LAND AT
LONDON ROAD
ATTLEBOROUGH
NORFOLK

GEOPHYSICAL SURVEY

Work undertaken for
Stepford Homes

November 2011

Report produced by
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OASIS Ref: archaeol1-113258
National Grid Reference: 603650 294160

APS Report No: **123/11**

ARCHAEOLOGICAL
PROJECT
SERVICES

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1. SUMMARY

Detailed magnetic gradiometer survey was undertaken for Stepford Homes in connection with proposed residential development on 2.4ha of land at London Road, Attleborough, Norfolk.

Geophysical survey revealed little of immediate archaeological interest. A number of linear features have been identified but these all are very straight and possibly all relate to post-medieval management and use of this land parcel. Background responses are very variable giving rise to readings as strong as or stronger than those of the linear features rendering interpretation of discrete anomalies difficult.

2. INTRODUCTION

2.1 Definition of an Evaluation

Geophysical survey is a non-intrusive method of archaeological evaluation which is defined as *'a limited programme of non-intrusive and/or intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site. If such archaeological remains are present Field Evaluation defines their character and extent, quality and preservation, and it enables an assessment of their worth in a local, regional, national or international context as appropriate'* (IFA 2008).

2.2 Background

Archaeological Project Services was commissioned by M&M Archaeological Services on behalf of Stepford Homes to undertake detailed magnetometer survey on 2.4ha of land at London Road, Attleborough, Norfolk. The survey was carried out on the 27th October 2011.

2.3 Topography and Geology

Attleborough is located approximately 22km southwest of Norwich and 20km northeast of Thetford in the administrative district of Breckland, Norfolk. The site lies on the southwestern edge of the town, comprising a single arable field of 2.4ha lying north of New Road and east of London Road at NGR 603650 294160 (Fig. 1).

Attleborough lies on the south bank of a stream that constitutes one of the tributaries of the River Thet which runs only 3km to the south. The land dips very gently north and west towards this stream and the site lies at approximately 35m OD.

Local soils are the Burlingham 1 Association, stagnogleyic argillic brown earths on chalky till and head deposits of the Lowestoft Formation over a solid geology of chalk (Hodge et al. 1984, 132).

2.4 Archaeological Setting

Previous archaeological work in the parish has revealed evidence for human activity from the middle Palaeolithic onwards. Prehistoric flintwork has been found widely and evidence for prehistoric burnt mounds located close to streams. Bronze Age metalwork and Iron Age and Roman artefacts are also known from a number of sites. It has been noted that early material is found quite widely in fieldwork with no clear foci in earlier periods.

Few Early or Middle Saxon artefacts are known from the parish. Attleborough is referred to in the Domesday Book of c. 1086 when it shared a mill and had a fishery, both probably located on the nearby watercourse. Domesday indicates the settlement was well established in the

Late Saxon period. The study area lies on the margins of the modern settlement, 1.6km southwest of the historic core.

3. AIMS

The aim of the survey was to locate any features of possible archaeological significance within the proposed development area in order to inform potential further site investigations.

4. GEOPHYSICAL SURVEY

4.1 Methods

Location and layout of the survey area is shown in Figure 2. Weather and ground conditions during the survey were dry with the area under low crop cover and in good condition for survey.

Survey was undertaken in accordance with English Heritage (2008) and IfA (2010) guidelines and codes of conduct.

The magnetic survey was carried out using a dual sensor Grad601-2 Magnetic Gradiometer manufactured by Bartington Instruments Ltd. Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.2 nanoTesla (nT) in an overall field strength of c. 49,000nT can be accurately detected using this instrumentation, although in practice instrument interference and soil noise can limit sensitivity.

The mapping of anomalies in a systematic manner allows an estimate of the type of material present beneath the surface. Strong magnetic anomalies will be generated by buried iron-based objects or by kilns or hearths. More subtle anomalies representing pits and ditches can be seen where their fills contain more topsoil which is normally richer in magnetic iron oxides and provides a contrast with the natural subsoil (but this can vary depending on the nature of the underlying deposits). Wall foundations can show as negative anomalies where the stone is less magnetic than the surrounding soil, or as stronger positive and negative anomalies if of brick, but are not always responsive to the technique.

Magnetometers measure changes in the Earth's magnetic field. With two sensors configured as a gradiometer the recorded values indicate the difference between two magnetic measurements separated by a fixed distance. The Grad601-2 consists of two high stability fluxgate gradiometers suspended on a single frame with a 1m separation between the sensing elements giving a strong response to deep anomalies.

Sampling interval and data capture
Readings were taken at 0.25m centres along traverses 1m apart. This equates to 3600 sampling points in a full 30m x 30m grid. The Grad 601 has a typical depth of penetration of 0.5m to 1.0m although a greater range is possible where strongly magnetic objects have been buried in the site.

Readings are logged consecutively into the data logger which is downloaded daily either into a portable computer whilst on site or directly to the office computer. At the end of each job, data is transferred to the office for processing and presentation.

Processing and presentation of results
Processing is performed using specialist ArcheoSurveyor software. This can emphasise various aspects contained within the data but which are often not easily seen in the raw data. Basic processing of the magnetic data involves

'flattening' the background levels with respect to adjacent traverses and adjacent grids. 'Despiking' is also performed to remove the anomalies resulting from small iron objects often found on agricultural land. Once the basic processing has flattened the background it is then possible to carry out further processing which may include low pass filtering to reduce 'noise' in the data and hence emphasise the archaeological or man-made anomalies.

The following shows the processing techniques carried out on the processed gradiometer data used in this report:

1. DeStripe (sets the background mean of each traverse within a grid to zero and is useful for removing striping effects)

2. Despike (useful for display and allows further processing functions to be carried out more effectively by removing extreme data values)
Parameters: X radius = 1; Y radius = 1; Threshold = 3SD; Spike replacement = mean

3. Clip (excludes extreme values allowing better representation of detail in the mid range): -4 to 4nT.

4.2 Results

The presentation of the data for the site involves a print-out of the raw data as minimally processed greyscale and trace plots (Figs 3, 4), together with greyscale plots of the processed data (Figs 5, 7). Magnetic anomalies have been identified and plotted onto interpretative drawings (Fig. 6, 8) and are described below.

Linear positive anomalies
There are few clear positive anomalies within the survey results which might represent cut features of archaeological origin. A NW-SE anomaly **A** is faintly expressed but perhaps relates to a further series of faint SSW-NNE lines. These are straight and parallel and perhaps relate to management and use (drainage?) of this land parcel.

Positive area anomalies
A small number of the strongest such have been highlighted. However, these are not much outside of the range of background variation across the survey area and little confidence can be placed in an archaeological interpretation.

Negative linear anomalies
A single straight linear feature **B** runs ESE-WNW along the southwest boundary of the field. This closely parallels the field boundary (and New Road) and seems likely to relate to current enclosure/ agricultural use of this land parcel.

Modern/magnetic disturbance
Strong bipolar responses occur around the margins of the field adjacent to fenced boundaries and more markedly in the southern corner of the field.

Iron spikes (discrete bipolar anomalies)
Iron items within the topsoil give a distinctive localised bipolar response. Such items usually derive from relatively recent management or agricultural use of the land – broken or discarded pieces of agricultural machinery or other modern debris. These are fairly widely scattered with no apparent concentration.

5. DISCUSSION

Geophysical survey revealed little of immediate archaeological interest. A number of linear features have been identified but these all are very straight and possibly all relate to post-medieval management and use of this land parcel. Background responses are very variable

giving rise to readings as strong as or stronger than those of the linear features rendering interpretation of discrete anomalies difficult.

6. ACKNOWLEDGEMENTS

Archaeological Project Services wishes to acknowledge the assistance of Martin Griffiths of M&M Archaeological Services who commissioned the project on behalf of Stepford Homes and arranged access to the site. Tom Lane edited the report.

7. PERSONNEL

Project coordinator: Steve Malone
Geophysical Survey: Andy Failes, Jonathon Smith, Bryn Leadbetter
Survey processing and reporting: Steve Malone

8. BIBLIOGRAPHY

Clark, A., 1996 *Seeing Beneath the Soil*, London, 2nd edn

English Heritage, 2008 *Geophysical Survey in Archaeological Field Evaluation*

IfA, 2011 *Standard and Guidance for Geophysical Survey*

9. ABBREVIATIONS

APS Archaeological Project Services

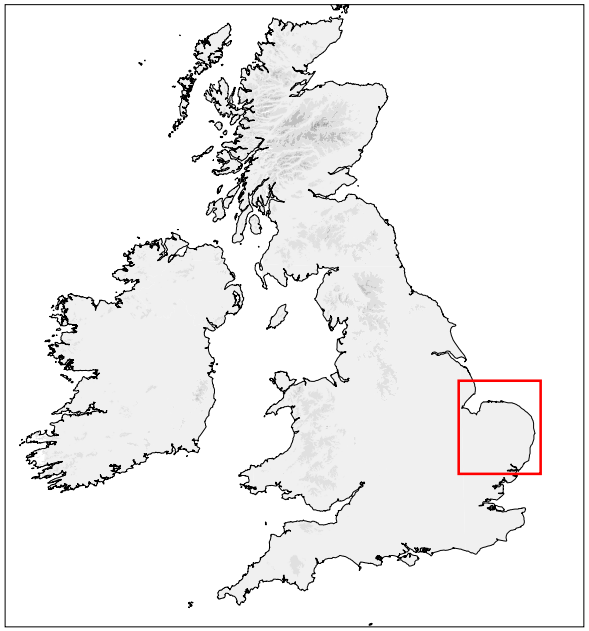
BGS British Geological Survey

EH English Heritage

IfA Institute for Archaeologists

HER Historic Environment Record

SM Scheduled Monument



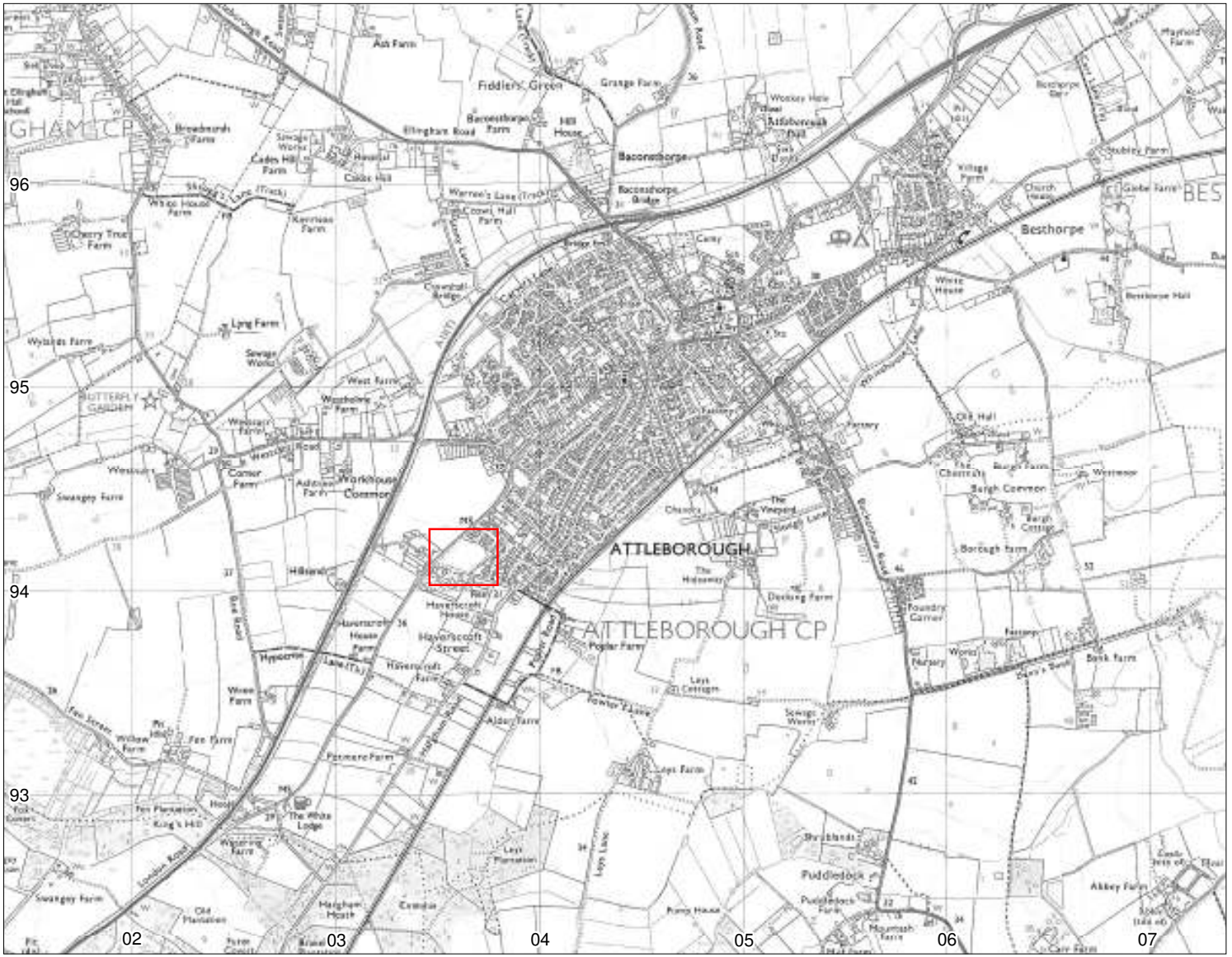


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Figure 1 Site location map

Figure 2 Location and layout of survey area

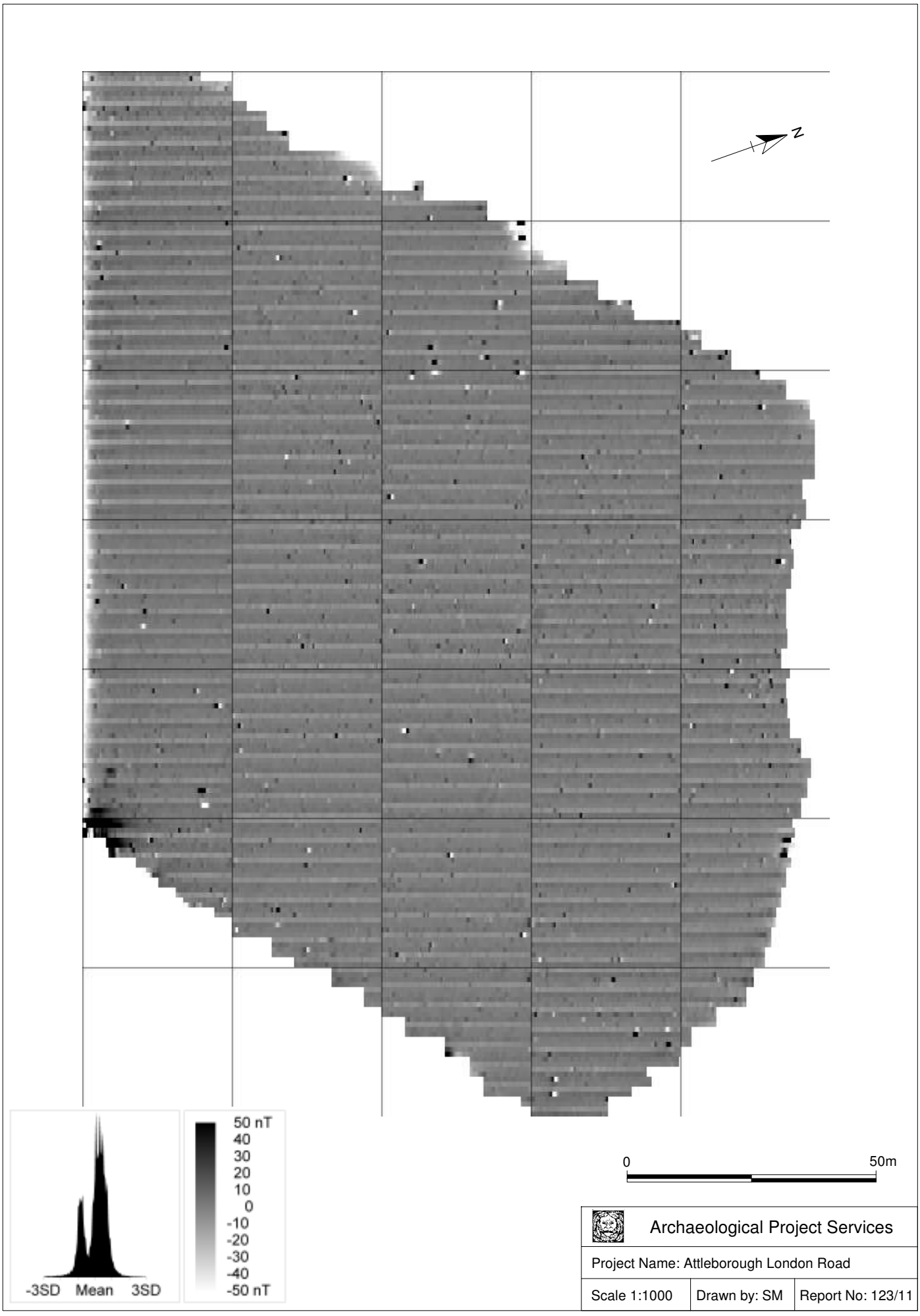


Figure 3 Minimally processed greyscale plot

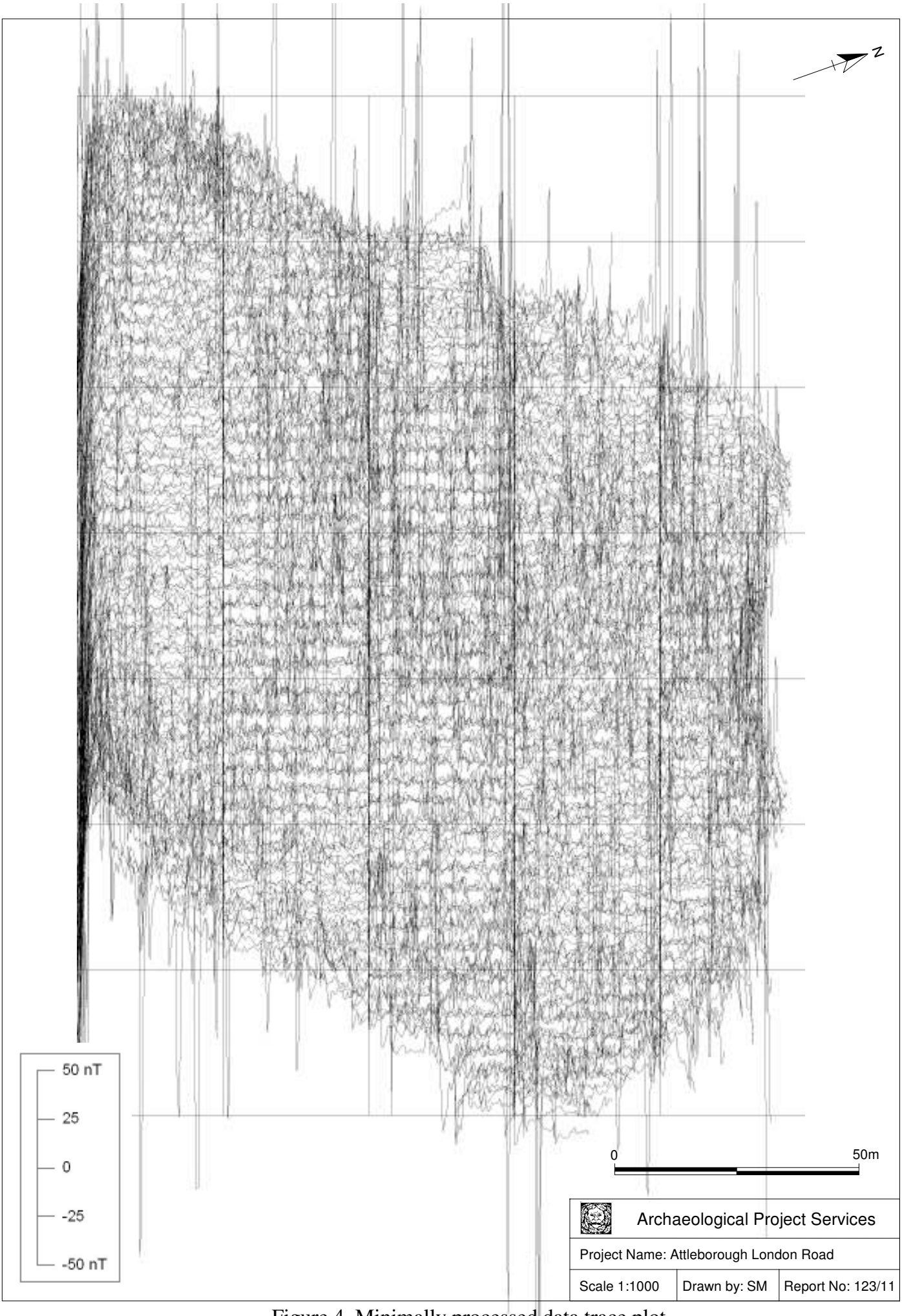


Figure 4 Minimally processed data trace plot

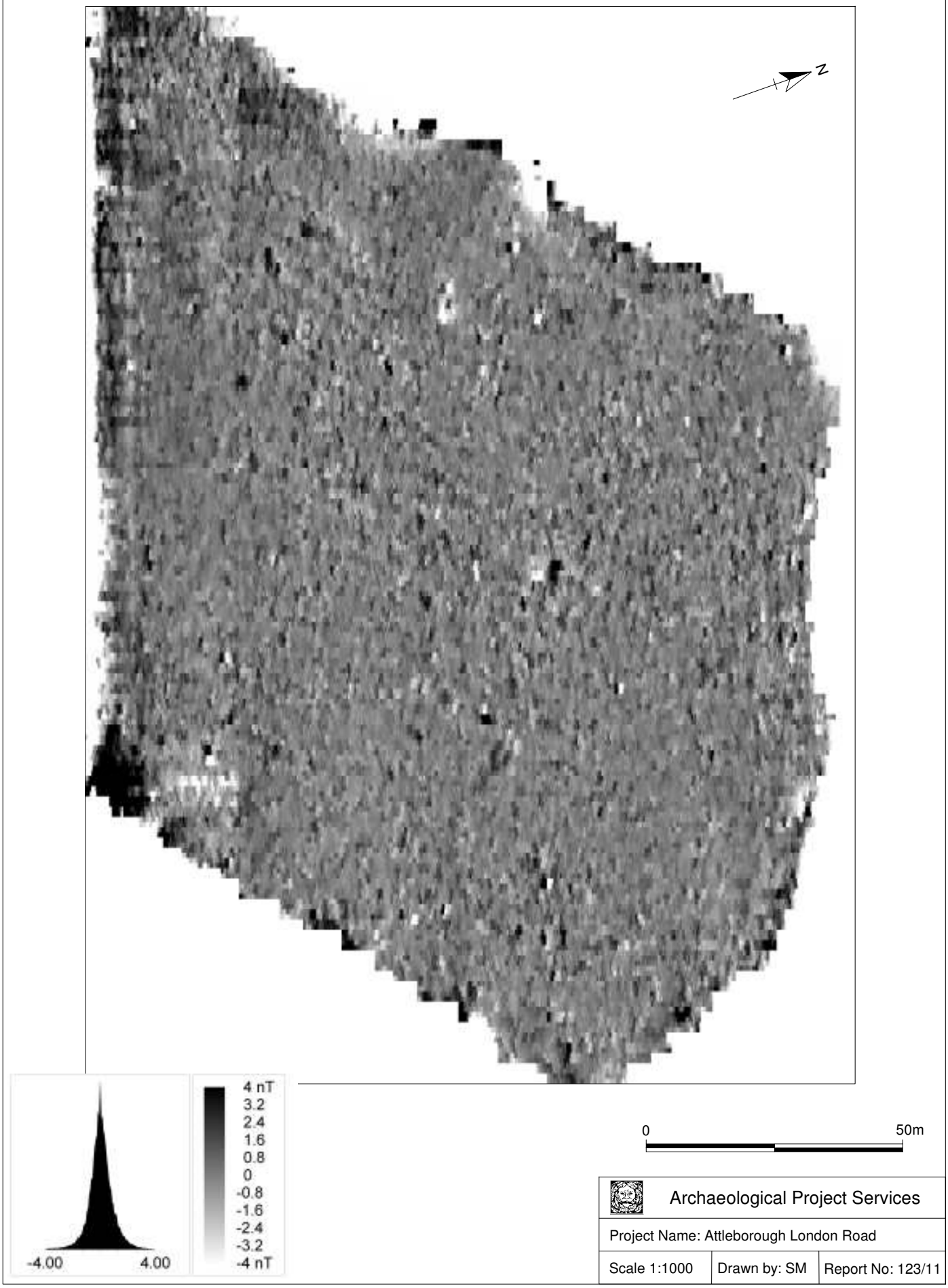


Figure 5 Processed data greyscale plot

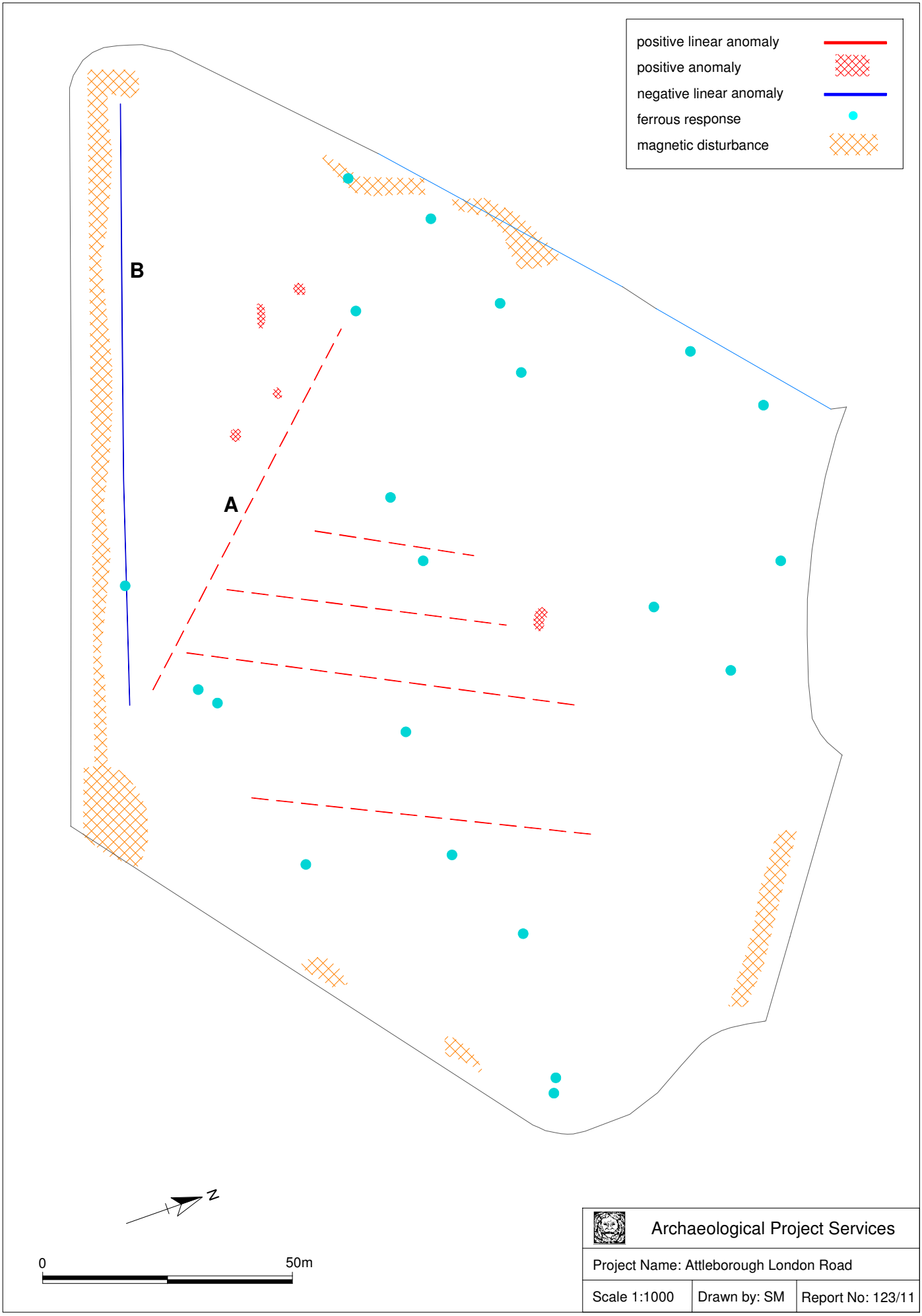


Figure 6 Interpretative plot

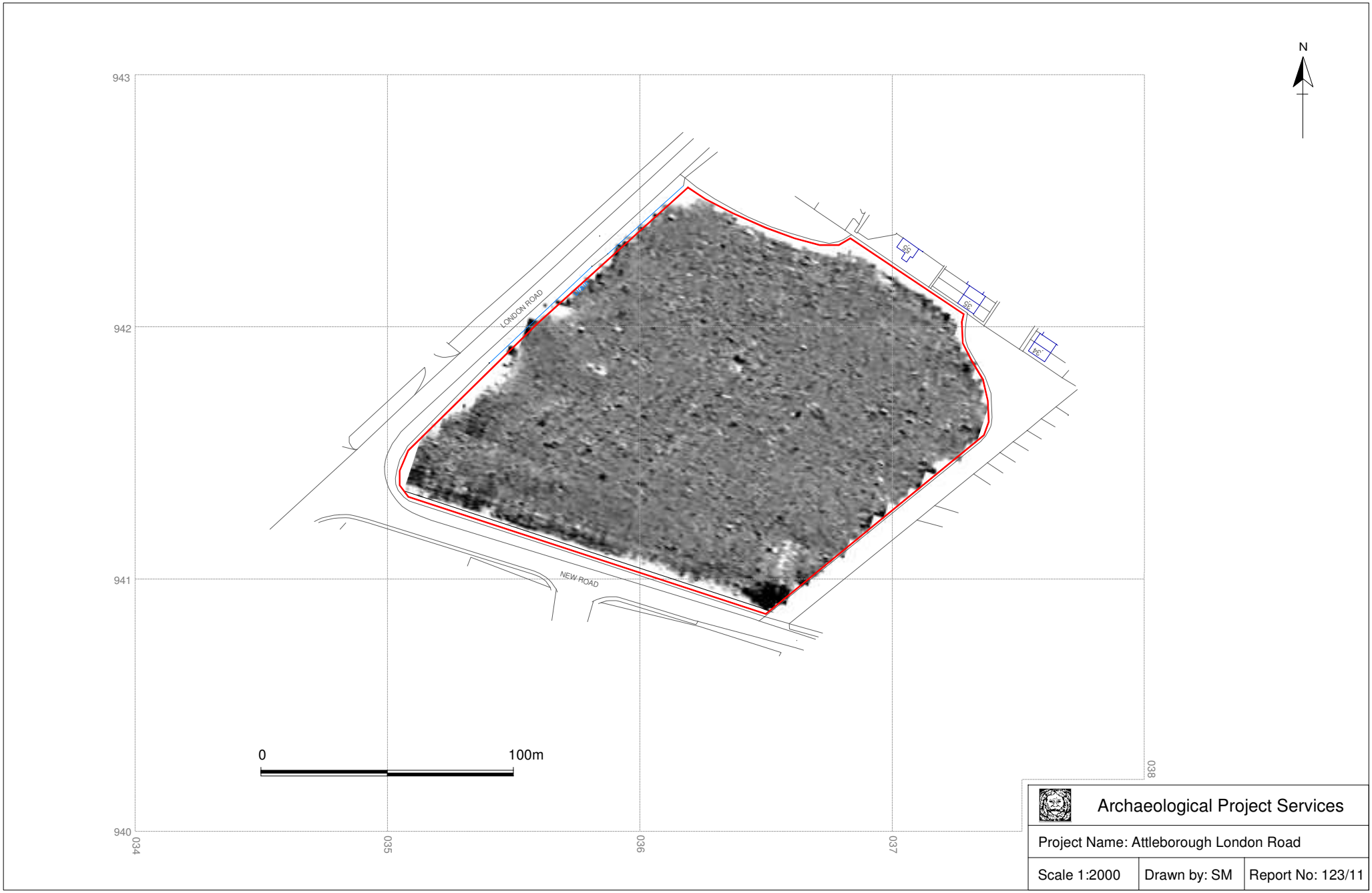


Figure 7 Processed survey data against basemap

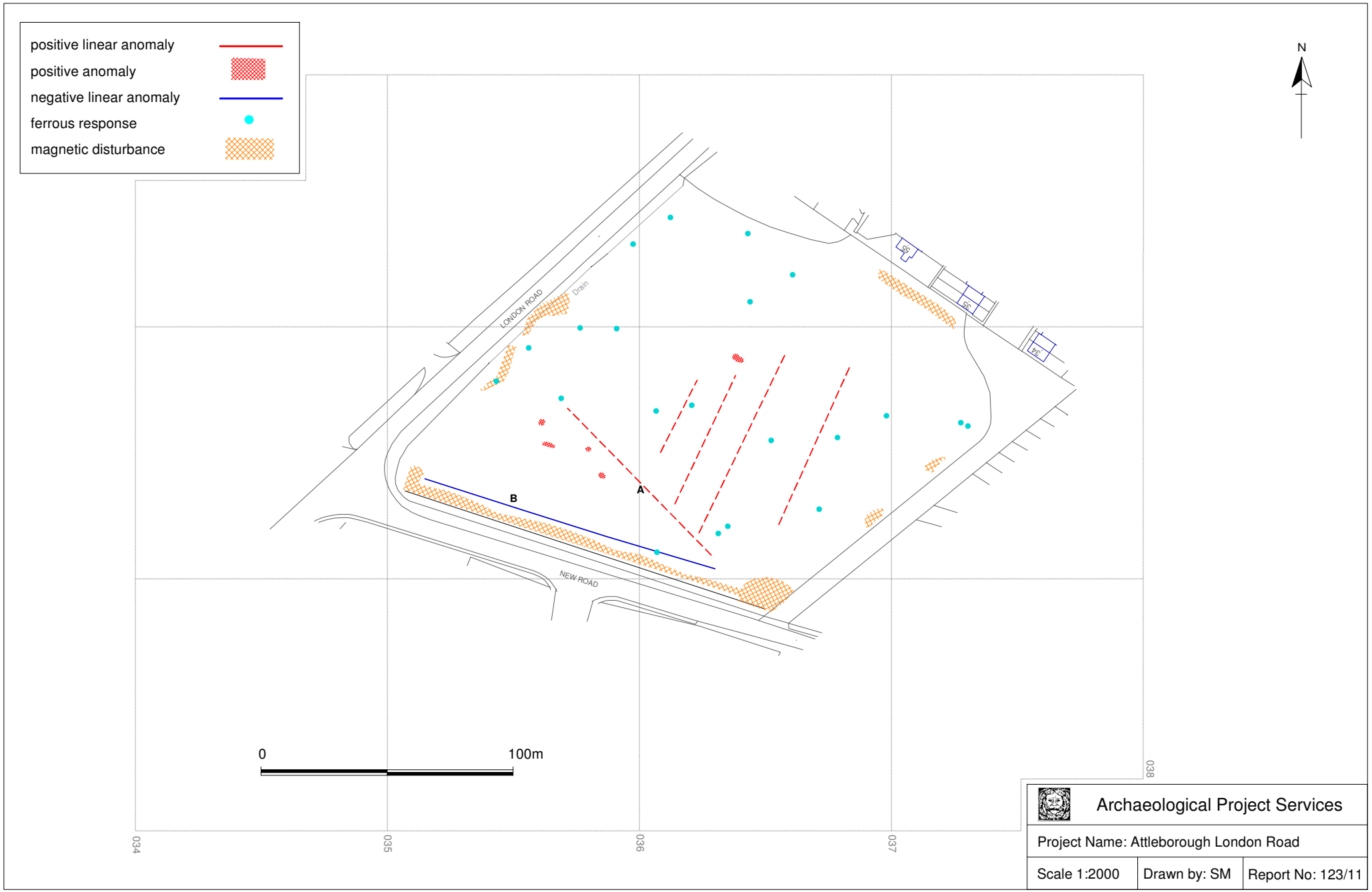


Figure 8 Interpretative plot against basemap

Appendix 1
THE ARCHIVE

The archive consists of:

1 Daily record sheet
1 Report text and illustrations
Digital data

File names	ablr11-01.xgd ablr11-02.xgd ablr11-02-a.xgd ablr11-03.xgd ablr11-03-a.xgd ablr11-04.xgd ablr11-04-a.xgd ablr11-05.xgd ablr11-05-a.xgd ablr11-06.xgd ablr11-06-a.xgd ablr11-07.xgd ablr11-07-a.xgd ablr11-08.xgd ablr11-08-a.xgd ablr11-09.xgd ablr11-09-a.xgd ablr11-10-a.xgd ablr11-10.xgd ablr11-11-a.xgd	ablr11-11.xgd ablr11-12-a.xgd ablr11-12.xgd ablr11-13-a.xgd ablr11-13.xgd ablr11-14.xgd ablr11-14-a.xgd ablr11-15.xgd ablr11-101.xgd ablr11-102.xgd ablr11-102-a.xgd ablr11-103.xgd ablr11-103-a.xgd ablr11-104.xgd ablr11-104-a.xgd ablr11-105.xgd ablr11-105-a.xgd ablr11-106.xgd ablr11-106-a.xgd ablr11-107.xgd	ablr11-107-a.xgd ablr11-108.xgd ablr11-108-a.xgd ablr11-109.xgd ablr11-109-a.xgd ablr11-110.xgd ablr11-111.xgd ablr11-112.xgd ablr11-113.xgd ablr11-114.xgd ablr11-115.xgd ablr11-116.xgd ablr11-116-a.xgd ablr11-117.xgd ablr11-117-a.xgd ablr11-118.xgd ablr11-118-a.xgd ablr11-c1.xcp
Explanation of codes used in file names	xgd files are magnetometer grids, named with site code and number in the order surveyed. Grids rotated to first traverse north are suffixed with "-a" xcp files are composites containing record of all the data and processes used to produce the end product		
Description of file formats	All files are in plain text xml format with header data defining survey and processing parameters		
List of codes used in files	D indicates a "dummy" value within the composite data		
Hardware, software and operating systems	ArcheoSurveyor 2.5.13 running under Windows XP Service Pack 3		
Date of last modification	04/11/11		
Indications of known areas of weakness in data	Grids 4-6, 115-116 show directional effects caused by highly magnetic material at margins of survey		

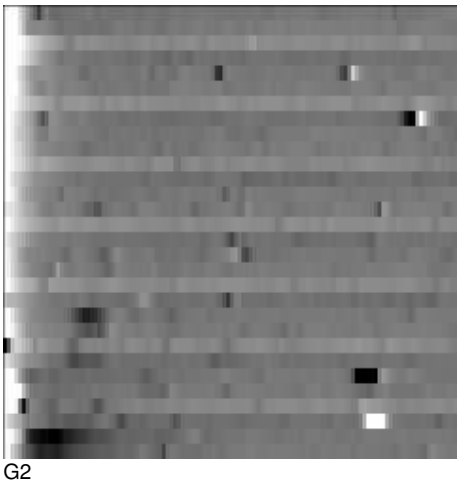
All primary records are currently kept at:

Archaeological Project Services, The Old School, Cameron Street, Heckington, Sleaford, Lincolnshire NG34 9RW

The ultimate destination of the project archive is:

Norfolk Museums Service, Union House, Gressenhall, Dereham, Norfolk, NR20 4DR

Archaeological Project Services Site Code: ABLR11



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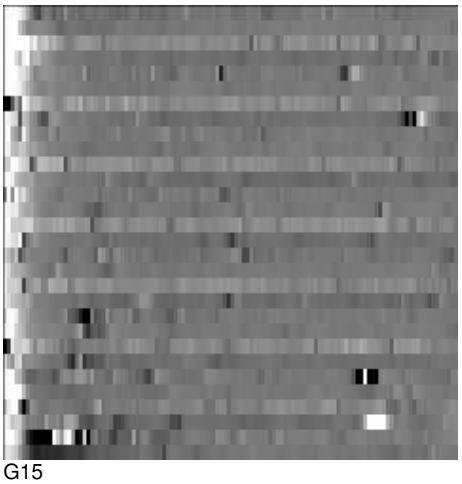

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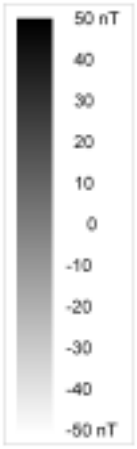

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Appendix 2 Re-survey of Grid 2 at end of day (clip +/-50nT)