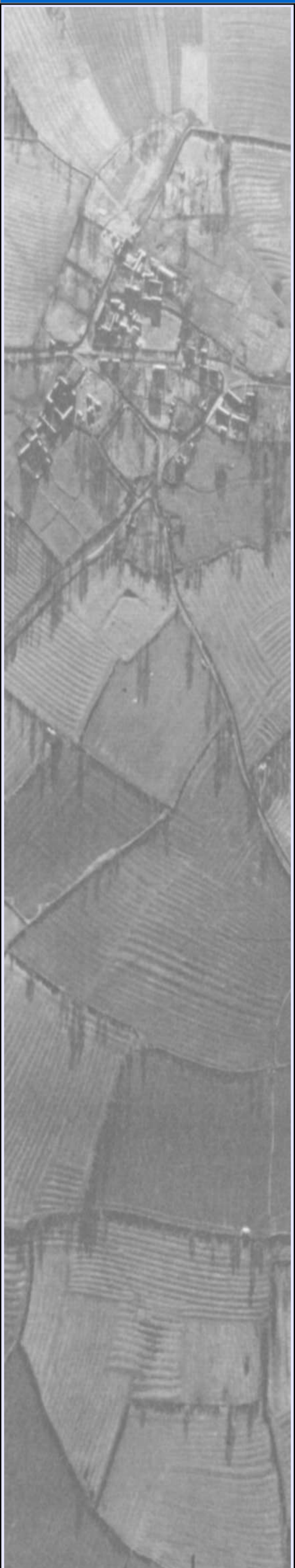
Archaeological Surveys Ltd



Bristol Airport
Site U
North Somerset

MAGNETOMETER SURVEY REPORT

for

Entec UK Ltd

Kerry Donaldson and David Sabin

January 2011

Ref. no. J349

ARCHAEOLOGICAL SURVEYS LTD

Bristol Airport
Site U
North Somerset

Magnetometer Survey Report

for

Entec UK Ltd

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

Survey date – 18th January 2011
Ordnance Survey Grid Reference – ST 50330 64615

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SUMMARY

A detailed magnetometer survey was carried out within three small fields on land to the south of Bristol Airport in North Somerset. The site has been outlined for additional car parking for the airport. The survey revealed a number of positive linear, discrete and amorphous anomalies, as wells as areas of negative responses. There is no clear or coherent morphology to determine which of the responses could relate to cut ditch-like and pit-like features and which relate to soil filled joints and cracks within the underlying limestone geology.

1 INTRODUCTION

1.1 Survey background

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

1.2 Survey objectives and techniques

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

1.2.2 The survey and report generally follow the recommendations set out by: English Heritage (2008) *Geophysical survey in archaeological field evaluation;* and Institute for Archaeologists (2002) *The use of Geophysical Techniques in Archaeological Evaluations*. The work has been carried out to the Institute for Archaeologists (2011) *Standard and Guidance for Archaeological Geophysical Survey.*

1.3 Site location, description and survey conditions

1.3.1 The site is located within agricultural land immediately south of Bristol Airport, within the parish of Wrington in North Somerset. It is centred on Ordnance Survey National Grid Reference (OS NGR) ST 50330 64615, see Figs 01 and 02.

1.3.2 The geophysical survey covers approximately 3.8ha of pasture within three separate fields.

1.4 Site history and archaeological potential

1.4.1 The site does not contain any designated or undesignated heritage assets; however, there are several in the vicinity. Approximately 300m south of the survey area is a Neolithic chambered long barrow (Long barrow 350m south-west of Cornerpool Farm, scheduled monument no. 11008291/22819) and the site of a Neolithic flint axe recorded nearby on the Historic Environment Record (HER 662). A second scheduled long barrow on Redhill (no. 1108289/22820) is located 1km to the south and a Bronze Age barrow cemetery group is located at Redhill, 1km to the south-west (nos. 1011126/22831,1011127/22832, 1011128/22833 and 1011129/22834). Other barrows are located on Felton Hill, including an oval barrow (no. 1008300/22812) and two confluent bowl barrows (no. 108361/22813), approximately 1.5km to the east.

1.5 Geology and soils

1.5.1 The underlying geology within the western half of the site is Carboniferous limestone from the Blackrock Limestone Group with Triassic/Jurassic Brockley Down Limestone over the eastern half (BGS, 2011).

1.5.2 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).

1.5.3 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 from those relating to the underlying geology.

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 Bartington Grad 601-2 gradiometer. The instrument effectively measures 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 instrument is extremely sensitive and is able to measure magnetic variation to 0.01nanoTesla (nT), with an effective resolution of 0.03nT. The data 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 instrument is 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 Data were collected at 0.25m centres along traverses 1m apart. The survey area was separated into 30m by 30m grids (900m²) giving 3600 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).

2.2.5 The survey grids were set out to the Ordnance Survey OSGB36 datum using a Leica GS10 RTK GPS. The GPS is used in conjunction with Leica's SmartNet service, where positional corrections are sent via a mobile telephone link. Positional accuracy of around 10 – 20mm is possible using the system.

2.2.6 The fixed orientation of survey grids based on the OSGB36 datum was considered appropriate given that the orientation of land boundaries was variable (or other obstructions – name) and consequently partial survey grids were unavoidable. 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 TerraSurveyor (formerly 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 TerraSurveyor; this should be used in conjunction with information provided by Fig 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,
- clipping of processed data at either ±8nT 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 and objective assessment of features within each survey area.

2.3.4 The main form of data display prepared for this report is the greyscale 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 TerraSurveyor. Regardless of survey orientation, data captured along each traverse are displayed and processed by TerraSurveyor 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.

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.

2.3.7 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 three survey areas covering approximately 3.8ha in total.

3.1.2 Magnetic anomalies located can be generally classified as positive and negative anomalies of an uncertain origin, anomalies associated with land management, linear anomalies of an agricultural origin, areas of magnetic debris and disturbance, strong discrete dipolar anomalies relating to ferrous objects and strong multiple dipolar linear anomalies relating to buried services or pipelines. Anomalies located within each survey area have been numbered and are described in 3.4 to 3.6 below.

3.2 Statement of data quality

3.2.1 Data are considered representative of the magnetic anomalies present within the site.

3.3 Data interpretation

3.3.1 The list of sub-headings below attempts to define a number of separate categories that reflect the range and type of features located during the survey. A basic explanation of the characteristics of the magnetic anomalies is set out for each category in order to justify interpretation, a basic key is indicated to allow cross referencing to the abstraction and interpretation plot. CAD layer names are included to aid reference to associated digital files (.dwg/.dxf). Sub-headings are then used to group anomalies with similar characteristics for each survey area.

Report sub-heading CAD layer names and plot colour	**Description and origin of anomalies**
Anomalies with an uncertain origin AS-ABST MAG POS LINEAR UNCERTAIN AS-ABST MAG NEG LINEAR UNCERTAIN AS-ABST MAG POS DISCRETE UNCERTAIN AS-ABST MAG POS UNCERTAIN AS-ABST MAG NEG UNCERTAIN	The category applies to a range of anomalies where there is not enough evidence to confidently suggest an origin. Anomalies in this category may well be related to archaeologically significant features, but equally relatively modern features, geological/pedological features and agricultural features should be considered. Positive anomalies are indicative of magnetically enhanced soils that may form the fill of 'cut' features or may be produced by accumulation within layers or 'earthwork' features; soils subject to burning may also produce positive anomalies.

	Negative anomalies are produced by material of comparatively low magnetic susceptibility such as stone and subsoil.
Anomalies relating to land management AS-ABST MAG BOUNDARY	Anomalies are mainly linear and may be indicative of the magnetically enhanced fill of cut features (i.e. ditches). The anomalies may be long and/or form rectilinear elements and they may relate to topographic features or be visible on early mapping. Associated agricultural anomalies (e.g. headlands, plough marks and former ridge and furrow) may support the interpretation.
Anomalies with an agricultural origin AS-ABST MAG AGRICULTURAL	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 <u>may therefore be archaeologically significant</u>. It is also possible that the response may be caused by natural material such as certain gravels and fragments of igneous or metamorphic rock. Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.
Anomalies with a modern origin 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.
Anomalies with a natural origin AS-ABST MAG NATURAL FEATURES	Naturally formed magnetic anomalies are 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; the latter are <u>almost impossible to distinguished from pit-like anomalies with an anthropogenic origin</u>. Fluvial, glacial and periglacial processes may be responsible for their formation within drift material and subsoil. Igneous and metamorphic activity can lead to anomalies within more solid geology.

Table 1: List and description of interpretation categories

3.4 List of anomalies - Area 1

Area centred on OS NGR 350225 164705, see Figs 03 – 05.

Anomalies with an uncertain origin

(1) - The survey area contains a number of positive linear, discrete and broad linear

zones. While such responses can relate to the fill of cut features, a natural origin is possible for many, with an agricultural origin also possible for some.

Anomalies with an agricultural origin

(2) - A series of parallel linear anomalies relate to former cultivation marks.

Anomalies with a modern origin

(3) - A modern service extends along the western edge of the survey area.

3.5 List of anomalies - Area 2

Area centred on OS NGR 350310 164650, see Figs 03 – 05.

Anomalies with an uncertain origin

(4 & 5) - Two parallel positive linear anomalies (4) could relate to cut, ditch-like features. It is possible that anomaly (5) is a continuation of the southernmost linear anomaly; however, geological features cannot be ruled out.

(6) - Discrete positive responses could relate to pit-like features with an anthropogenic or natural origin.

3.6 List of anomalies - Area 3

Area centred on OS NGR 350410 164570, see Figs 03 – 05.

Anomalies with an uncertain origin

(7) - Two positive linear anomalies are located in the north western part of the survey area. They have a similar form and strength to anomalies (4) & (5) seen to the north in Area 2 and the response indicates that they could relate to ditch-like features, but a natural origin is also possible.

(8) - A large number of positive linear anomalies are evident primarily within the western part of the survey area. They lack a coherent morphology, and it is not possible to determine if they relate to anthropogenic or natural features.

(9) - A number of positive, broad, linear responses have been located within the survey area. Again it is not possible to determine their origin.

(10) - In the centre of the survey area are broad, negative rectilinear responses

which appear to be associated with a number of discrete, positive responses. It is not possible to determine if they relate to geological features, agricultural features or some other form of ground disturbance.

(11) - A negative linear anomaly extends through much of the survey area. This type of response could relate to an agricultural track.

(12) - Located in the south eastern corner of the survey area is a positive response surrounding by a negative response. This type of anomaly could suggest former quarrying.

Anomalies associated with land management

(13) - A magnetically variable response in the western part of the survey area appears to relate to a formerly mapped field boundary.

Anomalies with a natural origin

(14) - Zones of magnetically variable responses relate to variations within the underlying geology.

Anomalies associated with magnetic debris

(15) - Magnetic debris around the Cornerpool Farm buildings relates to dumped material used as ground consolidation.

4 CONCLUSION

4.1.1 The detailed magnetometry survey located a number of positive discrete, linear and broad linear responses within all the survey areas. The majority lack any coherent pattern or morphology and while some could relate to cut, ditch-like and pit-like features, it is likely that the majority have an association with variations in the underlying geology.

5 REFERENCES

British Geological Survey, 2011. *Geology of Britain viewer, 1:50 000 scale [online]* available from http://mapapps.bgs.ac.uk/geologyofbritain/home.html [accessed 14/12011].

English Heritage, 2008. *Geophysical survey in archaeological field evaluation. Research and Professional Service Guideline No.1.* 2nd ed. Swindon: English Heritage.

Institute for Archaeologists, 2002. *The use of Geophysical Techniques in Archaeological Evaluations*. IfA Paper No. 6. IfA, University of Reading.

Institute for Archaeologists, 2011. *Standard and Guidance for archaeological geophysical survey*. IfA, University of Reading.

Soil Survey of England and Wales, 1983. *Soils of England and Wales, Sheet 5 South West England.*

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 ±10nT 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.

Appendix C – survey and data information

Area 1 raw data

Filename: J349-mag-Area1-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Dimensions
Composite Size (readings): 600 x 90
Survey Size (meters): 150 m x 90 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m
Stats
Max: 30.00
Min: -30.00
Std Dev: 7.59
Mean: -1.46
Median: -0.03
Composite Area: 1.35 ha
Surveyed Area: 0.92675 ha
PROGRAM
Name: TerraSurveyor
Version: 3.0.23.0
Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Area 1 processed data

Filename: J349-mag-Area1-proc.xcp
Stats
Max: 8.00
Min: -8.00
Std Dev: 2.57
Mean: -0.23
Median: -0.06
Processes: 8
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 Search & Replace From: -100 To: 100 With: Dummy (Area: Top 30, Left 548, Bottom 60, Right 599)
4 DeStripe Median Traverse: Grids: 02.xgd 03.xgd 05.xgd 06.xgd 08.xgd 09.xgd 11.xgd 12.xgd Threshold: 2 SDs
5 DeStripe Median Traverse: Grids: 13.xgd Threshold: 2 SDs
6 DeStripe Mean Traverse: Grids: 01.xgd 04.xgd 07.xgd 10.xgd Threshold: 2 SDs
7 DeStripe Mean Traverse: Grids: 14.xgd 15.xgd Threshold: 2 SDs
8 Clip from -8.00 to 8.00 nT

Area 2 raw data

Filename: J349-mag-Area2-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Dimensions
Composite Size (readings): 480 x 150
Survey Size (meters): 120 m x 150 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m
Stats
Max: 30.00
Min: -30.00
Std Dev: 11.22
Mean: -2.17
Median: -0.50
Composite Area: 1.8 ha
Surveyed Area: 0.4313 ha
Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Area 2 processed data

Filename: J349-mag-Area2-proc.xcp
Stats
Max: 8.00
Min: -8.00
Std Dev: 4.41
Mean: -0.61

Median: -0.11
Processes: 4
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: All Threshold: 2 SDs
4 Clip from -8.00 to 8.00 nT

Area 3 raw data

Filename: J349-mag-Area3-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Dimensions
Composite Size (readings): 720 x 240
Survey Size (meters): 180 m x 240 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m
Stats
Max: 30.00
Min: -30.00
Std Dev: 5.61
Mean: 0.79
Median: 1.02
Composite Area: 4.32 ha
Surveyed Area: 2.0411 ha
Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Area 3 processed data

Filename: J349-mag-Area3-proc.xcp
Stats
Max: 8.00
Min: -8.00
Std Dev: 3.02
Mean: -0.03
Median: 0.00
Processes: 9
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: 18.xgd 19.xgd 15.xgd 16.xgd 17.xgd 20.xgd 11.xgd 12.xgd 13.xgd 14.xgd 23.xgd 07.xgd 08.xgd 09.xgd 10.xgd 27.xgd 03.xgd 04.xgd 05.xgd 06.xgd 31.xgd 01.xgd 02.xgd 34.xgd Threshold: 2 SDs
4 DeStripe Median Traverse: Grids: 32.xgd 35.xgd Threshold: 2 SDs
5 DeStripe Median Traverse: Grids: 21.xgd 22.xgd 24.xgd 25.xgd 26.xgd Threshold: 2 SDs
6 DeStripe Median Traverse: Grids: 30.xgd Threshold: 2 SDs
7 DeStripe Median Traverse: Grids: 33.xgd Threshold: 2 SDs
8 DeStripe Mean Traverse: Grids: 28.xgd 29.xgd Threshold: 2 SDs
9 Clip from -8.00 to 8.00 nT

Appendix D – digital archive

Archaeological Surveys Ltd hold the primary digital archive at their offices in 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.

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

A digital copy of the report will provided to the North Somerset Historic Environment Record and uploaded to the Online AccesS to the Index of archaeological investigationS (OASIS).

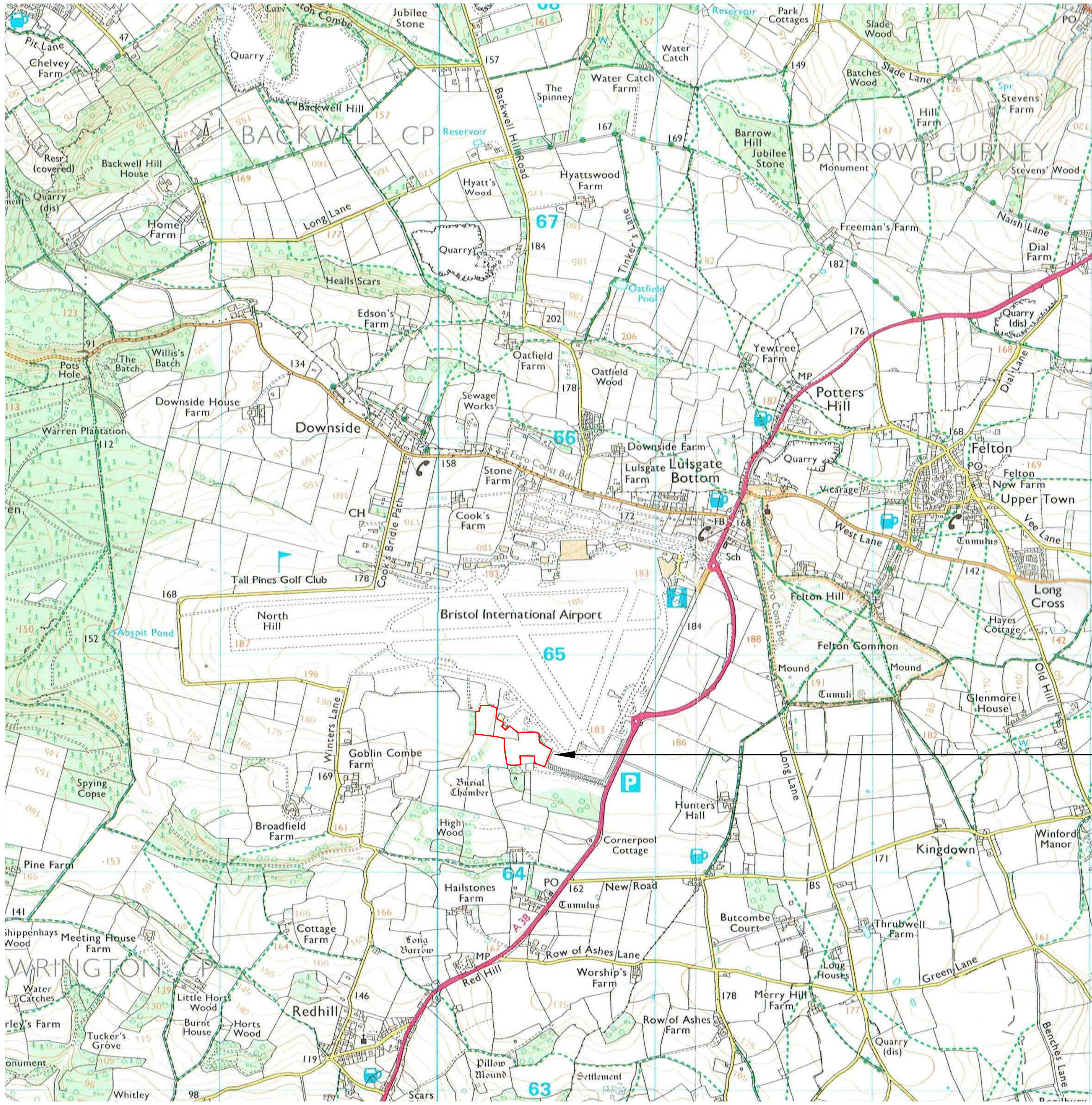
This report has been prepared using the following software on a Windows XP platform:

- TerraSurveyor version 3.0.23.0 (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 produced by the survey and report include the following files:

- TerraSurveyor 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.

N



Survey location

Archaeological Surveys Ltd

Geophysical Survey
Bristol Airport
Site U
North Somerset

Map of survey area

Reproduced from OS Explorer map no.154 1:25 000 by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office.

● Survey location

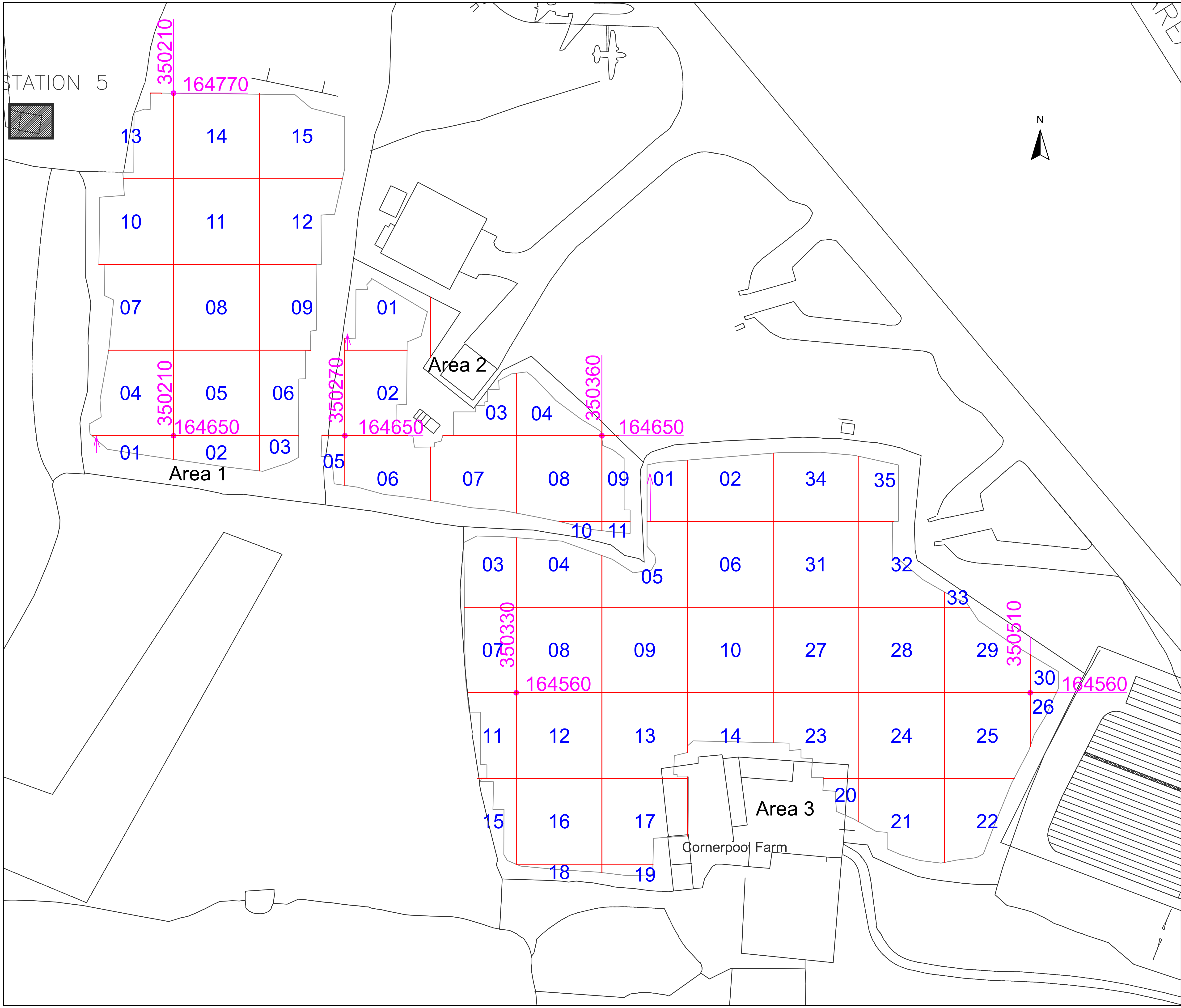
Site centred on OS NGR
ST 50330 64615

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

FIG 01



Archaeological Surveys Ltd

Geophysical Survey
Bristol Airport
Site U
North Somerset

Referencing information

Grid coordinates based on Ordnance Survey OSGB36 datum

Grids set out using RTK GPS with Leica SmartNet correction data RTCMv2 format OSTN02 transformation

Survey grid size = 30m

Survey start and traverse direction

01 Grid reference number and filename

SCALE 1:1250

0m 10 20 30 40 50m

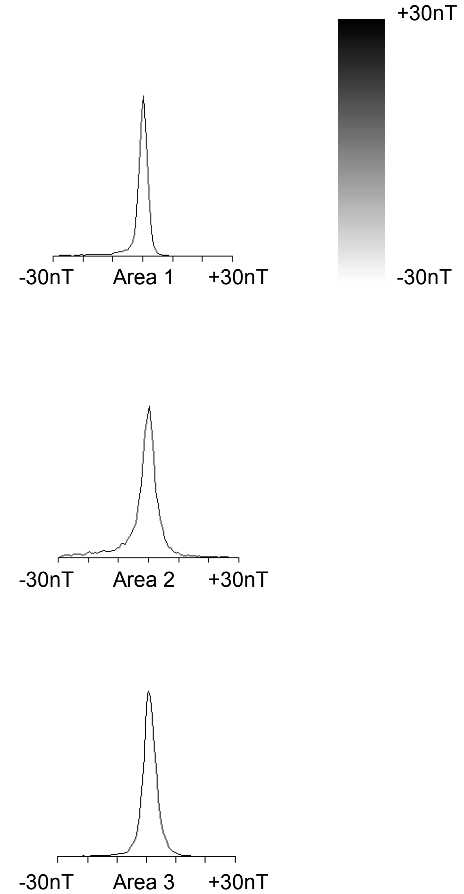
SCALE TRUE AT A3

FIG 02

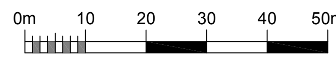
Archaeological Surveys Ltd

Geophysical Survey
Bristol Airport
Site U
North Somerset

Greyscale plot of raw magnetometer data



SCALE 1:1250



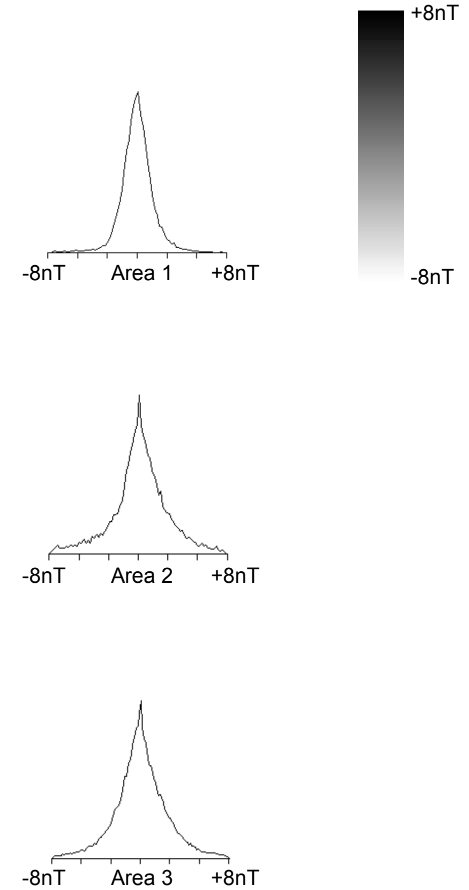
SCALE TRUE AT A3

FIG 03

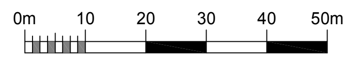
Archaeological Surveys Ltd

Geophysical Survey
Bristol Airport
Site U
North Somerset

Greyscale plot of minimally processed magnetometer data



SCALE 1:1250



SCALE TRUE AT A3

FIG 04

Archaeological Surveys Ltd

Geophysical Survey
Bristol Airport
Site U
North Somerset

Abstraction and interpretation of magnetic anomalies

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin (trend only shown)
- Negative linear anomaly - material of low magnetic susceptibility
- Discrete positive response - possible pit-like feature
- Positive linear anomaly - extant earthwork (possible former field boundary?)
- Weak positive anomaly - magnetically enhanced material
- Negative anomaly - material of low magnetic susceptibility
- Variable magnetic response - possible geological/pedological origin?
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 05