STLP18

SOUTHAMPTON TO LONDON PIPELINE PROJECT

GEOPHYSICAL SURVEY

commissioned by Jacobs UK Ltd
on behalf of Esso Petroleum Company Limited

May 2019

HEADLAND ARCHAEOLOGY

REGISTERED ORGANISATION CIfA

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This report adheres to the quality standard of ISO 9001:2015

PROJECT INFO:

HA Project Code **STLP18** / NGR **SU 5128 1438, TQ 0550 7078** / Local Authority **HampshireSurrey** / OASIS Ref. **headland5-350652**

PROJECT TEAM:

Project Manager **Sam Harrison** / Author **David Harrison** / Fieldwork **Beth Shenton, Krasimir Dyulgerski, Mark Evans, Olivier Vansassenbrouck, Phoebe Utting, Richard McGregor Edwards, Ross Bishop** / Graphics **Beata Wieczorek-Oleksy, Nick Hannon**

Approved by **Sam Harrison** .....

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HEADLAND ARCHAEOLOGY

PROJECT SUMMARY

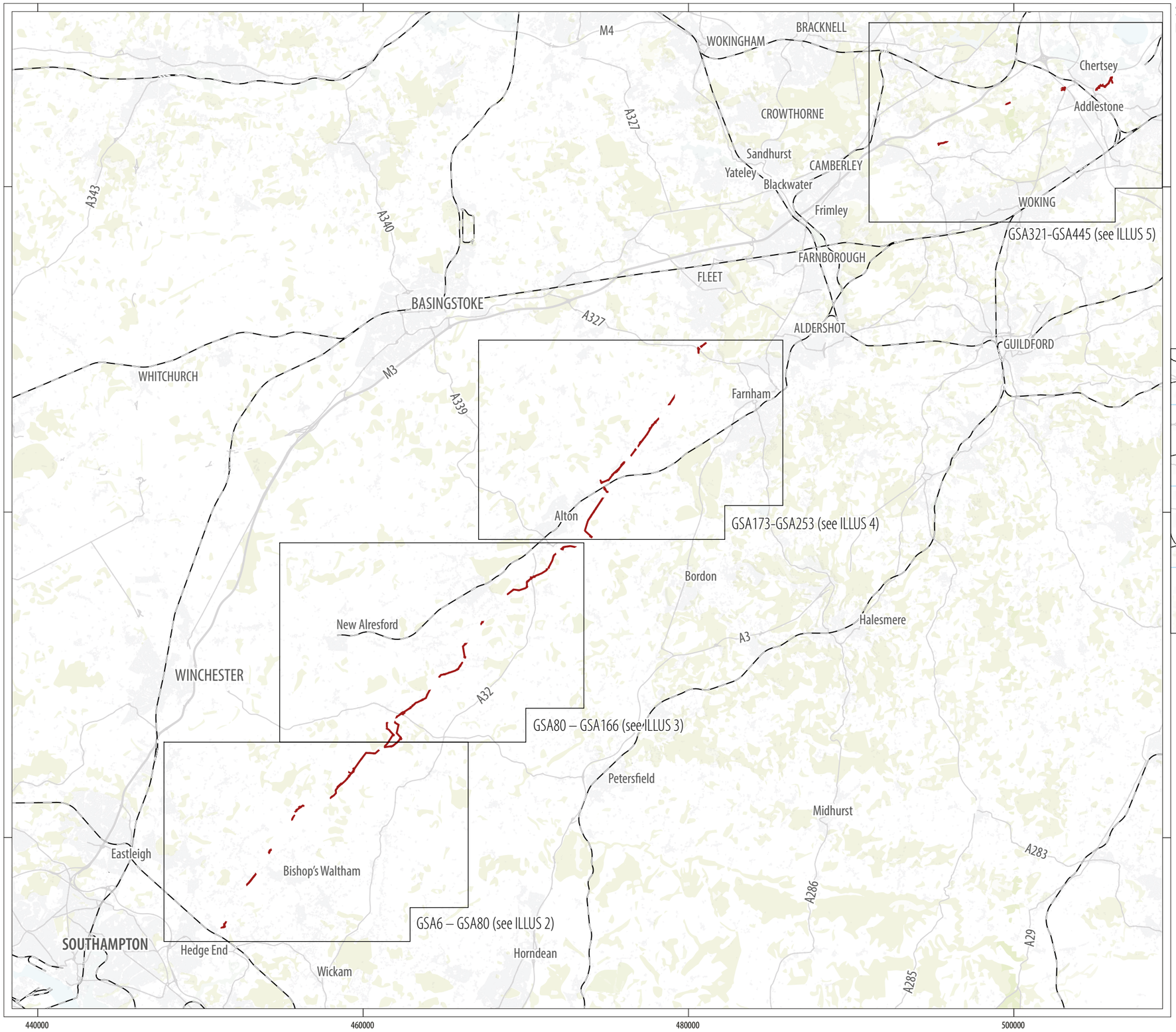
Headland Archaeology (UK) Ltd has undertaken a geophysical (magnetometer) survey, covering approximately 126 hectares, along the proposed route of the Southampton to London Pipeline. This study informs the cultural heritage inputs for the Environmental Statement, prior to the installation of the replacement pipeline (the project).

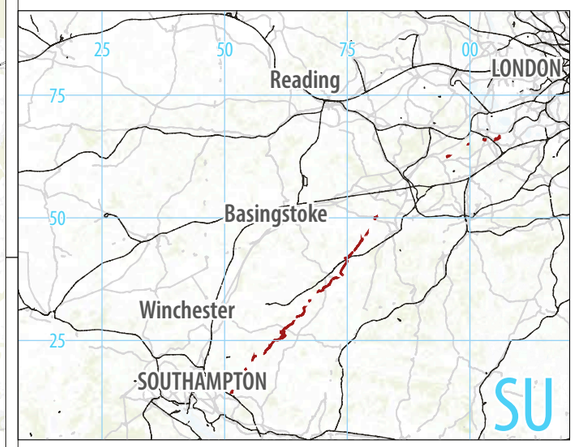
The survey has evaluated 102 Geophysical Survey Areas, identifying two distinct areas of clear archaeological activity comprising a ring-ditch and a sub-rectangular enclosure. These areas are assessed as having high archaeological potential. Anomalies at several other locations have been interpreted as having possible archaeological potential, including possible infilled pits and ditches. However, the narrow survey corridor, fragmentary nature of the anomalies, magnetic interference from the existing pipeline and/or an absence of supporting archaeological information (cropmarks or HER data) precludes a confident interpretation. These anomalies are ascribed a moderate archaeological potential.

Anomalies due to geological and pedological variation are common throughout all survey areas and linear trend anomalies due to post-medieval agricultural activity (boundary removal, field drains or ploughing) are also recorded in virtually all parts of the corridor.

CONTENTS

LIST OF ILLUSTRATIONS





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0 5km
1:250,000 @ A3

geophysical survey area

ILLUS 1 Site location (1:250,000)

SOUTHAMPTON TO LONDON PIPELINE PROJECT

GEOPHYSICAL SURVEY

1 INTRODUCTION

Headland Archaeology (UK) Ltd was commissioned by Jacobs UK Ltd (the Consultant), on behalf of Esso Petroleum Company Limited, to undertake a geophysical (magnetometer) survey along the proposed route of a 90km replacement aviation fuel pipeline between Southampton and London. The survey was carried out to inform the assessment of the heritage potential of the route for the Environmental Statement (ES).

The work was undertaken in accordance with a Written Scheme of Investigation (Jacobs 2018), and in line with current best practice (Chartered Institute for Archaeologists 2016, Europae Archaeologia Consilium 2016).

The survey was carried out between the 16th October and the 8th November 2018.

1.1 SITE LOCATION, TOPOGRAPHY AND LAND-USE

The project extends from Boorley Green, Hampshire, to the West London Terminal storage facility in Hounslow, Surrey (see Illus 1) and comprises 102 Geophysical Survey Areas (GSAs). These have been determined based on suitability for survey and on the results of the Desk-Based Survey. The scope of the survey has also been informed by engagement with Historic England and the local authority heritage advisors.

The route through Hampshire runs predominantly over flat arable land to the north of chalk and greensand hills which dominate the landscape. In Surrey, the route is characterised by flat areas surrounding the Thames Basin and large expanses of heathland, enclosed wooded gills, river valleys, water bodies, intimate small-scale farmland and open meadows.

1.2 GEOLOGY

The bedrock geology along the route as it passes through Hampshire is sedimentary, comprising predominantly of Bracklesham and Barton Group in the south, White Chalk Formations in the centre and Gault and Upper Greensand Formations in the northeast. Where present, the bedrock is overlain by superficial deposits of brick earth in the south, clay with flints and alluvial deposits in the centre and river terrace deposits along the Surrey County boundary. In Surrey, the bedrock is dominated by Bracklesham and Barton Group (sand, silt and clay) and is overlain by alluvium along the course of rivers (NERC 2018). Geological conditions within individual GSAs are shown in Appendix 1.

2 ARCHAEOLOGICAL BACKGROUND

The WSI (Jacobs 2018) records a total of 463 archaeological remains within the proposed pipeline corridor and within a 300m area extending from it. These include nine Scheduled Monuments, comprising Roman and Medieval settlements, an eighteenth-century bridge and a number of prehistoric earthwork monuments. Those within close proximity of, the GSAs are recorded in Appendix 1.

3 AIMS, METHODOLOGY AND PRESENTATION

The aim of the geophysical survey was to inform the cultural heritage inputs into the forthcoming ES and to disseminate the results.

The specific archaeological objectives of the geophysical survey were:

- to identify, record and interpret archaeological remains within the GSAs;
- prepare an interpretative report on the results of the archaeological geophysical survey;
- use the results of the magnetometer survey to inform the baseline, assessment of value, magnitude, significance of effect, mitigation and residual significance of effect to be presented in the cultural heritage chapter of the ES. This report forms a technical appendix supporting the ES Chapter 9 Historic Environment; and
- issue the report on the results of the archaeological geophysical survey to the Hampshire Archaeology and Historic Buildings Record (the Hampshire HER), the Winchester Historic Environment Record and the Surrey Historic Environment Record and prepare and deposit an ordered archive to the Archaeology Data Service (ADS) and a suitable final repository.

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. A feature 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 & Gater 2003). Further information on soil magnetism and the interpretation of magnetic anomalies is provided in Appendix 2.

The survey was undertaken using four Bartington Grad601 sensors mounted at 1m intervals (1m traverse interval) onto a rigid carrying frame. The system was programmed to take readings at a frequency of 10Hz (allowing for a 10–15cm sample interval) on roaming traverses (swaths) 4m apart. These readings were stored on an external weatherproof laptop and later downloaded for processing and interpretation. The system was 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 was used to collect and export the data. Terrasurveyor V3.0.32.4 (DWConsulting) software was used to process and present the data.

3.2 REPORTING

A general site location plan is shown in Illus 1 at a scale of 1:250,000. Illus 2–5 are 1:50,000 survey location plans. Large-scale, fully processed (greyscale) data, minimally processed data (XY traceplot) and interpretative plots are presented at a scale of 1:2,500 in Illus 6 to Illus 152 inclusive with more detailed plots (1:1,000) of the two areas of archaeological activity (AAA) shown in Illus 153 to Illus 158 inclusive.

Technical information on magnetic survey methodology and interpretation is given in Appendix 2. Appendix 3 details the survey location information and Appendix 4 describes the composition and location of the site archive. Data processing details are presented in Appendix 5. A copy of the OASIS entry (Online Access to the Index of Archaeological Investigations) is reproduced in Appendix 6.

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 corridor is only 30m wide and it is often difficult to accurately interpret linear single responses which cross the corridor or zones of variable magnetic response. It is particularly difficult to gauge whether the latter are simply a result of localised variations in the soils and geology. Throughout several of the GSAs, confident interpretation of the data is further hindered by the close proximity of the existing aviation fuel pipeline, the magnetic response from which saturates the datasets, potentially masking any low magnitude anomalies of archaeological potential, if present.

Nevertheless, generally a variable magnetic background has been recorded throughout the GSAs manifesting in the data as a plethora of discrete areas of magnetic enhancement. These are due to localised variations in the depth and composition of the soils and the bedrock and/or superficial deposits from which they derive. Areas of variation are also caused by differing agricultural activities and ploughing regimes.

Ground conditions were generally good across the GSAs and the data quality is correspondingly good throughout. It is therefore assessed that the results provide a reliable indication of the extent of the sub-surface archaeological remains. The reliability of the results over alluvial and colluvial (Head) deposits, and over glacial sand and gravels is less clear, and detection of some soil-filled features may be hampered by low magnetic contrast in the soils and/or the depth of the superficial deposits. In these instances, some isolated and/or low magnitude features, and localised areas of unenclosed settlement, may not manifest in the data at all.

The anomalies identified by the survey fall into a number of categories according to their origin. These are discussed below with those anomalies with modern, agricultural or geological origins discussed first followed by those anomalies with a possible or probable archaeological cause. The results are summarised in Appendix 1.

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 is common on most sites, often being present as a consequence of manuring or tipping/infilling. Throughout the GSAs, there is no obvious clustering to these ferrous anomalies which might indicate an archaeological

origin. Far more probable is that the 'spike' responses are likely caused by the random distribution of ferrous debris in the upper soil horizons.

The existing aviation fuel pipe has been detected as a high magnitude dipolar linear anomaly across many of the GSAs such as GSA68 (see Illus 24–26), and GSA176–181 (see Illus 96–104). In many cases the magnetic response from this pipe dominates more than half of the 30m corridor. Magnetic disturbance of this type may mask any lower magnitude anomalies of archaeological potential, if present, within the affected area. Several other high magnitude dipolar linear anomalies have also been identified across the GSAs, such as those in GSA198 (see Illus 111–116) and Area 435 (see Illus 144–146). These are caused by buried service pipes.

Localised areas of magnetic disturbance within GSA101 (see Illus 57–59), GSA180 (see Illus 102–104) and GSA198 (see Illus 111–113) locate former ponds which are depicted on historic Ordnance Survey maps (Old-Maps 2018). The disturbance in the north of GSA87 (see Illus 48–50) corresponds to a chalk pit which is also shown on historic OS maps whereas the larger area of disturbance in the northeast of GSA155 (see Illus 81–83) corresponds to a larger former quarry. The disturbance is caused by magnetic material used to infill the features.

Magnetic disturbance around the field edges is due to ferrous material within or close to the adjacent field boundaries and is of no archaeological interest.

4.2 AGRICULTURAL ANOMALIES

Analysis of historic OS maps (Old-Maps 2018) indicates that the pattern of land division throughout the GSAs has changed little since the publication of the first edition OS maps in the late 19th century with only a small number of boundaries having been removed to create larger fields. These former boundaries manifest in the data as linear anomalies - soil-filled ditches, such as those within GSA84 (see Illus 45–47) or as linear alignments of ferrous anomalies, such as those within GSA159 (see Illus 84–86) which are caused by modern debris within the fill of the ditch or which accumulated at the former field margins.

Closely-spaced linear anomalies, aligned parallel with the extant field boundaries, are due to modern ploughing. No anomalies have been identified in any of the magnetic datasets which are clearly indicative of medieval and/or post medieval ridge and furrow cultivation.

The magnetic background in GSA87 (see Illus 45–50) is notably elevated appearing 'speckled' throughout. This may be due to modern manuring/spreading of magnetically enhanced material. A similarly elevated background is visible throughout GSA196 (see Illus 111–113) and is also thought to be due to agricultural spreading.

4.3 GEOLOGICAL ANOMALIES

Geological anomalies are identified throughout the GSAs. These are mostly due to changes in the depth and composition of the topsoil, or the accumulation of topsoil along the breaks in, or bottom of, slopes. Broader areas of enhanced magnetic response such as those in GSA8 (see Illus 6–8), GSA321–322 (see Illus 138–140) and GSA445 (see Illus 150–152) correspond to alluvial and river terrace deposits recorded by the British Geological Survey (NERC 2018). The anomalies are caused by variations in the sand, gravel, silt and clay. In these areas, detection of some soil-filled features may be hampered by low (or conversely extremely high) magnetic contrast in the soils and/or the depth of the superficial deposits. In these instances, some isolated and/or low magnitude features, and localised areas of unenclosed settlement, if present, may not manifest in the data at all.

The variable and elevated magnetic background across GSA104–114 (see Illus 60–68) is more pock-marked in appearance and corresponds to superficial deposits of clay with flints formation, whereas the sinuous bands of enhanced response across GSA154–157) are caused by variations in the Head superficial deposits.

It can be difficult or impossible to identify any archaeological responses where geological anomalies are dense and/or of a high magnitude.

4.4 POSSIBLE ARCHAEOLOGICAL ANOMALIES

Anomalies interpreted as being of possible archaeological origin are caused by soil-filled features such as pits or ditches or by spreads of magnetically enhanced material within the upper soil horizons. Whilst these anomalies do not manifest in any coherent archaeological pattern, they are either located near to areas of known archaeology, or cannot be satisfactorily interpreted as either modern, agricultural or geological in origin. On this basis, these anomalies are ascribed moderate archaeological potential.

4.5 AREAS OF ARCHAEOLOGICAL ACTIVITY

Two distinct areas of archaeological activity (AAA) have been identified and are discussed below.

AAA1

AAA1 is located in the south of GSA 159, centred at SU 7145 3662 (see Illus 153–155). It comprises the eastern extent of a sub-rectangular enclosure, aligned north/south and measuring 43m from north to south. No anomalies of clear archaeological potential are visible within the interior of the enclosure although a number of low magnitude discrete anomalies are assessed as being potentially archaeological in origin, perhaps being due to pits.

AAA2

AAA2 is located in an elevated position in the southwest of GSA206, centred at SU 7736 4455 (see Illus 156–158). It comprises the northwestern extent of a ring-ditch, probably a barrow, measuring 20m in diameter. High magnitude discrete anomalies within the interior of the ring-ditch may be due to pits.

5 CONCLUSION

The survey has successfully evaluated the geophysical survey area and has identified two distinct, localised areas of archaeological activity comprising a sub-rectangular enclosure and a ring-ditch. These areas are assessed as of high archaeological potential. The survey has further advanced knowledge of the archaeological potential along the proposed pipeline, although there remain sections where survey was not possible, either due to current land use or access issues. Several other areas are identified throughout the Geophysical Survey Areas where anomalies of possible archaeological potential have also been identified. In these areas it has not been possible to give a definite interpretation due to the fragmented nature of the anomalies combined with the narrow corridor width and magnetic interference from the existing aviation fuel pipe.

6 REFERENCES

Chartered Institute for Archaeologists (ClfA) 2016 ***Standard and guidance for archaeological geophysical survey*** (Reading) http://www.archaeologists.net/sites/default/files/ClfAS%26GGeophysics_2.pdf accessed 6 November 2018

Europae Archaeologia Consilium (EAC) 2015 ***AC Guidelines for the Use of Geophysics in Archaeology: Questions to Ask and Points to Consider*** (Namur, Belgium) https://historicengland.org.uk/images-books/publications/eac-guidelines-for-use-of-geophysics-in-archaeology/ accessed 6 November 2018

Gaffney C & Gater J (2003) ***Revealing the Buried Past: Geophysics for Archaeologists Stroud***

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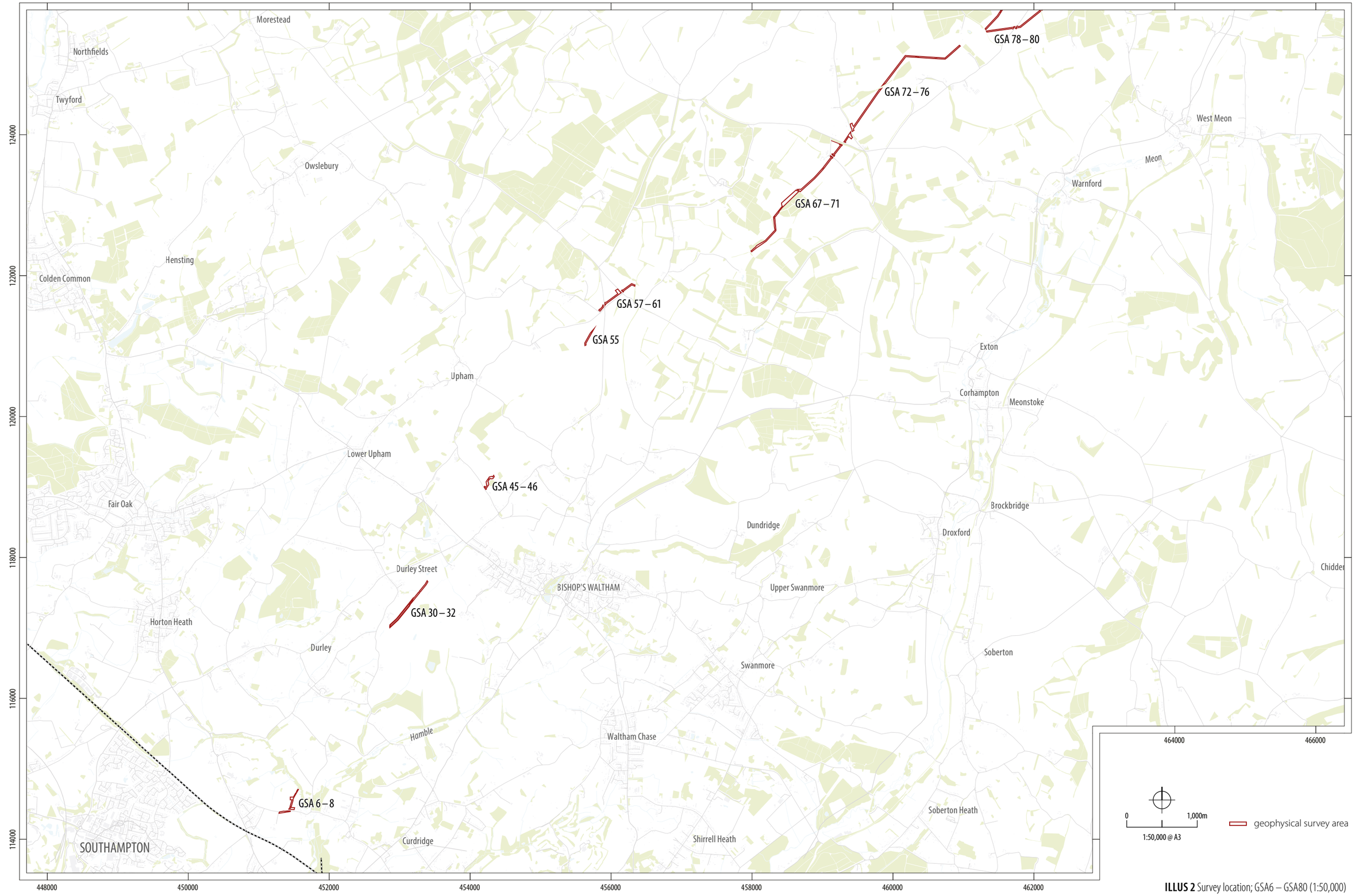
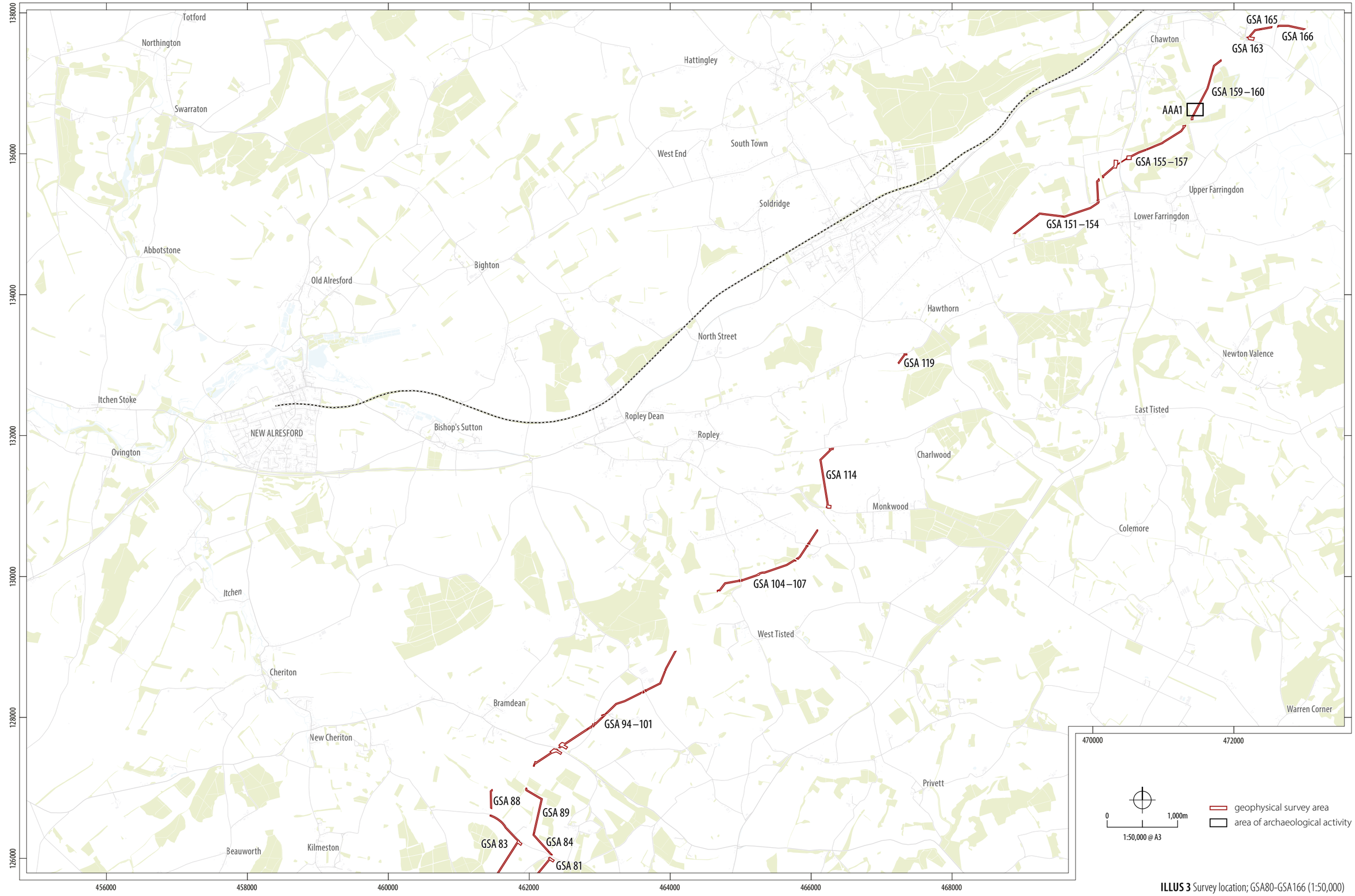
Natural Environment Research Council (NERC) 2018 ***British Geological Survey*** http://www.bgs.ac.uk/ accessed 6 November 2018

Old-Maps 2018 http://www.old-maps.co.uk accessed 20 November 2018

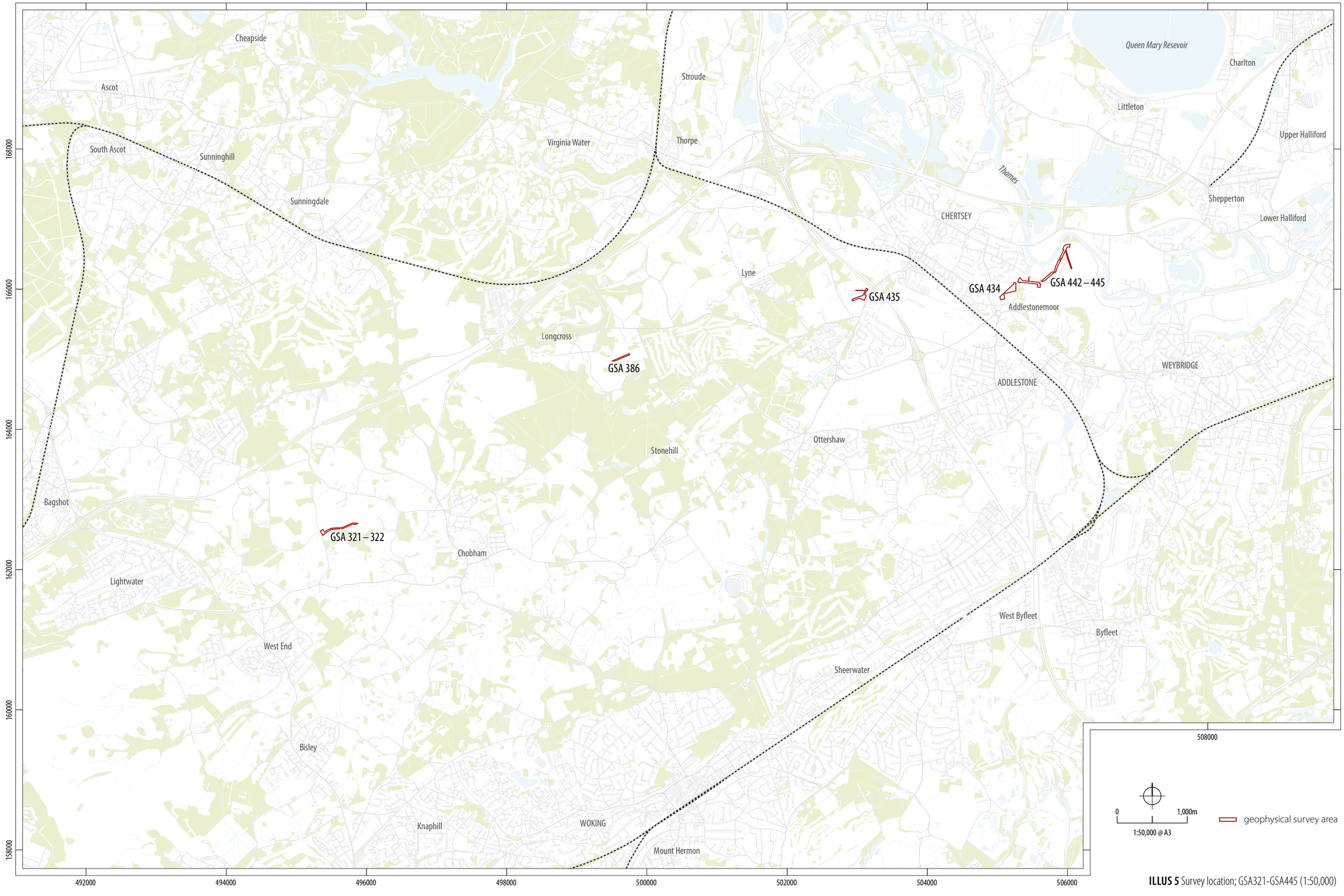


ILLUS 2 Survey location; GSA6 – GSA80 (1:50,000)



ILLUS 3 Survey location; GSA80-GSA166 (1:50,000)

ILLUS 4 Survey location; GSA173-GSA253 (1:50,000)



ILLUS 5 Survey location; GSA321-GSA445 (1:50,000)

geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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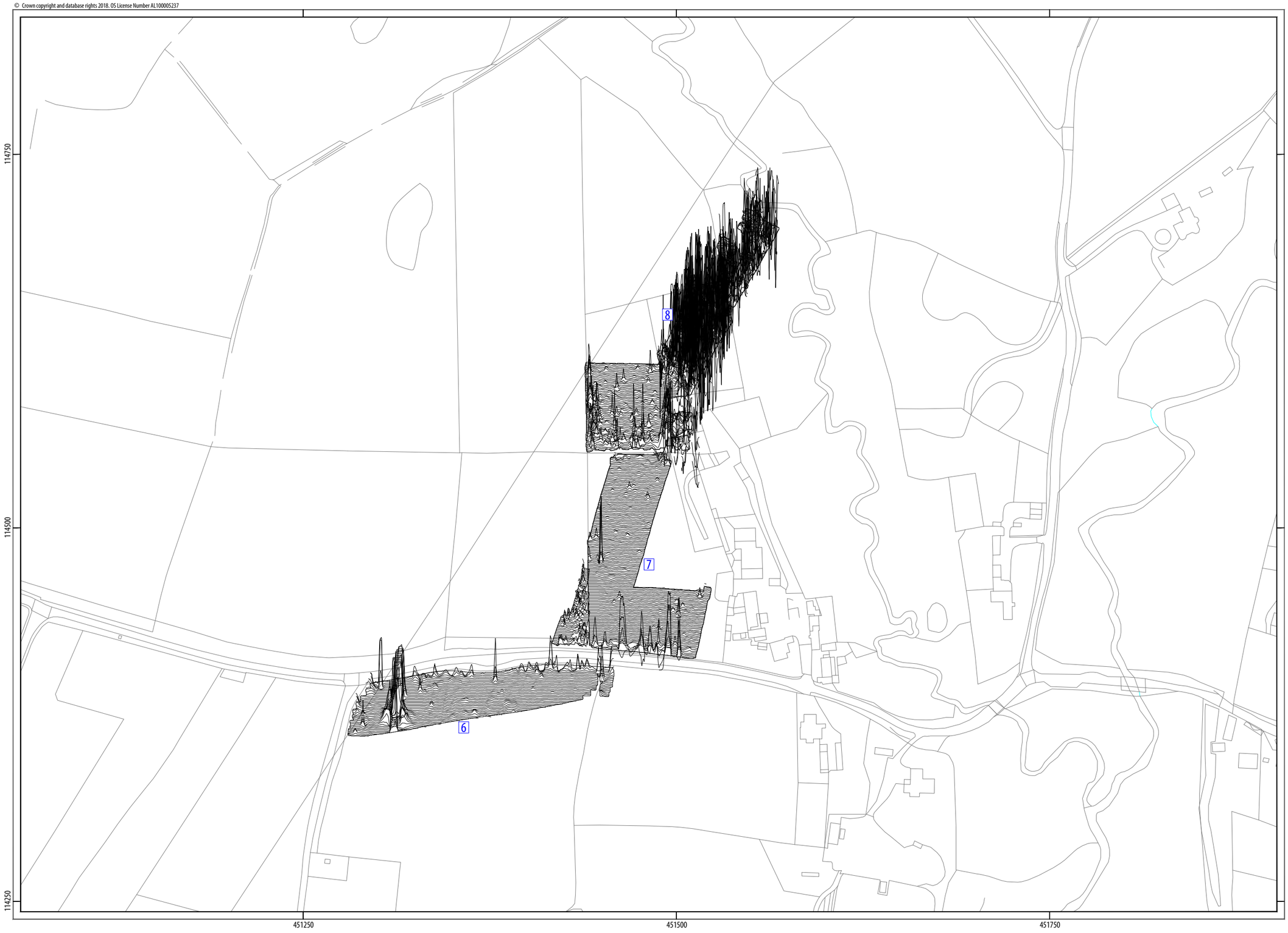
ILLUS 6 Processed greyscale magnetometer data; GSA6, GSA7 & GSA8



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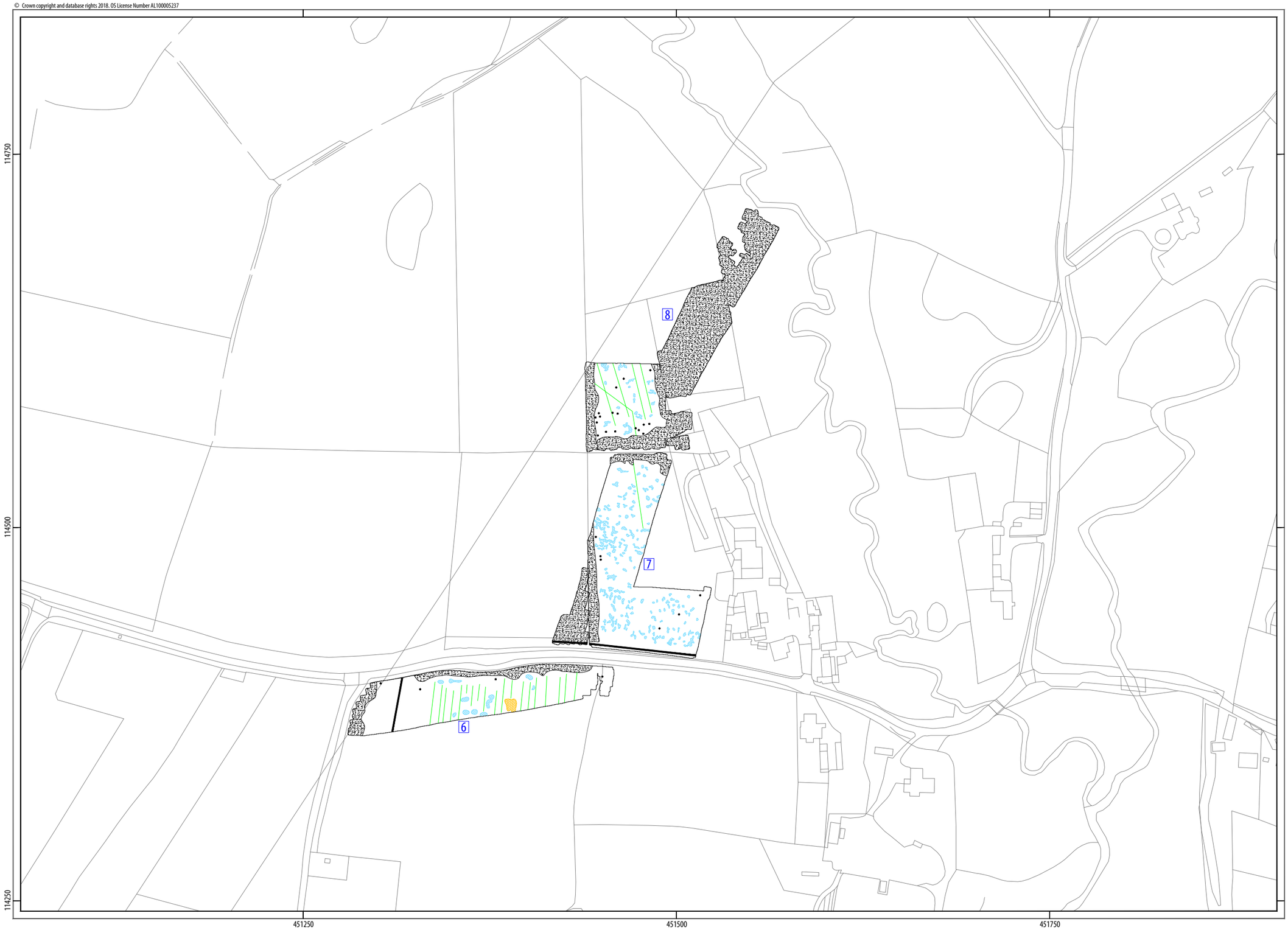
ILLUS 7 XY trace plot of minimally processed magnetometer data; GSA6, GSA7 & GSA8



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology
- archaeology?

0 50m
1:2,500 @ A3

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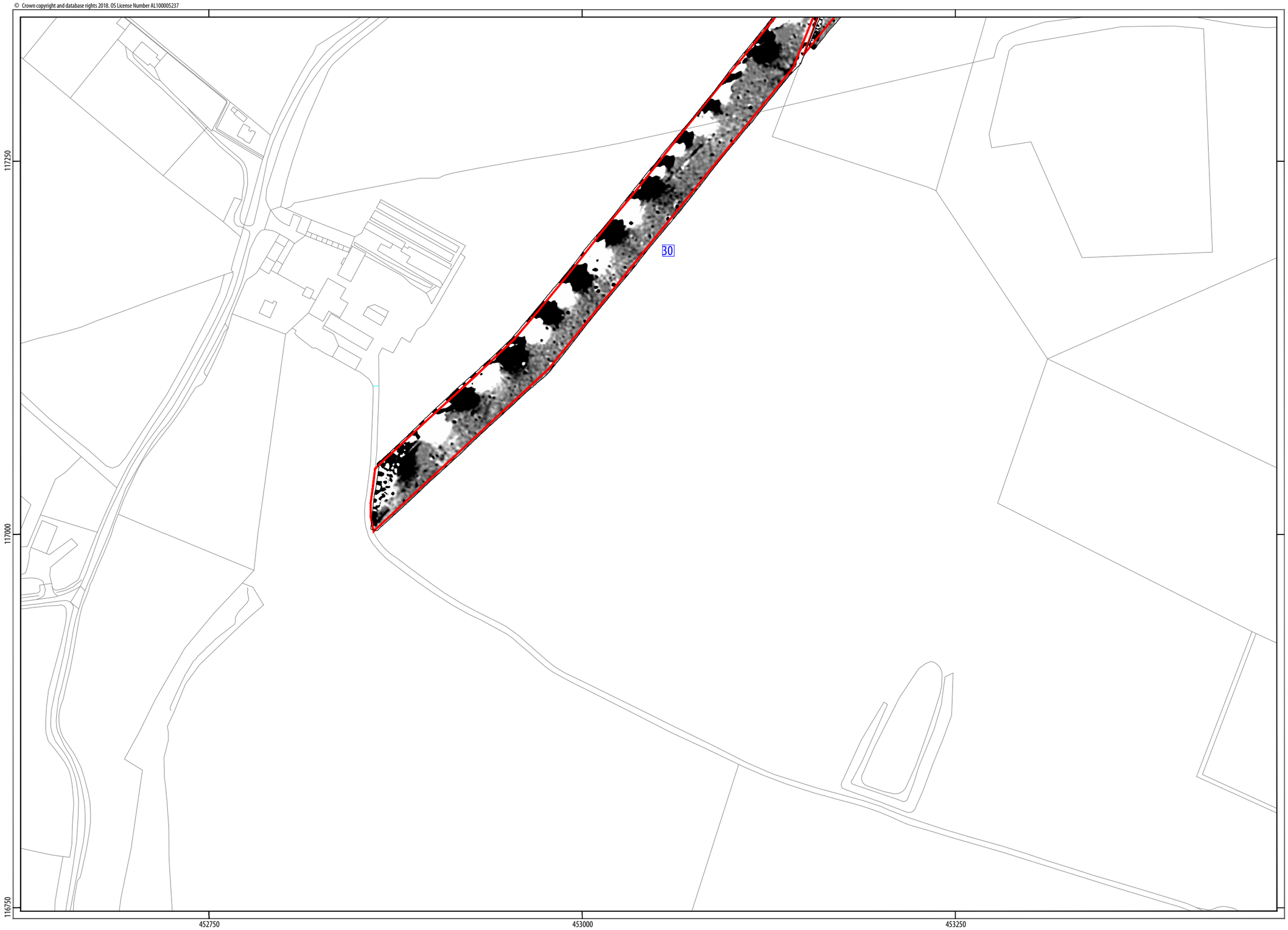
ILLUS 8 Interpretation of magnetometer data; GSA6, GSA7 & GSA8



geophysical survey area

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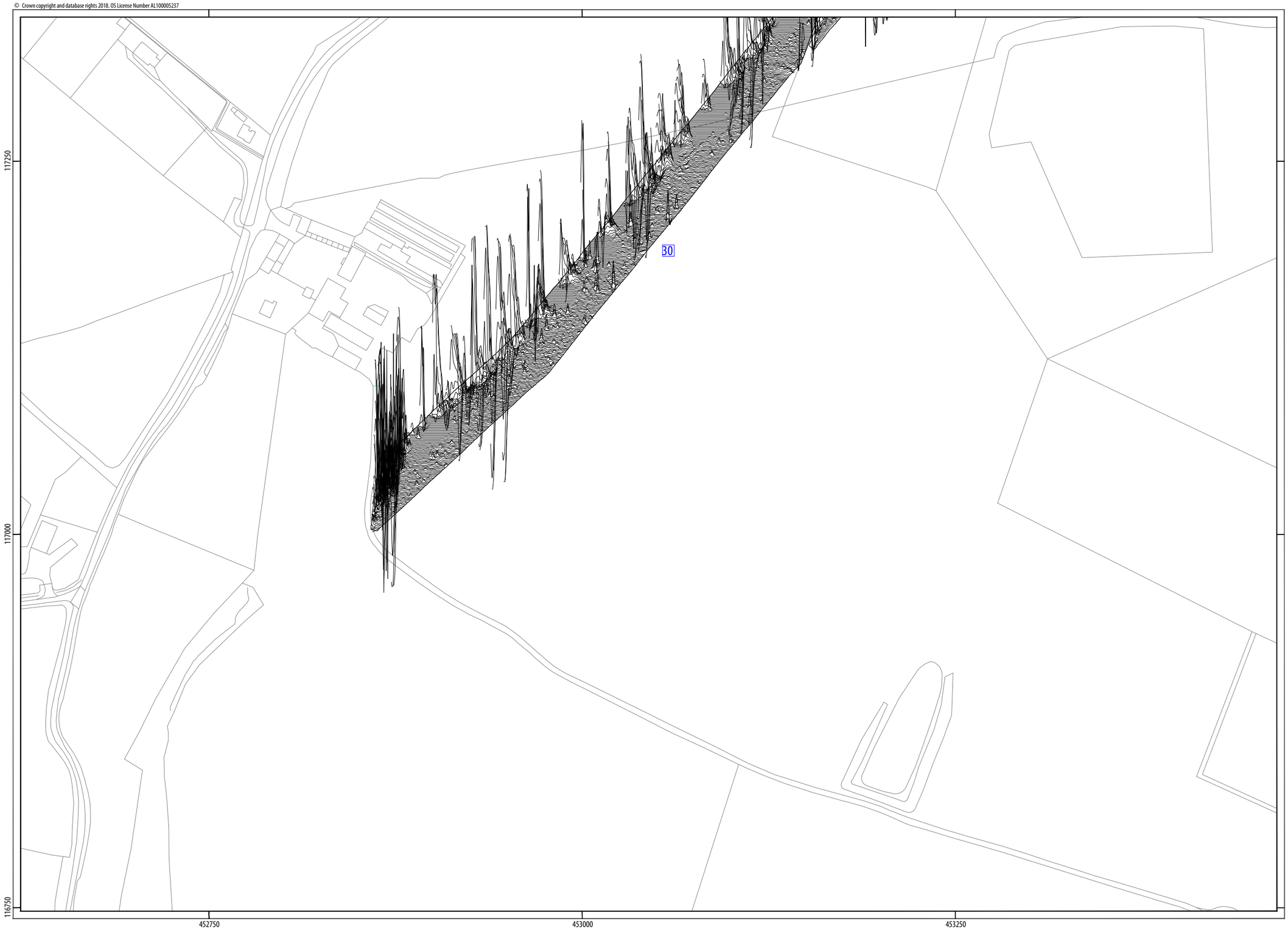
ILLUS 9 Processed greyscale magnetometer data; GSA30



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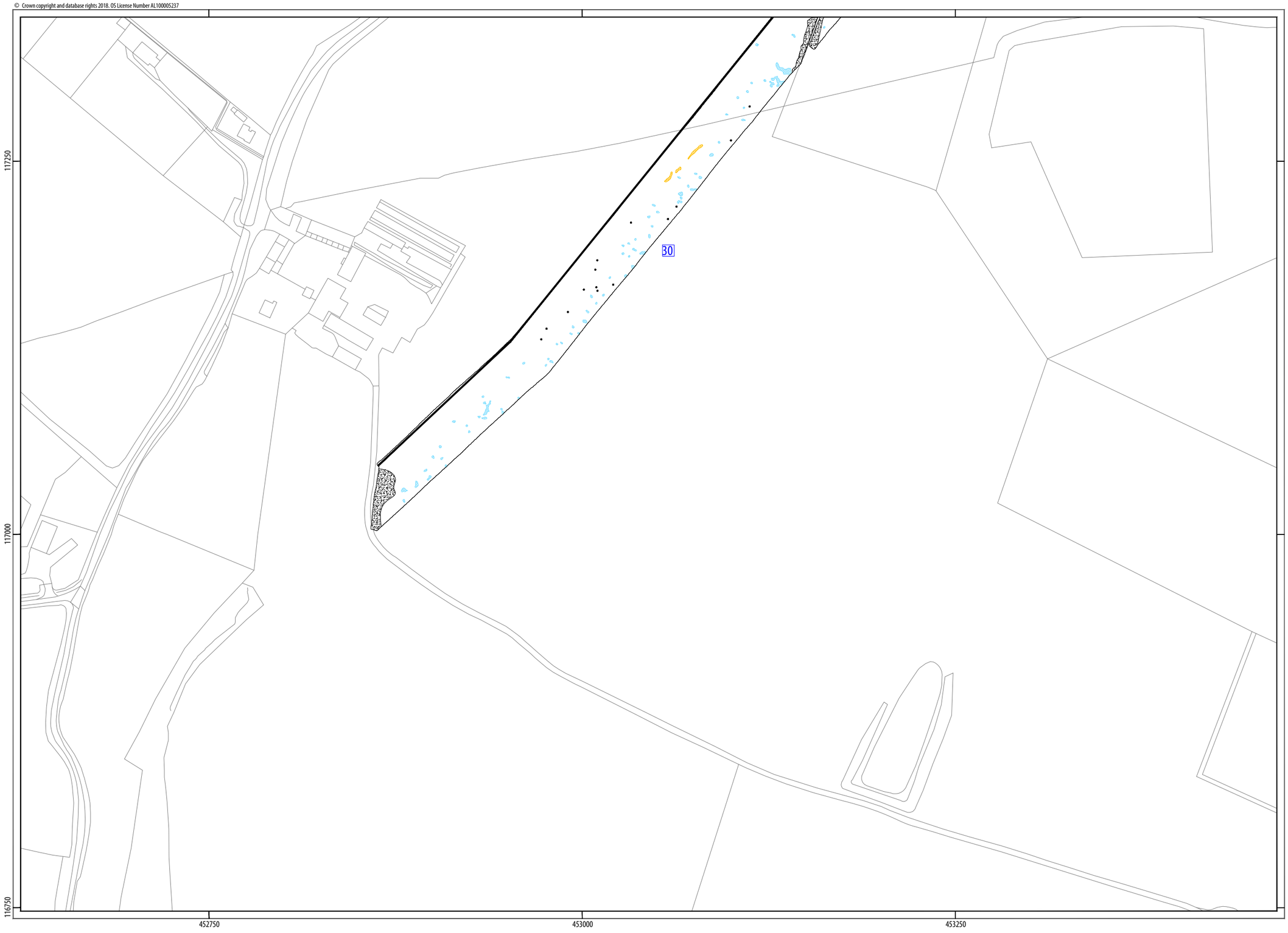
ILLUS 10 XY trace plot of minimally processed magnetometer data; GSA30



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- geology
- archaeology?

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ILLUS 11 Interpretation of magnetometer data; GSA30

geophysical survey area

-1.0 nT 1.0

0 50m

1:2,500 @ A3

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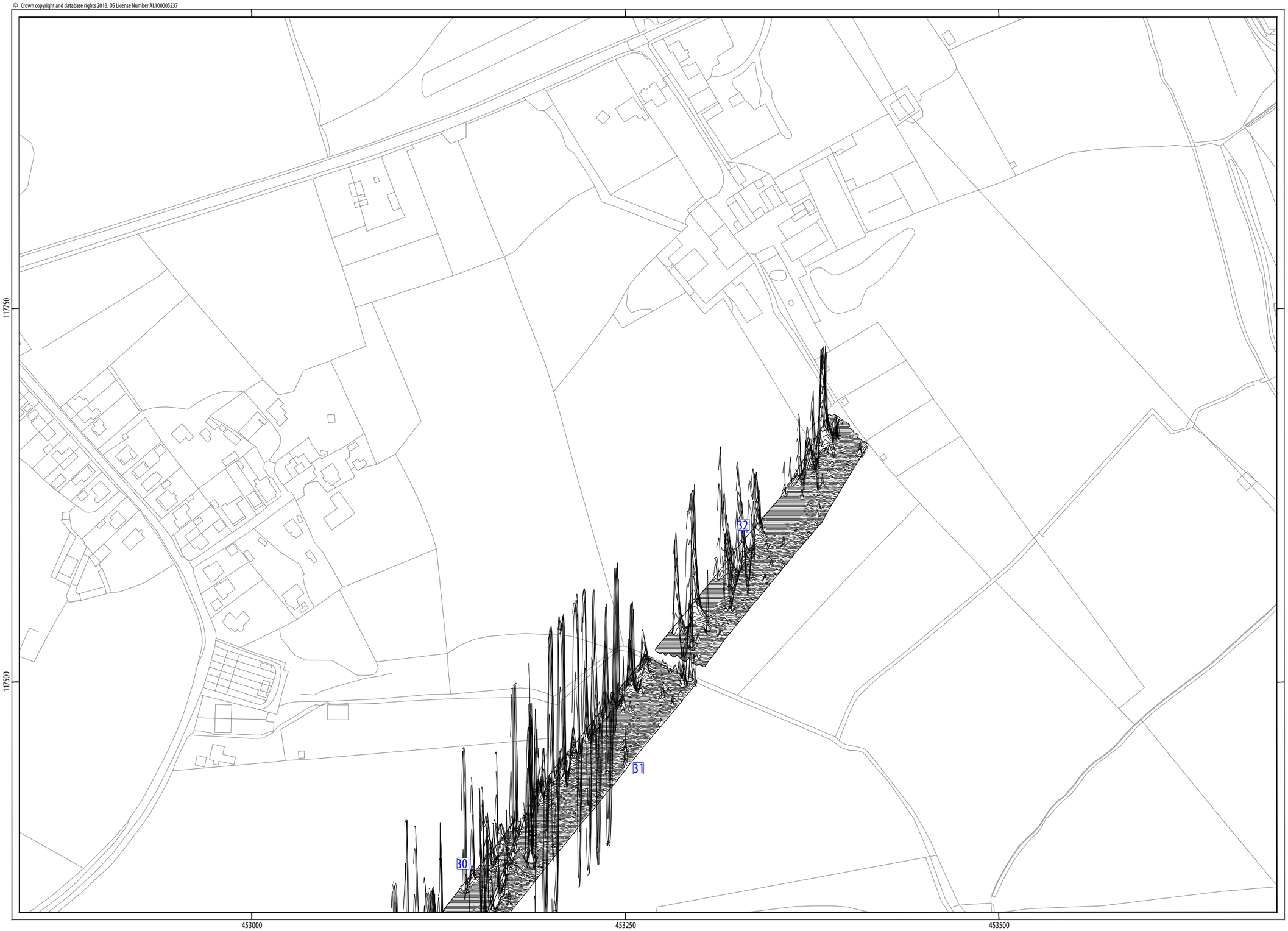
ILLUS 12 Processed greyscale magnetometer data; GSA30, GSA31 & GSA32



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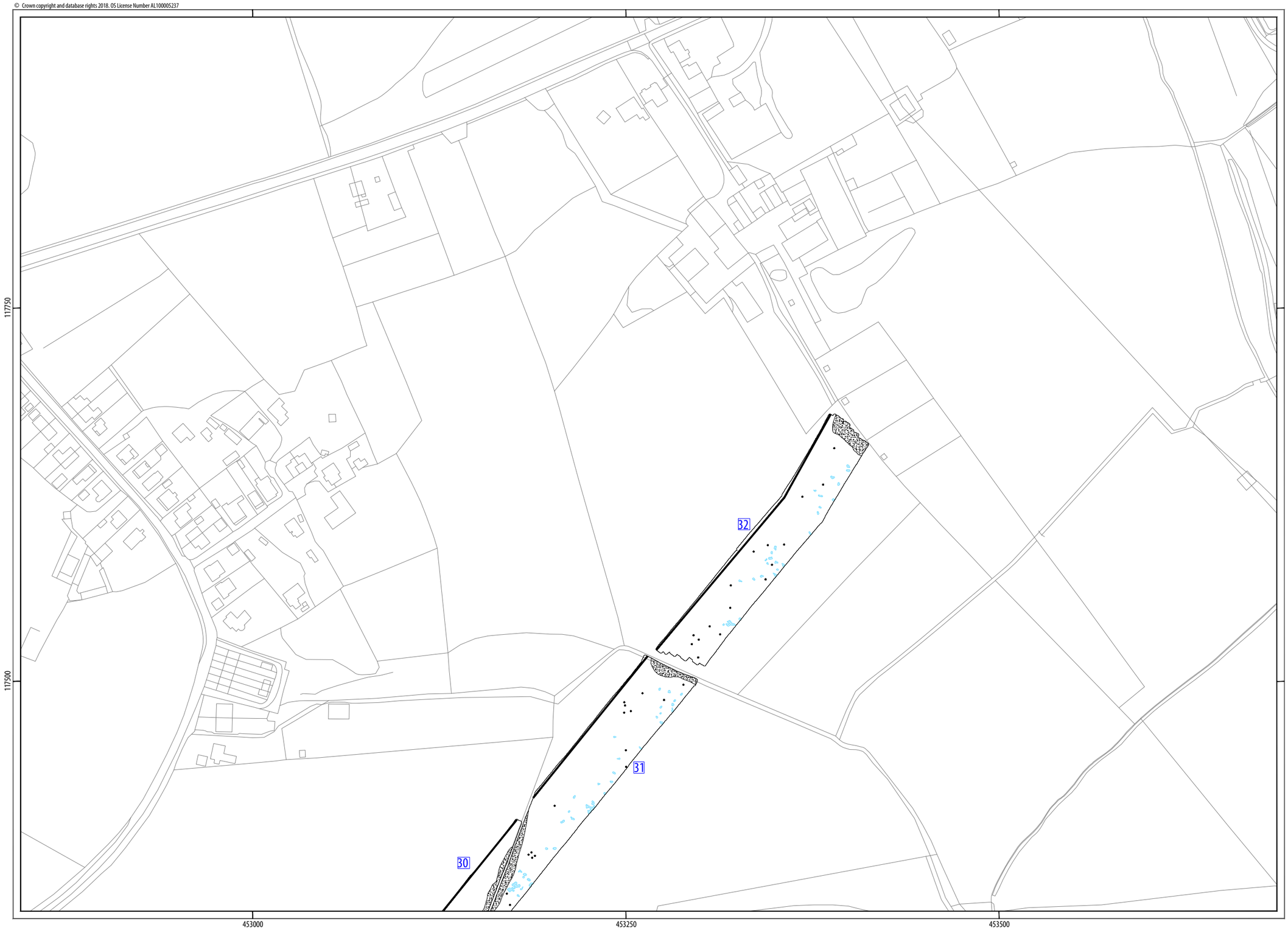
ILLUS 13 XY trace plot of minimally processed magnetometer data; GSA30, GSA31 & GSA32



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- geology

0 50m
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ILLUS 14 Interpretation of magnetometer data; GSA30, GSA31 & GSA32

geophysical survey area

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50m
1:2,500 @ A3

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ILLUS 15 Processed greyscale magnetometer data; GSA45 & GSA46

15.0nT/cm

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ILLUS 16 XY trace plot of minimally processed magnetometer data; GSA45 & GSA46

INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology

0 50m
1:2,500 @ A3

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ILLUS 17 Interpretation of magnetometer data; GSA45 & GSA46

geophysical survey area

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50m
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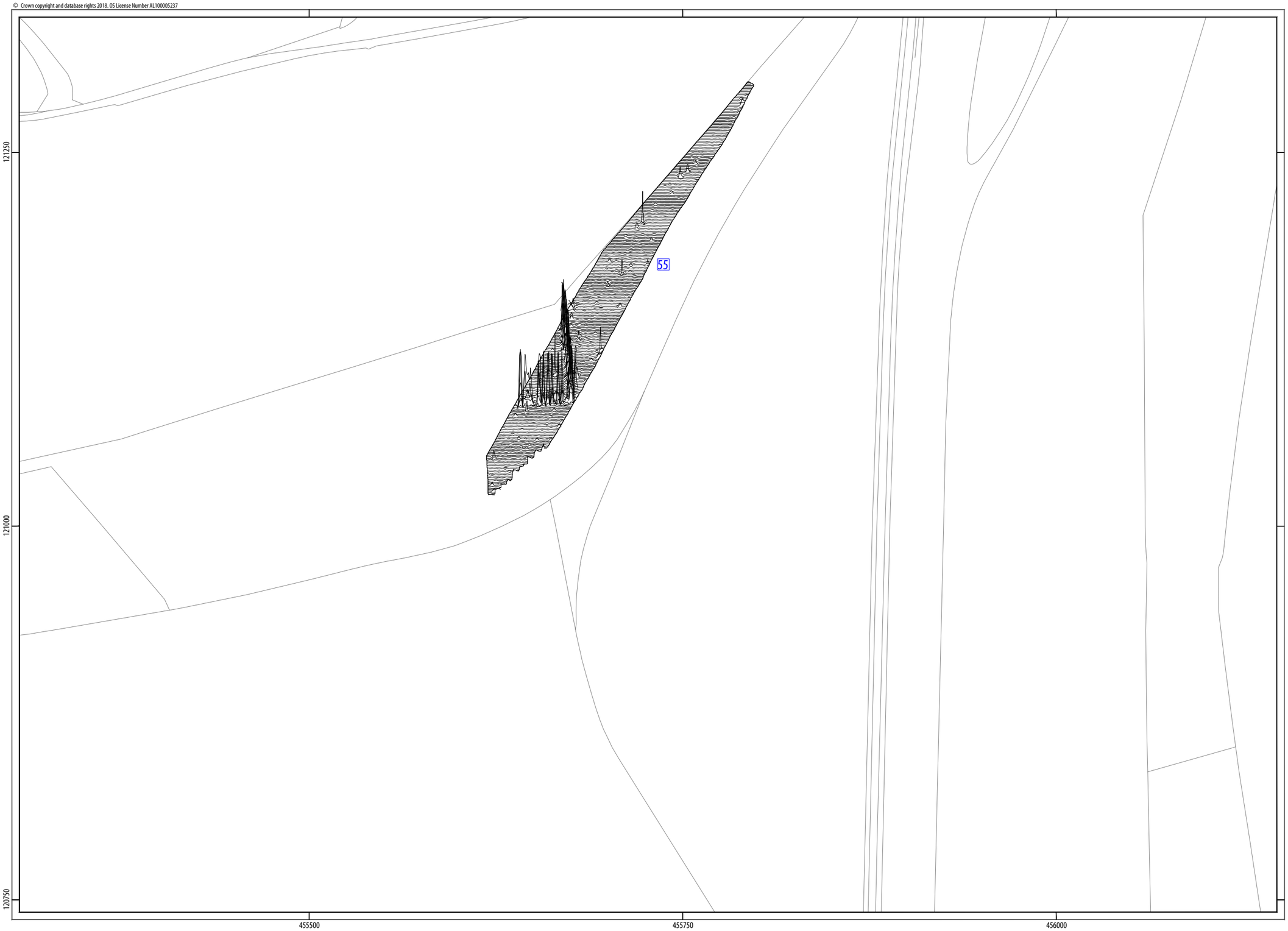
ILLUS 18 Processed greyscale magnetometer data; GSA55



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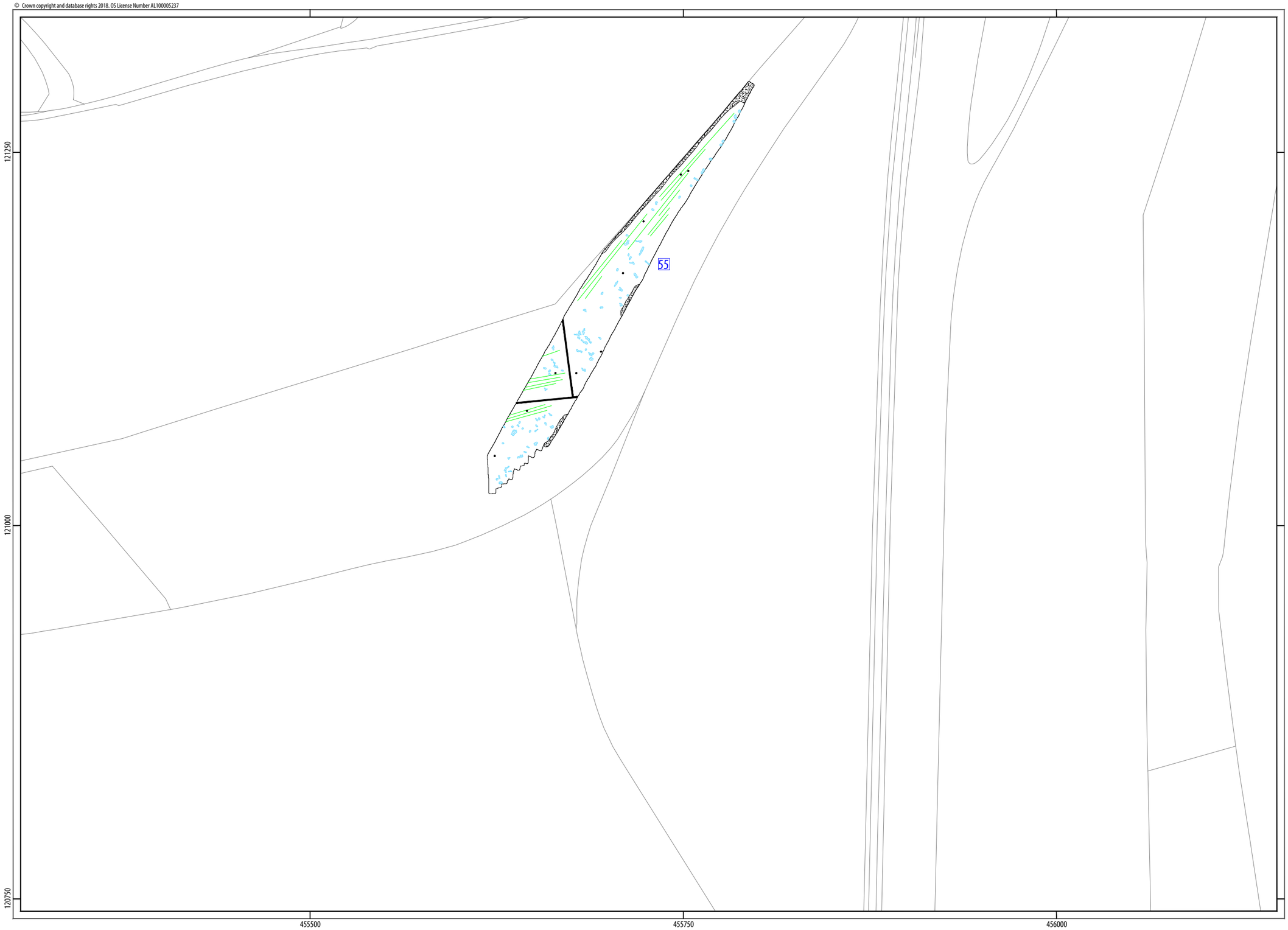
ILLUS 19 XY trace plot of minimally processed magnetometer data; GSA55



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology

0 50m
1:2,500 @ A3

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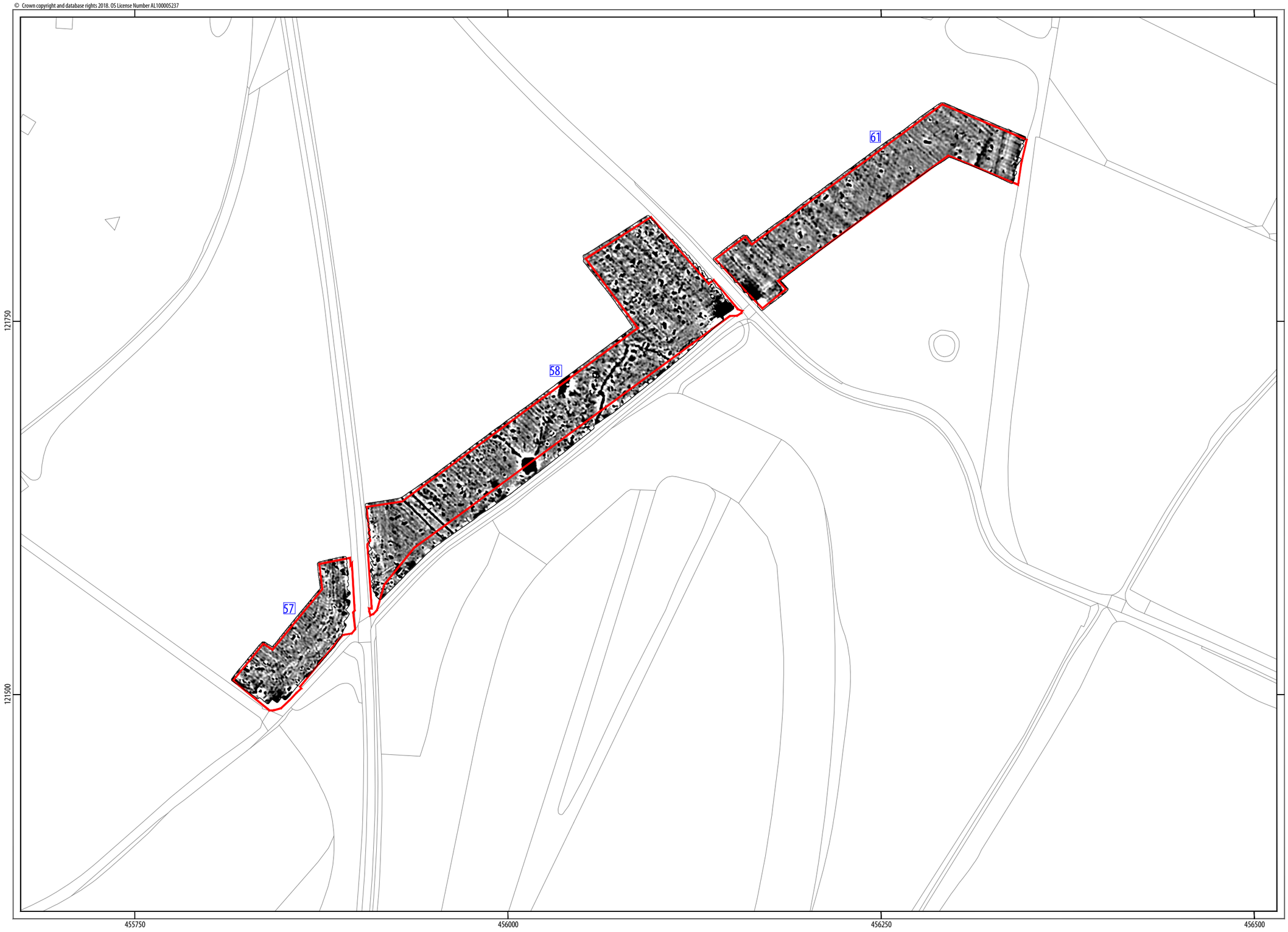
ILLUS 20 Interpretation of magnetometer data; GSA55



geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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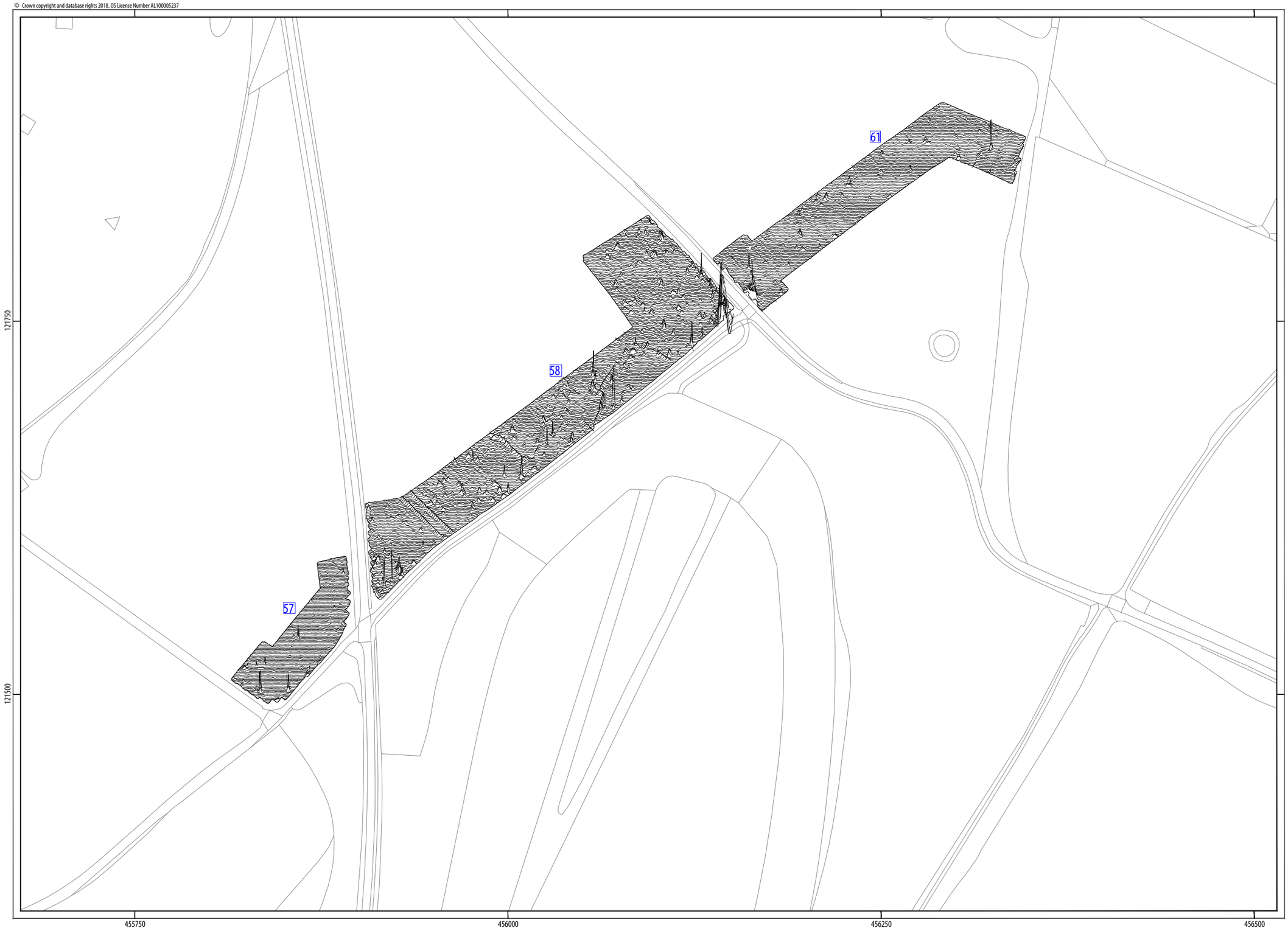
ILLUS 21 Processed greyscale magnetometer data; GSA57, GSA58 & GSA61



15.0nT/cm

0 50m

1:2,500 @ A3

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ILLUS 22 XY trace plot of minimally processed magnetometer data; GSA57, GSA58 & GSA61

INTERPRETATION
- ferrous material
- ferrous material
- agricultural
- geology
- archaeology?

0 50m
1:2,500 @ A3

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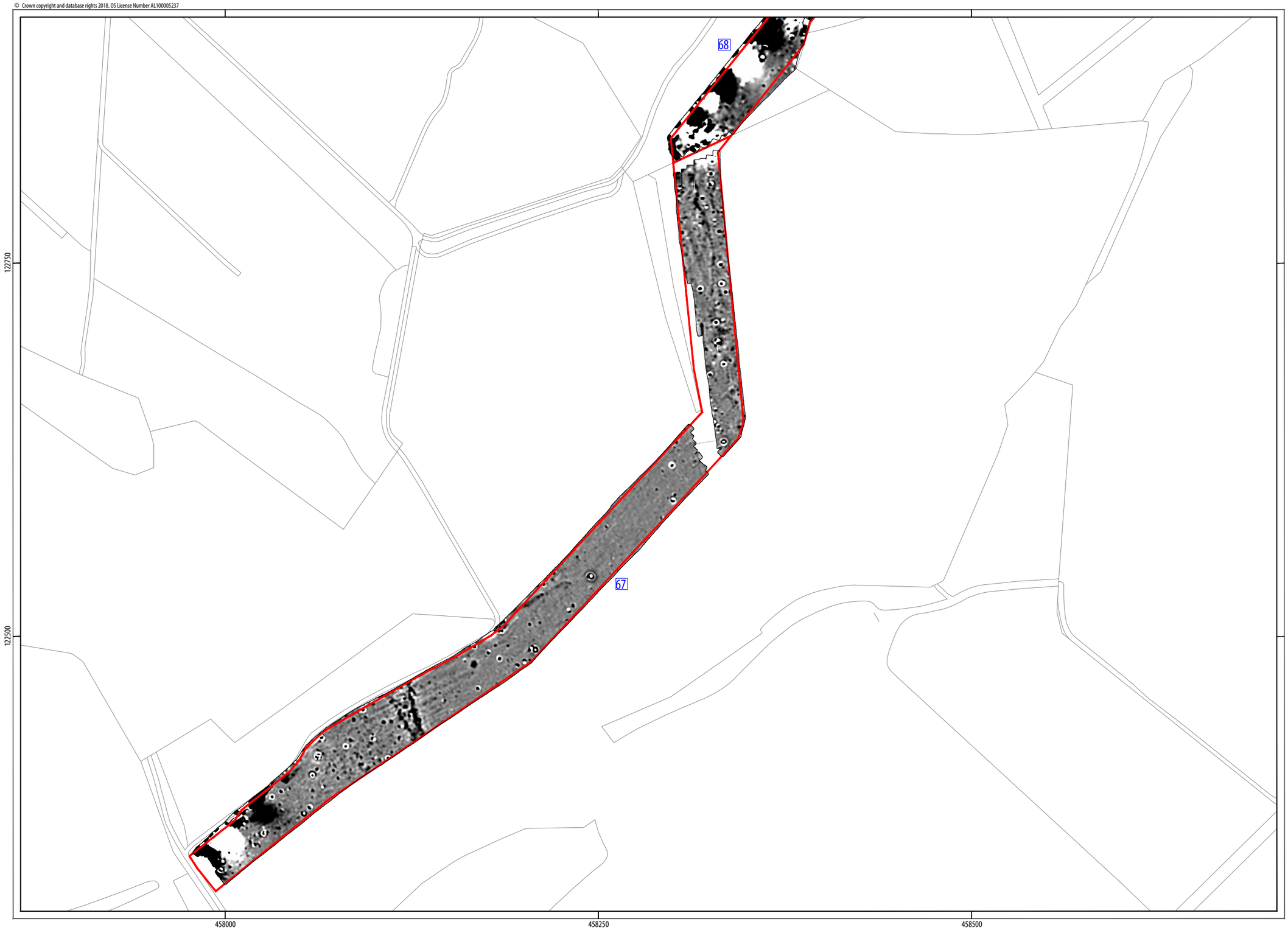
ILLUS 23 Interpretation of magnetometer data; GSA57, GSA58 & GSA61



geophysical survey area

-1.0 nT 1.0

0 50m

1:2,500 @ A3

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ILLUS 24 Processed greyscale magnetometer data; GSA67 & GSA68

68

67

122750

122500

458000

458250

458500

15.0nT/cm

0 50m

1:2,500 @ A3

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ILLUS 25 XY trace plot of minimally processed magnetometer data; GSA67 & GSA68

68

67

122750

122500

458000

458250

458500

INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology

0 50m
1:2,500 @ A3

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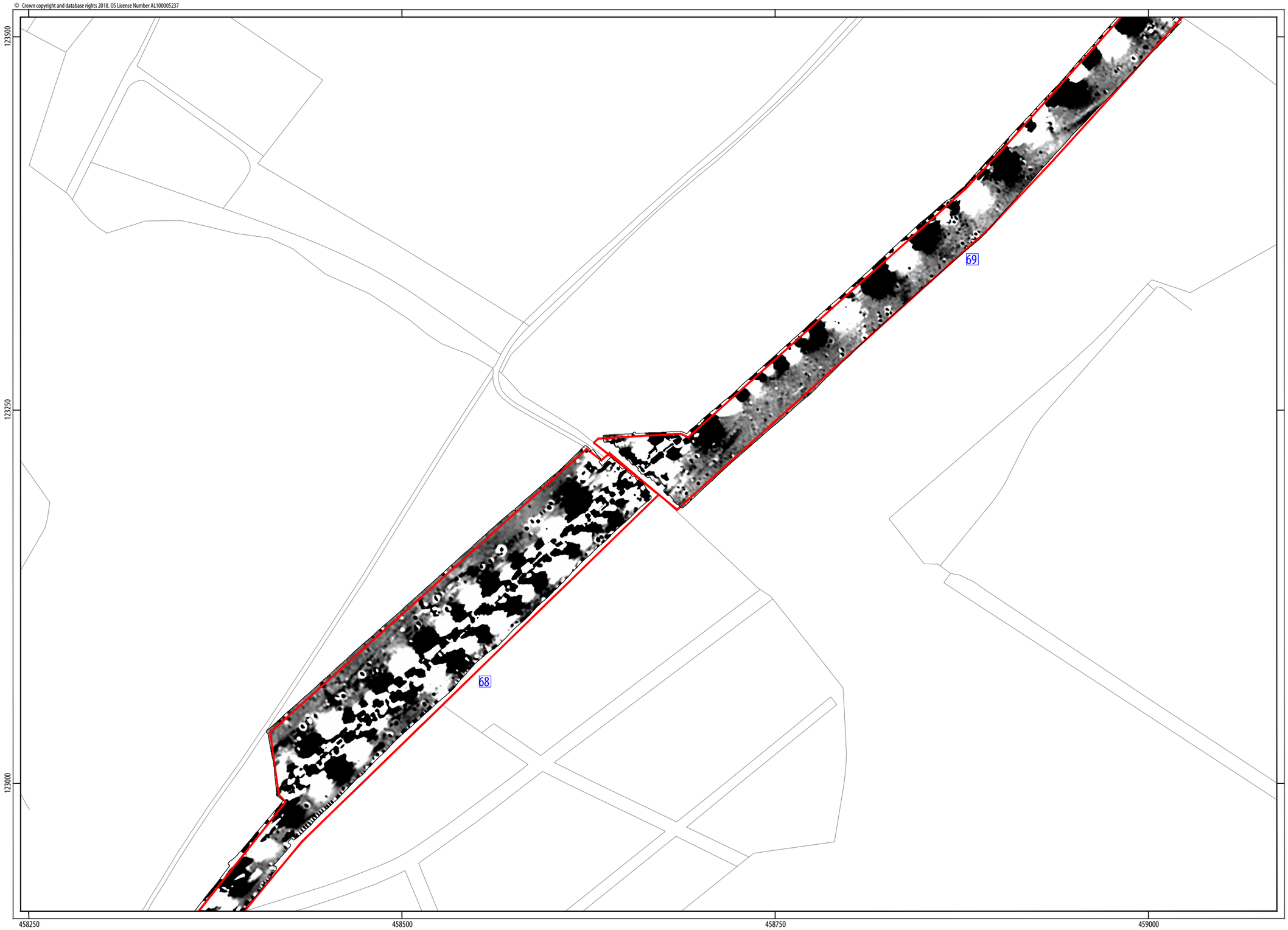
ILLUS 26 Interpretation of magnetometer data; GSA67 & GSA68



geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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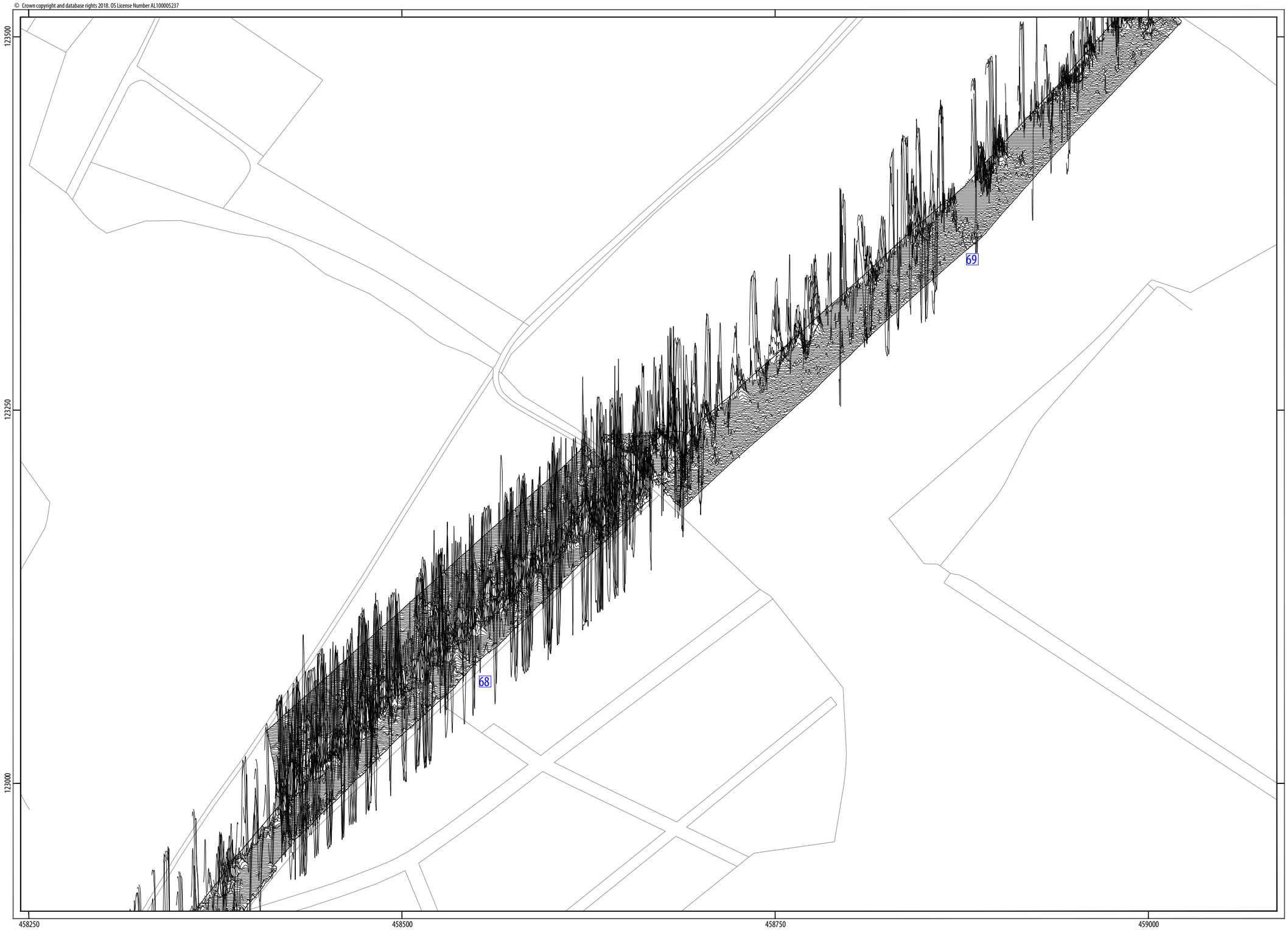
ILLUS 27 Processed greyscale magnetometer data; GSA68 & GSA69



15.0nT/cm

0 50m

1:2,500 @ A3

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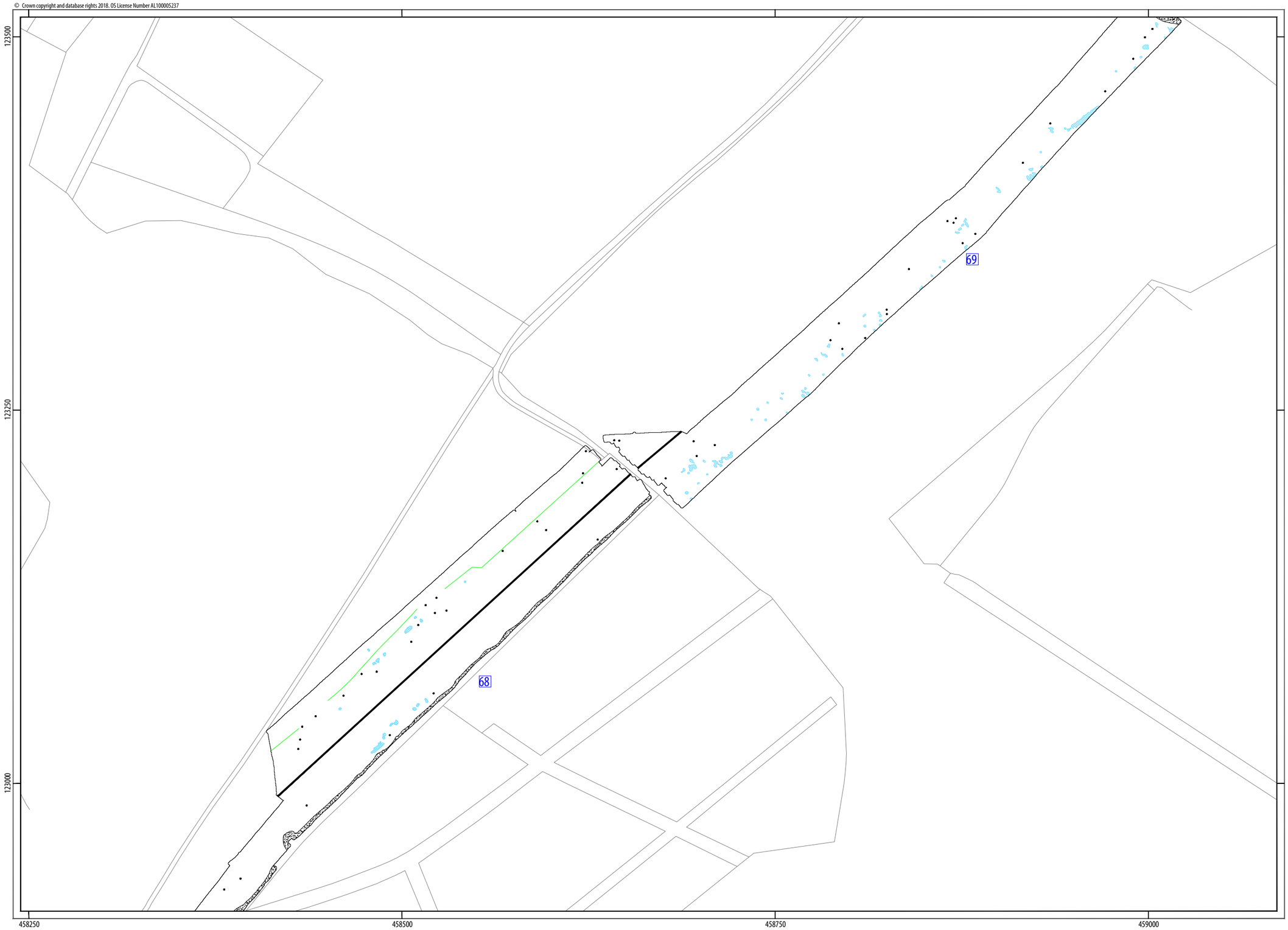
ILLUS 28 XY trace plot of minimally processed magnetometer data; GSA68 & GSA69



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology

0 50m
1:2,500 @ A3

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ILLUS 29 Interpretation of magnetometer data; GSA68 & GSA69

geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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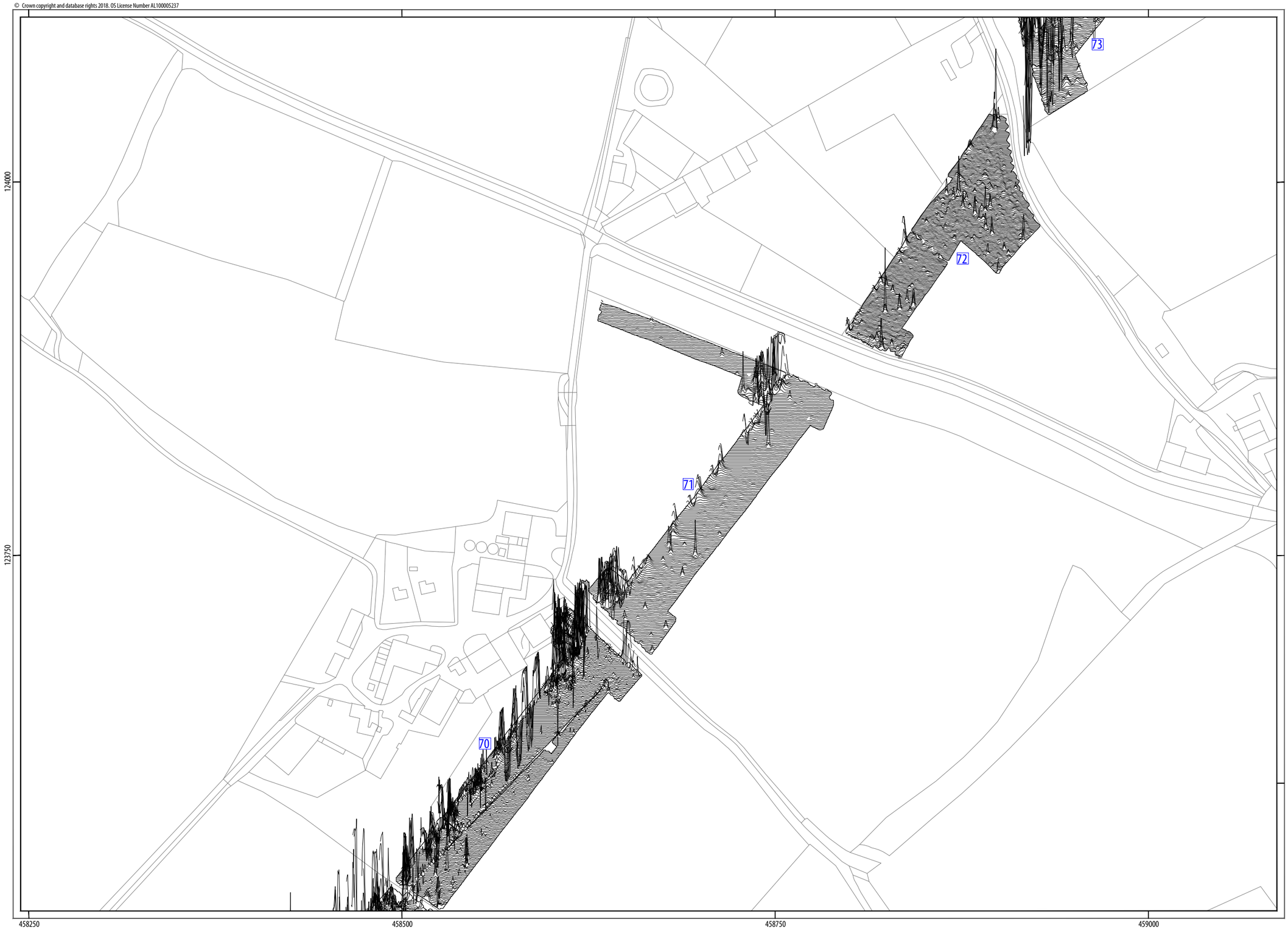
ILLUS 30 Processed greyscale magnetometer data; GSA70, GSA71, GSA72 & GSA73



15.0nT/cm

0 50m

1:2,500 @ A3

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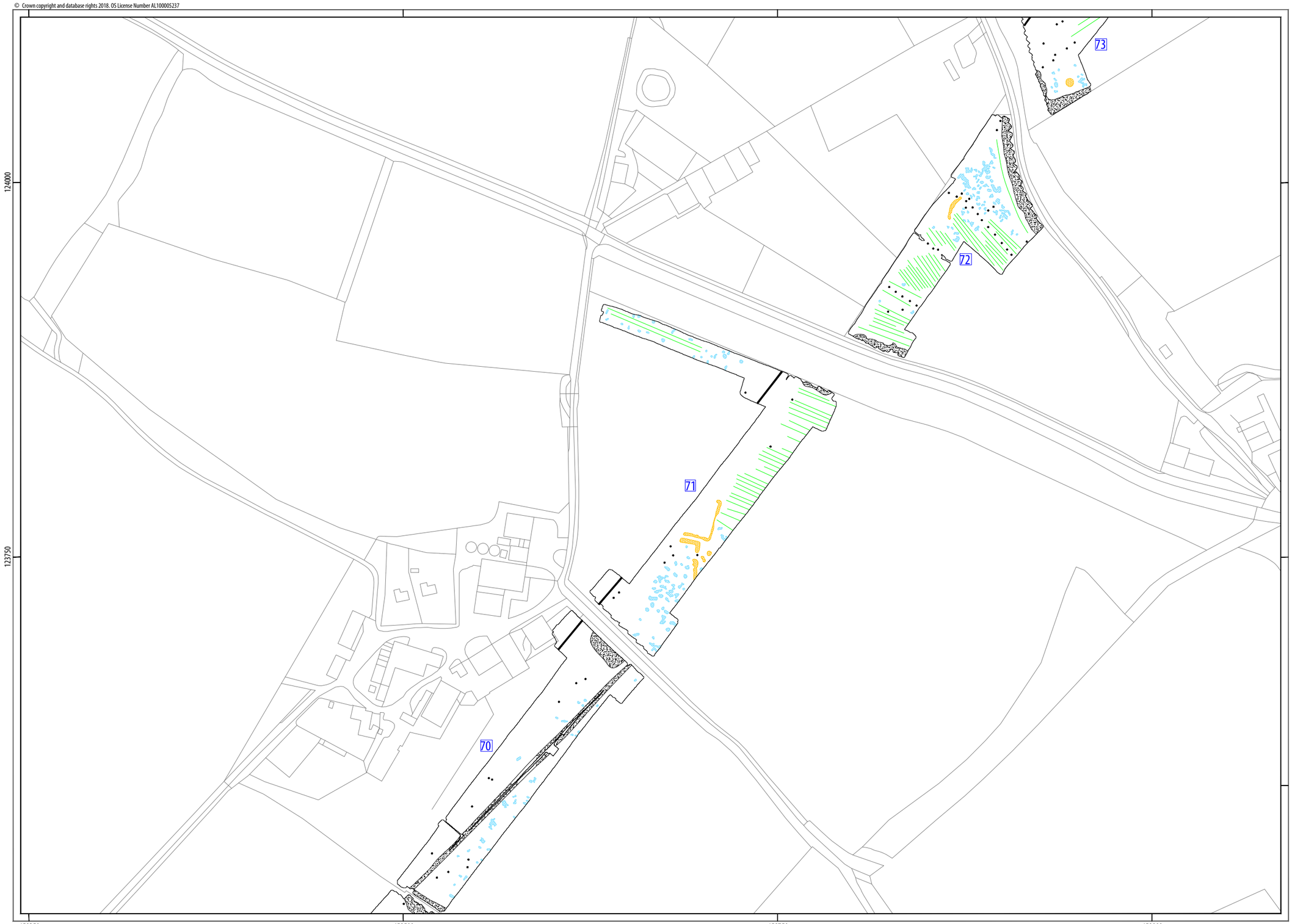
ILLUS 31 XY trace plot of minimally processed magnetometer data; GSA70, GSA71, GSA72 & GSA73



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology
- archaeology?

0 50m
1:2,500 @ A3

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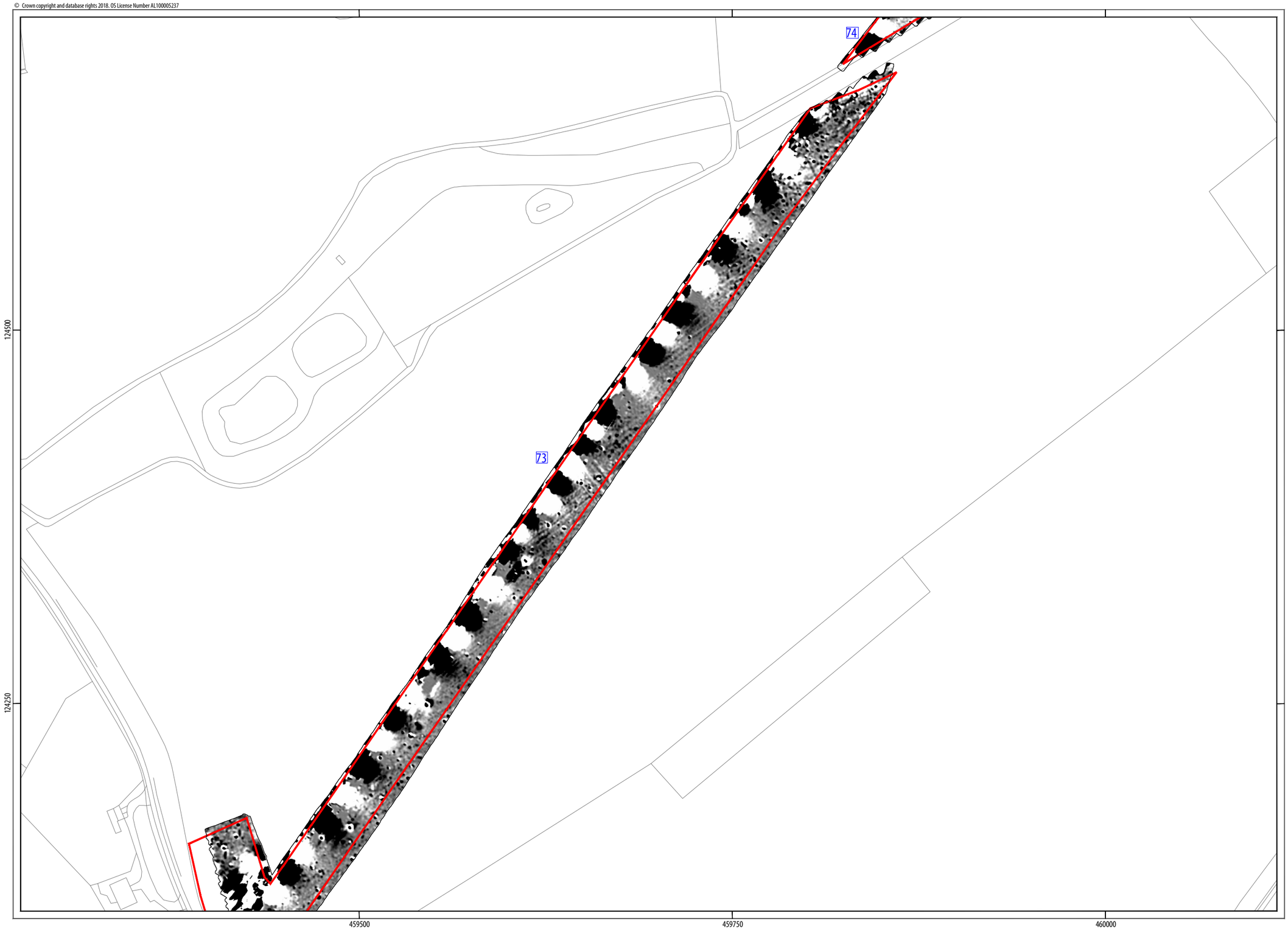
ILLUS 32 Interpretation of magnetometer data; GSA70, GSA71, GSA72 & GSA73



geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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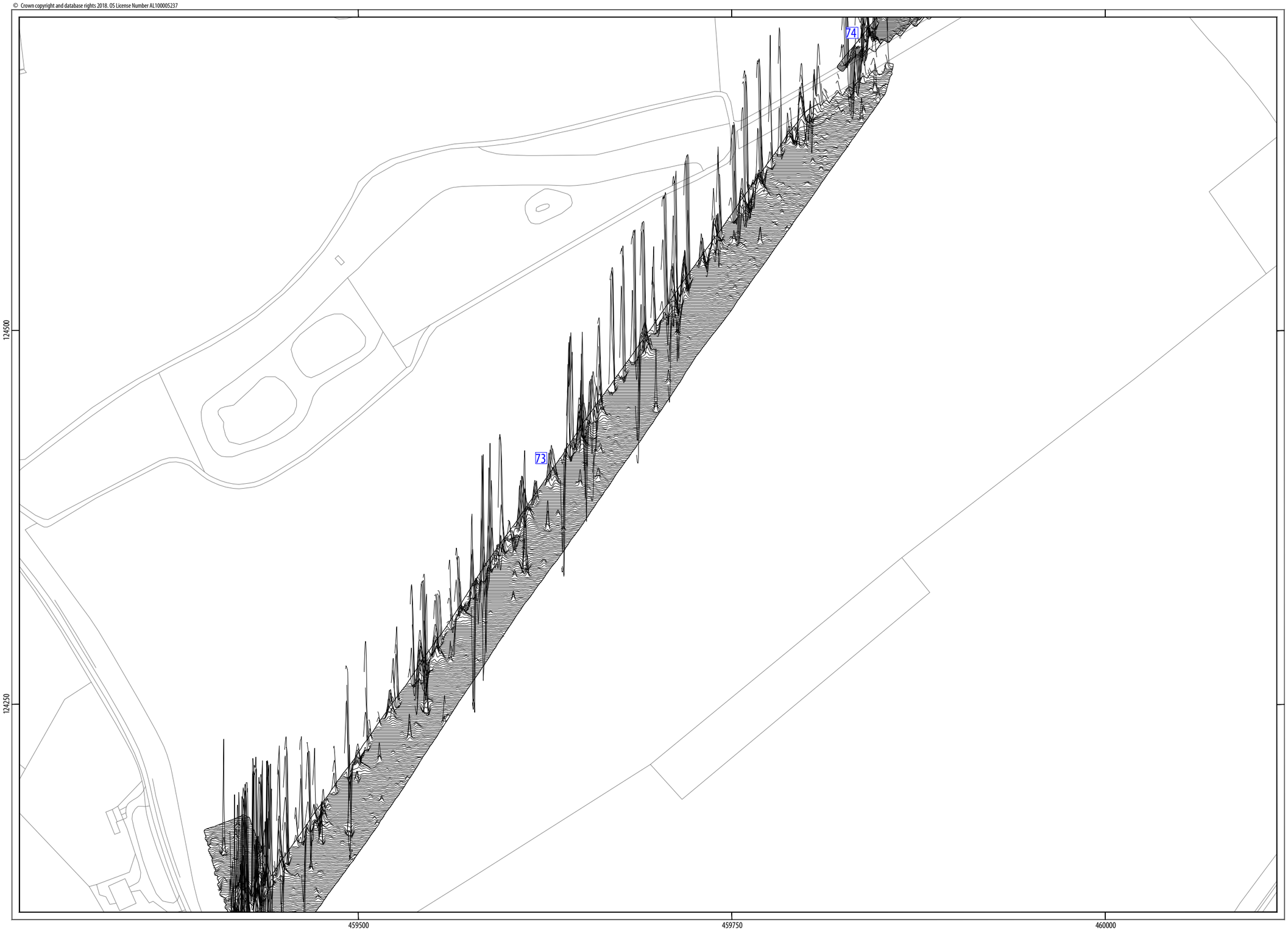
ILLUS 33 Processed greyscale magnetometer data; GSA73 & GSA74



15.0nT/cm

0 50m

1:2,500 @ A3

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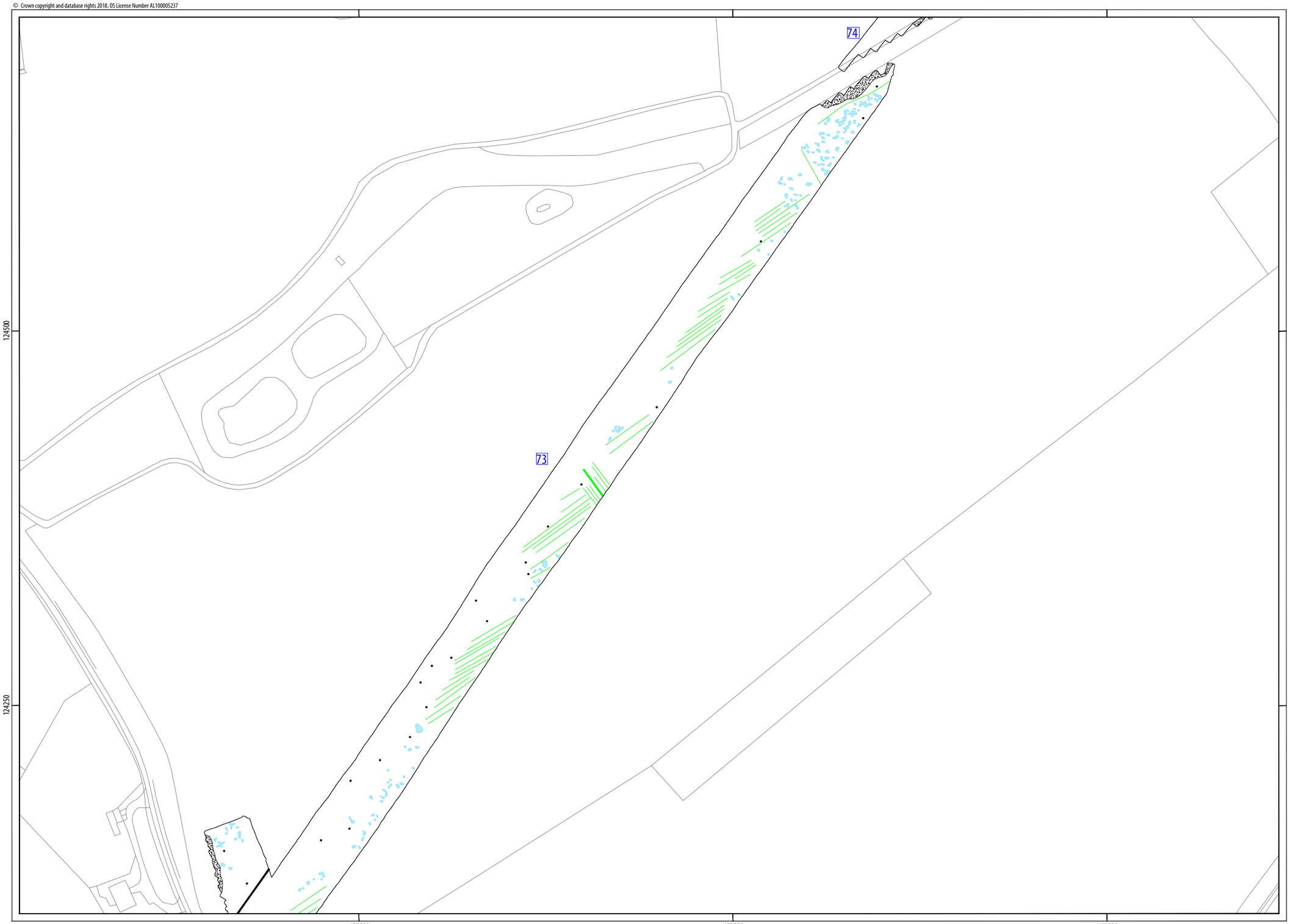
ILLUS 34 XY trace plot of minimally processed magnetometer data; GSA73 & GSA74



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- former field boundary
- geology

0 50m
1:2,500 @ A3

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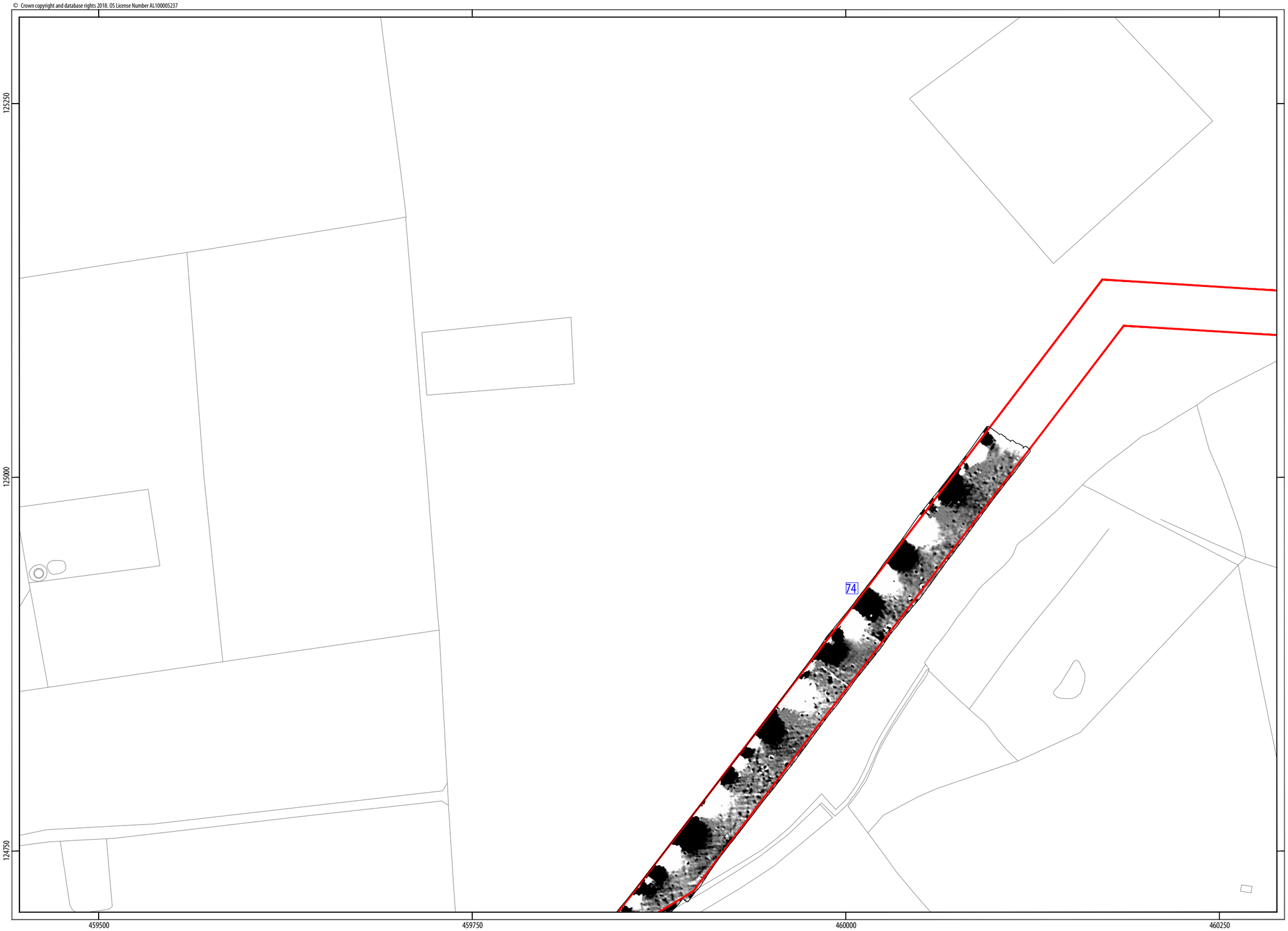
ILLUS 35 Interpretation of magnetometer data; GSA73 & GSA74



geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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ILLUS 36 Processed greyscale magnetometer data; GSA74

125250
125000
124750
459500
459750
460000
460250

74

15.0nT/cm

0 50m
1:2,500 @ A3

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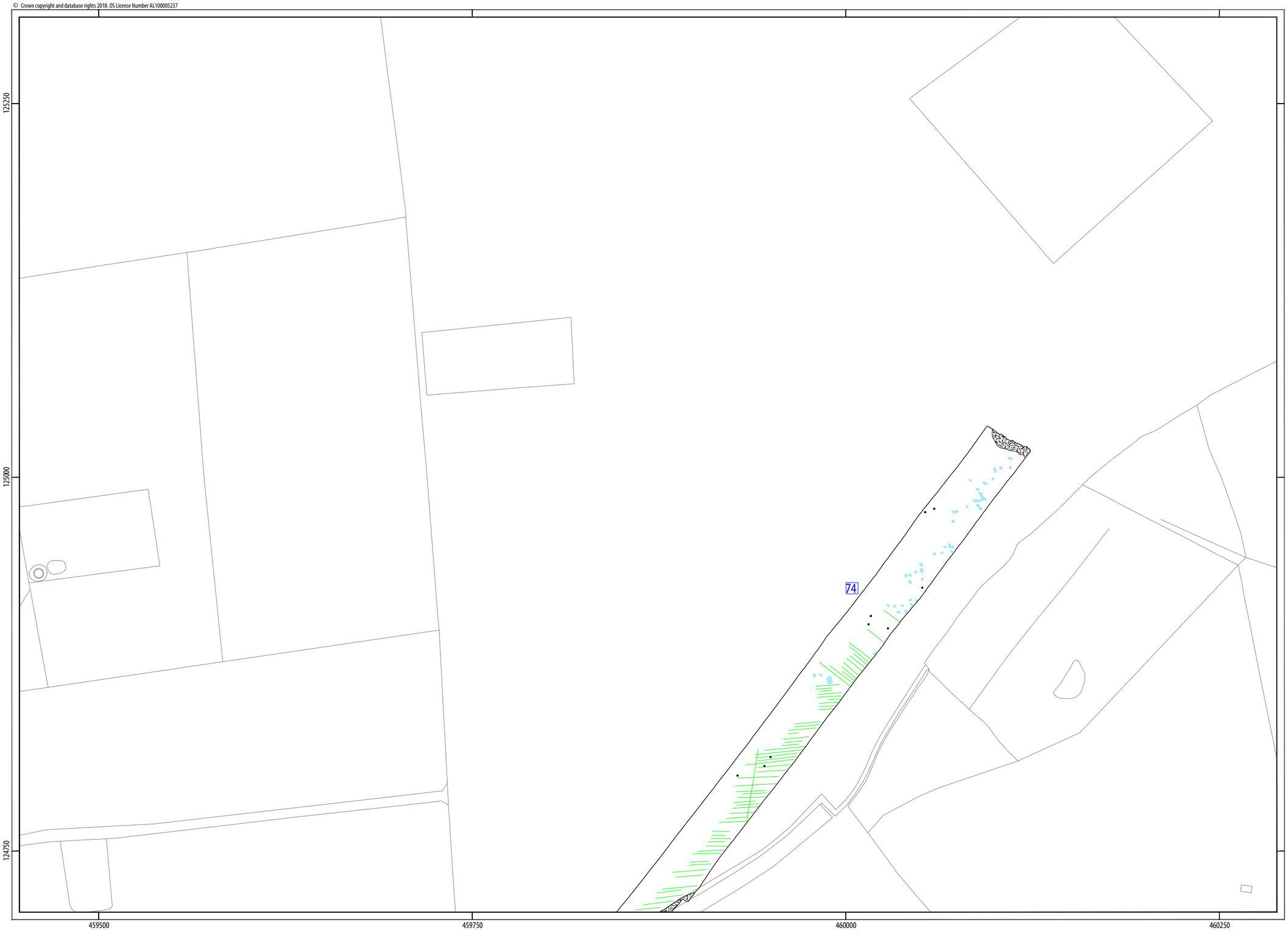
ILLUS 37 XY trace plot of minimally processed magnetometer data; GSA74



INTERPRETATION
- ferrous material
- ferrous material
- agricultural
- geology

0 50m
1:2,500 @ A3

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ILLUS 38 Interpretation of magnetometer data; GSA74

geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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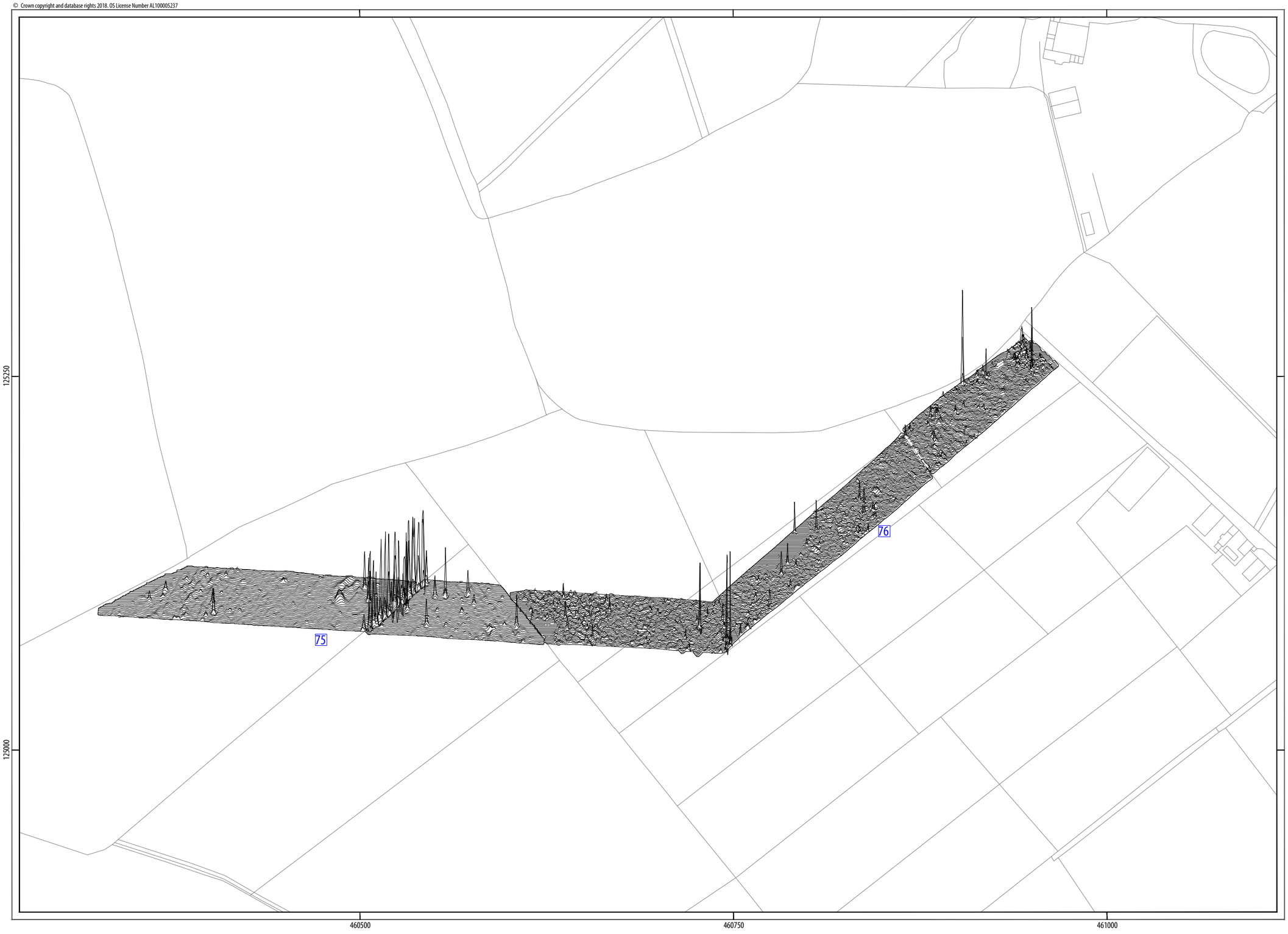
ILLUS 39 Processed greyscale magnetometer data; GSA75 & GSA76



15.0nT/cm

0 50m

1:2,500 @ A3

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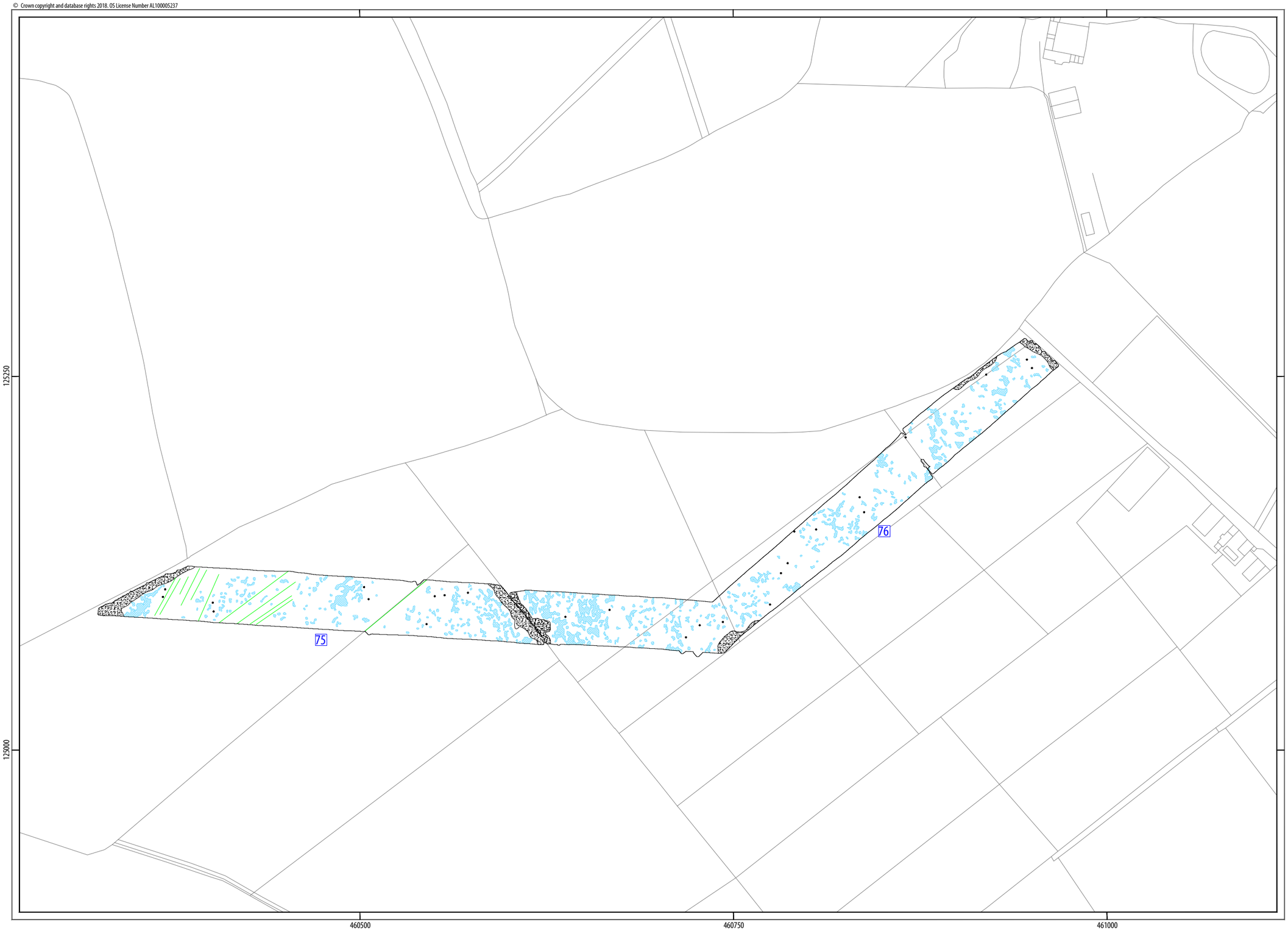
ILLUS 40 XY trace plot of minimally processed magnetometer data; GSA75 & GSA76



INTERPRETATION
- ferrous material
- ferrous material
- agricultural
- geology

0 50m
1:2,500 @ A3

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ILLUS 41 Interpretation of magnetometer data; GSA75 & GSA76

geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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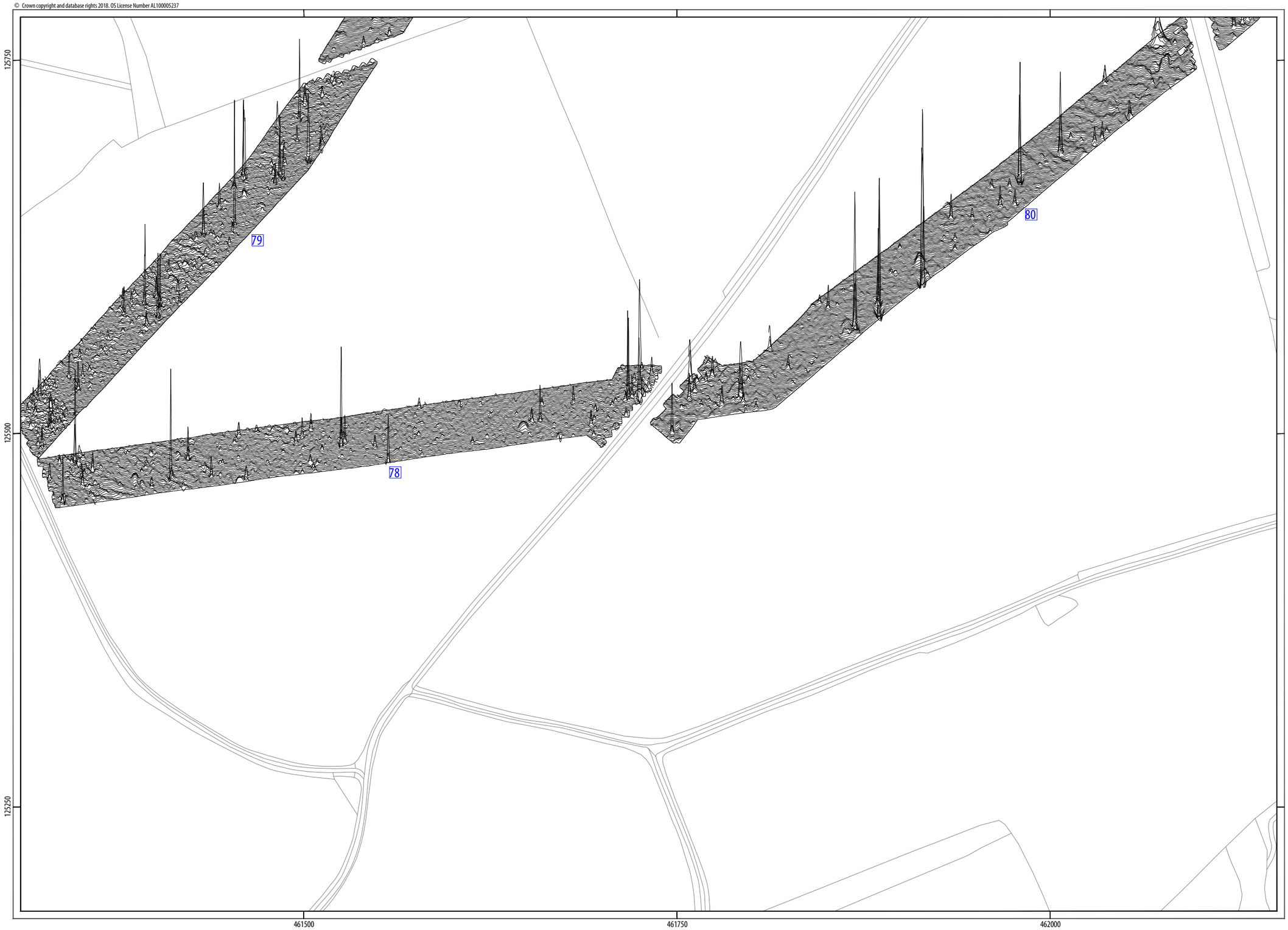
ILLUS 42 Processed greyscale magnetometer data; GSA78, GSA79 & GSA80



15.0nT/cm

0 50m

1:2,500 @ A3

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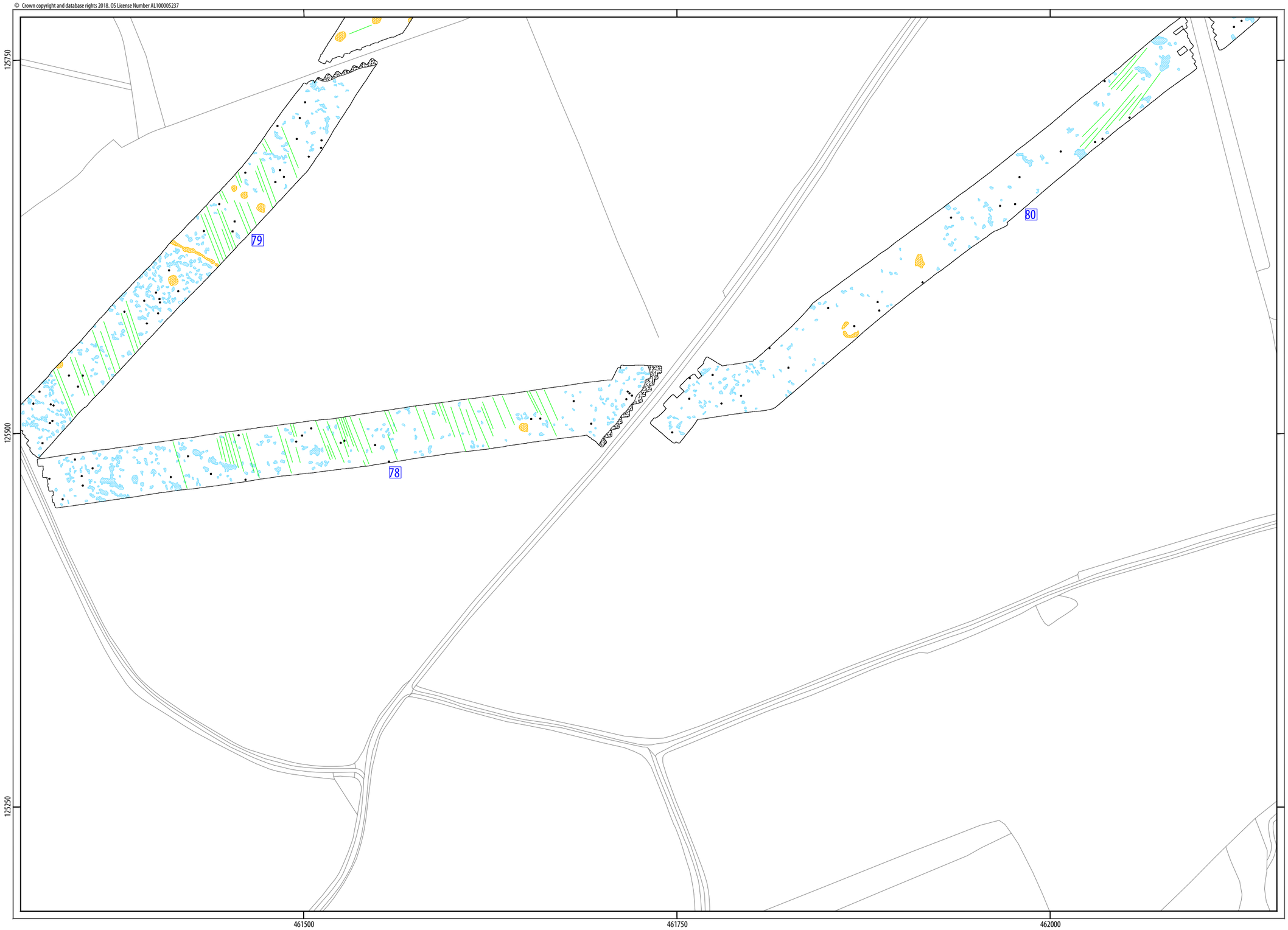
ILLUS 43 XY trace plot of minimally processed magnetometer data; GSA78, GSA79 & GSA80



INTERPRETATION
- ferrous material
- ferrous material
- agricultural
- geology
- archaeology?

0 50m
1:2,500 @ A3

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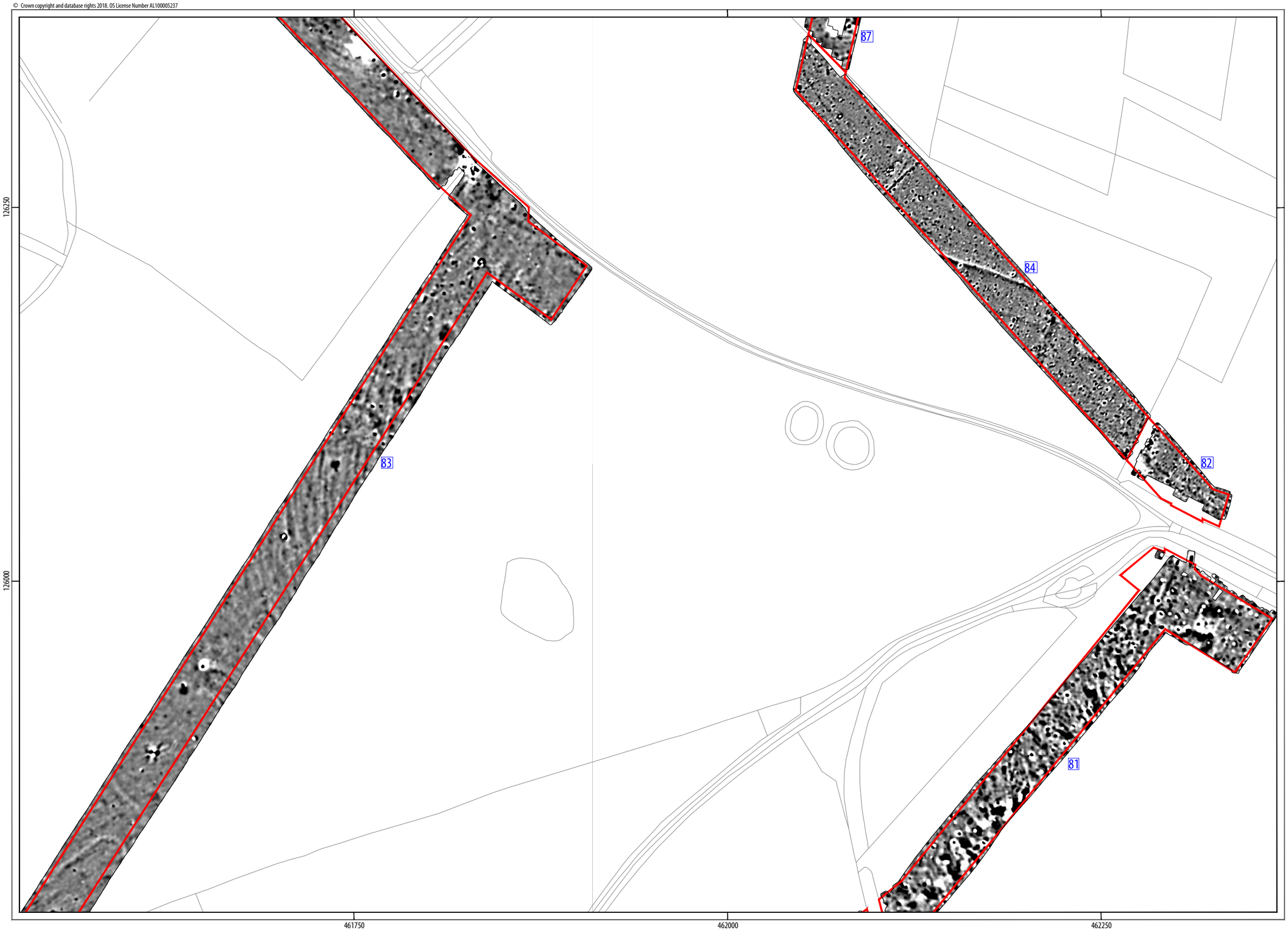
ILLUS 44 Interpretation of magnetometer data; GSA78, GSA79 & GSA80



geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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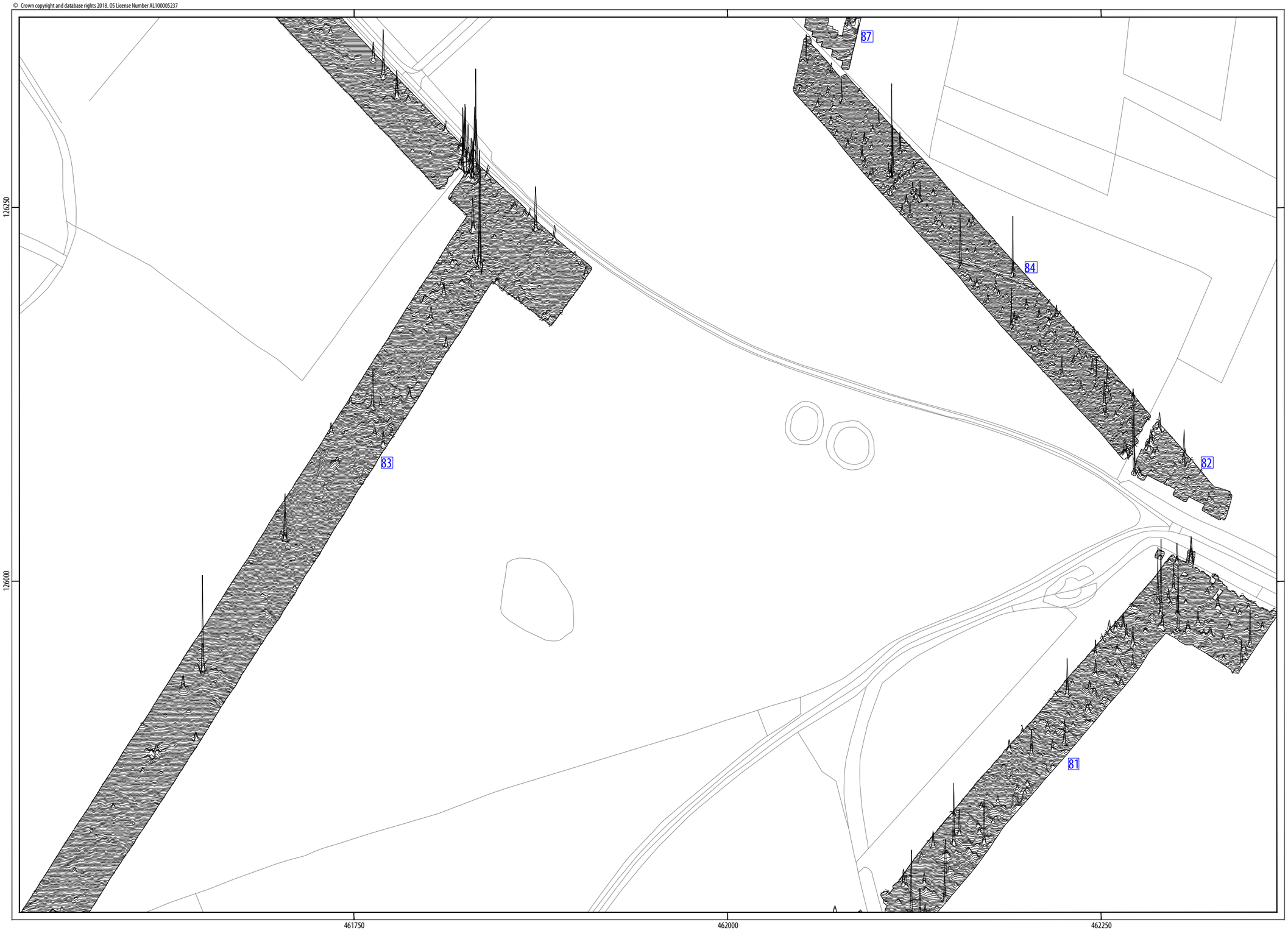
ILLUS 45 Processed greyscale magnetometer data; GSA81, GSA82, GSA83, GSA84 & GSA87



15.0nT/cm

0 50m

1:2,500 @ A3

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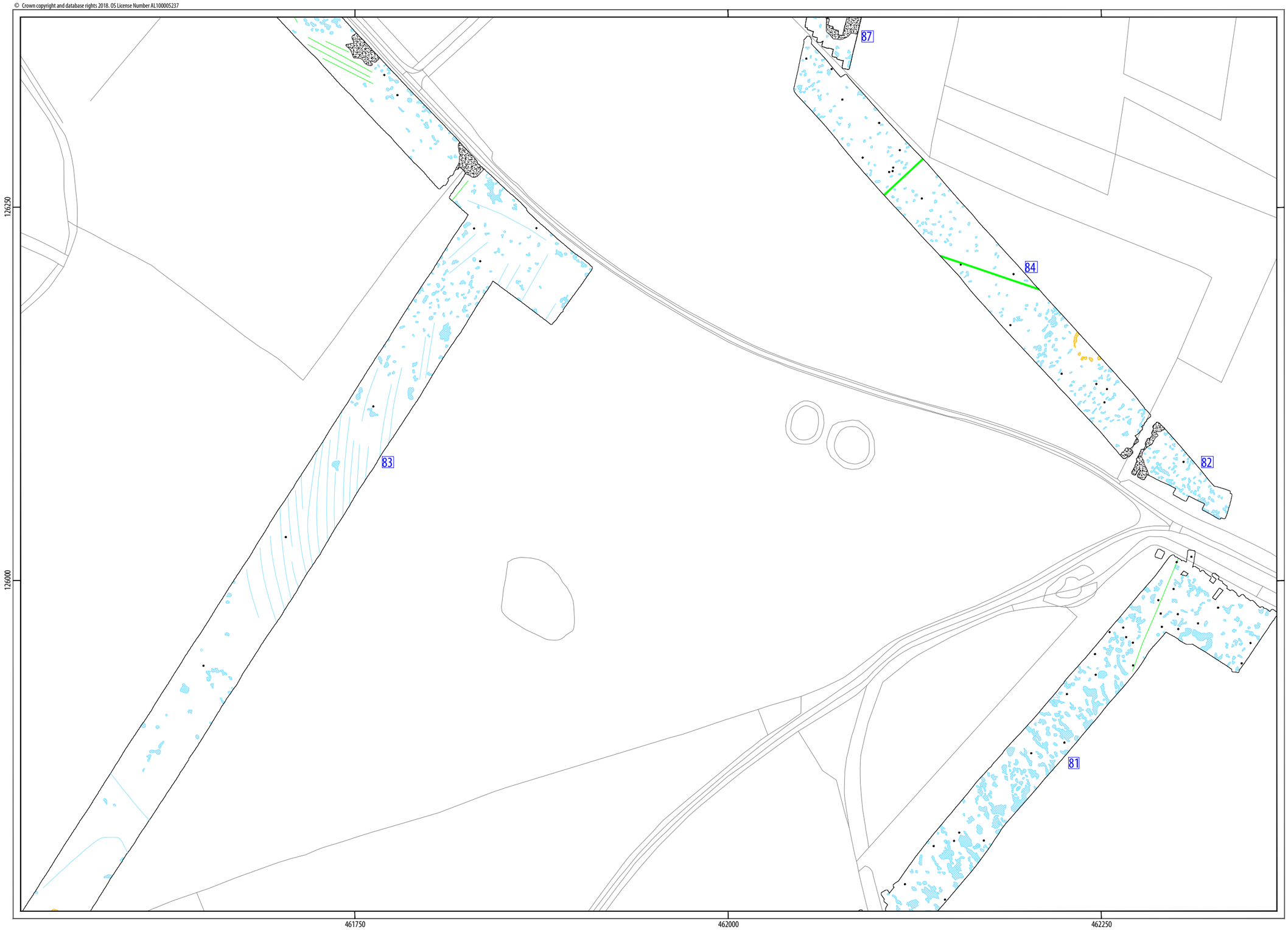
ILLUS 46 XY trace plot of minimally processed magnetometer data; GSA81, GSA82, GSA83, GSA84 & GSA87



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- former field boundary
- geology
- archaeology?

0 50m
1:2,500 @ A3

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ILLUS 47 Interpretation of magnetometer data; GSA81, GSA82, GSA83, GSA84 & GSA87

88

87

83

126750

126500

461500

461750

462000

geophysical survey area

-1.0 nT 1.0

0 50m

1:2,500 @ A3

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ILLUS 48 Processed greyscale magnetometer data; GSA83, GSA87 & GSA88

88

87

83

126750

126500

461500

461750

462000

15.0nT/cm

0 50m

1:2,500 @ A3

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ILLUS 49 XY trace plot of minimally processed magnetometer data; GSA83, GSA87 & GSA88

88

87

83

126750

126500

461500

461750

462000

INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology
- archaeology?

0 50m
1:2,500 @ A3

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ILLUS 50 Interpretation of magnetometer data; GSA83, GSA87 & GSA88

geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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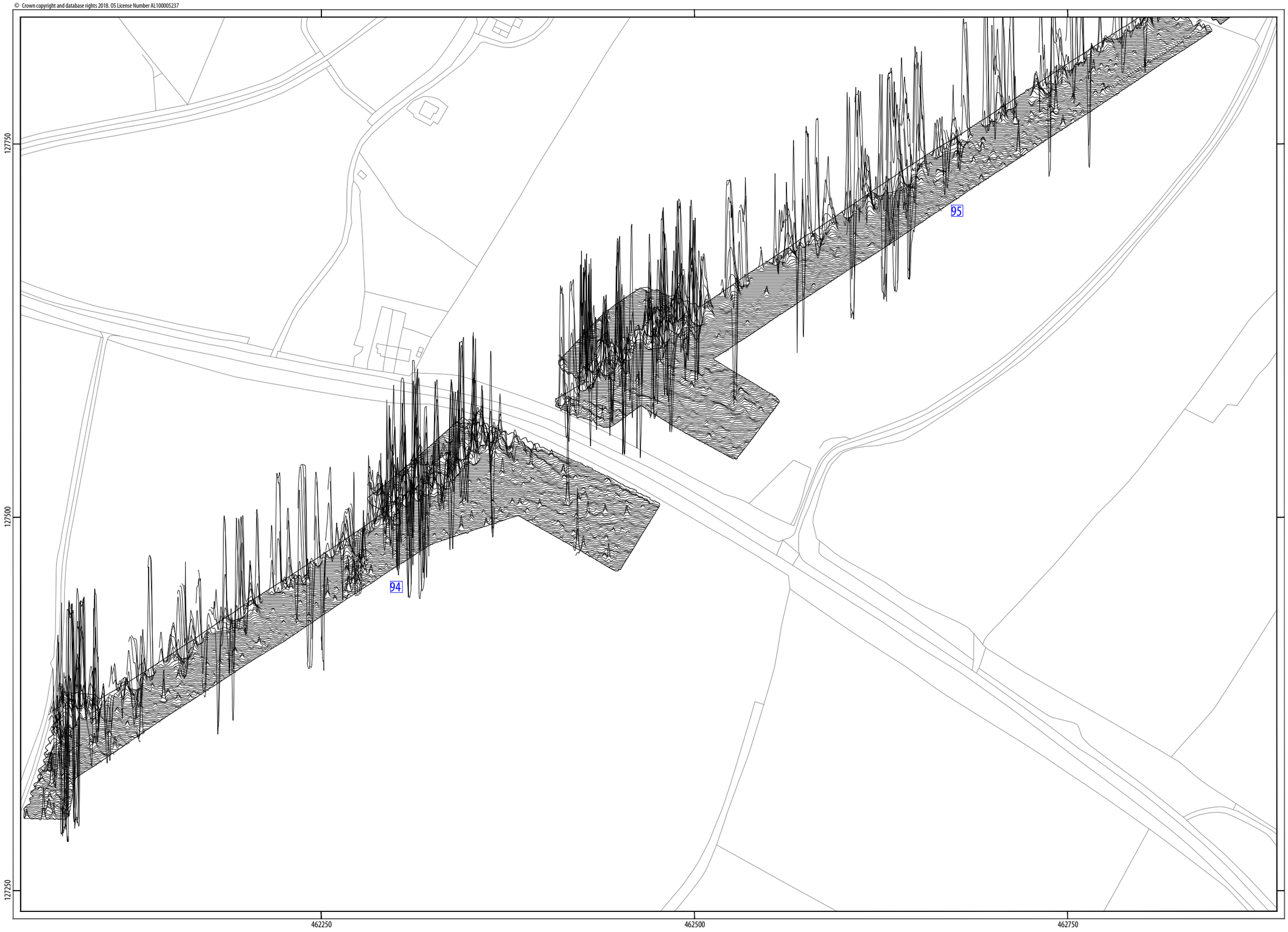
ILLUS 51 Processed greyscale magnetometer data; GSA94 & GSA95



15.0nT/cm

0 50m

1:2,500 @ A3

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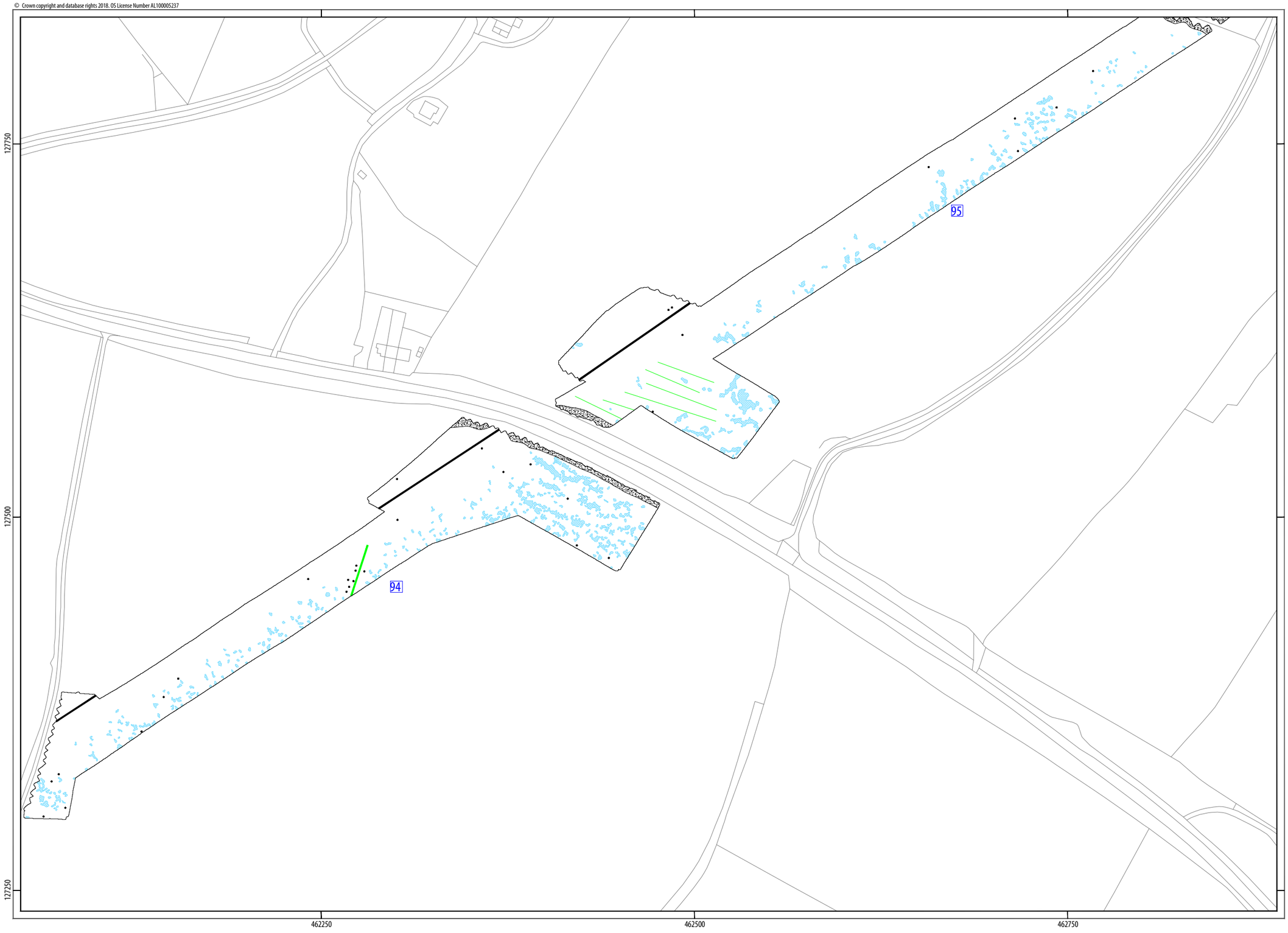
ILLUS 52 XY trace plot of minimally processed magnetometer data; GSA94 & GSA95



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- former field boundary
- geology

0 50m
1:2,500 @ A3

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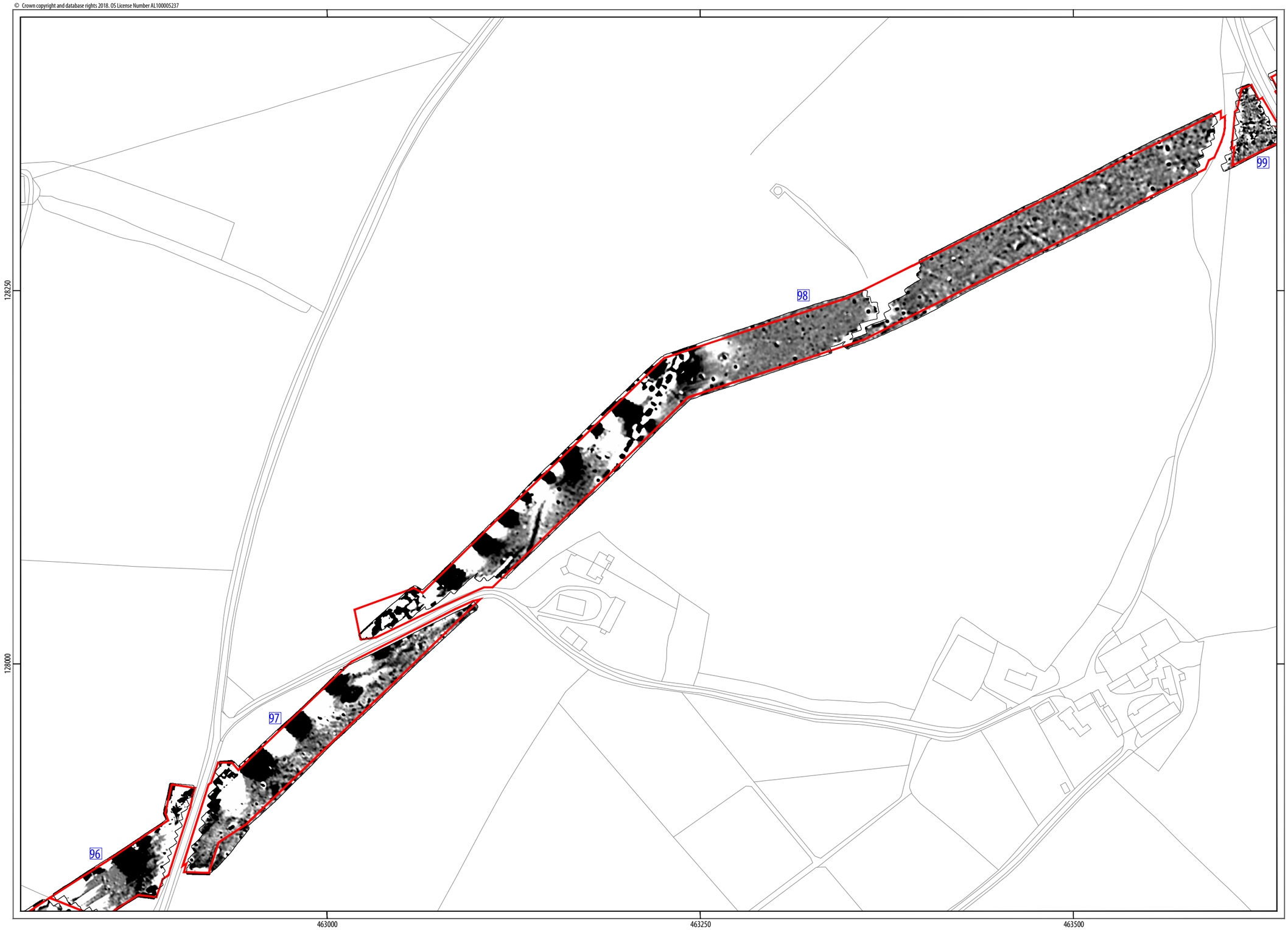
ILLUS 53 Interpretation of magnetometer data; GSA94 & GSA95



geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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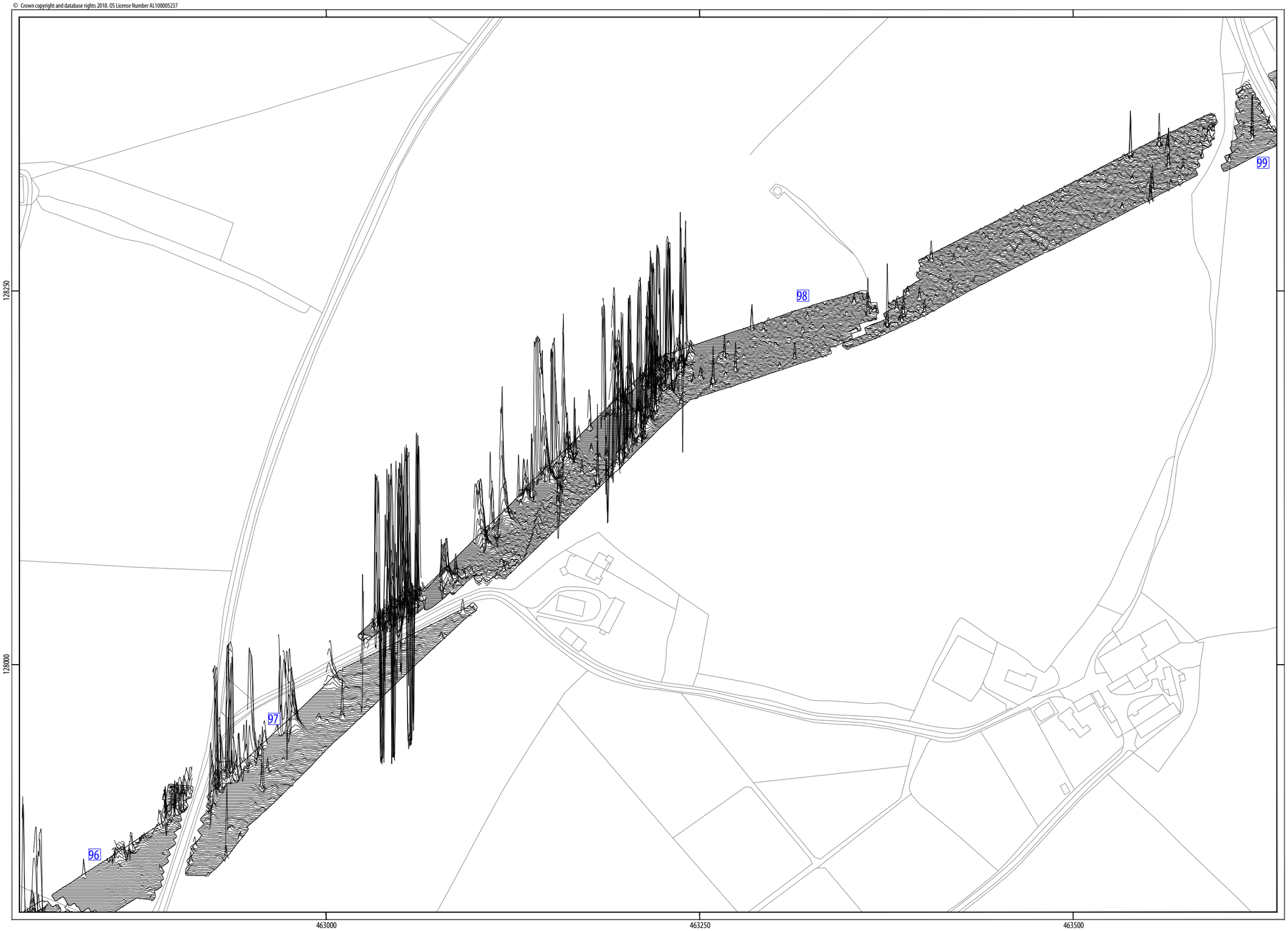
ILLUS 54 Processed greyscale magnetometer data; GSA96, GSA97, GSA98 & GSA99



15.0nT/cm

0 50m

1:2,500 @ A3

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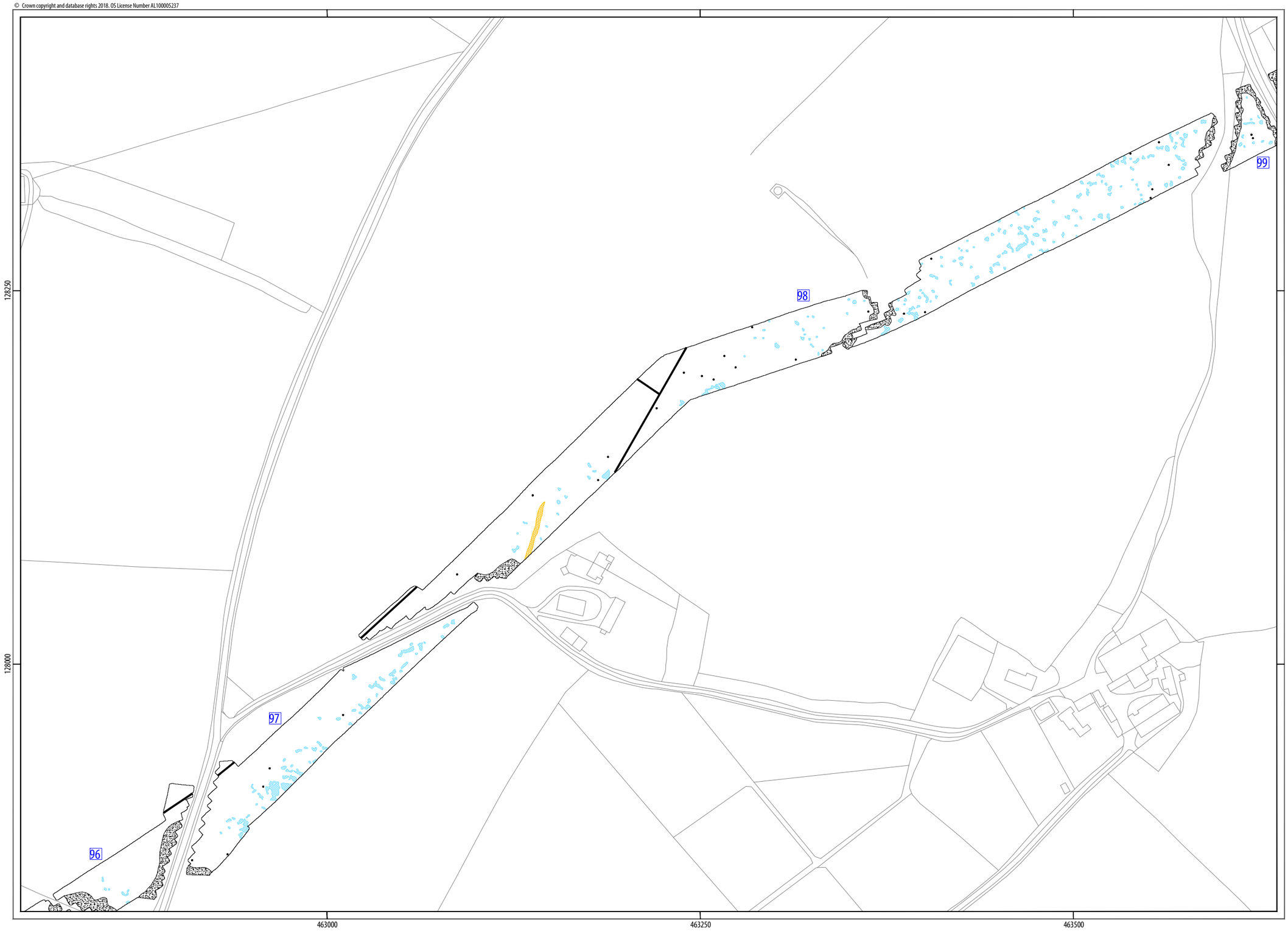
ILLUS 55 XY trace plot of minimally processed magnetometer data; GSA96, GSA97, GSA98 & GSA99



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- geology
- archaeology?

0 50m
1:2,500 @ A3

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ILLUS 56 Interpretation of magnetometer data; GSA96, GSA97, GSA98 & GSA99

geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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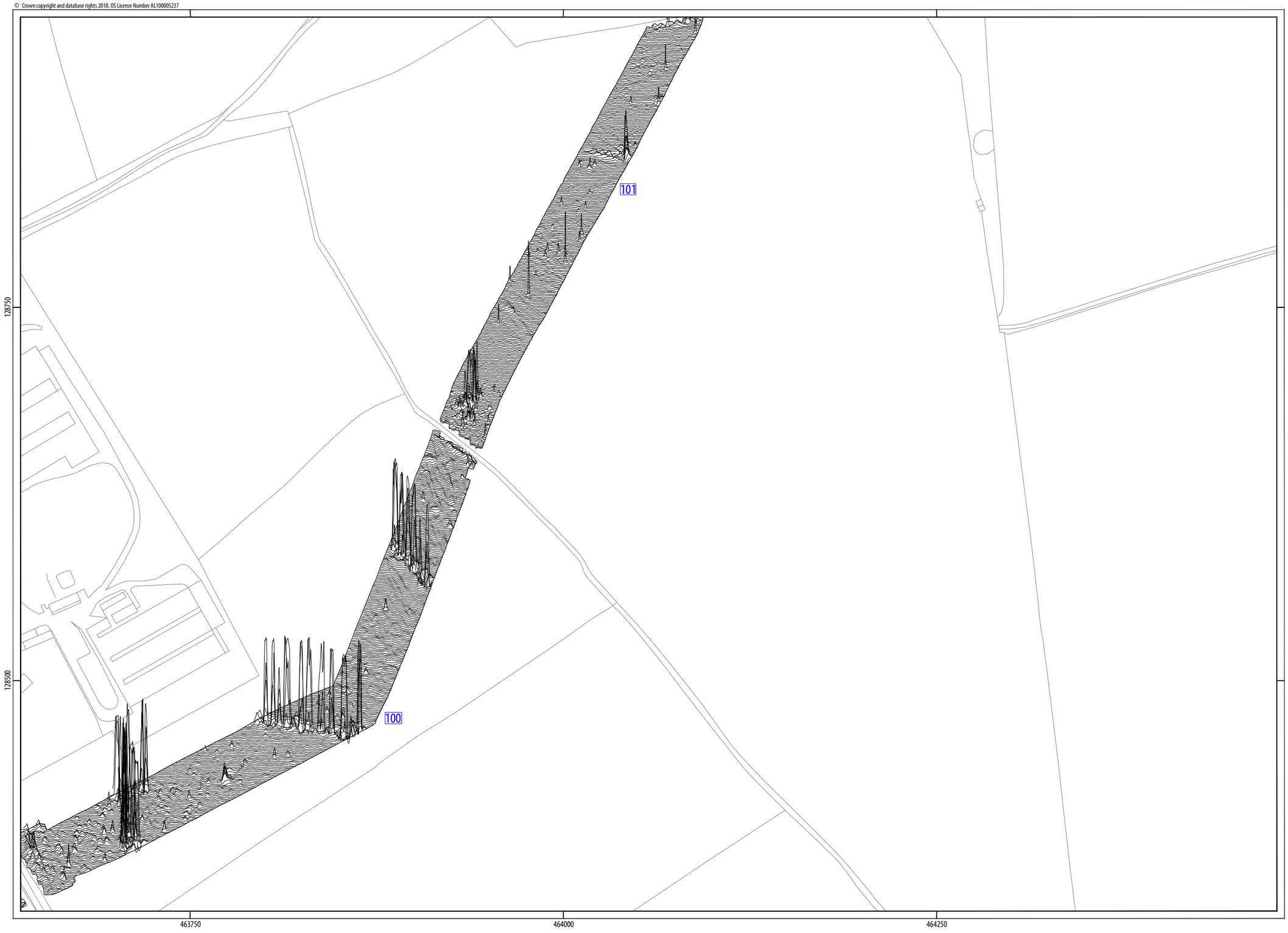
ILLUS 57 Processed greyscale magnetometer data; GSA100 & GSA101



15.0nT/cm

0 50m

1:2,500 @ A3

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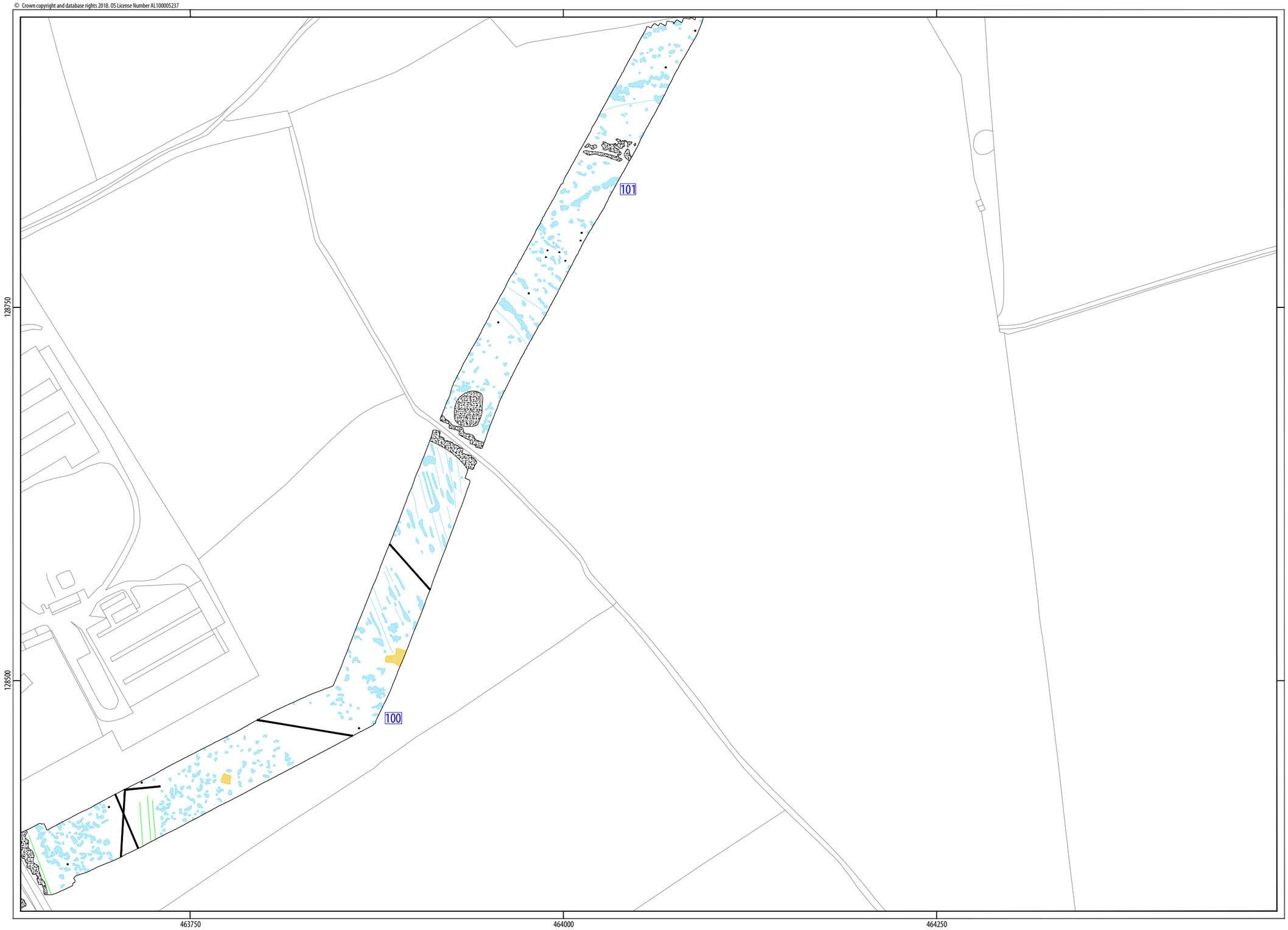
ILLUS 58 XY trace plot of minimally processed magnetometer data; GSA100 & GSA101



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology
- archaeology?

0 50m
1:2,500 @ A3

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ILLUS 59 Interpretation of magnetometer data; GSA100 & GSA101

geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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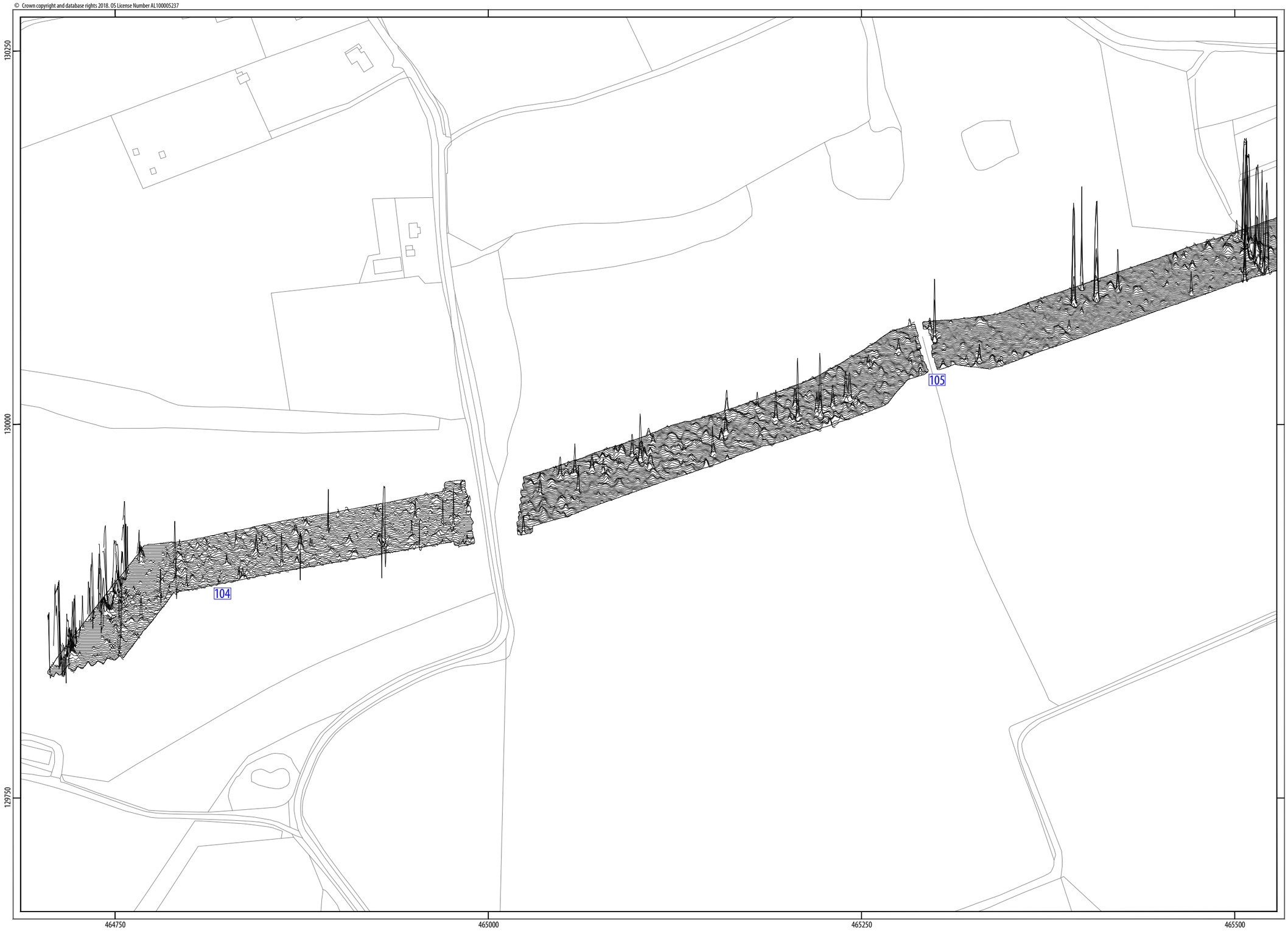
ILLUS 60 Processed greyscale magnetometer data; GSA104 & GSA105



15.0nT/cm

0 50m

1:2,500 @ A3

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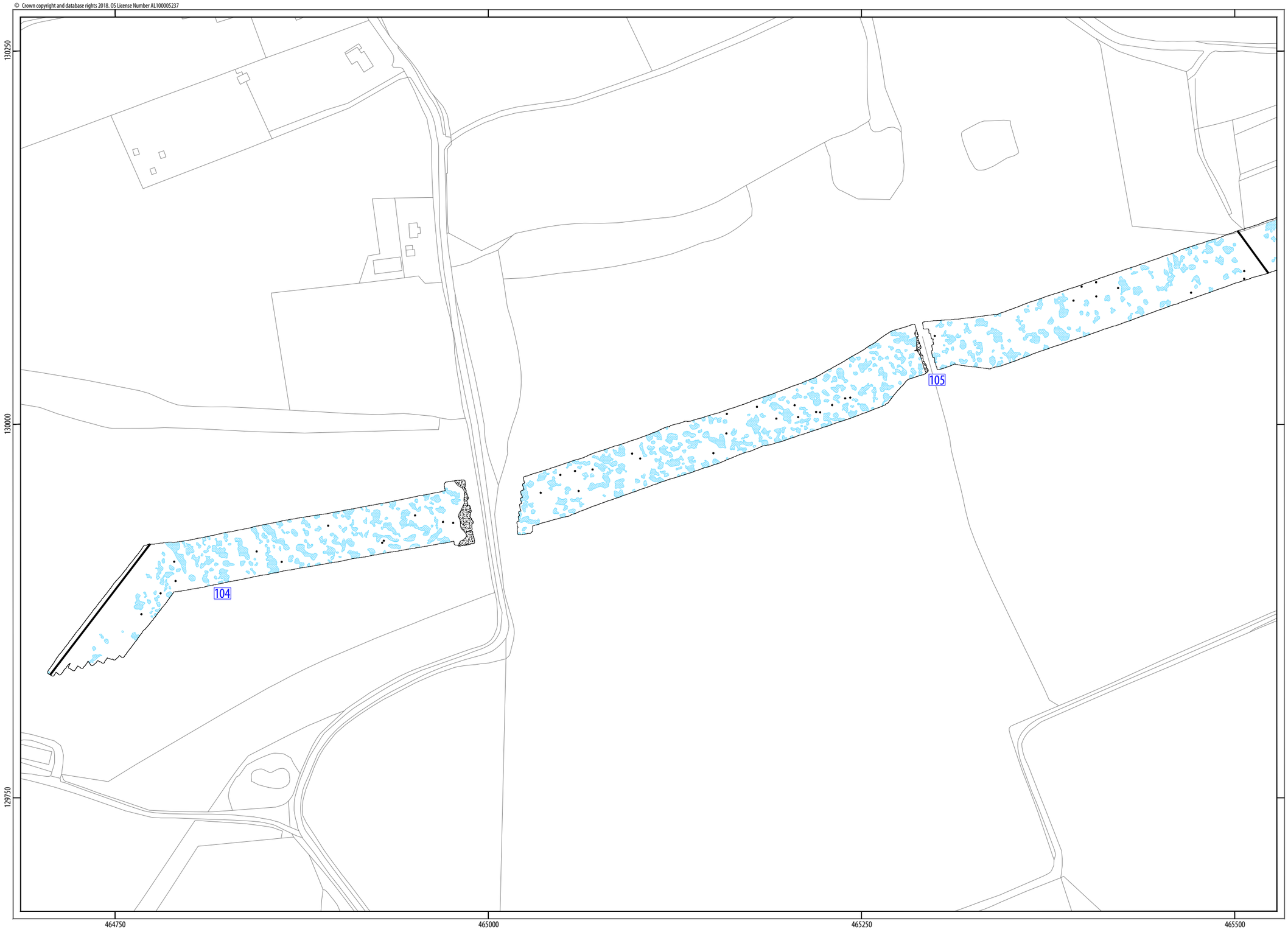
ILLUS 61 XY trace plot of minimally processed magnetometer data; GSA104 & GSA105



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- geology

0 50m
1:2,500 @ A3

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ILLUS 62 Interpretation of magnetometer data; GSA104 & GSA105

geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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ILLUS 63 Processed greyscale magnetometer data; GSA105, GSA106 & GSA107

15.0nT/cm

0 50m

1:2,500 @ A3

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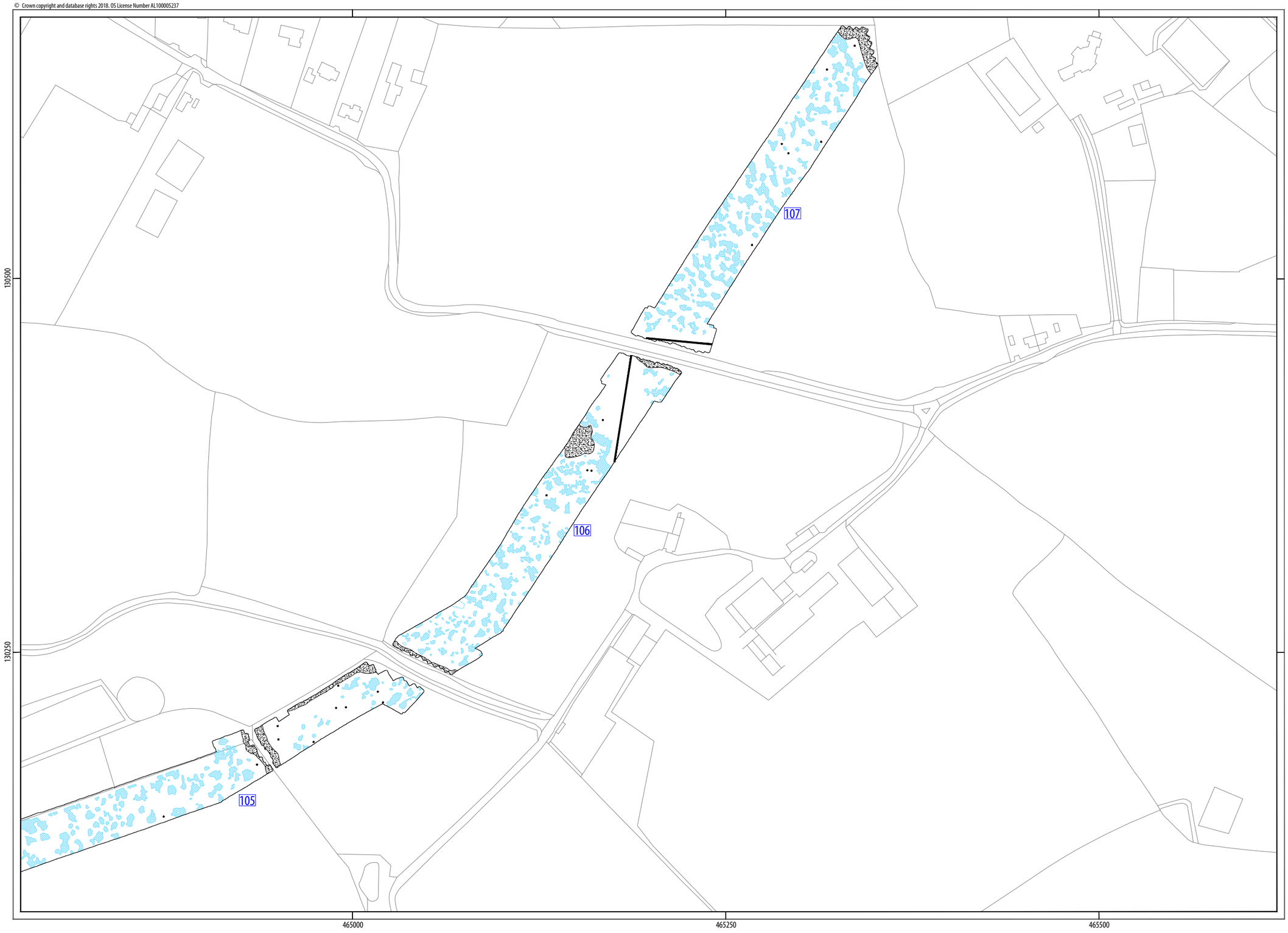
ILLUS 64 XY trace plot of minimally processed magnetometer data; GSA105, GSA106 & GSA107



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- geology

0 50m
1:2,500 @ A3

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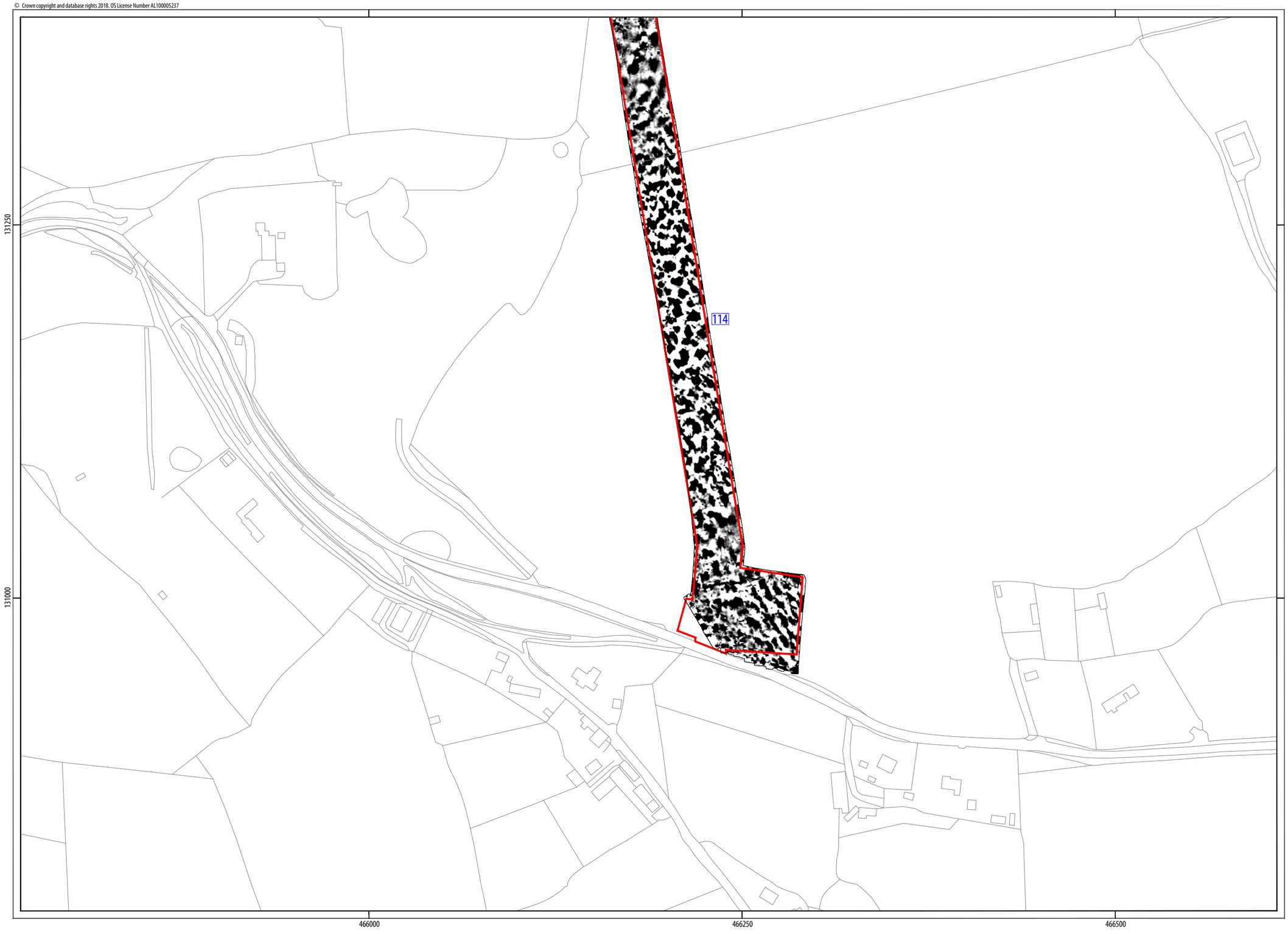
ILLUS 65 Interpretation of magnetometer data; GSA105, GSA106 & GSA107



geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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ILLUS 66 Processed greyscale magnetometer data; GSA114

15.0nT/cm

0 50m

1:2,500 @ A3

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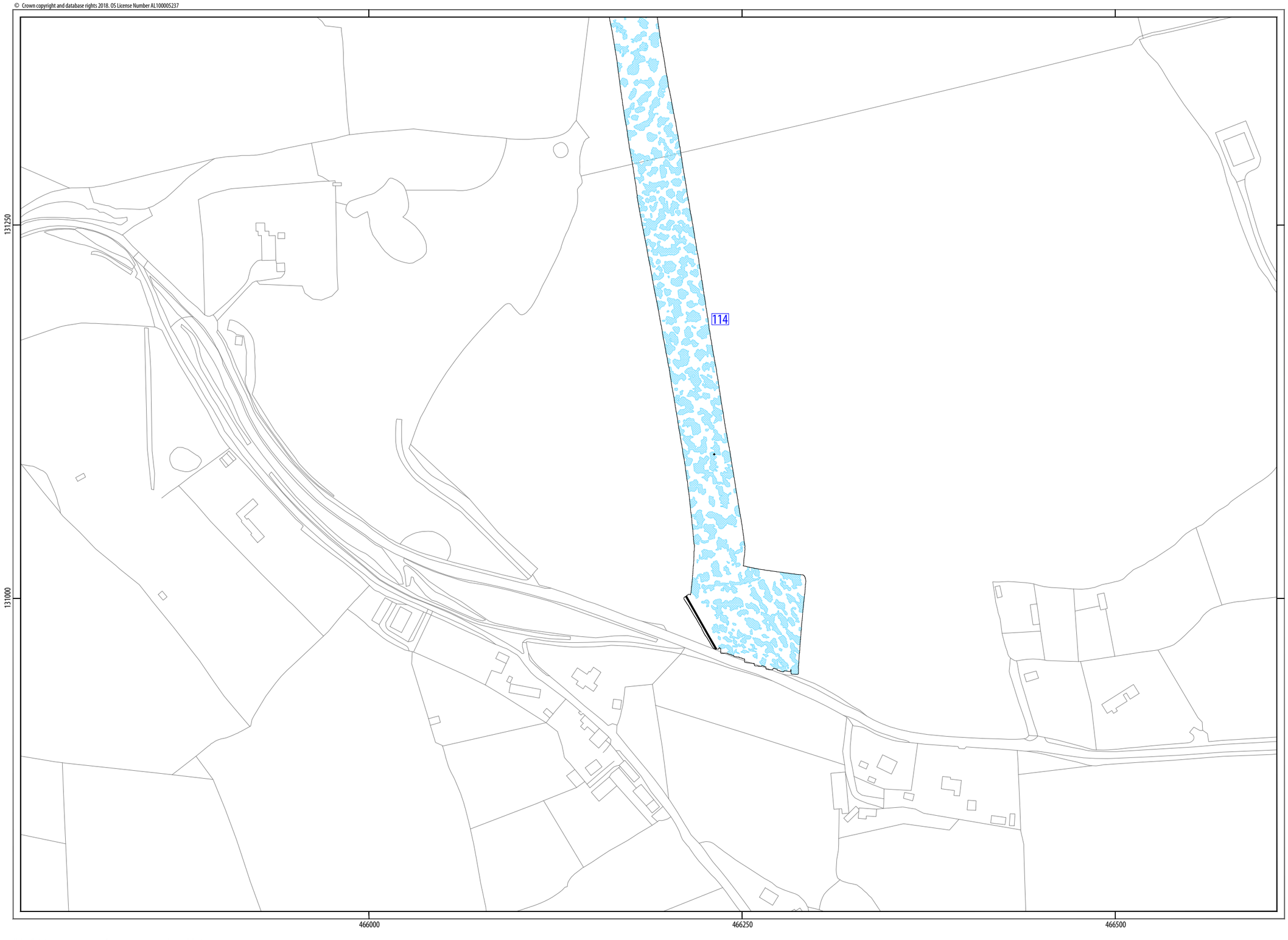
ILLUS 67 XY trace plot of minimally processed magnetometer data; GSA114



INTERPRETATION
- ferrous material
- service pipe
- geology

0 50m
1:2,500 @ A3

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ILLUS 68 Interpretation of magnetometer data; GSA114

geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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ILLUS 69 Processed greyscale magnetometer data; GSA114

15.0nT/cm

0 50m

1:2,500 @ A3

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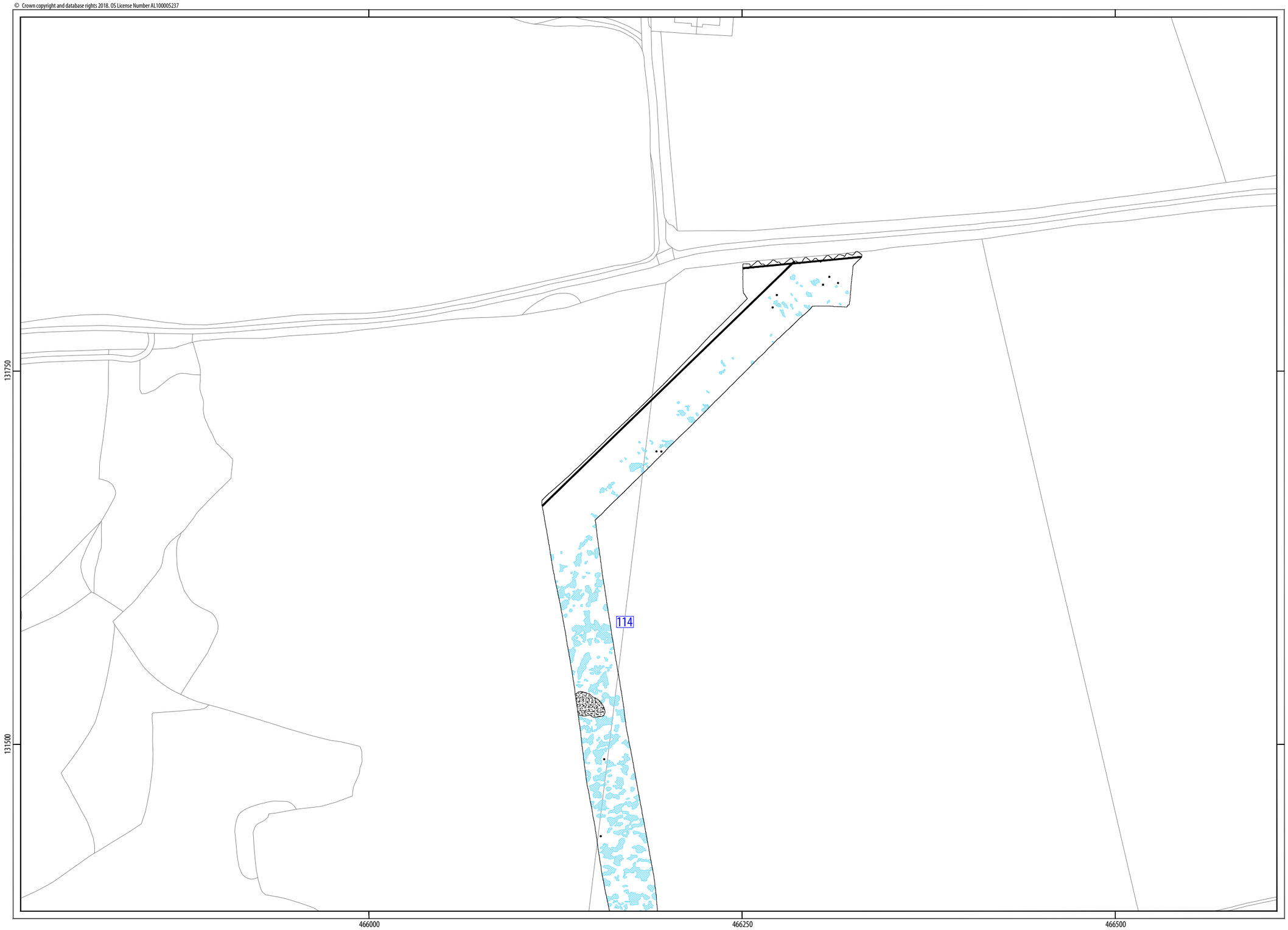
ILLUS 70 XY trace plot of minimally processed magnetometer data; GSA114



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- geology

0 50m
1:2,500 @ A3

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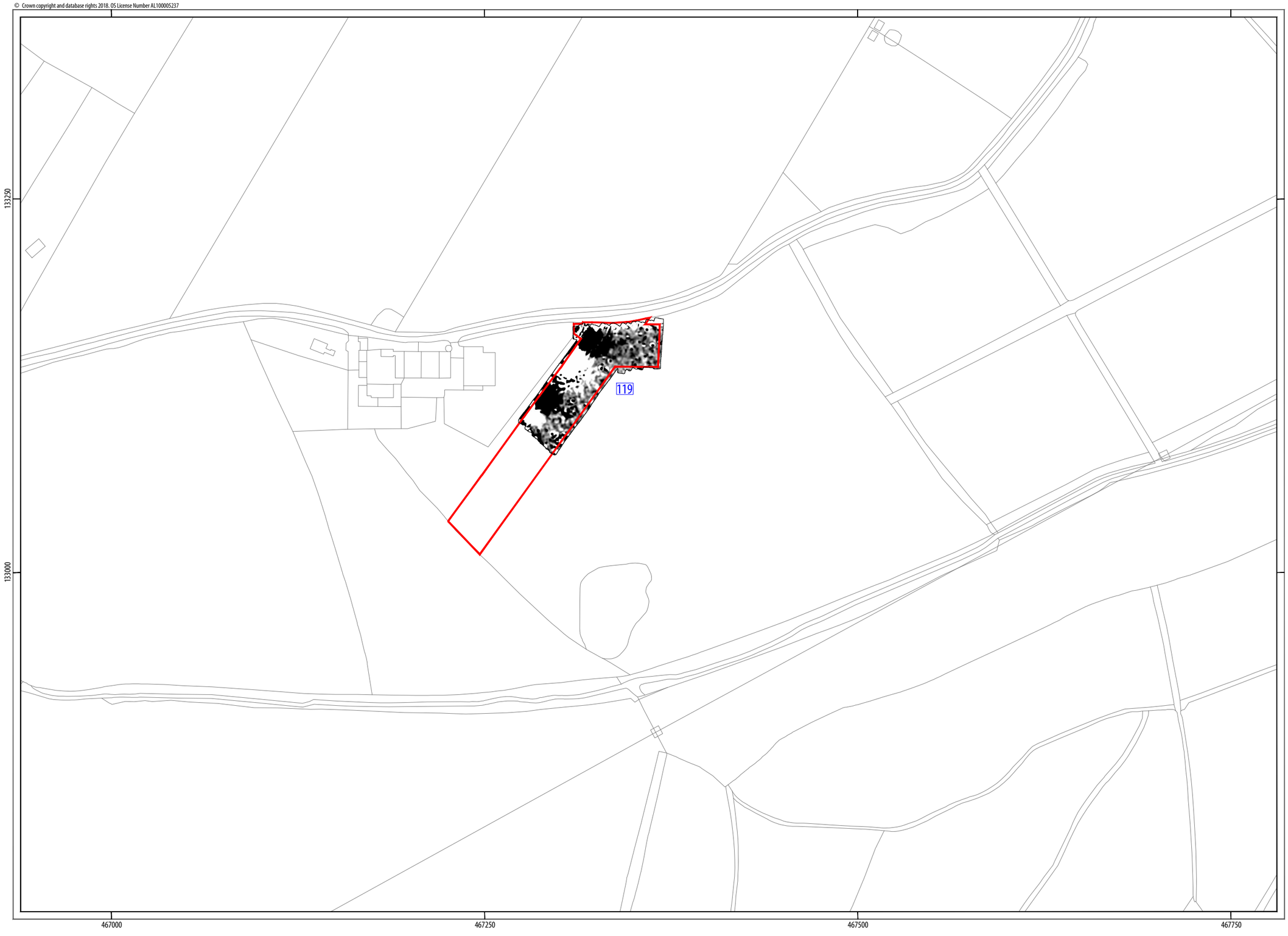
ILLUS 71 Interpretation of magnetometer data; GSA114



geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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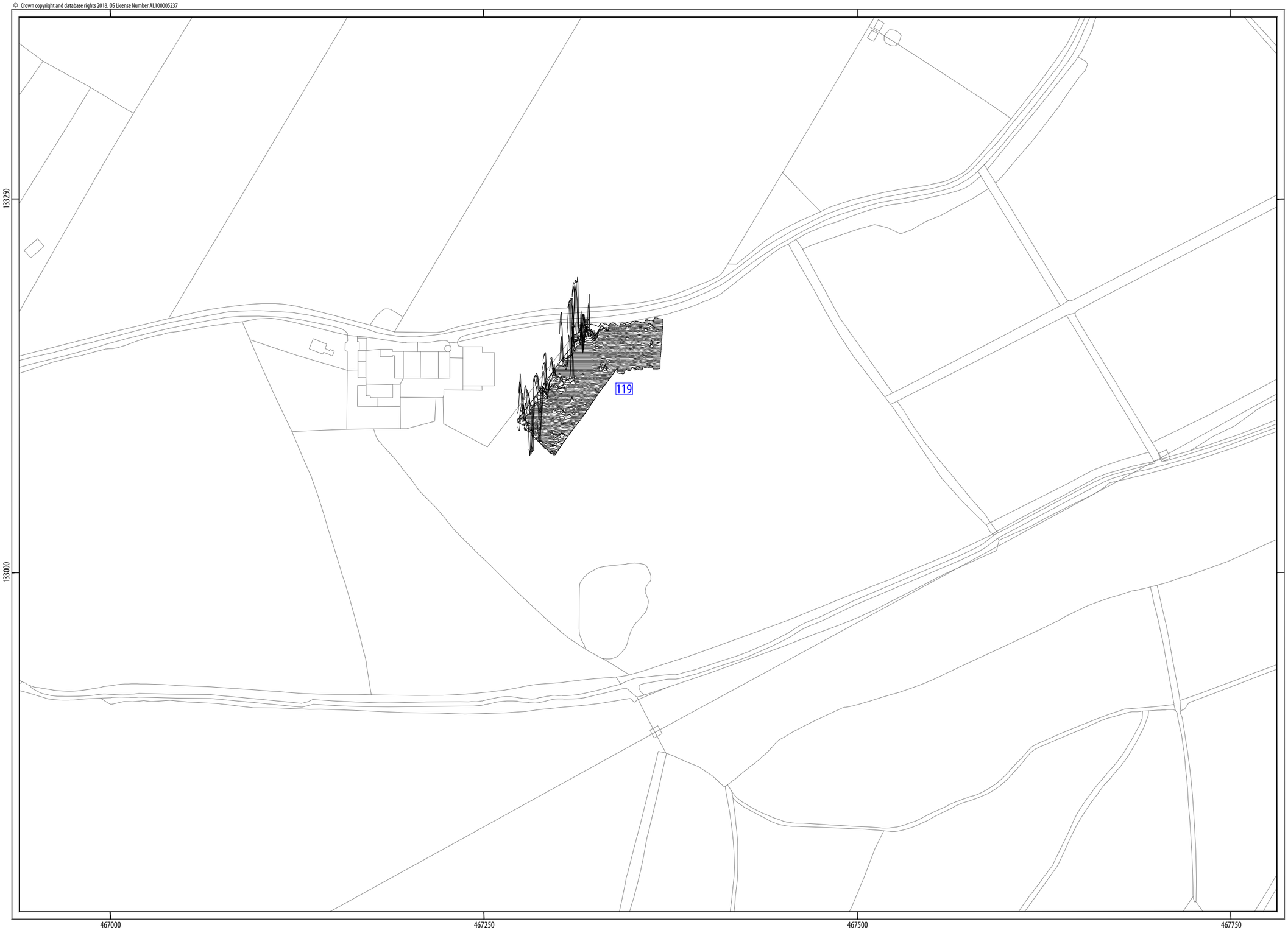
ILLUS 72 Processed greyscale magnetometer data; GSA119



15.0nT/cm

0 50m

1:2,500 @ A3

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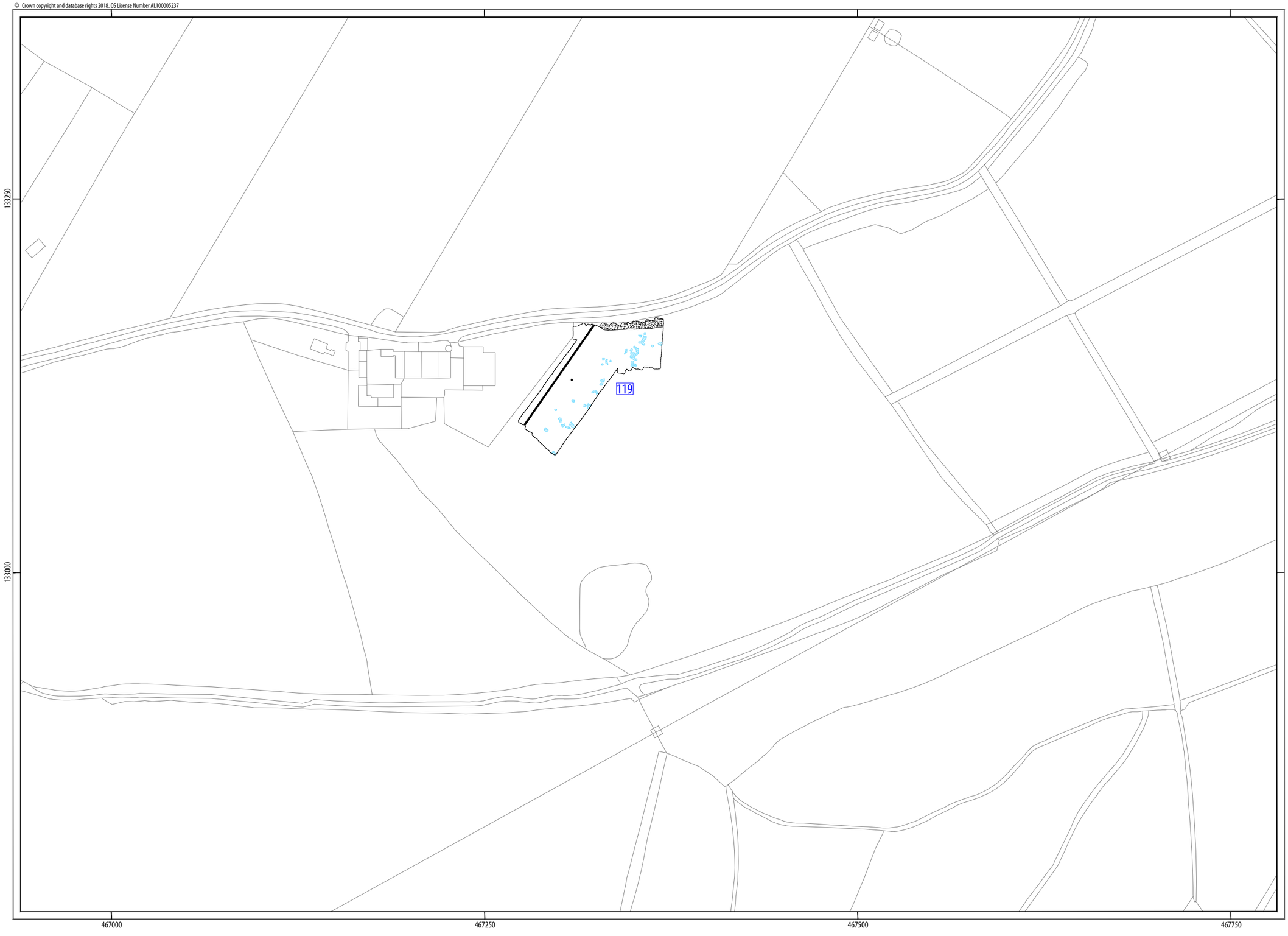
ILLUS 73 XY trace plot of minimally processed magnetometer data; GSA119



INTERPRETATION
service pipe
ferrous material
geology

0 50m
1:2,500 @ A3

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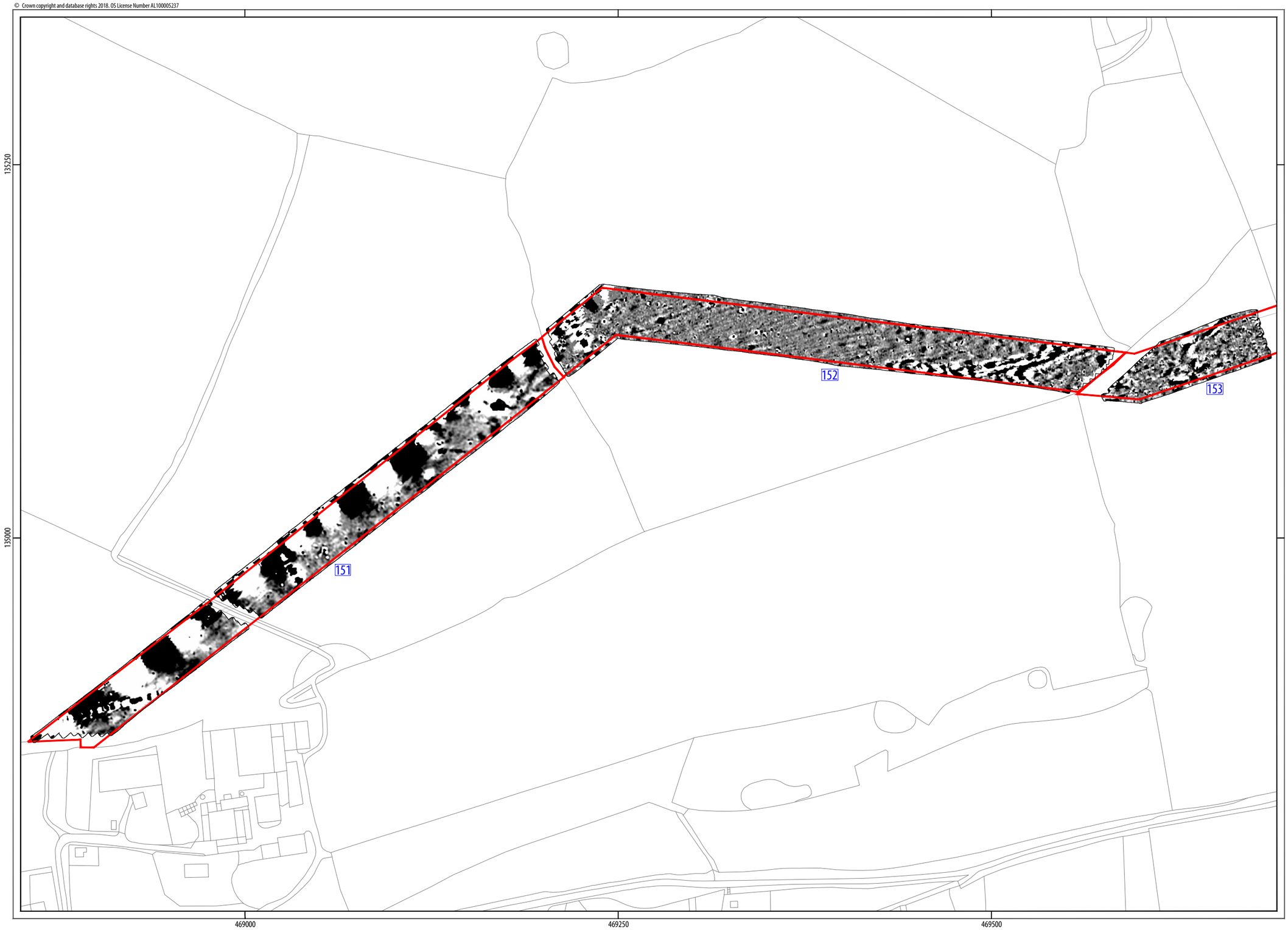
ILLUS 74 Interpretation of magnetometer data; GSA119



geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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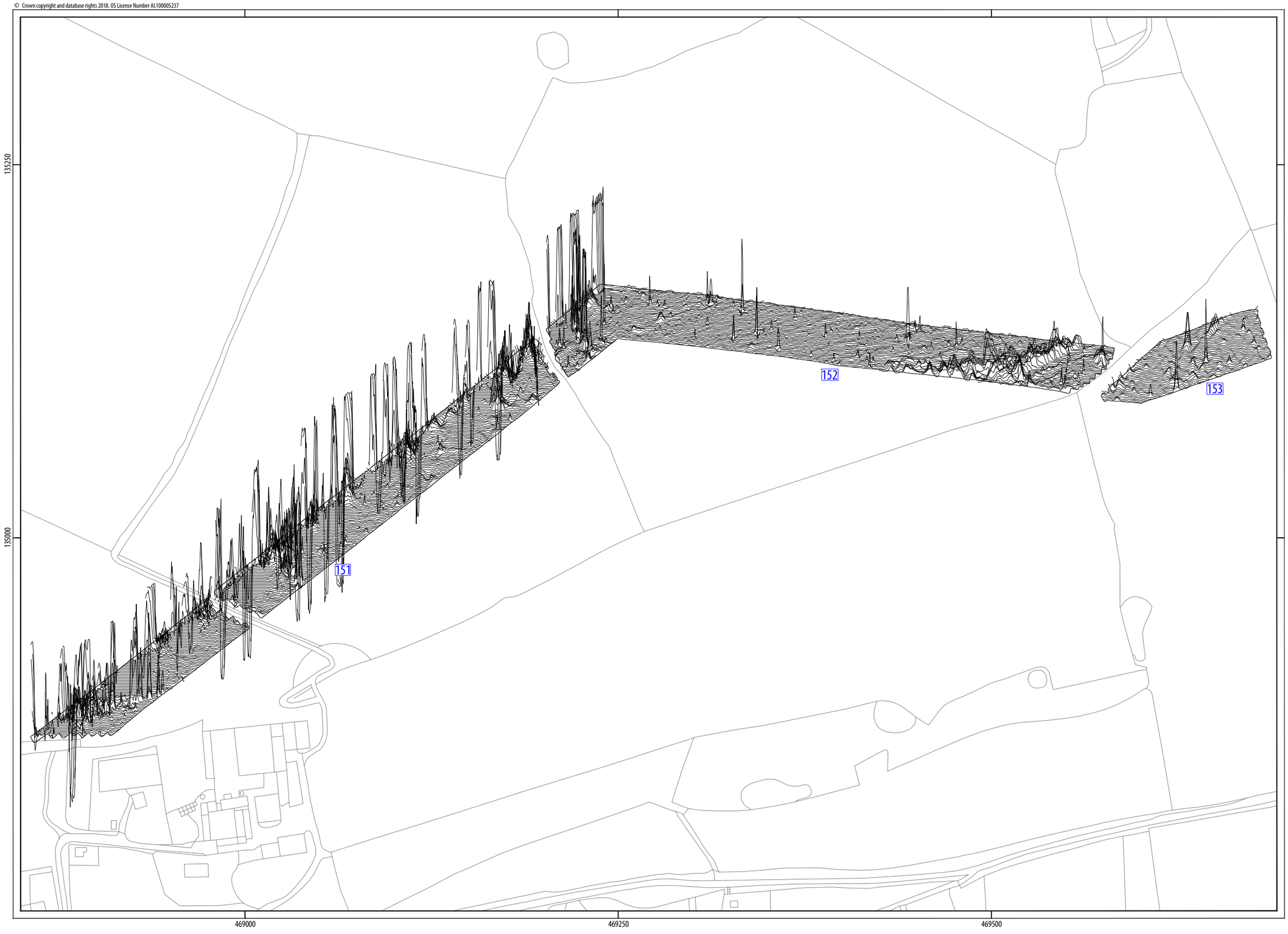
ILLUS 75 Processed greyscale magnetometer data; GSA151, GSA152 & GSA153



15.0nT/cm

0 50m

1:2,500 @ A3

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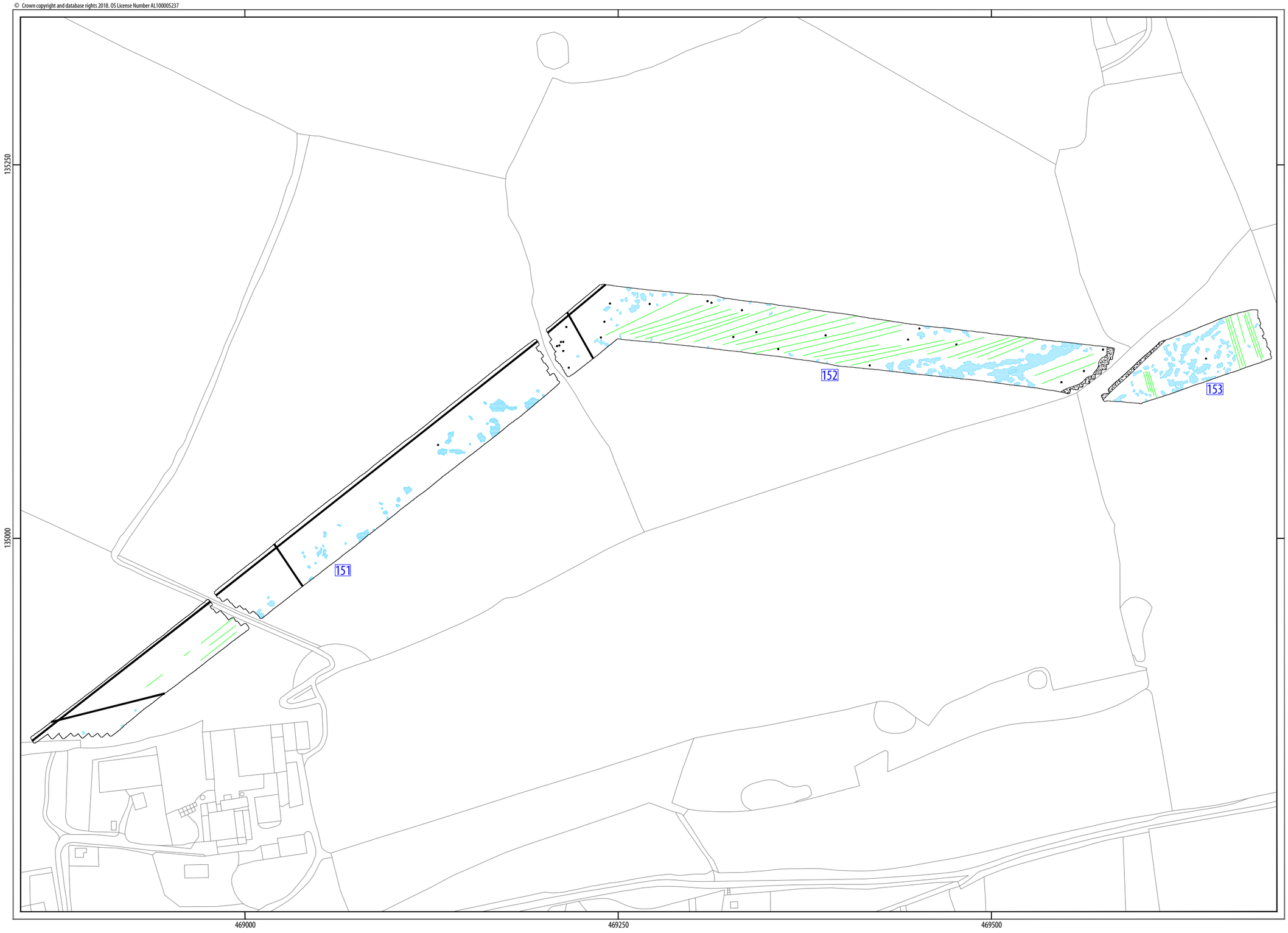
ILLUS 76 XY trace plot of minimally processed magnetometer data; GSA151, GSA152 & GSA153



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology

0 50m
1:2,500 @ A3

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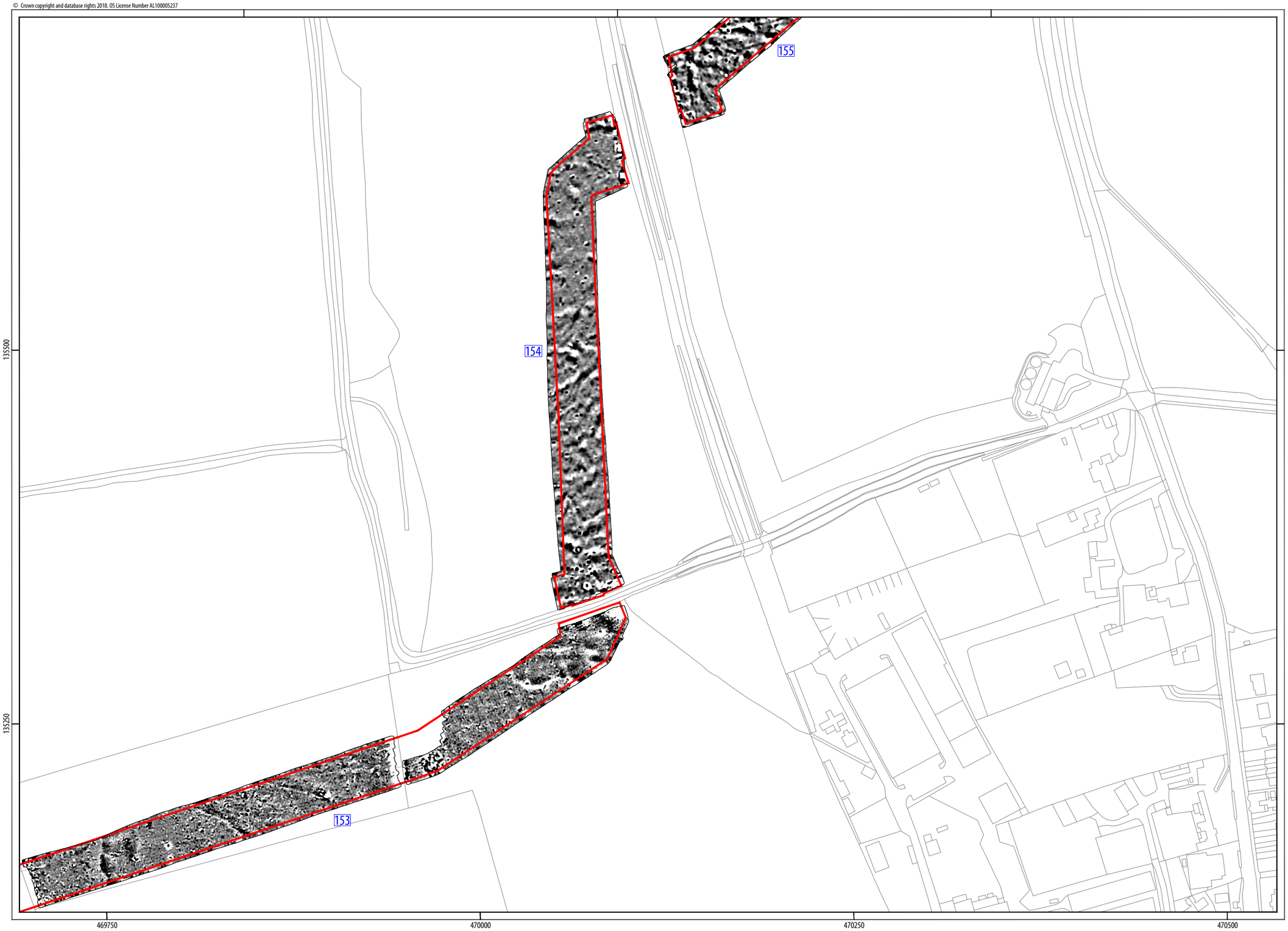
ILLUS 77 Interpretation of magnetometer data; GSA151, GSA152 & GSA153



geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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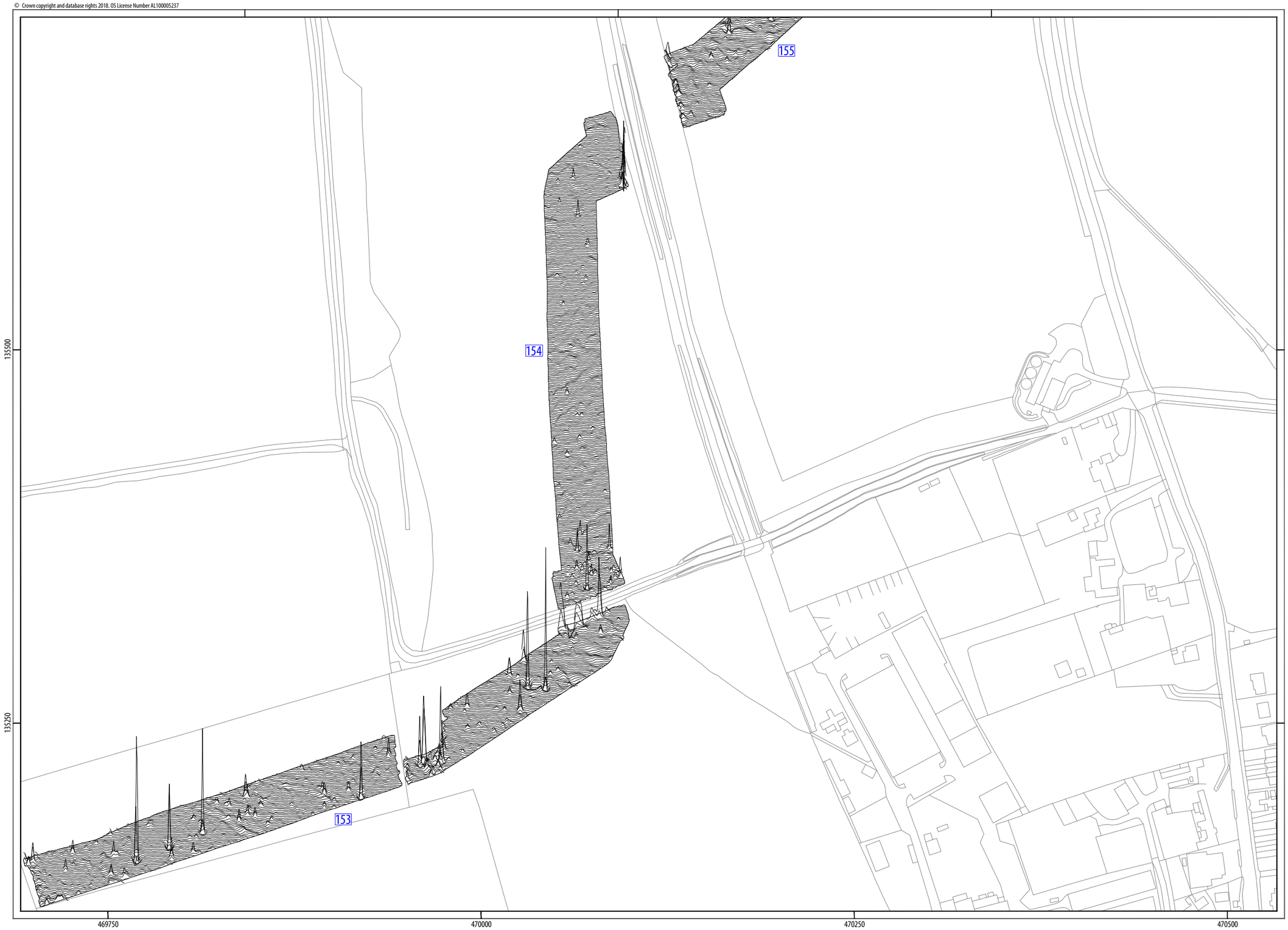
ILLUS 78 Processed greyscale magnetometer data; GSA153, GSA154 & GSA155



15.0nT/cm

0 50m

1:2,500 @ A3

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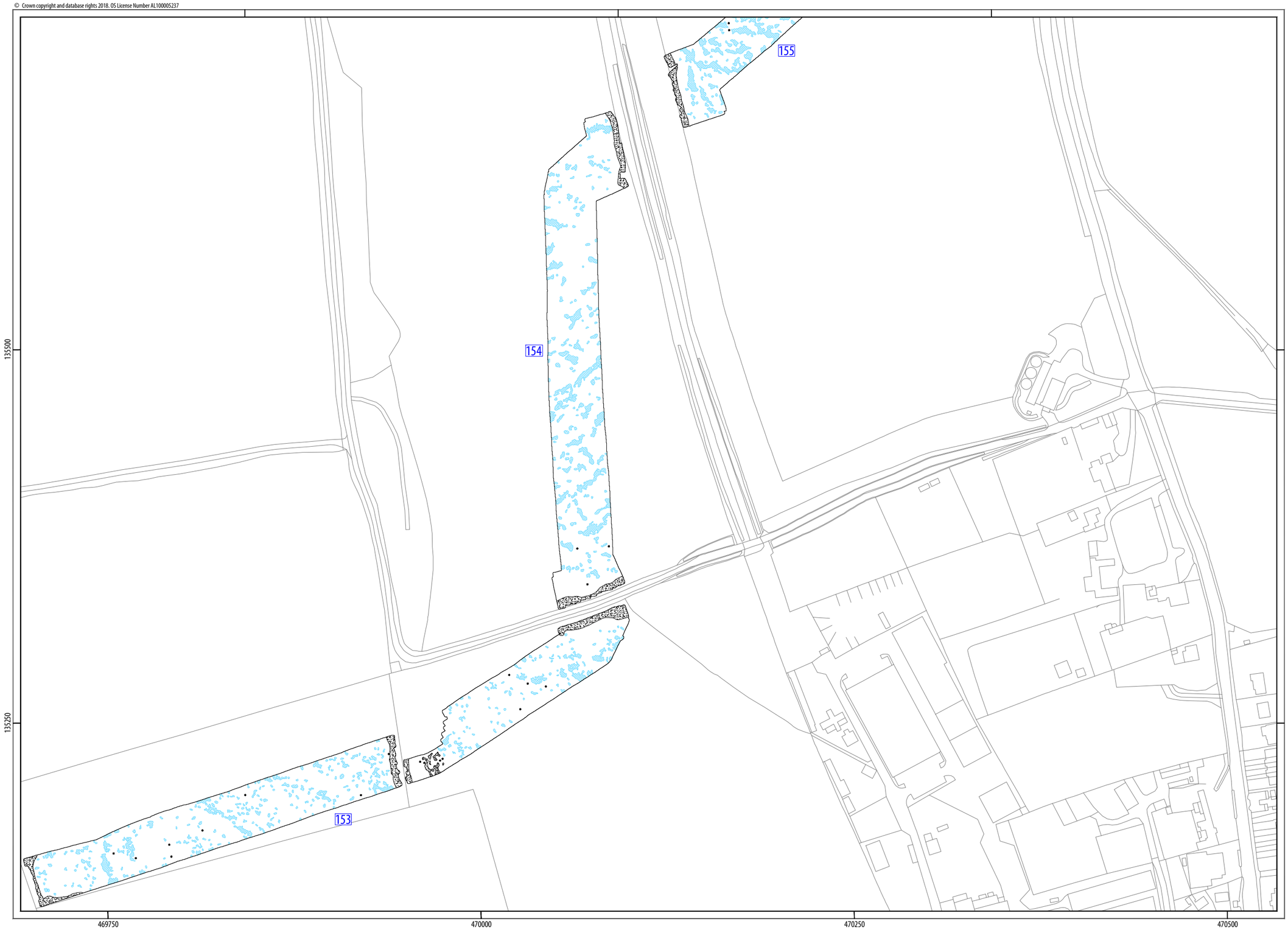
ILLUS 79 XY trace plot of minimally processed magnetometer data; GSA153, GSA154 & GSA155



INTERPRETATION
- ferrous material
- ferrous material
- geology

0 50m
1:2,500 @ A3

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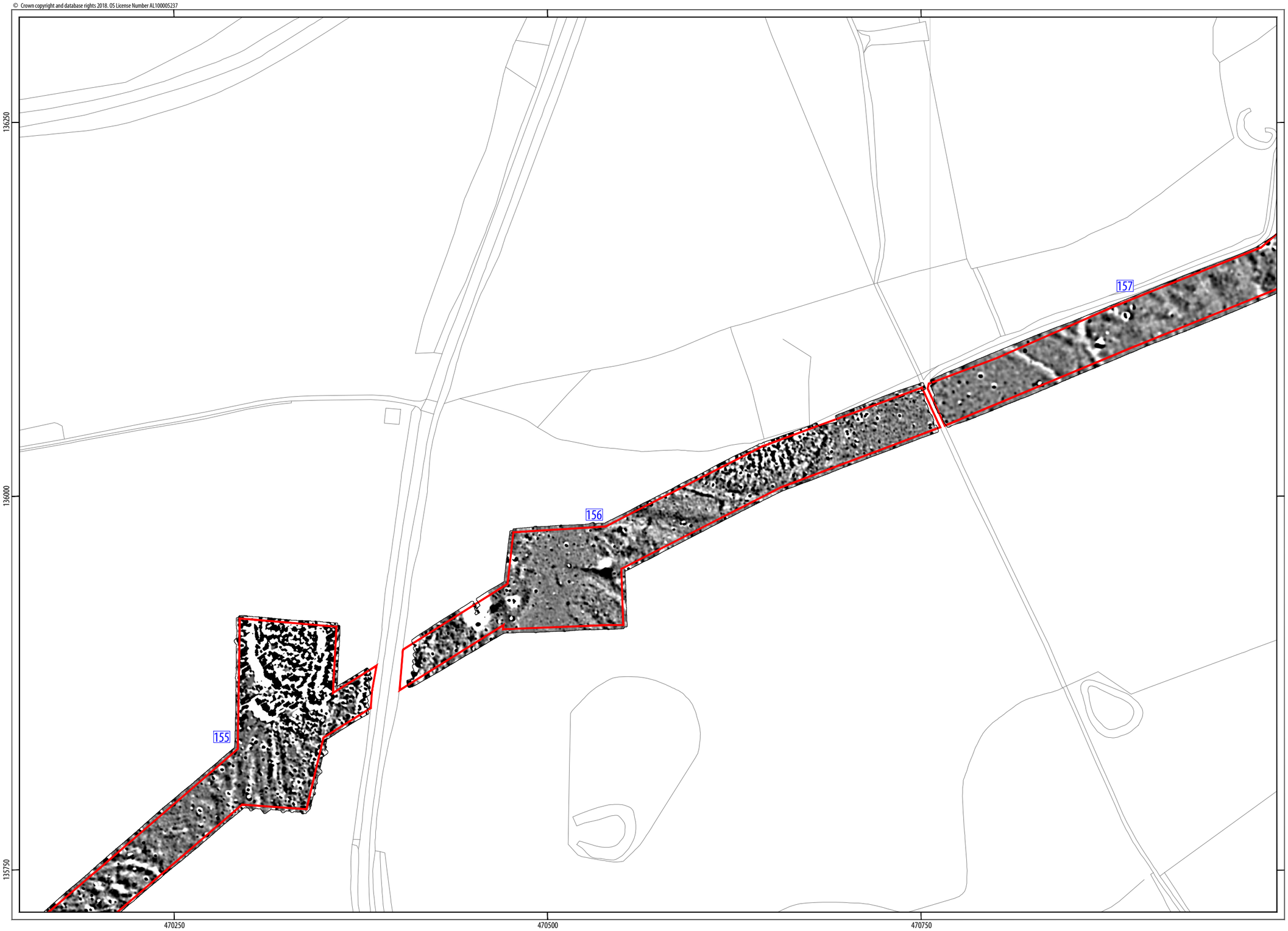
ILLUS 80 Interpretation of magnetometer data; GSA153, GSA154 & GSA155



geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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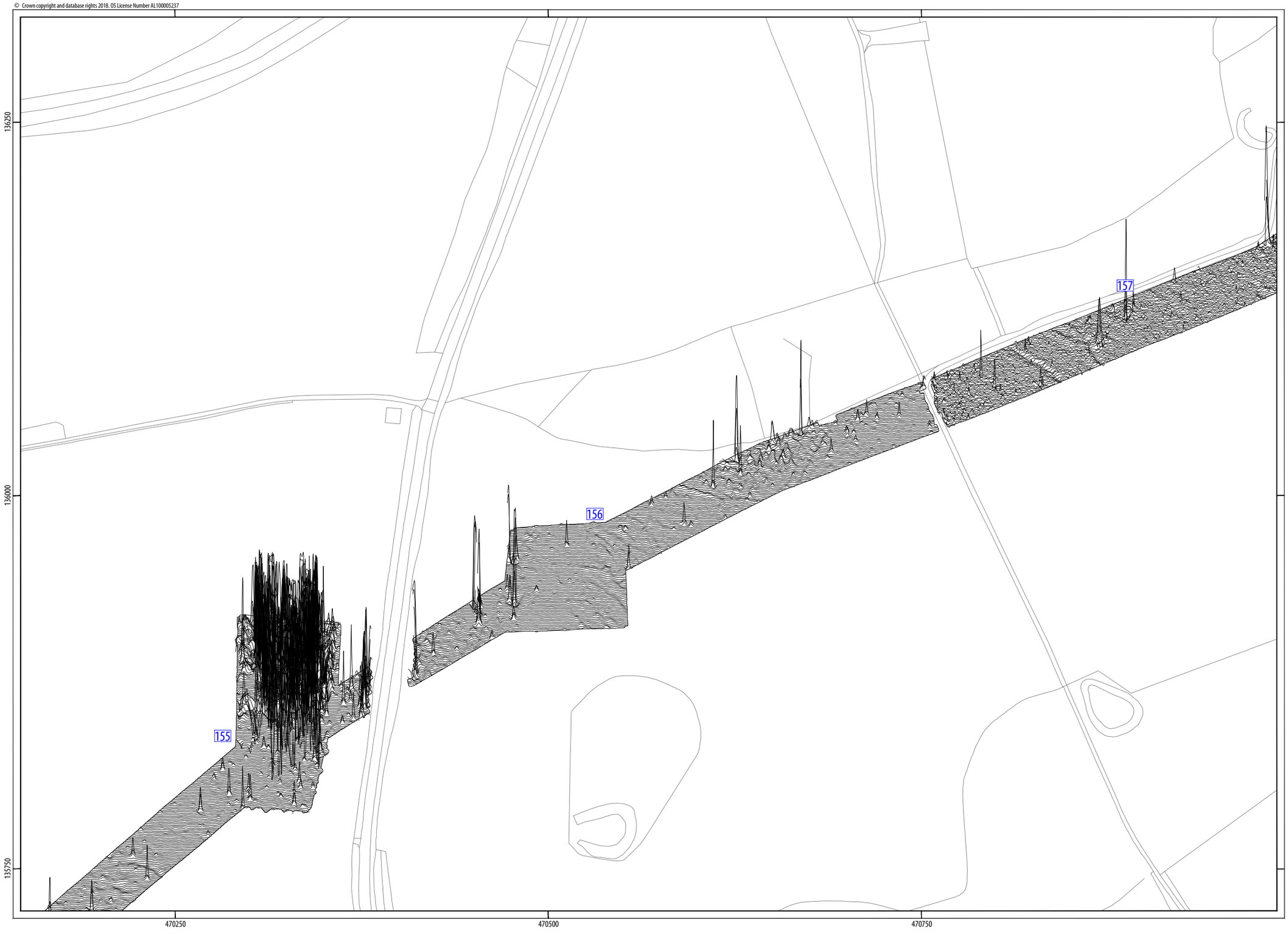
ILLUS 81 Processed greyscale magnetometer data; GSA155, GSA156 & GSA157



15.0nT/cm

0 50m

1:2,500 @ A3

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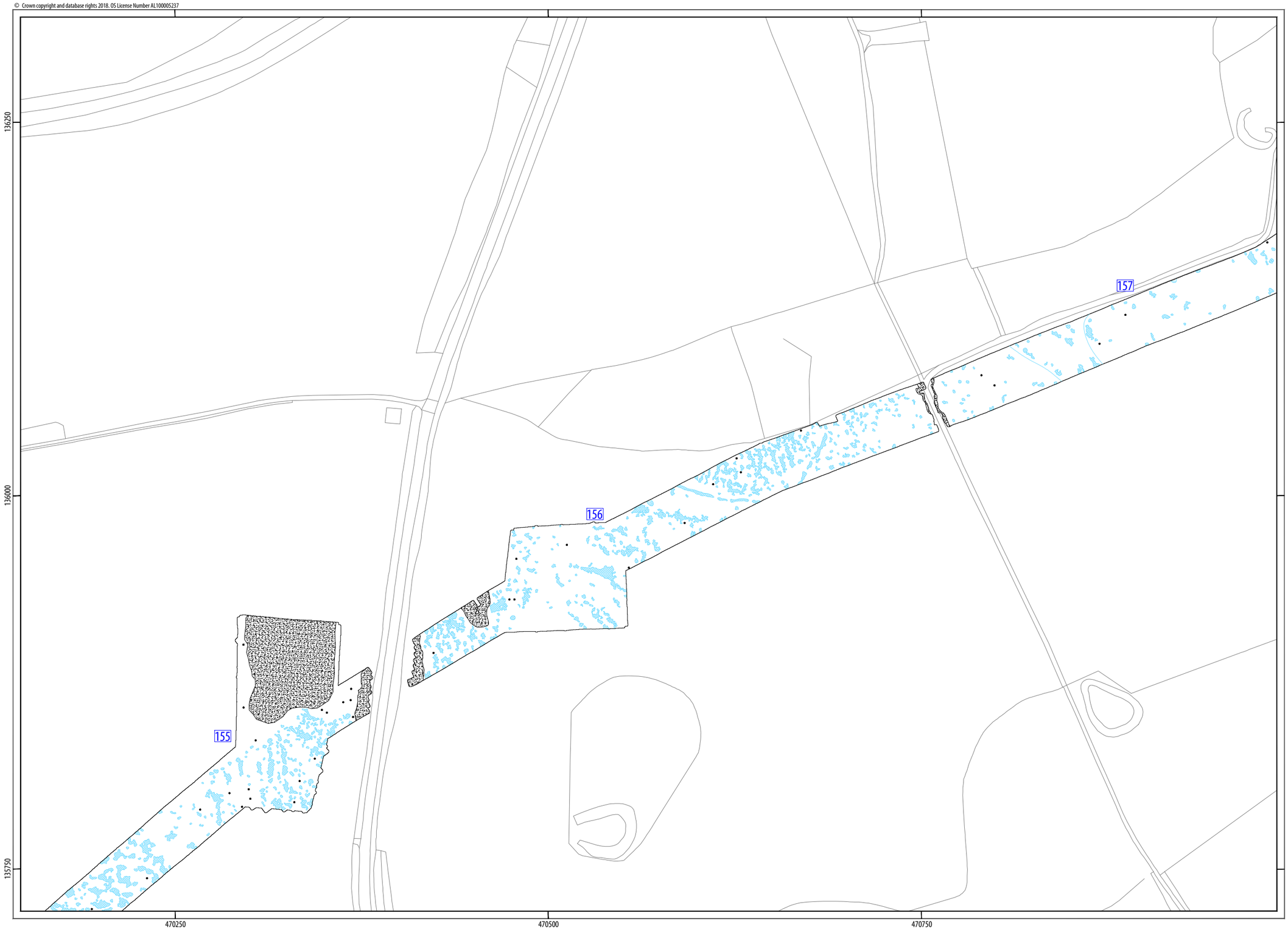
ILLUS 82 XY trace plot of minimally processed magnetometer data; GSA155, GSA156 & GSA157



INTERPRETATION
- ferrous material
- ferrous material
- geological variation
- geology

0 50m
1:2,500 @ A3

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ILLUS 83 Interpretation of magnetometer data; GSA155, GSA156 & GSA157

geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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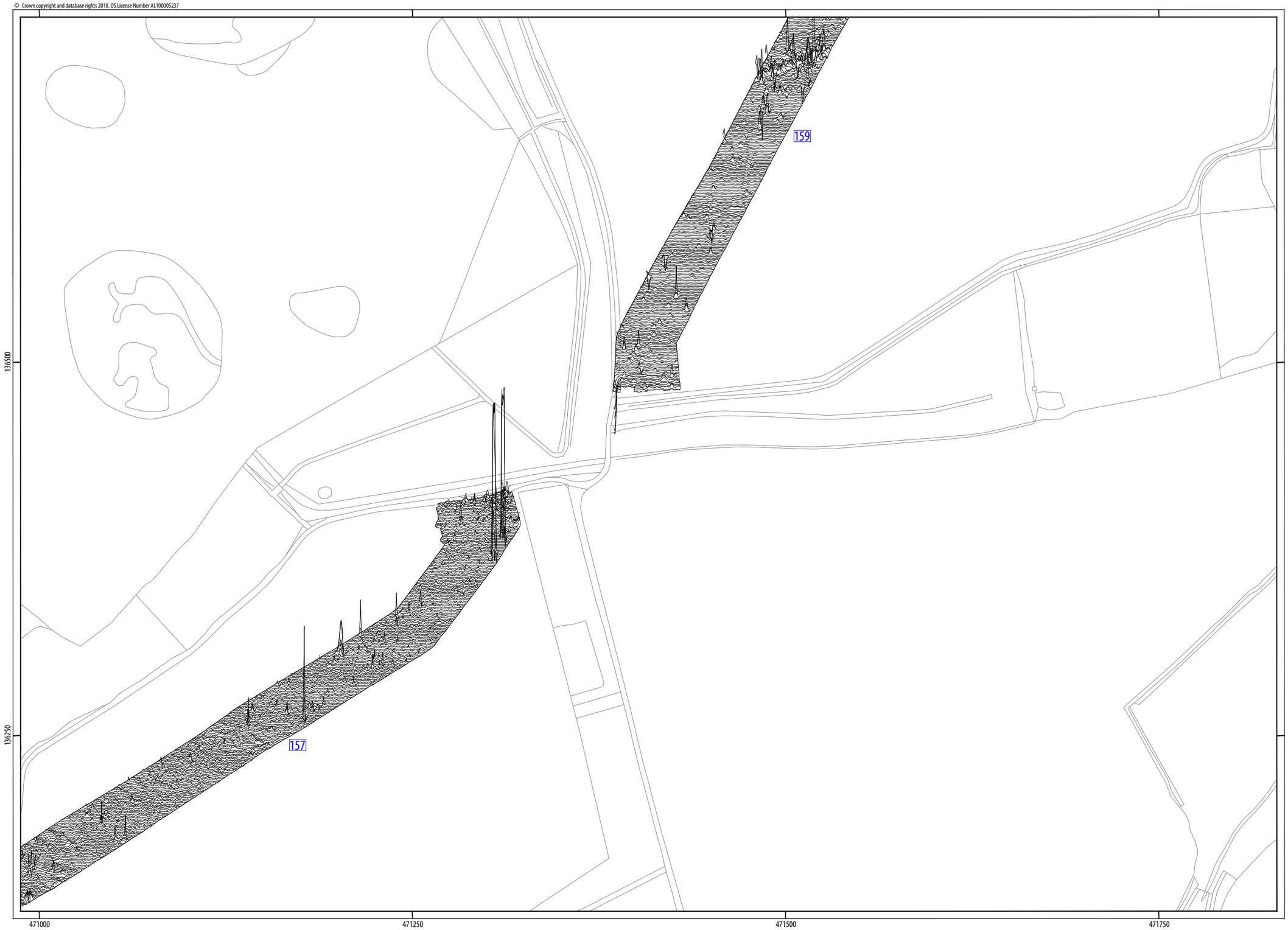
ILLUS 84 Processed greyscale magnetometer data; GSA157 & GSA159



15.0nT/cm

0 50m

1:2,500 @ A3

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ILLUS 85 XY trace plot of minimally processed magnetometer data; GSA157 & GSA159

AAA1
SEE ILLUS 153-155

159

157

136500

136250

471000

471250

471500

471750

INTERPRETATION
- ferrous material
- ferrous material
- agricultural
- former field boundary
- geology
- geological variation
- archaeology?
- archaeology

0 50m
1:2,500 @ A3

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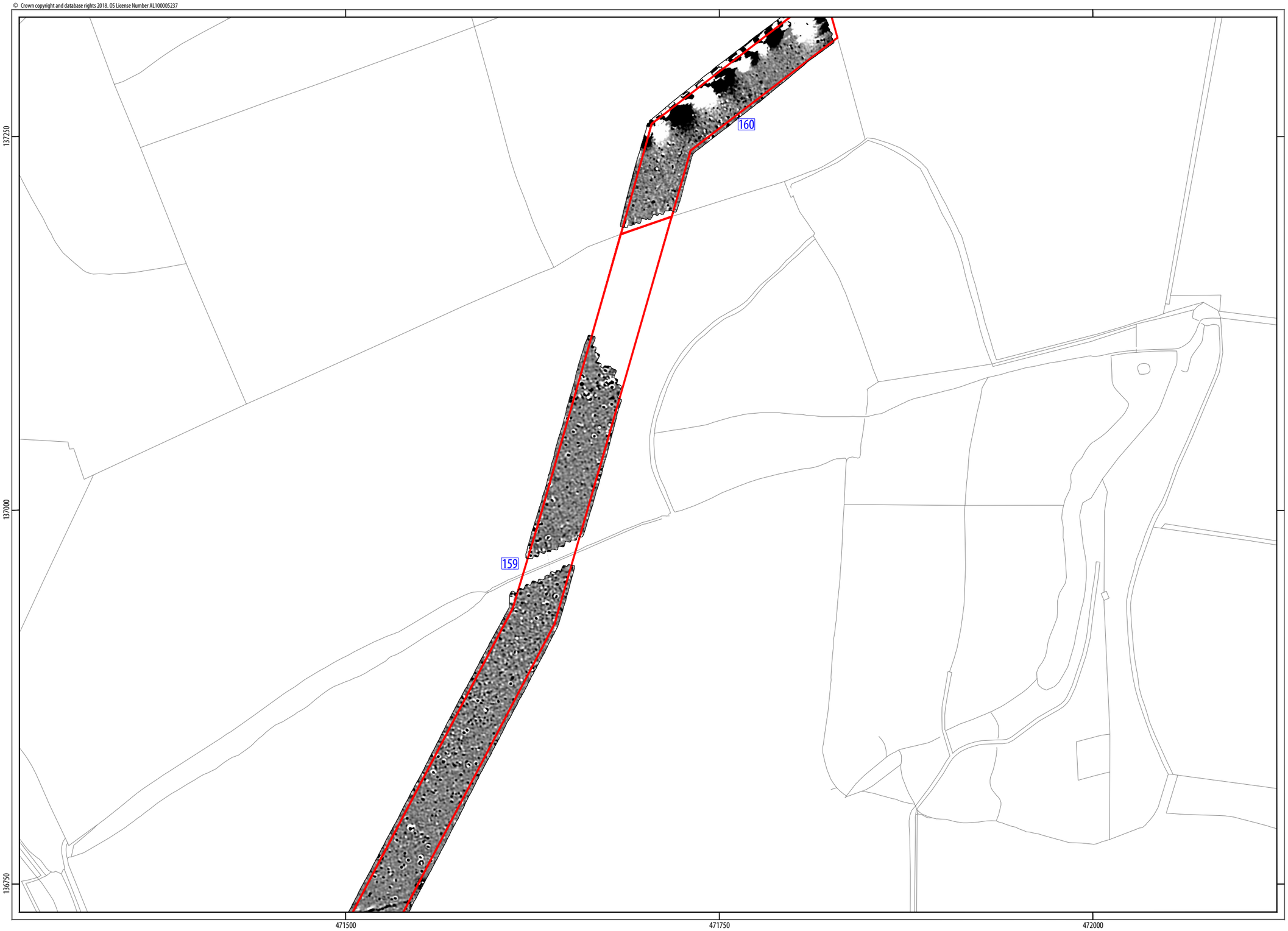
ILLUS 86 Interpretation of magnetometer data; GSA157 & GSA159



geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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ILLUS 87 Processed greyscale magnetometer data; GSA159 & GSA160

15.0nT/cm

0 50m

1:2,500 @ A3

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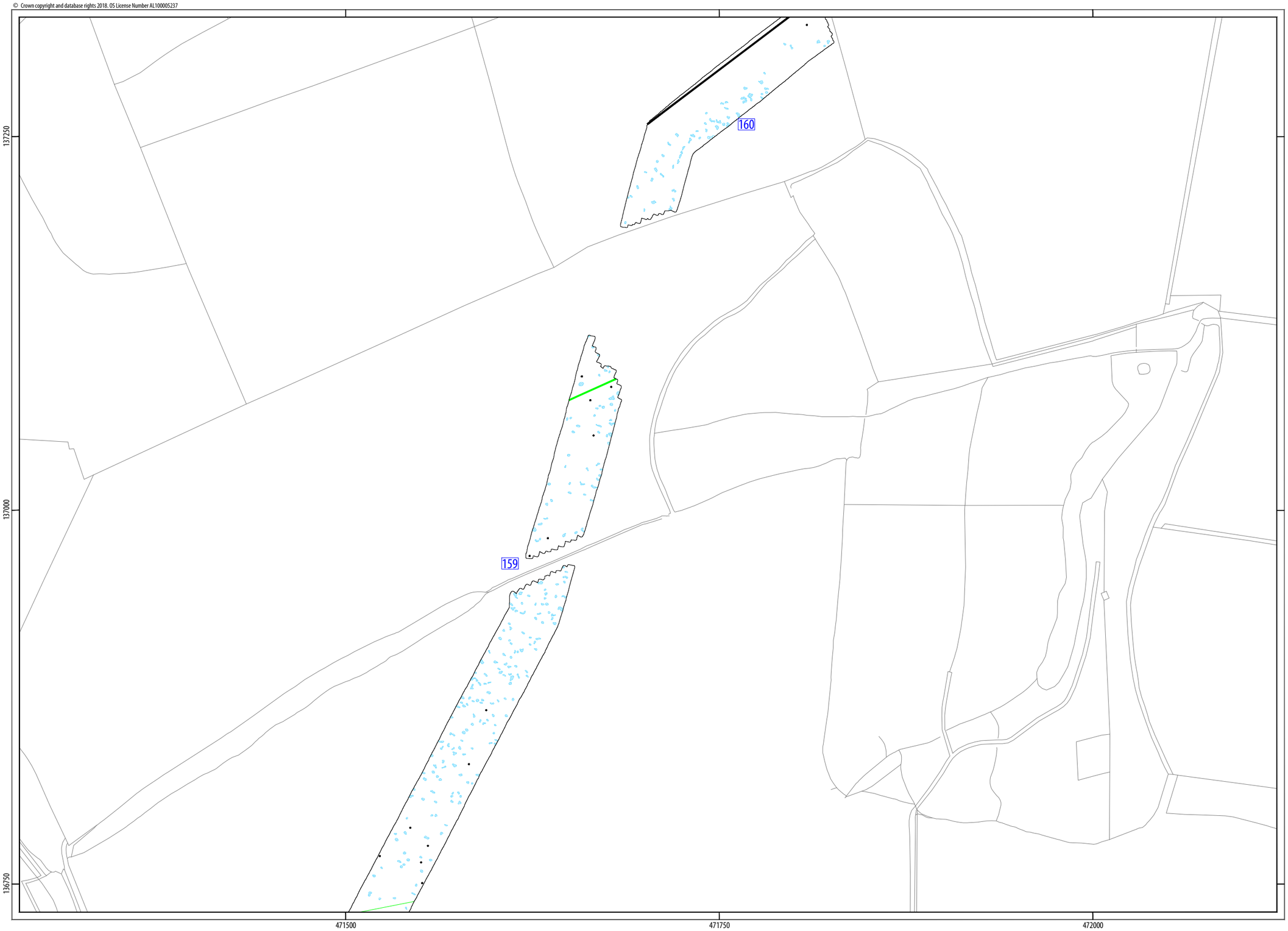
ILLUS 88 XY trace plot of minimally processed magnetometer data; GSA159 & GSA160



INTERPRETATION
- ferrous material
- service pipe
- former field boundary
- geology

0 50m
1:2,500 @ A3

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ILLUS 89 Interpretation of magnetometer data; GSA159 & GSA160

geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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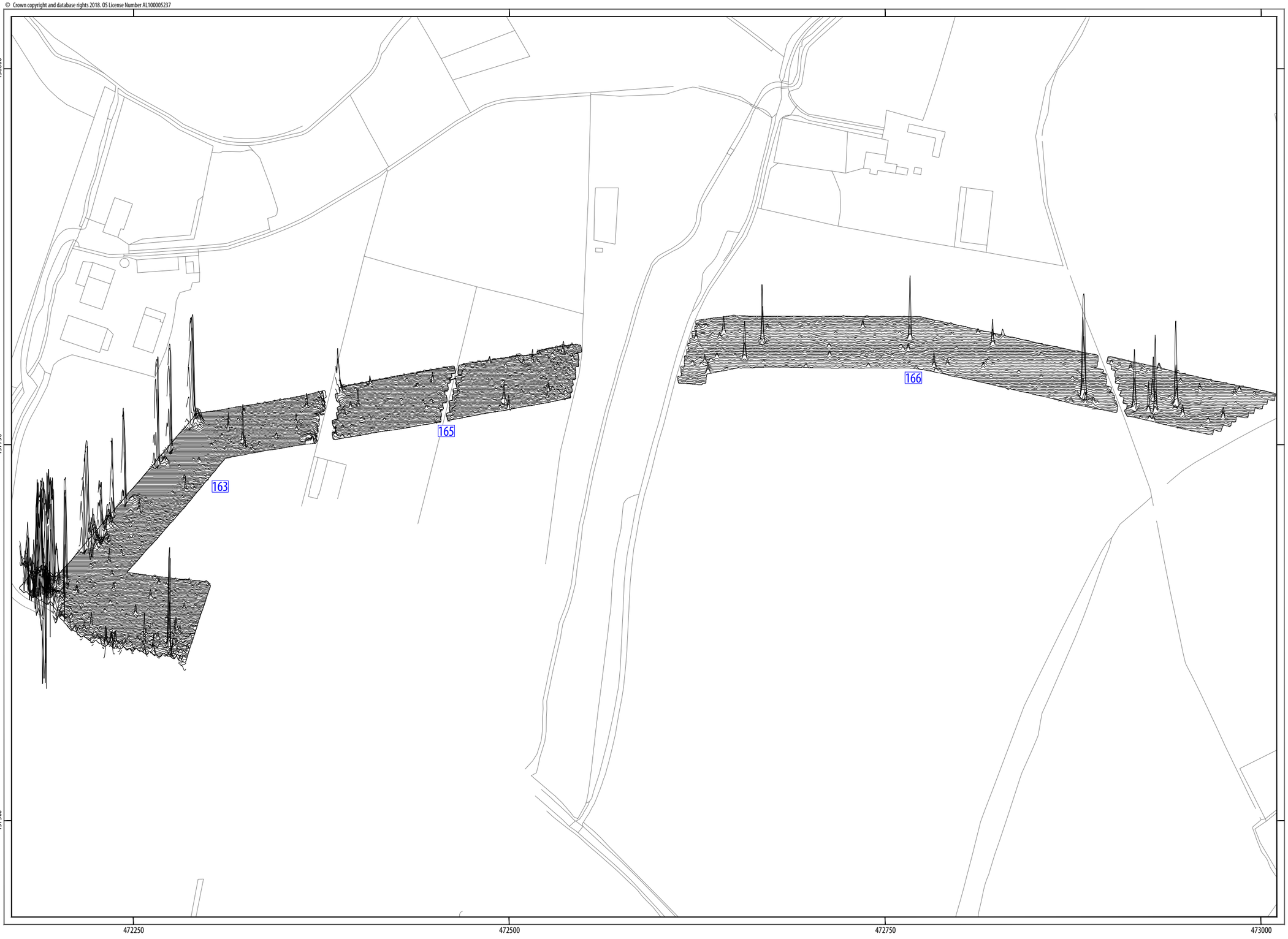
ILLUS 90 Processed greyscale magnetometer data; GSA163, GSA165 & GSA166



15.0nT/cm

0 50m

1:2,500 @ A3

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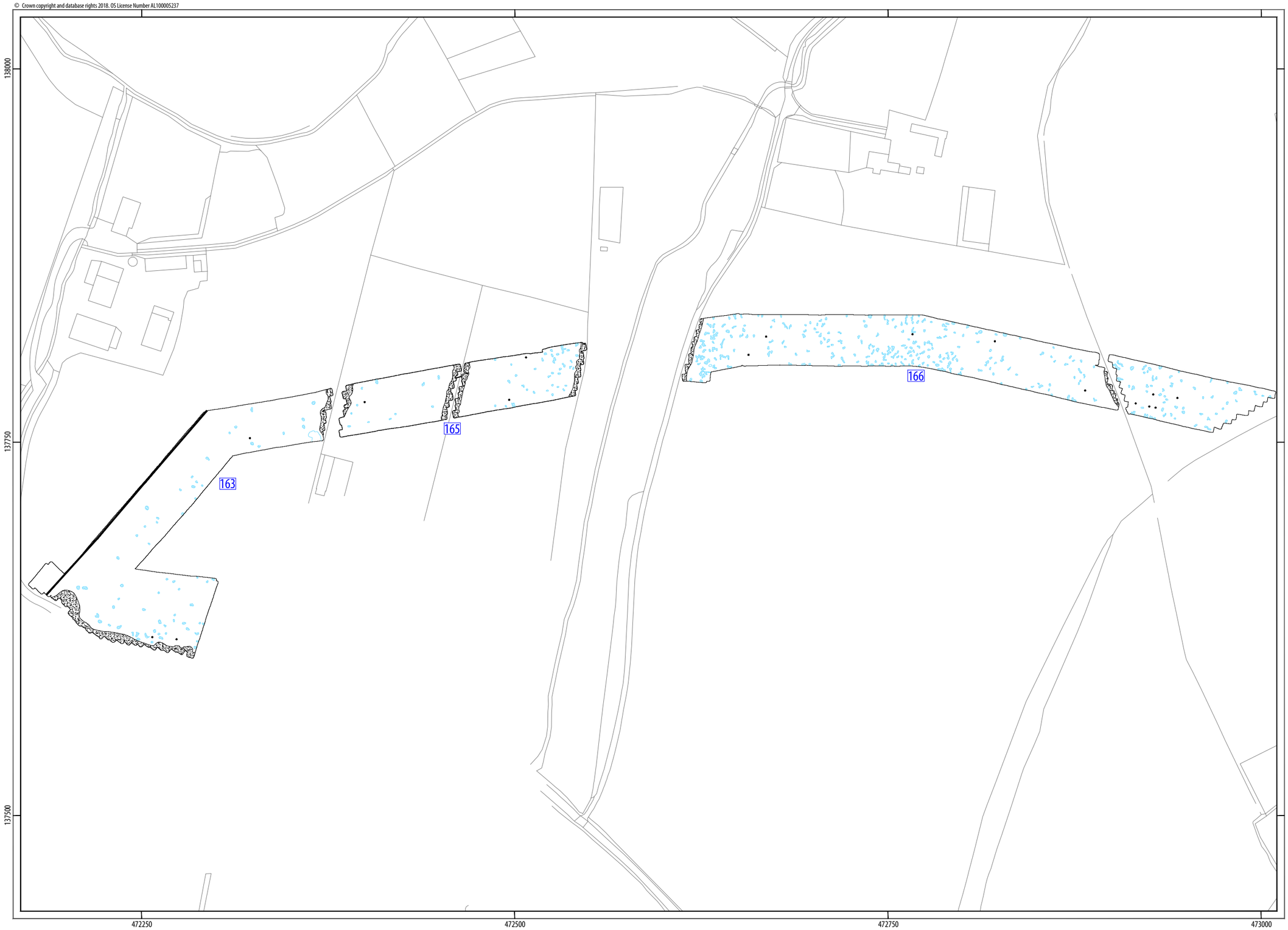
ILLUS 91 XY trace plot of minimally processed magnetometer data; GSA163, GSA165 & GSA166



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- geology

0 50m
1:2,500 @ A3

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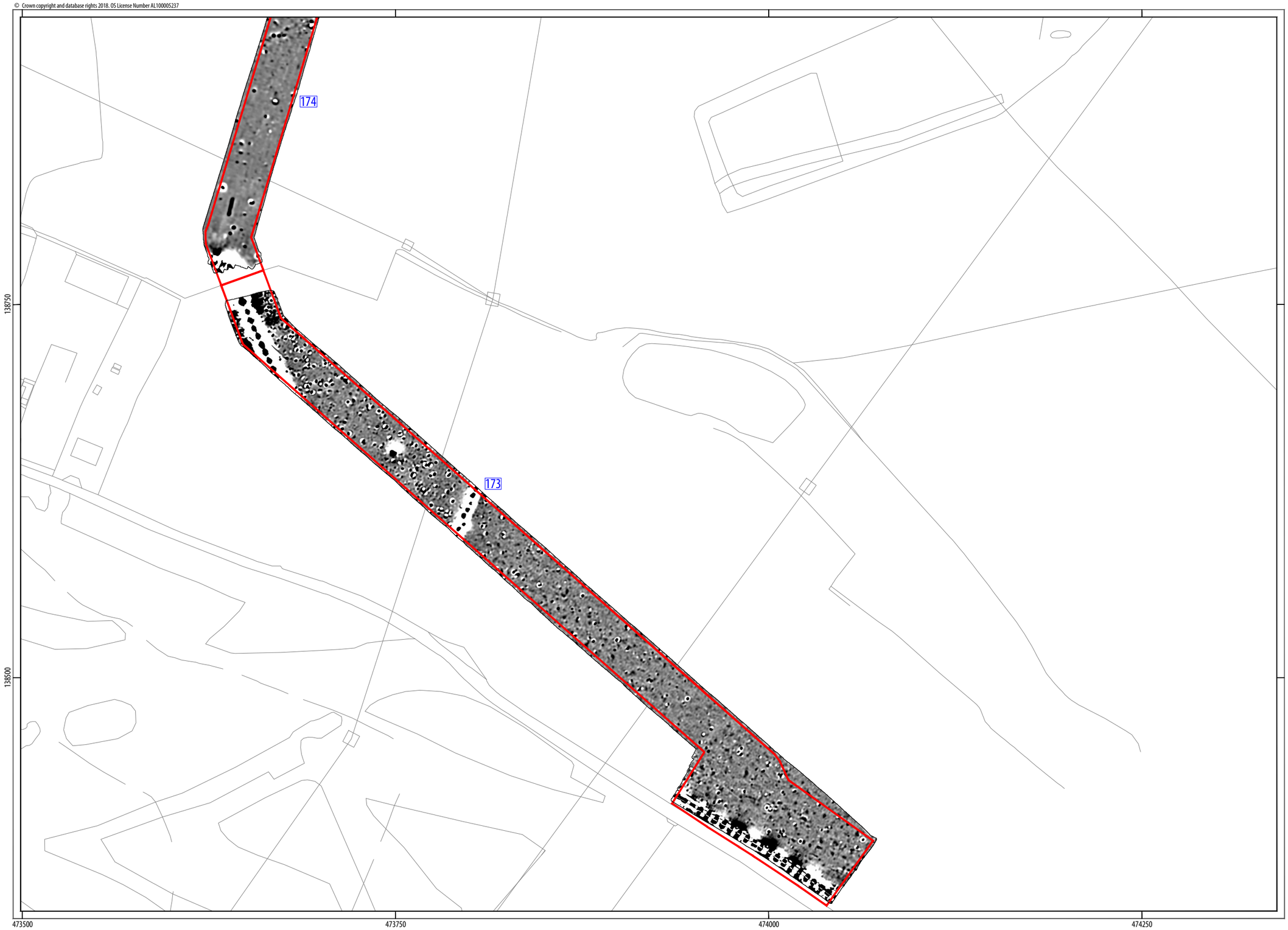
ILLUS 92 Interpretation of magnetometer data; GSA163, GSA165 & GSA166



geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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ILLUS 93 Processed greyscale magnetometer data; GSA173 & GSA174

174

173

138750

138500

473500

473750

474000

474250

15.0nT/cm

0 50m

1:2,500 @ A3

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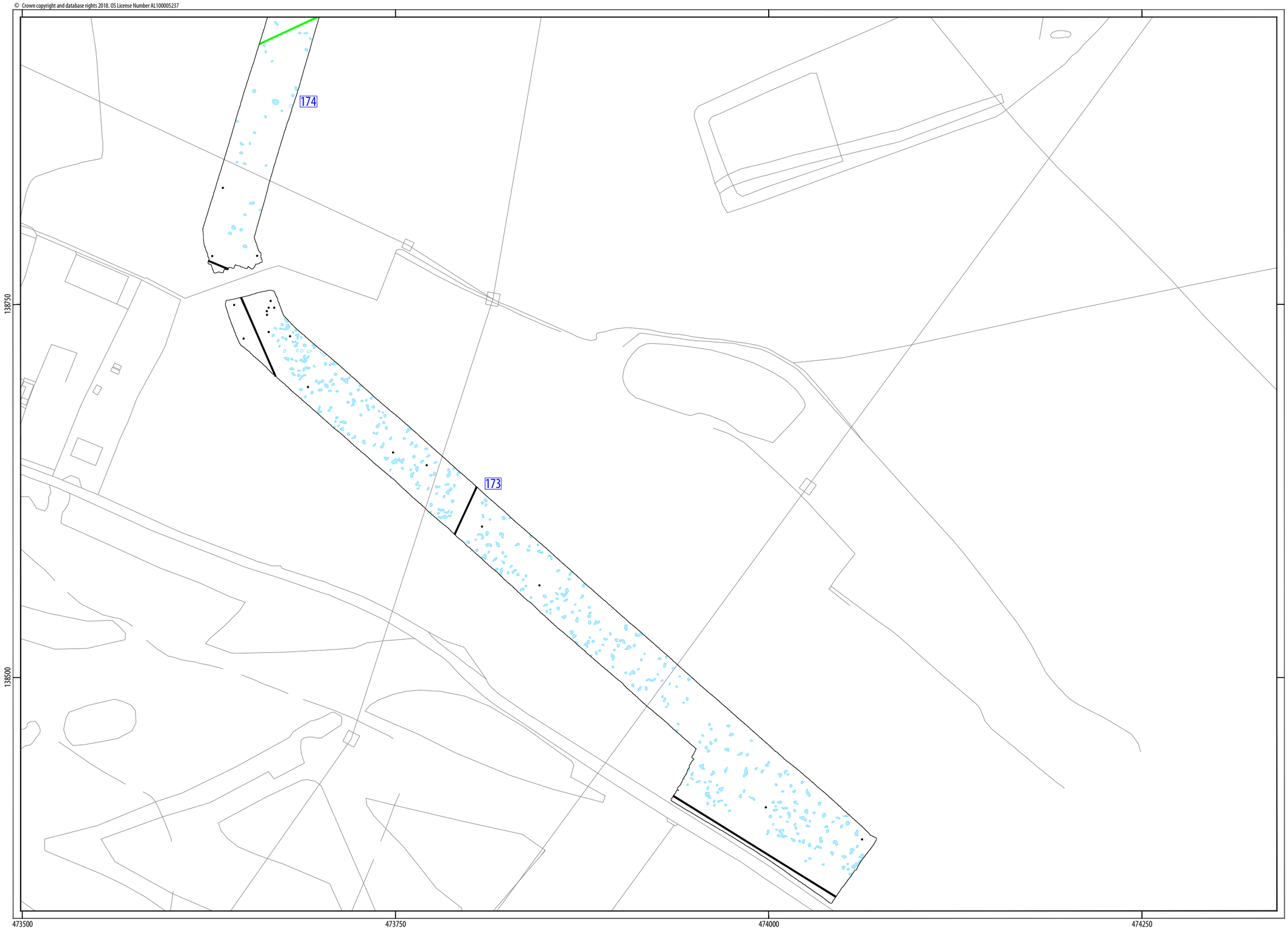
ILLUS 94 XY trace plot of minimally processed magnetometer data; GSA173 & GSA174



INTERPRETATION
- ferrous material
- service pipe
- former field boundary
- geology

0 50m
1:2,500 @ A3

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ILLUS 95 Interpretation of magnetometer data; GSA173 & GSA174

geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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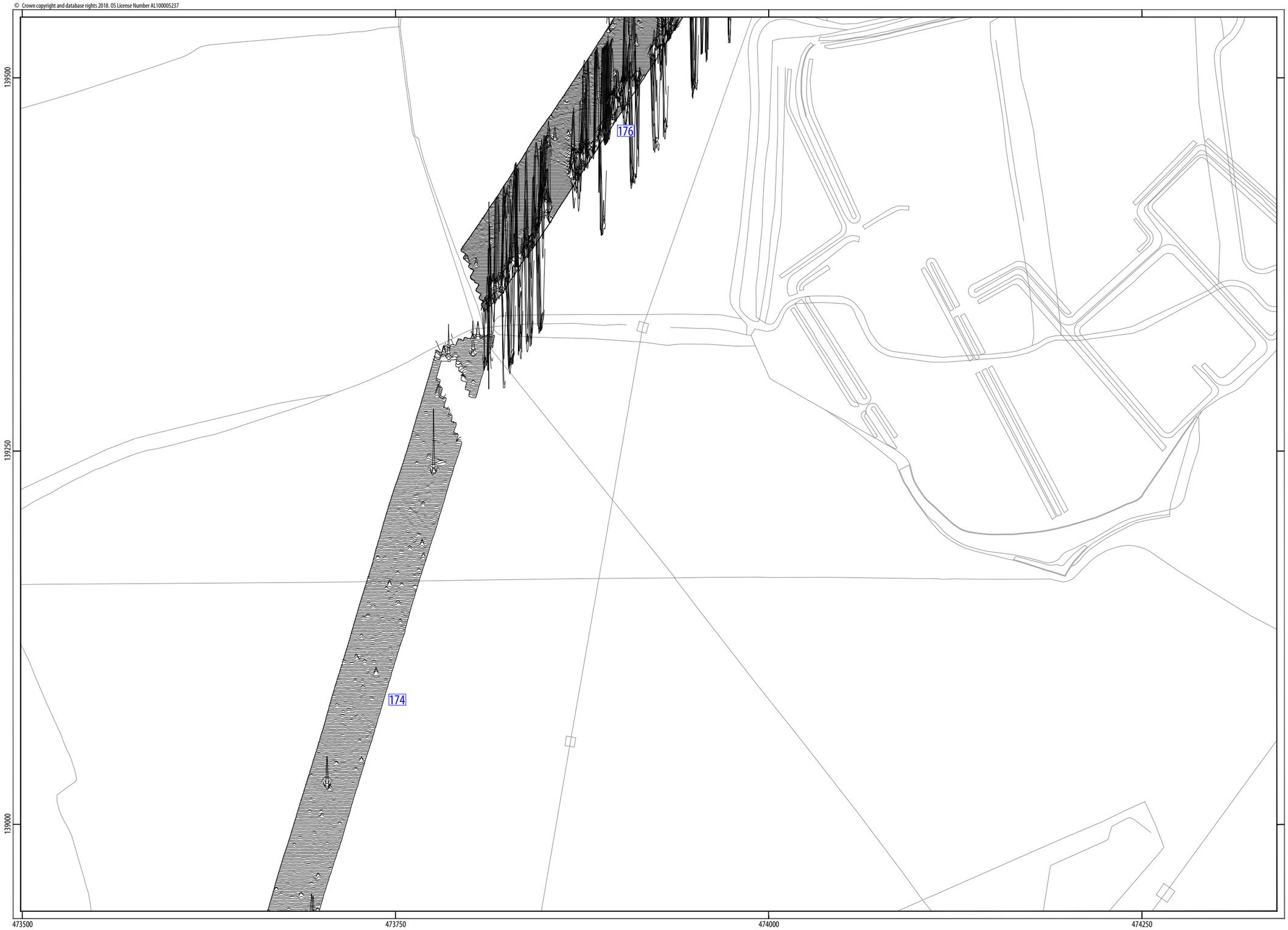
ILLUS 96 Processed greyscale magnetometer data; GSA174 & GSA176



15.0nT/cm

0 50m

1:2,500 @ A3

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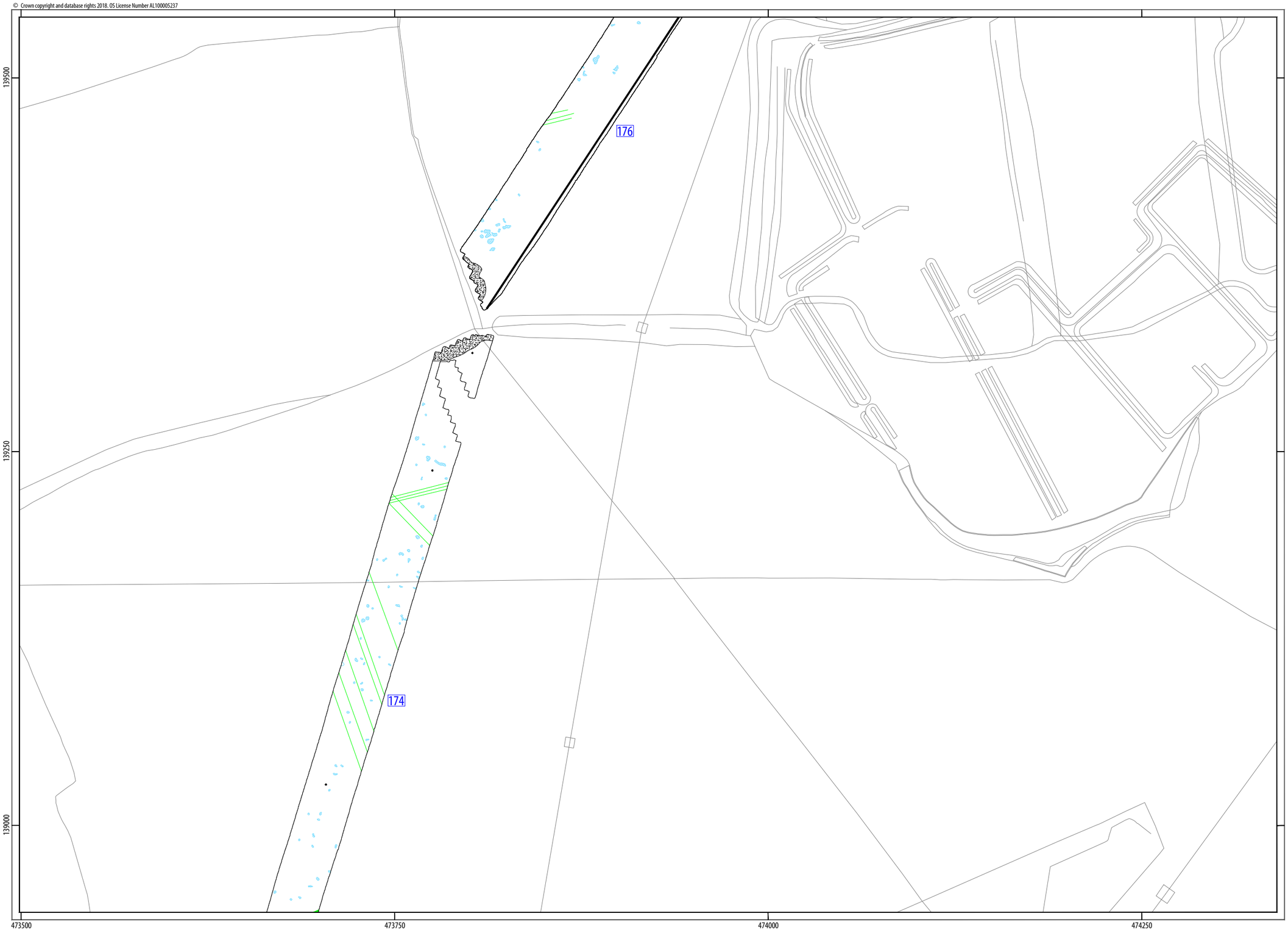
ILLUS 97 XY trace plot of minimally processed magnetometer data; GSA174 & GSA176



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology

0 50m
1:2,500 @ A3

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ILLUS 98 Interpretation of magnetometer data; GSA174 & GSA176

geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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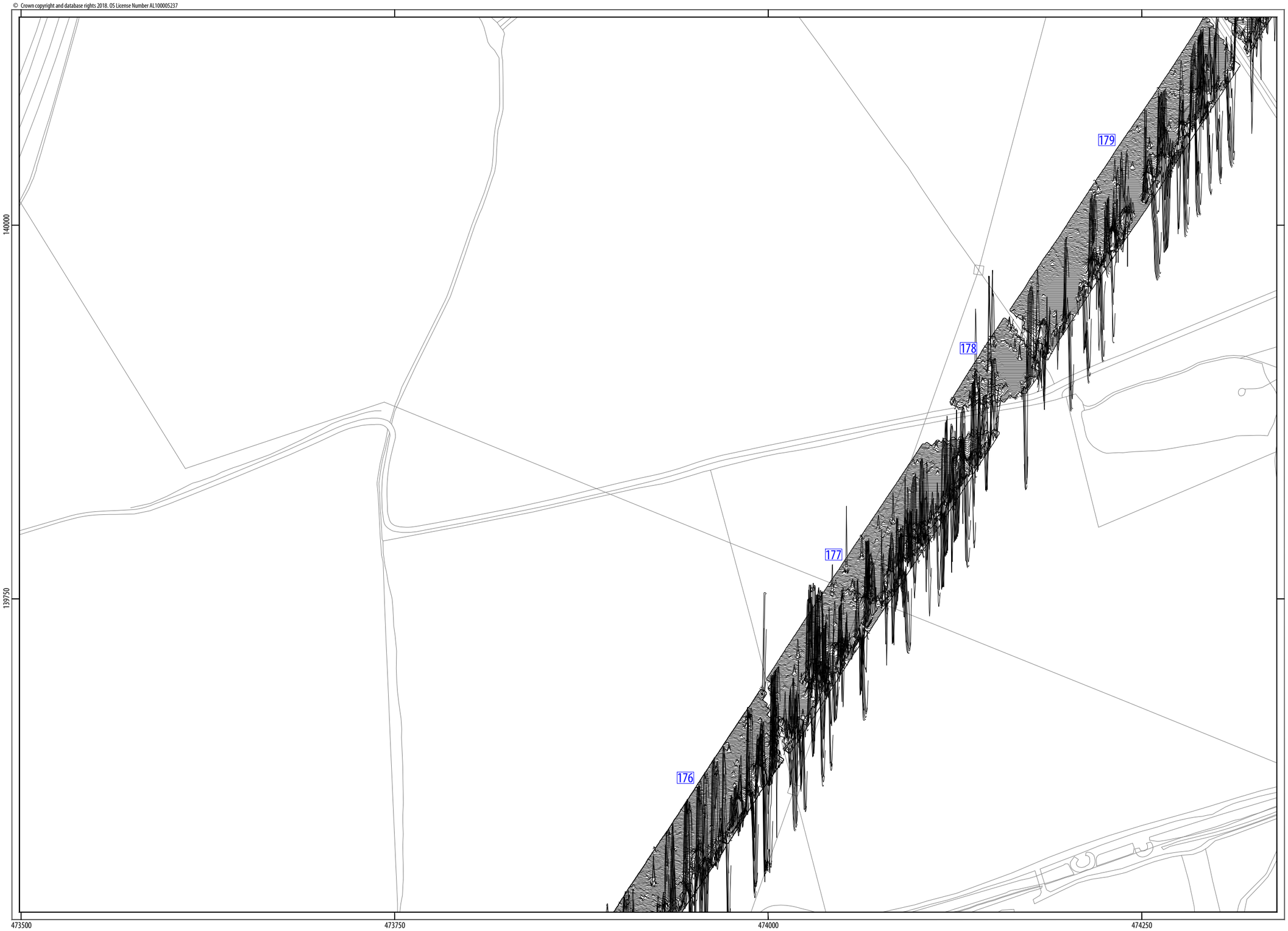
ILLUS 99 Processed greyscale magnetometer data; GSA176, GSA177, GSA178 & GSA179



15.0nT/cm

0 50m

1:2,500 @ A3

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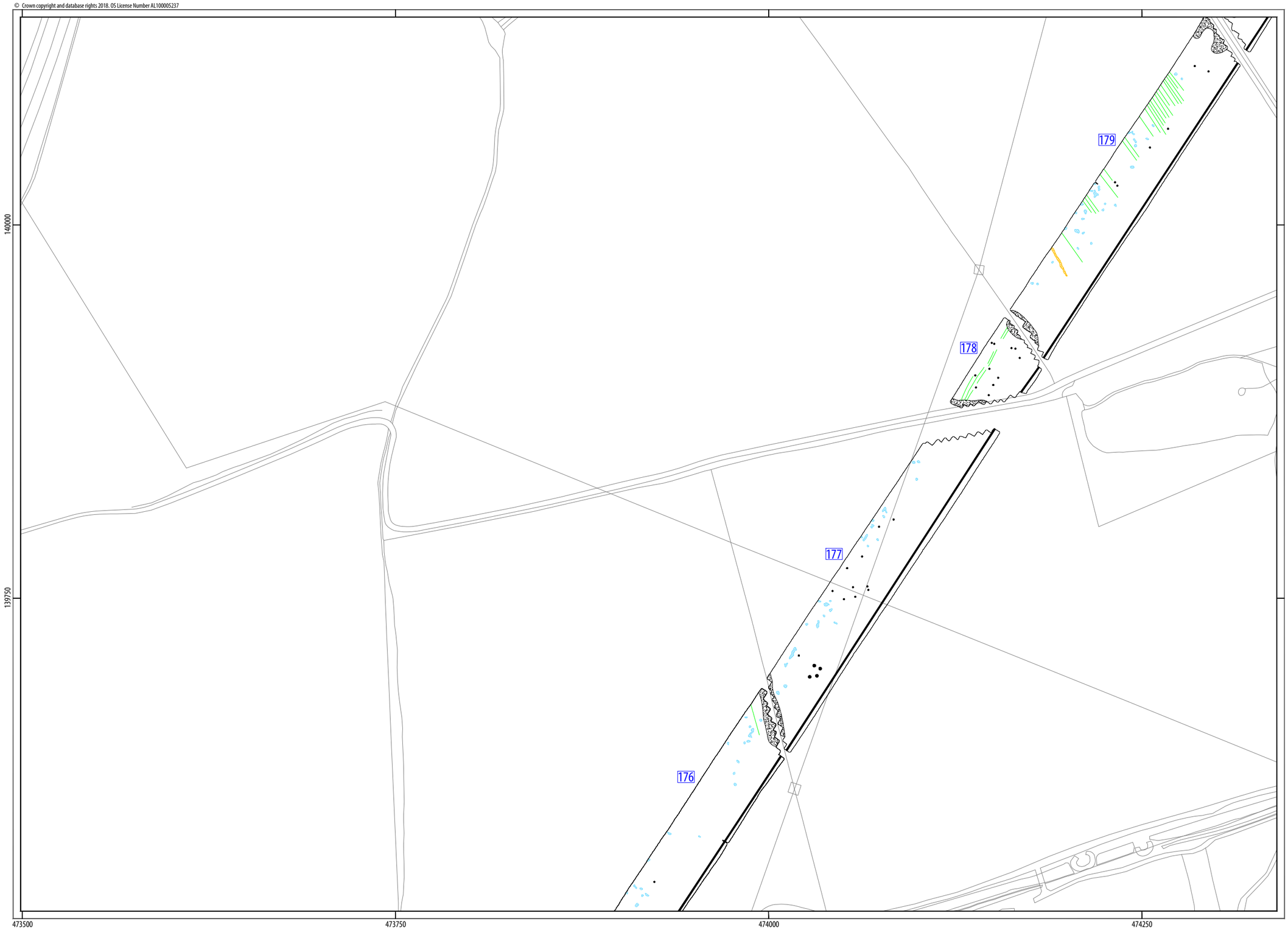
ILLUS 100 XY trace plot of minimally processed magnetometer data; GSA176, GSA177, GSA178 & GSA179



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology
- archaeology?

0 50m
1:2,500 @ A3

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ILLUS 101 Interpretation of magnetometer data; GSA176, GSA177, GSA178 & GSA179

geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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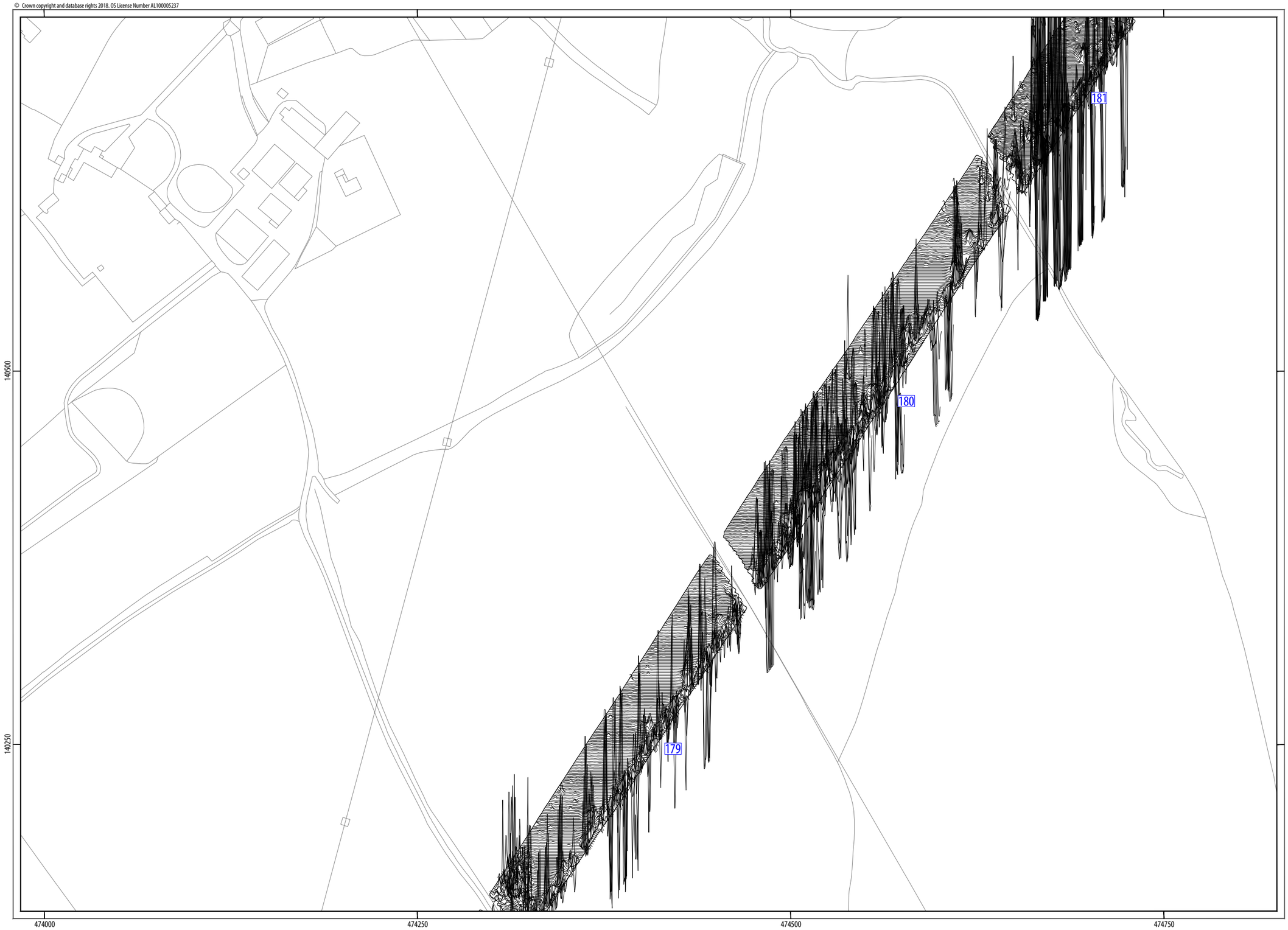
ILLUS 102 Processed greyscale magnetometer data; GSA179, GSA180 & GSA181



15.0nT/cm

0 50m

1:2,500 @ A3

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ILLUS 103 XY trace plot of minimally processed magnetometer data; GSA179, GSA180 & GSA181

INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology

0 50m
1:2,500 @ A3

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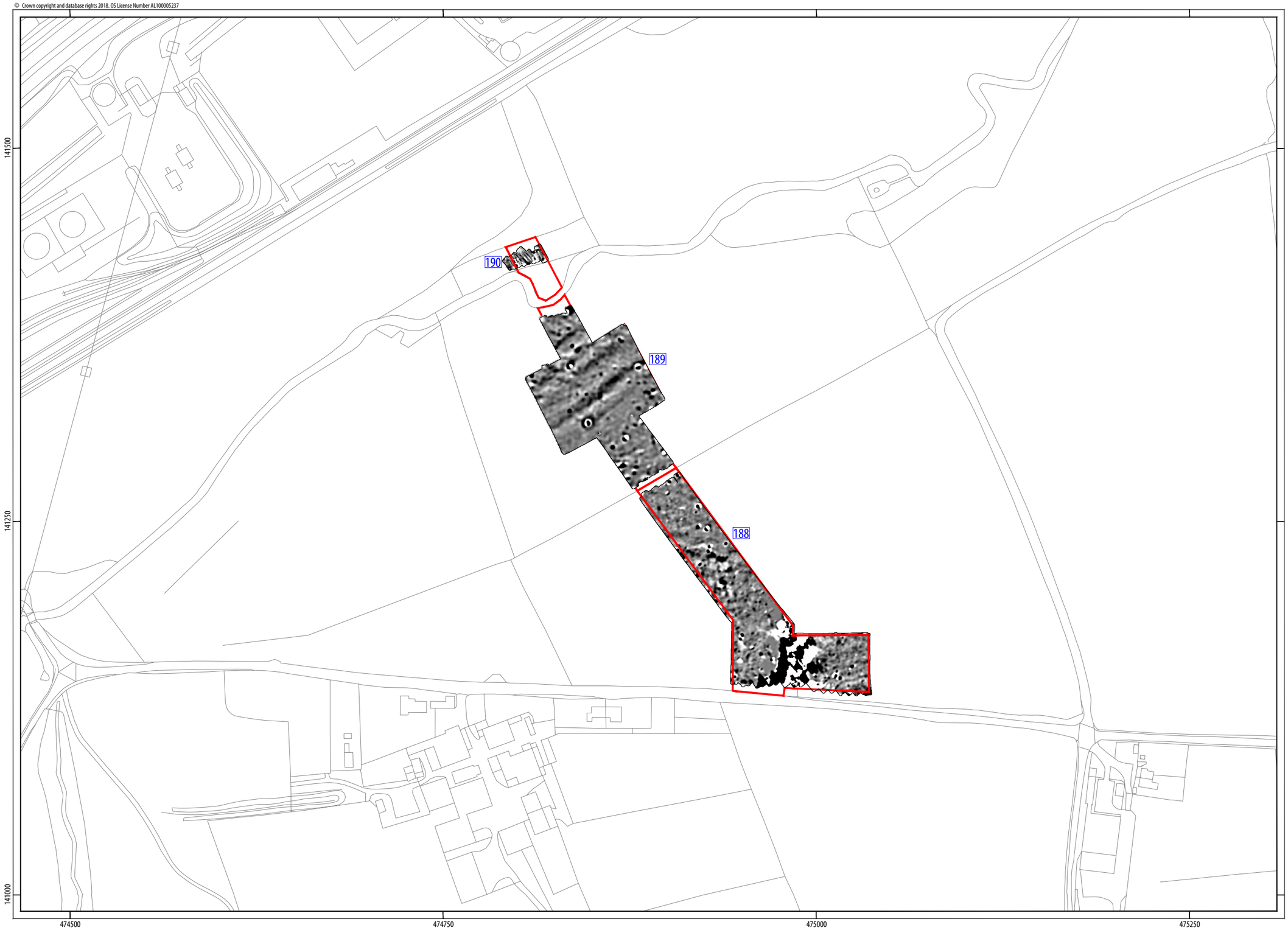
ILLUS 104 Interpretation of magnetometer data; GSA179, GSA180 & GSA181



geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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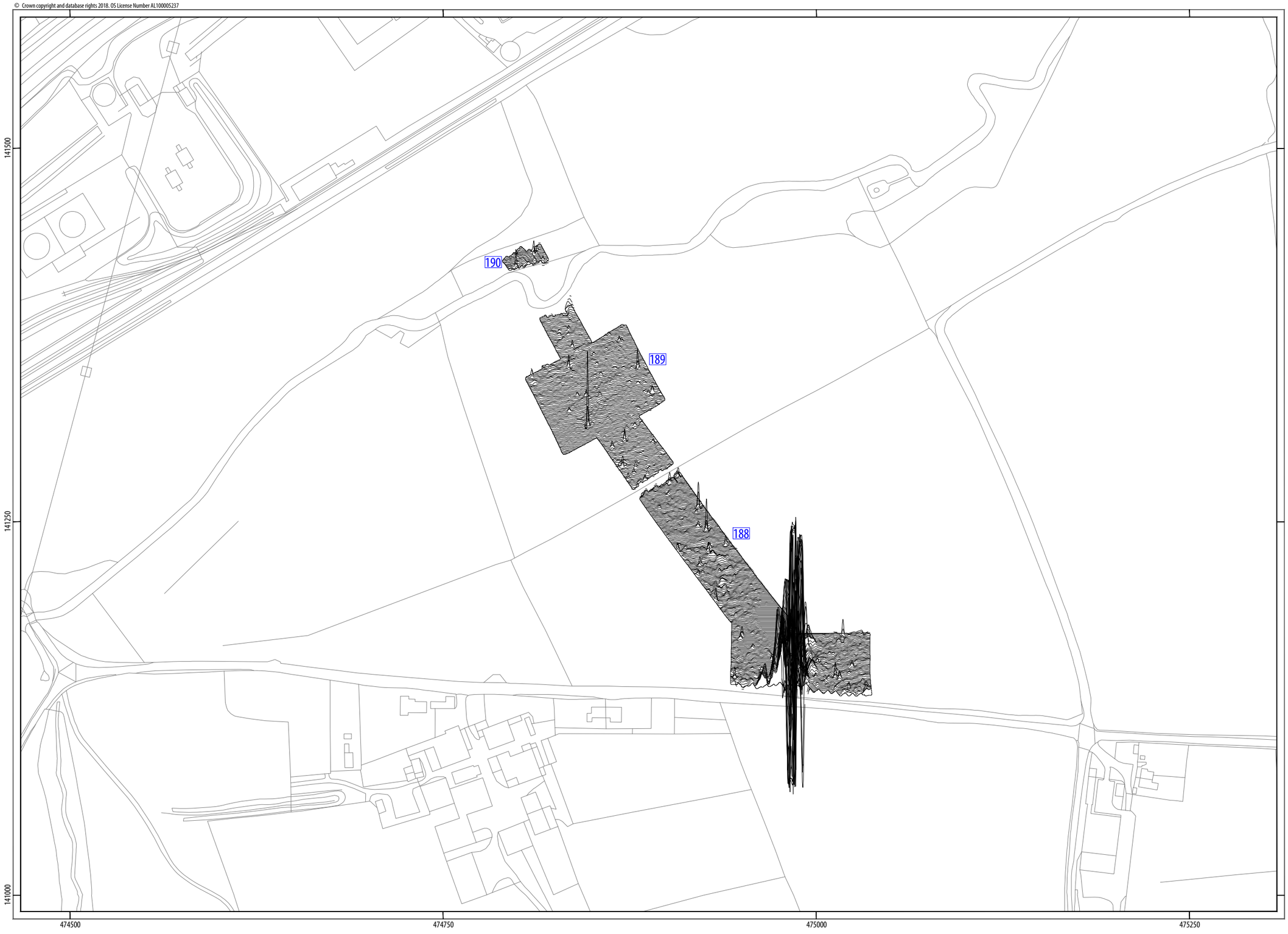
ILLUS 105 Processed greyscale magnetometer data; GSA188, GSA189 & GSA190



15.0nT/cm

0 50m

1:2,500 @ A3

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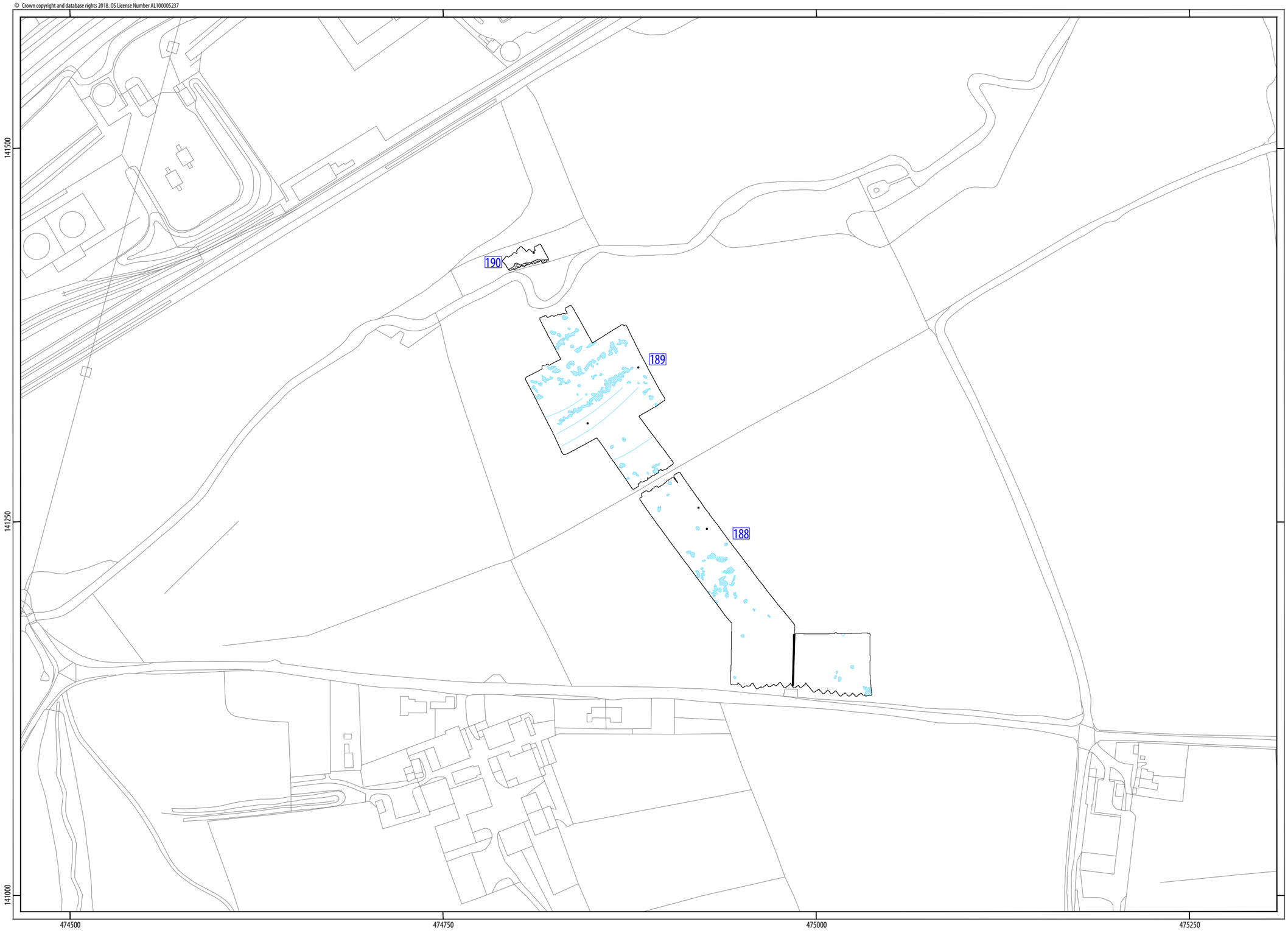
ILLUS 106 XY trace plot of minimally processed magnetometer data; GSA188, GSA189 & GSA190



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- geological variation
- geology

0 50m
1:2,500 @ A3

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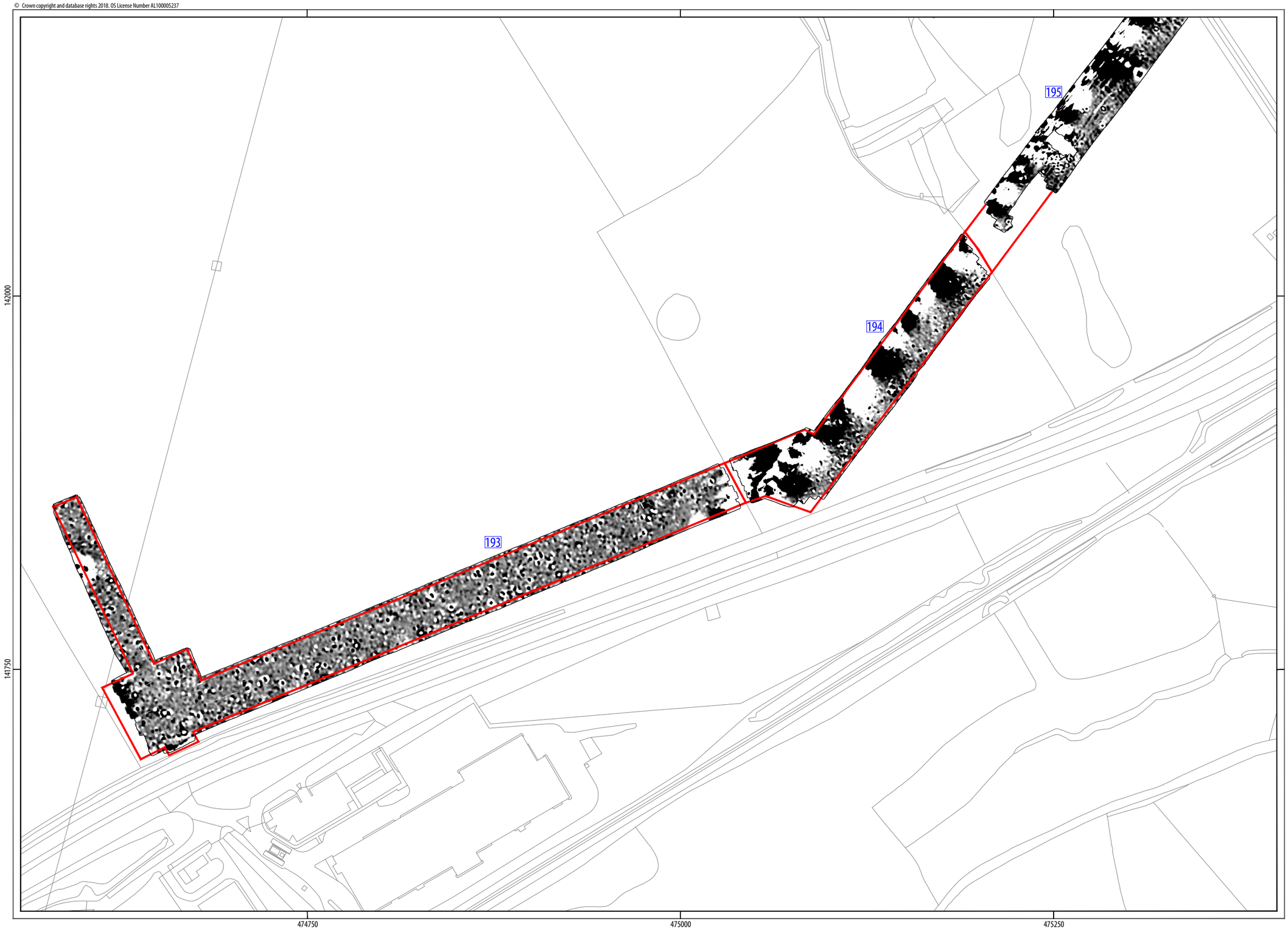
ILLUS 107 Interpretation of magnetometer data; GSA188, GSA189 & GSA190



geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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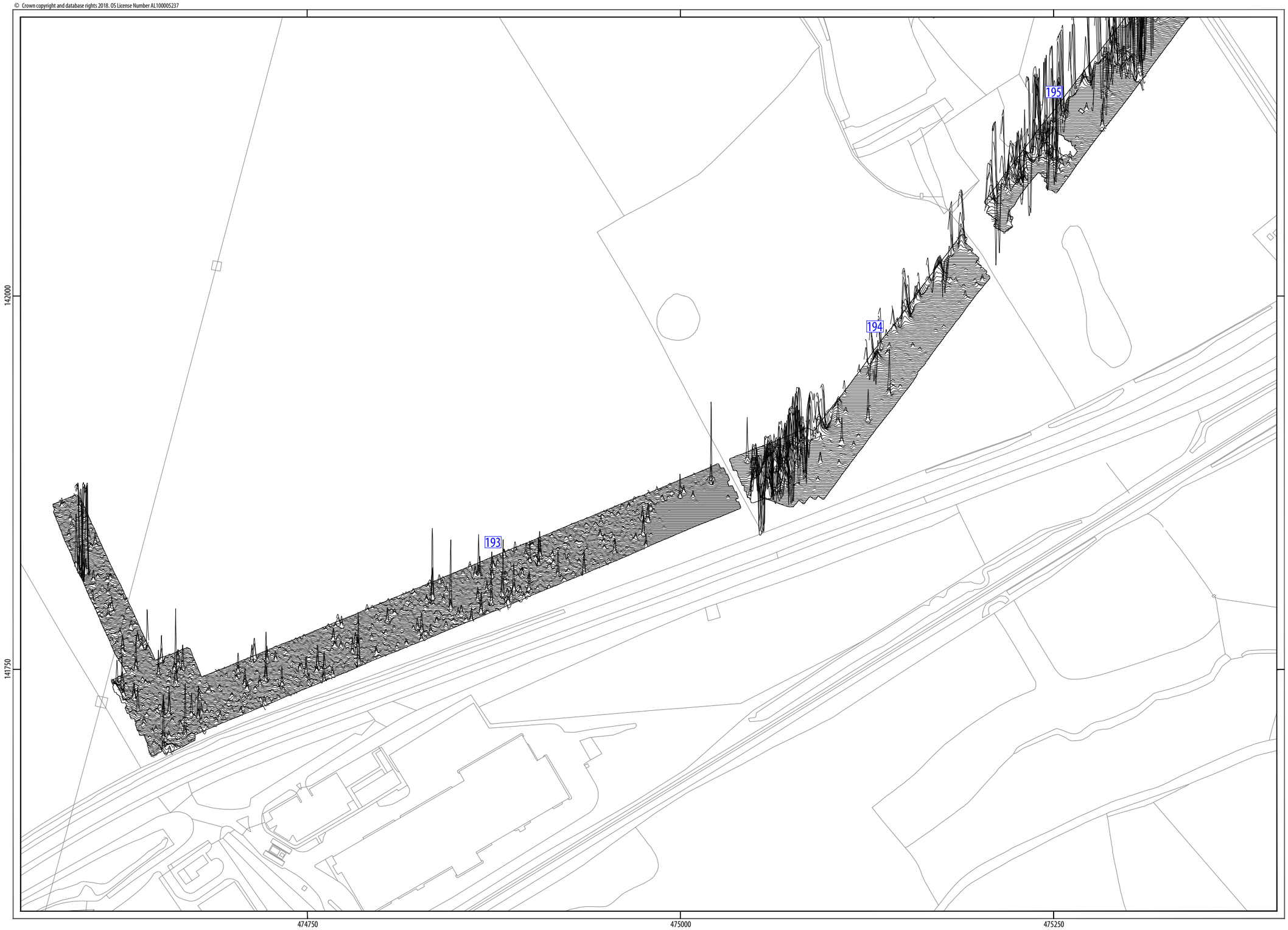
ILLUS 108 Processed greyscale magnetometer data; GSA193, GSA194 & GSA195



15.0nT/cm

0 50m

1:2,500 @ A3

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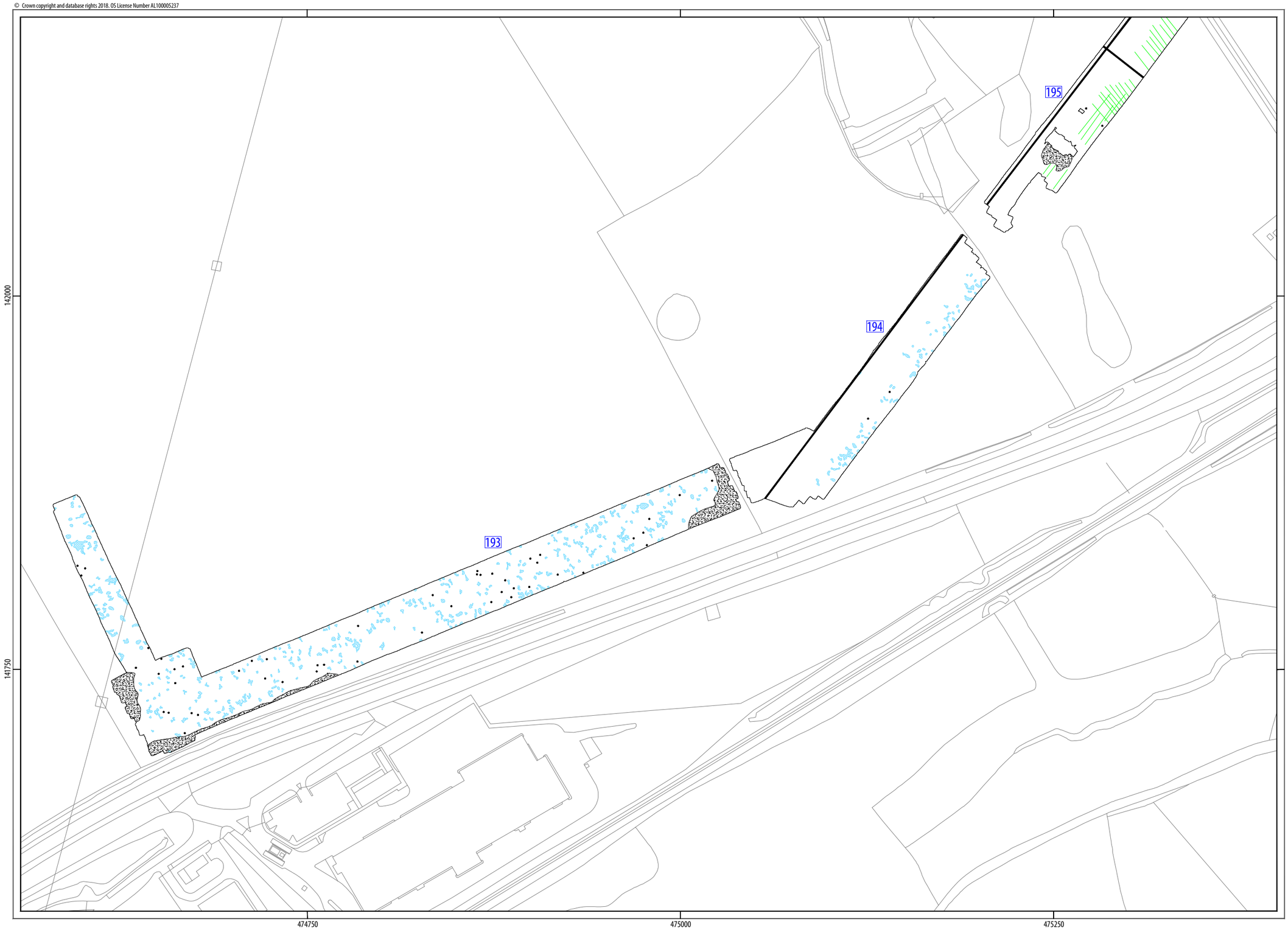
ILLUS 109 XY trace plot of minimally processed magnetometer data; GSA193, GSA194 & GSA195



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology

0 50m
1:2,500 @ A3

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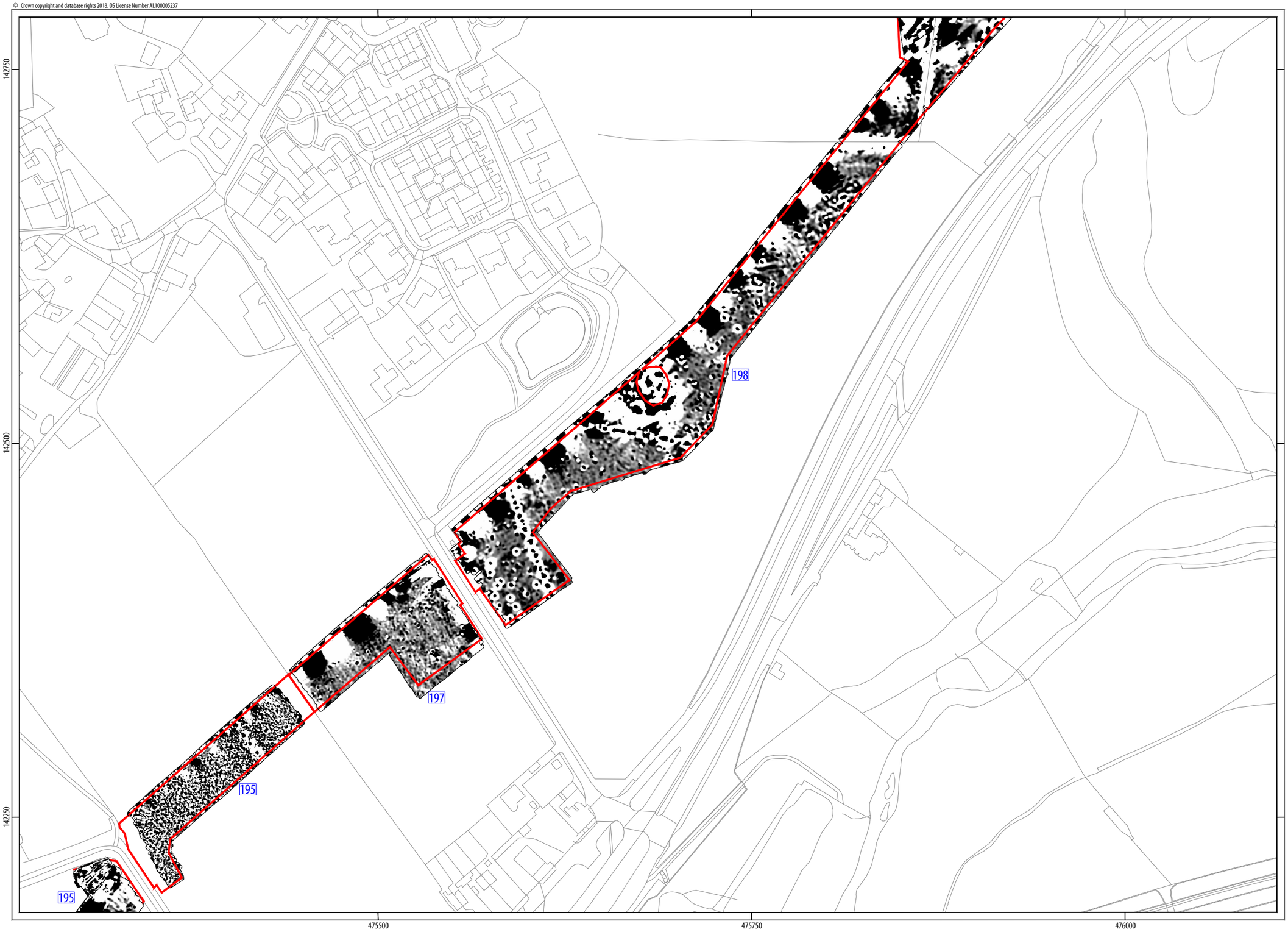
ILLUS 110 Interpretation of magnetometer data; GSA193, GSA194 & GSA195



geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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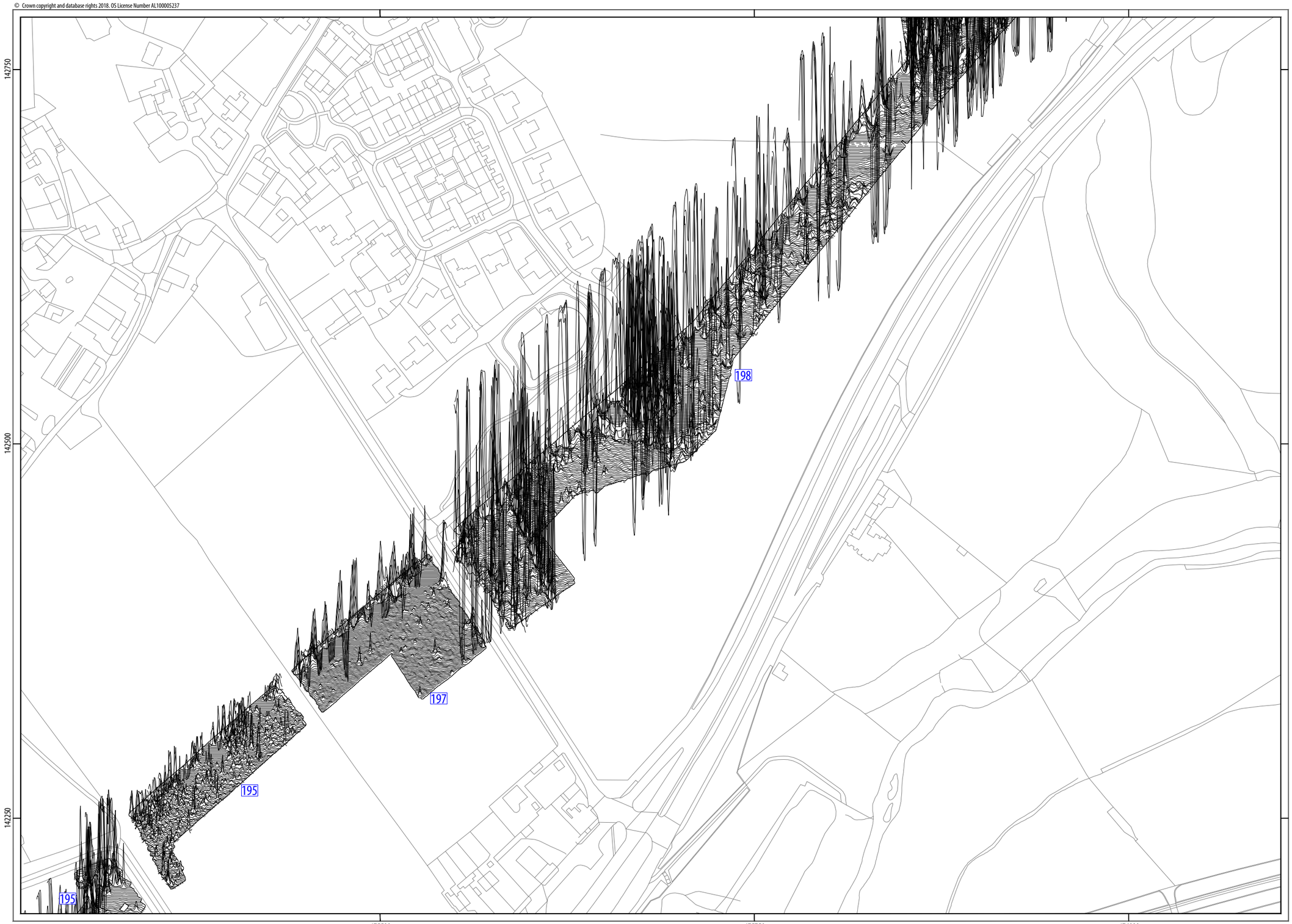
ILLUS 111 Processed greyscale magnetometer data; GSA195, GSA196, GSA197 & GSA198



15.0nT/cm

0 50m

1:2,500 @ A3

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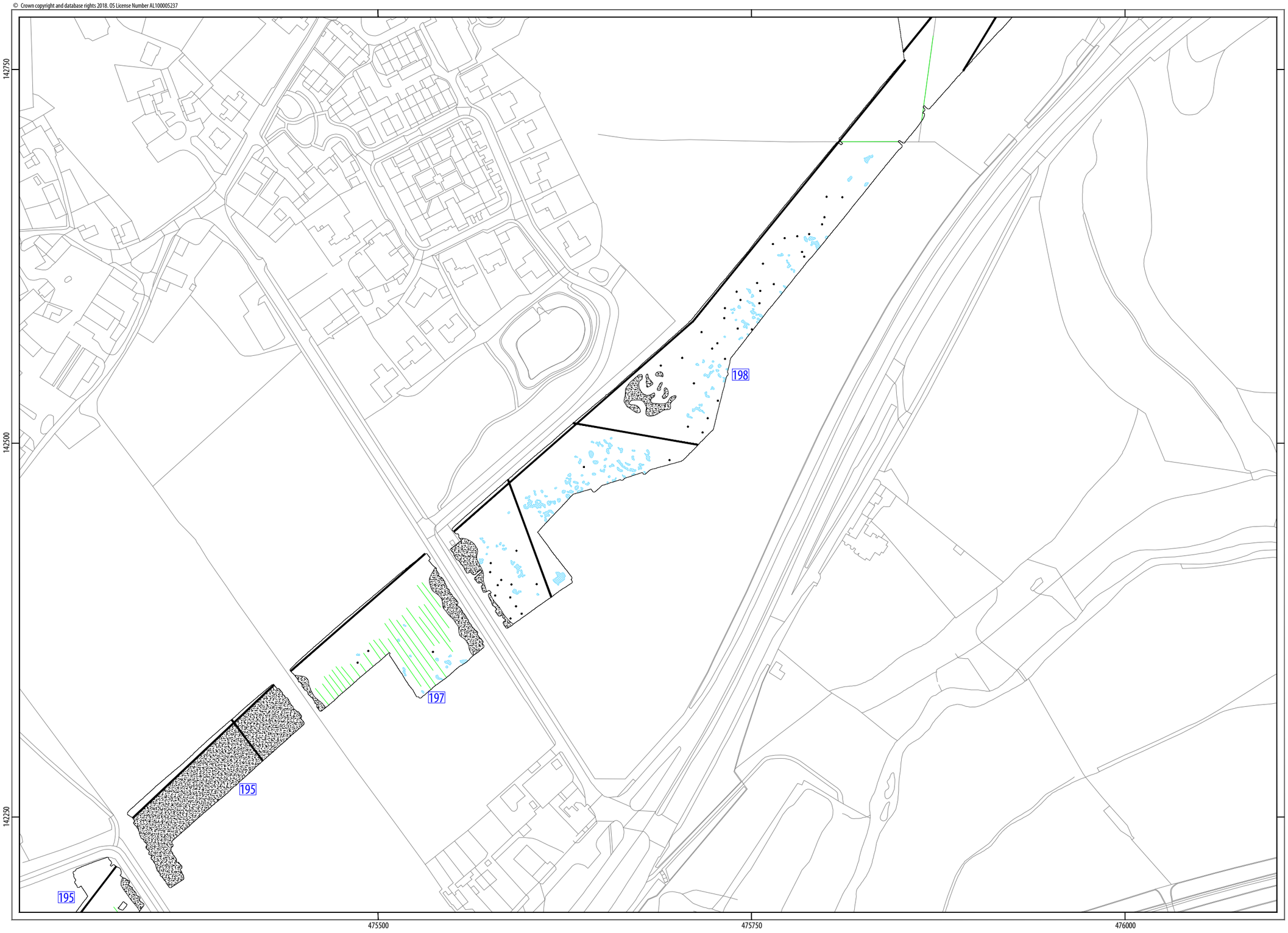
ILLUS 112 XY trace plot of minimally processed magnetometer data; GSA195, GSA196, GSA197 & GSA198



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology

0 50m
1:2,500 @ A3

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ILLUS 113 Interpretation of magnetometer data; GSA195, GSA196, GSA197 & GSA198

geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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ILLUS 114 Processed greyscale magnetometer data; GSA198

143250

143000

198

475750

476000

476250

476500

15.0nT/cm

0 50m

1:2,500 @ A3

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ILLUS 115 XY trace plot of minimally processed magnetometer data; GSA198

INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology

0 50m
1:2,500 @ A3

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ILLUS 116 Interpretation of magnetometer data; GSA198

geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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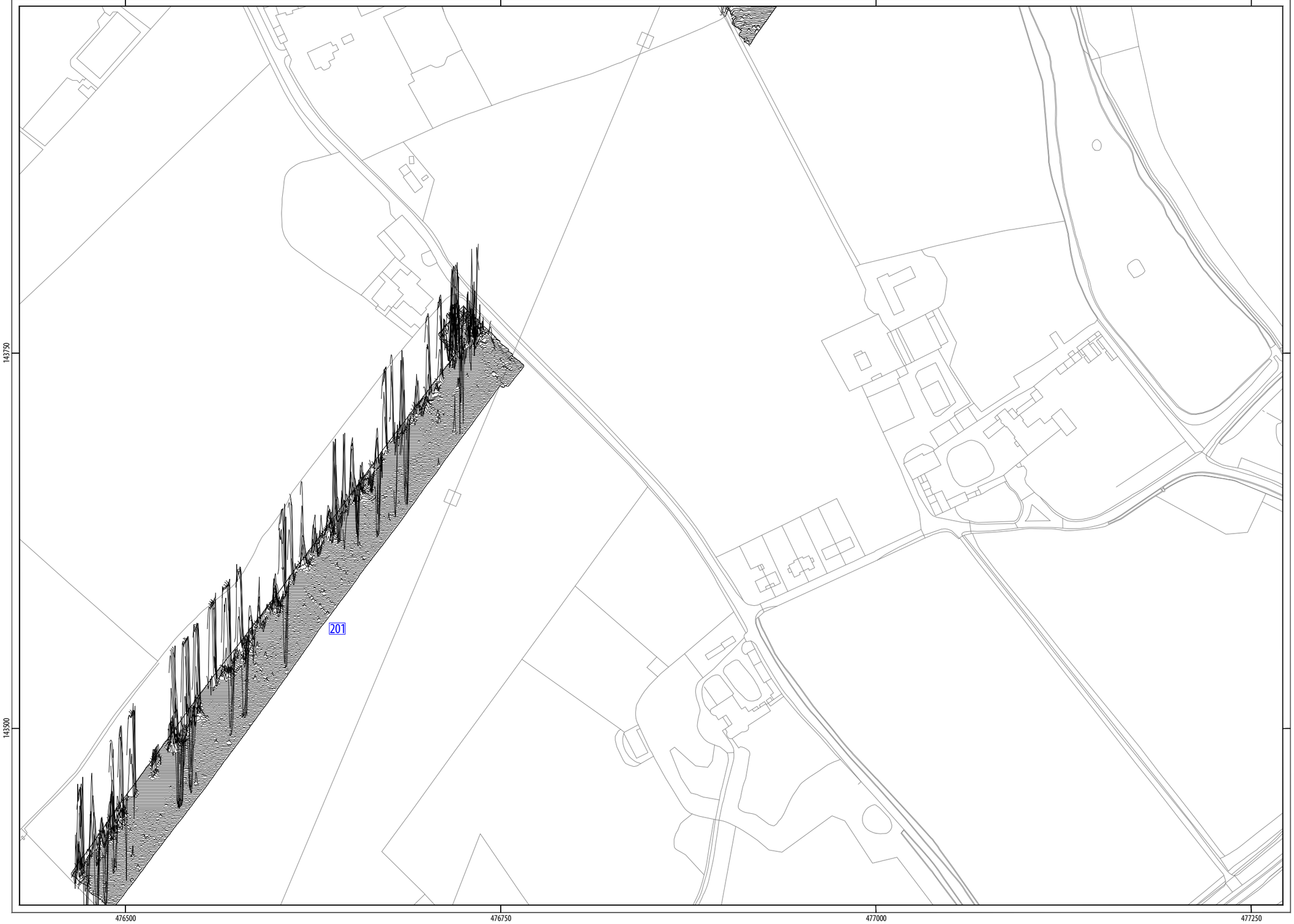
ILLUS 117 Processed greyscale magnetometer data; GSA201



15.0nT/cm

0 50m

1:2,500 @ A3

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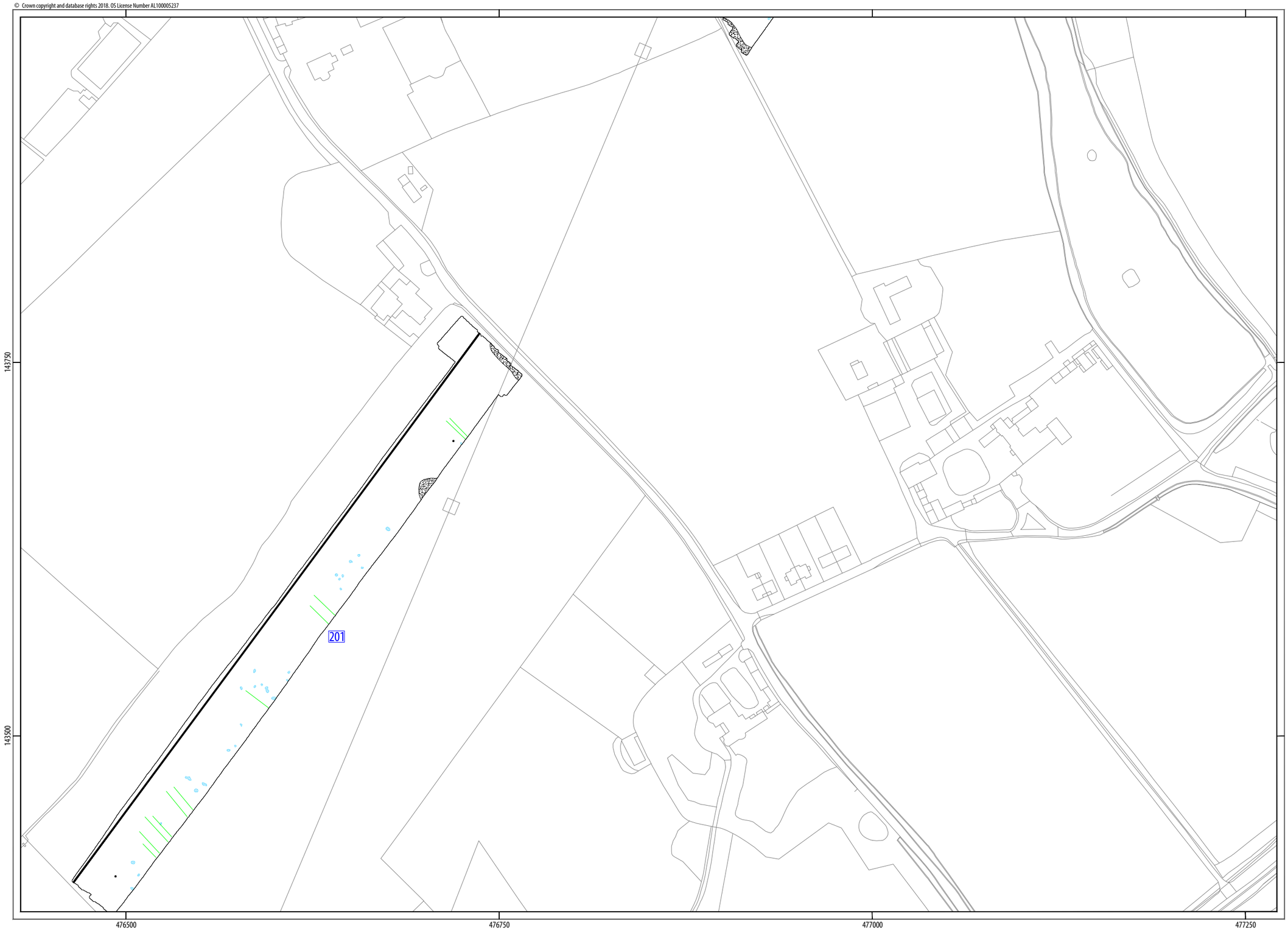
ILLUS 118 XY trace plot of minimally processed magnetometer data; GSA201



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology

0 50m
1:2,500 @ A3

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ILLUS 119 Interpretation of magnetometer data; GSA201

geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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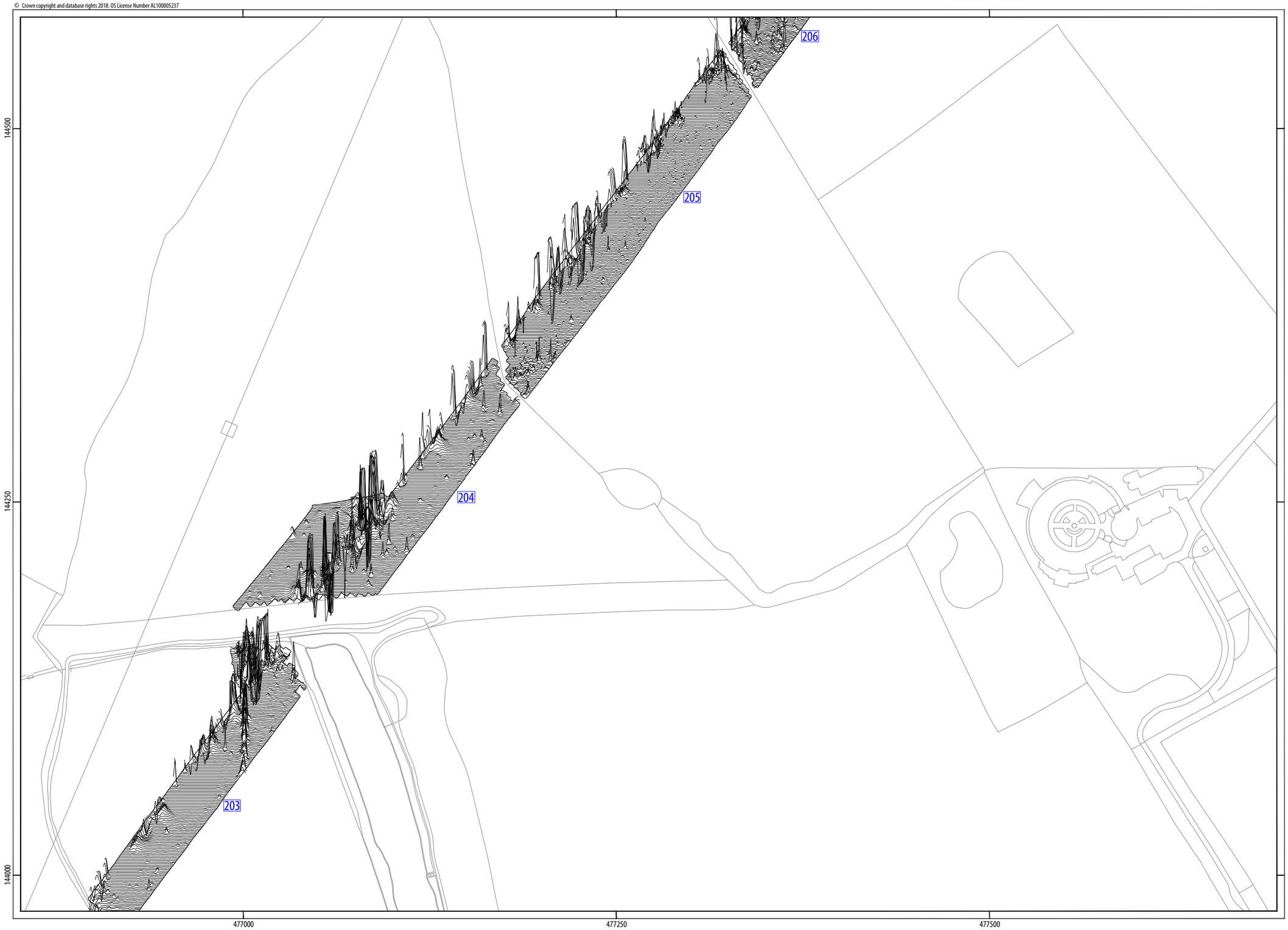
ILLUS 120 Processed greyscale magnetometer data; GSA203, GSA204, GSA205 & GSA206



15.0nT/cm

0 50m

1:2,500 @ A3

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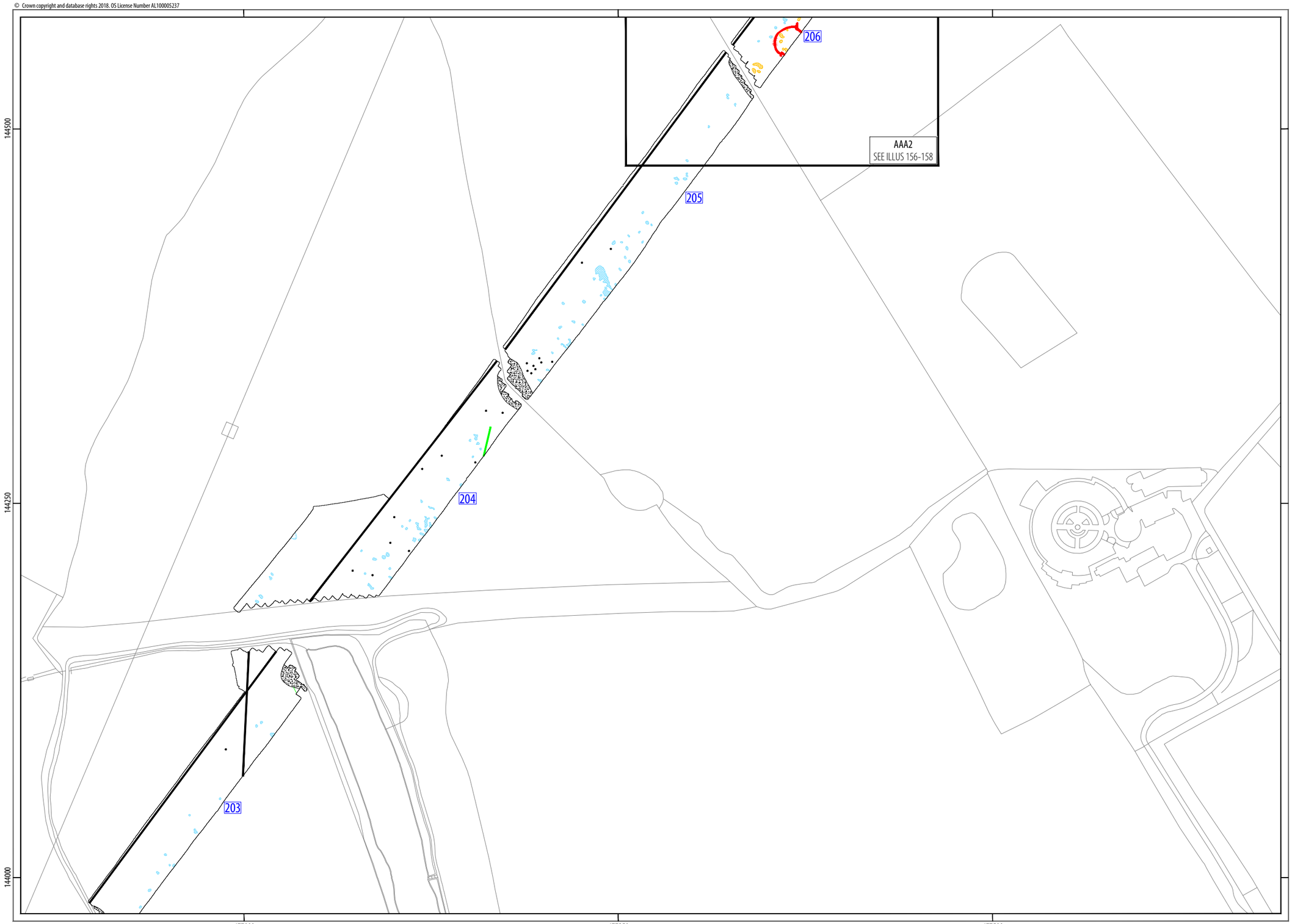
ILLUS 121 XY trace plot of minimally processed magnetometer data; GSA203, GSA204, GSA205 & GSA206



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- former field boundary
- geology
- archaeology?
- archaeology

0 50m
1:2,500 @ A3

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ILLUS 122 Interpretation of magnetometer data; GSA203, GSA204, GSA205 & GSA206

208

207

206

145000

144750

477250

477500

477500

geophysical survey area

nT

-1.0 1.0

0 50m

1:2,500 @ A3

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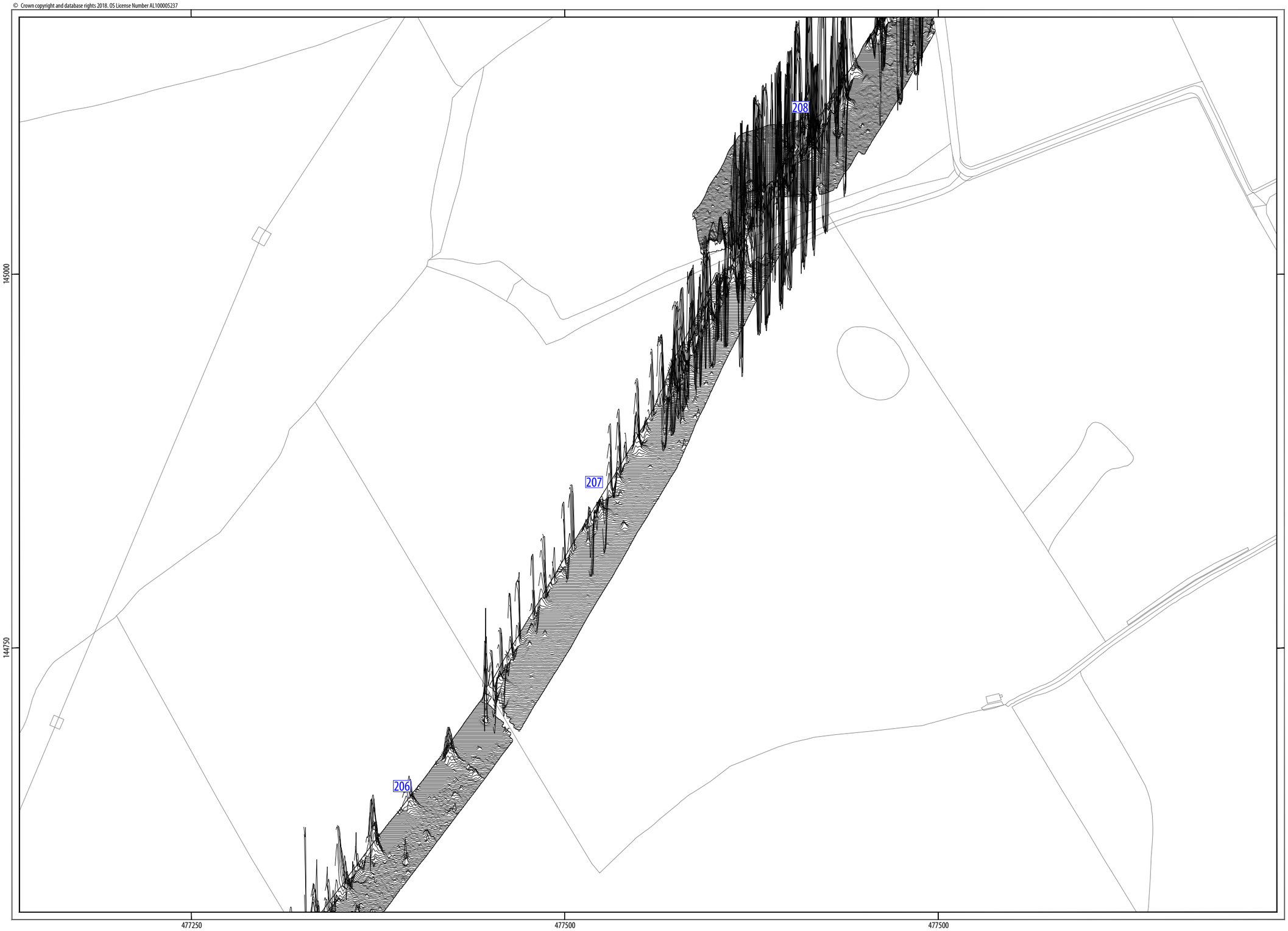
ILLUS 123 Processed greyscale magnetometer data; GSA206, GSA207 & GSA208



15.0nT/cm

0 50m

1:2,500 @ A3

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ILLUS 124 XY trace plot of minimally processed magnetometer data; GSA206, GSA207 & GSA208

208

207

206

AAA2
SEE ILLUS 156-158

145000

144750

477250

477500

477500

INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology
- archaeology?

0 50m
1:2,500 @ A3

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ILLUS 125 Interpretation of magnetometer data; GSA206, GSA207 & GSA208

geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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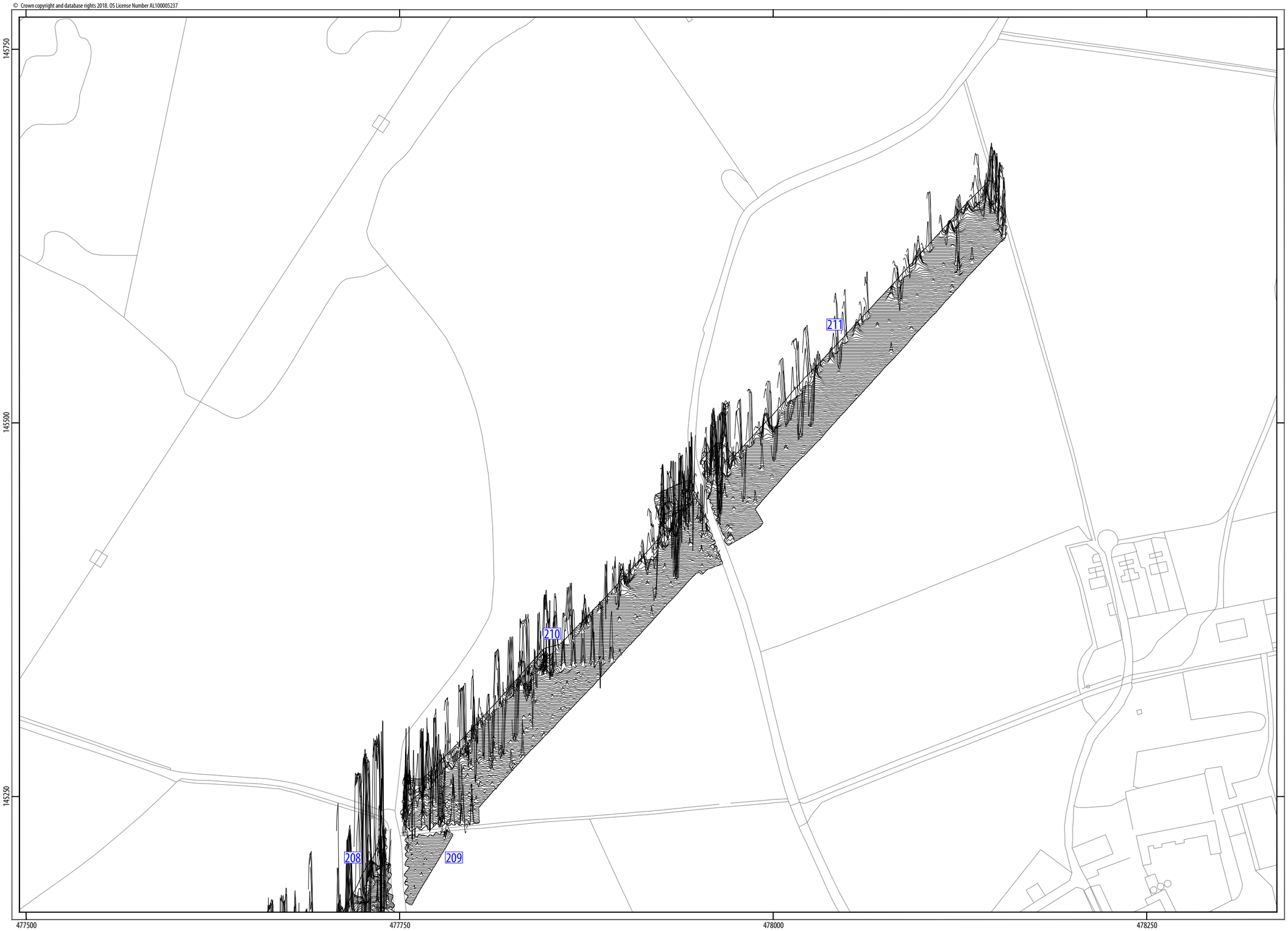
ILLUS 126 Processed greyscale magnetometer data; GSA208, GSA209, GSA210 & GSA211



15.0nT/cm

0 50m

1:2,500 @ A3

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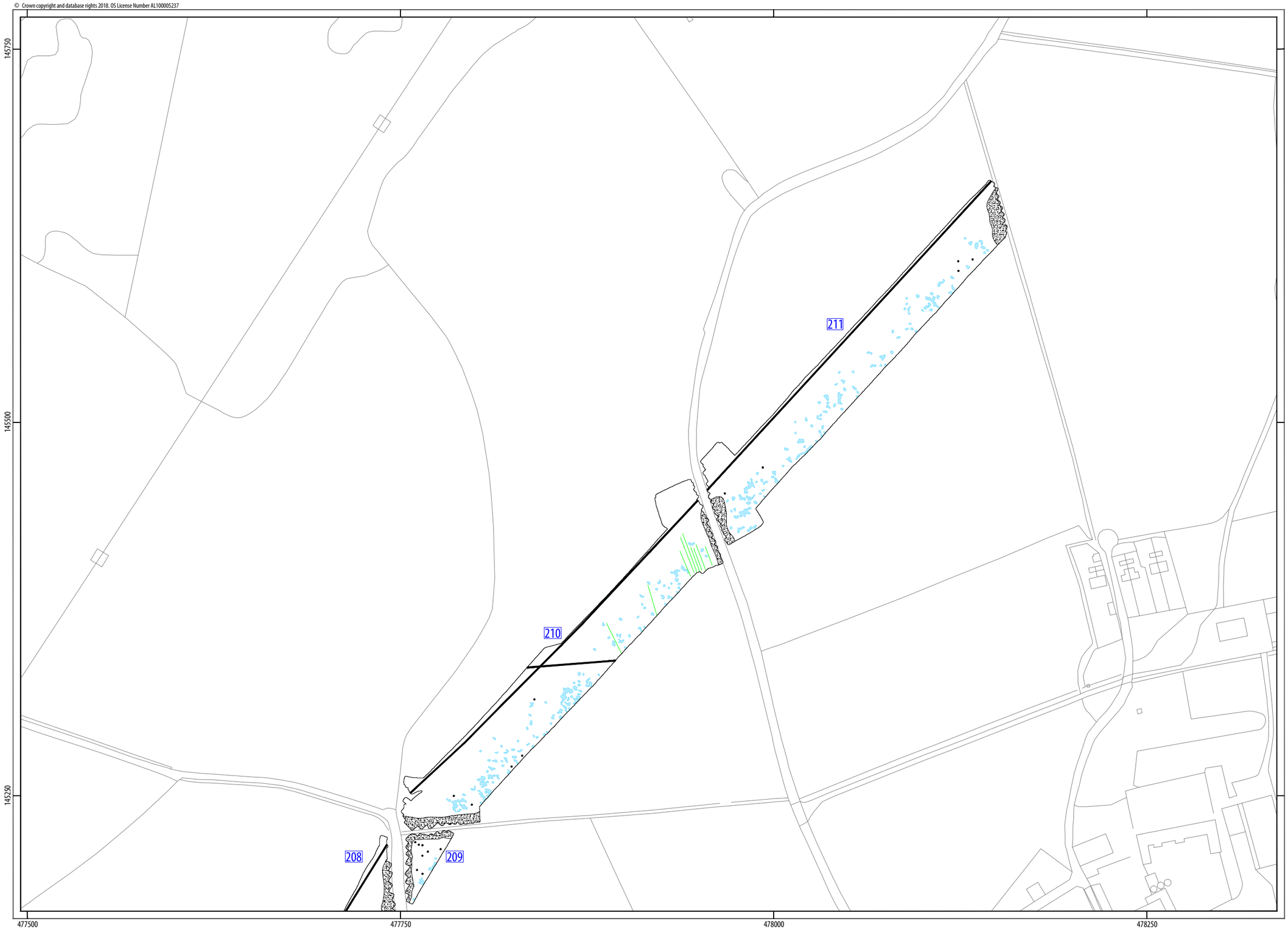
ILLUS 127 XY trace plot of minimally processed magnetometer data; GSA208, GSA209, GSA210 & GSA211



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology

0 50m
1:2,500 @ A3

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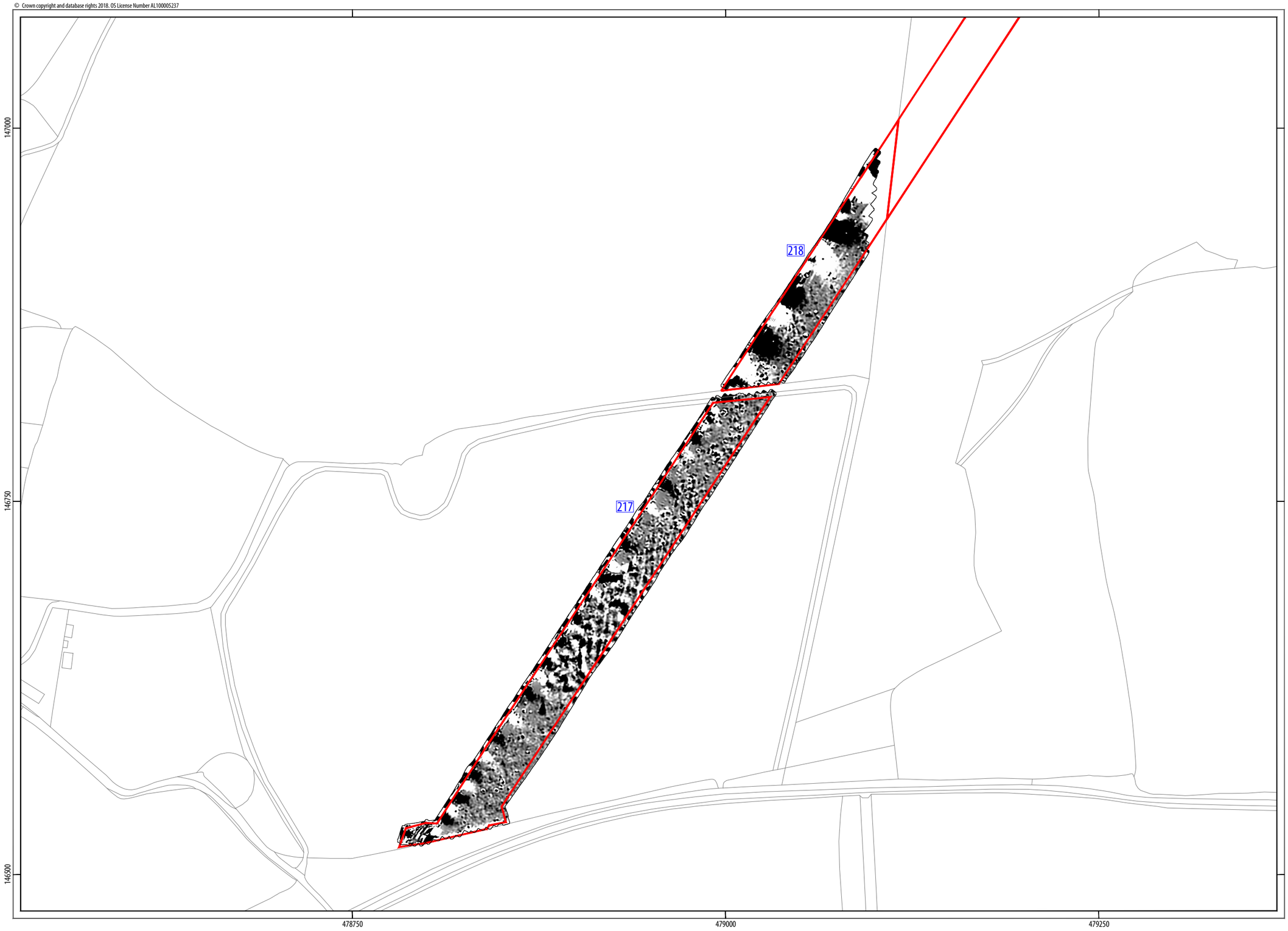
ILLUS 128 Interpretation of magnetometer data; GSA208, GSA209, GSA210 & GSA211



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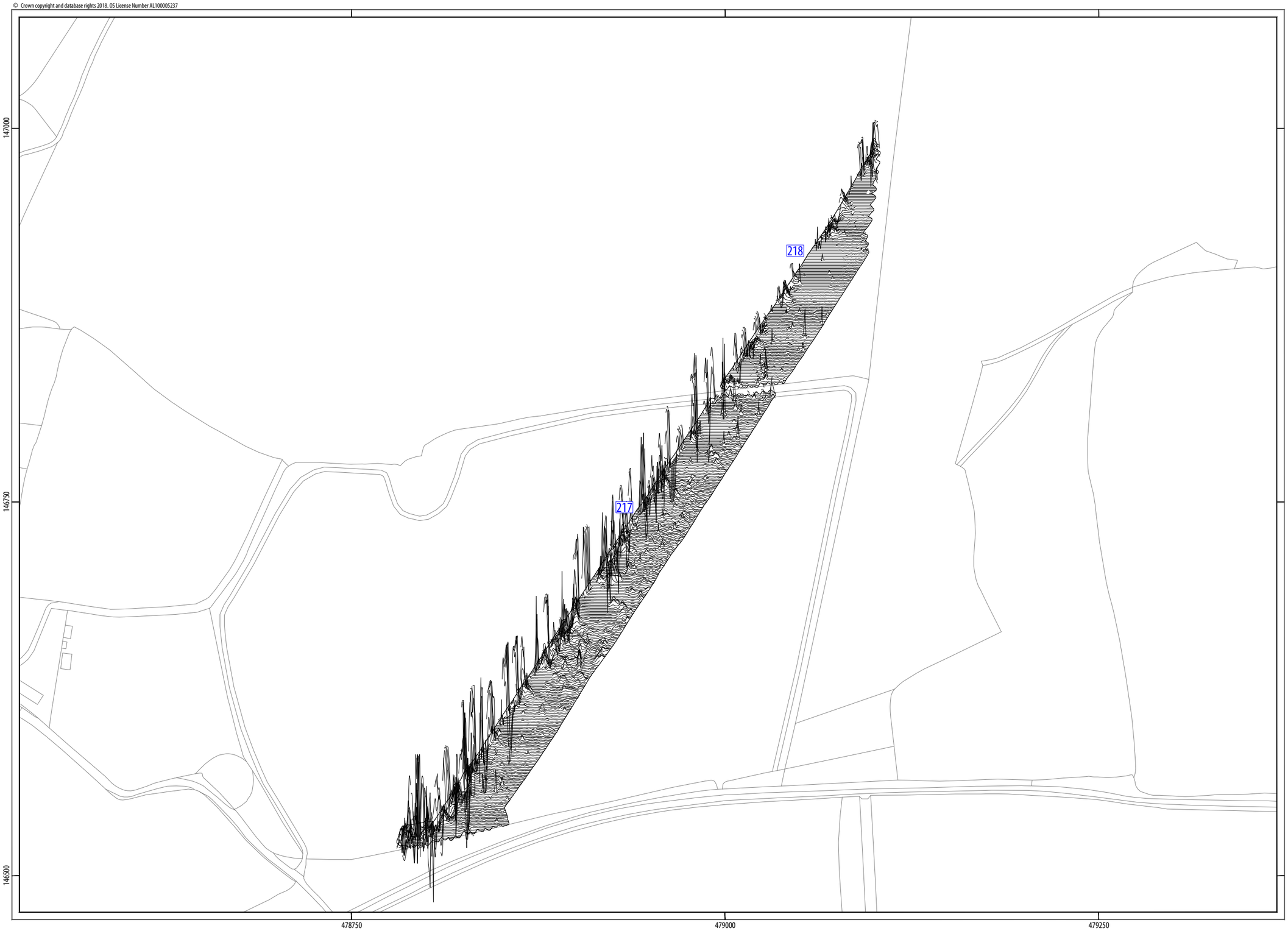
ILLUS 129 Processed greyscale magnetometer data; GSA217 & GSA218



15.0nT/cm

0 50m

1:2,500 @ A3

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ILLUS 130 XY trace plot of minimally processed magnetometer data; GSA217 & GSA218

INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- geology
- geology

0 50m
1:2,500 @ A3

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ILLUS 131 Interpretation of magnetometer data; GSA217 & GSA218

247

246

245

150000

149750

149500

480500

480750

481000

geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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ILLUS 132 Processed greyscale magnetometer data; GSA245, GSA246 & GSA247

15.0nT/cm

0 50m

1:2,500 @ A3

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ILLUS 133 XY trace plot of minimally processed magnetometer data; GSA245, GSA246 & GSA247

247

246

245

150000
149750
149500
480500
480750
481000

INTERPRETATION
ferrous material
ferrous material
geology

0 50m
1:2,500 @ A3

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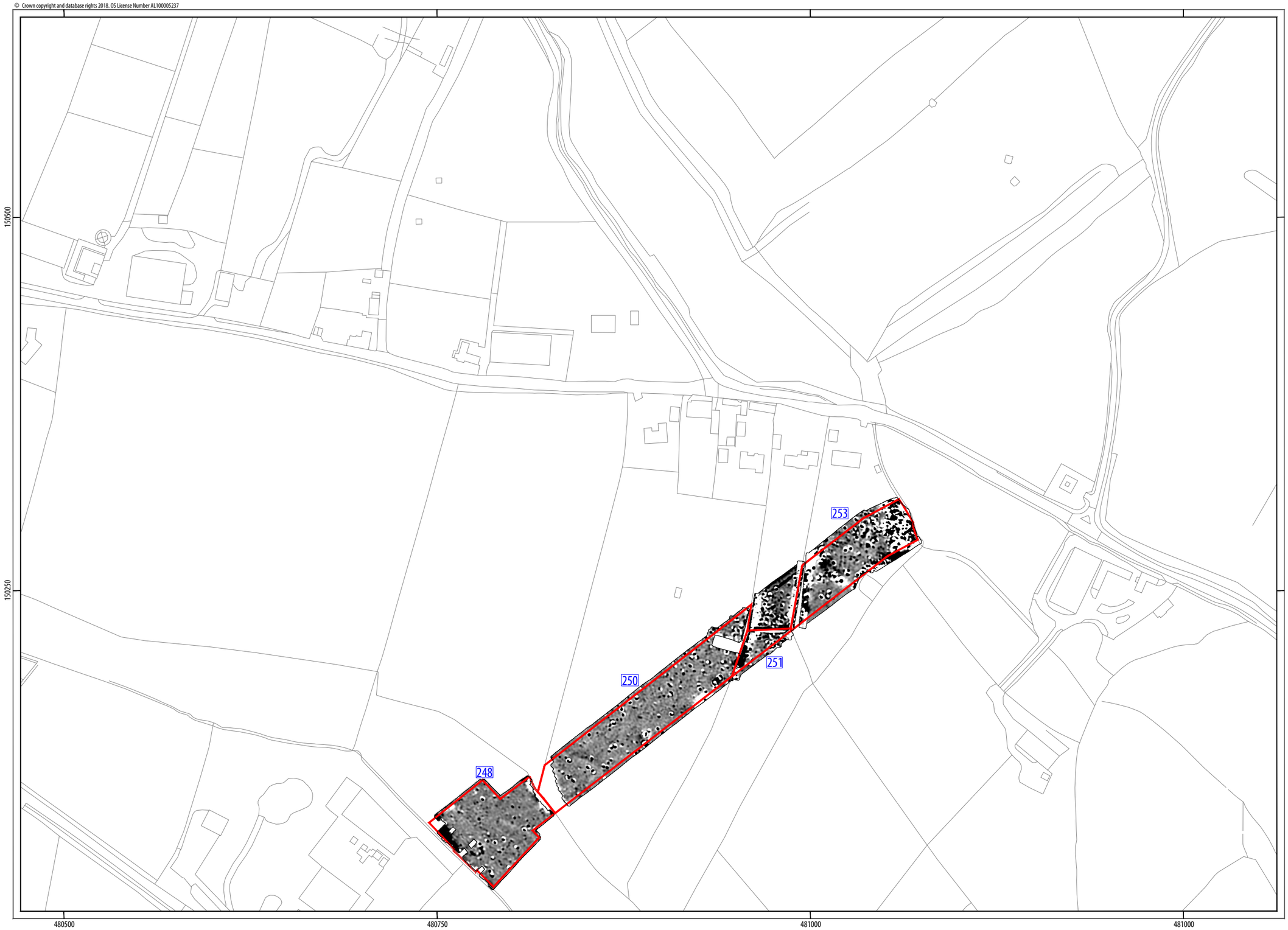
ILLUS 134 Interpretation of magnetometer data; GSA245, GSA246 & GSA247



geophysical survey area

-1.0 nT 1.0

0 50m

1:2,500 @ A3

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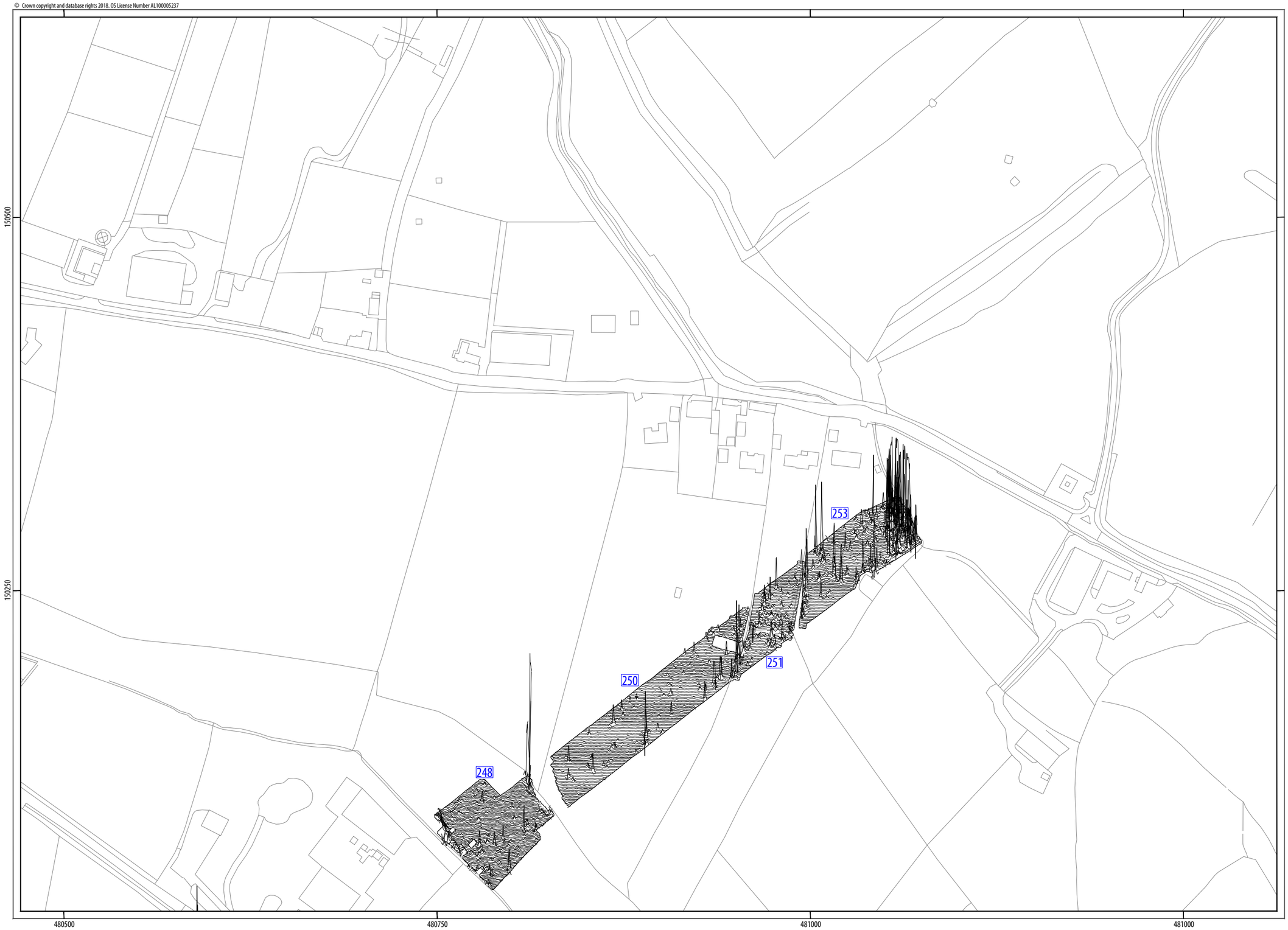
ILLUS 135 Processed greyscale magnetometer data; GSA248, GSA250, GSA251 & GSA253



15.0nT/cm

0 50m

1:2,500 @ A3

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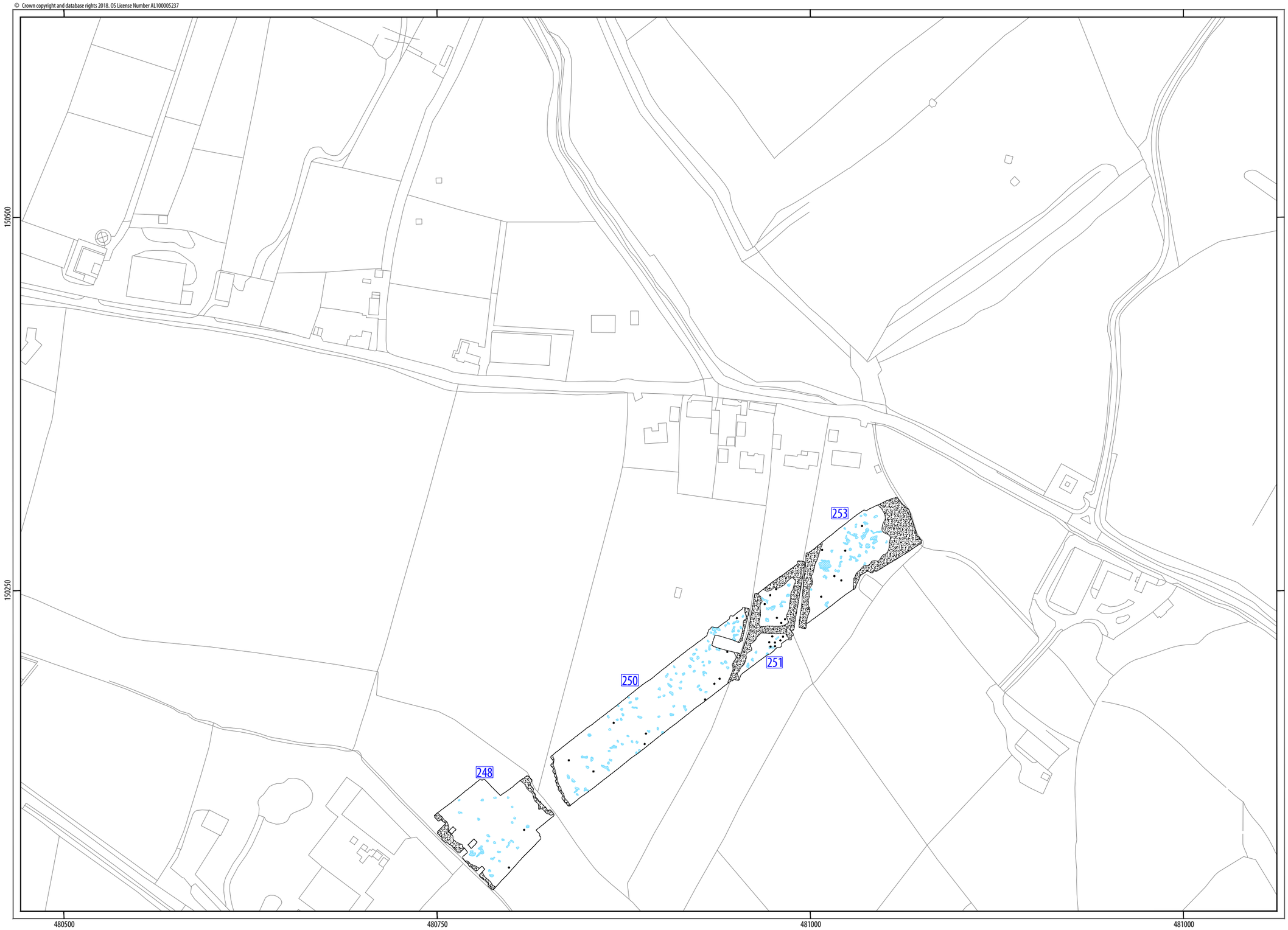
ILLUS 136 XY trace plot of minimally processed magnetometer data; GSA248, GSA250, GSA251 & GSA253



INTERPRETATION
- ferrous material
- ferrous material
- geology

0 50m
1:2,500 @ A3

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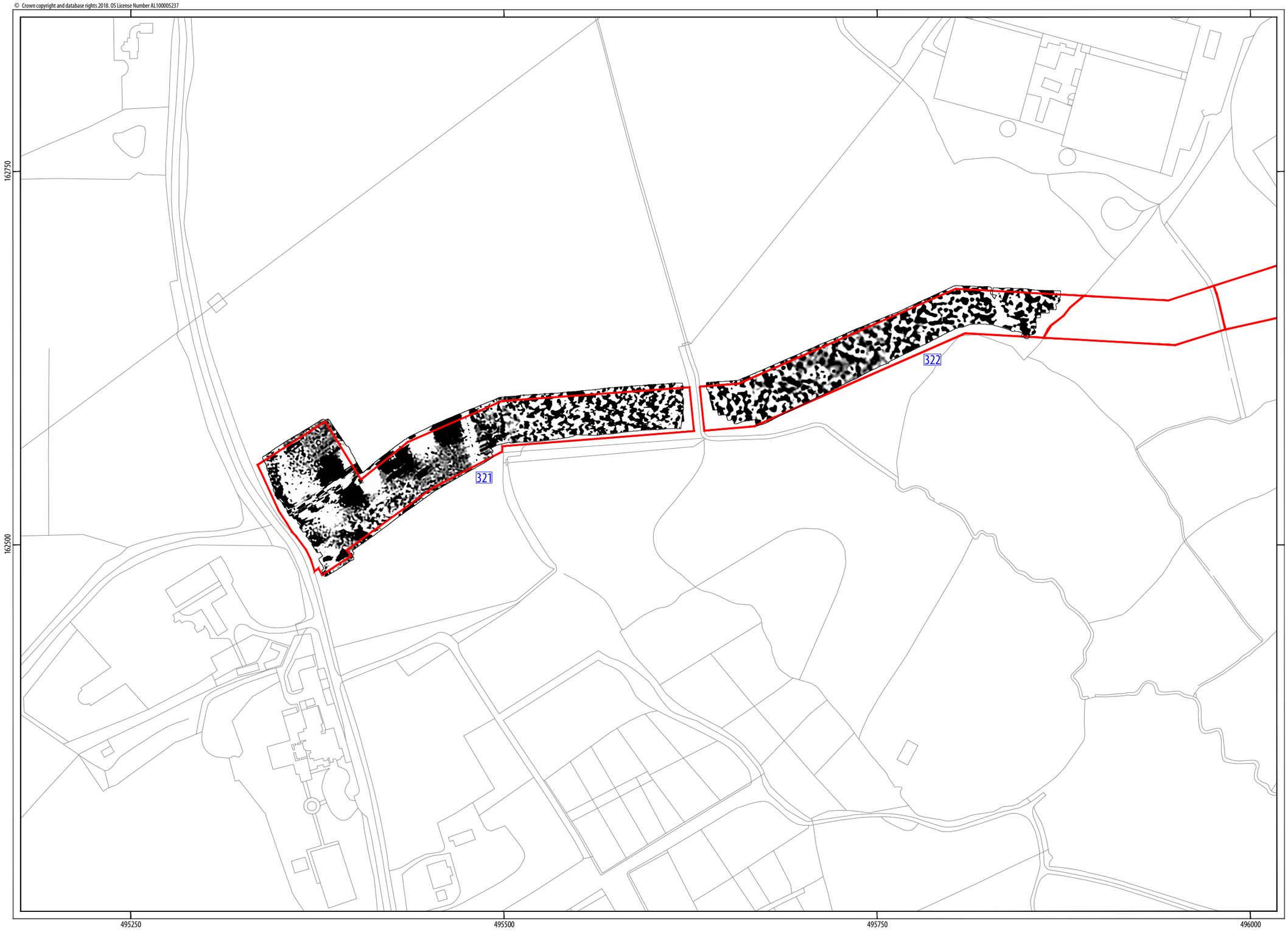
ILLUS 137 Interpretation of magnetometer data; GSA248, GSA250, GSA251 & GSA253



geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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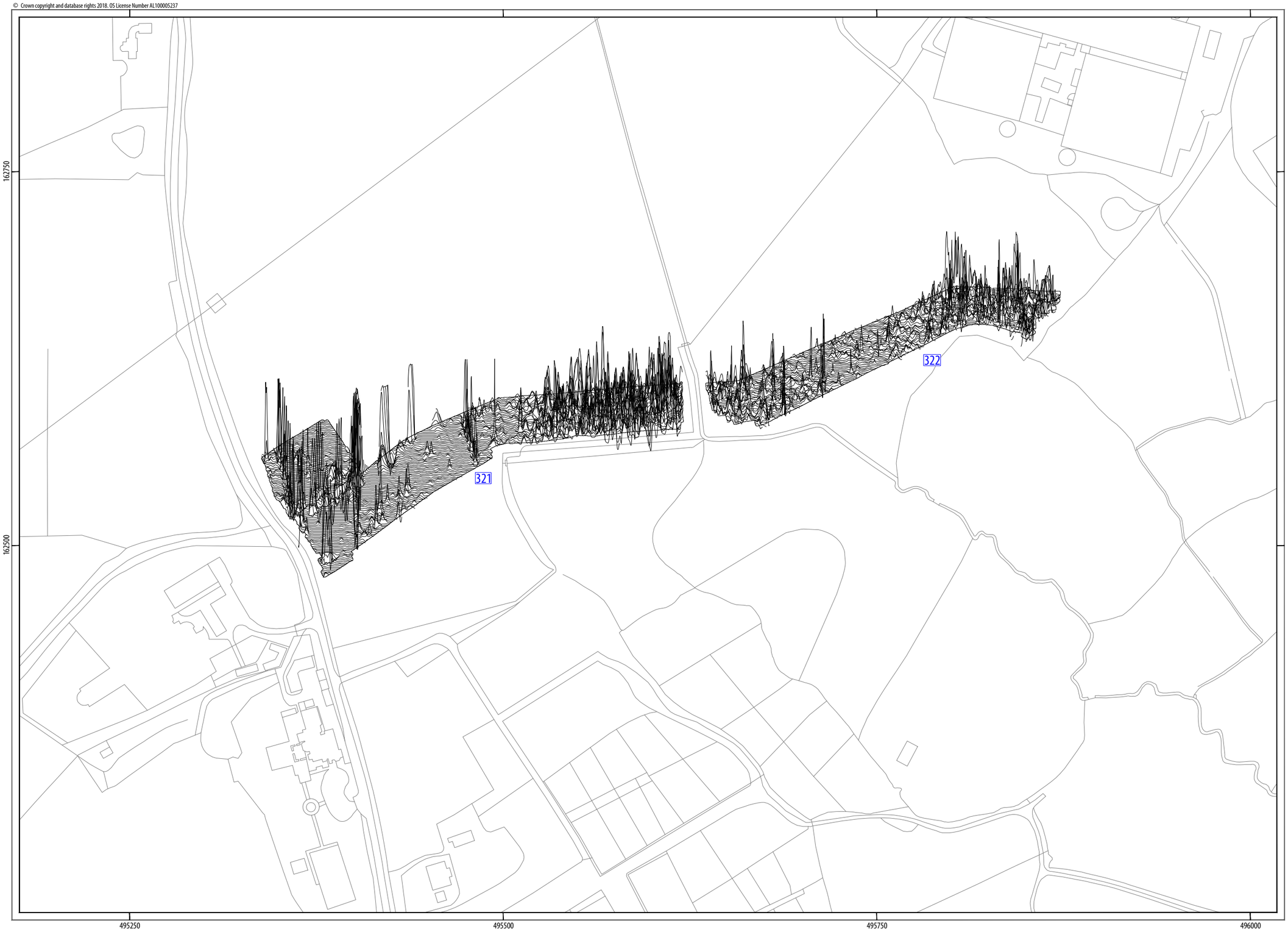
ILLUS 138 Processed greyscale magnetometer data; GSA321 & GSA322



15.0nT/cm

0 50m

1:2,500 @ A3

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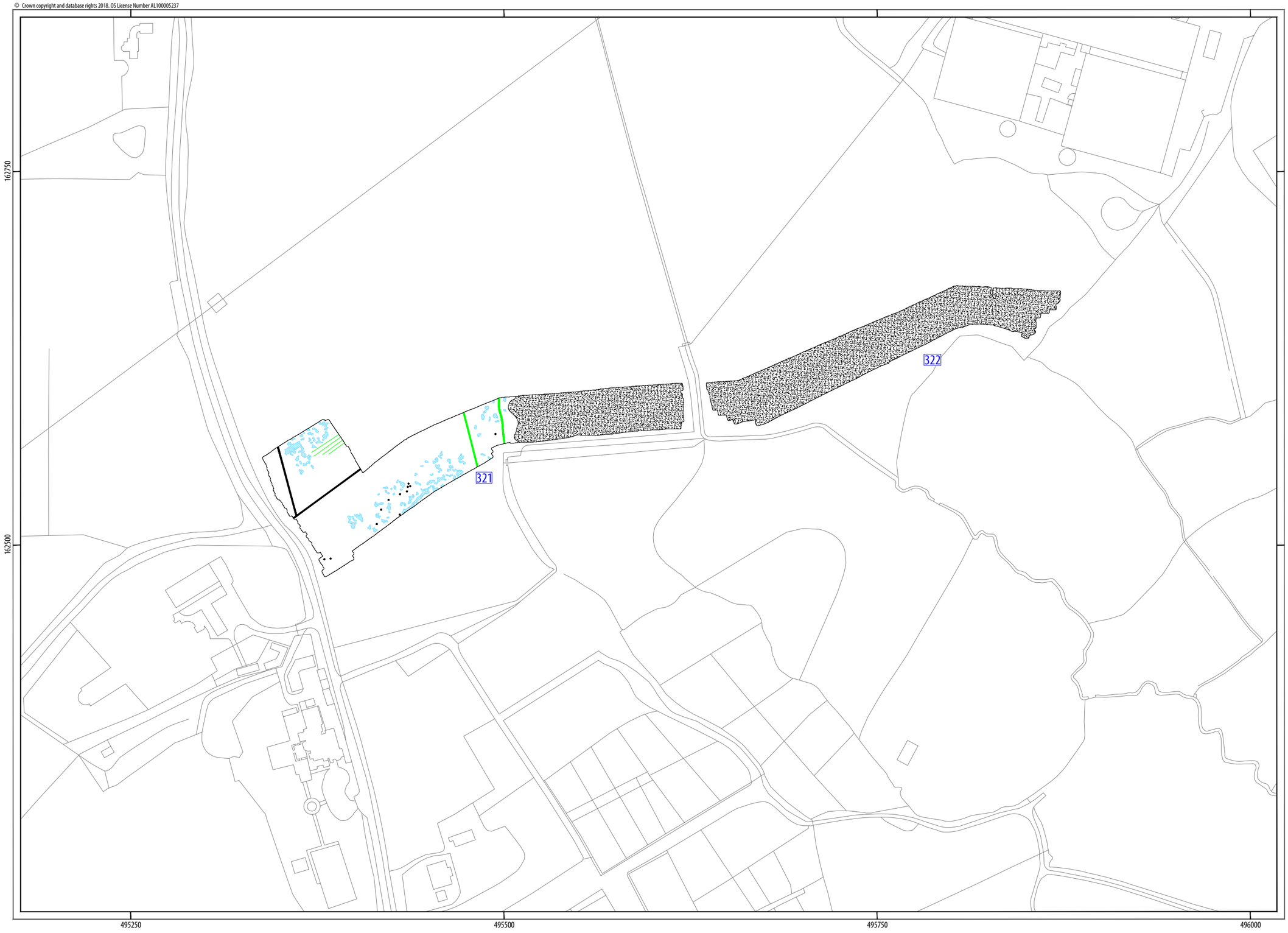
ILLUS 139 XY trace plot of minimally processed magnetometer data; GSA321 & GSA322



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- former field boundary
- geology

0 50m
1:2,500 @ A3

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ILLUS 140 Interpretation of magnetometer data; GSA321 & GSA322

geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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ILLUS 141 Processed greyscale magnetometer data; GSA386

386

165250
165000
164750
499250
499500
499750
500000

15.0nT/cm

0 50m
1:2,500 @ A3

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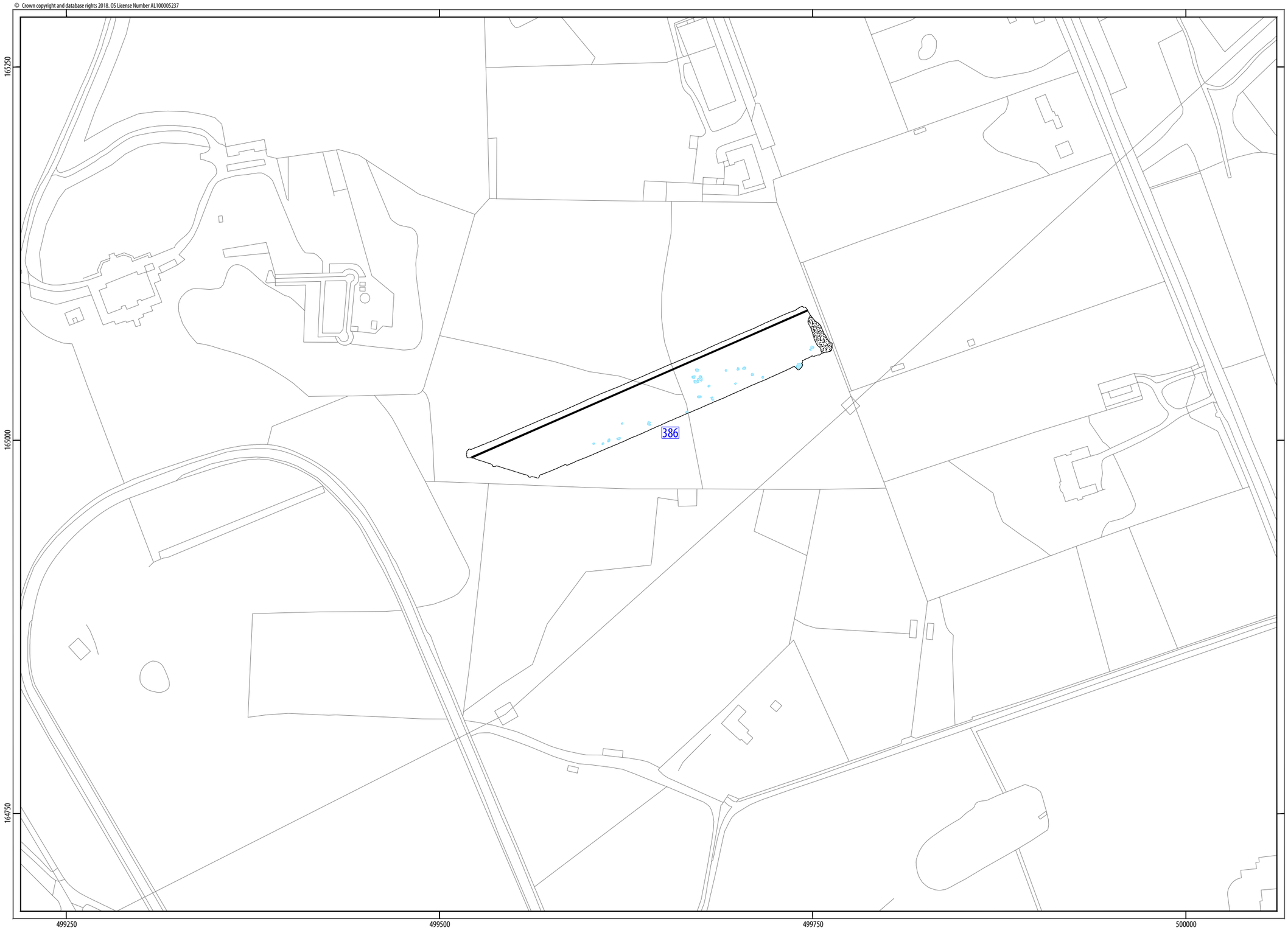
ILLUS 142 XY trace plot of minimally processed magnetometer data; GSA386



INTERPRETATION
- service pipe
- ferrous material
- geology

0 50m
1:2,500 @ A3

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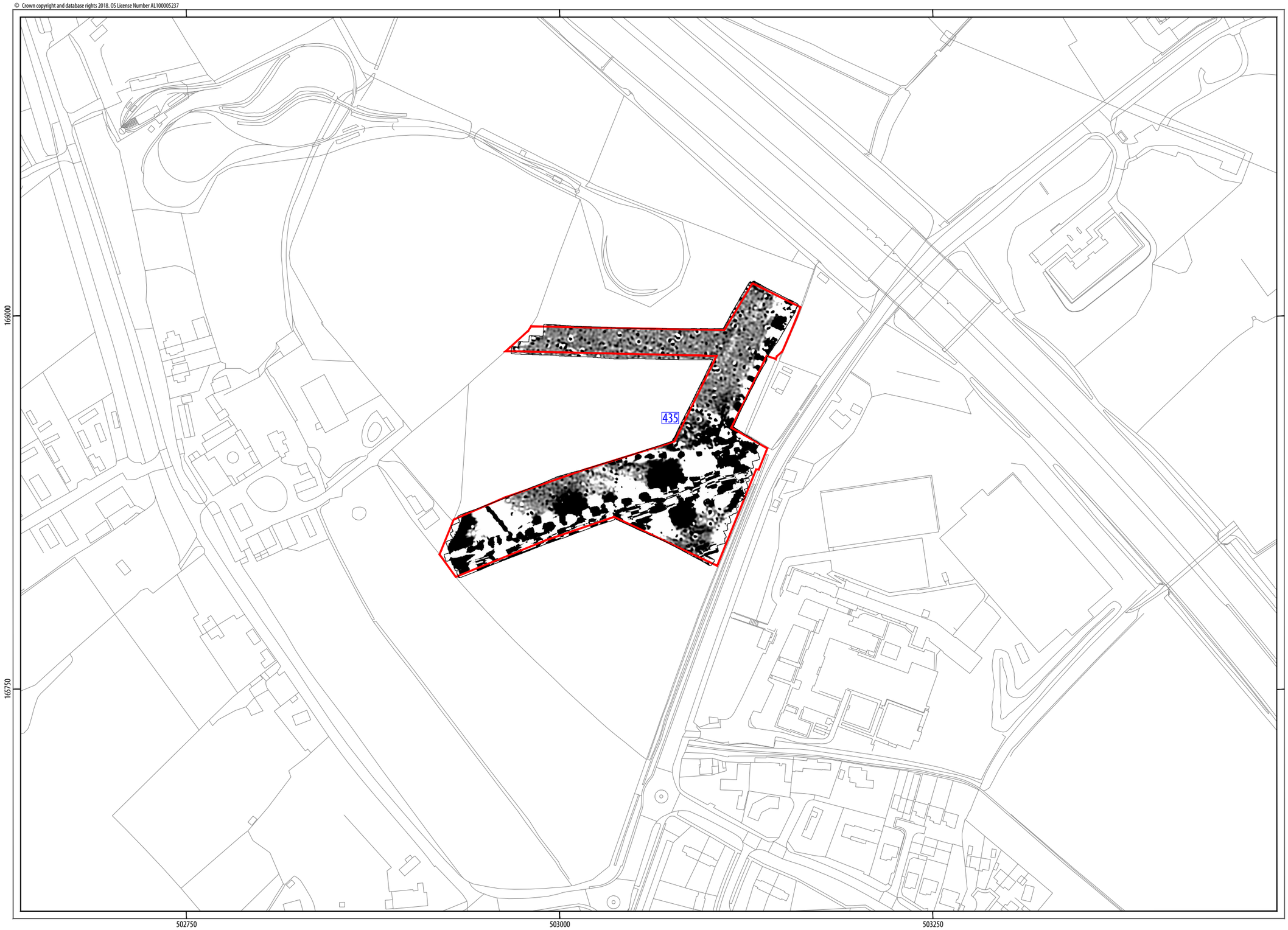
ILLUS 143 Interpretation of magnetometer data; GSA386



geophysical survey area

nT
-1.0
1.0

0
50m
1:2,500 @ A3

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ILLUS 144 Processed greyscale magnetometer data; GSA435

geophysical data area

15.0nT/cm

0 50m

1:2,500 @ A3

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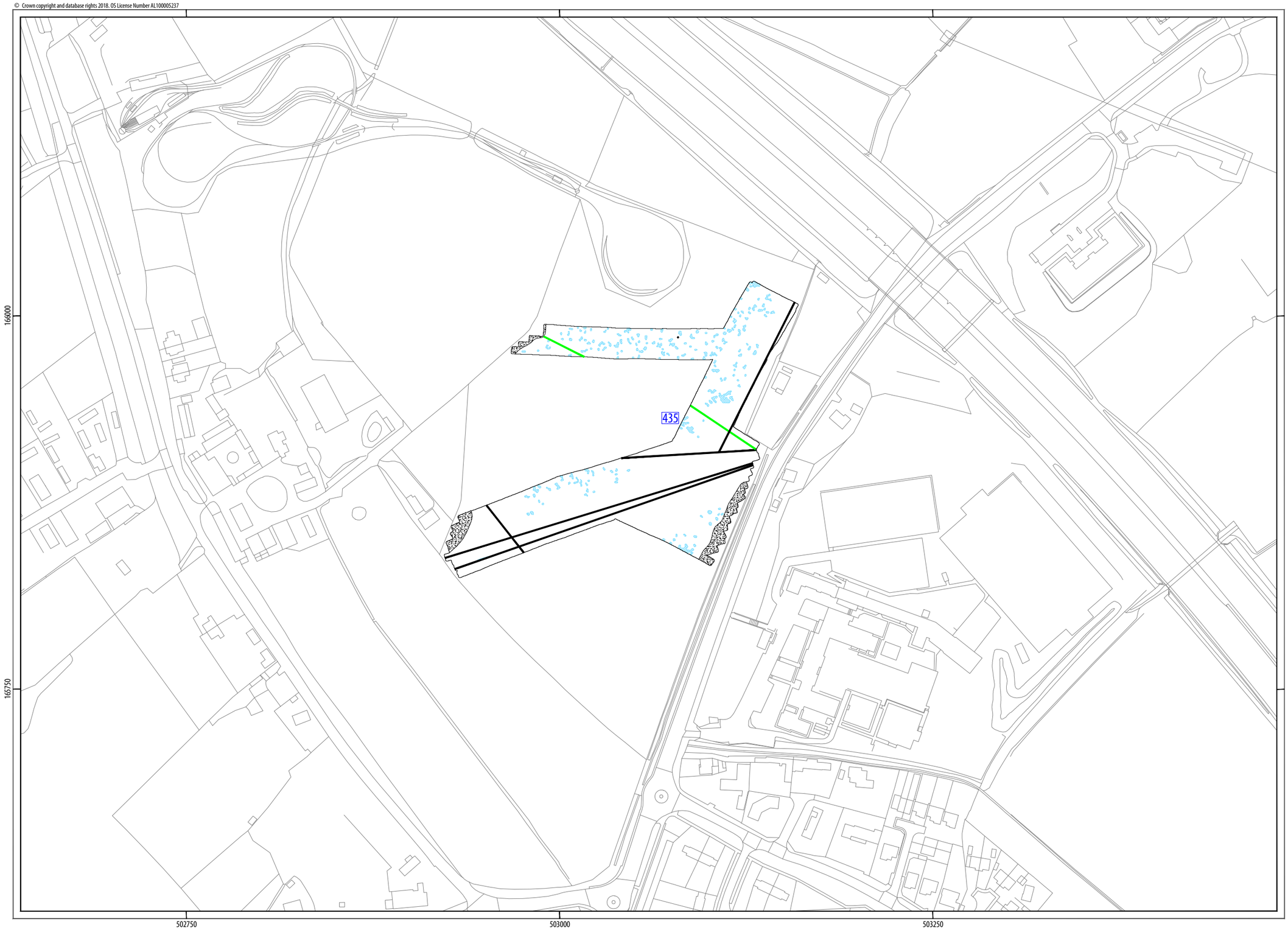
ILLUS 145 XY trace plot of minimally processed magnetometer data; GSA435



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- former field boundary
- geology

0 50m
1:2,500 @ A3

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ILLUS 146 Interpretation of magnetometer data; GSA435

geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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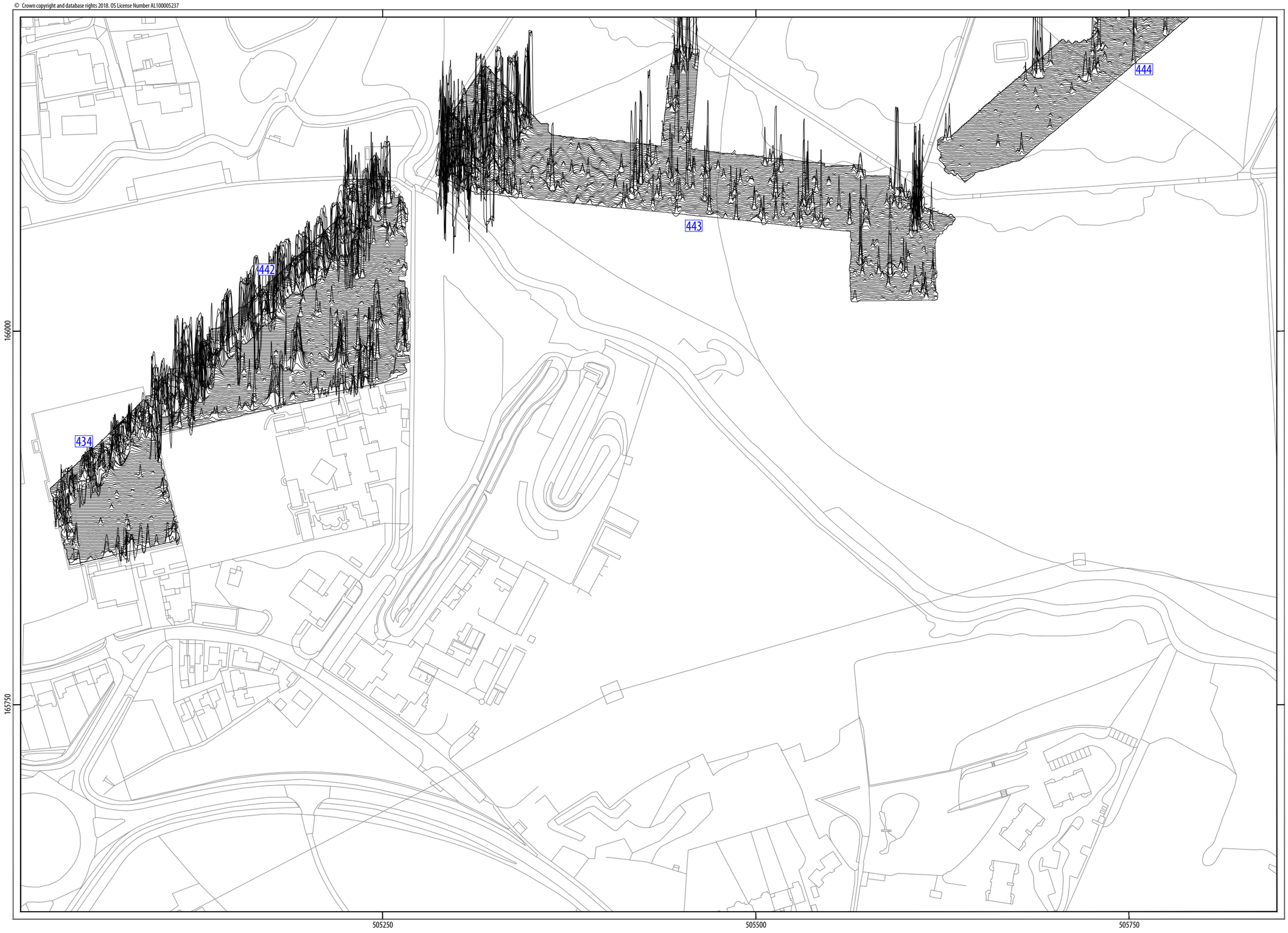
ILLUS 147 Processed greyscale magnetometer data; GSA434, GSA442, GSA443 & GSA444



15.0nT/cm

0 50m

1:2,500 @ A3

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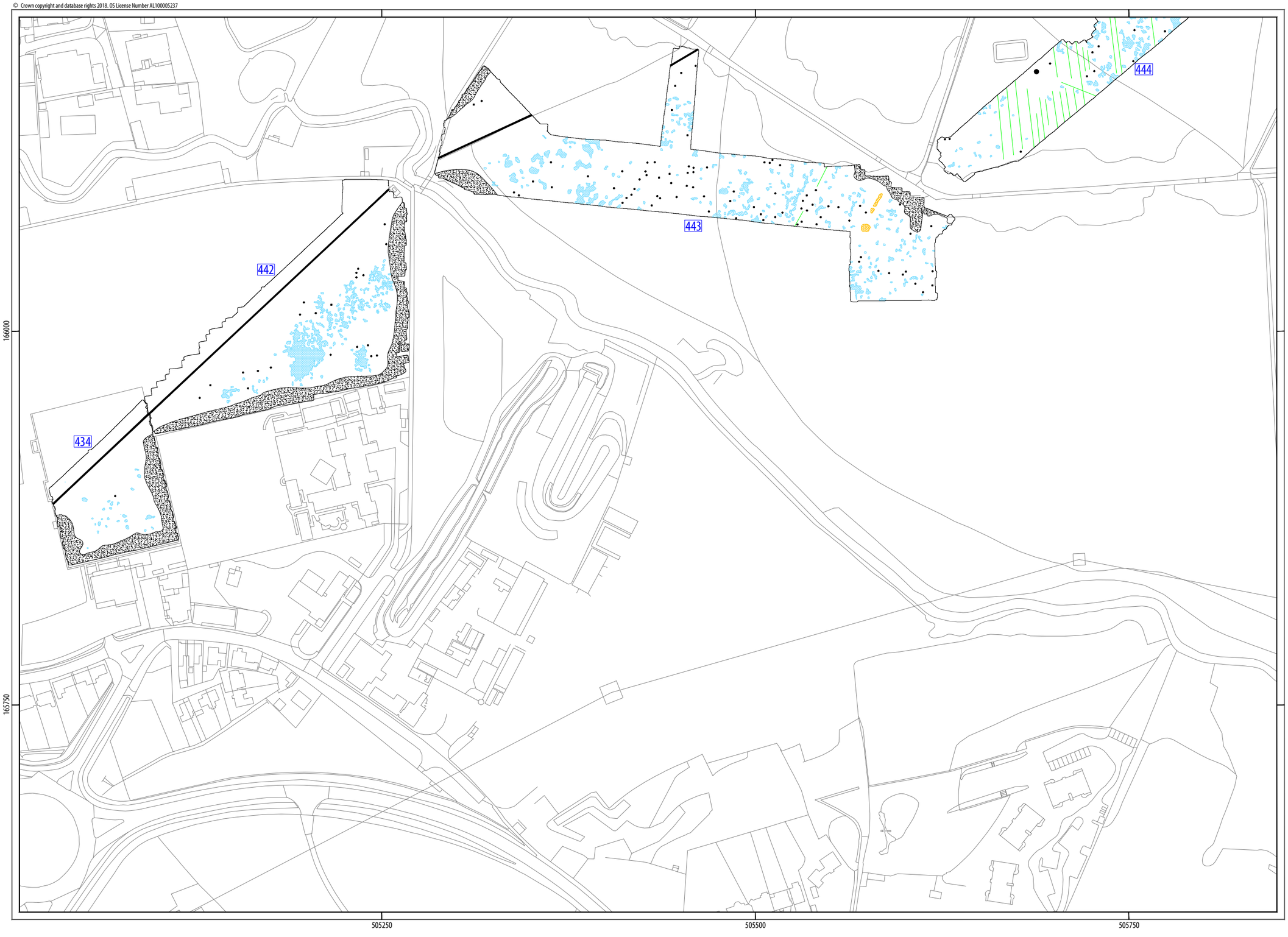
ILLUS 148 XY trace plot of minimally processed magnetometer data; GSA434, GSA442, GSA443 & GSA444



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- former field boundary
- geology
- archaeology?
- archaeology

0 50m
1:2,500 @ A3

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ILLUS 149 Interpretation of magnetometer data; GSA434, GSA442, GSA443 & GSA444

geophysical survey area

nT
-1.0 1.0

0 50m
1:2,500 @ A3

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ILLUS 150 Processed greyscale magnetometer data; GSA444 & GSA445

15.0nT/cm

0 50m

1:2,500 @ A3

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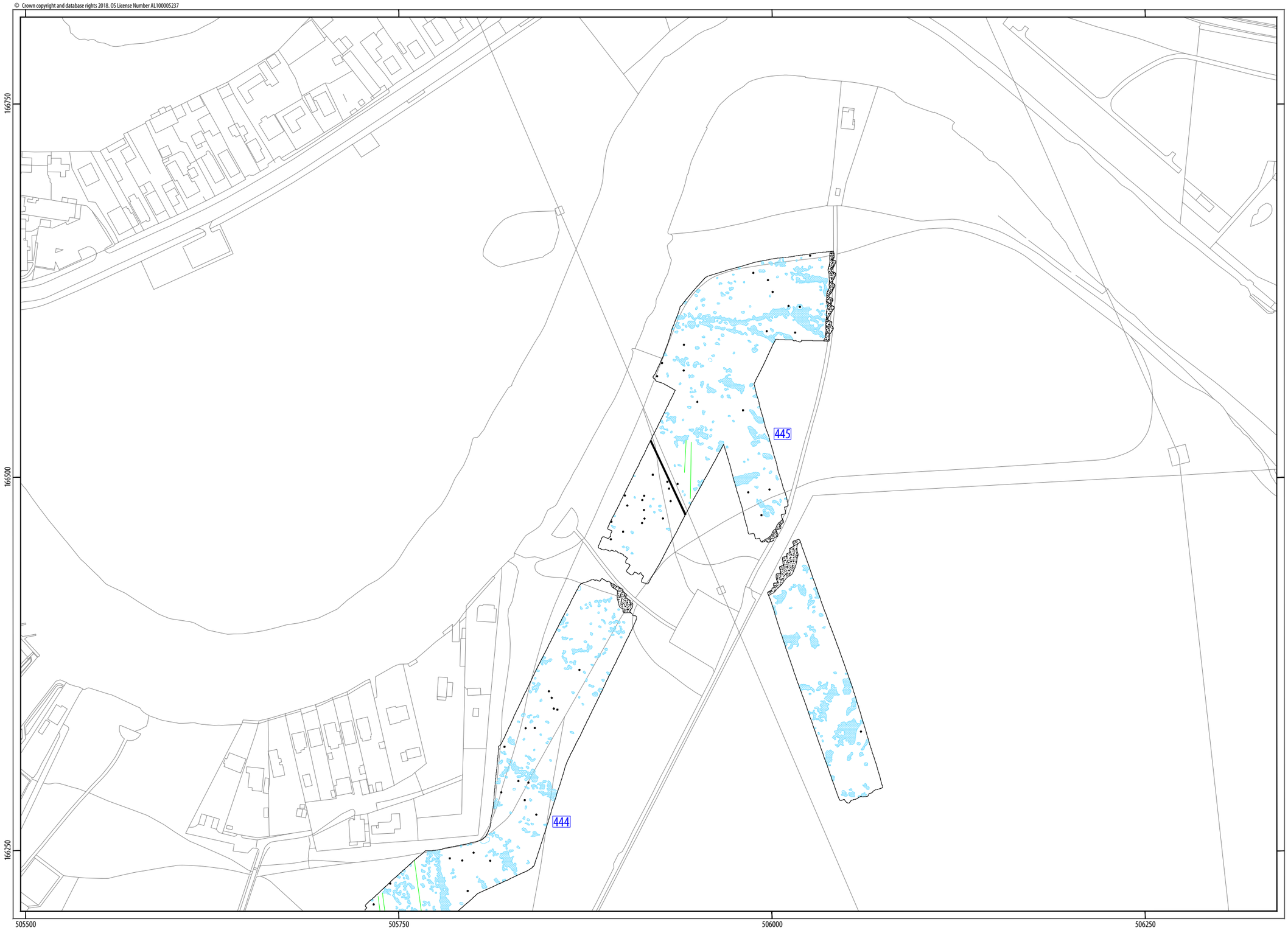
ILLUS 151 XY trace plot of minimally processed magnetometer data; GSA444 & GSA445



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- agricultural
- geology

0 50m
1:2,500 @ A3

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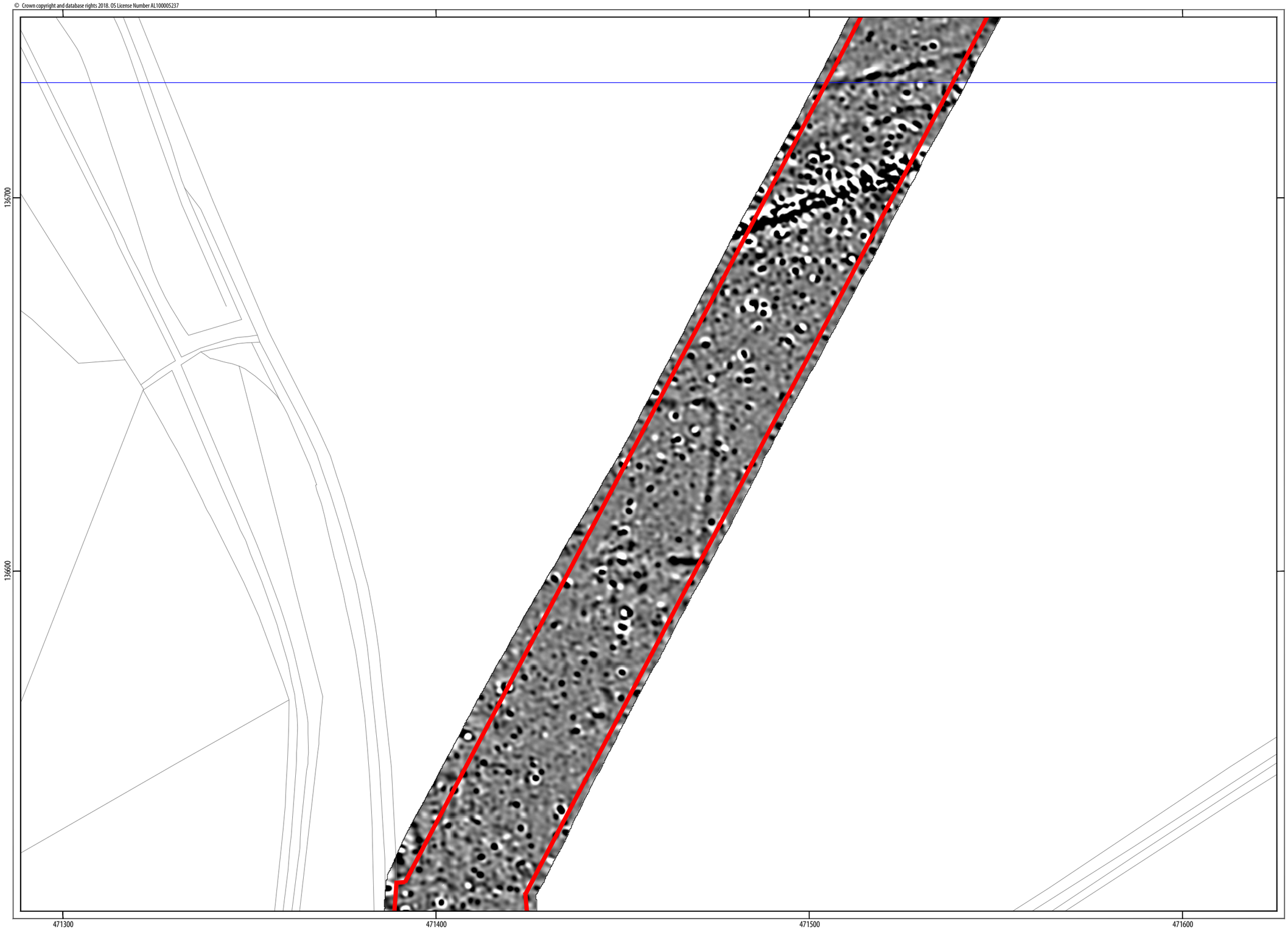
ILLUS 152 Interpretation of magnetometer data; GSA444 & GSA445



geophysical survey area

nT
-1.0
1.0

0
25m
1:1,000 @ A3

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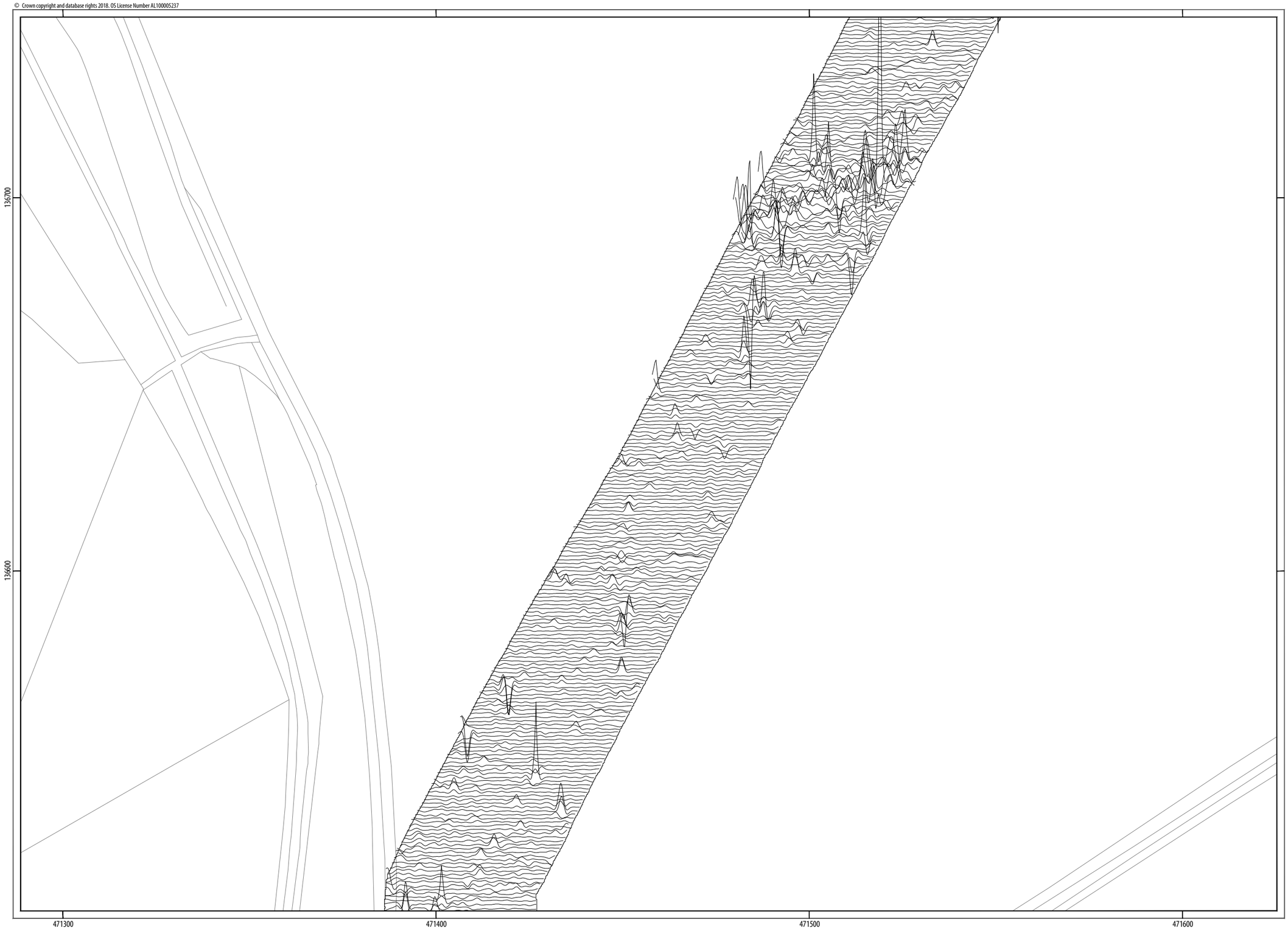
ILLUS 153 Processed greyscale magnetometer data; AAA1



15.0nT/cm

0 25m

1:1,000 @ A3

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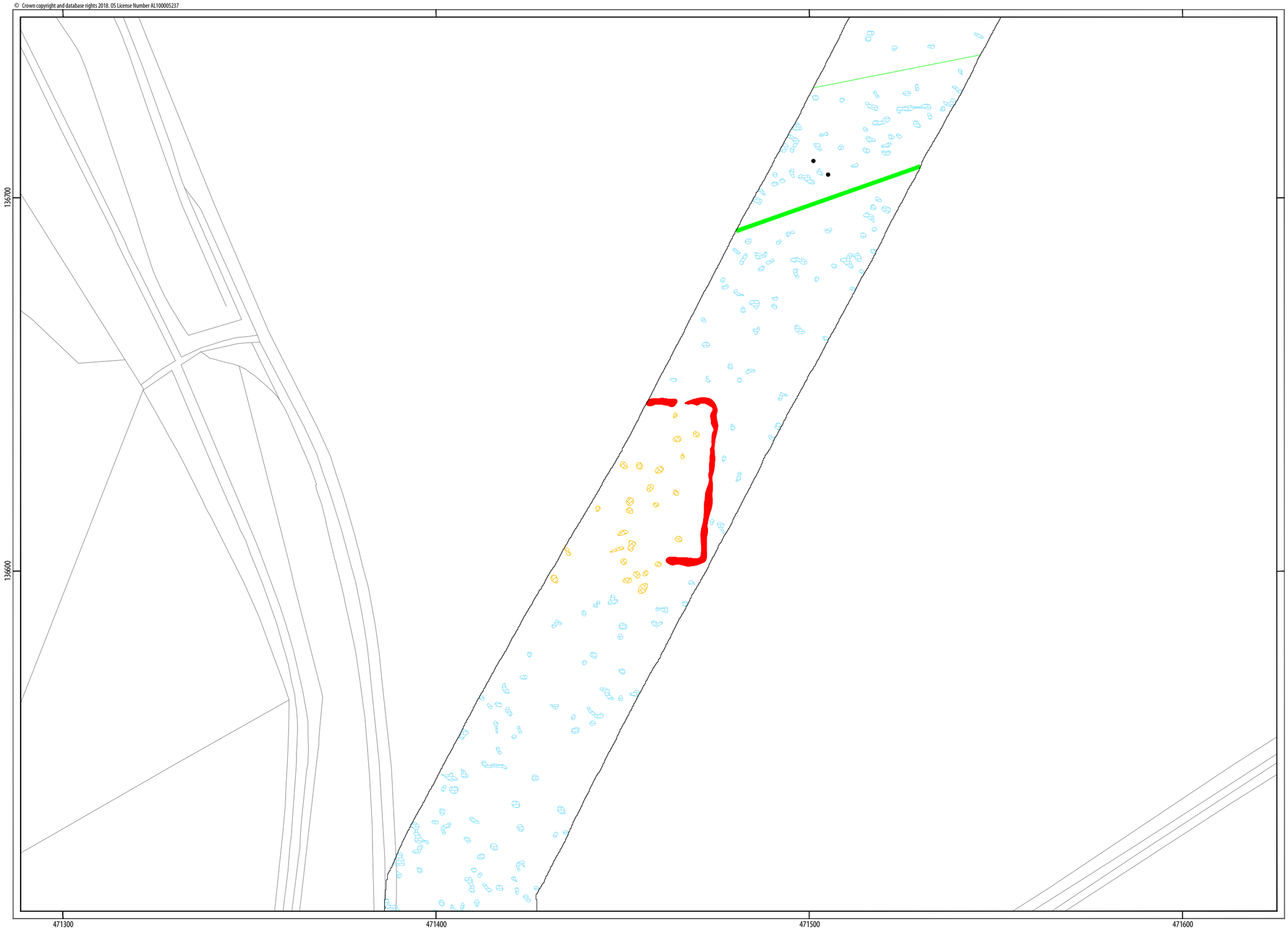
ILLUS 154 XY trace plot of minimally processed magnetometer data; AAA1



INTERPRETATION
- ferrous material
- agricultural
- agricultural
- geology
- archaeology?
- archaeology

0 25m
1:1,000 @ A3

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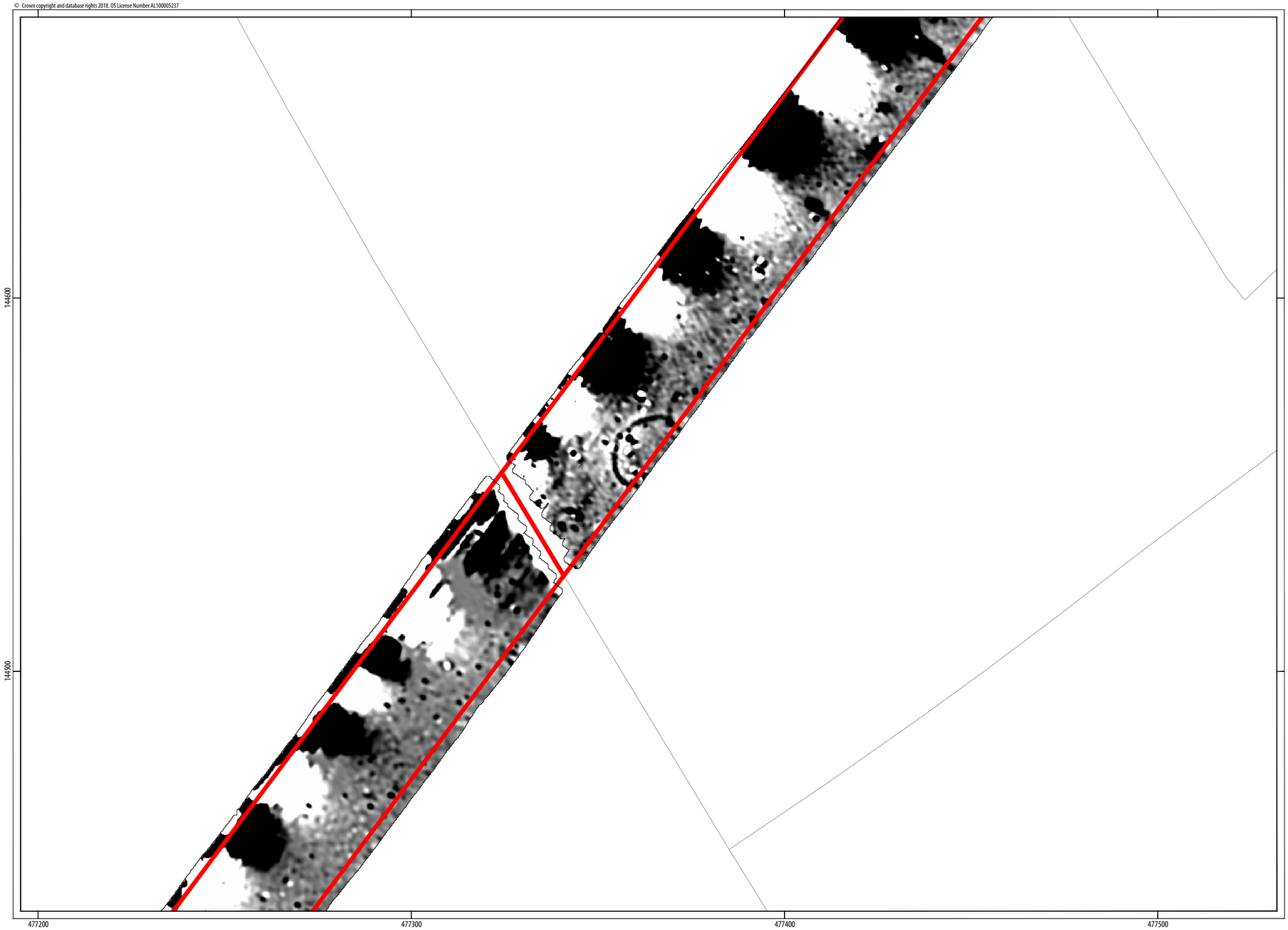
ILLUS 155 Interpretation of magnetometer data; AAA1



geophysical survey area

nT
-1.0
1.0

0
25m
1:1,000 @ A3

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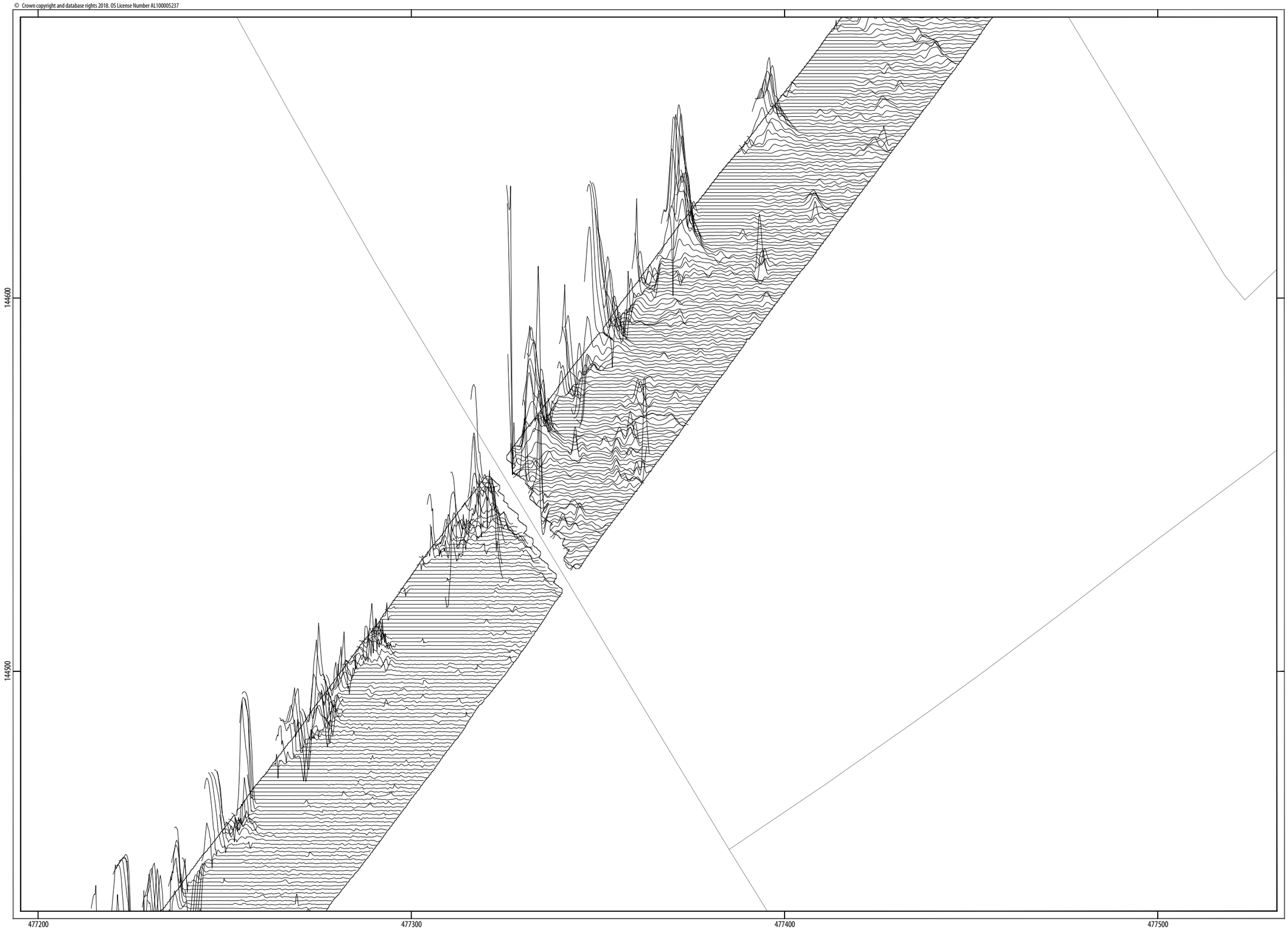
ILLUS 156 Processed greyscale magnetometer data; AAA2



15.0nT/cm

0 25m

1:1,000 @ A3

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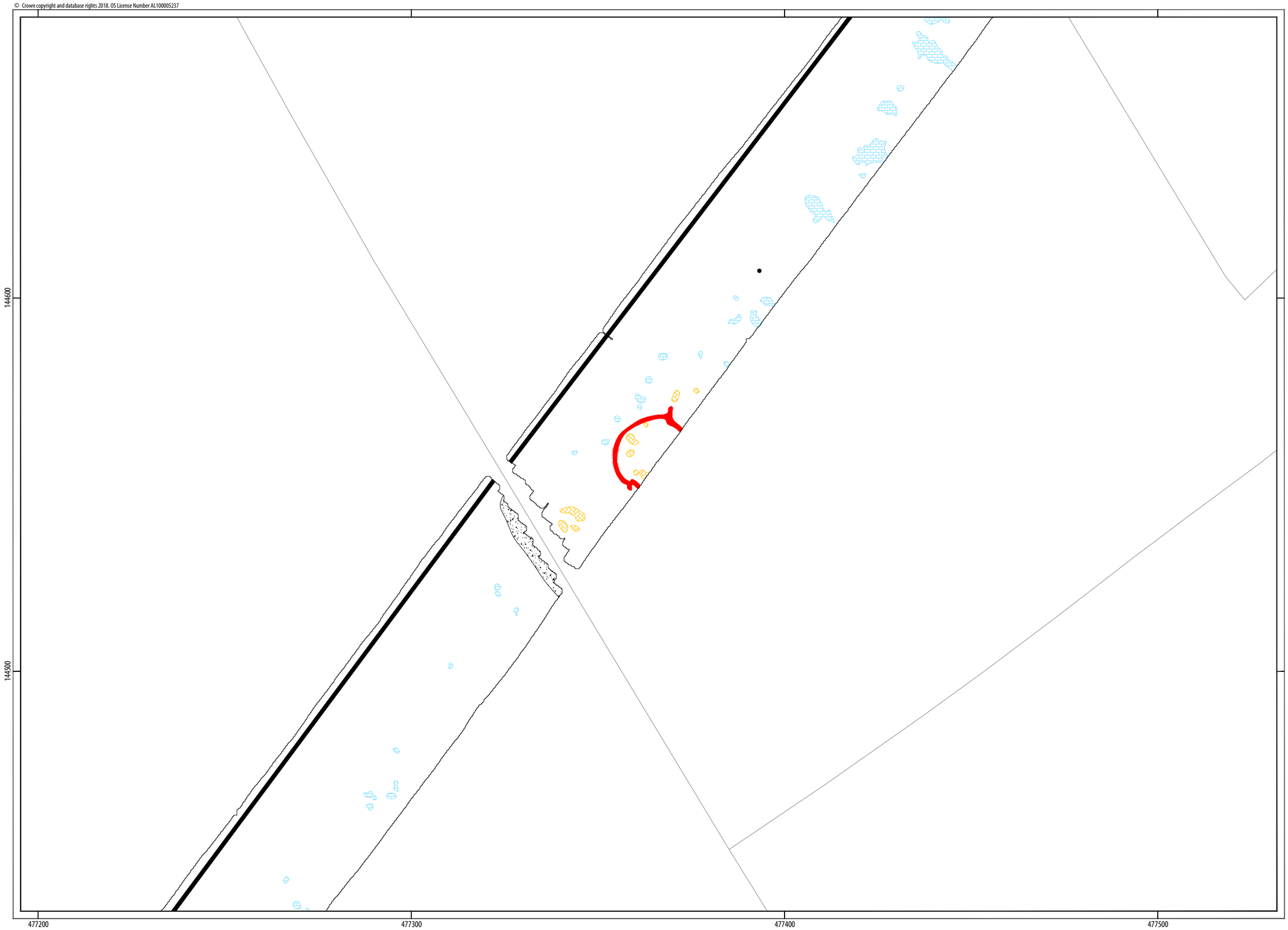
ILLUS 157 XY trace plot of minimally processed magnetometer data; AAA2



INTERPRETATION
- ferrous material
- service pipe
- ferrous material
- geology
- archaeology?
- archaeology

0 25m
1:1,000 @ A3

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ILLUS 158 Interpretation of magnetometer data; AAA2

7 APPENDICES

APPENDIX 1 PRIORITY GSAS AND SUMMARY INTERPRETATIONS

SURVEY AREA	M2	GEOLOGY	REASON FOR SURVEY	SUMMARY INTERPRETATION OF GEOPHYSICAL ANOMALIES
6	5022	Superficial: n/a Bedrock: Wittering Formation - Clay, Silt and Sand	Prehistoric flint tools and pot recovered during pipe line construction WB	No anomalies of definite archaeological potential. Broad anomaly interpreted as possibly archaeological in origin. North/south pipe in west of GSA. North/south ploughing trends.
7	698	Superficial: River Terrace Deposits, 3 - Sand and Gravel Bedrock: Wittering Formation - Clay, Silt and Sand	Med agricultural (farmstead, mill, barn) remains adjacent to proposed works	No anomalies of any archaeological potential. East/west pipe in south of GSA. Southwest corner dominated by modern magnetic disturbance.
8	11608	Superficial: River Terrace Deposits, 3 - Sand and Gravel Bedrock: Wittering Formation - Clay, Silt and Sand	Med agricultural (farmstead, mill, barn) remains adjacent to proposed works	No anomalies of any archaeological potential. Data dominated by magnetic disturbance from alluvial deposits. Ploughing trends in southwest
30	13722	Superficial: n/a Bedrock: London Clay Formation - clay, silt and sand	Med/post-med field systems recorded by NMP from aerials adjacent to red line of proposed works	No anomalies of any archaeological potential. Northwestern half of survey corridor dominated by magnetic interference from adjacent pipe.
31	5599	Superficial: n/a Bedrock: London Clay Formation - clay, silt and sand	Med/post-med field systems recorded by NMP from aerials adjacent to red line of proposed works	No anomalies of any archaeological potential. Northwestern half of survey corridor dominated by magnetic interference from adjacent pipe.
32	6017	Superficial: n/a Bedrock: London Clay Formation - clay, silt and sand	Med/post-med field systems recorded by NMP from aerials adjacent to red line of proposed works	No anomalies of any archaeological potential. Northwestern half of survey corridor dominated by magnetic interference from adjacent pipe.
45	6149	Superficial: n/a Bedrock: Tarrant Chalk Member - Chalk	Celtic field systems recorded by NMP from aerials adjacent to red line of proposed works	No anomalies of any archaeological potential. GSA dominated by magnetic interference from existing pipe and surrounding field boundaries.
46	3957	Superficial: n/a Bedrock: Tarrant Chalk Member - Chalk	Celtic field systems recorded by NMP from aerials adjacent to red line of proposed works	No anomalies of any archaeological potential. GSA dominated by magnetic interference from existing pipe and surrounding field boundaries.
55	8077	Superficial: n/a Bedrock: Newhaven Chalk Formation - Chalk	Celtic field systems recorded by NMP from aerials within red line of proposed works	No anomalies of any archaeological potential. Former field boundary and two buried pipes in south of GSA.
57	3394	Superficial: n/a Bedrock: Seaford Chalk Formation - Chalk	Celtic field systems recorded by NMP from aerials within red line of proposed works	No anomalies of any archaeological potential. Modern ploughing trends throughout.
58	12306	Superficial: n/a Bedrock: Seaford Chalk Formation - Chalk	Celtic field systems recorded by NMP from aerials within red line of proposed works	No anomalies of definite archaeological potential. Several linear and curvilinear anomalies identified as of possible archaeological potential. Modern ploughing trends throughout
61	7182	Superficial: n/a Bedrock: Seaford Chalk Formation - Chalk	Celtic field systems recorded by NMP from aerials within red line of proposed works	No anomalies of any archaeological potential. Modern ploughing trends throughout.
67	20168	Superficial: n/a Bedrock: Seaford Chalk Formation - Chalk	Celtic field systems recorded by NMP from aerials within red line of proposed works	No anomalies of any archaeological potential. Broad sinuous anomalies thought to be due to superficial deposits.
68	24548	Superficial: Head – Diamicton Bedrock: Lewes Nodular Chalk Formation - Chalk	Lynchets recorded by NMP from aerials are adjacent to proposed works	No anomalies of any archaeological potential. Data dominated by magnetic interference from existing pipe. Curvilinear anomaly northwest of pipe caused by extant field boundary.

SURVEY AREA	M2	GEOLOGY	REASON FOR SURVEY	SUMMARY INTERPRETATION OF GEOPHYSICAL ANOMALIES
69	15390	Superficial: Head – Diamicton Bedrock: Lewes Nodular Chalk Formation - Chalk	Med/post-med field boundaries recorded by NMP from aerials, and adjacent to scheduled monument: Lomer, deserted medieval settlement 1001797	No anomalies of any archaeological potential. Data dominated by magnetic interference from existing pipe.
70	7127	Superficial: Head – Diamicton Bedrock: Lewes Nodular Chalk Formation - Chalk	Not currently prioritised but located in an area of med/post-med field boundaries recorded by NMP from aerials, and adjacent to scheduled monument: Lomer, deserted medieval settlement 1001798	No anomalies of any archaeological potential. Data dominated by magnetic interference from existing pipe and extant field boundaries.
71	8653	Superficial: n/a Bedrock: Seaford Chalk Formation - Chalk	Not currently prioritised but located in an area of med/post-med field systems recorded by NMP from aerials, and adjacent to scheduled monument: Lomer, deserted medieval settlement 1001798	No anomalies of definite archaeological potential. Linear and rectilinear anomalies, oblique to extant and historical field boundaries, are identified as of possible archaeological potential, possibly being due to infilled ditches. Other anomalies include magnetic disturbance from the existing pipe and modern ploughing trends throughout.
72	7541	Superficial: n/a Bedrock: Seaford Chalk Formation - Chalk	Not currently prioritised but located in an area of med/post-med field systems recorded by NMP from aerials, and adjacent to scheduled monument: Lomer, deserted medieval settlement 1001799	No anomalies of definite archaeological potential. Curvilinear anomaly interpreted as of possible archaeological potential. Other anomalies include magnetic disturbance from the existing pipe and surrounding field boundaries.
73	25450	Superficial: n/a Bedrock: Seaford Chalk Formation - Chalk	Post-med field boundaries recorded by NMP from aerials within red line of proposed works	No anomalies of definite archaeological potential. Isolated discrete pit-type anomaly in southwest. Data dominated by magnetic interference from existing pipe. Modern ploughing trends throughout.
74	20844	Superficial: Head – Diamicton Bedrock: Seaford Chalk Formation - Chalk	Unknown age field boundaries recorded by NMP from aerials within red line of proposed works	No anomalies of definite archaeological potential. Isolated fragmented curvilinear trend interpreted as of possible archaeological potential. Data dominated by magnetic interference from existing pipe. Modern ploughing trends throughout.
75	8061	Superficial: Clay-With-Flints Formation – Diamicton Bedrock: Newhaven Chalk Formation - Chalk	Unknown age field boundaries recorded by NMP from aerials within red line of proposed works	No anomalies of any archaeological potential.
76	12384	Superficial: Clay-With-Flints Formation – Diamicton Bedrock: Newhaven Chalk Formation - Chalk	Unknown age field boundaries recorded by NMP from aerials within red line of proposed works	No anomalies of any archaeological potential.
78	12576	Superficial: Clay-With-Flints Formation – Diamicton Bedrock: Newhaven Chalk Formation - Chalk	Post-med circular pits recorded by NMP from aerials adjacent to red line of proposed works	No anomalies of definite archaeological potential. Three large circular pit-type anomalies identified as of possible archaeological potential. Modern ploughing trends throughout.
79	10141	Superficial: Clay-With-Flints Formation – Diamicton Bedrock: Newhaven Chalk Formation - Chalk	Post-med circular pits recorded by NMP from aerials adjacent to red line of proposed works	No anomalies of definite archaeological potential. Four large circular pit-type anomalies and a possible infilled ditch identified as of possible archaeological potential. Modern ploughing trends throughout.
80	13600	Superficial: Clay-With-Flints Formation – Diamicton Bedrock: Newhaven Chalk Formation - Chalk	Post-med circular pits recorded by NMP from aerials adjacent to red line of proposed works	No anomalies of definite archaeological potential. Three large circular pit-type anomalies identified as of possible archaeological potential. Modern ploughing trends throughout.
81	12134	Superficial: n/a Bedrock: Newhaven Chalk Formation - Chalk	Bronze age field system of Brockwood Park recorded by WCC	No anomalies of any archaeological potential against a variable magnetic background. Numerous anomalies thought to be geological in origin.

SURVEY AREA	M2	GEOLOGY	REASON FOR SURVEY	SUMMARY INTERPRETATION OF GEOPHYSICAL ANOMALIES
82	2097	Superficial: Head – Diamicton Bedrock: Newhaven Chalk Formation - Chalk	Bronze age field system of Brockwood Park recorded by WCC	No anomalies of any archaeological potential.
83	36662	Superficial: Head, 1 – Diamicton Bedrock: Newhaven Chalk Formation - Chalk	Med/post-med field systems recorded by NMP from aerials within redline of proposed works	No anomalies of definite archaeological potential. Two large circular pit-type anomalies in southwest identified as of possible archaeological potential. Other anomalies include geological striations and modern ploughing trends.
84	10178	Superficial: n/a Bedrock: Newhaven Chalk Formation - Chalk	Med/post-med field systems recorded by NMP from aerials within redline of proposed works	No anomalies of any archaeological potential. Linear anomalies caused by former field boundaries and ploughing trends.
87	23574	Superficial: Clay-With-Flints Formation – Diamicton Bedrock: Newhaven Chalk Formation - Chalk	Med/post-med field systems recorded by NMP from aerials within redline of proposed works	No anomalies of definite archaeological potential. Two parallel linear anomalies in south interpreted as of possible archaeological potential. Elevated magnetic background throughout, possibly as a result of modern manuring. East/west service pipe towards north.
88	8458	Superficial: n/a Bedrock: Newhaven Chalk Formation - Chalk	Med/post-med field systems recorded by NMP from aerials adjacent to redline of proposed works	No anomalies of any archaeological potential. Existing north/east/south/west pipe in north.
94	18868	Superficial: head – diamicton Bedrock: Seaford Chalk Formation - Chalk	Neolithic gravel pit, Bronze age barrows, post-med field systems, proximity to Bramdean Roman villa 1001880	No anomalies of any archaeological potential. Existing pipe in north.
95	20365	Superficial: n/a Bedrock: Seaford Chalk Formation - Chalk	Neolithic gravel pit, Bronze age barrows, post-med field systems, proximity to Bramdean Roman villa 1001881	No anomalies of any archaeological potential. Existing pipe in north.
96	2917	Superficial: head – diamicton Bedrock: Seaford Chalk Formation - Chalk	Med/post-med field systems recorded by NMP from aerials adjacent to redline of proposed works	No anomalies of any archaeological potential. Data dominated by magnetic disturbance from existing pipe and surrounding field boundaries.
97	6554	Superficial: head – diamicton Bedrock: Seaford Chalk Formation - Chalk	Med/post-med field systems recorded by NMP from aerials adjacent to redline of proposed works	No anomalies of any archaeological potential. Data dominated by magnetic disturbance from existing pipe.
98	19359	Superficial: head – diamicton Bedrock: Seaford Chalk Formation - Chalk	Unknown age field systems recorded by NMP from aerials within red line of proposed works	No anomalies of definite archaeological potential. North/south linear anomaly in southwest interpreted as of possible archaeological potential. Three service pipes within south-west.
99	1098	Superficial: head – diamicton Bedrock: Seaford Chalk Formation - Chalk	Unknown age field systems recorded by NMP from aerials within red line of proposed works	No anomalies of any archaeological potential.
100	13104	Superficial: head, 1 – diamicton Bedrock: Seaford Chalk Formation - Chalk	Unknown age field systems recorded by NMP from aerials within red line of proposed works	No anomalies of any archaeological potential. Four service pipes and geological variation throughout.
101	9539	Superficial: head – diamicton Bedrock: Seaford Chalk Formation - Chalk	Post-med circular pits recorded by NMP from aerials adjacent to red line of proposed works	No anomalies of any archaeological potential. Infilled pond in southwest. Curvilinear anomalies due to geological and topographical variation.
104	11828	Superficial: clay-with-flints Formation – diamicton Bedrock: Newhaven Chalk Formation - Chalk	Unknown age field systems recorded by HCC adjacent to redline of proposed works	No anomalies of any archaeological potential. Anomalies due to geological variation throughout.

SURVEY AREA	M2	GEOLOGY	REASON FOR SURVEY	SUMMARY INTERPRETATION OF GEOPHYSICAL ANOMALIES
105	25513	Superficial: clay-with-flints Formation – diamicton Bedrock: Newhaven Chalk Formation - Chalk	Unknown age field systems recorded by HCC adjacent to redline of proposed works	No anomalies of definite archaeological potential. Anomalies probably due to geological variation throughout.
106	8135	Superficial: clay-with-flints Formation – diamicton Bedrock: Newhaven Chalk Formation - Chalk	Med farm - Merryfield Farm recorded by HCC ID41437 adjacent to proposed redline works	No anomalies of definite archaeological potential. Anomalies due to geological variation throughout. North/south service in north.
107	7723	Superficial: clay-with-flints Formation – diamicton Bedrock: Newhaven Chalk Formation - Chalk	Med farm - Merryfield Farm recorded by HCC ID41437 adjacent to proposed redline works	No anomalies of archaeological potential. Anomalies probably due to geological variation throughout.
114	31331	Superficial: clay-with-flints Formation – diamicton Bedrock: Newhaven Chalk Formation - Chalk	Rectangular enclosure recorded by HCC adjacent to redline of proposed works	No anomalies of archaeological potential. Extremely variable magnetic background throughout. Existing pipe in north.
119	5940	Superficial: clay-with-flints Formation – diamicton Bedrock: Newhaven Chalk Formation - Chalk	Med farm - Kiteway Farm ID 39220 recorded by HCC adjacent to redline of proposed works	No anomalies of archaeological potential. Dataset dominated by magnetic disturbance from existing pipe.
151	12434	Superficial: clay-with-flints Formation – diamicton Bedrock: new pit Chalk Formation - Chalk	Worked and burnt flint findspot recovered as part of 1977 East Hampshire Survey recorded by HCC adjacent to redline of proposed works	No anomalies of archaeological potential. Dataset dominated by magnetic disturbance from existing pipe.
152	11518	Superficial: clay-with-flints Formation – diamicton Bedrock: new pit Chalk Formation - Chalk	Worked and burnt flint findspot recovered as part of 1977 East Hampshire Survey recorded by HCC adjacent to redline of proposed works	No anomalies of archaeological potential. Pipe in west and broad band of geological variation in the east.
153	17040	Superficial: n/a Bedrock: Holywell Nodular Chalk Formation - Chalk	Worked and burnt flint findspot recovered as part of 1977 East Hampshire Survey recorded by HCC adjacent to redline of proposed works	No anomalies of archaeological potential. Identified anomalies due to geological variation and ferrous contamination of the upper soil horizons.
154	9948	Superficial: Head, 1 - Clay, Silt, Sand and Gravel Bedrock: Zig Zag Chalk Formation - Chalk	Worked and burnt flint findspot recovered as part of 1977 East Hampshire Survey recorded by HCC adjacent to redline of proposed works. Prehistoric, Roman, med and post-med pot also recovered	No anomalies of archaeological potential. Identified anomalies due to geological variation and ferrous contamination of the upper soil horizons.
155	14754	Superficial: Head, 1 - Clay, Silt, Sand and Gravel Bedrock: Zig Zag Chalk Formation - Chalk	Bronze age pot and pit ID 39076 recorded by HCC adjacent to redline of proposed works	No anomalies of archaeological potential. Broad area magnetic disturbance in the northeast caused by infilled quarry. Other anomalies due to geological variation and ferrous contamination of the upper soil horizons.
156	13560	Superficial: Clay-with-flints Formation - Clay, Silt, Sand and Gravel Bedrock: Zig Zag Chalk Formation - Chalk	Trackway ID 62912 recorded by HCC from aerial photographs adjacent to redline of proposed works	No anomalies of definite archaeological potential. Isolated curvilinear anomaly identified as of possible archaeological potential but a geological origin equally plausible. Anomalies due to localised geological variation elsewhere.
157	20141	Superficial: n/a Bedrock: West Melbury Marly Chalk Formation - Chalk	Unknown age cropmarks recorded by HCC adjacent to redline of proposed works	No anomalies of any archaeological potential. Sinuous anomalies in the west due to superficial deposits.

SURVEY AREA	M2	GEOLOGY	REASON FOR SURVEY	SUMMARY INTERPRETATION OF GEOPHYSICAL ANOMALIES
159	23383	Superficial: n/a Bedrock: West Melbury Marly Chalk Formation - Chalk	Unknown age cropmarks recorded by HCC within redline of proposed works	AAA1 within south comprising the eastern extent of a sub-rectangular enclosure.
160	5894	Superficial: n/a Bedrock: West Melbury Marly Chalk Formation - Chalk	Not currently prioritised but unknown age cropmarks recorded by HCC adjacent to redline of proposed works	No anomalies of any archaeological potential. North of dataset dominated by magnetic interference from existing pipe.
163	11062	Superficial: n/a Bedrock: West Melbury Marly Chalk Formation - Chalk	Roman pot and rubbish pits discovered during pipe construction and as part of the East Hampshire Survey recorded by HCC adjacent and within the redline of proposed works	No anomalies of any archaeological potential. North of dataset dominated by magnetic interference from existing pipe.
165	5161	Superficial: n/a Bedrock: West Melbury Marly Chalk Formation - Chalk	Roman pot and rubbish pits discovered during pipe construction and as part of the East Hampshire Survey recorded by HCC adjacent and within the redline of proposed works	No anomalies of any archaeological potential.
166	12074	Superficial: n/a Bedrock: West Melbury Marly Chalk Formation - Chalk	Roman pot and rubbish pits discovered during pipe construction and as part of the East Hampshire Survey recorded by HCC adjacent and within the redline of proposed works	No anomalies of any archaeological potential.
173	20830	Superficial: n/a Bedrock: Upper Greensand Formation - Calcareous Sandstone and Siltstone	Unknown age cropmarks recorded by HCC within redline of proposed works	No anomalies of any archaeological potential. Dipolar linear anomalies locating buried service pipes.
174	17541	Superficial: n/a Bedrock: West Melbury Marly Chalk Formation - Chalk	Unknown age cropmarks recorded by HCC within redline of proposed works	No anomalies of definite archaeological potential. Parallel linear anomalies in north-east may locate a trackway. Former field boundary identified in the south.
176	13445	Superficial: n/a Bedrock: Zig Zag Chalk Formation - Chalk	Med Monk Wood manorial complex ID 17108 recorded by HCC adjacent to redline of proposed works. Worked and burnt flint also found in the vicinity	No anomalies of any archaeological potential. Southeast of dataset dominated by magnetic interference from existing pipe.
177	8783	Superficial: n/a Bedrock: Zig Zag Chalk Formation - Chalk	Med Monk Wood manorial complex ID 17108 recorded by HCC adjacent to redline of proposed works. Worked and burnt flint also found in the vicinity	No anomalies of any archaeological potential. Southeast of dataset dominated by magnetic interference from existing pipe.
178	1851	Superficial: n/a Bedrock: Zig Zag Chalk Formation - Chalk	Med Monk Wood manorial complex ID 17108 recorded by HCC adjacent to redline of proposed works. Worked and burnt flint also found in the vicinity	No anomalies of any archaeological potential. Southeast of dataset dominated by magnetic interference from existing pipe.
179	8621	Superficial: n/a Bedrock: Zig Zag Chalk Formation - Chalk	Scheduled monument Cuckoo's Corner Roman settlement 1001787 lies to the north of this area	No anomalies of definite archaeological potential. Northwest/ southeast linear anomaly may be archaeological origin. Southeast of dataset dominated by magnetic interference from existing pipe.
180	21295	Superficial: n/a Bedrock: West Melbury Marly Chalk Formation - Chalk	Roman road Silchester to Chichester recorded by HCC runs through redline of proposed works. Scheduled monument Cuckoo's Corner Roman settlement 1001787 lies to the north of this area	No anomalies of any archaeological potential. Southeast of dataset dominated by magnetic interference from existing pipe.

SURVEY AREA	M2	GEOLOGY	REASON FOR SURVEY	SUMMARY INTERPRETATION OF GEOPHYSICAL ANOMALIES
181	5109	Superficial: n/a Bedrock: West Melbury Marly Chalk Formation - Chalk	Scheduled monument Cuckoo's Corner Roman settlement 1001787 lies to the north of this area	No anomalies of any archaeological potential. Southeast of dataset dominated by magnetic interference from existing pipe.
188	7334	Superficial: river terrace deposits, 2 - sand and gravel Bedrock: west Melbury Marly Chalk Formation - Chalk	Roman pot recovered during construction of the pipeline recorded by HCC adjacent within the redline of proposed works. Unknown age crop marks also within this area	No anomalies of any archaeological potential. Existing pipe within south of dataset.
189	6241	Superficial: n/a Bedrock: Upper Greensand Formation - Calcareous Sandstone and Siltstone	Roman pot recovered during construction of the pipeline recorded by HCC adjacent within the redline of proposed works. Unknown age crop marks also within this area	No anomalies of any archaeological potential.
190	778	Superficial: n/a Bedrock: Upper Greensand Formation - Calcareous Sandstone and Siltstone	Scheduled monument Cuckoo's Corner Roman settlement 1001787 lies to the west of this area	No anomalies of any archaeological potential.
193	16684	Superficial: River Terrace Deposits, 2 - Sand and Gravel Bedrock: West Melbury Marly Chalk Formation - Chalk	Scheduled monument Cuckoo's Corner Roman settlement 1001787 lies to the west of this area	No anomalies of any archaeological potential.
194	7682	Superficial: River Terrace Deposits, 2 - Sand and Gravel Bedrock: West Melbury Marly Chalk Formation - Chalk	Scheduled monument Cuckoo's Corner Roman settlement 1001787 lies to the west of this area	No anomalies of any archaeological potential. North of dataset dominated by magnetic interference from existing pipe.
195	7020	Superficial: n/a Bedrock: West Melbury Marly Chalk Formation - Chalk	Scheduled monument Cuckoo's Corner Roman settlement 1001787 lies to the west of this area	No anomalies of any archaeological potential. North of dataset dominated by magnetic interference from existing pipe.
196	5168	Superficial: n/a Bedrock: West Melbury Marly Chalk Formation - Chalk	Scheduled monument Cuckoo's Corner Roman settlement 1001787 lies to the west of this area	No anomalies of any archaeological potential. Magnetic disturbance throughout.
197	5572	Superficial: n/a Bedrock: West Melbury Marly Chalk Formation - Chalk	Unknown age cropmarks recorded by HCC within redline of proposed works	No anomalies of any archaeological potential. Series of ploughing trends. North of dataset dominated by magnetic interference from existing pipe.
198	37522	Superficial: n/a Bedrock: Upper Greensand Formation - Calcareous Sandstone and Siltstone	Unknown age cropmarks recorded by HCC within redline of proposed works. Adjacent to Froyle (Upper) HCC conservation area - possible Roman archaeology discovered during evaluation	No anomalies of any archaeological potential. Dataset dominated by magnetic interference from existing pipe.
201	14915	Superficial: n/a Bedrock: Upper Greensand Formation - Calcareous Sandstone and Siltstone	Unknown age cropmarks recorded by HCC within redline of proposed works	No anomalies of any archaeological potential. North of dataset dominated by magnetic interference from existing pipe.
203	7163	Superficial: n/a Bedrock: Upper Greensand Formation - Calcareous Sandstone and Siltstone	Roman cremation urns 17022 and site of Roman villa 17044 recorded adjacent to redline of proposed works	No anomalies of any archaeological potential. Dataset dominated by magnetic interference from existing pipe.
204	8862	Superficial: n/a Bedrock: West Melbury Marly Chalk Formation and Zig Zag Chalk Formation (undifferentiated) - Chalk	Roman cremation urns 17022 and site of Roman villa 17044 recorded adjacent to redline of proposed works	No anomalies of any archaeological potential. Dataset dominated by magnetic interference from existing pipe. Former field boundary in north.

SURVEY AREA	M2	GEOLOGY	REASON FOR SURVEY	SUMMARY INTERPRETATION OF GEOPHYSICAL ANOMALIES
205	7747	Superficial: n/a Bedrock: West Melbury Marly Chalk Formation and Zig Zag Chalk Formation (undifferentiated) - Chalk	Roman cremation urns 17022 and site of Roman villa 17044 recorded adjacent to redline of proposed works	No anomalies of any archaeological potential. Dataset dominated by magnetic interference from existing pipe.
206	6238	Superficial: n/a Bedrock: West Melbury Marly Chalk Formation and Zig Zag Chalk Formation (undifferentiated) - Chalk	Roman cremation urns 17022 and site of Roman villa 17044 recorded adjacent to redline of proposed works	AAA2 within south comprising the northwestern extent of a ring-ditch. Northwest of dataset dominated by magnetic interference from existing pipe.
207	10525	Superficial: n/a Bedrock: West Melbury Marly Chalk Formation and Zig Zag Chalk Formation (undifferentiated) - Chalk	Roman cremation urns 17022 and site of Roman villa 17044 recorded adjacent to redline of proposed works	No anomalies of definite archaeological potential. Isolated high magnitude pit-type anomaly of possible archaeological potential. Northwest of dataset dominated by magnetic interference from existing pipe.
208	8558	Superficial: n/a Bedrock: Upper Greensand Formation - Calcareous Sandstone and Siltstone	Roman cremation urns 17022 and site of Roman villa 17044 recorded adjacent to redline of proposed works	No anomalies of any archaeological potential. Dataset dominated by magnetic interference from existing pipe.
209	800	Superficial: n/a Bedrock: Upper Greensand Formation - Calcareous Sandstone and Siltstone	Scheduled monument Earthwork at Penley 1001922, Roman villa 17507 and Roman cremation burial 39996 recorded by HCC adjacent to redline of proposed works	No anomalies of any archaeological potential.
210	10209	Superficial: n/a Bedrock: Upper Greensand Formation - Calcareous Sandstone and Siltstone	Scheduled monument Earthwork at Penley 1001922, Roman villa 17507 and Roman cremation burial 39996 recorded by HCC adjacent to redline of proposed works	No anomalies of any archaeological potential. Northwest of dataset dominated by magnetic interference from existing pipe. East/west service pipe within centre of dataset.
211	8938	Superficial: n/a Bedrock: Upper Greensand Formation - Calcareous Sandstone and Siltstone	Unknown age cropmarks recorded by HCC adjacent to redline of proposed works	No anomalies of any archaeological potential. Northwest of dataset dominated by magnetic interference from existing pipe.
217	10827	Superficial: n/a Bedrock: Seaford Chalk Formation - Chalk	Scheduled monument Barley Pound earthworks 1001919, Roman villa discovered in 1817 and crop marks recorded by HCC adjacent to redline of proposed works.	No anomalies of any archaeological potential. West of dataset dominated by magnetic interference from existing pipe. Geological variation across centre of dataset.
218	5224	Superficial: n/a Bedrock: Upper Greensand Formation - Calcareous Sandstone and Siltstone	Scheduled monument Barley Pound earthworks 1001919, Roman villa discovered in 1817 and crop marks recorded by HCC adjacent to redline of proposed works.	No anomalies of any archaeological potential. West of dataset dominated by magnetic interference from existing pipe.
245	3651	Superficial: n/a Bedrock: London Clay Formation - Clay, Silt and Sand	WWII installations recorded by HCC adjacent to redline of proposed works	No anomalies of any archaeological potential. Data dominated by modern ferrous disturbance throughout.
246	1002	Superficial: n/a Bedrock: London Clay Formation - Clay, Silt and Sand	WWII installations recorded by HCC adjacent to redline of proposed works	No anomalies of any archaeological potential. Data dominated by modern ferrous disturbance throughout.
247	9538	Superficial: n/a Bedrock: London Clay Formation - Clay, Silt and Sand	WWII installations recorded by HCC adjacent to redline of proposed works	No anomalies of any archaeological potential.
248	3266	Superficial: n/a Bedrock: London Clay Formation - Clay, Silt and Sand	WWII installations recorded by HCC adjacent to redline of proposed works	No anomalies of any archaeological potential.

SURVEY AREA	M2	GEOLOGY	REASON FOR SURVEY	SUMMARY INTERPRETATION OF GEOPHYSICAL ANOMALIES
250	5032	Superficial: n/a Bedrock: London Clay Formation - Clay, Silt and Sand	WWII installations recorded by HCC adjacent to redline of proposed works	No anomalies of any archaeological potential.
251	470	Superficial: n/a Bedrock: London Clay Formation - Clay, Silt and Sand	WWII installations recorded by HCC adjacent to redline of proposed works	No anomalies of any archaeological potential. Data dominated by modern ferrous disturbance throughout.
253	2792	Superficial: n/a Bedrock: London Clay Formation - Clay, Silt and Sand	WWII installations recorded by HCC adjacent to redline of proposed works	No anomalies of any archaeological potential. Data dominated by modern ferrous disturbance throughout.
321	11732	Superficial: Alluvium - Sand, Silt and Clay Bedrock: Bagshot Formation - Sand	Offline proposed works in an area of apparently unmodified ground with low vegetation	No anomalies of any archaeological potential. Data in the west dominated by magnetic interference from existing pipe and in the east by magnetic disturbance from alluvial and river terrace deposits. Two north/south former field boundaries in the centre of the dataset.
322	7577	Superficial: Alluvium - Sand, Silt and Clay Bedrock: Bagshot Formation - Sand	Offline proposed works in an area of apparently unmodified ground with low vegetation	No anomalies of any archaeological potential. Data dominated by magnetic disturbance from alluvial and river terrace deposits.
386	8036	Superficial: n/a Bedrock: Windlesham Formation - Sand	Scheduled monuments Bowl barrow 1008887 and Bowl barrow 1011600 site adjacent south and north of the redline of proposed works. Other possible bowl barrows and earthworks are also adjacent	No anomalies of any archaeological potential. West of dataset dominated by magnetic interference from existing pipe.
434	5611	Superficial: Kempton Park Gravel Formation - Sand and Gravel Bedrock: Bagshot Formation - Sand	Mesolithic tranchet axe findspot and Roman bronze artefact findspot recorded by SCC adjacent to redline of proposed works	No anomalies of any archaeological potential. North of dataset dominated by magnetic interference from existing pipe.
435	16207	Superficial: Lynch Hill Gravel Member - Sand and Gravel Bedrock: Bagshot Formation - Sand	Post -med Hardwick Court Farm 10585 and associated buildings, including moat 602 recorded by SCC adjacent to redline of proposed works. Possible Roman road London to Winchester 4619 recorded by SCC adjacent redline of proposed works	No anomalies of any archaeological potential. Five dipolar linear anomalies locate buried service pipes. North-west/south-east linear anomaly in centre of dataset.
442	15257	Superficial: Kempton Park Gravel Formation - Sand and Gravel Bedrock: Bagshot Formation - Sand	Ring ditch recorded by SCC adjacent to redline of proposed works	No anomalies of any archaeological potential. North of dataset dominated by magnetic interference from existing pipe.
443	17976	Superficial: Alluvium – Silt Bedrock: Bagshot Formation - Sand	Ring ditch recorded by SCC adjacent to redline of proposed works	No anomalies of any archaeological potential. Geological variation throughout the western half of the dataset with magnetic interference from the existing pipe.
444	16354	Superficial: Alluvium – Silt Bedrock: Bagshot Formation - Sand	Bronze age tools 1959 and medieval coins 2855 findspot recorded by SCC adjacent to the redline of proposed works	No anomalies of any archaeological potential. Broad and amorphous anomalies caused by variations in the alluvial deposits. The large ferrous spike in the south-west caused by an infilled clay pit.
445	19450	Superficial: Alluvium – Silt Bedrock: Bagshot Formation - Sand	Bronze age tools 1959 and medieval coins 2855 findspot recorded by SCC adjacent to the redline of proposed works	No anomalies of any archaeological potential. Broad and amorphous anomalies caused by variations in the alluvial deposits.

APPENDIX 2 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 3 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 cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party.

APPENDIX 4 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 5 DATA PROCESSING

The gradiometer data has been presented in this report in processed greyscale and minimally processed XY trace plot format.

Data collected using RTK GNSS-based methods cannot be produced without minimal processing of the data. The minimally processed data has been interpolated to project the data onto a regular grid and de-striped to correct for slight variations in instrument calibration drift and any other artificial data.

A high pass filter has been applied to the greyscale plots to remove low frequency anomalies (relating to survey tracks and modern agricultural features) in order to maximise the clarity and interpretability of the archaeological anomalies.

The data has also been clipped to remove extreme values and to improve data contrast.

APPENDIX 6 OASIS DATA COLLECTION FORM: ENGLAND

OASIS ID: headland5-350652

PROJECT DETAILS	
Project name	Southampton to London Pipeline Project
Short description of the project	Headland Archaeology (UK) Ltd has undertaken a geophysical (magnetometer) survey, covering approximately 126 hectares, along the proposed route of the Southampton to London Pipeline. This study informs the cultural heritage inputs for the Environmental Statement, prior to the installation of the replacement pipeline (the project). The survey has evaluated 102 Geophysical Survey Areas, identifying two distinct areas of clear archaeological activity comprising a ring-ditch and a sub-rectangular enclosure. These areas are assessed as having high archaeological potential. Anomalies at several other locations have been interpreted as having possible archaeological potential, including possible infilled pits and ditches. However, the narrow survey corridor, fragmentary nature of the anomalies, magnetic interference from the existing pipeline and/or an absence of supporting archaeological information (cropmarks or HER data) precludes a confident interpretation. These anomalies are ascribed a moderate archaeological potential. Anomalies due to geological and pedological variation are common throughout all survey areas and linear trend anomalies due to post-medieval agricultural activity (boundary removal, field drains or ploughing) are also recorded in virtually all parts of the corridor.
Project dates	Start: 16-10-2018 End: 08-11-2018
Previous/future work	Not known / Not known
Any associated project reference codes	STLP18 - Contracting Unit No.
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 4 - Character Undetermined
Current Land use	Grassland Heathland 5 - Character undetermined
Monument type	None
Monument type	None
Significant Finds	None
Significant Finds	None
Methods & techniques	"Geophysical Survey"
Development type	Pipelines/cables (e.g. gas, electric, telephone, TV cable, water, sewage, drainage etc.)
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Not known / Not recorded
Solid geology (other)	Bracklesham and Barton Group; White Chalk Formation; Gault and Upper Greensand Formation
Drift geology	BRICKEARTH, MAINLY LOESS
Drift geology	CLAY WITH FLINTS
Drift geology	ALLUVIUM
Techniques	Magnetometry

PROJECT LOCATION	
Country	England
Site location	HAMPSHIRE SOUTHAMPTON SOUTHAMPTON Southampton to London Pipeline
Study area	126 Hectares
Site coordinates	SU 5128 1438 50.926042434296 -1.270284499981 50 55 33 N 001 16 13 W Line
Site coordinates	TQ 0550 7078 51.425697448096 -0.4823868837034 51 25 32 N 000 28 56 W Line

PROJECT CREATORS	
Name of Organisation	Headland Archaeology
Project brief originator	Jacobs
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?	None
Digital Archive recipient	In house
Digital Contents	"Survey"
Digital Media available	"Geophysics","Text"
Paper Archive Exists?	None

PROJECT BIBLIOGRAPHY 1	
Publication type	Grey literature (unpublished document/manuscript)
Title	Southampton to LondoN Pipeline Project; Geophysical Survey
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