

**Substrata**

Archaeological Geophysical Surveyors

An archaeological magnetometer survey  
**Land to the north of Bitham Lane  
Woolavington, Somerset**

Centred on NGR 334520,140550

Report: 1804WOO-R-1

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## Contents

1. Introduction .....	1
2. Client .....	1
3. Copyright.....	1
4. Survey type and location .....	1
5. Summary.....	1
6. Standards .....	2
7. Aims and objectives.....	2
8. Methodology.....	2
9. Survey Area .....	2
10. Archaeological background .....	3
11. Results .....	3
12. Discussion.....	4
13. Conclusions .....	5
14. Disclaimer.....	5
15. Archive .....	5
16. Acknowledgements .....	5
17. Bibliography .....	5
Appendix 1 Figures .....	7
Appendix 2 Tables.....	14
Appendix 3 Project archive contents .....	19

## Figures

Figure 1: location map .....	8
Figure 2: survey interpretation.....	9
Figure 3: shade plot of processed data .....	10
Figure 4: contour plot of processed data .....	11
Figure 5: shade plot of minimally processed data.....	12
Figure 6: grid plan and location .....	13

## Tables

Table 1: data analysis .....	15
Table 2: methodology information .....	16
Table 3: processed data metadata .....	17
Table 4: minimally processed data metadata.....	18

## 1 Introduction

This report presents the results of an archaeological geophysical survey at the site listed in Section 4 and shown in Figure 1, hereafter referred to as the 'Survey Area'. The survey was commissioned by AC Archaeology Ltd on behalf of clients. The commissioning of this report was in keeping with the National Planning Policy Framework, Chapter 16, Paragraph 189 (Ministry of Housing, Communities & Local Government, 2018). The survey and report were completed in compliance with a Survey Method Statement (Substrata Ltd, 2018).

## 2 Client

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## 3 Copyright

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## 4 Survey type and location

### 4.1 Survey

Method:	shallow depth magnetometer survey
Instrument:	twin-sensor fluxgate gradiometer
Date:	6 July 2018 and 23 August 2018
Area:	6.68ha
Survey resolution:	1m by 0.25m

### 4.2 Location

Name:	Land to the north of Bitham Lane
Village:	Woolavington
Civil Parish:	Woolavington
District:	Sedgemoor
County:	Somerset
Nearest Postcode:	TA7 8JE
Survey centre NGR:	ST 3452 4055 (point)
Survey centre NGR (E/N):	334520,140550 (point)
Historic environment designation:	None
OASIS ID:	substrat1-328511

## 5 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 14). The magnetic anomaly groups pertaining to potential buried archaeology 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 7.

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

Seven magnetic anomaly groups were characterised as reflecting potential buried archaeology. Of these, three represent former field boundaries recorded on historic maps. Two groups may represent in-filled former quarries or natural deposits. One group may represent a sub-

rectangular section of a former field or enclosure boundary. One group may represent a large, in-filled pit or a small quarry.

## 6 Standards

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

## 7 Survey aims and objectives

### 7.1 Aims

1. Within the framework set out in Chartered Institute for Archaeologists (2014b) and Europae Archaeologiae Consilium (undated), 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.
2. Provide sufficient information on the nature of any archaeological remains to facilitate the assessment of their interest prior to the determination of the planning application.

### 7.2 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.

## 8 Methodology

The magnetometer survey was undertaken in accordance a Survey Method Statement (Substrata Ltd, 2018) using the standards specified in Section 6 to achieve the aims and objectives set out in Section 7. The survey method was selected to provide a relatively fast and cost-effective evaluation of any buried archaeology across the Survey Area (see Section 14).

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 (Chartered Institute for Archaeologists, 2014b).

## 9 Survey Area

### 9.1 Location and description

The Survey Area comprises two fields (designated Plots 1 and 2) on the southern side of the village of Woolavington (Figures 1 and 2). The fields are bound by a mix of banks with hedging, hedges and some wire fencing. To the north of the Survey Area are gardens and houses. A sturdy, tall, steel mesh fence bounds the north-eastern side with allotments beyond. The B3141 Wollavington Hill road borders the south-eastern side. To the south the Survey Area is bordered by Bitham Lane with fields beyond. To the west of the Survey Area are further fields. The ground is highest on the north-western corner at approximately 51m oAD and falls to approximately 40m oAD at the south-eastern corner.

At the time of survey Plot 1, which was completed on 23rd August 2018, was under stubble and Plot 2, completed on 6th July 2018, was under grass pasture.

## 9.2 Geology and sub-surface deposits

The solid geology across the Survey Area comprises interbedded mudstone and limestone of the Langport Member of the undifferentiated Blue Lias and Charmouth Mudstone Formations. The superficial geology is not recorded in the source consulted (British Geological Survey, undated).

No relevant geotechnical reports or borehole logs of near-surface deposits within 500m of the Survey Area were available at the time of writing.

## 9.3 Soils

The topsoils are 'slowly permeable seasonally wet slightly acid but base-rich loamy and clayey' and, on the southern border of the Survey Area, 'lime-rich loamy and clayey with impeded drainage' (LandIS, undated).

# 10 Archaeological background

## 10.1 Historic landscape characterisation

'Anciently Enclosed Land'

This type of landscape character comprises fields which are generally 6-12ha in size with less than 25% boundary loss since 1905 (Archaeology Data Service, undated b).

## 10.2 Summary of the archaeological background

This section summarises heritage assets that are thought relevant to the survey data analysis and is not designed to be a comprehensive description of the archaeological background.

An Archaeological Desk Based Assessment for a site including the current Survey Area was completed in November 2011 and updated in August 2012 (CgMs, 2012). The Assessment included an analysis of the recorded heritage assets, cartographic evidence, other documentary evidence and field name evidence within the site and an study area extending to 500m around the site. The following is taken from this Assessment and an examination of the Somerset Historic Environment Record via the Heritage Gateway (Historic England, undated). Historic maps were consulted using CgMs (2012) and Old-Maps (undated). Whilst providing a useful context for the data analysis, the HER information and maps from the on-line sources are not necessarily comprehensive and detailed publication in commercial reports of the HER information or maps is not permitted.

There are no known designated heritage assets or undesignated heritage assets situated within the Survey Area. A Roman road (HER 11831) is thought to follow the course of Bitham Lane along the south-western edge of the Survey Area before heading southeast away from Bitham Lane and the rest of the southern boundary.

There are three undesignated assets within approximately 500m of the Survey Area comprising a bronze age barrow (HER 12894), a rectangular enclosure recorded as a cropmark (HER 11180) and the site of a medieval windmill. Cartographic and field name evidence suggested that there was localised quarrying within the vicinity of the Survey Area.

The cartographic and documentary evidence suggests that the Survey Area was part of an agricultural landscape from the early medieval period onwards. The Assessment concludes that any buried evidence from this and later periods is likely to relate to agricultural practices only.

# 11 Results

## 11.1 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 differences in the magnetic properties 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.

## 11.2 Analysis

Figure 2 shows the interpretation of the survey data and includes the anomaly groups identified as possibly relating to buried archaeology 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 and Table 1 comprise the analysis of the survey data.

Figures 3 and 4 are plots of the processed data as specified in Table 3. Figure 5 is a plot of minimally processed data as specified in Table 4. Figure 6 shows the location of the survey grid and grid data files.

## 12 Discussion

### 12.1 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 magnetic materials within and adjacent to the plot boundaries. Strong magnetic responses mapped close to the boundaries are likely to relate to the magnetic 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 well defined in the data, 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.

#### Data trends

An approximately north-north-west to south-south-east set of parallel, linear trends in Plot 1 and a set of north-south trends in Plot 2 are likely to represent relatively recent ploughing disturbance.

A set of widely spaced, west-north-west to east-south-east linear trends across Plot 1 and extending into Plot 2 are most likely to reflect underlying geological patterns.

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

Magnetic anomaly groups **2**, **5** and **6** represent former field boundaries recorded on historic maps as shown in Table 1. The groups reflect a set of relatively narrow, parallel, curvilinear features which implies that the enclosed plots were formed from medieval strip fields.

### 12.3 Data with no previous archaeological provenance

Anomaly groups **1** and **3** have similar magnetic characteristics and their clarity in the data strongly suggests the presence of in-filled depressions in the ground surface. Although they do not exhibit the usual mixed magnetic responses representing disturbed earth and stony backfill often associated with former quarries, the cartographic evidence for small-scale quarrying to the immediate east (GgMs, 2012, pp.14 and Figure 6), makes it reasonable to classify groups 1 and 3 as possibly representing former quarries. Group **7** may be a similar in-filled quarry or a large pit.

Anomaly group **4** may represent a sub-rectangular feature such as a former enclosure or field boundary.

## 13 Conclusions

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

Seven magnetic anomaly groups were characterised as reflecting potential buried archaeology. Of these, three (2, 5 and 6) represent former field boundaries recorded on historic maps. Two groups (1 and 3) may represent in-filled former quarries or natural deposits. One group (4) may represent a sub-rectangular section of a former field or enclosure boundary. One group (7) may represent a large, in-filled pit or a small quarry.

## 14 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.

## 15 Archive

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

OASIS ID: substrat1-328511

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

### 15.2 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.

### 15.3 Archaeological Data Service (ADS)

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

### 15.4 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.

## 16 Acknowledgements

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

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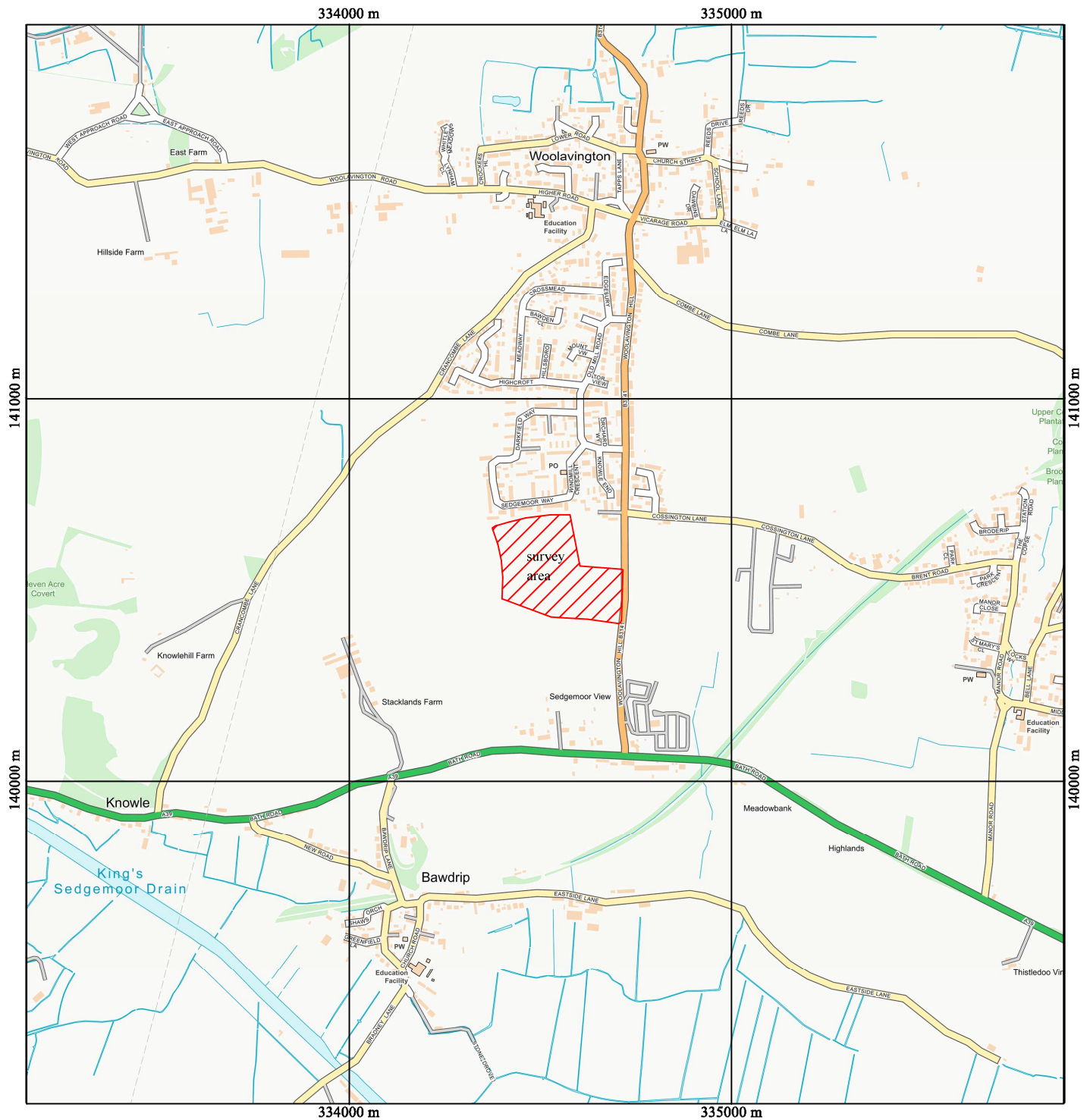


## Appendix 1     Figures

### 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: 334513.24 m, centre Y: 140567.17 m

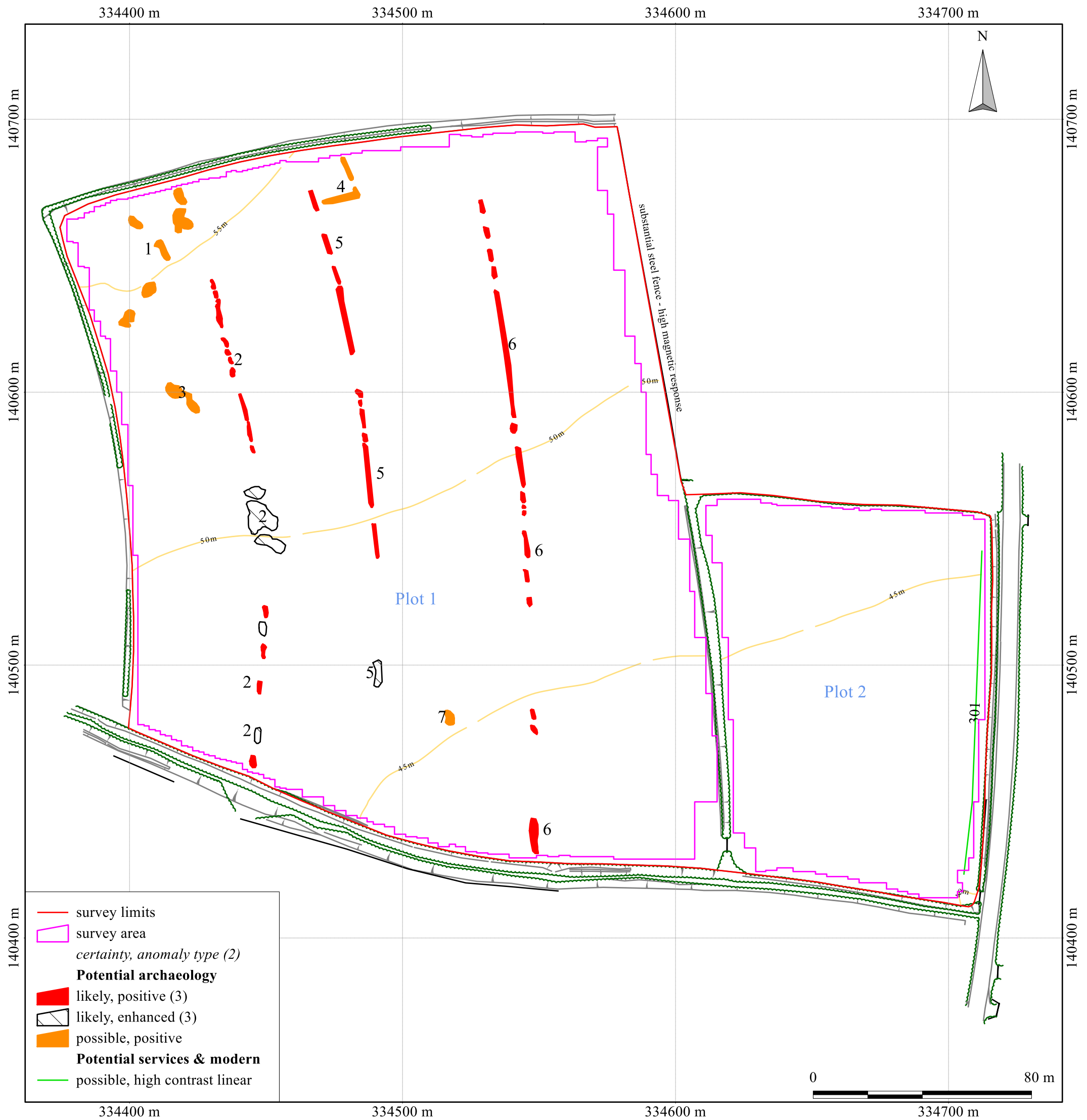
Geophysical survey: Copyright Substrata Limited.  
 Base map: Contains Ordnance Survey data  
 © Crown copyright and database right 2017

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

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Figure 1: location map



British Grid  
 centre X: 334551.73 m, centre Y: 140537.37 m

Geophysical survey: Copyright Substrata Ltd.  
 Base map: Benjamin Moore Land Surveyors Ltd.

Scale: 1:1400 @ A3. Spatial Units: Meter. Do not scale off this drawing

Notes:

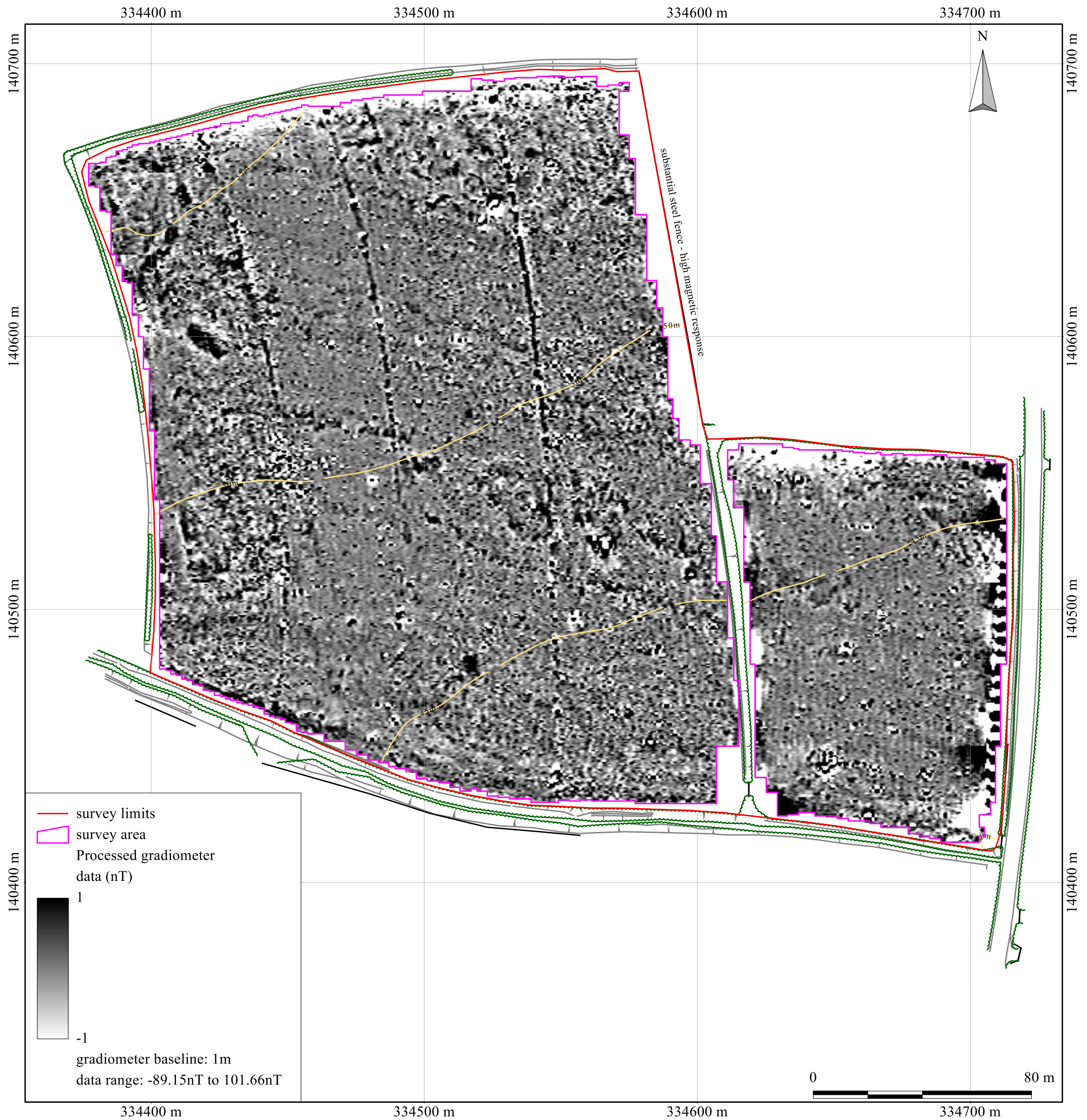
1. All interpretations are provisional and represent potential archaeological deposits.
2. 'Anomaly type' is a description of the magnetic anomaly. See the report text or GIS for an archaeological characterisation.
3. Anomalies designated "likely archaeology" have supporting evidence e.g. historical 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.

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Figure 2: survey interpretation





British Grid  
 centre X: 334543.76 m, centre Y: 140517.00 m

Geophysical survey: Copyright Substrata Ltd.  
 Base map: Benjamin Moore Land Surveyors Ltd.

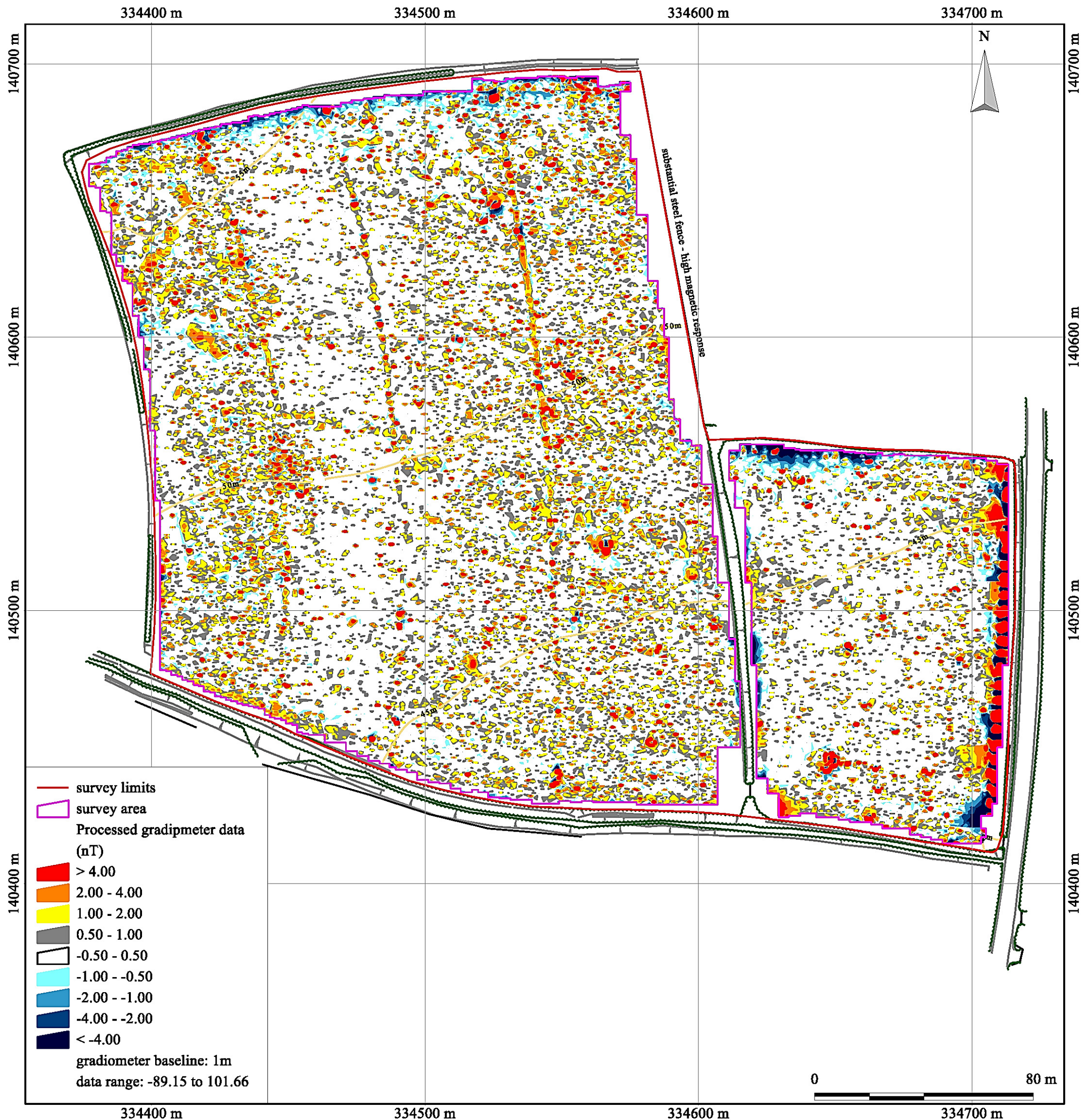
Scale: 1:1400 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 3: shade plot of processed data





British Grid  
 centre X: 334543.76 m, centre Y: 140517.00 m

Geophysical survey: Copyright Substrata Ltd.  
 Base map: Benjamin Moore Land Surveyors Ltd.

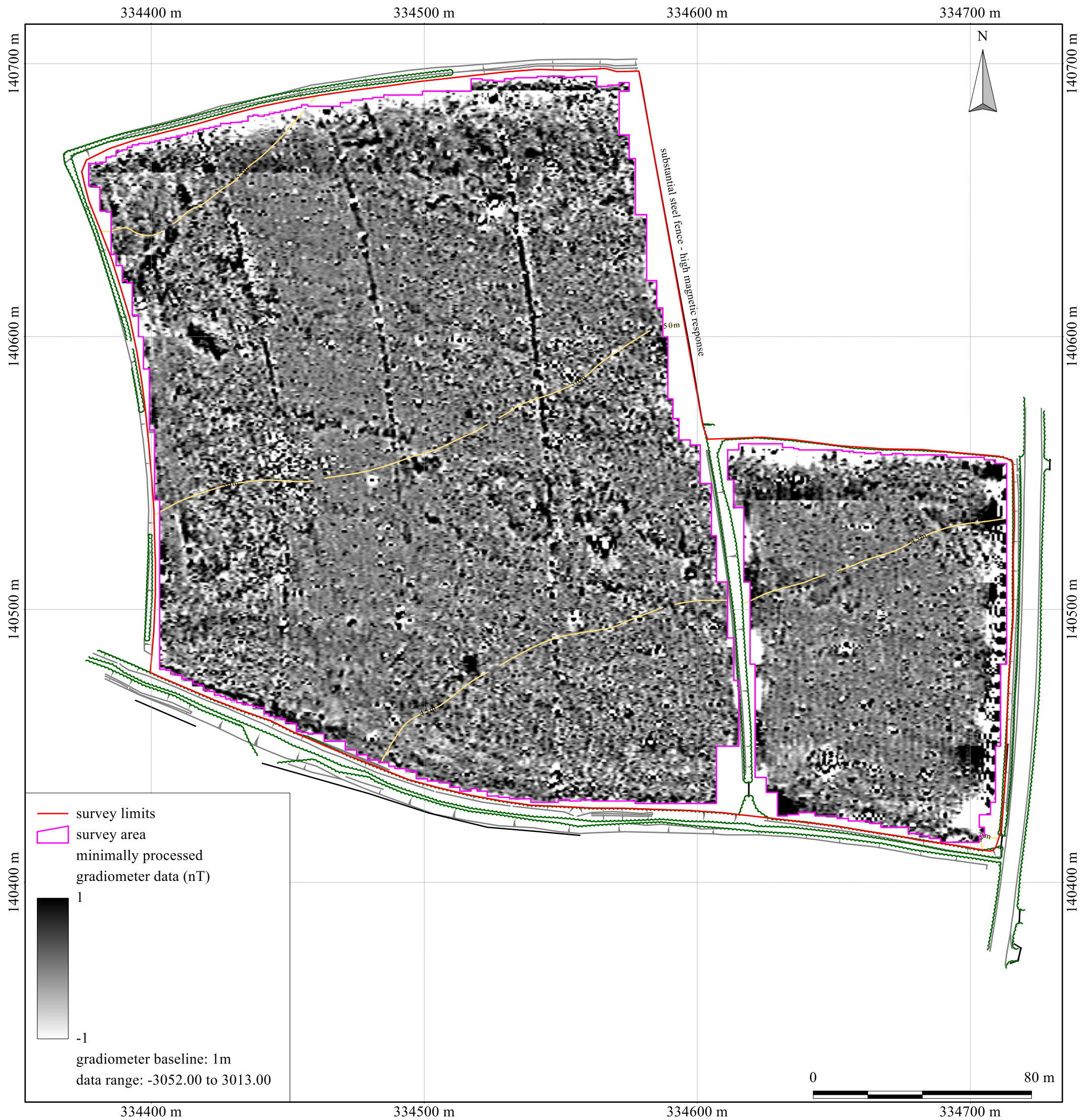
Scale: 1:1400 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 4: contour plot of processed data





British Grid  
 centre X: 334543.76 m, centre Y: 140517.00 m

Geophysical survey: Copyright Substrata Ltd.  
 Base map: Benjamin Moore Land Surveyors Ltd.

Scale: 1:1400 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 5: shade plot of minimally processed data



British Grid  
 centre X: 334551.73 m, centre Y: 140537.37 m

Geophysical survey: Copyright Substrata Ltd.  
 Base map: Benjamin Moore Land Surveyors Ltd.

Scale: 1:1400 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 6: grid plan and location

## Appendix 2    Tables



Site: Land to the north of Bitham Lane, Woolavington, Somerset  
 Centred on NGR: 334520,140550

plot	anomaly group	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
1	1	possible, positive	irregular	in-filled depressions - quarries or natural features	the magnetic response of these anomalies is unusual for in-filled quarries and so a natural origin is possible but an archaeological option such as quarries cannot be ruled out and a quarry is recorded on historic maps to the west of the anomaly group	Ordnance Survey maps 1904 1:10560 to 1969 1:2500
	2	likely, positive & enhanced	disrupted linear	field boundary & disturbed ground and stony deposits with a former field boundary	anomaly group coincides with, and likely represents, a field boundary recorded on historic maps	1775 Woolavington Enclosure Map, 1840 Bawdrip Tithe Map, Ordnance Survey maps 1886-8 1:2500 to 1969 1:2500
	3	possible, positive	irregular	in-filled depression - quarry or natural feature	the magnetic response of these anomalies is unusual for in-filled quarries and so a natural origin is possible but an archaeological option such as a quarry cannot be ruled out and a quarry is recorded on historic maps to the west of the anomaly group	Ordnance Survey maps 1904 1:10560 to 1969 1:2500
	4	possible, positive	rectilinear	enclosure or field boundary		
	5	likely, positive & enhanced	disrupted linear	field boundary & disturbed ground and stony deposits	anomaly group coincides with, and likely represents, a field boundary recorded on historic maps	1775 Woolavington Enclosure Map, 1840 Bawdrip Tithe Map, Ordnance Survey maps 1886-8 1:2500 to 1961-2 1:10560
	6	likely, positive	disrupted linear	field boundary	anomaly group coincides with, and likely represents, a field boundary recorded on historic maps	1840 Bawdrip Tithe Map, Ordnance Survey maps 1904 1:10560 to 1969 1:2500
	7	possible, positive	irregular	in-filled depression - large pit or small quarry		
	301	possible, high contrast linear		iron or steel pipe or cable		

Table 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

Instrument Type:	Bartington Grad 601
Units:	nT
Direction of 1st Traverse:	0 deg
Collection Method:	ZigZag
Sensors:	2 @ 1.00 m spacing.
Dummy Value:	32702
Dimensions	
Composite Size (readings):	1320 x 360
Survey Size (meters):	330 m x 360 m
Grid Size:	30 m x 30 m
X Interval:	0.25 m
Y Interval:	1 m
Stats	
Max:	101.66
Min:	-89.15
Std Dev:	5.12
Mean:	0.09
Median:	0.00
PROGRAM	
Name:	TerraSurveyor
Version:	3.0.33.6
Processes: 12	
1	Base Layer
2	Clip at 1.00 SD
3	DeStripe Median Traverse: Grids: All
4	De Stagger: Grids: b11.xgd b12.xgd b10.xgd b13.xgd b9.xgd b14.xgd b8.xgd b15.xgd b7.xgd b16.xgd b1.xgd b6.xgd b17.xgd b2.xgd b5.xgd b18.xgd b3.xgd b4.xgd b19.xgd By: 0 intervals, 50.00cm
5	Add/Subtract -0.5 (Area: Top 240, Left 600, Bottom 269, Right 719)
6	Add/Subtract -0.5 (Area: Top 270, Left 600, Bottom 299, Right 719)
7	Add/Subtract -0.5 (Area: Top 260, Left 600, Bottom 274, Right 616)
8	Add/Subtract -0.3 (Area: Top 90, Left 1080, Bottom 203, Right 1148)
9	Add/Subtract -0.4 (Area: Top 41, Left 1081, Bottom 89, Right 1132)
10	Add/Subtract -0.4 (Area: Top 10, Left 1080, Bottom 29, Right 1093)
11	Add/Subtract -1 (Area: Top 150, Left 1200, Bottom 207, Right 1226)
12	Add/Subtract -0.3 (Area: Top 309, Left 91, Bottom 339, Right 118)

Table 3: processed data metadata

Instrument Type:	Bartington Grad 601
Units:	nT
Direction of 1st Traverse:	0 deg
Collection Method:	ZigZag
Sensors:	2 @ 1.00 m spacing.
Dummy Value:	32702
Dimensions	
Composite Size (readings):	1320 x 360
Survey Size (meters):	330 m x 360 m
Grid Size:	30 m x 30 m
X Interval:	0.25 m
Y Interval:	1 m
Stats	
Max:	3013.00
Min:	-3052.00
Std Dev:	76.64
Mean:	0.30
Median:	0.00
PROGRAM	
Name:	TerraSurveyor
Version:	3.0.33.6
Processes: 2	
1	Base Layer
2	DeStripe Median Traverse: Grids: All

Table 4: minimally processed data metadata

## 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 (.pdf), Microsoft Publisher (.pub)
Raw grid data files:	DW Consulting TerraSurveyor 3 (.xgd) and CSV (.xyz)
Raw data composite files:	CSV (.xyz)
Minimally processed data composite files:	DW Consulting TerraSurveyor 3 (.xgd) and CSV (.xyz)
Final data processing composite files:	DW Consulting TerraSurveyor 3 (.xgd) and CSV (.xyz)
GIS project:	GIS project Manifold 8 (.map)
Survey interpretation:	ESRI shape files
AutoCAD version of the survey interpretation: (if generated)	AutoCAD (.dwg)
All project working files:	IntelliCAD 8.4 Microsoft Corp. Office 365: Excel, Publisher, Word Adobe Systems Inc Adobe Acrobat 9 Pro Extended

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

Metadata:	online form
Georeferenced survey boundary file:	ESRI shape file
Report:	Adobe PDF (.pdf)

### A3.3 Archaeological Data Service

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

Raw data composite file:	CSV (xyz)
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.