Substrata
Archaeological Geophysical Surveyors

An archaeological magnetometer survey and
re-interpretation of an earlier resistance survey

Clovelly Dykes hillfort southern extension
Clovelly, Devon

Centred on NGR (E/N): 231040,123290

Report: 1801CLO-R-1

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30 January 2018

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Client
NDAS
North Devon Archaeological Society

Contents

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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:	9, 11 and 12 January 2018
Area:	3.95ha
Lead surveyor:	Mark Edwards BA
Author:	Ross Dean BSc MSc MA MIfA

1.2 Clients

North Devon Archaeological Society (NDAS)

1.3 Location

Site:	Clovelly Dykes hillfort southern extension
Civil Parish:	Clovelly
District:	Torridge
County:	Devon
Nearest Postcode:	EX39 5RU
NGR:	SS 310 233 (point)
NGR (E/N):	231040,123290 (point)
Associated HER:	Devon Historic Environment Record MDV169

1.4 Archive

OASIS number:	substrat1-307503
Archive:	At the time of writing, the archive of this survey will be held by Substrata Ltd. 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 and, in the light of this magnetometer survey, the re-interpretation of a resistance survey previously completed at the above site. It has been prepared for NDAS as part of a research project assessing the southern extension of the hillfort. The survey area location is shown in Figure 1.

One of the reasons behind the commissioning of the report are crop marks of a group of banks and ditches situated to the south of the hillfort. These suggest that the hillfort extends into the area to the south of the hillfort and the A39. Unlike the extant hillfort, this southern area is not scheduled.

The resistance survey was carried out in January 2017 by Substrata Ltd (Dean, 2017). The re-interpretation is presented in Section 7.3.4, Figure 3 and Table 3.

1.6 Summary

This report presents the results of an archaeological magnetometer survey and, in the light of this magnetometer survey, the re-interpretation of a resistance survey previously undertaken along the northern edge of the magnetometer survey area (Dean, 2017).

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

Seventeen magnetic anomaly groups were mapped as representing potential archaeological deposits or features. One of these groups partially coincides with, and likely represents, the western side of the southern boundary of the Clovelly Dykes hillfort which was recorded as cropmarks on aerial photographs between 1947 and 1986 (Devon Historic Environment Record MDV169). This anomaly group does not follow the cropmarks north-eastwards to re-join extant banks of the monument and appears to have a slight curve south-eastward at its eastern end. Two groups may represent ring ditches. One group may represent a routeway of

unknown date. Speculatively, three linear anomalies may represent sections of an enclosure abutting the Clovelly Dykes southern boundary. The remaining anomaly groups have characteristics typical of fragmentary remains of field and enclosure boundaries of unknown date.

In the previously completed resistance survey dataset, a number of curvilinear anomaly groups were suggestive of stony banks with flanking earthen deposits or ditch-bank-ditch features. The distribution and pattern of these sets of anomaly groups were interpreted as a possible, partial mirroring continuation of the pattern of extant banks comprising the Clovelly Dykes hillfort to the north. In the light of the current magnetometer dataset, some of the curvilinear resistance anomalies are more likely to represent near-surface geological patterns and the remainder of these are of uncertain provenance with a geological or archaeological origin possible. One resistance anomaly group is likely to be associated with the southern boundary of the Clovelly Dykes monument.

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, 2018).

The survey grid location information and grid plan were recorded as part of the project in a suitable GIS system (Table 4).

Data processing was undertaken using appropriate software (Table 4), 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 comprised three plots in three agricultural fields to the south of the Clovelly Dikes hillfort and the A39 as shown in Figures 1 and 2. The topography of the site slopes downwards from north to south and the plots lie between approximately 210m and 200m AOD.

5.2 Geology

The bedrock across the site comprises rhythmically bedded, dark blue-grey mudstones and

subordinate predominantly grey sandstones and siltstones of the Carboniferous Crackington Formation (British Geological Survey, undated).

Superficial deposits for the site are unknown (ibid).

6 Archaeological background

6.1 Historic landscape characterisation

'Medieval enclosures based on strip fields'

This area was probably first enclosed with hedge-banks during the later middle ages. The curving form of the hedge-banks suggests that earlier it may have been farmed as open strip-fields (Devon County Council, undated).

6.2 Summary of archaeological background

The Devon County Council Historic Environment Record (DHER) 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 DHER entries though relevant to the survey.

The following is an extract taken from Devon County Council Historic Environment Record MDV169, Scheduled Monument 1018522

Clovelly Dykes hillfort

"One of the largest and most impressive Early Iron Age hillforts in Devon. It is a complex series of earthworks covering more than 8.09 hectares, forming four zones of outworks with restricted entry, suggesting segregation of herds for milking, or for autumn slaughter. The enclosures are visible on aerial photographs between 1946 and 2007, although scrub growth obscures the earthworks on many. Several new breaches of the hedgebanks were visible between the 1950s and 1970s. Ditches and banks immediately to the south of the hillfort are visible as cropmarks and earthworks on aerial photographs between 1947 and 1986, and may depict the original extent of the outer enclosures."

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 4 and 5 are plots of processed data as specified in Table 5. Figure 6 is a plot of minimally processed data with its metadata.

Figure 3 and Table 3 present, in the light of this magnetometer survey, a re-interpretation of a resistance survey previously completed across the northern section of the magnetometer survey area (Dean, 2017). A discussion of this re-interpretation is provided below in Section 7.3.4.

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 approximately north-south and following the line of the extant north-south field boundaries were interpreted as likely modern ploughing disturbance (Figures 4 and 5)

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

Magnetic anomaly group **g8** partially coincides with, and likely represents, the western side of the southern limits of the Clovelly Dykes hillfort as recorded from cropmarks and aerial photographs between 1947 and 1986 (Devon County Historic Environment Record MDV169). Unlike the recorded cropmarks, the eastern section of anomaly group 8 does not curve to the north-east to intersect extant earthworks of the monument east of the Higher Clovelly road junction with the A39. There is an apparent slight curve to the southeast at the eastern end of the anomaly as shown in Figures 4 and 5.

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

Magnetic anomaly group **g11** has characteristics typical of an anomaly group representing a ring ditch. These are often the remains of a ploughed out round barrow, a round house or a World War II searchlight emplacement. Anomaly group **g12** has similar characteristics although it is not so clearly defined as g11.

Group **g7** appears to abut g8 (Section 7.3.2). This does not necessarily mean that the two anomaly groups represent contemporary features. Nevertheless this remains an option and there is the intriguing possibility that groups g7, **g10** and **g13** may form a field or enclosure using g8 as the northern side.

Group **g14** may represent a track or routeway of unknown date.

The remaining anomaly groups (**g1 to g6** and **g15 to g17**) have characteristics typical of the fragmentary remains of field and enclosure boundaries of unknown date.

7.3.4 Re-interpretation of an earlier resistance survey (Figure 3 and Table 3)

A resistance survey was carried out along the north side of the magnetometer survey area during January 2017 by Substrata Ltd and reported by Dean (2017).

As previously reported (ibid), resistance anomaly group **r26** coincides with, and is likely to represent, a former field boundary recorded on historic maps as shown in Table 3.

A number of curvilinear resistance anomaly groups had a resistance pattern suggestive of stony banks with flanking earthen deposits or ditch-bank-ditch features although it was acknowledged that only archaeological excavation could confirm this interpretation. The distribution and pattern of the sets of anomaly groups was suggestive of a partial mirroring continuation of the pattern of extant banks comprising the Clovelly Dykes hillfort to the north with the possibility that the A39 follows the curve of this pattern at the north-western corner of the survey area. In the light of the current magnetometer dataset, it is likely that some of the curvilinear resistance anomalies are more likely to represent near-surface geological patterns and the remainder of these are of uncertain provenance with geological or archaeological origins possible (resistance anomaly groups **r401**, **r402**, **r405**, **r408**, **r409**, **r410** and **r423** in Figure 3).

As previously reported (ibid), anomalies **r2 and r3**, **r13 and r14,** and **r20 and 21** may represent archaeological deposits but recent origins, such a disturbance by vehicles, cannot be ruled out.

Group **r15** coincides with magnetic anomaly groups g8 and g9 and it is now clear that r15 is most likely to be associated with the southern boundary of the Clovelly Dykes monument (Devon Historic Environment Record MDV169).

As previously reported (ibid), resistance anomalies **r16**, **r17**, **r18**, and **r19** may represent archaeological deposits such as former field and enclosure ditches and banks, of unknown period and more than one phase of past land management.

7.4 Conclusions

This report presents the results of an archaeological magnetometer survey and, in the light of this magnetometer survey, the re-interpretation of a resistance survey previously undertaken along the northern edge of the magnetometer survey area (Dean, 2017).

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

Seventeen magnetic anomaly groups were mapped as representing potential archaeological deposits or features. One of these groups (g8) partially coincides with, and likely represents, the western side of the southern boundary of the Clovelly Dykes hillfort which was recorded as cropmarks on aerial photographs between 1947 and 1986 (Devon Historic Environment Record MDV169). Anomaly group g8 does not follow the cropmarks north-eastwards to re-join extant banks of the monument and appears to have a slight curve south-eastward at its eastern end. Two groups (g11 and g12) may represent ring ditches. One group (g14) may represent a routeway of unknown date. Speculatively, three linear anomalies (g7, g8 and g13) may represent sections of an enclosure or field abutting the Clovelly Dykes southern boundary. The remaining anomaly groups (g1 to g6 and g15 to g17) have characteristics typical of fragmentary remains of field and enclosure boundaries of unknown date.

In the previously completed resistance survey dataset, a number of curvilinear anomaly groups were suggestive of stony banks with flanking earthen deposits or ditch-bank-ditch features. The distribution and pattern of these sets of anomaly groups were interpreted as a possible, partial mirroring continuation of the pattern of extant banks comprising the Clovelly Dykes hillfort to the north. In the light of the current magnetometer dataset, some of the curvilinear resistance anomalies are more likely to represent near-surface geological patterns and the remainder of these are of uncertain provenance with a geological or archaeological origin possible (r401, r402, r405, r408, r409, r410 and r423). One resistance anomaly group (r15) coincides with magnetic anomaly groups g8 and g9 and it is now clear that r15 is likely to be associated with the southern boundary of the Clovelly Dykes monument.

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 NDAS 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 [January 20187]

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

Dean, R. (2018) *A survey method statement for a detailed magnetometer survey at Clovelly Dykes hillfort southern extension, Clovelly, Devon,* Substrata Ltd unpublished document 1801CLO-M-1

Dean, R. (2017) *An archaeological earth resistance survey, Clovelly Dykes hillfort southern extension, Clovelly, Devon, Centred on NGR (E/N): 231040,123290 (point)*, Substrata Ltd unpublished report 16CLO-R-1

Devon County Council (undated) *Historic Environment* [Online], https://new.devon.gov.uk/ historicenvironment/ [July 2017]

Historic England (undated) *Heritage Gateway* [Online], http://www.heritagegateway.org.uk/ Gateway/ [January 2018]

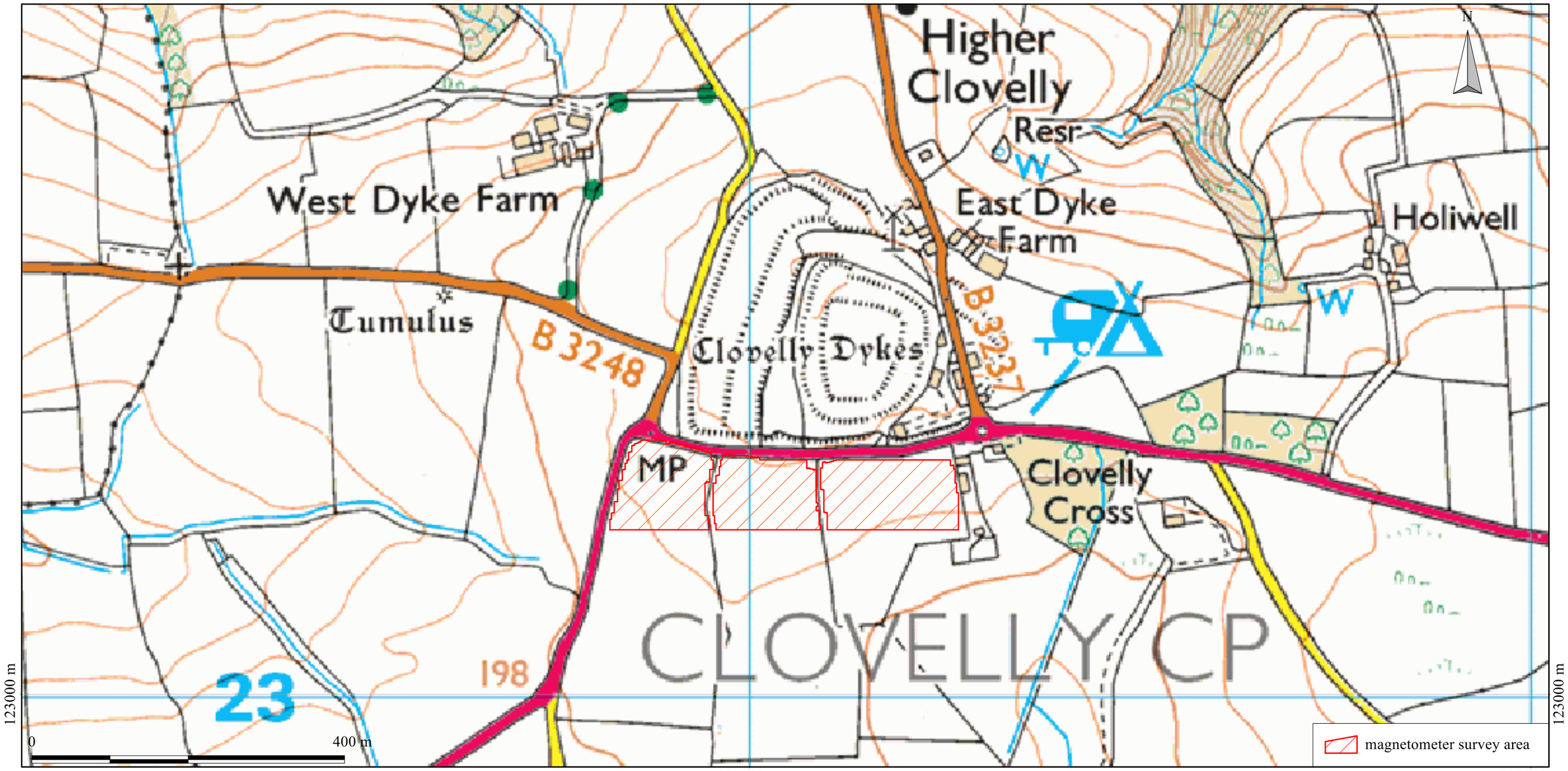
Historic England (2010) *Geophysical Survey in Archaeological Field Evaluation* [Online], Available: https://content.historicengland.org.uk/images-books/publications/geophysical-survey-in-archaeological-field-evaluation/geophysics-guidelines.pdf/ [December 2017]

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: 231046.08 m, centre Y: 123395.17 m

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

An archaeological magnetometer survey
and re-interpretation of an earlier resistance survey
Clovelly Dykes hillfort southern extension, Clovelly, Devon
Centred on NGR (E/N): 231040,123290 (point)
Report: 1801CLO-R-1

Figure 1: location map

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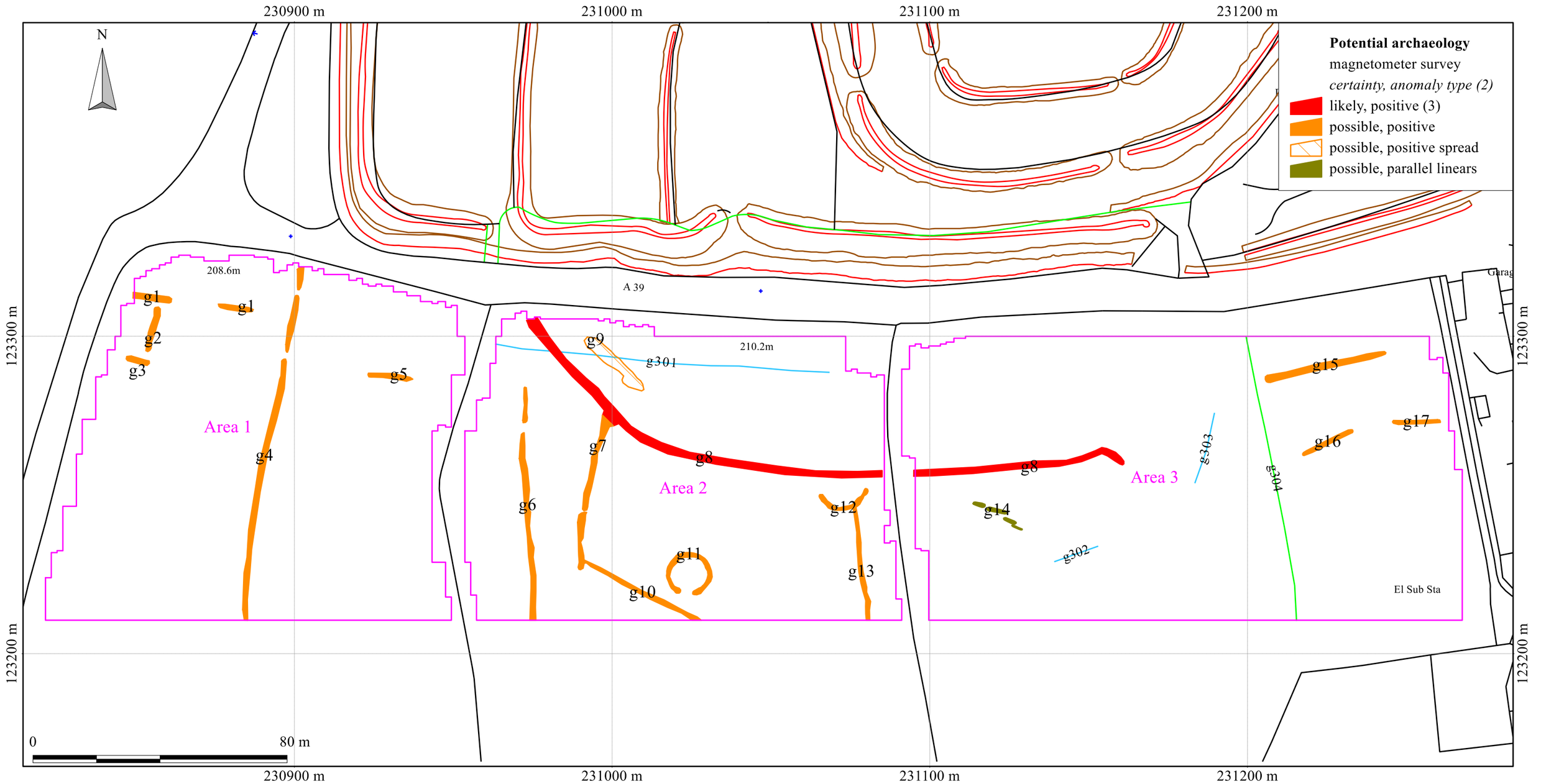

British Grid
centre X: 231049.09 m, centre Y: 123281.64 m

Scale: 1:1200 @ 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. Representative; 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: magnetometer survey interpretation

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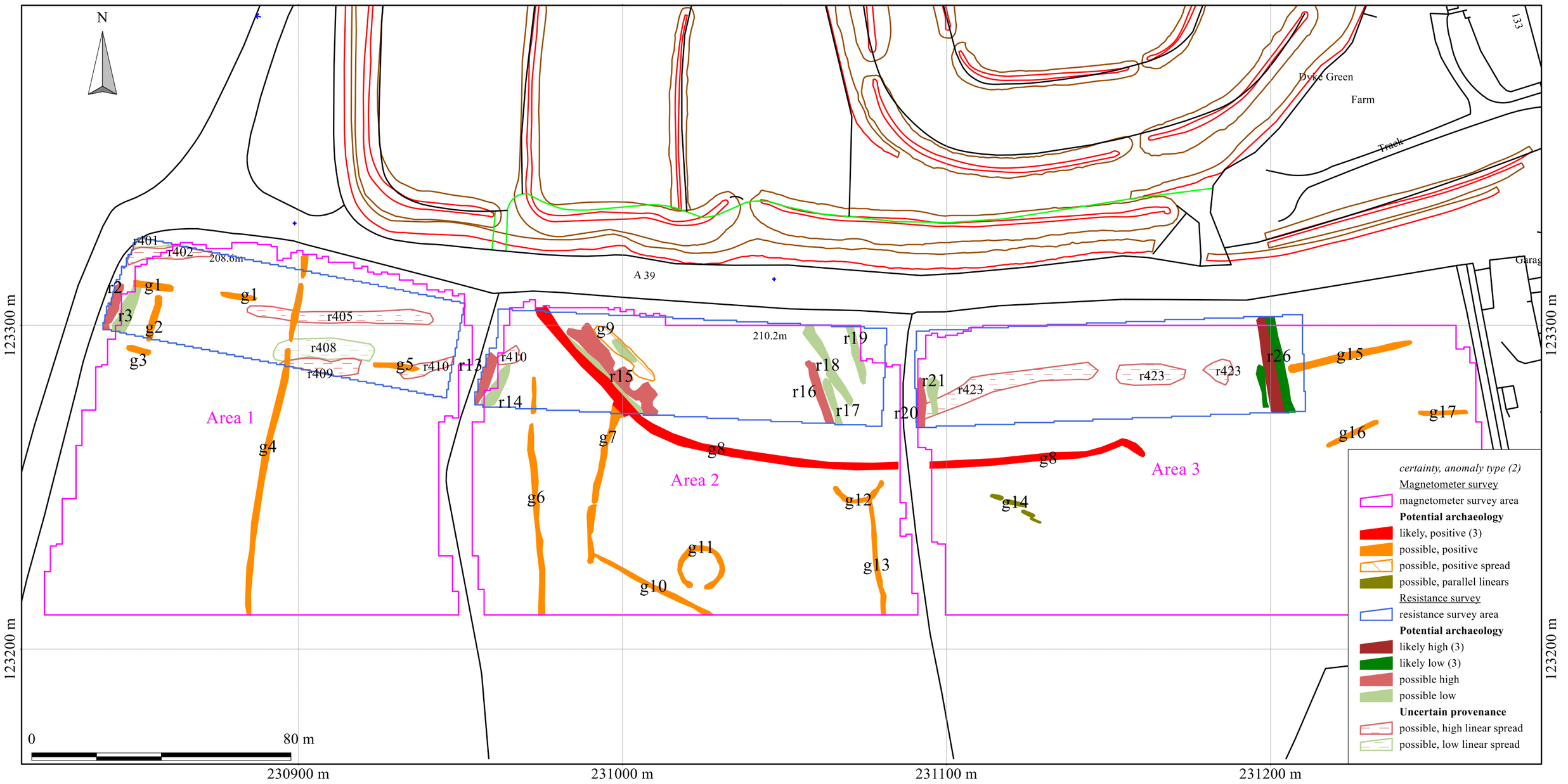

British Grid
centre X: 231049.09 m, centre Y: 123281.64 m

Scale: 1:1200 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 3: magnetometer survey interpretation (archaeology only) with revised resistance survey interpretation (archaeology and uncertain) after Dean (2017)

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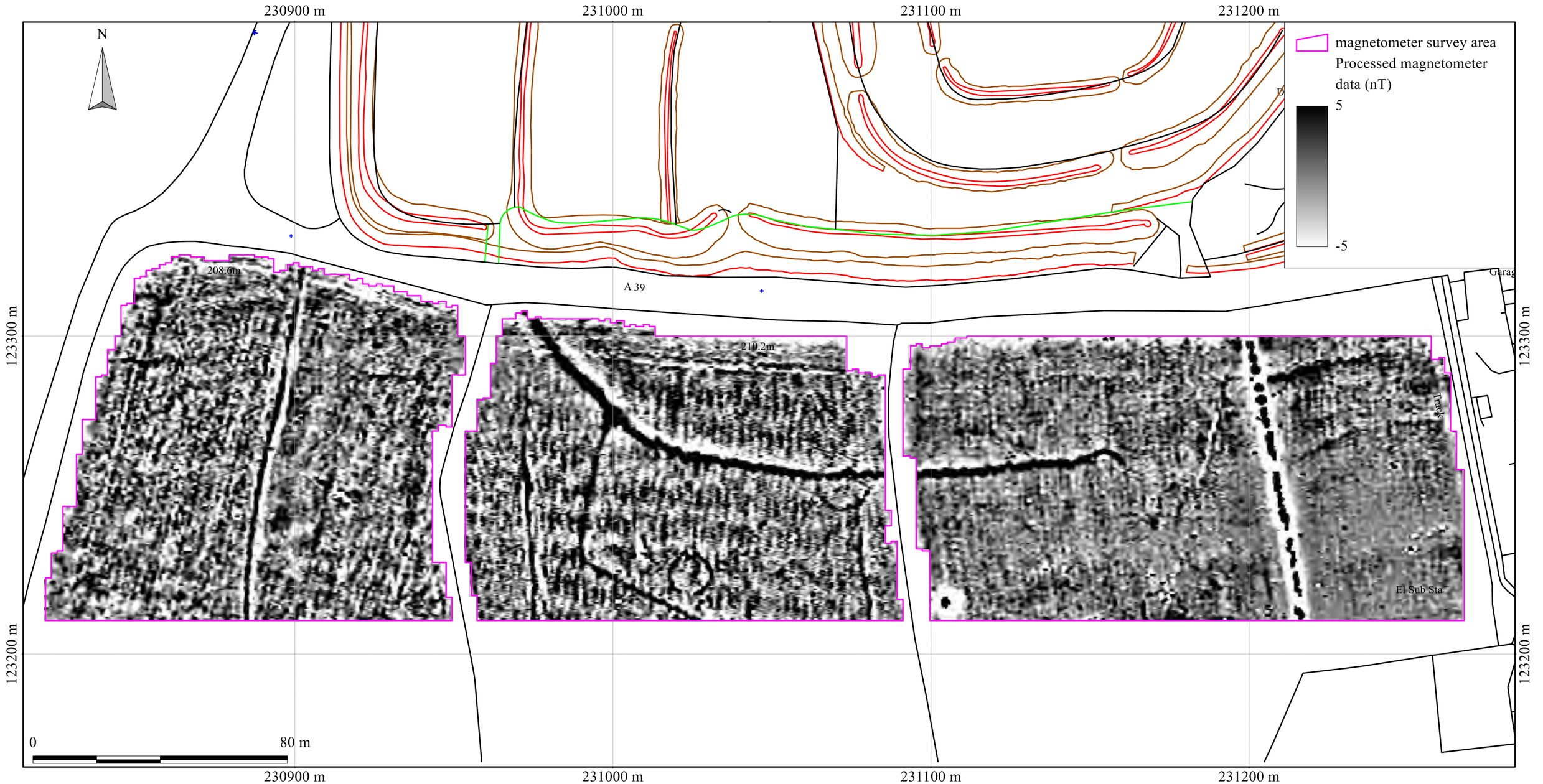

British Grid
centre X: 231049.09 m, centre Y: 123281.64 m

Scale: 1:1200 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 4: shade plot of processed magnetometer data

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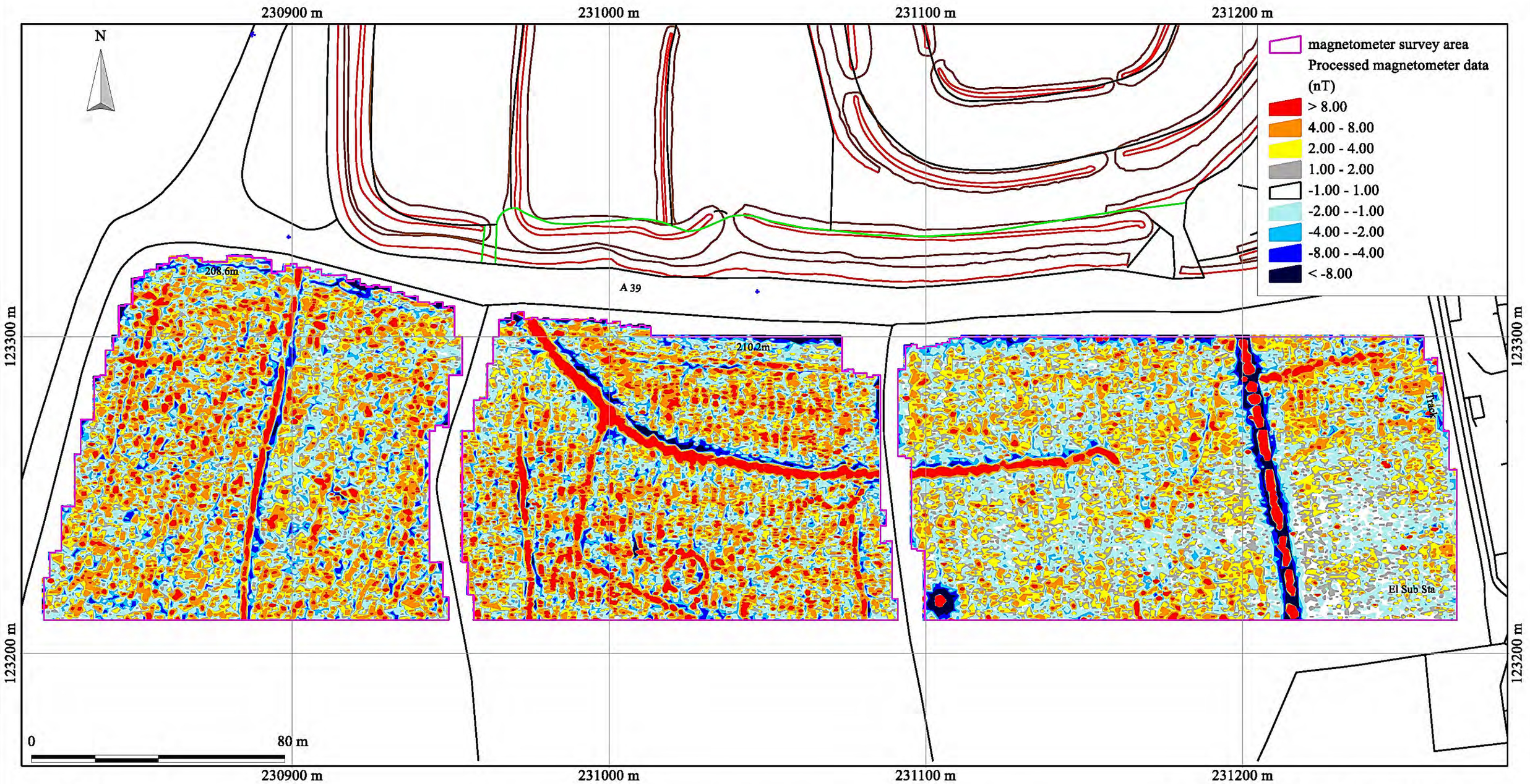

British Grid
centre X: 231049.09 m, centre Y: 123281.64 m

Scale: 1:1200 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 5: contour plot of processed magnetometer data

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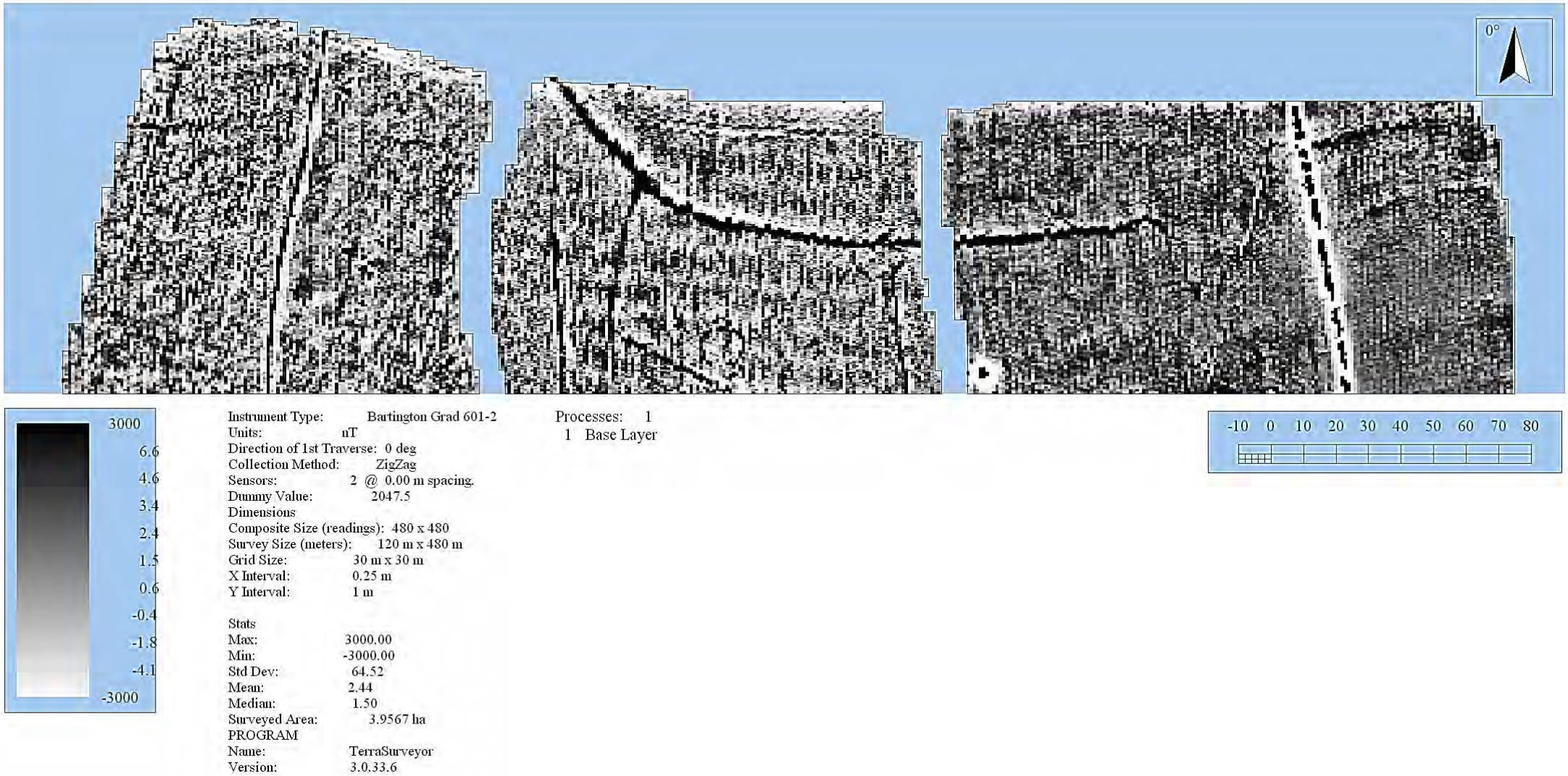

Instrument Type: Bartington Grad 601-2
Units: nT
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 0.00 m spacing.
Dummy Value: 2047.5
Dimensions
Composite Size (readings): 480 x 480
Survey Size (meters): 120 m x 480 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 3000.00
Min: -3000.00
Std Dev: 64.52
Mean: 2.44
Median: 1.50
Surveyed Area: 3.9567 ha
PROGRAM
Name: TerraSurveyor
Version: 3.0.33.6

Processes: 1
1 Base Layer

Figure 6: shade plot of unprocessed magnetometer data

Appendix 2 Tables

An archaeological magnetometer survey
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Centred on NGR (E/N): 231040,123290 (point)
Report: 1801CLO-R-1

County: Devon
District: Torridge
Parish: Clovelly
Source: Heritage Gateway

HER number	grid reference	designations	type	period	description	distance (m) from site centre	bearing (GN) from site centre
MDV169	SS 311 234 WITHIN THE SURVEY AREA	scheduled monument 1018522	Hillfort	Iron Age - 700 BC to 42 AD	One of the largest and most impressive Early Iron Age hillforts in Devon. It is a complex series of earthworks covering more than 8.09 hectares, forming four zones of outworks with restricted entry, suggesting segregation of animal herds for milking, or for autumn slaughter. Ditches and banks immediately to the south of the hillfort are visible as cropmarks and earthworks on aerial photographs between 1947 and 1986, and may depict the original extent of the outer enclosures.	224	27
MDV102402	SS 307 232		Field boundary	Post Medieval to XIX - 1540 AD to 1840 AD	A linear bank is visible as an earthwork on aerial photographs between 1959 and 1978. It is likely be a post-medieval field boundary that went out of use before the mid nineteenth century	300	270
MDV102404	SS307230		Quarry	Post medieval 1540 AD- 2009 AD	Irregular shaped pit visible as an earthwork on aerial photographs taken in 1971 and 2007 may have been associated with the construction of the road or field boundaries	361	236
MDV75342	SS 309 236		Orchard	Unknown	Possible orchard visible on 1946 aerial photograph Regular pattern of sub-circular features within small field visible on 1946 aerial photograph	412	346
MDV102408	SS 312 236		Building platform	Early Medieval to XIX- 1066 AD to 1840 AD	A subrectangular platform is visible as an earthwork on aerial photographs It is interpreted as a possible building platform of medieval or post-medieval date	447	27
MDV168	SS306235	Scheduled monument 1017980	Round Barrow	Neolithic to Iron Age 4000BC-42AD	Bowl barrow of probable bronze Age west of Clovelly dykes. Visible as a rough circular earthwork mound on aerial photographs between 1966 and 1971.	500	307
MDV102426	SS 313 236		Hollow way	Early Medieval to XIX- 1066 AD to 1840 AD	Two parallel linear ditches are visible as earthworks on aerial photographs	500	37
MDV102428	SS 315 231		Military site, Pit	World War II - 1939 AD to 1945 AD	A complex of cropmarks, earthworks and structural remains is visible on aerial photographs taken in the 1940s. It is tentatively interpreted as a military site of probable WWII date	510	101
MDV102416	SS 308 227		Mound	Unknown date	A circular mound with an attached sub-circular earthwork bank on its south-east side, is visible on aerial photographs from 1946. Possibly natural features	539	202
MDV102415	SS 308 227		Field boundary	Early Medieval to XIX- 1066 AD to 1840 AD	A linear bank is visible as an earthwork on aerial photographs. May have been levelled	539	202
MDV75343	SS 314 236		Field boundary	Early Medieval to XIX- 1066 AD to 1840 AD	Five parallel curvilinear ditches are visible as dark cropmarks on aerial photographs	566	45
MDV75180	SS 307 237		Settlement	Medieval - 1066 AD to 1539 AD	West Dyke is recorded as Westdich in 1333	583	329
MDV13821	SS 304 232		Racing circuit	XX - 1901 AD to 2000 AD	Three large pale oval cropmarks are visible in three different fields on aerial photographs dating to 1978. They are interpreted as the result of modern stock car racing, and described to avoid confusion with archaeological features	600	270
MDV102409	SS 306 226		Fortification	Post medieval 1540 AD- 1750 AD	A double bank is visible as an earthwork on aerial photographs dating to 1978, possibly forming the north-east segment of an octagonal feature. A possible outer ditch is visible as a cropmark on 1940s aerial photographs, and the evidence of nearby field names supports a possible military origin for this feature, as a Civil War fortification.	721	214
MDV102425	SS 314 238		Water meadow	Post Medieval to XX - 1540 AD to 1947 AD	A curvilinear earthwork ditch is visible in two fields on aerial photographs dating to 1947. It is aligned along the contour and is likely to be a simple post-medieval or modern catch meadow system to irrigate pasture by diverting water from a spring or stream	721	34
MDV102427	SS 318 230		Military site, Pit, Ditch	World War II to XX - 1939 AD to 1978 AD	A linear ditch is visible as an earthwork on aerial photographs between 1946 and 1978, and then as a pale cropmark on aerial photographs taken in 2007. It may be associated with the possible military site to the west, perhaps used for training. Slight earthworks may be visible in the field	825	104
MDV102414	SS 303 226		Quarry	Post Medieval to XIX - 1540 AD to 1880 AD	An irregular pit is visible as an earthwork on aerial photographs between 1946 and 1978. It is likely to be a modern or post-medieval extraction pit	922	229
MDV75177	SS 302 227		Earthwork	Unknown	Field name suggestive of the presence of a prehistoric or medieval earthwork	943	238
MDV102411	SS 301 227		Field boundary	Early Medieval to XIX - 1066 AD to 1840 AD	Linear ditch is visible as an interrupted dark cropmark on aerial photographs between 1946-2007	1030	221

Table 1: Historical Environment Entries thought relevant to geophysical survey

Site: An archaeological magnetometer survey
and re-interpretation of an earlier resistance survey
Clovelly Dykes hillfort southern extension, Clovelly, Devon
Centred on NGR (E/N): 231040,123290 (point)
Report: 1801CLO-R-1

area number	anomaly group	associated anomalies	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
1	g1		possible, positive	disrupted linear			
	g2		possible, positive	linear			
	g3		possible, positive	linear			
	g4		possible, positive	disrupted linear			
	g5		possible, positive	linear			
2	g6		possible, positive	linear			
	g7		possible, positive	curvilinear			
	g8	r15	likely, positive	curvilinear	ditch	anomaly group coincides with the southern limits of the Clovelly Dykes hillfort as recorded from cropmarks and aerial photographs between 1947 and 1986	HER entry MDV169
2 3	g9	r15	possible, positive spread	broad linear	filled linear hollow, surface spread or natural		
	g10		possible, positive	linear			
	g11		possible, positive	subcircular	ring ditch: ploughed out round barrow, round house or modern, e.g. searchlight emplacement	anomaly groups apparent gap in northern section is judged to be a survey pacing error	
	g12		possible, positive	subcircular	ring ditch: ploughed out round barrow, round house or modern, e.g. searchlight emplacement	although not well defined, the anomaly group may represent a partially ploughed out ring ditch or similar feature	
	g13		possible, positive	linear			
3	g14		possible, parallel linears		traces of a linear deposit or track/routeway	anomaly group may represent archaeological or recent ground disturbance and/or deposits	
	g15		possible, positive	linear			
	g16		possible, positive	linear			
	g17		possible, positive	linear			
	g301		possible, low contrast linear		service trench		
	g302		possible, low contrast linear		service trench		
	g303		possible, low contrast linear		service trench		
	g304	r26	possible, high contrast linear		ferrous cable, pipe, drain or buried wire fence	anomaly group follows the line of a former field boundary recorded on historic maps	1840 Clovelley tithe map, OS maps 1886 1:2500 to at least 1986 1:10000

Table 2: data analysis for magnetometer survey

Site: An archaeological magnetometer survey
and re-interpretation of an earlier resistance survey
Clovelly Dykes hillfort southern extension, Clovelly, Devon
Centred on NGR (E/N): 231040,123290 (point)
Report: 1801CLO-R-1

area number	anomaly group	associated anomalies	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
1	r401		possible, low linear spread		archaeological deposit or near-surface bedrock		
	r402		possible, high linear spread		archaeological deposit or near-surface bedrock		
	r405		possible, high linear spread		archaeological deposit or near-surface bedrock		
	r408		possible, low linear spread		archaeological deposit or near-surface bedrock		
	r409		possible, high linear spread		archaeological deposit or near-surface bedrock		
2	r13	r14	possible high	linear	relatively stony deposit	anomaly group may represent an archaeological deposit but vehicle or ploughing disturbance cannot be ruled out	
	r14	r13	possible low	linear		anomaly group may represent an archaeological deposit but vehicle or ploughing disturbance cannot be ruled out	
	r15		possible low	linear	combined linear earthen & stony deposits	anomaly group may represent a ditch-flanked track or a former Devon bank	
	r15		possible high	linear	combined linear earthen & stony deposits	anomaly group may represent a ditch-flanked track or a former Devon bank	
	r15	g8 g9	likely, low/high/low	linear	combined linear earthen & stony deposits	anomaly group coincides with the southern limits of the Clovelly Dykes hillfort as recorded from cropmarks and aerial photographs between 1947 and 1986	HER entry MDV169
	r16		possible high	linear	relatively stony deposit	anomaly group may represent an archaeological deposit but vehicle or ploughing disturbance cannot be ruled out	
	r17		possible low	linear		anomaly group may represent an archaeological deposit but vehicle or ploughing disturbance cannot be ruled out	
	r18		possible low	linear			
	r19		possible low	linear		anomaly group may represent an archaeological deposit but vehicle or ploughing disturbance cannot be ruled out	
1 2	r410		possible, high linear spread		archaeological deposit or near-surface bedrock		
3	r20	r21	possible high	linear		anomaly group may represent an archaeological deposit but vehicle or ploughing disturbance cannot be ruled out	
	r21	r20	possible low	linear		anomaly group may represent an archaeological deposit but vehicle or ploughing disturbance cannot be ruled out	
	r26	g304	likely low/high/low	linear	field boundary ditch - possible Devon bank	anomaly group coincides with and likely represents a field boundary recorded on historical maps	1840 Clovelly tithe map OS maps between 1886 1:2500 and at least 1986 1:10000
	r423		possible, high linear spread		archaeological deposit or near-surface bedrock		

Table 3: data analysis for revised resistance survey provided in Figure 3 (after Dean 2017)

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 4: 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		**Processing**
Max:	71.80	1 Base Layer
Min:	-64.67	2 Clip at 1.00 SD
Std Dev:	5.95	3 De Stagger: Grids: All By: 0 intervals, 25.00cm
Mean:	0.21	4 De Stagger: Grids: b19.xgd c6.xgd c7.xgd c12.xgd a1+c13.xgd b20.xgd c5.xgd c8.xgd c11.xgd a2+c14.xgd c1.xgd c4.xgd c9.xgd c10.xgd a3+c15.xgd c2.xgd c3.xgd By: 0 intervals, 25.00cm
Median:	0.00	5 DeStripe Median Sensors: Grids: All
Surveyed Area:	3.95ha	6 De Stagger: Grids: c7.xgd By: 0 intervals, 25.00cm

Table 5: processed data metadata