

An archaeological gradiometer survey

Belmont Park, Bickington Fremington, Devon

Centred on NGR (E/N): 253736,132870 (point)

Report: 1511BEL-R-1

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22 December 2015

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Project archive

Report	Adobe PDF format
Copies of report figures	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	
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:	19, 25 and 27 November 2015
Area:	gradiometer survey: 4.6ha
Lead surveyor:	Mark Edwards BA
Author:	Ross Dean BSc MSc MA MIfA

1.2 Client

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

1.3 Location

Site:	Belmont Park, Bickington
Town and Civil Parish:	Fremington
District:	North Devon
County:	Devon
Nearest Postcode:	EX31 2HX
NGR:	SS 537 329
Ordnance Survey NGR (E/N):	253736,132870 (point)

1.4 Archive

OASIS number:	substrat1-235406	
Archive:	At the time of writing, the archive of this survey will be held by	
	Substrata and will be deposited with the ADS in due course.	

1.5 Introduction

This report was commissioned by AC Archaeology Ltd on behalf of clients. It is part of a programme of archaeological works undertaken in preparation for a planning application for a proposed residential development at the above site. The site location is shown in Figure 1.

1.6 Summary

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

Thirteen magnetic anomaly groups were mapped as possibly representing archaeological deposits or features. Seven of these represent former field boundaries mapped by the Ordnance Survey on and after 1890 and now removed. The remainder are typical of anomalies representing remnants of earlier fields.

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 site. The results of the survey and any subsequent trial trenching will be reviewed and used to inform any ensuing mitigation.

2.2 Survey objectives

- 1. Complete a gradiometer survey across agreed parts of the site.
- 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 site about the location and possible archaeological character of the recorded anomalies.

3 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/Digital Antiquity Guides (undated).

4 Site description

4.1 Landscape and land use

The development site is situated within agricultural land measuring approximately 140m eastwest by 260m north-south, and is located between a footpath north of Ellerslie House and an access track to properties off Lynhurst Avenue as shown in Figure 1. Topographically, the site is located on a north-facing slope below a northwest to southeast orientated ridgeline. The height drops down from 49m AOD to 25m AOD (Passmore, 2014: 1).

4.2 Geology

The solid geology underlying the area comprises grey mudstones and siltstones with thin- to thick-bedded, locally calcareous sandstones and beds and lenses of limestone of the Carboniferous and Devonian Pilton Mudstone Formation. The superficial geology in not recorded in the source used (British Geological Survey, undated).

5 Archaeological background

5.1 Historic landscape characterisation

Modern enclosures adapting medieval fields.

These modern fields have been created out of probable Medieval strip-enclosures which themselves derive from the enclosure of open-field strips with hedge-banks during the later Middle ages. The sinuous medieval boundaries survive in places (Devon County Council, undated).

5.2 Historical and archaeological background

The following is a short summary of information obtained from the Devon Historic Environment Record (HER) via the Heritage Gateway (Historic England, undated). The heritage assets discussed below are within approximately 500m of the site and relevant to the understanding of the geophysical survey.

Archaeological sites, buildings, historic parks and gardens, conservation areas, registered battlefields and other aspects of the historic environment that are considered significant because of their historic, archaeological, architectural or artistic interest are considered *heritage assets*. *Designated heritage assets* are afforded protection as either scheduled monuments, listed buildings or through their inclusion within conservation areas. *Non-designated heritage assets* are potential archaeological remains and historic landscapes.

5.2.1 Heritage assets within the site

There are no known recorded heritage assets recorded within the site.

5.2.2 Heritage assets within 500m of the site

Little is known about the pre-Medieval occupation of the area. The Prehistoric period (pre-43 AD) is represented by only a stray Bronze Age (2400 BC to 700BC) axe find (Historic Environment Record MDV58015 at National Grid Reference SS 535 329) found in the adjacent field to the west of site. The presence of monuments such as a stone row in nearby Yelland (HER MDV5507 at SS 491 328) indicates Bronze Age activity in the wider landscape and therefore a potential for further finds of that date cannot be ruled out.

From the Medieval period (1066 AD to 1499 AD) onwards the site was located within the agrarian setting between the settlements of Fremington and Barnstaple, evidence of Medieval

ridge and furrow strip field systems have been recorded to the far south west of the site (MDV58776 at SS 527 321) and on the opposite side of the River Taw to the north east of the site at Pottington (HER MDV80172 at NGR SS 547 338).

In very close proximity to the south west of the site lies the Post-medieval site of Belmont College (1751 AD 2000 AD between), formerly a large house by the name of Ellerslie (MDV32669 at SS 536 324) the area has now been redeveloped for residential housing. A grade II listed 19th century (1801 AD 1900 AD) Gothic lookout tower (HER MDV32670 at NGR SS 536 326) associated with Ellerslie still remains to the south west of the site. It is the subject of a Heritage Statement produced by AC Archaeology Ltd (Passmore, 2014).

Possible faint lynchets of unknown date were recorded in an adjacent field to the east of the site (MDV14463, SX 878 729). Curvilinear fields, implying a Medieval origin but of unknown date, were recorded on late nineteenth century Ordnance Survey maps and lynchets were visible in 1977 some 80m southeast of the site (MDV14461, SX 877 726).

6 Results, discussion and conclusions

This survey was designed to record magnetic anomalies. The anomalies themselves cannot be regarded as actual archaeological features and the dimensions of the anomalies shown do not represent the dimensions of any associated archaeological features. The analysis presented below identifies and characterises anomalies and anomaly groups that may relate to archaeological deposits and structures.

Archaeological structures, features and deposits refer to any artefacts, material deposits or disturbance of natural deposits thought to be the result of human activity and not undertaken as recent land maintenance or farming.

The reader is referred to section 7.

6.1 Results

Figure 2 shows the interpretation of the survey data. It includes the anomaly groups identified as relating to archaeological deposits along with their numbers. Table 1 is an extract of the detailed analysis of the survey data which is provided in the attribute tables of the GIS project on the accompanying CD-ROM and in the project archive.

Figure 2 and Table 1 comprise the analysis of the survey data.

Figures 3 and 4 are plots of processed data as specified in Table 3. These plots represent different views of the data that were used to assess potential archaeology.

6.2 Discussion

6.2.1 General points

Discussion 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 the survey archive.

Data collection

Data collection along the site edges was restricted as shown in Figures 3 and 4 due to the presence of magnetic materials adjacent to the site. Strong magnetic responses mapped close to survey boundaries are likely to relate to these materials except where otherwise indicated in Figure 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 are only mapped as potential archaeology if they are clustered in groups or otherwise form recognisable patterns.

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. If mapped, they are listed in Table 1 but are not discussed below.

Anomalies thought to relate to natural features were not mapped.

General data trends

A north-north-west to south-south-east trend in the data represents recent ploughing (Figures 3 and 4).

6.2.2 Data relating to historical maps and other records

Magnetic anomaly groups 1, 3, 5, 9, 11, 12 and 13 represent former field boundaries mapped by the Ordnance Survey as shown in Table 1.

6.2.3 Data with no previous archaeological provenance

Group 4 appears to be an extension of a farm track which itself was only mapped by the Ordnance Survey on maps produced in 1964 onwards. It is not clear whether this anomaly group and the track represent an earlier historical feature such as a field boundary or have recent origins.

All of the remaining mapped anomaly groups are most likely to represent fragments of linear deposits such as ditches and are typical of anomalies representing remnants of earlier fields.

6.3 Conclusions

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

Thirteen magnetic anomaly groups were mapped as possibly representing archaeological deposits or features. Seven of these represent former field boundaries mapped by the Ordnance Survey in and after 1890 and now removed. The remainder are typical of anomalies representing remnants of earlier fields.

7 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.

Ross Dean, trading as Substrata, 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 copyright or the intellectual property of third parties. Such material is labelled with the appropriate copyright and is non-transferrable by Substrata.

8 Acknowledgements

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

9 Bibliography

Archaeology Data Service/Digital Antiquity Guides to Good Practice: Geophysical Data in Archaeology [Online], Available: http://guides.archaeologydataservice.ac.uk/g2gp/Geophysics_Toc [December 2015]

British Geological Survey (undated) Geology of Britain viewer, [Online], Available: http:// www.bgs.ac.uk/discovering Geology/geologyOfBritain/viewer.html [December 2015]

Chartered Institute for Archaeologists (2014a) Standard and guidance archaeological geophysical survey. Reading: Author [Online], Available: http://www.archaeologists.net/sites/default/files/ CIFAS&GGeophysics_1.pdf [December 2015]

Chartered Institute for Archaeologists (2014b) Code of conduct. Reading: Author [Online], http://www.archaeologists.net/sites/default/files/CodesofConduct.pdf [December 2015]

Clark, A. (2000) Seeing Beneath the Soil, Prospecting methods in archaeology, London: Routledge

Devon County Council (undated) *Historic Landscape Characterisation* [Online], Available: http://www.devon.gov.uk/landscape-characterisation [December 2015]

Dean, R. (2015) A gradiometer survey method statement, Belmont Park, Bickington, Fremington, Devon, Substrata unpublished document

Historic England (undated) *Heritage Gateway* [Online], Available: http://www.heritagegateway.org.uk/ gateway/ [December 2015]

Historic England (2010) *Geophysical Survey in Archaeological Field Evaluation*, [Online], Available: https://content.historicengland.org.uk/images-books/publications/geophysical-survey-in-archaeological-field-evaluation/geophysics-guidelines.pdf/ [December 2015]

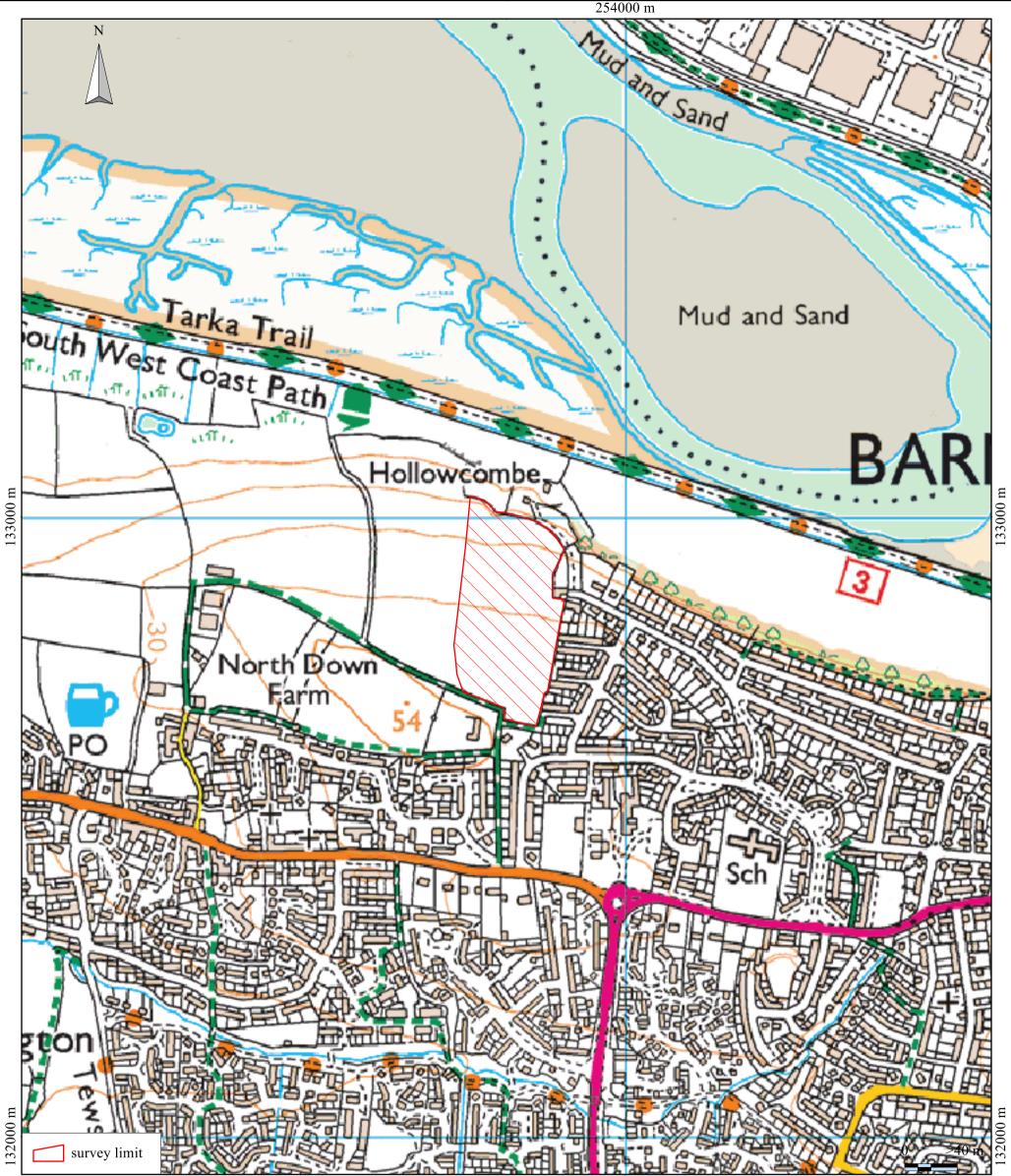
Passmore, A. (2014) *Belmont Park, Bickington, Fremington, Devon (NGR SS 53736 32870) Heritage Statement*, AC Archaeology Ltd, unpublished document ACD890/1/1

Appendix 1 Analysis table and supporting plots

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.



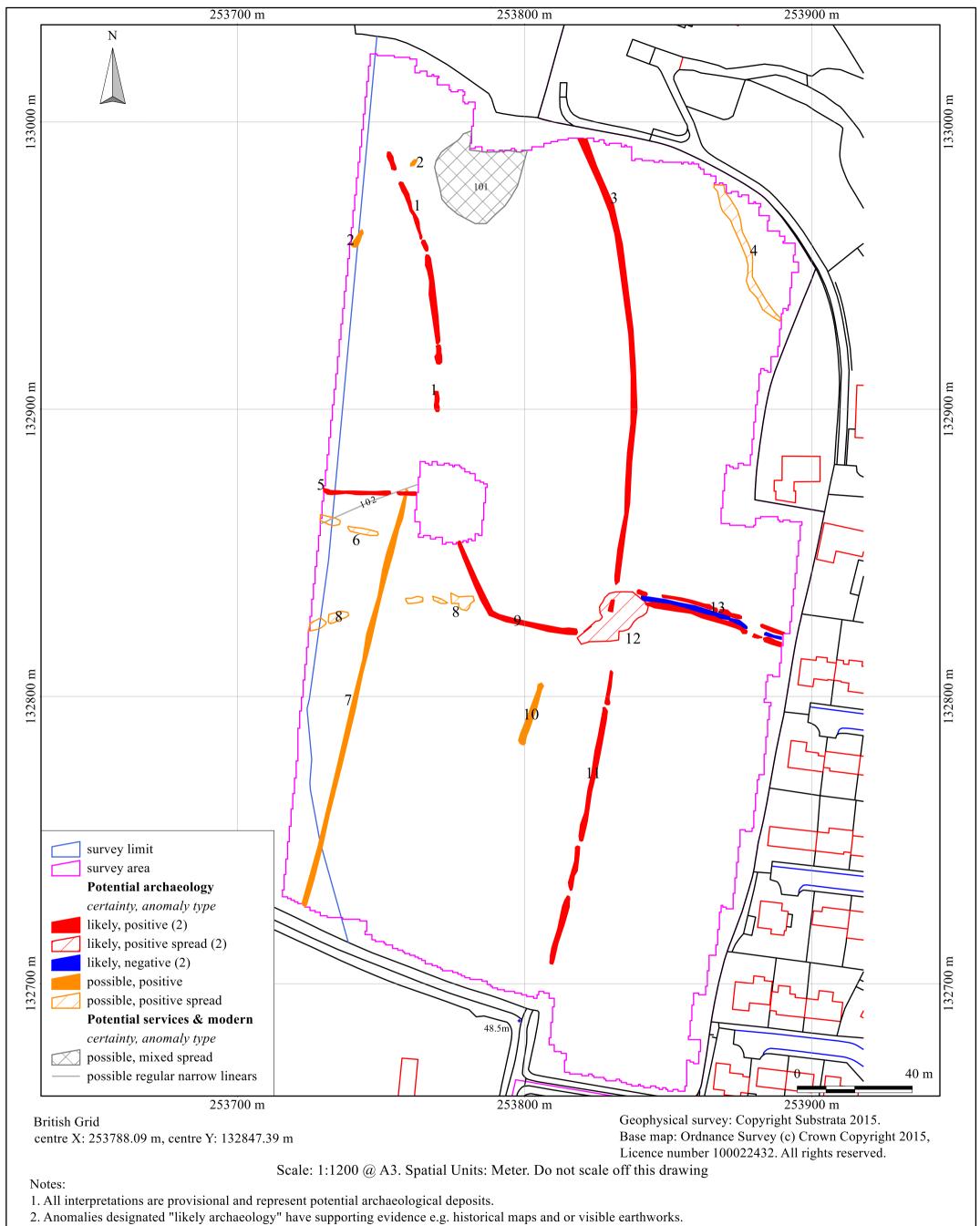
254000 m

British Grid centre X: 253808.21 m, centre Y: 132871.28 m Geophysical survey: Copyright Substrata 2015. Base map: Ordnance Survey (c) Crown Copyright 2015, Licence number 100022432. All rights reserved.

Scale: 1:6000 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 1: location map



3. Representative; not all instances are mapped.

4. Anomalies likely to represent geological or other natural deposits are not mapped unless relevant to potential archaeological events or deposits.

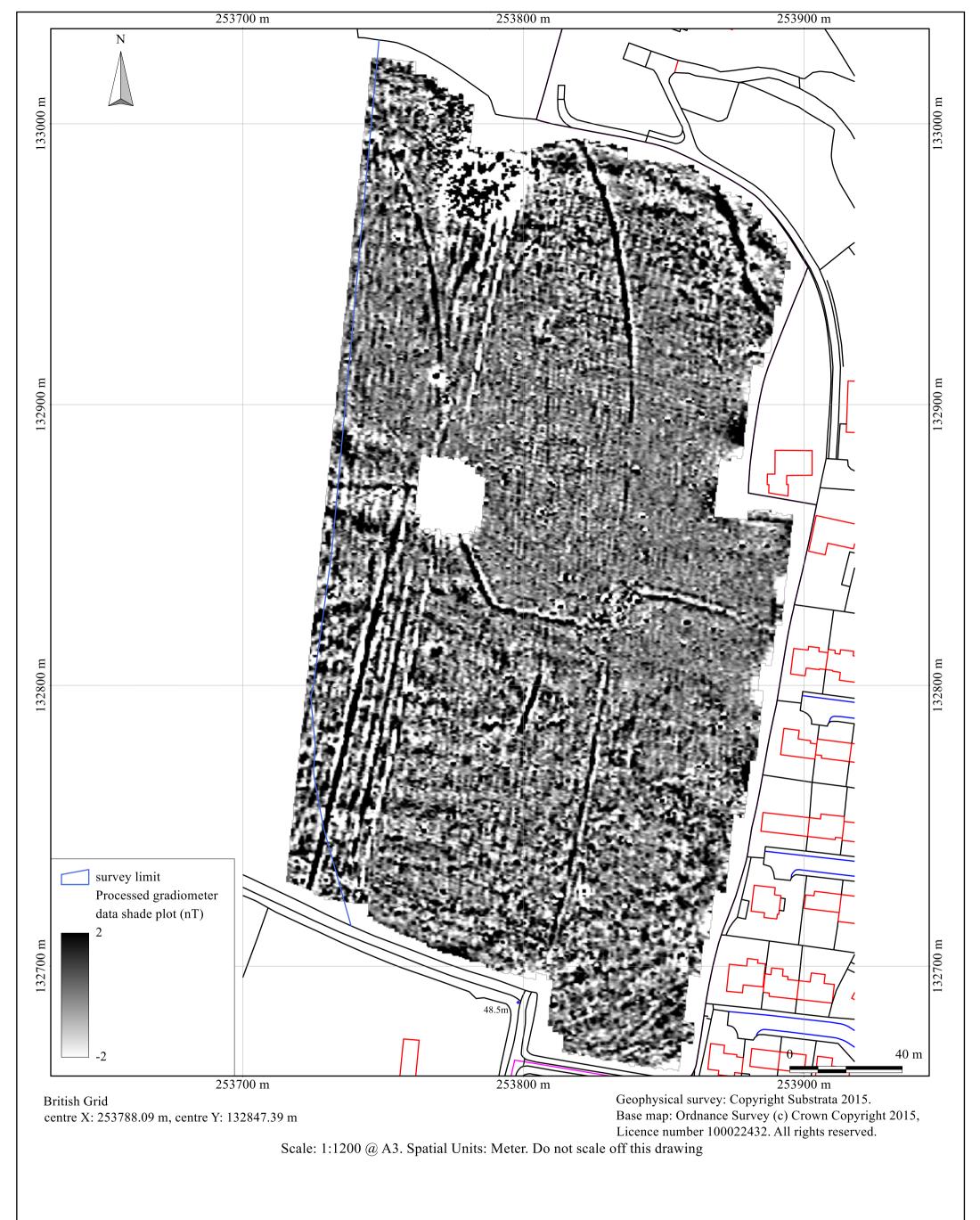
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Figure 2: survey interpretation

Site: An archaeological gradiometer survey Belmont Park, Bickington, Fremington, Devon Centred on NGR (E/N): 253736,132870 (point) Report: 111BEL-R-1

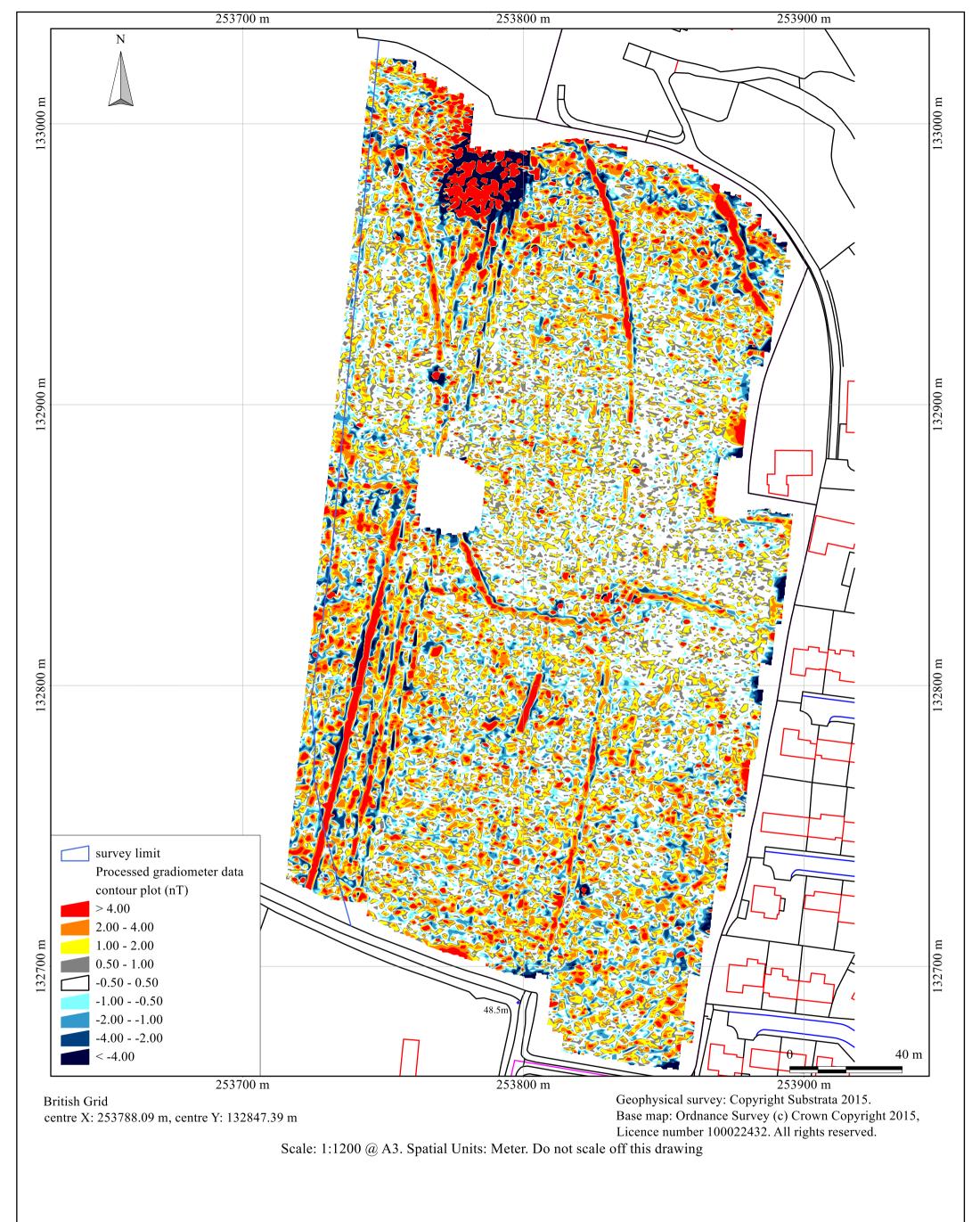
anomaly	associated	anomaly characterisation	anomaly form	additional archaeological	comments	supporting evidence
group	anomalies	certainty & class		characterisation		
1	9	likely, positive	disrupted curvilinear	field wall	anomaly group coincides with and represents a field wall mapped by the Ordnance Survey between 1890 and 1964	Ordnance Survey maps 1890 1:10560 to 1992 1:10000
2		possible, positive	disrupted linear			
3	11 13	likely, positive	curvilinear	field wall	anomaly group coincides with and represents a field wall mapped by the Ordnance Survey with a of a section at the southern end removed before 1932 and the whole wall removed by 1958	Ordnance Survey maps 1890 1:10560 to 1992 1:10000
4		possible, positive spread	broad linear		anomaly group appears to represent a southern extension of an extant farm track mapped from 1964 onwards	Ordnance Survey maps 1890 1:10560 to 1992 1:10000
5		likely, positive	disrupted linear	field wall	anomaly group coincides with and represents a field wall mapped by the Ordnance Survey between 1890 and 1976	Ordnance Survey maps 1890 1:10560 to 1992 1:10000
6		possible, positive spread	broad disrupted linear			
7		possible, positive	linear	field wall		
8		possible, positive spread	broad disrupted linear			
9	1 13	likely, positive	bilinear	field wall	anomaly group coincides with and represents a field wall mapped by the Ordnance Survey between 1890 and 1964	Ordnance Survey maps 1890 1:10560 to 1992 1:10000
10		possible, positive	linear			
11	3 11 13	likely, positive	disrupted linear		anomaly group coincides with and represents a field wall mapped by the Ordnance Survey between 1890 and 1964	Ordnance Survey maps 1890 1:10560 to 1992 1:10000
12		likely, positive spread	irregular	rubble	anomaly group probably represents demolition rubble from former mapped field walls	Ordnance Survey maps 1890 1:10560 to 1992 1:10000
13		likely, positive/negative/positive	linear	field wall - Devon bank	anomaly group coincides with and represents a field wall mapped by the Ordnance Survey between 1890 and 1958	Ordnance Survey maps 1890 1:10560 to 1964 1:10560
101		possible, low contrast linear		service trench		
102		possible, mixed spread	irregular	rubble or land-fill		

Table 1: data analysis



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Figure 3: shade plot of processed data



An archaeological gradiometer survey Belmont Park, Bickington, Fremington, Devon Centred on NGR (E/N): 253736,132870 (point) Report: 111BEL-R-1

Figure 4: contour plot of processed data

Appendix 2 Methodology Summary

Table 2: methodology summary			
Documents Survey methodology statement: Dean (2015)			
 Methodology The work was undertaken in accordance with the survey methodology statement. The geophysical (gradiometer) survey was undertaken with reference to standard guidance provided by the Chartered Institute for Archaeologists (2014) and Archaeology Data Service/ Digital Antiquity Guides (undated). The survey grid location information and grid plan was recorded as part of the project in a suitable GIS system. Data processing was undertaken using appropriate software, with all anomalies being digitised and geo-referenced. The final report included 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. 			
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 <i>Instrument:</i> Bartington Instruments grad601-2 <i>Firmware:</i> version 6.1	Data Capture Sample Interval: 0.25m Traverse Interval: 1 metre Traverse Method: zigzag Traverse Orientation: GN6		
Data Processing, Analysis and Presentation Software IntelliCAD Technology Consortium IntelliCAD 8.0 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			

Appendix 3 Data processing				
Table 3: gradiometer s	survey - processed data metadata			
	Bartington Grad 610 nT erse: see below ZigZag 2 @ 1.00 m spacing. 32702			
Stats Max: 70.96 Min: -81.29 Std Dev: 3.62 Mean: 0.07 Median: 0.00 Surveyed Area: 4.5564 ha	 Processes: 15 1 Base Layer 2 Clip at 1.00 SD 3 De Stagger: Grids: All Mode: Both By: -2 intervals 4 De Stagger: Grids: b14.xgd Mode: Both By: 1 intervals 5 De Stagger: Grids: a18.xgd Mode: Both By: 1 intervals 6 De Stagger: Grids: c1.xgd c2.xgd c3.xgd c4.xgd c5.xgd c6.xgd c7.xgd c8.xgd c9.xgd c10.xgd Mode: Both By: 2 intervals 7 De Stagger: Grids: c19+a3.xgd a4+c18.xgd c17+a5.xgd c16+a6.xgd c15+a7.xgd a8+c14.xgd a9+c13.xgd c12.xgd c11.xgd Mode: Both By: 1 intervals 8 De Stagger: Grids: c1.xgd c2.xgd c3.xgd c4.xgd c5.xgd c6.xgd c7.xgd c8.xgd c9.xgd c10.xgd Mode: Both By: -2 intervals 9 De Stagger: Grids: c15+a7.xgd a8+c14.xgd a9+c13.xgd c12.xgd c11.xgd Mode: Both By: -2 intervals 10 De Stagger: Grids: a4+c18.xgd c17+a5.xgd c16+a6.xgd Mode: Both By: -2 intervals 11 Clip at 2.00 SD 12 DeStripe Median Traverse: Grids: a22.xgd b19.xgd a1.xgd a21.xgd a23.xgd b18.xgd c1.xgd a25.xgd b16.xgd b21.xgd c3.xgd a4+c18.xgd a18.xgd b1.xgd b15.xgd b22.xgd c4.xgd c17+a5.xgd a17 xgd b2 xgd b14 xgd b23 xgd c5 xgd c16+a6 xgd a16 xgd 			

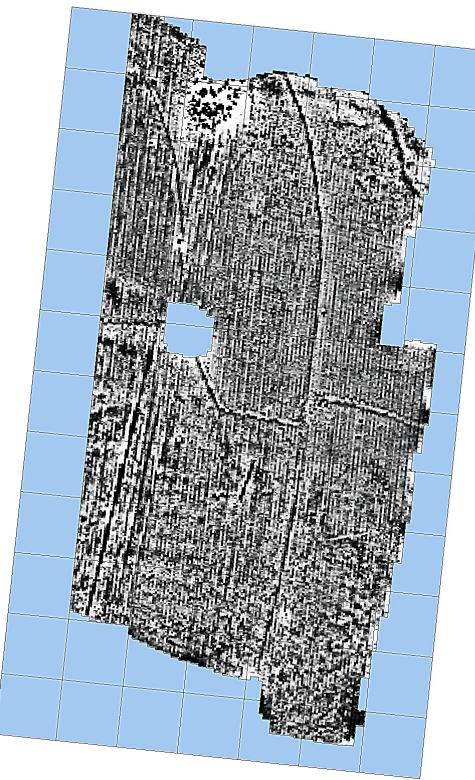
all.xgd b8.xgd

a17.xgd b2.xgd b14.xgd b23.xgd c5.xgd c16+a6.xgd a16.xgd b3.xgd b13.xgd b24.xgd c6.xgd c15+a7.xgd a15.xgd b4.xgd

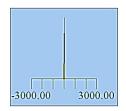
b12.xgd b25.xgd c7.xgd a8+c14.xgd a14.xgd b5.xgd b11.xgd
c8.xgd a9+c13.xgd a13.xgd b6.xgd b10.xgd b26.xgd
13 DeStripe Median Traverse: Grids: a12.xgd b7.xgd b9.xgd b27.xgd

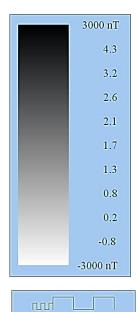
14 DeStripe Median Traverse: Grids: c9.xgd c10.xgd

15 Interpolate: Match X & Y Doubled.









	-10	0	10	20	30	
Bartington Grad 610						

Instrument Type:	Bartington Grad 610
Units:	nT
Direction of 1st Trav	verse: 0 deg
Collection Method:	ZigZag
Sensors:	2 @ 0.00 m spacing.
Dummy Value:	2047.5

DimensionsComposite Size (readings):1440 x 210Survey Size (meters):360 m x 210 mGrid Size:30 m x 30 mX Interval:0.25 mY Interval:1 m

Stats Max: Min: Std Dev: Mean: Median: Composite Area: Surveyed Area:

3000.00 -3000.00 186.55 0.47 1.70 7.56 ha 4.5702 ha

PROGRAM Name: Version:

TerraSurveyor 3.0.28.1

Processes: 1 1 Base Layer

Figure 5: shade plot of unprocessed data