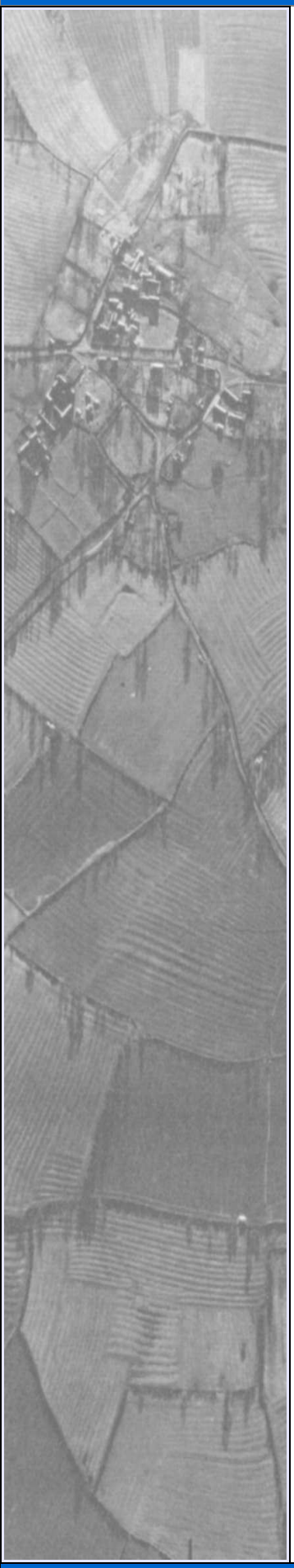

Inlands Farm
Wanborough
Swindon

MAGNETOMETER SURVEY REPORT

for

Wasdell Properties Ltd

Kerry Donaldson & David Sabin

June 2017

Ref. no. J714

ARCHAEOLOGICAL SURVEYS LTD

Inlands Farm
Wanborough
Swindon

Magnetometer Survey Report

for

Wasdell Properties Ltd

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 – 3rd, 4th, 8th & 9th May 2017
Ordnance Survey Grid Reference – **SU 20210 83165**

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SUMMARY

Detailed magnetometry was carried out by Archaeological Surveys Ltd within three land parcels covering 16ha at Inlands Farm, Wanborough, Swindon. The results of the survey show that the northern part of the site contains a small number of weakly positive linear and discrete responses, as well as a number of negative linear anomalies. The proximity to archaeological features to the south and west recorded in previous geophysical surveys may indicate that they have some archaeological potential, but they are poorly defined and lack a coherent morphology for their origin to be interpreted. Zones of responses relating to the underlying geology can be seen at the eastern end of the site, and other positive responses could be associated with these natural features. The line of a removed field boundary is associated with patches of magnetic debris and magnetic enhancement. Land drains have been located in the northern part of the site, with services located in the central and eastern part of the site.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Wasdell Properties Ltd to undertake a magnetometer survey of an area of land at Inlands Farm, Wanborough, Swindon. The site has been outlined for a potential development and the survey forms part of an archaeological assessment of the site.

1.1.2 The geophysical survey was carried out in accordance with a Written Scheme of Investigation (WSI) produced by Archaeological Surveys (2017a) and approved by Melanie Pomeroy-Kellinger, County Archaeologist for Wiltshire Council, prior to commencing the fieldwork.

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 The survey and report generally follow the recommendations set out by: English Heritage (2008) *Geophysical survey in archaeological field evaluation;* 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.*

1.3 Site location, description and survey conditions

1.3.1 The site is located at Inlands Farm, to the east of The Marsh and north of Pack Hill in Wanborough. It is centred on Ordnance Survey National Grid Reference (OS NGR) SU 20210 83165, see Figs 01 and 02.

1.3.2 The site covers approximately 16ha within three separate land parcels referred to as Area 1 in the north, Area 2 in the south east and Area 3 in the centre. Areas 1 and 2 contained an arable crop and Area 3 was a narrow strip of grazed land. The survey areas are part of a larger area considered for potential development. Two other fields covering 21ha immediately to the south and west have been subject to a previous geophysical survey and which have been reported on separately (Archaeological Surveys, 2017b).

1.3.3 The ground conditions across the site were generally considered to be favourable for the collection of magnetometry data. Weather conditions during the survey were generally fine.

1.4 Site history and archaeological potential

1.4.1 The Wiltshire Historic Environment Record lists that the site contains the redeveloped 19th century farmstead of Inlands Farm (MWI68145) and also the site of a demolished 19th century outfarm (MWI68143) at the south eastern end of Area 3. Located to the west of the site and The Marsh and to the north of Great Moor Leaze are the remains of a Romano-British settlement (MWI160204) identified through evaluation and geophysical survey Archaeological Surveys, 2015). It includes a Roman building (MWI74279), pits (MWI74276), ring ditches (MWI74278) and enclosures and ditches (MWI16354).

1.4.2 There is some potential for the western part of the site to contain further archaeological features associated with the Roman settlement to the north of Great Moor Leaze. Anomalies associated with agricultural activity and also the19th century outfarm are also likely.

1.4.3 Conditions were unsuitable for the observation of cultural material due to the nature of the ground cover.

1.5 Geology and soils

1.5.1 The underlying solid geology across the site is Gault Clay with head deposits overlying the eastern field (BGS, 2017). Chalk fragments were noted within the eastern half of the eastern field. Several large sarsen stones were noted within some of the field boundaries, and it is likely that these have been cleared from the fields. Smaller sarsen fragments were noted within the fields also.

1.5.2 The overlying soil across the survey area is from the Denchworth association and is a pelo-stagnogley soil. It consists of a slowly permeable, seasonally waterlogged clayey soil. The overlying soil within the eastern part of the site is from the Block association and is a gleyic brown calcareous earth and consists of moderately permeable, calcareous loamy soils over chalky drift (Soil Survey of England and Wales, 1983).

1.5.3 Magnetometry survey carried out across similar soils has produced variable results with low magnetic susceptibility associated with stagnogley soils. However, where there has been long term occupation or industrial activity there can be sufficient magnetic contrast between the fill of cut features and the material into which they are cut. The underlying geology and soils are considered acceptable 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 is manifest 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 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 within Area 2. This effectively removes low frequency variation along a traverse that has been caused by large magnetic bodies, cultivation and/or rapid temperature change.

2.3.5 All of the survey areas have also had low pass filtering carried out. This effectively removes high frequency variation along a traverse that has been caused by uneven ground and associated vibration. Data treated to additional processing have been compared to unprocessed data to ensure that no significant anomalies have been removed.

2.3.6 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.

2.3.7 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 is considered by the manufacturer to be data that is 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 very high density of data collection.

2.3.8 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.

2.3.9 An abstraction and interpretation is also 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.

2.3.10 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.

2.3.11 The abstraction and interpretation procedure has been supported by analysis of a digital terrain model and/or contour plot derived from the Environment Agency's LiDAR 1m resolution data interpolated and processed using Surfer 10 software. Shaded relief plots are created using Surfer 10 (see Fig 14).

2.3.12 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 three survey areas covering approximately 16ha.

3.1.2 Magnetic anomalies located can be generally classified as positive anomalies of an uncertain origin, anomalies associated with land management, areas of magnetic debris and disturbance, strong discrete dipolar anomalies relating to ferrous objects, strong multiple dipolar linear anomalies relating to buried services or pipelines and anomalies with a natural origin. 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. Some additional processing was carried out to improve the visual quality of some of the greyscale plots, see 2.3.4.

3.2.2 Area 3 contains several services that are associated with magnetic disturbance which has the potential to obscure anomalies of archaeological potential in the immediate vicinity.

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, a basic key is

indicated to allow cross referencing to the abstraction and interpretation plot. CAD layer names are included to aid reference to associated digital files (.dwg/.dxf). Sub-headings are then used to group anomalies with similar characteristics for each survey area.

Report sub-heading CAD layer names and plot colour	Description and origin of anomalies
Anomalies with an uncertain origin AS-ABST MAG POS LINEAR UNCERTAIN AS-ABST MAG POS DISCRETE UNCERTAIN AS-ABST MAG NEG LINEAR UNCERTAIN 	The category applies to a range of anomalies where there is not enough evidence to confidently suggest an origin. Anomalies in this category may well be related to archaeologically significant features, but equally relatively modern features, geological/pedological features and agricultural features should be considered. Positive anomalies are indicative of magnetically enhanced soils that may form the fill of 'cut' features or may be produced by accumulation within layers or 'earthwork' features; soils subject to burning may also produce positive anomalies. Negative anomalies are produced by material of comparatively low magnetic susceptibility such as stone and subsoil.
Anomalies relating to land management AS-ABST MAG BOUNDARY AS-ABST MAG LAND DRAIN 	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 a ceramic land drain.
Anomalies associated with magnetic debris AS-ABST MAG DEBRIS AS-ABST MAG STRONG DIPOLAR 	Magnetic debris often appears as areas containing many small dipolar anomalies that may range from weak to very strong in magnitude. It often occurs where there has been dumping or ground make-up and is related to magnetically thermoremnant materials such as brick or tile or other small fragments of ferrous material. This type of response is occasionally associated with kilns, furnace structures, or hearths and may therefore be archaeologically significant. It is also possible that the response may be caused by natural material such as certain gravels and fragments of igneous or metamorphic rock. Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.
Anomalies with a modern origin AS-ABST MAG DISTURBANCE AS-ABST MAG SERVICE 	The magnetic response is often strong and dipolar indicative of ferrous material and may be associated with extant above surface features such as wire fencing, cables, pylons etc.. Often a significant area around such features has a strong magnetic flux which may create magnetic disturbance; such disturbance can effectively obscure low magnitude anomalies if they are present. Fluxgate sensors may respond erratically and with hysteresis adjacent to strong magnetic sources. Buried services may produce characteristic multiple dipolar anomalies dependant upon their construction.
Anomalies with a natural origin AS-ABST MAG NATURAL FEATURES	Naturally formed magnetic anomalies are 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 distinguished 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 420135 183330, see Figs 05 - 10.

Anomalies with an uncertain origin

(1) - A positive linear anomaly is located in the far western corner of the survey area. It is close to the edge of the site near to buildings, and although a modern or agricultural origin is possible, the anomaly is located adjacent to a zone containing archaeology to the south and west. An archaeological origin for this anomaly is, therefore, possible. Other short, weakly positive linear anomalies are located in the vicinity but cannot be confidently interpreted.

(2) - A small number of discrete positive anomalies are located within the western part of the survey area. It is not possible to determine if they relate to pits with an archaeological origin, or if they are more modern features.

(3) - Also located in the north western part of the survey area are a number of negative linear anomalies. There is no coherent morphology but similar responses have been found during previous surveys of land to the south and west.

Anomalies associated with land management

(4) - Extending across the centre of the survey area is a positive linear anomaly and associated patches of magnetic debris. They relate to a former field boundary removed in the 20th century.

(5) - A series of weakly multiple dipolar, linear anomalies are a response to ceramic land drains.

Anomalies associated with magnetic debris

(6) - Patches of magnetic debris are evident close to the edge of the survey area and along former boundary (3). They relate to ferrous and magnetically thermoremnant material, such as brick and tile.

(7) - Strong, discrete, dipolar anomalies are a response to ferrous and other magnetically thermoremnant objects within the topsoil. Generally introduced during the process of manuring these responses are widespread throughout all the survey areas.

Anomalies with a natural origin

(8) - Amorphous weakly positive or magnetically variable responses relate to a change in the underlying geology/head deposits.

3.5 List of anomalies - Area 2

Area centred on OS NGR 420285 182795, see Figs 11 - 13.

Anomalies with an uncertain origin

(9) - The survey area contains a small number of very weakly positive linear anomalies. They are short, indistinct and do not form a coherent pattern or morphology.

Anomalies with a natural origin

(10) - A zone of magnetically variable responses relate to changes in the underlying geology/head deposits.

Anomalies with a modern origin

(11) - A strong, multiple dipolar, linear anomaly relates to a buried service/pipe.

3.6 List of anomalies - Area 3

Area centred on OS NGR 420142 183110, see Figs 08 - 10.

Anomalies associated with magnetic debris

(12) - Magnetic debris at the south eastern end of the survey area relates to demolition material derived from a former 19th century outfarm.

Anomalies with a modern origin

(13) - The survey area contains three strong, multiple dipolar, linear anomalies which relate to services/pipes. Two extend along the length of the field, with one continuing south eastwards into Area 2, while another extends across the width of the survey area towards a water trough.

4 CONCLUSION

4.1.1 Magnetic anomalies within the site are generally weak and poorly defined, with several appearing to be associated with the removal of trees, hedges and possibly buried sarsens during the 20th century. There is one positive linear anomaly towards the north western corner of the site which may relate to a cut, ditch-like feature and although there are a small number of discrete, pit-like anomalies and negative linear anomalies in the vicinity, their origin is uncertain. The site lies close to archaeological features to the south and west

and an archaeological origin should be considered. Zones of magnetically variable responses in the eastern part of the site relate to changes in the underlying geology. Other anomalies are of modern origin relating to land drains in the northern part of the site and buried services/pipes in the centre and south.

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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 field. The difference between the two sensors will relate to the strength 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: J714-mag-Area1.xcp
Description: Imported as Composite from: J714-mag-Area1.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 419912.284, 183624.808 m
Southeast corner: 420379.984, 183008.908 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702
Source GPS Points: 2964300
Dimensions
Composite Size (readings): 3118 x 4106
Survey Size (meters): 468 m x 616 m
Grid Size: 468 m x 616 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.77
Mean: 0.02
Median: 0.01
Composite Area: 28.806 ha
Surveyed Area: 9.7855 ha
PROGRAM
Name: TerraSurveyor
Version: 3.0.23.0
Processes: 1
1 Base Layer
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: J714-mag-Area1-proc-lpf.xcp
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.70
Mean: 0.01
Median: 0.01
Composite Area: 28.806 ha
Surveyed Area: 9.7855 ha
Processes: 1
1 Base Layer
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Lo pass Uniform (median) filter: Window dia: 13
5 Clip from -3.00 to 3.00 nT

Area 2 minimally processed data

Filename: J714-mag-Area2.xcp
Instrument Type: Sensys DLMGPS
Units: nT

UTM Zone: 30U
Survey corner coordinates (X/Y): OSGB 36
Northwest corner: 420117.079, 182965.058m
Southeast corner: 420423.529, 182680.958 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702
Source GPS Points: 1505200
Dimensions
Composite Size (readings): 2043 x 1894
Survey Size (meters): 306 m x 284 m
Grid Size: 306 m x 284 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.93
Mean: 0.01
Median: 0.01
Composite Area: 8.7062 ha
Surveyed Area: 4.3886 ha
Processes: 1
1 Base Layer
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 2 filtered data

Filename: J714-mag-Area2-proc.xcp

Stats
Max: 3.32
Min: -3.30
Std Dev: 0.82
Mean: 0.00
Median: 0.01
Composite Area: 8.7062 ha
Surveyed Area: 4.3886 ha
Processes: 1
1 Base Layer
GPS based Proce6
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 300
5 Lo pass Uniform (median) filter: Window dia: 13
6 Clip from -3.00 to 3.00 nT

Area 3 minimally processed data

Filename: J714-mag-Area3.xcp

Description: Imported as Composite from: J714-mag-Area3.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 420046.918, 183229.595m
Southeast corner: 420233.2189, 182977.895 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702
Source GPS Points: 167700
Dimensions
Composite Size (readings): 1242 x 1678
Survey Size (meters): 186 m x 252 m
Grid Size: 186 m x 252 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 2.32
Mean: -0.03
Median: 0.00
Composite Area: 4.6892 ha
Surveyed Area: 0.58095 ha
Processes: 1
1 Base Layer
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Lo pass Uniform (median) filter: Window dia: 13
5 Clip from -3.00 to 3.00 nT

Area 3 filtered data

Filename: J714-mag-Area3-proc-lpf.xcp

Stats
Max: 3.32
Min: -3.30
Std Dev: 2.32
Mean: -0.03
Median: 0.00
Composite Area: 4.6892 ha
Surveyed Area: 0.58095 ha
Processes: 1
1 Base Layer
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Lo pass Uniform (median) filter: Window dia: 13
5 Clip from -3.00 to 3.00 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 printed copy of the report and a PDF copy will be supplied to the Wiltshire Historic Environment Record. The report will also be uploaded to the Online AccesS to the Index of archaeological investigationS (OASIS).

Archive contents:

Geophysical data - path: J714 \Data\Inlands Farm, Wanborough\Data				
Path and Filename				
inlands1\MX\ inlands2\MX\ inlands3\MX\ .prm .dgb .disp	Sensys MXPDA	Proprietary data formats representing magnetometer survey traverses logged to a PDA.	04/05/17 08/05/17 09/05/17	D.J.Sabin
inlands1\MX\J714-mag-Area1.asc inlands2\MX\J714-mag-Area2.asc inlands3\MX\J714-mag-Area3.asc	Sensys DLMGPS	ASCII CSV (tab) file representing survey area in eastings, northings (UTM Z30N), magnetic measurement, traverse file and sensor number.	04/05/17 08/05/17 09/05/17	D.J.Sabin
Area1\comps\J714-mag-Area1.xcp Area2\comps\J714-mag-Area2.xcp Area3\comps\J714-mag-Area3.xcp	TerraSurveyor 3.0.23.0	Composite data file derived from ASCII CSV.	17/05/17 17/05/17 17/05/17	K.T.Donaldson
Area1\comps\J714-mag-Area1-proc.xcp Area2\comps\J714-mag-Area2-proc.xcp Area3\comps\J714-mag-Area3.-proc.xcp Area2\comps\J714mag-Area2-proc-hpf-lpf.xcp	TerraSurveyor 3.0.23.0	Processed composite data file (zmt, high/low pass filter and clipping to ±3nT).	17/05/17	K.T.Donaldson
Geophysical data - path: J714 \Data\Inlands Farm, Wanborough\Data\Graphics				
Area1\comps\J714-mag-Area1-proc.tif Area2\comps\J714-mag-Area2-proc.tif Area3\comps\J714-mag-Area.-proc.tif Area2\comps\J714mag-Area2-proc-hpf-lpf.tif	TerraSurveyor 3.0.23.0	TIF file showing processed greyscale plot clipped at ±3nT.	17/05/17	K.T.Donaldson
Area1\comps\J714-mag-Area1-proc.tfw Area2\comps\J714-mag-Area2-proc.tfw Area3\comps\J714-mag-Area3-proc.tfw Area2\comps\J714mag-Area2-proc-hpf-lpf.tfw	TerraSurveyor 3.0.23.0	World file georeferencing TIF to OSGB36	17/05/17	K.T.Donaldson
Text data - path: J714 \Data\Inlands Farm,\CAD				
J714 version 1.dwg	ProgeCAD 2016	CAD file for creating plots of greyscales, abstraction, interpretation and mapping. Grid coordinates as OSGB. AutoCAD 2010 format.	26/04/17	K.T.Donaldson
Text data - path: J714 \Data\Inlands Farm,\Report				
J714 report.odt	OpenOffice.org 3.0.1 Writer	Report text as an Open Office document.	23/05/17	K.T.Donaldson

Appendix E – copyright and intellectual property

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Survey location

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Geophysical Survey
Inlands Farm
Wanborough
Swindon

Map of survey area

Survey location

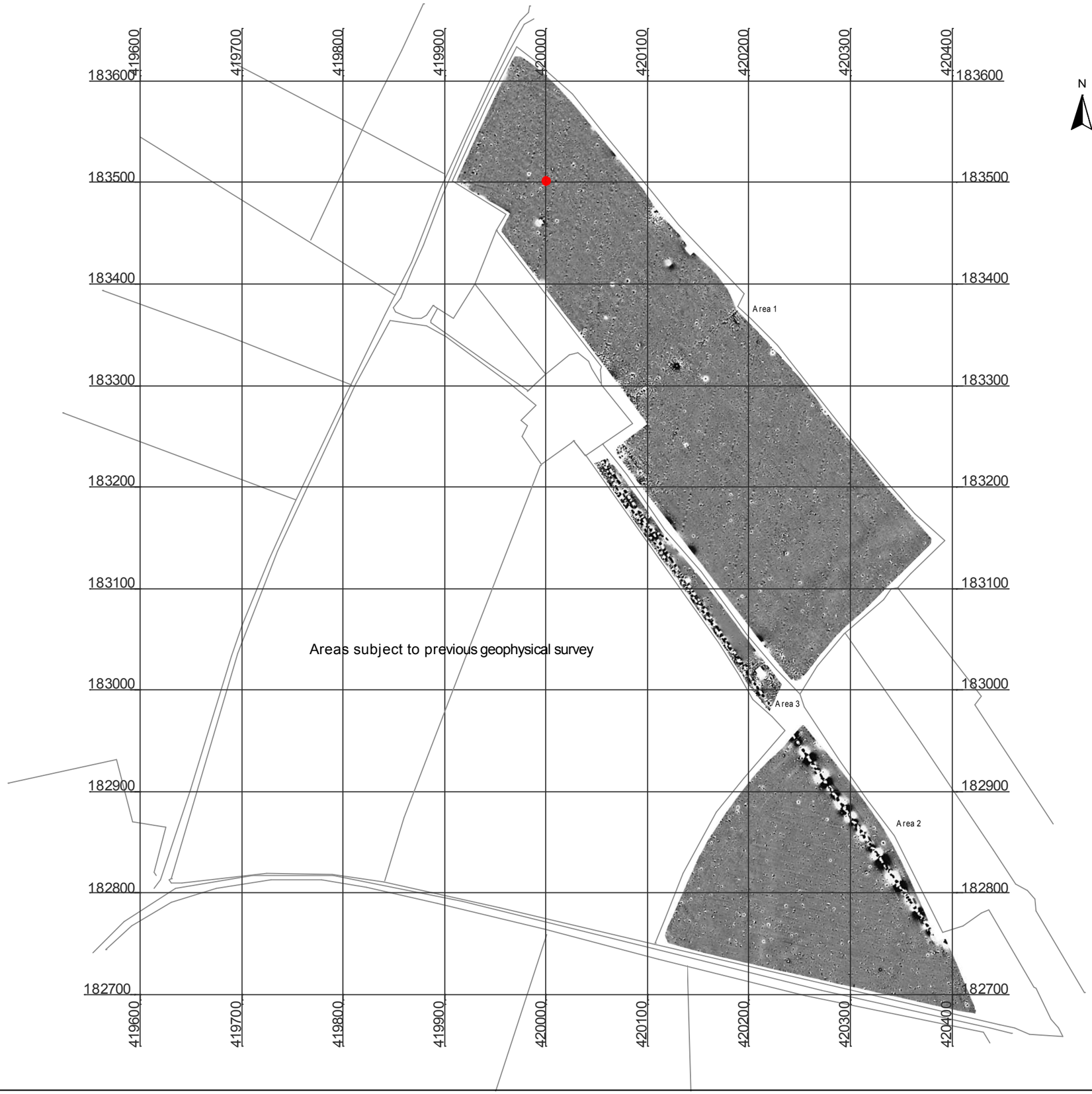
Site centred on OS NGR
SU 20210 83165

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

FIG 01



Archaeological Surveys Ltd

Geophysical Survey
Inlands Farm
Wanborough
Swindon

Referencing information

Referencing grid to OSGB36 datum at 100m intervals

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

420000 183500

SCALE 1:4000

0m 40 80 120 160 200m

SCALE TRUE AT A3

FIG 02

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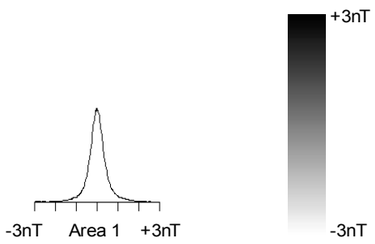
Geophysical Survey
Inlands Farm
Wanborough
Swindon

Greyscale plot of minimally processed magnetometer data



SCALE 1:3500

0m 35 70 105 140 175m

SCALE TRUE AT A3

FIG 03

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Wanborough
Swindon

Abstraction and interpretation of magnetic anomalies

- Positive linear anomaly - possible ditch-like feature
- Negative linear anomaly - material of low magnetic susceptibility
- Weakly multiple dipolar linear anomaly - land drain
- Positive linear anomaly - former field boundary
- Discrete positive response - possible pit-like feature
- Variable magnetic response - of natural origin (geology/pedology)
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:3500

0m 35 70 105 140 175m

SCALE TRUE AT A3

FIG 04

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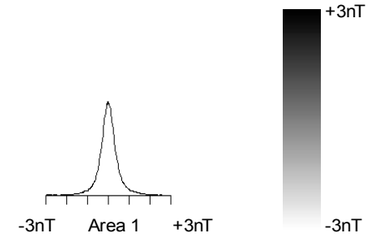
Inlands Farm
Wanborough
Swindon

Greyscale plot of minimally processed magnetometer data - Area 1 north west



N

Area 1

SCALE 1:1250

0m 10 20 30 40 50m

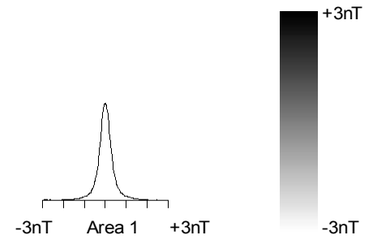
SCALE TRUE AT A3

FIG 05

Archaeological Surveys Ltd

Geophysical Survey
Inlands Farm
Wanborough
Swindon

Greyscale plot of filtered magnetometer data - Area 1 north west



N

Area 1

SCALE 1:1250

0m 10 20 30 40 50m

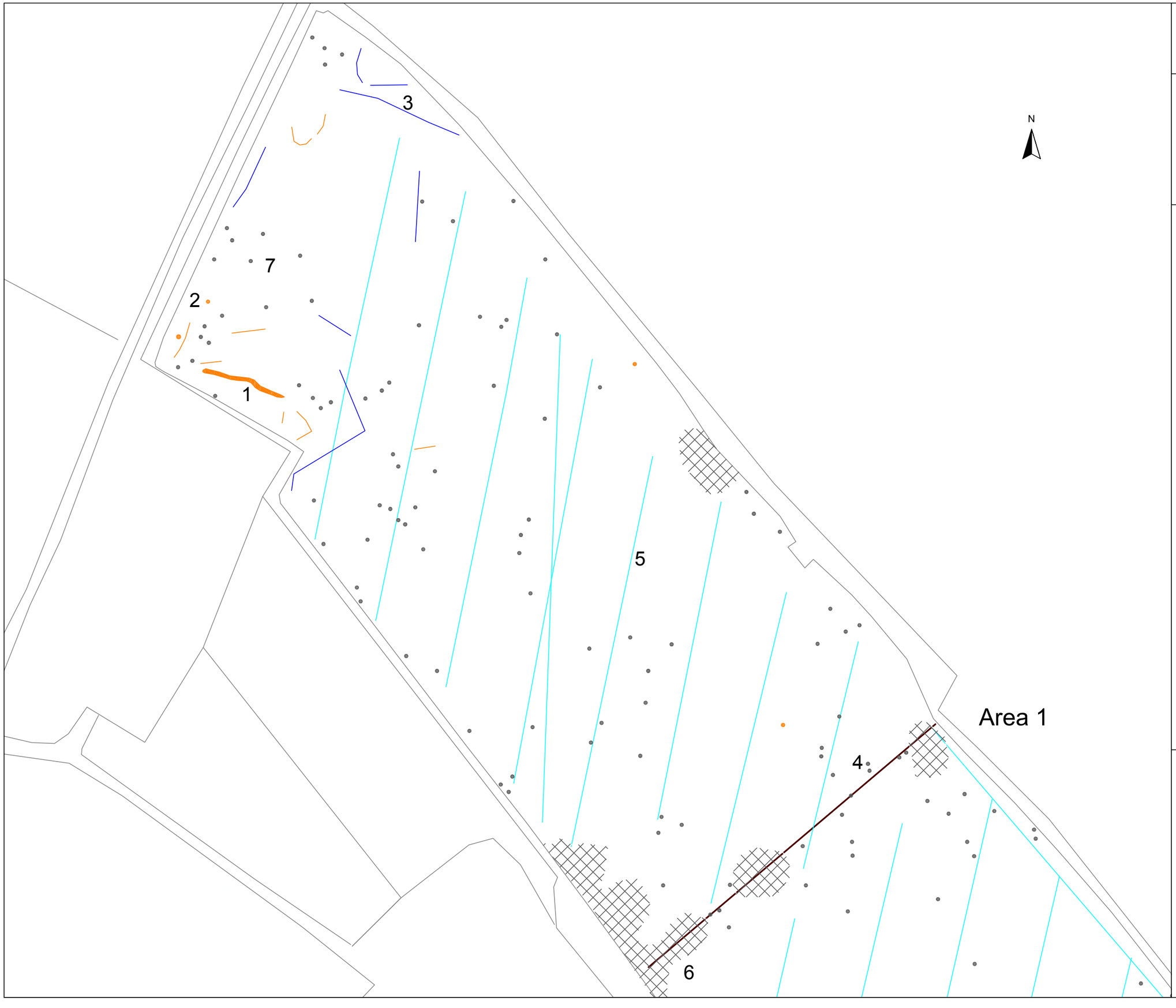
SCALE TRUE AT A3

FIG 06

Archaeological Surveys Ltd

Geophysical Survey
Inlands Farm
Wanborough
Swindon

Abstraction and interpretation of magnetic anomalies - Area 1 north west



- Positive linear anomaly - possible ditch-like feature
- Negative linear anomaly - material of low magnetic susceptibility
- Weakly 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
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 07

Area 1

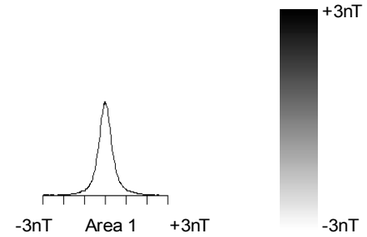
N

Area 3

Archaeological Surveys Ltd

Geophysical Survey
Inlands Farm
Wanborough
Swindon

Greyscale plot of minimally processed magnetometer data - Area 1 south east & Area 3



SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 08

Area 1

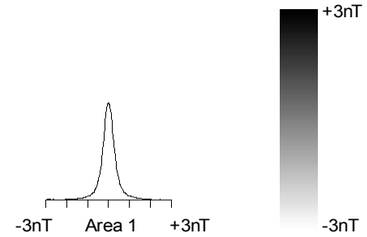
N

Area 3

Archaeological Surveys Ltd

Geophysical Survey
Inlands Farm
Wanborough
Swindon

Greyscale plot of minimally processed magnetometer data - Area 1 south east & Area 3



SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 09

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Geophysical Survey
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Wanborough
Swindon

Abstraction and interpretation of magnetic anomalies - Area 1 south east & Area 3

- Positive linear anomaly - possible ditch-like feature
- Weakly multiple dipolar linear anomaly - land drain
- Positive linear anomaly - former field boundary
- Discrete positive response - possible pit-like feature
- Variable magnetic response - of natural origin (geology/pedology)
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 10

Area 1

Area 3

N

6

13

12

8

Area 3

Area 2

N

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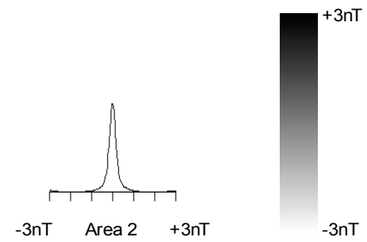
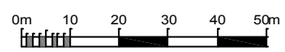
Geophysical Survey
Inlands Farm
Wanborough
Swindon

Greyscale plot of minimally processed magnetometer data - Area 2



SCALE 1:1250



SCALE TRUE AT A3

FIG 11

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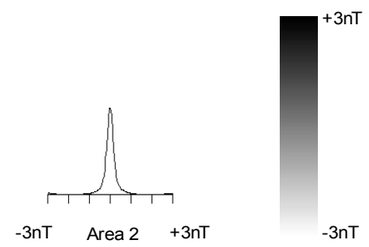
Geophysical Survey
Inlands Farm
Wanborough
Swindon

Greyscale plot of filtered magnetometer data



N

SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 12

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Geophysical Survey
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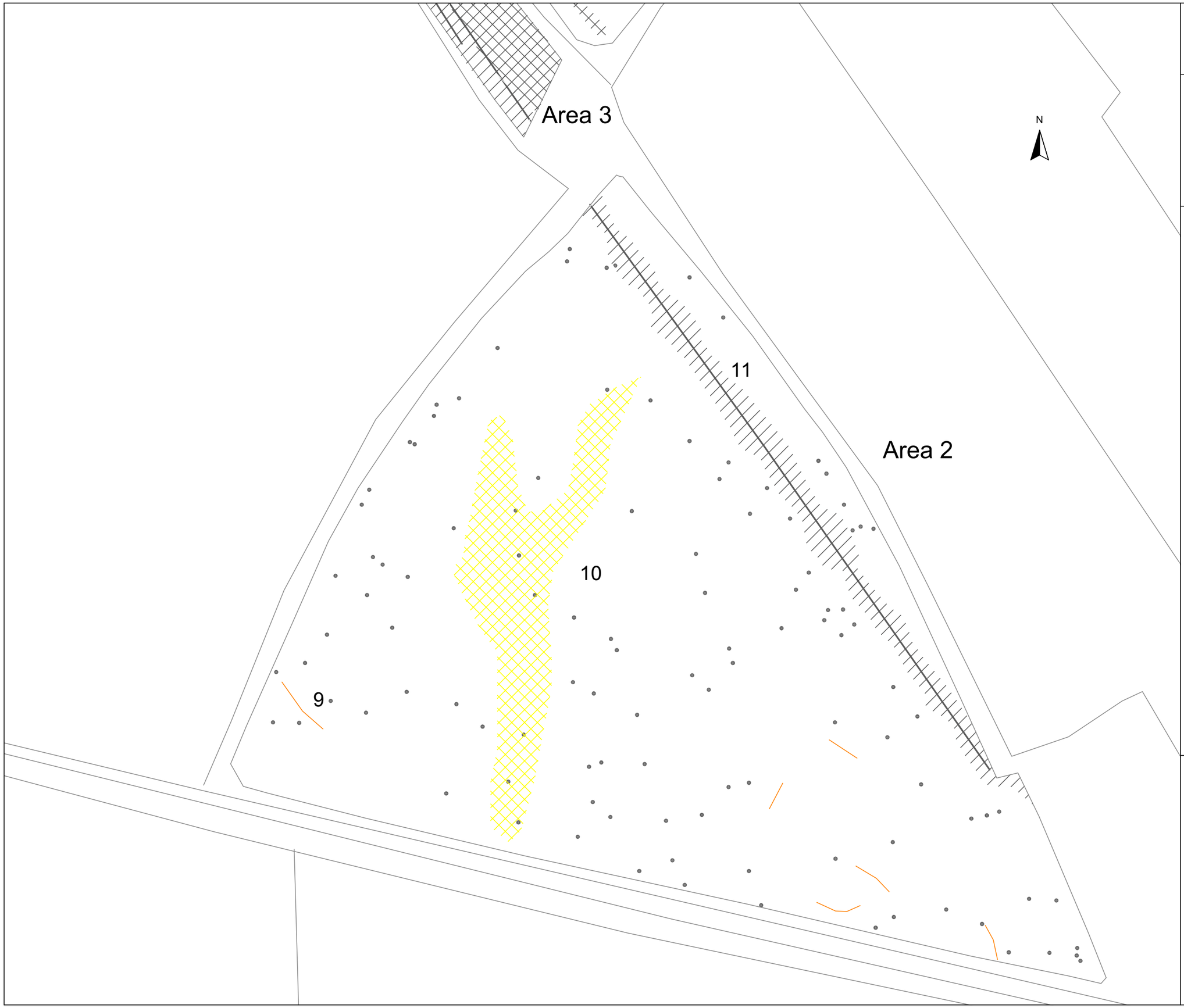
Wanborough
Swindon

Abstraction and interpretation of magnetic anomalies - Area 2



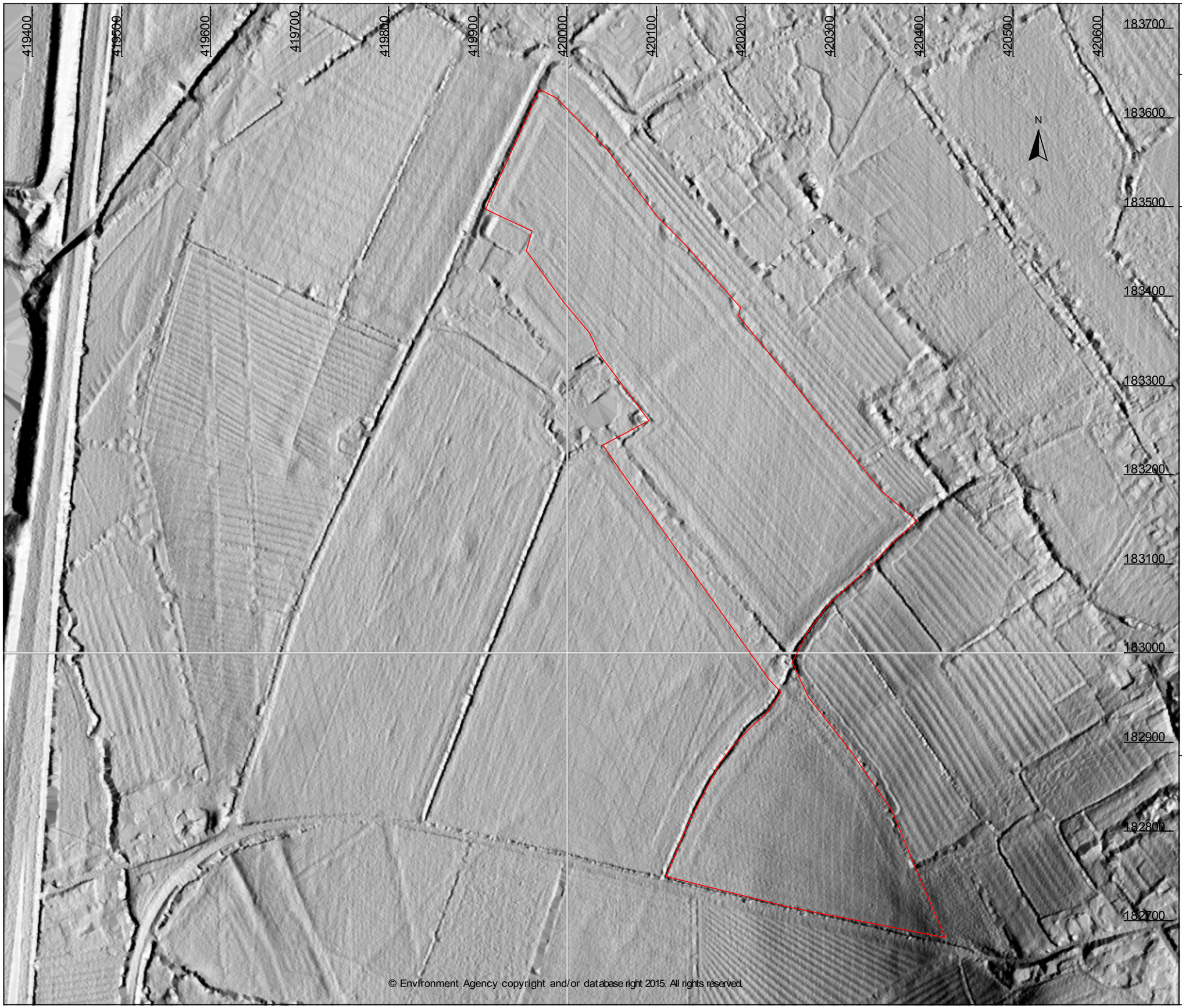
- Positive linear anomaly - of uncertain origin
- Variable magnetic response - of natural origin (geology/pedology)
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 13



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Geophysical Survey
Inlands Farm
Wanborough
Swindon

Shaded Relief Plot of Digital Terrain Model

Derived from Environment Agency's LiDAR data 1m resolution

SCALE 1:4000

0m 40 80 120 160 200m

SCALE TRUE AT A3

FIG 14