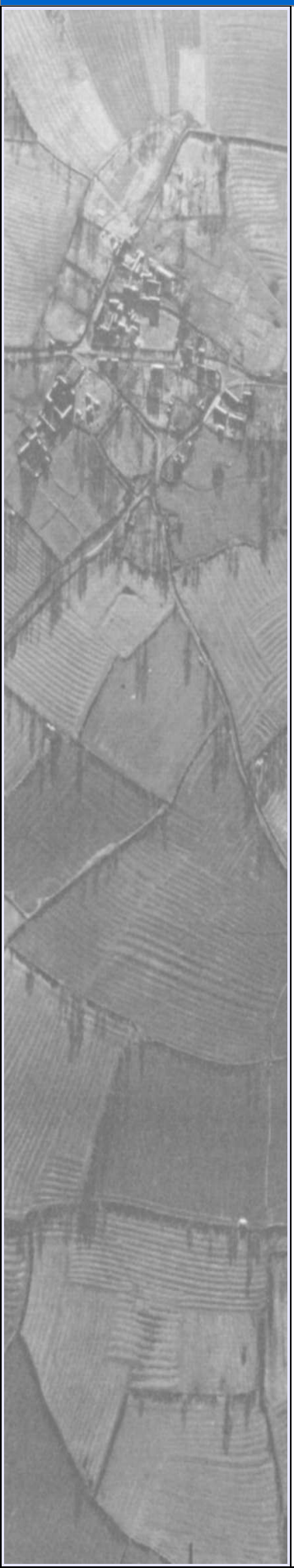

Bristol Airport
Area HH
North Somerset

MAGNETOMETER SURVEY REPORT

for

Cotswold Archaeology

Kerry Donaldson & David Sabin

May 2018

Ref. no. J751

ARCHAEOLOGICAL SURVEYS LTD

Bristol Airport
Area HH
North Somerset

Magnetometer Survey Report

for

Cotswold Archaeology

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

Survey date – 9th May 2018
Ordnance Survey Grid Reference – **ST 50025 64600**

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SUMMARY

A geophysical survey, comprising detailed magnetometry, was undertaken by Archaeological Surveys Ltd at the request of Cotswold Archaeology on land to the south of Bristol Airport ahead of a car park development. The data have revealed a number of widespread natural features within the underlying limestone geology and anomalies that may be related to soil reinstatement after quarrying. There are a number of positive linear, possible rectilinear and discrete anomalies that have a high potential to relate to further similar features; however, they do appear ditch-like and pit-like and an anthropogenic origin is possible.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Cotswold Archaeology to undertake a magnetometer survey of an area of land to the south of Bristol Airport in North Somerset. The site has been outlined for a proposed development of a car park for the airport and the survey forms part of an archaeological assessment.

1.1.2 The geophysical survey was carried out in accordance with a Written Scheme of Investigation (WSI) produced by Archaeological Surveys (2018). The land immediately to the north (Site C) has been previously subject to geophysical survey for an earlier car park scheme (Archaeological Surveys, 2016).

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.

1.2.2 The methodology is considered an efficient and effective approach to archaeological prospection.

1.2.3 Geophysical survey can provide useful information on the archaeological potential of a site; however, the outcome of any survey relies on a number of factors and as a consequence results can vary. The success in meeting the aims and objectives of a survey is, therefore, often impossible to predetermine.

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

1.3.1 The survey and report generally follow the recommendations set out by: English Heritage (2008) *Geophysical survey in archaeological field evaluation;* European Archaeological Council (2015) *Guidelines for the Use of*

Geophysics in Archaeology; Institute for Archaeologists (2002) *The use of Geophysical Techniques in Archaeological Evaluations*. The work has been carried out to the Chartered Institute for Archaeologists (2014) *Standard and Guidance for Archaeological Geophysical Survey.*

1.3.2 Archaeological Surveys Ltd provide a detailed geophysical survey report and it is recommended that where possible the contents should be considered in full. The Summary provides a brief overview of the results with more detail available in the Discussion and/or Conclusion. The *List of anomalies* within the Results provides a detailed assessment of the anomalies within separate categories which can be useful in inferring a level of confidence to the interpretation. Quality and factors influencing the interpretation of anomalies is also set out within the results.

1.3.3 It is recommended that the full report should always be considered when using data and interpretation plots; where this is not possible, in the field for example, the abstraction and interpretation plots should retain their colour coding and be used with a corresponding legend.

1.3.4 Where targeting of anomalies by excavation is to be carried out, care should be taken to place trenches over solid lines or features visible on the abstraction and interpretation plots. Archaeological Surveys abstraction and interpretation avoids the use of dashed or dotted lines; broken or fragmented anomalies may well correspond closely with subsurface truncation.

1.4 Site location, description and survey conditions

1.4.1 The site is located to the south of Bristol Airport on pasture land at Goblin Combe Farm within the parish of Wrington, North Somerset. It is centred on Ordnance Survey National Grid Reference (OS NGR) ST 50025 64600, see Figs 01 and 02.

1.4.2 The geophysical survey covers approximately 4ha of pasture mainly within a single field but also including a very small paddock at the south western corner. Several areas of rocks and scrub are situated within the site and these were unsurveyable. The land is known to have been subject to quarrying in the past, with topsoil reinstated.

1.4.3 The survey area generally slopes down gently towards the south although the eastern edge of the site drops more steeply due to a small combe further to the east beyond the boundary. Within the small paddock, forming the south western part of the site, the land is generally flat but was heavily poached and partly waterlogged at the time of survey. At the eastern end of the paddock is a pond surrounded by a stone wall.

Plate 1: Survey area looking south west

1.4.4 The ground conditions across the site were variable with scrubby vegetation and rocks preventing survey in some areas. Poor conditions due to poaching and waterlogging also prevented survey within the western part of the small paddock. Survey was also avoided in the vicinity of steel cattle feeders near the north western corner of the area. Weather conditions during the survey were fine.

1.5 Site history and archaeological potential

1.5.1 The site does not contain any designated or undesignated heritage assets. A previous geophysical survey on land immediately to the north located a number of positive linear and rectilinear anomalies (Archaeological Surveys, 2016). Subsequent evaluation revealed a ditch containing quantities of Roman pottery in this area (Cotswold Archaeology, 2016). The other geophysical anomalies proved to relate to natural joints and cracks within the underlying shallow geology. Approximately 125m south of the survey area is a Neolithic chambered long barrow (long barrow 350m south-west of Cornerpool Farm, scheduled monument no. 11008291/22819).

1.6 Geology and soils

1.6.1 The underlying geology is from the Black Rock Limestone Subgroup (Carboniferous limestone) with a small zone of Triassic mudstone and limestone from the Westbury Formation and Cotham Member across the south western corner of the main survey area (BGS, 2017).

1.6.2 During the course of the survey numerous large rocks were visible on and

within the ground surface. Personal communication with the farmer indicated that much of the site had been subject to quarrying associated with previous development of the airfield, although the precise area was uncertain. After the quarrying topsoil was replaced but this had become heavily contaminated with rock which in the following years had slowly been removed to improve the quality of the pasture.

1.6.3 The overlying soil across the site is from the Nordrach association and is a typical paleo-argillic brown earth. It consists of a well drained, fine, silty over clayey soil (Soil Survey of England and Wales, 1983).

1.6.4 Magnetometry carried out over similar geology and soil has produced good results; however, it can be difficult to distinguish the fill of anthropogenically cut features to those relating to the underlying geology. The properties and structure of the soil is likely have been altered by the previous quarrying and reinstatement operations and, as a consequence, anomalies of recent origin may be present.

2 METHODOLOGY

2.1 Technical synopsis

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

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

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

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

2.2 Equipment configuration, data collection and survey detail

2.2.1 The detailed magnetic survey was carried out using a SENSYS MAGNETO®MXPDA 5 channel cart-based system. The instrument has 5 fluxgate gradiometers (FGM650) spaced 0.5m apart with readings recorded at 20 Hz. The cart is pushed at walking speed and not towed. Each sensor is not zeroed in the field as the vertical axis alignment is precisely fixed leaving sensor offsets that are removed during data processing. The fixing of the vertical alignment ensures the sensors are not unduly influenced by localised magnetic fields and that the vertical component of a magnetic anomaly is measured. The gradiometers have a range of recording data between ±0.1nT and ±10,000nT. They are linked to a Leica GS10 RTK GPS with data recorded by SENSYS MAGNETO®MXPDA software on a rugged PDA computer system.

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

2.2.3 Data are collected along a series of parallel survey transects to achieve 100% coverage of the surveyable land. The length of each transect is variable and relates to the size of the survey area and other factors including ground conditions. A visual display allows accurate placing of transects and helps maintain the correct separation between adjacent traverses. Data are not collected within fixed grids and data points are considered to be random even though the data are collected in a systematic manner covering all accessible areas (Aspinall, Gaffney and Schmidt, 2009).

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

2.3 Data processing and presentation

2.3.1 Magnetic data collected by the MAGNETO®MXPDA cart-based system are initially prepared using SENSYS MAGNETO®DLMGPS software. The software effectively allocates a geographic position for each data point and can compensate for fixed offsets present within the FGM650 sensors. The offsets are positive or negative values present on all fluxgate gradiometer sensors. Some systems use manual or electronic balancing to effectively zero the sensors; however, this is a short term measure that is prone to drift

through temperature changes and vibration and can easily be incorrectly set due to localised magnetic fields. The FGM650 sensors are very accurately aligned to the vertical magnetic gradient and are highly stable showing negligible drift on long traverses. The offset values are removed using TerraSurveyor software.

2.3.2 Survey tracks are analysed and georeferenced raw data (UTM Z30N) are then exported in ASCII format for further analysis and display within TerraSurveyor. The removal of offset values (compensation) of the sensors is also carried out in TerraSurveyor using a zero median traverse function. Data are then considered to be minimally processed. Note: without the zero median traverse function it is not possible to create a meaningful data plot as all sensors have a different offset value. Although a zero median traverse algorithm can remove anomalies aligned with the survey tracks, in practice this rarely occurs due to the use of long traverses, high resolution measurement and variability within the magnetic susceptibility of long linear features.

2.3.3 The minimally processed data are collected between limits of ±10000nT and clipped for display at ±5nT and at ±3nT. Data are interpolated to a resolution of effectively 0.5m between tracks and 0.15m along each survey track.

2.3.4 Appendix C contains metadata concerning the survey and data attributes and is derived directly from TerraSurveyor. Reference should be made to Appendix B for further information on processing.

2.3.5 A TIF file is produced by TerraSurveyor software along with an associated world file (.TFW) that allows automatic georeferencing (OSGB36 datum) when using GIS or CAD software. The main form of data display used in the report is the minimally processed greyscale plot. With regard to the Sensys MXPDA, minimally processed data are considered by the manufacturer to be data that are compensated by SENSYS MAGNETO DLMGPS software, see 2.3.1 and 2.3.2. Note: traceplots are not considered to be appropriate as they do not provide an accurate or useful assessment of the magnetic anomalies due to the very high density of data collection.

2.3.6 The raster images are combined with base mapping using ProgeCAD Professional 2016, creating DWG (2010) file formats. All images are externally referenced to the CAD drawing in order to maintain good graphical quality. The CAD plots are effectively georeferenced facilitating relocation of features using GPS, resection method, etc.

2.3.7 An abstraction and interpretation is drawn and plotted for all geophysical anomalies located by the survey. Anomalies are abstracted using colour coded points, lines and polygons. All plots are scaled to landscape A3 for paper printing. Appendix E sets out CAD layer names with colour and graphic content for each interpretation category, see 3.3.

2.3.8 A brief summary of each anomaly, with an appropriate reference number, is set out in list form within the results (Section 3) to allow a rapid and objective

assessment of features within the survey area.

2.3.9 The abstraction and interpretation procedure has been supported by analysis of a digital terrain model and/or contour plot derived from GNSS height data automatically logged during the survey. The GNSS heights are converted from the ETRS89 ellipsoid using the National Geoid Model OSGM02 to obtain ODN (Ordnance Datum Newlyn) + the GNSS antenna height (approximately 1.5M).

2.3.10 A digital archive is produced with this report, see Appendix D below. The main archive is held at the offices of Archaeological Surveys Ltd.

3 RESULTS

3.1 General assessment of survey results

3.1.1 The detailed magnetic survey was carried out over a total of approximately 4ha.

3.1.2 Magnetic anomalies located can be generally classified as positive anomalies of an uncertain origin, anomalies associated with ground disturbance, areas of magnetic debris and disturbance and strong discrete dipolar anomalies relating to ferrous objects. Anomalies have been numbered and are described in 3.4 below.

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

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

3.2.2 Useful contrast between the magnetic susceptibility of the soil and underlying geology appears to exist across the site. However, due to the nature and extent of previous quarrying and reinstatement, abstraction and interpretation is problematic. Anomalies may relate to naturally formed features within the shallow solid geology or anthropogenically formed features associated with differences in the make-up of the reinstated soil. The precise extent and depth of previous quarrying is unclear and has implications for the the potential survival of archaeological features, should they exist within the site.

3.2.3 Data are positioned using RTK GNSS giving a high degree of precision to the location of anomalies. At least one linear anomaly crosses from the previously surveyed area to the north, where data were also collected with RTK GNSS, demonstrating continuity within the ground conditions and confidence in the accuracy of positioning.

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, see Table 1.

Interpretation category	Description and origin of anomalies
Anomalies with an uncertain origin	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. Morphology may be unclear or uncharacteristic and there may be a lack of additional supporting information. Positive anomalies are indicative of magnetically enhanced soils that may form the fill of 'cut' features or may be produced by accumulation within layers or 'earthwork' features; soils subject to burning may also produce positive anomalies. Negative anomalies are produced by material of comparatively low magnetic susceptibility such as stone and subsoil.
Anomalies associated with magnetic debris	Magnetic debris often appears as areas containing many small dipolar anomalies that may range from weak to very strong in magnitude. They often occur where there has been dumping or ground make-up and are related to magnetically 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, hearths and nail spreads from former wooden structures or rooves 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	The magnetic response is often strong and dipolar indicative of ferrous material and may be associated with extant above surface features such as wire fencing, cables, pylons etc.. Often a significant area around these features has a strong magnetic flux which may create magnetic disturbance; such disturbance can effectively obscure low magnitude anomalies if they are present. Fluxgate sensors may respond erratically adjacent to strong magnetic sources. Buried services may produce characteristic multiple dipolar anomalies dependant upon their construction.
Anomalies with a natural origin	Naturally formed magnetic anomalies are caused by localised variability in the magnetic susceptibility of soils, subsoils and other drift or solid geologies. Anomalies may be amorphous, linear or curvilinear and may appear 'fluvial' or discrete; and at times can be almost impossible to distinguished from pit-like anomalies with an anthropogenic origin. Fluvial, glacial and periglacial processes may be responsible for their formation within drift material and subsoil, with soil filled joint and cracks within limestone formations often appearing ditch-like and pit-like in form.
Anomalies associated with ground disturbance	Magnetically variable anomalies which may be negative indicating a response to geology/drift deposits and/or positive indicating an increased depth of topsoil. Very strongly magnetic anomalies are a response to highly magnetic material of modern origin which can be used to infill a quarry depression.

Table 1: List and description of interpretation categories

3.4 List of anomalies

Area centred on OS NGR 350025 164600, see Figs 03 – 06.

Anomalies with an uncertain origin

(1 & 2) - Two positive linear anomalies may relate to natural features within the underlying limestone geology; however, they could form a rectilinear feature. Rectilinear anomalies were located 240m to the north west during the previous survey with some evidence for them relating to Roman ditches and so an archaeological origin should be considered.

(3) – A positive linear anomaly extends southwards from an area of scrub and rocks towards the southern edge of the survey area. Again, this could be a natural feature, although it appears ditch-like.

(4) - Positive discrete and linear anomalies could relate to soil filled natural features.

(5) - The survey area contains a number of isolated discrete positive responses. Although they appear pit-like, they may well relate to natural features.

Anomalies associated with ground disturbance

(6) - A zone of magnetically variable response relates to a patch that contain widespread rocks on the surface. The field has been subject to quarrying and this may relate to redeposited material.

Anomalies with a natural origin

(7) – A positive linear anomaly extends south eastwards from the previous survey area and relates to a natural feature. At the time of the previous survey it was not clear if the long, parallel linear anomalies related to natural cracks within the underlying geology, or if they had an association with agricultural activity or land drainage. The previous evaluation to the north revealed that they related to natural joints and cracks within the limestone.

(8) - In the eastern part of the survey area are a number of positive discrete and linear anomalies. Again, previously it was not clear if similar responses to the north related to cut features or an increased depth of topsoil within natural features. The evaluation revealed that they were natural features.

(9) - Positive responses with no coherent morphology can be seen in the western part of the survey area. They are likely to relate to further natural features.

Anomalies associated with magnetic debris

(10) - Patches of magnetic debris relate to ferrous and other magnetically thermoremnant material and are likely to be of modern origin.

(11) - The entire survey area contains evidence for ferrous objects within the topsoil.

4 CONCLUSION

4.1.1 The detailed magnetometer survey located a number of positive linear and discrete anomalies that were similar to, and with one a direct continuation of, the natural features previously located within the survey area to the north. The majority of the anomalies probably relate to naturally formed, soil filled, joints, cracks and pits within the underlying limestone geology and to differences in the reinstated topsoil overlying quarried areas. However, there are a small number of positive linear anomalies and a possible rectilinear anomaly that appear ditch-like in form and several discrete positive responses that may indicate pit-like features. The likelihood of these also relating to natural features is high; however, fragmented rectilinear anomalies and a ditch containing Romano-British material were previously located approximately 200m to the north west and so further archaeological features are possible.

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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 magnetic field. The difference between the two sensors will relate to the strength of the magnetic field created by the buried feature.

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

Appendix B – data processing notes

Clipping

Minimum and maximum values are set and replace data outside of the range with those values. Extreme values are removed improving colour or greyscale contrast associated with data values that may be archaeologically significant. It has been found that clipping data to ranges between ±5nT and ±3nT often improves the appearance of features associated with archaeology. Different ranges are applied to data in order to determine the most suitable for anomaly abstraction and display.

Zero (destripe) Median/Mean Traverse

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

High Pass Filtering

A mathematical process used to remove low frequency anomalies relating to survey tracks, modern agricultural features and other large magnetic bodies within or adjacent to survey areas.

Low Pass Filtering

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

Appendix C – survey and data information

Filename: J751-mag.-proc-3nT.xcp
Description: Imported as Composite from: J751-mag.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 349859.3111, 164713.686 m
Southeast corner: 350163.961, 164495.136 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702
Source GPS Points: 1280900
Dimensions
Composite Size (readings): 2031 x 1457
Survey Size (meters): 305 m x 219 m
Grid Size: 305 m x 219 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.14
Mean: 0.01
4 Clip from -5.00 to 5.00 nT

Median: 0.01
Composite Area: 6.6581 ha
Surveyed Area: 3.9702 ha
PROGRAM
Name: TerraSurveyor
Version: 3.0.23.0
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -5.00 to 5.00 nT
5 Clip from -3.00 to 3.00 nT

Filename: J751-mag-proc.xcp
Stats
Max: 5.53
Min: -5.50
Std Dev: 1.44
Mean: 0.01
Median: 0.01
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:

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 PDF copy will be supplied to the North Somerset Historic Environment Record with printed copies on request. The report will also be uploaded to the Online AccesS to the Index of archaeological investigationS (OASIS). A summary will be placed in the Somerset Archaeology section of the *Proceedings of the Somerset Archaeological and Natural History Society.*

Archive contents:

File type	Naming scheme	Description
Data	J751-mag-**[area number/name]**.asc J751-mag-**[area number/name]**.xcp J751-mag-**[area number/name]**-proc.xcp	Raw data as ASCII CSV TerraSurveyor raw data TerraSurveyor minimally processed data
Graphics	J751-mag-**[area number/name]**-proc.tif	Image in TIF format
Drawing	J751-**[version number]**.dwg	CAD file in 2010 dwg format
Report	J751 report.odt	Report text in Open Office odt format

Table 2: Archive metadata

Appendix E – CAD layers for abstraction and interpretation plots

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

Report sub-heading and associated CAD layer names	Colour with RGB index		Layer content
Anomalies with an uncertain origin			
AS-ABST MAG POS LINEAR UNCERTAIN		255,127,0	Line, polyline or polygon (solid)
AS-ABST MAG POS DISCRETE UNCERTAIN		255,127,0	Solid donut, point or polygon (solid)
Anomalies associated with magnetic debris			
AS-ABST MAG DEBRIS		132, 132, 132	Polygon (cross hatched ANSI37)
AS-ABST MAG STRONG DIPOLAR		132, 132, 132	Solid donut, point or polygon (solid)
Anomalies with a modern origin			
AS-ABST MAG DISTURBANCE		132, 132, 132	Polygon (hatched ANSI31)
Anomalies with a natural origin			
AS-ABST MAG NATURAL FEATURES		Yellow 255,255,0	Polygon (cross hatched ANSI37)
Anomalies associated with ground disturbance/quarrying			
AS-ABST MAG QUARRYING/ GROUND DISTURBANCE		255,255, 127 or 255,223,127	Polygon (net)

Table 3: CAD layering

Appendix F – copyright and intellectual property

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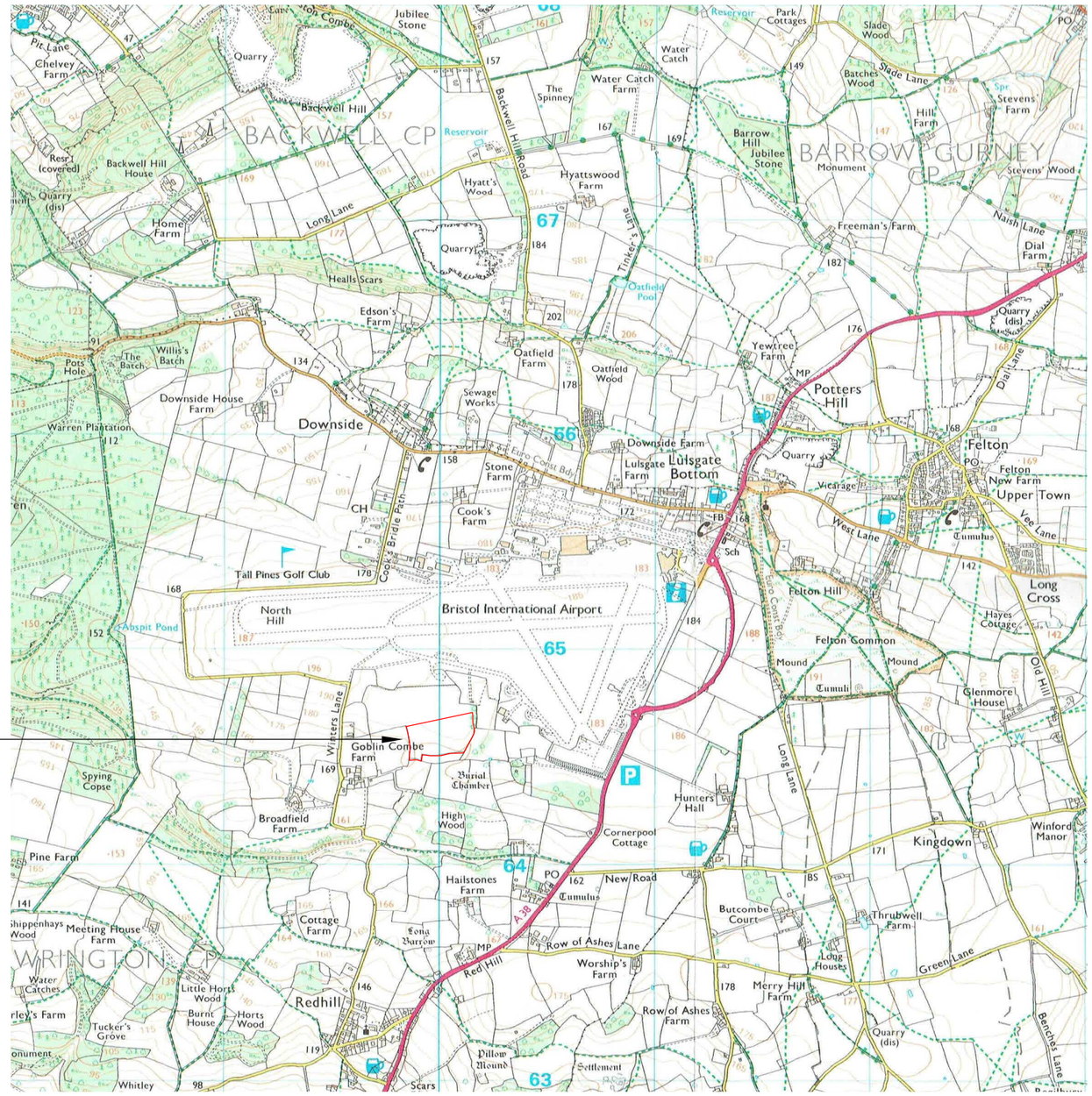
Survey location



N

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Map of survey area

● Survey location

Site centred on OS NGR
ST 50025 64600

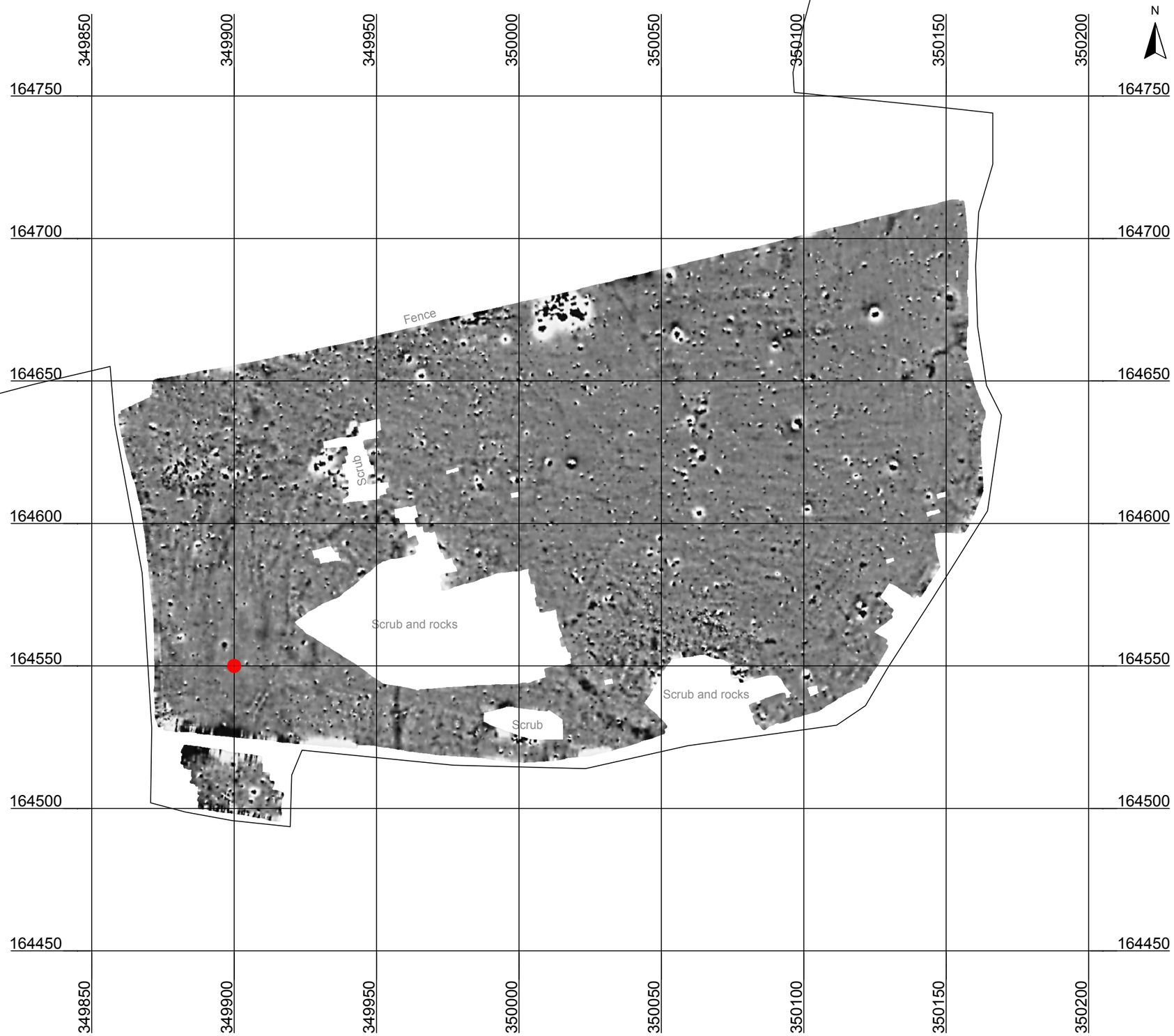
SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

FIG 01

Site C previously surveyed 2016



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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

● 349900 164550

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 02

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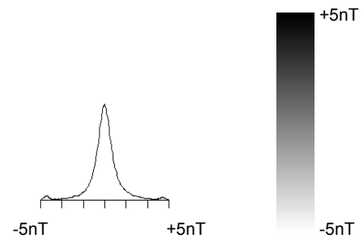
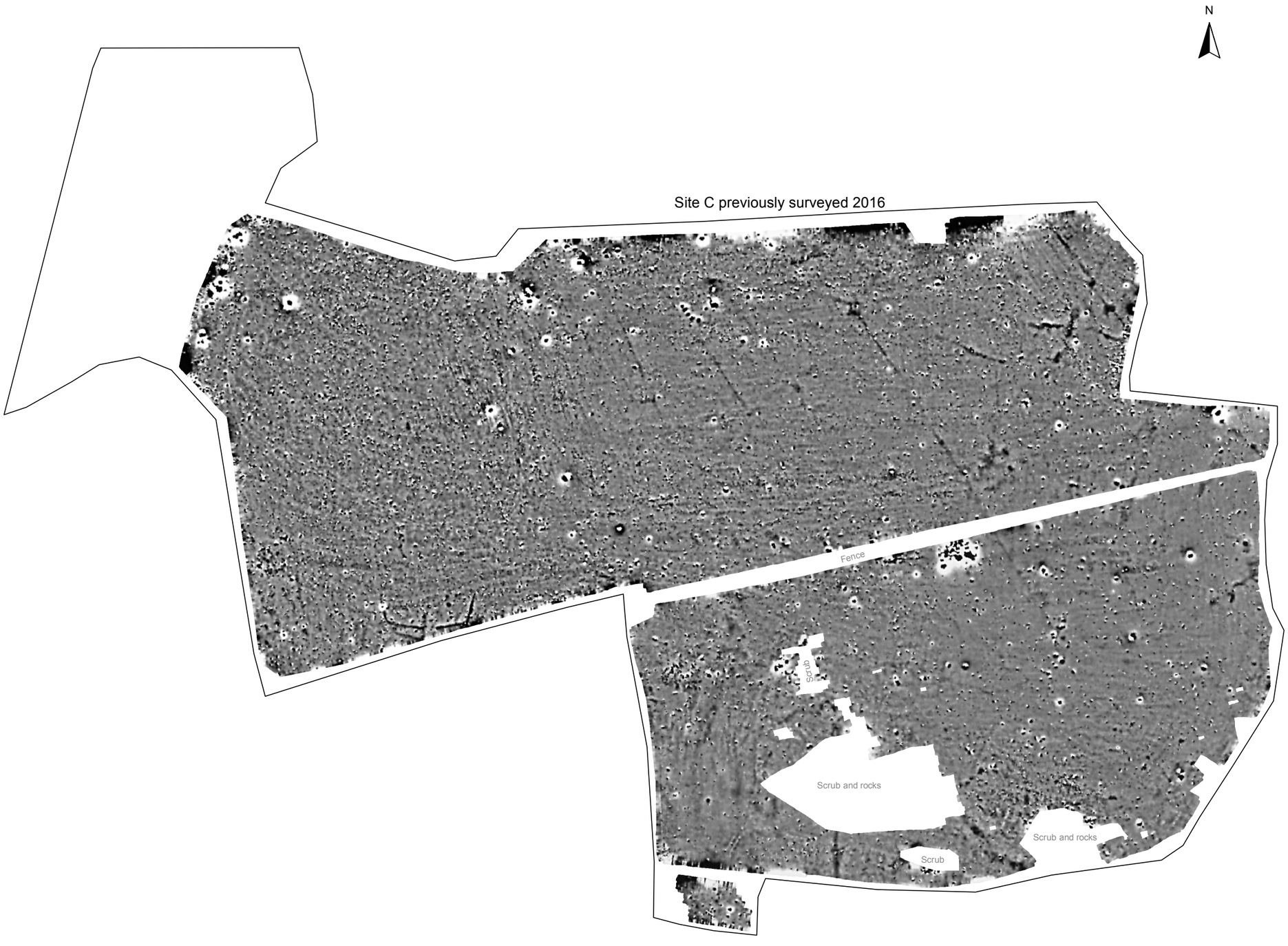
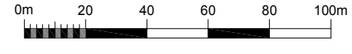
Greyscale plot of minimally processed magnetometer data





SCALE 1:2000



SCALE TRUE AT A3

FIG 03

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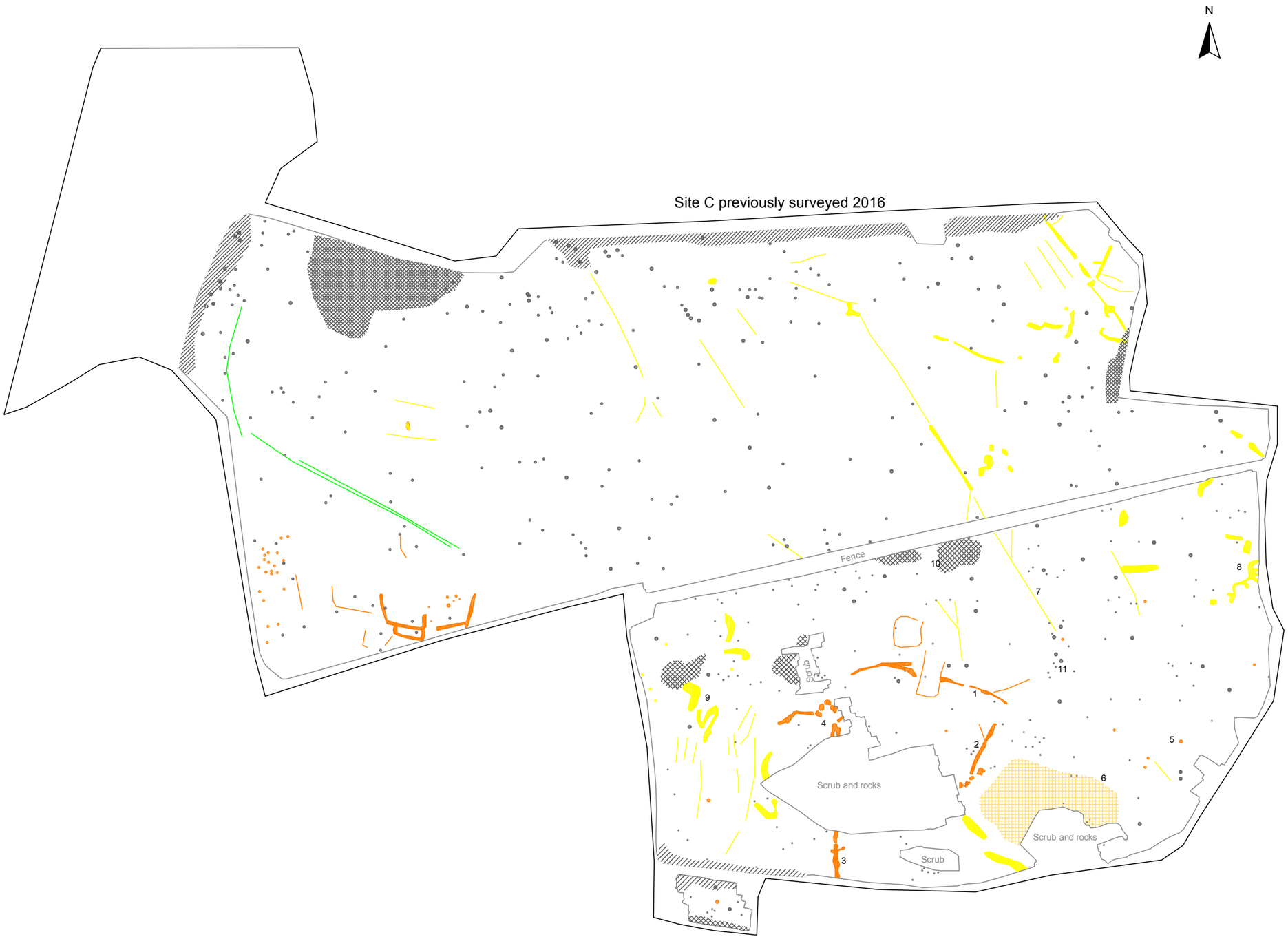
Abstraction and interpretation of magnetic anomalies



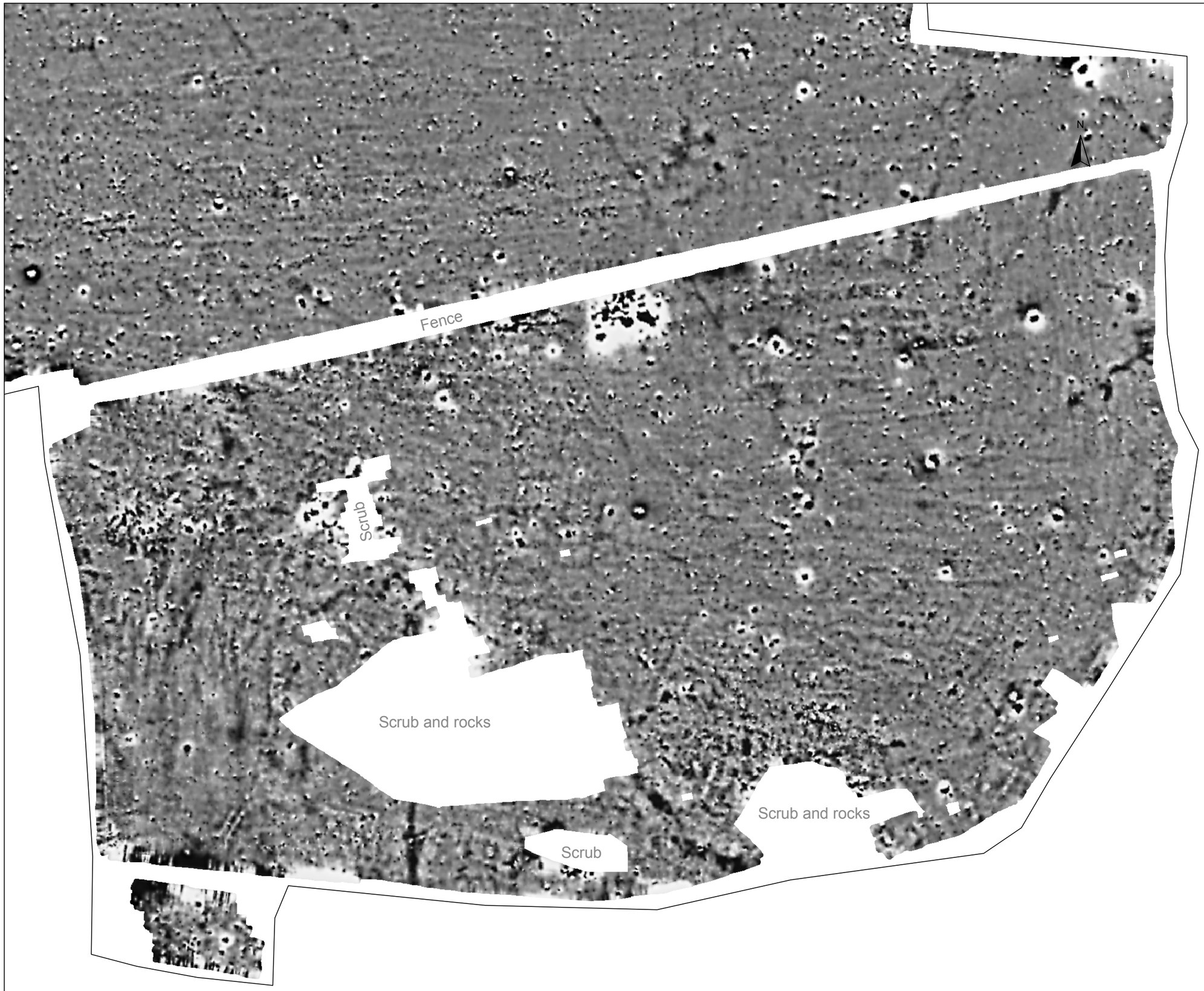
- Positive linear anomaly - possible ditch-like feature
- Negative linear anomaly - vehicle rut
- Discrete positive response - possible pit-like feature
- Positive linear anomaly - of natural origin
- Discrete positive response - of natural origin
- Variable magnetic response - ground disturbance
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:2000

0m 20 40 60 80 100m

SCALE TRUE AT A3

FIG 04



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Greyscale plot of minimally processed magnetometer data

+3nT
-3nT
-3nT
+3nT

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 05

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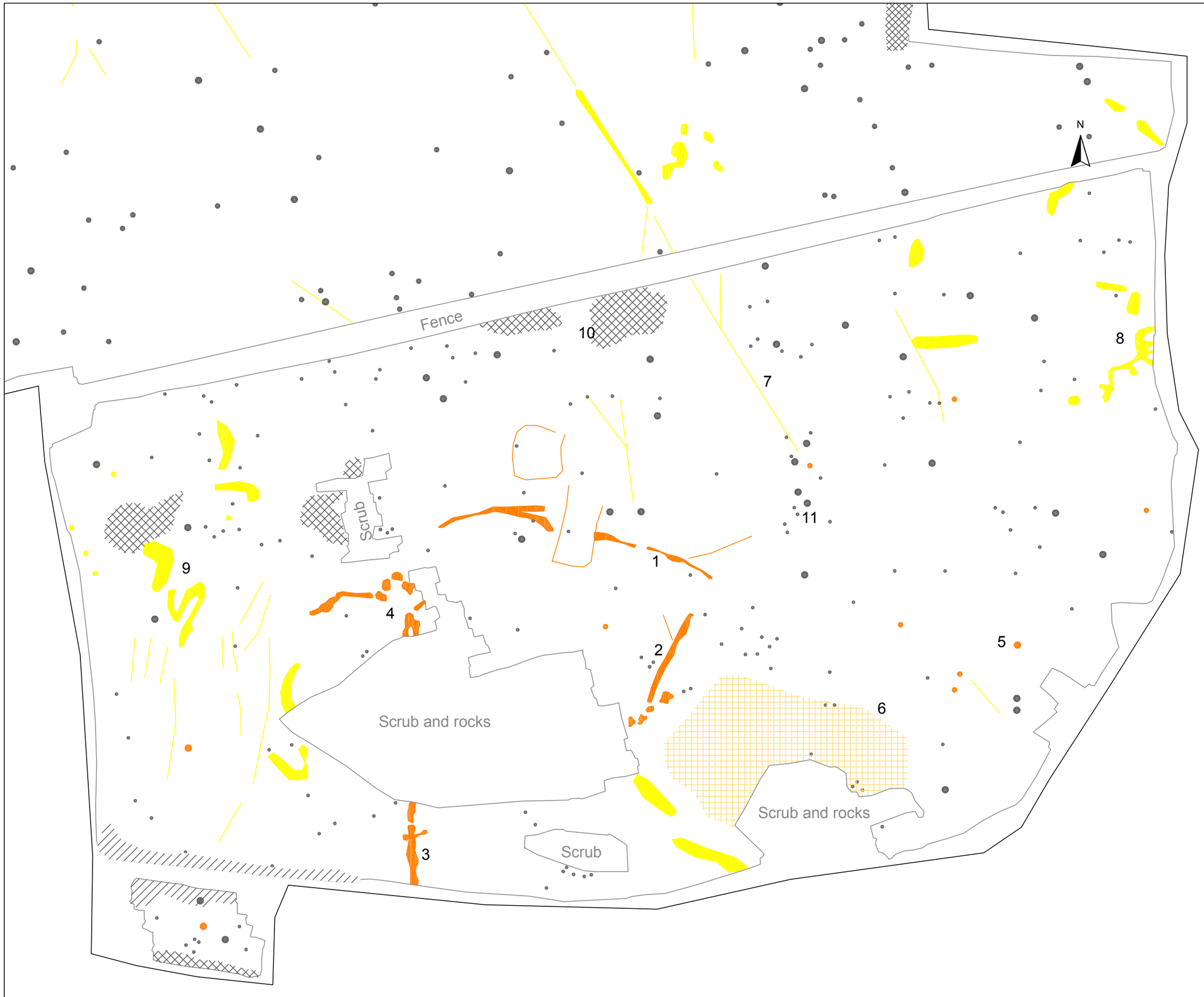
Abstraction and interpretation of magnetic anomalies



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

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 06