Archaeological Services
University of Durham

Land south of Howgrave Hall, Sutton Howgrave, North Yorkshire

geophysical survey

on behalf of
Stephen J Sherlock

Report 1567
November 2006

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Elm Lea, Malton Road, York, YO31 9LT

Contents

1. Summary

The project

1.1 This report presents the results of a geophysical survey conducted in advance of a proposed development on land at Sutton Howgrave, North Yorkshire. The works comprised both geomagnetic and resistance surveys.

1.2 The works were commissioned by Stephen Sherlock and conducted by Archaeological Services in accordance with a written scheme of investigation provided by Stephen Sherlock and approved by the Heritage Unit at North Yorkshire County Council.

Results

1.3 Several weak anomalies have been identified which could be of archaeological interest.

2. Project background

Location (Figure 1)

2.1 The study area is located south of Howgrave Hall, Sutton Howgrave, North Yorkshire (NGR: SE 3151 7909).

Development proposal

2.2 A proposal has been made for the construction of a detached dwelling on land south of Howgrave Hall, Sutton Howgrave.

Objective

2.3 The principal aim of the surveys was to assess the nature and extent of any sub-surface features of potential archaeological significance within the proposed development area, so that an informed decision may be made regarding the nature and scope of any further scheme of archaeological works that may be required in advance of development.

Methods statement

2.4 The surveys have been undertaken in accordance with a Written Scheme of Investigation provided by Stephen Sherlock and approved by the Heritage Unit at North Yorkshire County Council (Appendix II) and a Section 42 licence granted by English Heritage.

Dates

2.5 Fieldwork was undertaken on the 3rd November 2006. This report was prepared between 6th and 10th November 2006.

Personnel

2.6 Fieldwork was conducted by Graeme Attwood (Supervisor) and Janet Beveridge. This report was prepared by Graeme Attwood with illustrations by David Graham. The Project Manager was Duncan Hale.

Archive/OASIS

2.7 The site code is **SHV06**, for **S**utton **H**owgrave **V**illage 20**06**. The survey archive is currently held by Archaeological Services Durham University. Archaeological Services is registered with the **O**nline **A**cces**S** to the **I**ndex of archaeological investigation**S** project (OASIS). The OASIS ID number for this project is **archaeol3-20210**.

3. Archaeological and historical background

3.1 Immediately to the north of the proposed development area lies the deserted medieval village of Howgrave (SAM 31361; NYM 21645). First mentioned in the Domesday survey the village consisted of nine villagers and four ploughs. By 1640 it was recorded that Howgrave contained no villagers. The village survives in the form of earthworks, which are clearly visible on the ground.

3.2 To the north of deserted village is Howgrave Hall (NYM 19901) and Banqueting House, also known as Howgrave Old Hall (Grade II Listed Building – UID 332662). A survey of these buildings and surrounding grounds, which incorporates the earthworks of Howgrave village, was undertaken by English Heritage in 2005. The proposed development area was included in this survey and it was noted that "no features of immediate interest were observed" (English Heritage 2005).

4. Landuse, topography and geology

4.1 The proposed development area comprises a paddock which is approximately 40m square. It is bounded on all sides by hedges with wire fences. Two pylons are present in the field, one on the north-west edge of the field and one on the northern boundary.

4.2 The survey area was predominantly level at a mean elevation of *c*.48m OD.

4.3 The underlying solid geology of the area comprises sandstones of the Permian and Triassic period, which are overlain by glacial sand and gravel.

5. Geophysical survey

Standards

5.1 The surveys and reporting were conducted in accordance with English Heritage Research and Professional Services Guideline No.1, *Geophysical survey in archaeological field evaluation* (David 1995); the Institute of Field Archaeologists Technical Paper No.6, *The use of geophysical techniques in archaeological evaluations* (Gaffney, Gater & Ovenden 2002); and the Archaeology Data Service *Geophysical Data in Archaeology: A Guide to Good Practice* (Schmidt 2001).

Technique selection

5.2 Geophysical surveying enables the relatively rapid and non-invasive identification of potential archaeological features within landscapes and can involve a variety of complementary techniques such as magnetometry, electrical resistivity, ground-penetrating radar and electromagnetic survey. Some techniques are more suitable than others in particular situations, depending on a variety of site-specific factors including the nature of likely targets; depth of likely targets; ground conditions; proximity of buildings, fences or services and the local geology and drift.

5.3 In this instance, it was considered likely that cut features, such as ditches and pits, would be present on the site, and that other types of feature such as trackways, wall foundations and fired structures (for example kilns and hearths) might also be present.

5.4 Given the anticipated shallowness of targets and the non-igneous geological environment of the study area a geomagnetic technique, fluxgate gradiometry,

was considered appropriate for detecting each of the types of feature mentioned above. This technique involves the use of hand-held magnetometers to detect and record minute anomalies in the vertical component of the Earth's magnetic field caused by variations in soil magnetic susceptibility or permanent magnetisation; such anomalies can reflect archaeological features.

5.5 In this instance, given the likelihood of structural remains being present, it was also considered appropriate to carry out an electrical resistance survey. Earth resistance is the most widely used electrical survey method and relies on the relative inability of materials to conduct an electrical current. When a small electrical current is injected through the earth it encounters sub-surface resistance which can be measured. In the dry state, most soils and rocks are insulators but, when they become moist, electric currents are able to flow through the movement of ions dissolved in the porewater. As the soil or rock absorbs more water its conductivity increases. Hence electrical resistance surveying primarily maps the volume concentration of ground moisture which varies according to lithology, porosity and time of year.

5.6 Since resistance is linked to moisture content and porosity, rocky features such as wall foundations will give relatively high resistance values while soil-filled cut features, which retain more moisture, will provide relatively low resistance values. When measurements are taken over a regular grid, a map of sub-surface archaeological features can be produced. Although more time-consuming than magnetometry, this method can be used in a wider range of locations since it is not affected by the presence of buildings or igneous geology.

Field methods

5.7 A 20m grid was established across the survey area and tied-in to known, mapped Ordnance Survey points using a Trimble Pathfinder Pro XRS global positioning system (GPS) and subsequent RINEX calibration.

5.8 Measurements of vertical geomagnetic field gradient were determined using Bartington Grad601-2 fluxgate gradiometers with automatic datalogging facilities. A zig-zag traverse scheme was employed and data were logged in 20m grid units. The instrument sensitivity was set to 0.1nT, the sample interval to 0.25m and the traverse interval to 1.0m, thus providing 1600 sample measurements per 20m grid unit.

5.9 Measurements of electrical resistance were determined using a Geoscan RM15D resistance meter with automatic logging of the data. A zig-zag traverse scheme was employed and data were logged in 20m grid units. The instrument sensitivity was set to 0.1ohm, the sample interval to 0.5m and the traverse interval to 1.0m, thus providing 800 sample measurements per 20m grid unit.

5.10 Data were downloaded on-site into a laptop computer for initial processing and storage and subsequently transferred to a desktop computer for processing, interpretation and archiving.

Data processing

5.11 Geoplot v.3 software was used to process the geophysical data and to produce both continuous tone greyscale images and trace plots of the raw data. The greyscale images and interpretations are presented in Figures 2-5; the trace plots are provided in Appendix I. In the greyscale images, positive magnetic/high resistance anomalies are displayed as dark grey and negative magnetic/low resistance anomalies as light grey. A palette bar relates the greyscale intensities to anomaly values in nanoTesla/ohm.

5.12 The following basic processing functions have been applied to the data:

Clip	clips, or limits data to specified maximum or minimum values; to eliminate large noise spikes; also generally makes statistical calculations more realistic (magnetic)
Zero mean traverse	sets the background mean of each traverse within a grid to zero; for removing striping effects in the traverse direction and removing grid edge discontinuities (mag.)
Despike	locates and suppresses random spikes in the data (both)
Low pass filter	is used for enhancing larger weak features (mag.)
Interpolate	increases the number of data points in a survey to match sample and traverse intervals. In this instance the data have been interpolated to 0.25 x 0.25m intervals (both)

Interpretation: anomaly types

5.13 A colour-coded geophysical interpretation plan is provided in figure 4. Two types of geomagnetic anomaly have been distinguished in the data:

positive magnetic	regions of anomalously high or positive magnetic field gradient, which may be associated with high magnetic susceptibility soil-filled structures such as pits and ditches.
dipolar magnetic	paired positive-negative magnetic anomalies, which typically reflect ferrous or fired materials (including fences and service pipes) and/or fired structures such as kilns or hearths.

One type of resistance anomaly has been distinguished in the data:

high resistance	regions of anomalously high resistance, which may reflect foundations, tracks, paths and other concentrations of stone or brick rubble.

Interpretation: features

5.14 A colour-coded archaeological interpretation plan is provided in Figure 5.

5.15 Several very weak positive magnetic anomalies have been detected across the survey area which could represent the remains of soil-filled features.

5.16 Three strong positive magnetic anomalies have been detected in the south east corner of the survey; these may reflect the remains of soil-filled features, possibly pits.

5.17 Several relatively high resistance anomalies were detected in the survey. These could reflect the remains of wall footings or boundaries.

5.18 The only other anomalies detected here are small, discrete dipolar magnetic anomalies. These almost certainly reflect items of near-surface ferrous and/or fired debris, such as horseshoes and brick fragments. A chain of intense dipolar magnetic anomalies is evident in the northern corner of the survey; this is likely to be associated with the pylon that was present in the paddock. The ferrous nature of some of the field boundaries is also evident within the survey.

6. Conclusions

6.1 Both geomagnetic and electrical resistance surveys have been conducted on land south of Howgrave Hall, Sutton Howgrave.

6.2 Several weak anomalies have been identified which could possibly be of archaeological interest.

7. Sources

David, A, 1995 *Geophysical survey in archaeological field evaluation,* Research and Professional Services Guideline **1**, English Heritage

English Heritage, 2005 *Survey of Earthworks at Sutton Howgrave, North Yorkshire*. Unpublished report

Gaffney, C, Gater, J, & Ovenden, S, 2002 *The use of geophysical techniques in archaeological evaluations*, Technical Paper **6**, Institute of Field Archaeologists

Pevsner, N, 1966 *The Buildings of England: Yorkshire, The North Riding*, Harmondsworth

Schmidt, A, 2001 *Geophysical Data in Archaeology: A Guide to Good Practice*, Archaeology Data Service, Arts and Humanities Data Service

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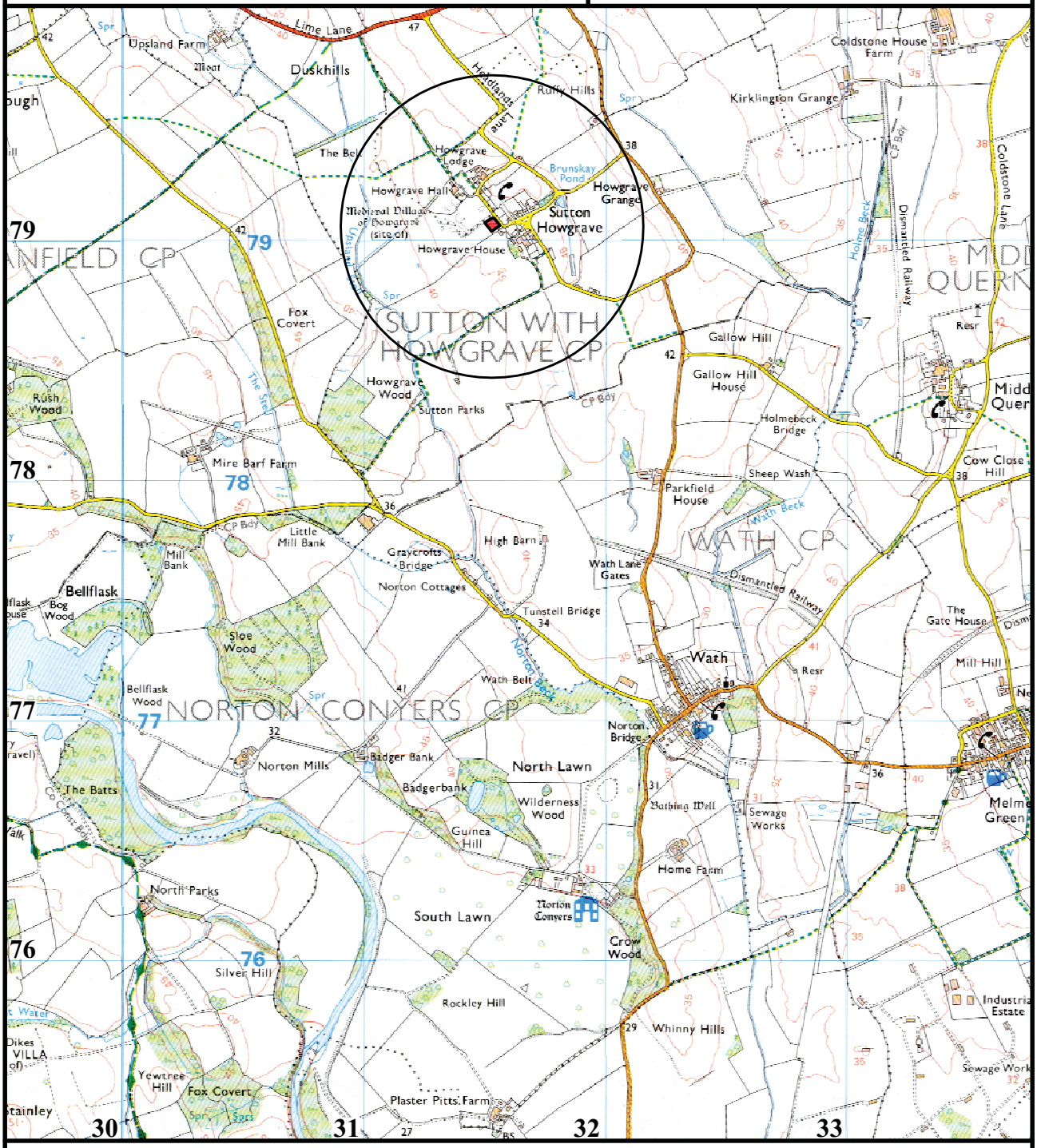
Figure 1
Location of the site

on behalf of
Stephen J Sherlock



proposed development area

0 1km

scale 1:25 000 - for A4 plot

The Willows

West View

White Dog Cottage

Hawt Hou

Hall Cottage

Craigmore

791

315

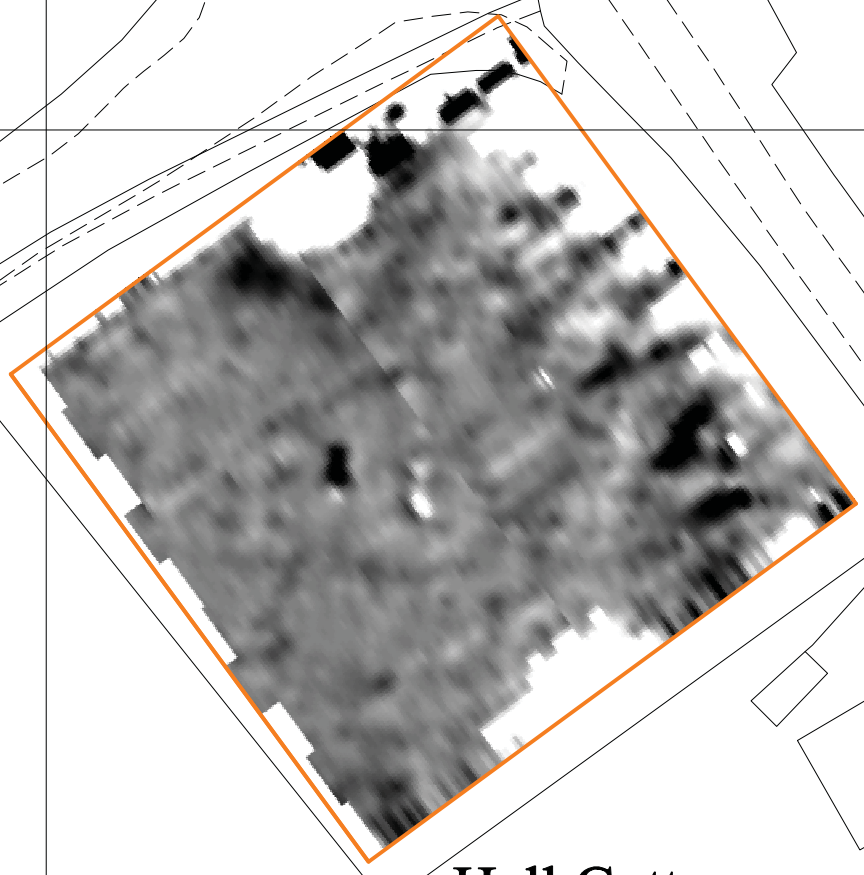


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Figure 2

Geomagnetic survey

on behalf of
Stephen J Sherlock

0 25m

scale 1:500 - for A3 plot

outline of survey area

5.00
4.17
3.33
2.50
1.67
0.83
0.00
-0.83
-1.67
-2.50
-3.33
-4.17
-5.00 nT

The Willows

West View

White Dog Cottage

Hawt Hou

Hall Cottage

Craigmore

791

315

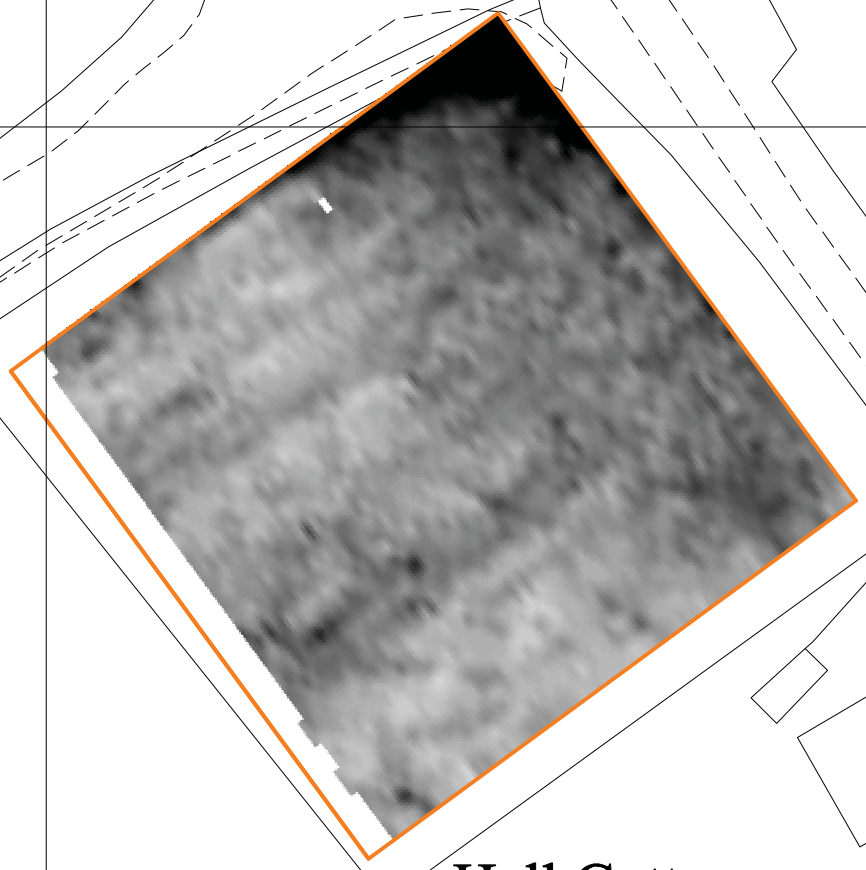

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Figure 3

Electrical resistance survey

on behalf of
Stephen J Sherlock

0 25m

scale 1:500 - for A3 plot

outline of survey area

34.87
33.17
31.47
29.76
28.06
26.35
24.65
22.95
21.24
19.54
17.84
16.13
14.43 ohm

The Willows

West View

White Dog Cottage

Hawt Hou

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Craigmore

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Figure 4

Geophysical interpretation

on behalf of
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0 25m

scale 1:500 - for A3 plot

outline of survey area

positive magnetic anomalies

dipolar magnetic anomalies

high resistance anomalies

The Willows

West View

White Dog Cottage

Hawt Hou

Hall Cottage

Craigmore

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Figure 5

Archaeological interpretation

on behalf of
Stephen J Sherlock

0 25m

scale 1:500 - for A3 plot

outline of survey area

soil-filled features

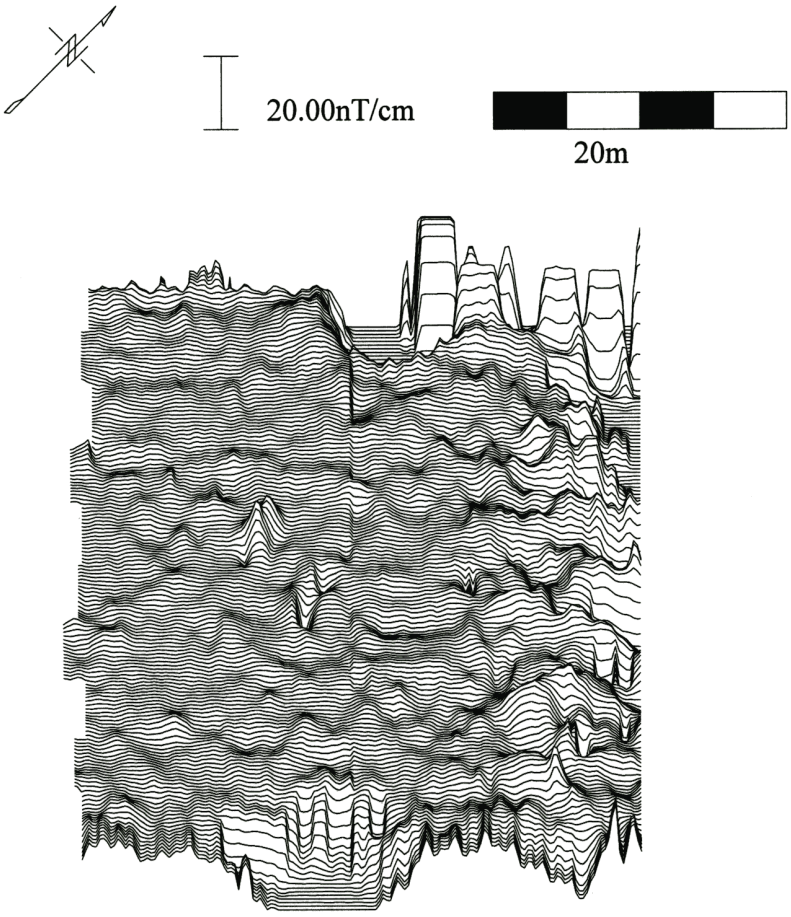
electrical cable

?stone features

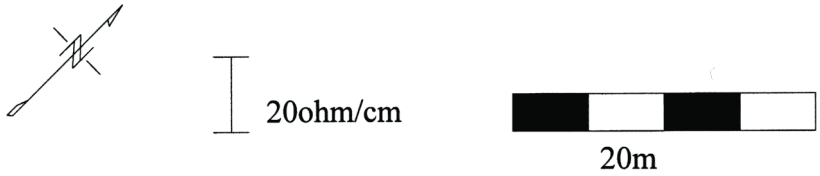
pylon

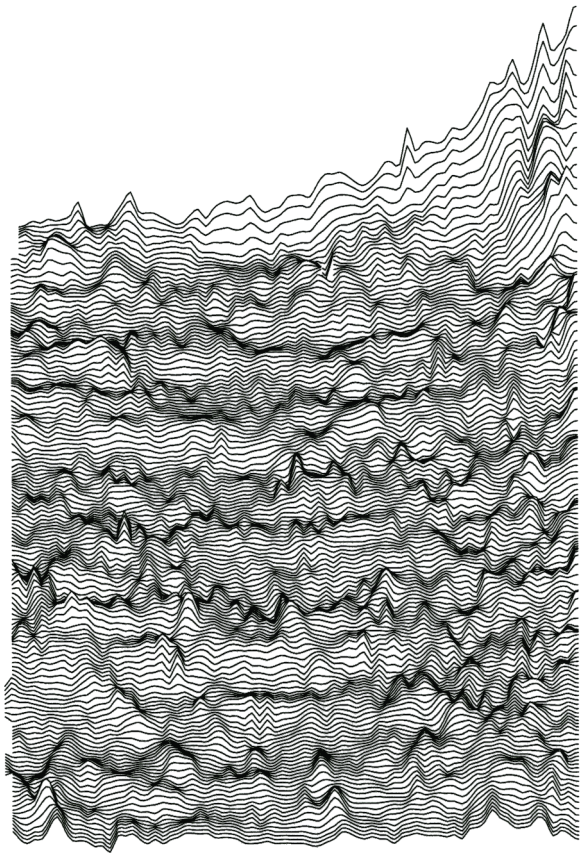
Appendix I: Trace plots of geophysical data

Magnetometer data



Resistance data





Appendix II: Written Scheme of Investigation

LAND SOUTH OF Howgrave Hall, Sutton Howgrave,
NORTH YORKSHIRE

WRITTEN SCHEME OF INVESTIGATION FOR ARCHAEOLOGICAL EVALUATION BY GEOPHYSICAL SURVEY

1. Summary

1.1 Planning permission is being sought for the erection of a single dwelling on land to the south of Howgrave Hall. The site lies within an area of archaeological interest, with the potential for the survival of remains of Medieval and also later settlement and activity. In response to consultation on the proposed planning application for the development of the site, the Senior Archaeologist, Heritage Section, North Yorkshire County Council advised the landowner that as a preliminary stage of archaeological evaluation, a pre-determination geophysical survey be undertaken over part of the proposed development area. Geophysical survey is recommended to investigate the potential for the presence of Medieval settlement and test for the survival of associated, buried archaeological features. Should this survey indicate the presence of likely archaeological features, a scheme of trial trenching may be recommended to ascertain the nature, date, extent, quality of survival and significance of any remains.

1.2 The aim of this work is to establish the nature, location, extent and state of preservation of archaeological remains within the proposed development area. The survey results will enable an assessment of the archaeological impact of the development proposals. This information will assist in identifying options for minimising, avoiding damage to, and/or recording any archaeological remains in advance of, and/or during development. This scheme of investigation has been prepared to define the scope of the geophysical survey for an area slightly in excess of 1,600 square metres of land in a paddock at Sutton Howgrave.

2. Purpose

2.1 This written scheme of investigation represents a summary of the broad archaeological requirements to enable an assessment of the impact of development proposals upon the archaeological resource. This is in accordance Policies HH20 and HH21 of the Hambleton District Local Plan and the guidance of Planning Policy Guidance note 16 on *Archaeology and Planning*, 1990. It does not comprise a full specification, and the County Council makes no warranty that the archaeological works are fully or exactly described. No work on site should commence until the implementation of the scheme is the subject of a standard ICE Conditions of Contract for Archaeological Investigation (ICE *et al* 2004), or similar agreement between the Client and the selected archaeological contractor.

3. Location and Description (centred at NGR SE 3138 7912)

3.1 An outline planning application was submitted by the landowner Mr Robinson, for the construction of a detached dwelling. The development is to provide funds for an enabling development for the repair and maintenance of Howgrave Hall Banqueting House.

3.2 The site lies within the settlement at Sutton Howgrave, North Yorkshire.

3.3 At the time of a site visit in 2006, the site was in use as a grass paddock and was bounded by a combination of wooden post and rail fencing and hedging, with a few mature trees around the perimeter.

3.4 The proposed application is for a single dwelling and garage across the grass paddock in the eastern part of the application site.

4. Historical and Archaeological Background

4.1 The proposed development site lies within an area of potential archaeological significance. The site lies immediately to the south of the medieval village of Howgrave. this survives as an earthwork, preserved as a scheduled ancient monument. The earthworks that are scheduled are thought to represent the remains of a medieval village. A recent assessment of the earthworks by English Heritage (2005) considers the remains to represent three house platforms and a holloway, formerly the village street. Due to the proximity of the proposed development site to the scheduled

ancient monument, there is potential for any surviving remains of the medieval period to be within the area of the proposed development.

4.2 The potential significance of any surviving archaeological remains in furthering our understanding of the origins and development of village of Howgrave and the associated medieval occupation of this area makes it important that the potential archaeological impact of this development proposal is assessed.

4.3 Additional archaeological information for the area is held by the North Yorkshire Historic Environment Record (HER). The HER can be consulted by prior appointment by contacting the HER Officer, North Yorkshire County Council, Heritage Section, County Hall, Northallerton, North Yorkshire, DL7 8AH; Tel. 01609 532331, Fax. 01609 532558.

5. Objectives

5.1 The objectives of the archaeological evaluation work within the proposed development area are:

.1 to determine by means of geophysical survey, the location and extent of any archaeological features within the proposals area and, where possible, to characterise the archaeology thus located. (Should this survey indicate the presence of likely archaeological features, appropriate fieldwork and/or mitigation will be explored to further investigate the anomalies and/or avoid disturbance of significant features by development proposals. Any further phase of fieldwork must be covered by a separate written scheme of investigation.)

.2 to prepare a report summarising the results of the work and assessing the archaeological implications of proposed development,

.3 to prepare and submit a suitable archive to an appropriate repository.

6. Access, Safety and Monitoring

6.1 Access to the site should be arranged through the commissioning body.

6.2 It is the archaeological contractor's responsibility to ensure that Health and Safety requirements are fulfilled.

6.3 The project will be monitored by the Senior Archaeologist, North Yorkshire County Council, to whom written documentation should be sent before the start of the survey confirming:

a) the date of commencement,

b) the names of all archaeological science specialists likely to be used in the evaluation, and

c) notification to the proposed archive repository of the nature of the works and opportunity to monitor the works.

6.4 Where appropriate, the advice of the Regional Advisor for Archaeological Science (Yorkshire) at English Heritage will be called upon.

6.5 It is the responsibility of the archaeological contractor to ensure that any significant results are brought to the attention of the Senior Archaeologist, North Yorkshire County Council and the commissioning body as soon as is practically possible. This is particularly important where there is any likelihood of the contingency arrangements being required.

7. Brief

7.1 In view of the nature of the potential archaeological interest, it is anticipated that both a resistivity and a magnetometer survey will be required for this survey

7.2 The total area of the application site covers 1,600 square metres within the pasture that is the proposed development area. The maximum sampling interval is 0.5m on traverses 1.0m apart; an interval of 0.25m is recommended.

7.3 The survey and archiving of survey data should be undertaken in a manner consistent with professional standards and guidance (David 1995, IFA 1999, Gaffney *et al* 2002 & Schmidt 2002).

7.4 The survey grid should be independently relocatable on the ground by a third party, by measurement to local permanent features. Grid tie-in information should be made available either in, or with, the final report, to enable the location plan to be relatable to the OS National Grid.

8. Report

8.1 Upon completion of the survey, the data obtained should be presented visually, in report form, and be accompanied by a written description of the survey and an interpretation of the results, indicating as far as possible the likely nature of the features giving rise to anomalies and an estimate of the reliability of the results.

8.2 The survey report should follow the guidance of English Heritage (David 1995). It should include a title page, summary of results, introduction, methods, results, conclusions, acknowledgements, references and appendices. A survey location plan should be included at a minimum scale of 1:2500; a plot of raw survey data at a preferred minimum scale of 1:100; a trace plot of raw magnetic data; a grey scale plot, or dot density plot. In addition, the report may optionally contain a plot of enhanced data. One or more, interpretative plots should be included. Each plan/plot must have a bar scale and accurately oriented north sign.

8.3 At least six copies of the report should be produced and submitted to the commissioning body, English Heritage, North Yorkshire County Council Heritage Section, the Local Planning Authority and the repository accepting the archive.

8.4 Upon completion of the work, the archaeological contractor should make their work accessible to the wider research community by submitting digital data and copies of reports online to OASIS (http://ads.ahds.ac.uk/project/oasis/). Submission of data to OASIS does not discharge the requirements for the archaeological contractor to notify the Senior Archaeologist, NYCC of the details of the work and to provide the Historic Environment Record (HER) with a report on the work.

9. Archive

9.1 A field archive should be compiled and the archaeological contractor should liaise with an appropriate archive repository to establish the detailed requirements of the archive repository and discuss archive transfer in advance of fieldwork commencing.

9.2 Preparation and deposition of the site archive should be undertaken with reference to the appropriate archive repository guidelines and standards, to Walker (1990), the Society of Museum Archaeologists (1993) and the County Council's *Guidelines on the Transfer and Deposition of Archaeological Archives*.

9.3 The archiving of any digital data arising from the project should be undertaken in a manner consistent with professional standards and guidance (Richards & Robinson 2000). The archaeological contractor should liaise with an appropriate digital archive repository to establish their detailed requirements and discuss the transfer of the digital archive.

9.4 The archaeological contractor should also liaise with the HER Officer, North Yorkshire County Council, to make arrangements for digital information arising from the project to be submitted to the North Yorkshire Historic Environment Record for HER enhancement purposes. The North Yorkshire Historic Environment Record is not an appropriate repository for digital archives arising from projects.

10. Copyright

10.1 Copyright in the documentation prepared by the archaeological contractor and specialist sub-contractors should be the subject of additional licences in favour of the repository accepting the archive and North Yorkshire County Council to use such documentation for their statutory educational and museum service functions, and to provide copies to third parties as an incidental to such functions.

10.2 Under the Environmental Information Regulations 2005 (EIR), information submitted to the HER becomes publicly accessible, except where disclosure might lead to environmental damage, and reports cannot be embargoed as 'confidential' or 'commercially sensitive'. Requests for sensitive information are subject to a public interest test, and if this is met, then the information has to be disclosed. The archaeological contractor should inform the client of EIR requirements, and ensure that any information disclosure issues are resolved before completion of the work. Intellectual property rights are not affected by the EIR.

11. Further Information

11.1 Further information or clarification of any aspects of this brief may be obtained from:

Stephen Sherlock, BA MA MIFA
ELM LEA,
Malton Road, **e: Stephen.Sherlock@ntlworld.com**
York
North Yorkshire Tel: 01904 430680
YO31 9LT **Fax: 01904 430680**

11.2 This written scheme of investigation is valid for a period of six months from the date of issue. After that time it may need to be revised to take into account new discoveries, changes in policy or the introduction of new working practices or techniques.

11 References

David, A	1995	*Geophysical survey in archaeological field evaluation*, English Heritage Research and Professional Services Guideline No 1, London
English Heritage Yorkshire(unpublished)	2005	Survey of Earthworks at Sutton Howgrave, North
Gaffney, C, Gater, J & Ovenden, S	2002	*The use of geophysical techniques in archaeological evaluations (revised edition)* Institute of Field Archaeologists Paper No 6
ICE, ACE, CECA Investigation and IFA	2004	ICE Conditions of Contract for Archaeological (Thomas Telford Ltd, ISBN: 0727732374)
Institute of Field Archaeologists	2001	*Standard and Guidance for Archaeological Field Evaluations* http://www.archaeologists.net/modules/icontent/inPages/docs/codes/fldeval2001.pdf
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Margary, I D	1973	*Roman Roads in Britain*
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Soil Survey of England & Wales	1983	*Soils of Northern England, Sheet 1*