Archaeological Services WYAS

Land off Leeming Lane
Catterick
North Yorkshire

Geophysical Survey

Report no. 2419

December 2012

Client: Cemex UK Operations

Registered IA Organisation

Land off Leeming Lane
Catterick
North Yorkshire

Geophysical Survey

Summary

A geophysical (magnetometer) survey was carried out in two fields to the east of Leeming Lane. The northern field is known for its crop mark of a temporary Roman camp and the geophysical survey was able to enhance the evidence for this feature. The camp measured 160m by 240m in plan and was revealed to have possessed entrances protected by external tituli; one in the centre of the north side and two positioned equidistantly along the eastern side. Two other potential entrances, opposed at the north-eastern and south-eastern sides, have no apparent protection, but may have originally have been furnished with claviculae, in the form of earthworks that have not survived. Only a few anomalies were found within the interior of the camp, although an interesting series of features are associated with the northern entrance. A number of anomalies were detected to the east of the camp, the most convincing of which are the southern sides of what appear to be two adjacent enclosures at the north-eastern edge of the site. The southern field contains linear anomalies of a different sort, which may reflect the remains of a former rectilinear enclosure that was defined by an upstanding earthwork, rather than by a ditch

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Report Information

Client:	Cemex UK Operations
Address:	Pallet Hill Quarry, Catterick, North Yorkshire D40 7JA
Report Type:	Geophysical Survey
Location:	Land to the east of Leeming Lane
County:	North Yorkshire
Grid Reference:	SE 2318 9910
Period(s) of activity represented:	Roman
Report Number:	2419
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Museum Accession No.:	n/a
OASIS ID:	
Date of fieldwork:	7th–10th September 2012
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Project Management:	Ian Roberts BSc FSA MIfA
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Authorisation for distribution: --

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1 Introduction

Archaeological Services WYAS was commissioned by Gavin Mennie of Cemex UK Operations to carry out a geophysical (magnetometer) survey and a field walking survey, on land between Leeming Lane and Cemex's Bridge Farm Quarry (see Fig. 1). The work was undertaken in compliance with recognised standards in September 2012. The work was carried out in order to better inform Cemex of the archaeological implications and potential mitigations required, should they decide to apply to extend their mineral operations into this area.

Site location, topography and land-use

The eight hectare site covers two arable fields immediately east of Leeming Lane and Catterick Racecourse (SE 2318 9910). The trapezoidal northern field (Field 1) is between 300m and 100m wide and 340m long, whilst the southern field (Field 2) is an elongated rectangle in plan, 100m wide and 270m long. The site is relatively flat and lies at approximately 60m above Ordnance Datum. At the time of the geophysical survey the fields had just been harvested (see Plates 1 and 2).

Soils and geology

The site is situated on the flood plain of the River Swale, the local geology being river terrace sands and gravels with occasional pockets of alluvial silt overlying Dolostone of the Cadeby Formation (British Geological Survey 2012). The soils are deep, well drained, coarse loamy sandy soils, locally over gravel (Soil Survey of England and Wales 1983).

2 Archaeological and Historical Background and Potential

The site is situated just 500m to the south-east of Roman *Cataractonium*, which was militarily important in commanding the Dere Street crossing of the River Swale. The excavations in the Roman town, carried out between 1958 and 1997 have been comprehensively reported by Wilson (2000, 46–138). They revealed evidence for a significant Roman town with military origins, a fort first being established in *c.* AD 80, with occupation lasting until the 5th century. By the 4th century the town had a stone wall and was composed mainly of stone-built structures in recognisable *insulae*. On the north bank of the Swale are ditches thought to represent a 2nd–century defended *vicus* or supply depot. The remains of *Cataractonium* itself, on the south bank, and the land to the west of the racecourse along the Roman road, is protected as a Scheduled Monument (National monument no. 34733).

Partly within the site under investigation are the crop marks of a Roman temporary camp, first recorded from the air by St Joseph (1955, 82; 1973, 214). This is one of six Roman camps recorded in Yorkshire in 1995, although more have since been found by air photography (Welfare and Swan 1995, 4, fig. 2; Ottaway 2000, 135). There are over a 100 camps known in England, mainly from along the Welsh border and Northumberland, with more in Scotland and Wales (see Jones 2012, fig. 2). Subsequent crop mark plots of the south-western element (in the area of the racecourse) do not agree precisely with the plot from the arable fields. This has been taken either as an indication that either there are two camps on slightly different alignments, or (more likely) that it reflect a problem in geo-referencing the crop mark plots due to there being few known points on the air photographs.

The crop marks indicate a typical rectangular camp measuring about 234m by between 166m and 190m, depending upon which crop mark plan is adopted (Wilson 2002, 40, figs 26 and 28). Part of the north field was subject to a geophysical survey in 1991, but this was generally restricted to the line of the crop marks that formed the northern and part of the eastern sides of the camp, and did not detect the southern side or investigate the interior (Bartlett and Boucher 1991).

On the line of Dere Street, about 600m to the south-east of the Roman town, is the site of what has been interpreted as a probable Neolithic/Early Bronze Age cairn and henge, which attracted later activity in the form a pre-Roman Iron Age settlement enclosure and, subsequently, a 5th to 6th–century Anglian cemetery (Moloney *et al*. 2003; Wilson 2000, 40, fig. 26). Excavations at Pallett Hill, in 1969–70 also investigated two Late Bronze Age or Early Iron Age enclosures (Wilson 2000, Fig. 6).

Further evidence of Roman and Anglian occupation has been found as a consequence of several excavations in the immediate hinterland of *Cataractonium*, particularly in the vicinity of Bainesse Farm and RAF Catterick (Wilson 2000, 139–242).

Archaeological monitoring of mineral extraction at Cemex's Bridge Farm Quarry, in the angle of the River Swale immediately to the east of the site of the temporary camp, has been ongoing since 2001. The work has found relatively little, other than a post-medieval lime kiln in the northern part of the area (O'Neil 2001) and some ploughed out features, some of which correspond to recorded crop marks. In 2011, however, topsoil stripping did reveal the degraded remains of a human skeleton, radiocarbon dated in the range cal AD 1041–1217 (Rose 2012).

3 Aims, Methodology and Presentation

The aim of the geophysical survey and field walking was to gather sufficient information to establish the presence/absence, character, extent and date of any archaeological remains within the site, and to inform further investigative strategies should they become necessary.

The specific objectives were to:

- to clarify the position and plan of the Roman camp and to ascertain if there are the remains of more than one camp within the site;

- to provide information about the nature and possible interpretation of any other magnetic anomalies that might be regarded to be archaeological in their nature;
- to plot and collect archaeological artefacts that may provide evidence of localised areas of activity at different periods and provide evidence for the date of Roman activity in the area;
- to produce a comprehensive site archive and report.

Bartington Grad601 instruments were used to take 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 a computer for processing and interpretation. Geoplot 3 (Geoscan Research) software was used to process and present the data. Further technical information on the equipment used, data processing and survey methodologies are given in Appendices 1 and 2.

The survey methodology and reporting standards comply with guidelines outlined by English Heritage (David *et al.* 2008) and by the Institute for Archaeologists (IfA 2010). All figures reproduced from Ordnance Survey mapping are with the permission of the controller of Her Majesty's Stationery Office (© Crown copyright).

The geophysical figures 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.

A general site location plan incorporating the 1:50000 Ordnance Survey mapping is shown in Figure 1 with a larger scale (1:5000) plan showing the cropmarks included as Figure 2. The magnetic data for the whole site is displayed in greyscale format with an accompanying overall site interpretation in Figure 3 and Figure 4 at 1:2000. The data is displayed in greyscale and X – Y trace plot formats with accompanying interpretation plots at a scale of 1:1000 in Figures 5 to 13 inclusive.

4 Results

Magnetometer Survey

Ferrous anomalies, either as individual 'spikes' or more extensive areas of magnetic disturbance, are typically caused by ferrous (magnetic) debris, either on the ground surface or mixed in with the plough-soil. Little importance is normally given to such anomalies, unless there is any supporting evidence for an archaeological interpretation, as ferrous debris is common on rural sites, often being present as a consequence of manuring or tipping/infilling.

On this site there is no apparent clustering to these anomalies and they are therefore assumed to be due to the random distribution of ferrous debris.

In both fields the background data contains a series of curvilinear trends which are a consequence of palaeochannels running generally west to east across the site. Larger areas of enhanced magnetic response are also interpreted as being geological in origin probably due to patches or bands of more magnetic gravels in the upper soil horizons.

Linear trend anomalies on differing alignments, but generally at right angles to the current field boundaries, are due to different phases of ploughing.

Field 1 (see Figs 5 to 10 inclusive)

The data from the northern field (Field 1) clearly shows the regular linear magnetic responses of the Roman camp, largely reflecting the plan suggested by the crop mark data. The data reveals the full extent of the northern and eastern sides, as well as the eastern end of the southern side and the northern end of the western side. It is notable the latter is not represented as a regular linear response, but as a series of wider, more ragged, magnetic anomalies. The response at the north-eastern corner of the camp appears enhanced due to the presence of an unrelated anomaly (**A**).

Three breaks in the anomaly around the defensive circuit probably represent entrances. One of these is at the centre of the northern side (**B**), whilst two others (**C** and **D**) occur symmetrically opposite one another in the eastern parts of the northern and southern sides respectively.

External to entrance **B** is a linear anomaly of a short straight traverse, similar in size, and distance from the defensive circuit, as two others (**E** and **F**) that are external to the eastern side.

Within and around the entrance gap at location **B** are a series of discrete elongated anomalies, but no such anomalies are in evidence in the other entrance gaps at **C** and **D**.

Potential internal features are represented by three magnetic anomalies (**G**, **H** and **I**) in the northern part of the enclosure, similar to anomaly A in the north-east corner; a group of seven small anomalies (**J**) in the central area, and ten anomalies of various sizes (**K**), situated just inside the eastern side of the camp, almost opposite **F**.

External features are represented by what appears to be the southern parts of two small, rectilinear ditched enclosures (**L** and **M**) at the northern edge of the survey area. In the eastern part of the field are two sides of another possible north-west/south-east aligned rectilinear enclosure with an internal feature (**N**), a single discrete anomaly (**O**), and an east-west linear (anomaly **P**) seemingly associated with an irregular feature at its eastern end.

Field 2 (see Figs 11, 12 and 13)

The most notable magnetic response in Field 2 is that of another potential rectangular enclosure. In this case the anomaly is of a low reading of –1.0nT, whereas the camp circuit to the north had been a high reading of at least 2nT. Only the north-eastern part of this putative enclosure is contained within the field, the northern edge being represented by two parallel anomalies (**Q** and **R**) and the eastern side by a single linear anomaly (**S**). A cluster of discrete anomalies, T, adjacent to the eastern side of the putative enclosure, may also be of archaeological significance.

5 Discussion and Conclusions

In Field 1 the magnetometer survey has confirmed the existence of a single temporary Roman camp measuring 160m by 240m; an area of 3.84 hectares. Based upon other camps known from England, this would have been a medium-sized example (see Welfare and Swan 1995, 12, fig. 6).

Although camps can have several functions (Jones 2012, 19–29), there is little reason to suppose that this is anything but a conventional marching camp. The breach in the centre of the north side of the camp is a typical central gateway protected by an external traverse or *titulus*, at a distance of 10m from the gateway (**B**). The terminals of this entrance appear to be wider than the ditch in general and it is possible that, although temporary, there was a formality to what could have been the principal portal into the camp. The discrete elongated cut features within the entrance gap have no known parallels, and it is supposed that they were designed to help defend the gate.

Classical sources indicate that a typical camp was supplied with six entrances (Jones 2012, 87). Although this was clearly not adhered to in Britain, there was usually, nevertheless, a symmetrical layout, except in cases where topography dictated otherwise. The Catterick camp would appear to have been symmetrical. We might envisage central *titula* gateways in the north (**B**) and south sides and two in each of the west and east sides; those in the latter being indicated by (**E** and **F**),. The fact that there are actually no apparent breaches to correspond with the *tituli* on the eastern side might indicate that the camp has more than one phase of use.

The opposed symmetry of breaches **C** and **D** would suggest that they are also entrances, rather than ploughed out sections of the camp ditch. Entrances near corners of camps are not common, but are known. The Catterick examples are not apparently protected by external *tituli*, but could have had been furnished with *clavicula* defence works comprising just an upstanding bank, the evidence for which would not have survived centuries of ploughing (see Jones 2012, 87).

There is no obvious reason for the uncharacteristic nature of the north-western side of the Catterick camp. The landscape here is flat and so a topographic explanation for the irregularity and width (up to 7m) of the magnetic response can not be invoked. It is conceivable that this side of the camp was adopted as part of a subsequent boundary or activity area and has therefore been subject to a different depositional regime at some point in the past.

By their very nature marching camps rarely have contemporary internal features of any substance, the temporary accommodation having taken the form of a fortified tented encampment. The most likely features to be detected in a magnetometer survey would be the locations of fires and ovens, and it is possibly these that are represented by anomalies **G**, **H** and **I**, and possibly **A**, in the northern extremity of the camp.

We may only speculate about the group of potential features at locations **J** and **K**, but the group at K may even represent features associated with an earlier entrance, suggested by the external *titulus* (**F**) here.

Of the external features, the linear anomaly at location **P** does not appear to be a contemporary of the camp. The detached nature of the anomalies labelled **L**, **M** and **N** means that they too cannot necessarily be associated with the camp. Nevertheless, **L** and **M** appear to be enclosures that respect one another spatially, and are therefore probably contemporary. Being on the same orientation as the main camp there is strong likelihood that they are contemporary with it. The width of Enclosure **L** (45m) would be consistent with the size of smaller Roman practice camps (see Jones 2012, 27–9), but there is no obvious evidence (e.g. entrance arrangements) for them having performed this function.

The linear geophysical anomalies in Field 2 (**Q**, **R** and **S**) are of a totally different type to those of the camp in Field 1. Yet, they could conceivably represent an enclosure of similar shape and dimensions on the same orientation. It is tempting to view this as the plan for another camp, possibly of two phases (given the parallel northern sides **Q** and **R**). For this to have been the case the enclosure would have to have been formed principally by an upstanding earthwork (possibly of turves), rather than by a ditch and bank. That this may have been the case could be reflected in the ragged nature of the anomaly, which appears to be the result of material having been 'dragged' from east to west at the points where the later furrows cross it – although such an enclosure need not necessarily have been of Roman date.

Disclaimer

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.

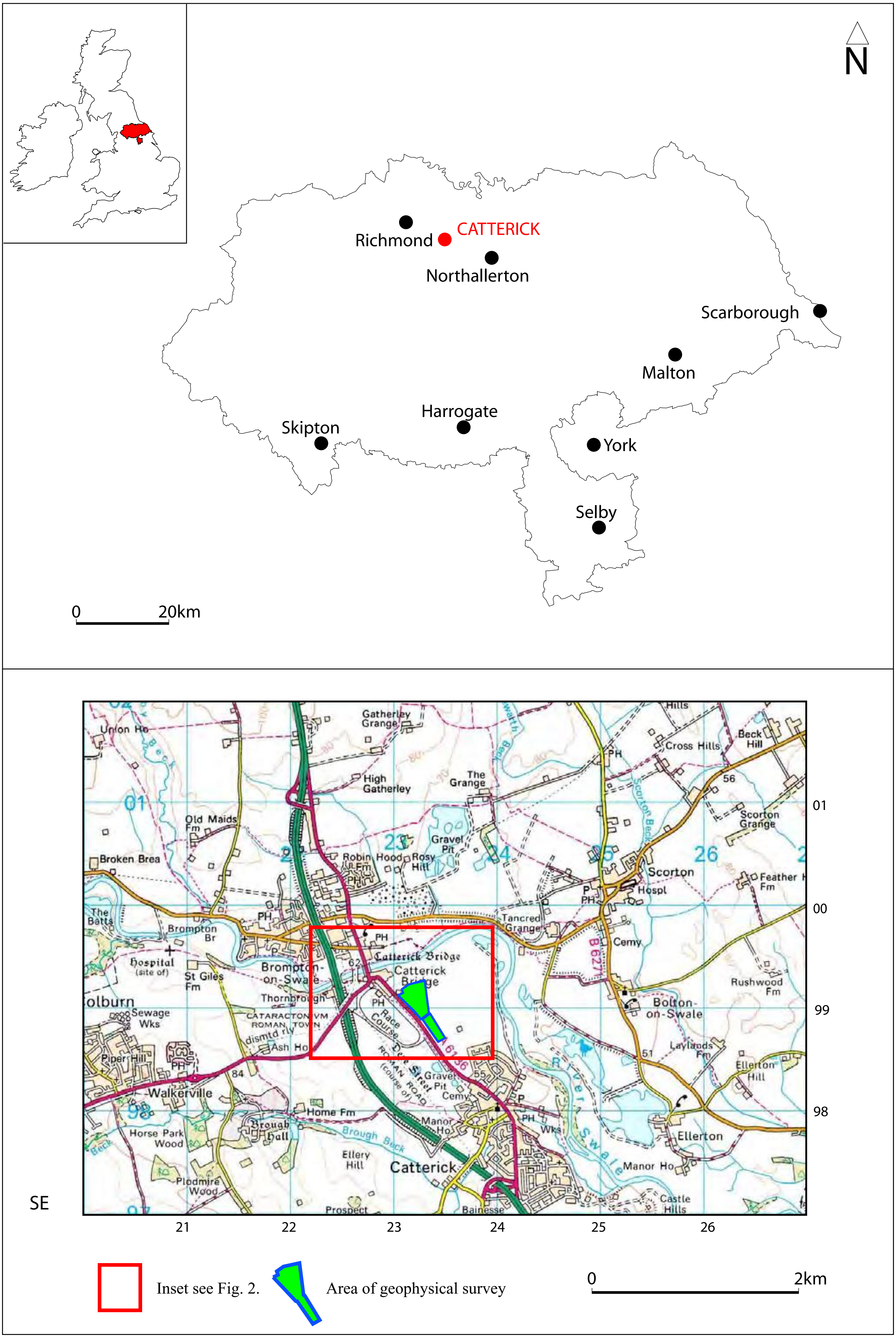

Fig. 1. Site location

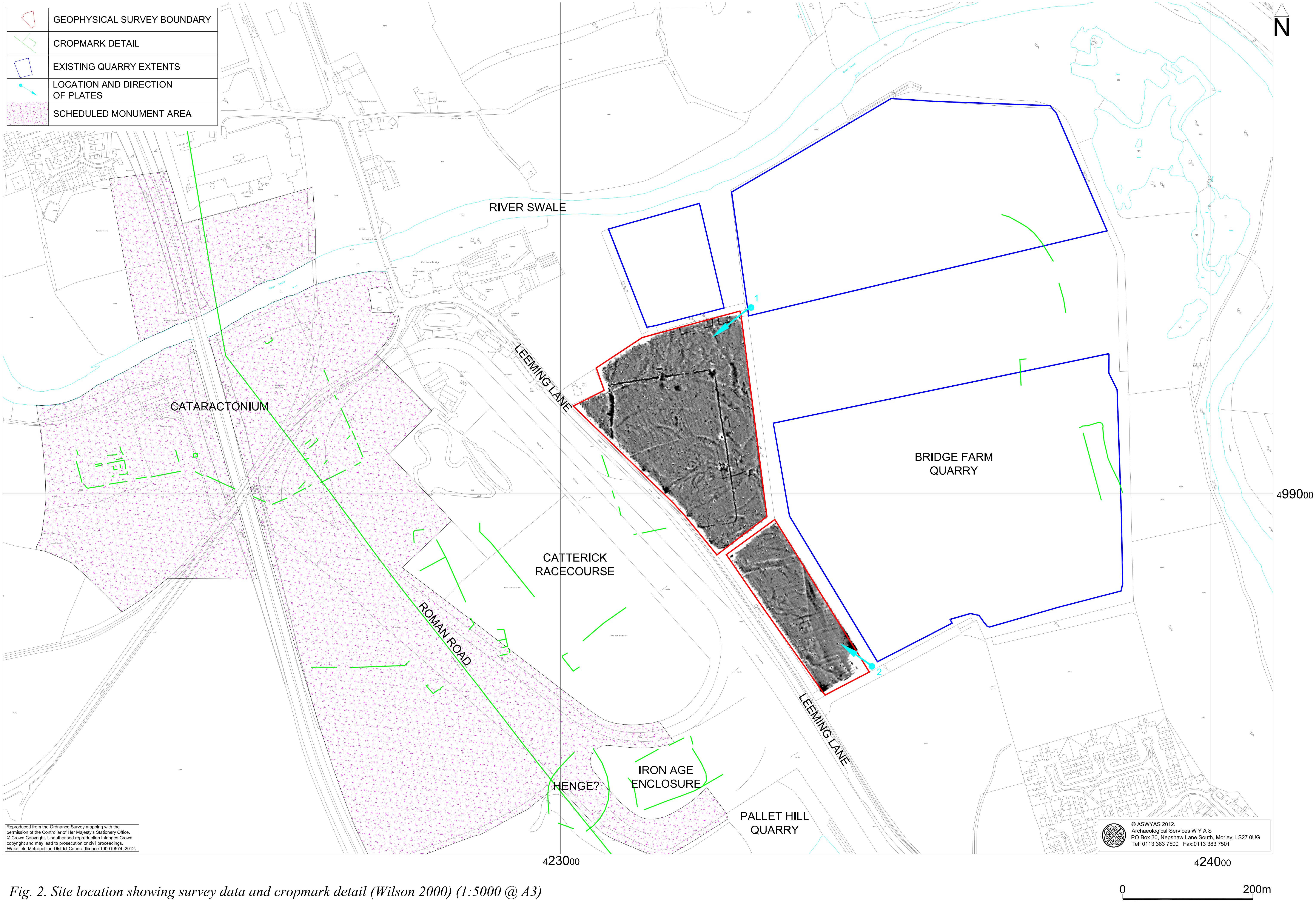

Fig. 2. Site location showing survey data and cropmark detail (Wilson 2000) (1:5000 @ A3)

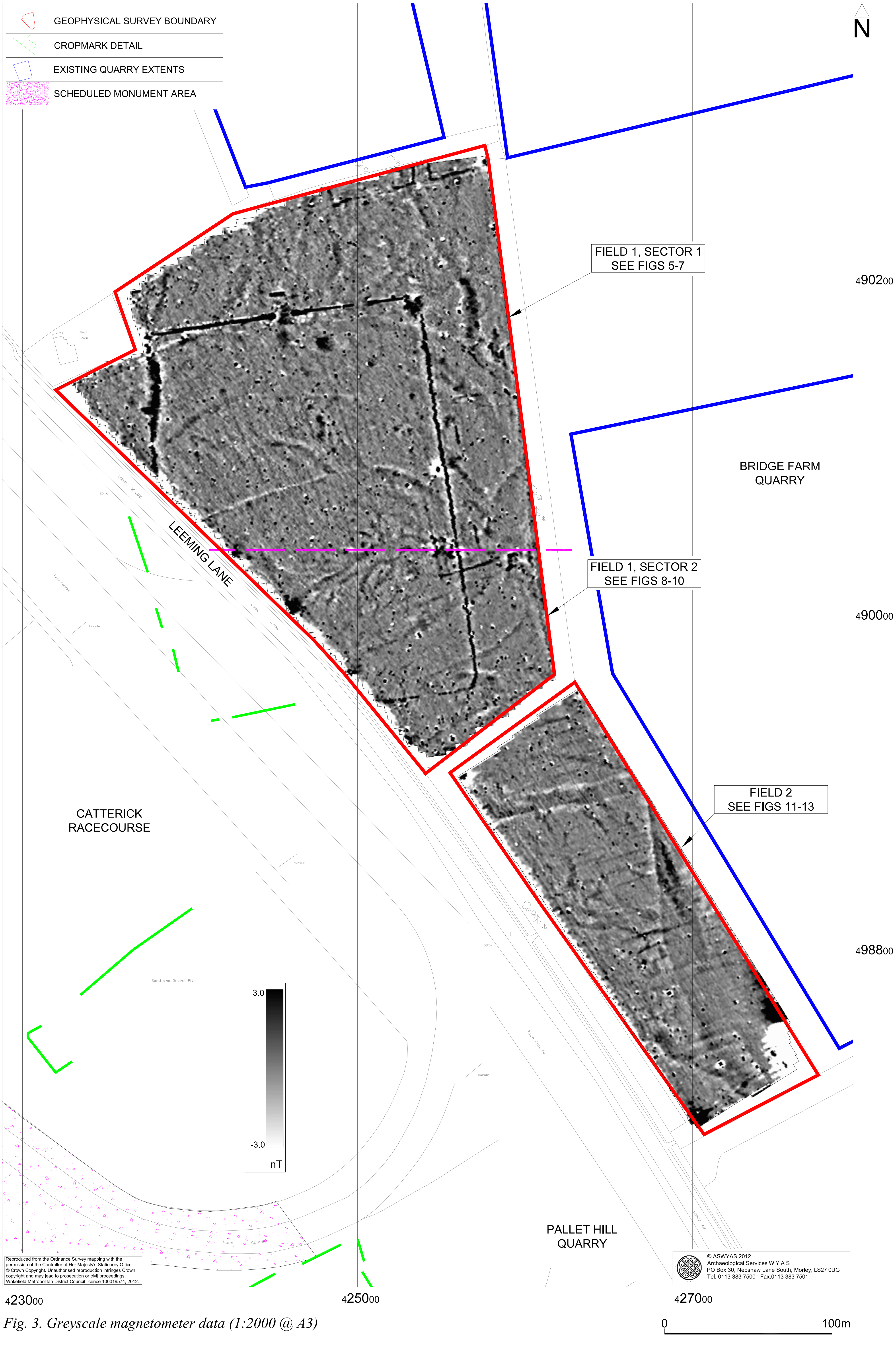

Fig. 3. Greyscale magnetometer data (1:2000 @ A3)

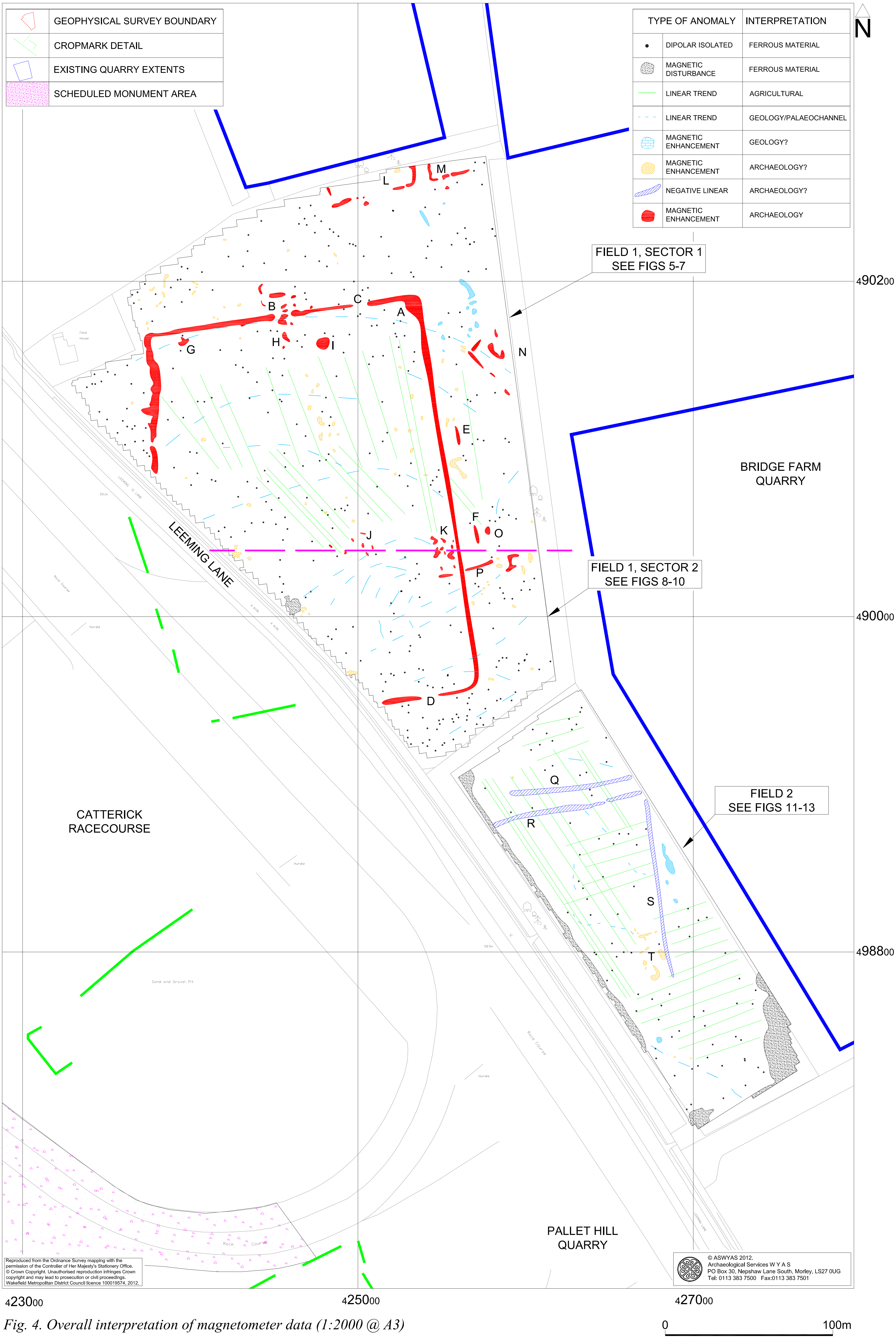

Fig. 4. Overall interpretation of magnetometer data (1:2000 @ A3)

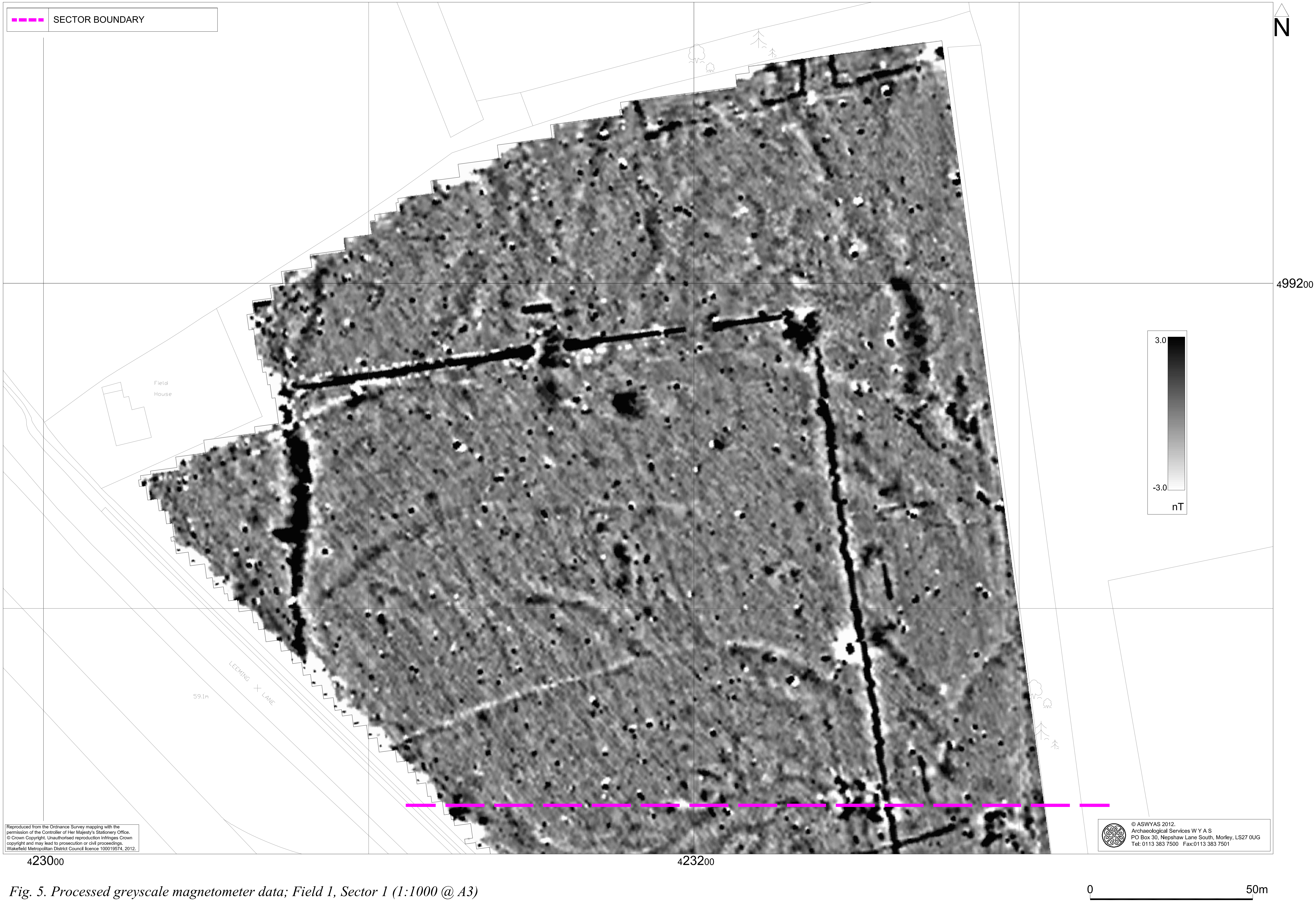

Fig. 5. Processed greyscale magnetometer data; Field 1, Sector 1 (1:1000 @ A3)

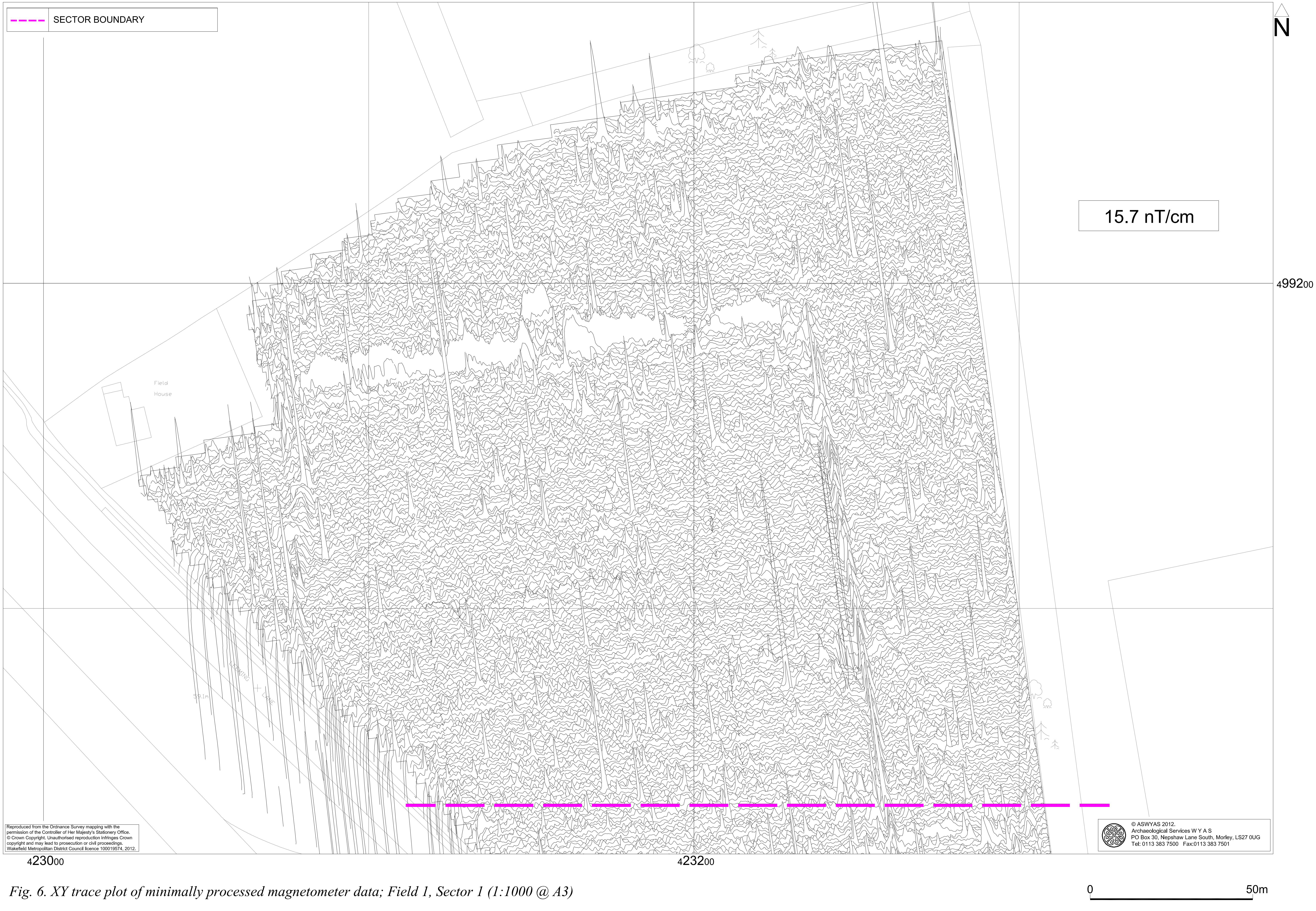

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Fig. 6. XY trace plot of minimally processed magnetometer data; Field 1, Sector 1 (1:1000 @ A3)

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Fig. 7. Interpretation of magnetometer data; Field 1, Sector 1 (1:1000 @ A3)

0 50m

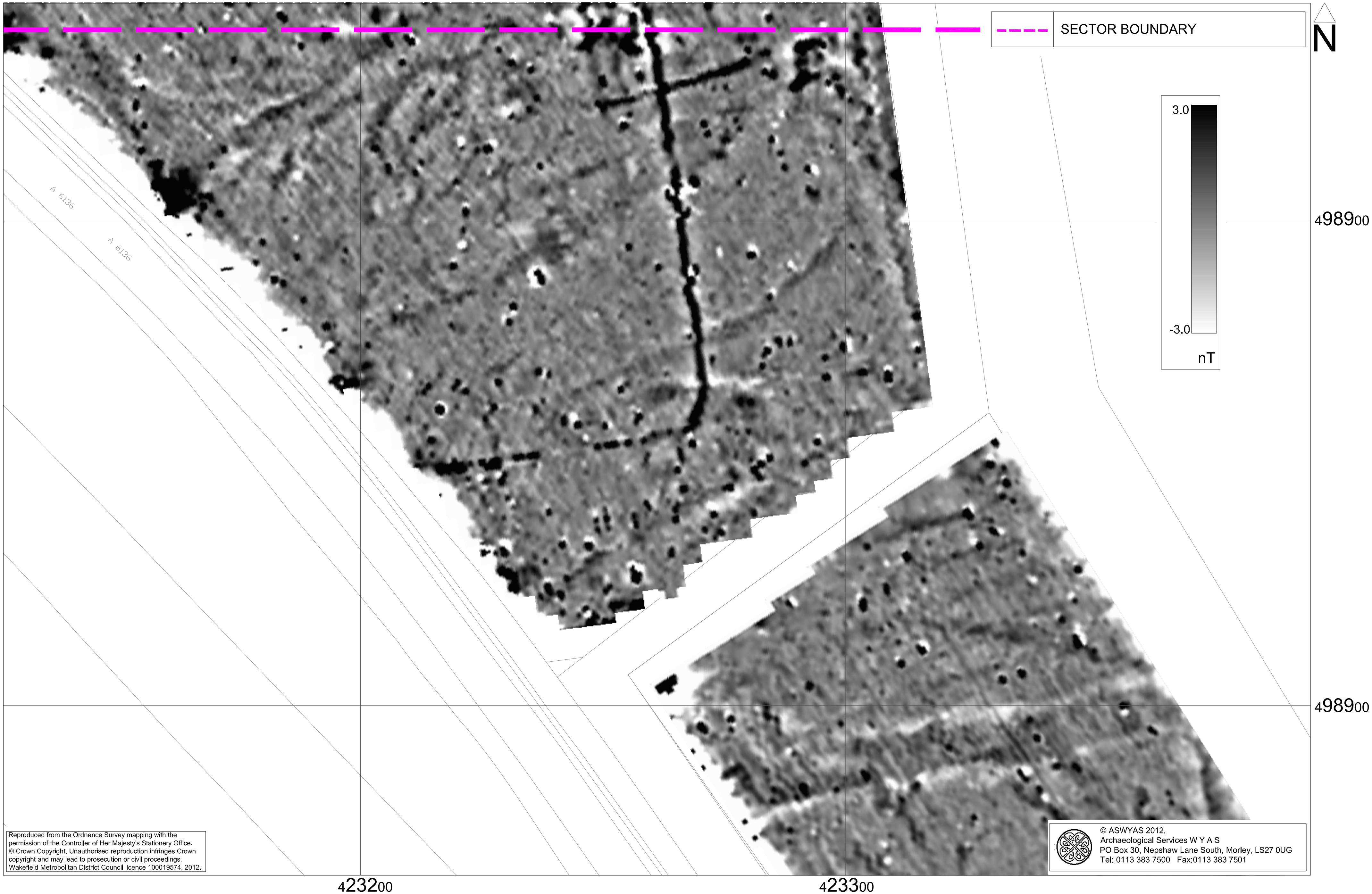

Fig. 8. Processed greyscale magnetometer data; Field 1, Sector 2 (1:1000 @ A4)

0 50m

Fig. 9. XY trace plot of minimally processed magnetometer data; Field 1, Sector 2 (1:1000 @ A4)

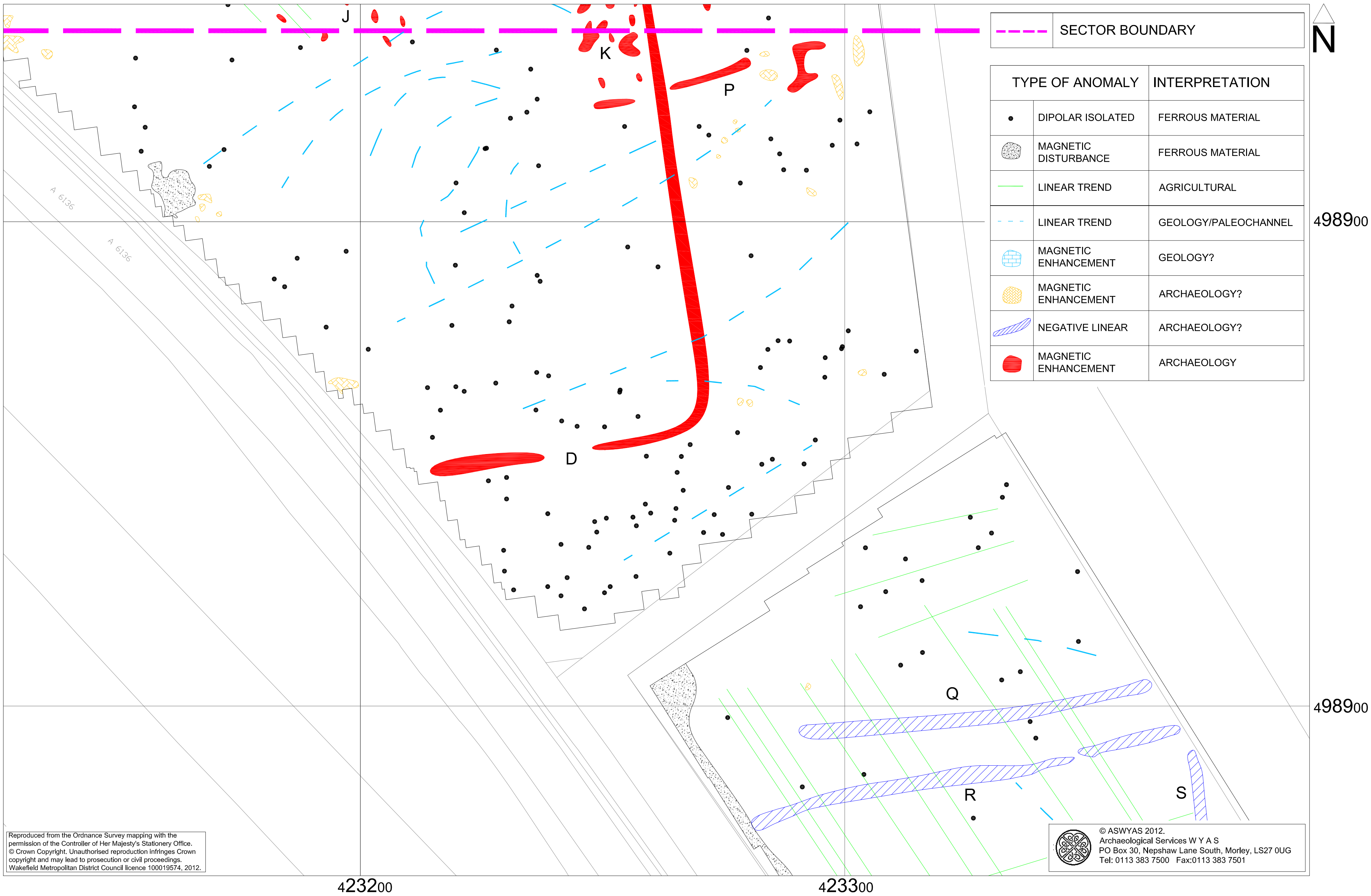

Fig. 10. Interpretation of magnetometer data; Field 1, Sector 2 (1:1000 @ A4)

0 50m

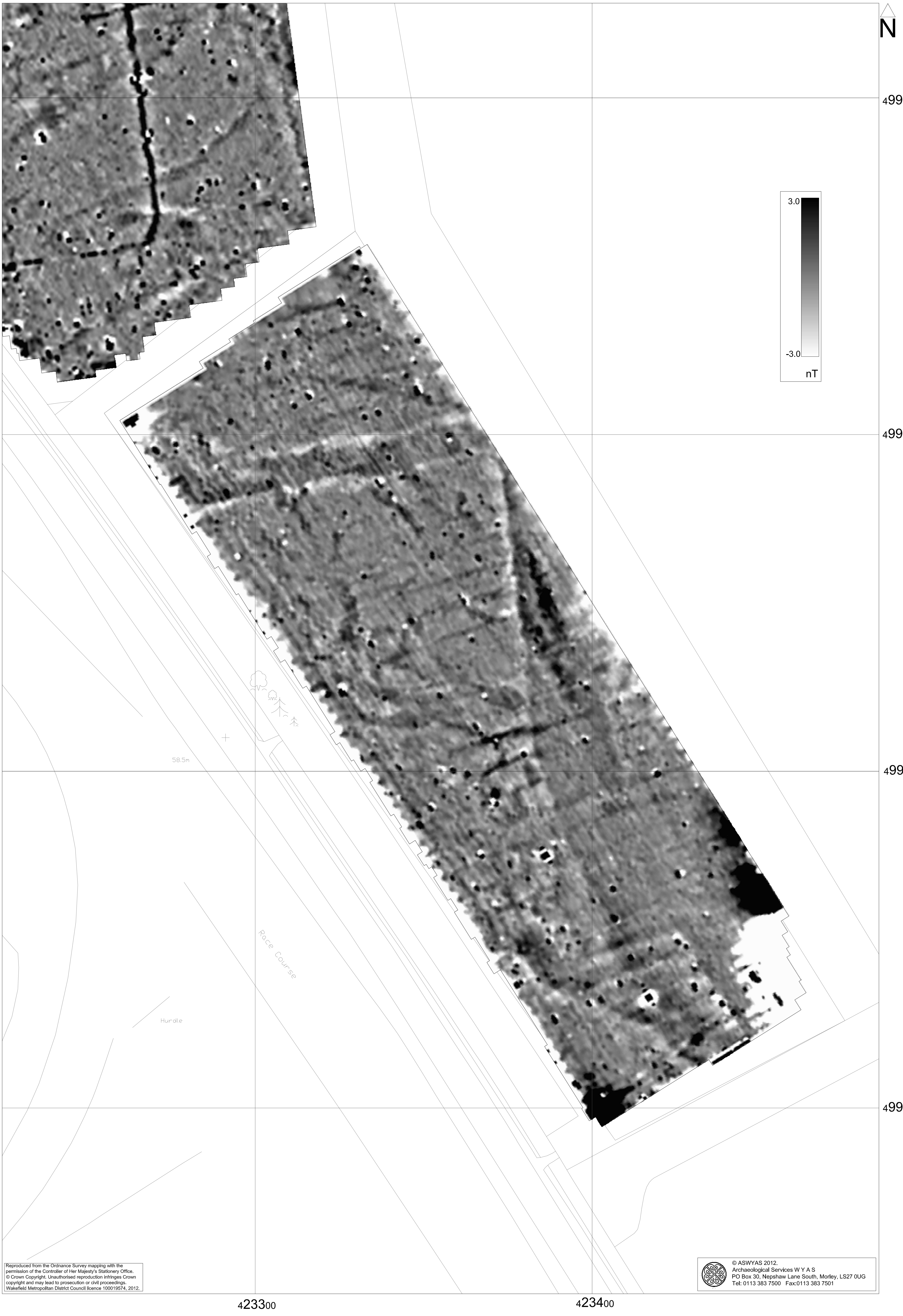

Fig. 11. Processed greyscale magnetometer data; Field 2 (1:1000 @ A3)

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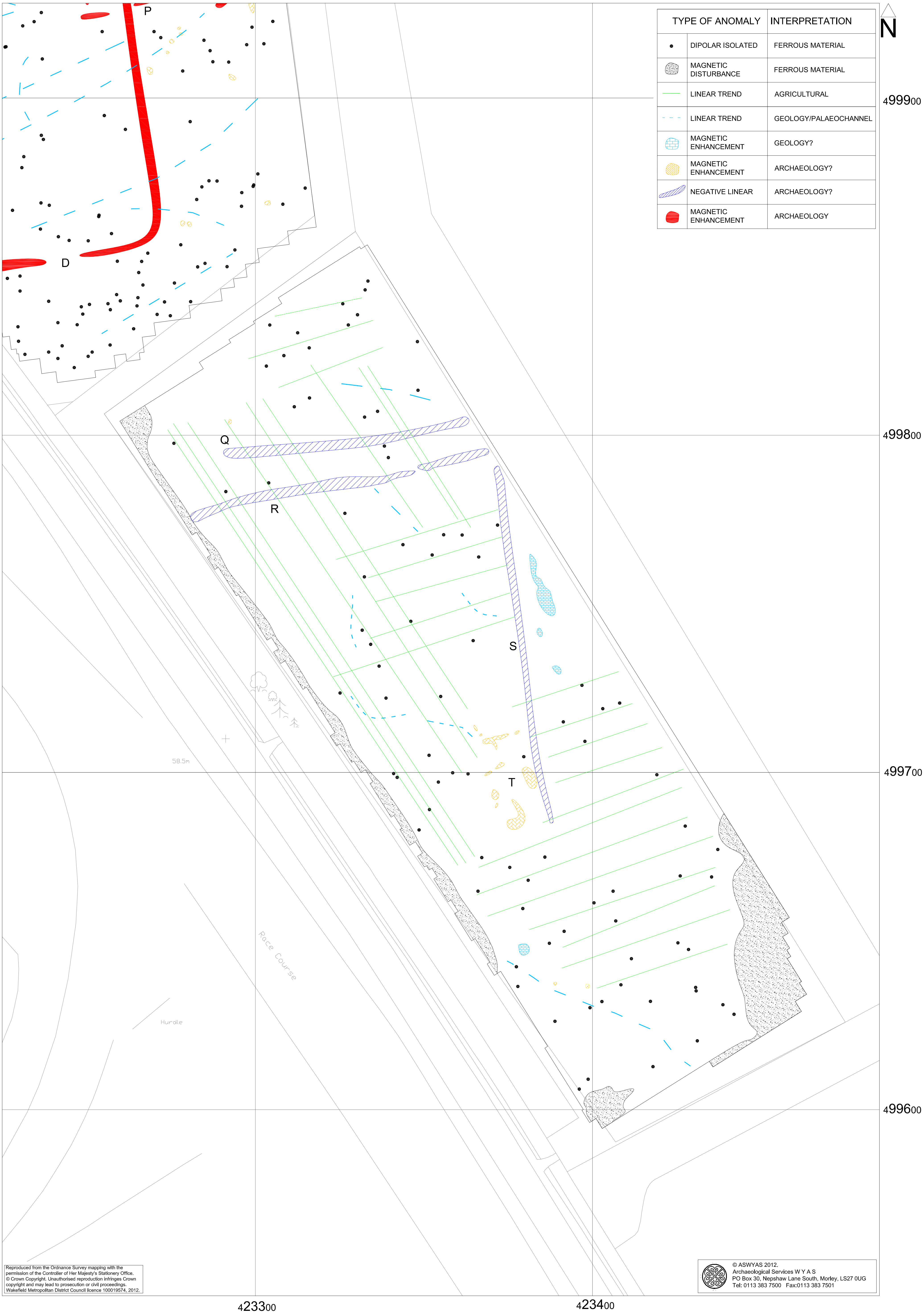
Fig. 12. XY trace plot of minimally processed magnetometer data; Field 2 (1:1000 @ A3)



0 50m

Fig. 13. Interpretaion of magnetometer data; Field 2 (1:1000 @ A3)

Plate 1. General view of Field 1; looking west

Plate 2. General view of Field 2; looking north-west

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 or for the removal of any of the survey reference points.

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 North Yorkshire Historic Environment Record).

Bibliography

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