

Detailed Magnetometer Survey on Land West of Southwater, West Sussex

**NGR: 515040 126090
(TQ 15040 26090)**

ASE Project No: 6060

OASIS ID: archaeol6-174874

ASE Report No. 2014092

By John Cook BSc (Hons) AIFA

March 2014

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Abstract

Archaeology South East was commissioned by Berkeley Strategic Land Ltd to undertake a detailed fluxgate gradiometer survey on land west of Southwater, West Sussex. The survey took place between the 6th and the 12th of March 2014. The survey area covered approximately 8 hectares and comprised arable land bounded by hedgerows.

Limited evidence of archaeological features was detected throughout the magnetic survey. The most obvious possible archaeological features were represented by a possible ditch and a series of anomalies representative of possible former ridge and furrow. Other anomalies identified consisted of possible infilled cut features. Areas of magnetic disturbance may mask underlying features with a weaker magnetic signature.

Statement of Indemnity

Geophysical survey is the collection of data that relate to subtle variations in the form and nature of soil and which relies on there being a measurable difference between buried archaeological features and the natural geology. Geophysical techniques do not specifically target archaeological features and anomalies noted in the interpretation do not necessarily relate to buried archaeological features. As a result, magnetic and earth resistance detail survey may not always detect sub-surface archaeological features. This is particularly true when considering earlier periods of human activity, for example those periods that are not characterised by sedentary social activity.

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1.0 INTRODUCTION

1.1 Site background

1.1.1 Archaeology South-East was commissioned by Berkeley Strategic Land Ltd to conduct a Magnetometer survey on a site totalling approximately 8 hectares of land west of Southwater, West Sussex hitherto referred to as 'the site' (NGR.TQ 15040 26090; Fig.1).

1.2 Geology and topography

1.2.1 According to the British Geological Survey (2014) the site lies over bedrock geology of Weald Clay Formation - Mudstone. No superficial deposits are recorded.

1.3 Aims of geophysical investigation

1.3.1 The purpose of the geophysical survey was to detect any buried archaeological anomalies that might provide a measurable magnetic response.

1.4 Scope of report

1.4.1 The scope of this report is to report on the findings of the survey. The project was conducted by John Cook and Catherine Douglas; project managed by Paul Mason (fieldwork) and by Jim Stevenson (post fieldwork).

2.0 ARCHAEOLOGICAL BACKGROUND

- 2.1 This survey forms part of a series of archaeological investigations across the site. A comprehensive Archaeological Desk Based Assessment (DBA) of the site has been undertaken by Archaeology South-East (James 2014). The full historical background for the site is presented therein and is not repeated in full here.
- 2.2 A detailed magnetometer was carried out by Stratascan Ltd (Smalley 2011) across 42 hectares of land adjacent to the current survey. The survey identified anomalies of possible archaeological origin across the entire site with the exception of the westernmost field immediately south-west of Great House Farm, and the two sports fields in the centre of the site on both sides of Church Lane. Most anomalies relate to former field boundaries and ditches, although a number of rectangular enclosures are also evident and clusters of possible pit alignments. Thermoremanent anomalies may relate to former kilns or hearths.

3.0 SURVEY METHODOLOGY

3.1 Geophysical survey

3.1.1 A fluxgate gradiometer (magnetometry) survey was undertaken in the areas depicted in Figure 2 (NGR 515040 126090).

3.1.2 The field work was undertaken between Thursday 6th and Wednesday 12th March 2014 when the weather was warm and dry.

3.2 Applied geophysical instrumentation

3.2.1 The Fluxgate Gradiometer employed was the Bartington Instrumentation Grad 601-2. The Grad 601-2 has an internal memory and a data logger that store the survey data. This data is downloaded into a PC and is then processed in a suitable software package.

3.2.2 30m x 30m grids were set out using a GPS (see below). Each grid was surveyed with 1m traverses; samples were taken every 0.25m.

3.2.3 Data was collected along north-south traverses in a zigzag pattern beginning in the south-west corner of each grid.

3.3 Instrumentation used for setting out the survey grid

3.3.1 The survey grid for the site was geo-referenced using a Leica Viva Smartrover. The GPS receiver collects satellite data to determine its position and uses the mobile phone networks to receive corrections, transmitting them to the RTK Rover via Bluetooth to provide a sub centimetre Ordnance Survey position and height. Each surveyed grid point has an Ordnance Survey position; therefore the geophysical survey can be directly referenced to the Ordnance Survey National Grid.

3.4 Data processing

3.4.1 All of the geophysical data processing was carried out using TerraSurveyor published by DW Consulting. Minimally processed data was produced using the following schedule of processing. Due to the very high positive readings of some of the magnetic disturbance the values were replaced with a dummy value so as to avoid detrimentally affecting the dataset when further processed. The first process carried out upon the data was to apply a DESPIKE to the data set which removes the random 'iron spikes' that occur within fluxgate gradiometer survey data. A ZERO MEAN TRAVERSE was then applied to survey data. This removes stripe effects within grids and ensures that the survey grid edges match. Figure 4 displays the processed survey data.

3.5 Data presentation

3.5.1 Data is presented using images exported from TerraSurveyor into Autocad software and inserted into the geo-referenced site grid. Data is presented (Figures 3 and 4) as raw data and processed data greyscale

plots.

4.0 GEOPHYSICAL SURVEY RESULTS (Figures 5 and 6)

4.1 Description of site

4.1.1 The survey area consisted of approximately eight hectares currently under plough sloping down to the south.

4.2 Survey limitations

4.2.1 There were few physical obstructions encountered on site. Obstructions are noted in the results. Areas where physical obstructions form a barrier to survey, or a health and safety issue, have been omitted.

4.2.2 In addition to the physical limitations of the survey, the effectiveness of magnetometer surveys depends on a contrast between the absolute magnetic susceptibility of the topsoil to the underlying subsoil (Clark 1996). Features may also be difficult to detect where there has been significant primary silting.

4.3 Introduction to results

4.3.1 The results should be read in conjunction with the figures at the end of this report. The types of features likely to be identified are discussed below.

4.3.2 Positive Magnetic Anomalies

Positive anomalies generally represent cut features that have been in-filled with magnetically enhanced material.

4.3.3 Negative Magnetic anomalies

Negative anomalies generally represent buried features such as banks or compacted ground that have a lower magnetic signature in comparison to the background geology.

4.3.4 Magnetic Disturbance

Magnetic disturbance is generally associated with interference caused by modern ferrous features such as fences and service pipes or cables.

4.3.5 Magnetic Debris

Low amplitude magnetic debris consists of a number of dipolar responses spread over an area and is indicative of ground disturbance.

4.3.6 Dipolar Anomalies

Dipolar anomalies are positive anomalies with an associated negative response. These anomalies are usually associated with discreet ferrous objects or may represent buried kilns or ovens.

4.3.7 Bipolar Anomalies

Bipolar anomalies consist of alternating responses of positive and negative magnetic signatures. Interpretation will depend on the strength of these responses; modern pipelines and cables typically produce strong bipolar responses.

4.3.8 Thermoremanence

Thermoremanence is most commonly encountered through the magnetizing of clay through the firing process although stones and soils can also acquire thermoremanence.

4.4 Interpretation of fluxgate gradiometer results (Figures 5 and 6)

4.4.1 The survey area assigned for geophysical survey was situated on a gentle south facing slope bounded by hedgerows, with Shaws Lane along its western boundary. The area at the time of survey was under plough.

4.4.2 Evidence for possible archaeological features in the form of discrete moderate positive anomalies representing possible cut features are noted throughout the survey. In addition to these a linear moderate positive anomaly indicating a possible ditch (A1) is noted in the north east of the survey. Weak positive anomalies representing more ephemeral cut features are observed in the far north east of the survey (A2) and in the southern half of the area (A3). Three positive and negative linear anomalies (A4) run across the centre of the survey area. Negative linear anomalies occur near the boundaries of the survey (A5) and across the northern half of the survey (A6). These anomalies may represent features of an archaeological origin such as buried earthworks, compacted features such as path/trackway surfaces or masonry. However, these anomalies may also relate to geological features. Negative anomalies may also stem from the dipolar effect of certain magnetic anomalies.

4.4.3 Three possible thermoremanent anomalies are observed with two in the north and one in the south (A7). These anomalies may be indicative of kilns, furnaces, ovens or other heating activity.

4.4.4 Two bipolar anomalies with associated magnetic disturbance are observed (A8). These anomalies correspond to below ground services such as a pipes and cables.

4.4.5 Areas of magnetic debris (A9) may indicate ground disturbance or made ground.

4.4.6 A series of linear anomalies are noted across the area (A10 and A11). These anomalies are interpreted as agricultural in origin.

4.4.7 A scattering of dipolar anomalies across the area may represent archaeological features such as kilns or ovens, but more likely they indicate discrete ferrous objects such as parts dropped from farm machinery. These anomalies are not individually marked due to their frequency.

4.4.8 Two areas of low level magnetic “noise” are noted (A12 and A13). These are likely to relate to variations in former land use.

5.0 CONCLUSION

5.1 Discussion

5.1.1 The most significant features noted in the survey were a possible ditch (A1) and linear areas interpreted as agricultural in origin (A10). A1 corresponds to an undefined boundary noted on historic mapping (James 2014, fig.8). The anomalies at A10 are interpreted as possible remnant ridge and furrow. However, these features, although consistent in form and magnetic strength, may not indicate earthworks or consolidated material but a change in the geochemistry of the soils from former agricultural activity. Evidence for archaeological features was also noted as a number of possible cut features along with thermoremanent anomalies indicative of a heat process such as a small furnaces, kilns or ovens. In addition, a number of struck flints and iron slag were noted across the area by the field team during survey.

5.2 Summary

5.2.1 Evidence for cut archaeological features within the magnetic survey was, in general, relatively sparse. However, the survey did successfully detect several linear and discrete anomalies of possible archaeological origin across the site. The most significant of these corresponding to an undefined boundary noted on historic mapping. Three discrete thermoremanent anomalies are noted, two in the north east corner of the survey area, that may represent areas of possible burning or industrial activity such as kilns, furnaces or deposits of thermoremanent material such as bricks or other fired clay. However these anomalies may also be caused by more modern activity. Linear and area anomalies representing former agricultural activity are observed with an area of possible former ridge and furrow activity noted in the north west.

5.2.2 In general, the possible archaeological anomalies identified within the survey are ephemeral. This may be due to the features themselves being ephemeral, overburden between the magnetometer and the feature, the result of more recent agricultural activity, infilling of natural features or a combination of these. Much of the magnetic debris and disturbance observed within the survey is undoubtedly related to modern activity.

Acknowledgements

Archaeology South-East would like to thank Berkeley Strategic Land Ltd for commissioning the survey.

Bibliography

BGS 2014 British Geological Survey, Geology of Britain Viewer, accessed 17.03.2014. <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

Clark, A. 1996. *Seeing Beneath the Soil*. (2nd edition). London: Routledge.

James, R., 2014. An Archaeological Desk-Based Assessment of Land West of Southwater, West Sussex. Unpublished ASE Report 2014018.

Smalley, R., 2011. Geophysical Survey Report: Land West of Southwater. Unpublished Stratascan Report J2883.

SMR Summary Form

Site Code	-					
Identification Name and Address	Land west of Southwater, West Sussex					
County, District &/or Borough	West Sussex					
OS Grid Refs.	620170 162410					
Geology	Weald Clay Formation - Mudstone					
Arch. South-East Project Number	6060					
Type of Fieldwork	Eval.	Excav.	Watching Brief	Standing Structure	Survey	Other
Type of Site	Green Field	Shallow Urban	Deep Urban	Other		
Dates of Fieldwork	Eval.	Excav.	WB.	6th – 12th March 2014		
Sponsor/Client	Berkeley Strategic Land Ltd					
Project Manager	Paul Mason					
Project Supervisor	John Cook					
Period Summary	Palaeo.	Meso.	Neo.	BA	IA	RB
	AS	MED	PM	Other Modern		
<p>100 Word Summary.</p> <p><i>Archaeology South East was commissioned by Berkeley Strategic Land Ltd to undertake a detailed fluxgate gradiometer survey on land west of Southwater, West Sussex. The survey took place between the 6th and the 12th of March 2014. The survey area covered approximately 8 hectares and comprised arable land bounded by hedgerows. Limited evidence of archaeological features was detected throughout the magnetic survey. The most obvious possible archaeological features were represented by a possible ditch and a series of anomalies representative of possible former ridge and furrow. Other anomalies identified consisted of possible infilled cut features. Areas of magnetic disturbance may mask underlying features with a weaker magnetic signature.</i></p>						

OASIS form

OASIS ID: archaeol6-174874

Project details

Project name	Detailed Magnetometer Survey on Land West of Southwater, West Sussex
Short description of the project	Archaeology South East was commissioned by Berkeley Homes (Southern) Ltd to undertake a detailed fluxgate gradiometer survey on land west of Southwater, West Sussex. The survey took place between the 6th and the 12th of March 2014. The survey area covered approximately 8 hectares and comprised arable land bounded by hedgerows. Limited evidence of archaeological features was detected throughout the magnetic survey. The most obvious possible archaeological features were represented by a possible ditch and a series of anomalies representative of possible former ridge and furrow. Other anomalies identified consisted of possible infilled cut features. Areas of magnetic disturbance may mask underlying features with a weaker magnetic signature.
Project dates	Start: 06-03-2014 End: 12-03-2014
Previous/future work	Yes / Not known
Any associated project reference codes	6060 - Contracting Unit No.
Type of project	Field evaluation
Current Land use	Cultivated Land 3 - Operations to a depth more than 0.25m
Monument type	NONE None
Significant Finds	NONE None
Methods & techniques	"Geophysical Survey"
Development type	Rural residential
Prompt	Planning condition
Position in the planning process	Not known / Not recorded
Solid geology	WEALD CLAY
Drift geology	Unknown
Techniques	Magnetometry

Project location

Country	England
Site location	WEST SUSSEX HORSHAM SOUTHWATER Land West of Southwater
Study area	8.00 Hectares
Site coordinates	TQ 15040 26090 51.0221108053 -0.35955933704 51 01 19 N 000 21 34 W Point

Project creators

Name of Organisation	Archaeology South-East
Project brief originator	Archaeology South-East
Project design originator	Archaeology South-East
Project director/manager	Paul Mason
Project supervisor	John Cook

Project archives

Physical Archive Exists?	No
Digital Archive recipient	West Sussex County Council
Digital Contents	"Survey"
Digital Media available	"Geophysics","Survey","Text"
Paper Archive recipient	West Sussex County Council
Paper Contents	"Survey"
Paper Media available	"Report"

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Detailed Magnetometer Survey on Land West of Southwater, West Sussex
Author(s)/Editor(s)	Cook, J.

Other bibliographic details	ASE report number: 2014092
Date	2014
Issuer or publisher	ASE
Place of issue or publication	Portslade
Description	Standard ASE Client Report. A4-sized with cover logos.
<hr/>	
Entered by	John Cook (john.cook@ucl.ac.uk)
Entered on	17 March 2014

Appendix 1

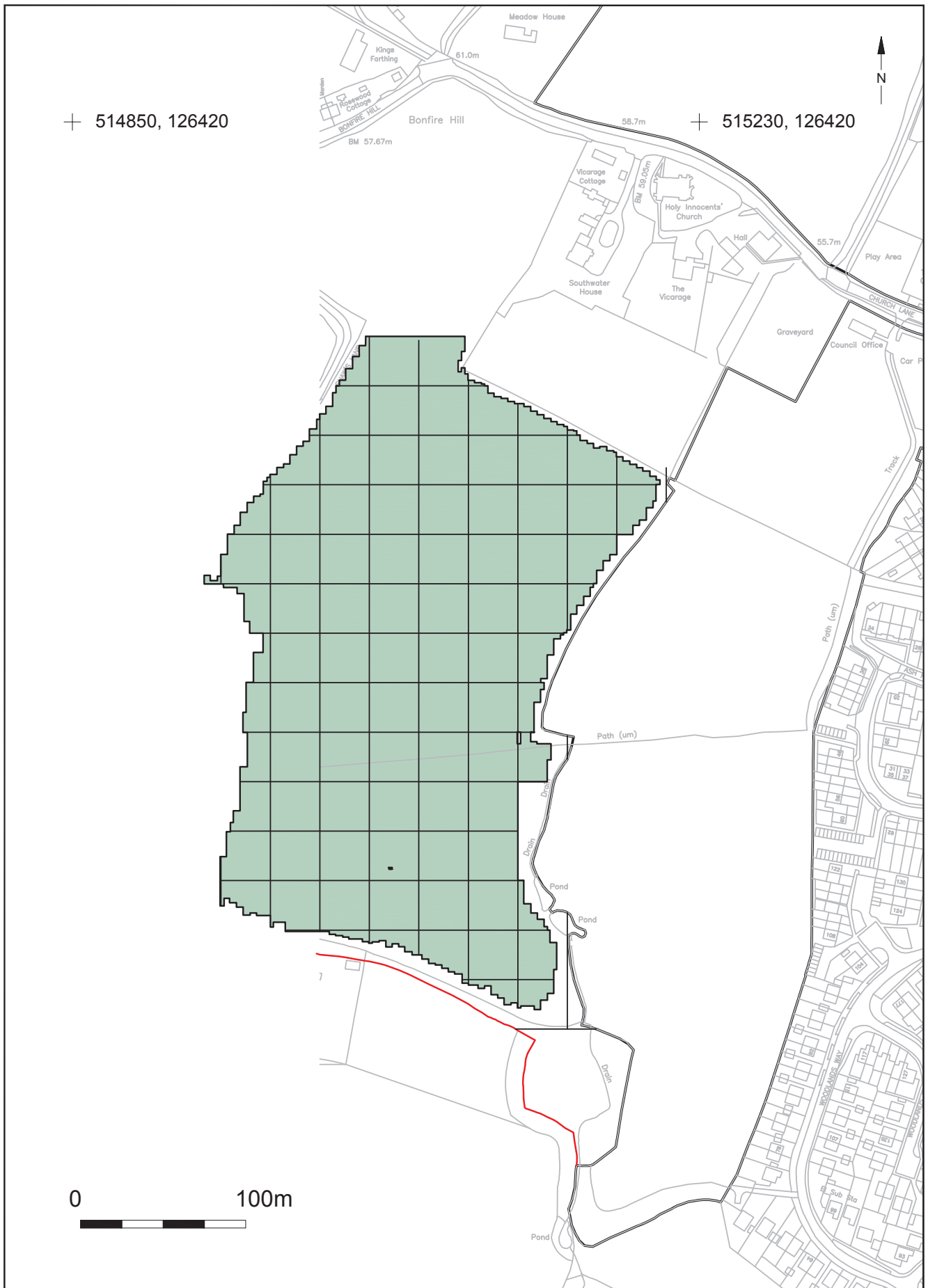
Included on C.D

1. Raw Magnetometry Data
2. Positive and negative trace plots



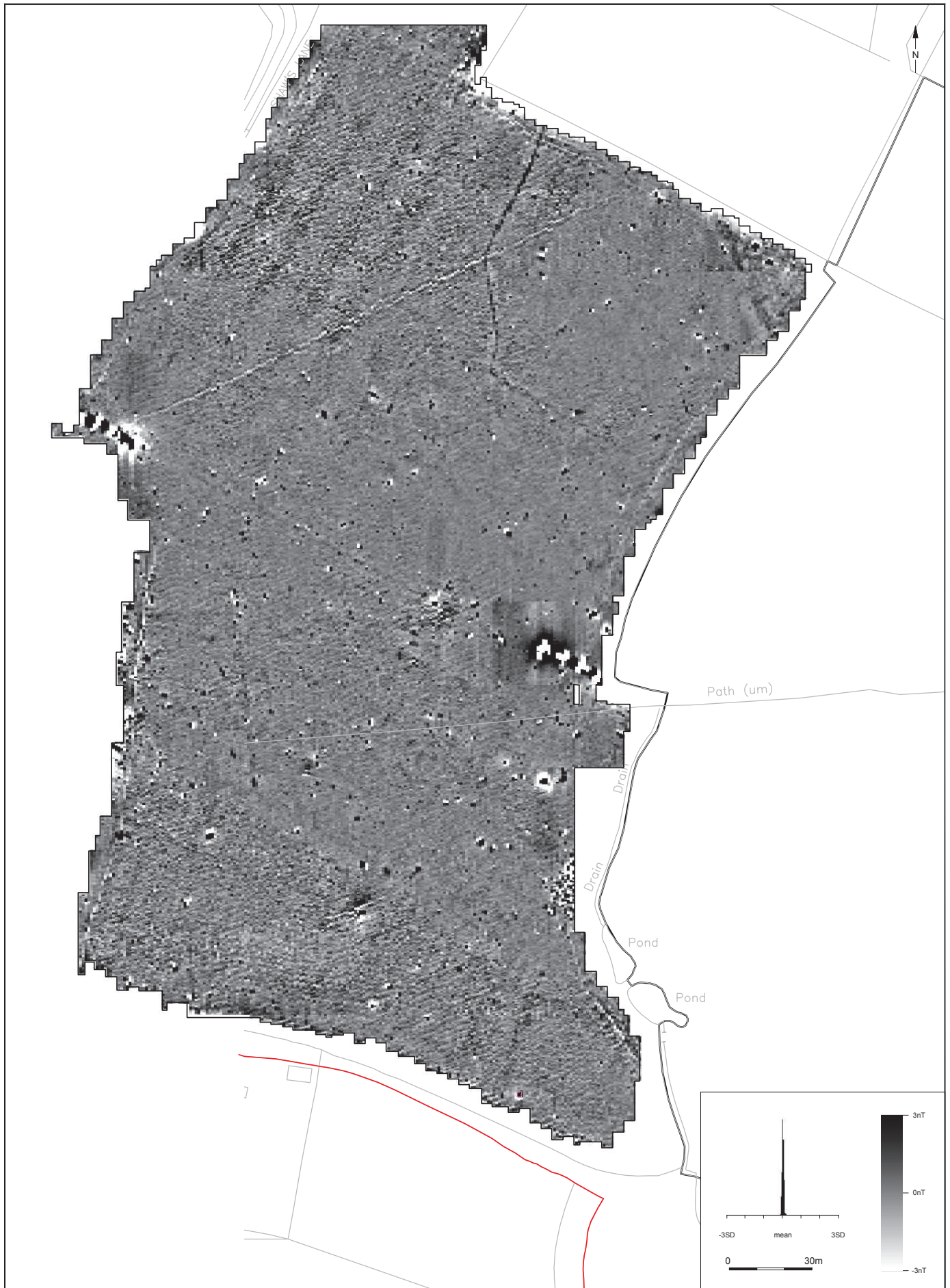
Contains Ordnance Survey data
 Crown copyright and database right 2014

© Archaeology South-East		Land West of Southwater	Fig. 1
Project Ref: 6060	March 2014	Site location	
Report Ref: 2014092	Drawn by: JC		

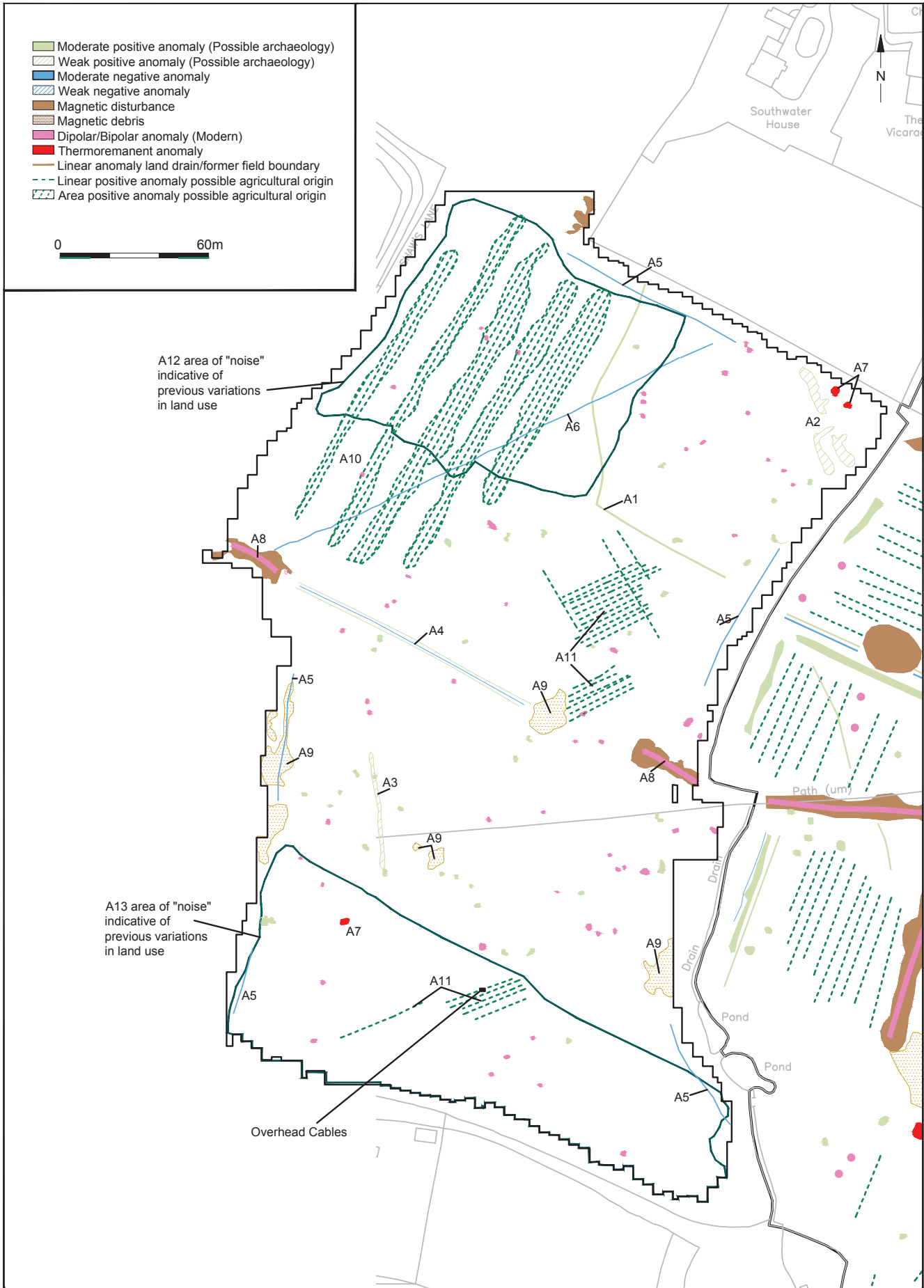


© Archaeology South-East		Land West of Southwater	Fig.2
Project Ref: 6060	March 2014	Geophysics Location	
Report Ref: 2014092	Drawn by: JC		

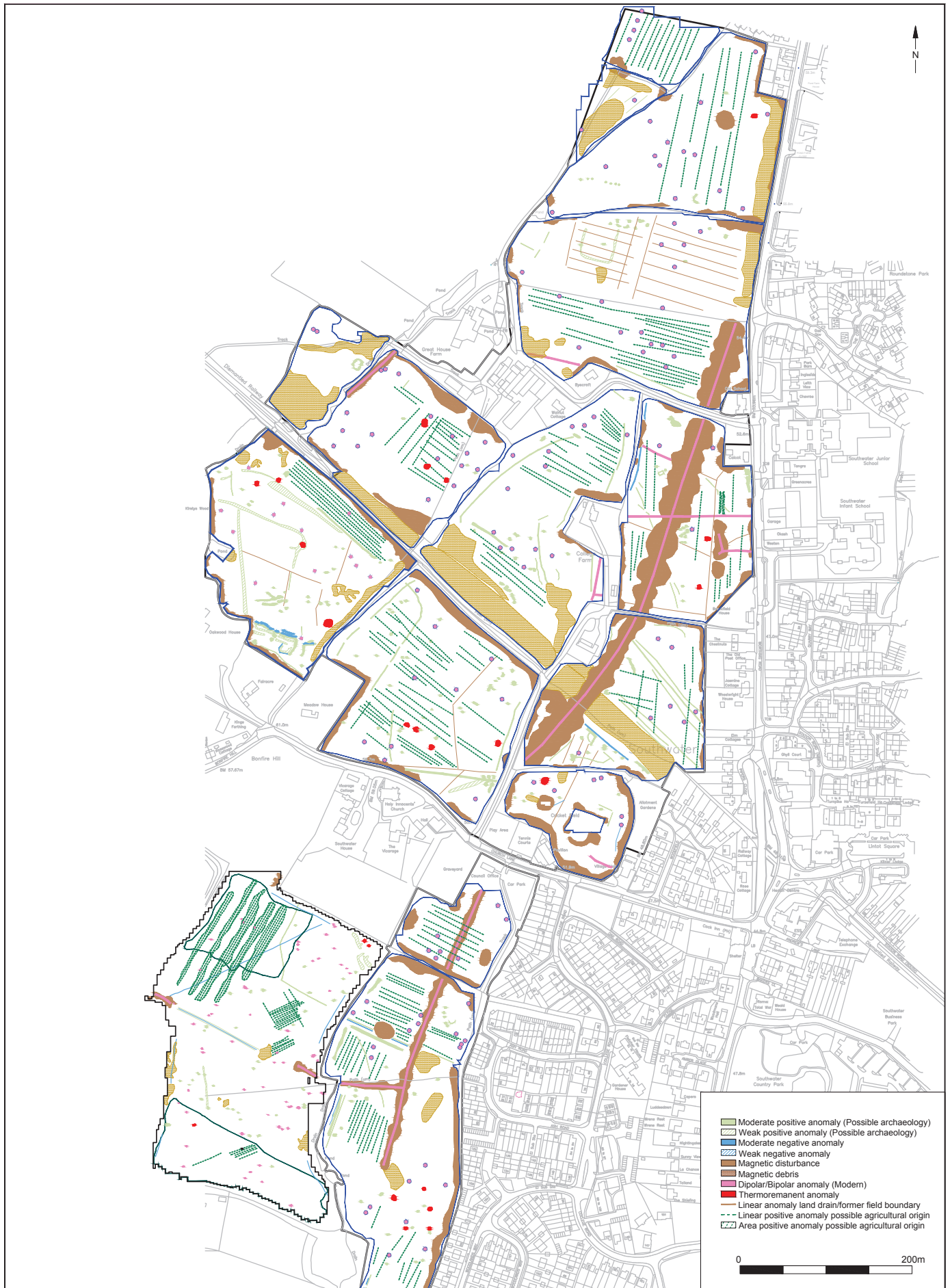




© Archaeology South-East		Land West of Southwater	Fig.4
Project Ref: 6060	March 2014	Processed data	
Report Ref: 2014092	Drawn by: JC		



© Archaeology South-East		Land West of Southwater	Fig.5
Project Ref: 6060	March 2014	Interpretation	
Report Ref: 2014092	Drawn by: JC		



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