



Walworth Expansion Land Andover, Hampshire

Detailed Gradiometer Survey Report

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Summary

A detailed gradiometer survey was conducted over land at Walworth Business Park (Plot 90), in Andover, Hampshire (centred on NGR 438746, 146679). The project was commissioned by Crossways Development Solutions Ltd., on behalf of Kier Property Developments Ltd., with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features in support of a planning application for the development of the site as part of expanding the industrial estate.

The Site occupies an area of 11.0 ha with the northern half currently being used as a sports ground and the southern half as arable land. The geophysical survey was undertaken on 14th and 17th March 2016. The detailed gradiometer survey has demonstrated the presence of a number of anomalies of possible archaeological interest in both the north and south fields.

Numerous anomalies of possible archaeological interest lie across the site and are primarily small pit- and ditch-like features, which have been identified in both the north and south fields.

Anomalies of possible archaeological interest are located both near the northern and southern extents of the north field and to the east in the southern field. A discrete circular feature has been identified as possible archaeological significance due to the discovery of a known barrow cemetery nearby during the planning of the Picket Twenty housing development in 2000 by GSB (WA 2013). It is possible that this feature has no archaeological province as these features are significantly smaller than the barrows discovered at Picket Twenty. A number of linear responses have also been identified across the Site that may be ditches of uncertain origin.

Additionally, this archaeological investigation has detected areas of increased magnetic response, areas of near surface geological change and evidence for historic cultivation, which may mask some archaeological responses.



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Acknowledgements

Wessex Archaeology would like to thank Crossways Development Solutions Ltd. for commissioning the geophysical survey. The assistance of Howard Morris is gratefully acknowledged in this regard.

The fieldwork was undertaken by Jen Smith, Laura Andrews and Alec Hutchings. Jen Smith processed and interpreted the geophysical data and wrote the report. The geophysical work was quality controlled by Elizabeth Richley and Paul Baggaley. Illustrations were prepared by Nancy Dixon. The project was managed on behalf of Wessex Archaeology by Paul Baggaley.



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1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Crossways Development Solutions Ltd., on behalf of Kier Property Developments Ltd., to carry out a geophysical survey on land at Walworth Business Park, Plot 90 hereafter “the Site”, centred on NGR 438746 146679) (**Figure 1**). The survey forms part of an ongoing programme of archaeological works being undertaken in support of a planning application for the development of the Site as part of expanding the industrial estate.

1.1.2 The aim of the geophysical survey was to establish the presence/absence, extent and character of detectable archaeological remains within the survey area.

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

1.2 Site location and topography

1.2.1 The Site is located 2.8 km northeast of the centre of Andover, 5 km northwest of Longparish and 3.3 km south of the village of Little London (**Figure 1**).

1.2.2 The Site occupies an area of 11.0 ha with the northern half currently being used as a sports ground and the southern half as arable land. The Site is bounded by Walworth Road to the north, the current construction site of Picket Piece to the east, Walworth Business Park to the west and Ox Drove road to the south.

1.2.3 The northern part of the site that is currently in use as a Sports Field, is relatively flat. The southern, arable field has an incline sloping from approximately 93m aOD at the southern edge to approximately 82m aOD at the northern edge.

1.3 Soils and geology

1.3.1 The solid geology comprises of chalk of the Seaford Chalk Formation to the north and of the Newhaven Chalk Formation to the south with no overlying superficial geological deposits recorded (BGS 2016).

1.3.2 The soils underlying the Site are likely to consist of Brown Redzinas soils of the 343h (Andover 1) association (SSEW SE Sheet 6 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 An Archaeological Desk-Based Assessment (DBA) undertaken by Wessex Archaeology (2010) examined the potential for the survival of buried archaeological remains within the development area and a 1 km Study Area. This DBA used information provided by the Hampshire Archaeology and Historic Buildings Record (AHBR) and the Hampshire Record Office (HRO). The following background is summarised from the DBA.

1.4.2 There are no designated historical assets within the Site however the DBA has identified a short linear cropmark in the arable field to the south of the Site which may, or may not, represent an archaeological feature. The DBA reports that the feature was not visible on the ground during the Site visit at the time.

The DBA has identified that the eastern boundary may have been established during the medieval period and so fulfils the criteria to be considered as historically important as defined by the Hedgerows Regulations 1997 (amended 2002).

1.4.3 There are no World Heritage Sites, Scheduled Monuments, Registered Parks and Gardens, Conservation Areas, Historic Battlefields or historic buildings, Listed or otherwise, identified within the Study Area.

1.4.4 Previous archaeological works recorded within the Study Area range from a number of DBA's, trial trench evaluations and geophysical surveys since 2000 undertaken by various archaeological contractors. These archaeological investigations revealed the presence of archaeological features, deposits and findspots from the prehistoric period onwards, including a Neolithic settlement site, significant Bronze Age funerary activity and Iron Age/Romano-British field systems.

1.4.5 The DBA has identified recorded evidence of later prehistoric, Bronze Age, Iron Age/Romano-British, Saxon and medieval activity within the Study Area. The archaeological potential for these periods is therefore classified as high.

1.4.6 The Site is situated within an area rich in prehistoric archaeological activity including Bronze Age funerary activity, with later evidence for Iron Age and Romano-British settlement activity. The focus of this later activity is likely to have been related to a number of roads and routeways which pass through and converge within this area.

1.4.7 Within the Study Area Iron Age and Romano-British settlement activity is known adjacent to the Icknield Way, the route of which corresponds with Churchill Way on the western side of Walworth Trading Estate. Further evidence for settlement is known from cropmark evidence and artefact finds in the fields to the north of the Site (in the region of Finkley Down Farm).

1.4.8 The map regression exercise undertaken as part of the DBA indicated that the Site area was in use as a pasture field from at least the 18th century until the later 20th century. The southern third of the Site was turned over to arable farming and remains as such at the time this report was written.



2 METHODOLOGY

2.1 Introduction

2.1.1 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team between the 14th and 17th March 2016. Field conditions at the time of the survey were good, with dry conditions throughout the period of survey. An overall coverage of 9.3 ha was achieved as the survey area was slightly reduced due to the presence of vegetation, fencing from the nearby construction site at Picket Piece, a parking area and football goal posts.

2.2 Method

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

2.2.2 The detailed gradiometer survey was conducted using a Bartington Grad601-2 fluxgate gradiometer instrument, which has a vertical separation of 1 m between sensors. Data were collected at 0.25 m intervals along transects spaced 1 m apart with an effective sensitivity of 0.03nT, in accordance with Historic England guidelines (English Heritage 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 (± 5 nT 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 throughout the survey area, 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 detailed gradiometer survey has identified magnetic anomalies across the Site, along with areas of increased magnetic response and a large amount of ferrous. Results are presented as a series of greyscale plots, XY plots and archaeological interpretations at a scale of 1:1800 (**Figures 2 to 4**). The data are displayed at -2 nT (white) to +3 nT (black) for the greyscale image and ± 25 nT at 25 nT per cm for the XY trace plots.
- 3.1.2 The interpretation of the datasets highlights the presence of possible 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 dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.
- 3.1.4 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 present than have been identified through geophysical survey.
- 3.1.5 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.

3.2 Gradiometer survey results and interpretation

- 3.2.1 Near the northern extent of the sports field at **4000** a faint negative circular feature of approximately -1.5 nT can be seen. A Bronze Age barrow cemetery was discovered during archaeological investigations prior to the construction of the Picket Twenty housing estate approximately 1.2 km southwest of the Site. These features are approximately 6-10 meters in diameter; possibly too small to be considered to be barrows so have been interpreted as possible archaeology.
- 3.2.2 A faint linear anomaly at **4001** aligned northeast to southwest can be seen near the eastern extent of the sports field. The extents of this feature are unclear due to the strong ferrous response along the eastern boundary of the Site that appears to be masking the northern extent of this feature and the area of increased magnetic response at the southern extent. It is possible that **4001** extends further south past the area of increased magnetic response as the linear at **4004**. These features do not appear to follow any of the ploughing trends in the dataset so have been interpreted as possible archaeology.
- 3.2.3 A faint linear negative anomaly at **4002** aligned northeast to southwest can be seen just south of **4001**. The northern extent of this feature appears to stop before reaching the eastern field boundary, whereas this features southern extent appears to stop in the same area of increased magnetic response as **4001**. It is possible that **4002** extends further south and is likely to be a continuation of the linear feature at **4003**.
- 3.2.4 Towards the southern extent of the sports field at **4005** a strong positive linear anomaly aligned approximately north to south can be seen extending towards the centre of the sports field. While **4005** intersects with **4003**; they do not appear to have any association



to each other, however it is not possible to ascertain the stratigraphic relationships of features from gradiometer data alone.

- 3.2.5 Along the western field boundary of the sports field at **4006** is a further linear anomaly that is similar to **4005** in terms of magnetic response. This feature is aligned northwest to southeast with both extents being masked by stronger ferrous responses. Unfortunately, it is not possible to determine whether **4005** and **4006** are in any way associated with each other due to the field boundary that now separates the sports field from the arable field.
- 3.2.6 At **4007** a weakly positive (0.5-1 nT) linear anomaly can be seen extending into the survey area on a northwest alignment from the survey extents. This extends for approximately 17 m before turning to the southwest and extending for a further 10 m. No features have been identified in the southern field that may be related as such it is unclear what this anomaly represents. It has been interpreted as possible archaeology due to its similarity in reading to other linear features seen in the northern field.
- 3.2.7 In the southern arable field two parallel linear anomalies at **4008** and **4010** are aligned northeast to southwest but it is not possible to say with any certainty if these features are related. They have been interpreted as possible archaeology due to their similarity to other nearby features and as such are considered to be caused by ditch like features.
- 3.2.8 The strong positive linear anomaly **4009** is likely to be an extension of **4008**. This feature's form and shape are similarly suggestive of a ditch-like feature of possible archaeological interest.
- 3.2.9 **4011** indicates three bands of positive magnetic readings in the south-eastern part of the southern field. These lie on a roughly north-north-west to south-south-east alignment, differing to the alignment of the visible ploughing trends and field boundaries. These are considered to relate to agricultural practices in the field and may be associated with modern farm machinery.
- 3.2.10 In the eastern corner of the arable field, two parallel positive linear anomalies at **4012** aligned northeast to southwest can be seen next to each other. These have similar magnetic responses (1-2 nT) however it is unclear as to whether they are associated with each other. There are no other comparative features in the field to these responses.
- 3.2.11 Across the entire Site there are numerous clusters of small strong positive anomalies which have been interpreted as possible archaeology and may represent clusters of pit-like features. Their form and size suggest that they may be of some archaeological interest although it is possible that they relate to natural features, such as tree throws, or agricultural activity. Historic mapping (OS Plan 1976-78) shows that the northern field had linear arrangement of trees extending northeast from the southern extent of the north field by trees and a further line bisecting the northern field from the east to west extents.
- 3.2.12 The areas of increased magnetic response towards the southern extent of the sports field and in the arable field look to be possibly remnants of early agricultural practices on the Site but it is not possible to determine this from the gradiometer data alone.
- 3.2.13 Numerous linear and other curvilinear trends can be seen across the Site. It is likely that the majority of these are the result of ploughing, and/or other agricultural activity. These predominately lie on a northeast to southwest alignment and show regular spacing.



4 CONCLUSION

- 4.1.1 The detailed gradiometer survey has been successful in detecting anomalies of possible archaeological interest in both the north and south fields. In addition to these, anomalies interpreted as ploughing trends, areas of increased magnetic response and superficial geology have also been identified.
- 4.1.2 The anomalies of archaeological interest are primarily pit- and ditch-like features and have been identified in both the north and south field.
- 4.1.3 The most intriguing anomaly of potential archaeology is located at **4000** in the northern field. This discreet circular feature has been interpreted as possible archaeology due to the discovery of a barrow cemetery nearby (c. 1.2 m southeast) during the planning of the Picket Twenty housing development in 2000 by GSB (WA 2013). This feature is, however, significantly smaller (approximately 10 m diameter compared to the maximum of 34 m) and is magnetically weaker than the barrows discovered at Picket Twenty. It is therefore possible that this response may represent other, unidentified features.
- 4.1.4 Numerous linear features have been identified across the Site (**4001, 4002, 4003, 4004, 4005, 4006, 4007, 4008, 4009** and **4010**) but none can be identified as former field boundaries as historic mapping shows that the Site was only subdivided in the 20th century (WA 2010). All appear to be ditch-like features of unknown date and origin. However, the two linear features at **4008** and **4009** are suspected of being field drains.
- 4.1.5 Numerous clusters of pit-like anomalies have been identified across the entire Site. These are difficult to interpret as they have no clear or coherent spatial alignments. Some of these responses may relate to tree throws; historic mapping shows a linear arrangement of trees in the northern field. An archaeological interpretation cannot be excluded entirely, resulting in their classification as being of possible interest.
- 4.1.6 The areas of increased magnetic response in the northern and southern fields are more difficult to define. The larger area located in the centre of the northern field may represent an area of former burning or a spread of magnetically enhanced debris. This feature is located in to two areas of superficial geology and as such may simply represent a change in the near surface geology. The large areas of increased magnetic response towards the southeast of the Site, however, have a more definite form and shape. Their origins are unknown but it is possible that they are a result of past agricultural practices on Site.
- 4.1.7 Frequent ploughing trends are visible across the Site on differing alignments, but predominately on a northeast to southwest alignment. This is likely due to variable boundaries and different farming processes and are likely to be medieval, post-medieval and/or modern in provenance.



5 RECOMMENDATIONS

- 5.1.1 Following the results of the geophysical survey, it is considered that further archaeological investigations will be required by the Local Planning Authority. It is recommended that these works could take the form of archaeological trial trenching in the first instance.
- 5.1.2 A trial trenching strategy would be advised by the County Archaeologist, but it is recommended that the anomalies identified as possible archaeology are ground-truthed.
- 5.1.3 Additionally, further data should be collected via trial trenching from the areas identified as superficial archaeology / potential spreads to ensure that these responses are not masking weaker and potentially archaeological responses. Trenches should also be planned to investigate areas where no anomalies of potential archaeological interest have been identified within the Site.



6 REFERENCES

6.1 Bibliography

Wessex Archaeology 2010 *Archaeological Desk-Based Assessment, Walworth Expansion Land, Andover, Salisbury*. Unpublished Client Report #73860.02

Wessex Archaeology 2013 *Detailed Gradiometer Survey Report, Picket Twenty Extension, Andover, Hampshire*. Unpublished Client Report #69393.01

English Heritage 2008 *Geophysical Survey in Archaeological Field Evaluation. Research and Professional Service Guideline No 1*. Swindon (2nd Edition)

6.2 Cartographic and documentary sources

1851 Andover tithe apportionment (HRO Ref. 10M71/6/1)

1876 Ordnance Survey 6"

1894 Ordnance Survey 6"

1911 Ordnance Survey 6"

1940 Ordnance Survey 6"

1961 Ordnance Survey 1:10,560

1968 Ordnance Survey 1:10,560

1974 Ordnance Survey 1:2,500

1978 Ordnance Survey 6" 1:10,560

1984 Ordnance Survey 6" 1:10,560

Ordnance Survey 1983 *Soil Survey of England and Wales Sheet 6, Soils of Midland and Western England*. Southampton.

6.3 Online resources

British Geological Survey geology of Britain viewer (March 2016)

<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>



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 ± 100 nT 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 Historic England (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 Historic England (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.
- 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.
- 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:

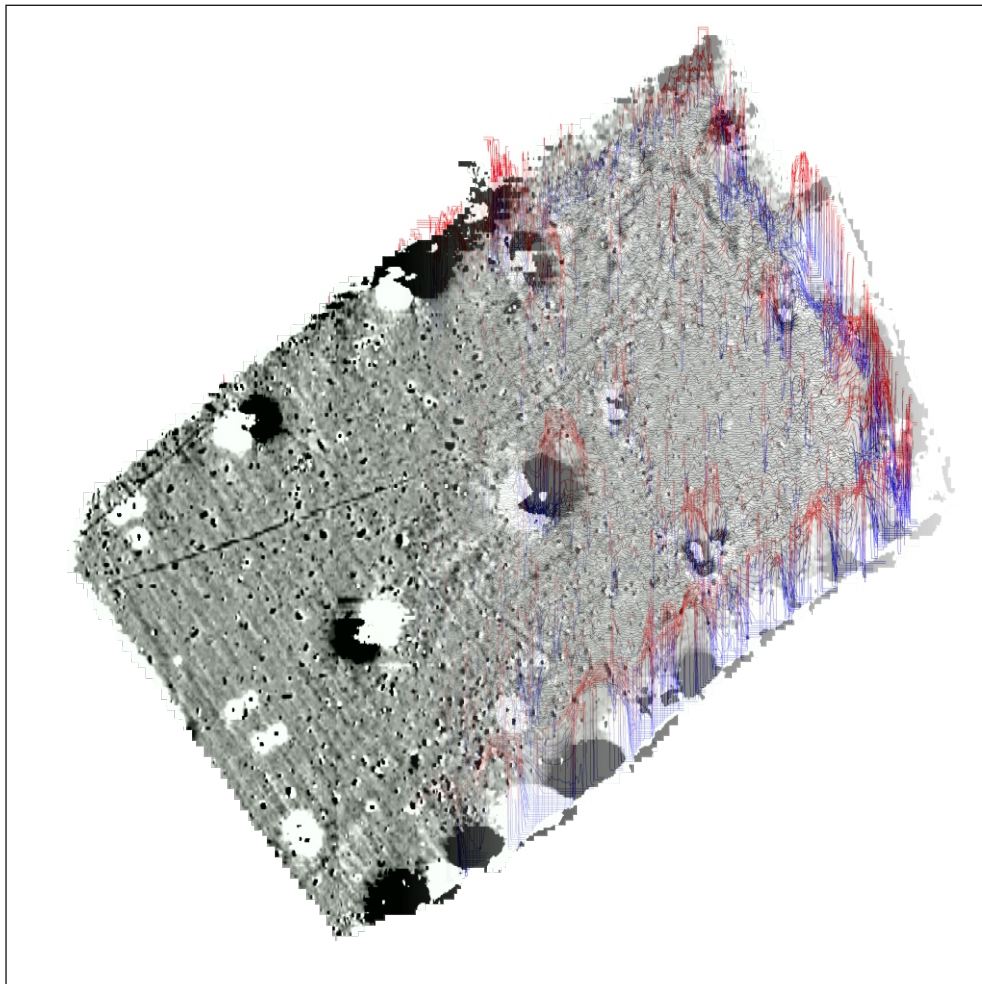
- Increased magnetic response – used for areas dominated by indistinct anomalies which may have some archaeological potential.
- Trend – used for low amplitude or indistinct linear anomalies.
- Superficial geology – used for diffuse edged spreads considered to relate to shallow geological deposits. They can be distinguished as areas of positive, negative or broad bipolar (positive and negative) anomalies.



making sense of heritage

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Detailed Gradiometer Survey Report

Summary

A detailed gradiometer survey was conducted over land at Walworth Business Park (Plot 90), in Andover, Hampshire (centred on NGR 438746, 146679). The project was commissioned by Crossways Development Solutions Ltd., on behalf of Kier Property Developments Ltd., with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features in support of a planning application for the development of the site as part of expanding the industrial estate.

The Site occupies an area of 11.0 ha with the northern half currently being used as a sports ground and the southern half as arable land. The geophysical survey was undertaken on 14th and 17th March 2016. The detailed gradiometer survey has demonstrated the presence of a number of anomalies of possible archaeological interest in both the north and south fields.

Numerous anomalies of possible archaeological interest lie across the site and are primarily small pit- and ditch-like features, which have been identified in both the north and south fields.

Anomalies of possible archaeological interest are located both near the northern and southern extents of the north field and to the east in the southern field. A discrete circular feature has been identified as possible archaeological significance due to the discovery of a known barrow cemetery nearby during the planning of the Picket Twenty housing development in 2000 by GSB (WA 2013). It is possible that this feature has no archaeological province as these features are significantly smaller than the barrows discovered at Picket Twenty. A number of linear responses have also been identified across the Site that may be ditches of uncertain origin.

Additionally, this archaeological investigation has detected areas of increased magnetic response, areas of near surface geological change and evidence for historic cultivation, which may mask some archaeological responses.



Walworth Expansion Land Andover, Hampshire

Detailed Gradiometer Survey Report

Acknowledgements

Wessex Archaeology would like to thank Crossways Development Solutions Ltd. for commissioning the geophysical survey. The assistance of Howard Morris is gratefully acknowledged in this regard.

The fieldwork was undertaken by Jen Smith, Laura Andrews and Alec Hutchings. Jen Smith processed and interpreted the geophysical data and wrote the report. The geophysical work was quality controlled by Elizabeth Richley and Paul Baggaley. Illustrations were prepared by Nancy Dixon. The project was managed on behalf of Wessex Archaeology by Paul Baggaley.



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1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Crossways Development Solutions Ltd., on behalf of Kier Property Developments Ltd., to carry out a geophysical survey on land at Walworth Business Park, Plot 90 hereafter “the Site”, centred on NGR 438746 146679) (**Figure 1**). The survey forms part of an ongoing programme of archaeological works being undertaken in support of a planning application for the development of the Site as part of expanding the industrial estate.

1.1.2 The aim of the geophysical survey was to establish the presence/absence, extent and character of detectable archaeological remains within the survey area.

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

1.2 Site location and topography

1.2.1 The Site is located 2.8 km northeast of the centre of Andover, 5 km northwest of Longparish and 3.3 km south of the village of Little London (**Figure 1**).

1.2.2 The Site occupies an area of 11.0 ha with the northern half currently being used as a sports ground and the southern half as arable land. The Site is bounded by Walworth Road to the north, the current construction site of Picket Piece to the east, Walworth Business Park to the west and Ox Drove road to the south.

1.2.3 The northern part of the site that is currently in use as a Sports Field, is relatively flat. The southern, arable field has an incline sloping from approximately 93m aOD at the southern edge to approximately 82m aOD at the northern edge.

1.3 Soils and geology

1.3.1 The solid geology comprises of chalk of the Seaford Chalk Formation to the north and of the Newhaven Chalk Formation to the south with no overlying superficial geological deposits recorded (BGS 2016).

1.3.2 The soils underlying the Site are likely to consist of Brown Redzinas soils of the 343h (Andover 1) association (SSEW SE Sheet 6 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 An Archaeological Desk-Based Assessment (DBA) undertaken by Wessex Archaeology (2010) examined the potential for the survival of buried archaeological remains within the development area and a 1 km Study Area. This DBA used information provided by the Hampshire Archaeology and Historic Buildings Record (AHBR) and the Hampshire Record Office (HRO). The following background is summarised from the DBA.

1.4.2 There are no designated historical assets within the Site however the DBA has identified a short linear cropmark in the arable field to the south of the Site which may, or may not, represent an archaeological feature. The DBA reports that the feature was not visible on the ground during the Site visit at the time.

The DBA has identified that the eastern boundary may have been established during the medieval period and so fulfils the criteria to be considered as historically important as defined by the Hedgerows Regulations 1997 (amended 2002).

1.4.3 There are no World Heritage Sites, Scheduled Monuments, Registered Parks and Gardens, Conservation Areas, Historic Battlefields or historic buildings, Listed or otherwise, identified within the Study Area.

1.4.4 Previous archaeological works recorded within the Study Area range from a number of DBA's, trial trench evaluations and geophysical surveys since 2000 undertaken by various archaeological contractors. These archaeological investigations revealed the presence of archaeological features, deposits and findspots from the prehistoric period onwards, including a Neolithic settlement site, significant Bronze Age funerary activity and Iron Age/Romano-British field systems.

1.4.5 The DBA has identified recorded evidence of later prehistoric, Bronze Age, Iron Age/Romano-British, Saxon and medieval activity within the Study Area. The archaeological potential for these periods is therefore classified as high.

1.4.6 The Site is situated within an area rich in prehistoric archaeological activity including Bronze Age funerary activity, with later evidence for Iron Age and Romano-British settlement activity. The focus of this later activity is likely to have been related to a number of roads and routeways which pass through and converge within this area.

1.4.7 Within the Study Area Iron Age and Romano-British settlement activity is known adjacent to the Icknield Way, the route of which corresponds with Churchill Way on the western side of Walworth Trading Estate. Further evidence for settlement is known from cropmark evidence and artefact finds in the fields to the north of the Site (in the region of Finkley Down Farm).

1.4.8 The map regression exercise undertaken as part of the DBA indicated that the Site area was in use as a pasture field from at least the 18th century until the later 20th century. The southern third of the Site was turned over to arable farming and remains as such at the time this report was written.



2 METHODOLOGY

2.1 Introduction

2.1.1 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team between the 14th and 17th March 2016. Field conditions at the time of the survey were good, with dry conditions throughout the period of survey. An overall coverage of 9.3 ha was achieved as the survey area was slightly reduced due to the presence of vegetation, fencing from the nearby construction site at Picket Piece, a parking area and football goal posts.

2.2 Method

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

2.2.2 The detailed gradiometer survey was conducted using a Bartington Grad601-2 fluxgate gradiometer instrument, which has a vertical separation of 1 m between sensors. Data were collected at 0.25 m intervals along transects spaced 1 m apart with an effective sensitivity of 0.03nT, in accordance with Historic England guidelines (English Heritage 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 (± 5 nT 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 throughout the survey area, 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 detailed gradiometer survey has identified magnetic anomalies across the Site, along with areas of increased magnetic response and a large amount of ferrous. Results are presented as a series of greyscale plots, XY plots and archaeological interpretations at a scale of 1:1800 (**Figures 2 to 4**). The data are displayed at -2 nT (white) to +3 nT (black) for the greyscale image and ± 25 nT at 25 nT per cm for the XY trace plots.
- 3.1.2 The interpretation of the datasets highlights the presence of possible 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 dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.
- 3.1.4 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 present than have been identified through geophysical survey.
- 3.1.5 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.

3.2 Gradiometer survey results and interpretation

- 3.2.1 Near the northern extent of the sports field at **4000** a faint negative circular feature of approximately -1.5 nT can be seen. A Bronze Age barrow cemetery was discovered during archaeological investigations prior to the construction of the Picket Twenty housing estate approximately 1.2 km southwest of the Site. These features are approximately 6-10 meters in diameter; possibly too small to be considered to be barrows so have been interpreted as possible archaeology.
- 3.2.2 A faint linear anomaly at **4001** aligned northeast to southwest can be seen near the eastern extent of the sports field. The extents of this feature are unclear due to the strong ferrous response along the eastern boundary of the Site that appears to be masking the northern extent of this feature and the area of increased magnetic response at the southern extent. It is possible that **4001** extends further south past the area of increased magnetic response as the linear at **4004**. These features do not appear to follow any of the ploughing trends in the dataset so have been interpreted as possible archaeology.
- 3.2.3 A faint linear negative anomaly at **4002** aligned northeast to southwest can be seen just south of **4001**. The northern extent of this feature appears to stop before reaching the eastern field boundary, whereas this features southern extent appears to stop in the same area of increased magnetic response as **4001**. It is possible that **4002** extends further south and is likely to be a continuation of the linear feature at **4003**.
- 3.2.4 Towards the southern extent of the sports field at **4005** a strong positive linear anomaly aligned approximately north to south can be seen extending towards the centre of the sports field. While **4005** intersects with **4003**; they do not appear to have any association



to each other, however it is not possible to ascertain the stratigraphic relationships of features from gradiometer data alone.

- 3.2.5 Along the western field boundary of the sports field at **4006** is a further linear anomaly that is similar to **4005** in terms of magnetic response. This feature is aligned northwest to southeast with both extents being masked by stronger ferrous responses. Unfortunately, it is not possible to determine whether **4005** and **4006** are in any way associated with each other due to the field boundary that now separates the sports field from the arable field.
- 3.2.6 At **4007** a weakly positive (0.5-1 nT) linear anomaly can be seen extending into the survey area on a northwest alignment from the survey extents. This extends for approximately 17 m before turning to the southwest and extending for a further 10 m. No features have been identified in the southern field that may be related as such it is unclear what this anomaly represents. It has been interpreted as possible archaeology due to its similarity in reading to other linear features seen in the northern field.
- 3.2.7 In the southern arable field two parallel linear anomalies at **4008** and **4010** are aligned northeast to southwest but it is not possible to say with any certainty if these features are related. They have been interpreted as possible archaeology due to their similarity to other nearby features and as such are considered to be caused by ditch like features.
- 3.2.8 The strong positive linear anomaly **4009** is likely to be an extension of **4008**. This feature's form and shape are similarly suggestive of a ditch-like feature of possible archaeological interest.
- 3.2.9 **4011** indicates three bands of positive magnetic readings in the south-eastern part of the southern field. These lie on a roughly north-north-west to south-south-east alignment, differing to the alignment of the visible ploughing trends and field boundaries. These are considered to relate to agricultural practices in the field and may be associated with modern farm machinery.
- 3.2.10 In the eastern corner of the arable field, two parallel positive linear anomalies at **4012** aligned northeast to southwest can be seen next to each other. These have similar magnetic responses (1-2 nT) however it is unclear as to whether they are associated with each other. There are no other comparative features in the field to these responses.
- 3.2.11 Across the entire Site there are numerous clusters of small strong positive anomalies which have been interpreted as possible archaeology and may represent clusters of pit-like features. Their form and size suggest that they may be of some archaeological interest although it is possible that they relate to natural features, such as tree throws, or agricultural activity. Historic mapping (OS Plan 1976-78) shows that the northern field had linear arrangement of trees extending northeast from the southern extent of the north field by trees and a further line bisecting the northern field from the east to west extents.
- 3.2.12 The areas of increased magnetic response towards the southern extent of the sports field and in the arable field look to be possibly remnants of early agricultural practices on the Site but it is not possible to determine this from the gradiometer data alone.
- 3.2.13 Numerous linear and other curvilinear trends can be seen across the Site. It is likely that the majority of these are the result of ploughing, and/or other agricultural activity. These predominately lie on a northeast to southwest alignment and show regular spacing.



4 CONCLUSION

- 4.1.1 The detailed gradiometer survey has been successful in detecting anomalies of possible archaeological interest in both the north and south fields. In addition to these, anomalies interpreted as ploughing trends, areas of increased magnetic response and superficial geology have also been identified.
- 4.1.2 The anomalies of archaeological interest are primarily pit- and ditch-like features and have been identified in both the north and south field.
- 4.1.3 The most intriguing anomaly of potential archaeology is located at **4000** in the northern field. This discreet circular feature has been interpreted as possible archaeology due to the discovery of a barrow cemetery nearby (c. 1.2 m southeast) during the planning of the Picket Twenty housing development in 2000 by GSB (WA 2013). This feature is, however, significantly smaller (approximately 10 m diameter compared to the maximum of 34 m) and is magnetically weaker than the barrows discovered at Picket Twenty. It is therefore possible that this response may represent other, unidentified features.
- 4.1.4 Numerous linear features have been identified across the Site (**4001, 4002, 4003, 4004, 4005, 4006, 4007, 4008, 4009** and **4010**) but none can be identified as former field boundaries as historic mapping shows that the Site was only subdivided in the 20th century (WA 2010). All appear to be ditch-like features of unknown date and origin. However, the two linear features at **4008** and **4009** are suspected of being field drains.
- 4.1.5 Numerous clusters of pit-like anomalies have been identified across the entire Site. These are difficult to interpret as they have no clear or coherent spatial alignments. Some of these responses may relate to tree throws; historic mapping shows a linear arrangement of trees in the northern field. An archaeological interpretation cannot be excluded entirely, resulting in their classification as being of possible interest.
- 4.1.6 The areas of increased magnetic response in the northern and southern fields are more difficult to define. The larger area located in the centre of the northern field may represent an area of former burning or a spread of magnetically enhanced debris. This feature is located in to two areas of superficial geology and as such may simply represent a change in the near surface geology. The large areas of increased magnetic response towards the southeast of the Site, however, have a more definite form and shape. Their origins are unknown but it is possible that they are a result of past agricultural practices on Site.
- 4.1.7 Frequent ploughing trends are visible across the Site on differing alignments, but predominately on a northeast to southwest alignment. This is likely due to variable boundaries and different farming processes and are likely to be medieval, post-medieval and/or modern in provenance.



5 RECOMMENDATIONS

- 5.1.1 Following the results of the geophysical survey, it is considered that further archaeological investigations will be required by the Local Planning Authority. It is recommended that these works could take the form of archaeological trial trenching in the first instance.
- 5.1.2 A trial trenching strategy would be advised by the County Archaeologist, but it is recommended that the anomalies identified as possible archaeology are ground-truthed.
- 5.1.3 Additionally, further data should be collected via trial trenching from the areas identified as superficial archaeology / potential spreads to ensure that these responses are not masking weaker and potentially archaeological responses. Trenches should also be planned to investigate areas where no anomalies of potential archaeological interest have been identified within the Site.



6 REFERENCES

6.1 Bibliography

Wessex Archaeology 2010 *Archaeological Desk-Based Assessment, Walworth Expansion Land, Andover, Salisbury*. Unpublished Client Report #73860.02

Wessex Archaeology 2013 *Detailed Gradiometer Survey Report, Picket Twenty Extension, Andover, Hampshire*. Unpublished Client Report #69393.01

English Heritage 2008 *Geophysical Survey in Archaeological Field Evaluation. Research and Professional Service Guideline No 1*. Swindon (2nd Edition)

6.2 Cartographic and documentary sources

1851 Andover tithe apportionment (HRO Ref. 10M71/6/1)

1876 Ordnance Survey 6"

1894 Ordnance Survey 6"

1911 Ordnance Survey 6"

1940 Ordnance Survey 6"

1961 Ordnance Survey 1:10,560

1968 Ordnance Survey 1:10,560

1974 Ordnance Survey 1:2,500

1978 Ordnance Survey 6" 1:10,560

1984 Ordnance Survey 6" 1:10,560

Ordnance Survey 1983 *Soil Survey of England and Wales Sheet 6, Soils of Midland and Western England*. Southampton.

6.3 Online resources

British Geological Survey geology of Britain viewer (March 2016)

<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>



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 ± 100 nT 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 Historic England (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 Historic England (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.
- 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:

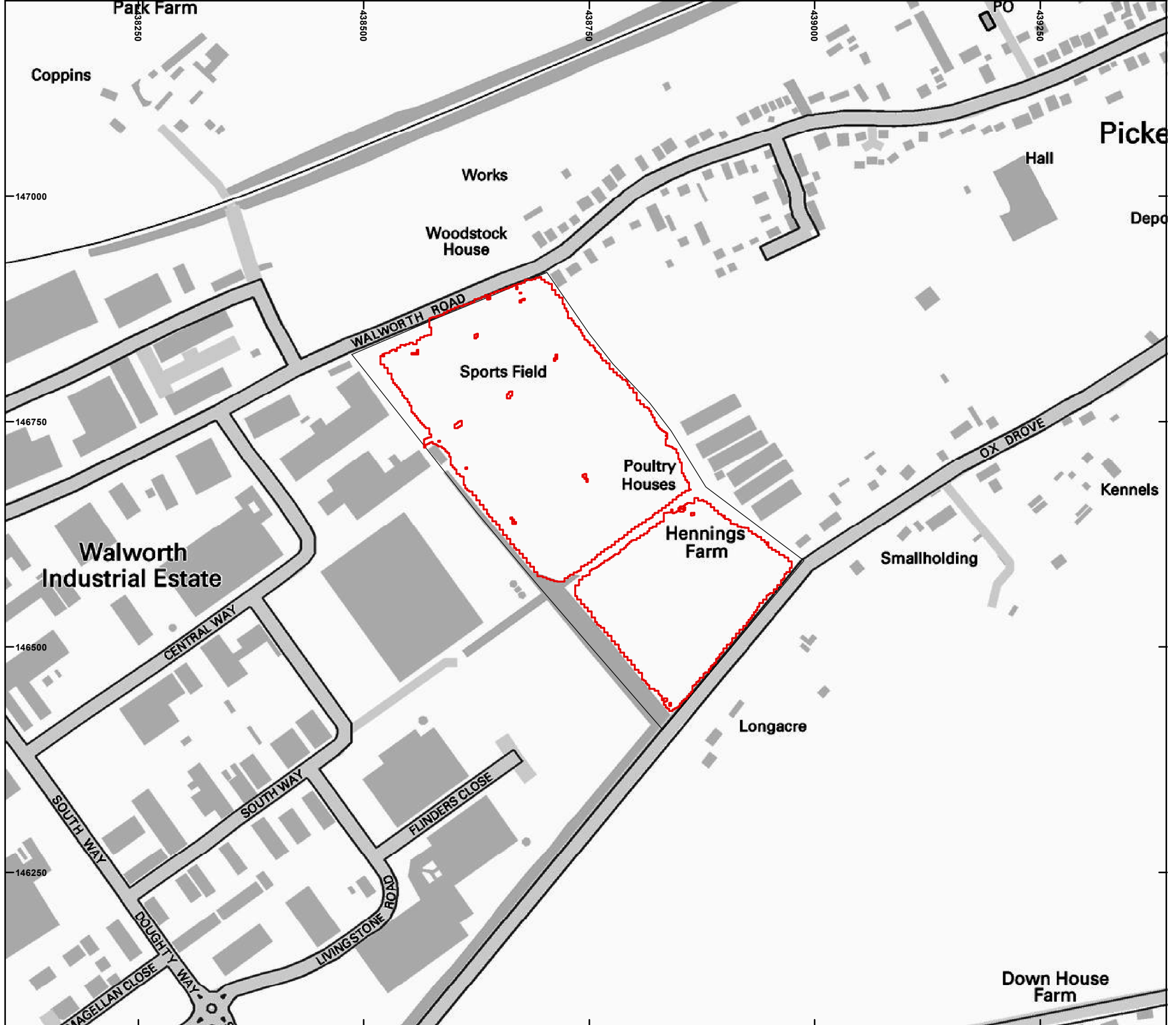
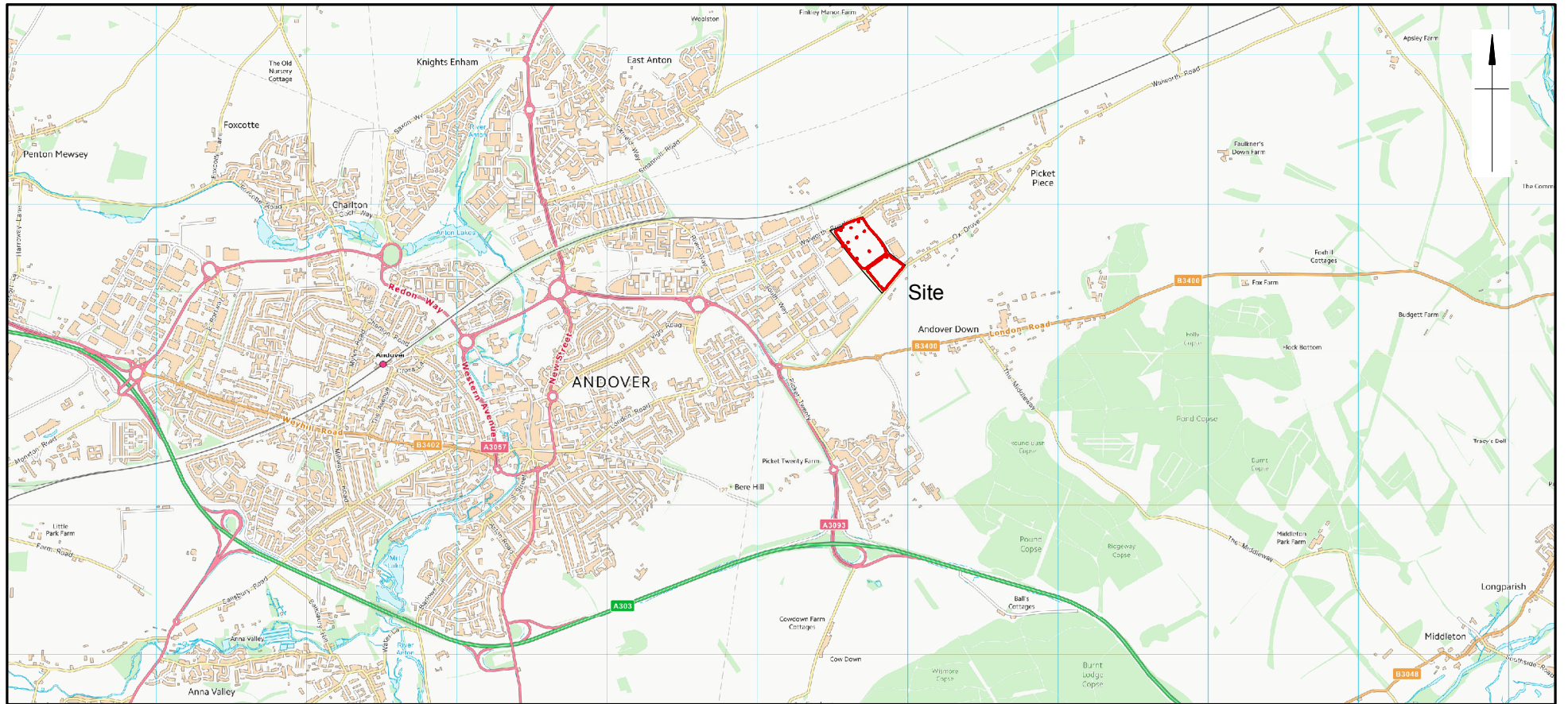
- Ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin.
- Modern service – used for responses considered relating to cables and pipes; most are composed of ferrous/ceramic material although services made from non-magnetic material can sometimes be 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.
- Ridge and furrow – used for broad and diffuse linear anomalies that are considered to indicate areas of former ridge and furrow.
- Ploughing – used for well-defined narrow linear responses, usually aligned parallel to existing field boundaries.
- Drainage – used to define the course of ceramic field drains that are visible in the data as a series of repeating bipolar (black and white) responses.

The uncertain origin/geological category is used for features when the form, nature and pattern of the anomaly are not sufficient to warrant a classification as an archaeological feature. This category is further sub-divided into:

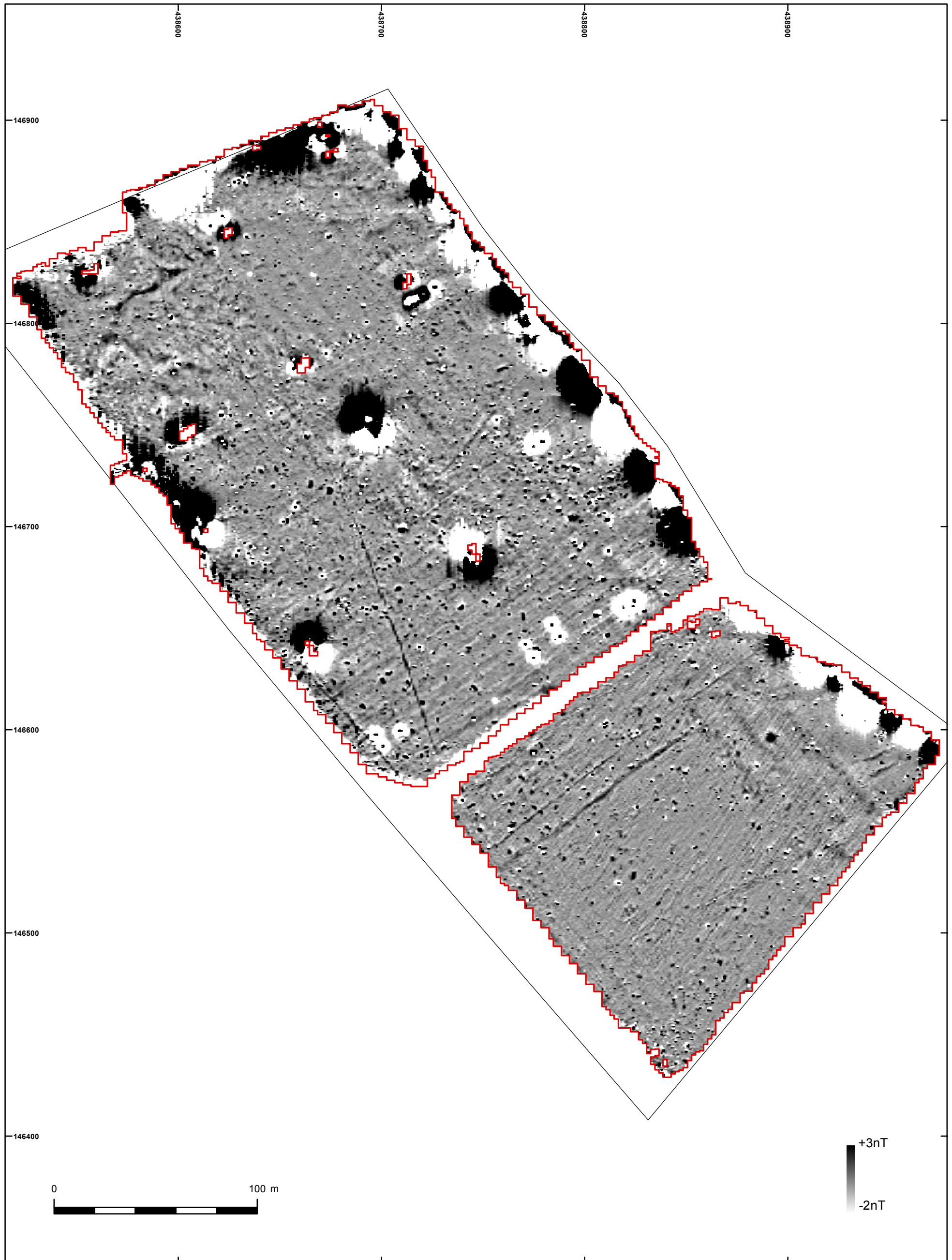
- Increased magnetic response – used for areas dominated by indistinct anomalies which may have some archaeological potential.
- Trend – used for low amplitude or indistinct linear anomalies.
- Superficial geology – used for diffuse edged spreads considered to relate to shallow geological deposits. They can be distinguished as areas of positive, negative or broad bipolar (positive and negative) anomalies.



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Site Location and Detailed Survey Extents

Figure 1



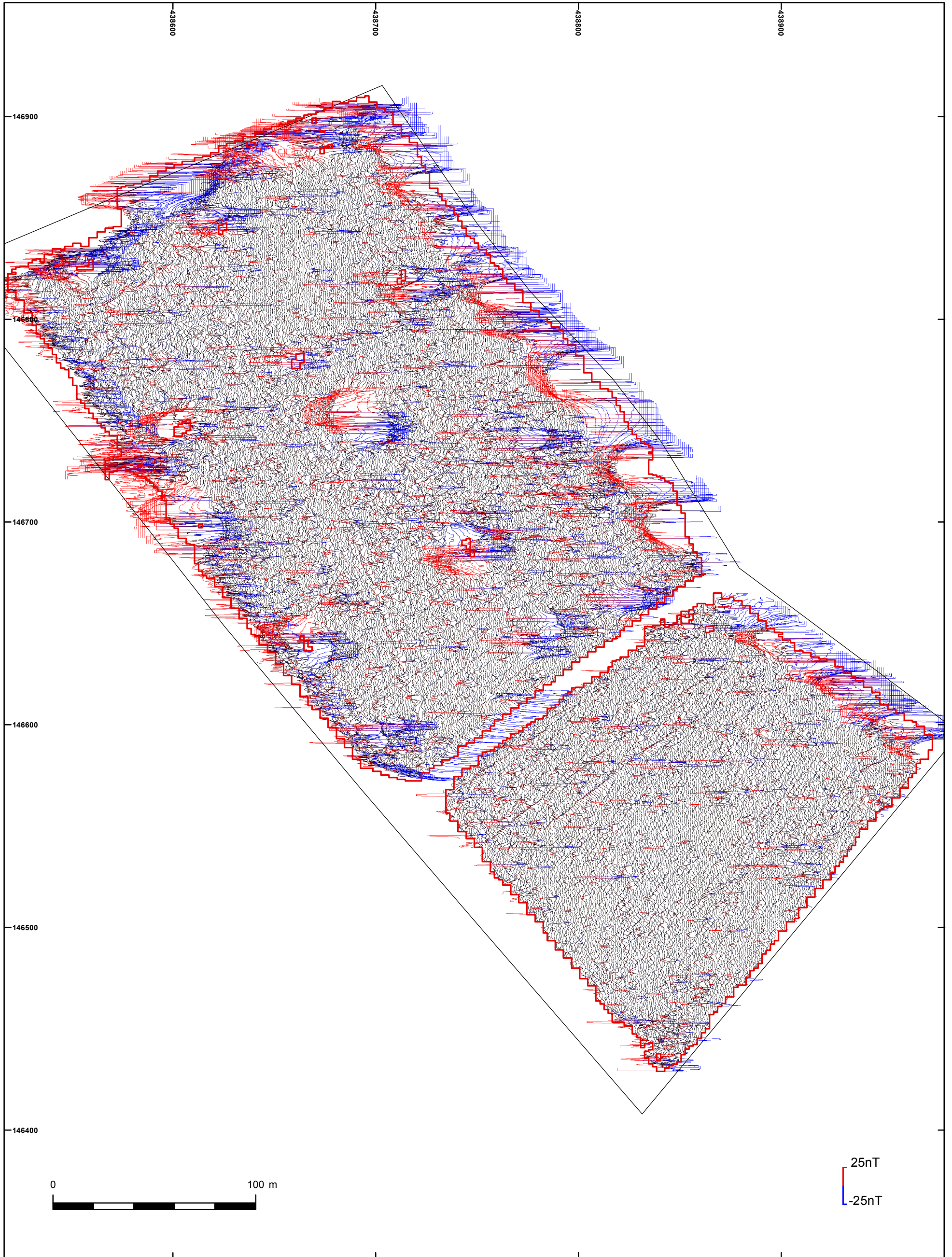
Detailed Survey Extents
 Site Boundary



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Gradiometer Results – Greyscale Image

Figure 2



□ Detailed Survey Extents
□ Site Boundary



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Gradiometer Results – XY Traceplot Image

Figure 3



- Detailed Survey Extents
- Site Boundary
- Possible Archaeology
- Ferrous
- Increased Magnetic Response
- Ploughing
- Trend
- Ridge Furrow
- Superficial Geology



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Gradiometer Results – Archaeological Interpretation

Figure 4



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