towards the northern extent of the westernmost field, which may form part of an enclosure or field system. The anomaly is oriented parallel with existing field boundaries, perhaps suggesting that it is agricultural in origin, although it is not possible to determine a likely date for the anomaly.

A number of other possible ditch segments and pit-like anomalies appear within the central survey area, although they are randomly distributed; whilst an archaeological interpretation cannot be ruled out entirely, it is possible that they are the result of near-surface geological changes. In the easternmost survey area, several larger pit-like anomalies are considered to be of probable archaeological interest, although this is not conclusive and again it is conceivable that they may be natural in origin.

A rectangular region of increased magnetic response and ferrous anomalies lies towards the southern extent of the westernmost survey area, which is consistent with a former field. Some former field boundaries were also identifiable from concentrations of ferrous but are not thought to be of archaeological interest. Weak linear and curvilinear trends were observed throughout the dataset and, although their origins are largely unclear, some are characteristic of ploughing.

# Land South of The Ridge
# Holmhurst St. Mary, Hastings, East Sussex

## Detailed Gradiometer Survey Report

**Acknowledgements**

The detailed gradiometer survey was commissioned by Entran Limited. The respective assistance of Nick Davey is gratefully acknowledged in this regard.

The fieldwork was directed by Laura Andrews and assisted by Rachel Chester and Clara Dickinson. Laura Andrews processed the geophysical data which was interpreted by Ross Lefort who also wrote this report. The geophysical work was quality controlled by Ben Urmston. Illustrations were prepared by Linda Coleman and Ken Lymer. The project was managed on behalf of Wessex Archaeology by Ben Urmston.

# Land South of The Ridge
# Holmhurst St. Mary, Hastings, East Sussex

## Detailed Gradiometer Survey Report

### 1 INTRODUCTION

### 1.1 Project background

1.1.1 Wessex Archaeology (WA) was commissioned by Entran Limited to carry out a geophysical survey of land to the south of The Ridge in Holmhurst St. Mary, near Hastings, East Sussex (**Figure 1**), hereafter "the Site" (centred on NGR 580220, 112825). The survey forms part of an ongoing programme of archaeological works being undertaken ahead of proposed development at the Site.

1.1.2 A Written Scheme of Investigation (WSI) was prepared by WA (2013) which outlines the main aim of the survey which 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, Topography, Soils and Geology

1.2.1 The survey area comprises several pasture fields to the south of the road known as The Ridge (B2093) in Holmhurst St. Mary, near Hastings, some 3.6km north of the centre of Hastings (**Figure 1**). Detailed gradiometer survey was undertaken over all accessible parts of the Site, a total of 3.5ha.

1.2.2 The Site is located on the eastern flank of a summit along the Ridgeway, which is oriented approximately E-W, with the land falling away somewhat to the north and south. The survey areas slope from c. 135m above Ordnance Datum (aOD) in the west to c. 105m aOD in the east. They are bordered to the north by Beaulieu Gardens, Eldridge Way and Francis Bird Place, by Welton Rise and Fairfield Road to the south and by the Conquest Hospital to the east. The survey area within Area C is located to cover a proposed playing field c. 60m x 70m and to the south of the former classrooms of the former Holmhurst St. Mary's Convent School within Area F.

1.2.3 The Site lies immediately south of the prehistoric trackway known as the Ridgeway, although the East Sussex Historic Environment Record does not identify any evidence for prehistoric activity within the proposed development area, aside from a single findspot of a Neolithic handaxe. A Romano-British jug was discovered some 900m to the southwest, although this is considered to have been imported as a curio (APS 2013).

1.2.4 Evidence for medieval and post-medieval archaeology is limited to agricultural activity. However, the lack of recorded archaeological interventions within the area is noted as a possible reason for the apparent low level of archaeological evidence within the 1km study area; the DBA concludes that there is the potential for prehistoric activity associated with

the Ridgeway and medieval and post-medieval field systems associated with the medieval settlements of Baldslow and Hollington.

1.2.5 The soils underlying the Site are likely to be the typical stagnogleys of the 711i (Wickham 5) association over plateau drift (SSEW 1983), with the solid geology comprising siltstones, sandstones and mudstones of the Tunbridge Wells, Ashdown and Wadhurst formations (BGS 2013). 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 a Bartington Grad601-2 dual fluxgate gradiometer system. 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 4th and 5th November 2013. Field conditions at the time of the survey were good, with firm ground under foot; there was a large amount of vegetation and tree cover across parts of the Site, which reduced the size of the surveyable area as defined by the WSI. In particular, the proposed extents of the southeastern survey area were located within dense woodland and very little survey was possible there (**Figure 1**).

### 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 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 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 been successful in identifying anomalies of likely, probable and possible archaeological interest across the Site, along with numerous linear and curvilinear trends. Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2,000 (**Figures 2** and **3**). The data are displayed at -2nT (white) to +3nT (black) for the greyscale image and 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 detailed survey dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.

### 3.2 Gradiometer Survey Results and Interpretation

3.2.1 The only anomaly of likely archaeological interest is a curving positive anomaly at **4000** and **4001**. This anomaly is well-defined from the general magnetic background and is considered to represent a ditch. This feature has been classed as archaeology with the weaker turn to the south classed as probable archaeology although its alignment parallel to existing field boundaries may suggest it formed part of a former field boundary.

3.2.2 To the south of **4000** and **4001** is a regular rectangular spread of ferrous responses at **4002** and **4003**; this spread most likely defines an enclosed or sub-divided part of this field. The function of this enclosed area was most likely agricultural although it is not possible to link this feature to any recorded on early Ordnance Survey (OS) maps. A line of ferrous responses at **4004** in the field to the east can be linked to a former field boundary observed on early OS mapping.

3.2.3 There are a number of intermittent positive linear anomalies across the central survey area at **4005**, **4006**, **4007**, **4008** and **4009**. All of these anomalies are well-defined from the general magnetic background but they do not appear to form obvious ditch segments or enclosures. These features are classed as possible archaeology, although his interpretation is not conclusive and there is a possibility that they may prove to be geological given their irregularity in plan.

3.2.4 There are two small positive anomalies around **4010** in the easternmost survey area that may prove to be archaeological; one is sub-oval in shape and the other is a short linear. Both of the anomalies show clear contrast and look to represent cut features such as pits or ditch segments. These anomalies have been interpreted as probable archaeology rather than archaeology due to their presence within an area of responses consistent with a geological origin.

3.2.5 There are a number of spreads of dipolar and bipolar anomalies (black and white) across the data with the biggest concentration towards the west. These spreads, such as **4011**, are considered to be concentrations of small ceramic fragments and small metallic objects and are not considered to be of archaeological significance.

3.2.6 There are numerous trends spread throughout the data set; most are ploughing trends like those around **4012** but other linear and curvilinear trends such as those around **4013**, **4014** and **4015** may prove to be of archaeological significance.

3.2.7 The remaining anomalies are small sub-circular and sub-oval positive responses scattered throughout the data. These features could represent archaeological features such as pits or postholes but could also represent data spikes, unusual ferrous anomalies or geological features. As these anomalies form no significant patterning in their spatial distribution they have been classed as possible archaeology.

### 3.3 Gradiometer Survey Results and Interpretation: Modern Services

3.3.1 There are at no modern services visible in the data. Gradiometer data will not be able to locate and identify 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 few anomalies of likely, probable and possible archaeological interest within the Site, in addition to numerous linear and curvilinear trends.

4.1.2 The main anomaly of interest within the surveyed areas is the ditch at **4000** and **4001** although this may prove to be an agricultural feature; whilst it is consistent with a ditch, it is possible that it represents part of an enclosure or field system, given its location and parallel orientation with the nearby existing boundaries.

4.1.3 There are other anomalies at **4005** to **4009** in the central survey area that are well defined from the magnetic background and are consistent with ditch-like and pit-like features; an archaeological interpretation cannot be excluded entirely and it is conceivable that these anomalies are associated with near-surface geological changes, given their apparently random distribution in plan.

4.1.4 Similarly, pit-like anomalies **4010** in the easternmost survey area are considered to be of probable archaeological interest given their strength of response and clarity in plan. However, they are located close to the field boundary and there are few other anomalies of even possible archaeological interest nearby.

4.1.5 It is interesting to note the presence of possible former field systems, detected through the change in texture of the magnetic background. This is likely to indicate varying types of agricultural usage across the Site. Faint ploughing trends are visible throughout the dataset, and are strongest across the central survey area where they are consistent with the remnants of ridge and furrow.

4.1.6 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

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## 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 two main categories: archaeological and unidentified responses.

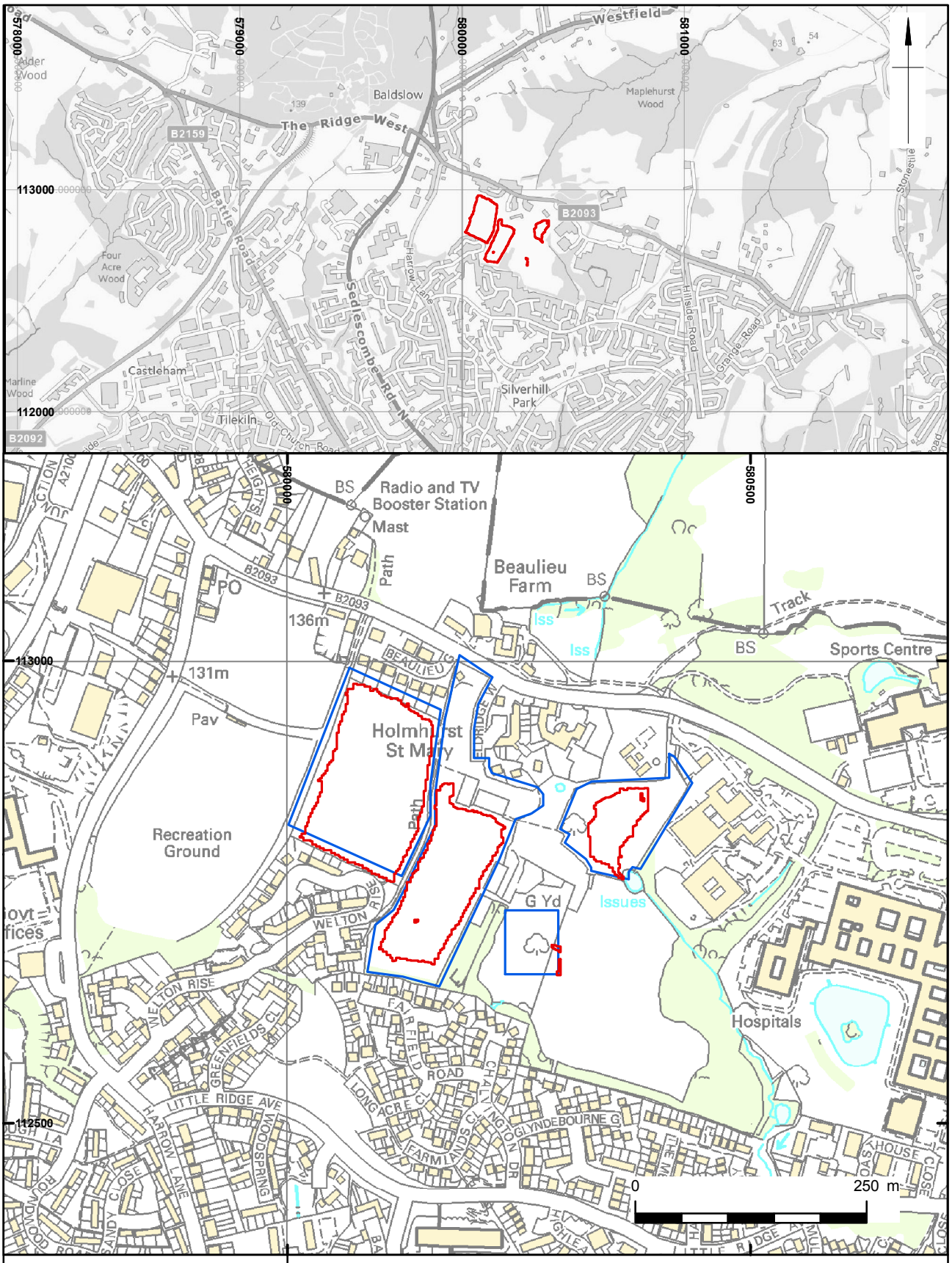
The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided 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 unidentified 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.
- Ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin.

Finally, services such as water pipes are marked where they have been identified.




Final Detailed Survey Extents

Proposed Site Boundary



| | | | |
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Site location plan

Figure 1


Detailed Survey Extents

+3nT

-2nT

0 50 m



| | |
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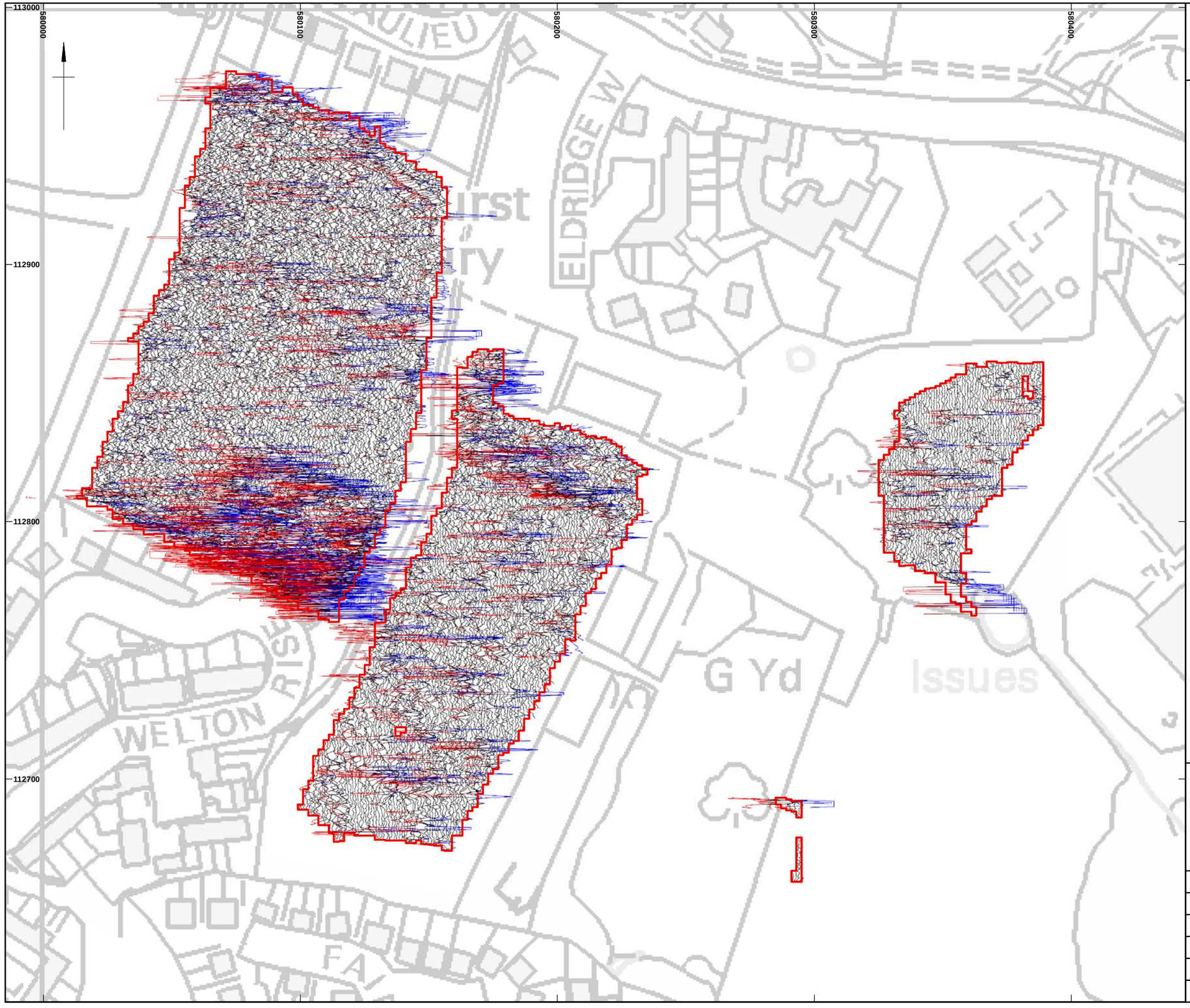
Greyscale

Figure 2




Detailed Survey Extents

+25nT

-25nT

0 50 m



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XY trace

Figure 3


Detailed Survey Extents
Ferrous
Archaeology
Probable Archaeology
Possible Archaeology
Trend
Ploughing
Superficial Geology
Increased Magnetic Response

0 50 m



| | |
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Interpretation

Figure 4

wessex archaeology

salisbury rochester sheffield edinburgh

Wessex Archaeology Ltd registered office Portway House, Old Sarum Park, Salisbury, Wiltshire SP4 6EB
Tel: 01722 326867 Fax: 01722 337562 info@wessexarch.co.uk www.wessexarch.co.uk