

CWMYSGYFARNOG, CARMARTHENSHIRE: GEOPHYSICAL SURVEY 2019



Aerial photograph of Cwmysgyfarnog cropmark. ©RCAHMW 2018

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By

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**CWMYSGFARNOG, CARMARTHENSHIRE:
GEOPHYSICAL SURVEY 2019**

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CRYNODEB GWEITHREDOL

Yn 2018 tynnodd y Comisiwn Brenhinol Henebion Cymru lun o'r ôl gnwd o loc hirsgwar mewn cae porfa yn Cwymsgfarnog, Sir Gaerfyrddin. Gall nodau ôl cnydau eraill sydd i'w gweld yng nghyffiniau'r lloc ôl cnwd ymwneud â'r safle neu beidio. Awgrymwyd bod y ffotograffau yn dystiolaeth o fila Rhufeinig posib.

Yn 2019, fel rhan o Flwyddyn Darganfod Llywodraeth Cymru, rhoddodd Cadw arolwg geoffisegol i helpu i nodweddu'r lloc ôlcnwd ymhellach. Cynhaliodd Ymddiriedolaeth Archeolegol Dyfed yr arolwg geoffisegol yn ystod haf 2019.

Roedd ansawdd cyffredinol canlyniadau'r arolwg geoffisegol yn dda, ond nid yw'r canlyniadau'n darlunio lloc yn ogystal ag awyrlun o 2018. Canfuwyd rhai anghysonderau mewnol ond mae'n ansicr a ydynt yn nodweddion archeolegol neu o wreiddyn naturiol. Mae swyddogaeth a dyddiad y lloc yn parhau i fod yn ansicr.

EXECUTIVE SUMMARY

In 2018 the Royal Commission on the Ancient and Historic Monuments of Wales photographed a cropmark of a rectangular enclosure in a pasture field at Cwymsgfarnog, Carmarthenshire. Other cropmarks visible in the vicinity of the cropmark enclosure may or may not relate to the site. It was suggested that the photographs were evidence of a possible Roman villa.

In 2019, as part of Welsh Government's Year of Discovery, Cadw granted aided a geophysical survey to help further characterise the cropmark enclosure. Dyfed Archaeological Trust undertook the geophysical survey in the summer of 2019.

The general quality of the geophysical survey results was good, but the results do not delineate the enclosure as well as the 2018 aerial photograph. Some internal anomalies were detected but it is uncertain whether they are archaeological features or of natural origin. The function and date of the enclosure remain uncertain.

**CWMYSGFARNOG, CARMARTHENSHIRE:
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1. INTRODUCTION

1.1 Project Commission

- 1.1.1 On the 9th July, 2018 the Royal Commission on the Ancient and Historic Monuments of Wales (RCAHMW) photographed a rectangular cropmark enclosure (NPRN 423434; Photo. 1) in a pasture field to the west of Cwymsgfarnog, Llangathen, Carmarthenshire (centred on NGR SN 56742325).
- 1.1.2 The rectangular univallate enclosure appeared to have a broad ditch and measured approximately 60m x 30m and was aligned generally east-west. Other cropmarks were visible on the west side of the enclosure which may or may not be related to the rectangular cropmark. It was difficult to assign a date to the feature but it was suggested that the site could be a later prehistoric settlement, a Roman villa or even a medieval enclosure.
- 1.1.3 Toby Driver who photographed the site, suggested it was likely to be of Roman date; possibly evidence of a villa.



Photo 1: Rectangular cropmark enclosure (NPRN 423434). The image is Crown copyright and is reproduced with the permission of Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW), under delegated authority from The Keeper of Public Records.

- 1.1.4 In 2019 Cadw granted-aided Dyfed Archaeological Trust to carry out a geophysical survey of the cropmark area to help further characterise the archaeology, as part of the Welsh Government's Year of Discovery. Depending on the results of the survey, this could be the first stage of a larger project.

1.2. Project Aim and Objectives

1.2.1 The aim of the project was:

- to define the extent and character of the archaeology of the site.
- to formulate ways in which the remains can be managed and protected for future generations.
- to make appropriate scheduling recommendations

The objectives of the project were:

- to characterise the buried remains of the site by means of a geophysical survey.
- to improve our understanding, management and protection of the site, and by extension, other similar sites in the region.
- to engage members of the local community in the project.
- to disseminate the results of the project to a wide audience.
- to recommend further work on the site.

1.3 Report Outline

1.3.1 This report provides a summary and discussion of the archaeological survey and its results, and puts those results within their regional and national context.

1.4 Abbreviations

1.4.1 Sites recorded on the regional Historic Environment Record (HER) are identified by their Primary Record Number (PRN) and located by their National Grid Reference (NGR). Sites recorded on the National Monument Record (NMR) held by the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) are identified by their National Primary Record Number (NPRN). Altitude is expressed to Ordnance Datum (OD). References to cartographic and documentary evidence and published sources will be given in brackets throughout the text, with full details listed in the sources section at the rear of the report.

1.5 Illustrations

1.5.1 Printed map extracts are not necessarily produced to their original scale.

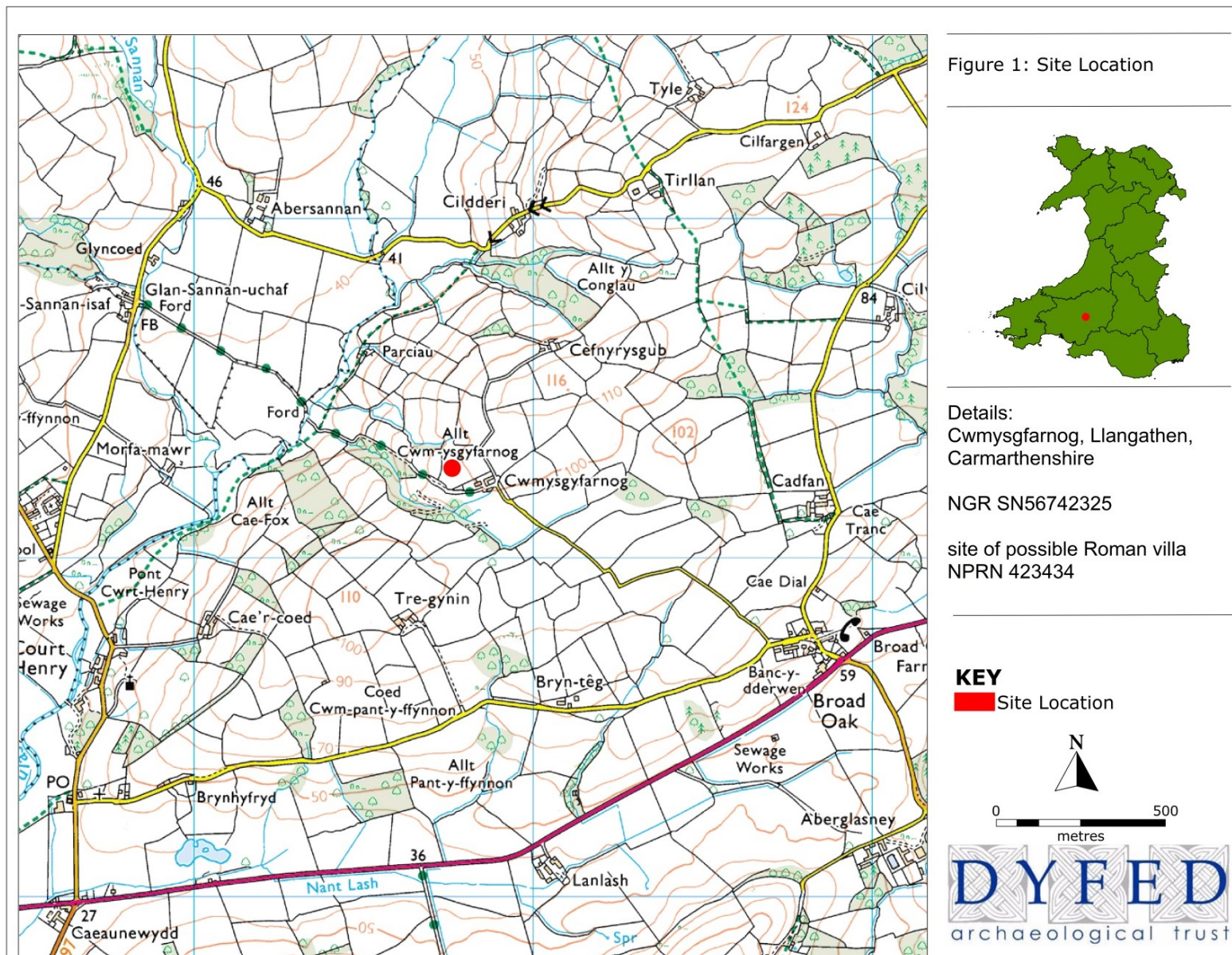
1.6 Timeline

1.6.1 The following timeline (Table 1) is used within this report to give date ranges for the various archaeological periods that may be mentioned within the text.

Period	Approximate date	
Palaeolithic –	c.450,000 – 10,000 BC	Prehistoric
Mesolithic –	c. 10,000 – 4400 BC	
Neolithic –	c.4400 – 2300 BC	
Bronze Age –	c.2300 – 700 BC	
Iron Age –	c.700 BC – AD 43	
Roman (Romano-British) Period –	AD 43 – c. AD 410	Historic
Post-Roman / Early Medieval Period –	c. AD 410 – AD 1086	
Medieval Period –	1086 – 1536	
Post-Medieval Period ¹ –	1536 – 1750	
Industrial Period –	1750 – 1899	
Modern –	20 th century onwards	

Table 1: Archaeological and Historical Timeline for Wales.

¹ The post-medieval and industrial periods are combined as the post-medieval period on the Regional Historic Environment Record as held by Dyfed Archaeological Trust



2. THE SITE

2.1 Site Location and Topography

- 2.1.1 The rectangular enclosure sits on a plateau within a pasture field at an elevation of approximately 100m OD. To the west of the enclosure the field begins to gradually slope westwards. From the site of the cropmark enclosure there are spectacular views westwards across the Towy valley (Photo. 2).
- 2.1.2 No obvious earthworks are visible on the ground.
- 2.1.3 The underling bedrock geology consists of Nantmel mudstones formation. A sedimentary rock formed approximately 444 – 449 million years ago in the Ordovician Period in a local environment previously dominated by deep seas (British Geological survey online [Accessed 31/07/19]).



Photo 2: Views westwards from the site of the cropmark enclosure across the valley.

3. GEOPHYSICAL SURVEY

3.1 Methodology

- 3.1.1 A fluxgate gradiometer with a DL601 data logger was used to conduct the detailed geophysical survey, which detects variations in the earth's magnetic field. A sample interval of 0.25m (four readings per metre) was used with 0.5m wide traverses across 20m x 20m grids using the zigzag traverse method of collecting data. The gradiometers sensitivity was set to detect a magnetic variation in the order of 0.1 nanoTesla.
- 3.1.2 The survey grid was tied into the local Ordnance Survey grid using a Trimble 5600 electronic distance measuring total station and theodolite (TST).
- 3.1.3 The data was processed using *Terrasurveyor 3.0.35.10* and is presented with a minimum of processing. The presence of high values caused by ferrous objects, which tend to hide fine details and obscure archaeological features, have been 'clipped' to remove the extreme values allowing the finer details to show through.
- 3.1.4 The processed data has been presented as a grey-scale plot, overlaid on local topographical features. The main magnetic anomalies have been identified and an interpretation of those results is also given.
- 3.1.5 The resulting survey results and interpretation diagrams should not be seen as a definitive model of what lies beneath the ground surface, not all buried features will provide a magnetic response that can be identified by the gradiometer. In interpreting those features that are recorded the shape is the principal diagnostic tool, along with comparison with known features from other surveys. The intensity of the magnetic response could provide further information, a strong response, for example, indicates burning, high ferric content or thermoremnancy in geology. The context may provide further clues but the interpretation of many of these features is still largely subjective.
- 3.1.6 All measurements given will be approximate as accurate measurements are difficult to determine from fluxgate gradiometer surveys. The width and length of identified features can be affected by its relative depth and magnetic strength.
- 3.1.7 The results of the geophysical survey do not necessitate the need for XY trace plots to enhance the interpretation and have not been included.

4. RESULTS

- 4.1 The geophysical survey results are presented as a greyscale plot in Figure 2 with an interpretation of the results provided in Figure 3. In total, an area of 1.2ha was surveyed.

Magnetic interference

- 4.2 Magnetic interference or disturbance often occurs where the survey is close to a field boundary that contains a ferrous material such as wire-fencing. In this instance, where the disturbance has occurred a single polarity response has been exhibited. This is evident along the southern and eastern boundaries of the survey. However, the interference is minimal and has not impacted adversely upon the rest of the survey.

Plough Marks

- 4.3 Towards the southeast corner of the survey area the linear anomalies probably represent plough marks aligned roughly northeast/southwest.

Dipoles

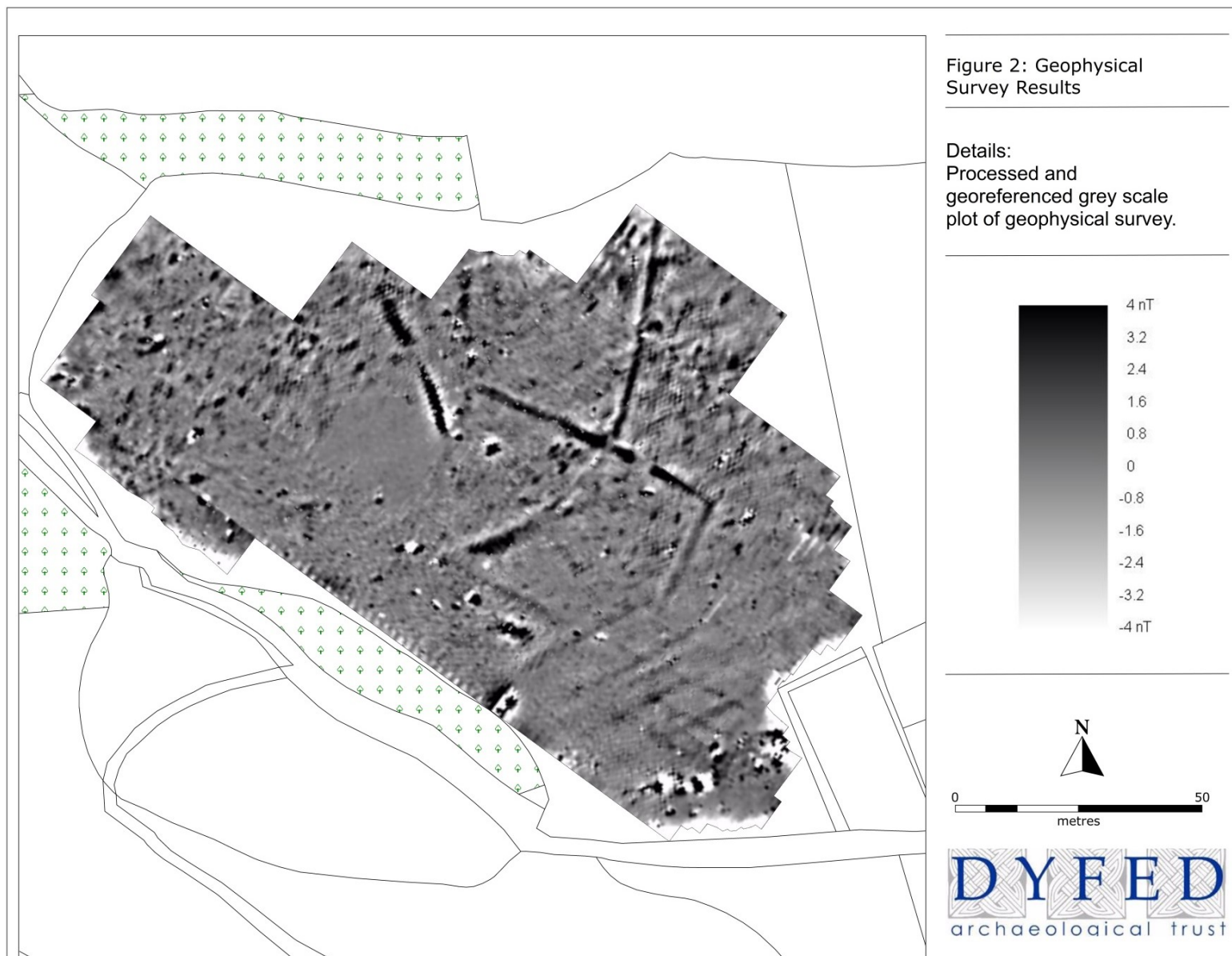
- 4.4 Several discrete positive anomalies can be seen throughout the area that possibly indicate the presence of features such as pits. Although there is some potential for them to be of archaeological origin it is also possible that they are a natural feature of the geology or a tree throw.
- 4.5 Other dipole anomalies may reflect archaeological artefacts but are more likely the response of modern ferrous-rich debris such as brick and tile fragments, as well as horseshoes and plough shares, which lie just below the surface.
- 4.6 The recorded larger concentrations of intense dipolar magnetic anomalies may reflect larger items of ferrous objects or areas of fired debris with possible archaeological interest.

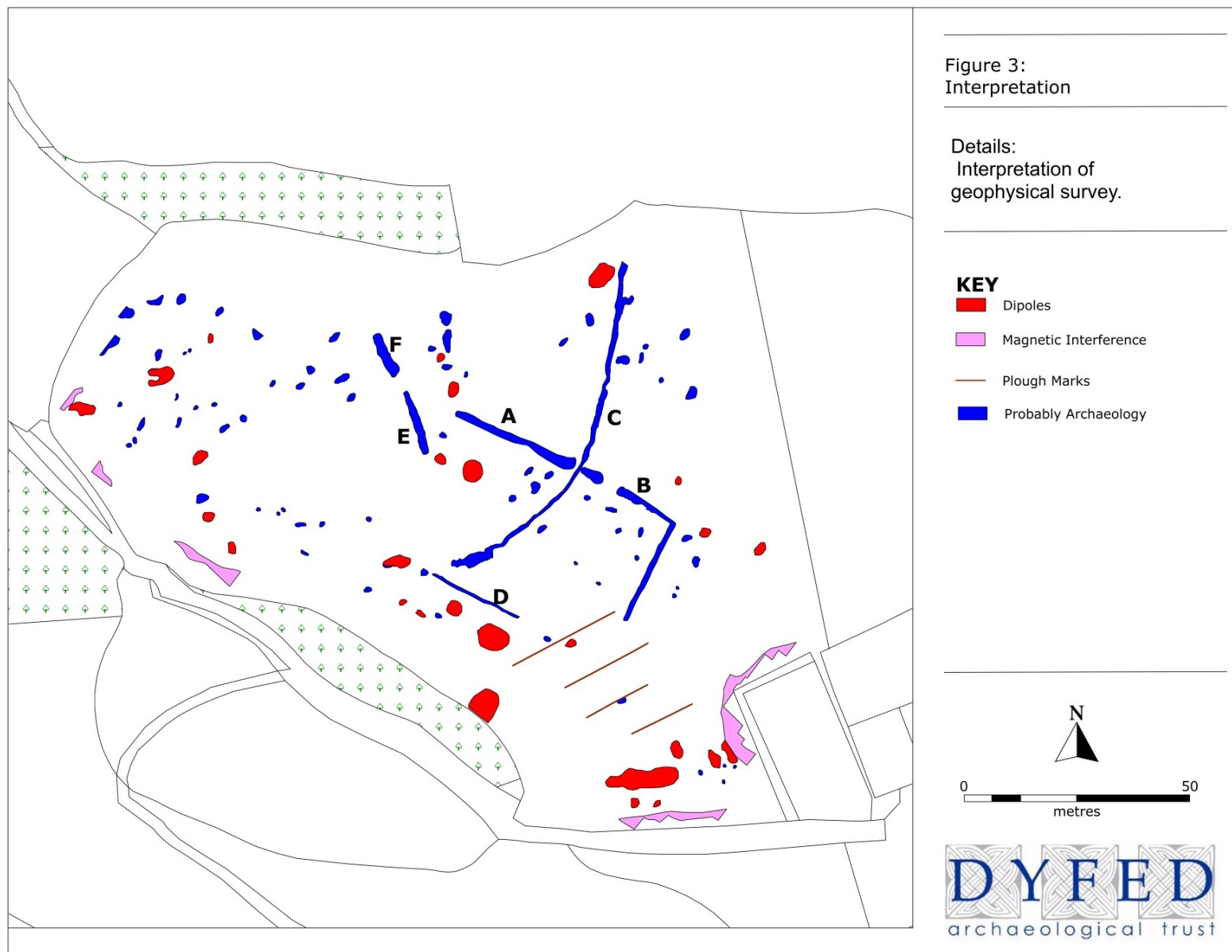
Probable Archaeology

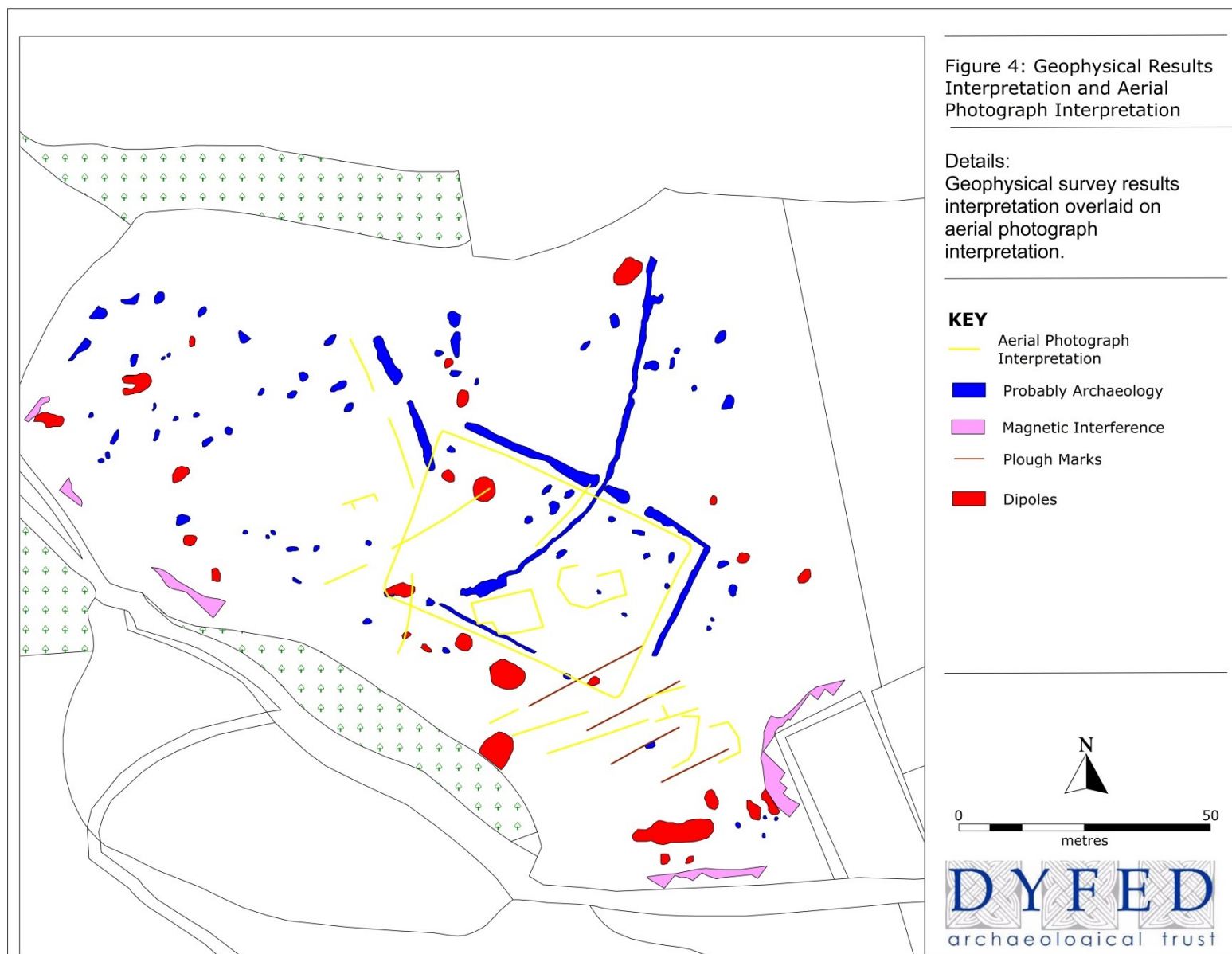
- 4.7 **A) Linear Ditch:** A strong magnetic anomaly aligned roughly northwest to southeast. The exhibited response suggests a ditch approximately 2.0m wide. The ditch appears to have been cut by Ditch C.
- 4.8 **B) Linear Ditch:** A probable continuation of Ditch A separated by a 3.4m wide north-facing entrance. As with Ditch A, this ditch is approximately 2.0m wide and set on the same alignment, measuring 14m in length. At its eastern end, the ditch turns 90° towards the south. Along this edge the response is more diffuse, running for 21m before fading away.
- 4.9 **C) Curvilinear Ditch:** This is represented by a positive magnetic response 82m in length running north to south, whilst bowing to the east. It is approximately 2.0m wide. To the south of where the ditch cuts Ditch A the response diffuses and exhibits a weaker magnetic response, but at its most southerly end, the ditch once again gains a strong magnetic response.
- 4.10 **D) Linear Ditch:** A weak magnetic response measuring 22m in length and 0.65m wide with the same orientation as Ditch A.
- 4.11 **E) Curvilinear Ditch:** A strong magnetic response aligned northwest/southeast. The ditch measures 14m long and 1.7m wide.
- 4.12 **F) Curvilinear Ditch:** Possibly a continuation of Ditch E, Ditch F represents a similarly intense response. Aligned the same as Ditch D, it measures 10 long and 2m wide.

5. CONCLUSIONS

- 5.1 Generally the quality of the magnetic data was good allowing it to be possible to discern features of archaeological interest.
- 5.2 For comparison purposes an interpretation of the aerial photograph has been overlaid over the interpretation of the geophysical survey results and can be seen in Figure 4. Due to the oblique angle of the aerial photograph, it has not been entirely possible to georeference accurately, and as such, features that appear in both interpretations are shifted slightly south in the aerial image overlay.
- 5.3 The geophysical survey results did not show the rectangular enclosure as clearly as that seen in the aerial photograph. The magnetic response along some of the enclosure ditches appeared too weak in places to exhibit an observable response and in its southeastern corner it appeared that plough marks may have obscured the ditch further.
- 5.4 More detail of curvilinear ditch C was recorded in the geophysical survey than was seen in the aerial photograph. The survey detected it as a much longer ditch that extended beyond the rectangular enclosure.
- 5.5 Both aerial photography and geophysical survey hinted at the presence of surviving archaeological features within the enclosure, but neither was particularly clear, making it difficult to determine whether the features were archaeological or geological in origin.
- 5.6 The survey has demonstrated that combining the results from more than one archaeological discipline contributes to a better understanding of the buried archaeological remains.
- 5.7 Unfortunately it has not been possible to characterise specific features that may shed light on the date of the enclosure, but it is still probable, from comparison with other known sites, that it is Romano-British in date. Further invasive work of the ditches and anomalies detected inside the enclosure may provide evidence of the enclosure's date and function.







6. SOURCES

Publications

CIFA, 2014 *Chartered Institute of Field Archaeologists Standards and Guidance for Archaeological Field Evaluation.*

National Standard and Guidance for Collecting and Depositing Archaeological Archives in Wales 2017.
<http://www.welshmuseumsfederation.org/en/news-archive/resources-landing/Collections/national-standard-and-guidance-for-collecting-and-depositing-archaeological-archives-in-wales-2017.html>

Database

Dyfed Archaeological Trust Historic Environment Record

Online resources

British Geological Survey [online]. Accessed 31/07/19. Available at:
www.bgs.ac.uk.

7. GLOSSARY

Fluxgate Gradiometer

An instrument used to measure magnetism to search for areas of disturbed ground that may be associated with subsurface archaeological features.

nanoTesla (nT)

A unit of measurement of a magnetic field.

Magnetic Disturbance

A high amplitude response typically associated with magnetic interference from modern ferrous objects such as buildings and fences. The response is commonly seen around the perimeter of survey areas.

Ferrous Objects

Metals and alloys that contain iron.

Dipole Anomalies

An anomaly consisting of a single positive response with an associated negative response forming a 'halo effect'. The negative and positive response is of equal magnitude but opposite polarity and are caused by the same feature. Dipole anomalies are very commonly observed across a range of sites, particularly agricultural land. Generally, unless the dipoles form part of a larger pattern or feature they are regarded as not significant. They are usually the result of modern ferrous rich debris such as brick and tile fragments as well as objects such as horseshoes or broken plough shares, which lie within the topsoil.

Polarity

An attribute with two possible values, positive or negative.

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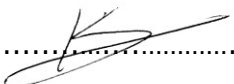
Signature  Date 02/08/19

This report has been checked and approved by

K Murphy

on behalf of Dyfed Archaeological Trust Ltd.

Position: **Director Dyfed Archaeological Trust**

Signature  Date 24/03/2020

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