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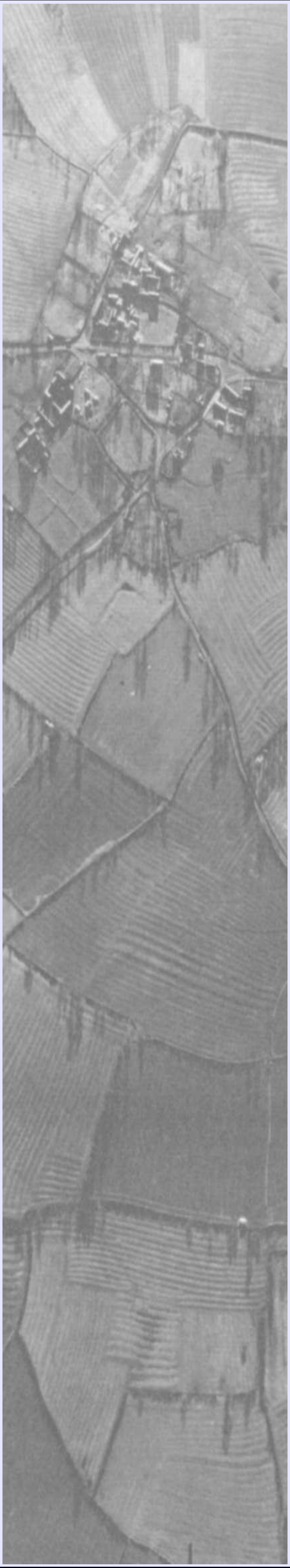

Kingston Farm
Bradford-on-Avon
Wiltshire

MAGNETOMETER SURVEY REPORT

for

BOA Property Ltd

David Sabin and Kerry Donaldson

April 2011

Ref. no. 361

ARCHAEOLOGICAL SURVEYS LTD

Kingston Farm, Bradford-on-Avon, Wiltshire

Magnetometer Survey

for

BOA Property Ltd

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

Survey date - **from 30th March to 4th April 2011**
Ordnance Survey Grid Reference – **ST 383 607**

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CONTENTS

SUMMARY.....1

1 INTRODUCTION.....1

1.1 Survey background.....1

1.2 Survey objectives and techniques.....1

1.3 Site location, description and survey conditions.....1

1.4 Site history and archaeological potential.....2

1.5 Geology and soils.....2

2 METHODOLOGY.....2

2.1 Technical synopsis.....2

2.2 Equipment configuration, data collection and survey detail.....3

2.3 Data processing and presentation.....4

3 RESULTS.....5

3.1 General overview.....5

3.2 List of anomalies - Area 2.....7

3.3 List of anomalies - Area 3.....7

3.4 List of anomalies - Area 4.....8

4 CONCLUSION.....10

5 REFERENCES.....10

Appendix A – basic principles of magnetic survey.....11

Appendix B – data processing notes.....12

Appendix C – survey and data information.....13

Appendix D – digital archive.....14

LIST OF FIGURES

Figure 01 Map of survey area (1:25 000)

Figure 02 Referencing information (1:2500)

Figure 03 Greyscale plot of raw magnetometer data – Area 2 (1:1000)

Figure 04 Greyscale plot of processed magnetometer data – Area 2 (1:1000)

Figure 05 Abstraction and interpretation of magnetic anomalies – Area 2 (1:1000)

Figure 06 Greyscale plot of raw magnetometer data – Area 3 (1:1000)

Figure 07 Greyscale plot of processed magnetometer data – Area 3 (1:1000)

Figure 08 Abstraction and interpretation of magnetic anomalies – Area 3 (1:1000)

Figure 09 Greyscale plot of raw magnetometer data – Area 4 (1:1000)

Figure 10 Greyscale plot of processed magnetometer data – Area 4 (1:1000)

Figure 11 Abstraction and interpretation of magnetic anomalies – Area 4 (1:1000)

Figure 12 Greyscale plot of processed magnetometer data (1:2500)

Figure 13 Abstraction and interpretation of magnetic anomalies (1:2500)

LIST OF TABLES

Table 1: Bartington fluxgate gradiometer sensor calibration results....................................4

Table 2: List and description of interpretation categories..7

SUMMARY

A magnetometer survey was commissioned by Michael Heaton Heritage Consultants on behalf of BOA Property Ltd, and undertaken over 7.2ha of land to the east of Bradford-on-Avon, Wiltshire at Kingston Farm. The site has been outlined for a proposed photovoltaic solar array installation. The detailed magnetometer survey located a number of geophysical anomalies relating to features of archaeological potential. Towards the northern edge of the site (Area 3), an isolated ring-ditch feature was located, and just on the periphery of the western edge of the site (Area 4), several linear, rectilinear and discrete anomalies relate to ditches and pits. Other positive linear and discrete anomalies of uncertain origin were also located within Area 4.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Michael Heaton Heritage Consultants, on behalf of BOA Property Ltd, to undertake a magnetometer survey of an area of land to the east of Bradford-on-Avon in Wiltshire. The survey aims to provide information on the archaeological potential of land prior to a planning application for the installation of photovoltaic solar arrays. 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.

1.2.2 The aim of the survey would be to inform decision-making as to further archaeological evaluation work and/or archaeological mitigation as part of the planning permission process, in line with the requirements of Planning Policy Statement (PPS) 5 policy HE6.1.

1.2.3 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, and *The use of Geophysical Techniques in Archaeological Evaluations*.

1.3 Site location, description and survey conditions

1.3.1 The site is located at Kingston Farm, on the eastern edge of Bradford-on-

Avon in Wiltshire and centred on Ordnance Survey National Grid Reference (OS NGR) ST 83895 60770, see Figures 01 and 02.

1.3.2 The geophysical survey covers approximately 7.2ha of agricultural land within three separate fields (labelled Areas 2-4). Area 1 and part of Area 2 were unsurveyable due to rough ploughing. The survey areas sloped down gently towards the south and south east.

1.3.3 The ground conditions across the site were generally considered to be favourable for the collection of magnetometry data, except for two areas containing roughly ploughed land and very uneven surfaces that were considered a risk to surveyors and likely to produce poor datasets. Weather conditions during the survey were variable though mainly fine.

1.4 Site history and archaeological potential

1.4.1 No specific information was made available to Archaeological Surveys Ltd with reference to the site. The nearest Scheduled Monument is a sub-rectangular earthwork within Great Bradford Wood (SM 34203), some 450m to the east of the site.

1.5 Geology and soils

1.5.1 The underlying geology is limestone from the Cornbrash Formation (BGS, 2011).

1.5.2 The overlying soils across the site are from the Sherborne association and are Brown Renzinas. These consist of shallow, well drained, brashy, calcareous clayey soils over limestone (Soil Survey of England and Wales, 1983).

1.5.3 Magnetometer survey carried out on similar geologies and soils have resulted in a strong magnetic contrast between the fill of cut features and the material into which they are cut. These soils can, however, produce strong pit-like anomalies relating to natural 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 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 certified calibration/service	Sensors 084 and 085 - 6th August 2010 (due Aug 2012) Sensors 242 and 396 - 3rd December 2009 (due Dec 2011)
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 0.25m 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).

2.2.7 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 orientation of land boundaries was variable 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 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,
- clipping of processed data at ±3nT 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.

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 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.

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 three survey areas covering 7.2ha. 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 disturbance and strong discrete dipolar anomalies relating to ferrous objects. Anomalies located within each survey area have been numbered and are described below.

3.1.2 A trial survey was undertaken over roughly ploughed soil in Area 1. The uneven ground surface prevented further survey due to a significant health and safety risk to surveyors. In addition, the trial indicated the presence of strong magnetic anomalies caused by the plough ridges and emphasised problems in collecting data at an even pace across the uneven surface. Within Area 2, rough ploughing and upstanding maize prevented survey across half the area.

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

Report sub-heading CAD layer names and plot colour	**Description and origin of anomalies**
Anomalies with archaeological potential AS-ABST MAG POS LINEAR ARCHAEOLOGY AS-ABST MAG POS DISCRETE ARCHAEOLOGY	Anomalies have the characteristics (mainly morphological) of a range of archaeological features such as pits, ring ditches, enclosures, etc..
Anomalies with an uncertain origin AS-ABST MAG POS LINEAR UNCERTAIN AS-ABST MAG NEG LINEAR UNCERTAIN AS-ABST MAG POS DISCRETE UNCERTAIN AS-ABST MAG POS AREA UNCERTAIN AS-ABST MAG NEG 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 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 AS-ABST MAG RIDGE AND FURROW	The anomalies are often linear and form a series of parallel responses or are parallel to extant land boundaries. Where the response is broad, former ridge and furrow is likely; narrow response is often related to modern ploughing.
Anomalies associated with magnetic debris	Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.

AS-ABST MAG STRONG DIPOLAR ●	
Anomalies with a modern origin AS-ABST MAG DISTURBANCE ▨	The magnetic response is often strong and dipolar indicative of ferrous material and may be associated with extant above surface features such as wire fencing, cables, pylons etc.. Often a significant area around such features has a strong magnetic flux which may create magnetic disturbance; such disturbance can effectively obscure low magnitude anomalies if they are present. Fluxgate sensors may respond erratically and with hysteresis adjacent to strong magnetic sources.

Table 2: List and description of interpretation categories

3.2 List of anomalies - Area 2

Area centred on OS NGR 384185,160760 see Figures 03 – 05.

Anomalies with an uncertain origin

(1) – The survey area contains several positive linear anomalies oriented roughly parallel with the north eastern field boundary (and anomaly (4)). They appear to relate to former land divisions or edges of cultivation, perhaps suggesting former allotments.

(2) – A positive linear anomaly, located parallel to the eastern field boundary. Although it may indicate a cut feature, it is likely that it relates to former cultivation.

(3) – Weak, amorphous positive responses indicate some magnetic enhancement, but it is possible that they relate agricultural activity.

Anomalies associated with land management

(4) – A positive linear anomaly that can be directly associated with a former field boundary indicated on Ordnance Survey mapping between at least 1886 and 1988.

3.3 List of anomalies - Area 3

Area centred on OS NGR 383975,160805 see Figures 06 – 08.

Anomalies of archaeological potential

(5) – A positive curvilinear anomaly, located in the northern part of the survey area, relates to a penannular ring-ditch with a diameter of 12m. It appears to have a gap on the western side; however, it is not possible to determine whether this was intentional or has been caused by subsequent ploughing.

Anomalies with an uncertain origin

(6) – The survey area contains several positive and negative linear anomalies that are not directly parallel with the plough trend, although it is possible that they relate to agricultural anomalies.

(7) – An “L” shaped negative linear anomaly is uncertain in origin; however, the eastern part of the anomaly is parallel with the plough trend which may suggest an agricultural origin.

(8) – An amorphous zone located along the south eastern edge of the survey area appears to relate to infilling of a former quarry.

(9) – Positive discrete and fragmented linear anomalies are located close to the southern and western edges of the survey area. Although the responses may indicate pits or depressions that are infilled with magnetically enhanced material or an increase depth in topsoil, it is possible that these may relate to natural features, agricultural activity or other anthropogenic activity.

Anomalies with an agricultural origin

(10) – A series of parallel linear anomalies relate to agricultural activity (only the trend has been shown).

Anomalies with a modern origin

(11) – A circular area of magnetic disturbance with a diameter of 20m is a response to the steel legs of the solar module table that have been inserted into the ground.

3.4 List of anomalies - Area 4

Area centred on OS NGR 383705,160715 see Figures 09 – 11.

Anomalies of archaeological potential

(12) – An “L” shaped positive rectilinear anomaly is located close to the northern edge of the survey area. It appears to relate to a cut feature that contains moderately enhanced magnetic soil (12nT to 30nT), which may indicate that burnt and other magnetically enhanced material derived from anthropogenic activity has become incorporated into it. It is likely to be associated with anomalies (13), (14) and (15).

(13) – A positive linear anomaly appears to extend towards anomalies (14) and (15) and is likely to relate to a cut feature with archaeological potential.

(14) – A positive curvilinear anomaly, possibly indicating a ring-ditch feature

containing a pit. This is located on a linear mound relating to a former boundary feature.

(15) – A series of three positive linear anomalies appear to relate to ditch-like features containing magnetically enhanced material. They appear to be directly associated with a linear mound that forms an old field boundary running along the edge of the development area.

Anomalies with an uncertain origin

(16) – A positive linear anomaly extends across much of the northern part of the survey area. Although of uncertain origin, it is parallel to anomaly (13) and it may relate to a ditch-like feature.

(17) – Fragmented positive linear, curvilinear and discrete anomalies in the north eastern corner of the field. It is not possible to determine the origin of these anomalies from their morphology.

(18) – A positive linear anomaly extends across much of the central southern part of the survey area, with a west-north-west to east-south-east orientation. Although not marked on Ordnance Survey mapping from 1886 onwards, it is possible that this relates to a former field boundary.

(19) – A fragmented positive linear anomaly extends in a north-north-easterly direction from anomaly (18). It may also extend south-westwards beyond anomaly (18). It is possible that this relates to a former field boundary, although there is no indication of it on OS mapping from 1886 onwards.

(20) – A broad, weakly positive linear anomaly and a parallel negative linear anomaly are located to the south of, but on a different orientation to, anomaly (18). It is possible that these anomalies are associated with a series of ridge and furrow on a different alignment to anomalies (22).

(21) – The survey area contains widespread and numerous discrete positive anomalies that appear to indicate pit-like features. Although it is possible that some have been caused by anthropogenic activity, others may relate to natural features.

Anomalies with an agricultural origin

(22) – A series of parallel, closely spaced linear anomalies, oriented parallel to the eastern field boundary, relate to modern agricultural activity.

(23) – A series of broad, weakly positive linear anomalies can be seen predominantly in the northern part of the survey area. This type of anomaly generally represents the remains of ploughed out ridge and furrow.

Anomalies with a modern origin

(24) – A 20m circular zone of magnetic disturbance has been caused by the steel

legs of a solar module table.

4 CONCLUSION

4.1.1 The magnetometer survey located a number of anomalies likely to relate to archaeological features on the periphery of the survey area. A ring-ditch was located close to the northern edge of Area 3, in the north of the site, and further linear, rectilinear and discrete anomalies were located on the northern and western edges of Area 4. These anomalies appear to relate to cut features, such as ditches and pits, although the majority of these lie just beyond the boundary of the development area. Area 4 also contains several other pit-like and ditch-like anomalies, and although they are uncertain in origin, it is possible that some also relate to archaeological features.

4.1.2 Half of Area 2, on the eastern edge of the site, was unsurveyable due to rough ploughing; however, the eastern half contains several positive linear anomalies that may relate to former land divisions or cultivation edges, although their origin is uncertain.

4.1.3 Area 3, on the northern edge of the site, contained evidence for quarrying along its southern and eastern edges. This quarry must pre-date the late 19th century, as it is not recorded on Ordnance Survey mapping from 1886 onwards.

5 REFERENCES

British Geological Survey, 2010. *Geology of Britain viewer, 1:50 000 scale [online]* available from http://maps.bgs.ac.uk/geologyviewer/ [accessed 6/4/2011].

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.

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 ±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.

FFT (Fast Fourier Transform) spectral filtering

A mathematical process used to determine the frequency components of a traverse. Repetitive features, such as plough marks, produce characteristic spectral zones that can be suppressed allowing greyscale images to appear clearer.

Appendix C – survey and data information

Area 2 raw data

COMPOSITE
Filename: J361-mag-Area2-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 05/04/2011
Assembled by: on 05/04/2011
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 720 x 150
Survey Size (meters): 180 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: 2.33
Mean: 0.42
Median: 0.32
Composite Area: 2.7 ha
Surveyed Area: 0.94185 ha

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

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

Area 2 processed data

COMPOSITE
Filename: J361-mag-Area2-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.03
Mean: 0.07
Median: 0.00
Composite Area: 2.7 ha
Surveyed Area: 0.94185 ha

Processes: 4
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: All
4 Clip from -3.00 to 3.00 nT

Area 3 raw data

COMPOSITE
Filename: J361-mag-Area3-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 01/04/2011
Assembled by: on 01/04/2011
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Dimensions
Composite Size (readings): 720 x 270
Survey Size (meters): 180 m x 270 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: 3.14
Mean: -0.06
Median: 0.08
Composite Area: 4.86 ha
Surveyed Area: 2.6304 ha

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

Source Grids: 39
1 Col:0 Row:2 grids\01.xgd
2 Col:0 Row:3 grids\02.xgd
3 Col:0 Row:4 grids\38.xgd
4 Col:0 Row:5 grids\39.xgd
5 Col:1 Row:0 grids\03.xgd
6 Col:1 Row:1 grids\04.xgd
7 Col:1 Row:2 grids\05.xgd
8 Col:1 Row:3 grids\06.xgd
9 Col:1 Row:4 grids\35.xgd
10 Col:1 Row:5 grids\36.xgd
11 Col:1 Row:6 grids\37.xgd
12 Col:2 Row:0 grids\07.xgd
13 Col:2 Row:1 grids\08.xgd
14 Col:2 Row:2 grids\09.xgd
15 Col:2 Row:3 grids\10.xgd
16 Col:2 Row:4 grids\31.xgd
17 Col:2 Row:5 grids\32.xgd
18 Col:2 Row:6 grids\33.xgd
19 Col:2 Row:7 grids\34.xgd
20 Col:3 Row:0 grids\11.xgd
21 Col:3 Row:1 grids\12.xgd
22 Col:3 Row:2 grids\13.xgd
23 Col:3 Row:3 grids\14.xgd
24 Col:3 Row:4 grids\26.xgd
25 Col:3 Row:5 grids\27.xgd
26 Col:3 Row:6 grids\28.xgd
27 Col:3 Row:7 grids\29.xgd
28 Col:3 Row:8 grids\30.xgd
29 Col:4 Row:1 grids\15.xgd
30 Col:4 Row:2 grids\16.xgd
31 Col:4 Row:3 grids\17.xgd
32 Col:4 Row:4 grids\21.xgd
33 Col:4 Row:5 grids\22.xgd
34 Col:4 Row:6 grids\23.xgd
35 Col:4 Row:7 grids\24.xgd
36 Col:4 Row:8 grids\25.xgd
37 Col:5 Row:6 grids\18.xgd
38 Col:5 Row:7 grids\19.xgd
39 Col:5 Row:8 grids\20.xgd

Area 3 processed data

COMPOSITE
Filename: J361-mag-Area3-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.55
Mean: -0.09
Median: -0.09
Composite Area: 4.86 ha
Surveyed Area: 2.6304 ha

Processes: 10
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: 01.xgd 02.xgd 03.xgd 04.xgd 05.xgd 06.xgd 07.xgd 08.xgd 09.xgd 10.xgd 11.xgd 12.xgd 13.xgd 14.xgd 15.xgd 16.xgd 17.xgd
4 DeStripe Median Traverse: Grids: 38.xgd 39.xgd 35.xgd 36.xgd 37.xgd
5 DeStripe Median Traverse: Grids: 32.xgd 33.xgd 34.xgd 27.xgd 28.xgd 29.xgd 22.xgd 23.xgd 24.xgd
6 DeStripe Median Traverse: Grids: 26.xgd 21.xgd
7 DeStripe Mean Traverse: Grids: 18.xgd 19.xgd 20.xgd Threshold: 0.25 SDs
8 DeStripe Mean Traverse: Grids: 25.xgd Threshold: 1 SDs
9 DeStripe Mean Traverse: Grids: 31.xgd Threshold: 1 SDs
10 Clip from -3.00 to 3.00 nT

Area 4 raw data

COMPOSITE
Filename: J361-mag-Area4-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 31/03/2011
Assembled by: on 31/03/2011
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 840 x 270
Survey Size (meters): 210 m x 270 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: 3.27
Mean: 0.30
Median: 0.30
Composite Area: 5.67 ha
Surveyed Area: 3.5274 ha

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

Source Grids: 48
1 Col:0 Row:3 grids\44.xgd
2 Col:0 Row:4 grids\45.xgd
3 Col:0 Row:5 grids\01.xgd
4 Col:0 Row:6 grids\02.xgd
5 Col:1 Row:0 grids\48.xgd
6 Col:1 Row:1 grids\40.xgd
7 Col:1 Row:2 grids\41.xgd
8 Col:1 Row:3 grids\42.xgd
9 Col:1 Row:4 grids\43.xgd
10 Col:1 Row:5 grids\03.xgd
11 Col:1 Row:6 grids\04.xgd
12 Col:2 Row:0 grids\47.xgd
13 Col:2 Row:1 grids\36.xgd
14 Col:2 Row:2 grids\37.xgd
15 Col:2 Row:3 grids\38.xgd
16 Col:2 Row:4 grids\39.xgd
17 Col:2 Row:5 grids\05.xgd
18 Col:2 Row:6 grids\06.xgd
19 Col:2 Row:7 grids\07.xgd
20 Col:3 Row:0 grids\46.xgd
21 Col:3 Row:1 grids\32.xgd
22 Col:3 Row:2 grids\33.xgd
23 Col:3 Row:3 grids\34.xgd
24 Col:3 Row:4 grids\35.xgd
25 Col:3 Row:5 grids\08.xgd
26 Col:3 Row:6 grids\09.xgd
27 Col:3 Row:7 grids\10.xgd
28 Col:3 Row:8 grids\11.xgd
29 Col:4 Row:0 grids\27.xgd
30 Col:4 Row:1 grids\28.xgd
31 Col:4 Row:2 grids\29.xgd
32 Col:4 Row:3 grids\30.xgd
33 Col:4 Row:4 grids\31.xgd
34 Col:4 Row:5 grids\12.xgd
35 Col:4 Row:6 grids\13.xgd
36 Col:4 Row:7 grids\14.xgd
37 Col:4 Row:8 grids\15.xgd
38 Col:5 Row:2 grids\24.xgd
39 Col:5 Row:3 grids\25.xgd
40 Col:5 Row:4 grids\26.xgd
41 Col:5 Row:5 grids\16.xgd
42 Col:5 Row:6 grids\17.xgd
43 Col:5 Row:7 grids\18.xgd
44 Col:5 Row:8 grids\19.xgd
45 Col:6 Row:4 grids\23.xgd
46 Col:6 Row:5 grids\20.xgd
47 Col:6 Row:6 grids\21.xgd
48 Col:6 Row:7 grids\22.xgd

Area 4 processed data

COMPOSITE
Filename: J361-mag-Area4-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.58
Mean: 0.06
Median: 0.00
Composite Area: 5.67 ha
Surveyed Area: 3.5274 ha

Processes: 4
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: All
4 Clip from -3.00 to 3.00 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 supplied to the client 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). The distribution of both hardcopy report and digital data is considered the responsibility of the Client unless explicitly stated in the survey Brief, Written Scheme of Investigation or other contractual agreement.

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

- ArcheoSurveyor version 2.5.9.4 (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 are supplied on CD ROM which includes the following files:

- 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.

The CD ROM structure is formed from a tree of directories under the title J361 Kingston Farm – CD. Directory titles include Data, Documentation, CAD and PDFs. 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).