



An archaeological magnetometer survey
Sanderson's Field, Kingston, Devon
Centred on NGR (E/N): 263580,047970
Report: 1801KIN-R-1
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1 February 2018

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Project archive

Report	Adobe PDF format
Raw and processed grid & composite files.....	DW Consulting TerraSurveyor 3 formats
Minimal processing data plots and metadata.....	DW Consulting TerraSurveyor 3 formats
Final data processing data plots and metadata.....	DW Consulting TerraSurveyor 3 formats
GIS project, shape files and classification schema	
GIS project.....	Manifold 8 '.map' file
GIS shape files.....	ESRI standard
GIS classification schema.....	Adobe PDF format
AutoCAD version of the survey interpretation.....	AutoCAD DXF

Website: substrata.co.uk

For an overview of Substrata, our archaeological geophysical surveying techniques and the results we obtain.

1 Survey description and summary

1.1 Survey

Type: twin-sensor fluxgate gradiometer
Date: 26 January 2018
Area: 0.87ha
Lead surveyor: Mark Edwards BA
Author: Ross Dean BSc MSc MA MifA

1.2 Clients

AC Archaeology Ltd, 4 Halthaies Workshops, Bradninch Nr Exeter, Devon EX5 4QL

1.3 Location

Site: Sanderson's Field, Kingston
Civil Parish: Kingston
District: South Hams
County: Devon
Nearest Postcode: TQ7 4PX
NGR: SX 63580 47970 (point)
NGR (E/N): 263580,047970 (point)

1.4 Archive

OASIS number: substrat1-307636
Archive: At the time of writing, the archive of this survey will be held by Substrata Ltd. Depending on local authority policy, an archive of the unprocessed data may be deposited with the Archaeological Data Service

1.5 Introduction

This report presents the results of an archaeological magnetometer survey at the above site, hereafter referred to as the survey area. It has been prepared for AC Archaeology Ltd on behalf of clients. The survey area location is shown in Figure 1.

1.6 Summary

The magnetic responses across the survey area were sufficient to be able to differentiate between anomalies representing possible archaeological features and background magnetic responses.

Six magnetic anomaly groups were mapped as representing potential archaeological deposits or features. All of these groups are likely to represent fragments of the boundaries of former fields or enclosures of unknown date. Three of these groups may represent boundary fragments of the same feature.

2 Survey aims and objectives

2.1 Aims

To establish the presence or absence, extent and character of any archaeological features and deposits within the survey area.

2.2 Survey objectives

1. Complete a magnetometer survey across agreed parts of the survey area.
2. Identify any magnetic anomalies that may be related to archaeological deposits, structures or artefacts.
3. Within the limits of the techniques and dataset, archaeologically characterise any such anomalies or patterns of anomalies.
4. Accurately record the location of the identified anomalies.
5. Produce a report based on the survey that is sufficiently detailed to inform any subsequent development on the survey area about the location and possible archaeological character of the recorded anomalies.

3 Methodology

The work was undertaken in accordance with the survey methodology statement (Dean, 2018).

The survey grid location information and grid plan were recorded as part of the project in a suitable GIS system (Table 3).

Data processing was undertaken using appropriate software (Table 3), with all anomalies being digitised and geo-referenced. The final report (this document) includes a graphical and textual account of the techniques undertaken, the data obtained and an archaeological interpretation of that data and conclusions about any likely archaeology.

4 Standards

The standards used to complete this survey are defined by the Chartered Institute for Archaeologists (2014a) and Historic England (2010). The codes of approved practice that were followed are those of the Chartered Institute for Archaeologists (2014b) and Archaeology Data Service (undated).

5 Site description

5.1 Landscape and land use

The survey area comprises one field on the northern edge of Kingston (Figure 1). The field under grass at the time of the survey and sloped gently north to south from approximately 105m to 100m AOD. The perimeter consisted of hedges with agricultural fields beyond to the northwest, northeast and southwest. A lane and domestic dwellings bordered the south-eastern side.

5.2 Geology

The bedrock across the site comprises slate, siltstone and sandstone of the Devonian Dartmouth Group. The superficial deposits for the site are unknown (British Geological Survey, undated).

6 Archaeological background

6.1 Historic landscape characterisation

‘Post-medieval enclosures with medieval elements’: These enclosures are probably based on medieval fields, but the many straight field boundaries suggest they were substantially re-organised in the post-medieval period (Devon County Council, undated)

6.2 Summary of archaeological background

The Devon County Council Historic Environment Record (DHER) was examined via the Heritage Gateway (Historic England, undated) to gain an appreciation of historic assets pertinent to the geophysical survey data within approximately 500m of the survey area perimeter.

This section is not designed to provide a comprehensive understanding of the historic environment of the surrounding area and should not be used as a source for further work.

Table 1 provides a summary of the DHER entries though relevant to the survey.

Further information on the archaeological background of the survey area can be found in Ryder (2017).

7 Results, discussion and conclusions

7.1 Scope and definitions

This survey was designed to record magnetic anomalies. A magnetic anomaly is a local variation in the Earth's magnetic field. Such variations can result from changes in the magnetism of the underlying solid geology, superficial geology and other near-surface deposits including those altered and created by past human activities. Near-surface artefacts can also create magnetic anomalies.

The terms 'archaeological deposit', 'structure' and 'feature' refer to any artefacts, material deposits or disturbance of natural deposits thought to be the result of human activity, excluding recent land maintenance and farming.

Magnetic anomalies cannot be regarded as physical archaeological deposits, structures or features and the dimensions of the anomalies shown do not represent the dimensions of any associated archaeology.

The analysis presented below identifies and characterises anomalies and anomaly groups that may relate to archaeological deposits, structures and features.

The reader is referred to section 8.

7.2 Results

Figure 2 shows the interpretation of the survey data which includes the anomaly groups identified as possibly relating to archaeological deposits along with their identifying numbers. Table 2 is an extract of the detailed analysis of the survey data sourced from the attribute tables of the GIS project provided in the project archive.

Figure 2 along with Table 2 comprise the analysis of the survey data.

Figures 3 and 4 are plots of processed data as specified in Table 4. Figure 5 is a plot of minimally processed data with its metadata.

7.3 Discussion

7.3.1 General points

Discussion scope

Not all anomalies or anomaly groups identified in Table 2 are necessarily discussed below. All identified anomaly groups are recorded in the GIS project held the survey archive.

Data collection

Data collection along the survey area edges was restricted as shown in the figures due to the presence of magnetic materials within and adjacent to boundaries. Strong magnetic responses mapped close to the boundaries are likely to relate to these materials except where otherwise indicated in Figure 2 and Table 2.

Anomaly characterisation and mapping

There are a number of anomaly groups that could be interpreted as relating to large postholes or pits although most will have natural origins. Anomalies of this sort were mapped as potential archaeology when they were associated with other significant anomaly groups or otherwise formed recognisable patterns as listed in Table 2.

Anomalies thought to relate to natural features and recent man-made objects such as manholes, water management equipment, drains, cables and other services were only mapped where they comprised significant magnetic responses across the dataset that needed clarification.

Numerous dipole magnetic anomalies are scattered across the data set. These are likely to represent recent ferrous objects. They are only mapped if they could influence the analysis of anomaly groups thought to have an archaeological origin.

7.3.2 Data relating to historic maps and other records

No magnetic anomaly groups coincided with features recorded on historic maps or other records.

7.3.3 Data with no previous archaeological provenance

Groups **1 to 6** have characteristics typical of magnetic anomalies representing fragments of field boundaries or enclosures of unknown date. Although the feature is only partially contained within the survey area and so no definitive statement can be made, it is likely that groups 2, 4 and 5 may represent part of the same former enclosure or small field.

7.4 Conclusions

The magnetic responses across the survey area were sufficient to be able to differentiate between anomalies representing possible archaeological features and background magnetic responses.

Six magnetic anomaly groups were mapped as representing potential archaeological deposits or features. All of these groups are most likely to represent fragments of the boundaries of former fields or enclosures of unknown date. Three of these groups (2, 4 and 5) may represent boundary fragments of the same feature.

8 Disclaimer and copyright

The description and discussion of the results presented in this report are the authors, based on his interpretation of the survey data. Every effort has been made to provide accurate descriptions and interpretations of the geophysical data set. The nature of archaeological geophysical surveying is such that interpretations based on geophysical data, while informative, can only be provisional. Geophysical surveys are a cost-effective early step in the multi-phase process that is archaeology. The evaluation programme of which this survey is part may also be informed by other archaeological assessment work and analysis. It must be presumed that more archaeological features will be evaluated than those specified in this report.

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9 Acknowledgements

Substrata would like to thank John Valentin of AC Archaeology Ltd for commissioning us to complete this survey.

10 Bibliography

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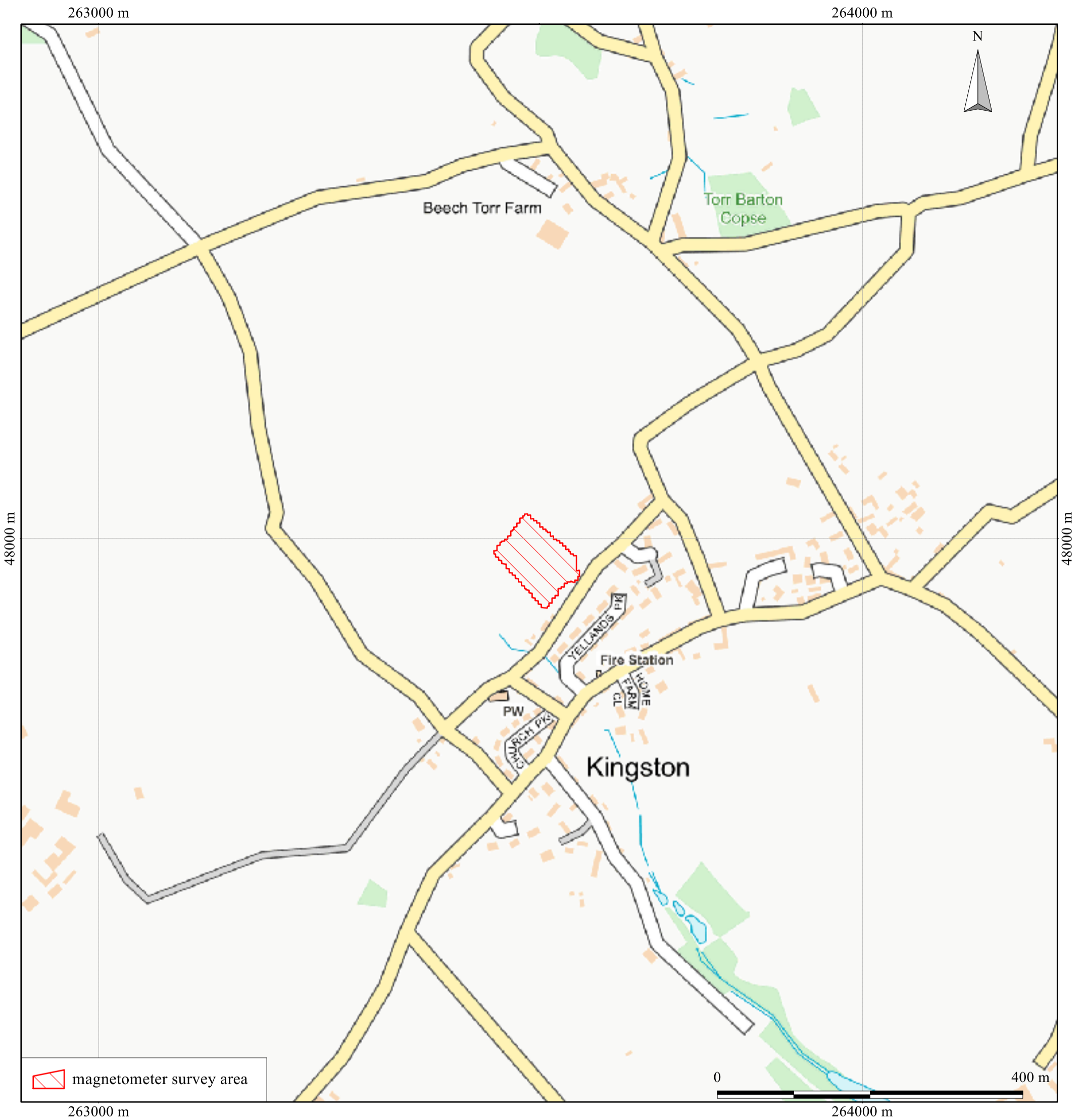
Ryder (2017) *Sanderson's Field, Kingston, Outline Planning Application, Design and Access Statement - Revision 2*, Ryder Architecture Limited unpublished report, project number 3121.00

Appendix 1 Figures

General Guidance

The anomalies represented in the survey plots provided in this appendix are magnetic anomalies. The apparent size of such anomalies and anomaly patterns are unlikely to correspond exactly with the dimensions of any associated archaeological features .

A rough rule for interpreting magnetic anomalies is that the width of an anomaly at half its maximum reading is equal to the width of the buried feature, or its depth if this is greater (Clark, 2000: 83). Caution must be applied when using this rule as it depends on the anomalies being clearly identifiable and distinct from adjacent anomalies. In northern latitudes the position of the maximum of a magnetic anomaly will be displaced slightly to the south of any associated physical feature.



British Grid
 centre X: 263576.86 m, centre Y: 47967.90 m

Geophysical survey: Copyright Substrata Limited.
 Base map: Contains Ordnance Survey data
 © Crown copyright and database right 2017

Scale: 1:5000 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 1: location map

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British Grid
centre X: 263576.86 m, centre Y: 47967.90 m

Geophysical survey: Copyright Substrata Limited.
Base map: Ordnance Survey (c) Crown Copyright 2017.
All rights reserved. Licence number 100022432

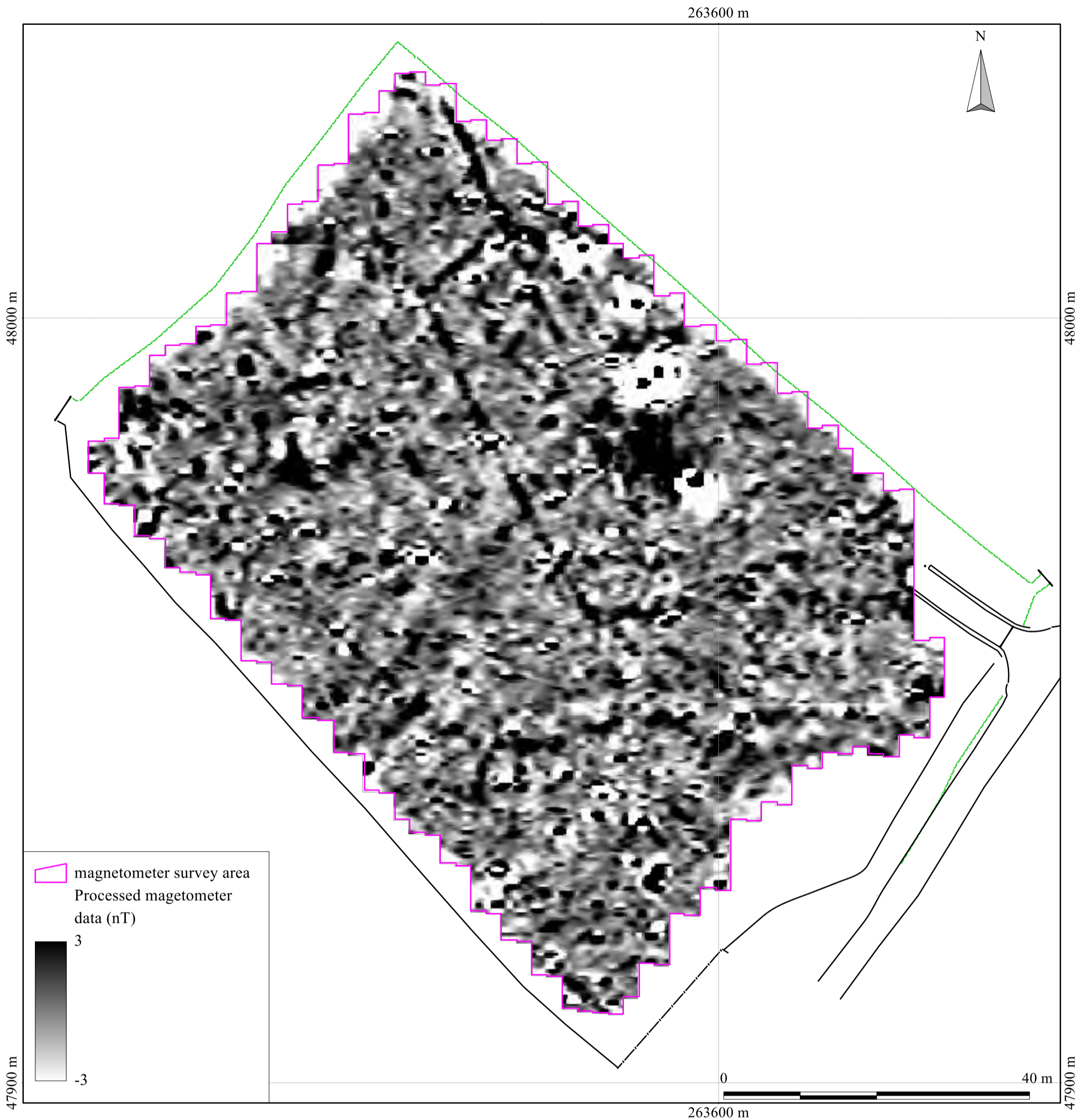
Scale: 1:500 @ A3. Spatial Units: Meter. Do not scale off this drawing

- Notes:
1. All interpretations are provisional and represent potential archaeological deposits.
 2. 'Anomaly type' is a description of the magnetic anomaly. See the report text or GIS for an archaeological characterisation.
 3. Anomalies designated "likely archaeology" have supporting evidence e.g. historical maps and or visible earthworks.
 4. Not all instances are mapped.
 5. Anomalies likely to represent geological or other natural deposits are not mapped unless relevant to potential archaeological events or deposits.

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Figure 2: survey interpretation

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British Grid
 centre X: 263576.86 m, centre Y: 47967.90 m

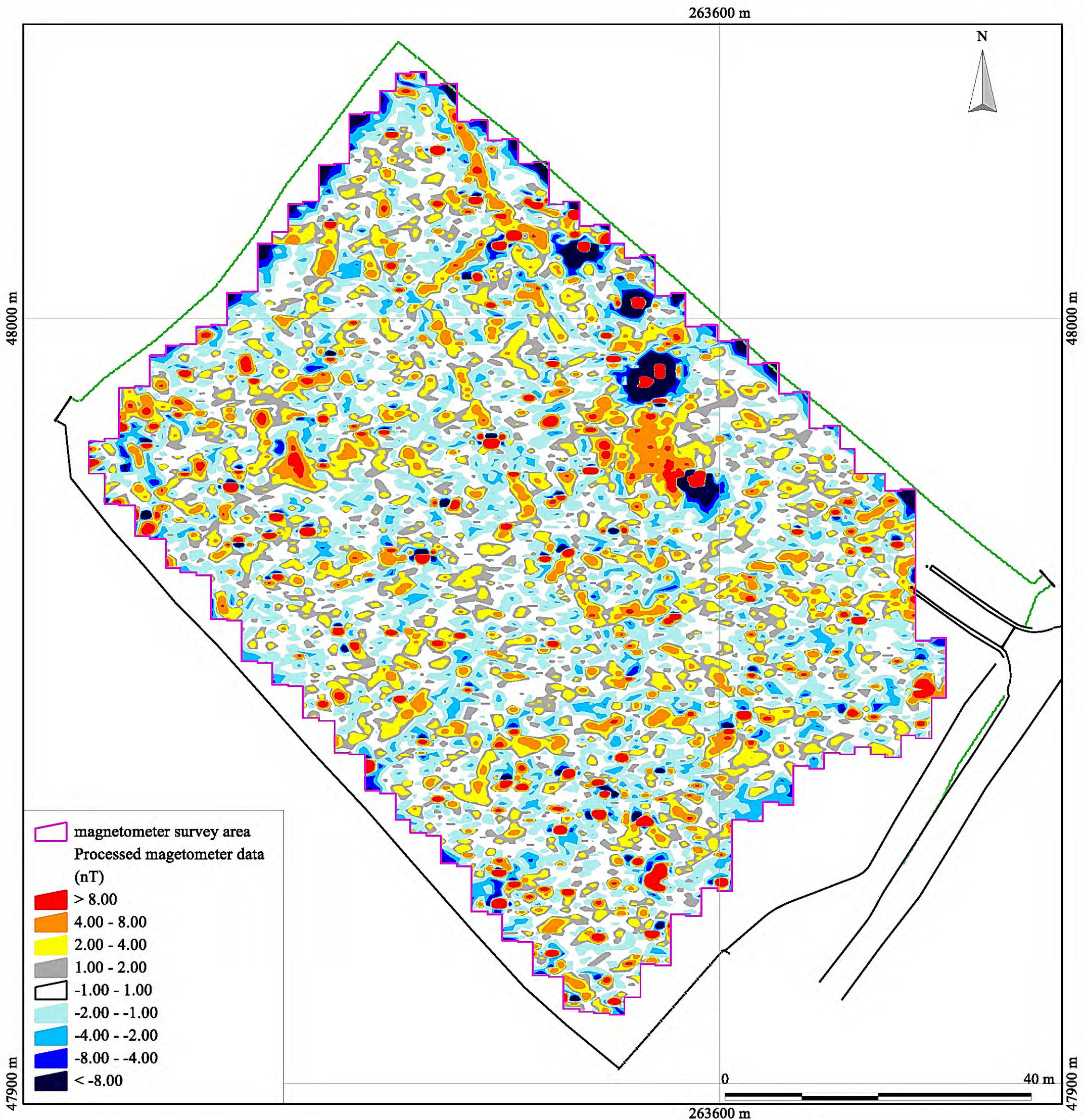
Geophysical survey: Copyright Substrata Limited.
 Base map: Ordnance Survey (c) Crown Copyright 2017.
 All rights reserved. Licence number 100022432

Scale: 1:500 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 3: shade plot of processed data

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British Grid
 centre X: 263576.86 m, centre Y: 47967.90 m

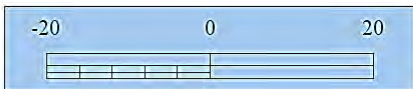
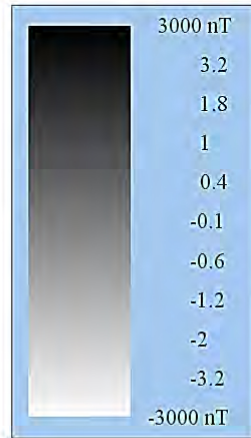
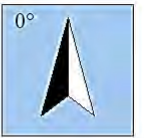
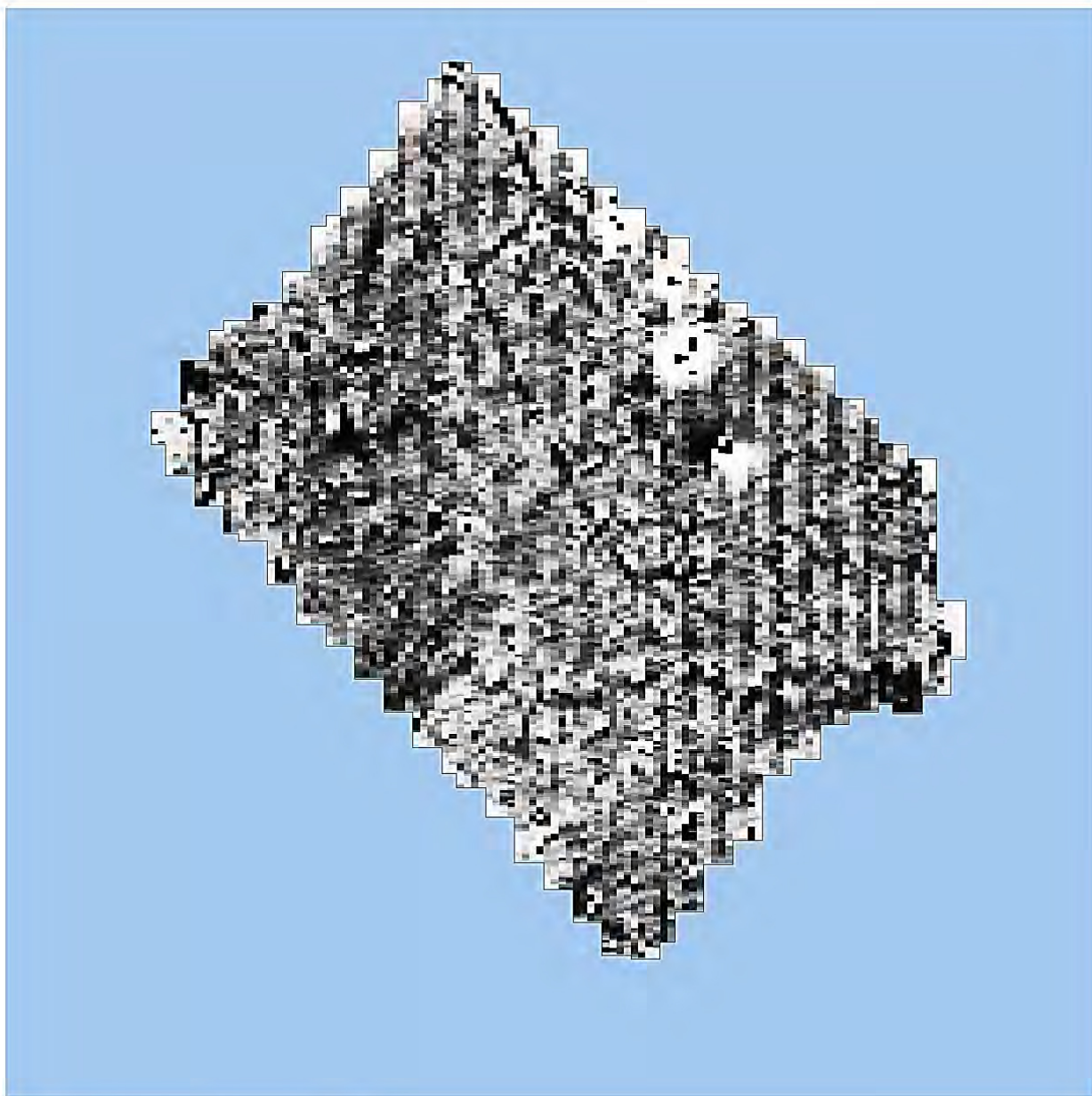
Geophysical survey: Copyright Substrata Limited.
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Scale: 1:500 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 4: contour plot of processed data

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Instrument Type: Bartington Grad 601
 Units: nT
 Direction of 1st Traverse: 0 deg
 Collection Method: ZigZag
 Sensors: 2 @ 0.00 m spacing.
 Dummy Value: 2047.5
 Dimensions
 Grid Size: 30 m x 30 m
 X Interval: 0.25 m
 Y Interval: 1 m

Processes: 1
 1 Base Layer

Stats
 Max: 3000.00
 Min: -3000.00
 Std Dev: 114.23
 Mean: -0.18
 Median: -0.10
 PROGRAM
 Name: TerraSurveyor
 Version: 3.0.33.6

Figure 5: shade plot of unprocessed data

Appendix 2 Tables

An archaeological magnetometer survey
 Sanderson's Field, Kingston, Devon
 Centred on NGR (E/N): 263580,047970
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County: Devon
 District: South Hams
 Parish: Kingston
 Source: Heritage Gateway

HER number	grid reference	designations	name	type	period	description	distance (m) from site centre	bearing (GN) from site centre
MDV118291	SX 637 481		Iron Age Enclosure, Vicarage Park, Chapel Row, Kingston	CURVILINEAR ENCLOSURE?	Middle Iron Age to Late Iron Age - 300 BC to 42 AD (Between)	An archaeological trench evaluation on land north of Westentown, Kingston, South Hams, Devon (NGR SX 6382 4806), was undertaken by AC archaeology during July 2017. Six of the trenches contained archaeological features and two were negative. An enclosure of mid to late Iron Age date has been identified encroaching on part of the proposed development site in the northeast corner. This enclosure undoubtedly continues outside of the site into the fields to the northeast and north. The enclosure has the potential for surviving internal features and is a type of settlement typical for this period in the South Hams. Two internal ditches and a posthole were recorded with no finds (see MDV118288).	177	43
MDV118288	SX 638 480		Archaeological Anomalies, Vicarage Park, Chapel Row, Kingston	ARCHAEOLOGICAL FEATURE	Unknown	A curved feature located in the north western corner of the site could form part of a larger circular feature with a high confidence to be of archaeological value (see MDV118291).	222	82
MDV21376	SX 638 489		Pipers Cross Field System	STRIP FIELD	Medieval - 1066 AD to 1539 AD (Between)	Possible medieval strip fields fossilized in the modern field pattern are shown on OS 6" 1967 and NMR1979.	956	13

Table 1: Historical Environment Entries thought relevant to geophysical survey

Site: An archaeological magnetometer survey
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anomaly group	associated anomalies	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
1	3?	possible, positive	linear			
2		possible, positive	linear			
5		possible, positive	disrupted linear		the anomaly pattern is vague but may reflect a disrupted linear deposit	
4		possible, positive	disrupted linear			
3	1?	possible, positive	disrupted linear			
6		possible, positive	disrupted linear		the anomaly pattern is vague but may reflect a disrupted linear deposit	

Table 2: data analysis

Grid <i>Method of Fixing:</i> DGPS set-out using pre-planned survey grids and Ordnance Survey coordinates. <i>Composition:</i> 30m by 30m grids <i>Recording:</i> Geo-referenced and recorded using digital map tiles. <i>DGPS used:</i> Spectra Precision PM5V2 GPS with external antenna and survey pole and DigiTerra Explorer 7 as the survey control program.	
Equipment <i>Instrument:</i> Bartington Instruments grad601-2 <i>Firmware:</i> version 6.1	Data Capture <i>Sample Interval:</i> 0.25m <i>Traverse Interval:</i> 1 metre <i>Traverse Method:</i> zigzag <i>Traverse Orientation:</i> GN
Data Processing, Analysis and Presentation Software QCAD Professional 3 DW Consulting TerraSurveyor3 Manifold System 8 GIS Microsoft Corp. Office Excel 2013 Microsoft Corp. Office Publisher 2013 Adobe Systems Inc Adobe Acrobat 9 Pro Extended	

Table 3: methodology information

Instrument Type: Bartington Grad-601 gradiometer Units: nT Direction of 1st Traverse: see below Collection Method: ZigZag Sensors: 2 @ 1.00 m spacing. Dummy Value: 32702	
Program Name: TerraSurveyor Version: 3.0.33.6	
Statistics Max: 128.25 Min: -135.61 Std Dev: 7.64 Mean: -0.09 Median: 0.00	Processing 1 Base Layer 2 Clip at 1.00 SD 3 DeStripe Median Traverse: Grids: All 4 De Stagger: Grids: All By: 0 intervals, 25.00cm 5 Interpolate: Match X & Y Doubled.

Table 4: processed data metadata