

**RESULTS FROM A DETAILED MAGNETOMETER SURVEY ON LAND  
AT PARKWOOD FARM, BOUGHTON MONCHELSEA, KENT**

**DRAFT**

**NGR: 578024 151202**

**Planning Ref: MA/09/2024**

**ASE Project No: 5071**

**ASE Report No. 2011205  
OASIS ID: archaeol6-108108**

**By Chris Russel BA (Hons)**

**August 2011**

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## **Abstract**

*Archaeology South East was commissioned by George Charlton & Sons Ltd to carry out a detailed fluxgate gradiometer survey on land at Parkwood Farm, Boughton Monchelsea, Kent, in advance of the construction of new polytunnels at the site. The survey covered approximately 0.91 hectares and took place on the 10th of August 2011. The survey area consisted of short grass pasture bounded by hedges. Several anomalies were identified, most of which were linear in nature with corresponding negative anomalies. More moderated linear anomalies were also detected as were several positive discrete anomalies. Two concentrations of dipole anomalies were also evident in the results with the potential to denote features with thermoremnant properties.*

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## **1.0 INTRODUCTION**

### **1.1 Site Background**

- 1.1.1 Archaeology South-East was commissioned by George Charlton & Sons Ltd to conduct a Magnetometer survey on land at Parkwood Farm, Boughton Monchelsea, Kent hitherto referred to as 'the site' (NGR 578024 151202 , Fig.1).

### **1.2 Geology and Topography**

- 1.2.1 The British Geological survey records the site geology as Hythe Formation interbedded sandstone and (subequal/subordinate) limestone with superficial deposits of alluvium to the south-east. (BGS 2011).
- 1.2.2 The site is situated south of the Parkwood suburb of Maidstone, adjacent to Brishing Lane. The survey area consisted of approximately 0.91 hectares of short grassland which sloped gently from south to north towards the Brishing stream. The survey area was bounded in the east by an area containing polytunnels and in the north and west by hedgerows. The southern edge of the survey area was open grassland.

### **1.3 Planning Background**

- 1.3.1 A planning application (Ref: MA/09/2024) for the construction of new polytunnels and associated landscaping has been submitted by George Charlton & Sons. The geophysical survey was undertaken as part of an archaeological planning condition attached to proposed work at the site.
- 1.3.2 A specification for the geophysical survey was produced by the Kent County Council Heritage Conservation Group (KCC 2011). A method statement was produced by ASE (Dawkes 2011) and submitted to Kent County Council Heritage Conservation Group for approval in advance of the commencement of fieldwork.

### **1.4 Aims and Objectives of Geophysical Investigation**

- 1.4.1 The general objective of the geophysical survey was to determine the presence or absence and the extent of any buried archaeological remains that might provide a measurable magnetic response within the boundary of the Parkwood Farm site. A review of the results of the survey will aim to establish whether extensive archaeological remains survive within the areas of proposed polytunnels and landscaping.
- 1.4.2 The aims of this geophysical survey are:
- a) to determine the presence/absence of any possible remains associated with the Roman road, Roman building and a possible Romano-British burial site;
  - b) to clarify the possible extent of Roman activity across the site;

c) to clarify the presence/absence of any prehistoric, Roman, medieval or post medieval activity within the site.

d) to provide sufficient information to guide a programme of targeted trial trench evaluation or detailed mitigation measures.

## **1.5 Scope of Report**

1.5.1 The scope of this report is to report on the findings of the survey with a view to fulfilling the archaeological planning condition on the site. The project was conducted by Chris Russel and John Cook. The project was managed by Neil Griffin (fieldwork) and by Jim Stevenson (post fieldwork).

## **2.0        ARCHAEOLOGICAL BACKGROUND**

### **2.1        Summary**

- 2.1.1        The specification (KCC 2011) states that the area has potential for Roman burials and a Roman bath-house building was discovered in the vicinity of the site in 1841 (Page 1974, 105). It is not known whether the masonry remains were left *in situ* or removed but it was noted on the plan that wall footings extended beyond the excavation limits.
- 2.1.2        The bath house site is also recorded as being the site of a post mediaeval corn mill and lime kiln. Metal detecting finds from the Roman period are recorded on site west and the line of a Roman road is presumed to run north-west to south-east across the site. A Roman burial is also recorded on site (HER No: TQ 75 SE 12).
- 2.2.3        The Medway valley in general has one of the highest densities of villa-related activity in the country as well as numerous prehistoric sites.

### **3.0 SURVEY METHODOLOGY**

#### **3.1 Summary of Methodology**

- 3.1.1 A Bartington Grad 601-2 fluxgate gradiometer was used to survey an area of 0.91 hectares. The survey grid was set out using a differential GPS (Global Positioning Systems). A 30 metre grid was set out across the survey area and transects were walked every meter across these grids. Samples for the magnetometry survey were taken at 0.25m intervals along each transect.

#### **3.2 Geophysical Survey Methods Used**

- 3.2.1 The magnetometry survey was undertaken in the areas depicted in Figures 1 and 2.
- 3.2.2 Clay type geologies will normally provide a poor-average result for magnetic survey techniques however sand geologies generally respond well to magnetic prospection techniques (David 1995: 10; Gaffney & Gater 2003: 79). A 100% detailed area survey is the desirable strategy for any given area of land and has the potential to provide the best possible information on all types of feature including those where no significant occupation may have occurred. The fluxgate gradiometer method of magnetic detail survey was chosen as this instrumentation perfectly balances speed with quality of data collection. In addition to this the resistance survey was undertaken as it was deemed that the technique may yield complementary results. The survey grid consisted of 30 x 30 metre grids. Each grid was surveyed with 1 metre traverses; samples were taken every 0.25m.

#### **3.3 Applied Geophysical Instrumentation**

- 3.3.1 The Fluxgate Gradiometer employed was the Bartington Instrumentation Grad 601-2. This consists of two separate Fluxgate Gradiometers joined to work as a pair. The Fluxgate Gradiometer is based around a pair of highly magnetic permeable cores made out of an alloy called 'Mu-metal'. They are driven in and out of magnetic saturation by the solenoid effect of an alternating 'drive current' in the coils wrapped around them. Every time the coils come out of saturation external fields can enter them; this will cause an electrical pulse in the detector coil proportional to the field strength. Two cores are used, with the cores in opposite direction, so that the drive current has no net magnetic effect arising on the sensor coil (Clark 1996: 69). A single sensor is very sensitive to tilt which causes the amount of ambient field flux along its axis to change, which will then alter the reading. The problem is solved by using two sensors arranged as a gradiometer with one sensor subtracting the output of the other (Clark 1996: 70). Before use the instrument is required to be 'balanced'. That is the fine tuning of the detector alignment that reduces direction sensitivity to a minimum. 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.

3.3.2 The Fluxgate Gradiometer is an efficient technique of archaeological prospecting (Gaffney et al 1991, 6). It is suitable for detecting ditches, walls, kilns, hearths and ovens. The Fluxgate Gradiometer will pick up areas of a magnetic field that differ from the 'background' magnetic field of the local geology. A zero point is set over a magnetically stable area of the site to be surveyed. This is termed as balancing. A cut feature such as a ditch will have a different magnetic field to the local geology therefore will elicit a greater response from the sensors. The response will be positive if the fill has a higher magnetic gradient than the surrounding soil. Areas of burning or a ceramic dump (e.g. collapsed tile roof) will have a drastically different magnetic field. Modern rubbish, concrete and other modern activity can have an adverse effect upon the sensors during magnetic survey. Buildings may not be readily detected unless there was a high proportion of brick/tile used in their construction.

3.3.3 The Fluxgate Gradiometer uses a NanoTesla (nT) as a unit of measurement. A Tesla is a unit of magnetic measurement. NanoTeslas must be used as the deviation of the magnetic field due to buried archaeology can be very small. The Earth's background magnetic field is in the region of 48000 nT.

3.3.4 The Fluxgate Gradiometer, in common with almost all geophysical techniques, is better at detecting archaeological sites from the Late Prehistoric period onwards. It should always be borne in mind that earlier periods of prehistory that have had less impact upon the landscape (e.g. in the form of significant boundaries, structures etc.) may not be detected by most geophysical techniques.

### **3.4 Instrumentation Used for Setting out the Survey Grid**

3.4.1 It is vitally important for the survey grid to be accurately set out. The English Heritage guidelines (David 1995) state that no one corner of any given survey grid square should have more than a few centimetres of error. The survey grid for the site was set out using a Leica TCRA 1205 total station. The grid points were then geo-referenced using a Leica System 1200 Differential Global Positioning System (DGPS). The GPS base station collects satellite position to determine its position. This data is processed in survey specific software to provide a sub centimetre Ordnance Survey position and height for the base station. The survey grid is then tied in to this known accurate position by using a roving satellite receiver that has its position corrected by the static base station. Each surveyed grid point has an Ordnance Survey position; therefore the geophysical survey can be directly referenced to the Ordnance Survey National Grid.

### **3.5 Data Processing**

3.5.1 All of the geophysical data processing was carried out using Geoplot V3 published by Geoscan Research. Data processing must be done to the

raw survey data to produce a meaningful representation of the results so that they can then be further interpreted. However it is important that the data is not processed too much. Data processing should not replace poor field work. The Fluxgate Gradiometer data has had four stages of processing applied to it. 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 CLIP it. CLIP can be used to limit data to specified maximum and minimum values for improving graphical presentation. It also has the effect of removing some of the 'iron spikes' that occur with fluxgate gradiometer survey data. ZERO MEAN TRAVERSE was then applied to survey data. This removes stripe effects within grids and ensures that the survey grid edges match. Next DESPIKE was applied to the data set which removes the remaining random 'iron spikes' that occur within fluxgate gradiometer survey data. LOW PASS FILTER was then applied to the data. LOW PASS FILTER removes high frequency minor scale spatial detail. This is particularly useful for smoothing data or for enhancing larger weak features. INTERPOLATE smoothes the data and enhances its presentation by creating extra data points based upon collected values. INTERPOLATE was carried out upon the survey data in the Y axis only. This was all the processing that was applied to the survey data. Figures 3 & 4 display the processed survey data.

## **4.0 GEOPHYSICAL SURVEY RESULTS (Figures 3-5)**

### **4.1 Introduction to Results**

- 4.1.1 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 (4.4 - 4.9).

### **4.2 Description of Site**

- 4.2.1 The survey area consisted of approximately 0.91 hectares of short grass pasture bounded by hedgerows in the north and west with an area containing polytunnels to the east. The southern portion of the survey area was bounded by open grassland. The survey area sloped gently down from south to north.

### **4.3 Survey Limitations**

- 4.3.1 There were no barriers to the geophysical survey.

### **4.4 Positive Magnetic Anomalies**

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

### **4.5 Negative Magnetic Anomalies**

- 4.5.1 Negative anomalies generally represent buried features such as banks that have a lower magnetic signature in comparison to the background geology

### **4.6 Magnetic Disturbance**

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

### **4.7 Dipolar Anomalies**

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

### **4.8 Bipolar Anomalies**

- 4.8.1 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.

### **4.9 Thermoremanence**

- 4.9.1 Thermoremanence is most commonly encountered through the

magnetizing of clay through the firing process although stones and soils can also acquire thermoremnance.

#### **4.10 Interpretation of Fluxgate Gradiometer Results (Fig 5)**

##### **4.10.1 Summary**

There were several anomalies visible in the results, most of which are linear and positive in nature. These were chiefly confined to the southern portion of the survey grid. Several discrete positive anomalies were also noted as were anomalies with strong dipolar responses. The dipolar anomalies were primarily confined to the periphery of the survey area.

##### **4.10.2 Dipolar Anomalies**

Two distinct groups of dipolar anomalies are visible within the survey data from Parkwood Farm. The first occurs along the northern field boundary and this cluster is denoted by M1, M2 and M3. The second group of the anomalies may be seen at M20 and M22 in the south-eastern extent of the survey. These anomalies may represent near surface metal objects although, given the fact that a lime kiln is recorded nearby, it is possible that these signals may be indicative of thermoremnant features (hearths or kilns). Slag was noted on the surface during the course of the survey.

##### **4.10.3 Discrete Positive Anomalies**

Discrete positive anomalies are noted at M4, M7, M10, M16 and M18 and are seen in close association with the complex of linear anomalies in the south of the survey area. These have the potential to relate to discrete cut features.

##### **4.10.4 Positive Linear Anomalies**

Positive linear anomalies may be seen at M12, M14, M15, M17 and M19. M12 runs on a north-east to south-west course before turning towards the south-east where it appears to diverge slightly and be sub-divided by at least two regular enclosure. M15 appears to run on a similar axial alignment and is situated further west. M17 can be seen running north-west to south-east before turning toward the north-east, crossing M15 at approximate right angles. In close association is M19 which appears to converge with M17. These features are moderate in their response.

##### **4.10.5 Positive Linear Anomalies with Corresponding Negative Anomalies**

These may be seen at M5, M6, M8, M9, M11 and M13. M5 runs approximately west to east and may continue to run into M6 and M8. M9 runs north-west to south-east for a short distance before appearing to join M8. M6 also runs approximately west to east before deviating towards the north-east. M11 comprises two parallel anomalies running north-west to south-east for a short distance. M13 trends from north-west to south-east across the southern portion of the survey area. These

anomalies have the potential to represent negative features with mirroring positive features (a good example would be a ditch and bank). The confluence of linear features in the west of the survey area is complex making the differentiation of individual anomalies here problematic. With this in mind the relationships shown on the interpretation (Fig. 5) should be treated as conjectural.

#### 4.10.6 Magnetic Disturbance.

Magnetic disturbance can be seen along the northern survey boundary caused by interference by metal objects on the surface, in this case a barbed wire fence.

## **5.0 CONCLUSION**

**5.1** The magnetometer survey at Parkwood Farm, Boughton Monchelsea successfully detected several anomalies most of which were linear in nature and positive in response with associated negative anomalies. These potentially represent ditch and bank features. More moderate linear anomalies were also evident as were several discrete positive anomalies. Clusters of dipolar anomalies were noted in the north of the survey area and in the south-east with circumstantial evidence to suggest that these may represent thermoremnant features. Magnetic disturbance was noted along the northern field boundary caused by metal objects on the surface in this area. The majority of the anomalies were tightly packed in the southern portion of the survey grid.

## **5.2 Statement of Indemnity**

**5.2.1** 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 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.

## **Bibliography**

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## **Acknowledgements**

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## OASIS ID: archaeol6-108108

### Project details

Project name	Deatiled Magnetometer Survey at Parkwood Farm, Boughton Monchelsea
Short description of the project	Magnetometer survey at Parkwood Farm, Boughton Monchelsea
Project dates	Start: 10-08-2011 End: 10-08-2011
Previous/future work	No / Not known
Any associated project reference codes	5071 - Contracting Unit No.
Type of project	Recording project
Site status	None
Current Land use	Cultivated Land 4 - Character Undetermined
Monument type	NONE None
Significant Finds	NONE None
Investigation type	'Geophysical Survey'
Prompt	Direction from Local Planning Authority - PPS
Solid geology (other)	Hythe formation interbedded sandstone and limestone
Drift geology	ALLUVIUM
Techniques	Magnetometry

### Project location

Country	England
Site location	KENT MAIDSTONE BOUGHTON MONCHELSEA Parkwood Farm, Boughton Monchelsea
Postcode	ME17 4NF
Study area	0.91 Hectares

Site coordinates                      TQ 578024 151202 50.9133634768 0.245028485393 50  
54 48 N 000 14 42 E Point

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**Project creators**

Name of Organisation	Archaeology South East
Project brief originator	Archaeology South East
Project design originator	Kent County Council
Project director/manager	Neil Griffin
Project supervisor	Chris Russel
Type of sponsor/funding body	Developer

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**Project archives**

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

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**Project bibliography 1**

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Title	Results from a Detailed Magnetometer Survey at Parkwood Farm, Boughton Monchelsea, Kent
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Entered on	19 August 2011

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## **Appendix**

### **Included on C.D**

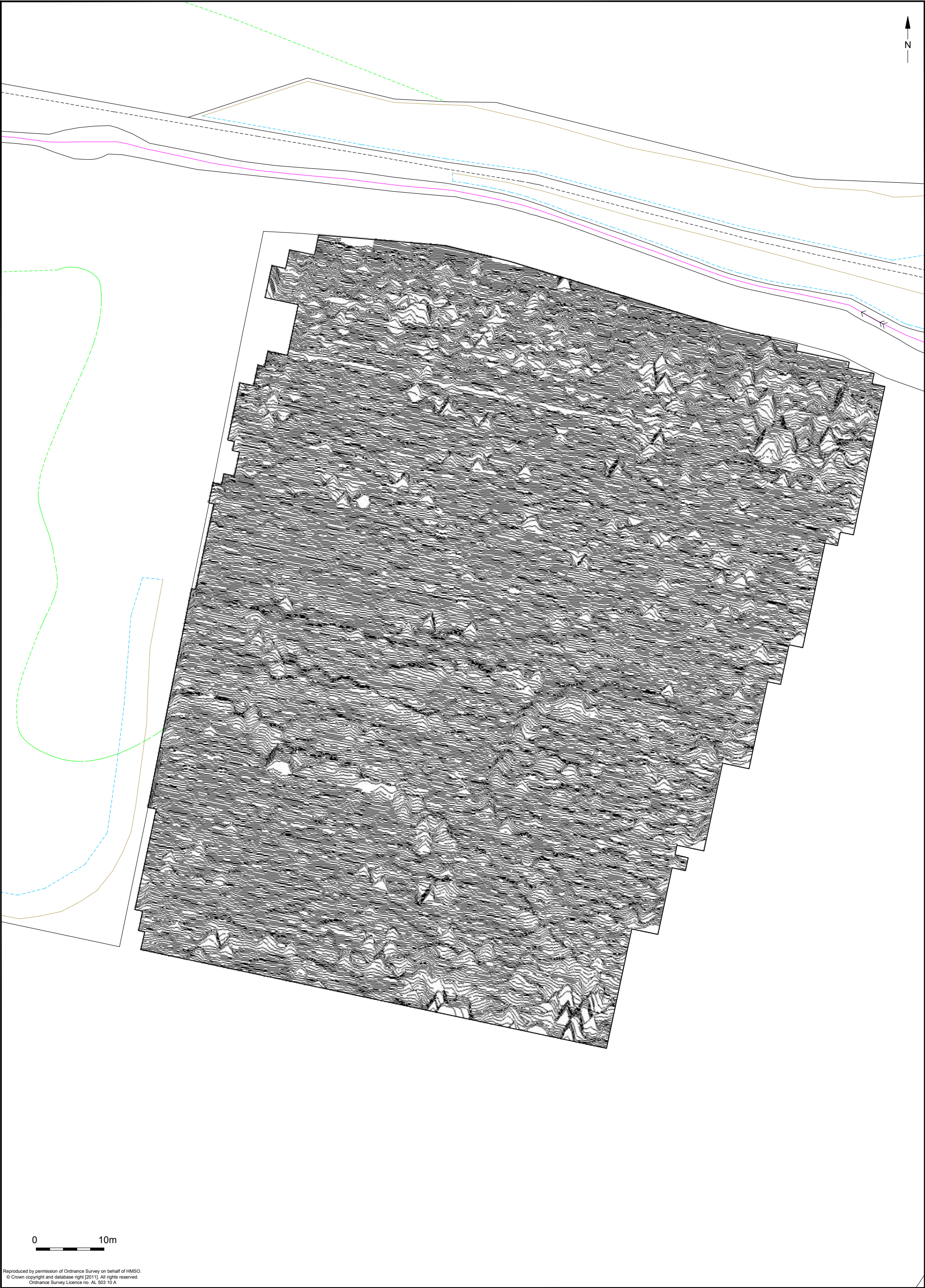
#### **1. Raw Magnetometry Data**

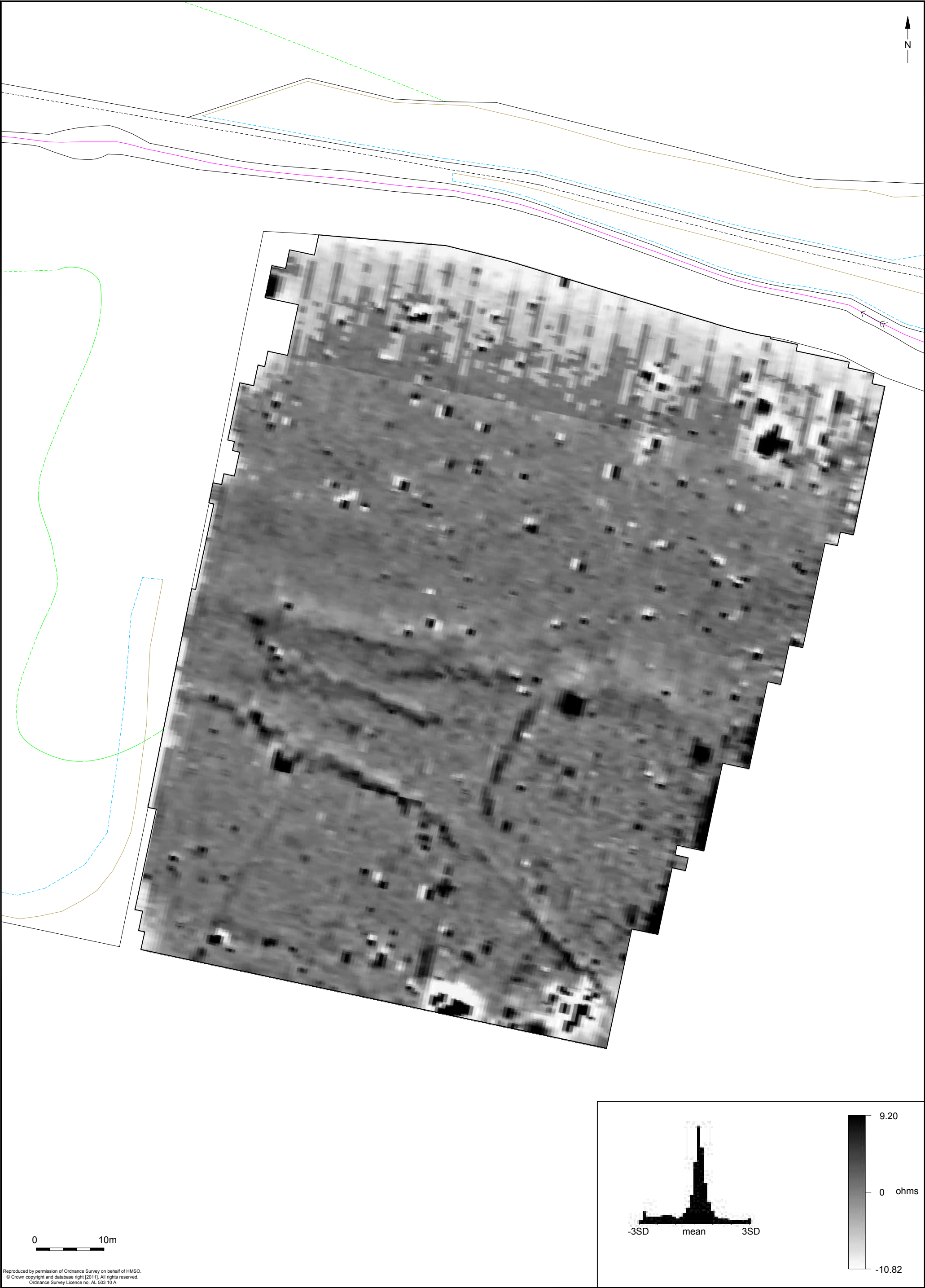


© Archaeology South-East		Land at Parkwood Farm, Boughton Monchelsea	Fig. 1
Project Ref: 5071	Aug 2011	Site location	
Report Ref: 2011205	Drawn by: JLR		



© Archaeology South-East		Land at Parkwood Fram, Boughton Monchelsea	Fig. 2
Project Ref: 5071	Aug 2011	Area of geophysical survey	
Report Ref: 2011205	Drawn by: JLR		







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