STRATASCAN

Geophysical Survey Report

Felton, N. Somerset

for

Bristol and Region Archaeological Services

January 2006

J2101

Richard A J Smalley (BA Hons)

REGISTERED IFA ORGANISATION

Document Title:	**Geophysical Survey Report** **Felton, N. Somerset**
Client:	**Bristol and Region Archaeological Services**
Stratascan Job No:	**J2101**
Techniques:	**Detailed magnetic survey (gradiometry)**
National Grid Ref:	**ST 521 656 (Site A) ST 524 655 (Site B)**

Field Team:	**Karl Munster BSc. (Hons)** **Claire Graham BA (Hons)**
Project Manager:	**Simon Stowe BSc. (Hons)**
Report written by:	**Richard Smalley BA (Hons)**
CAD illustration by:	**Richard Smalley BA (Hons)**
Checked by:	**Simon Stowe BSc. (Hons)**

Stratascan Ltd.

Vineyard House
Upper Hook Road
Upton upon Severn
WR8 0SA

Tel: 01684 592266
Fax: 01684 594142
Email: ppb@stratascan.co.uk

www.stratascan.co.uk

LIST OF FIGURES

1 SUMMARY OF RESULTS

The magnetometry survey undertaken over 3.6ha of land at Felton, N. Somerset was successful in locating a number of anomalies of possible archaeological origin. Positive linear anomalies may represent ditches and discrete positive anomalies may indicate the presence of pits. The tumulus present in Site B is evident within the data in the form of curvilinear and positive area anomalies.

2 INTRODUCTION

2.1 Background synopsis

Stratascan were commissioned by BARAS to undertake a geophysical survey of an area outlined for development as a school.

2.2 Site location

The site is located at Felton, near Bristol International Airport at OS ref. ST 521 656 (Site A) and ST 524 655 (Site B).

2.3 Description of site

The survey area consists of approximately 3.6ha of agricultural land currently used as pasture and for recreation.

2.4 Geology and soils

The underlying geology is Lower Lias from the Lower Jurassic (British Geological Survey South Sheet, Third Edition Solid, 2001; First Edition Quaternary, 1977). The overlying soils are known as Nordrach soils which are a type of Aeolian silty drift over Carboniferous limestone. These consist of Well drained fine silty over clayey soils, stoneless or with chert stones, often deep. (Soil Survey of England and Wales, Sheet 4 Eastern England).

2.5 Site history and archaeological potential

No specific details were available to Stratascan. However, the presence of a round barrow in Site B may increase the archaeological potential of this particular area.

2.6 Survey objectives

The objective of the survey was to locate any features of possible archaeological significance in order that they may be assessed prior to development.

2.7 Survey methods

Detailed magnetic survey (gradiometry) was used as an efficient and effective method of locating archaeological anomalies. More information regarding this technique is included in the Methodology section below.

3 METHODOLOGY

3.1 Date of fieldwork

The fieldwork was carried out over 3 days from the 16th January 2006. Weather conditions during the survey were variable.

3.2 Grid locations

The location of the survey grids has been plotted in Figures 2, 3 and 9 together with the referencing information. Grids were set out using a Leica 705auto Total Station and referenced to suitable topographic features around the perimeter of the site.

3.3 Survey equipment

The magnetic survey was carried out using a dual sensor Grad601-2 Magnetic Gradiometer manufactured by Bartington Instruments Ltd. The Grad601-2 consists of two high stability fluxgate gradiometers suspended on a single frame. Each sensor has a 1m separation between the sensing elements increasing the sensitivity to small changes in the Earths magnetic field.

3.4 Sampling interval, depth of scan, resolution and data capture

3.4.1 Sampling interval

Readings were taken at 0.25m centres along traverses 1m apart. This equates to 3600 sampling points in a full 30m x 30m grid.

3.4.2 Depth of scan and resolution

The Grad601-2 has a typical depth of penetration of 0.5m to 1.0m. This would be increased if strongly magnetic objects have been buried in the site. The collection of data at 0.25m centres provides an appropriate methodology balancing cost and time with resolution.

3.4.3 Data capture

The readings are logged consecutively into the data logger which in turn is daily down-loaded into a portable computer whilst on site. At the end of each job, data is transferred to the office for processing and presentation.

3.5 Processing, presentation of results and interpretation

3.5.1 Processing

Processing is performed using specialist software known as *Geoplot 3.* This can emphasise various aspects contained within the data but which are often not easily seen in the raw data. Basic processing of the magnetic data involves 'flattening' the background levels with respect to adjacent traverses and adjacent grids. 'Despiking' is also performed to remove the anomalies resulting from small iron objects often found on agricultural land. Once the basic processing has flattened the background it is then possible to carry out further processing which may include low pass filtering to reduce 'noise' in the data and hence emphasise the archaeological or man-made anomalies.

The following schedule shows the basic processing carried out on all processed gradiometer data used in this report:

1. *Despike* (useful for display and allows further processing functions to be carried out more effectively by removing extreme data values)

   Geoplot parameters:
   X radius = 1, y radius = 1, threshold = 3 std. dev.
   Spike replacement = mean

2. *Zero mean grid* (sets the background mean of each grid to zero and is useful for removing grid edge discontinuities)

   Geoplot parameters:
   Threshold = 0.25 std. dev.

3. *Zero mean traverse* (sets the background mean of each traverse within a grid to zero and is useful for removing striping effects)

Geoplot parameters:
Least mean square fit = off

3.5.2 Presentation of results and interpretation

The presentation of the data for each site involves a print-out of the raw data both as greyscale (Figures 4 and 10) and trace plots (Figures 5,6,11 and 12), together with a greyscale plot of the processed data (Figures 7 and 13). Magnetic anomalies have been identified and plotted onto the 'Abstraction and Interpretation of Anomalies' drawing for the site (Figures 8 and 14).

4 RESULTS

4.1 Site A

The data in Site A is dominated by magnetic disturbance from both metal fences and ground disturbance. A number of positive anomalies with associated negative responses, known as bipolar anomalies, are seen across the area. These are likely to be caused by buried ferrous objects.

Several linear anomalies running through the site represent evidence of archaeological activity. A positive linear anomaly aligned north- south in close proximity to a negative linear anomaly with the same orientation in the eastern section of the area may suggest a form of bank and ditch arrangement (Anomaly **1** on Figure 08). Other positive linear anomalies (**2**) represent cut features such as possible ditches. Negative linear anomalies (**3**) in this area may indicate banks of possible archaeological origin.

Two discrete positive anomalies have been interpreted as possible pits and may be of archaeological origin.

4.2 Site B

The data collected over the tumulus exhibited a group of positive and negative area anomalies surrounded by small positive and negative curvilinear anomalies in the southeastern limit of the survey area (Anomaly **4** on Figure 14). The positive curvilinear anomalies surrounding the tumulus may represent the ring ditch commonly associated with the round barrows of the Bronze Age. The presence of a negative curvilinear anomaly may indicate the presence of an earthen bank around the barrow.

A number of positive area anomalies are evident within Site B (**5**). These may be associated with large pits that could be of archaeological origin. Further investigation is required in order to ascertain the nature of these features. Positive linear anomalies representing possible ditches (**7**) are evident throughout Site B as are negative linear anomalies which may be related to banks (**8**).

Smaller discrete positive anomalies have been interpreted as possible pits and may be of archaeological origin.

The negative linear anomaly aligned north- south in the western limit of Site B (**6**) is related to the compacted earth of the existing sheep track/footpath (see Plate 1).

Large areas of magnetic debris are in evidence across Site B. Those areas of magnetic disturbance on the edge of the survey area may have been caused by nearby metal objects such as fences. Areas of magnetic interference that are not associated with fence lines are likely to be caused by general ground disturbance. Bipolar anomalies are likely to indicate the presence of buried ferrous objects.

Plate 1: (Site B)- Footpath or sheep track represented as a negative linear anomaly in the magnetometer data.

5 CONCLUSION

The geophysical survey was successful in locating a number of anomalies that may be of archaeological origin. A positive linear anomaly with a negative linear anomaly in close proximity may represent a form of bank and ditch structure. However, further investigation of this anomaly may reveal it to be a former field boundary. Other positive linear anomalies related to cut features in both sites may indicate the presence of backfilled ditches that may be of archaeological origin.

The tumulus in Site B exhibited small positive and negative area anomalies. Curvilinear positive anomalies are possibly related to a ring ditch and negative curvilinear anomalies may indicate the presence of a former earthen bank.

Positive area anomalies are evident in Site B that may represent large pits. The nature of these anomalies is unknown, however their close proximity to the round barrow may suggest an archaeological origin. A number of discrete positive anomalies in both sites have been interpreted as possible pits.

APPENDIX A – Basic principles of magnetic survey

Detailed magnetic survey can be used to effectively define areas of past human activity by mapping spatial variation and contrast in the magnetic properties of soil, subsoil and bedrock.

Weakly magnetic iron minerals are always present within the soil and areas of enhancement relate to increases in *magnetic susceptibility* and permanently magnetised *thermoremnant* material.

Magnetic susceptibility relates to the induced magnetism of a material when in the presence of a magnetic field. This magnetism can be considered as effectively permanent as it exists within the Earth's magnetic field. Magnetic susceptibility can become enhanced due to burning and complex biological or fermentation processes.

Thermoremnance is a permanent magnetism acquired by iron minerals that, after heating to a specific temperature known as the Curie Point, are effectively demagnetised followed by re-magnetisation by the Earth's magnetic field on cooling. Thermoremnant archaeological features can include hearths and kilns and material such as brick and tile may be magnetised through the same process.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil creates a relative contrast against the much lower levels of magnetism within the subsoil into which the feature is cut. Systematic mapping of magnetic anomalies will produce linear and discrete areas of enhancement allowing assessment and characterisation of subsurface features. Material such as subsoil and non-magnetic bedrock used to create former earthworks and walls may be mapped as areas of lower enhancement compared to surrounding soils.

Magnetic survey is carried out using a fluxgate gradiometer which is a passive instrument consisting of two sensors mounted vertically either 0.5 or 1m apart. The instrument is carried about 30cm above the ground surface and the top sensor measures the Earth's magnetic field whilst the lower sensor measures the same field but is also more affected by any localised buried field. The difference between the two sensors will relate to the strength of a magnetic field created by a buried feature, if no field is present the difference will be close to zero as the magnetic field measured by both sensors will be the same.

Factors affecting the magnetic survey may include soil type, local geology, previous human activity, disturbance from modern services etc.