Substrata

Archaeological Geophysical Surveyors

An archaeological gradiometer survey

Land at Countess Wear, Exeter, Devon

Ordnance Survey (E/N): 294740,90450 (point)

Report: 141103

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03 November 2014

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1 Survey description and summary

1.1 Survey

Type:	twin-sensor fluxgate gradiometer
Date:	15 to 17 September 2014
Area:	6ha
Lead surveyor:	Ross Dean BSc MSc MA MIfA

1.2 Client

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

1.3 Location

Site:	Land at Countess Wear, Exeter
Civil parish:	Exeter (Non-metropolitan District)
County:	Devon
Nearest Postcode:	EX2 6JH
NGR:	SX 947 904
Ordnance Survey E/N:	294740,90450 (point)

1.4 Archive

OASIS number:	substrat1-194022
Archive:	At the time of writing, the archive of this survey will be held by Substrata.

1.5 Introduction

This report was commissioned by AC Archaeology Ltd on behalf of clients. It has been prepared as part of a programme of work in support of a forthcoming planning application at the above site. The location of the proposed development area is shown in Figure 4.

1.6 Summary

The magnetic contrast across the area was sufficient to be able to differentiate between anomalies representing possible archaeological features and background magnetic responses. Twenty-four magnetic anomaly groups were identified as relating to possible archaeological deposits or features. Of these, one group lies adjacent to a small, single ditched, rectangular enclosure measuring approximately 40m by 30m, identified from aerial photographs and during a previous geophysical survey. It is likely that this group reflects the rectangular enclosure or related archaeological deposits. The remaining identified anomaly groups have characteristics typical of anomalies reflecting former field and other enclosure boundaries. Three of these may relate to former field boundaries of the current field system. The remainder are likely to relate to field boundaries or other enclosures of more than one phase of previous land management.

2 Survey aims and objectives

2.1 Aims

1. Define and characterise and detectable archaeological remains on the site.
2. Inform any future archaeological investigation of the area.

2.2 Objectives

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

3 Standards

The standards used to complete this survey are defined by the Institute for Archaeologists (2011). The codes of approved practice that were followed are those of the Institute for Archaeologists (2008 and 2009) and Archaeology Data Service/Digital Antiquity Guides (undated). The document text was written using the house style of the Institute for Archaeologists (Institute for Archaeologists, undated).

4 Site description

4.1 Landscape and land use

The application area is a parcel of land the residential district of Countess Wear within the city of Exeter. The survey area is approximately 6ha in extent and lies between 29m and 40m O.D. It is bounded to the northwest and southwest by residential infrastructure and a school. The A379 (Rydon Lane) runs along the south-eastern boundary. The north-eastern boundary comprises a field boundary with a field beyond (Figure 4).

At the time of the survey the land was under grass.

4.2 Geology

The application area is located on a solid geology of the Permian Heavitree Breccia Formation. Generally these rocks are reddish brown, mainly fine-grained, locally well-cemented breccia with clasts (mainly less than 8cm, some over 30cm) of Culm sandstone, vein quartz, hornfels lava, granite, and potassium feldspar (Murchisonite). The superficial geology was not recorded in the source used (British Geological Survey, undated).

5 Archaeological background

The following is a short summary of information obtained from the Devon and Dartmoor Historic Environment Record (HER) within 250m of the survey area and deemed relevant to the understanding of the gradiometer survey. Except where specifically stated, this information was obtained using the Heritage Gateway (English Heritage, undated). The HER entries cited below are summarised in Appendix 4.

The reader is advised that this summary should not be used outside the context of this report and is referred to the Devon Historical Environment Record (HER) for informed provision of the record.

5.1 Historical Landscape Characterisation

Barton fields: these relatively large, regular enclosures seem likely to have been laid out between the15th and 18th centuries with some curving boundaries possibly following earlier divisions in the pre-existing medieval fields (Devon County Council, undated).

5.2 Heritage Assets within the Survey Area

There are two undesignated heritage assets within the survey are. One is a parish boundary which runs along the north-eastern boundary of the survey area and that can be associated with a ‘dyke’ mentioned in the Topsham Charter dated to AD937 or AD938 (HER MDV19835 and MDV19836). The other is a small, single ditched, rectangular enclosure measuring approximately 40m by 30m, identified from aerial photographs and during a previous geophysical survey (MDV16940). The location of the enclosure is adjacent to magnetic anomaly group 8 (Figure 1).

5.3 Heritage Assets close to the Survey Area

There are a two of heritage assets within 250m of the application area and a view of the HER across a wider area demonstrates activity in the area from Prehistoric times onwards. A cropmark of a small oval enclosure and a corresponding extant low mound with a diameter of approximately 15m lies in a school playing field to the southwest of the survey area (MDV16940). To the northeast of the survey area, the orientation and regular pattern of a

series of field boundaries mapped on the Tithe Map and historical Ordnance Survey Maps suggests that they represent an early coaxial field system, possibly of Romano-British date (MDV63669).

5.4 Previous Historical Environment work

EDV6440 - Geophysical Survey on Land near Countess Wear (Ref: 0981096/COD/CHA)
Oxford Archaeotechnics (1996)

6 Results, discussion and conclusions

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

The reader is referred to section 7.

6.1 Results

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

Figure 1 along with Table 1 comprises the analysis of the survey data. Plots of the processed data are provided in Figures 2 and 3.

6.2 Discussion

Not all anomalies or anomaly groups identified in Table 1 are necessarily discussed below. All identified anomaly groups are recorded in the GIS project on the accompanying CD-ROM.

General points

Anomalies though to relate to natural features were not mapped. Recent man-made objects such as manholes, water management equipment, drains, cables and other services were only mapped where they comprised significant magnetic responses across the dataset that needed clarification. If mapped, they are listed in Table 1 but are not discussed below.

Data collection along the field edges was restricted as shown in Figures 1 to 3 due to the presence of magnetic materials in and adjacent to the field boundaries. Strong magnetic responses mapped close to the field boundaries are likely to relate to these materials except where indicated otherwise in Figure 1.

The closely spaced, parallel anomaly trends running along the long axis of the survey area are likely to be the result of ground disturbance caused by relatively recent ploughing.

A magnetically quiet area in the central-eastern part of the survey area is due to the leaching of magnetic minerals from local deposits by ground water.

Data relating to historical maps and other records

No recorded magnetic anomaly groups coincide with features recorded on historical Ordnance Survey maps.

Data with previous archaeological provenance

Anomaly group **8** lies adjacent to the location of a small, single ditched, rectangular enclosure measuring approximately 40m by 30m, identified from aerial photographs and during a previous geophysical survey and it is likely that this group reflects the same structure or related archaeological deposits (MDV16940, see Section 5 and Appendix 4). Group **1** trends in a similar direction to the shorter lengths of group 8 and there may be an archaeological correlation between the two groups.

Data with no previous archaeological provenance

The remaining magnetic anomaly groups identified as representing potential archaeological deposits or structures have characteristics typical of anomalies

reflecting former field and other enclosure boundaries. In this case a number of possible phases may be present. Groups **10, 17 and 21** appear to follow the extant field boundaries and may be related to this latest phase of enclosure. The archaeological provenience of the other anomaly groups would require further archaeological investigations to understand.

6.3 Conclusions

The magnetic contrast across the area was sufficient to be able to differentiate between anomalies representing possible archaeological features and background magnetic responses. Twenty-four magnetic anomaly groups were identified as relating to possible archaeological deposits or features. Of these, one group lies adjacent to a small, single ditched, rectangular enclosure measuring approximately 40m by 30m, identified from aerial photographs and during a previous geophysical survey. It is likely that this group reflects the rectangular enclosure or related archaeological deposits. The remaining identified anomaly groups have characteristics typical of anomalies reflecting former field and other enclosure boundaries. Three of these may relate to former field boundaries of the current field system. The remainder are likely to relate to field boundaries or other enclosures of more than one phase of previous land management.

7 Disclaimer and copyright

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

8 Acknowledgements

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

9 Bibliography

Archaeology Data Service/Digital Antiquity Guides to Good Practice (undated): *Geophysical Data in Archaeology* [Online], Available: http://guides.archaeologydataservice.ac.uk/g2gp/Geophysics_Toc [July 2014]

British Geological Survey (undated) *Geology of Britain viewer [Online], Available: http://www.bgs.ac.uk/discovering Geology/geologyOfBritain/viewer.html* [November 2014]

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

Dean, R. (2014) *A gradiometer survey method statement, Land at Countess Wear, Exeter, Devon,* Substrata unpublished document

Devon County Council (undated) *Historic Landscape Characterisation*, [Online], Available: http://gis.devon.gov.uk/basedata/viewer.asp?DCCService=hlc [November2014]

English Heritage (undated) *Heritage Gateway*, [Online], Available: http://www.heritagegateway.org.uk/Gateway/advanced_search.aspx [November 2014]

Institute for Archaeologists (undated) *IfA house style*, [Online], Available: http://www.archaeologists.net/sites/default/files/node-files/ifa_house_style.pdf [October 2014]

Institute for Archaeologists (2011) *Standard and guidance archaeological geophysical survey*. Reading: Author [Online], Available: http://www.archaeologists.net/sites/default/files/node-files/Geophysics2010.pdf [October 2014]

Institute for Archaeologists (2009) *Code of conduct*. Reading: Author [Online], Available: http://www.archaeologists.net/sites/default/files/node-files/code_conduct.pdf [October 2014]

Institute for Archaeologists (2008) *Code of approved practice for the regulation of contractual arrangements in archaeology*. Reading: Author [Online], Available: http://www.archaeologists.net/sites/default/files/node-files/ifa_code_practice.pdf [October 2014]

Oxford Archaeotechnics Ltd (1996) *Proposed Development at Topsham Road, Countess Wear, Exeter, Devon: Topsoil Magnetic Susceptibility & Gradiometer Survey*. Unpublished Oxford Archaeotechnics Ltd report

Appendix 1 Analysis table and supporting plots

General Guidance

The anomalies represented in the survey plots provided in this appendix are magnetic anomalies. The apparent size of such anomalies and anomaly patterns are unlikely to correspond exactly with the dimensions of any associated archaeological features.

A rough rule for interpreting magnetic anomalies is that the width of an anomaly at half its maximum reading is equal to the width of the buried feature, or its depth if this is greater (Clark, 2000: 83). Caution must be applied when using this rule as it depends on the anomalies being clearly identifiable and distinct from adjacent anomalies. In northern latitudes the position of the maximum of a magnetic anomaly will be displaced slightly to the south of any associated physical feature.

Site: An archaeological gradiometer survey
Land at Countess Wear, Exeter, Devon
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anomaly group	associated anomalies	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
1		possible, positive	disrupted linear			
2	3	possible, positive	linear			
3	2	possible, positive spread	disrupted linear		anomaly groups may represent an extension of group 2	
4		possible, positive	oval	large pit or natural deposit		
5		possible, positive spread	disrupted linear		anomaly groups define a broad linear spread much disrupted by ploughing which could indicate natural deposits but equally likely to be archaeological deposits	
6		possible, positive	oval	large pit or natural deposit		
7		possible, positive spread	disrupted linear		anomaly groups define a broad linear spread much disrupted by ploughing which could indicate natural deposits but equally likely to be archaeological deposits	
8		likely, positive	disrupted multilinear		anomaly group adjacent to a single ditched rectangular enclosure recorded by air and a previous geophysical survey	DCC HER MDV38794
9		possible, positive	disrupted linear			
10		possible, positive	disrupted linear			
11		possible, positive	linear			
12		possible, positive	linear			
13	14 15	possible, positive	disrupted linear		anomaly group may represent an archaeological linear anomaly that could be a flanking ditch of a Devon bank	
14	13 15	possible, negative	linear		anomaly group may be a "shadow" anomaly of surrounding anomaly groups 13 and 15 or may represent the stone-faced earthen bank of a "Devon bank" field boundary with groups 13 and 15representing the accompanying Devon bank ditches	
15	13 14	possible, positive	disrupted linear		anomaly group may represent an archaeological linear anomaly that could be a flanking ditch of a Devon bank	
16		possible, positive	linear			
17		possible, positive	disrupted linear			
18		possible, positive spread	linear		anomaly groups define a broad linear spread much disrupted by ploughing which could indicate natural deposits but equally likely to be archaeological deposits	
19		possible, positive	linear			
20		possible, positive spread	linear		anomaly groups define a broad linear spread much disrupted by ploughing which could indicate natural deposits but equally likely to be archaeological deposits	
21		possible, positive	linear			
22		possible, positive	linear			
23		possible, positive spread	linear		anomaly groups define a broad linear spread much disrupted by ploughing which could indicate natural deposits but equally likely to be archaeological deposits	
24		possible, positive spread	linear		anomaly groups define a broad linear spread much disrupted by ploughing which could indicate natural deposits but equally likely to be archaeological deposits	
101		possible, high contrast linear		ferrous cable, pipe or drain	relatively recent service	
102		possible, regular narrow linears		field drains		

Table 1: data analysis

294600 m 294700 m 294800 m 294900 m

90600 m 90500 m 90400 m 90300 m

N

40.8m

33.8m

1 2 3 4 5 6 7 8 9 10 11 12 13, 14, 15 16 17 18 19 20 21 22 23 24

101

102

29.6m

survey area

Potential archaeology

certainty, anomaly type

likely, positive (2)

possible, positive

possible, positive spread

possible, negative

Potential modern

certainty, anomaly type

possible, high contrast linear

possible, regular narrow linears (3)

0 100 m

294600 m 294700 m 294800 m 294900 m

British Grid
centre X: 294747.87 m, centre Y: 90444.22 m

Scale: 1:1500 @ A3. Spatial Units: Meter. Do not scale off this drawing

Notes:
1. All interpretations are provisional and represent potential archaeological deposits.
2. Anomalies designated "likely archaeology" have supporting evidence e.g. historical maps and or visible earthworks.
3. Representative; not all instances are mapped.
4. Anomalies likely to represent geological or other natural deposits are not mapped unless relevant to potential archaeological events or deposit

An archaeological gradiometer survey
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Figure 1: survey interpretation

Substrata
15 Horizon View, Bath Hotel Road
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British Grid
centre X: 294747.87 m, centre Y: 90444.22 m

Scale: 1:1500 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological gradiometer survey
Land at Countess Wear, Exeter, Devon
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Figure 2: shade plot of processed data

Substrata
15 Horizon View, Bath Hotel Road
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Tel: 07788627822
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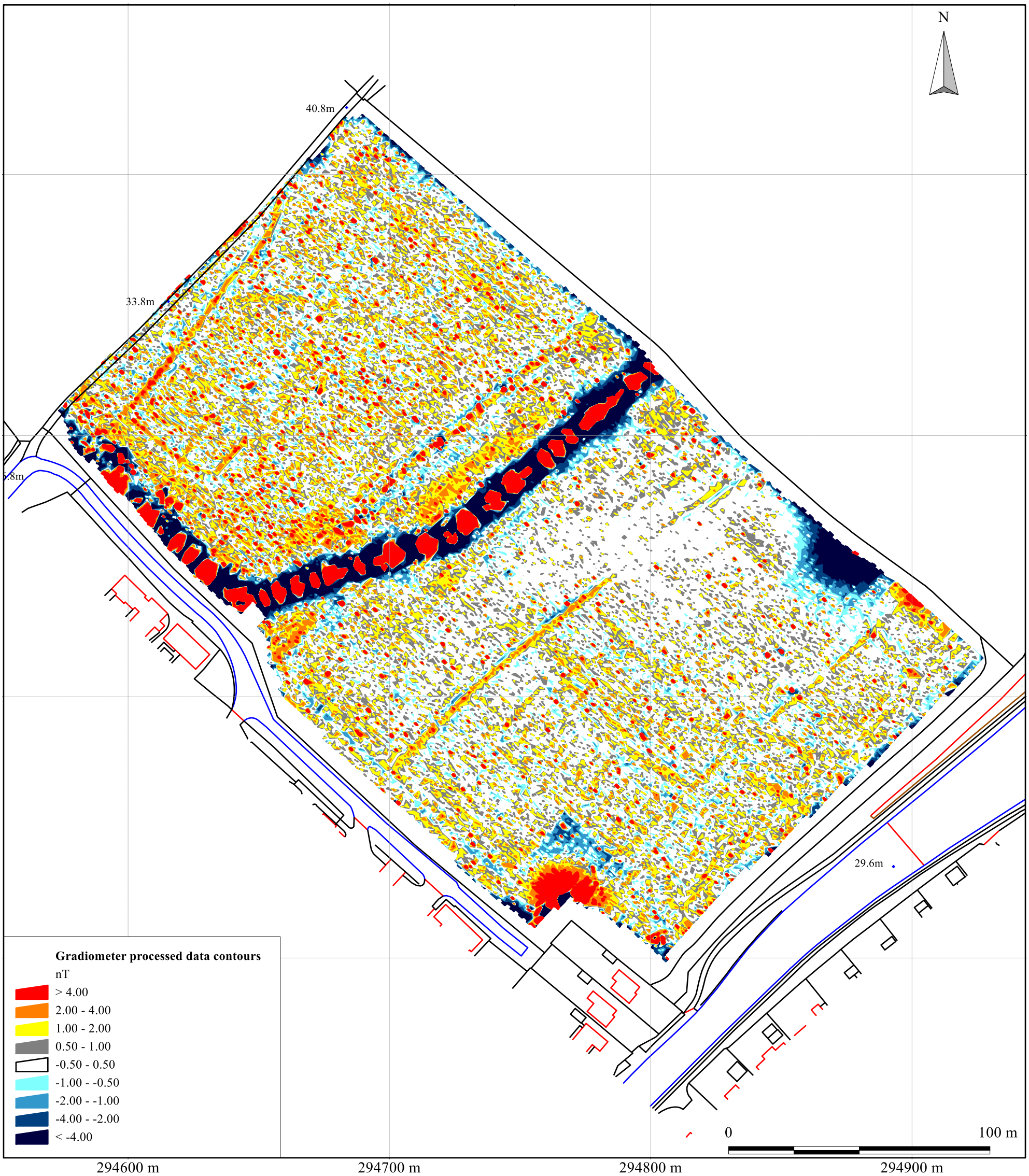

British Grid
centre X: 294747.87 m, centre Y: 90444.22 m

Scale: 1:1500 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological gradiometer survey
Land at Countess Wear, Exeter, Devon
Ordnance Survey (E/N): 294740,90450 (point)
Report: 141103

Figure 3: contour plot of processed data

Substrata
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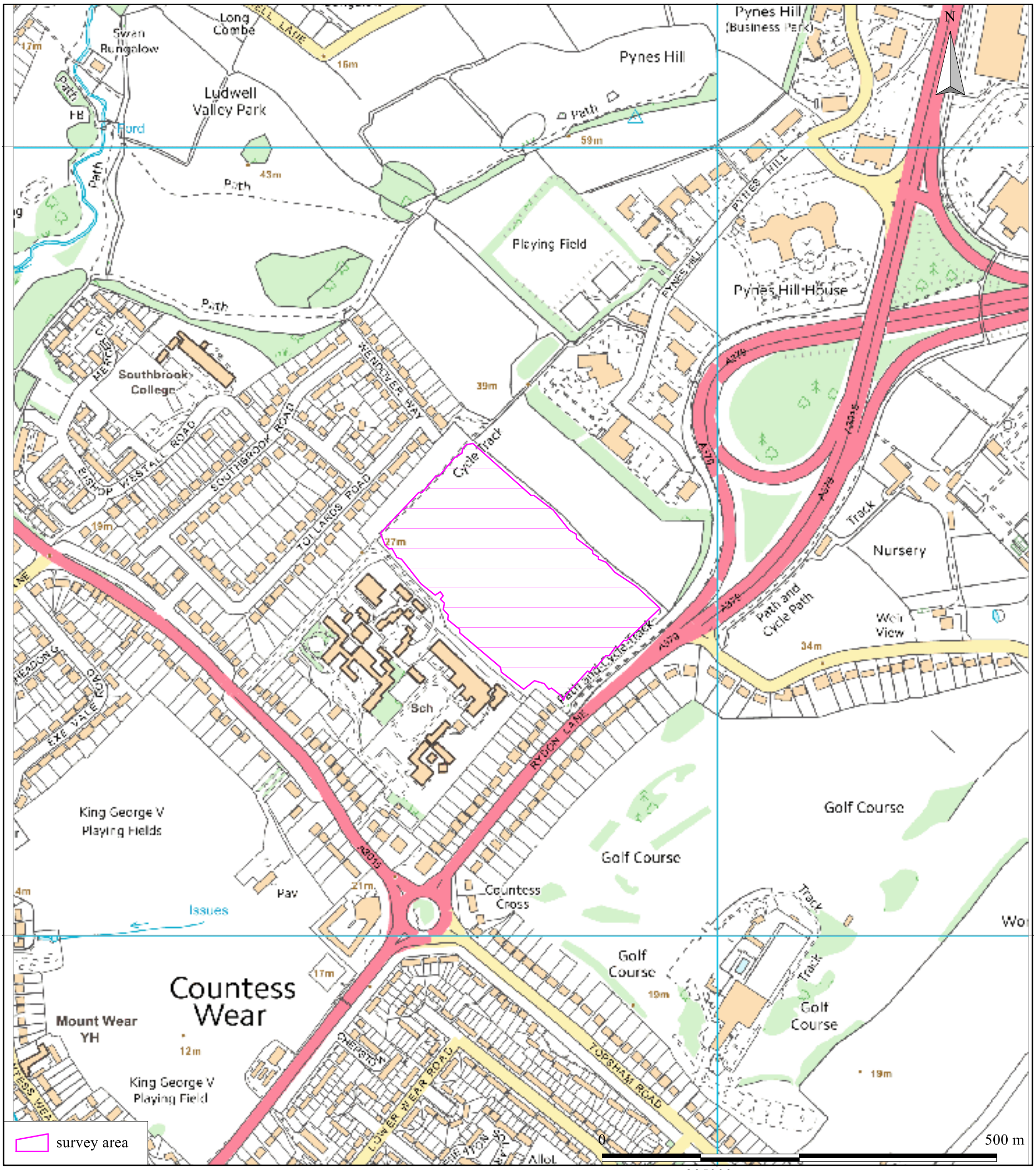

British Grid
centre X: 294747.87 m, centre Y: 90444.22 m

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

An archaeological gradiometer survey
Land at Countess Wear, Exeter, Devon
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Figure 4: survey location

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Appendix 2 Methodology Summary

Table 2: methodology summary	
Documents Survey methodology statement: Dean (2014)	
Methodology 1. The work was undertaken in accordance with the survey methodology statement. The geophysical (gradiometer) survey was undertaken with reference to standard guidance provided by the Institute for Archaeologists (2011) and Archaeology Data Service/Digital Antiquity Guides (undated). 2. The survey grid location information and grid plan was recorded as part of the project in a suitable GIS system. 3. Data processing was undertaken using appropriate software, with all anomalies being digitised and geo-referenced. The final report included a graphical and textual account of the techniques undertaken, the data obtained and an archaeological interpretation of that data and conclusions about any likely archaeology.	
Grid *Method of Fixing:* DGPS set-out using pre-planned survey grids and Ordnance Survey coordinates. *Composition:* 30m by 30m grids *Recording:* Geo-referenced and recorded using digital map tiles. *DGPS used:* Spectra Precision PM5V2 GPS with external antenna and survey pole and DigiTerra Explorer 7 as the survey control program.	
Equipment *Instrument:* Bartington Instruments grad601-2 *Firmware:* version 6.1	**Data Capture** *Sample Interval:* 0.25-metres *Traverse Interval:* 1 metre *Traverse Method:* zigzag *Traverse Orientation:* GN41
Data Processing, Analysis and Presentation Software IntelliCAD Technology Consortium IntelliCAD 7.2 DW Consulting TerraSurveyor3 Manifold System 8 GIS Microsoft Corp. Office Excel 2013 Microsoft Corp. Office Publisher 2013 Adobe Systems Inc Adobe Acrobat 9 Pro Extended	

Appendix 3 Data processing

Table 3: gradiometer survey - processed data metadata
SITE Instrument Type: Bartington Grad 610 Units: nT Direction of 1st Traverse: 0 deg Collection Method: ZigZag Sensors: 2 @ 1.00 m spacing. Dummy Value: 32702 PROGRAM Name: TerraSurveyor Version: 3.0.25.1
Stats Max: 120.86 Min: -82.15 Std Dev: 9.72 Mean: -0.13 Median: 0.00 Processes: 12 1 Base Layer 2 Clip at 1.00 SD 3 Clip at 4.00 SD 4 De Stagger: Grids: All Mode: Both By: -2 intervals 5 De Stagger: Grids: cb17.xgd cb18.xgd cc5.xgd cc6.xgd cc19.xgd cb16.xgd cb19.xgd cc4.xgd cc7.xgd cc18.xgd cc20.xgd cc31.xgd cb15.xgd cb20.xgd cc3.xgd cc8.xgd cc17.xgd cc21.xgd cc30.xgd cb14.xgd cb21.xgd cc2.xgd cc9.xgd cc16.xgd cc22.xgd cc29.xgd cb12.xgd cb22.xgd cc1.xgd cc10.xgd cc15.xgd cc23.xgd cc28.xgd cb11.xgd cb23.xgd cb26.xgd cc11.xgd cc14.xgd cc24.xgd cc27.xgd cb10.xgd cb24.xgd cb25.xgd cc12.xgd cc13.xgd cc25.xgd cc26.xgd Mode: Both By: -1 intervals 6 DeStripe Median Sensors: ca1.xgd ca12.xgd ca13.xgd ca24.xgd cb2.xgd cb16.xgd cb19.xgd cc4.xgd cc7.xgd ca2.xgd ca11.xgd ca14.xgd ca23.xgd cb3.xgd cb15.xgd cb20.xgd cc3.xgd cc8.xgd ca3.xgd ca10.xgd ca15.xgd ca22.xgd cb4.xgd cb14.xgd cb21.xgd cc2.xgd cc9.xgd ca4.xgd ca9.xgd ca16.xgd ca21.xgd cb5.xgd cb12.xgd cb22.xgd cc1.xgd cc10.xgd ca5.xgd ca8.xgd ca17.xgd ca20.xgd cb6.xgd cb11.xgd cb23.xgd cb26.xgd cc11.xgd ca6.xgd ca7.xgd ca18.xgd ca19.xgd cb7.xgd cb10.xgd cb24.xgd cb25.xgd cc12.xgd 7 DeStripe Median Sensors: cc18.xgd cc20.xgd cc31.xgd cc17.xgd cc21.xgd cc30.xgd cc16.xgd cc22.xgd cc29.xgd cc15.xgd cc23.xgd cc28.xgd cc14.xgd cc24.xgd cc27.xgd 8 DeStripe Median Sensors: cc25.xgd cc26.xgd 9 DeStripe Median Traverse: Grids: cb17.xgd cb18.xgd cc5.xgd cc6.xgd cc19.xgd 10 Search & Replace From: -3000 To: 3000 With: Dummy (Area: Top 157, Left 69, Bottom 180, Right 87) 11 Search & Replace From: -3000 To: 3000 With: Dummy (Area: Top 180, Left 64, Bottom 249, Right 79) 12 Edge Match (Area: Top 270, Left 720, Bottom 299, Right 839) to Left edge Note: converting the gradiometer data into ESRI GIS files imposed an x=y interpolation on the entire dataset

Appendix 4 Summaries of cited Devon and Dartmoor Historical Environment Record Entries as recorded in the Heritage Gateway (English Heritage, undated)

HER Number: MDV19835 & MDV19836
Name: Parish Boundary, probably the dyke mentioned in the Topsham charter
Summary:
Parish boundary runs SX94509080 to SX95009038. Probably the dyke mentioned in the Topsham charter.
Location Grid Reference: SX 948 905; north-eastern boundary of application area
Monument Type(s) and Dates: PARISH BOUNDARY (Unknown date)
Associated sources:
Raymond, F., 2006, An Archaeological Desk-Based Assessment of The Newcourt Area - Lower RNSD Site and Land Alongside Old Rydon Lane and the A379, Topsham, John Moore Heritage Services Report
It is probable that the early manorial boundary lay to the north of Old Rydon Lane, which would place it within Pratt Residential, but its course is uncertain. It is said to have followed 'The Way' which is mentioned in an eleventh century charter and is first documented in AD937 or 938. The western end of the boundary may have coincided with a dyke also described in the Topsham charter.

HER Number: MDV38794
Name: Enclosure North of Rydon Lane
Summary
Small single ditched rectangular enclosure about 45m x 40m. Recorded from the air by CUC (1959) and F. Griffith 1984 (aph).
Location Grid Reference: SX 946 905; within application area approximately 149m GN290 from application area centre point
Protected Status:
SHINE: Prehistoric rectangular, single ditched enclosure south west of Southbrook College
Monument Type(s) and Dates: ENCLOSURE (Prehistoric - 698000 BC to 42 AD (Between))
Associated source:
Oxford Archaeotechnics Ltd, 1996, Proposed Development at Topsham Road, Countess Wear, Exeter, Devon: Topsoil Magnetic Susceptibility & Gradiometer Survey (Report - Geophysical Survey)
The gradiometer plot shows an angular rectilinear enclosure, approximately 40 metres by 30 metres, on a north-west to south-east alignment, with a probable entrance on the south-west some 10 metres from the southern angle. A hollow trackway is suggested by this entrance, extending some 15 metres into the interior towards what may be a circular structure approximately 7 metres in diameter. Other subtle linteations are suggested. A substantial intrusive feature, probably a pit, lies just outside the enclosure to the north-east.
Associated Events:
EDV6440 - Geophysical Survey on Land near Countess Wear (Ref: 0981096/COD/CHA)

HER Number: MDV16940
Summary:
The cropmark of a small oval enclosure is visible on CUC air photograph. Diameter about 15m (CUC AP). Vis=23/3/1990 (Robinson). Site lies in level area, school playing field, but is visible as low mound about 15m diameter and 0.2m high.
Location Grid Reference: SX 946 902; approximately 287m GN209 from application area centre point
Monument Type(s) and Dates: BARROW (Prehistoric - 698000 BC to 42 AD (Between))

HER Number: MDV63669
Summary:
The NE to SW alignment of the field boundaries in this area as seen on the tithe map and early OS maps is very consistent. They may represent the survival of an early coaxial field system, possibly of Roman date as it reflects the alignment of Topsham road. Old Rydon Lane also appears to deflect around some of these fields, again hinting at an early origin.
Location Grid Reference: SX 950 907; approximately 360m GN46 from application area centre point
Monument Type(s) and Dates: FIELD SYSTEM (Roman - 43 AD to 409 AD (Between))

Appendix 5 Geophysical surveying techniques

1 Introduction

Substrata offers magnetometer and earth resistance surveying. We also provide other archaeology-specific geophysical surveys such as ground penetrating radar and resistivity. The particular method or combination of methods used depends on local soil conditions and the survey requirements. These methods are capable of delivering fast and accurate assessments of the archaeology of both large and small sites.

Further details can be found on our website at www.substrata.co.uk.

2 Magnetometer surveying

Standard magnetometer surveys are the workhorse of archaeological surveying when speed and cost-effectiveness are important. Identifiable archaeological features include areas of occupation, hearths, kilns, furnaces, ditches, pits, post-holes, ridge-and-furrow, timber structures, wall footings, roads, tracks and similar buried features.

Magnetometer surveying is used to detect and map small changes in the earth's magnetic field caused by concentrations of ferrous-based minerals within the soil and subsoil, and by materials buried beneath the surface. While most of these changes are too small to affect a compass needle, they can be detected and mapped by sensitive field equipment. During surveys the different magnetic properties of top-soils, sub-soils, rock formations and archaeological features are recorded as variations against a background value. Subsequently magnetic anomalies resulting from potential archaeology can be identified and interpreted.

<u>Bartington grad601-2 gradiometers</u>

A gradiometer is a type of magnetometer and is sensitive to relatively small changes in the earth's magnetic field. Our primary surveying instruments are Bartington Grad601-2 (dual sensor) fluxgate gradiometers with automatic data loggers. They are specifically designed for field use by archaeologists. The Bartington gradiometers provide proven technology in archaeological magnetic surveying and offer fast, accurate set-up and survey rates. They are sensitive to depths of between 0 and 1.5m below ground level, with optimum sensitivity at depths of 1m or less.

<u>Multiple sensor arrays</u>

A technique relatively new to commercial archaeological surveying but well understood in academic circles involves the use of multiple magnetometer sensors towed behind a quad bike or similar vehicle. With multiple sensors and the use of on-board GPS units, it is possible to achieve faster survey rates at competitive commercial rates when compared to the use of multiple instruments and the techniques discussed above provided the ground is suitable for the vehicle and array. Substrata is pleased to announce that we now offer this service on suitable larger sites

3 Earth resistance surveying

Earth resistance surveying is an excellent tool for detecting buried archaeology. Its relatively slow rate of survey compared to magnetometer surveys means that it usually employed in commercial surveys when a detailed understanding of buried building remains is required. This technique measures changes in the electrical resistance of the ground being surveyed. In practice, the recording of differences in the electrical resistance of near-surface deposits and structures allows the detection and interpretation of masonry and brick foundations, paving and floors, drains and other cavities, large pits, building platforms, robber trenches, ditches, graves and similar buried features.

Resistance to electrical current flow in the ground depends on the moisture content and structure of the soil and other materials buried beneath the surface. For example, the higher the moisture content of a soil, the less resistant it is to electrical current flow. A ditch completely buried beneath the present ground surface is likely to have an infill soil different to that surrounding the ditch in terms of compactness and composition. As a result, the soil filling the buried ditch will retain moisture in a different way to the surrounding soil which means it will

have an electrical resistance at variance with the surrounding environment. By passing a small current through the ground it is possible to detect, record, plot and interpret such changes in electrical resistance.

For earth resistance surveying Substrata uses the Geoscan Research RM15 series multi-probe resistance meters and purpose-built automatic data-loggers. The Geoscan MPX15 multiplexer is an integral part to the instrument configuration and facilitates multi-probe arrays which speed up survey area coverage rates and, if required, facilitate simultaneous multiple-depth data collection.