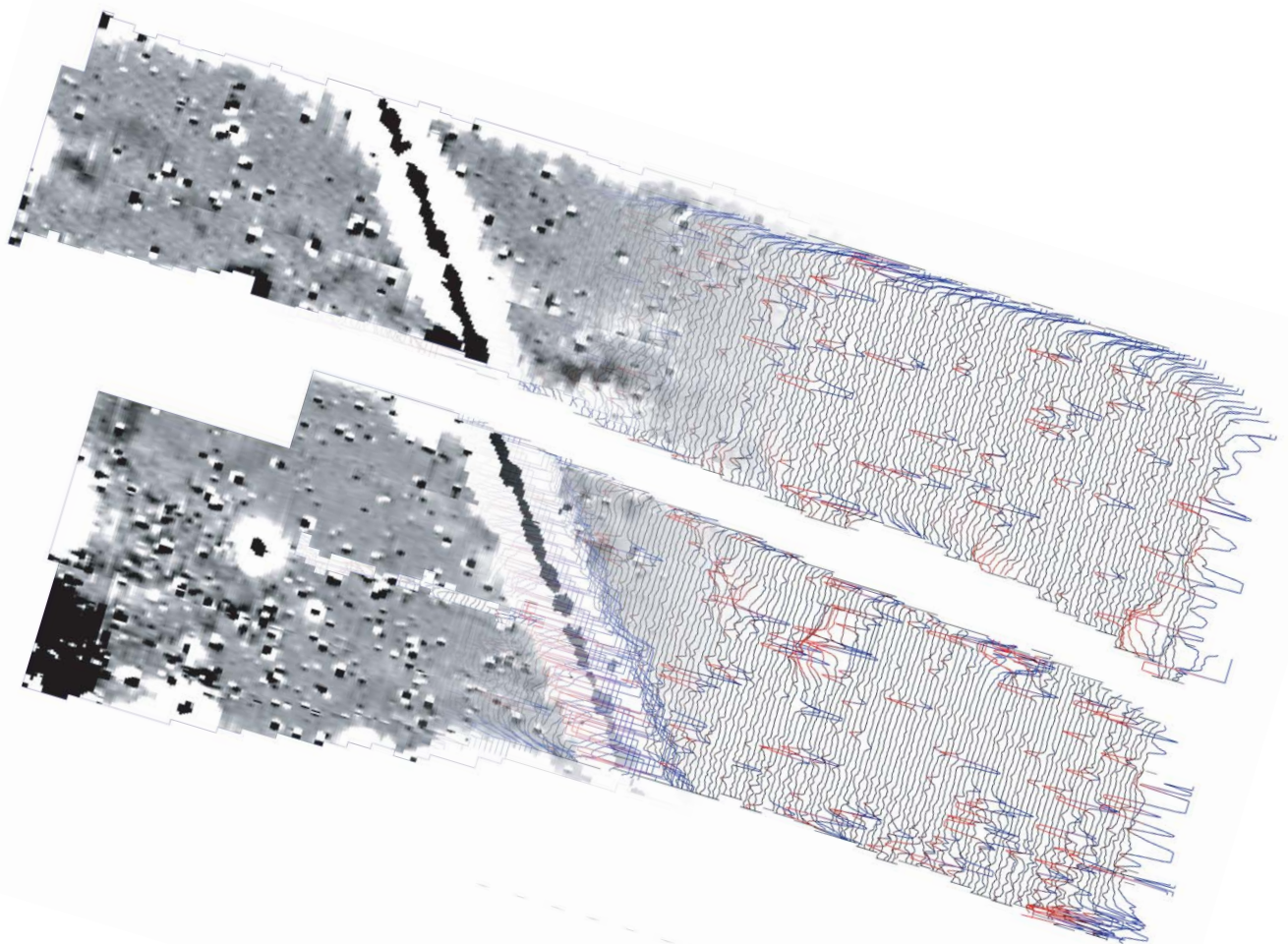




Land at East Wichel
Wichelstowe,
Swindon
Wiltshire

Detailed Gradiometer Survey Report



**LAND AT EAST WICHEL, WICHELSTOWE
SWINDON, WILTSHIRE**

Detailed Gradiometer Survey Report

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LAND AT EAST WICHEL, WICHELSTOWE SWINDON, WILTSHIRE

Detailed Gradiometer Survey Report

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Detailed Gradiometer Survey Report

Summary

Wessex Archaeology was commissioned by Swindon Capita Partnership, on behalf of Swindon Borough Council to conduct a geophysical survey on land at East Wichel, Wichelstowe, ahead of a proposed development approximately centred on NGR 414696, 182756.

The survey identified a limited number of anomalies that could be of archaeological interest. This included a pair of linear anomalies, interpreted as relating to former field boundaries or drains and a series of irregular discreet anomalies that may be of anthropogenic origin.

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Acknowledgements

The detailed gradiometer survey was commissioned by Swindon Capita Partnership, on behalf of Swindon Borough Council. The assistance of Roger Evans is gratefully acknowledged.

The fieldwork was directed by Ben Urmston, and assisted by Nathan Thomas and Victoria Lambert. Ben Urmston and Nathan Thomas processed and interpreted the geophysical data and wrote this report. Illustrations were prepared by Will Foster. The project was managed and quality-controlled on behalf of Wessex Archaeology by Paul Baggaley and Sue Farr.

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LAND AT EAST WICHEL, WICHELSTOWE SWINDON, WILTSHIRE

Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Swindon Capita Partnership, on behalf of Swindon Borough Council to undertake a geophysical survey on land at East Wichel, Wichelstowe (Figure 1), centred on NGR 414696, 182756 (hereafter 'the Site'), ahead of a proposed development.

1.1.2 The aim of the geophysical survey was to establish the presence/absence, extent, character and date of archaeological remains in view of the development proposal and its associated facilities, services and infrastructure.

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

1.2 The Site

1.2.1 The Site, (land parcel WV.36) covers an area of 2.4ha on low lying ground at approximately 100m above Ordnance Datum (aOD) within the flood plain of the River Ray, and is located 1.2km to the north of the village of North Wroughton, at the southern limits of the city of Swindon.

1.2.2 A total area of approximately 1.9ha was covered by the detailed gradiometer survey (**Figure 1**). The survey area was limited by both the presence of a haulage road constructed through the centre of the Site, and by the presence of large areas of saturated and corrugated ground which were not suitable for survey.

1.2.3 The soils underlying the Site are typical stagnogleys (711G) of the Wickham 3 series (SSEW 1983) typical of ground that is either permanently or seasonally waterlogged. These types of soils have been shown to produce magnetic contrasts suitable for the detection of archaeological features through detailed survey utilising the Bartington Grad 601-2 gradiometer.

2 METHODOLOGY

2.1 Introduction

- 2.1.1 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. This survey was conducted in accordance with English Heritage Guidelines for Geophysical Surveys (2008).
- 2.1.2 The geophysical survey was conducted by Wessex Archaeology's in-house team on the 20th November 2008.
- 2.1.3 Survey grids were established at 30m x 30m using a Leica 1200 RTK GPS system, which is able to provide locations in real-time, accurate to within 2cm, and therefore exceed English Heritage recommendations.
- 2.1.4 The detailed gradiometer survey was conducted using a Bartington Grad 601-2 Gradiometer system over 30m x 30m grids with a sample interval of 0.25m along transects spaced 1m apart. Data was collected in the zigzag method along traverses running from south to north.
- 2.1.5 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)
 - Low-pass filter, (3*1 box) to smooth the appearance of the data set.
- 2.1.6 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 are 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 understanding.

3.2 Detailed Survey Results and Interpretation

3.2.1 The geophysical survey has detected a limited number of anomalies of archaeological interest. Linear anomalies **4001** and **4002** run on an approximately parallel north-west to south-east alignment. Considering the aspect of the local area, these anomalies probably represent the course of former drainage ditches or boundaries.

3.2.2 Anomalies **4003**, **4004**, **4005**, **4006**, **4007**, **4008** and **4009** are a series of irregular discreet anomalies varying in area from between 15 to 80 m². They are closely allied to a number of areas of increased magnetic response that appear close to the central east-west axis of the Site. Interpretation of the origin of these anomalies is more difficult. The irregular morphology and lack of any coherent patterning may suggest a natural origin, for example features resulting from geology or fluvial action, however, an archaeological origin cannot be ruled out.

3.2.3 Numerous weak trends on various alignments have been highlighted across the Site. It is possible that these reflect former field divisions, water meadows or drainage systems. A number of curvilinear anomalies may be of archaeological interest although the lack of contrast with the magnetic background weakens such an interpretation.

3.2.4 Strong dipolar isolated ferrous anomalies appear throughout the dataset, especially to the south-west of the Site. A modern service **4010** is apparent crossing the Site approximately north to south.

3.2.5 Wire fencing, partitioning a local footpath along the northern edge of the Site is accountable for the strong magnetic response visible within the dataset at this extreme. Similarly, in the south western area of the Site, strong ferrous responses, for example **4011**, maybe due to former field boundaries or drainage pipes.

4 CONCLUSION

4.1 Introduction

4.1.1 A detailed gradiometer survey was carried out over approximately 1.9ha at the Site in advance of proposed development. The survey was successful in identifying a limited number of anomalies of archaeological potential and a modern service run.

4.2 Summary

- 4.2.1 Two linear anomalies identified are indicative of former drains or boundaries. A series of irregular discrete anomalies could be of archaeological interest, although a natural origin is also possible.
- 4.2.2 Geophysical survey at the East Wichel Site has enhanced our understanding of the potential archaeology present within the proposed development area.

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 West England: Sheet 5. 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 ± 3000 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 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 $\pm 3nT$ or $\pm 3SD$. 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.




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Site location and survey extents

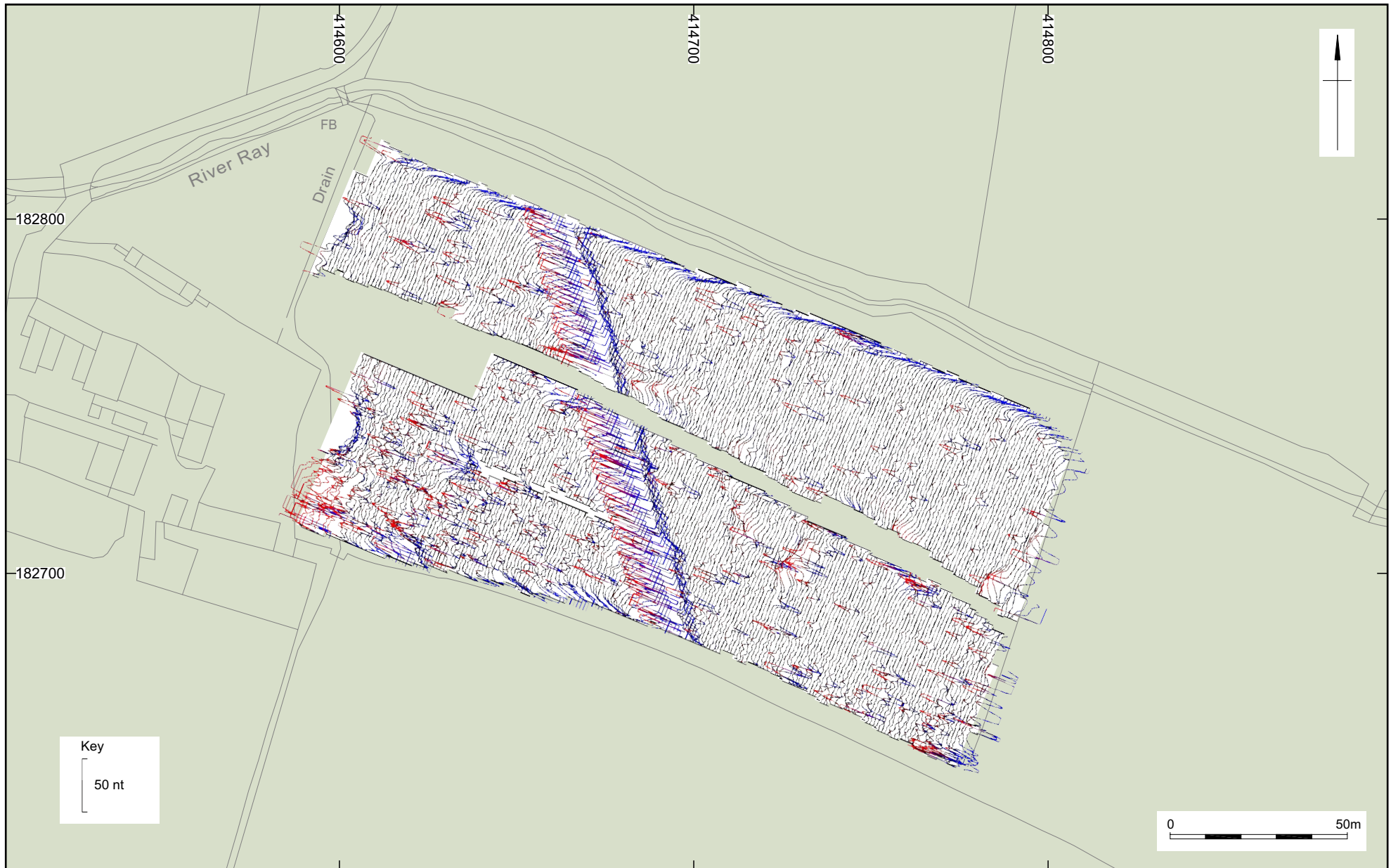
Figure 1



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Greyscale plot of geophysical results

Figure 2




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XY of geophysical results

Figure 3



| | | |
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Interpretation of geophysical results

Figure 4



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