Substrata
Archaeological Geophysical Surveyors

An archaeological gradiometer survey

Land adjacent to Mead Park Fremington, Devon

Centred on NGR (E/N): 252503,132602 (point)

Report: 1601MUD-R-1

Ross Dean BSc MSc MA MCIfA

15 February 2016

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Contents

Figures

Tables

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:	27 and 28 January 2016
Area:	gradiometer survey: 5.9ha
Lead surveyor:	Mark Edwards
Author:	Ross Dean BSc MSc MA MIfA

1.2 Client

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

1.3 Location

Site:	Land adjacent to Mead Park
Civil Parish:	Fremington
District:	North Devon
County:	Devon
Nearest Postcode:	EX31 2NF
NGR:	SS 525 326
Ordnance Survey NGR (E/N):	252503,132602 (point)

1.4 Archive

OASIS number:	substrat1-242597
Archive:	At the time of writing, the archive of this survey will be held by Substrata.

1.5 Introduction

This report was commissioned by AC Archaeology Ltd on behalf of clients. The site location is shown in Figure 1.

1.6 Summary

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

Eleven magnetic anomaly groups were mapped as representing possible archaeological deposits or structures. Of these, four are likely to represent a former field boundaries mapped on the 143 Fremington Tithe map and on historical Ordnance Survey maps. The remainder are typical of anomalies representing former field and enclosure boundaries of unknown origin and possibly of more than one phase of land enclosure.

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 trial trenching 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).

4 Site description

4.1 Landscape and land use

The site is situated between the villages of Fremington and Bickington at Muddlebridge. To the north and west it is bound by agricultural land, to the east by a residential area and to the south the B3233 as shown in Figure 1. Topographically, the site lies at approximately 20m OD on a gentle slope descending north-north-east to south-south-west. At the time of the survey the land was under short grass.

4.2 Geology

The site has a solid geology of rhythmically bedded, dark blue-grey mudstones and subordinate predominantly grey sandstones and siltstones of the Carboniferous Crackington Formation. The superficial geology is Mid-Pleistocene (Diamicton) till (British Geological Survey, undated).

5 Archaeological background

5.1 Historic landscape characterisation

Modern enclosures adapting medieval fields

These modern fields have been created out of probable Medieval (1066 AD to 1485 AD) enclosures. The sinuous Medieval boundaries survive in places. Here the Medieval enclosures are likely to have been narrow, curving strip-enclosures derived from the enclosure of open-field strips with hedge-banks during the later middle ages (Devon County Council, undated).

5.2 Historical and archaeological background

An historical environment assessment was produced by AC Archaeology Ltd (Costen, 2016) as part of the same programme of work as this report and is the main source for the discussion below.

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

The field names Crockers Lane and Crockfords Tenement recorded on the nineteenth century tithe apportionment at the eastern edge of the survey area (Costen 2016: Figure 1 and Appendix 1). It is not known if this represents the name of their former owner or evidence for clay extraction or pottery production. Given the cartographic depiction of the fields on the tithe map, the former seems most likely, with the plots being former medieval strip fields owned at one time by a local potter (ibid: 7).

5.2.2 Heritage assets within 1000m of the site

There is no evidence for any pre-Early Medieval (410 AD to 1066 AD) activity within the study area, and very little Prehistoric (before 43 AD) archaeology recorded on the HER in the immediate wider landscape.

The site is located within a landscape (within the study area and beyond to the east)

characterised by former Medieval fields, many of which are narrow and curving, indicative of strip fields. The documentary evidence probably indicates that vestiges of this medieval land ownership and agricultural practices survived until the nineteenth century when the landscape was opened up and agriculture intensified. The north and west boundaries are historic and possibly survivors from this medieval field system. A map regression exercise and site walkover have identified that the application area was formerly a number of smaller fields, and that evidence for removed boundaries between these fields survives.

The area around, and to the east of Fremington Pill, contains documented evidence for Post-medieval (1485 AD to 1900 AD) and Modern (1901 AD onwards) pottery and brick manufacture, and the extraction of clay for use in pottery production in Bideford. The earliest manufacture here appears to date to the early Post-medieval period, north of Muddlebridge House, but the local industry which may well extend back into the Medieval period (ibid: 7).

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 structures, features and 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

Figure 2 shows the interpretation of the survey data. It includes the anomaly groups identified as relating to archaeological deposits along with their numbers. Table 1 is an extract of the detailed analysis of the survey data sourced from the attribute tables of the GIS project provided in the project archive:

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

Figures 3 and 4 are plots of processed data as specified in Table 3. These plots represent different views of the data that were used to assess potential archaeology.

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

Data collection along the site edges was restricted as shown in Figures 3 and 4 due to the presence of magnetic materials adjacent to the site. Strong magnetic responses mapped close to survey boundaries are likely to relate to these materials except where otherwise indicated in Figure 2.

Anomaly characterisation and mapping

There are a number of anomaly groups that could be interpreted as relating to large postholes or pits although most will have natural origins. Anomalies of this sort are only mapped as potential archaeology if they are clustered in groups or otherwise form recognisable patterns.

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

Anomalies thought to relate to natural features were not mapped.

Data trends

A series of east-west trends in the data are clear on the western side of the survey area and, to a lesser extent, elsewhere (Figures 3 and 4). These are likely to relate to natural deposits and underlying geology.

6.2.2 Data relating to historic maps and other records

Magnetic anomaly groups **4**, **5**, **6** and **10** coincide with and likely represent field boundaries recorded on the 1843 Fremington Tithe map and on historic Ordnance Survey maps as listed in Table 1.

6.2.3 Data with no previous archaeological provenance

The remaining magnetic anomalies mapped as possible archaeological deposits or structures are typical of anomalies representing former field and enclosure boundaries of unknown origin and possibly of more than one phase of land enclosure.

6.3 Conclusions

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

Eleven magnetic anomaly groups were mapped as representing possible archaeological deposits or structures. Of these, four are likely to represent a former field boundaries mapped on the 143 Fremington Tithe map and on historical Ordnance Survey maps. The remainder are typical of anomalies representing former field and enclosure boundaries of unknown origin and possibly of more than one phase of land enclosure.

7 Disclaimer and copyright

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

8 Acknowledgements

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

9 Bibliography

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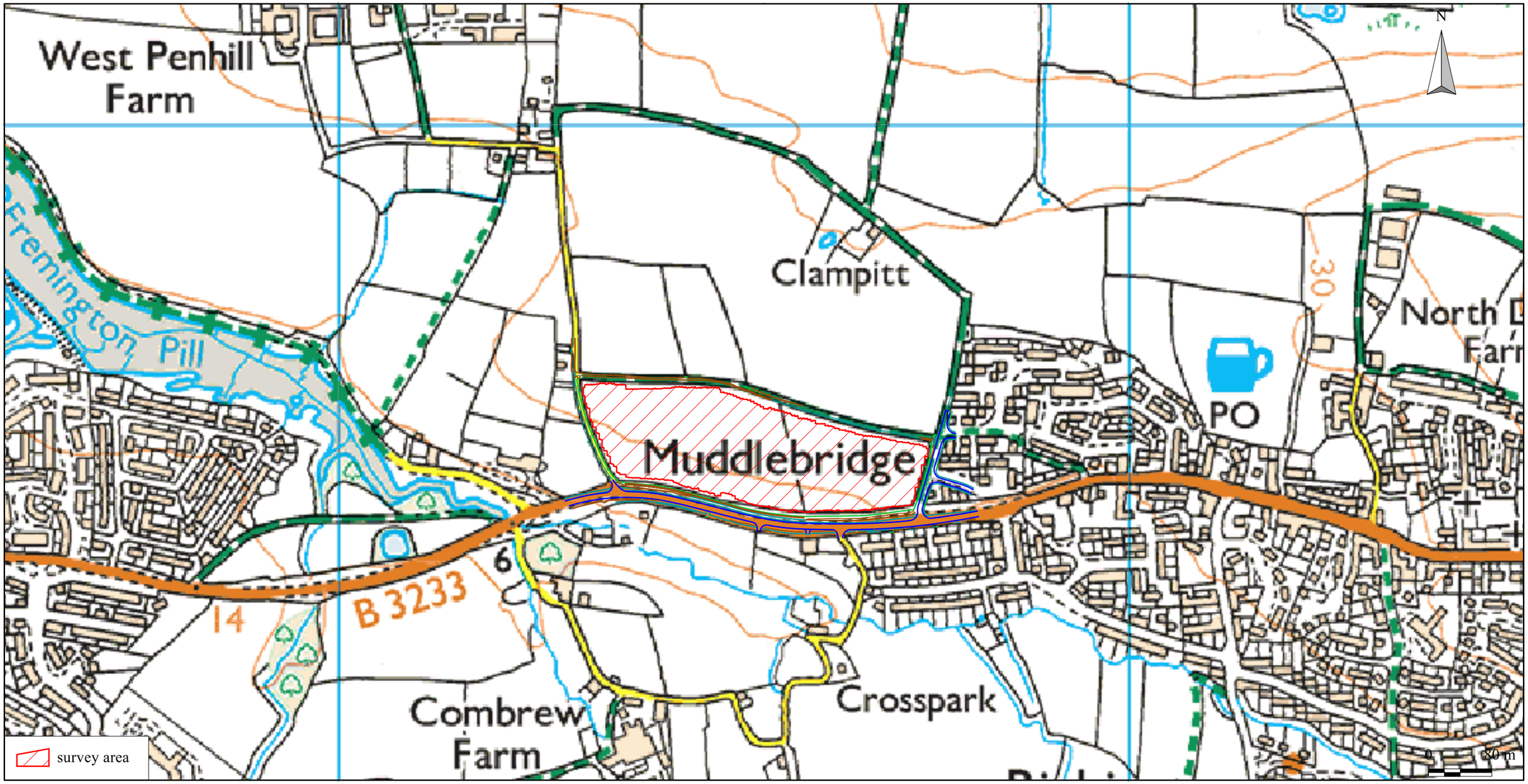
Historic England (2010) *Geophysical Survey in Archaeological Field Evaluation*, [Online], Available: https://content.historicengland.org.uk/images-books/publications/geophysical-survey-in-archaeological-field-evaluation/geophysics-guidelines.pdf/ [January 2016]

Appendix 1 Supporting plots

General Guidance

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

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.



British Grid
centre X: 252538.85 m, centre Y: 132661.58 m

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

An archaeological gradiometer survey
Land adjacent to Mead Park, Fremington, Devon
Centred on NGR (E/N): 252503,132602 (point)
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Figure 1: survey location

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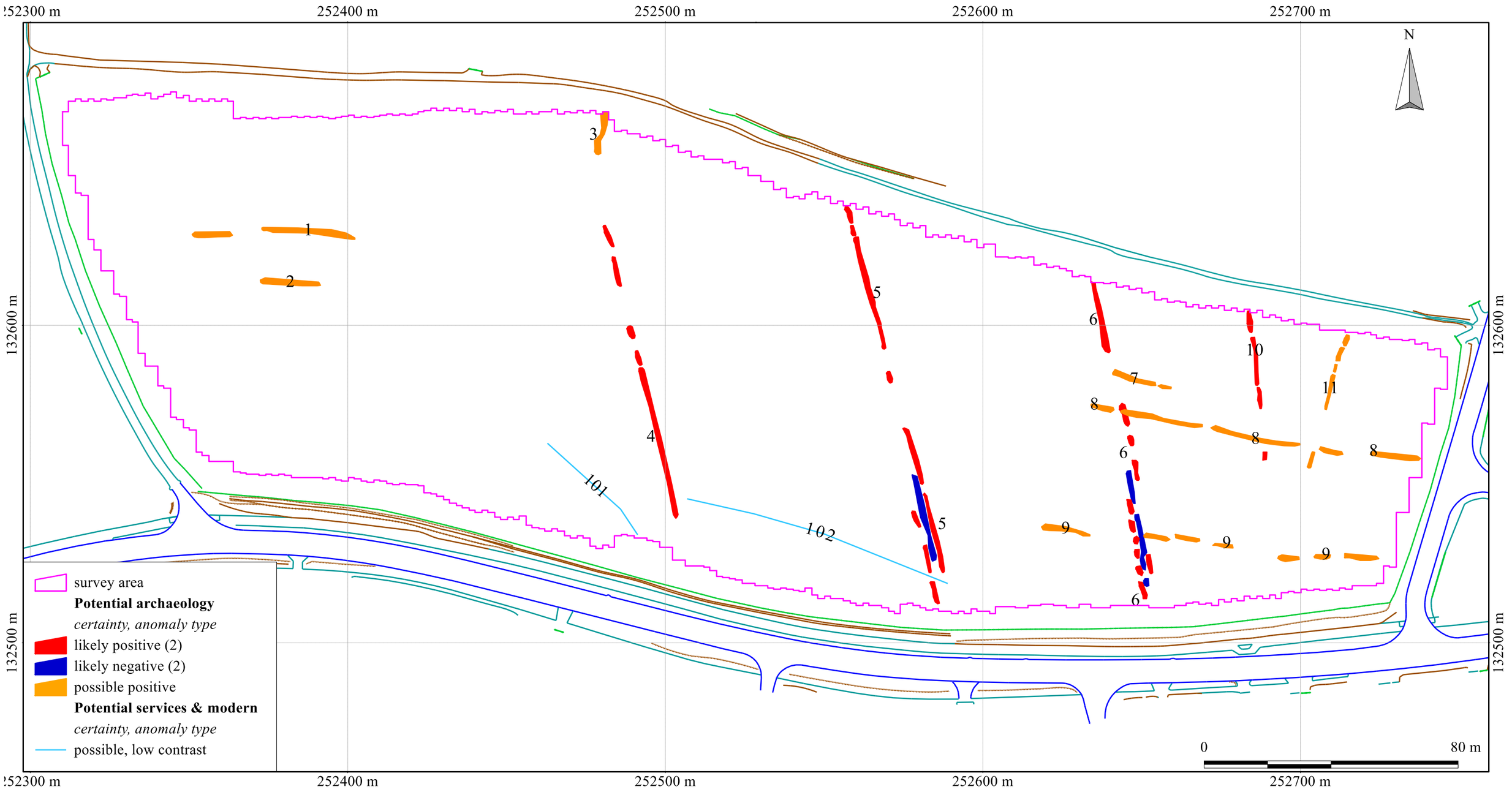

British Grid
centre X: 252528.55 m, centre Y: 132577.36 m

Scale: 1:1200 @ A3. Spatial Units: Meter. Do not scale off this drawing

Notes:
1. All interpretations are provisional and represent potential archaeological deposits.
2. Anomalies designated "likely archaeology" have supporting evidence e.g. historical maps and or visible earthworks.
3. 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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Site: An archaeological gradiometer survey
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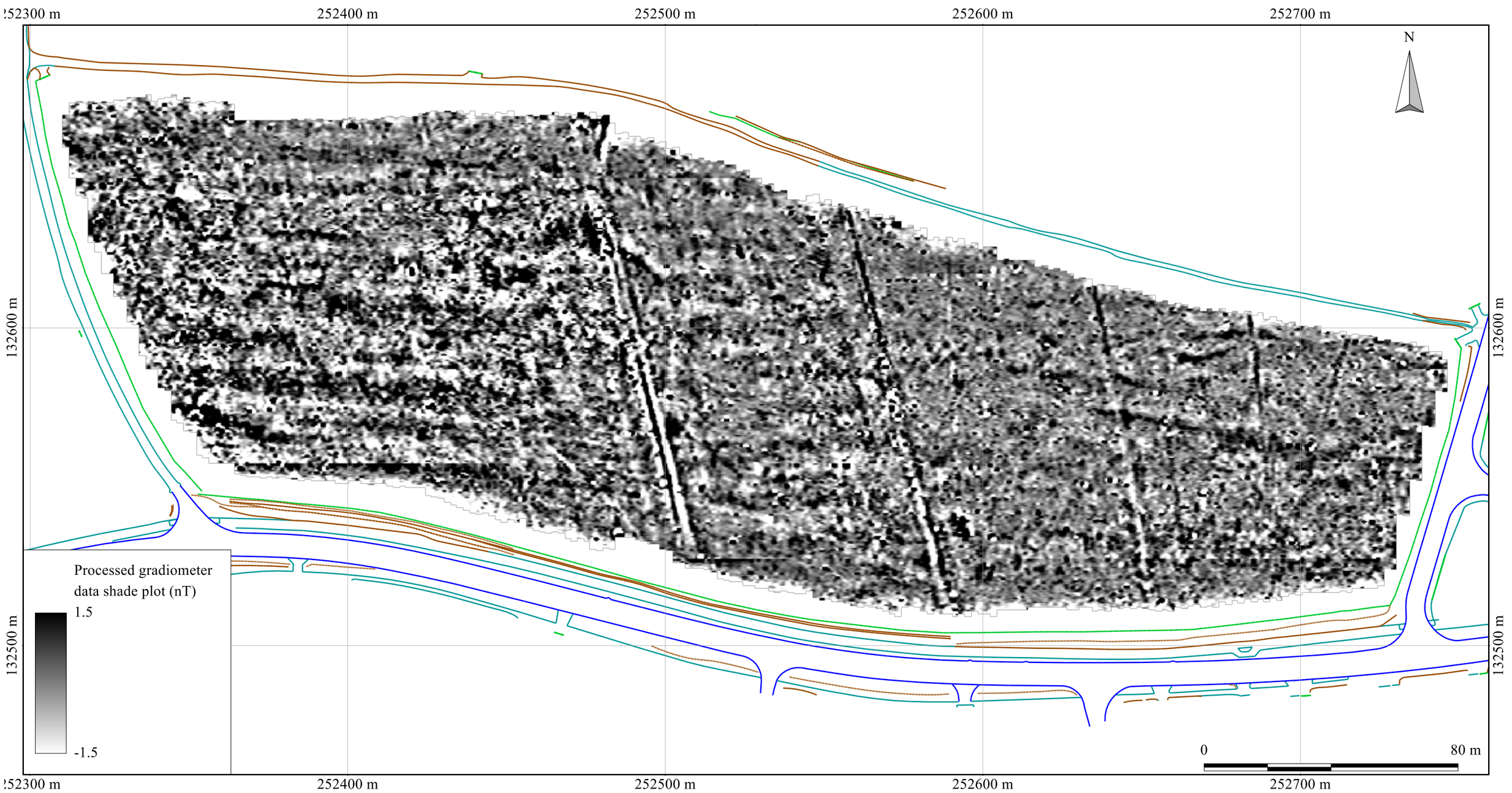
anomaly group	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
1	possible, positive	disrupted linear			
2	possible, positive	linear			
3	possible, positive	curvilinear			
4	likely positive	disrupted linear	field boundary	anomaly groups coincide with and likely represent a former field boundary mapped between 1843 and 1976	1843 Fremington Tithe map, Ordnance Survey maps 1889-90 1:10560 to 1976 1:10000
5	likely positive/negative/positive	disrupted linear	field boundary, southern section possibly a Devon bank	anomaly groups coincide with and likely represent a former field boundary mapped between 1843 and at least 1992	1843 Fremington Tithe map, Ordnance Survey maps 1889-90 1:10560 to 1992 1:10000
6	likely positive/negative/positive	disrupted linear	field boundary, southern section possibly a Devon bank	anomaly groups coincide with and likely represent a former field boundary mapped between 1843 and 1890	1843 Fremington Tithe map, Ordnance Survey maps 1889-90 1:10560 to 1890 1:2500
7	possible, positive	linear			
8	possible, positive	disrupted linear			
9	possible, positive	disrupted linear			
10	likely positive	disrupted linear	field boundary	anomaly groups coincide with and likely represent a former field boundary mapped in 1843 but not on later Ordnance Survey maps	1843 Fremington Tithe map
11	possible, positive	disrupted linear			
101	possible, low contrast	linear	service trench		
102	possible, low contrast	linear	service trench		

Table 1: data analysis



British Grid
centre X: 252528.55 m, centre Y: 132577.36 m

Scale: 1:1200 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 3: shade plot of processed data

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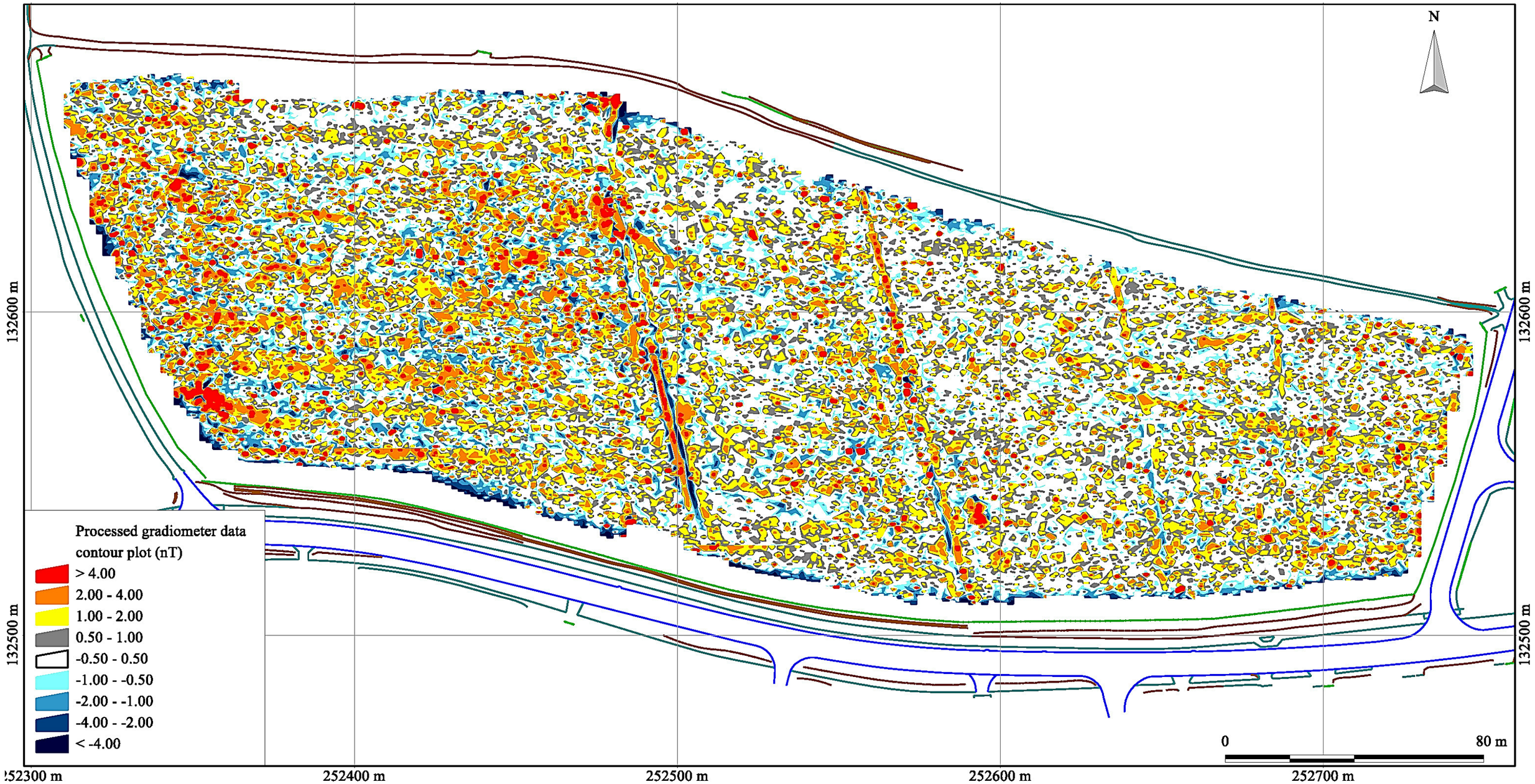

British Grid
centre X: 252528.55 m, centre Y: 132577.36 m

Scale: 1:1200 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological gradiometer survey
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Figure 4: contour plot of processed data

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Appendix 2 Methodology Summary

Table 2: methodology summary	
Documents Survey methodology statement: Dean (2016)	
Methodology 1. The work was undertaken in accordance with the survey methodology statement. The geophysical (gradiometer) survey was undertaken with reference to standard guidance provided by the 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.	
Grid *Method of Fixing:* DGPS set-out using pre-planned survey grids and Ordnance Survey coordinates. *Composition:* 30m by 30m grids *Recording:* Geo-referenced and recorded using digital map tiles. *DGPS used:* Spectra Precision PM5V2 GPS with external antenna and survey pole and DigiTerra Explorer 7 as the survey control program.	
Equipment *Instrument:* Bartington Instruments grad601-2 *Firmware:* version 6.1	**Data Capture** *Sample Interval:* 0.25m *Traverse Interval:* 1 metre *Traverse Method:* zigzag *Traverse Orientation:* GN
Data Processing, Analysis and Presentation Software IntelliCAD Technology Consortium IntelliCAD 8.0 DW Consulting TerraSurveyor3 Manifold System 8 GIS Microsoft Corp. Office Excel 2013 Microsoft Corp. Office Publisher 2013 Adobe Systems Inc Adobe Acrobat 9 Pro Extended	

Appendix 3 Data processing

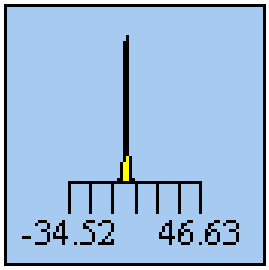
Table 3: gradiometer survey - processed data metadata

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

PROGRAM
Name: TerraSurveyor
Version: 3.0.28.1

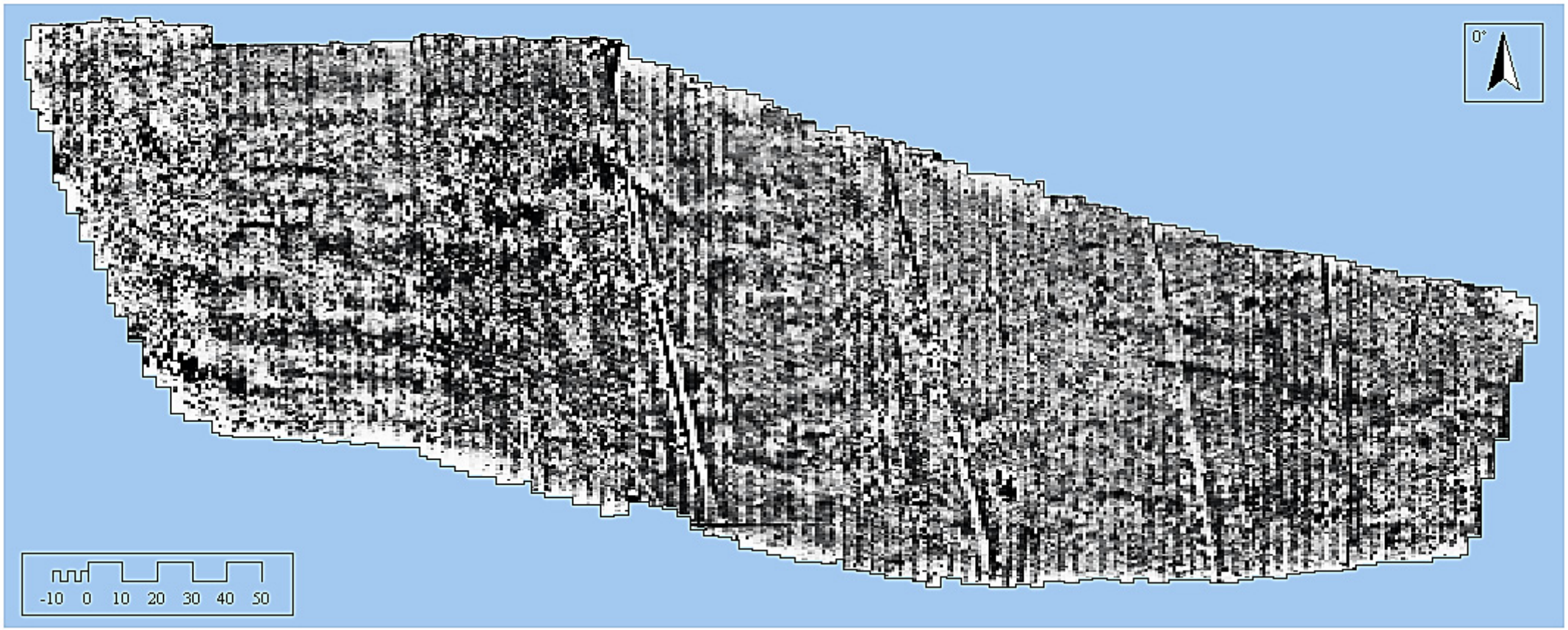
Stats

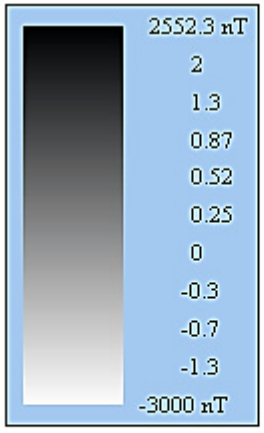
Max:	46.63
Min:	-34.52
Std Dev:	1.72
Mean:	0.06
Median:	0.01

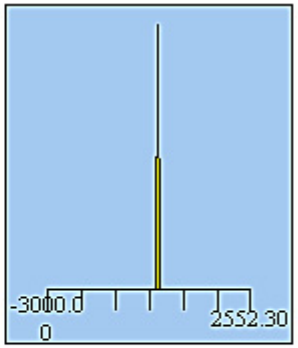


Processes: 15
1 Base Layer
2 Clip at 2.00 SD
3 De Stagger: Grids: All Mode: Both By: -2 intervals
4 De Stagger: Grids: b1.xgd b10.xgd b2.xgd b9.xgd b3.xgd b8.xgd b4.xgd b7.xgd b5.xgd b6.xgd Mode: Both By: 1 intervals
5 De Stagger: Grids: b11.xgd b22.xgd b12.xgd b21.xgd b13.xgd b20.xgd b14.xgd b19.xgd b15.xgd b18.xgd b16.xgd b17.xgd Mode: Both By: 1 intervals
6 De Stagger: Grids: b23.xgd Mode: Both By: 1 intervals
7 De Stagger: Grids: b23.xgd d8.xgd d1.xgd d7.xgd d2.xgd d6.xgd d3.xgd d5.xgd d4.xgd Mode: Both By: 1 intervals
8 De Stagger: Grids: d13.xgd d9.xgd d14.xgd d10.xgd d15.xgd d11.xgd d16.xgd d12.xgd Mode: Both By: 1 intervals
9 De Stagger: Grids: c7.xgd c8.xgd c9.xgd c10.xgd Mode: Both By: -1 intervals
10 De Stagger: Grids: c6.xgd c5.xgd c4.xgd c3.xgd c2.xgd Mode: Both By: -1 intervals
11 De Stagger: Grids: a18.xgd a19.xgd a20.xgd a21.xgd a22.xgd Mode: Both By: -1 intervals
12 De Stagger: Grids: a8.xgd a17.xgd a9.xgd c1.xgd a10.xgd a15.xgd a11.xgd a14.xgd a12.xgd a13.xgd Mode: Both By: -1 intervals
13 De Stagger: Grids: a7.xgd a1.xgd a6.xgd a2.xgd a5.xgd a3.xgd a4.xgd Mode: Both By: -1 intervals
14 DeStripe Median Traverse: Grids: All
15 Interpolate: Match X & Y Doubled.

Appendix 4 Unprocessed data plot







Instrument Type: Bartington Grad 610
Units: nT
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 0.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 720 x 450
Survey Size (meters): 180 m x 450 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 2552.30
Min: -3000.00
Std Dev: 9.48
Mean: 0.30
Median: 0.24

Processes: 1
1 Base Layer

Figure 5: shade plot of unprocessed data