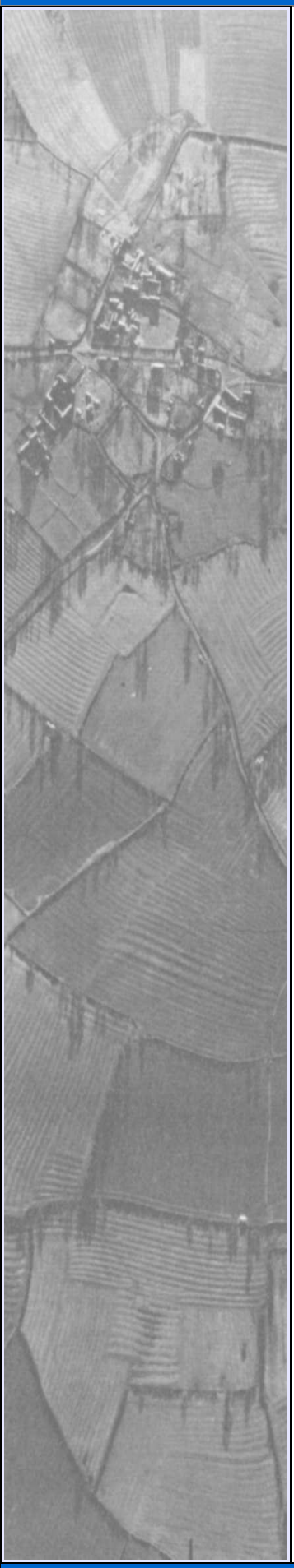

Land south of Horwood Lane
Wickwar
South Gloucestershire

MAGNETOMETER SURVEY REPORT

for

Cotswold Archaeology

Kerry Donaldson & David Sabin

March 2019

Ref. no. J778

ARCHAEOLOGICAL SURVEYS LTD

Land south of Horwood Lane
Wickwar
South Gloucestershire

Magnetometer Survey Report

for

Cotswold Archaeology

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

Survey dates – 18th & 19th March 2019
Ordnance Survey Grid Reference – **ST 72590 87405**

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SUMMARY

Detailed magnetometry was carried out on land to the south of Horwood Lane, on the southern edge of Wickwar in South Gloucestershire, by Archaeological Surveys Ltd. The survey located a number of positive linear and discrete anomalies, with the majority in the western part of the site, that could relate to cut, ditch-like and pit-like features. Several anomalies relate to formerly mapped land boundaries, land drains and ridge and furrow. Many of the anomalies were too weak and indistinct to clearly resolve. Along the southern edge of the site there are a number of anomalies that relate to former plots recorded along the northern edge of Pincots Lane on the 1838 Wickwar Tithe Map. Magnetic debris is also evident and although no buildings have been mapped, it appears the anomalies may be indicative of structural remains and debris.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Cotswold Archaeology to undertake a magnetometer survey of an area of land to the south of Wickwar in South Gloucestershire. The site has been outlined for a proposed residential development, and the survey forms part of an archaeological assessment.

1.1.2 The geophysical survey was carried out in accordance with a Written Scheme of Investigation (WSI) produced by Archaeological Surveys (2018) and issued to Paul Driscoll, South Gloucestershire Council Archaeology and Historic Environment Record Officer, prior to commencing the survey.

1.2 Survey objectives and techniques

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

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

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

1.3.1 The survey and report generally follow the recommendations set out by:

European Archaeological Council (2015) *Guidelines for the Use of Geophysics in Archaeology;* Institute for Archaeologists (2002) *The use of Geophysical Techniques in Archaeological Evaluations.* The work has been carried out to the Chartered Institute for Archaeologists (2014) *Standard and Guidance for Archaeological Geophysical Survey.* Note: currently Historic England (2018) no longer support the guidelines set out in English Heritage (2008) *Geophysical survey in archaeological field evaluation* and there are currently no plans to update the document. As a consequence other sources of written guidance referring to this document may be out of date and/or contain unsupported information *(e.g. Chartered Institute for Archaeologists, 2014).*

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

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

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

1.4 Site location, description and survey conditions

1.4.1 The site is located to the south of Horwood Lane, north of Pincots Lane and east of Sodbury Road on the southern edge of Wickwar in South Gloucestershire. It is centred on Ordnance Survey National Grid Reference (OS NGR) ST 72590 87405, see Figs 01 and 02.

1.4.2 The geophysical survey covers approximately 5.83ha within two pasture fields. The western field, Area 1, was covered in entirety, while only the western third of the eastern field, Area 2, is within the proposed development boundary. The land is generally flat although the eastern side of Area 2 slopes down towards the east.

1.4.3 The ground conditions across the site were generally considered to be favourable for the collection of magnetometry data. Sources of magnetic disturbance were identified within the field boundaries in the form of wire

fencing, steel gateways, etc. Weather conditions during the survey were mainly fine.

Plate 1: Area 1 looking north

1.5 Site history and archaeological potential

1.5.1 An Archaeological Desk-Based Assessment has been compiled for the site (Archaeology Collective, 2017). It outlines that there are no designated or undesignated heritage assets within the site. The land immediately to the north has been subject to a previous geophysical survey and this identified two former field boundaries and ridge and furrow cultivation as well as at least one possible ditch-like feature (Stratascan, 2016). Subsequent evaluation also identified the ditch; however, this remains undated (Cotswold Archaeology, 2018).

1.5.2 The site appears to have been within the agricultural hinterland of Wickwar since at least the medieval period with ploughed out ridge and furrow identified within the site during the English Heritage National Mapping Programme. Two field boundaries have also been recently removed. The 1838 Wickwar Tithe Map also appears to show that the boundary defining the Sodbury Road to the west may have encroached into the western field and that a number of small land plots existed at the southern edge of the western field along the northern edge of Pincots Lane.

1.6 Geology and soils

1.6.1 The underlying solid geology across the western part if the site is Triassic and Jurassic interbedded limestone and mudstone from the Langport Member and

Wilmcote Limestone member. In the centre it is Triassic mudstone from the Westbury Formation and Cotham Member and just on the eastern edge it is Devonian and Carboniferous sandstone from the Tintern Sandstone Member. There are no recorded superficial deposits (BGS, 2017).

1.6.2 The overlying soil across the survey area is from the Denchworth association which is a pelo-stagnogley soil, it consists of a slowly permeable, seasonally waterlogged, clayey soil (Soil Survey of England and Wales, 1983).

1.6.3 Magnetometry carried out over similar geology and soil has produced good results. The site is, therefore, considered suitable for magnetic survey.

2 METHODOLOGY

2.1 Technical synopsis

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

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

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

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

2.2 Equipment configuration, data collection and survey detail

2.2.1 The detailed magnetic survey was carried out using a SENSYS MAGNETO®MXPDA 5 channel cart-based system. The instrument has 5 fluxgate gradiometers (FGM650) spaced 0.5m apart with readings recorded at 20 Hz. The cart is pushed at walking speed and not towed. Each sensor is not zeroed in the field as the vertical axis alignment is precisely fixed leaving sensor offsets that are removed during data processing. The fixing of the vertical alignment ensures the sensors are not unduly influenced by localised magnetic fields and that the vertical

component of a magnetic anomaly is measured. The gradiometers have a range of recording data between ±0.1nT and ±10,000nT. They are linked to a Leica GS10 RTK GPS with data recorded by SENSYS MAGNETO®MXPDA software on a rugged PDA computer system.

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

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

2.2.4 Fluxgate sensors are highly sensitive to temperature change and this manifests as drift during the course of a survey. This can be particularly noticeable during the morning as temperatures rise and the equipment warms or cools. Sensor drift within the course of a traverse will appear as a line trending from negative to positive after processing with a zero median traverse algorithm. To remove the potential for temperature drift, data were collected after a 20 minute stabilisation period and traverses were limited to a time of generally <60s.

2.3 Data processing and presentation

2.3.1 Magnetic data collected by the MAGNETO®MXPDA cart-based system are initially prepared using SENSYS MAGNETO®DLMGPS software. The software effectively allocates a geographic position for each data point and can compensate for fixed offsets present within the FGM650 sensors. The offsets are positive or negative values present on all fluxgate gradiometer sensors. Some systems use manual or electronic balancing to effectively zero the sensors; however, this is a short term measure that is prone to drift through temperature changes and vibration and can easily be incorrectly set due to localised magnetic fields. The FGM650 sensors are very accurately aligned to the vertical magnetic gradient and are highly stable showing negligible drift on long traverses. The offset values are removed using TerraSurveyor software.

2.3.2 Survey tracks are analysed and georeferenced raw data (UTM Z30N) are then exported in ASCII format for further analysis and display within TerraSurveyor.

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

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

2.3.4 Additional data processing has been carried out in the form of high pass filtering. This effectively removes low frequency variation along a traverse that has been caused by large magnetic bodies, cultivation or rapid temperature change. Data treated to additional processing has been compared to unprocessed data to ensure that no significant anomalies have been removed.

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

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

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

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

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

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

3 RESULTS

3.1 General assessment of survey results

3.1.1 The detailed magnetic survey was carried out over a total of two survey areas covering approximately 5.83ha.

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

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

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

3.2.2 Magnetic disturbance caused by modern ferrous material and services is present along the western side of Area 1 and in the south eastern corner. It is unlikely that this has obscured weak anomalies of archaeological significance.

3.2.3 Magnetic debris is widespread across the site and likely to relate to small pieces of magnetically thermoremnant material, such as brick and tile, within the topsoil. The material may have been introduced with manuring. It is unlikely to obscure other anomalies of archaeological potential.

3.3 Data interpretation

3.3.1 The list of sub-headings below attempts to define a number of separate categories that reflect the range and type of features located during the survey. A basic explanation of the characteristics of the magnetic anomalies is set out for each category in order to justify interpretation, see Table 1.

Interpretation category	Description and origin of anomalies
Anomalies with an uncertain origin	The category applies to a range of anomalies where there is not enough evidence to confidently suggest an origin. Anomalies in this category may well be related to archaeologically significant features, but equally relatively modern features, geological/pedological features and agricultural features should be considered. Morphology may be unclear or uncharacteristic and there may be a lack of additional supporting information. Positive anomalies are indicative of magnetically enhanced soils that may form the fill of 'cut' features or may be produced by

	accumulation within layers or 'earthwork' features; soils subject to burning may also produce positive anomalies. Negative anomalies are produced by material of comparatively low magnetic susceptibility such as stone and subsoil.
Anomalies relating to land management	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. Land drains can appear in a classic herringbone pattern of interconnected multiple dipolar linear anomalies, or as parallel linear anomalies. The multiple dipolar response indicates ceramic land drains.
Anomalies with an agricultural origin	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. This category does not include agricultural features of early date or considered to be of archaeological potential (e.g. animal stockades, enclosures, farmsteads, etc).
Anomalies associated with magnetic debris	Magnetic debris often appears as areas containing many small dipolar anomalies that may range from weak to very strong in magnitude. They often occur where there has been dumping or ground make-up and are related to magnetically thermoremnant materials such as brick or tile or other small fragments of ferrous material. This type of response is occasionally associated with kilns, furnace structures, hearths and nail spreads from former wooden structures or rooves and may, therefore, be archaeologically significant. It is also possible that the response may be caused by natural material such as certain gravels and fragments of igneous or metamorphic rock. Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.
Anomalies with a modern origin	The magnetic response is often strong and dipolar indicative of ferrous material and may be associated with extant above surface features such as wire fencing, cables, pylons etc.. Often a significant area around these features has a strong magnetic flux which may create magnetic disturbance; such disturbance can effectively obscure low magnitude anomalies if they are present. Fluxgate sensors may respond erratically adjacent to strong magnetic sources. Buried services may produce characteristic multiple dipolar anomalies dependant upon their construction.

Table 1: List and description of interpretation categories

3.4 List of anomalies - Area 1

Area centred on OS NGR 372545 187385, see Figs 03 - 05.

Anomalies with an uncertain origin

(1) - A number of positive linear and discrete responses are evident within the north western part of the survey area. Although they could relate to cut features the northern part of the survey area is mapped as containing trees between 1882 and 1962 and some of these anomalies could be associated with the removal of trees.

(2) - The survey area contains a number of positive linear and discrete anomalies which lack a coherent morphology. Several lie close to the western field boundary, while others are more isolated and it is not possible to determine their origin.

(3) - A number of positive linear and discrete responses can be seen within the confines of former boundary features (8). The 1838 Wickwar Tithe Map indicates a series of small land plots along the northern edge of Pincots Lane. The anomalies cannot be confidently interpreted but could potentially relate to former structures, perhaps related to habitation or other intensive agricultural purposes.

(4) - A positive linear anomaly extends across the northern part of the survey area with a north west to south east orientation. It is possible that this relates to a former ditch-like feature; however, an association with a more modern feature, such as a land drain is possible. Several other weakly positive linear anomalies can be seen elsewhere with a similar orientation.

(5) - A weakly positive linear anomaly appears to lead towards anomaly (4) from the south west. Other anomalies further south have a similar orientation. It is possible that they relate to agricultural activity, but this is not certain.

Anomalies associated with land management

(6) - A weakly positive linear anomaly relates to a former field boundary removed in the late 20th century.

(7) - A positive linear anomaly extends along the western edge of the survey area. The 1838 Wickwar Tithe Map indicates that the eastern boundary of the Sodbury Road has since been straightened, and it is possible that this relates to the earlier boundary.

(8) - Along the southern edge of the survey area are a number of anomalies that relate to former plots recorded along the northern edge of Pincots Lane on the 1838 Tithe Map. They appear to contain magnetic debris and positive and negative responses (3).

(9) - Weakly dipolar linear anomalies relate to ceramic land drains.

Anomalies associated with magnetic debris

(10) - A patch of magnetic debris can be seen in the northern part of the survey area. The response is likely to relate to in-situ burning, possibly associated with the former removal of the trees within this part of the site, but this is not certain.

3.5 List of anomalies - Area 2

Area centred on OS NGR 372655 187438, see Figs 03 - 05.

Anomalies with an uncertain origin

(11) - Area 2 contains a small number of very short, weakly positive linear

anomalies and a small number of discrete positive responses. They do not have a coherent morphology preventing confident interpretation.

Anomalies associated with land management

(12) - A positive linear anomaly relates to a relatively recently removed field boundary.

Anomalies with an agricultural origin

(13) - Parallel linear anomalies, oriented west south west to east north east relate to former ridge and furrow.

(14) - A series of parallel linear anomalies oriented almost north south also have the response associated with former ridge and furrow. It appears to cross the former boundary (12) indicating that it is likely to relate to an earlier field layout.

Anomalies associated with magnetic debris

(15) - A patch of magnetic debris partially overlies a former field boundary (12). It is not possible to determine the age or origin of the material.

(16) - Strong, discrete, dipolar anomalies are a response to ferrous and other magnetically thermoremnant objects within the topsoil.

4 CONCLUSION

4.1.1 The geophysical survey located a number of positive responses within the site. While they do not generally have a coherent morphology for their origin to be confidently interpreted, those within the western part of the site could relate to cut features. Early mapping shows that the western field boundary once appeared to extend into the site and that a number of small land plots existed along the southern edge. Several of the anomalies are associated with these former boundaries, with magnetic debris and enhancement along the southern edge of Area 1 possibly indicating former habitation or intensive agricultural activity associated with the small land plots.

5 REFERENCES

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Appendix A – basic principles of magnetic survey

Iron minerals are always present to some degree within the topsoil and enhancement associated with human activity is related to increases in the level of magnetic susceptibility and thermoremnant material. Magnetic susceptibility is an induced magnetism within a material when it is in the presence of a magnetic field. This can be thought of as effectively permanent due to the presence of the Earth's magnetic field. Thermoremnant magnetism occurs when ferrous material is heated beyond a specific temperature known as the Curie Point. Demagnetisation occurs at this temperature with re-magnetisation by the Earth's magnetic field upon cooling.

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

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

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

Magnetic survey or magnetometry can be carried out using a fluxgate gradiometer and may be referred to as gradiometry. The SENSYS gradiometer is a passive instrument consisting of two fluxgate sensors mounted vertically 65cm apart. The instrument is carried about 10-20cm above the ground surface and the upper sensor measures the Earth's magnetic field as does the lower sensor but this is influenced to a greater degree by any localised buried magnetic field. The difference between the two sensors will relate to the strength of the magnetic field created by the buried feature.

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

Appendix B – data processing notes

Clipping

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

Zero (destripe) Median/Mean Traverse

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

High Pass Filtering

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

Low Pass Filtering

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

Appendix C – survey and data information

Area 1 minimally processed data

Filename: J778-mag-Area1-proc.xcp
Description: Imported as Composite from: J778-mag-Area1.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 372450.84, 187523.12 m
Southeast corner: 372630.54, 187243.22m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702
Source GPS Points: 1071700
Dimensions
Composite Size (readings): 1198 x 1866
Survey Size (meters): 180 m x 280 m
Grid Size: 180 m x 280 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.99
Mean: 0.02
Median: 0.03
Composite Area: 5.0298 ha
Surveyed Area: 3.7096 ha
PROGRAM
Name: TerraSurveyor
Version: 3.0.23.0
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00 nT

Area 1 filtered data

Filename: J778-mag-Area1-proc-hpf.xcp
Stats
Max: 2.21
Min: -2.20
Std Dev: 0.73
Mean: 0.02
Median: 0.01
GPS based Proce7
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00 nT
5 High pass Uniform (median) filter: Window dia: 300
6 Clip from -3.00 to 3.00 nT
7 Clip from -2.00 to 2.00 nT

Area 2 minimally processed data

Filename: J778-mag-Area2-proc.xcp
Description: Imported as Composite from: J778-mag-Area2.asc
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 372606.07, 187550.87 m
Southeast corner: 372716.32, 187318.52 m
Source GPS Points: 509500
Dimensions
Composite Size (readings): 735 x 1549
Survey Size (meters): 110 m x 232 m
Grid Size: 110 m x 232 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.83
Mean: 0.01
Median: 0.02
Composite Area: 2.5617 ha
Surveyed Area: 1.7526 ha
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 DeStripe Median Traverse:
5 Clip from -3.00 to 3.00 nT

Area 2 filtered data

Filename: J778-mag-Area2-proc-hpf.xcp
Stats
Max: 2.21
Min: -2.20
Std Dev: 0.64
Mean: 0.00
Median: 0.01
GPS based Proce6
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00 nT
5 High pass Uniform (median) filter: Window dia: 300
6 Clip from -2.00 to 2.00 nT

Appendix D – digital archive

Archaeological Surveys Ltd hold the primary digital archive at their offices in Wiltshire. Data are backed-up onto an on-site data storage drive and at the earliest opportunity data are copied to CD ROM for storage on-site and off-site.

A PDF copy will be supplied to the South Gloucestershire Historic Environment Record. The report will also be uploaded to the Online AccesS to the Index of archaeological investigationS (OASIS).

Archive contents:

File type	Naming scheme	Description
Data	J778-mag-**[area number/name]**.asc J778-mag-**[area number/name]**.xcp J778-mag-**[area number/name]**-proc.xcp	Raw data as ASCII CSV TerraSurveyor raw data TerraSurveyor minimally processed data
Graphics	J778-mag-**[area number/name]**-proc.tif	Image in TIF format
Drawing	J778-**[version number]**.dwg	CAD file in 2010 dwg format
Report	J778 report.odt	Report text in Open Office odt format

Table 2: Archive metadata

Appendix E – CAD layers for abstraction and interpretation plots

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

Report sub-heading and associated CAD layer names	Colour with RGB index	Layer content
Anomalies with an uncertain origin		
AS-ABST MAG POS LINEAR UNCERTAIN	255,127,0	Line, polyline or polygon (solid)
AS-ABST MAG POS DISCRETE UNCERTAIN	255,127,0	Solid donut, point or polygon (solid)
Anomalies relating to land management		
AS-ABST MAG BOUNDARY	127,0,0	Line, polyline or polygon (solid or cross hatched ANSI37)
AS-ABST MAG LAND DRAIN	Cyan 0,255,255	Line or polyline
Anomalies with an agricultural origin		
AS-ABST MAG RIDGE AND FURROW	0,127,63	Line, polyline or polygon (cross hatched ANSI37)
Anomalies associated with magnetic debris		
AS-ABST MAG DEBRIS	132, 132, 132	Polygon (cross hatched ANSI37)
AS-ABST MAG STRONG DIPOLAR	132, 132, 132	Solid donut, point or polygon (solid)
Anomalies with a modern origin		
AS-ABST MAG DISTURBANCE	132, 132, 132	Polygon (hatched ANSI31)

Table 3: CAD layering

Appendix F – copyright and intellectual property

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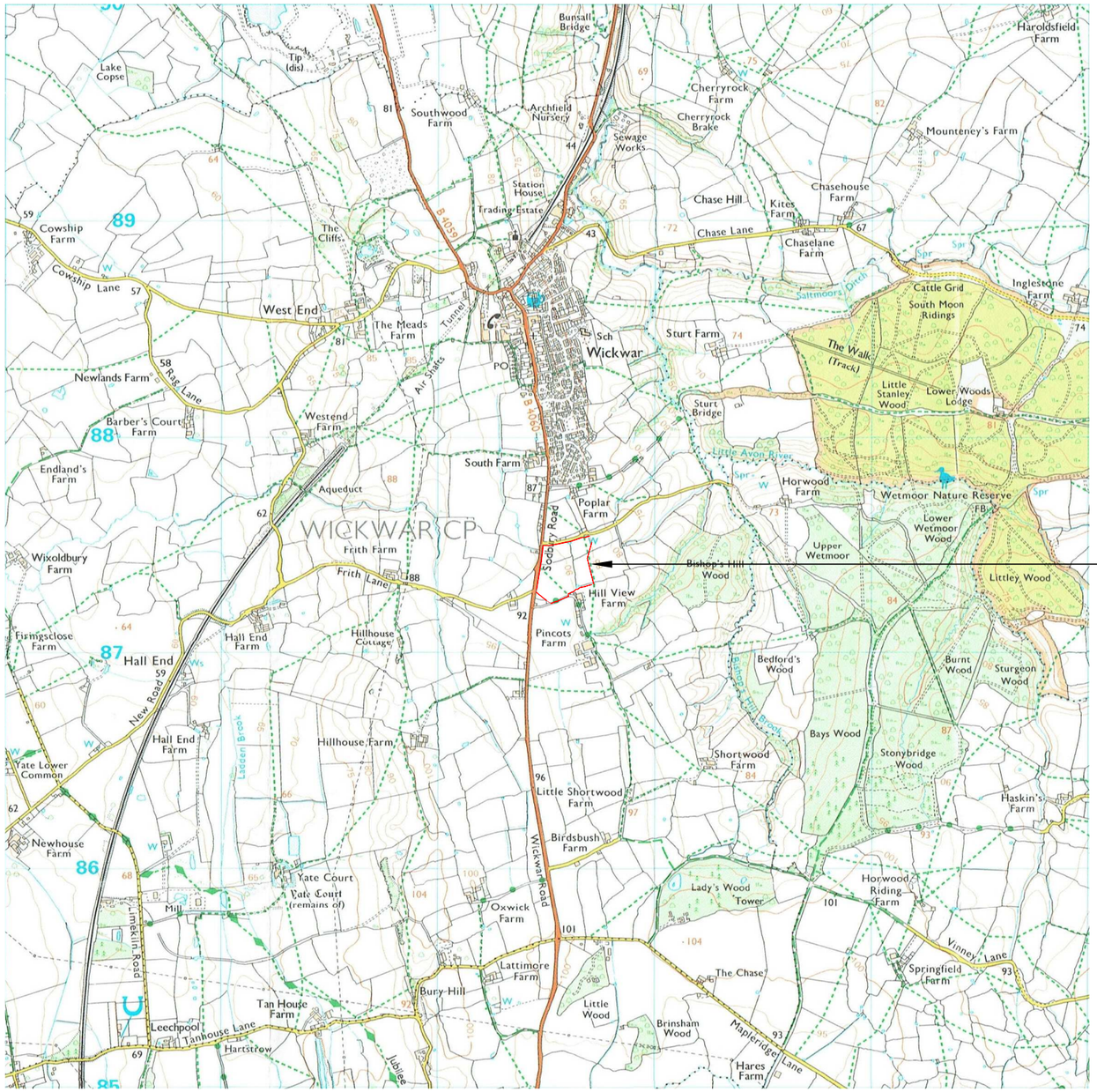
Geophysical Survey
Land south of Horwood Lane
Wickwar
South Gloucestershire

Map of survey area



Survey location

Site centred on OS NGR
ST 72590 87405

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 01

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Geophysical Survey
Land south of Horwood Lane
Wickwar
South Gloucestershire

Referencing information

Referencing grid to OSGB36 datum at 50m intervals

Data collected at 20Hz and georeferenced to ETRS89 zone 30 with conversion to OSGB36 using OSTN02

372500 187300

Development boundary

SCALE 1:2000

0m 10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 02

372400 372450 372500 372550 372600 372650 372700 372750

187600 187550 187500 187450 187400 187350 187300 187250 187200

N

Area 1

Area 2

Croft Cottage

Wall

HORWOOD LANE

Tollgate Cottage

The Yard

Rose Cottage

SODBURY ROAD

PINCOTS LANE

Pincot Cottage

Fernleigh

Hill View Farm

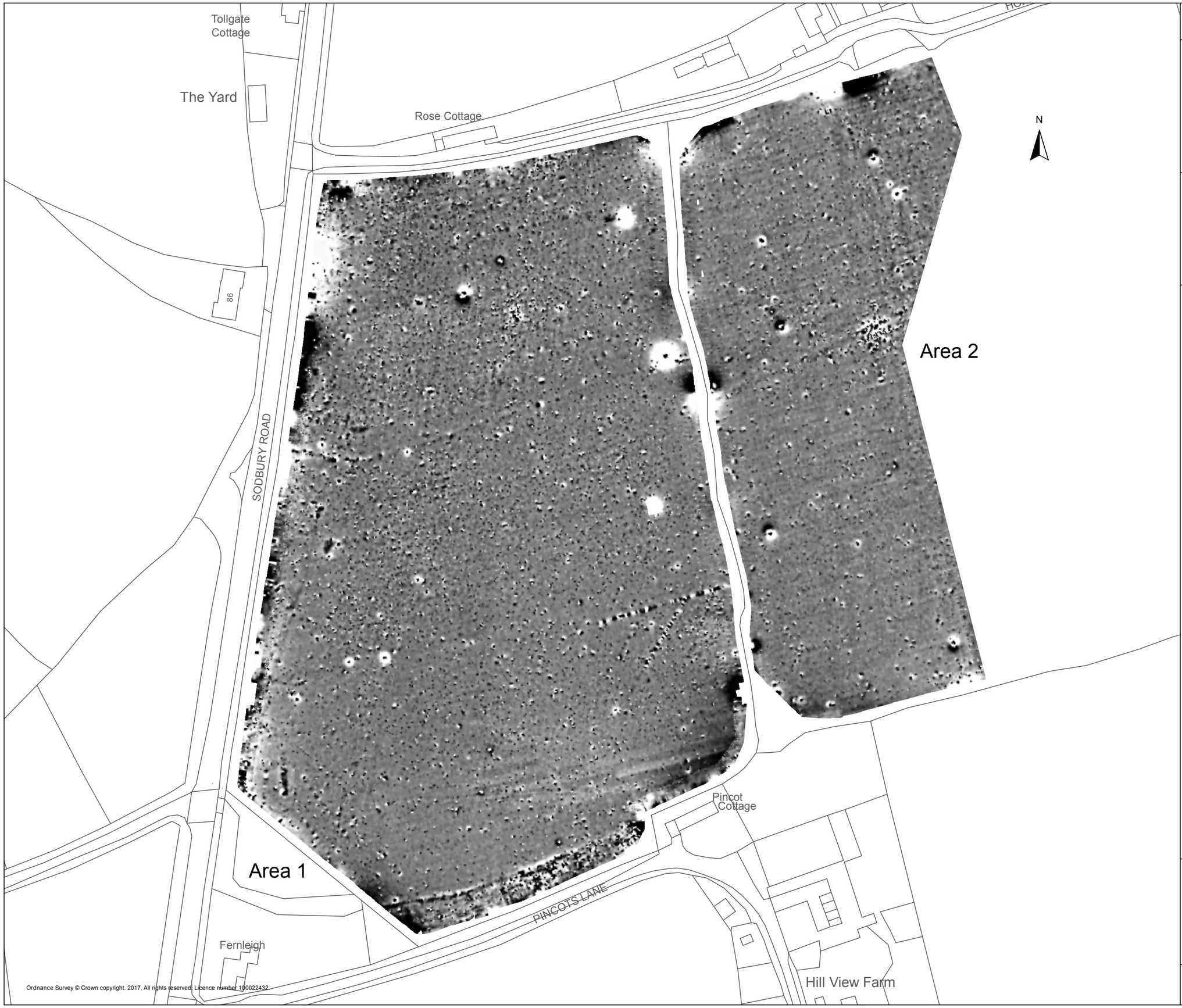
Bishop's Brook Cottage

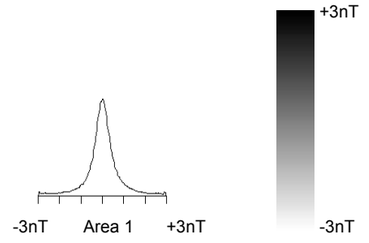
Dawlish Cottage

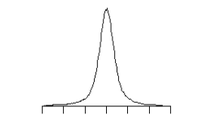
Archaeological Surveys Ltd

Geophysical Survey
Land south of Horwood Lane
Wickwar
South Gloucestershire

Greyscale plot of minimally processed magnetometer data







SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 03

Tollgate Cottage

The Yard

Rose Cottage

86

SODBURY ROAD

Area 2

N

Area 1

PINCOTS LANE

Pincot Cottage

Fernleigh

Hill View Farm

Archaeological Surveys Ltd

Geophysical Survey
Land south of Horwood Lane
Wickwar
South Gloucestershire

Greyscale plot of filtered magnetometer data

+2nT

-2nT

-2nT Area 1 +2nT

-2nT Area 2 +2nT

SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 04

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Land south of Horwood Lane
Wickwar
South Gloucestershire

Abstraction and interpretation of magnetic anomalies

Tollgate Cottage

The Yard

Rose Cottage

86

SODBURY ROAD

Area 1

Area 2

Pincot Cottage

PINCOTS LANE

Fernleigh

Hill View Farm

N

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

- Positive linear anomaly - possible ditch-like feature / magnetic enhancement
- Negative linear anomaly - material with low magnetic susceptibility
- Linear anomaly - ridge and furrow
- Weak multiple dipolar linear anomaly - land drain
- Positive linear anomaly - former field boundary
- Discrete positive response - possible pit-like feature / magnetic enhancement
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 05