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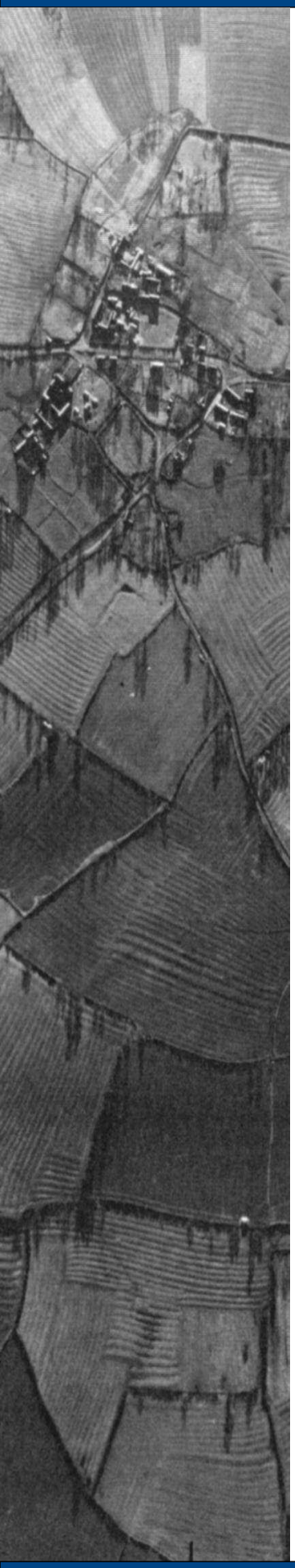

Roves Farm
Sevenhampton, Swindon

MAGNETOMETER SURVEY REPORT

for

AEE Renewables plc

David Sabin and Kerry Donaldson

April 2011

Ref. no. 362

ARCHAEOLOGICAL SURVEYS LTD

Roves Farm, Sevenhampton, Swindon

Magnetometer Survey

for

AEE Renewables plc

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

Survey dates **- 5th to 12th April 2011**
Ordnance Survey Grid Reference - **SU 204 889**

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SUMMARY

A magnetometer survey was commissioned by AEE Renewables plc on land at Roves Farm, Sevenhampton, near Swindon. The site has been outlined for the proposed development of an array of photovoltaic solar panels. A previous geophysical survey was targeted on a sub-rectangular enclosure identified from aerial photographs, and this area was excluded from the development zone.

The survey located evidence for widespread archaeological features within a zone of approximately 6.5ha. The original sub-rectangular enclosure is further enclosed by boundary ditches on its eastern, western and northern sides, with double ditches forming trackways extending to the north east and north west. Immediately to the east of the original enclosure are several positive linear, rectilinear, curvilinear and discrete anomalies representing ditches and pits with archaeological potential. To the north of the trackway feature are further linear and rectilinear anomalies that are likely to extend northwards beyond the limits of the survey area.

There is evidence for at least a further seven ring ditch features within the proposed development zone. All of these have associated internal and external ditches and pits suggesting settlement. In the northern part of the site (Area 2), four ring ditches appear to be associated with at least two sub-rectangular enclosures containing internal and external pits. Prehistoric pottery was visible on the field surface within the vicinity.

The widespread location of the geophysical anomalies form a landscape of land divisions, trackways and settlement features likely to date to both the prehistoric and Roman periods. Many of the anomalies are weak and fragmented suggesting agricultural destruction through arable cultivation. The features relating to the anomalies are likely to be shallow and vulnerable to further disturbance.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by AEE Renewables plc to undertake a magnetometer survey of an area of land at Roves Farm, Sevenhampton, to the north east of Swindon. The site has been outlined for the proposed development of an array of photovoltaic solar panels. The survey enhances the archaeological knowledge of the site.

1.1.2 The geophysical survey was carried out at the request of Melanie Pomeroy-Kellinger, Wiltshire County Archaeologist. An initial geophysical survey was carried out over cropmark features relating to a prehistoric enclosure in the central southern part of the site (Archaeological Surveys, 2010), which has subsequently been removed from the development area.

1.2 Survey aims, objectives and techniques

1.2.1 The aim of the survey is 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.

1.2.2 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.

1.2.3 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; 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 at Roves Farm, Sevenhampton, to the north east of Swindon. It is centred on Ordnance Survey National Grid Reference (OS NGR) SU 20460 88920, see Figures 01 and 02.

1.3.2 The magnetometry covers an area of 13.5ha within two arable fields covering approximately 35ha. The survey is separated into: Area 1, covering the southern array of solar panels; Area 2, covering the northern array; Area 3, covering the cable link between the southern and northern arrays. Area 1 is split into separate survey zones due to the shape of the area and to accommodate the previous survey, see Figure 02. Area 1a represents the original survey (now removed from the potential development) Area 1b is the section to the east of Area 1a, Area 1c is to the west of Area 1a, Area 1d is to the north of Area 1a and Area 1e is to the north of the beetle bank. Area 3 is separated into subsections a, b and c so as to accommodate changes in the direction of the cable.

Plate 1: Survey Area 1 looking towards the north west

1.3.3 The far northern part of Area 1e and the far eastern part of Area 2 were unsurveyable due to rough and lose soil due to recent cultivation. The majority of both Areas 1 and 2 contained short stubble although the ground surface was quite uneven and very dry. Area 3 generally followed the route of a grassed agricultural track. Area 1 slopes down gently towards the south whilst Area 2 is mainly flat, though tending to slope down to the north within the northern half of the survey area.

1.3.4 The ground conditions across the site were generally considered to be favourable for the collection of magnetometry data though surfaces were often poor due to rutting and uneveness. Weather conditions during the survey were mainly dry and warm.

1.4 Site history and archaeological potential

1.4.1 The previous survey carried out by Archaeological Surveys (2010) was targeted on an undated square enclosure visible as a cropmark on aerial photographs and listed within the Wiltshire Sites and Monuments Record as SMR NO. SU28NW602. To the north west of this feature is listed another rectilinear enclosure (SMR NO. SU28NW618), and it is possible that part of the survey area covers part of this feature. Romano-British pottery from the 2nd to 4th centuries is recorded from pits just on the south western edge of the area (SMR NO. SU28NW304) and some 600m to the north east, evidence for Romano-British settlement was discovered in 1972 within a trial trench.

1.4.2 Cultural material noted on the field surface during the fieldwork included

Roman pottery sherds and Pennant tile fragments (or possibly flooring material) in the north western part of Area 1 and small fragments of prehistoric pottery in the southern part of Area 2. The latter consisted of abraded reduced and oxidised fragments with frequent large shelly inclusions and may indicate domestic activity from the mid-Iron Age.

1.5 Geology and soils

1.5.1 The underlying geology is limestone from the Stanford formation, part of the Corallian beds of the Jurassic period (BGS, 2010), with overlying soils from the Sherborne association which are brown rendzinas. These consist of shallow, well-drained, brashy, calcareous, clayey soils formed over limestone (Soil Survey of England and Wales, 1983).

1.5.2 Magnetometer surveys carried out over similar soils in the region have produced good results. There is often a strong contrast between the fill of cut features and the material into which they are cut.

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 The Bartington gradiometers undergo regular servicing and calibration by the manufacturer. A current assessment of the instrument 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.

2.2.5 Data were collected at 0.25m centres along traverses 1m apart. The survey area was separated into 40m by 40m grids (1600m²) giving 6400 measurements per grid, and some 30m by 30m grids (900m²) giving 3600 measurements per grid. This sampling interval is very effective at locating archaeological features and is the recommended methodology for archaeological prospection (English Heritage, 2008).

2.2.6 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).

2.2.7 The survey was carried out within two fields over the area affected by the solar arrays and the interconnecting cable route.

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 ±5nT 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.

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 the survey area. Where further interpretation is possible, or where a number of possible origins should be considered, more subjective discussion is set out in Section 4.

2.3.4 The main form of data display used in 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. Prior to displaying against base mapping, raster graphics require a rotation of` 98° anticlockwise to restore north to the top of th e 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 13.5ha. Geophysical anomalies located can be generally classified as positive linear and discrete positive responses of archaeological potential, positive anomalies of an uncertain origin, linear anomalies of an agricultural origin and strong discrete dipolar anomalies relating to ferrous objects Anomalies have been numbered and are described below with subsequent discussion in Section 4.

3.1.2 Data are considered to be representative of the magnetic anomalies across the site. Some minor positional errors were corrected by data processing, it is likely that these were a consequence of uneven surfaces.

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 CURVILINEAR RING DITCH	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 POS AREA UNCERTAIN	The category applies to a range of anomalies where there is not enough evidence to confidently suggest an origin. Anomalies in this category may well be related to archaeologically significant features, but equally relatively modern features, geological/pedological features and agricultural features should be considered. Positive anomalies are indicative of magnetically enhanced soils that may form the fill of 'cut' features or may be produced by accumulation within layers or 'earthwork' features;

	soils subject to burning may also produce positive anomalies. Negative anomalies are produced by material of comparatively low magnetic susceptibility such as stone and subsoil.
Anomalies with an agricultural origin AS-ABST MAG AGRICULTURAL	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. It is also possible that this type of parallel anomaly relates to land drainage.
Anomalies associated with magnetic debris AS-ABST MAG STRONG DIPOLAR	Magnetic debris often appears as areas containing many small dipolar anomalies that may range from weak to very strong in magnitude. It often occurs where there has been dumping or ground make-up and is related to magnetically thermoremnant materials such as brick or tile or other small fragments of ferrous material. This type of response is occasionally associated with kilns, furnace structures, or hearths and may therefore be archaeologically significant. It is also possible that the response may be caused by natural material such as certain gravels and fragments of igneous or metamorphic rock. Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.
Anomalies with a modern origin AS-ABST MAG DISTURBANCE AS-ABST MAG SERVICE	The magnetic response is often strong and dipolar indicative of ferrous material and may be associated with extant above surface features such as wire fencing, cables, pylons etc.. Often a significant area around such features has a strong magnetic flux which may create magnetic disturbance; such disturbance can effectively obscure low magnitude anomalies if they are present. Fluxgate sensors may respond erratically and with hysteresis adjacent to strong magnetic sources. Buried services may produce characteristic multiple dipolar anomalies dependant upon their construction.

Table 2: List and description of interpretation categories

3.2 List of anomalies - Areas 1 (southern field)

Area centred on OS NGR 420560, 188875, see Figures 03 – 07.

Anomalies (1) to (3) are associated with the original survey area carried out over the rectilinear enclosure. For full results of this trial area please refer to report issued by Archaeological Surveys (2010).

Anomalies of archaeological potential

(1) – A positive rectilinear anomaly is a response to magnetically enhanced material within a ditch, associated with a sub-rectangular enclosure with dimensions of 94m by 77m. There is a 6.5m entrance on the western side and the response to the ditches is approximately 4m wide. Positive linear anomalies can also be seen as external ditches on the northern, north western and south western sides.

(2) – Positive linear anomalies extending from beyond anomaly (1) to the south. One linear then extends generally northwards, and the others westwards and north westwards forming a “Y” or funnel shaped feature. It appears to form an

elaborate trackway or entranceway that possibly underlies the enclosure.

(3) – Positive curvilinear anomalies representing at least two penannular ring ditches likely to relate to a former round houses. There is some evidence for internal pits and/or areas of burning. Several other weak or fragmented positive curvilinear and discrete anomalies have also been located and these may also relate to former ring-ditches and associated cut features.

(4) – Positive linear, curvilinear, rectilinear and discrete anomalies, located on the eastern side of anomaly (1) and representing archaeological cut features.

(5) – A series of positive linear anomalies representing ditches forming trackways leading to anomaly (1) from the north east and north west, and then forming a surrounding ditch on the eastern and western sides

(6) – Positive linear and rectilinear anomalies extending northwards from anomaly (5) relating to ditches and enclosures. These appear to extend northwards beyond the survey area.

(7) – A series of positive linear, rectilinear and discrete anomalies located within and to the north of the north western edge of anomaly (5). These anomalies are within the vicinity of the undated enclosure (SMR NO. SU28NW618) and it is possible that they are associated. These anomalies also appear to extend northwards and westwards beyond the confines of the survey area.

(8) – Located towards the north eastern edge of Area 1 is a weak positive curvilinear anomaly appearing to represent a ring-ditch with an 11m diameter. It appears to contain a central area of magnetic enhancement. Close to it is a positive linear anomaly and other discrete anomalies likely to relate to a ditch and pits with some archaeological potential.

Anomalies with an uncertain origin

(9) – A positive linear anomaly located parallel to and 100m east of the western field boundary. It is parallel with other agricultural marks/land drains and may be directly associated.

(10) – Weak positive linear anomalies may relate to agricultural activity but this is uncertain.

(11) – The survey area contains several weakly positive patches. It is possible that these relate to former quarrying although this is not certain.

Anomalies with an agricultural origin

(12) – A series of parallel linear anomalies extend across the survey area with a north-north-west to south-south-east orientation. These are likely to have been caused by agricultural activity or relate to land drains and appear to have partially affected or removed the archaeological features.

Anomalies with a modern origin

(13) – A water pipe extends from the southern edge of the survey area in a north-north-easterly direction. It then appears to follow the line of a former field boundary, now partially under the northern beetle bank. It has partially removed the eastern extension of anomaly (5).

(14) – Two areas of magnetic disturbance caused by the steel legs of a solar module table.

3.3 List of anomalies - Area 2 (northern field)

Area centred on OS NGR 420250,189090, see Figures 09 – 12.

Anomalies of archaeological potential

(15) – Area 2 contains at least four positive curvilinear anomalies relating to ring ditches. Each has an internal diameter of 10m to 13.5m. There is some evidence for associated internal pits or areas of magnetic enhancement which may suggest areas of burning.

(16) – Sub-rectangular enclosures and associated pits located in the vicinity of anomalies (15) and likely to be associated.

(17) – A positive linear anomaly extending across the south eastern corner of Area 2 appears to relate to a boundary ditch defining the edge of anomalies (15) and (16). It has been truncated by a former field boundary (22) and it is likely to extend beyond the limits of the survey area to the south and east.

(18) – An “L” shaped positive linear anomaly to the north of anomalies (15) appears to relate to a truncated ditch.

Anomalies with an uncertain origin

(19) – A weak, positive curvilinear anomaly located close to the south eastern corner of Area 2. Although an archaeological origin should be considered, its low magnitude has prevented confident interpretation.

(20) – A weak positive linear, and an amorphous anomaly, located in the northern part of the survey area. It is not possible to determine the origin of these anomalies.

(21) – Area 2 contains several weak positive linear and discrete anomalies that appear to form ditch-like and pit-like features; however, their origin is uncertain.

Anomalies associated with land management

(22) – A positive rectilinear anomaly and associated magnetic debris relate to the line of a former field boundary, removed sometime after 1978.

Anomalies with an agricultural origin

(23) – Area 2 contains several sets of parallel linear anomalies that relate to former agricultural activity.

Anomalies with a modern origin

(24) – Two circular areas of magnetic disturbance caused by the steel legs of the solar module table that have been inserted into the ground.

3.4 List of anomalies - Area 3 (cable route)

Area centred on OS NGR 420230,188940, see Figures 13 & 14.

Anomalies of archaeological potential

(25) – Two positive curvilinear anomalies, relating to ring ditches, have diameters of between 9.5m and 10.5m and appear to have some associated pits or areas of magnetic enhancement.

(26) – Positive linear anomalies, representing ditches possibly associated with anomalies (25).

Anomalies with an uncertain origin

(27) – Positive linear and discrete anomalies may relate to cut ditch-like and pit-like features.

Anomalies with an agricultural origin

(28) – A series of parallel linear anomalies appear to relate to agricultural activity, and a negative linear anomaly extends around the edge of the survey area and is likely to be associated with a modern agricultural track.

Anomalies associated with magnetic debris

(29) – Strong discrete dipolar anomalies are likely to be associated with ferrous or other magnetically thermoremnant material within the topsoil.

4 DISCUSSION

4.1.1 The original survey (Area 1a) located a sub-rectangular enclosure with dimensions of approximately 100m by 85m, containing several ring-ditches and associated cut features and areas of magnetic enhancement. This area has been excluded from the application area, but the results have been shown and commented on for context.

4.1.2 Beyond this enclosure, further geophysical anomalies with archaeological potential have been located within a zone of approximately 6.5ha. These anomalies are likely to extend southwards and northwards from Area 1, with an estimate of a further 5ha between Areas 1 and 2 that is likely to contain archaeological features.

4.1.3 Two trackways, defined by parallel linear anomalies some 11m to 13m apart, can be seen extending towards the sub-rectilinear enclosure from the north east and north west. They then extend southwards parallel to the eastern and western edges of the enclosure, forming an outer zone of linear ditches. The eastern extension of the trackway feature appears to extend towards a solitary ring ditch on the north eastern edge of the survey area, while the western extension appears to be associated with several linear ditches and rectilinear enclosures, both within its confines and directly to the north. These features appear to extend northwards beyond the limits of the survey area and it is possible that they may extend as far as Area 2, although this is conjectural.

4.1.4 Two ring-ditches and other associated linear features have been located within the line of the interconnecting cable route. It is possible that anomalies within Area 3 and the north eastern part of Area 1 may relate to a sub-rectangular enclosure seen on aerial photos and recorded as (SMR NO. SU28NW618).

4.1.5 In Area 2, the northern field, there is evidence for at least four ring-ditches and at least two sub-rectangular enclosures. The ring-ditches have internal diameters of between 10m and 13.5m, and the sub-rectangular enclosures have dimensions of 15m by 16m and 14m by 9.5m. There is evidence for internal features within both the ring-ditches and sub-rectangular enclosures and also external pits. A positive linear anomaly appears to relate to a boundary ditch enclosing these features. It would appear that these features are associated with Iron Age settlement; however, a funerary associated cannot be ruled out without further archaeological investigation.

5 CONCLUSION

5.1.1 The magnetometer survey has defined an area of archaeological potential over some 6.5ha. This includes a sub-rectangular enclosure located within a previous geophysical survey, and also further trackways, boundary ditches, ring ditches and enclosures.

5.1.2 Further ring ditches, sub-rectangular enclosures, linear and rectilinear ditches and pits have also been located in the northern part of the site and within the interconnecting cable route.

5.1.3 The weak and fragmented nature of a number of anomalies within the enclosure (Area 1a) and within the northern survey area (Area 2) tend to suggest agricultural erosion and disturbance. It is likely that features have already been removed by modern cultivation, and the results suggest the site is very vulnerable to continued ploughing. The site may provide a useful archaeological resource for the transition from the late Iron Age into the Roman period within the Swindon region.

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Appendix A – basic principles of magnetic survey

Iron minerals are always present to some degree within the topsoil and enhancement associated with human activity is related to increases in the level of magnetic susceptibility and thermoremnant material.

Magnetic susceptibility is an induced magnetism within a material when it is in the presence of a magnetic field. This can be thought of as effectively permanent due to the presence of the Earth's magnetic field.

Thermoremnant magnetism occurs when ferrous material is heated beyond a specific temperature known as the Curie Point. Demagnetisation occurs at this temperature with re-magnetisation by the Earth's magnetic field upon cooling.

Enhancement of magnetic susceptibility can occur in areas subject to burning and complex fermentation processes on biological material; these are frequently associated with human settlement. Thermoremnant features include ovens, hearths, and kilns. In addition thermoremnant material such as tile and brick may also be associated with human activity and settlement.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil can create an area of enhancement compared with surrounding soils and subsoils into which the feature is cut. Mapping enhanced areas will produce linear and discrete anomalies allowing an assessment and characterisation of hidden subsurface features.

It should be noted that areas of negative enhancement can be produced from material having lower magnetic properties compared to the topsoil. This is common for many sedimentary bedrocks and subsoils which were often used in the construction of banks and walls etc. Mapping these 'negative' anomalies may also reveal archaeological features.

Magnetic survey or magnetometry can be carried out using a fluxgate gradiometer and may be referred to as gradiometry. The gradiometer is a passive instrument consisting of two fluxgate sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the upper sensor measures the Earth's magnetic field as does the lower sensor but this is influenced to a greater degree by any localised buried field. The difference between the two sensors will relate to the strength the magnetic field created by the buried feature. If no enhanced feature is present the field measured by both sensors will be similar and the difference close to zero.

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

Appendix B – data processing notes

Clipping

Minimum and maximum values are set and replace data outside of the range with those values. Extreme values are removed improving colour or greyscale contrast associated with data values that may be archaeologically significant. It has been found that clipping data to ranges between ±5nT and ±1nT often improves the appearance of features associated with archaeology. Different ranges are applied to data in order to determine the most suitable for anomaly abstraction and display.

Zero Median/Mean Traverse

The median (or mean) of each traverse is calculated ignoring data outside a threshold value, the median (or mean) is then subtracted from the traverse. The process is used to equalise slight differences between the set-up and stability of gradiometer sensors and can remove striping. The process can remove archaeological features that run along a traverse so data analysis is also carried out prior its application.

De-stagger

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

Deslope

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

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

Raw magnetometry data - original survey (Area 1a)

COMPOSITE
Filename: J342-mag-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 09/11/2010
Assembled by: on 09/11/2010
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 480 x 120
Survey Size (meters): 120 m x 120 m
Grid Size: 40 m x 40 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 5.77
Mean: -0.21
Median: -0.74
Composite Area: 1.44 ha
Surveyed Area: 1.44 ha

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

Source Grids: 9
1 Col:0 Row:0 grids\11.xgd
2 Col:0 Row:1 grids\12.xgd
3 Col:0 Row:2 grids\09.xgd
4 Col:1 Row:0 grids\04.xgd
5 Col:1 Row:1 grids\05.xgd
6 Col:1 Row:2 grids\06.xgd
7 Col:2 Row:0 grids\01.xgd
8 Col:2 Row:1 grids\13.xgd
9 Col:2 Row:2 grids\03.xgd

Data processing

Filename: J342-mag-proc.xcp

Processes: 4
1 Base Layer
2 DeStripe Mean Traverse: Grids: All Threshold: 0.5 SDs
3 Clip from -10.00 to 10.00 nT
4 De Stagger: Grids: 03.xgd Mode: Outbound By: 1 intervals

Area 1b raw magnetometry data

COMPOSITE
Filename: J362-mag-Area1b-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 07/04/2011
Assembled by: on 07/04/2011
Direction of 1st Traverse: 270 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 1120 x 160
Survey Size (meters): 280 m x 160 m
Grid Size: 40 m x 40 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 5.74
Mean: -0.27
Median: -0.11
Composite Area: 4.48 ha
Surveyed Area: 3.515 ha

Processes: 5
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 De Stagger: Grids: 25.xgd 26.xgd Mode: Both By: 1 intervals
4 De Stagger: Grids: SubGrid (Area: Top 12, Left 800, Bottom 33, Right 959) Mode: Both By: 2 intervals
5 De Stagger: Grids: SubGrid (Area: Top 46, Left 800, Bottom 89, Right 959) Mode: Both By: -1 intervals

Source Grids: 28
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
5 Col:1 Row:0 grids\05.xgd
6 Col:1 Row:1 grids\06.xgd
7 Col:1 Row:2 grids\07.xgd
8 Col:1 Row:3 grids\08.xgd
9 Col:2 Row:0 grids\09.xgd
10 Col:2 Row:1 grids\10.xgd
11 Col:2 Row:2 grids\11.xgd
12 Col:2 Row:3 grids\12.xgd
13 Col:3 Row:0 grids\13.xgd
14 Col:3 Row:1 grids\14.xgd
15 Col:3 Row:2 grids\15.xgd
16 Col:3 Row:3 grids\16.xgd
17 Col:4 Row:0 grids\17.xgd
18 Col:4 Row:1 grids\18.xgd
19 Col:4 Row:2 grids\19.xgd
20 Col:4 Row:3 grids\20.xgd
21 Col:5 Row:0 grids\21.xgd
22 Col:5 Row:1 grids\22.xgd
23 Col:5 Row:2 grids\23.xgd
24 Col:5 Row:3 grids\24.xgd
25 Col:6 Row:0 grids\25.xgd
26 Col:6 Row:1 grids\26.xgd
27 Col:6 Row:2 grids\27.xgd
28 Col:6 Row:3 grids\28.xgd

Area 1b data processing

Filename: J362-mag-Area1b-proc.xcp
Stats
Max: 5.00
Min: -5.00
Std Dev: 1.78
Mean: 0.01
Median: 0.00

Processes: 17
1 Base Layer
2 DeStripe Median Traverse: Grids: All
3 Clip from -30.00 to 30.00 nT
4 De Stagger: Grids: All Mode: Both By: 1 intervals
5 De Stagger: Grids: 21.xgd Mode: Outbound By: 1 intervals
6 De Stagger: Grids: 21.xgd Mode: Outbound By: 1 intervals
7 Move (Area: Top 40, Left 960, Bottom 41, Right 1119) to X 3, Y 0
8 Move (Area: Top 4, Left 800, Bottom 5, Right 960) to X -2, Y 0
9 Move (Area: Top 0, Left 800, Bottom 1, Right 957) to X -2, Y 0
10 De Stagger: Grids: 27.xgd Mode: Outbound By: -1 intervals
11 Clip from -10.00 to 10.00 nT
12 Move (Area: Top 0, Left 957, Bottom 1, Right 1119) to X -2, Y 0
13 Move (Area: Top 28, Left 800, Bottom 29, Right 958) to X 2, Y 0
14 Move (Area: Top 30, Left 801, Bottom 31, Right 960) to X 1, Y 0
15 Move (Area: Top 20, Left 800, Bottom 21, Right 960) to X 1, Y 0
16 Search & Replace From: 1000 To: 1000000000 With: 0 (Area: Top 27, Left 793, Bottom 33, Right 810)
17 Clip from -5.00 to 5.00 nT

Area 1c raw magnetometry data

COMPOSITE
Filename: J362-mag-Area1c-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 08/04/2011
Assembled by: on 08/04/2011
Direction of 1st Traverse: 270 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 640 x 160
Survey Size (meters): 160 m x 160 m
Grid Size: 40 m x 40 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 4.68
Mean: -0.59
Median: -0.44
Composite Area: 2.56 ha
Surveyed Area: 1.972 ha

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

Source Grids: 16
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
5 Col:1 Row:0 grids\05.xgd
6 Col:1 Row:1 grids\06.xgd
7 Col:1 Row:2 grids\07.xgd
8 Col:1 Row:3 grids\08.xgd
9 Col:2 Row:0 grids\09.xgd
10 Col:2 Row:1 grids\10.xgd
11 Col:2 Row:2 grids\11.xgd
12 Col:2 Row:3 grids\12.xgd
13 Col:3 Row:0 grids\13.xgd
14 Col:3 Row:1 grids\14.xgd
15 Col:3 Row:2 grids\15.xgd
16 Col:3 Row:3 grids\16.xgd

Area 1c data processing

Filename: J362-mag-Area1c-proc.xcp

Stats
Max: 5.00
Min: -5.00
Std Dev: 1.62
Mean: -0.05
Median: -0.06
Composite Area: 2.56 ha
Surveyed Area: 1.972 ha

Processes: 9
1 Base Layer
2 DeStripe Median Traverse: Grids: 01.xgd 02.xgd 03.xgd 04.xgd
3 DeStripe Median Traverse: Grids: 13.xgd 14.xgd 15.xgd 16.xgd
4 DeStripe Mean Traverse: Grids: 05.xgd 06.xgd 07.xgd 08.xgd 09.xgd 10.xgd 11.xgd 12.xgd Threshold: 0.5 SDs
5 De Stagger: Grids: 07.xgd Mode: Both By: -1 intervals
6 De Stagger: Grids: 06.xgd Mode: Both By: -1 intervals
7 De Stagger: Grids: 01.xgd Mode: Outbound By: 1 intervals
8 Clip from -10.00 to 10.00 nT
9 Clip from -5.00 to 5.00 nT

Area 1d raw magnetometry data

Filename: J362-mag-Area1d-raw.xcp

Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 08/04/2011
Assembled by: on 08/04/2011
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 240 x 120
Survey Size (meters): 60 m x 120 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: 8.57
Mean: -0.70
Median: -0.66
Composite Area: 0.72 ha
Surveyed Area: 0.4419 ha

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

Source Grids: 8
1 Col:0 Row:0 grids\05.xgd
2 Col:0 Row:1 grids\06.xgd

3 Col:0 Row:2 grids\07.xgd
4 Col:0 Row:3 grids\08.xgd
5 Col:1 Row:0 grids\01.xgd
6 Col:1 Row:1 grids\02.xgd
7 Col:1 Row:2 grids\03.xgd
8 Col:1 Row:3 grids\04.xgd

Area 1d data processing

Filename: J362-mag-Area1d-proc.xcp

Stats
Max: 5.00
Min: -5.00
Std Dev: 2.56
Mean: -0.20
Median: -0.20

Processes: 5
1 Base Layer
2 DeStripe Median Traverse: Grids: 05.xgd
3 DeStripe Median Traverse: Grids: 07.xgd 08.xgd
4 Clip from -10.00 to 10.00 nT
5 Clip from -5.00 to 5.00 nT

Area 1e raw magnetometry data

Filename: J362-mag-Area1e-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 08/04/2011
Assembled by: on 08/04/2011
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 120 x 540
Survey Size (meters): 30 m x 540 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: 3.23
Mean: -0.04
Median: 0.00
Composite Area: 1.62 ha
Surveyed Area: 0.9896 ha

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

Source Grids: 18
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
5 Col:0 Row:4 grids\05.xgd
6 Col:0 Row:5 grids\06.xgd
7 Col:0 Row:6 grids\07.xgd
8 Col:0 Row:7 grids\08.xgd
9 Col:0 Row:8 grids\09.xgd
10 Col:0 Row:9 grids\10.xgd
11 Col:0 Row:10 grids\11.xgd
12 Col:0 Row:11 grids\12.xgd
13 Col:0 Row:12 grids\13.xgd
14 Col:0 Row:13 grids\14.xgd
15 Col:0 Row:14 grids\15.xgd
16 Col:0 Row:15 grids\16.xgd
17 Col:0 Row:16 grids\17.xgd
18 Col:0 Row:17 grids\18.xgd

Area 1e data processing

Filename: J362-mag-Area1e-proc.xcp

Stats
Max: 5.00
Min: -5.00
Std Dev: 1.58
Mean: 0.02
Median: 0.00

Processes: 6
1 Base Layer
2 DeStripe Median Traverse: Grids: All
3 Clip from -10.00 to 10.00 nT
4 De Stagger: Grids: 01.xgd Mode: Both By: -1 intervals
5 Clip from -10.00 to 10.00 nT
6 Clip from -5.00 to 5.00 nT

Area 2 raw magnetometry data

Filename: J362-mag-Area2-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 12/04/2011
Assembled by: on 12/04/2011
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 800 x 440
Survey Size (meters): 200 m x 440 m
Grid Size: 40 m x 40 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 2.42
Mean: -0.02
Median: -0.07
Composite Area: 8.8 ha
Surveyed Area: 5.6331 ha

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

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

Area 2 data processing

Filename: J362-mag-Area2-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 0.76
Mean: -0.01
Median: 0.00
Composite Area: 8.8 ha
Surveyed Area: 5.6329 ha

Processes: 12
1 Base Layer
2 DeStripe Median Traverse: Grids: 03.xgd 16.xgd 17.xgd 06.xgd 19.xgd 20.xgd 09.xgd 22.xgd 23.xgd 12.xgd 25.xgd 26.xgd 15.xgd
3 DeStripe Median Traverse: Grids: 21.xgd 31.xgd 24.xgd 34.xgd 27.xgd 37.xgd
4 DeStripe Median Traverse: Grids: 28.xgd 29.xgd 30.xgd 40.xgd 41.xgd 31.xgd 32.xgd 33.xgd 42.xgd 43.xgd
5 DeStripe Median Traverse: Grids: 36.xgd 44.xgd 45.xgd 39.xgd 46.xgd
6 DeStripe Median Traverse: Grids: 35.xgd
7 DeStripe Mean Traverse: Grids: 38.xgd Threshold: 1 SDs
8 DeStripe Mean Traverse: Grids: 18.xgd Threshold: 1 SDs
9 De Stagger: Grids: 29.xgd 30.xgd 32.xgd 33.xgd Mode: Both By: -1 intervals
10 De Stagger: Grids: 18.xgd Mode: Both By: 1 intervals
11 DeStripe Median Traverse: Grids: 01.xgd 02.xgd 04.xgd 05.xgd 07.xgd 08.xgd 10.xgd 11.xgd 13.xgd 14.xgd
12 Clip from -3.00 to 3.00 nT

Area 3a raw magnetometry data

Filename: J362-mag-Area3a-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 12/04/2011
Assembled by: on 12/04/2011
Direction of 1st Traverse: 270 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 120 x 90
Survey Size (meters): 30 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: 2.70
Mean: 1.30
Median: 1.14
Composite Area: 0.27 ha
Surveyed Area: 0.20295 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 3a data processing

Filename: J362-mag-Area3a-proc.xcp

Stats
Max: 5.00
Min: -5.00
Std Dev: 1.80
Mean: 0.09
Median: 0.00

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

Area 3b raw magnetometry data

Filename: J362-mag-Area3b-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 12/04/2011
Assembled by: on 12/04/2011
Direction of 1st Traverse: 270 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 120 x 120
Survey Size (meters): 30 m x 120 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: 4.84
Mean: 1.06

Median: 0.87
Composite Area: 0.36 ha
Surveyed Area: 0.21355 ha

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

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 3b data processing

Filename: J362-mag-Area3b-proc.xcp

Stats
Max: 5.05
Min: -5.08
Std Dev: 2.52
Mean: 0.05
Median: 0.00

Processes: 4
1 Base Layer
2 DeStripe Median Traverse: Grids: All
3 Clip from -5.00 to 5.00 nT
4 De Stagger: Grids: 03.xgd Mode: Both By: 1 intervals

Area 3c raw magnetometry data

Filename: J362-mag-Area3c-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 12/04/2011
Assembled by: on 12/04/2011
Direction of 1st Traverse: 270 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 120 x 60
Survey Size (meters): 30 m x 60 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: 2.91
Mean: 1.16
Median: 1.40
Composite Area: 0.18 ha
Surveyed Area: 0.098 ha

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

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

Area 3c data processing

Filename: J362-mag-Area3c-proc.xcp

Stats
Max: 5.00
Min: -5.00
Std Dev: 1.36
Mean: -0.01
Median: 0.00

Processes: 4
1 Base Layer
2 DeStripe Median Traverse: Grids: All
3 Clip from -5.00 to 5.00 nT
4 Move (Area: Top 32, Left 0, Bottom 35, Right 119) to X 3, Y 0

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.

- 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 J362 Roves 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).