Four Romano-British Sites, Tysoe, Warwickshire

(Madhill Romano-British Site SP 35630 46010
Lingcroft Romano-British Site SP 34580 44540
Old Lodge Farm Romano-British Site SP 35890 44780
Twenty Seven Acres Romano-British Site SP 35360 45890)

MAGNETOMETER SURVEY REPORT

David Sabin and Kerry Donaldson

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Magnetometer Survey

Fieldwork by David Sabin, Kerry Donaldson and Jack Cousins
Report by David Sabin BSc (Hons) MIFA and Kerry Donaldson BSc (Hons)

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Archaeological Surveys Ltd
PO Box 2862, Castle Combe, Chippenham, Wiltshire, SN14 7WZ
Tel: 01249 782234 Fax: 0871 661 8804
Email: info@archaeological-surveys.co.uk
Web: www.archaeological-surveys.co.uk

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ACKNOWLEDGMENTS

Survey work has been undertaken in a non-commercial capacity with the objectives of further assessing the findings of archaeological investigation carried out by David Sabin and the Edgehill Project Group. It is thanks to the Edgehill Project Group that the resources were made available in the 1990s to allow proper systematic fieldwalking and recording to be carried out, in particular the project could not have succeeded without the support of Dr Sarah Wager of Birmingham University and Emma Jones, Warwickshire Sites and Monuments Record Officer. The geophysical work reported on here could not have been carried out without the assistance of Kevin Wyles of Tysoe who has acted in the capacity of landowner liaison. The permissions granted by Rob Allen, Upton estate Manager, have been vital to the collection of geophysical data.

SUMMARY

Archaeological Surveys Ltd carried out a magnetometer survey of four areas of land within the parish of Tysoe, Warwickshire. The surveys form part of an archaeological assessment of Madhill, Lingcroft, Old Lodge Farm and Twenty Seven Acres Romano-British sites.

The archaeological potential of the sites became known to David Sabin in the late 1980s whilst carrying out unsystematic fieldwalking; later more systematic survey by the Edgehill Project Group resulted in an archive of cultural material and information for the Warwickshire Sites and Monuments Record.

The results of the geophysical surveys support the fieldwalking evidence and provide greater detail relating to the layout, survival, land-use and structural remains present at the sites. Strong magnetic anomalies indicate conditions very conducive to the formation of good magnetic contrast and are typical of Lias geologies within the region.

The sites have produced a large number of anomalies within a relatively small area and effectively record site development probably throughout the Roman period and possibly beginning in the prehistoric. The anomalies often lack coherence which has prevented confident abstraction and interpretation, though generally their morphology is indicative of small enclosures and other linear features typical of Romano-British settlement sites. Former medieval ridge and furrow cultivation has produced severe truncation and disturbance to the archaeology on all of the sites with the exception of Madhill.

The anomalies at Madhill stand out from the other sites in that there is evidence of good survival of archaeological features, in particular, structural remains. There is evidence that the anomalies are also associated with extant earthworks. The structures are indicated by negative rectilinear response within the data and at least two substantial buildings are evident. It is tentatively suggested that the buildings may relate to one large 'villa' complex.

Ring ditches to the west of the structures may indicate earlier origins to the site, in the late prehistoric or early Roman periods.

Anomalies at Lingcroft include positive linear, curvilinear and rectilinear features indicative of former ditches although there may be some evidence for fragmented survival of structural remains also. Former ridge and furrow has severely disturbed the archaeology so that the site survives as a series of strips representing the former ridges of the medieval cultivation.

The Old Lodge Farm Roman site is notably less complex and is evident within the data as a rectilinear enclosure, curvilinear enclosure, possible ring ditch and series of pits. The latter may show some linear alignment and correlate with a scatter of flint finds recorded by fieldwalking. The site has again been severely damaged by medieval ridge and furrow.

Twenty Seven Acres site again contains a complex of linear, rectilinear and curvilinear positive anomalies indicative of former cut features; some negative linear anomalies may indicate structural remains also. Anomalies appear to extend beyond the limit of the survey and the site may link to Madhill, a short distance to the north east.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd carried out a magnetometer survey of four areas of land within the parish of Tysoe, Warwickshire. The surveys form part of an archaeological assessment of Madhill, Lingcroft, Old Lodge Farm and Twenty Seven Acres Romano-British sites.

1.1.2 The sites came to the attention of David Sabin in the late 1980s whilst working in the vicinity. Systematic fieldwalking carried out by the Edgehill Project group in the mid 1990s recorded concentrations of Romano-British cultural material and masonry indicative of stone built structures.

1.1.3 Archaeological Surveys Ltd is a geophysical survey company set up in 2004 and based in Castle Combe, Wiltshire. Company directors are David Sabin and Kerry Donaldson. David Sabin is a Member of the Institute for Archaeologists and holds a Specialised BSc (Hons) in Remote Sensing and Geographic Information Systems and a Certificate in Practical Archaeology. Kerry Donaldson holds a BSc (Hons) in Geography, Certificate in Practical Archaeology and HNC in Heritage Management.

1.2 Survey objectives and techniques

1.2.1 The objective of the surveys was to use magnetometry to locate geophysical anomalies that may be archaeological in origin in order to further understand

the layout, preservation, date, status and activities associated with the Romano-British sites.

1.2.2 The methodology is considered an efficient and effective approach to archaeological prospection. The survey and report generally follow the recommendations set out by: English Heritage, 2008, *Geophysical survey in archaeological field evaluation;* Institute for Archaeologists, 2002, *The use of Geophysical Techniques in Archaeological Evaluations*.

1.3 Site locations, description and survey conditions

1.3.1 Madhill Romano-British site is located at Sun Rising Hill, Ordnance Survey National Grid Reference (OS NGR) SP 35630 46010. Lingcroft is located approximately 350m north east of Tysoe church, OS NGR SP 34580 44540. Old Lodge Farm Roman site is located approximately 200m south west of Old Lodge Farm, OS NGR SP 35890 44780. Twenty Seven Acres Roman site is located approximately 200m south west of Madhill, OS NGR SP 35360 45890. All three sites are located within the parish of Tysoe, Warwickshire, see Figures 01 and 02. The sites are referred to in order of survey.

1.3.2 The geophysical survey at Madhill covered an area of approximately 1.75ha of arable agricultural land . Land cover during the survey consisted of an emerging rape crop. The area is generally flat although lies on a small plateau with land falling steeply to the west and south, see Plate 1. To the east, land rises gently to the base of a very step scarp slope (generally referred to as Edgehill or Sun Rising). The ground conditions across the site were generally considered to be favourable for the collection of magnetometry data although heavy soil was encountered in some parts of the site. Weather conditions during the survey were cold but fine. The survey was carried out on 30th January 2010.

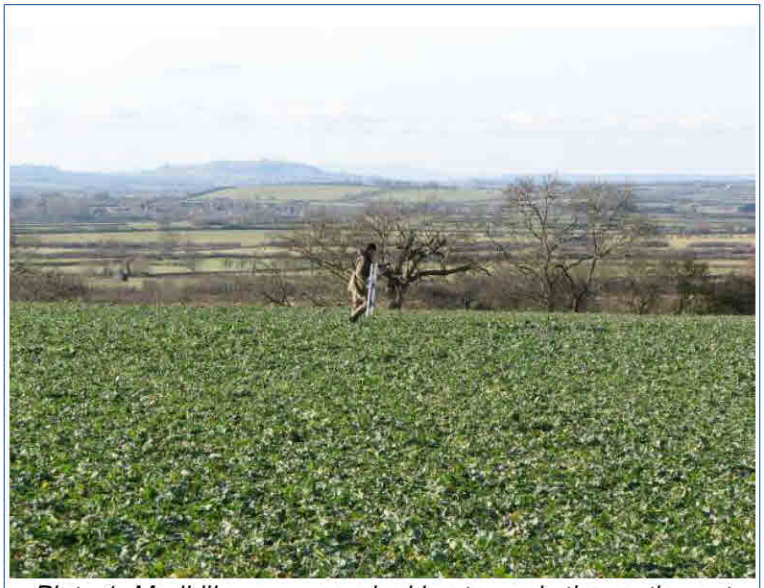

Plate 1: Madhill survey area looking towards the north west

1.3.3 The survey at Lingcroft covered approximately 1.6ha of arable agricultural land. Land cover during the survey consisted of an emerging rape crop. The area is flat although there is some evidence of surviving ridge and furrow. Ground conditions were variable with patches of sandy soil providing good conditions whilst more clayey waterlogged areas were difficult to traverse. The survey was carried out in overcast and cold weather on February 15th 2010.

1.3.4 The survey at Old Lodge Farm covered approximately 1ha of arable agricultural land. Land cover during the survey consisted of an emerging rape crop. The area is generally flat although tends to slope up gently towards the east. Ground conditions were variable but generally very clayey and difficult to traverse. The survey was carried out in overcast and cold weather on February 17th.

Plate 2: Old Lodge Farm survey area looking to the north west

1.3.5 The survey at Twenty Seven Acres covered approximately 1.6ha of arable agricultural land. The ground cover during the survey consisted of an emerging rape crop. The area is generally flat though tends to drop very gently towards the south east and rise rapidly beyond the eastern limit of the survey. Ground conditions were variable with clayey areas along the southern side difficult to traverse. The survey was carried out in fine conditions on March 2nd 2010.

1.4 Site history and archaeological potential - Madhill

1.4.1 The site initially came to the attention of David Sabin whilst carrying out works for Mr Richard Wood of Rupert Cottage, immediately adjacent to the site, in the late 1980s. Mr Wood often referred to the site as 'the old village', or 'Romany camp' and he remembered the removal of much stone, during ploughing or drainage works, including a large 'hearth complete with the

remains of the last fire'. Mr Kevin Wyles, a resident of Tysoe, also confirms the discovery of the hearth stone with burnt material.

1.4.2 Unsystematic fieldwalking by David Sabin in the early 1990s revealed the presence of a large number of Romano-British pottery sherds, including many large fragments that were freshly broken, and in 1994 part of a large silver Roman plate with a decorated rim that was probably manufactured in the late 2nd or 3rd centuries (Wise and Johns, 1996). The plate was subsequently subject of a Treasure Trove inquest where it was not regarded as Treasure and was donated to Warwickshire Museum for display.

1.4.3 Subsequent systematic metal detecting was carried out, using specialist equipment, in order to assess whether the site contained other precious metal objects so that they could be excavated in controlled conditions and to remove objects before damage by illegal treasure hunters. No large objects were located although 7 brooches, 2 pin heads, a silver finger ring, a lead steelyard weight, part of a copper alloy bracelet and other metal fragments were retrieved from the ploughsoil. The objects were recorded by Philip Wise of Warwickshire Museum. Detailed analysis of the brooches was undertaken by John Darley of Warwick University and the group includes a trumpet brooch, Colchester derivatives, a large Dolphin type and a disc brooch fragment. Most of the brooches can be attributed to the 1st and 2nd centuries although the disc brooch type can be attributed to the 3rd and 4th centuries and has been found in 5th century Anglo Saxon graves.

1.4.4 A systematic fieldwalking survey was carried out across the site by the Edgehill Project group. Cultural material was collected using a traverse and stint sampling technique. The distribution of finds was plotted allowing the extent of the site to be determined.

1.4.5 The site was subject to resistivity in the mid 1990s by David Sabin using 'home constructed' equipment. The site provided a useful test ground and anomalies indicative of structural remains were located although ground conditions were poor. The results of this survey work are likely to be reassessed and processed using current software with the hope of producing a supplementary supporting report.

1.5 Site history and archaeological potential - Lingcroft

1.5.1 The site was included within a fieldwalking programme carried out by the Edgehill project group; it had initially been recognised by David Sabin during unsystematic fieldwalking in the early 1990s. Cultural material, consisting mainly of Romano-British pottery sherds, defined the site although was obviously disturbed by former ridge and furrow cultivation. Dr Sarah Wager discovered a silver siliqua of Honorius (dating to the period 388 – 394 AD) during the fieldwalking. Fourth century Roman coins are known to have been found on the site by metal detector users. A small number of organically tempered pottery sherds were located during unsystematic fieldwalking.

1.6 Site history and archaeological potential – Old Lodge Farm

1.6.1 The site had initially been located by David Sabin in the early 1990s using unsystematic fieldwalking. A systematic fieldwalking survey was carried out across the site by the Edgehill Project group. Cultural material was collected using a traverse and stint sampling technique. The distribution of finds was plotted allowing the extent of the site to be determined.

1.6.2 The scatter of Romano-British pottery sherds and masonry was well-defined by the fieldwalking survey. Flint finds (flakes and implements) produced a notable concentration to the south and south west of the Roman material.

1.7 Site history and archaeological potential – Twenty Seven Acres

1.7.1 The site had initially been located by David Sabin in the early 1990s using unsystematic fieldwalking. A systematic fieldwalking survey was carried out across the site by the Edgehill Project group. Cultural material was collected using a traverse and stint sampling technique. The distribution of finds was plotted allowing the extent of the site to be determined.

1.7.2 Similar to Old Lodge Farm, the fieldwalking collection produced well-defined limits to the Romano-British pottery, with flint finds concentrated a little to the west.

1.8 Geology and soils

1.8.1 The underlying geology is Jurassic Lower Lias (BGS, 1982) although all sites lie close the the Middle Lias scarp. Quaternary head deposits are mapped a short distance from the east of the Madhill site.

1.8.2 The overlying soils are from the Evesham 2 association which are typical calcareous pelosols. These consist of slowly permeable clayey soils with some landslips and associated irregular terrain (Soil Survey of England and Wales, 1983).

1.8.3 Ferrous minerals within the soils are probably relatively high and may have been increased by weathering of the nearby Middle Lias scarp and Marlstone Rock Bed. All of the sites contain evidence for weathered masonry derived from the Marlstone, and it is likely that this has further increased the ferrous content of the soil locally. The Marlstone Rock Bed is considered to be a calcitic sideritic chamosite oolite or limestone (Edmonds et al, 1965). Chemical changes associated with weathering have produced a very red soil on the Middle Lias scarp and it is possible that this is related to changes in the siderite, an iron carbonate mineral, to hematite, an iron oxide.

1.8.4 Siderite, derived from either the scarp or degraded building remains, is considered to have weak magnetic susceptibility (canted antiferromagnetic) but it has been demonstrated that heating above 300ºC produces a rapid transition to magnetite and magnematite (ferrimagnetic) which have

comparatively high levels of magnetic susceptibility (Yongxin et al, 1999). Lower Lias soils away from the Middle Lias have also demonstrated that they convert readily from low to high magnetic susceptibility. Human occupation and associated burning within hearths etc. is, therefore, likely to have readily increased soil magnetic susceptibility allowing useful and strong magnetic contrast within archaeological features.

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 Bartington Grad601-2 gradiometers. The instruments effectively measure a magnetic gradient between two fluxgate sensors mounted vertically 1m apart. Two sets of sensors are mounted on a single frame 1m apart horizontally.

2.2.2 The instruments are extremely sensitive and are able to measure magnetic variation to 0.01nanoTesla (nT) with an effective resolution of 0.03nT. The data range are limited to ±100nT when surveying with the highest sensitivity. All readings are saved to an integral data logger for analysis and presentation.

2.2.3 The instruments are operated according to the manufacturer's instructions with consideration given to the local conditions. An adjustment procedure is required, prior to collection of data, in order to balance the sensors and remove the effects of the Earth's magnetic field; further adjustment is required during the survey due to instrument drift often associated with temperature change.

2.2.4 It can be very difficult to obtain optimum balance for the sensors due to localised magnetic vectors that may be associated with large ferrous objects, geological/pedological features, 'magnetic debris' within the topsoil and natural temperature fluctuations. Imperfect balance results in a heading error often visible as striping within the data; this can be effectively removed by software processing and generally has little effect on the data unless extreme.

2.2.5 The Bartington gradiometers undergo regular servicing and calibration by the manufacturer. A current assessment of the instruments is shown in Table 1 below.

Sensor type and serial numbers	Bartington Grad - 01 – 1000 Nos. 084, 085, 242 and 396
Date of calibration/service	16th May 2009
Bandwidth	12Hz (100nT range) both sensors
Noise	<100pT peak to peak
Adjustable errors	<2nT

Table 1: Bartington fluxgate gradiometer sensor calibration results

The instruments were considered to be in good working order prior to the survey with no known faults or defects.

2.2.6 Data were collected at 0.125m centres along traverses 1m apart. The survey area was separated into 30m by 30m grids (900m^2) giving 7200 recorded measurements per grid. This sampling interval is very effective at locating archaeological features and is the recommended methodology for archaeological prospection (English Heritage, 2008).

2.2.7 The survey grids were set out to the Ordnance Survey OSGB36 datum using a Penmap RTK GPS. The GPS is used in conjunction with Topcon's TopNet service where positional corrections are sent via a mobile telephone link. Positional accuracy of around 10 – 20mm is possible using the system. The instrument is regularly checked against the ETRS89 reference framework using Ordnance Survey ground marker C1ST7784 (Horton).

2.2.8 The fixed orientation of survey grids based on the OSGB36 datum was considered appropriate given that the further survey work may be carried out and the data may be combined within a Geographic Information System (GIS). In addition, there is an optimum north – south traverse direction for magnetic survey (English Heritage, 2008). Survey in this direction can produce anomalies with a higher contrast when compared to other orientations; this is a function of their presence within the Earth's

magnetic field. A fixed grid across the site also simplifies its relocation should that be required.

2.3 Data processing and presentation

2.3.1 Magnetometry data downloaded from the Grad 601-2 data logger are analysed and processed in specialist software known as ArcheoSurveyor. The software allows greyscale and trace plots to be produced for presentation and display. Survey grids are assembled to form an overall composite of data (composite file) creating a dataset of the complete survey area. Appendix C contains specific information concerning the survey and data attributes and is derived directly from ArcheoSurveyor; this should be used in conjunction with information provided by Figure 02.

2.3.2 Only minimal processing is carried out in order to enhance the results of the survey for display. Raw data are always analysed as processing can modify anomalies. The following schedule sets out the data and image processing used in this survey:

- clipping of the raw data at ±30nT to improve greyscale resolution,
- further clipping of processed data to enhance low magnitude anomalies,
- zero median/mean traverse is applied in order to balance readings along each traverse.

Reference should be made to Appendix B for further information on the specific processes carried out on the data. Appendix C metadata includes details on the processing sequence used for each survey area.

2.3.3 An abstraction and interpretation is offered for all geophysical anomalies located by the survey. 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 assessment of features within each survey area. Where further interpretation is possible, or where a number of possible origins should be considered, more detailed discussion is set out in Section 4.

2.3.4 The main form of data display used in this report is the greyscale plot. Magnetic data are also displayed as a trace plot. Both 'raw' and 'processed' data have been shown followed by an abstraction and interpretation plot. Anomalies are abstracted using colour coded points, lines and polygons. All plots are scaled to landscape A3 for paper printing.

2.3.5 Graphic raster images in bitmap format (.BMP) are initially prepared in ArcheoSurveyor. Regardless of survey orientation, data captured along each traverse are displayed and processed by ArcheoSurveyor from left to right; this corresponds to a direction of south to north in the field. Prior to displaying against base mapping, raster graphics require a rotation of 90° anticlockwise to restore north to the top of the image. Greyscale images are rotated by AutoCAD, traceplots are rotated using ArcheoSurveyor. Rotated traceplots are

derived from interpolated datasets and can be considered as representative only as the raw data will have been modified to a minor degree.

2.3.6 The raster images are combined with base mapping using ProgeCAD Professional 2009 and AutoCAD LT 2007, creating DWG file formats. All images are externally referenced to the CAD drawing in order to maintain good graphical quality. Quality can be compromised by rotation of graphics in order to allow the data to be orientated with respect to grid north; this is considered acceptable as the survey results are effectively georeferenced allowing relocation of features using GPS, resection method etc.. A digital archive, including raster images, is produced with this report allowing separate analysis if necessary, see Appendix D below.

3 RESULTS

3.1 General overview

3.1.1 The detailed magnetic survey was carried out over 4 survey areas covering a total of approximately 6ha. Geophysical anomalies located can be generally classified as positive linear and discrete positive responses of archaeological potential, positive and negative linear anomalies of an uncertain origin, linear anomalies of an agricultural origin, areas of magnetic debris and strong discrete dipolar anomalies relating to ferrous objects. Anomalies located within each survey area have been numbered and are described below with subsequent discussion in Section 4.

3.1.2 Data quality are generally considered good although additional 'noise' has been caused by additional instrument movement resulting from clayey and sticky ground conditions.

3.1.3 The listing 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 reference 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 AREA ARCHAEOLOGY AS-ABST MAG POS DISCRETE ARCHAEOLOGY AS-ABST MAG POS CURVILINEAR RING DITCH AS-ABST MAG NEG LINEAR ARCHAEOLOGY AS-ABST MAG DIPOLAR 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 AREA UNCERTAIN	The category applies to a range of anomalies where there is not enough evidence to confidently suggest an origin. Anomalies in this category may well be related to archaeologically significant features, but equally relatively modern features, geological/pedological features and agricultural features should be considered. Positive anomalies are indicative of magnetically enhanced soils that may form the fill of 'cut' features or may be produced by accumulation within layers or 'earthwork' features; soils subject to burning may also produce positive anomalies. Negative anomalies are produced by material of comparatively low magnetic susceptibility such as stone and subsoil.
Anomalies with an agricultural origin AS-ABST MAG AGRICULTURAL AS-ABST MAG RIDGE AND FURROW AS-ABST MAG LAND DRAIN	The anomalies are often linear and form a series of parallel responses or are parallel to extant land boundaries. Where the response is broad, former ridge and furrow is likely; narrow response is often related to modern ploughing.
Anomalies associated with magnetic debris AS-ABST MAG DEBRIS AS-ABST MAG STRONG DIPOLAR	Magnetic debris often appears as areas containing many small dipolar anomalies that may range from weak to very strong in magnitude. It often occurs where there has been dumping or ground make-up and is related to magnetically thermoremnant materials such as brick or tile or other small fragments of ferrous material. This type of response is occasionally associated with kilns, furnace structures, or hearths and may therefore be archaeologically significant. It is also possible that the response may be caused by natural material such as certain gravels and fragments of igneous or metamorphic rock. Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.
Anomalies with a modern origin AS-ABST MAG DISTURBANCE AS-ABST MAG SERVICE	The magnetic response is often strong and dipolar indicative of ferrous material and may be associated with extant above surface features such as wire fencing, cables, pylons etc.. Often a significant area around such features has a strong magnetic flux which may create magnetic disturbance; such disturbance can effectively obscure low magnitude anomalies if they are present. Fluxgate sensors may respond erratically and with hysteresis adjacent to strong magnetic sources. Buried services may produce characteristic multiple dipolar anomalies dependant upon their construction.

Table 2: List and description of interpretation categories

3.2 Madhill

Area centred on OS NGR 435630 246010, see Figures 03 – 06.

Anomalies of archaeological potential

(1) – Positive linear and rectilinear anomalies representing ditch-like features and/or accumulations of magnetically enhanced material. The anomalies are consistent with Romano-British features at the site and the complexity of the layout suggests a long period of occupation.

(2) – Linear and rectilinear negative anomalies within the north western part of the site have been caused by material of low magnetic susceptibility such as stone. The anomalies are consistent with structural remains and may represent a Romano-

British building approximately 45m by 20m.

(3) – Linear and rectilinear negative anomalies within the central northern part of the site have been caused by material of low magnetic susceptibility such as stone. The anomalies are consistent with structural remains and may represent a Romano-British building approximately 30m by 20m.

(4) – Negative rectilinear elements within the northern part of the survey area may indicate structural remains.

(5) – A negative linear anomaly crosses the survey area with an almost east to west orientation. The anomaly may represent structural remains such as a wall or drain.

(6) – Linear and rectilinear anomalies within the southern part of the survey area may represent former boundary ditches associated with earlier field systems and/or a trackway.

(7) – A ring ditch with a diameter of approximately 12m and a second more fragmented ring ditch immediately to the north east. The anomalies may indicate former roundhouses associated with late prehistoric or earlier Roman occupation at the site; however, it is possible that they are associated with funerary monuments.

(8) – A series of discrete dipolar anomalies appear to form a linear feature associated with (7). The dipolar response would be indicative of ferrous material or intense burning that has caused magnetic thermoremnance of the subsoil.

Anomalies with an uncertain origin

(9) – Negative linear anomalies within the south eastern part of the survey area are uncertain in origin although they may have been caused by land drainage.

Anomalies with an agricultural origin

(10) – Linear anomalies probably caused by modern cultivation.

Anomalies associated with magnetic debris

(11) – The area contains a number of discrete dipolar anomalies indicative of shallow ferrous objects. It is possible that some may be of archaeological significance.

3.3 Lingcroft

Area centred on OS NGR 434580 244540, see Figures 07 – 10.

Anomalies of archaeological potential

(12) – Positive linear and rectilinear anomalies representing ditch-like features and/or accumulations of magnetically enhanced material. The anomalies are consistent with Romano-British features at the site and the complexity of the layout suggests a long period of occupation.

(13) – Curvilinear anomalies at the northern end of the survey area may indicate the presence of ring ditches.

(14) – A negative linear anomaly in the central part of the survey area may indicate the survival of structural remains beneath a ridge within a medieval ridge and furrow field system.

Anomalies with an agricultural origin

(15) – A series of parallel linear anomalies have been caused by a medieval ridge and furrow field system. The furrows have been abstracted and appear to have caused severe truncation and destruction of features of archaeological potential.

3.4 Old Lodge Farm

Area centred on OS NGR 435890 244780, see Figures 11 – 14.

Anomalies of archaeological potential

(16) – A positive linear feature that may form a small enclosure.

(17) – A curvilinear enclosure that may extend beyond the north eastern limit of the survey area.

(18) – A possible ring ditch.

(19) – A discrete dipolar area within the northern part of the site may indicate burning.

(20) – The western part of the area contains a number of discrete positive anomalies that indicate pit-like features. The anomalies may extend beyond the southern limit of the survey and there is tentative evidence for alignment.

Anomalies with an uncertain origin

(21) – Positive areas located close to the eastern limit of the survey. The anomalies have been caused by magnetically enhance material although it is uncertain as to whether they are archaeologically significant.

(22) – Positive linear anomalies within the western part of the survey area are uncertain in origin although may have been caused by agricultural activity and/or land drainage.

Anomalies with an agricultural origin

(23) – The survey area is crossed by a series of parallel anomalies indicative of medieval ridge and furrow. The furrows are likely to have caused severe disturbance or destruction of archaeological features.

3.5 Twenty Seven Acres

Area centred on OS NGR 435360 245890, see Figures 15 – 18.

Anomalies of archaeological potential

(24) – Positive linear and rectilinear anomalies representing ditch-like features and/or accumulations of magnetically enhanced material. The anomalies are consistent with Romano-British features at the site and the complexity of the layout suggests a long period of occupation.

(25) – Negative linear anomalies within the central eastern part of the site may indicate structural remains.

(26) – A probable ring ditch, with a diameter of approximately 8m, is probably associated with late prehistoric or early Romano-British occupation.

Anomalies with an uncertain origin

(27) – An irregular linear anomaly close to the southern limit of the survey area is uncertain in origin although it may have been caused by a former fluvial feature of natural origin.

Anomalies with an agricultural origin

(28) – A series of parallel linear anomalies crossing the survey area is indicative of medieval ridge and furrow. The furrows are likely to have severely disturbed or destroyed features of archaeological potential.

Anomalies associated with magnetic debris

(29) – Magnetic debris possibly forms a linear feature close to the eastern limit of the survey area and may indicate the position of a recently removed field boundary.

4 DISCUSSION

4.1 Overview

4.1.1 Magnetometry survey has proved very effective over all of the survey areas. A large number of archaeological anomalies were revealed at Madhill, Lingcroft and Twenty Seven Acres, with fewer anomalies, although also archaeologically significant, at Old Lodge Farm. Positive anomalies generally represent former cut features although may also indicate accumulations of magnetically enhanced soils; negative anomalies are indicative of structural remains, e.g. stone footings, wall remains, drains.

4.1.2 The density of the anomalies, combined with disturbance and destruction by medieval ridge and furrow, has resulted in little coherence and interpretation is, therefore, limited. The data have revealed a palimpsest in that occupation over a long period has resulted in changes and redevelopment within the same general location. Any phasing within the data can only be suggested tentatively.

4.1.3 The results clearly reveal the widespread nature of the archaeological potential of this region of south Warwickshire. The geophysics adds some weight to the findings of systematic fieldwalking surveys carried out as part of the Edgehill Project within the 1990s. None of the sites were completely defined by the geophysics as it is evident that anomalies extend beyond the survey boundaries.

4.2 Madhill

4.2.1 The results from Madhill have provided strong evidence of Romano-British structural remains. The site contains low earthworks and over the last 30 years, it is known that much masonry has been removed from the site. The evidence suggests a much better survival of structures at Madhill, when compared to the other sites, and it is likely that medieval ridge and furrow has either never occurred on the site or has not been carried out over an extended period of time. There is no clear evidence for ridge and furrow in the data, unusual in this part of Warwickshire, and it is possible that attempts at medieval ploughing were thwarted by very substantial building remains.

4.2.2 The site lies on a distinct plateau with very extensive views to the north and north west and the finds from the site hint at a period of settlement with some status.

These two factors may distinguish the site somewhat when compared to the other sites surveyed and other Romano-British sites known to occur within the vicinity. The evidence possibly indicates the former location of a substantial 'villa' type agricultural complex.

4.2.3 Assessing the structural remains visible within the magnetic data, it would appear that there are two substantial buildings although it must be noted that magnetometry does not respond well to structural remains, particularly when compared to resistivity and ground penetrating radar. It is possible that the two structures are actually linked along the north eastern side which would form a large winged building, with the central part facing to the west of south. Although the more usual orientation for this type of Roman structure is to the south or south east, the local topography may influence the orientation so that the building is not facing the nearby scarp face.

4.2.4 At least one ring ditch was located in the southern part of the survey area. There is some evidence for a fragmented second ring ditch immediately to the north east. The diameter of the main ring (approximately 12m) would be consistent with a substantial dwelling of prehistoric or early Roman date; however, there is no clear evidence for a gap in the ring towards the south or south east, which is typically associated with an entrance to this type of feature. There is, however, a gap on the western side and this may be associated with the local topography in that a clear view across the Red Horse Vale may be preferable to the Edgehill scarp face to the south and south east. If the gap is an entrance, there appears to be some associated pits and more elongated discrete features extending from it towards the south west. The strongly dipolar magnetic response recorded by the data would suggest intense burning or the presence of ferrous objects. It is tentatively suggested that these features may represent a former boundary or protection from prevailing winds in this very exposed location. The dipolar response may occur with the burning of substantial timbers.

4.3 Lingcroft

4.3.1 The magnetometry results from Lingcroft have revealed a complex site heavily disturbed by former ridge and furrow. The furrows appear to have completely removed the archaeology across the site and indicate that survival is probably constrained to a series of strips that underlie the former ridges. Survival under the ridges may have been good until relatively recently but the field has now almost been flattened by modern agriculture, and masonry fragments appear in strips that undoubtedly represent the former ridges.

4.3.2 The geophysics is complex and often incoherent which would tend to support the fieldwalking evidence for a long period of occupation through the Roman period. The fieldwalking located a very small amount of organically tempered pottery and a late Roman coin of Honorius which may suggest continuing occupation in the sub Roman period. The medieval settlement of Middle Tysoe occurs a short distance to the south west with St Mary's church approximately 350m away. It is possible that

the site contains some evidence for early medieval activity.

4.4 Old Lodge Farm

4.4.1 The results appear less complex than the three other sites, the main features being a rectilinear enclosure, curvilinear enclosure, possible ring ditch and a number of pit-like features. The archaeology has again been severely disturbed and partly truncated by former ridge and furrow, possibly exacerbated by modern ploughing. Survival of features is also more likely where former ridges crossed the site.

4.4.2 A series of pit-like features may exhibit some alignment and probably extend to the south beyond the survey area. Fieldwalking by the Edgehill Project Group certainly recorded a concentration of worked flint that tends to correlate with the location of the pits and it is possible that some of the features located by the geophysics are Bronze Age. This would again suggest a favoured site with long standing occupation.

4.5 Twenty Seven Acres

4.5.1 The magnetometry again revealed a complex site disturbed by ridge and furrow. Evidence for former cut features tends to support activity over a long period with the establishment and development of a number of enclosures and land boundaries. Negative linear anomalies may support evidence for structural remains in the eastern part of the survey area where there are notable concentrations of masonry and Romano-British pottery on the field surface.

4.5.2 The extensive nature of the anomalies was not expected from the distribution of Roman pottery across the site. The presence of a ring ditch may indicate development from the late prehistoric/ early Roman with the construction of masonry structures in the later Roman period. Madhill Roman site lies only 130m to the north east and it is possible that the two sites are linked although they are separated by a moderately steep slope.

4.5.3 A possible fluvial feature was located along the southern side of the site and this may hint at a very different pattern of land drainage in the late prehistoric and Roman periods.

5 CONCLUSION

5.1.1 Magnetometry has proved very effective at locating features of archaeological potential on the four Romano-British sites identified by fieldwalking. The high magnitude of magnetic enhancement and strong contrast suggest geological and pedological conditions highly conducive to the formation of magnetic anomalies. The effect has been noted on other sites lying on Jurassic Lias geologies.

5.1.2 The sites, perhaps with the exception of Old Lodge Farm, produced evidence for development over a long period, possibly from the late prehistoric. Features often appear incoherent due to redevelopment and effectively indicate a palimpsest probably as a result of activity right through the Roman period. The Old Lodge Farm site is less complex but the evidence from the geophysics and fieldwalking does support activity in both the prehistoric and Romano-British periods. The incoherent nature of the anomalies is exacerbated by evidence of medieval ridge and furrow on all the sites, with the exception of Madhill, and more modern agricultural erosion.

5.1.3 The establishment of ridge and furrow, and the geophysical evidence for its disturbance to the archaeological features, would tend to support little survival of the sites into the Saxon or earlier medieval periods. Lingcroft produced organically tempered pottery and a very late 4th century coin of Honorius during fieldwalking. However, the focus of nucleated settlement forming Tysoe appears slightly further to the west and ridge and furrow damage is most severe at Lingcroft (possibly indicating agricultural activity back to the early medieval period).

5.1.4 The Madhill site appears to show comparatively good survival and possibly a more substantial site of higher status. Structural remains indicate at least two substantial buildings that may belong to a large 'villa' type structure. There is no clear evidence for ridge and furrow at the site and the presence of low earthworks may support the evidence for good survival of structural remains.

5.1.5 The surveys have provided a sample of the archaeological potential along the Edgehill escarpment within the parish of Tysoe. The geophysics may support evidence of a well developed landscape within the Romano-British period, and further work is needed within the environs of the sites in order to establish how the wider landscape was utilised. Further work immediately to the east of Middle Tysoe may throw light onto the establishment of the early medieval settlement within a zone that has so far escaped modern development. The Roman site at Madhill is also highlighted as having the potential for exceptional survival within the Midlands region and further protection of the site from agricultural and natural erosion should be a priority.

6 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 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 gradiometer is a passive instrument consisting of two fluxgate sensors mounted vertically 1m apart. The instrument is carried about 30cm 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. If no enhanced feature is present the field measured by both sensors will be similar and the difference close to zero.

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

Appendix B – data processing notes

Clipping

Minimum and maximum values are set and replace data outside of the range with those values. Extreme values are removed improving colour or greyscale contrast associated with data values that may be archaeologically significant. It has been found that clipping data to ranges between ±5nT and ±1nT 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 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 slight differences between the set-up and stability of gradiometer sensors and can remove striping. The process can remove archaeological features that run along a traverse so data analysis is also carried out prior its application.

De-stagger

Compensates for small positional errors within data collection by shifting the position of the readings along each traverse by a specified amount. Data lost at the end of each traverse are extrapolated from adjacent value in the same row.

Deslope

Corrects for striping and distortion caused by metal objects/services etc.. The process calculates a curve based on a polynomial best fit mathematical function for each traverse. This curve is then subtracted from the actual data.

Appendix C – survey and data information

Madhill raw data

Filename: mag-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 30/01/2010
Assembled by: on 30/01/2010
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 1200 x 150
Survey Size (meters): 150 m x 150 m
Grid Size: 30 m x 30 m
X Interval: 0.125 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 4.84
Mean: 0.76
Median: 0.47
Composite Area: 2.25 ha
Surveyed Area: 1.7432 ha

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Source Grids: 23
1 Col:0 Row:0 19.xgd
2 Col:0 Row:1 15.xgd
3 Col:0 Row:2 16.xgd
4 Col:0 Row:3 17.xgd
5 Col:0 Row:4 18.xgd
6 Col:1 Row:0 20.xgd
7 Col:1 Row:1 11.xgd
8 Col:1 Row:2 12.xgd
9 Col:1 Row:3 13.xgd
10 Col:1 Row:4 14.xgd
11 Col:2 Row:0 21.xgd
12 Col:2 Row:1 07.xgd
13 Col:2 Row:2 08.xgd
14 Col:2 Row:3 09.xgd
15 Col:2 Row:4 10.xgd
16 Col:3 Row:0 22.xgd
17 Col:3 Row:1 03.xgd
18 Col:3 Row:2 04.xgd
19 Col:3 Row:3 05.xgd
20 Col:3 Row:4 06.xgd
21 Col:4 Row:0 23.xgd
22 Col:4 Row:1 01.xgd
23 Col:4 Row:2 02.xgd

Madhill processing

Processes: 6
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: All
4 Clip from -5.00 to 5.00 nT
5 De Stagger: Grids: 12.xgd Mode: Outbound By: 2 intervals
6 De Stagger: Grids: 13.xgd Mode: Outbound By: 1 intervals

Lingcroft raw data

Filename: mag-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 15/02/2010
Assembled by: on 15/02/2010
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 1200 x 150
Survey Size (meters): 150 m x 150 m
Grid Size: 30 m x 30 m
X Interval: 0.125 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 6.25
Mean: 0.27
Median: -0.18
Composite Area: 2.25 ha
Surveyed Area: 1.6099 ha

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Source Grids: 21
1 Col:0 Row:1 17.xgd
2 Col:0 Row:2 18.xgd
3 Col:1 Row:0 13.xgd
4 Col:1 Row:1 14.xgd
5 Col:1 Row:2 15.xgd
6 Col:1 Row:3 16.xgd
7 Col:1 Row:4 21.xgd
8 Col:2 Row:0 09.xgd
9 Col:2 Row:1 10.xgd
10 Col:2 Row:2 11.xgd
11 Col:2 Row:3 12.xgd
12 Col:2 Row:4 20.xgd
13 Col:3 Row:0 05.xgd
14 Col:3 Row:1 06.xgd
15 Col:3 Row:2 07.xgd
16 Col:3 Row:3 08.xgd
17 Col:3 Row:4 19.xgd
18 Col:4 Row:0 01.xgd
19 Col:4 Row:1 02.xgd
20 Col:4 Row:2 03.xgd
21 Col:4 Row:3 04.xgd

Lingcroft processing

Processes: 3
1 Base Layer
2 DeStripe Median Traverse: Grids: All
3 Clip from -15.00 to 15.00 nT

Old Lodge Farm raw data

Filename: mag-raw.xcp
Description:
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 17/02/2010
Assembled by: on 17/02/2010
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 960 x 150
Survey Size (meters): 120 m x 150 m
Grid Size: 30 m x 30 m
X Interval: 0.125 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 4.42
Mean: 0.92
Median: 0.64
Composite Area: 1.8 ha
Surveyed Area: 0.94373 ha

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Source Grids: 14
1 Col:0 Row:1 12.xgd
2 Col:0 Row:2 13.xgd
3 Col:0 Row:3 14.xgd
4 Col:1 Row:0 07.xgd
5 Col:1 Row:1 08.xgd
6 Col:1 Row:2 09.xgd
7 Col:1 Row:3 10.xgd
8 Col:1 Row:4 11.xgd
9 Col:2 Row:0 03.xgd
10 Col:2 Row:1 04.xgd
11 Col:2 Row:2 05.xgd
12 Col:2 Row:3 06.xgd
13 Col:3 Row:0 01.xgd
14 Col:3 Row:1 02.xgd

Old Lodge Farm processing

Processes: 5
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 Clip from -15.00 to 15.00 nT
4 DeStripe Median Traverse: Grids: All
5 Clip from -5.00 to 5.00 nT

Twenty Seven Acres raw data

Filename: mag-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 02/03/2010
Assembled by: on 02/03/2010
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 960 x 150
Survey Size (meters): 120 m x 150 m
Grid Size: 30 m x 30 m
X Interval: 0.125 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 5.21
Mean: 0.63
Median: 0.04
Composite Area: 1.8 ha
Surveyed Area: 1.62 ha

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Source Grids: 18
1 Col:0 Row:0 13.xgd
2 Col:0 Row:1 14.xgd
3 Col:0 Row:2 15.xgd
4 Col:0 Row:3 16.xgd
5 Col:1 Row:0 09.xgd
6 Col:1 Row:1 10.xgd
7 Col:1 Row:2 11.xgd
8 Col:1 Row:3 12.xgd
9 Col:1 Row:4 18.xgd
10 Col:2 Row:0 05.xgd
11 Col:2 Row:1 06.xgd
12 Col:2 Row:2 07.xgd
13 Col:2 Row:3 08.xgd
14 Col:2 Row:4 17.xgd
15 Col:3 Row:0 01.xgd
16 Col:3 Row:1 02.xgd
17 Col:3 Row:2 03.xgd
18 Col:3 Row:3 04.xgd

Twenty Seven Acres processing

Processes: 4
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: All
4 Clip from -5.00 to 5.00 nT

Appendix D – digital archive

Archaeological Surveys Ltd hold the primary digital archive at Castle Combe, Wiltshire (see inside cover for address). 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. Digital data are also made available on CD ROM, see below.

Surveys are reported on in hardcopy (recycled paper) using A4 for text and A3 for plots (all plots are scaled for A3).

Further information on the production of the report and the digital formats involved in its creation are set out below.

This report has been prepared using the following software on a Windows XP platform:

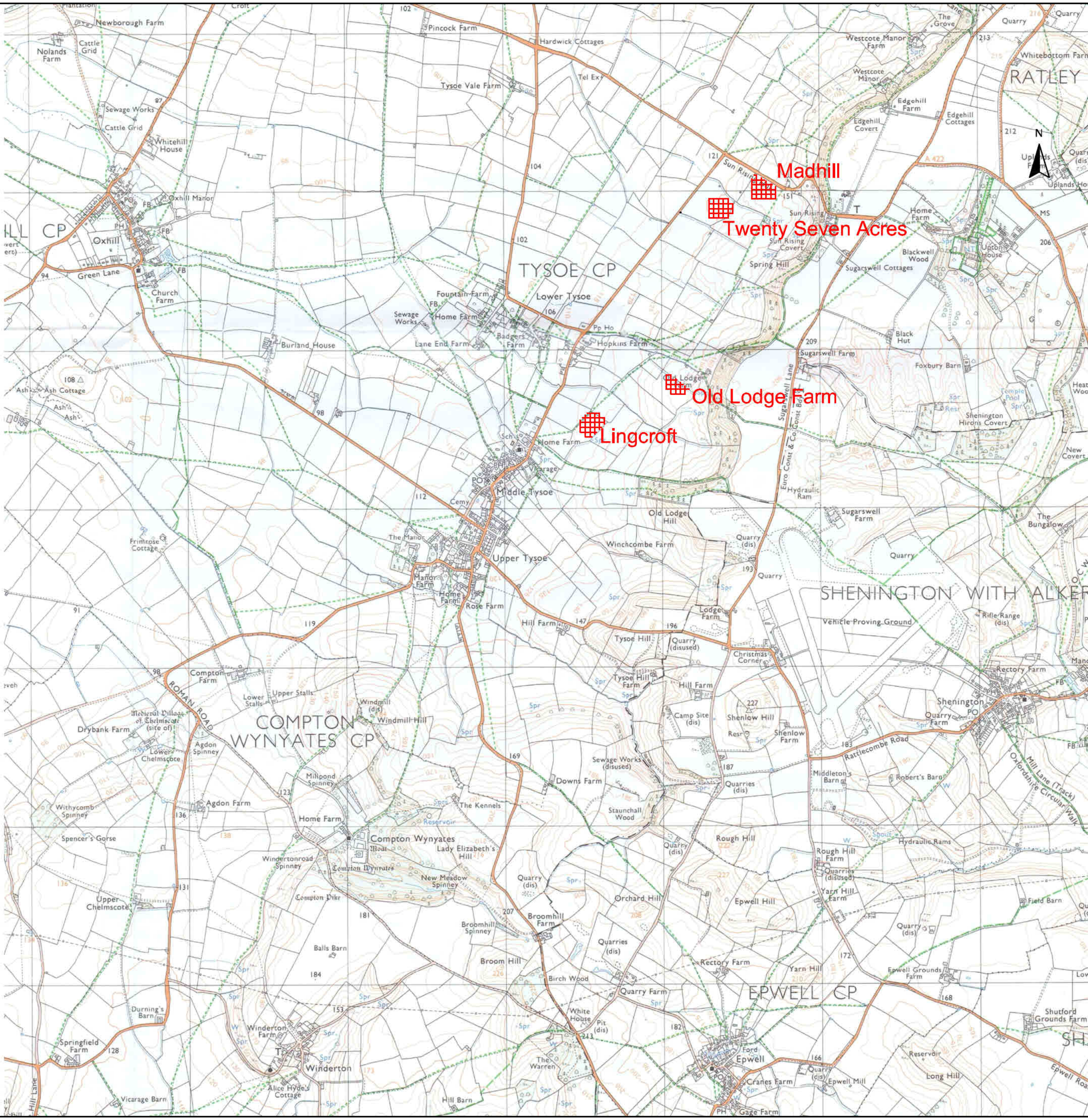
- ArcheoSurveyor version 2.5.2.1 (geophysical data analysis),
- ProgeCAD Professional 2009 (report graphics),
- AutoCAD LT 2007 (report figures),
- OpenOffice.org 3.0.1 Writer (document text),
- PDF Creator version 0.9 (PDF archive).

Digital data available on CD ROM include the following:

- ArcheoSurveyor grid and composite files for all geophysical data,
- CSV files for raw and processed composites,
- geophysical composite file graphics as Bitmap images,
- AutoCAD DWG files in 2000 and 2007 versions,
- report text as OpenOffice.org ODT file,
- report text as Word 2000 doc file,
- report text as rich text format (RTF),
- report text as PDF,
- PDFs of all figures,
- photographic record in JPEG format.

The CD ROM structure is formed from a tree of directories under the title Tysoe – CD. Directory titles include Data, Documentation, CAD, PDFs and Photos. Multiple directories exist under Data and hold Grid, Composite and Graphic files with CSV composite data held in Export.

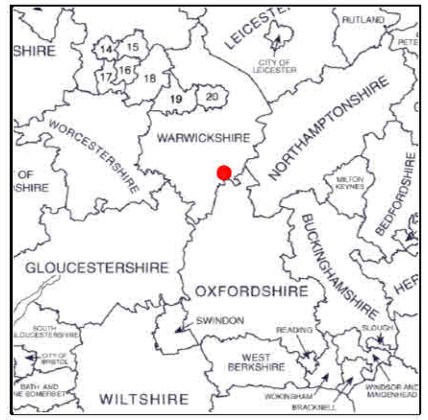
The CAD file contains externally referenced graphics that are rotated with separate A3 size layouts for each figure. Layouts are fixed using frozen layers and named views allowing straightforward plotting or analysis on screen. (Note – CAD files are prepared using AutoCAD's e Transmit function to produce a directory containing the digital drawing along with any externally referenced graphics which may need reloading).



Archaeological Surveys Ltd

Four Romano-British Sites, Tysoe, Warwickshire

Map of survey area



● Survey locations

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

FIG 01

Archaeological Surveys Ltd

Four Romano-British Sites, Tysoe, Warwickshire

Referencing information

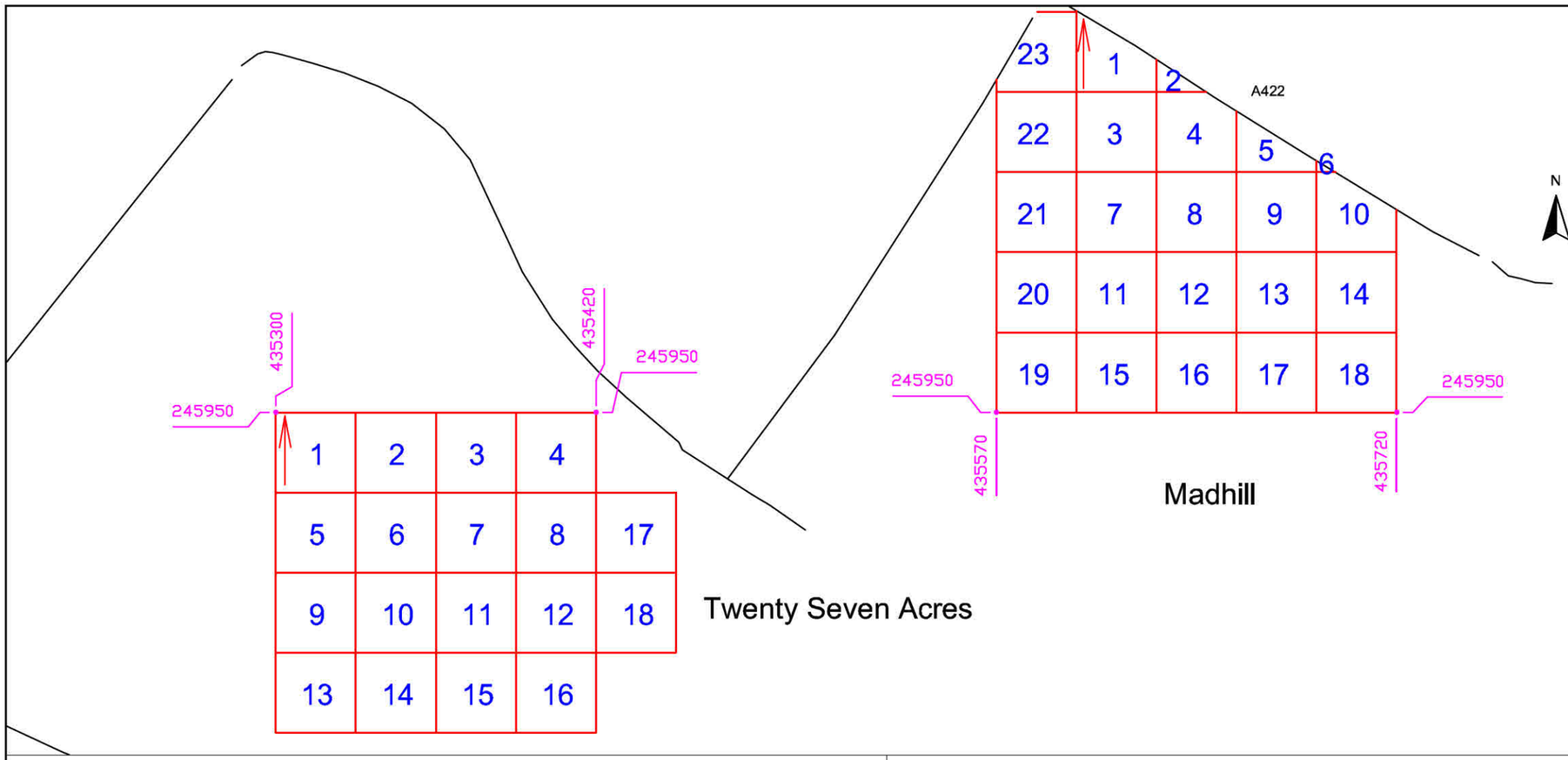
Grid coordinates based on Ordnance Survey OSGB36 datum

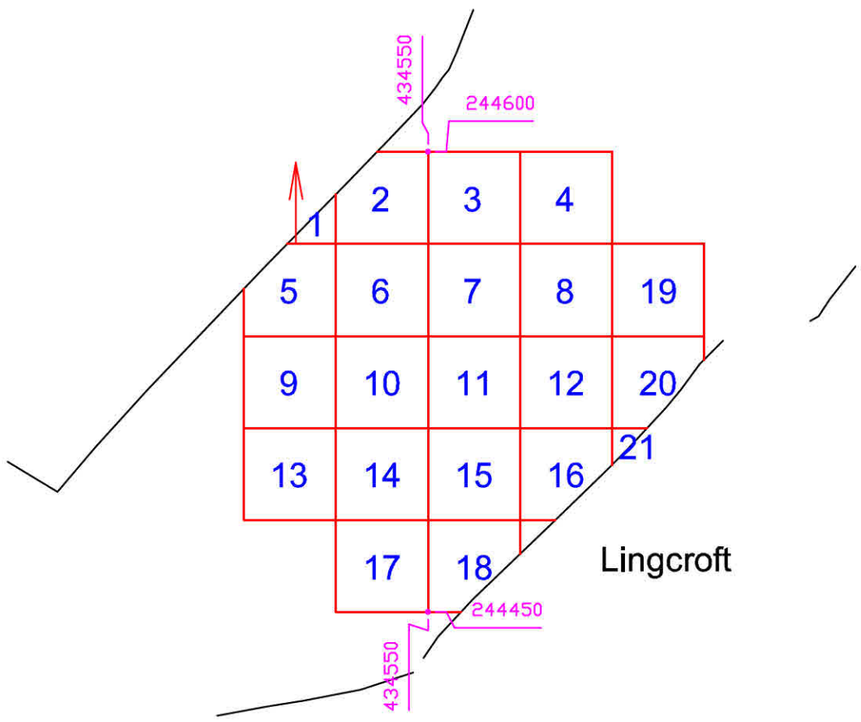
Grids set out using RTK GPS with Topcon TopNet correction data RTCMv2 format

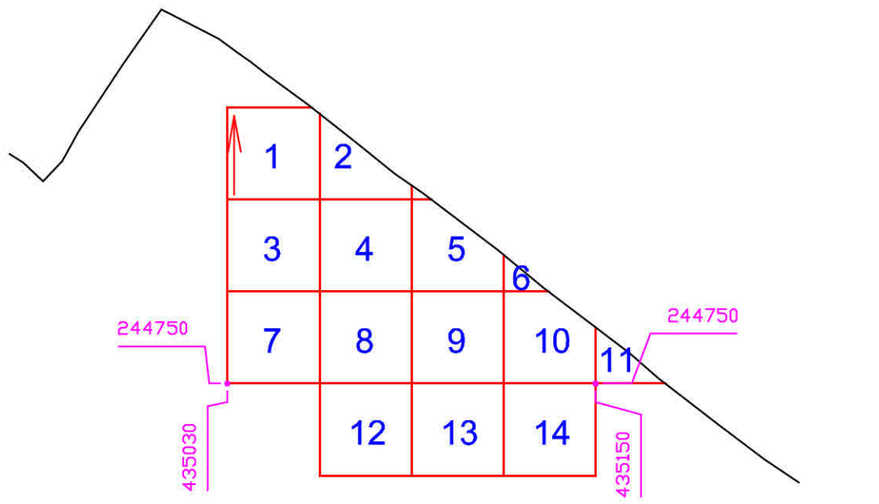
Survey grid size = 30m

Survey start and traverse direction

1 Grid reference number and filename







SCALE 1:2000

0m 20 40 60 80 100m

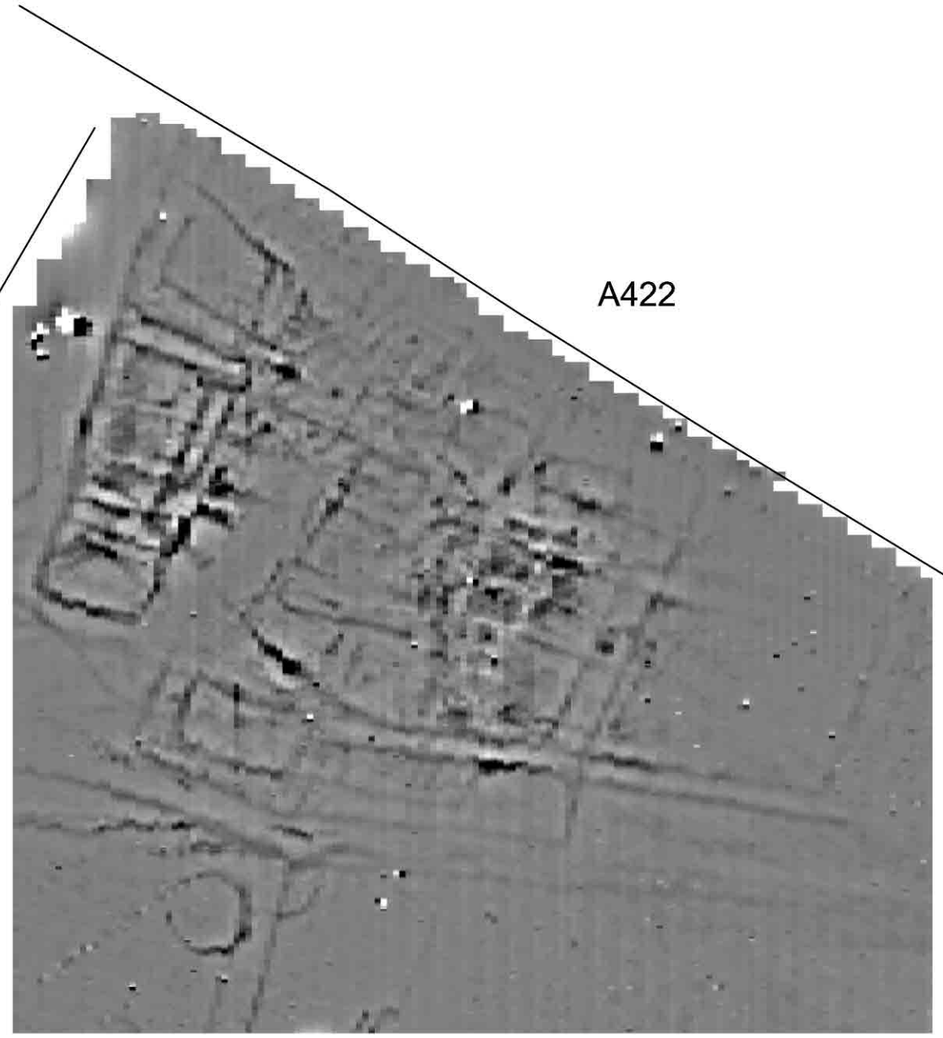
SCALE TRUE AT A3

FIG 02

Archaeological Surveys Ltd

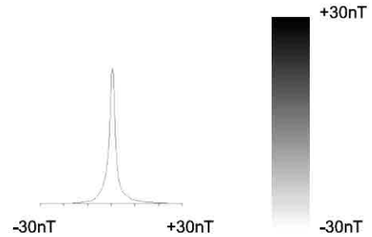
Four Romano-British Sites, Tysoe, Warwickshire

N



Madhill

Greyscale plot of raw magnetometer data - Madhill



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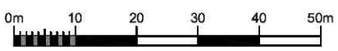


SCALE TRUE AT A3

FIG 03

Archaeological Surveys Ltd

Four Romano-British Sites, Tysoe, Warwickshire

Traceplot of raw magnetometer data - Madhill

+100nT Approx 50nT/ cm vertical displacement.

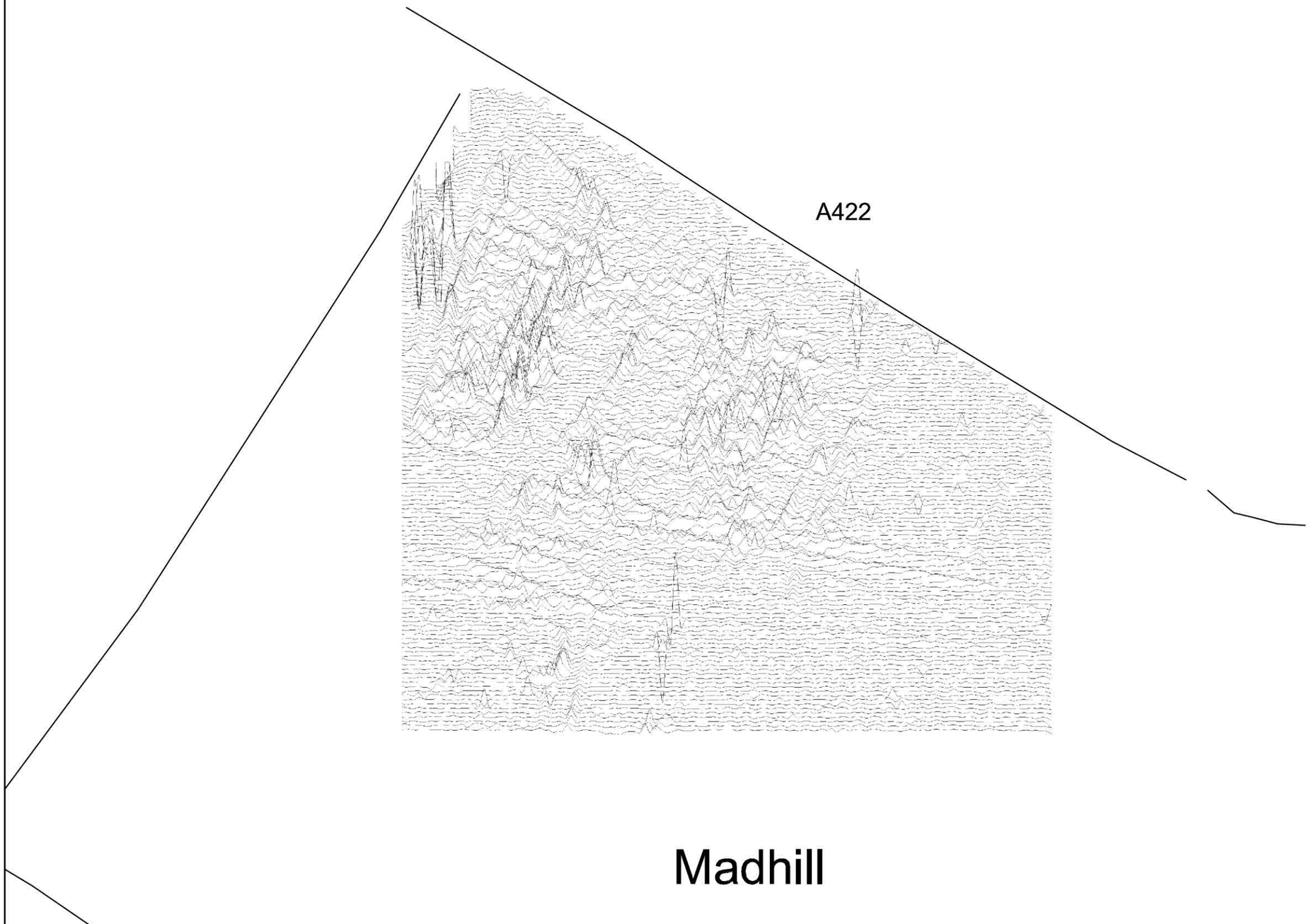
+50nT Data limits ± 100nT.

0nT

-50nT

-100nT

N



Madhill

SCALE 1:1000

0m 10 20 30 40 50m

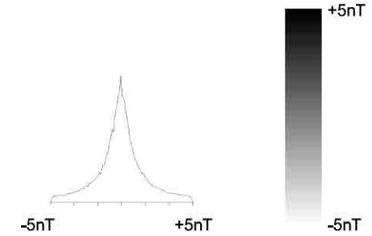
SCALE TRUE AT A3

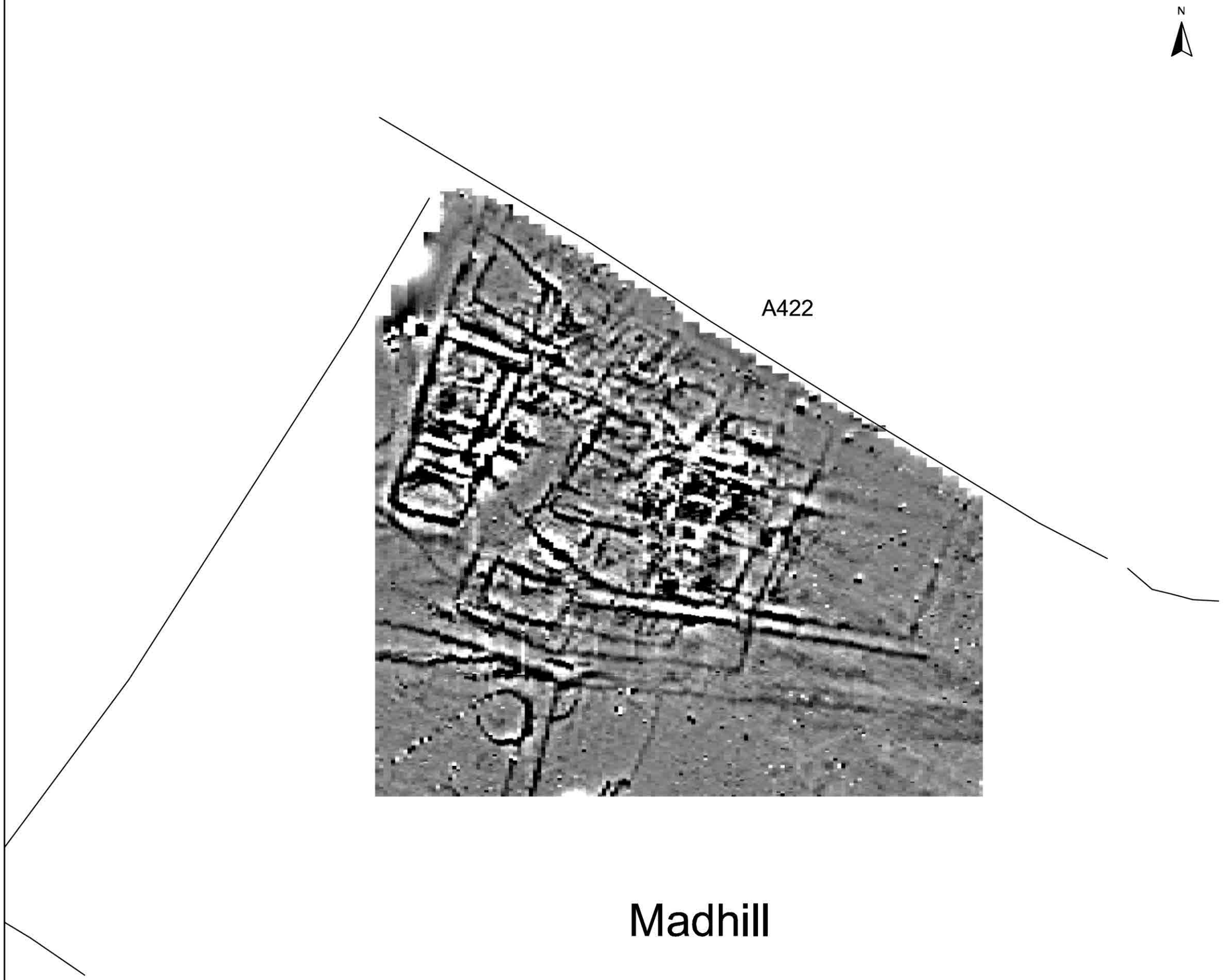
FIG 04

Archaeological Surveys Ltd

Four Romano-British Sites, Tysoe, Warwickshire

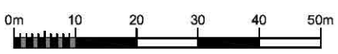
Greyscale plot of processed magnetometer data - Madhill





Madhill

SCALE 1:1000



SCALE TRUE AT A3

FIG 05

Archaeological Surveys Ltd

Four Romano-British Sites, Tysoe, Warwickshire

N

Madhill

Abstraction and interpretation of magnetometer anomalies - Madhill

- Positive linear anomaly - cut feature/ magnetically enhanced material of archaeological origin
- Negative linear anomaly - material with low magnetic susceptibility of archaeological potential
- Positive curvilinear anomaly - ring ditch
- Dipolar anomaly of archaeological potential
- Linear anomaly - of agricultural origin
- Negative linear anomaly - material of low magnetic susceptibility
- Positive area - magnetically enhanced material of archaeological potential
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

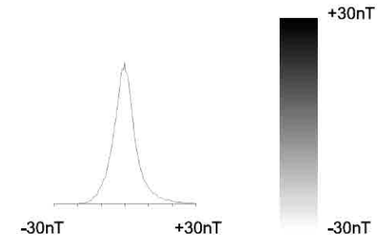
SCALE TRUE AT A3

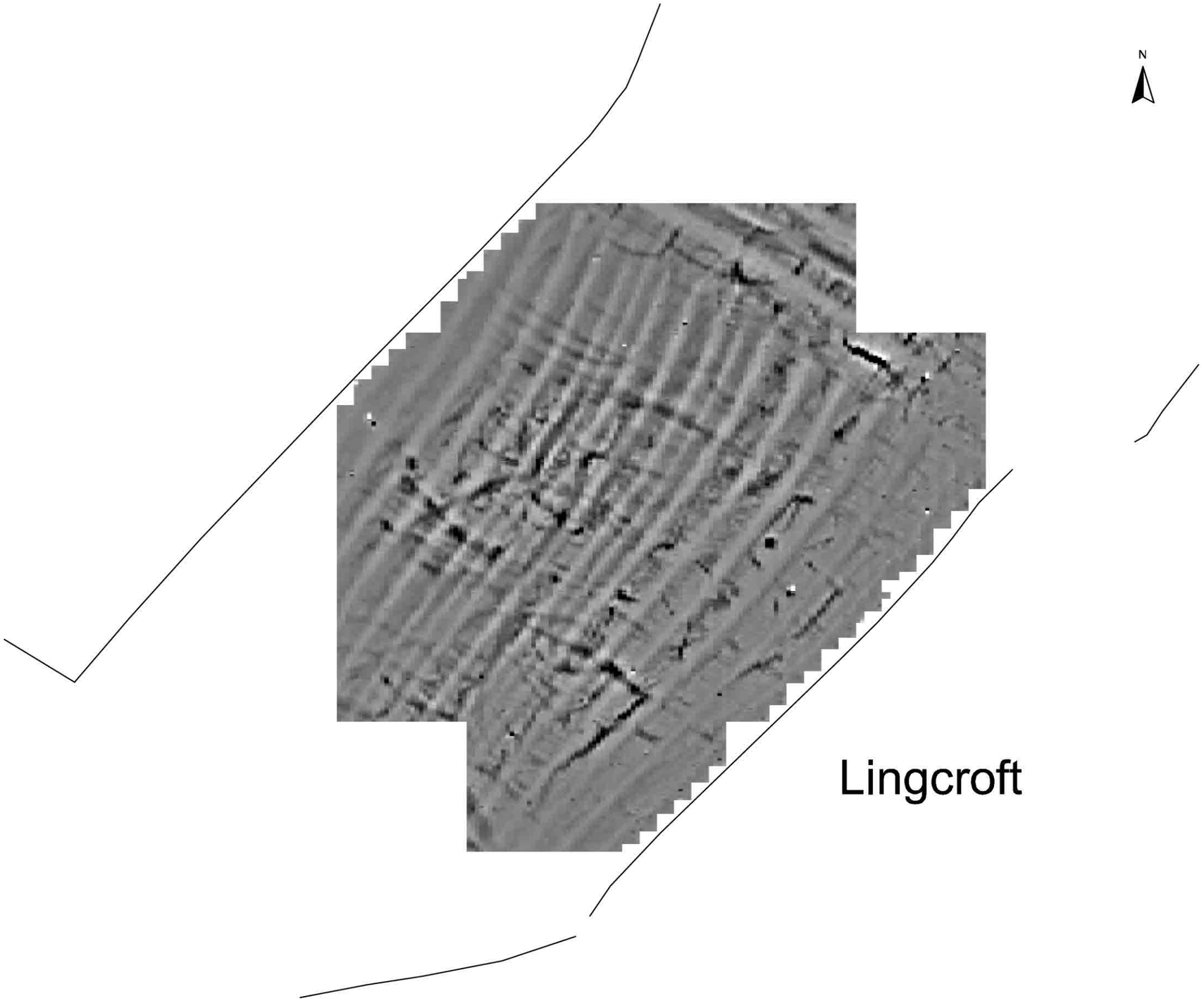
FIG 06

Archaeological Surveys Ltd

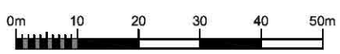
Four Romano-British Sites, Tysoe, Warwickshire

Greyscale plot of raw magnetometer data - Lingcroft





SCALE 1:1000



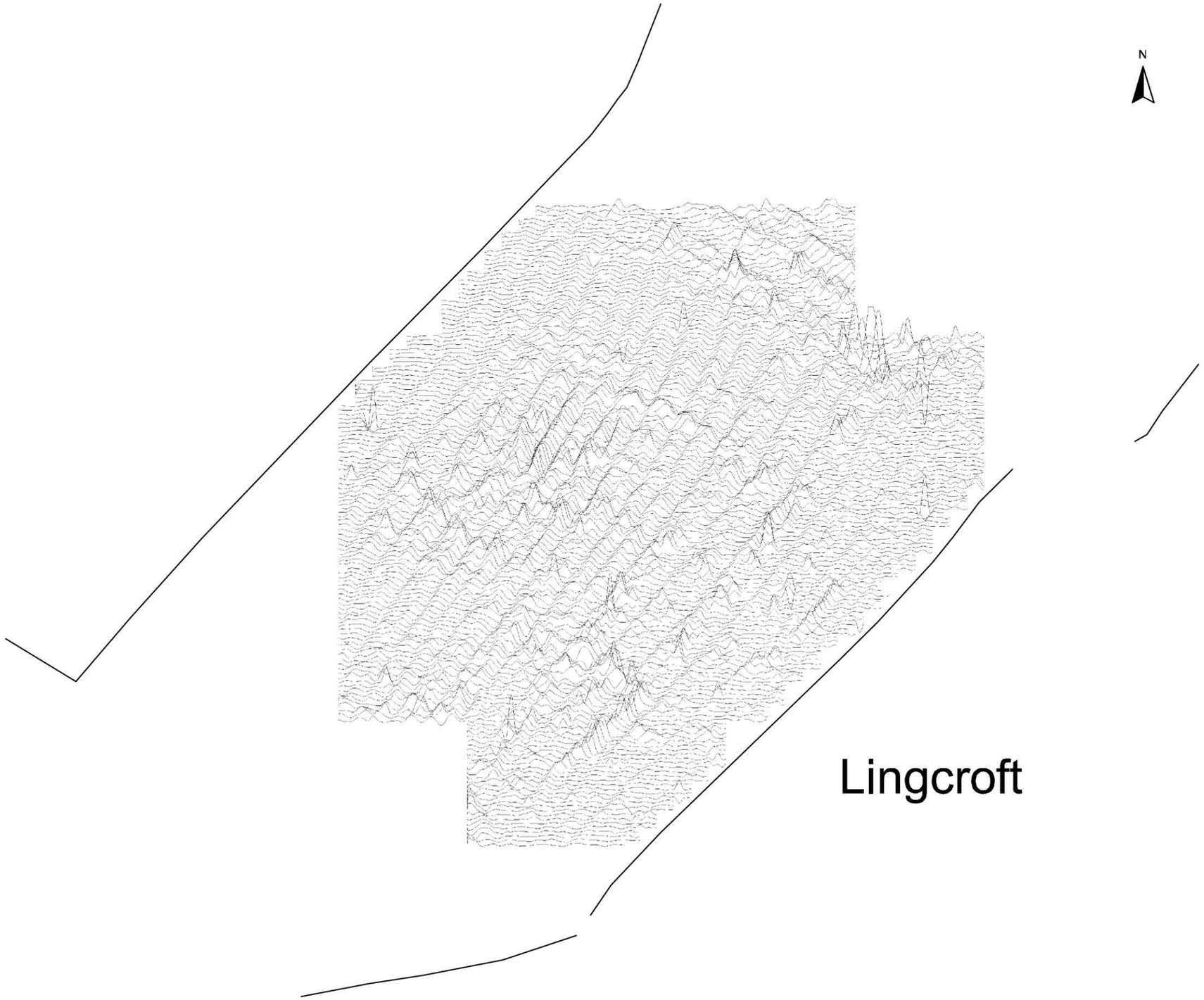
SCALE TRUE AT A3

FIG 07

Archaeological Surveys Ltd

Four Romano-British Sites, Tysoe, Warwickshire

Traceplot of raw magnetometer data - Lingcroft



+40nT
+20nT
0nT
-20nT
-40nT

Approx 20nT/ cm vertical displacement.

Data limits ± 100nT.

SCALE 1:1000

0m 10 20 30 40 50m

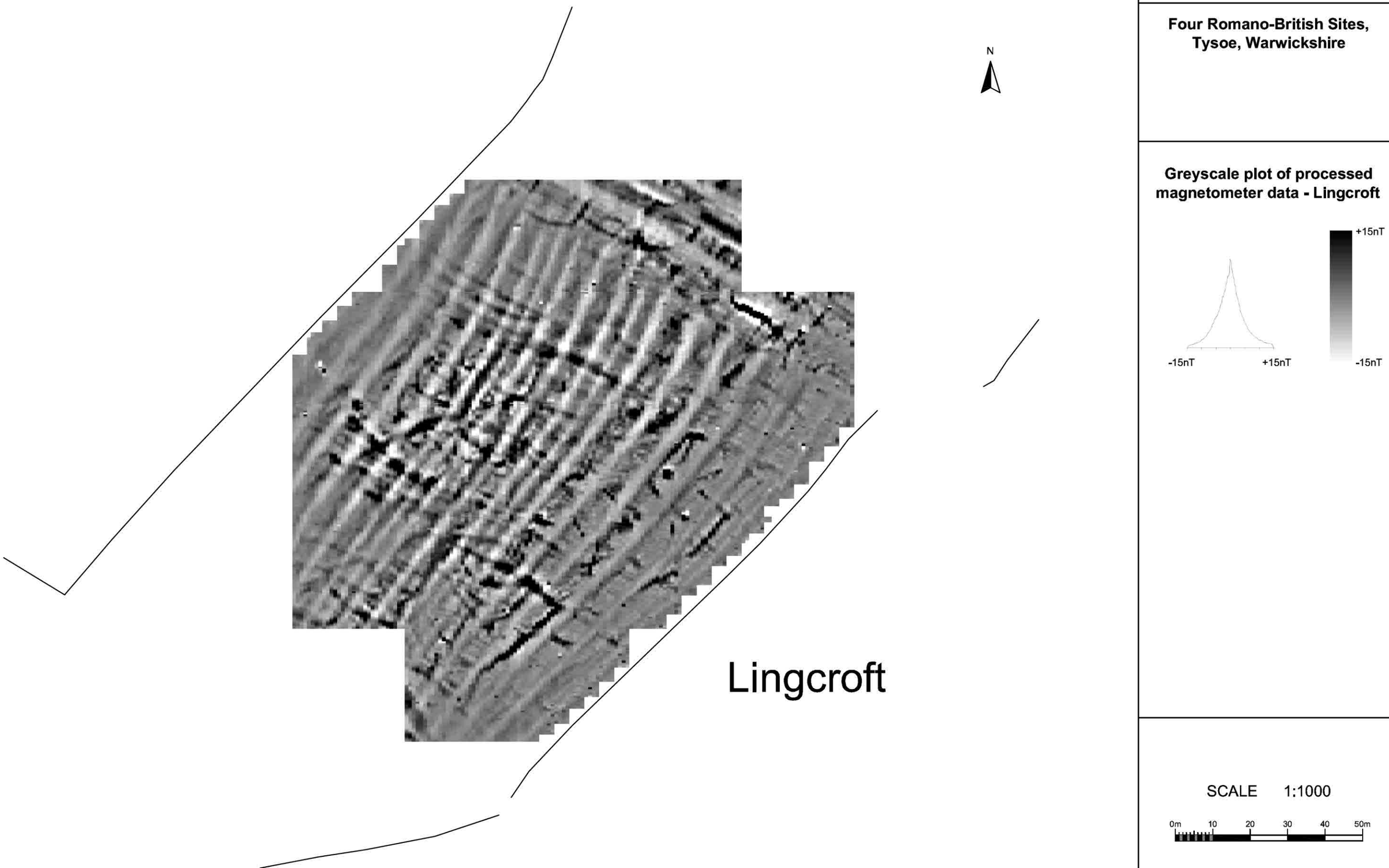
SCALE TRUE AT A3

FIG 08

Archaeological Surveys Ltd

Four Romano-British Sites, Tysoe, Warwickshire

Greyscale plot of processed magnetometer data - Lingcroft



SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

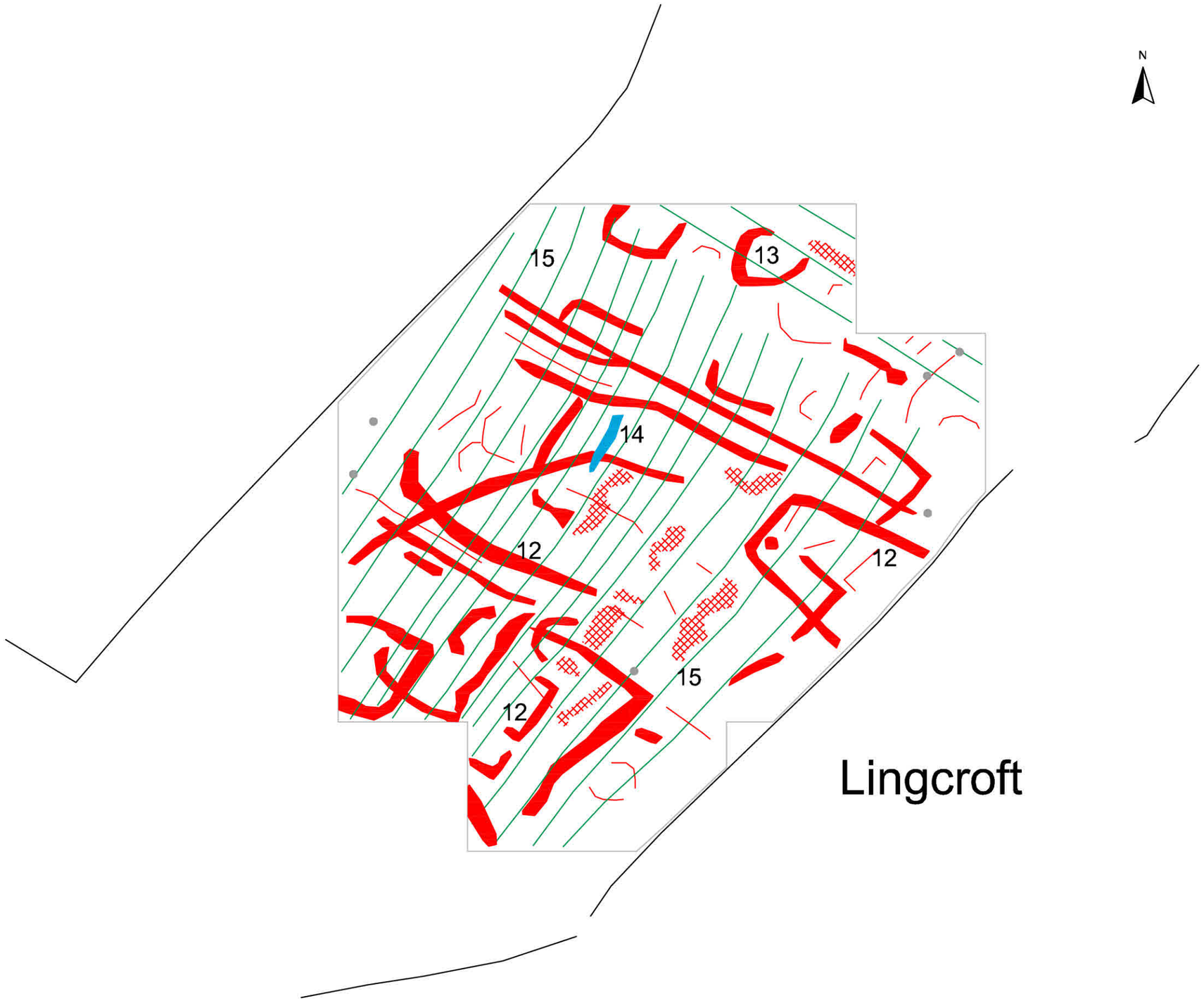
FIG 09

Archaeological Surveys Ltd

Four Romano-British Sites, Tysoe, Warwickshire

Abstraction and interpretation of magnetometer anomalies - Lingcroft

- Positive linear anomaly - cut feature/ magnetically enhanced material of archaeological origin
- Negative linear anomaly - material with low magnetic susceptibility of archaeological potential
- Linear anomaly - ridge and furrow (furrow plotted)
- Discrete positive response - cut feature/ magnetically enhanced material of archaeological origin
- Positive area - magnetically enhanced material of archaeological potential
- Strong dipolar anomaly - ferrous object



SCALE 1:1000

0m 10 20 30 40 50m

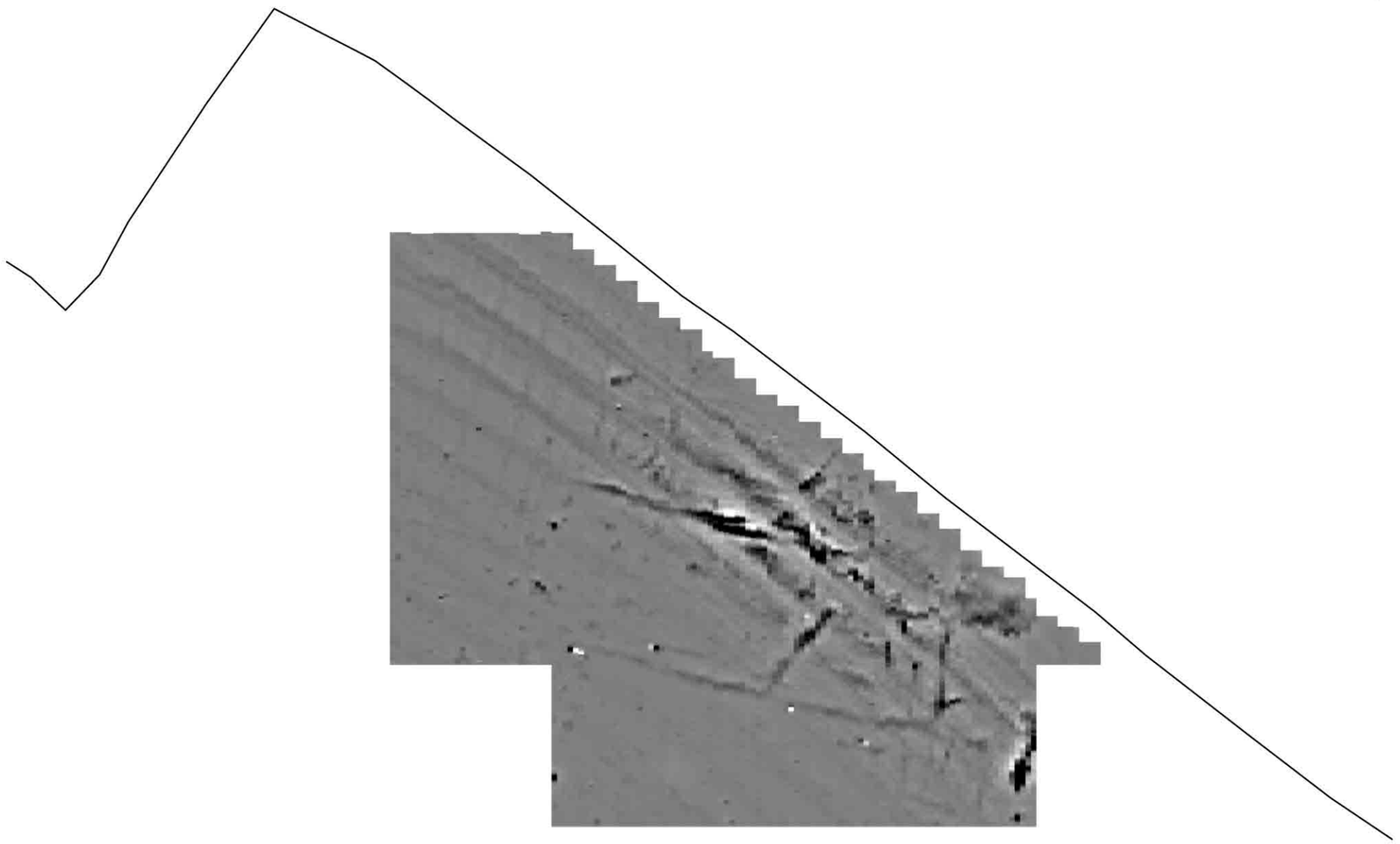
SCALE TRUE AT A3

FIG 10

Archaeological Surveys Ltd

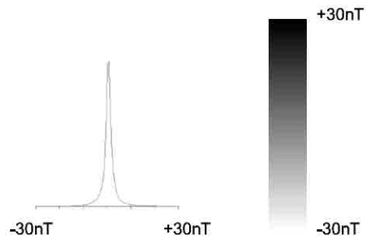
Four Romano-British Sites, Tysoe, Warwickshire

N

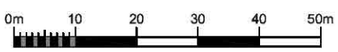


Old Lodge Farm

Greyscale plot of raw magnetometer data - Old Lodge Farm



SCALE 1:1000



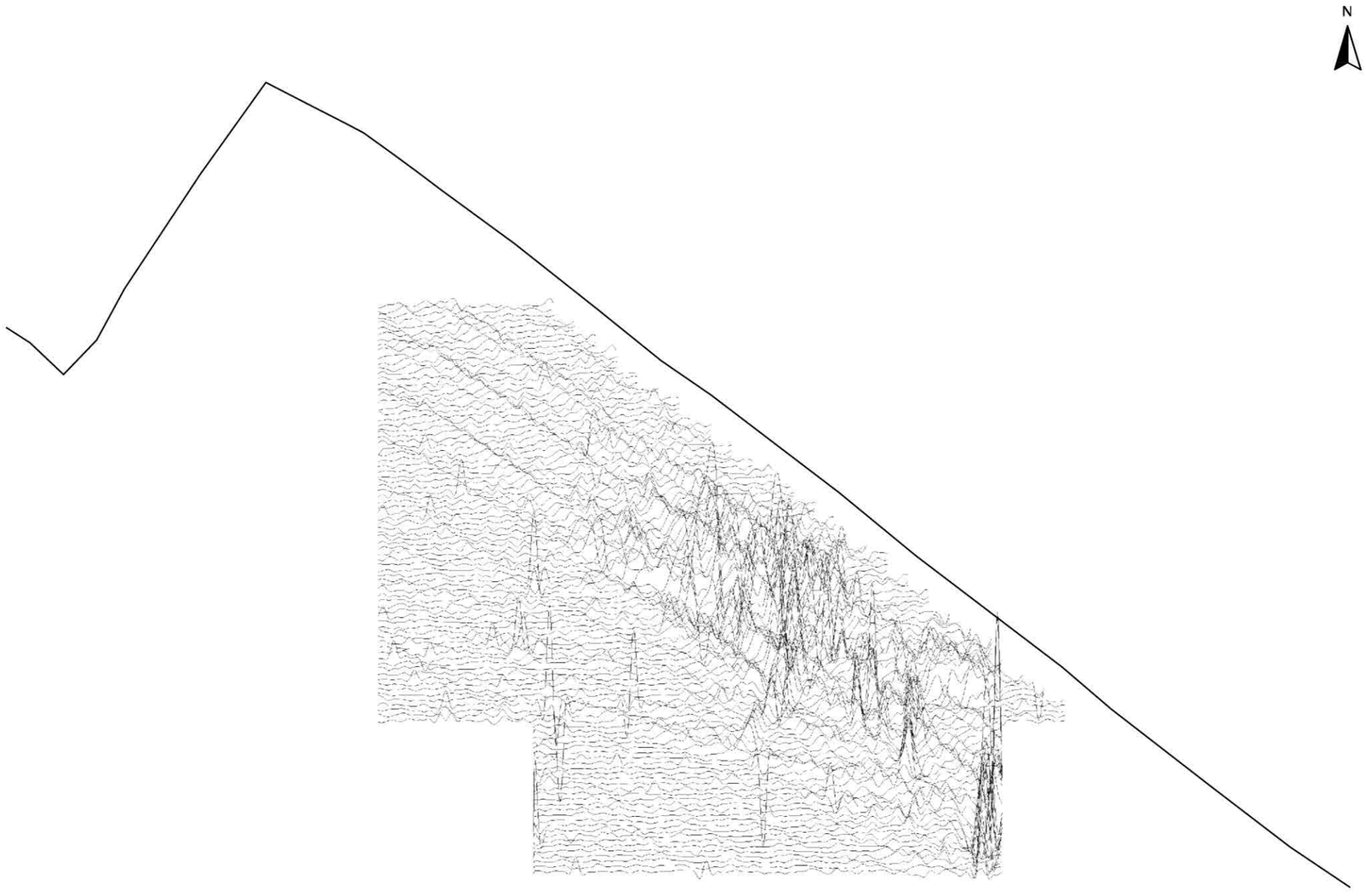
SCALE TRUE AT A3

FIG 11

Archaeological Surveys Ltd

Four Romano-British Sites, Tysoe, Warwickshire

Traceplot of raw magnetometer data - Old Lodge Farm



+60nT
+30nT
0nT
-30nT
-60nT

Approx 30nT/ cm vertical displacement.

Data limits ± 100nT.

SCALE 1:1000

0m 10 20 30 40 50m

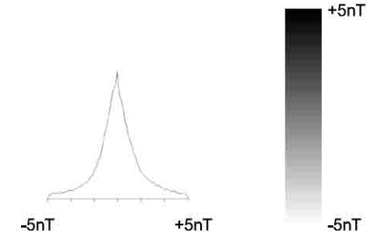
SCALE TRUE AT A3

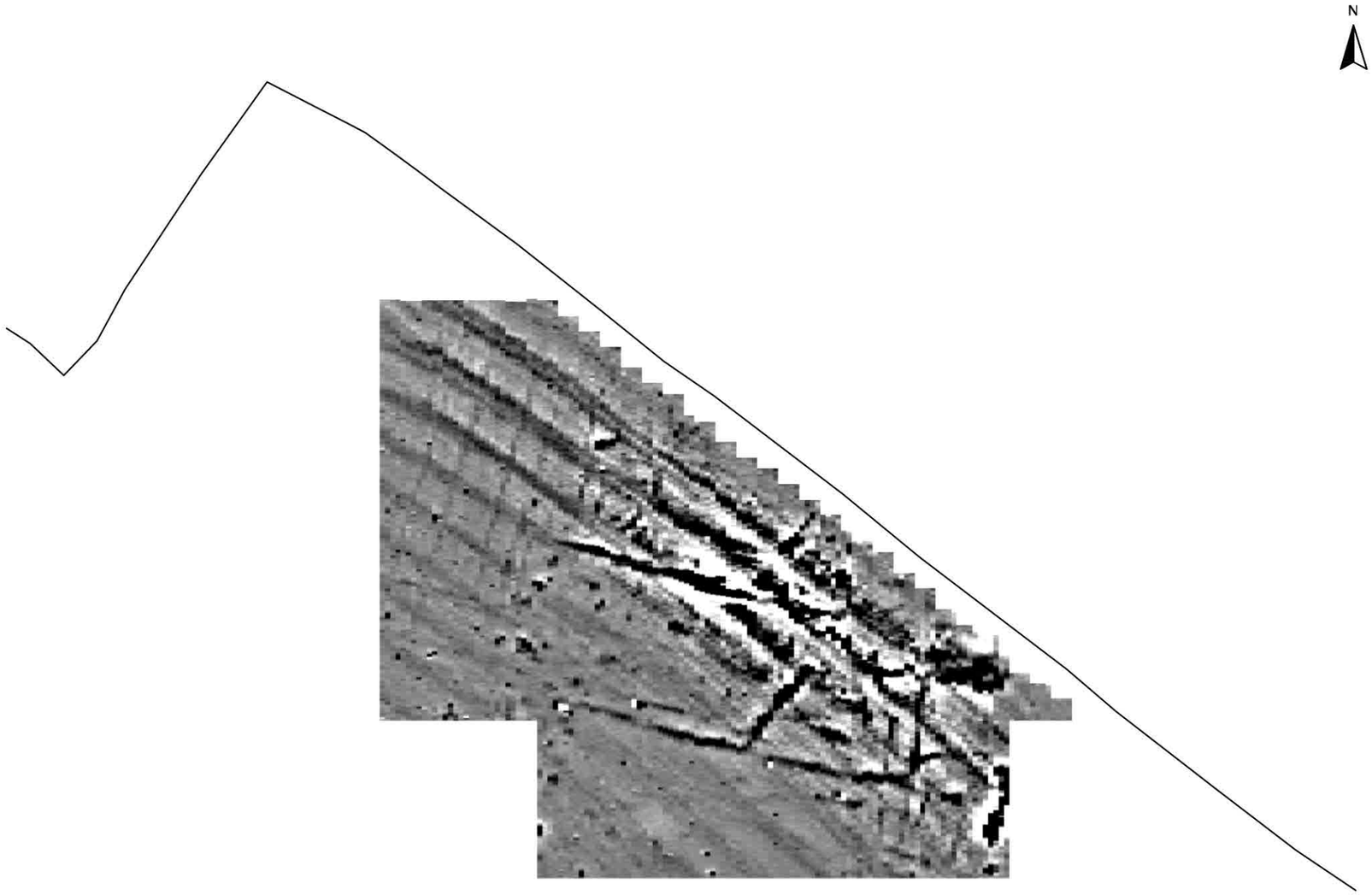
FIG 12

Archaeological Surveys Ltd

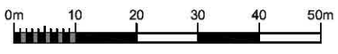
Four Romano-British Sites, Tysoe, Warwickshire

Greyscale plot of processed magnetometer data - Old Lodge Farm





SCALE 1:1000

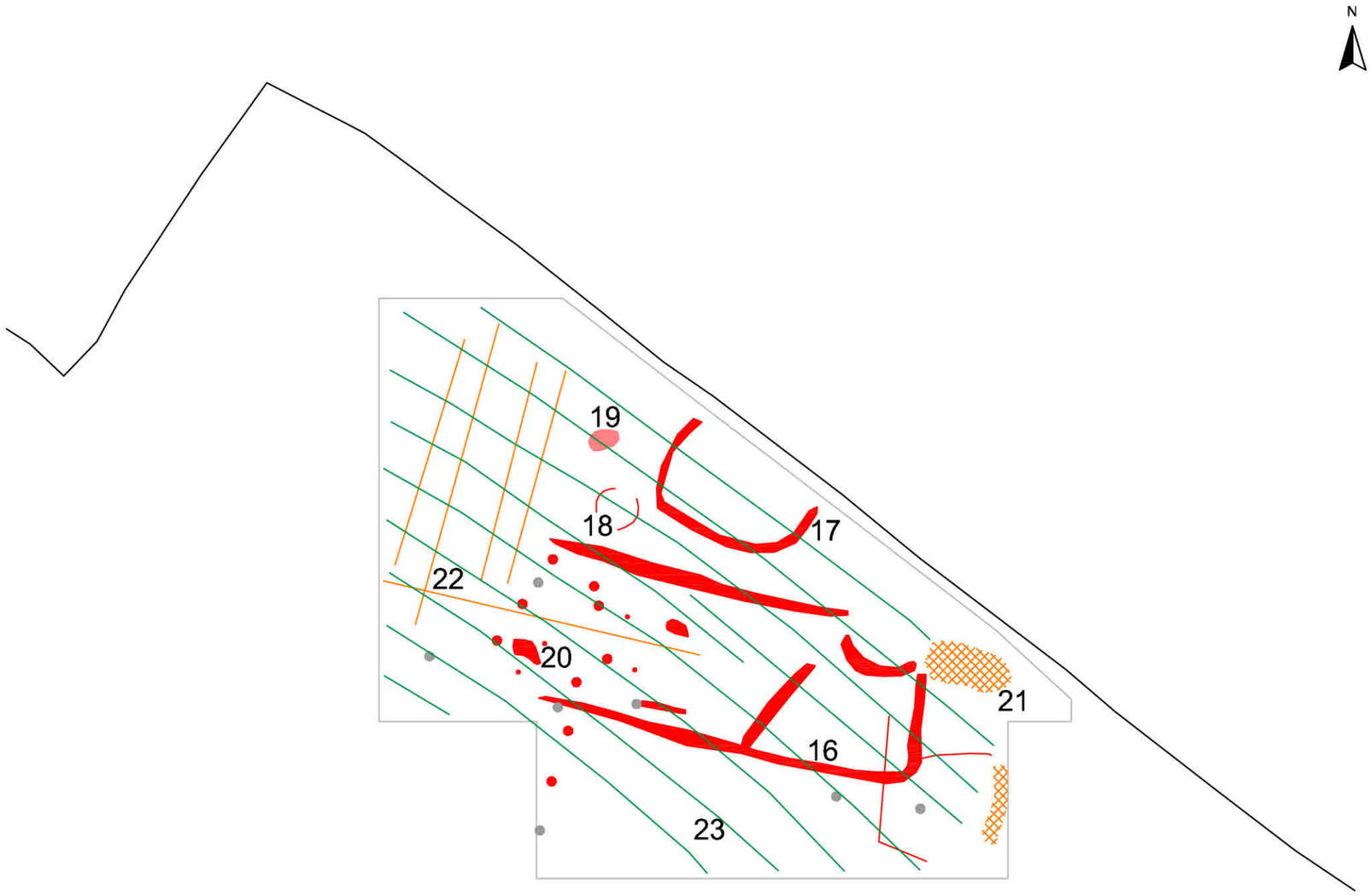


SCALE TRUE AT A3

FIG 13

Archaeological Surveys Ltd

Four Romano-British Sites, Tysoe, Warwickshire



Old Lodge Farm

Abstraction and interpretation of magnetometer anomalies - Old Lodge Farm

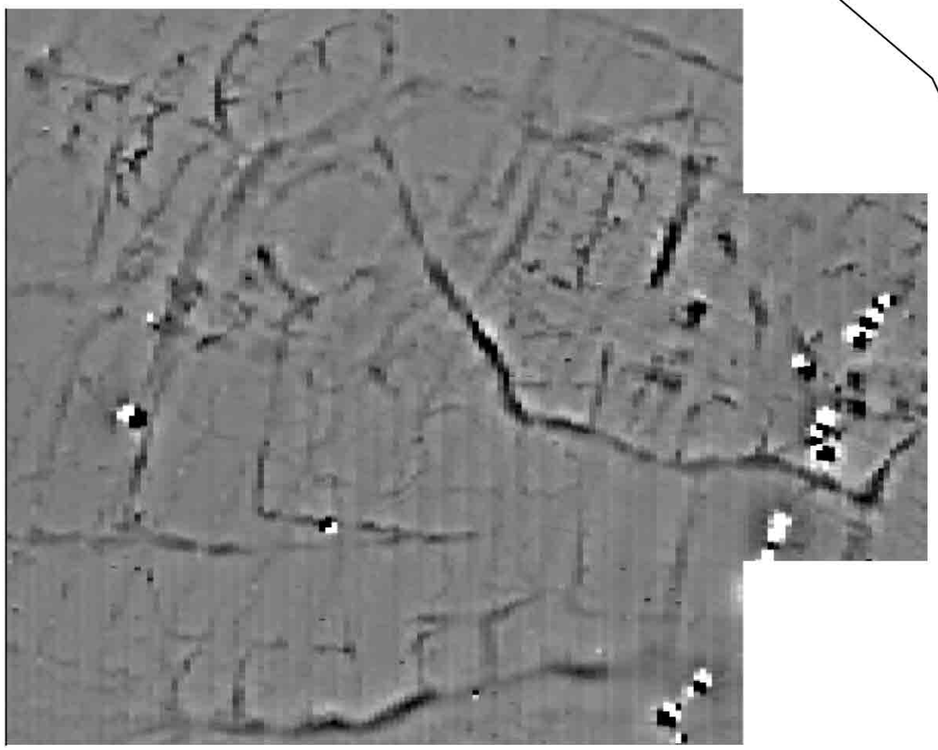
- Positive linear anomaly - cut feature/ magnetically enhanced material of archaeological origin
- Positive linear anomaly of uncertain origin - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Positive linear anomaly - possible land drain
- Discrete positive response - pit-like feature of archaeological potential
- Dipolar anomaly of archaeological potential - possible area of intense burning
- Positive area of uncertain origin
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 14



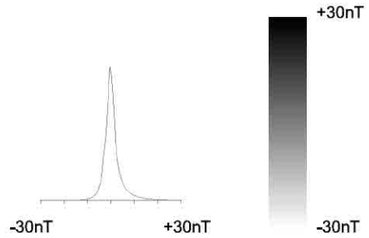
Twenty Seven

N

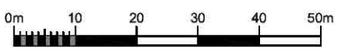
Archaeological Surveys Ltd

Four Romano-British Sites, Tysoe, Warwickshire

Greyscale plot of raw magnetometer data - Twenty Seven Acres



SCALE 1:1000



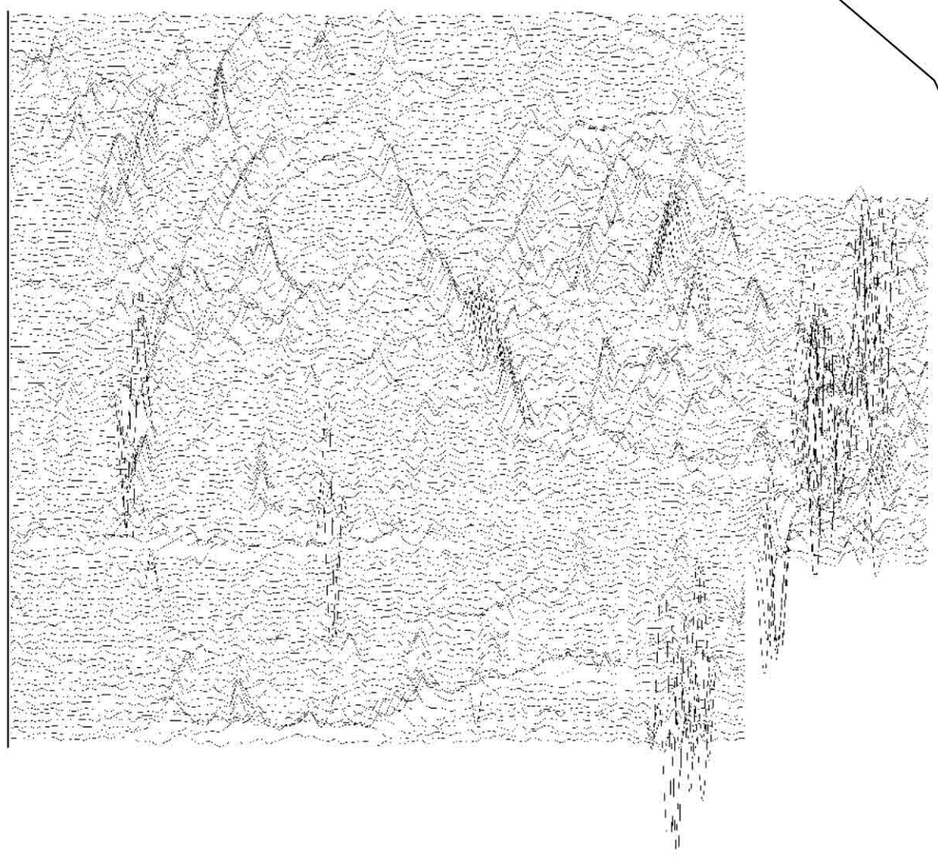
SCALE TRUE AT A3

FIG 15

Archaeological Surveys Ltd

Four Romano-British Sites, Tysoe, Warwickshire

Traceplot of raw magnetometer data - Twenty Seven Acres



Twenty Seven

N

+100nT
+50nT
0nT
-50nT
-100nT

Approx 50nT/ cm vertical displacement.

Data limits ± 100nT.

SCALE 1:1000

0m 10 20 30 40 50m

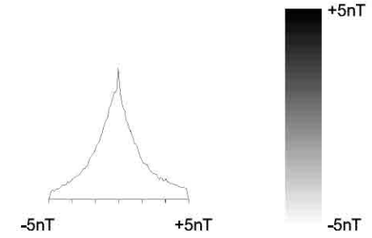
SCALE TRUE AT A3

FIG 16

Archaeological Surveys Ltd

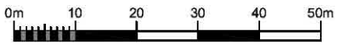
Four Romano-British Sites, Tysoe, Warwickshire

Greyscale plot of processed magnetometer data - Twenty Seven Acres



Twenty Seven

SCALE 1:1000



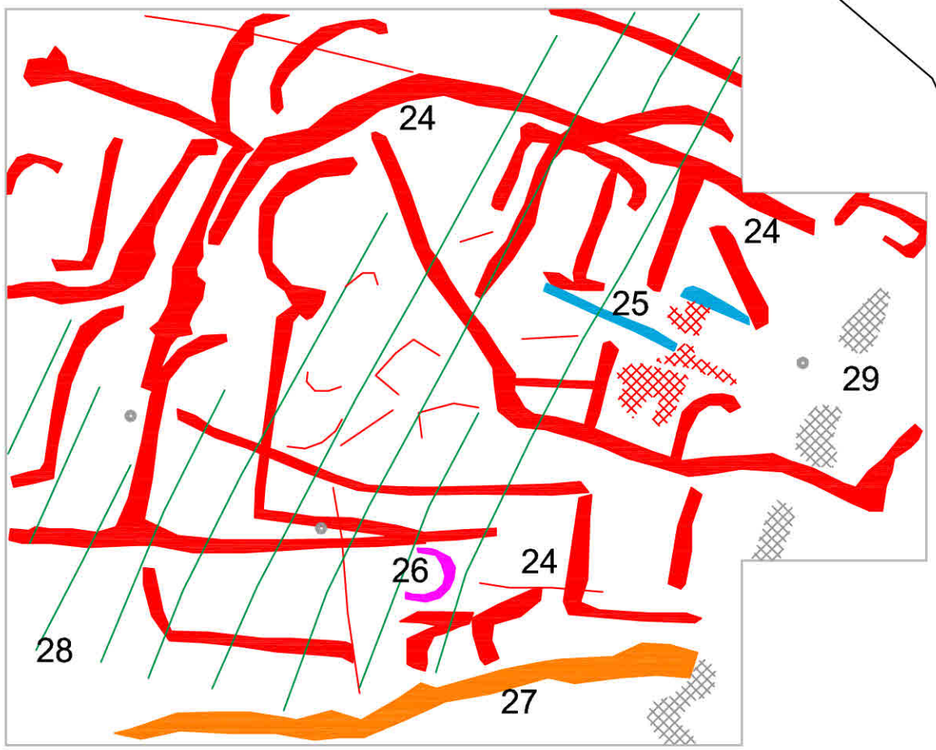
SCALE TRUE AT A3

FIG 17

Archaeological Surveys Ltd

Four Romano-British Sites, Tysoe, Warwickshire

N



Twenty Seven

Abstraction and interpretation of magnetometer anomalies - Twenty Seven Acres

- Positive linear anomaly - cut feature/ magnetically enhanced material of archaeological origin
- Negative linear anomaly - material with low magnetic susceptibility of archaeological potential
- Positive curvilinear anomaly - ring ditch
- Positive linear anomaly of uncertain origin - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Positive area - magnetically enhanced material of archaeological potential
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 18