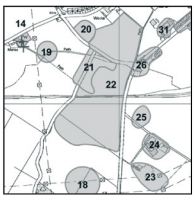
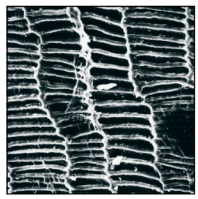
KBFP18










A9 DUALLING PROGRAMME: KILLIECRANKIE TO GLEN GARRY

ARCHAEOLOGICAL GEOPHYSICAL SURVEY

commissioned by Jacobs UK Ltd
on behalf of Transport Scotland

October 2018

HEADLAND ARCHAEOLOGY

REGISTERED ORGANISATION CIfA

A9 DUALLING PROGRAMME: KILLIECRANKIE TO GLEN GARRY

ARCHAEOLOGICAL GEOPHYSICAL SURVEY

commissioned by Jacobs UK Ltd
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October 2018

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

PROJECT INFO:

HA Project Code **KBFP18** / NGR **NN 9109 6342** / Parish **Moulin** / Local Authority **Perth and Kinross** / OASIS Ref. **headland5- 322778**

PROJECT TEAM:

Project Manager **Candy Hatherley** / Author **David Harrison** / Fieldwork **Michail-Athanasios Kaikas, Olivier Vansassenbrouck** / Graphics **Caroline Norrman, David Harrison, Julia Bastek-Michalska**

Approved by **Candy Hatherley** .....

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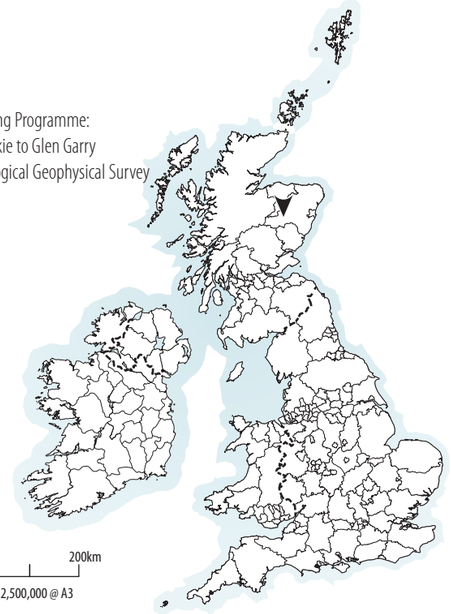
PROJECT SUMMARY

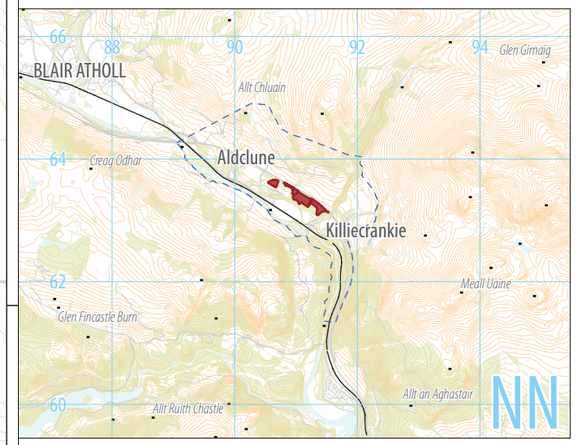
Headland Archaeology (UK) Ltd undertook a programme of geophysical (magnetometer) survey, covering approximately 8 hectares at Killicrankie in response to a request from Historic Environment Scotland (HES) that investigations are undertaken to inform their understanding of the potential impacts of the A9 Dualling Programme: Killiecrankie to Glen Garry on the site of the Battle of Killiecrankie (Ref BLT12), fought on the 27th July 1689. The geophysical survey is located south of the existing A9 and on either side of Urrard House, which is thought to have been at the core of the fighting. The survey has not identified any anomalies of definite archaeological potential with the magnetic datasets mainly identifying anomalies consistent with near-surface geological variation. Subsequent trial trenching of the geophysical survey results corroborated the interpretation. A single high magnitude anomaly has been identified 230m east of Urrard House and interpreted tentatively as a possible large pit which falls outside the Compulsory Purchase Area (CPO) or Lands Made Available (LMA). Numerous ferrous spikes have been identified throughout the datasets. Any of these anomalies could be due to iron objects lost during the battle but it is impossible to discriminate such anomalies from modern ferrous debris.

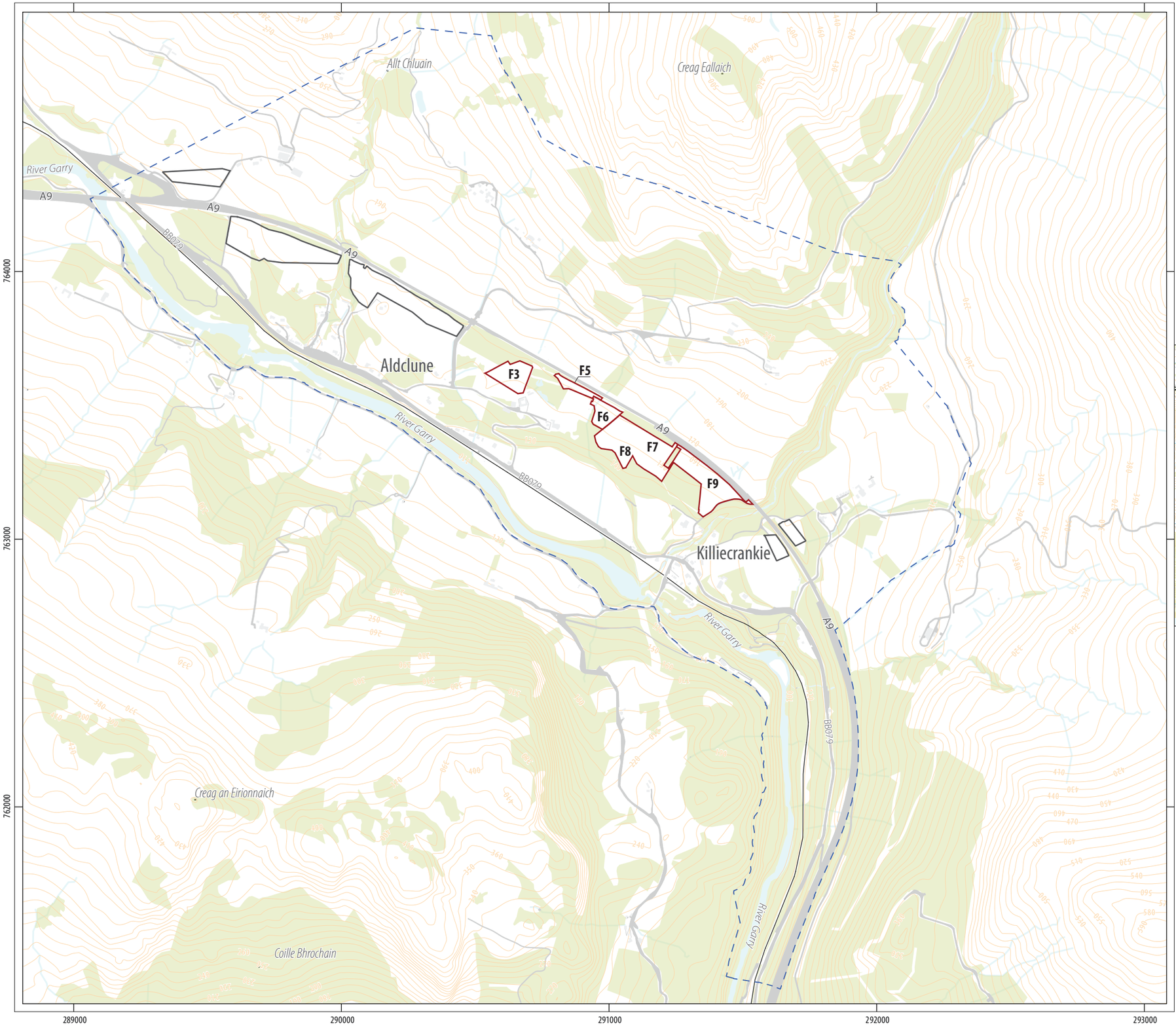
CONTENTS

LIST OF ILLUSTRATIONS

A9 Dualling Programme:
Killiecrankie to Glen Garry
Archaeological Geophysical Survey







geophysical survey area
previous geophysical survey area (AOC 2016)
inventory of historic battlefields boundary

0
400m
1:15,000 @ A3

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ILLUS 1 Site location

A9 DUALLING PROGRAMME: KILLIECRANKIE TO GLEN GARRY

ARCHAEOLOGICAL GEOPHYSICAL SURVEY

1 INTRODUCTION

Headland Archaeology (UK) Ltd was commissioned by Jacobs UK Ltd (the Client), to undertake a programme of geophysical (magnetometer) at Killiecrankie in response to a request from Historic Environment Scotland (HES) that investigations are undertaken to inform their understanding of the potential impacts of the A9 Dualling Programme on the site of Killiecrankie Battlefield (Ref BLT12). The geophysical survey is part of a wider scheme of archaeological investigations comprising metal detecting and trial trenching.

The work was undertaken in accordance with a Written Scheme of Investigation (Jacobs 2018) which was agreed with Historic Environment Scotland and Perth and Kinross Heritage Trust, and in line with current best practice (Chartered Institute for Archaeologists 2014, English Heritage 2008).

The survey was carried out on the 4th and 5th of June 2018.

1.1 SITE LOCATION, TOPOGRAPHY AND LAND-USE

Killiecrankie Battlefield is located in the Pass of Killiecrankie, on the south-west facing lower slopes of Creag Eallich (see Illus 1). The battlefield is bisected by the existing A9. The geophysical survey Areas (GSA's) comprise six irregularly-shaped fields (F3, F5, F6, F7/F8, F9) on the southern side of the A9 as it passes to the north and north-west of the village of Killiecrankie (centred at NN 9109 6342). They are bounded by the A9 to the north and by woodland on all other sides.

Topographically, the GSA's are largely located between 160m Above Ordnance Datum (AOD) and 140m AOD with localised undulations.

At the time of the survey, the GSA's were under short pasture (see Illus 2–4). Steep gradients part of the A9 embankment restricted survey in the north of F5 and further steep gradients restricted survey in the north-west of F8. High grass and a small agricultural building prevented survey in the north-west of F6 with further high grasses preventing survey in the south of F8. A small area in the south of F9 was inaccessible at the time of the survey due to the remains of modern debris (a shed).

1.2 GEOLOGY AND SOILS

The bedrock geology comprises Killiecrankie Schist Formation – semipelite and micaceous psammite which is overlain in the north and east by glacial till – diamicton (sand and gravel) and in the south by glaviofluvial deposits – gravel, sand and silt (see Illus 6; NERC 2018). No superficial deposits are recorded across most of Field F3, in the south of Field F6 or in the west of Field F8.

The soils are classified in the Strichen Soil Association, characterised as humus-iron podzols (Scotland's soils 2018).

2 ARCHAEOLOGICAL BACKGROUND

The Battle of Killiecrankie was fought on the 27th July 1689 between the Jacobites, led by John Graham of Claverhouse, the Viscount Dundee, and the Government forces led by General Hugh Mackay. While the Jacobites were victorious, Dundee was killed during the battle, along with around 800 men on the Jacobite side and around 2000 on the Government side. No burials have been found to date at the battle site although given the high death toll, it is likely that they are present, especially in the general area of Urrard House which was the core of the fighting (Historic Environment Scotland 2018).

ILLUS 2 F3, looking north **ILLUS 3** F7, looking south-east **ILLUS 4** F9, looking south-east

This phase of work is subsequent to a desk-based survey (Jacobs 2017), a metal detecting survey (GUARD 2015), and a geophysical survey (AOC 2016) which are detailed in Chapter 15 (Cultural Heritage) of the Environmental Statement (Jacobs 2017). Building on the results of metal detecting undertaken in 2003 (Pollard and Oliver 2003), the metal detecting survey recovered a number of significant finds relating to the battle including musket/carbine and pistol balls, copper alloy buttons, buckles, horse shoes, several fragments of a copper alloy bangle, a copper alloy pendant, a copper alloy harness boss and a part of the support for a sword belt. Fewer finds associated with the battle were recovered from the area of the geophysical survey although a cluster of lead munitions was recovered in 2003 from within the north-west of F7/F8 (see Illus 6). No anomalies of definite archaeological potential were identified by the previous phase of geophysical survey, north-west of the current survey, although a number of pit-type anomalies were identified which may be associated with the battle (AOC 2016).

3 AIMS, METHODOLOGY AND PRESENTATION

The aim of the archaeological investigations is to provide HES with the requested information to inform their understanding of the potential impacts on the Battle of Killiecrankie that may result from the project.

It is also likely that the results of the archaeological investigations will inform relevant research objectives of the Scottish Archaeological Research Framework (ScARF), especially those relating conflict and

battlefield presented in Modern Scotland: Archaeology, the Modern past and the Modern present.

The specific archaeological objectives of the geophysical survey were:

- to identify, record and interpret archaeological remains within Fields F3, F5, F6, F7/F8 and F9;
- to use existing information from the archaeological and historical record and from the topography of the battlefield itself, to provide an interpretation of these remains in the context of the battle; and
- to disseminate the results of the archaeological geophysical survey through the deposition of an ordered archive and report at the National Record of the Historic Environment (NRHE) and a copy of the report at the Perth and Kinross HER.

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 1.

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. This approach was undertaken in accordance with the agreed WSI.

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 1:15,000. Illus 2 is a general site photograph. Illus 3 is a 1:3,000 survey location plan showing the direction of survey as GPS swaths. Illus 4 shows the superficial deposits (NERC 2018), contour data derived from 1m LiDAR data (Environment Agency 2018), and metal detecting finds, also at a scale of 1:3,000. The processed greyscale magnetometer data is shown alongside the previous geophysical survey in Illus 5, at a scale of 1:7,500. Large-scale, fully processed (greyscale) data and an accompanying interpretative plot are shown at 1:3,000 in Illus 6 and Illus 7 whilst more detailed greyscale plots, minimally processed data (XY traceplot) and accompanying interpretative plots are presented at a scale of 1:1,000 in Illus 8–19 inclusive.

Technical information on the equipment used, data processing and magnetic survey methodology is given in Appendix 1. Appendix 2 details the survey location information and Appendix 3 describes the composition and location of the site archive. Data processing details are presented in Appendix 4. A copy of the OASIS entry (Online Access to the Index of Archaeological Investigations) is reproduced in Appendix 5.

The survey methodology, report and any recommendations comply with the Written Scheme of Investigation (Jacobs 2018), guidelines outlined by Historic England (English Heritage 2008) and by the Chartered Institute for Archaeologists (CIfA 2014). All illustrations from Ordnance Survey mapping are reproduced with the permission of the controller of Her Majesty's Stationery Office (© Crown copyright).

The illustrations in this report have been produced following analysis of the data in 'raw' and processed formats and over a range of different display levels. All illustrations are presented to most suitably display and interpret the data from this site based on the experience and knowledge of management and reporting staff.

4 RESULTS AND DISCUSSION

The ground conditions were generally good (see Illus 2) and contributed to a high standard of data quality throughout.

Generally, a variable magnetic background has been detected throughout the GSA's manifesting throughout the datasets as numerous low magnitude discrete anomalies. The anomalies are mostly due to localised variations in the depth and composition of the prevailing humus-iron podzols with broader amorphous anomalies caused by near-surface geological variation. Against this background, numerous anomalies have been identified and these are discussed below and cross-referenced to specific examples on the interpretive figures, where appropriate.

4.1 FERROUS ANOMALIES

Ferrous anomalies, characterised as individual 'spikes', are typically caused by ferrous (magnetic) material, either on the ground surface or in the plough-soil. Little importance is normally given to such anomalies, unless there is any supporting evidence for an archaeological interpretation, as modern ferrous debris is common on most sites, often being present as a consequence of manuring or tipping/infilling. There is no obvious clustering to these ferrous anomalies which might indicate an archaeological origin but any of these ferrous 'spikes' may be due to ferrous objects (such as horseshoes and buckles) associated with the Battle of Killiecrankie.

The broad area of magnetic disturbance in the north of F3 (TP1; see Illus 8–10) is caused by a telegraph pole whereas the high magnitude dipolar linear anomaly (SP1; see Illus 11–13) aligned north-west/south-east in the north of Field F6 locates a buried pipe.

In the south-east of F9 a broad area of high magnitude disturbance (FM1; see Illus 17–19) is almost certainly modern in origin, possibly being due to tipping/infilling of ferrous material as part of the construction of the A9. A more localised area of magnetic disturbance (FM2), 15m south of FM1 is likely to have similar origins although it is not inconceivable that the disturbance is due to buried ferrous material from the Battle of Killiecrankie. F9 has been identified for metal detecting which may provide more information on these anomalies.

Broad areas of disturbance around the perimeter of the field edges is due to ferrous material accumulated along, and contained within, the adjacent boundaries and is probably of no archaeological interest.

4.2 AGRICULTURAL ANOMALIES

Analysis of historical OS mapping indicates that the division and layout of land within the GSA's has changed little since the publication of the first edition OS map in 1867 albeit with the removal of two modern field boundaries from within F7 and F9. These two former boundaries have been partially detected by the survey as alignments of ferrous anomalies (FB1 and FB2; see Illus 14–19). The anomalies are caused by ferrous material within or alongside the former boundaries.

Series of faint parallel linear trends have been identified over most of the GSA's. The anomalies are all aligned parallel with the surrounding field boundaries and are caused by soil-filled furrows between cultivation ridges.

4.3 GEOLOGICAL ANOMALIES

As discussed above, the survey has detected a variable magnetic background which is characterised by numerous low magnitude discrete anomalies. Against this background a broad band of amorphous high magnitude anomalies are clearly visible aligned north/south across F7 and F8. This band corresponds closely to an area of localised topographical variation, and more closely-spaced contours, and is thought to be caused by near-surface geology.

4.4 POSSIBLE ARCHAEOLOGICAL ANOMALIES

A particularly high magnitude anomaly (P1; see Illus 13–18) has been identified 230m east of Urrard House, in the north-west of F7, close to the find spot of a cluster of lead munitions from a metal detecting survey in 2003. The anomaly is located in an area of geological and topographical variation and is probably geological in origin, however an archaeological origin should be considered given the local archaeological context. The anomaly may be due to a large soil-filled pit. This anomaly was not located within the Compulsory Purchase Area (CPO) or Lands Made Available (LMA) and as such was not evaluated through the subsequent trial trenching (Gaunt 2018). However, on a precautionary basis anomalies identified as being geological in origin and located within the CPO/LMA were trial trenched.

5 CONCLUSION

The survey has not identified any anomalies of definite archaeological potential with the magnetic datasets mainly identifying anomalies consistent with near-surface geological variation. A single high magnitude anomaly has been identified 230m east of Urrard House and interpreted tentatively as a possible large pit. Numerous ferrous spikes have been identified throughout the datasets. Any of these anomalies could be due to iron objects lost during the battle but it is impossible to discriminate such anomalies from modern ferrous debris.

6 REFERENCES

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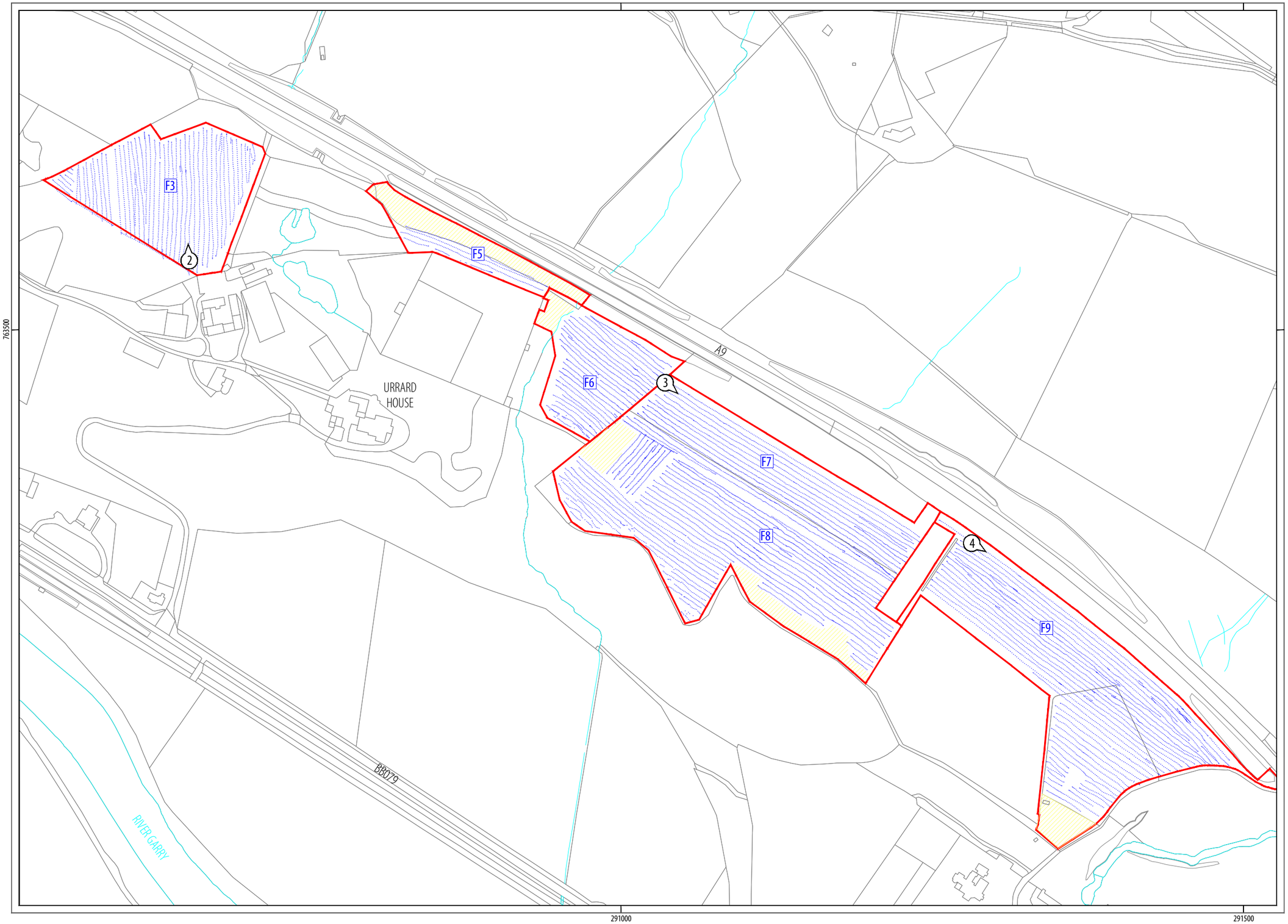

geophysical survey area
GPS swaths
area unsuitable for survey
location and direction of ILLUS 2-4

0 50m
1:3,000 @ A3

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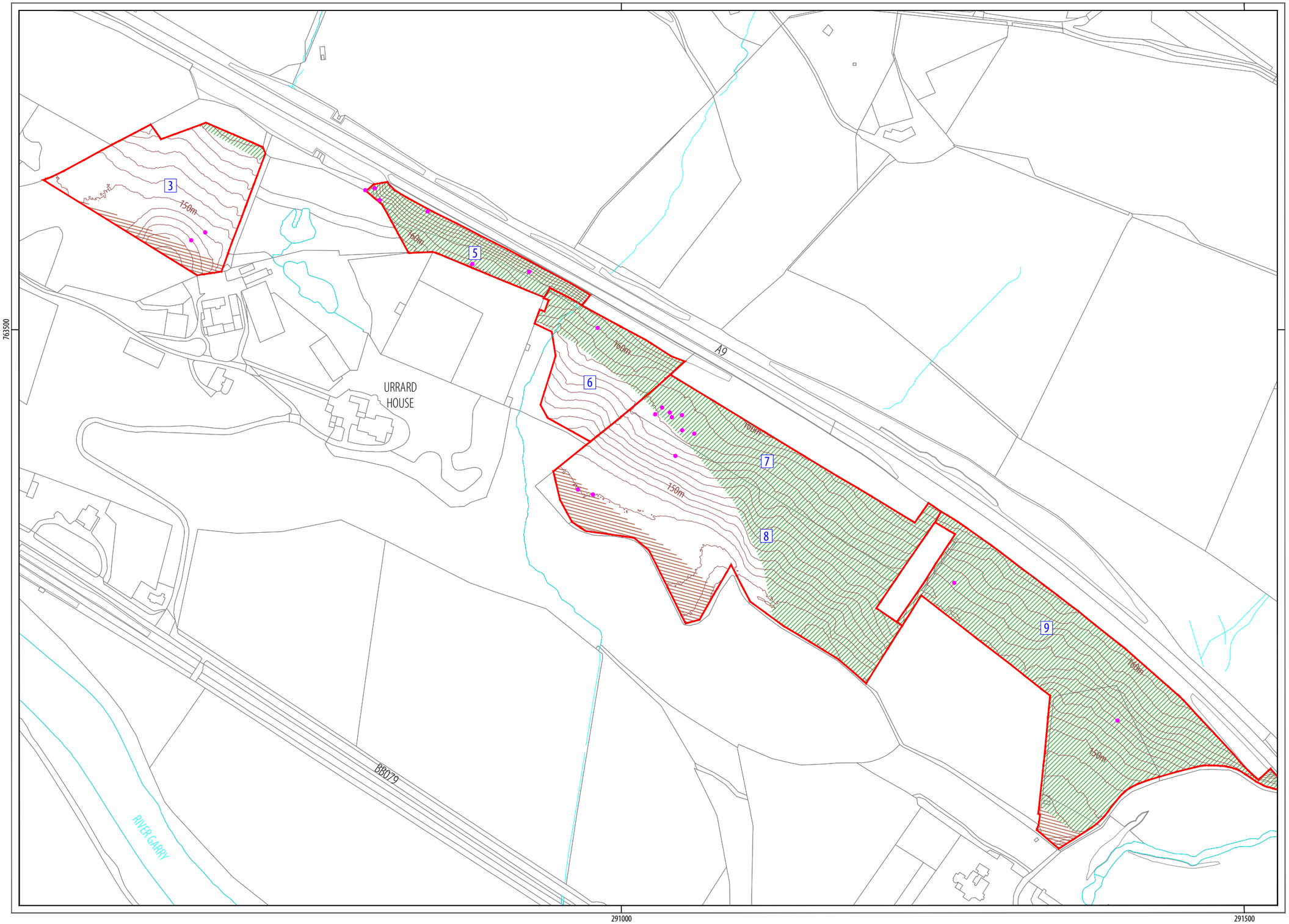
ILLUS 5 Survey location showing GPS swaths (1:3,000)



geophysical survey area

archaeological remains associated with the battle recovered during metal detecting surveys in 2003 and 2015

SUPERFICIAL GEOLOGY

Till - diamicton

Glaciofluvial Deposits - gravel, sand and silt

0 50m
1:3,000 @ A3

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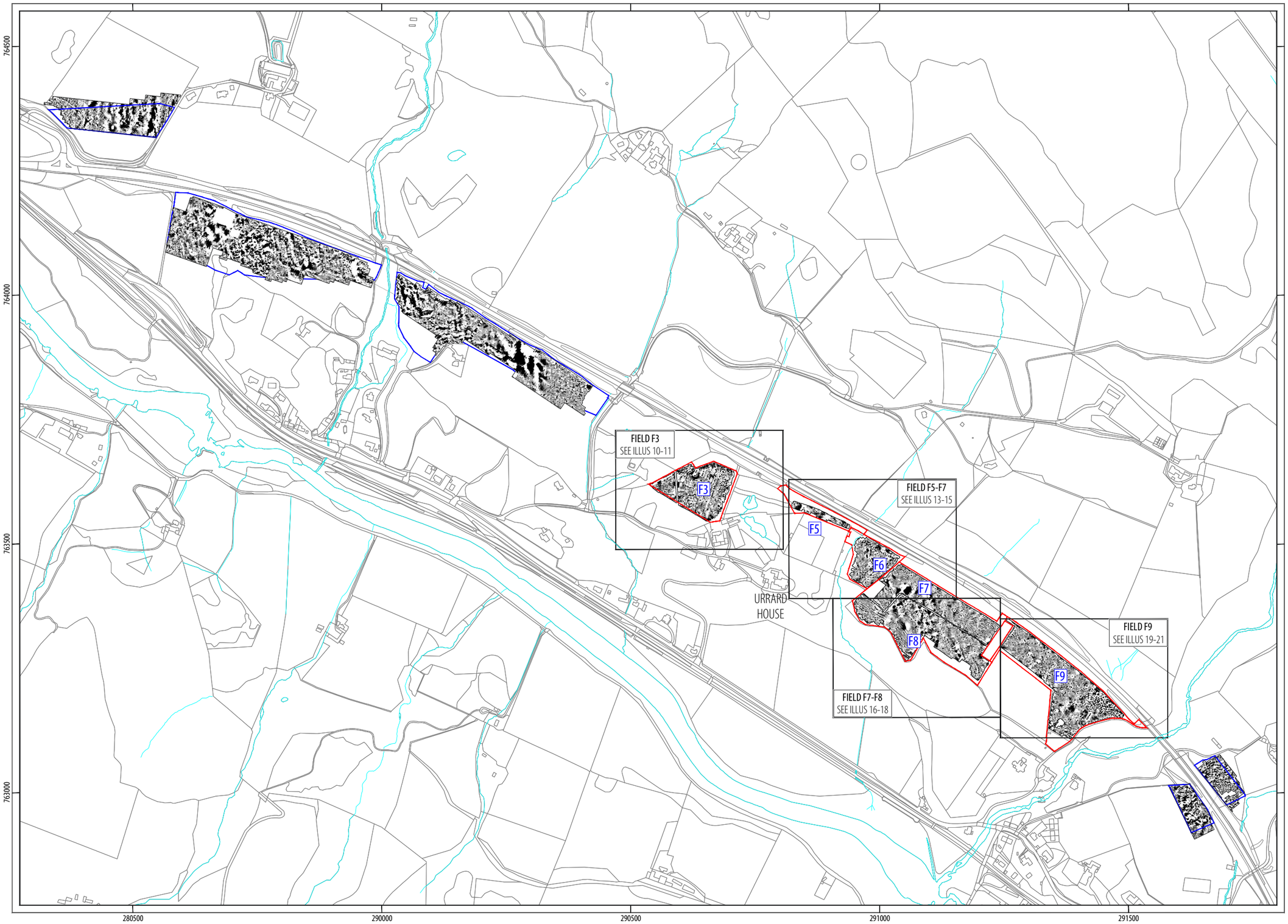
ILLUS 6 Survey location showing contours, superficial deposits and metal detecting finds (1:3,000)



geophysical survey area

previous geophysical survey area (AOC 2016)

0 200m

1:7,500 @ A3

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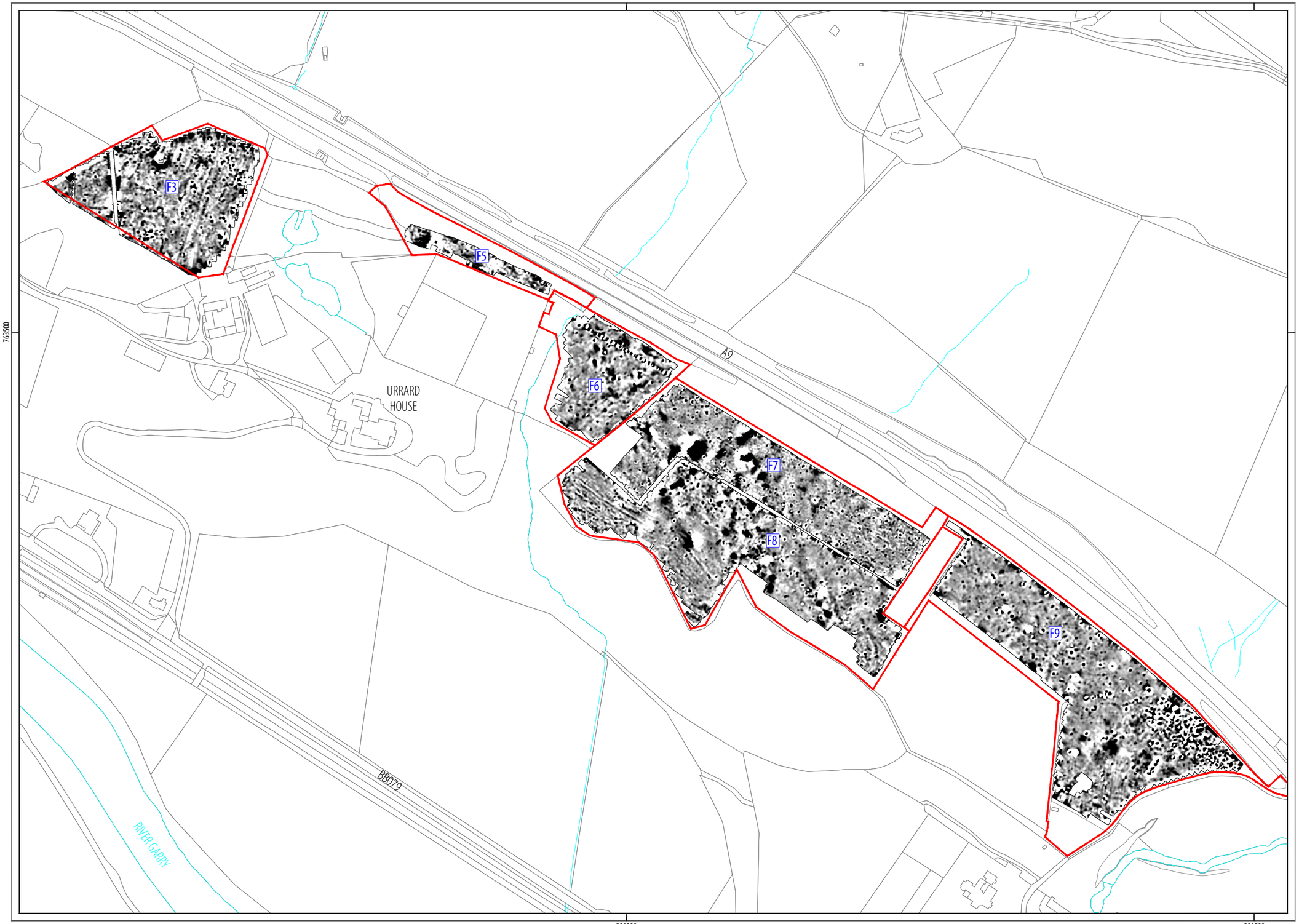
ILLUS 7 Processed greyscale magnetometer data showing previous geophysical survey (1:7,500)



geophysical survey area

nT
-1.0
2.0

0
50m
1:3,000 @ A3

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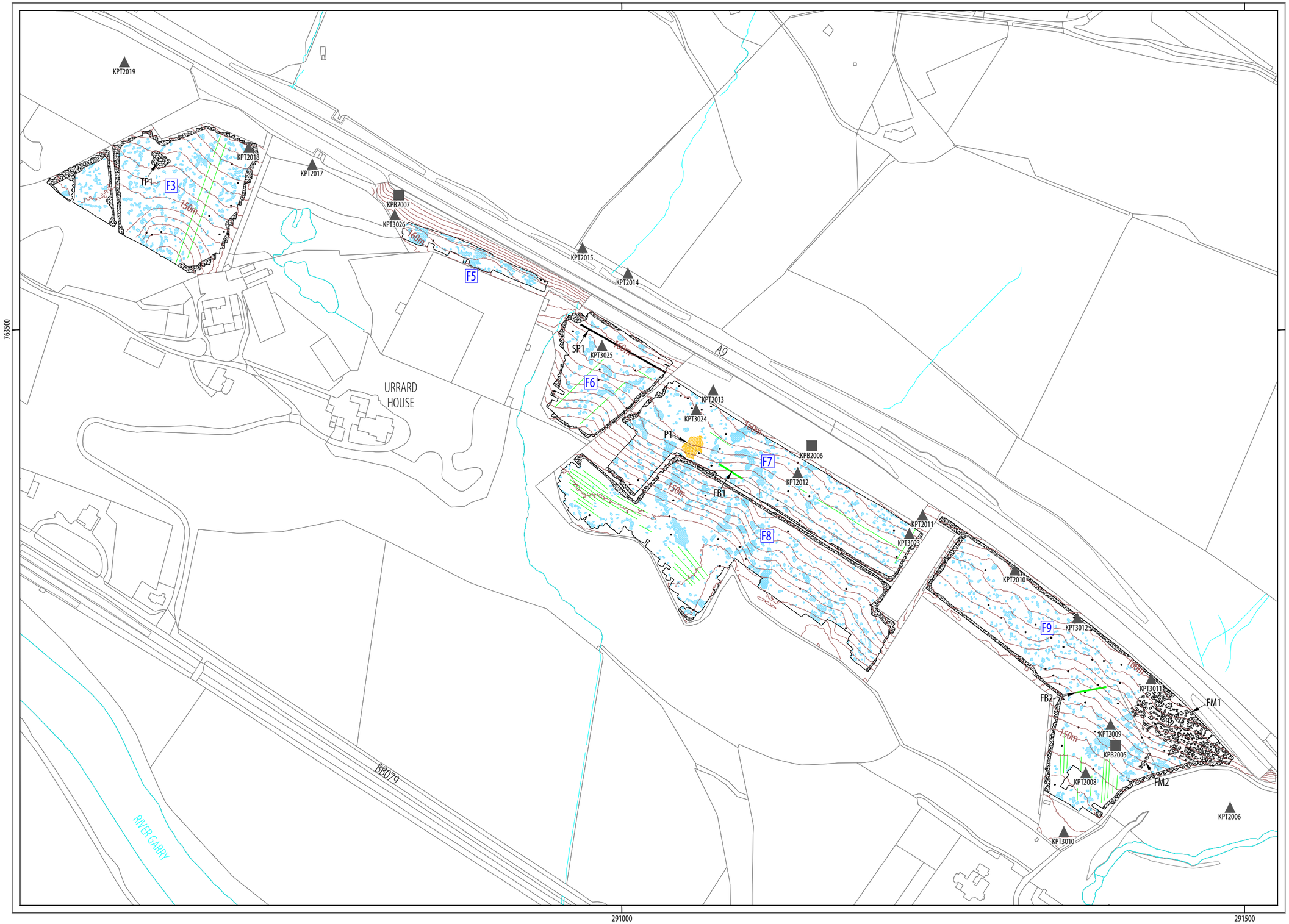
ILLUS 8 Processed greyscale magnetometer data (1:3,000)



GI_AsBuilt_BoreHole
GI_AsBuilt_TestPit

TYPE OF ANOMALY	INTERPRETATION
dipolar isolated	ferrous material
magnetic disturbance	ferrous material
dipolar linear	service pipe
linear trend	agricultural
linear	former boundary
linear trend	geological variation
magnetic enhancement	geology?
magnetic enhancement	archaeology?

ABBREVIATIONS

FB	former boundary
FM	ferrous material
P	pit
SP	service pipe
TP	telegraph pole

0 50m
1:3,000 @ A3

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ILLUS 9 Interpretation of magnetometer data showing contours and Geotechnical Investigations (1:3,000)

763700

763600

763500

290500

290600

290700

290800

F3

nT
-1.0 2.0

0 25m
1:1,000 @ A3

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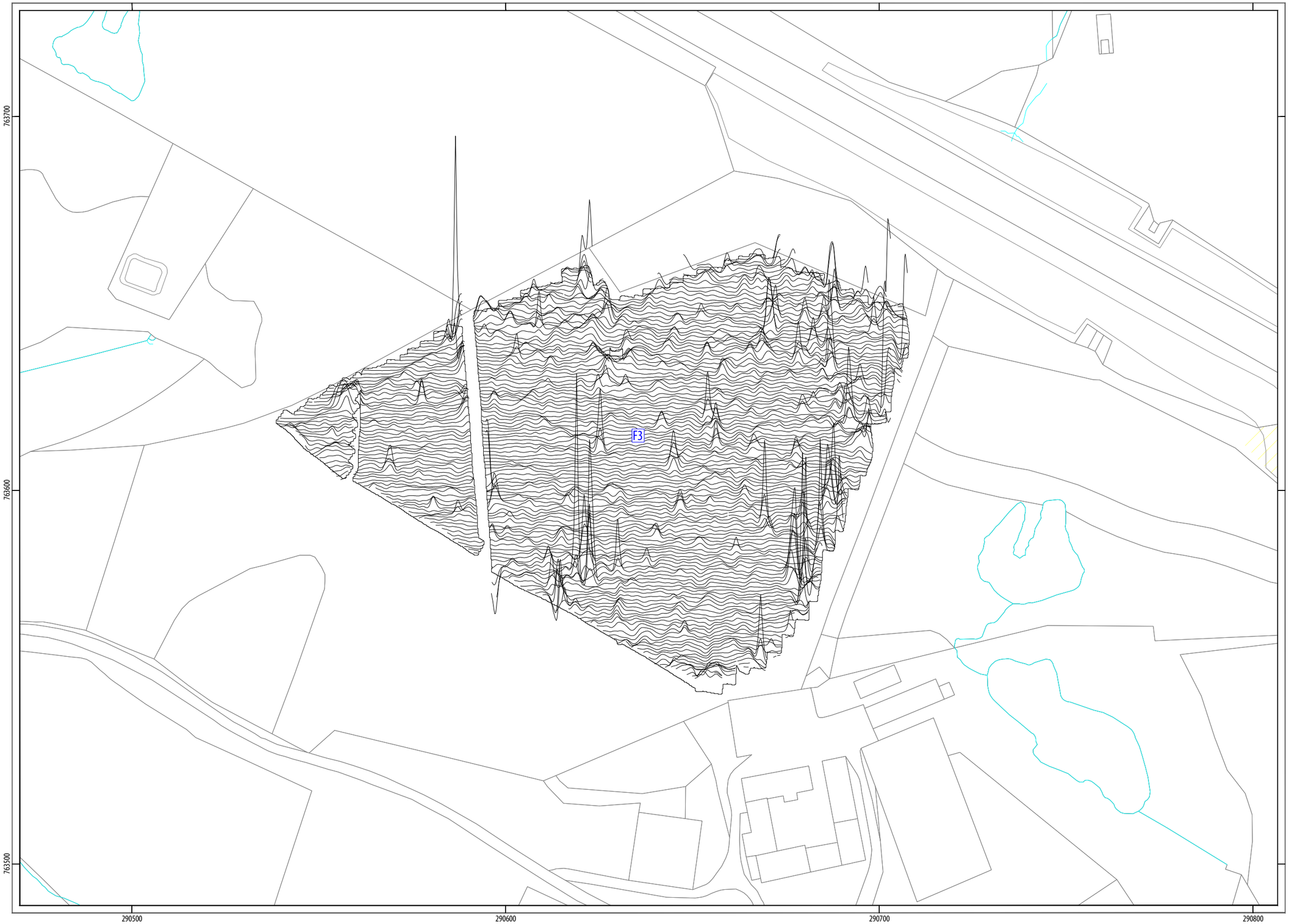
ILLUS 10 Processed greyscale magnetometer data; Field F3 (1:1,000)



32.0nT/cm

0 25m

1:1,000 @ A3

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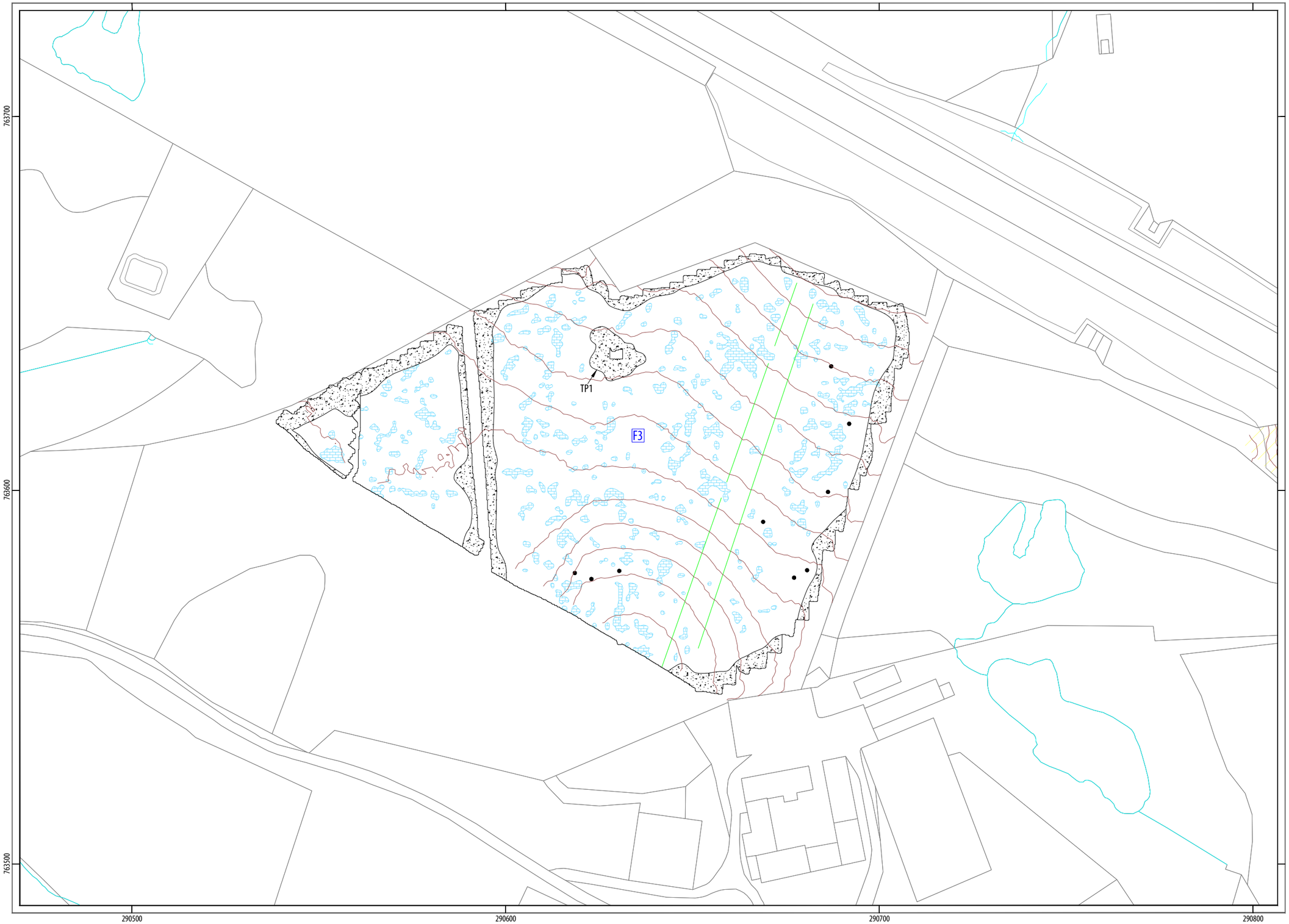
ILLUS 11 XY trace plot of minimally processed magnetometer data; Field F3 (1:1,000)



TYPE OF ANOMALY | INTERPRETATION

- dipolar isolated | ferrous material
- magnetic disturbance | ferrous material
- linear trend | agricultural
- magnetic enhancement | geology?

ABBREVIATIONS

TP telegraph pole

0 25m

1:1,000 @ A3

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ILLUS 12 Interpretation of magnetometer data; Field F3 (1:1,000)

763600
763500
763400
290900
291000
291100
F5
F6
F7
-1.0
nT
2.0
0
25m
1:1,000 @ A3
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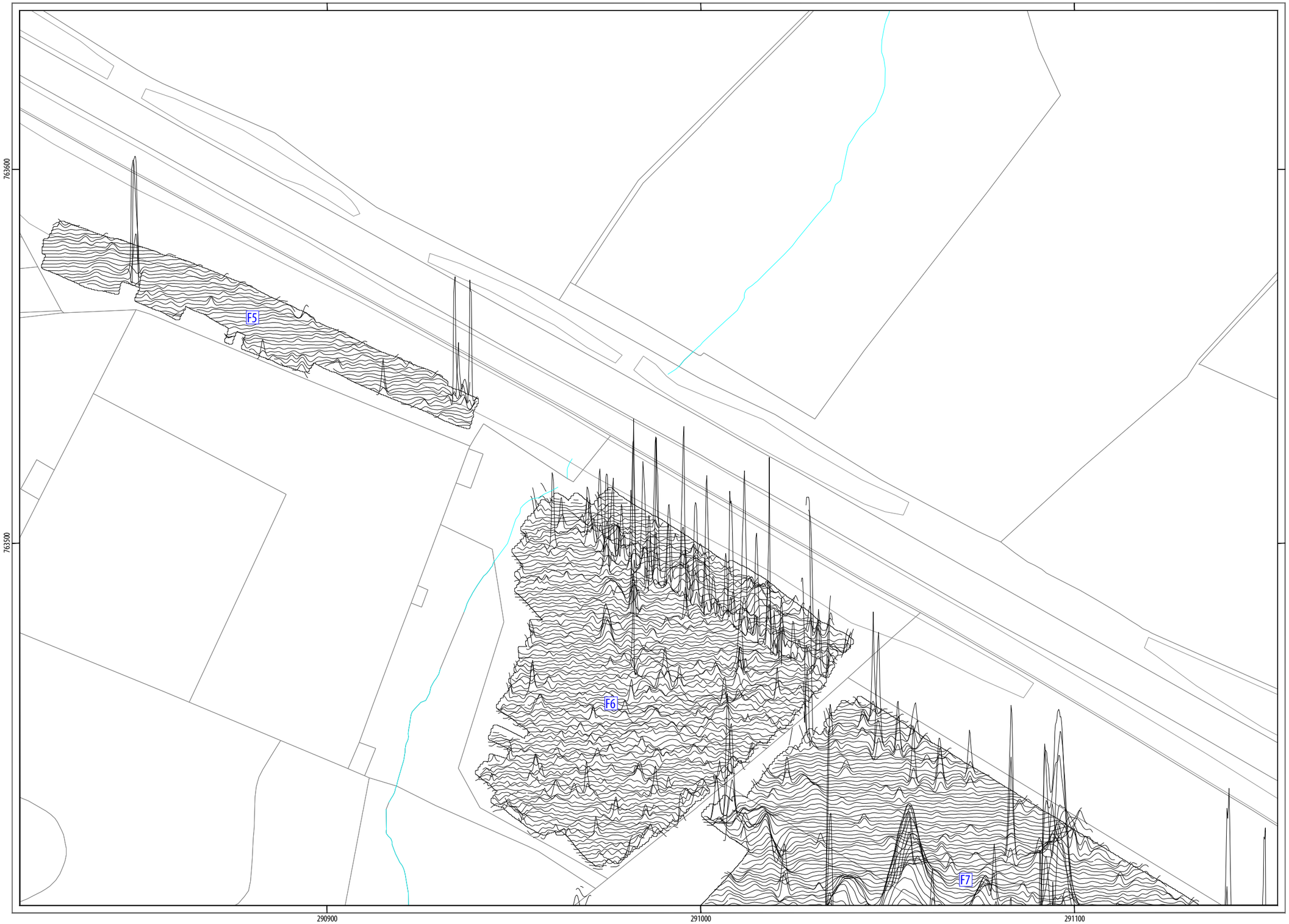
ILLUS 13 Processed greyscale magnetometer data; Field F5-F7 (1:1,000)



32.0nT/cm

0 25m

1:1,000 @ A3

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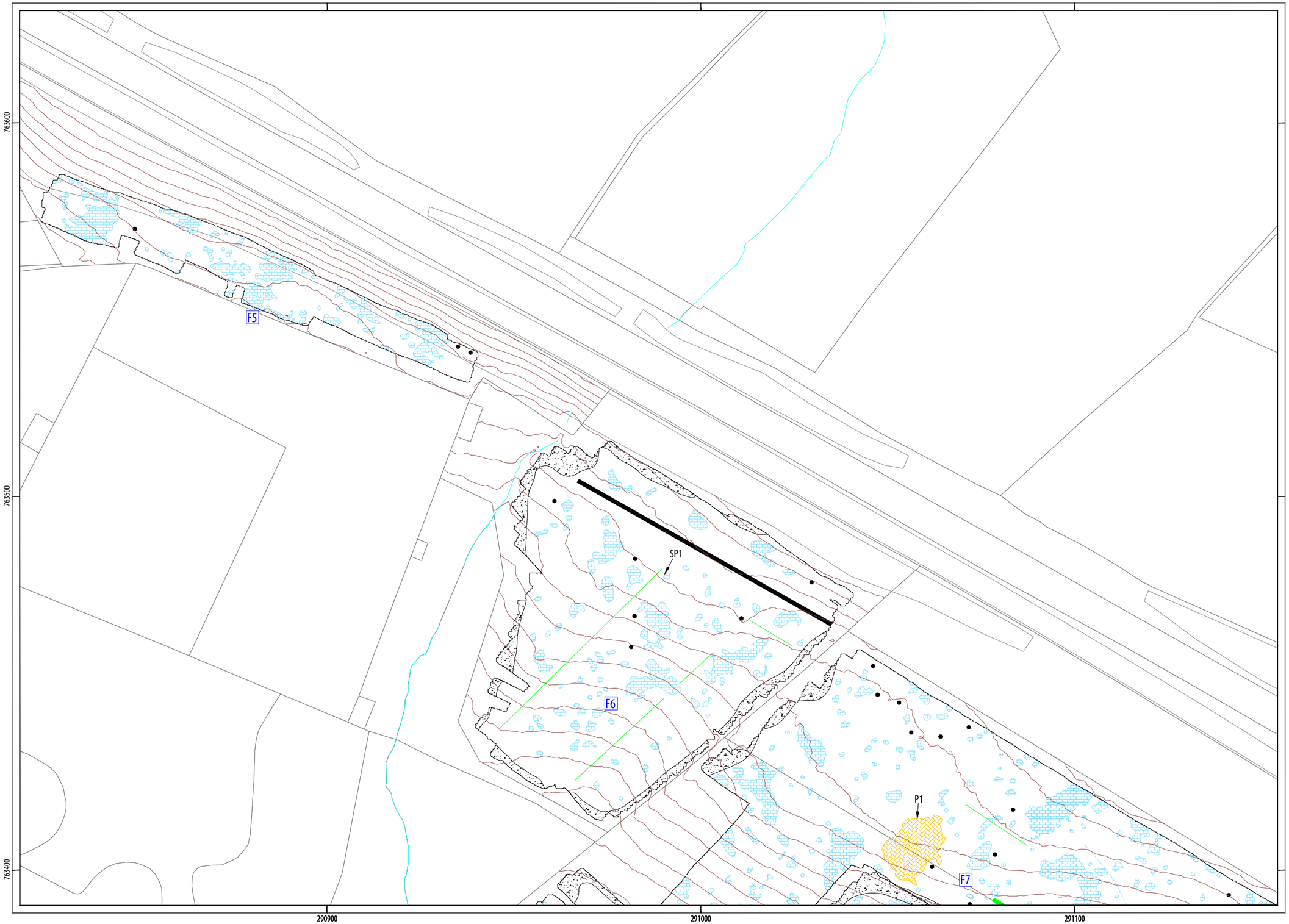
ILLUS 14 XY trace plot of minimally processed magnetometer data; Field F5-F7 (1:1,000)



TYPE OF ANOMALY | INTERPRETATION

TYPE OF ANOMALY	INTERPRETATION
dipolar isolated	ferrous material
magnetic disturbance	ferrous material
dipolar linear	service pipe
linear trend	agricultural
magnetic enhancement	geology?
magnetic enhancement	archaeology?

ABBREVIATIONS

P	pit
SP	service pipe

0 25m
1:1,000 @ A3

PROJECT KBFP18
A9 Dualling Programme:
Killiecrankie to Glen Garry
Geophysical Survey Jacobs UK

CLIENT Ltd on behalf of Transport Scotland

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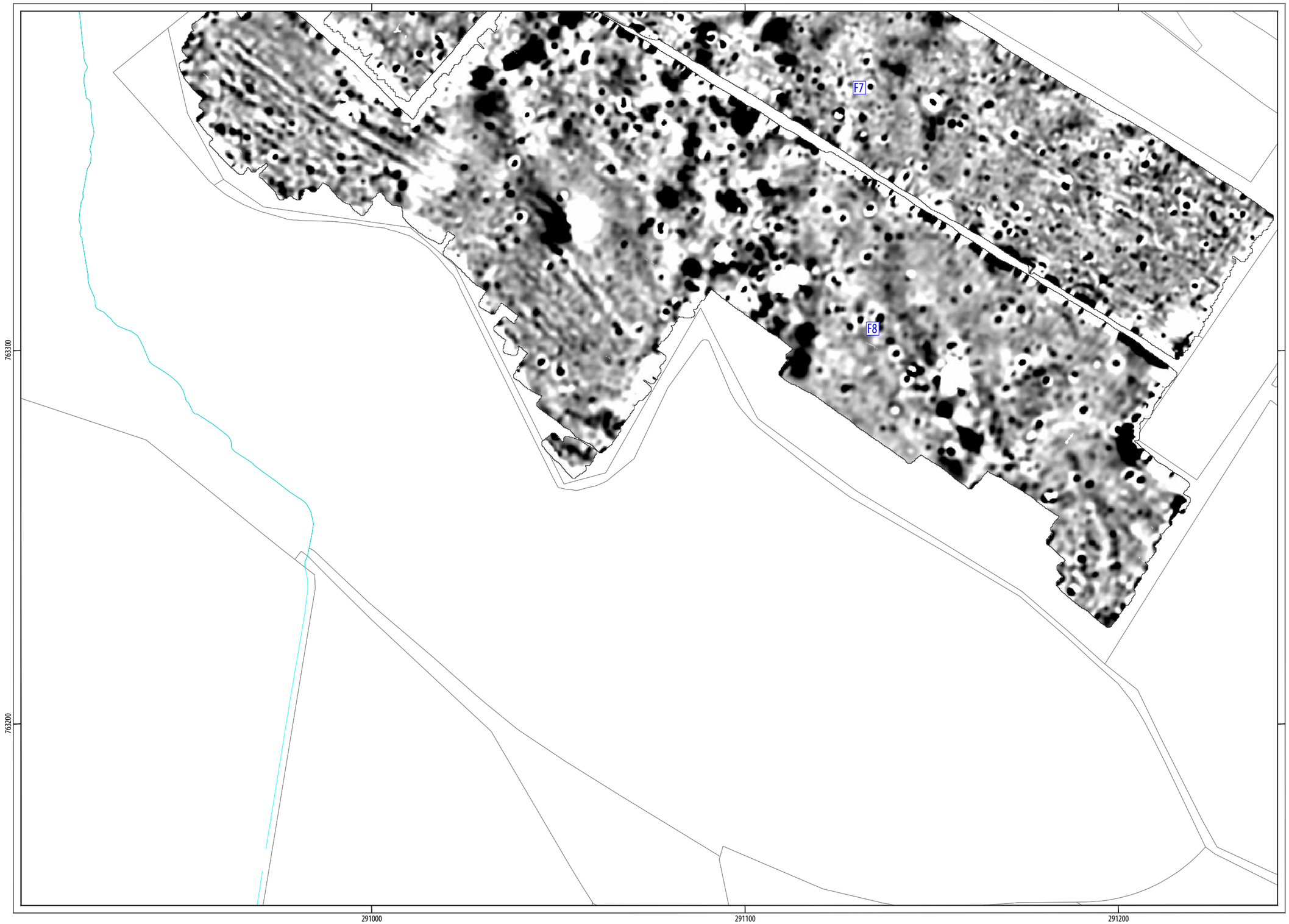
ILLUS 15 Interpretation of magnetometer data; Field F5-F7 (1:1,000)



nT
-1.0 2.0

0 25m
1:1,000 @ A3

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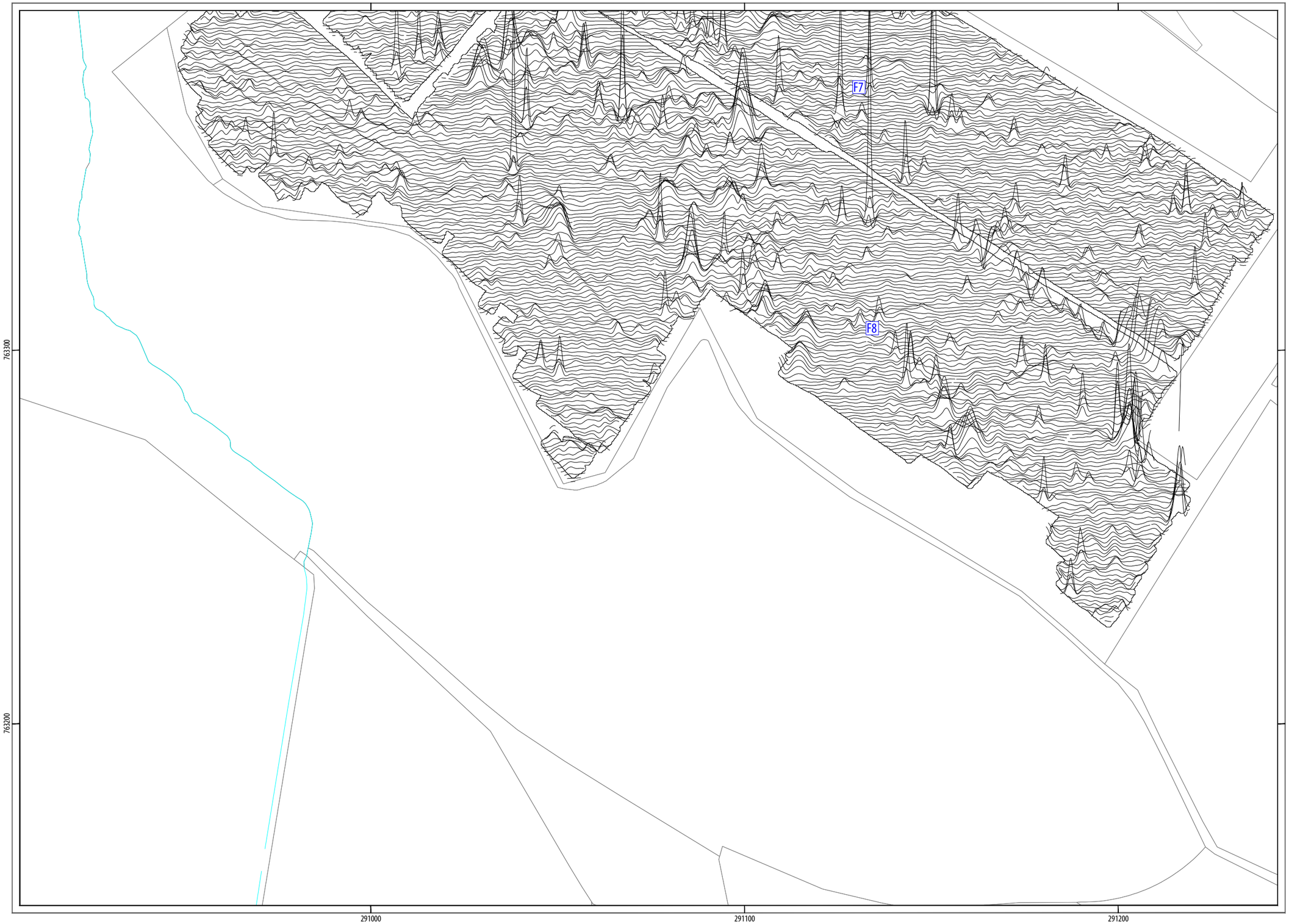
ILLUS 16 Processed greyscale magnetometer data; Field F7-F8 (1:1,000)



32.0nT/cm

0 25m

1:1,000 @ A3

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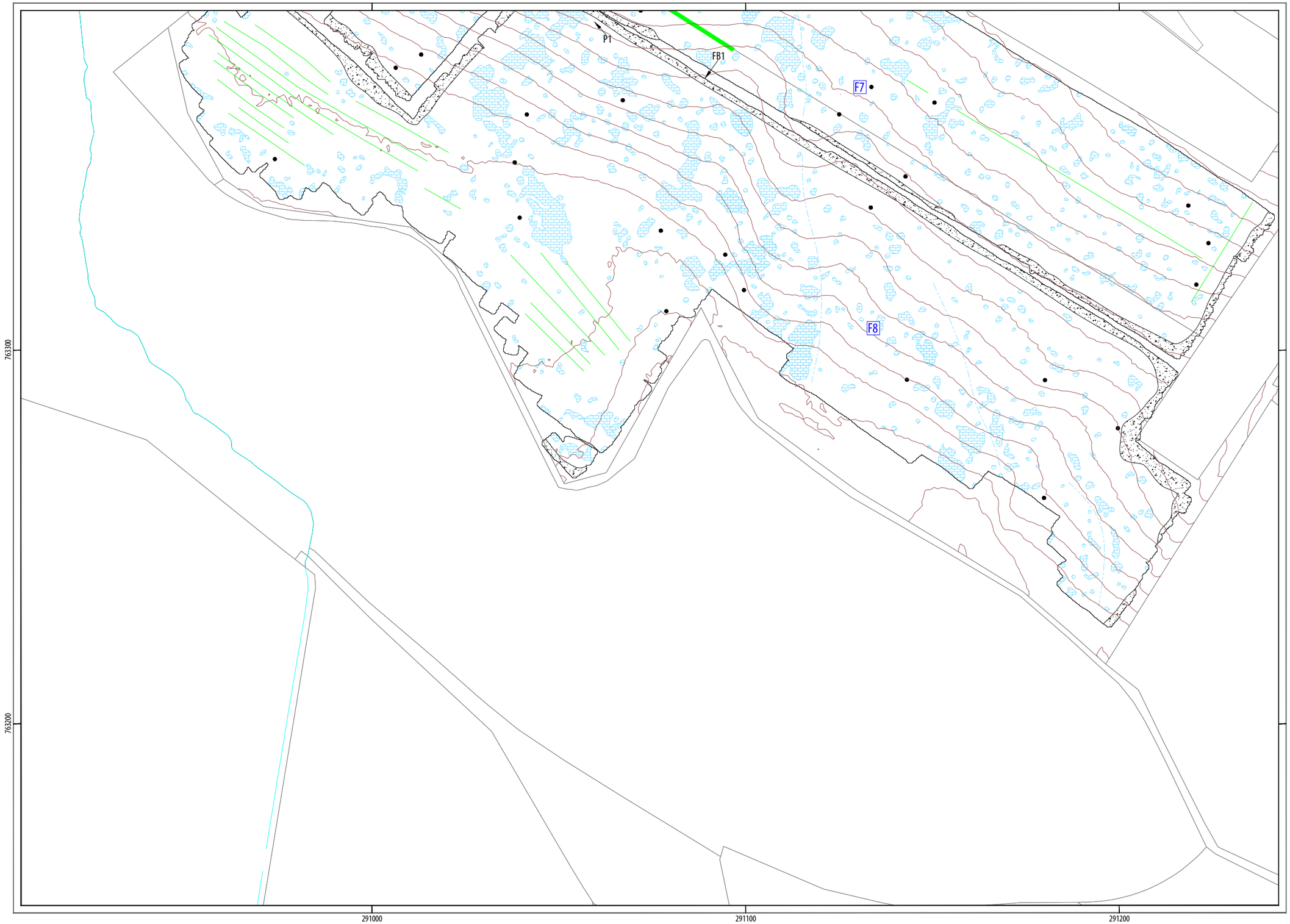
ILLUS 17 XY trace plot of minimally processed magnetometer data; Field F7-F8 (1:1,000)



TYPE OF ANOMALY | INTERPRETATION

- dipolar isolated | ferrous material
- magnetic disturbance | ferrous material
- linear trend | agricultural
- linear | former boundary
- linear trend | geological variation
- magnetic enhancement | geology?
- magnetic enhancement | archaeology?

ABBREVIATIONS

FB former boundary

P pit

0 25m

1:1,000 @ A3

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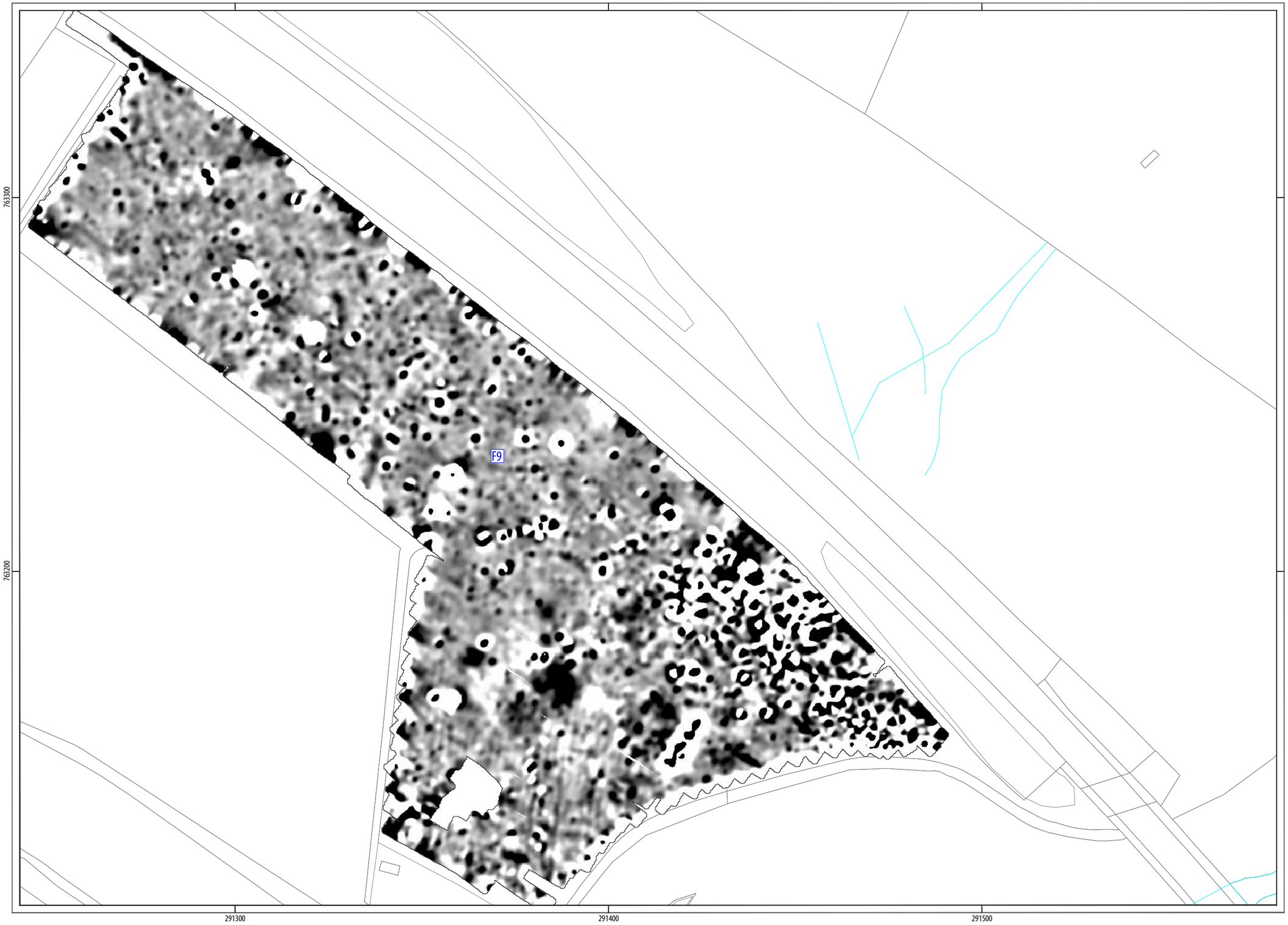
ILLUS 18 Interpretation of magnetometer data; Field F7-F8 (1:1,000)



nT
-1.0 2.0

0 25m
1:1,000 @ A3

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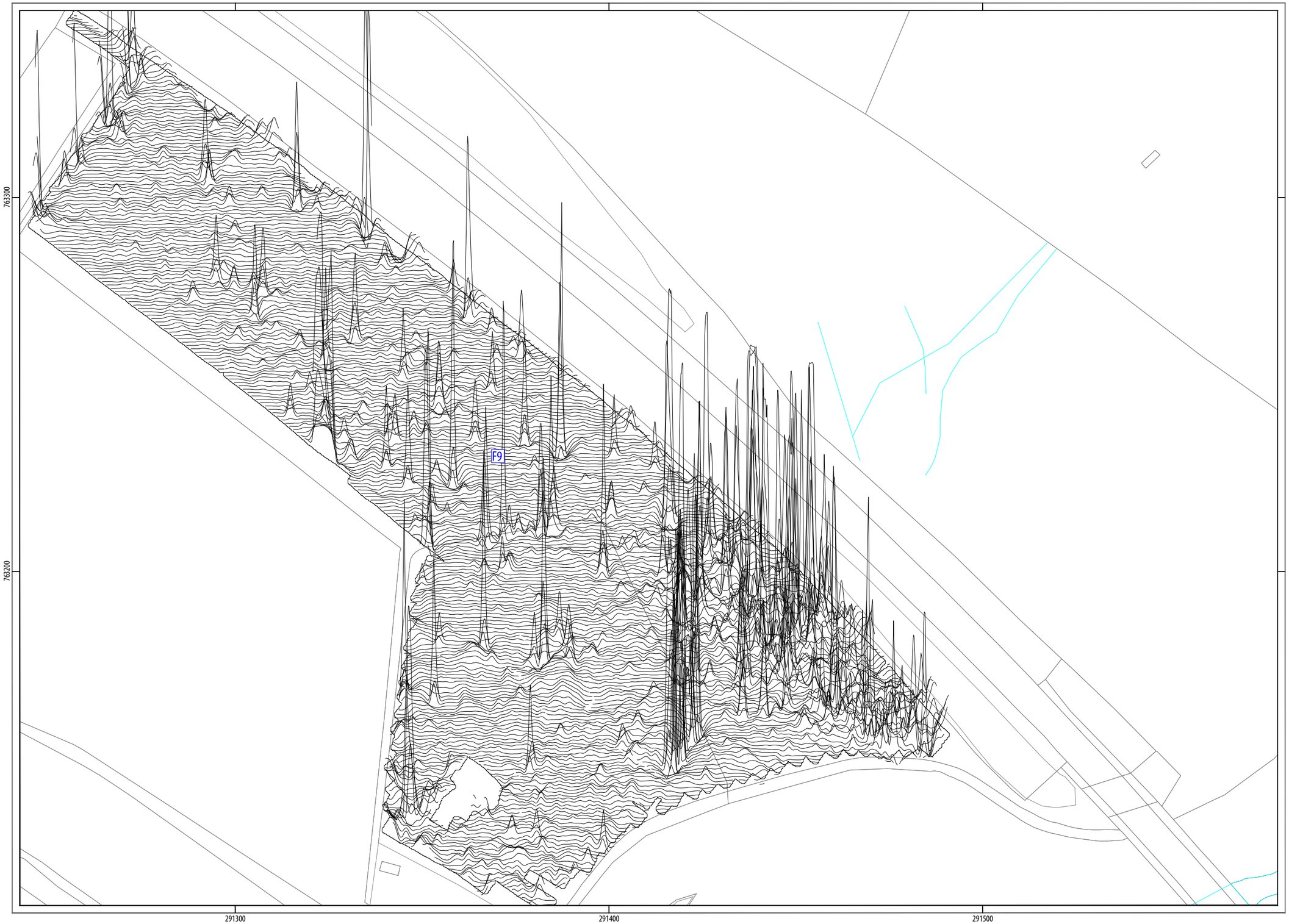
ILLUS 19 Processed greyscale magnetometer data; Field F9 (1:1,000)



32.0nT/cm

0 25m

1:1,000 @ A3

PROJECT KBFP18
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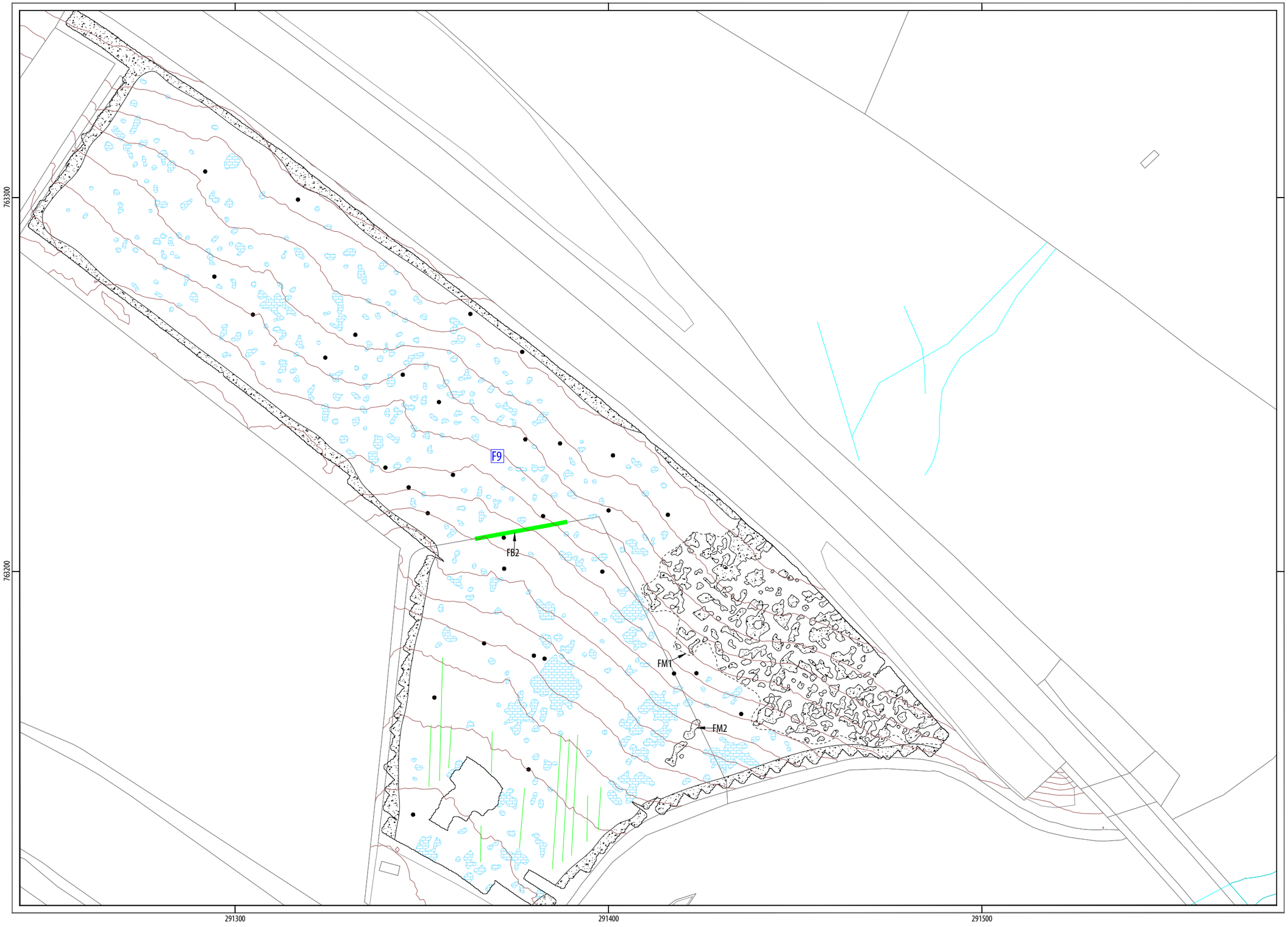
ILLUS 20 XY trace plot of minimally processed magnetometer data; Field F9 (1:1,000)



TYPE OF ANOMALY / INTERPRETATION

TYPE OF ANOMALY	INTERPRETATION
dipolar isolated	ferrous material
magnetic disturbance	ferrous material
linear trend	agricultural
linear	former boundary
magnetic enhancement	geology?

ABBREVIATIONS

FB former boundary

FM ferrous material

0 25m

1:1,000 @ A3

PROJECT KBFP18
A9 Dualling Programme: Killiecrankie to Glen Garry Geophysical Survey Jacobs UK Ltd on behalf of Transport Scotland

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ILLUS 21 Interpretation of magnetometer data; Field F9 (1:1,000)

7 APPENDICES

APPENDIX 1 MAGNETOMETER SURVEY

Magnetic susceptibility and soil magnetism

Iron makes up about 6% of the earth's crust and is mostly present in soils and rocks as minerals such as maghaemite and haematite. These minerals have a weak, measurable magnetic property termed magnetic susceptibility. Human activities can redistribute these minerals and change (enhance) others into more magnetic forms so that by measuring the magnetic susceptibility of the topsoil, areas where human occupation or settlement has occurred can be identified by virtue of the attendant increase (enhancement) in magnetic susceptibility. If the enhanced material subsequently comes to fill features, such as ditches or pits, localised isolated and linear magnetic anomalies can result whose presence can be detected by a magnetometer (fluxgate gradiometer).

In general, it is the contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of topsoils, subsoils and rocks into which these features have been cut, which causes the most recognisable responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or the bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected.

The magnetic susceptibility of a soil can also be enhanced by the application of heat. This effect can lead to the detection of features such as hearths, kilns or areas of burning.

Types of magnetic anomaly

In the majority of instances anomalies are termed 'positive'. This means that they have a positive magnetic value relative to the magnetic background on any given site. However some features can manifest themselves as 'negative' anomalies that, conversely, means that the response is negative relative to the mean magnetic background.

Where it is not possible to give a probable cause of an observed anomaly a '?' is appended.

It should be noted that anomalies interpreted as modern in origin might be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the feature causing the anomaly.

The types of response mentioned above can be divided into five main categories that are used in the graphical interpretation of the magnetic data:

Isolated dipolar anomalies (iron spikes) These responses are typically caused by ferrous material either on the surface or in the topsoil. They cause a rapid variation in the magnetic response giving a characteristic 'spiky' trace. Although ferrous archaeological artefacts could produce this type of response, unless there is supporting evidence for an archaeological interpretation, little emphasis is normally given to such anomalies, as modern ferrous objects are common on rural sites, often being present as a consequence of manuring.

Areas of magnetic disturbance These responses can have several causes often being associated with burnt material, such as slag waste or brick rubble or other strongly magnetised/fired material. Ferrous structures such as pylons, mesh or barbed wire fencing and buried pipes can also cause the same disturbed response. A modern origin is usually assumed unless there is other supporting information.

Linear trend This is usually a weak or broad linear anomaly of unknown cause or date. These anomalies are often caused by agricultural activity, either ploughing or land drains being a common cause.

Areas of magnetic enhancement/positive isolated anomalies Areas of enhanced response are characterised by a general increase in the magnetic background over a localised area whilst discrete anomalies are manifest by an increased response (sometimes only visible on an XY trace plot) on two or three successive traverses. In neither instance is there the intense dipolar response characteristic exhibited by an area of magnetic disturbance or of an 'iron spike' anomaly (see above). These anomalies can be caused by infilled discrete archaeological features such as pits or post-holes or by kilns. They can also be caused by pedological variations or by natural infilled features on certain geologies. Ferrous material in the subsoil can also give a similar response. It can often therefore be very difficult to establish an anthropogenic origin without intrusive investigation or other supporting information.

Linear and curvilinear anomalies Such anomalies have a variety of origins. They may be caused by agricultural practice (recent ploughing trends, earlier ridge and furrow regimes or land drains), natural geomorphological features such as palaeochannels or by infilled archaeological ditches.

APPENDIX 2 SURVEY LOCATION INFORMATION

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

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

The survey data were then super-imposed onto a base map provided by the client to produce the displayed block locations. However, it should be noted that Ordnance Survey positional accuracy for digital map data has an error of 0.5m for urban and floodplain areas, 1.0m for rural areas and 2.5m for mountain and moorland areas. This potential error must be considered if coordinates are measured off hard copies of the mapping rather than using the digital coordinates.

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

APPENDIX 3 GEOPHYSICAL SURVEY ARCHIVE

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

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

APPENDIX 4 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 GPS-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 5 OASIS DATA COLLECTION FORM: SCOTLAND

OASIS ID: headland5-322778

Project details	
Project name	A9 Dualling Programme: Killiecrankie to Glen Garry Archaeological Geophysical Survey
Short description of the project	Headland Archaeology (UK) Ltd undertook a programme of geophysical (magnetometer) survey, covering approximately 8 hectares at Killiecrankie in response to a request from Historic Environment Scotland (HES) that investigations are undertaken to inform their understanding of the potential impacts of the A9 Dualling Programme: Killiecrankie to Glen Garry on the site of the Battle of Killiecrankie (Ref BLT12), fought on the 27th July 1689. The geophysical survey is located south of the existing A9 and on either side of Urrard House, which is thought to have been at the core of the fighting. The survey has not identified any anomalies of definite archaeological potential with the magnetic datasets mainly identifying anomalies consistent with near-surface geological variation. A single high magnitude anomaly has been identified 230m east of Urrard House and interpreted tentatively as a possible large pit. Numerous ferrous spikes have been identified throughout the datasets. Any of these anomalies could be due to iron objects lost during the battle but it is impossible to discriminate such anomalies from modern ferrous debris.
Project dates	Start: 04-06-2018 End: 05-06-2018
Previous/future work	Not known / Yes
Any associated project reference codes	KBFP – Sitecode
Type of project	Field evaluation
Site status (other)	Registered Battlefield
Current Land use	Grassland Heathland 5 – Character undetermined
Monument type	BATTLE SITE Uncertain
Monument type	N/A None
Significant Finds	N/A None
Significant Finds	N/A None
Methods & techniques	"Geophysical Survey"
Development type	Road scheme (new and widening)
Prompt	Planning condition
Position in the planning process	Not known / Not recorded
Solid geology (other)	Killiecrankie Schist Formation – semipelite and micaceous psammite
Drift geology (other)	by glacial till – diamicton (sand and gravel) and in the south by glaviofluvial deposits – gravel, sand and silt
Techniques	Magnetometry
Project location	
Country	Scotland
Site location	PERTH AND KINROSS MOULIN A9 Dualling Programme: Killiecrankie to Glen Garry
Study area	8 Hectares
Site coordinates	NN 9109 6342 56.749787126454 -3.781173264813 56 44 59 N 003 46 52 W Polygon
Project creators	
Name of Organisation	Headland Archaeology
Project brief originator	Jacobs
Project design originator	Headland Archaeology
Project director/manager	Hatherley, C.
Project supervisor	Vansassenbrouck, O.
Type of sponsor/funding body	Developer
Entered by	Sam Harrison (sam.harrison@headlandarchaeology.com)
Entered on	18 July 2018

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