

CRES20



# LAND NORTH OF WALSHES ROAD (PHASE 2) CROWBOROUGH, EAST SUSSEX

## GEOPHYSICAL SURVEY REPORT

commissioned by Catesby Estates Promotions Ltd

April 2020



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#### PROJECT INFO:

HA Project Code **CRES20** / NGR **TQ 5271 2954** / Parish **Crowborough** / Local Authority **Wealden District Council** / OASISRef. **headland5-391816**

#### PROJECT TEAM:

Project Manager **David Harrison** / Author **Krasimir Dyulgierski** / Fieldwork **Krasimir Dyulgierski, Michalis Kaikas** / Graphics **Beata Wieczorek-Oleksy, Julia Bastek-Michalska, Krasimir Dyulgierski**

Approved by **David Harrison**



Headland Archaeology Yorkshire & North  
Unit 16 | Hillside | Beeston Rd | Leeds LS11 8ND  
t 0113 387 6430  
e yorkshireandnorth@headlandarchaeology.com  
w www.headlandarchaeology.com



part of the **RSK** Group





## PROJECT SUMMARY

Headland Archaeology (UK) Ltd undertook a second phase of geophysical (magnetometer) survey over 5 hectares on land north of Walshes Road, Crowborough, prior to the submission of a planning application for a new housing development. No anomalies of definite archaeological origin have been identified by the survey. Two isolated linear anomalies and two localised clusters of discrete anomalies have been interpreted as of possible archaeological potential due to their elevated magnetic response and the presence of Romano-British remains immediately north of the application area. These anomalies are ascribed moderate to low archaeological potential. Elsewhere, no anomalies of any potential have been identified and the majority of the area surveyed is assessed as of low potential. Woodland and overgrown scrub limited survey across the north of the site and archaeological potential here remains unclear.

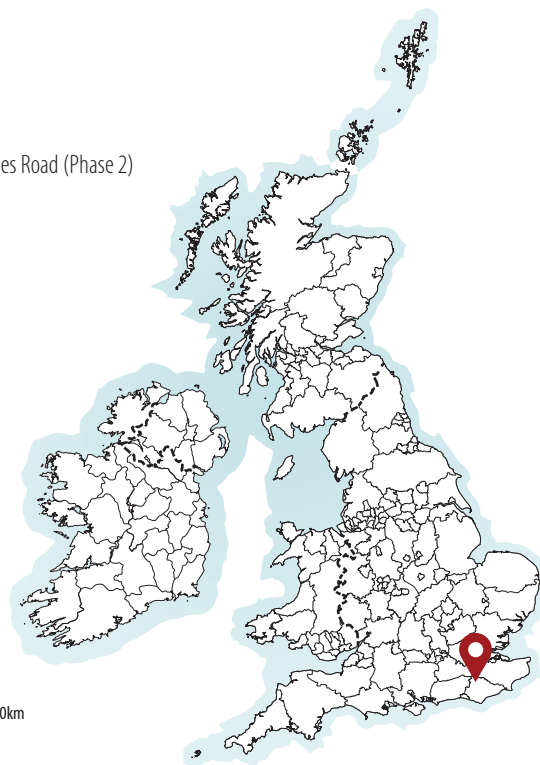
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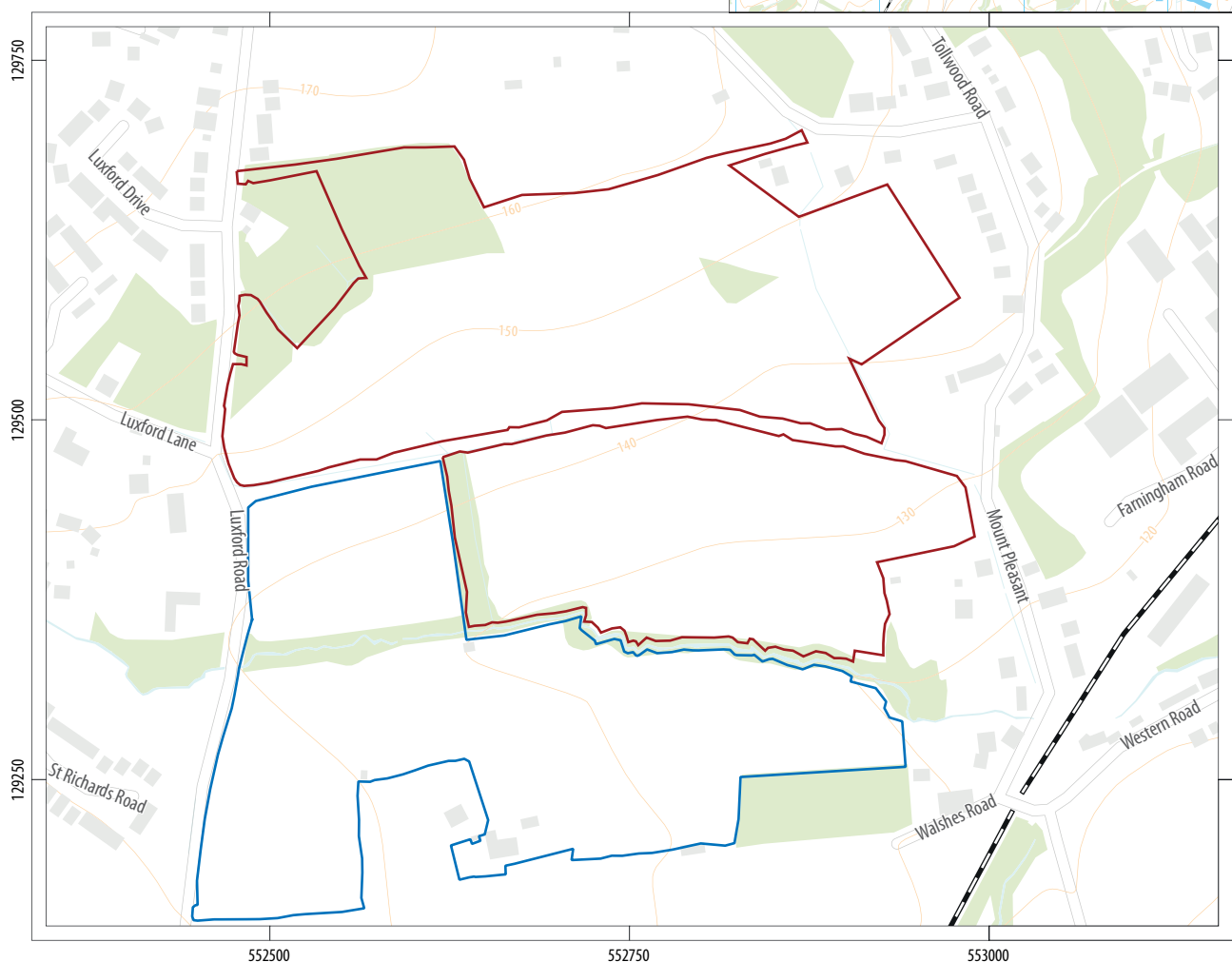
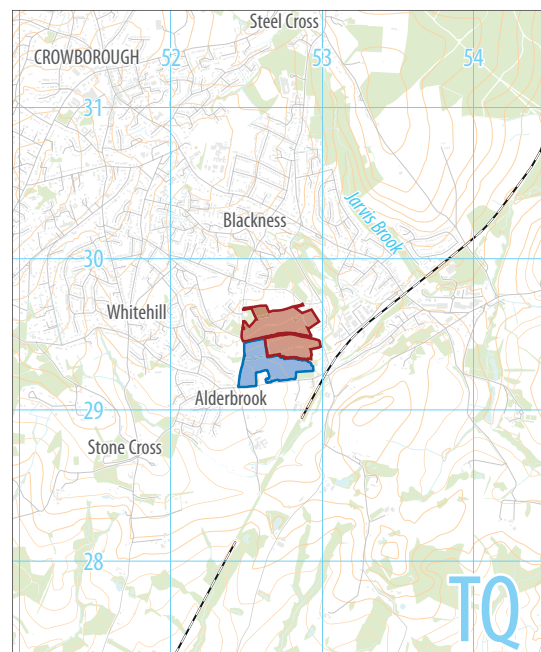
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Land north of Walshes Road (Phase 2)  
 Crowborough  
 East Sussex



0 200km  
 1:12,500,000 @ A4



0 100m  
 1:5,000 @ A4

geophysical survey area (Phase 2)  
 previous geophysical survey area (Phase 1)

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**ARCHAEOLOGY**

Headland Archaeology Yorkshire & North  
 Unit 16 | Hillside | Beeston Rd | Leeds LS11 8ND  
 t 0113 387 6430  
 e yorkshireandnorth@headlandarchaeology.com  
 w www.headlandarchaeology.com

ILLUS 1 Site location (1:5,000)



# LAND NORTH OF WALSHES ROAD (PHASE 2) CROWBOROUGH, EAST SUSSEX

## GEOPHYSICAL SURVEY REPORT

### 1 INTRODUCTION

Headland Archaeology (UK) Ltd was commissioned by Catesby Estates Promotions Ltd (the Client) to undertake a second phase geophysical survey on land north of Walshes Road, Crowborough, East Sussex. The results of the survey will be submitted to inform a planning application for a proposed residential development and 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 a Written Scheme of Investigation (Harrison 2020) which was submitted to the Archaeology Section of East Sussex County Council. The survey was also undertaken in line with guidance contained within the National Planning Policy Framework (MHCLG 2019) and with current best practice (Chartered Institute for Archaeologists 2014, Europae Archaeologia Consilium 2016).

#### 1.1 SITE LOCATION, TOPOGRAPHY AND LAND-USE

The Geophysical Survey Area (GSA) comprises eight fields (F1-F8) within an irregularly-shaped block of land centred on TL 5271 2954. It is bound to the north by residential dwellings and a nursery along Blackness Road, to the east by gardens and residential properties along Mount Pleasant and to the west by Luxford Road. An irregular block of permanent pasture (Phase 1) separates the PDA from Walshes Road in the south (Illus 1).

At the time of survey F1–F5 were under unimproved permanent pasture with localised areas of scrub, overgrown vegetation and waterlogging (Illus 2, Illus 3). F6 and F8 (Illus 5) were wooded and unsuitable for survey and F7 contained overgrown vegetation throughout and was also unsuitable for survey (Illus 4). No survey could be undertaken in the west of F5 due to very soft, waterlogged ground conditions (Illus 6).

The GSA is located on a south-facing gradient being at 128m Above Ordnance Datum (AOD) in the south and 156m AOD in the north.

The survey was carried out on the 2nd March and the 3rd March 2020.

#### 1.2 GEOLOGY AND SOILS

The bedrock geology comprises Ashdown Formation – interbedded sandstone and siltstone. No superficial deposits are recorded (NERC 2020).

The soils are classified in the Soilscape 8 Association, characterised as slightly acid loams and clays with impeded drainage (Cranfield University 2020).

### 2 ARCHAEOLOGICAL BACKGROUND

An Archaeological Desk-Based Assessment (Nikolic 2020) has identified previous archaeological investigations to the north and south-west of the GSA which have revealed the presence of Romano-British smelting works and it is thought likely that these

extend into the GSA. There may also be remains from the medieval or post medieval periods such as buildings or field boundaries. The assessment concluded that:

*The archaeological potential of the PDA is considered to be medium: undiscovered heritage assets of low importance are likely to be present; and it is possible that assets of high or medium importance may also be present'*

Geophysical survey of the Phase 1 lands (see Illus 7) did not identify any anomalies of definite archaeological potential, identifying two isolated areas of possible archaeological potential. The survey (Harrison 2017) concluded that, on the basis of the survey, the archaeological potential of the site was low.

### 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 GSA. This will therefore 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 provide information about the nature and possible interpretation of any magnetic anomalies identified;
- › to therefore determine the likely presence/absence and extent of any buried archaeological features; and
- › to produce a comprehensive site archive and report.

#### 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)



ILLUS 2 F1, looking east

ILLUS 3 F5, looking north

ILLUS 4 F7, looking east

ILLUS 5 F8, looking east

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 1:5,000. Illus 2–5 are site condition photographs. Illus 6 is a 1:2,500 survey location plan showing the direction of survey as GPS swaths. Illus 7 shows the processed greyscale magnetometer data, and the previous survey data at 1:2,500 scale. Large scale (1:2,000) fully processed (greyscale) data, minimally processed (XY trace plot) data and an accompanying interpretation plot are presented in Illus 8–10 inclusive.

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 WSI (Harrison 2020), guidelines outlined by Europae Archaeologia 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).

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 varied across the GSA with broad areas of soft, waterlogged and overgrown ground (see Illus 2–5 inclusive). Nevertheless, the quality of the data collected is high. A low level of magnetic variation has been detected across the GSA. Against this background occasional anomalies have been identified and cross-referenced to specific examples on the interpretation figures.

### 4.1 FERROUS 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.

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 GEOLOGICAL ANOMALIES

Occasional discrete anomalies and faint curvilinear trends throughout the GSA are interpreted as geological in origin, probably being due to localised variation in the depth and composition of the topsoil.

### 4.3 POSSIBLE ARCHAEOLOGICAL ANOMALIES

An isolated north/south linear anomaly in the north of F1 (D1; Illus 10) is due to the magnetic contrast between the soil-fill of a ditch and the surrounding soil. The ditch is not depicted on historic mapping and therefore an archaeological origin should be considered. However, the anomaly is not detected extending northwards into F4, possibly terminating at the adjacent field boundary and so an agricultural origin is thought more likely, perhaps a field drain.

Towards the corner of F1 a high magnitude linear anomaly, D2, is also ascribed some archaeological potential, perhaps being due to burnt material. However this interpretation is considered tentative and a modern origin is equally possible.

Two localised clusters of increased magnetic response have been identified in the centre of F2 and the east of F4. These clusters are thought to be due to spreads of magnetically enhanced material and, whilst a modern origin is plausible, an archaeological cause cannot be dismissed.

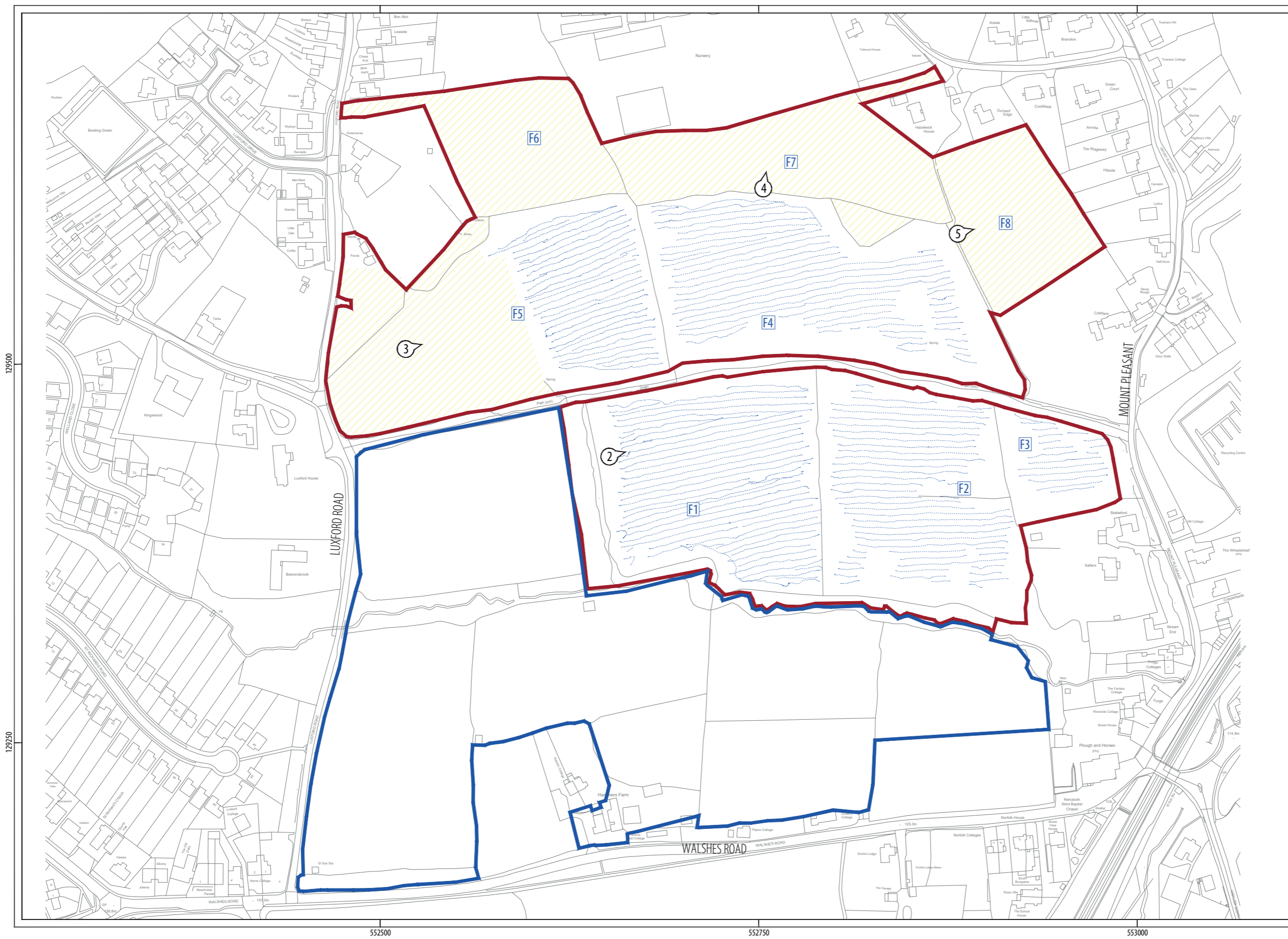
## 5 CONCLUSION

The survey has successfully evaluated the majority of the site and has not identified any anomalies of definite archaeological origin. Two isolated linear anomalies and two localised clusters of increased magnetic response have been interpreted as of possible archaeological potential due to their elevated response and the presence of Romano-British remains immediately north of the application area. These anomalies are ascribed moderate to low archaeological potential. Elsewhere, no anomalies of any potential have been identified and the majority of the area surveyed is assessed as of low potential. Woodland and overgrown scrub limited survey across the north of the site and archaeological potential here remains unclear.

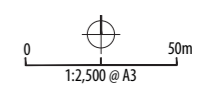
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- geophysical survey area (Phase 2)
- previous geophysical survey area (Phase 1)
- GPS swaths
- area unsuitable for survey
- location and direction of ILLUS 2-5



**PROJECT** CRES20  
 Land north of Walshes Road  
 Phase 2  
 Crowborough  
 East Sussex

**CLIENT** Gatesby Estates Promotions Ltd

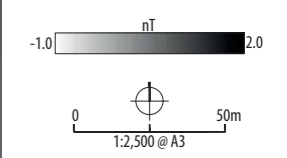
**HEADLAND ARCHAEOLOGY**

Headland Archaeology Yorkshire & North  
 Unit 16 | Hillside, Beeston Road | Leeds LS11 8ND  
 t 0113 387 6430  
 e yorkshireandnorth@headlandarchaeology.com  
 www.headlandarchaeology.com





▭ geophysical survey area (Phase 2)  
▭ previous geophysical survey area (Phase 1)



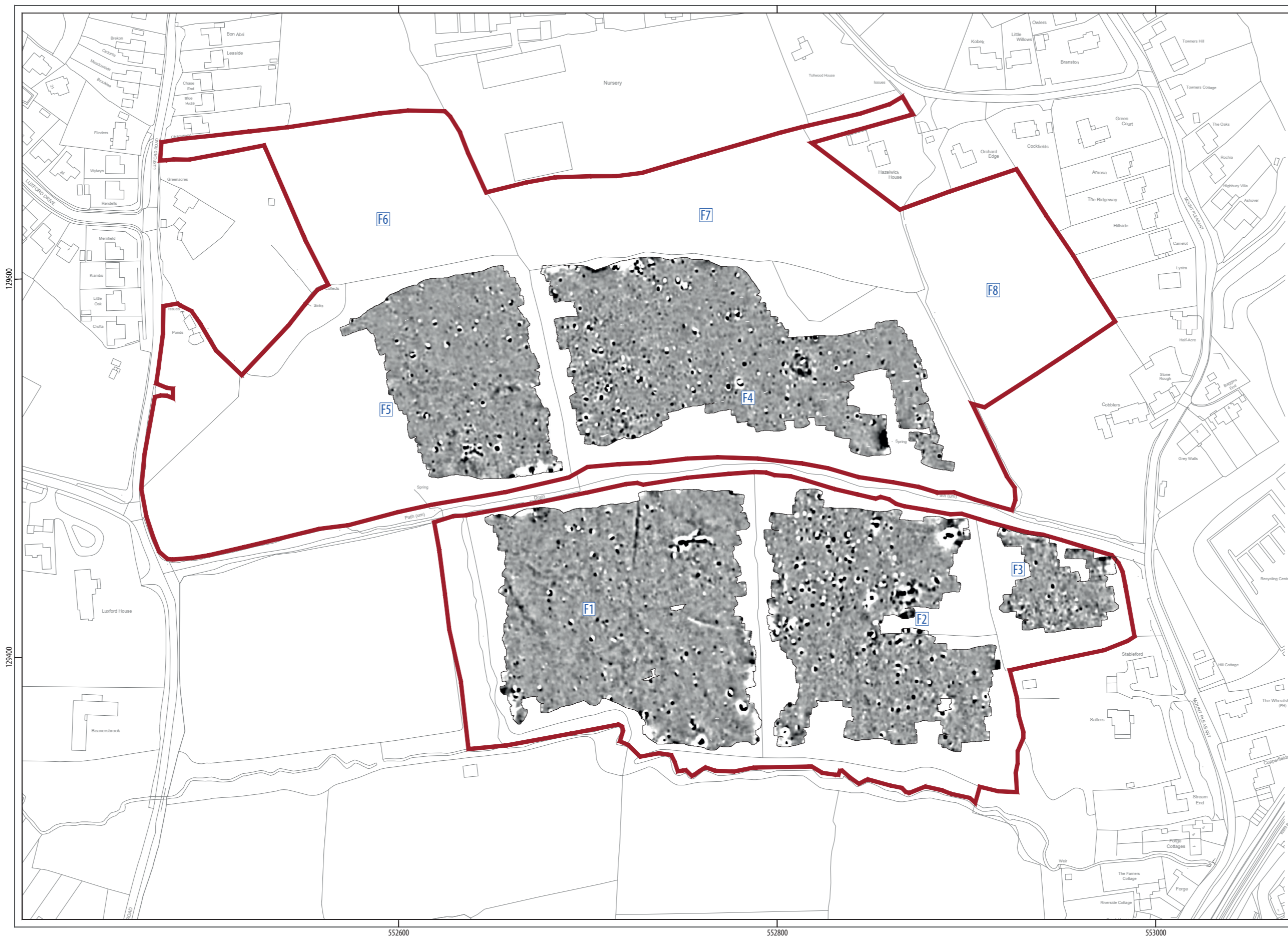
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 Headland Archaeology Yorkshire & North  
 Unit 16 | Hillside, Beeston Road | Leeds LS11 8ND  
 t 0113 387 6430  
 e yorkshireandnorth@headlandarchaeology.com  
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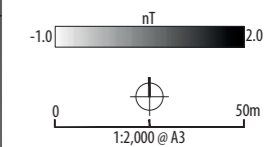
ILLUS 7 Processed greyscale magnetometer data showing previous geophysical survey (1:2,500)







geophysical survey area (Phase 2)



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 Phase 2  
 Crowborough  
 East Sussex

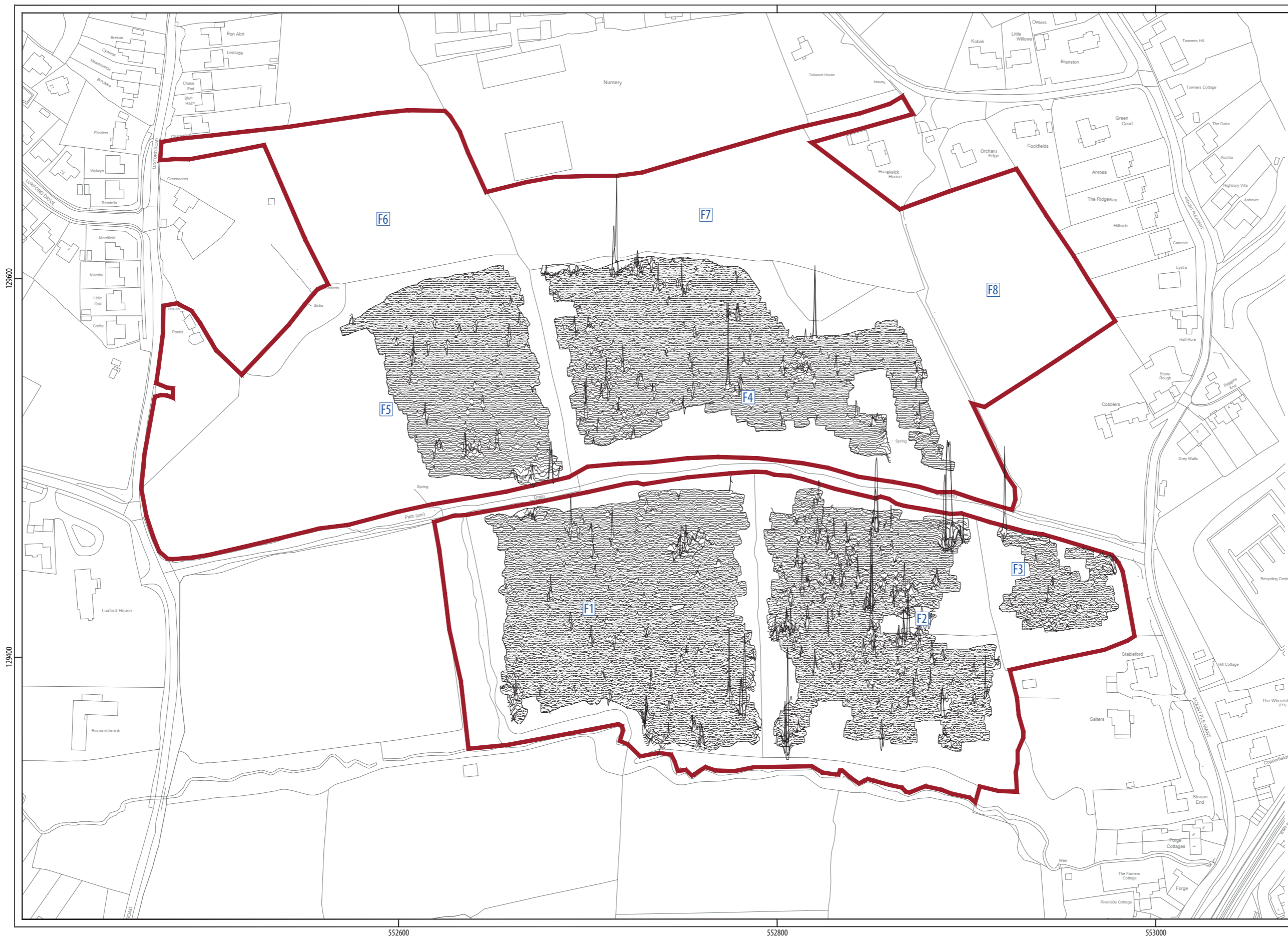
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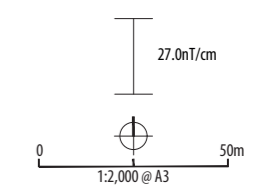
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 t 0113 387 6430  
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ILLUS 8 Processed greyscale magnetometer data (1:2,000)





geophysical survey area (Phase 2)



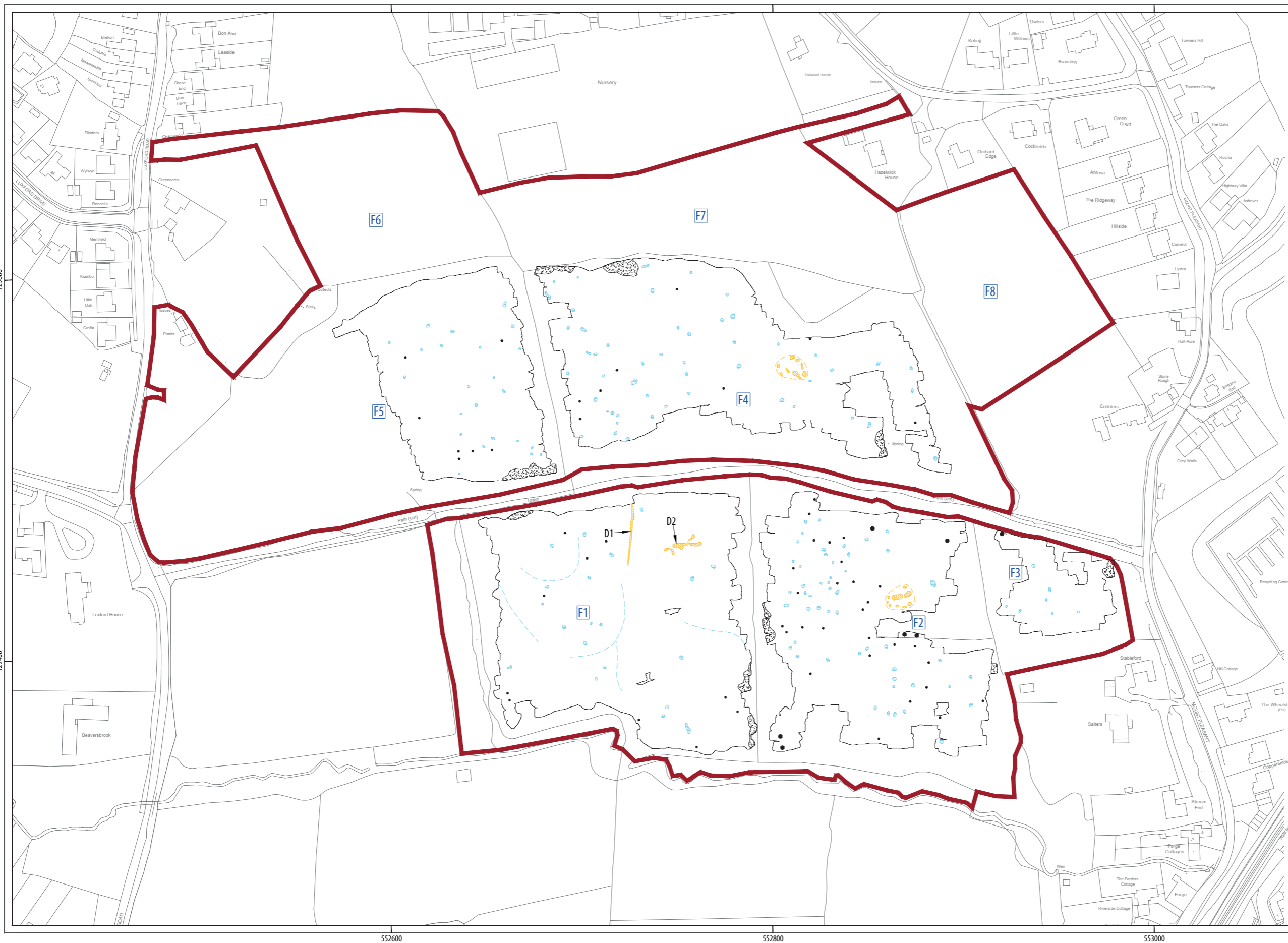
PROJECT CRES20  
 Land north of Walshes Road  
 Phase 2  
 Crowborough  
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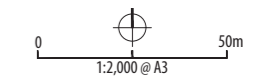
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Headland Archaeology Yorkshire & North  
 Unit 16 | Hillside, Beeston Road | Leeds LS11 8ND  
 t 0113 387 6430  
 e yorkshireandnorth@headlandarchaeology.com  
 w www.headlandarchaeology.com





- geophysical survey area (Phase 2)
- | TYPE OF ANOMALY        | INTERPRETATION       |
|------------------------|----------------------|
| ● dipolar isolated     | ferrous material     |
| ● magnetic disturbance | ferrous material     |
| — linear trend         | geological variation |
| ● magnetic enhancement | geology              |
| ● magnetic enhancement | archaeology?         |
- ABBREVIATIONS
- D ditch



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Phase 2  
Crowborough  
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Headland Archaeology Yorkshire & North  
Unit 16 | Hillside, Beeston Road | Leeds LS11 8ND  
t 0113 387 6430  
e yorkshireandnorth@headlandarchaeology.com  
w www.headlandarchaeology.com



## 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 an 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 was 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 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 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 associated 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](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.



## APPENDIX 5 OASIS DATA COLLECTION FORM: ENGLAND

OASIS ID: *headland5-391816*

PROJECT DETAILS	
Project name	Land north of Walshes Road (Phase 2), Crowborough, East Sussex
Short description of the project	Headland Archaeology (UK) Ltd undertook a second phase of geophysical (magnetometer) survey over 5 hectares on land north of Walshes Road, Crowborough, prior to the submission of a planning application for a new housing development. No anomalies of definite archaeological origin have been identified by the survey. Two isolated linear anomalies and two localised clusters of discrete anomalies have been interpreted as of possible archaeological potential due to their elevated magnetic response and the presence of Romano-British remains immediately north of the application area. These anomalies are ascribed moderate to low archaeological potential. Elsewhere, no anomalies of any potential have been identified and the majority of the area surveyed is assessed as of low potential. Woodland and overgrown scrub limited survey across the north of the site and archaeological potential here remains unclear.
PROJECT DATES	
<b>START: 02-03-2020 END: 03-03-2020</b>	
Previous/future work	Yes / Not known
Any associated project reference codes	CRES20 – Contracting Unit No.
Type of project	Field evaluation
Site status	None
Current Land use	Grassland Heathland 5 - Character undetermined
Monument type	N/A None
Significant Finds	N/A None
Methods & techniques	'Geophysical Survey'
Development type	Housing estate
Prompt	National Planning Policy Framework – NPPF
Position in the planning process	Pre-application
Solid geology (other)	Ashdown Formation
Drift geology (other)	None
Techniques	Magnetometry
PROJECT LOCATION	
Country	England
Site location	EAST SUSSEX WEALDEN CROWBOROUGH Land north of Walshes Lane (Phase 2), Crowborough
Study area	5 Hectares
Site coordinates	TQ 5271 2954 51.044325025454 0.178695350856 51 02 39 N 000 10 43 E Point
PROJECT CREATORS	
Name of Organisation	Headland Archaeology
Project brief originator	Consultant
Project design originator	Headland Archaeology
Project director/manager	Harrison, D
Project supervisor	Dyulgerski, K
Type of sponsor/funding body	Developer
PROJECT ARCHIVES	
Physical Archive Exists?	No
Digital Archive recipient	In house

Digital Contents	'other'
Digital Media available	'Geophysics'
Paper Archive Exists?	No

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**PROJECT BIBLIOGRAPHY 1**

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Publication type	Grey literature (unpublished document/manuscript)
Title	Land north of Walshes Road (Phase 2), Crowborough, East Sussex; Geophysical Survey Report
Author(s)/Editor(s)	Dyulgierski, K
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**Headland Archaeology** Scotland  
13 Jane Street  
Edinburgh EH6 5HE  
t 0131 467 7705  
e scotland@headlandarchaeology.com

**Headland Archaeology** Yorkshire & North  
Unit 16 | Hillside | Beeston Rd  
Leeds LS11 8ND  
t 0113 387 6430  
e yorkshireandnorth@headlandarchaeology.com

**Headland Archaeology** South & East  
Building 68C | Wrest Park | Silsoe  
Bedfordshire MK45 4HS  
t 01525 861 578  
e southandeast@headlandarchaeology.com

**Headland Archaeology** Midlands & West  
Unit 1 | Clearview Court | Twyford Rd  
Hereford HR2 6JR  
t 01432 364 901  
e midlandsandwest@headlandarchaeology.com

**Headland Archaeology** North West  
Fourways House | 57 Hilton Street  
Manchester M1 2EJ  
t 0161 236 2757  
e northwest@headlandarchaeology.com

[www.headlandarchaeology.com](http://www.headlandarchaeology.com)