

**Detailed Magnetometer Survey of Land at New Line
Learning Academy, Boughton Monchelsea, Kent.**

NGR: 577040 152670

ASE Project No: 5286

OASIS ID: archaeol6-118060

ASE Report No. 2012021

**By Chris Russel
With Illustrations by Justin Russell**

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Abstract

Archaeology South East was commissioned by CgMs Consulting Ltd. to carry out a detailed fluxgate gradiometer survey on land at New Line Learning Academy, Boughton Monchelsea, Kent. The survey covered approximately 9 hectares and took place between the 9th and the 12th January 2012. The survey area consisted of short grass bounded by school buildings, woodland and thoroughfares. Evidence for modern activity on site was seen across the survey area making the identification of possible buried archaeology problematic. Despite this, several anomalies with archaeological potential were visible in the results. Also noted were responses likely to be of geological origin.

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
2.0	ARCHAEOLOGICAL BACKGROUND
3.0	SURVEY METHODOLOGY
4.0	GEOPHYSICAL SURVEY RESULTS
5.0	CONCLUSIONS

Bibliography
Acknowledgements

Appendix. Raw survey data (CD).

HER Summary sheet

OASIS Form

Figures

- Figure 1: Site location
- Figure 2: Area of geophysics
- Figure 3: Raw shade plot
- Figure 4: Processed shade plot
- Figure 5: Processed and interpolated shade plot
- Figure 6: Interpretation - probable modern disturbance
- Figure 7: Interpretation positive anomalies

1.0 INTRODUCTION

1.1 Site background

- 1.1.1 Archaeology South-East was commissioned by CgMs Consulting Ltd. to conduct a Magnetometer survey over land at The New Line Learning Academy, Boughton Monchelsea, Kent hitherto referred to as 'the survey area' (NGR 577040 152670, Figure 1).

1.2 Geology and topography

- 1.2.1 According to the British Geological Survey (2012) the site lies over bedrock geology of Hythe Interbedded Sandstone and (subequal/subordinate) Limestone. No overlying 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 Catherine Douglas, John Cook and Chris Russel; project managed by Neil Griffin (fieldwork) and by Jim Stevenson (post fieldwork).

2.0 ARCHAEOLOGICAL BACKGROUND

- 2.1** A desk-based assessment (DBA) undertaken by CgMs Consulting Ltd. (Hawkins 2011) concluded that the study site has low potential for Palaeolithic and Mesolithic periods. Neolithic flint implements have been recovered from two nearby locations and there is therefore a moderate potential for remains of this period being encountered. During the Bronze Age the site would have lain within an agricultural and ritual landscape comprising fields, farmstead, enclosures and funerary monuments. Traces of field systems and a possible dew pond exist close to the site and the potential for encountering further remains of this period within the site are regarded as moderate to good.
- 2.2** A small mid Iron Age to Roman settlement interpreted as a probable farmstead lies east of the site. Iron Age field systems have also been identified close to the site and the Rochester-Maidstone-Hastings Roman road passes along the eastern boundary of the site. A substantial earthwork enclosure north of the site, now substantially destroyed by development in the 1920's, possibly represents a shrine precinct. A Roman cemetery, now largely destroyed, lies to the south east of the site whilst a Roman field system, superimposing the Iron Age one, is recorded to the east of the site. Roman structural remains have also been encountered to the east. Therefore the potential for encountering further Roman remains is considered as being very good on the eastern half of the site and good for the western half.
- 2.3** No finds of Anglo Saxon or early medieval date are recorded within a 1km radius of the site and cartographic sources show that the site lies within an agricultural landscape (latterly a playing field on the western half) from the mid-18th century onwards. Archaeological potential from the Anglo Saxon period onwards is therefore regarded as low, but it is acknowledged that former historic field divisions may survive as buried features.

3.0 SURVEY METHODOLOGY

3.1 Geophysical survey

3.1.1 A fluxgate gradiometer (magnetometry) survey was undertaken in Areas A and B as depicted in Figure 2 (TQ 577040 152670).

3.1.2 The fieldwork was undertaken between the 9th and the 12th of January 2012 when the weather was cold and overcast with occasional light showers.

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 zigzag traverses in Area A and north-east to south-west zig-zag traverses in Area B.

3.3 Instrumentation used for setting out the survey grid

3.3.1 The survey grid for the site was geo-referenced using a Topcon GR3 receiver and FC-250 controller using Virtual Reference Stations (VRS). 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 Geoplot V3 published by Geoscan Research. 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. The data was then INTERPOLATED along the 'Y' axis to cosmetically improve look of the data. As there is the potential to remove more ephemeral anomalies with this processes results are presented both with and without the interpolation applied. Figures 4 & 5 display the processed survey data.

3.5 Data presentation

- 3.5.1 Data is presented using images exported from Geoplot into AutoCAD software and inserted into the geo-referenced site grid. Data is presented (Figures 3-7) as raw data and processed data greyscale plots.

4.0 GEOPHYSICAL SURVEY RESULTS (Figures 3-5)

4.1 Description of site

- 4.1.1 The survey area consisted of approximately nine hectares of short grass. The survey took place in two distinct areas, the largest of which was occupied by playing fields (Area A). In addition to this a strip of grids was surveyed along the northern and eastern boundaries of the agricultural field to the north-east of the main survey area (Area B). The site is bounded by woodland to the west and east. Area A was bounded to the north by school buildings and Area B was bounded to the north by a hedgerow with playing fields beyond. Both sites were bounded in the south by roads and track-ways. Both survey areas were relatively flat.

4.2 Survey limitations

- 4.2.1 The north of the Area A contained semi-permanent fencing. Where this proved to be a barrier to survey or a health and safety hazard these areas were omitted from the survey. Also present in this area were several goalposts and two all weather cricket pitches which proved a slight barrier to survey and some areas around these were also omitted.
- 4.2.2 Disturbed ground was noted in the north-western extent of the main survey area. Four grids were surveyed to determine the effect on the survey results. This proved to be detrimental and plans to survey further grids in this area were abandoned after consultation with the client. There were no significant barriers to the survey in Area B.

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 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 Area A: interpretation of fluxgate gradiometer results (Figures 6 and 7)**
- 4.4.1 Evidence of modern activity can be seen across the entire survey area making interpretation problematic. Three linear bipolar anomalies can be made out, one running along the southern boundary, another running south-west to north-east and a third running roughly east to west in the north of the survey area. These are almost certainly modern services of one kind or another.
- 4.4.2 Other discrete areas of modern disturbance are also visible. These were characterised by extremely high responses some of which were dipolar in nature. These relate to sports-related surface features, geotechnical boreholes or recent removal of tree boles. Alongside these areas there is a spread of near surface metallic object across the survey area which relate to modern activity at the site.
- 4.4.3 Areas of disturbed ground can be seen in the north of the survey area almost certainly relating to the construction of the existing school buildings.
- 4.4.4 A complex of series of strong positive anomalies is evident in the south and east of Area A. These appear to form erratic linear alignments and are consistent with the responses one might expect from fissures within the bedrock geology.
- 4.4.5 Five, ephemeral, moderate positive anomalies are noted in the survey results. A1, A4 and A5 are linear in nature and appear to be running north-west to south-east on similar alignments. A3 runs approximately east to west and is interrupted by an area of modern disturbance. A2 is noted in close physical association with anomalies A1 and A3 and runs roughly north-east to south-west.

4.5 Area B: interpretation of fluxgate gradiometer results (Figures 6 and 7)

- 4.5.1 Modern disturbance similar to that noted in Area A is evident in the results for the eastern survey including discrete areas of disturbance, disturbed ground and near surface metallic objects. A good deal of modern rubbish was noted on the surface during the survey which may have been deposited by activity associated with nearby housing or by plough action.
- 4.5.2 Discernible anomalies are restricted to the south of the survey area and even these are obscured by modern disturbance. Three linear anomalies with moderate responses are just detectable. Anomalies B1 and B3 are positive in response and appear to run north-east to south-west with B1 being the wider of the two features. B1 was noted as a visible earthwork during the survey. B2 is negative in response and runs north-west to south-east.
- 4.5.3 In addition to these linear anomalies there is a group of positive features with strong responses noted at B4. These may indicate discrete archaeological features or could be responses from geological fissures similar to those noted above.

5.0 CONCLUSION

5.1 Discussion

- 5.1.1 Interference from modern activity was evident across all areas surveyed at New Line Learning Academy. This took the form of very strong discrete responses, areas of disturbed ground and near surface objects caused by modern sports related activity, the development of the existing school , geotechnical boreholes or modern rubbish dumping all of which were observed during the survey. Such disturbance may mask the presence of features of archaeological origin.
- 5.1.2 The complex of strong positive anomalies identified in the main survey area almost certainly relate to fissures within the underlying solid geology.
- 5.1.3 Despite the level of modern disturbance noted in the results it was still possible to make out several anomalies that have the potential to indicate buried archaeology. Moderate linear anomalies were noted in both survey areas, with three (A1, A4 and A5) in Area A being on similar alignments. Area B contained two similar anomalies, one of which was observed as a visible earthwork during the survey as well as a group of strong, discrete positive anomalies. These anomalies potentially relate to buried archaeology such as buried pits and ditches although a geological origin for these features should not be ruled out.

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Acknowledgements

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

SMR Summary Form

Site Code	-					
Identification Name and Address	New Line Learning Academy, Boughton Monchelsea					
County, District &/or Borough	Kent					
OS Grid Refs.	577040 152670					
Geology	Hythe interbedded sandstone and limestone					
Arch. South-East Project Number	5286					
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.	9th-12th Jan 2012		
Sponsor/Client	CgMs					
Project Manager	Neil Griffin					
Project Supervisor	Chris Russel					
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 CgMs Consulting Ltd. to carry out a detailed fluxgate gradiometer survey on land at New Line Learning Academy, Boughton Monchelsea, Kent. The survey covered approximately 9 hectares and took place between the 9th and the 12th January 2012. The survey area consisted of short grass bounded by school buildings, woodland and thoroughfares. Evidence for modern activity on site was seen across the survey area making the identification of possible buried archaeology problematic. Despite this, several anomalies with archaeological potential were visible in the results. Also noted were responses likely to be of geological origin.</i></p>						

OASIS Form

OASIS ID: archaeol6-118060

Project details

Project name	Magnetometer Survey New Line Academy Boughton Monchelsea
Short description of the project	Archaeology South East was commissioned by CgMs Consulting Ltd. to carry out a detailed fluxgate gradiometer survey on land at New Line Learning Academy, Boughton Monchelsea, Kent. The survey covered approximately 9 hectares and took place between the 9th and the 12th January 2012. The survey area consisted of short grass bounded by school buildings, woodland and thoroughfares. Evidence for modern activity on site was seen across the survey area making the identification of possible buried archaeology problematic. Despite this, several anomalies with archaeological potential were visible in the results. Also noted were responses likely to be of geological origin.
Project dates	Start: 09-01-2012 End: 12-01-2012
Previous/future work	Not known / Not known
Any associated project reference codes	5286 - Contracting Unit No.
Type of project	Recording project
Site status	None
Current Land use	Other 14 - Recreational usage
Current Land use	Cultivated Land 1 - Minimal cultivation
Monument type	NONE None
Significant Finds	NONE None
Investigation type	'Geophysical Survey'
Solid geology (other)	Hythe interbedded sandstone and limestone
Drift geology	Unknown
Techniques	Magnetometry

Project location

Country	England
Site location	KENT MAIDSTONE BOUGHTON MONCHELSEA New Line Academy
Postcode	ME15 9QL
Study area	9.00 Hectares
Site coordinates	TQ 7704 5267 51.2451261211 0.536844171123 51 14 42 N 000 32 12 E Point

Project creators

Name of Organisation	Archaeology South East
Project brief originator	CgMs Consulting
Project design originator	Archaeology South-East
Project director/manager	Neil Griffin
Project supervisor	Chris Russel
Type of sponsor/funding body	CgMs Consulting

Project archives

Physical Archive Exists?	No
Digital Archive recipient	CgMs
Digital Media available	'Geophysics'
Paper Archive Exists?	No

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Detailed Magnetometer Survey on Land at New Line Academy, Boughton Monchelsea, Kent
Author(s)/Editor(s)	Russel,C

Other bibliographic details Report No: 2012021

Date 2012

Issuer or publisher ASE

Place of issue or publication	Portslade
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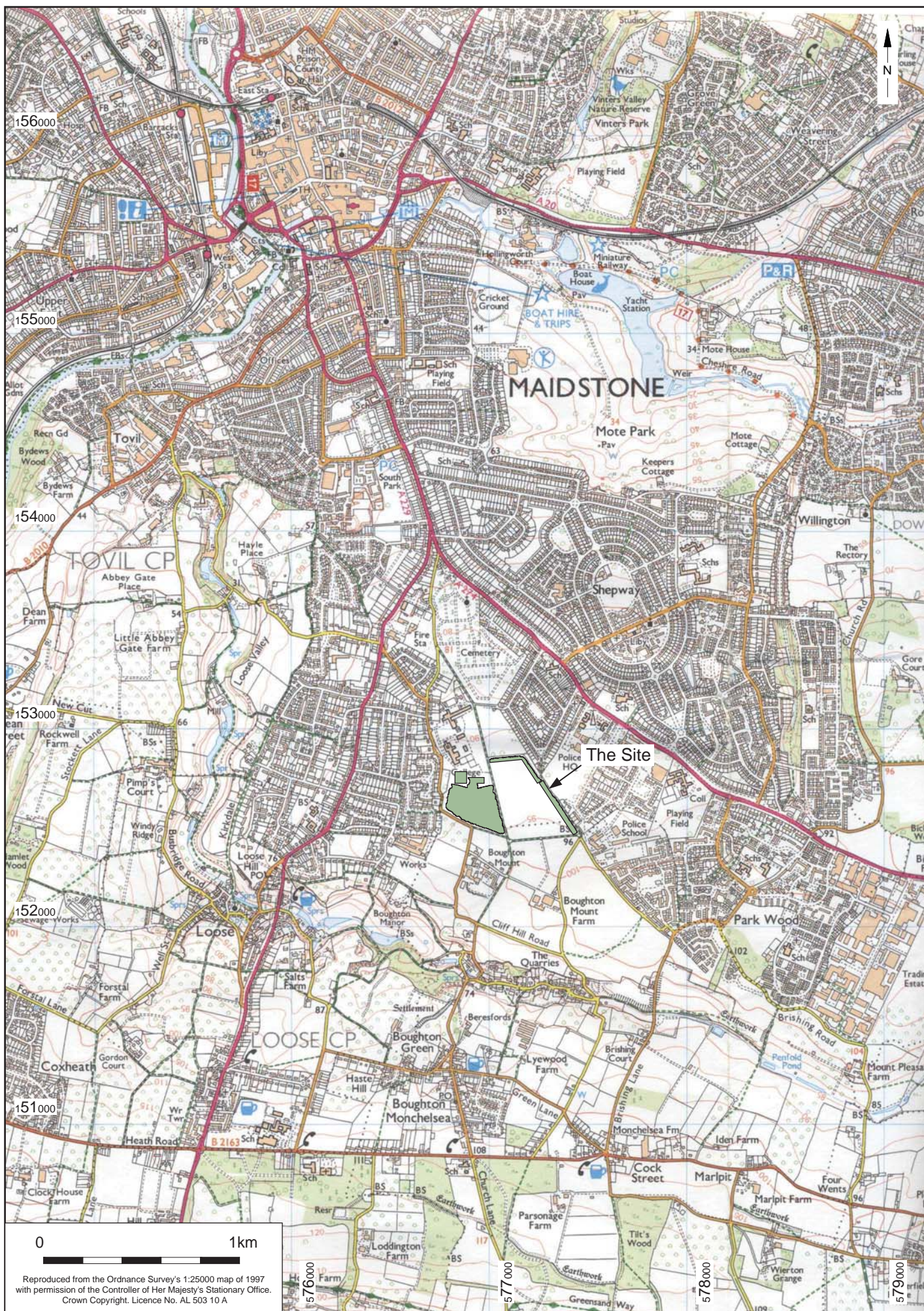
Entered by Chris Russel (c.russel@ucl.ac.uk)

Entered on 23 January 2012

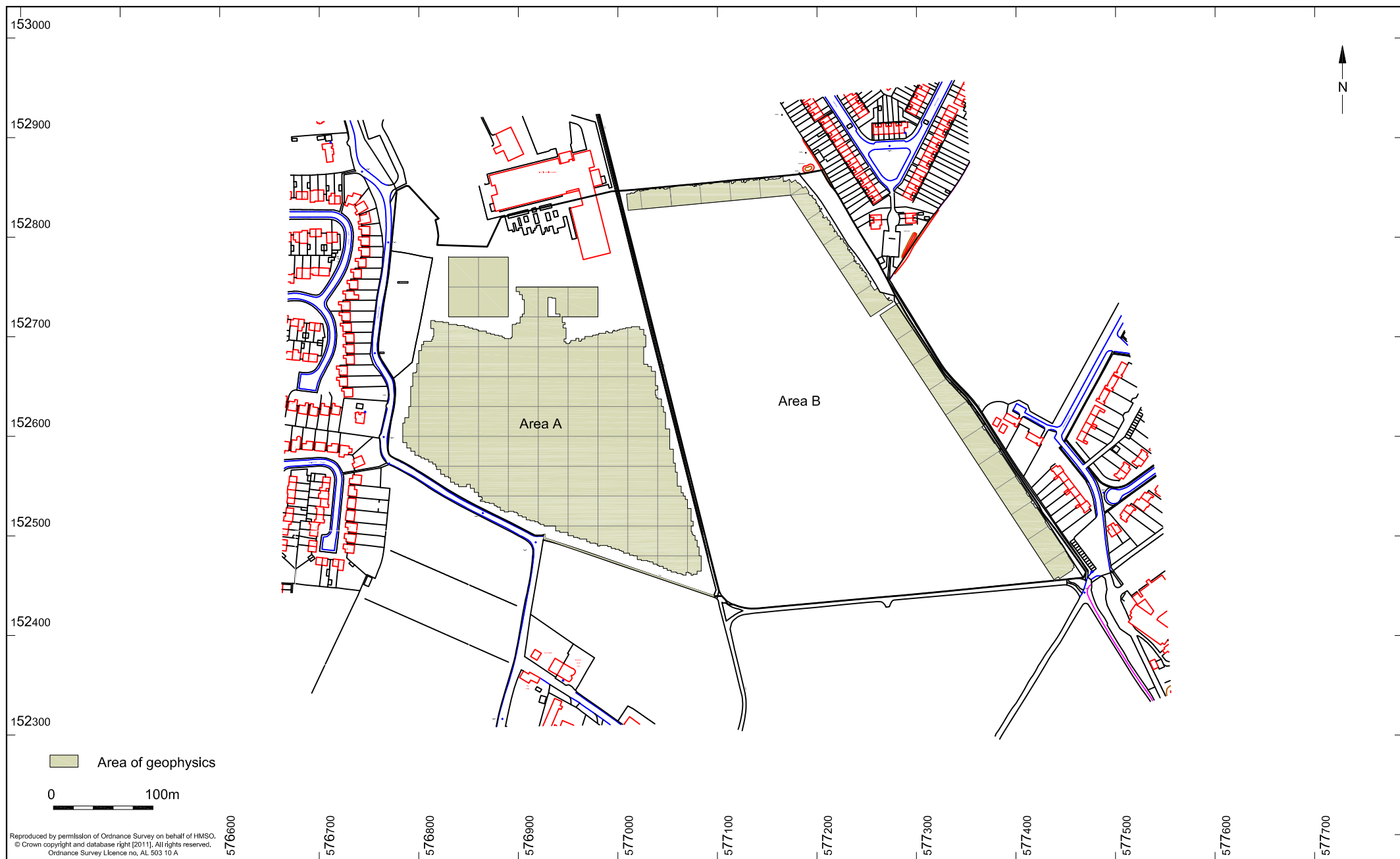
Appendix 1

Included on C.D

1. Raw Magnetometry Data



© Archaeology South-East		Land at New Line Academy, Boughton Monchelsea	Fig. 1
Project Ref: 5286	Jan 2012	Site location	
Report Ref: 2012021	Drawn by: JLR		



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Project Ref: 5286

Jan 2012

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Land at New Line Academy, Boughton Monchelsea

Area of geophysics

Fig. 2



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© Archaeology South-East		Land at New Line Academy, Boughton Monchelsea	Fig. 3
Project Ref: 5286	Jan 2012	Raw shade plot	
Report Ref: 2012021	Drawn by: JLR		



© Archaeology South-East		Land at New Line Academy, Boughton Monchelsea	Fig. 4
Project Ref: 5286	Jan 2012	Processed shade plot	
Report Ref: 2012021	Drawn by: JLR		



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© Archaeology South-East		Land at New Line Academy, Boughton Monchelsea	Fig. 5
Project Ref: 5286	Jan 2012	Processed and interpolated shade plot	
Report Ref: 2012021	Drawn by: JLR		



© Archaeology South-East		Land at New Line Academy, Boughton Monchelsea	Fig. 6
Project Ref: 5286	Jan 2012	Interpretation - probable modern disturbance	
Report Ref: 2012021	Drawn by: JLR		



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