BOSCOMBE AIRFIELD BATCHING PLANT, AMESBURY, WILTSHIRE

Detailed Gradiometer Survey Report

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Summary

Wessex Archaeology was commissioned by QinetiQ to conduct a geophysical survey on land at Boscombe Airfield, near Amesbury, Wiltshire. The survey formed the first element of a programme of archaeology fieldwork, undertaken during groundworks for the construction of a concrete batching plant, centred on NGR 417080 139890.

Three areas covering approximately 1.8ha were surveyed, bordered by concrete hard standing and access roads. The geophysical survey identified relatively few anomalies of potential archaeological interest. A series of linear anomalies, perhaps representing a former boundary or ditch were identified near the northernmost extent of the proposed development area.

Elsewhere, the data demonstrate extensive modern disturbance which will have masked the responses from any underlying archaeological anomalies that may lie within the development area. Numerous modern services have been identified, along with the possible foundations of a former structure.

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Detailed Gradiometer Survey Report

Acknowledgements

The detailed gradiometer survey was commissioned by Jonathan Wade of QinetiQ and his assistance is gratefully acknowledged.

The fieldwork was directed by Ben Urmston, and assisted by Cristina Serra Ruiz. Ben Urmston processed and interpreted the geophysical data and prepared this report. Illustrations were prepared by Linda Coleman. The project was managed on behalf of Wessex Archaeology by Andrew Manning.

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Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by QinetiQ to undertake a geophysical survey on land at Boscombe Airfield, near Amesbury, Wiltshire, approximately centred on NGR 417080 139890 (hereafter 'the Site'). The Site comprises the proposed location for a concrete batching plant and associated infrastructure, to be used during resurfacing works.

1.1.2 The aim of the geophysical survey was to establish the likely presence/absence and extent of detectable archaeological remains and potential modern disturbance. The results would be then used to inform the nature and scope of subsequent fieldwork.

1.1.3 Salisbury District Council indicated that the proposed project did not require planning permission. Initial archaeological advice was sort from Richard Osgood of the Historical Environmental Team, Defence Estates and following recommendations, Wessex Archaeology were invited to prepare a geophysical specification to investigate the proposed study area.

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

1.2 The Site

1.2.1 The Site comprises three areas separated by access roads and concrete hardstanding (**Figure 1**); approximately 0.5ha was suitable for survey in the northernmost area, 1.1ha in the central area and 0.2ha in the southern. Topographically, the Site lies at approximately 110m above Ordnance Datum (aOD) and slopes gently down from northeast to southwest.

1.2.2 The soils underlying the Site are the brown rendzinas of the 343h (Andover 1) association (SSEW 1983). Such soils have been shown to produce magnetic contrasts suitable for the detection of archaeological features through detailed survey using the Bartington Grad 601-2 gradiometer.

2 METHODOLOGY

2.1 Introduction

2.1.1 Salisbury District Council had indicated that the proposed project did not require planning permission and accordingly, Wiltshire County Archaeology Service were not involved in monitoring the archaeological work. Initial archaeological advice was sort from Richard Osgood of the Historical Environmental Team, Defence Estates and a geophysical specification was prepared by Wessex Archaeology to investigate the proposed study area. The methodology consisted of a detailed gradiometer survey conducted

using a Bartington Grad 601-2 dual gradiometer system. The survey was conducted by Wessex Archaeology's in-house geophysical team on the 20th January 2009, in accordance with English Heritage Guidelines for Geophysical Surveys (2008).

2.1.2 Survey grids were established at 20m x 20m using a Leica 1200 RTK GPS system, which is able to provide locations in real-time, accurate to within 2cm, and therefore exceeds English Heritage recommendations.

2.1.3 The detailed gradiometer survey was conducted using a Bartington Grad 601-2 Gradiometer system over 20m x 20m grids with a sample interval of 0.25m along transects spaced 1m apart. Data were collected in the zigzag method along traverses running from south to north.

2.1.4 Results from the survey were subject to limited processing. Processes applied to correct the data were;

- De-stripe/zero mean traverse (±5 nT thresholds applied)
- De-stagger (to account for walking errors)

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

3 RESULTS AND INTERPRETATION

3.1 Introduction

3.1.1 The geophysical survey identified a limited number of anomalies of possible archaeological interest. Results are presented as both a greyscale (**Figure 2**) and an XY trace plot (**Figure 3**) of the entire site.

3.1.2 The interpretation of the datasets highlights the presence of possible archaeological anomalies, trends, ferrous/burnt or fired objects and areas of general increased magnetic response. The interpretation is shown for the entire Site in **Figure 4**. Full definitions of the interpretation terms used in this report are provided in **Appendix 2**.

3.1.3 Numerous ferrous anomalies were visible throughout the detailed survey dataset. These are presumed to be modern in provenance and are not referred to in the interpretation, unless considered relevant to the archaeological interpretation.

3.2 Detailed survey results and interpretation

3.2.1 The geophysical survey detected a limited number of anomalies of potential archaeological interest. A series of linear anomalies **4001**, oriented approximately west southwest to east southeast, may represent a linear feature, such as a ditch or former boundary. Given the proximity of a band of strong magnetic disturbance immediately to the north, little confidence can be given to an archaeological origin for these anomalies. Nearby linear trends may be associated with **4001**, especially those extending to the southwest.

3.2.2 Elsewhere, linear trends appear on varying alignments. The extent of modern disturbance makes it difficult to understand their provenance in a

wider context. Numerous modern services are apparent in the data and the majority show excellent correlation with the locations of known services (*e.g.* **4002**, **4003** and **4004)**. In the case of near-surface drainage, trends can be observed within the ferrous responses that closely match the known positions of such drains, but not all can be clearly identified from the local magnetic background from the geophysical survey alone. This is illustrated by two known services running through the southernmost portion of the central area and the southern area respectively. One anomaly relating to a low voltage cable (**4006**) can only just be separated from the local magnetic background, while another anomaly (a water drainage service **4006**) exhibits little contrast with the local magnetic background and is effectively untraceable.

3.2.3 The anomaly **4007** appears to represent the foundations of a possible modern circular structure, approximately 30m in diameter, and including a number of possible radial projections. This structure is surrounded by widespread disturbance, which may relate to extensive demolition debris, perhaps derived from post-structural levelling of this part of the Site.

4 CONCLUSION

4.1 Introduction

4.1.1 The detailed gradiometer survey appeared to indicate a relatively low archaeological potential. A series of linear anomalies near the northernmost extent of the geophysical survey may represent a ditch or former boundary, although the anomalies lack sufficient contrast with the magnetic background to allow confident interpretation.

4.1.2 Numerous modern services are apparent, and correlate well with the positions of known services. It is possible that the responses of other services crossing the survey areas have been masked by the strongly varying magnetic background; the responses from surface drainage channels are similarly swamped by nearby anomalies.

4.1.3 One large likely modern feature **4007** has been identified, although within large sections of the Site, there is a poor contrast between the strong magnetic background and potential anomalies. This may suggest that, within these areas, underlying archaeological features and/or deposits may still survive, although their magnetic responses will have been concealed by the much stronger magnetic debris overlying them.

5 REFERENCES

English Heritage, 2008, *Geophysical survey in archaeological field evaluation*. Research and Professional Service Guideline No 1, 2nd edition.

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 a resolution of 0.1nT over a ±3000nT 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 1200 RTK GPS system and then extended using tapes. The Leica 1200 RTK GPS system receives corrections from a network of reference stations operated by the Ordnance Survey and Leica Geosystems, allowing positions to be determined to an accuracy of 1-2cm in real-time and therefore exceed the level of accuracy recommended by English Heritage (1995) 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 detail surveys consist of 30m x 30m grids, and data are collected at 0.25m intervals along traverses spaced 1m apart. This gives 1600 measurements per grid and is the recommended methodology for archaeological surveys of this type (English Heritage, 2008).

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 forward or backward by a number of readings. This corrects for operator errors and is used to enhance linear features;
- Clipping – Limiting the displayed range of the processed data to either ±3nT or ±3SD. in order to enhance the appearance of smaller anomalies.
- Despike – Filtering any data points that exceed the mean by a specified amount to reduce the appearance of dominant anomalous readings caused by modern, small ferrous objects at the surface

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 image can include a hidden line algorithm to remove certain lines and enhance the image. This type of image is useful as it shows the full range and shape 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.

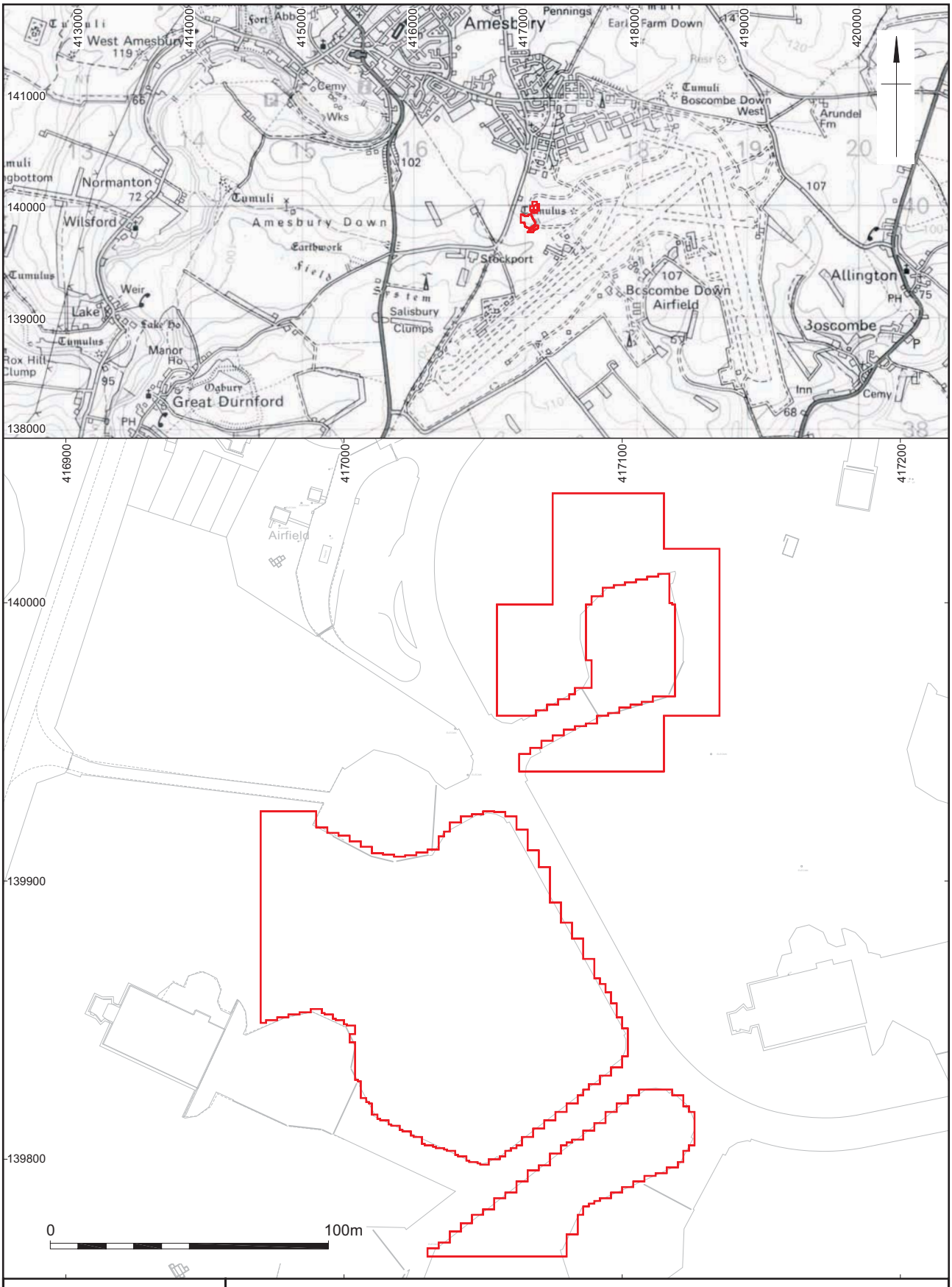
The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided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

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:

- Possible archaeology – used for features which give a response but which form no discernable pattern or trend.
- 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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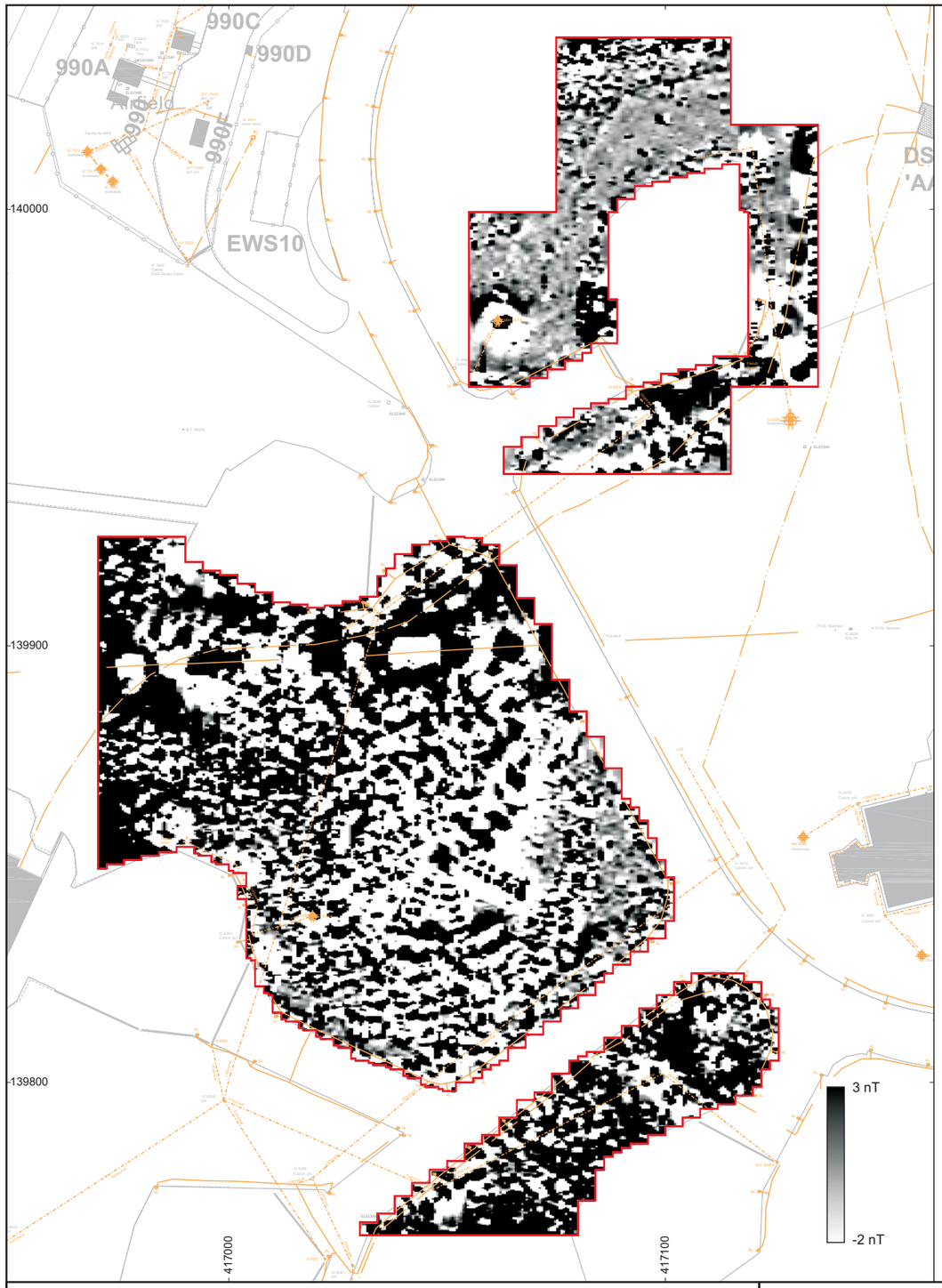
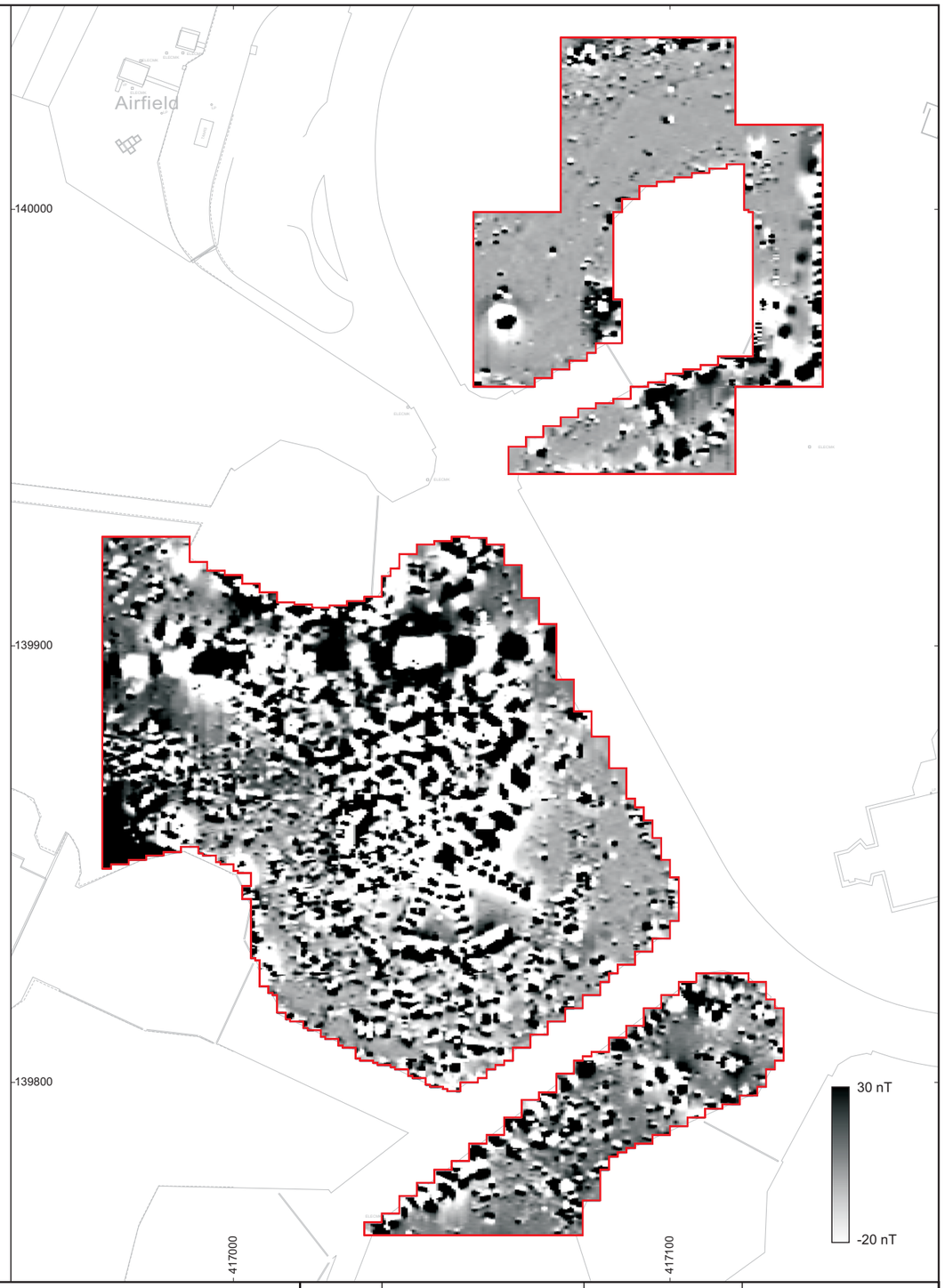
Wessex Archaeology

Site location and survey extents

Figure 1





Wessex Archaeology

Geophysical Survey Area

Services

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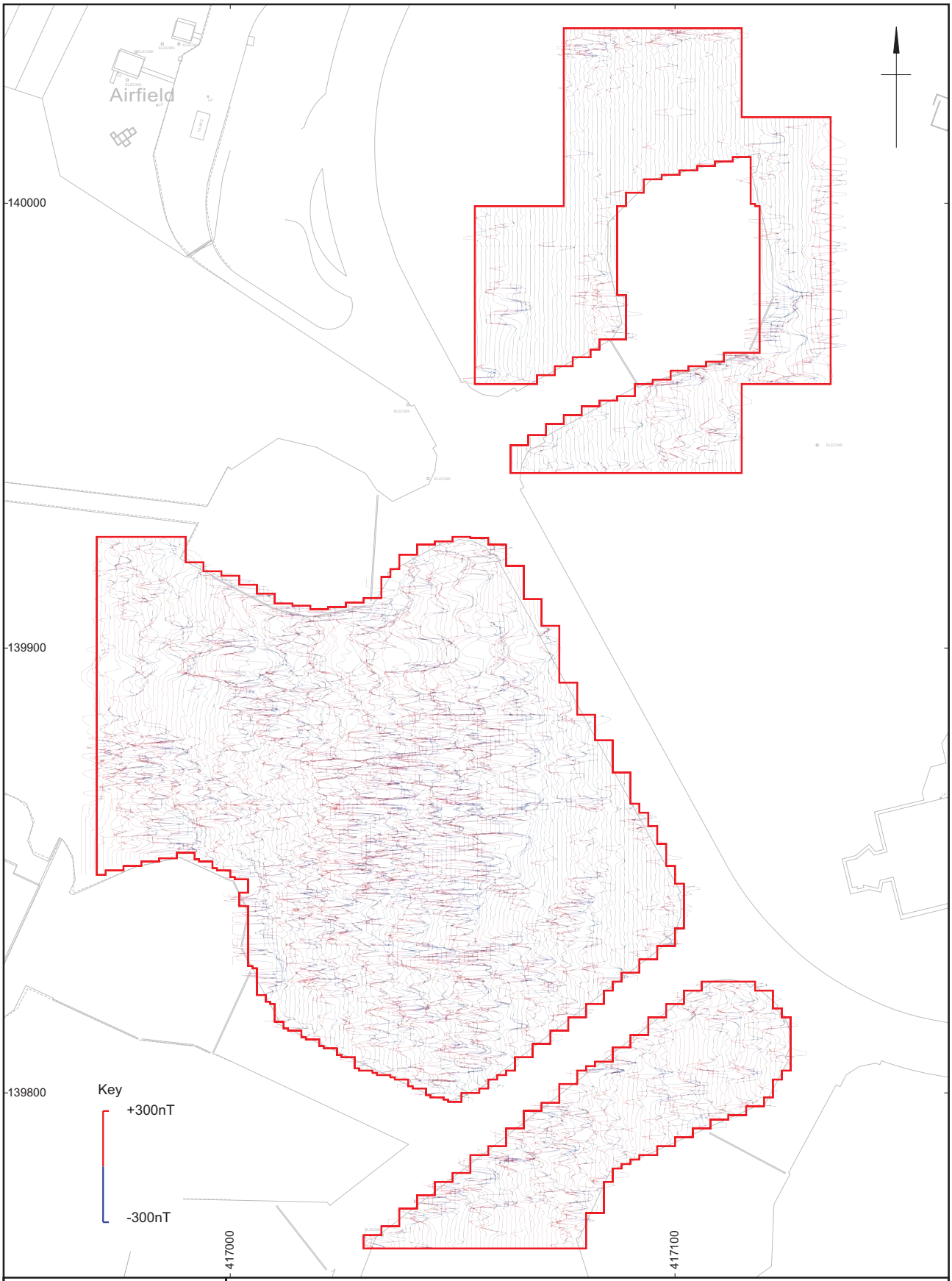
Greyscale plots of geophysical results

Figure 2



Geophysical Survey Area

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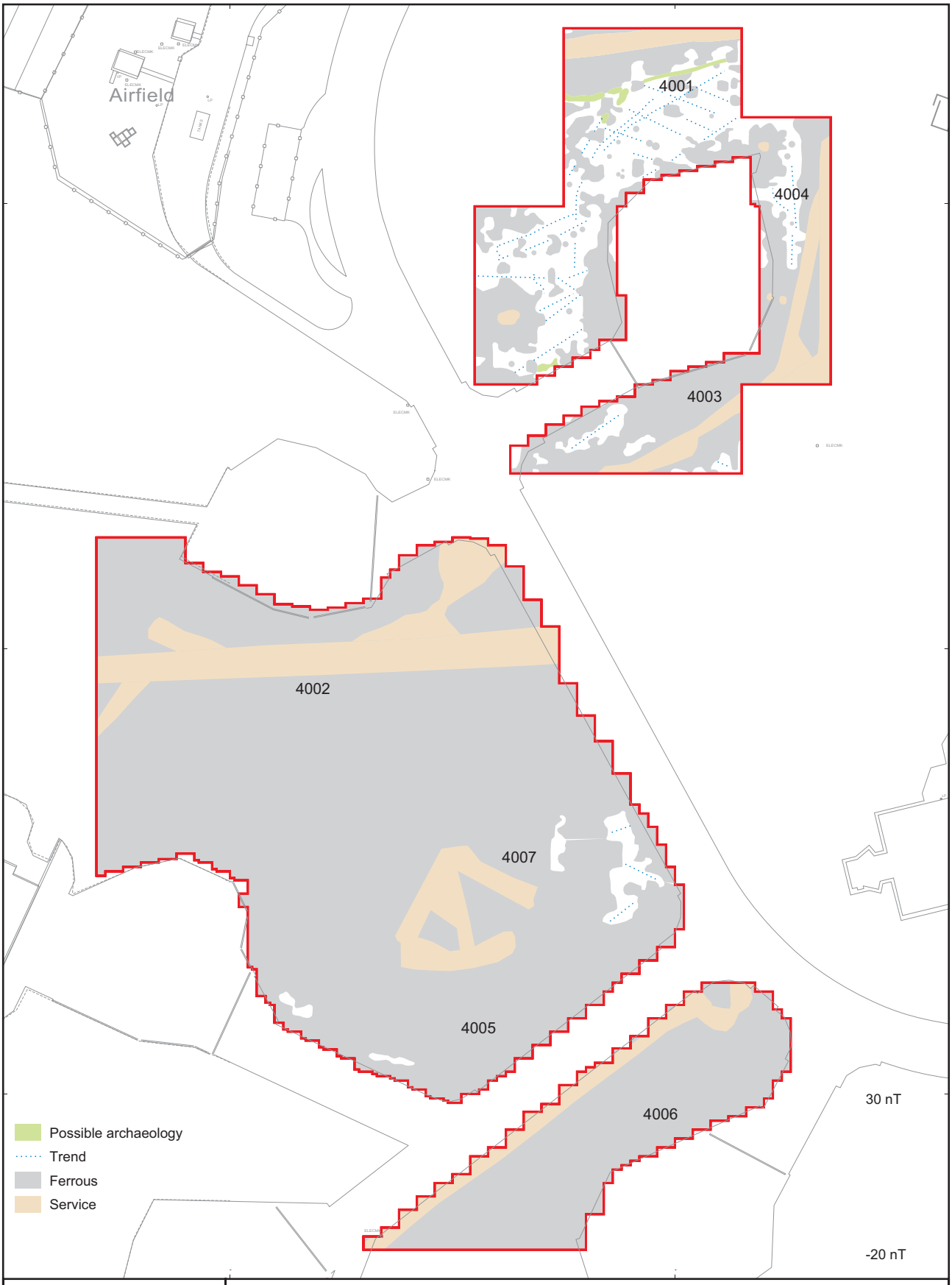
XY plot of geophysical results

Figure 3



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Interpretation of geophysical results

Figure 4