Substrata
Archaeological Geophysical Surveyors

An archaeological magnetometer survey

Moor View Park, Modbury, Devon

Centred on NGR (E/N): 270340,52420

Report: 1707MOO-R-1

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13 July 2017

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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:	5 and 6 July 2017
Area:	2.6ha
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:	Moor View Park
Civil Parish:	Modbury
District:	South Hams
County:	Devon
Nearest Postcode:	PL21 0SG
NGR:	SX 70340 52420 (point)
NGR (E/N):	270340,52420 (point)

1.4 Archive

OASIS number:	substrat1-290140
Archive:	At the time of writing, the archive of this survey will be held by Substrata. 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.

Five magnetic anomaly groups were mapped as representing potential archaeological deposits or features. Three of these groups represent former field boundaries recorded on historic maps. One anomaly group may represent a linear archaeological deposit or feature such as a fragment of a ditch. Another group is likely to represent disturbed ground with rubble of unknown date.

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, 2017).

The survey grid location information and grid plan was 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 two adjacent fields within Moor View Park caravan park which lies to the southeast of Brownston in the parish of Modbury, Devon (Figure 1). Both fields were bounded by hedges and under grass at the time of the survey. The north-western and south-eastern edges of the survey area are bound by lanes. Drains bound the south-western edge and a drain separates the two fields. Otherwise, the area is surrounded by agricultural fields with rest of Moor View Park to the southwest.

5.2 Geology

The bedrock across the site comprises slate, siltstone and sandstone of the Devonian Meadfoot Group. Generically the Meadfoot Group consists of dark shales and siltstones with sporadic grey-brown sandstones and beds of decalcified shell debris. The upper part exhibits red coloration in places. The superficial deposits for the site are unknown (British Geological Survey, undated).

6 Archaeological background

6.1 Historic landscape characterisation

‘Post-medieval enclosures’: Enclosures of post-medieval date. Fields laid out in the C18th and C19th which commonly have many surveyed dead-straight field boundaries (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. There are no entries recorded within the survey area. A bronze age bole barrow lies approximately 400m south of the survey area (DHER MDV7618, Historic England list number 1019320).

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 underlying, varying 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.

The magnetic response from a building close to the boundary between the two fields surveyed precluded data collection as shown in Figure 3.

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.

Data trends

Sets of parallel linear anomalies trending northwest to southeast were interpreted as likely ploughing disturbance, possibly from historical ridge-and-furrow ploughing (magnetic anomaly groups **101** and **102** in Figure 2).

7.3.2 Data relating to historic maps and other records (Figure 2 and Table 2)

Magnetic anomaly groups **1**, **2** and **3** coincide with former field boundaries recorded on historic maps. They formed three sides of a single field recorded on the Modbury tithe map of 1841. By the publication of the Ordnance Survey 1:2500 map in 1886, groups 1 and 3 had been removed. Group 2 was recorded on the Ordnance Survey 1:2500 map of 1963 and was removed sometime later.

7.3.3 Data with no previous archaeological provenance (Figure 2 and Table 2)

Group **4** is a linear anomaly of unknown provenance which may have an archaeological origin.

Group **5** most likely represents disturbed ground with rubble of unknown date.

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.

Five magnetic anomaly groups were mapped as representing potential archaeological deposits or features. Three of these groups (1, 2 and 3) represent former field boundaries recorded on historic maps. One anomaly group (4) may represent a linear archaeological deposit or feature such as a fragment of a ditch. One group (5) is likely to represent disturbed ground with rubble of unknown date.

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.

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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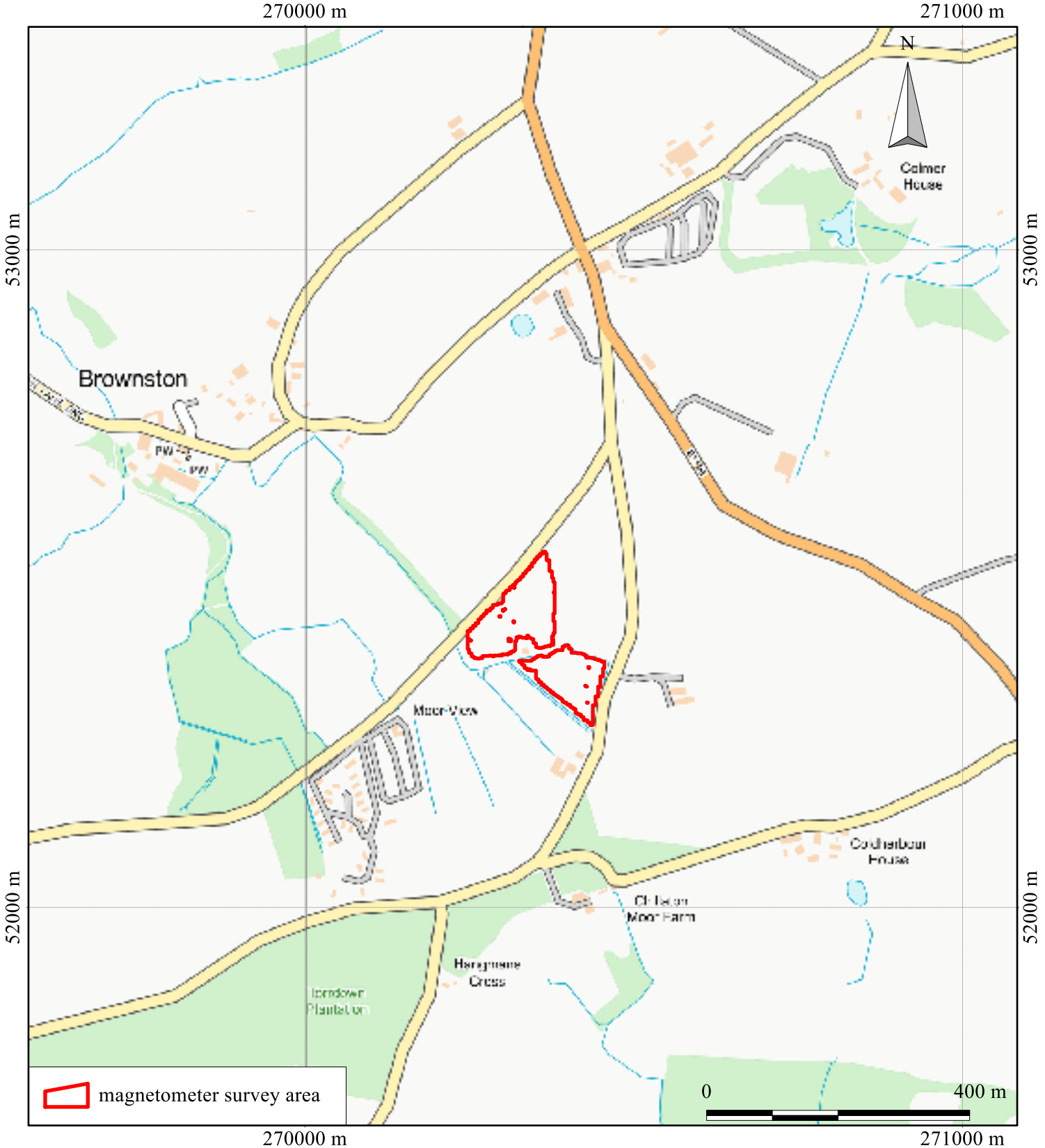
Appendix 1 Figures

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 (see Section 6.1).

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: 270331.26 m, centre Y: 52503.70 m

Scale: 1:8000 @ A3. Spatial Units: Meter. Do not scale off this drawing

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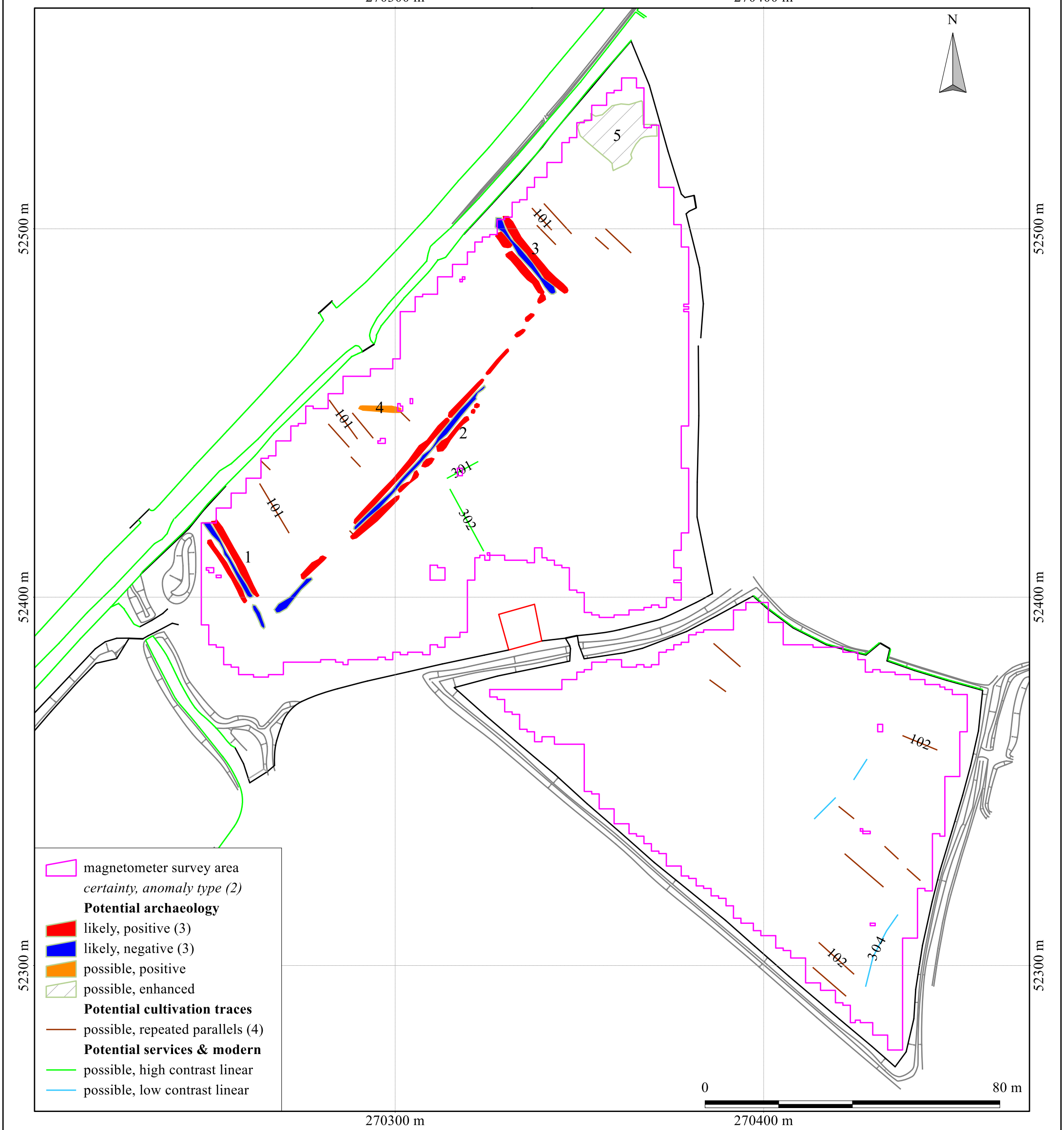
Figure 1: location map



British Grid
centre X: 270337.13 m, centre Y: 52410.17 m

Scale: 1:1000 @ 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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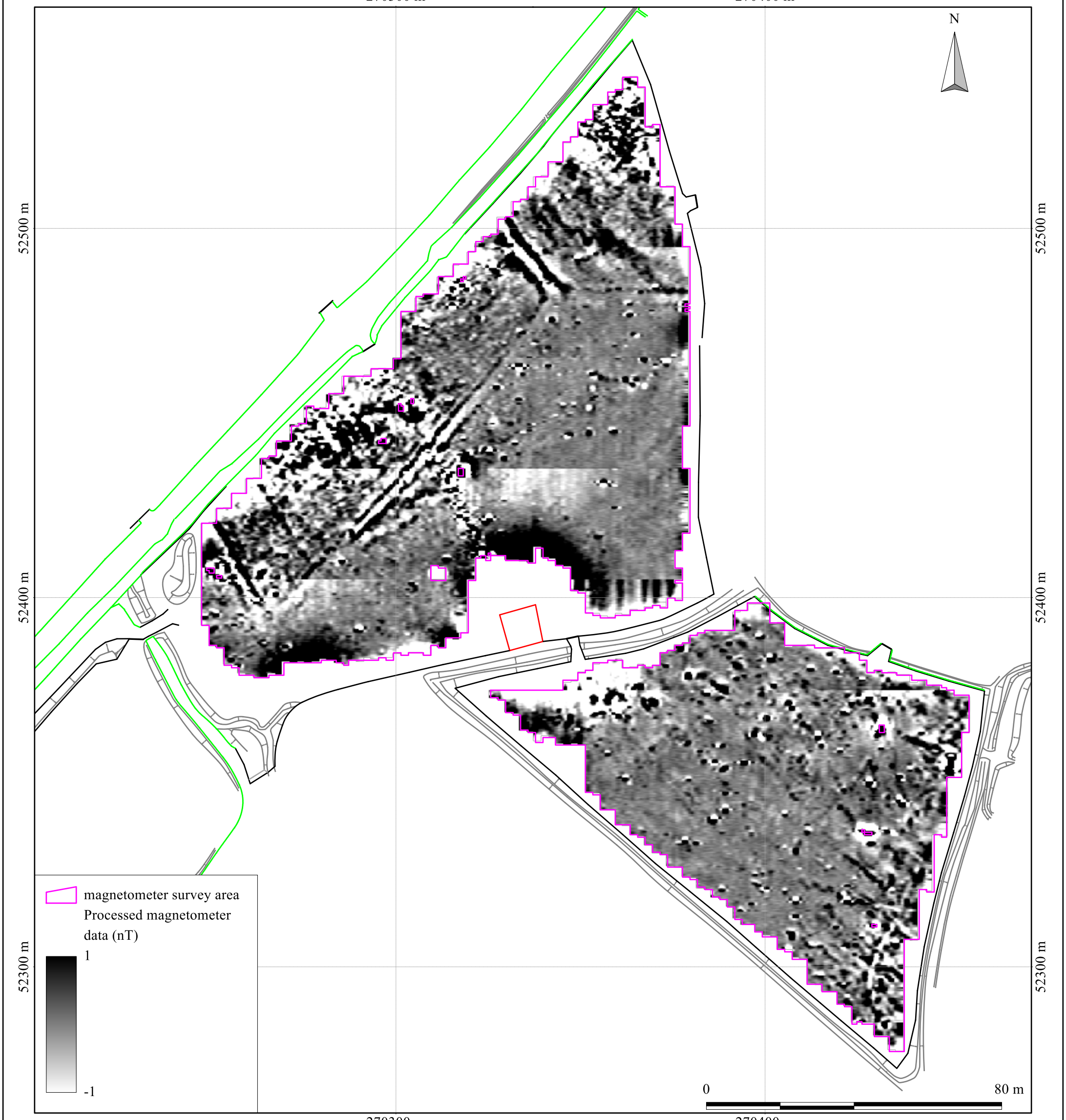

British Grid
centre X: 270337.13 m, centre Y: 52410.17 m

Scale: 1:1000 @ 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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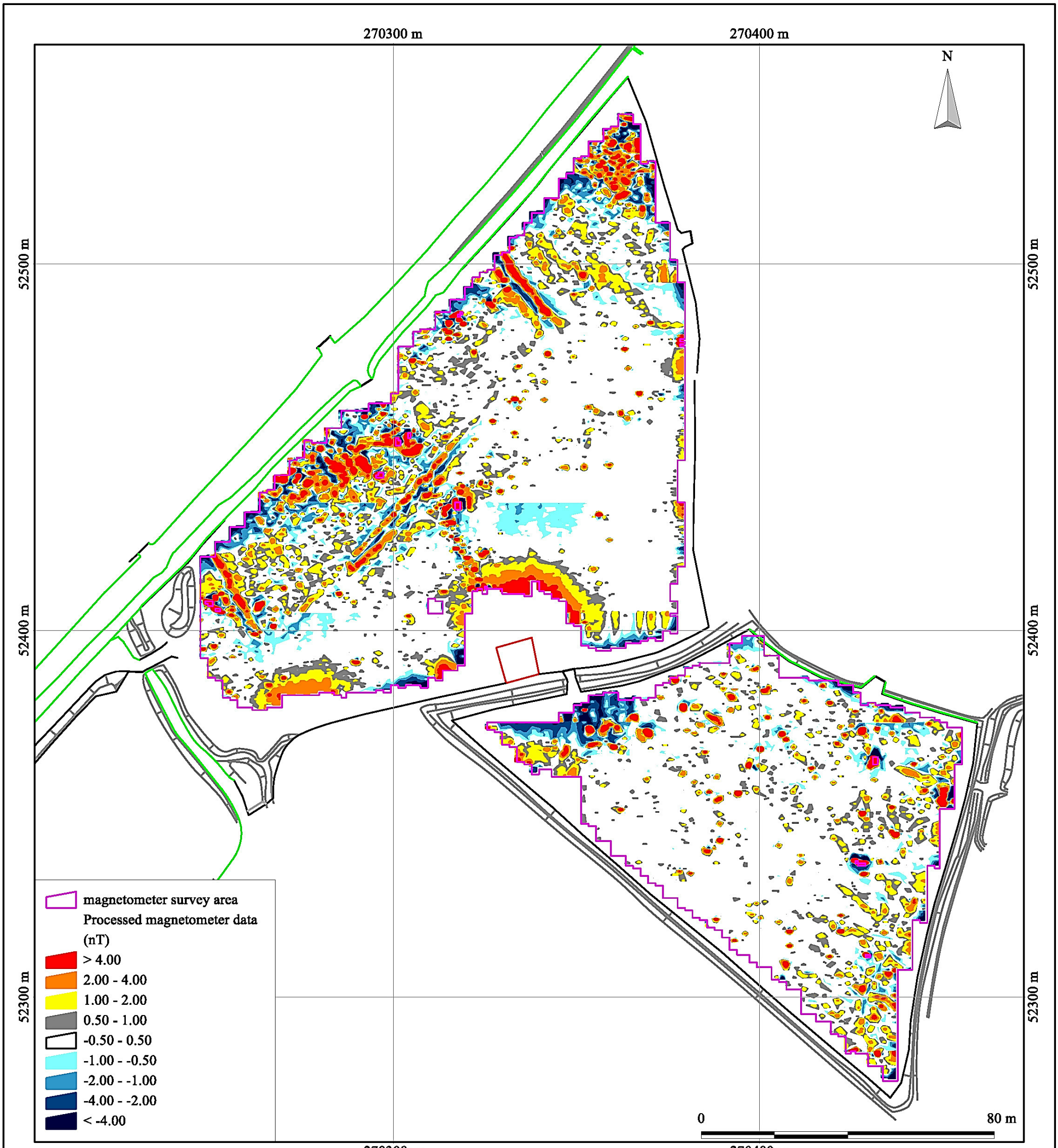

British Grid
centre X: 270337.13 m, centre Y: 52410.17 m

Scale: 1:1000 @ 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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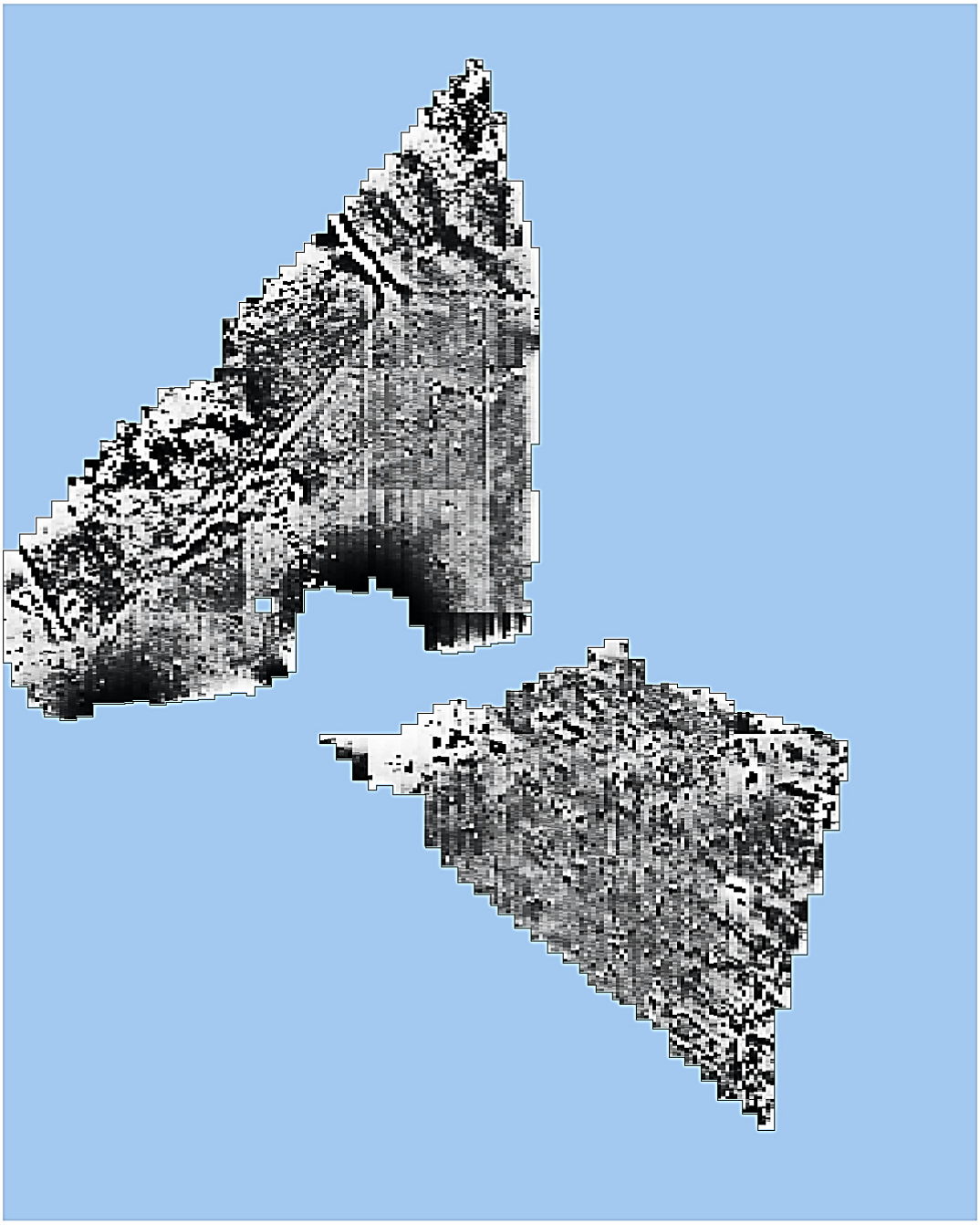

Instrument Type: Bartington Grad 601
Units: nT
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 0.00 m spacing.
Dummy Value: 32702
Dimensions
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m
Stats
Max: 3000.90
Min: -3003.10
Std Dev: 44.57
Mean: 0.10
Median: 0.00
PROGRAM
Name: TerraSurveyor
Version: 3.0.31.0

Processes: 2
1 Base Layer
2 DeStripe Median Sensors: Grids: All

Figure 5: shade plot of minimally processed data

Appendix 2 Tables

An archaeological magnetometer survey
Moor View Park, Modbury, Devon
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County: Devon
District: South Hams
Parish: Modbury
Source: Heritage Gateway

HER number	grid reference	designations	type	period	description	distance (m) from site centre	bearing (GN) from site centre
MDV7618	SX 704 520	Historic England List entry Number: 1019320, Bowl barrow on Churchland Green 350m west of Coldharbour Farm National Monuments Record: 444703	BOWL BARROW	Bronze Age - 2200 BC to 701 BC (Between)	Prehistoric bowl barrow to the north of Chillaton Moor Farm close to the boundary of three parishes NMR description: Remains of a bowl barrow on Churchland Green. The barrow mound measures 16 metres by 19 metres and is up to 1 metre high on the south side and 1.8 metres high on the north. A hollow in the centre of the mound indicates that the barrow has been partially excavated in the past. There are spoil heaps to the south and west and traces of a surrounding ditch are visible on the north side.	424	172
MDV46840	SX 700 520		QUARRY	XVIII to XXI - 1751 AD to 2009 AD (Between)	old quarries' indicated on os 6" (1906). Shown but not indicated on os 6" (1963)	540	219

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	2 3	likely, positive/negative/positive	linear	field boundary - Devon bank	anomaly group coincides with and represents a field boundary recorded on historic maps	1841 Modbury tithe map,
2	1 3	likely, positive/negative/positive	disrupted linear	field boundary - Devon bank	anomaly group coincides with and represents a field boundary recorded on historic maps	1841 Modbury tithe map, OS 1886 1:2500 to at least OS 1963 1:2500
3	1 2	likely, positive/negative/positive	disrupted linear	field boundary - Devon bank	anomaly group coincides with and represents a field boundary recorded on historic maps	1841 Modbury tithe map,
4		possible, positive	linear			
5		possible, enhanced	irregular	disturbed ground with rubble		
101		possible, repeated parallels	cultivation traces - possible ridge-and-furrow			
102		possible, repeated parallels	cultivation traces - possible ridge-and-furrow			
301		possible, high contrast linear		ferrous pipe, cable or drain		
302		possible, high contrast linear		ferrous pipe, cable or drain		
303		possible, low contrast linear		service trench or drain		
304		possible, low contrast linear		service trench		

Table 2: data analysis

Grid *Method of Fixing:* DGPS set-out using pre-planned survey grids and Ordnance Survey coordinates. *Composition:* 30m by 30m grids *Recording:* Geo-referenced and recorded using digital map tiles. *DGPS used:* Spectra Precision PM5V2 GPS with external antenna and survey pole and DigiTerra Explorer 7 as the survey control program.	
Equipment *Instrument:* Bartington Instruments grad601-2 *Firmware:* version 6.1	**Data Capture** *Sample Interval:* 0.25m *Traverse Interval:* 1 metre *Traverse Method:* zigzag *Traverse Orientation:* 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: 3.0.31.0		
Statistics		**Processing**
Max:	80.53	1 Base Layer
Min:	-57.51	2 Clip at 1.00 SD
Std Dev:	2.42	3 De Stagger: Grids: All Mode: Both By: -1 intervals
Mean:	0.02	4 DeStripe Median Traverse: Grids: All
Median:	0.00	5 Edge Match (Area: Top 90, Left 480, Bottom 119, Right 599) to Right edge
		6 De Stagger: Grids: a21.xgd Mode: Both By: -1 intervals
		7 Interpolate: Match X & Y Doubled.

Table 4: processed data metadata