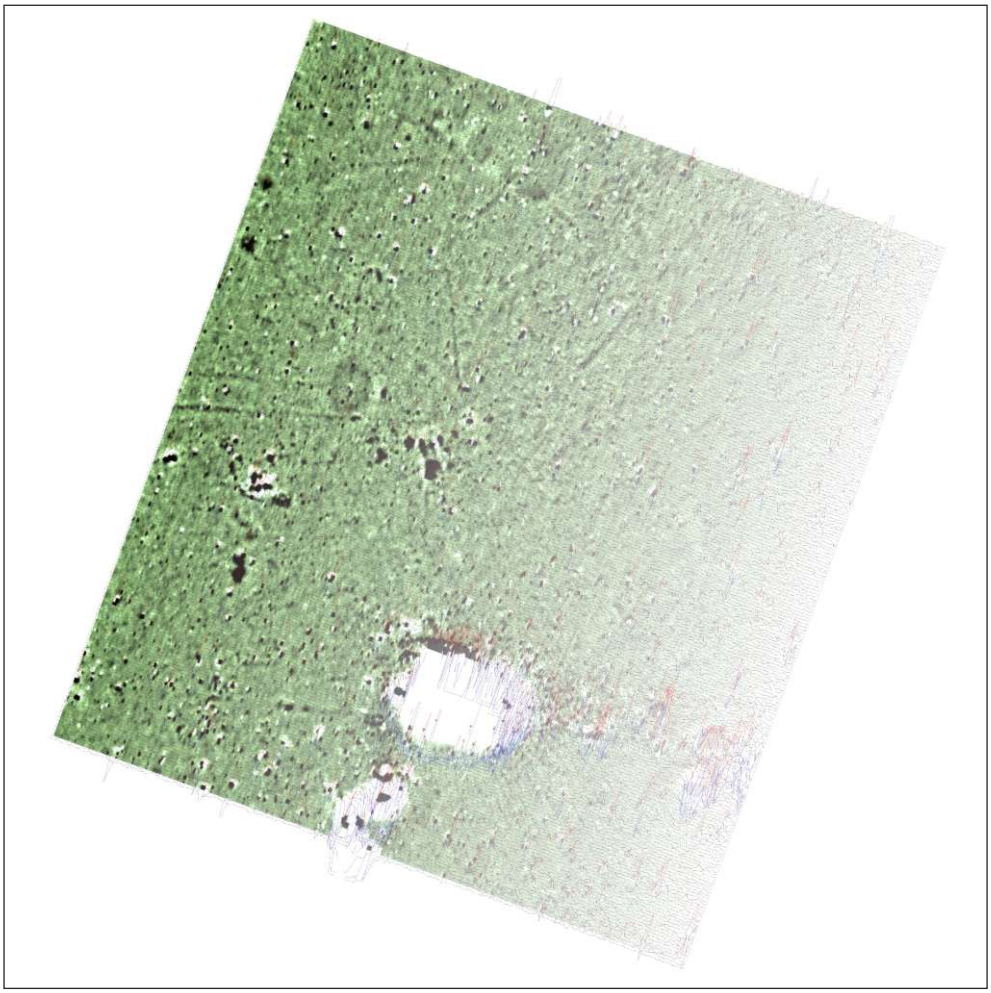
making sense of heritage

Land at Littles Manor Farm, Sheldwich Faversham, Kent

Detailed Gradiometer Survey Report



Ref: 88830.01
February 2013

geoservices

Land at Littles Manor Farm, Sheldwich, Faversham, Kent

Detailed Gradiometer Survey Report

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February 2013

88830.01

Quality Assurance

Project Code	88830.01	**Accession Code**		**Client Ref.**	
Planning Application Ref.		**Ordnance Survey (OS) national grid reference (NGR)**	601121 158587		

Version	Status*	Prepared by	Checked and Approved By	Approver's Signature	Date
v01	I	*S. Mounce*	*M. Williams*		
File:	R:\PROJECTS\88830\Report\Working versions\88830.01				
File:					
File:					
File:					
File:					

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

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Detailed Gradiometer Survey Report

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Summary

A detailed gradiometer survey was conducted over land at Littles Manor Farm, off Ashford Road, Sheldwich, Kent. The project was commissioned by Mrs S. Holmes with the aim of establishing the extent of a possible high status Roman building previously identified on the Site and the extent of any associated structures and the presence/absence, extent and character of any other detectable archaeological features within the survey area in advance of any potential development.

The Site comprises an arable field to the north of Littles Manor Farm house off Ashford Road, some 1.2 km north of Sheldwich and 5 km from the centre of Faversham. The Site gradually falls from the south to the north with a clump of trees focused on a disused pit in the southern part of the Site. The field had been tilled with a recently seeded crop of wheat at the time of survey.

The gradiometer survey covered an area of 5ha and has demonstrated the presence archaeological anomalies including those of probable and possible archaeological interest within the survey area, along with areas of increased magnetic response.

A number of ditch-like features have been identified within the northern and western areas of the survey grid, with two anomalies possibly representing the opposing corners of a rectilinear feature, possibly a building. To the south west of this feature, a possible trackway leading towards a second rectilinear feature has also been identified. Weak linear trends have also been observed which may be continuations of the archaeological features. A number of small discrete anomalies have also been identified across the survey area, some of which may be pits.

The geophysical survey has demonstrated a high potential for archaeological remains, specifically within the northern and western areas of the survey grid.

Land at Littles Manor Farm, Sheldwich, Faversham, Kent

Detailed Gradiometer Survey Report

Acknowledgements

The detailed gradiometer survey was commissioned by Mrs S. Holmes, who is gratefully acknowledged in this regard.

The fieldwork was directed by Sarah Mounce and assisted by Jo Condliffe and Marie Kelleher. Ben Urmston processed and interpreted the geophysical data and Sarah Mounce prepared this report. Illustrations were prepared by Ken Lymer. The project was managed on behalf of Wessex Archaeology by Mark Williams.

Land at Littles Manor Farm, Sheldwich, Faversham, Kent

Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Mrs S. Holmes to carry out a geophysical survey on land at Littles Manor Farm, off Ashford Road, Sheldwich, Kent (**Figure 1**), hereafter "the Site" (centred on NGR 601121 158587). The survey was undertaken in advance of potential development at the Site.

1.1.2 The aim of the geophysical survey was to establish the extent of a possible high status Roman building previously identified on the Site and the presence/absence, extent and character of any other 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 The Site

1.2.1 The survey area comprises an arable field to the north of Littles Manor Farm house off Ashford Road, some 1.2 km north of Sheldwich and 5 km from the centre of Faversham (**Figure 1**). Detailed gradiometer survey was undertaken over all accessible parts of the Site, a total of 5 ha.

1.2.2 The Site falls gradually from 63m above Ordnance Datum (aOD) at the southern end to 58m aOD at the northern end. Within the southern part of the Site is a clump of trees focused on a disused pit and crossing the southern boundary of the Site are electrical overhead lines.

1.2.3 The soils underlying the Site are likely to be typical of the stagnogleyic palaeo-argillic brown earths of the 582a (Batcombe) and the typical argillic brown earths of the 571y (Hamble 1) associations (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.

1.2.4 The underlying geology is mapped as Chalk with superficial capping deposits of Clay with Flints and Head. To the east are Thanet Sand formations.

2 ARCHAEOLOGICAL BACKGROUND AND POTENTIAL

2.1 Introduction

2.1.1 The main archaeological potential of the Site arises from the identification of Roman building remains. A previous geophysical survey and two small hand excavated test pits in the south western part of the Site had revealed the presence of a hypocaust. One of the test pits produced a coin dating to between AD 364 and 378 found within a ditch

truncating demolitions layers within one of the rooms. The second test pit uncovered a pit containing a large quantity of Roman pottery, tile, animal bone and some fragments of painted wall plaster.

2.1.2 This potential Roman building is considered to be one of a number of villas found on the slope of the North Downs and south of Watling Street. The Site lies to the south of the Roman town of Ospringe, which is located to the south west of Faversham.

2.1.3 Numerous Roman coins have also been found in the south western area of the Site through metal detecting suggesting that the villa focus is possibly in this area.

3 AIMS

3.1 Geophysical Survey

3.1.1 The objective of the geophysical survey, as set out in the *Specification for Geophysical Survey* (KCC 2013), was to confirm the extent of the potential Roman building and to characterise those remains.

3.1.2 The general aims of the archaeological survey were to:

- Conduct a detailed survey which covers as much of the specified area as possible, allowing for artificial obstructions;
- Clarify the presence/absence and extent of any buried archaeological remains within the Site;
- Characterise any other remains of significance identified during the detailed survey; and
- Produce a report which will present the results of the geophysical survey in sufficient detail to allow an informed decision to be made concerning the Site's archaeological potential.

4 METHODOLOGY

4.1 Introduction

4.1.1 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). The methodology differend form the specification prepared by Kent County Council but this variation was agreed in advance.

4.1.2 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team on 5th and 6th February 2013. Field conditions at the time of the survey were good, with the survey area having been tilled with a recently seeded crop of wheat at the time of the survey.

4.2 Method

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

4.2.2 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.

4.2.3 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 the survey area, with no interpolation applied.

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

5 GEOPHYSICAL SURVEY RESULTS AND INTERPRETATION

5.1 Introduction

5.1.1 The gradiometer survey has been successful in identifying anomalies of archaeological interest across the Site, along with areas of increased magnetic response. Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (**Figure 2**). The data are displayed at -2nT (white) to +3nT (black) for the greyscale image and ±25nT at 50nT per cm for the XY trace plots.

5.1.2 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (**Figure 3**). Full definitions of the interpretation terms used in this report are provided in **Appendix 2**.

5.1.3 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.

5.2 Gradiometer Survey Results and Interpretation

5.2.1 Within the north west corner of the survey area are two linear anomalies **4000** which are considered to be of probable archaeological interest. These two linears may intersect at their eastern extents, with the northern linear extending further north-westwards and south-eastwards as suggested by the geophysical trends. It is also possible that there is a third linear, which produced a weaker response and is highlighted as a trend, running parallel with the southern anomaly of probable archaeology.

5.2.2 Located to the east south east of anomaly **4000** is another linear anomaly **4001** aligned northeast – southwest which appears to turn south-eastwards at its north east end. The strong positive response obtained from this anomaly suggests that it is consistent with a cut feature such as a ditch. An area of increased magnetic response interrupts this linear anomaly along its northwest – southeast alignment but it reappears again a little further on to the south east and may continue further south-eastwards as indicated by the slightly weaker response highlighted as a geophysical trend.

5.2.3 To the south of anomaly **4001** are two linear anomalies **4002** running parallel with the two anomalies recorded as **4001**, with slightly weaker geophysical trends extending on from these anomalies of archaeological interest suggesting that these linear cut features may continue further along the same alignment. It is possible that these well defined anomalies **4001** and **4002** form the opposing corners of a rectilinear feature.

5.2.4 A little further to the north east of the northeast – southwest linear anomaly **4002** is a slightly weaker linear response continuing along the same alignment. It is possible that

this geophysical trend is a continuation of the linear cut feature **4002**. The weaker positive response of this trend may have been affected by the large area of increased magnetic response to the north west, which may also be masking other weaker responses.

5.2.5 Some small positive anomalies are present within **4001** and **4002** but as no clear anthropogenic pattern can be seen in their distribution they have been termed possible archaeology.

5.2.6 An east – west aligned linear anomaly **4003** which turns south at its eastern end has an increased response towards its southern end and has been identified as archaeology. It runs roughly parallel with the linear anomaly **4006** and it may be possible that they both form part of the same feature.

5.2.7 A single linear anomaly **4004** aligned northwest – southeast is considered to be of probable archaeological interest. Although this anomaly is not well defined from the magnetic background, it does retain a higher response than the linear trends aligned northeast – southwest. To the south of **4004** are a few small irregular shaped positive anomalies which are considered to be possible archaeology as their is no clear anthropogenic pattern in their distribution.

5.2.8 Two parallel linears **4005** aligned roughly east – west and separated by a distance of 9m has been interpreted as archaeology. These two linears appear to be the type of response obtained from a cut feature such as a ditch. Towards the eastern end of the southern linear anomaly is a roughly north – south aligned linear **4006** which curves at both ends and has also been interpreted as archaeology. Part way along this linear is a large circular area of increased magnetic response measuring 16m by 13m. The northern linear of anomaly **4005** also runs into this area.

5.2.9 A concentration of small positive circular anomalies and larger irregular shaped positive anomalies **4007**, mostly located within an area of increased magnetic response, show no clear pattern in their distribution and have therefore been interpreted as probable and possible archaeology.

5.2.10 A number of small irregular shaped positive anomalies **4008** have been identified amongst the larger ferrous responses but as no clear anthropogenic pattern can be observed they have been interpreted as possible archaeology.

5.2.11 Located to the south of anomaly **4008** is an irregular shaped positive anomaly **4009** which has been interpreted as probable archaeology. Surrounding this anomaly are a series of trends which may indicate poorly defined linear features.

5.2.12 Located towards the south west corner of the survey area is a linear anomaly **4010** aligned roughly east – west and interpreted as probable archaeology; this linear may continue westwards as represented by a weaker linear response and interpreted as a geophysical trend. Aligned parallel to this trend, roughly 11m to the north, is another trend which may represent a poorly defined linear feature. Together these linear trends suggest a similar pattern identified with the two linear anomalies **4005** located further to the north. To the east of **4010** are a scatter of irregular shaped positive anomalies; although these are not well defined from the magnetic background and have no clear pattern, they are considered to be of possible archaeological interest.

5.2.13 A number of ferrous responses **4011** appear to be protruding eastwards from the existing disused pit. It is possible that these ferrous responses are a result of up cast from the pits construction or they may relate to the continuation of the linear anomaly **4010**.

5.2.14 Within the south-eastern extent of the survey grid is an area of increased magnetic response **4012**, roughly oval in shape and measuring 12m by 8m. Just to the north of this is an irregular shaped positive anomaly considered to be of possible archaeological interest. To the east and north of these two anomalies are areas of ferrous which may be an extension of the ferrous responses of **4011**.

6 CONCLUSION

6.1.1 The detailed gradiometer survey has been successful in detecting archaeological anomalies including those of probable and possible archaeological interest across the Site, in addition to areas of increased magnetic response.

6.1.2 The nature of ditch-like anomalies **4001** and **4002** suggest that they may form the opposing corners of a rectilinear feature, possibly a building. The characteristics of linear anomaly **4003** may also indicate at a second rectilinear feature and may be related to linear anomaly **4006**.

6.1.3 The two parallel ditch-like anomalies **4005** may represent a trackway leading towards the possible rectilinear feature **4003** and **4006** or could represent field boundaries along with anomaly **4006**. It is also possible that second double ditch anomaly **4005** lies further to the south and on the same alighnment at **4010**.

6.1.4 The geophysical trends, specifically those relating to archaeological anomalies **4000**, **4001**, **4002** and **4010**, exhibit a weak contrast with the general magnetic background. It is possible that they are archaeological features but contain fills that do not exhibit sufficient magnetic contrast from the surrounding natural layers to be detected as an anomaly.

6.1.5 The large areas of ferrous anomalies within the south east section of the survey grid have reduced the area in which it is possible to detect archaeological features. This can also be said for the areas of increased magnetic response which may have masked weaker positive anomalies of potential archaeological interest.

6.1.6 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 presant than have been identified through geophysical survey.

7 REFERENCES

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

Kent County Council, 2013. *Specification for Geophysical Survey (Magnetometry and Resistivity) at Littles Manor Farm, Ashford Road, Sheldwich, Kent*. Manual of Specifications Part A.

Soil Survey of England and Wales, 1983. *Soils of South East England: Sheet 6*. 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 two main categories: archaeological and unidentified responses.

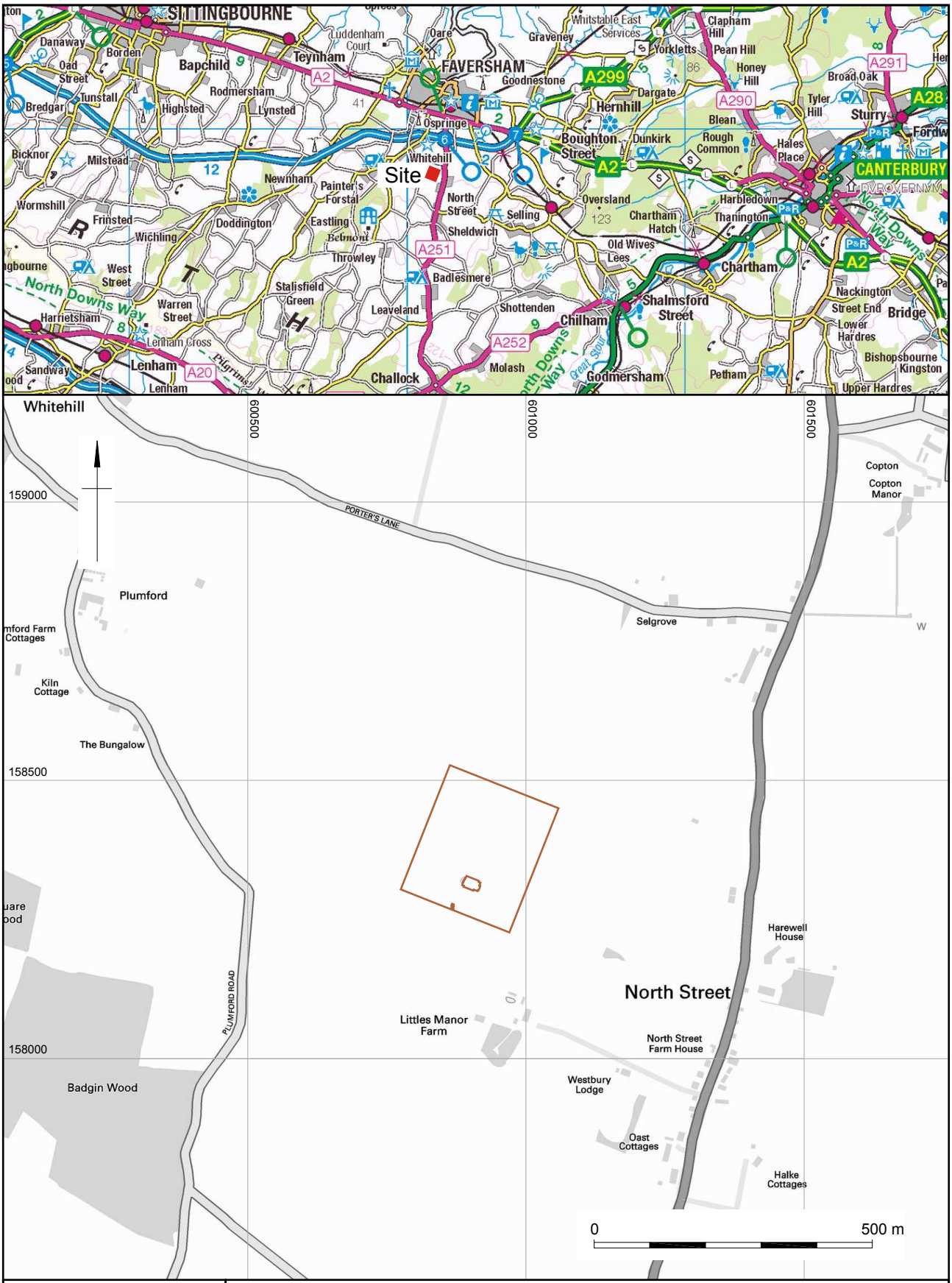
The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided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



Geophysical survey area

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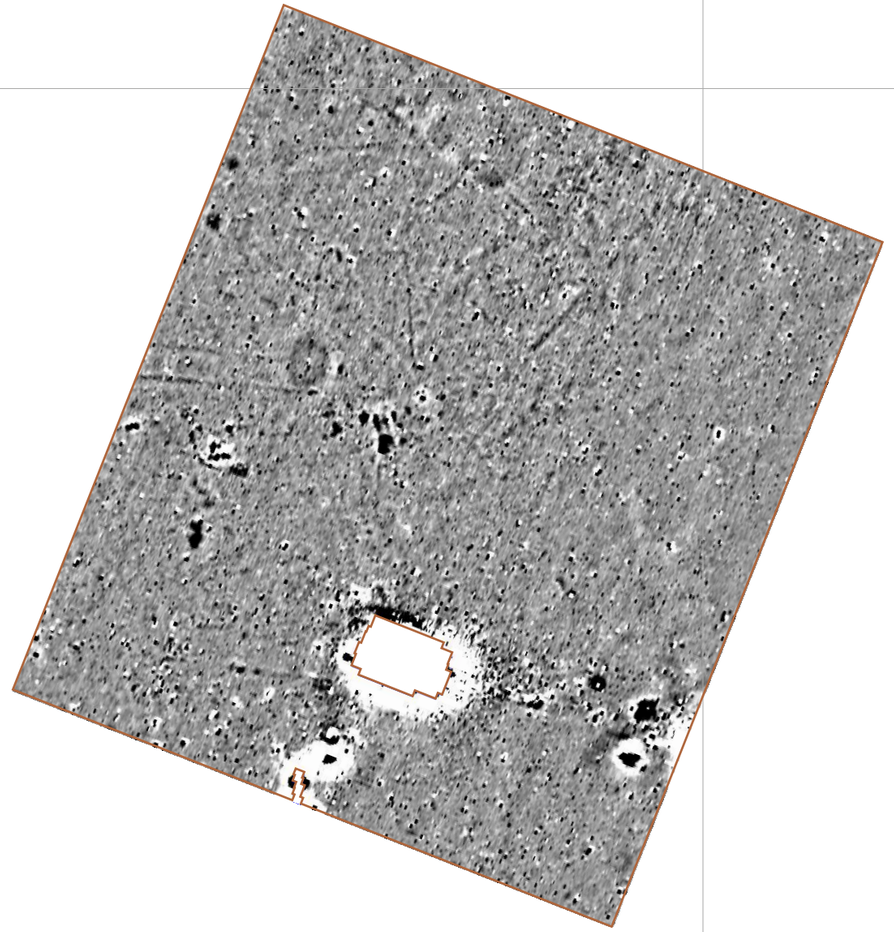
Site location and survey extents

Figure 1

601000

158500



Key

3nT

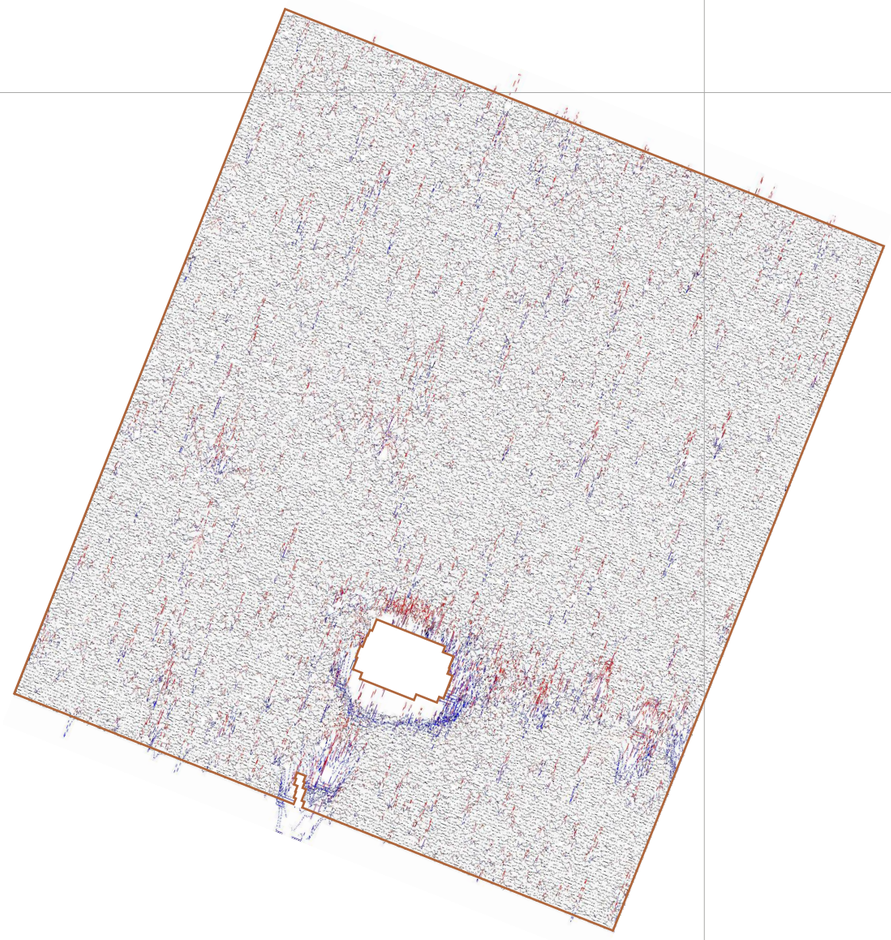
-2nT

Greyscale

0 100 m

601000

158500



Key

+25nT

-25nT

XY Trace

0 100 m

Geophysical survey area

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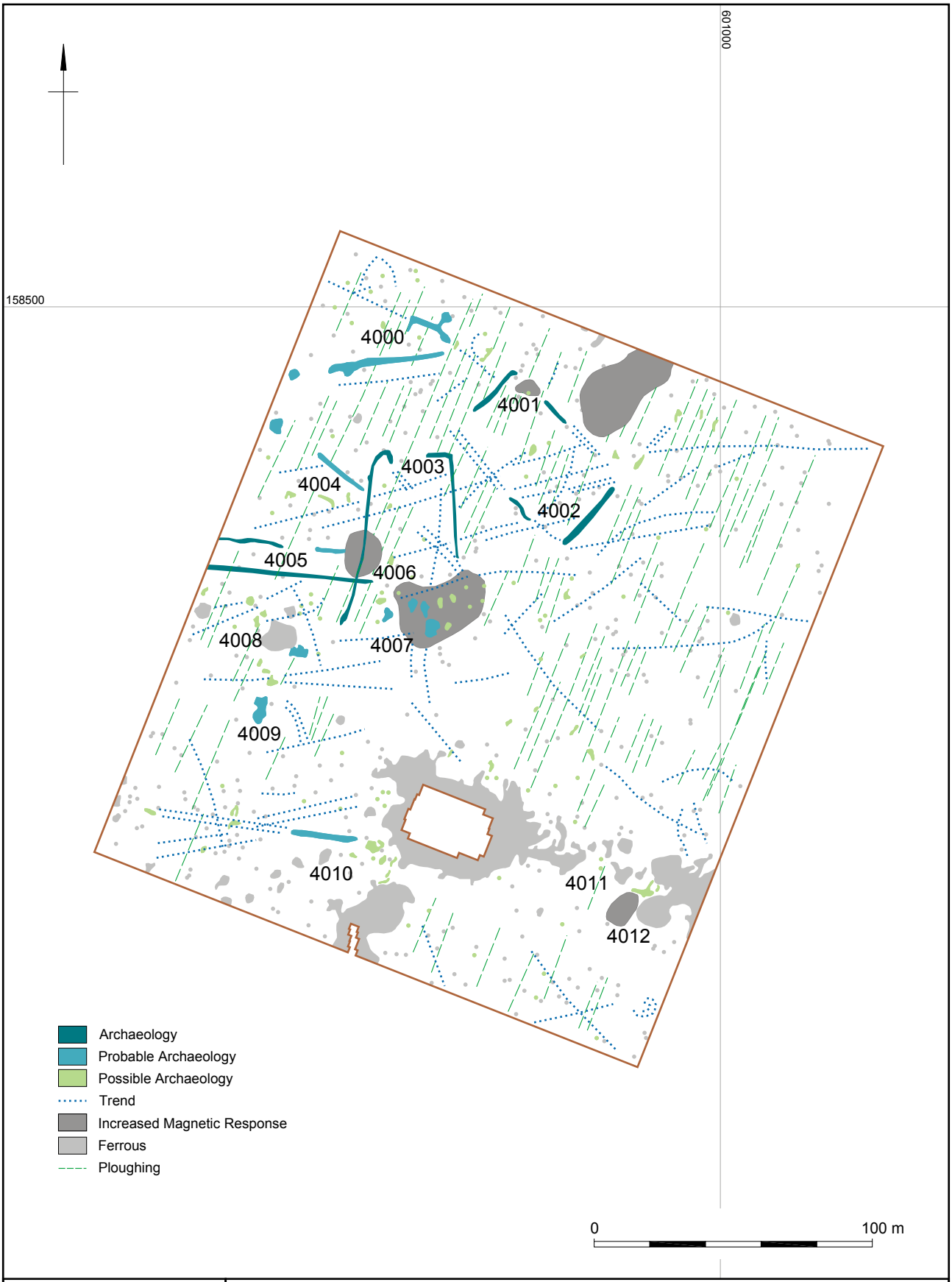
Greyscale and XY trace

Figure 2



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Interpretation

Figure 3

wessex archaeology

salisbury rochester sheffield edinburgh

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