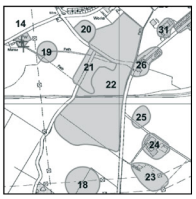
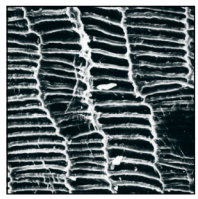
CHBN/01










LAND AT CHAPEL LANE, BINGHAM, NOTTINGHAMSHIRE

GEOPHYSICAL SURVEY

commissioned by Amec Foster Wheeler Environmental & Infrastructure UK Limited

10/01962/OUT

February 2016

HEADLAND ARCHAEOLOGY

REGISTERED ORGANISATION CIfA

LAND AT CHAPEL LANE, BINGHAM, NOTTINGHAMSHIRE

GEOPHYSICAL SURVEY

commissioned by Amec Foster Wheeler Environmental & Infrastructure UK Limited

10/01962/OUT

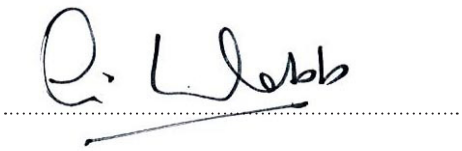
February 2016

project info

HA JOB NO.	CHBN/01
NGR	SK 70000 40479
PARISH	Bingham
LOCAL AUTHORITY	Nottinghamshire
OASIS REF.	headland5-241156

project team

PROJECT MANAGER	Sam Harrison
AUTHOR	David Harrison
FIELDWORK	Alex Schmidt, David Harrison, Ross Bishop
GRAPHICS	Caroline Norman, Mano Kapazoglou, Rafael Maya-Torcelly
APPROVED BY	Alistair Webb



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PROJECT SUMMARY

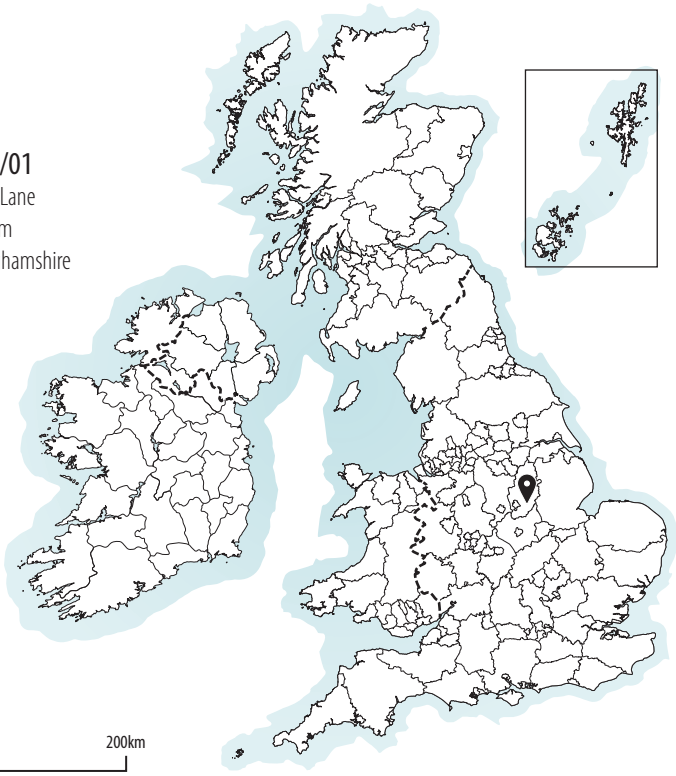
Headland Archaeology (UK) Ltd undertook a geophysical (magnetometer) survey covering 34 hectares on land to the north of Bingham, to provide information about the archaeological potential of the site in advance of proposed development. The survey has identified a section of probable settlement bordering Fosse Road, immediately north-east of Fosse Way Farm. At least 16 small rectangular enclosures have been identified on the southern side of the road, within which are numerous discrete anomalies which may be due to pits, post holes and spreads of archaeological material. A linear ditch type anomaly to the south of the settlement could indicate the remnants of a field system associated with the settlement. A cluster of anomalies located on the margins of the Bingham Basin, a former lake and marshland, may also be of archaeological potential. Throughout the survey area anomalies which reflect the post-medieval agricultural landscape are identified including ridge and furrow cultivation, back-filled ponds and former field boundaries.

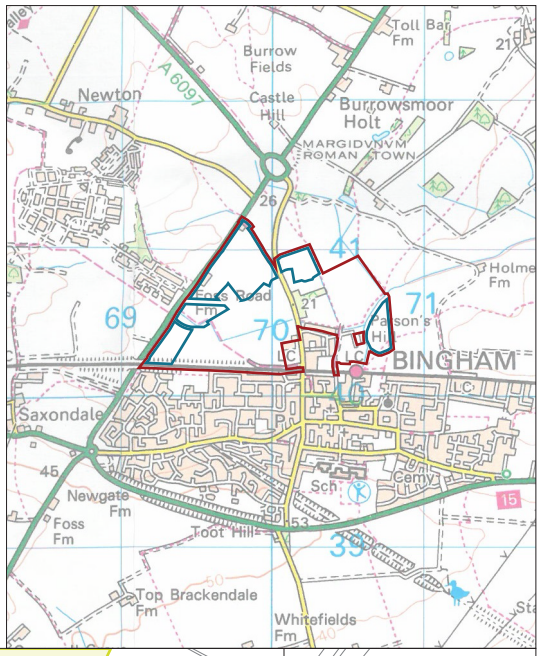
The presence of superficial deposits may have led to reduced magnetic contrast in parts of the site which could have limited the identification of particularly low magnitude, ephemeral or discontinuous features. However, but it is not considered likely that any further significant archaeological activity would not have been detected under these conditions. Based on the results and interpretation of the data, the archaeological potential of the site is considered to be very high to the north-west of Fosse Road Farm bordering the road, and moderate to low elsewhere.

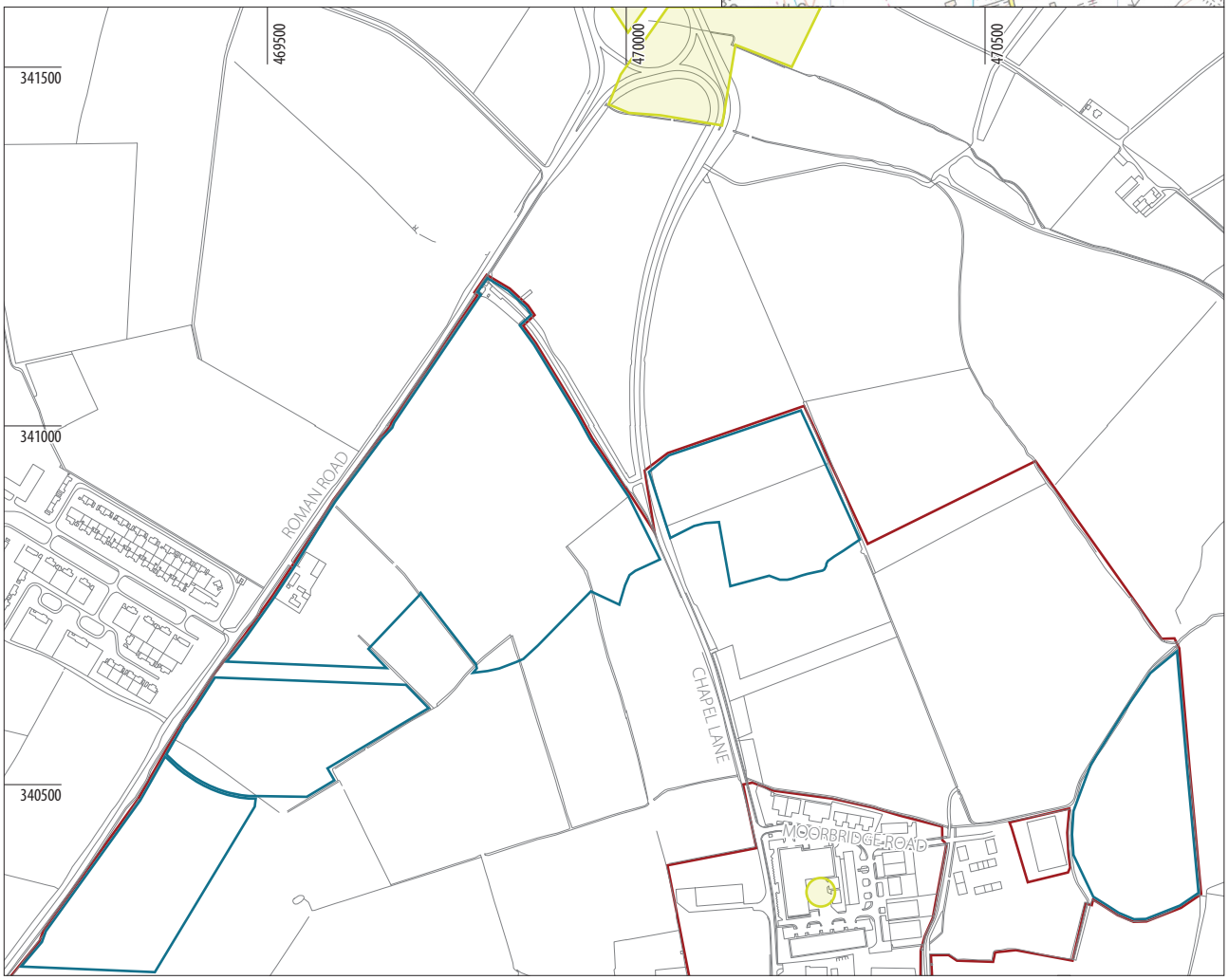
CONTENTS

LIST OF ILLUSTRATIONS

CHBN/01
Chapel Lane
Bingham
Nottinghamshire







KEY
- geophysical survey area
- proposed development area
- scheduled monument

N
0 500m
scale 1:10,000 @ A4

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ILLUS 1 Site location

LAND AT CHAPEL LANE, BINGHAM, NOTTINGHAMSHIRE

GEOPHYSICAL SURVEY

1 INTRODUCTION

Headland Archaeology (UK) Ltd was commissioned by Amec Foster Wheeler Environmental & Infrastructure UK Limited (The Client) to undertake a geophysical (magnetometer) survey of five areas within a wider proposed residential led mixed-use development for which outline planning consent has been granted (Planning ref. 10/01962/OUT) by Nottingham County Council.

The work was undertaken in accordance with a Written Scheme of Investigation for Archaeological Evaluation (AMEC 2016), with guidance outlined in the National Planning Policy Framework (DCLG 2012) and in line with current best practice (David et al. 2008). The survey was carried out between the 14th and the 21st of January 2016 in order to provide additional information on the archaeological potential of the site.

1.1 SITE LOCATION, TOPOGRAPHY AND LAND-USE

The proposed development area (PDA) is located to the immediate north of Bingham, being bound to the south by the Nottingham to Skegness railway, to the west by the B692 Fosse Road and Fosse Road Farm and extending eastwards to include Parson's Hill (see **ILLUS 1**). The site is bisected from north to south by Chapel Lane. The five geophysical survey areas comprise irregularly-shaped parcels of land, spanning 10 fields (F1–F10) which are located either side of Chapel Lane, three adjacent to the B692 Fosse Road, one immediately east of Chapel Lane and another at Parson's Hill (see **ILLUS 8**).

The PDA lies across part of a shallow basin which is thought to be the remains of a former lake and associated marsh (Bingham Basin). The topography slopes from 28m above Ordnance Datum (aOD) at the Fosse Road to 23m aOD at Chapel Lane before rising again to 28m aOD at Parson's Hill.

At the time of the survey the five survey areas contained a mixture of short crops of varying type (see **ILLUS 2** – **ILLUS 7**). A strip of trees at the north of F6 was unsuitable for survey (see **ILLUS 8**).

1.2 GEOLOGY AND SOILS

The underlying bedrock geology comprises Edwalton Member (Mudstone), which is overlain in the west by superficial deposits of Head (clay, silt, sand and gravel) and by Lacustrine Deposits (clay, silt and sand) in the east – the interface between the two superficial deposits reflecting the extent of the Bingham Basin (see **ILLUS 9**). No superficial deposits are recorded within the north of the PDA nor at Parson's Hill in the east (British Geological Survey 2016).

The former lake and marshland setting is also reflected in the soil types with those in the west of the PDA being classified in the Soilscape 8 Association, characterised as slightly acid loams and clays with impeded drainage. In the east, however, the soils are classified in the Soilscape 20 Association, characterised as loamey and clayey floodplain soils with naturally high groundwater (LandIS 2016).

2 ARCHAEOLOGICAL BACKGROUND

The following archaeological background is abstracted from information provided in the Written Scheme of Investigation (AMECFW 2016) which in turn is based on information contained within the Environmental Statement (Entec 2010).

Part of the survey area and wider PDA comprises Bingham Basin, a former lake dating from approximately 110,000–13,000BC. This feature is likely to have been the focus for Palaeolithic and Mesolithic activity and artefacts from these periods have been found in the vicinity of the site.

Neolithic activity in the area is attested by the Neolithic henge monument at Bingham (see **ILLUS 8** 1016777) located on a low ridge, which rises to form Parson's Hill, part of which was covered as part of the survey (Field F10). Other cropmarks recorded to the east of Parson's Hill have been interpreted as being possibly indicative of further Neolithic or early Bronze Age remains.

Perhaps most notably the PDA is situated in very close proximity to the A46 which may cover remains of the Fosse Way which is thought

ILLUS 2 General view of Field 1, looking south
ILLUS 3 General view of Field 3 (north), looking north
ILLUS 4 General view of Field 4 (north), looking north-east

to follow a Roman road. This is a significant historic feature, running close to Bingham's former wetlands. The slightly elevated lands close to the road and wetlands could suggest the survey area may have been the site of settlements dating back to the Iron Age or Romano-British period (1,000BC – 410AD).

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 any proposed development on any potential sub-surface archaeological remains and for further evaluation or mitigation proposals, if appropriate, to be recommended.

The general archaeological objectives of the geophysical survey were:

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

3.1 MAGNETOMETER 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 soil magnetism and the interpretation of magnetic anomalies is provided in Appendix 1.

The survey was undertaken using four Bartington Grad601 sensors mounted at 1m intervals (1m traverse interval) onto a rigid carrying frame. The system is programmed to take readings at a frequency of 10Hz (allowing for a 10-15cm sample interval) on roaming traverses 4m apart. These readings are stored on an external weatherproof laptop and later downloaded for processing and interpretation. The system is linked to a Trimble R8s Real Time Kinetic (RTK) differential Global Positioning System (dGPS) outputting in NMEA mode to ensure a high positional accuracy for each data point.

MLGrad601 and MultiGrad601 (Geomar Software Inc.) software has been used to collect and export the data. Terrasurveyor V3.0.28.4 (DWConsulting) software has been used to process and present the data.

3.2 REPORTING

A general site location plan is shown in **ILLUS 1** at a scale of 1:10,000. **ILLUS 2** to **ILLUS 7** are general site condition photographs. A large scale (1:5,000) survey location plan showing the processed greyscale magnetometer data is presented in **ILLUS 8**. The superficial deposits (after BGS 2016) are overlain on the same data in **ILLUS 9**, which also records the location and facing-direction of the photographs. **ILLUS 10** presents an overall interpretation of the geophysical data,

ILLUS 5 General view of Field 4 (south), looking south-west
ILLUS 6 General view of Field 8, looking east
ILLUS 7 General view of Field 10, looking south-west

also at 1:5,000. Detailed data plots (greyscale and XY trace) and interpretative illustrations are presented at a scale of 1:1,000 in **ILLUS 11** to **ILLUS 37** inclusive.

Technical information on the equipment used, data processing and magnetic survey methodology is given in Appendix 1. Appendix 2 details the survey location information and Appendix 3 describes the composition and location of the site archive. A copy of the OASIS entry (Online Access to the Index of Archaeological Investigations) is reproduced in Appendix 4.

The survey methodology, report and any recommendations comply with the Written Scheme of Investigation (Headland Archaeology 2015) and guidelines outlined by English Heritage (David et al. 2008) and by the Chartered Institute for Archaeologists (ClfA 2014). All illustrations reproduced from Ordnance Survey mapping are with the permission of the controller of Her Majesty's Stationery Office (© Crown copyright).

The illustrations 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 illustrations are presented to most suitably display and interpret the data from this site based on the experience and knowledge of management and reporting staff.

4 RESULTS AND DISCUSSION

The magnetic background varies across the site with the greatest variability recorded in those parts of the survey area where superficial deposits are present (see below) and in the field closest to Fosse Road Farm. Against this background numerous linear and discrete anomalies have been identified and these are discussed below and cross-referenced to specific examples on the interpretive figures, where appropriate.

4.1 FERROUS ANOMALIES

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

Three high magnitude dipolar linear anomalies, (A and B in F2 and C, which crosses F6 and F7), have been identified. These anomalies are caused by sub-surface pipes.

A high concentration of ferrous disturbance, D, is recorded in F3 in the field north-west of Fosse Road Farm. This is caused by the presence of farm equipment and the general accumulation of ferrous detritus close to the farm (see **ILLUS 3**). There is also a notably higher magnetic background in this location, probably due to the increased activity around the farm or possibly spreading of organic materials on the field.

Anomaly E in F8 correlates with a circular feature, probably a pond or small extraction pit, which is recorded on the historic mapping dating back to 1883. The anomaly is caused by the magnetic material used to backfill the depression.

The cause of F is unknown but may also be a former pit/pond – the pipe anomaly C clearly deviates to avoid whatever is the cause of F.

Magnetic disturbance around the perimeter of the survey area and along the field edges is due to ferrous material within the boundaries and by the proximity of farm buildings.

4.2 AGRICULTURAL ANOMALIES

Analysis of historical mapping indicates that the pattern of land division within the survey area has changed substantially since the publication of the first edition Ordnance Survey (OS) map of the area in 1883 with the removal of several boundaries over the last 130 years to create the fewer, larger, fields present today.

Anomalies G to M inclusive all correspond to former boundaries recorded on historic mapping that are no longer extant. Anomaly N, which runs approximately north-west to south-east in the south-eastern half of F4 is not recorded on the historic mapping but does, however, appear to follow the general pattern of historic land divisions and has therefore also been interpreted as a former field boundary.

Broader, parallel and slightly sinuous linear trends are identified running north-west to south-east in F4. These anomalies are characteristic of the medieval and post-medieval practice of ridge and furrow cultivation with the striped appearance being due to the contrast between former ridges and the soil-filled furrows. In F2 and F4, similar patterns are visible running north-east to south-west, and are indicative of recent ploughing.

4.3 GEOLOGICAL ANOMALIES

Throughout the survey area numerous discrete anomalies have been identified. The distribution of these anomalies appears to be linked to the presence of the superficial deposits (see **ILLUS 9**) with the greatest concentration where the lacustrine deposits are present, notably in F9, with fewer in the areas where head deposits predominate. Where there are no superficial deposits discrete anomalies are still recorded but in far fewer numbers. These anomalies are all due to small variations in the composition of the soils, most notably the localised presence of magnetic gravels.

Geological boundaries are clearly distinguishable in the data. The dashed line O in F4 marks the boundary between the area to the north where there are no superficial deposits and the zone of head to the south. This boundary is defined as an edge beyond which the ridge and furrow anomalies are no longer visible. This effect suggests that it may be more difficult to identify, particularly weaker anomalies, where there are superficial deposits.

In F8 there appears to be a greater concentration of discrete anomalies in the zone of head deposits than in the lacustrine deposits immediately to the south. This boundary is marked by the dashed line, P. Within this band of lacustrine deposits a cluster of anomalies are defined within the dashed lines, Q.

4.4 ARCHAEOLOGICAL AND POSSIBLE ARCHAEOLOGICAL ANOMALIES

Running parallel with and immediately adjacent to Fosse Road on a south-west/north-east alignment are a series of interconnecting linear anomalies which together locate a series of small adjoining enclosures. This roadside activity is defined on the southern side by a linear ditch type anomaly, D1, which extends the full length of F4; there is no evidence for the activity continuing to the south-west into F3 or beyond. A second linear ditch type anomaly, D2, runs parallel with D1 suggestive of a trackway perhaps separating the smaller enclosures from a field system beyond.

Sixteen enclosures, E1 to E16, are fairly well defined with larger enclosures (E1, E2 and E14) at the south-western and north-eastern ends, up to 1600m^2, with a series of smaller enclosures of about 400m^2 in the centre – these latter enclosures are sub-divided by linear anomaly, D3. Within these enclosures numerous discrete anomalies are identified which are also likely to be archaeological in origin due to either industrial and/or settlement activity. A small sub-circular cluster of discrete anomalies, R, probably locates another later extraction pit or pond.

Across the survey area there are a number of other anomalies where a confident interpretation cannot be made and for which an archaeological cause can be considered possible.

Linear ditch type anomaly, T, which runs on a south-eastern alignment in F4 slightly oblique to the direction of the ridge and furrow ploughing, may form the continuation of D1 and could provide evidence for a ditched field system extending beyond the roadside activity. As with the ridge and furrow ploughing anomalies this anomaly is not recorded beyond the interface with the superficial deposits.

A weak, discontinuous linear anomaly, U, running parallel with the road, to the south of the survey area in F1 may possibly also be indicative of an archaeological ditch feature but an agricultural cause is equally plausible given the lack of any other more definite archaeological evidence in this part of the site.

Also in F1 three discrete anomalies, V, W, and X, of higher magnitude than the other discrete geological anomalies, have been interpreted as of possible archaeological origin. However, as with U the lack of more robust evidence of archaeological activity in the vicinity suggests a geological origin is also possible.

Finally, a band of broad, high magnitude discrete anomalies, Y, are identified along the southern edge of F4. Again there is no obvious cause for these anomalies or any other archaeological context to aid interpretation although it is worth noting that this part of the site is close to the edge of Bingham Basin; the anomalies could be consistent with a series of pits. Alternatively a pipe runs along the southern edge of this field and the anomalies may be the result of modern activity. Tree boles are another possibility.

5 CONCLUSION

The geophysical survey has successfully identified, and defined the extent of, an area of clear and high archaeological potential bordering Fosse Road, which is thought to follow the line of Fosse Way, a Roman Road. Anomalies forming a pattern of at least sixteen enclosures all of which also reveal evidence of internal features suggestive of settlement and possibly industrial activity are clearly identified. There is no clear evidence to suggest this activity continues to the south of Fosse Road Farm or into the wider landscape although a single linear anomaly extending southwards from the roadside settlement hints at a possible field system to the south of the roadside settlement.

An enigmatic cluster of discrete anomalies close to the edge of a former lake are also of potential interest although an archaeological interpretation is considered tentative.

The presence of superficial geology across parts of the site may be having an effect on the identification of weaker anomalies. Certainly ridge and furrow anomalies, clearly identifiable where there are no superficial deposits, are no longer visible on the head deposits. Therefore the possibility remains that there may be archaeological features present across parts of the site that have not been identified by the survey. However, it would be expected that any major archaeological activity, such as that located along Fosse Road, would still be identified even with the potentially reduced magnetic contrast in the areas of superficial deposits.

Elsewhere anomalies indicative of post-medieval agricultural activity, including ridge and furrow ploughing, localised extraction and boundary removal have been identified.

Based solely on the results and interpretation of the geophysical data, the archaeological potential adjacent to Fosse Road in the north-west of the site is assessed as very high. Elsewhere it is assessed as low to moderate.

6 REFERENCES

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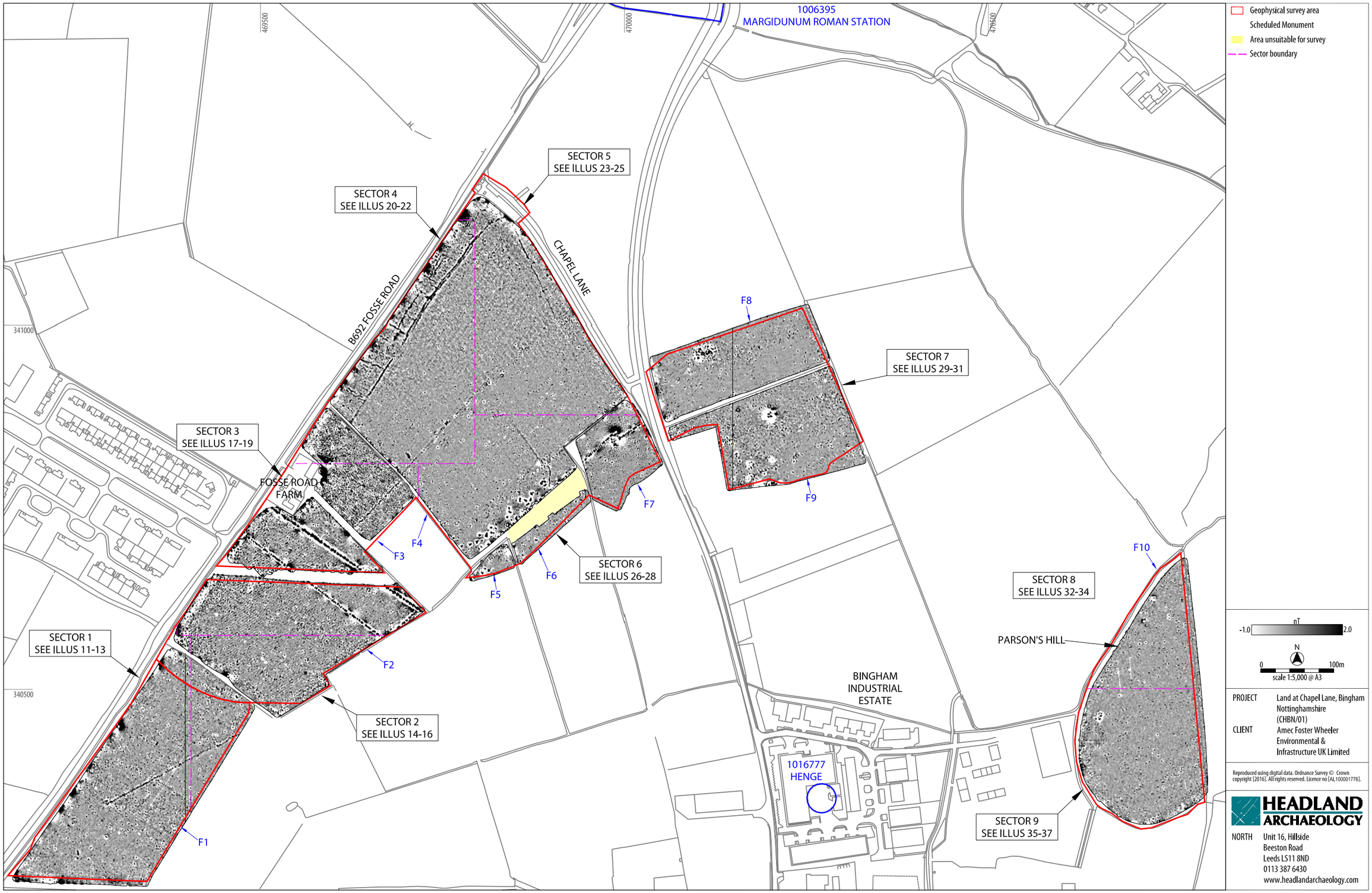
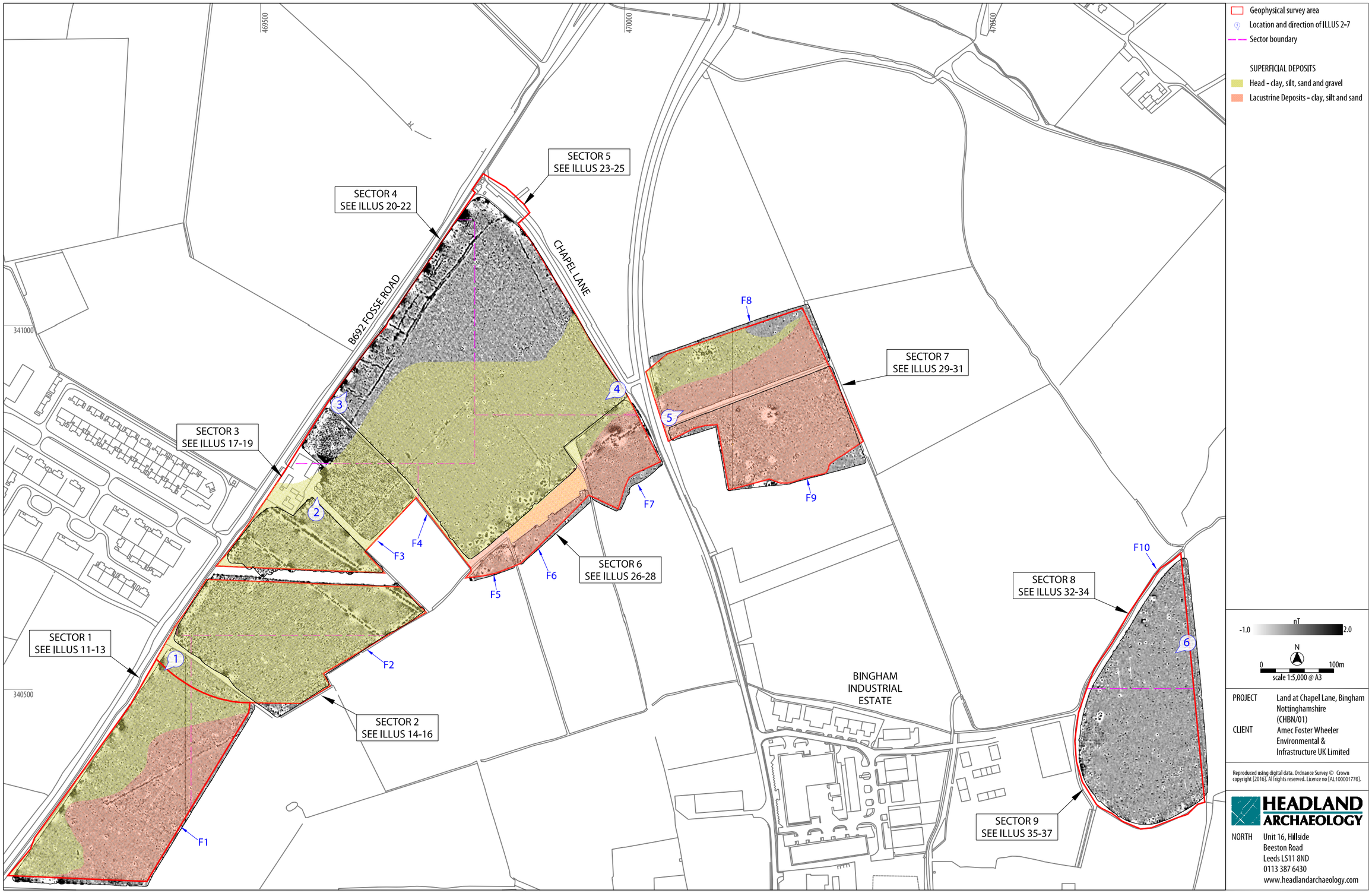
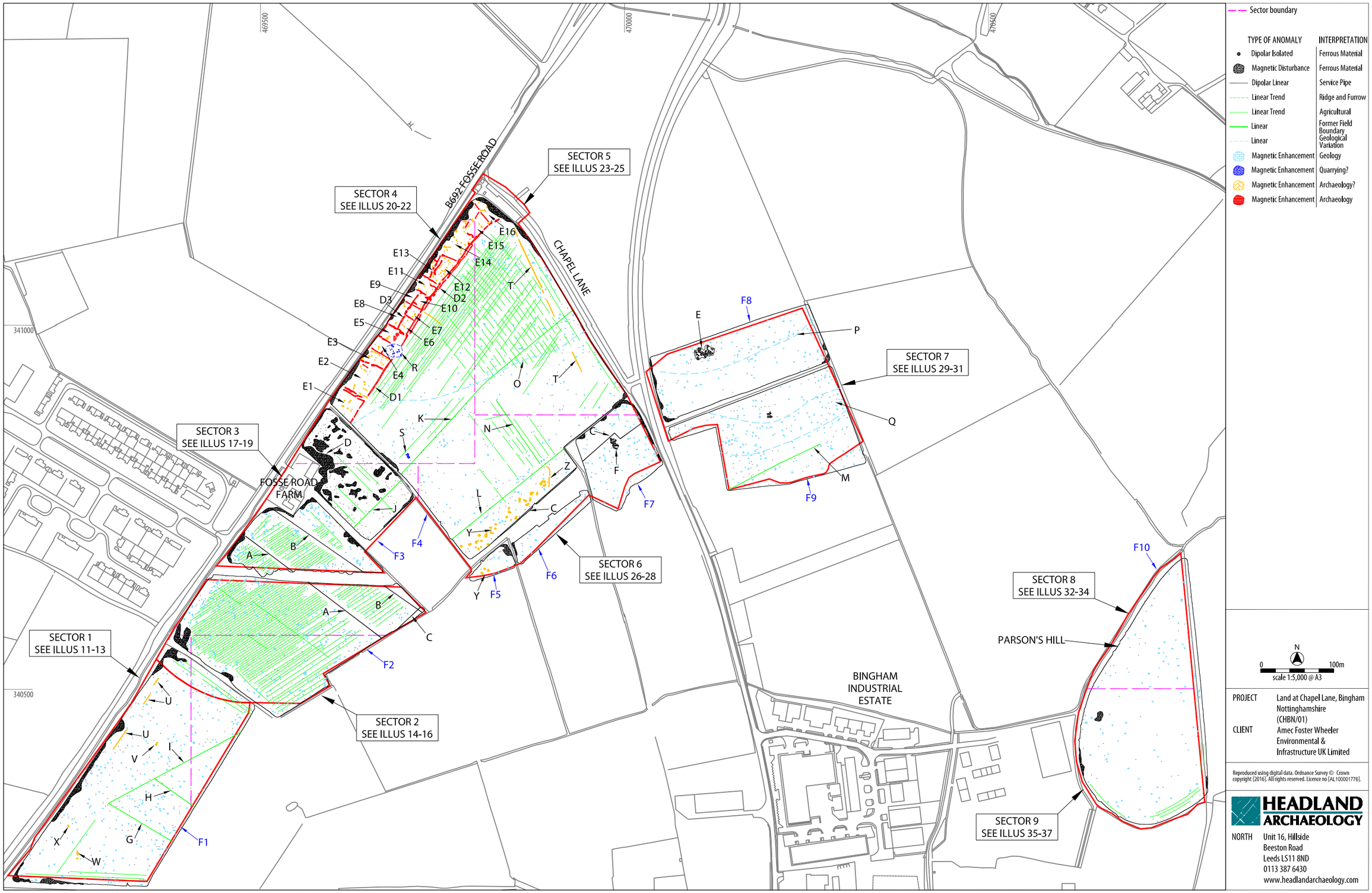


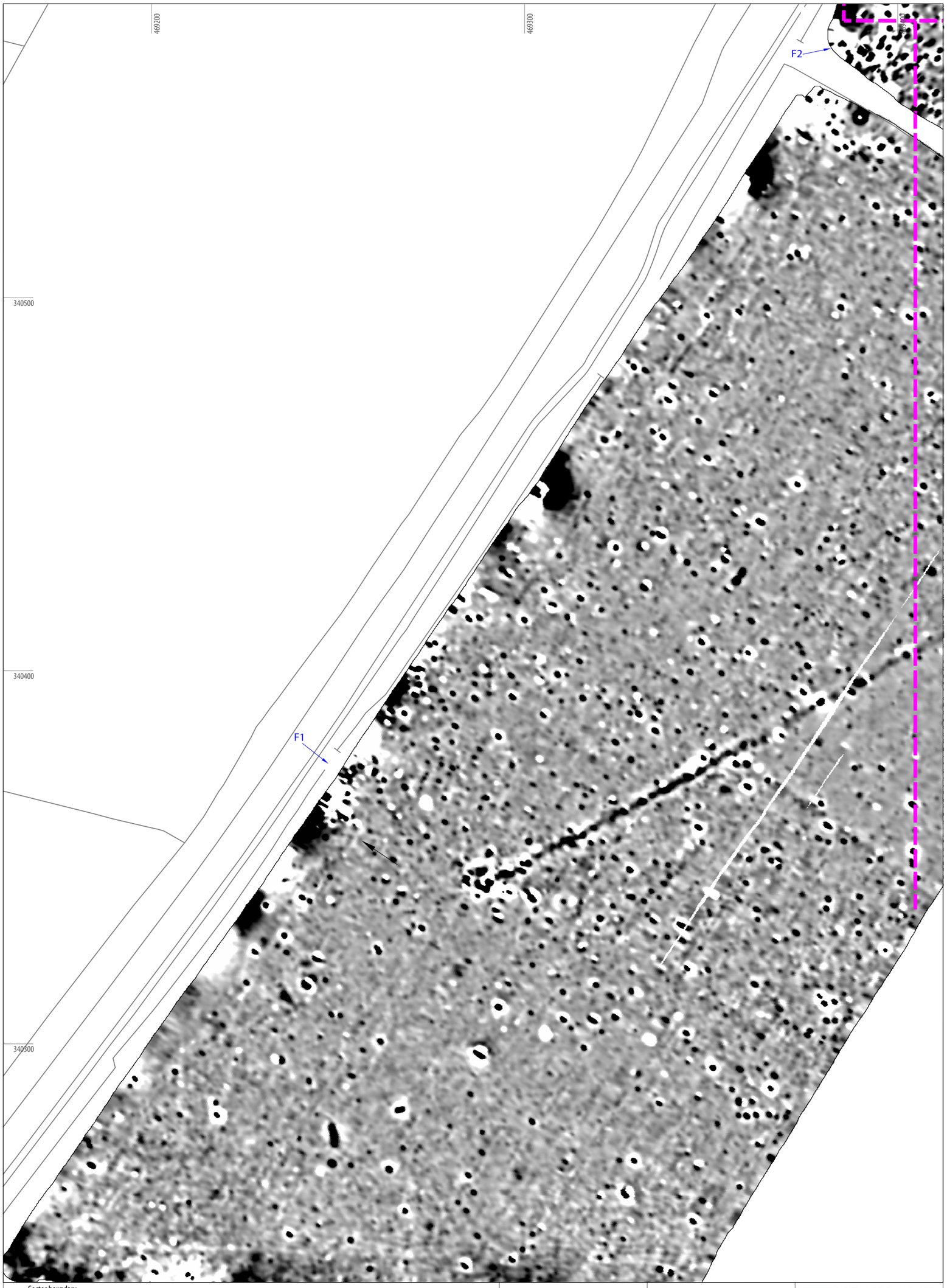
Illus 8
Survey location showing processed greyscale magnetometer data



Illus 9
Processed greyscale magnetometer data overlain by superficial deposits (after BGS 2016)



Illus 10
Overall interpretation of magnetometer data



Sector boundary

nT
-1.0
2.0

N

0
25m

scale 1:1,000 @ A3

PROJECT Land at Chapel Lane, Bingham Nottinghamshire (CHBN/01)

CLIENT Amec Foster Wheeler Environmental & Infrastructure UK Limited

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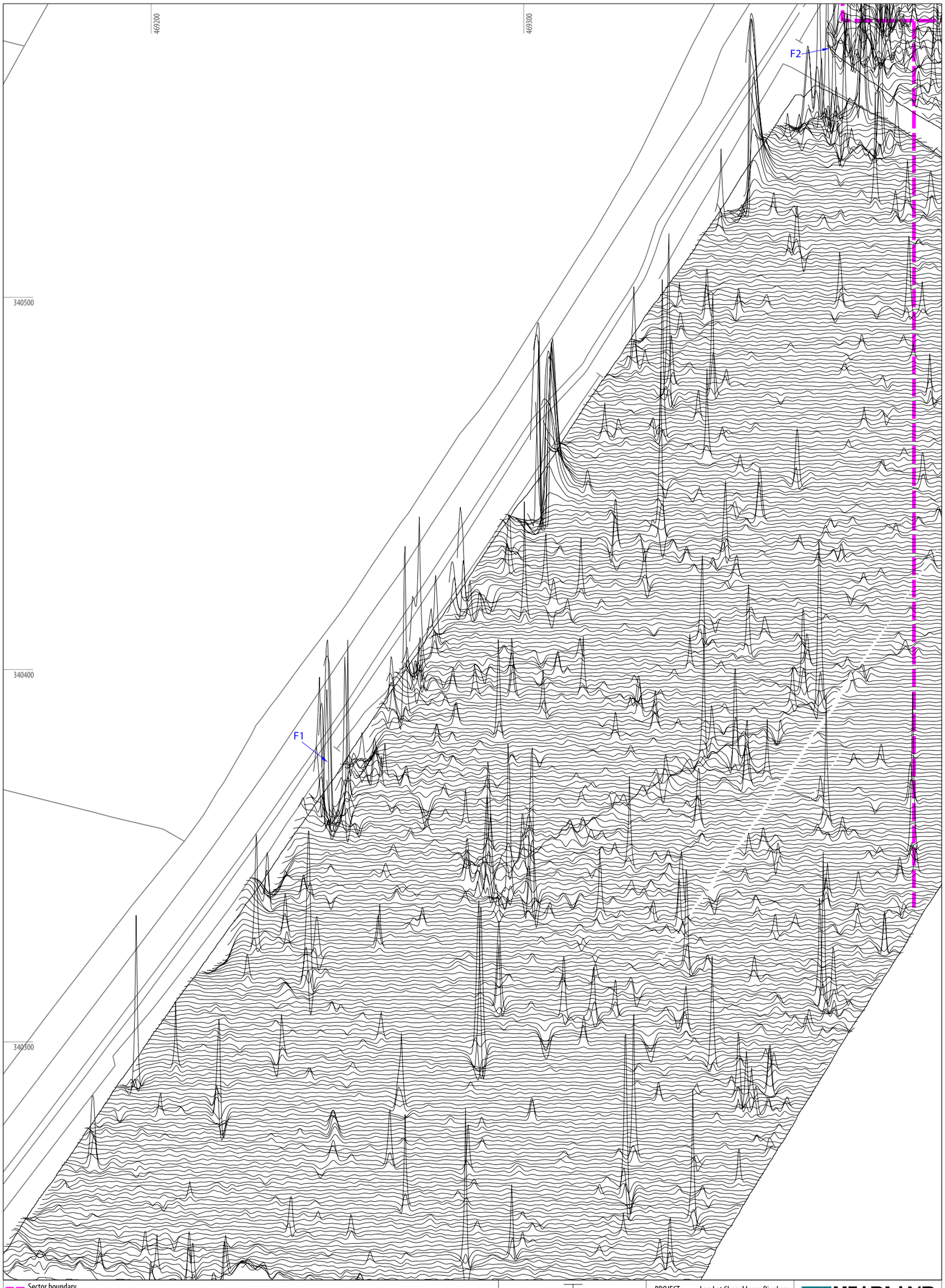
Illus 11
Processed greyscale magnetometer data; Sector 1



Sector boundary

25.0nT/cm

N

0 25m

scale 1:1,000 @ A3

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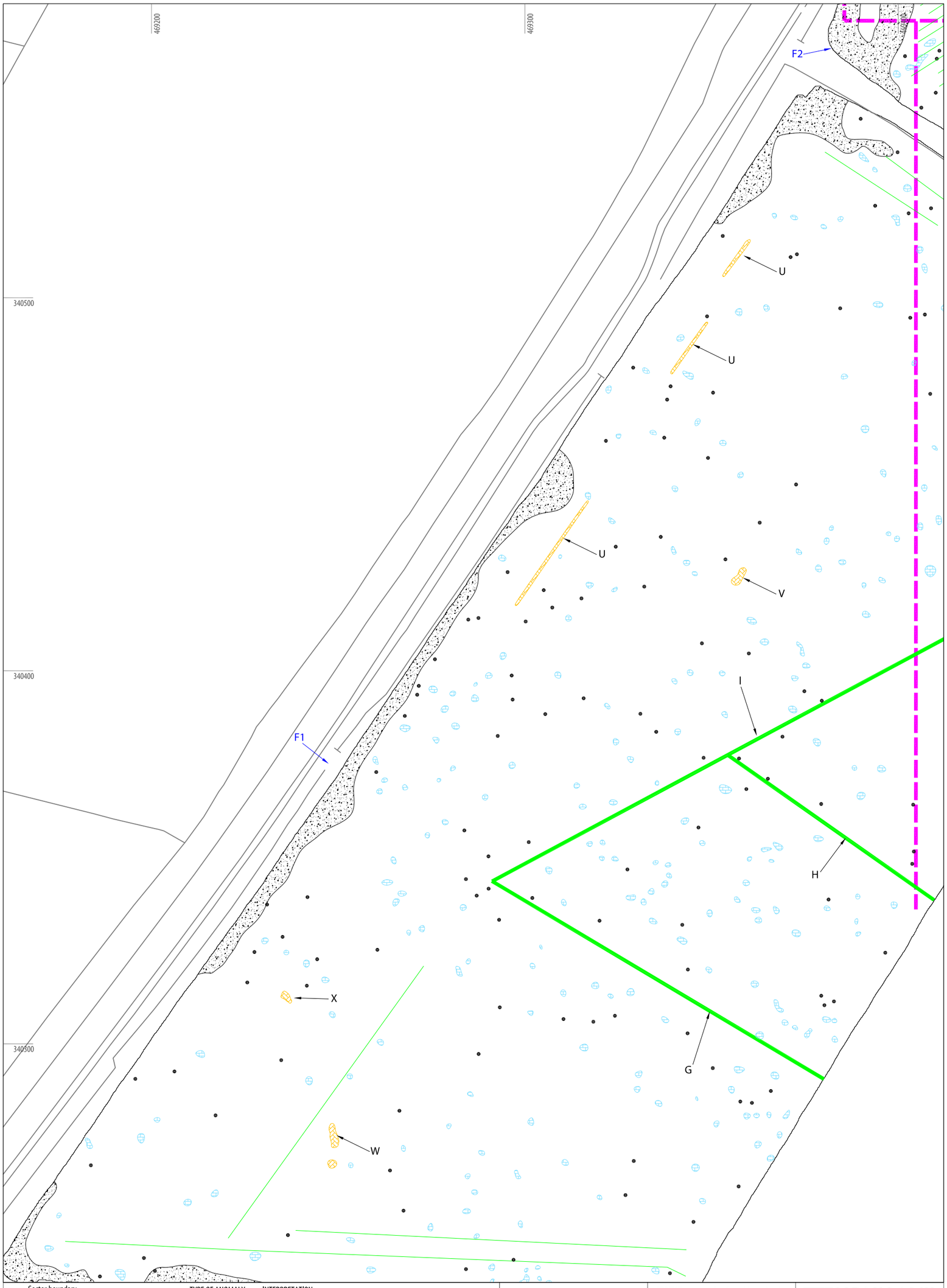
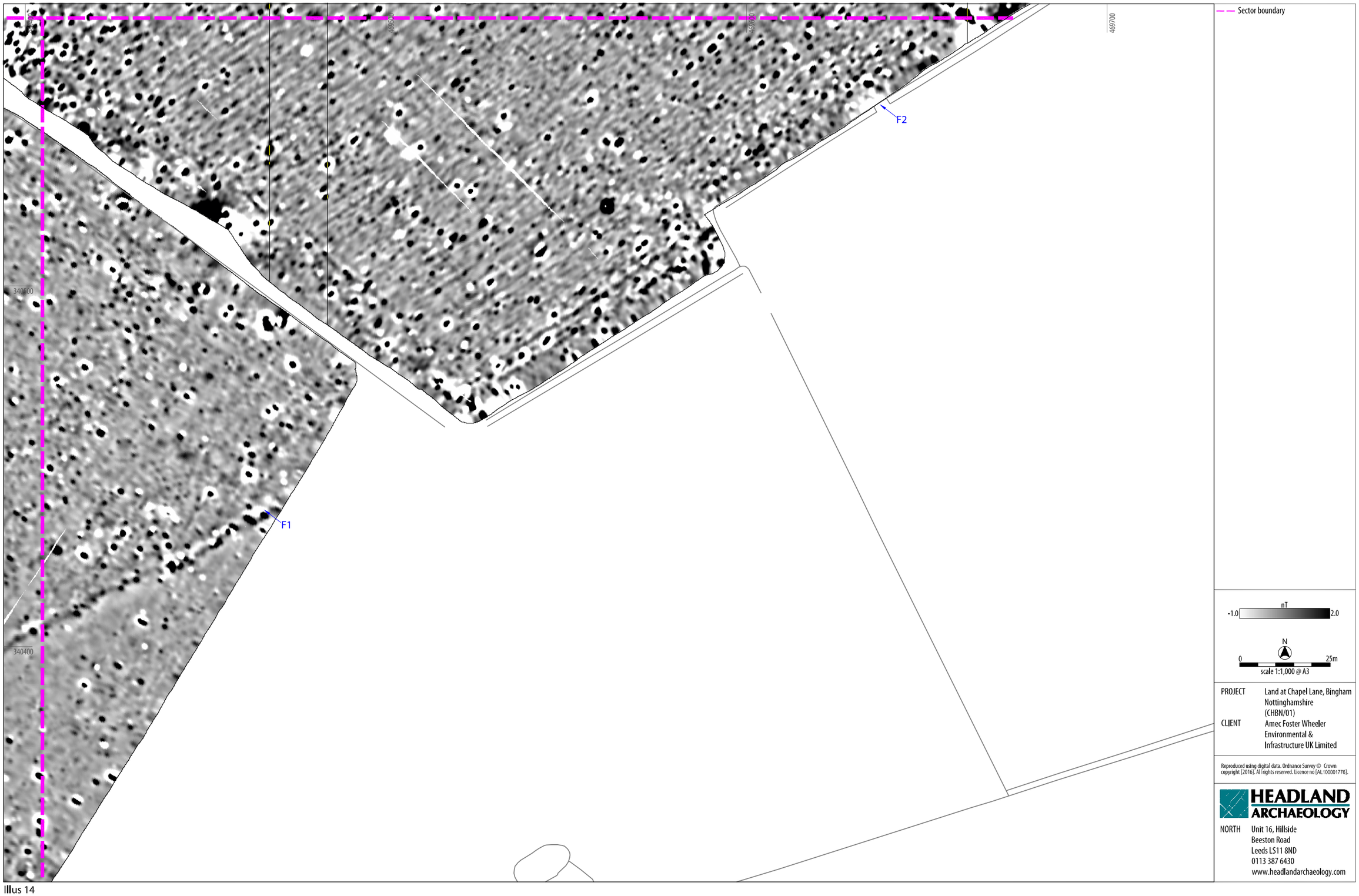
Illus 12
XY trace plot of magnetometer data; Sector 1



Illus 13
Interpretation of magnetometer data; Sector 1



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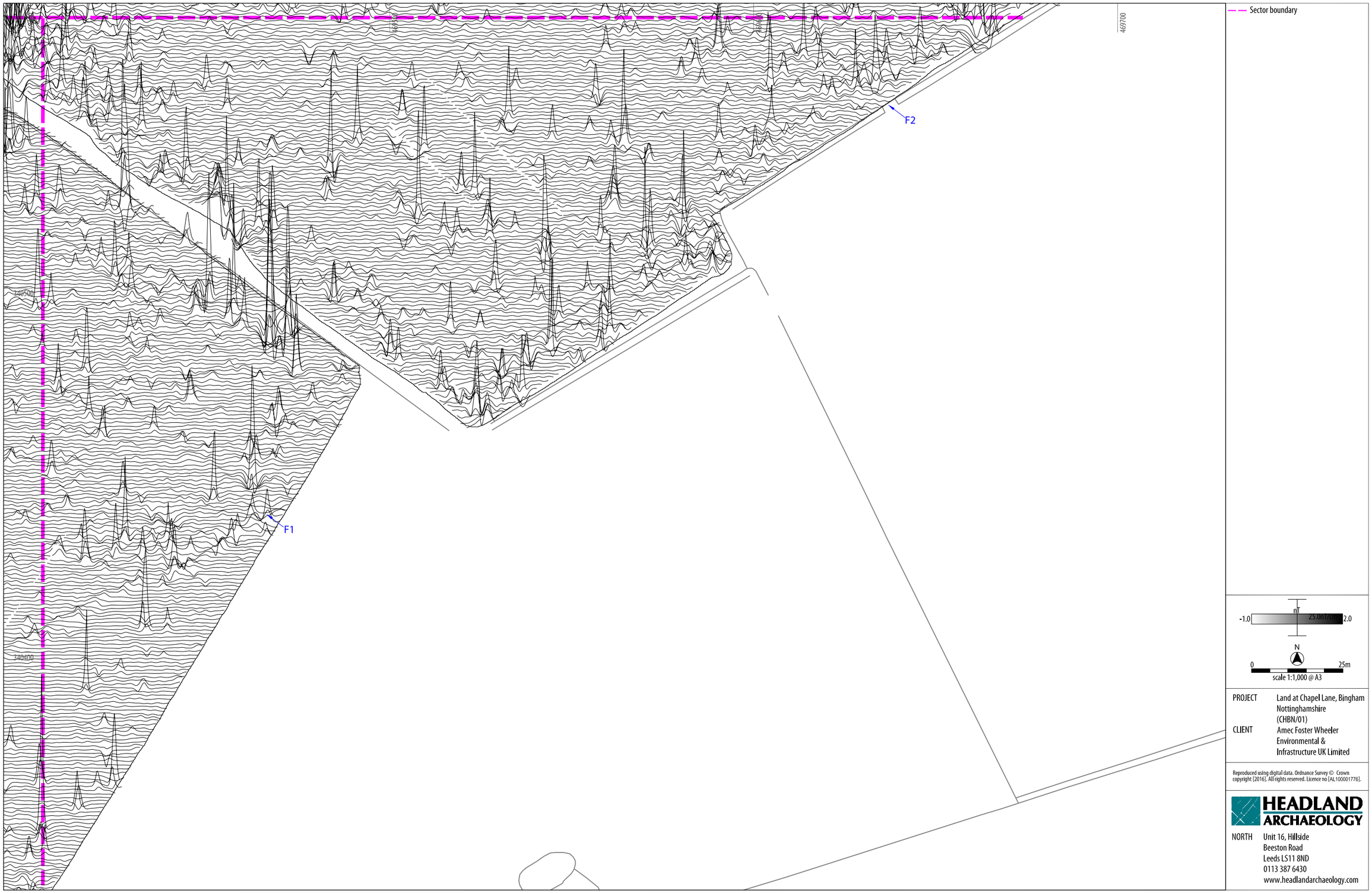
Illus 14
Processed greyscale magnetometer data; Sector 2



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Illus 15
XY trace plot of magnetometer data; Sector 2

Sector boundary

TYPE OF ANOMALY	INTERPRETATION
Dipolar Isolated	Ferrous Material
Magnetic Disturbance	Ferrous Material
Dipolar Linear	Service Pipe
Linear Trend	Agricultural
Linear	Former Field Boundary
Linear	Geology
Magnetic Enhancement	Geology

N

0 25m

scale 1:1,000 @ A3

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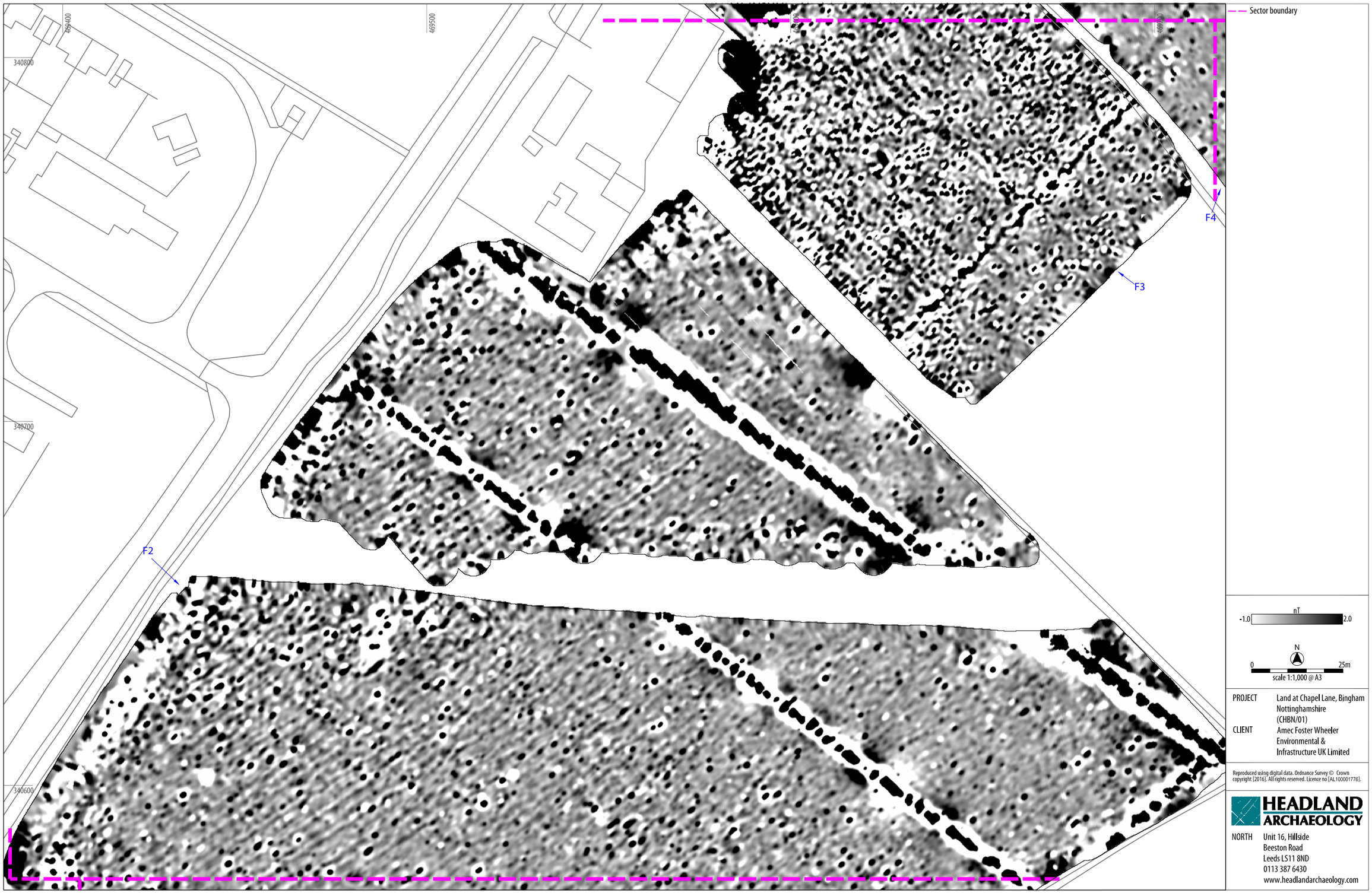
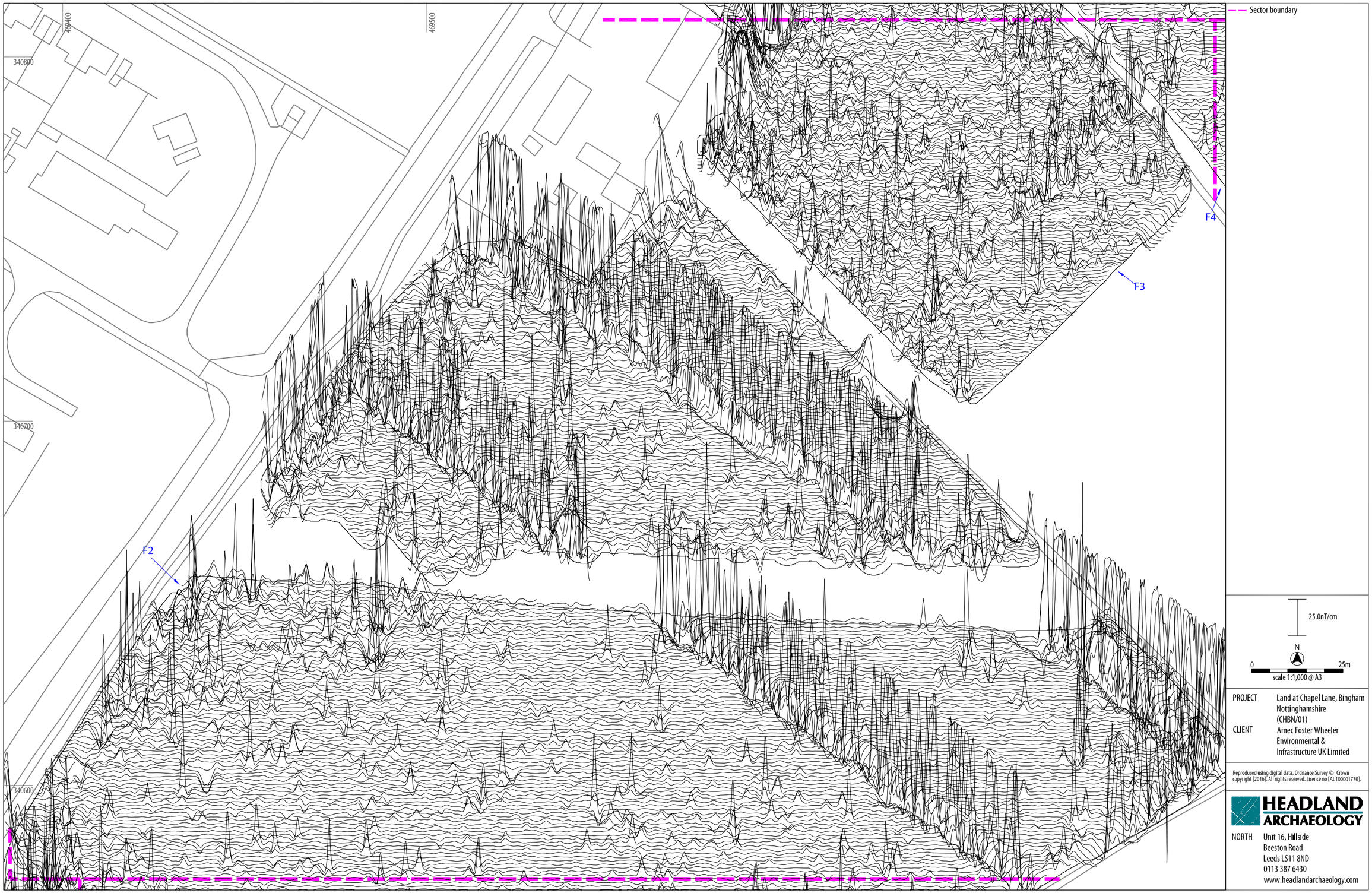
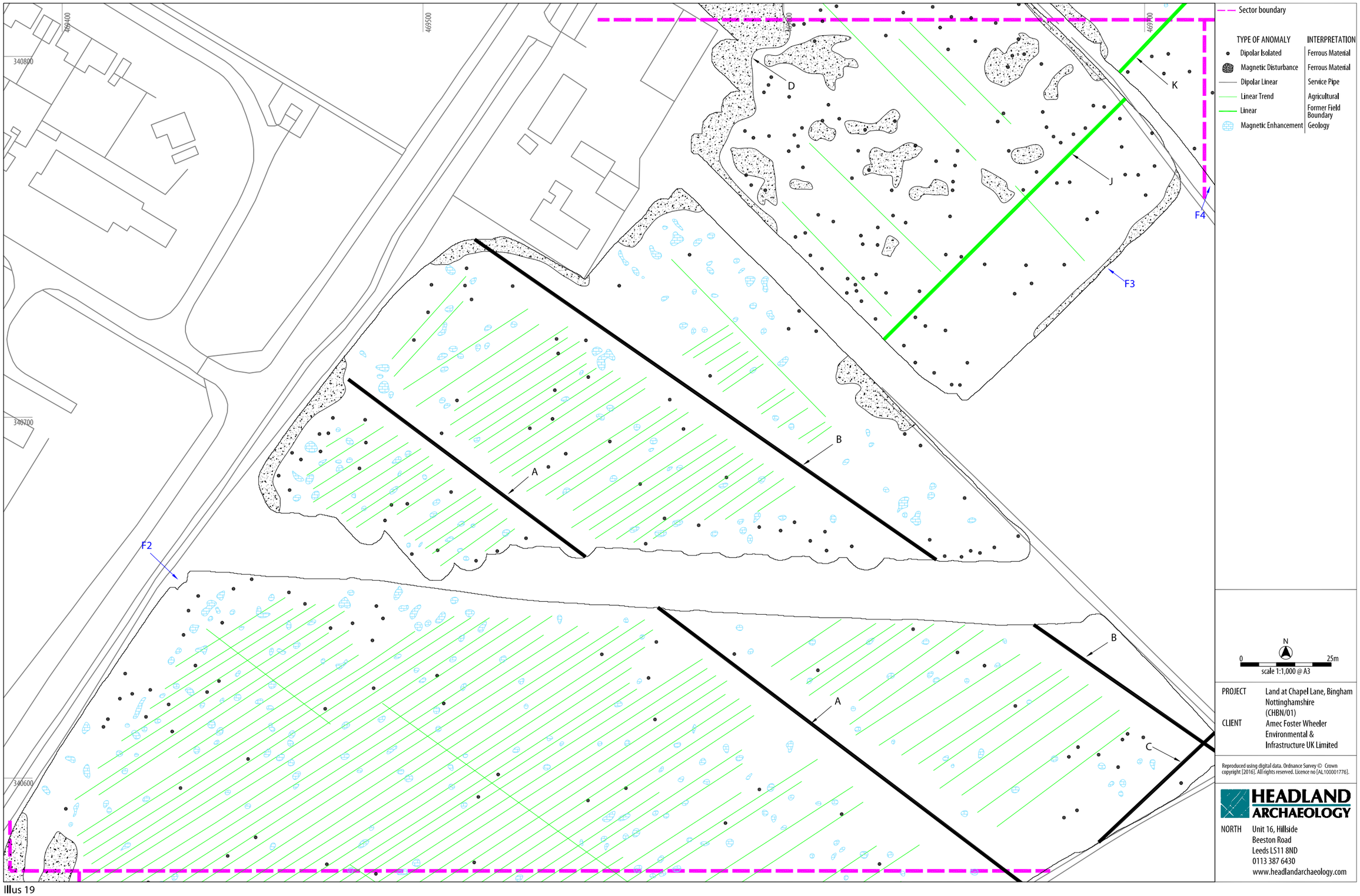
Illus 16
Interpretation of magnetometer data; Sector 2



Illus 17
Processed greyscale magnetometer data; Sector 3



Illus 18
XY trace plot of magnetometer data; Sector 3



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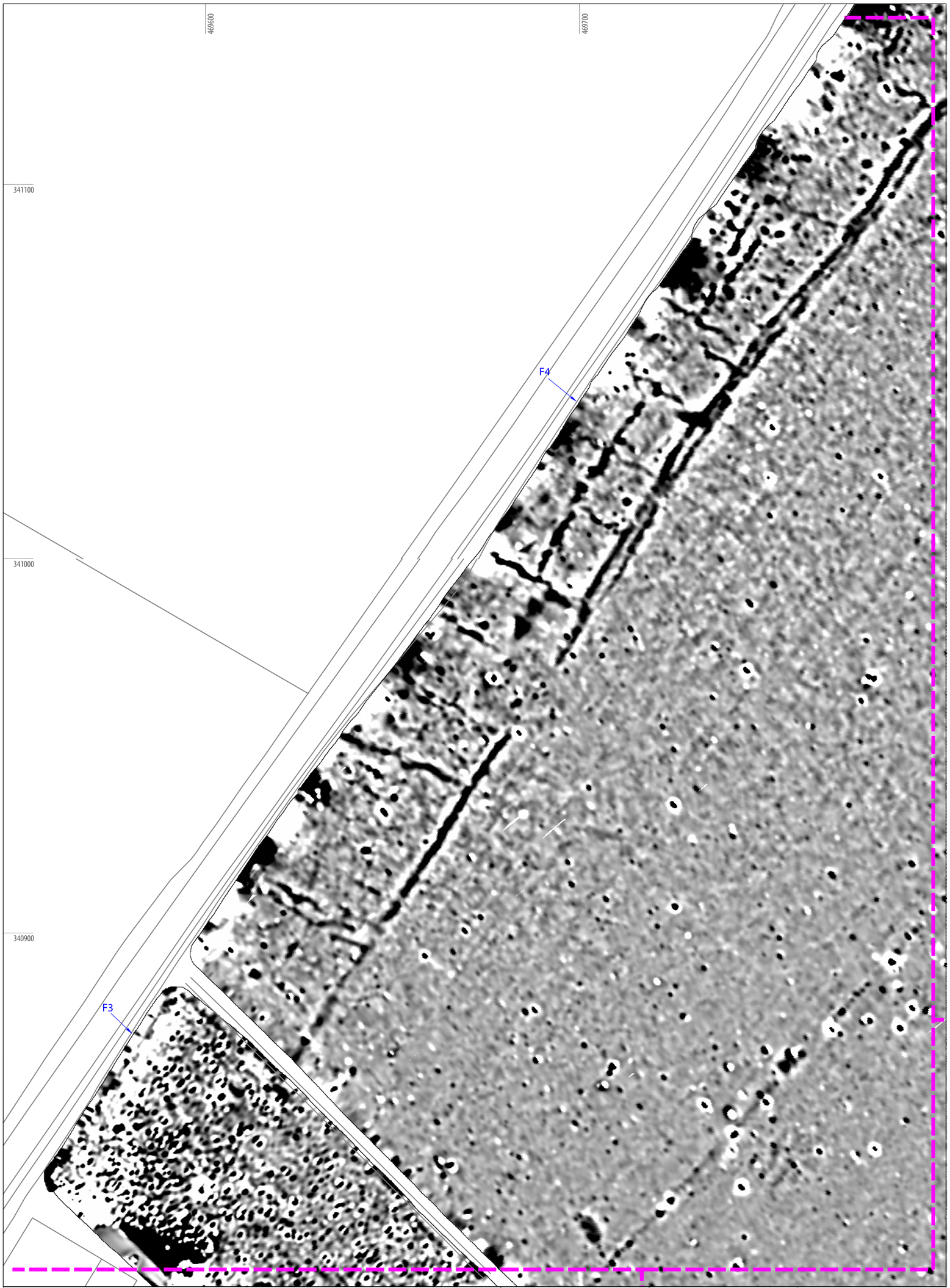
Illus 19
Interpretation of magnetometer data; Sector 3



Sector boundary

nT
-1.0
2.0

N
0
25m
scale 1:1,000 @ A3

PROJECT Land at Chapel Lane, Bingham Nottinghamshire (CHBN/01)

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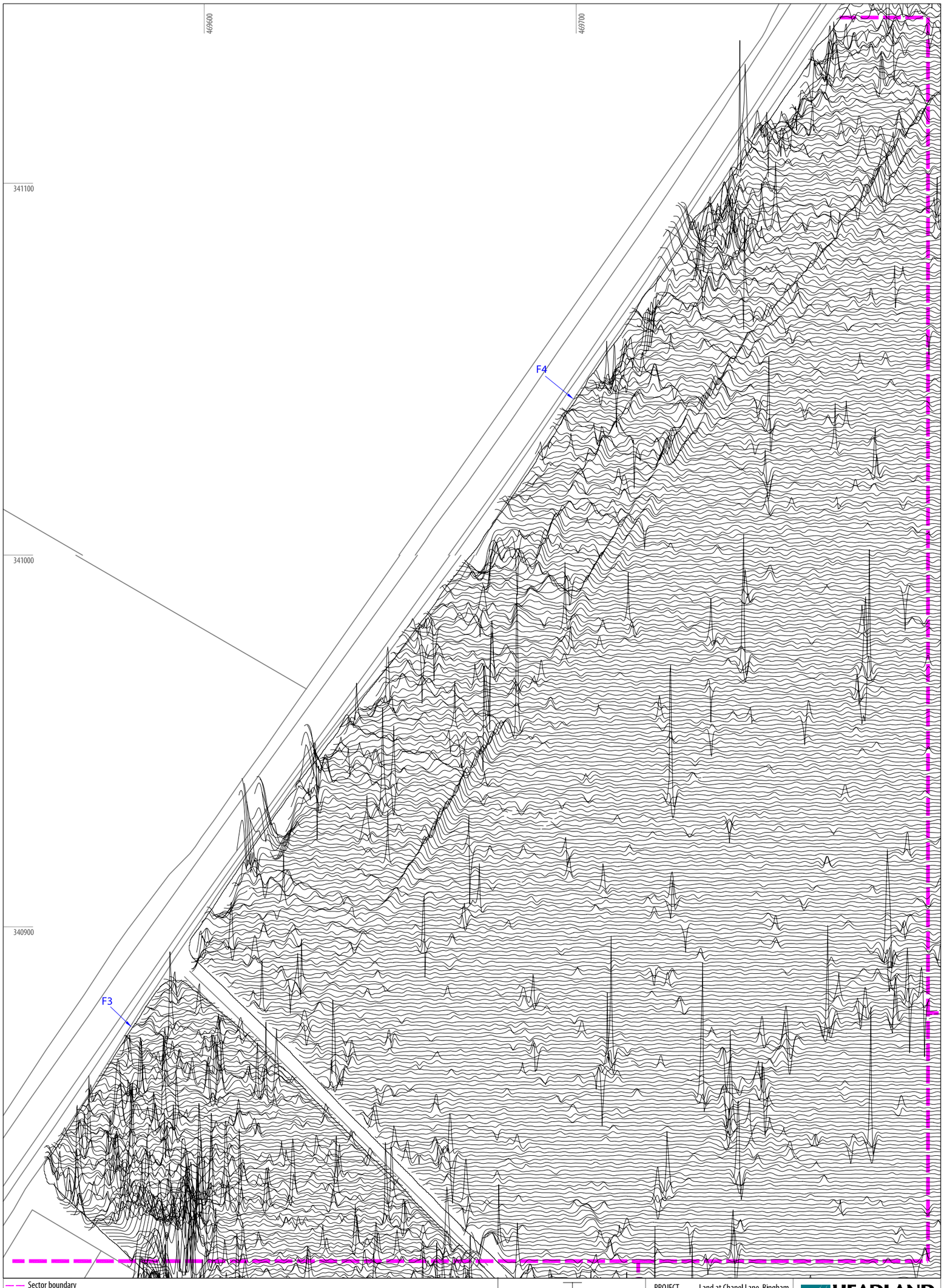
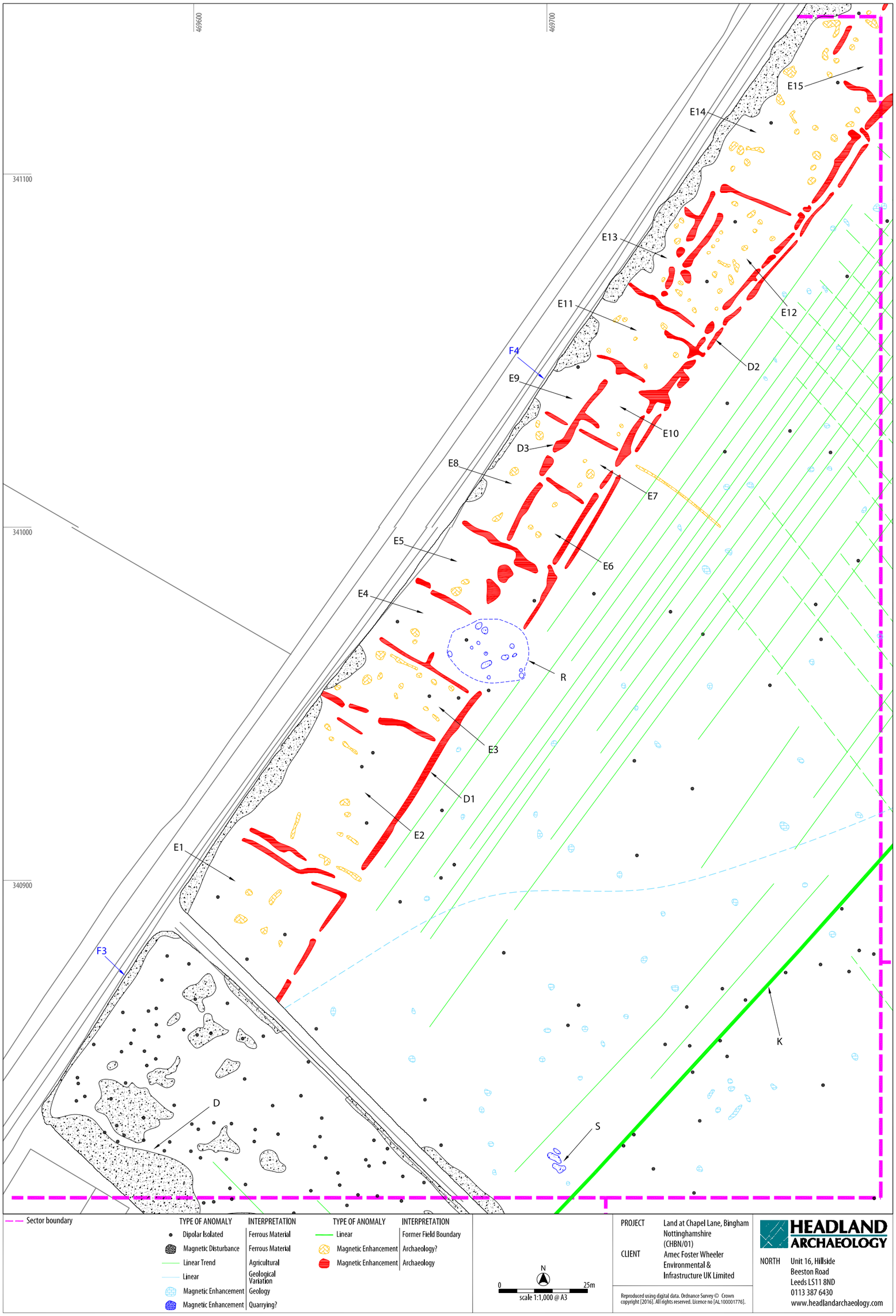
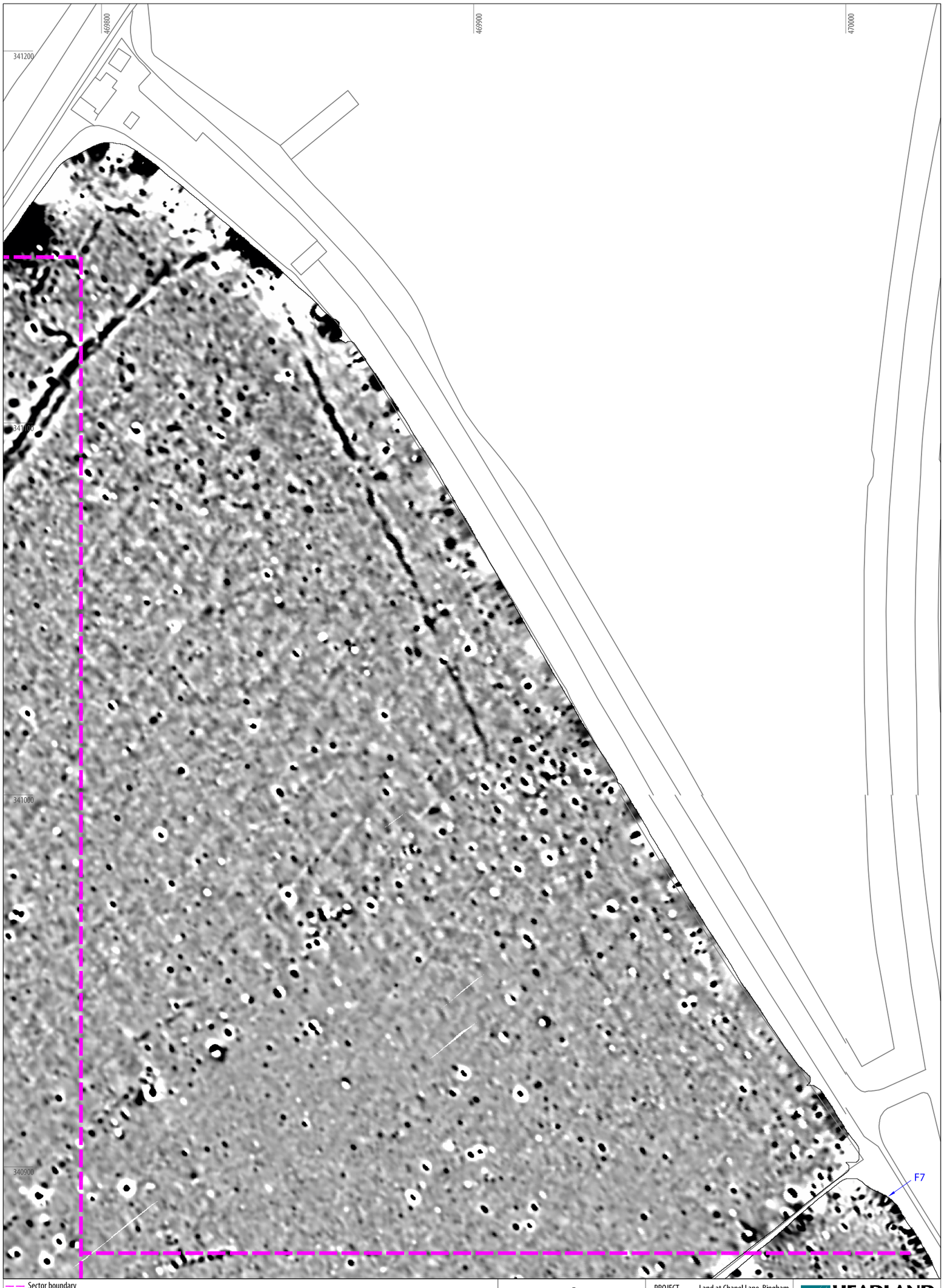
Illus 20
Processed greyscale magnetometer data; Sector 4



Illus 21
XY trace plot of magnetometer data; Sector 4



Illus 22
Interpretation of magnetometer data; Sector 4



Illus 23
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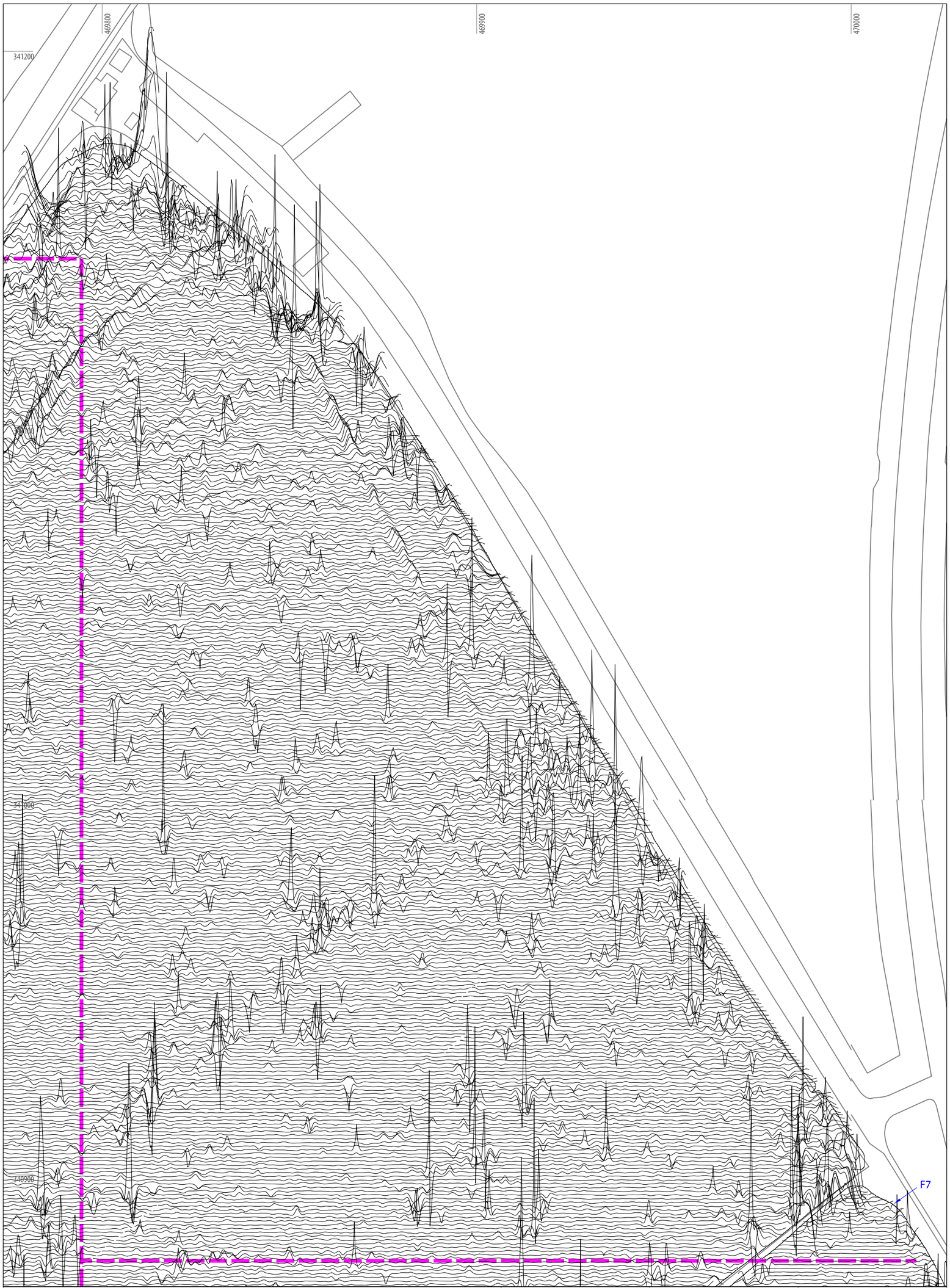

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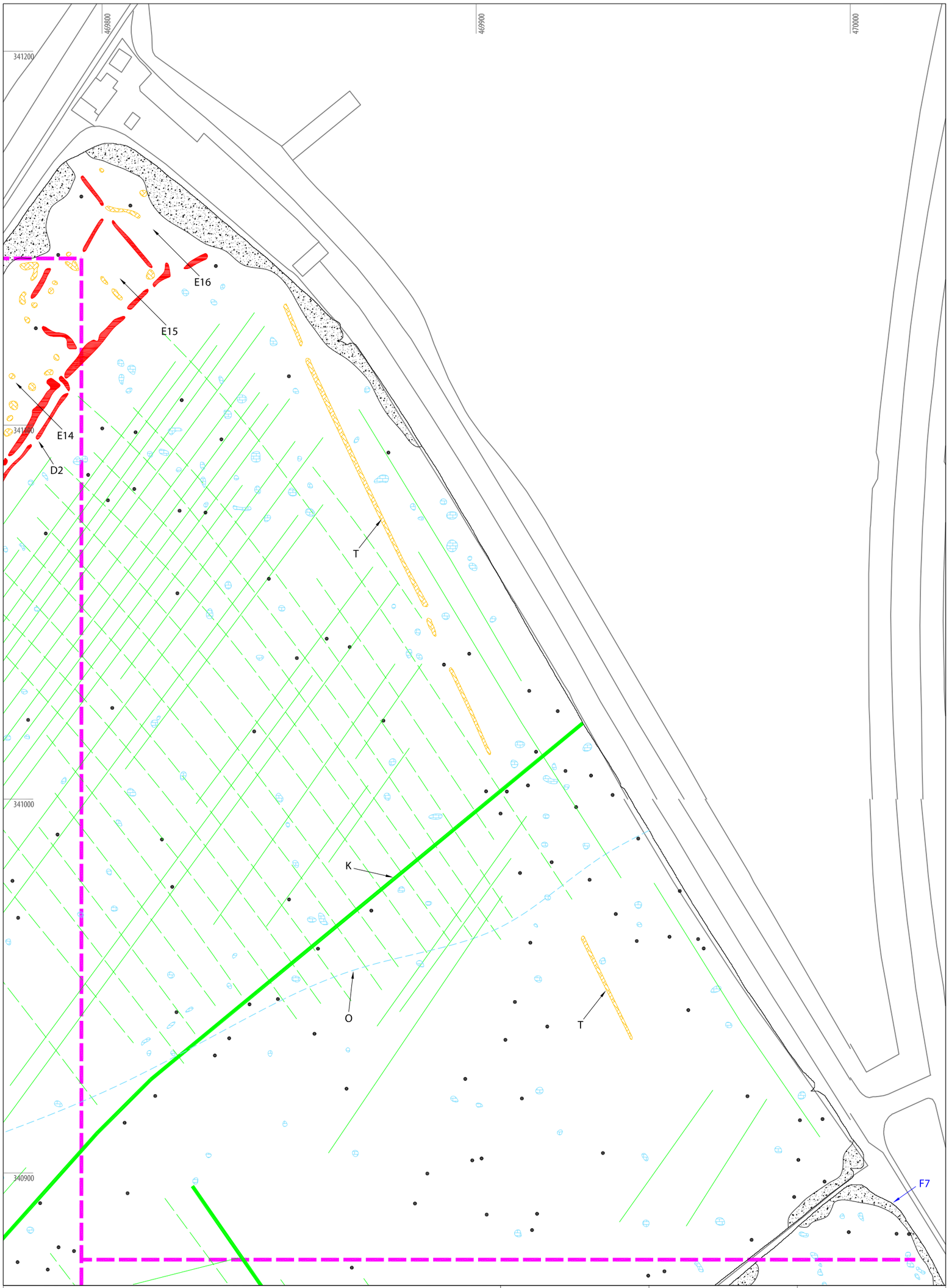

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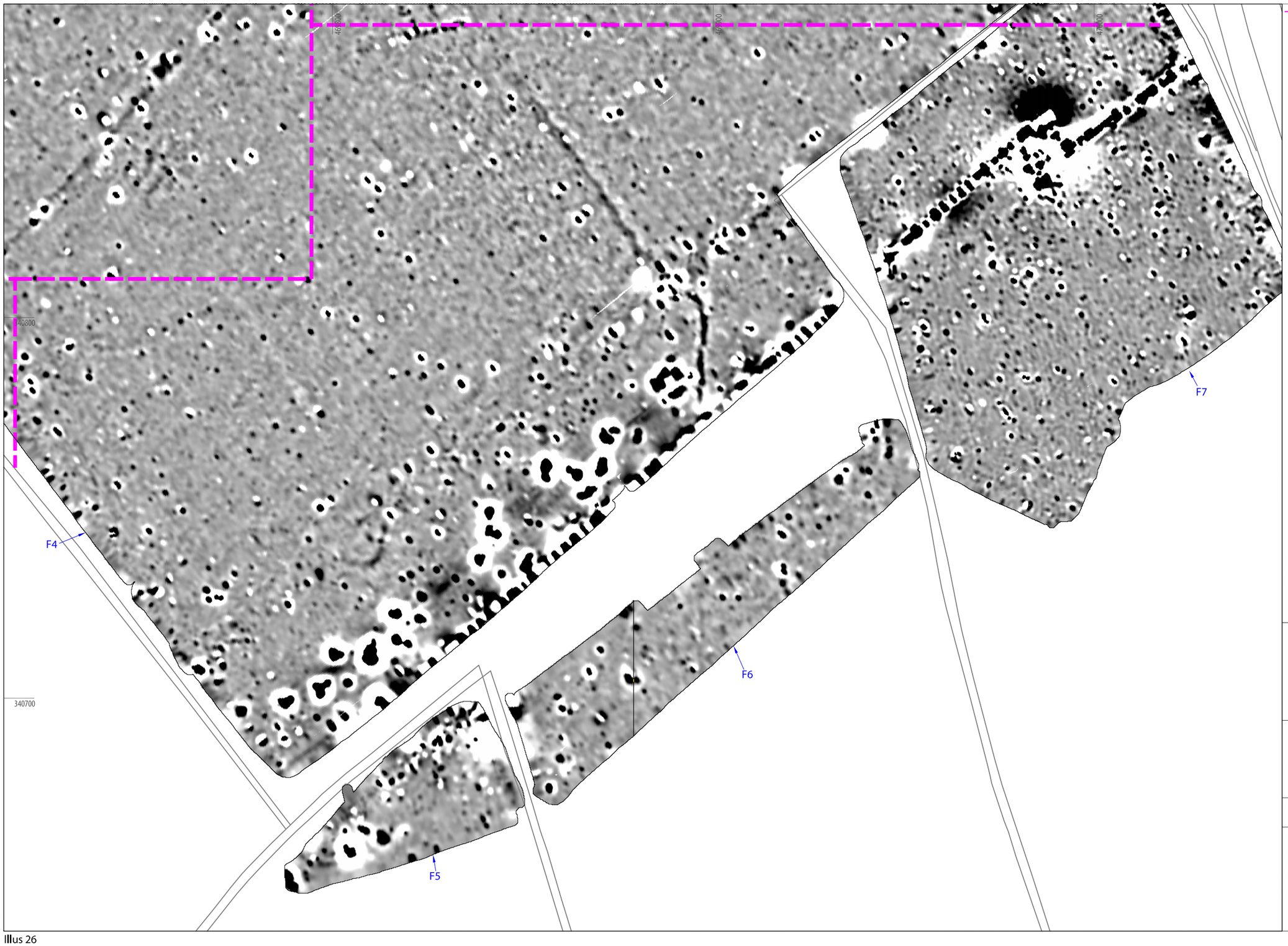
Interpretation of magnetometer data; Sector 5



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Nottinghamshire
(CHBN/01)

CLIENT Amec Foster Wheeler
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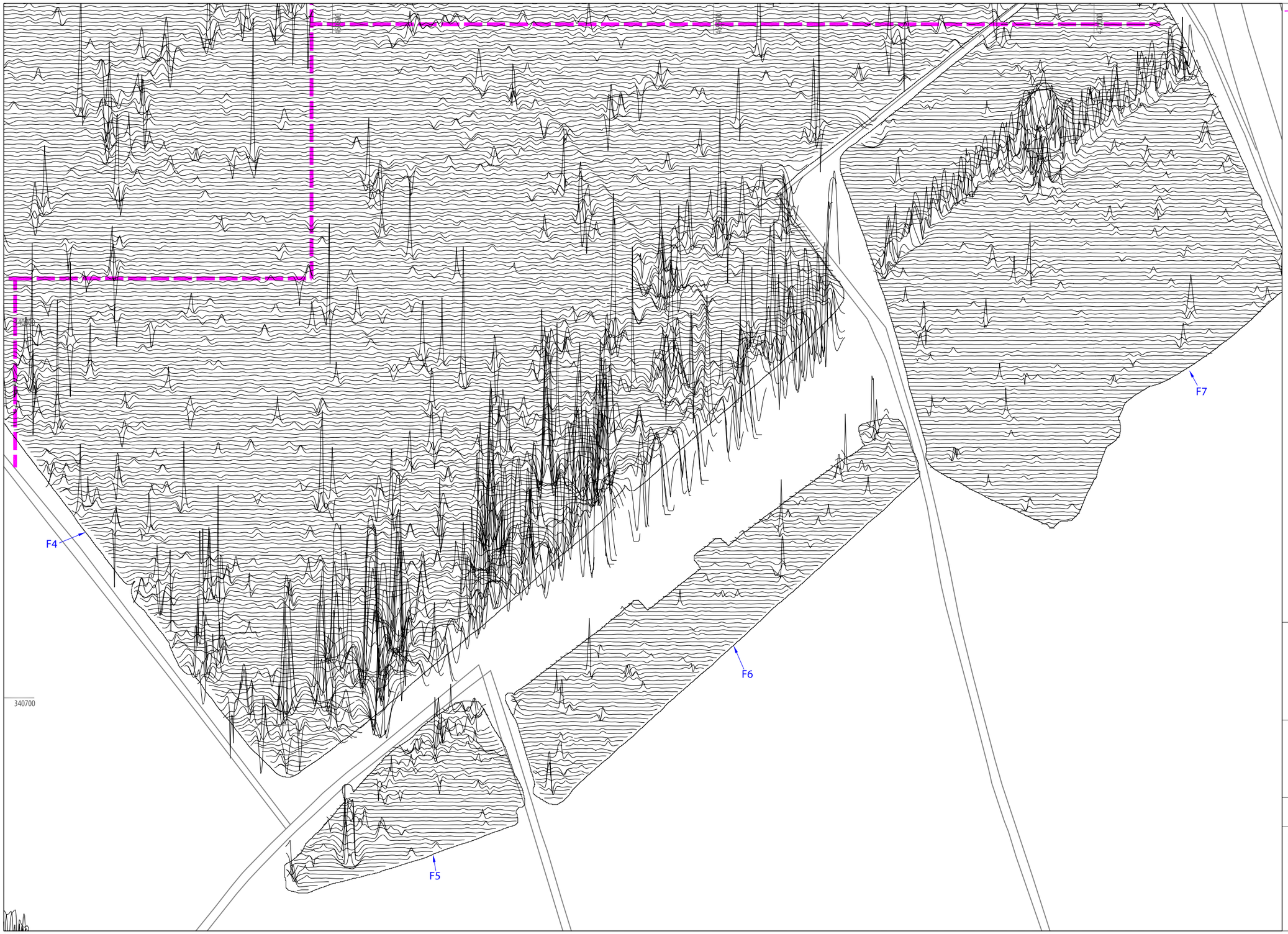
Illus 26
Processed greyscale magnetometer data; Sector 6



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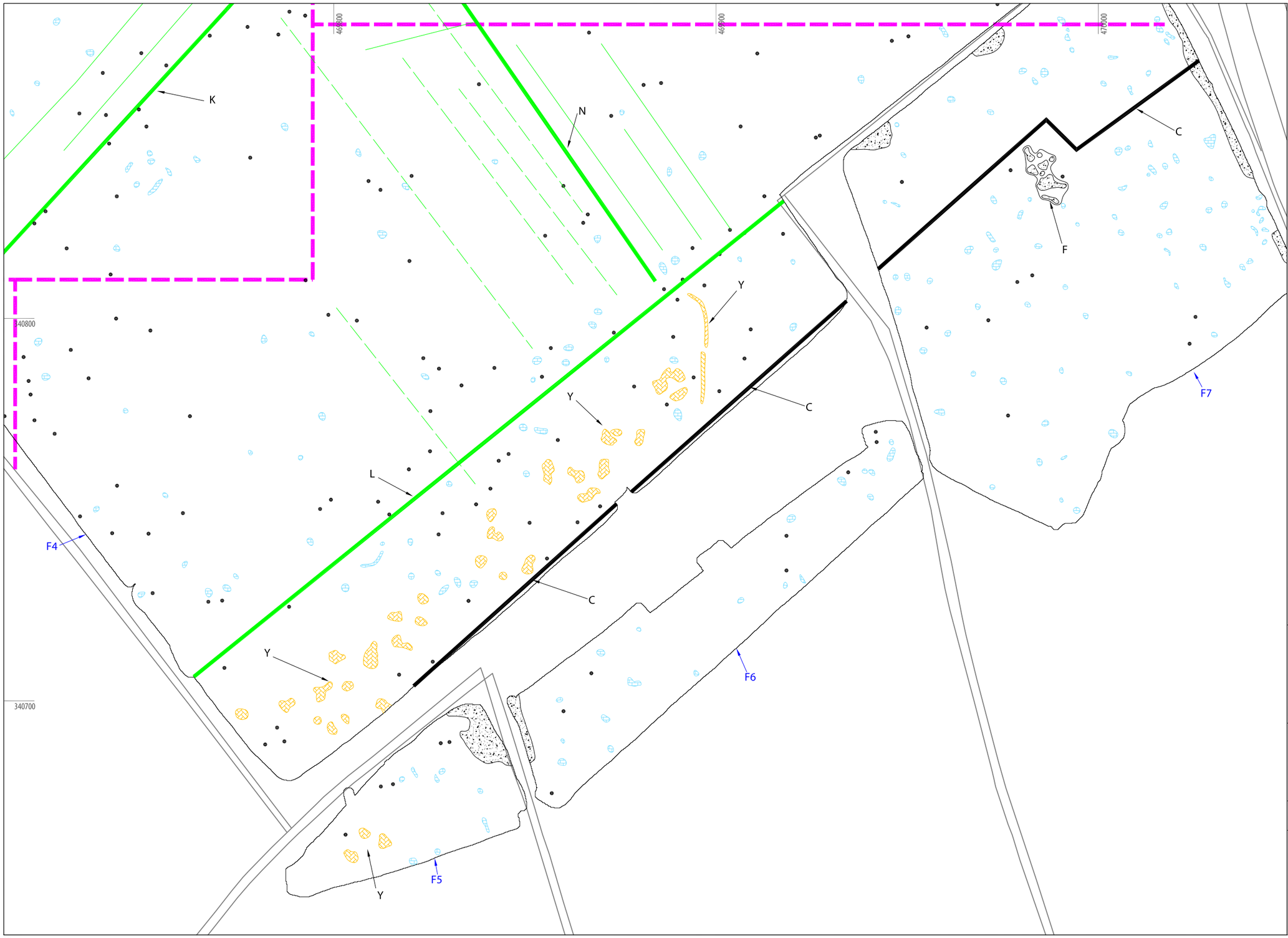
Illus 27
XY trace plot of magnetometer data; Sector 6



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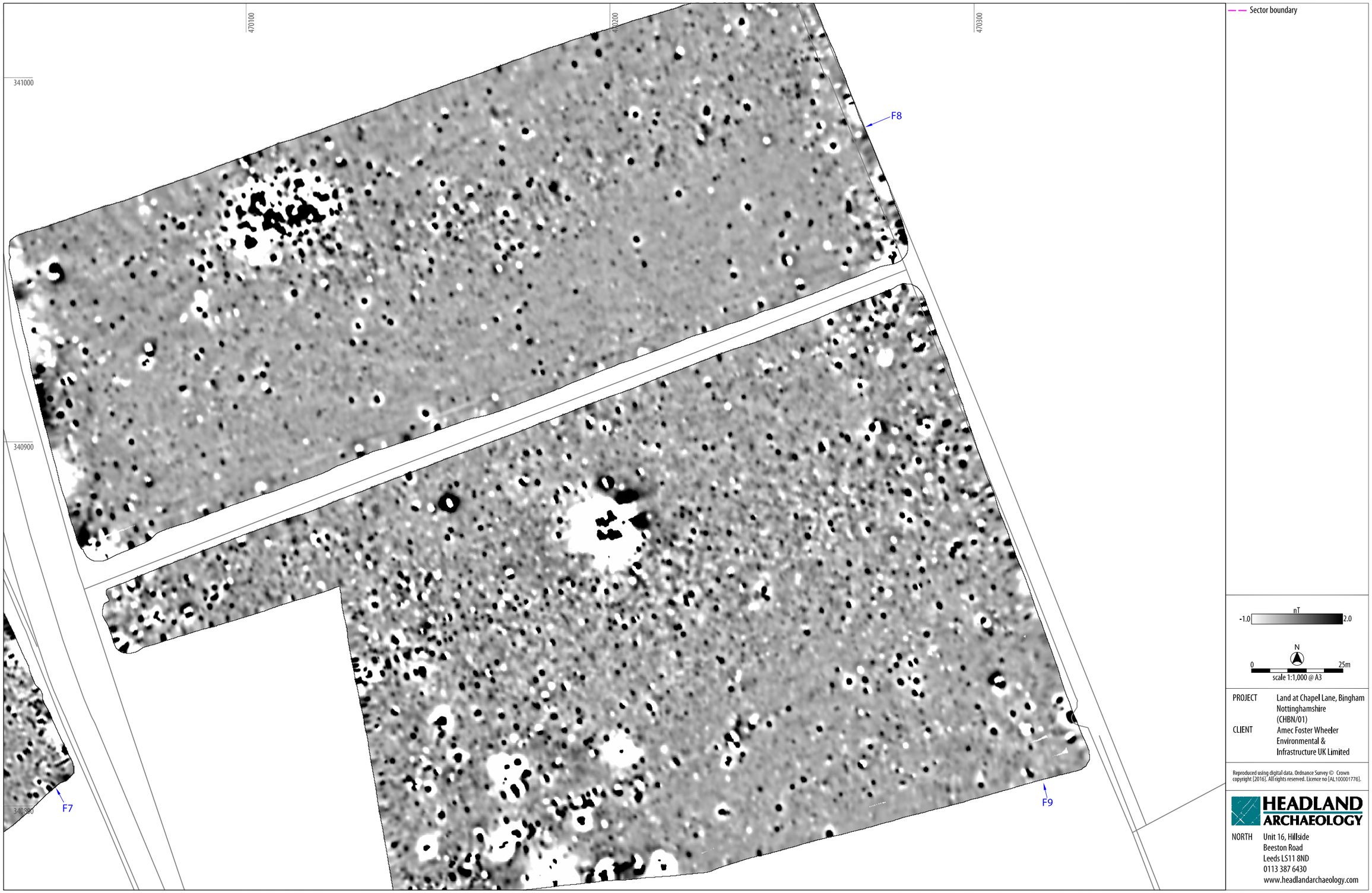
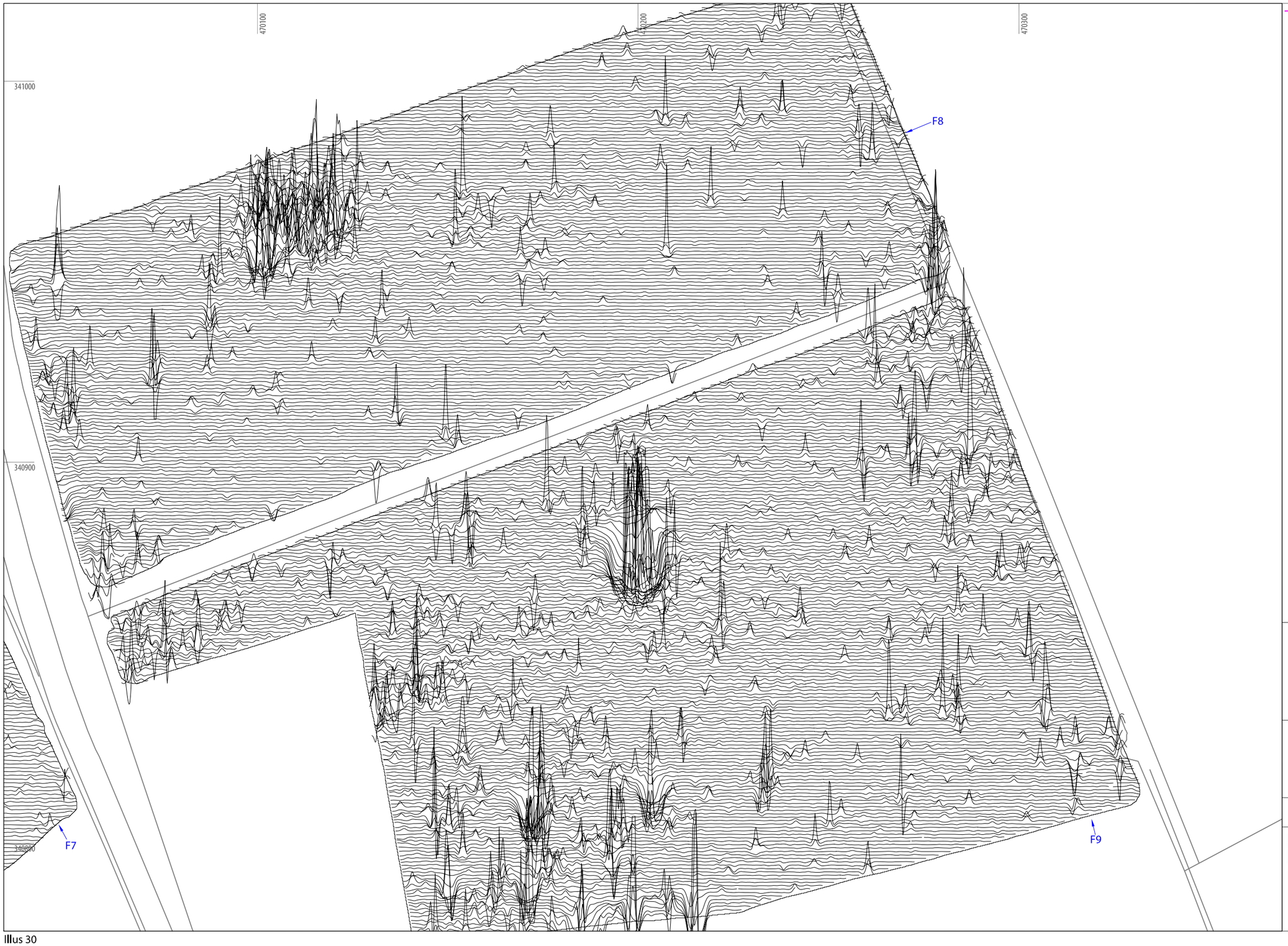
Illus 28
Interpretation of magnetometer data; Sector 6



Illus 29
Processed greyscale magnetometer data; Sector 7



Sector boundary

25.0nT/cm

N

0 25m

scale 1:1,000 @ A3

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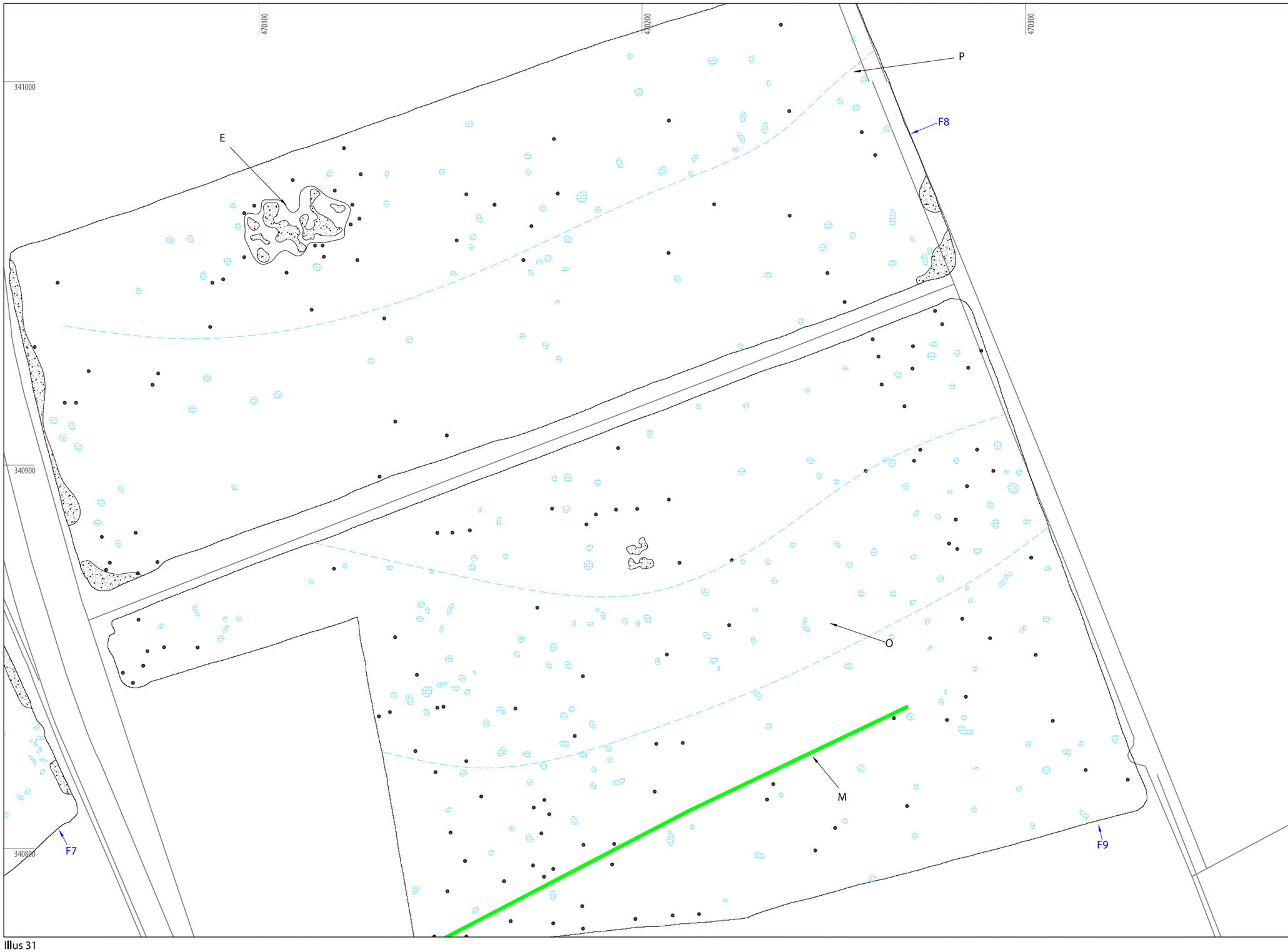
Illus 30
XY trace plot of magnetometer data; Sector 7



Sector boundary

TYPE OF ANOMALY	INTERPRETATION
Dipolar Isolated	Ferrous Material
Magnetic Disturbance	Ferrous Material
Linear	Former Field Boundary
Linear	Geological Variation
Magnetic Enhancement	Geology

N

0 25m

scale 1:1,000 @ A3

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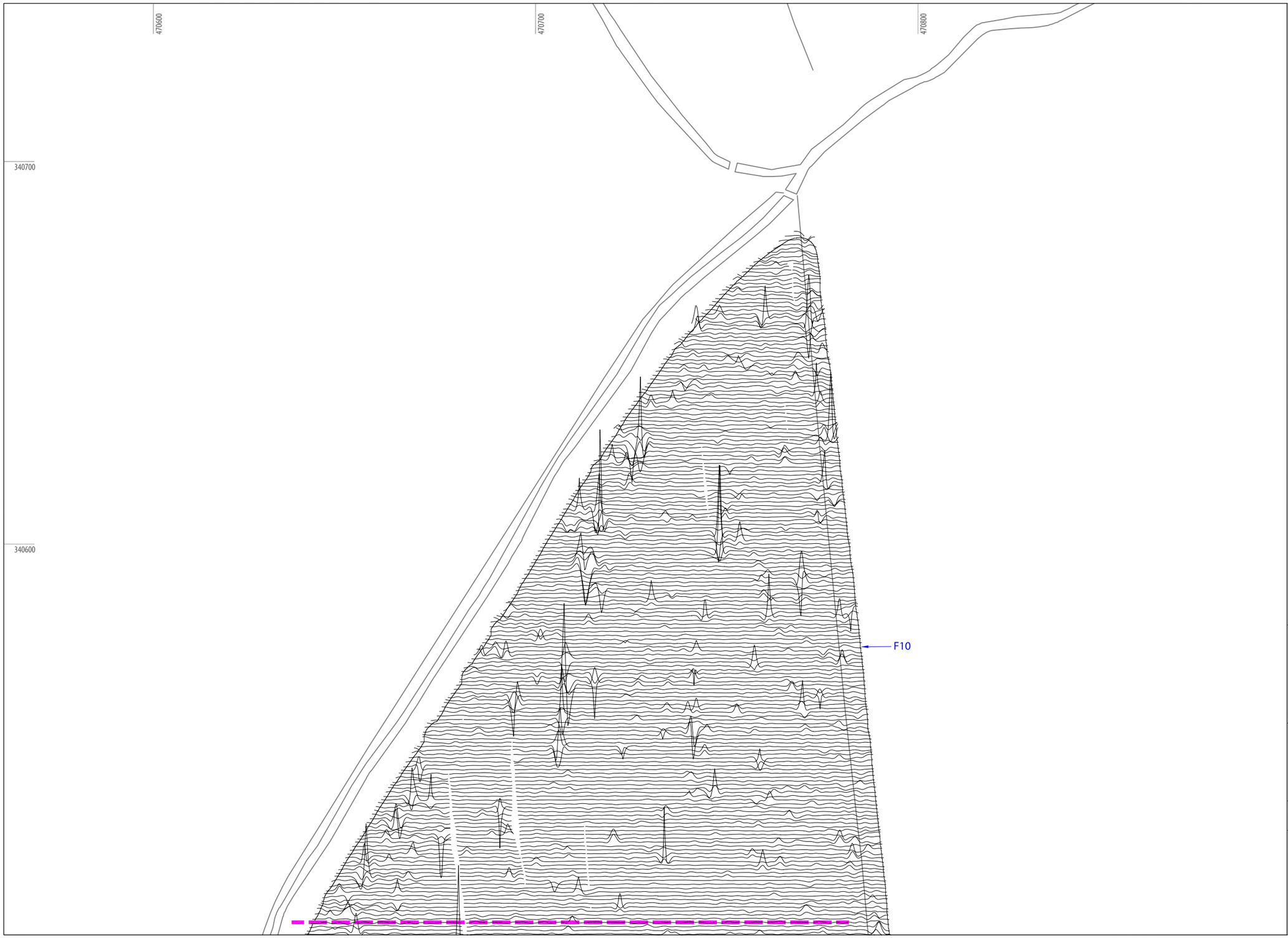
Illus 31
Interpretation of magnetometer data; Sector 7

Illus 32
Processed greyscale magnetometer data; Sector 8



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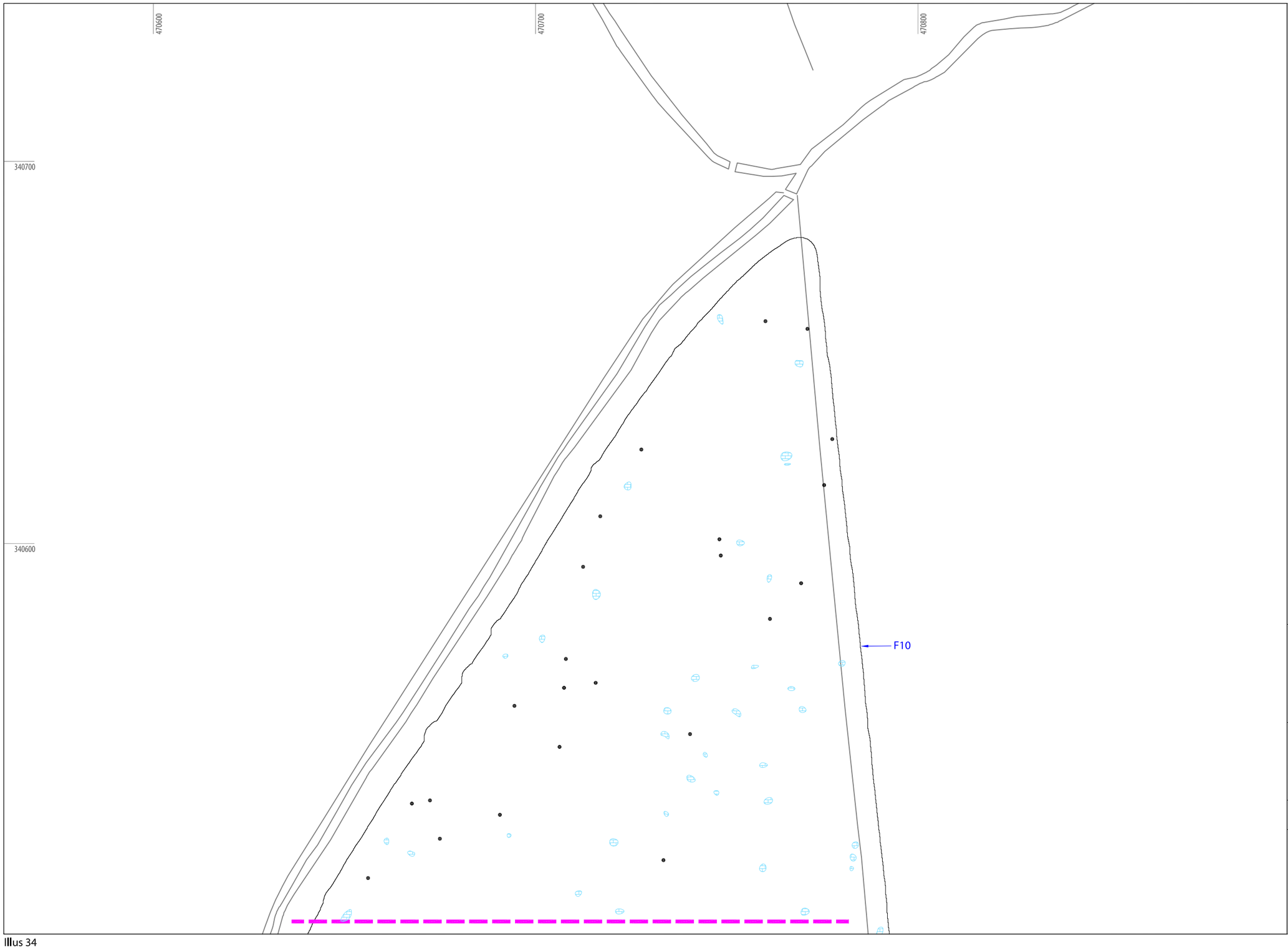
Illus 33
XY trace plot of magnetometer data; Sector 8



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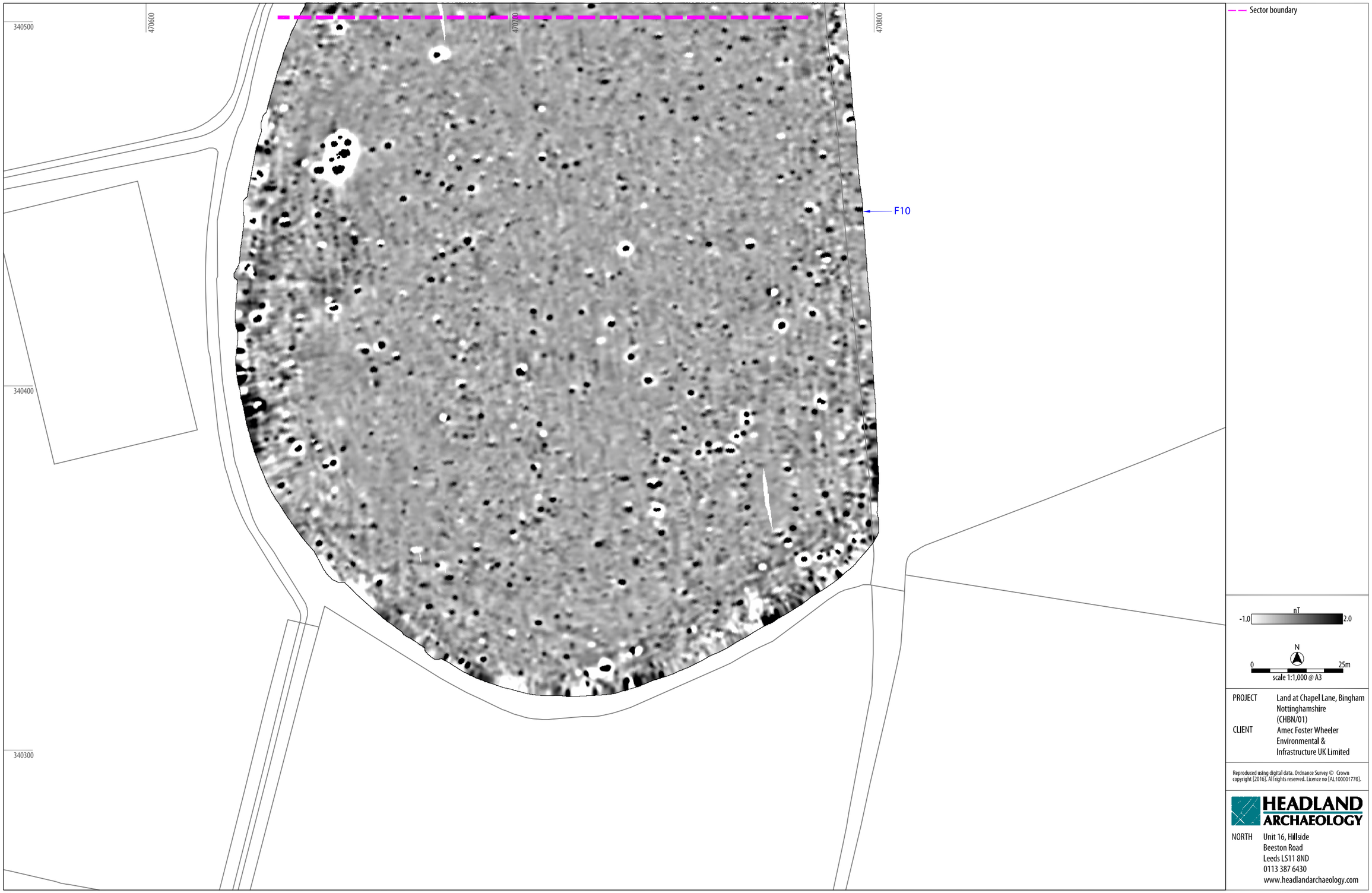
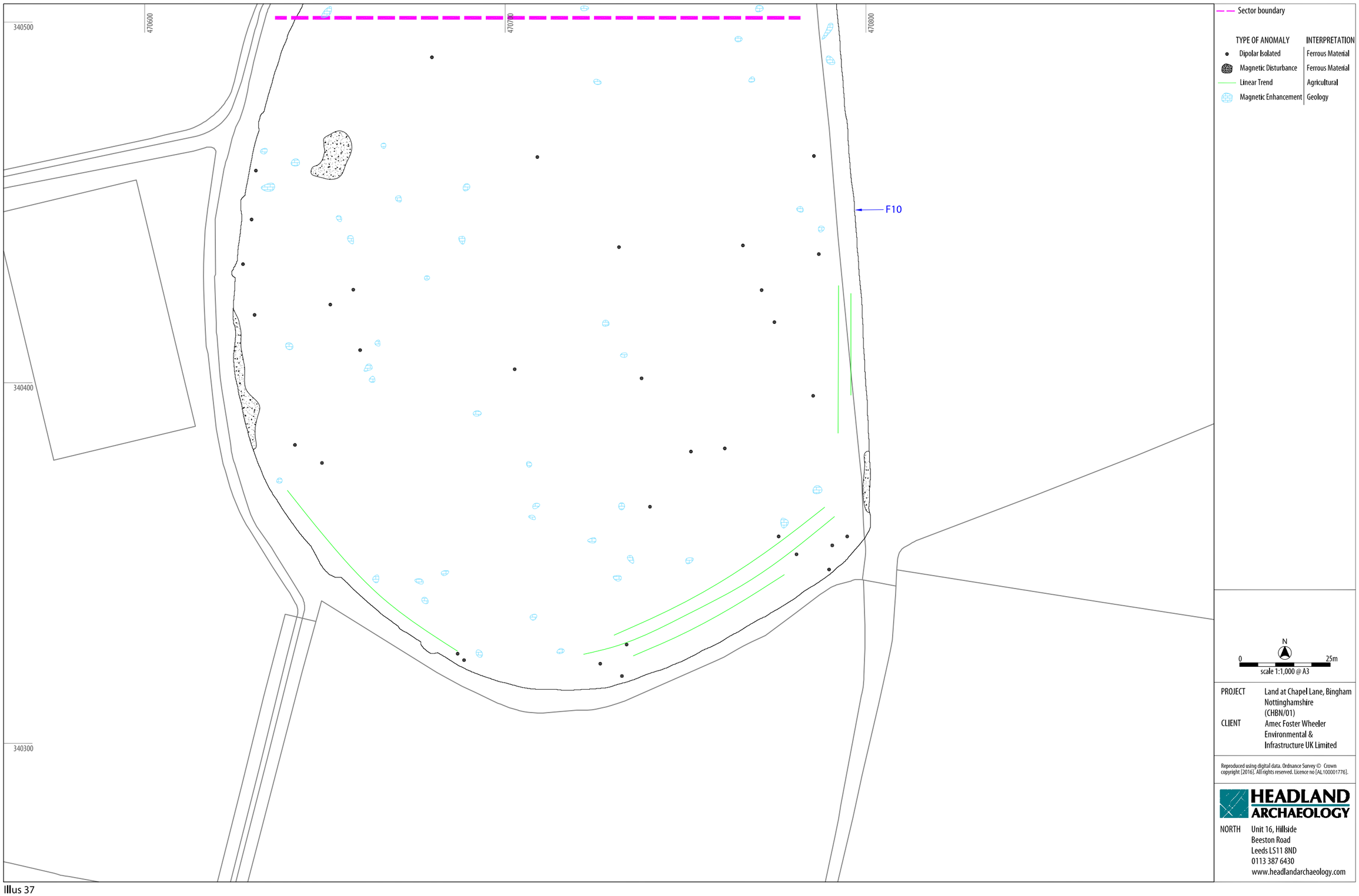
Illus 34
Interpretation of magnetometer data; Sector 8



Illus 35
Processed greyscale magnetometer data; Sector 9

Illus 36
XY trace plot of magnetometer data; Sector 9



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Illus 37
Interpretation of magnetometer data; Sector 9

7 APPENDICES

APPENDIX 1 MAGNETOMETER SURVEY

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 haematite. 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. This effect can lead to the detection of features such as hearths, kilns or areas of burning.

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 SURVEY LOCATION INFORMATION

An initial survey base station was established using a Trimble VRS differential Global Positioning System (dGPS). The magnetometer data was georeferenced using a Trimble RTK differential Global Positioning System (Trimble R8s model).

Temporary sight markers were laid out using a Trimble VRS differential Global Positioning System (Trimble R8s model) to guide the operator and ensure full coverage. The accuracy of this dGPS equipment is better than 0.01m.

The survey data 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 coordinates are measured off hard copies of the mapping rather than using the digital coordinates.

Headland Archaeology (UK) Ltd cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party.

APPENDIX 3 GEOPHYSICAL SURVEY ARCHIVE

The geophysical archive comprises:

- an archive disk containing the raw data in XYZ format, a raster image of each greyscale plot with associate world file, and a PDF of the report

The project will be archived in-house in accordance with recent good practice guidelines (http://guides.archaeologydataservice.ac.uk/g2gp/Geophysics_3). The data will be stored in an indexed archive and migrated to new formats when necessary.

APPENDIX 4 OASIS DATA COLLECTION FORM: ENGLAND

OASIS ID: headland5-241156

Project details	
Project name	Land at Chapel Laen, Bingham, Nottinghamshire
Short description of the project	Headland Archaeology (UK) Ltd undertook a geophysical (magnetometer) survey covering 34 hectares on land to the north of Bingham, to provide information about the archaeological potential of the site in advance of proposed development. The survey has identified a section of probable settlement bordering Fosse Road, immediately north-east of Fosse Way Farm. At least 16 small rectangular enclosures have been identified on the southern side of the road, within which are numerous discrete anomalies which may be due to pits, post holes and spreads of archaeological material. A linear ditch type anomaly to the south of the settlement could indicate the remnants of a field system associated with the settlement. A cluster of anomalies located on the margins of the Bingham Basin, a former lake and marshland, may also be of archaeological potential. Throughout the survey area anomalies which reflect the post-medieval agricultural landscape are identified including ridge and furrow cultivation, back-filled ponds and former field boundaries. The presence of superficial deposits may have led to reduced magnetic contrast in parts of the site which could have limited the identification of particularly low magnitude, ephemeral or discontinuous features. However, but it is not considered likely that any further significant archaeological activity would not have been detected under these conditions. Based on the results and interpretation of the data, the archaeological potential of the site is considered to be very high to the north-west of Fosse Road Farm bordering the road, and moderate to low elsewhere.
Project dates	Start: 14-01-2016 End: 21-01-2016
Previous/future work	Not known / Not known
Any associated project reference codes	CHBN - Sitecode
Any associated project reference codes	01 - Contracting Unit No.
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 4 - Character Undetermined
Monument type	N/A None
Monument type	N/A None
Significant Finds	N/A None
Significant Finds	N/A None
Methods & techniques	"Geophysical Survey"
Development type	Housing estate
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	After full determination (eg. As a condition)
Solid geology (other)	Edwalton Member (Mudstone)
Drift geology (other)	overlain in the west by superficial deposits of Head (clay, silt, sand and gravel) and by Lacustrine Deposits (clay, silt and sand) in the east
Techniques	Magnetometry

Project location	
Country	England
Site location	NOTTINGHAMSHIRE RUSHCLIFFE BINGHAM Land at Chapel Lane, Bingham
Study area	34 Hectares
Site coordinates	SK 70000 40479 52.956796005986 -0.957865844762 52 57 24 N 000 57 28 W Point

Project creators	
Name of Organisation	Headland Archaeology
Project brief originator	AMECFW
Project design originator	Headland Archaeology
Project director/manager	Harrison, S
Project supervisor	Bishop, R
Type of sponsor/funding body	Developer

Project archives	
Physical Archive Exists?	No
Digital Archive recipient	In house
Digital Contents	"other"
Digital Media available	"Geophysics"
Paper Archive Exists?	No

Project bibliography 1	
Publication type	Grey literature (unpublished document/manuscript)
Title	Land at Chapel Lane, Bingham, Nottinghamshire: Geophysical Survey
Author(s)/Editor(s)	Harrison, D. and Webb, A.
Other bibliographic details	CHBN15/01
Date	2016
Issuer or publisher	Headland Archaeology
Place of issue or publication	Edinburgh
Description	A4 Glue bound report

Entered by	Sam Harrison (sam.harrison@headlandarchaeology.com)
Entered on	1 February 2016

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