Archaeology South-East

ASE

# Detailed Magnetometer Survey at Benfield Golf Course, Hove, East Sussex

**NGR: 526200 107300**
**(TQ 26200 07300)**

**ASE Project No: 7094**

**OASIS ID: archaeol6-177017**

**ASE Report No. 2014413**

**By John Cook BSc (Hons) ACIFA**

**January 2015**

# Detailed Magnetometer Survey at Benfield Golf Course, Hove, East Sussex

**NGR: 526200 107300**
**(TQ 26200 07300)**

**ASE Project No: 7094**

**OASIS ID: archaeol6-199500**

**ASE Report No. 2014413**

**By John Cook BSc (Hons) ACIFA**

**January 2015**

**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 Cirrus Environmental and Planning Consultancy Ltd to undertake a detailed fluxgate gradiometer survey at Benfield Golf Course, Hove, East Sussex. The survey took place on the 17th and 18th of December 2014. The survey area covered approximately 1.7 hectares of golf course.*

*Evidence for archaeological features within the magnetic survey was, in general, sparse. However, the survey did successfully detect a small number of linear and discrete anomalies across the site. 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.*

© Archaeology South-East UCL

## CONTENTS



© Archaeology South-East UCL

# 1.0 INTRODUCTION

## 1.1 Site background

1.1.1 Archaeology South-East was commissioned by Cirrus Environmental and Planning Consultancy Ltd to conduct a magnetometer survey on a site totalling approximately 2.0 hectares of land at Benfield Golf Course, Hove, East Sussex hitherto referred to as 'the site' (NGR. TQ 05188 39054; Fig.1).

## 1.2 Geology and topography

1.2.1 According to the British Geological Survey (2014) the site lies over bedrock geology of Newhaven chalk formation - chalk. 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 Steve Price; project managed by Paul Mason (fieldwork) and by Dan Swift (post fieldwork).

© Archaeology South-East UCL

## 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 (Hopkinson 2014). The full historical background for the site is presented therein and is not repeated in full here.

2.2 In summary, the DBA concluded that there is a high potential for archaeological deposits of prehistoric, Roman and Anglo-Saxon date, a moderate potential for deposits of medieval date and there are few records of post-medieval date in the vicinity, and for this period the potential of the Site is considered to be low.

© Archaeology South-East UCL

## 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 505188 139054).

3.1.2 The field work was undertaken on 17th and 18th December.

### 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 0.125m.

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 and interpretation is presented (Figures 3-4) as raw data and processed data greyscale plots.

© Archaeology South-East UCL

## 4.0 GEOPHYSICAL SURVEY RESULTS (Figures 5-6)

### 4.1 Description of site

4.1.1 The survey area consisted of approximately 2.0 hectares of a south facing golf course. Of which only 1.7 hectares were accessible.

### 4.2 Survey limitations

4.2.1 There were a few physical obstructions encountered on site, 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.

© Archaeology South-East UCL

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** (Figure 5)

4.4.1 Evidence for archaeological activity may comprise moderate positive discrete anomalies (A1) and weak positive linear anomalies (A2). These anomalies may represent cut features of an archaeological origin such as ditches. However, these anomalies may also relate to in filled natural features or more modern agricultural activity.

4.4.2 A bipolar anomaly with associated magnetic disturbance is noted (A3). This anomaly corresponds to a probable below ground service such as a pipe or cable. Further areas of magnetic disturbance relate to nearby metallic objects such as wire fences (A4).

4.4.3 Areas of magnetic debris (A5) may indicate ground disturbance or made ground. A linear area of magnetic debris (A6) corresponds to a footpath running through the site.

4.4.4 A number of linear anomalies are noted in the south west of the survey area (A7). These anomalies are interpreted as resulting from possible plough activity.

4.4.5 A thin 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 the quantity.

© Archaeology South-East UCL

## 5.0 CONCLUSION

### 5.1 Discussion

5.1.1 The most significant possible archaeological features noted in the survey were possible cut features (A1 and A2). These anomalies are likely to relate to features such as former boundaries, trackways or ditches. However, it is difficult to interpret such anomalies due to the small area sampled. Areas of magnetic debris may be linked to the use of the site as a golf course with one area (A6) linked to the footpath.

### 5.2 Summary

5.2.1 Evidence for archaeological features within the magnetic survey was, in general, sparse. However, the survey did successfully detect a small number of linear and discrete anomalies across the site. Areas of magnetic disturbance may mask underlying features with a weaker magnetic signature.

5.2.2 In general, the possible archaeological anomalies identified within the survey are weak and limited in distribution. This may be due to the features themselves being ephemeral, the result of more recent landscaping activity, infilling of natural features or a combination of these. Much of the magnetic debris and disturbance observed within the survey is likely related to modern activity.

**Acknowledgements**

Archaeology South-East would like to thank Cirrus Environmental and Planning Consultancy Ltd for commissioning the survey and Benfield Golf Course for allowing access.

© Archaeology South-East UCL

## Bibliography

BGS 2015 British Geological Survey, Geology of Britain Viewer, accessed 05.01.2015. http://mapapps.bgs.ac.uk/geologyofbritain/home.html

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

Hopkinson, G., 2014 Benfield Valley Golf Course, Hove, East Sussex Archaeological Desk-Based Assessment. Unpublished ASE DBA Report no. 2014413.

© Archaeology South-East UCL

**SMR Summary Form**

| | | | | | | |
|---|---|---|---|---|---|---|
| Site Code | - | | | | | |
| Identification Name and Address | Detailed Magnetometer Survey at Benfield Golf Course, Hove, East Sussex | | | | | |
| County, District &/or Borough | Surrey | | | | | |
| OS Grid Refs. | 505188 139054 | | | | | |
| Geology | Newhaven Chalk Formation - Chalk | | | | | |
| Arch. South-East Project Number | 7094 | | | | | |
| 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. | **17th – 18th December 2014** | | |
| Sponsor/Client | Cirrus Environmental and Planning Consultancy Ltd | | | | | |
| Project Manager | Paul Mason | | | | | |
| Project Supervisor | John Cook | | | | | |
| Period Summary | Palaeo. | Meso. | Neo. | BA | IA | RB |
| | AS | MED | PM | Other Modern | | |

100 Word Summary.

*Archaeology South East was commissioned by Cirrus Environmental and Planning Consultancy Ltd to undertake a detailed fluxgate gradiometer survey at Benfield Golf Course, Hove, East Sussex. The survey took place on the 17th and 18th of December 2014. The survey area covered approximately 1.7 hectares of golf course. Evidence for archaeological features within the magnetic survey was, in general, sparse. However, the survey did successfully detect a small number of linear and discrete anomalies across the site. Areas of magnetic disturbance may mask underlying features with a weaker magnetic signature.*

© Archaeology South-East UCL

## OASIS form

### OASIS ID: archaeol6-199500

#### Project details

| | |
|---|---|
| Project name | Detailed Magnetometer Survey at Benfield Golf Course, Hove, East Sussex |
| Short description of the project | Archaeology South East was commissioned by Cirrus Environmental and Planning Consultancy Ltd to undertake a detailed fluxgate gradiometer survey at Benfield Golf Course, Hove, East Sussex. The survey took place on the 17th and 18th of December 2014. The survey area covered approximately 1.7 hectares of golf course. Evidence for archaeological features within the magnetic survey was, in general, sparse. However, the survey did successfully detect a small number of linear and discrete anomalies across the site. Areas of magnetic disturbance may mask underlying features with a weaker magnetic signature. |
| Project dates | Start: 17-12-2014 End: 18-12-2014 |
| Previous/future work | Yes / Not known |
| Any associated project reference codes | 7094 - Contracting Unit No. |
| Type of project | Field evaluation |
| Site status | None |
| Current Land use | Other 14 - Recreational usage |
| Monument type | NONE None |
| Significant Finds | NONE None |
| Methods & techniques | "Geophysical Survey" |
| Development type | Not recorded |
| Prompt | Planning condition |
| Position in the planning process | Pre-application |
| Solid geology (other) | Newhaven Chalk formation - chalk |
| Drift geology (other) | None |
| Techniques | Magnetometry |

#### Project location

| | |
|---|---|
| Country | England |
| Site location | EAST SUSSEX BRIGHTON AND HOVE HOVE Benfield Golf |

© Archaeology South-East UCL

| | |
|---|---|
| | Course |
| Postcode | BN3 8EB |
| Study area | 1.70 Hectares |
| Site coordinates | TQ 05188 39054 51.1405478305 -0.496217787963 51 08 25 N 000 29 46 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 |
| Type of sponsor/funding body | Consultant |
| Name of sponsor/funding body | Cirrus Environmental and Planning Consultancy |

**Project bibliography 1**

| | |
|---|---|
| Publication type | Grey literature (unpublished document/manuscript) |
| Title | Detailed Magnetometer Survey at Benfield Golf Course, Hove, East Sussex |
| Author(s)/Editor(s) | Cook, J. |
| Other bibliographic details | report number 2014413 |
| Date | 2015 |
| Issuer or publisher | ASE |
| Place of issue or publication | Portslade |

| | |
|---|---|
| Entered by | John Cook (john.cook@ucl.ac.uk) |
| Entered on | 9 January 2015 |

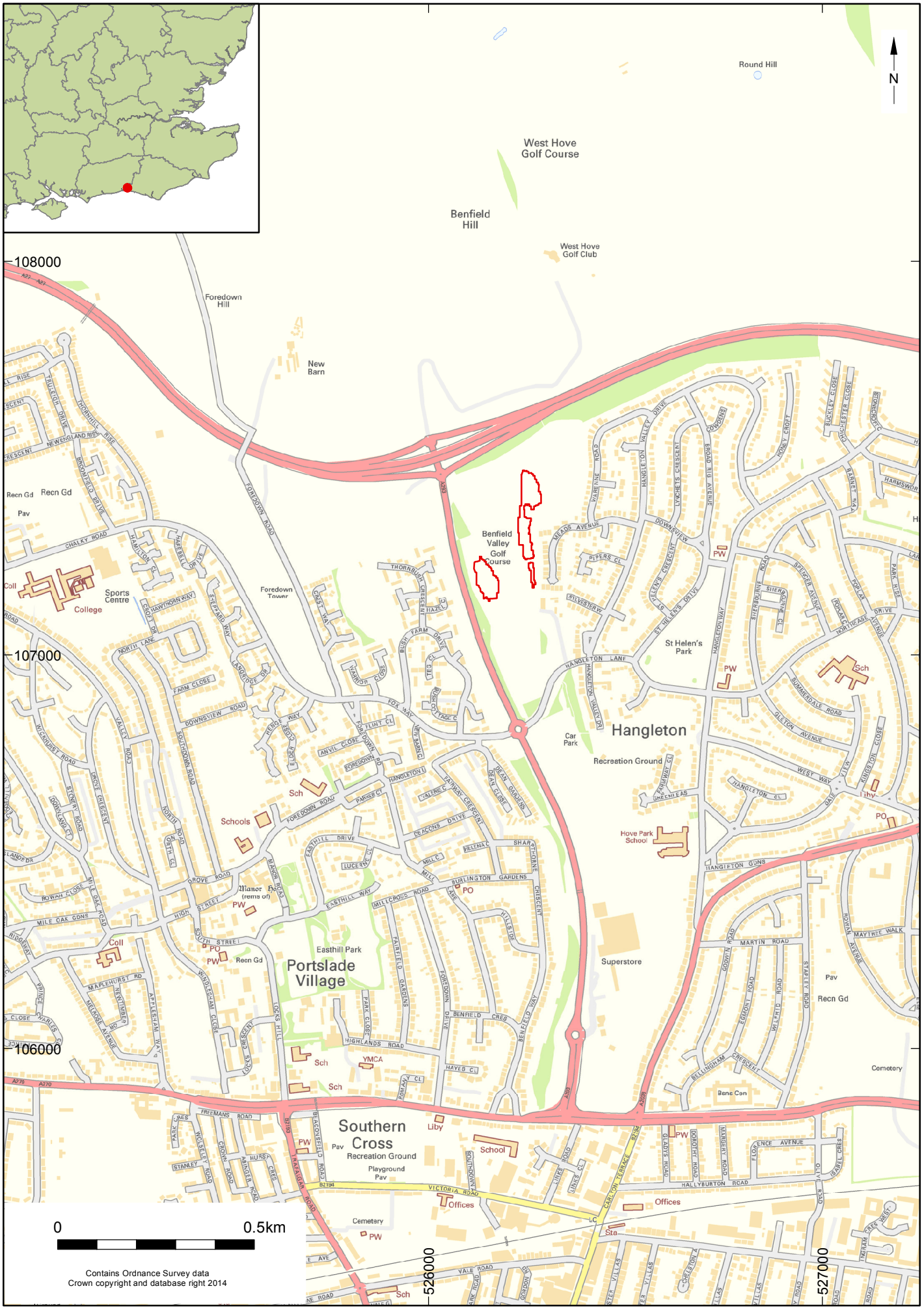
© Archaeology South-East UCL

## Appendix 1

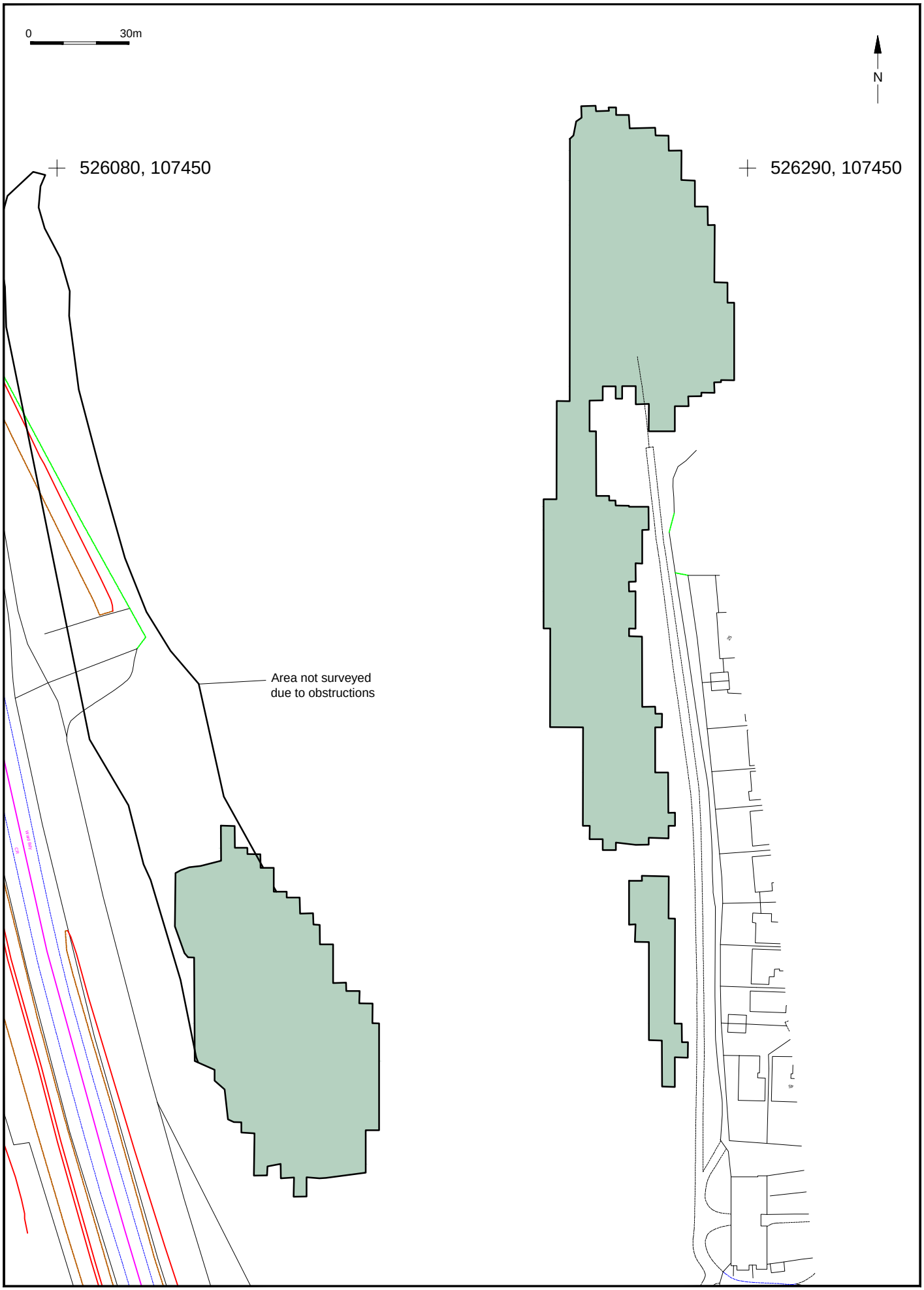
## Included on C.D

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

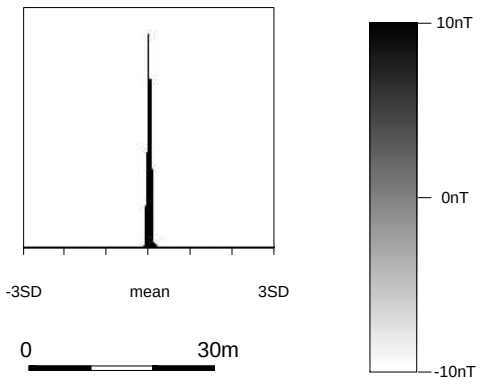
© Archaeology South-East UCL




| © Archaeology South-East | | Benfield Golf Course | Fig. 1 |
|---|---|---|---|
| Project Ref: 7094 | January 2015 | Site location | |
| Report Ref: 2014413 | Drawn by: RHC | | |




| © **Archaeology South-East** | | Benfield Golf Course | Fig.2 |
|---|---|---|---|
| Project Ref: 7094 | December 2014 | Geophysics Location | |
| Report Ref: 2014413 | Drawn by: JC | | |



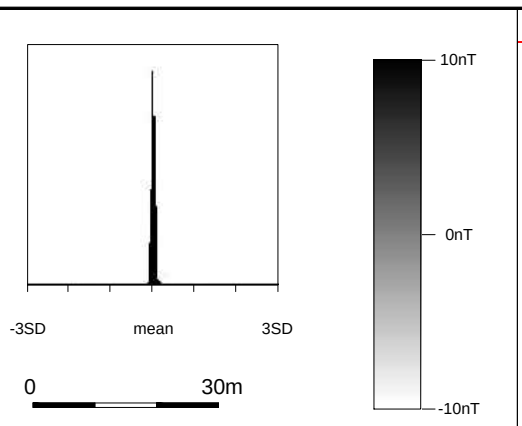




N

526290, 107450

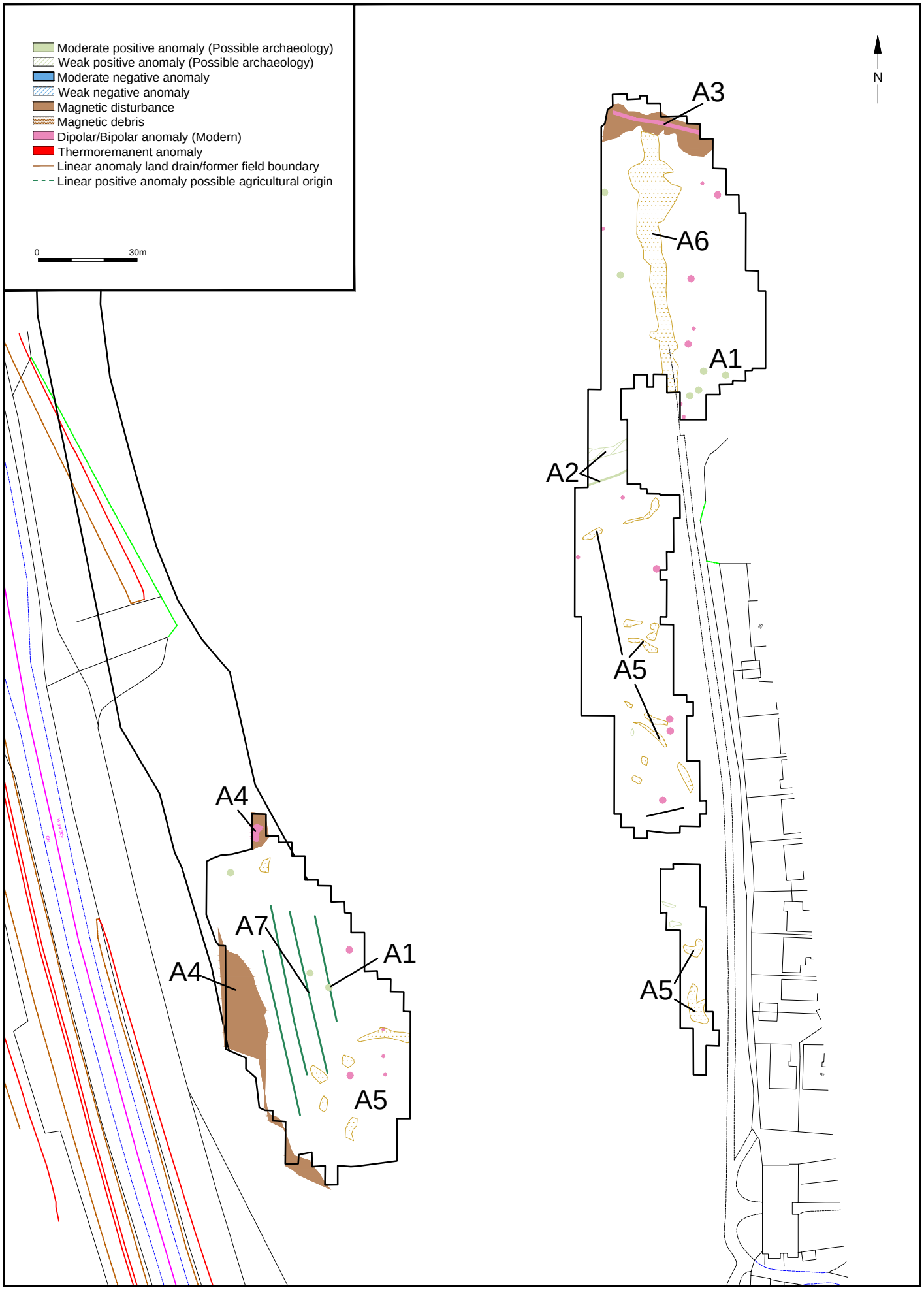
| © **Archaeology South-East** | | Benfield Golf Course | Fig.3 |
|---|---|---|---|
| Project Ref: 7094 | December 2014 | Raw data | |
| Report Ref: 2014413 | Drawn by: JC | | |




N

526290, 107450

| | | | |
|---|---|---|---|
| © **Archaeology South-East** | | Benfield Golf Course | Fig.4 |
| Project Ref: 7094 | December 2014 | Processed data | |
| Report Ref: 2014413 | Drawn by: JC | | |




| © **Archaeology South-East** | | Benfield Golf Course | Fig.5 |
|---|---|---|---|
| Project Ref: 7094 | December 2014 | Interpretation | |
| Report Ref: 2014413 | Drawn by: JC | | |

Fig. 6a Site shot facing south

Fig. 6b Site shot facing north

Fig. 6c Obstructions on western edge of site, fences and overgrown

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

**Essex Office**
The Old Magistrates Court
79 South Street
Braintree
Essex CM7 3QD
tel: +44(0)1376 331470
email: fau@ucl.ac.uk
web: 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
web: www.ucl.ac.uk/caa