WYAS Archaeological Services

Land northwest of Moores Lane

East Bergholt

Suffolk

Geophysical Survey

Report no. 2810
September 2015

Client: NPS Archaeological Services

Land north-west of Moores Lane, East Bergholt Suffolk

Geophysical Survey

Summary

A cart-based geophysical survey was conducted on land north-west of Moores Lane, East Bergholt in Suffolk. Survey work was commissioned on two fields. A total of approximately 8.5 hectares was surveyed on arable land. The survey identified a number of geological anomalies, but despite evidence of known archaeology in the area, none was identified by the geophysical survey. The archaeological potential of the site, therefore, is deemed to be low.

WYAS Archaeological Services

Report Information

Client:	NPS Archaeological Associates
Address:	Scandic House, 85 Mountergate, Norwich, NR1 1PY
Report Type:	Geophysical Survey
Location:	Land north-west of Moores Lane, East Bergholt
County:	Suffolk
Grid Reference:	TM 607255 235674
Period(s) of activity:	Modern
Report Number:	2810
Project Number:	6050
Site Code:	EBS15
OASIS ID:	archaeol11-226794
Planning Application No.:	ESF23261
Date of fieldwork:	July and October 2015
Date of report:	November 2015
Project Management:	Christopher Sykes BA MSc
Fieldwork:	Mark Evans BA
	Ross Bishop BA
	Christopher Sykes
	Ashely Green BS
Report:	Christopher Sykes
Illustrations:	Christopher Sykes
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Authorisation for distribution: ----------

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1 Introduction

Archaeological Services WYAS (ASWYAS) was commissioned by NPS Archaeological Associates (the Client), to undertake a geophysical (magnetometer) survey of land to the north-west of Moores Lane, East Bergholt, Suffolk, to inform a proposed planning application. The work was undertaken in accordance with the Project Design (Sykes 2015). Guidance contained within the National Planning Policy Framework (DCLG 2012) was also followed, in line with current best practice (CIfA 2014; David *et al*. 2008). The survey was carried out in July and October 2015 to provide additional information on the archaeological resource of the site.

Site location, topography and land-use

The survey area is located to the east of the B1070, and to the north-west of Moores Lane, East Bergholt. Agricultural fields bound the site to the far north and the far east of the survey area. The site comprises two fields currently under agricultural cultivation. The site is centred at TM 607255 235674.

Soils and geology

The underlying bedrock for this site is Thames Group sedimentary bedrock. The superficial geology of the survey area is of the Lowestoft Formation of sands and gravels. The soil formations are of the Tendring Formation, characterised as Aeolian and glaciofluvial drift soils, which are deep, often stoneless coarse loams. They are slowly permeable, and experience seasonal waterlogging (BGS 2015, Soil Survey of England 1983).

2 Archaeological Background

The site of the proposed development has high potential for the discovery of important hitherto unknown heritage assets of archaeological interest in view of its large size and location close to a number of sites recorded in the County Historic Environment Record. This includes scatters of Roman and medieval finds (EBG 002 and 036), an undated human skull (EBG 008) and number of cropmark features, which include ring ditches (EBG 002). The site, however, has not been the subject of previous systematic investigation, but the high potential to encounter important archaeological deposits at this location remains (Suffolk County Council 2015).

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 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 cart-based magnetometer survey covering all accessible 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 completed using a Sensys Magneto®MXPDA 5 channel cart-based system which has five FGM650 fluxgate gradiometers mounted at 0.5m intervals with readings of between 0.1nT and 10,000nT recorded at 20Hz. The gradiometers are linked to a Trimble R6 Real Time Kinetic (RTK) differential Global Position System (dGPS) allowing for the geo-referencing of all measurement points within a ±1cm accuracy, readings being taken at a minimum of 0.125m intervals. The data are recorded by Sensys Magneto®MXPDA software on a rugged Personal Data Assistant (PDA) device and stored on a Secure Digital (SD) memory card within the PDA.

Reporting

A general site location plan, incorporating the 1:50000 Ordnance Survey (OS) mapping, is shown in Figure 1. Figure 2 shows a large scale (1:2000) survey location plan and processed data in greyscale format. Figure 3 shows an overall interpretation of the data at a scale of 1:2000. The processed and minimally processed data, together with an interpretation of the survey results are presented in Figures 4 and 5 at a scale of 1:1250. A figure representing data repeatability is presented in Figure 6.

Technical information on the equipment used, data processing and survey methodologies are given in Appendix 1 and Appendix 2. Appendix 3 shows the Data repeatability, while Appendix 4 describes the composition and location of the archive. Appendix 5 presents a copy of the OASIS form.

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 'raw' and 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)

Summary

The survey was conducted over two visits. Field 1 was surveyed in August 2015, while Field 2 was surveyed in October 2015 post-harvest. Field 1 had been recently harvested and was available for survey.

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 to suggest anything other than a random background scatter of ferrous debris in the plough-soil.

Geological anomalies

The magnetic background of the site is highly variable, resulting in the 'speckled' appearance of the data, particularly in the northern area. This is caused by the homogenous nature of the superficial sand and gravel deposits.

Magnetic enhancement that is geological in origin can appear very similar to that of archaeological anomalies, but the widespread dispersal and large number of the anomalies supports the hypothesis that they are geological in origin. A geological channel exists in Field 2, corresponding with the topography of the field.

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

Whilst the potential for archaeology was identified as high prior to the fieldwork (Suffolk County Council Brief 2015), the geophysical survey has not detected any anomalies that can be considered archaeological. This may be a result of the underlying sand and gravel geology. The variation in geological anomalies across the survey areas is likely to reflect differentiations in the overlying soil formations of the area. The archaeological potential for this site, therefore, is considered to be low.

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 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 were stored on an SD memory card

within the PDA and later downloaded to a computer for processing and interpretation. MAGNETO (Sensys Gmbh) and TerraSurveyor V3.0.25.0 software was used to process and present the data.

Data Processing and Presentation

The detailed 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.

TerraSurveyor V3.0.25.0 was used to compensate (destripe) interpolate and clip the data. The same program 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 cart data were 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 then 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: Data repeatability

Appendix 4: 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 CS2 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 Suffolk Historic Environment Record).

Appendix 5: OASIS form

OASIS DATA COLLECTION FORM: England

Printable version

OASIS ID: archaeol11-226794

Project details

Project name	Land north-west of Moores Lane, East Bergholt, Suffolk
Short description of the project	A cart based geophysical survey was conducted on land north-west of Moores Lane, in Suffolk. Survey work was commissioned on two fields, with a total of 8.5 hectares being surveyed in recently harvested land. The survey revealed a number of geological anomalies, but despite evidence of known archaeology in the area, none was identified by the geophysical survey . The archaeological potential of the site therefore is deemed to be low.
Project dates	Start: 01-07-2015 End: 31-08-2015
Previous/future work	Not known / Not known
Type of project	Field evaluation
Site status	None
Current Land use	Grassland Heathland 4 - Regularly improved
Methods & techniques	"Geophysical Survey"
Development type	Housing estate
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Not known / Not recorded
Solid geology (other)	Thames Group Sedimentary bedrock
Drift geology (other)	Lowestoft Formation of sand and gravels
Techniques	Magnetometry

Project location

Country	England
Site location	SUFFOLK BABERGH EAST BERGHOLT Moores Lane
Postcode	CO7 6RF
Study area	8.5 Hectares
Site coordinates	TM 607255 235674 51.849003157805 1.786183494397 51 50 56 N 001 47 10 E

	Point

Project creators

Name of Organisation	Archaeological Services WYAS
Project brief originator	NPS Archaeology
Project design originator	Archaeological Services WYAS
Project director/manager	C. Sykes
Project supervisor	C. Sykes
Type of sponsor/funding body	Developer

Project archives

Physical Archive Exists?	No
Digital Archive recipient	N/A
Digital Contents	"Survey"
Digital Media available	"Geophysics"
Paper Archive recipient	N/A
Paper Contents	"Survey"
Paper Media available	"Report"

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Land north-west of Moores Lane, East Bergholt, Suffolk
Author(s)/Editor(s)	Sykes, C.
Other bibliographic details	Report Number: 2810
Date	2015
Issuer or publisher	ASWYAS
Place of issue or publication	Morley

Entered by	Becky Goulding (rgoulding@aswyas.com)
Entered on	16 October 2015

OASIS:

Please e-mail Historic England for OASIS help and advice

Appendix 6: Written Scheme of Investigation

Land north-west of Moores Lane, East Bergholt, Suffolk

Geophysical Survey Project Design

Prepared by: Chris Sykes
Archaeological Services WYAS
PO Box 30
Nepshaw Lane South
Morley
Leeds
West Yorkshire
LS27 0UG

August 2015

Project Design for Geophysical Survey at Moores Lane, East Bergholt, Suffolk

1. Introduction

1.1 This Project Design has been prepared by Archaeological Services WYAS (ASWYAS) for NPS Archaeological Associates in advance of a cart –based geophysical (magnetometer) survey of land north-west of Moores Lane, East Bergholt, Suffolk.

1.2 The scheme of work will be undertaken in accordance with the requirements of the National Planning Policy Framework (DCLG 2012).

1.3 This document details a proposed programme of non-intrusive cart-based geophysical (magnetometer) survey.

1.4 The Project Design was produced to the standards laid down in English Heritage's guideline publication Geophysical Survey in Archaeological Field Evaluation (David *et al*. 2008) and the Chartered Institute for Archaeologists (CIfA) Standard and Guidance for Archaeological Geophysical Survey (CIfA 2014).

2. Site location and Description

2.1 The survey area is located to the east of the B1070, and to the north-west of Moores Lane, East Bergholt. Fields bound the site to the far north and the far east of the survey area. The site comprises of three fields currently under agricultural cultivation. The site is centred at TM 607255 235674.

3. Geology and Soils

3.1 The underlying bedrock for this site is Thames Group sedimentary bedrock. The superficial geology of the survey area is of the Lowestoft Formation of sands and gravels. The soil formations are of the Tendring formation, characterised as Aeolian and glaciofluvial drift soils, which are deep, often stoneless coarse loams. They are slowly permeable, and experience seasonal waterlogging. (BGS 2015, Soil Survey of England 1983)

4. Archaeological Background

4.1 The site of the proposed development has high potential for the discovery of important hitherto unknown heritage assets of archaeological interest in view of its large size and location close to a number of sites recorded in the County Historic Environment Record. This includes scatters of Roman and medieval finds (EBG 002 and 036), an undated human skull (EBG 008) and number of cropmark features, which include ring ditches (EBG 002). However, the sites has not been the subject of previous systematic investigation. As a result there is high potential to encounter important archaeological deposits at this location. (Suffolk County Council Brief 2015).

5. Aims and Objectives

5.1 The aims and objectives of the programme of geophysical survey is to gather sufficient information to establish the presence/absence, character, extent, of any archaeological remains within the specific areas to be impacted by the proposed quarry extension, and to inform further strategies should they be necessary.

The aims of the survey are to:

- 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;
- to produce a comprehensive site archive and report.

6. Fieldwork Methodology

6.1 A cart-based geophysical (magnetometer) survey will be carried out across all of the area amenable for a magnetometer survey. The total area for survey will be approximately 8.4 hectares.

6.2 The magnetometer survey will be undertaken using a Sensys Magneto® MXPDA 5 channel cart-based system which has five FGM650 fluxgate gradiometers mounted at 0.5m intervals with readings of between ±0.1nT and 10,000nT recorded at 20Hz.

6.3 The fluxgate 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 ±1cm accuracy. The data is recorded by Sensys Magneto® MXPDA software on a rugged Personal Data Assistant (PDA) device and stored on a Secure Digital (SD) memory card within the PDA. TerraSurveyor V3.0.26.1 software will be used to process and present the data.

6.4 In the event of the ground conditions not being suitable for a cart survey, the Bartington instruments take readings at 0.25m intervals on zig-zag traverses 1m apart within 30m by 30m grid squares, allowing 3600 readings to be recorded in each grid square. These readings will be stored in the memory of the instrument and later downloaded for processing and interpretation. Geoplot 3 (Geoscan Research) software will be used to process and present the data.

6.5 The geophysical survey will comply with guidelines outlined by English Heritage (David *et al.* 2008) and by the Chartered Institute for Archaeologists (CIfA 2014). All figures will be reproduced from Ordnance Survey mapping with the permission of the controller of Her Majesty's Stationery Office (Crown copyright).

6.6 On completion of the geophysical survey, a report will be produced containing all relevant information including:

i) Site code/project number; dates for fieldwork visits; grid references; location plan, and a plan showing the limits of the detailed study area.

ii) A non-technical summary of the reason, aims and main results of the assessment.

iii) An introduction to outline the circumstances leading to the commission of the report and any restrictions encountered.

iv) The aims and objectives of the study.

v) The methodology used.

vi) A summary and synthesis of the archaeological results in relation to the methods used. This shall be supported by a survey location plan (minimum scale 1:2500), a plot of raw data (preferred minimum scale 1:1000, greyscale format, and/or XY trace format as appropriate to the technique(s) used), a plot of enhanced data and one, or more, interpretative plots. Each plan/plot will have a bar scale and accurately oriented north sign.

vii) An assessment of the importance of sites and features within the study area against a background of national, regional or local importance.

viii) Recommendations regarding the future treatment of the remains and/or any further archaeological work necessary on site in advance of, or during, development.

ix) References to all primary and secondary sources consulted.

6.7 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.

6.8 If required, the archive will be deposited with the Archaeology Data Service (ADS).

6.9 A basic archive CD will be sent to the client containing compressed files of the raw data (ASCII and XYZ), report text (DOCX), and graphics files (Adobe Illustrator CS6 and AutoCAD 2007) files.

6.10 Following completion and submission of the report to the client, and compiling of the archive, copies of the report will be sent to the relevant Historic Environment Record, local authority Planning Officer and/or Conservation Officer. In addition, ASWYAS will make their work accessible to the wider research community by submitting digital data and copies of the report on line to OASIS.

7. Copyright, Confidentiality and Publicity

7.1 The copyright of any written, graphic or photographic record and reports produced as part of this project shall belong to the client, unless otherwise agreed, with ASWYAS being acknowledged as the originating body.

7.2 The circumstances under which the report or records can be used by other parties will be identified at the commencement of the project, as will the proposals for the distribution of the report. ASWYAS will respect any requirements regarding confidentiality, but will endeavour to emphasise the company's professional obligation to make the results of archaeological work known to the wider archaeological community within a reasonable time.

8. Health and Safety

8.1 All work will conform to the ASWYAS Health and Safety Policy (a copy of which can be supplied if requested), which makes particular reference to the FAME (Federation of Archaeological Managers and Employers) Health and Safety Manual and will be carried out according to the relevant Health and Safety Legislation. This includes, in particular, the following regulations:

- Health and Safety at Work 1974
- Construction (Design and Management) Regulations 2007
- The Management of Health and Safety at Work Regulations 1999
- Personal Protective Equipment at Work Regulations 1992
- Provision and Use of Work Equipment Regulations 1998
- Manual Handling Operations Regulations 1992
- Workplace (Health, Safety and Welfare) Regulations 1992

8.2 In addition each project undergoes a 'Risk Assessment' which sets project specific Health and Safety requirements to which all members of staff are made aware of prior to on-site work commencing.

8.3 Health and Safety will take priority over archaeological matters. Necessary precautions will be taken with regard to protecting ASWYAS staff and the public.

8.4 Archaeological Services WYAS is a fully accredited member of the Contractors Health and Safety Assessment Scheme (CHAS).

9. Insurance

9.1 ASWYAS is covered by the insurance and indemnities of the City of Wakefield Metropolitan District Council. Insurance has been effected with: Zurich Municipal, PO Box 568, 1st Floor, 1 East Parade, Leeds, LS1 2UA (policy number QLA-03R896 0013). Any further enquiries should be directed to: City of Wakefield Metropolitan District Council, Corporate Services, Financial Services (Insurance, Room 403), County Hall, Bond Street, Wakefield WF1 2QW.

10. Quality

10.1 ASWYAS is an accredited ISO 9001:2008 organisation and a Registered Archaeological Organisation with the Chartered Institute for Archaeologists, operating to nationally agreed guidelines, processes and procedures. These are set within a framework that endeavours to carry out the required work and submit the final report in a manner that meets with our client's specific needs, providing quality assurance throughout the project and for the end product. These guidelines, processes and procedures are contained within a Quality Manual and all staff work in accordance with this manual.

11. Monitoring

11.1 A standard working day will involve driving to site, condition surveys of the survey area, survey area setting out and detailed earth resistance and/or magnetic survey recording. Constant updating of the survey work will be relayed back to the office by telephone.

Contacts

Manager: Jane Richardson	0113 393 9751
Supervisor: Chris Sykes	0113 393 9744
Health and Safety Coordinator: Jane Richardson	0113 393 9751
Survey team:	07796 996 444

12. Staffing

12.1 Archaeological Services WYAS currently employs four dedicated geophysicists together with a further two staff with extensive field experience. Summary Curriculum Vitae for all the staff to be employed on the proposed project are detailed below together with their proposed role in the scheme.

Project Manager:	Chris Sykes BA MSc
Archaeological Geophysicist	Mark Evans BSc
Assistant Geophysicist	Ross Bishop BA

Name:- Chris Sykes BA MSc

Current Position:- Project Manager (Geophysics)

Proposed Role:- Geophysical Surveyor/Manager

Having graduated from the University of Sheffield with his degree in Archaeology in 2008, Christopher has been engaged in a number of community involvement projects in and around South Yorkshire as an excavation supervisor. It was an interest in geophysical survey which prompted him to undertake the Masters programme in Archaeological Prospection at Bradford University in September 2009.

Since completing his Masters studies, Christopher immediately began working as a geophysicist in Ireland with Headland Archaeology on the major N20 project. Building on this experience he undertook geophysics in Crete, before becoming the geophysicist for Wessex Archaeology at their Sheffield office. Here he supervised staff in the undertaking of geophysical projects and also assisted in excavations, before joining ASWYAS in 2011. Chris joined AOC in 2014 before returning to Archaeological Services WYAS in late 2014.

Starting in 2005, Christopher has been involved in a number of community focused archaeological pursuits which has included working with children and adults with special requirements. Chris is CSCS certified, CRB checked and Emergency First Aid at Work trained.

Name:- Mark Evans BSc

Current Position:- Archaeologist (Geophysics)

Proposed Role:- Geophysical Surveyor/Supervisor

Mark graduated in 2005 from the University of Sheffield having studied Archaeological Sciences at BSc (Hons) level. Marks previous experience includes working with a number of community excavations and as a site supervisor at Flag Fen, the Stonehenge Riverside Project and excavation in the Preseli Hills.

Mark has experience of various survey equipment including total stations Trimble GPS, earth resistance and magnetometers. He joined Archaeological Services in 2014. Mark is CSCS certified.

Name:- Ross Bishop BA

Current Position:- Assistant Archaeologist (Geophysics)

Proposed Role:- Geophysical Surveyor

Ross joined Archaeological Services in 2013 after working for MAP Archaeological Practice in Malton. He initially worked as an excavation assistant before an interest in geophysical survey enabled him to assist on nationwide geophysical surveys.

He graduated from York University in 2013 with a BA in archaeology. Ross's dissertation looked at dendrochronology as well as other advanced techniques to look at and record climate over thousands of years, which he linked to the Warring States period of China (475-221 bce) to determine if climate played a role in the many major battles of the period. Ross has worked on a variety of sites for ASWYAS, including Sprotborough Weir in Doncaster, and Hatfield lane, Armthorpe. Since the summer of 2014 Ross has worked in the Geophysical survey team and has knowledge of magnetometry, resistivity, dGPS, geoplot and data manipulation techniques. Ross is CSCS certified and Emergency First Aid at Work trained.

Name:- Becky Goulding BSc (Hons) MSc Dip (Arch)

Current Position:- Assistant Archaeologist (Geophysics)

Proposed Role:- Geophysical Surveyor

Becky graduated from Bradford University in 2008 having completed both a degree in Bioarchaeology BSc (Hons) as well as completing an additional placement year which allowed her to acquire a Diploma in Professional Archaeological Studies. Her placement year was spent working for the Yorkshire Dales National Park. Work with the National Park involved mainly Historic Environment Record work, as well as completion of landscape survey for Farm Environment Plans.

She returned to university at Bradford to complete a NERC funded MSc in Archaeological Prospection. Here she gained a good working knowledge of prospection techniques including magnetometry, resistivity and GPR, as well as use of ArcGIS, MapInfo, Surfer and Geoplot software. As part of the MSc Becky completed a large number of geophysical surveys on a wide range of site types, as

well as personally organising a large scale geophysical survey of lead mining remains in the Yorkshire Dales, using a combination of prospection techniques to attempt to characterise lead processing areas.

Currently Becky is completing the final stages of an AHRC funded PhD looking at 'Shooting Landscapes': the creation, management and use of grouse moorland in Yorkshire, 1800-2000, which in combination with Nidderdale AONB aims to characterise these historic landscapes in order to enable their importance to be recognised, thus enabling them to be protected in the future. She has a current CSCS card.

12.2 Archaeological Services WYAS project personnel may be subject to change.

13. References

British Geological Survey, 2015. http://mapapps.bgs.ac.uk/geologyofbritain/home.html (viewed 14th August 2015)

CIfA, 2014. *Standard and Guidance for archaeological geophysical survey*. Chartered Institute for Archaeologists

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

Soil Survey of England and Wales, 1983, Soils of Midland and Western England, Sheet 4.

Suffolk County Council 2015 Brief for an Archaeological Evaluation

Bibliography

British Geological Survey, 2015. www.bgs.ac.uk/discoveringGeology/geology Of Britain/viewer.html. (Viewed July 2015)

Chartered Institute for Archaeologists, 2014. *Standard and Guidance for Archaeological Geophysical Survey*

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

Sykes, C. 2015. *Land to the North-west of Moores Lane, East Bergholt, Suffolk: Geophysical Survey Project Design.* Unpublished ASWYAS document

Soil Survey of England and Wales, 1983. *Soil Survey of England and Wales: Soils of Eastern England*, Sheet 4

Suffolk County Council, 2015. *Brief for an Archaeological Evaluation.* Unpublished document.