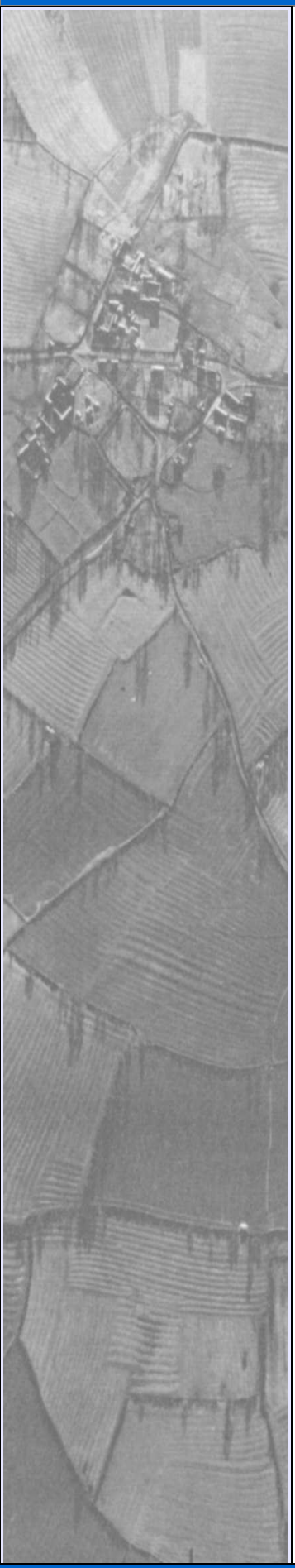

Land off Coventry Road
Cawston, Dunchurch
Warwickshire

MAGNETOMETER SURVEY REPORT

for

Archaeology Warwickshire

Kerry Donaldson & David Sabin

May 2015

Ref. no. 608

ARCHAEOLOGICAL SURVEYS LTD

Land off Coventry Road
Cawston, Dunchurch
Warwickshire

Magnetometer Survey Report

for

Archaeology Warwickshire

Fieldwork by David Sabin (Hons) MCIfA
Report by Kerry Donaldson BSc (Hons)
Report checked by David Sabin
Primary archive location - Archaeological Surveys Ltd, Yatesbury, Wiltshire

Survey dates – 6th & 7th May 2015
Ordnance Survey Grid Reference – **SP 47775 73435**

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SUMMARY

Archaeological Surveys Ltd undertook a detailed magnetometer survey at land off Coventry Road, Cawston, near Rugby in Warwickshire. The survey was carried out at the request of Archaeology Warwickshire as part of an archaeological assessment of the 5ha site, which has been outlined for residential development. The results demonstrate that a positive linear anomaly extends throughout much of the site and appears to relate to a linear boundary feature. Although the site is immediately adjacent to a number of cropmark features, possibly relating to prehistoric settlement, the linear feature appears to bound former ridge and furrow, and also may have continued eastwards and south westwards as former land boundaries mapped during the 20th century. Within the western part of the site are a number of positive linear responses, and although these lack definition they appear to have been truncated by the former ridge and furrow. It is possible, therefore, that these relate to cut, ditch-like features and an archaeological origin should be considered. The site contains a number of isolated positive discrete, linear and more amorphous responses, and it is not clear if these relate to cut ditch-like and pit-like features and possible ridge and furrow, or if some are natural in origin.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Archaeology Warwickshire to undertake a magnetometer survey of an area of land off Coventry Road, Cawston near Rugby, Warwickshire. The site has been outlined for a proposed housing development and the survey forms part of an archaeological assessment of the site.

1.1.2 The geophysical survey was carried out in accordance with a Written Scheme of Investigation (WSI) produced by Archaeology Warwickshire (2015).

1.2 Survey objectives and techniques

1.2.1 The objective of the survey was to use magnetometry to help determine if there are any significant archaeological remains in the area to be developed, to form an understanding of their value and their potential to shed light on the subsequent development of the area. The results of the survey will be used to inform the positioning of trial trenches, covering 4% of the site.

1.2.2 The survey and report generally follow the recommendations set out by: English Heritage (2008) *Geophysical survey in archaeological field evaluation;* and Institute for Archaeologists (2002) *The use of Geophysical Techniques in Archaeological Evaluations*. The work has been carried out to the Chartered

Institute for Archaeologists (2014) *Standard and Guidance for Archaeological Geophysical Survey.*

1.3 Site location, description and survey conditions

1.3.1 The site is located within the parish of Dunchurch and lies to the south east of Coventry Road, Cawston, near Rugby in Warwickshire. It is centred on Ordnance Survey National Grid Reference (OS NGR) SP 47775 73435, see Figures 01 and 02.

1.3.2 The geophysical survey covers approximately 5ha within two fields containing long grass. The Coventry road bounds the north western edge of the site with a residential area located to the south east and houses at the north western corner. The site tends to slope down gently towards the south east.

1.3.3 The ground conditions across the site were generally considered to be favourable for the collection of magnetometry data although the long grass proved difficult to traverse. Weather conditions during the survey were wet and windy.

1.4 Site history and archaeological potential

1.4.1 The Warwickshire Historic Environment Record (HER) does not record any designated or non-designated heritage assets directly within the survey area. However, the site lies within an area that contains widespread cropmark evidence for prehistoric and medieval settlement within the vicinity. Numerous cropmarks are visible immediately to the west of the site.

1.4.2 Ordnance Survey mapping indicates that the eastern part of the site was part of a single large field until prior to 1925 when the southern field boundary was constructed. Area 2 contained a field boundary separating it into two plots of land in the mid to late 20th century.

1.4.3 The location of widespread cropmark features of prehistoric and medieval date immediately adjacent to the site indicates that there may be a high potential for the survey area to contain further archaeological features.

1.5 Geology and soils

1.5.1 The underlying geology is from the Charmouth Mudstone Formation (Lower Lias) with overlying Dunsmore Gravel across the majority of the site with clay and silt deposits of the Bosworth Clay Member just encroaching along the south eastern edge of the site (BGS, 2015).

1.5.2 The overlying soil across the site is from the Arrow association and is a gleyic brown earth. It consists of a deep, permeable, coarse, loamy soil affected by groundwater (Soil Survey of England and Wales, 1983).

1.5.3 Magnetometry carried out over similar geology and soil has produced variable results as there can be poor contrast between cut features and the material into which they are cut, and often drift deposits can cause naturally formed anomalies that can be difficult to distinguish from those with an anthropogenic origin. The site is, however, considered suitable for magnetic survey.

2 METHODOLOGY

2.1 Technical synopsis

2.1.1 Magnetometry survey records localised magnetic fields that can be associated with features formed by human activity. Magnetic susceptibility and magnetic thermoremnance are factors associated with the formation of localised fields. Additional details are set out below and within Appendix A.

2.1.2 Iron minerals within the soil may become altered by burning and the break down of biological material; effectively the magnetic susceptibility of the soil is increased, and the iron minerals become magnetic in the presence of the Earth's magnetic field. Accumulations of magnetically enhanced soils within features, such as pits and ditches, may produce magnetic anomalies that can be mapped by magnetic prospection.

2.1.3 Magnetic thermoremnance can occur when ferrous minerals have been heated to high temperatures such as in a kiln, hearth, oven etc. On cooling, a permanent magnetisation may be acquired due to the presence of the Earth's magnetic field. Certain natural processes associated with the formation of some igneous and metamorphic rock may also result in magnetic thermoremnance.

2.1.4 The localised variations in magnetism are measured as sub-units of the Tesla, which is a SI unit of magnetic flux density. These sub-units are nano Teslas (nT), which are equivalent to 10^{-9} Tesla (T).

2.2 Equipment configuration, data collection and survey detail

2.2.1 The detailed magnetic survey was carried out using a SENSYS MAGNETO®MXPDA 5 channel cart-based system. The instrument has 5 fluxgate gradiometers spaced 0.5m apart with readings recorded at 100 Hz. The gradiometers have a range of recording data between 0.1nT and 10,000nT. The system is linked to a Leica GS10 RTK GPS with data recorded by SENSYS MAGNETO®MXPDA software on a rugged PDA computer system.

2.2.2 Data are collected along a series of parallel survey transects wherever possible. The length of each transect is variable and relates to the size of the survey area and other factors including ground conditions. A visual display allows accurate placing of transects and helps maintain the correct separation between adjacent traverses.

2.2.3 Data are not collected within fixed grids and data points are considered to be random even though the data are collected in a systematic manner covering all accessible areas (Aspinall, Gaffney and Schmidt, 2009).

2.3 Data processing and presentation

2.3.1 Magnetic data collected by the MAGNETO®MXPDA cart-based system are initially prepared using SENSYS MAGNETO®DLMGPS software. Survey tracks are analysed and georeferenced raw data (UTM Z30N) are then exported in ASCII format for further analysis and display using TerraSurveyor.

2.3.2 The data are collected between limits of ±10000nT and clipped for display. Data are interpolated to a resolution of effectively 0.5m between tracks and 0.18m along each survey track. A zero median traverse function is required in order to remove fixed offset values present within the sensors which do not undergo a zeroing procedure in the field. The approach ensures that the gradiometer sensors are very accurately aligned and fixed to the vertical magnetic field and are not influenced by localised magnetic fields or disturbed by vibration. Although a zero median traverse algorithm can remove anomalies aligned with the survey tracks, in practice this rarely occurs due to the use of long traverses, high resolution measurement and variability within the magnetic susceptibility of long linear features.

2.3.3 Appendix C contains metadata concerning the survey and data attributes and is derived directly from TerraSurveyor. Reference should be made to Appendix B for further information on any processes, such as clipping, carried out on the data.

2.3.4 A TIF file is produced by TerraSurveyor software along with an associated world file (.TFW) that allows automatic georeferencing (OSGB36 datum) when using GIS or CAD software. The main form of data display used in the report is the minimally processed greyscale plot.

2.3.5 The raster images are combined with base mapping using ProgeCAD Professional 2014, creating DWG file formats. All images are externally referenced to the CAD drawing in order to maintain good graphical quality. The CAD plots are effectively georeferenced facilitating relocation of features using GPS, resection method, etc.

2.3.6 An abstraction and interpretation is offered for all geophysical anomalies located by the survey. Anomalies are abstracted using colour coded points, lines and polygons. All plots are scaled to landscape A3 for paper printing.A brief summary of each anomaly, with an appropriate reference number, is set out in list form within the results (Section 3) to allow a rapid and objective assessment of features within each survey area.

2.3.7 A digital archive is produced with this report, see Appendix D below. The main

archive is held at the offices of Archaeological Surveys Ltd.

3 RESULTS

3.1 General assessment of survey results

3.1.1 The detailed magnetic survey was carried out over a total of 2 survey areas covering approximately 5ha.

3.1.2 Magnetic anomalies located can be generally classified as positive anomalies of an uncertain origin, anomalies associated with land management, linear anomalies of an agricultural origin, areas of magnetic debris and disturbance and strong discrete dipolar anomalies relating to ferrous objects.

3.2 Statement of data quality

3.2.1 Data are considered representative of the magnetic anomalies present within the site. There are no significant defects within the dataset.

3.3 Data interpretation

3.3.1 The list of sub-headings below attempts to define a number of separate categories that reflect the range and type of features located during the survey. A basic explanation of the characteristics of the magnetic anomalies is set out for each category in order to justify interpretation, a basic key is indicated to allow cross referencing to the abstraction and interpretation plot. CAD layer names are included to aid reference to associated digital files (.dwg/.dxf). Sub-headings are then used to group anomalies with similar characteristics for each survey area.

Report sub-heading CAD layer names and plot colour	**Description and origin of anomalies**
Anomalies with an uncertain origin AS-ABST MAG POS LINEAR UNCERTAIN AS-ABST MAG POS DISCRETE UNCERTAIN AS-ABST MAG POS UNCERTAIN 	The category applies to a range of anomalies where there is not enough evidence to confidently suggest an origin. Anomalies in this category may well be related to archaeologically significant features, but equally relatively modern features, geological/pedological features and agricultural features should be considered. Positive anomalies are indicative of magnetically enhanced soils that may form the fill of 'cut' features or may be produced by accumulation within layers or 'earthwork' features; soils subject to burning may also produce positive anomalies. Negative anomalies are produced by material of comparatively low magnetic susceptibility such as stone and subsoil.
Anomalies relating to land management AS-ABST MAG BOUNDARY	Anomalies are mainly linear and may be indicative of the magnetically enhanced fill of cut features (i.e. ditches). The anomalies may be long and/or form rectilinear elements and they may relate to topographic features or be visible on early mapping. Associated agricultural anomalies (e.g. headlands, plough marks and former ridge and furrow) may support the interpretation.
Anomalies with an agricultural origin	The anomalies are often linear and form a series of parallel responses or are parallel to extant land boundaries. Where the

AS-ABST MAG RIDGE AND FURROW 	response is broad, former ridge and furrow is likely; narrow response is often related to modern ploughing.
Anomalies associated with magnetic debris AS-ABST MAG DEBRIS  AS-ABST MAG STRONG DIPOLAR	Magnetic debris often appears as areas containing many small dipolar anomalies that may range from weak to very strong in magnitude. It often occurs where there has been dumping or ground make-up and is related to magnetically thermoremnant materials such as brick or tile or other small fragments of ferrous material. This type of response is occasionally associated with kilns, furnace structures, or hearths and may therefore be archaeologically significant. It is also possible that the response may be caused by natural material such as certain gravels and fragments of igneous or metamorphic rock. Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.
Anomalies with a modern origin AS-ABST MAG DISTURBANCE 	The magnetic response is often strong and dipolar indicative of ferrous material and may be associated with extant above surface features such as wire fencing, cables, pylons etc.. Often a significant area around such features has a strong magnetic flux which may create magnetic disturbance; such disturbance can effectively obscure low magnitude anomalies if they are present. Fluxgate sensors may respond erratically and with hysteresis adjacent to strong magnetic sources.

Table 1: List and description of interpretation categories

3.4 List of anomalies - Area 1

Area centred on OS NGR 447830 273475. See Figures 05 & 06.

Anomalies with an uncertain origin

(1) - A positive linear anomaly with a sinuous form, extends through the western part of the survey area in a north easterly direction from Area 2 to the south west. It is slightly stronger (2-4nT) towards the west and is more fragmented towards the centre of the survey area where the response is nearer 1-2nT as it curves to the east. This anomaly appears to relate to a linear ditch, and although an archaeological origin is possible, it appears that the former ridge and furrow (6) is delimited by the anomaly. It may, therefore, relate to a former field boundary that pre-dates the Ordnance Survey 1st Edition mapping from 1887, but is contemporary with the former ridge and furrow.

(2) - A weakly positive linear anomaly that may be associated with anomaly (1) forming a ditch-like feature extending from anomaly (1) towards the north western field boundary.

(3) - A very weakly positive linear anomaly, close to amorphous responses (5). It is not possible to determine if this relates to a cut, ditch-like feature.

(4) - The survey area contains a small number of discrete positive responses. Some lie close to anomaly (1), and it is possible that they relate to cut, pit-like features with an anthropogenic origin. Isolated discrete anomalies may indicate

pit-like features; however, it is not possible to determine if they are natural or anthropogenic in origin. Those lying close to the north eastern corner of the site, close to an area of magnetic debris (8), may be associated with this material but this is not certain.

(5) - Located in the south eastern part of the survey area are a number of weak, broad, linear and amorphous positive responses. It is not possible to determine if these relate to naturally formed features, or if some are associated with former ridge and furrow.

Anomalies with an agricultural origin

(6) - A series of broad parallel positive and linear anomalies are located in the south western part of the survey area. These relate to former ridge and furrow which appears to extend towards, but cannot be seen clearly beyond, anomaly (1). The negative responses have been abstracted as linear anomalies and these are likely to relate to the furrows, with the positive responses in between associated with the former ridges.

Anomalies associated with magnetic debris

(7) - A patch of magnetic debris is evident at the north eastern corner of the survey area. This is likely to be a response to magnetically thermoremnant material used for ground consolidation at a former field entrance. A second zone can be seen at the south eastern corner of the survey area and is also likely to relate to dumped material.

(8) - The survey area contains a large number of strong, discrete, dipolar anomalies which are a response to numerous ferrous and other magnetically thermoremant objects within the topsoil.

Anomalies with a modern origin

(9) - Magnetic disturbance can be seen around much of the edge of the survey area. This is a response to ferrous material around the exterior of the site.

3.5 List of anomalies - Area 2

Area centred on OS NGR 447650 273325, see Figures 07 & 08.

Anomalies with an uncertain origin

(10) - A positive linear anomaly extends through the survey area and is a continuation of anomaly (1) seen within Area 1 to the east. It appears that it bounds the ridge and furrow (16).

(11) - Located in the north eastern part of the survey area are two positive linear

anomalies that appear to have been truncated by the ridge and furrow. It is possible that these relate to cut features, and an archaeological origin should be considered. There are other weakly positive, short or fragmented positive linear anomalies within the vicinity, and while these may be associated, they lack definition.

(12) - A positive linear anomaly is located in the south eastern part of the survey are. It is possible that it relates to a cut feature; however, an association with ridge and furrow (15) cannot be ruled out.

(13) - In the south western part of the survey area are two weakly positive responses. It is possible that this is associated with the ridge and furrow to the north of anomaly (10) but a natural origin is possible.

(14) - There are a number of positive linear responses in the western part of the survey area but they lack a coherent morphology; however, given the proximity to archaeological features within the field immediately to the west, an archaeological origin is possible.

Anomalies associated with land management

(15) - A zone of magnetic debris is associated with a former field boundary that was constructed sometime between 1925 and 1938 and recently removed.

Anomalies with an agricultural origin

(16) - A series of parallel linear anomalies can be seen in the northern and western parts of the survey area. The negative anomalies have been abstracted and these appear to relate to former furrows associated with ridge and furrow cultivation. They do not appear to extend beyond anomaly (10) although this is not certain.

4 CONCLUSION

4.1.1 The detailed magnetometer survey located a positive linear anomaly with a sinuous form that crosses the two survey areas. It appears that former ridge and furrow extends up to this linear feature along its north western side, but cannot be clearly seen to extend beyond it to the south east. The anomaly is sinuous in form, extending from the south western edge of the site in a north easterly direction for over 325m, where it then appears to curve towards the east. If the two ends of this anomaly are projected, they can be seen to continue south westwards and eastwards as field boundaries mapped until at least the first half of the 20th century. It is, therefore, likely to relate to a linear boundary at least contemporary with the former ridge and furrow.

4.1.2 Within the western part of the site in Area 2 are a number of positive linear

anomalies that appear that they may have been truncated by the ridge and furrow. Although the anomalies are poorly defined, it should be considered that these may relate to cut features with some archaeological potential. Other positive responses lie within the site, but it is not clear if they are associated with the ridge and furrow, or if they relate to naturally formed features. Several isolated discrete positive responses are evident, and again it is not possible to determine if they relate to pit-like responses with an anthropogenic or natural origin.

5 REFERENCES

Archaeology Warwickshire, 2015. *Written Scheme of Investigation, Archaeological Evaluation (Part 1: Geophysical survey), Land off Coventry Road, Cawston, Rugby, Warwickshire.* Unpublished typescript document.

Aspinall, A., Gaffney, C. and Schmidt, A., *Magnetometry for Archaeologists*. Lanham (US), AltaMira Press.

British Geological Survey, 2015. *Geology of Britain viewer, 1:50 000 scale [online]* available from http://mapapps.bgs.ac.uk/geologyofbritain/home.html [accessed 18/5/2015].

Chartered Institute for Archaeologists, 2014. *Standard and Guidance for archaeological geophysical survey*. IfA, University of Reading.

English Heritage, 2008. *Geophysical survey in archaeological field evaluation. Research and Professional Service Guideline No.1.* 2nd ed. Swindon: English Heritage.

Institute for Archaeologists, 2002. *The use of Geophysical Techniques in Archaeological Evaluations*. IfA Paper No. 6. IfA, University of Reading.

Chartered Institute for Archaeologists, 2014. *Standard and Guidance for archaeological geophysical survey*. IfA, University of Reading.

Soil Survey of England and Wales, 1983. *Soils of England and Wales, Sheet 3 Midland & Western England.*

Appendix A – basic principles of magnetic survey

Iron minerals are always present to some degree within the topsoil and enhancement associated with human activity is related to increases in the level of magnetic susceptibility and thermoremnant material.

Magnetic susceptibility is an induced magnetism within a material when it is in the presence of a magnetic field. This can be thought of as effectively permanent due to the presence of the Earth's magnetic field.

Thermoremnant magnetism occurs when ferrous material is heated beyond a specific temperature known as the Curie Point. Demagnetisation occurs at this temperature with re-magnetisation by the Earth's magnetic field upon cooling.

Enhancement of magnetic susceptibility can occur in areas subject to burning and complex fermentation processes on biological material; these are frequently associated with human settlement. Thermoremnant features include ovens, hearths, and kilns. In addition thermoremnant material such as tile and brick may also be associated with human activity and settlement.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil can create an area of enhancement compared with surrounding soils and subsoils into which the feature is cut. Mapping enhanced areas will produce linear and discrete anomalies allowing an assessment and characterisation of hidden subsurface features.

It should be noted that areas of negative enhancement can be produced from material having lower magnetic properties compared to the topsoil. This is common for many sedimentary bedrocks and subsoils which were often used in the construction of banks and walls etc. Mapping these 'negative' anomalies may also reveal archaeological features.

Magnetic survey or magnetometry can be carried out using a fluxgate gradiometer and may be referred to as gradiometry. The SENSYS gradiometer is a passive instrument consisting of two fluxgate sensors mounted vertically 65cm apart. The instrument is carried about 10-20cm above the ground surface and the upper sensor measures the Earth's magnetic field as does the lower sensor but this is influenced to a greater degree by any localised buried field. The difference between the two sensors will relate to the strength the magnetic field created by the buried feature.

There are a number of factors that may affect the magnetic survey and these include soil type, local geology and previous human activity. Situations arise where magnetic disturbance associated with modern services, metal fencing, dumped waste material etc., obscures low magnitude fields associated with archaeological features.

Appendix B – data processing notes

Clipping

Minimum and maximum values are set and replace data outside of the range with those values. Extreme values are removed improving colour or greyscale contrast associated with data values that may be archaeologically significant. It has been found that clipping data to ranges between ±20nT and ±10nT often improves the appearance of features associated with archaeology. Different ranges are applied to data in order to determine the most suitable for anomaly abstraction and display.

Zero (destripe) Median/Mean Traverse

The median (or mean) of each traverse is calculated ignoring data outside a threshold value, the median (or mean) is then subtracted from the traverse. The process is used to equalise differences between the baseline value of gradiometer sensors.

High Pass Filtering

A mathematical process used to remove low frequency anomalies relating to survey tracks and modern agricultural features.

Appendix C – survey and data information

Area 1

COMPOSITE
Filename: J608-mag-Area1-proc.xcp
Description: Imported as Composite from: J608-mag-Area1.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y): OSGB36
Northwest corner: 447656.521435517, 273576.365648692 m
Southeast corner: 447986.101435517, 273360.365648692 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702

Source GPS Points: 4661500

Dimensions
Composite Size (readings): 1831 x 1200
Survey Size (meters): 330 m x 216 m
Grid Size: 330 m x 216 m
X Interval: 0.18 m
Y Interval: 0.18 m

Stats
Max: 5.00
Min: -5.00
Std Dev: 1.83
Mean: -0.06
Median: -0.06
Composite Area: 7.1189 ha
Surveyed Area: 2.5612 ha

PROGRAM
Name: TerraSurveyor
Version: 3.0.23.0

Processes: 2
1 Base Layer
2 Clip from -5.00 to 5.00 nT

GPS based Proce2
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).

Area 2

COMPOSITE
Filename: J608-mag-Area2-proc.xcp
Description: Imported as Composite from: J608-mag-Area2.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y): OSGB36
Northwest corner: 447546.178229546, 273419.59778733 m
Southeast corner: 447755.878229546, 273235.27778733 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702

Source GPS Points: 3478750

Dimensions
Composite Size (readings): 1165 x 1024
Survey Size (meters): 210 m x 184 m
Grid Size: 210 m x 184 m
X Interval: 0.18 m
Y Interval: 0.18 m

Stats
Max: 5.00
Min: -5.00
Std Dev: 1.98
Mean: -0.11
Median: -0.10
Composite Area: 3.8652 ha
Surveyed Area: 2.0395 ha

Processes: 2
1 Base Layer
2 Clip from -5.00 to 5.00 nT

GPS based Proce2
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).

Appendix D – digital archive

Archaeological Surveys Ltd hold the primary digital archive at their offices in Wiltshire. Data are backed-up onto an on-site data storage drive and at the earliest opportunity data are copied to CD ROM for storage on-site and off-site.

Three printed copies of the report and a PDF copy will be supplied to the Warwickshire Historic Environment Record. The report will also be uploaded to the Online AccesS to the Index of archaeological investigationS (OASIS). A summary of the survey will also be supplied to *West Midlands Archaeology.*

Archive contents:

Geophysical data Area 1 - path: J608 Cawston, Rugby\Data				
Path and Filename	**Software**	**Description**	**Date**	**Creator**
caw1\MX\ .prm, .dgb., disp	Sensys MXPDA	Proprietary data formats representing magnetometer survey traverses logged to a PDA.	06/05/15	D.J.Sabin
caw1\MX\J608-mag-Area1.asc	Sensys DLMGPS	ASCII CSV (tab) file representing survey Area 1 in eastings, northings (UTM Z30N), magnetic measurement, traverse file and sensor number.	12/05/15	D.J.Sabin
Area1\comps\J608-mag-Area1.xcp	TerraSurveyor 3.0.23.0	Composite data file derived from ASCII CSV.	12/05/15	D.J.Sabin
Area1\comps\J608-mag-Area1-proc.xcp	TerraSurveyor 3.0.23.0	Processed composite data file (zmt and clipping to ±3nT).	13/05/15	K.T.Donaldson
Geophysical data Area 2 - path: J608 Cawston, Rugby\Data				
caw2\MX\ .prm, .dgb., disp	Sensys MXPDA	Proprietary data formats representing magnetometer survey traverses logged to a PDA at.	07/05/15	D.J.Sabin
caw2\MX\J608-mag-Area2.asc	Sensys DLMGPS	ASCII CSV (tab) file representing survey Area 2 in eastings, northings (UTM Z30N), magnetic measurement, traverse file and sensor number.	13/05/15	K.T.Donaldson
Area2\comps\J608-mag-Area2.xcp	TerraSurveyor 3.0.23.0	Composite data file derived from ASCII CSV.	13/05/15	K.T.Donaldson
Area2\comps\J608-mag-Area2-proc.xcp	TerraSurveyor 3.0.23.0	Processed composite data file (zmt and clipping to ±5nT).	13/05/15	K.T.Donaldson
Graphic data - path: J608 Cawston, Rugby\Data				
Area1\graphics\ J608-mag-Area1-proc.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±5nT.	13/05/15	K.T.Donaldson
Area1\graphics\ J608-mag-Area1-proc.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	13/05/15	K.T.Donaldson
Area2\graphics\ J608-mag-Area2-proc.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±5nT.	13/05/15	K.T.Donaldson
Area2\graphics\ J608-mag-Area2-proc.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	13/05/15	K.T.Donaldson
CAD data - path: J608 Cawston, Rugby\CAD				
J608 version 1.dwg	ProgeCAD 2014	CAD file for creating plots of greyscales, abstraction, interpretation and mapping. Grid coordinates as OSGB. AutoCAD 2010 format.	12/05/15	K.T.Donaldson
Text data - path: J608 Cawston, Rugby\Documentation				
J608 report.odt	OpenOffice.org 3.0.1 Writer	Report text as an Open Office document.	18/05/15	K.T.Donaldson

Appendix E – copyright and intellectual property

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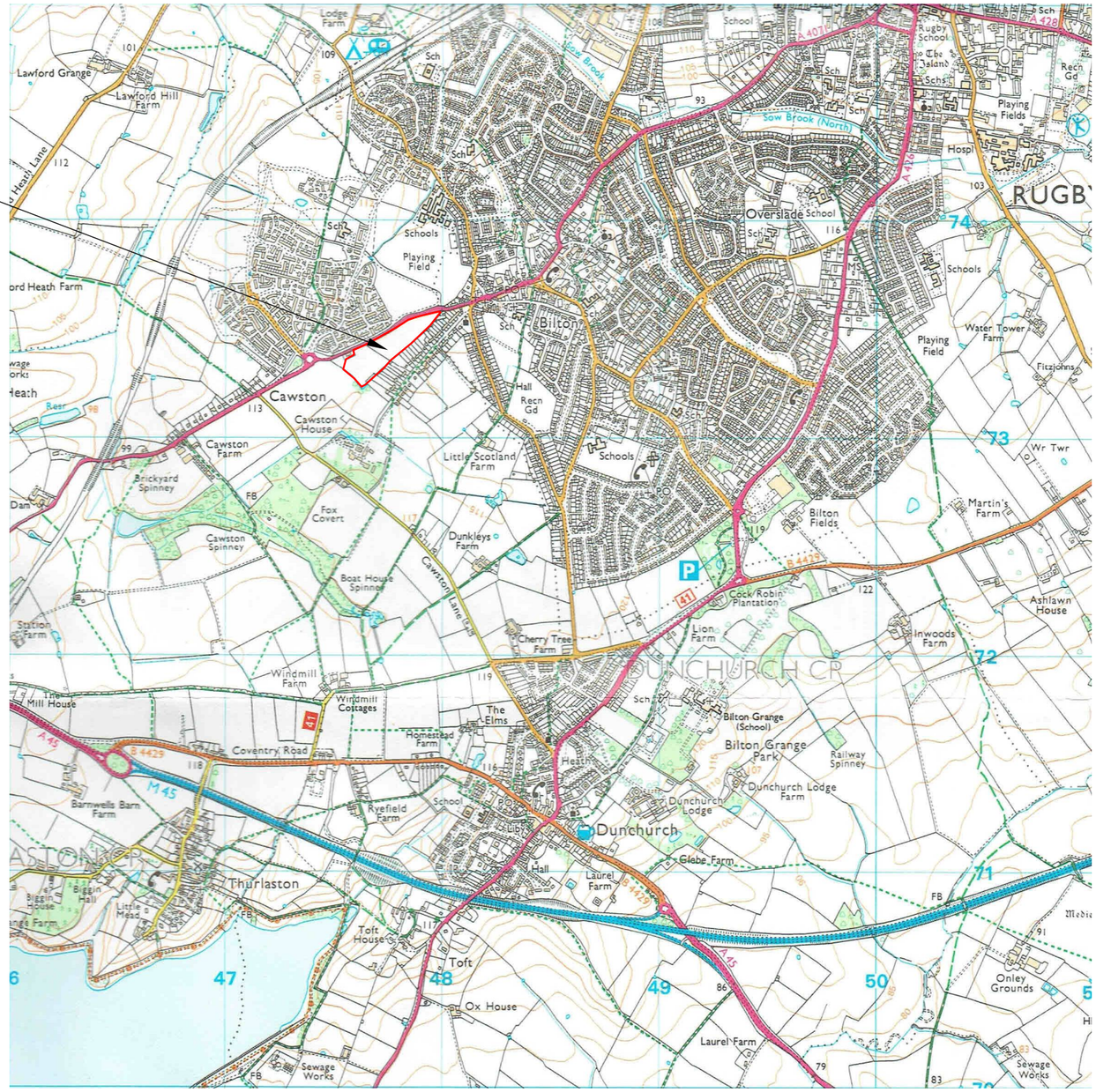
Survey location



N

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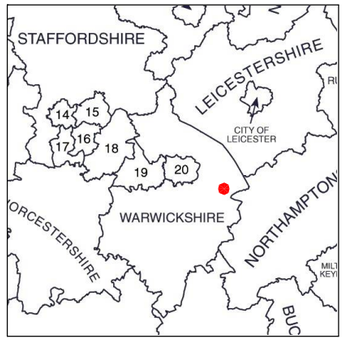
Warwickshire

Map of survey area



● Survey location

Site centred on OS NGR
SP 47775 73435

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

FIG 01

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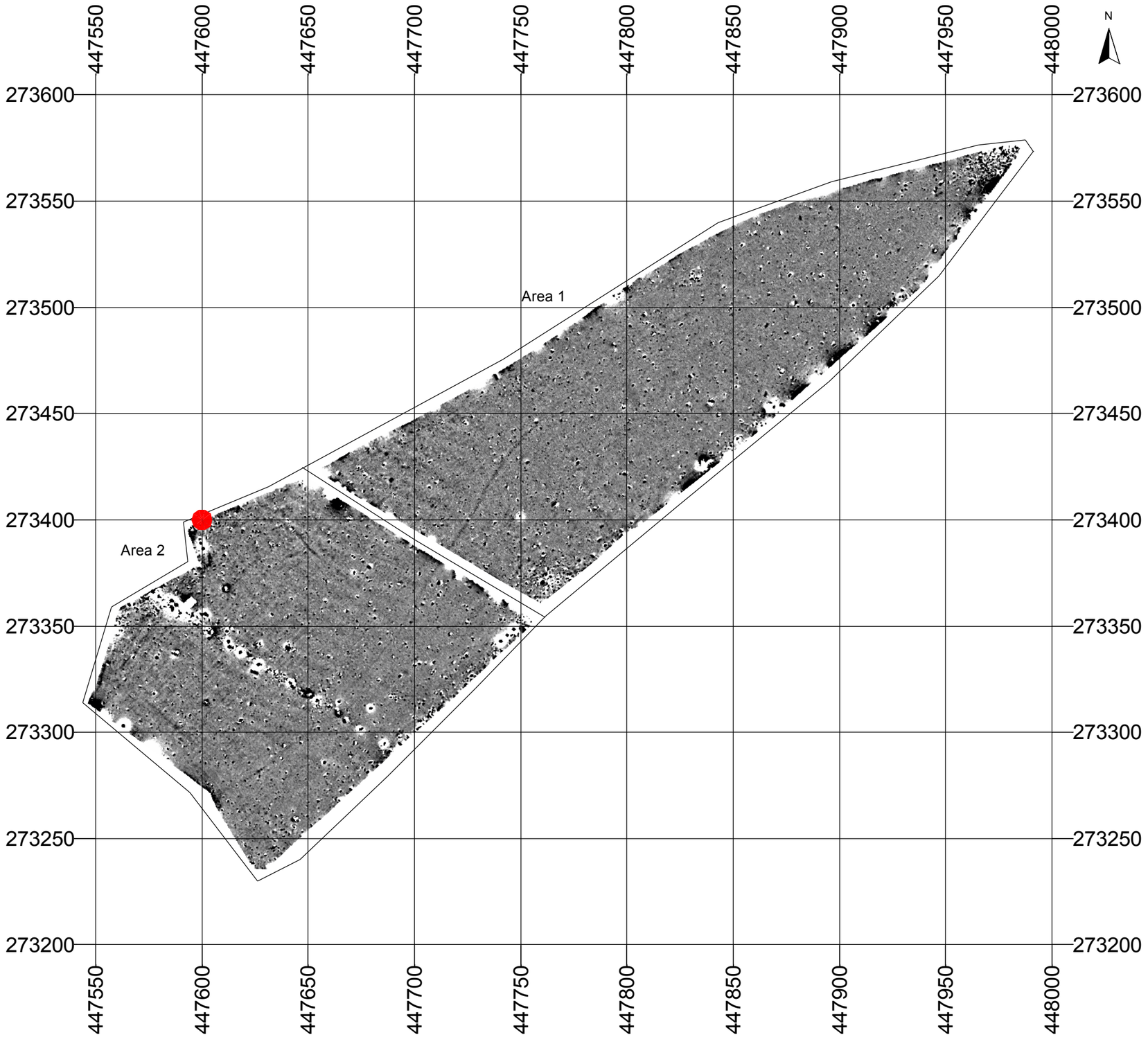
Warwickshire

Referencing information

Referencing grid to OSGB36 datum at 50m intervals

Data collected at 20Hz and georeferenced to ETRS89 zone 30 with conversion to OSGB36 using OSTN02

447600 273400



SCALE 1:2000

0m 20 40 60 80 100m

SCALE TRUE AT A3

FIG 02

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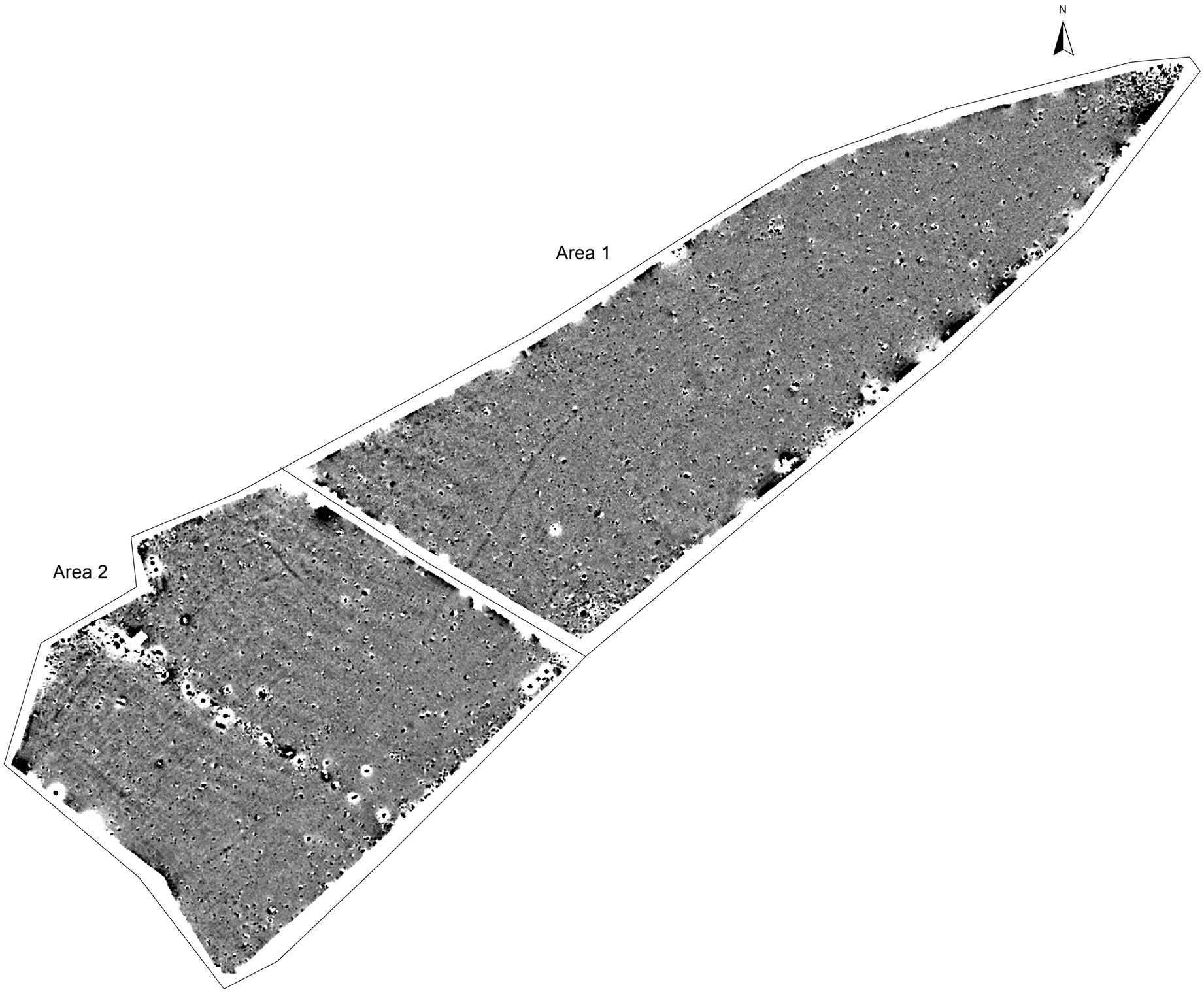
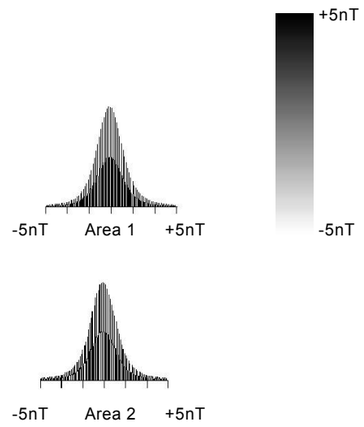
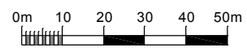


Greyscale plot of minimally processed magnetometer data



SCALE 1:1500



SCALE TRUE AT A3

FIG 03

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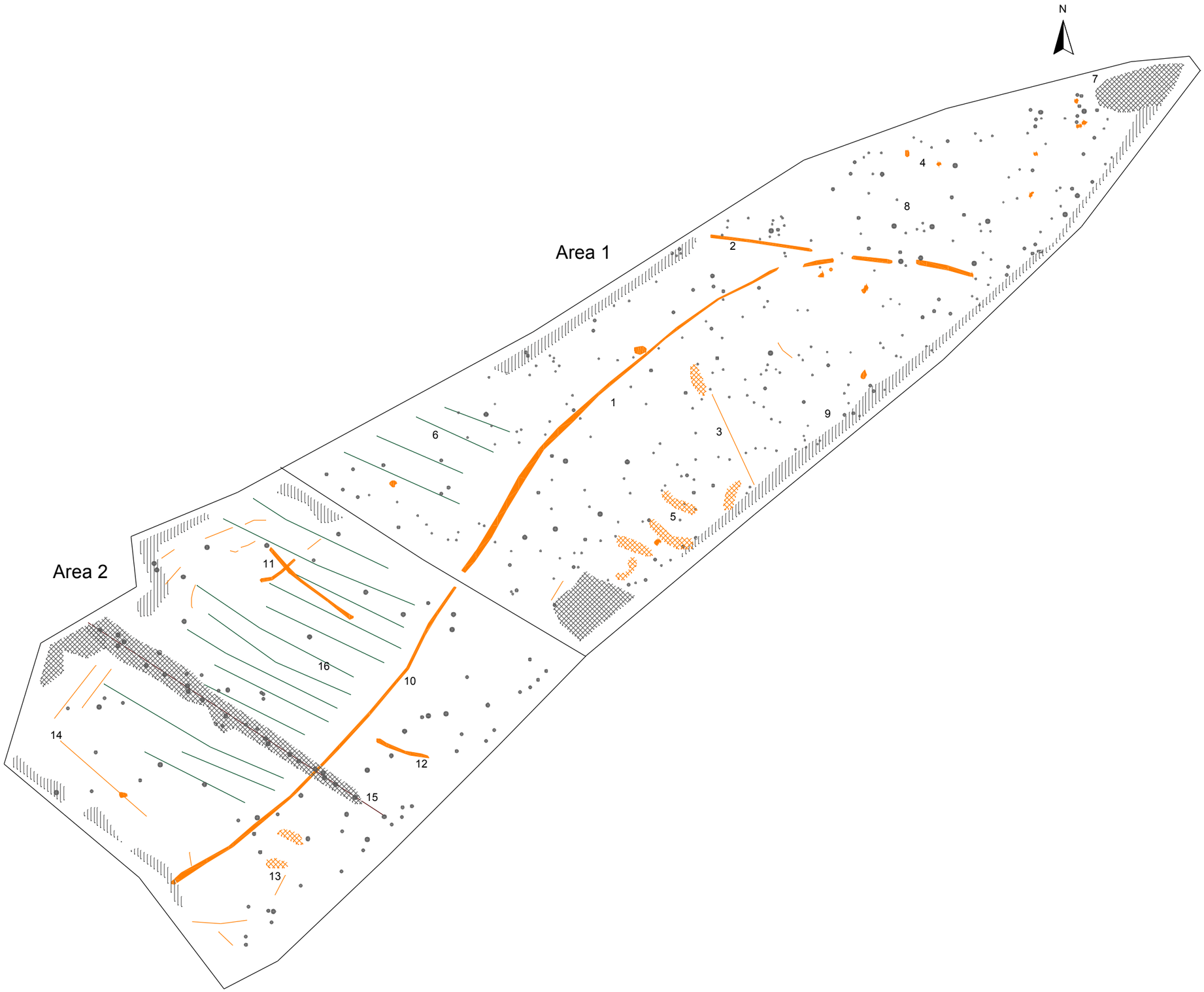
Abstraction and interpretation of magnetometer anomalies



- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Linear anomaly - former field boundary
- Discrete positive response - possible pit-like feature
- Positive anomaly - magnetically enhanced material
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 04

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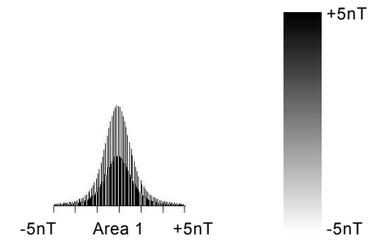
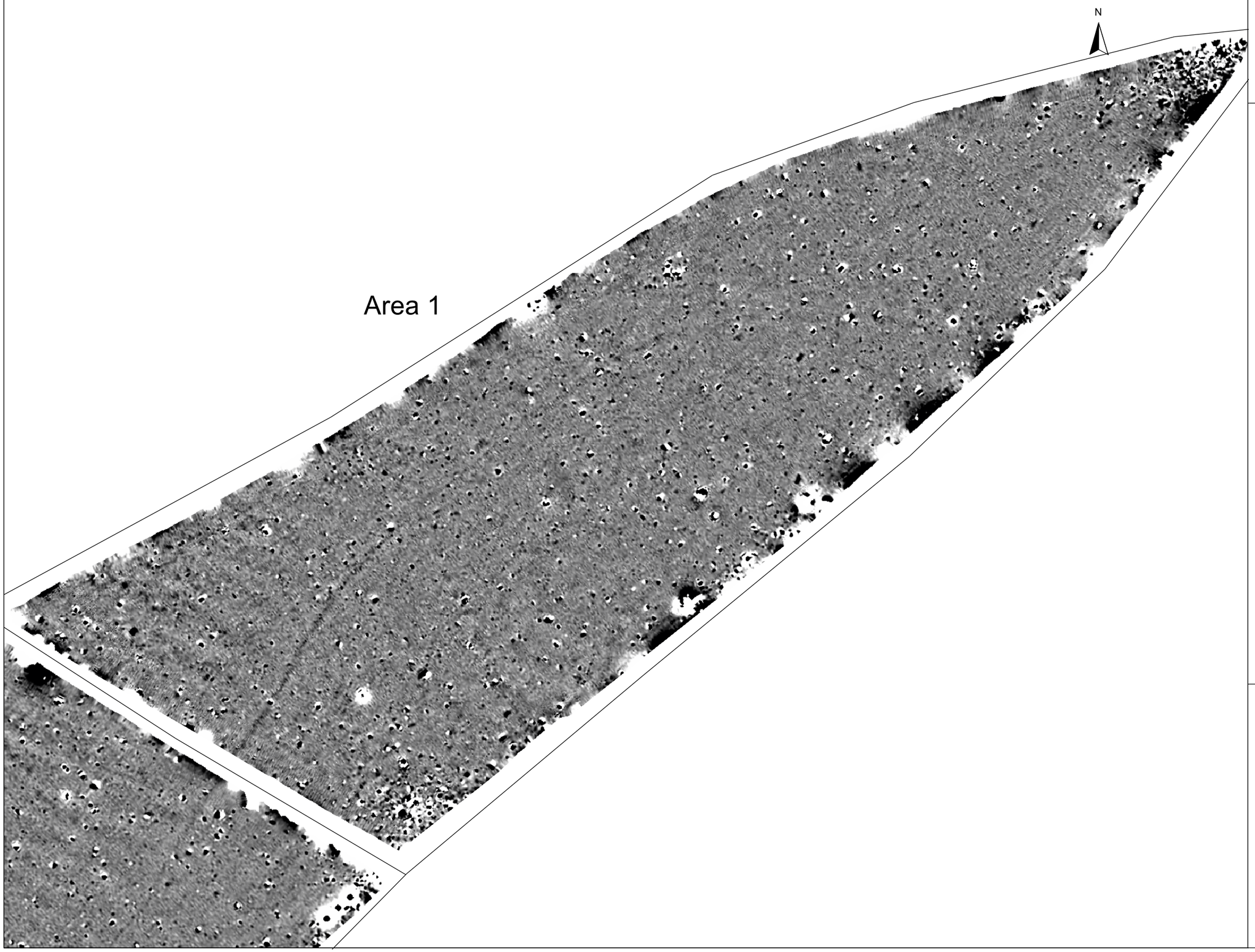
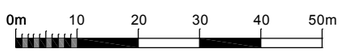
Warwickshire

Greyscale plot of minimally processed magnetometer data - Area 1





SCALE 1:1000



SCALE TRUE AT A3

FIG 05

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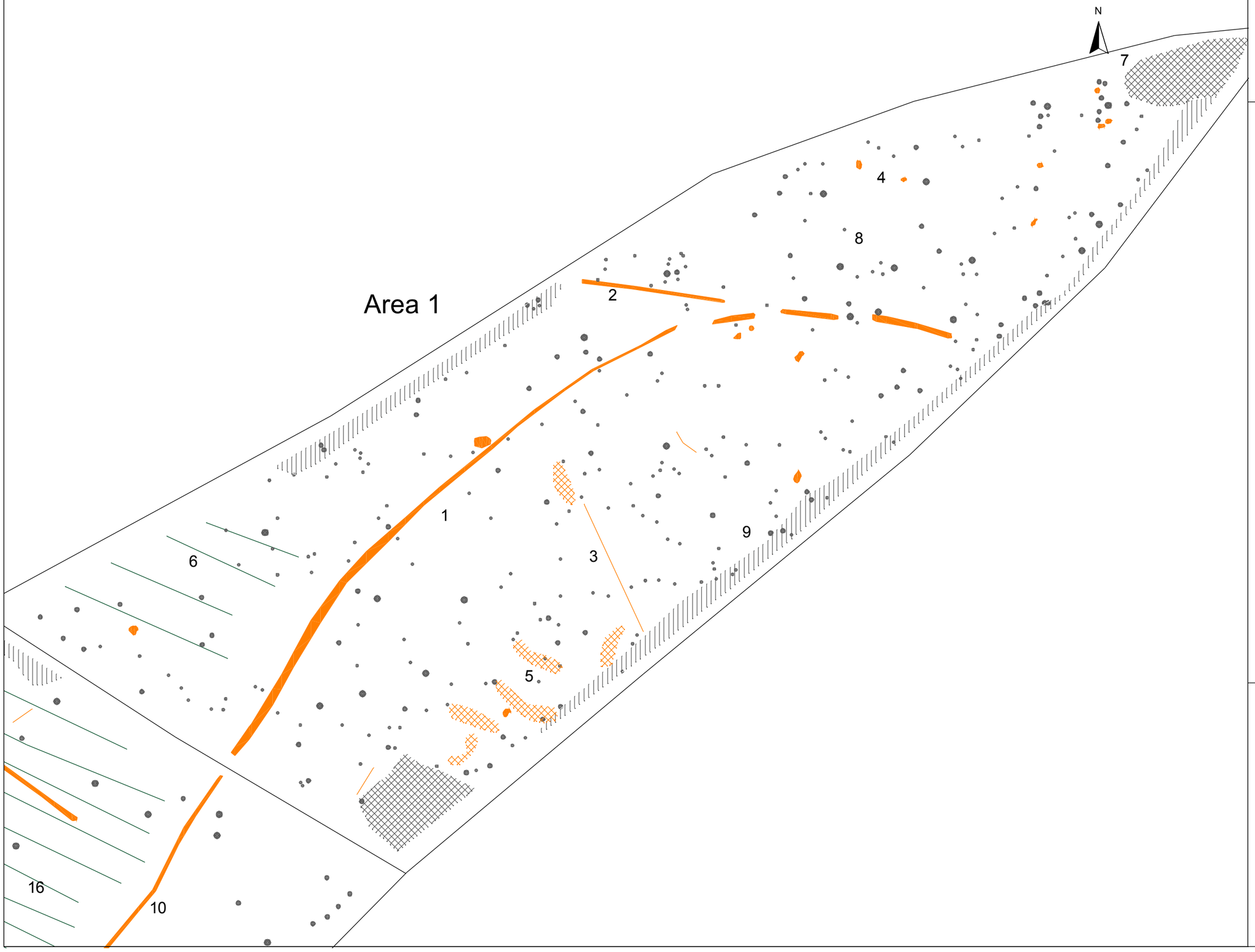
Abstraction and interpretation of magnetometer anomalies - Area 1



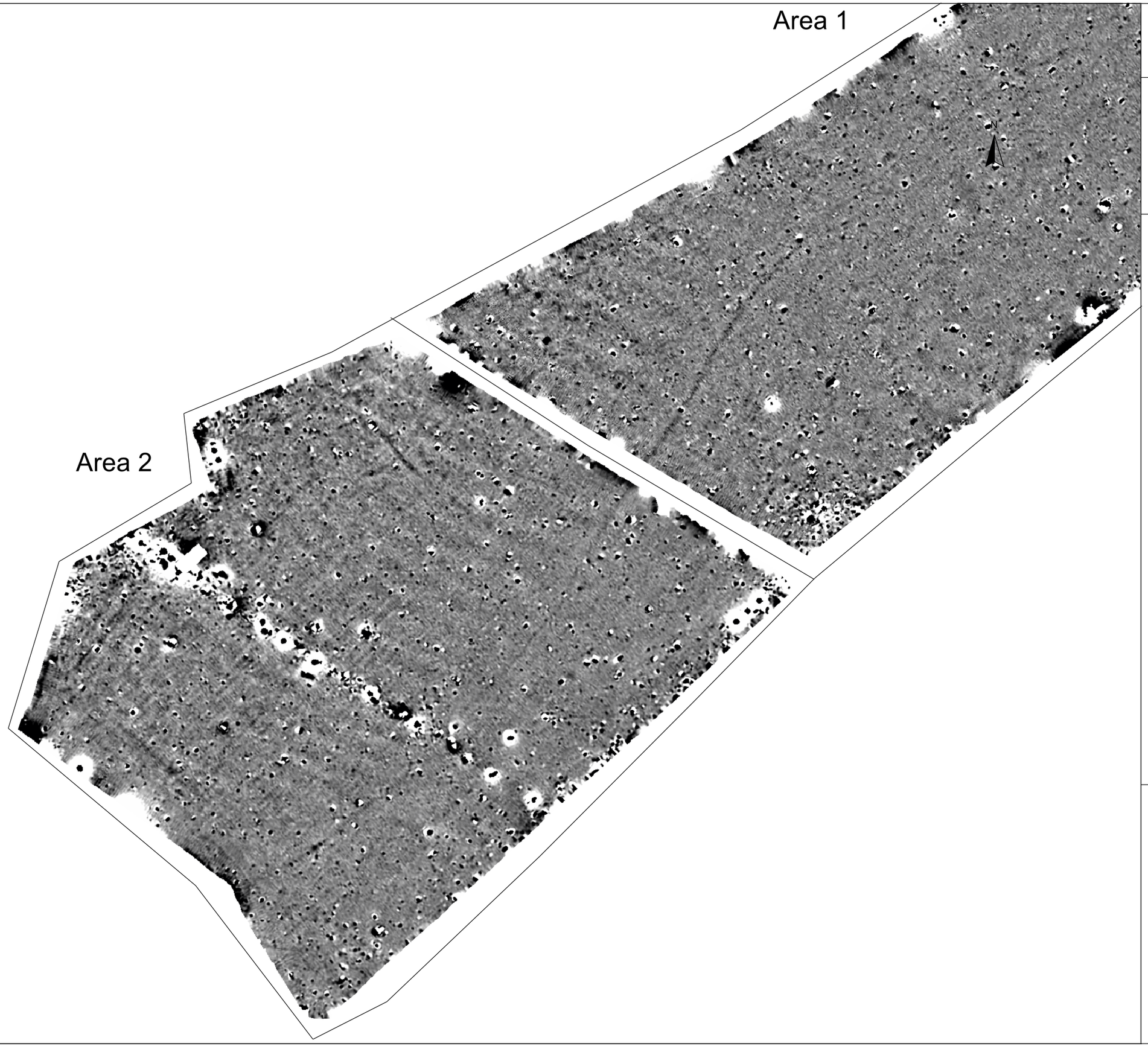
- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Positive linear anomaly - possible former field boundary
- Discrete positive response - possible pit-like feature
- Positive anomaly - magnetically enhanced material
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 06



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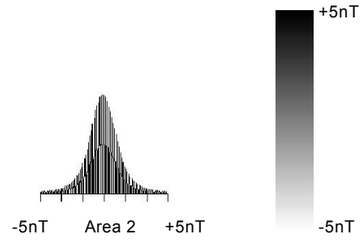
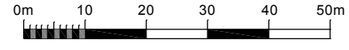
Greyscale plot of minimally processed magnetometer data - Area 2



SCALE 1:1000



SCALE TRUE AT A3

FIG 07

Area 1

Area 2

1

2

3

5

6

10

11

12

13

14

15

16

N

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Abstraction and interpretation of magnetometer anomalies - Area 2

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Positive linear anomaly - possible former field boundary
- Discrete positive response - possible pit-like feature
- Positive anomaly - magnetically enhanced material
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 08