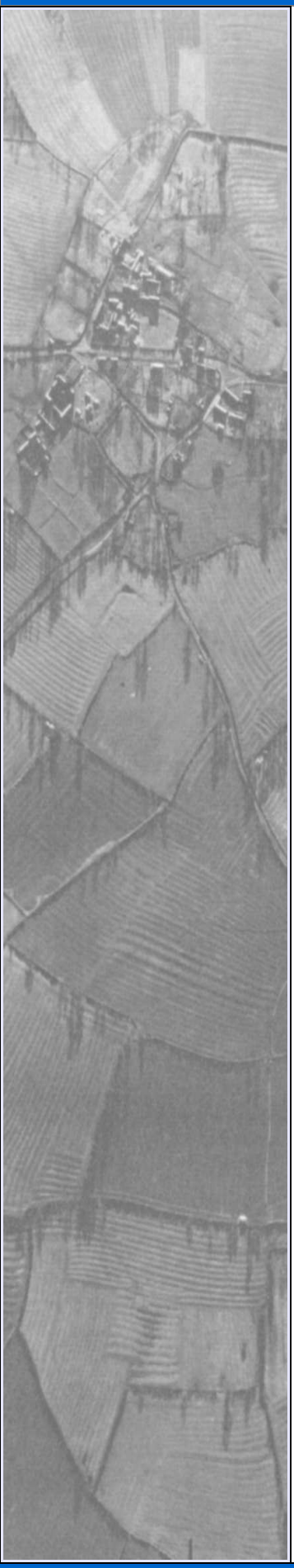

Over Farm
Highnam
Gloucestershire

MAGNETOMETER SURVEY REPORT

for

Cotswold Archaeology

Kerry Donaldson & David Sabin

January 2017

Ref. no. J701

ARCHAEOLOGICAL SURVEYS LTD

Over Farm
Highnam
Gloucestershire

Magnetometer Survey Report

for

Cotswold Archaeology

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

Survey dates – 9th & 11th to 14th January 2017
Ordnance Survey Grid Reference – **SO 80445 19730**

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SUMMARY

Detailed magnetometry was carried out by Archaeological Surveys Ltd within a single arable field at Over Farm, Highnam in Gloucestershire, ahead of a potential solar farm development. The survey located a number of small groups of positive linear and discrete responses, with one in the northern part of the site appearing to be associated with magnetic debris and in the vicinity of removed field boundaries. The response indicates that magnetically enhanced material is incorporated into possible cut features, or a possible association with burning or industrial activity. Other groups of anomalies are indistinct and lack a coherent morphology. There is also evidence for ridge and furrow, formerly mapped field boundaries and possible land drainage.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Cotswold Archaeology to undertake a magnetometer survey of an area of land at Over Farm, near Highnam in Gloucestershire. The site has been outlined for a proposed development of a solar farm covering 11.5ha, 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 Archaeological Surveys (2017) and approved by Charles Parry, Archaeologist for Gloucestershire County Council, prior to commencing the survey.

1.2 Survey objectives and techniques

1.2.1 The objective of the survey was to use magnetometry to locate geophysical anomalies that may be archaeological in origin so that they may be assessed prior to development of the site. The methodology is considered an efficient and effective approach to archaeological prospection.

1.2.2 The survey and report generally follow the recommendations set out by: English Heritage (2008) *Geophysical survey in archaeological field evaluation;* European Archaeological Council (2015) *Guidelines for the Use of Geophysics in Archaeology;* 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 at Over Farm, to the north of the A40 and east of Highnam

in Gloucestershire. It is centred on Ordnance Survey National Grid Reference (OS NGR) SO 80445 19730, see Figs 01 and 02.

1.3.2 The geophysical survey covers approximately 11ha within the majority of a single arable field which contained a young oilseed rape crop at the time of survey. The survey covered the area to contain the solar arrays, fencing, hedgerow planting and site compound where accessible. The northern part of the field was not included in the application area and was therefore not subject to survey.

Plate 1: Survey area looking north

1.3.3 The ground conditions across the site were exceptionally poor through the survey period. Despite the presence of a young rape crop, traversing was very difficult due to a very sticky clay soil. Survey was abandoned on two occasions and was only possible in heavy rain and snow that restricted the amount of soil sticking to footwear, and in frozen conditions which prevented soil sticking. The survey was, therefore, mainly carried out within periods of heavy rain/snow and during the early part of mornings with the aid of frost.

1.4 Site history and archaeological potential

1.4.1 A Historic Environment Assessment has been carried out for a larger scheme, but which includes the survey area within the eastern half of it (CgMs, 2015). It outlines that a number of Roman findspots have been located within 1km of the site (e.g. HER 115267) and the Roman road from Gloucester to Mitcheldean is located 150m to the south (HER 1161622). The application area lies within an area of medieval ridge and furrow (HER 1448920), with the

hamlet of Over having medieval origins (HER 14811) and an L-shaped pond associated with medieval sherds of pottery possibly indicating a former moated site immediately to the west (HER 7126). Ridge and furrow has been plotted from aerial photographs and early mapping shows the site split into five land parcels in the 1840s, although all had been removed by the late 20th century to form a single field.

1.4.2 The field situated 165m to the west has also been subject to archaeological investigation. A geophysical survey, comprising magnetometry, located a number of weakly positive linear and discrete anomalies that may relate to ditch-like and pit-like features, but they lacked a coherent morphology (Archaeological Surveys, 2015). The subsequent evaluation identified Roman features within the eastern part of the site, including two drainage ditches, a possible palisade or fence-like structure and a number of pits. A post-medieval boundary ditch and furrows were also recorded (Cotswold Archaeology, 2015).

1.4.3 The surface conditions within the site were not suitable for the observation of cultural material during the course of the survey.

1.5 Geology and soils

1.5.1 The underlying geology is Blue Lias and Charmouth Mudstone Formation (BGS, 2016).

1.5.2 The overlying soil across the site is from the Wickham 2 association and is a typical stagnogley soil. It consists of a slowly permeable, seasonally waterlogged fine loamy over clayey soil (Soil Survey of England and Wales, 1983).

1.5.3 Magnetometry survey carried out across similar soils has produced variable results. At times there can be a low magnetic contrast between the fill of cut features and the material into which they are cut; however, areas containing long term occupation and/or industrial activity can result in magnetically enhanced features. The underlying geology and soils are considered acceptable 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 (FGM650) spaced 0.5m apart with readings recorded at 20 Hz. The cart is pushed at walking speed and not towed. Each sensor is not zeroed in the field as the vertical axis alignment is precisely fixed leaving sensor offsets that are removed during data processing. The fixing of the vertical alignment ensures the sensors are not unduly influenced by localised magnetic fields and that the vertical component of a magnetic anomaly is measured. The gradiometers have a range of recording data between ±0.1nT and ±10,000nT. They are linked to a Leica GS10 RTK GPS with data recorded by SENSYS MAGNETO®MXPDA software on a rugged PDA computer system.

2.2.2 Due to the fixed offsets within the fluxgate sensors, as a result of the manufacturing and tensioning process, the survey data do not provide a visually useful dataset until a zero median traverse algorithm is applied. It is recognised that this has the potential to affect some anomalies detrimentally by removing linear features orientated parallel to survey transects. However, this has not been noted as a particular problem with the system due to the high resolution data collection, generally long length of traverses and variability within the magnetic characteristics of a linear anomaly.

2.2.3 Data are collected along a series of parallel survey transects to achieve 100% coverage of the surveyable land. 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. 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).

2.2.4 Fluxgate sensors are highly sensitive to temperature change and this is manifest as drift during the course of a survey. This can be particularly noticeable during the morning as temperatures rise and the equipment warms or cools. Sensor drift within the course of a traverse will appear as a line trending from negative to positive after processing with a zero median traverse algorithm. To remove the potential for temperature drift data were collected after a 20 minute stabilisation period and traverses were limited to a time of generally <100s.

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. The software effectively allocates a geographic position for each data point and can compensate for fixed offsets present within the FGM650 sensors. The offsets are positive or negative values present on all fluxgate gradiometer sensors. Some systems use manual or electronic balancing to effectively zero the sensors; however, this is a short term measure that is prone to drift through temperature changes and vibration and can easily be incorrectly set due to localised magnetic fields. The FGM650 sensors are very accurately aligned to the vertical magnetic gradient and are highly stable showing negligible drift on long traverses. The offset values are removed using TerraSurveyor software.

2.3.2 Survey tracks are analysed and georeferenced raw data (UTM Z30N) are then exported in ASCII format for further analysis and display within TerraSurveyor. The removal of offset values (compensation) of the sensors is also carried out in TerraSurveyor using a zero median traverse function. Data are then considered to be minimally processed. Note: without the zero median traverse function it is not possible to create a meaningful data plot as all sensors have a different offset value. 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 The minimally processed data are collected between limits of ±10000nT and clipped for display at ±3nT. Data are interpolated to a resolution of effectively 0.5m between tracks and 0.15m along each survey track.

2.3.4 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 processing.

2.3.5 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. With regard to the Sensys MXPDA, minimally processed data is considered by the manufacturer to be data that is

compensated by SENSYS MAGNETO DLMGPS software, see 2.3.1 and 2.3.2. Note: traceplots are not considered to be appropriate as they do not provide an accurate or useful assessment of the magnetic anomalies due to very high density of data collection.

2.3.6 The raster images are combined with base mapping using ProgeCAD Professional 2016, creating DWG (2010) 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.

2.3.7 An abstraction and interpretation is also drawn and plotted 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.

2.3.8 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 the survey area. Where further interpretation is possible, or where a number of possible origins should be considered, more subjective discussion is set out in Section 4.

2.3.9 A digital archive is produced with this report, see Appendix D below. The main archive is held at the offices of Archaeological Surveys Ltd. In order to comply with the *Gloucestershire Archaeological Archive Standards* (SWMDP, 2017), the data will be archived with the Archaeology Data Service (ADS) and the report uploaded to Online AccesS to the Index of archaeological investigationS (OASIS).

3 RESULTS

3.1 General assessment of survey results

3.1.1 The detailed magnetic survey was carried out over approximately 11ha within a single arable field.

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, strong discrete dipolar anomalies relating to ferrous objects and strong multiple dipolar linear anomalies relating to buried services or pipelines.

3.2 Statement of data quality and factors influencing the interpretation of anomalies

3.2.1 Data are considered representative of the magnetic anomalies present within the site. A very small number of traverses contain additional magnetic

disturbance due to soil contaminated with magnetic debris sticking to the operator's footwear. These are located on the western and southern edges of the survey area and a very short length within the northern half of the site. This additional 'noise' has not significantly affected the data and has not obscured other anomalies. It is unavoidable where very sticky soil is contaminated with small ferrous objects.

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 within the 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 	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 AS-ABST MAG LAND DRAIN 	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. Land drains can appear in a classic herringbone pattern of interconnected multiple dipolar linear anomalies, or as parallel linear anomalies. The multiple dipolar response indicates a ceramic land drain.
Anomalies with an agricultural origin AS-ABST MAG RIDGE AND FURROW 	The anomalies are often linear and form a series of parallel responses or are parallel to extant land boundaries. Where the 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 AS-ABST MAG SERVICE	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. Buried services may produce characteristic multiple dipolar anomalies dependant upon their construction.

Table 1: List and description of interpretation categories

3.4 List of anomalies

Area centred on OS NGR 380445 219730, see Figs 03 - 08.

Anomalies with an uncertain origin

(1) - A group of positive linear and discrete anomalies are located close to the junction of two former field boundaries (7 & 8) in the northern part of the survey area (Figs 05 & 06). It is not possible to determine the dating sequence of the anomalies and the field boundaries, but the strength of the responses (5-18nT) indicates that they are associated with magnetically enhanced material or burning. A number of small dipolar responses are located within the vicinity and indicate an associated spread of weak magnetic debris. While an association with dumped material is possible, cut features and/or magnetically enhanced features associated with some form of industrial activity should be considered.

(2) - To the north of anomalies (1) are a number of discrete positive responses and a weakly positive, short, linear anomaly. Their origin is uncertain but an association with anomalies (1) is possible.

(3) - Located in the southern part of the survey area (Figs 07 & 08) are a number of groups of positive linear and discrete responses. They do not form a coherent morphology or pattern, and although of uncertain origin, archaeological features cannot be ruled out.

(4) - In the north western corner of the survey area (Figs 05 & 06) there are a number of positive linear and discrete responses. They lie in the vicinity of a number of ceramic land drains (10); however, it is not possible to determine if they are associated.

(5) - In the central northern part of the survey area are a number of positive linear anomalies. It is not possible to determine if they relate to agricultural activity, land drainage or cut features.

(6) - A positive linear anomaly is adjacent to and parallel with former field boundary (7). It may relate to the boundary, agricultural activity or possible land drainage.

Anomalies associated with land management

(7, 8 & 9) - The survey area contains a number of positive linear anomalies relating to field boundaries removed during the 20th century. Not all of the boundaries have a complete response, and other mapped field boundaries are not visible.

(10) - A number of possible land drains are located in the north western corner and eastern corner of the survey area.

Anomalies with an agricultural origin

(11) - A series of linear anomalies in the eastern part of the site relates to ridge and furrow contained by former field boundaries (7 & 8).

Anomalies associated with magnetic debris

(12) - Much of the survey area contains widespread weakly magnetic debris, with the strongest concentrations of the material abstracted. It is not possible to determine if they relate to spreads of dumped ferrous and other magnetically thermoremnant mateial, or if they have an association with industrial activity.

(13) - Patches of magnetic debris and spreads around the field margins appear to relate to dumped magnetically thermoremnant material.

(14) - Strong dipolar anomalies relate to ferrous and other magnetically thermoremnant objects within the topsoil.

Anomalies with a modern origin

(15 & 16) - Strong, multiple dipolar, linear anomalies indicate the presence of iron/steel buried services or pipes. Anomaly (16) appears to extend towards, but not beyond, former field boundary (7).

4 DISCUSSION

4.1.1 The survey area contains widespread magnetic debris. This is often caused by spreading ferrous and other magnetically thermoremnant material, such as brick and tile fragments within the process of manuring. However, there are distinct zones and clusters of this material, within the eastern part of the site, (see anomalies (12)), and within a small area in the northern part of the site associated with anomalies (1). The magnetic debris is generally weak, with some stronger responses, but the positive anomalies may indicate a response to magnetically enhanced material or possible burning or industrial activity. The positive linear and discrete responses appear either to underlie or overlie

a former field boundary (8), but the phasing and association is unclear.

4.1.2 Elsewhere within the site there are a number of positive linear and discrete responses, but they are either short, fragmented or weak and lack a clear morphology. Cut features, with a magnetically enhanced fill, however, should be considered.

4.1.3 Two buried pipes or services have also been located, but the responses do not extend in full across the field. Anomaly (15) appears to have a gap along its length, although this may be that the material is non-magnetic in this position or it may have been truncated. This also leads in a north westerly direction towards a former pond or depression in the adjacent field. This is outlined in the HER as a possible moated site, but the response to the anomaly would indicate that water was being brought from the pond towards the farm through an iron pipe. Anomaly (16) also appears to relate to a pipe but stops abruptly in the field close to former field boundary (7).

5 CONCLUSION

5.1.1 The magnetometer survey located a number of positive linear and discrete anomalies within the site. Generally they are widespread and lack a coherent pattern or morphology. A group of such anomalies is located in the northern part of the site in the vicinity of two former field boundaries. They are associated with a spread of magnetic debris and although dumped material could be inferred, it is possible that they relate to cut features with a magnetically enhanced fill, burning, or industrial activity. Other such groups of positive linear and discrete responses are very indistinct and it is not possible to determine their origin.

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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 ±5nT and ±3nT 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, modern agricultural features and other large magnetic bodies within or adjacent to survey areas.

Low Pass Filtering

A mathematical process used to remove high frequency anomalies relating to uneven ground, vibration, etc.

Appendix C – survey and data information

Minimally processed magnetometer data

Filename: J701-mag.xcp
Description: Imported as Composite from: J701-mag.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 380220.086333133, 219991.612965378 m
Southeast corner: 380619.086333133, 219440.512965378 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702
Source GPS Points: 4067100
Dimensions
Composite Size (readings): 2660 x 3674
Survey Size (meters): 399 m x 551 m
Grid Size: 399 m x 551 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.03
Mean: 0.02
Median: 0.01
Composite Area: 21.989 ha
Surveyed Area: 11 ha
PROGRAM
Name: TerraSurveyor
Version: 3.0.23.0
Processes: 1
1 Base Layer

GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00 nT

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.

A copy of the report in PDF/A format will be supplied to the Gloucestershire Historic Environment Record, together with a DXF of the survey boundary. In order to comply with the Gloucestershire Archaeological Archive Standards (SWMDP, 2017) the data will be archived with the Archaeology Data Service (ADS) and the report uploaded to Online AccesS to the Index of archaeological investigationS (OASIS) in the formats stated below for archiving:

Archive contents:

Geophysical data - path: J701_Over_Farm_geophysics				
Path and Filename	**Software**	**Description**	**Date**	**Creator**
J701_Over_Farm_raw_mag.zip	Sensys DLMGPS	ASCII CSV (tab) file representing survey area in eastings, northings (UTM Z30N), magnetic measurement, traverse file and sensor number.	24/01/17	K.T.Donaldson
J701_Over_Farm_proc_mag.zip	TerraSurveyor 3.0.23.0	Composite data file derived from ASCII CSV for minimally processed composite (zmt and clipping to ±3nT).	24/01/17	K.T.Donaldson
J701_geophysics_metadata	OpenOffice.4.1.1 Calc	ADS spreadsheet for geophysics metadata	24/01/17	K.T.Donaldson
Graphic data - path: J701_Over_Farm_gis				
J701_mag_proc-3nT.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±3nT.	24/01/17	K.T.Donaldson
J701_mag_proc-3nTtfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	24/01/17	K.T.Donaldson
J701_gis_metadata	OpenOffice.4.1.1 Calc	ADS spreadsheet for graphic TIF metadata	24/01/17	K.T.Donaldson
CAD data - path: J701_Over_Farm_CAD				
J701_Over_Farm_CAD.dwg	ProgeCAD 2016	CAD file for creating plots of greyscales, abstraction, interpretation and mapping. Grid coordinates as OSGB. AutoCAD 2010 format.		K.T.Donaldson
J701_CAD_metadata	OpenOffice.4.1.1 Calc	ADS spreadsheet for CAD drawing	24/01/17	K.T.Donaldson

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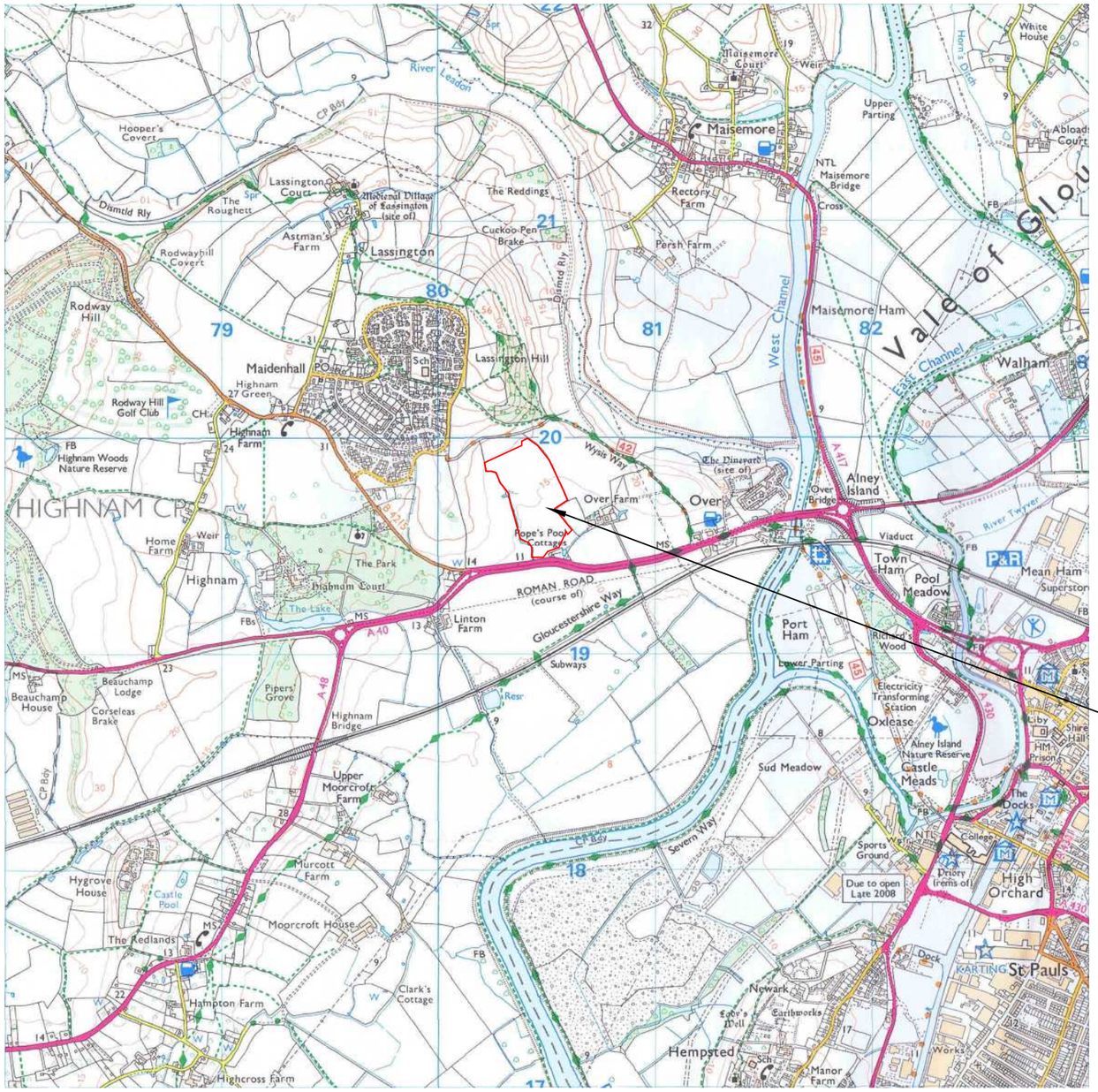
Geophysical Survey
Over Farm
Highnam
Gloucestershire

Map of survey area



Survey location

Site centred on OS NGR
SO 80445 19730

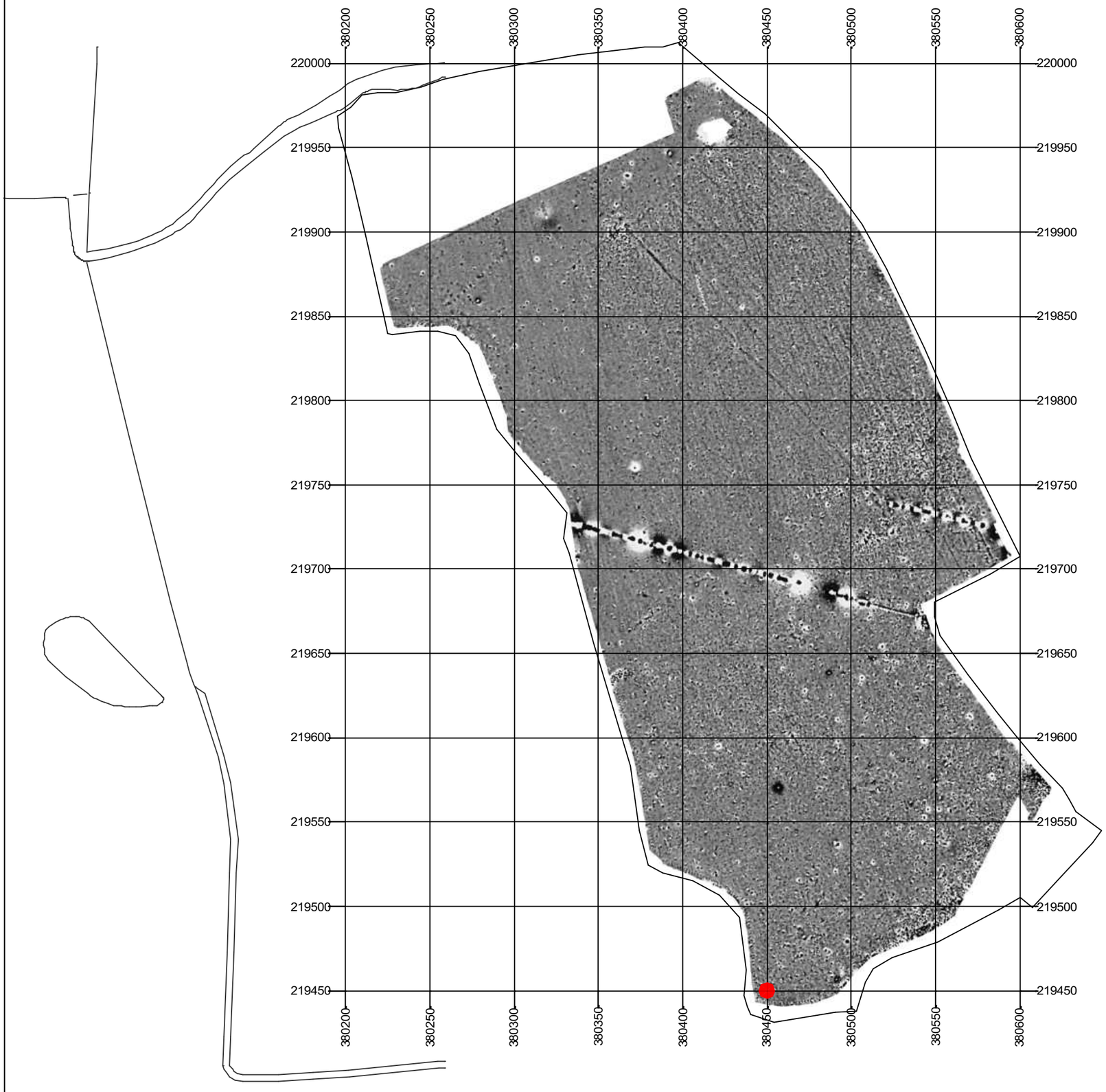
Reproduced from OS Explorer map no. 179 1:25 000 by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office. © Crown copyright. All rights reserved. Licence number 100043739.

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

FIG 01



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Geophysical Survey Over Farm Highnam Gloucestershire

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

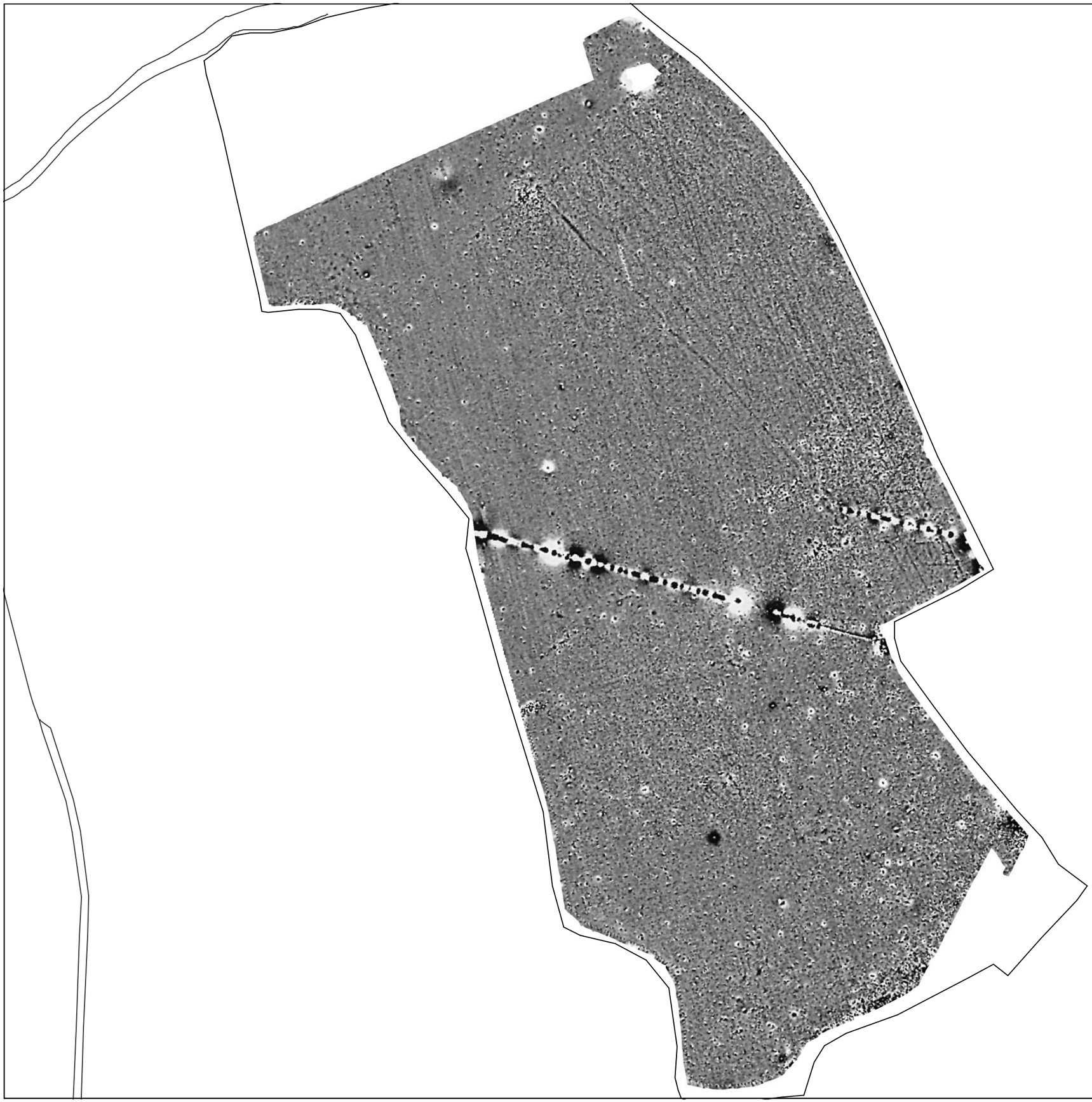
● 380450 219450

SCALE 1:2500

0m 50 100m

SCALE TRUE AT A3

FIG 02



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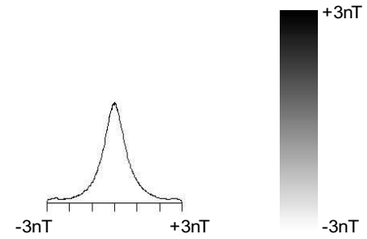
Geophysical Survey Over Farm Highnam Gloucestershire

Greyscale plot of minimally processed magnetometer data



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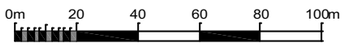

SCALE TRUE AT A3

FIG 03

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Geophysical Survey Over Farm Highnam Gloucestershire

Abstraction and interpretation of magnetic anomalies

N

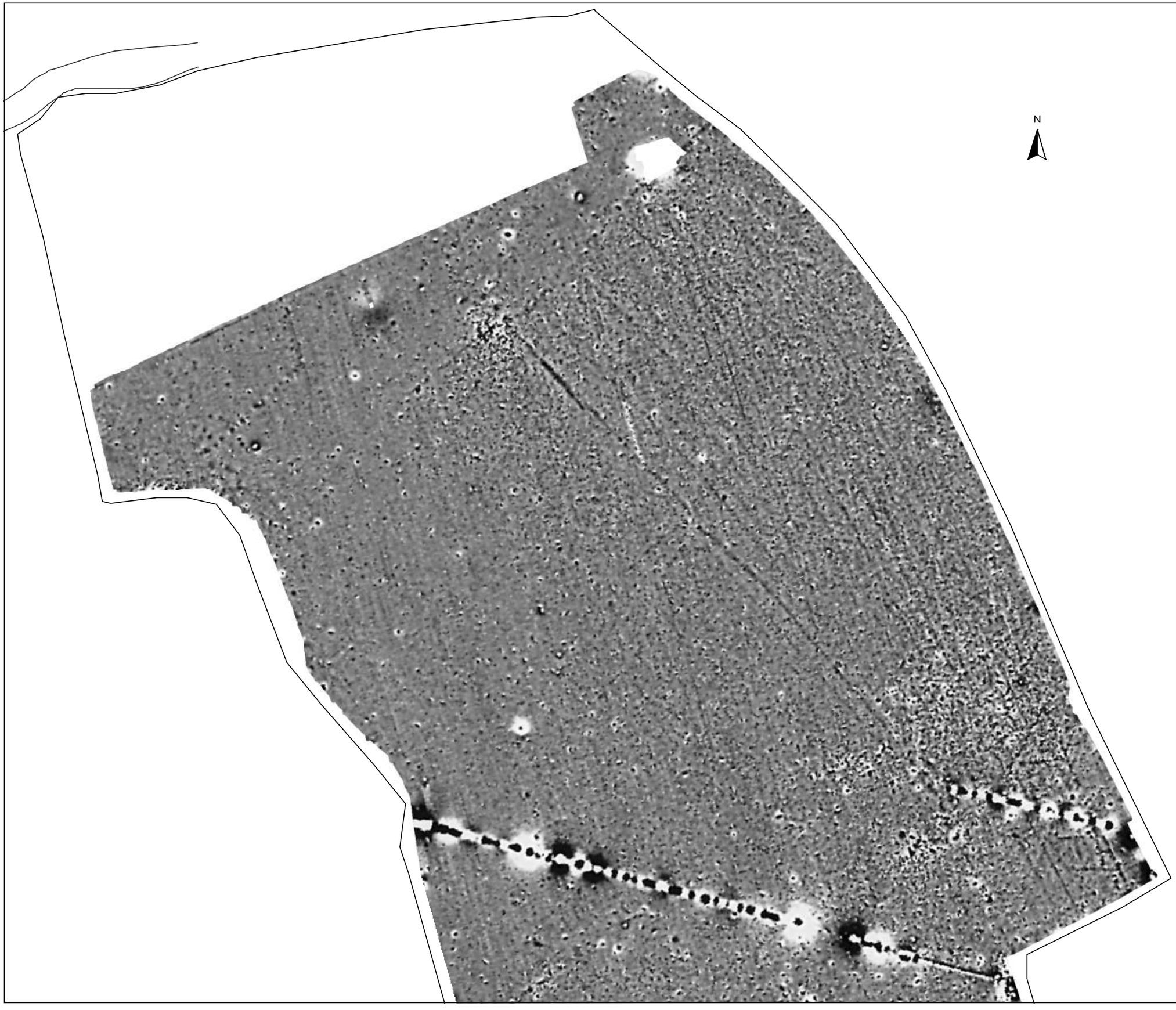
- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Positive linear anomaly - possible land drain
- Positive linear anomaly - former field boundary
- Discrete positive response - possible pit-like feature
- Magnetic debris - spread of magnetically thermoremnant/ferrous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

SCALE 1:2000

0m 20 40 60 80 100m

SCALE TRUE AT A3

FIG 04



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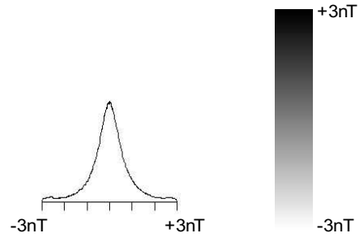
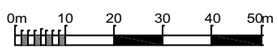
Greyscale plot of minimally processed magnetometer data - north



SCALE 1:1250



SCALETRUEATA3

FIG 05

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Geophysical Survey Over Farm Highnam Gloucestershire

Abstraction and interpretation of magnetic anomalies - north

N

1
2
4
5
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8
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10
10
11
12
15
16

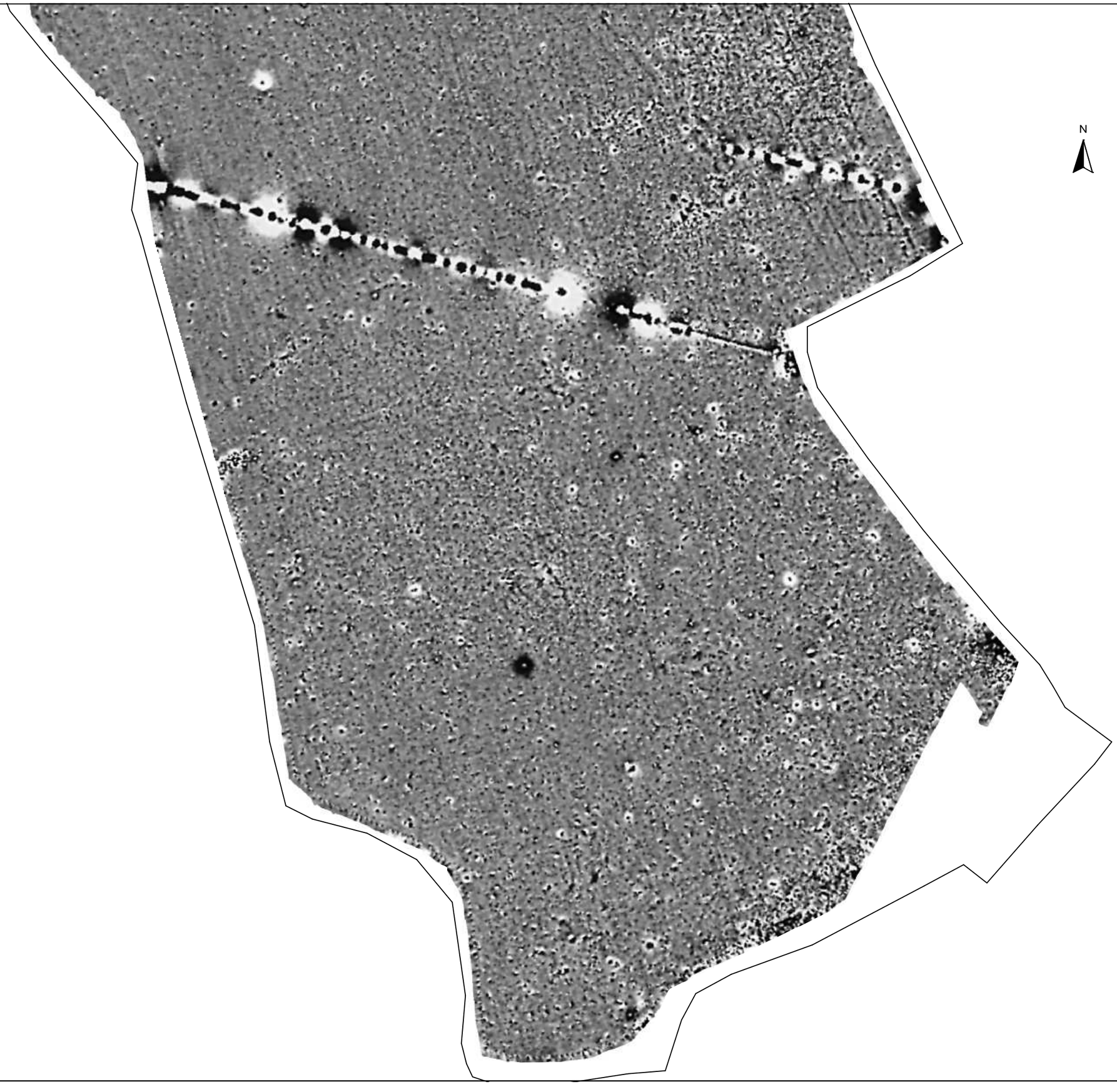
- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Positive linear anomaly - possible land drain
- Positive linear anomaly - former field boundary
- Discrete positive response - possible pit-like feature
- Magnetic debris - spread of magnetically thermoremnant/ferrous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

SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 06



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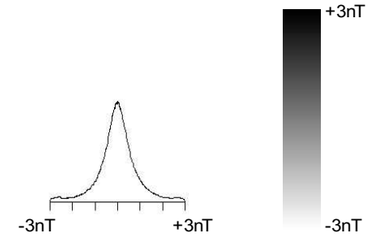
Greyscale plot of minimally processed magnetometer data - south



SCALE 1:1250

SCALE TRUE AT A3

FIG 07

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Abstraction and interpretation of magnetic anomalies - south

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

SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 08