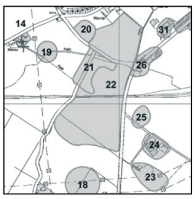
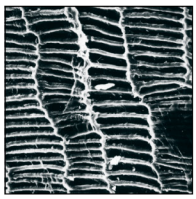
GLTG/01








LAND AT GLOUCESTER ROAD, TUTSHILL, GLOUCESTERSHIRE

GEOPHYSICAL SURVEY

commissioned by Brock Planning Consultancy

November 2015

HEADLAND ARCHAEOLOGY

REGISTERED · CIfA · ORGANISATION

LAND AT GLOUCESTER ROAD, TUTSHILL, GLOUCESTERSHIRE

GEOPHYSICAL SURVEY

commissioned by Brock Planning Consultancy

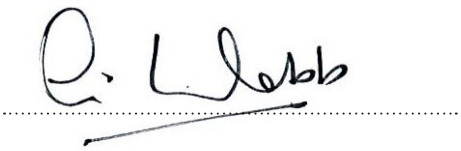
November 2015

project info

HA JOB NO.	GLTG/01
NGR	ST 54483 94620
PARISH	Tidenham
LOCAL AUTHORITY	Gloucestershire
OASIS REF.	Headland5-231364

project team

PROJECT MANAGER	Alistair Webb
AUTHOR	Alexander Schmidt, Alistair Webb
FIELDWORK	David Harrison, Ross Bishop
GRAPHICS	Mano Kapazoglou, Rafael Maya-Torcelly
APPROVED BY	Alistair Webb – Project Manager



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PROJECT SUMMARY

Headland Archaeology (UK) Ltd undertook a geophysical (magnetometer) survey covering approximately 2.5 hectares on land on the western periphery of the village of Tutshill, Gloucestershire approximately 1km north-east of Chepstow. The aim was to provide information about the archaeological potential of land proposed for development. The data is dominated by discrete anomalies indicative of variations in the composition of the soil. Two linear anomalies are likely to locate former field boundaries. The survey identified no anomalies of obvious archaeological potential. There is no indication from any other source to suggest that the magnetic data provides anything other than an accurate representation of the sub-surface conditions within the proposed development area. Therefore, based on the results and interpretation of the data, the archaeological potential of the site is considered to be low.

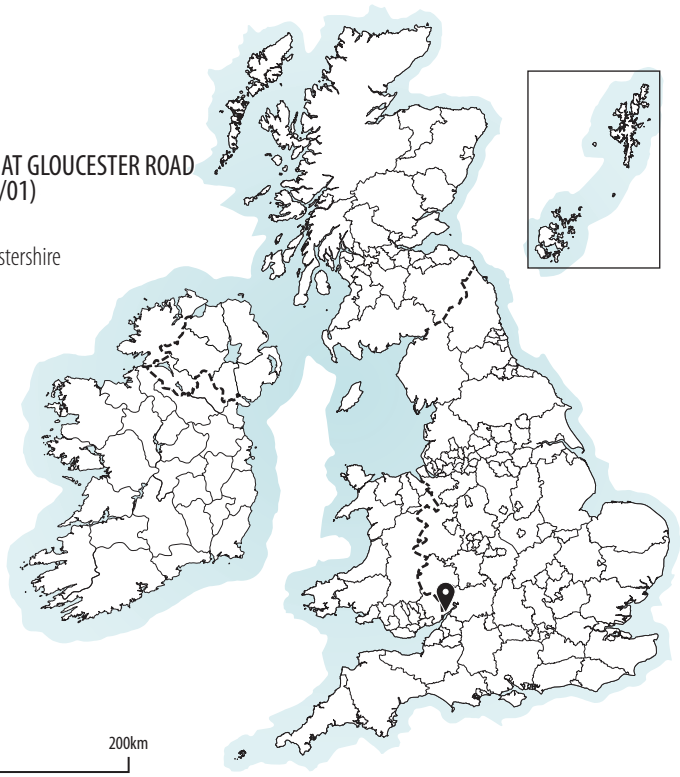
CONTENTS

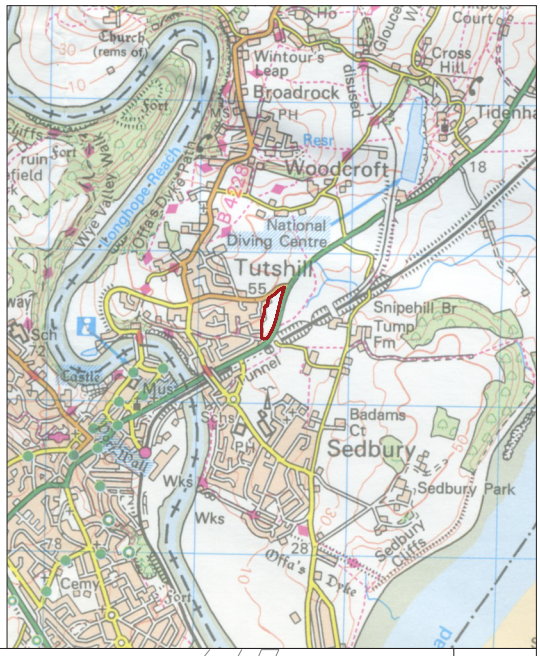
LIST OF ILLUSTRATIONS

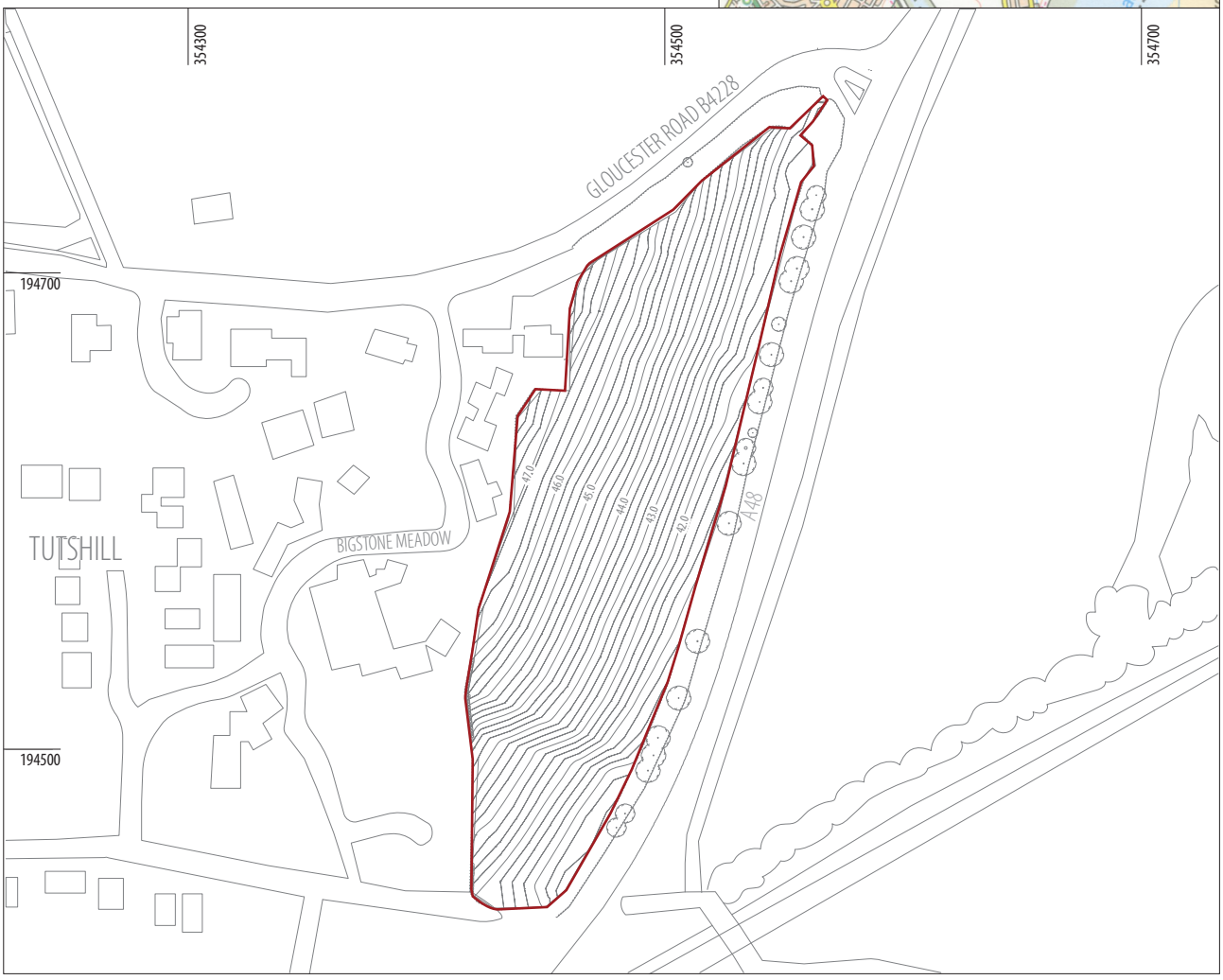
LAND AT GLOUCESTER ROAD (GLGT/01)

Tutshill

Gloucestershire







KEY

geophysical survey area

–45.0– contour

N

0 200m

scale 1:3,000 @ A4

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ILLUS 1

Site location

LAND AT GLOUCESTER ROAD, TUTSHILL, GLOUCESTERSHIRE

GEOPHYSICAL SURVEY

1 INTRODUCTION

Headland Archaeology (UK) Ltd was commissioned by Brock Planning Consultancy to undertake a geophysical (magnetometer) survey on land proposed for development east of Tutshill, Gloucestershire, approximately 1km north-east of Chepstow (See **ILLUS 1**). The work was undertaken in accordance with a Written Scheme of Investigation (Headland Archaeology 2015), supplied to and approved by Charles Parry of Gloucestershire County Council, archaeological advisor to the Local Planning Authority, 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 on the 4th and 5th of November 2015 in order to provide additional information on the archaeological potential of the site.

1.1 SITE LOCATION, TOPOGRAPHY AND LAND-USE

The proposed development area (PDA) comprises a small (2.5 hectares), irregularly shaped parcel of land, centred at NGR 354472, 194582, that is bound to the south and east by the A48, to the west by residential properties on Bigstone Meadow and to the north by Gloucester Road (B4228).

Topographically, the site slopes gradually down from the west (at approximately 47m above Ordnance Datum) to approximately 41m aOD in the east. A prominent ridge/scarp is visible on an east/west alignment within the south of the survey area. At the time of the survey the field was fallow and used for grazing livestock (see **ILLUS 2**).

1.2 GEOLOGY AND SOILS

The solid geology underlying the site consists of conglomerate of the Mercia Mudstone Group (British Geological Survey 2015). There are no recorded superficial deposits however river terrace and tidal flat deposits are located nearby to the south of Sedbury and along the banks of the River Wye. The soils are classified in the Soilscape 7, characterised as loamy, slightly acid but base rich and freely draining soils (Landis 2015).

2 ARCHAEOLOGICAL BACKGROUND

An archaeological desk-based assessment is currently being prepared by Headland Archaeology. A single heritage asset is recorded within the development area; an east-west orientated bank (HER 22508) of unknown date and function located in the south of the site.

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 potential sub-surface archaeological remains and for further evaluation or mitigation proposals, if appropriate, to be recommended.

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.

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.

ILLUS2

General view of site, looking south

Bartington Grad601 magnetic gradiometers were used during the survey, taking readings at 0.25m intervals on zig-zag traverses 1m 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.

The site grid was 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 1:3,000. **ILLUS 2** shows a general site photograph, detailing ground cover and land use. **ILLUS 3** is a 1:2,500 site location plan showing greyscale data. **ILLUS 4** to **ILLUS 6** are 1:1,000 scale plots displaying the greyscale data, detailed XY traceplot and overall interpretation of processed magnetometer data detailing magnetic anomalies identified across the site.

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 2015) and guidelines outlined by English Heritage (David et al. 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.

4 RESULTS AND DISCUSSION

The data is characterised by numerous discrete anomalies giving the greyscale plot a speckled appearance. These anomalies are likely to be natural in origin (see below). Within this variable magnetic background a handful of other anomalies stand out. These are described in detail and, for ease of discussion, assigned a letter (in this instance A-C) corresponding to their subsequent interpretation (See **ILLUS 6**).

4.1 FERROUS/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

Geophysical survey area

Location and direction of ILLUS 2

nT
-1.0
1.0

N

0
50m

scale 1:2,500 @ A4

PROJECT Land at Gloucester Road
Tutshill
Gloucestershire
(GLTG/01)

CLIENT The Brock Planning Consultancy

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ILLUS 3

Survey location showing greyscale magnetometer data

archaeological interpretation, as modern ferrous debris or material is common on most sites, often being present as a consequence of manuring or tipping/infilling. On this site, there is no obvious pattern to their distribution.

One notable ferrous anomaly, A, has been identified crossing the southern boundary of the site. This is characterised by a strong dipolar linear response and is interpreted as a buried service pipe.

Further ferrous disturbance can be seen surrounding the perimeter of the site. This is likely to be due to boundary fences and/or peripheral interference from outside the survey area.

4.2 AGRICULTURAL ANOMALIES

Analysis of the first edition OS mapping (1881-1882) indicates that a linear anomaly identified to the south of the survey area, B, correlates with a former field boundary running west to east.

A similar, longer linear anomaly, C, has been identified. This anomaly runs parallel with and at right angles to the former pattern of land division but is not recorded on historic mapping. It is also visible as a linear feature on LIDAR data from the area and runs in line with the contours of the site (See Illus 1) (Environment Agency, 2015). It is considered likely that this anomaly is indicative of a former field boundary, the anomaly does not continue beyond the former field boundary, perhaps adding weight to this interpretation. However, a geological origin cannot be completely dismissed.

4.3 GEOLOGICAL ANOMALIES

Throughout the site numerous low to moderate magnitude areas of magnetic enhancement have been identified. Although there are no recorded superficial deposits the widespread occurance and magnitude of these discrete anomalies (See **ILLUS 4** and **ILLUS 5)** is suggestive of the presence of magnetic gravels in the upper soil horizons. Whilst an archaeological origin for any of these anomalies is possible, the lack of any pattern or any other evidence to support an archaeological interpretation lends weight to a geological interpretation.

5 CONCLUSION

The geophysical survey has identified numerous discrete anomalies throughout the site. However, these are considered likely to be of geological origin, probably due to pockets of magnetic sands or gravel, and there is no evidence that might lend weight to an anthropogenic interpretation.

Two linear anomalies, which locate probable 19th century field boundaries, are the only other anomalies, excluding those caused by a pipe and modern ferrous contamination, which have been identified by the survey.

There is no indication from any other source to suggest that the magnetic data provides anything other than an accurate representation of the sub-surface conditions within the proposed development area. Therefore, based on the results and interpretation of the data, the archaeological potential of the site is considered to be low.

6 REFERENCES

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 File Name: GLTG-01-Report-v1.indd

nT
-1.0 1.0

N
0 25m
scale 1:1,000 @ A3

PROJECT Land at Gloucester Road
Tutshill
Gloucestershire
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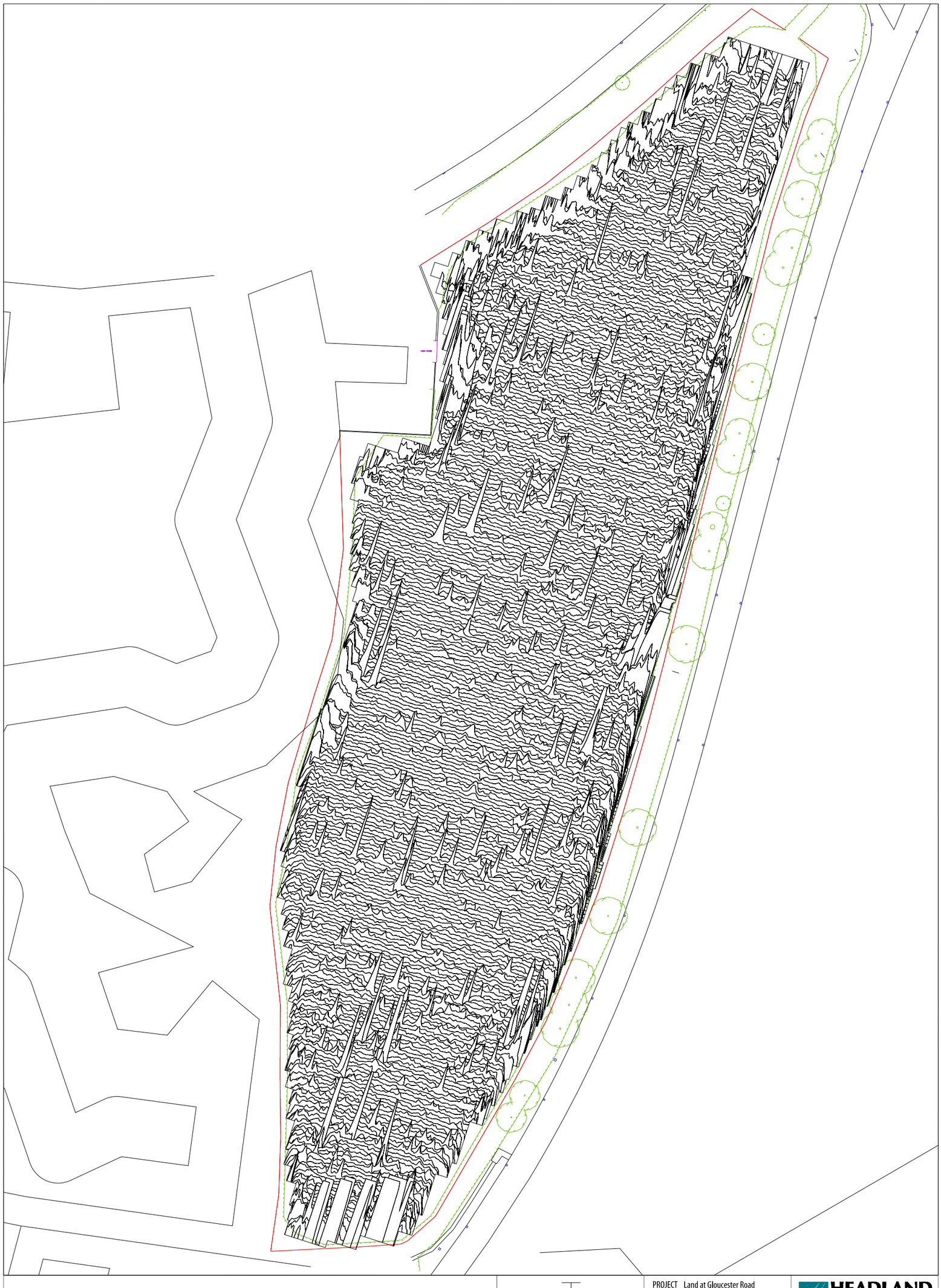
ILLUS 4

Processed greyscale magnetometer data



17.5nT/cm

N

0 25m

scale 1:1,000 @ A3

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Tutshill
Gloucestershire
(GLTG/01)

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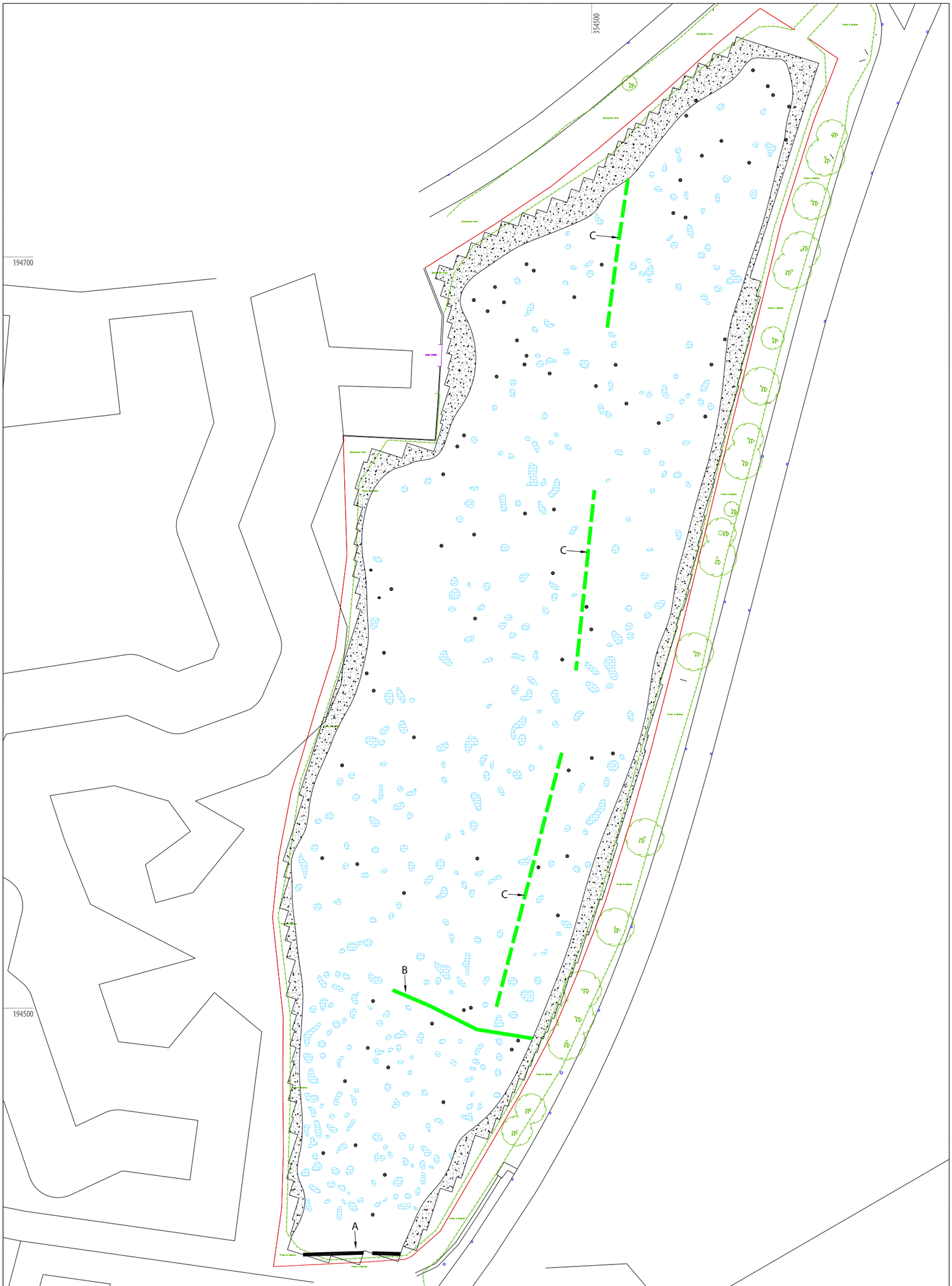
ILLUS 5

XY trace plot of minimally processed magnetometer data



TYPE OF ANOMALY	INTERPRETATION
Dipolar Isolated	Ferrous Material
Magnetic Disturbance	Ferrous Material
Dipolar Linear	Service Pipe
Linear	Former Field Boundary
Linear	Former Field Boundary?
Magnetic Enhancement	Geology

N

0 25m

scale 1:1,000 @ A3

PROJECT Land at Gloucester Road
Tutshill
Gloucestershire
(GLTG/01)

CLIENT The Brock Planning Consultancy

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ILLUS 6

Interpretation of magnetometer data

7 APPENDICES

APPENDIX 1 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 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

The site grid was laid out using a Trimble VRS differential Global Positioning System (Trimble GeoXR 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 coordinates are measured off hard copies of the mapping rather than using the digital coordinates.

Headland Archaeology cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party.

APPENDIX 3 GEOPHYSICAL SURVEY ARCHIVE

The geophysical archive comprises:-

- an archive disk containing the raw data in XYZ format, a raster image of each greyscale plot with associate world file, and a PDF of the report

The project will be archived in-house in accordance with recent good practice guidelines (http://guides.archaeologydataservice.ac.uk/g2gp/Geophysics_3). The data will be stored in an indexed archive and migrated to new formats when necessary.

APPENDIX 4 OASIS DATA COLLECTION FORM: ENGLAND

OASIS ID: headlandS-231364

PROJECT DETAILS	
Project name	Land at Gloucester Road, Tutshill, Gloucestershire
Short description of the project	Headland Archaeology (UK) Ltd undertook a geophysical (magnetometer) survey covering approximately 2.5 hectares on land on the western periphery of the village of Tutshill, Gloucestershire approximately 1km north-east of Chepstow. The aim was to provide information about the archaeological potential of land proposed for development. The data is dominated by discrete anomalies indicative of variations in the composition of the soil. Two linear anomalies are likely to locate former field boundaries. The survey identified no anomalies of obvious archaeological potential. There is no indication from any other source to suggest that the magnetic data provides anything other than an accurate representation of the sub-surface conditions within the proposed development area. Therefore, based on the results and interpretation of the data, the archaeological potential of the site is considered to be low.
Project dates	Start: 04-11-2015 End: 05-11-2015
Previous/future work	Not known / Not known
Any associated project reference codes	GRTG15 - Sitecode
Any associated project reference codes	01 - 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	Housing estate
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Pre-application
Solid geology (other)	Mercia Mudstone Group
Drift geology (other)	Unknown
Techniques	Magnetometry

PROJECT LOCATION	
Country	England
Site location	GLOUCESTERSHIRE FOREST OF DEAN TIDENHAM Land at Gloucester Road, Tutshill
Study area	2.5 Hectares
Site coordinates	ST 54483 94620 51.648064339935 -2.657944646794 51 38 53 N 002 39 28 W Point

PROJECT CREATORS	
Name of organisation	Headland Archaeology
Project brief originator	Headland Archaeology
Project design originator	Headland Archaeology
Project director/manager	Craddock-Bennett, L.

PROJECT CREATORS	
Project supervisor	Harrison, D
Type of sponsoring/funding body	Developer

PROJECT ARCHIVES	
Physical Archive exists	No
Digital Archive recipient	In house
Digital Contents	other
Digital Media available	Geophysics
Paper Archive exists	No

PROJECT BIBLIOGRAPHY 1	
Publication type	Grey literature (unpublished document/manuscript)
Title	Land at Gloucester Road, Tutshill, GLoucestershire: Geophysical Survey
Author(s)/Editor(s)	Webb, A. and Schmidt, S.
Other bibliographic details	GRTG15
Date	2015
Issuer or publisher	Headland Archaeology
Place of issue or publication	Edinburgh
Description	A4 bound report

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ENTERED ON	23 November 2015

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