WYAS Archaeological Services

Land at Goldsborough

North Yorkshire

Geophysical Survey

Report no. 3055
December 2017

Client: Prospect Archaeology

West Yorkshire Joint Services

Land at Goldsborough, North Yorkshire

Geophysical Survey

Summary

A geophysical (magnetometer) survey, covering approximately 1.5 hectares, was undertaken on land to the west of Station Road, Goldsborough approximately 5km east of Knaresborough. This was part of a programme of archaeological works in advance of a proposed development. The magnetic survey has detected anomalies of possible archaeological origin, in the form of possible pits or post-holes and small, faint linear trends. A prominent linear trend, considered to be archaeological in origin has been discovered. Agricultural, a service pipe and ferrous responses have been recorded throughout the site and are not thought to be of archaeological interest. Overall the archaeological potential of the site is moderate to high.

WYAS
Archaeological Services

Report Information

Client:	Prospect Archaeology
Address:	Prospect House, Garden Lane, Sherburn-in-Elmet, Leeds, North Yorkshire, LS25 6AT
Report Type:	Geophysical Survey
Location:	Goldsborough
County:	North Yorkshire
Grid Reference:	SE 38087 56351
Period(s) of activity:	Prehistoric?/ Modern
Report Number:	3055
Project Number:	6934
Site Code:	GOL17
OASIS ID:	Archaeol11-304598
Date of fieldwork:	December 2017
Date of report:	December 2017
Project Management:	Emma Brunning BSc MCIfA
Fieldwork:	Christopher Sykes BA MSc MCIfA
Report:	Christopher Sykes
Illustrations:	Christopher Sykes
Photography:	Christopher Sykes
Research:	Christopher Sykes

Authorisation for distribution: ----------

Nepshaw Lane South, Morley, Leeds LS27 7JQ
Telephone: 0113 383 7500.
Email: admin@aswyas.com

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1 Introduction

Archaeological Services WYAS (ASWYAS) were commissioned by Prospect Archaeology to undertake a geophysical (magnetometer) survey on agricultural land to the west of Station Road, Goldsborough, North Yorkshire. This is in advance of a 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 1st December 2017.

Site location, topography and land-use

The survey area is approximately centred on National Grid Reference SE 38087 56351 and located 5km to the east of Knaresborough and approximately 14km to the north of Wetherby. It lies at approximately 48m above Ordnance Datum (aOD) and is flat. The proposed area is approximately 1.5 hectares consisting of one field. The survey area is bounded to the west by a field, with the village cricket pitch in the southwest corner, to the north by fields, and to the south east by residential housing (Figs 1 and 2).

Soils and geology

The underlying bedrock geology comprises of Brotherton Formation Limestone. No superficial deposits for this survey area are recorded (BGS 2017). The overlying soils belong to the Aberford association (511a) described as shallow, locally, brashy, well-drained calcareous fine loams over limestone. (SSEW 1983).

2 Archaeological Background

An examination of Pastscape (www.pastscape.org.uk) has identified a number of features and findspots within a 1km radius of the survey area.

Goldsborough Hall (53257) is located to the southeast of the survey area and has evidence of two phases of construction, with the present hall origins from the 1620's.

Again to the southeast, a medieval hoard (53263) of silver coins and ingots were found in a chest near Goldsborough Church in 1858. Within the churchyard, a medieval cross base (53266) concealed human remains and evidence of Viking activity in 1910.

Ridge and furrow has been identified to the northwest (1552982) of the survey area, to the north (1552983) and to the west (1552985, 1552987) via aerial reconnaissance.

To the southwest a series of curvilinear and perpendicular cropmarks (1552986) have been identified although they are undated. They may have formed enclosures, but are undated.

To the south of Goldsborough, two round barrows have been identified as two incomplete ring ditches, with faint cropmarks suggesting further round barrows from aerial photographs (1552992, 1552993). A Roman trackway, with enclosure spurs, has been identified to the south (1552997) along with a number of discrete features. (1552998-1553003).

3 Aims, Methodology and Presentation

The main aim of the geophysical survey was to provide additional information on the known archaeology within the area. To achieve this, a magnetometer survey covering all available 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 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. 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 shows a more detailed site location plan at a scale of 1:1000. 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 Figs 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.

Around the periphery of the survey area there are distinct areas of magnetic disturbance, which are due to the proximity of the field boundaries. Bisecting the survey area on a northwest to southeast alignment, a service pipe can be seen.

Agricultural anomalies

Faint cultivation anomalies, indicative of modern ploughing have been detected within the survey area.

Possible archaeological anomalies

Possible archaeological anomalies have been identified throughout in the form of fragmented ditches and possible pits. These responses have been interpreted as possible archaeology given the magnetic strength of the features.

Anomalies (**A**) comprises three pit-like responses and associated curvilinear features. In comparison to the magnetic strength of the service pipe and the archaeological linear response (discussed later) a possible archaeological interpretation has been reached. The archaeological background of known features like round barrows, to the south of the survey area, means that a there is an archaeological potential within the vicinity.

Two thin and ephemeral magnetic responses have been identified (**B**) which may form spurs from the archaeological linear response, to form square enclosures, similar to those mentioned in the archaeological background (1552997).

Archaeological anomalies

A linear feature (**C**) runs through the survey area on a southwest to northeast alignment. It is fragmented and stronger in response to anomalies that have been given a possible archaeological interpretation. It corresponds with a description of a Roman trackway (1552997), which is broadly orientated along the same alignment, with enclosure spurs, which have been identified as **B**. As this feature is not recorded on cartographic evidence, an archaeological interpretation has been reached.

5 Conclusions

The magnetometer survey has been able to identify a number of features of archaeological potential in the forms of a long linear response and enclosure spurs which may be associated with a Roman trackway, along with possible pits and curvilinear anomalies.

A service pipe, magnetic disturbance and isolated ferrous spots have been identified along with agricultural activity. On this basis the site overall can be said to have moderate to high archaeological potential.

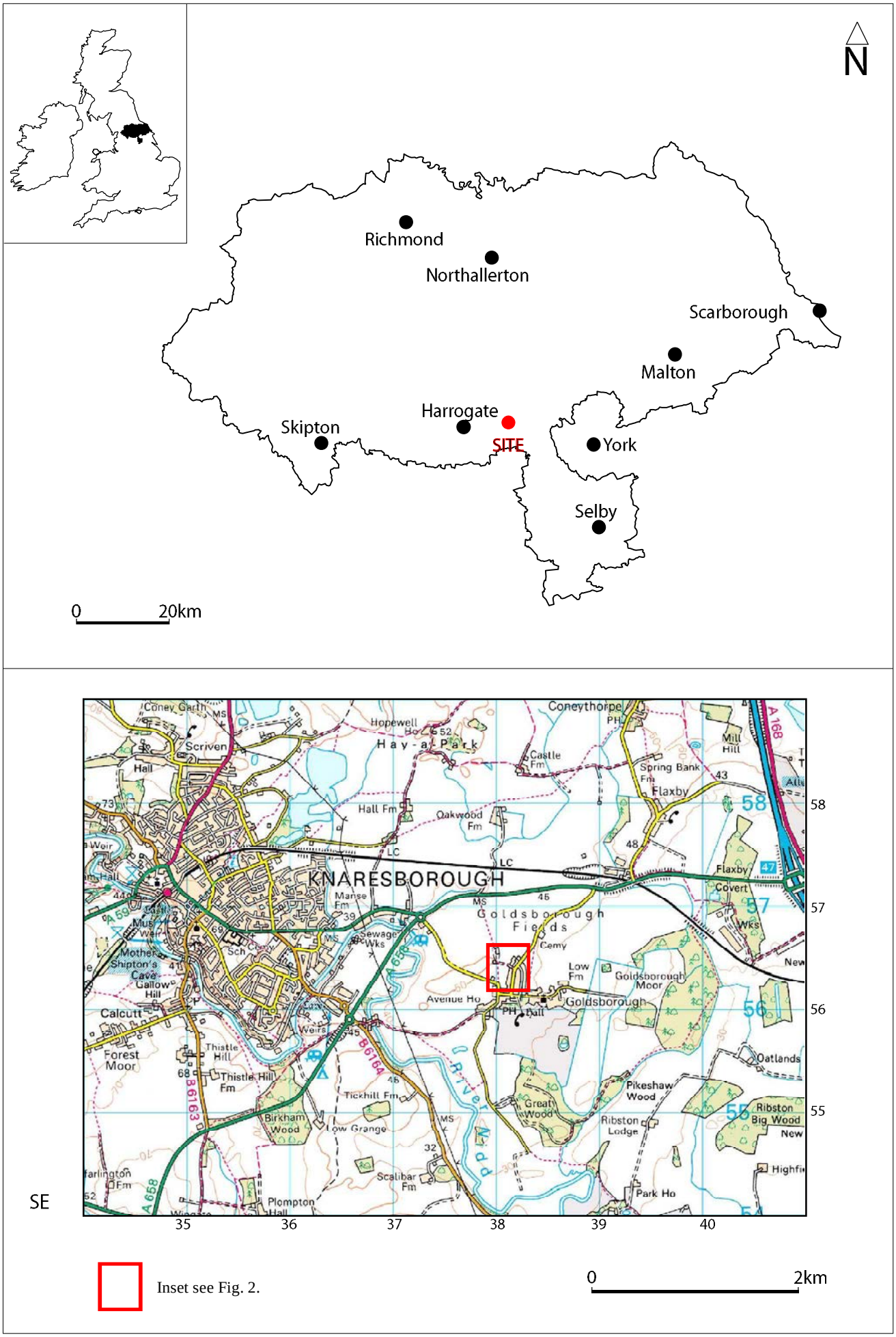

Fig. 1. Site location

PROJECT ID: 6934_GOL17	
	SURVEY BOUNDARY
1	LOCATION AND DIRECTION OF PLATES

N

4564 00

4562 00

4380 00

4382 00

2.0

-1.0

nT

0 30m

Archaeological Services W Y A S
Nepshaw Lane South, Morley, LS27 7JQ
Tel: 0113 383 7500 Fax:0113 383 7501

Fig. 2. Site location showing greyscale magnetometer data (1:1000 @ A3)

PROJECT ID: 6934_GOL17

N

4564 00

4562 00

2.0

-1.0

nT

Archaeological Services W Y A S
Nepshaw Lane South, Morley, LS27 7JQ
Tel: 0113 383 7500 Fax:0113 383 7501

4380 00

4382 00

0 30m

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

PROJECT ID: 6934_GOL17

N

4564 00

4562 00

20.0 nT/cm

Archaeological Services W Y A S
Nepshaw Lane South, Morley, LS27 7JQ
Tel: 0113 383 7500 Fax:0113 383 7501

4380 00

4382 00

0 30m

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

PROJECT ID: 6934_GOL17

N

TYPE OF ANOMALY		INTERPRETATION
•	DIPOLAR ISOLATED	FERROUS MATERIAL
—	DIPOLAR LINEAR	SERVICE PIPE
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
	LINEAR TREND	AGRICULTURAL
	LINEAR TREND	ARCHAEOLOGY?
	MAGNETIC ENHANCEMENT	ARCHAEOLOGY?
	MAGNETIC ENHANCEMENT	ARCHAEOLOGY

A

B

B

C

C

4564 00

4562 00

4380 00

4382 00

0 30m

Archaeological Services W Y A S
Nepshaw Lane South, Morley, LS27 7JQ
Tel: 0113 383 7500 Fax:0113 383 7501

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

Plate 1. General view of site, looking southwest

Plate 2. General view of site, looking northeast

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 North Yorkshire Historic Environment Record).

Appendix 4: Oasis form

OASIS DATA COLLECTION FORM: England

OASIS ID: archaeol11-304598

Project details

Project name	Land at Goldsborough
Short description of the project	A geophysical (magnetometer) survey, covering approximately 1.5 hectares, was undertaken on land to the west of Station Road, Goldsborough approximately 5km east of Knaresborough. This was part of a programme of archaeological works in advance of a proposed development. The magnetic survey has detected anomalies of possible archaeological origin, in the form of possible pits or post-holes and small, faint linear trends. A prominent linear trend, considered to be archaeological in origin has been discovered. Agricultural, a service pipe and ferrous responses have been recorded throughout the site and are not thought to be of archaeological interest. Overall the archaeological potential of the site is moderate to high.
Project dates	Start: 01-12-2017 End: 01-12-2017
Previous/future work	No / Not known
Any associated project reference codes	6934 - Sitecode
Type of project	Field evaluation
Monument type	NONE None
Significant Finds	?TRACKWAY Roman
Significant Finds	?ENCLOSURES Roman
Methods & techniques	''Geophysical Survey''
Development type	Housing estate
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Pre-application
Solid geology (other)	Limestone
Drift geology (other)	loams
Techniques	Magnetometry

Project location

Country	England
Site location	NORTH YORKSHIRE HARROGATE GOLDSBOROUGH Land at Goldsborough
Study area	1.5 Hectares
Site coordinates	SE 3808 5635 54.001582702757 -1.418984176937 54 00 05 N 001 25 08 W Point
Height OD / Depth	Min: 48m Max: 48m

Project creators

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

Project archives

Physical Archive Exists?	No
Digital Archive recipient	Prospect Archaeology
Digital Contents	''Survey''
Digital Media available	''Geophysics'',''Images raster / digital photography'',''Text''
Paper Archive Exists?	No

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Land at Goldsborough, North Yorkshire
Author(s)/Editor(s)	Sykes, C.
Date	2017
Issuer or publisher	ASWYAS
Place of issue or publication	Leeds
Description	A4 report with A3 figures

Entered by	Emma Brunning (emma.brunning@aswyas.com)
Entered on	20 December 2017

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