ARCHAEOLOGICAL SERVICES WYAS

Rakehill Road
Scholes
Leeds

Geophysical Survey

Report no. 2601

April 2014

Client: Prospect Archaeology Ltd

REGISTERED ORGANISATION IfA

Rakehill Road
Scholes
Leeds

Geophysical Survey

Summary

A geophysical (magnetometer) survey covering approximately 31 hectares was carried out on a block of agricultural land along the eastern edge of the village of Scholes, near Leeds. Anomalies consistent with agricultural activity including ridge and furrow ploughing, field drains and former boundaries have been identified throughout the site. In addition anomalies of possible or probable archaeological origin have also been identified, particularly at the southern end of the site. Some, but not all, of these anomalies, which are interpreted as probable enclosures of presumed late prehistoric/early post-Roman date, have previously been identified as cropmarks. On the basis of the survey, the southern end of the site is considered to have a high archaeological potential but with the majority of the site of moderate to low potential.

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Report Information

Client:	Prospect Archaeology Ltd
Address:	Prospect House, Garden Lane, Sherburn-in-Elmet, Leeds, North Yorkshire, LS25 6AT
Report Type:	Geophysical Survey
Location:	Rakehill Road, Scholes
County:	West Yorkshire
Grid Reference:	SE 381 371
Period(s) of activity:	late prehistoric/early post-Roman?
Report Number:	2601
Project Number:	4188
Site Code:	RRR14
OASIS ID:	archaeol11-177140
Planning Application No.:	
Museum Accession No.:	n/a
Date of fieldwork:	February – March 2014
Date of report:	March 2014
Project Management:	Sam Harrison BSc MSc MIfA
Fieldwork:	Tom Fildes BA
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Photography:	Chris Sykes
Research:	n/a

Authorisation for distribution: --

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1 Introduction

Archaeological Services WYAS (ASWYAS) were commissioned by Nansi Rosenberg of Prospect Archaeology Ltd (The Client), to undertake a geophysical (magnetometer) survey of a block of land on the eastern edge of Scholes, near Leeds (see Fig. 1), prior to the submission of a planning application for the proposed development of the site. The work was undertaken in accordance with a Project Design (Harrison, 2014) supplied to and approved by the Client, with guidance contained within the National Planning Policy Framework (2012) and in line with current best practice (David *et al* 2008). The survey was carried out between February 10th and February 26th 2014 in order to provide additional information on the archaeological potential of the site.

Site location, topography and land-use

The Proposed Development Area (PDA) is situated on the eastern periphery of Scholes, centred at SE 381 371, to the immediate north and south of Rakehill Road. Residential properties back on to the site along the western perimeter (see Fig. 2) with agricultural land to the east. Stockheld Lane borders the site to the north-east with Main Street forming the southern limit. Rake Beck forms a natural boundary between fields at the northern end of the site whilst Carr Beck forms part of the eastern edge of the site.

Rakehill Road is the highest point within the PDA at approximately 109m above Ordnance Datum (aOD) with the land sloping down to 100m aOD at Rake Beck before rising gently towards the northern site boundary. The land also slopes gradually to the south of the road being 101m aOD at Main Street. The PDA comprises fifteen fields, mostly under permanent pasture (eg Plate 1 and Plate 2) with some arable cultivation (see Plates 5, 6 and 11). The arable fields were waterlogged. One small parcel of land was unsuitable for survey (see Plate 12).

Soils and geology

The underlying bedrock comprises Pennine Lower Coal Measures Formation (mudstone, siltstone and sandstone) overlain by superficial deposits of Harrogate Till Formation comprised of clay, sand and gravel. A band of head (clay, silt, sand and gravel) is recorded adjacent to Rake Beck, to the north of the site (British Geological Survey 2014).

The majority of the site is covered by soils classified in the Dunkeswick association. These soils are characterised as slowly permeable, seasonally waterlogged fine loams (Soil Survey of England and Wales 1983). However, to the south of the site the soils are classified in the Rivington 1 association which comprise well-drained coarse loams over sandstone.

2 Archaeological Background

No detailed archaeological background is available at the time of writing. However, analysis of air photographs by the Lower Wharfedale Mapping Programme has identified a number of cropmarks (see Fig. 2) of archaeological potential. These appear to be indicative of enclosures and linear boundaries of presumed late prehistoric or early Roman date.

3 Aims, Methodology and Presentation

The main aim of the geophysical survey was to provide sufficient information to enable an assessment to be made of the impact of potential sub-surface archaeological remains and for further evaluation or mitigation proposals, if appropriate, to be recommended. To achieve this aim a magnetometer survey covering all available parts of the PDA was carried out.

The general 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 1m 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. Figure 2 is a large scale (1:5000) location plan displaying the processed magnetic data and cropmark detail. Figure 3 is an overall data interpretation plot, also at 1:5000. Detailed data plots ('raw' and processed) and full interpretative figures are presented at a scale of 1:1000 in Figures 4 to 21 inclusive.

Further technical information on the equipment used, data processing and survey methodologies is given in Appendix 1 and Appendix 2. Appendix 3 describes the composition and location of the site archive.

The survey methodology, report and any recommendations comply with the Project Design (Harrison 2013) and guidelines outlined by English Heritage (David *et al* 2008) and by the Institute for Archaeologists (IfA 2013). 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 Figs 4 to 21 inclusive)

The magnetic background across the site varies considerably. In areas where there are relatively few linear anomalies, such as the north-eastern quarter of Field 15 or Field 7 the background is relatively homogenous resulting in a uniform grey tone to the data plot. However, in Field 5 the magnetic background is extremely variable giving the data plot a speckled appearance. Against this variable background numerous anomalies have been identified throughout the site which fall into a number of different types and categories according to their origin. These types/categories are discussed below and cross-referenced to specific examples and locations within the site, where appropriate.

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. Throughout the PDA individual iron 'spike' anomalies are common but there is no obvious pattern or clustering to their distribution to suggest anything other than a random background scatter of ferrous debris in the soil. There does appear to be a greater density of these anomalies in Field 5 but here it is considered likely that many of these responses may be due to the presence of magnetic gravels within the superficial head deposits found in this part of the site.

Areas of disturbance around the periphery of the PDA and between fields are due to ferrous material forming part of, or incorporated into, the adjacent field boundaries, or to the proximity of buildings/structures.

A single high magnitude linear anomaly, **A**, running east/west across Field 4 is caused by a sub-surface pipe.

Modern Anomalies

Several anomalies have been identified by the survey which correspond to features depicted on historic Ordnance Survey mapping. The most obvious of these are the three clusters of high magnitude linear anomalies, **B**, **C** and **D**, in Field 8. All these anomalies are associated with the use of this field previously as a cricket ground; anomaly **B** is caused by the sub-surface remains of the pavilion, **C**, probably locates footings for the nets whilst **D** locates the former square.

Agricultural Anomalies

Historical mapping shows that the division and layout of fields within the PDA has remained largely unchanged since the publication of the first edition map. In the northern half of the site a north/south boundary has been removed that previously divided Field 5. No anomaly corresponding with this former feature is identified in the data set but a series of parallel linear ploughing trend anomalies all terminate to the west along a line that correlates with the former boundary.

At the southern end of the site four former boundaries, **E**, **F**, **G** and **I**, recorded on the first edition Ordnance Survey, are identified as linear anomalies. The alignment of anomaly **G**, if extended to the east, correlates with a linear anomaly, **H**. This anomaly is also interpreted as a former, but unmapped, boundary.

The data recorded within all the fields and former fields at the southern end of the site are dominated by linear trend anomalies aligned north/south, with the exception of in Field 8 where they are aligned south-west/north-east. These slightly curving trends are due to the medieval and post-medieval agricultural practice of ridge and furrow cultivation. The anomalies are due to the magnetic contrast between the now soil-filled furrows and the former ridges. Other ridge and furrow anomalies, aligned north-west/south-east are also identified at the northern end of the site in Fields 1, 2, 3 and 4.

At the northern end of the site, in Field 2 and Field 3, more regularly spaced and straighter linear anomalies aligned west/east are caused by a system of field drains feeding into a ditch that forms the boundary between the two fields.

Three other individual linear anomalies, **J**, **K** and **L**, are identified, none of which align with current or former boundaries. Nor do they align with any of the ploughing anomalies. Whilst an archaeological origin cannot be discounted, on balance they are considered more likely to also have an agricultural origin, probably drains.

Geological anomalies

Discrete anomalies, characterised as localised areas of enhanced magnetic response, are noted at certain locations across the site, particularly close to the eastern site boundary, such as in Field 15. These anomalies are interpreted as geological in origin being due to the variation in composition of the upper soil horizons.

A notable cluster is identified to the east of Field 6 where vague curvilinear anomalies appear to contain the cluster of enhanced responses. These curvilinear anomalies also manifest as cropmarks (see Fig. 2). However, they are not considered to be of archaeological significance.

Archaeological and ?Archaeological anomalies

Even against the extremely strong magnetic response caused by the ridge and furrow ploughing, anomalies of archaeological potential have been identified at the southern end of the site.

In Field 13 a small square enclosure, about 25m by 25m, is identified as anomaly **M**. The density and strength of the ridge and furrow anomalies, which are on virtually the same alignment, means that it is impossible to determine whether there are any discrete anomalies within the enclosure which might indicate settlement activity.

Two hundred metres to the south-east, in Field 15, a series of linear anomalies, **N**, locate infilled ditch features which define a large rectangular enclosure with internal partitions in the south-eastern corner of the site. Other linear anomalies indicative of ditches extend to the west and south-west of the enclosure, beyond the site boundary. Most of these anomalies were previously identified as cropmarks but the survey has added further detail.

In the south-western corner of the site in Field 11, discontinuous linear anomalies, **O**, may define two sides of another enclosure. However, here magnetic disturbance around the field edges and the magnitude of the ridge and furrow anomalies makes interpretation difficult.

At the eastern edge of Field 8 curvilinear anomaly, **P**, might also locate part of another enclosure although an archaeological interpretation here is far from certain.

A faint and fragmented curvilinear anomaly, **Q**, is identified within the south-east of Field 15 on an east/west alignment. The anomaly is located 50m north-east of rectangular enclosure, **N**, and therefore an archaeological origin is possible. However, there is no clear definition to the anomaly and a geological interpretation is also plausible.

In the south-western corner of Field 5 another very poorly defined rectilinear anomaly, **R**, is identified. Again an archaeological origin is considered possible and this anomaly also correlates with a cropmark (see Fig. 2).

5 Conclusions

The geophysical survey has clearly demonstrated that there are surviving sub-surface archaeological remains within the PDA including two different types of enclosure. The smaller of the two enclosures was not previously known while the other has been identified as a cropmark, although in this case the survey has provided greater resolution and more detail. Several other anomalies of possible archaeological potential (enclosures?) have also been identified but the anomalies are either very low magnitude or fragmentary, making a confident interpretation difficult. Cropmark evidence does support an archaeological origin in one of these instances, although cropmarks to the immediate south of Rakehill Road appear to be geological in origin. To the south of the site the data is dominated by very strong anomalies caused by ridge and furrow cultivation. On the basis of the geophysical survey, the archaeological potential at the southern end of the site is considered to be high and moderate to low elsewhere.

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.

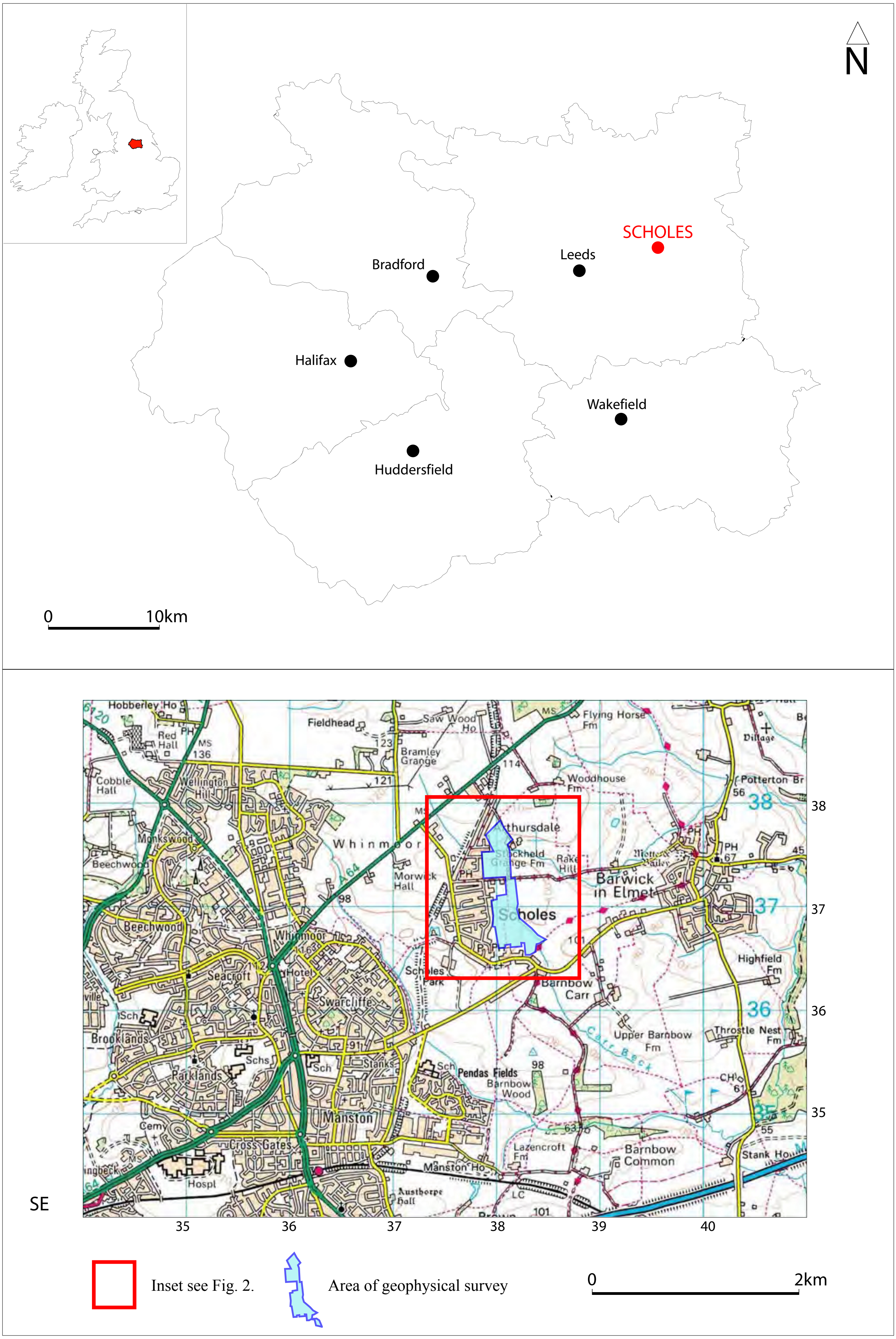

Fig. 1. Site location

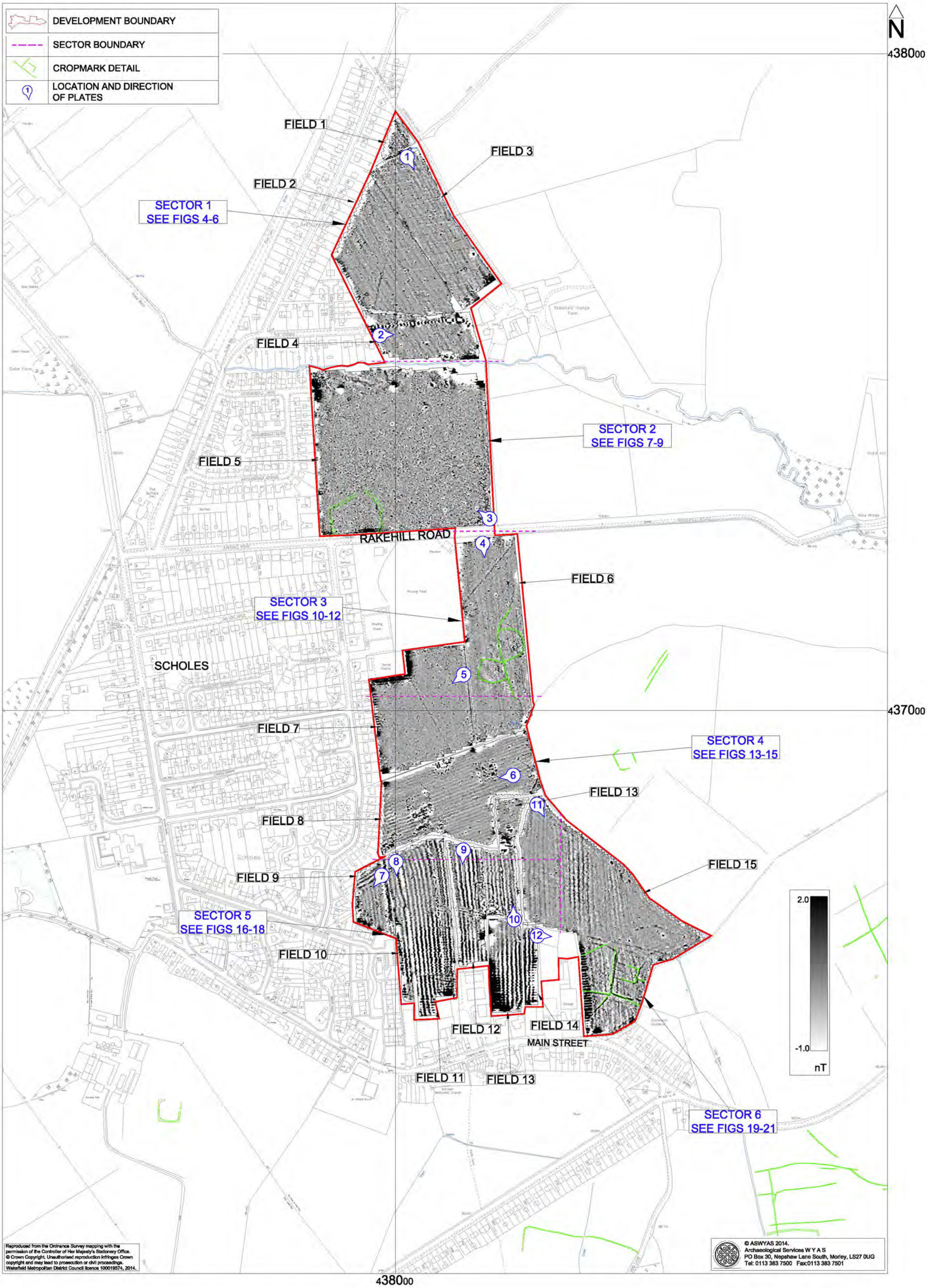

Fig. 2. Site location showing greyscale magnetometer data (1:5000 @ A3)

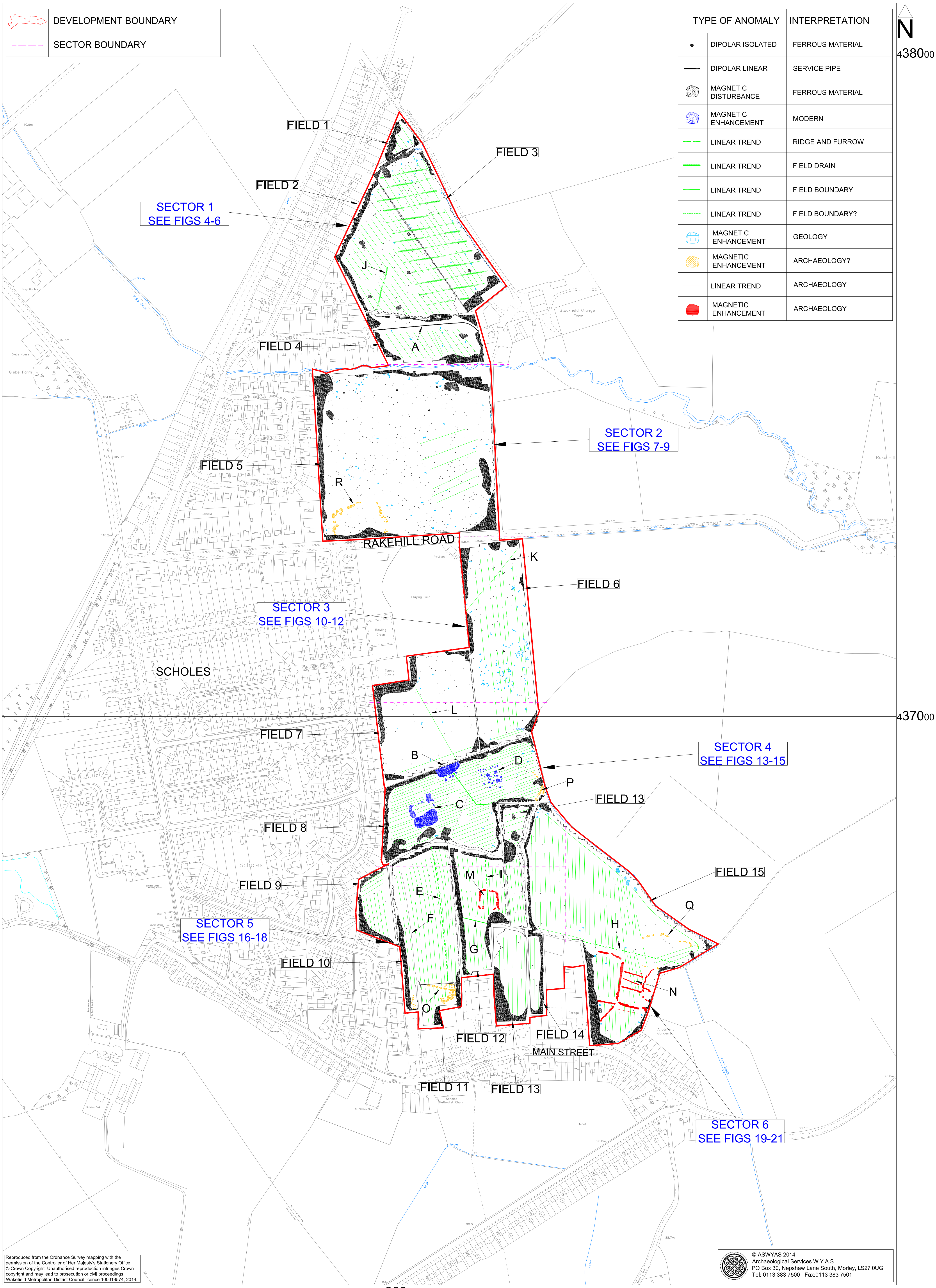

Fig. 3. Overall interpretation of magnetometer data (1:5000 @ A3)

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

0 20m

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

0 20m

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

0 20m

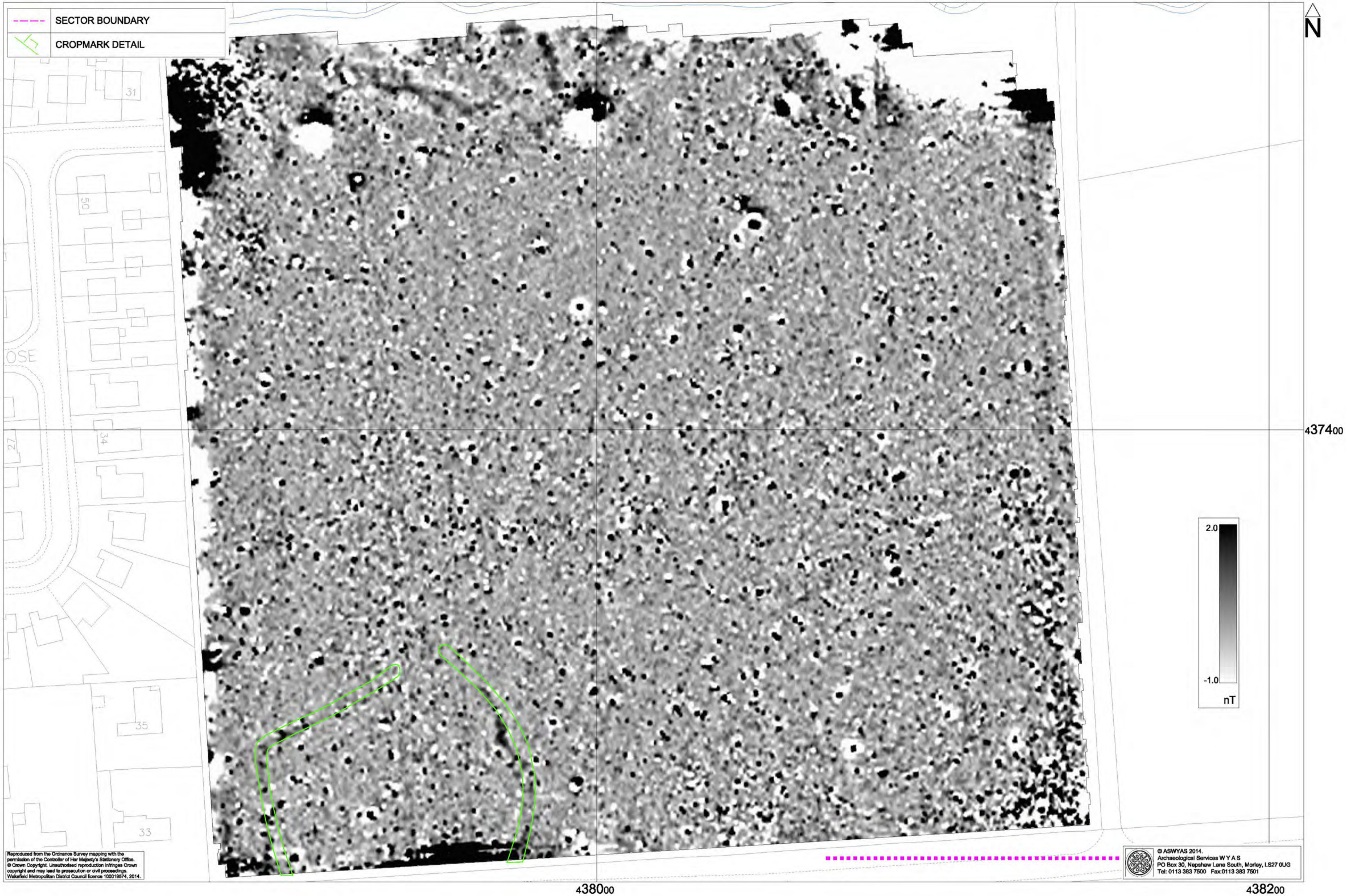

Fig. 7. Processed greyscale magnetometer data; Sector 2 (1:1000 @ A3)

0 20m

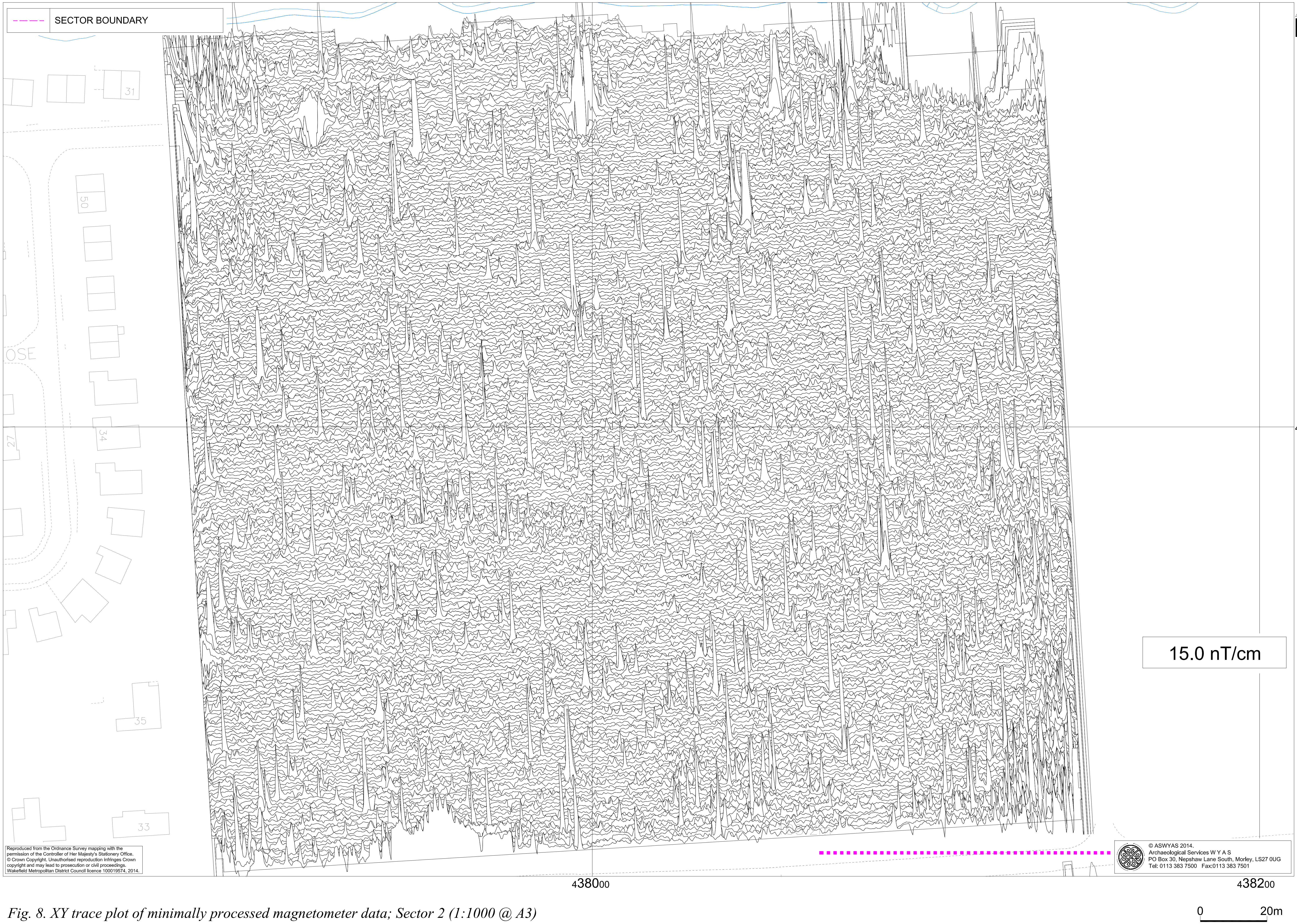

Fig. 8. XY trace plot of minimally processed magnetometer data; Sector 2 (1:1000 @ A3)

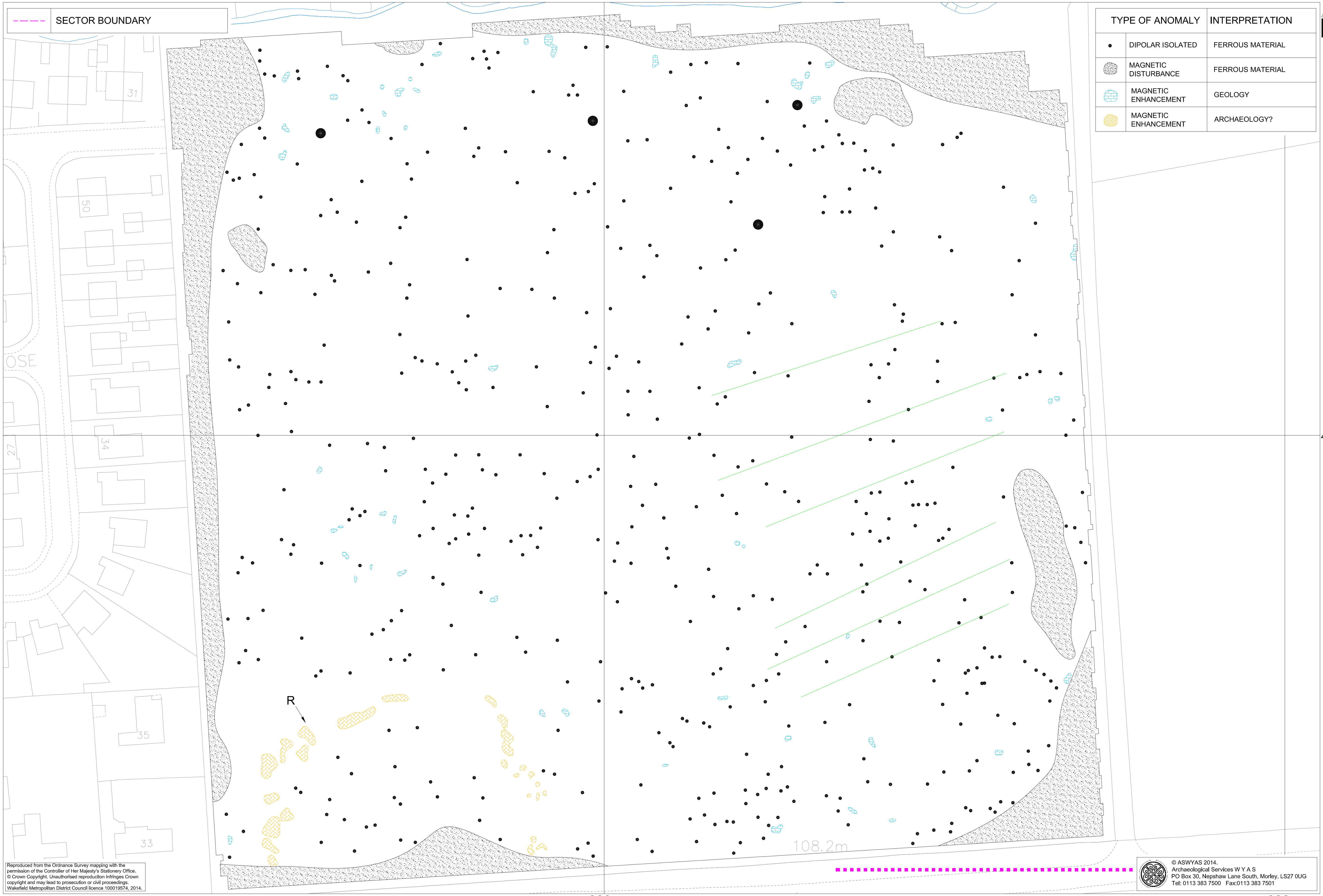

Fig. 9. Interpretation of magnetometer data; Sector 2 (1:1000 @ A3)

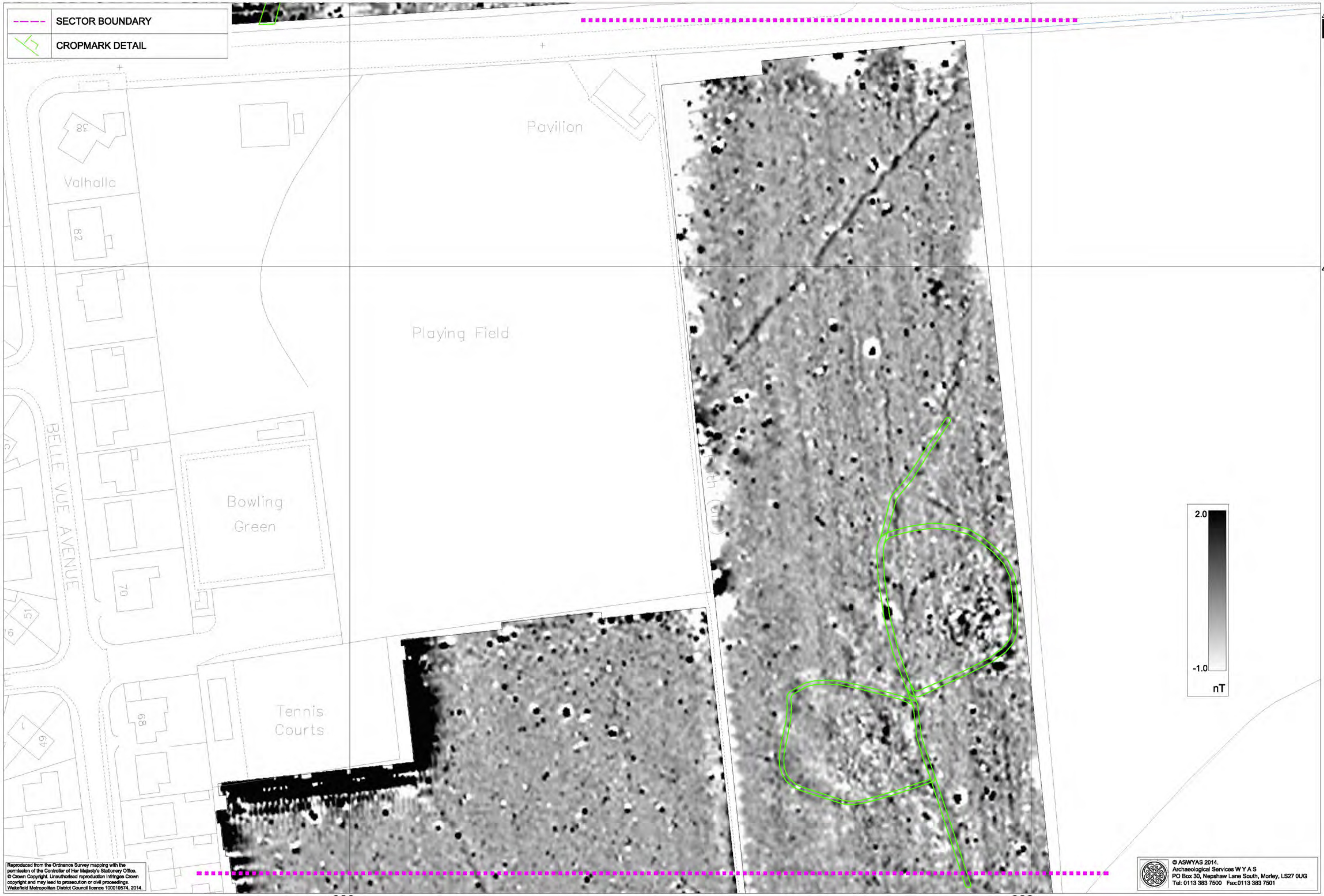

Fig. 10. Processed greyscale magnetometer data; Sector 3 (1:1000 @ A3)

0 20m

Fig. 11. XY trace plot of minimally processed magnetometer data; Sector 3 (1:1000 @ A3)

Fig. 12. Interpretation of magnetometer data; Sector 3 (1:1000 @ A3)

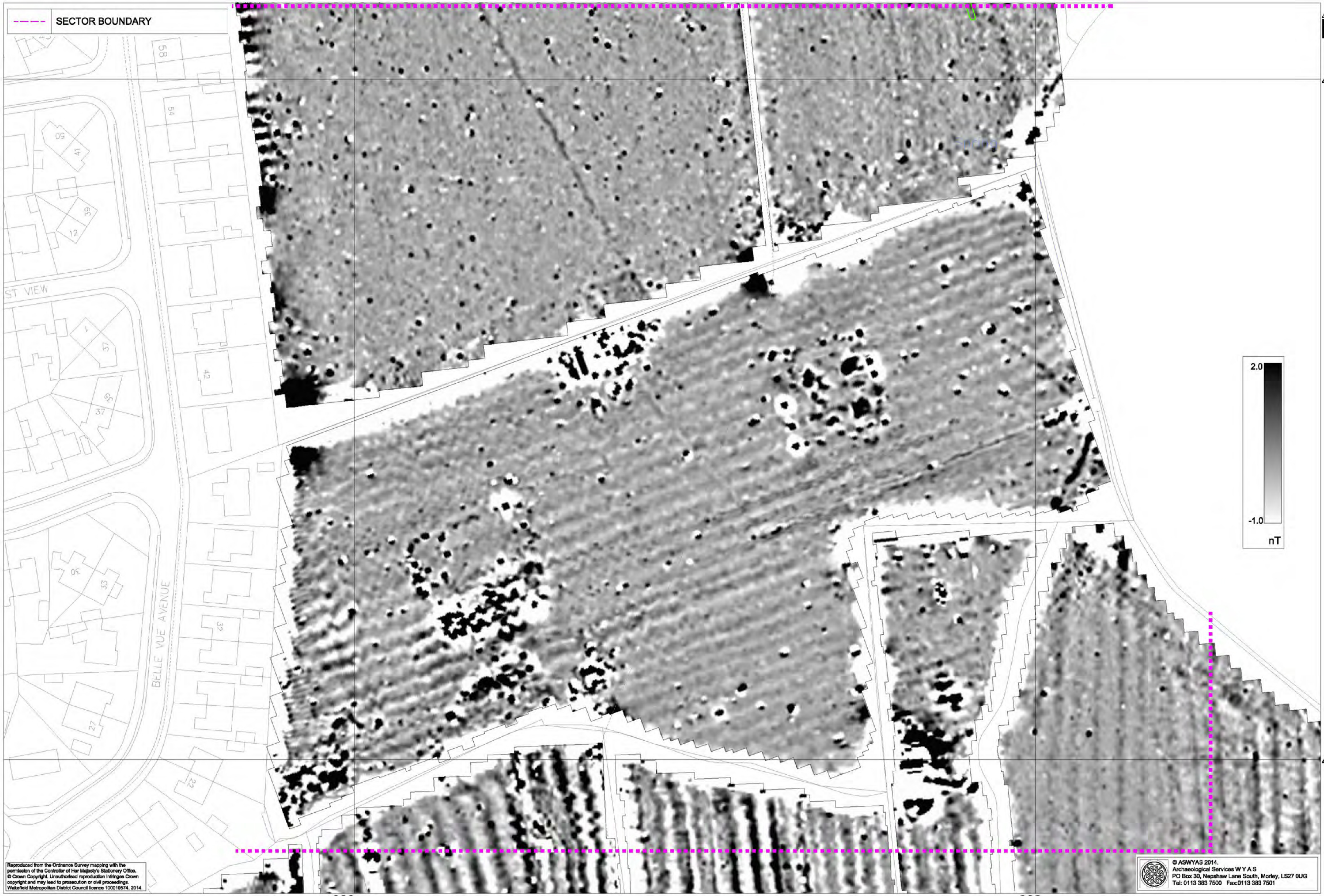

Fig. 13. Processed greyscale magnetometer data; Sector 4 (1:1000 @ A3)

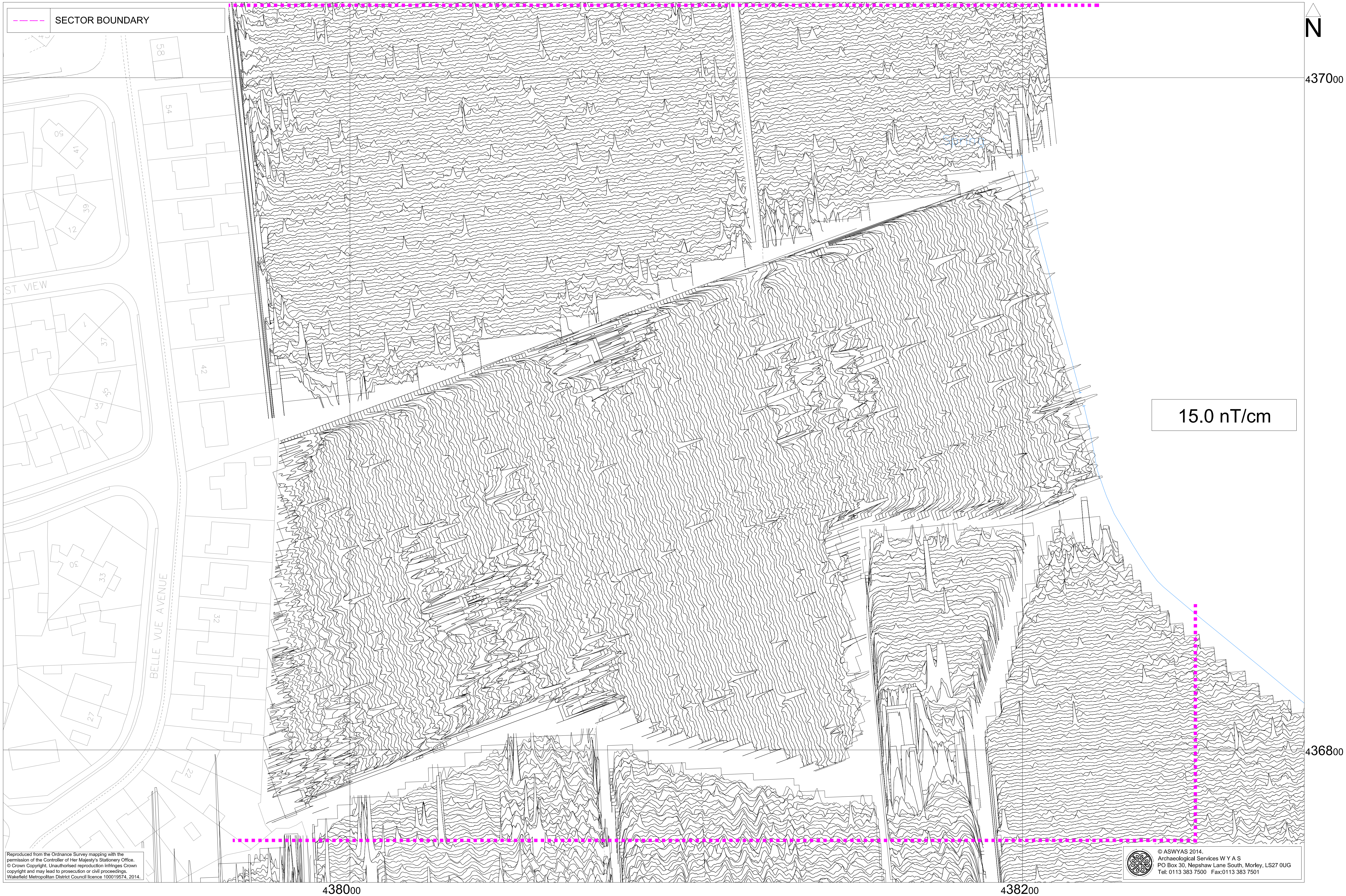

Fig. 14. XY trace plot of minimally processed magnetometer data; Sector 4 (1:1000 @ A3)

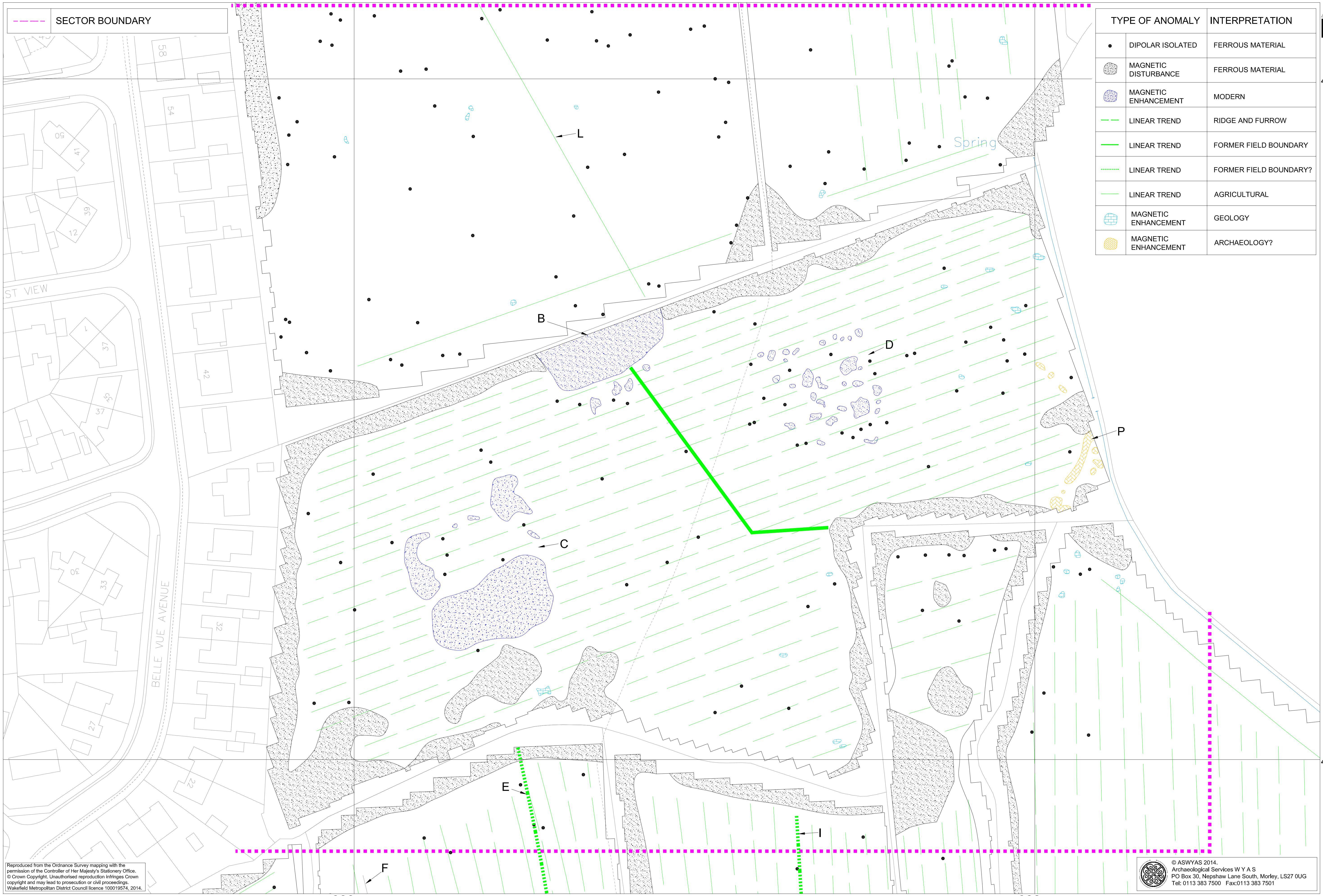

Fig. 15. Interpretation of magnetometer data; Sector 4 (1:1000 @ A3)

Fig. 16. Processed greyscale magnetometer data; Sector 5 (1:1000 @ A3)

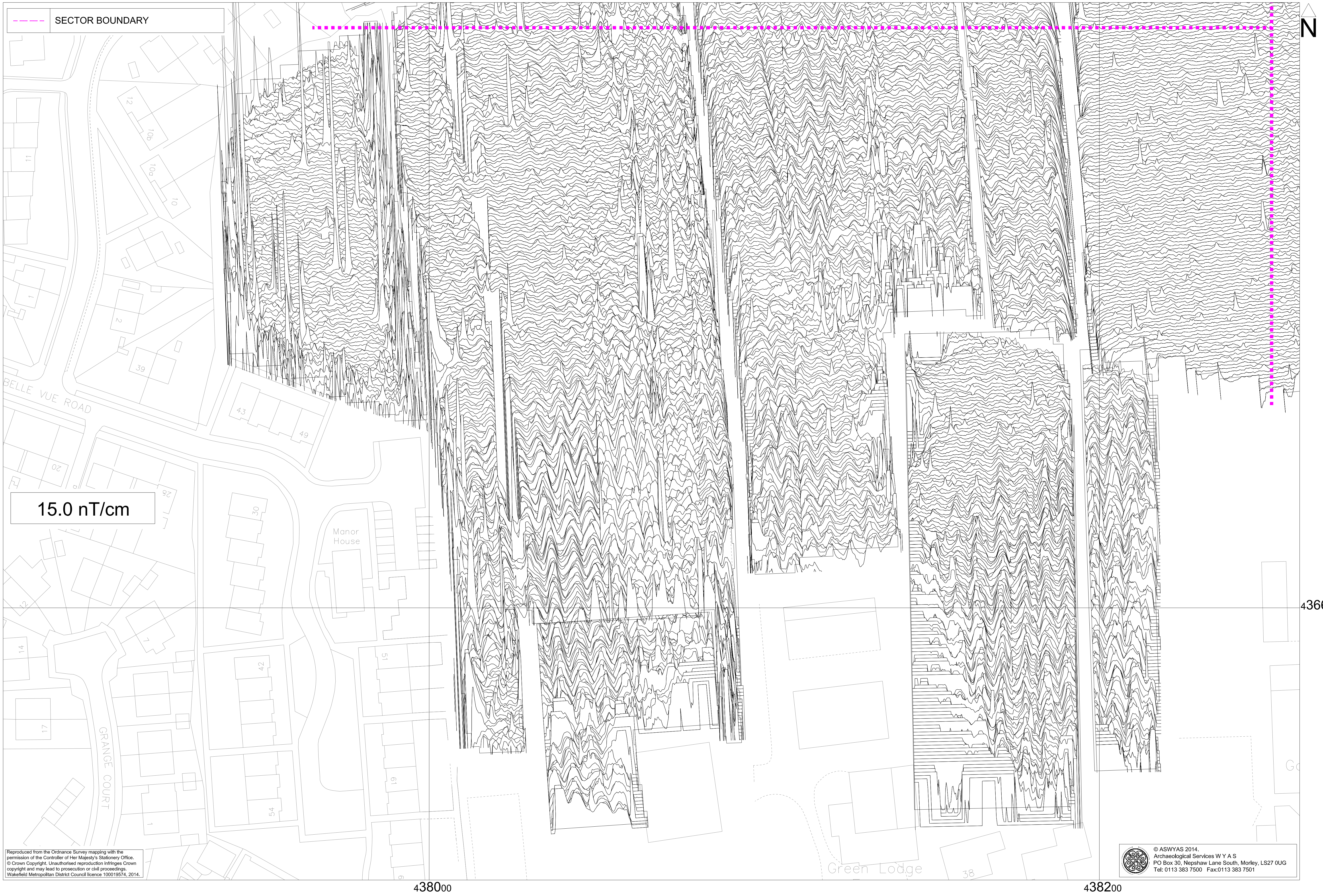

Fig. 17. XY trace plot of minimally processed magnetometer data; Sector 5 (1:1000 @ A3)

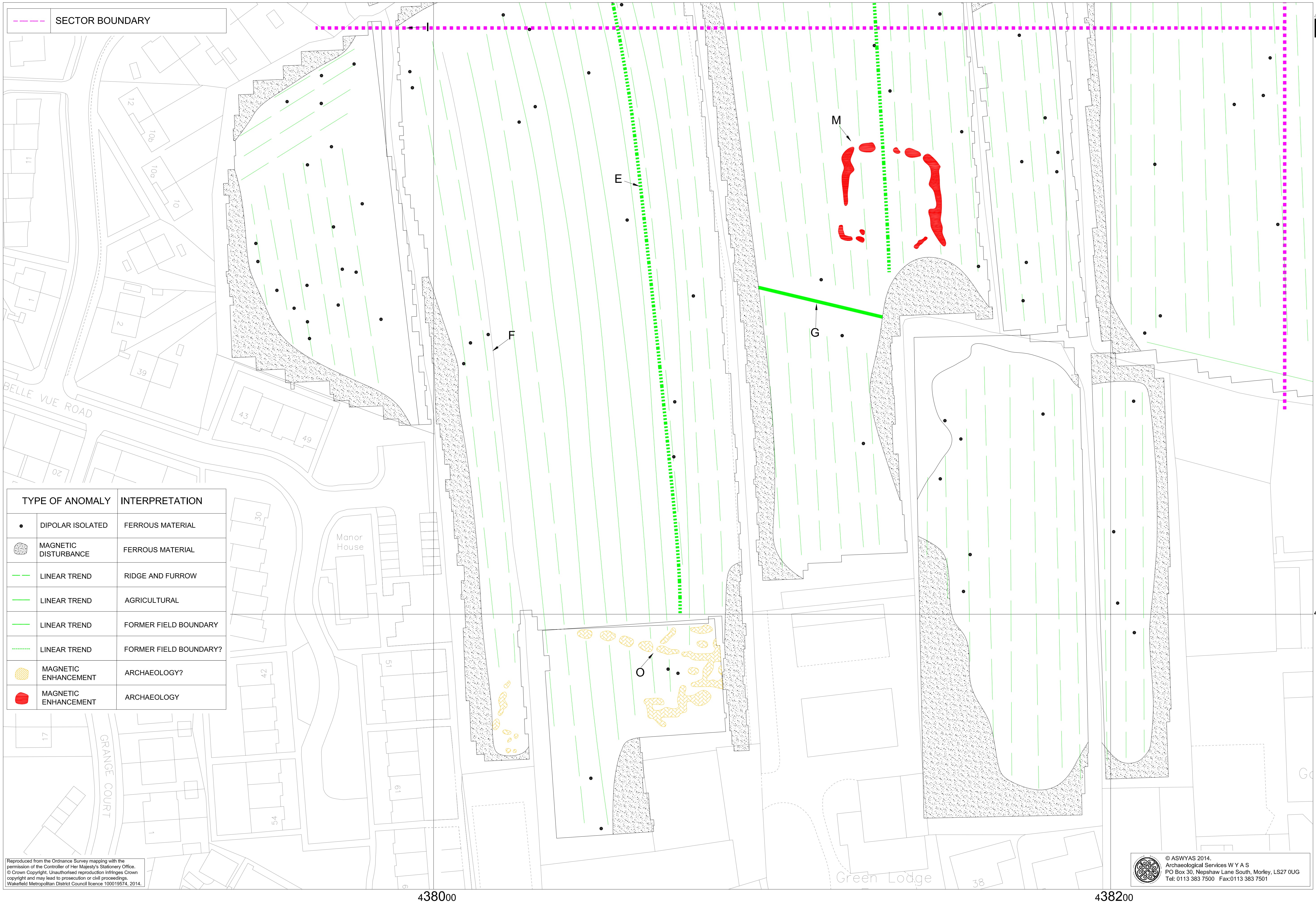

Fig. 18. Interpretation of magnetometer data; Sector 5 (1:1000 @ A3)

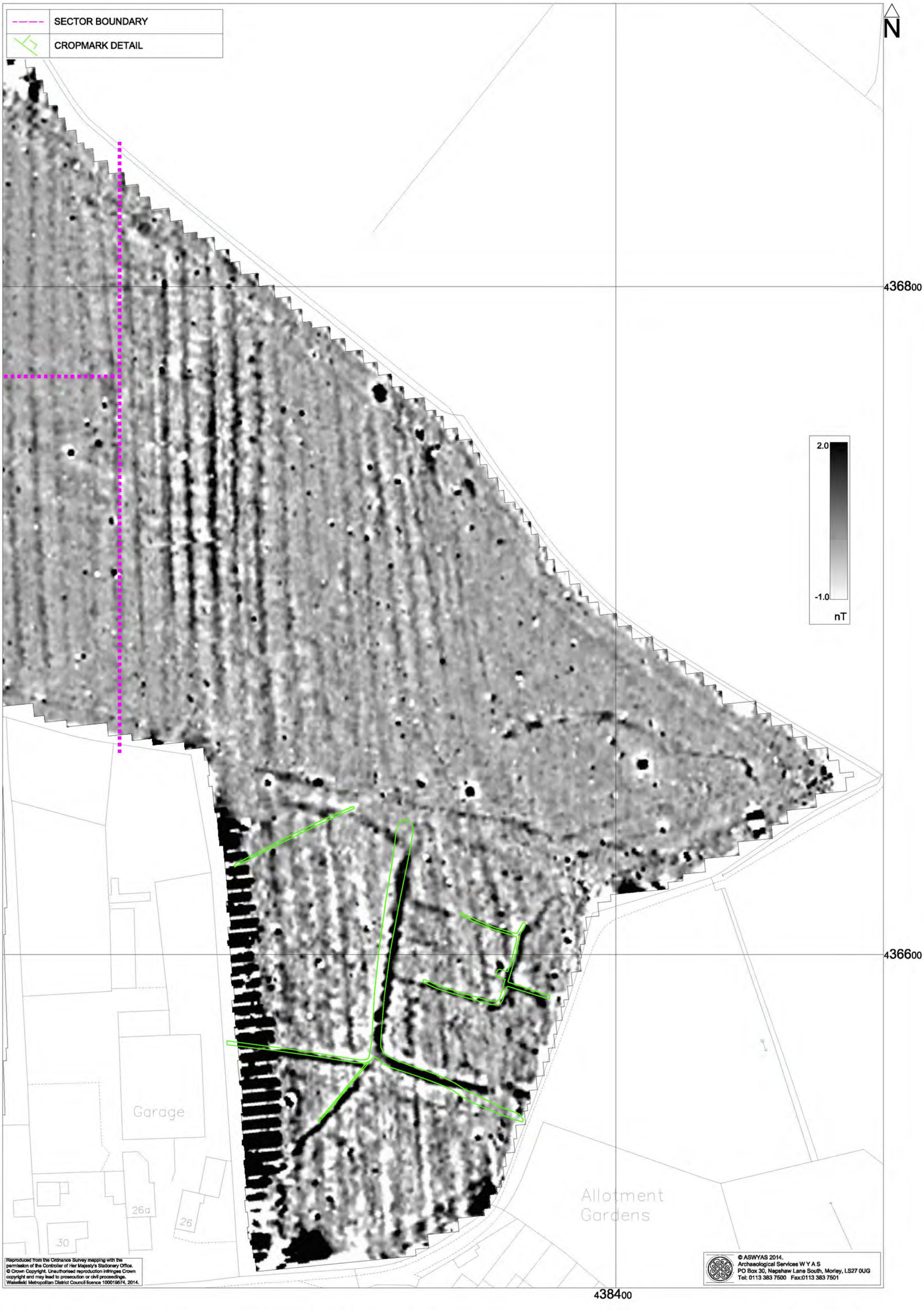

Fig. 19. Processed greyscale magnetometer data; Sector 6 (1:1000 @ A3)

0 20m

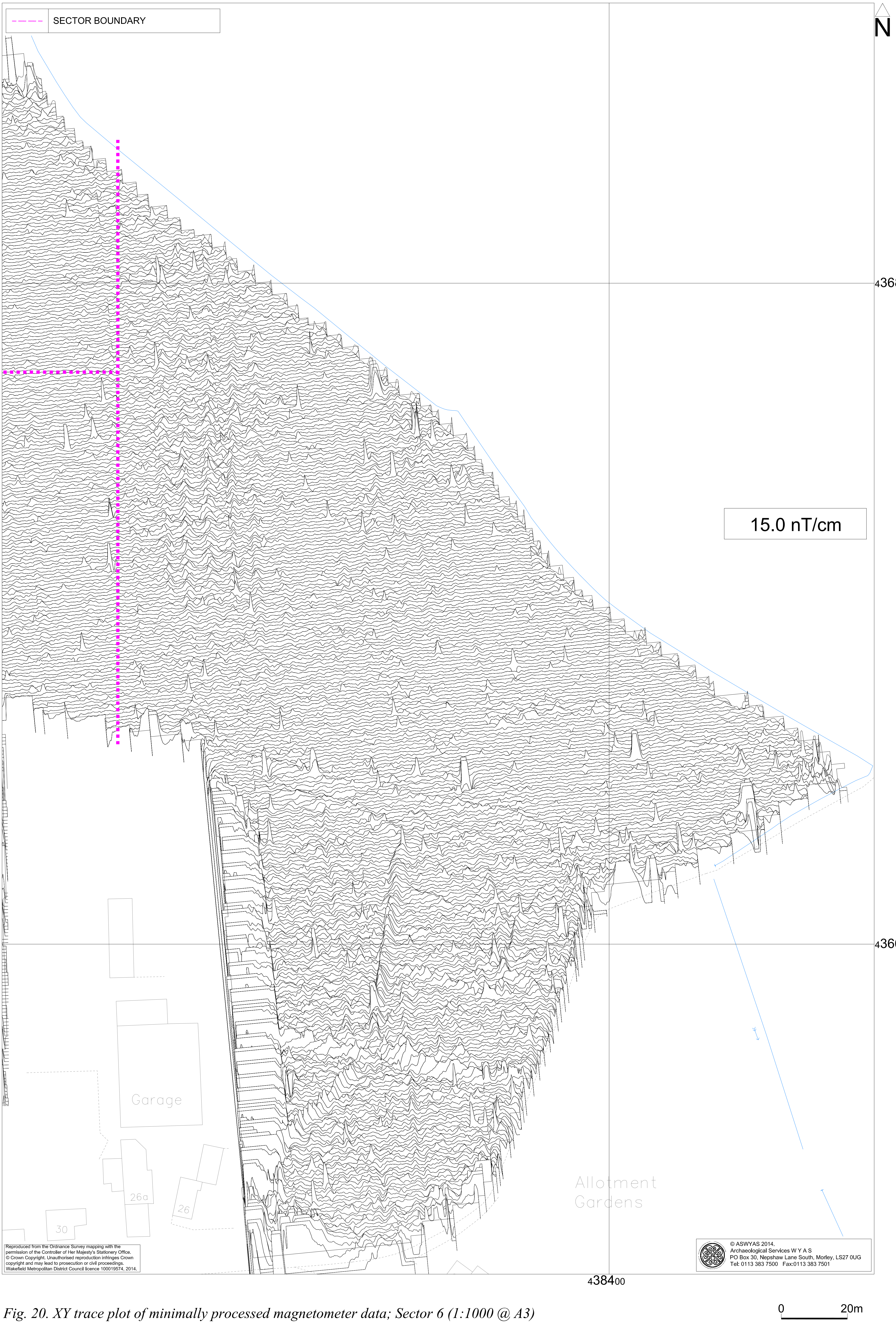

Fig. 20. XY trace plot of minimally processed magnetometer data; Sector 6 (1:1000 @ A3)

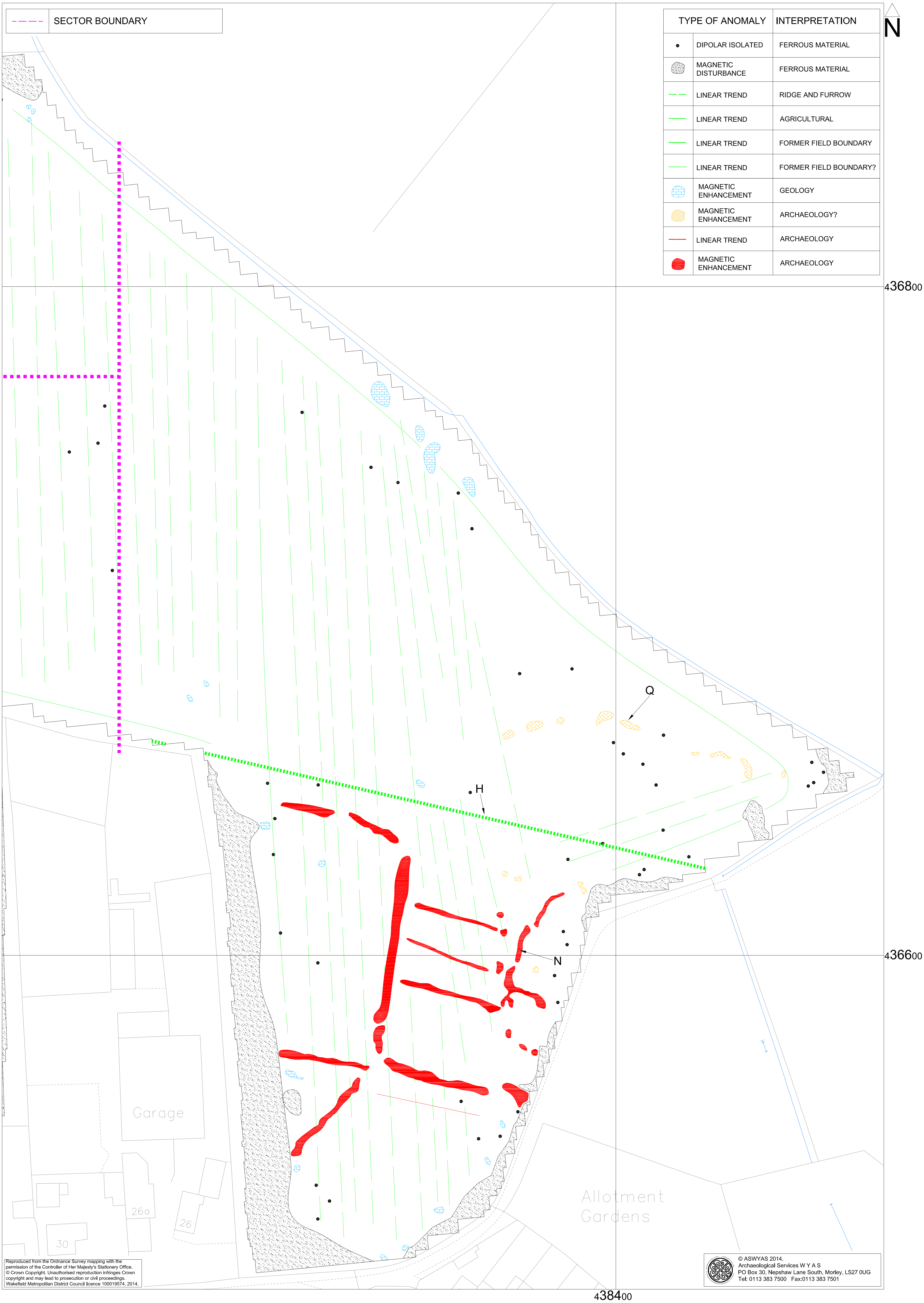

Fig. 21 Interpretation of magnetometer data; Sector 6 (1:1000 @ A3)

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

Plate 2. General view of Field 4, looking east

Plate 3. General view of Field 5, looking north-west

Plate 4. General view of Field 6, looking south

Plate 5. General view of Field 7, looking south-west

Plate 6. General view of Field 8, looking west

Plate 7. General view of Field 9, looking south-west

Plate 8. General view of Field 11, looking south

Plate 9. General view of Field 12, looking south

Plate 10. General view of Field 13, looking north

Plate 11. General view of Field 15, looking south

Plate 12. General view of area unsuitable for survey

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 so that by measuring the magnetic susceptibility of the topsoil, areas where human occupation or settlement has occurred can be identified by virtue 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: Magnetic Susceptibility Survey

There are two methods of measuring the magnetic susceptibility of a soil sample. The first involves the measurement of a given volume of soil, which will include any air and moisture that lies within the sample, and is termed volume specific susceptibility. This method results in a bulk value that it not necessarily fully representative of the constituent components of the sample. For field surveys a Bartington MS2 meter with MS2D field loop is used due to its speed and simplicity. The second technique overcomes this potential problem by taking into account both the volume and mass of a sample and is termed mass specific susceptibility. However, mass specific readings cannot be taken in the field where the bulk properties of a soil are usually unknown and so volume specific readings must be taken. Whilst these values are not fully representative they do allow general comparisons across a site and give a broad indication of susceptibility changes. This is usually enough to assess the susceptibility of a site and evaluate whether enhancement has occurred.

Methodology: Gradiometer Survey

There are two main methods of using the fluxgate gradiometer for commercial evaluations. The first of these is referred to as ***magnetic scanning*** and requires the operator to visually identify anomalous responses on the instrument display panel whilst covering the site in widely spaced traverses, typically 10m apart. The instrument logger is not used and there is therefore no data collection. Once anomalous responses are identified they are marked in the field with bamboo canes and approximately located on a base plan. This method is usually employed as a means of selecting areas for detailed survey when only a percentage sample of the whole site is to be subject to detailed survey.

The disadvantages of magnetic scanning are that features that produce weak anomalies (less than 2nT) are unlikely to stand out from the magnetic background and so will be difficult to detect. The coarse sampling interval means that discrete features or linear features that are parallel or broadly oblique to the direction of traverse may not be detected. If linear features are suspected in a site then the traverse direction should be perpendicular (or as close as is possible within the physical constraints of the site) to the orientation of the suspected features. The possible drawbacks mentioned above mean that a 'negative' scanning result should be validated by sample detailed magnetic survey (see below).

The second method is referred to as ***detailed survey*** and employs the use of a sample trigger to automatically take readings at predetermined points, typically at 0.25m intervals, on zig-zag traverses 1m apart. These readings are stored in the memory of the instrument and are later dumped to computer for processing and interpretation. Detailed survey allows the visualisation of weaker anomalies that may not have been detected by magnetic scanning.

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 1m 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.

Appendix 2: Survey location information

The site grid was laid out using a Trimble VRS differential Global Positioning System (Trimble 5800 model). The accuracy of this equipment is better then 0.01m. 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.

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 West Yorkshire Historic Environment Record).

Bibliography

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