



An archaeological gradiometer survey

Land off Stretton Lane  
Houghton-on-the-Hill  
Harborough, Leicestershire

Centred on NGR (E/N): 467400,303330 (point)

Report: 1509HOU-R-1

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28 September 2015

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## Accompanying CD-ROM

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](http://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: 17 September 2015  
Area: 1.5 ha  
Lead surveyor: Adam Dean  
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 off Stretton Lane  
Parish: Houghton-on-the-Hill  
District: Harborough  
County: Leicestershire  
Nearest Postcode: LE7 9HU  
NGR: SK 673 033  
Ordnance Survey NGR (E/N): 467360,303376 (point)

### 1.4 Archive

OASIS number: substrat1-224812  
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 and is part of a programme of archaeological works undertaken in preparation for a forthcoming planning application. The proposed development site is shown in Figure 1.

### 1.6 Summary

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

*Eleven magnetic anomaly groups were identified as possibly representing archaeological deposits or features. The majority of these are linear and disrupted linear groups that, along with one disrupted curvilinear group and one right-angled return, are most likely to relate to past field boundaries or other enclosures of unknown date but removed before the publication of the first Ordnance Survey map in 1886. There are three clusters of anomaly groups that may represent pits or similar archaeological deposits although natural origins cannot be ruled out. One group, spread across the site, is likely to represent former ridge-and-furrow ploughing.*

## 2 Survey aims and objectives

### 2.1 Aims

The aim of the geophysical survey was 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 proposed development 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 proposed development site occupies one part of a field of agricultural land to the west of Houghton-on-the-Hill. The survey area lies at 150m AOD on the north-eastern side of a west-north-west to east-south-east trending spur on which the village of Houghton is sited as shown in Figure 1.

#### 4.2 Geology

The proposed development site overlies a solid geology of dark grey laminated shales and dark, pale and bluish grey mudstones of the Jurassic Charmouth Mudstone Formation. Concretionary and tabular limestone beds are found within the formation along with localised abundant argillaceous limestone, phosphatic or ironstone (sideritic mudstone) nodules. The superficial geology comprises sand and gravel from Mid Pleistocene glaciofluvial deposits (British Geological Survey, undated).

### 5 Archaeological background

#### 5.1 Historic landscape characterisation

Fields and Enclosed Land; reorganised piecemeal enclosure (Leicestershire County Council, undated).

#### 5.2 Recorded heritage assets

The following is a short summary of information obtained from the Leicestershire and Rutland Historic Environment Record (HER) 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 proposed development site

An Early Roman (138 AD to 161 AD) coin, a sestertius of Antoninus Pius, was found via metal detecting in 1987 close to the south-western corner of the proposed development site (Historic Environment Record (HER) Reference MLE7845, National Grid Reference (NGR) SK 673 032).

##### 5.2.2 Heritage Assets within 500m of the proposed development site

Early Neolithic to Early Bronze Age (4000 BC to 1501 BC) worked flint area was recovered during fieldwalking in 1993/4 in the same field as the proposed development site. The recovered flint was collected all over the field but a concentration of flakes, cores and two scrapers may represent an occupation site to the west of the proposed development site (MLE16941, SK 671 033).

Fieldwalking undertaken in 1979 in the same field recovered 134 sherds of Roman (43 AD to



409 AD) pottery and three fragments of tile; further fieldwalking in the 1990s recovered 20 more sherds. The finds were interpreted as representing a low status farmstead lying to the west of the proposed development site. A lead weight, spindle whorl and four more sherds were found in 2000 (MLE1660, NGR SK 670 033).

The Late Anglo Saxon to Late Post-medieval (850 AD to 1899 AD) historic settlement core lies to the east of the proposed development site. The village was known as Hohtone in 1086 (Domesday Book) which derives from Old English placename elements and can be translated as 'The settlement on the spur of the hill' (MLE16325, SK 678 034).

There are earthworks of banks and ditches in a field to the southeast of the proposed development site, clearly visible on 1988 oblique photos. They appear to be a Late Medieval to Early Post-medieval (1350 AD to 1699 AD) dam and other earthworks relating to water management. At some date a substantial earth dam, up to 2m in height, was constructed across the stream to form a pond. A by-pass channel allowed for the pond to be drained periodically (MLE21529, SK 6764 0312). Below the dam earthwork is a small area enclosed by a ditch and containing slight ridges. This may have been an osier bed (MLE21551, SK 6764 0310).

## 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 on the accompanying CD-ROM and 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 on the accompanying CD-ROM.

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. Three such clusters are discussed below.

There are two clear linear trends in the data set. One, relating to possible historic ploughing running northwest to southeast, is discussed below. The second trend runs approximately northeast to southwest and is likely to reflect soil disturbance from relatively recent ploughing.

Data collection along the survey area edges was restricted as shown in Figures 3 and 4 due to the presence of magnetic materials in and adjacent to field and roadside boundaries. Strong magnetic responses mapped close to the field and roadside 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

No magnetic anomalies related to features recorded on historic maps or other records.

#### 6.2.3 Data with no previous archaeological provenance

The elements of magnetic anomaly group 1 display characteristics typical of anomalies representing former ridge-and-furrow ploughing.

Groups **2, 3, 4, 5, 6** and **10** are linear, disrupted linear and disrupted curvilinear anomalies that are most likely to represent past field boundaries or other enclosures of unknown date and pre-dating the 1:2,500 Ordnance Survey map of 1886.

Group **7** appears to reflect an archaeological deposit with a return and so possibly represents a corner of a former enclosure or field boundary pre-dating the 1:2,500 Ordnance Survey map of 1886.

Groups **8, 9** and **11** are three clusters of well defined, approximately circular and oval anomalies. Such anomalies can represent either natural deposits such as filled tree boles or filled natural depressions but can also represent archaeological deposits such as filled pits. In this case, given the clear definition and clustering of the anomalies, an archaeological origin cannot be ruled out.

### 6.3 Conclusions

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

Eleven magnetic anomaly groups were identified as possibly representing archaeological deposits or features. The majority of these are linear and disrupted linear groups that, along with one disrupted curvilinear group and one right-angled return, are most likely to relate to past field boundaries or other enclosures of unknown date but removed before the publication of the first Ordnance Survey map in 1886. There are three clusters of anomaly groups that may represent pits or similar archaeological deposits although natural origins cannot be ruled out. One group, spread across the site, is likely to represent former ridge-and-furrow ploughing.

## 7 Disclaimer and copyright

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

Ross Dean, trading as Substrata, will assign copyright to the client upon written request but retains the right to be identified as the author of all project documentation and reports as defined in the Copyright, Designs and Patents Act 1988 (Chapter IV, s.79).

## 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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Dean, R. (2015) *A gradiometer survey method statement, Land off Stretton Lane, Houghton-on-the-Hill, Leicestershire*, Substrata unpublished document

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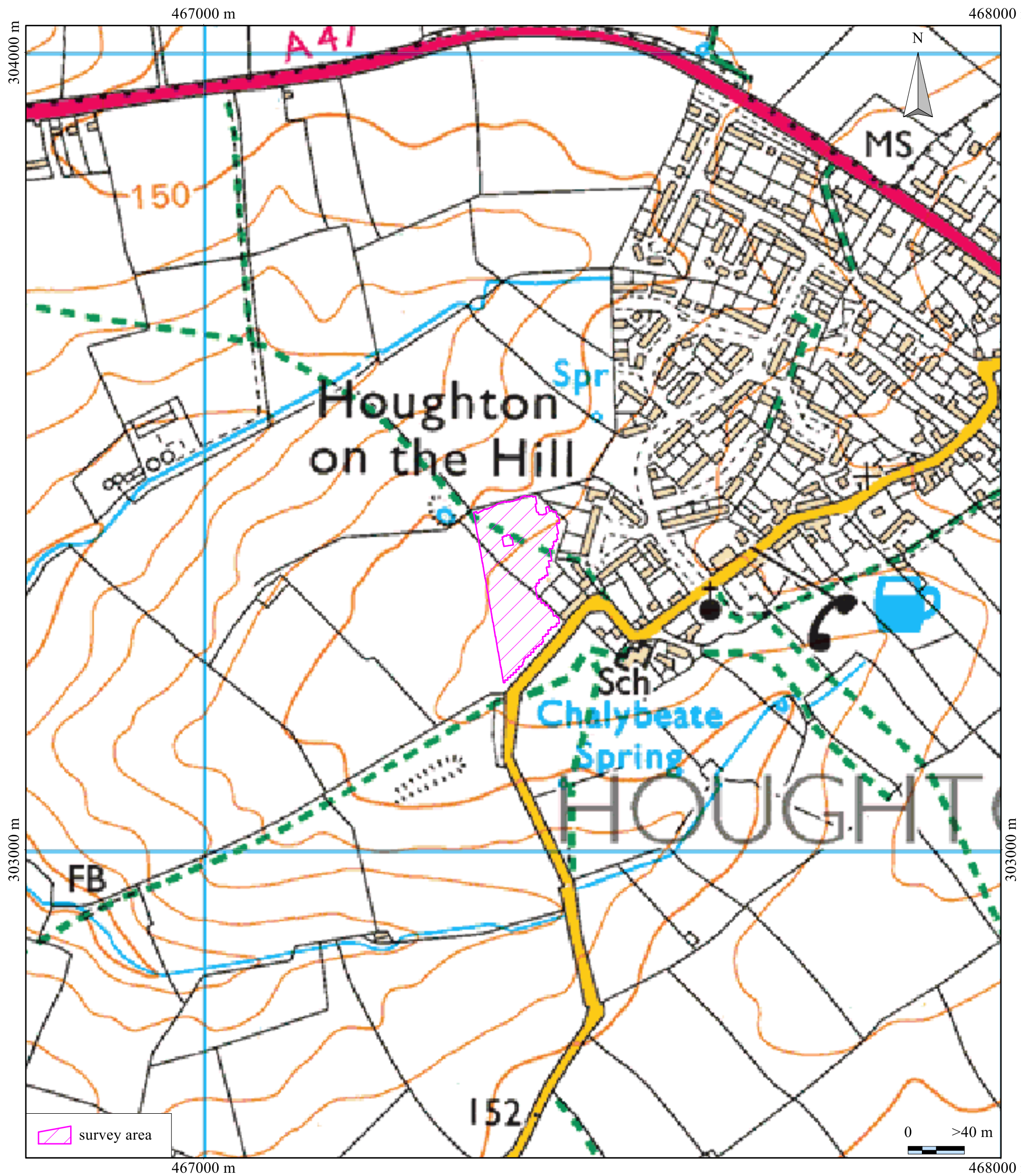
Leicestershire County Council (undated) *The Leicestershire, Leicester and Rutland Historic Landscape Characterisation Project*, [Online], Available: [http://www.leics.gov.uk/index/leisure\\_tourism/local\\_history/archaeology/historic\\_landscape\\_characterisation.htm](http://www.leics.gov.uk/index/leisure_tourism/local_history/archaeology/historic_landscape_characterisation.htm) [September 2015]

## 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: 467388.44 m, centre Y: 303323.59 m

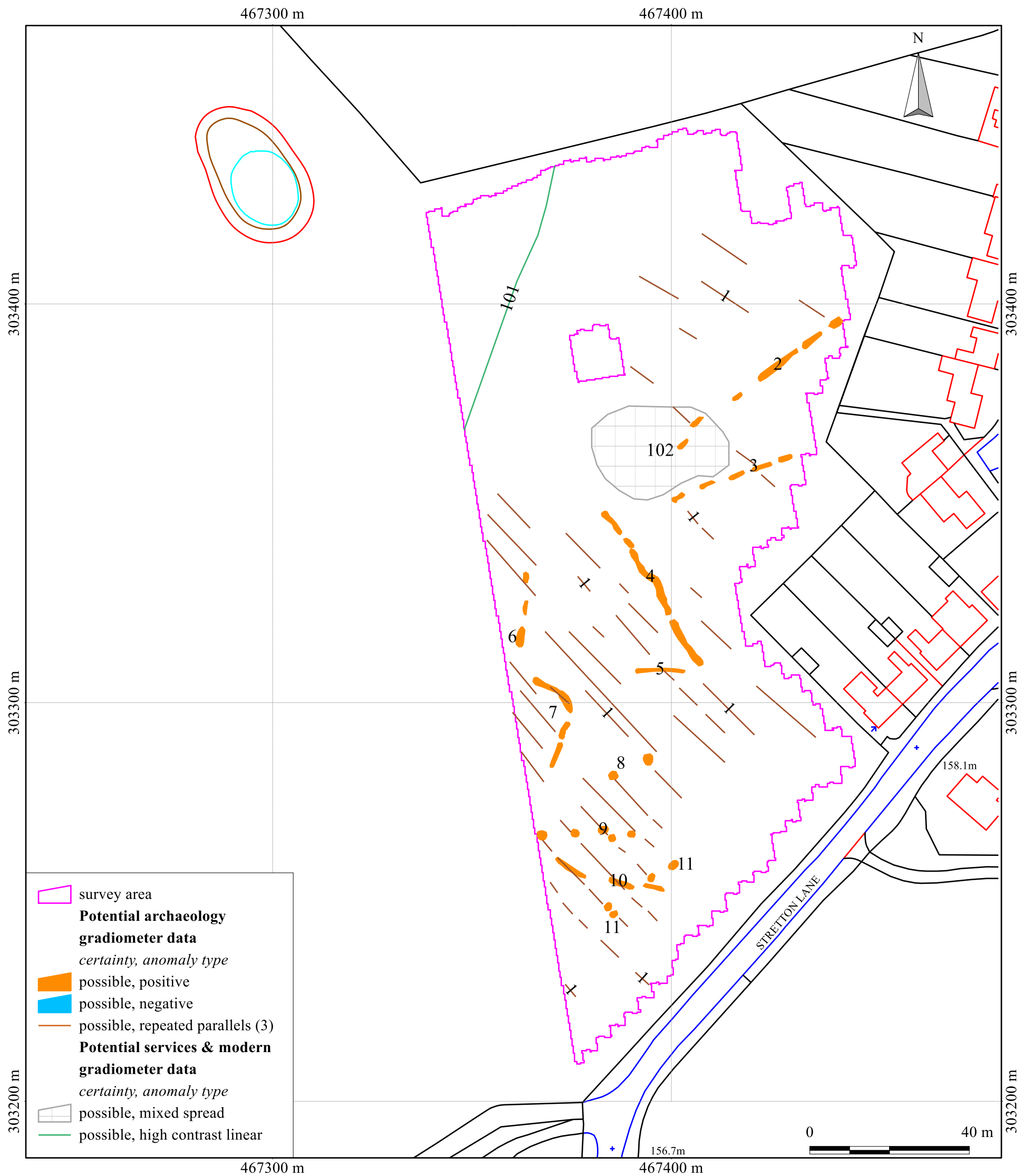
Geophysical survey: Copyright Substrata 2015.  
 Base map: Ordnance Survey (c) Crown Copyright 2015,  
 via Promap, Licence number 72561336\_1\_1  
 All rights reserved.

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

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Figure 1: location map



British Grid  
 centre X: 467360.44 m, centre Y: 303327.82 m

Geophysical survey: Copyright Substrata 2015.  
 Base map: Ordnance Survey (c) Crown Copyright 2015,  
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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. Representative; not all instances are mapped.
4. Anomalies likely to represent geological or other natural deposits are not mapped unless relevant to potential archaeological events or deposit

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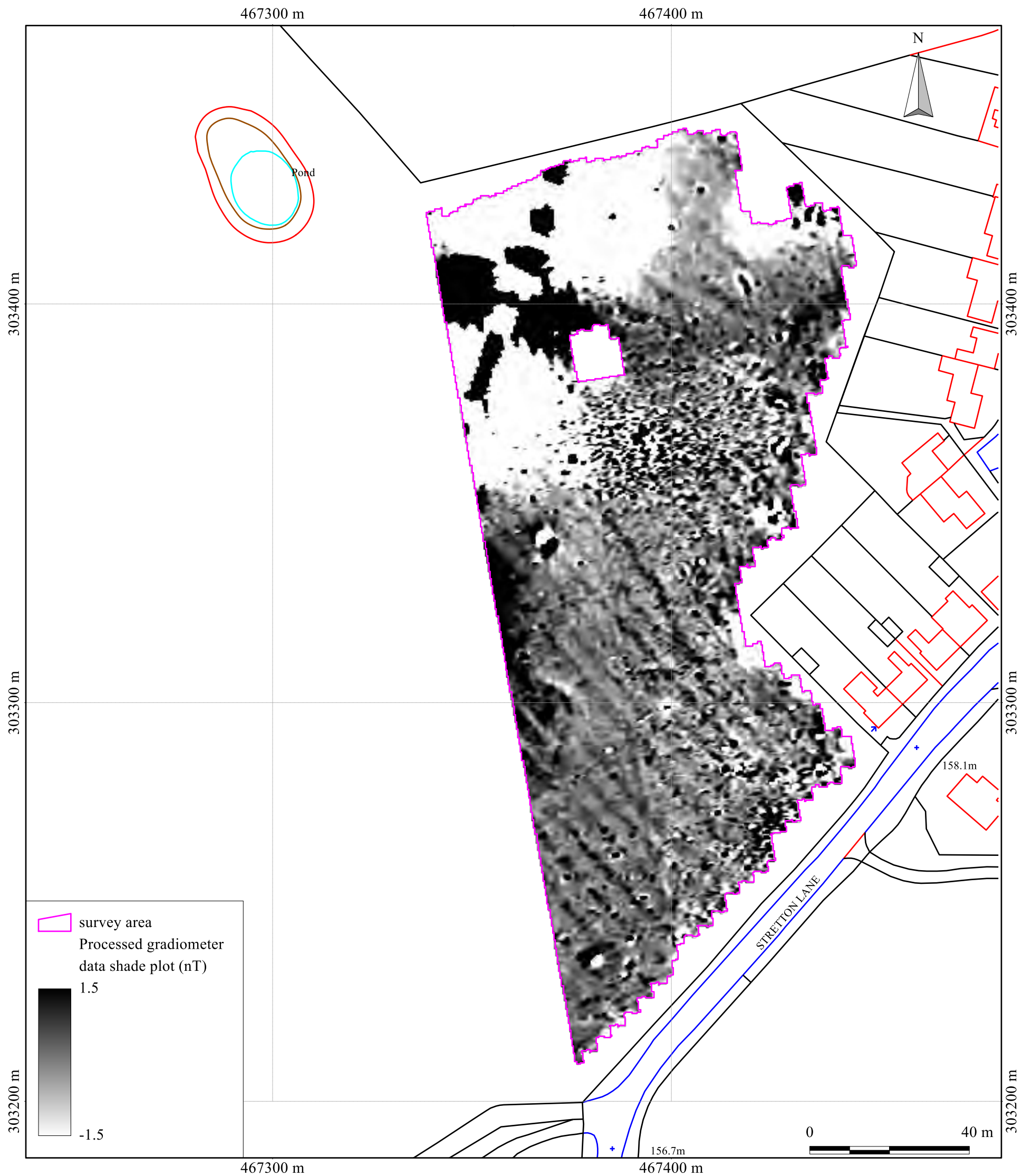
Figure 2: survey interpretation

Site: An archaeological gradiometer survey  
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Centred on NGR (E/N): 467400,303330 (point)  
Report: 1509HOU-R-1

anomaly group	associated anomalies	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments
1		possible, repeated parallels		former ridge-and-furrow ploughing	
2		possible, positive	disrupted linear		
3		possible, positive	disrupted linear		
4		possible, positive	disrupted linear		
5		possible, positive	linear		
6		possible, positive	disrupted linear		
7		possible, positive	disrupted return		
8		possible, positive	oval	pits	anomaly groups are distinct in the data set and may represent archaeological pits although natural origins cannot be ruled out
9		possible, positive	oval	pits	anomaly groups are distinct in the data set and may represent archaeological pits although natural origins cannot be ruled out
10		possible, positive	disrupted curvilinear		
11		possible, positive	oval	pits	anomaly groups are distinct in the data set and may represent archaeological pits although natural origins cannot be ruled out
101		possible, high contrast linear		modern service	
102		possible, mixed spread	irregular	rubble, landfill or near-surface bedrock	

Table 1: data analysis





British Grid  
 centre X: 467360.44 m, centre Y: 303327.82 m

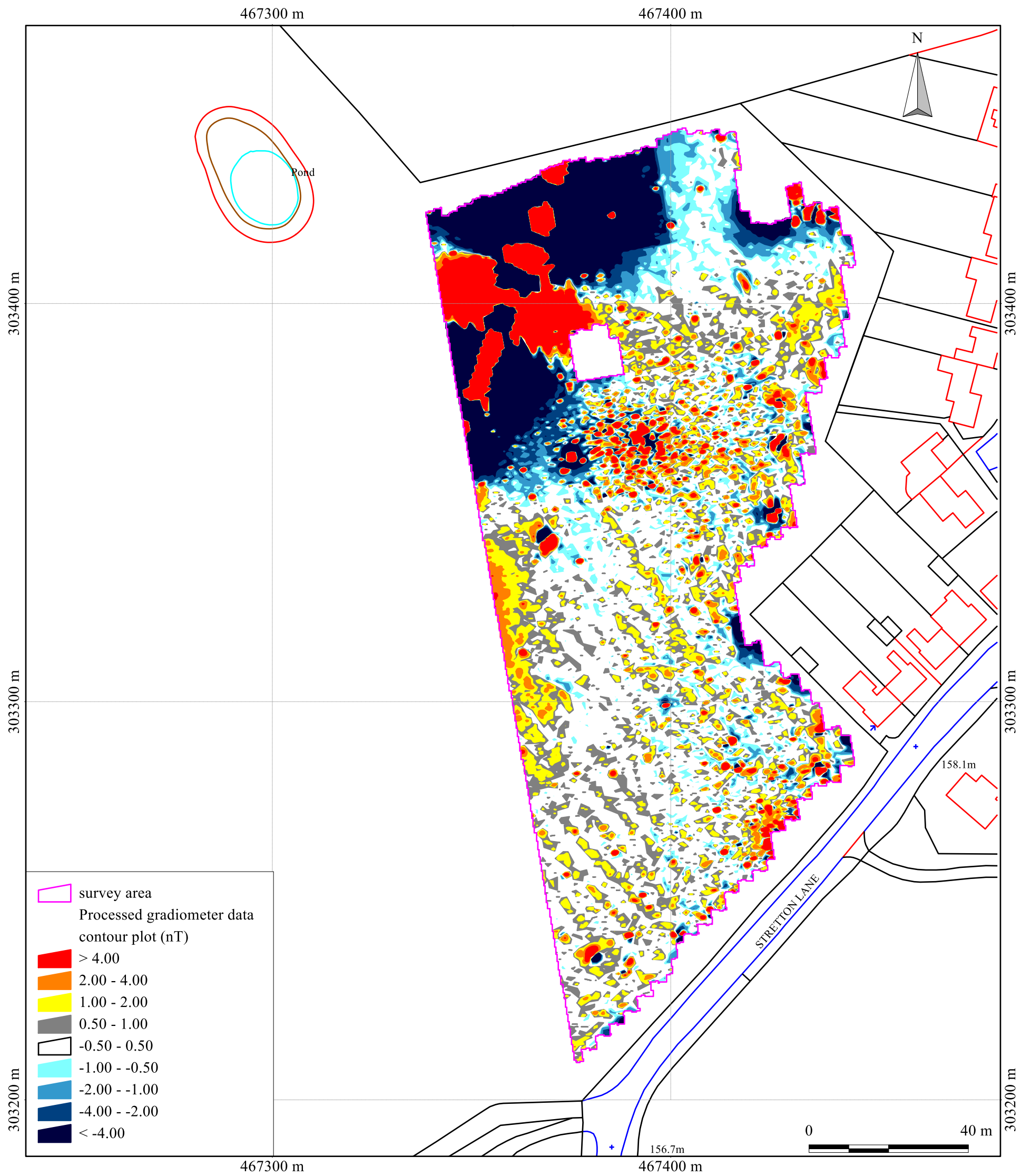
Geophysical survey: Copyright Substrata 2015.  
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Scale: 1:1000 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 3: shade plot of processed data



British Grid  
 centre X: 467360.44 m, centre Y: 303327.82 m

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

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Figure 4: contour plot of processed data

## Appendix 2 Methodology Summary

Table 2: methodology summary	
<p><b>Documents</b> Survey methodology statement: Dean (2015)</p>	
<p><b>Methodology</b></p> <ol style="list-style-type: none"> <li>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).</li> <li>2. The survey grid location information and grid plan was recorded as part of the project in a suitable GIS system.</li> <li>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.</li> </ol>	
<p><b>Grid</b>  <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><b>Equipment</b>  <i>Instrument:</i> Bartington Instruments grad601-2  <i>Firmware:</i> version 6.1</p>	<p><b>Data Capture</b>  <i>Sample Interval:</i> 0.25-metres  <i>Traverse Interval:</i> 1 metre  <i>Traverse Method:</i> zigzag  <i>Traverse Orientation:</i> GN355</p>
<p><b>Data Processing, Analysis and Presentation Software</b>            IntelliCAD Technology Consortium IntelliCAD 8.0            DW Consulting TerraSurveyor3            Manifold System 8 GIS            Microsoft Corp. Office Excel 2013            Microsoft Corp. Office Publisher 2013            Adobe Systems Inc Adobe Acrobat 9 Pro Extended</p>	

Appendix 3 Data processing

Table 3: gradiometer survey - processed data metadata	
<b>SITE</b>	
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
<b>PROGRAM</b>	
Name:	TerraSurveyor
Version:	3.0.25.0
<b>Stats</b>	
Max:	68.31
Min:	-72.36
Std Dev:	10.79
Mean:	-1.83
Median:	-0.05
<b>Processes: 12</b>	
1	Base Layer
2	Clip at 1.00 SD
3	Clip at 1.00 SD
4	Clip at 1.00 SD
5	De Stagger: Grids: All Mode: Both By: -2 intervals
6	DeStripe Median Sensors: les1.xgd les2.xgd les15.xgd les3.xgd les14.xgd les16.xgd les4.xgd les13.xgd les17.xgd les5.xgd les12.xgd les18.xgd les6.xgd les11.xgd les19.xgd les24.xgd
7	DeStripe Median Sensors: les20.xgd les23.xgd les21.xgd les22.xgd
8	DeStripe Median Sensors: les10.xgd
9	Range Match (Area: Top 0, Left 0, Bottom 29, Right 719) to Bottom edge
10	Range Match (Area: Top 60, Left 840, Bottom 89, Right 959) to Left edge
11	Edge Match (Area: Top 0, Left 600, Bottom 29, Right 719) to Left edge
12	Interpolate: Match X & Y Doubled.