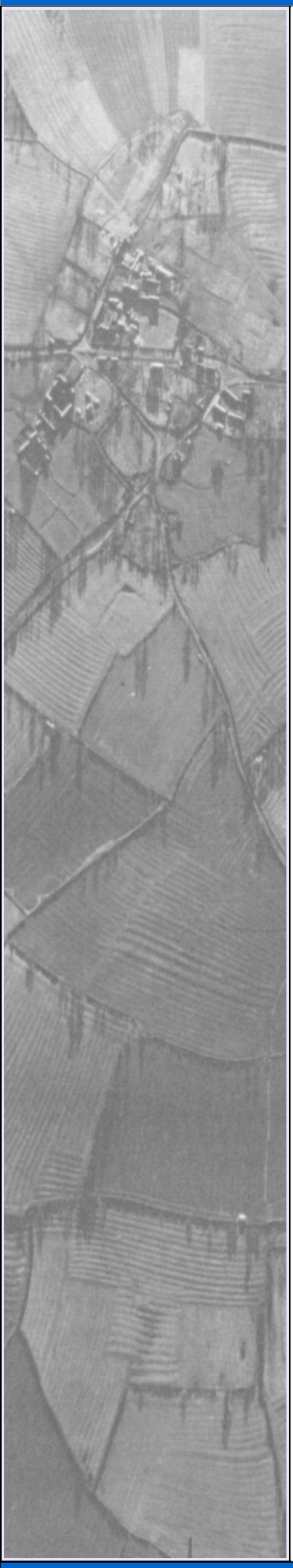

Marston Farm
South Marston
Swindon

MAGNETOMETER SURVEY REPORT

for

CgMs Consulting

Kerry Donaldson & David Sabin

April 2015

Ref. no. 606

ARCHAEOLOGICAL SURVEYS LTD

Marston Farm
South Marston
Swindon

Magnetometer Survey Report

for

CgMs Consulting

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Primary archive location - Archaeological Surveys Ltd, Yatesbury, Wiltshire

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Ordnance Survey Grid Reference – **SU 195 864**

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SUMMARY

A geophysical survey was carried out by Archaeological Surveys Ltd, over 20ha at Marston Farm, South Marston, Swindon. The survey area is part of a larger 38ha site, which has been subject to partial geophysical survey (ASUD, 2008 & Bartlett, 2013) and evaluation (TVAS, 2014) which showed the site contained evidence for Roman and Saxon occupation. The current survey was commissioned by CgMs Consulting in order to better define the zones containing evidence for occupation from those relating to field systems.

The results demonstrate a complex series of linear ditches, rectilinear enclosures, pits and areas of burning within the northern part of the site (Area 1). However, this is further complicated by a large number of extant linear ditches that probably relate to land drainage. It appears that these extant ditches may have re-cut, truncated or disturbed some of the Roman ditches. Beyond this complex zone towards the west the extant ditches form a series of enclosures and towards the east they appear as linear ditches that converge within the field immediately to the east. Although these extant linear ditches and gullies cannot be dated from the geophysical data, their profile and extant nature would indicate that these may relate to medieval or post-medieval features.

Within the south western part of the site (Area 2), a group of anomalies appear to suggest a possible structure or kiln site, and an evaluation trench in the vicinity contained a number of Saxon sherds of pottery. Other features are less well defined within this part of the site, although some relate to extant linear features and others may be a continuation of the zone of archaeology to the north. Within the south eastern part of the site (Area 3) there is a narrow zone that contains a fragmented positive linear anomaly with other linear and discrete responses either side. The responses are much weaker away from the central linear feature and, apart from a zone of linear responses in the north western corner of Area 3, the majority of the survey area does not contain anomalies with clearly definable magnetic contrast.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by CgMs Consulting to undertake a magnetometer survey of an area of land at Marston Farm, South Marston, Swindon. The site has been outlined for a proposed development of a new commercial centre, and the survey forms part of an archaeological assessment of the site.

1.1.2 Parts of the site have already been subject to geophysical survey by Archaeological Services University of Durham (ASUD, 2008) and the Bartlett-Clark Consultancy (Bartlett, 2013), with subsequent evaluation by Thames Valley Archaeological Services (TVAS, 2014). These investigations were carried out within an area of

approximately 38ha, with the eastern zone showing no archaeological remains and the western zone containing settlement remains dating primarily to the Roman period, with some Saxon features to the south. The current survey aims to better define the Roman settlement and field systems identified within the previous investigations and was only carried out within the western zone.

1.1.3 The geophysical survey was carried out in accordance with a Written Scheme of Investigation (WSI) produced by Archaeological Surveys (2015) and approved by Melanie Pomeroy-Kellinger, County Archaeologist for Wiltshire Council, prior to commencing the fieldwork.

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;* 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 at Marston Farm, South Marston in the Borough of Swindon. It is centred on Ordnance Survey National Grid Reference (OS NGR) SU 195 864, see Figures 01 and 02.

1.3.2 The geophysical survey covers approximately 20ha of pasture split between three fields that are referred to as Areas 1, 2 and 3 in this report. Area 1 forms the north part of the surveyed area, Area 2 the south western part and Area 3 the south eastern part. There is a general trend of land sloping down very gently towards the south and east.

1.3.3 Area 1 lies immediately south of the A420, residential buildings and a farm yard with agricultural buildings. Land immediately adjacent to the farm yard was boggy, poached and unsurveyable due to magnetic disturbance from steel-framed barns. The field contains a water trough and a large bank marking the course of the disused Wilts & Berks Canal. Sources of magnetic debris, mostly in the form of brick, were noted within visible soil on the canal bank. Boundaries were formed mainly of hedgerows with some wooden and barbed wire fending and several steel gates. The area contains numerous extant field drainage ditches.

Plate 1: Area 1 looking north east

1.3.4 Area 2 lies immediately to the south of Area 1 and west of Area 3. At the north eastern corner there is evidence of concrete and some modern soil dumping close to a water trough. The soil was poached and very boggy adjacent to the trough. The field contains some low, straight ridge and furrow with a low circular mound close to the western boundary in the southern part of the field. Boundaries are formed by hedgerows and patchy wire fencing.

1.3.5 Area 3 lies to the south of Area 1 and east of Area 2. The north western corner of the field was very boggy due to an overflowing water trough. There is evidence of low, straight ridge and furrow cultivation. The eastern part of the field contains a shallow linear depression running north to south.

1.3.6 The ground conditions across the site were generally considered to be favourable for the collection of magnetometry data, although backfilled evaluation trenches were very uneven in places. Weather conditions during the survey were fine and sunny.

1.4 Site history and archaeological potential

1.4.1 The site lies 500m north of the scheduled area of Wanborough Roman town, identified as *Durocornovium,* situated either side of Ermin Street, with a number of other Roman and Iron Age sites identified through geophysical survey and evaluation within the wider landscape. Parts of the current site have been subject to previous geophysical surveys (ASUD, 2008; Bartlett, 2013) and the site has been evaluated (TVAS, 2014). These investigations found evidence for an extensive multi-phased Romano-British settlement with

a number of enclosures, pits, post holes, gullies and ditches and a large amount of Roman pottery, with tile, slag and possible masonry structures being identified. The range of features tended to indicate a change to linear ditches indicative of field boundaries or paddocks towards the southern part of the site.

1.4.2 Observations within the northern part of the site (Area 1) indicate the presence of numerous shallow field drainage ditches trending east west with some converging towards the eastern boundary. Other ditches appear to trend north south and are overlain by the bank of the former Wilts & Berks canal. Some of the ditches may be overlain by extant field boundaries.

1.5 Geology and soils

1.5.1 The underlying solid geology across the site is Ampthill Clay Formation with Kimmeridge Clay Formation (BGS, 2015). The overlying soil across the survey area is from the Denchworth association and is a pelo-stagnogley. It consists of a slowly permeable, seasonally waterlogged, clayey soil (Soil Survey of England and Wales, 1983).

1.5.2 Magnetometry survey carried out across similar soils has produced good results, although there can be poor magnetic contrast within the fill of cut features away from more intense areas of occupation and activity. The underlying geology and soils are however 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 spaced 0.5m apart with readings recorded at 20 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 0.15m 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 filtered greyscale plot and an unfiltered plot is also show in Fig 03. Filtered images have been displayed in Figs 04, 06, 08 & 10 where a high pass filter is applied to smooth data and remove slight variations along survey tracks caused by temperature fluctuations and uneven ground surfaces.

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

2.3.7 The abstraction and interpretation procedure has been supported by analysis of a digital terrain model derived from GPS height data automatically logged during the survey. The heights are converted from the ETRS89 ellipsoid using the National Geoid Model OSGM02 to obtain ODN (Ordnance Datum Newlyn) + the GPS antenna height (approximately 1.5M). Shaded relief plots and associated georeferenced TIF files are created using Surfer 10.

2.3.8 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 3 survey areas covering approximately 20ha.

3.1.2 Magnetic anomalies located can be generally classified as positive linear and discrete positive responses of archaeological potential, positive and negative anomalies of an uncertain origin, linear anomalies of an agricultural origin, areas of magnetic debris and disturbance and strong discrete dipolar anomalies relating to ferrous objects.

3.1.3 Anomalies located within each survey area have been numbered and are described below with subsequent discussion in Section 4.

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. Due to high surface temperatures, a small amount of drift was apparent at times particularly when changing traverse direction. This was corrected using a high pass filter and checked against unfiltered data to ensure no detrimental effects on 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 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 archaeological potential AS-ABST MAG POS LINEAR ARCHAEOLOGY AS-ABST MAG POS DISCRETE ARCHAEOLOGY AS-ABST MAG POS ARCHAEOLOGY AS-ABST MAG VARIABLE ARCHAEOLOGY	Anomalies have the characteristics (mainly morphological) of a range of archaeological features such as pits, ring ditches, enclosures, etc..
Anomalies with an uncertain origin AS-ABST MAG POS LINEAR UNCERTAIN AS-ABST MAG NEG LINEAR UNCERTAIN AS-ABST MAG POS DISCRETE UNCERTAIN AS-ABST MAG ZONE OF PITS	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 EXTANT DITCH	Anomalies are mainly linear and may be indicative of the magnetically enhanced fill of cut features (i.e. ditches) or of ditches with a less magnetic enhanced fill than the surrounding soils. They relate to visible depressions within the ground surface and appear to relate to field drainage.
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	Magnetic debris often appears as areas containing many small dipolar anomalies that may range from weak to very strong in

AS-ABST MAG DEBRIS AS-ABST MAG STRONG DIPOLAR 	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 419445 186620, see Figures 06 & 07.

Anomalies of archaeological potential

(1) - A complex zone of linear and discrete anomalies relates to linear ditches and enclosures containing numerous pits within the central part of the survey area. The results indicate several phases of features. Several of the discrete positive responses are very strong (65-100nT), indicating intense burning. Within this zone, evaluation trenches (T18-T26) located a large number of intercutting ditches and pits containing quantities of Roman pottery and also evidence for smithing activity. The anomalies may continue to the north west (4) and west (5), but these features are either very weak, or cannot be easily distinguished from extant linear drainage ditches (6) & (7).

Anomalies with an uncertain origin

(2) - A sinuous, positive linear anomaly extends through the centre of the complex of archaeological anomalies (1). Other anomalies are located parallel and perpendicular to it within this zone and to the north of it. While they appear to be associated cut linear features, they correspond to extant linear drainage ditches within the ground surface and are associated with anomalies (7). It is therefore possible that they have either been re-cut and/or they are partly backfilled with cultural material associated with the earlier activity.

(3) - A series of linear and rectilinear anomalies in the southern part of the survey area appear to be a continuation of anomalies (1). However, these anomalies are associated with extant linear drainage ditches within the field.

(4) - Located in the northern part of the survey area are a number of positive linear and rectilinear anomalies that have been truncated or overlain by magnetic debris associated with the infilled Wilts & Berks Canal. These features may be a continuation of anomalies (1); however they do appear generally to correspond to extant linear ditch features within this part of the site.

(5) - A series of negative linear and rectilinear anomalies are located in the western part of the survey area. They appear to be associated with anomalies (6), although they do not have a surface expression. They are parallel with, and perpendicular to, anomalies (6) and also archaeological anomalies (1), and although they appear to relate to small enclosures, it is not possible to ascertain their date.

Anomalies associated with land management

(6) - In the western part of the survey area are a number of negative and positive linear anomalies that correspond to extant linear ditches within the ground surface. These are associated with anomalies (7) to the east and form a series of linear and rectilinear shallow ditches or gullies many of which converge within the field immediately to the east. These anomalies may relate to later re-cuts of the Roman archaeological linear and rectilinear ditches but their extant status would indicate that they post-date the Roman period and pre-date the existing field boundary layout, presumably parliamentary enclosure act boundaries, recorded since the 1840s.

(7) - A number of positive and negative linear anomalies are associated with extant linear ditches within the central and eastern part of the field. They extend eastwards and converge within the south western corner of the field immediately to the east.

Anomalies associated with magnetic debris

(8) - A zone of very strong magnetic debris in the northern part of the survey area relates to ferrous and other magnetically thermoremnant material used to infill the Wilts & Berks Canal. A linear zone of magnetic debris extends northwards from it, possibly relating to a track.

(9) - Patches of magnetic debris are evident around the margins of the survey area and some are associated with ground consolidation near gateways.

(10) - Numerous and widespread strong, discrete, dipolar anomalies are a response to ferrous and other magnetically thermoremnant objects within the topsoil. These are evident within all of the survey areas; however, it is not possible to determine if they relate to objects with an archaeological origin, or if they relate to objects spread through the process of manuring.

3.5 List of anomalies - Area 2

Area centred on OS NGR 419540 186340, see Figures 08 - 11.

Anomalies of archaeological potential

(11) - Located in the south western part of the survey area (see Figs 10 & 11) is a complex of positive curvilinear, positive discrete and magnetically variable responses that appear to form a structure. The positive curvilinear anomalies are located on the eastern side and form what appears to be an oval shaped ring ditch, with a gap on the eastern side, containing pits or areas of burning. To the north west is a well defined triangular zone of positive and negative responses, with this zone extending southwards and south eastwards. It is possible that this relates to a structure, possibly a kiln. This corresponds to a ring ditch feature located during the previous geophysical survey. An evaluation trench (T172), which cut through from south west to north east just to the west of the central pits, found a number of pits and gullies containing tile and Saxon pottery.

Anomalies with an uncertain origin

(12) - Located adjacent to the eastern field boundary (Figs 10 & 11) are a number of positive curvilinear anomalies that may form a ring ditch, although they are too fragmented and indistinct to interpret them as such. There appear to be other linear and discrete anomalies within and to the south of it, and also two very strongly magnetic discrete responses on the south eastern side. This corresponds to a ring ditch located during a previous geophysical survey.

(13 &14) - In the northern part of the survey area (Figs 08 & 09) is a negative linear and curvilinear anomaly (13) that forms a "D" shaped feature with anomaly (14). Anomaly (14) corresponds to a broad, shallow, linear ditch that is partly evident within the ground surface and appears to be crossed by ridge and furrow. Anomaly (13) may be overlain by ridge and furrow and cannot be seen as a surface expression. The evaluation trench (T193) found 5 linear features, with a small number of Early Roman pottery sherds within this "D" shaped feature (13).

(15) - A number of positive linear and discrete anomalies are located in the north eastern corner of the survey area (Figs 08 & 09). A linear anomaly appears to be a continuation of a ditch from the north, with the pit-like responses bounded to the south by anomaly (14). A large number of ditches, gullies, post holes and pits were located within the evaluation trench (T194) within this area, and although these anomalies are likely to be associated, their morphology is unclear.

(16) - A small cluster of discrete positive responses appear to relate to a group of pits. They lie just to the south of a zone containing numerous pit-like responses (20) and evaluation trenches (T187 & T186) within this zone found a number of linear features with a small amount of Early Roman pottery, and also pits with no dating evidence.

(17) - Located in the southern part of the survey area (Figs 10 & 11), are a number of negative linear anomalies. Although one extending across the whole of the width of the survey area has a corresponding surface expression, the majority do not, although they appear to have "cut" the ridge and furrow (22).

(18) - Situated in the north western corner (Figs 08 & 09), are a number of negative linear anomalies contained within anomaly (21). Some correspond to surface expressions, others do not and they have a similar form and orientation to anomalies (5) and (6) located immediately to the north within Area 1.

(19) - The survey area contains a number of short, weakly positive linear anomalies that lack a coherent morphology preventing confident interpretation.

(20) - The survey area contains three zones containing numerous pit-like responses. While evaluation has located a number of ditches and pits within all three of these zones, it is not clear if the numerous responses are to cut pits as they lack a coherent morphology and are more indicative of naturally formed pit-like features.

Anomalies associated with land management

(21) - A negative rectilinear anomaly corresponds to an extant rectilinear ditch within the north western corner of the survey area (Figs 08 & 09).

Anomalies with an agricultural origin

(22) - A number of narrow, negative linear anomalies relate to ridge and furrow. These are more clearly seen as surface expressions within the surface relief plot (see Figs12 & 13).

3.6 List of anomalies - Area 3

Area centred on OS NGR 419700 186400, see Figures 08 - 11.

Anomalies of archaeological potential

(23) - A discontinuous sinuous positive linear anomaly is located within the north eastern part of the survey area (Figs 08 & 09). It is associated with a number of positive linear and discrete responses either side of it. The strongest responses (27nT) are within the linear anomaly, with anomalies 15m away having a response of 1nT. Evaluation trenches (T139, T149, T155 & T156) within this zone revealed a mass of intercutting features containing Roman pottery and also slag in some.

(24) - A positive linear anomaly in the south eastern part of the survey area (Figs 10 & 11), with associated pits appears to be a continuation of anomaly (23) after a gap of 110m. As with anomaly (23), the responses can only be seen within a narrow linear zone.

Anomalies with an uncertain origin

(25) - Located in the north western part of the survey area are a number of positive linear and discrete responses (Figs 08 & 09). The linear responses are generally parallel with others seen to the north in Area 1 (1) & (3), but these are also parallel and orthogonal with extant linear ditches (7) and the current field boundaries. They appear to relate to ditches and pits and an archaeological origin should be considered. Evaluation trenches (T143 & T144) revealed a number of linear ditches and pits containing Roman pottery; however, some of the pits may relate to tree boles.

(26) - A number of weakly positive linear anomalies and a small number of negative linear anomalies are located within the survey area. Several are oriented west north west to east south east, and although they may relate to cut linear ditch features, their archaeological potential cannot be determined.

(27) - The survey area contains three zones containing numerous pit-like responses. Their morphology may indicate that they relate to naturally formed features; however, the evaluation has revealed a number of archaeological features which contain Roman and Saxon material within these zones.

Anomalies with an agricultural origin

(28) - A series of parallel linear anomalies can be seen primarily within the southern part of the survey area and these relate to ridge and furrow. These exist as extant features and can be clearly seen within the surface relief (Figs 12 & 13).

Anomalies associated with magnetic debris

(29) - The survey area contains widespread strong, discrete, dipolar anomalies, with some clustered into small patches (29). Evaluation (T158, T161 & T162) close to some of these patches have revealed archaeological features.

4 DISCUSSION

4.1.1 The results of the magnetometer survey indicate that the main zones of archaeological features appear within Area 1 to the north, within the eastern part of Area 3 to the south east and a small group of anomalies forming a possible structure in Area 2 to the south west. The archaeological anomalies within Area 1 are further complicated by a large number of extant linear ditches and gullies, which can be seen on aerial images and have a corresponding surface expression recorded during the survey and displayed as a surface relief plot (Fig 12).

4.1.2 Within the centre of Area 1 are a large number of complex positive linear,

rectilinear and discrete anomalies relate to a zone of ditches, enclosures, pits and areas of burning. This zone is at least 110m long and 75m wide (0.8ha), but may extend to at least 225m long by 160m wide (3.6ha). Many of the linear and rectilinear features within this wider zone correspond to extant linear features. The fact that the extant linear ditches appear to cut into the archaeological features creates difficulty in distinguishing those with a Roman date from those with a post-Roman date and probably relating to post-medieval drainage. The extant linear features form a gridded series of features within the western part of Area 1, with a more linear trend towards the east. These are visible on aerial images and appear to conjoin within the field immediately to the east of Area 1.

4.1.3 In the southern part of Area 2 there is a group of positive curvilinear, discrete and magnetically variable responses that appear to form a structure, or possible kiln. Evaluation over this anomaly located a number of archaeological features containing Saxon pottery. Another curvilinear anomaly is located 150m to the east, but is poorly defined. Within the northern part of Area 2 there is a linear feature and a "D" shaped negative linear anomaly. Archaeological features were located in this area during the evaluation.

4.1.4 Area 3 lies within the eastern part of the site and contains a narrow linear zone with evidence of a positive linear anomaly and associated positive linear and discrete responses either side. This linear zone contains some strongly magnetic anomalies within the centre and is approximately 190m long and 30m wide; however, the anomalies become much weaker and less well defined away from the central linear feature. Several of the evaluation trenches within Areas 2 and 3 contain linear ditches, gullies, post holes and pits, but the majority of these do not correspond to geophysical anomalies.

5 CONCLUSION

5.1.1 The detailed magnetometer survey was carried out over 20ha within the western half of a larger site that had been previously subject to some geophysical survey and evaluation. The results demonstrate a dense cluster of geophysical anomalies within the northern part of the site (Area 1) that relate to a number of linear ditches, rectilinear enclosures, pits and areas of burning with several phases evident. However, the results are complicated by the presence of numerous extant linear drainage ditches, and some of these appear to have cut into or re-cut the line of many of the earlier linear ditches and enclosures that have been seen to contain Roman cultural material during the evaluation. The extant linear and rectilinear features form a gridded pattern of ditches within the western part of Area 1, with a number extending eastwards and converging within the field immediately to the east.

5.1.2 Area 2 in the south western part of the site contains a group of anomalies that appear to form a structure or possible kiln. Evaluation of this anomaly, previously identified during an earlier geophysical survey, revealed a number of features that contained Saxon pottery, although it was not identified as a possible kiln. Other negative and positive linear anomalies can be seen across Area 2 and while some correspond to extant linear ditches, others do not have a surface expression. The survey area contains three zones containing numerous pit-like responses and although evaluation revealed a number of archaeological features, these are not definable within the magnetic data.

5.1.3 A linear zone of archaeology is located in the eastern part of Area 3, and although some responses are strong, with corresponding evidence of smithing seen within the evaluation, the anomalies are only visible within a narrow 30m wide band. Several zones containing numerous pit-like responses, similar to those within Area 2 can be seen in this part of the site. Within these zones evaluation has shown that they contain archaeological features; however, these features do not correspond to clearly definable geophysical anomalies.

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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 ±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 minimally processed data

COMPOSITE
Path: C:\Business\Jobs\J606 Marston Farm\Data\Area 1\comps\
Filename: J606-mag-Area1-proc.xcp
Description: Imported as Composite from: J606-mag-Area1.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y): OSGB 36
Northwest corner: 419272.387939383, 186743.13033719 m
Southeast corner: 419638.507939383, 186497.97033719 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702

Source GPS Points: 1780300

Dimensions
Composite Size (readings): 3051 x 2043
Survey Size (meters): 366 m x 245 m
Grid Size: 366 m x 245 m
X Interval: 0.12 m
Y Interval: 0.12 m

Stats
Max: 5.53
Min: -5.50
Std Dev: 1.59
Mean: 0.02
Median: 0.00
Composite Area: 8.9758 ha
Surveyed Area: 5.0772 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 -5.00 to 5.00 nT

Area 1 filtered data

COMPOSITE
Filename: J606-mag-Area1-proc-hpf.xcp
Description: Imported as Composite from: J606-mag-Area1.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y): OSGB 36
Northwest corner: 419272.387939383, 186743.13033719 m
Southeast corner: 419638.507939383, 186497.97033719 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702

Source GPS Points: 1780300

Dimensions
Composite Size (readings): 3051 x 2043
Survey Size (meters): 366 m x 245 m
Grid Size: 366 m x 245 m
X Interval: 0.12 m
Y Interval: 0.12 m

Stats
Max: 2.00
Min: -2.00
Std Dev: 0.94
Mean: 0.02
Median: 0.00
Composite Area: 8.9758 ha
Surveyed Area: 5.0772 ha

Processes: 2
1 Base Layer
2 Clip from -2.00 to 2.00 nT

GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 300
5 Clip from -3.00 to 3.00 nT

Area 2 minimally processed data

COMPOSITE
Filename: J606-mag-Area2-proc.xcp
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y): OSGB36
Northwest corner: 419366.52556083, 186557.374308022 m
Southeast corner: 419679.12556083, 186140.254308022 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702

Source GPS Points: 2321800

Dimensions
Composite Size (readings): 2605 x 3476
Survey Size (meters): 313 m x 417 m
Grid Size: 313 m x 417 m
X Interval: 0.12 m
Y Interval: 0.12 m

Stats
Max: 5.00
Min: -5.00
Std Dev: 0.90
Mean: 0.02
Median: 0.01
Composite Area: 13.039 ha
Surveyed Area: 7.0764 ha

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

GPS based Proce3
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:

Area 2 filtered data

COMPOSITE
Filename: J606-mag-Area2-proc-hpf.xcp
Description: Imported as Composite from: J606-mag-Area2.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y): OSGB36
Northwest corner: 419366.425560806, 186557.474308046 m
Southeast corner: 419679.265560806, 186140.054308046 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702

Source GPS Points: 2321800

Dimensions
Composite Size (readings): 1738 x 2319
Survey Size (meters): 313 m x 417 m
Grid Size: 313 m x 417 m
X Interval: 0.18 m
Y Interval: 0.18 m

Stats
Max: 2.21
Min: -2.20
Std Dev: 0.55
Mean: 0.01
Median: 0.00
Composite Area: 13.059 ha
Surveyed Area: 7.0743 ha

Processes: 1
1 Base Layer

GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 300
5 Clip from -2.00 to 2.00 nT

Area 3 minimally processed data

COMPOSITE

Filename: J606-mag-Area3-proc.xcp
Description: Imported as Composite from: J606-mag-Area3.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y): OSGB36
Northwest corner: 419549.255342138, 186601.939535033 m
Southeast corner: 419858.255342138, 186163.699535033 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702

Source GPS Points: 2328000

Dimensions
Composite Size (readings): 2575 x 3652
Survey Size (meters): 309 m x 438 m
Grid Size: 309 m x 438 m
X Interval: 0.12 m
Y Interval: 0.12 m

Stats
Max: 5.53
Min: -5.50
Std Dev: 0.98
Mean: 0.00
Median: -0.01
Composite Area: 13.542 ha
Surveyed Area: 7.0699 ha

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 -5.00 to 5.00 nT

Area 3 filtered data

COMPOSITE
Filename: J606-mag-Area3-proc-hpf.xcp
Description: Imported as Composite from: J606-mag-Area3.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y): OSGB36
Northwest corner: 419549.155342114, 186602.039535056 m
Southeast corner: 419858.455342114, 186163.589535056 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702

Source GPS Points: 2328000

Dimensions
Composite Size (readings): 2062 x 2923
Survey Size (meters): 309 m x 438 m
Grid Size: 309 m x 438 m
X Interval: 0.15 m
Y Interval: 0.15 m

Stats
Max: 2.21
Min: -2.20
Std Dev: 0.62
Mean: 0.00
Median: -0.01
Composite Area: 13.561 ha
Surveyed Area: 7.0694 ha

Processes: 1
1 Base Layer

GPS based Proce6
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 300
5 Clip from -3.00 to 3.00 nT
6 Clip from -2.00 to 2.00 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 printed copy of the report and a PDF copy will be supplied to the Wiltshire Historic Environment Record. The report will also be uploaded to the Online AccesS to the Index of archaeological investigationS (OASIS).

Archive contents:

Geophysical data Area 1 - path: J606 Marston Farm\Data				
Path and Filename	**Software**	**Description**	**Date**	**Creator**
marston1\MX\ .prm .dgb .disp	Sensys MXPDA	Proprietary data formats representing magnetometer survey traverses logged to a PDA.	16/04/15	D.J.Sabin
marston1\MX\J606-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.	16/04/15	D.J.Sabin
Area1\comps\J606-mag-Area1.xcp	TerraSurveyor 3.0.23.0	Composite data file derived from ASCII CSV.	17/04/15	D.J.Sabin
Area1\comps\J606-mag-Area1-proc.xcp	TerraSurveyor 3.0.23.0	Minimally processed composite data file (zmt and clipping to ±5nT).	17/04/15	D.J.Sabin
Area1\comps\J606-mag-Area1-proc-hpf.xcp	TerraSurveyor 3.0.23.0	Processed composite data file (zmt, high pass filter, clipping to ±2nT).	17/04/15	D.J.Sabin
Geophysical data Area 2 - path: J606 Marston Farm\Data				
marston2\MX\ .prm .dgb .disp	Sensys MXPDA	Proprietary data formats representing magnetometer survey traverses logged to a PDA.	16/04/15	D.J.Sabin
marston2\MX\J606-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.	16/04/15	D.J.Sabin
Area2\comps\J606-mag-Area2.xcp	TerraSurveyor 3.0.23.0	Composite data file derived from ASCII CSV.	17/04/15	D.J.Sabin
Area2\comps\J606-mag-Area2-proc.xcp	TerraSurveyor 3.0.23.0	Minimally processed composite data file (zmt and clipping to ±5nT).	17/04/15	D.J.Sabin
Area2\comps\J606-mag-Area2-proc-hpf.xcp	TerraSurveyor 3.0.23.0	Processed composite data file (zmt, high pass filter, clipping to ±2nT).	17/04/15	D.J.Sabin
Geophysical data Area 3 - path: J606 Marston Farm\Data				
marston3\MX\ .prm .dgb .disp	Sensys MXPDA	Proprietary data formats representing magnetometer survey traverses logged to a PDA.	16/04/15	D.J.Sabin
marston3\MX\J606-mag-Area3.asc	Sensys DLMGPS	ASCII CSV (tab) file representing survey Area 2 in eastings, northings (UTM Z30N), magnetic measurement, traverse file and sensor number.	16/04/15	D.J.Sabin
Area3\comps\J606-mag-Area3.xcp	TerraSurveyor 3.0.23.0	Composite data file derived from ASCII CSV.	17/04/15	D.J.Sabin
Area3\comps\J606-mag-Area3-proc.xcp	TerraSurveyor 3.0.23.0	Minimally processed composite data file (zmt and clipping to ±5nT).	17/04/15	D.J.Sabin

Area3\comps\J606-mag-Area3-proc-hpf.xcp	TerraSurveyor 3.0.23.0	Processed composite data file (zmt, high pass filter, clipping to ±2nT).	17/04/15	D.J.Sabin
Topographic data all areas - path: J606 Marston Farm\Data\Topo				
J606-Area1.txt J606-Area2.txt J606-Area3.txt	Sensys DLMGPS	RTK GNSS positional data in WGS84 (ETRS89 geodetic).	24/04/15	D.J.Sabin
J606-Area1.csv J606-Area2.csv J606-Area3.csv	Grid InQuest	RTK GNSS positional data in OSGB36.	24/04/15	
J606-Area1.grd J606-Area2.grd J606-Area3.grd	Surfer 10	Surfer grid files.	24/04/15	D.J.Sabin
J606-shadedrelief-Area1.grs J606-shadedrelief-Area2.grs J606-shadedrelief-Area3.grs	Surfer 10	Surfer shaded relief raster files	24/04/15	D.J.Sabin
Graphic data - path: J606 Marston Farm\Data				
Area1\graphics\ J606-mag-Area1-proc.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±5nT.	23/04/15	D.J.Sabin
Area1\graphics\ J606-mag-Area1-proc.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	23/04/15	D.J.Sabin
Area1\graphics\ J606-mag-Area1-proc-hpf.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±2nT.	23/04/15	D.J.Sabin
Area1\graphics\ J606-mag-Area1-proc-hpf.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	23/04/15	D.J.Sabin
Topo\J606-shadedrelief-Area1.tif	Surfer 10	TIF file of shaded relief digital terrain model.	24/04/15	D.J.Sabin
Topo\J606-shadedrelief-Area1.tfw	Surfer 10	World file for georeferencing TIF to OSGB36.	24/04/15	D.J.Sabin
Area2\graphics\ J606-mag-Area2-proc.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±5nT.	23/04/15	D.J.Sabin
Area2\graphics\ J606-mag-Area2-proc.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	23/04/15	D.J.Sabin
Area2\graphics\ J606-mag-Area2-proc-hpf.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±2nT.	23/04/15	D.J.Sabin
Area2\graphics\ J606-mag-Area2-proc-hpf.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	23/04/15	D.J.Sabin
Topo\J606-shadedrelief-Area2.tif	Surfer 10	TIF file of shaded relief digital terrain model.	24/04/15	D.J.Sabin
Area3\graphics\ J606-mag-Area3-proc.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±5nT.	23/04/15	D.J.Sabin
Area3\graphics\ J606-mag-Area3-proc.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	23/04/15	D.J.Sabin
Area3\graphics\ J606-mag-Area3-proc-hpf.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±2nT.	23/04/15	D.J.Sabin
Area3\graphics\ J606-mag-Area3-proc-hpf.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	23/04/15	D.J.Sabin
Topo\J606-shadedrelief-Area3.tif	Surfer 10	TIF file of shaded relief digital terrain model.	24/04/15	D.J.Sabin
CAD data - path: J606 Marston Farm\CAD				
J606 version 1.dwg	ProgeCAD 2014	CAD file for creating plots of greyscales, abstraction, interpretation and mapping. Grid coordinates as OSGB. AutoCAD 2010 format.		D.J.Sabin
Text data - path: J606 Marston Farm\Documentation				
J606 report.odt	OpenOffice.org 3.0.1 Writer	Report text as an Open Office document.		D.J.Sabin

Appendix E – copyright and intellectual property

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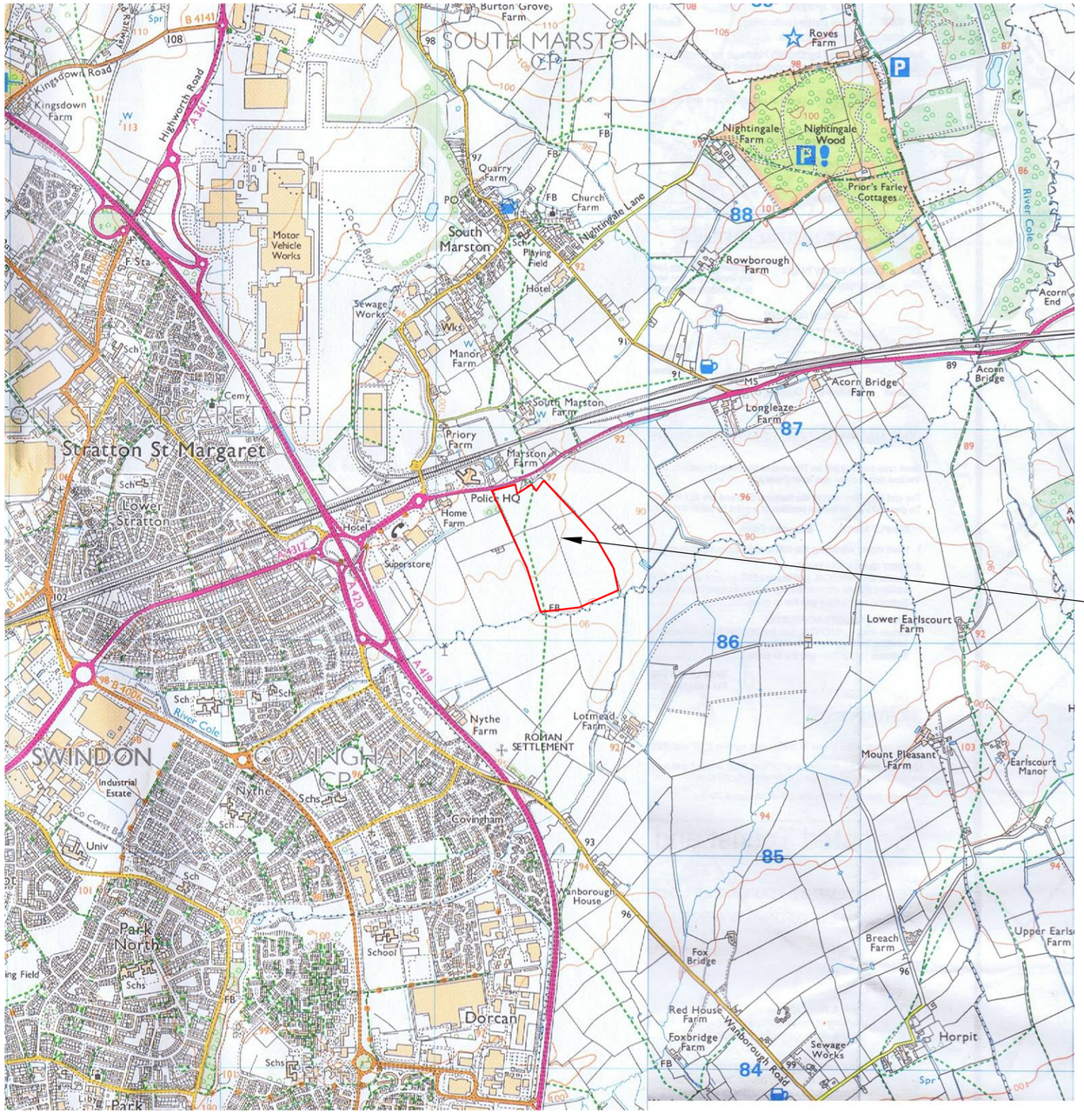

N

Survey location

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Geophysical Survey
Marston Farm
South Marston
Swindon

Map of survey area

Survey location

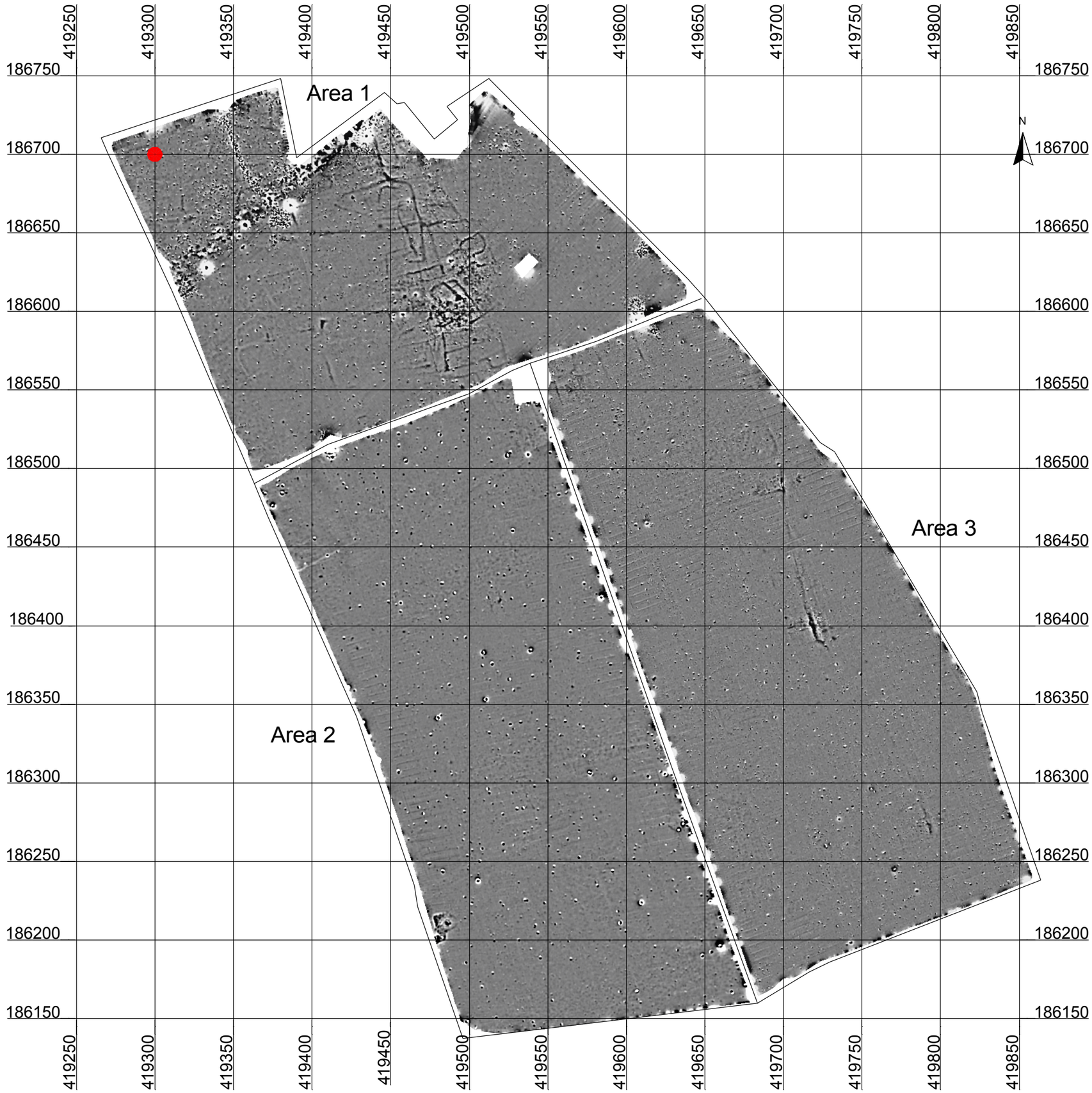
Site centred on OS NGR
SU 195 864

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

FIG 01



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South Marston
Swindon

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

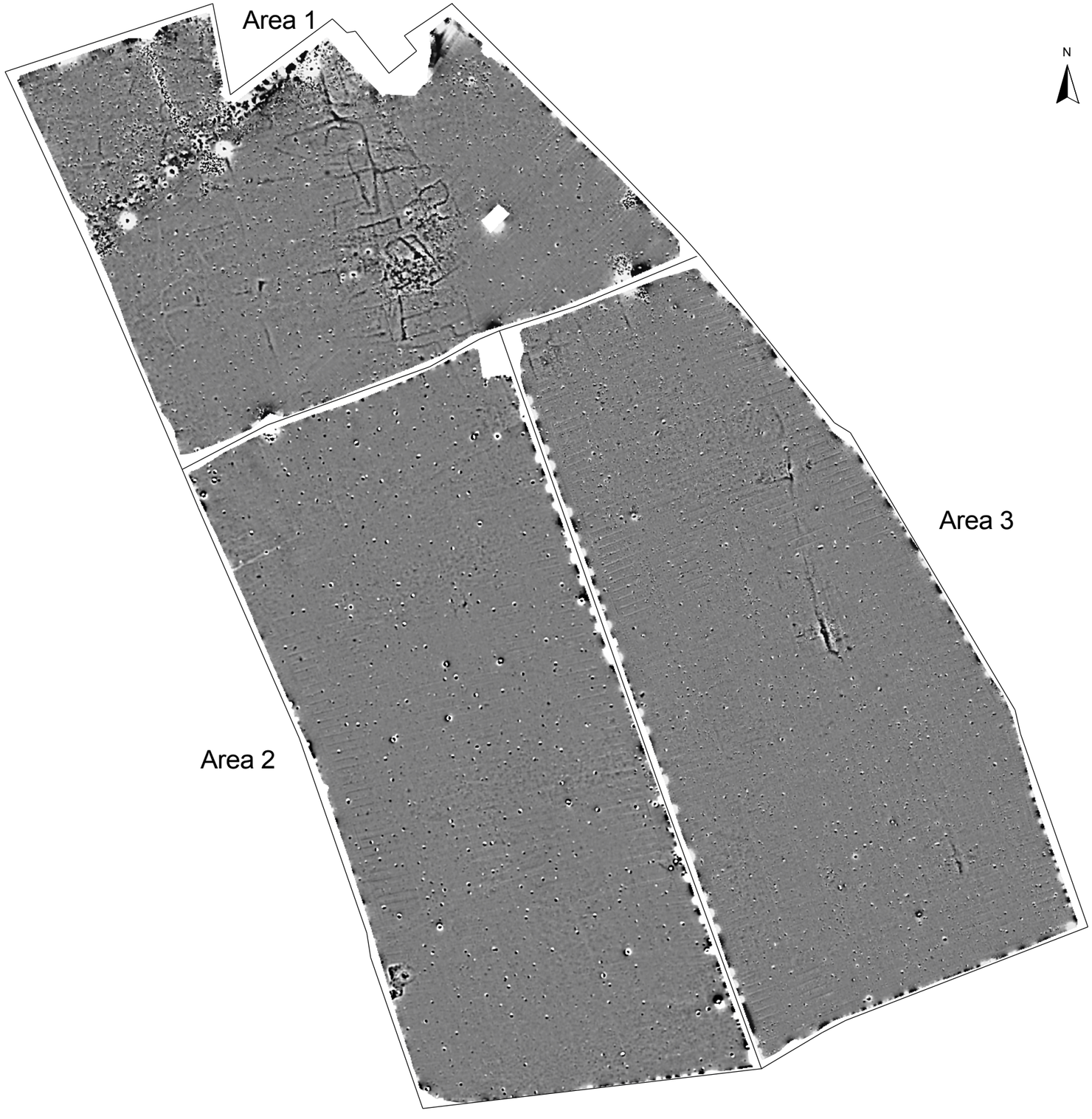
● 419300 186700

SCALE 1:2500

0m 50 100m

SCALE TRUE AT A3

FIG 02



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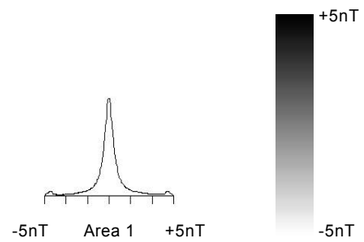
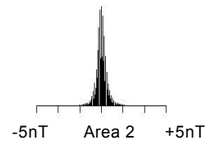
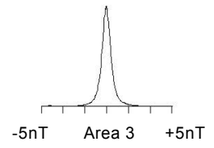
Greyscale plot of minimally processed magnetometer data







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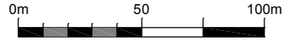
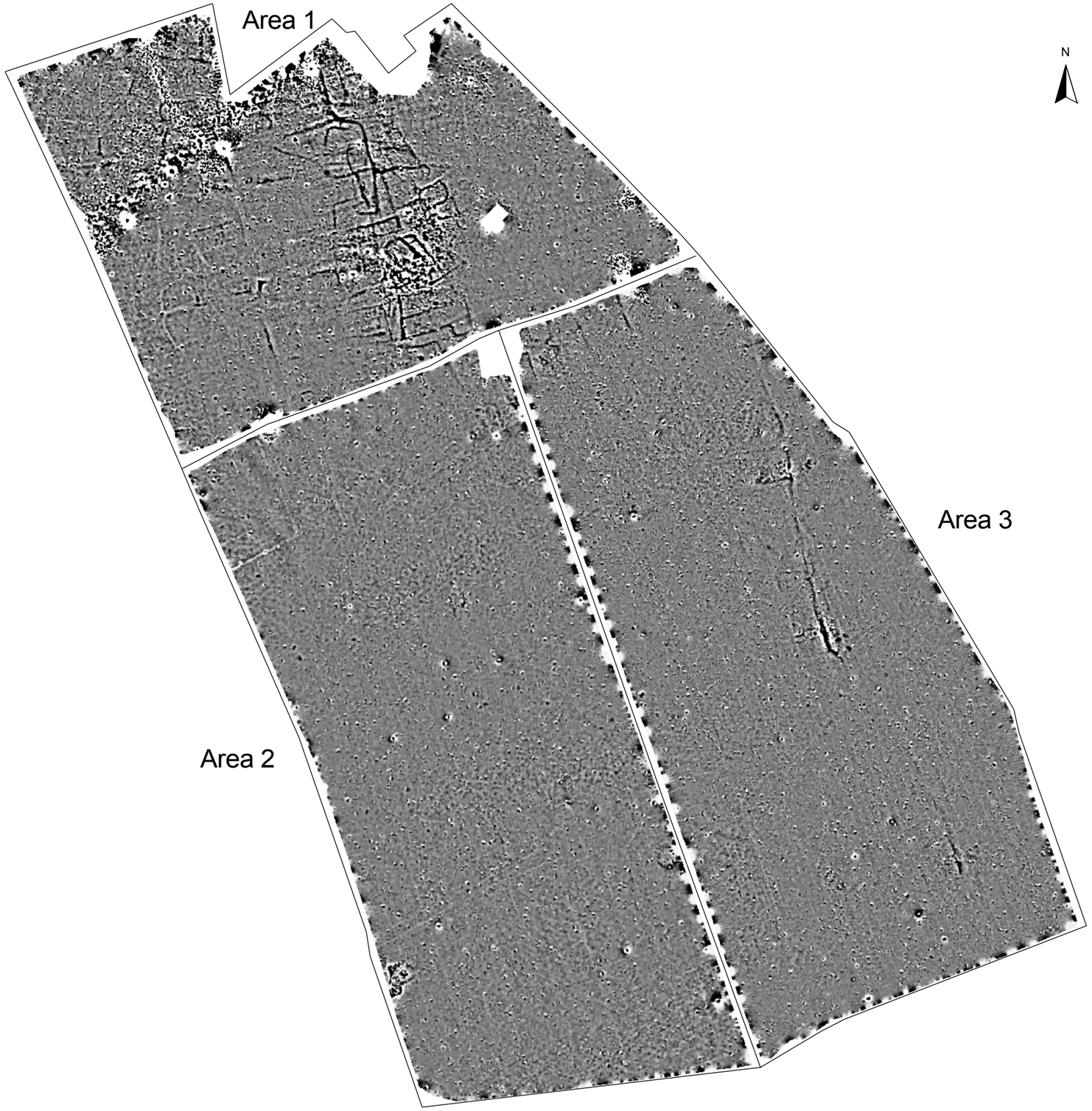


SCALE TRUE AT A3

FIG 03



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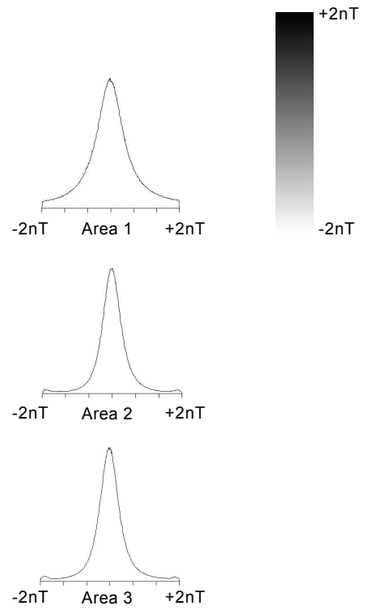
Greyscale plot of filtered magnetometer data



SCALE 1:2500

0m 50 100m

SCALE TRUE AT A3

FIG 04

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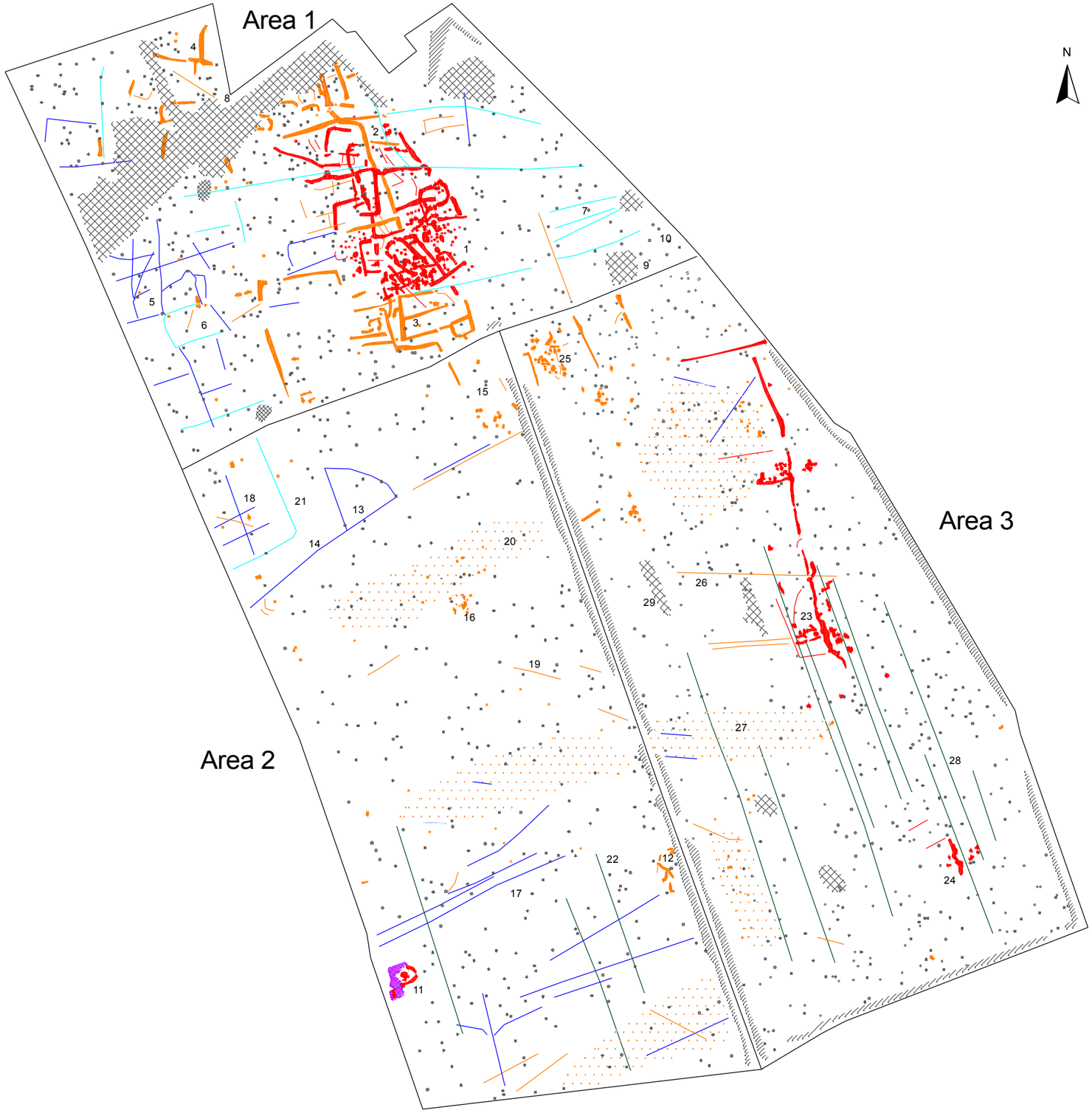

Abstraction and interpretation of magnetometer anomalies

- Positive linear anomaly - cut feature of archaeological potential
- Linear anomaly - ridge and furrow
- Linear anomaly - associated with extant ditch
- Positive linear anomaly - ditch-like feature
- Negative linear anomaly - material of low magnetic susceptibility
- Discrete positive response - cut feature of archaeological potential
- Discrete positive response - possible pit-like feature
- Variable magnetic response - of archaeological potential
- Zone of numerous pit-like responses - of uncertain origin
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:2500

0m 50 100m

SCALE TRUE AT A3

FIG 05

Area 1

N

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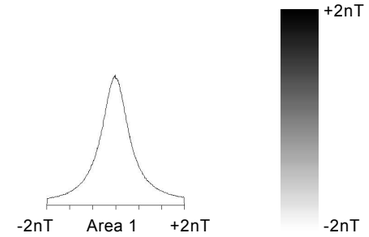
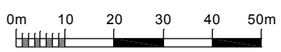
Greyscale plot of filtered magnetometer data - Area 1



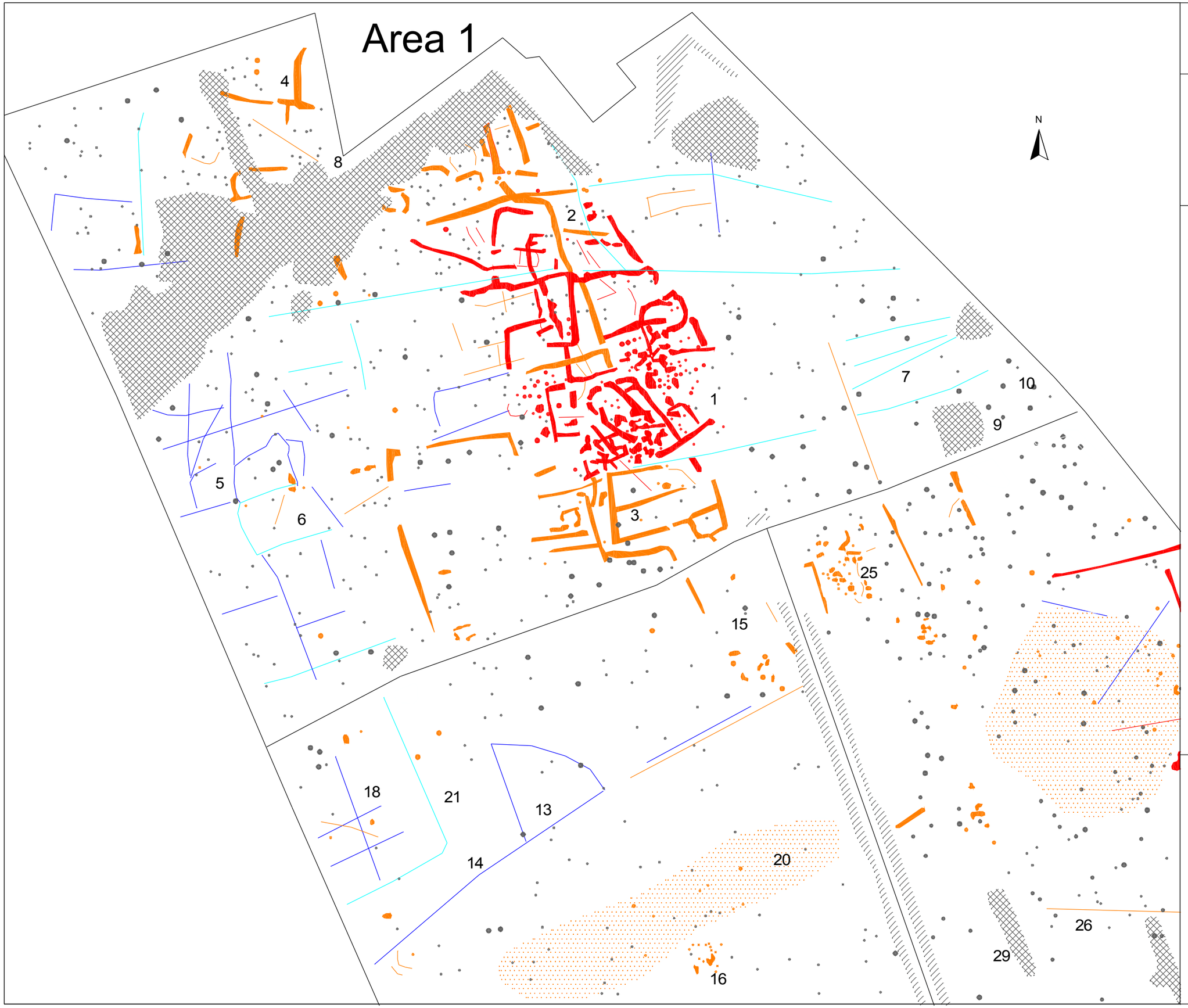
SCALE 1:1250



SCALE TRUE AT A3

FIG 06

Area 1



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Geophysical Survey
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South Marston
Swindon

Abstraction and interpretation of magnetometer anomalies - Area 1

- Positive linear anomaly - cut feature of archaeological potential
- Linear anomaly - associated with extant ditch
- Positive linear anomaly - ditch-like feature
- Negative linear anomaly - material of low magnetic susceptibility (possible ditch)
- Discrete positive response - cut feature of archaeological potential
- 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 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 07

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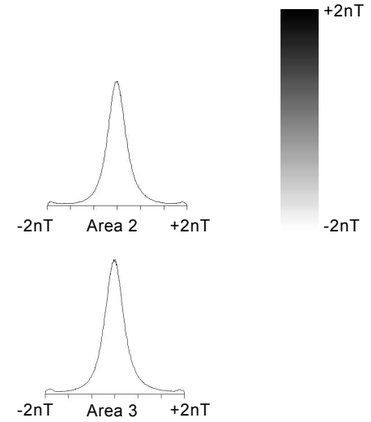
Greyscale plot of filtered magnetometer data - Areas 2 & 3 north



N

Area 2

SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 08

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Abstraction and interpretation of magnetometer anomalies - Areas 2 & 3 north

- Positive linear anomaly - cut feature of archaeological potential
- Linear anomaly - ridge and furrow
- Linear anomaly - associated with extant ditch
- Positive linear anomaly - ditch-like feature
- Negative linear anomaly - material of low magnetic susceptibility
- Discrete positive response - cut feature of archaeological potential
- Discrete positive response - possible pit-like feature
- Zone of numerous pit-like responses - of uncertain origin
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

N

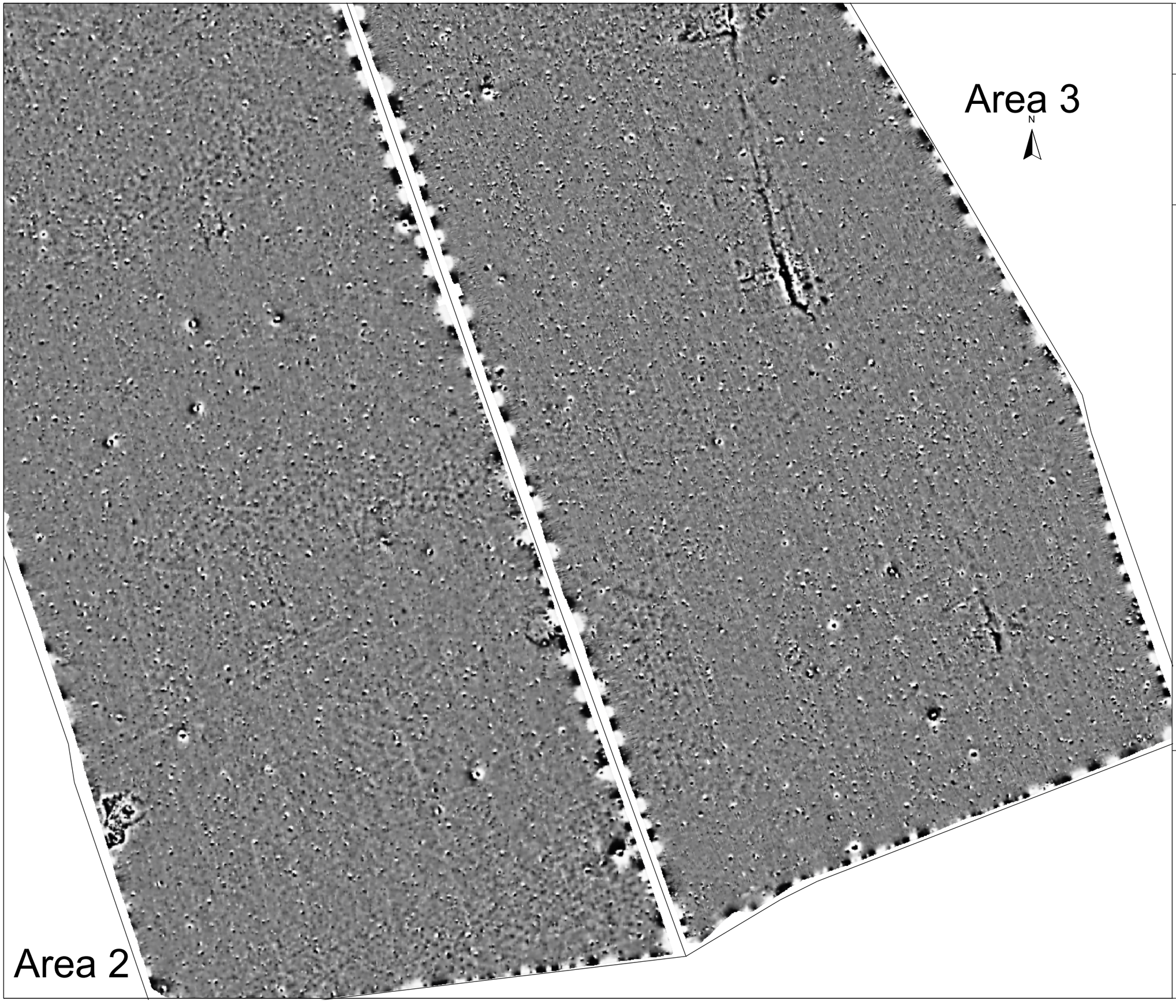
Area 2

SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 09



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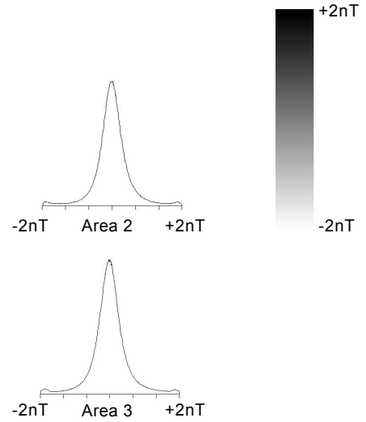
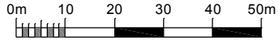
Greyscale plot of filtered magnetometer data - Areas 2 & 3 south



SCALE 1:1250



SCALE TRUE AT A3

FIG 10

Area 3

Area 2

13
20
16
19
26
29
23
27
28
22
12
17
24
11

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Abstraction and interpretation of magnetometer anomalies - Areas 2 & 3 south

- Positive linear anomaly - cut feature of archaeological potential
- Linear anomaly - ridge and furrow
- Linear anomaly - associated with extant ditch
- Positive linear anomaly - ditch-like feature
- Negative linear anomaly - material of low magnetic susceptibility
- Discrete positive response - cut feature of archaeological potential
- Discrete positive response - possible pit-like feature
- Variable magnetic response - of archaeological potential
- Zone of numerous pit-like responses - of uncertain origin
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 11

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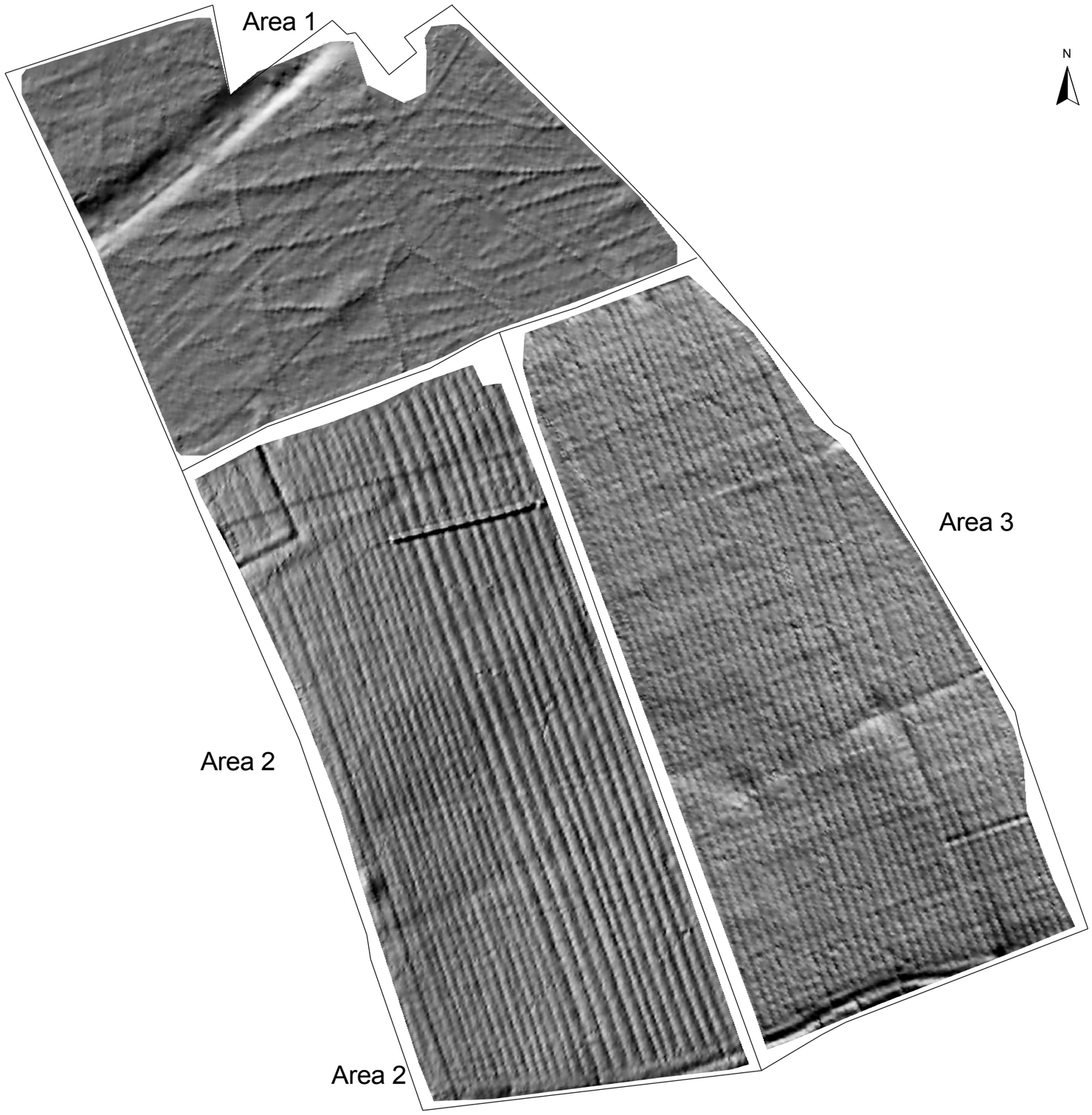
Shaded relief model derived from height data collected using RTK GPS during magnetometer survey

Height data converted from WGS84 to ODN plus antenna height of 1.5m using OSGM02



SCALE 1:2500

0m 50 100m

SCALE TRUE AT A3

FIG 12

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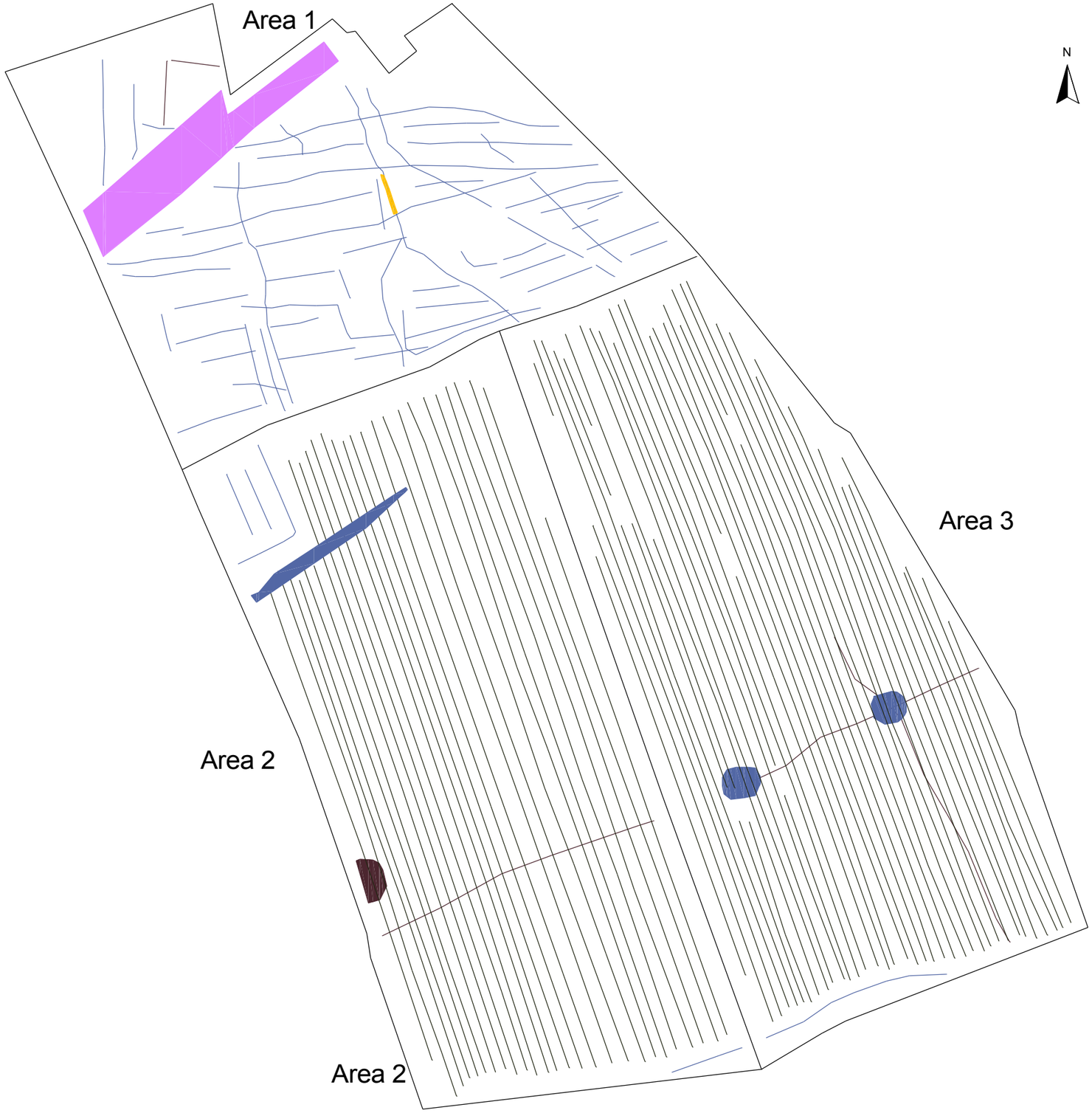

Abstraction and interpretation of shaded relief features

- Linear bank - infilled canal
- Linear feature - possible bank of uncertain origin
- Linear feature - ditch
- Linear mark - uncertain origin
- Linear feature - ridge & furrow (furrow)
- Discrete feature - mound
- Discrete feature - depression

SCALE 1:2500

0m 50 100m

SCALE TRUE AT A3

FIG 13