

LAND SOUTH OF WELSH ROAD WEST, SOUTHAM, WARWICKSHIRE

GEOPHYSICAL SURVEY

commissioned by Barwood Development Securities Ltd

Pre-application

September 2016





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HA JOB NO. WRWS/01 PARISH Southam LOCAL AUTHORITY

project info

NGR SP 4095 6213 Warwickshire OASIS REF. headland5-263979

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PROJECT SUMMARY

Headland Archaeology (UK) Ltd undertook a geophysical (magnetometer) survey, covering 12.5 hectares on land south of Welsh Road West, Southam, to provide further information on the archaeological potential of the site in advance of a proposed development. No anomalies of archaeological potential have been identified by the survey. Anomalies have been identified throughout the site which are caused by the medieval and post-medieval practice of ridge and furrow cultivation. These anomalies may be of local historical interest but are not of any archaeological significance. Two localised areas of magnetic disturbance may also be of local historical interest, being due to a back-filled stone pit and a demolished post-medieval barn. Therefore, based solely on the results and interpretation of the magnetic data, the archaeological potential across the site is considered to be very low, corroborating the results of the Archaeology and Heritage Assessment.

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ILLUS 1 Site location

LAND SOUTH OF WELSH ROAD WEST, SOUTHAM, WARWICKSHIRE

GEOPHYSICAL SURVEY

1 INTRODUCTION

Headland Archaeology (UK) Ltd was commissioned by BSA Heritage Ltd (The Consultant) on behalf of Barwood Development Securities Ltd (The Client) to undertake a geophysical (magnetometer) survey of land south of Welsh Road West, Southam, Warwickshire. The survey will inform forthcoming archaeological strategy in advance of the proposed development of the site.

The work was undertaken in accordance with a Written Scheme of Investigation (Headland Archaeology 2016), submitted to and approved by the Consultant, with guidance within the National Planning Policy Framework (DCLG 2012) and in line with current best practice (David et al 2008).

The survey was carried out between September 5th and September 13th 2016 in order to provide information on the archaeological potential of the site.

1.1 SITE LOCATION, TOPOGRAPHY AND LAND-USE

The proposed development area (PDA) is located within an irregularlyshaped parcel of land on the western periphery of Southam, Warwickshire, centred at SP 4095 6213 (see Illus 1).It comprises four fields (F1–F4) which are bound by Welsh Road West to the north, the River Stowe to the south, residential properties on Old Ford Avenue, Bascote Rise, Gorse Lea and Glebe Road to the north-east, Ford Farm to the north-west, and elsewhere by arable fields.

The site is located on the south-west facing slope of a low hill being at 98m above Ordnance Datum (aOD) at Welsh Road West in the north-east and at 76m aOD at the River Stowe in the south-west.

At the time of the survey the fields contained a young rape crop (see Illus 2 and 3).

1.2 GEOLOGY AND SOILS

The underlying bedrock geology consists of Rugby Limestone Member (limestone and mudstone, interbedded), in the north-east with bands of Saltford Shale Member (mudstone), Langport Member (limestone) and Penarth Group (argillaceous rock and limestone, interbedded) occupying the lower-lying parts of the PDA in the west and the south (see Illus 4). Alluvial superficial deposits are recorded along the course of the River Stowe in the south (NERC 2016).

The soils are classified in the Soilscape 9 association, characterised as slightly lime-rich loams and clays with impeded drainage (Cranfield University 2016).

2 ARCHAEOLOGICAL BACKGROUND

An Archaeology and Heritage Assessment (BSA Heritage 2016) identified two heritage sites within the PDA which are listed within the Warwickshire Historic Environment Record (HER). A stone pit (HER776) is shown on an 18th century map to the south-east of Ford Farm (see Illus 4). Two adjacent extant ponds are thought to reflect further extraction. The HER also defines an 'area of ridge and furrow' across F1.

A scheduled and Grade II listed Holy Well (1005730) is located to the immediate south-east of the PDA.

Analysis of historical mapping indicates that the division and layout of land within the PDA has changed little since the publication of the first edition Ordnance Survey map in 1886 albeit with the addition of a copse of trees in the south of F1, the removal of a barn from within the north-east of F2 and the removal of allotments and tracks from within F4.

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;



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

- > 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. Features 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 and 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 V3.0.28.4 (DWConsulting) software has been used to process and present the data.

3.2 REPORTING

A general site location plan is shown in Illus 1 at a scale of 1:10,000. Illus 2 and 3 are general site condition photographs. A large scale (1:3,000) survey location plan showing the field numbers, Warwickshire HER data, geology data and site condition photograph locations is presented in Illus 4.

Detailed data plots (greyscale and XY trace) and interpretative illustrations are presented at a scale of 1:1,500 in Illus 5, 6 and 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. 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 (Headland Archaeology 2016) and guidelines outlined by English Heritage (David et al 2008) and by the Chartered Institute for Archaeologists (ClfA 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.

4 RESULTS AND DISCUSSION

Magnetic background

A variable magnetic background has been recorded across most of the PDA with slightly lower levels of variation in the west corresponding to the Saltford Shale Member (mudstone) bedrock. Against this background numerous linear 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 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 or material is common on most sites, often being present as a consequence of manuring or tipping/infilling. Within the west of F1 a broad area of high magnitude magnetic disturbance, Q, corresponds broadly to the stone pit (HER776) which is recorded in the Warwickshire Historic Environment Record. The disturbance is due to ferrous material (e.g. iron, brick, gravel etc) within the fill of the former pit.

At the north-eastern corner of F2, the broad area of magnetic disturbance, R, corresponds to a former barn which is depicted on historic Ordnance Survey maps until the 1971 edition. The disturbance is caused by rubble and other demolition material within the topsoil, and may also be due to in situ structural remains.

High magnitude linear dipolar anomalies, SP1 and SP2, recorded east/west within the north and the south of F3 and F4, locate subsurface pipes.

Other areas of disturbance around the perimeter of the PDA and along the field edges is due to ferrous material within, and close to, the field boundaries.

4.2 AGRICULTURAL ANOMALIES

Widely spaced, slightly curvilinear, anomalies recorded throughout the PDA are characteristic of ridge and furrow cultivation with the striped appearance being due to the contrast between former ridges and the soil-filled furrows.

The remaining linear trend anomalies are also likely to have an agricultural origin.

4.3 GEOLOGICAL ANOMALIES

Numerous discrete anomalies are visible throughout the magnetic datasets. These are interpreted as geological in origin and are due to minor variations in the depth and composition of the upper soil horizons. The vague curving trend, GB, within the west of F1 and the south of F3 corresponds to the geological boundary between Saltford Shale Member (mudstone) and Langport Member (limestone).

5 CONCLUSION

The geophysical survey has successfully evaluated the PDA, identifying numerous anomalies, the majority of which are due to medieval or post-medieval ridge and furrow ploughing. A backfilled stone pit and a demolished barn are also identified in the data. These anomalies may be of local historical interest but are not of any archaeological significance. No anomalies indicative of possible or probable archaeological activity have been identified within the PDA. Therefore, on the basis of the survey the archaeological potential of the site is assessed as low, corroborating the results of the Archaeology and Heritage Assessment.

6 **REFERENCES**

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ILLUS 4 Survey location showing field numbers, Warwickshire HER data, geology data and the location and direction of Illus 2 - Illus 3







eter data ILLUS 5 Proc



data ILLUS 6 XY trace plot of





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 (<u>http://guides.archaeologydataservice.</u> <u>ac.uk/g2gp/Geophysics_3</u>). 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 destriped 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.

Data is also clipped to remove extreme values and to improve data contrast.

APPENDIX 5 OASIS DATA COLLECTION FORM: ENGLAND

OASIS ID: headland5-263979

PROJECT DETAILS				
PROJECT NAME	Land south of Welsh Road West, Southam			
SHORT DESCRIPTION OF THE PROJECT	Headland Archaeology (UK) Ltd undertook a geophysical (magnetometer) survey, covering 12.5 hectares on land south of Welsh Road West, Southam, to provide further information on the archaeological potential of the site in advance of a proposed development. No anomalies of archaeological potential have been identified by the survey. Anomalies have been identified throughout the site which are caused by the medieval and post-medieval practice of ridge and furrow cultivation. These anomalies may be of local historical interest but are not of any archeeologically significance. Two localised areas of magnetic disturbance may also be of local historical interest, being due to a back-filled stone pit and a demolished post-medieval barm. Therefore, based solely on the results and interpretation of the magnetic data, the archaeological potential across the site is considered to be very low, corroborating the results of the Archaeology and Heritage Assessment.			
PROJECT DATES	Start: 05-09-2016 End: 13-09-2016			
PREVIOUS/FUTURE WORK	Not known / Not known			
ANY ASSOCIATED PROJECT REFERENCE CODES	WRWS-01 - Contracting Unit No.			
TYPE OF PROJECT	Field evaluation			
SITE STATUS	None			
CURRENT LAND USE	Cultivated Land 4 - Character Undetermined			
MONUMENTTYPE	N/A None			
MONUMENTTYPE	N/A None			
SIGNIFICANT FINDS	N/A None			
SIGNIFICANT FINDS	N/A None			
METHODS & TECHNIQUES	"Geophysical Survey"			
DEVELOPMENTTYPE	Not recorded			
PROMPT	National Planning Policy Framework – NPPF			
POSITION IN THE PLANNING PROCESS	Not known / Not recorded			
SOLID GEOLOGY (OTHER)	Rugby Limestone Member; Saltford Shale Member; Langport Member; Penarth Group			
DRIFT GEOLOGY	ALLUVIUM			
TECHNIQUES	Magnetometry			
PROJECT LOCATION				
COUNTRY	England			
SITE LOCATION	WARWICKSHIRE STRATFORD ON AVON SOUTHAM Land south of Welsh Road West, Southam			
POSTCODE	CV47 0LH			

LAND SOUTH OF WELSH ROAD WEST, SOUTHAM, WARWICKSHIRE WRWS/01

PROJECT CREATORS		
NAME OF ORGANISATION	Headland Archaeology	
PROJECT BRIEF ORIGINATOR	BSA Heritage	
PROJECT DESIGN ORIGINATOR	Headland Archaeology	
PROJECT DIRECTOR/MANAGER	Webb, A.	
PROJECT SUPERVISOR	Bishop, R	
PROJECT SUPERVISOR	Turner, J	
TYPE OF SPONSOR/FUNDING BODY	Developer	

PROJECT ARCHIVES			
PHYSICAL ARCHIVE EXISTS?	No		
DIGITAL ARCHIVE EXISTS?	No		
DIGITAL MEDIA AVAILABLE	"Geophysics"		
PAPER ARCHIVE EXISTS?	No		
PAPER MEDIA AVAILABLE	"Report"		

PROJECT BIBLIOGRAPHY 1

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