Land to the Southeast of Slingsby, North Yorkshire: A Geophysical Survey

On behalf of the Castle Howard Estate

CS Archaeology
January 2011

On behalf of:	Mr H Rayment Resident Agent Castle Howard Estate Office Castle Howard Malton North Yorkshire YO60 7DA
National Grid Reference (NGR):	SE 699 746 (centre)
Project Number:	71
Timing:	Survey January 2011 Report January 2011
Report Contents:	Geophysics Report by GSB Appendix 1: Geotechnical data by GSB Appendix 2: WSI by CS Archaeology

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GEOPHYSICAL SURVEY REPORT
2011/01

Slingsby

Client:

CS Archaeology

on behalf of

Castle Howard
YORK

(Castle Howard Estate)

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Specialising in Shallow and Archaeological Geophysics

GSB Survey No. 2011/01

Slingsby, North Yorkshire

NGR	SE 699 746
Location	The site is located on land directly to the north east of the Junction of the B1257 and The Balk in Slingsby; approximately 10km north west of Malton.
County	North Yorkshire
District	Ryedale
Parish	Slingsby CP
Topography	Gently sloping downhill from S to N
Land-use	Pasture
Soils	Badsey 2 association (511i): Well drained calcareous fine loamy soils over limestone gravel (*Soils of England and Wales. Sheet 1, Northern England.* Soil Survey of England and Wales. 1983).
Geology	River terrace and lacustrine gravel
Archaeology	No known archaeology within application area
Study Area	1.6ha
Survey Methods	Detailed Fluxgate Magnetometry

Aims

To locate and characterise any anomalies of possible archaeological interest within the application area.

Summary of Results*

Apart from three possible ditches of unknown antiquity the survey has identified few anomalies that have clear archaeological potential. The nature of results is such that many responses are simply interpreted as *Uncertain.*

Two pipes have been noted in the fields.

Project Information

Project Co-ordinator: E Wood BSc MIfA
Project Assistants: J Tanner & J Gater
Date of Fieldwork: 10th January 2011
Date of Report: 14th January 2011

***It is essential that this summary is read in conjunction with the detailed results of the survey.**

Survey Specifications

Method

All survey grid positioning was carried out using Trimble R8 Real Time Kinematic (RTK) differential GPS equipment. The geophysical survey areas are geo-referenced relative to the Ordnance Survey National Grid by tying in to local detail and corrected to the OS Mastermap. These tie-ins are presented in Figure T1. Please refer to this diagram when re-establishing the grid or positioning trenches.

Technique	Traverse Separation	Reading Interval	Instrument	Survey Size
Magnetometer - Scanning (Appendix 1)	-	-	-	-
Magnetometer – Detailed (Appendix 1)	1m	0.25	Bartington Grad 601-2	1.5ha
Resistance – Twin Probe (Appendix 1)	-	-	-	-
Ground Penetrating Radar (GPR) (Appendix 1)	-	-	-	-

Data Processing

	Magnetic	Resistance	GPR
Zero Mean Traverse	Y	-	-
Step Correction	Y	-	-
Interpolate	Y	-	-
Low Pass Filter	Y	-	-

Presentation of Results

Report Figures (Printed & Archive CD):	Location, data plots and interpretation diagram on base map (Figures 1-4).
Reference Figures (Archive CD):	Data plots at 1:500 for reference and analysis. (See List of Figures). Tie-in information (Figure T1).
Plot Formats:	See Appendix 1: Technical Information, at end of report.

General Considerations

Conditions for survey were good, the fields comprising short grass although remnants of an old fence were present in the southernmost field, and also car wheels and chicken wire which have resulted in ferrous disturbance.

Smaller scale ferrous anomalies ("iron spikes") are present throughout, their form best illustrated in the XY trace plots. These responses are characteristic of small pieces of ferrous debris in the topsoil and are commonly assigned a modern origin. While the most prominent of these are highlighted on the interpretation diagram, they are not discussed in the text below unless considered relevant.

Results of Survey

1. Magnetic Survey

Three fields were investigated but the results will be considered as a whole.

1.1 In the northern half of the survey area are three rather poorly defined linear anomalies which clearly have archaeological potential as probable infilled ditches. The responses are not particularly strong and there are indications that the features may have suffered from later plough damage. The results suggest that the presumed ditches extend beyond the survey area to the north and west, but without this wider context it is difficult to be certain whether or not the ditches relate to old field systems, boundaries or enclosures. As such, their archaeological significance, if any, is difficult to fully ascertain. The lack of any definite associated features and the presence of modern pipes (see paragraph 1.4) have added to uncertainty about the archaeological potential. A few other anomalies of tentative interest have been highlighted but confidence levels in their interpretation are low.

1.2 The majority of the anomalies recorded in the survey lack any particular shape, strength or character which would indicate a specific origin; they have therefore been characterised as *Uncertain*. They could be archaeological, agricultural or natural in origin; it is impossible to ascertain which.

1.3 There is a series of regularly spaced parallel anomalies / trends aligned N-S which clearly represent past ploughing. It is uncertain whether any could be classified as ridge and furrow cultivation, or if they are of a more recent date.

1.4 There are two ferrous pipes within the survey area and some strong responses associated with old fencing in the southwestern block. Modern fences are responsible for magnetic noise around the survey edges and in the southeastern extremity a nearby gate has resulted in a strong magnetic 'halo'.

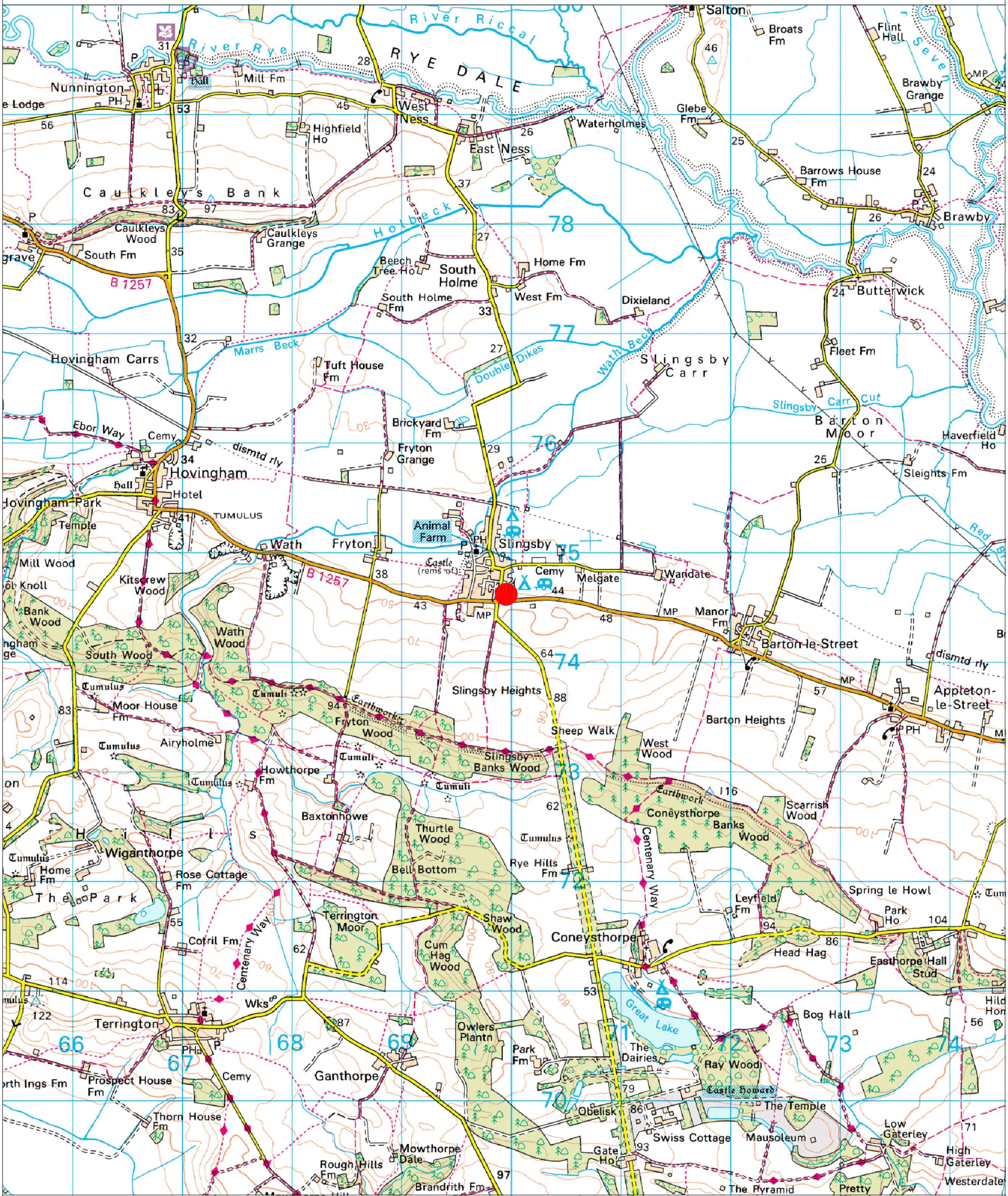
2. Conclusions

2.1 The results of the survey at Slingsby have highlighted three possible ditches of archaeological interest along with a few other responses that may be anthropogenic. Unfortunately the presence of modern pipes and a lack of clearly defined anomalies has made confidence levels of interpretation low: many anomalies have been classified as *Uncertain* though it seems unlikely that they have an archaeological origin

List of Figures

Report Figures

Reference Figures on CD



Site Location

0 metres 2000

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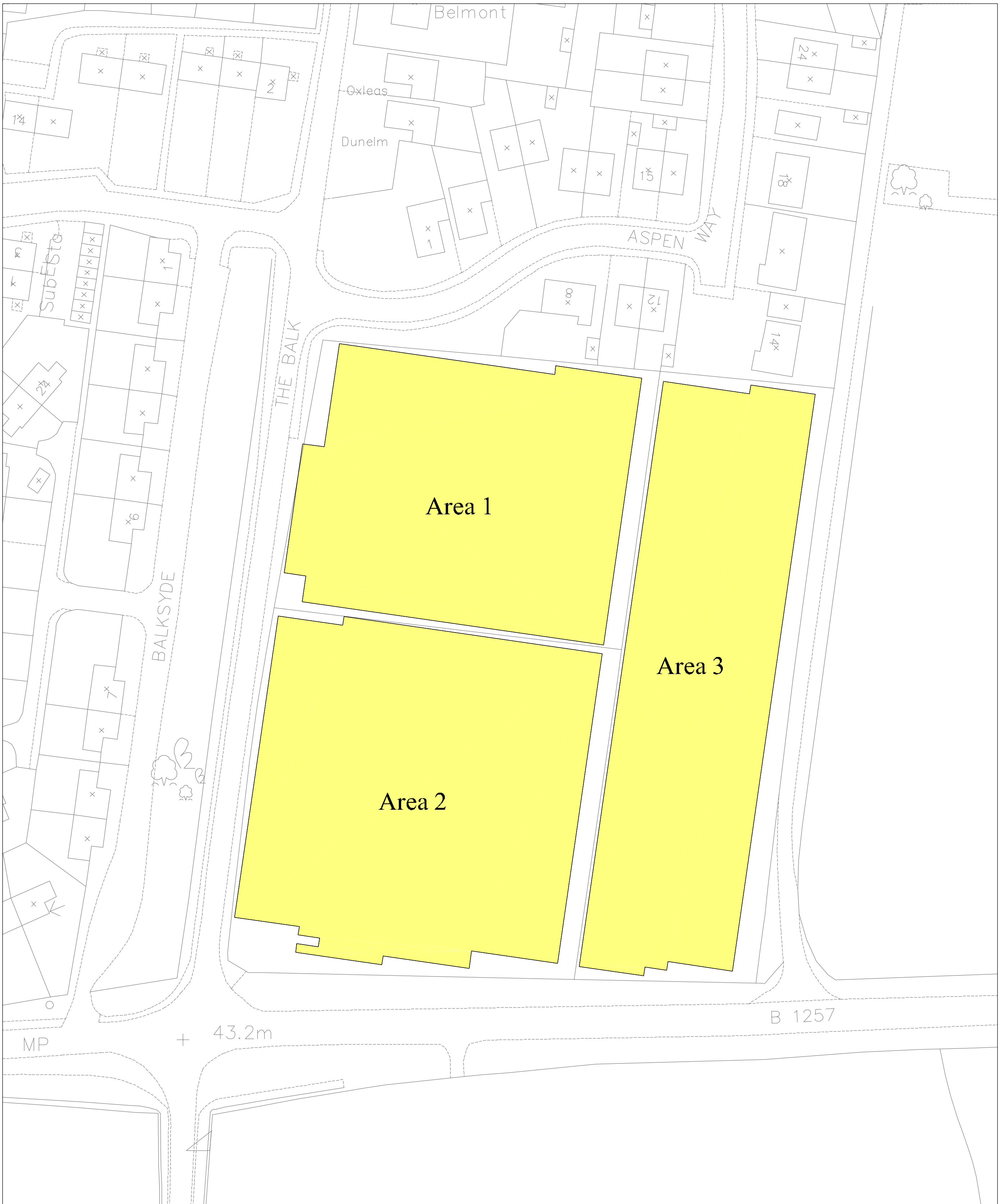
2011/01 Slingsby

Location of Survey Area

Figure 1



Location of Survey Areas

0 metres 50

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2011/01 Slingsby
Detailed Location of Survey Area
Reproduced from the Ordnance Survey Map with the permission of the Controller of HMSO © Crown Copyright (AL100018665)
Figure 2

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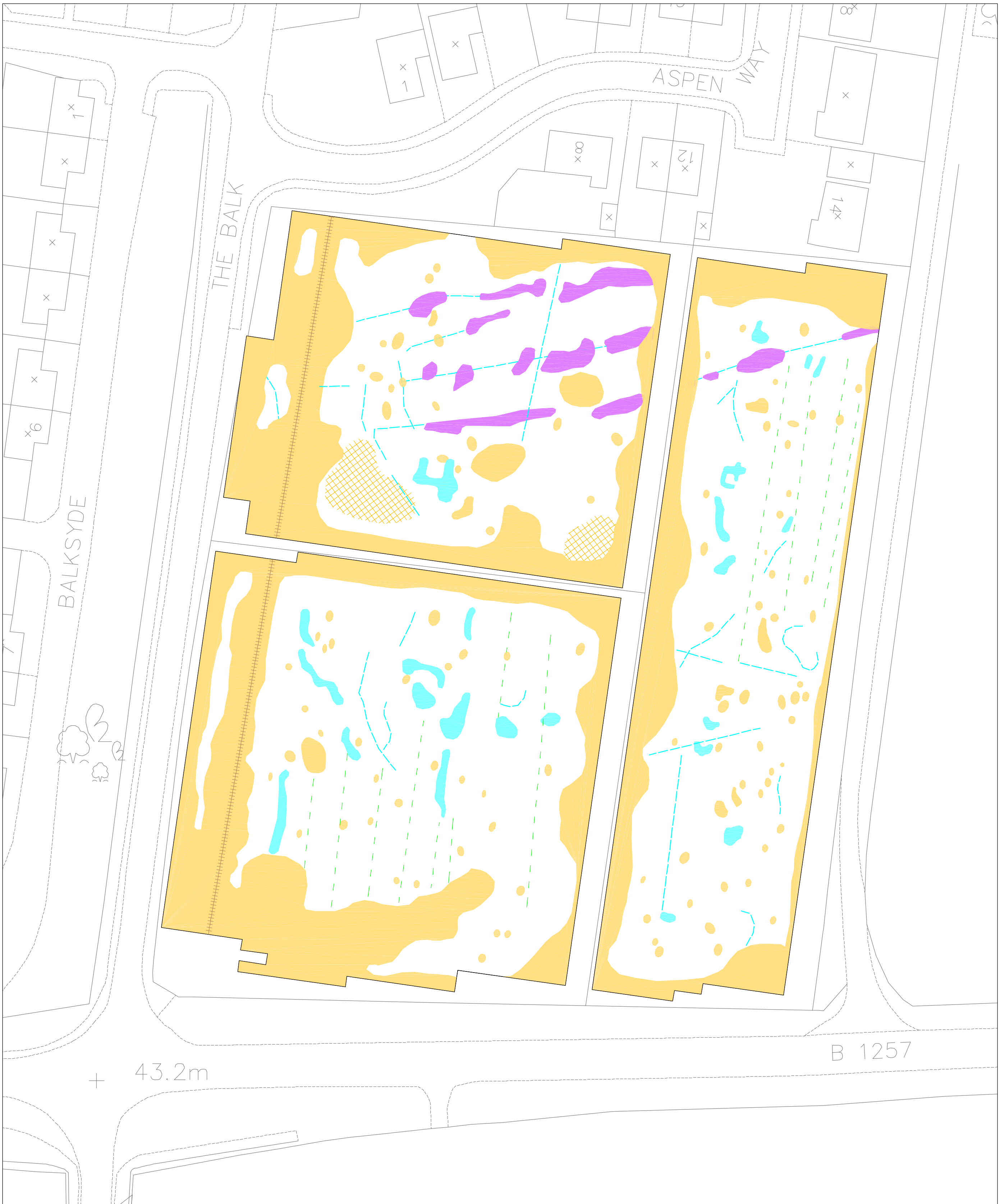
Summary Greyscales

Figure 3



?Archaeology

Uncertain

Trends

Ploughing

Ferrous/Disturbance

Pipe

0 metres 40

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Summary Interpretations

Figure 4

Appendix 1: Technical Information

Instrumentation

Fluxgate Gradiometer: Geoscan FM36/256 and Bartington *Grad*601-2

Both the Geoscan and Bartington instruments comprise two fluxgate sensors mounted vertically apart; the distance between the sensors on the former is 500mm, on the latter 1000mm. The gradiometers are carried by hand, with the bottom sensor approximately 100-300mm from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is measured in nanoTesla (nT). The sensitivity of the instrument can be adjusted; for most archaeological surveys the most sensitive range (0.1nT) is used. The fluxgate gradiometer suppresses any diurnal or regional effects. Generally, features up to 1m deep may be detected by this method. Having two gradiometer units mounted laterally with a separation of 1000mm, the Bartington instrument can collect two lines of data per traverse.

Resistance Meter: Geoscan RM15

This instrument measures the electrical resistance of the earth, using a system of four electrodes (two current and two potential.) Depending on the arrangement of these electrodes an exact measurement of a specific volume of earth may be acquired. This resistance value may then be used to calculate the earth resistivity. The most common arrangement is the Twin Probe configuration which involves two pairs of electrodes (one current and one potential): one pair remain in a fixed position, whilst the other measures the resistance variations across a grid. The resistance is measured in ohms and, when calculated, resistivity is in ohm-metres. The resistance method as used for standard area survey employs a probe separation of 0.5m, which samples to a depth of approximately 0.75m. The nature of the overburden and underlying geology will cause variations in this depth.

GPR: Sensors & Software Noggin Smartcart*plus*

The Noggin system includes an onboard digital video logger (DVL III), 250 MHz or 500MHz antenna, an odometer wheel and battery. It is, therefore, a fully integrated system. The built-in software uses the integrated odometer to provide an accurate distance measurement to the response. The data are recorded in digital format and can be processed to produce depth slice maps, 2D sections or 3D cubes.

Display Options

XY Trace

This involves a line representation of the data. Each successive row of data is equally incremented in the Y axis, to produce a stacked profile effect. This display may incorporate a hidden-line removal algorithm, which blocks out lines behind the major peaks and can aid interpretation. The advantages of this type of display are that it allows the full range of the data to be viewed and shows the shape of the individual anomalies. The display may also be changed by altering the horizontal viewing angle and the angle above the plane. The output may be either colour or black and white.

Greyscale

This format divides a given range of readings into a set number of classes. Each class is represented by a specific shade of grey, the intensity increasing with value. All values above the given range are allocated the same shade (maximum intensity); similarly all values below the given range are represented by the minimum intensity shade. Similar plots can be produced in colour, either using a wide range of colours or by selecting two or three colours to represent positive and negative values. The assigned range (plotting levels) can be adjusted to emphasise different anomalies in the data-set.

Relief Plot

This is a method of display that creates a three dimensional effect by directing an imaginary light source on a given data set. Particular elements of the results are highlighted depending on the angle of strike of the light source. This display method is particularly useful when applied to resistance data to highlight subtle changes in resistance that might otherwise be obscured.

3D Surface Plot

This is similar to the XY trace, but in 3 dimensions. Each data point of a survey is represented in its relative position on the x and y axes and the data value is represented in the z axis. This gives a digital terrain, or topographic effect.

Radargram

Radar data comprise a record of reflection intensity against the time taken for the emitted energy to travel from the transmitter down to the reflector and back to the receiver. The resultant plot is effectively a vertical section through the ground along the line of the traverse, with time (depth) on the vertical axis, displacement on the horizontal axis and reflection intensity as a grey or colour scale.

Time Slice

If a number of radargrams are collected over a grid, or in conjunction with GPS data, it is possible to reconstruct the entire dataset into a 3D volume. This can then be resampled to compile ‘plan’ maps of response strength at increasing time offsets (typically converted to show approximate depth), thus simplifying the visualisation of how anomalies vary beneath the surface across a survey area.

Volume Plot

Rather than looking at discrete slices of data from the 3D volume, it is possible to strip away all reflections with intensity below a user-defined threshold, leaving just the strongest anomalies. This serves to create a rendered 3D model of the most substantial subsurface deposits which can then be rotated or enlarged/reduced to either animate the display or view it from any perspective.

Data Processing

Zero Mean Traverse	This process which sets the background mean of each traverse within each grid to zero. The operation removes striping effects and edge discontinuities over the whole of the data set. It is usually only applied to gradiometer data.
Step Correction	When gradiometer data are collected in 'zig-zag' fashion, stepping errors can sometimes arise. These occur because of a slight difference in the speed of walking on the forward and reverse traverses. The result is a staggered effect in the data, which is particularly noticeable on linear anomalies. This process corrects these errors
Interpolation	When geophysical data are presented as a greyscale, each data point is represented as a small square. The resulting plot can sometimes have a 'blocky' appearance. The interpolation process calculates and inserts additional values between existing data points. The process can be carried out with points *along* a traverse (the *x* axis) and/or *between* traverses (the *y* axis) and results in a smoother greyscale image.
Despike	In resistance survey, spurious readings can occasionally occur, usually due to a poor contact of the probes with the surface. This process removes the spurious readings, replacing them with values calculated by taking the mean and standard deviation of surrounding data points. It is not usually applied to gradiometer data.
High Pass Filter	Carried out over the whole a resistance data-set, the filter removes low frequency, large scale spatial detail, such as that produced by broad geological changes. The result is to enhance the visibility of the smaller scale archaeological anomalies that are otherwise hidden within the broad 'background' change in resistance. It is not usually applied to gradiometer data.
GPR Filters	There are a wide range of GPR filters available and their application will vary from project to project. The most commonly used are: Dewow (removes low frequency, down-trace instrument noise); DC-Shift (re-establishes oscillation of the radar pulse around the zero point); Bandpass Filtering (suppresses frequencies outside of the antenna's peak bandwidth thus reducing noise); Background Removal (can remove ringing, instrument noise and minimize the near-surface 'coupling' effect); Migration (collapses hyperbolic tails back towards the reflection source).

Tie-in Techniques and Information

Tapes

A number of points on each survey grid are recorded by triangulating to at least two fixed points on the base map. If there is a lack of 'hard detail' in the mapping, some form of survey marker will be left *in-situ* for reference.

NOTE: When re-establishing the grid (for excavation or other post-survey work) only data from the supplied tie-in diagram should be used and NOT the report figures.

Electronic Distance Measurers (EDM) / Total Stations (TST)

This type of instrument measures the distance and angle to features with reference to a fixed point. Where possible the EDM will be set up over a point that can be re-established with relative ease, e.g. over map detail, a survey marker or at a point measureable by tapes. Distances and angles to permanent points of reference and/or map detail are recorded as well as at least two points per survey grid.

NOTE: When re-establishing the grid (for excavation or other post-survey work) only data from the supplied tie-in diagram should be used and NOT the report figures.

Global Positioning Systems (GPS)

Using a roving receiver unit, these systems record the longitude, latitude and altitude of a given point by triangulating between a network of satellites. For survey-grade measurements, the accuracy is refined by integrating data from a fixed base station or local reference network. In addition to grid points, elements of map detail are collected to assess the existing base-map accuracy and, in worst-case scenarios, use the data on a non-georeferenced map. If the supplied mapping is found to be inaccurate, it is sometimes necessary to shift the position of GPS points (keeping their relative positions fixed) within the site plan to correlate cartographic features with the 'real-world' co-ordinates; this should be considered when using GPS to re-establish an existing survey grid (see note below). It should be noted that the accuracy of any GPS-positioned point is dependent upon both the system and the satellite geometry at the time of survey. On projects where multiple contractors have used GPS, the possibility of compound errors between original survey grid creation, tie-in information and grid re-establishment should be borne in mind when positioning trenches over recorded anomalies.

NOTE: If re-establishing the grid with a GPS (for excavation or other post-survey work), use only the co-ordinates recorded on the tie-in diagram or, if supplied, the GPS data file included on the Archive CD; relative positions in the report diagrams may be correct but absolute co-ordinates can vary if discrepancies in the base mapping have been encountered.

Terms Commonly used in the Interpretation of Results

Magnetic

Archaeology	This term is used when the form, nature and pattern of the response are clearly or very probably archaeological These anomalies, whilst considered anthropogenic, could be of any age.
? Archaeology	The interpretation of such anomalies is often tentative, with the anomalies exhibiting either weak signal strength or forming incomplete archaeological patterns. They may be the result of variable soil depth, plough damage or even aliasing as a result of data collection orientation.
Areas of Increased Magnetic Response	These responses show no visual indications on the ground surface and are considered to have some archaeological potential.
Industrial	Strong magnetic anomalies that, due to their shape and form or the context in which they are found, suggest the presence of kilns, ovens, corn dryers, metal-working areas or hearths. It should be noted that in many instances modern ferrous material can produce similar magnetic anomalies.
Natural	These responses form clear patterns in geographical zones where natural variations are known to produce significant magnetic distortions e.g. palaeochannels or magnetic gravels.
? Natural	These are anomalies that are likely to be natural in origin i.e. geological or pedological.
Ridge and Furrow	These are regular and broad linear anomalies that are presumed to be the result of ancient cultivation. In some cases the response may be the result of modern activity.
Ploughing Trend	These are isolated or grouped linear responses. They are normally narrow and are presumed modern when aligned to current field boundaries or following present ploughing.
Uncertain Origin	Often, anomalies (both positive and negative) will be recorded which stand out from the background magnetic variation yet show little to suggest an exact origin. This may be because the characteristics and distribution of the responses straddle the categories of "*?Archaeology*" and "*?Natural*" or that they are simply of an unusual form.
Trend	This is usually an ill-defined, weak, isolated or obscured linear anomaly of unknown cause or date.
Areas of Magnetic Disturbance	These responses are commonly found in places where modern ferrous or fired materials are present e.g. brick rubble. They are presumed to be modern.
Ferrous Response	This type of response is associated with ferrous material and may result from small items in the topsoil, larger buried objects such as pipes, or above ground features such as fence lines or pylons. Ferrous responses are usually regarded as modern. Individual burnt stones, fired bricks or igneous rocks can produce responses similar to ferrous material.

Resistance

Archaeology	High or low res responses are clearly or very probably archaeological These anomalies, whilst considered anthropogenic, could be of any age.
? Archaeology	The interpretation of such anomalies is often tentative, with the anomalies exhibiting either weak signal strength or forming incomplete archaeological patterns. They may be the result of variable soil depth, plough damage or even aliasing as a result of data collection orientation.
Natural	These responses form clear patterns in geographical zones where natural variations are known to produce significant magnetic distortions e.g. palaeochannels or magnetic gravels.
? Natural	These are anomalies that are likely to be natural in origin i.e. geological or pedological.
? Landscaping / topography	These are regular and broad linear anomalies that are presumed to be the result of ancient cultivation. In some cases the response may be the result of modern activity.
Vegetation	These are isolated or grouped linear responses. They are normally narrow and are presumed modern when aligned to current field boundaries or following present ploughing.
Trend	This is usually an ill-defined, weak, isolated or obscured linear anomaly of unknown cause or date.

GPR

Wall /Foundation/ /Vault /Culvert etc.	High amplitude anomaly definitions used when other evidence is available that supports a clear archaeological interpretation.
Archaeology	Anomalies whose form, nature and pattern indicate archaeology but where little or no supporting evidence exists. If a more precise archaeological interpretation is possible, for example the responses appear to respect known local archaeology, then this will be indicated in the accompanying text. As low amplitude responses are less obvious features it is unlikely that they would have a definitive categorisation.
? Archaeology	When the anomaly could be archaeologically significant, given its discrete nature, but where the distribution of the responses is not clearly archaeological. Interpretation of such anomalies is often tentative, exhibiting either little contrast or forming incomplete archaeological patterns.
Historic	Responses showing clear correlation with earlier map evidence.
?Historic	Responses relating to features not directly recorded on earlier maps but which appear to respect features that are. May form patterns suggestive of formal gardens, landscaping or footpaths.
Area of Anomalous Response	An area in which the response levels are very slightly elevated or diminished with respect to the 'background'. Where no obvious surface features or documentary evidence can explain this spread of altered reflectivity it is assumed to denote some kind of disturbance, though the origins could be of any age and either anthropogenic or natural. Possible explanations are changes in subsurface composition and groundwater 'ponding'.
Natural	Anomalies relating to natural sub-surface features as indicated by documentary sources, local knowledge or evidence on the surface.
?Natural	Responses forming patterns akin to subsoil/geological variations either attenuating or reflecting greater amounts of energy. An archaeological origin such as rubble spreads or robbed out remains cannot be dismissed.
Trend	An ill defined, weak or isolated linear anomaly of unknown cause or date.
Modern	Reflections that indicate features such as services, rebar or modern cellars correlating with available evidence (maps, communications with the client, alignment of drain covers etc.).
?Modern	Reflections appearing to indicate buried services but where there is no supporting evidence. Also applies to responses which form patterns, or are at a depth which suggests a modern origin. An archaeological source cannot be completely dismissed.
Surface	Responses clearly due to surface discontinuities, the effects of which may be seen to 'ring' down through radargrams and so incorrectly appearing in the deeper time-slices.

Appendix 2: PROJECT DESIGN FOR A GEOPHYSICAL SURVEY AT SLINGSBY, NORTH YORKSHIRE

CS Archaeology

January 2011

0 SUMMARY

0.1 This Project Design (PD) is in response to pre-planning application information from Ryedale District Council/North Yorkshire County Council for further information in advance of a proposed planning application.

0.2 This PD proposes that a geophysical survey is implemented to record potential archaeological features in advance of a forthcoming planning application to develop the site.

0.3 The results from this survey will provide more detailed information of potential heritage assets within the Proposed Development Area's (PDA) and will enable future archaeological management of the PDA.

1 INTRODUCTION

1.1 Details

1.1.1	*Site Name:*	Land SE of Slingsby, North Yorkshire
1.1.2	*Location:*	Enclosed fields north of the B1257, Slingsby, North Yorkshire
1.1.3	*Grid reference:*	SE 6995 4762 (centre)
1.1.4	*PDA:*	1.7 hectares (Figure 1)
1.1.5	*Purpose of the Survey:*	To record geophysical traces of potential archaeological deposits.

1.2 Archaeological Background

1.2.1 The vale of Pickering is an internationally renowned area for archaeology; in particular the Mesolithic remains at Star Carr continue to offer unique insights into lifestyles and technology. Evidence for multi-period land-use has been demonstrated at West Heslerton covered and protected by wind blown deposits along the southern edge of the former Lake Pickering.

1.2.2 Historically the PDA has been enclosed fields for at least the last 150 years, and these enclosed fields are depicted on the 1st Edition Ordnance Survey Map of 1856. There was an inclosure of 354 acres in 1655 by private commission, and an Inclosure Act was passed in 1755 (Internet 1). Prior to enclosure it is assumed that the PDA formed a series of arable strip fields part of Slingsby's system of open Medieval/Post Medieval agriculture.

1.2.3 There is a considerable potential for well preserved archaeological remains, this is helped by potential wind blown sediments protecting these deposits.

1.3 Planning Background

1.3.1 This PD is in response to a pre-planning request for further archaeological information form Ryedale Borough who are archaeologically advised by North Yorkshire County Council.

1.3.2 This PD represents a summary of the broad geophysical requirements for the evaluation of the PDA. This is in accordance with English Heritage's *Geophysical Survey In Archaeological Field Evaluation* (Internet 2) and according to the Institute for Field Archaeologists code of practice (2001).

2 OBJECTIVES

2.1 The objectives of this stage of the programme of archaeological work, is to accurately map any geophysical anomalies within the PDA.

3 METHODOLOGY for Geophysical Survey *(GSB 2011).*

3.1 Grid Establishment / Relocation Data

3.1.1 All recorded survey data are collected with reference to a site survey grid or survey baselines. For gradiometer survey this grid consists of individual 20mx20m squares.

3.1.2 The survey grid is marked out by means of red plastic tent-pegs or brightly coloured/flagged canes and grid nodes are set out with a positional accuracy of at least 10cm (0.1m) as per EH guidelines. As standard the survey grid will be established using Real Time Kinematic (RTK) differential GPS equipment. On rare occasions where this is not practicable, a combination of Total Station, optical square, ranging rods and tape measures may be used.

3.2.3 For all techniques data are collected along regularly spaced traverses within the grid. These traverses are marked by "intermediate" plastic pegs or canes, set out using tape measures. For resistance and GPR surveys, tapes or string lines marked at regular intervals (usually 1m) are laid out along the traverses, between these intermediate markers.

3.2.4 Either at this stage or after data collection is completed, measurements will be taken which allow the re-location of the survey area. This is necessary for the production of maps in the report and for any subsequent re-establishment of the survey grid by other workers. Tie-in measurements are made to clear features (such as boundaries and buildings) *which appear on the mapping*.

3.2.5 If required, markers (pegs, canes, stakes or fluorescent spray-paint) can be left *in situ* at boundaries to mark grid baselines and assist in the subsequent re-establishment of the grid. The client should advise of any special arrangements/preferences in advance of survey.

3.2.6 On completion of the survey (i.e. when all data have been collected, downloaded to computer, visually examined, and backed up to an external device) all pegs/canes and any other temporary markers will be removed from the evaluation area, with the exception of any baseline markers specifically requested by the client (see above).

3.2 Data Collection - Gradiometer Survey

3.2.1 Equipment

- Standard Instrument: Bartington Grad 601-2
- Standard sample interval (along traverse): 0.25m
- Standard traverse interval: 1.00m
- Total data points: 1600 readings per individual 20m x 20m grid square
- Data are stored within the instrument's memory

3.2.2 For optimum data quality, it is imperative that the operator is able to walk at an even pace whilst holding the instrument steady. It is for this reason that the survey area needs to be free of obstructions such as dense vegetation.

3.3 General Data Handling

3.3.1 All data files (survey data and grid tie-in data) are transferred to the GSB server immediately upon returning to the office. Nightly off-site backups are made of all project work in progress. (On completion of a project the entire archive is written to two CDs and an external hard disk drive) held at separate off-site locations).

3.4 Data Processing and Analysis

3.4.1 The results are analysed using a combination of commercial and in-house software. All data processing is kept to a minimum and any processed data files are stored in a separate directory or with different filenames. Thus the raw data are always available for reference when interpreting the results. Any processing which has been carried out, such as de-staggering or interpolation, is clearly stated in the report.

3.4.2 The interpretation is based on a variety of plotting formats and a range of data displays; it is undertaken by the PC. Wherever possible, account is taken of the nature of the prevailing archaeological, pedological, geological, and land use conditions. These interpretations are independently checked by either the Senior Geophysicist or the Director.

3.4.3 In-house templates and guidelines and standard reference texts (e.g. English Heritage Thesaurus of Monument Types) are used to assist in the analysis of results.

3.5 Project Report

3.5.1 A standard GSB project report will be printed and bound and will contain the following sections: report text; list of figures; report figures; appendix detailing technical information. A CD is affixed to the inside front cover of the report. This will contain a pdf version of the printed report, additional reference plots of data in pdf format and the tie-in information. Depending on the client's specifications, AutoCAD (dwg or dxf) versions of the report figures may also be included.

3.5.2 The report text will:

- Describe the site and situation of a survey area and the prevailing local topography, land use, soils and geology;
- Provide a brief description of any known archaeological remains in the vicinity, and their relevance to the survey results, will be made as necessary;
- State the aims and objectives of the survey;
- List and explain the display formats adopted;
- Describe any general factors or complications which must be considered when viewing the data. These include any local factors which may hinder the collection or interpretation of the results;

- Assess the results in accordance with the aims of the survey. In the majority of cases, the anomalies are interpreted from the perspective of their archaeological potential;
- Provide the names of the project co-ordinator and all project assistants together with the dates of the survey and report.

3.5.3 All reports are proof read by at least two other qualified members of staff to ensure: completeness and quality of data interpretation, clarity and accuracy of expression; consistency of format; good spelling and grammar; that references to figures and tables are complete, and that any external references are as full as possible.

3.5.4 The report figures will present the results of the survey accurately positioned on the site mapping. They are produced in AutoCAD and will include:

- A diagram showing the location of the survey areas (with key, scale and north arrow)
- Greyscale or colour plot(s) of the data-set(s) (with plotting levels, scale and north arrow)
- Digitised interpretation(s) of the results (with key, scale and north arrow)

3.5.5 The scale of the above printed figures will vary depending on survey size but the scale of the data plots and interpretations will not exceed 1:2500.

3.5.6 The reference data plots on the CD are not positioned on the mapping and are presented at a scale of 1:500 unless otherwise indicated. For magnetic data these will include at least one XY trace plot and one greyscale image for each complete survey area/data-set; for resistance data, a greyscale image of each raw data-set together with other plots that have been used to assist in the interpretation; for GPR data, full time-slice data images and selected radargrams used in analysis.

3.5.7 The Geophysical Survey will comprise of readings at 0.25m intervals with a traverse separation of 1.0m using Bartington Grad 601-2 instruments over a survey grid.

3.5.8 Three bound copies of the survey report (including digital copies on CD) will be provided.

3.5.9 The survey and report will be in accordance with all current relevant codes, standards and guidelines.

3.6 Report Submission

3.6.1 Copies of the completed report will be submitted to the Client, Castle Howard Estates, the client's planning consultant (How Planning) and to the Historic Environment Record in both hard and digital formats.

3.7 Site Monitoring

3.7.1 NYCC will be responsible for monitoring the evaluation. A minimum of one week's notice of the start of the field work will be given by CS Archaeology to NYCC, so that arrangements for monitoring can be made.

3.8 Health and Safety

3.8.1 CS Archaeology and the subcontractor GSB will operate with due regard to health and safety legislation.

3.9 Publicity

3.8.1 Provision will be made for publicising the results of the work locally, and an OASIS form will be completed for the project.

3.8.2 CS Archaeology is aware that this work may lead to further archaeological dissemination.

3.9 References

GSB 2011, Geophysical Method statement, unpublished document

Internet 1: a history of Slingsby *(http://www.british-history.ac.uk)*

Internet 2: English Heritage 2008, *Geophysical Survey in Archaeological Field Evaluation* (*http*://www.english-heritage.org.uk)

Institute of Archaeologists 2001, *Standard and Guidance for Archaeological Field Evaluations*

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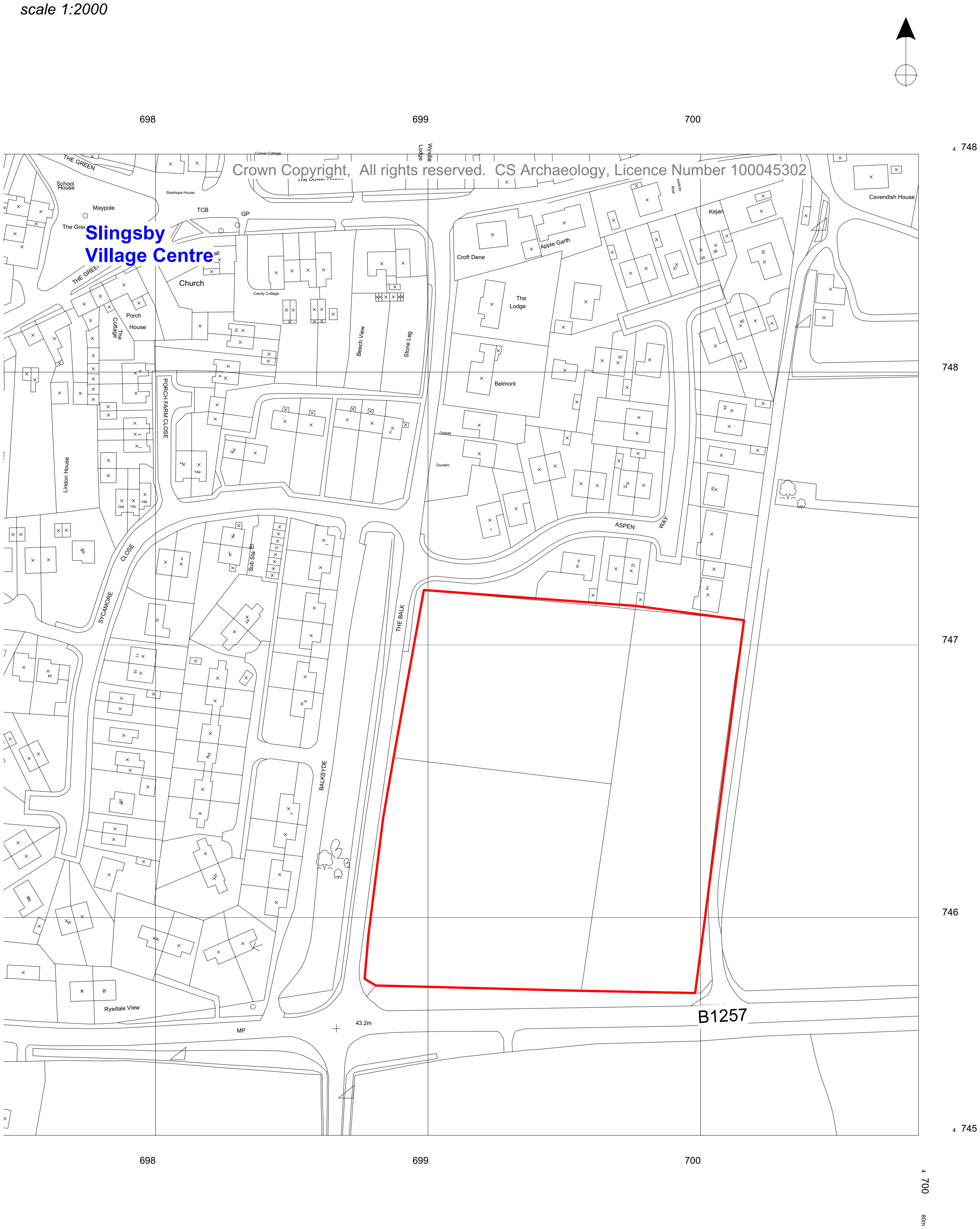


Survey Area (1.7 Ha)

Land to the southeast of Slingsby, North Yorkshire: A Geophysical Survey	Figure 1: Site Map	CS Archaeology January 2011