



WYAS  
**Archaeological  
Services**

**Land to the south of Glossop Road,  
Gamesley  
Derbyshire**

Geophysical Survey

Report no. 2952  
March 2017

**Client:** Ecus Ltd.



# **Land to the south of Glossop Road, Gamesley, Derbyshire**

## **Geophysical Survey**

### *Summary*

*A geophysical (magnetometer) survey, covering approximately 1.2 hectares was undertaken on pastoral land to the south of Glossop Road, Gamesley, Derbyshire. This was part of a programme of archaeological works in advance of a proposed development. No anomalies associated with archaeological remains were detected. A handful of field drains and linear trends associated with agriculture have been located. Magnetic disturbance along the limits of the dataset are primarily due to metal fencing. Therefore the archaeological potential of the survey area is deemed to be low.*

## Report Information

Client: ECUS Ltd.  
 Address: Brook Holt, 3 Blackburn Road, Sheffield, S61 2DW  
 Report Type: Geophysical Survey  
 Location: Gamesley  
 County: Derbyshire  
 Grid Reference: SK 010 940  
 Period(s) of activity: Modern  
 Report Number: 2952  
 Project Number: 6626  
 Site Code: GRG17  
 OASIS ID: Archaeol11-280354  
 Date of fieldwork: March 2017  
 Date of report: March 2017  
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Authorisation for  
distribution: -----



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## **1 Introduction**

Archaeological Services WYAS (ASWYAS) were commissioned by ECUS Ltd., to undertake a geophysical (magnetometer) survey on land to the south of Glossop Road, Gamesley to inform on proposed development. Guidance contained within the National Planning Policy Framework (DCLG 2012) was followed, in line with current best practice (CifA 2014; David *et al.* 2008). The survey was carried out on the 1st March 2017 to provide additional information on the archaeological resource of the Proposed Development Area (PDA).

### **Site location, topography and land-use**

The PDA consists of one field totaling approximately 1.2ha and lies to the south of Glossop Road and north of a railway line to the immediate south of Gamesley and approximately 2.5km to the west of Glossop (see Fig. 1). At the time of survey, ground cover consisted of pasture which was heavily waterlogged resulting in an area of standing water in the northeast of the PDA. It is centered at SK 010940. Topography of the site is generally level with a height above Ordnance Datum (aOD) of approximately 168m.

### **Soils and geology**

The underlying geology comprises of the Huddersfield white rock association – sandstone. Superficial deposits are recorded as till, Devensian – diamicton that formed up to 2 million years ago in the Quaternary Period (BGS 2017). Soils of the area belong to the Brickfield 3 association (713g) consisting of slowly permeable seasonally waterlogged fine loamy and clayey soils (SSEW 1983).

## **2 Archaeological Background**

In 2011 ASWAYS conducted a geophysical survey to the immediate east of the PDA (ASWYAS 2011). The survey detected a former field boundary, field drains and geological variations. No anomalies of archaeological interest were detected. A desk-based assessment (DBA) was produced by ECUS for that programme of works in which the following summarises the archaeological background.

The Roman Fort known as Melandra Castle, a scheduled ancient monument that survives as earthworks, is situated 750m to the north of the site. It has been suggested that the Roman road between Melandra and Buxton (Margary 1973; 520, Road No. 714) crosses the site on a north/south alignment. However, there is, as yet, no physical evidence to locate the exact line of this road. The Desk Based Assessment also revealed that there are isolated find spots and archaeological sites within the 1km study area surrounding the site that date from the Romano-British period through to the post-medieval and industrial periods (Burn 2011).

### 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 site grid was laid out using a Trimble VRS differential Global Positioning System (Trimble 5800 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. Further details are given in Appendix 1.

#### Reporting

A general site location plan, incorporating the 1:50000 Ordnance Survey (OS) mapping, is shown in Figure 1. Figure 2 displays processed magnetometer data at a scale of 1:2500. The processed and minimally processed data, together with an interpretation of the survey results are presented in Figures 3 to 5 inclusive at a scale of 1:1000.

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 3 to 5)**

### **Ferrous 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.

Large ferrous responses along the limits of the survey area are due to metal fencing within the field boundaries, the adjacent road in the north and the warehouse to the east.

### **Agricultural anomalies**

A handful of magnetically strong linear trends in the data are likely to reflect field drains and given the current waterlogged conditions these are probably in place to help the drainage. Other linear trends are likely to be agricultural in origin such as former ploughing as they reflect the alignment of the boundary in the north.

*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.*

## **5 Conclusions**

No anomalies of archaeological interest have been detected in the magnetic survey. Linear responses associated with field drains and former field boundaries have been recorded.

The remaining anomalies are of a modern ferrous nature in the forms of responses associated with metal fencing and the adjacent road.



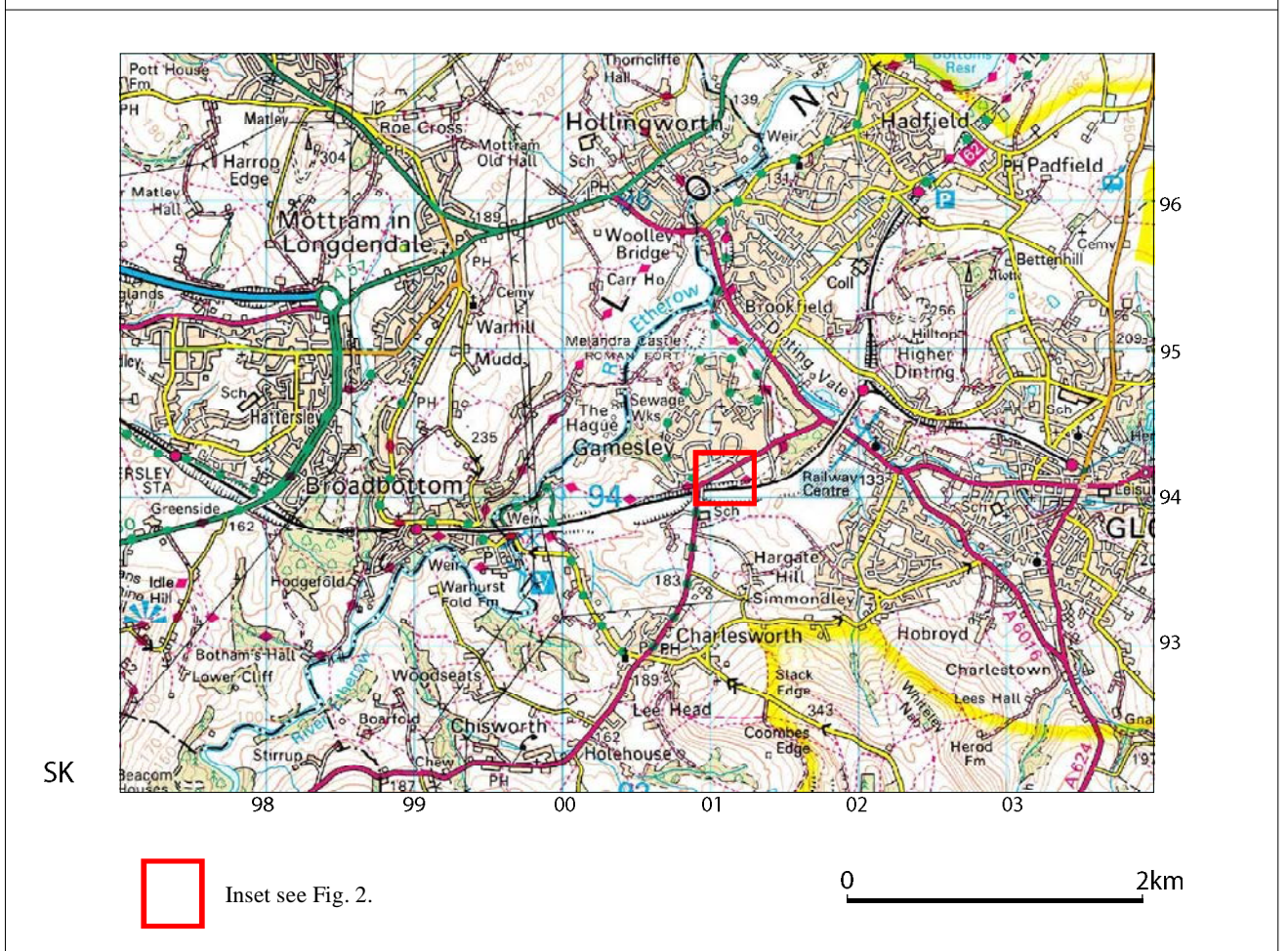
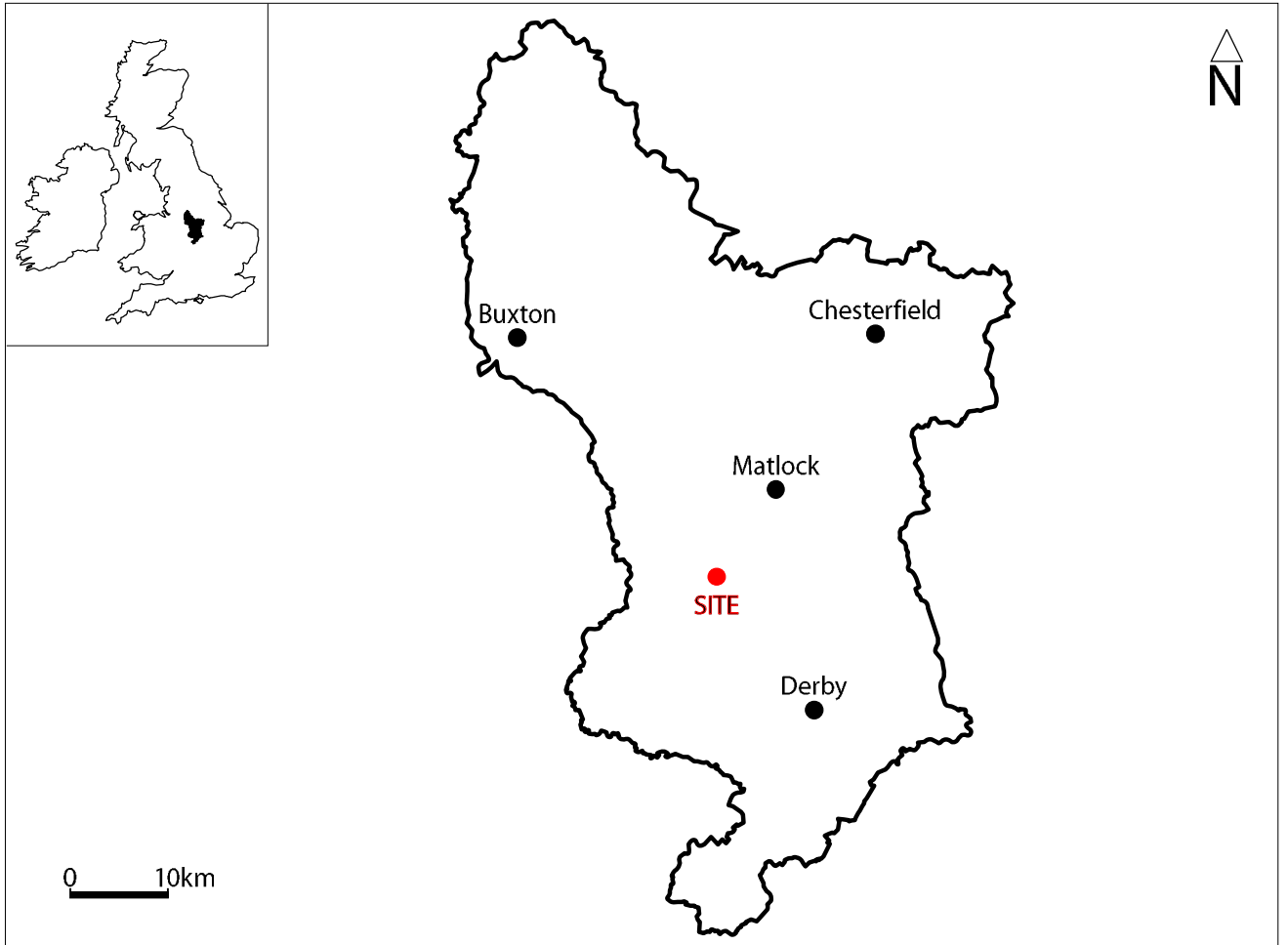


Fig. 1. Site location



PROJECT ID: 6626\_GRG17

1

LOCATION AND DIRECTION OF PLATES

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Fig. 2. Survey location showing greyscale magnetometer data incorporating previous survey data (1:1250 @ A3)

0 50m

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394200

394000

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401000

401200

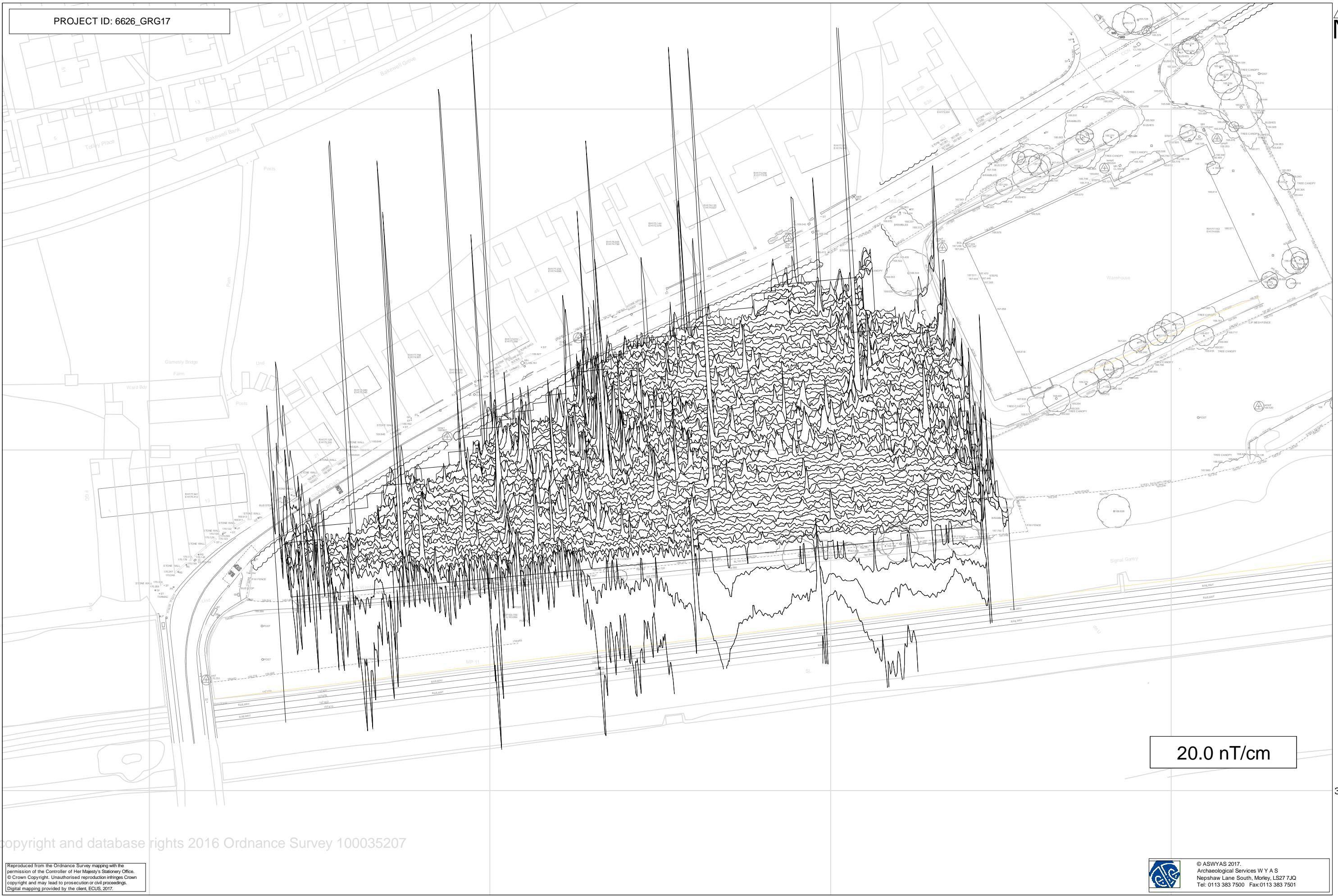
Fig. 3. Processed greyscale magnetometer data (1:1000 @ A3)

0 50m

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20.0 nT/cm

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401000

401200

Fig. 4. XY trace plot of minimally processed magnetometer data (1:1000 @ A3)

0 50m

PROJECT ID: 6626\_GRG17

| TYPE OF ANOMALY | INTERPRETATION                           |
|-----------------|--|
| •               | DIPOLAR ISOLATED<br>FERROUS MATERIAL     |
| ◉               | MAGNETIC DISTURBANCE<br>FERROUS MATERIAL |
|                 | LINEAR TREND<br>FIELD DRAIN              |
| —               | LINEAR TREND<br>AGRICULTURAL             |



Fig. 5. Interpretation of processed greyscale magnetometer data (1:1000 @ A3)

0 50m



*Plate 1. General view of survey area, looking southwest*



*Plate 2. General view of survey area, looking southeast*



*Plate 3. General view of survey area, looking south*

## **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 of the topsoil because 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 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 main method of using the fluxgate gradiometer for commercial evaluations is referred to as *detailed survey* and requires the surveyor to walk at an even pace carrying the instrument within a grid system. A sample trigger automatically takes readings at predetermined points, typically at 0.25m intervals, on traverses 1m apart. These readings are stored in the memory of the instrument and are later dumped to computer for processing and interpretation.



During this survey a Bartington Grad601 magnetic gradiometer was used taking readings on the 0.1nT range, at 0.25m intervals on zig-zag traverses 0.5m apart within 30m by 30m square grids. The instrument was checked for electronic and mechanical drift at a common point and calibrated as necessary. The drift from zero was not logged.

The gradiometer data have been presented in this report in processed greyscale format. The data in the greyscale images have 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.

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 Derbyshire Historic Environment Record).

## **Appendix 4: Oasis form**

# OASIS DATA 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: archaeol11-280354**

## Project details

|  |   |
|--|---|
| Project name                           | Glossop Road, Gamesley  |
| Short description of the project       | A geophysical (magnetometer) survey, covering approximately 1.2 hectares was undertaken on pastoral land to the south of Glossop Road, Gamesley, Derbyshire. This was part of a programme of archaeological works in advance of a proposed development. No anomalies associated with archaeological remains were detected. A handful of field drains and linear trends associated with agriculture have been located. Magnetic disturbance along the limits of the dataset are primarily due to metal fencing. Therefore the archaeological potential of the survey area is deemed to be low. |
| Project dates                          | Start: 01-03-2017 End: 01-03-2017   |
| Previous/future work                   | Yes / Not known   |
| Any associated project reference codes | 6626 - Sitecode   |
| Type of project                        | Recording project   |
| Current Land use                       | Grassland Heathland 5 - Character undetermined  |
| Monument type                          | NONE None   |
| Significant Finds                      | NONE None   |
| Investigation type                     | "Geophysical Survey"  |
| Prompt                                 | National Planning Policy Framework - NPPF   |
| Solid geology (other)                  | sandstone   |
| Drift geology (other)                  | till  |
| Techniques                             | Magnetometry  |

## Project location

|                  |  |
|------------------|--|
| Country          | England  |
| Site location    | DERBYSHIRE HIGH PEAK GLOSSOP Land to the south of Glossop Road, Gamesley |
| Study area       | 1.2 Hectares   |
| Site coordinates |  |

SK 010 940 53.442513978502 -1.984943342025 53 26 33 N 001 59 05 W  
Point

Height OD / Depth Min: 168m Max: 168m

### Project creators

|                           |                              |
|---------------------------|------------------------------|
| Name of Organisation      | Archaeological Services WYAS |
| Project brief originator  | ECUS Ltd                     |
| Project design originator | ECUS Ltd                     |
| Project director/manager  | C. Sykes                     |
| Project supervisor        | E Brunning                   |

### Project archives

|                           |  |
|---------------------------|--|
| Physical Archive Exists?  | No   |
| Digital Archive recipient | Ecus Ltd   |
| Digital Contents          | "Survey"   |
| Digital Media available   | "Geophysics","Images raster / digital photography","Survey","Text" |
| Paper Archive Exists?     | No   |

### Project bibliography 1

|                               |   |
|-------------------------------|---|
| Publication type              | Grey literature (unpublished document/manuscript) |
| Title                         | Land to the South of Glossop Road, Gamesley       |
| Author(s)/Editor(s)           | Brunning, E                                       |
| Date                          | 2017  |
| Issuer or publisher           | ASWYAS  |
| Place of issue or publication | Morley, Leeds                                     |
| Description                   | A4 report with A3 figures                         |
| Entered by                    | Emma Brunning (emma.brunning@aswyas.com)          |
| Entered on                    | 24 March 2017                                     |

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