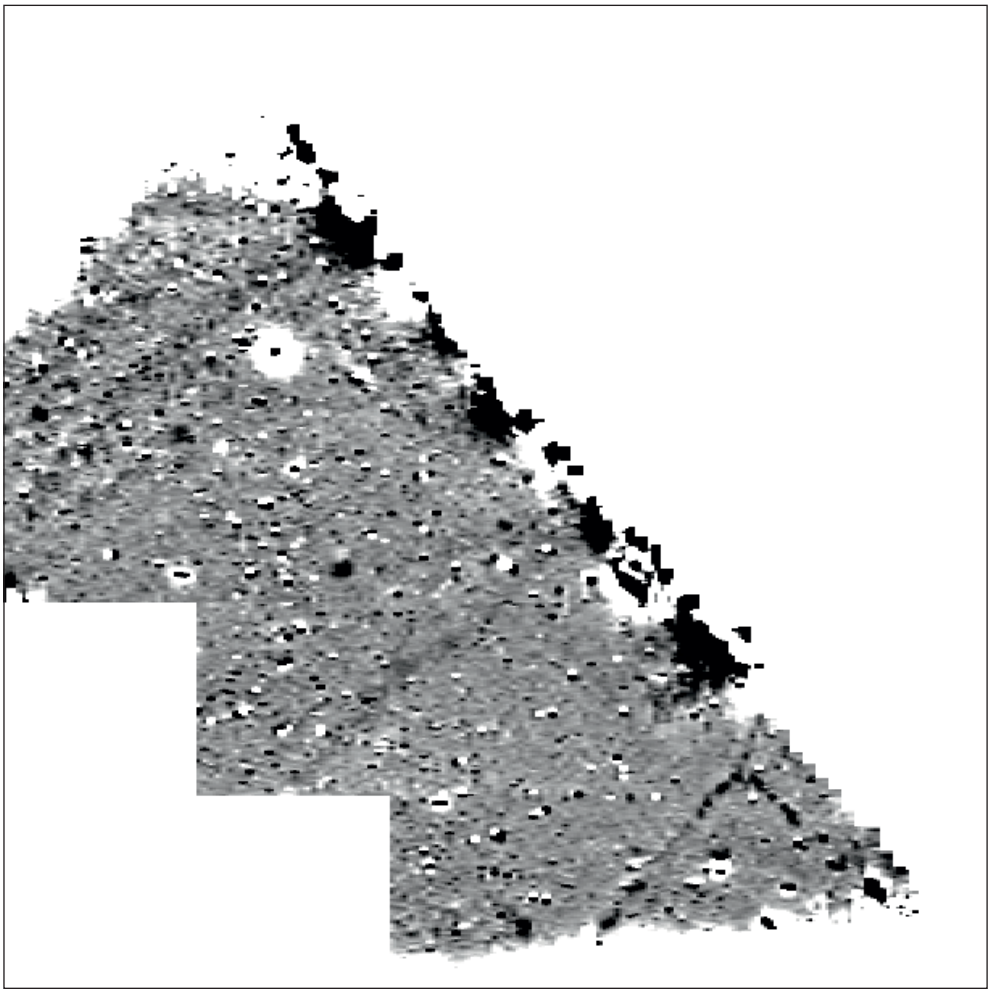
making sense of heritage

Percy Throwers Garden Centre, Oteley Road, Shrewsbury

Detailed Gradiometer Survey Report



Ref: 101320.01
November 2013

geoservices

Percy Throwers Garden Centre, Oteley Road, Shrewsbury

Detailed Gradiometer Survey Report

Prepared for:
CgMs Consulting
Adamson House
Towers Business Park
Wilmslow Road
Didsbury
Manchester
M20 2YY

Prepared by:
Wessex Archaeology
Unit R6
Sheaf Bank Business Park
Prospect Road
Sheffield
S2 3EN

www.wessexarch.co.uk

November 2013

Report Ref. 101320.01

Quality Assurance

Project Code	101320	**Accession Code**		**Client Ref.**	101320.01
Planning Application Ref.		**Ordnance Survey (OS) national grid reference (NGR)**	350050, 310135		

Version	Status*	Prepared by	Checked and Approved By	Approver's Signature	Date
v01	E	*BCU*	*CS*		20/11/2013
File:	X:\Projects\101320\Geophysics\Report\101320_Geophysics_Report.Doc				
File:					
File:					
File:					
File:					

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

Percy Throwers Garden Centre, Oteley Road, Shrewsbury

Detailed Gradiometer Survey Report

Contents

Summary ii
Acknowledgements iii

1 INTRODUCTION 1
1.1 Project Background 1
1.2 The Site 1
1.3 Historic Background 1

2 METHODOLOGY 2
2.1 Introduction 2
2.2 Method 2

3 GEOPHYSICAL SURVEY RESULTS AND INTERPRETATION 2
3.1 Introduction 2
3.2 Detailed Gradiometer Survey Results and Interpretation 3
3.3 Gradiometer Survey Results and Interpretation: Modern Services 3

4 DISCUSSION 4
4.1 Summary 4

5 REFERENCES 5

APPENDIX 1: SURVEY EQUIPMENT AND DATA PROCESSING 6

APPENDIX 2: GEOPHYSICAL INTERPRETATION 8

Figures

Figure 1 Site location and survey extents
Figure 2 Greyscale
Figure 3 XY Trace
Figure 4 Interpretation

Percy Throwers Garden Centre, Oteley Road, Shrewsbury

Detailed Gradiometer Survey Report

Summary

A detailed gradiometer survey was conducted over land south of Percy Throwers Garden Centre, Oteley Road, Shrewsbury (centred on NGR 350050, 310135). The project was commissioned by CgMs Consulting with the aim of establishing the presence and significance, or otherwise, of detectable archaeological features within the site ahead of a proposed re-development.

The site comprises a 2.5ha area of scrubland, immediately to the south of the current retail premises. This survey has demonstrated the presence of anomalies of definite, probable and possible archaeological interest within the survey area, although these are largely confined to the southwest extent of the survey area. The survey was undertaken between 14th and 15th November 2013.

The geophysical survey has identified a probable enclosure or part of a field system within the southern portion of the western field, measuring at least 40m x 15m. Although its origins are uncertain, it is considered likely to be of some archaeological interest. Several large pit-like responses are visible within the western field, but it is possible that they relate to more recent agricultural activity.

The magnetic background of the eastern field is highly variable, consistent with the former use of the land for storing or dumping materials, perhaps relating to the construction of the garden centre or its activities. Regions of ferrous debris and magnetic disturbance can be discerned within the generally noisy background, although they are probably modern in origin.

Ploughing trends can be seen within the western field, oriented parallel with the existing boundaries. Other linear trends are visible, although they are of less certain origins.

A modern service has been identified oriented parallel with the field boundary separating the two fields.

Percy Throwers Garden Centre, Oteley Road, Shrewsbury

Detailed Gradiometer Survey Report

Acknowledgements

The detailed gradiometer survey was commissioned CgMs Consulting, and the assistance of Dr Robert Smith is gratefully acknowledged in this regard.

The fieldwork was undertaken by Mike O'Connell and was assisted by Ashley Tuck and Chris Breeden. Ben Urmston processed the geophysical data and wrote this report. The geophysical work was quality controlled by Ben Urmston. Illustrations were prepared by Chris Swales. The project was managed on behalf of Wessex Archaeology by Chris Swales.

Percy Throwers Garden Centre, Oteley Road, Shrewsbury

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 south of Percy Throwers Garden Centre, Oteley Road, Shrewsbury (**Figure 1**), hereafter "the Site" (centred on NGR 350050, 310135).

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 The Site

1.2.1 The survey area comprises a 2.5ha patch of scrubland, located to the immediate south of the current retail premises for Percy Throwers Garden Centre (**Figure 1**). A detailed gradiometer survey was undertaken covering the total available area of the Site (2.3ha).

1.2.2 The Site is bounded to the south by the A5 and to the north by the B4380, Oteley Road. The land to the east is made up of farmland with scrubland located to the west. The Site is situated on a north-west facing slope with a maximum height of 82m aOD in the south-eastern corner and a minimum height of 68m aOD in the north-west corner (CgMs 2013a)

1.2.3 The underlying solid geology is made up of hard greywacke and conglomerate bedrock of the Bayston Group of the Wentnor Series of the Longmyndian Pre-Cambrian Period. The superficial deposits are composed of Boulder Clay with pockets of sand/gravel deposited after the glacial retreat of the last Ice Age (CgMs 2013a).

1.3 Historic Background

1.3.1 The following assessment is a brief overview of the desk-based assessment carried out by CgMs on the Site (CgMs 2013b)

1.3.2 The assessment established that the Site has a low/nil potential for archaeological remains relating to the Prehistoric, Saxon or Medieval periods. The only probable archaeological remains are likely to relate to the Roman and Post-Medieval period.

1.3.3 A Roman road between Wroxeter and the Moele Brace settlement (located 700m to the west of the Site) has been postulated on a course that would cut through the central part of the Site. However, watching briefs in the area have failed to identify the presence of any Roman road. The Moele Brace settlement itself has been identified as being of mid-to late 2nd century origin with timber buildings fronting onto the Roman road with associated cobbled courtyards (CgMs 2013b).

1.3.4 The first detailed map of the Site is from 1807 and shows the area as being given over to pasture with a north-west to south-east aligned field boundary running through the centre of the survey area. This remains the situation until the 1927 Ordnance survey map which shows additional buildings being erected in the surrounding area (CgMs 2013b)

2 METHODOLOGY

2.1 Introduction

2.1.1 The detailed magnetometer survey was conducted using a Bartington Grad601-2 dual fluxgate gradiometer system. The survey was conducted in accordance with English Heritage guidelines (2008).

2.1.2 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team on 14th and 15th November 2013. Field conditions at the time of the survey were good, with the survey area having been recently mown.

2.2 Method

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

2.2.2 The magnetometer survey was conducted using a Bartington Grad601-2 fluxgate gradiometer instrument, which has a vertical separation of 1m between sensors. The detailed survey data were acquired at 0.25m intervals along transects spaced 1m apart. The system used has an effective sensitivity of 0.03nT, in accordance with EH guidelines (2008). Detailed data were collected in the zigzag method.

2.2.3 Data from the detailed survey was subject to minimal data correction processes. These comprise a zero mean traverse (ZMT) function (typically ±5nT thresholds) applied to correct for any variation between the two Bartington sensors used, a deslope function to remove errors created by the ZMT function in areas of broad and strong anomalies, and a de-step function to account for variations in traverse position due to varying ground cover and topography. These three processing steps were used only with no interpolation applied to the data.

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

3 GEOPHYSICAL SURVEY RESULTS AND INTERPRETATION

3.1 Introduction

3.1.1 The gradiometer survey has been successful in identifying anomalies of definite, probable and possible archaeological interest across the Site. Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:1250, (**Figures 1** to **3**). The data are displayed at -2nT (white) to +3nT (black) for the greyscale images and 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. 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 Detailed Gradiometer Survey Results and Interpretation

3.2.1 At the western extent of the survey area, a large pit-like anomaly **4000** is clearly defined from the general magnetic background, with several other weaker pit-like responses nearby to the east.

3.2.2 At the centre of the western survey area, a similar pit-like response **4001** is apparent, with further isolated pit-like anomalies nearby. Whilst **4000** and **4001** are not conclusively archaeological in origin, it is considered probable that they are of archaeological interest.

3.2.3 At the southwestern extent of the Site, several pit-like anomalies **4002** are visible adjacent to the field boundary. Immediately to the east, rectilinear anomalies **4003** extend NE-SW from the southern boundary, turning NW-SE parallel with the eastern boundary of the western field; the anomalies are consistent with part of an enclosure or field system. It is considered likely to be archaeological in origin, although it is not possible to determine from which period it dates.

3.2.4 Numerous ploughing trends are visible within the western field, parallel with the extant boundaries. There are a number of other trends visible on differing orientations, although the origin of these is unclear; it is possible that they are agricultural in origin, however an archaeological interpretation cannot be excluded. A modern service **4007** is partly visible parallel with the boundary separating the two fields, which will be discussed in more detail below.

3.2.5 The magnetic background within the eastern field shows large variability, mainly concentrated within the western portion of the field. Whilst the origin of this increased magnetic response and the frequency of ferrous debris is unclear, it is likely to relate to modern or historic agricultural or construction activity. Given the proximity of the magnetic disturbance to the garden centre and adjacent yard, it is possible that it relates to the stockpiling of materials or waste.

3.2.6 Several regions of coherent ferrous anomalies can be seen within the eastern field, for instance at **4004**, **4005** and **4006**. It is likely that these clusters of anomalies are modern in origin and probably relate to the agricultural or construction activities noted above.

3.2.7 Several linear trends are visible within the eastern field; it is unclear whether these represent chance alignments within the strongly varying magnetic background or if they are associated with physical features. However, the origin of these features is uncertain and it is possible that they are associated with the events causing the extensive magnetic disturbance.

3.3 Gradiometer Survey Results and Interpretation: Modern Services

3.3.1 Modern service **4007** is oriented NW-SE, parallel with the boundary dividing the survey areas. Whilst its function cannot be determined, it appears to be of steel construction and is therefore probably associated with a mains utility. It is beyond the scope of this survey to establish further information regarding the service, such as depth of burial and physical dimensions; it is advised that due care is taken should intrusive investigations take place in the vicinity.

4 DISCUSSION

4.1 Summary

4.1.1 The detailed gradiometer survey has been successful in identifying anomalies of definite, probable and possible archaeological interest within the survey areas, along with regions of magnetic disturbance and increased response, ploughing trends and a modern service.

4.1.2 The clearest anomalies of archaeological interest comprise the somewhat fragmentary enclosure or field system at the southern extent of the western field. It appears to extend at least 40m NE-SW by at least 15m NW-SE, although the eastern and southern extents seem to lie outside the survey area.

4.1.3 Several large pit-like anomalies have been interpreted as being of probable archaeological interest, based primarily on the strength of their response and their form in plan. It is conceivable that they are associated with recent agricultural activity although it is not possible to determine their age from the geophysical survey alone. A number of smaller isolated pit-like anomalies have also been identified, and the uncertainty over their origin is reflected in their interpretation.

4.1.4 The postulated Roman road (CgMs 2013a, b) has been plotted passing NW-SE through the eastern field, approximately parallel with the existing boundary. No discernible anomaly has been detected on this orientation within the vicinity of the postulated road, although it is possible that the extensive magnetic disturbance may have masked weaker archaeological anomalies associated with a track or road, particularly if it was not formalised with flanking ditches or an agger.

4.1.5 Ploughing trends in the western field demonstrate that ephemeral features produce measurable magnetic anomalies in this geological setting, and it is considered likely that more substantial archaeological features would have resulted in measurable magnetic anomalies, should any others have been present.

5 REFERENCES

CgMs Consulting, 2013a. *Written Scheme of Investigation for Geophysical Survey: Comprehensive redevelopment of the Percy Throwers Garden Centre Site, Otley Road, Shrewsbury*. Unpublished Client Report.

CgMs Consulting, 2013b. *Archaeological Desk-Based Assessment: Comprehensive redevelopment of the Percy Throwers Garden Centre Site, Otley Road, Shrewsbury*. Unpublished Client Report.

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

Ordnance Survey, 1977. *Quaternary Map of the United Kingdom: South*. Ordnance Survey, Southampton.

Ordnance Survey, 1957. *Sheet 2, Geological Map of Great Britain: England and Wales*. Ordnance Survey, Chessington.

Soil Survey of England and Wales, 1983, *Sheet 1, Northern England*. 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 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.

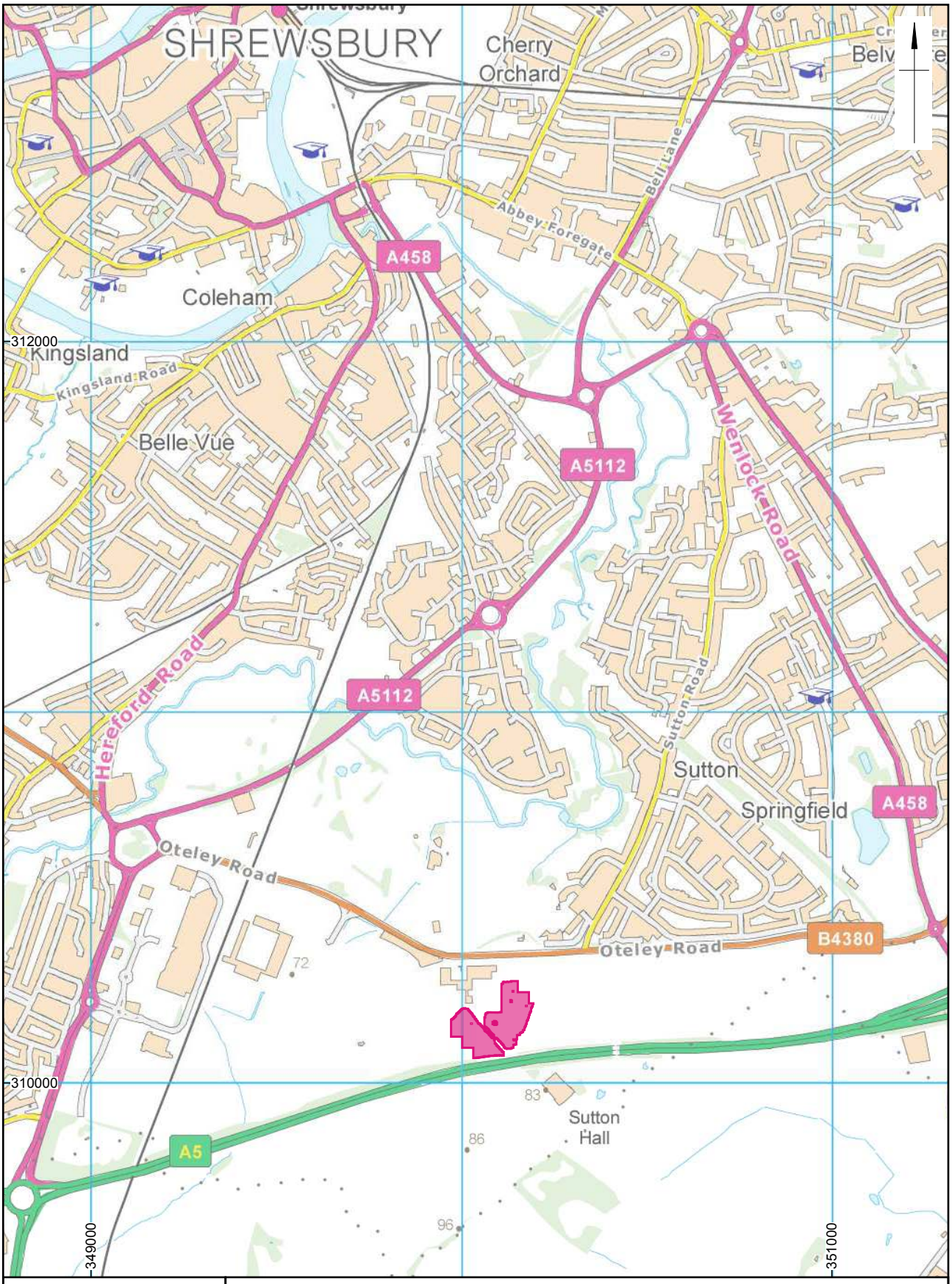
The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided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

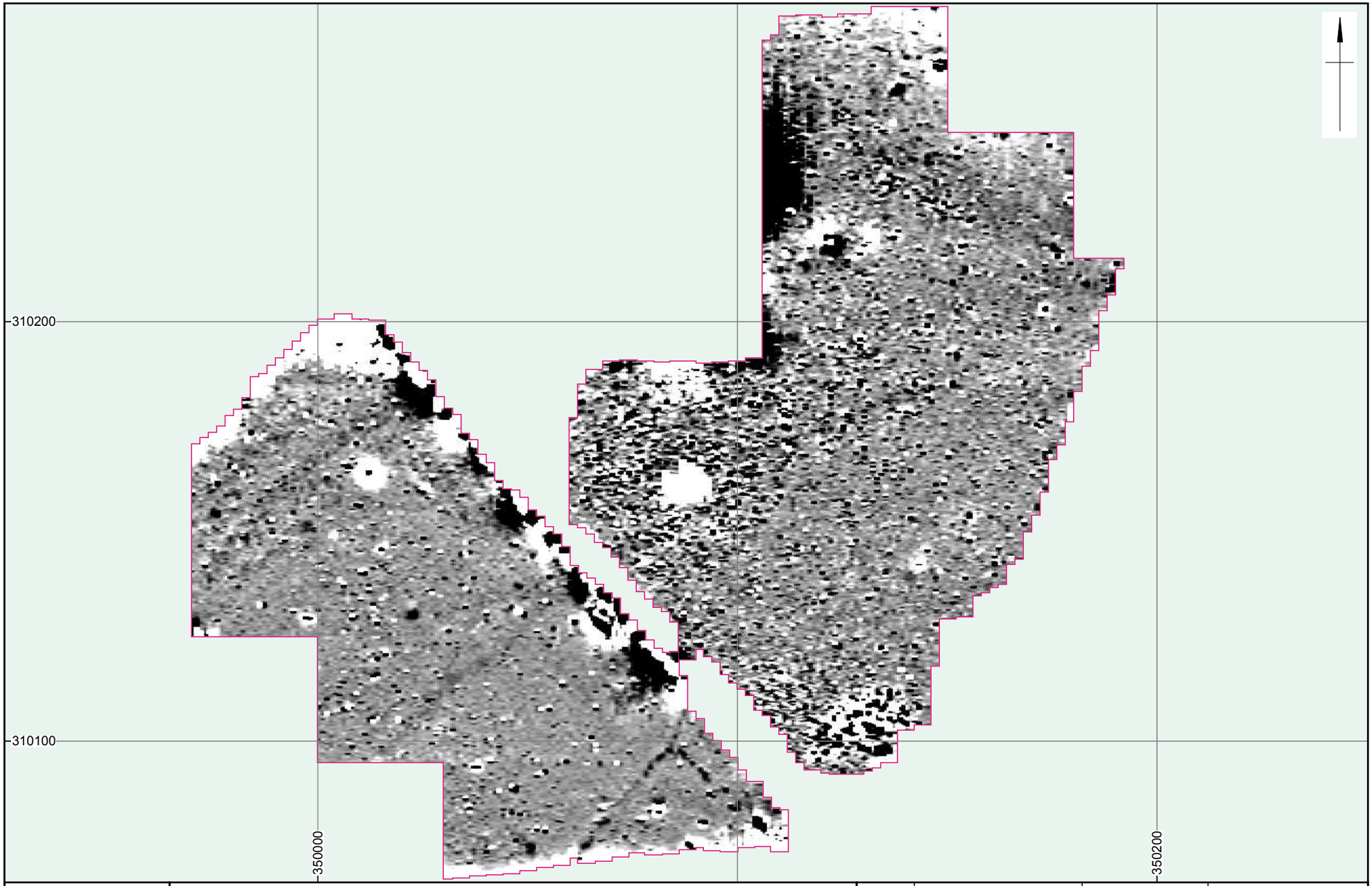


Survey extents

Date:	21/11/2013	Revision Number:	0
Scale:	1:15,000 @ A4	Illustrator:	CS
Path:	S:\PROJECTS\101320_percy Thrower Garden Centre\Geophysics\AutoCAD		

Site location and survey extents

Figure 1



Survey extents

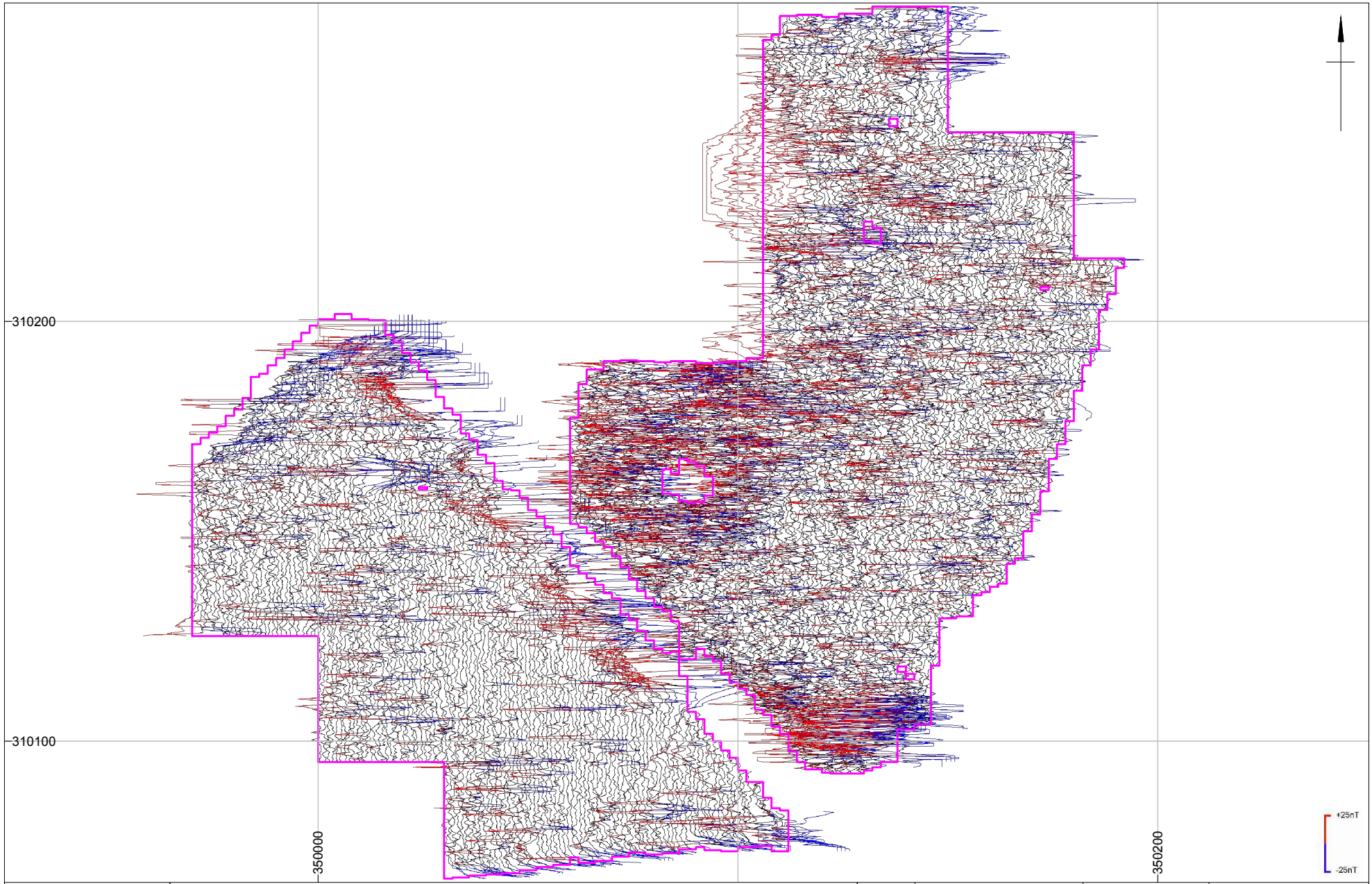
+3nT

-2nT

Date:	21/11/2013	Revision Number:	0
Scale:	1:1250 @ A4	Illustrator:	CS
Path:	S:\PROJECTS\101320_percy Thrower Garden Centre\Geophysics\AutoCAD		

Greyscale

Figure 2

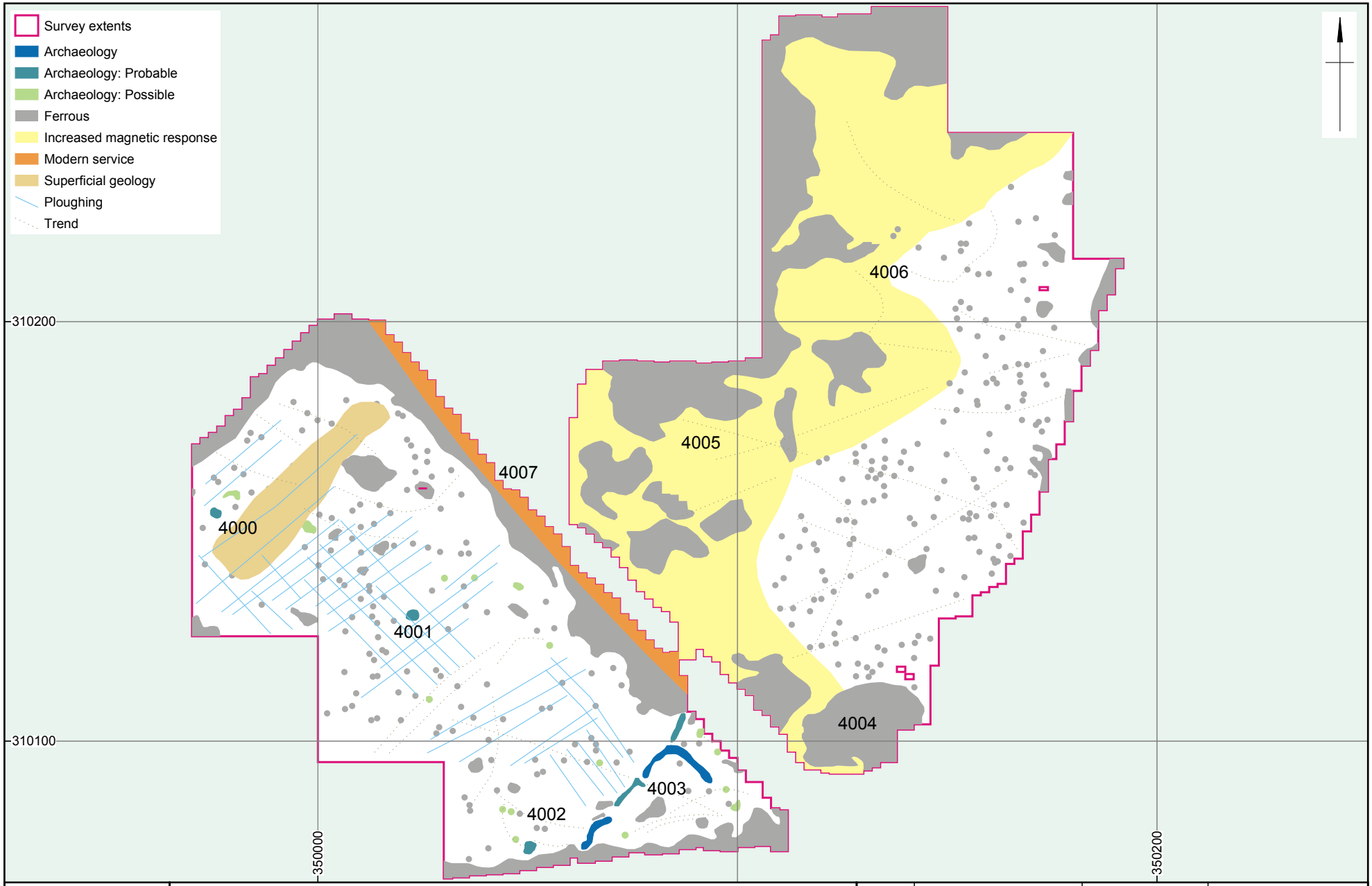


Survey extents

Date:	21/11/2013	Revision Number:	0
Scale:	1:1250 @ A4	Illustrator:	CS
Path:	S:\PROJECTS\101320_percy Thrower Garden Centre\Geophysics\AutoCAD		

XY Trace

Figure 3



Date:	21/11/2013	Revision Number:	0
Scale:	1:1250 @ A4	Illustrator:	CS
Path:	S:\PROJECTS\101320_percy Thrower Garden Centre\Geophysics\AutoCAD		

Interpretation

Figure 4

wessex archaeology

salisbury rochester sheffield edinburgh

Wessex Archaeology Ltd registered office Portway House, Old Sarum Park, Salisbury, Wiltshire SP4 6EB
Tel: 01722 326867 Fax: 01722 337562 info@wessexarch.co.uk www.wessexarch.co.uk