STRATASCAN

Geophysical Survey Report

Land Opposite Ashcroft, Avebury High Street
Wiltshire

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REGISTERED IFA ORGANISATION

Document Title:	**Geophysical Survey Report** **Land Opposite Ashcroft, Avebury High Street, Wiltshire**
Client:	**Laurie Dobie**
Stratascan Job No:	**J2048**
Techniques:	**Detailed magnetic survey (gradiometry)** **Detailed resistance survey**
National Grid Ref:	**SU 100 669**

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1 SUMMARY OF RESULTS

The geophysical survey undertaken over 0.14ha of rough pasture on the land opposite 'Ashcroft' on Avebury High Street identified two positive area anomalies. The majority of the data however showed very little in the way of potentially archaeological features. This was probably due to a combination of the presence of large ferrous objects and modern construction activity.

2 INTRODUCTION

2.1 Background synopsis

Stratascan were commissioned by Laurie Dobie to undertake a geophysical survey of an area outlined for proposed housing development.

2.2 Site location

The site is located on the land opposite 'Ashcroft,' Avebury High Street, Wiltshire at OS ref. SU 100 699.

2.3 Description of site

The survey area is approximately 0.14ha of rough pasture. The presence of buildings, metal fences and ferrous objects on site caused some obstruction to the survey. The underlying geology is chalk, including red chalk from the lower cretaceous period (British Geological Survey South Sheet, Third Edition Solid, 1979). The overlying soils are known as Blewbury soils. These consist of well drained calcareous clayey and fine silty over clayey soils over argillaceous chalk (Soil Survey of England and Wales, Sheet 4 Eastern England).

2.4 Site history and archaeological potential

No specific details were available to Stratascan. However, the site's proximity to the Avebury henge and its ritual landscape would suggest a high degree of archaeological potential.

2.5 Survey objectives

The objective of the survey was to locate any anomalies that may be of archaeological significance prior to development.

2.6 Survey methods

Detailed magnetometry and resistivity surveys were carried out across the site in order to assess the area with complementary techniques. More information regarding these techniques is included in the Methodology section below.

3 METHODOLOGY

3.1 Date of fieldwork

The fieldwork was carried out over 1 day on the 11th of August 2005 when the weather was dry and sunny.

3.2 Grid locations

The location of the survey grids has been plotted in Figure 2 together with the referencing information.

3.3 Description of techniques and equipment configurations

3.3.1 Magnetometer

Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.2 nanoTesla (nT) in an overall field strength of 48,000nT, can be accurately detected using an appropriate instrument.

The mapping of the anomaly in a systematic manner will allow an estimate of the type of material present beneath the surface. Strong magnetic anomalies will be generated by buried iron-based objects or by kilns or hearths. More subtle anomalies such as pits and ditches can be seen if they contain more humic material which is normally rich in magnetic iron oxides when compared with the subsoil.

To illustrate this point, the cutting and subsequent silting or backfilling of a ditch may result in a larger volume of weakly magnetic material being accumulated in the trench compared to the undisturbed subsoil. A weak magnetic anomaly should therefore appear in plan along the line of the ditch.

The magnetic survey was carried out using a dual sensor Grad601-2 Magnetic Gradiometer manufactured by Bartington Instruments Ltd. The instrument consists of two fluxgates very accurately aligned to nullify the effects of the Earth's magnetic field. Readings relate to the difference in localised magnetic anomalies compared with the general magnetic background. 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 giving a strong response to deep anomalies.

3.3.2 Resistance Meter

This method relies on the relative inability of soils (and objects within the soil) to conduct an electrical current, which is passed through them. As resistivity is linked to moisture content, and therefore porosity, hard dense features such as rock will give a relatively high resistivity response, while features such as a ditch which retains moisture give a relatively low response.

The resistance meter used was an RM15 manufactured by Geoscan Research incorporating a mobile Twin Probe Array. The Twin Probes are separated by 0.5m and the associated remote probes were positioned approximately 15m outside the grid. The instrument uses an automatic data logger, which permits the data to be recorded as the survey progresses for later downloading to a computer for processing and presentation.

Though the values being logged are actually resistances in ohms they are directly proportional to resistivity (ohm-metres) as the same probe configuration was used through-out.

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

3.4.1 Sampling interval

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

Resistivity
Readings were taken at 1.0m centres along traverses 1.0m apart. This equates to 900 sampling points in a full 30m x 30m grid. All traverses were surveyed in a “zigzag” mode.

3.4.2 Depth of scan and resolution

Magnetometer
The Grad 601 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 0.5m centres provides an appropriate methodology balancing cost and time with resolution.

Resistivity
The 0.5m probe spacing of a twin probe array has a typical depth of penetration of 0.5m to 1.0m. As with the gradiometer the collection of resistance data at 1m centres with a 0.5m probe spacing provides an appropriate methodology balancing cost and time with resolution.

3.4.3 Data capture

The readings from both instruments are logged consecutively into their individual data loggers which in turn are downloaded daily 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

Magnetometer
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 magnetometer data used in this report:

Zero mean grid	*Threshold = 0.25 std. dev.*
Zero mean traverse	*Last mean square fit = off*
Despike	*X radius = 1 Y radius = 1* *Threshold = 3 std. dev.* *Spike replacement = mean*

Resistivity
As with the magnetometer data the processing was carried out using *Geoplot 3* software. Processing involved the 'despiking' of high contact resistance readings and the passing of the data though a high pass filter. This has the effect of removing the larger variations in the data often associated with geological features. The nett effect is aimed at enhancing the archaeological or man-made anomalies contained in the data.

The following schedule shows the processing carried out on the processed resistance plots.

Despike	*X radius = 1* *Y radius = 1* *Spike replacement*
High pass filter	*X radius = 10* *Y radius = 10* *Weighting = Gaussian*

3.5.2 Presentation of results and interpretation

Magnetometer

The presentation of the data for the survey involves a print-out of the raw data both as grey scale (Figure 3) and trace plots (Figure 4 and 5), together with a grey scale plot of the processed data (Figure 6). Magnetic anomalies have been identified and plotted onto the 'Abstraction and Interpretation of Anomalies' drawing for the site (Figure 7).

Resistivity

The resistance data is presented in the same manner as that of the gradiometry. The raw and processed data are both shown as grey scale plots (Figures 8 and 9). Resistance anomalies have been identified and plotted onto the ‘Abstraction and Interpretation of Anomalies’ drawing (Figure 10).

4 RESULTS

The geophysical survey undertaken on the land opposite Ashcroft, Avebury High Street produced very little in the way of potentially archaeological anomalies.

The gradiometer survey was greatly affected by the presence of buildings, metal fences and ferrous objects stored on site. A quiet area to the north east of the site produced two small positive area anomalies. These may caused by an archaeological feature, however their origin is unknown.

The resistance survey produced both high and low resistance area anomalies. The high resistance anomalies seem to occur in close proximity to the standing buildings and as a result may be caused by sub surface rubble. High resistance anomalies in the central part of the survey area may be related to the path that runs through part of the site.

The low resistance area anomalies may represent ground disturbance within the survey area. This may come in the form of landscaping or the construction of the buildings presently on site. Alternatively they may be of geological origin as a result of waterlogging or depressions in the ground.

5 CONCLUSION

The geophysical survey undertaken on the land opposite Ashcroft, Avebury has successfully located a number of anomalies. Few of these, however, are of archaeological potential. Two positive area anomalies have been located to the north east of the site where the gradiometer was least affected by the presence of ferrous objects. Further investigation is required in order to ascertain whether or not these anomalies are of archaeological origin.

The resistance survey produced both high and low area anomalies across the site. These may be related to the construction of the buildings on site. However, it is difficult to differentiate between modern and past activity.