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Engineering Archaeological Services Ltd.



Caerau Farm, Llandewi Velfrey, Pembrokeshire: Geophysical Survey

> Analysis by I.P. Brooks

EAS Client report 2018/11

# Caerau Farm, Llandewi Velfrey, Pembrokeshire: Geophysical Survey

**Commissioned by Trysor** 

# Analysis by I.P. Brooks Engineering Archaeological Services Ltd

Engineering Archaeological Services Ltd is Registered in England No 286978

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Engineering Archaeological Services Ltd EAS Client Report 2018/11 October 2018

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# NGR

#### Centred on: SN 13838 16059

#### *Location and Topography* (Figures 1 and 2)

The survey area was approximately 95 m north of Caerau Farm, Llanddewi Velfrey, Narberth, Pembrokeshire. It was located at the southern end of a field which had been subdivided by an electric fence. The eastern and southern sides of the survey area were defined by permanent field boundaries, whilst the northern and western edges of the survey area were defined by the electric fence. The survey area slopes down towards the south and along the eastern end of the survey area was a linear platform standing approximately 200 mm high. This covered an area of approximately 30 x 4 m and runs parallel with the minor road immediately to the west of the survey area.

At the time of survey, the field was under permanent pasture, although there was marked poaching in places.

The survey took place on 1<sup>st</sup> October 2018.

#### Archaeological Background

It is intended to construct a stable complex within the survey area (Pembrokeshire Planning number 18/0422/PA). The survey area lies only 50 m east of the western rampart of the Caerau Gaer defended enclosure (https://www.archwilio.org.uk/arch/query/page.php?watprn=DAT4905&dbname=dat&tbname=core) and thus an archaeological field evaluation was recommended by Mike Ings of the Dyfed Archaeological Trust, acting as advisers to Pembrokeshire County Council. Initially this work was to include the current geophysical survey and a desk-top study.

The current survey was commissioned by Trysor as part of the field evaluation.

#### Aims of Survey

To investigate, define and record any potentially archaeological features within the survey areas.

#### **SUMMARY OF RESULTS**

A complex of, up to seven, enclosures and two possible round houses have been defined within the survey area together with a few other, presumably later, magnetic anomalies. Theses enclosures and possible rounds houses appear to form a consistent, extended, settlement pattern.

## Methods

The survey consisted of parts of nine 20 x 20 m grid squares laid out as in Figure 2. Readings were taken at 0.25 m intervals along transects 1 m apart using a Geoscan FM256 Fluxgate Gradiometer. Grey scale plots were produced using Geoscan Research "Geoplot" v.3.00v and X - Y plots using Golden Software "Surfer" v. 10.7.972.

Small soil samples were taken for Magnetic Susceptibility analysis from some of the grid squares (Figure 6). These were dried, sieved through a 2mm sieve and analysed using a Bartington MS2 Magnetic Susceptibility meter and MS2B detector

#### Survey Results:

#### Area

0.31 Ha

#### Display

The results are displayed as a grey scale image (Figure 3) and as X-Y trace plot (Figure 4). Interpretation plots are shown as Figure 5 and the data is summarised in Figure 7.

#### **Results**:

#### **Fluxgate Gradiometer Survey**

Throughout the survey (Figure 5) area are a series of linear magnetic anomalies which form a pattern which has been interpreted as part of a prehistoric field system. There are, however a few other anomalies which are assumed to be from later phases of activity. Two ferromagnetic responses were recorded which are shown in blue on Figure 5. Anomaly B is the site of a field tree which can be seen on the Google Earth image dated 18/6/2017 and presumably the enhanced magnetic response is related to the either rubbish collecting around this tree or the burning of the tree stump. Anomaly B marks the position of a metal water trough in the field.

Whilst most of the linear anomalies are probably related to the prehistoric field system, Anomalies C and D, however, are on a different alignment and lead to/from a gate in the southern boundary of the field. They are likely, therefore, to relate to a trackway through this gate. Anomaly E also does not appear to directly relate to the alignment of the probable field system crossing a number of the probable prehistoric anomalies.

The main complex consists of two circular anomalies (Anomalies F and G) which appear to sit within a series of at least six, possibly seven, enclosures (Anomalies H, I J, K, L and M). Anomaly F is 7.75 m in diameter and sits within the enclosure Anomaly H, whilst Anomaly G is 6.25 m in diameter and sits at the junction of enclosures L and M. It is assumed that both of these anomalies mark the position of round houses.

The possible enclosures are of relatively small sizes, possibly representing paddocks or garden plots associated with the possible round houses. The area of the enclosures is summarised below:

Anomaly	Area (m <sup>2</sup> )
Н	304
Ι	149
J	107
K	106
L	83
М	164

The pattern of these enclosure and their alignment would suggest an extended prehistoric settlement, possibly associated with the Caerau Gaer defended enclosure.

Anomaly N, in the north western corner of the survey area is divorced from the other anomalies, but appears to be on a similar alignment to the rest of the enclosures and may therefore be of a similar date.

#### Magnetic Susceptibility (Figure 6)

It was possible to take soil samples in order to assess the magnetic susceptibility of the soils. It was not possible, however, to obtain a subsoil sample for comparison. The location of the magnetic susceptibility samples is shown on Figure 6.

Sample	Volume susceptibility $\chi_v$	Mass susceptibility χ <sub>m</sub>
Grid 1	122	169.4
Grid 2	132	163.0
Grid 3	76	104.1
Grid 4	32	59.3
Grid 5	109	178.7
Grid 6	201	291.3
Grid 7	120	171.4
Grid 8	52	81.3

In general, the susceptibilities, as measured, are of moderate values, suggesting that magnetic conditions are suitable for magnetic survey. There is a degree of variability within the measured values with high values particularly in Grid Squares 5, 6 and 7. Magnetic susceptibility can be used as a proxy for the level of archaeological activity within the general area of the sample (Clark 1996, 106), thus the increased values from the survey would suggest increased activity in Grid Squares 5, 6 and 7. These would roughly correlate with the results of the fluxgate gradiometer survey with the possible round houses in Grid Squares 6-7 and 7-8.

# **Conclusions (Figures 7)**

It is a fundamental axiom of archaeological geophysics that the absence of features in the survey data does not mean that there is no archaeology present in the survey area only that the techniques used have not detected it. The survey at Caerau Farm, however, would appear to define part of an extended settlement with at least two possible round houses within a series of small enclosures or paddocks. Whilst no direct dating evidence is possible from the fluxgate gradiometer survey the pattern of enclosures and possible round houses would suggest a late prehistoric (Bronze – Iron Age) date for the features recorded. If this is so the relationship between theses features and the defended enclosure of Caerau Gaer is of particular interest. The current survey is only approximately 50 m west of the western rampart of Caerau Gaer and this proximity leads to questions as to whether these two sites are part of a larger complex or whether they are of different periods of occupation.

### References

Clark, A. 1996. Seeing Beneath the Soil. Prospecting Methods in Archaeology. Routledge, London

#### **Acknowledgements**

This survey was commissioned by Trysor and the help of Jenny Hall and Paul Sambrook for commissioning the survey and for providing background information is gratefully acknowledged. Access to the field was permitted by Mr. Benjamin Lewis.

# Techniques of Geophysical Survey:

#### Magnetometry:

This relies on variations in soil magnetic susceptibility and magnetic remenance which often result from past human activities. Using a Fluxgate Gradiometer these variations can be mapped, or a rapid evaluation of archaeological potential can be made by scanning.

## **Resistivity:**

This relies on variations in the electrical conductivity of the soil and subsoil which in general is related to soil moisture levels. As such, results can be seasonally dependant. Slower than Magnetometry this technique is best suited to locating positive features such as buried walls that give rise to high resistance anomalies.

# **Resistance Tomography**

Builds up a vertical profile or pseudosection through deposits by taking resistivity readings along a transect using a range of different probe spacings.

# Magnetic Susceptibility:

Variations in soil magnetic susceptibility occur naturally but can be greatly enhanced by human activity. Information on the enhancement of magnetic susceptibility can be used to ascertain the suitability of a site for magnetic survey and for targeting areas of potential archaeological activity when extensive sites need to be investigated. Very large areas can be rapidly evaluated and specific areas identified for detailed survey by gradiometer.

# Instrumentation:

- 1. Fluxgate Gradiometer Geoscan FM256
- 2. Resistance Meter Geoscan RM4/DL10
- 3. Magnetic Susceptibility Meter Bartington MS2
- 4. Geopulse Imager 25 Campus

# Methodology:

For Gradiometer and Resistivity Survey 20m x 20m or 30m x 30m grids are laid out over the survey area. Gradiometer readings are logged at either 0.5m or 1m intervals along traverses 1m apart. Resistance meter readings are logged at 0.5m or 1m intervals. Data is down-loaded to a laptop computer in the field for initial configuration and analysis. Final analysis is carried out back at base.

For scanning transects are laid out at 10m intervals. Any anomalies noticed are where possible traced and recorded on the location plan.

For Magnetic Susceptibility survey, a large grid is laid out and readings logged at 20m intervals along traverses 20m apart, data is again configured and analysed on a laptop computer.

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Extract from the 1953 Ordnance Survey Pembrokeshire XXIX.NE map

Figure 1: Location Scale 1:5,000



Based on drawing 01A by Ken Morgan Design and Building Management Ltd



Figure 2: Location of the Survey Area Scale 1:1,250





13.43
11.18
8.93
6.68
4.43
2.18
-0.07
-2.18
-4.57
-6.82
-9.07
-11.32
-13.57 nT





Figure 3: Grey Scale Plot Scale 1:500



Figure 4: X-Y Plot Scale 1:500



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Figure 5: Interpretation Scale 1:750



Based on drawing 01A by Ken Morgan Design and Building Management Ltd

Figure 6: Magnetic Susceptibility Results Scale 1:1250

0

<u>50</u> m



Figure 7: Summary Scale 1:1,250