

Land at Brodricklands and Hamlands Farm,

Lower Willingdon,

East Sussex

Geophysical Survey

Report no. 2842 February 2016

Client: Catesby Property Group plc





Land at Brodricklands and Hamlands Farm, Lower Willingdon, East Sussex

Geophysical Survey

Summary

A geophysical (magnetometer) survey, covering approximately 28 hectares, was carried out on pasture at Brodricklands and Hamlands Farm, Lower Willingdon, East Sussex. The survey was undertaken to inform a planning application for residential development of the site. No anomalies of archaeological interest have been detected by the magnetometer survey. Geological responses have been recorded in the north of the survey area, which are likely to be associated with the adjacent stream. A number of service pipes, drains and sluices have been located along with areas of disturbance that are likely to represent made ground and tracks. Consequently, based upon the geophysical dataset alone, the archaeological potential of the site is deemed to be low.



Report Information

Client:	Catesby Property Group plc
Address:	Catesby House, 5b Tournament Court, Edgehill Drive, Warwick, CV34 6LG
Report Type:	Geophysical Survey
Location:	Lower Willingdon
County:	East Sussex
Grid Reference:	TQ 59537 03659
Period(s) of activity:	Modern
Report Number:	2842
Project Number:	6214
Site Code:	PLW16
OASIS ID:	archaeol11-241303
Museum Accession No.:	N/A
Date of fieldwork:	January 2016
Date of report:	February 2016
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Authorisation for distribution:



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1 Introduction

Archaeological Services WYAS (ASWYAS) was commissioned by EDP, on behalf of Catesby Property Group plc (the Client), to undertake a geophysical (magnetometer) survey of Land at Brodricklands and Hamlands Farm, in advance of an outline planning application. The work was undertaken in accordance with a Project Design (Brunning 2016). Guidance contained within the National Planning Policy Framework (DCLG 2012) and the Sussex Archaeology Standards 2015 (SAS 2015) was also followed, in line with current best practice (CIFA 2014; David *et al.* 2008). The survey was carried out between 25th and 29th January 2016, to provide additional information on the archaeological resource of the site.

Site location, topography and land-use

The proposed development area (PDA) is located to the southeast of the village of Polegate and northeast of Willingdon, East Sussex centred at TQ 59537 03659, approximately 5 km to the northwest of Eastbourne (see Fig 1). The site is bound by housing to the southwest and southeast, and to the northeast by a railway line. The PDA totals c. 37.56ha of which approximately 28ha was available for survey, consisting of pasture over six fields with one field used for horse grazing. The site is at an elevation of between 4m in the east and 9m in the west above Ordnance Datum (aOD).

Soils and geology

The underlying bedrock geology comprises of the Gault formation – mudstone and the Lower Greensand group – sandstone, siltstone and mudstone. Superficial deposits have been recorded in the easternmost section of the site as Head – clay, silt, sand and gravel (BGS 2016). Soils of the survey area belong to the Newchurch 2 (814c) association; deep stoneless mainly calcareous clayey soils. Groundwater controlled by ditches and pumps with a risk of flooding in places (SSEW 1983).

2 Archaeological Background

Immediately east of the site, during a watching brief for the construction of a flood relief lake, timber trackways of Prehistoric date were recorded. A trackway on a roughly north-south orientation comprised of 100m length of paired posts, driven vertically through the freshwater peat and into the underlying blue clay (HER number: MES15464). Another trackway on an east-west alignment (HER number: MES15465) comprised a single row of timbers and a series of horizontal rods. An isolated group of 4 posts (HER number: MES15466) was also recorded.

To the north of the site lies a possible Roman road – RR143 (Margary), Stone Cross - Jevington (HER number: MES5058).

Approximately 2km to the southwest is the Neolithic causewayed enclosure on Combe Hill (Scheduled list entry 1012497). The monument takes the form of a double circuit of ditch segments with an earthen bank on its inner edge and each separated from the next ditch by a causeway of undisturbed chalk. Partial excavation in 1949 recovered evidence of the Neolithic date of the enclosure in the form of stone tools and pottery.

3 Aims and Methodology

The main aim of the geophysical survey was to provide sufficient information to enable an assessment to be made of the impact of the development on potential sub-surface archaeological remains and for further evaluation or mitigation proposals, if appropriate, to be recommended. To achieve this aim, a magnetometer survey covering all amenable parts of the PDA was undertaken (see Fig. 2).

The general objectives of the geophysical survey were:

- to provide information about the nature and possible interpretation of any magnetic anomalies identified;
- to therefore determine the presence/absence and extent of any buried archaeological features; and
- to prepare a report summarising the results of the survey.

Magnetometer survey

The site grid was laid out using a Trimble VRS differential Global Positioning System (Trimble 5800 model). The survey was undertaken using Bartington Grad601 magnetic gradiometers. These were employed taking readings at 0.25m intervals on zig-zag traverses 1.0m apart within 30m by 30m grids, so that 3600 readings were recorded in each grid. These readings were stored in the memory of the instrument and later downloaded to computer for processing and interpretation. Geoplot 3 (Geoscan Research) software was used to process and present the data. Further details are given in Appendix 1.

Reporting

A general site location plan, incorporating the 1:50000 Ordnance Survey (OS) mapping, is shown in Figure 1. Figure 2 displays an overview of the processed magnetometer data whilst Figure 3 shows an overall interpretation, both at a scale of 1:4000. The processed and minimally processed data, together with an interpretation of the survey results are presented in Figures 4 to 21 inclusive at a scale of 1:1250.

Technical information on the equipment used, data processing and survey methodologies are given in Appendix 1. Technical information on locating the survey area is provided in Appendix 2. Appendix 3 describes the composition and location of the archive. A copy of the OASIS form is included in Appendix 4.

The survey methodology, report and any recommendations comply with guidelines outlined by English Heritage (David *et al.* 2008) and by the Chartered Institute for Archaeologists (CIFA 2014). All figures reproduced from Ordnance Survey mapping are with the permission of the controller of Her Majesty's Stationery Office (© Crown copyright).

The figures in this report have been produced following analysis of the data in 'raw' and processed formats and over a range of different display levels. All figures are presented to most suitably display and interpret the data from this site based on the experience and knowledge of Archaeological Services staff.

4 Results and Discussion (see Figures 4-21)

An area in the east of the PDA, immediately west of the trainline was unsuitable for survey (see Plate 4).

Ferrous anomalies

Ferrous anomalies, as individual 'spikes', or as large discrete areas are typically caused by ferrous (magnetic) material, either on the ground surface or in the plough-soil, or the proximity of the survey area to magnetic material in boundary fences, buildings, or other above ground features. Little importance is normally given to such anomalies, unless there is any supporting evidence for an archaeological interpretation, as modern ferrous debris or material is common on rural sites, often being present as a consequence of manuring or tipping/infilling. There is no obvious pattern or clustering to their distribution to suggest anything other than a random background scatter of ferrous debris in the plough-soil.

Service pipes can be seen within Fields 1, 3 and 4. Ferrous responses along the limits of the datasets are due to metal fencing within the field boundaries and in some areas the proximity to buildings.

The western limits of Field 5 are dominated by magnetic disturbance (**F1**) representing a track (St Davids Close). Anomalies at (**F2**) indicate the location of a former track which correspond to Ordnance Survey old mapping dating from 1875 to 1961 (Old Maps 2016).

Responses (F3) located in the south of Field 4 are similar in magnetic strength to those at F2 and are likely to represent disturbance due to the construction of drainage which was visible on the ground. Similar responses in Field 3 at (F4) are likely to represent a temporary track as aerial images show areas where the ground has been stripped.

Geological anomalies

The majority of anomalies within Field 2 have been interpreted as having a geological origin; these are thought to be caused by variations in the depth and composition of the soils and the superficial deposits from which they derive. It is likely that they are associated with either the

flooding of the adjacent New Stream Ditch along the southern boundary and the drain to the north or that they represent a former course of the stream, which was then straightened to its present alignment.

Agricultural anomalies

A band of magnetic disturbance in the southeast of Field 4 at (AG1) represents a former track as already mentioned above but is also the location of a former field boundary which is visible on old mapping dating from 1875 to 1905 (Old Maps, 2016).

A series of strong magnetic linear responses (AG2) in Field 5 represents a combination of drains and sluices associated with a former sewerage works, these are also shown on old mapping dating from 1910. To the north and east of these responses weaker magnetic linear responses can be seen which are likely to be associated to field drains. Further field drains can be seen in the south of Field 4.

An informal track (AG3) located in the southern section of Area 4 leads to the mobile signal mast from a gateway in the south eastern boundary.

5 Conclusions

The magnetic survey has not detected anomalies of an archaeological origin. The majority of responses are of a modern nature comprising service pipes, former sewerage works, tracks and field drains. The data are scattered with small scale ferrous anomalies associated with debris within the ploughsoil or on the surface. A former field boundary has been located which corresponds to old mapping.

In the north of the PDA a handful of responses have been interpreted as geological and are likely to be associated with a former course of the stream or flooding. Based upon the geophysical dataset alone the archaeological potential of the site is deemed to be low.

Appendix 1: Magnetic survey - technical information

Magnetic Susceptibility and Soil Magnetism

Iron makes up about 6% of the Earth's crust and is mostly present in soils and rocks as minerals such as maghaemite and haemetite. These minerals have a weak, measurable magnetic property termed magnetic susceptibility. Human activities can redistribute these minerals and change (enhance) others into more magnetic forms. Areas of human occupation or settlement can then be identified by measuring the magnetic susceptibility. If the enhanced material subsequently comes to fill features, such as ditches or pits, localised isolated and linear magnetic anomalies can result whose presence can be detected by a magnetometer (fluxgate gradiometer).

In general, it is the contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of topsoils, subsoils and rocks into which these features have been cut, which causes the most recognisable responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or the bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected. The magnetic susceptibility of a soil can also be enhanced by the application of heat and the fermentation and bacterial effects associated with rubbish decomposition. The area of enhancement is usually quite large, mainly due to the tendency of discard areas to extend beyond the limit of the occupation site itself, and spreading by the plough.

Types of Magnetic Anomaly

In the majority of instances anomalies are termed 'positive'. This means that they have a positive magnetic value relative to the magnetic background on any given site. However some features can manifest themselves as 'negative' anomalies that, conversely, means that the response is negative relative to the mean magnetic background.

It should be noted that anomalies interpreted as modern in origin might be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the feature causing the anomaly.

The types of response mentioned above can be divided into five main categories that are used in the graphical interpretation of the magnetic data:

Isolated dipolar anomalies (iron spikes)

These responses are typically caused by ferrous material either on the surface or in the topsoil. They cause a rapid variation in the magnetic response giving a characteristic 'spiky' trace. Although ferrous archaeological artefacts could produce this type of response, unless

there is supporting evidence for an archaeological interpretation, little emphasis is normally given to such anomalies, as modern ferrous objects are common on rural sites, often being present as a consequence of manuring.

Areas of magnetic disturbance

These responses can have several causes often being associated with burnt material, such as slag waste or brick rubble or other strongly magnetised/fired material. Ferrous structures such as pylons, mesh or barbed wire fencing and buried pipes can also cause the same disturbed response. A modern origin is usually assumed unless there is other supporting information.

Linear trend

This is usually a weak or broad linear anomaly of unknown cause or date. These anomalies are often caused by agricultural activity, either ploughing or land drains being a common cause.

Areas of magnetic enhancement/positive isolated anomalies

Areas of enhanced response are characterised by a general increase in the magnetic background over a localised area whilst discrete anomalies are manifest by an increased response on two or three successive traverses. In neither instance is there the intense dipolar response characteristic exhibited by an area of magnetic disturbance or of an 'iron spike' anomaly (see above). These anomalies can be caused by infilled discrete archaeological features such as pits or post-holes or by kilns. They can also be caused by pedological variations or by natural infilled features on certain geologies. Ferrous material in the subsoil can also give a similar response. It can often therefore be very difficult to establish an anthropogenic origin without intrusive investigation or other supporting information.

Linear and curvilinear anomalies

Such anomalies have a variety of origins. They may be caused by agricultural practice (recent ploughing trends, earlier ridge and furrow regimes or land drains), natural geomorphological features such as palaeochannels or by infilled archaeological ditches.

Methodology: Gradiometer Survey

The main method of using the fluxgate gradiometer for commercial evaluations is referred to as *detailed survey* and requires the surveyor to walk at an even pace carrying the instrument within a grid system. A sample trigger automatically takes readings at predetermined points, typically at 0.25m intervals, on traverses 1m apart. These readings are stored in the memory of the instrument and are later dumped to computer for processing and interpretation.

During this survey a Bartington Grad601 magnetic gradiometer was used taking readings on the 0.1nT range, at 0.25m intervals on zig-zag traverses 0.5m apart within 30m by 30m square grids. The instrument was checked for electronic and mechanical drift at a common point and calibrated as necessary. The drift from zero was not logged.

The gradiometer data have been presented in this report in processed greyscale format. The data in the greyscale images have been interpolated and selectively filtered to remove the effects of drift in instrument calibration and other artificial data constructs and to maximise the clarity and interpretability of the archaeological anomalies.

The results and subsequent interpretation of data from geophysical surveys should not be treated as an absolute representation of the underlying archaeological and non-archaeological remains.

Appendix 2: Survey location information

An initial survey station was established using a Trimble VRS differential Global Positioning System (Trimble R6 model). The data were geo-referenced using the geo-referenced survey station with a Trimble RTK differential Global Positioning System (Trimble R6 model). The accuracy of this equipment is better then 0.01m. The survey grids were then super-imposed onto a base map provided by the client to produce the displayed block locations. However, it should be noted that Ordnance Survey positional accuracy for digital map data has an error of 0.5m for urban and floodplain areas, 1.0m for rural areas and 2.5m for mountain and moorland areas. This potential error must be considered if co-ordinates are measured off hard copies of the mapping rather than using the digital co-ordinates.

Archaeological Services WYAS cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party.

Appendix 3: Geophysical archive

The geophysical archive comprises:-

- an archive disk containing compressed (WinZip 8) files of the raw data, report text (Microsoft Word 2000), and graphics files (Adobe Illustrator CS2 and AutoCAD 2008) files; and
- a full copy of the report.

At present the archive is held by Archaeological Services WYAS although it is anticipated that it may eventually be lodged with the Archaeology Data Service (ADS). Brief details may also be forwarded for inclusion on the English Heritage Geophysical Survey Database after the contents of the report are deemed to be in the public domain (i.e. available for consultation in the East Sussex Historic Environment Record).

Appendix 4: OASIS form

Bibliography

- BGS, 2016. British Geological Survey www.bgs.ac.uk/discoveringGeology/geology OfBritain/viewer.html. Viewed 1st February 2016
- Brunning, E, 2016. Land at Brodricklands and Hamlands Farm, Lower Willingdon, East Sussex. Geophysical Survey Project Design. Unpublished document
- Chartered Institute for Archaeologists, 2014. *Standard and Guidance for Archaeological Geophysical Survey*
- David, A., N. Linford, P. Linford and L. Martin, 2008. *Geophysical Survey in Archaeological Field Evaluation: Research and Professional Services Guidelines (2nd edition)* English Heritage
- DCLG, 2012. *National Planning Policy Framework*. Department of Communities and Local Government
- Gaffney, C. and Gater, J., 2003. *Revealing the Buried Past: Geophysics for Archaeologists* Tempus Publishing Ltd
- Old Maps, 2016. *https://www.old-maps.co.uk/#/Map/559637/103616*. Viewed 8th February 2016

SAS, 2015. Sussex Archaeological Standards. April 2015

SSEW, 1983. Soil Survey of England and Wales: Soils of South East England, Sheet 6



Fig. 1. Site location

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Fig. 4. Processed greyscale magnetometer data; Sector 1 (1:1250 @ A3)





50m



_50m











103800



Fig. 11. XY trace plot of greyscale plot of magnetometer data; Sector 3 (1:1250 @ A3)







50m





50m





50m

-0





50m

0

50m









0

50m











Plate 1. View of Field 1, looking southwest



Plate 3. View of Field 5, looking northeast



Plate 2. View of Field 2, looking northeast



Plate 4. View of field unsuitable for survey, looking east



Plate 5. View of Field 5, looking northwest



Plate 6. View of Field 4, looking west



Plate 7. View of Field 4, looking southwest



Plate 8. View of Field 6, looking north

OASIS DATA COLLECTION FORM: England

List of Projects | Manage Projects | Search Projects | New project | Change your details | HER coverage | Change country | Log out

Printable version

OASIS ID: archaeol11-241303

Project details

Project name Land at Brodricklands and Hamlands Farm Short description A geophysical (magnetometer) survey, covering approximately 28 hectares, was carried out on pasture at Brodricklands and Hamlands Farm, Lower of the project Willingdon, East Sussex. The survey was undertaken prior to the proposed residential development of the site. No anomalies of archaeological interest have been detected by the magnetometer survey. Geological responses have been recorded in the north of the survey area which are likely to be associated with the adjacent stream. A number of service pipes, drains and sluices have been located along with areas of disturbance which are likely to represent made ground and tracks. Consequently, based upon the geophysical dataset alone, the archaeological potential of the site is deemed to be low. Project dates Start: 25-01-2016 End: 29-01-2016 Previous/future No / Not known work Any associated 6214 - Sitecode project reference codes Type of project Field evaluation Grassland Heathland 4 - Regularly improved Current Land use **DRAINS Modern** Monument type Significant Finds **DRAINS Modern** Significant Finds **TRACKS Modern** Methods & "Geophysical Survey" techniques Development type Housing estate Prompt National Planning Policy Framework - NPPF Position in the Pre-application planning process Solid geology LOWER GREENSAND Solid geology Gault Formation (other) Drift geology CLAY WITH FLINTS Techniques Magnetometry

Project location

Country	England
Site location	EAST SUSSEX WEALDEN WILLINGDON AND JEVINGTON Land at Brodricklands and Hamlands Farm
Study area	28 Hectares
Site coordinates	TQ 595 036 50.809370138121 0.264138065873 50 48 33 N 000 15 50 E Point
Height OD / Depth	Min: 4m Max: 9m

Project creators

Name of Organisation	Archaeological Services WYAS
Project brief originator	Environmental Dimension Partnership
Project design originator	Environmental Dimension Partnership
Project director/manager	C. Sykes
Project supervisor	C. Sykes

Project archives

Physical Archive Exists?	No
Digital Archive recipient	Environmental Dimension Partnership
Digital Contents	"Survey"
Digital Media available	"Geophysics","Images raster / digital photography","Text"
Paper Archive recipient	East Sussex HER
Paper Contents	"Survey"
Paper Media available	"Map","Survey ","Unpublished Text"

Project bibliography 1

	Grey literature (unpublished document/manuscript)
Publication type	
Title	Land at Brodricklands and Hamlands Farm, Lower Willingdon
Author(s)/Editor(s)	Brunning, E
Date	2016
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Place of issue or publication	Morley, Leeds
Description	A4 report with A3 figures
Entered by	Emma Brunning (emma.brunning@aswyas.com)

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