Archaeology South-East

ASE

Detailed Magnetometer Survey Report
Land at Horeham Flat Farm, Horam, East Sussex

NGR: 556880 116000
(TQ 56880 16000)

ASE Project No: 160050
ASE Report No: 2016118

By John Cook

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Date of Issue:	February 2016		
Revision:			

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Abstract

Archaeology South-East was commissioned to undertake a magnetometer survey on land at Horeham Flat Farm, Horam, East Sussex. The work was undertaken between Monday 7th and Friday 11th March 2016.

Evidence for possible archaeological features was scant across the western two thirds of the site. This may be due to absence of archaeological remains in this area or potentially increased overburden limiting the effectiveness of. In the far east of the site potential archaeological features include the possible iron working bloomery site previously only recorded by small amounts of cinder (slag) and place name evidence.

The bloomery may have been enclosed with ditches shown by anomalies which may also correspond to possible grass marks noted in the field to the south of Cindergill and outside of the site. Areas of strong magnetism are likely to represent slag heaps, furnace locations or ore roasting. Moderate positive anomalies on the western side of the possible bloomery may be the result of cut features such as ditches or, possibly, wheel ruts.

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.

CONTENTS

1.0 INTRODUCTION

1.1 Site background

1.1.1 Archaeology South-East was commissioned by Wealden District Council to undertake a magnetometer survey on land at Horeham Flat Farm, Horam, East Sussex and hereafter referred to as 'the site' (NGR. 556880 116000; Figure 1).

1.2 Geology and topography

1.2.1 According to the British Geological Survey (BGS 2016a) the bedrock geology of the site comprises Wadhurst Clay Formation - mudstone. No superficial deposits are recorded. No boreholes are recorded within the vicinity of the site on the BGS Borehole Viewer (BGS 2016b).

1.2.2 The site comprises seven enclosures of improved grassland to the south of the settlement of Horam. It is bounded by hedgerows, woodland and fields (Figure 2).

1.3 Aims of geophysical investigation

1.3.1 The primary aim of this initial programme of archaeological survey is to obtain a better understanding of the archaeological potential of the site. This work will allow informed decisions to be made as to the need, nature and scope of any further mitigation measures that may be required. The purpose of the geophysical survey in addressing this aim 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 with the assistance of Jake Wilson. The project was managed by Neil Griffin (fieldwork), Jim Stevenson (post-fieldwork).

2.0 BACKGROUND

2.1 Archaeological and historic background

2.1.1 An examination of the historical mapping for the site indicated little change in the site boundaries since Yeakell and Gardiner's map of Sussex circa 1780 and the 1875 1st Edition Ordnance Survey map.

2.1.2 The Weald is known for iron working both during the Roman period and during the medieval and early post-medieval period with a rapid decline following the Seven Years War in the 18th century (Cleere and Crossley 1995).

2.1.3 The site of a bloomery is depicted on modern Ordnance Survey mapping in the south east corner of the site. Cindergill is recorded on the 1875 1st Edition Ordnance Survey map and the site is recorded as a bloomery with cinder being found in the ditch and field (Straker 1931).

3.0 SURVEY METHODOLOGY

3.1 Geophysical survey

3.1.1 A fluxgate gradiometer (magnetometry) survey was undertaken across three parcels of land, as depicted on Figure 2 (NGR 556880 116000). The work was undertaken between Monday 7th and Friday 11th March 2016 during largely dry but cold weather.

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, following the contours of the site.

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 MEDIAN TRAVERSE was then applied to survey data. This removes stripe effects within grids and ensures that the survey grid edges match.

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 as raw and processed data greyscale plots.

4.0 GEOPHYSICAL SURVEY RESULTS

4.1 Description of site

4.1.1 The survey area consisted of seven enclosures totalling approximately *c.*9.5 hectares of pasture land, bounded by hedgerows and woodland.

4.2 Survey limitations

4.2.1 Physical obstructions encountered included undulating and waterlogged ground, wire fences and vegetation. Obstructions for each area are noted in the results. In addition, 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 and development of significant overburden. Areas where physical obstructions form a barrier to survey, or a health and safety issue, have been omitted. The site lies over sandstone, siltstone and mudstone geology. Over sandstone a poor response to magnetometer is possible, although can be good over Greensand and some tertiary formations (English Heritage 2008). Over mudstones results can be very variable.

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.

4.3.9 Magnetism from ferromagnetic materials (iron) and from thermoremanence are forms of permanent magnetism and in most cases a magnetometer will not enable the separation of anomalies into the two categories. The interpretation of these anomalies into either category relies on field strength within an area. Magnetic anomalies due to iron normally rise and fall rapidly, forming a 'spike' in the data.

4.4 Interpretation of fluxgate gradiometer results

4.4.1 The interpretation of fluxgate gradiometer results should be read in conjunction with the figures at the end of the report. Specific examples of anomaly types are numbered in the figures and text but not all anomalies are numbered.

4.4.2 The site consists of seven enclosures generally level but with a gentle south facing slope in the south and east, sloping more steeply at the edge of Cindergill. At the time of the survey the land was under improved grassland.

4.4.3 Evidence of possible archaeological activity included the following described anomalies (Figures 7 and 8). The most obvious possible archaeological anomalies are the anomalies noted in the south east corner of the site (A1) likely to relate to a possible former bloomery site and shown in greater detail on Figure 8. Discrete moderate positive anomalies (A2) are noted across the site representing possible cut features such as pits. Moderate positive linear anomalies (A3) may relate to a cut features such as ditches. However these may be the result of previous agricultural activity or geological features.

4.4.4 Dipolar anomalies (A4) are observed across the area. These anomalies may relate to thermoremanent material such as that due to kilns and furnaces or, more likely, near surface ferrous objects.

4.4.5 A linear anomaly in the north of the site (A5) relates to a probable service.

4.4.6 Linear anomalies in the eastern two enclosures (A6) are demonstrative of land drains.

4.5 Possible bloomery site results (Figure 8)

4.5.1 Dipolar anomalies are observed in the region of the possible bloomery site (A7, A8) these anomalies may be associated with either the permanent magnetism of iron objects or thermoremanence related to the high heat of the iron working process. Strong and moderate positive anomalies (A9, A10 and A11) may relate to dumps of magnetically enhanced material such as slag or to cut features.

5.0 CONCLUSIONS

5.1 Introduction

5.1.1 Evidence for possible archaeological features was scant across the western two thirds of the site. This may be due to a lack of archaeological remains in this area or to increased overburden masking potential remains. The soil depth is in fact recorded as being deep (UKSO 2016).

5.1.2 In the far east of the site potential archaeological features are more readily observed including the possible iron working bloomery site previously only recorded by small amounts of cinder (slag) and place name evidence.

5.2 The Bloomery

5.2.1 It is possible to elucidate further about activity at the potential bloomery site. The bloomery may have been enclosed with ditches (A9 and A11) which may correspond to possible grass marks noted in the field to the south of Cindergill and outside of the site (Figure 9).

5.2.2 Areas of strong magnetism (A7 and A8) are likely to represent slag heaps, furnace locations or ore roasting. Moderate positive anomalies on the western side of the possible bloomery (A10) may be the result of cut features such as ditches or wheel ruts.

5.2.3 A probable service (A5) is indicated to the north of the Site.

Bibliography

BGS 2016a. *Geology of Britain Viewer*
http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html?src=topNav
Accessed 18th March 2016

BGS 2016b. British Geological Survey, *Borehole Scans*
http://www.bgs.ac.uk/data/boreholescans/home.html
Accessed 18th March 2016

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

Cleere, H. and Crossley, D. 1995. *The Iron Industry of the Weald (2nd Edition)*. Cardiff: Merton Priory Press

English Heritage 2008 *Geophysical Survey in Archaeological Field Evaluation 2nd Edition* Swindon: English Heritage

Straker, E. 1931 *Wealden Iron* London: Bell and Sons

UKSO 2016 *Soils map viewer* http://mapapps2.bgs.ac.uk/ukso/home.html
Accessed 22nd March 2016

Acknowledgements

Archaeology South-East would like to thank Wealden District Council for commissioning the survey.

HER Summary

Project code	160050					
Planning reference	none					
Site address	Land at Horeham Flat Farm, Horam, East Sussex					
District/Borough	East Sussex					
NGR (12 figures)	556880 116000					
Geology	Wadhurst Clay Formation - mudstone					
Fieldwork type					**Survey**	
Date of fieldwork	7th – 11th March 2016					
Sponsor/client	Wealden District Council					
Project manager	Neil Griffin					
Project supervisor	John Cook					
Project summary	*Evidence for possible archaeological features was scant across the western two thirds of the site. This may be due to absence of archaeological remains in this area or potentially increased overburden limiting the effectiveness of. In the far east of the site potential archaeological features include the possible iron working bloomery site previously only recorded by small amounts of cinder (slag) and place name evidence.* *The bloomery may have been enclosed with ditches shown by anomalies which may also correspond to possible grass marks noted in the field to the south of Cindergill and outside of the site. Areas of strong magnetism are likely to represent slag heaps, furnace locations or ore roasting. Moderate positive anomalies on the western side of the possible bloomery may be the result of cut features such as ditches or, possibly, wheel ruts.*					

Oasis form

OASIS ID: archaeol6-246500

Project details

Project name	Detailed Magnetometer Survey Land at Horeham Flat Farm, Horam, East Sussex
Short description of the project	Evidence for possible archaeological features was scant across the western two thirds of the site. This may be due to absence of archaeological remains in this area or potentially increased overburden limiting the effectiveness of. In the far east of the site potential archaeological features include the possible iron working bloomery site previously only recorded by small amounts of cinder (slag) and place name evidence. The bloomery may have been enclosed with ditches shown by anomalies which may also correspond to possible grass marks noted in the field to the south of Cindergill and outside of the site. Areas of strong magnetism are likely to represent slag heaps, furnace locations or ore roasting. Moderate positive anomalies on the western side of the possible bloomery may be the result of cut features such as ditches or, possibly, wheel ruts.
Project dates	Start: 07-03-2016 End: 11-03-2016
Previous/future work	No / Not known
Any associated project reference codes	160050 - Contracting Unit No.
Type of project	Field evaluation
Site status	None
Current Land use	Grassland Heathland 4 - Regularly improved
Monument type	NONE None
Methods & techniques	"Geophysical Survey"
Solid geology (other)	Wadhurst Clay Formation - mudstone
Drift geology	Unknown
Techniques	Magnetometry

Project location

Country	England
Site location	EAST SUSSEX WEALDEN HORAM Horeham Flat Farm, Horam, East Sussex
Postcode	TN21 0JL
Study area	10 Hectares

Site coordinates	TQ 56880 16000 50.921522030613 0.232294749055 50 55 17 N 000 13 56 E Point

Project creators

Name of Organisation	Archaeology South East
Project brief originator	Archaeology South East
Project design originator	ASE
Project director/manager	Neil Griffin
Project supervisor	John Cook
Type of sponsor/funding body	District Council
Name of sponsor/funding body	Wealden District Council

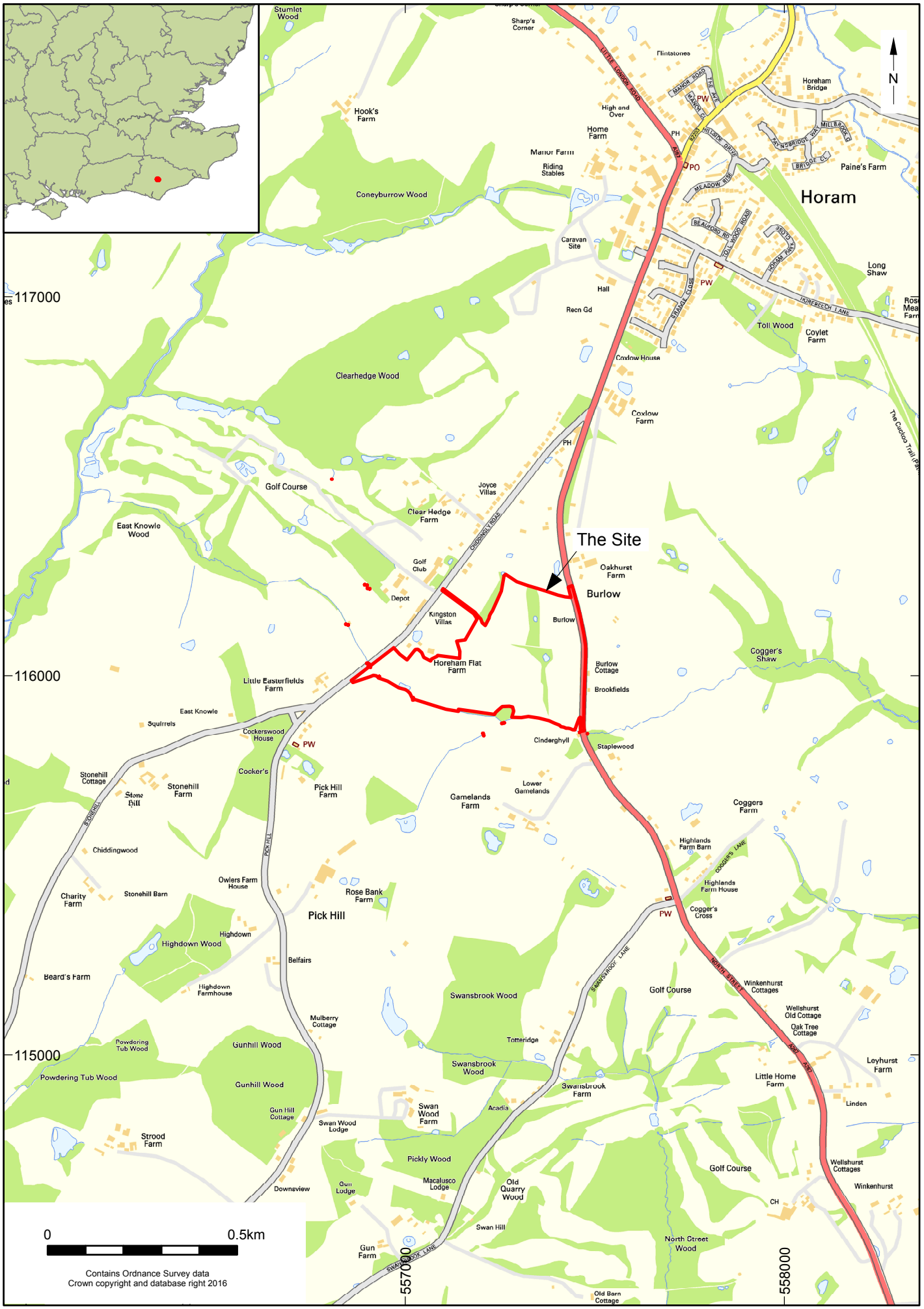
Project archives

Physical Archive Exists?	No
Digital Archive recipient	East Sussex County Council
Digital Contents	"Survey"
Digital Media available	"Geophysics"

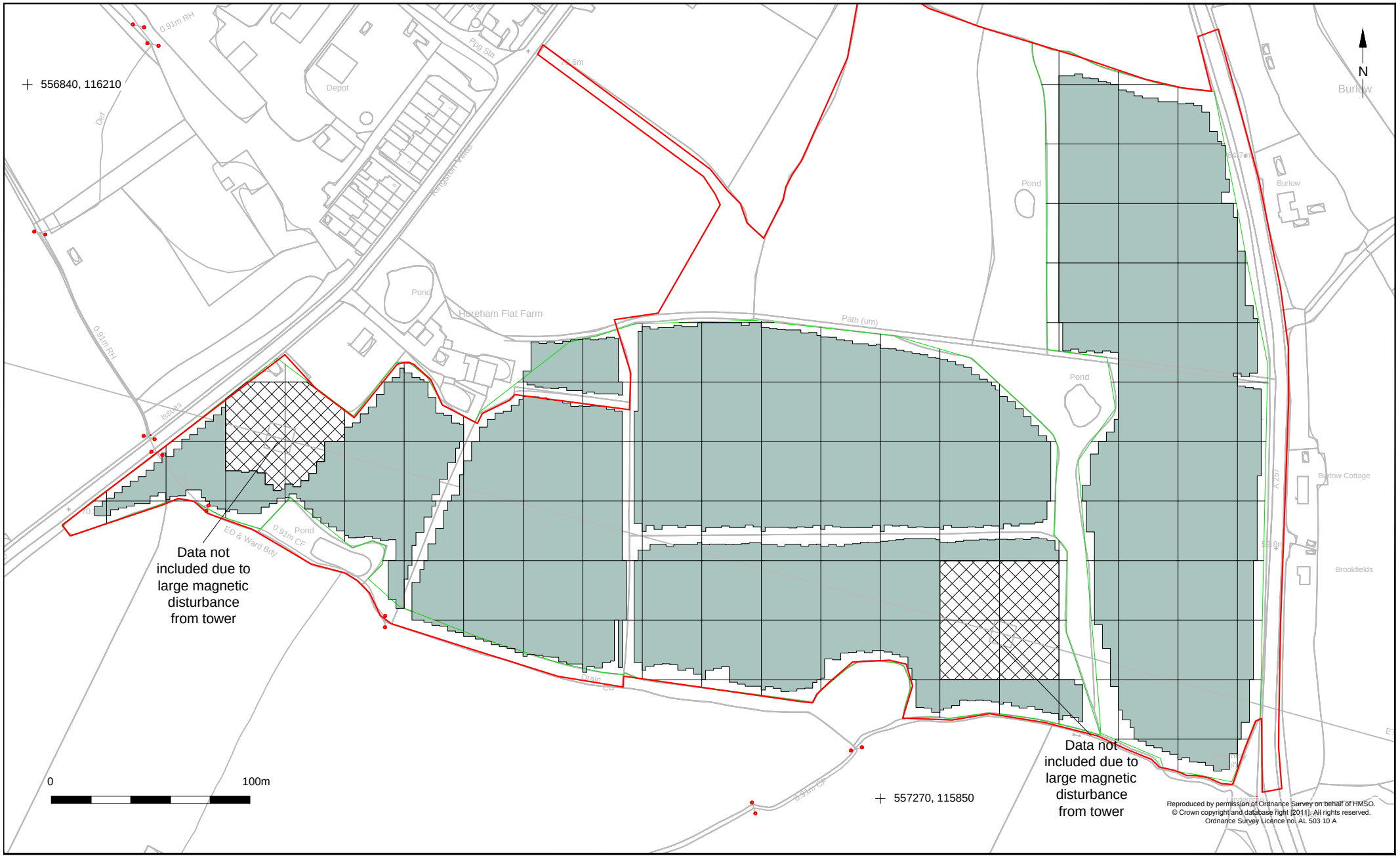
Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Detailed Magnetometer Survey Report Land at Horeham Flat Farm, Horam, East Sussex
Author(s)/Editor(s)	Cook, J.
Other bibliographic details	2016118
Date	2016
Issuer or publisher	ASE
Place of issue or publication	Portslade

Entered by	John Cook (john.cook@ucl.ac.uk)
Entered on	23 March 2016



© **Archaeology South-East**		Land at Horeham Flat Farm, Horam, East Sussex	Fig. 1
Project Ref: 160050	March 2016	Site location	
Report Ref: 2016118	Drawn by: JC		



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Project Ref: 160050	March 2016	Site plan	
Report Ref: 2016118	Drawn by: JC		

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Project Ref: 160050	March 2016	Raw data - west	
Report Ref: 2016118	Drawn by: JC		

N

Burlow

64.7m

Pond

Burlow

Path (um)

Pond

Pond

A 267

Burlow Cottage

59.8m

Brookfields

ETL

Bloomery (site of)

Cinderghyll

54.5m

-3SD mean 3SD

10nT 0nT -10nT

0 30m

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Project Ref: 160050	March 2016	Processed data - west	
Report Ref: 2016118	Drawn by: JC		

N

Burlow

64.7m

Pond

Burlow

Pond

Path (um)

Pond

A 267

Burlow Cottage

59.8m

Brookfields

Pond

ETL

Cinderghyll

54.5m

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-3SD mean 3SD

0 30m

7nT 0nT -7nT

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Project Ref: 160050	March 2016	Processed data - east	
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© **Archaeology South-East**		Horeham Flat Farm, Horam, East Sussex	Fig. 7
Project Ref: 160050	March 2016	Interpretation overview	
Report Ref: 2016118	Drawn by: JC		

© **Archaeology South-East**		Horeham Flat Farm, Horam, East Sussex	Fig. 8
Project Ref: 160050	March 2016	Interpretation area of possible bloomery	
Report Ref: 2016118	Drawn by: JC		

Fig. 9a Oblique Google Earth imagery with geophysical survey data overlain

Fig. 9b Oblique Google Earth 3D imagery with geophysical survey data overlain showing possible bloomery

Fig. 9c Oblique Google Earth 3D imagery over area of possible bloomery with possible grass marks in enclosure to south

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Project Ref: 160050	March 2016	Google Earth images	
Report Ref: 2016118	Drawn by: JC		

Fig. 10a small northern enclosure

Fig. 10b westernmost enclosure showing electricity tower base

Fig. 10c middle enclosures

Fig. 10d easternmost enclosures

Fig. 10e electricity tower in middle enclosures

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