STRATASCAN

# Geophysical Survey Report

## Higher Newham Farm, Truro

for

**A C Archaeology**

September 05

J2059.

Richard Smalley BA (Hons)

REGISTERED IFA ORGANISATION

| | |
|---|---|
| Document Title: | **Geophysical Survey Report<br>Higher Newham Farm, Truro** |
| Client: | **A C Archaeology** |
| Stratascan Job No: | **J2059** |
| Techniques: | **Detailed magnetic survey (gradiometry)** |
| National Grid Ref: | **SW 824 436** |

| | |
|---|---|
| Field Team: | Karl Munster BSc. (Hons)<br>Daniel Pavett |
| Project Manager: | Simon Stowe BSc. |
| Report written by: | Richard A J Smalley BA (Hons) |
| CAD illustration by: | Richard A J Smalley BA (Hons) |
| Checked by: | Simon Stowe BSc. |

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 gradiometry survey undertaken at Higher Newham Farm, near Truro was successful in locating a number of anomalies of possible archaeological origin. There is also evidence of past agricultural activity. The survey was unsuccessful in locating the ploughed out round barrow PRN 50845.

# 2 INTRODUCTION

## 2.1 Background synopsis

Stratascan were commissioned by A C Archaeology to undertake a geophysical survey of an area at Higher Newham Farm, near Truro. This survey forms part of an archaeological investigation into the existence of PRN 50845.

## 2.2 Site location

The site is located at Higher Newham Farm, Truro at OS ref. SW 824 436.

## 2.3 Description of site

The survey area is approximately 1ha of agricultural land currently used for pasture. The topography was sloping.

## 2.4 Geology and soils

The underlying geology is Lower Devonian and Lower Old Red Sandstone including Downtonian (British Geological Survey South Sheet, Third Edition Solid, 1979; First Edition Quaternary, 1977). The overlying soils are known as Denbigh soils, which are a type of Palaeozoic slaty mudstone and siltstone. These consist of well-drained fine loamy and fine silty soils over rock (Soil Survey of England and Wales, Sheet 4 Eastern England).

## 2.5 Site history and archaeological potential

The presence of a possible round barrow within the survey area would suggest a high level of archaeological potential. This is further reinforced by the close proximity of other PRN sites.

### 2.6 Survey objectives

The objective of the survey was to either locate or otherwise disprove the existence of PRN 50845, a possible ploughed-out barrow at SW 8243 4369.

### 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 1 day on the 19th September 05. Weather conditions during the survey were fine.

### 3.2 Grid locations

The survey grid was set up on the Ordnance Survey National Grid, as shown Figure 2. The referencing and alignment of grids was achieved using a Leica GS 50 DGPS System.

### 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 (Figure 3) and trace plots (Figure 4 and 5), together with a greyscale 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).

## 4 RESULTS

The gradiometry survey has not been successful in locating the possible ploughed out barrow (PRN 50845). However, a number of other anomalies with possible archaeological potential have been identified. Positive linear anomalies, marked in red on Figure 05, may represent cut features such as ditches. Two of these anomalies are curvilinear in shape and may be related to circular ditches commonly associated with round barrows. There are a number of discrete positive anomalies within the survey area. These may be of archaeological origin and have been interpreted as possible pits. A broad positive rectangular trend is seen across the area intersecting with some of the identified pits. This feature is difficult to identify due to the high-level background noise of the site and as a result of the agricultural activity that has taken place in more recent times. This weak anomaly may be evidence of a large scale feature on the site such as a positive ditch structure.

Evidence for agricultural activity can be seen in the form of positive linear anomalies, marked in green on Figure 05, running east to west across the survey area. There are a number of negative linear anomalies, some of which are rectilinear, that may represent bank features associated with this agricultural activity.

A linear area of magnetic disturbance to the northwest of the survey area is probably related to a cable or pipe. Further evidence of modern activity comes in the form of positive anomalies with associated negative responses. These represent buried ferrous objects.

## 5 CONCLUSION

The survey was successful in locating a number of anomalies of archaeological potential. Unfortunately, none of the anomalies can be associated with PRN 50845 with any confidence.

The curvilinear shape of two of the positive linear anomalies may suggest that they are parts of circular ditches associated with round barrows. The rectilinear arrangement of the negative linear anomalies to the east of the survey area suggests a type of bank feature. This may represent a former field boundary. Further investigation is required in order to fully understand the origin of these features.

The broad positive anomaly seems to be too large (70m in diameter) to represent the ditch of a round barrow. It is cut by the agricultural marks, which would suggest that it predates the agricultural activity on the site. The presence of possible pits in and around this feature may suggest that it is some sort of mortuary enclosure. However, further investigation is required in order to ascertain the origin of this anomaly.

# **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.