

Substrata

Archaeological Geophysical Surveyors

An archaeological magnetometer survey

Tiverton High School Playing Field

Centred on NGR (E/N) 295420,113550

Report: 1704TIV-R-1

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4 May 2017

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Contents

1. Survey description and summary	1
2. Survey aims and objectives	1
3. Standards	2
4. Site description	2
5. Archaeological background.....	2
6. Results, discussion and conclusions	5
7. Disclaimer and copyright	7
8. Acknowledgements	7
9. Bibliography.....	7
Appendix 1 Figures	8
Appendix 2 Tables.....	15

Figures

Figure 1: location map	9
Figure 2: survey interpretation.....	10
Figure 3: shade plot of processed data	11
Figure 4: contour plot of processed data.....	12
Figure 5: shade plot of unprocessed data, northern plot	13
Figure 6: shade plot of unprocessed data, southern plot	14

Tables

Table 1: methodology summary	16
Table 2: processed data metadata	17

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: 24 April 2017
Area: 1.8ha
Lead surveyor: Mark Edwards BA
Author: Ross Dean BSc MSc MA MifA

1.2 Clients

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

1.3 Location

Site: Tiverton High School Playing Field
Address: Tiverton High School, Bolham Road, Tiverton EX16 6S
Civil Parish: Tiverton
District: Mid Devon
County: Devon
Nearest Postcode: EX16 6UP
NGR: SS 95420 13550 (point)
NGR (E/N): 295420,113550 (point)

1.4 Archive

OASIS number: substrat1-284248
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 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 AC Archaeology Ltd on behalf of clients. 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.

Apart from a few traces of possible ridge-and-furrow ploughing, no magnetic anomaly groups were characterised as relating to archaeological deposits or features. The data set suggests that the ground has undergone significant levelling or other disturbance.

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 comprises two plots. The southern plot covers the whole of a sports field currently used for rugby and football with accompanying goal posts, dug outs and storage facilities. The northern plot is a strip of land approximately 30m wide on the eastern side of a sports field immediately to the north. The northern boundary of the survey area comprises of town infrastructure and Lea Road. The eastern boundary borders farmland with town infrastructure beyond. The southern boundary borders further sports facilities including an all-weather pitch and a skatepark. The western boundary lies along the A3126 Bolham Road. The land is flat and lies at just less than 65m AOD.

4.2 Geology

The bedrock across the site is sandstone of the Permian Tidcombe Sand Member. The superficial geology is Quaternary river terrace deposits which generically comprise sand and gravel, locally with lenses of silt, clay or peat (British Geological Survey, undated).

Borehole data: BGS ID 717212, NGR 295350,113860, completed 2/10/75, 318m from the centre of the southern plot on a bearing of N347 within the same geological sequence.

<u>levels</u>	<u>geology</u>
0 - 0.15m	topsoil
0.15 - 1.40m	firm grey sandy, clayey, silt with siltstone fragments
1.40 – 3.90m	medium coarse sandy gravel
3.90 – 5.00m	well cemented red brown clayey and silty sandy breccia

5 Archaeological background

5.1 Historic landscape characterisation

Northern plot

'Modern enclosures'

Modern enclosures that have been created by adapting earlier Barton fields which are relatively large, regular enclosures that are likely to have been laid out between C15th-C18th. Some curving boundaries may be following earlier divisions in the pre-existing medieval fields (Devon County Council, undated).

Southern plot

'Public complex'

Represents public buildings and other related complexes including schools, colleges, hospitals, government offices, civic centres and cemeteries. In this case the playing fields were constructed over post-medieval enclosures which are fields laid out in the C18th and C19th commonly have many surveyed dead-straight field boundaries (Devon County Council, undated).

5.2 Summary of archaeological background

The following Historic Environment Records (HER) were examined via the Heritage Gateway (Historic England, undated) to gain an appreciation of historic assets deemed pertinent to the geophysical survey data within 500m of the survey area perimeter.

This Section is not designed to provide a comprehensive understanding of the historic environment of the application area and should not be used as a source for further work. The reader is referred to the Devon Country Council Historic Environment Service for a comprehensive HER data set.

Within the proposed development area

The southern sports field was shown on 20th century Ordnance Survey maps from 1913 (HER number NDV 35270).

To the north of the site

Dark lines visible on 1940s Royal Air Force aerial photographs, in a field to the east of Castle Gate House, may represent former field boundaries of unknown date although none were present in 1842 when the Tithe survey was made (HER Number MDV62899, NGR SS 953 137).

A V-shaped Rifle Range is shown on late 19th and early 20th century Ordnance Survey maps with butts at 300 and 600 yards, and meeting just to the north of Castle Gate House (MDV72932 , SS 952 139).

A scatter of Prehistoric & Post Mediaeval artefacts from the south of Bolham Hill centred at SS 9555 1401 included Post-medieval South Somerset sherds and a glazed ridge tile from the same area, of 17th or 18th century date. Seventy-seven flint pieces and eleven chert pieces were recovered from the same area, the former including scrapers, a lozenge arrowhead and a possible solutrean point (MDV21878, SS 954 139).

A possible water meadow system of probable 19th century date is visible as a series of earthwork ditches on aerial photographs of 1946 and as possible cropmarks on specialist oblique aerial photographs of 1984, to the south of Bolham. The fragmented system occupies an area of approximately 3.6 hectares of fairly level floodplain, on the eastern side of the River Exe. It is visible as a series of linear north to south aligned ditches which are parallel to a number of drains depicted on the First Edition Ordnance Survey map of between the 1880's-90's, with which the system was possibly associated. The earthwork ditches appear to have been levelled after 1946, although remain visible as a series of possible cropmarks on oblique aerial photographs of 1984 (MDV108615, SS 952 142).

The Roman fort at Bolham Hill near Tiverton is visible as a series of cropmark ditches on aerial photographs of 1946 onwards. The fort was initially thought to be a Roman marching camp, although excavations between 1981 and 1986 proved the site to be a regular fort dating from the third quarter of the first century AD (MDV12371, SS 956 143, Scheduled Monument 1013409). To the west of the fort a ditch of potential prehistoric to Roman date is visible as a cropmark on aerial photographs of 1988 and 1999. The partial cropmark ditch is visible as an L-shaped feature which may represent the northwest corner of a possible enclosure, or ancillary ditched feature associated with the Roman fort. A possible linear northeast to southwest aligned cropmark ditch is visible to the immediate south, although it is unclear if the two features are associated, or represents a continuation of the linear cropmark ditched feature recorded approximately 130m to the northeast (MDV60520, SS 955 143, Scheduled Monument 1013409).

A possible Roman road from Bolham fort to Exeter is thought to have crossed the River Exe at Tiverton, its exact location being unknown. In the approximate vicinity of the projected line of the Roman road at the location specified below, it was noted that the topsoil contained a higher concentration of stone rubble. There was no sign of metalling on the machined surface to indicate the presence of a former road. The rubble is assumed to represent hardcore used to consolidate a modern farm track (MDV63460, SS 956 139).

To the west of the site

A military camp was recorded on Royal Air Force aerial photographs of 1946 and 1947 and comprised at least 50 close set huts in rows. There was also a race track enclosing a sports field on south side. By 1971 Ordnance Survey map this area is occupied by the Technical College and School. This could be the camp of the United States 4th Infantry Division's signals and cavalry reconnaissance troops and may also be a former German working camp. The division arrived in Devon in January 1944 and had its headquarters at Collipriest on the south side of Tiverton. By 1966 the former camp had been completely cleared. The site is now occupied by Petroc College and Tiverton High School (MDV57281, SS 951 134, National Monuments Record 1473948).

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 changes 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 artefacts can also create magnetic anomalies.

The terms 'archaeological deposit', 'structure' and 'feature' refer to any artefacts, material deposits or disturbance of natural deposits thought to be the result of human activity, excluding recent land maintenance and farming.

Magnetic anomalies cannot be regarded as physical archaeological deposits, structures or features and the dimensions of the anomalies shown do not represent the dimensions of any associated archaeology.

The analysis presented below identifies and characterises anomalies and anomaly groups that may relate to archaeological deposits, structures and features.

The reader is referred to section 7.

6.2 Results

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

Figures 3 and 4 are plots of processed data as specified in Table 2. Figures 5 and 6 are plots of unprocessed data and metadata.

6.3 Discussion

6.3.1 General points

Data collection

Data collection along the survey area edges and within the survey area was restricted as shown in the figures due to the presence of magnetic materials. Un-mapped strong magnetic responses shown in Figures 3 and 4 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 mapped as potential archaeology only when they are associated with other significant anomaly groups or otherwise form recognisable patterns.

Anomalies thought to relate to recent disturbance such as ploughing, natural features and recent man-made objects such as manholes, water management equipment, drains, cables and other services were only mapped where they comprised significant magnetic responses across the dataset that needed clarification.

Numerous dipole magnetic anomalies are scattered across the data set. These are likely to represent recent ferrous objects. They are only mapped if they could influence the analysis of anomaly groups thought to have an archaeological origin.

6.3.2 Data relating to historic maps and other records

No magnetic anomaly groups were identified as relating to previously recorded archaeological deposits or features.

6.3.3 Data with no previous archaeological provenance

There is a trend in the data set which may relate to ground disturbance associated with former ridge-and-furrow ploughing as shown in Figure 2. No other magnetic anomaly groups were characterised as relating to archaeological deposits or features.

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.

Apart from a few traces of possible ridge-and-furrow ploughing, no magnetic anomaly groups were characterised as relating to archaeological deposits or features. The data set suggests that the ground has undergone significant levelling or other disturbance.

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.

Substrata Ltd 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 Limited copyright or the intellectual property of third parties. Such material is labelled with the appropriate copyright and is non-transferrable by Substrata Ltd.

8 Acknowledgements

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

9 Bibliography

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Historic England (undated) *Heritage Gateway* [Online], <http://www.heritagegateway.org.uk/Gateway/> [May 2017]

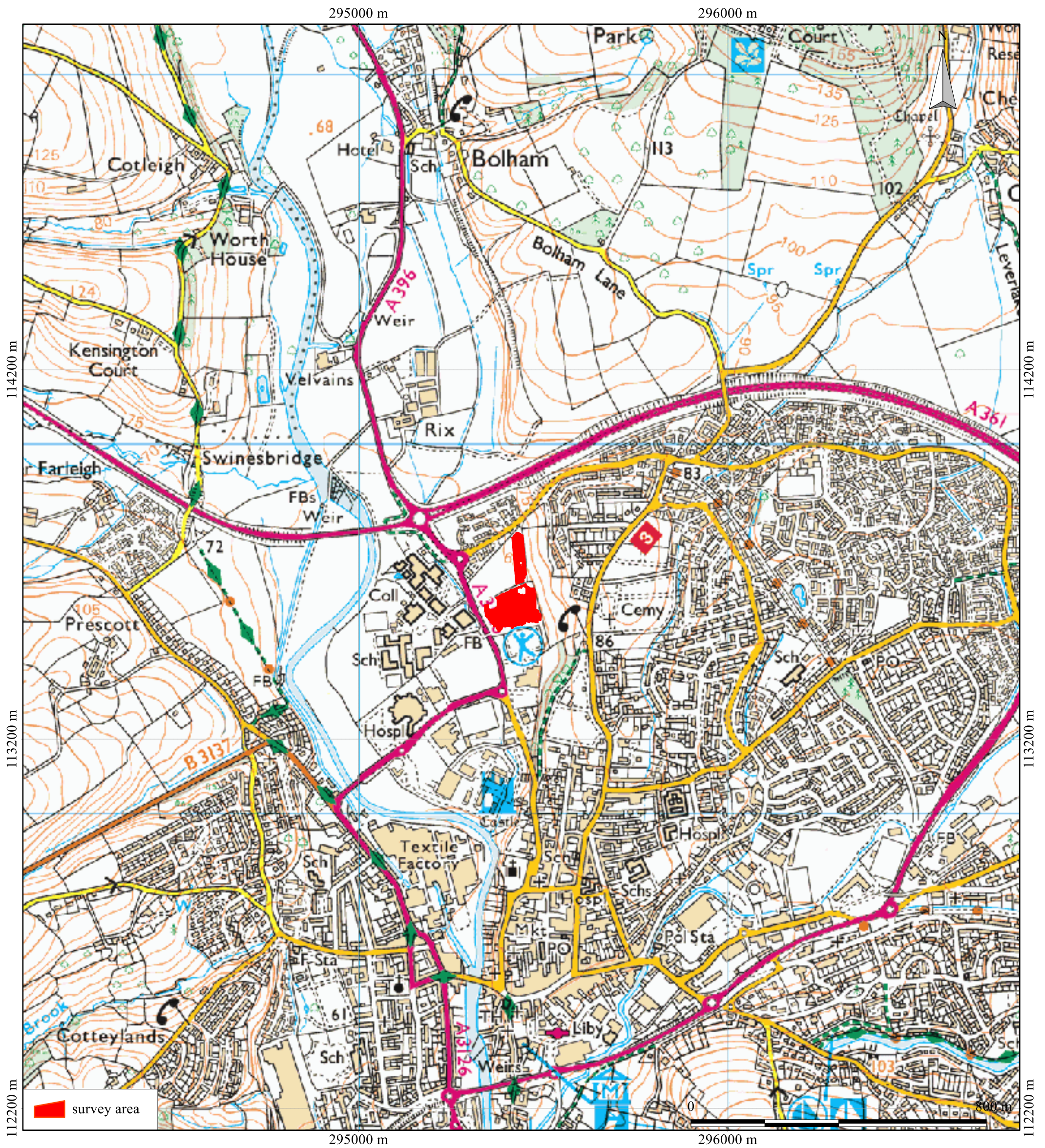
Historic England (2010) *Geophysical Survey in Archaeological Field Evaluation*. [Online], Available: <https://content.historicengland.org.uk/images-books/publications/geophysical-survey-in-archaeological-field-evaluation/geophysics-guidelines.pdf/> [May 2017]

Appendix 1 Figures

General Guidance

The anomalies represented in the survey plots provided in this appendix are magnetic anomalies. The apparent size of such anomalies and anomaly patterns are unlikely to correspond exactly with the dimensions of any associated archaeological features (see Section 6.1).

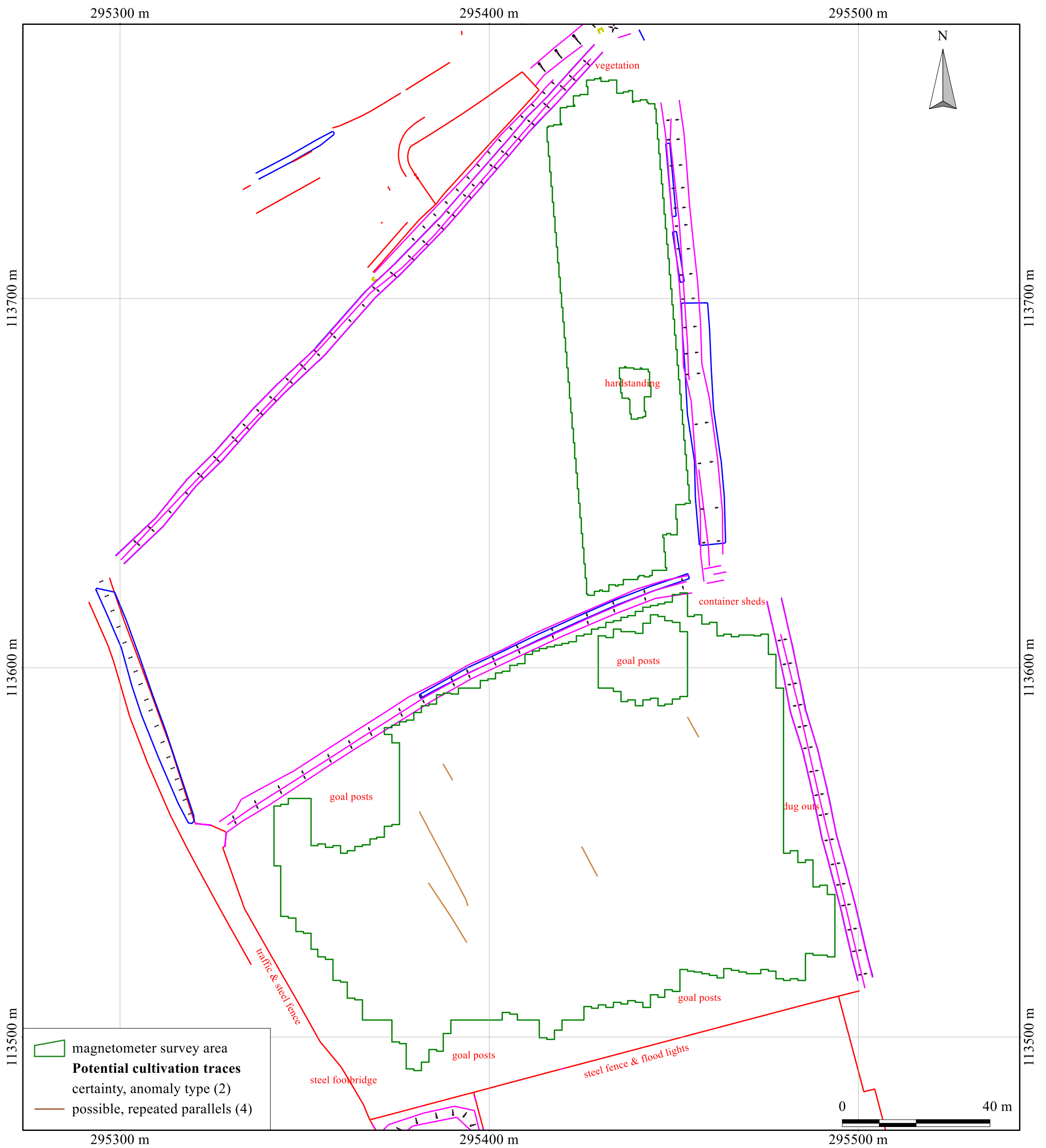
A rough rule for interpreting magnetic anomalies is that the width of an anomaly at half its maximum reading is equal to the width of the buried feature, or its depth if this is greater (Clark, 2000: 83). Caution must be applied when using this rule as it depends on the anomalies being clearly identifiable 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.



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Figure 1: location map

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British Grid
 centre X: 295408.69 m, centre Y: 113624.52 m

Geophysical survey: Copyright Substrata Ltd
 Base map: NPS South West Ltd

Scale: 1:1000 @ 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.

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Figure 2: survey interpretation

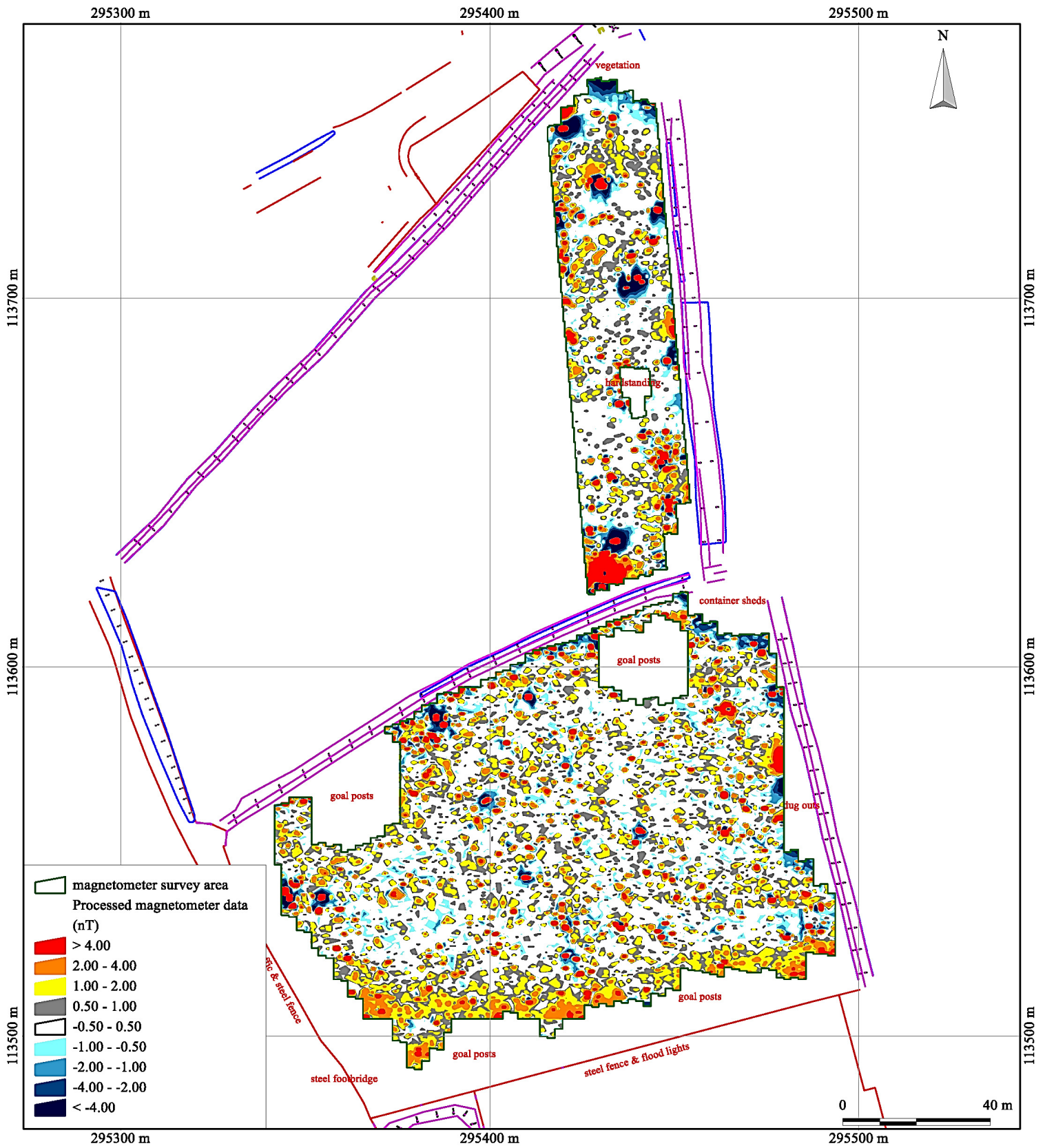
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British Grid
 centre X: 295408.69 m, centre Y: 113624.52 m

Geophysical survey: Copyright Substrata Ltd
 Base map: NPS South West Ltd

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



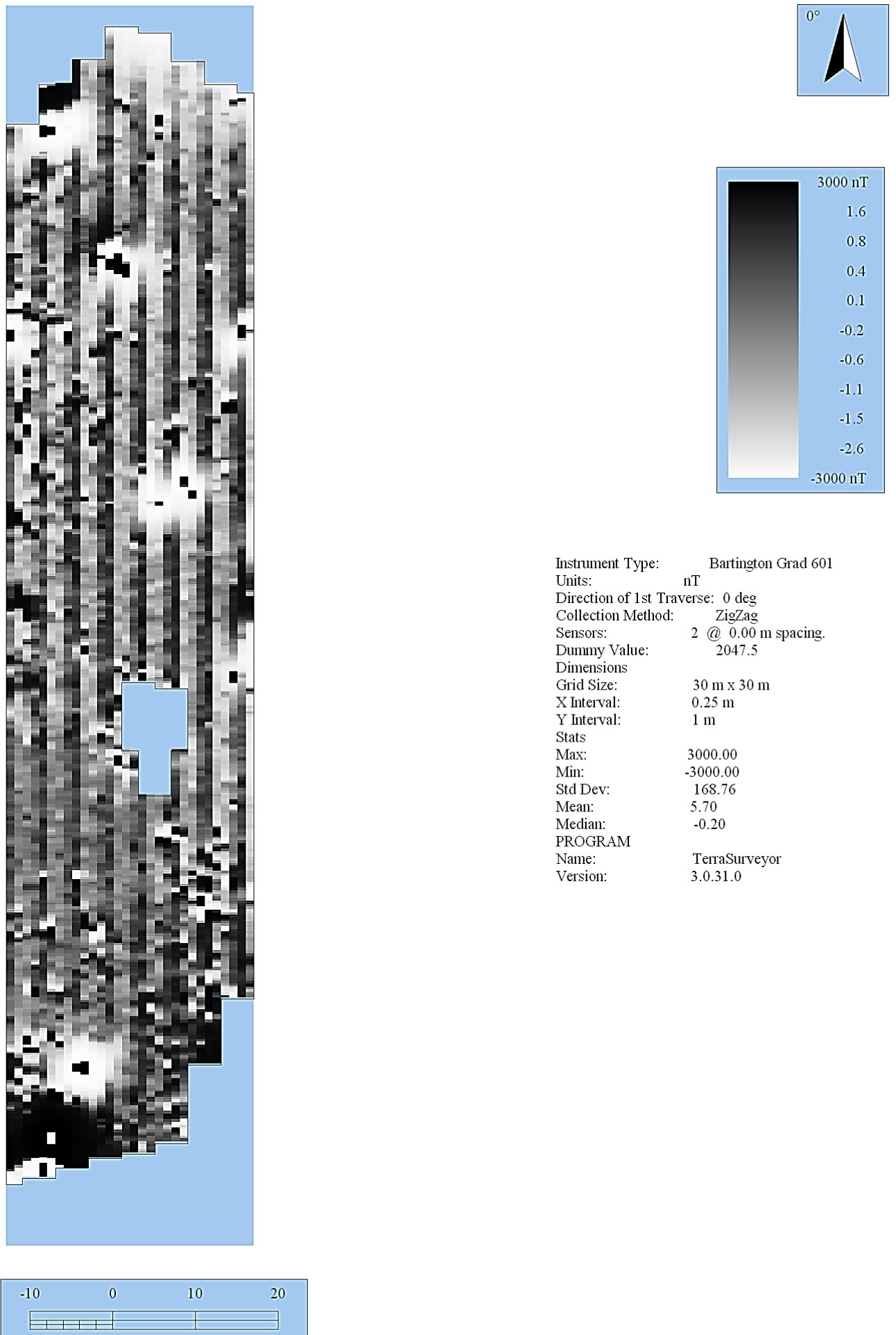
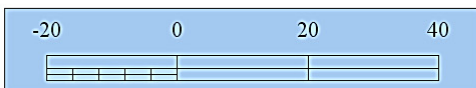
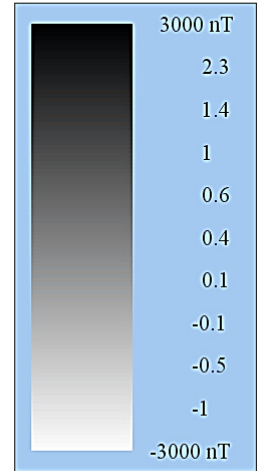
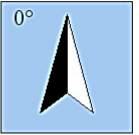
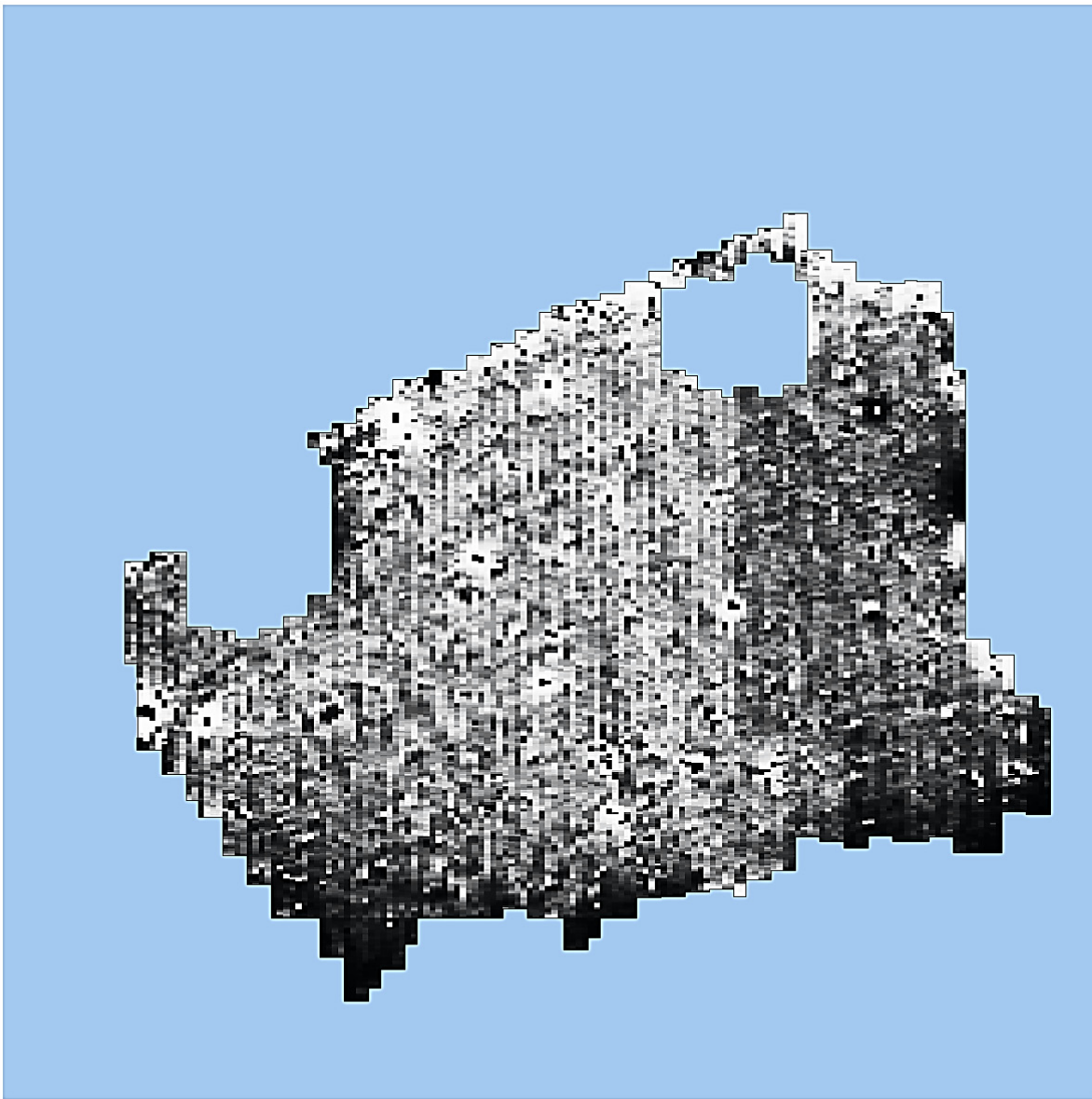


Figure 5: shade plot of unprocessed data, northern plot



Instrument Type: Bartington Grad 601
 Units: nT
 Direction of 1st Traverse: 0 deg
 Collection Method: ZigZag
 Sensors: 2 @ 0.00 m spacing.
 Dummy Value: 2047.5
 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: 67.43
 Mean: 1.09
 Median: 0.40
 PROGRAM
 Name: TerraSurveyor
 Version: 3.0.31.0

Processes: 1
 1 Base Layer

Figure 6: shade plot of unprocessed data, southern plot

Appendix 2 Tables

<p>Documents Survey methodology statement: Dean (2017)</p>	
<p>Methodology</p> <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. 	
<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 in southern plot and approximately N along line of proposed access road in northern plot</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>	

Table 1: methodology summary

<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: 3.0.31.0</p>	
<p><u>Northern plot</u></p> <p>Stats</p> <p>Max: 201.59</p> <p>Min: -431.18</p> <p>Std Dev: 13.08</p> <p>Mean: 0.27</p> <p>Median: 0.0</p>	<p>Processes: 5</p> <p>1 Base Layer</p> <p>2 Clip at 1.00 SD</p> <p>3 DeStripe Median Traverse: Grids: All</p> <p>4 De Stagger: Grids: All Mode: Both By: -1 intervals</p> <p>5 Interpolate: Match X & Y Doubled.</p>
<p><u>Southern plot</u></p> <p>Stats</p> <p>Max: 16.86</p> <p>Min: -16.59</p> <p>Std Dev: 2.11</p> <p>Mean: 0.12</p> <p>Median: 0.06</p>	<p>Processes: 9</p> <p>1 Base Layer</p> <p>2 Clip at 1.00 SD</p> <p>3 De Stagger: Grids: All Mode: Both By: -1 intervals</p> <p>4 De Stagger: Grids: All Mode: Both By: -1 intervals</p> <p>5 DeStripe Median Traverse: Grids: All</p> <p>6 Range Match (Area: Top 30, Left 120, Bottom 179, Right 239) to Right edge</p> <p>7 Range Match (Area: Top 30, Left 0, Bottom 89, Right 119) to Right edge</p> <p>8 Interpolate: Match X & Y Doubled.</p> <p>9 Clip at 5.00 SD</p>

Table 2: processed data metadata