WYAS Archaeological Services

Land at Kingsdown

Swindon

Geophysical Survey

Report no. 3025
September 2015

Client: Persimmon Homes Wessex

West Yorkshire Joint Services

Land at Kingsdown, Swindon

Geophysical Survey

Summary

A geophysical (magnetometer) survey, covering approximately 36.39 hectares, was carried out on agricultural land north of Kingsdown Lane, Swindon prior to the proposed development of the site. Anomalies consistent with former agricultural practice and underlying geological variation have been identified largely to the north of the site. In fields to the south, magnetically enhanced responses, indicative of an enclosure, possibly Iron Age or Romano-British in date has been identified. Overall the archaeological potential of this site is deemed to be low in the north, and medium to the south, with the area around the enclosure deemed to be high.

WYAS
Archaeological Services

Report Information

Client:	Persimmon Homes Wessex
Address:	Verona House, Tetbury Hill, Malmesbury,Wiltshire, SN16 9JR
Report Type:	Geophysical Survey
Location:	Kingsdown, Swindon
County:	Wiltshire
Grid Reference:	SU 16106 90060
Period(s) of activity:	Prehistoric to post medieval
Report Number:	3025
Project Number:	6139
Site Code:	KDS15
OASIS ID:	archaeol11-298488
Planning Application No.:	N/A
Museum Accession No.:	N/A
Date of fieldwork:	September 2015
Date of report:	September 2015
Project Management:	Christopher Sykes BA MSc
Fieldwork:	Christopher Sykes BA MSc MRes
	Mark Evans BSc
	Paul Johnson BSc MSc
	Harvey Tesseyman
	Ross Bishop BA
Report:	Christopher Sykes and Becky Goulding BSc MSc (Dip), David Williams BA MCIfA
Illustrations:	Becky Goulding
Photography:	Paul Johnson
Research:	N/A

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

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1 Introduction

Archaeological Services WYAS (ASWYAS) was commissioned by Matthew Morgan of Environmental Dimension Partnership Ltd on behalf of their client Persimmon Homes Wessex, to undertake a geophysical (magnetometer) survey of approximately 36.39 hectares on land to the south-east of the village of Broad Blunsdon, Swindon. The work was undertaken in order to inform a planning application for the proposed development of the site and in accordance with the National Planning Policy Framework (DCLG 2012), in line with current best practice (CIfA 2014; David *et al*. 2008) and to a Project Design (Sykes 2015) approved by the Client. The survey was carried out during early September 2015 to provide additional information on the archaeological resource of the site.

Site location, topography and land-use

The village of Broad Blunsdon is located approximately 6km to the north of Swindon, centred at SU 16106 90060 (see Fig. 1). The Proposed Development Area (PDA), is located to the south-west of the village covering 16 separate agricultural fields (Fig. 2), bound on its southern edge by Kingsdown Lane, to the north by the B4019, and to the west and east by agricultural land. Fields I – V, and XIII – XVI had been recently sown with winter wheat. Fields VI – VIII were under pasture, whilst Fields IX – XII were being used for the production of silage and were unsurveyable in places due to the height and density of the silage. The PDA lies on a gradual rise of land with Fields I – L located at the bottom of a sloping valley. The northern part of the PDA is located at 139m above Ordnace Datum (aOD) and falling down to 115m aOD at the centre of the site before rising again towards the south.

Soils and geology

The underlying bedrock for the majority of the site comprises limestone of the Stanford Formation, with small areas of (undifferentiated) - Sandstone, Siltstone And Mudstone of the Hazelbury Bryan Formation and Kingston Formation and also mudstone from the Oxford Clay Formation. This small intrusion is located along the centre of the site following the area of low ground and water course. No drift geology is present over the majority of the site although a small band of alluvium is present along the area of the water course (British Geological Survey 2015). The soils in this area are generally in the Sherborne association (343d), characterised as shallow well drained brashy calcareous soils over the limestone geology or from the Evesham 2 association (411b), which are generally located in the lower lying areas of the site and described as slowly permeable calcareous clayey soils (Soil Survey of England and Wales 1983).

2 Archaeological Background

A desk-based assessment by Wessex Archaeology (2007) has detailed the archaeological background of the PDA. This identified the potential for archaeological remains within the PDA to date from the Neolithic to the medieval period. A series of enclosures and linear features identified as cropmarks located *c.* 200m to the south of the surveyed area, were interpreted as dating from the later Bronze Age, Iron Age or Romano-British periods. Along the northern edge of the site, the presence of a number of possible Romano-British buildings and isolated finds of Romano-British date may indicate a focus of Romano-British settlement activity. The course of a major Roman road (Ermin Street) located 550m to the south-west of the PDA, largely follows the course of the A419.

A subsequent survey by Wessex Archaeology (2008), covering 96ha included part of the PDA with additional areas to the north and south. This survey identified evidence for potential archaeological features and refined the cropmark evidence. This included a complex of enclosures and possible field systems, which apparently contained an abundance of anomalies that were interpreted as archaeological in origin. Elsewhere, the survey identified numerous relict field systems and former field boundaries, with good evidence for historic ploughing.

3 Aims and Methodology

Magnetometer survey

The aim of the geophysical survey as described in the Project Design (Sykes 2015) is to, as far as possible, identify the presence or absence, and extent and layout, of buried archaeological remains across the site, through the interpretation of magnetic anomalies identified following the processing of data gathered during the survey.

Magnetic survey methods rely on the ability of a variety of instruments to measure very small magnetic fields associated with buried archaeological remains. Features such as a ditch, pit or kiln can act like a small magnet, or series of magnets, that produce distortions (anomalies) in the Earth's magnetic field. In mapping these slight variations, detailed plans of sites can be obtained as buried features often produce reasonably characteristic anomaly shapes and strengths (Gaffney and Gater 2003). Further information on the types of anomalies is provided in Appendix 1.

On this site Bartington Grad601 magnetic gradiometers were used. These instruments are calibrated to take readings at 0.25m intervals on zig-zag traverses 1m apart within a series of 30m by 30m grids resulting in 3600 readings per 30m grid square. The data are stored in the memory of the instrument before being downloaded to a lap-top computer each day in preparation for data processing and interpretation.

The survey grid was laid out using a Trimble VRS differential Global Positioning System (Trimble TSC3 model) providing an accuracy greater than 0.01m. The locations of the survey grid and anomalies are available as a DXF file. The survey grids were then super-imposed onto a base map provided by the client to produce the displayed block locations. 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 hard copies of the mapping rather than using the digital co-ordinates.

Data processing

The gradiometer data have been presented in this report in XY trace and greyscale formats. In the former format the data shown are 'raw' with no processing other than grid biasing having been done. 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 have 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'. The data in the greyscale images have been interpolated and selectively filtered, using Geoplot 3 (Geoscan Research) software 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.

Presentation

A general site location plan, incorporating the 1:50000 Ordnance Survey (OS) mapping, is shown in Figure 1. Figure 2 shows the extent of the survey areas together with the processed data at a scale of 1:5000. Figure 3 displays an overall interpretation of the site, at a scale of 1:5000. Detailed data plots ('raw' and processed) and interpretative figures are presented at a scale of 1:1250 in Figures 4 to 21 inclusive.

Further information on magnetic survey and characterisation and interpretation of anomaly types is given in Appendix 1. Appendix 2 describes the composition and location of the site archive and Appendix 3 reproduces the OASIS entry.

The survey methodology, report and any recommendations comply with the Project Design (Sykes 2015) and guidelines outlined by English Heritage (David *et al.* 2008) and by the Chartered Institute for Archaeologists (CIfA 2014).

Disclaimers

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.

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.

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

4 Results and Discussion (see Figs 4-21 inclusive)

Ferrous anomalies

Ferrous responses, either as individual 'spike' anomalies or more extensive areas of magnetic disturbance, are typically caused by modern ferrous (magnetic) debris, either on the ground surface or in the plough-soil, or are due to the proximity of magnetic material in field boundaries, buildings or other above ground features. Little importance is normally given to such anomalies, unless there is any supporting evidence for an archaeological interpretation, as ferrous debris or material is common on rural sites, often being present as a consequence of manuring or tipping/infilling. There is no obvious pattern or clustering to their distribution to suggest anything other than a random background scatter of ferrous debris in the plough-soil.

Several linear dipolar anomalies (**A**-**D**) are located throughout the site. With several (**A**) across the northern limits of the survey area and extending into Fields VI and VII (**B**). Further short lengths of similar anomalies are located in the centre (**C**) and southern areas (**D**) of the PDA. All of these anomalies are caused by buried service pipes.

Areas of high magnetic disturbance within Fields I, VIII, XIII, XV and XVI are located along the field edges and relate to the metal fencing forming the fields' boundaries.

Several high magnitude 'spike' responses are noted in Fields IV and V (**E**). These anomalies relate to overhead powerlines and represent the location of telegraph poles. Other anomalies of similar magnitude are also noted across the site (**F**), but do not correspond with any surface features and are therefore likely to be the result of earlier modern disturbance.

There is a cluster of ferrous responses, **G,** in the western side of Field IX. Although they do not appear to be a continuous linear they may represent the course of a buried service pipe or one that has either been removed or repaired with plastic pipe.

Agricultural anomalies

Several former field boundaries have been detected across the survey area. Anomalies **H**, within Fields IV and V appear to correspond with at least one recorded boundary or 1st edition Ordnance Survey mapping and may indicate the field was previously subdivided.

Others linear anomalies (**I-J**) appear to run parallel or close to present field boundaries and could either represent an earlier boundary or even perhaps a plough headland.

A series of vague regular spaced linear trends have been identified within the survey area, specifically within Fields VI to XVI. Many are aligned in parallel with the existing field boundaries and reflect modern ploughing. Within the centre of the site these anomalies are oriented in a roughly north to south direction, with those located in Field XVI oriented in a north-west to south-west direction. The anomalies in Field VI appear to have two separate orientations (north-south and north-west to south-east) and may represent two non-contemporary cultivation regimes or even field drains located at right angels to the ploughing trends.

Geological anomalies

Throughout the survey area numerous broad areas of enhanced magnetic response have been identified. These anomalies increase in frequency on the higher ground to the north perhaps reflecting the underlying limestone bedrock. The anomalies are typically sub-rectangular in appearance and of fairly limited extend, with some forming more sinuous linear or broken linear patterns such as those in Fields XIV and XV.

A distinct area of geological activity has been identified in Fields V and IV, (**M**) which could be an area of former quarrying. The magnetic response is indicative of geological material, yet the more regular linear nature of the anomaly, suggests a form of quarrying, albeit limited in its extent.

Fewer geological anomalies are located on the lower lying areas of the PDA but they also coincide with areas of high density plough trends which could be masking them. All these anomalies are interpreted as being geological in origin, probably caused by variation in the composition of the soils or from the underlying bedrock geology.

Possible archaeological anomalies

Several linear anomalies, **N** and **O**, are identified, in Field XIV and XV. They are located in close proximity to the areas of known archaeology and may form field boundaries associated with the enclosure (**Q**). Anomaly **N** forms a linear feature oriented in a north-south direction

which intersects with a further linear that is oriented east-west. Anomalies **O,** located toward the northern field boundary of Field XV are stronger in magnitude than the plough trends also identified in this field suggesting they further field boundaries of possible archaeological origin.

Due to their location within an enclosed area anomalies **P** are also considered to have archaeological potential and could form features or structures within the enclosure but their magnetic enhancement is very similar to the surrounding geological anomalies and as such a geological origin cannot be ruled out.

Archaeological anomalies

An enclosure (**Q**) located within Field XV forms a roughly rectangular enclosure tapering towards the north, measuring 45m by 40m and enclosing an area of *c.*1900m². A clearly defined entranceway is located along the eastern side of the enclosure. Possible anomalies of archaeological interest have been identified within the enclosure (see above). Collectively these magnetically-enhanced responses indicate an enclosure indicative of the Iron Age/Roman-British period.

Additional anomalies (**R** and **S)**, are located to the east and south of the enclosure. The magnetic signature of the features suggests an archaeological origin, perhaps field boundaries contemporary with these enclosure. The full extent of anomaly **S,** located south of the enclosure is unclear and may have been partly masked by later ploughing.

5 Conclusions

Several anomalies of definite archaeological origin have been identified by the geophysical survey. These are largely confined to Field XV and the immediately surrounding fields and take the form of an Iron Age or Romano-British enclosure and perhaps fragments of associated field systems.

Largely the geophysical survey results and interpretations from this phase of investigation, correspond with the findings from the targeted areas undertaken by Wessex Archaeology in 2008. In places it is clear that changes have occurred within the landscape between the dates of the two surveys. In Field XII (Area 18, WA 2008), for example, the magnetic responses from the ridge and furrow are stronger in the current survey than they were in 2008. Similarly, the complete survey of Fields IV and V allows for a clearer interpretation of anomaly 4011 (Area 8 South, WA 2008) to be made. One difference of interpretation occurs with the magnetic responses that appear around enclosure Q, but generally there is agreement about which magnetic responses are possible archaeology and which reflect geological material.

The survey has also been able to detect a variety of magnetic anomalies, consisting of agricultural, geological and higher magnetite ferrous responses. Modern cultivation and land division has been identified across the site with plough trends strongly within the valley and lower part of the PDA. Geological responses are largely confined to the north and south on areas of higher ground. Overall the archaeological potential of this site is deemed to be low in the north, and medium to the south, with the area around the enclosure deemed to be high.

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.

Appendix 2: 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 CS6 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 Wiltshire Historic Environment Record).

Appendix 3: 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: archaeol11-298488

Project details

Project name	Land at Kingsdown
Short description of the project	A geophysical (magnetometer) survey, covering approximately 36.39 hectares, was carried out on agricultural land north of Kingsdown Lane, Swindon prior to the proposed development of the site. Anomalies consistent with former agricultural practice and underlying geological variation have been identified largely to the north of the site. In fields to the south, magnetically enhanced responses, indicative of an enclosure, possibly Iron Age or Romano-British in date has been identified. Overall the archaeological potential of this site is deemed to be low in the north, and medium to the south, with the area around the enclosure deemed to be high.
Project dates	Start: 01-09-2015 End: 10-09-2015
Previous/future work	No / Not known
Any associated project reference codes	6139 - Contracting Unit No.
Any associated project reference codes	KDS15 - Sitecode
Type of project	Recording project
Site status	None
Current Land use	Cultivated Land 3 - Operations to a depth more than 0.25m
Monument type	NONE None
Significant Finds	NONE None
Investigation type	"Geophysical Survey"
Prompt	National Planning Policy Framework - NPPF
Solid geology (other)	Sandstone, Siltstone And Mudstone of the Hazelbury Bryan Formation and Kingston Formation and also mudstone from the Oxford Clay Formation
Drift geology (other)	No drift geology is present over the majority of the site although a small band of alluvium is present along the area of the water course
Techniques	Magnetometry

Project location

Country	England
Site location	WILTSHIRE SWINDON BLUNSDON ST ANDREW Kingsdown Lane
Study area	36 Hectares
Site coordinates	SU 16106 90060 51.608672198963 -1.767391618645 51 36 31 N 001 46 02 W Point
Height OD / Depth	Min: 115m Max: 139m

Project creators

Name of Organisation	Archaeological Services WYAS
Project brief originator	Environmental Dimension Partnership
Project design originator	ASWYAS
Project director/manager	C. Sykes
Project supervisor	C. Sykes
Type of sponsor/funding body	Developer
Name of sponsor/funding body	Persimmon Homes Wessex

Project archives

Physical Archive Exists?	No
Digital Archive recipient	ASWYAS
Digital Contents	"none"
Digital Media available	"Geophysics"
Paper Archive Exists?	No

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Land at Kingsdown, Swindon: Geophysical Survey
Author(s)/Editor(s)	Sykes, C.
Author(s)/Editor(s)	Goulding, R.
Author(s)/Editor(s)	Williams, D.
Other bibliographic details	ASWYAS Report No.3025
Date	2017

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Description	A4 Paper report
Entered by	zoe horn (zoe.horn@aswyas.com)
Entered on	17 October 2017

OASIS:

Please e-mail Historic England for OASIS help and advice

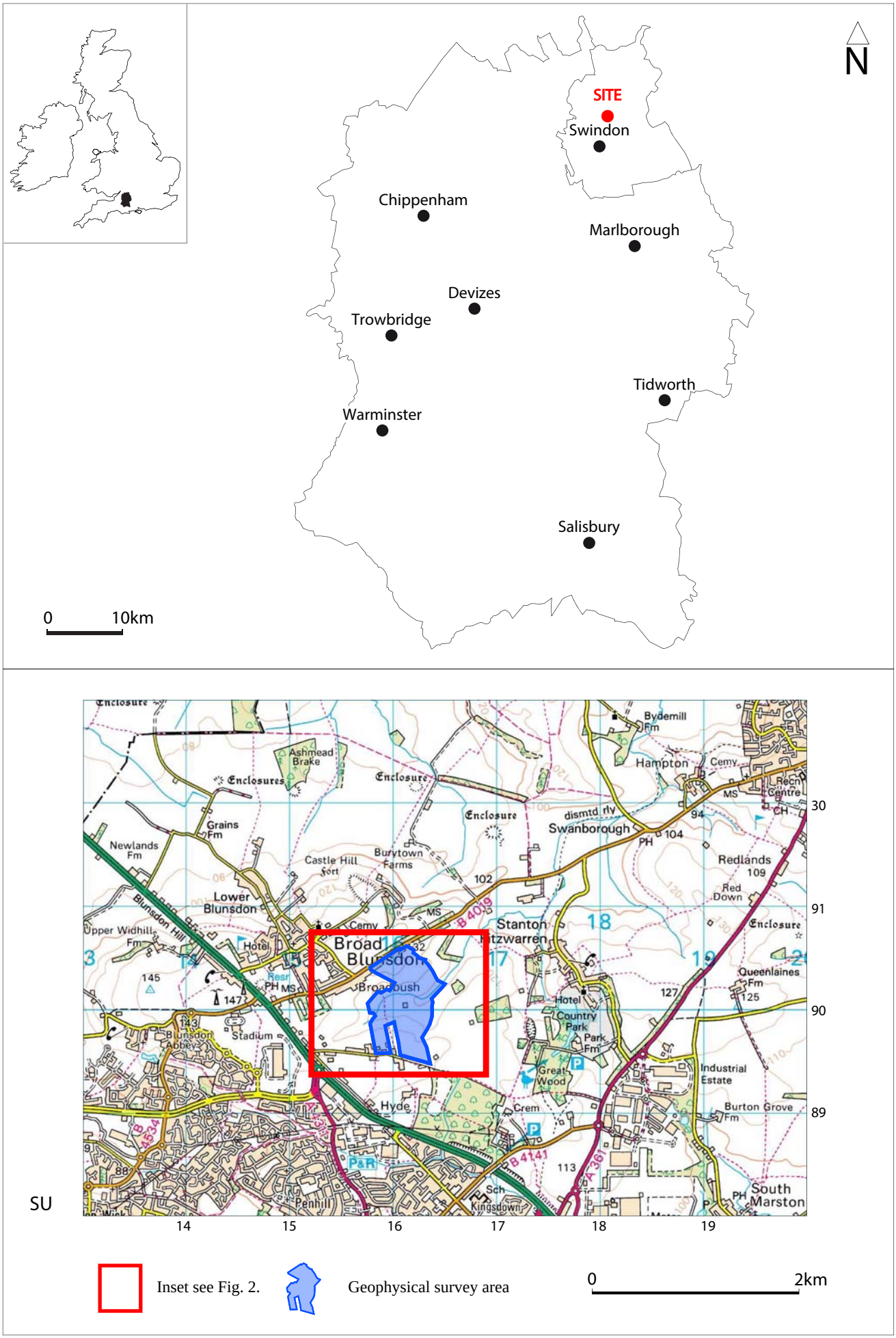

Fig. 1. Site location

	SURVEY BOUNDARY
	SECTOR BOUNDARY
	AREA OF FORMER SURVEY

TYPE OF ANOMALY		INTERPRETATION
•	DIPOLAR ISOLATED	FERROUS MATERIAL
—	DIPOLAR LINEAR	SERVICE PIPE
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
	LINEAR TREND	AGRICULTURAL
	MAGNETIC ENHANCEMENT	GEOLOGY
	MAGNETIC ENHANCEMENT	ARCHAEOLOGY?
	MAGNETIC ENHANCEMENT	ARCHAEOLOGY - DITCH

N

SECTOR 1
SEE FIGS 4-6

SECTOR 2
SEE FIGS 7-9

SECTOR 3
SEE FIGS 10-12

SECTOR 4
SEE FIGS 13-15

SECTOR 5
SEE FIGS 16-18

SECTOR 6
SEE FIGS 19-21

Field I
Field II
Field III
Field IV
Field V
Field VI
Field VII
Field VIII
Field IX
Field X
Field XI
Field XII
Field XIII
Field XIV
Field XV
Field XVI

A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S

190000

416000

417000

0 100m

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Fig. 3. Overall interpretation of magnetometer data and location of previous geophysical survey (1:5000 @ A3)

SURVEY BOUNDARY

SECTOR BOUNDARY

1 LOCATION AND DIRECTION OF PLATES

N

SECTOR 1
SEE FIGS 4-6

SECTOR 2
SEE FIGS 7-9

SECTOR 3
SEE FIGS 10-12

SECTOR 4
SEE FIGS 13-15

SECTOR 5
SEE FIGS 16-18

SECTOR 6
SEE FIGS 19-21

Field I

Field II

Field III

Field IV

Field V

Field VI

Field VII

Field VIII

Field IX

Field X

Field XI

Field XII

Field XIII

Field XIV

Field XV

Field XVI

1

2

3

4

2.0

-1.0

nT

190000

416000

417000

0 100m

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Fig. 2. Survey location showing greyscale magnetometer data (1:5000 @ A3)

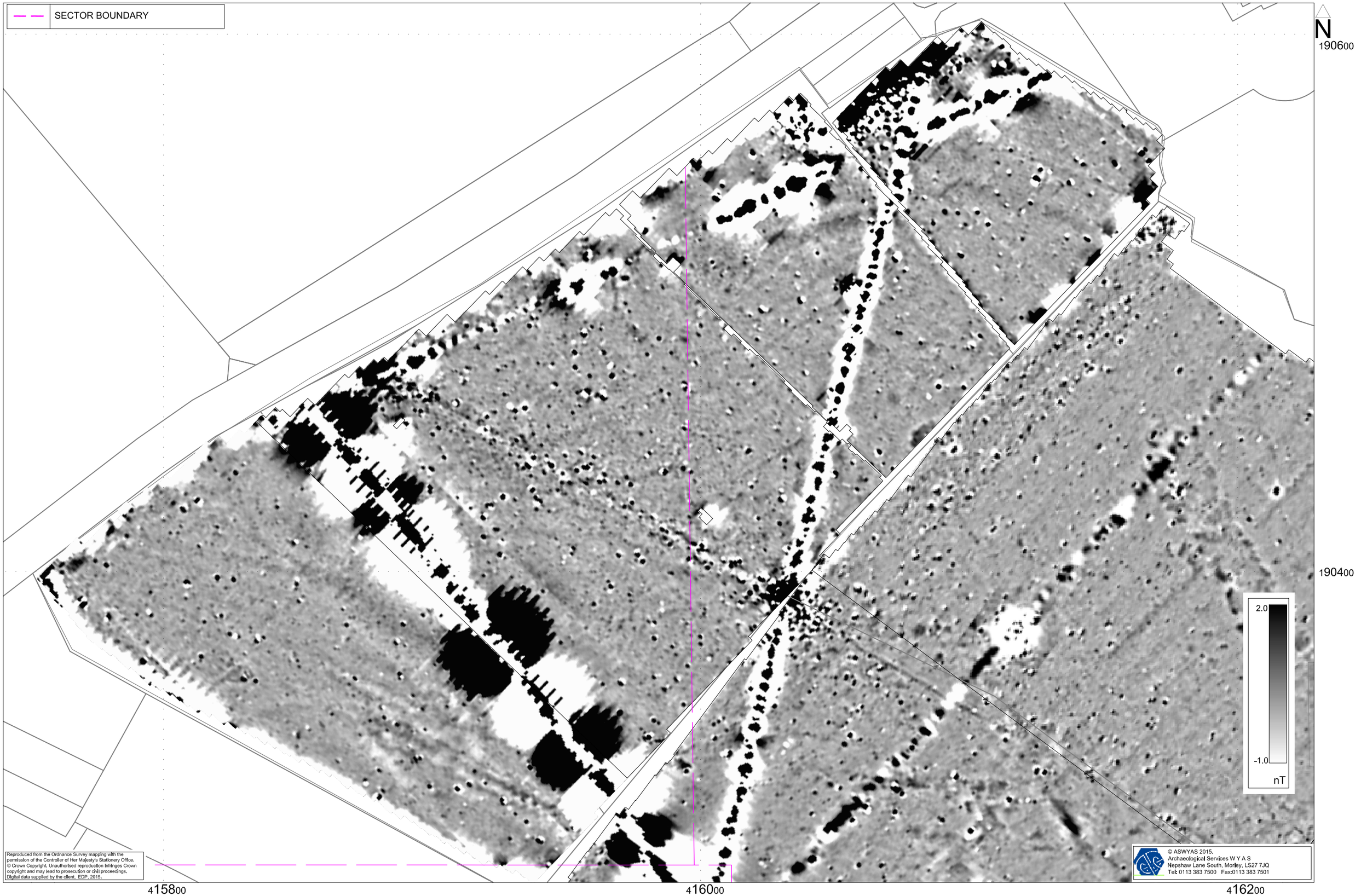

Fig. 4. Processed greyscale magnetometer data; Sector 1 (1:1250 @ A3)

SECTOR BOUNDARY

20.0 nT/cm

N

1906 00

1904 00

4158 00

4160 00

4162 00

0 50m

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Fig. 5. XY trace plot of minimally processed magnetometer data; Sector 1 (1:1250 @ A3)

— —	SECTOR BOUNDARY

TYPE OF ANOMALY		INTERPRETATION
•	DIPOLAR ISOLATED	FERROUS MATERIAL
——	DIPOLAR LINEAR	SERVICE PIPE
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
	MAGNETIC ENHANCEMENT	GEOLOGY
——	LINEAR TREND	AGRICULTURAL

N

190600

190400

415800

416000

416200

A

A

A

A

H

M

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Nepshaw Lane South, Morley, LS27 7JQ
Tel: 0113 383 7500 Fax:0113 383 7501

0 50m

Fig. 6. Interpretation of magnetometer data; Sector 1 (1:1250 @ A3)

SECTOR BOUNDARY

N

190400

190200

2.0

-1.0

nT

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Nepshaw Lane South, Morley, LS27 7JQ
Tel: 0113 383 7500 Fax:0113 383 7501

416000 416200 416400

0 50m

Fig. 7. Processed greyscale magnetometer data; Sector 2 (1:1250 @ A3)

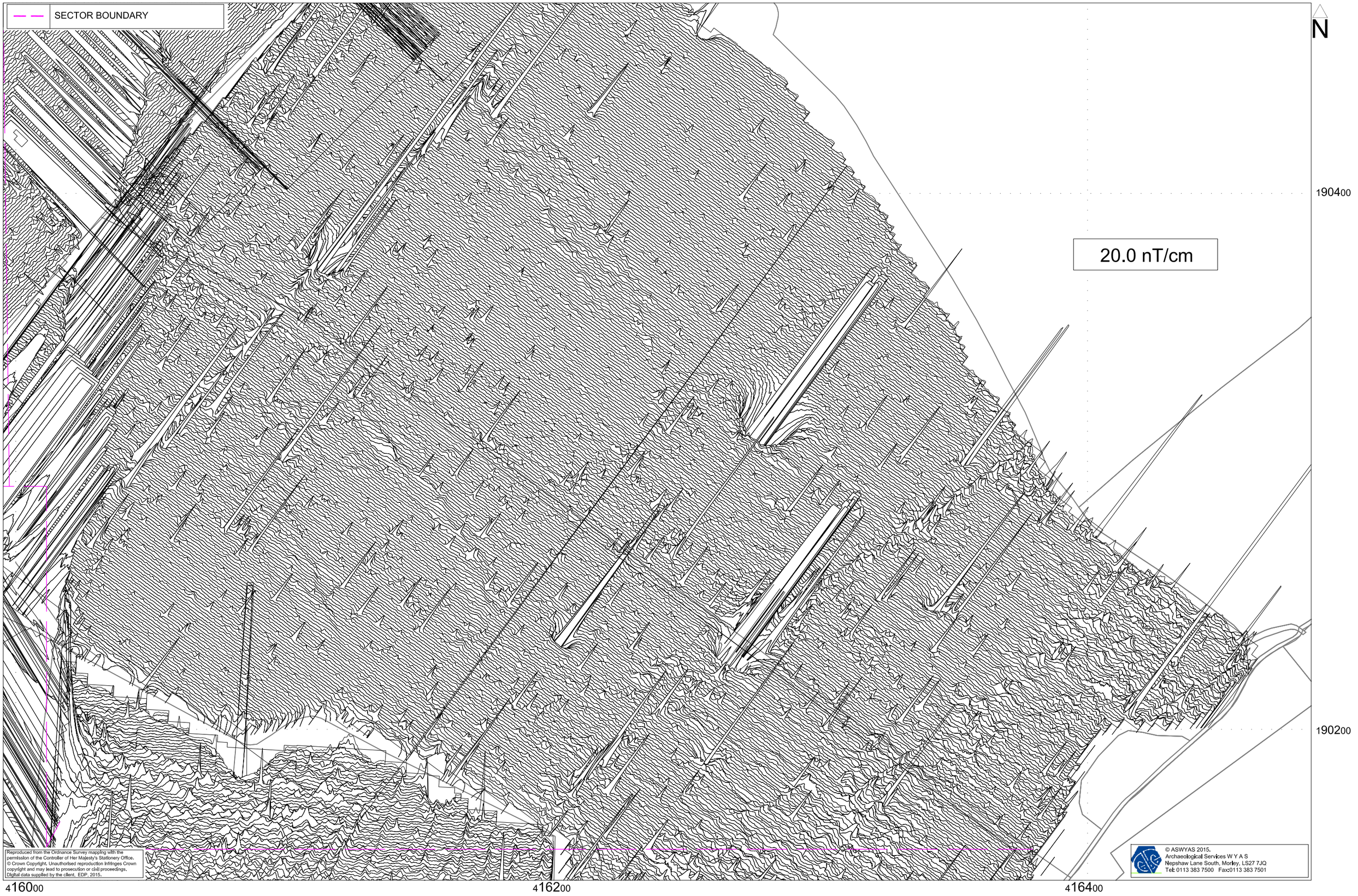

Fig. 8. XY trace plot of minimally processed magnetometer data; Sector 2 (1:1250 @ A3)

SECTOR BOUNDARY

TYPE OF ANOMALY		INTERPRETATION
•	DIPOLAR ISOLATED	FERROUS MATERIAL
—	DIPOLAR LINEAR	SERVICE PIPE
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
	MAGNETIC ENHANCEMENT	GEOLOGY
—	LINEAR TREND	AGRICULTURAL

N

A
A
H
M
H
H
M
M
F
E
E
E
B

1904 00
1902 00

4160 00
4162 00
4164 00

Archaeological Services W Y A S
Nepshaw Lane South, Morley, LS27 7JQ
Tel: 0113 383 7500 Fax:0113 383 7501

0 50m

Fig. 9. Interpretation of magnetometer data; Sector 2 (1:1250 @ A3)

SECTOR BOUNDARY

N

1900 00

2.0

-1.0

nT

Archaeological Services W Y A S
Nepshaw Lane South, Morley, LS27 7JQ
Tel: 0113 383 7500 Fax:0113 383 7501

4160 00 4162 00 4164 00

0 50m

Fig. 10. Processed greyscale magnetometer data; Sector 3 (1:1250 @ A3)

SECTOR BOUNDARY

N

1900 00

20.0 nT/cm

Archaeological Services W Y A S
Nepshaw Lane South, Morley, LS27 7JQ
Tel: 0113 383 7500 Fax:0113 383 7501

4160 00 4162 00 4164 00

0 50m

Fig. 11. XY trace plot of minimally processed magnetometer data; Sector 3 (1:1250 @ A3)

SECTOR BOUNDARY

B

L

N

O

F

N

TYPE OF ANOMALY		INTERPRETATION
•	DIPOLAR ISOLATED	FERROUS MATERIAL
—	DIPOLAR LINEAR	SERVICE PIPE
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
	LINEAR TREND	AGRICULTURAL
	MAGNETIC ENHANCEMENT	GEOLOGY
	MAGNETIC ENHANCEMENT	ARCHAEOLOGY?

1900 00

4160 00

4162 00

4164 00

Archaeological Services W Y A S
Nepshaw Lane South, Morley, LS27 7JQ
Tel: 0113 383 7500 Fax:0113 383 7501

0 50m

Fig. 12. Interpretation of magnetometer data; Sector 3 (1:1250 @ A3)

SECTOR BOUNDARY

N

1898 00

1896 00

2.0

-1.0

nT

4160 00

4162 00

4164 00

0 50m

Archaeological Services W Y A S
Nepshaw Lane South, Morley, LS27 7JQ
Tel: 0113 383 7500 Fax:0113 383 7501

Fig. 13. Processed greyscale magnetometer data; Sector 4 (1:1250 @ A3)

SECTOR BOUNDARY

N

20.0 nT/cm

1898 00

1896 00

4160 00

4162 00

4164 00

0 50m

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Tel: 0113 383 7500 Fax:0113 383 7501

Fig. 14. XY trace plot of minimally processed magnetometer data; Sector 4 (1:1250 @ A3)

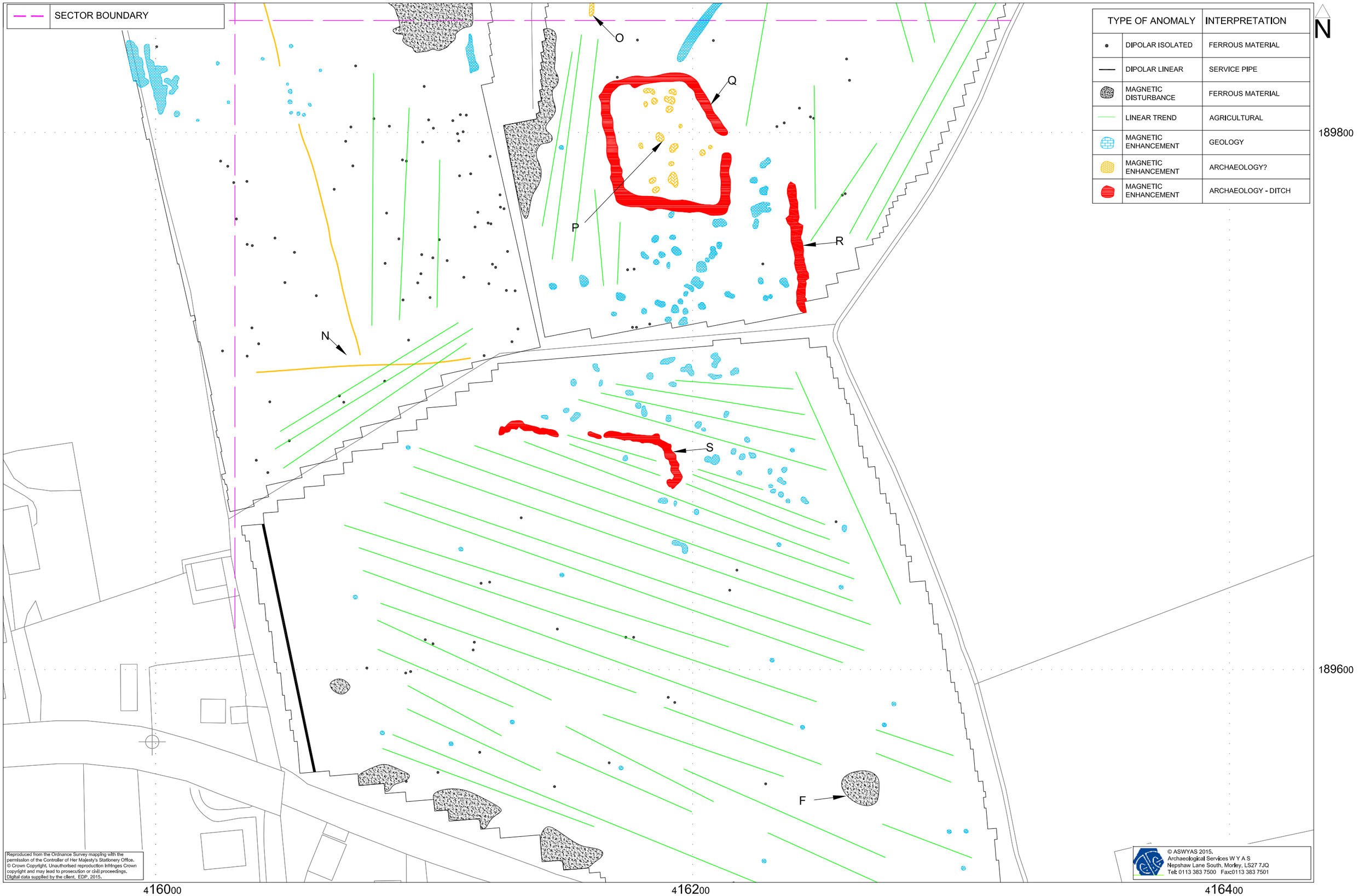

Fig. 15. Interpretation of magnetometer data; Sector 4 (1:1250 @ A3)

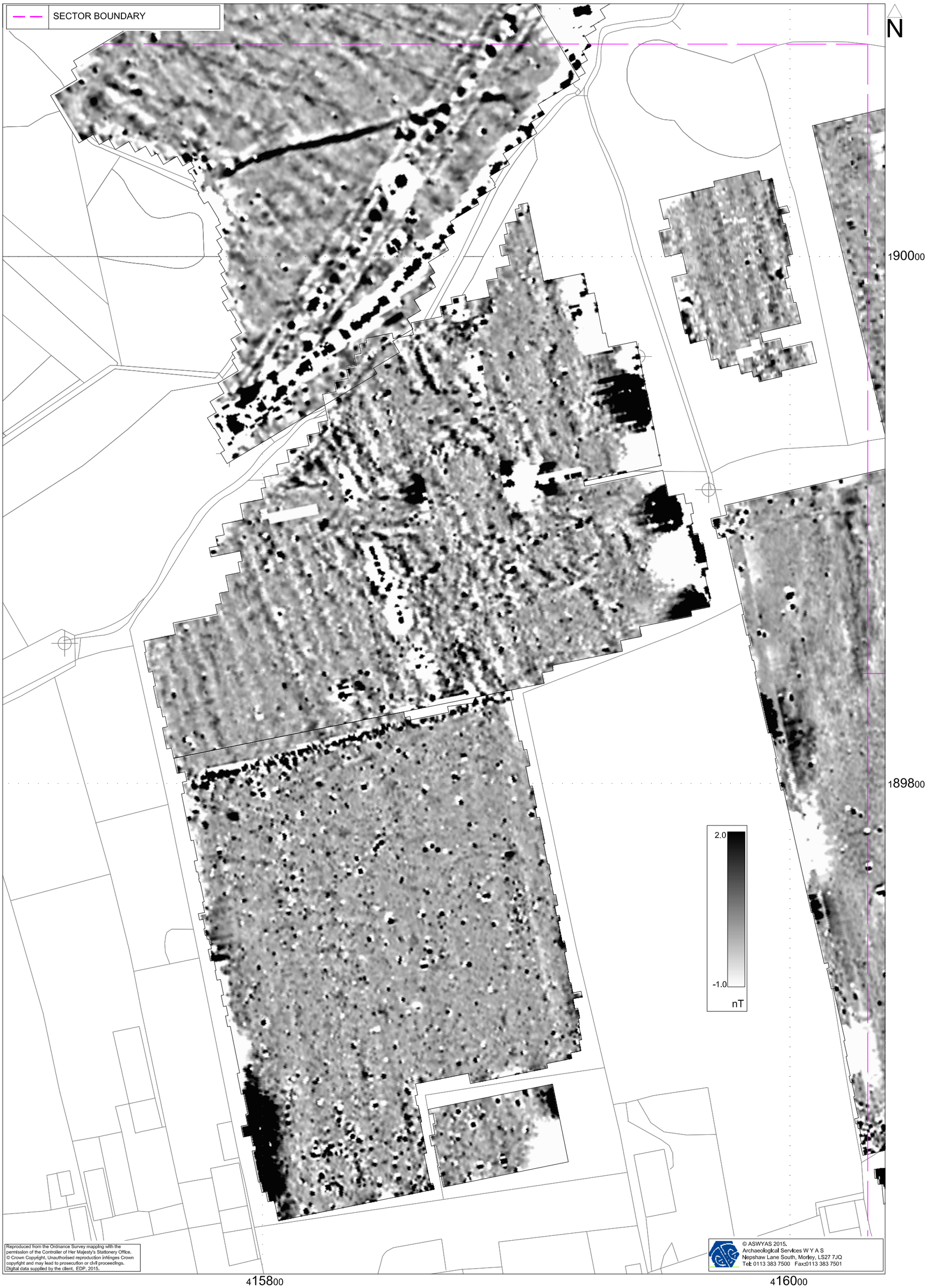

Fig. 16. Processed greyscale magnetometer data: Sector 5 (1:1250 @ A3)

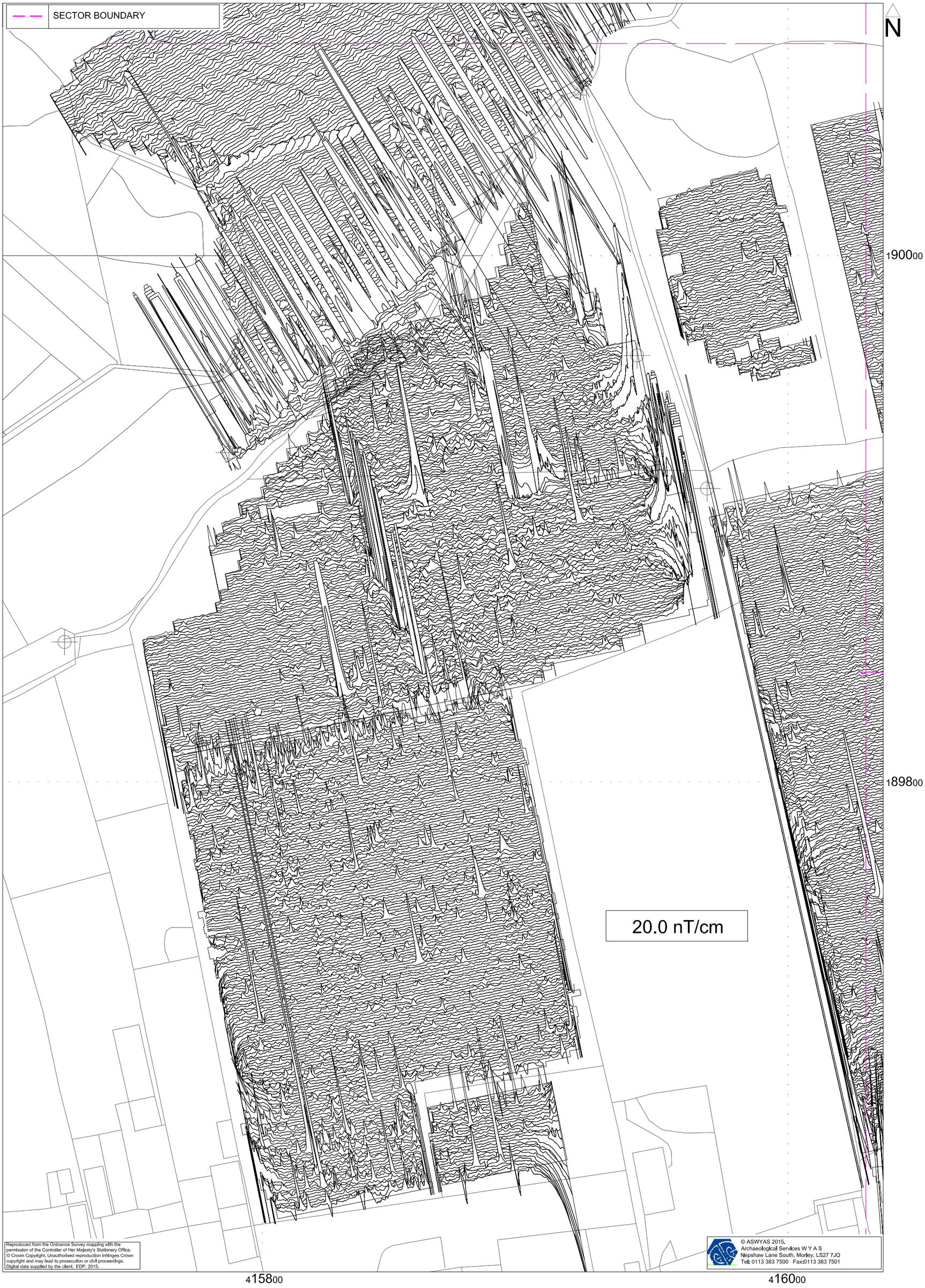

Fig. 17. XY trace plot of minimally processed magnetometer data: Sector 5 (1:1250 @ A3)

SECTOR BOUNDARY

N

I

B

C

J

G

K

1900 00

1898 00

TYPE OF ANOMALY		INTERPRETATION
•	DIPOLAR ISOLATED	FERROUS MATERIAL
—	DIPOLAR LINEAR	SERVICE PIPE
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
—	LINEAR TREND	AGRICULTURAL
	MAGNETIC ENHANCEMENT	GEOLOGY
—	MAGNETIC ENHANCEMENT	ARCHAEOLOGY?

Archaeological Services W Y A S
Nepshaw Lane South, Morley, LS27 7JQ
Tel: 0113 383 7500 Fax:0113 383 7501

4158 00

4160 00

0 50m

Fig. 18. Interpretation of magnetometer data: Sector 5 (1:1250 @ A3)

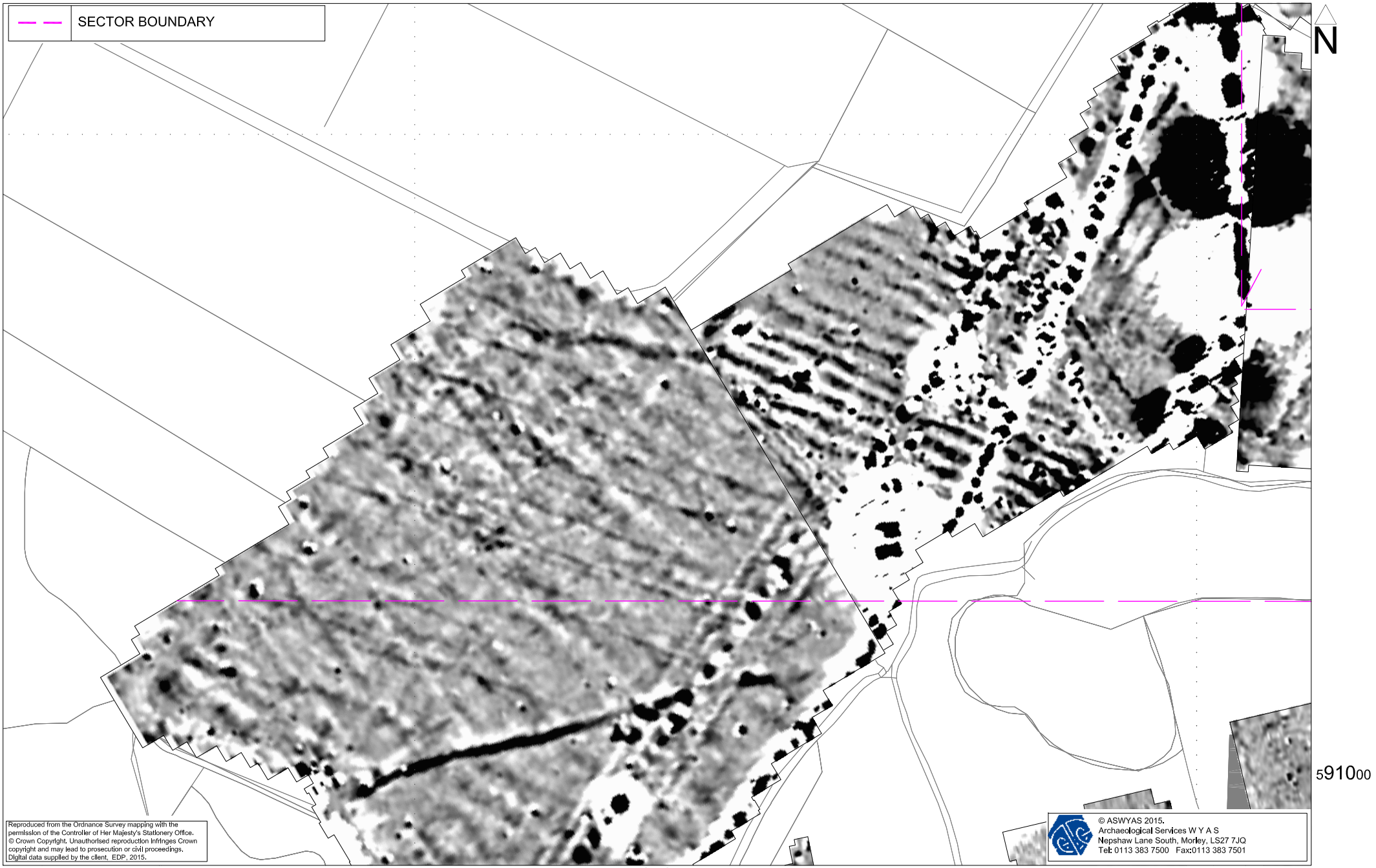

Fig. 19. Processed greyscale magnetometer data; Sector 6 (1:1250@ A4)

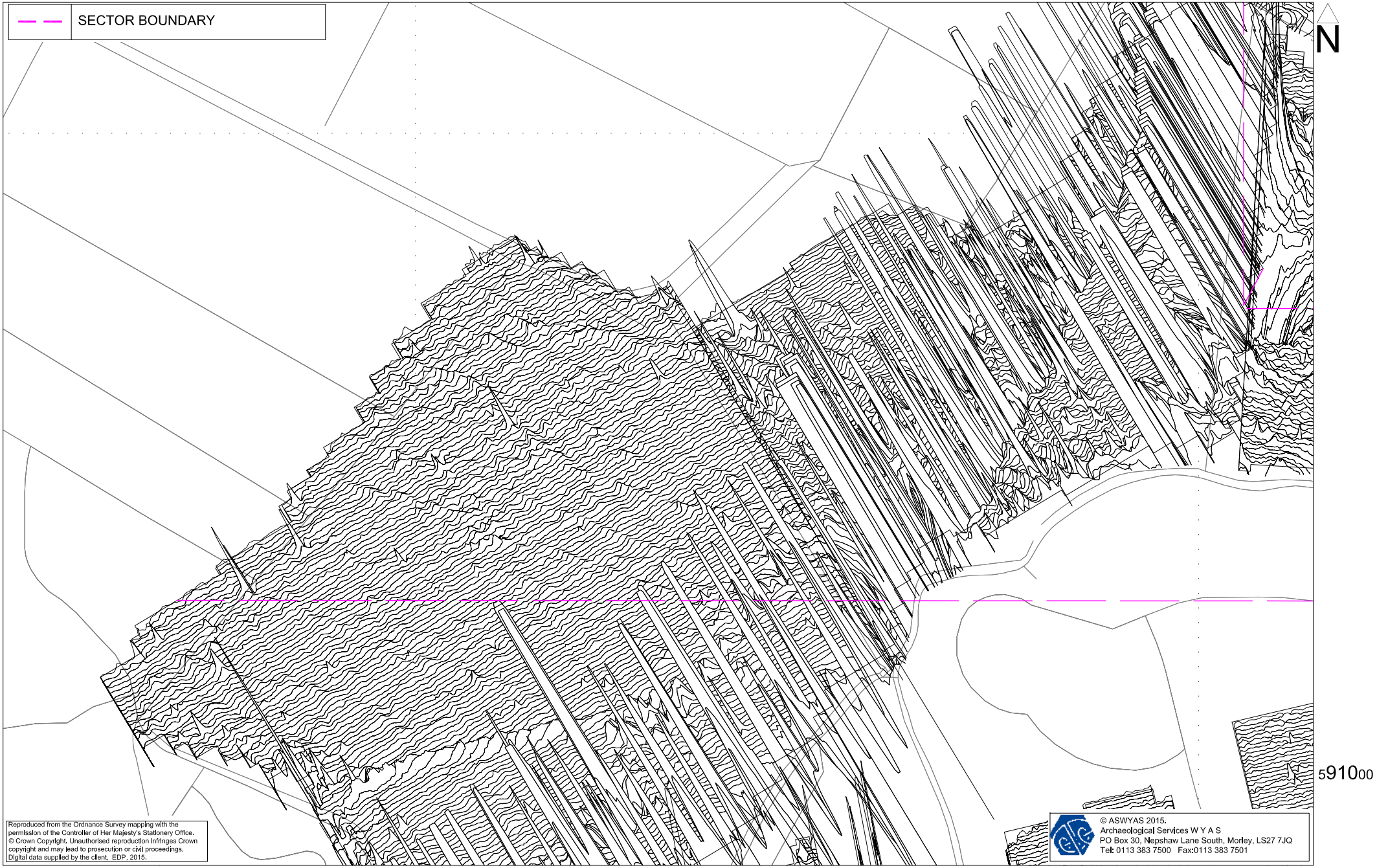

Fig. 20. XY trace plot of minimally processed magnetometer data; Sector 6 (1:1250@ A4)

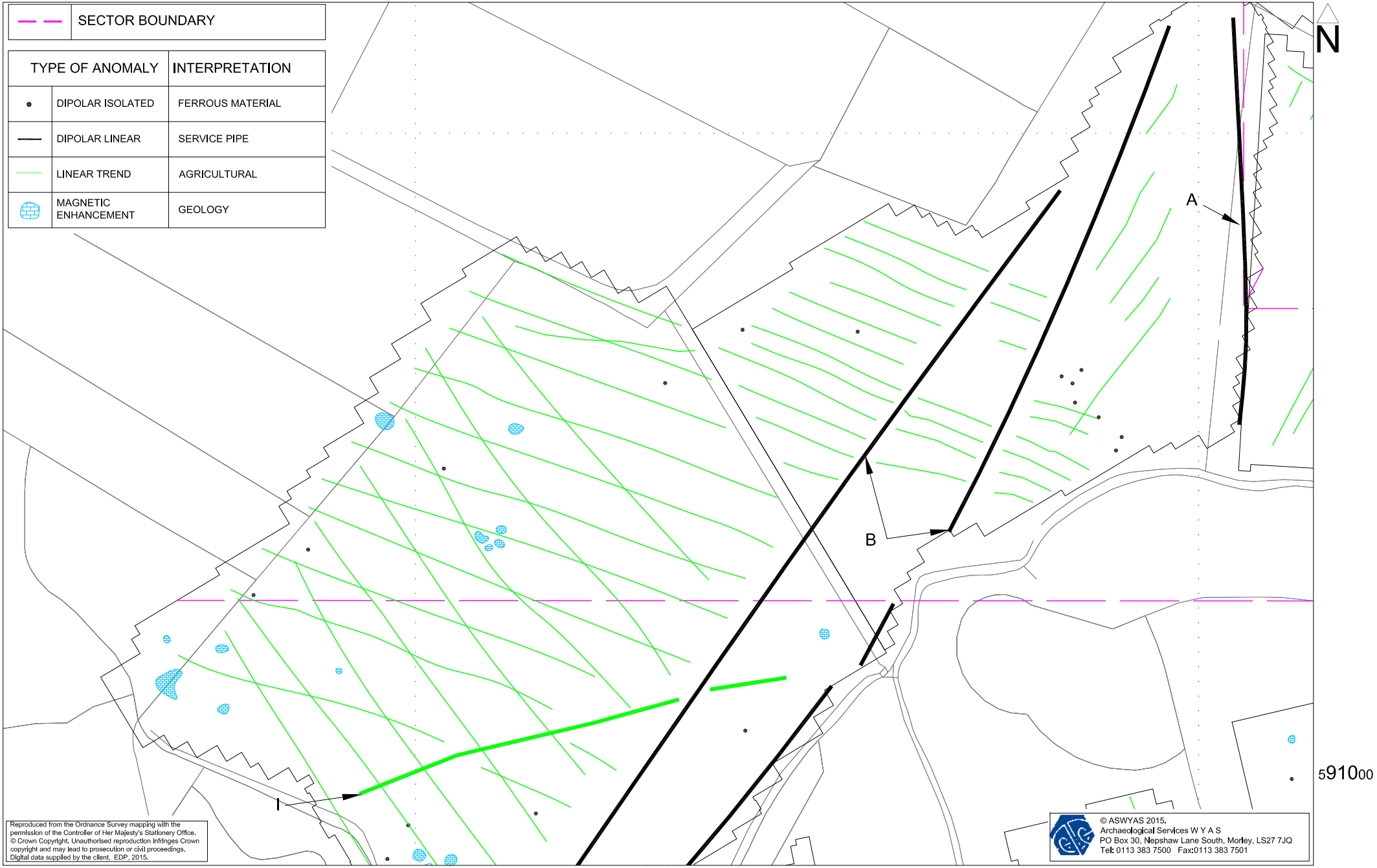

Fig. 21. Interpretation of magnetometer data; Sector 6 (1:1250@ A4)

Plate 1. General view of survey area, Field V, looking south

Plate 2. General view of survey area, Field VIII, looking south-west

Plate 3. General view of survey area,Field XII, looking north-east

Plate 4.General view of survey area, Field XVI, looking north-east

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