Archaeological Services
University of Durham

# White Hill Woods, Easington Lane, Tyne & Wear and County Durham

# geophysical surveys

*on behalf of*
**The Woodland Trust**

**Report 2100**
October 2008

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*Autumn Park, Dysart Road, Grantham, Lincolnshire NG31 6LL*

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## Contents

# 1. Summary


### *The project*

1.1 This report presents the results of geophysical surveys conducted in advance of a tree planting scheme at White Hill Woods, Easington Lane. The study area spans Tyne & Wear and County Durham. The works comprised magnetic susceptibility survey of approximately 65ha and detailed geomagnetic survey of two smaller areas to the north and south, totalling approximately 8ha.

1.2 The works were commissioned by The Woodland Trust and conducted by Archaeological Services Durham University.

### *Results*

1.3 Possible traces of ridge and furrow cultivation, or other former ploughing, are evident across much of the detailed survey areas.

1.4 In the northern part of the site, Area 1, the detailed survey also detected the probable remains of two ditched enclosures and a large number of probable pits, some on an apparent alignment, some in a cluster and others spread over a large area. A former field boundary was also detected in the east of that area.

1.5 The detailed survey of Area 2 detected the probable remains of some ditch and pit features.

1.6 The magnetic susceptibility (MS) survey of the remaining 65ha identified broad areas of anomalously high and low MS values, which may reflect higher and lower levels of past human activity respectively. The highest values were recorded in the northern part of the survey area, near the probable archaeological features detected in the detailed gradiometer survey.

1.7 It is likely that the ridge and furrow traces have a medieval/post-medieval origin and that the former field boundary in Area 1 is post-medieval. The ditched enclosures in Area 1 could be of late prehistoric/Romano-British date.

### *Possible further work*

1.8 Further archaeological recording at this site might involve targeted, detailed gradiometer surveys to sample areas of anomalously high and low MS values in order to confirm the presence or absence of archaeological remains. MS survey is intended as a precursor to more detailed survey. A programme of archaeological trial trenching could be used to try to establish the functions, dates, depths and preservation states of features identified in the gradiometer surveys.

1.9 It may then be possible and appropriate to re-define the areas proposed for deep ploughing and tree or grassland planting based on the depths to archaeological features, where present, in different parts of the site.

## 2. Project background

***Location*** (Figures 1 & 2)

2.1 The site comprises land at White Hill, to the south of Easington Lane and north of Pig Hill, spanning the border between Tyne & Wear and County Durham (NGR centre: NZ 3677 4511). It is bounded by Salter's Lane (B1280) to the east and by a track and Coldwell Burn to the south, with areas of woodland to the west. The northern boundary is the rear of properties on South View, Easington Lane. The total area of the site is 82ha, of which 9.5ha consists of existing woodland. The areas for survey therefore covered approximately 73ha.

***Development proposal***

2.2 The Woodland Trust are proposing to create native woodland. The scheme will involve some deep ploughing (five and three hectares in the northern and southern parts of the area respectively) and both grassland seeding and tree planting.

***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 requested in advance of development.

***Methods statement***

2.4 The surveys have been undertaken in accordance with a Specification for Archaeological Geophysical Survey prepared by the Durham County Council Archaeology Section (Appendix).

***Dates***

2.5 Fieldwork was undertaken between the 24th September and 7th October 2008. This report was prepared between the 8th and 16th October 2008.

***Personnel***

2.6 Fieldwork was conducted by Richie Villis (Supervisor), Janice Adams, Edward Davies, Natalie Swann and David Webster. This report was prepared by Duncan Hale, the Project Manager, with illustrations by Edward Davies, David Graham and Janine Wilson.

***Archive/OASIS***

2.7 The site code is **WHW08**, for **W**hite **H**ill **W**oods 20**08**. The survey archive will be supplied on CD to the Bowes Museum on completion of the project. Archaeological Services is registered with the **O**nline **A**cces**S** to the **I**ndex of archaeological investigation**S** project (OASIS). The OASIS ID numbers for this project are **archaeol3-49858** (Co Durham) and **49862** (Tyne & Wear).

## 3. Archaeological and historical background

3.1 An archaeological desk-based assessment for the proposed woodland scheme was conducted by Archaeological Services Durham University on behalf of The Woodland Trust (Archaeological Services 2008).

3.2 In summary, the assessment indicated that the proposed development may impact upon unknown archaeological resources most likely dating to the prehistoric/Romano British periods in terms of agricultural remains and settlement. Analysis of sites in the vicinity has indicated a high potential for potential prehistoric features.

## 4. Landuse, topography and geology

4.1 At the time of survey, the bulk of the site (73ha) was in use as arable land with 9.5ha of mature woodland in the west.

4.2 The land slopes gradually down to Coldwell Burn in the south. To the north is the village of Easington Lane. The mean elevation on the northern-eastern part of the site is 133m OD, and at Coldwell Burn 115m OD.

4.3 The underlying solid geology of the area is Magnesian Limestone which is overlain by boulder clay and morainic drift (glacial till).

## 5. Geophysical survey

***Standards***

5.1 The surveys and reporting were conducted in accordance with English Heritage guidelines *Geophysical survey in archaeological field evaluation, 2nd edition* (David, Linford & Linford 2008); 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 2002).

***Technique selection***

5.2 Geophysical survey enables the relatively rapid and non-invasive identification of sub-surface features of potential archaeological significance and can involve a variety of complementary techniques such as magnetometry, earth electrical resistance, 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, the methodology was specified (Appendix) as follows:

- Detailed geomagnetic survey (fluxgate gradiometry) over the two areas of proposed deep ploughing (5ha and 3ha)

- Topsoil magnetic susceptibility survey (MS) over the remaining 65ha

5.4 Fluxgate gradiometry involves the use of hand-held magnetometers to detect and record 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 The topsoil MS survey technique is designed for rapid assessment of the concentration of ferrimagnetic minerals in the top *c.*60mm of soil. When used for gridded surveys it can help to identify areas of archaeological potential such as former occupation sites, since human habitation leads to an irreversible magnetic enhancement of the soil, mainly as a result of burning.

### *Field methods*

#### Detailed geomagnetic survey

5.6 A 30m grid was established over each of the two areas destined for deep ploughing and tied-in to known, mapped Ordnance Survey points using a Trimble Pathfinder Pro XRS global positioning system (GPS) with real-time correction providing sub-metre accuracy.

5.7 Measurements of vertical geomagnetic field gradient were determined using Bartington Grad601-2 dual fluxgate gradiometers. A zig-zag traverse scheme was employed and data were logged in 30m 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 3600 sample measurements per 30m grid unit.

5.8 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.

#### Topsoil magnetic susceptibility

5.9 A 100m grid was established over the remainder of the site. This survey was undertaken using Bartington Instruments MS2 meters and MS2D field loop sensors. The instrument sensitivity was set to 1SI and data were logged at 10m intervals across the site, thus providing 100 sample measurements per 100m grid unit. Data were subsequently uploaded to a desktop computer for processing, interpretation and archiving.

### *Data processing*

5.10 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 (unfiltered) data. The greyscale images and interpretations are presented in Figures 2-7; the trace plots are provided in Figure 8. In the gradiometer greyscale images, positive magnetic anomalies are displayed as dark grey and negative magnetic anomalies as light grey. A palette bar relates the greyscale intensities to anomaly values in nanoTesla. The magnetic susceptibility greyscale image is similar, with the highest values being displayed as the darkest greys; a palette bar relates the greyscale intensities to SI units.

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

| | |
|---|---|
| *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. |
| *despike* | locates and suppresses iron spikes in gradiometer data. |
| *destagger* | corrects for displacement of anomalies caused by alternate zig-zag traverses. |
| *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 0.25m x 0.25m intervals. |

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

| | |
|---|---|
| *despike* | locates and suppresses spikes in MS data. |
| *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 5m x 5m intervals. |

***Anomaly types***

5.13 Colour-coded geophysical interpretation plans are provided. Two types of anomaly have been distinguished in the magnetic susceptibility data (Figure 4):

| | |
|---|---|
| *high MS* | regions of enhanced magnetic susceptibility materials which might be associated with areas of human settlement or activity. |
| *low MS* | regions of anomalously low magnetic susceptibility which might be associated with areas of less human activity. |

5.14 Three types of geomagnetic anomaly have been distinguished in the gradiometer data (Figure 6):

| | |
|---|---|
| *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. |
| *negative magnetic* | regions of anomalously low or negative magnetic field gradient, which may correspond to features of low magnetic susceptibility such as wall footings and other concentrations of sedimentary rock or voids. |
| *dipolar magnetic* | paired positive-negative magnetic anomalies, which typically reflect ferrous or fired debris and/or fired structures such as kilns or hearths. |

# 6. Discussion

***Topsoil magnetic susceptibility survey***

6.1 The survey has identified marked variations in topsoil MS between different parts of the development area. Considerably enhanced MS values were recorded across most of the northern and north-western parts of the area, with slightly raised values in the eastern and east-central parts. The magnetic susceptibility of the topsoil in these areas may have been enhanced by the increased presence of decomposed organic matter, such as food and animal remains, or by burning. Both of these factors can indicate human activity and an increased likelihood that archaeological features may survive beneath the topsoil compared with areas of low MS.

6.2 A roughly triangular area of particularly low MS values was identified in the west-central part of the site. This area can be considered to be less likely to contain evidence for former settlement or craft/industrial activities, and broadly corresponds to the shape and extent of a former field evident on early Ordnance Survey editions. This former field appears to have a quite different land-use history to its neighbours, possibly including the removal of topsoil.

***Detailed geomagnetic survey***

**General comments**

6.3 A scatter of small, discrete dipolar magnetic anomalies has been detected across each survey area, though there is a particularly high concentration of such anomalies along the northern boundary of Area 1, adjacent to the residential area. These anomalies almost certainly reflect items of near-surface ferrous and/or fired debris, such as horseshoes and brick fragments, and in most cases have little or no archaeological significance. A sample of these is shown on the geophysical interpretation plans, however, they have been omitted from the archaeological interpretation plans and the following discussion.

6.4 Except where stated otherwise in the text below, positive magnetic anomalies are taken to reflect relatively high magnetic susceptibility materials, typically sediments in cut archaeological features (such as furrows, ditches or pits) whose magnetic susceptibility has been enhanced, as above, by decomposed organic matter or by burning.

**Area 1**

6.5 A curvilinear positive magnetic anomaly in the western part of this area almost certainly reflects a soil-filled ditch. This appears to define a large, 65m diameter, sub-circular enclosure. It has not been possible to identify associated features within the enclosure, but this may be due to the overlying anomalies associated with later ploughing of the site; such features could lie undetected beneath the ploughsoil.

6.6 The above enclosure sits within a possible rectilinear enclosure, though the chronological relationship between the two is not known. The rectilinear enclosure appears to be defined by a double-ditch. Both enclosures appear to extend northwards beyond the limit of the survey area.

6.7 A cluster of discrete positive magnetic anomalies was detected near the south-western corner of the larger enclosure. These anomalies may also reflect soil-filled features, such as pits, which are probably not related to the enclosure as they extend beyond its limit. Another concentration of probable pits was detected to the west of the enclosures, on a north-west/south-east alignment. The eastern half of this survey area is characterised by a concentration of more large pits.

6.8 One of the most prominent features in this area comprises a rectilinear arrangement of intense linear anomalies, almost certainly reflecting the course of a utility. The anomaly skirts around the south side of the possible enclosures described above and its composition changes before re-entering the residential estate to the north.

6.9 Weak, parallel, positive magnetic anomalies were detected across much of the north-western part of the area. The anomalies are spaced at 5-8m intervals and probably reflect former ridge and furrow cultivation. Similar anomalies were recorded across the eastern half of this area, aligned north-west/south-east, which probably also reflect former ridge and furrow farming. One particularly strong lineation within this latter group almost certainly reflects a former field boundary, as shown on early Ordnance Survey editions.

**Area 2**

6.10 The most prominent anomalies in this area are intense and irregular in shape and may reflect geological variation or features in the slope above Coldwell Burn.

6.11 Weak, parallel, slightly arcuate positive magnetic anomalies were also detected across much of this area. The anomalies are evenly-spaced at 7-8m intervals, on three different orientations, and almost certainly reflect traces of former ridge and furrow cultivation.

6.12 Other positive magnetic anomalies detected in this area could reflect ditch and pit remains.

6.13 A right-angled, discontinuous chain of small dipolar magnetic anomalies in the south-western part of the area probably reflects a former wire fence line or cable.

## 7. Conclusions

7.1 Geophysical surveys were undertaken over 73ha of land at White Hill, Easington Lane, prior to a proposed woodland planting scheme.

7.2 Detailed fluxgate gradiometer surveys over two areas proposed for deep ploughing detected extensive traces of probable former ridge and furrow cultivation.

7.3 In the northern part, Area 1, the detailed survey also detected the possible remains of two ditched enclosures and a large number of probable pits, some on an apparent alignment, some in a cluster and others spread over a large area. A former field boundary was also detected in the east of that area.

7.4 The detailed survey of Area 2 detected the probable remains of some ditch and pit features.

7.5 The magnetic susceptibility (MS) survey of the remaining 65ha identified broad areas of anomalously high and low MS values, which may reflect higher and lower levels of past human activity respectively. The highest values were recorded in the northern part of the survey area, near the probable archaeological features detected in the detailed gradiometer survey.

7.6 The geophysical surveys cannot provide dates for these features but it is likely that the ridge and furrow traces have a medieval/post-medieval origin and that the former field boundary in Area 1 is post-medieval. The ditched enclosures in Area 1 could be of late prehistoric/Romano-British date.

7.7 Further archaeological recording at this site might involve targeted, detailed gradiometer surveys over sample areas of anomalously high and low MS values in order to confirm the presence or absence of archaeological remains. MS survey is usually a precursor to such surveys. A programme of archaeological trial trenching could be used to try to establish the functions, dates, depths and preservation states of features identified in the gradiometer surveys.

7.8 It may then be possible and appropriate to re-define the areas proposed for deep ploughing and tree or grassland planting schemes based on the depths to archaeological features, where present, in different parts of the site.

## 8. Sources

David, A, Linford, N, & Linford, P, 2008 *Geophysical survey in archaeological field evaluation, 2nd edition,* English Heritage

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

Schmidt, A, 2002 *Geophysical Data in Archaeology: A Guide to Good Practice*, Archaeology Data Service, Arts and Humanities Data Service

# Appendix: Specification for archaeological geophysical survey

**SPECIFICATION FOR ARCHAEOLOGICAL GEOPHYSICAL SURVEY:**
**At White Hill Woods, Easington Lane**

**1.0 Site Location**

1.1 The development site is located south of Easington Lane and to the north of Pig Hill.

1.2 The site is centred on grid reference NZ 3677245111

1.3 The site is approx 90ha

1.4 The site lies between Easington Lane, Tyne and Wear and Haswell, County Durham

**2.0 The Woodland Development**

2.1 The evaluation will be used to inform Durham County Council and Tyne and Wear Council of any archaeological features in the area. This site is currently under arable but has been purchased by the Woodland Trust who will be creating a native woodland for the people of the area.

2.2 The results of this evaluation work will be used to determine the level of archaeological mitigation which may be required.

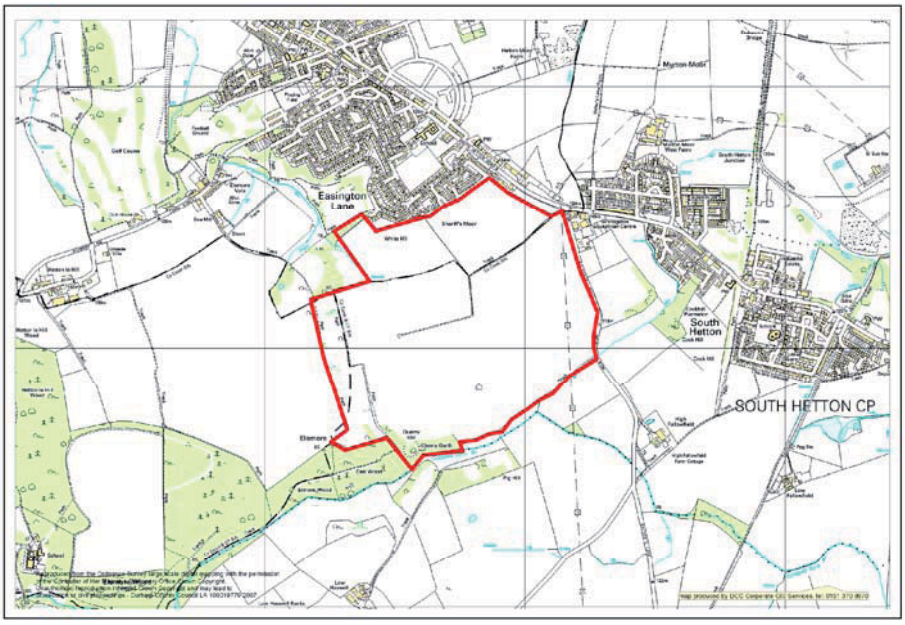


**Figure 1: Site location shown in red hatching (© Durham County Council)**

DURHAM COUNTY COUNCIL

***Adult and Community Services:** Culture & Leisure: Archaeology* 1

**3.0 Background**

3.1 An archaeological assessment for the proposed woodland scheme development has been conducted by Archaeological Services, Durham University on behalf of the Woodland Trust. This work was carried out in September 2008. This report must be referred to during the tendering process and is available for consultation in the SMR

3.2 Briefly, the assessment has indicated that the proposed development may impact upon unknown archaeological resources most likely dating to the prehistoric/romano british periods in terms of agricultural remains and settlement. Analysis of sites in the vicinity has indicated a high potential for potential prehistoric features.

**4.0 Archaeological brief**

4.1 This brief sets out the standards and methodology for the geophysical survey and how it must be carried out. Any further works which may be required to mitigate the impact of the proposed development will be dealt with under a separate brief as a condition of future detailed planning permission.

4.2 In order to evaluate the archaeological potential for remains of any period, the site must be sampled by geophysical survey.

4.3 The overall objectives of the evaluation are to determine if there are any deposits or features relating to archaeological/historical land use. Specific aims and objectives must be indicated by the appointed archaeological contractor and must take into account the recently published research framework for the North-East (NERRF).

**4.4 This brief does not constitute the "written scheme of investigation" which must be submitted by the developer and approved by the planning authority in advance of development commencing on the site.**

4.5 It is Durham County Council's usual practice to specify 100% geophysical survey on rural and previously undeveloped sites however, due to the fact that this site is an unusually large woodland scheme c90ha, the decision has been taken to use a rapid scanning technique followed by targeted detailed survey.

4.6 When a 100% of an area cannot be evaluated by magnetometer survey then English Heritage (2008:18) recommends that the areas to be surveyed in detail are targeted using a prior magnetic susceptibility (MS) survey taking readings every 10m over the whole evaluation area then identifying the areas of high magnetic susceptibility to return to and survey in detail with the magnetometer.

4.7 An alternative to the above will be to divide the whole evaluation area up into 20 metre wide strips then do detailed magnetometer coverage over every other strip thus achieving 50% detailed coverage. There should then be a provision to go back and infill the un-surveyed strips in any areas where archaeological remains are detected.

**4.8 Both of the above approaches will need to be costed separately in the tender document.**

4.9 Additionally, the 8ha area which is to be deep ploughed for the wildflower meadow and the Magnesian Limestone grassland must be evaluated by magnetometer survey.

4.10 The archaeological contractor must liaise with the client over development layout and discuss the final survey sample with the DCC Assistant Archaeology Officer.

4.11 The overall purpose of the geophysical survey will be:

- A detailed 8ha survey of the deep ploughed areas
- A rapid MS survey of the remainder of the area (approx 82ha)
- A detailed survey of areas of high magnetic susceptibility (area yet to be defined)
- to establish the presence/absence, and nature of any archaeological anomalies within the area specified
- to define the extent of any such anomalies, and to characterise, if possible
- to establish the presence/absence, and nature of any known modern anomalies within the area of proposed development which may affect the results

4.12 Methodologies must be clearly costed in the tender document and information on how the contractor proposes to conduct the work clearly set out in the project design document. Costings for both the magnetic susceptibility survey and the alternative scheme should be included within the WSI.

4.13 A survey grid must be placed across the site and must be accurately tied in to local topographic features and overlaid onto an OS map base. The grid tie-in information should be made available in, or with, the final report so that the location plan can be related to the OS National Grid. Once the survey is complete any markers used must be removed from site. The results, including archaeological interpretation of the data must be set out in a report format with maps and must be available to aid placement of the subsequent evaluation trenches.

4.14 Depending on the results of the evaluation phase, further works may be required to mitigate the impact of the development on any archaeological remains. This will be dealt with by a separate brief should this be required.

**5.0 OASIS**

5.1 The Durham County Council Archaeology Section supports the Online Access to Index of Archaeological Investigations (OASIS) Project. The overall aim of the OASIS project is to provide an online index to the mass of archaeological grey literature that has been produced as a result of the advent of large scale developer funded fieldwork.

5.2 The archaeological contractor must therefore complete the online OASIS form at http://ads.ahds.ac.uk/project/oasis/ within 3 months of completion of the work. Contractors are advised to ensure that adequate time and costings are built into their tenders to allow the forms to be filled in.

5.3 Technical advice must be sought in the first instance from OASIS (oasis@ads.ahds.ac.uk) and not from Durham County Council Archaeology Section.

5.4 Once a report has become a public document by submission to or incorporation into the SMR, Durham County Council Archaeology Section will validate the OASIS form thus placing the information into the public domain on the *OASIS* website.

5.5 The archaeological consultant or contractor must indicate that they agree to this procedure within the specification/project design/written scheme of investigation submitted to Durham County Council Archaeology Section for approval

**6.0 Health and Safety Policy**

6.1 Contractors are expected to abide by the *1974 Health and Safety Act* and its subsequent amendments as stated in the *Construction and Design Management Regulations 1994*. Appropriate provision of first aid, telephone and safety clothing as described in the *SCAUM* manual on archaeological health and safety must be followed. Each site must have a nominated safety officer.

6.2 The undertaking of a risk assessment prior to the commencement of works is required. A copy of the risk assessment must be circulated to the client and any other sub-contractors working on the site at the same time. Contractors must ensure that all staff working on the site are fully briefed on all health and safety issues relating to the site prior to working there.

6.3 Adequate and secure safety fencing must be placed around excavated trenches in order to inhibit easy access by the public. Clear signage regarding excavation trenches must be displayed on the fences and site perimeter as necessary. These items must be agreed with the client prior to work commencing and detailed in the WSI.

6.4 Contractors are advised to identify the location of any services or overhead wires which may cross the site and ensure that they are clearly marked before trenching commences so that they can be avoided.

6.5 The archaeological contractor is responsible for all on-site safety issues in relation to the archaeological works.

**7.0 Publication**

7.1 All assessments, evaluations and watching briefs which do not progress to further excavation and research (with the relevant post-excavation and publication scheme and costs), must have a time and budget allocation identified for publication. This must be to a minimum standard to include a summary of the work, findings, dates, illustrations and photographs and references to where the archive is lodged.

7.2 Editors of regional journals, either the *Durham Archaeological Journal* or *Archaeologia Aeliana* must be contacted for information on outline publication costs, fuller figures may be worked out on completion of the watching brief. As the final note is largely unpredictable in advance a contingency sum must be set aside at the outset of work in the tender.

7.3 County Durham Archaeology Section produces an annual publication every March which highlights the archaeological work conducted in the county over the previous 12 months. To this end, it is now a requirement of every specification that a précis of archaeological works conducted in the county as a result of PPG16 must be submitted to the DCC Archaeology Section.

7.4 The précis must be no more than 500 words in length and it would be appreciated if JPEG or TIFF images of a minimum of 300dpi are also included. The summary must be sent to the County Archaeologist by the beginning of December of the same year in which the work was conducted.

**8.0 The Report**

8.1 At least two paper copies of the report must be sent to the client as well as one bound paper copy to the HER as well as **one digital copy with images** which can be used to enhance the on-line HER website *Keys To The Past* (PDF on CD-Rom is acceptable). The geophysical survey report must include the following:

- executive summary
- a site location plan to at least 1:10,000 scale with 10 figure central grid reference
- OASIS reference number
- contractor's details including date work carried out
- nature and extent of the proposed development, including developer/client details
- description of the site location and geology
- geophysical technical and processing information
- geophysical results

- geophysical discussion and interpretation
- a plot of the raw geophysical data (to an appropriate scale)
- geophysical plots must show the location of modern intrusions (i.e. services etc)
- geophysical X-Y trace and greyscale and/or dot density plots (to an appropriate scale)
- geophysical interpretative feature map (to an appropriate scale)
- discussion of the results of field work
- suggestions regarding the need for, and scope of, any further archaeological work, including publication
- bibliography

8.2 A report synthesising the results of the works must be produced for the client and the County Durham HER. This must include a site location plan with NGR references, and also be accompanied by additional plans/map extracts to display noted and recorded archaeological features as appropriate.

8.3 The report must be presented in an ordered state and contained within a protective cover/sleeve or bound in some fashion (loose-leaf presentation is unacceptable). The report must contain a title page listing site/development name, district and county together with a general NGR, the name of the archaeological contractor and the developer or commissioning agent. The report must be page numbered and supplemented with sections and paragraph numbering for ease of reference.

8.4 The report must seek to identify any deposits remaining on or associated with the site that will remain following the completion of the evaluation.

**9.0 The Tender**

9.1 Tenders for the work must include a method statement and the following:

9.2 Brief details of the organisation and the number of staff who are proposing to carry out the work including any relevant specialisms or experience.

9.3 The earliest date at which the work can be commenced and the amount of notice required to initiate the fieldwork.

9.4 Details concerning proposed methods of recording.

9.5 Statement agreeing to complete the OASIS forms on completion of the evaluation report.

9.6 An estimate of how long the work will take broken down by time and cost in terms of data collection and report production (the anticipated extent of the work must be confirmed with the client in advance) on a *per diem* basis where possible (this is particularly in reference to the specialists' costs). The tender must include a breakdown of costs attributable to:

- travelling and subsistence
- geophysical survey
- report production
- archiving deposition charge
- publication
- administration
- 1 x site monitoring visit from DCC archaeologist
- other

**10.0 Submission of Report**

10.1 This evaluation must be considered as a project in its own right. At least **two copies of the report** must be sent to the client. A third paper copy of the report and **a PDF on CD-ROM with digital images** (JPEG's) of the site for the *Keys To The Past* website must be sent to the Archaeology Section, Durham County Council for inclusion into the County Durham Archaeological Archive (HER) at:

> Archaeology Section, Adult and Community Services, Culture & Leisure, Durham County Council, Rivergreen Centre, Aykley Heads, Durham, DH1 5TS.

**11.0 The Archive**

11.1 The site archive comprising the original paper records and plans, photographs, negatives etc, must be deposited at the Bowes Museum at the completion of the work. This must be in accordance with both the County Archaeological Archive policy and the Durham County Council Historic Environment Record Revised Charging Scheme (2008-09). Both of these are available from DCC Archaeology if required.

**12.0 Notice**

12.1 The County Archaeologist must be given two weeks notice in writing of the commencement of evaluation works. During such works the County Archaeologist or his nominated representative must be allowed access to the site and excavations at all reasonable times.

**13.0 References**


| | | |
|---|---|---|
| Archaeological Archives Forum | 2007 | *Archaeological Archives: A guide to best practice in creation, compilation, transfer and curation.* |
| English Heritage | 1991 | *Management of Archaeological Projects 2* |
| | 2002 | *Guidelines for Environmental Archaeology: a guide to the theory and practice of methods from sampling and recording to post-excavation* |
| | 2006 | *Understanding Historic Buildings: A Guide to Good Recording Practice* |
| | 2008 | Geophysical Surveys in Field Evaluation |
| Institute of Field Archaeologists | 1999 | *Standard and Guidance: Archaeological Excavation* |
| | 2001 | *Standards and Guidance For The Archaeological Investigation and Recording of Standing Buildings or Structures* |
| United Kingdom Institute of Conservation | 1990 | *Guidelines for the Preparation of Excavation* |


***17th September 2008***

**Deborah Anderson**
**DCC Archaeology**

Archaeological Services
University of Durham

**White Hill Woods, Easington Lane, Tyne & Wear and County Durham**
**geophysical surveys**

**Report 2100**
Figure 1
*Site location*

*on behalf of*

**The Woodland Trust**




proposed development area

0 1km

*scale 1:25 000 - for A4 plot*

Archaeological Services
University of Durham

**White Hill Woods, Easington Lane, Tyne & Wear and County Durham**

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**Report 2100**

Figure 2

*Overview of results*

*on behalf of*

**The Woodland Trust**

0 250m

*scale 1:5000 - for A3 plot*

- proposed development area
- survey area
- proposed deep ploughing area

Area 1

Area 2

Elemore

Cherry Garth

East Wood

Pig Hill

Coldwell Burn

Whitegates Equestrian Centre

45

37

38

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Figure 3

*Magnetic susceptibility survey results*

*on behalf of*

**The Woodland Trust**

0 250m

*scale 1:5000 - for A3 plot*

proposed development area

MS survey area

200.00
185.00
170.00
155.00
140.00
125.00
110.00
95.00
80.00
65.00
50.00
35.00
20.00 SI units

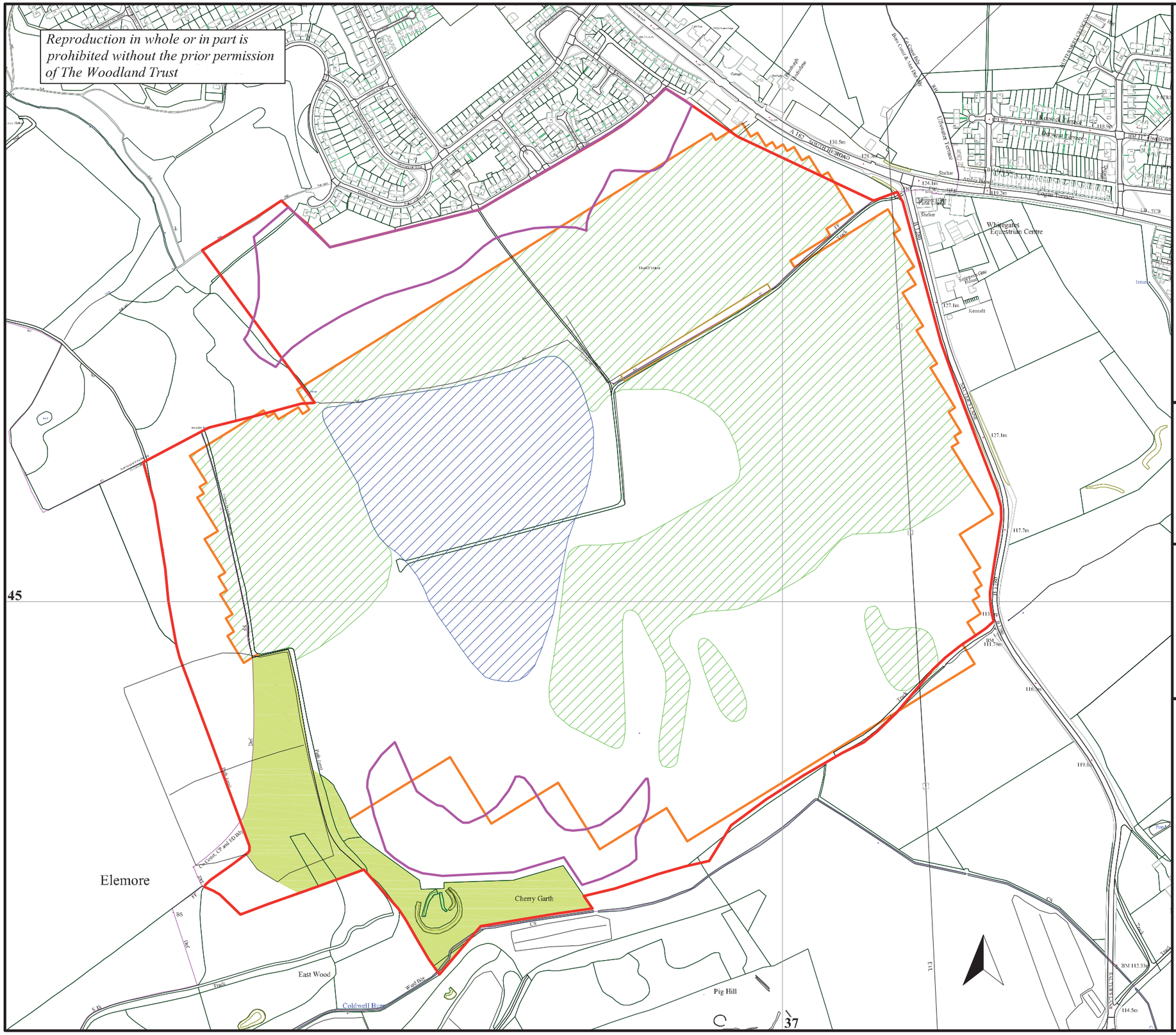


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Figure 4

*Magnetic susceptibility survey interpretation*

*on behalf of*

**The Woodland Trust**

0 250m

*scale 1:5000 - for A3 plot*

- proposed development area
- MS survey area
- high magnetic susceptibility
- low magnetic susceptibility

Area 1

Area 2

Sheriff's Moor

outline of survey area

8.00
6.67
5.33
4.00
2.67
1.33
0.00
-1.33
-2.67
-4.00
-5.33
-6.67
-8.00 nT

0 50m

*scale 1:1000 - for A1 plot*

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Figure 5

*Detailed gradiometer surveys*

Area 1

Area 2

Sheriff's Moor

A 182

132.3m

TEVIOT

SCHOMBEW

SHERIFFS MOOR AVENUE

SHERIFFMOOR AVENUE

RUSKIN AVENUE

SHELLEY AVENUE

SOUTH CLOSE

SOUTHVIEW

TCB

LB

Sub Sta

Path (um)

Path

FB

Def

Const, CP and ED Bdy

Boro' Comm

456

455

454

448

447

363

364

365

366

367

368

369

370

outline of survey area

positive magnetic anomalies

negative magnetic anomalies

dipolar magnetic anomalies

0 50m

*scale 1:1000 - for A1 plot*

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Figure 6

*Gradiometer surveys, geophysical interpretation*

Area 1

Area 2

Sheriff's Moor

outline of survey area

soil-filled features

service pipes

orientation of ridge and furrow

0 50m

*scale 1:1000 - for A1 plot*

*on behalf of*

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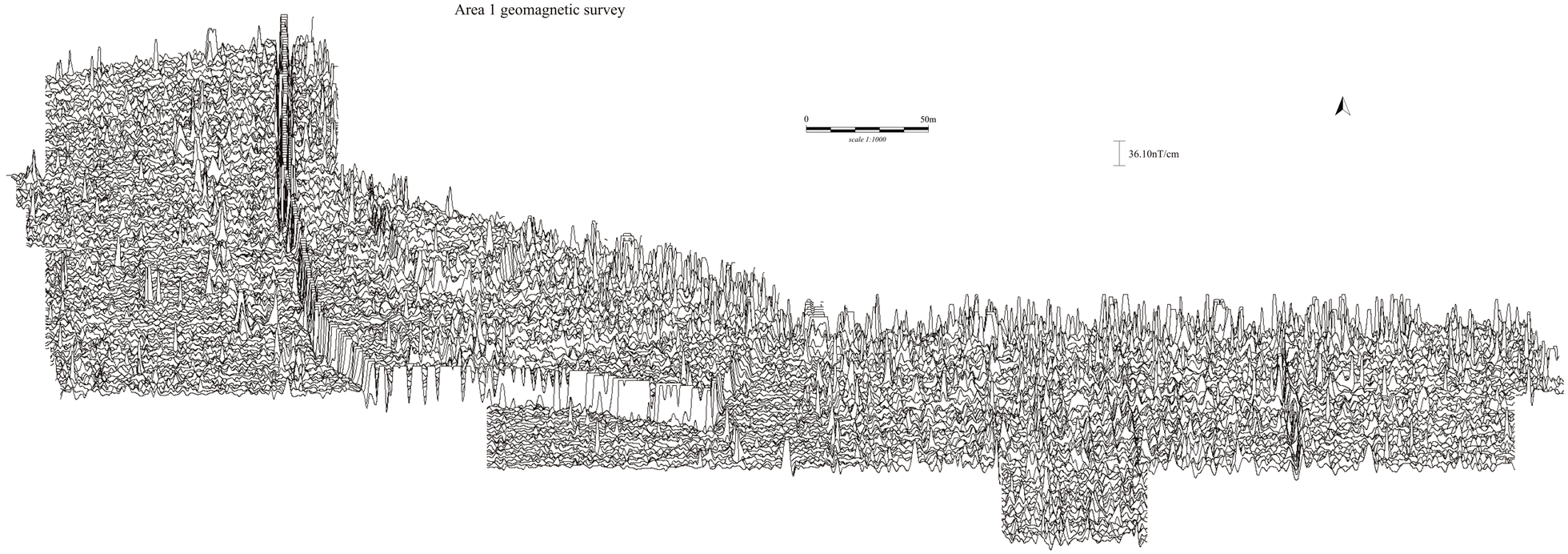
Figure 7

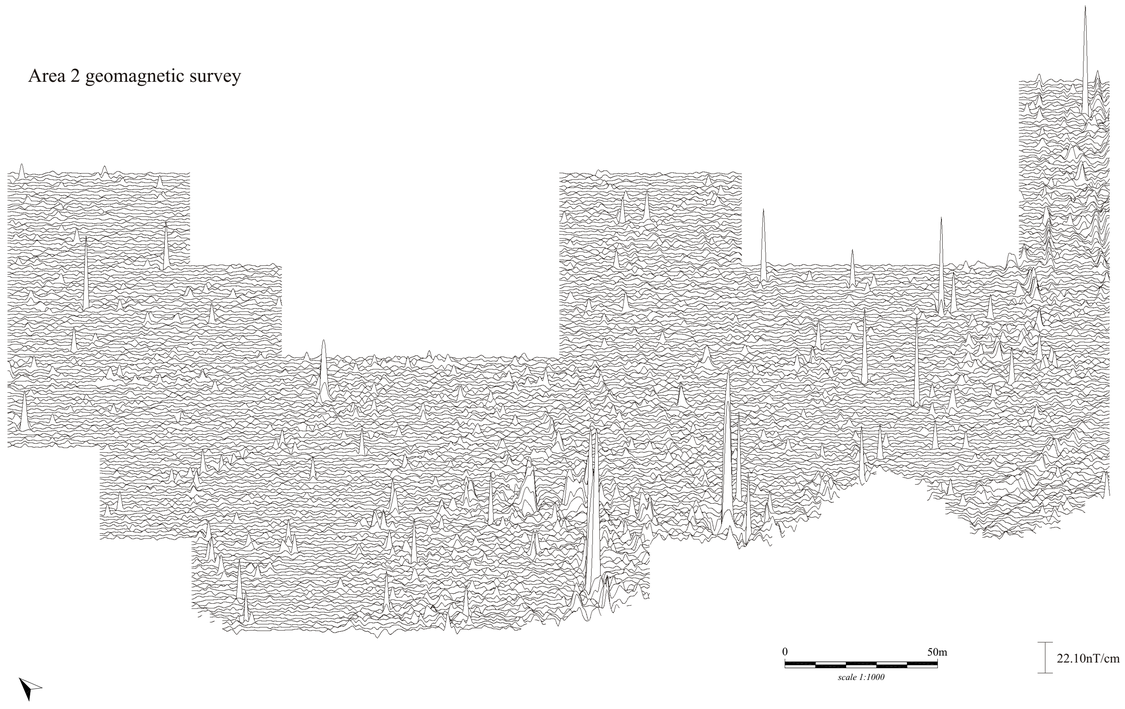
*Gradiometer surveys, archaeological interpretation*

**Figure 8: Trace plots of geophysical data**

Area 1 geomagnetic survey




Area 2 geomagnetic survey




Magnetic susceptibility survey