Substrata
Archaeological Geophysical Surveyors

An archaeological magnetometer survey

Land adjacent to Rosecott Park, East Road, Kilkhampton, Bude, Cornwall

Centred on NGR (E/N): 225520,111270

Report: 1709ROS-R-1

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16 September 2017

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Client
Michael Vanstone Plant Hire
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Website: substrata.co.uk
For an overview of Substrata, our archaeological geophysical surveying techniques and the results we obtain.

1 Survey description and summary

1.1 Survey

Type:	twin-sensor fluxgate gradiometer
Date:	7 September 2017
Area:	1.3ha
Lead surveyor:	Mark Edwards BA
Author:	Ross Dean BSc MSc MA MIfA

1.2 Clients

This survey was commissioned by Trewin Design Architects Ltd, 1 Stanhope Square, Holsworthy, Devon EX22 6DR on behalf of Michael Vanstone Plant Hire, Marwood, Kilkhampton, Bude, Cornwall EX23 9RY

1.3 Location

Site:	Land adjacent to Rosecott Park, East Road, Kilkhampton, Bude, Cornwall
Civil Parish:	Kilkhampton
County:	Cornwall
Nearest Postcode:	EX23 9QG
NGR:	SS 25520 11270 (point)
NGR (E/N):	225520,111270 (point)

1.4 Archive

OASIS number:	substrat1-296037
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 Michael Vanstone Plant Hire. 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 group represents a former field boundary recorded on the Ordnance Survey 1:2500 map published in 1885 but not on later maps. Three anomaly groups may represent linear archaeological deposits such as a fragments of former field boundary ditches. It is possible that two of these comprise a former droveway or field lane. Four groups may represent similar field boundary features or relatively recent field drains. One group is likely to represent a deposit of rubble of unknown date.

2 Survey aims and objectives

2.1 Aims

To establish the presence or absence, extent and character of any archaeological features and deposits within the survey area.

2.2 Survey objectives

1. Complete a magnetometer survey across agreed parts of the survey area.
2. Identify any magnetic anomalies that may be related to archaeological deposits, structures or artefacts.
3. Within the limits of the techniques and dataset, archaeologically characterise any such

anomalies or patterns of anomalies.
4. Accurately record the location of the identified anomalies.
5. Produce a report based on the survey that is sufficiently detailed to inform any subsequent development on the survey area about the location and possible archaeological character of the recorded anomalies.

3 Methodology

The work was undertaken in accordance with the survey methodology statement (Dean, 2017).

The survey grid location information and grid plan was recorded as part of the project in a suitable GIS system (Table 3).

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

4 Standards

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

5 Site description

5.1 Landscape and land use

The survey area comprises part of one field which lies to the southeast of Kilkhampton (Figure 1). The field is bounded by wire fencing and hedges and was under stubble at the time of the survey. The northern and eastern edges of the survey area are bound by agricultural land. The B3254 East Lane runs along the southern boundary. The infrastructure of Rosecott lies on the western boundary.

5.2 Geology

(British Geological Survey, undated).

The bedrock across the site comprises sandstone, mudstone and siltstone of the Carboniferous Bude Formation. The generic description of the Bude Formation is grey thick-bedded, 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 destratified 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. Five named beds of black sulphurous "shales" with goniatite-bearing calcareous nodules occur within the Formation. Thin units of thin- to medium-bedded siltstones are also present.

The superficial deposits for the site are unknown.

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. The field patterns have either medieval or prehistoric origins (Cornwall County Council, undated)

6.2 Summary of archaeological background

The Cornwall and Scilly Isles 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 (the 'study area').

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. There are no entries recorded within the survey area. Medieval and post-medieval settlements, field systems and ridge-and-furrow are present around the survey area. Three possible iron age and/or Romano-British rounds are recorded within the study area. The site of a former post-medieval brick works may be present to the south of the survey area.

7 Results, discussion and conclusions

7.1 Scope and definitions

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

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

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

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

The reader is referred to section 8.

7.2 Results

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

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

Figures 3 and 4 are plots of processed data as specified in Table 4. Figure 5 is a plot of unprocessed 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.

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

Magnetic anomaly group **4** coincides with a former field boundary recorded on the 1:2500 Ordnance Survey map published in 1885 but not on later maps.

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

Magnetic anomaly group **1** may represent a linear deposit such as the ditch of a former field boundary.

Groups **2** and **3** have a similar trend to ridge-and-furrow recorded in an adjacent field to the north but do not have a pattern typical of anomalies associated with ridge-and-furrow. They are more likely to represent former field boundaries and their relative position suggests that they may comprise part of a droveway or lane although, as is usually the case for geophysical data, their relative dates of origin cannot be determined.

Groups **5 to 9** may represent either archaeological deposits such as filled former ditches or relatively recent field drains.

Anomaly group **10** most likely represents a deposit of rubble. Speculatively, it may be associated with the removal of the field boundary represented by group 4 but an association with recent field maintenance cannot be ruled out.

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 group (4) represents a former field boundary recorded on the Ordnance Survey 1:2500 map published in 1885 but not on later maps. Three anomaly groups (1 to 3) may represent linear archaeological deposits such as a fragments of former field boundary ditches. It is possible that two of these (2 and 3) comprise a former droveway or field lane. Four groups (5 to 9) may represent similar field boundary features or relatively recent field drains. One group (10) is likely to represent a deposit of rubble of unknown date.

8 Disclaimer and copyright

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

9 Acknowledgements

Substrata would like to thank James Trewin, Managing Director of Trewin Design Architects Ltd for commissioning us to complete this survey on behalf of Michael Vanstone Plant Hire . We would also like to thank Mr D Vanstone of Michael Vanstone Plant Hire for advising on site access.

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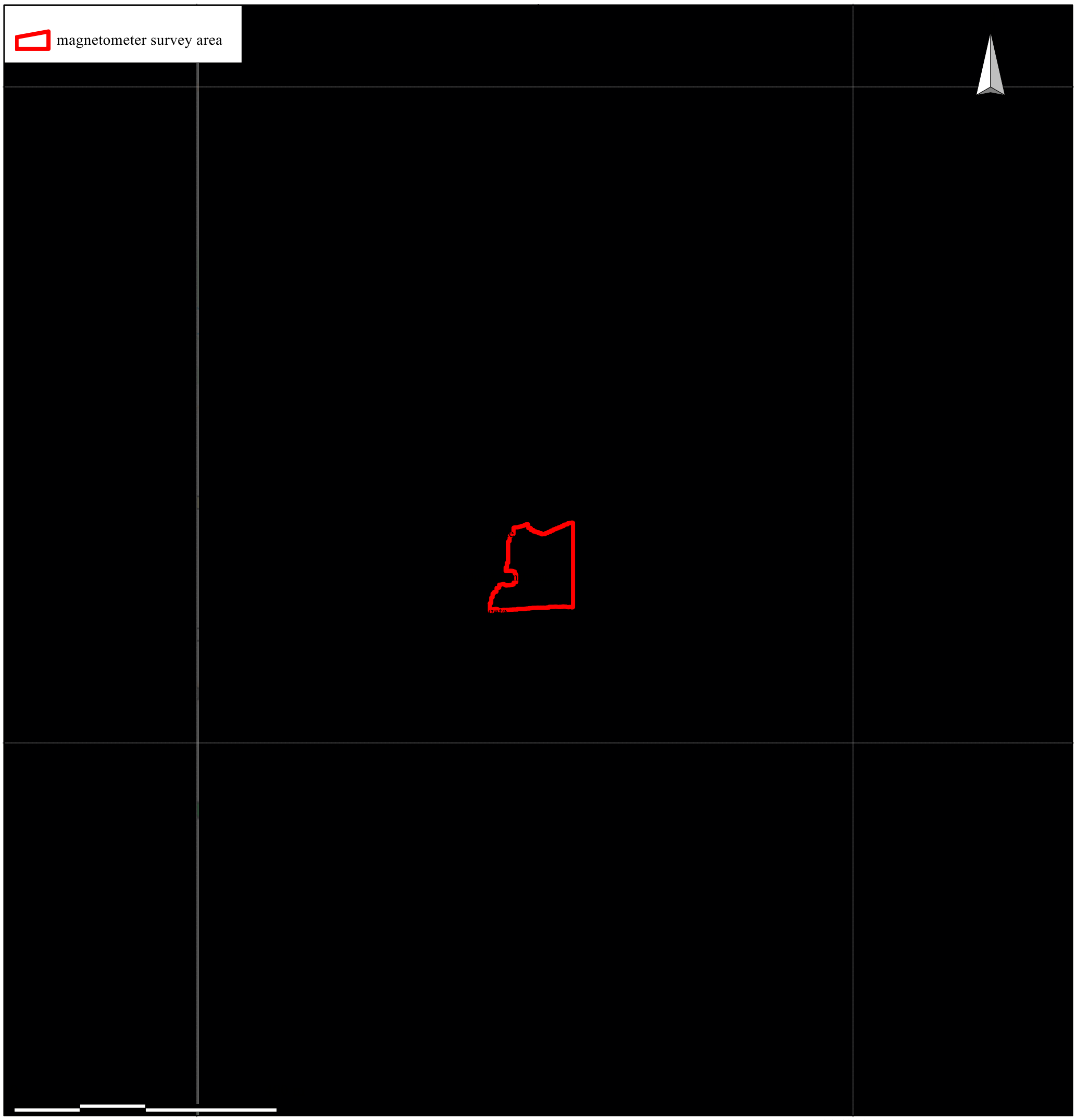
Appendix 1 Figures

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: 225520.31 m, centre Y: 111278.37 m

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

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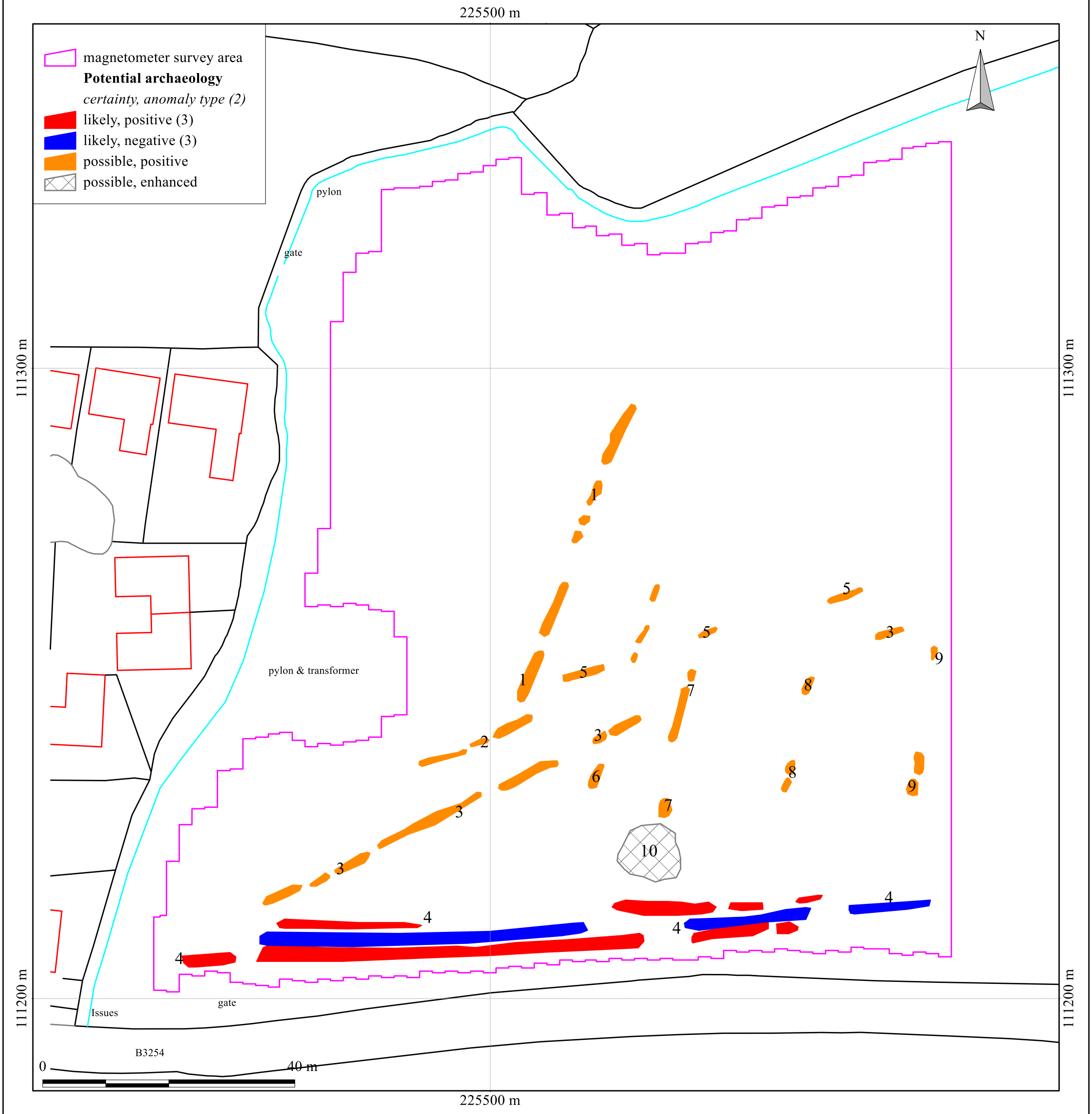
Figure 1: location map



British Grid
centre X: 225508.84 m, centre Y: 111270.00 m

Scale: 1:600 @ 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

British Grid
centre X: 225508.84 m, centre Y: 111270.00 m

Scale: 1:600 @ A3. Spatial Units: Meter. Do not scale off this drawing

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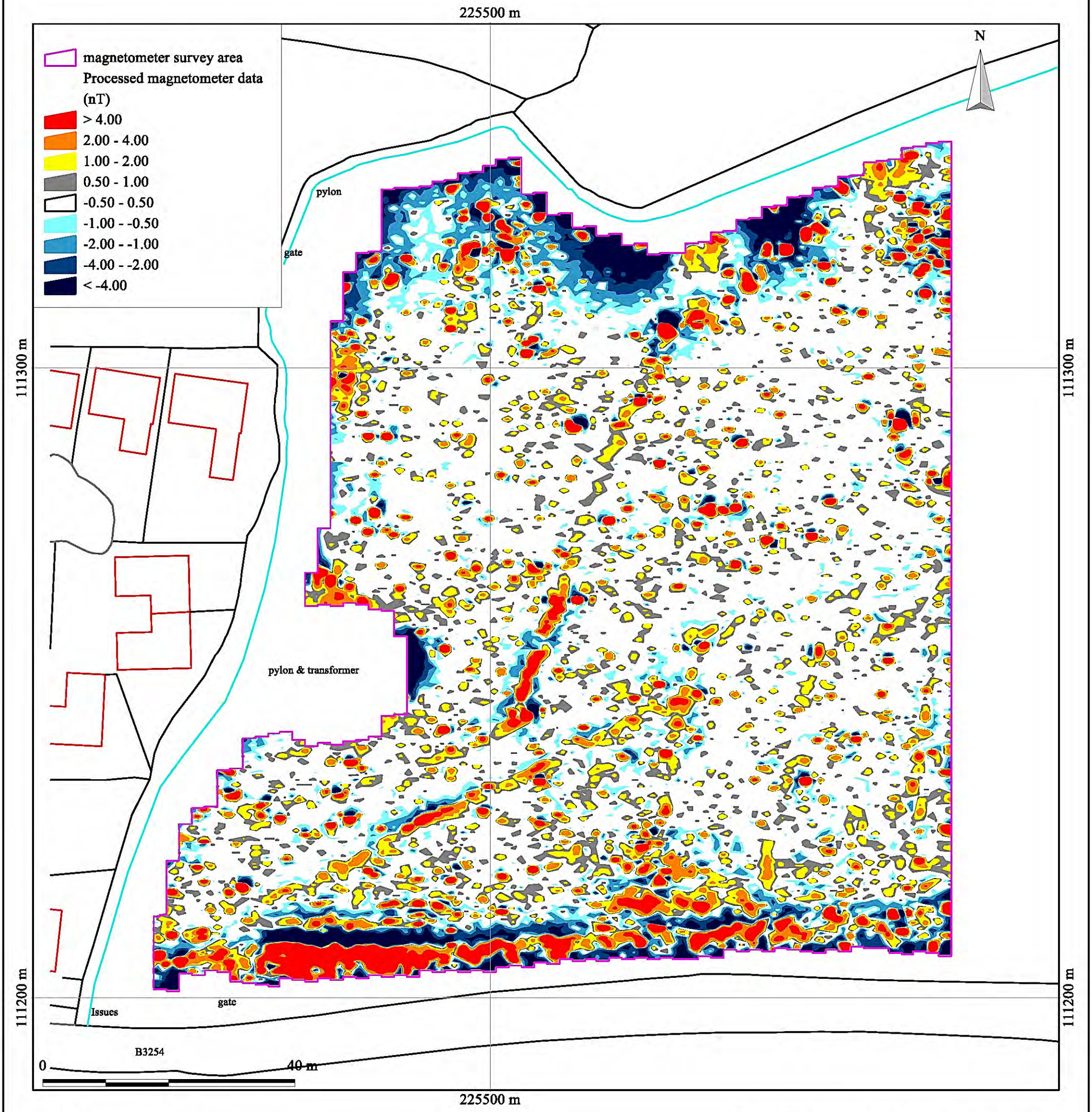
Figure 3: shade plot of processed data



British Grid
centre X: 225508.84 m, centre Y: 111270.00 m

Scale: 1:600 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 4: contour plot of processed data

Instrument Type: Bartington Grad 601
Units: nT
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 0.00 m spacing.
Dummy Value: 2047.5
Dimensions
Composite Size (readings): 600 x 150
Survey Size (meters): 150 m x 150 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m
Stats
Max: 3000.00
Min: -3000.00
Std Dev: 34.36
Mean: 0.07
Median: 0.00
PROGRAM
Name: TerraSurveyor
Version: 3.0.31.0

Processes: 1
1 Base Layer

Figure 5: shade plot of unprocessed data

Appendix 2 Tables

An archaeological magnetometer survey
Land adjacent to Rosecott Park, East Road,
Kilkhampton, Bude, Cornwall
Centred on NGR (E/N): 225520,111270
Report: 1709ROS-R-1

County: Cornwall
District:
Parish: Kilkhampton
Source: Heritage Gateway

HER number	grid reference	designations	type	period	description	distance (m) from site centre	bearing (GN) from site centre
70756	SS 2557 1135		RIDGE AND FURROW	Early Medieval to Modern - 410 AD to 2050 AD likely to be post-medieval	The remains of ridge and furrow are visible on air photos and were plotted as part of the NMP. The remains are sited within an area of Recently Enclosed Land.	94	32
70767	SS 2592 1189		QUARRY	Post Medieval - 1540 AD to 1900 AD	A quarry is visible on air photos and was plotted as part of the NMP.	738	33
70765	SS 2599 1173		FIELD SYSTEM FIELD BOUNDARY?	Early Medieval to Modern - 410 AD to 2050 AD likely to be medieval - 1066 AD to 1539 AD	The remains of a field system are visible on air photos and were plotted as part of the NMP. The remains are sited within an area of Anciently Enclosed Land.	658	46
70757	SS 2579 1137		SETTLEMENT?	Prehistoric - 500000 BC to 42 AD Early Medieval - 410 AD to 1065 AD	The earthwork remains of a complex of trackways and enclosures are visible on air photos and were plotted as part of the NMP. A central oval enclosure 35m in diameter and consisting of parallel banks flanked by ditches; its northern edge is not visible. This enclosure is surrounded by linear earthworks, which run across Lords Meadow from SE to NW and SW to NE. A smaller enclosure is visible 61m to the NE of the central feature, and has a diameter of approx. 6.0m; it consists of a single bank, and the SE edge is not visible.	288	70
70759	SS 2648 1160		ENCLOSURE ROUND? ROUND?	Unknown Iron Age - 800 BC to 42 AD Romano British - 43 AD to 409 AD	A rectilinear enclosure is visible as a cropmark on aerial photographs and was plotted as part of the NMP. The enclosure is 60m long by 44m wide; the southern edge is not visible. It is located on a south-facing slope. The size of the enclosure and its location are suggestive of an Iron Age/Romano-British round. There is not enough evidence to make a positive identification.	1015	71
70753	SS 2632 1115		RIDGE AND FURROW	Early Medieval to Modern - 410 AD to 2050 AD likely to be (Post Medieval - 1540 AD to 1900 AD	The remains of ridge and furrow are visible on air photos and were plotted as part of the NMP. The remains are sited within an area of Recently Enclosed Land.	809	99
70753	SS 2632 1115		RIDGE AND FURROW	Early Medieval to Modern - 410 AD to 2050 AD likely to be Post Medieval - 1540 AD to 1900 AD	The remains of ridge and furrow are visible on air photos and were plotted as part of the NMP. The remains are sited within an area of Recently Enclosed Land.	809	99
70751	SS 2633 1110		FIELD SYSTEM	Early Medieval to Modern - 410 AD to 2050 AD likely to be Medieval - 1066 AD to 1539 AD	The remains of a field system are visible on aerial photographs and were plotted as part of the NMP. The remains are sited within an area of Anciently Enclosed Land.	828	102
4412	SS 2592 1094		SETTLEMENT	First mentioned, Medieval - 1066 AD to 1539 AD	The settlement of Thorne is first recorded in 1413. The settlement subdivided and East Thorne is first mentioned c1580. The subdivision of West Thorne is first recorded in 1602 as 'Thorne alias Westthorne'. It may have been in existence for some time by this date and have had a medieval origin. Both East Thorne and West Thorne are still occupied.	519	130
70713	SS 2570 1083		RIDGE AND FURROW	Early Medieval to Modern - 410 AD to 2050 AD likely to be Post Medieval - 1540 AD to 1900 AD	The remains of ridge and furrow are visible on air photos and were plotted as part of the NMP. The remains are sited within an area of Recently Enclosed Land.	475	158
4437	SS 2553 1115		BRICKWORKS	Post Medieval - 1540 AD to 1900 AD	The site of a brickfield, identified as a result of local information. Nothing is recorded on the OS or NMP at this location	120	175
70754	SS 2542 1109		RIDGE AND FURROW	Early Medieval to Modern - 410 AD to 2050 AD likely to be (Post Medieval - 1540 AD to 1900 AD	The remains of ridge and furrow are visible on air photos and were plotted as part of the NMP. The remains are sited within an area of Recently Enclosed Land.	206	209
70755	SS 2545 1116		FIELD SYSTEM	Early Medieval to Modern - 410 AD to 2050 AD likely to be Post Medieval - 1540 AD to 1900 AD	The remains of a field system are visible on air photos and were plotted as part of the NMP. The remains are sited within an area of Recently Enclosed Land.	130	212
4535	SS 2485 1108		ROUND	Iron Age - 800 BC to 42 AD Romano British - 43 AD to 409 AD	The remains of an Iron Age or Romano-British defended settlement. The site is marked and named as "Winswood Castle, camp" on the 1963 OS map. In 1977 it was surveyed as a horseshoe-shaped bank, 40m in diameter, 0.5m high, about 8.0m in width with no trace of a ditch. The situation, size and plan suggest an Iron Age/Romano-British 'round' settlement. The site is visible as a faint earthwork on aerial photographs and was plotted as part of the NMP.	696	254
4451	SS 253 114		FIELD SYSTEM	Medieval - 1066 AD to 1539 AD	A open strip field system which surrounds Kilkhampton (4444) and extends westwards towards the castle. These strips are evident on the Ordnance Survey maps as well as air photographs.	256	301
4444.1	SS 2533 1139		TOWN	Medieval - 1066 AD to 1539 AD	The town of Kilkhampton, which stands on the north end of an old ridgeway that runs into Cornwall from Bideford Bay, is medieval in origin and was preceded by a Saxon manor.	225	302
4444	SS 2533 1140		SETTLEMENT MANOR	Early Medieval to Medieval - 410 AD to 1539 AD First mentioned, Medieval - 1066 AD to 1539 AD	The settlement and manor of Kilkhampton is first recorded in the Domesday survey of 1086 when it is spelt "Chilchetone".	230	304

Table 1: Historical Environment Entries thought relevant to geophysical survey, sorted by bearing

Site: An archaeological magnetometer survey
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anomaly group	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
1	possible, positive	disrupted linear			
2	possible, positive	disrupted linear		anomaly group has a similar trend to ridge-and-furrow recorded in the adjacent field to the north but here a feature such as a ditch is more likely	HER entry 70756
3	possible, positive	disrupted linear		anomaly group has a similar trend to ridge-and-furrow recorded in the adjacent field to the north but here a feature such as a ditch is more likely	HER entry 70756
4	likely, positive/negative/positive	disrupted linear	field boundary - possibly a Cornish Hedge	anomaly group approximately coincides with a partial field boundary mapped by the Ordnance Survey in 1885 but not on later maps	Ordnance Survey 1885 1:2500
5	possible, positive	disrupted linear		anomaly group has a similar trend to ridge-and-furrow recorded in the adjacent field to the north but here a feature such as a ditch or relatively recent field drain is more likely	HER entry 70756
6	possible, positive	disrupted linear		anomaly group may represent a linear archaeological feature but could represent relatively recent field drains	
7	possible, positive	disrupted linear		anomaly group may represent a linear archaeological feature but could represent relatively recent field drains	
8	possible, positive	disrupted linear		anomaly group may represent a linear archaeological feature but could represent relatively recent field drains	
9	possible, positive	disrupted linear		anomaly group may represent a linear archaeological feature but could represent relatively recent field drains	
10	possible, enhanced	irregular	rubble		

Table 1: data analysis

Grid
Method of Fixing: DGPS set-out using pre-planned survey grids and Ordnance Survey coordinates.
Composition: 30m by 30m grids
Recording: Geo-referenced and recorded using digital map tiles.
DGPS used: Spectra Precision PM5V2 GPS with external antenna and survey pole and DigiTerra Explorer 7 as the survey control program.

Equipment	**Data Capture**
Instrument: Bartington Instruments grad601-2 *Firmware:* version 6.1	*Sample Interval:* 0.25m *Traverse Interval:* 1 metre *Traverse Method:* zigzag *Traverse Orientation:* GN

Data Processing, Analysis and Presentation Software
QCAD Professional 3
DW Consulting TerraSurveyor3
Manifold System 8 GIS
Microsoft Corp. Office Excel 2013
Microsoft Corp. Office Publisher 2013
Adobe Systems Inc Adobe Acrobat 9 Pro Extended

Table 3: methodology information

Instrument

Type:	Bartington Grad-601 gradiometer
Units:	nT
Direction of 1st Traverse:	see below
Collection Method:	ZigZag
Sensors:	2 @ 1.00 m spacing.
Dummy Value:	32702

Program

Name:	TerraSurveyor
Version:	3.0.31.0

Statistics	
Max:	103.95
Min:	-103.84
Std Dev:	3.77
Mean:	-0.07
Median:	-0.01

Processing
1 Base Layer
2 Search & Replace From: -3000 To: 3000 With: Dummy (Area: Top 2, Left 73, Bottom 6, Right 115)
3 Clip at 3.00 SD
4 De Stagger: Grids: All Mode: Both By: -1 intervals
5 De Stagger: Grids: a4.xgd Mode: Both By: -1 intervals
6 DeStripe Median Traverse: Grids: a1.xgd a3.xgd a12.xgd a13.xgd a22.xgd a2.xgd a4.xgd a11.xgd a14.xgd a21.xgd a5.xgd a10.xgd a15.xgd a20.xgd a6.xgd a9.xgd a16.xgd a19.xgd
7 Interpolate: Match X & Y Doubled.

Table 4: processed data metadata