

**Substrata**

Archaeological Geophysical Surveyors

An archaeological magnetometer survey  
**Brockridge Park, Brockridge Road  
Twynning**

Centred on NGR 389264,237432

Report: 1804TEW-R-1

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12 June 2018

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## 1 Introduction

This report presents the results of an archaeological geophysical survey at the site listed in Section 2 and shown in Figure 1, hereafter referred to as the 'Survey Area'. It was commissioned by AC Archaeology Limited on behalf of clients.

The survey and report were completed in compliance with a Survey Method Statement (Dean, 2018).

## 2 Survey description

### 2.1 Survey

Method: shallow depth magnetometer  
Instrument: twin-sensor fluxgate gradiometer  
Date: 30 May 2018  
Area: 2ha

### 2.2 Location

Survey Area name: Brockeridge Park, Brockeridge Road  
Civil parish: Twynning  
District: Tewksbury  
County: Gloucestershire  
Nearest Postcode: GL20 6FF  
NGR: SO 89264 37432 (point)  
NGR (E/N): 389264,237432 (point)  
Historic environment designation: none

### 2.3 Client

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

## 3 Summary

A magnetometer survey was selected to provide a relatively fast and cost-effective evaluation of any buried archaeology across the Survey Area (see Section 12). The magnetic anomaly groups pertaining to potential archaeology and other deposits as relevant were georeferenced to the Ordnance Survey National Grid, mapped, characterised and assigned with an appropriate degree of certainty in conformance with the survey aims and objectives set out in Section 4.

The differences in magnetic responses across the Survey Area were sufficient to be able to differentiate between anomalies representing possible buried archaeology, recent ground disturbance and background magnetic responses.

No magnetic anomaly groups were characterised as reflecting buried archaeology within the two plots comprising the Survey Area. One group in the eastern plot represents extant and ridge-and-furrow earthworks which were recorded by the National Mapping Programme. This group may mask any magnetic responses relating to underlying archaeology. One anomaly group may represent relatively recent disturbed and possibly made ground. The magnetic responses within the western plot indicate the likelihood of recently disturbed ground across this area. Strong magnetic responses in the southern part of the western plot will mask any anomalies representing buried archaeology in the vicinity.

## 4 Aims and objectives

### 4.1 Aims

Within the framework set out in Chartered Institute for Archaeologists (2014a), complete an archaeological geophysical survey and report which will, as far as possible, establish the presence or absence, extent and character of any buried archaeology within the survey area.

### 4.2 Survey objectives

1. Complete a magnetometer survey across the Survey Area.
2. Identify any magnetic anomalies that may be related to buried archaeology.

3. Within the limits of the technique 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.

## 5 Standards

The standards used to complete this survey are defined by the Chartered Institute for Archaeologists (2014a) and Historic England (2008). The codes of approved practice that were followed are those of the Chartered Institute for Archaeologists (2014b) and Archaeology Data Service (undated).

## 6 Methodology

The magnetometer survey was undertaken in accordance with a Survey Method Statement (Dean, 2018) to achieve the aims and objectives set out in Section 4 using the standards and guidance specified in Section 5. The survey method was selected to provide a relatively fast and cost-effective evaluation of any buried archaeology across the Survey Area (see Section 12).

Data processing was undertaken using appropriate software (Table 2), 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. The survey and report conform to the Chartered Institute for Archaeologists standard for geophysical survey (CIfA, 2014a).

## 7 Survey Area

### 7.1 Location

The Survey Area comprises two plots to the northwest of the village of Twynning as shown in Figure 1. The fields were designated Plots 1 and 2 as shown in Figure 2.

### 7.2 Geology

The bedrock across the Survey Area comprises rocks of the Jurassic Charmouth Mudstone Formation. Generically they comprise dark grey laminated shales, and dark, pale and bluish grey mudstones with locally concretionary and tabular limestone beds and abundant argillaceous limestone. The superficial deposits across the remainder of the Survey Area are not recorded in the source used (British Geological Survey, undated).

### 7.3 Soils and near-surface deposits

‘Slightly acid loamy and clayey soils with slightly impeded drainage’ (Cranfield, undated).

No site-relevant geotechnical reports or borehole logs of near-surface deposits are currently available.

### 7.4 Topography

The plots are generally flat with gentle slopes towards the drainage ditch which flows south to north between the plots (Figure 2).

### 7.5 Land use

At the time of the survey, the Survey Area was under pasture. The Plot 1 is confined by the remainder of the field and wire fencing surrounding a pond in the north, by fenced boundaries to the east and south, and by a tall wooden fence with wire to the west. Plot 2 is confined by an overgrown hedge with fencing to the north, an electric fence to the east and by wire fencing to the south and east. A number of large steel objects were present at the time of the survey beyond the western, southern and eastern boundaries of the Survey Area.

## 8 Archaeological background

### 8.1 Historic Environment Status

None.

### 8.2 Historic landscape characterisation

Less irregular, enclosure partly reflecting former unenclosed cultivation patterns (Archaeology Data Service, undated b).

### 8.3 Summary of the archaeological assets adjacent to the Survey Area

The Gloucestershire HER was consulted by use of GIS shape files provided by Gloucestershire County Council to AC Archaeology Ltd. Historic England's 'Heritage Gateway' on-line resource was also consulted. The Historic Environment entries thought relevant to geophysical survey are recorded in Table 5. Ridge-and-furrow crop marks are recorded within, and adjacent to, Plots 1 and 2 and these are still extant in Plot 2. No other historic assets were recorded within the Survey Area.

## 9 Results

### 9.1 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 dimensions of magnetic anomalies mapped as representing potential buried archaeology do not represent the dimensions of any associated archaeology.

The analysis presented below identifies and characterises anomalies and anomaly groups that may relate to buried archaeology.

### 9.2 Analysis

Figure 2 shows the interpretation of the survey data and include the anomaly groups identified as possibly relating to archaeological deposits along with their identifying numbers. Table 1 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 1 comprise the analysis of the survey data.

Figure 3 is a plot of the processed data as specified in Table 3. Figure 4 is a plot of minimally processed data as specified in Table 4. Figure 5 shows the location of the survey grid and the designations of the grid data files.

## 10 Discussion

### 10.1 General points

#### Scope

Not all anomalies or anomaly groups identified in Table 1 are necessarily discussed below. All identified anomaly groups are recorded in the GIS project held in 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 1.

#### Anomaly characterisation

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 are mapped as potential

archaeology when they are associated with other significant anomaly groups or otherwise formed recognisable patterns as listed in Table 1.

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

Numerous dipole magnetic anomalies are present within the dataset. 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.

#### 10.2 Data relating to historic maps and other records

Magnetic anomaly group **101** reflects extant ridge-and-furrow earthworks which are recorded in the National Mapping Programme entry 1452018, feature 41844. This anomaly group may mask magnetic responses from any underlying buried archaeology.

#### 10.3 Data with no previous archaeological provenance

Apart from the cultivation traces noted in Section 10.2, no anomaly groups were characterised as relating to buried archaeology.

Group **301** in Plot 1 provides evidence of disturbed and made ground, speculatively associated with the construction of the adjacent M50 motorway.

The character of the magnetic responses in the rest of Plot 1 suggest that the ground has been subject to relatively recent disturbance.

Magnetic anomaly group **302** reflects the steel fencing and steel gate and in this area. Any magnetic anomalies reflecting buried archaeology in this area would be masked by this relatively strong response.

### 11 Conclusions

The differences in magnetic responses across the Survey Area were sufficient to be able to differentiate between anomalies representing possible buried archaeology, recent ground disturbance and background magnetic responses.

No magnetic anomaly groups were characterised as reflecting buried archaeology within the two plots comprising the Survey Area. One group (101) in the eastern plot represents extant and ridge-and-furrow earthworks which were recorded by the National Mapping Programme. This group may mask any magnetic responses relating to underlying archaeology. One anomaly group (301) may represent relatively recent disturbed and possibly made ground. The magnetic responses within the western plot indicate the likelihood of recently disturbed ground across this area. Strong magnetic responses in the southern part of the western plot (group 302) will mask any anomalies representing buried archaeology in the vicinity.

### 12 Disclaimer

The description and discussion of the results presented in this report are the authors', based on their 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 programme of archaeological work of which this survey is part may also be informed by other archaeological work and analysis. It must be presumed that more archaeological features will be found than those specified in

this report.

## 13 Copyright

Substrata Ltd will assign copyright to the client upon written request but retains the right to be identified as the author of all project documentation and reports as defined in the Copyright, Designs and Patents Act 1988 (Chapter IV, s.79). This report contains material that is non-Substrata Limited copyright or the intellectual property of third parties. Such material is labelled with the appropriate copyright and is non-transferrable by Substrata Ltd.

## 14 Archive

### 14.1 Online Access to the Index of archaeological investigationS (OASIS)

OASIS ID: substrat1-319647

The OASIS entry has been completed and the boundary file and report uploaded with six months delay in publication.

### 14.2 Substrata Limited archive

A full archive of this survey will be held by Substrata Limited on cloud and local hard drive storage as specified in Appendix 3.

### 14.3 Archaeological Data Service (ADS)

Depending on local authority policy, an archive may be deposited with the ADS as specified in Appendix 3.

### 14.4 Historic Environment Record (HER)

Subject to any contractual requirements on confidentiality, a PDF or printed copy of the report will be submitted to the appropriate HER within six months of completion.

## 15 Acknowledgements

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

## 16 Bibliography

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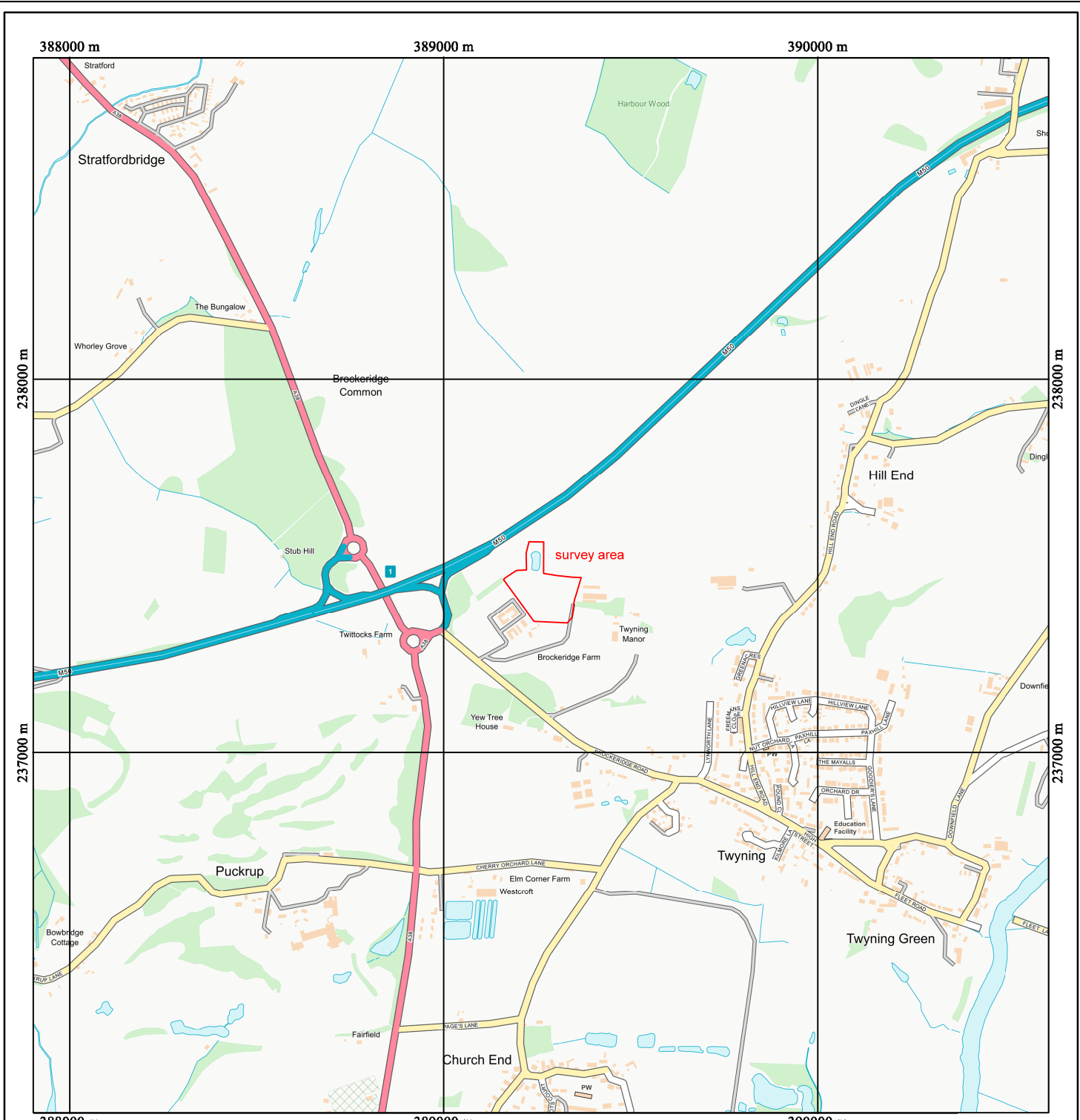


## Appendix 1     Figures

### 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 .

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: 389260.32 m, centre Y: 237448.22 m

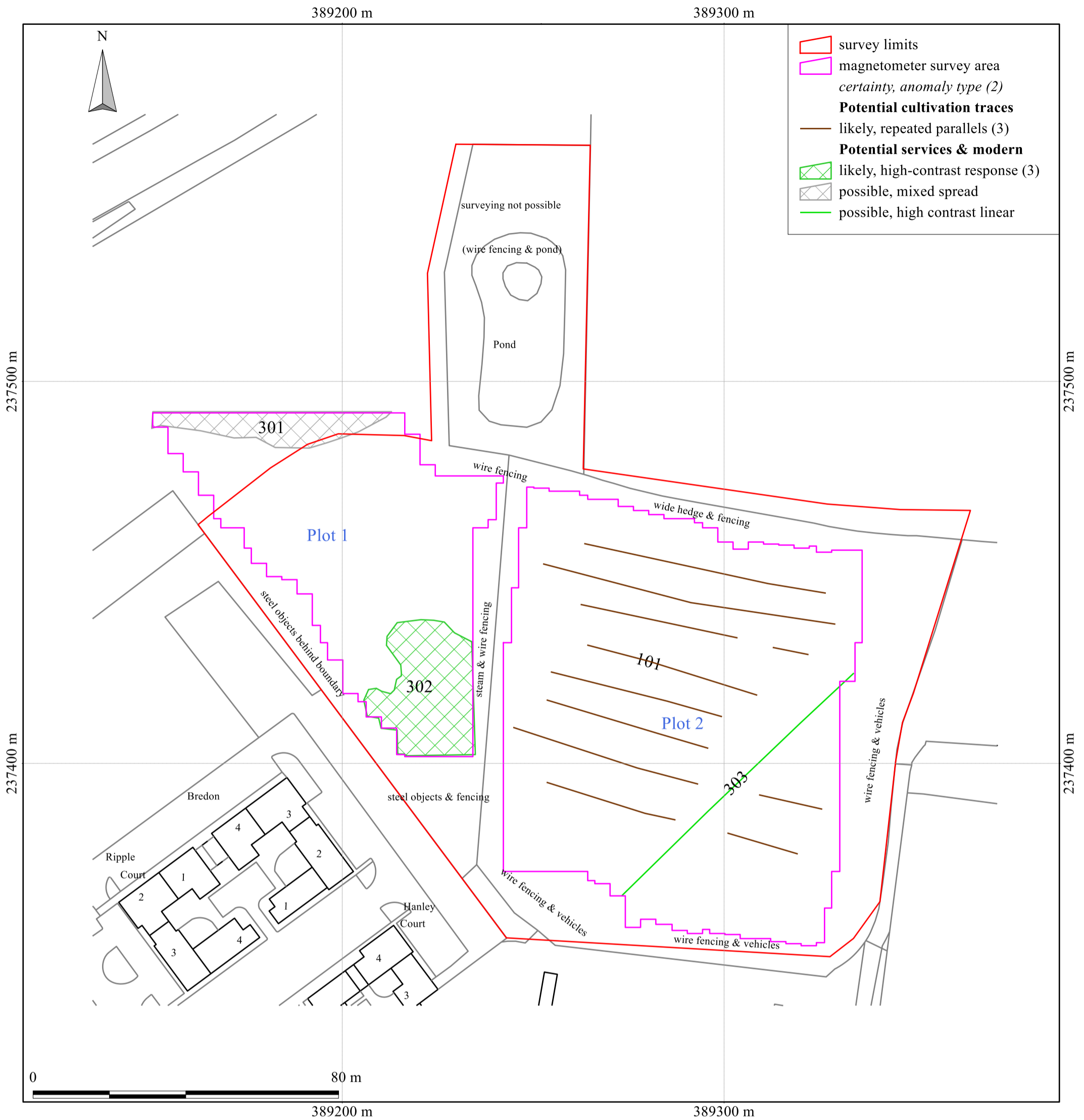
Geophysical survey: Copyright Substrata Limited.  
 Base map: Ordnance Survey (c) Crown Copyright 2018.  
 All rights reserved. Licence number 100022432

Scale: 1:10000 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological magnetometer survey  
 Brookeridge Park, Brookeridge Road, Twyning  
 Centred on NGR: 389264,237432  
 Report: 1804TEW-R-1

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Figure 1: location map



British Grid  
centre X: 389252.12 m, centre Y: 237452.45 m

Geophysical survey: Copyright Substrata Limited.  
Base map: Ordnance Survey (c) Crown Copyright 2018.  
All rights reserved. Licence number 100053143

Scale: 1:1000 @ A3. Spatial Units: Meter. Do not scale off this drawing

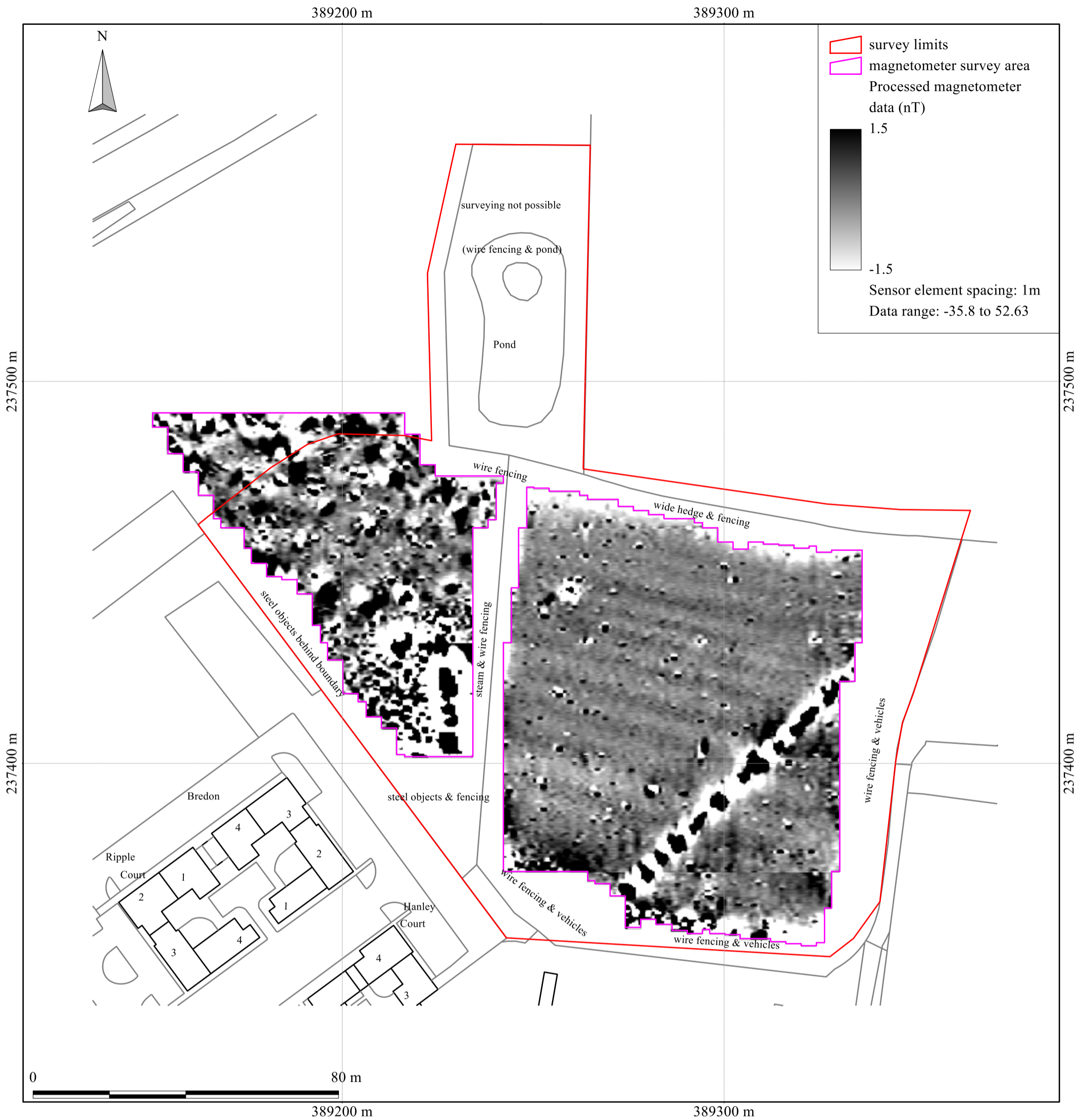
Notes:

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 recent deposits or ground disturbance, or geological and other natural deposits are not mapped unless relevant to potential buried archaeology.

An archaeological magnetometer survey  
Brockridge Park, Brockridge Road, Twyning  
Centred on NGR: 389264,237432  
Report: 1804TEW-R-1

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Figure 2: survey interpretation



British Grid  
 centre X: 389252.12 m, centre Y: 237452.45 m

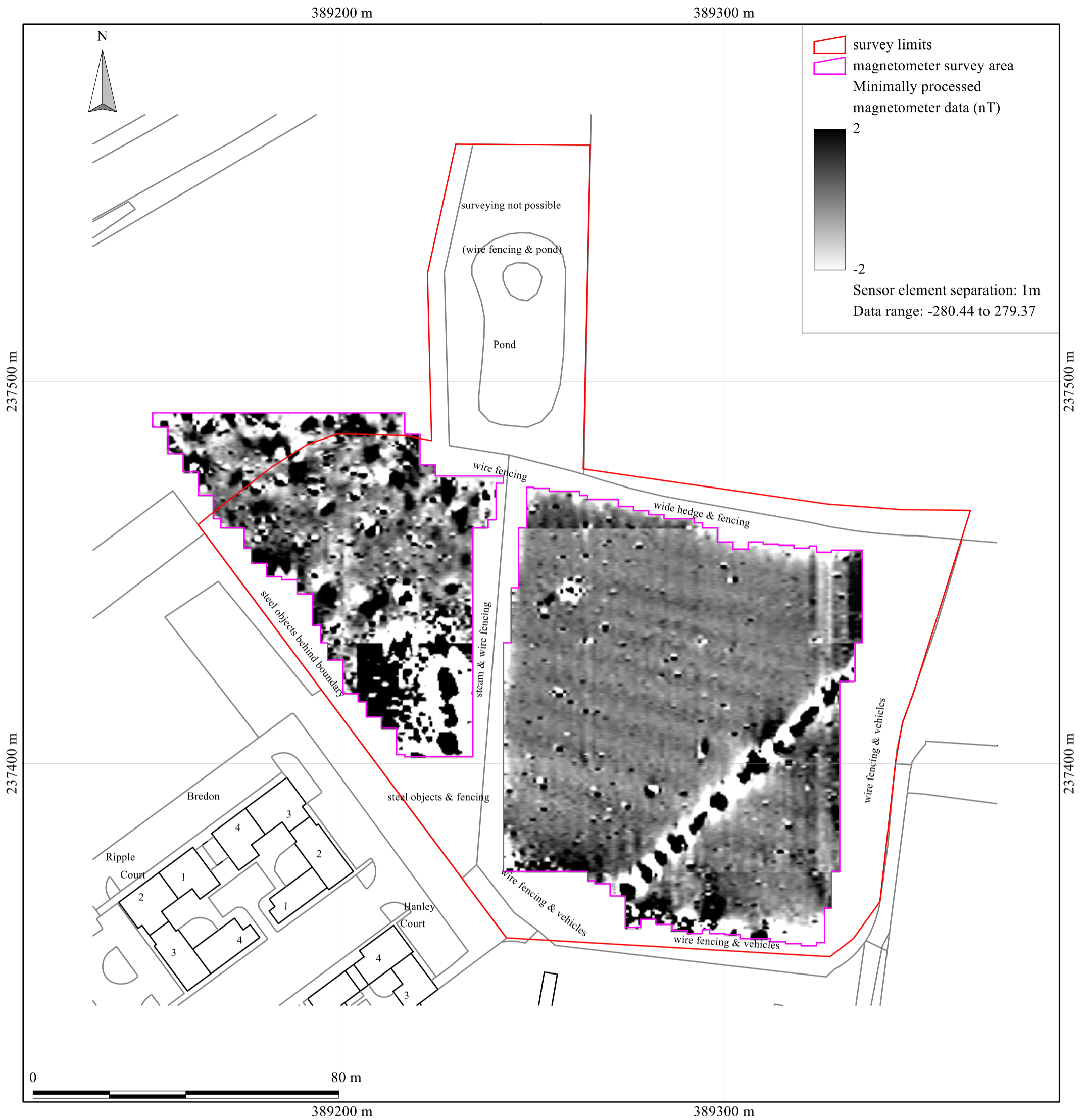
Geophysical survey: Copyright Substrata Limited.  
 Base map: Ordnance Survey (c) Crown Copyright 2018.  
 All rights reserved. Licence number 100053143

Scale: 1:1000 @ A3. Spatial Units: Meter. Do not scale off this drawing

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 Centred on NGR: 389264,237432  
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Figure 3: shade plot of processed data



British Grid  
 centre X: 389252.12 m, centre Y: 237452.45 m

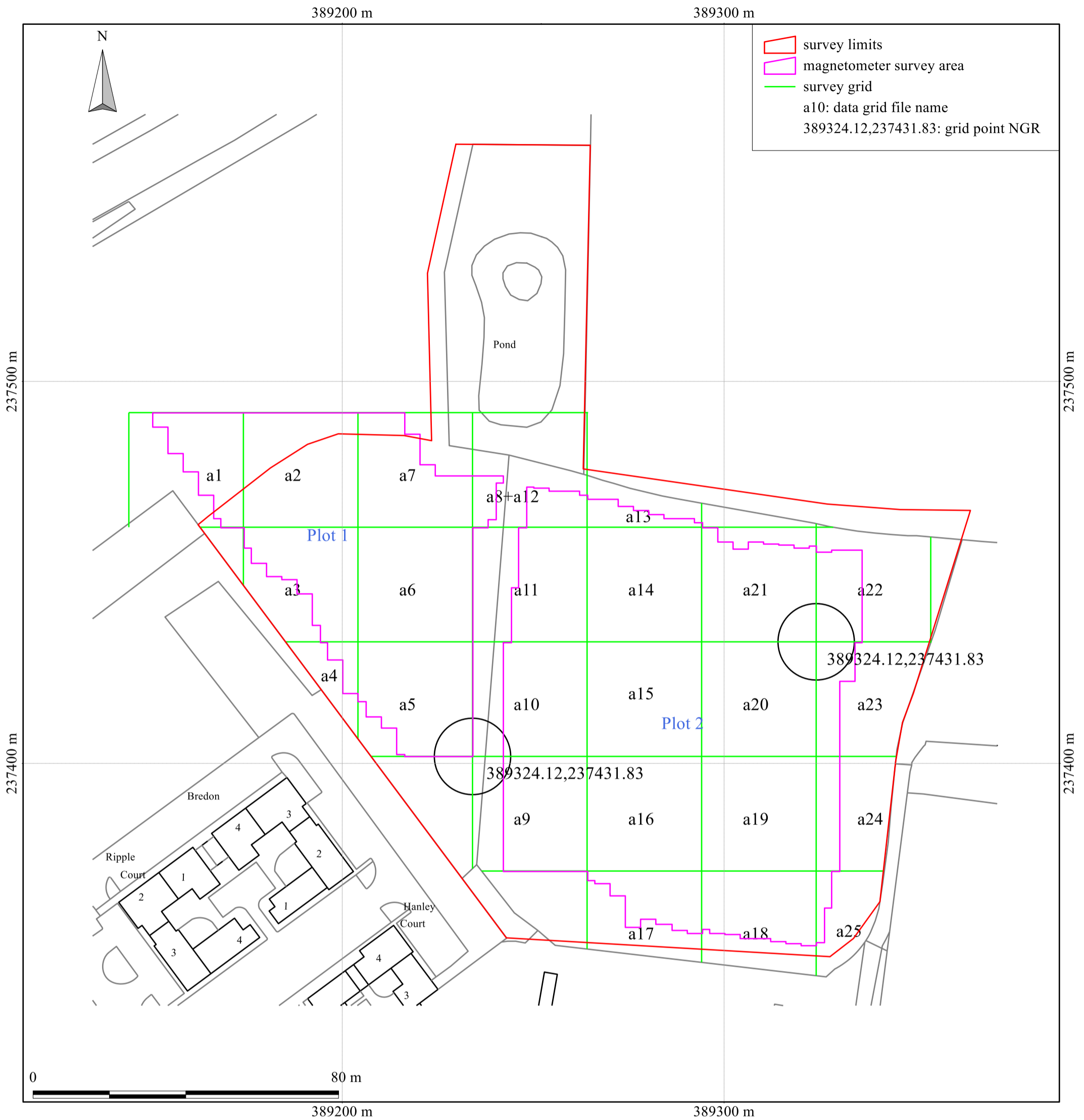
Geophysical survey: Copyright Substrata Limited.  
 Base map: Ordnance Survey (c) Crown Copyright 2018.  
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Scale: 1:1000 @ A3. Spatial Units: Meter. Do not scale off this drawing

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 Centred on NGR: 389264,237432  
 Report: 1804TEW-R-1

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Figure 4: shade plot of minimally processed data



An archaeological magnetometer survey  
 Land near Twyning, Tewksbury, Gloucestershire  
 Centred on NGR: 389264,237432  
 Report: 1804TEW-R-

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Figure 5: survey grid plan and location

## Appendix 2 Tables

An archaeological magnetometer survey  
 Brockeridge Park, Brockeridge Road, Twyning  
 Centred on NGR: 389264,237432  
 Report: 1804TEW-R-1

anomaly group	anomaly characterisation certainty & class	additional archaeological characterisation	comments	supporting evidence
101	likely, repeated parallels	ridge-and-furrow	anomaly group represents extant ridge-and-furrow earthworks recorded in the National Mapping programme	surveyor observation, NMP unique id 1452018 & feature id 41844
301	possible, mixed spread	disturbed & possible made ground		
302	likely, high-contrast response	modern steel objects & fencing	anomaly group represents magnetic responses from adjacent modern fencing, a steel gate and steel object	surveyor observation
303	possible, high contrast linear	recent steel cable or iron/steel pipe		

1: data analysis



<p><b>Grid</b>  <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.</p>	
<p><b>Equipment</b>  <i>Instrument:</i> Bartington Instruments grad601-2  <i>Firmware:</i> version 6.1</p>	<p><b>Data Capture</b>  <i>Sample Interval:</i> 0.25m  <i>Traverse Interval:</i> 1 metre  <i>Traverse Method:</i> zigzag  <i>Traverse Orientation:</i> GN</p>
<p><b>Data Processing, Analysis and Presentation Software</b>  IntelliCAD 8.4  DW Consulting TerraSurveyor3  Manifold System 8 GIS  Microsoft Corp. Office 365: Excel, Publisher, Word  Adobe Systems Inc Adobe Acrobat 9 Pro Extended</p>	

Table 2: methodology information

<b>Instrument</b>	
Type:	Bartington Grad-601 gradiometer
Units:	nT
Direction of 1st Traverse:	see below
Collection Method:	ZigZag
Sensors:	2 @ 1.00 m spacing, each with 1m separation
Dummy Value:	32702
<b>Program</b>	
Name:	TerraSurveyor
Version:	3.0.33.6
<u>Statistics</u>	<u>Processing</u>
Max:	52.63
Min:	-35.80
Std Dev:	6.89
Mean:	-0.23
Median:	0.00
	1 Base Layer
	2 Clip at 1.00 SD
	3 Clip at 1.00 SD
	4 DeStripe Median Traverse: Grids: All
	5 Edge Match (Area: Top 90, Left 480, Bottom 149, Right 599) to Left edge
	Interpolate match x & y double is imposed on export to the GIS

Table 3: processed data metadata

<b>Instrument</b>	
Type:	Bartington Grad-601 gradiometer
Units:	nT
Direction of 1st Traverse:	see below
Collection Method:	ZigZag
Sensors:	2 @ 1.00 m spacing, each with 1m separation
Dummy Value:	32702
<b>Program</b>	
Name:	TerraSurveyor
Version:	3.0.33.6
<b>Statistics</b>	<b>Processing</b>
Max:	279.37
Min:	-280.44
Std Dev:	30.41
Mean:	-0.30
Median:	0.0
	1 Base Layer
	2 DeStripe Median Sensors: Grids: All
	3 Clip at 1.00 SD
	Interpolate match x & y double is imposed on export to the GIS

Table 4: minimally processed data metadata

An archaeological magnetometer survey  
 Brockridge Park, Brockridge Road, Twyning  
 Centred on NGR: 389264,237432  
 Report: 1804TEW-R-1

County: Gloucestershire  
 District: Tewksbury  
 Parish: Twyning  
 Source: Shape files: Gloucestershire County Council via AC Archaeology Ltd  
 Heritage Gateway (Historic England, undated)

HER number	NMP unique id	NMP feature id	NGR easting	NGR northing	monuments	period	description	distance (m) from site centre	bearing (GN) from site centre
	1452018	41844	389243	237402			ridge-and-furrow crop marks	37	215
	1452018	6704	389151	237457			ridge-and-furrow crop marks	116	282
	1452018	12640	389157	237375			ridge-and-furrow crop marks	121	242
	1452018	34291	389315	237294			ridge-and-furrow crop marks	147	160
9878			389500	237600	STORAGE PIT BOUNDARY DITCH TRACKWAY) BOUNDARY DITCH STORAGE PIT GEOLOGICAL MARKS	LATER PREHISTORIC LATER PREHISTORIC LATER PREHISTORIC ROMAN ROMAN UNCERTAIN	A possible Later Prehistoric to Roman site is visible as cropmarks to the north of Twyning Green. The site may be that of either a trackway or storage pits.	290	55
7456			389100	237700	DESERTED SETTLEMENT	MEDIEVAL	Medieval Settlement	314	329
40518			389170	237110	LIMESTONE QUARRY	POST MEDIEVAL to 20TH CENTURY	A post medieval to 20th century area of quarrying is visible as an earthwork to the north east of Twyning,	335	196

Table 5: Historic Environment entries thought relevant to geophysical survey

## Appendix 3 Project archive contents

### A3.1 Substrata Limited archive

A full archive of this survey will be held by Substrata Limited on cloud and local hard drive storage as follows:

Report:	Adobe PDF format
Raw grid & composite files:	DW Consulting TerraSurveyor 3 format xyz files
Final data processing composite files: (excluding interpolation processes)	DW Consulting TerraSurveyor 3 format xyz files
GIS project:	GIS project Manifold 8 .map format ESRI shape files
AutoCAD version of the survey interpretation: (if generated)	AutoCAD DXF
All project working files:	various (Table 2)

### A3.2 Online Access to the Index of archaeological investigationS (OASIS)

Metadata:	online form
Georeferenced survey boundary file:	ESRI shape file
Report:	Adobe PDF format

### A3.3 Archaeological Data Service

Depending on local authority policy, an archive may be deposited with the ADS as follows:

Raw data composite file:	xyz file
Processed data plot:	rendered images in TIFF format
Survey grid plot:	image in TIFF format
Details of data processing:	image in TIFF format
Interpretation plot:	rendered images in TIFF format
Metadata:	Microsoft Excel format

### A3.4 Historic Environment Record (HER)

Subject to any contractual requirements on confidentiality, a PDF copy of the report will be submitted to the appropriate HER within 6 months of the completion of this report via the OASIS process or by other means, depending on the relevant HER process.