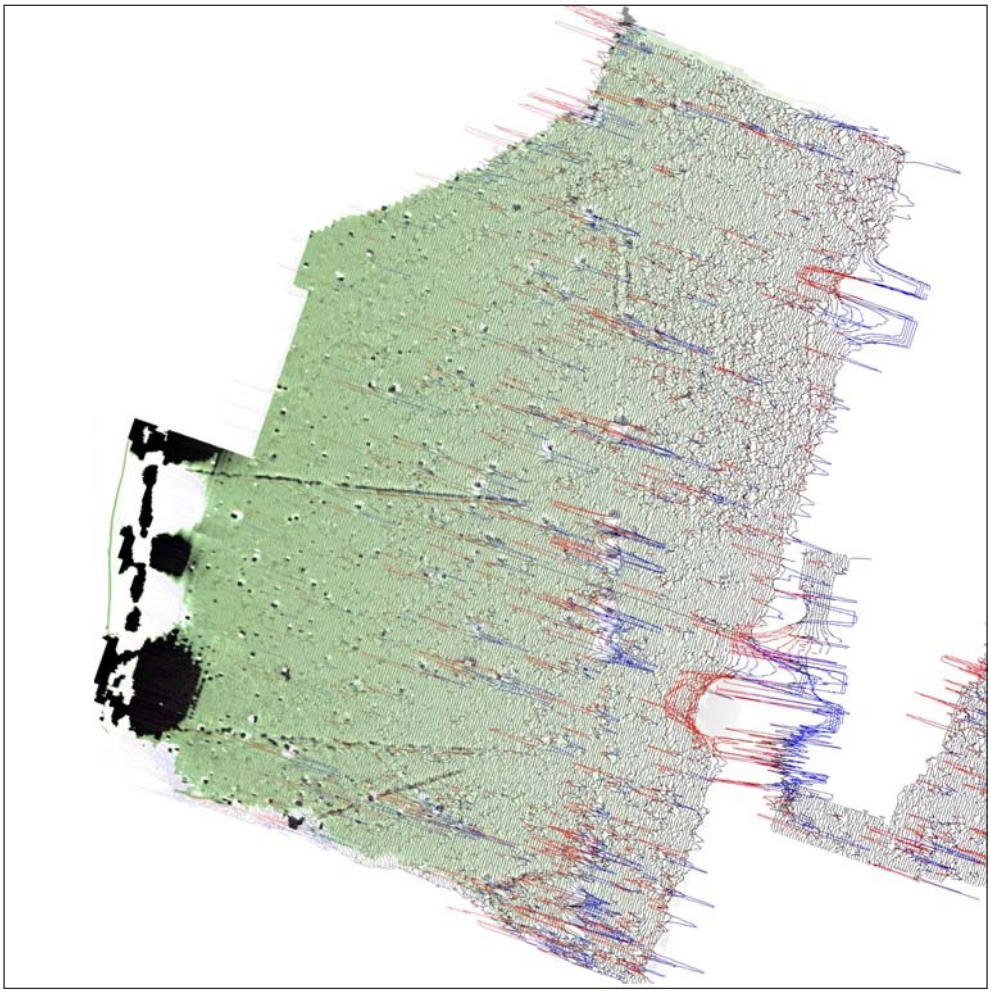
making sense of heritage

Lower Easton Farm
Pylle, Somerset

Detailed Gradiometer Survey Report



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July 2014

geoservices

Lower Easton Farm, Pylle, Somerset

Detailed Gradiometer Survey Report

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Summary

A detailed gradiometer survey was conducted over land off Easton Lane, Pylle, near Shepton Mallet, Somerset. The project was commissioned by Pylle Solar Ltd. with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features on the site ahead of the development of a proposed solar farm.

The site comprises a mix of arable and pasture fields to the north of Easton Lane, approximately 1.9km west of Evercreech and some 2.2km east-northeast of Shepton Mallet. The site occupies the base of a shallow valley, sloping up towards the northern and southern extents. The gradiometer survey covered 4.8ha and has demonstrated the presence of a few anomalies of probable and possible archaeological interest within the survey area, along with regions of increased magnetic response, ploughing, drainage and modern services.

The geophysical data has revealed a circular feature within a larger area of increased magnetic response which is probably archaeological in origin. Agricultural features including drainage ditches and ceramic field drains have been identified along with a line of ferrous responses running parallel to the ploughing trends may represent a former field boundary.

The survey results are notable in that very few archaeological anomalies were identified; a geophysical survey was carried out in 2013 immediately south of this one that revealed an extensive complex of rectilinear enclosures. No clear signs of the continuation of this enclosure complex can be seen in any of the geophysical data collected by Wessex Archaeology.

The survey was undertaken between 29th April and 2nd July 2014.

Lower Easton Farm, Pylle, Somerset

Detailed Gradiometer Survey Report

Acknowledgements

The detailed gradiometer survey was commissioned by Pylle Solar Ltd. The assistance of Jonathan Thompson and Nigel Davie is gratefully acknowledged in this regard.

The fieldwork was undertaken by Clara Dickinson, Alistair Salisbury, Garreth Davey, Jen Smith and Ross Lefort. Alistair Salisbury, Genevieve Shaw and Ross Lefort processed and interpreted the geophysical data, in addition to writing this report. The geophysical work was quality controlled by Ross Lefort and Dr. Paul Baggaley. Illustrations were prepared by Ross Lefort and Ken Lymer. The project was managed on behalf of Wessex Archaeology by Caroline Budd.

Lower Easton Farm, Pylle, Somerset

Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Pylle Solar Ltd. to carry out a geophysical survey of land off Easton Lane, Pylle, near Shepton Mallet, Somerset (**Figure 1**), hereafter "the Site" (centred on NGR 362950, 138725). The survey forms part of an ongoing programme of archaeological works being undertaken, as required by Somerset County Council, to inform a planning application for a proposed solar farm 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, in relation to a previous survey undertaken in selected areas of the site (Pre-Construct Geophysics Ltd 2013). This additional survey was required due to a series of alterations in the application outline for the proposed solar farm.

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 a mix of arable and pasture fields off Easton Lane, some 2.2km east-northeast of the centre of Shepton Mallet and 1.9km west of Evercreech (**Figure 1**). A detailed gradiometer survey was undertaken over all accessible parts of the Site however, some areas of the former paintball range were inaccessible due to scrub, overgrown vegetation, steep earthworks and structures created for the paintball range. In light of these limitations a total area of 4.8ha was surveyed. It should be noted that some areas of the Site, which were included at the beginning of the survey, were subsequently removed from the application area. This accounts for the discrepancy between the site outline and the survey areas as shown on **Figure 1**.

1.2.2 The Site occupies the base of a shallow valley, extending NW-SE, sloping from c. 65m above Ordnance Datum (aOD) at the southern extent to c. 70m aOD at the northern boundary. The survey area lies centrally between Easton Lane and Bagborough Lane and is directly north of a small river named on Ordnance Survey (OS) maps as Whitelake. The survey extents are defined by field boundaries in most directions with some of the northern extents defined by the limits of the proposed development.

1.3 Soils and Geology

1.3.1 The bedrock geology recorded under the Site is recorded as Langport member, blue lias formation and Charmouth mudstone formation (undifferentiated) mudstone that dates to the Jurassic and Triassic periods. No superficial deposits are recorded under the Site (BGS).

1.3.2 The soils underlying most of the Site are likely to be pelo-stagnogley soils of the 712b (Denchworth) association with typical calcareous pelosols of the 411b (Evesham 2) association recorded under the eastern edge of the Site (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 There are no Scheduled Ancient Monuments, sites or findspots recorded within the Site.

1.4.2 A Cultural Heritage Assessment was carried out for the proposed development in 2011 by URS/Scott Wilson (prior to the 2013 geophysical survey) which identified four sites within the vicinity of the solar farm area. These comprised:

- Neolithic flint finds north of Easton Lane (Somerset HER No. 25730)
- A suspected Roman villa to the southwest of Lower Easton Farm as evidenced by 'high status' material recovered during fieldwalking (Somerset HER No. 15053)
- The Roman road linking Exeter to Lincoln, the Fosse Way, lies c.500m to the west of the Site (Somerset HER No. 55101).
- Earthworks of a deserted medieval village settlement to the southwest of the Site in the field adjacent to Easton Hill Farm and identified from aerial photographs (Somerset HER No.23515)

(Summarised from Pre-Construct Geophysics Ltd 2013)

1.4.3 In June 2013 a geophysical survey was undertaken over a 22 hectare area for the proposed solar farm development (Pre-Construct Geophysics Ltd 2013). The gradiometer survey revealed a widespread and complex array of rectilinear enclosure ditches to the south of the Site which were observed to be especially dense between the Whitelake River and Easton Lane.

1.4.4 Other features which were detected and identified included a track or road flanked by rectilinear enclosures, numerous pits and possible postholes, a circular ditch, the line of the former Somerset and Dorset Joint Railway bisecting the field, larger areas of ferrous and a modern service known to be a gas pipeline (Pre-Construct Geophysics Ltd 2013). The 2013 geophysical survey area and greyscale plot is shown in **Figure 5**.

2 METHODOLOGY

2.1 Introduction

2.1.1 The detailed magnetometer survey was conducted using a Bartington Grad 601-2 dual fluxgate gradiometer system. The survey was conducted in accordance with English Heritage guidelines (English Heritage 2008).

2.1.2 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team between 29th April and 2nd July 2014. Field conditions at the time of the survey were variable, with parts of the survey area either under silage crop or within an overgrown former paintball range.

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 a few anomalies of probable and possible archaeological interest across the Site, along with a single modern service. Results are presented as a series of greyscale and XY plots, with corresponding archaeological interpretations, at a scale of 1:2000 (**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 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 westernmost survey area has a few anomalies of probable and possible archaeological interest. The field generally exhibits a quiet magnetic background with a few exceptions including a modern service at **4005** and some areas displaying higher readings in the eastern half of the field.

3.2.2 The most interesting anomaly is a sub-circular anomaly at **4000** that looks to be a ring ditch. The eastern half of this anomaly has the strongest magnetic values over +1.5nT whereas the western half has lower values less than +1nT. The stronger half of this anomaly has been classed as probable archaeology and the weaker half as possible archaeology.

3.2.3 There are two ditch-like anomalies within this field at **4001** and **4002**; the former is straight with magnetic values over +2.5nT and the latter is slightly curved with values around +1.5nT. The straight ditch at **4001** is located in an area of drainage features and may represent a drainage ditch but has been classed as possible archaeology as its alignment does not follow these drainage features. The curved feature at **4002** has very weak magnetic values and has also been classed as possible archaeology as it could represent a geological or an archaeological feature.

3.2.4 A line of ferrous responses, trends and short ditch sections around **4003** marks the position of a former field boundary that can be seen on early OS maps from 1886 as a tree-lined boundary. Areas of increased magnetic response in the southern corner of this field also correspond to positions of former trees within this field. The field boundary appears on OS maps up to 1962 but is not recorded by 1970.

3.2.5 A ditch is visible at **4004** but this is clearly a drainage ditch as a number of ceramic field drains can be seen feeding into it. This ditch has been classed as agricultural. A modern service is present at **4005** but this will be discussed I more detail in the next section of the report.

3.2.6 The only notable feature observed in the former paintball range is a weak positive L-shaped anomaly at **4006**. This feature has magnetic values around +1nT and appears to be isolated within this field; it has been classed as possible archaeology due to its weak magnetic values.

3.2.7 The fields furthest east contain very few anomalies of archaeological interest. The most notable anomalies are a series of trends around **4007** that may be evidence of an earlier scheme of ploughing, spreads of metallic/ceramic debris around **4008** that are likely to be modern and ceramic field drains such as those around **4009**.

3.2.8 The remaining anomalies detected in all the areas include very small positive anomalies of possible archaeological interest and weak linear trends of uncertain origin. It is unclear whether these features indicate the presence of archaeological features or are modern or geological in origin.

3.3 Gradiometer Survey Results and Interpretation: Modern Services

3.3.1 A modern service has been identified in the geophysical data at **4005** with a rough north-south alignment. The anomaly most likely represents a pipe and markers in field boundaries indicate it is a service.

3.3.2 It is not clear from the geophysical data whether the service identified is in active use. 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 few anomalies of possible archaeological interest within the Site, in addition to regions of increased magnetic response, agricultural features and a modern service.

4.1.2 The main concentrations of possible archaeological features are located in the westernmost fields with the possible ring ditch at **4000**, the ditches at **4001** and **4002** and the L-shaped ditch at **4006** representing the most interesting features in the geophysical data.

4.1.3 The remaining anomalies detected appear to be agricultural in origin, either in the form of ceramic field drains, plough scars, ditches and former field boundaries.

4.1.4 The previous geophysical survey conducted by Pre-Construct Geophysics Ltd. covering the land to the south of Whitelake River shows widespread archaeology in the form of rectilinear enclosures, a circular ditched feature and numerous pits indicating settlement occupation of an unknown date (**Figure 5**). It does not appear that this concentrated activity extends to the north side of the river based on the geophysical data collected by Wessex Archaeology. It is possible that some of the overgrown areas within the former paintball range may contain archaeological features. It should however be noted that this area has been subject to the digging of trenches and pits as well as the possibility of a service running through it; these activities may have impacted on any buried remains that may be present here.

4.1.5 The two fields surveyed to the east of the paintball range contain very few archaeological anomalies aside from a few very small positive responses. The archaeology noted on the south side of the river does not appear to extend into these fields either.

4.1.6 The relative dimensions of the modern services identified by the gradiometer survey are indicative of the strength of their magnetic response, which is dependent upon the materials used in their construction and the backfill of the service trenches. The physical dimensions of the services indicated may therefore differ from their magnetic extents in plan; it is assumed that the centreline of services is coincident with the centreline of their anomalies, however. Similarly, it is difficult to estimate the depth of burial of the services through gradiometer survey.

4.1.7 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. A specific issue for this survey might have been the height of the crop at the time of surveying and therefore anomalies interpreted as trends in the data might potentially be archaeological in origin.

5 REFERENCES

5.1 Bibliography

Astill, M. 2011. *Solar Farm, Land at Pylle: Cultural Heritage Assessment.* Unpublished report. URS/Scott Wilson.

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

Pre-Construct Geophysics 2013, *Archaeological Geophysical Survey: Proposed Solar Farm Land at Easton Farm Pylle, Shepton Mallet Somerset* Ref. 32212

5.2 Cartographic Sources

British Geological Survey
http://www.bgs.ac.uk/discoveringgeology/geologyofbritain/viewer.html [accessed July 2014]

Ordnance Survey, 1886. *Somerset,* 1:2500.

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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 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:

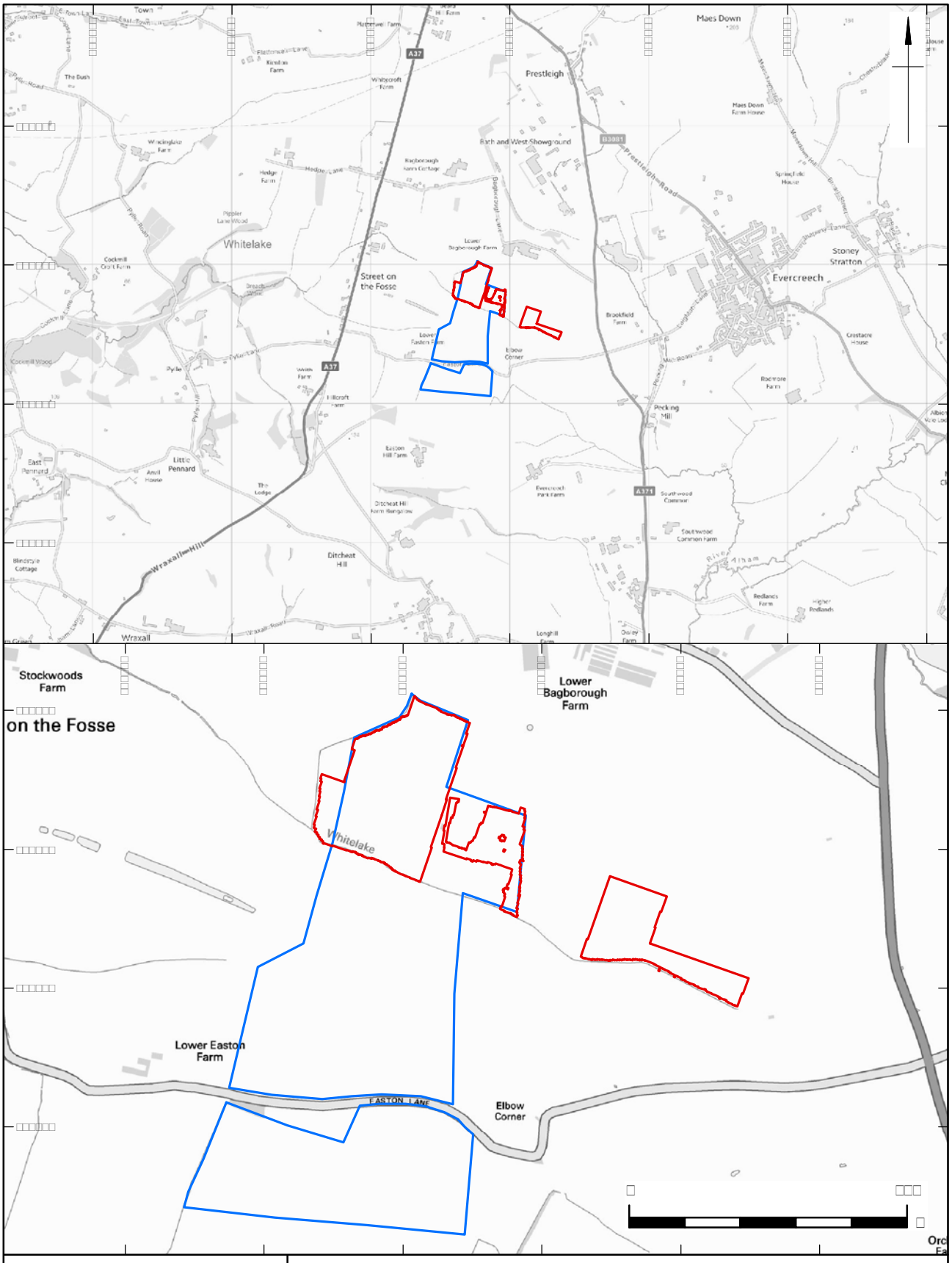
- Ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin.
- Modern service – used for responses considered relating to cables and pipes; most are composed of ferrous/ceramic material although services made from non-magnetic material can sometimes be 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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on the Fosse
Lower Bagborough Farm
Whitelake
Lower Easton Farm
EASTON LANE
Elbow Corner

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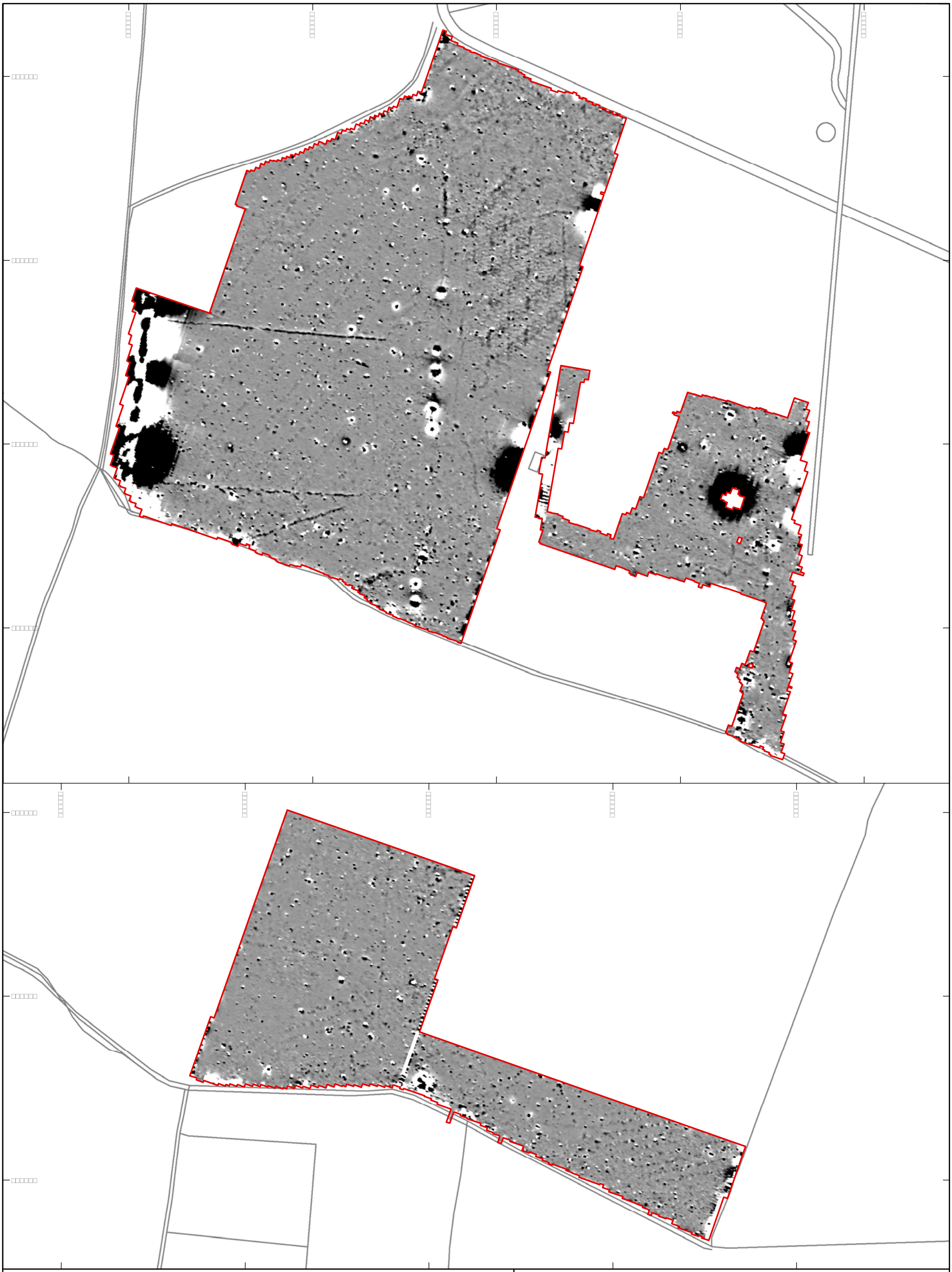

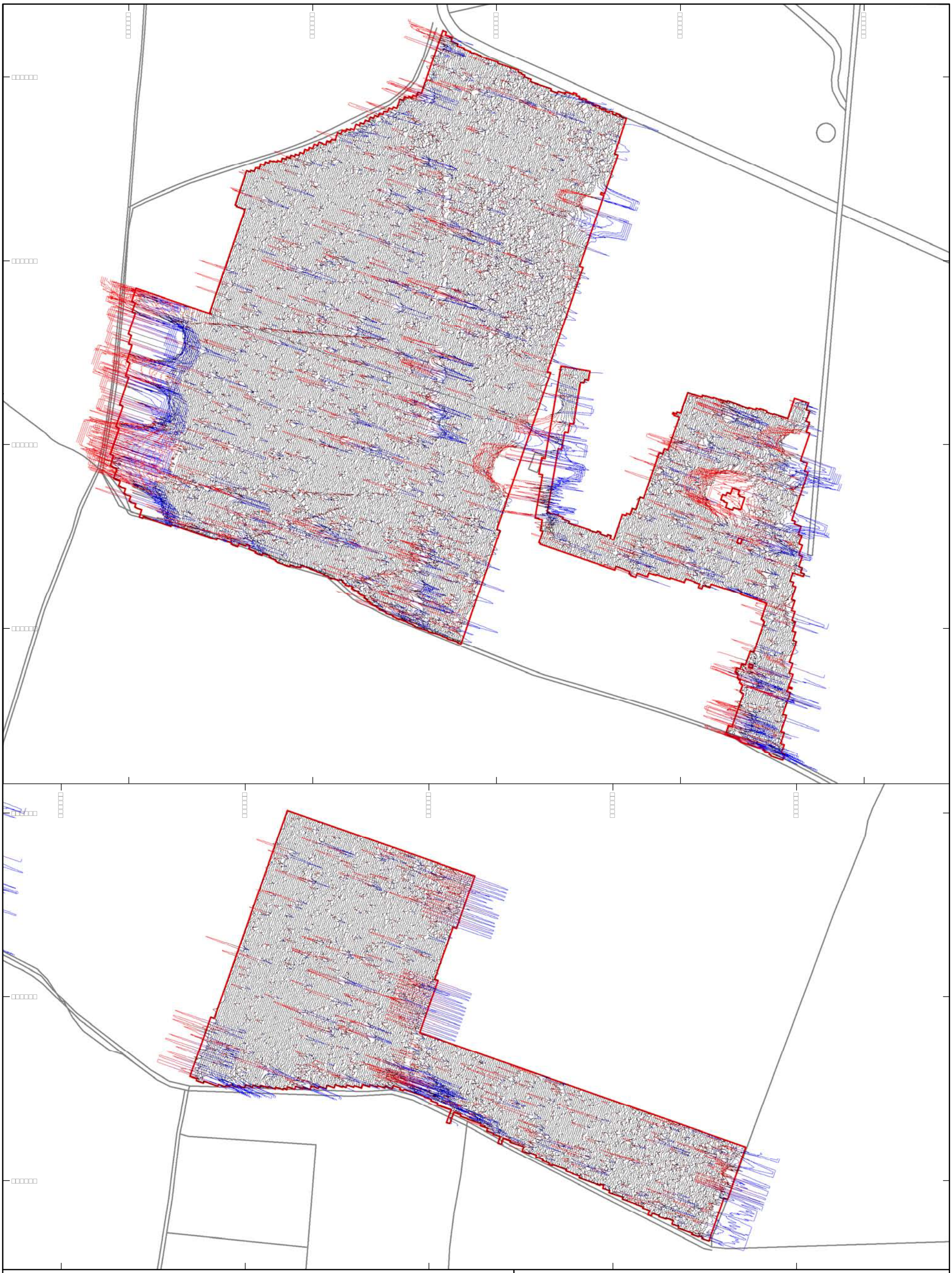

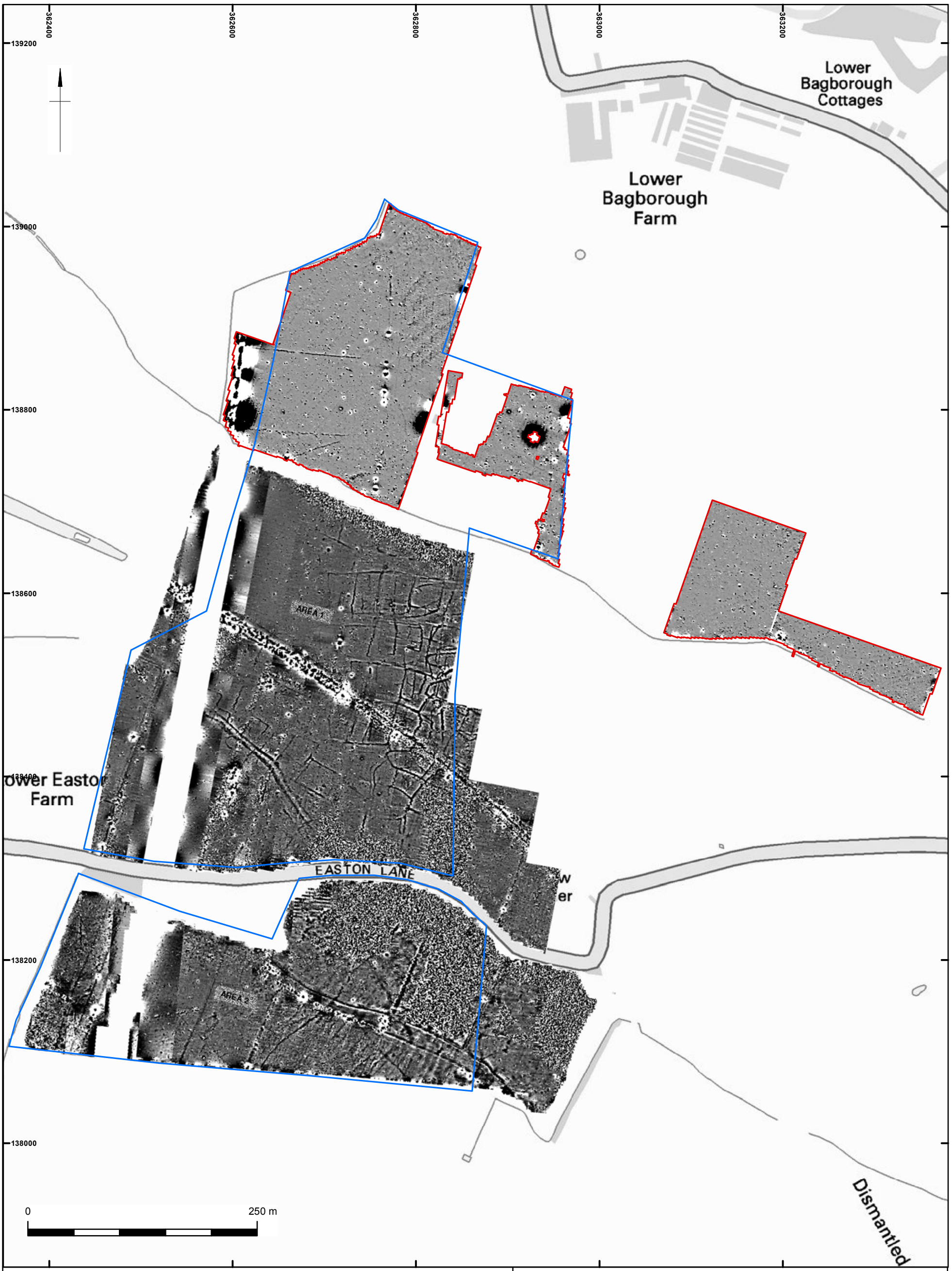

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Previous and current greyscale survey results

Figure 5

wessex archaeology

salisbury rochester sheffield edinburgh

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