

Substrata

Archaeological Geophysical Surveyors

An archaeological magnetometer survey

Land off High Lanes, Hayle, Cornwall

Centred on NGR: 156945,037465

Report: 1807HAY-R-1

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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:	9 September 2018
Area:	2ha
Survey resolution:	1m by 0.25m

4.2 Location

Name:	Land off High Lanes
Town:	Hayle
Civil Parish:	Hayle
District:	Penwith
County:	Cornwall
Nearest Postcode:	TR27 4AW
Survey centre NGR:	SW 56945 37465 (point)
Survey centre NGR (E/N):	156945,037465 (point)
Historic environment designation:	None
OASIS ID:	substrat1-329286

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.

Three magnetic anomaly groups were characterised as reflecting potential buried archaeology. One group represents a former field boundary recorded on historic maps between 1842 and 1936. One group is most likely to represent a Cornish hedge field boundary which is not

recorded on historic maps. The third group may represent a linear archaeological deposit but recent ground disturbance is equally likely.

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 one field to the east of Hayle centre and south of Copperhouse (Figure 1). The Survey Area is bound to the north by a Cornish bank disrupted by building work with houses and a building site beyond. An overgrown Cornish hedge bounds the eastern side of the site with building site beyond. The southern boundary is Cornish hedge with High Lanes road beyond. To the west the Survey Area is bound by a steel mesh fence with houses beyond. The field lies at approximately 50m aOD and was under stubble at the time of the survey

9.2 Geology and sub-surface deposits

The solid geology on the northern part of the site is mudstone and sandstone of the Devonian Porthtowan Formation. Generically these rocks are interbedded grey and grey-green slaty mudstone with subordinate sandstone beds up to 2m thick. On the southern part of the site the solid geology is slate and siltstone of the Devonian Mylor Slate Formation. The superficial geology is not recorded in the source consulted (British Geological Survey, undated).

Two example borehole logs within 600m of the Survey Area are provided in Table 5.

9.3 Soils

The topsoil is 'freely draining slightly acid loamy soil' (LandIS, undated).

10 Archaeological background

10.1 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 fields have either medieval or prehistoric origins (Cornwall Council, undated)

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.

A Heritage Impact Assessment for a site including the current Survey Area was completed by Armour Heritage (2016). 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 1000m around the site. The following is taken from the Assessment and an examination of the Cornwall and Scilly Historic Environment Record via Cornwall Council (undated) and Historic England (undated). Historic maps were consulted using Armour Heritage (2016) and Old-Maps (undated). Whilst providing a useful context for the data analysis, publication in commercial reports of the on-line historic maps is not permitted.

Table 6 provides a summary of HER entries thought relevant to this geophysical survey.

There are no known designated or undesignated heritage assets situated within the Survey Area. There is cartographic evidence for a former field boundary which was confirmed by this survey (Section 12.2).

The cartographic and documentary evidence suggests that the Survey Area was part of an agricultural landscape associated with the earlier settlement of Phillack and its estates from the medieval period onwards (Armour Heritage 2016, pp. 4).

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.

Figure2 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 northeast to southwest set of parallel, linear anomalies are likely to represent relatively recent ploughing disturbance.

12.2 Data relating to historic maps and other records

Magnetic anomaly group **2** represents a former field boundary recorded on historic maps between 1842 and 1936. This boundary does not appear on the 1965 1:2,500 Ordnance Survey map or on later maps.

12.3 Data with no previous archaeological provenance

Anomaly group **1** may represent a linear archaeological deposit such as an in-filled ditch but recent ground disturbance from vehicles around the edge of the field is equally likely.

Group **3** has characteristics typically associated with Cornish hedge field boundaries and is not shown on the 1842 Phillack tithe map or on later Ordnance Survey maps.

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.

Three magnetic anomaly groups were characterised as reflecting potential buried archaeology. One (group 2) represents a former field boundary recorded on historic maps between 1842 and 1936. One group (3) is most likely to represent a Cornish hedge field

boundary which is not recorded on historic maps. The third group (1) may represent a linear archaeological deposit but recent ground disturbance is equally likely.

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 John Valentin of AC Archaeology Ltd for commissioning us to complete this survey.

17 Bibliography

Archaeology Data Service, (undated). *Archaeology Data Service/Digital Antiquity Guides to Good Practice: Geophysical Data in Archaeology*. 2nd Edition. [online]. Available at: http://guides.archaeologydataservice.ac.uk/g2gp/Geophysics_Toc [Accessed 5 Sep. 2018]

Armour Heritage Ltd, (2016). *Land off High Lanes, Hayle, Cornwall, Proposed Residential Development Heritage Impact Assessment*. Frome: unpublished report AH411/1

British Geological Survey, (undated). *Geology of Britain viewer, 1:50000 scale data*. [online]. Available at: <http://www.bgs.ac.uk/discovering-Geology/geologyOfBritain/viewer.html> [Accessed 24 Sep. 2018]

Chartered Institute for Archaeologists, (2014). *Code of conduct*. [pdf]. Available at: <https://www.archaeologists.net/sites/default/files/CodesofConduct.pdf> [Accessed 5 Sep. 2018]

Chartered Institute for Archaeologists, (2014b). *Standard and guidance archaeological geophysical survey*. [pdf]. Available at: https://www.archaeologists.net/sites/default/files/CIFAS%26GGeophysics_2.pdf [Accessed 5 Sep. 2018]

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

Cornwall Council, (undated). *Cornwall and Scilly Historic Environment Record*. [online]. Available at: <https://map.cornwall.gov.uk/website/ccmap/?zoomlevel=1&xcoord=162690&ycoord=64380&wsName=ccmap&layerName=> [Accessed 25 Sep. 2018]

Europae Archaeologiae Consilium, (undated). *EAC Guidelines for the Use of Geophysics in Archaeology, Questions to Ask and Points to Consider*. EAC Guidelines 2. [pdf]. Available at: http://old.european-archaeological-council.org/files/eac_guidelines_2_final.pdf [Accessed 5 Sep. 2018]

Historic England, (undated). *Heritage Gateway*. [online]. Available at: <http://www.heritagegateway.org.uk/Gateway/> [Accessed 25 Sep. 2018]

LandIS, (undated). *Cranfield Soils and Agrifood Institute Soilscales*. [online]. Available at: <http://www.landis.org.uk/soilscales/> [Accessed 24 Sep. 2018]

Ministry of Housing, Communities & Local Government, (2018). *National Planning Policy Framework*. [pdf]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/728643/Revised_NPPF_2018.pdf [Accessed 3 Aug. 2018]

Old-Maps, (undated). old-maps.co.uk. [online]. Available at: <https://www.old-maps.co.uk/#/> [Accessed 24 Sep. 2018]

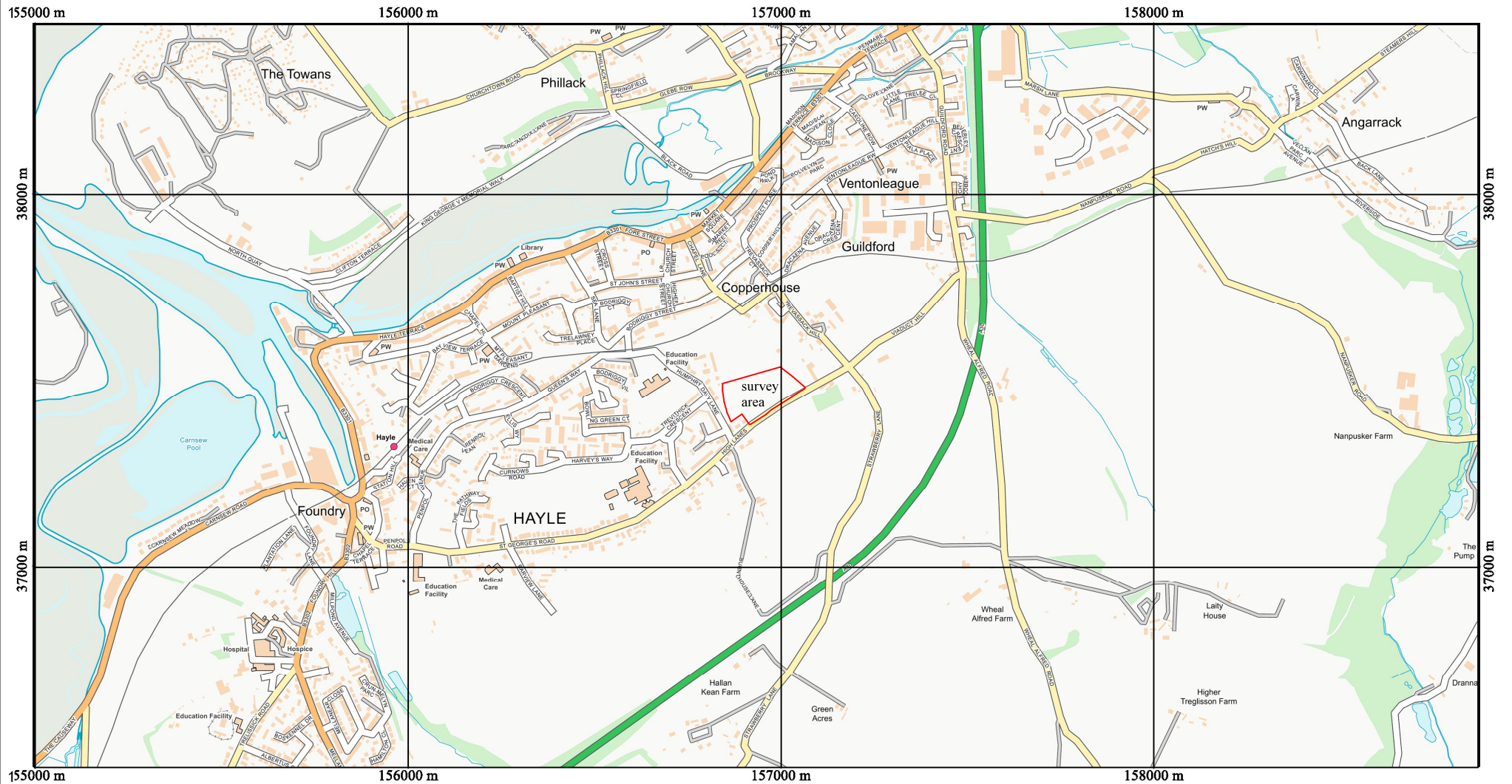
Substrata Ltd, (2018). *Magnetometer survey method statement, Land off High Lanes, Hayle, Cornwall*. Barnstaple: Unpublished document 1807HAY-M-1

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: 156933.72 m, centre Y: 37460.14 m

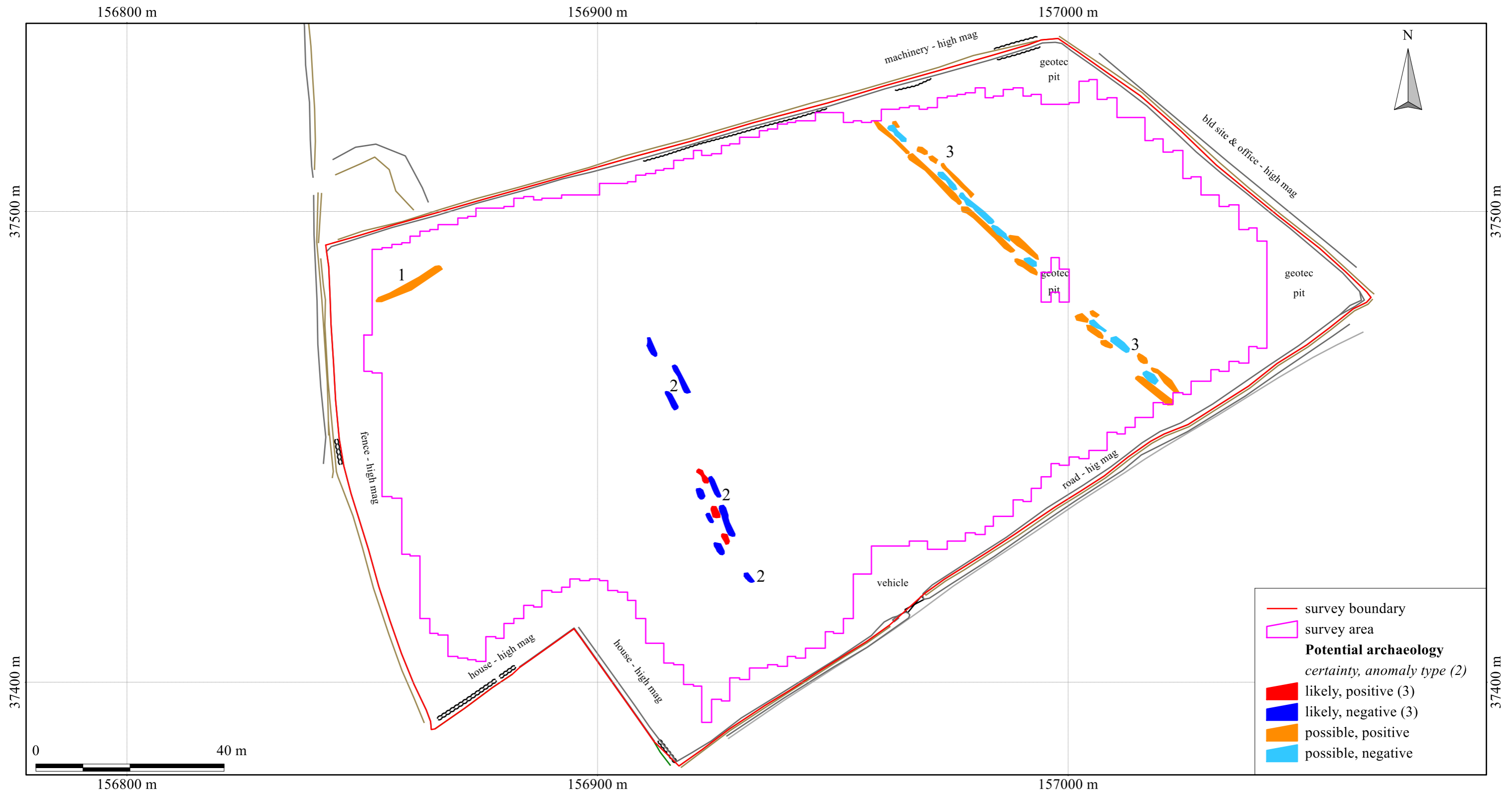
Scale: 1:10000 @ A3. Spatial Units: Meter. Do not scale off this drawing

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 Base map: KEMP Chartered Land & Engineering Surveyors
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An archaeological magnetometer survey
 Land off High Lanes, Hayle, Cornwall
 Centred on NGR: 156945,037465
 Report 1807HAY-R-1

Figure 1: location map

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 Web: substrata.co.uk



British Grid
 centre X: 156933.72 m, centre Y: 37460.14 m

Notes: Scale: 1:800 @ A3. Spatial Units: Meter. Do not scale off this drawing

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

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British Grid
 centre X: 156933.72 m, centre Y: 37460.14 m

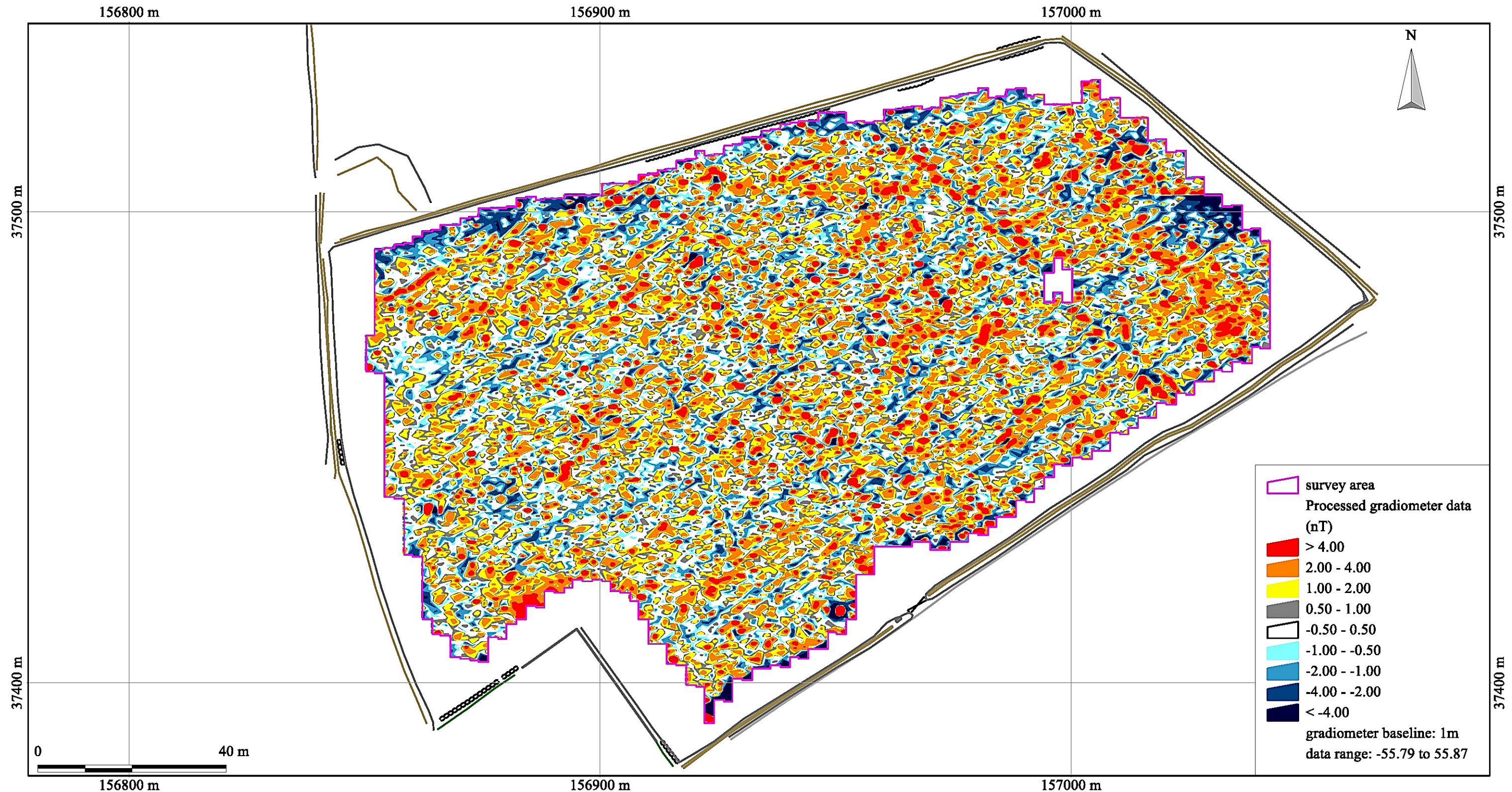
Scale: 1:800 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 3: shade plot of processed data

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British Grid
centre X: 156933.72 m, centre Y: 37460.14 m

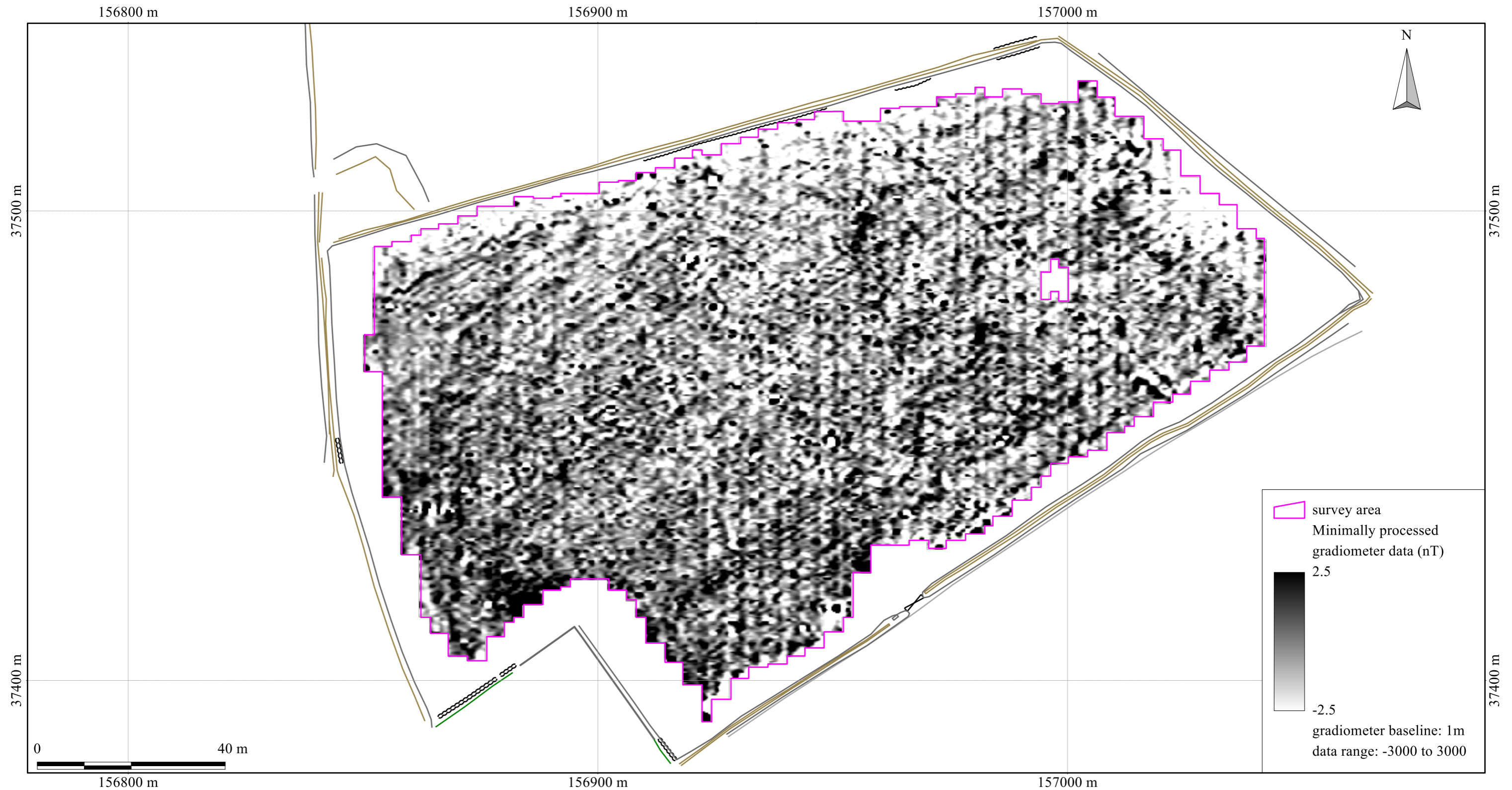
Scale: 1:800 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 4: contour plot of processed data

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Web: substrata.co.uk



British Grid
 centre X: 156933.72 m, centre Y: 37460.14 m

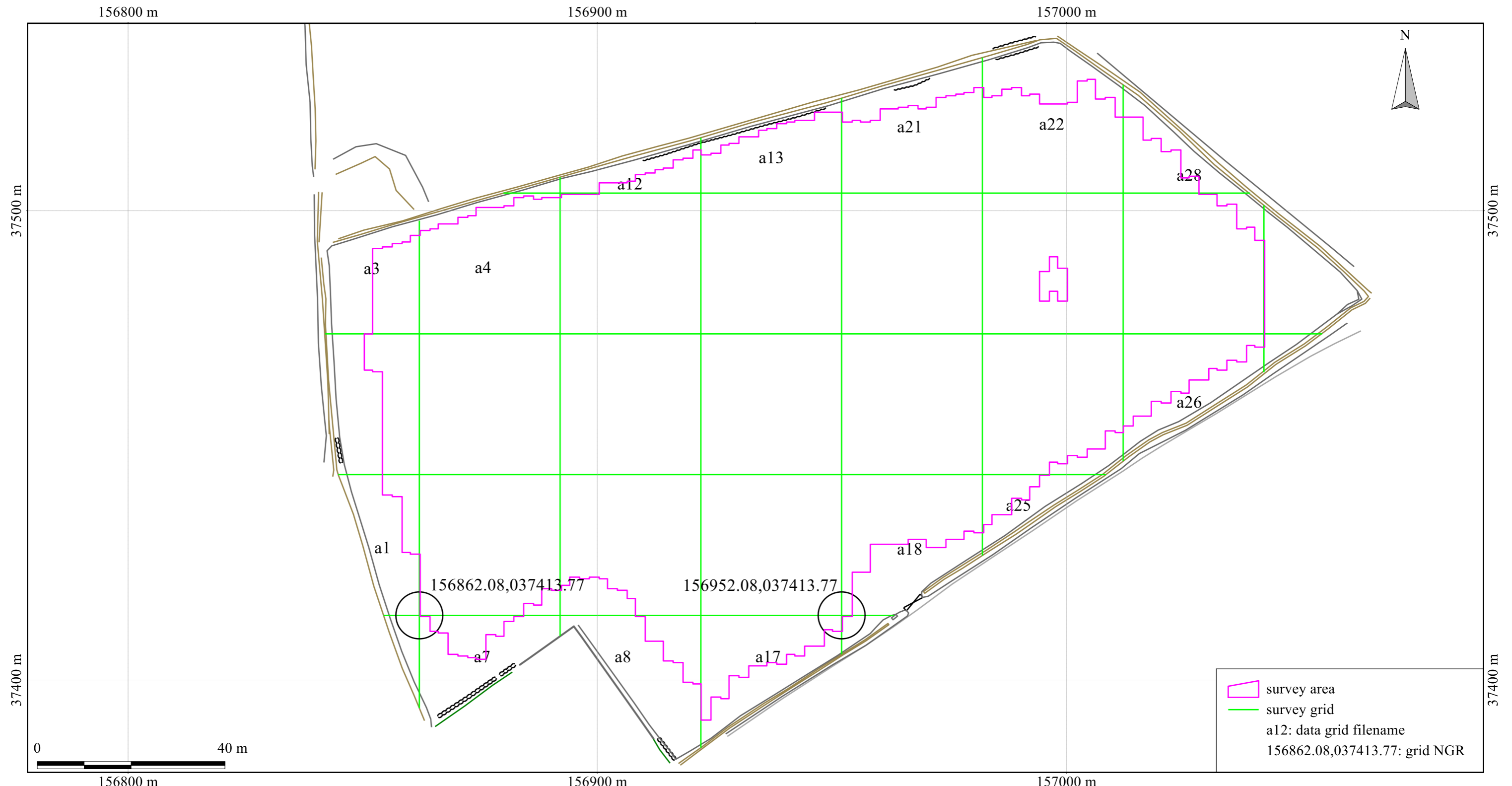
Scale: 1:800 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 5: shade plot of minimally processed data

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British Grid
 centre X: 156933.72 m, centre Y: 37460.14 m

Scale: 1:800 @ A3. Spatial Units: Meter. Do not scale off this drawing

Geophysical survey: Copyright Substrata Limited.
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Figure 6: survey grid map and location

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Appendix 2 Tables

Site: Land off High Lanes, Hayle, Cornwall
 Centred on NGR: 156945,037465

anomaly group	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
1	possible, positive	linear		anomaly group may represent buried archaeology but modern ground disturbance is equally likely	
2	likely, positive/negative/positive	disrupted linear	deposits associated with former field boundary	anomaly group coincides with a former field boundary recorded on historic maps between 1842 and 1936 and removed before 1965	1842 Phillack tithe map, Ordnance Survey maps 1877-9 1:2500 to 1965 1:2500
3	possible, positive/negative/positive	disrupted linear	field boundary - Cornish hedge		

Table 1: data analysis

<p>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.</p>	
<p>Equipment <i>Instrument:</i> Bartington Instruments grad601-2 <i>Firmware:</i> version 6.1</p>	<p>Data Capture <i>Sample Interval:</i> 0.25m <i>Traverse Interval:</i> 1 metre <i>Traverse Method:</i> zigzag <i>Traverse Orientation:</i> GN</p>
<p>Data Processing, Analysis and Presentation Software 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):	600 x 210
Survey Size (meters):	150 m x 210 m
Grid Size:	30 m x 30 m
X Interval:	0.25 m
Y Interval:	1 m
Stats	
Max:	55.87
Min:	-55.79
Std Dev:	2.91
Mean:	0.04
Median:	0.00
PROGRAM	
Name:	TerraSurveyor
Version:	3.0.33.6
Processes: 4	
1	Base Layer
2	DeStripe Median Traverse: Grids: All
3	Clip at 2.00 SD
4	De Stagger: Grids: All By: 0 intervals, 25.00cm

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):	600 x 210
Survey Size (meters):	150 m x 210 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:	27.95
Mean:	-0.63
Median:	-0.60
PROGRAM	
Name:	TerraSurveyor
Version:	3.0.33.6
Processes: 1	
1 Base Layer	

Table 4: minimally processed data metadata

Site: Land off High Lanes, Hayle, Cornwall
 Centred on NGR: 156945,037465

BGS ID	BGS reference	NGR (E/N)	solid geology	method	strata	depth below ground level(m) level (m)	OD level (m)	thickness (m)
715263	SW53NE115	156600,37500	Portowan Formation	borehole	ground level		not given	
					MADE GROUND	1.75		1.75
					firm moist yellow brown and blue grey mottled silty CLAY with occasional fine to medium sub-angular flint gravel and root traces	2.80		1.05
					firm light grey sometimes yellowish brown mottled very gravelly silty CLAY. Gravel in fine to coarse sub-angular flint	3.60		0.80
					firm to stiff light grey yellowish brown and orange brown mottled silty CLAY with fine to medium sub-angular mudstone gravel. Becomes mainly yellowish green with mottle. Vaguely thinly laminated. Some fine to medium sub-angular flint gravel. Fiable in places.	5.90		2.65
					stiff light grey very thinly laminated micaceous very silty CLAY with some yellowish brown mottle	6.25		0.35
					end of borehole			
715194	SW53NE48/A	157520,37560	Mylor Slate Formation	borehole	ground level		38.14	
					TOPSOIL	0.30	37.84	0.30
					stiff grey/brown mottled silty stony CLAY with siltstone fragments increasing with depth	2.80	35.34	2.50
					highly weathered grey/brown crimsonstained silty MUDSTONE	9.00	29.14	6.20
					slightly weathered dark grey/black MUDSTONE with abundant small quartz veins			
					end of borehole	39.00	-0.86	

Table 5: example geological borehole logs within 600m of the Survey Area centre (British Geological Survey, undated).

Land off High Lanes, Hayle, Cornwall
 Centred on NGR: 156945,037465

County: Cornwall
 District: Penwith
 Parish: Hayle
 Source: Cornwall Council (undated) & Heritage Gateway (undated)

HER number	grid reference	designations	type	period	description	distance from site centre (m)	bearing from site centre (GN)
MCO17838	SW 5710 3762		SETTLEMENT? SETTLEMENT	Early Medieval - 410 AD to 1065 AD Medieval - 1066 AD to 1539 AD	The settlement of Trevassack is first recorded as "Trevasek" in 1284. The name is Cornish and contains the element tre 'estate, farmstead' (suggesting a settlement of early medieval origin) and personal name.	219	45
MCO3798	SW 573 375		BARROW?	Bronze Age - 2500 BC to 801 BC	The Tithe Award for Phillack records the field-name 'Park Corgan' at Trevassack which may indicate the site of a barrow. There are no visible remains.	357	84
MCO35183	SW 574 371		ROUND?	Early Iron Age to Romano British - 800 BC to 409 AD	The Tithe Award for Phillack records the field-name of 'The Rounds' and 'Rounds Long Croft' for two enclosures close to Wheal Alfred. There are no traces of any prehistoric remains.	583	129
MCO34012	SW 5723 3675		ROUND?	Prehistoric - 500000 BC to 42 AD	A probable round of the Iron Age/Romano-British period is visible on air photographs and was plotted as part of the NMP. The north-eastern side of the enclosure is fossilised in the existing field hedge, whereas the south-western side is partially visible only as a very faint crop mark ditch and bank. The round is oval in shape, measuring 120m by 70m, with no sign of an entrance.	770	158
National Mapping Programme lines					Spoil heaps to east and southeast with a mine to southeast of the Survey Area	c. 100m c. 200m	east southeast

Table 6: Historic Environment Records thought relevant to the survey

Appendix 3 Project archive contents

A3.1 Substrata Limited archive

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

Report:	Adobe PDF (.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.