

SCHEDULED MONUMENT NUMBER 1017132, BOWL BARROW 260M NORTHWEST OF PUTSON CROSS, TIVERTON, DEVON

(NGR SS 98617 13990)

Results of Archaeological Topographic and Geophysical Surveys

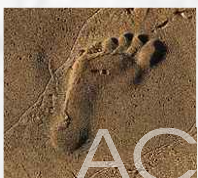
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With a contribution from:
Ross Dean

On behalf of:
Devon County Council

Report No: ACD1579/3/0

Date: February 2018



archaeology

**SCHEDULED MONUMENT NUMBER 1017132, BOWL
BARROW 260m NORTHWEST OF PUTSON CROSS,
TIVERTON, DEVON**

(NGR SS 98617 13990)

Results of archaeological topographic and geophysical surveys

Client	Devon County Council
Report Number	ACD1579/3/0
Date	19 February 2018
Status	Version 1
Report Author	Paul Rainbird
Contributions	Ross Dean
Checked by	John Valentin
Approved by	John Valentin

Acknowledgements

The work was commissioned by Anette Smith, Devon County Council. The site works were carried out by Ross Dean, Mark Edwards and Paul Rainbird, with the illustrations for this report prepared by Sarnia Blackmore. The advice of Stephen Reed, Devon County Senior Historic Environment Officer, is gratefully acknowledged.

The views and recommendations expressed in this report are those of AC archaeology and are presented in good faith on the basis of professional judgement and on information currently available.

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Summary

Archaeological topographic and geophysical surveys were undertaken by AC archaeology and Substrata during October 2017 on and adjacent to a scheduled monument, bowl barrow 260m northwest of Putson Cross, Tiverton, Devon (National Heritage List for England [NHLE] ref. 1017132), a funerary monument of probable Bronze Age date.

The barrow has historically been slighted by a road to the northeast and the topographic survey showed that the surviving part of the earthwork, although damaged by ploughing, survives to a height of 0.7m and showed no indication of undocumented excavation within the earthwork. The geophysical survey has established that there is potential for buried features within the barrow and provides a clear indication for a probable ring ditch associated with the monument.

The surveys have provided a current condition report of the monument, enhanced the Devon Historic Environment and NHLE records for this site, and have shown that the currently scheduled area does not completely encompass the buried ring ditch associated with the monument.

1. INTRODUCTION

- 1.1 This document sets out the results of archaeological topographic and geophysical survey of a scheduled monument known as 'bowl barrow 260m northwest of Putson Cross', Tiverton, Devon (National Heritage List for England no. 1017132) which was undertaken by AC archaeology and Substrata during October 2017. The barrow is situated adjacent to the construction of a new road junction for the A361 dual carriageway at Tiverton, Devon (SS 98617 13990) and the works presented here were undertaken as part of agreed mitigation following consultation with Historic England and the Devon County Council Historic Environment Team. The survey was carried out under a Section 42 licence granted by Historic England (reference SL00171767).
- 1.2 The bowl barrow is located on level ground in the valley of the River Lowman at a height of 85m above Ordnance Datum (Fig. 1; Plate 1). It is formed by a mound adjacent to the eastern boundary of an arable field. Only approximately half of the barrow remains above ground, with the remainder beneath a road on the east side of the field boundary. The underlying solid geology consists of sandstone of the Tidcombe Sand Member overlain by superficial alluvium deposits of clay, silt and sand (British Geological Survey Online Viewer 2018).

2. ARCHAEOLOGICAL BACKGROUND

- 2.1 Bowl barrow 1017132, is described by Historic England as:

This monument includes a bowl barrow situated in the valley of the River Lowman 120m southeast of a natural ford now crossed by a bridge. The monument survives as a circular mound which measures 21.5m in diameter and is up to 0.9m high. The surrounding quarry ditch from which material to construct the mound was derived is preserved as a buried feature, which measures approximately 3m wide. The monument is crossed by a road and ditched field boundary on its eastern side. The surface and make up of the road and field boundary are excluded from the scheduling, although the ground beneath is included.

Bowl barrows, the most numerous form of round barrow, are funerary monuments dating from the Late Neolithic period to the Late Bronze Age, with most examples belonging to the period 2400-1500 BC. They were constructed as earthen or rubble mounds, sometimes ditched, which covered single or multiple burials. They occur either in isolation or grouped as cemeteries and often acted as a focus for burials in later periods. Often superficially similar, although differing widely in size, they exhibit regional variations in form and a diversity of burial practices. There are over 10,000 surviving bowl barrows recorded nationally (many more have already been destroyed), occurring across most of lowland Britain. Often occupying prominent locations, they are a major historic element in the modern landscape and their considerable variation of form and longevity as a monument type provide important information on the diversity of beliefs and social organisations amongst early prehistoric communities. They are particularly representative of their period and a substantial proportion of surviving examples are considered worthy of protection.

The bowl barrow 260m northwest of Putson Cross survives comparatively well, despite reduction in its height through cultivation, and its partial inclusion beneath the public highway. The barrow will contain archaeological information concerning the construction and use of the monument and also environmental evidence relating to the surrounding landscape.

- 2.2** The bowl barrow has been subject to previous mapping and monitoring as listed in the Devon Historic Environment Record (HER ref. MDV12370, Craze Lowman Barrow, Tiverton). This monitoring has established that it has been subject to ploughing. Despite this damage the barrow survives as a distinct earthwork (Plate 2).
- 2.3** The field containing the barrow and adjacent to it has been subject to fieldwalking with a large amount of worked flint and chert collected (e.g. Devon HER MDVs 30264 and 30282), which has identified material from a wide range of dates from the Mesolithic through to the Bronze Age (Quinnell *et al.* 2015). Approximately 400m to the southwest of the site is a Neolithic long barrow (MDV1364) which has been subject to excavation (Smith 1990).
- 2.4** An image on Google Earth dated 2006 shows the distinct cropmark of a ditch forming a semi-circle in crops around the surviving western part of the barrow mound (Plate 3)
- 2.5** As part of the wider application area for the new road junction, a programme of archaeological work associated with planning permission reference 14/01168/MFUL had been undertaken. This included a trial trench evaluation (Caine and Rainbird 2016) and targeted excavations (Rainbird 2017). The latter part of this work comprised a series of excavation areas that were positioned to target features recorded during the trial trench evaluation. Of particular note were three adjacent pits containing a Late Neolithic finds assemblage that included worked flint, Grooved Ware pottery and a stone axe (Rainbird and Quinnell forthcoming).

3. AIMS

- 3.1** The aims of the archaeological geophysical and topographic surveys were to provide an accurate record of the bowl barrow and identify any buried features that might be associated with it. This will be used to enhance the site record held by Historic England and the Devon Historic Environment Record.

4. METHODOLOGY

4.1 Topographic survey

The topographic earthwork survey of the bowl barrow was undertaken using a Leica Netrover GPS, with sub 10mm accuracy. Field data was downloaded for processing into survey software then transferred into a CAD environment for field annotation. All levels relate to height above Ordnance Datum.

4.2 Geophysical survey

Both magnetometer and resistivity surveys were undertaken. The fieldwork used a temporary survey grid accurately positioned using a Leica Netrover GPS, with sub 10mm accuracy. The temporary grid was co-registered to the Ordnance Survey National Grid using digital map tiles. The detailed methodology is presented in Appendix 1.

5. RESULTS

5.1 Introduction

The results of the topographic and geophysical surveys are presented on Figs 1b-c and in Appendix 1.

5.2 Topographic survey

The key findings of the topographic survey show that the mound stands 0.7m high and measures approximately 26m northwest-southeast across the surviving full profile of the barrow. The survey results appear to show that the central area of the barrow may survive, has not been dug into, and that a little over half of the barrow mound survives as an earthwork feature. The radius estimated from the centre of the barrow on the northeast-southwest axis measures approximately 14m, which is a little longer than expected and may indicate distortion of the earthwork by ploughing.

5.3 Geophysical survey

The magnetic and resistance responses were sufficient to be able to differentiate anomalies representing possible archaeological features. The detailed results are presented in Appendix 1.

A total of six magnetic anomaly groups and six resistance anomaly groups were mapped within the wider survey area as representing potential archaeological deposits and features. Of these, one magnetic group and one resistance group coincide and are likely to represent the remains of a ring ditch associated with the barrow. One magnetic anomaly group may represent deposits within the confines of the barrow that appear to have been disrupted by possible ridge-and-furrow ploughing, although no relationship between these deposits and the barrow could be ascertained. Three magnetic groups represent either archaeological deposits such as small pits or postholes or natural deposits. Two resistance groups also lie within the barrow area, but these may represent relatively recent ploughing.

The remaining magnetic and resistance anomalies are linear in form and may be associated with former field or enclosure boundaries of unknown date although they may represent field drains or natural deposits.

6. COMMENTS

- 6.1 The archaeological topographic and geophysical surveys have added to the detailed record for this monument. The topographic survey shows that the core of the barrow is likely to be intact and does not appear to have been subject to undocumented excavation by antiquarians or others; this indicates that there should be good preservation within the part of the barrow that is extant. A magnetic response (g3) from the geophysical survey may indicate a feature buried within the barrow mound, although there is the possibility that this represents a robber trench that is no longer present as a surface feature. It has also been established that the barrow's quarry ditch is present as a buried feature, up to 1.6m wide, with a possible terminal on the southeast side.
- 6.2 The quarry ditch for the barrow was not present as a surface earthwork feature, although at the time of the survey this was largely under recent ploughing. The ditch, as represented by the magnetometer survey, extrapolates well with an aerial view on Google Earth dated 2006, shows the ditch as a well-defined semi-circle from which a circular form may be extrapolated (Plate 3). The ditch has a projected diameter of 27m and several probable former barrows have been identified by cropmarks of ring ditches in the Lowman Valley which are of a similar size. One of these, 500m to the north, measures 21m in diameter (Devon HER ref. MDV56029), while a group of three ring ditches located approximately 2km to the east, near Wallflower Cottage, have diameters of between 17m and 25.5m (MDVs 59013-15).
- 6.3 It is evident that the currently scheduled area underestimates the size of the barrow including its ring ditch (see Fig. 1b).

7. ARCHIVE AND OASIS

- 7.1 The paper and digital archive is currently held at the offices of AC archaeology Ltd at 4 Halthaies Workshops, Bradninch, near Exeter, Devon, EX5 4LQ, under the unique project code of **ACD1579**. An archive of the unprocessed data will be deposited with the Archaeological Data Service.
- 7.2 An online OASIS entry has been completed, using the unique identifier **306999** which includes a digital copy of this report.

8. REFERENCES

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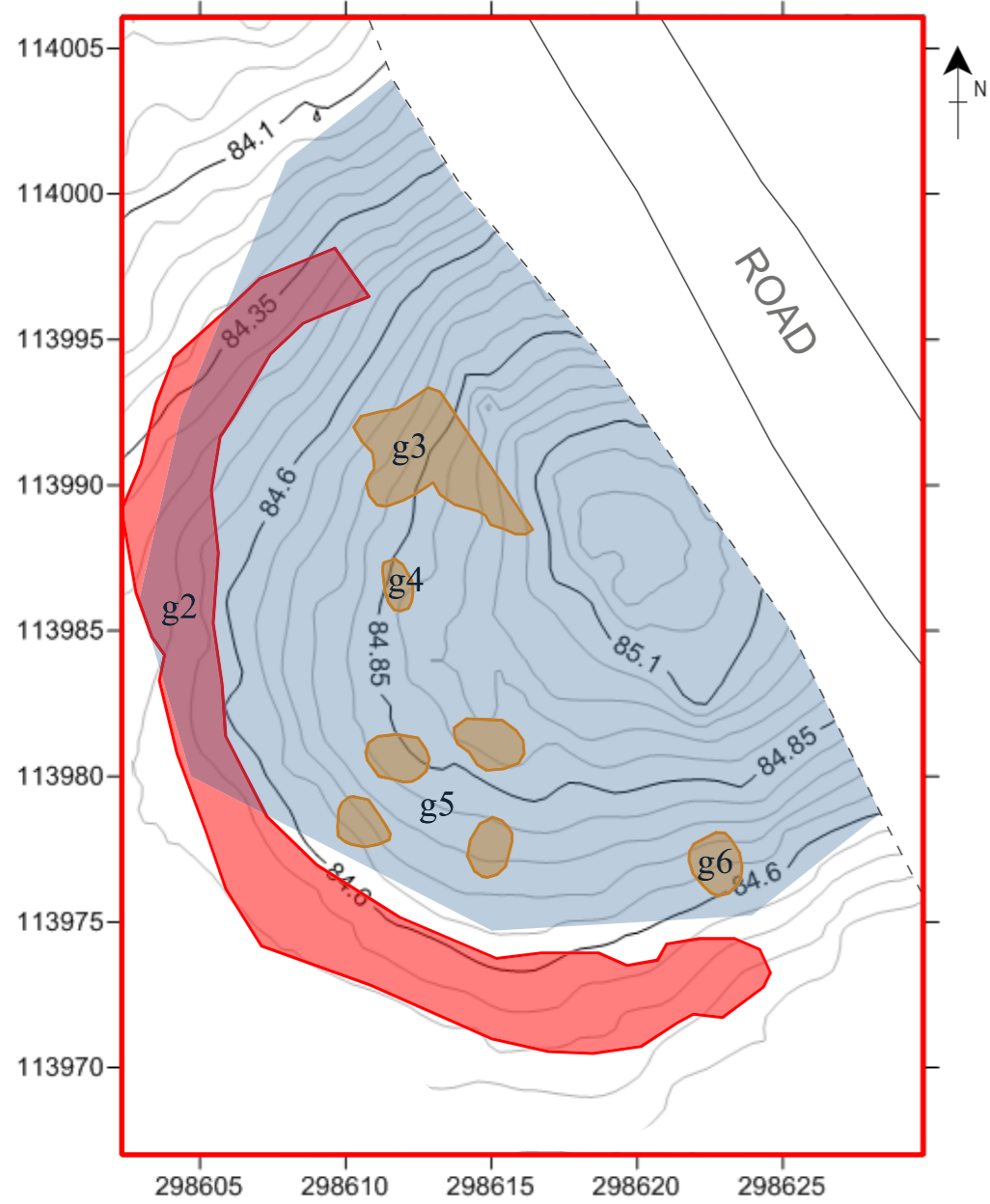
Quinnell, H., Dymond, T., Keene, B. and Newberry, J. 2015: 'Lithic Scatters, Archaeology and Road Construction in the Tiverton Area', *Proc. Devon Arch. Soc.* **73**, 1-66.

Rainbird, P. 2017: *Land off the A361 and Blundell's Road, Tiverton, Devon: Results of Targeted Archaeological Excavation*. Unpublished AC archaeology Report No. **ACD1454/2/1**.

Rainbird, P. and Quinnell, H. forthcoming: 'Three Late Neolithic pits at Blundell's Road, Tiverton, Devon', *Proc. Devon Archaeol. Soc.*

Smith, G. 1990: 'A Neolithic Long Barrow at Uplowman Road, Tiverton', *Proc. Devon Archaeol. Soc.* **48**, 15-26.

b) Contour plan

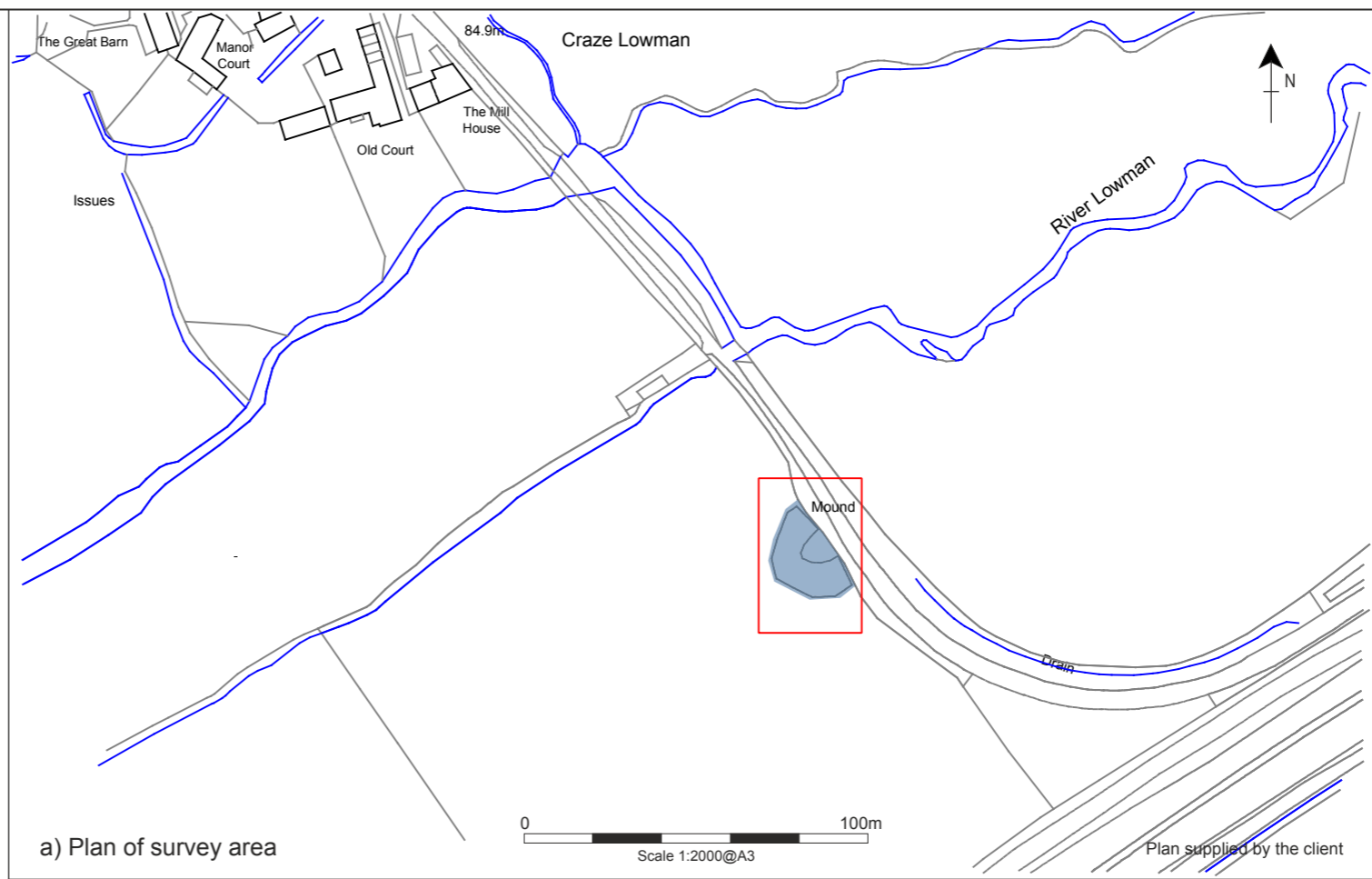


0 10m
Scale 1:250@A3

magnetometer survey

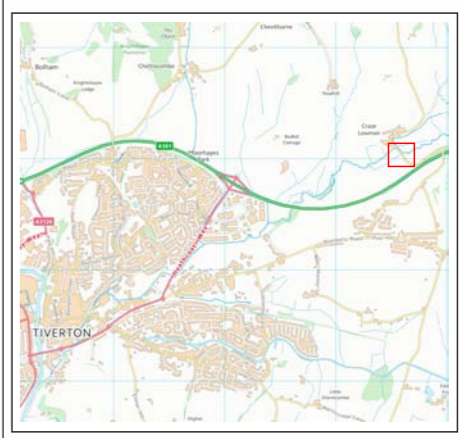
Potential archaeology

- likely, positive (3)
- possible, positive



a) Plan of survey area

0 100m
Scale 1:2000@A3

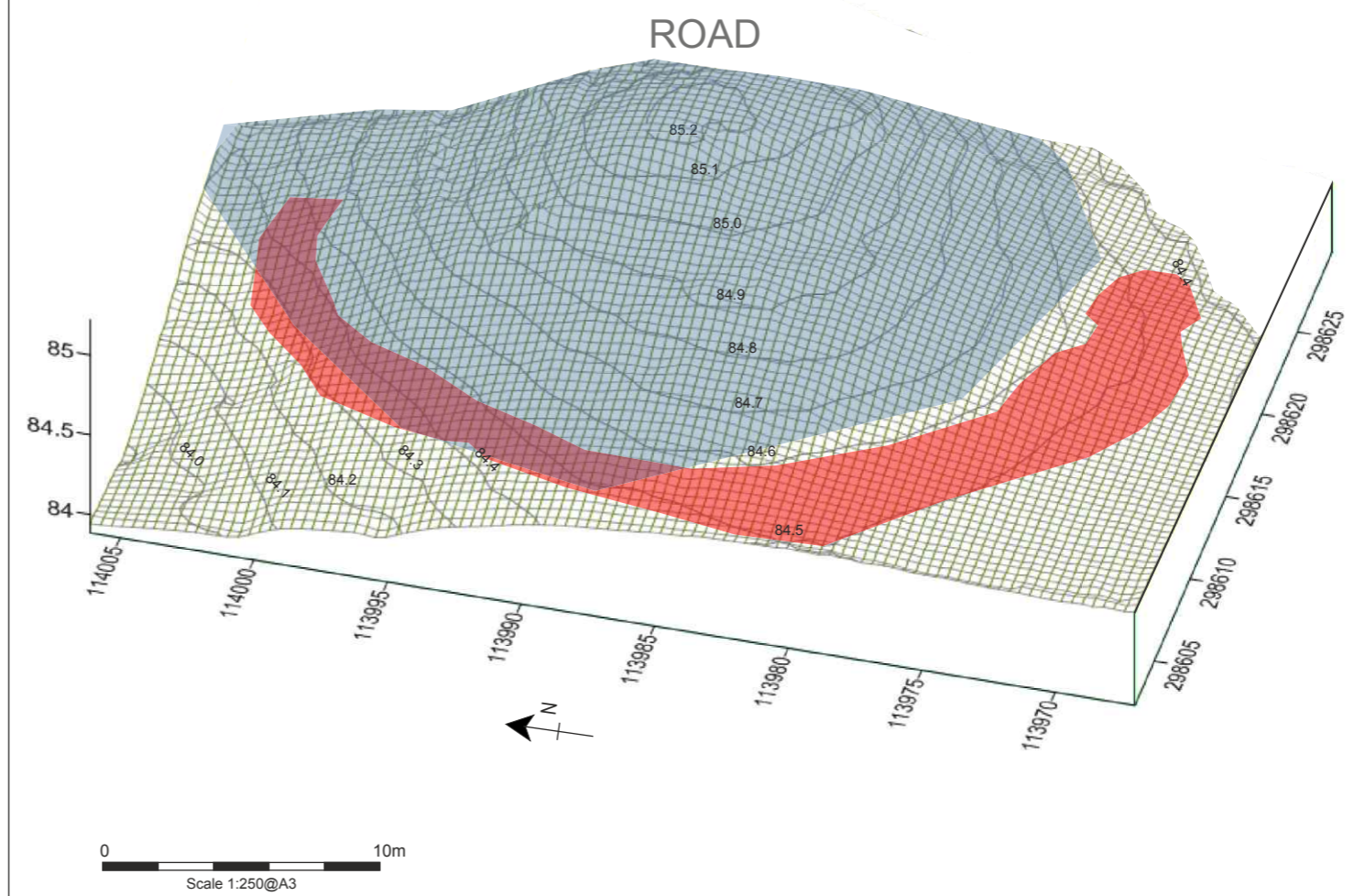


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Legend

- Survey area
- Scheduled area of bowl barrow NHLE 1017132
- Ring ditch identified from geophysical survey

c) 3D wireframe



0 10m
Scale 1:250@A3

PROJECT
**Bowl barrow NHLE 1017132,
Putson Cross, Tiverton, Devon**
TITLE

Fig. 1: Location of bowl barrow and results of the topographic and geophysical surveys





Plate 1: General site view, bowl barrow NHLE 1017132, looking southeast



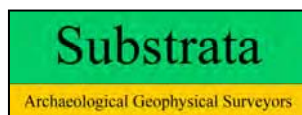
Plate 2: General site view, bowl barrow NHLE 1017132, looking northeast



Plate 3: Bowl barrow NHLE 1017132 from Google Earth dated 2006

Appendix 1

Geophysical Survey Report



An archaeological magnetometer and resistance survey

**A bowl barrow 260m northwest of Putson Cross
Tiverton, Devon**

Centred on NGR (E/N) 298617,113989

Report 1710TIV-R-1

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21 January 2018

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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: magnetometer; twin-sensor fluxgate gradiometer
twin-probe resistance
Dates: magnetometer survey: 9 October 2017
resistance survey: 16 October May 2017
Area: magnetometer survey: 0.9ha
resistance survey: 0.58ha
Lead surveyor: Mark Edwards
Author: Ross Dean

1.2 Client

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

1.3 Site information

Site: A bowl barrow 260m northwest of Putson Cross
Civil Parish: Tiverton
District: Mid Devon
County: Devon
NGR: SS 98617 13989 (point)
NGR E/N: 298617,113989 (point)
Post code: EX35 6JJ
Historic Environment Entry: MDV12370
Scheduled Monument Number: 1017132

1.4 Archive

OASIS number: substrat1-299073
Archive: At the time of writing, the archive of this survey will be held by Substrata. Depending on local authority policy, an archive of the unprocessed data may be deposited with the Archaeological Data Service

1.5 Introduction

This work comprises part of a larger survey completed by AC Archaeology Ltd at the above site and documented in report ACD1579/2/0.

1.6 Summary

The magnetic and resistance responses were sufficient to be able to differentiate anomalies representing possible archaeological features.

A total of six magnetic anomaly groups and six resistance anomaly groups were mapped as representing potential archaeological deposits and features. Of these one magnetic group and one resistance group coincide and are likely to represent the remains of a ring ditch associated with the barrow. One magnetic anomaly group may represent deposits within the confines of the barrow that appear to have been disrupted by possible ridge-and-furrow ploughing although no relationship between these deposits and the barrow could be ascertained. Three magnetic groups represent either archaeological deposits such as small pits or postholes or natural deposits. Two resistance groups also lie within the barrow area but these may represent relatively recent ploughing.

The remaining magnetic and resistance anomalies are linear and may be associated with former field or enclosure boundaries of unknown date although they may represent field drains or natural deposits.

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 Objectives

1. To identify any below ground archaeological feature (such as ditches, pits, burning activity, walling etc).
2. To ascertain the nature of the circular feature.
3. To identify any related archaeological features or potential features.
4. To build on the knowledge of surveying sites of this type on Exmoor.
5. To use modern remote sensing techniques including gradiometry and earth resistance.

3 Methodology

The work was undertaken in accordance with the survey methodology statement (Dean, 2017).

The survey grid location information and grid plan were recorded as part of the project in a suitable GIS system (Table 3).

Data processing was undertaken using appropriate software (Table 3), 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/Digital Antiquity Guides (undated).

5 Site description

5.1 Landscape and land use

The survey area comprised part of a large, relatively flat agricultural field that had been recently harrowed at the time of the survey. Details of the barrow setting and related information are provided in AC Archaeology report ACD1579/2/0.

5.2 Geology

The solid geology across the survey area is sandstone of the Permian Tidcombe Sand Member. The superficial geology is alluvium. Additional layers of silt, sand, peat, basal gravel and a stronger, desiccated surface zone may be present (British Geological Society undated).

6 Archaeological background

The archaeology of the site is described in AC Archaeology report ACD1579/2/0.

7 Methodology, results, discussion and conclusions

7.1 Scope and definitions

The two surveys were designed to record magnetic anomalies and resistance anomalies. The analysis of the data sets was designed to highlight anomalies and reflection patterns judged indicative of archaeological deposits, structures, features or other signs of past human activity.

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.

The reader is referred to section 8.

7.1.1 Magnetometer survey

A magnetic anomaly is a local variation in the Earth's magnetic field. Such variations can result from differences in the magnetism of underlying solid geology, superficial geology and other near-surface deposits including those altered and created by past human activities. Near-surface and surface artefacts can also create magnetic anomalies.

7.1.2 Resistance survey

A resistance anomaly is a local variation in the electrical resistance of a soil and is related to its porosity, permeability, saturation, and chemical nature of entrapped fluids (Heimmer and De Vore, 1995:30), all of which can be altered by past human activities. Higher concentrations of ions allow electrical current to pass more easily through the soil, creating a lower electrical resistance.

7.2 Results

The interpretations of the magnetometer and resistance surveys are summarised together in Figure 2 and individually in Figures 3 and 4. All three figures include the designations of the anomaly groups identified as possibly relating to archaeological and other deposits. Tables 1 and 2 are extracts of the detailed analysis of the magnetometer and resistance survey data sourced from the attribute tables of the GIS project provided in the project archive.

Figures 2 to 4 and Tables 1 and 2 comprise the analysis of the survey data.

Various plots of the processed data as specified in Tables 4 and 5 are provided in Figures 5 to 8.

Figures 9 and 10 are plots of the unprocessed magnetometer data and the unprocessed resistance data respectively.

7.3 Discussion

7.3.1 General points

Discussion scope

Not all magnetic and resistance anomaly groups or radar reflection patterns identified in the figures and tables specified in Section 7.2 are necessarily discussed below. All identified anomaly groups are recorded in the GIS project held the survey archive.

Data collection

Data collection during the magnetometer survey was restricted as shown in the relevant figures due to the presence of relatively modern magnetic materials along boundaries and elsewhere within the survey area. Strong magnetic responses are likely to relate to these materials except where otherwise indicated in Figures 2 and 3.

Anomaly characterisation and mapping

There are a number of magnetic and resistance 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.

Anomalies thought to relate to natural features and recent man-made objects were only mapped where they comprised significant magnetic responses across the dataset that needed clarification.

Numerous dipole magnetic anomalies are scattered across the magnetometer 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.

A gas main and the remains of another ferrous service pipe or cable crosses the survey area. The magnetic response from the gas main was large enough to interfere with the data processing and was masked out to allow the processing to be undertaken (compare Figures 5 and 9).

Data trends

A number of data trends were recorded in both the magnetometer and resistance data. It is likely that group r102 (Figure 4) reflects relatively recent ploughing whereas groups g101 g102 g103 (Figure 3) and r101 (Figure 4) may relate to historical ridge-and-furrow cultivation.

7.3.2 Anomaly groups

Refer to Figures 2 to 6 and Tables 1 and 2.

Magnetic anomaly group g1 and resistance anomaly group r1 have the same trend and lie adjacent to each other which implies that they represent the same deposit or structure. The groups may represent archaeological linear deposits, natural deposits or field drains with r1 more likely to have a relatively stony composition and g1 more earthen.

Magnetic group g2 and resistance group r3 coincide and are likely to represent the remains of a ring ditch associated with the barrow.

Magnetic group g3 appears to be disrupted by possible ridge-and-furrow ploughing (Figure 3) and so could represent a deposit or structure that pre-dates at least the latest phase of any ridge-and-furrow ploughing. Group g3 also coincides with resistance groups r4 and r5 although these could reflect relatively recent ploughing disturbance.

Magnetic groups g4, g5 and g6 may represent natural deposits or archaeological deposits such as small pits or post holes. Similar anomaly groups were recorded in the dataset outside the barrow but these do not display any particular grouping or other pattern and so have not been mapped as potential archaeological deposits.

Groups r2 and r6 may represent linear, relatively stony archaeological deposits, natural features or field drains.

7.4 Conclusions

The magnetic and resistance responses were sufficient to be able to differentiate anomalies representing possible archaeological features.

A total of six magnetic anomaly groups and six resistance anomaly groups were mapped as representing potential archaeological deposits and features. Of these one magnetic group (g2) and one resistance group (r3) coincide and are likely to represent the remains of a ring ditch associated with the barrow. One magnetic anomaly group (g3) may represent deposits within the confines of the barrow that appear to have been disrupted by possible ridge-and-

furrow ploughing although no relationship between these deposits and the barrow could be ascertained. Three magnetic groups (g4 to g6) represent either archaeological deposits such as small pits or postholes or natural deposits. Two resistance groups (r4 and r5) also lie within the barrow area but these may represent relatively recent ploughing.

The remaining magnetic and resistance anomalies (g1, r1, r2 and r6) are linear and may be associated with former field or enclosure boundaries of unknown date although they may represent field drains or natural deposits.

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.

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9 Acknowledgements

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

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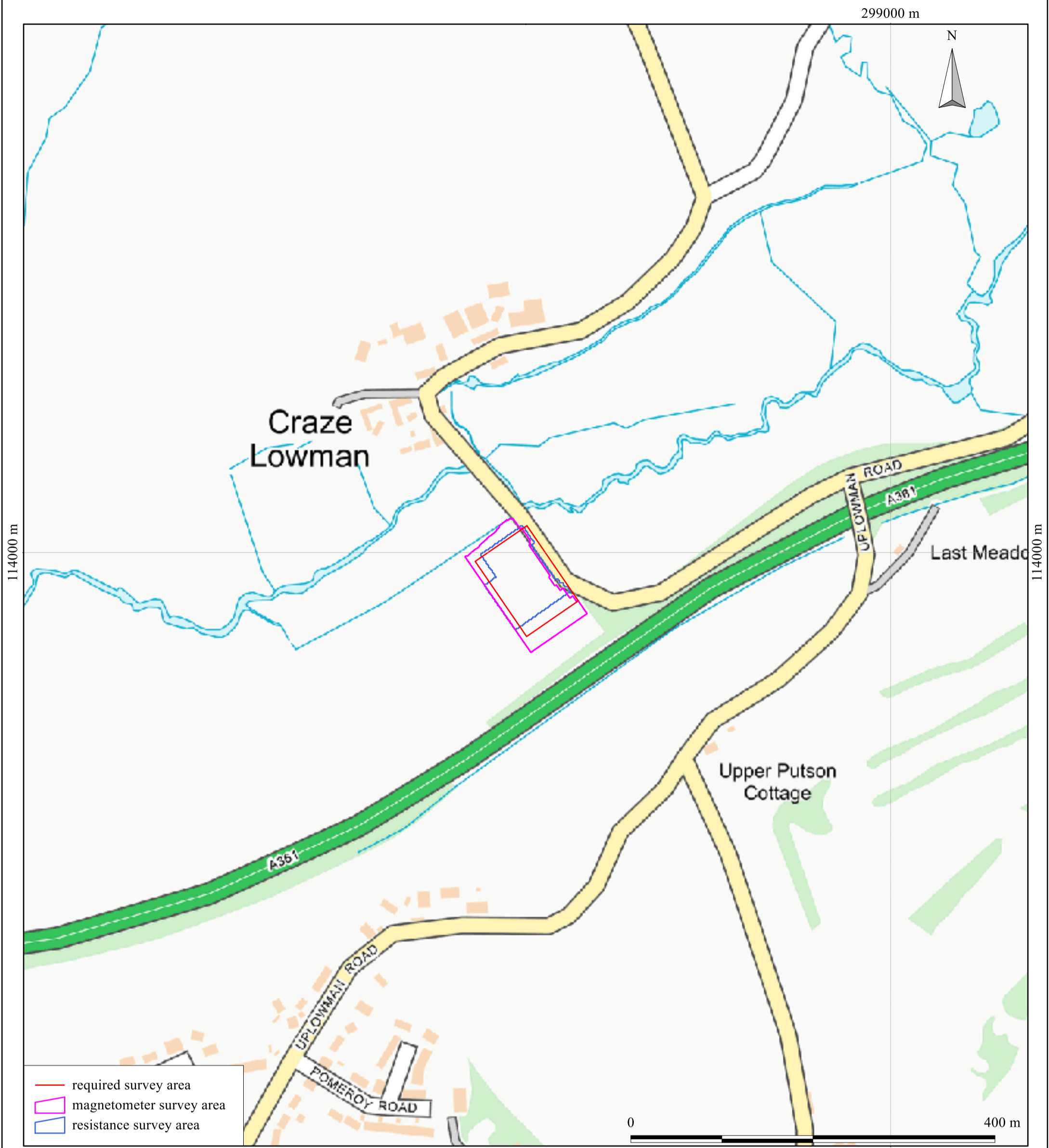
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Appendix 1 Figures



British Grid
 centre X: 298599.19 m, centre Y: 113964.31 m

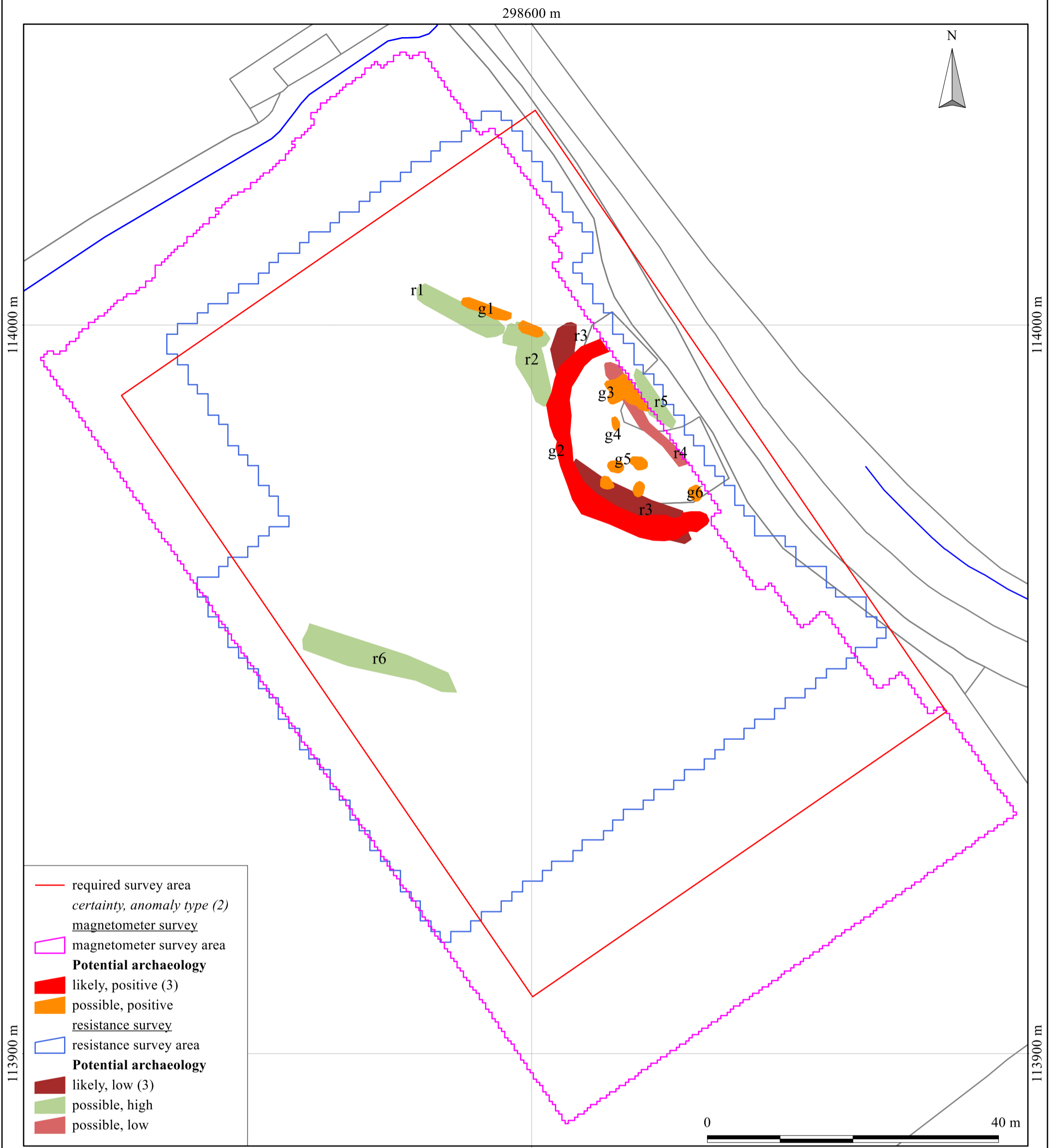
Geophysical survey: Copyright Substrata Limited.
 Base map: Contains Ordnance Survey data
 © Crown copyright and database right 2017

Scale: 1:4000 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological magnetometer and resistance survey
 A bowl barrow 260m northwest of Putson Cross, Tiverton, Devon
 Centred on NGR (E/N) 298617,113989
 Report 1710TIV-R-1

Figure 1: location map

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— required survey area
certainty, anomaly type (2)
 magnetometer survey
 ▭ magnetometer survey area
Potential archaeology
 ■ likely, positive (3)
 ■ possible, positive
 ▭ resistance survey area
Potential archaeology
 ■ likely, low (3)
 ■ possible, high
 ■ possible, low

British Grid
 centre X: 298599.19 m, centre Y: 113964.31 m

Geophysical survey: Copyright Substrata Limited.
 Base map: Ordnance Survey (c) Crown Copyright 2017.
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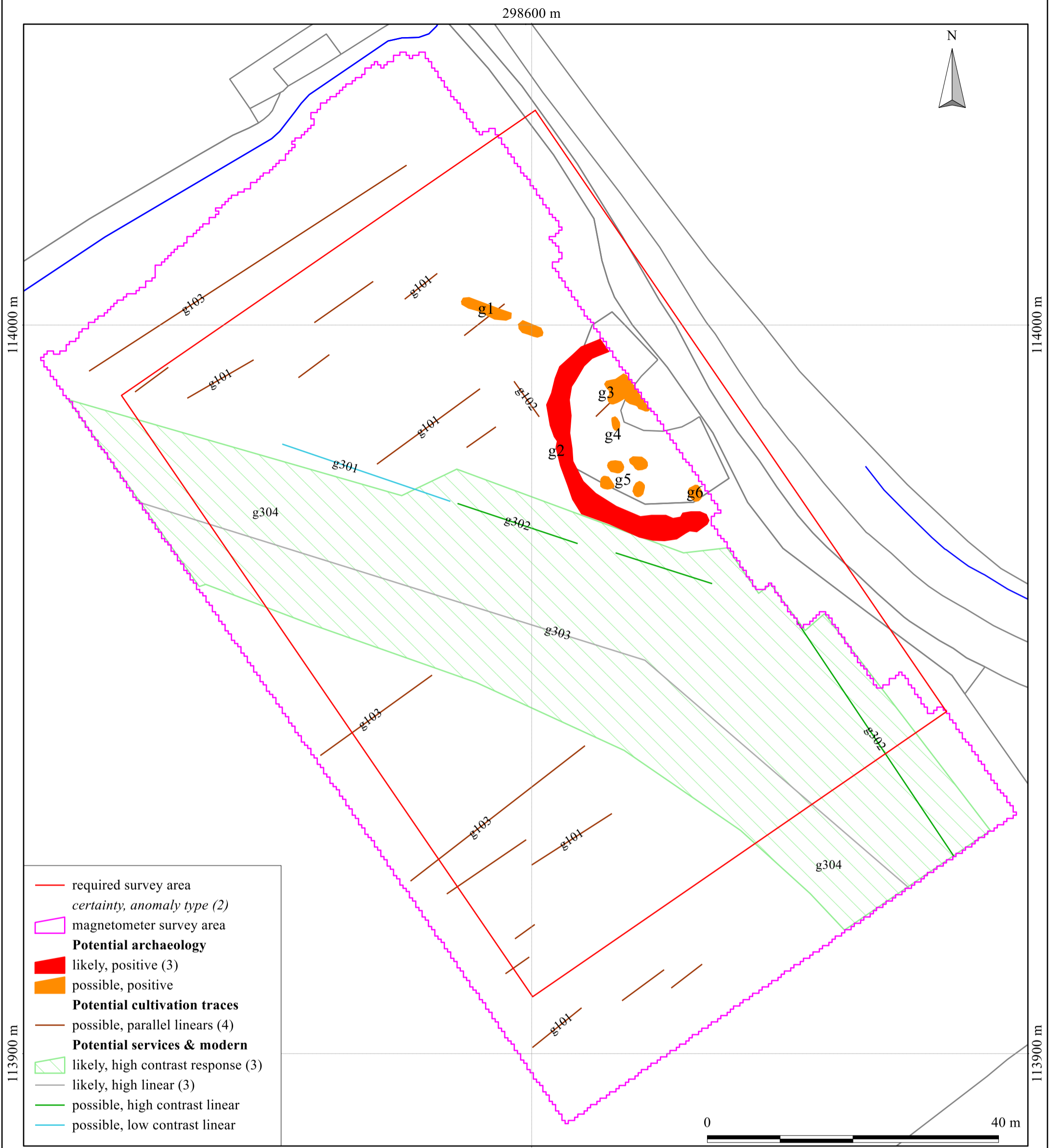
Scale: 1:500 @ A3. Spatial Units: Meter. Do not scale off this drawing

- 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. 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.

An archaeological magnetometer and resistance survey
 A bowl barrow 260m northwest of Putson Cross, Tiverton, Devon
 Centred on NGR (E/N) 298617,113989
 Report 1710TIV-R-1

Figure 2: magnetometer and resistance survey interpretation,
 whole survey area, archaeology only

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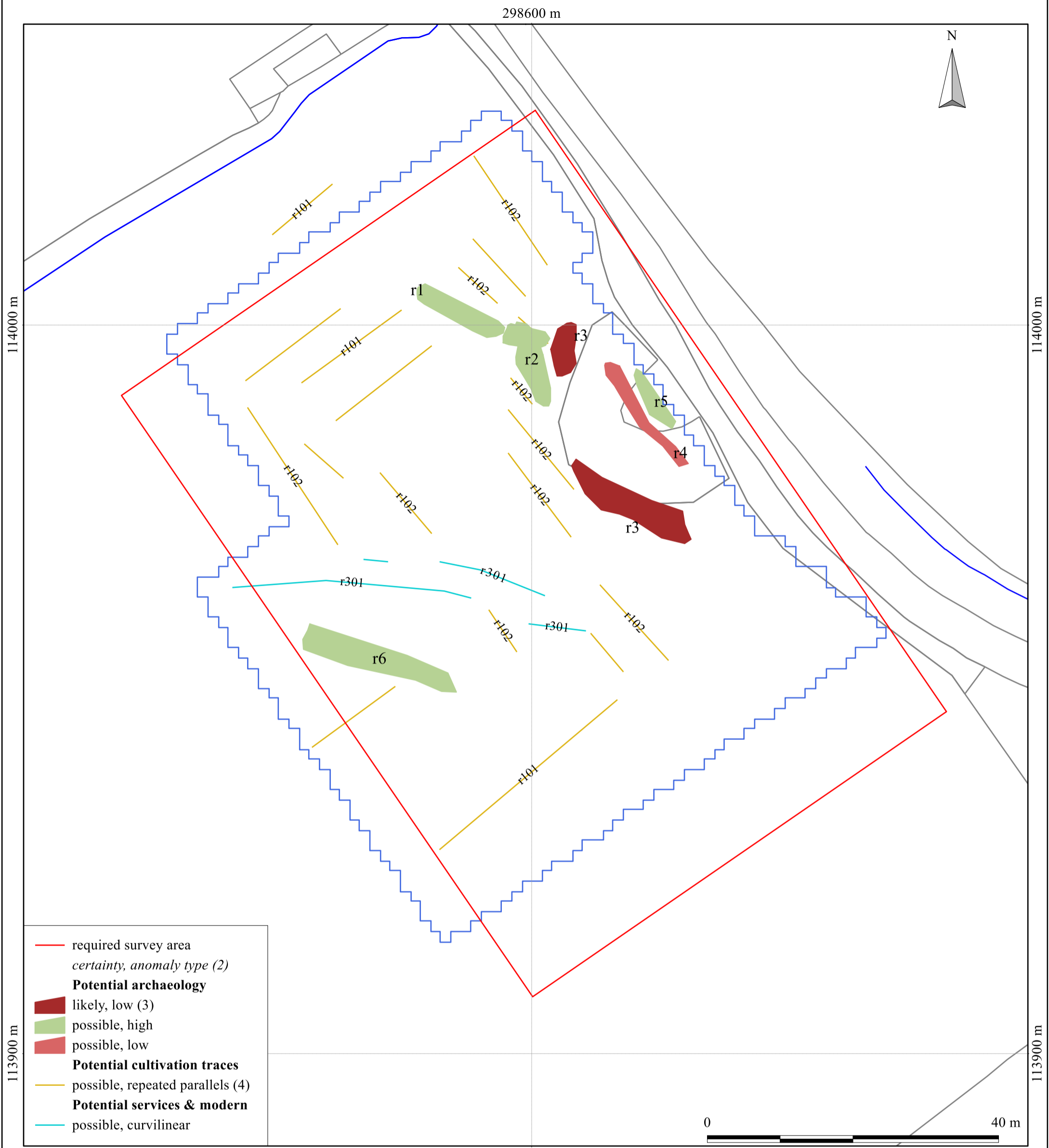
Scale: 1:500 @ A3. Spatial Units: Meter. Do not scale off this drawing

- 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.
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An archaeological magnetometer and resistance survey
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Figure 3: magnetometer survey interpretation

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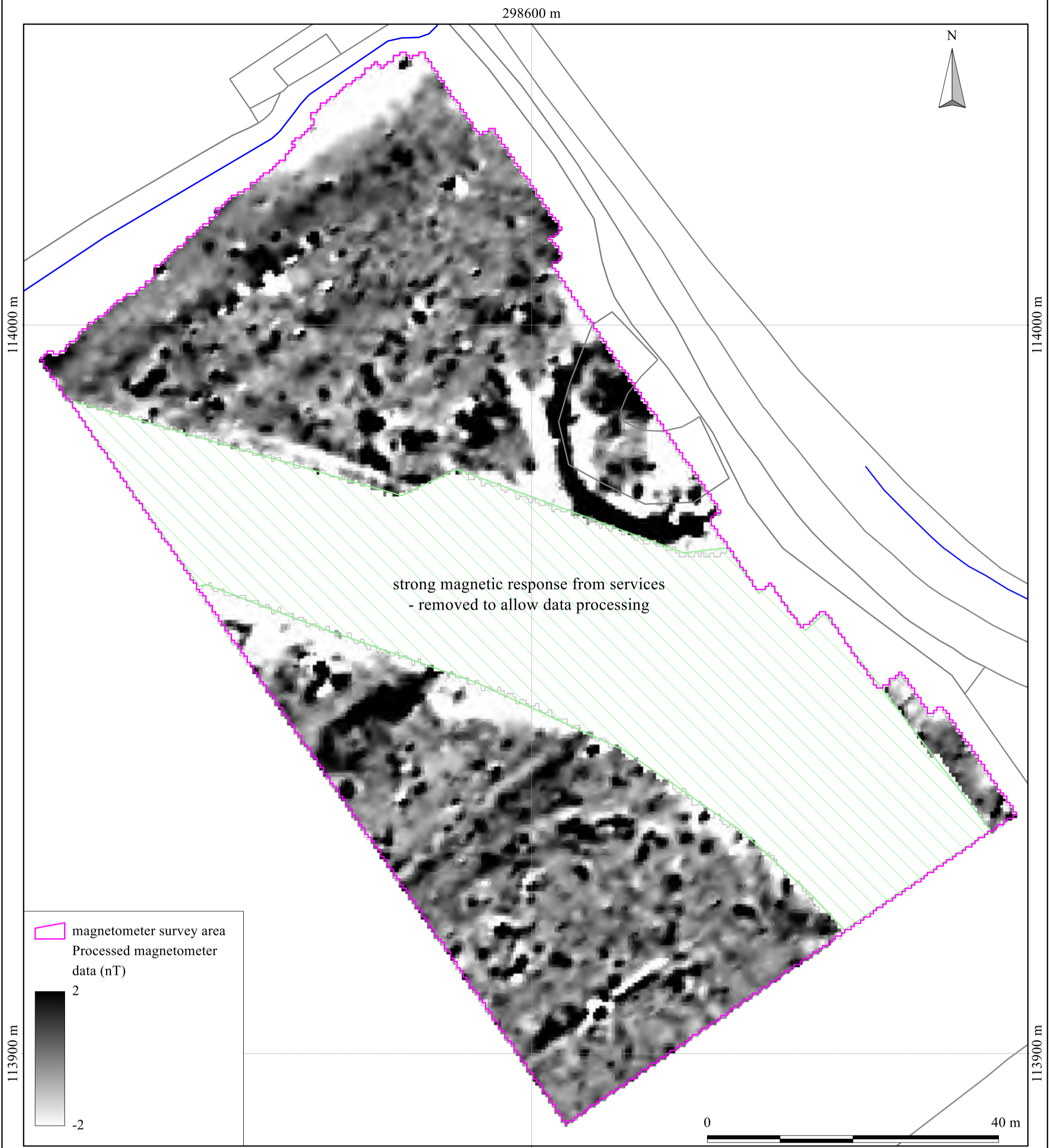
Scale: 1:500 @ A3. Spatial Units: Meter. Do not scale off this drawing

- 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. 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.

An archaeological magnetometer and resistance survey
 A bowl barrow 260m northwest of Putson Cross, Tiverton, Devon
 Centred on NGR (E/N) 298617,113989
 Report 1710TIV-R-1

Figure 4: resistance survey interpretation

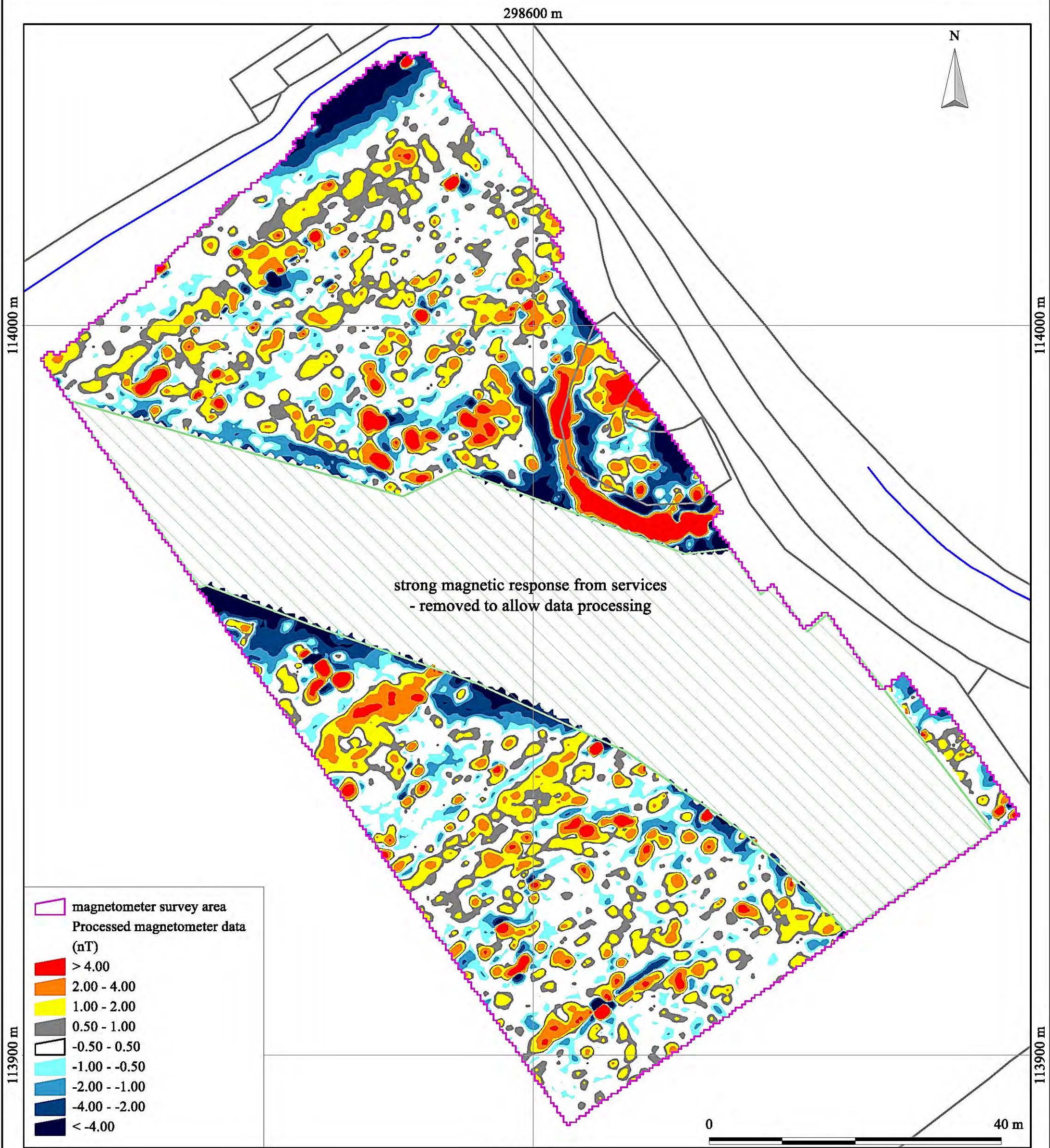
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British Grid
 centre X: 298599.19 m, centre Y: 113964.31 m

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



British Grid
centre X: 298599.19 m, centre Y: 113964.31 m

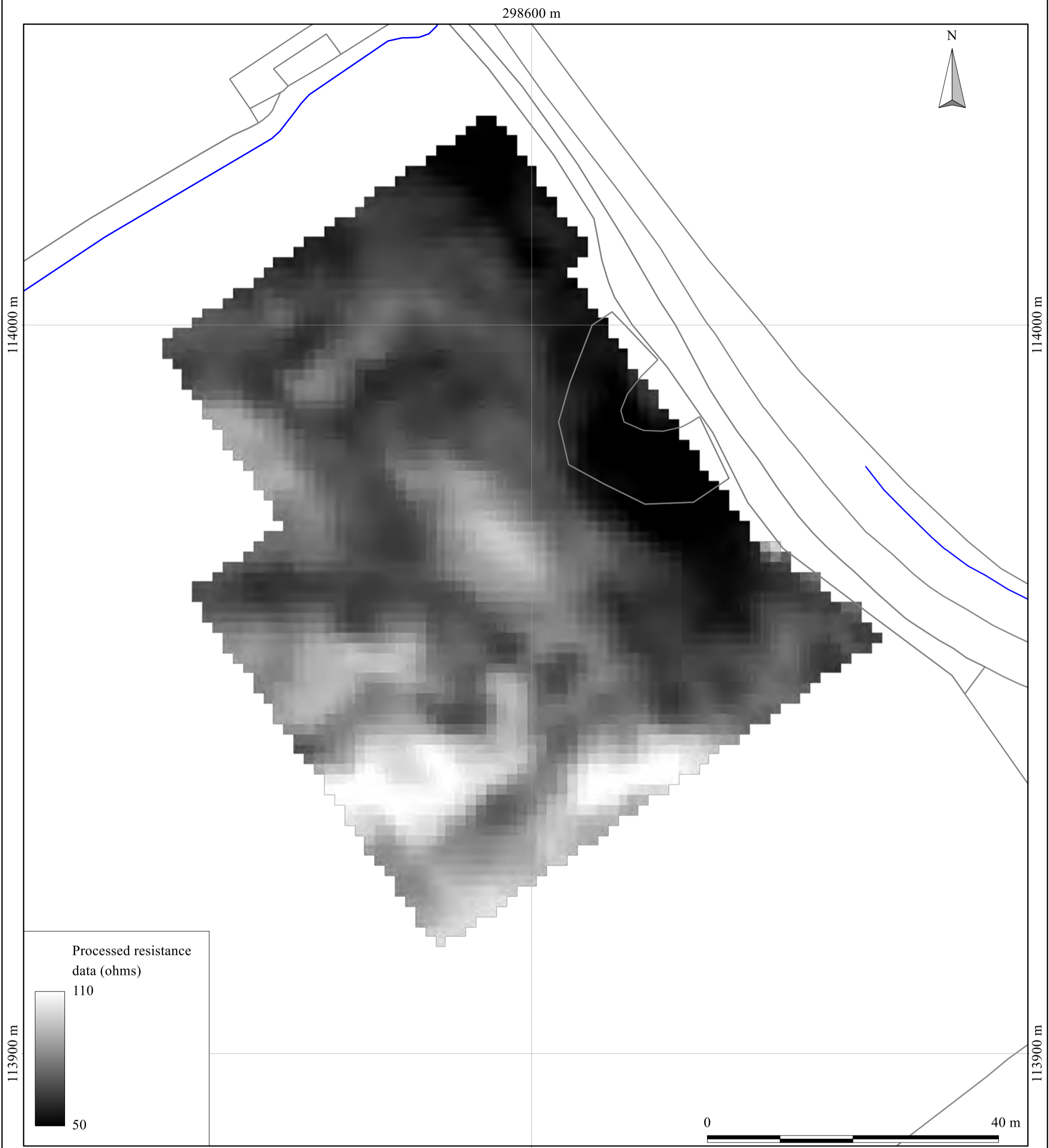
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An archaeological magnetometer and resistance survey
A bowl barrow 260m northwest of Putson Cross, Tiverton, Devon
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Figure 6: contour plot of processed magnetometer data

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British Grid
 centre X: 298599.19 m, centre Y: 113964.31 m

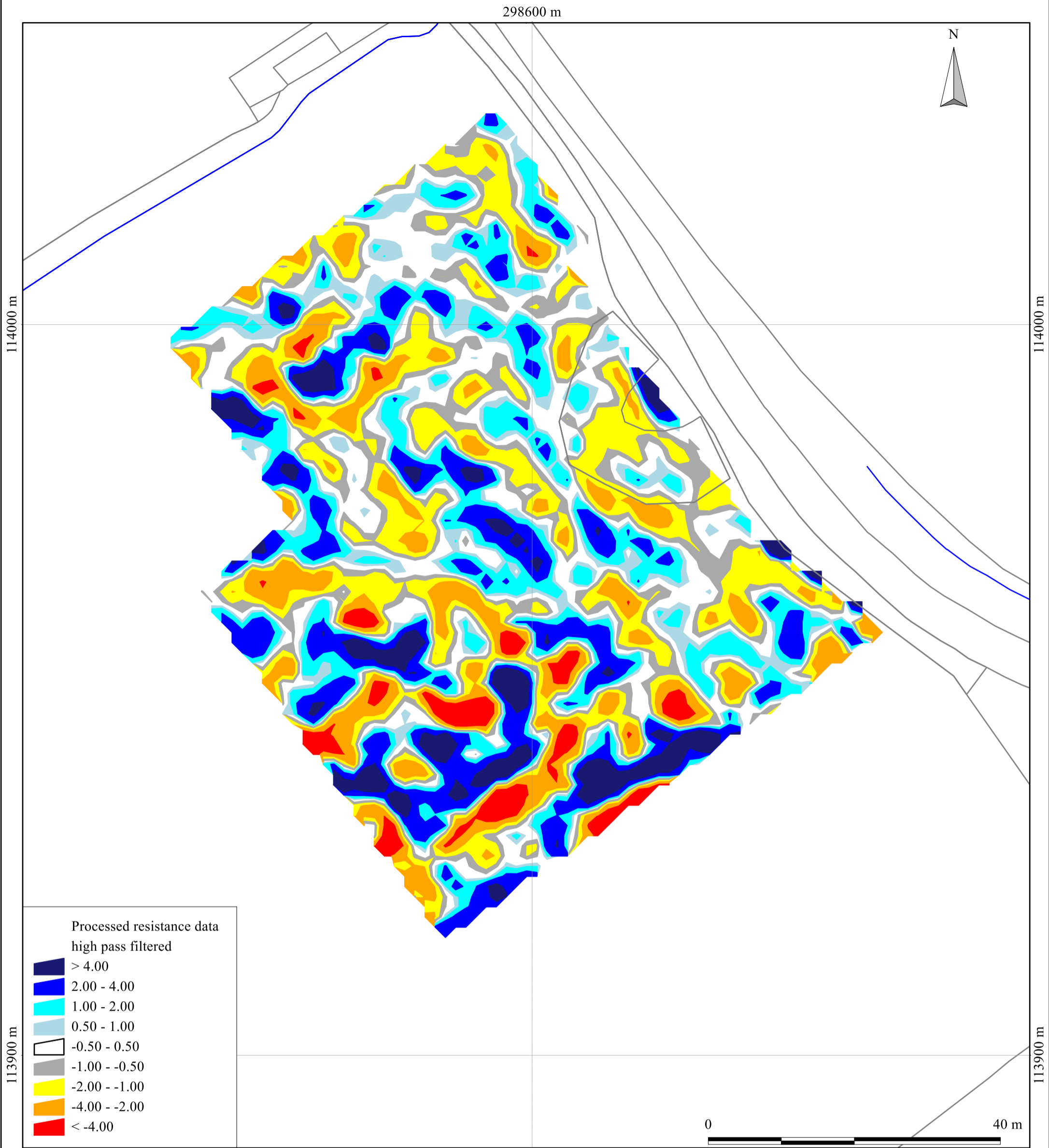
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Scale: 1:500 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological magnetometer and resistance survey
 A bowl barrow 260m northwest of Putson Cross, Tiverton, Devon
 Centred on NGR (E/N) 298617,113989
 Report 1710TIV-R-1

Figure 7: shade plot of processed resistance data

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British Grid
centre X: 298599.19 m, centre Y: 113964.31 m

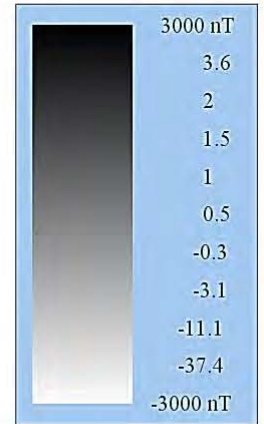
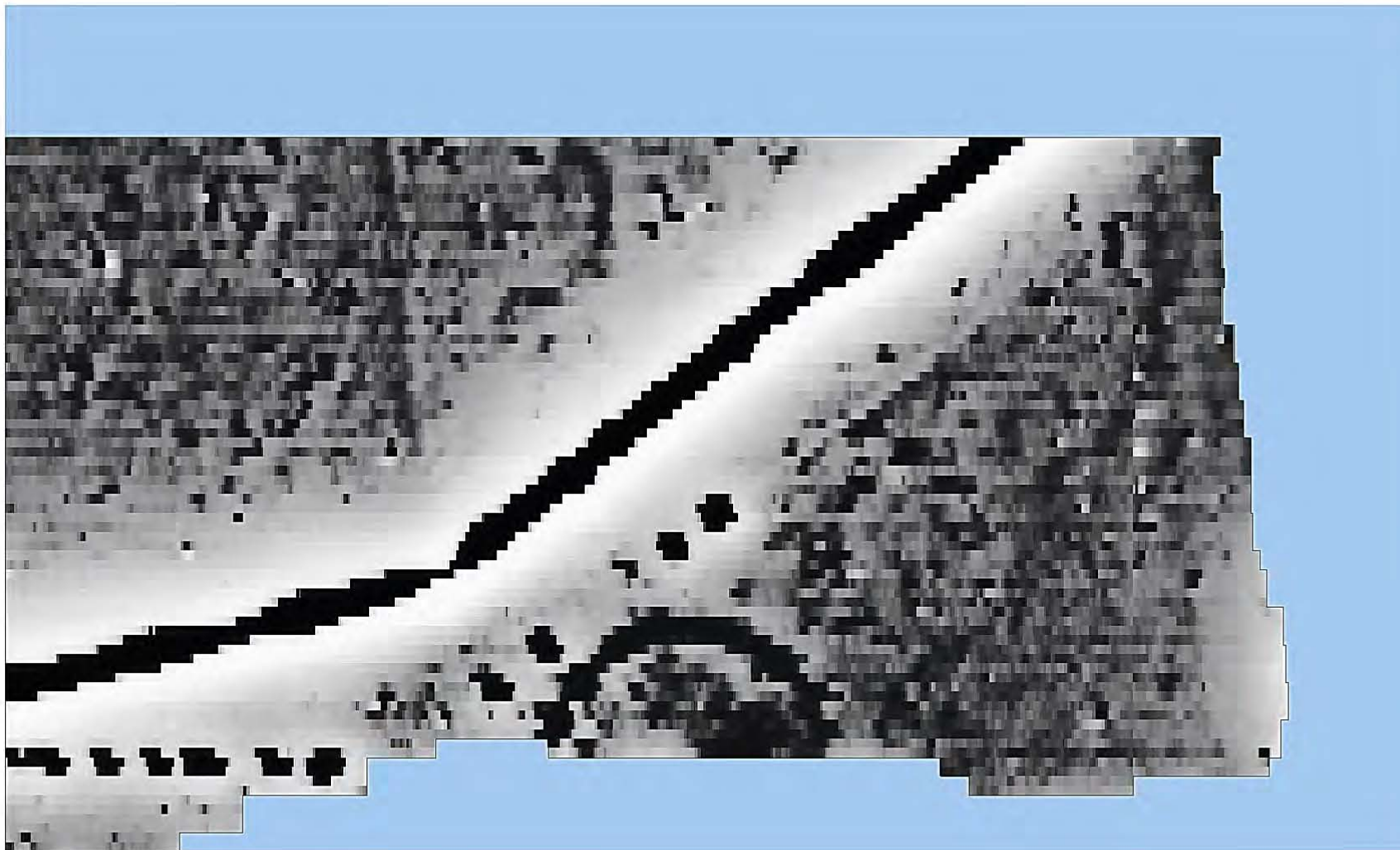
Geophysical survey: Copyright Substrata Limited.
Base map: Ordnance Survey (c) Crown Copyright 2017.
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Scale: 1:500 @ A3. Spatial Units: Meter. Do not scale off this drawing

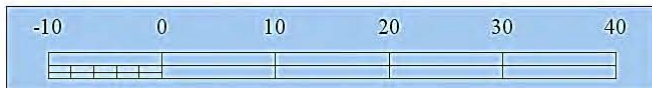
An archaeological magnetometer and resistance survey
A bowl barrow 260m northwest of Putson Cross, Tiverton, Devon
Centred on NGR (E/N) 298617,113989
Report 1710TIV-R-1

Figure 8: contour plot of processed resistance data

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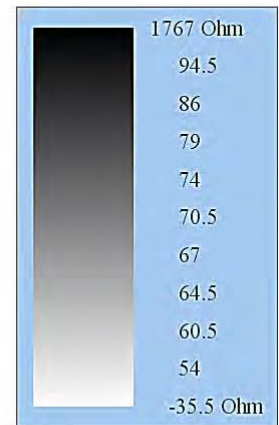
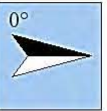
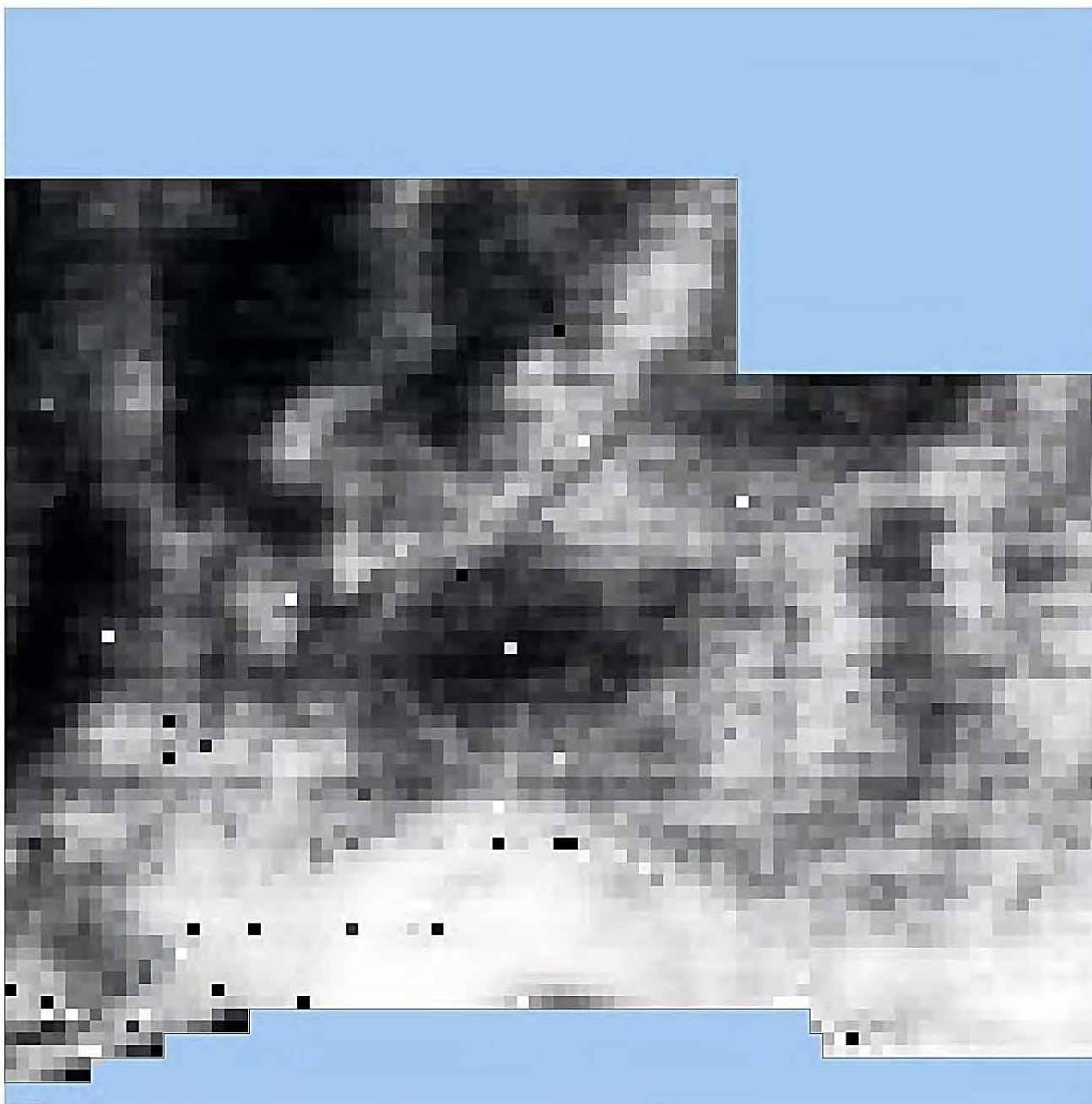


Instrument Type: Bartington Grad 601-2
 Units: nT
 Direction of 1st Traverse: 0 deg
 Collection Method: ZigZag
 Sensors: 2 @ 0.00 m spacing.
 Dummy Value: 32702
 Dimensions
 Grid Size: 30 m x 30 m
 X Interval: 0.25 m
 Y Interval: 1 m
 Stats
 Max: 3000.00
 Min: -3000.00
 Std Dev: 673.92
 Mean: 22.66
 Median: 0.50
 Surveyed Area: 0.9106 ha
 PROGRAM
 Name: TerraSurveyor
 Version: 3.0.33.6

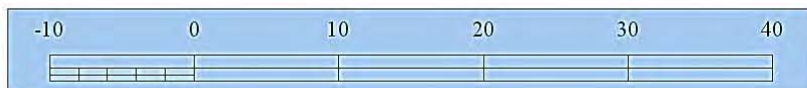


Processes: 1
 1 Base Layer

Figure 9: shade plot of unprocessed magnetometer data



Instrument Type:	GeoScan (Resistance)
Units:	Ohm
Direction of 1st Traverse:	0 deg
Collection Method:	ZigZag
Sensors:	1
Dummy Value:	2047.5
Dimensions	
Grid Size:	30 m x 30 m
X Interval:	1 m
Y Interval:	1 m
Stats	
Max:	1767.00
Min:	-35.50
Std Dev:	32.86
Mean:	73.82
Median:	70.50
PROGRAM	
Name:	TerraSurveyor
Version:	3.0.31.0



Processes: 1
1 Base Layer

Figure 10: shade plot of unprocessed resistance data

Appendix 2 Tables

Site: An archaeological magnetometer and resistance survey
 A bowl barrow 260m northwest of Putson Cross, Tiverton, Devon
 Centred on NGR (E/N) 298617,113989
 Report 1710TIV-R-1

anomaly group	associated anomalies	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
g1	r1	possible, positive	disrupted linear			
g2	r3	likely, positive	semi-circular	bowl barrow ring ditch	anomaly group coincides with an extant Scheduled bowl barrow and likely represents part of an associated ring ditch	Monument number 1017132, HER entry MDV12370
g3	r4	possible, positive	irregular	potential archaeological deposit apparently disrupted by historical (ridge-and-furrow?) ploughing		
g4		possible, positive	oval	small pit, posthole or natural deposit		
g5		possible, positive	group of ovals	group of small pits, postholes or natural deposits		
g6		possible, positive	oval	small pit, posthole or natural deposit		
g101		possible, parallel linears		cultivation traces - possible ridge-and-furrow		
g102		possible, parallel linears		cultivation traces - possible ridge-and-furrow?		
g103		possible, parallel linears		cultivation traces - possible ridge-and-furrow?	anomaly group is more pronounced suggesting that the groups may represent more substantial deposits such as ditches but the equivalent resistance anomalies do not exhibit any differences to similar anomalies on the site - on balance, these anomaly groups represent cultivation traces and not ditches	
g301		possible, low contrast linear		service trench		
g302		possible, high contrast linear	disrupted multi-linear	ferrous drain, pipe or cable		
g303	g304	likely, high linear	multilinear	gas main		field owner personal communication
g304	g303 g302	likely, high contrast response			strong magnetic signal associated with services	

Table 1: magnetometer survey data analysis

Site: An archaeological magnetometer and resistance survey
 A bowl barrow 260m northwest of Putson Cross, Tiverton, Devon
 Centred on NGR (E/N) 298617,113989
 Report 1710TIV-R-1

anomaly group	associated anomalies	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
r1	g1	possible, high	linear			
r2		possible, high	linear			
r3	g2	likely, low	disrupted curvilinear	bowl barrow ring ditch	anomaly group coincides with an extant Scheduled bowl barrow and likely represents part of an associated ring ditch	Monument number 1017132, HER entry MDV12370
r4	r5 g3	possible, low	linear	either archaeological deposits or ploughing disturbance		
r5	r4	possible, high	linear	either archaeological deposits or ploughing disturbance		
r6		possible, high	linear			
r101		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
r102		possible, repeated parallels		cultivation traces		
r301		possible, curvilinear		ground disturbance associated with services		

Table 2: resistance survey data analysis

<p>Grid <i>Method of Fixing:</i> DGPS and RTK 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.</p>	
<p>Magnetometer Equipment <i>Instrument:</i> Bartington Instruments grad601-2 <i>Firmware:</i> version 6.1</p>	<p>Magnetometer Data Capture <i>Sample Interval:</i> 0.25-metres <i>Traverse Interval:</i> 1 metre <i>Data capture:</i> automatic data logger <i>Traverse Method:</i> zigzag <i>Traverse Orientation:</i> GN324</p>
<p>Resistance Equipment <i>Instrument:</i> Geoscan Research RM15 multi-probe resistance meter <i>Configuration:</i> twin probe <i>Mobile probe spacing:</i> 0.5-metres</p>	<p>Resistance Data Capture <i>Sample Interval:</i> 1 metre <i>Traverse Interval:</i> 1 metre <i>Data capture:</i> automatic data logger <i>Traverse Method:</i> zigzag <i>Traverse Orientation:</i> GN326</p>
<p>Data Processing, Analysis and Presentation Software QCAD Professional 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>	

Table 3: methodology information

Instrument	
Type:	Bartington Grad 601
Units:	nT
Direction of 1st Traverse:	0 deg
Collection Method:	ZigZag
Sensors:	2 @ 1.00 m spacing.
Dummy Value:	32702
Program	
Name:	TerraSurveyor
Version:	3.0.31.0
<u>Figures 5 and 6</u>	
Statistics	Processes: 8
Max: 11.59	1 Base Layer
Min: -11.10	2 Mask for All layers (services)
Std Dev: 1.49	3 De Stagger: Grids: All Mode: Both By: -1 intervals
Mean: -0.15	4 Clip at 1.00 SD
Median: -0.07	5 Clip at 1.00 SD
Surveyed Area: 0.9ha	6 DeStripe Median Traverse: Grids: All
	7 Periphery Match ALL grids in the survey.
	8 Interpolate: Match X & Y Doubled.

Table 4: magnetometer survey - processed data metadata

Instrument Type: Geoscan Research RM15 Units: resistance data (ohms) normalised about a near-zero mean Direction of 1st Traverse: 0 deg Collection Method: ZigZag Sensors: 2 @ 1.00 m spacing. Dummy Value: 32702 PROGRAM Name: TerraSurveyor Version: 3.0.31.0	
<u>Figure 7</u> Statistics Max: 118.23 Min: 43.30 Std Dev: 14.93 Mean: 72.84 Median: 70.05 Surveyed Area: 0.58ha	Processes 1 Base Layer 2 Despike Threshold: 1 Window size: 3x3 3 Despike Threshold: 1 Window size: 3x3 4 Despike Threshold: 1 Window size: 3x3 5 Low pass Gaussian filter: Window: 3 x 3
<u>Figure 8</u> Statistics Max: 39.12 Min: -11.82 Std Dev: 2.72 Mean: 0.04 Median: -0.06 Surveyed Area: 0.58ha	Processes 1 Base Layer 2 Despike Threshold: 1 Window size: 3x3 3 Despike Threshold: 1 Window size: 3x3 4 Despike Threshold: 1 Window size: 3x3 5 High pass Gaussian filter: Window: 10 x 10 6 Low pass Gaussian filter: Window: 3 x 3

Table 5: resistance survey - processed data metadata

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