

HLBL/01



# LAND AT MANOR FARM, BEEBY, LEICESTERSHIRE

GEOPHYSICAL SURVEY

commissioned by A H Pick & Son

2015/1650/02

September 2016



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project info

HA JOB NO. HLBL/01  
NGR SK 6729 0772  
PARISH Beeby  
LOCAL AUTHORITY Leicestershire  
OASIS REF. headland5-261995

project team

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APPROVED BY Sam Harrison – Project Manager



 **HEADLAND  
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## PROJECT SUMMARY

Headland Archaeology (UK) Ltd undertook a geophysical (magnetometer) survey covering 4.5 hectares on land at Manor Farm, Beeby, Leicestershire, in advance of the proposed development of a poultry farm and anaerobic digestion plant. No anomalies of archaeological potential have been identified by the survey. Parallel curvilinear trends have been identified which are thought to be due to the medieval and post medieval practice of ridge and furrow. These trends may be of local historical interest but are not thought to be of any archaeological significance. Therefore, based on the results and interpretation of the geophysical survey, the archaeological potential of the proposed development area is considered to be very low, corroborating the results of the Heritage Impact Statement.

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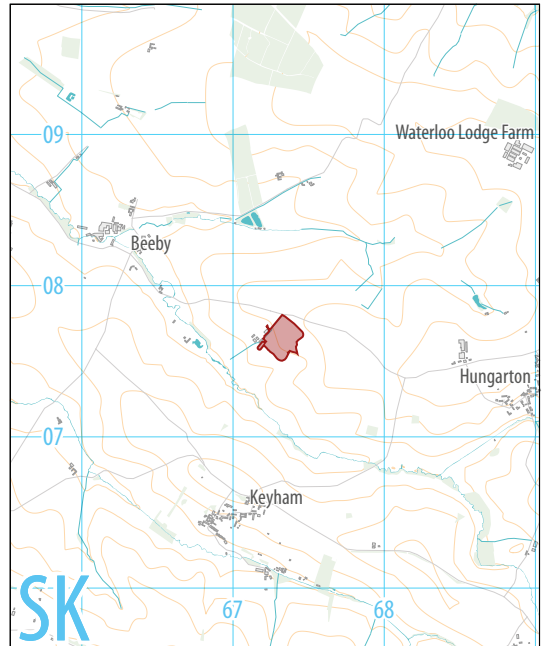
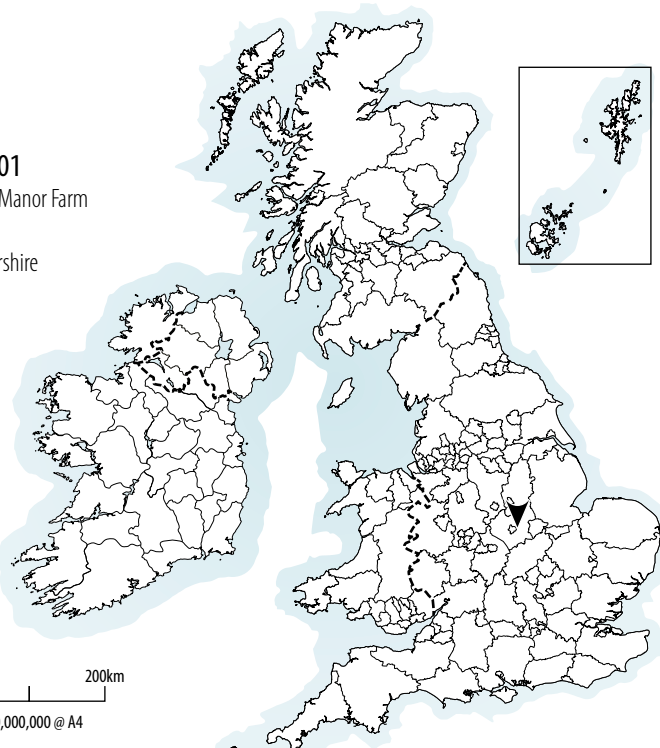
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**HLBL/01**

Land at Manor Farm  
Beeby  
Leicestershire

0 200km  
1:10,000,000 @ A4



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N  
0 100m  
1:5,000 @ A4

KEY  
[Red outline] proposed development area



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# LAND AT MANOR FARM, BEEBY, LEICESTERSHIRE

## GEOPHYSICAL SURVEY

### 1 INTRODUCTION

Headland Archaeology (UK) Ltd was commissioned by The Environmental Dimension Partnership (the Consultant) on behalf of A H Pick & Son (the Developer) to undertake a geophysical (magnetometer) survey on land at Manor Farm, Beeby, Leicestershire. The survey will inform forthcoming archaeological strategy in advance of the proposed development of a poultry farm and anaerobic digestion plant (Planning Ref. 2015/1650/02).

The work was undertaken in accordance with a Written Scheme of Investigation (Headland Archaeology 2016), provided to Mark Fennell (Conservation and Design Officer at Charnwood Borough Council), with guidance contained within the National Planning Policy Framework (DCLG 2012) and in line with current best practice (English Heritage 2008).

The survey was carried out on August 15th 2016 in order to provide information on the archaeological potential of the proposed development area (PDA).

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

The PDA is located 1km south-east of the village of Beeby in north-east Leicestershire centred at SK 6729 0772 (see Illus 1). It comprises an irregularly-shaped parcel of land comprising parts of two fields (F1 and F2), which is bound to the north-west by Manor Farm and to the north by Hungarton Lane. The remainder of the PDA is unbound and opens onto arable farmland. The topography undulates locally but generally slopes from a maximum elevation of 117m above Ordnance Datum (aOD) at Hungarton Lane in the north to 103m aOD in the south. At the time of the survey the PDA had been recently harvested of a cereal crop. The remainder of the fields contained a mature crop, some of which extended into the PDA. These areas were unsuitable for survey (see Illus 4).

#### 1.2 GEOLOGY AND SOILS

The underlying bedrock geology consists of Blue Lias Formation (mudstone) which is overlain by Oadby Member (diamictin) (NERC 2016).

The soils are classified in the Soilscape 18 association which are characterised as slowly permeable, seasonally wet loams and clays (Cranfield University 2016).

### 2 ARCHAEOLOGICAL BACKGROUND

A Heritage Impact Statement (Morris 2015) concluded that the archaeological potential of the site is very low.

The shrunken medieval settlement of Little Beeby is located 650m to the west of the PDA. Ridge and furrow cultivation is recorded as both earthworks and cropmarks throughout the surrounding landscape.

Analysis of historical Ordnance Survey mapping (Old-Maps 2016) indicates that the division and layout of land within the PDA has remained unchanged for at least the last 130 years.

### 3 AIMS, METHODOLOGY AND PRESENTATION

The main aim of the geophysical survey was to provide sufficient information to enable an assessment to be made of the impact of any proposed development on any potential sub-surface archaeological remains.

The general 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.



**ILLUS 2** General view of Field 1, looking south-east

### 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 is programmed to take readings at a frequency of 10Hz (allowing for a 10–15cm sample interval) on roaming traverses 4m apart. These readings are stored on an external weatherproof laptop and later downloaded for processing and interpretation. The system is 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 has been used to collect and export the data. Terrasurveyor V3.0.29.3 (DWConsulting) software has been used to process and present the data.

Marker canes were laid out using a Trimble VRS differential Global Positioning System (Trimble GeoXR model).

### 3.2 REPORTING

A general site location plan is shown in Illus 1 at a scale of 1:5,000. Illus 2 and Illus 3 are general site condition photographs taken at the time of the survey. Illus 4 shows the survey location at a scale of 1:4,000. Detailed data plots (greyscale and XY trace) and interpretative illustrations are presented at a scale of 1:2,000 in Illus 5, Illus 6 and Illus 7.

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. A copy of the OASIS entry (Online Access to the Index of Archaeological Investigations) is reproduced in Appendix 4.

The survey methodology, report and any recommendations comply with the Written Scheme of Investigation (Headland Archaeology 2016) and guidelines outlined by English Heritage (English Heritage 2008) and by the Chartered Institute for Archaeologists (CIFA 2014). All illustrations reproduced from Ordnance Survey mapping are 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.



ILLUS 3 General view of Field 2, looking south-west

## 4 RESULTS AND DISCUSSION

The survey has detected a low to moderate level of background magnetic variation across the PDA which manifests in the data as an even distribution of low magnitude discrete areas of magnetic enhancement. These are caused by variations in the depth and composition of the soils and the superficial deposits from which they derive. Against this background a series of parallel, slightly sinuous, trends are visible on a north-west/south-east orientation across F2. These are due to the medieval and post-medieval practice of ridge and furrow cultivation. The characteristic striping of the data is caused by the contrast between the former ridges and the soil-filled furrows.

The only other anomalies identified by the survey are ferrous anomalies, characterised as individual 'spikes', which are typically caused by ferrous (magnetic) material (e.g. nails and other agricultural detritus), either on the ground surface or in the plough-soil.

Areas of magnetic disturbance around the perimeter of the survey area and field edges can be attributed to the proximity of post and wire fencing and agricultural buildings at Manor Farm.

## 5 CONCLUSION

No anomalies of archaeological potential have been identified by the geophysical survey. Anomalies have been identified which are consistent with the historical agricultural landscape in the form of ridge and furrow

cultivation. These anomalies may be of local historical interest but are not thought to be of any archaeological significance. Therefore, based solely on the results and interpretation of the geophysical data, the archaeological potential of the PDA is assessed as very low, confirming the results of the Heritage Impact Statement.

## 6 REFERENCES

- Chartered Institute for Archaeologists (CIfA) 2014 *Standard and guidance for archaeological geophysical survey* [online document] Accessed 17 August 2016 from [http://www.archaeologists.net/sites/default/files/CIfA&GGeophysics\\_1.pdf](http://www.archaeologists.net/sites/default/files/CIfA&GGeophysics_1.pdf)
- Cranfield University 2016 *Cranfield Soil and Agrifood Institute Soilscales* [online] Accessed 17 August 2016 from [www.landis.org.uk/soilscales/](http://www.landis.org.uk/soilscales/)
- Department of Communities and Local Government (DCLG) 2012 *National Planning Policy Framework* [online document] Accessed 17 August 2016 from [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/60777/2116950.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/60777/2116950.pdf)

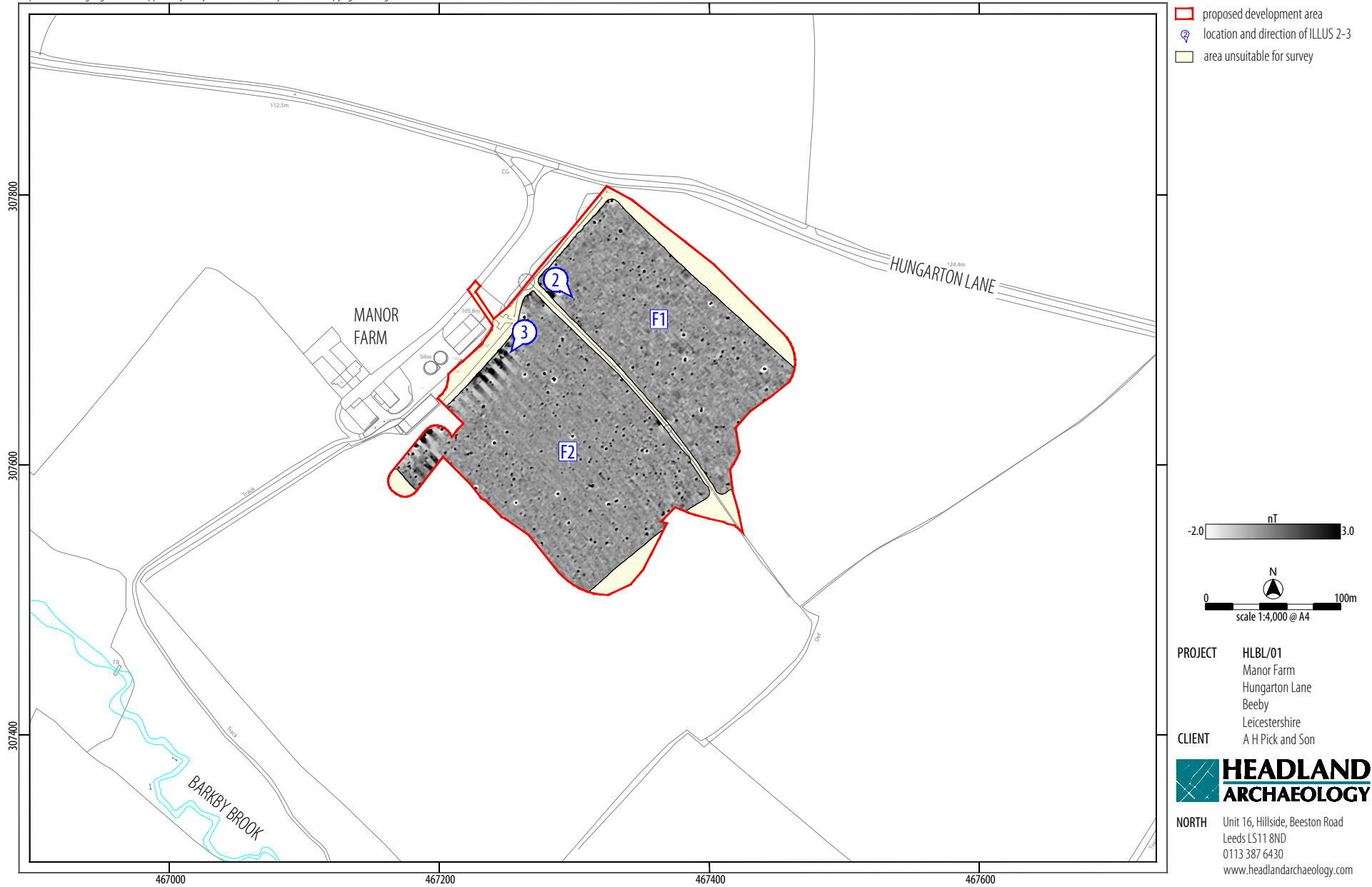
English Heritage 2008 *Geophysical Survey in Archaeological Field Evaluation: Research and Professional Services Guidelines* (2nd edition) [online document] Accessed 17 August 2016 from <http://content.historicengland.org.uk/images-books/publications/geophysical-survey-in-archaeological-field-evaluation/geophysics-guidelines.pdf>

Gaffney, C & Gater, J 2003 *Revealing the Buried Past: Geophysics for Archaeologists* The History Press: Stroud

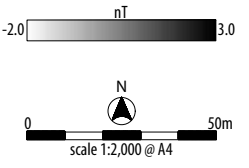
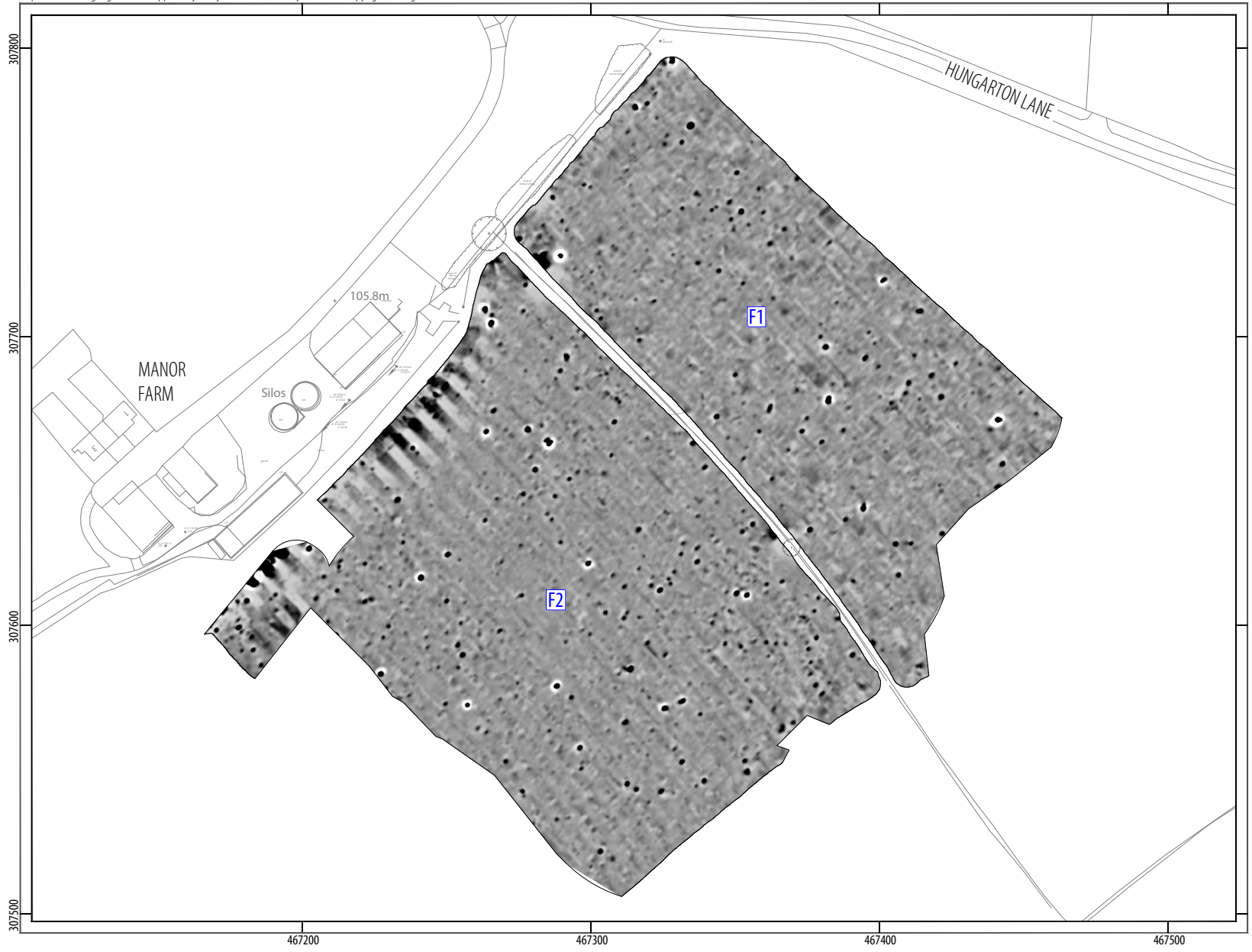
Morriss 2015 *Land at Manor Farm, Beeby, Leicestershire: A Heritage Impact Statement on a Proposed Poultry Unit* Richard K Morriss & Associates Mercian Heritage Series No 849

Natural Environment Research Council (NERC) 2016 *British Geological Survey* [online] Accessed 17 August 2016 from <http://www.bgs.ac.uk/>

Old-Maps 2015 *Old-Maps* [online] Accessed 17 June 2016 from <https://www.old-maps.co.uk>



ILLUS 4 Survey location showing processed greyscale magnetometer data



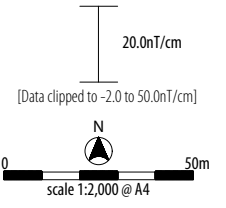
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ILLUS 5 Processed greyscale magnetometer data



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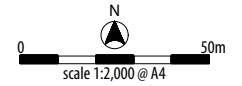


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ILLUS 6 XY trace plot of magnetometer data



TYPE OF ANOMALY	INTERPRETATION
● dipolar isolated	ferrous material
● magnetic disturbance	ferrous material
— linear trend	ridge and furrow
⊕ magnetic enhancement	geology



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ILLUS 7 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 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](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 OASIS DATA COLLECTION FORM: ENGLAND

OASIS ID: headland5-261995

## PROJECT DETAILS

PROJECT NAME	Land at Manor Farm, Beeby
SHORT DESCRIPTION OF THE PROJECT	Headland Archaeology (UK) Ltd undertook a geophysical (magnetometer) survey covering 4.5 hectares on land at Manor Farm, Beeby, Leicestershire, in advance of the proposed development of a poultry farm and anaerobic digestion plant. No anomalies of archaeological potential have been identified by the survey. Parallel curvilinear trends have been identified which are thought to be due to the medieval and post medieval practice of ridge and furrow. These trends may be of local historical interest but are not thought to be of any archaeological significance. Therefore, based on the results and interpretation of the geophysical survey, the archaeological potential of the proposed development area is considered to be very low, corroborating the results of the Heritage Impact Statement.
PROJECT DATES	Start: 15-08-2016 End: 15-08-2016
PREVIOUS/FUTURE WORK	Not known / Not known
ANY ASSOCIATED PROJECT REFERENCE CODES	HLBL-01 - Sitecode
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	Pre-application
SOLID GEOLOGY (OTHER)	Blue Lias Formation (mudstone)
DRIFT GEOLOGY (OTHER)	Oadby Member (diamicton)
TECHNIQUES	Magnetometry

## PROJECT LOCATION

COUNTRY	England
SITE LOCATION	LEICESTERSHIRE CHARNWOOD BEEBY Land at Manor Farm, Beeby
STUDY AREA	4.5 Hectares
SITE COORDINATES	SK 6729 0772 52.66266787127 -1.004951475102 52.39 45 N 001 00 17 W Polygon

## PROJECT CREATORS

NAME OF ORGANISATION	Headland Archaeology
PROJECT BRIEF ORIGINATOR	Headland Archaeology
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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