Substrata
Archaeological Geophysical Surveyors

An archaeological gradiometer survey

Land at Tagon Harbour Farm Whimple, Devon

Centred on NGR (E/N): 306070,96140 (point)

Report: 1508TAG-R-1

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Project archive

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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:	10 September 2015
Area:	2 ha
Lead surveyor:	Mark Edwards BA
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 at Tagon Harbour Farm
Parish:	Whimple
District:	East Devon
County:	Devon
Nearest Postcode:	EX5 2QS
NGR:	SY 060 961
Ordnance Survey NGR (E/N):	306070,96140 (point)

1.4 Archive

OASIS number:	substrat1-223984
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 AC Archaeology Ltd on behalf of clients as information to be included in a forthcoming planning application at the above site. The survey location is shown in Figure 1.

1.6 Summary

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

Four magnetic anomaly groups were mapped as representing possible archaeological deposits or features. Of these, one curvilinear group approximately coincides with a circular enclosure recorded in the Devon County Council Historic Environment Record but it is unclear whether this group represents archaeological deposits or recent ground disturbance with the latter being more likely. The remaining anomaly groups are typical of those representing former field and other enclosure boundaries of unknown date and removed before the publication of the first Ordnance Survey map in 1889.

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 subsequent 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 Landscape and land use

The application area comprises a field sub-divided by a post-and-wire fence with wire fencing forming the southern field boundary and used to protect the hedge-and-tree field boundaries to the north, west and east. The land lies between 140m and 150m AOD on the western side of a north-south trending spur that rises to over 160m AOD to the southeast of the site as shown in Figure 1.

4.2 Geology

The site is located on rocks of the Triassic Aylesbeare Mudstone Group which is undivided and consists of reddish-brown silty mudstone and clayey siltstone. Clayey, fine-grained sandstone occurs locally as does, less commonly, clean, fine- to medium-grained sandstone. The superficial geology is not recorded in the source used (British Geological Survey, undated).

5 Archaeological background

5.1 Historic landscape characterisation

Post-medieval enclosures: Enclosures of post-medieval date. Fields laid out in the eighteenth and nineteenth centuries that commonly have surveyed, dead-straight field boundaries (Devon County Council, undated).

5.2 Historical and archaeological background

The following is a short summary of information obtained from the Devon Historic Environment Record (HER) within approximately 500m of the application area and relevant to the understanding of the geophysical survey. Except where specifically cited, this information was obtained using the Heritage Gateway (Historic England, undated 1).

5.2.1 Heritage assets within the application area

A circular cropmark, approximately 25 metres in diameter and of unknown date, is shown within the application area on an aerial photograph (HER number MDV74675).
No definite evidence of this feature was recorded in the survey dataset although one questionable curvilinear anomaly approximately coincides with the position of the cropmark (anomaly group 3 in Figure 2).

5.2.2 Heritage assets within 500m of the application area

The line of a Roman (between 43 AD and 409 AD) road between Exeter and Honiton runs to the north of the application area (MDV1875 and Figure 1). An 1983 aerial photograph recording this section of the Roman road also records a probable rectangular enclosure near to the northern boundary of the application area and which is cut by the road (MDV58508). The enclosure is undated but precedes the road.
No evidence of this feature was recorded in the survey dataset.

A marked boundary (MDV53328) that can be traced for approximately 6km in a north-south direction appears to extend beyond the A30 and to be truncated by the Roman road so thought to be Prehistoric (between 698000 BC and 42 AD). The NGR, SY 06 96, lies to the southwest of the application area but this refers to a 1000m square block from this point to the north and east and the feature actually lies approximately 700m to the east of the application area (Reed, 2013).

Excavations carried out in 1996-1997 prior to improvements to the A30 revealed a number of Prehistoric heritage assets. An excavation at Long Range to the southeast of the application area revealed Iron Age features including two complete penannular gullies with fragments of others, several post-built structures, a number of post-holes and several small pits of middle to late Iron Age date. The most northern of the two complete penannular gullies was earlier with a radiocarbon date of 400-100 cal. BC with the other giving a date of 350 cal. BC to cal. AD 10. It is assumed that the gullies surrounded buildings but few features were located within them and no traces of walls remained. Finds included flaked flint and chert, quern fragments and Iron Age pottery sherds (MDV62739, NGR SY 064 959). Samples of charred cereals and charcoal were also obtained. Eight sherds of uncertain later Prehistoric (before 43 AD) pot were recovered at NGR SY 063 959 (MDV60749). An isolated Neolithic (between 4000 BC to 2201 BC) pit was uncovered during the same excavation. It contained three sherds of Early Neolithic pottery, three pieces of flaked stone, a barley grain and a hazel nutshell fragment (MDV78016 and MDV62740, NGR SY 063 958).

Also to the southeast of the application area, at the point where the A30 cuts across the Ottery and Whimple parish boundary, the B3180 follows a north-south Saxon (Early Medieval, between 410 AD and 1066 AD) herepath or military road which ran from the coast towards the Blackdown Hills. The parish boundaries here reflect the boundary between the Saxon estates of Ottery and Strete (MDV53326 and MDV53327, NGR SY 063 958).

Three Modern (from 1751 AD) heritage assets relate to land usage that may be reflected in the survey dataset; a marl pit to the north of the application area (MDV36883, NGR SY 059 964), a gravel pit to the east (MDVMDV36885, NGR SY 062 961) and a gravel pit to the southeast (MDV36886, SY 063 959).

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.

The terms '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

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 which is provided in the attribute tables of the GIS project in the project archive.

Figure 2 and Table 1 comprise the analysis of the survey data. Plots of the processed data are provided in Figures 3 and 4.

6.2 Discussion

6.2.1 General points

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.

Anomalies thought to relate to natural features were not mapped.

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.

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.

Data collection along the survey area edges was restricted as shown in Figures 3 and 4 due to 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.

6.2.2 Data relating to historical maps and other records

None of the recorded anomalies related directly to features recorded on historic maps or other records. Whilst the curvilinear magnetic anomaly group **3** does approximately coincide with a circular cropmark of unknown date shown on an aerial photograph (MDV74675, Section 5 above), it is far from clear whether the anomaly group relates to archaeological deposits or recent soil disturbance with the latter being more likely.

6.2.3 Data with no previous archaeological provenance

Magnetic anomaly groups **1**, **2** and **4** are linear anomalies that are typical of those representing possible archaeological deposits that have been subject to disruption in the past by ploughing and other human activities. Such anomaly groups are usually associated with former field and other enclosure boundaries of unknown date and preceding the earliest Ordnance Survey map of 1889.

6.3 Conclusions

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

Four magnetic anomaly groups were mapped as representing possible archaeological deposits or features. Of these, one curvilinear group approximately coincides with a circular enclosure recorded in the Devon County Council Historic Environment Record but it is unclear whether this group represents archaeological deposits or recent ground disturbance with the latter being more likely. The remaining anomaly groups are typical of those representing former field and other enclosure boundaries of unknown date and removed before the publication of the first Ordnance Survey map in 1889.

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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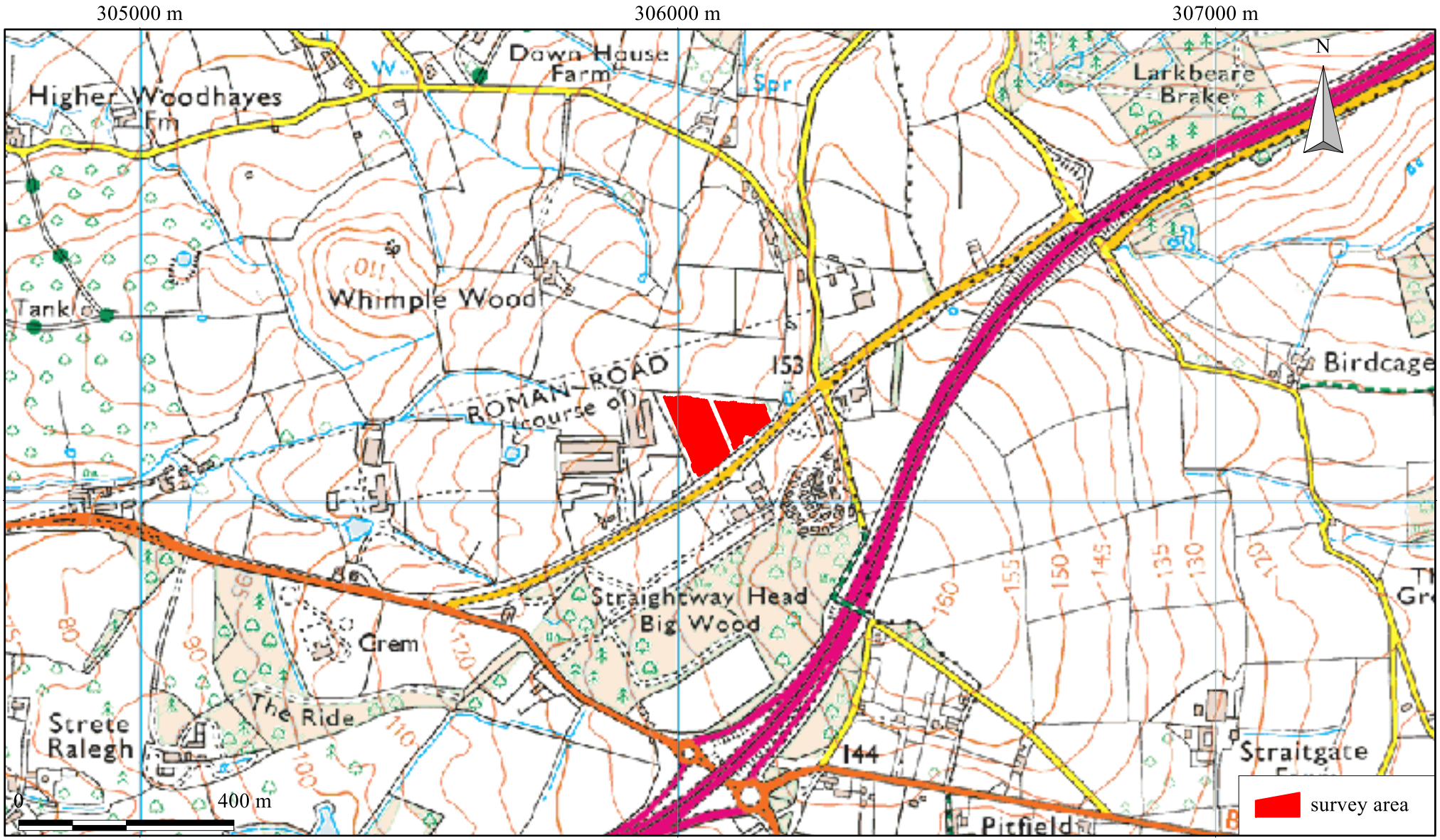
Appendix 1 Analysis table and supporting plots

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.



British Grid
centre X: 306078.46 m, centre Y: 96126.28 m

Scale: 1:10000 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 1: location map

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British Grid
centre X: 306071.28 m, centre Y: 96120.95 m

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. 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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anomaly group	associated anomalies	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
1		possible, positive	disrupted linear			
2		possible, positive	disrupted linear			
3		possible, positive	curvilinear	archaeological deposit or recent soil disturbance	anomaly group approximately coincides with a circular cropmark, about 25m in diameter, recorded in this field but the group is tenuous and may reflect recent soil disturbance rather than archaeology	DCC HER MDV74675
4		possible, positive	disrupted curvilinear			
101		possible, medium contrast linear		service trench		
102		possible, mixed spread	irregular	rubble or near-surface bedrock		
103		possible, mixed spread	irregular	rubble or near-surface bedrock		
104		possible, mixed spread	irregular	rubble or near-surface bedrock		

Table 1: data analysis

British Grid
centre X: 306071.28 m, centre Y: 96120.95 m

Scale: 1:1000 @ 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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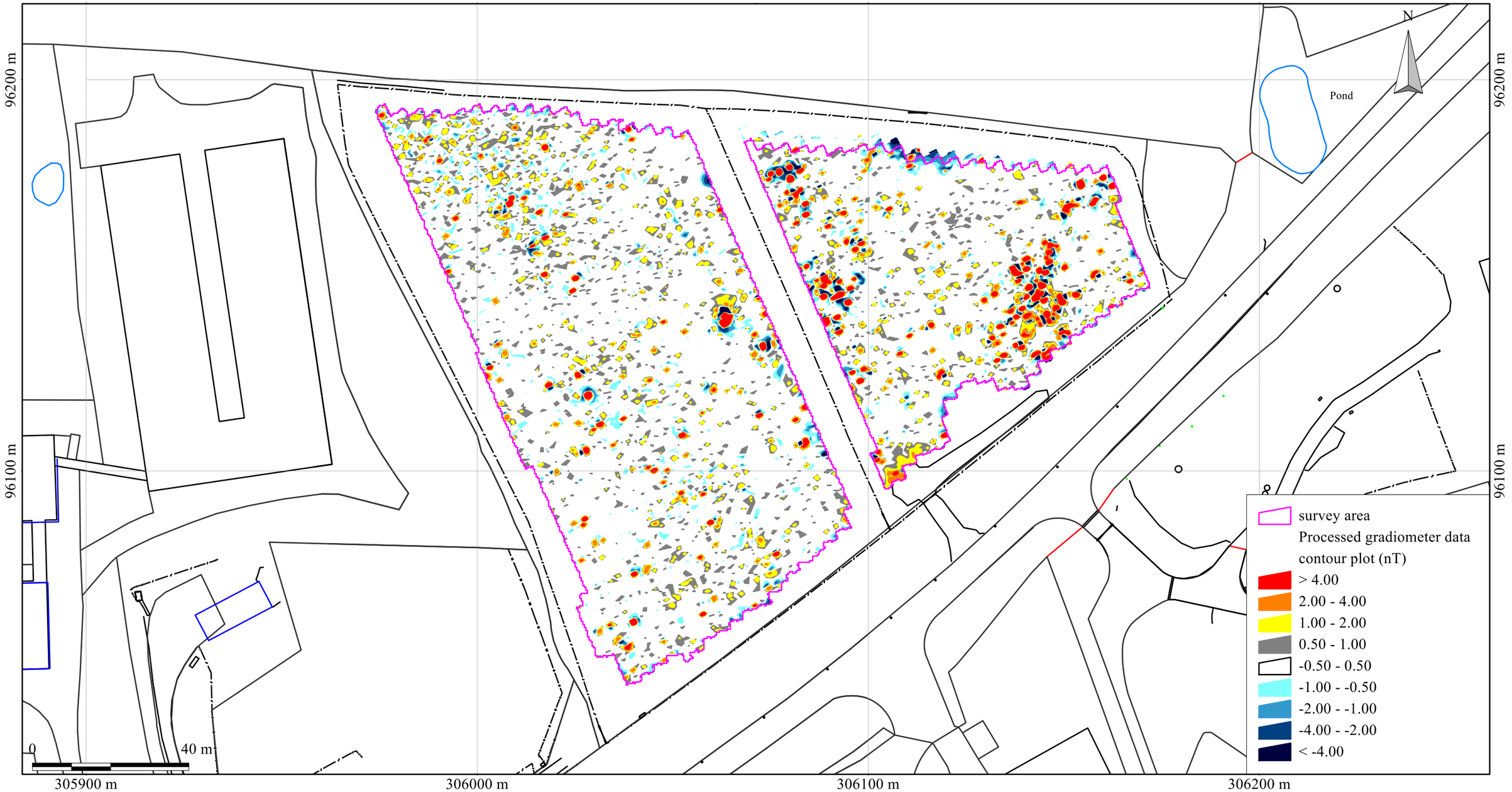

British Grid
centre X: 306071.28 m, centre Y: 96120.95 m

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

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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 (2015)	
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:* 0.25-metres *Traverse Interval:* 1 metre *Traverse Method:* zigzag *Traverse Orientation: GN336*
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 Collection Method: ZigZag Sensors: 2 @ 1.00 m spacing. Dummy Value: 32702 PROGRAM Name: TerraSurveyor Version: 3.0.25.0
Stats Max: 37.82 Min: -30.93 Std Dev: 1.62 Mean: 0.01 Median: -0.01 Processes: 10 1 Base Layer 2 Search & Replace From: -3000 To: 3000 With: Dummy (Area: Top 10, Left 444, Bottom 12, Right 716) 3 Clip at 1.00 SD 4 De Stagger: Grids: All Mode: Both By: -2 intervals 5 DeStripe Median Traverse: Grids: All 6 Add/Subtract -0.5 (Area: Top 12, Left 360, Bottom 30, Right 373) 7 Add/Subtract -0.5 (Area: Top 9, Left 480, Bottom 23, Right 489) 8 High pass Uniform (mean) filter: Window: 21 x 21 (Area: Top 0, Left 0, Bottom 29, Right 719) 9 High pass Uniform (mean) filter: Window: 21 x 21 (Area: Top 30, Left 240, Bottom 59, Right 359) 10 Interpolate: Match X & Y Doubled.