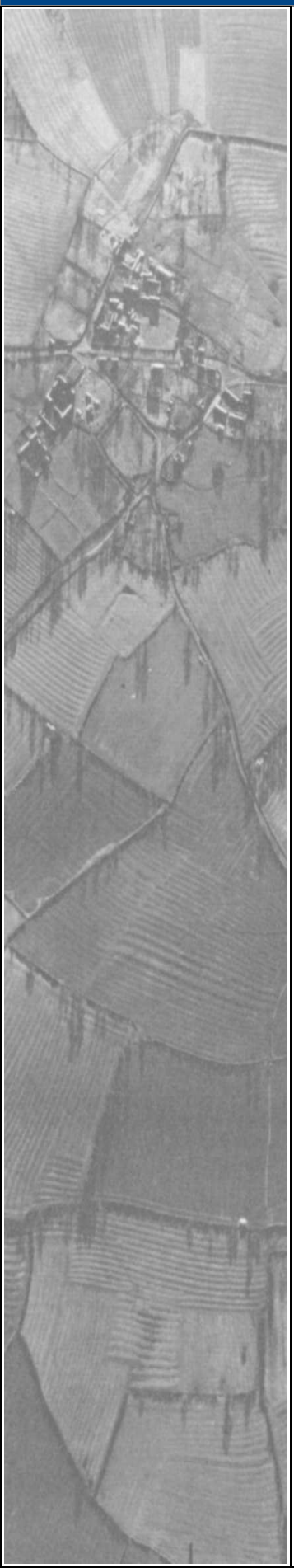

Solar Farm near Arlingham Gloucestershire

MAGNETOMETER SURVEY REPORT

for

AC Archaeology

Kerry Donaldson & David Sabin

November 2021

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ARCHAEOLOGICAL SURVEYS LTD

Solar Farm near Arlingham Gloucestershire

MAGNETOMETER SURVEY REPORT

for

AC Archaeology

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Ordnance Survey Grid References – **SO 71340 10490 & SO 72650 10870**

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SUMMARY

Detailed magnetometry was carried out over 59ha ahead of a proposed solar farm development at Milton End near Arlingham in Gloucestershire. The results of the survey indicate the presence of a small number of positive linear, rectilinear and discrete anomalies in the northern part of the site that could relate to features with archaeological potential. To the east of these is a zone containing numerous pits and two areas of weakly magnetic debris; however, it is not possible to determine if these have an anthropogenic origin, or if they have an association with the underlying gravels. Elsewhere, the majority of the survey areas contain positive anomalies, but these are generally weak and lack a coherent morphology for them them to be characterised as relating to cut features. Areas 9 and 14 contain linear, rectilinear and curvilinear anomalies that could relate to cut features, but again, these are generally poorly defined. The majority of the survey areas contain ridge and furrow, former land boundaries and many contain land drains. Within Area 3 in the far south western part of the site, magnetically variable responses could relate to a former palaeochannel.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by AC Archaeology to undertake a magnetometer survey of an area of land at Milton End, near Arlingham, Gloucestershire. The site has been outlined for a proposed development of a solar farm and the survey forms part of an archaeological assessment.

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 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) (updated 2020) *Standard and Guidance for Archaeological Geophysical Survey.*

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 line formats, and broken or fragmented lines used in interpretive plots may well correspond closely with truncation of archaeological features.

1.4 Site location, description and survey conditions

1.4.1 The site is located within three farms, Lower Milton End Farm, Milton End Farm and Oldbury Farm, over two locations at Milton End near Arlingham in Gloucestershire. The western section (Areas 1-3) is centred on Ordnance Survey National Grid Reference (OS NGR) SO 71340 10490 and the eastern section (Areas 4-18) is centred on SO 72650 10870, see Figs 01 and 02.

1.4.2 The geophysical survey covers approximately 59ha within 17 separate survey areas, named Areas 1-18 for the purposes of the survey. The south eastern corner of Area 17 and all of Area 13 was not available for survey due to the presence of wild flower cover for conservation (c2.6ha).

1.4.3 Ground cover consisted of maize stubble within Areas 1, 2, & 14; grass within Areas 3 – 6, 8, 11, 12 & 17; cereal crop stubble within Areas 7, 15 & 16; recently cultivated soil within Areas 9, 10 & 18.

1.4.4 The western survey block (Areas 1 – 3) generally slopes down to the west from approximately 15m ODN to around 6m ODN. Area 1 contains a steel-framed barn within its eastern side and a boggy and heavily rutted zone near the southwestern corner that could not be surveyed. Area 2 contains a steel

pylon and an overgrown and heavily rutted zone near its south western corner that also could not be surveyed. Areas 3 is comparatively low lying and was waterlogged at the time of survey.

1.4.5 The eastern block of survey is located on undulating land generally sloping down towards the west and south from a high point of 24m ODN on the boundary between Areas 7 and 8. A small stream runs north within a narrow valley the base of which forms the boundary between Areas 8 and 9. Area 10 also slopes to the north from approximately 25m ODN at its southern boundary to around 12m ODN at the northern boundary.

1.4.6 Areas 4 and 5 contain steel pylons and survey was avoided in their vicinity due to magnetic disturbance. A small zone of vegetables was also unsurveyable at the northern end of Area 4. A zone of magnetic disturbance relating to farm machinery etc. was also avoided at the eastern end of Area 5.

1.4.7 The ground conditions across the site were generally considered to be favourable for the collection of magnetometry data. Traversing was often difficult through the maize stubble and over the saturated clayey ground within Areas 1 and 2. Weather conditions during the survey were mainly fine.

1.5 Site history and archaeological potential

1.5.1 Within the western part of the site the Gloucestershire HER records that a number of scatters of flint scrapers and cores have been found, both within the site and within the surrounding fields. The south western part of the site also contains part of the earthen bank believed to be dated to the Roman period of land reclamation in the area. However, this feature appears to correlate with a field boundary and therefore was not surveyed.

1.5.2 In the northern part of the site there are a number of medieval and/or post medieval linear drainage ditches and associated ridge and furrow, and also a number of flint implements. A possible medieval moated site is recorded just to the south and a circular cropmark macula to the south east. The Roman road from the Severn crossing at Arlingham (Margary 543), believed to extend to the Fosse Way, runs between the two blocks of survey partly along the existing lane to Arlingham, but outside of the survey areas.

1.5.3 The location of widespread and numerous flint tools indicates that the site was utilised during the prehistoric periods, it is possible for the geophysical survey to locate anomalies relating to prehistoric settlement and land division. It is also possible that there will be further evidence for medieval and post medieval drainage and agricultural activity.

1.5.4 The surface conditions within several of the survey areas was suitable for the observation of surface finds. No significant scatters or objects were noted.

1.6 Geology and soils

1.6.1 The underlying geology is Blue Lias Formation and Charmouth Mudstone Formation with overlying tidal flats deposits in the south western field (Area 3), head deposits within many parts of the site and Kidderminster Station sands and gravels in the northern parts of the site (BGS, 2017).

1.6.2 The overlying soil across the site is from the Wickham 2 association and is a typical stagnogley soil. It consists of a slowly permeable, seasonally waterlogged, fine loamy over clayey and fine silty over 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 (also known as thermoremanence) are factors associated with the formation of localised fields.

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). Additional details are set out in 2.2 below and within Appendix A.

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 20Hz. 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 measurement range of ±8000nT, although the recorded range is ±3000nT, and resolution is around 0.1nT. They are linked to a Leica GS10 RTK GNSS 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 <100s.

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 the 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 ±3000nT 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 have 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. In addition, traceplots cannot be meaningfully plotted against base mapping and in areas of complexity traces may be lost or highly confused. Traceplots may be used to demonstrate characteristic magnetic profiles across discrete features where it is considered beneficial.

2.3.7 The raster images are combined with base mapping using ProgeCAD Professional 2021, creating DWG (2018) 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 GNSS, 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. Where further interpretation is possible, or where a number of possible origins should be considered, more subjective discussion is set out in Section 4.

2.3.10 The abstraction and interpretation procedure has been supported by analysis of a digital terrain model plot derived from the Environment Agency's LiDAR data. Shaded relief plots and contours are created using Surfer 15 (Azimuth:135, Altitude:45, Z factor:15), (Fig 29).

2.3.11 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 17 survey areas covering approximately 59ha. Area 13 is not included in the results as it was unavailable for survey due to the presence of a conservation crop, as was the south eastern corner of Area 17.

3.1.2 Magnetic anomalies located can be generally classified as positive linear and discrete positive responses of archaeological potential, positive and negative linear anomalies of an uncertain origin, anomalies associated with land management, linear anomalies of an agricultural origin, anomalies with a natural origin, areas of magnetic debris and disturbance and strong discrete dipolar anomalies relating to ferrous objects.

3.1.3 Anomalies located within each survey area have been numbered and are described in 3.4 to 3.19 below with subsequent discussion in Section 4. Area 13 was not available for survey due to a conservation mix crop and Areas 15 & 16 are considered together.

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. Only a very small part of the site is affected by magnetic disturbance caused by modern steel objects and it is unlikely that more significant anomalies have been obscured.

3.2.2 The magnetic susceptibility of the soils is likely to be low but useful magnetic contrast exists within the site. Evidence of former ridge and furrow cultivation is widespread and provides a basic assessment of magnetic contrast where very few anomalies have been located

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 general 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 archaeological potential	Anomalies have the characteristics (mainly morphological) of a range of archaeological features such as pits, ring ditches, enclosures, etc. The category is used where there is a high level of confidence which may be due to additional supporting information where morphology is unclear or uncharacteristic.
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.
Anomalies with a natural origin	Naturally formed magnetic anomalies are caused by localised variability in the magnetic susceptibility of soils, subsoils and other drift or solid geologies. Anomalies may be amorphous, linear or curvilinear and may appear 'fluvial' or discrete; the latter are almost impossible to distinguish from pit-like anomalies with an anthropogenic origin. Fluvial, glacial and periglacial processes may be responsible for their formation within drift material and subsoil. Igneous and metamorphic activity can lead to anomalies within more solid geology.

Table 1: List and description of interpretation categories

3.4 List of anomalies - Area 1

Area centred on OS NGR 371380 210600, see Figs 05 & 06.

3.4.1 Area 1 contains a small number of weakly positive linear anomalies at the south western corner. This is close to a tree and it is possible that the anomalies are associated with agricultural vehicle ruts.

3.5 List of anomalies - Area 2

Area centred on OS NGR 371313 210394, see Figs 07 & 08.

3.5.1 Area 2 contains a small number of positive linear and discrete anomalies. It is not possible to determine their origin.

3.6 List of anomalies - Area 3

Area centred on OS NGR 371212 210419, see Figs 07 & 08.

3.6.1 Area 3 contains evidence for former waterlogging in the western and southern parts of the survey area. Although it is not possible to date the anomalies, this type of response may be indicative of the location of a former palaeochannel.

3.7 List of anomalies - Area 4

Area centred on OS NGR 372085 210930, see Figs 09 & 10.

Anomalies with an uncertain origin

(4.1) – Two, broad, weakly positive parallel anomalies are located in the northern part of Area 4. Such responses can be associated with ridge and furrow, natural features, or other forms of magnetic enhancement. Similar responses can be seen within Area 5 to the north (5.2).

(4.2) – A strongly positive response (40nT) can be seen in the north western part of the survey area. This type of response could suggest a deeply buried ferrous object, but an association with burning is also possible.

(4.3) – The survey area contains a small number of weakly positive linear anomalies. They lack a coherent morphology and cannot be confidently interpreted.

Anomalies associated with land management

(4.4) – Positive linear and rectilinear anomalies are associated with magnetic debris at the southern end of the survey area. These are associated with a formerly mapped boundary forming a small land parcel in the southern part of the field.

(4.5) – Two, weak, multiple dipolar, linear anomalies appear to be associated with land drainage.

Anomalies with an agricultural origin

(4.6) – The survey area contains evidence for former ridge and furrow.

Anomalies associated with magnetic debris

(4.7) – A linear zone of magnetic debris is a response to magnetically thermoremnant material, such as brick/tile that has been used in consolidation of a farm track.

3.8 List of anomalies - Area 5

Area centred on OS NGR 372290 211065, see Figs 11 & 12.

Anomalies with an uncertain origin

(5.1) – The survey area contains several weakly positive linear anomalies. They are very weak and indistinct and cannot be confidently interpreted as cut features.

(5.2) – Two, broad, parallel, positive anomalies are located in the north western corner of the survey area. Such responses can be related to ridge and furrow, but this is not certain. They are similar to anomalies (4.1) located 65m to the south west.

Anomalies with a modern origin

(5.3) – Magnetic disturbance from adjacent electricity pylon.

3.9 List of anomalies - Area 6

Area centred on OS NGR 372222 210874, see Figs 09 & 10.

3.9.1 Area 6 contains ridge and furrow, a land drain and magnetic debris in the north west corner.

3.10 List of anomalies - Area 7

Area centred on OS NGR 372383 210938, see Figs 11 & 12.

Anomalies of archaeological potential

(7.1) – Positive linear and rectilinear anomalies are located on the break of slope within the field. Their morphology suggests that they could to relate to cut features with archaeological potential, although they appear fragmented and do not clearly extend northwards into Area 5.

(7.2) – Two discrete positive responses are located 20m to the south of anomalies (7.1) and could relate to associated pits or areas of burning.

Anomalies with an uncertain origin

(7.3) – The north eastern part of the survey area contains a number of short, positive linear and discrete positive responses. It is not clear if they relate to cut features with an archaeological origin, or if they relate to naturally formed features within the underlying gravels that are recorded on the highest point of the land within the north eastern part of Area 7 and north western part of Area 8.

(7.4) – A zone of weakly magnetically variable responses appear to be associated with several pit-like anomalies. This type of response can be associated with the remains of spreads of occupation debris associated with settlement and could, therefore, have archaeological potential; however, it could also be associated with the edge of the underlying Kidderminster Station Member gravels (4th River Terrace) that are recorded in this area.

Anomalies with an agricultural origin

(7.5 & 7.6) – The survey area contains ridge and furrow on various orientations relating to the natural topography. The north eastern part of Area 7 is a flat plateau, which was once a separate field with ridge and furrow oriented north to south (7.5), while the rest of the field slopes down to the south and west and the ridge and furrow (7.6) is aligned up and down the slope.

Anomalies with a natural origin

(7.7) – Magnetic responses in the southern and south western corner of the survey area relate to naturally formed features at the base of the slope.

3.11 List of anomalies - Area 8

Area centred on OS NGR 372630 211030, see Figs 13 & 14.

Anomalies with an uncertain origin

(8.1) – The western part of the survey area contains a number of discrete, pit-like anomalies. It is not clear if they relate to pits with an anthropogenic or natural origin.

(8.2) – A zone of weakly magnetically variable responses, similar to anomaly (7.4) is located in the western part of Area 8. Again it is not possible to determine if the response is a spread of anthropogenically derived material, such as occupation debris, or if it is associated with the underlying Kidderminster Station Member gravels.

(8.3) – A small number of weakly positive linear anomalies are located in the south western part of Area 8. They lack a coherent morphology.

3.12 List of anomalies - Area 9

Area centred on OS NGR 372782 211025, see Figs 13 & 14.

Anomalies with an uncertain origin

(9.1) – A number of weakly positive linear, broad linear and discrete anomalies are located in the centre of the survey area. It is not clear if they relate to cut features.

(9.2) – A group of discrete positive responses and linear anomalies can be seen in the north of the survey area. The northern part of the field was mapped in the 1880s as a separate land parcel containing trees and it is possible that they are associated, although an association with the ground disturbance related to the adjacent pond construction is also possible.

Anomalies associated with land management

(9.3) – A series of land drains are located in the southern part of the survey area.

Anomalies associated with magnetic debris

(9.4) – Magnetic debris is evident along the western edge of the survey area. This relates to ferrous and other magnetically thermoremnant material, such as brick and tile fragments, possibly used for ground consolidation.

3.13 List of anomalies - Area 10

Area centred on OS NGR 372955 211065, see Figs 15 & 16.

Anomalies with an uncertain origin

(10.1) – A number of weakly positive linear and discrete anomalies can be seen

close to the western edge of Area 10. Similar anomalies can also be seen within and at the edges of the survey area. They generally lack a coherent morphology and are not well defined.

Anomalies with an agricultural origin

(10.2) – The survey area shows evidence for ridge and furrow cultivation on different orientations indicating it was previously sub-divided into smaller fields.

Anomalies associated with magnetic debris

(10.3) – A patch of magnetic debris in the north east corner could be associated with the line of a formerly mapped field boundary. Magnetic debris is also evident along the north eastern edge of the field.

3.14 List of anomalies - Area 11

Area centred on OS NGR 372500 210700, see Figs 17 & 18.

3.14.1 Area 11 contains a small number of positive linear anomalies in the south western part of the survey area. They are weak and generally lack a coherent morphology. The survey area also contains evidence for former field boundaries, a number of series of land drains in the centre and west and ridge and furrow in the east.

3.15 List of anomalies - Area 12

Area centred on OS NGR 372505 210500, see Figs 19 & 20.

3.15.1 Area 12 contains a number of short, weakly positive linear and curvilinear anomalies, as well as a small number of discrete positive responses. They generally lack a coherent morphology preventing confident interpretation.

3.16 List of anomalies - Area 14

Area centred on OS NGR 372764 210604, see Figs 21 & 22.

3.16.1 Positive linear and discrete anomalies situated towards the south western corner of Area 14 are weak; however, it is possible that they relate to cut, ditch-like and pit-like features.

3.17 List of anomalies - Areas 15 & 16

Areas centred on OS NGR 372710 210800, see Figs 23 & 24.

3.17.1 Areas 15 & 16 contain a number of weakly positive linear anomalies with no coherent pattern or morphology. There is also evidence for two formerly mapped field boundaries and ridge and furrow.

3.18 List of anomalies – Area 17

Areas centred on OS NGR 37 21, see Figs 25 & 26.

3.18.1 Area 17 contains a number of positive linear anomalies in the southern part of the survey area that are uncertain in origin. Evidence for land drains and ridge and furrow has also been located.

3.19 List of anomalies - Area 18

Area centred on OS NGR 373160 210815, see Figs 27 & 28.

3.19.1 Area 18 contains a small number of positive linear anomalies that do not appear to correspond to the general agricultural trends in the field. There are a number of series of ridge and furrow as well as a former land boundary and more recent agricultural activity.

4 DISCUSSION

4.1.1 Areas 1 to 3 lie separate to and 500m south west of the main body of survey areas to the north east of Milton End. Areas 1 and 2 are west facing slopes and contain a small number of weakly positive anomalies, but they are generally not coherent. Area 3 lies at around 6m AOD, and within the lowest lying areas is evidence for former waterlogging, possibly indicating a palaeochannel.

4.1.2 Areas 4 to 18 lie to the north east of Milton End and the majority of the survey areas contain evidence for former ridge and furrow, formerly mapped field boundaries and some land drainage, mainly on the lower lying areas. The majority of the survey areas also contain weakly positive linear, rectilinear and discrete responses, but they generally lack a coherent morphology preventing confident interpretation as cut features.

4.1.3 Only a small number of anomalies can be characterised as of archaeological potential and these are clustered within the northern part of Area 7, just on the

edge of the crest of higher ground. Although their morphology is not well defined, there does appear to be a rectilinear anomaly (7.1) as well as linear and discrete responses (7.2). They do not clearly extend northwards into Area 5. Situated between 75m and 275m to the east within Areas 7 and 8 are a large number of discrete, positive responses (7.3 & 8.1). This zone relates to an area of higher land at 22m, which is recorded as being overlain by river terrace gravels. It is, therefore, not possible to determine if they relate to cut, pit-like features, or if they are associated with naturally formed features. However, two zones of weakly magnetic debris (7.4 & 8.2) can also be seen on this higher ground and this type of anomaly can be a response to spreads of occupation material, and it is possible that the anomalies within this part of the site have some archaeological potential.

4.1.4 Further east Area 9 contains a number of linear, discrete and broad linear and amorphous positive responses which could also extend into Area 10, but they cannot be confidently interpreted. To the south, at the south western corner of Area 14 are a number of positive linear and discrete anomalies. Although these also lack a well defined morphology it is possible that they relate to cut, ditch-like features.

5 CONCLUSION

5.1.1 The geophysical survey was carried out over 59ha within 17 separate survey areas. The majority of responses relate to former ridge and furrow, field boundaries and land drainage. However, one area in the northern part of the site (Area 7) appears to contain linear, rectilinear and discrete anomalies that could be of archaeological potential. They do not appear to extend further northwards into Area 5, although this area does contain a number of linear anomalies, they cannot be confidently interpreted. To the east of the anomalies with archaeological potential there are a large number of pit-like features and zones of weakly magnetic debris. While such anomalies could relate to spreads of occupation material and therefore have archaeological potential, this part of the site is overlain by river terrace gravels and an association with naturally formed features is possible.

5.1.2 Elsewhere the majority of the survey areas contain weakly positive linear and discrete anomalies, but generally they lack a coherent morphology. Anomalies within Area 9 in the north and Area 14 further south are also uncertain in origin, but some do have a rectilinear or curvilinear morphology that could relate to cut, ditch-like features.

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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. Different ranges are applied to data in order to determine the most suitable for anomaly abstraction and display.

High Pass Filter

Removes low frequency anomalies within the data that are not considered to be archaeologically significant and may be natural in origin. A window passes over the data, the mean of all the data within the window is subtracted from the centre value. The size of the window is adjusted as is the weighting which may be uniform or Gaussian. The process is used to improve the visibility of anomalies of interest.

Low Pass Filter

Removes high frequency anomalies or 'noise' within datasets and provides a smoother output. A window passes over the data, the mean of all the data within the window is used to replace the centre value. The size of the window is adjusted as is the weighting. The process is used to improve the visibility of anomalies of interest.

Zero Median/Mean Traverse

The median (or mean) of data from 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 offset values of the gradiometer sensors. The process can remove archaeological features that run along a traverse but with the high resolution datasets created by the Sensys FGM650 sensors and the method of data collection this has not been a notable problem. In fact, the removal of offsets using software avoids carrying out a balancing procedure on site, which inevitably can never be done in magnetically clean conditions and results in improperly aligned fluxgate sensors and/or electronic adjustment values.

Appendix C – survey and data information

Area 1

Filename: J874-mag-Area1-proc.xcp
Instrument Type: Sensys DLMGPS
Units:
UTM Zone: 30U
Survey corner coordinates (X/Y): OSGB36
Northwest corner: 371289.50, 210703.07 m
Southeast corner: 371481.05, 210489.62 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702
Dimensions
Survey Size (meters): 192 m x 213 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 904782, Recorded: 904782
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.01
Mean: 0.01
Median: 0.01
Composite Area: 4.0886 ha
Surveyed Area: 3.023 ha
PROGRAM
Name: TerraSurveyorPre
Version: 3.0.36.24
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 300
5 Clip from -3.00 to 3.00

Area 2
Filename: J874-mag-Area2-proc.xcp
Northwest corner: 371207.68, 210509.15 m
Southeast corner: 371417.987, 210279.80m
Survey Size (meters): 210 m x 229 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 849883, Recorded: 849883
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.17
Mean: 0.06
Median: 0.01
Composite Area: 4.8232 ha
Surveyed Area: 2.8195 ha
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 300
5 Clip from -3.00 to 3.00

Area 3

Filename: J874-mag-Area3-proc.xcp
Northwest corner: 371122.68, 210578.74 m
Southeast corner: 371284.53, 210400.54 m
Dimensions
Survey Size (meters): 162 m x 178 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 513400, Recorded: 513400
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.94
Mean: 0.01
Median: 0.01
Composite Area: 2.8842 ha
Surveyed Area: 2.0162 ha
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00

Area 4

Filename: J874-mag-Area4-proc.xcp
Northwest corner: 371961.14, 211072.28m
Southeast corner: 372193.04, 210783.23 m
Dimensions
Survey Size (meters): 232 m x 289 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 914594, Recorded: 914594
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.10
Mean: 0.02
Median: 0.00
Composite Area: 6.7031 ha
Surveyed Area: 3.1713 ha
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 150
5 Clip from -3.00 to 3.00

Area 5

Filename: J874-mag-Area5-proc.xcp
Northwest corner: 372179.887, 211121.64 m
Southeast corner: 372406.98, 210986.34m
Survey Size (meters): 227 m x 135 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 500198, Recorded: 500198
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.28
Mean: 0.04
Median: 0.01
Composite Area: 3.0727 ha
Surveyed Area: 1.4968 ha
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 150
5 Clip from -3.00 to 3.00

Area 6
Filename: J874-mag-Area6-proc.xcp
Northwest corner: 372165.02, 210969.62 m
Southeast corner: 372280.82, 210798.77m
Dimensions
Survey Size (meters): 116 m x 171 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 296694, Recorded: 296694
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.96
Mean: 0.01
Median: 0.00
Composite Area: 1.9784 ha
Surveyed Area: 1.0549 ha
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00

Area 7

Filename: J874-mag-Area7-proc.xcp
Northwest corner: 372210.46, 211068.36 m
Southeast corner: 372533.26, 210801.36 m
Dimensions
Survey Size (meters): 323 m x 267 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 1734065, Recorded: 1734065
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.92
Mean: 0.02
Median: 0.00
Composite Area: 8.6188 ha
Surveyed Area: 6.0112 ha

GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 300
5 Clip from -3.00 to 3.00

Area 8

Filename: J874-mag-Area8-proc.xcp

Northwest corner: 372510.89, 211200.44 m
Southeast corner: 372732.74, 210862.04 m
Dimensions
Survey Size (meters): 222 m x 338 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 1317583, Recorded: 1317583
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.15
Mean: 0.01
Median: 0.00
Composite Area: 7.5074 ha
Surveyed Area: 4.8983 ha
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 300
5 Clip from -3.00 to 3.00

Area 9

Filename: J874-mag-Area9-proc.xcp
Northwest corner: 372699.21, 211172.55 m
Southeast corner: 372857.91, 210901.95 m
Dimensions
Survey Size (meters): 159 m x 271 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 923100, Recorded: 923100
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.07
Mean: 0.00
Median: 0.00
Composite Area: 4.2944 ha
Surveyed Area: 2.8839 ha
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 300
5 Clip from -3.00 to 3.00

Area 10

Filename: J874-mag-Area10-proc.xcp
Northwest corner: 372827.57, 211215.46 m
Southeast corner: 373115.42, 210921.31 m
Dimensions
Survey Size (meters): 288 m x 294 m
X&Y Interval: 0.15 m

Source GPS Points: Active: 1735184, Recorded: 1735184
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.92
Mean: 0.02
Median: 0.01
Composite Area: 8.4671 ha
Surveyed Area: 6.1289 ha
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00

Area 11

Filename: J874-mag-Area11-proc.xcp
Northwest corner: 372367.93, 210819.79 m
Southeast corner: 372700.03, 210542.59 m
Dimensions
Survey Size (meters): 332 m x 277 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 1281900, Recorded: 1281900
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.75
Mean: 0.00
Median: 0.01
Composite Area: 9.2058 ha
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00

Area 12

Filename: J874-mag-Area12-proc.xcp
Northwest corner: 372392.04, 210582.80 m
Southeast corner: 372623.94, 210455.75 m
Dimensions
Survey Size (meters): 232 m x 127 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 445500, Recorded: 445500
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.68
Mean: 0.01
Median: 0.01
Composite Area: 2.9463 ha
Surveyed Area: 1.5796 ha
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00

Area 14

Filename: J874-mag-Area14-proc.xcp
Northwest corner: 372684.78, 210732.20 m
Southeast corner: 372854.38, 210480.20 m
Dimensions
Survey Size (meters): 170 m x 252 m
X&Y Interval: 0.16 m
Source GPS Points: Active: 748897, Recorded: 748897
Stats
Max: 2.21
Min: -2.20
Std Dev: 0.60
Mean: 0.01
Median: 0.01
Composite Area: 4.2739 ha
Surveyed Area: 2.3279 ha
GPS based Proce7
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 300
5 Lo pass Uniform (median) filter: Window dia: 11
6 Clip from -3.00 to 3.00
7 Clip from -2.00 to 2.00

Areas 15 & 16

Filename: J874-mag-Area15&16.xcp
Northwest corner: 372520.26, 210911.95m
Southeast corner: 372878.76, 210678.25 m
Dimensions
Survey Size (meters): 359 m x 234 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 1117475, Recorded: 1117475
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.91
Mean: 0.02
Median: 0.00
Composite Area: 8.3781 ha
Surveyed Area: 3.9455 ha
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00

Area 17

Filename: J874-mag-Area17-proc.xcp
Northwest corner: 372870.78, 210944.51 m
Southeast corner: 373109.88, 210588.26 m
Dimensions
Survey Size (meters): 239 m x 356 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 1181294, Recorded: 1181294
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.92
Mean: 0.02
Median: 0.01
Composite Area: 8.5179 ha
Surveyed Area: 4.2733 ha
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00

Area 18

Filename: J874-mag-Area18-proc.xcp
Northwest corner: 373024.16, 210974.36 m
Southeast corner: 373310.51, 210675.26 m
Dimensions
Survey Size (meters): 286 m x 299 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 1094371, Recorded: 1094371

Stats
Max: 3.32
Min: -3.30
Std Dev: 1.08
Mean: 0.04
Median: 0.01
Composite Area: 8.5647 ha
Surveyed Area: 3.5306 ha
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00

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 copy of the report in PDF/A format will be supplied to the Gloucestershire Historic Environment Record, together with a DXF of the survey boundary. In order to comply with the Gloucestershire Archaeological Archive Standards (Paul, 2018) the data will be archived with the Archaeology Data Service (ADS) and the report uploaded to Online AccesS to the Index of archaeological investigationS (OASIS) in the formats stated below for archiving:

Archive contents:

File type	Naming scheme	Description
Data	J874-mag-**[area number/name]**.asc J874-mag-**[area number/name]**.xcp J874-mag-**[area number/name]**-proc.xcp	Raw data as ASCII CSV TerraSurveyor raw data TerraSurveyor processed data
Graphics	J874-mag-**[area number/name]**-proc.tif	Image in TIF format
Drawing	J874-**[version number]**.dwg	CAD file in 2018 dwg format
Report	J874 report.odt	Report text in LibreOffice 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 archaeological potential		
AS-ABST MAG POS DISCRETE ARCHAEOLOGY	Red 255,0,0	Solid donut, point or polygon (solid)
AS-ABST MAG POS ARCHAEOLOGY	Red 255,0,0	Polygon (cross hatched ANSI37)
AS-ABST MAG POS LINEAR ARCHAEOLOGY	Red 255,0,0	Polyline or polygon (solid)
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)
AS-ABST MAG POS UNCERTAIN	255,127,0	Polygon (cross hatched ANSI37)
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 AGRICULTURAL	Green 0,255,0	Line or polyline
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)
Anomalies with a natural origin		
AS-ABST MAG NATURAL FEATURES	Yellow 255,255,0	Polygon (cross hatched ANSI37)

Table 3: CAD layering

Appendix F – copyright and intellectual property

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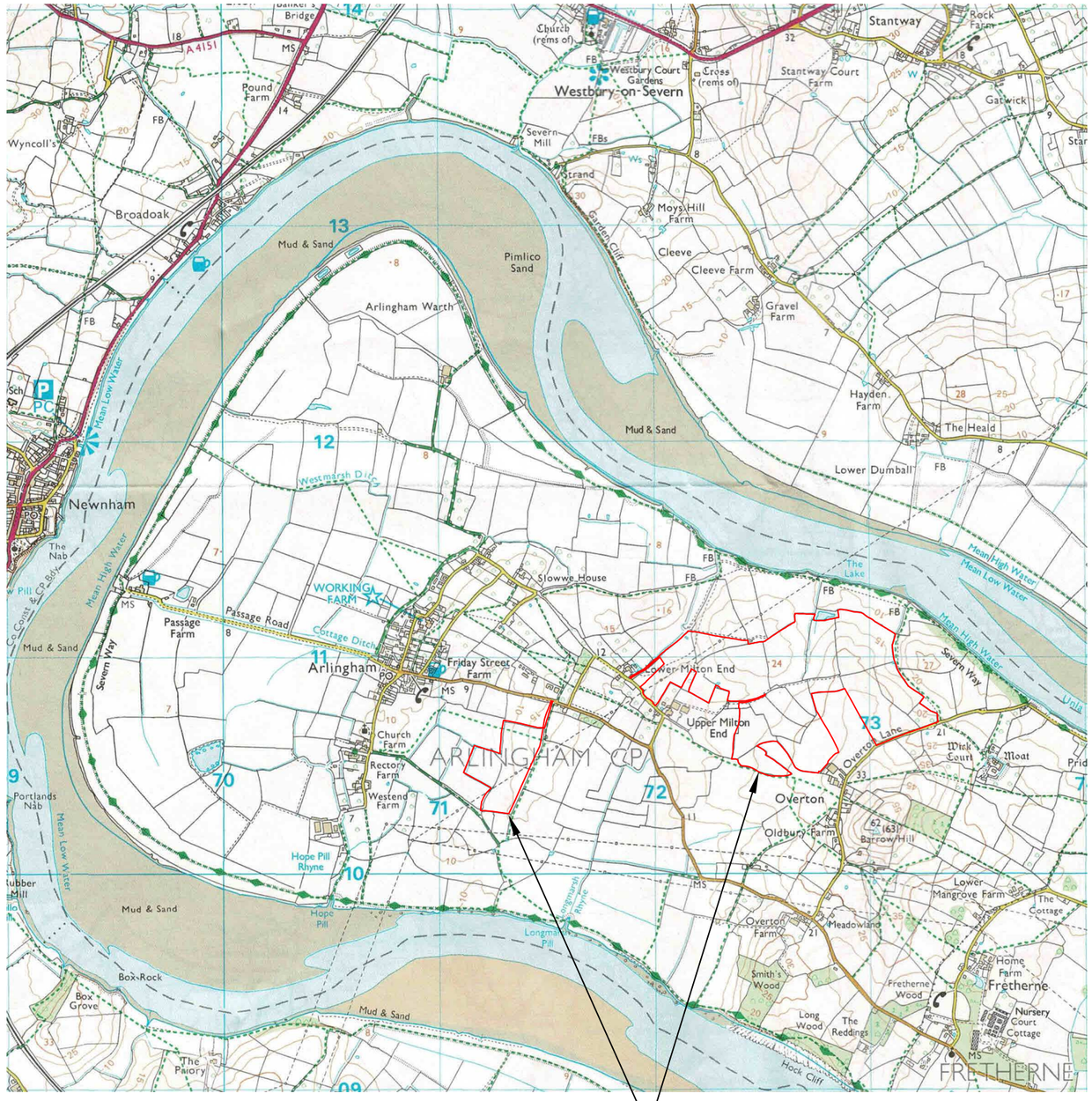
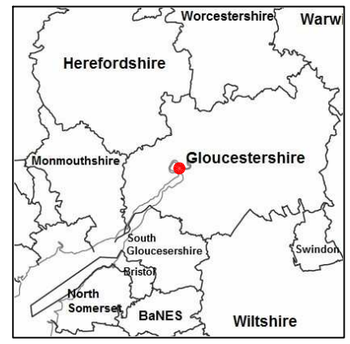
Tel: 01249 814 231

Archaeological Surveys
Specialist Geophysical Surveyors

Geophysical Survey
Solar Farm near Arlingham
Gloucestershire

Map of survey area





Site centred on OS NGR
SO 71340 10490 & SO 72650 10870

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 01

Archaeological Surveys
Specialist Geophysical Surveyors

Geophysical Survey
Solar Farm near Arlingham
Gloucestershire

Referencing information

Referencing grid to OSGB36 datum at 100m intervals

- Survey tracks
- Survey track start
- Survey track stop

SCALE 1:7000

0m 70 140 210 280 350m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 02

Archaeological Surveys
Specialist Geophysical Surveyors

Geophysical Survey
Solar Farm near Arlingham
Gloucestershire

Greyscale plot of processed magnetometer data

+3nT

-3nT

N

Area 1
Area 2
Area 3
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
Area 12
Area 13
Area 14
Area 15
Area 16
Area 17
Area 18

Unsurveyable - conservation mix

Overton

The Lake

Barrow Hill

Mud

SCALE 1:7000

0m 70 140 210 280 350m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 03

Archaeological Surveys
Specialist Geophysical Surveyors

Geophysical Survey
Solar Farm near Arlingham
Gloucestershire

Abstraction and interpretation of magnetic anomalies

N

Area 1
Area 2
Area 3
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
Area 12
Area 13
Area 14
Area 15
Area 16
Area 17
Area 18

- Positive linear anomaly - cut feature of archaeological potential
- Positive linear anomaly - possible ditch-like feature
- Positive linear anomaly - former field boundary
- Positive/weak multiple dipolar linear anomaly - land drain
- Linear anomaly - ridge and furrow
- Linear anomaly - of agricultural origin
- Discrete positive response - cut feature of archaeological potential
- Discrete positive response - possible pit-like feature
- Magnetic debris - spread of weakly magnetically thermoremnant material
- Positive anomaly - magnetically enhanced material
- Variable magnetic response - of natural origin
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:7000

0m 70 140 210 280 350m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 04

Area 1

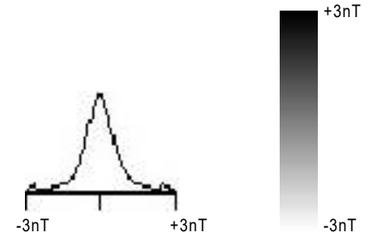
Area 3

N

Archaeological Surveys
Specialist Geophysical Surveyors

Geophysical Survey
Solar Farm near Arlingham
Gloucestershire

Greyscale plot of processed magnetometer data - Area 1



SCALE 1:1250

0m 10 20 30 40 50m

KTD	DJS	FIG 05

Area 1

Area 3

N

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Solar Farm near Arlingham
Gloucestershire

Abstraction and interpretation of magnetic anomalies - Area 1

- Positive linear anomaly - of uncertain origin
- Linear anomaly - ridge and furrow
- Discrete positive response - possible pit-like feature
- Variable magnetic response - of natural origin
- 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 06

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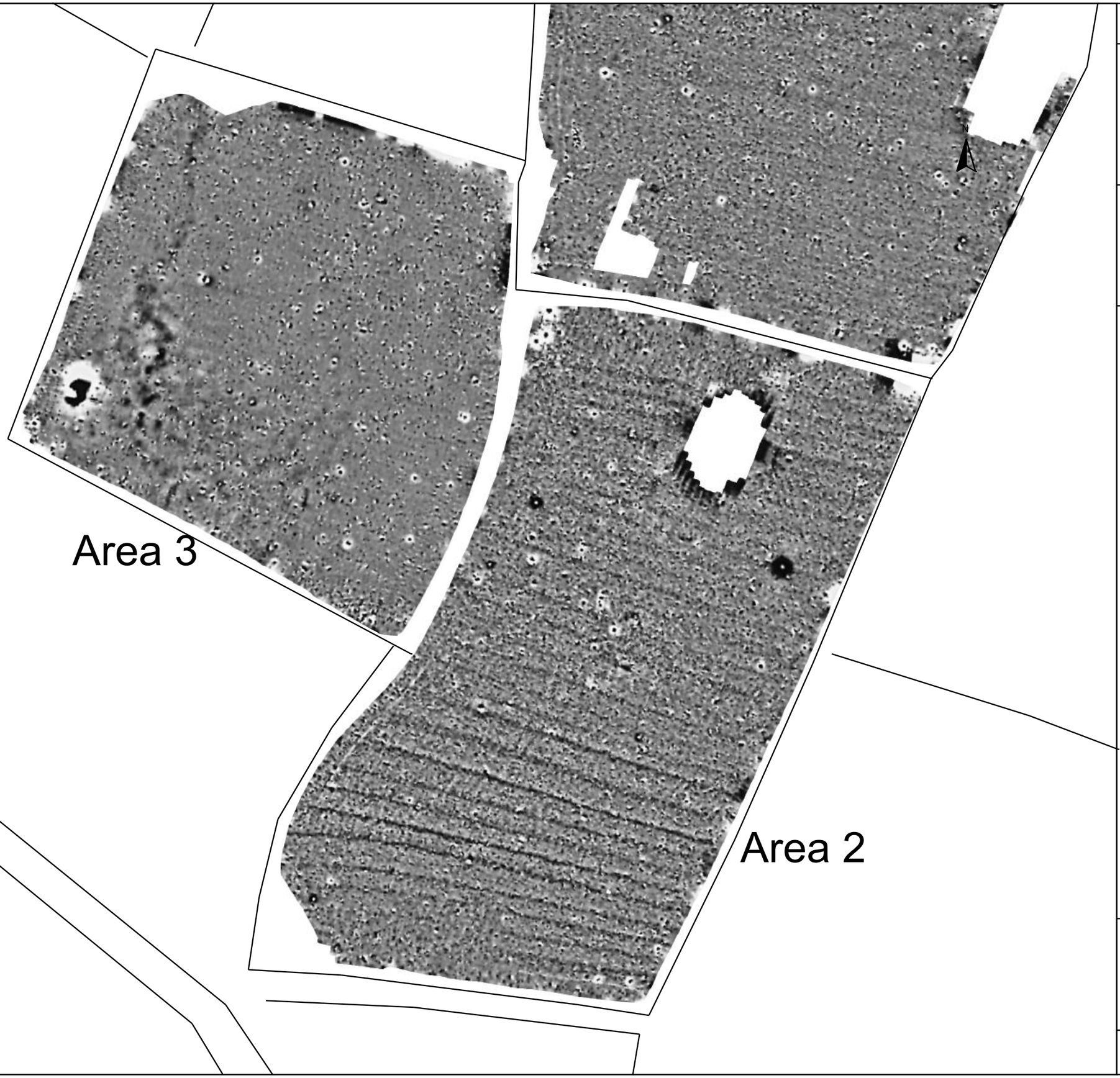
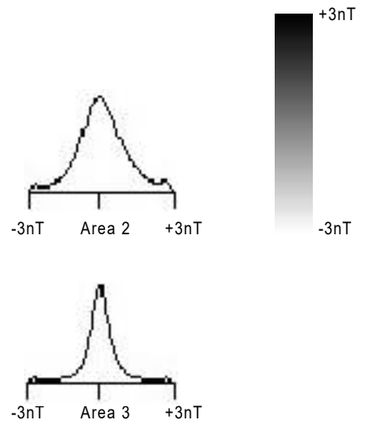
Greyscale plot of processed magnetometer data - Areas 2 & 3





SCALE 1:1250

0m 10 20 30 40 50m

KTD	DJS	FIG 07

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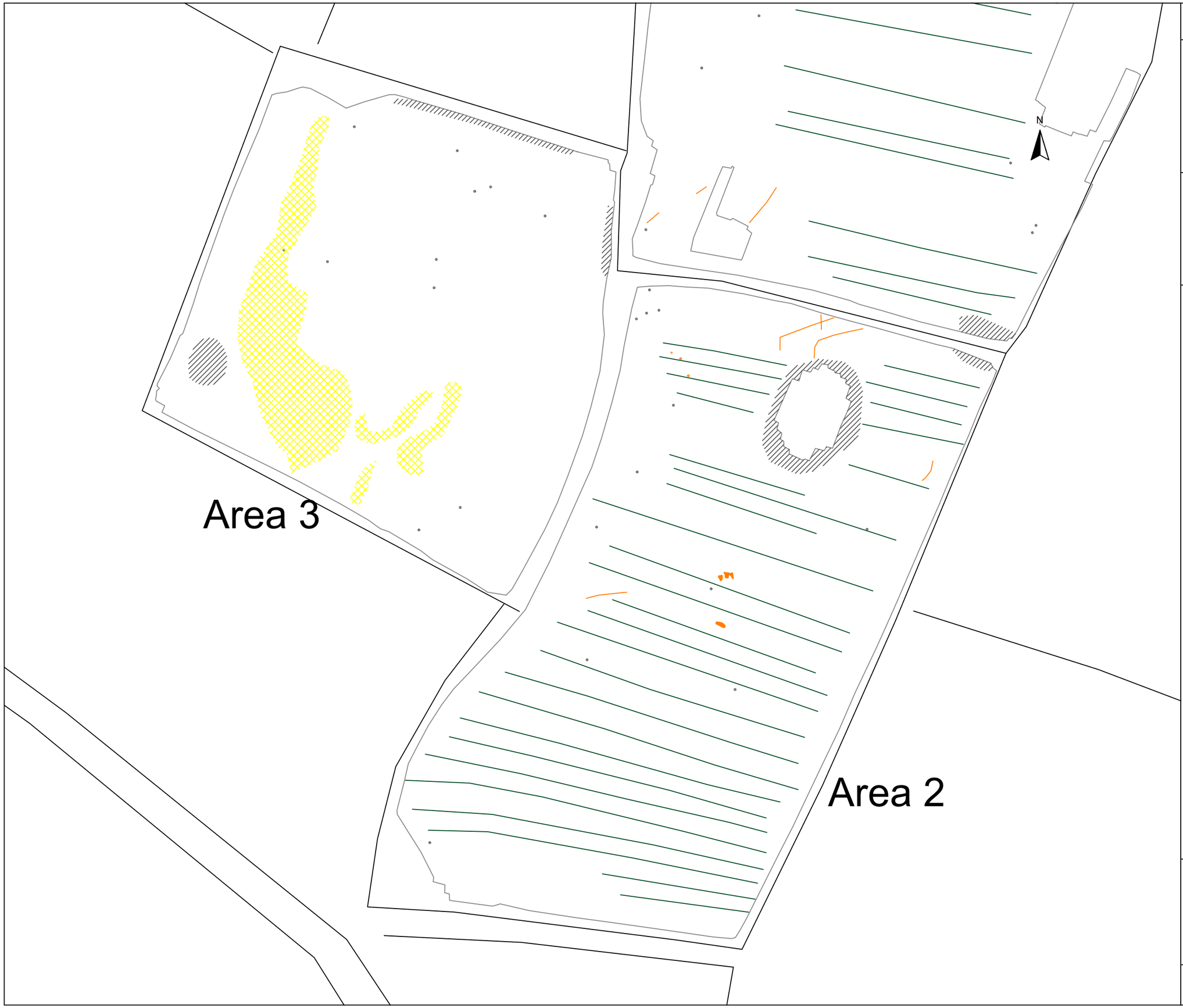
Abstraction and interpretation of magnetic anomalies - Areas 2 & 3



- Positive linear anomaly - of uncertain origin
- Linear anomaly - ridge and furrow
- Discrete positive response - possible pit-like feature
- Variable magnetic response - of natural origin
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 08

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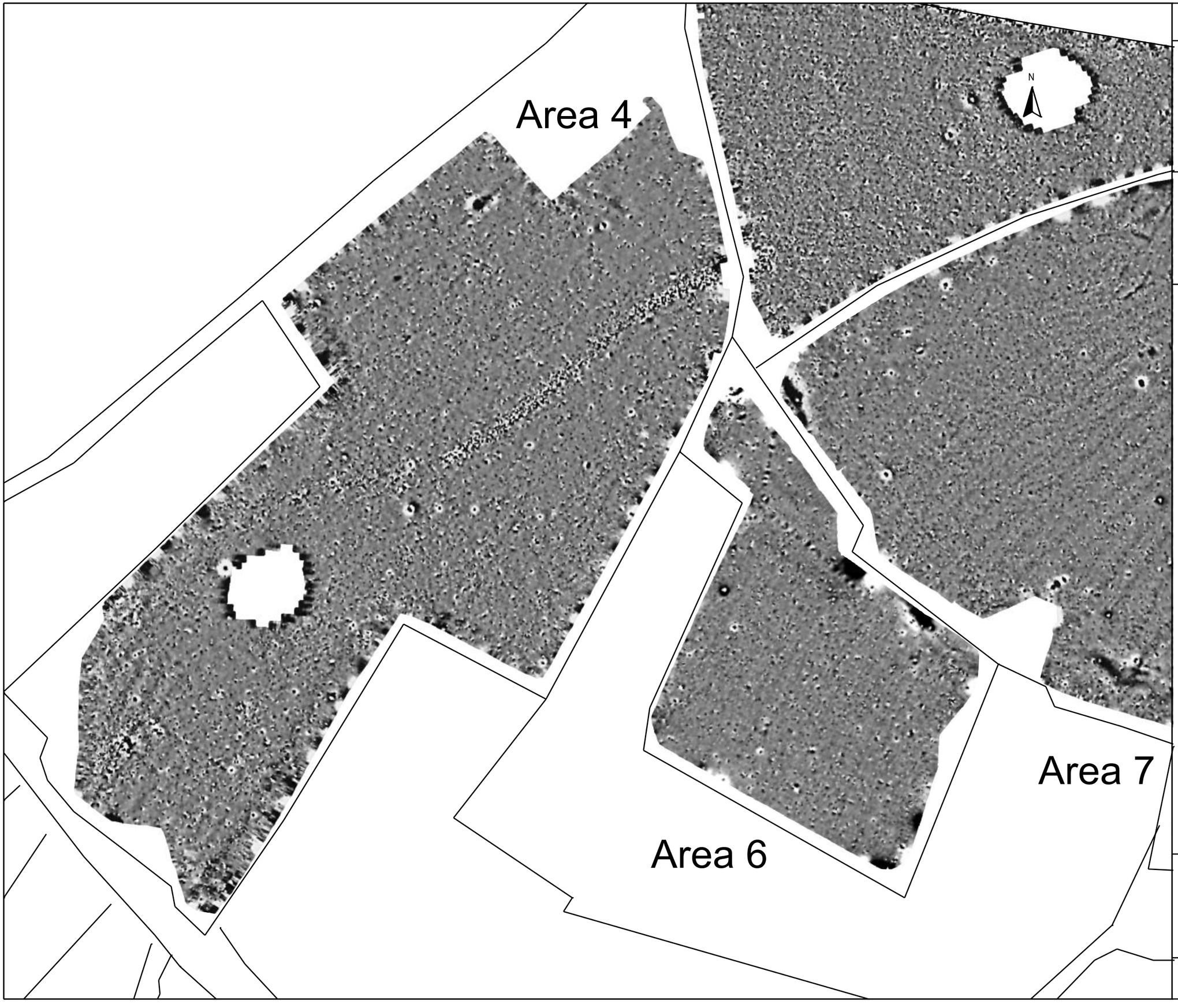
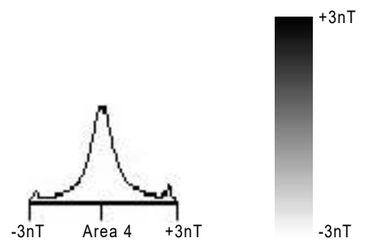
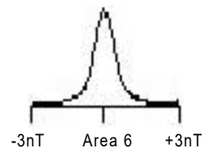
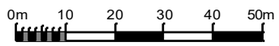
Greyscale plot of processed magnetometer data - Areas 4 & 6







SCALE 1:1250



KTD	DJS	FIG 09

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Gloucestershire

Abstraction and interpretation of magnetic anomalies - Areas 4 & 6

Area 4

Area 6

Area 7

5.1
5.2
5.3
4.1
4.2
4.3
4.4
4.5
4.6
4.7
7.1
7.2
7.7

N

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Positive/weak multiple dipolar linear anomaly - land drain
- Discrete positive response - possible pit-like feature
- Positive anomaly - magnetically enhanced material
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 10

Area 5

Area 7

Area 6

4

N

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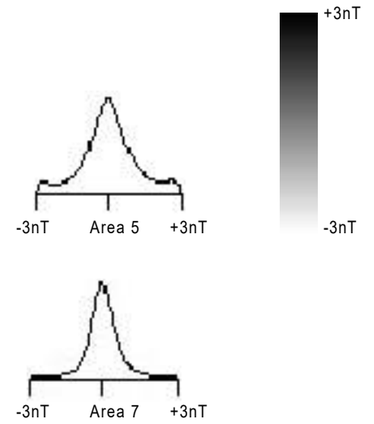
Greyscale plot of processed magnetometer data - Areas 5 & 7



SCALE 1:1250

0m 10 20 30 40 50m

KTD | DJS | FIG 11

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Gloucestershire

Abstraction and interpretation of magnetic anomalies - Areas 5 & 7

Area 5

Area 6

Area 7

5.1
5.2
5.3
7.1
7.2
7.3
7.4
7.5
7.6
7.7
8.2

N

- Positive linear anomaly - cut feature of archaeological potential
- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Discrete positive response - cut feature of archaeological potential
- Discrete positive response - possible pit-like feature
- Positive anomaly - magnetically enhanced material of archaeological potential
- Magnetic debris - spread of weakly magnetically thermoremnant material
- Positive anomaly - magnetically enhanced material
- Variable magnetic response - of natural origin
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 12

Area 9

Area 8

N

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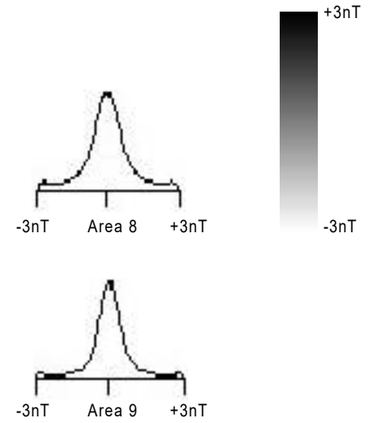
Gloucestershire

Greyscale plot of processed magnetometer data - Areas 8 & 9



SCALE 1:1250

0m 10 20 30 40 50m

KTD	DJS	FIG 13

Area 9

Area 8

N 10.3

9.2

10.1

9.1

8.1

8.2

9.4

8.3

9.3

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Solar Farm near Arlingham
Gloucestershire

Abstraction and interpretation of magnetic anomalies - Areas 8 & 9

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Positive/weak multiple dipolar linear anomaly - land drain
- Discrete positive response - possible pit-like feature
- Magnetic debris - spread of weakly magnetically thermoremnant material
- Positive anomaly - magnetically enhanced material
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 14

Area 9

Area 10

N

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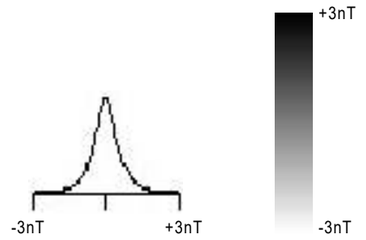
Gloucestershire

Greyscale plot of processed magnetometer data - Area 10



SCALE 1:1250

0m 10 20 30 40 50m

KTD	DJS	FIG 15

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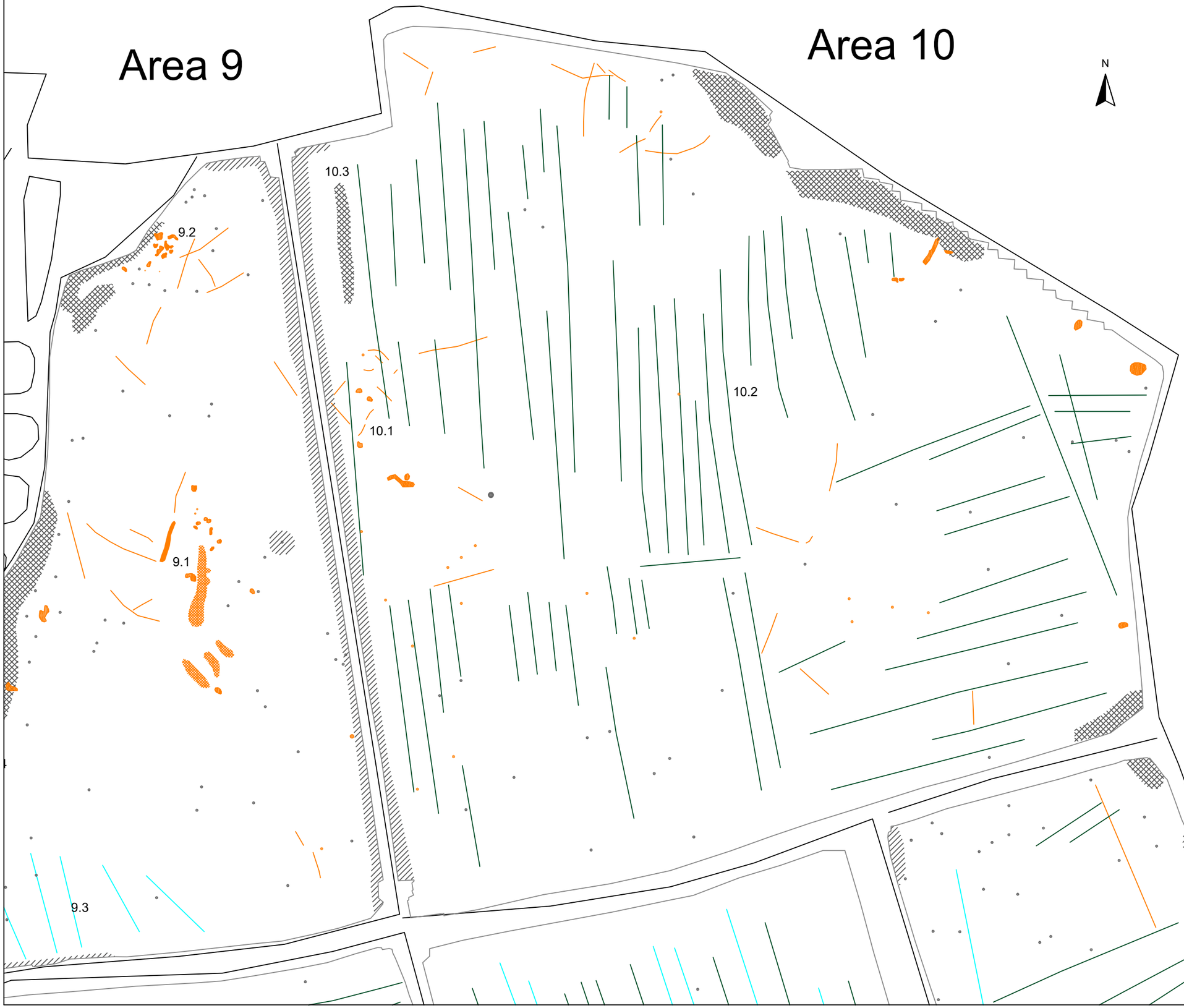
Solar Farm near Arlingham
Gloucestershire

Abstraction and interpretation of magnetic anomalies - Area 10



- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Discrete positive response - possible pit-like feature
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 16

rea 7

Area 11

N

Unsurveyable

-3nT +3nT

+3nT

-3nT

Archaeological Surveys
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Solar Farm near Arlingham
Gloucestershire

Greyscale plot of processed magnetometer data - Area 11

SCALE 1:1250

0m 10 20 30 40 50m

KTD	DJS	FIG 17

rea 7

Area 11

N

Archaeological Surveys
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Geophysical Survey
Solar Farm near Arlingham
Gloucestershire

Abstraction and interpretation of magnetic anomalies - Area 11

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

SCALE 1:1250

10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 18

Archaeological Surveys
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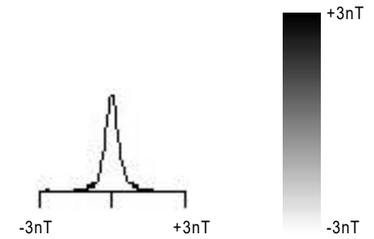
Solar Farm near Arlingham
Gloucestershire

Greyscale plot of processed magnetometer data - Area 12



ea 11

N

Unsurveyable

Area 12

Area 13

SCALE 1:1250

0m 10 20 30 40 50m

KTD	DJS	FIG 19

Archaeological Surveys
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Solar Farm near Arlingham
Gloucestershire

Abstraction and interpretation of magnetic anomalies - Area 12

ea 11

N

Unsurveyable

Area 12

Area 13

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Discrete positive response - possible pit-like feature
- Positive anomaly - magnetically enhanced material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 20

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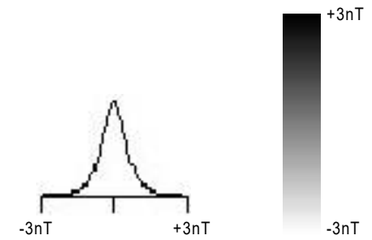
Solar Farm near Arlingham
Gloucestershire

Greyscale plot of processed magnetometer data - Area 14



Area 15

N

Unsurveyable

Area 14

Area 13

12

SCALE 1:1250

0m 10 20 30 40 50m

KTD	DJS	FIG 21

Archaeological Surveys
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Geophysical Survey
Solar Farm near Arlingham
Gloucestershire

Abstraction and interpretation of magnetic anomalies - Area 14

Area 15

N

Unsurveyable

Area 14

Area 13

12

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Discrete positive response - possible pit-like feature
- Positive anomaly - magnetically enhanced material
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 22

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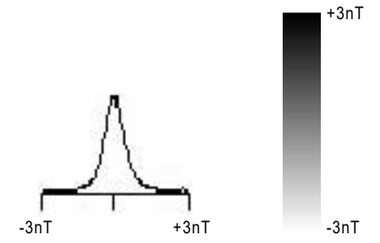
Gloucestershire

Greyscale plot of processed magnetometer data - Areas 15 & 16



Area 16

Area 15

SCALE 1:1250

0m 10 20 30 40 50m

KTD	DJS	FIG 23

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Specialist Geophysical Surveyors

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Solar Farm near Arlingham
Gloucestershire

Abstraction and interpretation of magnetic anomalies - Areas 15 & 16

8.3

9.3

N

Area 16

Area 15

A

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Positive linear anomaly - former field boundary
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 24

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Solar Farm near Arlingham
Gloucestershire

Greyscale plot of processed magnetometer data - Area 17

Area 18

N

Area 17

Unsurveyable - conservation mix

+3nT

-3nT +3nT

-3nT

SCALE 1:1250

0m 10 20 30 40 50m

KTD	DJS	FIG 25

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Solar Farm near Arlingham
Gloucestershire

Abstraction and interpretation of magnetic anomalies - Area 17

Area 18

N

Area 17

Unsurveyable - conservation mix

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Positive/weak multiple dipolar linear anomaly - land drain
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 26

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Geophysical Survey
Solar Farm near Arlingham
Gloucestershire

Greyscale plot of processed magnetometer data - Area 18

Area 18

N

17

Unsurveyable - conservation mix

+3nT
-3nT
-3nT
+3nT

SCALE 1:1250

0m 10 20 30 40 50m

KTD	DJS	FIG 27

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Geophysical Survey
Solar Farm near Arlingham
Gloucestershire

Abstraction and interpretation of magnetic anomalies - Area 18

Area 18

17

Unsurveyable - conservation mix

N

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Linear anomaly - ridge and furrow
- Positive/weak multiple dipolar linear anomaly - land drain
- Positive linear anomaly - former field boundary
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 28

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Gloucestershire

Digital Terrain Model

Derived from Environment Agency's LiDAR data 1m resolution

SCALE 1:7000

0m 70 140 210 280 350m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 29