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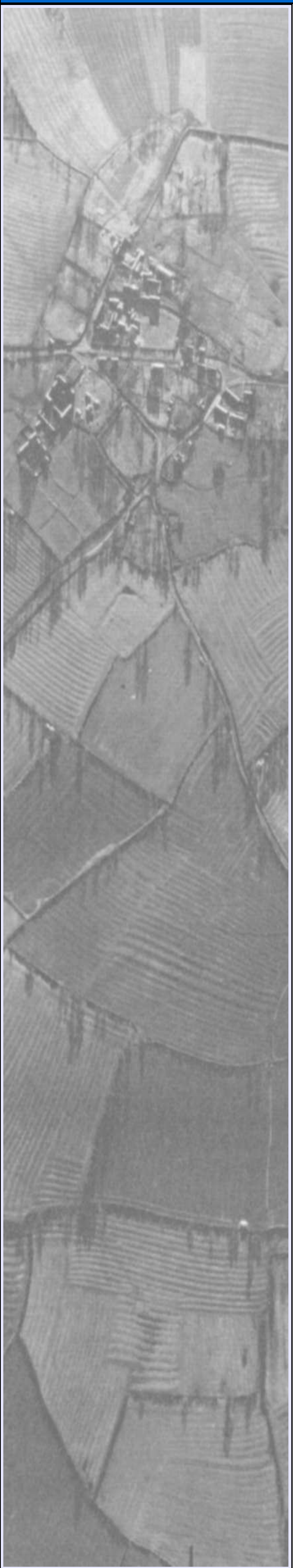

Land near Grovelands Way, Warminster, Wiltshire

GEOPHYSICAL SURVEY REPORT

for

Wiltshire Council Archaeology Service

David Sabin and Kerry Donaldson

April 2012

Ref. no. 399

ARCHAEOLOGICAL SURVEYS LTD

Land near Grovelands Way, Warminster, Wiltshire

Geophysical Survey

for

Wiltshire Council Archaeology Service

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

Survey date – **16th April 2012**
Ordnance Survey Grid Reference **– ST 86665 45370**

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

SUMMARY

Archaeological Surveys Ltd undertook magnetometry and resistivity for Wiltshire Council Archaeology Service over an area of land near Grovelands Way, Warminster, Wiltshire. Recent intrusive works associated with a new pipeline revealed the presence of Romano-British pottery sherds and burnt stone.

The results of the survey suggest that it is unlikely that there are any cut features or structural remains of archaeological potential. The area is low lying and damp as it is immediately adjacent to a small stream known as The Were. The conditions appear unsuitable for habitation, and it is considered possible that the Roman material is related to dumping and possible ground make-up in the vicinity of an area of habitation.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Wiltshire Council Archaeology Service to undertake magnetometry and resistivity of an area of land near Grovelands Way, Warminster, Wiltshire. Recent intrusive works associated with a new pipeline revealed the presence of Romano-British pottery sherds and burnt stone. The survey forms part of an archaeological assessment of an area of unknown archaeological potential.

1.2 Survey objectives and techniques

1.2.1 The objective of the survey was to use magnetometry and resistivity to locate geophysical anomalies that may be archaeological in origin and that could infer previous land use, period of occupation/activity and state of preservation.

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

1.3 Site location, description and survey conditions

1.3.1 The site is located to the north east of Grovelands Way on the northern edge of Warminster in Wiltshire and centred on Ordnance Survey National Grid Reference (OS NGR) ST 86665 45370, see Figures 01 and 02.

1.3.2 The geophysical survey covers approximately 0.25ha of scrubby land split into two areas, referred to as Areas 1 and 2 for the purposes of this report. Area 1 belongs to Richard Newton and was the location of Romano-British pottery sherds found after recent groundworks. Area 2 belongs to Warminster School and lies immediately to the east of Area 1. A small brook known as The Were bounds the northern side of the survey areas. The land cover is unmanaged and consists of grasses, wild plants, briars, areas of thorn and young trees.

1.3.3 The ground conditions across the site limited the area available for survey. Weather conditions during the survey were mainly fine.

1.4 Site history and archaeological potential

1.4.1 A local resident discovered Romano-British pottery sherds and burnt stone within ground disturbed by construction of a pipeline running through the western part of the site. It was considered by Wiltshire Council Archaeology Service that there may be some potential to gather further archaeological information in an area of previously unrecorded Roman remains.

1.4.2 The Wiltshire online SMR (2011) records several Romano-British find spots within the wider area. This includes one sherd of Late Iron Age/Early Romano-British pottery from 350m to the east in the school grounds, a findspot of several Roman coins some 1.4km south west and a possible Romano-British settlement located approximately 2.2km south west, close to the Iron Age hillfort of Cley Hill. The SMR also records that the RCHME had plotted some features immediately to the south of the site which related to former allotments.

1.4.3 There may be a high potential for archaeological features within the site as Romano-British material has been located in recently disturbed ground. There is also evidence for further Romano-British activity and possible settlement within the wider vicinity. However, nearby former allotments and possible dumping or ground make up within the site may result in anomalies of modern origin.

1.5 Geology and soils

1.5.1 The underlying geology is sandstone from the Shaftesbury Sandstone member (Upper Greensand) with overlying alluvial deposits of clay, silt, sand and gravel (BGS, 2012).

1.5.2 The overlying soils across the site are from the Frome association which are calcareous alluvial gley soils. These consist of shallow, calcareous and non-calcareous loamy soils over flint gravel affected by groundwater (Soil Survey of England and Wales, 1983).

2 METHODOLOGY

2.1 Technical synopsis - magnetometry

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 Technical synopsis - earth resistance survey

2.2.1 The electrical resistance or resistivity of the soil depends upon the moisture content and distribution within the soil. Buried features such as walls can affect the moisture distribution and are usually more moisture resistant than other features such as the infill of a ditch. A stone wall will generally give a high resistance response and the moisture retentive content of a ditch can give a low resistance response. Localised variations in resistance are measured in ohms (Ω) which is the SI unit for electrical impedance or resistance.

2.2.2 The Twin Probe configuration used in this survey is favoured for archaeological prospection and can give a response to features up to 1m in depth with a mobile probe separation of 0.5m.

2.3 Equipment configuration and data collection - magnetometry

2.3.1 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.

2.3.2 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.

2.3.3 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.

2.3.4 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.

2.3.5 The Bartington gradiometer undergoes 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
Date of certified calibration/service	Sensors 084 and 085 - 6th August 2010 (due Aug 2012)
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.

2.3.6 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).

2.4 Equipment configuration and data collection - earth resistance survey

2.4.1 The earth resistance survey was carried out using a TR Systems Ltd Resistance Meter TRCIA 1.31 using a mobile Twin Probe array. The standard mobile frame for the TRCIA instrument has a 0.5m electrode separation.

2.4.2 The Twin Probe array requires two remotely place probes linked to the mobile frame by a cable. The remote probes were placed at a distance of 15m to the nearest point of the survey grid in order to minimise changes in resistance relating to their proximity.

2.4.3 Data were collected at 1m centres along traverses 1m apart. The survey area was separated into 20m by 20m grids (400m²) giving 400 recorded measurements per grid.

2.5 Survey grid and base mapping

2.5.1 Magnetometer and earth resistance survey used a common survey baseline, but with the magnetometry carried out over 30m grids and the earth resistance over 20m grids, see Figure 02.

2.5.2 Georeferenced base mapping was supplied by Wiltshire Council as part of the project.

2.5.3 The survey grids were set out to the Ordnance Survey OSGB36 datum using a Penmap 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. The instrument is regularly checked against the ETRS89 reference framework using Ordnance Survey ground marker C1ST7784 (Horton).

2.6 Data processing and presentation

2.6.1 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.

2.6.2 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,
- de-stagger is used to enhance linear 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.

2.6.3 Data logged by the resistance meter are downloaded and processed within ArcheoSurveyor software. Raw data are analysed and displayed within the report as well as processed data. The following processing has been carried out on earth resistance data captured by this survey:

- raw earth resistance data have been shown with absolute readings of between 33.03Ω and 13.24Ω for Area 1 and between 30.22Ω and 14.42Ω for Area 2,
- processed data have been clipped at 2SD with values of between 18.04Ω and 13.33Ω for Area 1 and 22.97Ω and 14.61Ω for Area 2 to enhance any possible archaeological anomalies.

2.7 Data presentation

2.7.1 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.

2.7.2 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.

2.7.3 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 upon insertion into AutoCAD.

2.7.4 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.

2.7.5 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 overview

3.1.1 Magnetometry revealed positive and discrete linear anomalies of uncertain origin, areas of magnetic debris and areas of magnetic disturbance. Earth resistance survey located high and low resistance anomalies of uncertain origin.

3.2 Magnetometry

3.2.1 The detailed magnetic survey was carried out over a total of two survey areas covering approximately 0.25ha. Anomalies located within each survey area have been numbered and are described below.

3.2.2 Data appear representative of the magnetic conditions encountered within the site. The area available for survey was restricted by vegetation, in particular briars and young trees.

3.2.3 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 an uncertain origin AS-ABST MAG POS LINEAR UNCERTAIN AS-ABST MAG POS DISCRETE 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 with an associated negative response.
Anomalies associated with magnetic debris AS-ABST MAG DEBRIS AS-ABST MAG STRONG DIPOLAR	Magnetic debris often appears as areas containing many small dipolar anomalies that may range from weak to very strong in magnitude. It often occurs where there has been dumping or ground make-up and is related to magnetically thermoremnant materials such as brick or tile or other small fragments of ferrous material. This type of response is occasionally associated with kilns, furnace structures, or hearths and may therefore be archaeologically significant. It is also possible that the response may be caused by natural material such as certain gravels and fragments of igneous or metamorphic rock. Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.

Anomalies with a modern origin AS-ABST MAG DISTURBANCE	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 magnetic interpretation categories

3.3 List of magnetic anomalies - Area 1

Area centred on OS NGR 386637 145371, see Figures 03 – 05.

Anomalies with an uncertain origin

(1) – Area 1 contains two weakly positive linear anomalies (3nT), that are oriented north east to south west. They are short and lack a coherent form, and although they could relate to cut features, their origin is uncertain.

Anomalies associated with magnetic debris

(2) – The survey area contains several patches of magnetic debris containing strongly dipolar anomalies. These are likely to be a response to ferrous or other magnetically thermoremnant material.

Anomalies with a modern origin

(3) – Magnetic disturbance is a response to an inspection cover at the eastern end of the survey area, and other ferrous material on the southern side.

3.4 List of magnetic anomalies - Area 2

Area centred on OS NGR 36693 145362, see Figures 03 – 05.

Anomalies with an uncertain origin

(4) – A series of moderately strong linear anomalies (up to 60nT), appear to form a partially rectilinear feature. Other linear anomalies are also evident at a different orientation, but appear to be a response to similar material. It is possible that they relate to brick or other ceramic material, possibly a former structural base or land drains. No structure is recorded on any Ordnance Survey mapping from 1887

onwards, however the RCHME has recorded features within allotments immediately to the south.

(5) – A positive linear anomaly of uncertain origin crosses the southern part of the survey area. The anomaly may represent a former ditch-like feature.

(6) – The area contains several discrete positive anomalies that may represent pit-like features.

3.5 Earth resistance survey

3.5.1 The earth resistance survey was carried out over a total of two survey areas covering approximately 0.25ha. Anomalies located within each survey area have been numbered and are described below.

3.5.2 Data appear representative of the resistive properties of the soil across the site. The area available for survey was restricted by vegetation, in particular briars and thorn thickets.

3.5.3 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 resistive 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 RES HIGH LINEAR UNCERTAIN AS-ABST RES HIGH AREA UNCERTAIN AS-ABST RES LOW 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. High resistance anomalies may be indicative of structural remains, areas of ground make-up, soil depleted of moisture by vegetation, etc.. Low resistance anomalies may indicate moisture retentive soil within cut features, such as ditches and pit-like features or other depressions.

Table 3: List and description of resistive interpretation categories

3.6 List of resistive anomalies - Area 1

Area centred on OS NGR 386637 145371, see Figures 06 – 08.

Anomalies with an uncertain origin

(7) – A broadly linear zone of high resistance of uncertain origin. The response may indicate naturally deposited alluvial material or made ground.

(8) – A high resistance linear anomaly that may be a response to a pipeline.

(9) – A broadly low resistance zone indicative of moisture retentive soil. The feature may be natural in origin.

3.7 List of resistive anomalies - Area 2

Area centred on OS NGR 36693 145362, see Figures 06 – 08.

Anomalies with an uncertain origin

(10) – An area of low resistance indicative of more moisture retentive soil.

(11) – Areas of high resistance may be associated with disturbed ground.

(12) – A high resistance linear anomaly in the south eastern part of the survey area is of uncertain origin although it may indicate the presence of structural remains.

4 CONCLUSION

4.1.1 The results of the geophysical survey do not indicate the presence of features of archaeological potential within the survey areas. Linear and rectilinear anomalies within Area 2 may indicate former structural remains, although the high magnitude of the magnetic anomalies suggests the presence of magnetically thermoremnant material such as brick.

4.1.2 Romano-British pottery sherds and burnt stone discovered during recent intrusive works within Area 1 do not appear to be associated with structural remains or former cut features. The very damp conditions and the location of the site adjacent to The Were would tend to indicate a site unsuitable for habitation, although this would not preclude the presence of early water management features. However, the material may relate to a convenient dumping ground within close vicinity to Roman habitation.

5 REFERENCES

British Geological Survey, 2012. *Geology of Britain viewer, 1:50 000 scale [online]* available from http://maps.bgs.ac.uk/geologyviewer/ [accessed 24/4/2012].

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.*

Wiltshire Council, 2011. Wiltshire and Swindon Sites and Monument Record Search [online] available from http://history.wiltshire.gov.uk/smr/smr_search.php [accessed 24/4/2012].

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.

Edge Match

Calculates the mean of the 2 lines (rows or columns) of data either side of the edge to match. It then subtracts the difference between the means from all datapoints in the selected area.

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 1 raw resistance data

COMPOSITE
Filename: J399-res-Area1.xcp
Instrument Type: TRCIA (Resistance)
Units: Ohm
Surveyed by: on 16/04/2012
Assembled by: on 16/04/2012
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 0 @ 0.00 m spacing.
Dummy Value: 32702.00

Dimensions
Composite Size (readings): 20 x 80
Survey Size (meters): 20.00m x 80.00 m
Grid Size: 20.00 m x 20.00 m
X Interval: 1.00 m
Y Interval: 1.00 m

Stats
Max: 33.03
Min: 13.24
Std Dev: 1.18
Mean: 15.69
Median: 15.59
Composite Area: 0.16 ha
Surveyed Area: 0.09 ha

PROGRAM
Name: ArcheoSurveyor
Version: 2.5.16.0

Processes: 1
1 Base Layer

Source Grids: 4
1 Col:0 Row:0 grids\01.xgd
2 Col:0 Row:1 grids\02.xgd
3 Col:0 Row:2 grids\03.xgd
4 Col:0 Row:3 grids\04.xgd

Area 1 processed resistance data

COMPOSITE
Path: D:\Business\Jobs\J399 Warminster\Data\Res\Area 1\comps\

Stats
Max: 18.05
Min: 13.34
Std Dev: 0.94
Mean: 15.66
Median: 15.59
Composite Area: 0.16 ha
Surveyed Area: 0.09 ha

Processes: 2
1 Base Layer
2 Clip at 2.00 SD

Area 2 raw resistance data

COMPOSITE
Filename: J399-res-Area2.xcp
Instrument Type: TRCIA (Resistance)
Units: Ohm
Surveyed by: on 16/04/2012
Assembled by: on 16/04/2012
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 0 @ 0.00 m spacing.
Dummy Value: 32702.00

Dimensions
Composite Size (readings): 40 x 40
Survey Size (meters): 40.00m x 40.00 m
Grid Size: 20.00 m x 20.00 m
X Interval: 1.00 m
Y Interval: 1.00 m

Stats
Max: 30.22
Min: 14.42
Std Dev: 2.09
Mean: 18.79
Median: 18.45
Composite Area: 0.16 ha
Surveyed Area: 0.09 ha

Processes: 1
1 Base Layer

Source Grids: 4
1 Col:0 Row:0 grids\03.xgd
2 Col:0 Row:1 grids\04.xgd
3 Col:1 Row:0 grids\01.xgd
4 Col:1 Row:1 grids\02.xgd

Area 2 processed resistance data

COMPOSITE
Filename: J399-res-Area2-proc.xcp

Stats
Max: 22.97
Min: 14.61
Std Dev: 1.82
Mean: 18.70
Median: 18.45
Composite Area: 0.16 ha
Surveyed Area: 0.09 ha

Processes: 2
1 Base Layer
2 Clip at 2.00 SD

Area 1 raw magnetometer data

COMPOSITE
Filename: J399-mag-Area1-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 16/04/2012
Assembled by: on 16/04/2012
Direction of 1st Traverse: 135 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702.00

Dimensions
Composite Size (readings): 120 x 90
Survey Size (meters): 30.00m x 90.00 m
Grid Size: 30.00 m x 30.00 m
X Interval: 0.25 m
Y Interval: 1.00 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 13.19
Mean: -2.48
Median: -0.32
Composite Area: 0.27 ha
Surveyed Area: 0.08 ha

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

Source Grids: 3
1 Col:0 Row:0 grids\01.xgd
2 Col:0 Row:1 grids\02.xgd
3 Col:0 Row:2 grids\03.xgd

Area 1 processed magnetometer data

COMPOSITE
Filename: J399-mag-Area1-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 2.12
Mean: -0.26
Median: -0.19
Composite Area: 0.27 ha
Surveyed Area: 0.08 ha

Processes: 3
1 Base Layer
2 DeStripe Mean Traverse: Grids: All Threshold: 0.5 SDs
3 Clip from -3.00 to 3.00 nT

Area 2 raw magnetometer data

COMPOSITE
Filename: J399-mag-Area2-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 16/04/2012
Assembled by: on 16/04/2012
Direction of 1st Traverse: 135 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702.00

Dimensions

Composite Size (readings): 240 x 60
Survey Size (meters): 60.00m x 60.00 m
Grid Size: 30.00 m x 30.00 m
X Interval: 0.25 m
Y Interval: 1.00 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 7.56
Mean: 1.59
Median: 0.15
Composite Area: 0.36 ha
Surveyed Area: 0.08 ha

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

Source Grids: 3
1 Col:0 Row:0 grids\03.xgd
2 Col:1 Row:0 grids\01.xgd
3 Col:1 Row:1 grids\02.xgd

Area 2 processed magnetometer data

COMPOSITE
Filename: J399-mag-Area2-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.99
Mean: 0.20
Median: 0.20
Composite Area: 0.36 ha
Surveyed Area: 0.08 ha

Processes: 5
1 Base Layer
2 DeStripe Mean Traverse: Grids: All Threshold: 0.5 SDs
3 Clip from -3.00 to 3.00 nT
4 De Stagger: Grids: All Mode: Both By: 1 intervals
5 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.

Surveys are reported on in hardcopy (recycled paper) using A4 for text and A3 for plots (all plots are scaled for A3). Two reports will be supplied to Wiltshire HER and also uploaded to Oasis.

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

- ArcheoSurveyor version 2.5.16.0 (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:

- 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.