ARCHAEOLOGICAL SERVICES WYAS

Land at Naird Lane
Telford
Shropshire

Geophysical Survey

Report no. 2717

February 2015

Client: Cotswold Archaeology

Land at Naird Lane
Telford
Shropshire

Geophysical Survey

Summary

A geophysical (magnetometer) survey covering 12 hectares was carried out on land west of Naird Lane, Telford, prior to the proposed development of the site. No anomalies of archaeological potential have been identified by the survey. Areas of magnetic disturbance within the north of the site may be due to demolition material from the site of Naird Farm. These anomalies may be of local historical interest but are not thought to be of archaeological significance. Consequently, on the basis of the survey, the archaeological potential of the site is considered to be low.

ARCHAEOLOGICAL
SERVICES
WYAS

Report Information

Client:	Cotswold Archaeology
Address:	Building 11, Kemble Enterprise Park, Cirencester, Gloucestershire, GL7 6BQ
Report Type:	Geophysical Survey
Location:	Telford
County:	Shropshire
Grid Reference:	SJ 718 077
Period(s) of activity:	Modern
Report Number:	2717
Project Number:	4361
Site Code:	NLT15
OASIS ID:	archaeol11-204478
Planning Application No.:	
Museum Accession No.:	n/a
Date of fieldwork:	February 2015
Date of report:	February 2015
Project Management:	Sam Harrison BSc MSc MCIfA
Fieldwork:	Alex Schmidt BA
	Lewis Colau BA MA
Report:	David Harrison BA MSc MCIfA
Illustrations:	Chris Sykes BA MSc
Photography:	Alex Schmidt
Research:	n/a

Authorisation for distribution: ----------

PO Box 30, Nepshaw Lane South, Morley, Leeds LS27 0UG
Telephone: 0113 383 7500.
Email: admin@aswyas.com

Contents

List of Figures

List of Plates

1 Introduction

Archaeological Services WYAS (ASWYAS) was commissioned by Richard Young of Cotswold Archaeology (The Client), to undertake a geophysical (magnetometer) survey of land to the west of Naird Lane, Telford (see Fig. 1). The work was undertaken in order to inform a planning application for the proposed development of the site. The work was undertaken in accordance with policy contained within the National Planning Policy Framework (DCLG 2012), in line with current best practice (CIfA 2014; David *et al.* 2008) and to a Project Design (Harrison 2014) approved by the Client. The survey was carried out between February 3rd and February 6th 2015 to provide additional information on the archaeological resource of the site.

Site location, topography and land-use

The proposed development area (PDA) is located on the eastern periphery of Telford, centred at NGR SJ 718 077 (see Fig. 1). It comprises an oval-shaped parcel of land containing four fields (Field 1-4) of recently harvested arable farmland and is located on the gentle north-facing slope of a small hill known as Nedge hill. A disused parcel of land within the north of the PDA was largely overgrown at the time of survey and was unsuitable for survey (see Plate 1; Fig. 2). The northern and north-eastern limits of the site are bound by Naird Lane. It is bound to the east by the Telford and Wrekin/Shropshire local authority boundary and by woodland to the west. A reservoir is located at the southern boundary of the site.

Soils and geology

The underlying bedrock geology comprises sandstone, siltstone and mudstone of the Enville Member overlain by till (British Geological Survey 2015). The soils are classified in the Clifton and Bromsgrove associations, characterised as slowly permeable, seasonally waterlogged loams and clays and freely draining loams respectively – the former being located towards the lower-lying slopes (Soil Survey of England and Wales 1983).

2 Archaeological Background

No detailed archaeological background is available at the time of writing but it is understood that there are no known heritage assets within the PDA. Analysis of historic Ordnance Survey (OS) mapping shows that over the past 130 years the division and layout of land within PDA has remained largely unchanged, albeit with the removal of Naird Farm which is depicted within the north of the PDA on historical mapping from the first edition OS map (1882) through to later 20th century edition OS maps.

3 Aims, Methodology and Presentation

The general objective of the geophysical survey was to provide information about the presence/absence, character, and extent of any archaeological remains identified within the PDA and to help inform further strategies, should they be required.

Specifically, the objectives of the geophysical survey were:

- to provide information about the nature and possible interpretation of any magnetic anomalies identified;
- to therefore determine the presence/absence and extent of any buried archaeological features; and
- to prepare a report summarising the results of the survey.

Magnetometer survey

The site grid was laid out using a Trimble VRS differential Global Positioning System (Trimble 5800 model). Bartington Grad601 magnetic gradiometers were used during the survey, taking readings at 0.25m intervals on zig-zag traverses 1.0m apart within 30m by 30m grids, so that 3600 readings were recorded in each grid. These readings were stored in the memory of the instrument and later downloaded to computer for processing and interpretation. Geoplot 3 (Geoscan Research) software was used to process and present the data. Further details are given in Appendix 1.

Reporting

A general site location plan, incorporating the 1:50000 Ordnance Survey (OS) mapping, is shown in Figure 1. A large scale (1:2500) survey location plan, showing the processed data, is provided as Figure 2 with an overall interpretation of the data at the same scale included as Figure 3. The processed and minimally processed data, together with an interpretation of the survey results are presented in Figures 4 to 9 inclusive, at a scale of 1:1000.

Technical information on the equipment used, data processing and survey methodologies are given in Appendix 1 and Appendix 2. Appendix 3 describes the composition and location of the archive. A copy of the OASIS form is in Appendix 4.

The survey methodology, report and any recommendations comply with guidelines outlined by English Heritage (David *et al.* 2008) and by the Chartered Institute for Archaeologists (CIfA 2014). All figures reproduced from Ordnance Survey mapping are with the permission of the controller of Her Majesty's Stationery Office (© Crown copyright).

The figures in this report have been produced following analysis of the data in 'raw' and processed formats and over a range of different display levels. All figures are presented to most suitably display and interpret the data from this site based on the experience and knowledge of Archaeological Services staff.

4 Results and Discussion (see Figures 4 to 9 inclusive)

Generally, the survey has identified a variable magnetic background response within the north and east of the site with less background variation in the south and west. This disparity is attributed to differing land-use and drainage practices. Several anomalies have been identified by the geophysical survey which are discussed below and cross-referenced to specific examples depicted on the interpretative figures, where appropriate.

Ferrous Anomalies

Ferrous anomalies, as individual 'spikes', are typically caused by ferrous (magnetic) material, either on the ground surface or in the plough-soil. Little importance is normally given to such anomalies, unless there is any supporting evidence for an archaeological interpretation, as modern ferrous debris or material is common on rural sites, often being present as a consequence of manuring or tipping/infilling. Generally, there is no obvious pattern or clustering to their distribution on this site to suggest anything other than a random background scatter of ferrous debris in the plough-soil, except within the north of the PDA (Field 1) where the magnetic background is notably elevated. Broad areas of magnetic disturbance, **A**, and dense clusters of 'spikes' are thought to be caused by magnetic material, such as brick, rubble and metal, within the topsoil. No obvious reason for the magnetic disturbance was observed during the survey but it is likely that it is caused by demolition material and ground disturbance relating to the removal of Naird Farm. More localised areas of magnetic disturbance, **B** and **C**, have been identified within the north of Field 2. These may be of interest, perhaps being due to spreads of magnetically enhanced material. However, given the local context and notable magnetic disturbance in Field 1, it is likely that the anomalies are caused by modern deposits.

Dipolar linear anomalies **D** and **E** within Field 1 and Field 3 respectively locate buried pipes. The anomalies are caused by the magnetic materials, such as sand and gravel, used to backfill the pipe trench.

Elsewhere, magnetic disturbance at the perimeters of the fields is caused by ferrous material within or close to the adjacent field boundaries.

Geological Anomalies

Throughout the site discrete low magnitude anomalies (areas of magnetic enhancement) have been identified. These are interpreted as geological in origin and are thought to be caused by variations in the depth and composition of the soils and superficial deposits from which they derive. An increase in the density and frequency of these anomalies can be seen in the south of Field 2. This area, **F**, corresponds to a geological variation between mainly sandstone bedrock, in the west, and the prevailing sandstone, siltstone and mudstone bedrock in the east.

Agricultural Anomalies

Series of parallel linear anomalies within the east of Field 3 and the south of Field 1 are typical of field drains. Within the east of Field 3 the drains manifest in the data in the 'herring-bone' pattern which is typical of modern land improvement practices.

5 Conclusions

No anomalies of archaeological potential have been identified by the geophysical survey. The survey has detected anomalies which reflect the agricultural landscape as depicted on historical Ordnance Survey mapping including series of field drains as well as magnetic disturbance which may be caused by demolition material from Naird Farm, the site of which is located within the north of the proposed development area. These anomalies may be of local historical interest but are not thought to be of any archaeological significance. Consequently, on the basis of the survey, the archaeological potential of the site is considered to be low.

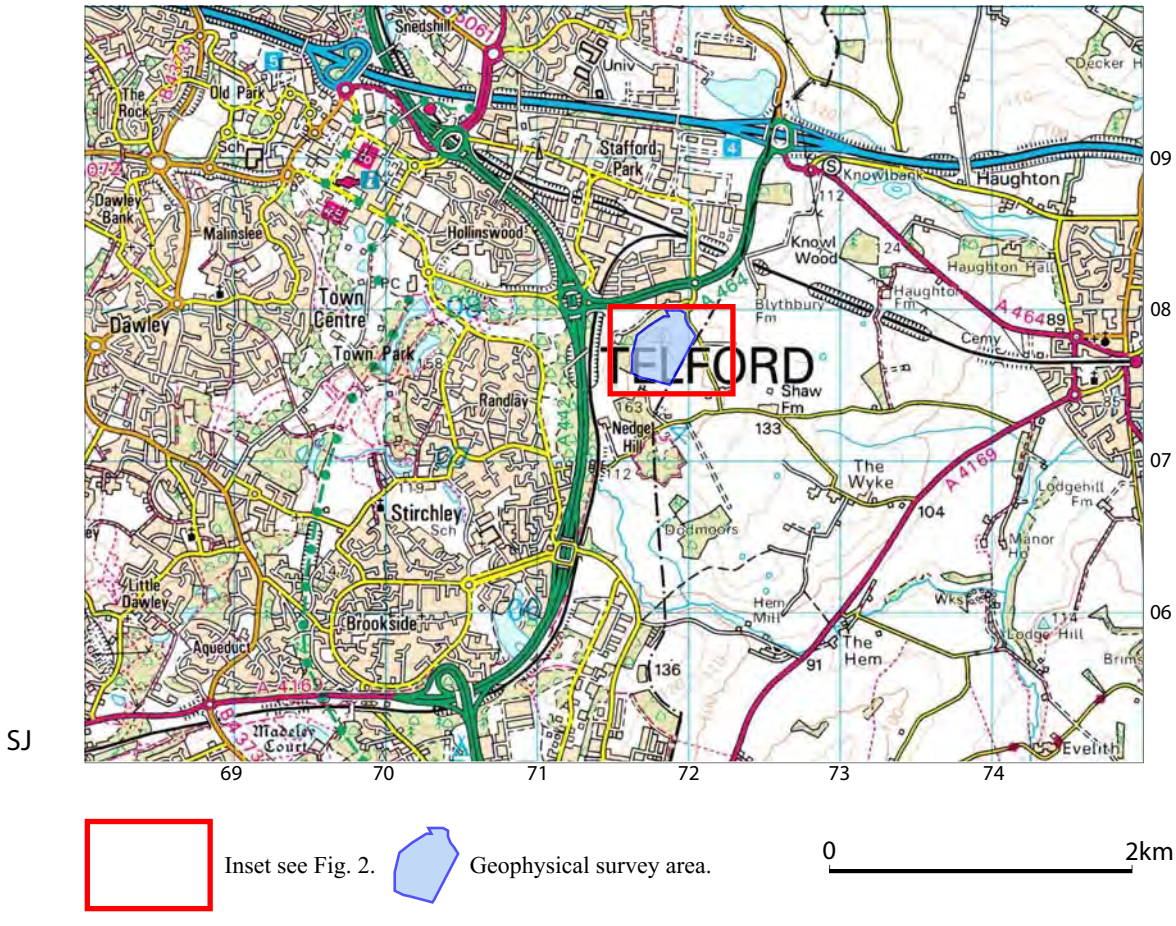


Fig. 1. Site location

	PROPOSED DEVELOPMENT AREA
1	LOCATION AND DIRECTION OF PLATES
	SECTOR BOUNDARY
	AREA UNSUITABLE FOR SURVEY

N

3080 00

SECTOR 1:
SEE FIGS 4-6

FIELD 1

FIELD 2

FIELD 3

SECTOR 2:
SEE FIGS 7-9

FIELD 4

Track

Pond

El Sub Sta

Boro Const & UA Bdy

Co Const & CP Bdy

Und

144.5m

Track

NARD LANE

Track

Pond

Tower

148.7m

Sunnymede Farm

150.9m

Nedge Hill

Track

Reservoir (covered)

Und

2.0

-1.0

nT

3075 00

3715 00

3720 00

0 100m

Archaeological Services W Y A S
PO Box 30, Nepshaw Lane South, Morley, LS27 0UG
Tel: 0113 383 7500 Fax:0113 383 7501

Fig. 2. Survey location showing greyscale magnetometer data (1:2500 @ A3)

SECTOR BOUNDARY

TYPE OF ANOMALY		INTERPRETATION
•	DIPOLAR ISOLATED	FERROUS MATERIAL
●	DIPOLAR ISOLATED	FERROUS MATERIAL
	DIPOLAR LINEAR	SERVICE PIPE
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
	LINEAR TREND	FIELD DRAIN
	LINEAR TREND	GEOLOGY
	MAGNETIC ENHANCEMENT	GEOLOGY

SECTOR 1: SEE FIGS 4-6

SECTOR 2: SEE FIGS 7-9

FIELD 1

FIELD 2

FIELD 3

FIELD 4

A

B

C

D

E

F

Track

Pond

El Sub Sta

Boro Const & UA Bdy

Co Const & CP Bdy

Und

144.5m

NAIRD LANE

Nedge Hill

Tower

148.7m

Sunnymede Farm

Reservoir (covered)

150.9m

N

3080 00

3075 00

3715 00

3720 00

Archaeological Services W Y A S
PO Box 30, Nepshaw Lane South, Morley, LS27 0UG
Tel: 0113 383 7500 Fax:0113 383 7501

0 100m

Fig. 3. Overall interpretation of magnetometer data (1:2500 @ A3)

SECTOR BOUNDARY

N

FIELD 1

FIELD 2

FIELD 3

Pond

2.0

-1.0

nT

3079 00

3077 00

3718 00

3720 00

0 30m

Reproduced from the Ordnance Survey mapping with the permission of the Controller of Her Majesty's Stationery Office. © Crown Copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Digital data supplied by the client, AMECFW, 2015.

Archaeological Services W Y A S
PO Box 30, Nepshaw Lane South, Morley, LS27 0UG
Tel: 0113 383 7500 Fax:0113 383 7501

Fig. 4. Processed greyscale magnetometer data; Sector 1 (1:1000 @ A3)

SECTOR BOUNDARY

N

FIELD 1

FIELD 2

FIELD 3

Pond

3079 00

3077 00

3718 00

3720 00

15.0 nT/cm

0 30m

Archaeological Services W Y A S
PO Box 30, Nepshaw Lane South, Morley, LS27 0UG
Tel: 0113 383 7500 Fax:0113 383 7501

Fig. 5. XY trace plot of minimally processed magnetometer data; Sector 1 (1:1000 @ A3)

— —	SECTOR BOUNDARY

TYPE OF ANOMALY		INTERPRETATION
•	DIPOLAR ISOLATED	FERROUS MATERIAL
●	DIPOLAR ISOLATED	FERROUS MATERIAL
	DIPOLAR LINEAR	SERVICE PIPE
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
	LINEAR TREND	FIELD DRAIN
	MAGNETIC ENHANCEMENT	GEOLOGY

N

FIELD 1

FIELD 2

FIELD 3

A

B

C

D

E

Pond

3079 00

3077 00

3718 00

3720 00

0 30m

Archaeological Services W Y A S
PO Box 30, Nepshaw Lane South, Morley, LS27 0UG
Tel: 0113 383 7500 Fax:0113 383 7501

Fig. 6. Interpretation of magnetometer data; Sector 1 (1:1000 @ A3)

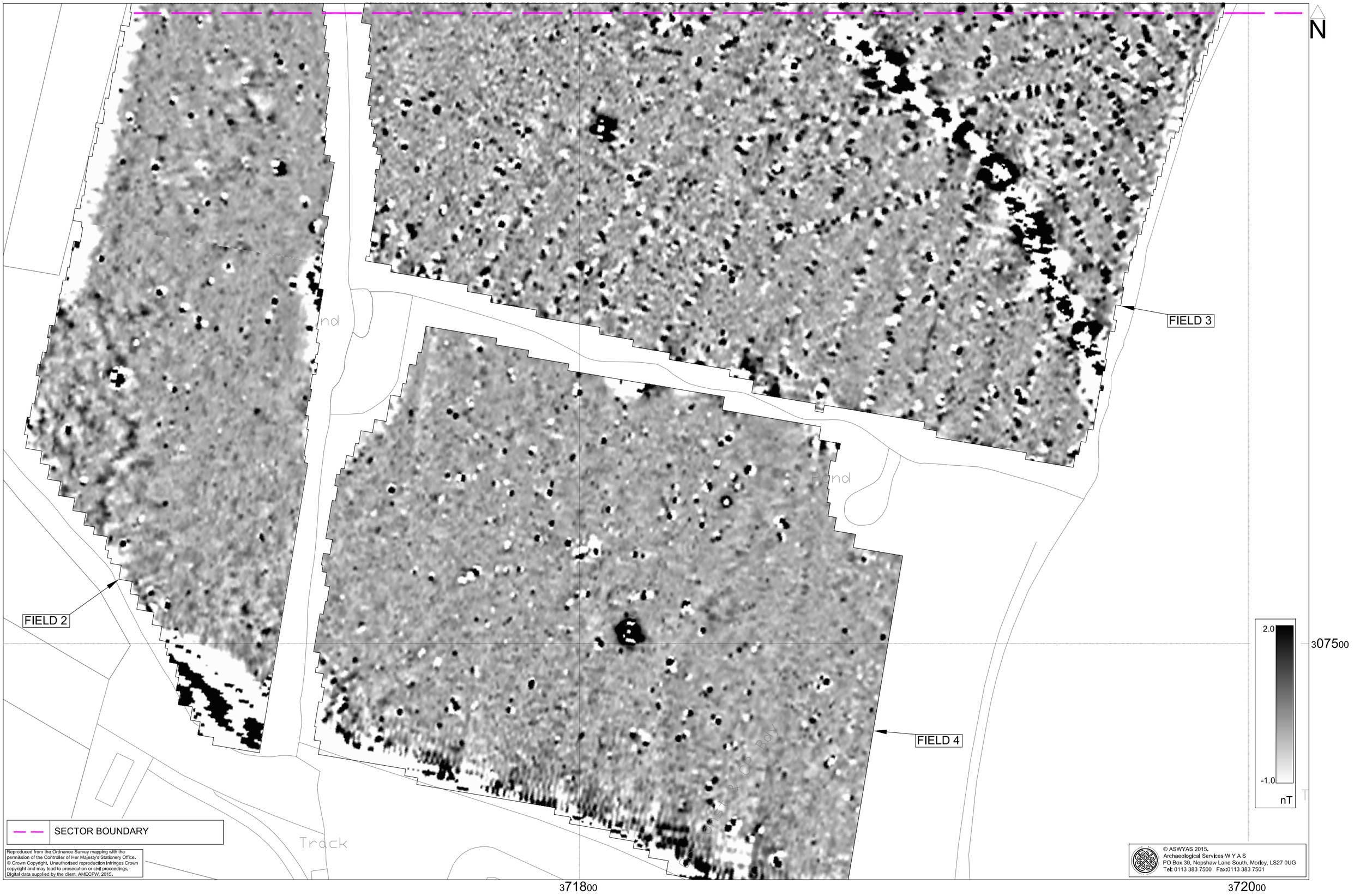


Fig. 7. Processed greyscale magnetometer data; Sector 2 (1:1000 @ A3)

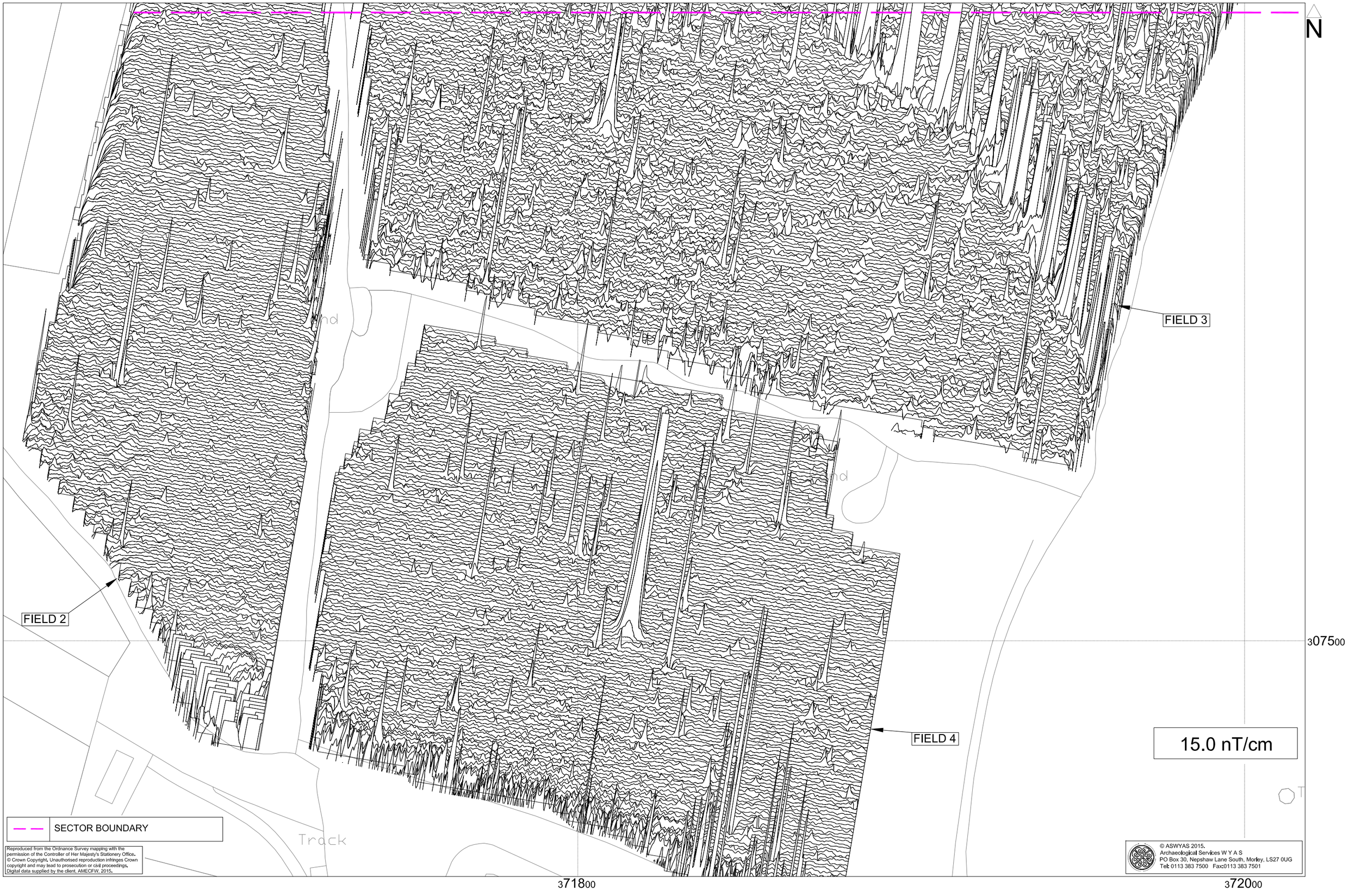
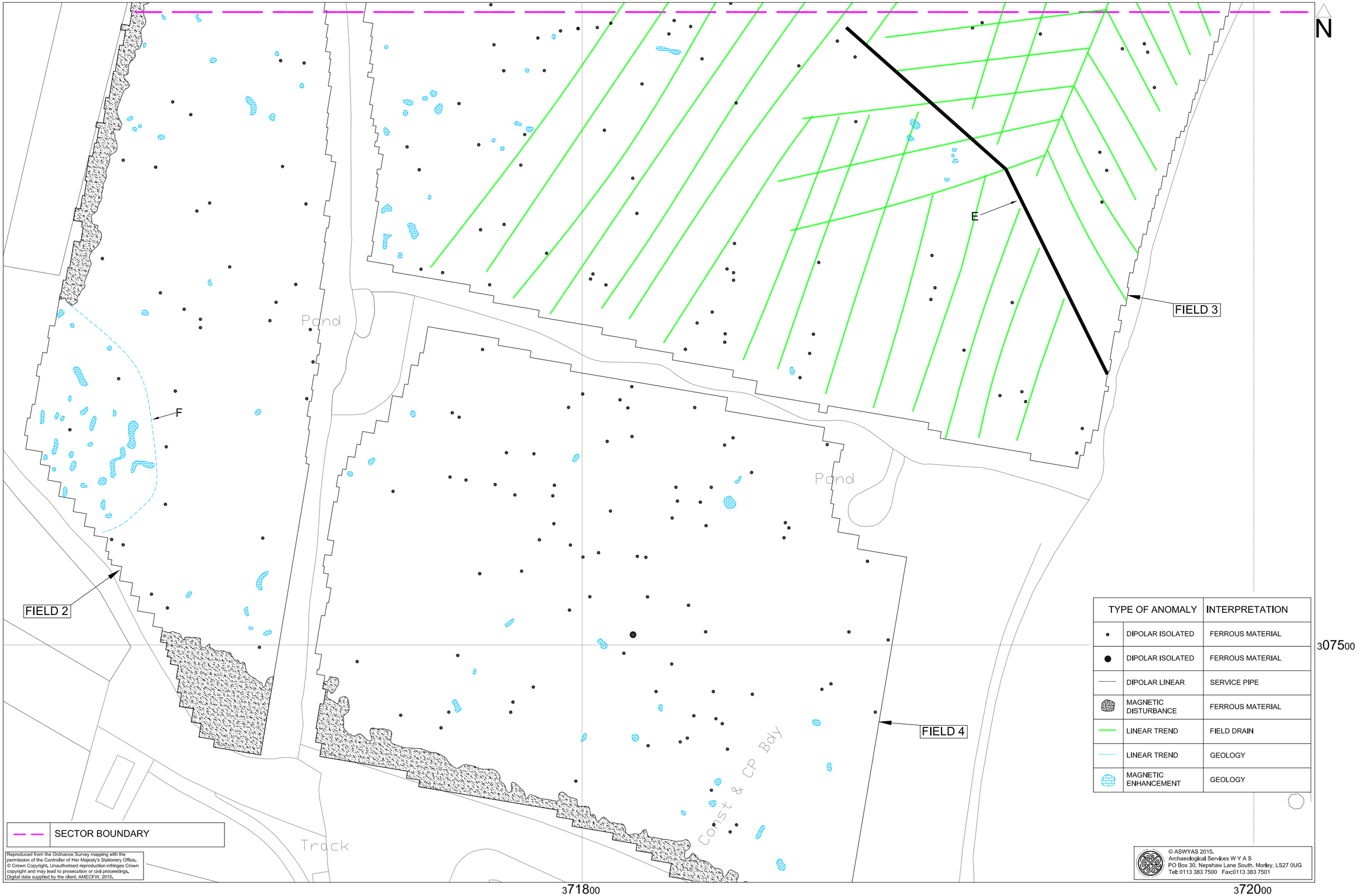


Fig. 8. XY trace plot of minimally processed magnetometer data; Sector 2 (1:1000 @ A3)



Archaeological Services W Y A S
PO Box 30, Nepshaw Lane South, Morley, LS27 0UG
Tel: 0113 383 7500 Fax:0113 383 7501

Fig. 9. Interpretation of magnetometer data; Sector 2 (1:1000 @ A3)

Plate 1. View of area unsuitable for survey within the north of the proposed development area

Plate 2. General view of Field 1, looking south-west

Plate 3. General view of Field 2, looking north

Plate 4. General view of Field 3, looking east

Appendix 1: Magnetic survey - technical information

Magnetic Susceptibility and Soil Magnetism

Iron makes up about 6% of the Earth's crust and is mostly present in soils and rocks as minerals such as maghaemite and haemetite. These minerals have a weak, measurable magnetic property termed magnetic susceptibility. Human activities can redistribute these minerals and change (enhance) others into more magnetic forms. Areas of human occupation or settlement can then be identified by measuring the magnetic susceptibility of the topsoil because of the attendant increase (enhancement) in magnetic susceptibility. If the enhanced material subsequently comes to fill features, such as ditches or pits, localised isolated and linear magnetic anomalies can result whose presence can be detected by a magnetometer (fluxgate gradiometer).

In general, it is the contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of topsoils, subsoils and rocks into which these features have been cut, which causes the most recognisable responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or the bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected. The magnetic susceptibility of a soil can also be enhanced by the application of heat and the fermentation and bacterial effects associated with rubbish decomposition. The area of enhancement is usually quite large, mainly due to the tendency of discard areas to extend beyond the limit of the occupation site itself, and spreading by the plough. An advantage of magnetic susceptibility over magnetometry is that a certain amount of occupational activity will cause the same proportional change in susceptibility, however weakly magnetic is the soil, and so does not depend on the magnetic contrast between the topsoil and deeper layers. Susceptibility survey is therefore able to detect areas of occupation even in the absence of cut features. On the other hand susceptibility survey is more vulnerable to the masking effects of layers of colluvium and alluvium as the technique, using the Bartington system, can generally only measure variation in the first 0.15m of ploughsoil.

Types of Magnetic Anomaly

In the majority of instances anomalies are termed 'positive'. This means that they have a positive magnetic value relative to the magnetic background on any given site. However some features can manifest themselves as 'negative' anomalies that, conversely, means that the response is negative relative to the mean magnetic background.

Where it is not possible to give a probable cause of an observed anomaly a '?' is appended.

It should be noted that anomalies interpreted as modern in origin might be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the feature causing the anomaly.

The types of response mentioned above can be divided into five main categories that are used in the graphical interpretation of the magnetic data:

Isolated dipolar anomalies (iron spikes)

These responses are typically caused by ferrous material either on the surface or in the topsoil. They cause a rapid variation in the magnetic response giving a characteristic 'spiky' trace. Although ferrous archaeological artefacts could produce this type of response, unless there is supporting evidence for an archaeological interpretation, little emphasis is normally given to such anomalies, as modern ferrous objects are common on rural sites, often being present as a consequence of manuring.

Areas of magnetic disturbance

These responses can have several causes often being associated with burnt material, such as slag waste or brick rubble or other strongly magnetised/fired material. Ferrous structures such as pylons, mesh or barbed wire fencing and buried pipes can also cause the same disturbed response. A modern origin is usually assumed unless there is other supporting information.

Linear trend

This is usually a weak or broad linear anomaly of unknown cause or date. These anomalies are often caused by agricultural activity, either ploughing or land drains being a common cause.

Areas of magnetic enhancement/positive isolated anomalies

Areas of enhanced response are characterised by a general increase in the magnetic background over a localised area whilst discrete anomalies are manifest by an increased response (sometimes only visible on an XY trace plot) on two or three successive traverses. In neither instance is there the intense dipolar response characteristic exhibited by an area of magnetic disturbance or of an 'iron spike' anomaly (see above). These anomalies can be caused by infilled discrete archaeological features such as pits or post-holes or by kilns. They can also be caused by pedological variations or by natural infilled features on certain geologies. Ferrous material in the subsoil can also give a similar response. It can often therefore be very difficult to establish an anthropogenic origin without intrusive investigation or other supporting information.

Linear and curvilinear anomalies

Such anomalies have a variety of origins. They may be caused by agricultural practice (recent ploughing trends, earlier ridge and furrow regimes or land drains), natural geomorphological features such as palaeochannels or by infilled archaeological ditches.

Methodology: Gradiometer Survey

The main method of using the fluxgate gradiometer for commercial evaluations is referred to as ***detailed survey*** and requires the surveyor to walk at an even pace carrying the instrument within a grid system. A sample trigger automatically takes readings at predetermined points, typically at 0.25m intervals, on traverses 1m apart. These readings are stored in the memory of the instrument and are later dumped to computer for processing and interpretation.

During this survey a Bartington Grad601 magnetic gradiometer was used taking readings on the 0.1nT range, at 0.25m intervals on zig-zag traverses 0.5m apart within 30m by 30m square grids. The instrument was checked for electronic and mechanical drift at a common point and calibrated as necessary. The drift from zero was not logged.

Data Processing and Presentation

The detailed gradiometer data has been presented in this report in XY trace and greyscale formats. In the former format the data shown is 'raw' with no processing other than grid biasing having been done. The data in the greyscale images has been interpolated and selectively filtered to remove the effects of drift in instrument calibration and other artificial data constructs and to maximise the clarity and interpretability of the archaeological anomalies.

An XY plot presents the data logged on each traverse as a single line with each successive traverse incremented on the Y-axis to produce a 'stacked' plot. A hidden line algorithm has been employed to block out lines behind major 'spikes' and the data has been clipped. The main advantage of this display option is that the full range of data can be viewed, dependent on the clip, so that the 'shape' of individual anomalies can be discerned and potentially archaeological anomalies differentiated from 'iron spikes'. Geoplot 3 software was used to create the XY trace plots.

Geoplot 3 software was used to interpolate the data so that 3600 readings were obtained for each 30m by 30m grid. The same program was used to produce the greyscale images. All greyscale plots are displayed using a linear incremental scale.

The results and subsequent interpretation of data from geophysical surveys should not be treated as an absolute representation of the underlying archaeological and non-archaeological remains. Confirmation of the presence or absence of archaeological remains can only be achieved by direct investigation of sub-surface deposits.

Appendix 2: Survey location information

The site grid was laid out using a Trimble dual frequency Global Positioning System (GPS) with two Rovers (Trimble 5800 models) working in real-time kinetic mode. The accuracy of such equipment was better than 0.02m. However, it should be noted that Ordnance Survey positional accuracy for digital map data has an error of 0.5m for urban and floodplain areas, 1.0m for rural areas and 2.5m for mountain and moorland areas. This potential error must be considered if co-ordinates are measured off for relocation purposes.

Archaeological Services WYAS cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party.

Appendix 3: Geophysical archive

The geophysical archive comprises:-

- an archive disk containing compressed (WinZip 8) files of the raw data, report text (Microsoft Word 2000), and graphics files (Adobe Illustrator CS2 and AutoCAD 2008) files; and
- a full copy of the report.

At present the archive is held by Archaeological Services WYAS although it is anticipated that it may eventually be lodged with the Archaeology Data Service (ADS). Brief details may also be forwarded for inclusion on the English Heritage Geophysical Survey Database after the contents of the report are deemed to be in the public domain (i.e. available for consultation in the Shropshire Historic Environment Record).

Appendix 4: OASIS Form

OASIS DATA COLLECTION FORM: England

List of Projects | Manage Projects | Search Projects | New project | Change your details | HER coverage | Change country | Log out

Printable version

OASIS ID: archaeol11-204478

Project details

Project name	Land at Naird Lane, Telford
Short description of the project	A geophysical (magnetometer) survey covering 12 hectares was carried out on land west of Naird Lane, Telford, prior to the proposed development of the site. No anomalies of archaeological potential have been identified by the survey. Areas of magnetic disturbance within the north of the site may be due to demolition material from the site of Naird Farm. These anomalies may be of local historical interest but are not thought to be of archaeological significance. Consequently, on the basis of the survey, the archaeological potential of the site is considered to be low.
Project dates	Start: 03-02-2015 End: 06-02-2015
Previous/future work	Not known / Not known
Any associated project reference codes	4361 - Contracting Unit No.
Any associated project reference codes	NLT15 - Sitecode
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 4 - Character Undetermined
Monument type	N/A None
Monument type	N/A None
Significant Finds	N/A None
Significant Finds	N/A None
Methods & techniques	"Geophysical Survey"
Development type	Not recorded
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Not known / Not recorded
Solid geology (other)	Enville Member - sandstone, mudstone and siltstone

Drift geology (other)	None
Techniques	Magnetometry

Project location

Country	England
Site location	SHROPSHIRE TELFORD AND WREKIN HOLLINSWOOD AND RANDLAY Land at Naird Lane, Telford
Postcode	TF3 3AH
Study area	12.00 Hectares
Site coordinates	SJ 718 077 52.6659325684 -2.4170329997 52 39 57 N 002 25 01 W Point

Project creators

Name of Organisation	Archaeological Services WYAS
Project brief originator	Cotswold Archaeology
Project design originator	Archaeological Services WYAS
Project director/manager	Harrison, S.
Project supervisor	Schmidt, A.
Type of sponsor/funding body	Developer

Project archives

Physical Archive Exists?	No
Digital Archive Exists?	No
Digital Media available	"Geophysics"
Paper Archive Exists?	No
Paper Media available	"Report"

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Land at Naird Lane, Telford; Geophysical Survey
Author(s)/Editor(s)	Harrison, D.
Other bibliographic details	Report No. 2717
Date	2015
Issuer or publisher	ASWYAS
	Morley

Place of issue or publication	
Description	A4 blue comb-bound report
Entered by	David Harrison (dharrison@aswyas.com)
Entered on	23 February 2015

Bibliography

British Geological Survey, 2015. www.bgs.ac.uk/discoveringGeology/geology OfBritain/viewer.html. (Viewed February 13th 2015)

Chartered Institute for Archaeologists, 2014. *Standard and Guidance for archaeological geophysical survey.* CIfA

David, A., N. Linford, P. Linford and L. Martin, 2008. *Geophysical Survey in Archaeological Field Evaluation: Research and Professional Services Guidelines (2nd edition)* English Heritage

DCLG, 2012. *National Planning Policy Framework*. Department of Communities and Local Government

Harrison, D. 2014. *Land at Naird Lane, Telford, Shropshire: Geophysical Survey Project Design.* Unpublished ASWYAS document

Soil Survey of England and Wales, 1983. *Soil Survey of England and Wales: Soils of Midland and Western England*, Sheet 3