

Substrata

Archaeological Geophysical Surveyors

An archaeological magnetometer survey

Land at Ashlawn Farm, Rooks Bridge East Brent, Sedgemoor, Somerset

Ordnance Survey E/N: 337000, 151100 (point)

Report: 130719
Ross Dean BSc MSc MA MifA
19 July 2013

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Report.....	Adobe PDF format
Copies of report figures.....	Adobe PDF format

Accompanying CD-ROM

Data files	grid files generated using DW Consulting TerraSurveyor3
Minimal processing data plots and metadata.....	Adobe PDF format
GIS project, shape files and classification schema	
GIS project and shape files.....	ESRI standard
GIS classification schema.....	Adobe PDF format

1 Survey description and summary

Type of survey: caesium magnetometer

Date of survey: 1 July 2013

Area surveyed: 9ha.

Lead surveyor: Ross Dean BSc MSc MA MifA

Client

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

Location

Site:	Land at Ashlawn Farm, Rooks Bridge
Civil Parish:	East Brent
District:	Sedgemoor
County:	Somerset
NGR:	ST 370 511 (point)
OS E/N:	337000, 151100 (point)
OASIS number:	substrat1-155331
Archive:	The archive of this survey will be held by Substrata.

Summary

This report was commissioned by AC Archaeology Ltd on behalf of clients and was designed to contribute to a report produced by AC Archaeology (Passmore, 2013).

The magnetic contrast across the survey areas was sufficient to be able to differentiate between anomalies representing possible archaeological features and background magnetic responses. A total of 18 magnetic anomaly groups were identified as pertaining to potential archaeology.

Four of the groups are spatially associated with recorded potential settlement sites. Three of these represent probable enclosure boundaries and one an area of enclosures and platforms. A long linear anomaly group may represent a ditched track or road running almost north-south across the main field in the survey area. This feature either respects or is cut by a palaeo-channel of the Medieval and earlier river Siger. Two anomalies may represent large pits at the northern junction of the palaeo-channel and the possible ditched track or road. One set of five linear anomalies run along the northern edge of the palaeo-channel. The remaining anomaly groups are linear patterns of anomalies that typically relate to archaeological features such as field boundaries and other enclosures.

Survey aims

1. Define and characterise and detectable archaeological remains on the site.
2. Inform any future archaeological investigation of the area.

Survey Objectives

1. Complete a gradiometer 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 site about the location and possible archaeological character of the recorded anomalies.

Standards

The standards used to complete this survey are defined by the Institute for Archaeologists (2011). The codes of approved practice that were followed are those of the Institute for Archaeologists (2008 and 2009) and Archaeology Data Service/Digital Antiquity Guides (undated). The document text was written using the house style of the Institute for Archaeologists (Institute for Archaeologists, undated).

2 Site description

Site location and description

The site is located within flat farmland at approximately 6m O.D., 1km to the south of the hamlet of Rooks Bridge (figure 7).

Geology and soils

The site is located on a solid geology of Lower Jurassic (Sinemurian to Pliensbachian Charmouth Mudstone Formation comprising dark grey laminated shales, pale and bluish grey mudstones, locally concretionary and tabular limestone beds and abundant argillaceous limestone, phosphatic or ironstone (sideritic mudstone) nodules in some areas. (British Geological Survey, undated 1, undated 2).

The superficial deposits across the area are Holocene Tidal Flat deposits which are normally a consolidated soft silty clay, with layers of sand, gravel and peat (ibid).

The soils comprise silty clay soils of the Newchurch 2 Association; a pelo-calcareous alluvial gley soil to depths at least 1m (Soil Survey of England and Wales, 1983; Findlay et al, 1984: 247-8).

Known archaeological sites near the survey area

The following Historical Environment Record (HER) entries lie within the survey area (Somerset County Council Historic Environment Service, undated):

PRN18228 Possible settlement site, Pill Road, East Brent. An A triangular enclosure and earthworks are visible on the RAF aerial photographs of c1947 and may represent a deserted occupation site. ST 3671 5166
Northern end of survey area 1.
Linear anomalies recorded (anomaly group 1, figure 1)

PRN18229 Possible settlement site, Pill Road, East Brent. An enclosure and earthworks are visible on the RAF aerial photographs of c1947 and may represent a deserted occupation site. Possibly the site from which the metal detecting finds (PRN 12824 below) came from. ST 3683 5151
Survey area 1.
Linear anomalies recorded (anomaly group 2, figure 1)

PRN18230 Possible settlement site, Pill Road, East Brent. An enclosure and earthworks are visible on the RAF aerial photographs of c1947 and may represent a deserted occupation site. ST 3696 5130
Southern end of survey area 2 (figure 1).
Linear anomalies recorded (anomaly group 3, figure 1)

(continued)

PRN18232 Deserted settlement, East Brent. There are substantial ditched enclosures, earthworks and ruined buildings, possibly representing several deserted occupation sites, visible on the RAF aerial photographs of c1947. ST 3725 5103 South-eastern corner of survey area 3 (figure 1).
Numerous anomalies recorded (anomaly group 18, figure 1).

PRN29606 Medieval and earlier River Siger, Burnham and East Huntspill.
Runs east-west across survey area 3.
Recorded as a palaeo-channel (figure 1).

The following HER entries are located adjacent to the survey area (Somerset County Council Historic Environment Service, undated):

PRN11118 Roman buildings, Blind Pill Rhyne, Rook's Bridge. Well-constructed lengths of lias RB walling found during drainage operations in 1984 and recorded by Axbridge Archaeological and Natural History Society Three main features: ST36725130 - wall, associated floor level and earlier features visible in side of rhyne ST36735129 - probable road metalling visible in side of rhyne ST36555118 - massive wall surviving over 1m high with floor level detected by probing below water table in September 1984 Pennant and lias roof tiles. Small number of finds indicates a late Roman date. Features survive at depth of about 40cm. ST 366 512 Field to the west of that of survey area 3 (figure 1).

PRN12824 Medieval finds, S of Rooks Bridge. Medieval material including C12 metalwork and C14 coins has been found at this location by a metal detectorist. ST 369 515 Eastern boundary of survey area 1.

PRN28600 Pilrow Cut. Date of the construction of this canal is uncertain, but it was in existence by 1235. It ran through Mark where it joined with the River Axe at Rooksbridge. On modern OS maps it appears to be called the Old Yeo and Mark Yeo. Must have been completed by 1316 as at this time written sources mention that it reached the sea. The cut was probably used as a connection between the four main coastal manors at the time with the Abbey of Glastonbury.
ST 3675 5358, ST 3736 5082, ST 3793 4723, ST 3999 4499
Borders eastern edge of all survey areas. (figure 1).

Previous fieldwork within the survey area

The following HER event entry is located within the survey area (Somerset County Council Historic Environment Service, undated):

PRN32221 Earthwork survey (2013), Bridgwater to Compton Bishop. ST 385 566, ST 320 396. South-eastern corner of survey area 3.

The following HER event entries are located adjacent to the survey area:

PRN 31852 Geophysical survey in 2012. Associated records PRN29686 (above).
ST 362 520, ST 359 503. To the west of survey area .

PRN31602 Evaluation (2012), N of Vole, East Brent. Associated records PRN 11118 (above).
ST 359 504, ST 362 507, ST 364 512. To the west of survey area 3.

3. 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 attempts to identify and characterise anomalies and anomaly groups that may pertain to archaeological deposits and structures.

The reader is referred to section 4.

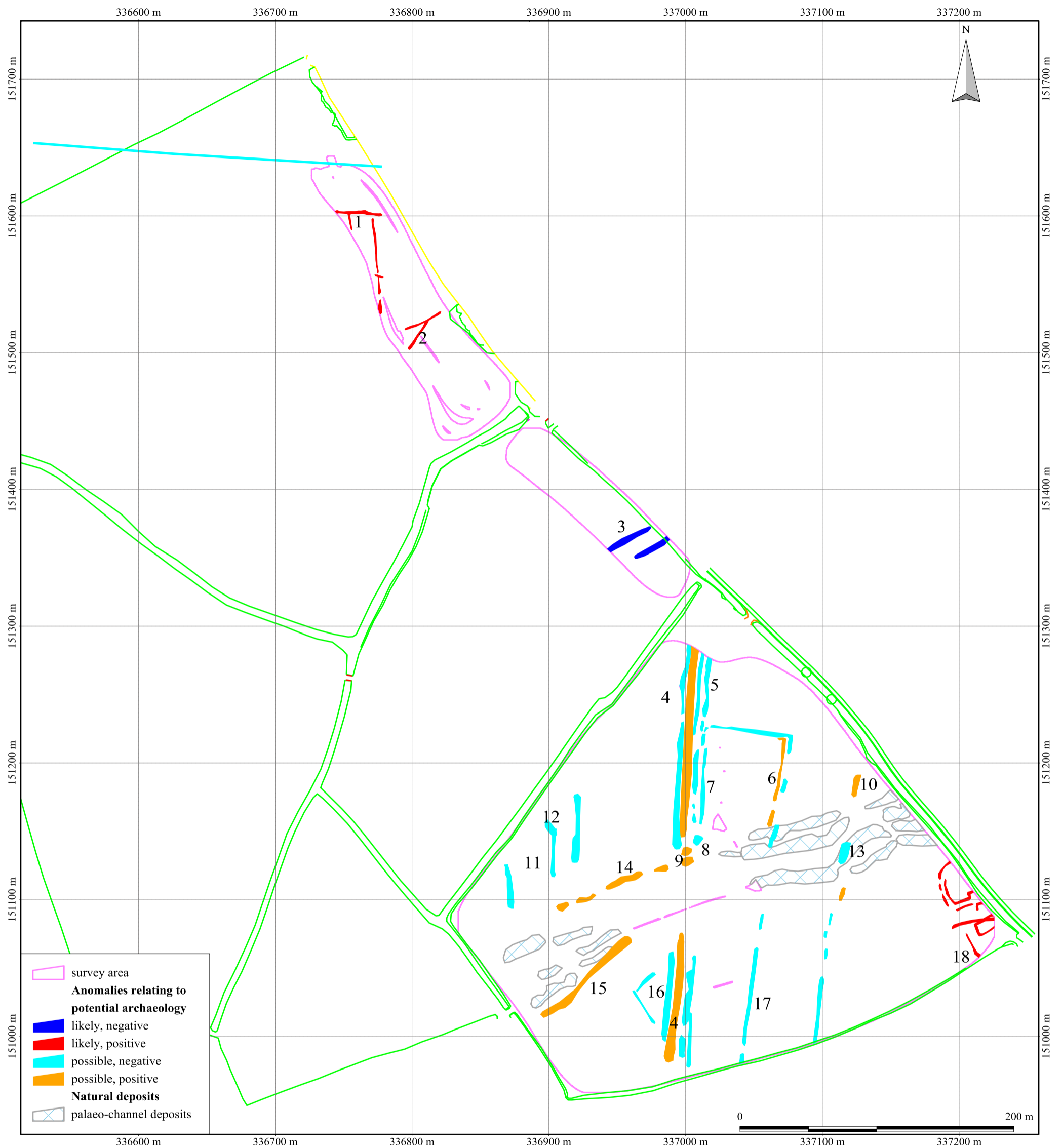
3.1 Results

For ease of discussion, the survey area was divided into three areas as shown in figure 1 (this section) which also shows a summary of the survey interpretation across the entire survey area.

Figures 2 and 3 (this section) show the interpretation of the survey across areas 1 and 2, and area 3 respectively. The accompanying table 1 is an extract from a detailed analysis of the survey data provided in the attribute tables of the GIS project on the accompanying CD-ROM.

Figures 2 and 3 along with table 1 comprise the analysis and interpretation of the survey data.

The processed gradiometer data is presented in figures 4 to 6, appendix 1.



British Grid
centre X: 336886.05 m, centre Y: 151335.48 m

Scale: 1:2800 @ A3. Spatial Units: Meter. Do not scale off this drawing

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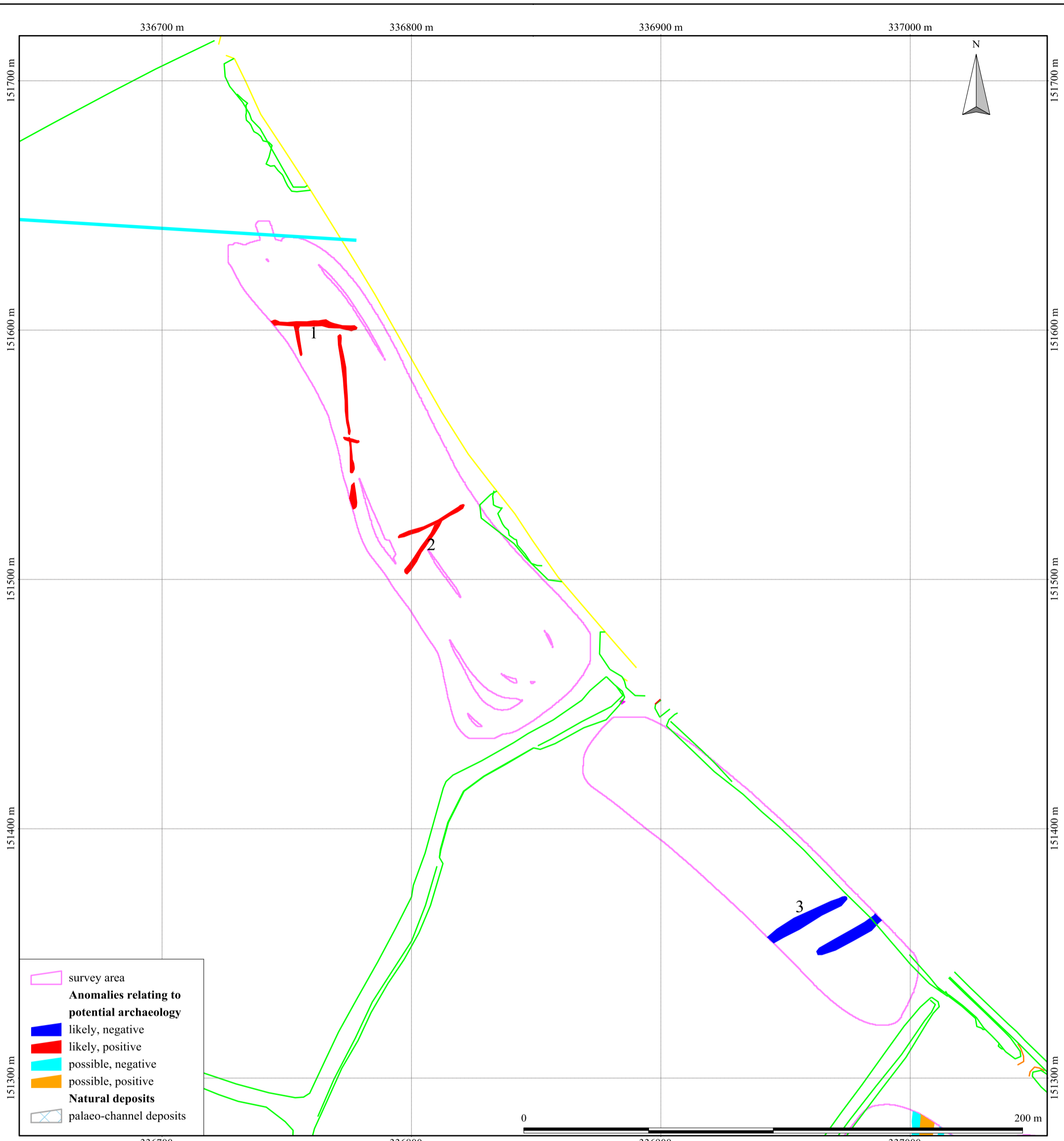
- Notes:
1. All interpretations are provisional and represent potential archaeological deposits.
 2. Anomalies designated "likely archaeology" have supporting evidence e.g. historical maps and or visible earthworks.
 3. Representative; not all instances are mapped.
 4. Anomalies likely to represent geological or other natural deposits are not mapped except where they are significant to the interpretation.

Figure 1: survey interpretation, all areas

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field number	anomaly group	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
1	1	likely, positive	linear		anomaly group lie within the area of PRN18228, a possible settlement site	HER entry PRN18228
	2	likely, positive	linear		anomaly group lie within the area of PRN18229 - possible settlement site	HER entry PRN18229
2	3	likely, negative	linear		anomaly group lie within the area of PRN18230 - possible settlement site	HER entry PRN18230
3	4	possible, positive	linear		anomalies part of a sequence that may define a ditched track or routeway either respecting or disrupted by a palaeo-channel	
	5	possible, negative	linear			
	6	possible, positive	linear, rectilinear		anomalies part of a sequence possibly defining a rectilinear enclosure	
	7	possible, negative	linear			
	8	possible, negative	oval	stony deposit or pit		
	9	possible, positive	oval	pit or section of ditch		
	10	possible, positive	disrupted linear		anomaly group may either respect or are disrupted by a palaeo-channel	
	11	possible, negative	linear		3 anomaly groups representing either linear archaeological features or field drainage	
	12	possible, negative	oval	stony deposit		
	13	possible, negative	linear			
	14	possible, positive	disrupted linear		anomalies are too regular to be natural & lie on the northern edge of a palaeo-channel	
	15	possible, positive	linear			
	16	possible, negative	multilinear			
	17	possible, negative	disrupted linear		3 anomaly groups representing either linear archaeological features or field drainage	
	18	likely, positive	linear/rectilinear/curvilinear	enclosures & platforms	anomaly group lie within the area of PRN18232 - a complex of ditched enclosures & earthworks that possibly form several deserted settlements	HER entry PRN18232

Table 1: data analysis



survey area
Anomalies relating to potential archaeology
 likely, negative
 likely, positive
 possible, negative
 possible, positive
Natural deposits
 palaeo-channel deposits

British Grid
 centre X: 336848.83 m, centre Y: 151497.48 m

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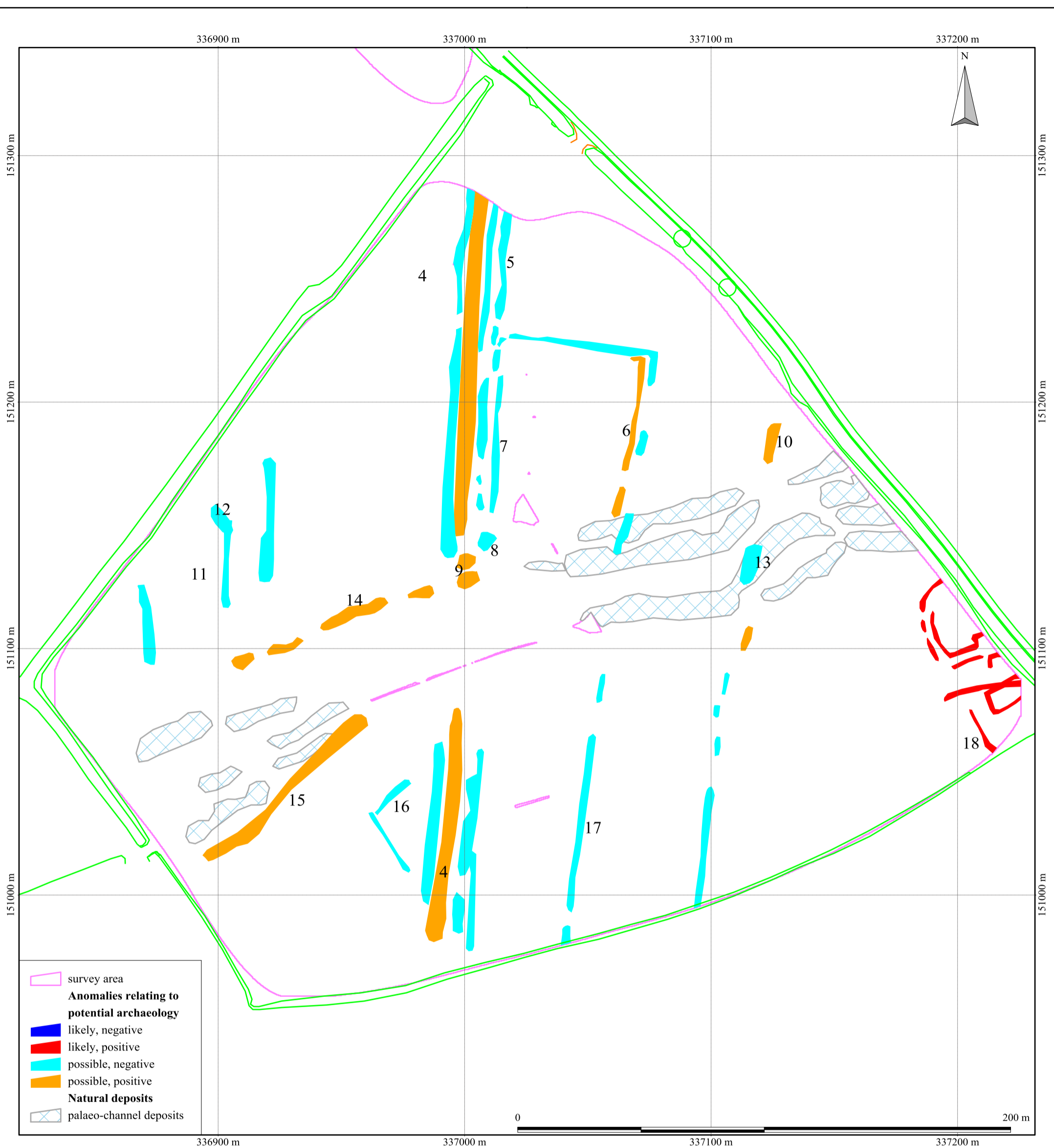
- Notes:
1. All interpretations are provisional and represent potential archaeological deposits.
 2. Anomalies designated "likely archaeology" have supporting evidence e.g. historical maps and or visible earthworks.
 3. Representative; not all instances are mapped.
 4. Anomalies likely to represent geological or other natural deposits are not mapped except where they are significant to the interpretation.

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Figure 2: survey interpretation, areas 1 & 2



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British Grid
centre X: 337025.32 m, centre Y: 151123.26 m

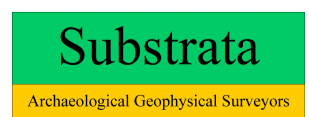
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- Notes:
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Figure 3: survey interpretation, area 3



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3.2 Discussion

Refer to figures 1 and 2

Not all anomalies or anomaly groups identified in the survey dataset are discussed below. All identified anomaly groups are recorded in the GIS project on the accompanying CD-ROM. Those anomaly groups possibly representing archaeological deposits are included in data analysis tables 1 and 2.

General points

Modern field drains in field 3 are clear in the data plot in figure 6. The main trend is west-west-south to east-east-north with occasional drains at right-angles.

Magnetic anomalies representing a palaeo-channel are clear in the data set for field 3 (figures 4 and 6). The channel is recorded in the Somerset HER (PRN29606, see section 2) as a branch of the Medieval and earlier river Siger. The palaeo-channel is plotted in figures 1 and 3 as it has a bearing on the interpretation of some of the anomalies as discussed below.

Data related to historical maps and other records

Anomaly groups **1**, **2**, **3** and **18** lie within areas designated in the HER as possible former settlement areas recorded as cropmarks and earthworks on aerial photographs. These anomaly groups are clear within the data set and are likely to represent archaeological features associated with these sites (HER entries PRN18228, PRN18229, PRN18230 and PRN18232 respectively which are briefly described in section 2).

Data with no previous provenance

Group **4** comprises a set of positive and negative features which are typical of a ditch-lined track or road. The group either respects or is cut by the palaeo-channel of a branch of the Medieval and earlier river Siger discussed above and shown in figures 1 and 3.

Groups **8** and **9** lie on the junction between the northern part of group 4 and the palaeo-channel. They represent possible pit deposits. Group **14** comprises a set of regularly spaced linear anomalies unlikely to represent natural deposits that are aligned along the northern bank of the palaeo-channel.

Groups **11** and **12** may represent either linear archaeological deposits or, less likely, field drainage of some kind.

All the remaining anomaly groups are linear patterns of anomalies that typically relate to archaeological features such as field boundaries and other enclosures.

3.3 Conclusions

The magnetic contrast across the survey areas was sufficient to be able to differentiate between anomalies representing possible archaeological features and background magnetic responses. A total of 18 magnetic anomaly groups were identified as pertaining to potential archaeology.

Four of the groups are spatially associated with recorded potential settlement sites. Three of these represent probable enclosure boundaries and one an area of enclosures and platforms. A long linear anomaly group may represent a ditched track or road running almost north-south across the main field in the survey area. This feature either respects or is cut by a palaeo-channel of the Medieval and earlier river Siger. Two

anomalies may represent large pits at the northern junction of the palaeo-channel and the possible ditched track or road. One set of five linear anomalies run along the northern edge of the palaeo-channel. The remaining anomaly groups are linear patterns of anomalies that typically relate to archaeological features such as field boundaries and other enclosures.

4 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).

5 Acknowledgements

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

6 References

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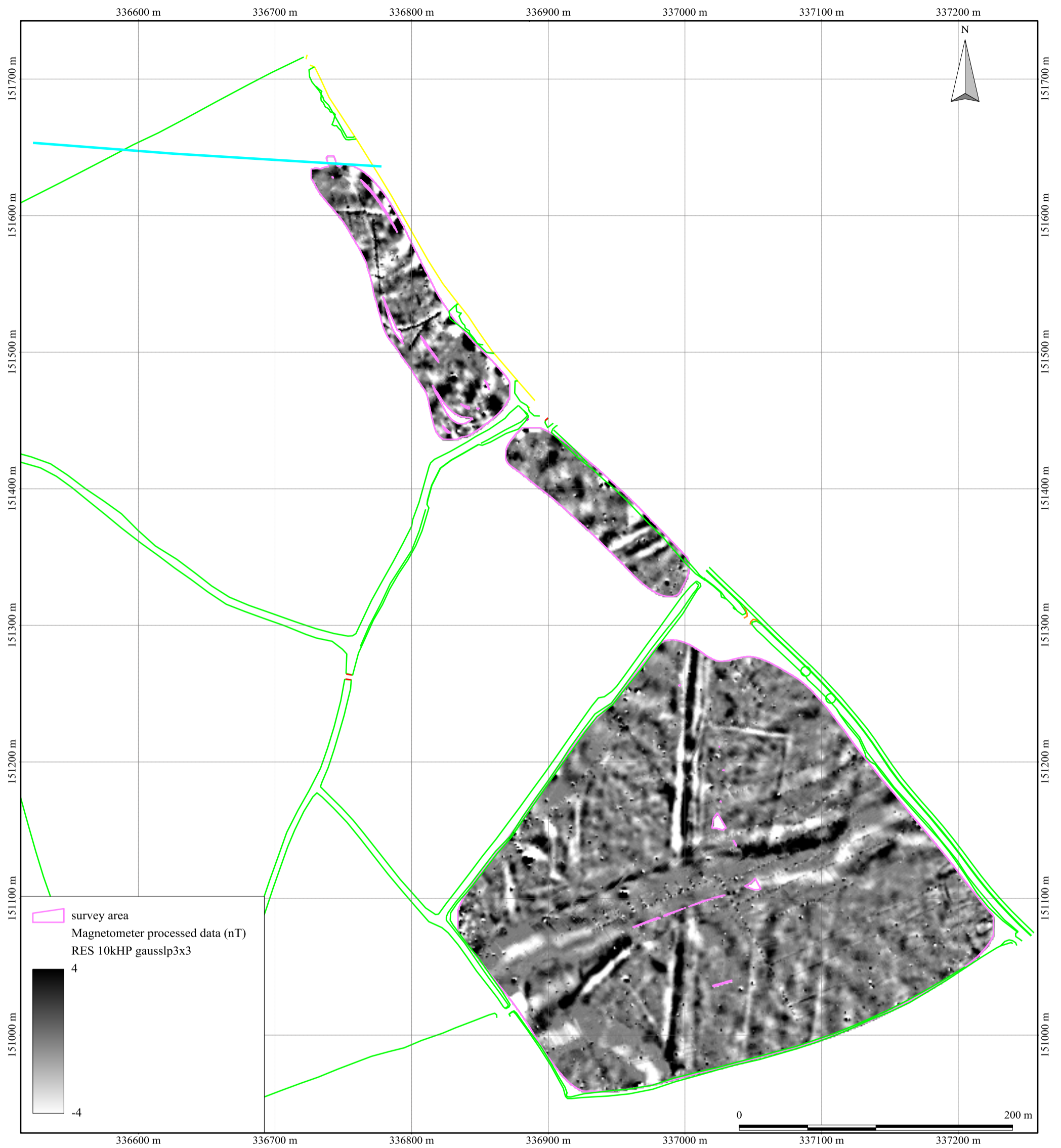
Somerset County Council Historic Environment Service (undated) *Somerset Historic Environment Record*, Available: <http://webapp1.somerset.gov.uk/her/sop.asp?flash=true> [July 2013]

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.



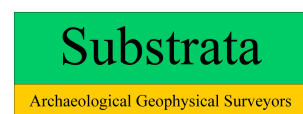
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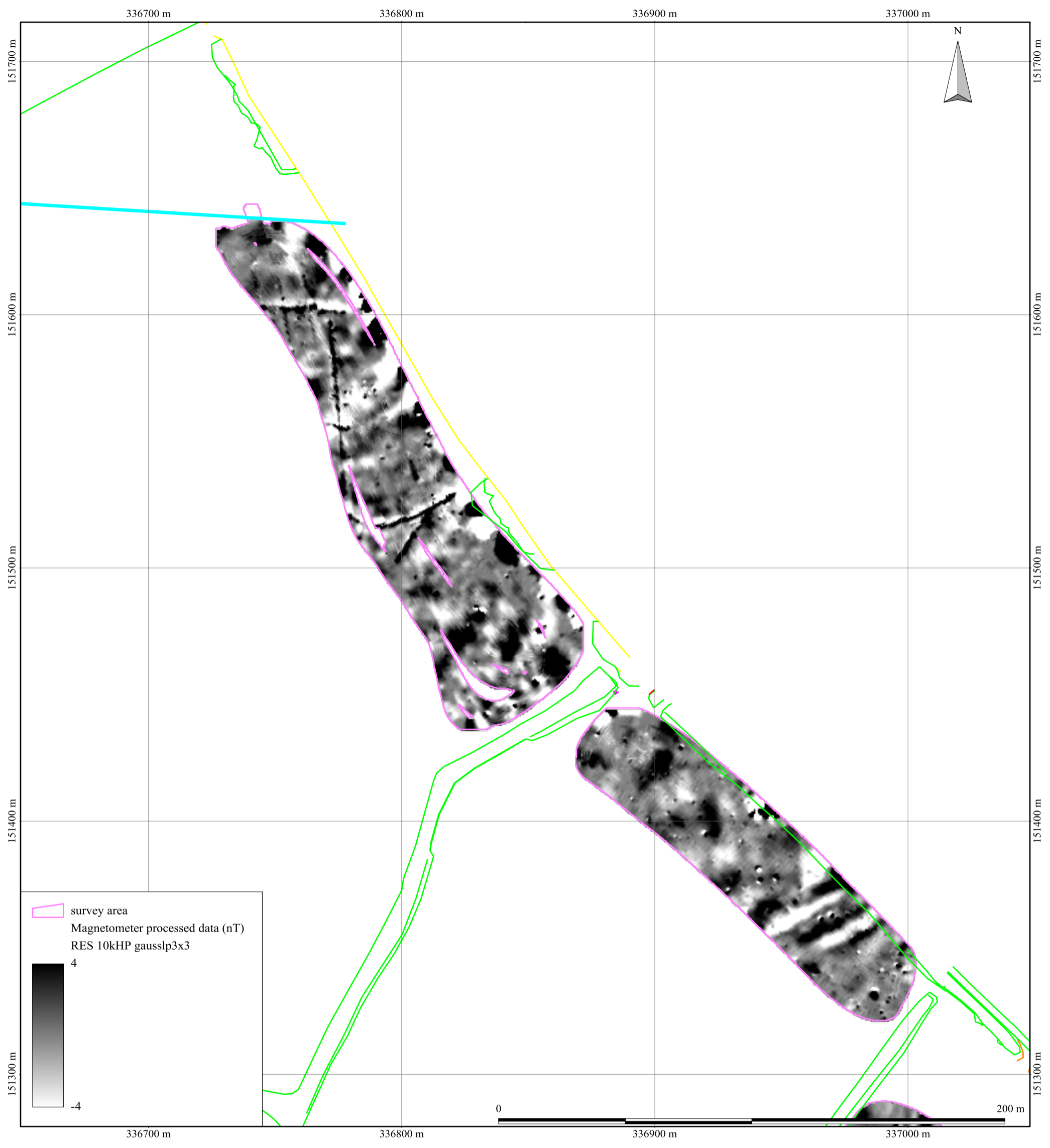
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Figure 4: processed data, all areas



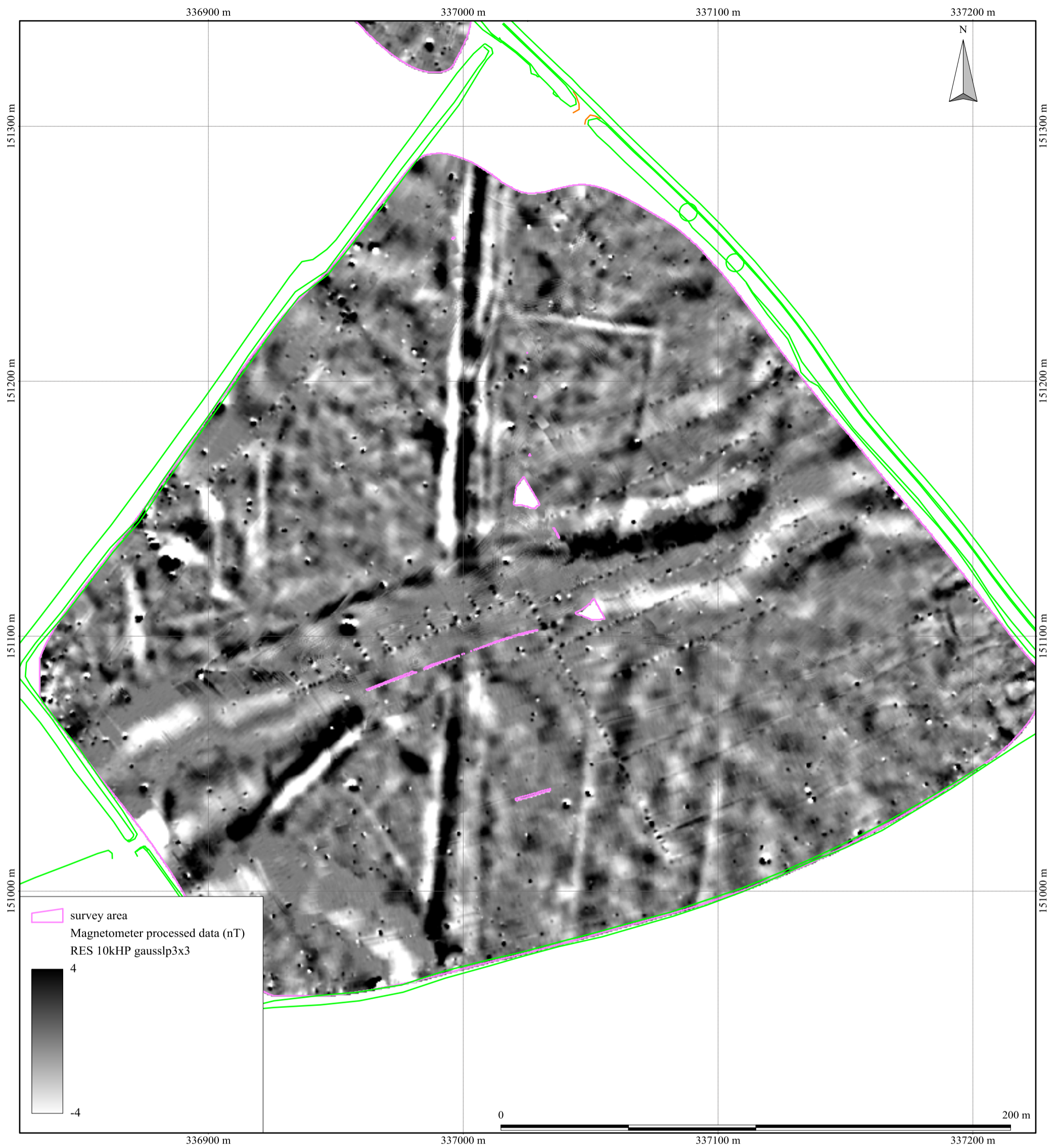
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Figure 6: processed data, area 3



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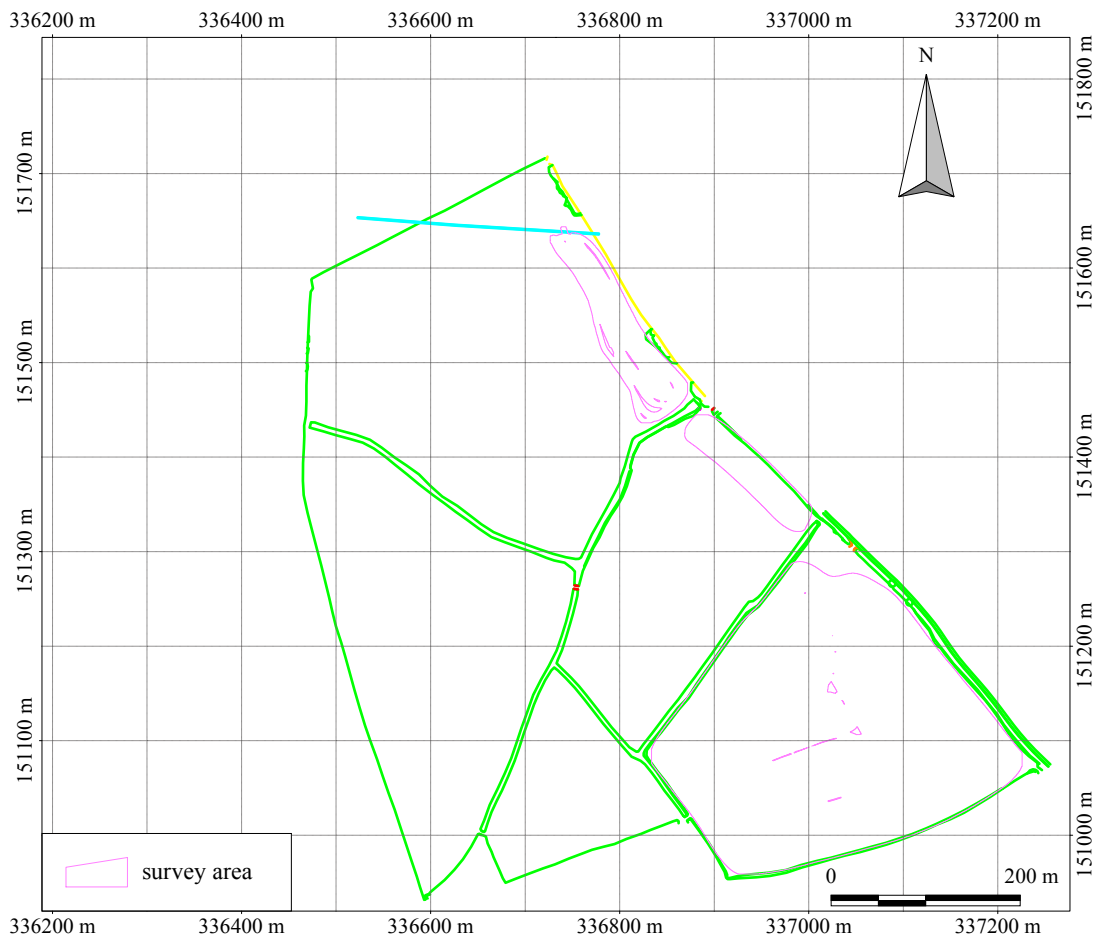
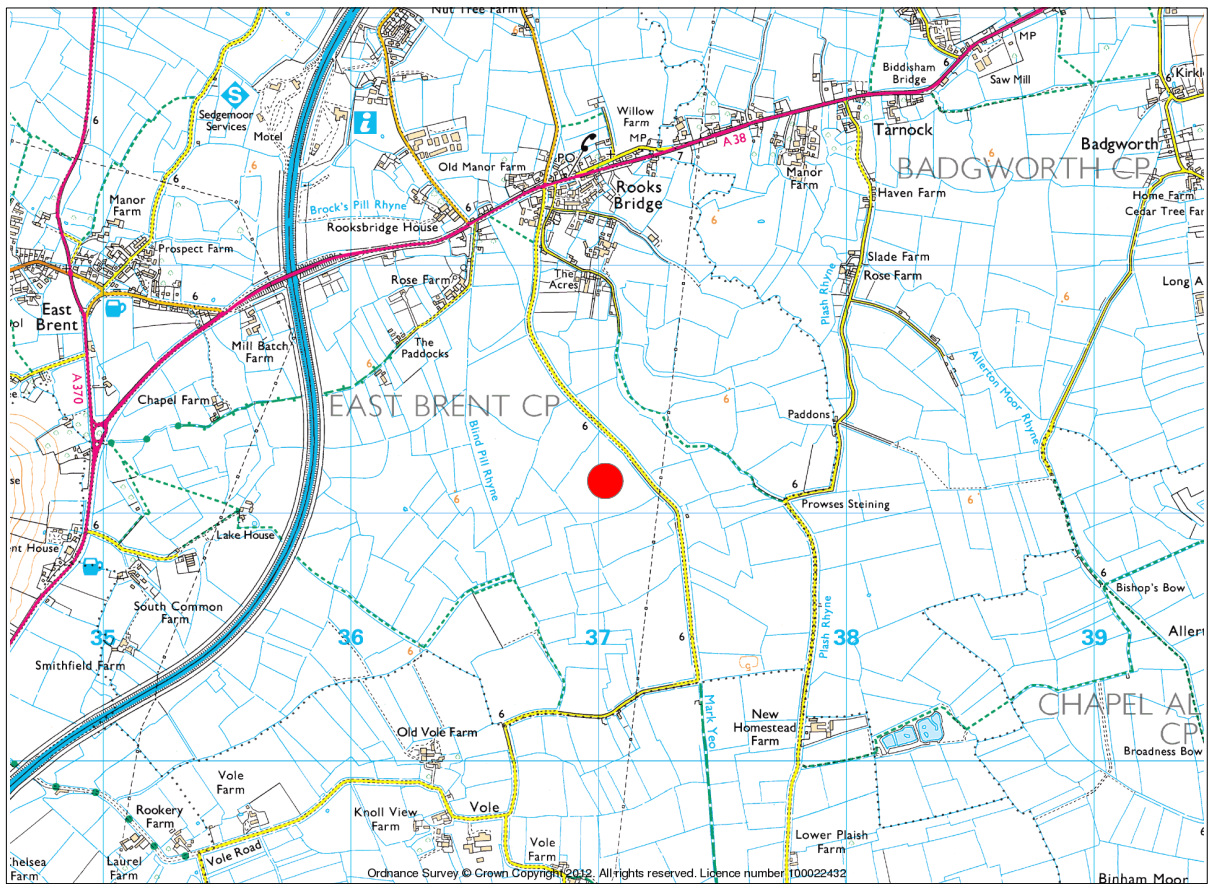


Figure 7: location map

Appendix 2 Methodology

Table 2: methodology
<p>Documents Survey methodology: Dean (2013)</p>
<p>Methodology</p> <ol style="list-style-type: none"> 1. The work was undertaken in accordance with the project design. The geophysical (magnetometer) survey was undertaken with reference to standard guidance provided by the Institute for Archaeologists (2011) and Archaeology Data Service/Digital Antiquity Guides (undated). 2. The survey location information 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> automated GNSS receiver data alignment <i>Recording:</i> Geo-referenced and recorded using digital map tiles.</p>
<p>Equipment <i>Instrument:</i> Geomatrix G858 Measured Variable: magnetic flux density / nT Instrument: array of Geomatrix G858 Magmapper caesium magnetometers Configuration: Non-gradiometric transverse array (4 sensors, ATV towed) Sensitivity: 0.03nT @ 10 Hz (manufacturer's specification) QA procedure: continuous observation Resolution: 1.0m between lines, 0.25 mean along line interval</p>
<p>Data Processing, Analysis and Presentation Software ArchaeoPhysica Ltd proprietary: measurement and GNSS receiver data alignment, initial processing Golden Software Inc Surfer 8.002: gridding Manifold System 8.0 Professional Edition: analysis and final display Microsoft Corp. Office Publisher 2003: report production and publication</p>

Appendix 3 Data processing

Table 3: gradiometer survey - processed data metadata

High pass median filter above 20 seconds to achieve temporal reduction and regional field suppression.
Export to Surfer 8 ASCII files.

Appendix 4 Geophysical surveying techniques

1 Introduction

Substrata offers magnetometer and earth resistance surveying. We also provide other archaeology-specific geophysical surveys such as ground penetrating radar and resistivity. The particular method or combination of methods used depends on local soil conditions and the survey requirements. These methods are capable of delivering fast and accurate assessments of the archaeology of both large and small sites.

Further details can be found on our website at www.substrata.co.uk

2 Magnetometer surveying

Standard magnetometer surveys are the workhorse of archaeological surveying when speed and cost-effectiveness are important. Identifiable archaeological features include areas of occupation, hearths, kilns, furnaces, ditches, pits, post-holes, ridge-and-furrow, timber structures, wall footings, roads, tracks and similar buried features.

Magnetometer surveying is used to detect and map small changes in the earth's magnetic field caused by concentrations of ferrous-based minerals within the soil and subsoil, and by magnetised materials buried beneath the surface. While most of these changes are too small to affect a compass needle, they can be detected and mapped by sensitive field equipment. During surveys the different magnetic properties of top-soils, sub-soils, rock formations and archaeological features are recorded as variations against a background value. Subsequently magnetic anomalies resulting from potential archaeology can be identified and interpreted.

Bartington grad601-2 gradiometers

A gradiometer is a type of magnetometer and is sensitive to relatively small changes in the earth's magnetic field. Our primary surveying instruments are Bartington Grad601-2 (dual sensor) fluxgate gradiometers with automatic data loggers. They are specifically designed for field use by archaeologists. The Bartington gradiometers provide proven technology in archaeological magnetic surveying and offer fast, accurate set-up and survey rates. They are sensitive to depths of between 0 and 1.5m below ground level, with optimum sensitivity at depths of 1m or less.

Multiple sensor arrays

A technique relatively new to commercial archaeological surveying but well understood in academic circles involves the use of multiple magnetometer sensors towed behind a quad bike or similar vehicle. With multiple sensors and the use of on-board GPS units, it is possible to achieve faster survey rates at competitive commercial rates when compared to the use of multiple instruments and the techniques discussed above provided the ground is suitable for the vehicle and array. Substrata is pleased to announce that we now offer this service on suitable larger sites

3 Earth resistance surveying

Earth resistance surveying is an excellent tool for detecting buried archaeology. Its relatively slow rate of survey compared to magnetometer surveys means that it is usually employed in commercial surveys when a detailed understanding of buried building remains is required. This technique measures changes in the electrical resistance of the ground being surveyed. In practice, the recording of differences in the electrical resistance of near-surface deposits and structures allows the detection and interpretation of masonry and brick foundations, paving and floors, drains and other cavities, large pits, building platforms, robber trenches, ditches, graves and similar buried features.

Resistance to electrical current flow in the ground depends on the moisture content and

structure of the soil and other materials buried beneath the surface. For example, the higher the moisture content of a soil, the less resistant it is to electrical current flow. A ditch completely buried beneath the present ground surface is likely to have an infill soil different to that surrounding the ditch in terms of compactness and composition. As a result, the soil filling the buried ditch will retain moisture in a different way to the surrounding soil which means it will have an electrical resistance at variance with the surrounding environment. By passing a small current through the ground it is possible to detect, record, plot and interpret such changes in electrical resistance.

For earth resistance surveying Substrata uses the Geoscan Research RM15 series multi-probe resistance meters and purpose-built automatic data-loggers. The Geoscan MPX15 multiplexer is an integral part to the instrument configuration and facilitates multi-probe arrays which speed up survey area coverage rates and, if required, facilitate simultaneous multiple-depth data collection.