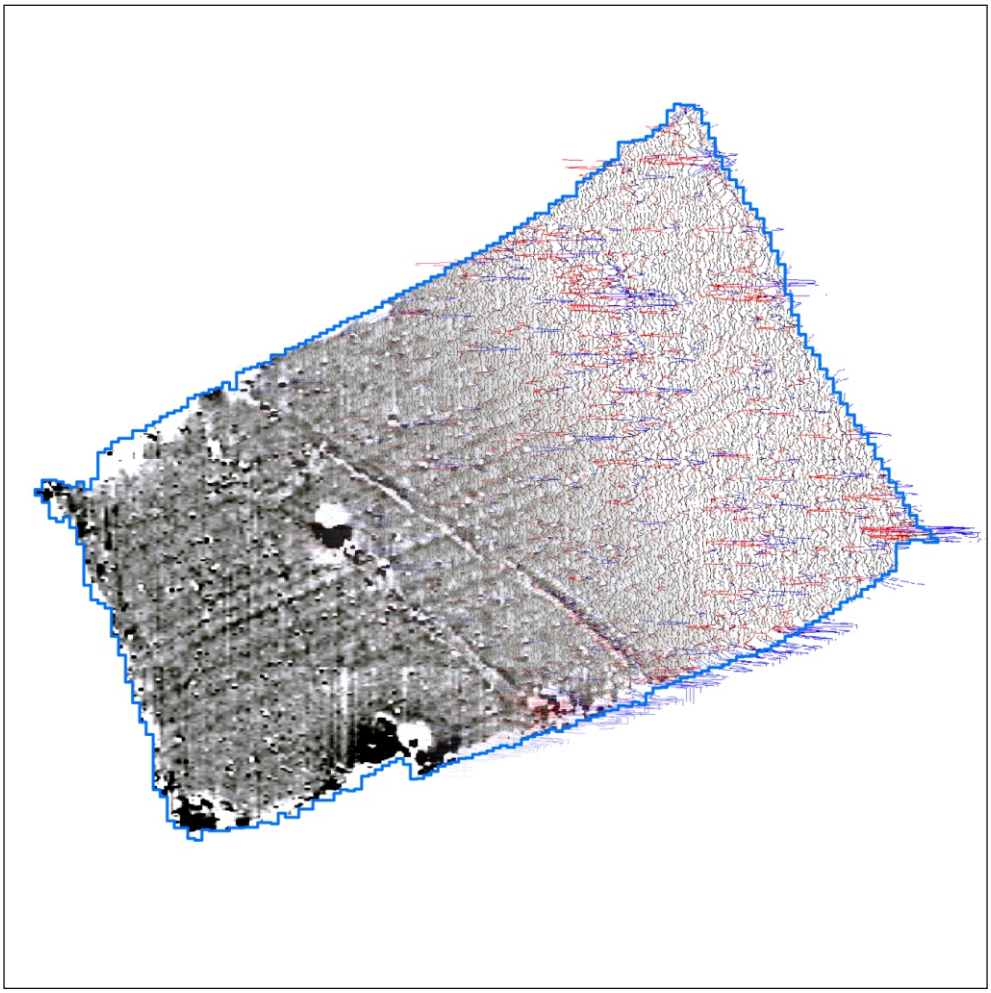
making sense of heritage

Land at Acresford Road Overseal, Derbyshire

Detailed Gradiometer Survey Report



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geoservices

Land At Acresford Road, Overseal, Derbyshire

Detailed Gradiometer Survey Report

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

Land At Acresford Road, Overseal, Derbyshire

Detailed Gradiometer Survey Report

Contents

Figures

Land At Acresford Road, Overseal, Derbyshire

Detailed Gradiometer Survey Report

Summary

A detailed gradiometer survey was conducted over land east of Acresford Road, Overseal, Derbyshire (centred on NGR 429809,314952). The project was commissioned by CgMs Consulting with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features on the site ahead of a proposed development.

The site comprised of arable fields located to the east of Acresford Road, covering an area of approximately 4.7 hectares. Due to crop growth the surveyable area was reduced to approximately 2.9ha. The geophysical survey was undertaken on 1st- 2nd April 2015 by Wessex Archaeology's in-house geophysics team.

The gradiometer survey has demonstrated the presence of anomalies of archaeological and possible archaeological interest within the site, along with ploughing trends, remnant ridge and furrow and regions of increased magnetic response. The anomalies of archaeological interest are primarily linear features of unknown origin.

Land At Acresford Road, Overseal, Derbyshire

Detailed Gradiometer Survey Report

Acknowledgements

Wessex Archaeology would like to thank Cathy Patrick and CgMs Consulting for commissioning the geophysical survey.

The fieldwork was undertaken by Chris Hirst and Matthew Tooke. Garreth Davey processed and interpreted the geophysical data and wrote the report. The geophysical work was quality controlled by Genevieve Shaw and Lucy Learmonth. Illustrations were prepared by Garreth Davey. The project was managed on behalf of Wessex Archaeology by Chris Swales.

Land At Acresford Road, Overseal, Derbyshire

Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by CgMs Consulting to carry out a geophysical survey of land to the east of Acresford Road, Overseal, Derbyshire (hereafter "the Site", centred on NGR 429809,314952) (**Figure 1**). The survey forms part of an ongoing programme of archaeological works being undertaken in support of a planning application 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.

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 comprised of two arable fields located approximately 500m south-east of Overseal, Derbyshire (**Figure 1**). The Site is bounded to the north and north-west by residential properties, to the north-east, east and south by hedgerow field boundaries and farm buildings and to the west by Acresford Road. At the time of the survey the southern field was open and free of obstruction, however, the northern field was under high crop and survey was not possible here.

1.2.2 The Site occupies a level expanse of ground at approximately 100m aOD (above Ordnance Datum).

1.3 Soils and geology

1.3.1 The solid geology is recorded as primarily Pennine Middle Coal Measures Formation with superficial deposits of alluvium recorded on the Site.

1.3.2 Soils underlying the site have not been recorded but soild recorded nearby are likely to be sandy and coarse loamy soils of the 551a (Bridgnorth) association or reddish fine and coarse loamy soils of the 572c (Hodnet) associations (SSEW SE Sheet 3-2 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 A desk-based assessment (DBA) was undertaken to identify the potential for the survival or buried archaeological remains within the development area using information provided by the Derbyshire Historic Environment Record (HER) and the National Heritage List (NHL).

1.4.2 There are no designated assets of Scheduled Ancient Monuments, Conservation Areas, Registered Parks and Gardens and Registered Battlefields identified within the DBA Study Area. There is one Grade II* and seven Grade II listed buildings within Overseal.

1.4.3 There are no recorded prehistoric or Roman features recorded within the survey area. Archaeological potential from these periods is therefore considered to be low.

1.4.4 Overseal and Netherseal are historically recorded as a single parish and township. Seal was documented in the Domesday Survey as number of settlements and is reported as being held by Henry of Ferrers and containing 39 households, 3 lord's plough teams, 5 men's plough teams, 12 acres of meadow, a mill and woodland 6x4 furlongs in size (Open Domesday 2015).

1.4.5 Areas of medieval ridge and furrow have been identified within the survey area to the north-east and west of the Site (MDR11735 and MDR7034). Undated quarrying remains have also been identified in the centre of Overseal, north of the Site (MDR7085.)

1.4.6 The landscape surrounding Overseal is characterised as fossilised strip fields (HER HDR1081) and is likely to have been an area of open field systems surrounding the settlements. Based on this, Anglo-Saxon and medieval archaeological potential is considered to be low.

1.4.7 Overseal house is located adjacent to the site on the western boundary. The Grade II* listed building is formed of a row of four houses dated to c. 1780 and has had 19th century additions.

1.4.8 Other records relate to late 18th century farm buildings at Grange Farm (EDR2476) west of the site boundary, St Matthews Church built 1840 (MDR6961) and former Baptist and Methodist chapels dated to the mid to late 1800s which have since been demolished and replaced by modern structures (MDR13080, MDR13081, MDR13082, MDR13083).

1.4.9 The map regression exercise indicated that the Site area has been in use as arable fields from at least the 19th century.

2 METHODOLOGY

2.1 Introduction

2.1.1 The detailed gradiometer 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 the 1st and 2nd April 2015. Field conditions at the time of the survey were good, with dry conditions throughout the period of survey, and an overall coverage of 2.9ha.

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 gradiometer 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 English Heritage 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 identified magnetic anomalies across the Site, along with ploughing trends and areas of increased magnetic response. Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (**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 Interpretation: Archaeology

3.2.1 The gradiometer survey has demonstrated the presence of anomalies of archaeological and possible archaeological interest within the site, along with ploughing trends, remnant ridge and furrow and regions of increased magnetic response. The majority of these probable features are in the form of weak positive responses forming large, linear features with a magnetic strength of between 2 to 3nT. The anomalies of archaeological interest are primarily linear features of unknown origin.

3.2.2 A linear feature of strong positive and negative anomalies running approximately north-west to south-east is evident at **4000** (**Figure 4**)**.** This feature is evident in the field as a small ridge however it is not present on historical mapping and its origin is unknown. The bipolar responses are characteristic of ceramic/fired/ferrous material and possibly represent a stone or brick-faced boundary. This feature is continued at **4001** (**Figure 4**) where it also branches out; both these areas of anomalies are similar to those at **4000** (**Figure 4**) although are weaker in response.

3.2.3 A parallel pair of linear +2nT positive anomalies at **4002** (**Figure 4**) are likely to be cut ditch-like features.

3.2.4 A second parallel pair of +1-2nT magnetised linear features are evident at **4003** (**Figure 4**) however their extents are unclear as they may be obscured by the large area of ferrous disturbance surrounding them.

3.2.5 Small cut features like those at **4004 (Figure 4)** are evident across the site. These could present small pit features however it is also possible that they maybe geological in origin.

3.2.6 A number of south-west to north-east aligned linear anomalies are highlighted at **4005** (**Figure 4**) to show historic cultivation. These are evident across the entire site and have been interpreted as remnant ridge and furrow and evidence for historic ploughing disturbance.

3.2.7 Weak positive linear and curvilinear anomalies have also been identified in the field but given their weak magnetic contrast to the background means it is not possible to characterise them further as archaeological or not, they have been interpreted as trends (**Figure 4**).

4 CONCLUSION

4.1 Introduction

4.1.1 The detailed gradiometer survey has been successful in detecting anomalies of archaeological interest within the Site, along with ploughing trends, remnant ridge and furrow and regions of increased magnetic response. The anomalies of archaeological interest are primarily linear features of unknown origin possibly representing former internal field boundaries.

4.2 Discussion

4.2.1 The origin of the linear feature running north-west to south-east across the site around **4000** and **4001** (**Figure 4**) is unclear. The feature remains as a ridge in the field however it is not evident in adjoining fields and there is no evidence for any boundary at this location on historic mapping or satellite imagery. The feature may be formed by brick or stone given the nature of the magnetic responses and is likely to have been a short lived farm track.

4.2.2 The pair of linear features at **4002** (**Figure 4**) are of unknown origin but are likely to represent ditch-type features. The similar pair of linear anomalies at **4003** (**Figure 4**) may also be related to those at **4002** as a continuation of the same feature given their alignment and proximity. However, due to the ferrous disturbances between these areas, it is only a speculative relationship.

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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 two main categories: archaeological and unidentified responses.

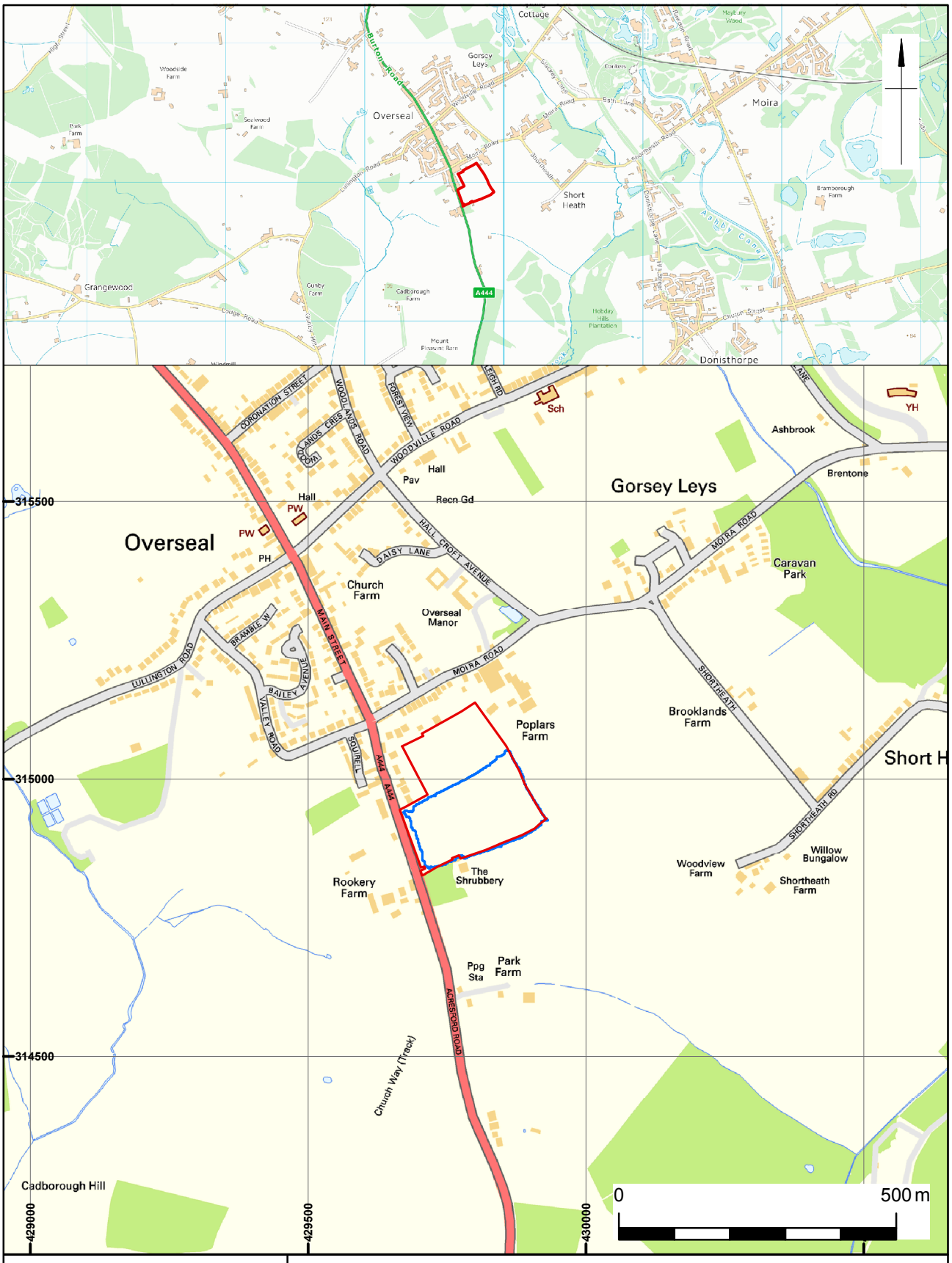
The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided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

- Archaeology – used when there is a clear geophysical response and anthropogenic pattern.
- Probable archaeology – used for features which give a clear response but which form incomplete patterns.
- Possible archaeology – used for features which give a response but which form no discernible pattern or trend.

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

- Increased magnetic response – used for areas dominated by indistinct anomalies which may have some archaeological potential.
- Trend – used for low amplitude or indistinct linear anomalies.
- Ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin.

Finally, services such as water pipes are marked where they have been identified.



Site Boundary

Survey Extents

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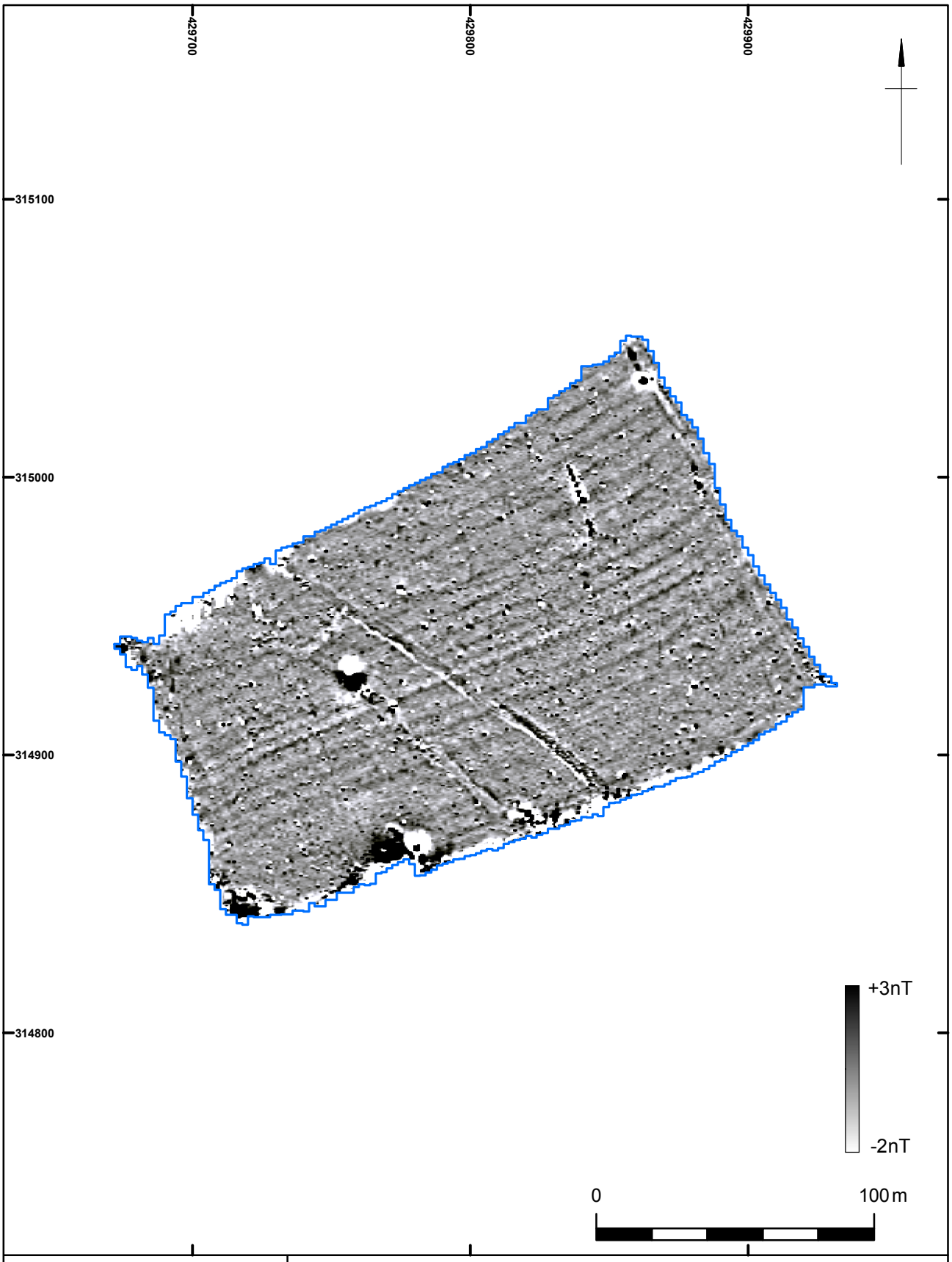
Site location and survey extents

Figure 1



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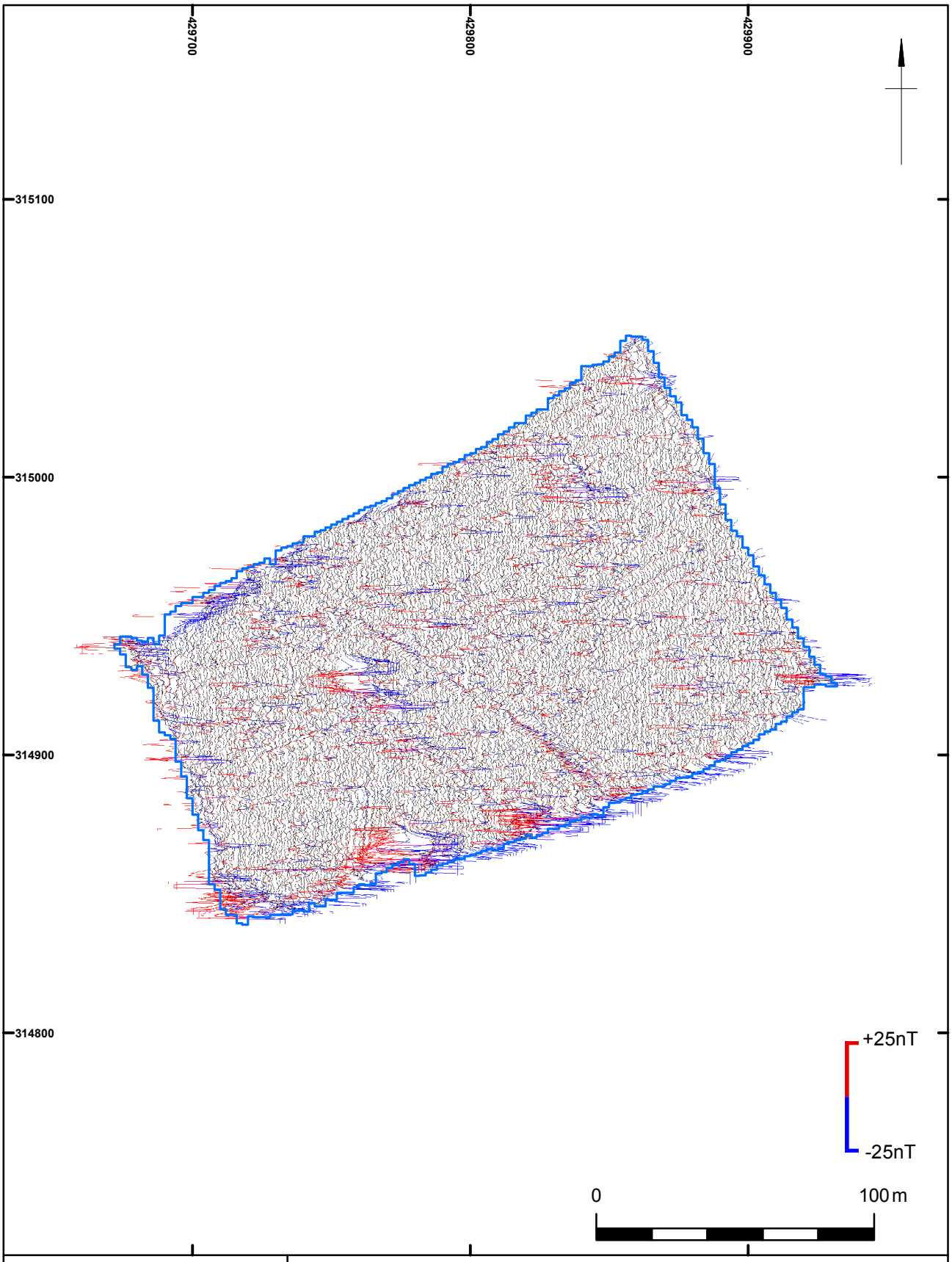
Greyscale plot

Figure 2



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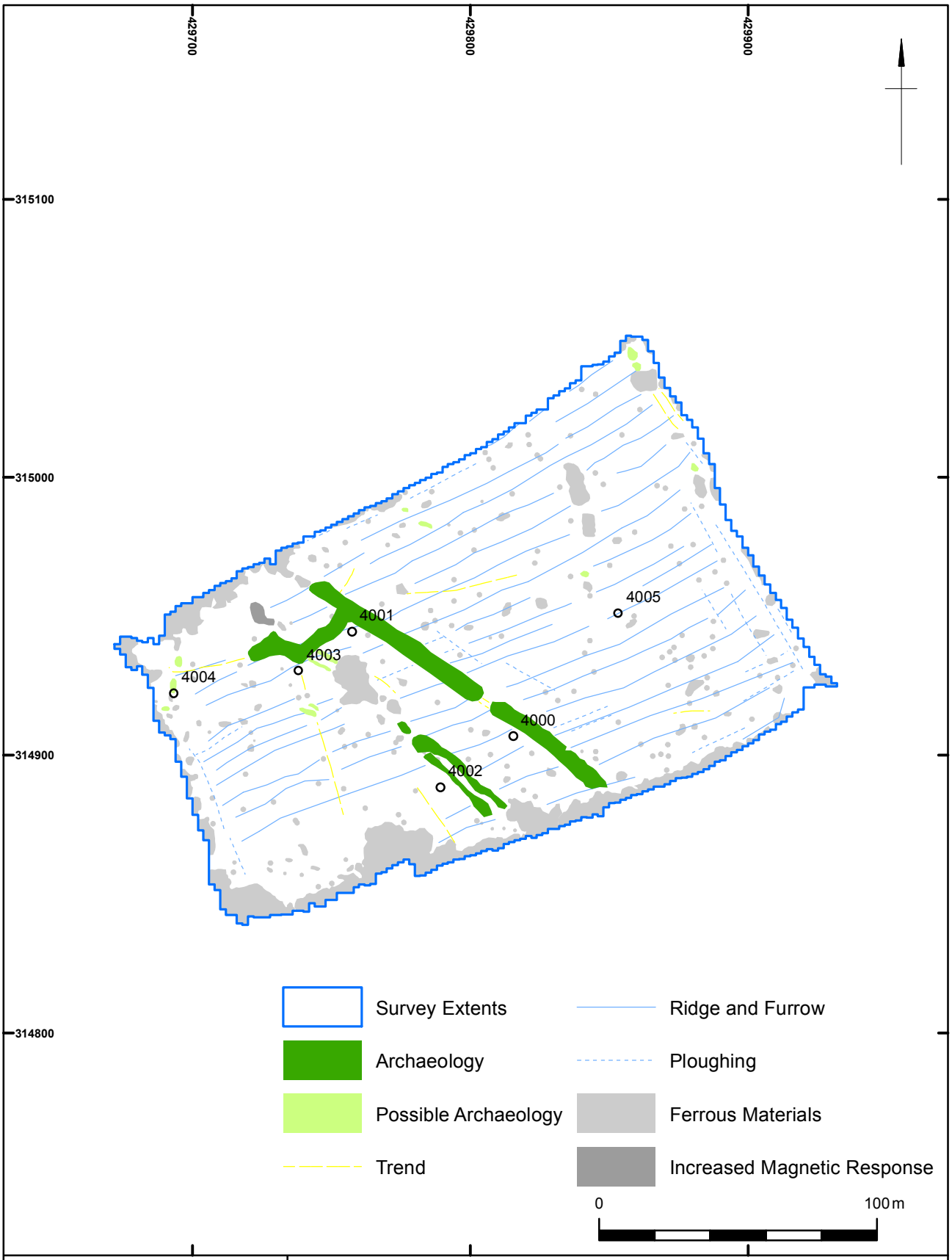
XY Trace plot

Figure 3



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Archaeological Interpretation

Figure 4

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