

**Land at Ashleworth
Tewkesbury
Gloucestershire**

MAGNETOMETER SURVEY REPORT

for

Cotswold Archaeology

Kerry Donaldson & David Sabin

April 2020

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ARCHAEOLOGICAL SURVEYS LTD

**Land at Ashleworth
Tewkesbury
Gloucestershire**

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Cotswold Archaeology

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SUMMARY

Detailed magnetometry was carried out by Archaeological Surveys Ltd on land at Ashleworth in Gloucestershire ahead of a proposed residential development. The results demonstrate the presence of a group of discrete positive responses that could relate to pit-like features or have an association with burning. A number of weakly positive linear and a curvilinear anomaly have also been located; however, they are very weak and poorly defined, and it is not possible to determine if they relate to cut features.

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 Ashleworth, near Tewkesbury, Gloucestershire. The site has been outlined for a proposed residential development, and the survey forms part of an archaeological assessment.
- 1.1.2 The geophysical survey was carried out in accordance with a Written Scheme of Investigation (WSI) produced by Archaeological Surveys (2020) and approved by Toby Catchpole, Heritage Team Leader for Gloucestershire County Council Archaeology Service, 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 Geophysical survey can provide useful information on the archaeological potential of a site; however, the outcome of any survey relies on a number of factors and as a consequence results can vary. The success in meeting the aims and objectives of a survey is, therefore, often impossible to predetermine.

1.3 *Standards, guidance and recommendations for the use of this report*

- 1.3.1 The survey and report generally follow the recommendations set out by: 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*. Note: currently Historic England (2018) no longer support the guidelines set out in English Heritage

(2008) *Geophysical survey in archaeological field evaluation* and there are currently no plans to update the document. As a consequence other sources of written guidance referring to this document may be out of date and/or contain unsupported information (e.g. Chartered Institute for Archaeologists, 2014).

- 1.3.2 Archaeological Surveys Ltd provide a detailed geophysical survey report and it is recommended that where possible the contents should be considered in full. The Summary provides a brief overview of the results with more detail available in the Discussion and/or Conclusion. The *List of anomalies* within the Results provides a detailed assessment of the anomalies within separate categories which can be useful in inferring a level of confidence to the interpretation. Quality and factors influencing the interpretation of anomalies is also set out within the results.
- 1.3.3 It is recommended that the full report should always be considered when using data and interpretation plots; where this is not possible, in the field for example, the abstraction and interpretation plots should retain their colour coding and be used with a corresponding legend.
- 1.3.4 Where targeting of anomalies by excavation is to be carried out, care should be taken to place trenches over solid lines or features visible on the abstraction and interpretation plots. Archaeological Surveys abstraction and interpretation avoids the use of dashed or dotted line formats, and broken or fragmented lines used in interpretive plots may well correspond closely with truncation of archaeological features.

1.4 *Site location, description and survey conditions*

- 1.4.1 The site is located on the western edge of Ashleworth in Gloucestershire. It is centred on Ordnance Survey National Grid Reference (OS NGR) SO 81025 25810 see Figs 01 and 02.
- 1.4.2 The geophysical survey covers approximately 1.9ha within a single grass field. It lies immediately south of a new residential development, Rectory Close, off Nup End, and is bounded by a fence from this development to the north and mature field boundary hedges on the other sides.
- 1.4.3 The ground conditions across the site were generally considered to be favourable for the collection of magnetometry data. Ground make-up and landscaping associated with the adjacent development was noted along the northern and western sides of the survey area. The northern part of the area also contained a number of deep ruts. The field had been recently mown and weather conditions during the survey were fine.



Plate 1: Survey area looking south west

1.5 Site history and archaeological potential

1.5.1 A Heritage Desk-Based Assessment has been undertaken by Cotswold Archaeology (2019). It outlines that although there is potential for the site to contain buried remains of former ridge and furrow, there are no known archaeological remains identified within the site. Previous geophysical survey (HER47619) and evaluation (HER48158) were carried out by Headland Archaeology on land immediately north of the site and a single Neolithic/Early Bronze Age scraper was found along with post medieval cultivation furrows. No previous archaeological investigation has taken place within the site.

1.6 Geology and soils

1.6.1 The underlying solid geology across the site is interbedded Triassic and Jurassic limestone and mudstone from the Wilmcote Limestone Member (BGS, 2017).

1.6.2 The overlying soil across the survey area is from the Evesham 1 association and is a typical calcareous pelosol. It consists of a slowly permeable, calcareous, clayey soil associated with shallow, well drained brashy calcareous soils over limestone (Soil Survey of England and Wales, 1983).

1.6.3 Magnetometry carried out over similar geology and soil has produced good results. The site is, therefore, considered suitable for magnetic survey. A narrow zone of ground make-up close to the northern and western field boundaries has raised the surface by approximately 0.3m. It is likely that the soil is derived from the adjacent development and it may contain magnetic

debris associated with modern ferrous material.

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 (also known as thermoremanence) are factors associated with the formation of localised fields.
- 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). Additional details are set out in 2.2 below and within Appendix A.

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 20Hz. 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 ± 0.1 nT and ± 8000 nT. They are linked to a Leica GS10 RTK GNSS 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 manifests 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 the 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 $\pm 8000\text{nT}$ and clipped for display at $\pm 3\text{nT}$. Data are interpolated to a resolution of effectively 0.5m between tracks and 0.15m along each survey track.
- 2.3.4 Additional data processing has been carried out in the form of high pass filtering. This effectively removes low frequency variation along a traverse that has been caused by large magnetic bodies, cultivation or rapid temperature change. Data treated to additional processing have been compared to unprocessed data to ensure that no significant anomalies have been removed.
- 2.3.5 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.
- 2.3.6 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 are considered by the manufacturer to be data that are 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 the very high density of data collection. In addition, traceplots cannot be meaningfully plotted against base mapping and in areas of complexity traces may be lost or highly confused. Traceplots may be used to demonstrate characteristic magnetic profiles across discrete features where it is considered beneficial.
- 2.3.7 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 GNSS, resection method, etc.
- 2.3.8 An abstraction and interpretation is 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. Appendix E sets out CAD layer names with colour and graphic content for each interpretation category, see 3.3.
- 2.3.9 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.
- 2.3.10 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 1.9ha within a single land parcel. Magnetic anomalies located can be generally classified as positive anomalies of an uncertain origin, areas of magnetic debris and disturbance and strong discrete dipolar anomalies relating to ferrous objects. Anomalies located within each survey area have been numbered and are described in 3.4 below.

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. There are no significant defects within the dataset.

3.2.2 A narrow zone of magnetic debris close to the northern field boundary is associated with recent ground make-up with soil containing magnetic debris. No anomalies of archaeological potential were located in the vicinity and it is, therefore, considered unlikely to obscure significant features. A low level of magnetic debris appears widespread within the field but is not sufficiently dense to obscure other anomalies.

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 general explanation of the characteristics of the magnetic anomalies is set out for each category in order to justify interpretation, see Table 1.

Interpretation category	Description and origin of anomalies
Anomalies with an uncertain origin	The category applies to a range of anomalies where <u>there is not enough evidence to confidently suggest an origin</u> . Anomalies in this category <u>may well be related to archaeologically significant features, but equally relatively modern features, geological/pedological features and agricultural features should be considered</u> . Morphology may be unclear or uncharacteristic and there may be a lack of additional supporting information. 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 associated with magnetic debris	Magnetic debris often appears as areas containing many small dipolar anomalies that may range from weak to very strong in magnitude. They often occur where there has been dumping or ground make-up and are related to magnetically thermoremanent materials such as brick or tile or other small fragments of ferrous material. This type of response is occasionally associated with kilns, furnace structures, hearths and nail spreads from former wooden structures or rooves and <u>may, therefore, be archaeologically significant</u> . 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	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 these 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 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 NGR381025 225810, see Figs 03 – 05.

Anomalies with an uncertain origin

(1) - A group of discrete positive responses is located in the eastern part of the survey area appears to lie within a shallow depression within the field. They have a response of 2-10nT, peaking at over 12nT. It is possible that these relate to pit-like features or have an association with burning and an archaeological origin is possible. A small number of further discrete positive responses can be seen elsewhere, mainly in the eastern half of the site, but it is not clear if these are associated.

(2) - A weakly positive curvilinear anomaly (<1nT) is located towards the southern part of the site. As it is so weak and poorly defined it is not possible to confidently interpret its origin, but a ditch-like feature is possible.

(3) - A weakly positive linear anomaly extends across the centre of the survey area. It is not clear if this relates to a ditch-like feature or if it has an association with former agricultural activity.

(4) - Other short, weakly positive linear anomalies can be seen elsewhere within the site, but they lack a coherent morphology preventing confident interpretation.

Anomalies associated with magnetic debris

(5) - Magnetic debris adjacent to the northern boundary relates to material spread during construction of the houses to the north.

(6) - The entire site is covered with widespread and numerous strong, discrete, dipolar responses. This type of response indicates ferrous and other magnetically thermoremanent objects that have been spread across the site.

4 CONCLUSION

4.1.1 The geophysical survey located a cluster of pit-like anomalies in the eastern part of the site. They are associated with magnetic enhancement that could indicate burning and although of uncertain origin their archaeological potential should be considered. A weakly positive curvilinear and a number of weak positive linear anomalies were also located, but these lack a coherent morphology and as a consequence cannot be confidently interpreted.

5 REFERENCES

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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 thermoremanent 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. Thermoremanent 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. Thermoremanent features include ovens, hearths, and kilns. In addition thermoremanent 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 magnetic field. The difference between the two sensors will relate to the strength of 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. Different ranges are applied to data in order to determine the most suitable for anomaly abstraction and display.

Despike

Removal of data points that exceed the mean/median/threshold by selecting a window size of data points and replace by mean/median/threshold. Magnetic spikes can be caused iron objects on the surface or within the topsoil. Despike can improve the appearance of data and remove extreme readings that may affect further processing.

High Pass Filter

Removes low frequency anomalies within the data that are not considered to be archaeologically significant and may be natural in origin. A window passes over the data, the mean of all the data within the window is subtracted from the centre value. The size of the window is adjusted as is the weighting which may be uniform or Gaussian. The process is used to improve the visibility of anomalies of interest.

Low Pass Filter

Removes high frequency anomalies or 'noise' within datasets and provides a smoother output. A window passes over the data, the mean of all the data within the window is used to replace the centre value. The size of the window is adjusted as is the weighting. The process is used to improve the visibility of anomalies of interest.

Zero Median/Mean Traverse

The median (or mean) of data from 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 offset values of the gradiometer sensors. The process can remove archaeological features that run along a traverse but with the high resolution datasets created by the Sensys FGM650 sensors and the method of data collection this has not been a notable problem. In fact, the removal of offsets using software avoids carrying out a balancing procedure on site, which inevitably can never be done in magnetically clean conditions and results in improperly aligned fluxgate sensors and/or electronic adjustment values.

Appendix C – survey and data information

Minimally processed data	Composite Area: 2.8373 ha Surveyed Area: 1.6458 ha
Filename: J814_mag_proc.xcp	PROGRAM
Description: Imported as Composite from: J814_mag.asc	Name: TerraSurveyor
Instrument Type: Sensys DLMGPS	Version: 3.0.23.0
Units: nT	GPS based Proce4
UTM Zone: 30U	1 Base Layer.
Survey corner coordinates (X/Y):OSGB36	2 Unit Conversion Layer (Lat/Long to OSGB36).
Northwest corner: 380951.93, 225893.59 m	3 DeStripe Median Traverse:
Southeast corner: 381118.88, 225723.64m	4 Clip from -3.00 to 3.00 nT
Collection Method: Randomised	
Sensors: 1	Filtered data
Dummy Value: 32702	Filename: J814_mag_proc_hpf.xcp
Source GPS Points: 511600	Stats
Dimensions	Max: 3.32
Composite Size (readings): 1113 x 1133	Min: -3.30
Survey Size (meters): 167 m x 170 m	Std Dev: 0.90
Grid Size: 167 m x 170 m	Mean: 0.03
X Interval: 0.15 m	Median: 0.01
Y Interval: 0.15 m	GPS based Proce5
Stats	1 Base Layer.
Max: 3.32	2 Unit Conversion Layer (Lat/Long to OSGB36).
Min: -3.30	3 DeStripe Median Traverse:
Std Dev: 0.97	4 High pass Uniform (median) filter: Window dia: 250
Mean: 0.02	5 Clip from -3.00 to 3.00 nT
Median: 0.01	

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 (Paul, 2018) 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:

File type	Naming scheme	Description
Data	J814_mag.asc J814_mag.xcp J814_mag_proc.xcp J814_mag_proc_hpf.xcp	Raw data as ASCII CSV TerraSurveyor raw data TerraSurveyor minimally processed data
Graphics	J814_mag_proc.tif J814_mag_proc_hpf.tif.xcp	Image in TIF format
Drawing	J814_CAD.dwg	CAD file in 2010 dwg format
Report	J814 report.odt	Report text in Open Office odt format

Table 2: Archive metadata

Appendix E – CAD layers for abstraction and interpretation plots

The table below sets out Archaeological Surveys Ltd CAD layer names with associated colours and graphical content. Where CAD files are available layers may be extracted for further CAD/GIS use. Note: hatched polygon boundaries are contained within layers with the RGB colour code 254, 255, 255 (near white) in order to prevent their visibility.

Report sub heading and associated CAD layer names	Colour with RGB index	Layer content
Anomalies with an uncertain origin		
AS-ABST MAG POS LINEAR UNCERTAIN	255,127,0	Line, polyline or polygon (solid)
AS-ABST MAG POS DISCRETE UNCERTAIN	255,127,0	Solid donut, point or polygon (solid)
Anomalies associated with magnetic debris		
AS-ABST MAG DEBRIS	132, 132, 132	Polygon (cross hatched ANSI37)
AS-ABST MAG STRONG DIPOLAR	132, 132, 132	Solid donut, point or polygon (solid)
Anomalies with a modern origin		
AS-ABST MAG DISTURBANCE	132, 132, 132	Polygon (hatched ANSI31)
AS-ABST MAG SERVICE	132, 132, 132	Line or polyline

Table 3: CAD layering

Appendix F – copyright and intellectual property

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**Geophysical Survey
Land at Ashleworth
Tewkesbury
Gloucestershire**

Map of survey area



Survey location



● Survey location

Site centred on OS NGR
SO 81025 25810

SCALE 1:25 000



SCALE TRUE AT A3



**Geophysical Survey
Land at Ashleworth
Tewkesbury
Gloucestershire**

Referencing information

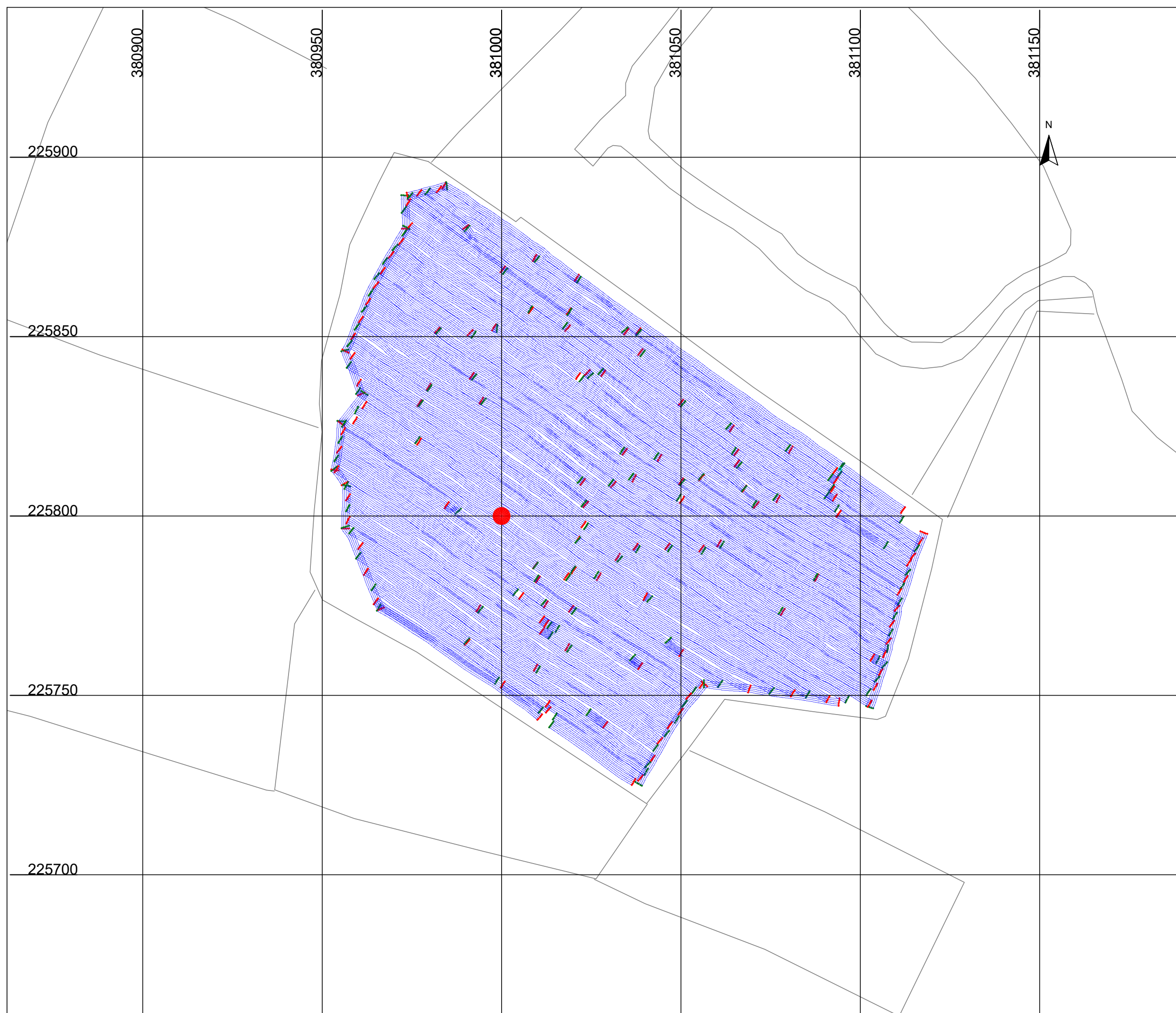
Referencing grid to OSGB36 datum at 50m intervals

● 381000 225800

— Survey tracks

⋯ Survey track start

⋯ Survey track stop



SCALE 1:1000



SCALE TRUE AT A3

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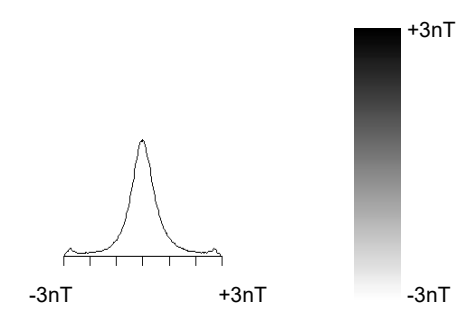
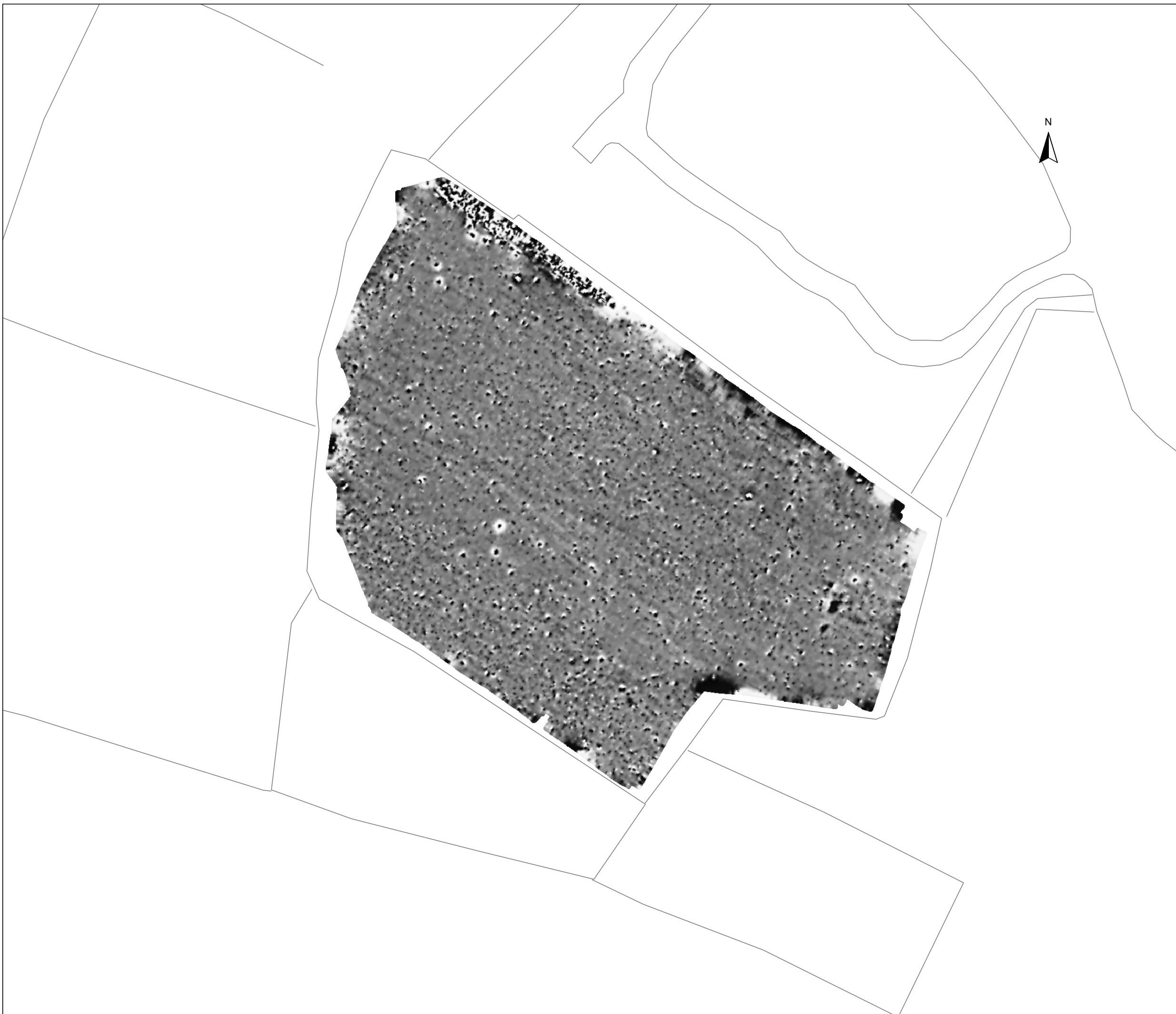
CHECKED BY
DJS

FIG 02



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**Greyscale plot of minimally
processed magnetometer data**



SCALE 1:1000



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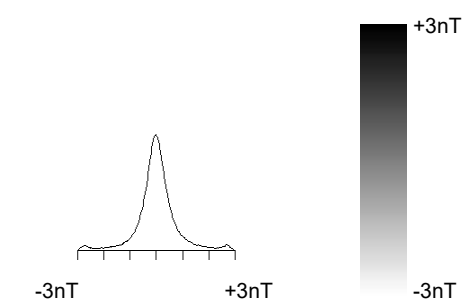
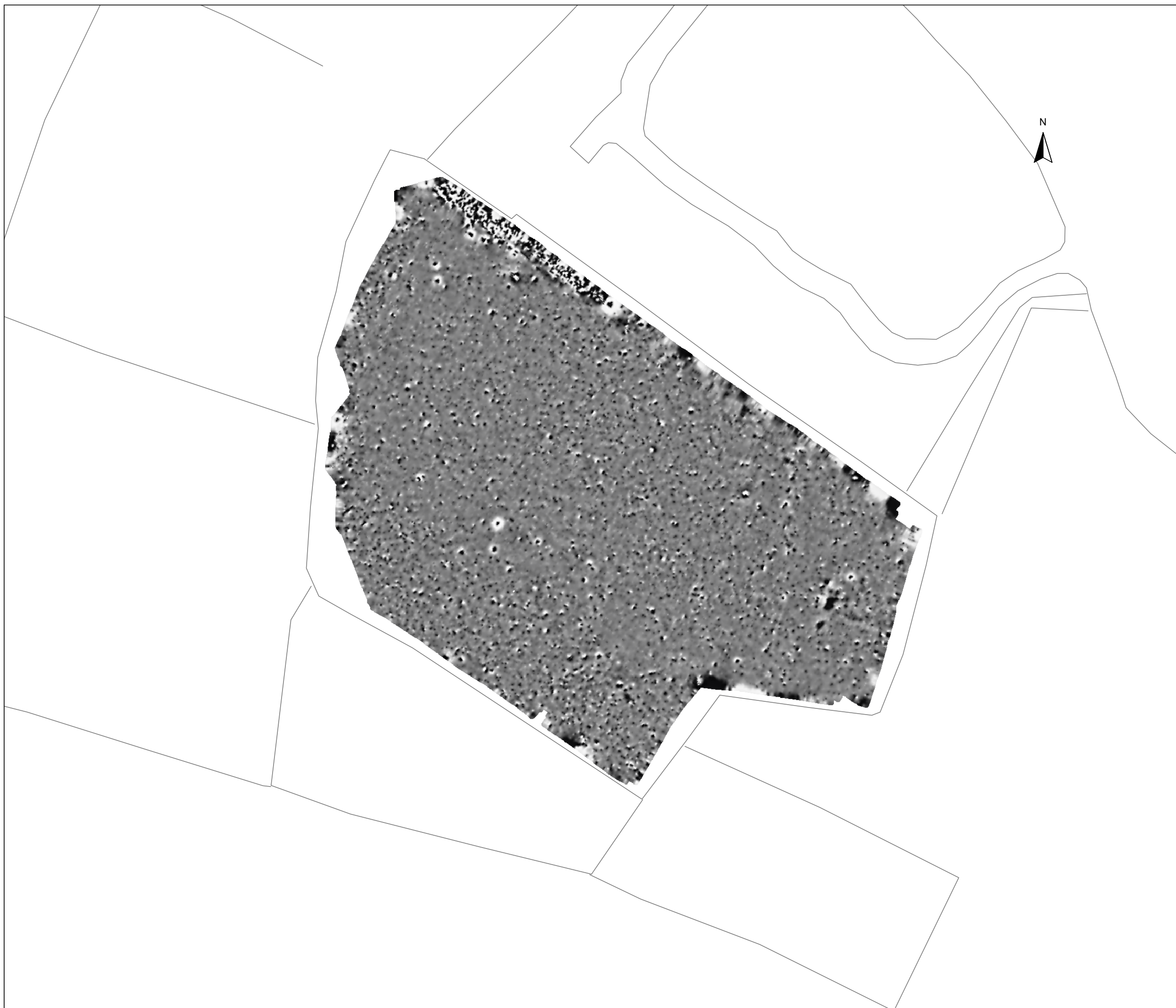
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FIG 03

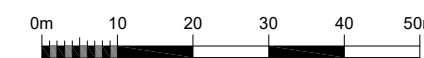


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**Greyscale plot of high pass
filtered magnetometer data**



SCALE 1:1000



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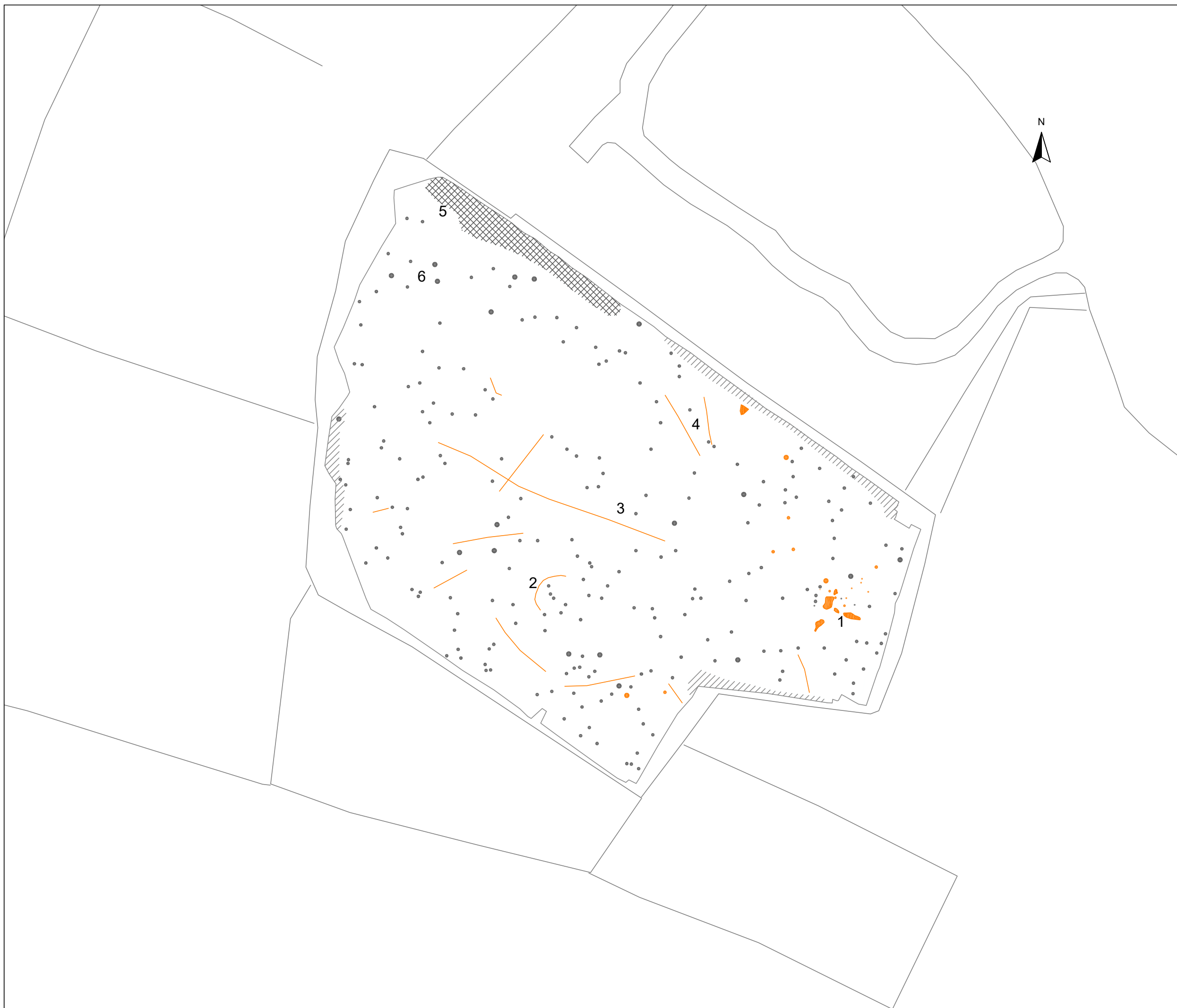
FIG 04



**Geophysical Survey
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Gloucestershire**

**Abstraction and interpretation of
magnetic anomalies**

-  Positive linear anomaly - of uncertain origin
-  Discrete positive response - possible pit-like feature
-  Magnetic debris - spread of magnetically thermoremnant/ferrous material
-  Magnetic disturbance from ferrous material
-  Strong dipolar anomaly - ferrous object



SCALE 1:1000



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FIG 05