STRATASCAN

# Geophysical Survey Report

## Hatch Farm Dairies
## Winnersh, Berkshire

for

**Wessex Archaeology**

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# 1 SUMMARY OF RESULTS

A gradiometer survey was carried out over approximately 10ha of agricultural land southwest of Winnersh, Berkshire. The survey was unable to identify the series of cropmarks seen within the area from aerial photography. However, a number of weak positive linear anomalies and a weak rectilinear anomaly may represent cut features of archaeological origin. In view of the identification of crop marks and the designation of the area as 'high archaeological potential', further investigation may be needed to understand the full archaeological potential of the area.

# 2 INTRODUCTION

## 2.1 Background synopsis

Stratascan were commissioned by Wessex Archaeology to undertake a geophysical survey of an area outlined for a large mixed-use proposed development. This survey forms part of an archaeological investigation undertaken by Wessex archaeology.

## 2.2 Site location

The site is located to the southwest of Winnersh, Berkshire, between the towns of Wokingham and Reading at OS ref. SU 772 704.

## 2.3 Description of site

The survey area is approximately 10ha of agricultural land subject to arable cultivation. The survey area is bounded by a trackway to the east, a tree plantation, field boundaries and the River Loddon to the west and a field boundary and water course to the north. The topography slopes gently northwards. The field situated on the northwest of the survey area, close to the River Loddon was unable to be surveyed due to overgrown vegetation.

## 2.4 Geology and soils

The underlying geology is London Clay with overlying river terrace deposits and alluvium (British Geological Survey South Sheet, Fourth Edition Solid, 2001; First Edition Quaternary, 1977). The overlying soils are known as Fladbury 3 soils which are Pelo-alluvial gley soils. These consist of stoneless clayey, fine silty and fine loamy soils (Soil Survey of England and Wales, Sheet 6 South East England).

### 2.5 Site history and archaeological potential

The following information has been provided by the archaeological desk based assessment carried out by Wessex Archaeology (report reference 56300.01).

No Scheduled Monuments or Listed buildings are within or directly adjacent to the survey area. However, the site lies within an 'area of high archaeological potential' as identified in the *Workingham Local Plan (Adopted 2004)*. This is due to the presence of complex cropmarks recorded on aerial photographs. The cropmarks appear to represent the remains of Iron Age and/or Roman settlement. However, the absence of cropmarks should not be interpreted as the absence of archaeology.

The potential for earlier prehistoric remains have been assessed as low to moderate. There is also a low potential for remains of medieval or Saxon origin. The Parliamentary Act of Inclosure in the early 19th century transformed the landscape from medieval large open fields into smaller, regular fields. Many of these field boundaries have been removed but are visible cropmarks, with a number corresponding to the boundaries recorded on the 1842 tithe map.

### 2.6 Survey objectives

The objective of the survey is to provide additional information by non-invasive means concerning the archaeological potential of the survey area. The results will be used to inform subsequent stages of evaluation.

### 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 5 days from the 5-6th and the 10-12th October 2006. Weather conditions during the survey were wet.

### 3.2 Grid locations

The location of the survey grid has been plotted in Figure 2 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

In addition the following processing has been carried out to further enhance the data: Extreme data values were removed to enhance faint gradiometer anomalies.

### 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 gradiometer survey has revealed little to no evidence of the cropmarks identified within the aerial photography. The gradiometer data has also not been able to identify the series of post medieval field boundaries thought to exist across the survey area. As previous field boundaries are usually clearly visible within the data, this may indicate the ineffectiveness of the gradiometer to see archaeological anomalies within this area.

However a series of faint positive linear anomalies have been identified mainly in the north of the survey area, which may relate to archaeological activity.

Three positive linear anomalies can be seen in the north of the survey area, running in an east to west alignment (**1-3**). These linear anomalies may represent cut features of possible archaeological origin. However, due to their parallel alignment, they may also be of agricultural origin.

A faint rectilinear positive anomaly has been identified in the northwest of the survey area (**4**). This anomaly may represent weak evidence for a rectangular enclosure of archaeological origin. Additional positive linear anomalies in the north and south of the survey area (**5-10**) may represent further weak evidence for cut features or ground disturbance relating to archaeological activity.

Three positive area anomalies have also been identified within the survey area (**11-13**). These anomalies may represent discrete cut features or areas of ground disturbance, however, anomaly **11** may also be of geological origin.

Two large areas of magnetic debris have been identified in the south of the survey (**14** and **15**). These area anomalies may represent areas of ground disturbance of uncertain origin. The limits of anomaly **14** may represent a previous parcel of land bounded by the series of post medieval field boundaries identified from cropmarks. The magnetic debris relating to ground disturbance may be associated with agricultural activity.

Two faint negative area anomalies situated in the south of the survey may represent anomalies of geological or pedological origin (**16** and **17**).

Agricultural marks can be clearly identified across the centre and south of the survey area as a series of parallel linear anomalies in an approximate northwest to southeast orientation. A large number of positive anomalies with associated negative returns have been identified across the survey. These anomalies are likely to be associated with near surface ferrous objects.

## 5 CONCLUSION

The gradiometer survey has been unsuccessful in identifying the cropmarks of possible archaeological origin situated within the survey area. A series of faint positive linear anomalies along with a possible rectilinear anomaly have been identified mainly in the north of the survey area. These anomalies may represent cut features of archaeological origin. A large area of magnetic debris situated in the centre south of the survey may represent weak evidence of a previous land parcel associated with the post medieval field boundaries identified through aerial photography. The lack of any clear anomalies of archaeological origin within the gradiometer data does not suggest the absence of archaeological activity within the area. With the identification of crop marks and the designation of the area as ‘high archaeological potential’, further investigation may be needed to understand the full archaeological potential of the area.

# **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.