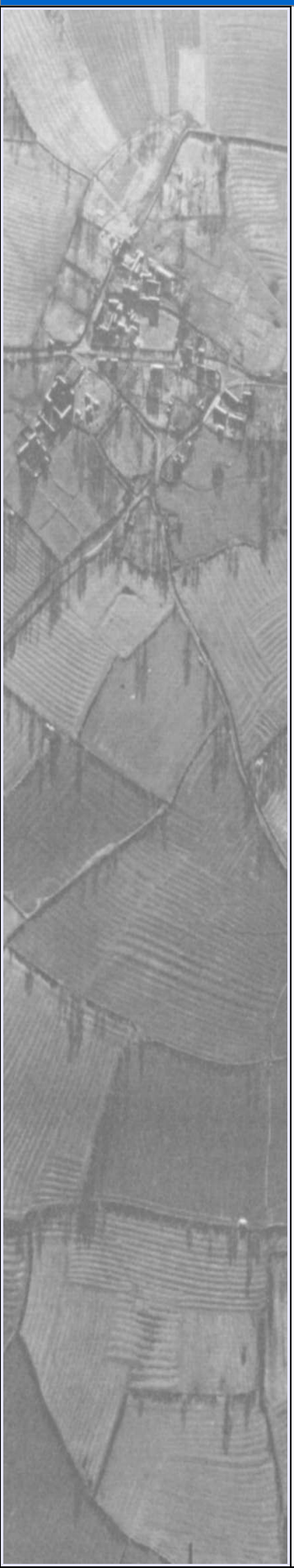

B0562 Malmesbury Aquifer Resilience Scheme: Cowbridge to Shipton Moyne Wiltshire

MAGNETOMETER SURVEY REPORT

for

AC Archaeology Ltd

Kerry Donaldson & David Sabin

January 2017

Ref. no. J694

ARCHAEOLOGICAL SURVEYS LTD

B0562 Malmesbury Aquifer Resilience Scheme: Cowbridge to Shipton Moyne Wiltshire

Magnetometer Survey Report

for

AC Archaeology Ltd

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

Survey dates – 7th to 11th, 14th, 15th, 24th & 25th November 2016
Ordnance Survey Grid Reference – **ST 94220 86334 to ST 89967 88610**

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SUMMARY

A detailed magnetometer survey was carried out along the route of a proposed new water main to the south and west of Malmesbury in Wiltshire. The coverage was over 28ha within 24 separate areas, the majority being 40m or 30m wide corridors, with a zone to the west of Malmesbury surveyed extended over a wider area of cropmarks and geophysical anomalies located during the initial survey. These anomalies relate to a number of ring ditches, some possibly relating to round barrows, with the majority appearing to relate to prehistoric round houses. There are a number of linear ditches, possible trackways and rectilinear enclosures, some of which overlie the ring ditches, indicating they may relate to later, possibly Roman features. A large number of pits have also been located, some may indicate further round houses, others form arcs and linear arrangements. Away from this zone of archaeology, the majority of the other survey areas contain geophysical anomalies of uncertain origin where an assessment of their archaeological potential cannot be confidently made due to the constraints of the survey area, or the fragmented and weak nature of the responses.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by AC Archaeology, on behalf of Wessex Water, to undertake a magnetometer survey along the length of a proposed new water main between Cowbridge and Shipton Moyne near Malmesbury, Wiltshire. 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 (2016) 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 survey area extends in a corridor between at the eastern end Cowbridge pumping station (NGR ST 94220 86334) and at the western end Shipton Moyne

pumping station (NGR ST 89967 88610) on the southern and western sides of Malmesbury in Wiltshire respectively (see Figs 01 to 04).

1.3.2 The geophysical survey covers approximately 28ha with approximately 21ha within 24 fields over a survey corridor 40m wide, centred on the pipeline route where possible, or 30m wide offset from the field margin where it extends along the field boundary.

1.3.3 An additional area of approximately 6.9ha was surveyed within a zone of known archaeological features identified through cropmarks to the south of Twatley Cottages to the west of Malmesbury and also further anomalies located through the initial corridor survey (Area 12 north east and north west). As the pipeline route extended through several archaeological features, a wider area to the north of the initial route was surveyed to map the extent of the archaeology and see if there were zones without archaeology for a possible re-route of the pipeline.

1.3.4 The survey area numbers are based on land ownership with separate fields indicated by the addition of a letter. Several were not surveyed due to the pipeline being subject to horizontal directional drilling (HDD) rather than cut and fill, hence resulting in a discontinuous numbering system. The survey was therefore carried out within Area 1, Area 2 (2a-2c), Area 4 (4a & 4b), Area 5 (5a & 5b), Area 8, Area 9 (9a-9c), Area 10, Area 12 (12a-12f), Area 13 and Area 14 (14a-14d).

1.3.5 Ground cover was variable as the survey corridor crossed areas of pasture and emerging arable crops or open soil. Topography and ground cover notes are included in Table 1 below.

Area no.	Ground cover/conditions	Topography/notes	Geology	Soils
1	Grass - pasture.	Land slopes down to the south and east, steeply towards the north eastern end of the corridor due to a terrace. Made ground at north eastern end.	Kellaways Clay	Wickham 3
2a	Soil - dry, recently cultivated.	Central part of corridor elevated with land sloping down to the west and east.	Kellaways Clay	Wickham 3
2b	Emerging crop - dry.	Generally flat.	Kellaways Clay	Wickham 3
2c	Grass - pasture.	Generally flat.	Kellaways Clay	Wickham 3
4a	Emerging crop - dry.	Flat but slopes down to stream at western end.	Cornbrash	Sherborne
4b	Emerging crop - dry.	Flat but slopes down to stream at eastern end. Evidence of recent flooding of stream into survey area. Solar PVs immediately north.	Cornbrash	Sherborne
5a	Emerging crop - damp.	Flat. Steel clad barn immediately north adjacent to farm.	Kellaways Clay	Wickham 3
5b	Stubble and soil - damp. Some difficulty traversing.	Generally flat, ground rising to south west.	Kellaways Clay	Wickham 3
8	Grass - pasture.	Generally flat.	Kellaways Clay	Wickham 3
9a	Grass - pasture. Poached and waterlogged ground at western end.	Rising gently towards the north west. Recently disturbed ground and ferrous objects at western end.	Kellaways Clay	Wickham 3
9b	Grass - pasture with cattle. Poached and waterlogged at eastern end.	An elevated area with land falling to the north west and south east.	Kellaways Clay	Wickham 3
9c	Grass - pasture.	Land sloping down to the north west with a steep bank/terrace at former field boundary near nor western end.	Kellaways Clay	Wickham 3
10	Grass - rough ungrazed.	Land slopes down gently towards the north west. Some modern dumping/ground consolidation and ferrous objects at north western end.	Kellaways Clay & Cornbrash	Wickham 3 & Sherborne

12a	Grass - grazed.	Generally flat but drops away at southern end	Forest Marble & Cornbrash	Sherborne
12b	Grass - grazed.	Land rising towards the north.	Kellaways Clay	Wickham 3
12c	Grass - grazed.	Land rising towards the north.	Kellaways Clay	Wickham 3
12d	Ungrazed grass margin with area of beet or rape separated by electric fencing. Wide grass verge with trees adjacent to track at north western edge.	Generally flat with south eastern corner falling to the south. Elevated area overlooking river valley to the south.	Sands and gravels of unknown date	Sherborne
12e	Beet or rape surrounded by electric fencing. Wide grass verge with trees adjacent to track at south eastern edge. Ground saturated during survey with standing water pooled in central area.	Generally flat and elevated area overlooking river valley to the south. Barns and former gravel quarry to the west.	Sands and gravels of unknown date	Sherborne
12f	Grass - grazed.	Generally flat and elevated area overlooking river valley to the south. Former gravel quarry to the east. Temporary barn and agricultural objects at south eastern corner.	Sands and gravels of unknown date	Sherborne
13	Grass - grazed. Waterlogged at north western end.	Land slopes down gently towards the north west. North western end low lying and waterlogged. Gas pipe markers along north eastern boundary.	Sands and gravels of unknown date	Sherborne
14a	Emerging crop - damp. Some difficulty traversing.	Land slopes down towards the south east. Evidence of modern dumping or ground consolidation near north western end.	Cornbrash, Forest Marble and Kellaways Clay	Sherborne
14b	Emerging crop - dry.	Elevated flat area. Partly infilled pond immediately north east.	Kellaways Clay	Sherborne
14c	Emerging crop - dry.	Land slopes down towards the north west.	Cornbrash	Sherborne
14d	Emerging crop - dry.	Generally flat but slopes down near eastern end. Evidence of stone quarrying towards eastern end.	Forest Marble	Evesham 1

Table 1: Ground cover, topography, geology and soils along the survey corridor

1.3.6 The ground conditions across the site were generally considered to be favourable for the collection of magnetometry data. Weather conditions during the survey were variable with periods of rain and more dry conditions favourable to crossing arable land.

1.4 Site history and archaeological potential

1.4.1 A Historic Environment Assessment has been undertaken by AC Archaeology (2016) which outlines that the western end of the pipeline route crosses the line of the Fosse Way Roman road. A number of undated cropmarks are also recorded within the vicinity of the pipeline route in the western (Area 14) and central part of the site, with a number of ring ditches and enclosures identified to the south of Twatley Cottages (Area 12). To the south of this are further cropmarks, including a possible Roman enclosure adjacent to Area 12a. The corridor route extends though a number of areas identified as having been part of medieval or post medieval field systems, with ridge and furrow recorded from aerial photographs possibly subject to removal through ploughing in places.

1.5 Geology and soils

1.5.1 The underlying solid geology varies across the survey corridor with alternating bands of Forest Marble Formation, Cornbrash Formation and Kellaways Clay Member, with alluvial deposits around the River Avon and its tributaries and sand and gravel

deposits of an unknown age or origin around Hyam Farm and Twatley (BGS, 2016).

1.5.2 The overlying soils generally vary with the underlying geology. Evesham 1 soil, overlying the Forest Marble at the western end of the site, is a typical calcareous pelosol and consists of a slowly permeable calcareous clayey soil associated with shallow, well drained, brashy soils over limestone. Overlying the Cornbrash the soil is from the Sherborne association and is a brown rendzina which also consists of a shallow, well drained, brashy, calcareous, clayey soil over limestone. The soil overlying the Kellaways Clay is from the Wickham 3 association and is a typical stagnogley that consists of a slowly permeable, seasonally waterlogged, fine, loamy over clay soil (Soil Survey of England and Wales, 1983).

1.5.3 Magnetometry survey carried out across similar soils has produced good results. There can be lower magnetic contrasts within the fill of cut features within clay geologies; however, where there has been long term occupation there can be sufficient magnetic contrast for anomalies to be located. The underlying geology and soils are, therefore, 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 for Area 12c and 12d in the form of low pass filtering. This effectively removes high frequency variation along a traverse that has been caused by uneven ground and associated vibration. Data treated to additional processing has been compared to unprocessed data to ensure that no significant anomalies have been removed.

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

2.3.6 A TIF file is produced by TerraSurveyor software along with an associated world file (.TFW) that allows automatic georeferencing (OSGB36 datum) when using GIS or CAD software. The main form of data display used in the report is the minimally processed greyscale plot. With regard to the Sensys MXPDA, minimally processed data 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.

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

2.3.8 An abstraction and interpretation is 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.

2.3.9 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 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 24 survey areas covering approximately 28ha. For ease of referral between the text and the figures, the survey areas will be considered as Areas 1 & 2 east (Fig 05), Area 2 west (Figs 06 & 07), Area 4 (Fig 08), Area 5 (Fig 09), Areas 8 & 9 (Fig 10), Area 10 (Fig 11), Area12 south (Fig 12), Area 12 centre (Fig 13), Area 12 north east (Figs 14 & 15),

Area 12 north west (Figs 16 & 17), Area 13 (Figs 19 & 20), Area 14 east (Figs 21 & 22) and Area14 west (Fig 23). A figure just showing the abstraction of the archaeological anomalies and those with an uncertain origin is also shown for the northern part of Area 12 (Fig 18).

3.1.2 Magnetic anomalies located can be generally classified as positive responses of archaeological potential, positive and negative anomalies of an uncertain origin, anomalies associated with land management, linear anomalies of an agricultural origin, 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.

3.1.3 Anomalies located within each survey area have been numbered and are described in 3.4 to 3.18 below with subsequent discussion in Section 4.

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. Some localised zones of very high magnitude were encountered, mainly due to crossing steel pipelines and most notable in Areas 13 and 14d. Some additional filtering was necessary within Area 14d to suppress the effects of the disturbance; however, both filtered and unfiltered data were analysed in order to ensure that no other anomalies were removed by the processing. However, high magnitude magnetic disturbance always has the potential to obscure weak anomalies of archaeological potential.

3.2.2 Other services and modern ferrous objects are associated with less significant areas of magnetic disturbance that are unlikely to obscure significant anomalies.

3.2.3 Generally most areas seem to contain useful magnetic contrast. The presence of linear anomalies associated with former ridge and furrow may be a useful indicator of contrasting magnetic susceptibility within anthropogenic features cut into the subsoil. However, fewer anomalies towards the eastern end of the survey corridor may indicate poorer magnetic contrast over clayey geology and alluvium; this trend is frequently encountered in the region.

3.2.4 It should be noted that interpretation of anomalies can be limited where geophysical survey is constrained into survey corridors as the full extent and morphology of features is often not visible.

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 archaeological potential AS-ABST MAG POS LINEAR ARCHAEOLOGY AS-ABST MAG POS DISCRETE ARCHAEOLOGY AS-ABST MAG POS CURVILINEAR RING DITCH AS-ABST MAG POS ENCLOSURE DITCH	Anomalies have the characteristics (mainly morphological) of a range of archaeological features such as pits, ring ditches, enclosures, etc.
Anomalies with an uncertain origin AS-ABST MAG POS LINEAR UNCERTAIN AS-ABST MAG NEG LINEAR UNCERTAIN AS-ABST MAG POS DISCRETE UNCERTAIN AS-ABST MAG POS 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 with an agricultural origin AS-ABST MAG AGRICULTURAL AS-ABST MAG RIDGE AND FURROW	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.
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. Often occuring adjacent to water courses, they can relate to former palaeochannels.

Table 2: List and description of interpretation categories

3.4 List of anomalies - Area 1

Area centred on OS NGR 394135 186294, see Fig 05.

Anomalies with an uncertain origin

(1.1) - In the western part of the survey area is a positive linear anomaly with adjacent negative linear response. These correspond to a linear depression or gully within the field, possibly relating to a former field boundary. Other positive responses nearby are of uncertain origin.

(1.2) - The survey area contains a number of short positive linear anomalies and discrete responses. They are close to a zone of magnetic debris (1.4) and an association is possible.

(1.3) - A negative curvilinear response may be associated with the adjacent magnetic debris (1.4). Two negative linear responses are located in the vicinity of (1.2) and may relate to agricultural activity.

Anomalies associated with magnetic debris

(1.4) - A zone of strongly magnetic debris is likely to relate to dumped material.

3.5 List of anomalies - Area 2 east

Area centred on OS NGR 393878 186220, see Fig 05.

Anomalies with an uncertain origin

(2.1) - Two positive linear anomalies with pit-like responses at the southern end may relate to agricultural activity, but this is uncertain.

(2.2) - A weakly positive linear anomaly may relate to a cut, ditch-like feature.

(2.3) - A number of weakly positive linear anomalies are located in the eastern part of the survey area.

Anomalies associated with land management

(2.4) - A positive linear anomaly appears to relate to a former field boundary.

Anomalies with an agricultural origin

(2.5) - Parallel linear anomalies relating to agricultural activity, possibly ridge and furrow.

3.6 List of anomalies - Area 2 west

Area centred on OS NGR 393460 186022, see Figs 06 & 07.

Anomalies with an uncertain origin

(2.6) - A positive linear anomaly appears to have been truncated by agricultural anomalies, possibly ridge and furrow. This may indicate a ditch-like feature.

(2.7) - A number of weakly positive linear and discrete responses of uncertain origin can be seen in each part of the survey area.

(2.8) - A negative linear anomaly is located in the southern part of the survey area. It is parallel with, but 20m east of the indicated line of an existing sewer pipe; however, the response may indicate that the pipe is not mapped correctly or it is an earlier, parallel pipe.

Anomalies associated with land management

(2.9) - A positive linear anomaly appears to relate to a former field boundary.

3.7 List of anomalies - Area 4

Area centred on OS NGR 393095 185986, see Fig 08.

Anomalies with an uncertain origin

(4.1) - A positive linear anomaly may relate to a naturally formed feature.

(4.2) - A number of weakly positive linear anomalies with no coherent morphology.

Anomalies with an agricultural origin

(4.3) - Both fields within the survey area contain former ridge and furrow.

Anomalies with a modern origin

(4.4) - A service or pipe extends across the eastern part of the survey area.

3.8 List of anomalies - Area 5

Area centred on OS NGR 392850 186215 see Fig 09.

Anomalies with an uncertain origin

(5.1) - A weakly positive linear anomaly appears to have been truncated by ridge and furrow.

(5.2) - Two sets of closely spaced, parallel, positive linear anomalies may relate to vehicle ruts or tracks, but this is not certain.

(5.3) - Negative linear anomalies extend across the survey area (5b) from east to west. An agricultural origin is possible.

Anomalies associated with land management

(5.4) - A former land boundary.

Anomalies with an agricultural origin

(5.5) - Strongly positive linear responses relate to former ridge and furrow or strip fields.

3.9 List of anomalies - Area 8

Area centred on OS NGR 392523 186524, see Fig 10.

Area 8 contains a small number of discrete positive responses and ridge and furrow.

3.10 List of anomalies - Area 9

Area centred on OS NGR 392280 186524, see Fig 10.

Anomalies with an uncertain origin

(9.1) - Within the central part of Area 9 (9b) there are a number of positive and negative responses. Although a modern origin is possible, the farm to the south has medieval origins and an association with earlier activity or occupation is possible.

(9.2) - Two positive linear anomalies flanking a negative response are of uncertain origin.

(9.3) - Two positive linear anomalies extend across Area 9a.

Anomalies associated with land management

(9.4) - A strongly positive linear anomaly relates to a boundary ditch with an existing adjacent bank.

Anomalies with an agricultural origin

(9.5) - Each part of the survey area contains evidence for former ridge and furrow.

3.11 List of anomalies - Area 10

Area centred on OS NGR 392046 186728, see Fig 11.

Anomalies with an uncertain origin

(10.1) - Two parallel positive linear anomalies, appear to have been truncated by two other linear anomalies (10.2). While it is possible that they relate to former ridge and furrow, they have a slightly different orientation to anomalies (10.5).

(10.2) - Two positive linear anomalies may relate to agricultural activity, or a formerly unmapped field boundary.

(10.3) - The survey area contains a number of short positive linear and discrete responses. It is not possible to determine their origin.

(10.4) - The north western corner of the survey area contains a zone of magnetic enhancement. Such a response can relate to an infilled quarry pit, but there is no obvious corresponding depression. The origin of the enhancement is uncertain but may be of modern origin.

Anomalies with an agricultural origin

(10.5) - The survey area contains evidence for former ridge and furrow.

3.12 List of anomalies - Area 12 south

Area centred on OS NGR 391970 187230, see Fig 12.

Anomalies with an uncertain origin

(12.1) - A positive linear anomaly extends southwards from the northern field boundary of Area 12a for approximately 35m, but there is no apparent continuation northwards into 12b. It appears to have been truncated by agricultural activity. It lies approximately 115m north east of a square enclosure identified from cropmarks. It is not possible to determine if it is associated, but is may relate to a cut feature.

(12.2) - A large number of discrete, pit-like responses can be seen in 12a. Although such responses can relate to natural features, given the proximity of the square cropmark enclosure less than 35m west of the survey corridor, they may have some archaeological potential.

Anomalies with an agricultural origin

(12.3) - Parallel linear anomalies associated with agricultural activities do appear to have truncated anomaly (12.1).

3.13 List of anomalies - Area 12 centre

Area centred on OS NGR 391818 187428, see Fig 13.

The central part of Area 12 (12c) contains a few weakly positive and negative linear anomalies of uncertain origin. There are also small patches of magnetic debris along the field margin.

3.14 List of anomalies - Area 12 north east

Area centred on OS NGR 391693 187712, see Figs 14 & 15.

Anomalies of archaeological potential

(12.4) - Positive rectilinear anomalies relate to rectilinear enclosure features towards the south eastern part of the survey area (12d). The eastern side of the larger enclosure, however, is not obvious in the data. A number of discrete anomalies generally within the confines of the large enclosure appear to relate to pit-like features with archaeological potential. Other linear anomalies are located close-by and these may also relate to cut features.

(12.5) - Positive linear anomalies form what appears to be possible trackway ditches that may extend south eastwards beyond the limits of the survey area. They may extend westwards to continue as anomalies (12.21) in the north western part of the site (Area 12f).

Anomalies with an uncertain origin

(12.6) - Positive linear anomalies that extend towards and join anomalies (12.7). Although they extend either side of a modern trackway, indicating that they pre-date it, the trackway was only established in the 20th century. It is possible that they relate to linear ditches with archaeological potential; however, it is possible that they are associated with land drainage.

(12.7) - A series of positive rectilinear anomalies appear to relate to a large rectangular enclosure with internal sub-divisions, with possible evidence for truncation by ridge and furrow. Anomalies (12.6) appear to join it towards the centre and at the south eastern corner. It is possible that they relate to archaeological features, but an association with land drainage should be considered.

(12.8) - A positive linear anomaly extends through anomalies (12.7) and may have been truncated by them. It does not appear to continue southwards into Area 12d from 12e, but it is parallel with the north-south axis of rectangular enclosures (12.4) seen to the south east. An archaeological origin is, therefore, possible.

(12.9) - A number of short, positive linear and discrete anomalies are located throughout the survey area. They are often fragmented and generally lack a coherent morphology.

Anomalies associated with land management

(12.10) - A series of linear anomalies oriented north west to south east appear to feed into a linear anomaly oriented north to south. These relate to modern land drains.

Anomalies with an agricultural origin

(12.11) - Linear anomalies relating to ridge and furrow and oriented north north east to south south west. Modern agricultural anomalies are oriented north east to south west.

Anomalies associated with magnetic debris

(12.12) - A cluster of patches of magnetic debris are situated in the south western corner of Area 12e. While such responses can indicate burning and industrial activity, the site of a

duck rearing barn and enclosure is located immediately to the west and a similar modern use of the site or modern burning or dumping, could also cause such responses.

3.15 List of anomalies - Area 12 north west

Area centred on OS NGR 391380 187820 see Figs 16-18.

Anomalies of archaeological potential

(12.13) - Two concentric ring ditches, with the outer having a diameter of 23m and the inner 14.5m. The outer ditch appears to have a gap on the eastern side, the inner has no gaps or entrances. There is a central pit or post-hole, with several others between the two ring ditches. The size and morphology suggests a round barrow but with several phases of use and development.

(12.14) - Positive linear anomalies forming enclosure features. One extends from the south eastern corner of the survey area, over anomaly 12.13 to join the others at a very acute angle. Those just to the west are more rectilinear; however, the western extent is not clearly visible in the results. They appear to partially enclose a number of ring ditches (12.15), but may also have truncated others.

(12.15) - A number of fragmented positive curvilinear responses are located within the vicinity of the rectilinear enclosure ditches (12.14) with some appearing to be overlain or cut by the enclosures. The majority of the responses form incomplete ring ditches, with others possibly indicated by rings of pits or post-holes. There are at least eight in this area, with possibly up to fifteen as others are less clear in the results. They have diameters of between 8m and 11m and they are likely to relate to prehistoric round houses.

(12.16) - Situated in the western part of the survey area is a large ring ditch with a diameter of approximately 20m. It is possible that a smaller ring ditch underlies the larger one, but phasing or association is not clear. Due to its size, it is possible that this relates to a round barrow but there is no clear evidence for an internal mound.

(12.17) - A ring ditch with a 13.5m diameter and an outward turning opening on the southern side of the entrance on the south eastern side. Elongated pits appear to be located internally, just inside the south eastern entrance. It appears to overlie a second ring ditch to the north. It is not clear if these two ring ditches relate to round houses or possible barrows.

(12.18) - A ring ditch with several possible phases. It comprises a fragmented outer ring of 12m diameter with an inner ring of 8m diameter. The outer ring has a complex entrance, funnelling internally.

(12.19) - Located 7m north east of anomaly (12.18) is what appears to be a ring of pits or post-holes. It is possible that they relate to a round house structure.

(12.20) - Further ring ditches, including a group of four lie to the north east of anomaly (12.16). The larger ones are 15m and 16m in diameter, others 12m and the smallest 9m in diameter. They are likely to relate to prehistoric round houses.

(12.21) - Positive linear and rectilinear anomalies form trackways and enclosures that

appear to be a westward continuation of anomalies (12.5) seen to the east (Area 12d & 12e). Two linears extend northwards with a large pit appearing to cut through them . Others extend to the south, towards enclosures (12.14), and westwards with one truncating two ring ditches (12.20) and another appearing to extend across the group of ring ditches in the western part of the site (e.g. 12.17). It would suggest that these are later, perhaps Roman ditches, enclosures and trackways.

(12.22) - In the eastern part of the survey area, located north of ring ditch (12.13), are a number of discrete pits. They appear to form several arcs and lines; however, It is not possible to determine their age or function but they may relate to alignments or possible rings of pits or post-holes.

Anomalies with an uncertain origin

(12.23) - In the northern part of the survey area the anomalies are much weaker and less well defined than elsewhere. While they may relate to further cut features, their archaeological potential cannot be determined as they could also relate to agricultural activity.

(12.24) - Several positive linear anomalies, oriented north west to south east, are located in the north eastern part of the survey area. While such responses may relate to cut, ditch-like features, it is possible that these relate to land drainage.

Anomalies with an agricultural origin

(12.25) - Ridge and furrow is visible throughout the survey area, truncating many of the archaeological features. Modern ploughing has also disturbed the underlying archaeology and only a small number of marks have been abstracted in order not to obscure the archaeological anomalies.

3.16 List of anomalies - Area 13

Area centred on OS NGR 391042 188087, see Figs 19 & 20.

Anomalies with an uncertain origin

(13.1) - A positive linear anomaly extends across the eastern part of the survey area. It is not clear it it continues in a straight line as it heads eastwards or if it curves to the south east. It may have been truncated by the ridge and furrow, but this is uncertain.

(13.2) - A pit-like response is located towards the eastern edge of the survey area.

(13.3) - Positive responses of uncertain origin are located between two different orientations of ridge and furrow.

(13.4) - In the western part of the survey area are a number of positive linear anomalies with some evidence of truncation by ridge and furrow.

(13.5) - Close to the linear anomalies (13.4) are a number of discrete positive responses in rows. it is not possible to determine their age or origin, but archaeology should be considered.

Anomalies associated with land management

(13.6) - Rectilinear anomaly defining the boundary between two series of ridge and furrow.

Anomalies with an agricultural origin

(13.7) - Four different series of ridge and furrow exist within the field.

Anomalies with a modern origin

(13.8) - The survey area contains three buried services or pipes. Two relate to gas pipes (the western one is at a slightly different angle to that mapped and about 10m to the east, the eastern one is about 5m further east of where mapped). Another pipe has been crossed by or crosses the eastern gas pipe.

Anomalies with a natural origin

(13.9) - Positive response along the western edge is likely to be associated with the adjacent stream. A similar response can be seen in the adjacent field to the west (Area 14a).

3.17 List of anomalies - Area 14 east

Area centred on OS NGR 390563 188355, see Figs 21 & 22.

Anomalies with an uncertain origin

(14.1) - A group of discrete positive responses and several possible curvilinear anomalies are located in the eastern part of the survey area. It is not clear if they relate to cut pit-like and ditch-like features, but an archaeological origin should be considered.

(14.2) - At the eastern edge of the area is a large ditch which is likely to relate to a former fluvial feature, but several pit-like responses are located close by. It is not possible to determine if these are of natural or of anthropogenic origin.

(14.3) - Two parallel positive linear anomalies in the eastern part of the survey area may relate to a field boundary, although none has been mapped.

(14.4) - A broad, positive linear anomaly appears to have been truncated by ridge and furrow and extends between Areas 14b & 14c.

(14.5) - Each part of the survey area contains a small number of weakly positive linear and discrete anomalies. They do not generally form a coherent morphology.

(14.6) - At the western edge of the survey area positive responses may be associated with quarrying or ground disturbance/make-up.

Anomalies with an agricultural origin

(14.7) - Several series of former ridge and furrow can be seen within the site as well as

modern agricultural marks and possible land drains.

3.18 List of anomalies - Area 14 west

Area centred on OS NGR 390563 188355, see Fig 23.

Anomalies with an uncertain origin

(14.8) - The survey area (14d) contains a number of positive linear and discrete anomalies of uncertain origin.

Anomalies associated with land management

(14.9) - A linear anomaly relates to a former land boundary. It bounds former ridge and furrow.

Anomalies associated with magnetic debris

(14.10) - A patch of magnetic debris with a strong response indicates ferrous material is incorporated within. This corresponds to a depression typical of quarrying.

Anomalies with a modern origin

(14.11) - A strong, multiple, dipolar linear anomaly relates to a pipeline or service.

4 DISCUSSION

4.1.1 The majority of the survey areas contain linear and discrete anomalies with no coherent morphology preventing confident interpretation. However, within the northern part of Area 12, to the west of Malmesbury, is a complex of archaeological features covering at least 4ha and situated on a lens of sands and gravels of an unknown date (BGS, 2016). This appears to include possible Bronze Age round barrows, numerous prehistoric round houses, trackways, ditches and enclosures, that may be prehistoric and also have a later, possible Roman, phase.

4.1.2 One large ring ditch (12.13) in the south eastern part of Area 12f may relate to a Bronze Age round barrow, with a possible earlier phase of use. It is in the form of two concentric ring ditches, with the outer having a diameter of 23m and the inner 14.5m. The outer ditch appears to have a gap on the eastern side; however, this is where a linear ditch extends across the ring ditch, so it is possible that truncation has occurred. It butts up against a second rectilinear enclosure ditch on the western side. The width of the outer ring ditch varies between 0.75m and 1.5m wide. The inner ring also varies in width, up to 1.5m adjacent to the entrances, narrowing to 0.4m in places. There appear to be entrance gaps on the north western and south eastern sides of the inner circle, with a series of three pits or post-holes in the south eastern gap. There is also a central pit or post-hole with a response of 25nT, indicating an association with burnt material. Other pits or post-holes are also located on the southern and western sides, between the two rings. The size and complexity of the

feature, together with its position just on the edge of the higher ground that drops sharply from its southern edge, may indicate that this relates to a round barrow, possibly with several phases of development. Such complex barrows, with several phases of construction and use can be seen around the Stonehenge area, for example Amesbury 6, has an outer ditch, with an internal oval ditch sealed by the later mound, formed by a series of conjoined pits with entrances or causeways in the north west and south east, perhaps indicating a henge-type monument (Field et al, 2014). Anomaly (12.13) has a similar formation and an earlier henge-type phase is possible.

4.1.3 To the north of this feature is the location of a number of discrete pits or possible post-holes (12.22). They appear to form several arcs and lines of pits, positioned at fairly regular 7m intervals. While much of the site contains numerous and widespread pits with no particular pattern, these appear more regular with linear arrangements and arcs. It is possible that they relate to alignments or possible rings of pits or post-holes, although a modern origin cannot be dismissed.

4.1.4 Another potential barrow is situated in the western part of Area 12f (12.16) and is a large ring ditch with a diameter of approximately 20m. It has gaps on the eastern, south western and northern sides with a smaller ring ditch possibly underlying it within the northern gap, but the phasing or association is not clear. The large ring ditch appears to contain a small number of discrete pits, generally clustered towards the northern internal edge. Due to its size, it is possible that this relates to a round barrow, but there is no clear evidence for an internal mound.

4.1.5 Located 23m to the west of (12.16) is another ring ditch (12.17) with a 13.5m diameter. It has a south eastern entrance with an outward turning opening on the southern side of the entrance. Elongated pits are located just inside the south eastern entrance. The ditch is 1.5m wide with varying strength of response, generally 15-20nT, along the majority of the ditch, but 2-7nT in the north west and also the south west. It overlies the southern part of a second ring ditch which although has a similar diameter, has a narrower ditch at 0.6m wide. This second ring appears to have entrances on the south eastern and also north western sides. A number of pits or linear anomalies are located inside it and also to the south west, it is possible that these represent earlier ring ditches. It is not clear if these two ring ditches relate to round houses or possible barrows. The ditch of the southern ring is quite substantial and its magnitude also indicates quantities of burnt material, perhaps more attributable to domestic occupation.

4.1.6 Another complex ring ditch feature appears to have several phases (12.18). There is a fragmented outer ring, with a diameter of up to 12m, surrounding an inner ring ditch of 8m in diameter which contains a number of pits or post-holes. The outer ring ditch has several gaps, which although appear deliberate, may relate to truncation by ploughing. The eastern edge of the outer ring ditch has a complex entrance which funnels internally. However, the inner ring ditch can be seen across this entrance, indicating that they may not be contemporary.

4.1.7 Within this zone there are at least fifteen small ring ditches, with diameters ranging between 7m and 16m, which appear to relate to several phases of round house construction and occupation (eg 12.15 & 12.20). Many of them overlie one another, and some may be represented by rings of post-holes (12.19) rather than a ditch. The fragmented response has also been caused by the later ridge and furrow and modern ploughing. There is also evidence for several of the ring ditches being overlain by

later linear ditches and enclosures (12.14 & 12.21).

4.1.8 Just to the east of this main zone of archaeological features are further rectilinear anomalies (12.4). These may represent prehistoric or Roman enclosures and linear ditches and trackways extending westward as anomalies (12.21). Also within Areas 12d & 12e is a group of rectilinear anomalies with linear anomalies joining them from the east, which may also relate to further enclosures and linear ditches; however, an association with more recent land drainage is possible.

4.1.9 Several linear anomalies do appear to extend to the northern edge of Areas 12e and 12f, but the majority of the anomalies are far well less defined and weaker. It may be an indication that this part of the site is away from the main concentration of occupation and that there is less magnetically enhanced material within cut features, and/or that there are fewer features.

4.1.10 Other areas with anomalies that could relate to cut features include Areas 13 & 14 to the west of Area 12f where linear anomalies appear to have been truncated by ridge and furrow. Discrete positive responses also appear pit-like but it is not possible to determine their origin. Although immediately adjacent to the Fosse Way Roman road, there are no anomalies within Area 14 that can be seen to be directly associated with the Roman road.

4.1.11 Further south along the survey corridor, Area 12a is located some distance from the core area of archaeological features identified in Areas 12d - f, but numerous discrete and linear positive anomalies of uncertain origin were located that may indicate pit-like and ditch-like features respectively. The survey corridor passes less than 40m east of cropmarks indicative of archaeological features, and the archaeological potential of these anomalies should be considered.

4.1.12 Near to Thornhill Farm in the central part of the survey corridor, a number of discrete and linear anomalies are of uncertain origin (Area 9b). It is possible that they relate to modern activity, but given the medieval origins of the farm, their archaeological potential should be considered.

5 CONCLUSION

5.1.1 Almost all of the survey areas contain a number of discrete and positive linear responses, although the majority of these are either, short, fragmented, weak, indistinct or lack a coherent morphology preventing confident interpretation. Evidence for former field boundaries and ridge and furrow has also been located.

5.1.2 The areas with the highest archaeological potential are within the western part of the survey corridor, within Area 12 (12d-f), on an area of sands and gravels of unknown date. There are a number of ring ditches, with some possibly indicating Bronze Age round barrows, with others appearing to form numerous prehistoric round houses. Rectilinear enclosures and linear ditches are also evident, and these may relate to a later, possible Roman phase of activity. The southern part of Area 12 (12a) contains numerous discrete positive anomalies and positive linear anomalies of uncertain origin. Given their close proximity to cropmarks indicating archaeological features, the archaeological potential of these anomalies should also be considered.

5.1.3 Away from Area 12, Areas 13 and 14 to the west contain linear anomalies that may relate to cut, ditch-like features with some evidence of truncation by ridge and furrow. Close to Thornhill Farm, in the central part of the survey corridor (Area 9b), there are a number of anomalies. While they lack a clearly definable form, and it is possible that they are associated with the modern use of the site adjacent to the farm, earlier features should be considered.

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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

Filename: J694-mag-Area1-proc.xcp
Description: Imported as Composite from: J694-mag-Area1.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 394051.820249534, 186354.852804536 m
Southeast corner: 394229.870249534, 186229.902804536 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702
Source GPS Points: 187500
Dimensions
Composite Size (readings): 1187 x 833
Survey Size (meters): 178 m x 125 m
Grid Size: 178 m x 125 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 5.53
Min: -5.50
Std Dev: 1.87
Mean: -0.33
Median: 0.09
Composite Area: 2.2247 ha
Surveyed Area: 0.74699 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 -5.00 to 5.00 nT

Area 2a

Filename: J694-mag-Area2a.xcp
Description: Imported as Composite from: J694-mag-Area2a.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 393645.745501213, 186277.542024389 m
Southeast corner: 394052.095501213, 186148.692024389 m
Source GPS Points: 635200
Composite Size (readings): 2709 x 859
Survey Size (meters): 406 m x 129 m
Grid Size: 406 m x 129 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.97
Mean: 0.02
Median: 0.00
Composite Area: 5.2358 ha
Surveyed Area: 1.651 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 2b

Filename: J694-mag-Area2b.xcp
Description: Imported as Composite from: J694-mag-Area2b.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 393533.351569154, 186178.199365175 m
Southeast corner: 393644.201569154, 186128.249365175 m
Source GPS Points: 118900
Composite Size (readings): 739 x 333
Survey Size (meters): 111 m x 50 m
Grid Size: 111 m x 50 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.39
Mean: 0.05
Median: 0.03
Composite Area: 0.5537 ha
Surveyed Area: 0.33307 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 2c

Filename: J694-mag-Area2c.-procxcp
Description: Imported as Composite from: J694-mag-Area2c.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 393339.107407551, 186140.113559354 m
Southeast corner: 393567.557407551, 185865.763559354 m
Source GPS Points: 401400
Composite Size (readings): 1523 x 1829
Survey Size (meters): 228 m x 274 m
Grid Size: 228 m x 274 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.70
Mean: 0.01
Median: 0.00
Composite Area: 6.2675 ha
Surveyed Area: 1.4735 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 4a

Filename: J694-mag-Area4a-prco.xcp
Description: Imported as Composite from: J694-mag-Area4a.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 393099.800123504, 186005.403689925 m
Southeast corner: 393299.000123504, 185898.153689925 m
Source GPS Points: 218700
Composite Size (readings): 1328 x 715
Survey Size (meters): 199 m x 107 m
Grid Size: 199 m x 107 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.12
Mean: 0.05
Median: 0.00
Composite Area: 2.1364 ha
Surveyed Area: 0.82768 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 4b

Filename: J694-mag-Area4b-proc.xcp
Description: Imported as Composite from: J694-mag-Area4b.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 392963.873158496, 186080.103262654 m
Southeast corner: 393082.223158496, 185950.053262654 m
Source GPS Points: 134100
Composite Size (readings): 789 x 867
Survey Size (meters): 118 m x 130 m
Grid Size: 118 m x 130 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.41
Mean: 0.02
Median: 0.02
Composite Area: 1.5391 ha
Surveyed Area: 0.51966 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 5a

Filename: J694-mag-Area5a-proc.xcp
Description: Imported as Composite from: J694-mag-Area5a.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 392857.289400208, 186193.428174883 m
Southeast corner: 392980.139400208, 186065.028174883 m
Source GPS Points: 137700
Composite Size (readings): 819 x 856
Survey Size (meters): 123 m x 128 m
Grid Size: 123 m x 128 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.39
Mean: 0.17
Median: -0.08
Composite Area: 1.5774 ha
Surveyed Area: 0.4939 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 5b

Filename: J694-mag-Area5b-proc.xcp
Description: Imported as Composite from: J694-mag-Area5b.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 392644.148981201, 186285.100986827 m
Southeast corner: 392880.398981201, 186186.100986827 m
Source GPS Points: 298300
Composite Size (readings): 1575 x 660
Survey Size (meters): 236 m x 99 m
Grid Size: 236 m x 99 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 5.53
Min: -5.50
Std Dev: 2.14
Mean: 0.14
Median: -0.01
Composite Area: 2.3389 ha
Surveyed Area: 0.95261 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 -5.00 to 5.00 nT

Area 8

Filename: J694-mag-Area8-proc.xcp
Description: Imported as Composite from: J694-mag-Area8.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 392505.955690561, 186529.694934848 m
Southeast corner: 392568.955690561, 186468.494934848 m
Source GPS Points: 47600
Composite Size (readings): 420 x 408
Survey Size (meters): 63 m x 61.2 m
Grid Size: 63 m x 61.2 m
X Interval: 0.15 m
Y Interval: 0.15 m

Stats
Max: 3.32
Min: -3.30
Std Dev: 0.95
Mean: 0.02
Median: 0.00
Composite Area: 0.38556 ha
Surveyed Area: 0.19287 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 9a

Filename: J694-mag-Area9a-proc.xcp
Description: Imported as Composite from: J694-mag-Area9a.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 392257.680926213, 186543.123275469 m
Southeast corner: 392506.680926213, 186487.023275469 m
Source GPS Points: 260400
Composite Size (readings): 1660 x 374
Survey Size (meters): 249 m x 56.1 m
Grid Size: 249 m x 56.1 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.82
Mean: 0.06
Median: -0.01
Composite Area: 1.3969 ha
Surveyed Area: 0.93224 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 9b

Filename: J694-mag-Area9b-proc.xcp
Description: Imported as Composite from: J694-mag-Area9b.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 392086.669439534, 186599.546559919 m
Southeast corner: 392163.619439534, 186504.296559919 m
Source GPS Points: 89500
Composite Size (readings): 513 x 635
Survey Size (meters): 77 m x 95.3 m
Grid Size: 77 m x 95.3 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 5.53
Min: -5.50
Std Dev: 2.46
Mean: 0.07
Median: 0.06
Composite Area: 0.73295 ha
Surveyed Area: 0.30438 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 -5.00 to 5.00 nT

Area 9c

Filename: J694-mag-Area9-proc.xcp
Description: Imported as Composite from: J694-mag-Area9c.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 392161.863069988, 186566.554035017 m
Southeast corner: 392255.013069988, 186498.004035017 m
Source GPS Points: 90400
Composite Size (readings): 621 x 457
Survey Size (meters): 93.2 m x 68.6 m
Grid Size: 93.2 m x 68.6 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.68
Mean: 0.05
Median: -0.04
Composite Area: 0.63854 ha
Surveyed Area: 0.31082 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 10

Filename: J694-mag-Area10-proc.xcp
Description: Imported as Composite from: J694-mag-Area10.asc

Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 391997.316323241, 186824.852771327 m
Southeast corner: 392112.666323241, 186620.552771327 m
Source GPS Points: 210200
Composite Size (readings): 769 x 1362
Survey Size (meters): 115 m x 204 m
Grid Size: 115 m x 204 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.14
Mean: 0.03
Median: 0.01
Composite Area: 2.3566 ha
Surveyed Area: 0.67735 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 12a

Filename: J694-mag-Area12a-proc.xcp
Description: Imported as Composite from: J694-mag-Area12a.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 391923.124601686, 187246.466625092 m
Southeast corner: 392003.224601686, 187009.166625092 m
Source GPS Points: 313600
Composite Size (readings): 534 x 1582
Survey Size (meters): 80.1 m x 237 m
Grid Size: 80.1 m x 237 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.80
Mean: 0.01
Median: 0.00
Composite Area: 1.9008 ha
Surveyed Area: 1.0627 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 12b

Filename: J694-mag-Area12b-proc.xcp
Description: Imported as Composite from: J694-mag-Area12b.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 391822.616360788, 187338.272455674 m
Southeast corner: 392012.166360788, 187247.832455674 m
Source GPS Points: 217700
Composite Size (readings): 1115 x 532
Survey Size (meters): 190 m x 90.4 m
Grid Size: 190 m x 90.4 m
X Interval: 0.17 m
Y Interval: 0.17 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.74
Mean: 0.02
Median: 0.02
Composite Area: 1.7143 ha
Surveyed Area: 0.70457 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 12c

Filename: J694-mag-Area12c-proc.xcp
Description: Imported as Composite from: J694-mag-Area12c.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 391793.259582265, 187508.882463719 m
Southeast corner: 391840.509582265, 187332.032463719 m
Source GPS Points: 164600
Composite Size (readings): 315 x 1179
Survey Size (meters): 47.3 m x 177 m
Grid Size: 47.3 m x 177 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.65
Mean: 0.01
Median: 0.02
Composite Area: 0.83562 ha
Surveyed Area: 0.58904 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 12d

Filename: J694-mag-Area12d-proc.xcp
Description: Imported as Composite from: J694-mag-Area12d.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 391600.652447923, 187795.932367341 m
Southeast corner: 391831.802447923, 187513.182367341 m
Dummy Value: 32702
Source GPS Points: 994000
Composite Size (readings): 1541 x 1885
Survey Size (meters): 231 m x 283 m
Grid Size: 231 m x 283 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.80
Mean: 0.02
Median: 0.01
Composite Area: 6.5358 ha
Surveyed Area: 3.3344 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 12e

Filename: J694-mag-Area12e-proc.xcp
Description: Imported as Composite from: J694-mag-Area12e.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 391517.376791492, 187841.948587575 m
Southeast corner: 391722.126791492, 187639.148587575 m
Source GPS Points: 642400
Composite Size (readings): 1365 x 1352
Survey Size (meters): 205 m x 203 m
Grid Size: 205 m x 203 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.23
Mean: 0.01
Median: 0.02
Composite Area: 4.1523 ha
Surveyed Area: 2.0629 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 12f

Filename: J694-mag-Area12f-proc.xcp
Description: Imported as Composite from: J694-mag-Area12f.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 391241.940474976, 187917.272402065 m
Southeast corner: 391549.740474976, 187637.072402065 m
Dummy Value: 32702
Source GPS Points: 1181400
Composite Size (readings): 2052 x 1868
Survey Size (meters): 308 m x 280 m
Grid Size: 308 m x 280 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 5.53
Min: -5.50
Std Dev: 1.58
Mean: 0.06
Median: 0.01
Composite Area: 8.6246 ha
Surveyed Area: 4.1678 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 -5.00 to 5.00 nT

Area 13

Filename: J694-mag-Area13-proc.xcp
Description: Imported as Composite from: J694-mag-Area13.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 390828.111850373, 188220.643101469 m
Southeast corner: 391255.011850373, 187914.943101469 m 5
Dummy Value: 32702
Source GPS Points: 653300
Composite Size (readings): 2846 x 2038
Survey Size (meters): 427 m x 306 m
Grid Size: 427 m x 306 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.64
Mean: 0.03
Median: 0.03
Composite Area: 13.05 ha
Surveyed Area: 1.9957 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 14a

Filename: J694-mag-Area14a.xcp
Description: Imported as Composite from: J694-mag-Area14a.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 390559.096943093, 188366.437582916 m
Southeast corner: 390825.196943093, 188203.537582916 m
Dummy Value: 32702
Source GPS Points: 371900
Composite Size (readings): 1774 x 1086
Survey Size (meters): 266 m x 163 m
Grid Size: 266 m x 163 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.05
Mean: 0.04
Median: 0.00
Composite Area: 4.3348 ha
Surveyed Area: 1.1666 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 14b

Filename: J694-mag-Area14b-proc.xcp
Description: Imported as Composite from: J694-mag-Area14b.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 390488.277099284, 188396.341847392 m
Southeast corner: 390561.777099284, 188322.391847392 m
Dummy Value: 32702
Source GPS Points: 82400
Composite Size (readings): 490 x 493
Survey Size (meters): 73.5 m x 74 m
Grid Size: 73.5 m x 74 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.21
Mean: 0.02
Median: 0.01
Composite Area: 0.54353 ha
Surveyed Area: 0.30319 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 14c

Filename: J694-mag-Area14c-proc.xcp
Description: Imported as Composite from: J694-mag-Area14c.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 390360.321602444, 188508.091775298 m
Southeast corner: 390524.421602444, 188370.691775298 m
Dummy Value: 32702
Source GPS Points: 256700
Composite Size (readings): 1094 x 916
Survey Size (meters): 164 m x 137 m
Grid Size: 164 m x 137 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.21
Mean: 0.03
Median: 0.01
Composite Area: 2.2547 ha
Surveyed Area: 0.83944 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 14d

Filename: J694-mag-Area14d-proc.xcp
Description: Imported as Composite from: test.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 389955.284847767, 188632.272733049 m
Southeast corner: 390387.584847767, 188495.472733049 m
Source GPS Points: 568400
Composite Size (readings): 2882 x 912
Survey Size (meters): 432 m x 137 m
Grid Size: 432 m x 137 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.92
Mean: 0.00
Median: 0.00
Composite Area: 5.9139 ha
Surveyed Area: 1.9806 ha
Processes: 1
1 Base Layer
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 High pass Uniform (median) filter: Window dia: 153
4 Clip from -3.00 to 3.00 nT
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: J694 Malmesbury Pipeline\Data				
Path and Filename	**Software**	**Description**	**Date**	**Creator**
malmpipe1\MX\ malmpipe2\MX\ malmpipe3\MX\ malmpipe4\MX\ malmpipe5\MX\ malmpipe6\MX\ malmpipe7\MX\ malmpipe8\MX\ malmpipe9\MX\ malmpipe11\MX\ malmpipe12\MX\ malmpipe13\MX\ malmpipe14\MX\ malmpipe15\MX\ malmpipe16\MX\ malmpipe17\MX\ malmpipe18\MX\ malmpipe19\MX\ malmpipe20\MX\ malmpipe21\MX\ malmpipe22\MX\ malmpipe23\MX\ malmpipe24\MX\ malmpipe25\MX\ .prm .dgb .disp	Sensys MXPDA	Proprietary data formats representing magnetometer survey traverses logged to a PDA.	07/11/16 07/11/16 07/11/16 07/11/16 08/11/16 08/11/16 08/11/16 09/11/16 10/11/16 11/11/16 11/11/16 11/11/16 14/11/16 14/11/16 14/11/16 14/11/16 15/11/16 15/11/16 15/11/16 15/11/16 24/11/16 25/11/16 25/11/16 05/12/16	D.J.Sabin
malmpipe1\MX\J694-mag-Area14d.asc malmpipe2\MX\J694-mag-Area14c.asc malmpipe3\MX\J694-mag-Area14b.asc malmpipe4\MX\J694-mag-Area14a.asc malmpipe5\MX\J694-mag-Area 2b.asc malmpipe6\MX\J694-mag-Area2a.asc malmpipe7\MX\J694-mag-Area2c.asc malmpipe8\MX\J694-mag-Area13.asc malmpipe9\MX\J694-mag-Area12f.asc malmpipe11\MX\J694-mag-Area12c.asc malmpipe12\MX\J694-mag-Area12b.asc malmpipe13\MX\J694-mag-Area12a.asc malmpipe14\MX\J694-mag-Area9c.asc malmpipe15\MX\J694-mag-Area9b.asc malmpipe16\MX\J694-mag-Area9a.asc malmpipe17\MX\J694-mag-Area8.asc malmpipe18\MX\J694-mag-Area10.asc malmpipe19\MX\J694-mag-Area5a.asc malmpipe20\MX\J694-mag-Area5b.asc malmpipe21\MX\J694-mag-Area1.asc malmpipe22\MX\J694-mag-Area12e.asc malmpipe23\MX\J694-mag-Area4b.asc malmpipe24\MX\J694-mag-Area4a.asc malmpipe25\MX\J694-mag-Area12d.asc	Sensys DLMGPS	ASCII CSV (tab) file representing survey area in eastings, northings (UTM Z30N), magnetic measurement, traverse file and sensor number.	05/12/16	K.T.Donaldson
Area1\comps\J694-mag-Area1.xcp Area2a\comps\J694-mag-Area2a.xcp Area2b\comps\J694-mag-Area2b.xcp Area2c\comps\J694-mag-Area2c.xcp Area4acomps\J694-mag-Area4a.xcp Area4b\comps\J694-mag-Area4b.xcp Area5acomps\J694-mag-Area5a.xcp Area5b\comps\J694-mag-Area5b.xcp Area8comps\J694-mag-Area8.xcp Area9a\comps\J694-mag-Area9a.xcp Area9b\comps\J694-mag-Area9b.xcp Area9c\comps\J694-mag-Area9c.xcp Area10\comps\J694-mag-Area10.xcp Area12a\comps\J694-mag-Area12a.xcp Area12b\comps\J694-mag-Area12b.xcp Area12c\comps\J694-mag-Area12c.xcp	TerraSurveyor 3.0.23.0	Composite data file derived from ASCII CSV.	05/12/16	K.T.Donaldson

Area12d\comps\J694-mag-Area12d.xcp Area12e\comps\J694-mag-Area12e.xcp Area12f\comps\J694-mag-Area12f.xcp Area13\comps\J694-mag-Area13.xcp Area14a\comps\J694-mag-Area14a.xcp Area14b\comps\J694-mag-Area14b.xcp Area14c\comps\J694-mag-Area14c.xcp Area14d\comps\J694-mag-Area14d.xcp				
Area1\comps\J694-mag-Area1-proc.xcp Area1\comps\J694-mag-Area1-proc.xcp Area2a\comps\J694-mag-Area2-proc.xcp Area2b\comps\J694-mag-Area2b-proc.xcp Area2c\comps\J694-mag-Area2c-proc.xcp Area4acomps\J694-mag-Area4a-proc.xcp Area4b\comps\J694-mag-Area4b-proc.xcp Area5acomps\J694-mag-Area5a-proc.xcp Area5b\comps\J694-mag-Area5b-proc.xcp Area8comps\J694-mag-Area8-proc.xcp Area9a\comps\J694-mag-Area9a-proc.xcp Area9b\comps\J694-mag-Area9b-proc.xcp Area9c\comps\J694-mag-Area9c.xcp Area10\comps\J694-mag-Area10-proc.xcp Area12a\comps\J694-mag-Area12a-proc.xcp Area12b\comps\J694-mag-Area12b-proc.xcp Area12c\comps\J694-mag-Area12c-proc.xcp Area12d\comps\J694-mag-Area12d-proc.xcp Area12e\comps\J694-mag-Area12e-proc.xcp Area12f\comps\J694-mag-Area12f-proc.xcp Area13\comps\J694-mag-Area13-proc.xcp Area14a\comps\J694-mag-Area14a-proc.xcp Area14b\comps\J694-mag-Area14b-proc.xcp Area14c\comps\J694-mag-Area14c-proc.xcp Area14d\comps\J694-mag-Area14d-proc.xcp	TerraSurveyor 3.0.23.0	Processed composite data file (zmt and clipping to ±3nT).	05/12/16	D.J.Sabin
Graphic data - path: J694 Malmesbury Pipeline\Data				
Area1\graphics\J694-mag-Area1-proc.tif Area2a\graphics\J694-mag-Area2a-proc.tif Area2b\graphics\J694-mag-Area2b-proc.tif Area2c\graphics\J694-mag-Area2c-proc.tif Area4a\graphics\J694-mag-Area4a-proc.tif Area4b\graphics\J694-mag-Area4b-proc.tif Area5a\graphics\J694-mag-Area5a-proc.tif Area5b\graphics\J694-mag-Area5b-proc.tif Area8\graphics\J694-mag-Area8-proc.tif Area9a\graphics\J694-mag-Area9a-proc.tif Area9b\graphics\J694-mag-Area9b-proc.tif Area9c\graphics\J694-mag-Area9c-proc.tif Area10\graphics\J694-mag-Area10-proc.tif Area12a\graphics\J694-mag-Area12a-proc.tif Area12b\graphics\J694-mag-Area12b-proc.tif Area12c\graphics\J694-mag-Area12c-proc.tif Area12d\graphics\J694-mag-Area12d-proc.tif Area12e\graphics\J694-mag-Area12e-proc.tif Area12f\graphics\J694-mag-Area12f-proc.tif Area13\graphics\J694-mag-Area13-proc.tif Area14a\graphics\J694-mag-Area14a-proc.tif Area14b\graphics\J694-mag-Area14b-proc.tif Area14c\graphics\J694-mag-Area14c-proc.tif Area14d\graphics\J694-mag-Area14d-proc.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±3nT.	05/12/16	K.T.Donaldson
Area1\graphics\J694-mag-Area1-proc.tfw Area2a\graphics\J694-mag-Area2a-proc.tfw Area2b\graphics\J694-mag-Area2b-proc.tfw Area2c\graphics\J694-mag-Area2c-proc.tfw Area4a\graphics\J694-mag-Area4a-proc.tfw Area4b\graphics\J694-mag-Area4b-proc.tfw Area5a\graphics\J694-mag-Area5a-proc.tfw Area5b\graphics\J694-mag-Area5b-proc.tfw Area8\graphics\J694-mag-Area8-proc.tfw Area9a\graphics\J694-mag-Area9a-proc.tfw Area9b\graphics\J694-mag-Area9b-proc.tfw Area9c\graphics\J694-mag-Area9c-proc.tfw Area10\graphics\J694-mag-Area10-proc.tfw Area12a\graphics\J694-mag-Area12a-proc.tfw Area12b\graphics\J694-mag-Area12b-proc.tfw Area12c\graphics\J694-mag-Area12c-proc.tfw Area12d\graphics\J694-mag-Area12d-proc.tfw Area12e\graphics\J694-mag-Area12e-proc.tfw Area12f\graphics\J694-mag-Area12f-proc.tfw Area13\graphics\J694-mag-Area13-proc.tfw Area14a\graphics\J694-mag-Area14a-proc.tfw Area14b\graphics\J694-mag-Area14b-proc.tfw Area14c\graphics\J694-mag-Area14c-proc.tfw Area14d\graphics\J694-mag-Area14d-proc.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	05/12/16	K.T.Donaldson
CAD data - path: J694 Malmesbury Pipeline\CAD				
J694version 2.dwg	ProgeCAD 2016	CAD file for creating plots of greyscales, abstraction, interpretation and mapping. Grid coordinates as OSGB. AutoCAD 2010 format.	02/11/16	K.T.Donaldson
Text data - path: J694 Malmesbury Pipeline\Documentation				
J694 report.odt	OpenOffice.org 3.0.1 Writer	Report text as an Open Office document.	05/12/16	K.T.Donaldson

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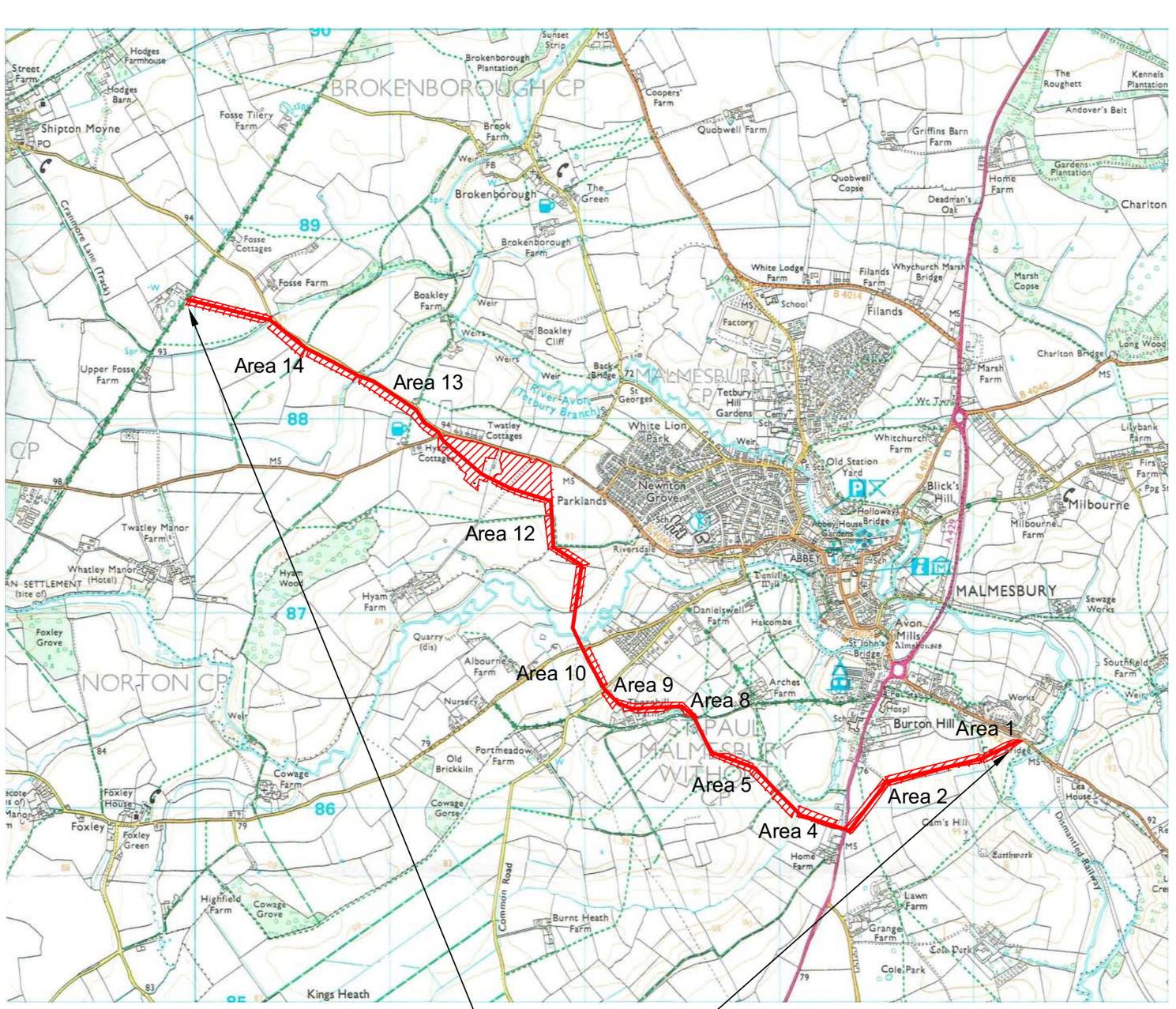
Wiltshire

Map of survey area



Survey location

Site located between OS NGR ST 94220 86334 & ST 89967 88610

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

FIG 01

Archaeological Surveys Ltd

Geophysical Survey B0562 Malmesbury Aquifer Resilience Scheme Wiltshire

Referencing information - east

Referencing grid to OSGB36 datum at 100m intervals

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

N

392700 392800 392900 393000 393100 393200 393300 393400 393500 393600 393700 393800 393900 394000 394100 394200

186400 186300 186200 186100 186000 185900 185800

HDD no survey

Area 1

Made ground

Area 2a

Area 2b

Area 2c

Area 4a

Area 4b

Area 5a

Area 5b

SCALE 1:5000

0m 50 100 150 200 250m

SCALE TRUE AT A3

FIG 02

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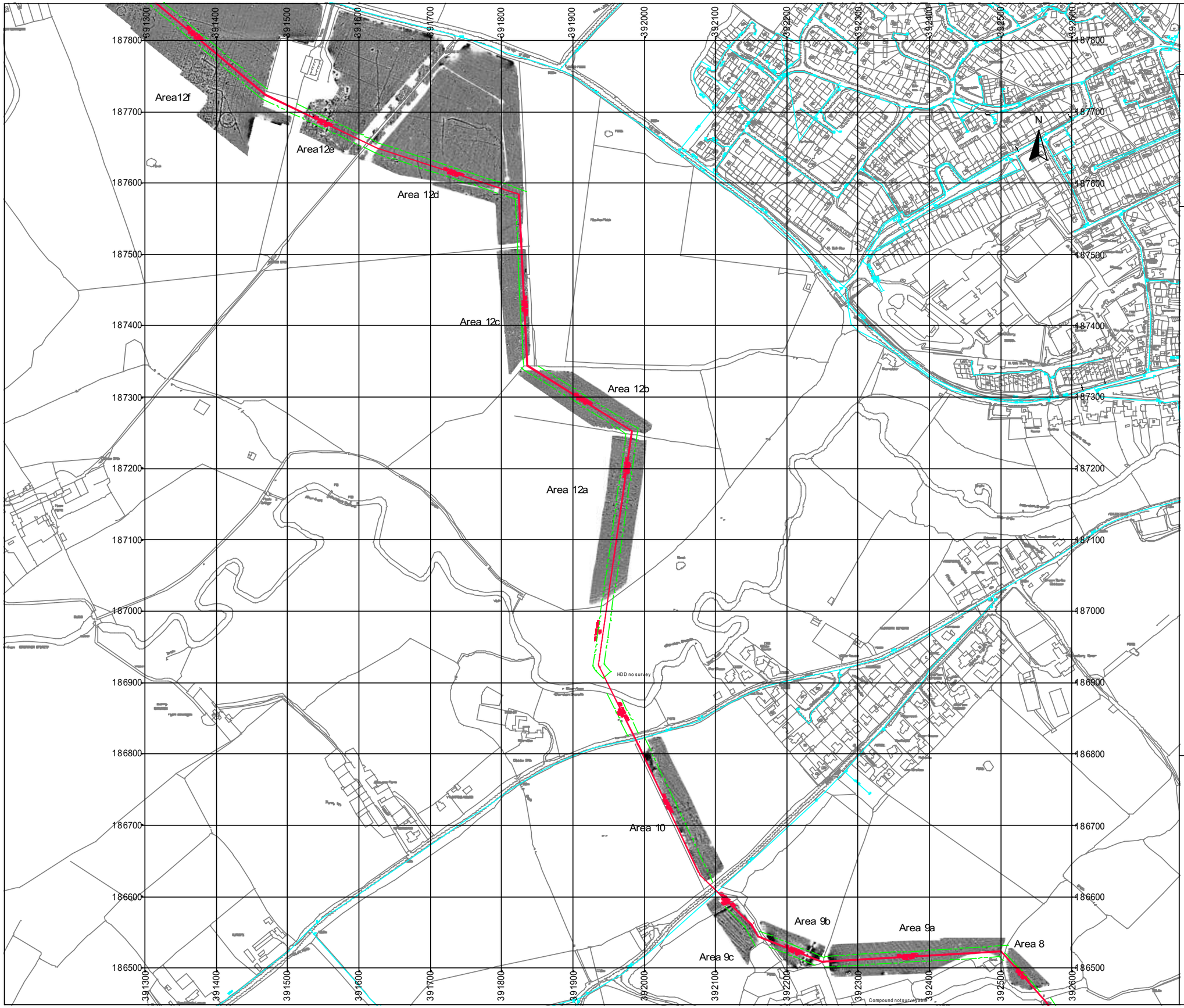
B0562 Malmesbury Aquifer Resilience Scheme
Wiltshire

Referencing information - centre

Referencing grid to OSGB36 datum at 100m intervals

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



SCALE 1:5000

0m 50 100 150 200 250m

SCALE TRUE AT A3

FIG 03

Archaeological Surveys Ltd

Geophysical Survey
B0562 Malmesbury Aquifer Resilience Scheme
Wiltshire

Referencing information - west

Referencing grid to OSGB36 datum at 100m intervals

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

Area 14d

Area 14c

Area 14b

Area 14a

Area 13

Area12f

Area12e

N

390000 390100 390200 390300 390400 390500 390600 390700 390800 390900 391000 391100 391200 391300 391400 391500

188700 188600 188500 188400 188300 188200 188100 188000 187900 187800 187700 187600

SCALE 1:5000

0m 50 100 150 200 250m

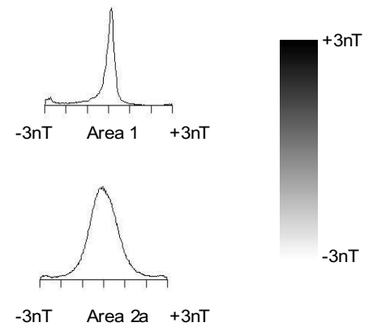
SCALE TRUE AT A3

FIG 04

Archaeological Surveys Ltd

Geophysical Survey B0562 Malmesbury Aquifer Resilience Scheme Wiltshire

Greyscale plot of minimally processed magnetometer data - Area 1 & Area 2 east



Abstraction and interpretation of magnetometer anomalies

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Positive linear anomaly - possible former field boundary
- Negative linear anomaly - material of low magnetic susceptibility
- 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 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 05

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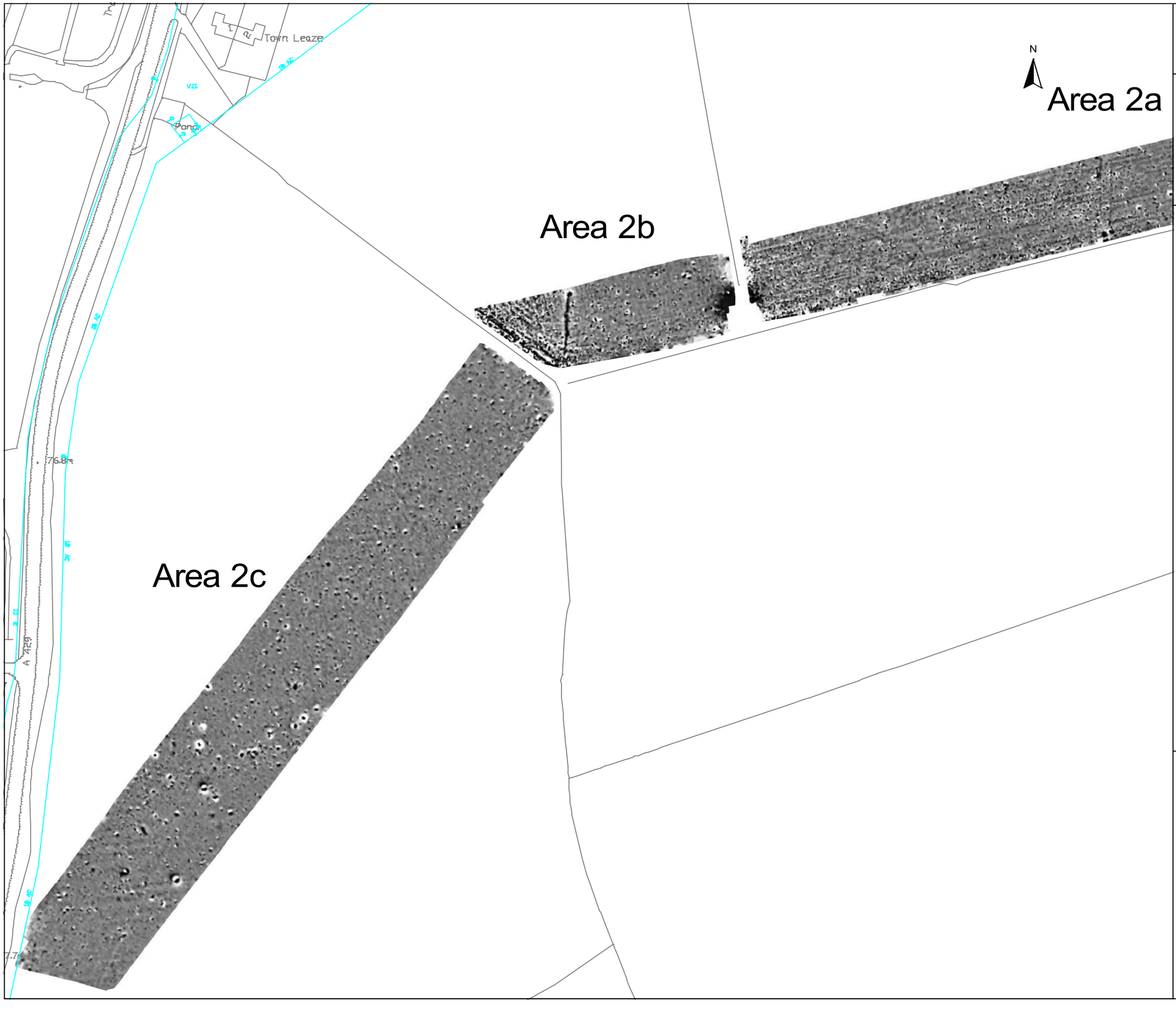
Geophysical Survey B0562 Malmesbury Aquifer Resilience Scheme Wiltshire

Greyscale plot of minimally processed magnetometer data - Area 2 west



SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 06

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Abstraction and interpretation of magnetometer anomalies - Area 2 west

- Positive linear anomaly - possible ditch-like feature
- Negative linear anomaly - material of low magnetic susceptibility
- Linear anomaly - of agricultural origin
- Discrete positive response - possible pit-like feature
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 07

Area 2b

Area 2c

N

Weir

Lake

Foot Bridge

Pond

Brooklyn

Burton Hill

A 429

76.8m

77.7m

2.9

2.7

2.7

2.8

2.6

4.4

Area 4b

Area 4a

Area 4b

Area 4a

4.1

4.2

4.3

4.3

4.4

2.6

Brooklyn

Brooklyn

Track

N

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Wiltshire

Greyscale plot of minimally processed magnetometer data - Area 4

-3nT Area 4a +3nT

-3nT Area 4b +3nT

+3nT

-3nT

Abstraction and interpretation of magnetometer anomalies

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge & furrow
- Discrete positive response - possible pit-like feature
- Positive anomaly - magnetically enhanced material
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 08

Area 5b

Area 5a

Pond

South Barn

Pond

N

Area 5b

5.2

5.5

5.2

5.1

5.3

Area 5a

5.4

Pond

South Barn

Pond

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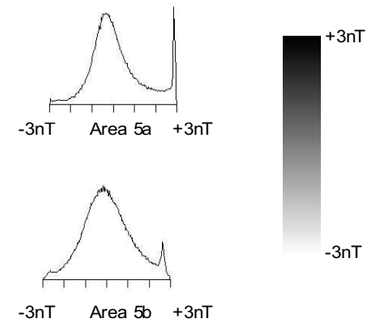
Wiltshire

Greyscale plot of minimally processed magnetometer data - Area 5



Abstraction and interpretation of magnetometer anomalies

- Positive linear anomaly - possible ditch-like feature
- Negative linear anomaly - material of low magnetic susceptibility
- Linear anomaly - ridge & furrow
- Linear anomaly - former field boundary
- Discrete positive response - possible pit-like feature
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 09

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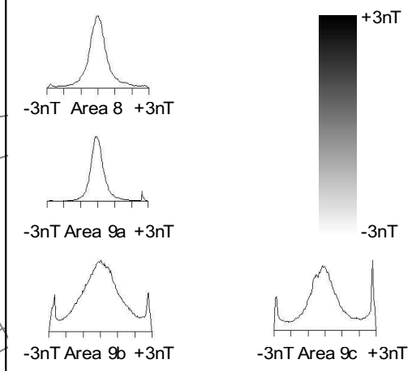
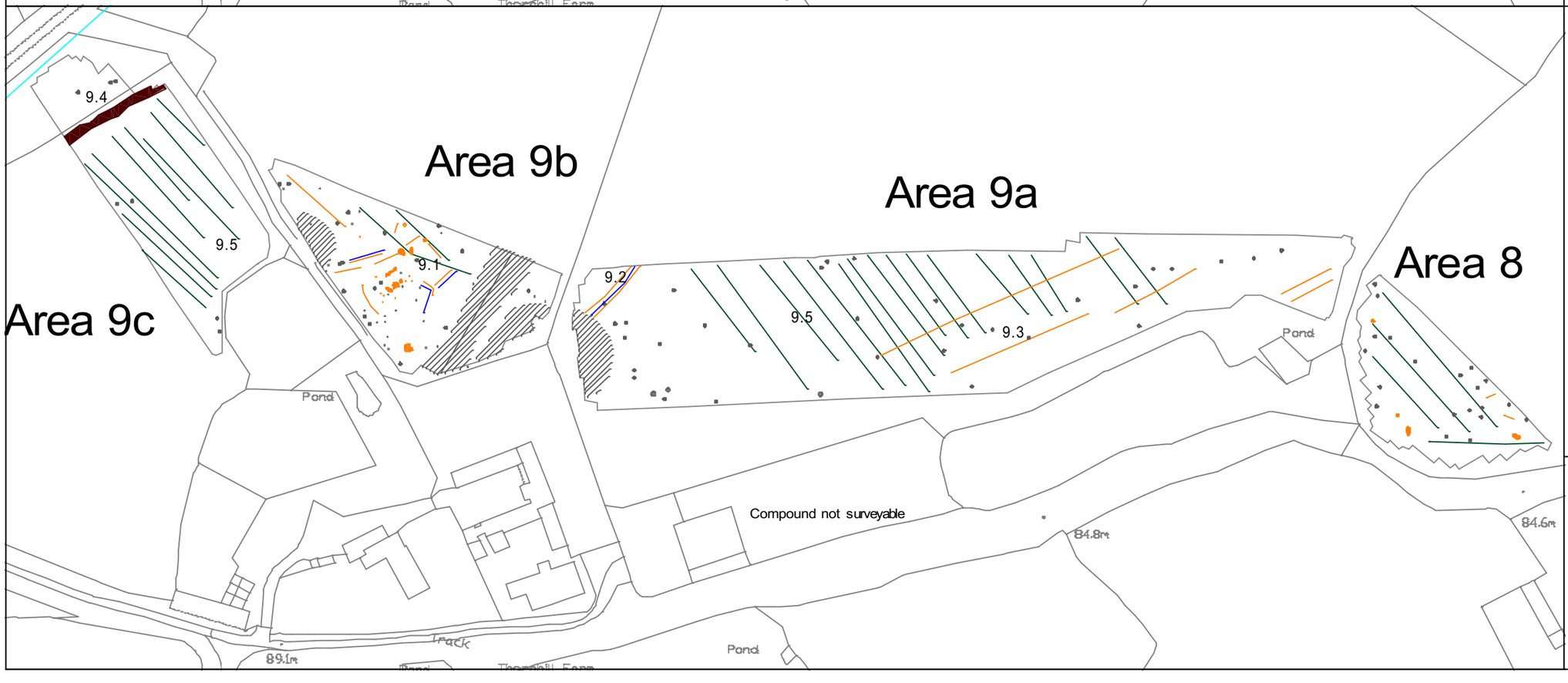
Greyscale plot of minimally processed magnetometer data - Areas 8 & 9



Abstraction and interpretation of magnetometer anomalies



- Positive linear anomaly - possible ditch-like feature
- Negative linear anomaly - material of low magnetic susceptibility
- Positive linear anomaly - field boundary ditch
- Linear anomaly - ridge & furrow
- Discrete positive response - possible pit-like feature
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 10

HDD no survey

Greyscale plot of minimally processed magnetometer data - Area 10

Area 10

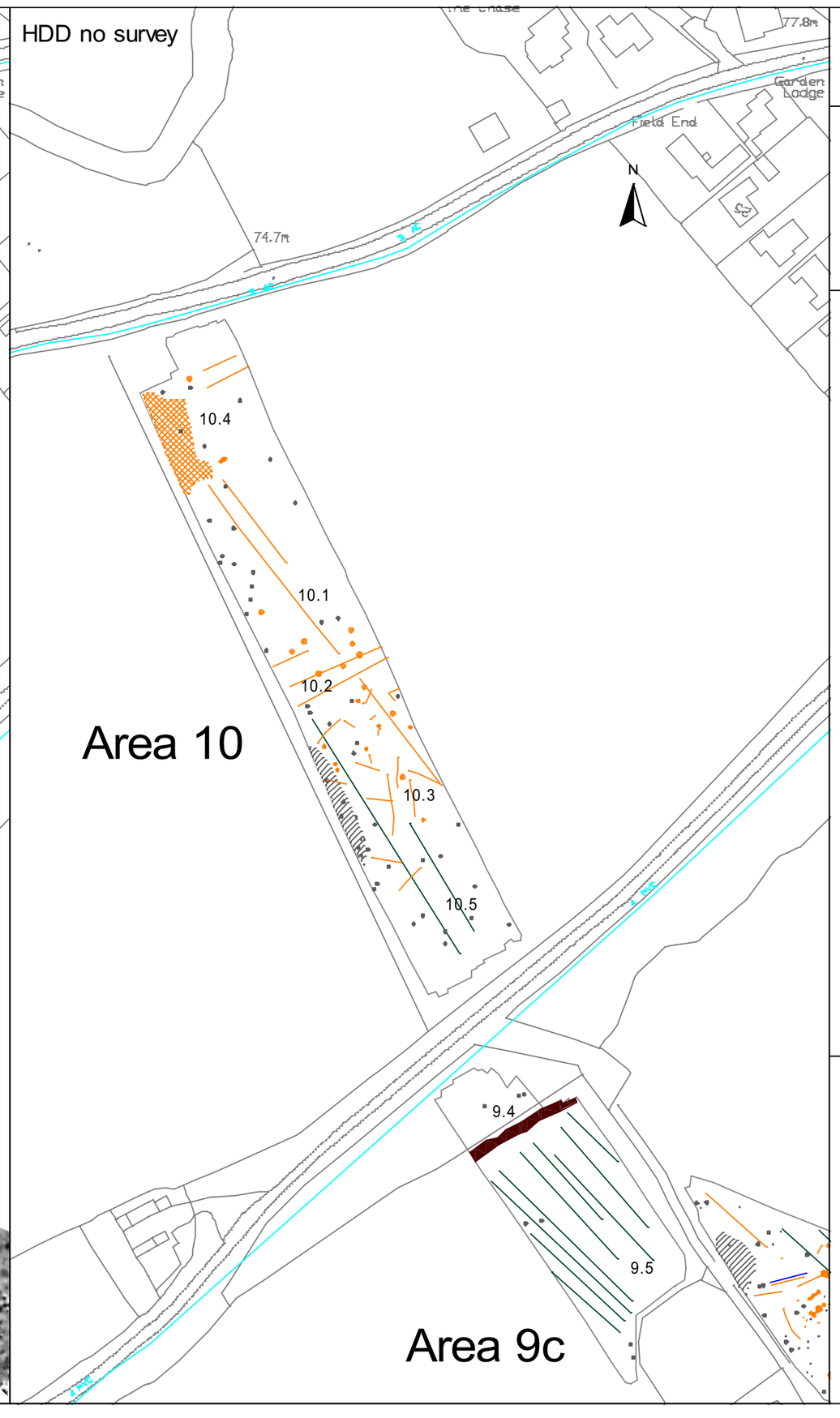
Area 9c

-3nT Area 10 +3nT

+3nT

-3nT

HDD no survey



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Abstraction and interpretation of magnetometer anomalies - Area 10

- 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 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 11

12c

Greyscale plot of minimally processed magnetometer data - Area 12 south

Area 12b

Area 12a

Cropmarks

-3nT Area 12b +3nT

+3nT

-3nT Area 12a +3nT

-3nT

Weir

12c

N

Area 12b

12.1

12.2

12.3

Area 12a

Cropmarks

Weir

Archaeological Surveys Ltd

Geophysical Survey
B0562 Malmesbury Aquifer Resilience Scheme
Wiltshire

Abstraction and interpretation of magnetometer anomalies - Area 12 south

- Positive linear anomaly - possible ditch-like feature
- Negative linear anomaly - material of low magnetic susceptibility
- Linear anomaly - of agricultural origin
- Discrete positive response - possible pit-like feature
- Strong dipolar anomaly - ferrous object

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 12

Greyscale plot of minimally processed magnetometer data - Area 12 centre

Area 12d

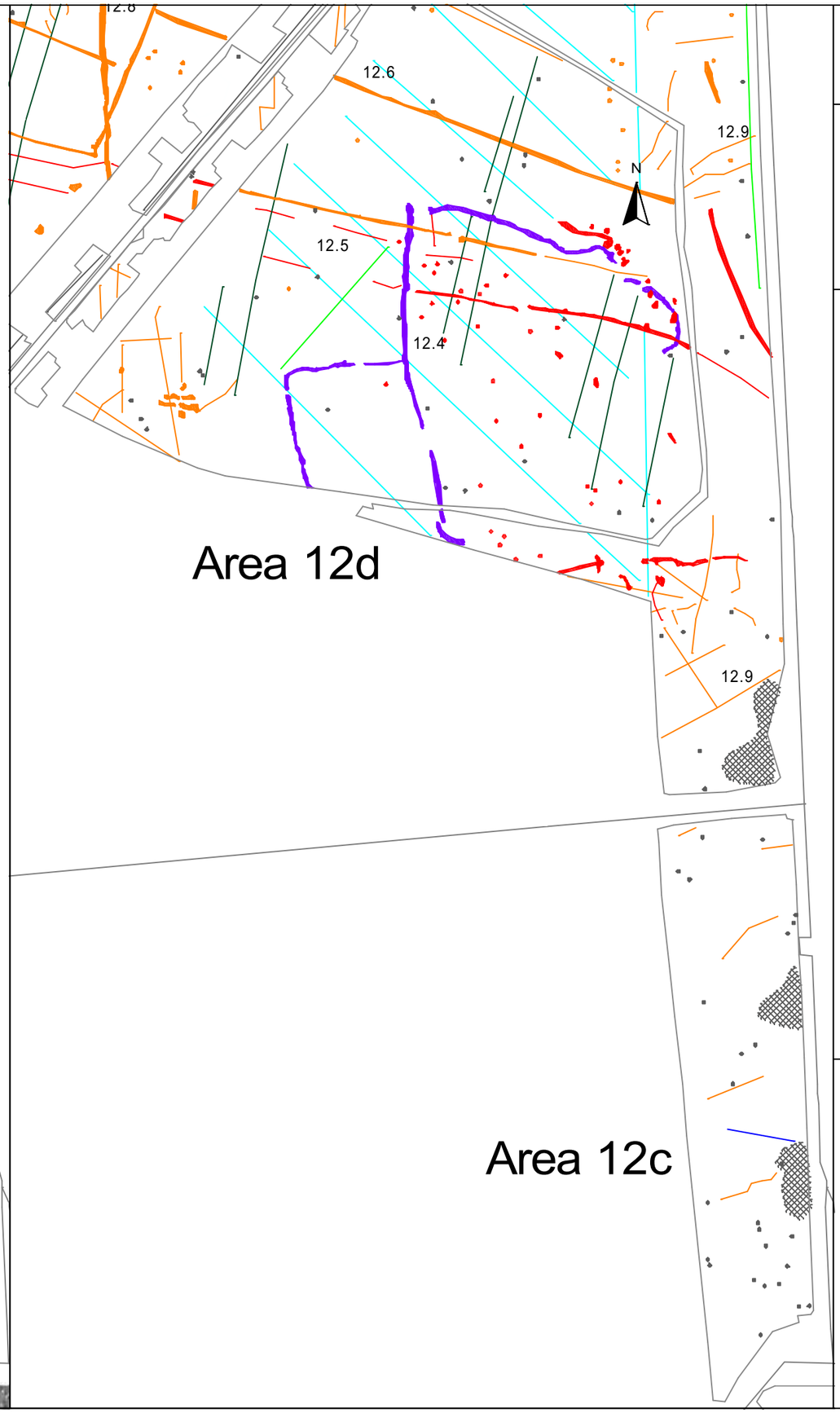
Area 12c

-3nT Area 12d +3nT

-3nT Area 12c +3nT

+3nT

-3nT



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Abstraction and interpretation of magnetometer anomalies - Area 12 centre

- Positive linear anomaly - cut feature of archaeological potential
- Positive rectilinear anomaly - enclosure ditch
- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Linear anomaly - ridge and furrow
- Positive linear anomaly - land drain
- Negative linear anomaly - material of low magnetic susceptibility
- Discrete positive response - cut feature of archaeological potential
- Discrete positive response - possible pit-like feature
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 13

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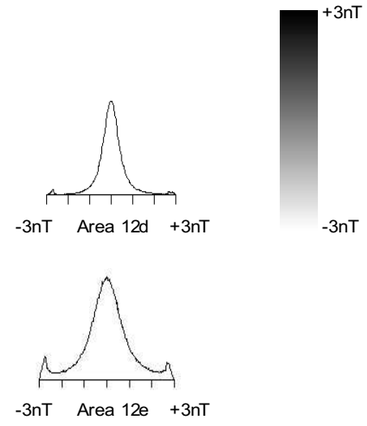
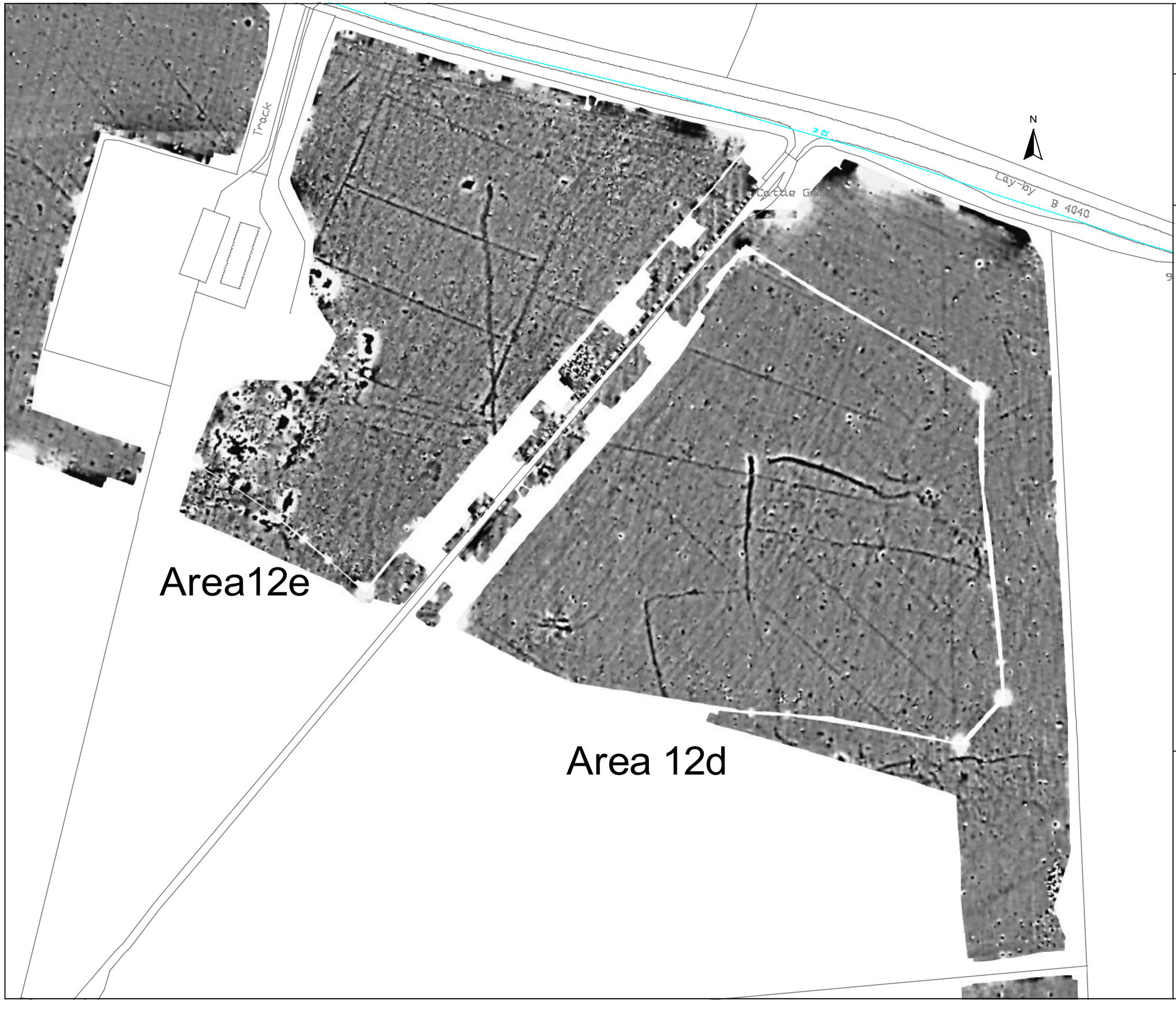
Wiltshire

Greyscale plot of minimally processed magnetometer data - Area 12 north east





SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 14

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Abstraction and interpretation of magnetometer anomalies - Area 12 north east

- Positive linear anomaly - cut feature of archaeological potential
- Positive curvilinear/rectilinear anomaly - enclosure ditch
- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Linear anomaly - ridge and furrow
- Positive linear anomaly - possible land drain
- Discrete positive response - cut feature of archaeological potential
- 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

0m 10 20 30 40 50m

SCALE TRUE AT A3

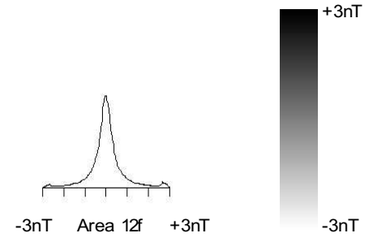
FIG 15

12.24
Track
12.7
12.8
12.12
12.11
Area12e
a cr
Cattle Grid
Lay-by
B 4040
N
12.10
12.6
12.9
12.5
12.4
Area 12d
12.9

Archaeological Surveys Ltd

Geophysical Survey
B0562 Malmesbury Aquifer Resilience Scheme
Wiltshire

Greyscale plot of minimally processed magnetometer data - Area 12 north west



SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 16

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Geophysical Survey B0562 Malmesbury Aquifer Resilience Scheme Wiltshire

Abstraction and interpretation of magnetometer anomalies - Area 12 north west

- Positive linear anomaly - cut feature of archaeological potential
- Positive curvilinear anomaly - ring ditch
- Positive curvilinear/rectilinear anomaly - enclosure ditch
- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Linear anomaly - ridge and furrow
- Positive linear anomaly - possible land drain
- Discrete positive response - cut feature of archaeological potential
- 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 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 17

B 4040

94.2m

N

Track

Area12f

Area12e

12.12

12.13

12.14

12.15

12.16

12.17

12.18

12.19

12.20

12.21

12.22

12.23

12.24

12.25

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Abstraction and interpretation of magnetometer anomalies showing archaeological and uncertain anomalies - Area 12 north

- Positive linear anomaly - cut feature of archaeological potential
- Positive curvilinear anomaly - ring ditch
- Positive curvilinear/rectilinear anomaly - enclosure ditch
- Positive linear anomaly - possible ditch-like feature
- Discrete positive response - cut feature of archaeological potential
- Discrete positive response - possible pit-like feature

N

Area12f

Area12e

Area 12d

Ivartley Cottages

Stalling House

B 4040

Track

Cattle Grid

Pond

Cattle Grid

SCALE 1:2000

0m 20 40 60 80 100m

SCALE TRUE AT A3

FIG 18

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Wiltshire

Greyscale plot of minimally processed magnetometer data - Area 13

+3nT

-3nT +3nT -3nT

N

Area 13

Bole Hills

Pavilion

The Red Bull (PH)

The Bull House

B 4040

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 19

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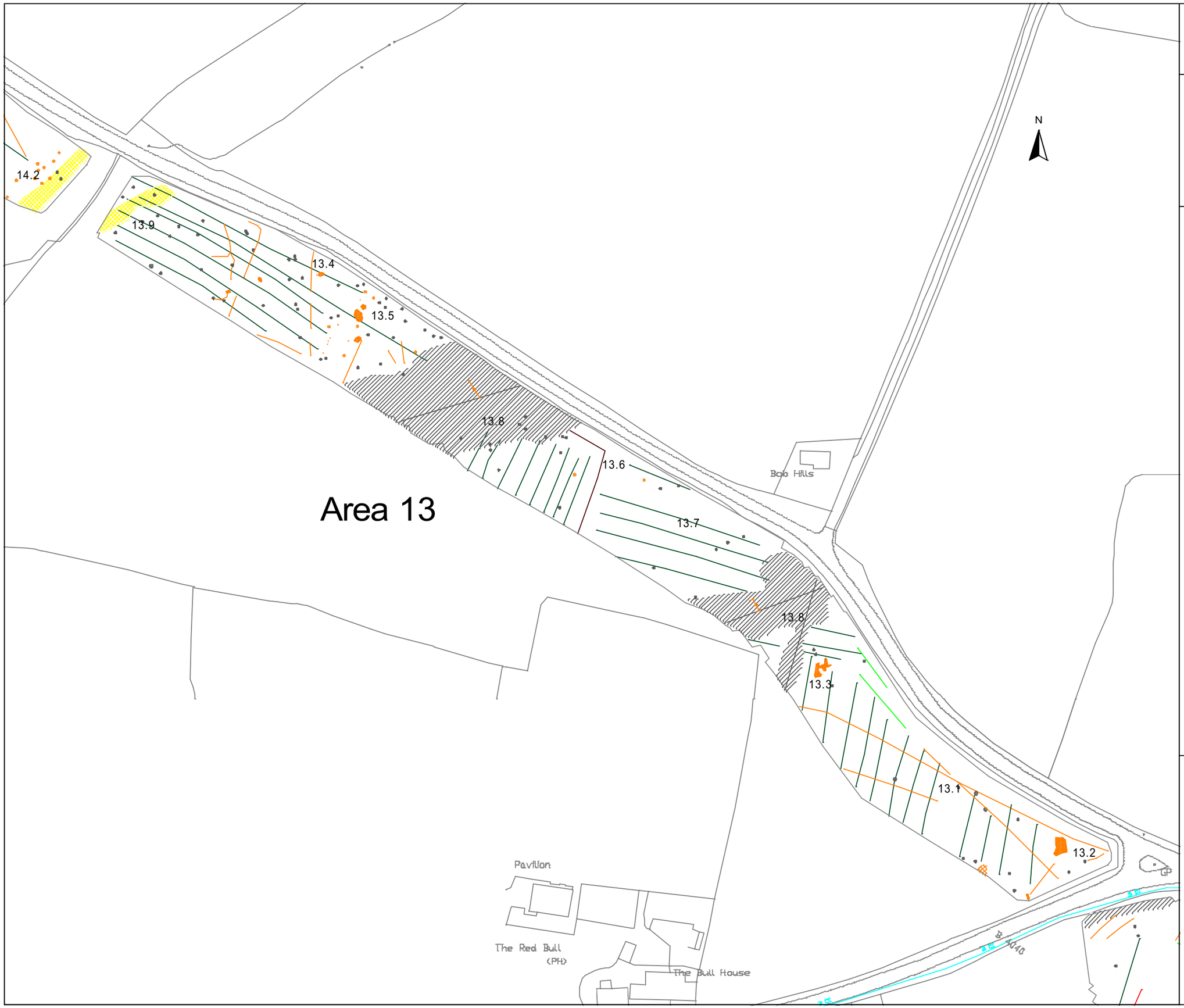
Geophysical Survey B0562 Malmesbury Aquifer Resilience Scheme Wiltshire

Abstraction and interpretation of magnetometer anomalies - Area 13



- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Linear anomaly - ridge and furrow
- Positive linear anomaly - possible former field boundary
- Discrete positive response - possible pit-like feature
- Variable magnetic response - of natural origin
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 20

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B0562 Malmesbury Aquifer Resilience Scheme
Wiltshire

Area 14c

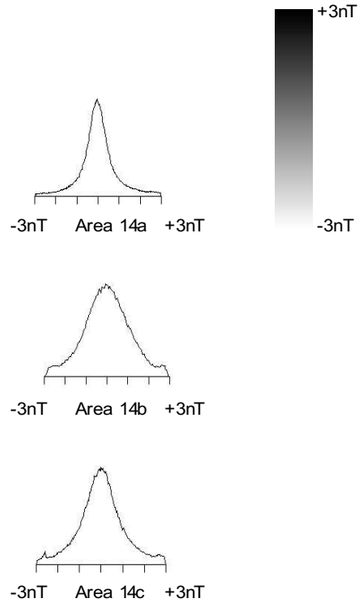
Area 14b

Area 14a

Pond

N

Greyscale plot of minimally processed magnetometer data - Area 14 east



SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 21

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Geophysical Survey B0562 Malmesbury Aquifer Resilience Scheme Wiltshire

Abstraction and interpretation of magnetometer anomalies - Area 14 east

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Linear anomaly - ridge and furrow
- Positive linear anomaly - possible land drain
- Discrete positive response - possible pit-like feature
- Variable magnetic response - of natural origin
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 22

Archaeological Surveys Ltd

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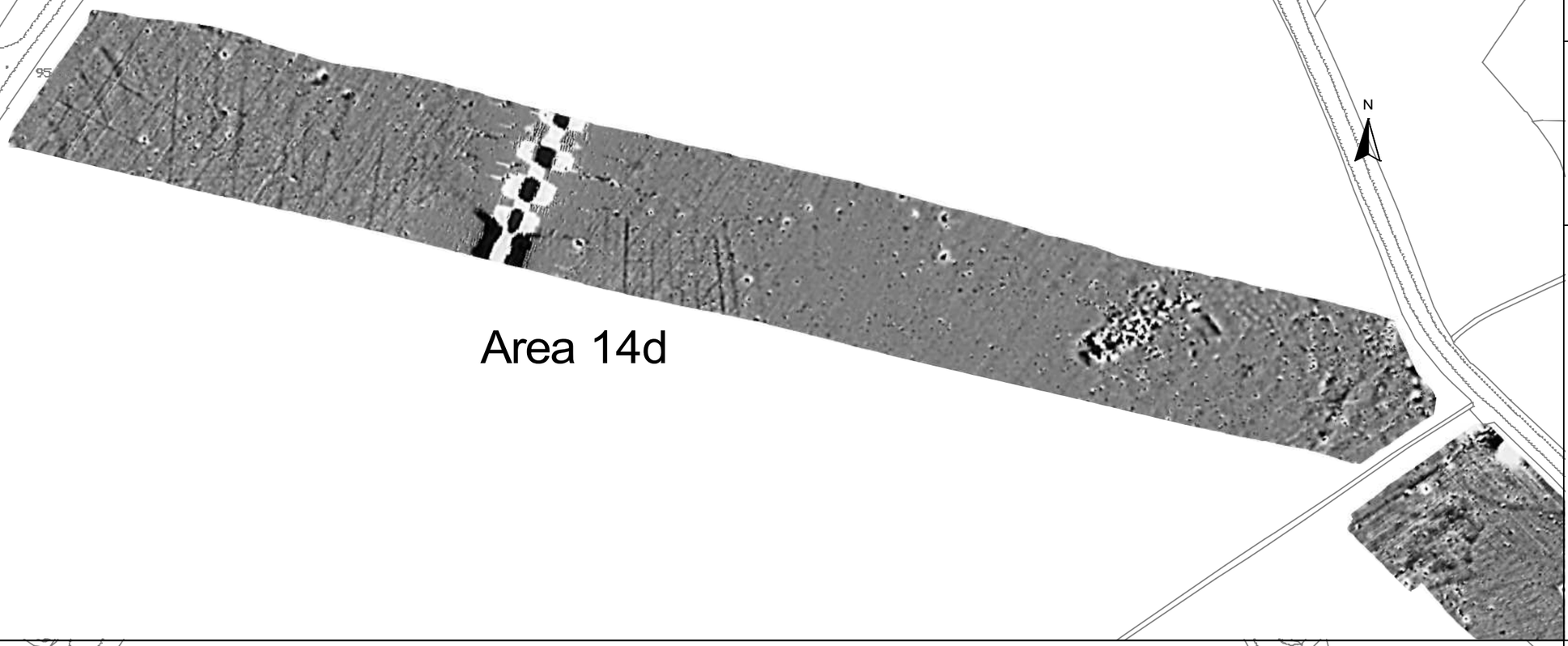
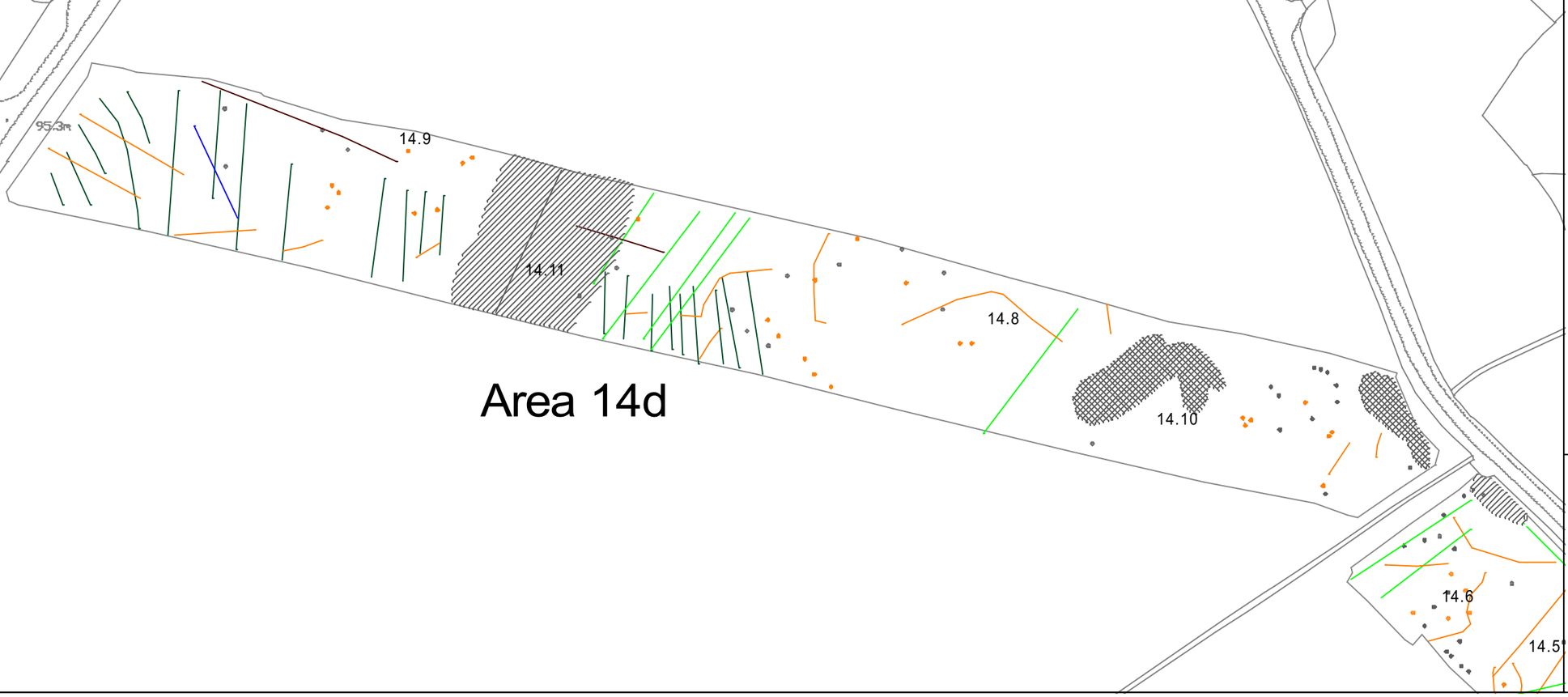
B0562 Malmesbury Aquifer Resilience Scheme
Wiltshire

Greyscale plot of processed magnetometer data - Area 14 west



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

Abstraction and interpretation of magnetometer anomalies



- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Linear anomaly - ridge and furrow
- Positive linear anomaly - possible former field boundary
- Negative linear anomaly - material of low magnetic susceptibility
- Discrete positive response - possible pit-like feature
- 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 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 23