



An archaeological magnetometer survey

Land at Poughill Road, Bude, Cornwall

Centred on NGR (E/N): 221640,107460

Report: 1711POU-R-1

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29 December 2017

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E Trewin & Sons
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Project archive

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

Website: substrata.co.uk

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

1 Survey description and summary

1.1 Survey

Type: twin-sensor fluxgate gradiometer
Date: 12 and 13 December 2017
Area: 2.7ha
Lead surveyor: Mark Edwards BA
Author: Ross Dean BSc MSc MA MifA

1.2 Clients details

E Trewin & Sons, Higher Northcott Barn, Poughill, Bude, Cornwall, EX23 9EQ

1.3 Location

Site: Land at Poughill Road
Civil Parish: Bude-Stratton
District: North Cornwall
County: Cornwall
Nearest Postcode: EX23 8PD
NGR: SS 21640 07460 (point)
NGR (E/N): 221640,107460 (point)

1.4 Archive

OASIS number: substrat1-304824
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 E Trewin & Sons (details above). 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.

Ten magnetic anomaly groups were mapped as representing potential archaeological deposits or features. One of these groups represents a former field boundary recorded on historic maps. The groups characteristics also point to the presence of a recent service pipe, cable or drain along the line of the former field boundary. Four anomaly groups may represent former cultivation traces from ridge-and-furrow ploughing although natural origins for these groups cannot be ruled out. The remaining anomaly groups have characteristics typical of fragmented deposits such as ditches from former field or enclosure boundaries.

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 were recorded as part of the project in a suitable GIS system (Table 3).

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

4 Standards

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

5 Site description

5.1 Landscape and land use

The survey area comprises part of one field off Poughill Road opposite Seawell Road in the Parish of Bude-Stratton, North Cornwall (Figure 1). The field was bounded by hedges and had been harvested at the time of the survey. In addition to Poughill Road to the south, the field has agricultural fields to the north and east and a lane to the west.

5.2 Geology

The bedrock across the site comprises sandstone of the Carboniferous Bude Formation. Generically the Bude Formation consists of grey thick-bedded, somewhat argillaceous and silty sandstones, in laterally discontinuous internally massive beds 1-5m thick and commonly amalgamated into units up to 10m thick. Very thick beds of slumped and de-stratified strata are also present. Grey mudstones occur as interbeds up to 1m thick but locally packets of darker mudstone up to 20m thick with thin ironstone beds and bundles of thin sandstones are present, especially in the upper part of the Formation (British Geological Survey, undated).

The superficial deposits for the site are unknown (ibid).

6 Archaeological background

6.1 Historic landscape characterisation

‘Farmland: Medieval’. The agricultural heartland, with farming settlements documented before the 17th century AD and whose field patterns are morphologically distinct from the generally straight-sided fields of later enclosure; either medieval or prehistoric origins (Cornwall Council, undated).

6.2 Summary of archaeological background

The Cornwall and Scilly Historic Environment Record (HER) 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 HER entries though relevant to the survey.

7 Results, discussion and conclusions

7.1 Scope and definitions

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

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

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

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

The reader is referred to section 8.

7.2 Results

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

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

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

7.3 Discussion

7.3.1 General points

Discussion scope

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

Data collection

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

Anomaly characterisation and mapping

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

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

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

Data trends

Sets of parallel linear anomalies trending west-north-west to east-south-east in the western and central sections of the survey area, and north-south in the eastern section of the survey area, were interpreted as relatively recent ploughing disturbance.

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

Magnetic anomaly group **9** coincides with a former field boundary recorded on historic Ordnance Survey maps between 1885 and 1970. It is likely to represent remnant deposits from this boundary along with a recent service such as an iron or steel pipe, cable or drain.

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

Anomaly groups **1 to 4** may to represent former cultivation traces such as remnant ridge-and-furrow although a natural origin such as the influence of underlying geology cannot be ruled out. If these groups represent cultivation traces, then groups 1, 3 and 4 are clearer in the dataset and may represent former field boundaries or other boundaries within a ridge-and-furrow system.

Groups **5, 6 and 7** may represent the fragments of a linear archaeological feature such as a field boundary ditch although group 5 is slightly off the line of groups 6 and 7 and may be a separate remnant.

Group **8** is a curvilinear anomaly of unknown provenance which may have an archaeological origin. At first sight of the raw data the group could be mistaken as being part of a larger circular feature. On a detailed analysis of the data, however, this apparent feature is not present.

Group **10** has characteristics typical of a fragmented linear deposit such as a ditch of a former field boundary.

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.

Ten magnetic anomaly groups were mapped as representing potential archaeological deposits or features. One of these groups (9) represents a former field boundary recorded on historic maps. The groups characteristics also point to the presence of a recent service pipe, cable or drain along the line of the former field boundary. Four anomaly groups (1 to 4) may represent former cultivation traces from ridge-and-furrow ploughing although natural origins for these groups cannot be ruled out. The remaining anomaly groups (5, 6, 7, 8 and 10) have characteristics typical of fragmented deposits such as ditches from former field or enclosure boundaries.

8 Disclaimer and copyright

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

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9 Acknowledgements

Substrata would like to thank E Trewin & Sons for commissioning us to complete this survey.

10 Bibliography

Archaeology Data Service (undated) *Archaeology Data Service/Digital Antiquity Guides to Good Practice: Geophysical Data in Archaeology*. [Online], Available: http://guides.archaeologydataservice.ac.uk/g2gp/Geophysics_Toc [December 2017]

British Geological Survey (undated) *Geology of Britain viewer, 1:50000 scale data* [Online], Available: [http://www.bgs.ac.uk/discovering Geology/geologyOfBritain/viewer.html](http://www.bgs.ac.uk/discovering_Geology/geologyOfBritain/viewer.html) [December 2017]

Chartered Institute for Archaeologists (2014a) *Standard and guidance archaeological geophysical survey* [Online], Available: http://www.archaeologists.net/sites/default/files/CIfAS&GGeophysics_1.pdf [December 2017]

Chartered Institute for Archaeologists (2014b) *Code of conduct* [Online], <http://www.archaeologists.net/sites/default/files/CodesofConduct.pdf> [December 2017]

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

Cornwall Council (undated) *Interactive Map* [Online], <https://map.cornwall.gov.uk/website/ccmap/?zoomlevel=1&xcoord=162690&ycoord=64380&wsName=ccmap&layerName=> [December 2017]

Dean, R. (2017) *A survey method statement for a detailed magnetometer survey over land at Poughill Road, Bude, Cornwall*. Substrata Ltd unpublished document 1711POU-M-1

Historic England (undated) *Heritage Gateway* [Online], <http://www.heritagegateway.org.uk/Gateway/> [December 2017]

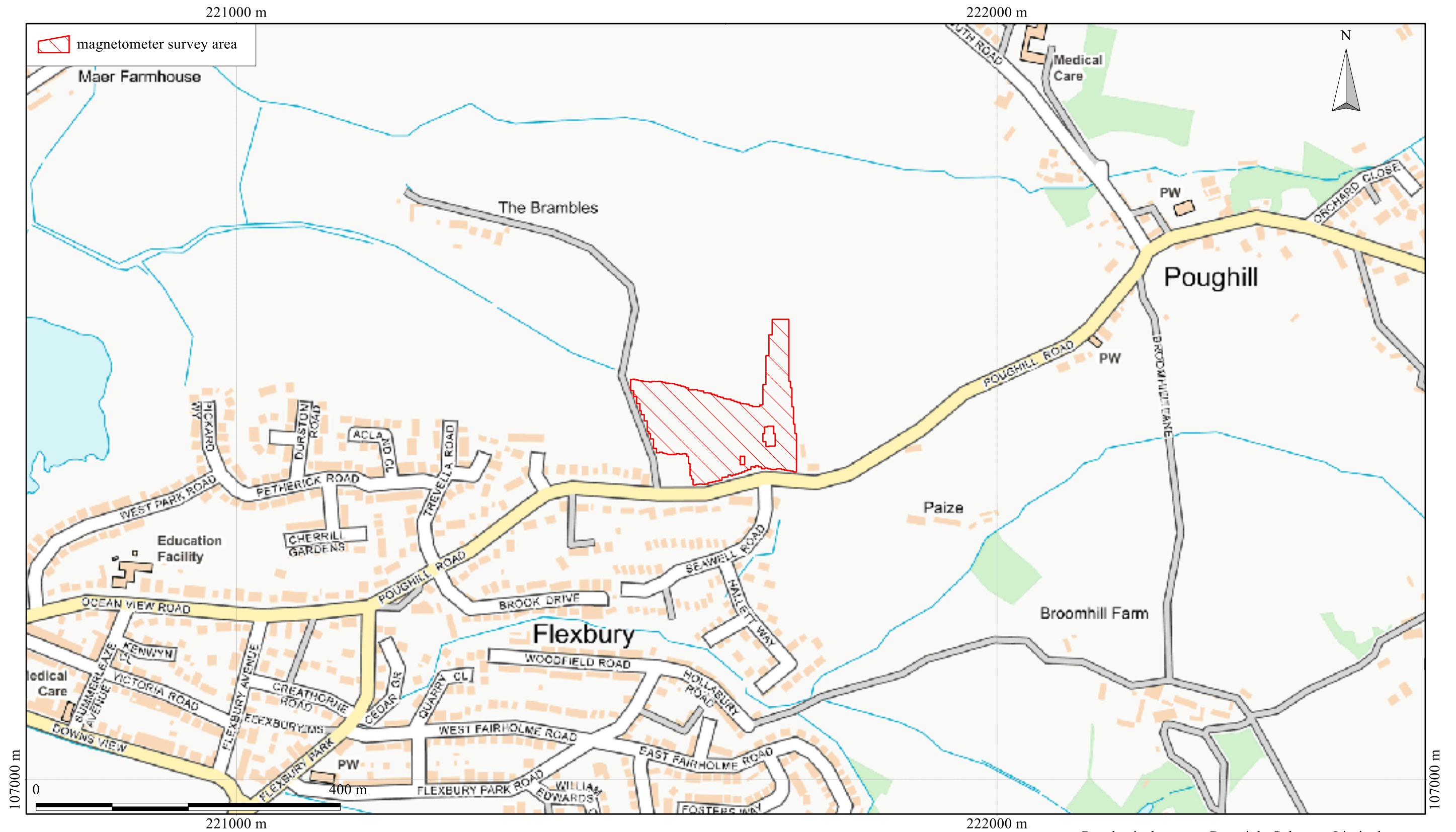
Historic England (2010) *Geophysical Survey in Archaeological Field Evaluation* [Online], Available: <https://content.historicengland.org.uk/images-books/publications/geophysical-survey-in-archaeological-field-evaluation/geophysics-guidelines.pdf/> [December 2017]

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: 221643.28 m, centre Y: 107474.56 m

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

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

An archaeological magnetometer survey
Land at Poughill Road, Bude, Cornwall
Centred on NGR (E/N): 221640,107460
Report: 1711POU-R-1

Figure 1: location map

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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: 221622.08 m, centre Y: 107494.91 m

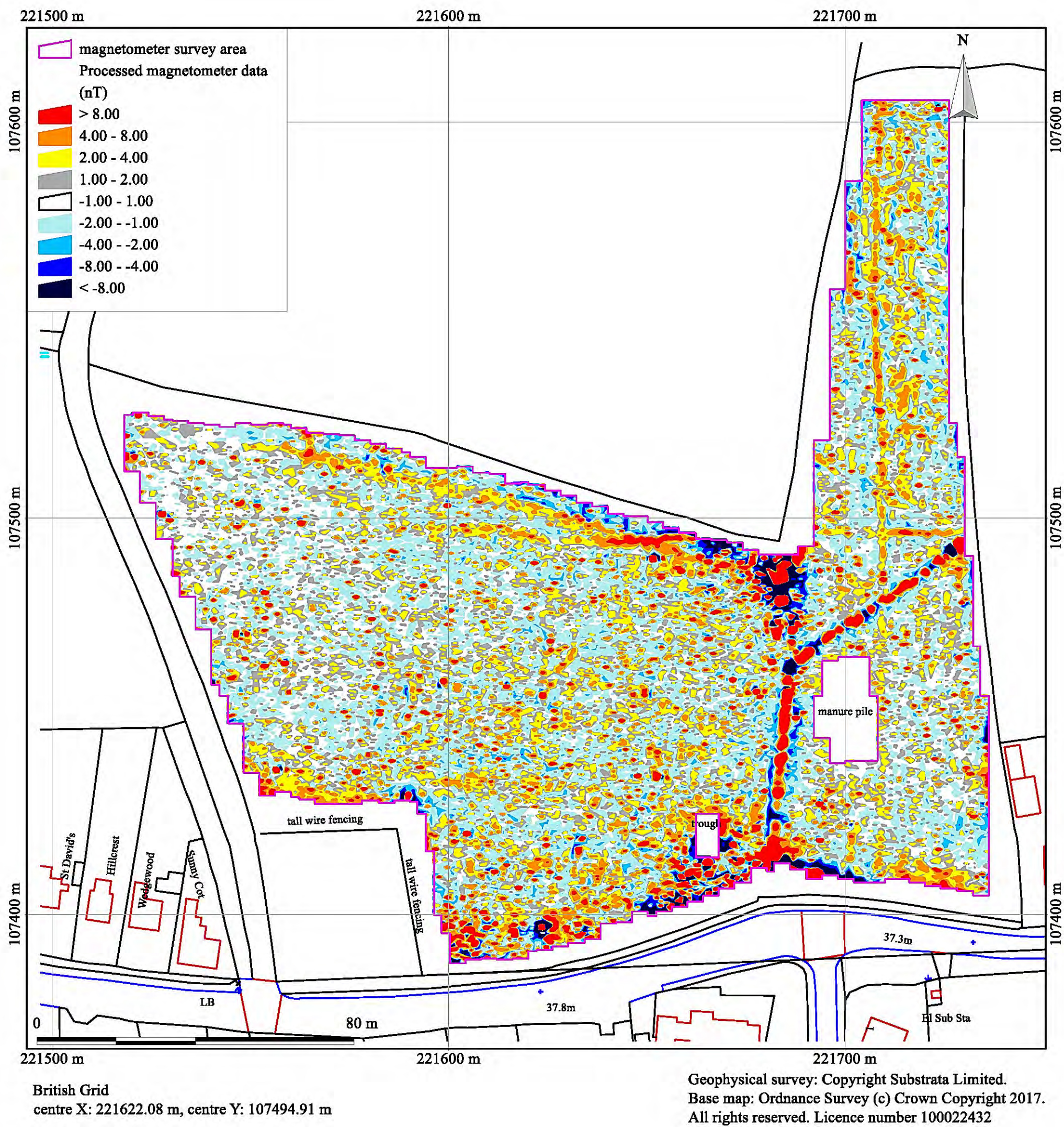
Geophysical survey: Copyright Substrata Limited.
Base map: Ordnance Survey (c) Crown Copyright 2017.
All rights reserved. Licence number 100022432

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

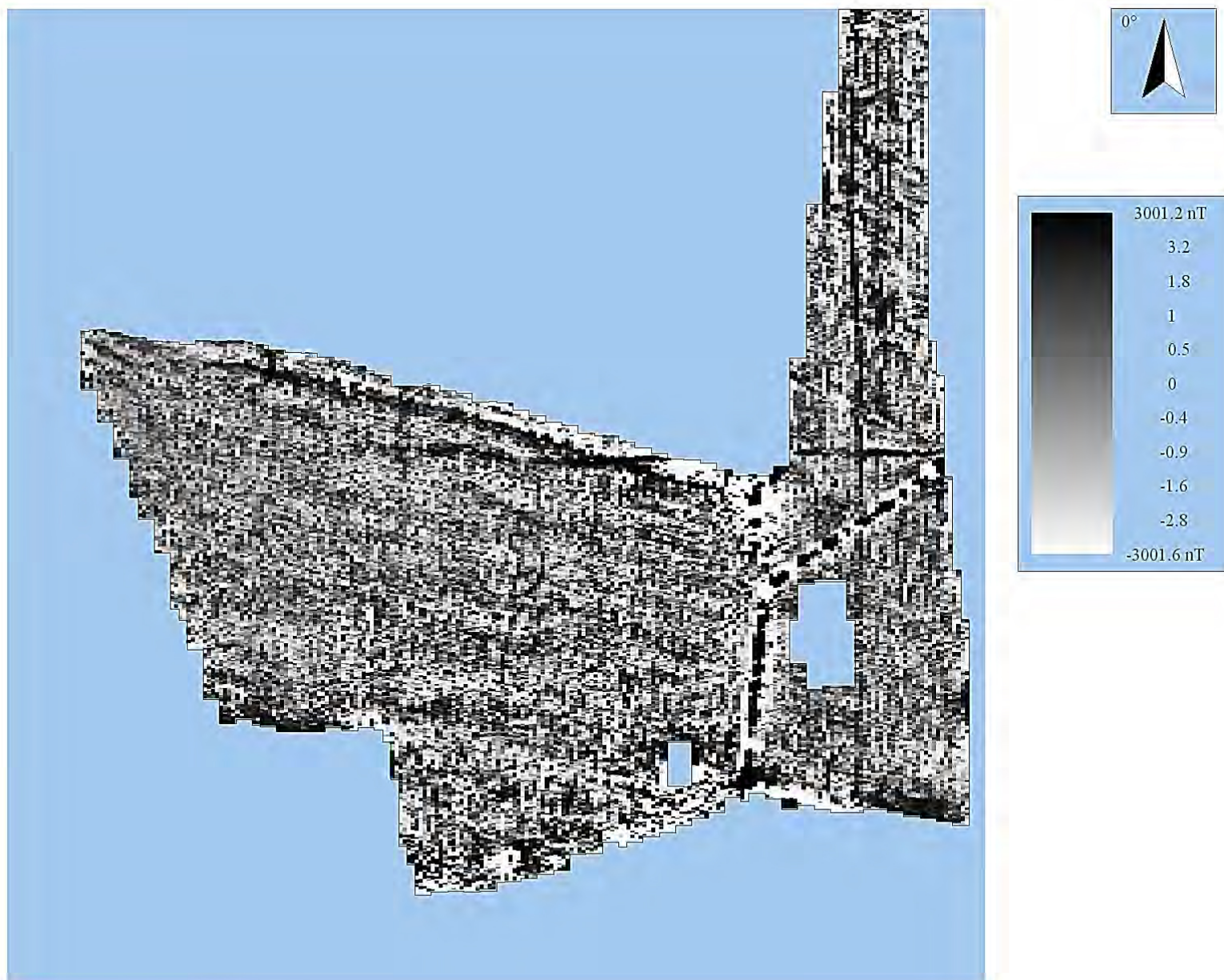
An archaeological magnetometer survey
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Figure 3: shade plot of processed data

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



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: 3001.20
 Min: -3001.60
 Std Dev: 141.02
 Mean: 0.14
 Median: 0.00
 PROGRAM
 Name: TerraSurveyor
 Version: 3.0.33.6

Processes: 1
 1 Base Layer

Figure 5: shade plot of unprocessed data

Appendix 2 Tables

An archaeological magnetometer survey
Land at Poughill Road, Bude, Cornwall
Centred on NGR (E/N): 221640,107460
Report: 1711POU-R-1

County: Cornwall
District: North Cornwall
Parish: Bude Stratton
Source: Heritage Gateway

HER number	grid reference	designations	type	period	description	distance (m) from site centre	bearing (GN) from site centre
70303	SS 2188 0753		Field system	(Medieval - 1066 AD to 1539 AD)	The remains of a field system are visible on air photos The remains are sited within an area of Anciently Enclosed Land	250	74
70378	SS 2201 0761		Ridge and Furrow	(Medieval - 1066 AD to 1539 AD)	The remains of a ridge and furrow field system are visible on air photos	399	68
70321	SS 2128 0715		Quarry	(Post Medieval - 1540 AD to 1900 AD)	A quarry is visible on air photos and was plotted as part of the NMP. The site is no longer visible, since it has been covered by housing.	474	229
133	SS 2122 0724		Settlement	(Medieval - 1066 AD to 1539 AD)	The settlement of Flexbury is first recorded in 1201 and during the late C19 it became a suburb of Bude. The name is English, but its meaning is somewhat obscure, for it seems to contain the words 'flax' and 'stronghold'	474	242
70302	SS 2115 0758		Field system	(Medieval - 1066 AD to 1539 AD)	The remains of a field system are visible on air photos	504	284
119	SS 22 07		Find spot	(Neolithic - 4000 BC to 2501 BC) (Bronze Age - 2500 BC to 801 BC)	Handful of flint arrowheads were found in Poughill parish, 'in the days of horse-drawn agriculture'	584	142
120	SS 22 07		Find spot	(Romano British - 43 AD to 409 AD)	Roman coins, including a gold coin of Trajan have been found in the parish of Poughill.	584	142

Table 1: Historical Environment Entries thought relevant to geophysical survey

Site: An archaeological magnetometer survey
Land at Poughill Road, Bude, Cornwall
Centred on NGR (E/N): 221640,107460
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anomaly group	associated anomalies	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
1	2 3 4	possible, positive	linear	cultivation traces or natural deposits		
2	1 3 4	possible, parallel linears		cultivation traces, agricultural boundary or natural deposits		
3	1 2 4	possible, parallel linears		cultivation traces, agricultural boundary or natural deposits		
4	1 2 3	possible, parallel linears		cultivation traces, agricultural boundary or natural deposits		
5	6? 7?	possible, positive	linear			
6	5? 7	possible, positive	linear			
7	5? 6	possible, positive	disrupted linear			
8		possible, positive	curvilinear			
9		likely, positive	disrupted linear	former field boundary with recent service pipe or cable	anomaly group coincides with and likely represents a former field boundary recorded on historic maps	Ordnance Survey maps 1885 1:2500 to 1970 1:2500
10		possible, positive	disrupted linear	field boundary		
301		possible, high contrast linear		ferrous cable, pipe or drain		
302		possible, high contrast linear		ferrous cable, pipe or drain		
303		possible, high contrast linear		ferrous cable, pipe or drain		
304		possible, mixed spread	irregular	rubble		
305		possible, mixed spread	irregular	rubble		

Table 2: data analysis

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

Table 3: methodology information

Instrument Type: Bartington Grad-601 gradiometer Units: nT Direction of 1st Traverse: see below Collection Method: ZigZag Sensors: 2 @ 1.00 m spacing. Dummy Value: 32702	
Program Name: TerraSurveyor Version: 3.0.33.6	
Statistics Max: 237.16 Min: -175.15 Std Dev: 9.64 Mean: 0.14 Median: 0.00	Processing 1 Base Layer 2 Clip at 1.00 SD 3 DeStripe Median Sensors: Grids: All 4 Interpolate: Match X & Y Doubled.

Table 4: processed data metadata