

Substrata

Archaeological Geophysical Surveyors

An archaeological gradiometer survey

**Land at Challabrook Farm
Bovey Tracy, Devon**

Ordnance Survey (E/N): 280915,77840 (point)

Report: 1508CHA-R-1

Ross Dean BSc MSc MA MCifA

19 October 2015

Substrata
Office 1, 5 Mill Street
Bideford, Devon EX39 2JT
Tel: 01273 273599
Email: geophysics@substrata.co.uk
Web: substrata.co.uk

Client:
Rule Five Land Ltd
Higher Clare
Shaldon Road
Combeinteignhead
Newton Abbot
Devon TQ12 4RR
Tel: 07785 307018
Web: rulefiveland.co.uk

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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: between 1 and 15 September 2015
Area: gradiometer survey: 19ha
Lead surveyor: Mark Edwards BA
Author: Ross Dean BSc MSc MA MifA

1.2 Client

Rule Five Land Ltd, Higher Clare, Shaldon Road, Combeinteignhead, Newton Abbot, Devon TQ12 4RR

1.3 Location

Site: Land at Challabrook Farm
Town: Bovey Tracy
District: Teignbridge
County: Devon
Nearest Postcode: EX31 3UW
NGR: SX 809 778
Ordnance Survey NGR (E/N): 253030,132090 (point)

1.4 Archive

OASIS number: substrat1-226957
Archive: At the time of writing, the archive of this survey will be held by Substrata and will be deposited with the ADS in due course.

1.5 Introduction

This report was commissioned by Rule Five Land Ltd and is part of a programme of work undertaken in preparation for the submission of a Masterplan for a proposed residential housing development at the above site. The site location is shown in Figure 1. The site was divided into survey areas designated 1 to 10 as part of the survey interpretation as shown in Figure 2. Area 1 was not surveyed because of constraints imposed by vegetation.

1.6 Summary

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

Thirty-one magnetic anomaly groups were mapped as possibly representing archaeological deposits or features. The majority of these anomaly groups have characteristics typical of former field boundaries and enclosures of unknown date and possibly more than one phase of land management, although some of the linear anomalies may represent field drains. One group may represent an area of former clay or stone extraction.

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 site. The results of the survey and any subsequent archaeological work will be reviewed and used to inform any ensuing mitigation.

2.2 Survey objectives

1. Complete a gradiometer survey across agreed parts of the site.
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 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/Digital Antiquity Guides (undated). The document text was written using the house style of the Chartered Institute for Archaeologists (Chartered Institute for Archaeologists, undated).

4 Site description

4.1 The site

The site comprises twelve fields which were split into 10 areas for the purposes of reporting as shown in Figure 2. Area 1 could not be surveyed because of vegetation growth and difficult conditions underfoot. The land lies between 30m and 47m AOD with the land rising from the northeast to the southwest as shown in Figure 1.

4.2 Geology

The solid geology underlying the site comprises sand, silt and clay of the Palaeogene Bovey Formation (British Geological Survey, undated).

The superficial geology is not recorded in the source used but the site is bordered to the east by Quaternary alluvium (ibid).

5 Archaeological background

5.1 Historic landscape characterisation

Areas 1 to 4

Post-medieval enclosures: enclosures of Post-medieval date (between 1539AD and 1900 AD); fields laid out in the eighteenth and nineteenth centuries, commonly have many surveyed dead-straight field boundaries (Devon County Council, undated).

Area 5 to 10

Modern enclosures adapting Medieval fields: these modern (after 1900 AD) fields have been created out of probable Medieval (between 1066 AD and 1539 AD) enclosures. The sinuous medieval boundaries survive in places (ibid).

5.2 Historical and archaeological background

The following is a short summary of information obtained from the Devon Historic Environment Record (HER) via the Heritage Gateway (Historic England, undated 1). The heritage assets discussed below are within approximately 1000m of the site and relevant to the understanding of the geophysical survey.

Archaeological sites, buildings, historic parks and gardens, conservation areas, registered battlefields and other aspects of the historic environment that are considered 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.

5.2.1 Heritage assets within the site

A Medieval (1066 AD to 1539 AD) wayside cross is situated on a public footpath between areas 6, 7 and 8 (Figure 2). The cross is rectangular in shape with one arm missing. It has been used as a gatepost and the eastern face has been slotted with gate hangers still in place. The cross also contains a brass plate with an inscription (HER MDV91686 and MDV8941, National Grid Reference (NGR) SX 809 778).

Along the southern edge of areas 9 and 10 (Figure 2) lies the Bovey Pottery Leat. The leat runs from SX 8076 7755 to the Indio Pond at SX 81507758 for use at the pottery works at SX 8145 7726 (MDV16744 and MDV21315, 1701 AD to 2009 AD).

5.2.2 Heritage assets within 1000m of the survey area

Several find spots have been recorded in the area. To the west of the survey area a Bronze Age (2200 BC to 701 BC) bronze celt ploughed up in 1873 in a portion of Bovey Heathfield which had been recently enclosed (MDV8976, SX 80 78). To the south of the survey area a Neolithic (4000 BC to 2201 BC) polished stone axe head made of chert with fair degree of patination was found in a garden (MDV8944, SX 810 773).

To the southeast of the survey area lies the Pottery Pond which the Pottery Leat supplied (MDV56321, 1751 AD to 2009 AD, SX 812 772). Also to the southeast of the survey lies the former Bovey Tracey Potteries (MDV8963, SX 815 771). These potteries were founded around 1750 and worked until 1958. To the east of the survey area is the site of the former Indio Pottery (MDV21227, SX 816 777) which was established in the 18th century and closed in 1841. Also to the east of the survey area lie three relatively shallow ditches and one significantly more substantial ditch along with a pit on the south eastern side of Indio Pond. They are eighteenth century in date, are located within the historic enclosure of Pond Gardens and may be contemporary with nearby pottery production or may be associated with garden features (MDV79984, SX 816 774 and MDV109335, SX 818 774).

To the south west of the survey area lies an Early-medieval to Post-medieval (1066 AD to 1750 AD) tin mill (MDV20895, SX 801 771). To the west of the site near Colehays Plantation a number of ridges, pits and gullies are visible to the east of the Haytor granite tramway line which may be Early-medieval to Post-medieval tin stream works. There are also two possible blocked trial adit entrances at this location (MDV19917, SX 800 780).

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.

Archaeological features and *archaeological deposits* refer to any artefacts, material deposits or disturbance of natural deposits thought to be the result of human activity and not undertaken as recent land maintenance or farming.

The reader is referred to section 7.

6.1 Results

For the purposes of discussion, the survey area was divided into areas 1 to 10 as shown in Figure 2. Area 1 was not surveyed because of ground constraints.

Figure 2 shows the interpretation of the survey data. It includes the anomaly groups identified as relating to archaeological deposits along with their numbers. Larger scale plots of the interpretation are provided in Figures 3 to 6. Table 1 is an extract of the detailed analysis of the survey data which is provided in the attribute tables of the GIS project on the accompanying CD-ROM and in the project archive. Figures 7 to 11 are shade plots of the processed data.

Figures 2 to 6 and Table 1 comprise the analysis of the survey data.

6.2 Discussion

6.2.1 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

As shown in Figures 2 to 11, data collection along the survey area edges was restricted by the presence of magnetic materials adjacent to the survey areas. 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 numerous 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.

General data trends

Natural drainage channels and palaeochannels are prevalent in the north and east of the survey area as shown in Figure 7. Areas 6, 8 and 10 (Figure 2) display low magnetic responses compared to the rest of the data set (Figure 7). This is due to a relatively low concentration of magnetic minerals in the wetter conditions found in these lower parts of the site.

6.2.2 Data relating to historical maps and other records

Magnetic anomaly groups **9** (area 5), **15** (area 6), **24** (area 7), **25** (area 7) and **30** (area 9) coincide with, and are likely to represent, former field boundaries recorded on historic maps as listed in Table 1.

6.2.3 Data with no previous archaeological provenance

The majority of the anomaly groups characterised as representing potential archaeological deposits or features are typical of anomaly groups representing former field boundaries and enclosures of unknown date. More than one phase of past land management may be represented by these anomaly groups.

Group **13** (area 6) is a little unusual in its extent and the relatively high magnetic contrast compared to the rest of the site. It may reflect near surface geology but is more likely to represent an area of fill, comprising rubble and other materials. Such a group is typical of an area of former clay or stone extraction.

Group **31** (area 6) may represent field drainage or other drainage ditches associated with human activity of an unknown nature.

6.3 Conclusions

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

Thirty-one magnetic anomaly groups were mapped as possibly representing archaeological deposits or features. The majority of these anomaly groups have characteristics typical of former field boundaries and enclosures of unknown date and possibly more than one phase of land management, although some of the linear anomalies may represent field drains. One group may represent an area of former clay or stone extraction.

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 Guy Langworthy of Rule Five Land Ltd for commissioning us to complete this survey.

9 Bibliography

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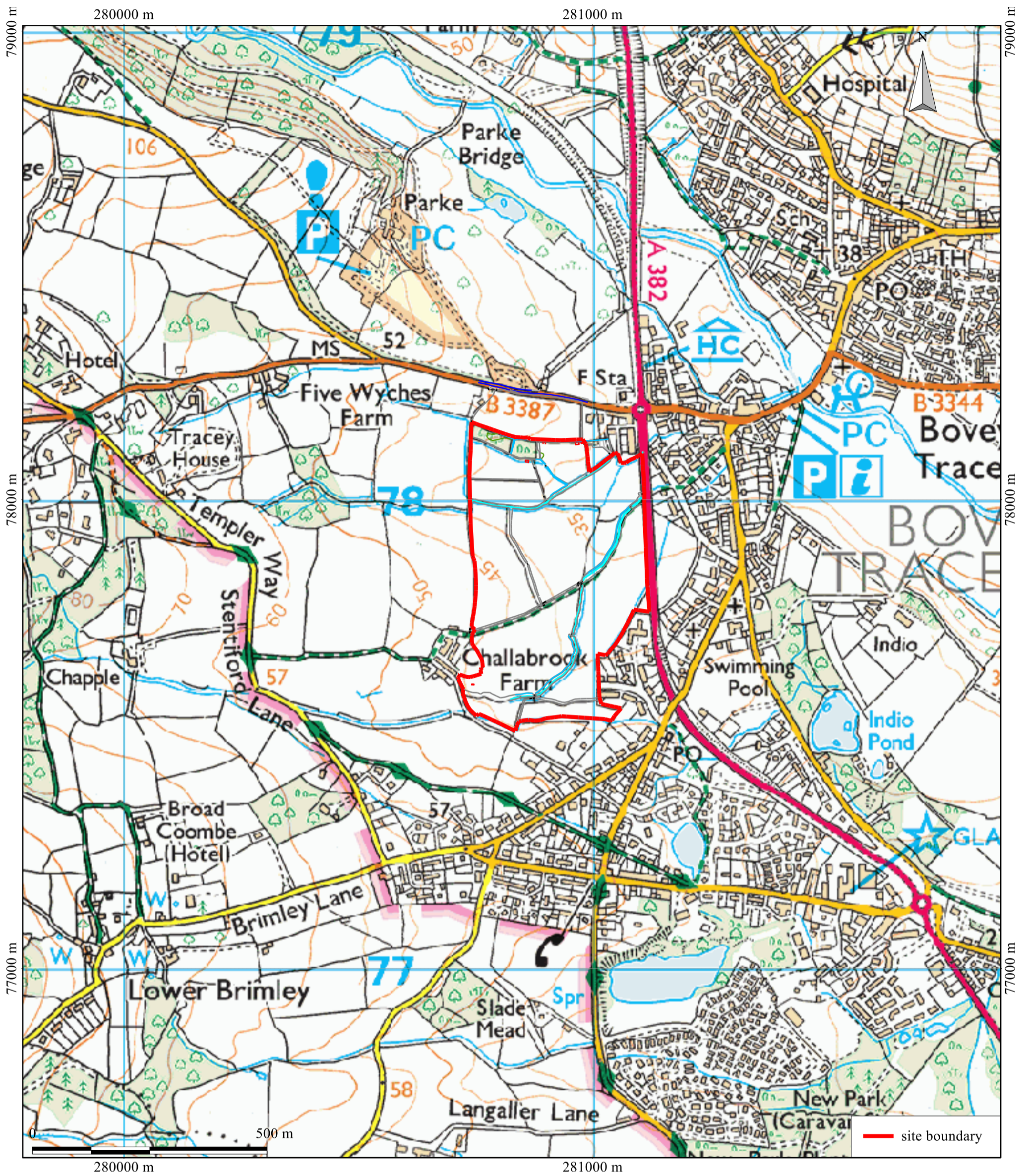
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Appendix 1 Analysis table and supporting plots

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.



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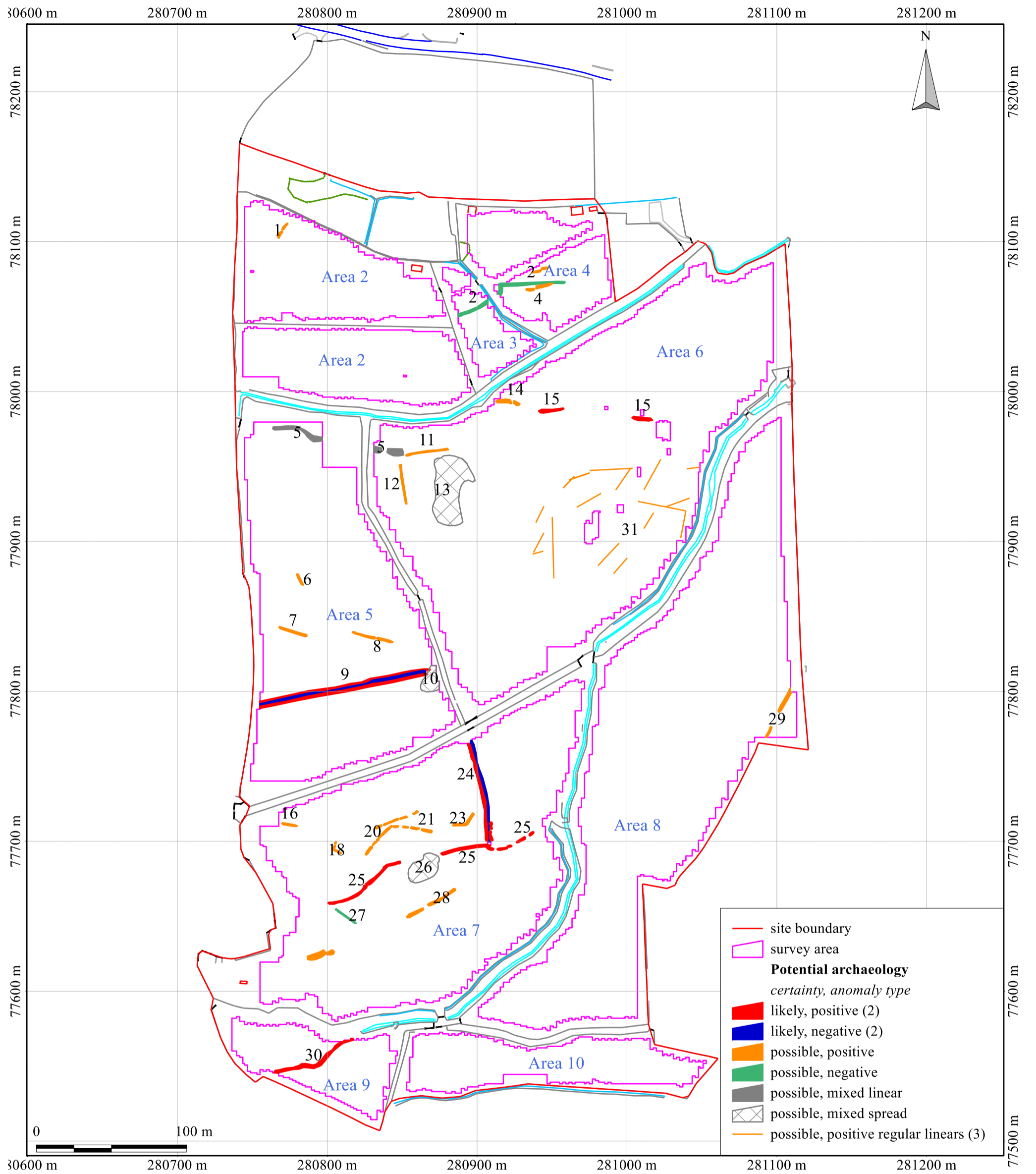
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Figure 1: location map

Substrata
 Office 1, 5 Mill Street
 Bideford, Devon EX39 2JT
 Tel: 01273 273599
 Email: geophysics@substrata.co.uk
 Web: substrata.co.uk



British Grid
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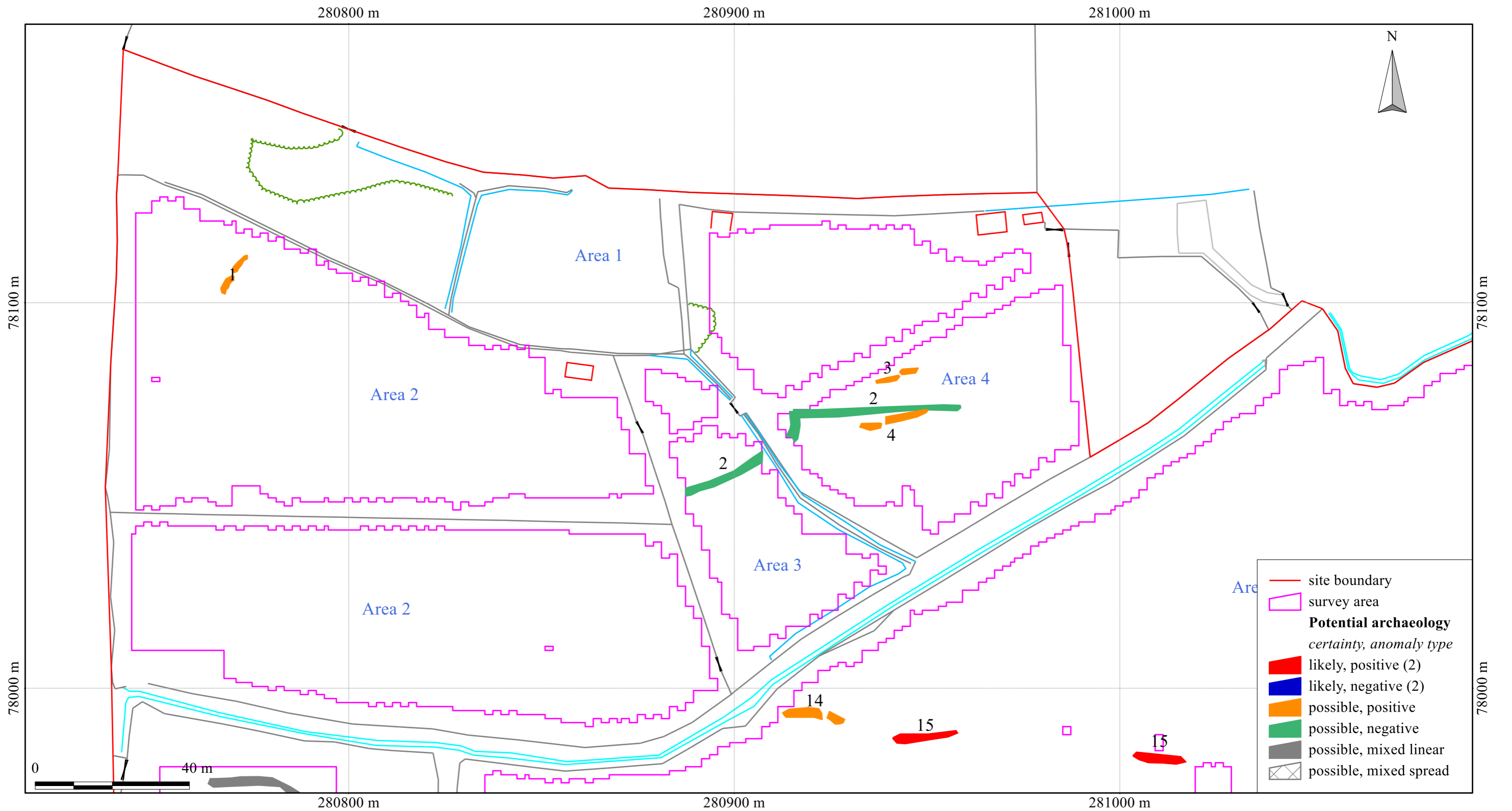
Figure 2: survey interpretation, all areas

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Bideford, Devon EX39 2JT
Tel: 01273 273599
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field number	anomaly group	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
2	1	possible, positive	disrupted linear			
3 4	2	possible, negative	multilinear		anomaly group may represent either archaeological deposits, an augmented drainage channel or natural deposits	
4	3	possible, positive	disrupted linear			
4	4	possible, positive	disrupted linear			
5 6	5	possible, mixed linear	disrupted linear			
5	6	possible, positive	linear			
5	7	possible, positive	linear			
5	8	possible, positive	disrupted linear			
5	9	likely, positive/negative/positive	linear	field boundary - Devon bank	anomaly group coincides with a field boundary mapped by the Ordnance Survey between 1888 and 1980	Ordnance Survey maps 1888-9 1:2500 to 1980 1:10000
5	10	possible, mixed spread	irregular	rumble		
6	11	possible, positive	linear		anomaly group may represent an archaeological deposit such as a ditch or relatively recent field drains	
6	12	possible, positive	linear		anomaly group may represent an archaeological deposit such as a ditch or relatively recent field drains	
6	13	possible, mixed spread	irregular	extraction pit with fill or near-surface geology	anomaly group may represent a filled area of extraction, possibly of stone or clay or, less likely, an area of near-surface bedrock	
6	14	possible, positive	disrupted curvilinear			
6	15	likely, positive	linear	field boundary	anomaly group coincides with a field boundary mapped by the Ordnance Survey between 1888 and 1980	Ordnance Survey maps 1888-9 1:2500 to 1980 1:10000
6	31	possible, positive	linear	field drains or industrial deposits	the most likely explanation for this group of anomalies is that they are field drains or drainage ditches associated with an activity of unknown type	
7	16	possible, positive	linear			
7	17	possible, positive	disrupted linear			
7	18	possible, positive	linear			
7	19	possible, positive	disrupted linear			
7	20	possible, positive	disrupted linear			
7	21	possible, positive	disrupted linear			
7	22	possible, positive	linear			
7	23	possible, positive	linear			
7	24	likely, positive/negative/positive	linear	field boundary - possible Devon bank	anomaly group coincides with a field boundary mapped by the Ordnance Survey between 1888 and 1980	Ordnance Survey maps 1888-9 1:2500 to 1980 1:10000
7	25	likely, positive	disrupted linear		anomaly group coincides with a field boundary mapped by the Ordnance Survey between 1888 and 1980	Ordnance Survey maps 1888-9 1:2500 to 1980 1:10000
7	26	possible, mixed spread	irregular	near-surface geology or rubble	anomaly group may represent archaeological or recent rubble deposits but may equally represent near-surface bedrock	
7	27	possible, negative	linear	field drain or archaeological deposit		
7	28	possible, positive	disrupted linear		anomaly group may represent either archaeological deposits such as a former field boundary or natural deposits	
8	29	possible, positive	disrupted linear			
9	30	likely, positive	curvilinear	field boundary	anomaly group coincides with a field boundary mapped by the Ordnance Survey between 1888 and 1906 but removed by 1939	Ordnance Survey maps 1888-9 1:2500 to 1939 1:2500

Table 1: data analysis



British Grid
centre X: 280903.78 m, centre Y: 78072.54 m

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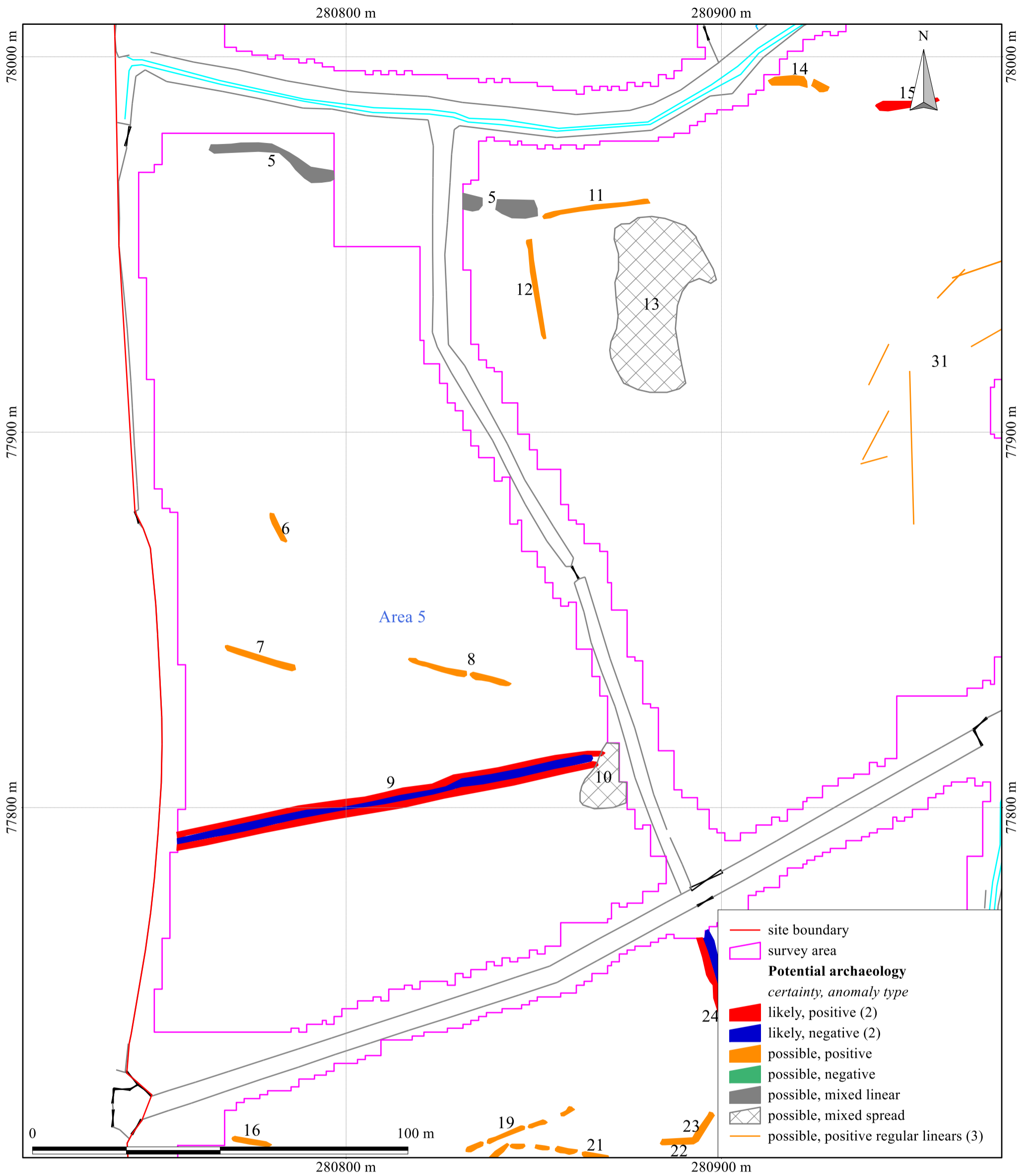
Notes:

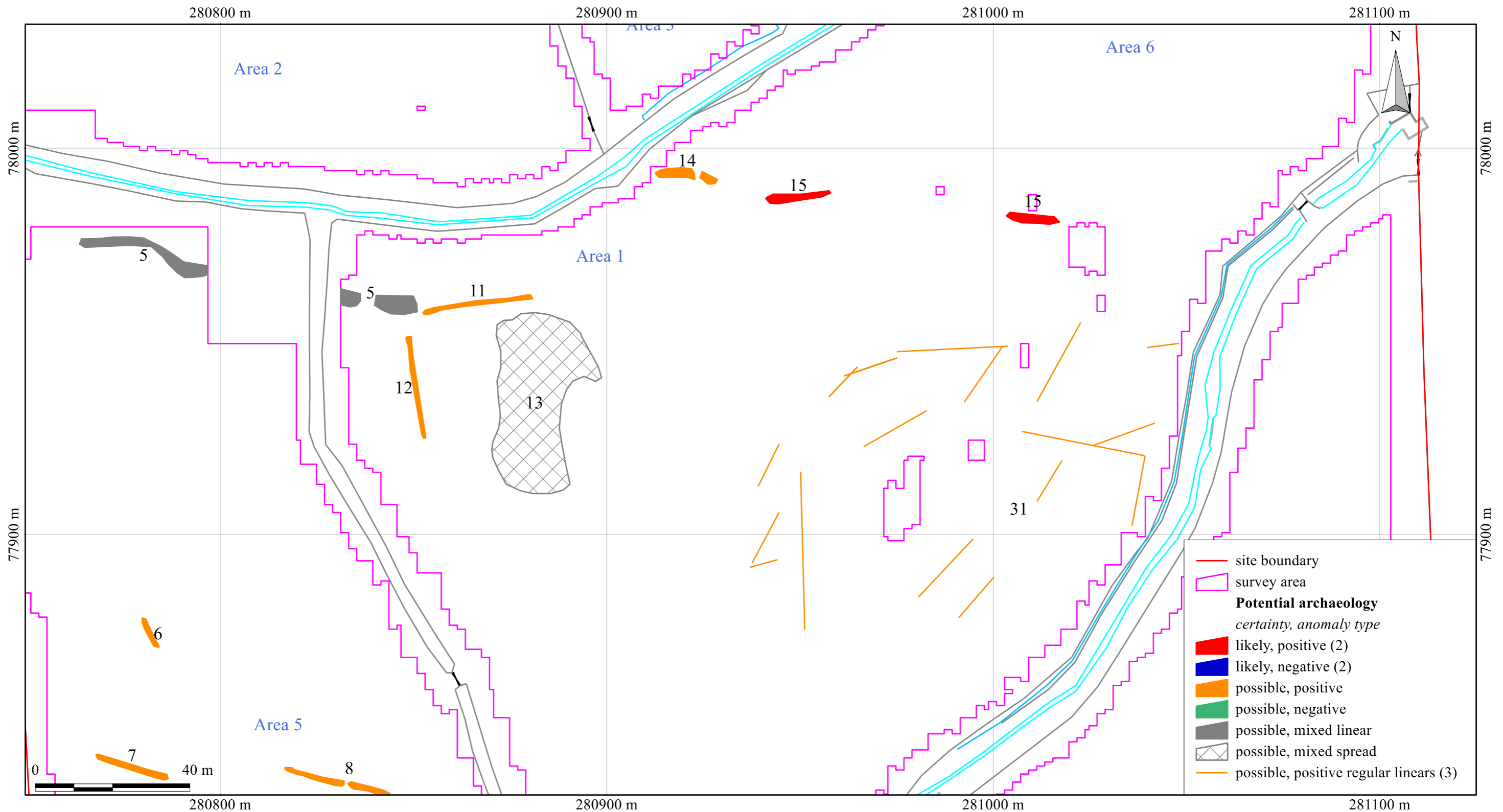
1. All interpretations are provisional and represent potential archaeological deposits.
2. Anomalies designated "likely archaeology" have supporting evidence e.g. historical maps and or visible earthworks.
3. Representative; not all instances are mapped.
4. Anomalies likely to represent geological or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

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Figure 3: survey interpretation, areas 1 to 4

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Office 1, 5 Mill Street
Bideford, Devon EX39 2JT
Tel: 01273 273599
Email: geophysics@substrata.co.uk
Web: substrata.co.uk





British Grid
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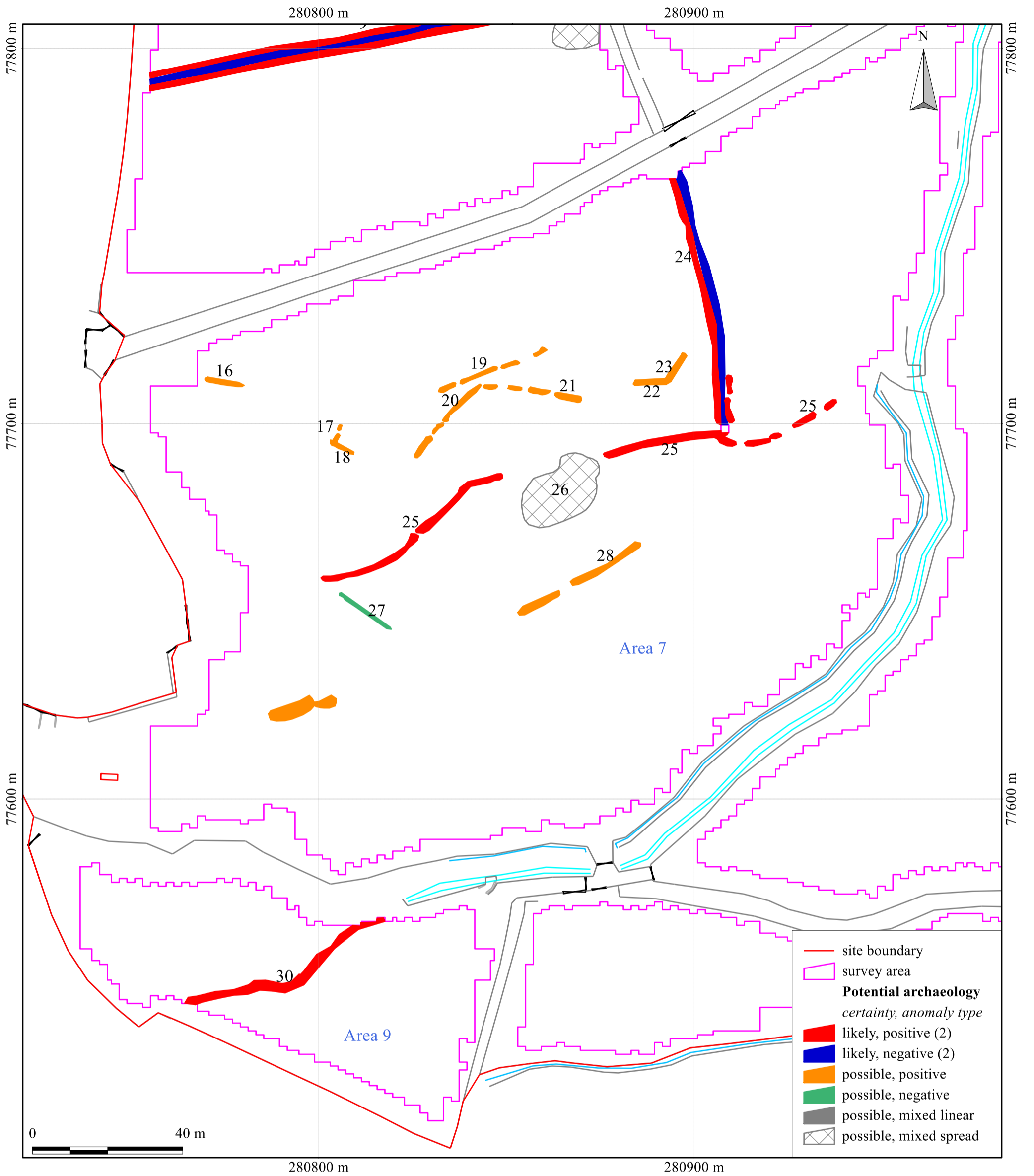
Notes:

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Figure 5: survey interpretation, area 6

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 Bideford, Devon EX39 2JT
 Tel: 01273 273599
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 Web: substrata.co.uk



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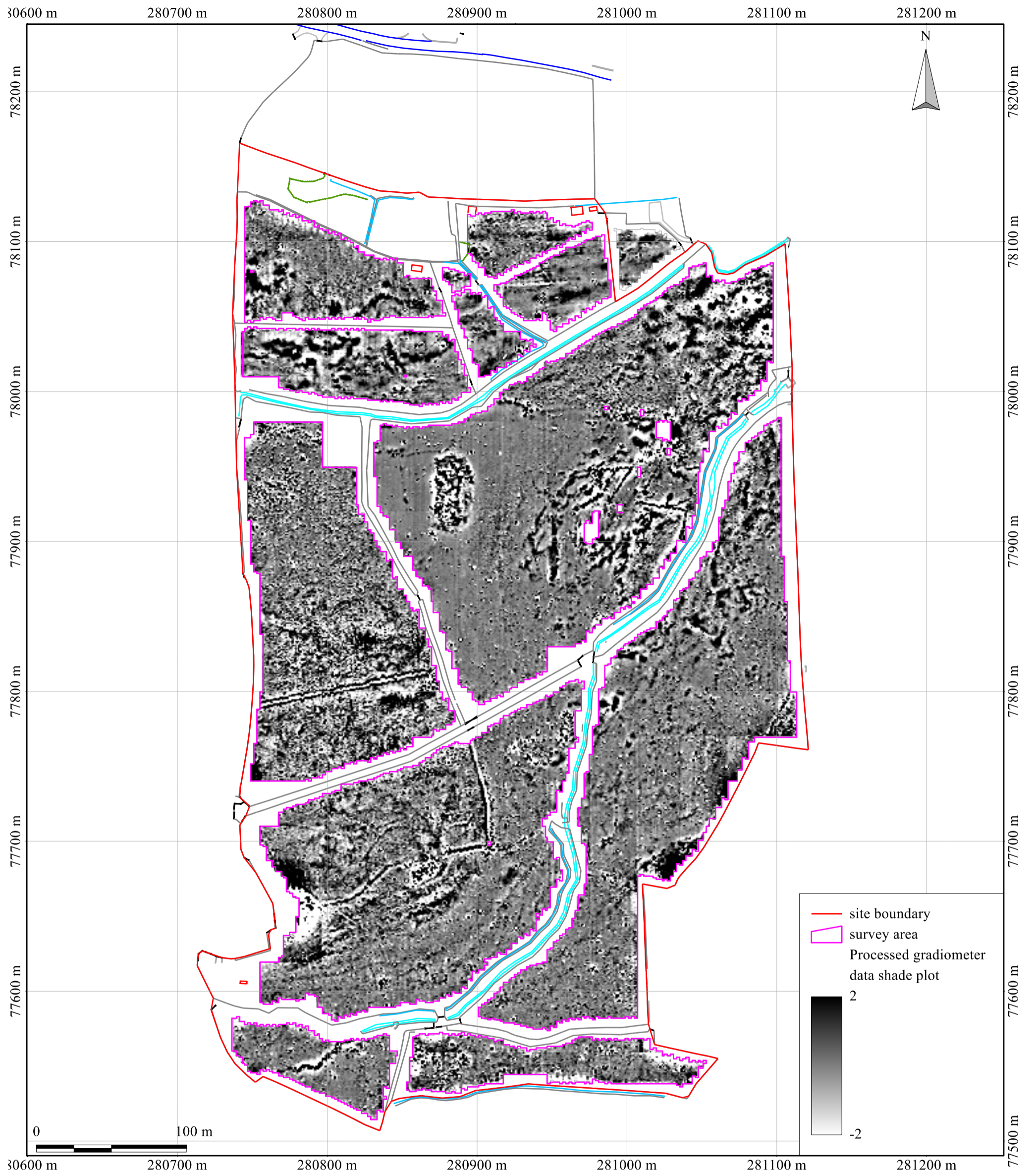
Notes:

1. All interpretations are provisional and represent potential archaeological deposits.
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Figure 6: survey interpretation, areas 7 and 9

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Figure 7: shade plot of processed data, all areas

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Figure 8: shade plot of processe data, areas 1 to 4

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British Grid
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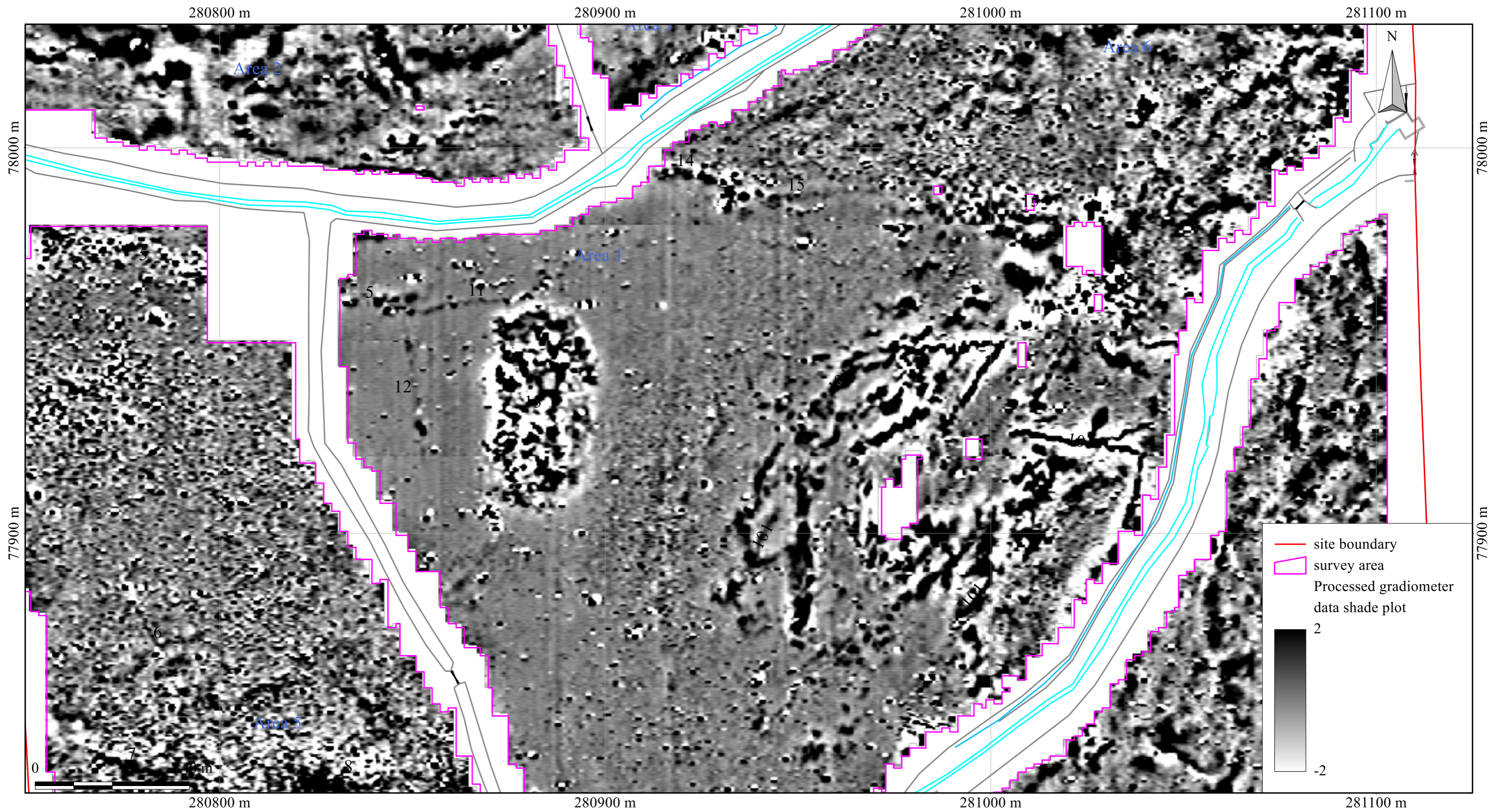
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Figure 9: shade plot of processed data, area 5

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 Email: geophysics@substrata.co.uk
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British Grid
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Figure 10: shade plot of processed data, area 6

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 centre X: 280851.54 m, centre Y: 77655.43 m

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 Base map: Copyright Preston Engineering Survey,
 All rights reserved.

Scale: 1:1000 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological gradiometer survey
 Land at Challabrook Farm, Bovey Tracy, Devon
 Centred on NGR (E/N): 280915,77840 (point)
 Report: 1508CHA-R-1

Figure 11: shade plot of processe data, areas 7 and 9

Substrata
 Office 1, 5 Mill Street
 Bideford, Devon EX39 2JT
 Tel: 01273 273599
 Email: geophysics@substrata.co.uk
 Web: substrata.co.uk

Appendix 2 Methodology Summary

Table 2: methodology summary	
<p>Documents Survey methodology statement: Dean (2015)</p>	
<p>Methodology</p> <ol style="list-style-type: none"> 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 Chartered Institute for Archaeologists (2014) 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. 	
<p>Grid <i>Method of Fixing:</i> DGPS set-out using pre-planned survey grids and Ordnance Survey coordinates. <i>Composition:</i> 30m by 30m grids <i>Recording:</i> Geo-referenced and recorded using digital map tiles. <i>DGPS used:</i> Spectra Precision PM5V2 GPS with external antenna and survey pole and DigiTerra Explorer 7 as the survey control program.</p>	
<p>Equipment <i>Instrument:</i> Bartington Instruments grad601-2 <i>Firmware:</i> version 6.1</p>	<p>Data Capture <i>Sample Interval:</i> 0.25m <i>Traverse Interval:</i> 1 metre <i>Traverse Method:</i> zigzag <i>Traverse Orientation:</i> GN</p>
<p>Data Processing, Analysis and Presentation Software IntelliCAD 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</p>	

Appendix 3 Data processing

Table 3: gradiometer survey - processed data metadata	
<p>SITE Instrument Type: Bartington Grad 610 Units: nT Direction of 1st Traverse: see below Collection Method: ZigZag Sensors: 2 @ 1.00 m spacing. Dummy Value: 32702</p> <p>PROGRAM Name: TerraSurveyor Version: 3.0.25.0</p>	
<p>Stats Max: 62.17 Min: -24.42 Std Dev: 3.06 Mean: 0.21 Median: 0.00</p>	<p>Processes: 19 1 Base Layer 2 Clip at 1.00 SD 3 Clip at 2.00 SD 4 De Stagger: Grids: All Mode: Both By: -2 intervals 5 DeStripe Median Sensors: All 6 DeStripe Median Traverse: Grids: a25+a14.xgd a26+f1.xgd 7 Search & Replace From: -200 To: 200 With: 2047.5 (Area: Top 180, Left 150, Bottom 209, Right 179) 8 De Stagger: Grids: h (19).xgd Mode: Both By: 1 intervals 9 Move (Area: Top 241, Left 1680, Bottom 244, Right 1778) to X 6, Y 0 10 DeStripe Median Traverse: Grids: j (30)+k (15).xgd 11 DeStripe Median Traverse: Grids: k (16)+h (9)+j (29).xgd 12 DeStripe Median Traverse: Grids: j (15)+g14.xgd 13 DeStripe Median Traverse: Grids: j (18).xgd j (19).xgd j (24).xgd 14 Move (Area: Top 94, Left 1198, Bottom 97, Right 1253) to X 4, Y 0 15 Move (Area: Top 114, Left 2040, Bottom 115, Right 2157) to X 6, Y 0 16 De Stagger: Grids: j (9)+j (26).xgd Mode: Both By: 1 intervals 17 Move (Area: Top 95, Left 2200, Bottom 97, Right 2278) to X -6, Y 0 18 Move (Area: Top 12, Left 2320, Bottom 13, Right 2352) to X 6, Y 0 19 Clip at 1.00 SD</p> <p>Note: exporting the processed data from TerraSurveyor into Manifold GIS for analysis imposes an 'x matches y' interpolation on the data which is reflected in the processed data figures.</p>