

MROG18



LAND EAST OF THE A417, MAIN ROAD, OVERTON, GLOUCESTERSHIRE

GEOPHYSICAL SURVEY

commissioned by Ian Pick Associates
on behalf of GM Smith & Son

January 2019

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PROJECT INFO:

HA Project Code **MROG18** / NGR **SO 8063 2219** / Parish **Maisemore** / Local Authority
Gloucestershire / OASIS Ref. **headland5-339407** / Archive Repository **archive**

PROJECT TEAM:

Project Manager **David Harrison** / Author **David Harrison** / Fieldwork **Beth Shenton, Krasimir Dyulgerski** / Graphics **David Harrison, Eleanor Winter**

Approved by **David Harrison**



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



PROJECT SUMMARY

Headland Archaeology (UK) Ltd undertook a geophysical (magnetometer) survey of a 5.5 hectare site on land east of the A417, Overton, Gloucestershire, where a new poultry unit is proposed. No anomalies of archaeological potential have been identified. Localised areas of magnetic enhancement in the south of the application area are thought likely to be due to small-scale mineral extraction. Elsewhere, the survey has identified a service pipe and anomalies which reflect recent and historical ploughing. On the basis of the geophysical survey, the archaeological potential of the site is assessed as very low.

CONTENTS

1	INTRODUCTION	1
1.1	SITE LOCATION, TOPOGRAPHY AND LAND-USE	1
1.2	GEOLOGY AND SOILS	1
2	ARCHAEOLOGICAL BACKGROUND	1
3	AIMS, METHODOLOGY AND PRESENTATION	2
3.1	MAGNETOMETER SURVEY	2
3.2	REPORTING	2
4	RESULTS AND DISCUSSION	3
4.1	FERROUS ANOMALIES	3
4.2	AGRICULTURAL ANOMALIES	3
4.3	GEOLOGICAL ANOMALIES	3
4.4	QUARRYING ANOMALIES	3
5	CONCLUSION	3
6	REFERENCES	3
7	APPENDICES	13
APPENDIX 1	MAGNETOMETER SURVEY	13
APPENDIX 2	SURVEY LOCATION INFORMATION	14
APPENDIX 3	GEOPHYSICAL SURVEY ARCHIVE	14
APPENDIX 4	DATA PROCESSING	14
APPENDIX 5	OASIS DATA COLLECTION FORM: ENGLAND	15

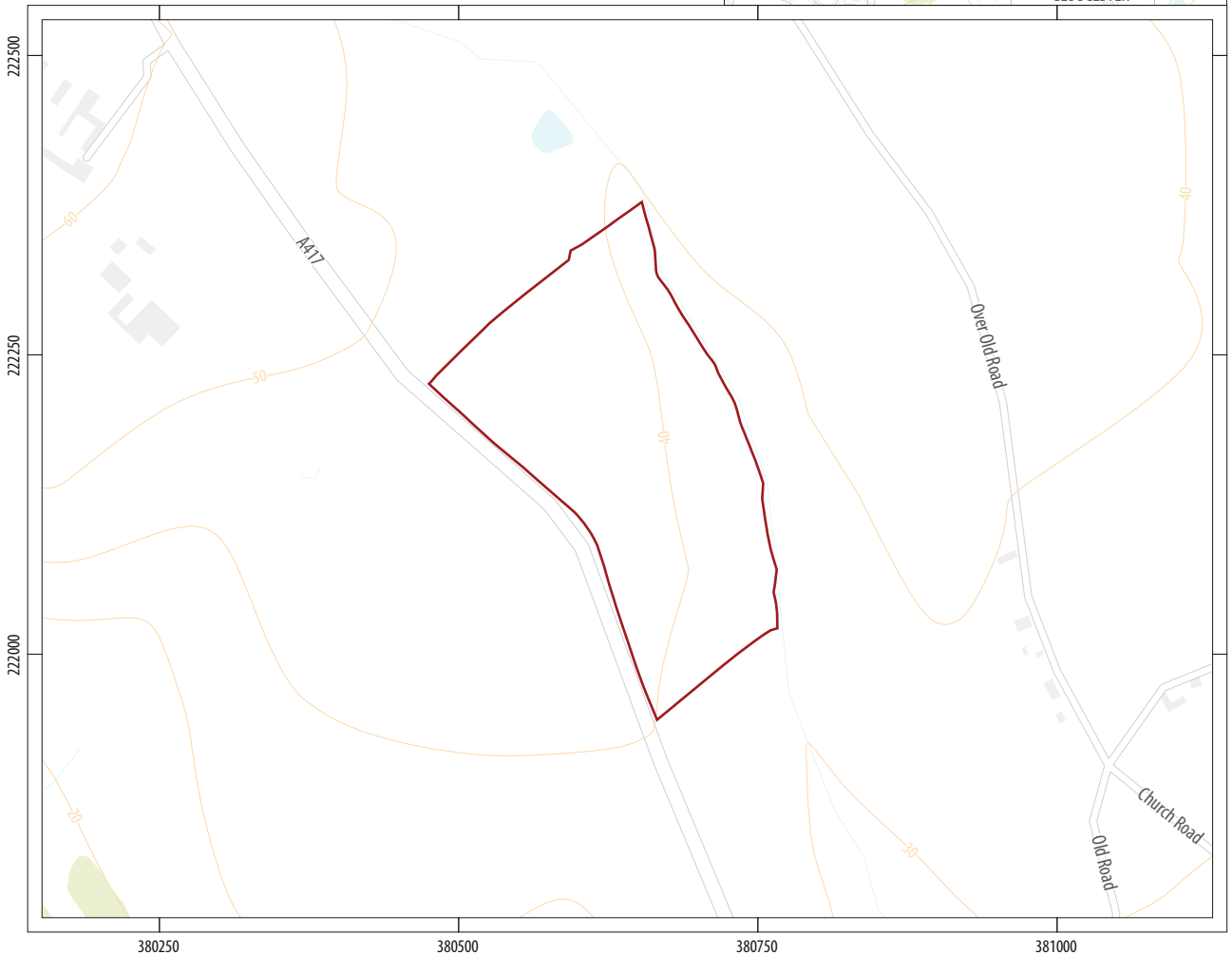
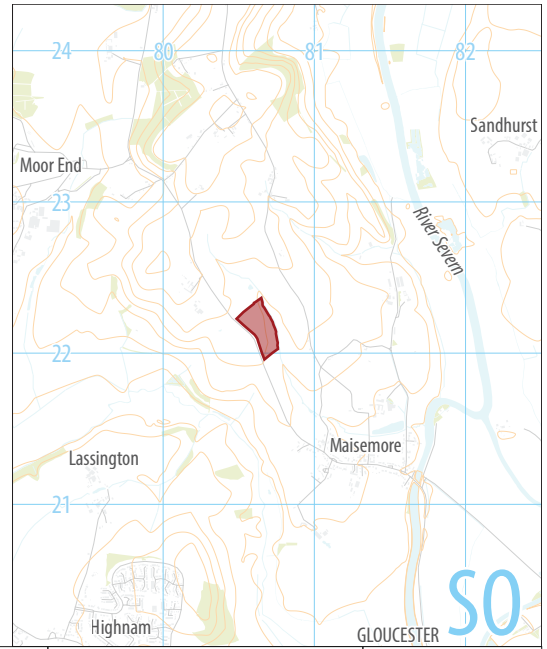
LIST OF ILLUSTRATIONS

ILLUS 1 SITE LOCATION	VIII
ILLUS 2 APPLICATION AREA, LOOKING NORTH	2
ILLUS 3 SURVEY LOCATION SHOWING GPS SWATHS AND PROPOSED POULTRY UNITS	5
ILLUS 4 PROCESSED GREYSCALE MAGNETOMETER DATA	7
ILLUS 5 XY TRACE PLOT OF MINIMALLY PROCESSED MAGNETOMETER DATA	9
ILLUS 6 INTERPRETATION OF MAGNETOMETER DATA	11

Land east of the A417
Main Road
Overton
Gloucestershire



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



0 100m
1:6,000 @ A4

application area



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

LAND EAST OF THE A417, MAIN ROAD, OVERTON, GLOUCESTERSHIRE

GEOPHYSICAL SURVEY

1 INTRODUCTION

Headland Archaeology was commissioned by Ian Pick Associates on behalf of GM Smith & Son (the Client), to undertake a geophysical (magnetometer) survey of land east of the A417, Main Road, Overton, Gloucestershire, where new poultry units are proposed. The work forms part of an archaeological field evaluation which was recommended by Charles Parry, Archaeologist at Gloucestershire County Council in response to a Planning Application (Ref 18/01162/FUL). The results of the survey will inform future archaeological strategy at the site.

The work was undertaken in accordance with a Written Scheme of Investigation (Harrison 2019) which was submitted to, and approved by, Charles Parry, with guidance within the National Planning Policy Framework (MHCLG 2018) and in line with current best practice (Chartered Institute for Archaeologists 2016, Europae Archaeologia Consilium 2016).

The survey was carried out on the 7th and 8th January 2019.

1.1 SITE LOCATION, TOPOGRAPHY AND LAND-USE

The application area (AA) is located east of the A417 Main Road, 750m north-west of Maisemore and 300m south-east of Overton Farm, centred on SO 8063 2219 (see Illus 1). It comprises a roughly rectangular block of land within the north of an arable field and covers approximately 5.5 hectares. It is bounded to the west by the A417, to the east by a minor watercourse and to the north by a hedged field boundary, with arable farmland beyond. The southern limit of the AA is unbound but is defined by an east/west public footpath.

The AA is sited on the south-facing slope of a low ridge which extends north from Maisemore. It slopes eastwards towards the minor watercourse being at 47m Above Ordnance Datum (AOD) at the A417, 40m AOD in the north-east, and 35m AOD in the south east.

At the time of the survey, the AA was under a young brassica crop (see Illus 2).

1.2 GEOLOGY AND SOILS

The bedrock geology comprises interbedded mudstone and limestone of the Rugby Limestone Member. No superficial deposits are recorded (NERC 2019).

The soils are classified in the Soilscape 9 Association, characterised as lime-rich loams and clays with impeded drainage (Cranfield University 2019).

2 ARCHAEOLOGICAL BACKGROUND

No heritage assets are recorded within the AA on the Gloucestershire Historic Environment Record.

A Heritage Statement (ACD Environmental 2018) has confirmed the presence of Roman activity in the Overton area and the wider landscape is known to contain extensive archaeological remains relating to prehistoric and Roman activity and settlement.

Analysis of historical Ordnance Survey (OS) maps (Old-maps 2019) indicates that the division and layout of land within the AA has remained unchanged since the publication of the first edition OS map in 1885. A review of recent satellite imagery (Infoterra Ltd &



ILLUS 2 Application area, looking north

Bluesky 2019) has identified six trapezoidal cropmarks in the south of the AA which is characteristic of quarrying activity.

3 AIMS, METHODOLOGY AND PRESENTATION

The general aim of the geophysical survey was to provide sufficient information to establish the presence/absence, character and extent of any archaeological remains within the AA. 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, model the presence/absence and extent of any buried archaeological features; 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 0.5m intervals (0.5m 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 (Illus 3). 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 V3.0.32.4 (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 1:6,000. Illus 2 is a site condition photograph. Illus 3 shows the survey location, the direction of survey as GPS swaths and the proposed poultry

units at a scale of 1:2,500. Large scale minimally processed (XY trace plot) data, fully processed (greyscale) data and an accompanying interpretative plot are presented at a scale of 1:1,500 in Illus 4–6 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 Written Scheme of Investigation (Harrison 2018), guidelines outlined by Europae Archaeologia Consilium (EAC 2016) and by the Chartered Institute for Archaeologists (CIfA 2016). All illustrations from Ordnance Survey 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 across the entire survey area leading to a high standard of data.

The survey has detected a variable magnetic background across the AA which is characterised by numerous north-east/south-west plough trends. Against this background, linear, curvilinear and discrete anomalies have been identified and these are discussed below and cross-referenced to specific examples on the interpretive figures, where appropriate.

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 consequence 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.

The high magnitude dipolar linear anomaly, SP1, in the north-west of the AA locates a buried service pipe.

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

4.2 AGRICULTURAL ANOMALIES

Series of closely-spaced parallel linear trend anomalies are identified aligned both parallel with or at right angles to, the modern and historic field boundaries and are due to modern ploughing.

4.3 GEOLOGICAL ANOMALIES

A few discrete low-magnitude anomalies have been identified throughout the AA. The frequency and distribution of these anomalies preclude an archaeological interpretation and the anomalies are thought to be caused by localised variation in the depth and composition of the topsoil.

4.4 QUARRYING ANOMALIES

Five low magnitude, amorphous areas of magnetic enhancement (Q1–Q5) have been identified in the south of the AA correspond to trapezoidal cropmarks shown on recent satellite imagery (Infoterra Ltd & Bluesky 2019). The magnetic enhancement is likely to be caused by the contrast between infilled quarry pits and the surrounding soil. No features are shown here on any historical Ordnance Survey mapping and, in the absence of any supporting information, a modern origin is considered probable.

5 CONCLUSION

The survey has successfully evaluated the AA and has not identified any anomalies of archaeological potential. Localised areas of magnetic enhancement in the south of the application area are thought to be due to small-scale extraction or modern activity. Elsewhere, the survey has identified a service pipe and anomalies which reflect the historical agricultural landscape in the form of ploughing trends. On the basis of the geophysical survey, the archaeological potential of the site is assessed as very low.

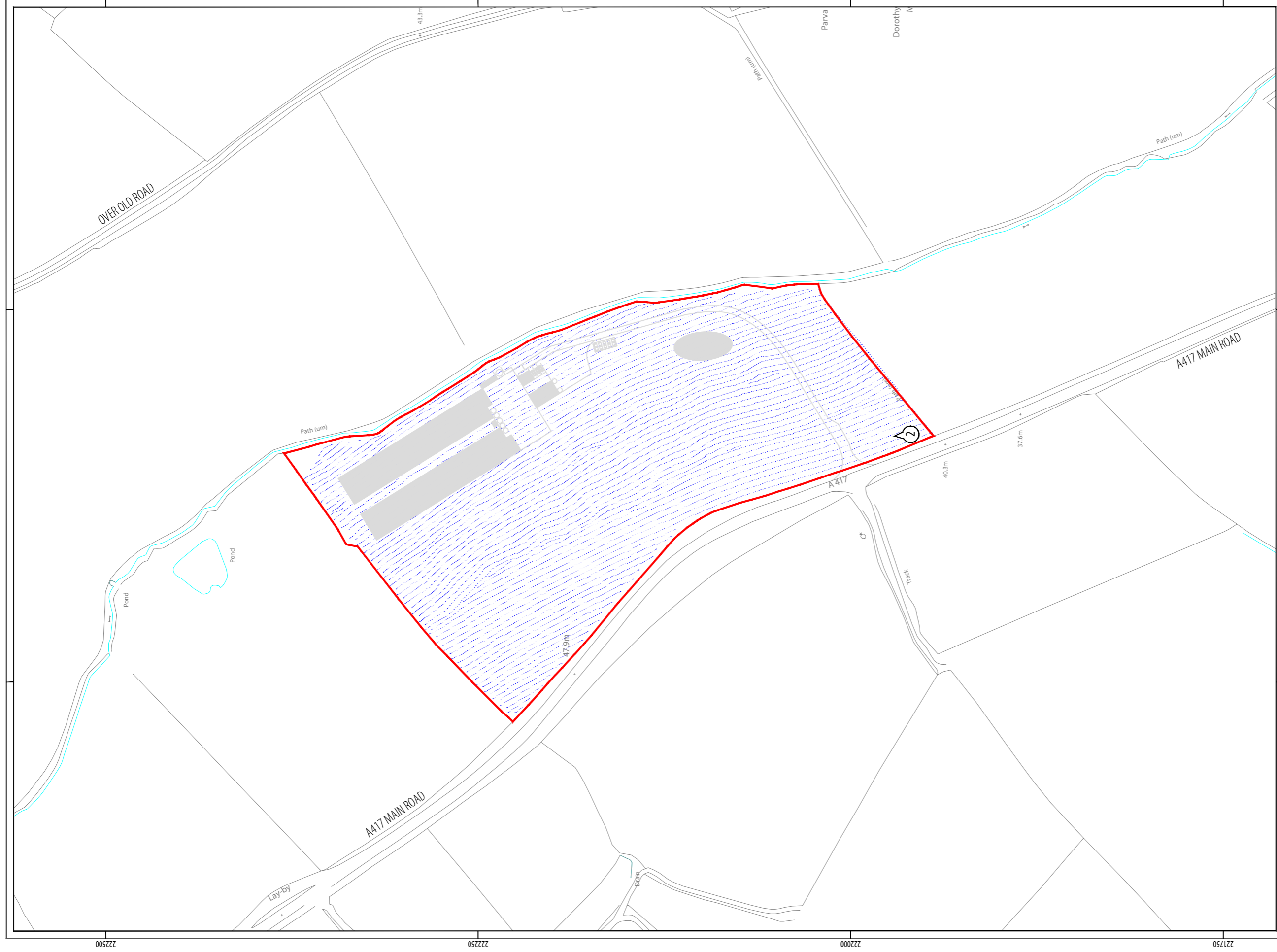
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Old-maps.co.uk 2019 *old-maps.co.uk* <http://www.old-maps.co.uk> accessed 14 January 2019

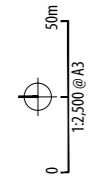


- Application Area
- GPS Swaths
- Proposed poultry units and associated infrastructure
- Ⓜ Location and direction of ILLUS 2

HEADLAND ARCHAEOLOGY
 NORTH
 Unit 16, Hillside, Beeston Road
 Leeds LS11 8ND
 0113 387 6430
 www.headlandarchaeology.com

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 MROG19
 Land east of the A417
 Main Road
 Overton
 Gloucestershire

CLIENT
 GM Smith & Son



ILLUS 3 Survey location showing GPS swaths and proposed poultry units



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NORTH
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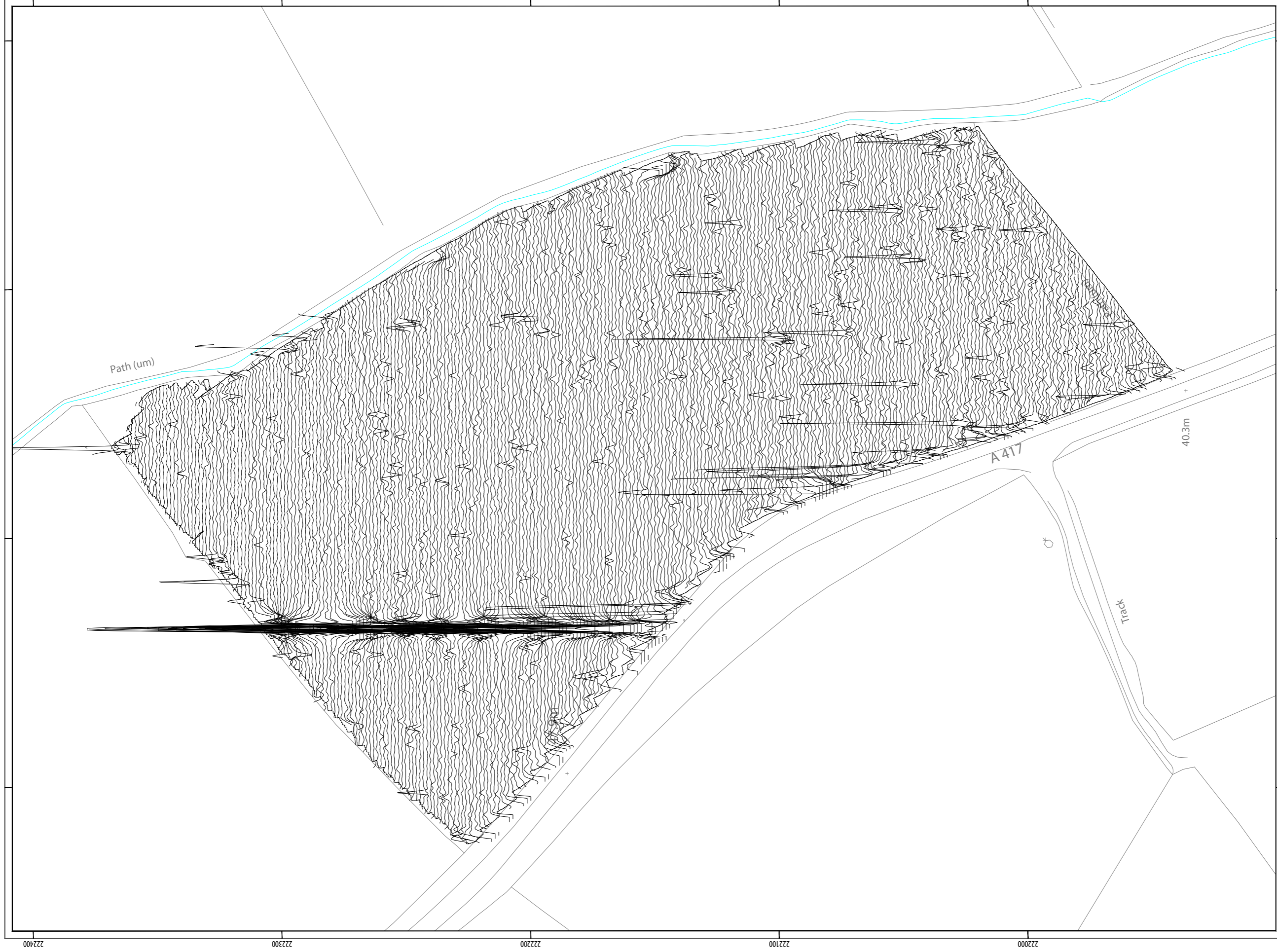
PROJECT

CLIENT

Scale: 1:1,500 @ A3
0 50m

Color scale: -1.0 nT to 2.0 nT

ILLUS 4 Processed greyscale magnetometer data



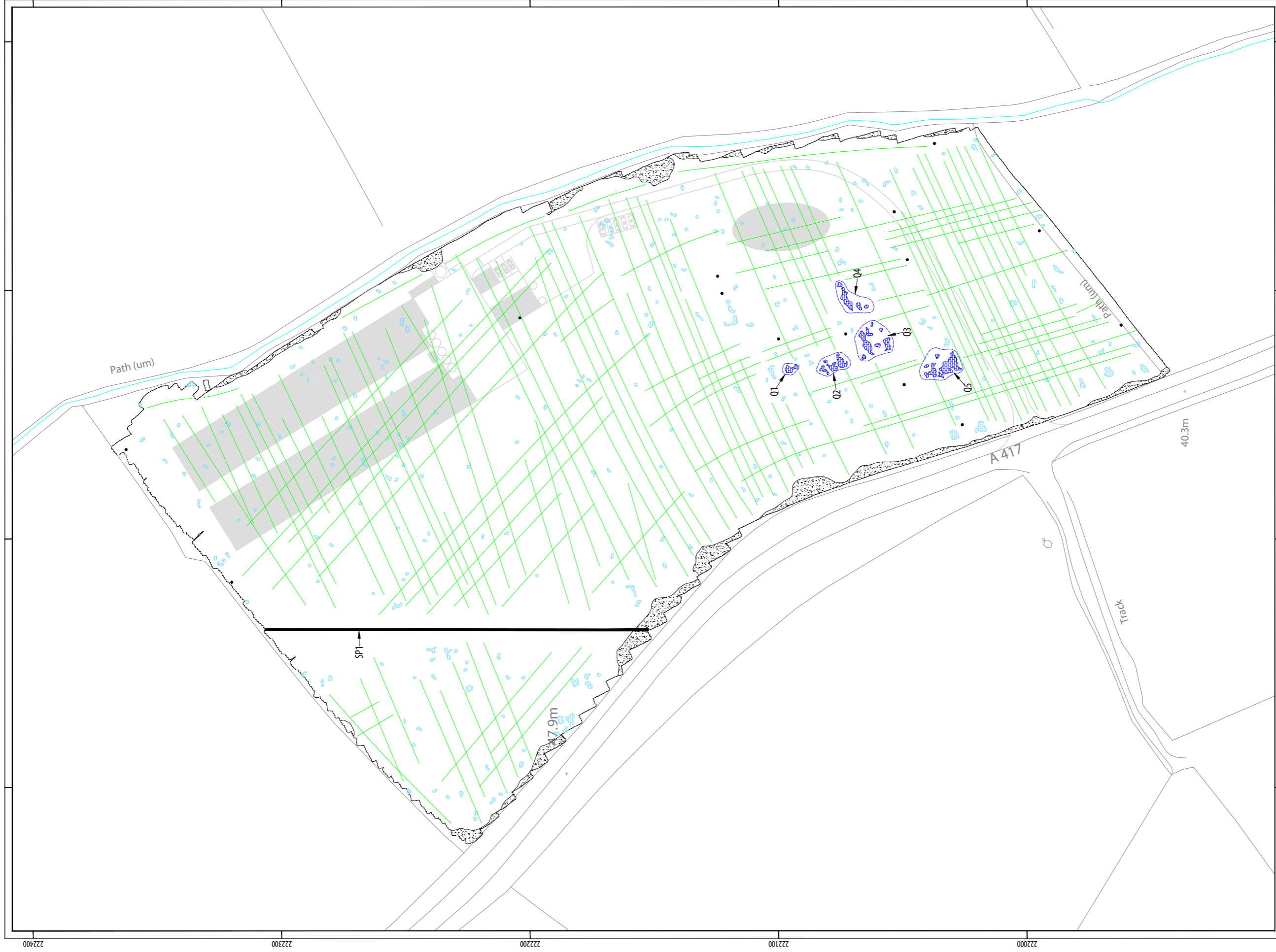
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NORTH
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30m Tr/cm

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50m
0
1:1,500 @ A3

ILLUS 5 XY trace plot of minimally processed magnetometer data



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ABBREVIATIONS
 Q quarry
 SP service pipe

INTERPRETATION

TYPE OF ANOMALY	INTERPRETATION
● dipolar isolated	ferrous material
■ magnetic disturbance	ferrous material
— dipolar linear	service pipe
— linear trend	agricultural
■ magnetic enhancement	geology
■ magnetic enhancement	quarry pit?

Scale: 0 50m 1:1,500 @ A3

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.

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). 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: *headland5-339407*

Project details	
Project name	Land east of the A417, Main Road, Overton, Gloucestershire
Short description of the project	Headland Archaeology (UK) Ltd undertook a geophysical (magnetometer) survey of a 5.5 hectare site on land east of the A417, Overton, Gloucestershire, where a new poultry unit is proposed. No anomalies of archaeological potential have been identified. Localised areas of magnetic enhancement in the south of the application area are thought likely to be due to small-scale mineral extraction. Elsewhere, the survey has identified a service pipe and anomalies which reflect recent and historical ploughing. On the basis of the geophysical survey, the archaeological potential of the site is assessed as very low.
Project dates	Start: 07-01-2019 End: 08-01-2019
Previous/future work	No / Yes
Any associated project reference codes	MROG - Contracting Unit No.
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 4 - Character Undetermined
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	Farm infrastructure (e.g. barns, grain stores, equipment stores, etc.)
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Between deposition of an application and determination
Solid geology (other)	Rugby Limestone Member
Drift geology (other)	None
Techniques	Magnetometry
Project location	
Country	England
Site location	GLOUCESTERSHIRE TEWKESBURY MAISEMORE Land east of the A417, Main Road, Overton, Gloucestershire
Study area	5.5 Hectares
Site coordinates	SO 8063 2219 51.897482643228 -2.281538336608 51 53 50 N 002 16 53 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	Harrison, D
Project supervisor	Dyulgierski, K.
Type of sponsor/funding body	Developer
Project archives	
Physical Archive Exists?	No
Digital Archive recipient	In house

Digital Contents	"Survey"
Digital Media available	"Geophysics;"Survey;"Text"
Paper Archive Exists?	No
Project bibliography 1	
Publication type	Grey literature (unpublished document/manuscript)
Title	Land east of the A417, Main Road, Overton, Gloucestershire; Geophysical Survey
Author(s)/Editor(s)	Harrison, D.
Date	2019
Issuer or publisher	Headland Archaeology
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Description	PDF[A]
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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 | Ivyford Rd | Hereford HR2 6JR
t 01432 364 901
e midlandsandwest@headlandarchaeology.com

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

Headland Archaeology Scotland
13 Jane Street | Edinburgh EH6 5HE
t 0131 467 7705
e scotland@headlandarchaeology.com

www.headlandarchaeology.com