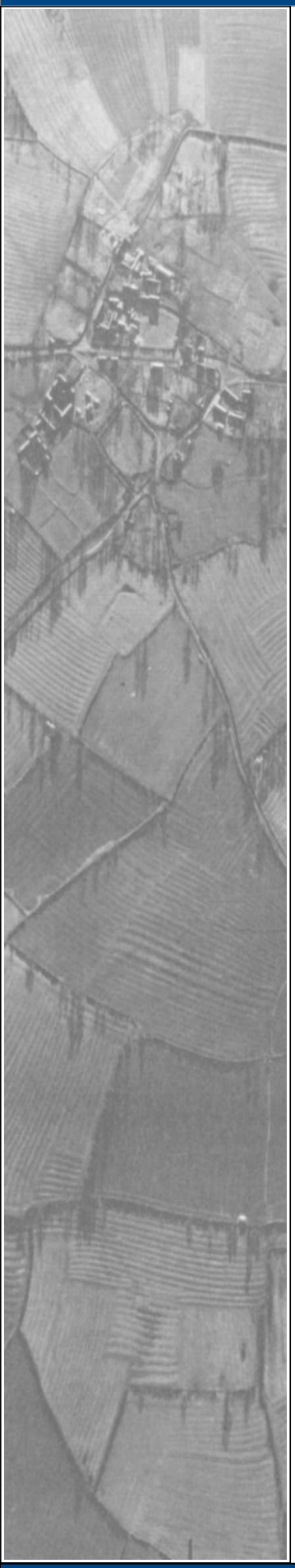

Faringdon to Blunsdon Pipeline
Phase 3
Oxfordshire

MAGNETOMETER SURVEY REPORT

for

WSP

Kerry Donaldson & David Sabin

October 2021

Ref. no. J873

ARCHAEOLOGICAL SURVEYS LTD

Faringdon to Blunsdon Pipeline
Phase 3
Oxfordshire

MAGNETOMETER SURVEY REPORT

for

WSP

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

Survey dates – 6th, 10th & 13th September 2021
Ordnance Survey Grid Reference – **SU 24285 95365**

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SUMMARY

A geophysical survey, comprising detailed magnetometry, was carried out by Archaeological Surveys Ltd along a new section of a water main route near Coleshill in Oxfordshire. The survey was requested as an addition to three areas previously surveyed during the initial scoping for the location of a new water main between Faringdon and Blunsdon. The original survey located evidence for prehistoric settlement laid out as two linear groups within a single field to the south of Gorse Hill on the Buscot estate. The results of the current survey indicate a continuation of the prehistoric settlement southwards for another 100m. The features include a number of ring ditches, relating to probable Iron Age round houses, as well as a number of small square enclosures and conjoined sub-circular enclosures. A number of discrete positive responses have also been located, which could relate to pits or areas of burning along with a group that appear to form a circle and could relate to former post-holes. A fragmented linear anomaly may form a south western boundary to the features, but no clear boundary feature can be seen in the south east or east.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by WSP, on behalf of Kier Infrastructure and Thames Water, to undertake an additional geophysical survey of a 9.3ha area of land along the Phase 3 section of a new water pipeline that extends for 6.1km between Faringdon Water Booster Station (WBS) and Snowswick Lane, near Coleshill, Oxfordshire. A previous geophysical survey along the route discovered a number of unrecorded ring ditches likely to relate to prehistoric settlement (Archaeological Surveys, 2021). The current survey was carried out over a wider area to the south, east and west of the ring ditches in order to assess the potential for further archaeological features and to assess the feasibility of amending the proposed route of the pipeline further south to avoid the archaeology.

1.1.2 The geophysical survey was carried out in accordance with a Written Scheme of Investigation (WSI) produced by WSP (2021) and approved by Richard Oram, Lead Archaeologist for Oxfordshire County Council, prior to commencing the fieldwork. The geophysical survey comprised detailed magnetometry over 9.3ha within three arable fields.

1.1.3 In the original survey, the three areas were labelled Areas 17, 18 and 19 from east to west (Archaeological Surveys, 2021) and these area labels have been continued for the purposes of this report. In order to understand the relationship of the geophysical anomalies, set them in context and archive the data as a coherent data set, the data of the current survey has been combined

with those of the original survey. The only differentiation is seen as a red-line boundary within the report figures.

1.2 Survey aims, purpose and objectives

1.2.1 The aim of the survey is to identify the presence and extent of geophysical anomalies in the fields to the south of Area 18, where a possible prehistoric settlement was recorded in the previous geophysical survey. This is for the purposes of informing the scope of further archaeological evaluation in the form of trial trenching.

1.2.2 The purpose of the geophysical survey in compliance with the CIfA *Standard and Guidance for Archaeological Geophysical Survey* (CIfA, 2014) (updated 2020), is as follows:

- To determine, as far as is reasonably possible, the nature of the detectable archaeological resource using appropriate methods and practices;
- To inform either the scope and/or nature of any further site-base archaeological work that may be required to develop the site.

1.2.3 In order to achieve the above aims, the objectives of the archaeological geophysical survey are:

- Objective 1: Conduct the archaeological geophysical survey of the proposed survey area, covering as much of the specified area as possible, allowing for on-site obstructions;
- Objective 2: Provide a fully illustrated survey report which will identify the presence of any geophysical anomalies of possible archaeological origin, and where possible provide an archaeological interpretation and commentary on potential and significance;
- Objective 3: Provide accompanying digital survey data.

1.2.4 Geophysical survey can provide useful information on the archaeological potential of a site; however, the outcome of any survey relies on a number of factors and as a consequence results can vary.

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

1.3.1 The survey and report follow the recommendations set out by: European Archaeological Council (2015) *Guidelines for the Use of Geophysics in Archaeology;* Institute for Archaeologists (2002) *The use of Geophysical Techniques in Archaeological Evaluations.* The work has been carried out to the Chartered Institute for Archaeologists (2014) (updated 2020) *Standard and Guidance for Archaeological Geophysical Survey.*

1.3.2 Archaeological Surveys Ltd provide a detailed geophysical survey report and it is recommended that where possible the contents should be considered in full. The Summary provides a brief overview of the results with more detail

available in the Discussion and/or Conclusion. The *List of anomalies* within the Results provides a detailed assessment of the anomalies within separate categories which can be useful in inferring a level of confidence to the interpretation. Quality and factors influencing the interpretation of anomalies is also set out within the results.

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

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

1.4 Site location, description and survey conditions

1.4.1 The site is located to the south of Gorse Hill within the parish of Coleshill, Oxfordshire. It is centred on Ordnance Survey National Grid Reference (OS NGR) SU 24285 95365, see Figs 01 and 02.

1.4.2 The geophysical survey covers approximately 9.3ha within three arable fields, labelled Area 17, 18 and 19 for continuity with the original survey (Archaeological Surveys, 2021).

1.4.3 At the time of survey the ground cover within all of the survey areas was stubble; however, Area 17 contained a number of straw bales that impeded survey across a very small fraction of the site. Weather conditions were fine and warm.

1.4.4 The ground conditions across the site were generally considered to be favourable for the collection of magnetometry data.

1.5 Site history and archaeological potential

1.5.1 The previous geophysical survey carried out immediately to the north of the current survey area, located a number of unrecorded ring ditches possibly associated with late prehistoric settlement within Area 18 to the south of Gorse Hill (Archaeological Surveys, 2021). The results indicated that they were likely to continue southwards into the area of the current survey.

1.6 Geology and soils

1.6.1 The underlying geology is mudstone from the Oxford Clay Formation (BGS, 2017).

1.6.2 The overlying soil across the site is from the Denchworth association and is a pelo-stagnogley. It consists of a slowly permeable, seasonally waterlogged soil over clay (Soil Survey of England and Wales, 1983).

1.6.3 The underlying geology and soils are frequently associated with low magnetic contrast and low levels of magnetic susceptibility. However, cut features of archaeological potential can be located where human activity has altered the magnetic characteristics of the soil sufficiently. 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 (also known as thermoremanence) are factors associated with the formation of localised fields.

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

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

2.1.4 The localised variations in magnetism are measured as sub-units of the Tesla, which is a SI unit of magnetic flux density. These sub-units are nano Teslas (nT), which are equivalent to 10^{-9} Tesla (T). Additional details are set out in 2.2 below and within Appendix A.

2.2 Equipment configuration, data collection and survey detail

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

component of a magnetic anomaly is measured. The gradiometers have a measurement range of ±8000nT, although the recorded range is ±3000nT, and resolution is around 0.1nT. They are linked to a Leica GS10 RTK GNSS with data recorded by SENSYS MAGNETO®MXPDA software on a rugged PDA computer system.

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

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

2.2.4 Fluxgate sensors are highly sensitive to temperature change and this manifests as drift during the course of a survey. This can be particularly noticeable during the morning as temperatures rise and the equipment warms or cools. Sensor drift within the course of a traverse will appear as a line trending from negative to positive after processing with a zero median traverse algorithm. To remove the potential for temperature drift, data were collected after a 20 minute stabilisation period and traverses were limited to a time of generally <100s.

2.3 Data processing and presentation

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

2.3.2 Survey tracks are analysed and georeferenced raw data (UTM Z30N) are then

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

2.3.3 The minimally processed data are collected between limits of ±3000nT and clipped for display at ±3nT. Data are interpolated to a resolution of effectively 0.5m between tracks and 0.15m along each survey track.

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

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

2.3.6 A TIF file is produced by TerraSurveyor software along with an associated world file (.TFW) that allows automatic georeferencing (OSGB36 datum) when using GIS or CAD software. The main form of data display used in the report is the minimally processed greyscale plot. With regard to the Sensys MXPDA, minimally processed data are considered by the manufacturer to be data that are compensated by SENSYS MAGNETO DLMGPS software, see 2.3.1 and 2.3.2. Note: traceplots are not considered to be appropriate as they do not provide an accurate or useful assessment of the magnetic anomalies due to the very high density of data collection. In addition, traceplots cannot be meaningfully plotted against base mapping and in areas of complexity traces may be lost or highly confused. Traceplots may be used to demonstrate characteristic magnetic profiles across discrete features where it is considered beneficial.

2.3.7 The raster images are combined with base mapping using ProgeCAD Professional 2021, creating DWG (2018) file formats. All images are externally referenced to the CAD drawing in order to maintain good graphical quality. The CAD plots are effectively georeferenced facilitating relocation of features using GNSS, resection method, etc.

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

content for each interpretation category, see 3.3.

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

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 but the data will also be archived with the Archaeology Data Service (ADS).

3 RESULTS

3.1 General assessment of survey results

3.1.1 The detailed magnetic survey was carried out over a total of 3 survey areas covering approximately 9.3ha.

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

3.1.3 Anomalies located within each survey area have been numbered and are described in 3.4 to 3.6 below.

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

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

3.2.2 The data contain a number of long linear anomalies of low magnitude related to ruts and furrows formed during cultivation. These were effectively removed by additional high pass filtering; both filtered and unfiltered data are compared and assessed in order to ensure that significant anomalies are not removed or altered.

3.2.3 The results demonstrate the presence of useful magnetic contrast within the soils with the potential for more enhanced anomalies indicative of more intensive activity or occupation. Some of the anomalies of archaeological potential are very weak or fragmented, but it is unclear whether this relates to near truncation by agricultural activity or whether there is insufficient magnetic contrast for the location of some former cut features.

3.3 Data interpretation

3.3.1 The list of sub-headings below attempts to define a number of separate categories that reflect the range and type of features located during the survey. A general explanation of the characteristics of the magnetic anomalies is set out for each category in order to justify interpretation, see Table 1 and the CAD layering description, colouring and graphical content for abstraction and interpretation plots in Table 3.

Interpretation category	Description and origin of anomalies
Anomalies with archaeological potential	Anomalies have the characteristics (mainly morphological) of a range of archaeological features such as pits, ring ditches, enclosures, etc. Ring ditches can be defined in a different colour (magenta) from other anomalies of archaeological potential (red) in order to highlight them when they are often, partial, fragmented and indistinct. The category is used where there is a high level of confidence which may be due to additional supporting information where morphology is unclear or uncharacteristic.
Anomalies with an uncertain origin	The category applies to a range of anomalies where there is not enough evidence to confidently suggest an origin. Anomalies in this category may well be related to archaeologically significant features, but equally relatively modern features, geological/pedological features and agricultural features should be considered. Morphology may be unclear or uncharacteristic and there may be a lack of additional supporting information. Positive anomalies are indicative of magnetically enhanced soils that may form the fill of 'cut' features or may be produced by accumulation within layers or 'earthwork' features; soils subject to burning may also produce positive anomalies. Negative anomalies are produced by material of comparatively low magnetic susceptibility such as stone and subsoil.
Anomalies relating to land management	Anomalies are mainly linear and may be indicative of the magnetically enhanced fill of cut features (i.e. ditches). The anomalies may be long and/or form rectilinear elements and they may relate to topographic features or be visible on early mapping. Associated agricultural anomalies (e.g. headlands, plough marks and former ridge and furrow) may support the interpretation. Land drains can appear in a classic herringbone pattern of interconnected multiple dipolar linear anomalies, or as parallel linear anomalies. The multiple dipolar response indicates ceramic land drains.
Anomalies with an agricultural origin	The anomalies are often linear and form a series of parallel responses or are parallel to extant land boundaries. Where the response is broad, former ridge and furrow is likely; narrow response is often related to modern ploughing. This category does not include agricultural features of early date or considered to be of archaeological potential (e.g. animal stockades, enclosures, farmsteads, etc).
Anomalies associated with magnetic debris	Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.

Table 1: List and description of interpretation categories

3.4 List of anomalies - Area 17

Area 17 between OS NGR 424656 195540 & 424358 195376, see Figs 06 – 08.

Anomalies with an uncertain origin

(1) – The survey area contains a small number of discrete positive responses, with three in the west and one in the east. It is not possible to determine if they relate to cut, pit-like features.

Anomalies associated with land management

(2 - 5) – The survey area contains a large number of land drains on different orientations. Anomaly (2) appears to extend towards a former boundary ditch (13) seen within Area 18 to the west. Extending through the field to the north and west of (2) are a series of parallel linear anomalies (3) that relate to an unusual pattern of drainage features, with some elements of ceramic land drains within them. It appears that fragmented linear anomalies previously located to the north are also associated with land drainage. Anomalies (4) extend across the site from east to

west and anomalies (5) are ceramic land drains within the former furrows of the ridge and furrow cultivation.

3.5 List of anomalies - Area 18

Area 18 between OS NGR 424349 195376 & 423999 195367, see Figs 09 – 11.

Anomalies of archaeological potential

(6) – A continuation of the group of ring ditch features located during the previous geophysical survey (Archaeological Surveys, 2021). This includes the southern extent of a larger curvilinear enclosure ditch which is conjoined to a smaller ring ditch and which appears to contain evidence for another ring ditch.

(7) – A group of linear, curvilinear, rectilinear and discrete positive responses relate to a group of features which include a number of partial ring ditches, a small square enclosure and an irregularly shaped enclosure, which could relate to conjoined ring ditches. A number of positive responses in the vicinity appear to relate to pits and possible spread of occupation material.

(8) – A small number of discrete positive responses are located to the west of (7) and appear to relate to a circular formation of pits or post-holes. They have a response of 3-7nT and the larger two have a diameter of c1-1.5m, while the smaller ones have general dimensions of c0.7m by c0.4m.

(9) – A positive linear anomaly appears to relate to a cut, linear ditch-like feature. It is very weak (<1nT) and fragmented as it extends north westwards, with the strongest response at the southern end (6-8nT) which indicates that magnetically enhance or burnt material has been incorporated into it. It appears to end abruptly at this point.

(10) – A continuation of ring ditches, and square and irregularly shaped enclosures seen as an eastern grouping of anomalies in the previous survey (Archaeological Surveys, 2021).

(11) – Located 30m to the south of (10) are the remains of at least 2 partial ring ditches and what appears to be a partial small square enclosure.

Anomalies with an uncertain origin

(12) – Weakly positive linear anomalies with a north west to south east trend. Although this is a similar orientation to anomaly (9), the anomalies are very weak and do not appear to extend into Area 17 to the east.

Anomalies associated with land management

(13) – A broad positive linear anomaly relates to a former ditch within a lower lying

part of the survey area.

(14) – A land drain that appears to join land drains (3), seen in Area 17, to linear ditch (13).

(15) – Linear anomalies that appear to relate to land drainage features.

Anomalies with an agricultural origin

(16) – A series of positive linear anomalies relate to former ridge and furrow.

Anomalies associated with magnetic debris

(17) – Strong, discrete, dipolar anomalies relate to ferrous objects within the topsoil

3.6 List of anomalies - Area 19

Area 19 between OS NGR 423991 195373, see Figs 12 – 14.

3.6.1 Area 19 contains a small number of weakly positive anomalies that lack a coherent morphology which prevents confident interpretation as cut features. Possible pit-like features were located in the northern part of the survey area during the previous survey (Archaeological Surveys, 2021). Former ridge and furrow is evident as a direct continuation of the series seen within Area 18 to the east and the modern cultivation trend can also be seen within Area 19 as well as the other survey areas.

4 CONCLUSION

4.1.1 The additional geophysical survey has located further evidence for possible prehistoric settlement features within Area 18. A number of ring ditches, square and circular enclosures and pits extend in total southwards for 170-190m in two linear groups located 100-150m apart and covering some 2ha in total. The westernmost group appears to be partially bounded to the south west by a linear, ditch-like feature, while the southern extent of the easternmost group appears to end with several partial ring ditches.

4.1.2 Former ridge and furrow can be seen within data from all three survey areas, as well as evidence for land drainage, with a complex arrangement in Area 17.

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Appendix A – basic principles of magnetic survey

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

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

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

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

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

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

Appendix B – data processing notes

Clipping

Minimum and maximum values are set and replace data outside of the range with those values. Extreme values are removed improving colour or greyscale contrast associated with data values that may be archaeologically significant. Different ranges are applied to data in order to determine the most suitable for anomaly abstraction and display.

High Pass Filter

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

Zero Median/Mean Traverse

The median (or mean) of data from each traverse is calculated ignoring data outside a threshold value, the median (or mean) is then subtracted from the traverse. The process is used to equalise differences between the offset values of the gradiometer sensors. The process can remove archaeological features that run along a traverse but with the high resolution datasets created by the Sensys FGM650 sensors and the method of data collection this has not been a notable problem. In fact, the removal of offsets using software avoids carrying out a balancing procedure on site, which inevitably can never be done in magnetically clean

conditions and results in improperly aligned fluxgate sensors and/or electronic adjustment values.

Appendix C – survey and data information

Area 17 minimally processed data

Filename: J873-mag-Area17-proc.xcp
Instrument Type: Sensys DLMGPS
Units:
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 424355.52, 195603.64 m
Southeast corner: 424663.47, 195292.69 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702
Dimensions
Survey Size (meters): 308 m x 311 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 1834981, Recorded: 1834981
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.72
Mean: 0.02
Median: -0.01
Composite Area: 9.5757 ha
Surveyed Area: 5.5754 ha
PROGRAM
Name: TerraSurveyorPre
Version: 3.0.36.24
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00

Area 17 minimally processed data

Filename: J873-mag-Area17-proc-hpf.xcp
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.70
Mean: 0.01
Median: -0.01
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 300
5 Clip from -3.00 to 3.00

Area 18 minimally processed data

Filename: J873-mag-Area18-proc.xcp
Northwest corner: 423960.50, 195542.01 m
Southeast corner: 424358.00, 195290.61 m
Dimensions
Survey Size (meters): 398 m x 251 m
Source GPS Points: Active: 2548216, Recorded: 2548216
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.72
Mean: 0.04
Median: -0.01
Composite Area: 9.9932 ha
Surveyed Area: 8.0265 ha
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00

Area 18 filtered data

Filename: J873-mag-Area18-proc-hpf.xcp
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.68
Mean: 0.04
Median: -0.01
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 300
5 Clip from -3.00 to 3.00

Area 19 minimally processed data

Filename: J873-mag-Area19-proc.xcp
Northwest corner: 423799.12, 195484.49 m
Southeast corner: 424005.52, 195293.99 m
Dimensions
Survey Size (meters): 206 m x 191 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 475794, Recorded: 475794
Stats
Max: 3.32
Min: -3.30
Std Dev: 0.64
Mean: 0.00
Median: -0.01
Composite Area: 3.9319 ha
Surveyed Area: 1.7283 ha
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00

Area 19 filtered data

Filename: J873-mag-Area19-proc-hpf.xcp
Max: 3.32
Min: -3.30
Std Dev: 0.60
Mean: 0.01
Median: -0.02
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 300
5 Clip from -3.00 to 3.00

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. The data will also be archived with the Archaeology Data Service (ADS) including the raw and processed data, the CAD abstraction layers and the raster graphic images as georeferenced TIFs with TFWs. The report will also be uploaded to the Online AccesS to the Index of archaeological investigationS (OASIS).

A draft copy will be supplied to the Oxfordshire county archaeological officer for comment and the agreed final copy supplied in PDF format to the Oxfordshire Historic Environment Record. The report will also be uploaded to the Online AccesS to the Index of archaeological investigationS (OASIS).

Archive contents:

File type	Naming scheme	Description
Data	J873-mag-**[area number/name]**.asc J873-mag-**[area number/name]**.xcp J873-mag-**[area number/name]**-proc.xcp J873-mag-**[area number/name]**-proc.csv	Raw data as ASCII CSV TerraSurveyor raw data TerraSurveyor minimally processed data Exported TerraSurveyor xyz file
Graphics	J873-mag-**[area number/name]**-proc.tif	Image in TIF format
Drawing	J873-**[version number]**.dwg	CAD file in 2018 dwg format
Report	J873 report.odt	Report text in LibreOffice odt format

Table 2: Archive metadata

Appendix E – CAD layers for abstraction and interpretation plots

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

Report sub-heading and associated CAD layer names	Colour with RGB index	Layer content
Anomalies with archaeological potential		
AS-ABST MAG POS DISCRETE ARCHAEOLOGY	Red 255,0,0	Solid donut, point or polygon (solid)
AS-ABST MAG POS LINEAR ARCHAEOLOGY	Red 255,0,0	Polyline or polygon (solid)
AS-ABST MAG POS CURVILINEAR RING DITCH	Magenta 255,0,255	Polyline or polygon (solid)
AS-ABST MAG NEG LINEAR ARCHAEOLOGY	127,0,255	Line, polyline or polygon (solid)
Anomalies with an uncertain origin		
AS-ABST MAG POS LINEAR UNCERTAIN	255,127,0	Line, polyline or polygon (solid)
AS-ABST MAG POS DISCRETE UNCERTAIN	255,127,0	Solid donut, point or polygon (solid)
Anomalies relating to land management		
AS-ABST MAG BOUNDARY	127,0,0	Line, polyline or polygon (solid or cross hatched ANSI37)
AS-ABST MAG LAND DRAIN	Cyan 0,255,255	Line or polyline
Anomalies with an agricultural origin		
AS-ABST MAG AGRICULTURAL	Green 0,255,0	Line or polyline
AS-ABST MAG RIDGE AND FURROW	0,127,63	Line, polyline or polygon (cross hatched ANSI37)
Anomalies associated with magnetic debris		
AS-ABST MAG STRONG DIPOLAR	132, 132, 132	Solid donut, point or polygon (solid)
Anomalies with a modern origin		
AS-ABST MAG SERVICE	132, 132, 132	Line or polyline

Table 3: CAD layering

Appendix F – copyright and intellectual property

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Tel: 01249 814 231

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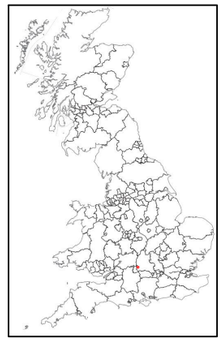
Geophysical Survey
Faringdon to Blunsdon Pipeline
Phase 3
Oxfordshire

Map of survey area

N



Survey location

Site centred on OS NGR
SU 24285 95365

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 01

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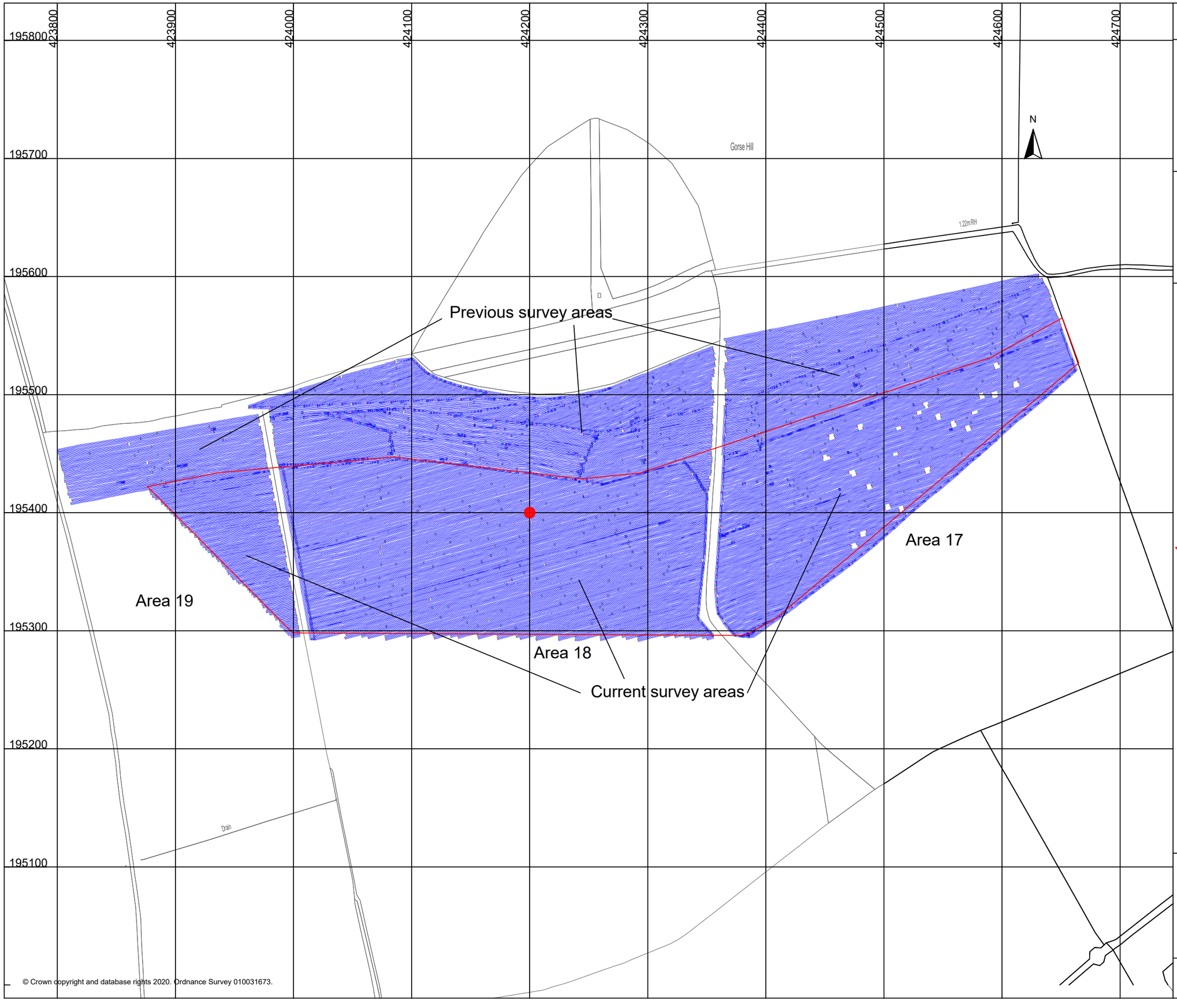
Referencing information



Referencing grid to OSGB36 datum at 100m intervals

- 424200 195400
- Survey tracks
- Survey track start
- Survey track stop
- Additional survey area

SCALE 1:3000

0m 20 40 60 80 100m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 02

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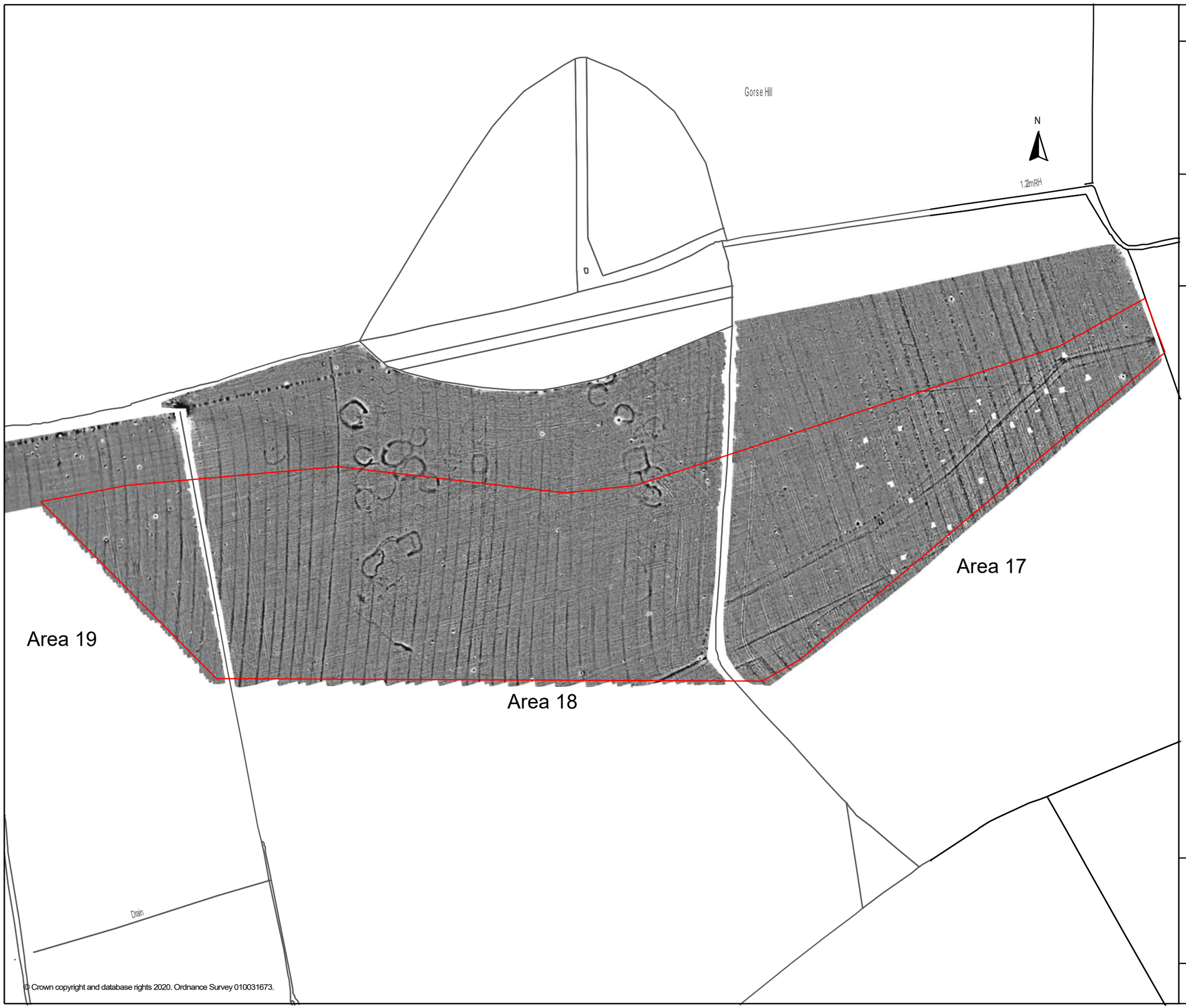
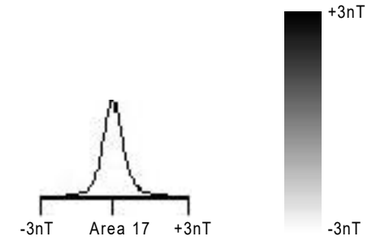
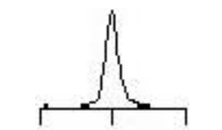
Greyscale plot of minimally processed magnetometer data







SCALE 1:2500

0m 50 100m

KTD | DJS | FIG 03

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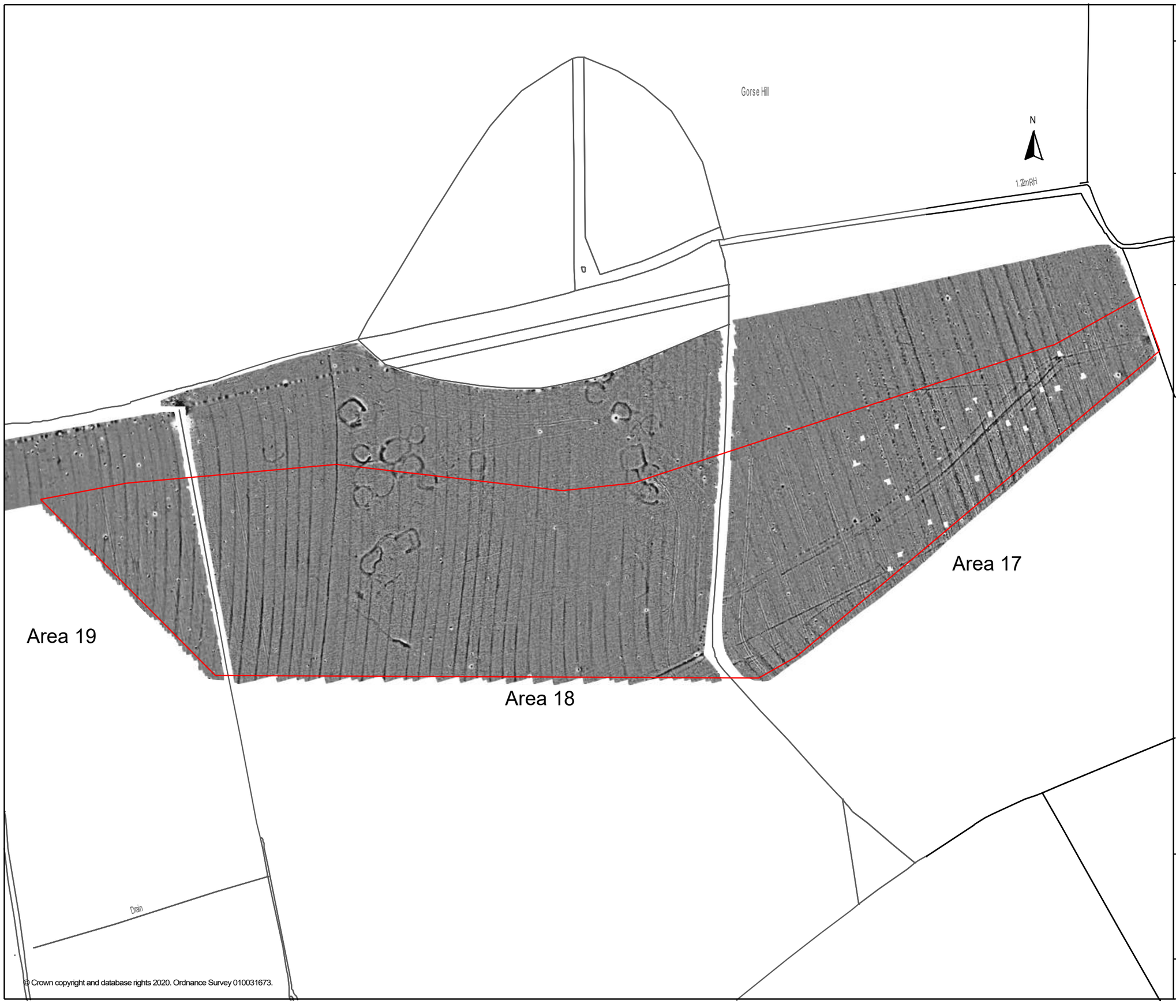
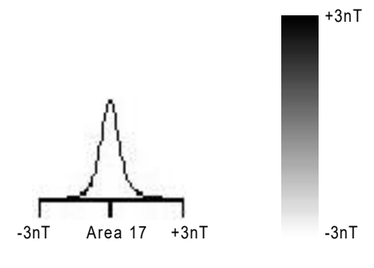
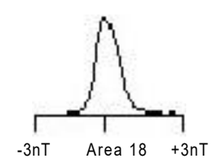
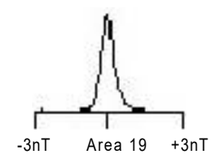
Greyscale plot of filtered magnetometer data









SCALE 1:2500

0m 50 100m

KTD	DJS	FIG 04

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Abstraction and interpretation of magnetic anomalies

- Positive linear anomaly - cut feature of archaeological potential
- Positive curvilinear anomaly - ring ditch
- Negative linear anomaly - of archaeological potential
- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Linear anomaly - ridge and furrow
- Positive/weak multiple dipolar linear anomaly - possible land drain
- Positive linear anomaly - former field boundary
- Multiple dipolar linear anomaly - water pipe
- Discrete positive response - cut feature of archaeological potential
- Discrete positive response - possible pit-like feature
- Strong dipolar anomaly - ferrous object

SCALE 1:2500

0m 50 100m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 05

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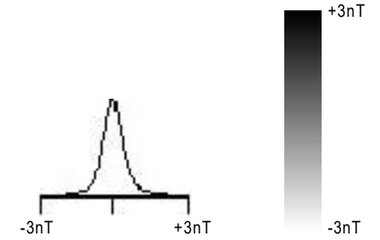
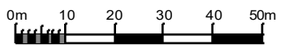
Greyscale plot of minimally processed magnetometer data - Area 17



SCALE 1:1250



KTD	DJS	FIG 06

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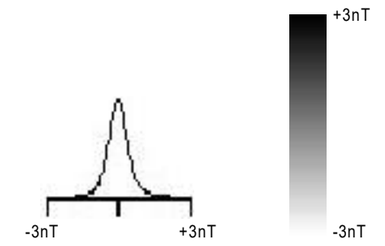
Greyscale plot of filtered magnetometer data - Area 17



SCALE 1:1250

0m 10 20 30 40 50m

KTD | DJS | FIG 07

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Abstraction and interpretation of magnetic anomalies - Area 17

N

Area 17

1
2
3
4
5
10
11
12
13
14
15

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Linear anomaly - ridge and furrow
- Positive/weak multiple dipolar linear anomaly - land drain
- Discrete positive response - possible pit-like feature
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 08

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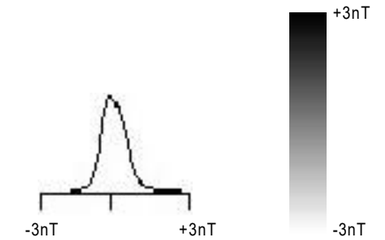
Greyscale plot of minimally processed magnetometer data - Area 18



SCALE 1:1000

0m 10 20 30 40 50m

KTD | DJS | FIG 09

Area 18

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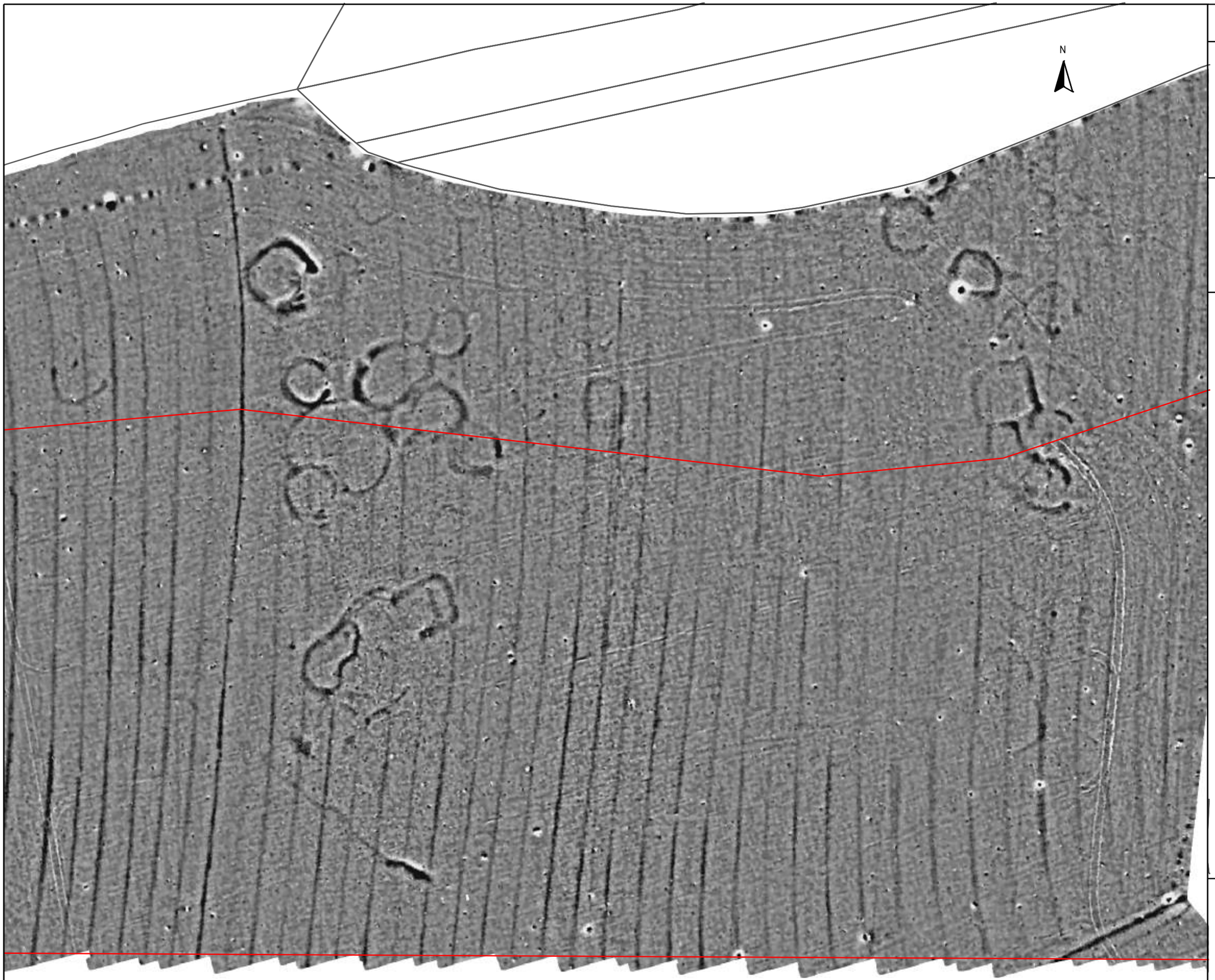
Greyscale plot of filtered magnetometer data - Area 18

N



-3nT +3nT

+3nT
-3nT

SCALE 1:1000

0m 10 20 30 40 50m

Area 18

KTD	DJS	FIG 10

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Abstraction and interpretation of magnetic anomalies - Area 18

N

6
7
8
9
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11
12
13
14
15
16
17

Area 18

- Positive linear anomaly - cut feature of archaeological potential
- Positive curvilinear anomaly - ring ditch
- Negative linear anomaly - of archaeological potential
- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Linear anomaly - ridge and furrow
- Positive/weak multiple dipolar linear anomaly - possible land drain
- Positive linear anomaly - former field boundary
- Multiple dipolar linear anomaly - water pipe
- Discrete positive response - cut feature of archaeological potential
- Discrete positive response - possible pit-like feature
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 11

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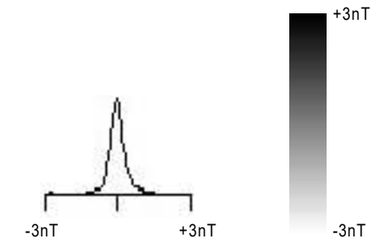
Greyscale plot of minimally processed magnetometer data - Area 19



SCALE 1:1000

0m 10 20 30 40 50m

KTD	DJS	FIG 12

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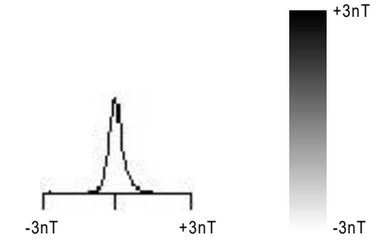
Greyscale plot of filtered magnetometer data - Area 19



SCALE 1:1000

0m 10 20 30 40 50m

KTD	DJS	FIG 13

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Abstraction and interpretation of magnetic anomalies - Area 19

N

Area 19

8

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Linear anomaly - ridge and furrow
- Discrete positive response - possible pit-like feature
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 14