Archaeological geophysical survey of land east of Bicester Road, Kidlington Oxfordshire June – August 2021

Site Code: KID 21

Report No. 21/079

Author: Graham Arkley

Illustrator: Adam Meadows

Project Manager: John Walford
Site code: KID 21
NGR: SP 501 125

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Text:	Graham Arkley
Illustrations:	Graham Arkley

Project: BICESTER ROAD, KIDLINGTON			OASIS No: molanort1-502257
ACTIVITY TYPE			
Project/Activity type	Geophysical survey		
Reason for investigation	Planning: Between application and determination		
Development type	Residential development		
Planning reference ID	-		
PROJECT LOCATION			
National grid ref	SP 501 125		
Site name	Bicester Road, Kidlington		
REVIEWERS/ ADMIN			
HER for project	Oxfordshire		
National organisation	-		
WORK UNDERTAKEN			
Methodological summary	Magnetometer survey with a cart-mounted array of Bartington Grad-01-100L fluxgate gradiometers.		
Previous work?	None	Future works?	Yes
Dates - Start date:	14-06-21	End date:	15-08-21
GEOPHYSICS			
Geology	Oxford Clay. No drift geology recorded		
Land use (i.e. arable)	Pasture and hay meadow		
Survey type	Magnetometer survey		
Size of survey area	*c*27ha		
Instrumentation	Bartington Grad-01-1000L	Fluxgate – Multiple sensor	
Configuration	Pushed cart survey (8-probe)		
Spatial resolution	Traverse spacing 0.5m	Reading interval	0.225m
Resolution (data values)	0.1nT		
BIBLIOGRAPHY			
Title	Archaeological geophysical survey of land east of Bicester Road, Kidlington, Oxfordshire. June – August 2021		
Author(s)	Graham Arkley		
Publisher / place / date	MOLA Northampton / Northampton / 2021		
Report number	21/079		
Report release delay?	Six months		
PEOPLE			
Organisation	MOLA		
Project manager	John Walford		
Project supervisor	Graham Arkley		
Funding body	Barwood Land (via CSA Environmental)		
KEYWORDS			
Monuments found/ date	Settlement – Iron Age or Roman Trackway – undated		
RESULTS			
Description of outcomes	A rectilinear enclosure complex and associated trackway, covering at least 1.5ha, was detected near the centre of the survey area. The overall character and plan of these remains suggested that they may date from the late Iron Age or the Roman period. Other archaeological remains were detected in the north and south of the survey area but in each case these were slight and marginal features which could not be adequately characterised.		
ARCHIVES			
Accession ID	KID21		
Finds Archive repository	None	Expected date of submission:	-
Paper Archive repository	None	Expected date of submission:	-
Digital Archive repository	TBC	Expected date of submission:	TBC

CONTENTS

Figures

Archaeological geophysical survey of land east of Bicester Road, Kidlington, Oxfordshire. June – August 2021

ABSTRACT

MOLA (Museum of London Archaeology) was commissioned to undertake a magnetometer survey across c27ha of land east of Bicester Road, Kidlington, Oxfordshire. A rectilinear enclosure complex and associated trackway, covering at least 1.5ha, was detected near the centre of the survey area. The overall character and plan of these remains suggested that they may date from the late Iron Age or the Roman period. Other archaeological remains were detected in the north and south of the survey area but in each case these were slight and marginal features which could not be adequately characterised.

1 INTRODUCTION

MOLA (Museum of London Archaeology) was commissioned by CSA Environmental, on behalf of their client Barwood Land, to undertake an archaeological geophysical survey across three fields to the east of Bicester Road, Kidlington, Oxfordshire (NGR SP 501 125) (Fig 1). The purpose of the survey was to identify and map any archaeological remains which may be affected by a proposed development scheme.

The survey comprised a magnetometer survey, and was conducted in two stages. The survey of the northern and central fields (Fields 1 and 2) occurred between the 14th and 16th June 2021 and a return visit was made on the 4th and 5th August to survey the southern field (Field 3). The works were conducted under a Written Scheme of Investigation (MOLA 2021) approved by Richard Oram the Lead Archaeologist at Oxfordshire County Council. The survey was also conducted in accordance with Chartered Institute for Archaeologists and European Archaeological Council guidelines (CIfA 2014 and Schmidt *et al* 2015).

2 BACKGROUND

2.1 Location, geology and topography

The survey area included three grass fields east of Bicester Road, Kidlington (Fig 1). These are surrounded and divided by hedgerows and gates, and bounded by Bicester Road, Oxford Road (the A4165) and the A34 to the west, south and east respectively. Further fields lie to the north, with Kidlington Cemetery to the north-west and part of the hamlet of Gosford along Water Eaton Lane to the north-east

At the time of survey Fields 1 and 2 lay under *c*15cm high grass. Field 3 was under a hay crop throughout June and July but was mown shortly before the return visit in August.

The survey area stands to the west of the River Cherwell valley and is broadly level between 60-65m above Ordnance Datum (Hoffstetter 2021). The British Geological Survey (BGS) records a geology of Oxford Clay with no overlying drift deposits (BGS 2021).

2.2 Historical and archaeological background

The following heritage background statement has been provided by CSA Environmental, based on their review of data from the Oxfordshire Historic Environment Record (HER) (R. Meara *pers comm*):

No Palaeolithic, Mesolithic, Neolithic or Bronze Age activity is recorded within, or in the immediate vicinity of the Site although there is some evidence of Mesolithic-Bronze Age activity in the area. The findspot of a Mesolithic macehead is recorded from the general vicinity of Water Eaton, east of the Site (HER ref. 1325). A pit associated with worked flint, likely of Neolithic date, was recorded during archaeological works south of Lock Crescent, along with undated features potentially of Neolithic or Bronze Age date (HER ref. EOX102, EOX1304; Oxford Archaeology 1994). Subsequent targeted excavation recorded a substantial assemblage of Mesolithic to Neolithic flint. Archaeological works associated with East West Rail Phase 1, to the south-east of the Site, recorded as small assemblage of prehistoric flint (HER ref. 29013).

Bronze Age round barrows, including two extant barrows, are recorded c. 750m south of the Site (HER ref. 1323/1324). Ring ditch cropmarks, which might represent barrows or potentially prehistoric round houses, are recorded c. 800m north-east of the Site.

The A4165, which bounds the south-western edge of the Site, may follow the course of the Oxford Ridgeway, a historic routeway potentially of Roman origin (HER ref. 8861).

Archaeological works associated with East West Rail Phase 1 recorded Roman period activity including rectilinear enclosures, boundaries and a trackway, likely associated with stock management to the east of the Site (HER ref. 29013; Oxford Archaeology 2016). Archaeological works at the North Oxford Park and Ride recorded a Roman period ditch (HER ref. 16191). Cropmarks likely to represent Iron Age and Roman period agricultural activity and settlement are recorded further east (HER ref. 17430, 17431, 9654).

Trial trench evaluation immediately north of the Site, comprising 9 trenches, recorded an undated ditch not aligned with the extant field system. A pre-medieval date is not ruled out for this feature. Finds, recovered from the topsoil, included a single heavily abraded sherd of Roman period pottery (HER ref. 26418; John Moore Heritage Services 2010).

Iron Age / Roman period activity is also recorded at Yarnton Marina at the western extent of the study area (HER ref. 15098; Cotswold Archaeology 2009). Archaeological excavation to the south of Lock Crescent recorded an enclosure of Iron Age / early Roman date (HER ref. EOX1304; Booth 1997).

No Early Medieval finds or features are recorded within the Site or the study area. The Site was historically part of the hamlet of Gosford, part of Kidlington Parish. Medieval settlement within Gosford is recorded c. 450m north of the Site (HER ref. 1066). The Site was most likely part of the agricultural hinterland to Gosford in the medieval period and ridge and furrow earthworks of likely medieval origin are extant within the Site. Historic mapping indicates the Site remained in agricultural use through to the present day.

In addition to the above, it should be noted that MOLA has previously undertaken a geophysical survey at Stratfield Farm, *c*200m west of the present site and adjacent to the Lock Crescent excavation area. This revealed remnants of ridge and furrow cultivation and some other scattered and fragmentary features of possible archaeological interest (Walford 2018).

3 METHODOLOGY

3.1 Fieldwork

The magnetometer survey was undertaken with a Bartington magnetometer cart. This is a two-wheeled, lightweight sensor platform designed to be pushed by hand. It incorporates a bank of eight vertically-mounted Bartington Grad-01-1000L magnetic sensor tubes, spaced at consistent half-metre intervals along a bar aligned crossways to the direction of travel. These sensors were calibrated ('zeroed') at the start of each day's survey to minimise heading errors and offsets in their zero values.

The cart incorporates a Leica Geosystems Viva GPS antenna mounted on the central axis, 1.02m astern of the sensors. The magnetic sensors each output data at a rate of eight readings per second and the GPS antenna outputs NMEA format data (GGA messages) at a rate of one position per second. These data streams are compiled into a single raw data file by MultiGrad601 logging software specifically designed for that purpose.

The cart was propelled along straight and parallel traverses across the survey area, with data logging being toggled on and off at the start and end of each traverse to avoid the collection of spurious data whilst turning. Traverse ends were marked with ranging poles to aid even coverage, and the evenness of coverage was further checked by monitoring the positional trace plotted in real time by the MultiGrad601 logging software. The typical speed of coverage was under 1.8m/s, with an effective data resolution thus approximated to better than 0.225m x 0.50m.

3.2 Data processing and presentation

The raw survey data was initially processed with MLGrad601 software, which calculated a UTM co-ordinate for each data point by interpolating the GPS readings and applying offset corrections based on the array geometry and calculated heading direction. This produced an output file in XYZ format which could be imported into TerraSurveyor software for data visualisation and further processing.

The raw XYZ data exhibited minor striping caused by slight mismatches in the calibration of the individual magnetic sensors. This was removed in TerraSurveyor by applying the median destripe function to runs of data from each sensor.

The processed survey data is presented in this report as greyscale raster images which have been rotated and scaled to fit against topographic base-mapping at a scale of 1:2000.

The processed magnetometer data is displayed at +/-2nT (Figs 2 and 3). An interpretive overlay highlights notable anomalies for discussion (Figs 4 and 5). A minimally processed data plot for the magnetometer survey is presented at a scale of +/ 10nT (Figs 6 and 7) as a comparison to the final destriped results.

XY trace plots of the processed data have also been produced, by outputting a regular grid of XYZ values from TerraSurveyor and using a bespoke in-house procedure to generate vector files from this. The traces are presented at 1:1500, rather than the 1:2000 scale of the other data plots, for the sake of greater legibility (Figs 8-10).

4 SURVEY RESULTS

Overview

The survey has detected a collection of anomalies in Field 2 which probably indicate the remains of a settlement clustered around a T-junction of trackways. Further fragmentary linear anomalies suggest the lines of other trackways in Fields 1 and 3 and there are indications of separate archaeological sites intruding slightly into the north-eastern corner of Field 1 and the southern tip of Field 3. More recent features including medieval or post-medieval ridge and furrow and a plough headland as well as modern utilities, have also been revealed.

Probable archaeology

The series of magnetically positive linear anomalies in the centre and east of Field 2 represent ditches defining a rectilinear pattern of enclosures (Figs 2 and 4). The majority of these lie to either side of a pair of trackway ditches that are aligned roughly north to south, with a short but broad spur of trackway branching to the east and terminating amongst the enclosures. Other anomalies indicate a detached but similarly oriented group of enclosures a short distance to the south-east, in the corner of the field. A loose collection of discrete positive anomalies, probably representing pits, has also been detected, with a distribution biased towards the north and north-west of the site. Considered as a whole, these remains have the appearance of a small but coherently planned settlement, perhaps of late Iron Age to Roman date.

The magnetic responses from this probable settlement are generally weak and have a fragmentary appearance, being noticeably weaker or wholly interrupted where features are crossed by ridge and furrow. This evident disruption of the site by medieval to post-medieval ploughing broadly supports the suggested pre-medieval dating.

In the north-east of Field 1 the survey has detected a pair of short, curving anomalies, each one measuring *c*15m long and probably representing a section of ditch. Their southern portions are overlain by a broad magnetic response from a modern utility and their northern ends are lost beyond the edge of the survey area. No further discussion can be supported on such slender evidence.

In the southern corner of Field 3 the survey data reveals a T-shaped positive anomaly, measuring *c*14m x 10m, which may represent the north-eastern corner of a rectangular enclosure. This is almost directly west of two short, concentric arcs, measuring *c*11m and *c*17m across and separated by *c*4m, which strongly suggest a portion of a double-ditched enclosure. Unfortunately, the eastern extents of both arcs are lost in the magnetic noise from the adjacent fence and road.

Possible archaeology

The survey has detected pairs of weak and intermittent linear anomalies in the south-eastern corner of Field 1 and east of centre in Field 3, with spacings of *c*5m and *c*8m respectively. They both lie across the direction of the ridge and furrow and are offset from the angle of the survey traverses, so cannot be dismissed as plough marks or as residual data striping. The most credible interpretation would be as pairs of ditches flanking roads or trackways, although in neither case do the ditches align the trackway ditches projecting from the settlement in Field 2.

Disparate weak, unconnected fragments of positive linear and curvilinear anomalies have been detected in the centre of Field 3 and the north and centre of Field 1. These are too scattered and fragmentary to allow detailed or confident discussion.

Ridge and furrow

The survey has detected three sets of parallel linear anomalies which match with the surviving ridge and furrow earthworks. Two sets are aligned east to west and exhibit the typical reverse S-profile of ridge and furrow, whilst the third is aligned north to south and has an almost straight profile.

One of the east to west sets of furrows crosses Field 2 and the eastern sides of Fields 1 and 3, with noticeably enhanced magnetic responses to the east of the probable settlement. The second set lies across the western half of Field 3 on a very similar alignment. The boundary between the two is defined by the western hedgeline of Field 2 and by a headland earthwork projecting southwards on the same alignment (*pers obs*). The two sets butt end to end at the headland, appearing almost continuous, and this suggests that what were originally two sets of furrows may at some point have been joined together and ploughed as a whole.

The headland does not have a consistent magnetic signature, but one short positive linear anomaly corresponds with a part of its line. There is also a perceptible, though very, diffuse concentration of magnetic dipoles (indicative of ferrous debris) along its length.

The third set of furrows lies in the west of Field 1. The absence of a reverse S-profile is notable, and suggests that these furrows may relate to a different, perhaps more modern, episode of cultivation than the others.

Historic field boundaries

A short positive linear anomaly can be seen in Field 3, projecting west-south-west from the corner of the hedge shared with Field 2. It correlates with a field boundary depicted on the first Ordnance Survey County Series map of 1876 to 1884 and removed by 1899 (National Library of Scotland 2021, Old Maps 2021).

Utilities

The survey data reveals a strong linear anomaly with alternating polarity across the north of Field 1. This is a typical response for a buried metal pipe or cable (Fig 4).

The survey has also detected a series of very large dipolar responses with large negative haloes across the centre and south of Field 3 (Fig 5). These correlate with two sets of wooden telegraph poles supporting overhead cables (*pers obs)*. A cluster of other strong anomalies occur where the lines converge at the south-western field boundary, and these probably indicate associated pieces of electrical infrastructure.

Ferrous objects

The data contains several very large magnetic dipoles with substantial haloes which relate to surface obstructions such as metal troughs and hay-feeders. Other dipoles of similar size have no obvious above-ground cause and probably relate to large buried metal objects.

Much smaller discrete dipolar anomalies are widespread across the survey area, and a representative sample of the clearer examples have been flagged on the interpretation plots. The individual dipoles will typically relate to incidental ferrous material on or close to the surface, such as modern litter and scraps of agricultural debris (wire, nails, *etc*).

A very distinct, narrow band of dipoles crosses Field 2 from east to west, following the line of one of the medieval furrows. This perhaps represents an accumulation of debris along the course of a modern, temporary fence subdividing that field.

Ferrous haloes

Small positive and negative magnetic haloes around the boundaries of the fields arise from post and wire fencing within the hedges, with larger haloes around the gates between fields (Figs 3 and 5). At the eastern edge of field 3 there are also some small bar-shaped anomalies (not highlighted on the interpretation figures) which form an essentially random pattern of interference from lorries passing along the adjacent road.

5 CONCLUSION

The survey has detected a compact collection of rectangular enclosures grouped around a T-junction of trackways in the centre and east of Field 2, with an outlying set of enclosures in the south-east of the same field. The layout and form of these remains suggest that they form part of a settlement, perhaps of late Iron Age to Roman date. A medieval or later date appears unlikely as the remains are overlain and interrupted by ridge and furrow earthworks which are themselves likely to have medieval origins.

As mapped by the survey the site appears to cover around 1.5ha, but its full extent may be somewhat greater than this. Many of the features are represented by weak and seemingly incomplete anomalies; for instance the enclosures west of the trackway lack well-defined western edges. This is probably an instance of the well-known ‘habitation effect’ (Gaffney and Gater 2003), whereby features in the core of a site are sometimes found to be more magnetically enhanced, and therefore more readily detectable, than those at its margins.

Separate groups of archaeological features have been identified in the north-eastern corner of Field 1 and the southern tip of Field 3. In each case these features cover only a small area of ground and probably represent the edges of sites lying largely outside the survey area. Less certain archaeological remains, including two possible trackways, have been detected in a variety of other locations across all three fields.

A buried pipe or cable crosses the north of the survey area and two sets of wooden telegraph poles cross the southern field. These features should be noted as obstacles to any archaeological trenching which may subsequently occur.

6 BIBLIOGRAPHY

BGS 2021 The British Geological Survey Geology of Britain Viewer, http://mapapps.bgs.ac.uk/geologyofbritain/home.html, last accessed 27th August 2021

CIfA 2014 *Standard and Guidance for Archaeological Excavation,* Chartered Institute for Archaeologists

Gaffney, C, and Gater, J, 2003 *Revealing the buried past: Geophysics for archaeologists*, Tempus Publishing

GE 2021 Google Earth, last accessed 27th August 2021

Hoffstetter, C, 2021 *Contour map creator*, https://contourmapcreator.urgr8.ch/, last accessed 27th August 2021

National Library of Scotland 2021 *Explore georeferenced maps*, https://maps.nls.uk/, National Library of Scotland, last accessed 27th August 2021

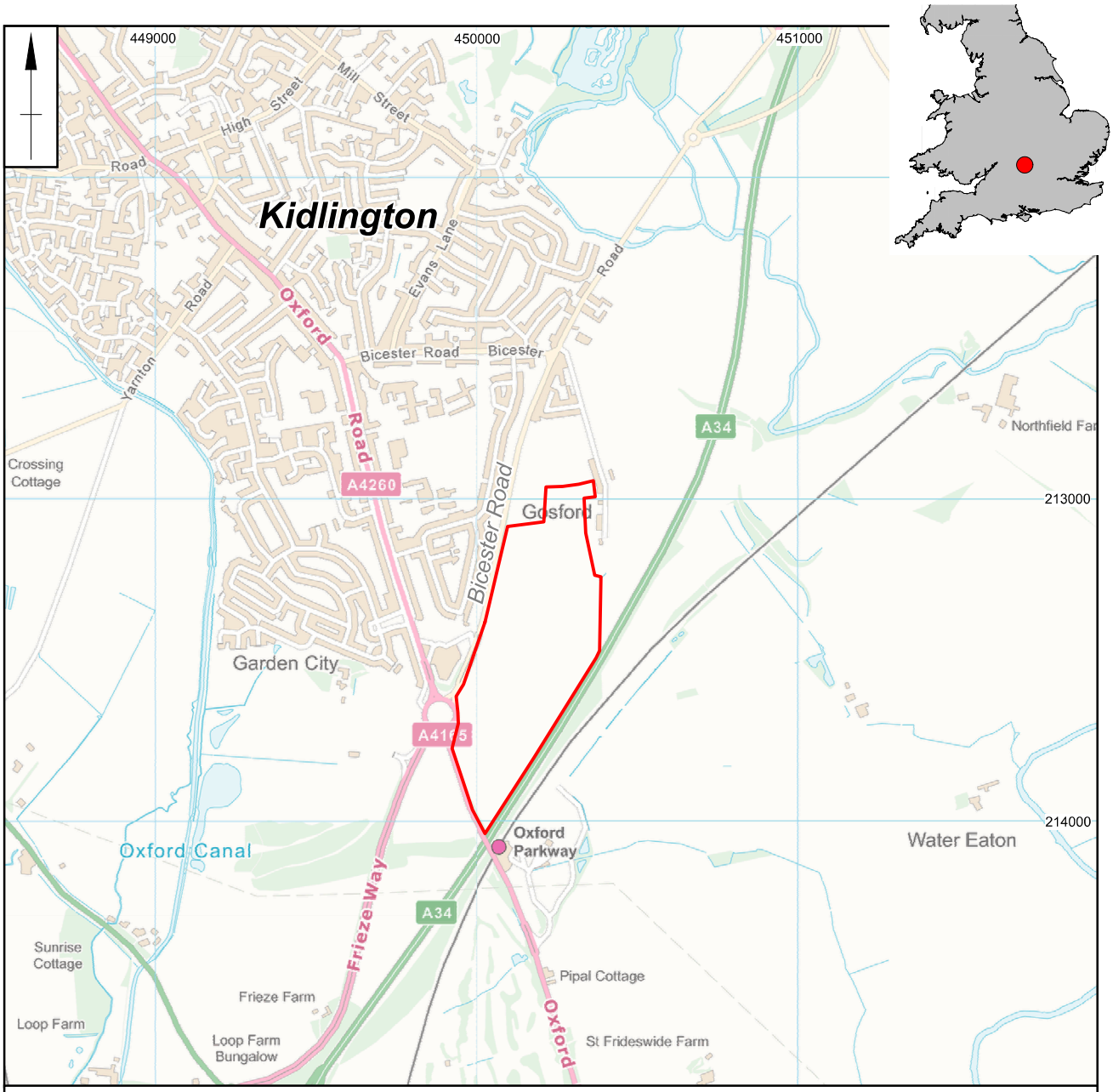
Old Maps 2021 *Historic Ordnance Survey Map Search*, https://www.old-maps.co.uk, Old-Maps, last accessed 27th August 2021

Schmidt, A, Linford, P, Linford, N, David, A, Gaffney, C, Sarris, A, and Fassbinder, J, 2015 *Guidelines for the use of geophysics in archaeology: Questions to ask and points to consider*, European Archaeological Council

Walford, J, 2018 *Archaeological geophysical survey at Stratfield Farm, Kidlington, Oxfordshire, September 2018*. MOLA Northampton report no. **18/114**

MOLA

6th September 2021

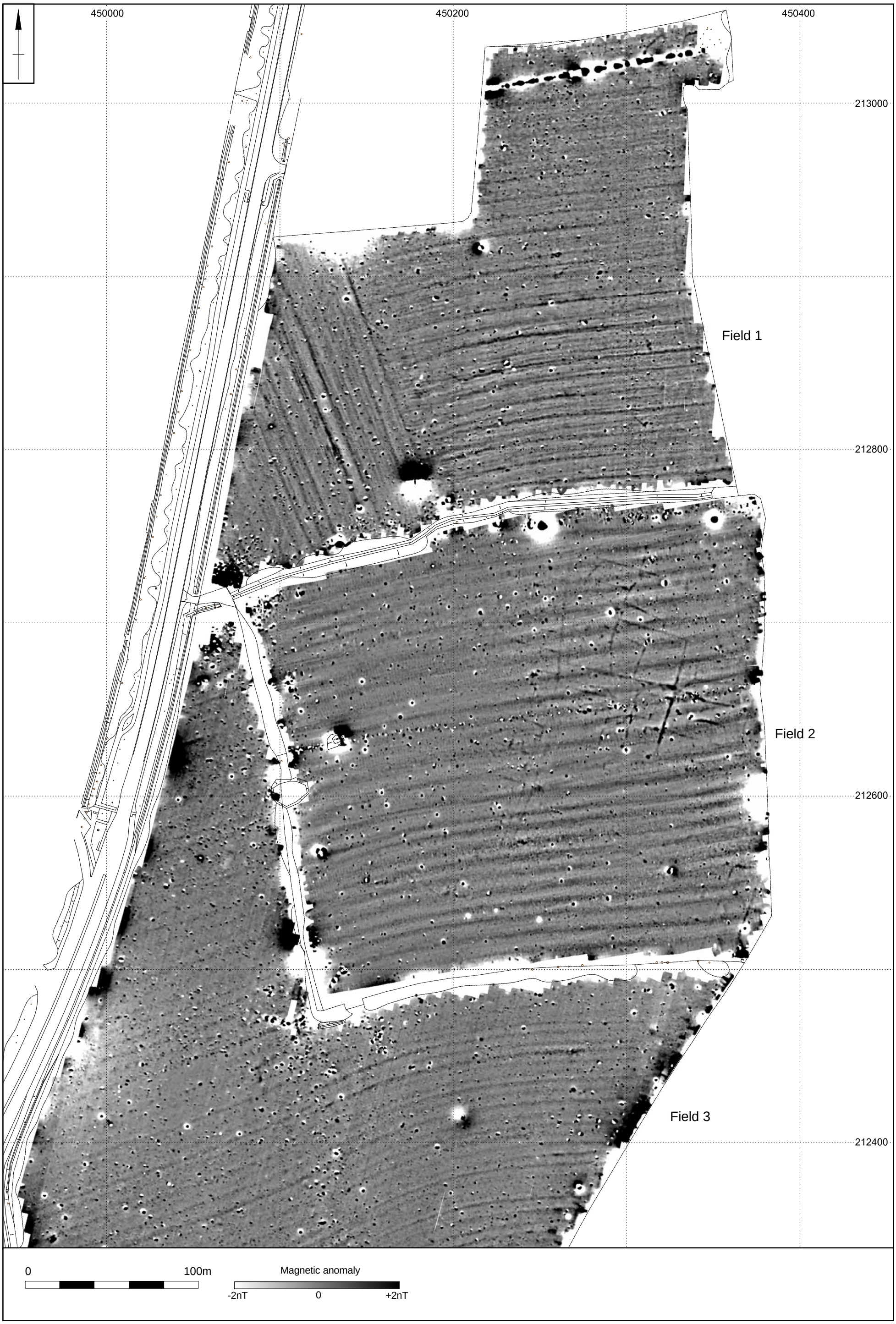


0 1km

Survey area

Scale 1:20,000

Site location Fig 1



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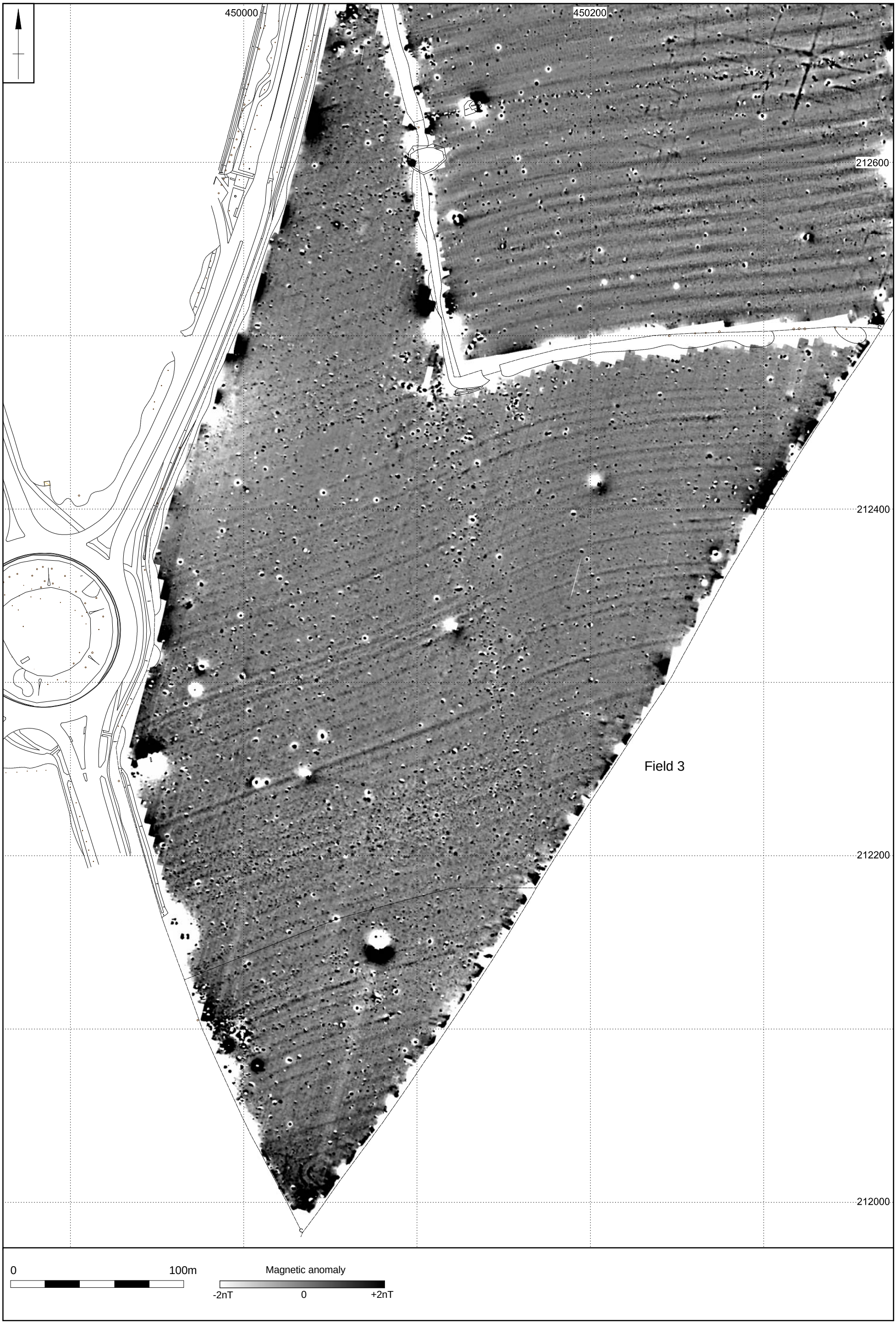
Magnetometer survey results (North) Fig 2



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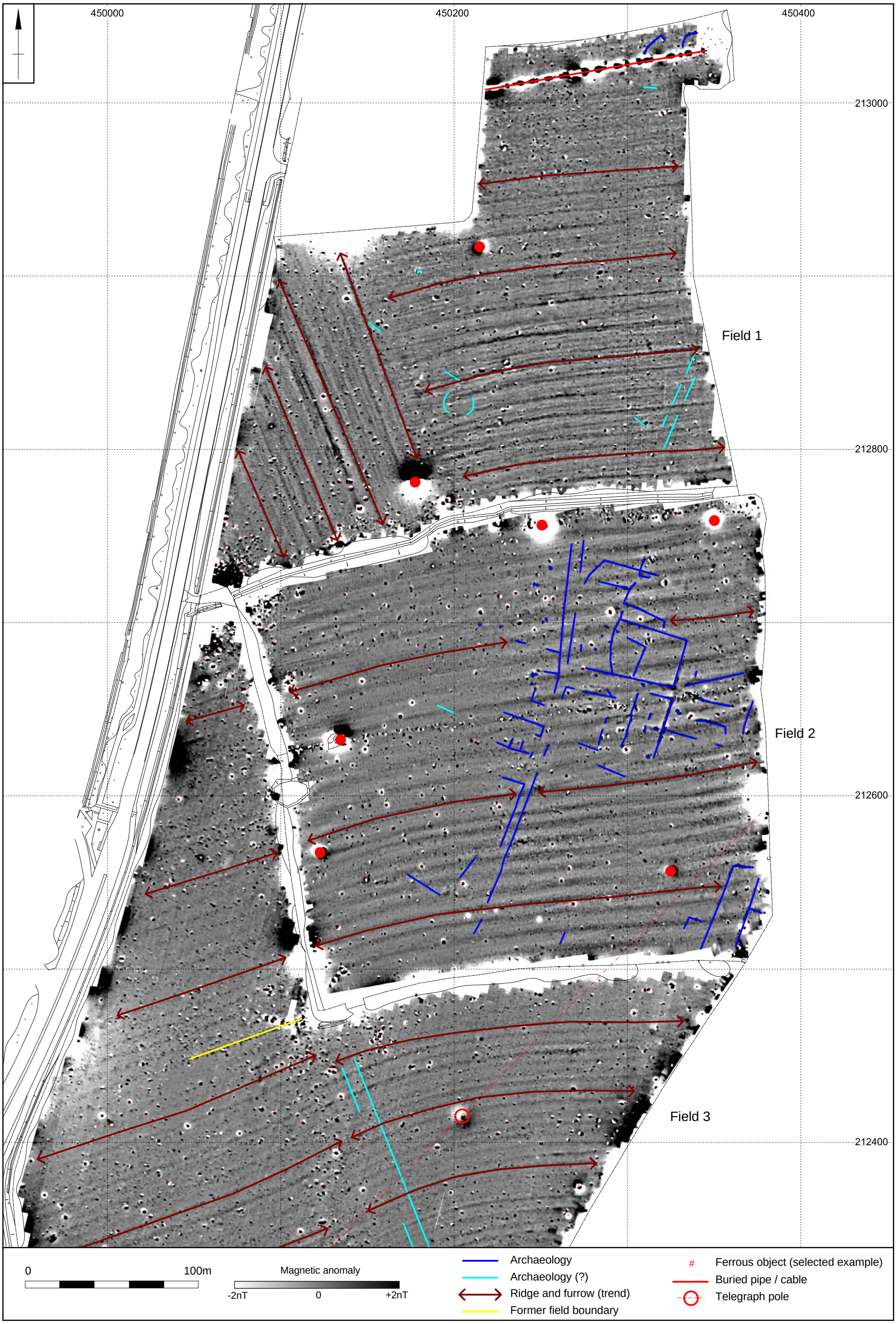
Magnetometer survey results (South) Fig 3



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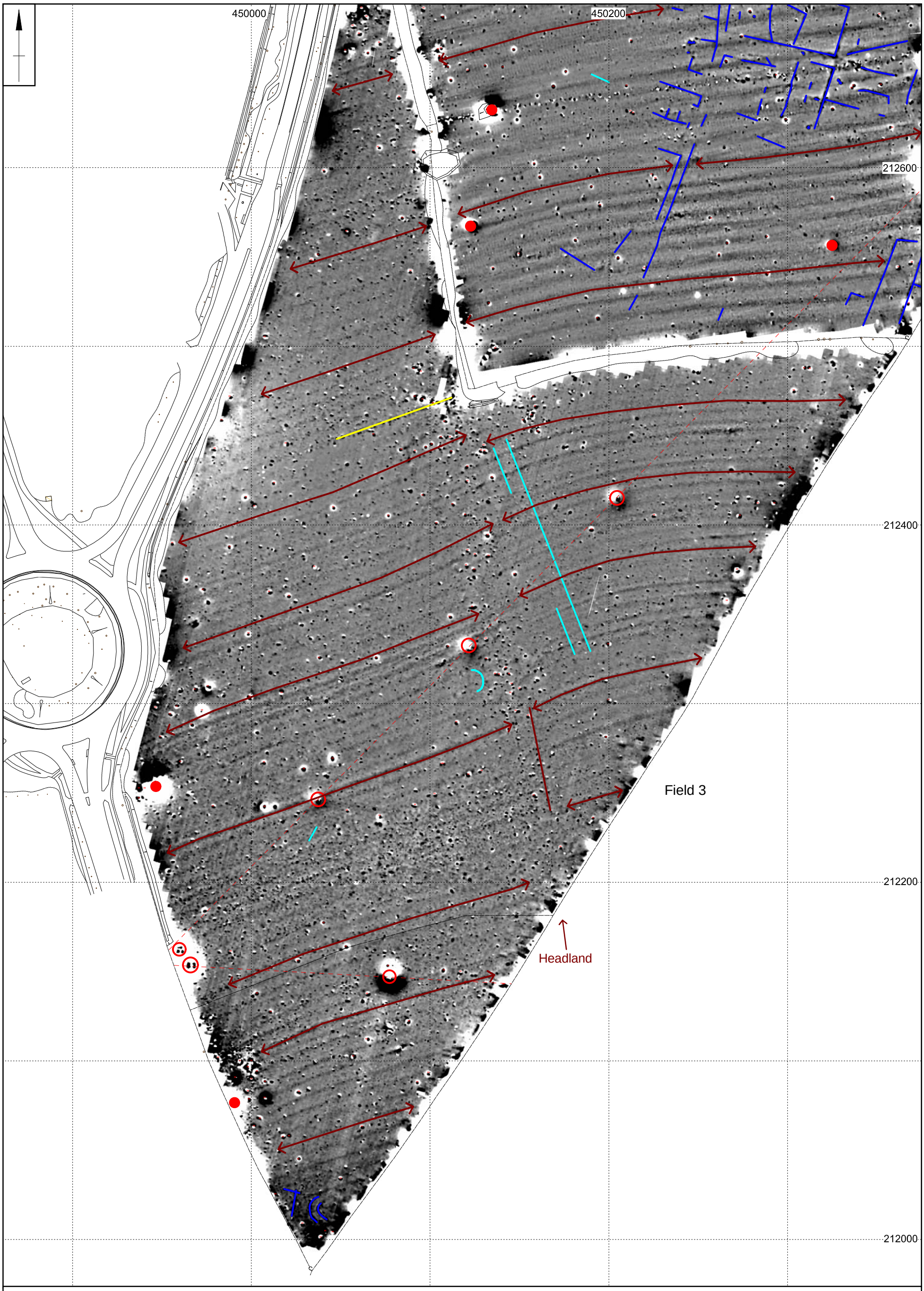
Magnetometer survey interpretation (North) Fig 4



0 100m

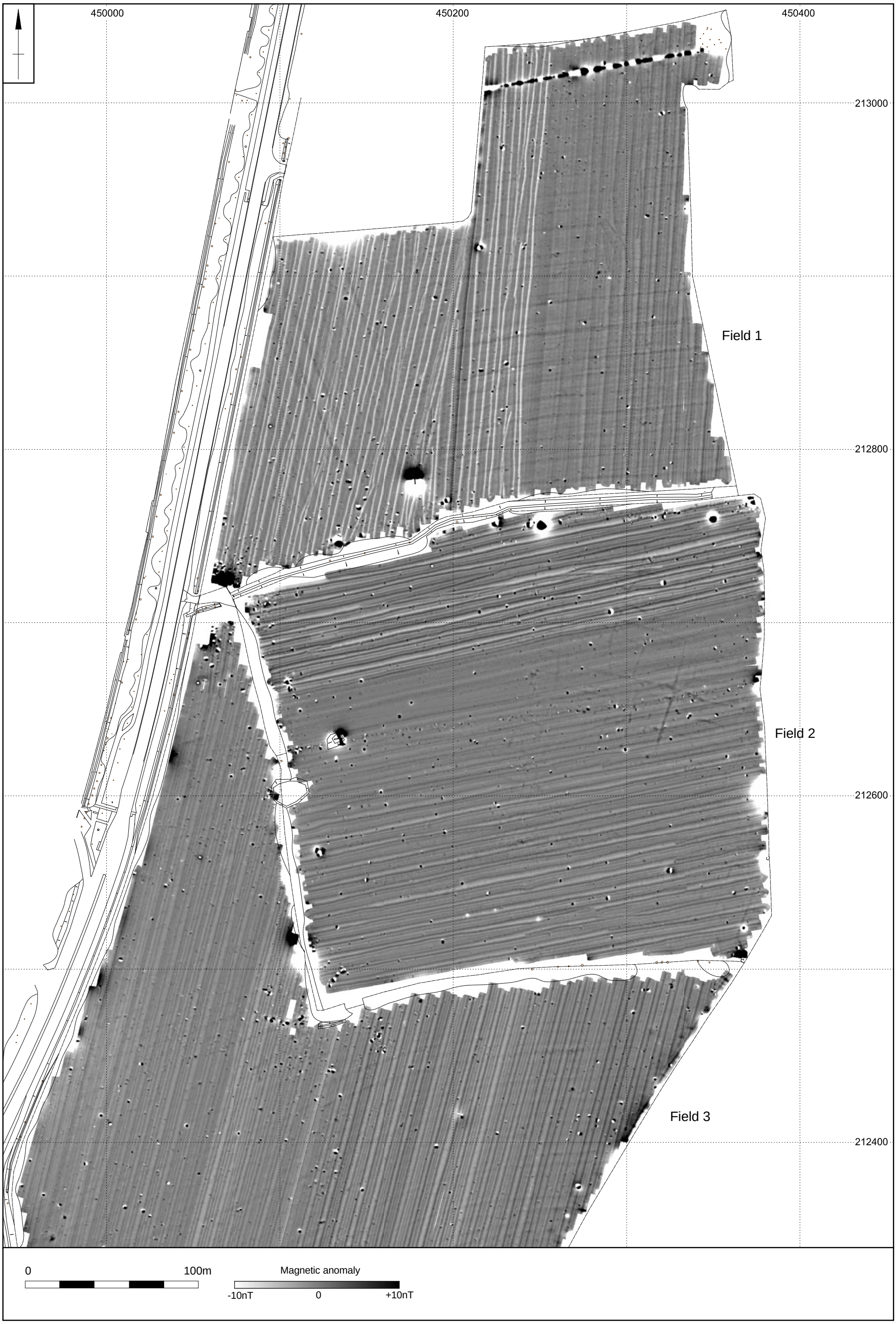
Magnetic anomaly
-2nT 0 +2nT

Archaeology
Archaeology (?)
Ridge and furrow (trend)
Former field boundary

Ferrous object (selected example)
Buried pipe / cable
Telegraph pole

Scale 1:2000 (A3)

Magnetometer survey interpretation (South) Fig 5



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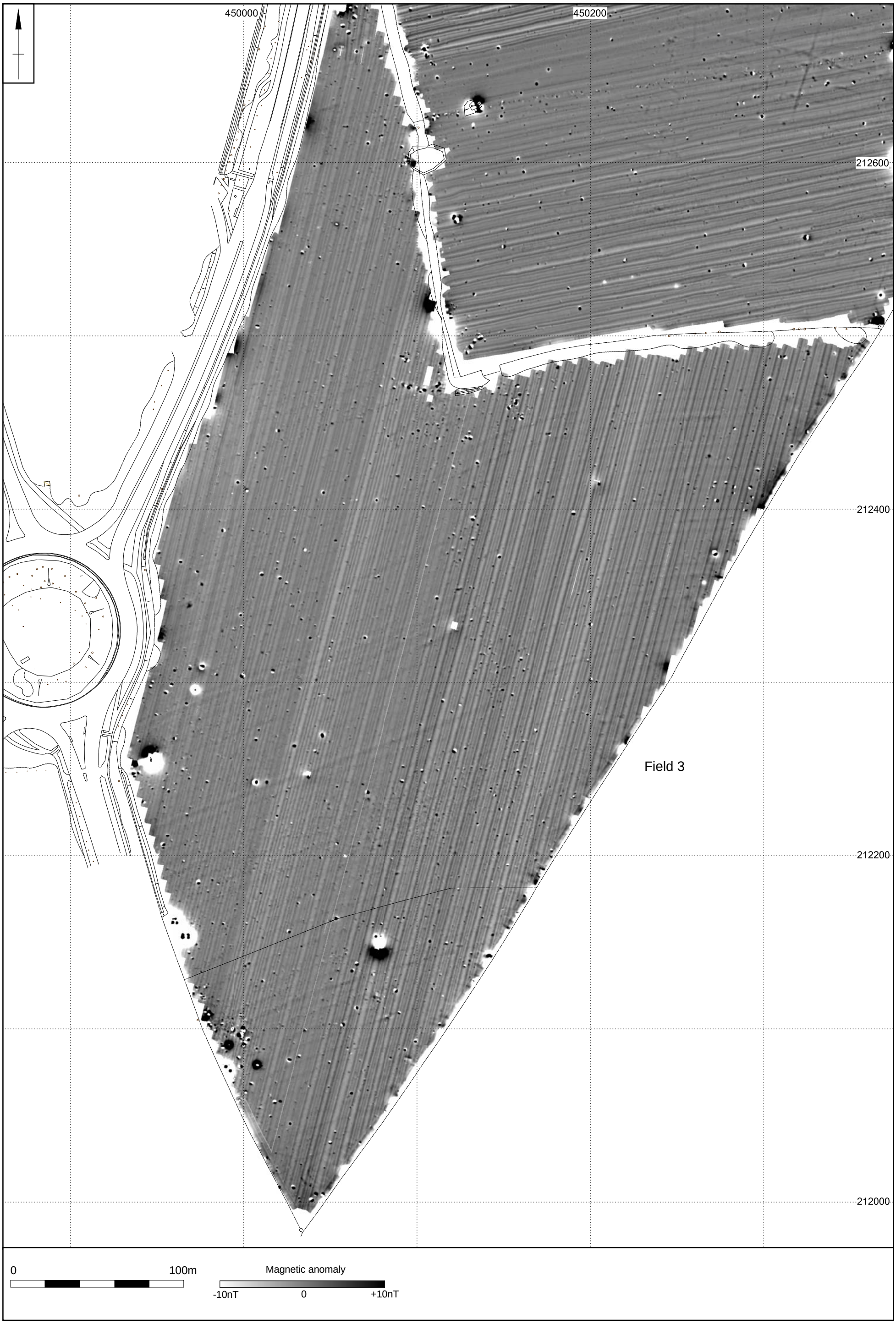
Unprocessed magnetometer data (North) Fig 6



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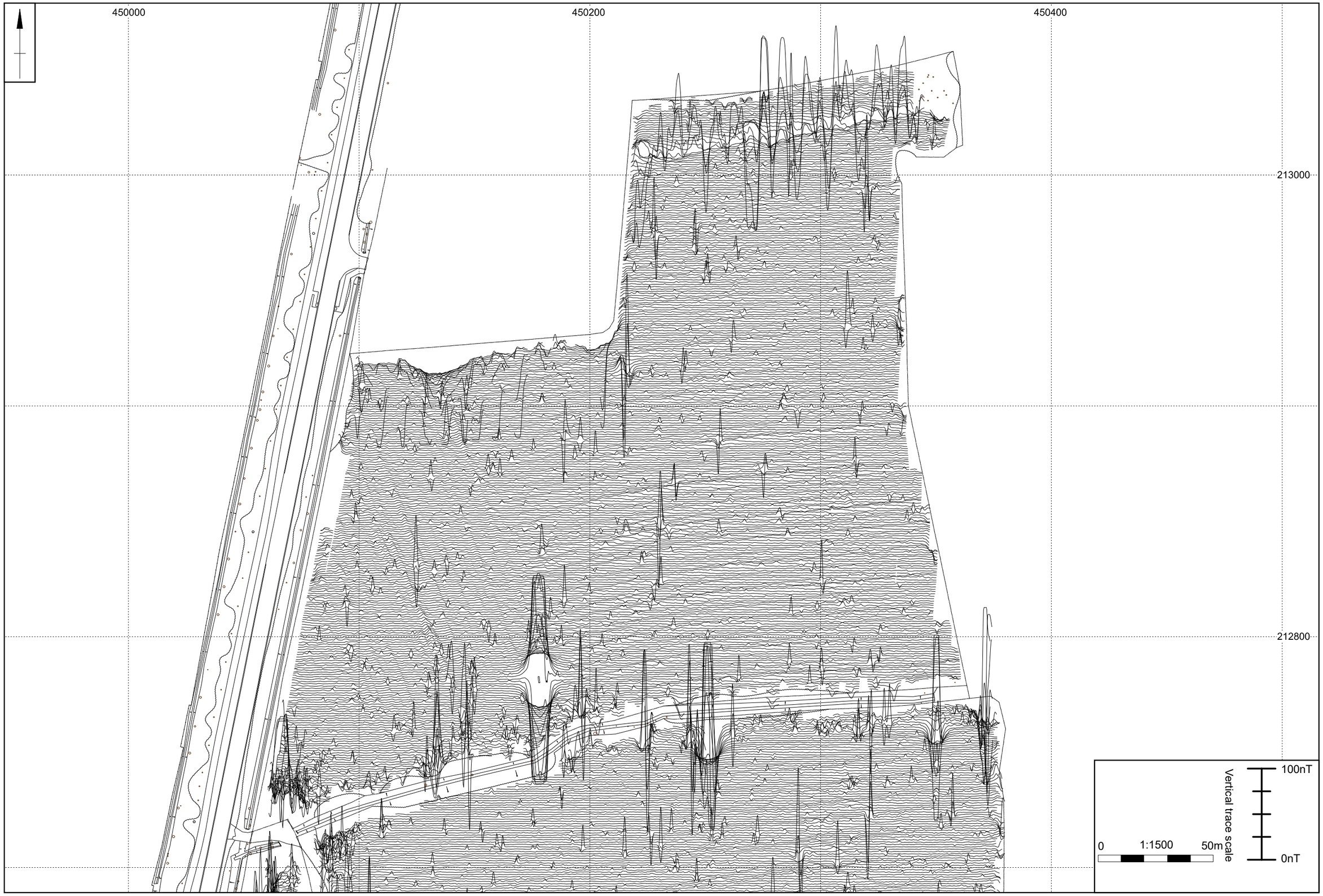
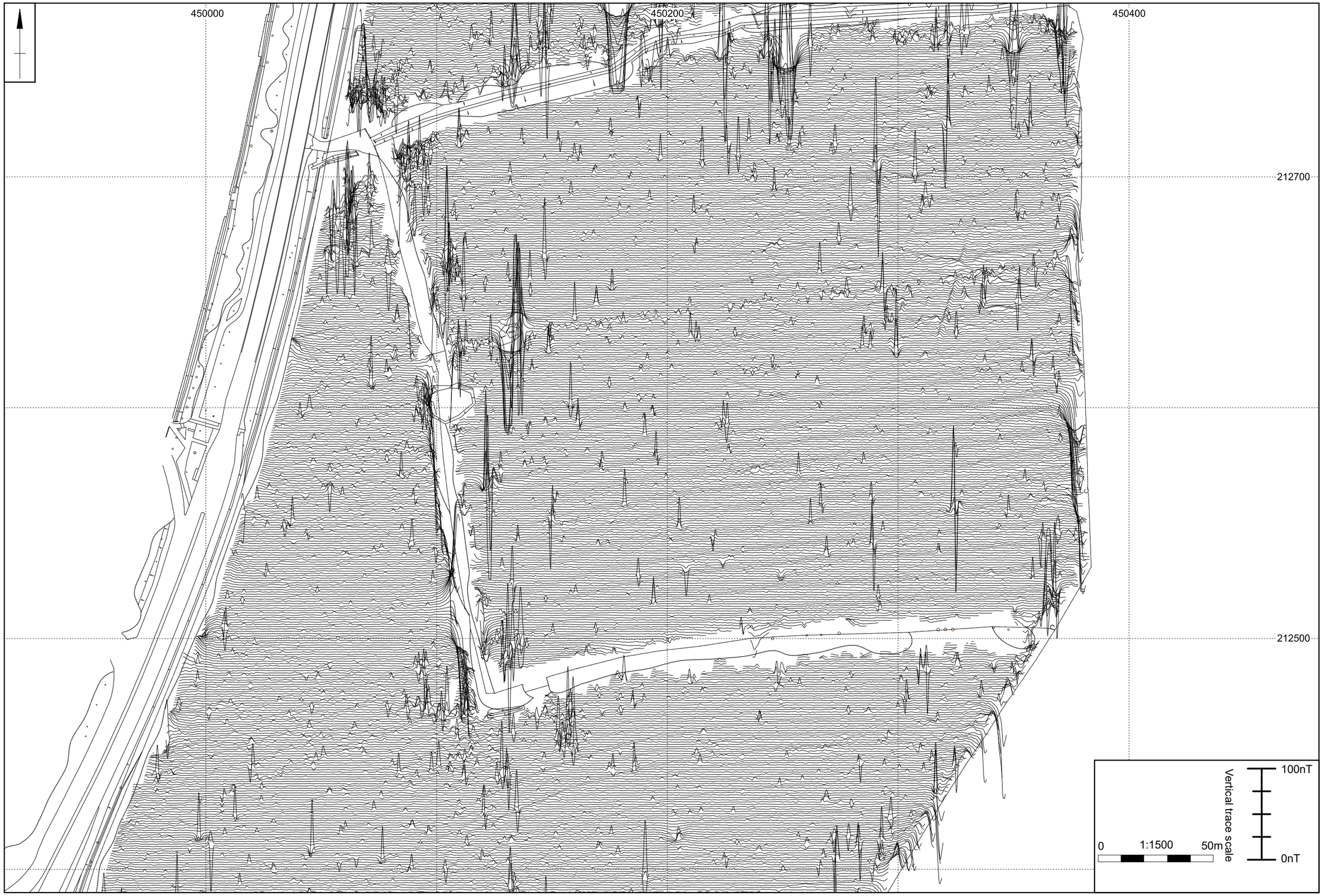
Unprocessed magnetometer data (South) Fig 7



Scale 1:1500 (A3)

XY trace plot of magnetometer data (North) Fig 8



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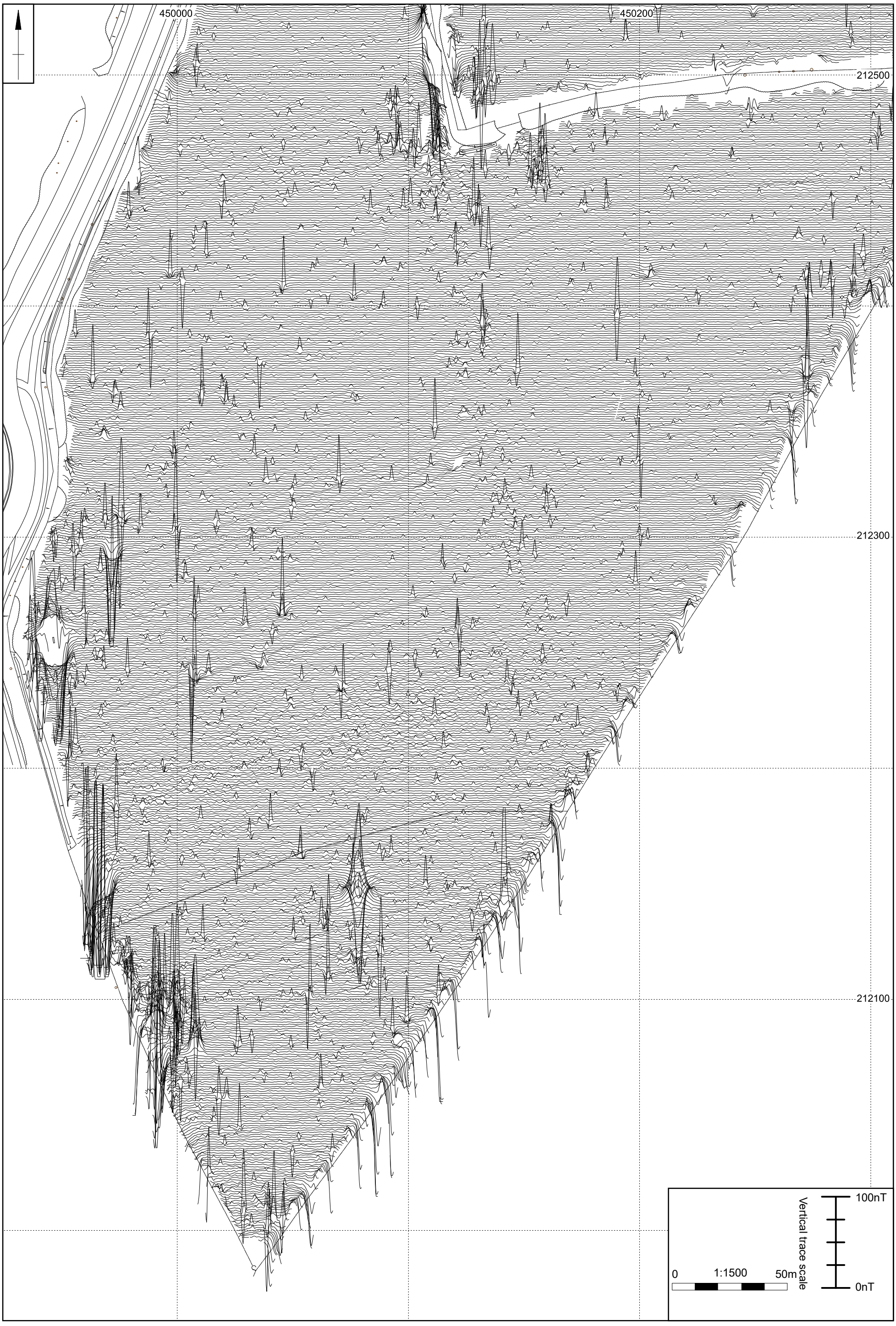
XY trace plot of magnetometer data (Centre) Fig 9



Scale 1:1500 (A3)

XY trace plot of magnetometer data (South) Fig 10

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