Archaeology South-East

ASE

Detailed Magnetometer Survey Report
Land east of Warren Lane
Stanway, Colchester, Essex

NGR: 595200 223336
(TL 95200 23336)

ASE Project No: 160114
ASE Report No: 2016086

By John Cook

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Prepared by:	John Cook	Senior Geophysicist	J. Cook
Reviewed and approved by:	Jim Stevenson	Project Manager	
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Archaeology South-East
Units 1 & 2
2 Chapel Place
Portslade
East Sussex
BN41 1DR

Tel: 01273 426830
Fax: 01273 420866
Email: fau@ucl.ac.uk
www.archaeologyse.co.uk

Abstract

Archaeology South-East was commissioned by CgMs Consulting Ltd to undertake a magnetometer survey on land east of Warren Lane, Stanway, Colchester, Essex. The work was undertaken between Thursday 25th and Friday 26th February 2016.

The most compelling evidence for possible archaeological features was represented by a positive anomaly on higher gravels in the east of the site. This anomaly may represent part of a rectilinear cut feature such as an infilled enclosure ditch. Further moderate positive anomalies representing possible ditches correspond to two features seen on aerial photography. These features appear to relate to a possible palaeochannel system flowing into the Roman River valley. A large area of weak positive magnetic enhancement corresponds to the broad area of the features noted on aerial photography. Several weak discrete and linear positive anomalies may relate to cut features such as pits and ditches but a natural origin cannot be discounted. Linear anomalies may also relate to plough scarring.

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 CgMs Consulting Ltd to undertake a magnetometer survey on land east of Warren Lane, Stanway, Colchester, Essex and hereafter referred to as 'the site' (NGR. 595200 223336; 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 London Clay formation – clay, silt and sand. Superficial deposits are recorded as Cover sand- clay, silty, sandy. Although, gravel was observed on site which may relate to Kesgrave catchment subgroup – sand and gravel. A number of boreholes lie within the vicinity of the site on the BGS Borehole Viewer (BGS 2016b) but these mostly confirm sand and gravel to the south of the site or are monitoring wells.

1.2.2 The site comprises a single parcel of land made up of an irregular plot of arable land to the north of Stanway Quarry. It is bounded by residential development, hedgerows and roads (Figure 2).

1.3 Aims of geophysical investigation

1.3.1 The primary aim of the archaeological survey was to obtain a better understanding of the archaeological potential of the site. This 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 Chris Russel. The project was managed by Andy Leonard (fieldwork), Jim Stevenson and Dan Swift (post-fieldwork).

2.0 ARCHAEOLOGICAL BACKGROUND

2.1 Desk Based Assessment

2.1.1 An Archaeological Desk Based Assessment (DBA) of the site has been undertaken by CgMs (CgMs 2015). The historical background for the site is presented therein and is not repeated in full here.

2.1.2 In summary the site has a low-nil potential for containing archaeological deposits relating to the early prehistoric periods, a low to moderate potential for the Iron Age and Roman period and a low to nil potential for the Anglo Saxon, early medieval, late medieval and early post medieval periods.

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 595200 223336). The work was undertaken between Thursday 25th and Friday 26th February 2016 during cold and dry 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 three sites totalling approximately *c.*8.8 hectares of pasture land, bounded by hedgerows and wire fences.

4.2 Survey limitations

4.2.1 Physical obstructions encountered on site 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 it 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 a single parcel of land with an undulating dry valley running roughly north to south through the site. At the time of the survey the land was under grassland with evidence of previous cereal cultivation.

4.4.3 Evidence of possible archaeological activity included the following described anomalies (Figure5). The most obvious possible archaeological anomalies are the linear and discrete positive anomalies, noted as A1 and A2, and likely to be due to cut features such as pits and ditches. Weak positive anomalies (A3) may relate to a cut features such as ditches. However these anomalies may be the result of previous agricultural activity or geological features.

4.4.4 A large area of weak magnetic enhancement (A4) may relate to archaeological activity. However, this area may also relate to natural geological features such as palaeochannels, and, indeed, corresponds to the dry valley running across the site and features noted in aerial photography (Figure 6).

4.4.5 Areas of magnetic debris (A5) may relate to a scattering of near surface ferrous material, ground disturbance or made ground.

4.4.6 Dipolar anomalies (A6) 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.

4.4.7 Magnetic disturbance is noted near the site boundaries and a monitoring well (A7).

5.0 CONCLUSIONS

5.1 Evidence for possible archaeological features was represented by a positive anomaly on higher gravels in the east of the site (A1). This anomaly may represent part of a rectilinear cut feature such as an infilled enclosure ditch.

5.2 Further moderate positive anomalies (A2) representing possible ditches correspond to two features seen on aerial photography (Figure 6a). These features appear to relate to a possible palaeochannel system flowing into the Roman River valley which is located around 1.4km to the southwest of the site. A large area of weak positive magnetic enhancement (A4) corresponds to the broad area of the features noted on aerial photography.

5.3 Several weak discrete and linear positive anomalies (A3) may relate to cut features such as pits and ditches but a natural origin cannot be discounted. Linear anomalies may also relate to plough scarring.

5.4 A large area of magnetic debris (A5) may indicate an area of made ground or a geological deposit. Small areas of magnetic debris may indicate made ground and dipolar anomalies (A6) near surface ferrous objects.

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Acknowledgements

Archaeology South-East would like to thank CgMs Consulting Ltd for commissioning the survey.

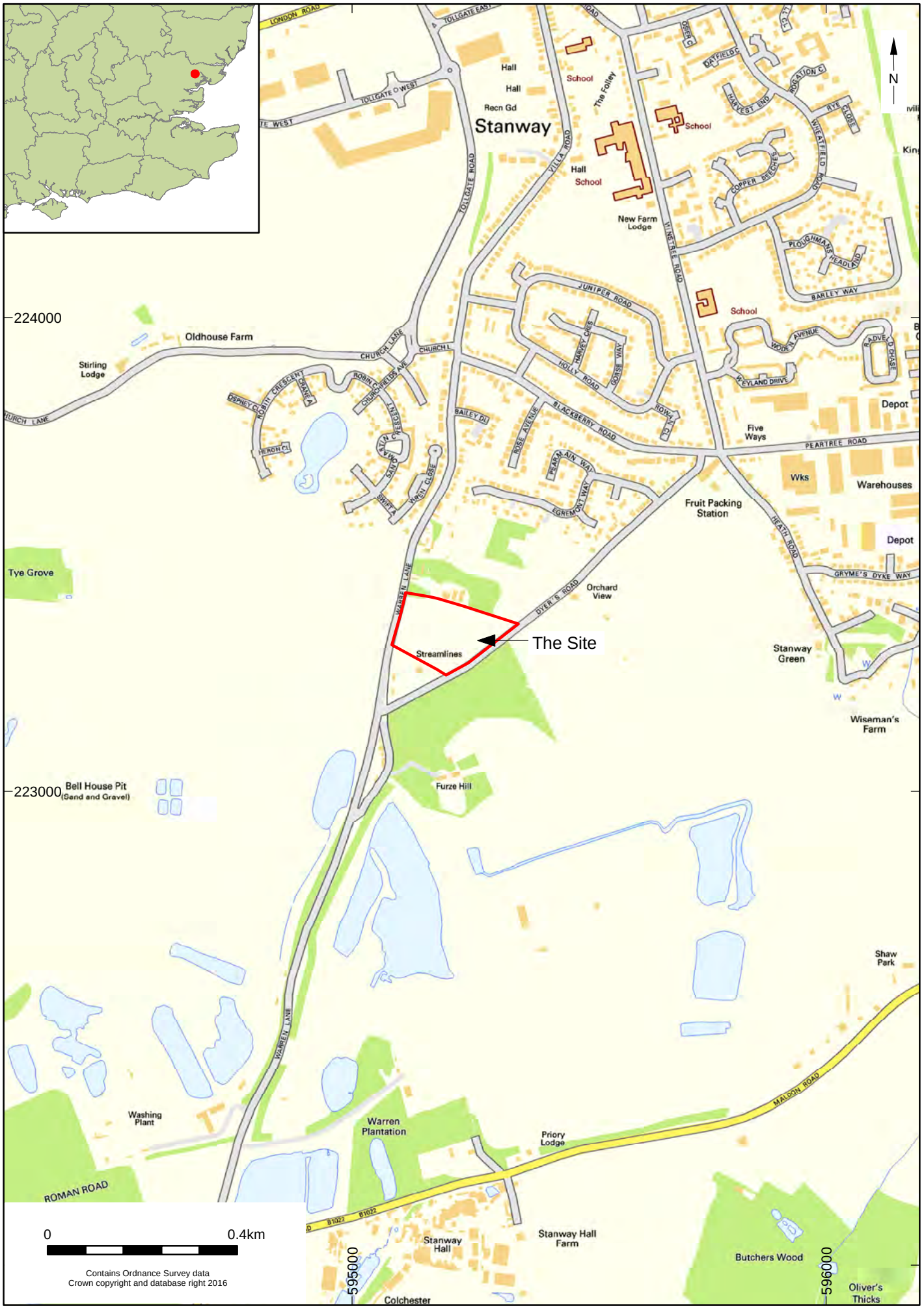
HER Summary

Project code	160114					
Planning reference	none					
Site address	Land east of Warren Lane, Stanway, Colchester					
District/Borough	Essex					
NGR (12 figures)	595200 223336					
Geology	London Clay formation – clay, silt and sand Cover sand- clay, silty, sandy Kesgrave catchment subgroup – sand and gravel					
Fieldwork type					**Survey**	
Date of fieldwork	25th – 26th February 2016					
Sponsor/client	CgMs Consulting					
Project manager	Andy Leonard					
Project supervisor	John Cook					
Project summary	*Evidence for possible archaeological features was represented by a positive anomaly on higher gravels in the east of the site. This anomaly may represent part of a rectilinear cut feature such as an infilled enclosure ditch. Further moderate positive anomalies representing possible ditches correspond to two features seen on aerial photography. These features appear to relate to a possible palaeochannel system flowing into the Roman River valley. A large area of weak positive magnetic enhancement corresponds to the broad area of the features noted on aerial photography. Several weak discrete and linear positive anomalies may relate to cut features such as pits and ditches but a natural origin cannot be discounted. Linear anomalies may also relate to plough scarring.*					

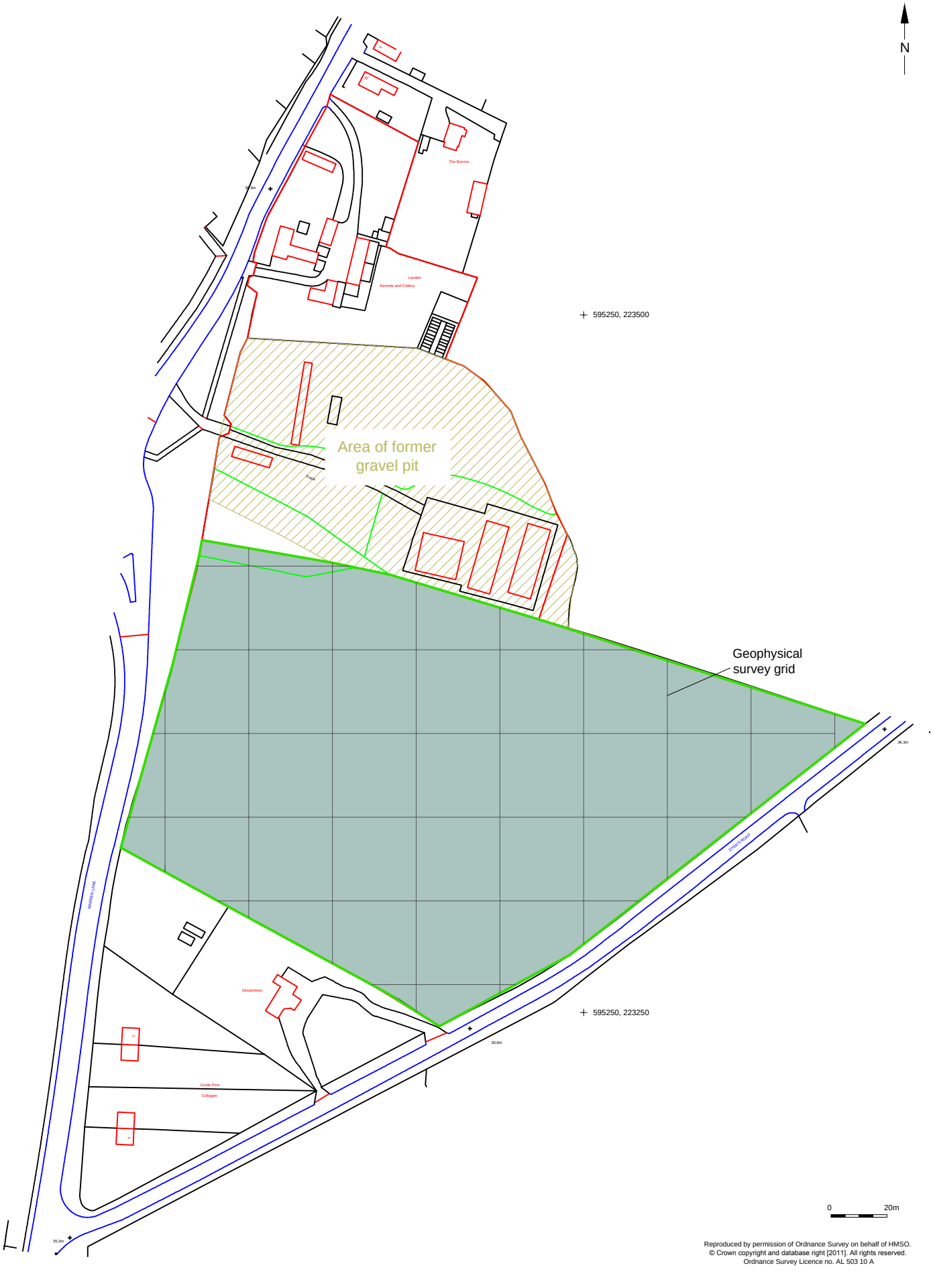
OASIS ID: archaeol6-245429

Project details	
Project name	Land East of Warren Lane, Stanway
Short description of the project	Archaeology South-East was commissioned by CgMs Consulting Ltd to undertake a magnetometer survey on land east of Warren Lane, Stanway, Colchester, Essex. The work was undertaken between Thursday 25th and Friday 26th February 2016. The most compelling evidence for possible archaeological features was represented by a positive anomaly on higher gravels in the east of the site. This anomaly may represent part of a rectilinear cut feature such as an infilled enclosure ditch. Further moderate positive anomalies representing possible ditches correspond to two features seen on aerial photography. These features appear to relate to a possible palaeochannel system flowing into the Roman River valley. A large area of weak positive magnetic enhancement corresponds to the broad area of the features noted on aerial photography. Several weak discrete and linear positive anomalies may relate to cut features such as pits and ditches but a natural origin cannot be discounted. Linear anomalies may also relate to plough scarring.
Project dates	Start: 26-02-2016 End: 03-03-2016
Type of project	Field evaluation
Current Land use	Cultivated Land 1 - Minimal cultivation
Project location	
Country	England
Site location	ESSEX COLCHESTER STANWAY Land East of Warren Lane, Stanway
Postcode	CO3OLL
Study area	2.5 Hectares
Site coordinates	TL 595200 223336 51.876248171868 0.31764322943 51 52 34 N 000 19 03 E Point
Height OD / Depth	Min: 38m Max: 38m
Project creators	
Name of Organisation	Archaeology South-East

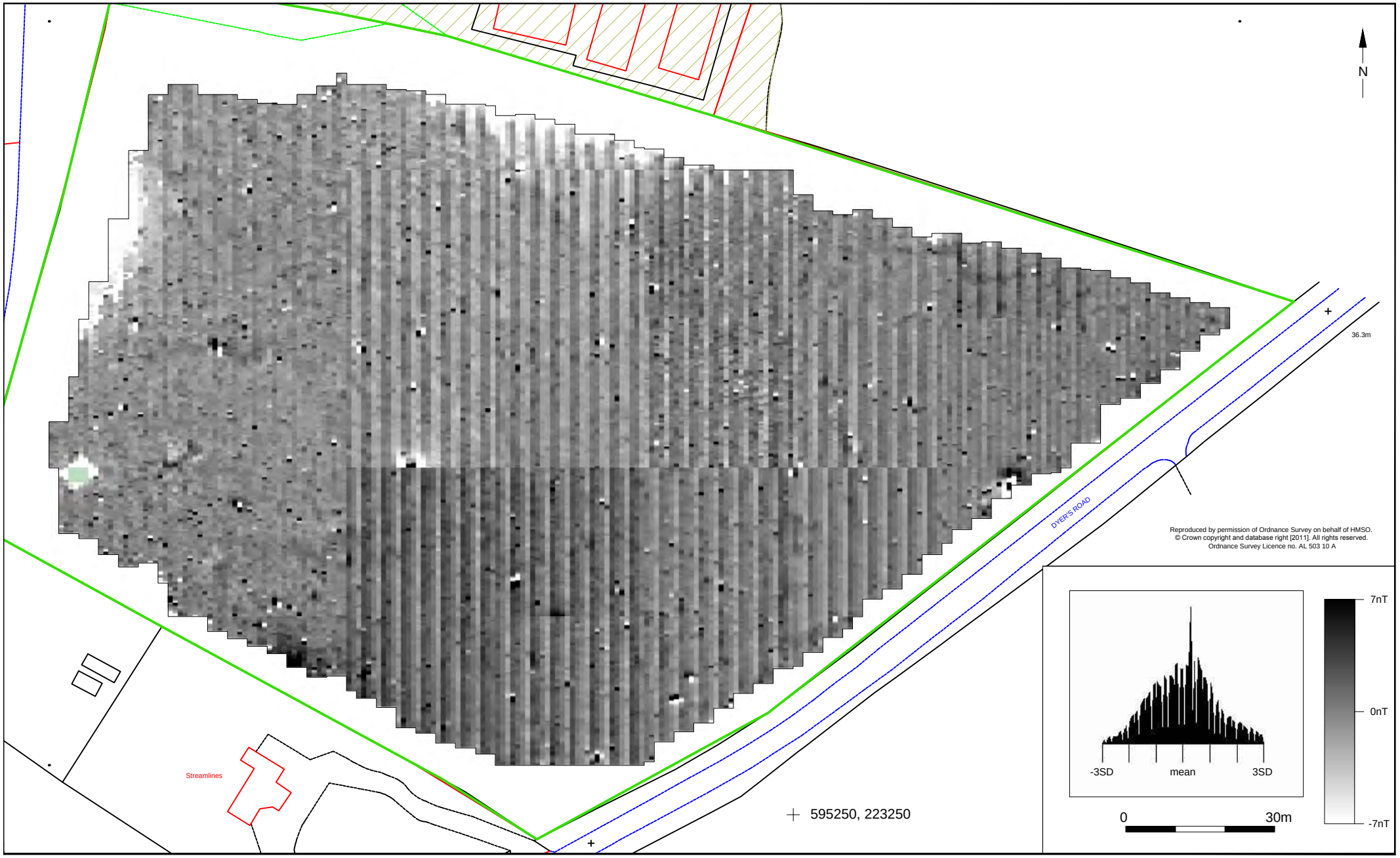
Project brief originator	CgMs Consulting
Project design originator	CgMs Consulting
Project director/manager	Andy Leonard
Project supervisor	John Cook
Type of sponsor/funding body	Developer
Project archives	
Digital Archive recipient	Colchester Museum
Digital Media available	"Geophysics","Survey"
Project bibliography 1	
Publication type	Grey literature (unpublished document/manuscript)
Entered by	Jim Stevenson (jimstevenson@ucl.ac.uk)
Entered on	11 March 2016



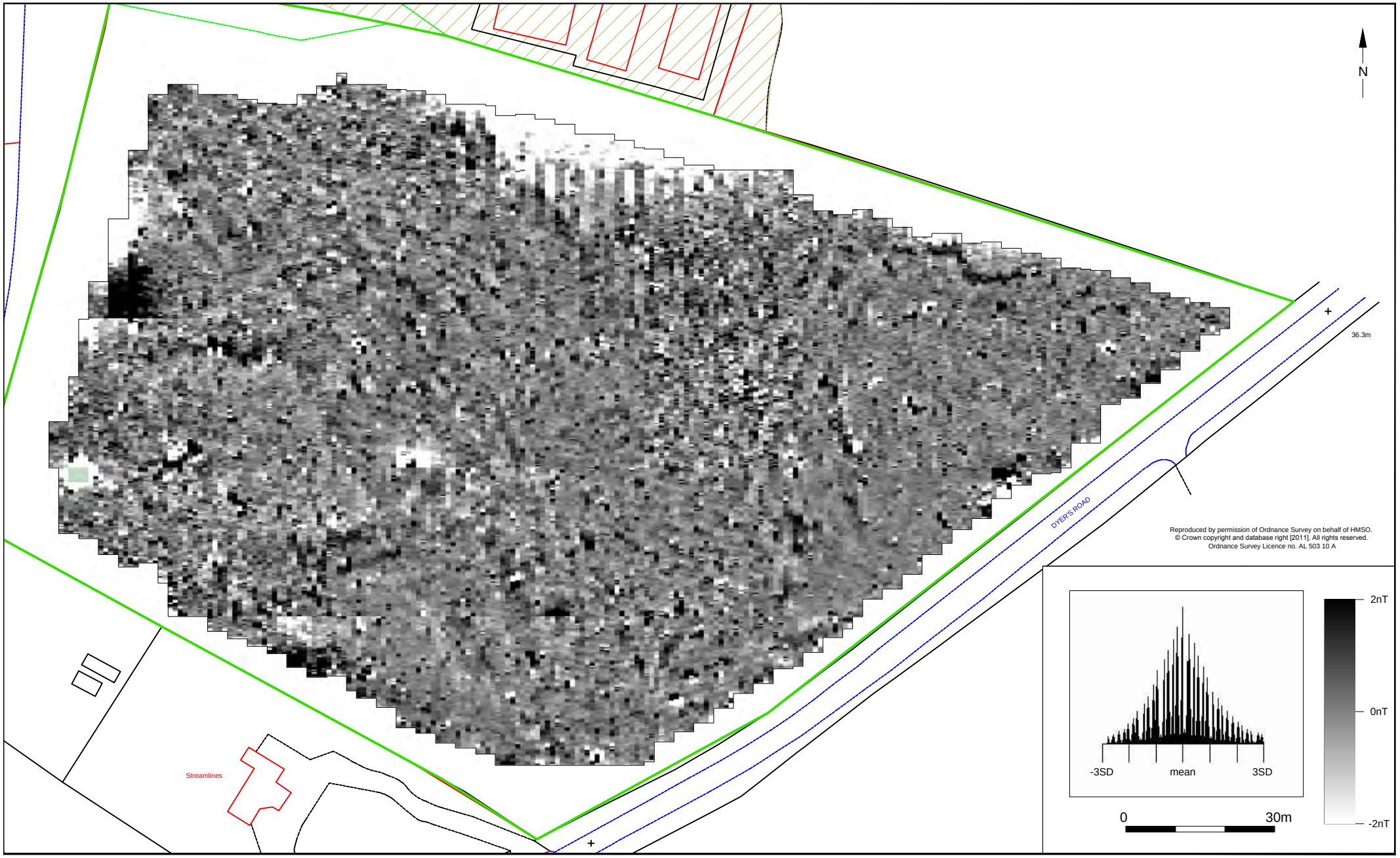
© Archaeology South-East		Land East of Warren Lane, Stanway, Colchester, Essex	Fig. 1
Project Ref: 160114	March 2016	Site location	
Report Ref: 2016086	Drawn by: JC		



© Archaeology South-East		Land East of Warren Lane, Stanway, Colchester, Essex	Fig. 2
Project Ref: 160114	March 2016	Site plan	
Report Ref: 2016086	Drawn by: JC		



© **Archaeology South-East**		Land East of Warren Lane, Stanway, Essex	Fig. 3
Project Ref: 160114	March 2016	Raw data	
Report Ref: 2016086	Drawn by: JC		



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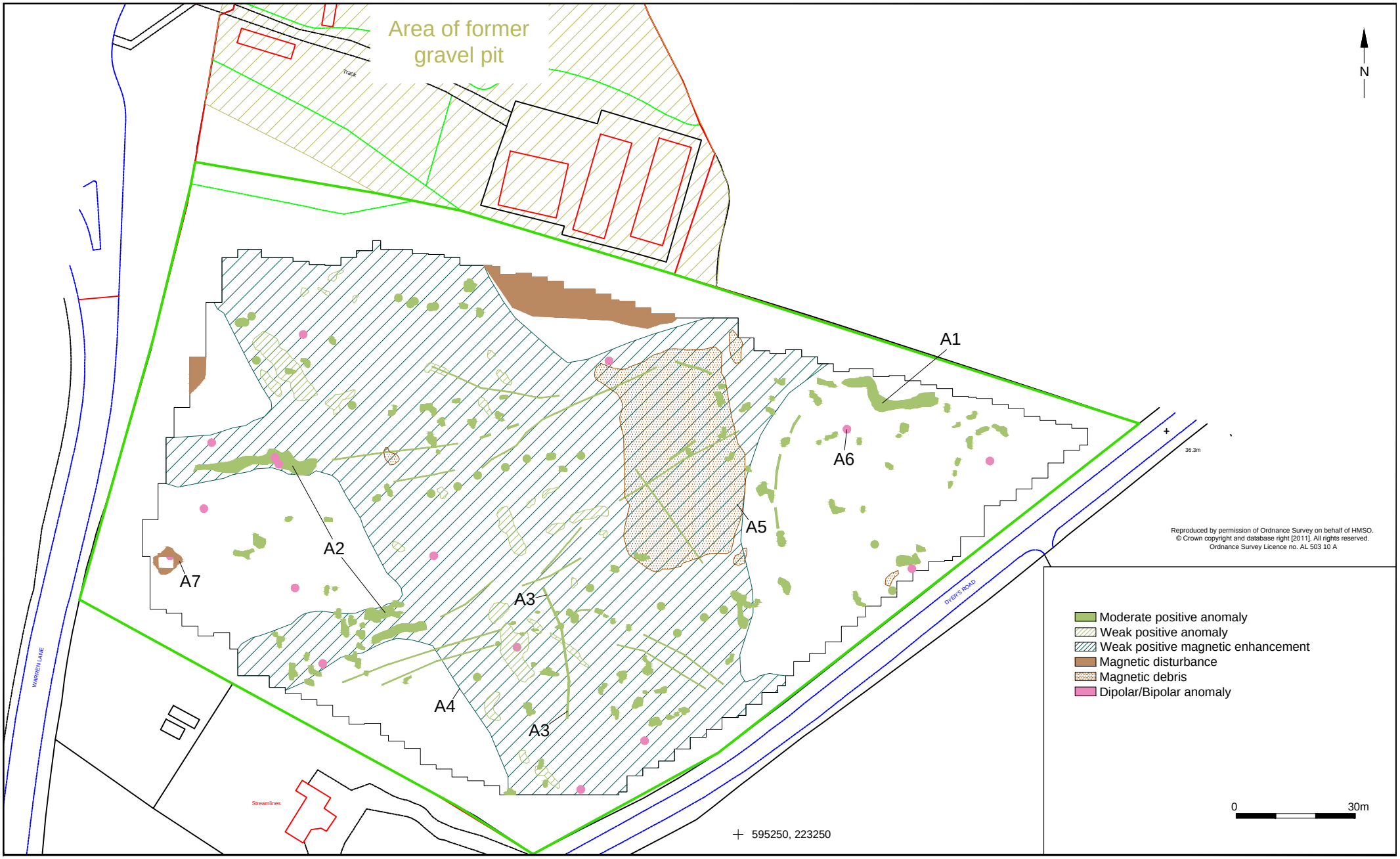
Project Ref: 160114	March 2016	Processed data	
Report Ref: 2016086	Drawn by: JC		



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Project Ref: 160114	March 2016	Interpretation	
Report Ref: 2016086	Drawn by: JC		

Fig. 6a Oblique Google Earth imagery showing crop marks two possible ditches in the west of the site and one in the east

Fig. 6b Oblique Google Earth 3D imagery showing possible continuation of palaeochannel into adjacent field to the east

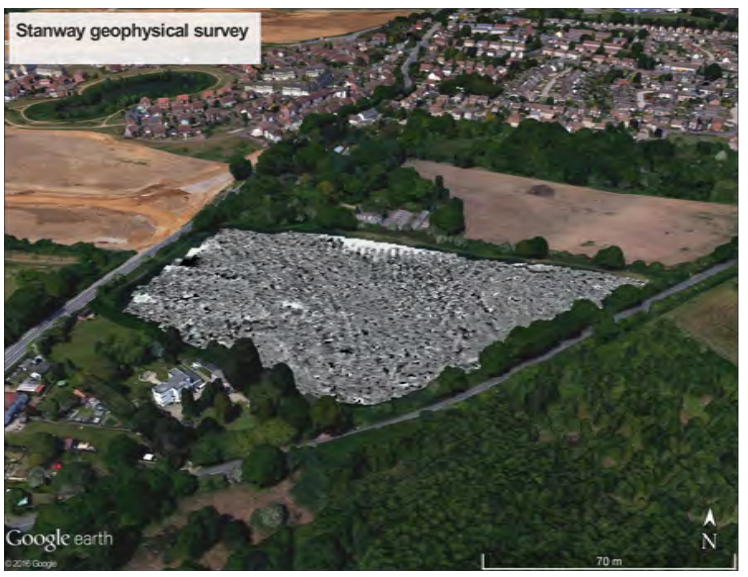

Fig. 6c Oblique Google Earth 3D imagery with processed geophysics overlain

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Project Ref: 160114	March 2016	Google Earth images	
Report Ref: 2016086	Drawn by: JC		

Sussex Office
Units 1 & 2
2 Chapel Place
Portslade
East Sussex BN41 1DR
tel: +44(0)1273 426830
email: fau@ucl.ac.uk
www.archaeologyse.co.uk

Essex Office
27 Eastways
Witham
Essex
CM8 3YQ
tel: +44(0)1376 331470
email: fau@ucl.ac.uk
www.archaeologyse.co.uk

London Office
Centre for Applied Archaeology
UCL Institute of Archaeology
31-34 Gordon Square
London WC1H 0PY
tel: +44(0)20 7679 4778
email: fau@ucl.ac.uk
www.ucl.ac.uk/caa