

Land off Melton Road

East Goscote

Leicestershire

Geophysical Survey

Report no. 3313 April 2018

Client: WYG Environment Planning Transport Limited





Land off Melton Road East Goscote Leicestershire

Geophysical Survey

Summary

A cart-based geophysical (magnetometer) survey, covering approximately 17 hectares was undertaken on land off Melton Road, East Goscote. Anomalies of possible archaeological origin have been recorded in the forms of linear trends and pit like responses. Responses associated with the extraction and infilling of part of the site is also present and two services are clearly shown in the data set. A former field boundary has also been detected in the eastern part of the site and corresponds well with recorded boundaries on Ordnance Survey mapping. The magnetic survey has worked well on this site and the archaeological potential of the site overall would be characterised as low.



Report Information

Client:	WYG Environment Planning Transport Limited
Address:	Arndale Court, Otley Road, Headingley, Leeds, LS6 2UJ
Report Type:	Geophysical Survey
Location:	East Goscote
County:	Leicestershire
Grid Reference:	SK 6495 1354
Period(s) of activity:	Modern
Report Number:	3113
Project Number:	8216
Site Code:	EGL18
OASIS ID:	archaeol11-313946
Date of fieldwork:	March 2018
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Project Management:	Emma Brunning BSc MCIfA
Fieldwork:	Alastair Trace BSc MSc
	Jake Freeman BA
	Josh Hunter BA
Report:	David Williams BA MCIfA
Illustrations:	Emma Brunning

Authorisation for distribution:



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1 Introduction

Archaeological Services WYAS (ASWYAS) were commissioned by WYG Environment Planning Transport Limited (WYG), to undertake a geophysical (magnetometer) survey on land off Melton Road, East Goscote, Leicestershire, to inform a proposed development, in line with current best practice (CIfA 2014; David *et al.* 2008). The survey was carried out between the 20th March and 26th March 2018 to provide additional information on the archaeological resource of the Proposed Development Area (PDA).

Site location, topography and land-use

The survey area is located on land off Melton Road on the eastern outskirts of East Goscote (see Figure 1). The site is bounded by Melton Road to the northwest, the A607 to the south east, and farm land to the south west and north east. The survey area comprises of 3 fields of agricultural land. The area totals approximately 17 ha. The survey area is centred at SK 6495 1354. The topography of the site forms a slight rise in the center of the site, with the height above Ordnance Datum (aOD) between 59m and 63m.

Soils and geology

The underlying geology forms a band of east to west bedrock that belongs to the Branscombe Mudstone Formation. This sedimentary bedrock formed approximately 201 to 228 million years ago during the Triassic Period. Superficial deposits have been recorded as Birstall Member, consisting of sand and gravel. These superficial deposits formed up to 2 million years ago in the Quaternary Period (BGS, 2018). Soils cover two areas and belong to the Wick 1 association which comprises deep well drained coarse loamy and sandy soils. The other area of soils comprises the Fladbury 1 association described as stone less clayey soils. (SSEW 1983).

2 Archaeological Background

The following information has been taken from a Desk Based Assessment prepared by WYG 2018 which covered a 1km radius from the survey area.

There is one Scheduled Monument within the study area; the Bridge at Rearsby (1005081) is a possible 13th-14th century stone packhorse bridge, consisting of almost unspooling, plain masonry with seven semi-circular arches acutely pointed without ribs.

There are 20 Listed Buildings recorded within the study area which mostly date to the postmedieval to the Industrial periods. There are three Grade II* Listed Buildings within the study area dating to the medieval and post-medieval periods. The Church of St Michael (1307375) largely dates to the late 13th to early 14th century, and has a perpendicular tower to the west. It is built of sandstone and granite rubble with ashlar dressing, low-pitched leaded roofs, and a nave with a clerestory and 2 aisles, along with a chancel. The Old Hall on Mill Road (1361185) is a post-medieval brick house mainly built in 1661, and comprises of roughcast render probably over brick to the west and south elevations of the buildings, with brick to the rear. The Old Hall on Coppice Lane (1074513) is a large late 17th century brick house, which is dated to 1670 on the north-west gable and 1675 to the north-east gable. The listing also includes the adjacent stables.

There are ten assets within the study area that date to the Roman period. Several of these are Roman enclosures discovered during excavations. To the north of Lodge Farm, there is a site consisting of an enclosure, two oven-like features, and a stone lined well (MLE22959). Near Rearsby Mill, a possible Iron Age or Roman enclosure is visible on aerial photographs (MLE20723). To the north of Coppice Lane, a Roman site was discovered, revealing finds including pottery, coins and brooches. Two sites are of Roman activity (MLE22925, MLE22926) with the excavations revealing Roman pits, linear features and a gully. Three are findspots; two Roman coins (MLE7762, MLE9008) of Constantine, and a spoon (MLE7760). Le Strete (MLE8839) is the Roman road within the study area, being the main road from Melton to Leicester in 1396, and borders the proposed development on the south-western edge. Lastly, an undated burial (MLE873) was discovered to the south of Rearsby House, with the remains including a brooch or mounting, but is thought to be either Roman or Saxon.

There are three assets of modern date recorded within the study area. Rearsby Airfield (MLE15975) started as an airfield used by flying clubs in 1937, then was used in WWII by Taylorcraft (renamed Auster in 1946), a Thurmaston company. The company then built aircrafts here until 1965, with the works closing in 1970. The airfield was then used by a gliding club, then bought by Rearsby Automotive Ltd to make car components. Queniborough Royal Ordnance Explosives Filling Factory (MLE21309) was one of the last six such factories to be built. It finished in 1942 and was an Agency factory run by Lever Brothers/Unilever. By 1944 it was temporarily occupied by the War Office. It was decommissioned in 1959 and in 1962 Jelsons developed houses over the site. The last modern asset within the study area is St Hilda's Church (MLE22772), which opened in 1975 and is brick-built with metal windows.

There are seven assets of unknown date. Five are cropmarks noted from aerial photography (MLE774, MLE782, MLE863, MLE565). There is also a pit alignment consisting of seven pits (MLE22927), although no finds were discovered. The one asset within the proposed development that is of unknown date is enclosure cropmarks that were identified from aerial photographs (MLE564), although they may not be archaeological.

A geophysical survey was carried out in 2011, adjacent to the Melton Road site by Phase Site Investigations. The survey revealed no archaeology (Taylor 2011).

Trial trenching was carried out in 2013, by Northamptonshire Archaeology adjacent to the Melton Road site and confirmed that there were no archaeological features (Clements 2013).

3 Aims and Methodology

The main aim of the geophysical survey was to provide sufficient information to enable an assessment to be made of the impact of the development on potential sub-surface archaeological remains and for further evaluation or mitigation proposals, if appropriate, to be recommended. To achieve this aim, a magnetometer survey covering all amenable parts of the PDA was undertaken (see Fig. 2).

The general objectives of the geophysical survey were:

- to provide information about the nature and possible interpretation of any magnetic anomalies identified;
- to therefore determine the presence/absence and extent of any buried archaeological features; and
- to prepare a report summarising the results of the survey.

Magnetometer survey

The survey was undertaken using a Sensys Magneto®MXPDA cart-based magnetometer system. This system has five FGM650 fluxgate gradiometers mounted at 0.5m intervals with readings of between ± 0.1 nT and $\pm 10,000$ nT recorded at 20Hz. The gradiometers are linked to a Trimble R6 Real Time Kinetic (RTK) differential Global Positioning System (dGPS) allowing for the geo-referencing of all measurement points within ± 1 cm accuracy. The data is recorded by Sensys Magneto®MXPDA software on a Personal Data Assistant (PeDA) device and stored on a Secure Digital (SD) memory card within the PeDA. Terrasurveyor (DW Consulting) software was used to process and present the data. Further details are given in Appendix 1.

The southern part of the field was not suitable for a cart survey as such Bartington Grad601 magnetic gradiometers were used. For this survey the site grid was laid out using a Trimble VRS differential Global Positioning System (Trimble R6 model). The survey was undertaken using Bartington Grad601 magnetic gradiometers. These were employed taking readings at 0.25m intervals on zig-zag traverses 1.0m apart within 30m by 30m grids, so that 3600 readings were recorded in each grid. These readings were stored in the memory of the instrument and later downloaded to computer for processing and interpretation. Geoplot 3 (Geoscan Research) software was used to process and present the data.

Reporting

A general site location plan, incorporating the 1:50000 Ordnance Survey (OS) mapping, is shown in Figure 1. Figure 2 displays an overview of the processed magnetometer data at a scale of 1:2500, with the overall interpretation, at the same scale in Figure 3. The minimally

processed data, together with an interpretation of the survey results are presented in Figures 4 to 9 inclusive at a scale of 1:1250.

Technical information on the equipment used, data processing and survey methodologies are given in Appendix 1. Technical information on locating the survey area is provided in Appendix 2. Appendix 3 describes the composition and location of the archive. A copy of the completed OASIS form is included in Appendix 4.

The survey methodology, report and any recommendations comply with guidelines outlined by English Heritage (David *et al.* 2008) and by the Chartered Institute for Archaeologists (CIFA 2014). All figures reproduced from Ordnance Survey mapping are with the permission of the controller of Her Majesty's Stationery Office (© Crown copyright).

The figures in this report have been produced following analysis of the data in processed formats and over a range of different display levels. All figures are presented to most suitably display and interpret the data from this site based on the experience and knowledge of Archaeological Services staff.

4 Results and Discussion (see Figures 2 to 9)

Within Field 2 the data set has a speckled appearance with localised pockets of higher magnitude responses. These are all deemed to be part of the underlying geological layers.

Modern anomalies

Ferrous anomalies, as individual 'spikes', or as large discrete areas 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 or material is common on rural sites, often being present as a consequence of manuring or tipping/infilling. There is no obvious pattern or clustering to their distribution in this survey to suggest anything other than a random background scatter of ferrous debris in the plough-soil.

The large area of magnetic disturbance in the south-western part of the site appears to be a large area of dumping or made ground. Review of the 1972, 1:2500 Ordnance Survey Map shows this area to have been subjected to both extraction and then subsequent infill. Further areas of disturbance are also located at the end of Tea Rose Crescent and likely to be the result of material dumped on the land during construction of the houses towards the south.

Magnetic disturbance along the northern limit of are due to underground services and appear to run along the northern side of the site with traces seen on the very north-western corner. A further service is located in the data set and is located centrally running in a west direction and may possibly be traced through the large area of disturbance in a south-west direction.

Agricultural anomalies

Few agricultural anomalies are visible in the data set. A former field boundary trend runs from the south-east corner of the site and would form a roughly triangular field that corresponds to Ordnance survey mapping.

Parallel linear trends can be seen throughout and are likely to be associated modern cultivation. The trends, follow the established field boundaries or run in a north to south direction.

Possible archaeological anomalies

A number of responses have been recorded towards the south and west of Field 3. These are considered to have a possible archaeological origin and consist of linear and discrete areas of higher magnitude responses. These anomalies may be either pit like features or infilled ditches. The pit like features may be held within a slight enclosure. The nature of the features is unclear and they could well be smaller areas of extraction or areas of disturbance.

5 Conclusions

The magnetic survey has detected anomalies of possible archaeological origin within Field 3. Large areas of historical extraction and infilling have also been identified within the western part of Field 3. The remainder of the survey is largely devoid of any responses that are likely to be archaeological.

The survey has worked well on this geology and land-use detecting anomalies of possible archaeology. Based upon the results of the survey the potential of the site is considered to be low and Field 3 characterised as low to medium potential.



Fig. 1. Site location

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Fig. 2. Survey location showing greyscale magnetometer data (1:2500 @ A3)

Q



Fig. 3. Overall interpretation of magnetometer data (1:2500 @ A3)

Q



Fig. 4. Greyscale magnetometer data; Sector 1, Field 1 (1:1250 @ A3)

50m

Q



Fig. 5. Interpretation of magnetometer data; Sector 1, Field 1 (1:1250 @ A3)









Fig. 9. Interpretation of magnetometer data; Sector 3, Field 3 (1:1250 @ A3)

Appendix 1: Magnetic survey - technical information

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 haemetite. 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. Areas of human occupation or settlement can then be identified by measuring the 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 and the fermentation and bacterial effects associated with rubbish decomposition. The area of enhancement is usually quite large, mainly due to the tendency of discard areas to extend beyond the limit of the occupation site itself, and spreading by the plough.

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 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.

Methodology: Gradiometer Survey

The magnetometer survey was undertaken using a Sensys Magneto MXPDA cart-based instrument. The instrument has 5 fluxgate gradiometers spaced 0.5m apart with readings recorded at 20Hz. The gradiometers have a range of recording between 0.1nT and 10,000nT. They are linked to a Trimble R6 RTK dGPS system with data recorded by Sensys Magneto MXPDA software on a rugged PDA device. The data was stored on an SD memory card

within the PDA and later downloaded to a computer for processing and interpretation. MAGNETO (Sensys Gmbh) software was used to process and present the data

Data Processing and Presentation

The detailed gradiometer data has been presented in this report in processed greyscale format. The data in the greyscale images has been interpolated and selectively filtered to remove the effects of drift in instrument calibration and other artificial data constructs and to maximise the clarity and interpretability of the archaeological anomalies.

MAGNETO was used to produce the greyscale images. All greyscale plots are displayed using a linear incremental scale.

The results and subsequent interpretation of data from geophysical surveys should not be treated as an absolute representation of the underlying archaeological and non-archaeological remains. Confirmation of the presence or absence of archaeological remains can only be achieved by direct investigation of sub-surface deposits

Appendix 2: Survey location information

An initial survey station was established using a Trimble VRS differential Global Positioning System (Trimble R6 model). The data was geo-referenced using the geo-referenced survey station with a Trimble RTK differential Global Positioning System (Trimble R6 model). The accuracy of this equipment is better than 0.01m. The survey grids 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 co-ordinates are measured off hard copies of the mapping rather than using the digital co-ordinates.

Archaeological Services WYAS cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party.

Appendix 3: Geophysical archive

The geophysical archive comprises:-

- an archive disk containing compressed (WinZip 8) files of the raw data, report text (Microsoft Word 2000), and graphics files (Adobe Illustrator CS6 and AutoCAD 2008) files; and
- a full copy of the report.

At present the archive is held by Archaeological Services WYAS although it is anticipated that it may eventually be lodged with the Archaeology Data Service (ADS). Brief details may also be forwarded for inclusion on the English Heritage Geophysical Survey Database after the contents of the report are deemed to be in the public domain (i.e. available for consultation in the Leicestershire Historic Environment Record).

Appendix 4: Oasis form

OASISDA TA COLLECTION FORM: England

List of Projects ∟| Manage Projects | Search Projects | New project | Change your details | HER coverage | Change country | Log out

Printable version

OASIS ID: archaeol11-313946

Project details

Project name	Land off Melton Road East Goscote Leicestershire
Short description of the project	A cart-based geophysical (magnetometer) survey, covering approximately 17 hectares was undertaken on land off Melton Road, East Goscote. Anomalies of possible archaeological origin have been recorded in the forms of linear trends and pit like responses. Responses associated with the extraction and infilling of part of the site is also present and two services are clearly shown in the data set. A former field boundary has also been detected in the eastern part of the site and corresponds well with recorded boundaries on Ordnance Survey mapping. The magnetic survey has worked well on this site and the archaeological potential of the site overall would be characterised as low.
Project dates	Start: 20-03-2018 End: 11-04-2018
Previous/future work	Not known / Not known
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 1 - Minimal cultivation
Monument type	NONE None
Significant Finds	NONE None
Methods & techniques	"Geophysical Survey"
Development type	Not recorded
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Not known / Not recorded
Solid geology (other)	Branscombe Mudstone Formation
Drift geology	Unknown
Drift geology (other)	None
Techniques	Magnetometry

Project location

Country	England
Site location	LEICESTERSHIRE CHARNWOOD EAST GOSCOTE Land off Melton Road
Postcode	LE7 4YQ
Study area	17 Hectares
Site coordinates	SK 6495 1354 52.715271902199 -1.038400003538 52 42 54 N 001 02 18 W Point

11/04/2018

Project creators

Name of Organisation	Archaeological Services WYAS
Project brief originator	WYG
Project design originator	ASWYAS
Project director/manager	E Brunning
Project supervisor	A. Trace
Type of sponsor/funding body	Consultant
Name of sponsor/funding body	WYG

Project archives

Physical Archive Exists?	No
Digital Archive recipient	ASWYAS
Digital Contents	"none"
Digital Media available	"Geophysics","Images raster / digital photography","Images vector","Survey"
Paper Archive Exists?	No

Project bibliography 1

	Grey literature (unpublished document/manuscript)
Publication type	
Title	Land off Melton Road East Goscote Leicestershire
Author(s)/Editor(s)	Williams, D.
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Bibliography

- British Geological Survey, 2018. http://mapapps.bgs.ac.uk/geologyofbritain/home.html (viewed April 2018)
- CIfA, 2014. *Standard and Guidance for Archaeological Geophysical Survey*. Chartered Institute for Archaeologists
- Clements, P. 2013. Archaeological trial trench evaluation on land at Melton Road, East Goscote, Leicestershire. Unpublished. Accessed at: http://archaeologydataservice.ac.uk/archsearch/record.xhtml (viewed March 2018)
- David, A., N. Linford, P. Linford and L. Martin, 2008. *Geophysical Survey in Archaeological Field Evaluation: Research and Professional Services Guidelines (2nd edition)* English Heritage
- DCLG, 2012. *National Planning Policy Framework*. Department of Communities and Local Government
- Gaffney, C. and Gater, J., 2003. *Revealing the Buried Past: Geophysics for Archaeologists* Tempus Publishing Ltd
- SSEW, 1983 Soils of Northern England, Sheet 1. Soil Survey of England and Wales
- Taylor, K. 2011. Melton Road, East Goscote, Leicestershire, Archaeological Geophysical Survey, Phase Site Investigations report
- WYG, 2018. Land off Melton Road, East Goscote. Archaeology Desk-Based Assessment A106551. WYG Environment Planning Transport Limited