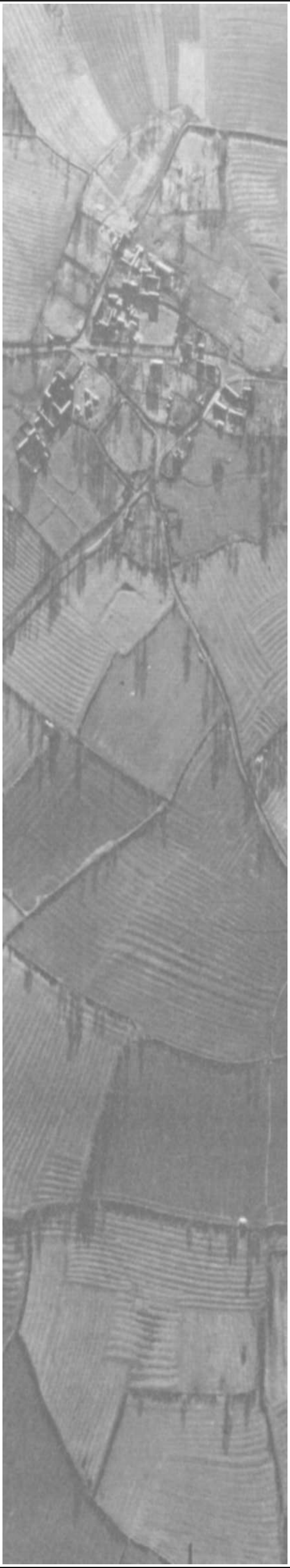

# Land off Jarvis Street
# Eckington
# Worcestershire

## MAGNETOMETER SURVEY REPORT

for

# Archaeology Warwickshire

Kerry Donaldson & David Sabin

November 2021

Ref. no. J884

ARCHAEOLOGICAL SURVEYS LTD

# Land off Jarvis Street
# Eckington
# Worcestershire

## MAGNETOMETER SURVEY REPORT

for

# Archaeology Warwickshire

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 date – 16th November 2021
Ordnance Survey Grid Reference – **SO 92530 41257**

**Worcestershire Historic Environment No. WSM77800**

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# SUMMARY

A detailed magnetometry survey was carried out by Archaeological Surveys Ltd within a small area of land at Eckington in Worcestershire. The results indicate the presence of a small number of discrete positive anomalies that could indicate pit-like features, possibly associated with tree removal, but their origin is uncertain. The survey also located linear anomalies associated with former ridge and furrow cultivation.

# 1 INTRODUCTION

## *1.1 Survey background*

1.1.1 Archaeological Surveys Ltd was commissioned by Archaeology Warwickshire to undertake a magnetometer survey of an area of land off Jarvis Street, Eckington in Worcestershire. The site has been outlined for a proposed development of six residential dwellings and a new community owned playing field and car park (Worcestershire County Council pre-application no. 21/00298/PA).The survey forms part of an archaeological assessment.

1.1.2 The geophysical survey was carried out in accordance with a Written Scheme of Investigation (WSI) produced by Archaeological Surveys (2021) and approved by Aidan Smith, the Worcestershire County Council Planning and Archaeology Advisor, prior to commencing the survey.

## *1.2 Survey objectives and techniques*

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

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

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

*1.3.1* The survey and report 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 lies on the south eastern edge of Eckington in Worcestershire. It is centred on Ordnance Survey National Grid Reference (OS NGR) SO 92530 41257, see Figs 01 and 02. A slightly larger area was surveyed to the east in order to help place anomalies in context.

1.4.2 The geophysical survey covers approximately 1ha within a small area of grassland divided into two plots by post and wire fencing. A number of barns are located near the north western corner and the site contains trees, shrubs and overgrown vegetation in several places, all of which restricted the survey area into only the open and accessible parts.

1.4.3 The ground conditions across the site were variable but generally considered to be favourable for the collection of magnetometry data with the exception of the north eastern part of the survey area where briars, long grass and nettles were encountered. Weather conditions during the survey were fine.

Plate 1: Central part of survey area looking north east

## *1.5 Site history and archaeological potential*

1.5.1 The Worcestershire Historic Environment Record outlines that medieval ridge and furrow is recorded within the site (WSM10435) and within the immediate environs to the south and east (WSM10448 & WSM10503). Situated approximately 500m to the north west of the site are a number of records of Romano-British activity and settlement including the site of a possible villa (WSM41487), with further Romano-British ditches and gullies (WSM66921), post holes and a pit (WSM66923) and also evidence for activity from the Neolithic, Iron Age and Roman periods (WSM66922). Former Ordnance Survey mapping records that the central and north eastern sections of the site contained an orchard in the 19th and early 20th centuries.

## *1.6 Geology and soils*

1.6.1 The underlying solid geology across the site is from the Charmouth Mudstone Formation with overlying deposits of sand and gravel from the Wasperton Sand and Gravel Member in the western part of the site (BGS, 2017).

1.6.2 The overlying soil across the western part of the survey area is from the Wick 1 association and is a typical brown earth. This consists of a deep, well drained, coarse, loamy and sandy soil over river terrace drift. The soil in the central part of the site is from the Wickham 2 association and is a typical stagnogley consisting of a slowly permeable, seasonally waterlogged, clayey soil. The soil in the north eastern part of the site is from the Evesham 2 association and is a typical calcareous pelosol consisting of a slowly permeable, calcareous, clay soil (Soil Survey of England and Wales, 1983).

1.6.3 Magnetometry survey carried out across similar soils has produced variable results as they can be associated with low magnetic contrast and low levels of magnetic susceptibility. However, cut features of archaeological potential may 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 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 the survey area.

2.3.10 The abstraction and interpretation procedure has been supported by analysis of a digital terrain model plot derived from the Environment Agency's LiDAR data. Shaded relief plots and contours are created using Surfer 15 (Azimuth:135, Altitude:45, Z factor:10), (Fig 06).

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

# 3 RESULTS

### *3.1 General assessment of survey results*

3.1.1 The detailed magnetic survey was carried out over approximately 1ha.

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

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

3.2.1 Data are considered representative of the magnetic anomalies present within the site. Localised zones of high magnitude magnetic disturbance relating to steel-framed barns, and other above surface steel or iron objects, were encountered. The disturbance has the potential to obscure other weak magnetic features should they exist within those zones.

3.2.2 Very few anomalies were located that could be used to form a qualitative assessment of the suitability of the soils for magnetic prospection. However, linear anomalies associated with former ridge and furrow cultivation were located and infer the potential for the formation of some useful magnetic contrast within the soils.

### *3.3 Data interpretation*

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

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

Table 1: List and description of interpretation categories

## *3.4 List of anomalies*

Area centred on OS NGR 362530 241257, see Figs 03 – 05.

*Anomalies with an uncertain origin*

(1) - In the north western part of the site there are a number of positive linear and discrete responses, with some curvilinear elements. Although it is possible that they relate to cut ditch-like and pit-like features, due to widespread magnetic debris and strong, discrete, dipolar responses, their origin is uncertain

(2) - The central southern part of the site contains a number of discrete anomalies, it is possible that they are associated with the removal of trees once mapped within the central part of the site, although they are not widely distributed. A small number are located to the west and again, these are of uncertain origin.

(3) – The north eastern part of the site contains a small number of very weak and short positive linear anomalies. Although they appear that they may have been truncated by ridge and furrow, they do not have a coherent morphology.

*Anomalies with an agricultural origin*

(4) – Parallel linear anomalies relate to ridge and furrow. The response is more narrowly spaced in the eastern part of the site indicating later phases of ploughing.

*Anomalies associated with magnetic debris*

(5) – Several parts of the site contain magnetic debris which is likely to relate to relatively modern dumped material.

(6) – Strong, discrete, dipolar anomalies are a response to ferrous and other magnetically thermoremnant objects, such as brick and tile, within the topsoil.

*Anomalies with a modern origin*

(7) – Ferrous material within fencing, agricultural objects and the adjacent barns has produced high magnitude magnetic disturbance.

# 4 CONCLUSION

4.1.1 The results of the geophysical survey indicate the presence of a small number of discrete positive responses as well as a small number of weakly positive linear anomalies, with a cluster towards the north western corner of the site. While such anomalies could relate to cut, pit-like and ditch-like features, due to the lack of a coherent morphology they cannot be confidently interpreted.

4.1.2 Other anomalies include zones of magnetic debris and disturbance probably of modern origin and unlikely to be archaeologically significant. Parallel linear anomalies were also located and these are likely to be related to former ridge and furrow and more recent cultivation.

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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

Minimally processed data

Filename: J884-mag-proc.xcp
Instrument Type: Sensys DLMGPS
Units:
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 392461.58, 241336.77 m
Southeast corner: 392582.93, 241191.87 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702
Dimensions
Survey Size (meters): 121 m x 145 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 313191, Recorded: 313191
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.42
Mean: 0.00
Median: 0.03
Composite Area: 1.7584 ha
Surveyed Area: 0.9945 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

Filtered data
Filename: J884-mag-proc-hpf.xcp
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.32
Mean: 0.00
Median: 0.02
Composite Area: 1.7584 ha
Surveyed Area: 0.9945 ha
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 350
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.

A PDF copy will be supplied to the Worcestershire Historic Environment Record with greyscale images and abstraction layers made available on request. The report will also be uploaded to the Online AccesS to the Index of archaeological investigationS (OASIS). The raw and processed geophysical data, along with the greyscale images and abstraction layers will be archived with the Archaeology Data Service.

Archive contents:

| File type | Naming scheme | Description |
|---|---|---|
| Data | J884-mag.asc<br>J884-mag.xcp<br>J884-mag-proc.xcp | Raw data as ASCII CSV<br>TerraSurveyor raw data<br>TerraSurveyor minimally processed data |
| Graphics | J884-mag-**[area number/name]**-proc.tif | Image in TIF format |
| Drawing | J884-**[version number]**.dwg | CAD file in 2018 dwg format |
| Report | J884 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 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 with an agricultural origin*** | | | |
| AS-ABST MAG RIDGE AND FURROW | | 0,127,63 | Line, polyline or polygon (cross hatched ANSI37) |
| ***Anomalies associated with magnetic debris*** | | | |
| AS-ABST MAG DEBRIS | | 132, 132, 132 | Polygon (cross hatched ANSI37) |
| AS-ABST MAG STRONG DIPOLAR | | 132, 132, 132 | Solid donut, point or polygon (solid) |
| ***Anomalies with a modern origin*** | | | |
| AS-ABST MAG DISTURBANCE | | 132, 132, 132 | Polygon (hatched ANSI31) |

Table 3: CAD layering

## Appendix F – copyright and intellectual property

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Archaeological Surveys
Specialist Geophysical Surveyors

**Geophysical Survey**
**Land at Jarvis Street**
**Eckington**
**Worcestershire**

**Map of survey area**

N


Survey location


● Survey location

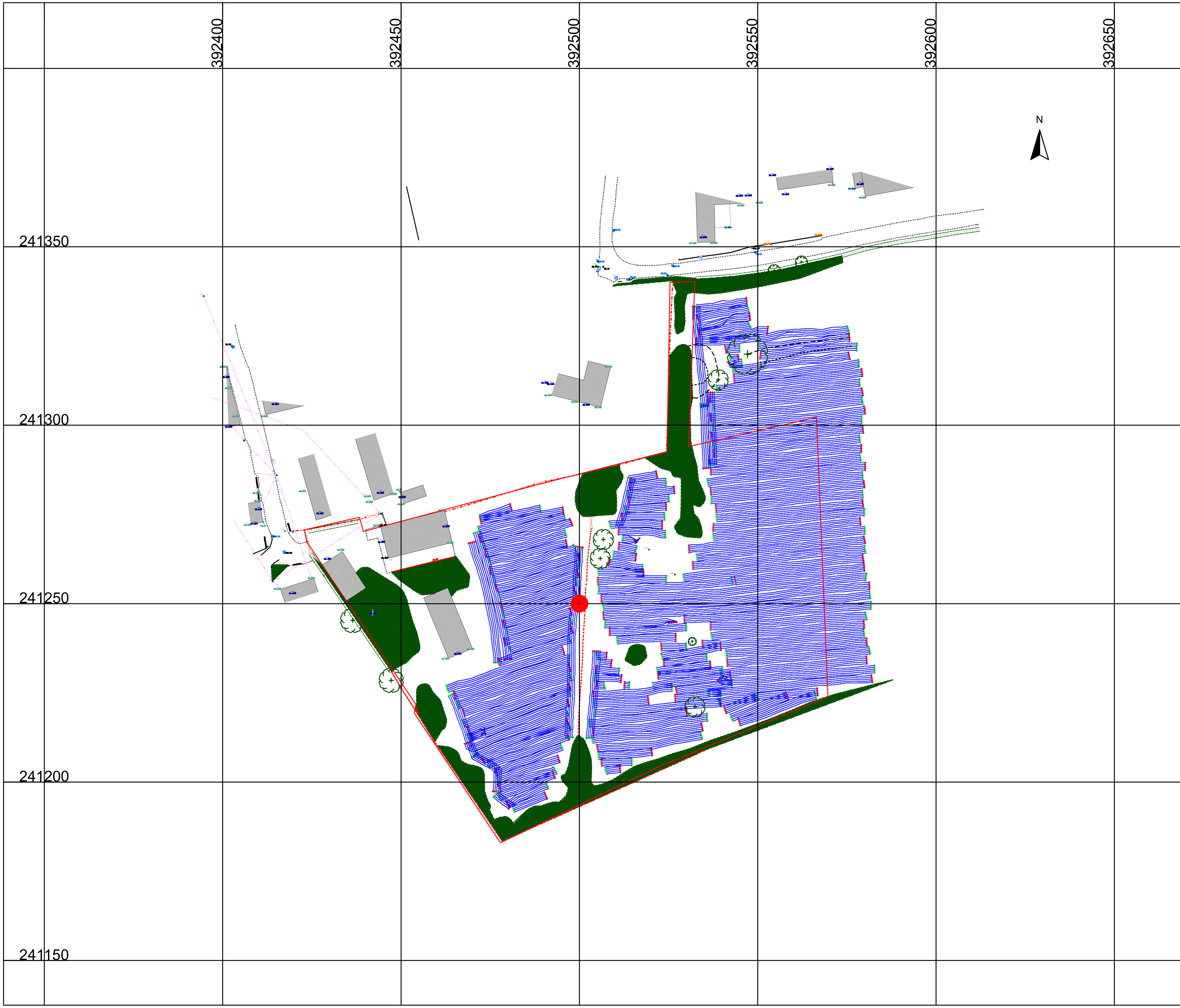
Site centred on OS NGR
SO 92530 41257

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 50m intervals

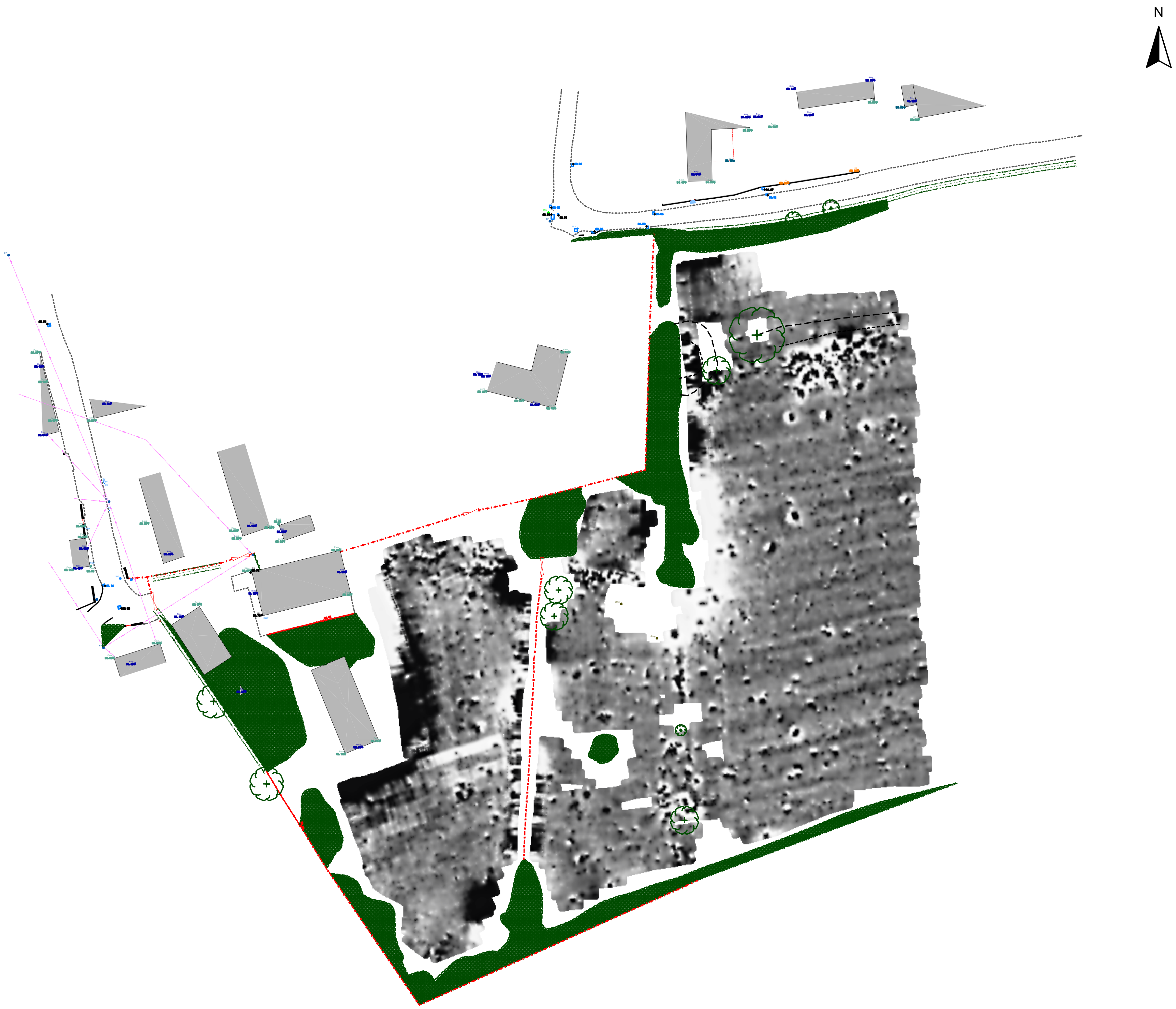
- 392500 241250
- Survey tracks
- Survey track start
- Survey track stop
- Development boundary

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

| DRAWN BY | CHECKED BY | |
|---|---|---|
| KTD | DJS | FIG 02 |

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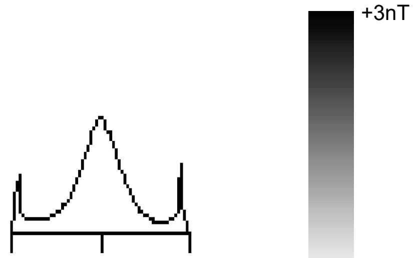
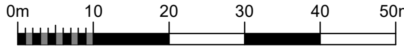
**Greyscale plot of minimally processed magnetometer data**

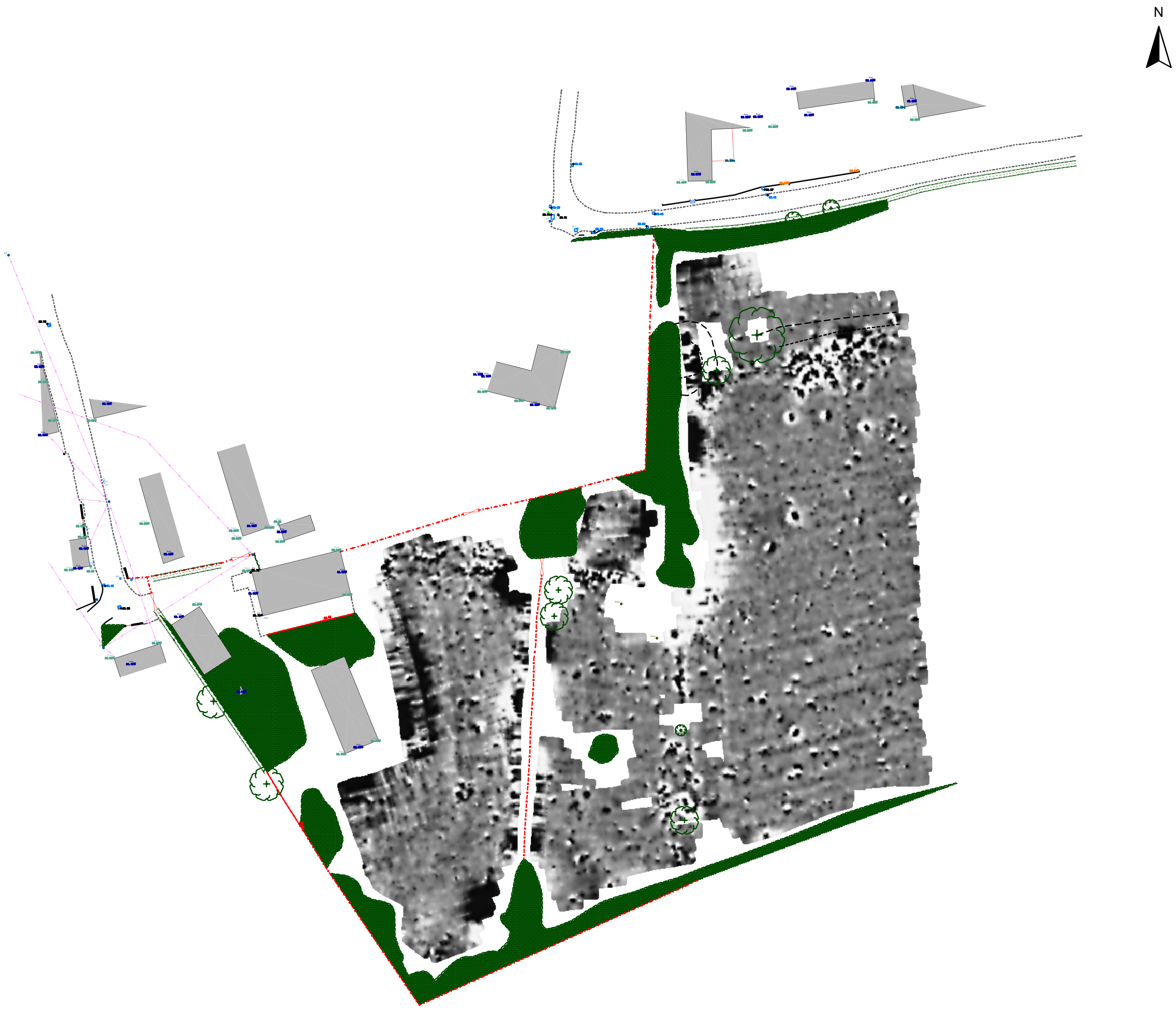



SCALE 1:1000




SCALE TRUE AT A3

| DRAWN BY | CHECKED BY | |
|---|---|---|
| KTD | DJS | FIG 03 |

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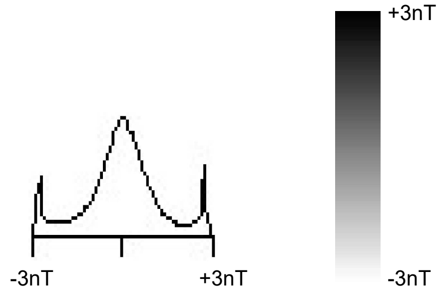
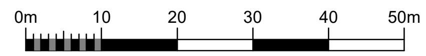
**Greyscale plot of filtered magnetometer data**




SCALE 1:1000




SCALE TRUE AT A3

| DRAWN BY | CHECKED BY | |
|---|---|---|
| KTD | DJS | FIG 04 |

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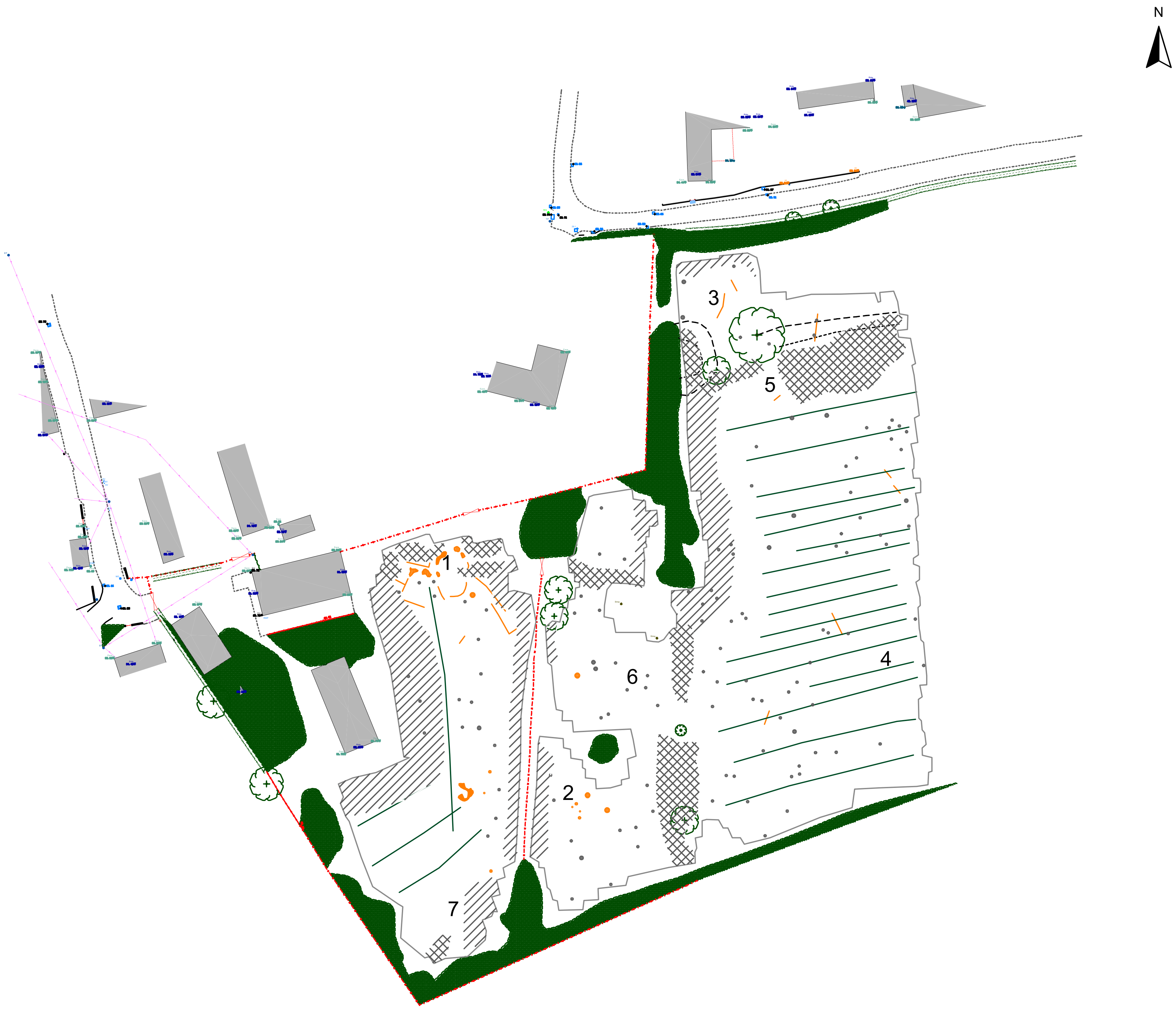
**Abstraction and interpretation of magnetic anomalies**



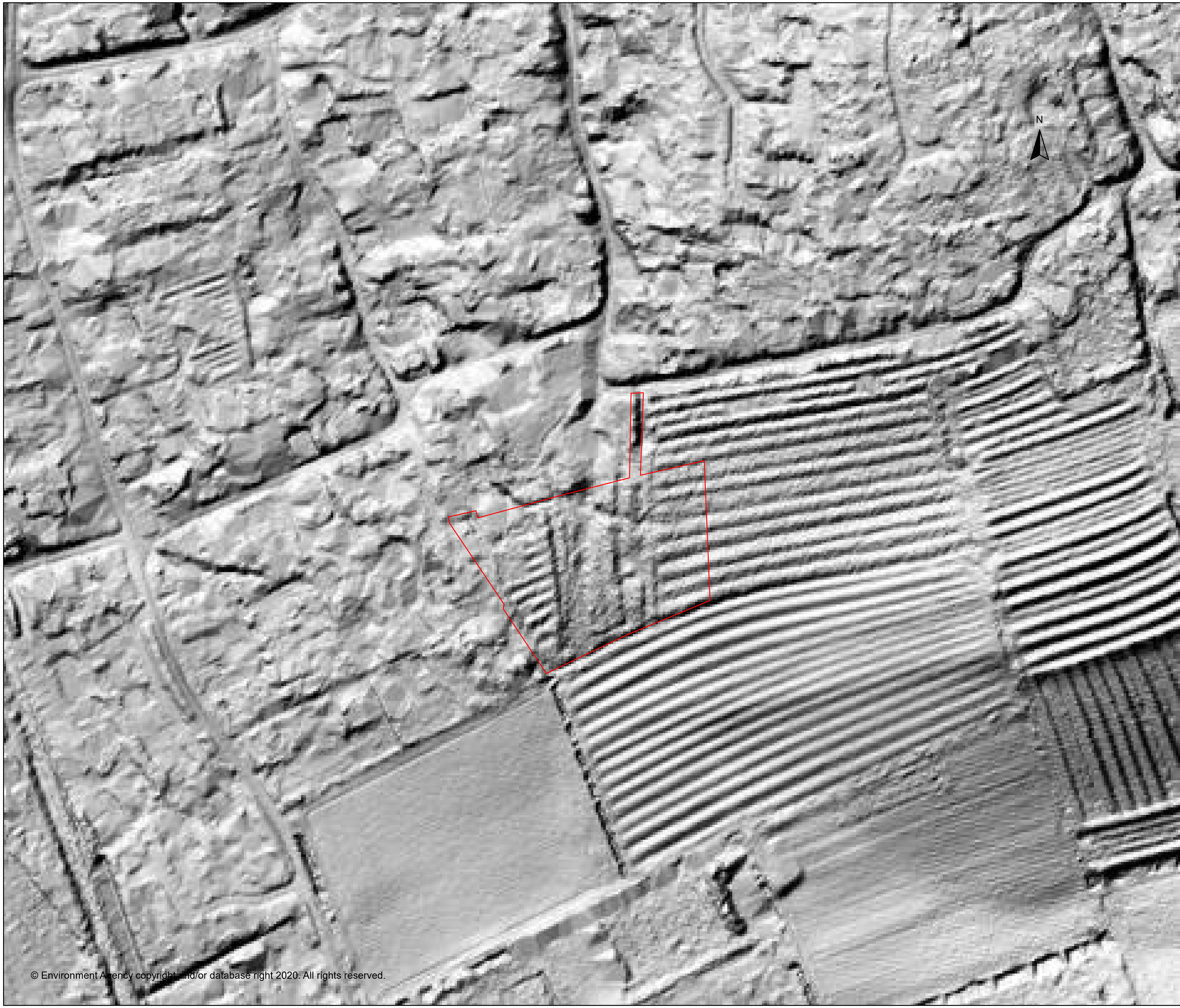

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Discrete positive response - possible pit-like feature
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous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

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

| DRAWN BY | CHECKED BY | |
|---|---|---|
| KTD | DJS | FIG 05 |



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**Digital Terrain Model**

Derived from Environment Agency's LiDAR data 1m resolution

SCALE 1:2000

0m 20 40 60 80 100m

SCALE TRUE AT A3

| DRAWN BY | CHECKED BY | |
|---|---|---|
| KTD | DJS | FIG 06 |