

Substrata

Archaeological Geophysical Surveyors

An archaeological magnetometer survey

Land north of Orley Road Ipplepen, Devon

Centred on NGR (E/N): 282880,066600 (point)

Report: 1605ORL-R-1

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5 July 2016

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Project archive

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

Website: substrata.co.uk

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

1 Survey description and summary

1.1 Survey

Type: twin-sensor fluxgate gradiometer
Date: 12 May 2016
Area: 1.5ha
Lead surveyor: Mark Edwards BA
Author: Ross Dean BSc MSc MA MifA

1.2 Clients

Devon County Council Environment Group, Lucombe House, County Hall, Exeter, Devon EX2 4QD

1.3 Location

Site: Land north of Orley Road
Civil Parish: Ipplepen
District: Teignbridge
County: Devon
Nearest Postcode: TQ12 5SA
NGR: SX 82880 66600 (point)
Ordnance Survey NGR (E/N): 282880,066600 (point)

1.4 Archive

OASIS number: substrat1-25667
Archive: At the time of writing, the archive of this survey will be held by Substrata.

1.5 Introduction

This report presents the results of an archaeological magnetometer survey at the above site, hereafter referred to as the survey area. It has been prepared for the Devon County Council Environment Group. The survey area location is shown in Figure 1.

1.6 Summary

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

Twelve magnetic anomaly groups were mapped as representing possible archaeological deposits or features. Of these, nine are most likely to represent linear and disrupted linear deposits, such as former ditches or banks, of unknown period and probably from more than one phase of past land management. Two groups indicate parallel trends in the data which represent ground disturbance such as field drains and/or ploughing of unknown period. One group is distinct in the data but its characterisation is unclear and, while the associated deposits may be natural, an archaeological origin cannot be ruled out.

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 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).

4 Site description

4.1 Landscape and land use

The survey area (Figure 1) comprises one field on the northern slopes of an approximately east to west trending spur. The land slopes from approximately 75m AOD in the southeast to approximately 60m AOD in the northwest. To the north of the site there relatively steep-sided valley containing an east to west flowing stream. The site is bounded by woodland to the north and west, a field to the east and Orley Road to the south. At the time of the survey the field was under grass pasture.

4.2 Geology

The survey area has a solid geology of limestone of the Devonian East Ogwell Limestone Formation. The superficial geology is not recorded in the source used (British Geological Survey, undated).

5 Archaeological background

5.1 Definitions

5.1.1 Heritage assets

Archaeological sites, buildings, historic parks and gardens, conservation areas, registered battlefields and other aspects of the historic environment that are significant because of their historic, archaeological, architectural or artistic interest are considered heritage assets. Designated heritage assets are afforded protection as either scheduled monuments, listed buildings or through their inclusion within conservation areas. Non-designated heritage assets are potential archaeological remains and historic landscapes.

5.1.2 Historic Environment Records (HERs) are sources of, and signposts to, information relating to landscapes, buildings, monuments, sites, places, areas and archaeological finds spanning more than 700,000 years of human endeavour. Based mainly in local authorities, they are used for planning and development control but they also fulfil an educational role (Historic England, undated b).

5.1.2 Archaeological periods

Archaeological periods use in this report are defined as follows:

Prehistoric: before AD 43

Palaeolithic: circa 500,000 BC to circa 10,000 BC

Mesolithic: circa 10,000 BC to circa 4,000 BC

Neolithic: circa 4,000 BC to 2,200 BC

Bronze Age: circa 2,200 BC to circa 700 BC

Iron Age: circa 700 BC to AD 43

Romano-British: AD 43 to circa AD 410

Early Medieval: circa AD 410 to AD 1066

Medieval: AD 1066 to AD 1540

Post-medieval: AD 1540 to AD 1901

Modern: AD 1901 onwards

5.1.3 Grid references, distances and bearings

The centre of the survey area is provided in Section 1 as a twelve figure National Grid easting/northing (E/N) and as a ten figure National Grid reference (NGR), both of which define a 1m square with its south-western corner on the reference point. Eight figure NGRs define a 10m square. Six figure NGRs a 100m square and so on. The distances and bearings provided below are relative to the south-western corner of the square defined by the NGR quoted.

All distances and bearings provided below are relative to the Ordnance Survey NGR centre point of the site recorded in Section 1.

5.2 Historic landscape characterisation

Medieval enclosures based on strip fields.

This area was probably first enclosed with hedge-banks during the later Medieval period. The curving form of the hedge-banks suggests that earlier it may have been farmed as open strip-fields (Turner, 2015).

5.3 Historical and archaeological background

The following is a short summary of information obtained from the Devon HER within approximately 500m of the survey area and relevant to the understanding of the geophysical survey. Except where specifically cited, this information was obtained using the Heritage Gateway portal (Historic England, undated a).

5.3.1 Heritage assets within the survey area

There are no heritage assets recorded in the HER within the survey area.

5.3.2 Heritage assets within 500m of the survey area

A Prehistoric field system lies 429m from the survey area centre on a bearing of N242 (HER MDV19187, NGR SX 825 664). Further away, the early Iron Age to Medieval Denbury Hillfort lies 2291m on N326 and is visible from the application area (MDV8603, SX 816 685).

A Medieval field system has been recorded 344m on N306 to the south of the lane leading to Broadway Farm (MDV30074, SX 826 668).

Evidence of Post-medieval quarrying in the area has been recorded 372m from the survey area on N36 (MDV48062, SX 831 669), 516m on N126 (MDV49108, SX 833 663), 269m on N222 (MDV48045, SX 827 664) and 520m on N247 (MDV48046, SX 824 664).

6 Results, discussion and conclusions

6.1 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 variations in the chemistry or magnetism of 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 actual 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 (see also Section 7).

6.2 Results

Figure 2 shows the interpretation of the survey data. It includes the anomaly groups identified as possibly relating to archaeological deposits 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.

Figure 2 and Table 1 comprise the analysis of the survey data.

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

6.3 Discussion

6.3.1 General points

Discussion 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 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 adjacent to the survey area. Strong magnetic responses mapped close to survey boundaries are likely to relate to these materials except where otherwise indicated in Figure 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 are only mapped as potential archaeology if they are clustered in groups or otherwise form recognisable patterns.

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.

Anomalies thought to relate to natural features were not mapped.

Numerous dipole magnetic anomalies are scattered across the data set. These are likely to represent recent ferrous objects.

6.3.2 Data relating to historic maps and other records

No magnetic anomaly groups pertaining to known heritage assets were recorded.

6.3.3 Data with no previous archaeological provenance

Magnetic anomaly groups **1** to **9** are likely to represent linear and disrupted linear deposits, such as former ditches or banks, of unknown period and probably from more than one phase of past land management.

Group **10** may represent archaeological or natural deposits as indicated in Table 1. The group is mapped because an archaeological origin cannot be ruled out.

Two linear trends exist in the data set (Figures 3 and 4) and have been recorded as groups **11** and **12** in figure 2. Such groups can represent land disturbance such as field drains and/or ploughing of unknown period.

6.4 Conclusions

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

Twelve magnetic anomaly groups were mapped as representing possible archaeological deposits or features. Of these, nine are most likely to represent linear and disrupted linear deposits, such as former ditches or banks, of unknown period and probably from more than one phase of past land management. Two groups indicate parallel trends in the data which represent ground disturbance such as field drains and/or ploughing of unknown period. One group is distinct in the data but its characterisation is unclear and, while the associated deposits may be natural, an archaeological origin cannot be ruled out.

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.

Ross Dean, trading as Substrata, will assign copyright to the client upon written request but retains the right to be identified as the author of all project documentation and reports as defined in the Copyright, Designs and Patents Act 1988 (Chapter IV, s.79). This report contains material that is non-Substrata copyright or the intellectual property of third parties. Such material is labelled with the appropriate copyright and is non-transferrable by Substrata.

8 Acknowledgements

Substrata would like to thank Bill Horner, Devon County Council Archaeologist, for commissioning us to complete this survey.

9 Bibliography

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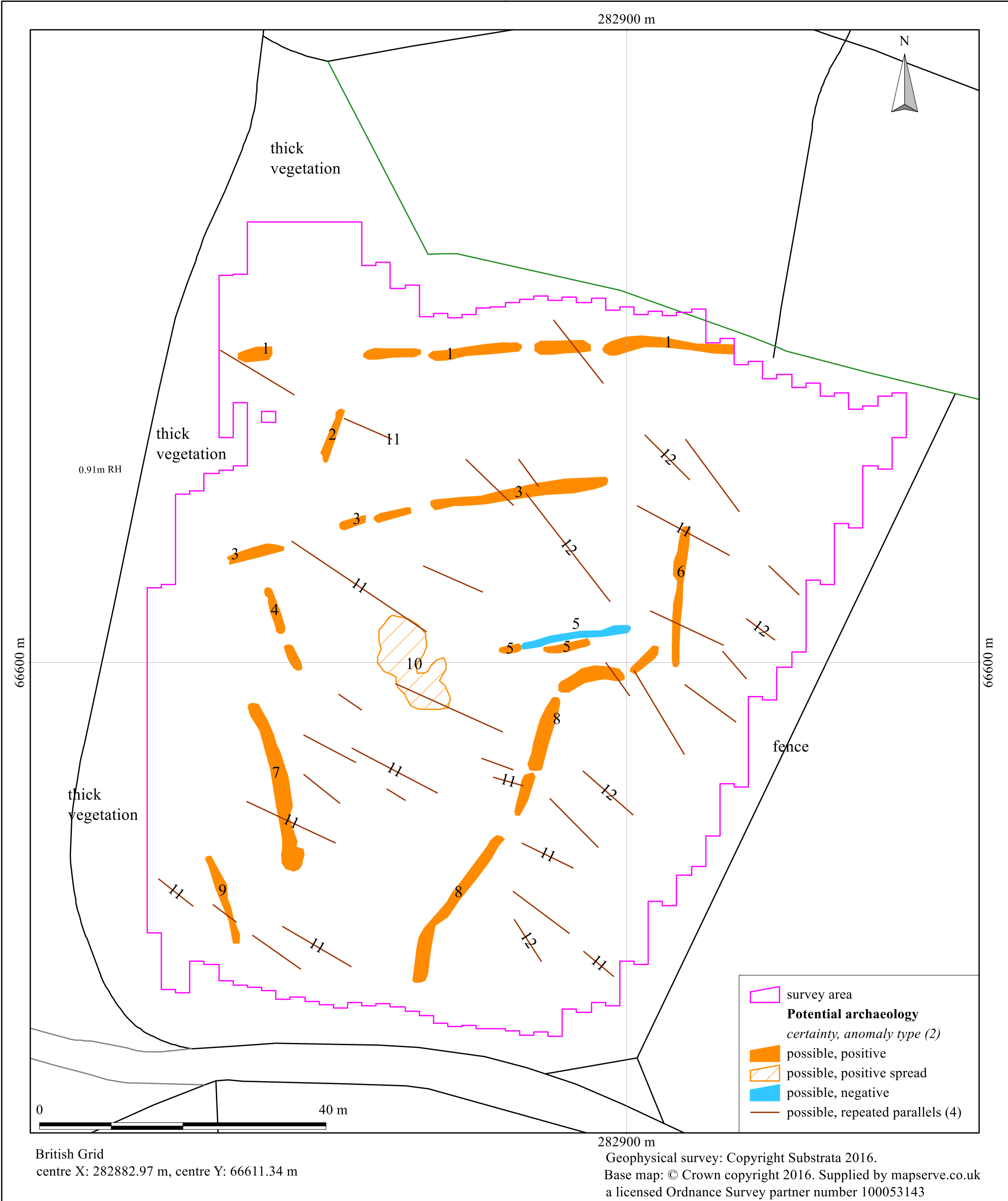
Turner, S. (2015) *Devon Historic Landscape Characterisation (HLC)* [data-set]. York: Archaeology Data Service [distributor], [Online], Available: http://archaeologydataservice.ac.uk/archives/view/devon_hlc_2015/index.cfm [July 2016]

Appendix 1 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 (see Section 6.1).

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.



Notes:

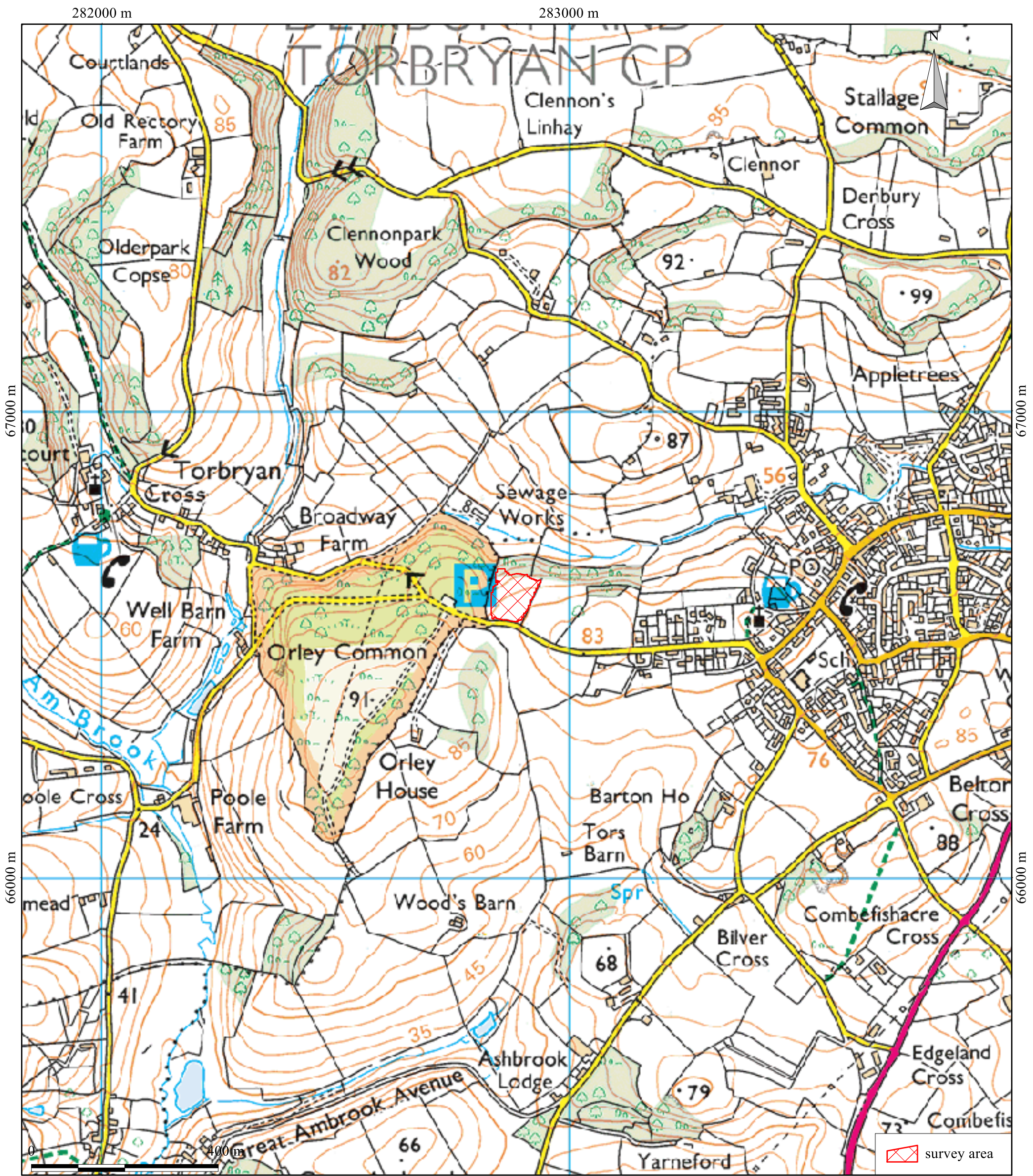
1. All interpretations are provisional and represent potential archaeological deposits.
2. 'Anomaly type' is a description of the magnetic anomaly. See the report text or GIS for an archaeological characterisation.
3. Anomalies designated "likely archaeology" have supporting evidence e.g. historical 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.

Scale: 1:500 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological magnetometer survey
Land north of Orley Road, Ipplepen, Devon
Centred on NGR (E/N): 282880,066600 (point)
Report: 1605ORL-R-1

Figure 2: survey interpretation

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282000 m
British Grid
centre X: 282887.96 m, centre Y: 66595.50 m

283000 m

Geophysical survey: Copyright Substrata 2016.
Base map: © Crown copyright 2016. Supplied by mapserve.co.uk
a licensed Ordnance Survey partner number 100053143

Scale: 1:8000 @ A3. Spatial Units: Meter. Do not scale off this drawing

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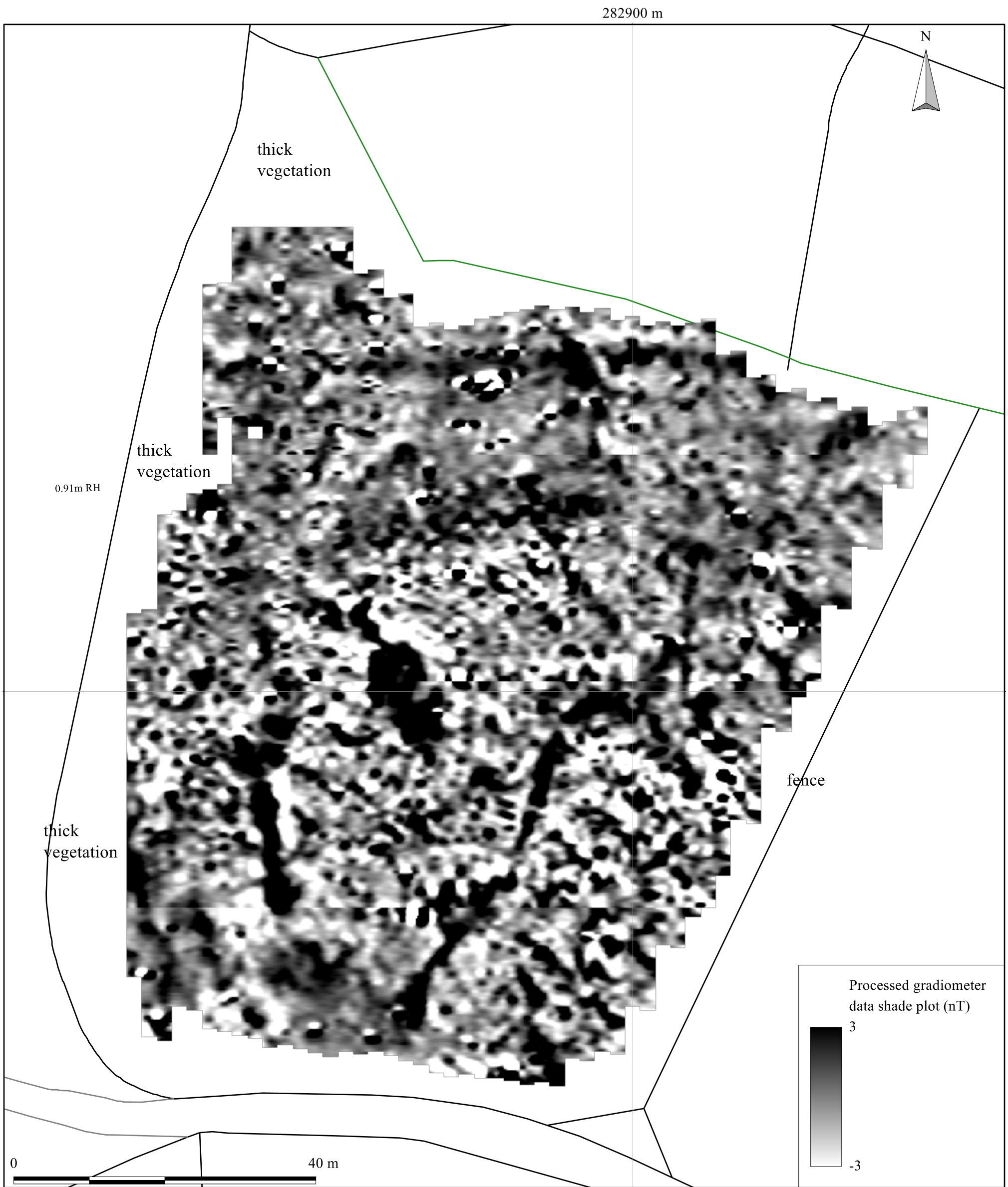
Figure 1: location map

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Site: An archaeological magnetometer survey
Land north of Orley Road, Ipplepen, Devon
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anomaly group	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments
1	possible, positive	disrupted linear		
2	possible, positive	linear		
3	possible, positive	disrupted linear		
4	possible, positive	disrupted linear		
5	possible, positive/negative/positive	linear		
6	possible, positive	linear		
7	possible, positive	linear		
8	possible, positive	disrupted multilinear		
9	possible, positive	linear		
10	possible, positive spread	irregular	archaeological or natural deposits	anomaly group may represent archaeological deposits such as a disturbed filled hollow, earthen surface or spread of earthen material but could equally represent natural filled hollows or deposits
11	possible, repeated parallels		cultivation traces or field drains	anomaly trends are most likely to represent ploughing of unknown date; some groups may represent field drains
12	possible, repeated parallels		cultivation traces or field drains	anomaly trends are most likely to represent ploughing of unknown date; some groups may represent field drains

Table 1: data analysis



British Grid
centre X: 282882.97 m, centre Y: 66611.34 m

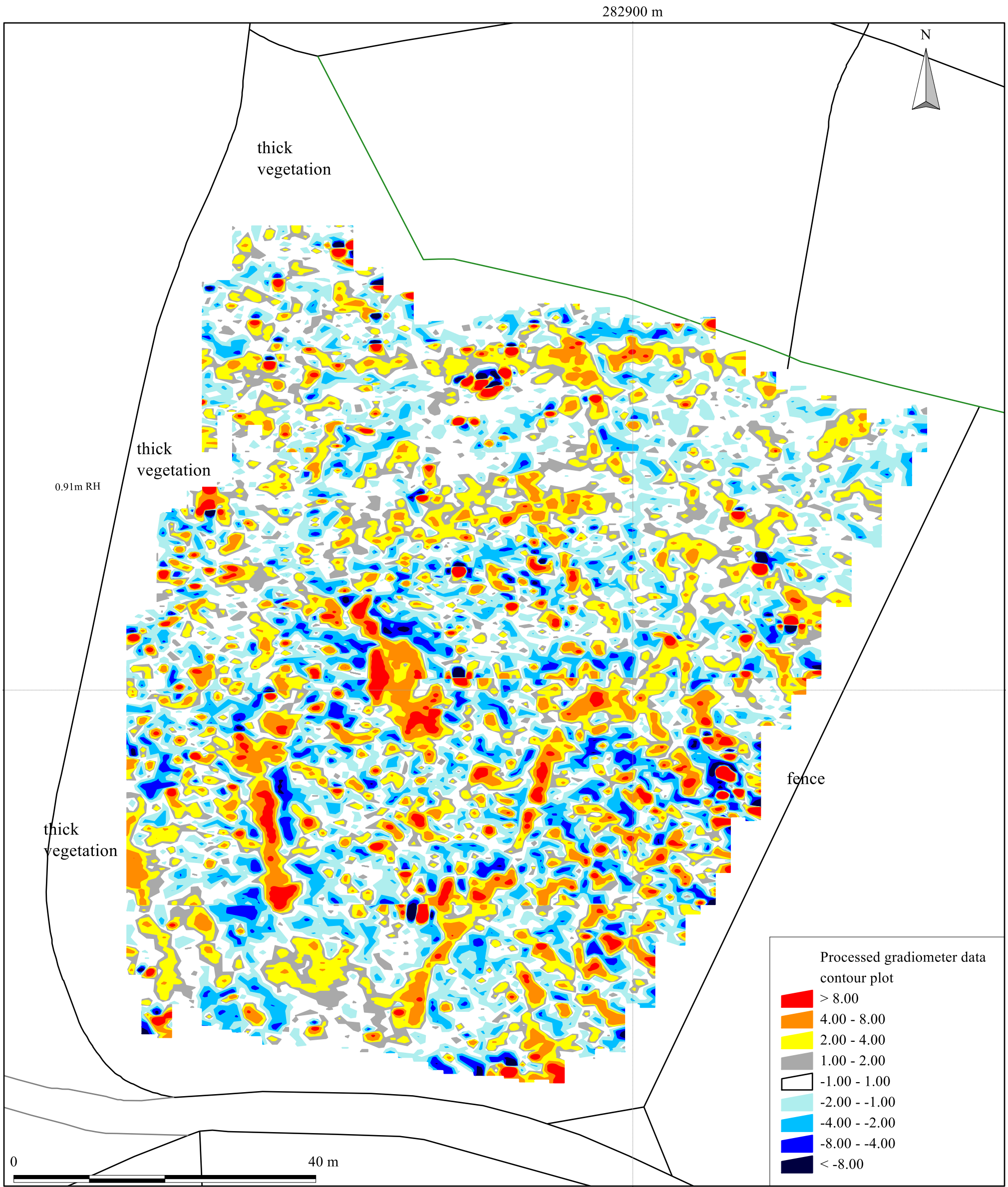
282900 m
Geophysical survey: Copyright Substrata 2016.
Base map: © Crown copyright 2016. Supplied by mapserve.co.uk
a licensed Ordnance Survey partner number 100053143

Scale: 1:500 @ A3. Spatial Units: Meter. Do not scale off this drawing

Figure 3: shade plot of processed data

An archaeological magnetometer survey
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British Grid
centre X: 282882.97 m, centre Y: 66611.34 m

Geophysical survey: Copyright Substrata 2016.
Base map: © Crown copyright 2016. Supplied by mapserve.co.uk
a licensed Ordnance Survey partner number 100053143

Scale: 1:500 @ A3. Spatial Units: Meter. Do not scale off this drawing

Figure 4: contour plot of processed data

An archaeological magnetometer survey
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Appendix 2 Methodology Summary

Table 2: methodology summary	
Documents Survey methodology statement: Dean (2016)	
Methodology <ol style="list-style-type: none"> 1. The work was undertaken in accordance with the survey methodology statement. The geophysical (magnetometer) survey was undertaken with reference to standard guidance provided by the Chartered Institute for Archaeologists (2014) and Archaeology Data Service (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 <i>Method of Fixing:</i> DGPS set-out using pre-planned survey grids and Ordnance Survey coordinates. <i>Composition:</i> 30m by 30m grids <i>Recording:</i> Geo-referenced and recorded using digital map tiles. <i>DGPS used:</i> Spectra Precision PM5V2 GPS with external antenna and survey pole and DigiTerra Explorer 7 as the survey control program.	
Equipment <i>Instrument:</i> Bartington Instruments grad601-2 <i>Firmware:</i> version 6.1	Data Capture <i>Sample Interval:</i> 0.25m <i>Traverse Interval:</i> 1 metre <i>Traverse Method:</i> zigzag <i>Traverse Orientation:</i> GN
Data Processing, Analysis and Presentation Software IntelliCAD Technology Consortium IntelliCAD 8.0 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: magnetometer survey - processed data metadata		
<p>SITE</p> <p>Instrument Type: Bartington Grad-601 gradiometer</p> <p>Units: nT</p> <p>Direction of 1st Traverse: see below</p> <p>Collection Method: ZigZag</p> <p>Sensors: 2 @ 1.00 m spacing.</p> <p>Dummy Value: 32702</p> <p>PROGRAM</p> <p>Name: TerraSurveyor</p> <p>Version: 3.0.29.3</p>		
<p>Stats</p> <p>Max: 101.96</p> <p>Min: -97.53</p> <p>Std Dev: 3.74</p> <p>Mean: 0.24</p> <p>Median: 0.02</p>	<p>Processes: 5</p> <p>1 Base Layer</p> <p>2 De Stagger: Grids: All Mode: Both By: -2 intervals</p> <p>3 De Stagger: Grids: All Mode: Both By: -2 intervals</p> <p>4 DeStripe Median Sensors: Grids: All</p> <p>5 Interpolate: Match X & Y Doubled.</p>	

Appendix 4: Unprocessed data plot

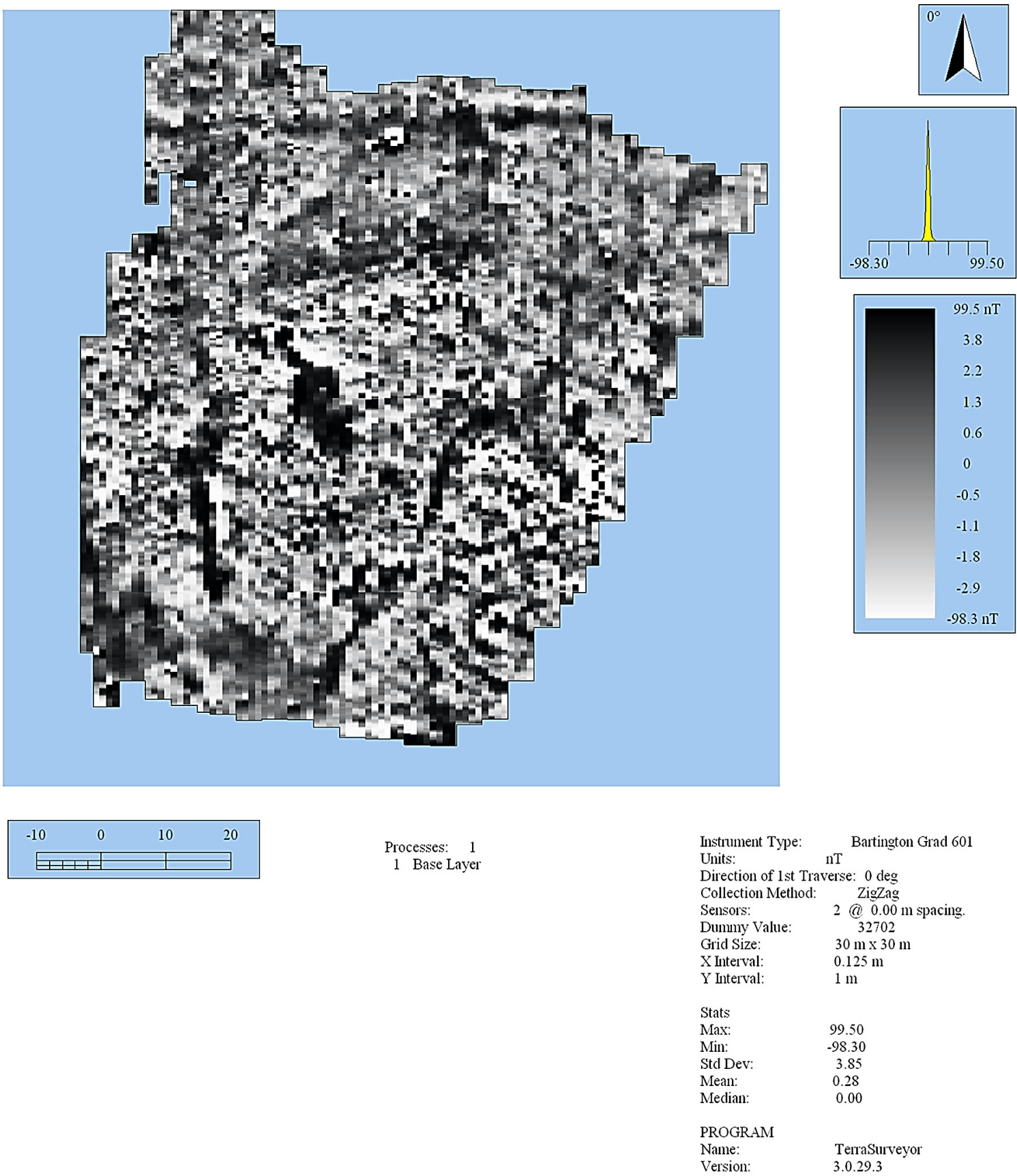


Figure 5: shade plot of unprocessed data