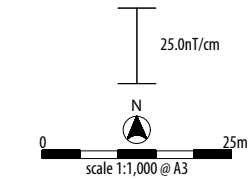
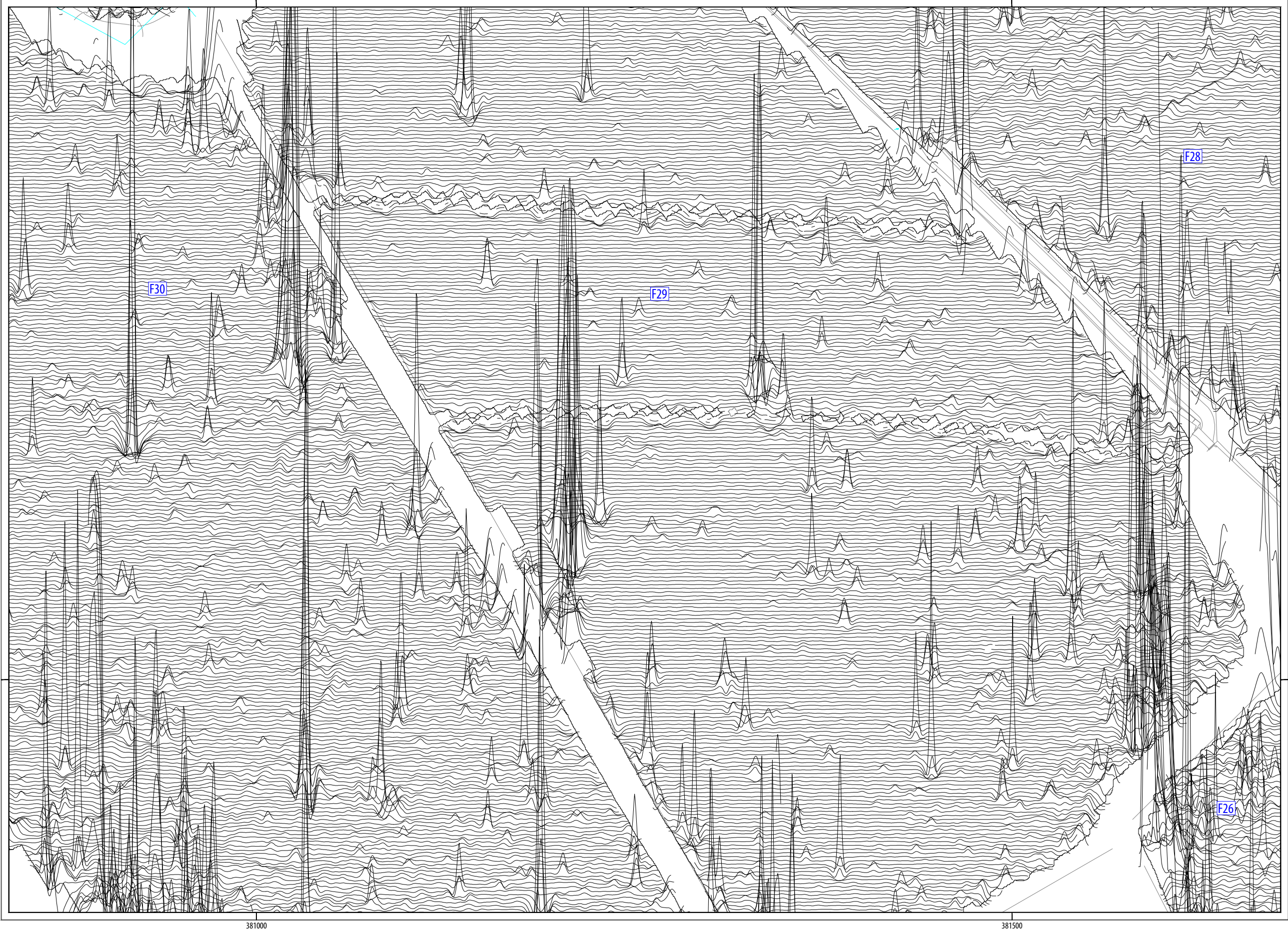


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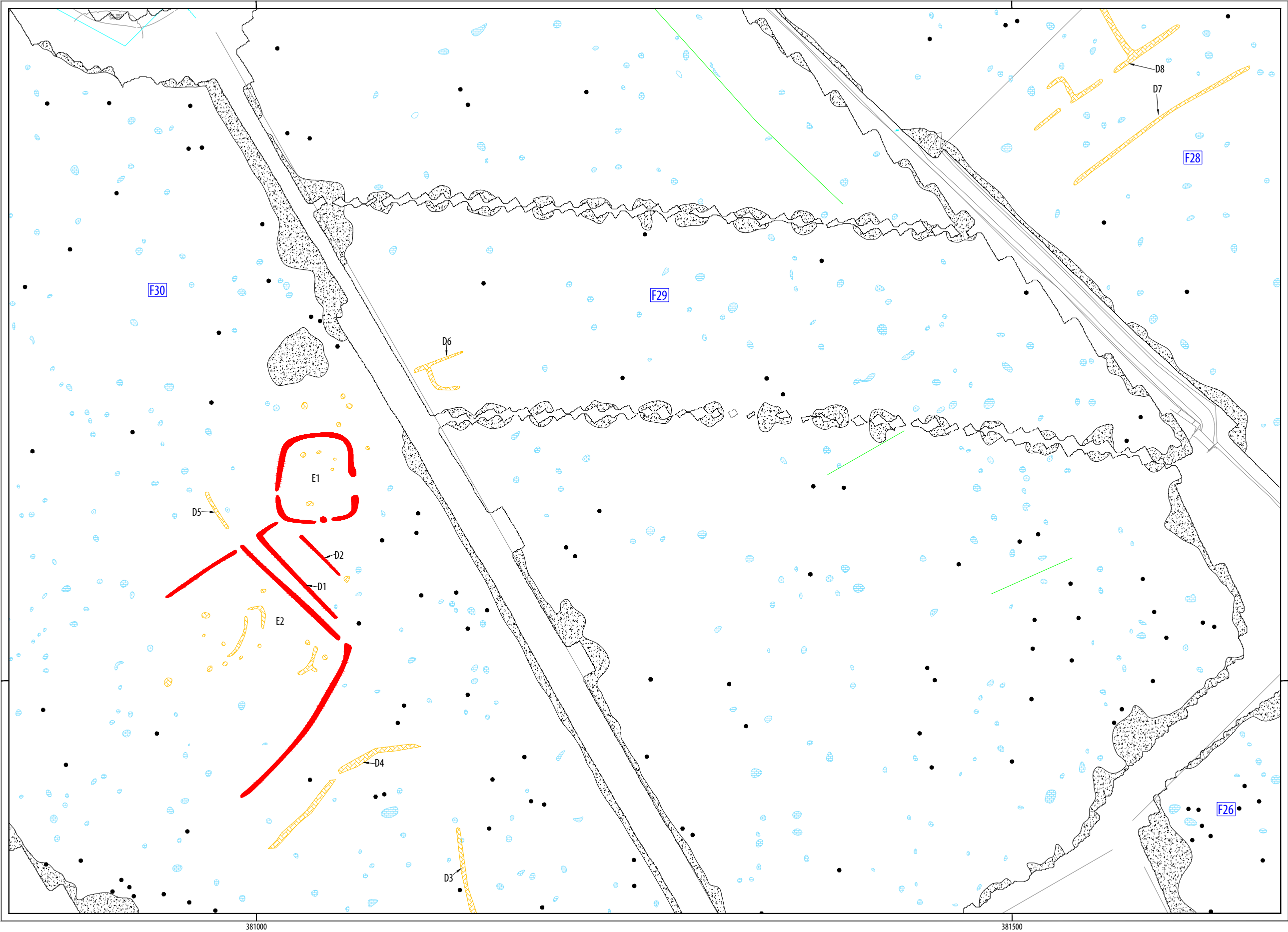
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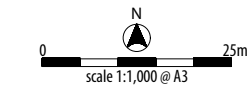
ILLUS 26 XY trace plot of minimally processed magnetometer data; Area of Archaeological Potential





TYPE OF ANOMALY	INTERPRETATION
● dipolar isolated	ferrous material
● magnetic disturbance	ferrous material
— linear trend	agricultural
● magnetic enhancement	geology?
● magnetic enhancement	archaeology?
● magnetic enhancement	archaeology

ABBREVIATIONS	
D	ditch
E	enclosure



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ILLUS 27 Interpretation of magnetometer data; Area of Archaeological Potential

## 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.

**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: headland5-284199

PROJECT DETAILS	
Project name	Gillingham Southern Extension
Short description of the project	Headland Archaeology (UK) Ltd undertook a geophysical (magnetometer) survey of a 115 hectare site, south of Gillingham, Dorset, as part of a baseline assessment of the heritage potential of the site. This information will help guide archaeological strategy in advance of the proposed development of the site. The majority of anomalies are indicative of post-medieval agricultural and modern activity with some natural variation within the soils due to the localised presence of alluvial deposits and the widespread distribution of other superficial deposits. One area of clear archaeological potential has, however, been located in the south-western corner of the site. Here linear anomalies forming one small square enclosure and one larger rectangular enclosure, together with other ditch type anomalies, have been identified. This area is assessed as of moderate to high archaeological potential. A curvilinear anomaly which may locate the continuation of a medieval deer park pale boundary (which is recorded beyond the site limits) has also been identified. However, this interpretation is extremely tentative and the anomaly could be indicative of much more recent agricultural activity. Consequently its potential is assessed as low to moderate. The archaeological potential of the remainder of the site is assessed as very low.
Project dates	Start: 22-02-2017 End: 10-03-2017
Previous/future work	Not known / Not known
Any associated project reference codes	GSEX - Sitecode
Type of project	Field evaluation
Site status	None
Current Land use	Grassland Heathland 4 - Regularly improved
Monument type	N/A None
Monument type	N/A None
Significant Finds	N/A None
Significant Finds	N/A None
Methods & techniques	"Geophysical Survey"
Development type	mixed use development
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Pre-application
Solid geology (other)	Kimmeridge Clay Formation
Drift geology (other)	Alluvium and Head
Techniques	Magnetometry
PROJECT LOCATION	
Country	England
Site location	DORSET NORTH DORSET GILLINGHAM GILLINGHAM SOUTHERN EXTENSION, DORSET
Study area	115 Hectares
Site coordinates	ST 81622 25543 51.028421162992 -2.262093759055 51 01 42 N 002 15 43 W Polygon
PROJECT CREATORS	
Name of Organisation	Headland Archaeology
Project brief originator	WYG
Project design originator	Headland Archaeology

Project director/manager	Harrison, S
Project supervisor	Bishop, R
Type of sponsor/funding body	Developer

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PROJECT ARCHIVES

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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	Gillingham Southern Extension, Dorset: Geophysical Survey
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Entered on	4 May 2017







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