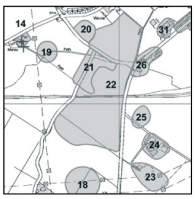
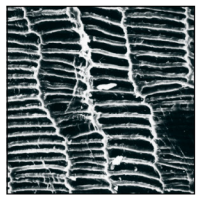
DBFH21










LAND AT DITCHFORD BANK FARM PHASE 2: HANBURY, BROMSGROVE, WORCESTERSHIRE

GEOPHYSICAL SURVEY REPORT

commissioned by G O Few & Son

May 2021

HEADLAND ARCHAEOLOGY

REGISTERED ORGANISATION CIfA

LAND AT DITCHFORD BANK FARM PHASE 2: HANBURY, BROMSGROVE, WORCESTERSHIRE

GEOPHYSICAL SURVEY REPORT

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May 2021

This report adheres to the quality standard of ISO 9001:2015

PROJECT INFO:

HA Project Code **DBFH21** / HER Event No. **WSM7740** / NGR **SO 9854 6370** / Parish **Hanbury** / Local Authority **Wychavon District Council** / OASIS Ref. **headland5-421893**

PROJECT TEAM:

Project Manager **David Harrison** / Author **David Harrison** / Fieldwork **Peter Heykoop, Eleanor Culverhouse** / Graphics **Beata Wieczorek-Oleksy, Eleanor Winter, Sam Harrison**

Approved by **David Harrison** D Harrison.....

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HEADLAND ARCHAEOLOGY

part of the RSK Group

REGISTERED ORGANISATION CIfA

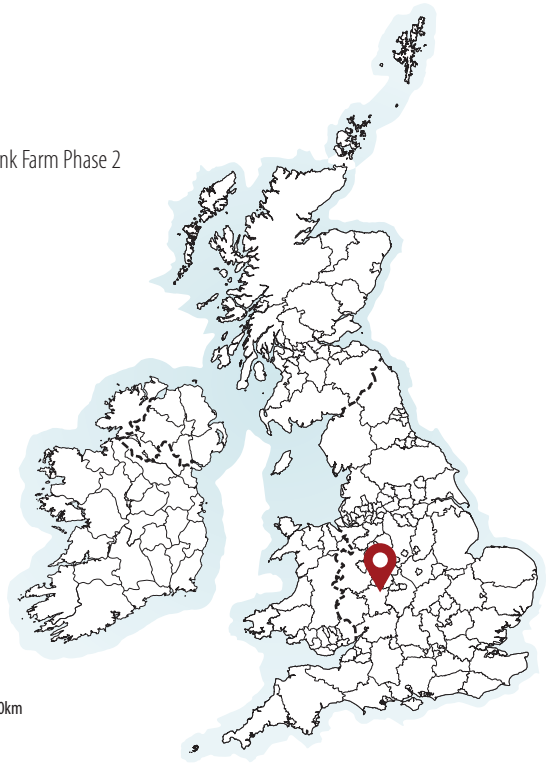
PROJECT SUMMARY

Headland Archaeology (UK) Ltd undertook a second phase of geophysical (magnetometer) survey covering 1.3 hectares on land at Ditchford Bank Farm, Hanbury, Worcestershire, to inform planning proposals for the development of four poultry buildings. No anomalies of any archaeological potential have been identified by the survey. Faint, parallel, linear trends may be due to ridge and furrow cultivation, which is also recorded on the Worcestershire Historic Environment Record (HER), but these are unlikely to be considered as of any more than local historic interest, and could equally be modern in origin. Therefore, on the basis of the geophysical survey, the application area is assessed as of low archaeological potential.

CONTENTS

LIST OF ILLUSTRATIONS

Land at Ditchford Bank Farm Phase 2
Hanbury
Bromsgrove
Worcestershire



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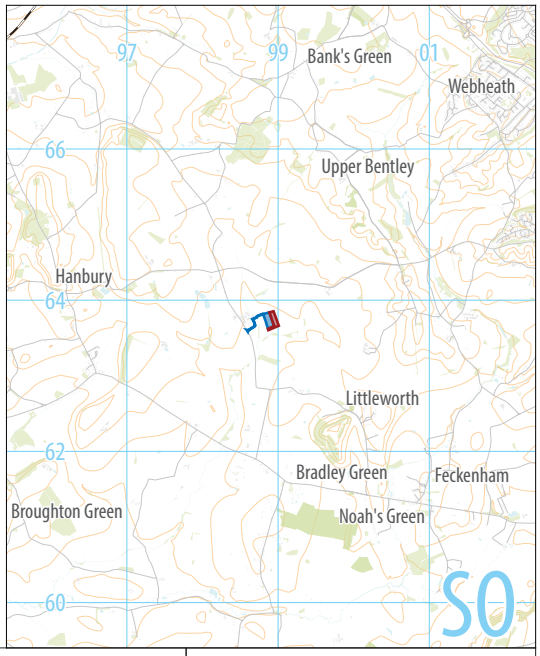

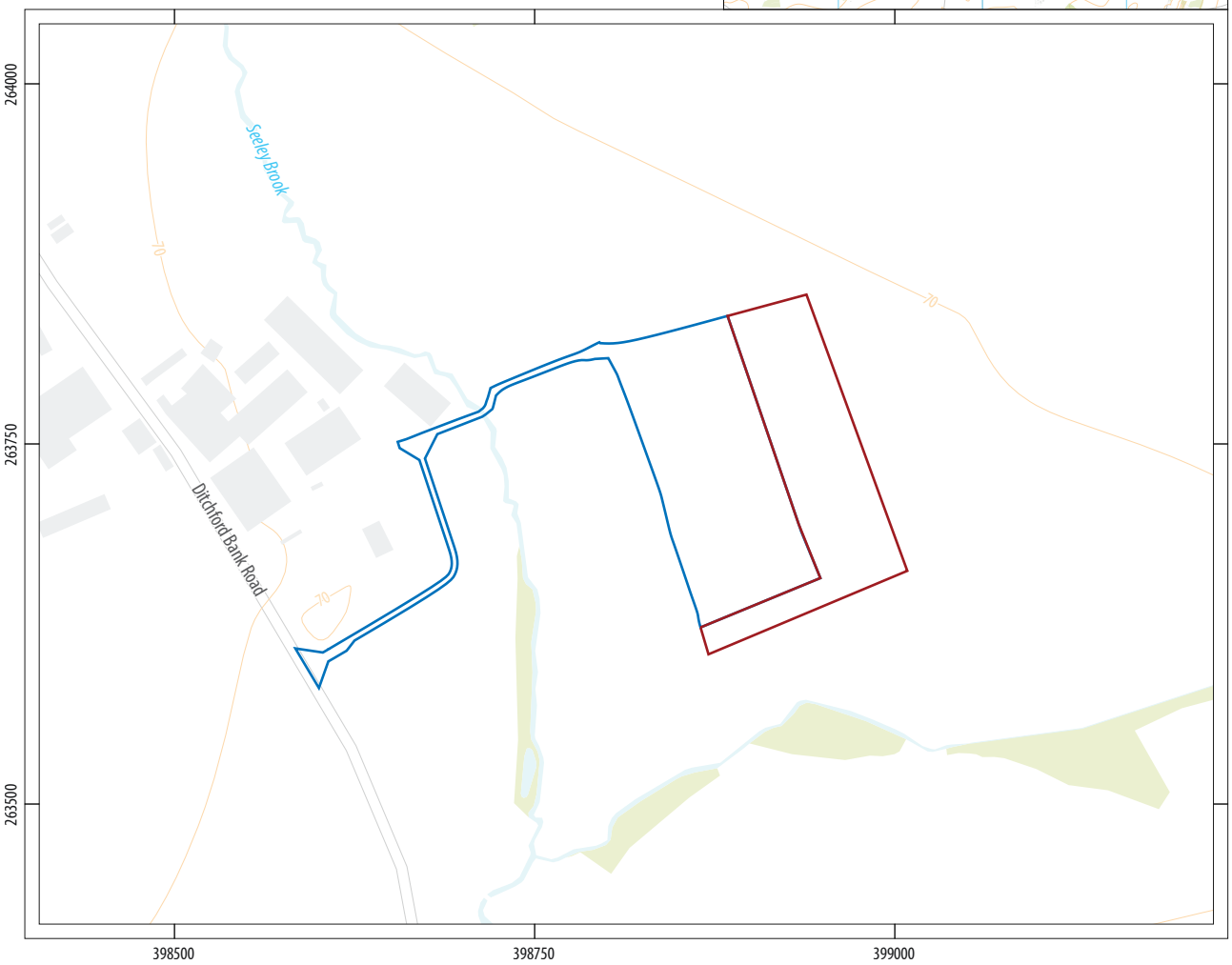

0 100m
1:5,000 @ A4

geophysical survey area
previous geophysical survey area

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ILLUS 1 Site location

LAND AT DITCHFORD BANK FARM PHASE 2: HANBURY, BROMSGROVE WORCESTERSHIRE

GEOPHYSICAL SURVEY REPORT

1 INTRODUCTION

Headland Archaeology (UK) Ltd was commissioned by G O Few & Sons (the Client), to undertake a second phase of geophysical (magnetometer) survey on land at Ditchford Bank Farm, Hanbury, Worcestershire, to inform planning proposals for the development of four poultry buildings. The results of the survey will inform an Archaeological Desk-Based Assessment (c/o Ian Pick & Associates, in prep).

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) which was submitted to and approved by Aidan Smyth (Archaeological Advisor to Wychavon District Council), with guidance within the National Planning Policy Framework (MHCLG 2019) and in line 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) is located south and east of Ditchford Bank Farm, centred on SO 9854 6370. It comprises a rectangular block of land in the west of an arable field which is connected to Ditchford Bank Road by a section of existing farm track (Illus 1).

Generally, the topography slopes towards Seeley Brook at 66m Above Ordnance Datum (AOD) which passes along the field boundary at the western side of the field. At the time of the survey, the field had recently been harvested for silage (Illus 2).

The survey was carried out on the 30th April 2021.

1.2 GEOLOGY AND SOILS

The bedrock geology mostly comprises Wilmcote Limestone Member (mudstone and limestone) with Cotham Member (mudstone) recorded in the south of the field. River Terrace Deposits 1 (sand and gravel) overlie the bedrock geology (NERC 2019).

The soils are classified in the Soilscape 8 Association in the west, characterised as loams and clays with impeded drainage, and in the Soilscape 18 Association in the east, characterised as slowly permeable, seasonally wet loams and clays (Cranfield University 2019).

2 ARCHAEOLOGICAL BACKGROUND

The GSA is located in an area containing possible medieval house platforms (WSM45371 & WSM45372) and evidence of ridge and furrow cultivation (WSM45387) which are recorded on the Worcestershire Historic Environment Record. The records may indicate the presence of a deserted medieval village.

ILLUS 2 Survey area, looking south

An earlier phase of geophysical survey (Headland Archaeology 2019) did not identify any anomalies of archaeological potential.

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) 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 is a site condition photograph. Illus 3 is a 1:2,000 survey location plan showing the direction of survey as GPS swaths. The data is presented in greyscale and XY trace formats, at a scale of 1:2,000, in Illus 4 and Illus 5. Illus 6 is an interpretation plot of the data also at a scale of 1:2,000.

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 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 good throughout the GSA contributing to a high standard of data collection. The magnetic background is relatively homogenous throughout and is characterised by numerous discrete anomalies which are probably due to localised variations in the depth and composition of the topsoil. Against this background several anomalies have been identified and cross-referenced to specific examples on the interpretation figure (Illus 6).

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.

Magnetic disturbance along the field edges is due to the presence of ferrous material within and adjacent to the field boundaries and is of no archaeological interest.

4.2 AGRICULTURAL ANOMALIES

A series of very faint, parallel linear trends aligned east/west across F2 are due to former ploughing. It is possible that they are caused by ridge and furrow cultivation which is recorded within the GSA on the HER (WSM45387) and therefore may be of local historical interest. However, the trends could equally be caused by modern ploughing.

4.3 GEOLOGICAL ANOMALIES

Occasional localised, discrete areas of magnetic enhancement have been identified across the GSA. These are isolated and form no coherent pattern. Whilst an archaeological origin cannot be completely dismissed, a geological origin is thought to be more probable, with the anomalies being due to localised variations in the composition of the topsoil and the superficial deposits from which they derive.

5 CONCLUSION

The survey has successfully evaluated the Geophysical Survey Area and has not identified any anomalies of clear archaeological potential and none to suggest the presence of medieval settlement activity which is recorded in the vicinity of the application area on the Worcestershire Historic Environment Record (HER). Faint, parallel, linear trends in the east of the site may be due to ridge and furrow cultivation, which is also recorded on the HER, but these are unlikely to be considered as of any more than local historic interest, and could equally be modern in origin. Therefore, on the basis of the geophysical survey, the survey area is assessed as of low archaeological potential.

6 REFERENCES

Chartered Institute for Archaeologists (ClfA) 2014 ***Standard and guidance for archaeological geophysical survey*** (Reading) http://www.archaeologists.net/sites/default/files/ClfAS%26GGeophysics_3.pdf accessed 20 May 2021

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geophysical survey area
previous survey area (Headland Archaeology 2019)
proposed development footprint
GPS swaths
location and direction of ILLUS 2

0 — 50m
1:2,000 @ A4

PROJECT DBFH21
Land at Ditchford Bank Farm
Hanbury
Bromsgrove
Worcestershire

CLIENT G O Few & Sons

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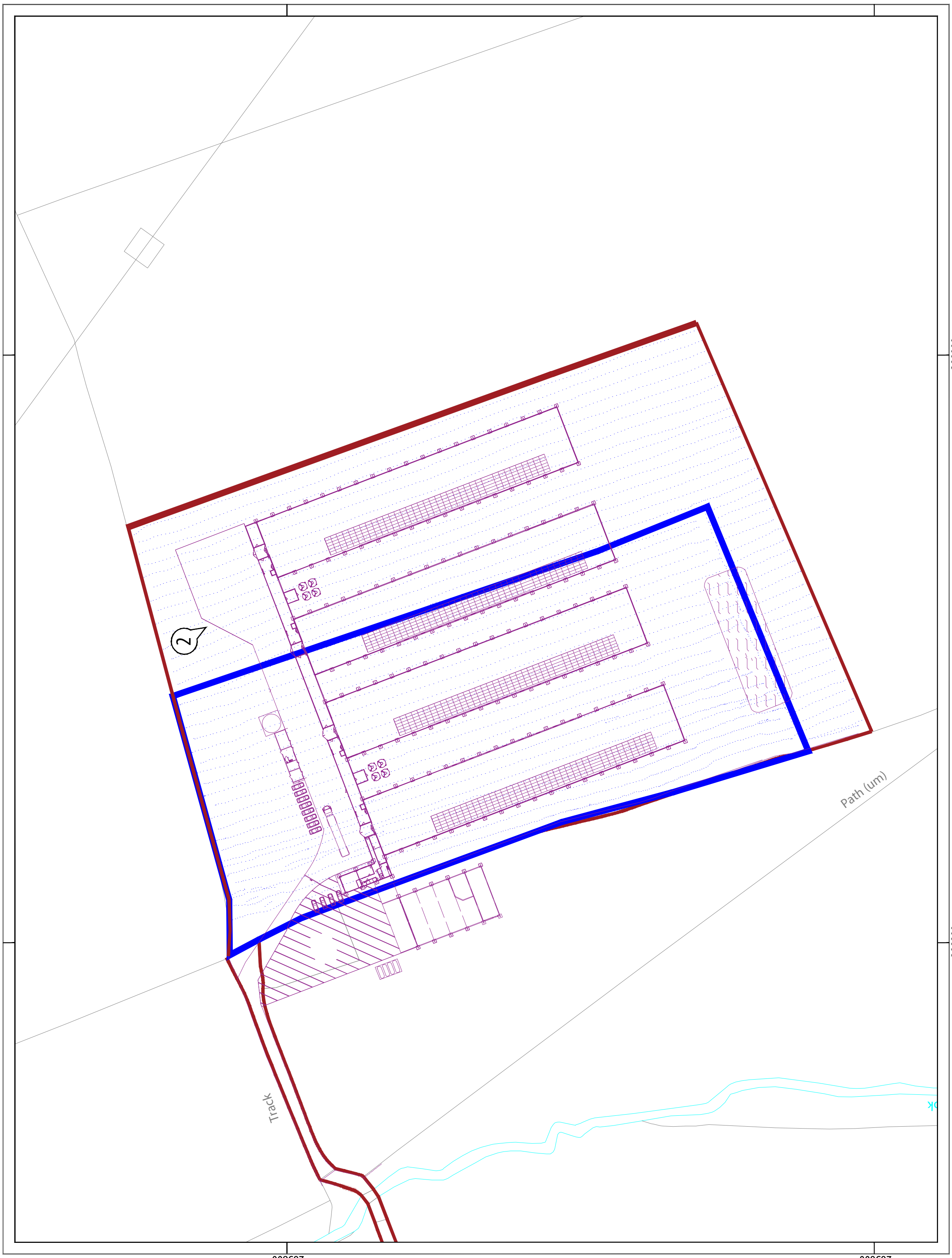
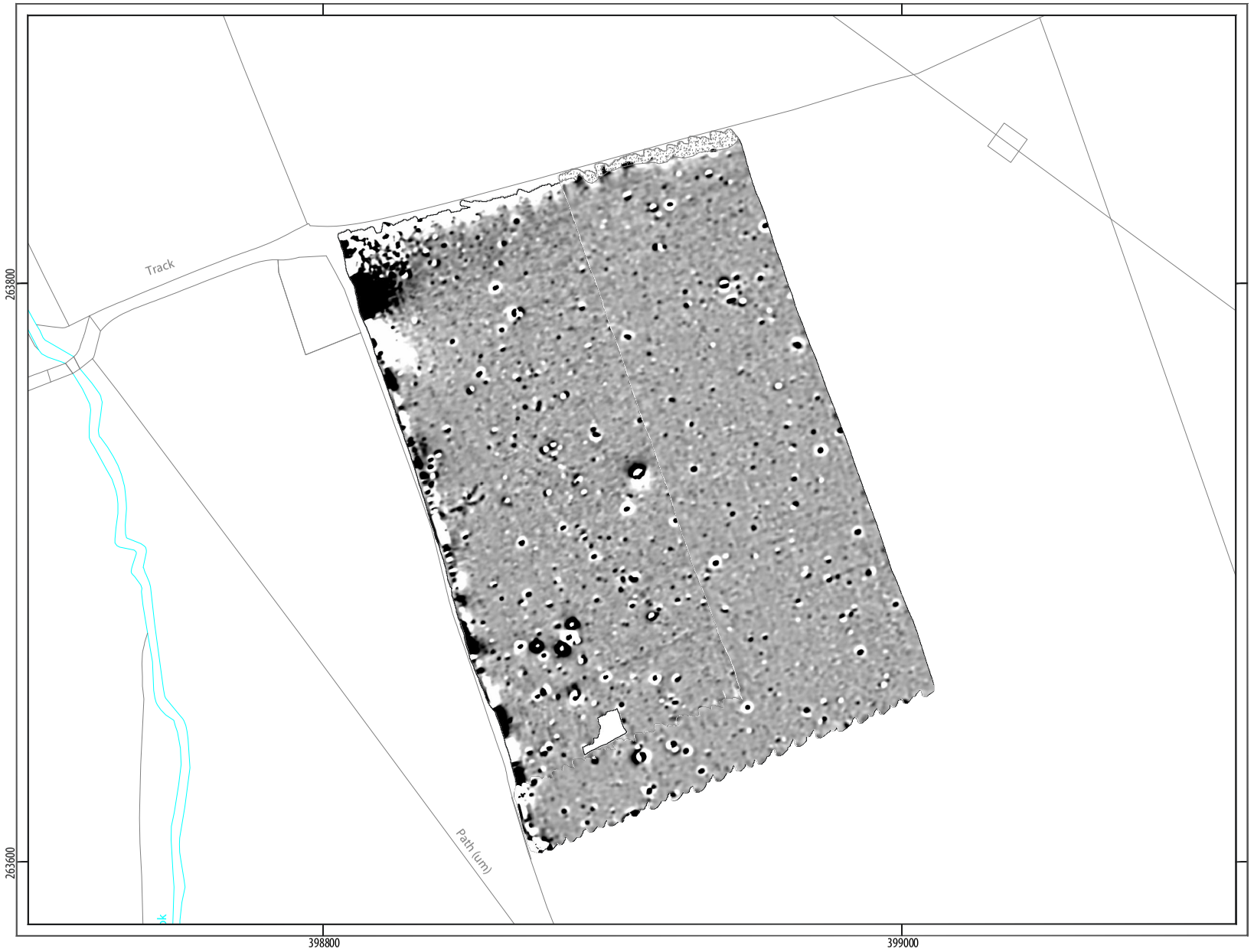


ILLUS 3 Survey location showing GPS swaths



PROJECT DBFH21
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Worcestershire

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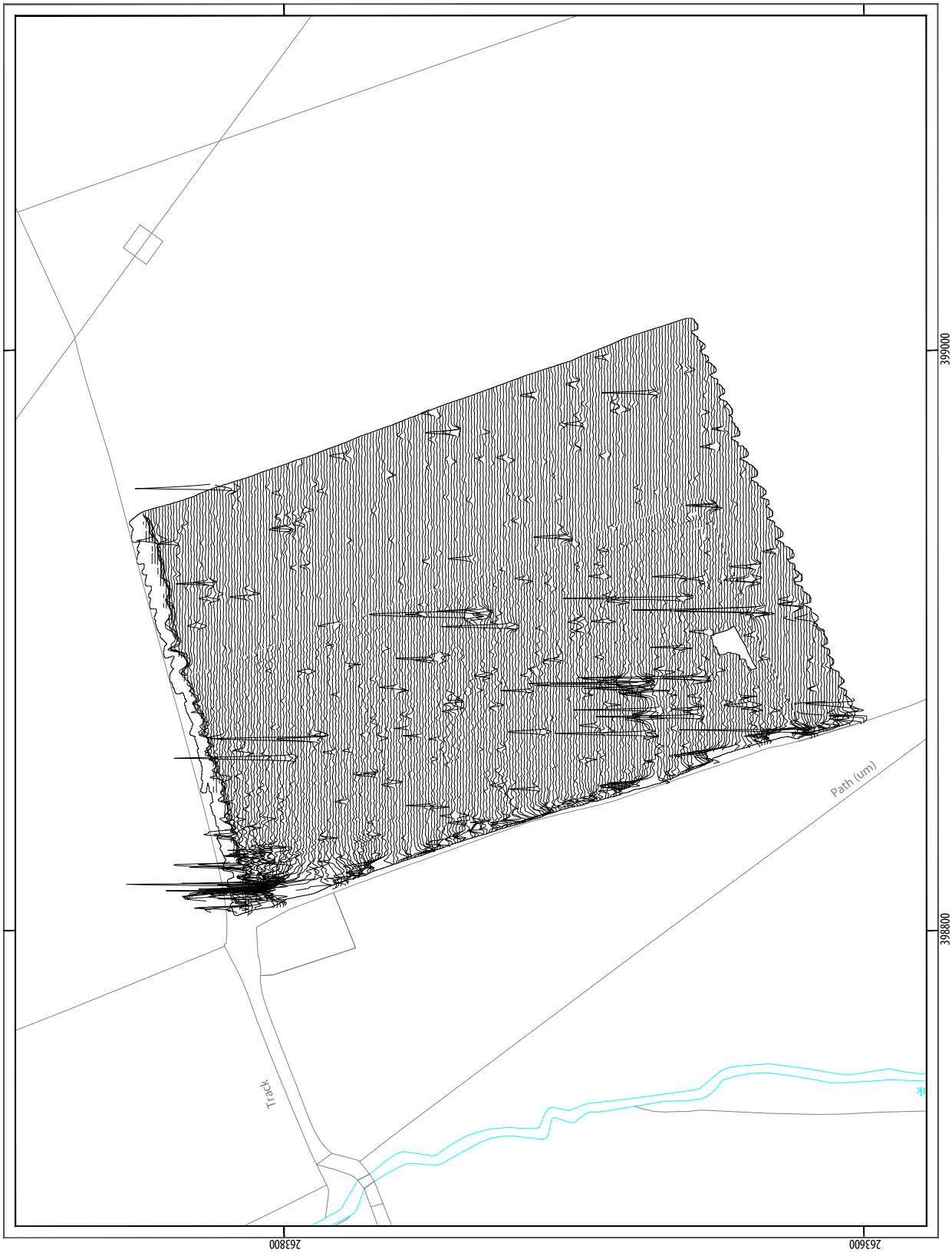
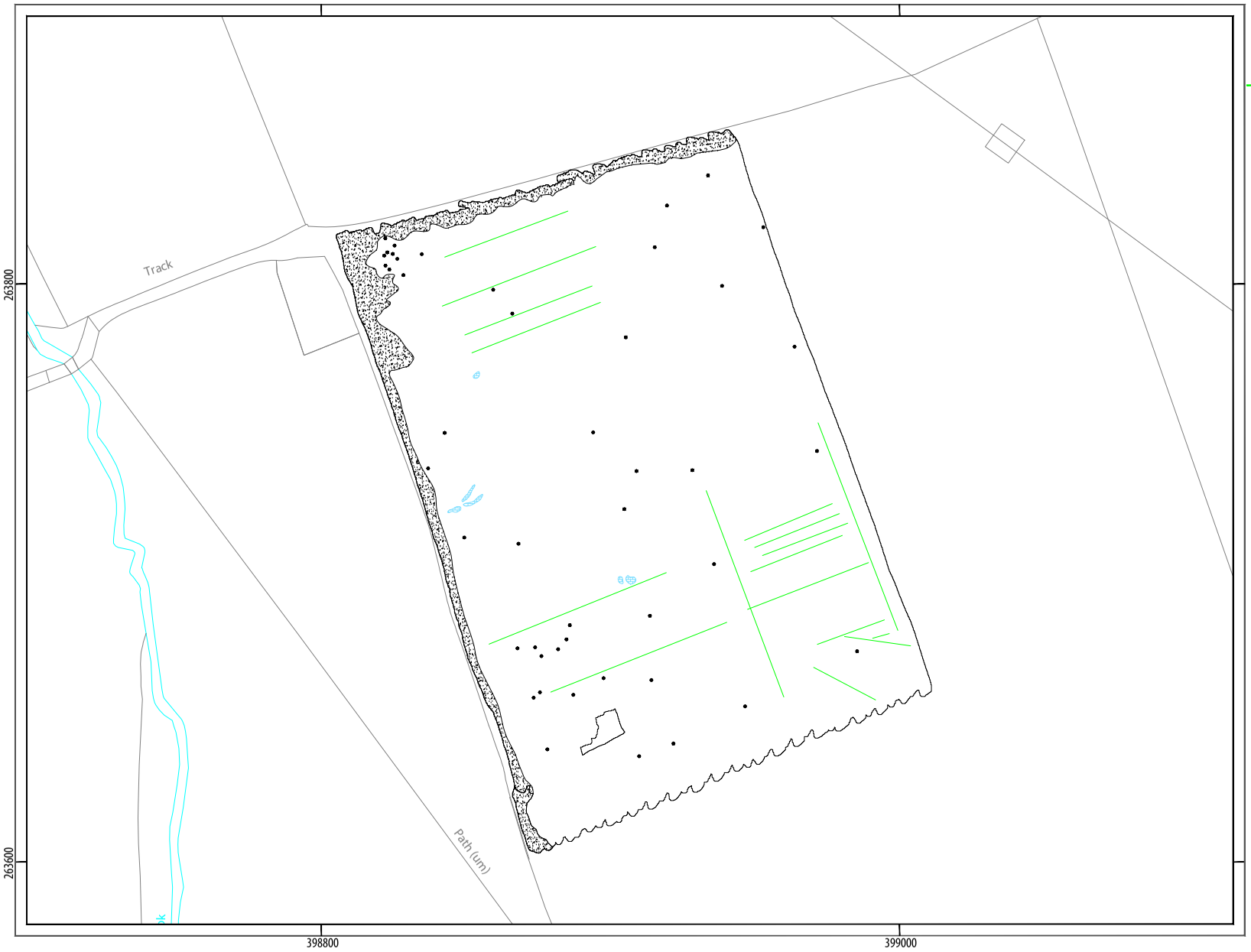
ILLUS 4 Processed greyscale magnetometer data



ILLUS 5 XY trace plot of minimally processed magnetometer data



TYPE OF ANOMALY	INTERPRETATION
dipolar isolated	ferrous material
magnetic disturbance	ferrous material
linear trend	agricultural
magnetic enhancement	geology

0 50m
1:2,000 @ A4

PROJECT DBFH21
Land at Ditchford Bank Farm
Hanbury
Bromsgrove
Worcestershire

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ILLUS 6 Interpretation of magnetometer data

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 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 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.

APPENDIX 5 OASIS DATA COLLECTION FORM: ENGLAND

OASIS ID: headland5-421893

PROJECT DETAILS	
Project name	Land at Ditchford Bank Farm Phase 2
Short description of the project	Headland Archaeology (UK) Ltd undertook a second phase of geophysical (magnetometer) survey covering 1.3 hectares on land at Ditchford Bank Farm, Hanbury, Worcestershire, to inform planning proposals for the development of four poultry buildings. No anomalies of any archaeological potential have been identified by the survey. Faint, parallel, linear trends may be due to ridge and furrow cultivation, which is also recorded on the Worcestershire Historic Environment Record (HER), but these are unlikely to be considered as of any more than local historic interest, and could equally be modern in origin. Therefore, on the basis of the geophysical survey, the application area is assessed as of low archaeological potential.
Project dates	Start: 30-04-2021 End: 30-04-2021
Previous/future work	Yes / Not known
Any associated project reference codes	DBFH21 – Contracting Unit No
Any associated project reference codes	WSM77403 – HER event no
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 4 – Character Undetermined
Monument type	None
Monument type	None
Significant Finds	None
Significant Finds	None
Methods & techniques	'Geophysical Survey'
Development type	Farm infrastructure (eg barns, grain stores, equipment stores, etc)
Prompt	National Planning Policy Framework – NPPF
Position in the planning process	Pre-application
Solid geology (other)	Wilmote Limestone Member; Cotham Member
Drift geology	River Terrace DepositS
Techniques	Magnetometry
PROJECT LOCATION	
Country	England
Site location	Worcestershire Wychavon Hanbury Land at Ditchford Bank Farm Phase 2
Study area	1.3 Hectares
Site coordinates	SO 9854 6370 52.27105923777 -2.021398659544 52 16 15 N 002 01 17 W Point
PROJECT CREATORS	
Name of Organisation	Headland Archaeology
Project brief originator	Local Authority Archaeologist and/or Planning Authority/advisory body
Project design originator	Headland Archaeology
Project director/manager	David Harrison
Project supervisor	Peter Heykoop
Type of sponsor/funding body	Developer

PROJECT ARCHIVES	
Physical Archive Exists?	None
Digital Archive recipient	In house
Digital Contents	'other'
Digital Media available	'Text','Geophysics'
Paper Archive Exists?	None

PROJECT BIBLIOGRAPHY 1	
Publication type	Grey literature (unpublished document/manuscript)
Title	Land at Ditchford Bank Farm Phase 2: Hanbury, Bromsgrove, Worcestershire; Geophysical Survey Report
Author(s)/Editor(s)	David Harrison
Date	2021
Issuer or publisher	Headland Archaeology
Place of issue or publication	Cleckheaton
Description	PDF[A]
Entered by	David Harrison (david.harrison@headlandarchaeology.com)
Entered on	20 May 2021

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