HHES19



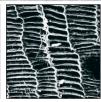














# PARK FARM WEST (HN1C), HELLINGLY, HAILSHAM, EAST SUSSEX

**GEOPHYSICAL SURVEY REPORT** 

commissioned by Catesby Estates Ltd

September 2020





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PROJECT INFO:

HA Project Code HHES19 / NGR TQ 5916 1195 / Parish Hellingly / Local Authority East Sussex County Council / OASIS Ref. headland5-403344

PROJECT TEAM:

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### PROJECT SUMMARY

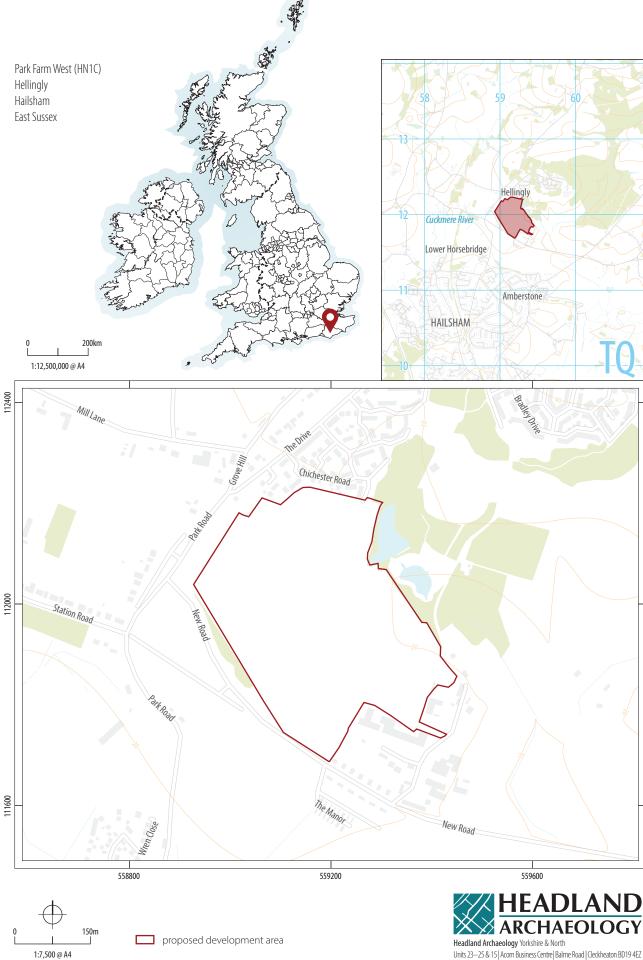
Headland Archaeology (UK) Ltd undertook a geophysical (magnetometer) survey of a 16 hectare site at Hellingly, East Sussex, where a new residential development is proposed. The site is located close to an Archaeological Notification Area (ANA DES9894) containing prehistoric and Roman settlement activity. No anomalies of archaeological potential have been identified by the survey with the majority of the anomalies reflecting postmedieval agricultural activity including boundary removal and land drainage, and modern services. Therefore, on the basis of the geophysical survey, the archaeological potential of the site is assessed as low.

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# PARK FARM WEST (HN1C), HELLINGLY, HAILSHAM, EAST SUSSEX

### GEOPHYSICAL SURVEY REPORT

### 1 INTRODUCTION

Headland Archaeology (UK) Ltd was commissioned by Catesby Estates Ltd (the Client), to undertake a geophysical (magnetometer) survey on land west of Park Farm, Hellingly, Hailsham, East Sussex, where a new residential development is proposed. The results of the survey will inform future archaeological strategy at the site.

The survey was undertaken in order to assess the impact of the proposed development on the historic environment and was undertaken in accordance with an Archaeological Written Scheme of Investigation (WSI) (Harrison 2019), with guidance within the National Planning Policy Framework (MHCLG 2019) and in line with current best practice (Chartered Institute for Archaeologists 2014, Europae Archaeologiae Consilium 2016).

# 1.1 SITE LOCATION, TOPOGRAPHY AND LAND-USE

The proposed development area (PDA) is located immediately south-east of Hellingly and north of Hailsham, East Sussex (centred on TQ 5916 1195). It comprises two fields (F1–F2) within an irregularly-shaped block of land which is bound by trees and residential properties to the north, Park Road to the west, New Road to the south and by Park Farm and further residential properties to the east.

The PDA slopes gently from 29m Above Ordnance Datum (AOD) in the north-west to 22m AOD at New Road in the south-east. Both F1 and F2 had been recently harvested at the time of the survey (Illus 2–3).

The survey was carried out on the 28th and 29th August 2019.

### 1.2 GEOLOGY AND SOILS

The bedrock geology mostly comprises siltstone of the Tunbridge Wells Sand Formation with mudstone (also of the Tunbridge Wells Sand Formation) in the south (NERC 2019). No superficial deposits are recorded.

The soil is classified in the Soilscape 8 Association, characterised as slightly acid loams and clays with impeded drainage (Cranfield University 2019).

# 2 ARCHAEOLOGICAL BACKGROUND

The PDA is located immediately north of an Archaeological Notification Area (ANA) containing prehistoric and Roman settlement activity which is recorded on the East Sussex Historic Environment Record (HER) as DES9894 (Illus 4).

Analysis of historical Ordnance Survey (OS) maps indicates that several former field boundaries have been removed from within the PDA since the publication of the first edition OS map in 1875. F2 is shown as an orchard during the first half of the twentieth century.

# 3 AIMS, METHODOLOGY AND PRESENTATION

The general aim of the geophysical survey was to provide enough information to establish the presence/absence, character and extent of any archaeological remains within the PDA. This will therefore



ILLUS 2 F1, looking north-west

enable an assessment to be made of the impact of the proposed development on any sub-surface archaeological remains, if present.

The specific archaeological objectives of the geophysical survey were:

- > to gather enough information to inform the extent, condition, character and date (as far as circumstances permit) of any archaeological features and deposits within the PDA;
- > to obtain information that will contribute to an evaluation of the significance of the scheme upon cultural heritage assets; and
- > to prepare a report summarising the results of the survey.

### 3.1 MAGNETOMETER SURVEY

Magnetic survey methods rely on the ability of a variety of instruments to measure very small magnetic fields associated with buried archaeological remains. A feature such as a ditch, pit or kiln can act like a small magnet, or series of magnets, that produce distortions (anomalies) in the earth's magnetic field. In mapping these slight variations, detailed plans of sites can be obtained as buried features often produce reasonably characteristic anomaly shapes and strengths (Gaffney & Gater 2003). Further information on soil magnetism and the interpretation of magnetic anomalies is provided in Appendix 1.

The survey was undertaken using four Bartington Grad601 sensors mounted at 1m intervals (1m traverse interval) onto a rigid carrying frame. The system was programmed to take readings at a frequency of 10Hz (allowing for a 10–15cm sample interval) on roaming traverses (swaths) 4m apart. These readings were stored on an external weatherproof laptop and later downloaded for processing

and interpretation. The system was linked to a Trimble R8s Real Time Kinetic (RTK) differential Global Positioning System (dGPS) outputting in NMEA mode to ensure a high positional accuracy for each data point.

MLGrad601 and MultiGrad601 (Geomar Software Inc) software was used to collect and export the data. Terrasurveyor V3.0.35.1 (DWConsulting) software was used to process and present the data.

### 3.2 REPORTING

A general site location plan is shown in Illus 1 at a scale of 1:7,500. Illus 2 and Illus 3 are site condition photographs. Illus 4 is a 1:4,000 survey location plan showing the Archaeological Notification Area and the direction of survey as GPS swaths. The data is presented in greyscale and XY trace formats, at a scale of 1:2,500, in Illus 5 and Illus 6. Illus 7 is an interpretation plot of the data also at a scale of 1:2,500.

Technical information on the equipment used, data processing and magnetic survey methodology is given in Appendix 1. Appendix 2 details the survey location information and Appendix 3 describes the composition and location of the site archive. Data processing details are presented in Appendix 4. A copy of the OASIS entry (Online Access to the Index of Archaeological Investigations) is reproduced in Appendix 5.

The survey methodology, report and any recommendations comply with the Written Scheme of Investigation (Harrison 2019), guidelines outlined by Europae Archaeologiae Consilium (EAC 2016) and by the Chartered Institute for Archaeologists (CIfA 2014). All illustrations from Ordnance Survey (OS) mapping are reproduced with the permission of the controller of Her Majesty's Stationery Office (© Crown copyright).



ILLUS 3 F2, looking north-west

The illustrations 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 illustrations are presented to most suitably display and interpret the data from this site based on the experience and knowledge of management and reporting staff.

### 4 RESULTS AND DISCUSSION

Ground conditions were good throughout contributing to a high standard of data collection. The magnetic background manifests throughout F1 as a relatively monotone greyscale with minimal background magnetic variation. This is due to the homogeneous properties of the siltstone bedrock. The magnetic background in F2 is more variable, probably due to the former use of the field as an orchard. Against these backgrounds numerous anomalies have been identified and cross-referenced to specific examples on the interpretation figure (Illus 7).

# 4.1 FERROUS AND MODERN ANOMALIES

Ferrous anomalies, characterised as individual 'spikes', are typically caused by ferrous (magnetic) material, either on the ground surface or in the plough-soil. Little importance is normally given to such anomalies, unless there is any supporting evidence for an archaeological interpretation, as modern ferrous debris is common on most sites, often being present as a result of manuring or tipping/infilling. There is no obvious clustering to these ferrous anomalies which might indicate an archaeological origin. Far more probable is that the 'spike' responses are likely caused by the random distribution of ferrous debris in the upper soil horizons.

High magnitude dipolar linear anomalies (SP1–SP6; Illus 7) crisscrossing the eastern part of the PDA locate buried service pipes. Localised areas of magnetic disturbance (MH1–MH2) and an isolated ferrous spike (MH3) in the west of F1 are due to inspection covers, probably associated with a deeply buried service. Overhead services are recorded in the data by an alignment of broad areas of magnetic disturbance and clusters of large spikes which are due to telegraph poles (TP1 and TP2) and pylons (PY1).

Magnetic disturbance around the field edges is due to ferrous material within, or adjacent to the boundaries and is of no archaeological interest.

### 4.2 AGRICULTURAL ANOMALIES

Analysis of historical Ordnance Survey (OS) maps indicates that several former field boundaries have been removed from within the PDA since the publication of the first edition OS map in 1875. Four of these former boundaries manifest in the data as clear linear anomalies (FB1–FB4, Illus 7). The anomalies are caused by the magnetic contrast between the former (but now infilled) boundary ditch and the surrounding soils.

Elsewhere series of parallel linear anomalies across the west of F1 are typical of field drains.

### 4.3 GEOLOGICAL ANOMALIES

Occasional discrete high magnitude anomalies are interpreted as geological in origin, probably being due to localised variation in the depth and composition of the topsoil and the siltstone bedrock from which they derive.

### 5 CONCLUSION

The survey has successfully evaluated the proposed development area and has not identified any anomalies of archaeological potential. The majority of the anomalies identified are due to post-medieval agricultural activity including boundary removal and land drainage, and modern services. Therefore, on the basis of the geophysical survey, the archaeological potential of the site is assessed as low.

### 6 REFERENCES

Chartered Institute for Archaeologists (ClfA) 2014 Standard and guidance for archaeological geophysical survey (Reading) <a href="http://www.archaeologists.net/sites/default/files/ClfAS%26GGeophysics\_2.pdf">http://www.archaeologists.net/sites/default/files/ClfAS%26GGeophysics\_2.pdf</a> accessed 16 September 2019

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Ministry of Housing, Communities and Local Government MHCLG) 2019 National Planning Policy Framework <a href="https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\_data/file/81017/NPPF\_Feb\_2019\_revised.pdf">https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\_data/file/81017/NPPF\_Feb\_2019\_revised.pdf</a> accessed 16 September 2019

Natural Environment Research Council (NERC) 2018 *British Geological Survey* <a href="http://www.bgs.ac.uk/">http://www.bgs.ac.uk/</a> accessed 16 September 2019

proposed development area

GPS swaths

MALTHOUSE

### 7 APPENDICES

### APPENDIX 1 MAGNETOMETER SURVEY

### 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 haematite. 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 so that by measuring the magnetic susceptibility of the topsoil, areas where human occupation or settlement has occurred can be identified by virtue of the attendant increase (enhancement) in 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. This effect can lead to the detection of features such as hearths, kilns or areas of burning.

### 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.

Where it is not possible to give a probable cause of an observed anomaly a '?' is appended.

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.

**Lightning-induced remnant magnetisation (LIRM)** LIRM anomalies are thought to be caused in the near-surface soil horizons by the flow of electrical currents associated with lightning strikes. These observed anomalies have a strong bipolar signal which decreases with distance from the spike point and often appear as linear or radial in shape.

**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 (sometimes only visible on an XY trace plot) 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.

### APPENDIX 2 SURVEY LOCATION **INFORMATION**

An initial survey base station was established using a Trimble VRS differential Global Positioning System (dGPS). The magnetometer data were georeferenced using a Trimble RTK differential Global Positioning System (Trimble R8s model).

Temporary sight markers were laid out using a Trimble VRS differential Global Positioning System (Trimble R8s model) to guide the operator and ensure full coverage. The accuracy of this dGPS equipment is better than 0.01m.

The survey data were then superimposed 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 coordinates are measured off hard copies of the mapping rather than using the digital coordinates.

Headland Archaeology cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party.

### APPENDIX 3 GEOPHYSICAL SURVEY **ARCHIVE**

The geophysical archive comprises an archive disk containing the raw data in XYZ format, a raster image of each greyscale plot with associate world file, and a PDF of the report.

The project will be archived in-house in accordance with recent good practice guidelines (http://guides.archaeologydataservice. ac.uk/g2gp/Geophysics\_3). The data will be stored in an indexed archive and migrated to new formats when necessary.

### APPENDIX 4 DATA PROCESSING

The gradiometer data has been presented in this report in processed greyscale and minimally processed XY trace plot format.

Data collected using RTK GPS-based methods cannot be produced without minimal processing of the data. The minimally processed data has been interpolated to project the data onto a regular grid and de-striped to correct for slight variations in instrument calibration drift and any other artificial data.

A high pass filter has been applied to the greyscale plots to remove low frequency anomalies (relating to survey tracks and modern agricultural features) in order to maximise the clarity and interpretability of the archaeological anomalies.

The data has also been clipped to remove extreme values and to improve data contrast.

# © 2020 by Headland Archaeology (UK) Ltd File Name: HHES-HN1C-Report-v.2.pdf

### APPENDIX 5 OASIS DATA COLLECTION FORM: ENGLAND

### OASIS ID: headland5-403344

PRO.	IFCT	DF1	ſAIJ	ς

Project name Park Farm West (HN1C), Hellingly, Hailsham, East Sussex

Short description of the project Headland Archaeology (UK) Ltd undertook a geophysical (magnetometer) survey of a 16 hectare site at Hellingly, East Sussex, where a new

residential development is proposed. The site is located close to an Archaeological Notification Area (ANA DES9894) containing prehistoric and Roman settlement activity. No anomalies of archaeological potential have been identified by the survey with the majority of the anomalies reflecting post-medieval agricultural activity including boundary removal and land drainage, and modern services. Therefore, on the basis of the

geophysical survey, the archaeological potential of the site is assessed as low.

Project dates Start: 28-08-2019 End: 29-08-2019

Previous/future work No / Yes

Any associated project reference codes HHES19 — Contracting Unit No

Type of project Field evaluation

Site status N/A

Current Land use Cultivated Land 4 — Character Undetermined

Monument type N/A

Monument type N/A

Significant Finds N/A

Significant Finds N/A

Methods & techniques "Geophysical Survey"

Development type Housing estate

**Prompt** National Planning Policy Framework — NPPF

Position in the planning process Pre-application

Solid geology (other) Tunbridge Wells Sand Formation

Drift geology (other)  $$\mathbb{N}/\mathbb{A}$$ 

Techniques Magnetometry

### PROJECT LOCATION

**Country** England

Site location East Sussex, Wealden, Hailsham, Park Farm West (HN1C), Hellingly, Hailsham, East Sussex

Study area 16 Hectares

Site coordinates TQ 5916 1195 50.88450098354 0.26294486162 50 53 04 N 000 15 46 E Point

### PROJECT CREATORS

Name of Organisation Headland Archaeology

**Project brief originator** The Environmental Dimension Partnership

Project design originator Headland Archaeology

 Project director/manager
 David Harrison

 Project supervisor
 Krasimir Dyulgerski

Type of sponsor/funding body Developer

### PROJECT ARCHIVES

Physical Archive Exists?

No

### PARK FARM WEST (HN1C), HELLINGLY, HAILSHAM, EAST SUSSEX HHES19

 Digital Archive recipient
 In house

 Digital Contents
 "other"

Digital Media available "Geophysics"

Paper Archive Exists? No

PROJECT BIBLIOGRAPHY 1

Publication type Grey literature (unpublished document/manuscript)

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