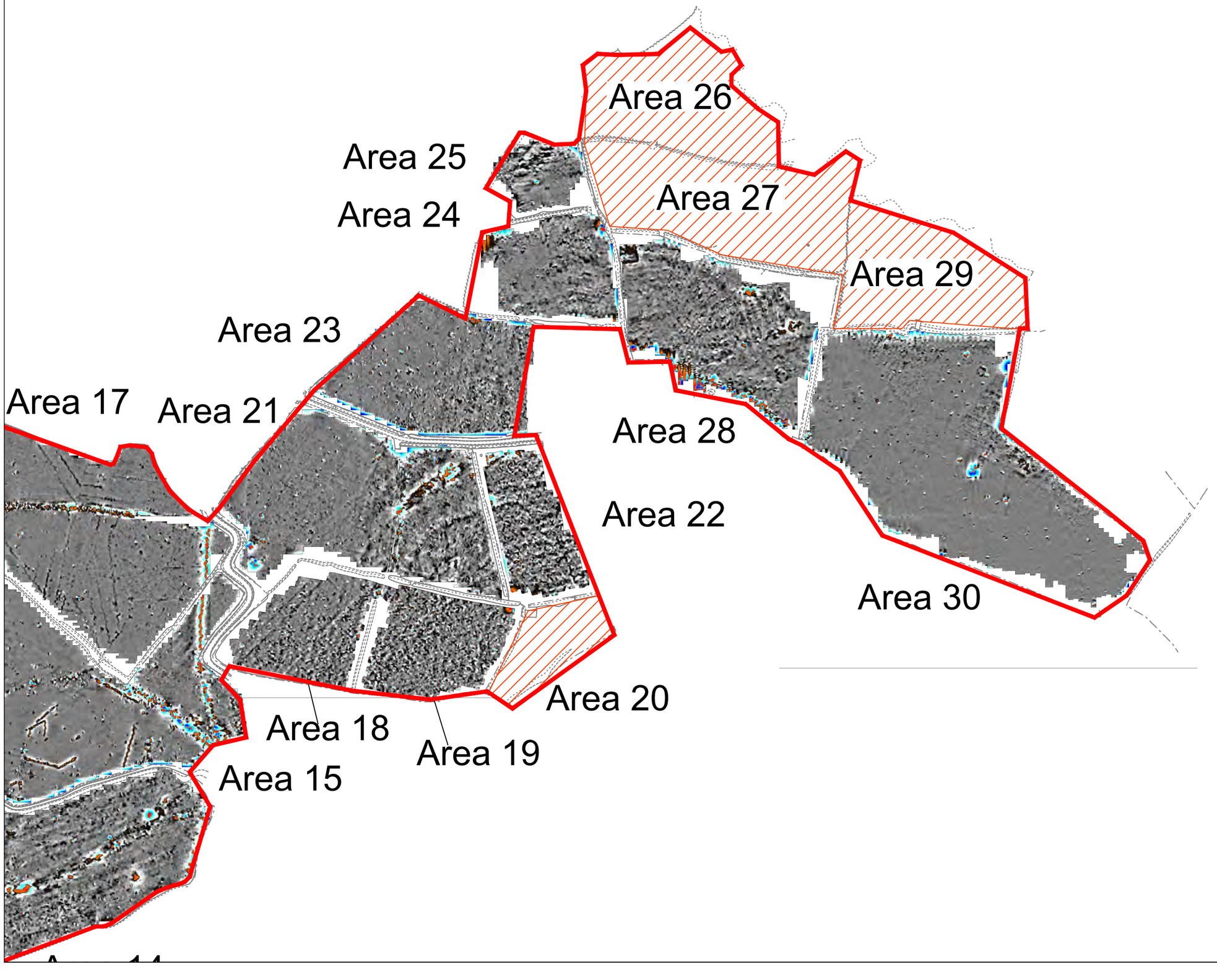


N

+100nT

-100nT

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

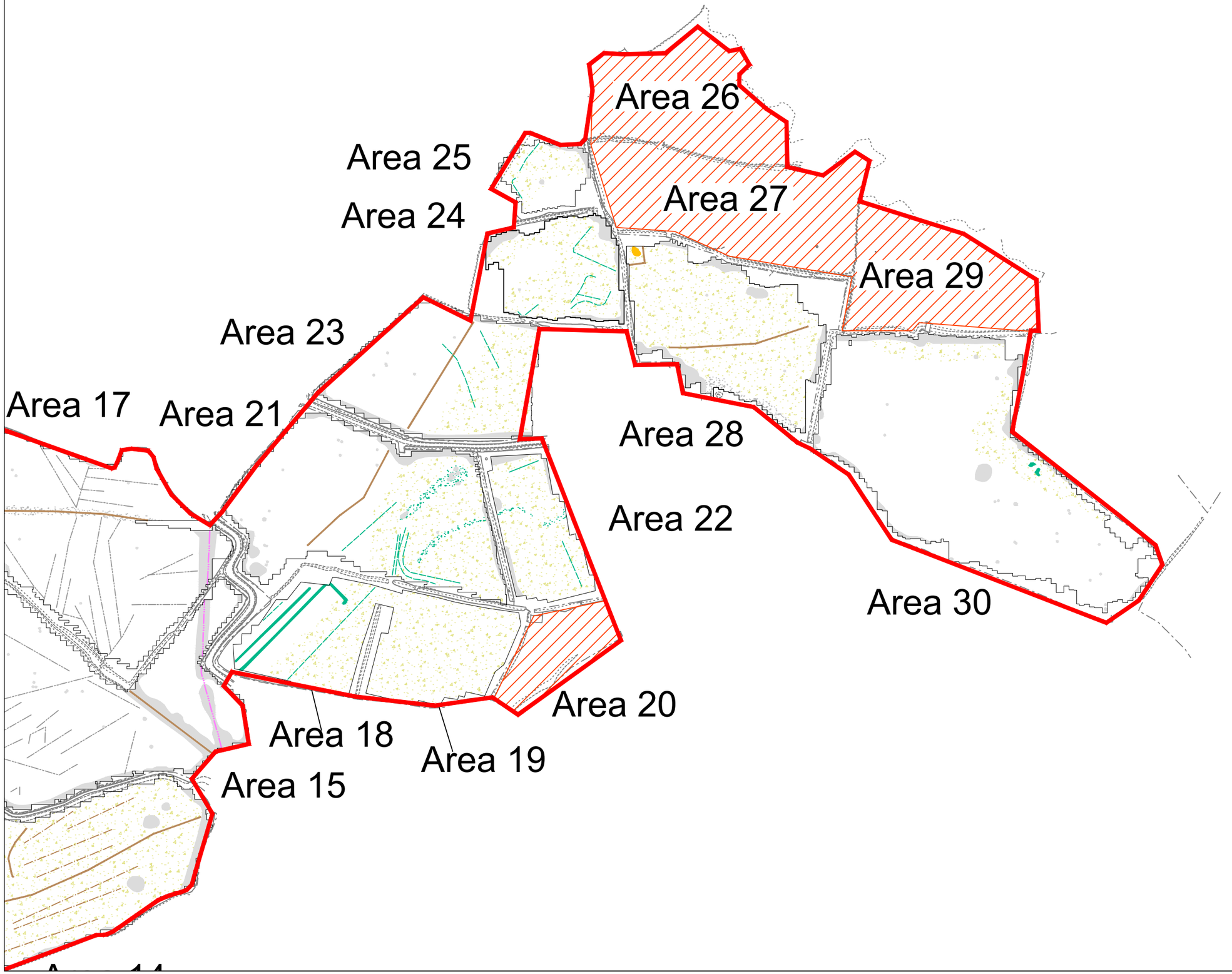
Title:
Magnetometer Survey - Colour Plots
(Areas 18-30)

Client:
Pegasus Group

Project:
02676 - Land at Brynrhyd Farm, Llanedi, Carmarthenshire

Scale:
0 metres 150
1:3000 @ A3

Fig No:
10



N

KEY

	Uncertain Origin (Discrete Anomaly / Trend / Increased Response)
	Former Field Boundary (Corroborated)
	Former Field Boundary (Conjectural)
	Former Agricultural Buildings (Corroborated)
	Ridge and Furrow
	Land Drain
	Natural (e.g. Geological / Pedological)
	Magnetic Disturbance
	Service
	Ferrous

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Magnetometer Survey - Interpretation (Areas 18-30)

Client:
Pegasus Group

Project:
02676 - Land at Brynrhyd Farm, Llanedi, Carmarthenshire

Scale:
0 metres 150
1:3000 @ A3

Fig No:
11

N

Magnetometer Survey Area

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

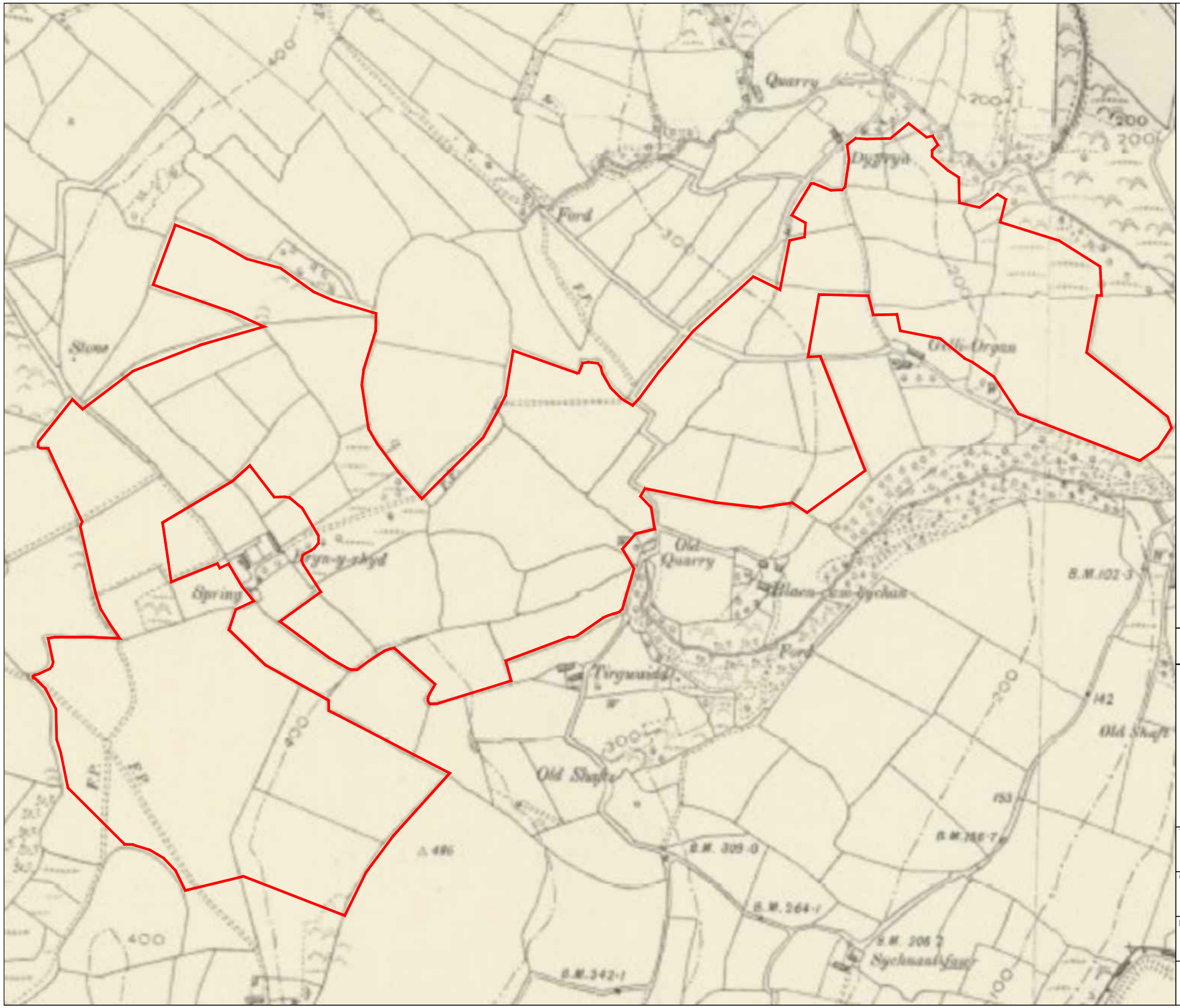
Title:
1842 Tithe Mapping (PG 2021)

Client:
Pegasus Group

Project:
02676 - Land at Brynrhyd Farm, Llanedi, Carmarthenshire

Scale:
0 metres 250
1:5000 @ A3

Fig No:
12



N

Magnetometer Survey Area

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

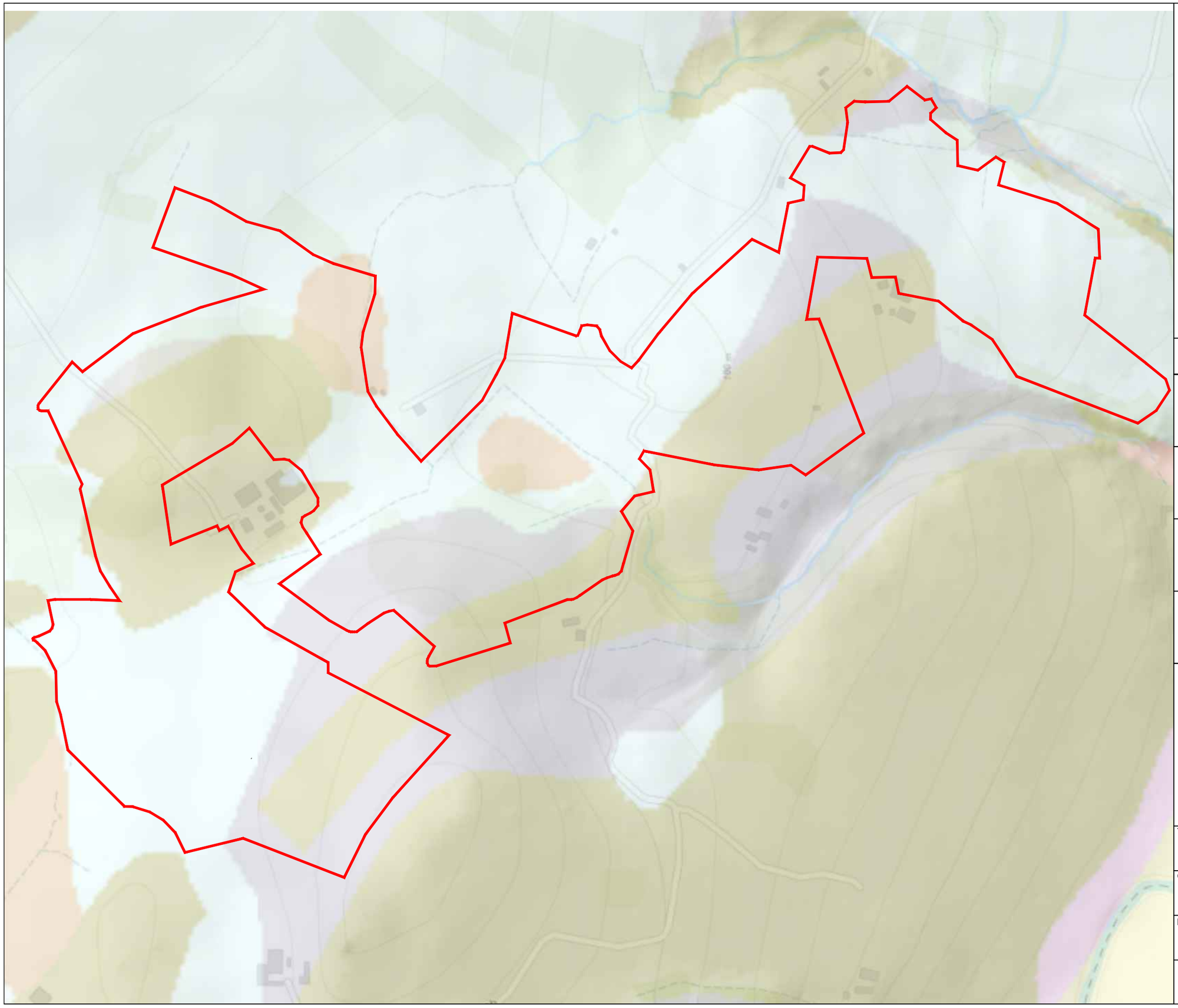
Title:
1908 Ordnance Survey Mapping (PG 2021)

Client:
Pegasus Group

Project:
02676 - Land at Brynrhyd Farm, Llanedi, Carmarthenshire

Scale:
0 metres 250
1:5000 @ A3

Fig No:
13



N

KEY (Bedrock / Superficial)

	Rhondda Member - Mudstone, Siltstone And Sandstone Peat - Peat
	Rhondda Member - Mudstone, Siltstone And Sandstone Till, Devensian - Diamicton
	Rhondda Member - Sandstone none recorded
	Rhondda Member - Mudstone, Siltstone And Sandstone none recorded

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Geology (Bedrock / Superficial) (BGS 2021)

Client:
Pegasus Group

Project:
02676 - Land at Brynrhyd Farm, Llanedi, Carmarthenshire

Scale:
0 metres 250
1:5000 @ A3

Fig No:
14

N

+10nT

-10nT

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Minimally Processed Data - Greyscale Plots

Client:
Pegasus Group

Project:
02676 - Land at Brynrhyd Farm, Llanedi, Carmarthenshire

Scale:
0 metres 250
1:5000 @ A3

Fig No:
15

Appendix A - Technical Information: Magnetometer Survey Method, Processing and Presentation

Standards & Guidance

This report and all fieldwork have been conducted in accordance with the latest guidance documents issued by Historic England (EH 2008) (then English Heritage), the Chartered Institute for Archaeologists (ClfA 2014) and the European Archaeological Council (EAC 2016).

Grid Positioning

For hand held gradiometers the location of the survey grids has been plotted together with the referencing information. Grids were set out using a Trimble R8 Real Time Kinematic (RTK) VRS Now GNSS GPS system.

An RTK GPS (Real-time Kinematic Global Positioning System) can locate a point on the ground to a far greater accuracy than a standard GPS unit. A standard GPS suffers from errors created by satellite orbit errors, clock errors and atmospheric interference, resulting in an accuracy of 5m-10m. An RTK system uses a single base station receiver and a number of mobile units. The base station re-broadcasts the phase of the carrier it measured, and the mobile units compare their own phase measurements with those they received from the base station. This results in an accuracy of around 0.01m.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1m	0.25m

Instrumentation: Bartington *Grad* 601-2

Bartington instruments operate in a gradiometer configuration which comprises fluxgate sensors mounted vertically, set 1.0m apart. The fluxgate gradiometer suppresses any diurnal or regional effects. The instruments are carried, or cart mounted, with the bottom sensor approximately 0.1-0.3m from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is measured in nanoTesla (nT). The sensitivity of the instrument can be adjusted; for most archaeological surveys the most sensitive range (0.1nT) is used. Generally, features up to 1m deep may be detected by this method, though strongly magnetic objects may be visible at greater depths. The Bartington instrument can collect two lines of data per traverse with gradiometer units mounted laterally with a separation of 1.0m. 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 site survey, data is transferred to the office for processing and presentation.

Data Processing

Zero Mean Traverse	This process sets the background mean of each traverse within each grid to zero. The operation removes striping effects and edge discontinuities over the whole of the data set.
Step Correction (De-stagger)	When gradiometer data are collected in 'zig-zag' fashion, stepping errors can sometimes arise. These occur because of a slight difference in the speed of walking on the forward and reverse traverses. The result is a staggered effect in the data, which is particularly noticeable on linear anomalies. This process corrects these errors.

Display

Greyscale/ Colourscale Plot	This format divides a given range of readings into a set number of classes. Each class is represented by a specific shade of grey, the intensity increasing with value. All values above the given range are allocated the same shade (maximum intensity); similarly, all values below the given range are represented by the minimum intensity shade. Similar plots can be produced in colour, either using a wide range of colours or by selecting two or three colours to represent positive and negative values. The assigned range (plotting levels) can be adjusted to emphasise different anomalies in the data-set.

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Presentation of results and interpretation

The presentation of the results includes a ‘minimally processed data’ and a ‘processed data’ greyscale plot. Magnetic anomalies are identified, interpreted and plotted onto the ‘Interpretation’ drawings.

When interpreting the results, several factors are taken into consideration, including the nature of archaeological features being investigated and the local conditions at the site (geology, pedology, topography etc.). Anomalies are categorised by their potential origin. Where responses can be related to other existing evidence, the anomalies will be given specific categories, such as: Abbey Wall or Roman Road. Where the interpretation is based largely on the geophysical data, levels of confidence are implied, for example: Probable, or Possible Archaeology. The former is used for a confident interpretation, based on anomaly definition and/or other corroborative data such as cropmarks. Poor anomaly definition, a lack of clear patterns to the responses and an absence of other supporting data reduces confidence, hence the classification Possible.

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Interpretation Categories

In certain circumstances (usually when there is corroborative evidence from desk-based or excavation data) very specific interpretations can be assigned to magnetic anomalies (for example, *Roman Road, Wall,* etc.) and where appropriate, such interpretations will be applied. The list below outlines the generic categories commonly used in the interpretation of the results.

Archaeology / Probable Archaeology	This term is used when the form, nature and pattern of the responses are clearly or very probably archaeological and /or if corroborative evidence is available. These anomalies, whilst considered anthropogenic, could be of any age.
Possible Archaeology	These anomalies exhibit either weak signal strength and / or poor definition, or form incomplete archaeological patterns, thereby reducing the level of confidence in the interpretation. Although the archaeological interpretation is favoured, they may be the result of variable soil depth, plough damage or even aliasing as a result of data collection orientation.
Industrial / Burnt-Fired	Strong magnetic anomalies that, due to their shape and form or the context in which they are found, suggest the presence of kilns, ovens, corn dryers, metal-working areas or hearths. It should be noted that in many instances modern ferrous material can produce similar magnetic anomalies.
Former Field Boundary (probable & possible)	Anomalies that correspond to former boundaries indicated on historic mapping, or which are clearly a continuation of existing land divisions. Possible denotes less confidence where the anomaly may not be shown on historic mapping but nevertheless the anomaly displays all the characteristics of a field boundary.
Ridge & Furrow	Parallel linear anomalies whose broad spacing suggests ridge and furrow cultivation. In some cases, the response may be the result of more recent agricultural activity.
Agriculture (ploughing)	Parallel linear anomalies or trends with a narrower spacing, sometimes aligned with existing boundaries, indicating more recent cultivation regimes.
Land Drain	Weakly magnetic linear anomalies, quite often appearing in series forming parallel and herringbone patterns. Smaller drains may lead and empty into larger diameter pipes, which in turn usually lead to local streams and ponds. These are indicative of clay fired land drains.
Natural	These responses form clear patterns in geographical zones where natural variations are known to produce significant magnetic distortions.
Magnetic Disturbance	Broad zones of strong dipolar anomalies, commonly found in places where modern ferrous or fired materials (e.g. brick rubble) are present.
Service	Magnetically strong anomalies, usually forming linear features are indicative of ferrous pipes/cables. Sometimes other materials (e.g. pvc) or the fill of the trench can cause weaker magnetic responses which can be identified from their uniform linearity.
Ferrous	This type of response is associated with ferrous material and may result from small items in the topsoil, larger buried objects such as pipes, or above ground features such as fence lines or pylons. Ferrous responses are usually regarded as modern. Individual burnt stones, fired bricks or igneous rocks can produce responses similar to ferrous material.
Uncertain Origin	Anomalies which stand out from the background magnetic variation, yet whose form and lack of patterning gives little clue as to their origin. Often the characteristics and distribution of the responses straddle the categories of *Possible Archaeology* / *Natural* or (in the case of linear responses) *Possible Archaeology* / *Agriculture*; occasionally they are simply of an unusual form.

Where appropriate some anomalies will be further classified according to their form (positive or negative) and relative strength and coherence (trend: weak and poorly defined).

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Appendix B - Technical Information: Magnetic Theory

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. Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.1 nanoTeslas (nT) in an overall field strength of 48,000 (nT), can be accurately detected.

Weakly magnetic iron minerals are always present within the soil and areas of enhancement relate to increases in *magnetic susceptibility* and permanently magnetised *thermoremanent* 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.

Thermoremanence 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. Thermoremanent archaeological features can include hearths and kilns; 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 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 feature. The difference between the two sensors will relate to the strength of a magnetic field created by this 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 and disturbance from modern services.

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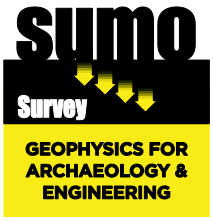

- Archaeological
- Geophysical
- Laser Scanning
- Measured Building
- Topographic
- Utility Mapping

SUMO Services Ltd, incorporated under the laws of England and Wales,
Company Registration No.4275993.
Registered Office Unit 8 Hayward Business Centre, New Lane, Havant, Hampshire, PO9 2NL

APPENDIX 9.3

GEOPHYSICAL SURVEY REPORT (ASWYAS 2021)

WYAS Archaeological Services

Brynrhyd Solar Farm, Llanedi, Carmarthenshire

Geophysical Survey

Report no. 3616
July 2021

Client: Brynrhyd Solar Farm Limited

REGISTERED ORGANISATION CIfA

West Yorkshire Joint Services

Brynrhyd Solar Farm, Llanedi, Carmarthenshire

Geophysical Survey

Summary

A geophysical (magnetometer) survey was attempted of approximately 4 hectares of land located to the north and south of Gelli Organ Farm, Llanedi, Carmarthenshire consisting of Areas 20, 26, 27 and 29 within the overall area of the proposed Brynrhyd Solar Farm. This followed on from a wider geophysical survey undertaken of the whole of the proposed solar farm area by SUMO in 2021, at which time Areas 20, 26, 27 and 29 were not accessible or the ground conditions made them unsuitable for geophysical survey. Therefore the present survey was carried out with the aim of assessing whether ground conditions had changed, and to undertake archaeological geophysical survey if this was possible. Out of the four Areas attempted, it was only survey Area 26 that was suitable for data collection. All other areas were un-surveyable due to the height of vegetation within them, which would have prevented successful data collation. The survey of Area 26 did detect a number of anomalies that could possibly have an archaeological origin, which have a pit-like and short-ditch like character, but no features that certainly represent archaeology. Other responses in the dataset were of a geological and modern origin.

Crynodeb

Ceisiwyd arolwg geoffisegol (magnetomedr) o oddeutu 4 hectar o dir i'r gogledd a'r de o Fferm Organ Gelli, Llanedi, Sir Gaerfyrddin sy'n cynnwys Ardaloedd 20, 26, 27 a 29 yn ardal gyffredinol Fferm Solar arfaethedig Brynrhyd. Dilynodd hyn o arolwg geoffisegol ehangach a gynhaliwyd o'r holl ardal fferm solar arfaethedig gan SUMO yn 2021, ac ar yr adeg honno nid oedd amodau'r ddaear yn Ardaloedd 20, 26, 27 a 29 yn hygyrch nac yn addas ar gyfer arolwg geoffisegol. Felly cynhaliwyd yr arolwg presennol gyda'r nod o asesu a oedd cyflwr y ddaear wedi newid, ac i gynnal arolwg geoffisegol archeolegol os oedd hyn yn bosibl. O'r pedair Ardal a geisiwyd, dim ond Ardal 26 yr arolwg oedd yn addas ar gyfer casglu data. Nid oedd modd arolygu pob ardal arall oherwydd uchder y llystyfiant ynddynt, a fyddai wedi atal coladu data yn llwyddiannus. Canfu'r arolwg o Ardal 26 nifer o anghysonderau a allai o bosibl fod â tharddiad archeolegol, sydd â chymeriad tebyg i bwll a ffos fer, ond dim nodweddion sy'n sicr yn cynrychioli archeoleg. Roedd ymatebion eraill yn y set ddata o darddiad daearegol a modern.

Report Information

Client:	Brynrhyd Solar Farm Limited
Address:	Unit 20.2, Coda Studios, 189 Munster Road, London, SW6 6AW
Report Type:	Archaeological Geophysical Survey
Location:	Llanedi
County:	Carmarthenshire
Grid Reference:	SN 6007 0854
Period(s) of activity:	Uncertain
Report Number:	3616
Project Number:	XC59
Site Code:	GOF21
Date of fieldwork:	July 2021
Date of report:	July 2021
Project Management:	Emma Brunning BSc MCIfA
Fieldwork:	Alastair Trace BSc MSc
	Jake Freeman BA
Illustrations:	Emma Brunning
Photography:	Alastair Trace
Research:	Emma Brunning
Report:	Emma Brunning

Authorisation for distribution: ----------

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[redacted]

Document Issue Record

Ver	Author(s)	Reviewer	Approver	Date
1.0	EB	JR	JR	July 2021

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7 General view of Area 27/29, looking northeast
8 General view of Area 27/29, looking east
9 General view of Area 29, looking east
10 General view of Area 29, looking east
11 General view of Area 20, looking south
12 General view of Area 20, looking south

1 Introduction

Archaeological Services (ASWYAS) has been commissioned by Island Green Power on behalf of Brynrhyd Solar Farm Limited to undertake a geophysical survey of Areas 20, 26, 27 and 29 at the proposed Brynrhyd Solar Farm at Gelli Organ Farm, Llanedi, Carmarthenshire (Planning ref. DNS/3260565). This was undertaken in line with current best practice (CIfA 2014; Schmidt *et al.* 2015). The survey was carried out on the 15th-16th July 2021.

This survey followed on from a wider geophysical survey undertaken of the whole of the proposed solar farm area by SUMO from late April to early May 2021, at which time the ground conditions in Areas 20, 26, 27 and 29 were not accessible or suitable for geophysical survey. The aim of the current survey was therefore to re-assess the ground conditions with these Areas, and undertake geophysical survey where possible.

Site location, topography and land-use

The Site is located at SN 6007 0854 (approximate centre) and comprises *c*. 4ha divided between four fields (Areas 20, 26, 27 and 29) situated to the north and south of Gelli Organ Farm, approximately 700m north of Llanedi (see Fig. 1).

The survey Areas all consisted of overgrown pasture/meadow in which only Area 26 was suitable for survey (see Plates 1-4) totalling approximately 1.2ha. The Site topography is undulating, with the fields lying between 87m above Ordnance Datum (aOD) and 50m aOD.

Limitations

The archaeological survey of Areas 20, 27 and 29 was impeded by ground conditions and vegetation, leaving only Area 26 suitable for archaeological geophysical survey.

The vegetation in Areas 20, 27 and 29 was above waist height at the time of survey, which impeded any successful data collection. The instruments in use need to be held level whilst walking at a constant pace, and the sensors would have been constantly disturbed in such conditions, significantly distorting any results. The ground surface was also heavily disturbed from the former presence of horses in the fields, creating safety concerns regarding potential trip hazards during the survey, especially where the ground was largely obscured by vegetation (see Plates 5-12).

Such conditions were encountered in Areas 20, 26, 27 and 29 by SUMO in April/May 2021; conditions had improved only in Area 26 in the intervening period.

Soils and geology

The recorded bedrock geology comprises Rhondda Formation, a sedimentary bedrock that formed approximately 308 to 315 million years ago in the Carboniferous Period. Superficial deposits have been recorded as Devensian and Diamicton tills (BGS 2021). Soils are described as slowly permeable seasonally wet acid loamy and clayey soils (Soilscape 17; CSAI 2021).

2 Archaeological Background

The following archaeological background has been derived from prior work conducted by SUMO (2021), and the desk-based assessment produced by Pegasus Group (2021).

Two Neolithic Cotswold-Severn type chambered tombs are located *c*. 2km south-east of the Site (ref. 00924w), Bronze Age ring cairns and burnt mounds, *c*. 2–3km south-east of the site (refs. 05114w, 00342w, 00343w, GM384, GM380, and others), and an Iron Age enclosure *c*. 1.9km south-east of the site (ref. GM386). In a field immediately outside the north-western boundary is a large Bronze Age standing stone (refs. CM193 and 676). Approximately 720m to its north-west is the former site of a Bronze Age round barrow (burial mound), which comprised an earthwork with visible kerb stones in 1973 but had seemingly been destroyed by 2002 (ref. 7339). Earthworks are recorded by the HER within the western part of the site, to the south-west of Brynrhyd Farm, and interpreted as the remains of a medieval strip field system (ref. 11719). To the south and south-east of the site at Erw-wastad-fach and Erw-wastad-fawr, earthworks suggestive of deserted medieval to post-medieval rural settlement were identified during aerial reconnaissance in 2012 (refs. 421636 and 421637).

Despite prehistoric monuments being recorded in the immediate and wider vicinity of the site, there is currently no indication of buried archaeological evidence of prehistoric activity within the Site. It is likely that the site has comprised marshland and farmland from the early medieval period onwards. There is potential for the site to preserve buried plough furrows, buried drainage and field boundary ditches, and buried footings or debris of the post-medieval dwelling called Ty Mawr recorded by the NMRW and of the field barns shown on 19th-century maps.

Previous geophysical survey performed by SUMO in 2021 took place surrounding the current survey areas and recorded northing of definite archaeological interest. The majority of the responses were attributed to field boundaries, ridge and furrow and land drains.

3 Aims, Methodology and Presentation

The aims and objectives of the programme of geophysical survey were to assess whether the ground conditions within Areas 20, 26, 27 and 29 were suitable for geophysical survey, and then to gather sufficient information to establish the presence/absence, character and extent, of any archaeological remains within the specific area to inform an assessment of the archaeological potential of the Site. To achieve this aim, a magnetometer survey covering all accessible parts of the Site was undertaken (see Fig. 2).

The general objectives of the geophysical survey were:

- to provide information about the nature and possible interpretation of any magnetic anomalies identified;
- to therefore determine the presence/absence and extent of any buried archaeological features; and
- to prepare a report summarising the results of the survey.

Magnetometer survey

The site grid was laid out using a Trimble VRS differential Global Positioning System (Trimble R6 model). The survey was undertaken using Bartington Grad601 magnetic gradiometers. These were employed taking readings at 0.25m intervals on zig-zag traverses 1.0m apart within 30m by 30m grids, so that 3600 readings were recorded in each grid. These readings were stored in the memory of the instrument and later downloaded to computer for processing and interpretation. Bespoke in-house software was used to process and present the data. Further details are given in Appendix 1.

Reporting

A general site location plan, incorporating the 1:50000 Ordnance Survey (OS) mapping, is shown in Figure 1. Figure 2 displays the location of the survey areas with processed magnetometer data at a scale of 1:2500. Processed and minimally processed data, together with interpretation of the survey results are presented in Figures 3 to 5 inclusive at a scale of 1:1000.

Technical information on the equipment used, data processing and survey methodologies are given in Appendix 1. Technical information on locating the survey area is provided in Appendix 2. Appendix 3 describes the composition and location of the archive.

The survey methodology, report and any recommendations comply with guidelines outlined by the European Archaeological Council (Schmidt *et al*. 2015) and by the Chartered Institute for Archaeologists (CIfA 2014). All figures reproduced from Ordnance Survey mapping are with the permission of the controller of Her Majesty's Stationery Office (© Crown copyright).

The figures in this report have been produced following analysis of the data in processed formats and over a range of different display levels. All figures are presented to most suitably display and interpret the data from this site based on the experience and knowledge of Archaeological Services staff.

4 Results and Discussion (see Figures 3 to 5)

Ferrous anomalies and magnetic disturbance

Ferrous anomalies, as individual 'spikes', or as large discrete areas are typically caused by ferrous (magnetic) material, either on the ground surface or in the plough-soil. Little importance is normally given to such anomalies, unless there is any supporting evidence for an archaeological interpretation, as modern ferrous debris or material is common on rural sites, often being present as a consequence of manuring or tipping/infilling. There is no obvious pattern or clustering to the distribution of individual spikes in the results of the Area 26 survey to suggest anything other than a random background scatter of ferrous debris in the plough-soil.

Geological anomalies

The survey of Area 26 has detected a number of anomalies that have been interpreted as geological in origin. It is thought that the responses have been detected because of the variation in the composition and depth of the deposits of superficial material in which they derive. They are particularly evident along the limits of the survey area, adjacent to the field boundaries.

Possible archaeological anomalies

Anomalies of a possible archaeological origin have been recorded within the dataset within Area 26 as linear trends, short ditch-type anomalies and pit-like responses.

Anomalies (**A1**) in the west of the dataset are isolated responses and have a greater magnetic strength to the surrounding geological responses, hence the possible archaeological origin. However, the responses may also be related natural or modern origins. A handful of perpendicular linear anomalies have been recorded (**A2**) in the east of the dataset which again may be of some interest. Due to the limited survey area, it is impossible to determine what these anomalies are. They may be part of a larger feature or may be associated with agricultural or geological origins. A group of magnetically strong responses (**A3**) in the east of the area have been highlighted as possible archaeology. These are magnetically stronger than those at **A1** so have extra weight to the interpretation. Due to there being no discernible patterns, however, any archaeological interpretation must be viewed with caution.

5 Conclusions

Out of the four Areas attempted, only survey Area 26 was suitable for geophysical data collection. The geophysical survey of Area 26 detected magnetic anomalies which could have a possible archaeological origin in the form of pit-like and short ditch-like responses and linear trends, but no clear patterns can be seen. Other responses in the dataset are of a geological and modern origin. All other areas (20, 27 and 29) were un-surveyable due to the height of vegetation within them, which prevented successful data collation.

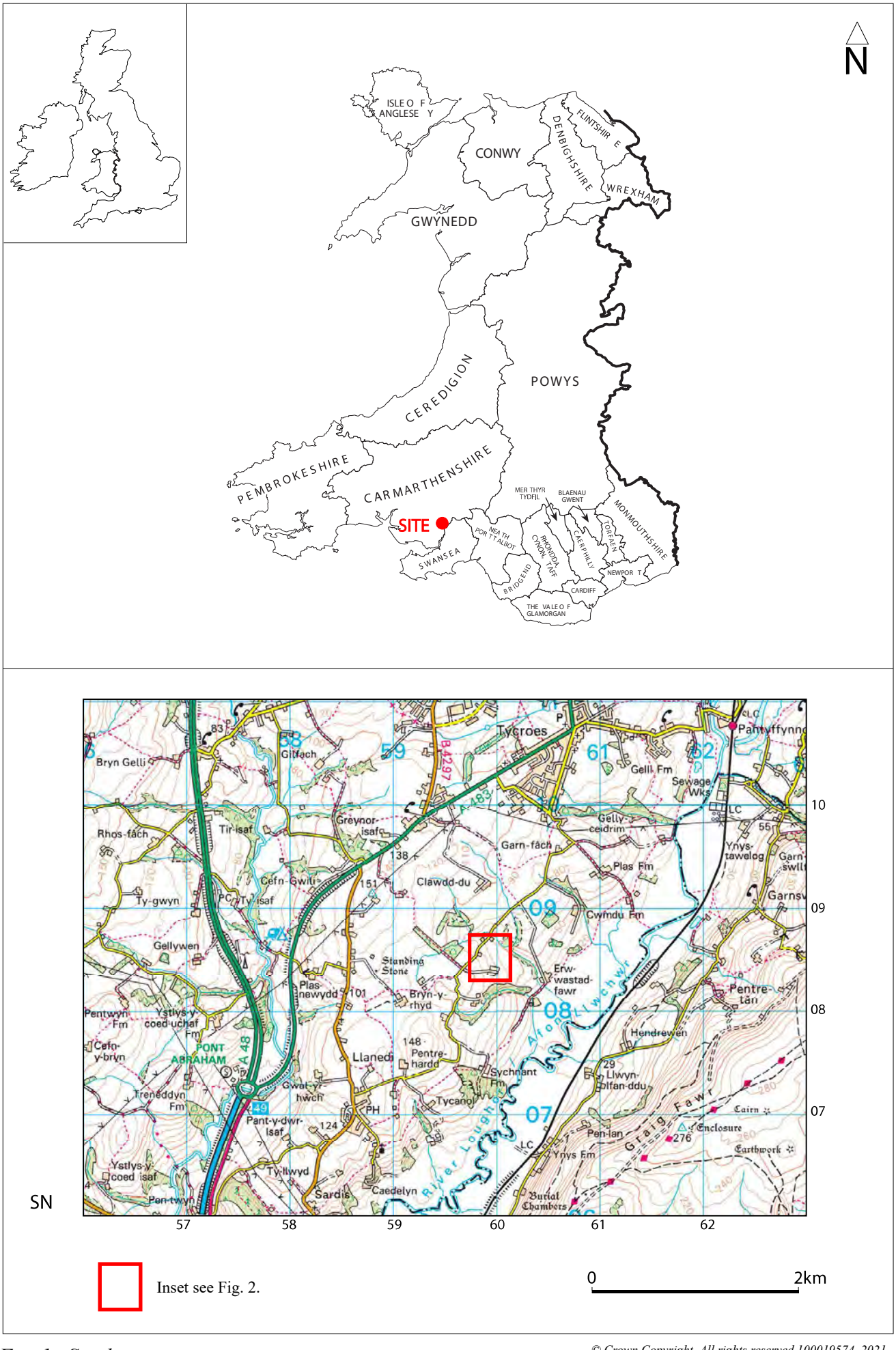

Fig. 1. Site location

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N

2088 00

2086 00

2084 00

2082 00

2080 00

2598 00

2600 00

2602 00

Area 26

Area 27

Area 29

Area 20

1

2

3

4

5

6

7

8

9

10

11

12

Wern-Ddu

Dyffryn Fach

Penrhiw Cottage

84.7m

Isallt

The Old Stable Yard

Gelli Organ

ETL

Well

Track

21.0m

Well

35.0m

41.8m

Blaen-Cwm-Bychan

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Archaeological Services W Y A S,
Nepshaw Lane South, Morley, LS27 7JQ
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Project ID: XC59_GOF21

Location of survey areas

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Digital data supplied by the client, Ed Dennison Archaeological Services Ltd , 2021.

Fig.2

Title

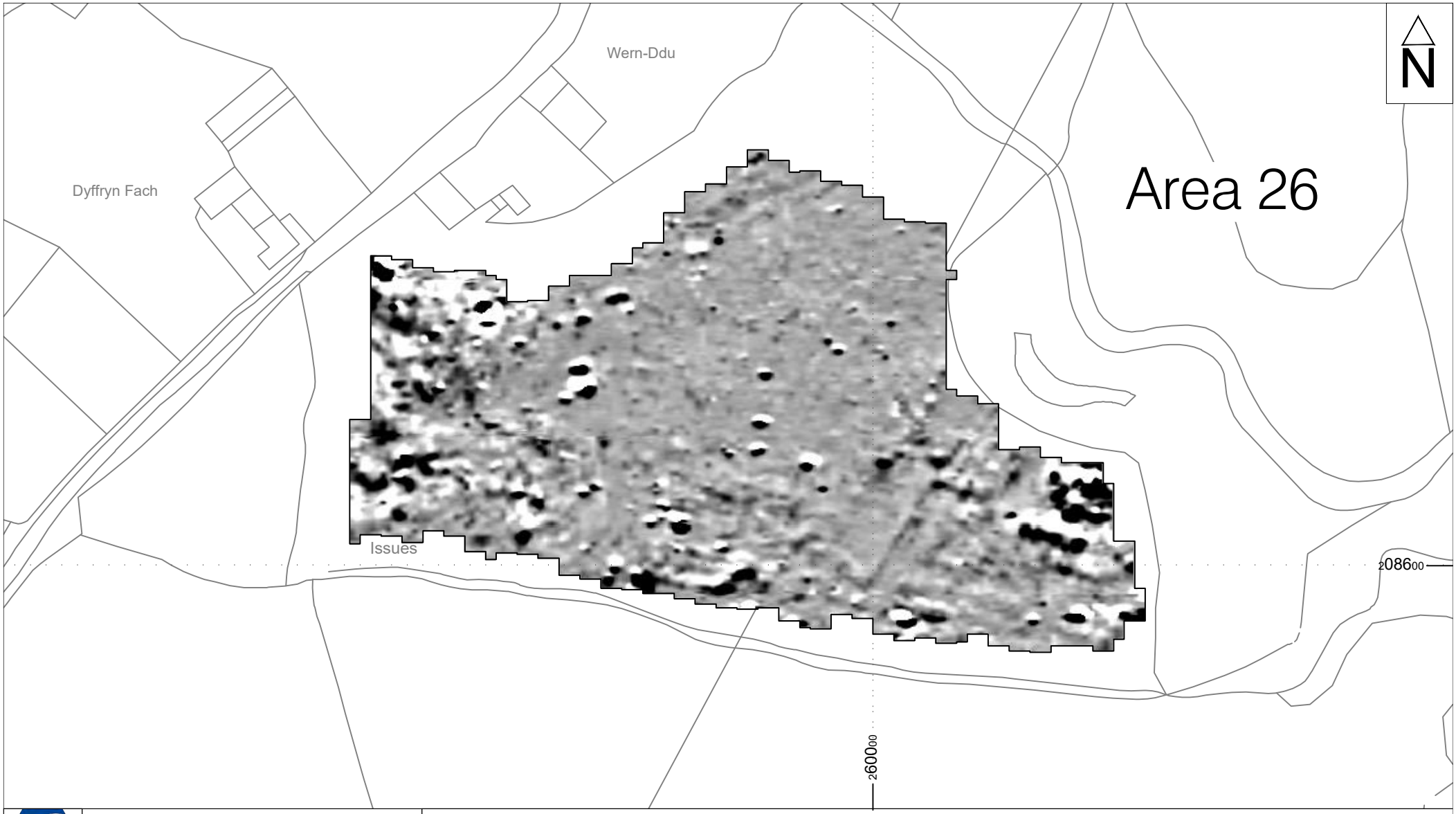
SURVEY AREA

UNSUITABLE FOR SURVEY

nT -1.0 2.0

0 100m

1:2500 @ A3



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Processed greyscale magnetometer data

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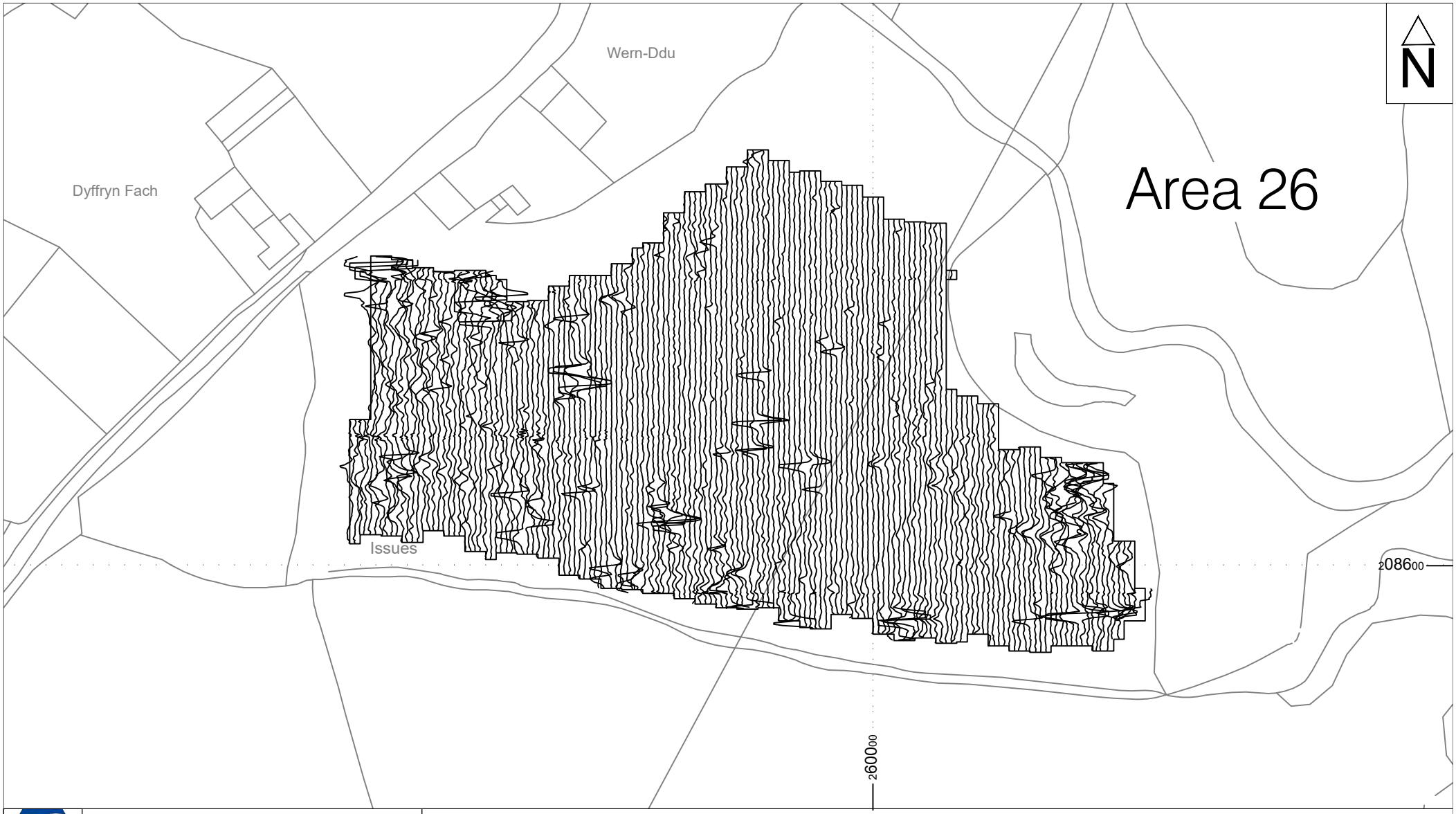
Fig. 3



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XY Trace plot of minimally processed magnetometer data

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Fig. 4

15.0 nT/cm

0 50m

1:1000 @ A4

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Interpretation of magnetometer data

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Fig. 5

Interpretation

FERROUS
GEOLOGY
ARCHAEOLOGY?

0 50m

1:1000 @ A4

Plate 1. General view of Area 26, looking northwest

Plate 2. General view of Area 26, looking west

Plate 3. General view of Area 26, looking southeast

Plate 4.General view of Area 26, looking east

Plate 5. General view of Area 27, looking west

Plate 6. General view of Area 27, looking west

Plate 7. General view of Area 27/29 looking northeast

Plate 8.General view of Area 27/29 looking east

Plate 9. General view of Area 29, looking east

Plate 10. General view of Area 29, looking east

Plate 11. General view of Area 20, looking south

Plate 12.General view of Area 20, looking south

Appendix 1: Magnetic survey - technical information

Magnetic Susceptibility and Soil Magnetism

Iron makes up about 6% of the Earth's crust and is mostly present in soils and rocks as minerals such as maghaemite and haemetite. These minerals have a weak, measurable magnetic property termed magnetic susceptibility. Human activities can redistribute these minerals and change (enhance) others into more magnetic forms. Areas of human occupation or settlement can then be identified by measuring the magnetic susceptibility of the topsoil because of the attendant increase (enhancement) in magnetic susceptibility. If the enhanced material subsequently comes to fill features, such as ditches or pits, localised isolated and linear magnetic anomalies can result whose presence can be detected by a magnetometer (fluxgate gradiometer).

In general, it is the contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of topsoils, subsoils and rocks into which these features have been cut, which causes the most recognisable responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or the bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected. The magnetic susceptibility of a soil can also be enhanced by the application of heat and the fermentation and bacterial effects associated with rubbish decomposition. The area of enhancement is usually quite large, mainly due to the tendency of discard areas to extend beyond the limit of the occupation site itself, and spreading by the plough.

Types of Magnetic Anomaly

In the majority of instances anomalies are termed 'positive'. This means that they have a positive magnetic value relative to the magnetic background on any given site. However some features can manifest themselves as 'negative' anomalies that, conversely, means that the response is negative relative to the mean magnetic background.

Where it is not possible to give a probable cause of an observed anomaly a '?' is appended.

It should be noted that anomalies interpreted as modern in origin might be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the feature causing the anomaly.

The types of response mentioned above can be divided into five main categories that are used in the graphical interpretation of the magnetic data:

Isolated dipolar anomalies (iron spikes)

These responses are typically caused by ferrous material either on the surface or in the topsoil. They cause a rapid variation in the magnetic response giving a characteristic 'spiky' trace. Although ferrous archaeological artefacts could produce this type of response, unless there is supporting evidence for an archaeological interpretation, little emphasis is normally given to such anomalies, as modern ferrous objects are common on rural sites, often being present as a consequence of manuring.

Areas of magnetic disturbance

These responses can have several causes often being associated with burnt material, such as slag waste or brick rubble or other strongly magnetised/fired material. Ferrous structures such as pylons, mesh or barbed wire fencing and buried pipes can also cause the same disturbed response. A modern origin is usually assumed unless there is other supporting information.

Linear trend

This is usually a weak or broad linear anomaly of unknown cause or date. These anomalies are often caused by agricultural activity, either ploughing or land drains being a common cause.

Areas of magnetic enhancement/positive isolated anomalies

Areas of enhanced response are characterised by a general increase in the magnetic background over a localised area whilst discrete anomalies are manifest by an increased response on two or three successive traverses. In neither instance is there the intense dipolar response characteristic exhibited by an area of magnetic disturbance or of an 'iron spike' anomaly (see above). These anomalies can be caused by infilled discrete archaeological features such as pits or post-holes or by kilns. They can also be caused by pedological variations or by natural infilled features on certain geologies. Ferrous material in the subsoil can also give a similar response. It can often therefore be very difficult to establish an anthropogenic origin without intrusive investigation or other supporting information.

Linear and curvilinear anomalies

Such anomalies have a variety of origins. They may be caused by agricultural practice (recent ploughing trends, earlier ridge and furrow regimes or land drains), natural geomorphological features such as palaeochannels or by infilled archaeological ditches.

Methodology: Gradiometer Survey

The main method of using the fluxgate gradiometer for commercial evaluations is referred to as ***detailed survey*** and requires the surveyor to walk at an even pace carrying the instrument within a grid system. A sample trigger automatically takes readings at predetermined points, typically at 0.25m intervals, on traverses 1m apart. These readings are stored in the memory of the instrument and are later dumped to computer for processing and interpretation.

During this survey a Bartington Grad601 magnetic gradiometer was used taking readings on the 0.1nT range, at 0.25m intervals on zig-zag traverses 0.5m apart within 30m by 30m square grids. The instrument was checked for electronic and mechanical drift at a common point and calibrated as necessary. The drift from zero was not logged.

The gradiometer data have been presented in this report in processed greyscale format. The data in the greyscale images have been interpolated and selectively filtered to remove the effects of drift in instrument calibration and other artificial data constructs and to maximise the clarity and interpretability of the archaeological anomalies.

Appendix 2: Survey location information

An initial survey station was established using a Trimble VRS differential Global Positioning System (Trimble R6 model). The data was geo-referenced using the geo-referenced survey station with a Trimble RTK differential Global Positioning System (Trimble R6 model). The accuracy of this equipment is better than 0.01m. The survey grids were then super-imposed onto a base map provided by the client to produce the displayed block locations. However, it should be noted that Ordnance Survey positional accuracy for digital map data has an error of 0.5m for urban and floodplain areas, 1.0m for rural areas and 2.5m for mountain and moorland areas. This potential error must be considered if co-ordinates are measured off hard copies of the mapping rather than using the digital co-ordinates.

Archaeological Services WYAS cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party.

Appendix 3: Geophysical archive

The geophysical archive comprises:-

- an archive disk containing compressed (WinZip 8) files of the raw data, report text (Microsoft Word 2000), and graphics files (Adobe Illustrator CS2 and AutoCAD 2008) files; and
- a full copy of the report.

At present the archive is held by Archaeological Services WYAS although it is anticipated that it may eventually be lodged with the Archaeology Data Service (ADS). Brief details may also be forwarded for inclusion on the English Heritage Geophysical Survey Database after the contents of the report are deemed to be in the public domain (i.e. available for consultation in the Dyfed Historic Environment Record).

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Schmidt, A. Linford, P., Linford, N., David, A., Gaffney, C., Sarris, A, and Fassbinder, J. 2015. *EAC Guidelines for the Use of Geophysics in Archaeology*. English Heritage

SUMO 2021. 'Land at Brynrhyd Farm, Llanedi. Archaeological Geophysical Survey'

APPENDIX 9.4

EMAIL CORRESPONDENCE BETWEEN PEGASUS GROUP AND DYFED ARCHAEOLOGICAL TRUST

From: [redacted]
To:
Subject: RE: Land at Bryn-y-rhyd, north-east of Llanedi, SA18 3PP
Date: 20 July 2021 10:44:00
Attachments: image001.png
image012.png
image017.png
image018.png
image019.png
image020.png

Hi Mike,

Thanks for your reassuring reply and acceptance of the WSI.

We have now received ASWYAS' survey report. Unfortunately not only Areas 27 and 29 but also Area 20 remained inaccessible. In Area 26 the survey detected a number of anomalies that could possibly have an archaeological origin, which have a pit-like and short-ditch like character, but no features that certainly represent archaeology. Other responses in the dataset were of a geological and modern origin.

I will issue the report to you shortly.

Best wishes,

Elizabeth

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www.pegasusgroup.co.uk

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IMPORTANT INFORMATION REGARDING PEGASUS GROUP & CORONAVIRUS / COVID-19

From: Mike Ings <[redacted]
Sent: 19 July 2021 14:16
To: Elizabeth Pratt [redacted]
Subject: RE: Land at

Dear Elizabeth

Thanks for your email.

I must admit that I'm somewhat puzzled by the response from PINS regarding the geophysics – there will be no impact on potential archaeology in the two fields that will not be developed and the results from the areas that were surveyed indicate low potential for archaeology in the two fields that were inaccessible.

That said, the specification for further geophysics looks fine.

With best wishes
Mike

From: Elizabeth Pratt <[redacted]
Sent: 19 July 2021 13:3
To: Mike Ings
Cc: Gareth Ro [redacted]

Subject: RE: Land at Bryn-y-rhyd, north-east of Llanedi, SA18 3PP

Good morning Mike,

I hope you're well.

Last week we received an assessment from PINS of our submitted ES for the Brynrhyd Solar Farm. It raised concerns about the gaps in the geophysical survey dataset (Areas 20, 26, 27, 29) and the decision to exclude archaeology from the EIA. We have been given one week, i.e. until Wednesday, to provide further information.

The applicant has re-directed ASWYAS from one of their other proposed sites to Brynrhyd. Unfortunately Areas 27 and 29 (where development is proposed) remain inaccessible, this time due to tall/dense vegetation. But Areas 20 and 26 (where no development is proposed) have been accessed and we are awaiting the results. In the meantime, we (Pegasus) have drafted an ES Chapter.

I am attaching ASWYAS' RAMS for your records. Their survey report will be standalone and the results discussed in the ES Chapter alongside SUMO's data and the findings of our DBA.

If you have any queries or comments, I'd be grateful if you could let me know as soon as possible.

Best wishes,

Elizabeth

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From: Mike Ings [redacted]
Sent: 20 May 2021 10:26
To: Elizabeth Prat[redacted]
Subject: RE: Land at Bryn-y-rhyd, north-east of Llanedi, SA18 3PP

Hi Elizabeth

Thanks for your email and the geophysics report.

I'm not too concerned over the two fields that couldn't be surveyed as the rest indicates low archaeological potential. However, I think it would be worth further investigation of the possible archaeology in Areas 2 and 14 to see if further mitigation is required. This shouldn't be a constraint on development and, as you suggest, could be conditioned.

With best wishes
Mike

From: Elizabeth Pratt [redacted]
Sent: 18 May 2021 14:51
To: Mike Ings [redacted]
Subject: RE: Land at Bryn-y-rhyd, north-east of Llanedi, SA18 3PP

Hi Mike,

Please find attached the geophysical survey report for Land at Bryn-y-rhyd. The dataset is dominated by evidence of historic agricultural activity, including ditches of the possible medieval strip field system recorded by the HER in Area 5. The only other anomalies of archaeological/historic interest seem to be a possible trackway in Area 1 and a tentative ring ditch in Area 14.

You will note that Areas 20, 26, 27 and 29 were inaccessible. Horses had clearly been put to grazing here during wet weather, churning up the soil to such a degree that it was not possible to safely walk across the areas with the survey equipment. Luckily, though, we are not proposing development in Areas 20 and 26 – please refer to the attached working draft development layout.

I'd be grateful if you could let me know if you would like SUMO to return to survey all/some of these fields in better weather, or if you're happy that we have a sufficient understanding of the site's (limited) archaeological potential from the collected dataset. I would hope that any additional requirement for trial trenching to test the geophys anomalies can be secured by condition.

Best wishes,

Elizabeth

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From: Elizabeth Pratt
Sent: 09 April 2021 11:23
To: Mike Ings <[redacted]
Subject: RE: Land at Bryn-y-rhyd, north-east of Llanedi, SA18 3PP

Hi Mike,

Thanks for confirming. I've advised the client that should the proposals later change, the fields should of course be surveyed.

Best wishes,

Elizabeth

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From: Mike Ings <[redacted]

Sent: 07 April 2021 19:39
To: Elizabeth Pratt [redacted]
Subject: RE: Land at Bryn-y-rhyd, north-east of Llanedi, SA18 3PP

Hi Elizabeth

No problem with excluding these fields from the survey if they're no longer being developed.

With best wishes
Mike

From: Elizabeth Prat [redacted]
Sent: 07 April 2021 17:22
To: Mike Ings
Subject: RE: Land at Bryn-y-rhyd, north-east of Llanedi, SA18 3PP

Hi Mike,

Belated thanks for the approval of the WSI.

In the past few days our client has advised that Areas 1, 31 and 32 (as numbered on the attached plan) are to be excluded from development and instead reserved for wildlife conservation.

With this in mind, would you be happy for these fields to be excluded from the scope of the geophysical survey?

Best wishes,

Elizabeth

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From: Mike Ings [redacted]
Sent: 30 March 2021 15:16
To: Elizabeth Pratt [redacted]
Subject: RE: Land at Bryn-y-rhyd, north-east of Llanedi, SA18 3PP

Hi Elizabeth

The WSI from SUMO seems fine.

With best wishes
Mike

From: Elizabeth Pratt [redacted]
Sent: 29 March 2021
To: Mike Ings
Subject: RE: Land at Bryn-y-rhyd, north-east of Llanedi, SA18 3PP

Hi Mike,

Thank you very much for reviewing the DBA. I will address your comments after Easter (I did review the pipeline investigation results so must have forgotten to reference these!) and then send the updated version of the report to you and to Cadw.

In the meantime, we have received the attached draft WSI from SUMO for the geophys. Please can you confirm whether it meets your requirements / let me know if anything is missing or needs changing, in advance of the survey starting on 19th April?

Best wishes,

Elizabeth

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From: Mike Ings [redacted]
Sent: 22 March 2
To: Elizabeth Pratt [redacted]
Subject: RE: Land at Bryn-y-rhyd, north-east of Llanedi, SA18 3PP

Hi Elizabeth

Many thanks for sending the DBA. It generally looks fine and I just have a couple of comments:

Paragraph 5.5 refers to previous archaeological work and 5.8 says that these investigations within the study area will be discussed below. I haven't found this discussion – if it's there, please could you direct me toward it? – I was particularly interested to see what had been picked up during the pipeline project. I'm also uncertain about the meaning of paragraph 5.28. as we'd consider all these features, apart from drainage, to be historic assets.

Impact on setting of designated sites is within Cadw's remit and presumably this DBA will also reach them. As for further mitigation, with so much prehistoric activity recorded in the vicinity I consider there is potential for buried archaeology to be preserved within the development boundary and your suggested geophysics survey would be an appropriate next step.

With best wishes
Mike

From: Elizabeth Prat [redacted]
Sent: 19 March 2021 06:58
To: Mike Ings
Subject: RE: Land at Bryn-y-rhyd, north-east of Llanedi, SA18 3PP

Hi Mike,

Our Heritage Desk-Based Assessment is now complete, and hopefully you can access this WeTransfer link to download it: https://we.tl/t-sfQlEXYCu7 (NB A Welsh summary will be added once we've addressed any comments from you and made any other tweaks once the layout is finalised ahead of submission as part of the planning application).

You kindly indicated previously that you would reserve judgment on the timing of a geophysical survey until you'd had sight of the DBA. As contractors are so busy at the moment and we have a target submission date of 30th April, the client has already pencilled in SUMO Geophysics to undertake the work from 19th April – but obviously if you were happy for it to be

conditioned, this approach may be preferable to them.

Let me know if you're unable to use WeTransfer and I can send the DBA as an attachment or via Dropbox or something. I'd be grateful if you could let me know your comments and thoughts as soon as you are able. Please note that I will be on leave between Tuesday 30th March and Monday 5th April inclusive so it would be great to hear from you before then if possible.

Best wishes,

Elizabeth

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From: Mike Ings <[redacted]
Sent: 19 January 2021 15:26
To: Elizabeth Pratt [redacted]
Subject: RE: Land at Bryn-y-rhyd, north-east of Llanedi, SA18 3PP

Hi Elizabeth

All looks good – thanks.

With best wishes
Mike

From: Elizabeth Pratt [redacted]
Sent: 19 January 202
To: Mike Ings
Subject: RE: Land at Bryn-y-rhyd, north-east of Llanedi, SA18 3PP

Hi Mike,

Thanks for the clarification.

I have hopefully addressed your comments satisfactorily in the attached revised draft, but please let me know if I've misunderstood or omitted anything.

Best wishes,

Elizabeth

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From: Mike Ings [redacted]
Sent: 19 January 2021 14:06
To: Elizabeth Pratt <[redacted]
Subject: RE: Land at P

Hi Elizabeth

A digital archive should be submitted to the Royal Commission, following the standard and guidance already referenced in the WSI - *The National Standard and Guidance to Best Practice for Collecting and Depositing Archaeological Archives in Wales (National Panel for Archaeological Archives in Wales 2017)*

Actually I only mentioned arbitration as something to consider as the survey crosses into Gwent Glamorgan Trust's territory. I understand that in the past they have asked for a section outlining how any disputes that may arise from the work would be resolved. However, I can't see this as a requirement in CIfA S&G for DBAs so would be happy to approve the WSI without it.

Reference should be made to Health & Safety protocols, preparation of a risk assessment and insurance policies in accordance with Sections 3.3.10 and 3.3.12 of the CIfA S&G for DBAs – full details are unnecessary, just confirmation that they have been/will be addressed or are in hand.

I hope this helps?

With best wishes
Mike

From: Elizabeth Pratt [redacted]
Sent: 19 January 2021 07:24
To: Mike Ings
Subject: RE: Land at Bryn-y-rhyd, north-east of Llanedi, SA18 3PP

Hi Mike,

Thank you for the speedy response.

What are your requirements in terms of archiving? Digital/hard copies of the DBA submitted to the HER?

I can provide our company insurance certificates and COVID-19 risk assessments in relation to the site visit.

Please can you clarify what you mean by arbitration?

Best wishes,

Elizabeth

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IMPORTANT INFORMATION REGARDING PEGASUS GROUP & CORONAVIRUS / COVID-19

From: Mike Ings [redacted]
Sent: 18 January 2021 16:10
To: Elizabeth Pratt [redacted]
Subject: RE: Land at 3PP

Hi Elizabeth

Thanks for the WSI – generally all looks fine but I have a few comments:

I appreciate that the s & g for archiving in Wales are referenced in the document but it would be useful to have a paragraph confirming that the archive will be submitted once the work is completed. Also, sections detailing insurance, arbitration, risk assessment and h & s should be included, with particular reference to Covid 19.

With best wishes
Mike

From: Elizabeth Pratt [redacted]
Sent: 18 January 2021 14:08
To: Mike Ings
Subject: RE: Land at Bryn-y-rhyd, north-east of Llanedi, SA18 3PP

Hi Mike,

Thank you very much.

I've now prepared a WSI for your review, please find attached.

Best wishes,

Elizabeth

Elizabeth Pratt BA (Hons), MA, PhD, ACIfA
Senior Heritage Consultant
Pegasus Group
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IMPORTANT INFORMATION REGARDING PEGASUS GROUP & CORONAVIRUS / COVID-19

From: Mike Ings [redacted]
Sent: 14 January 2021 09:04
To: Elizabeth Pratt [redacted]
Subject: RE: Land at Bryn-y-rhyd, north-east of Llanedi, SA18 3PP

Hi Elizabeth

Thank you for your email.

The scope and methodology you've outlined for the desk-based assessment look fine, although the Royal Commission records should also be reviewed. Of course we'd expect to see a WSI for the work before commencement. A pre-determination

geophysics survey may be needed but, as the DBA is designed to assess the archaeological potential of the proposed development area, I'm inclined to wait for the results of this before confirming this as a requirement.

With best wishes
Mike

Mike Ings MCIfA
Archaeological Planning Manager
Dyfed Archaeological Trust – Development Management

I am currently working from home and as such not contactable on the phone. If you need to get in touch, please email and I will respond as quickly as possible.

DYFED ARCHAEOLOGICAL TRUST LTD
Corner House, 6 Carmarthen Street, Llandeilo, Carmarthenshire, SA19 6AE
Tel: [redacted] Email [redacted] Website www.dyfedarchaeology.org.uk
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Mae'r e-bost hwn ac unrhyw ffeiliau a drosglwyddir gydag ef yn gyfrinachol ac at ddefnydd yr unigolyn neu'r corff y cyfeiriwyd hwy atynt yn unig. Os ydych wedi derbyn yr e-bost hwn drwy gamgymeriad, dylech hysbysu'r gweinyddydd yn y cyfeiriad canlynol: [redacted]

Be green and only print this email if really necessary. Thank you.

APPENDIX 9.5

LETTER TO PEGASUS GROUP FROM DYFED ARCHAEOLOGICAL TRUST DATED 24TH AUGUST 2021

ymddiriedolaeth archaeolegol
DYFED
archaeological trust

PLANNING SERVICES

Elizabeth Pratt BA (Hons), MA, PhD, ACIfA
Senior Heritage Consultant
Pegasus Group
Querns Business Centre
Whitworth Rd
Cirencester
GL7 1RT

24th August 2021

Dear Ms. Pratt

re: Land at Bryn-y-rhyd, north-east of Llanedi, Carmarthenshire, SA18 3PP. NGR SN6007 0854.

Thank you for sending copies of the two reports (prepared by SUMO Geophysics Ltd job ref: 02676, May 2021 and WYAS Archaeological Services report no. 3616, July 2021) following geophysics surveys undertaken at the proposed site of a solar installation at Bryn-y-rhyd Farm, Llanedi. In our role as archaeological advisors to Carmarthenshire Planning Authority, we have reviewed these reports and considered the requirement for further archaeological mitigation.

The SUMO survey identified two parallel, linear anomalies in Area 2 and 'a tentative ring-ditch' in Area 14, which are of potential archaeological interest. All other anomalies correspond with former buildings, field boundaries, ridge and furrow and land drains. The WYAS Archaeological Services survey was subsequently carried out to evaluate areas that were inaccessible during the first survey, although only Area 26 was found to be suitable for data collection. Several discrete anomalies recorded in this area could possibly have an archaeological origin.

The geophysics surveys have shown that the archaeological potential of the proposed development site is low. Although we do not consider archaeology to be a constraint on development, we recommend that an archaeological condition should be attached to consent, if forthcoming, to ensure further investigation of the recorded anomalies of possible archaeological origin through the excavation of **targeted trenches.** These would ascertain their nature, depth, and date, with the results to be used to inform possible further mitigation. This is in line with Section 6.1.27 of Planning Policy Wales (ed.11, 2021) and Sections 4.13 and 4.14 of TAN 24: The Historic Environment (2017).

Such a condition would require the applicant to produce a written scheme of investigation for submission to the Planning Authority prior to the commencement of any development. This should be prepared for the applicant by a qualified archaeological contractor and will require approval from the Planning Authority. All aspects of the archaeological work should be carried out to the relevant Standard and Guidance of the Chartered Institute for Archaeologists (CIfA).

Yours sincerely

Mike Ings MCIfA
Archaeological Planning Manager
Dyfed Archaeological Trust

[redacted]

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REGISTERED ORGANISATION CIfA

Cadeirydd/Chair
Judith Wainwright MA MSc FIC FRSA

Cyfarwyddwr/Director
K Murphy BA MCIfA

APPENDIX 9.6

OUTLINE WRITTEN SCHEME OF INVESTIGATION FOR ARCHAEOLOGICAL TRIAL TRENCH EVALUATION (GAT 2021

BRYNRHYD SOLAR FARM

OUTLINE WRITTEN SCHEME OF INVESTIGATION FOR ARCHAEOLOGICAL TARGETED TRENCHING

DRAFT

Prepared for Brynrhyd Solar Farm Limited

September 2021

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

BRYNRHYD SOLAR FARM

OUTLINE WRITTEN SCHEME OF INVESTIGATION FOR ARCHAEOLOGICAL TARGETED TRENCHING

Prepared for *Brynrhyd Solar Farm Limited*, September 2021

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Location plan, denoting development area (outlined blue) and targeted trenching (red). Scale 1:15,000@A4. Background mapping reproduced from Ordnance Survey VectorMap District with the permission of H.M.S.O © Crown Copyright and database right 2021 22
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Reproduction of a letter from the Archaeological Planning Manager at the Dyfed Archaeological Trust, dated 24th August 2021. 24

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1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been asked by Brynrhyd Solar Farm Limited to prepare an outline written scheme of investigation (WSI) for targeted trenching in advance of a proposed solar installation at Bryn-y-rhyd Farm, Llanedi, Carmarthenshire (NGR SN60070854; postcode SA18 3PP; Figure 01). The purpose of this document is to outline the measures that could be used prior to the build out phase to inform the targeted trenching. This outline WSI details an appropriate technique that will be adopted by the appropriate contractor team. Post consent, the Outline WSI will require updating and formal submission to the Local Planning Authority for approval. The Outline WSI has been provided pursuant to the PINS Wales Environmental Officer.

The land proposed for the solar arrays measures c.76ha and comprises pasture fields outlying the farms of Bryn-Y-Rhyd to the west and Gelli Organ to the east (the farms are both excluded from the development area). The point of connection will be the substation beside Heol Ddu just off the A483 to the south of Tycroes; the cable route will run in the verge of the lane running between Gelli Organ Farm and Heol Dddu. The targeted trenching has been preceded by a heritage desk-based assessment (Pegasus Group, June 2021) and geophysical survey (SUMO Geophysics Ltd, May 2021 and WYAS, July 2021).

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The targeted trenching will be undertaken in accordance with the following guidelines:

- *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* Version 1.1 (The Welsh Archaeological Trusts, 2018);
- *Guidelines for digital archives* (Royal Commission on Ancient and Historic Monuments of Wales, 2015);
- *Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide* (Historic England, 2015); and
- *Standard and Guidance for Archaeological Field Evaluation* (Chartered Institute for Archaeologists, 2020).
- *Standard and guidance for the collection, documentation, conservation and research of archaeological materials* (Chartered Institute for Archaeologists, 2020); and

- *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives* (Chartered Institute for Archaeologists, 2020).

GAT is certified to ISO 9001:2015 and ISO 14001:2015 (Cert. No. 74180/B/0001/UK/En) and is a Registered Organisation with the Chartered Institute for Archaeologists.

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1.1 Aims and Objectives

The key aims and objectives are:

- to ascertain nature, depth, and date of any archaeological remains identified within the designated area and assess their implications for understanding local historical development, in conjunction with the known archaeological record;
- to inform possible further mitigation; and
- If no archaeological activity is identified, establish why this may be the case.

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1.2 Monitoring Arrangements

The archaeological evaluation will be monitored by the Archaeological Planning Manager at the Dyfed Archaeological Trust (DAT), in accordance with their role as archaeological advisors to Carmarthenshire Planning Authority. DAT have stated that the geophysical surveys of the proposed development site have shown that the archaeological potential is low and they have recommended targeted trenches as an archaeological condition to ensure further investigation of the recorded anomalies of possible archaeological origin (cf. Appendix I).

The content of this Outline WSI and all subsequent archaeological reporting must be approved by DAT prior to final issue and must be kept informed of the project timetable and of the subsequent progress and findings. This will allow time to arrange monitoring visits and attend site meetings (if required) and enable discussion about the need or otherwise for further works (if required) as features of potential archaeological significance are encountered. DAT contact details are:

- Mike Ings | [redacted]

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1.3 Historic Environment Record

The Dyfed Archaeological Trust Historic Environment Record (HER) must be contacted at the onset of the project to ensure that any data arising is formatted in a manner suitable for accession to the HER and follows the guidance set out in *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (The Welsh Archaeological Trusts, 2018). In line with this guidance, the following are required:

- all submitted reporting to include the equivalent of a non-technical summary in Welsh and English;
- a bilingual Event Primary Reference Number summary; and
- short bilingual summaries of the principal Historic Assets recorded during the event (if applicable).

The HER will be responsible for supplying Primary Reference Numbers (PRN) for new assets identified and recorded.

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2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

2.1 Introduction

A heritage desk-based assessment and geophysical survey have been completed for the site. The heritage desk-based assessment was completed in June 2021; the magnetometer geophysical survey was completed between May 2021 and July 2021. The results are summarised below and the reports must be consulted in full by the archaeological contractor prior to the targeted trenching.

2.2 Heritage Desk-Based Assessment

A heritage desk-based assessment was prepared by Pegasus Group in June 2021. The aim of the heritage desk-based assessment was to assess the significance of the heritage resource within the site, to assess any contribution that the site makes to the significance of the identified historic assets, and to identify any harm or benefit that may result from implementation of the development proposals, along with the level of any harm caused, if relevant. The assessment considered archaeology, built heritage (setting), and historic landscape.

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The report stated that there were no designated historic assets within the site. In addition, despite prehistoric monuments being recorded in the immediate and wider vicinity, there was no indication of buried archaeological evidence of prehistoric activity within the site.

It was also deemed likely that the site has comprised marshland and farmland from the early medieval period onwards; faint earthworks that may relate to a medieval field system were recorded and observed in the western part of the site, whilst earthworks of unknown provenance were also recorded in the southernmost part of the site. There was also potential for the site to preserve buried plough furrows, buried drainage and field boundary ditches.

Buried footings or debris of a post-medieval building were also identified by DAT during the installation of the Pontarddulais to Ammanford Gas Pipeline in 1995 along the southern part of the site (DAT 1995). A post-medieval dwelling called Ty Mawr recorded by the NMRW and field barns shown on 19th-century maps may also be present and the report states that such features could be of some evidential and historical illustrative value, providing information about the use and organisation of the historic landscape, but are expected to be of insufficient significance to warrant preservation in situ.

2.3 Geophysical Survey

The geophysical survey was sub-divided into thirty areas across the site (Areas 1 to 30).

The initial survey was completed by SUMO Geophysics Ltd (May 2021) and comprised a detailed magnetic survey (cf. Figure 02); Area 20 was excluded from the survey as it was overgrown while Areas 26, 27 and 28 were too boggy and undulating to survey. The survey did not record any magnetic responses that could be interpreted as being of definite archaeological interest, but multiple anomalies were assigned to the category of "uncertain", including two curving parallel ditch-like anomalies and a possible double ditched trackway, which may be archaeological but could equally be due to natural or modern agricultural processes. Discrete pit-like and ditch-like responses in the dataset were thought likely to have modern origins, whilst linear anomalies in the dataset corresponded with former field boundaries, ridge and furrow ploughing plus land drains.

The subsequent survey by WYAS (July 2021) targeted Areas 20, 26, 27 and 29 with the aim of assessing whether ground conditions had changed, and to undertake a detailed magnetic survey if this was possible. Out of the four areas attempted, it was only survey Area 26 that was suitable for data collection. The survey detected a number of anomalies that could possibly have an archaeological origin, which have a pit-like and short-ditch like character, but, as with the previous survey, no features were identified that certainly represented archaeology.

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3 METHODOLOGY

3.1 Targeted trenching

The targeted trenching programme aims to expose and characterise the possible archaeological anomalies identified during the geophysical survey. A total of four 25x2m trial trenches will be excavated. The trenches will target linear anomalies in Area 2 and 'a tentative ring-ditch' in Area 14, which are of potential archaeological interest. The trench locations were proposed by Pegasus Group and agreed with DAT on 2nd September 2021. The details of the individual trenches are shown below and located in Figure 02:

Trench	Size	Orientation	Start (E / N m OSGB 1936)	End (E / N m OSGB 1936)	Rationale
T01	25x2m	NNE-SSW	259161.38 / 207767.13	259155.99 / 207742.72	Targeting two parallel ditch-like responses in Area 2 as identified in SUMO Geophysics Ltd job ref: 02676; cf. Figure 02.
T02	25x2m	NNE-SSW	259201.07 / 207752.84	259195.68 / 207728.43	Targeting conjectured line of two parallel ditch-like responses in Area 2 as identified in SUMO Geophysics Ltd job ref: 02676; cf. Figure 02.
T03	25x2m	NNE-SSW	259240.75 / 207737.50	259235.36 / 207713.08	Targeting conjectured line of two parallel ditch-like responses in Area 2 as identified in SUMO Geophysics Ltd job ref: 02676; cf. Figure 02.
T04	25x2m	NW-SE	259423.46 / 207983.79	259441.08 / 207966.06	Targeting a tentative ring ditch in Area 14 as identified in SUMO Geophysics Ltd job ref: 02676; cf. Figure 02.

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The field boundaries across the site are defined by mature hedgerows, whilst public footpaths cross the western, south-western and central-northern parts of the site. Tracks cross the western, southern, central and north-eastern parts of the site and access to the site

will be via the existing track to Bryn-Y-Rhyd Farm off the B4297 to the north-west (cf. Figure 01).

As stated in the Heritage Desk-Based Assessment report, the geology of the site comprises mudstone, siltstone and sandstone of the Rhondda Member overlain by diamicton with localised areas of peat to the north and east of Bryn-Y-Rhyd Farm. The pedology includes slowly permeable and seasonally wet acid loamy and clayey soils (south and north-east), slowly permeable and wet very acid upland soils with a peaty surface (centre), and freely draining slightly acid loamy soils (south and south-east).

The following methodology will be applied:

- The trench locations will be demarcated in advance by the archaeological contractor using a GPS unit and the trench locations scanned with a cable avoidance tool prior to opening to determine the presence or absence of any services. In support of this, existing service drawings must also be sourced and consulted;
- The trenches will be opened using a machine excavator fitted with a toothless bucket and excavated in controlled layers. Turf/topsoil, and subsoil will be stored in separate bunds;
- Excavation by machine will continue until the first significant archaeological horizon, or the glacial horizon, whichever is encountered first;
- A record will be made of the topsoil and subsoil depths, as well as the composition of the glacial horizon. All encountered subsurface features will be recorded on suitable pro-formas with detailed notations and will be recorded photographically with an appropriate scale. Photographic images will be taken using a digital SLR camera set to maximum resolution in RAW format; the photographic record will be digitised in *Microsoft Excel* (or equivalent) as part of the fieldwork archive and dissemination process. Photographic images will be archived in TIFF format using Adobe Photoshop; the archive numbering system will start from **001**. A photographic ID board will be used during the trenching to record site code, image orientation and any relevant trench and context numbers.
- Any archaeological features/deposits/structures encountered will be manually cleaned and examined to determine extent, function, date and relationship to adjacent activity. The following excavation strategy will generally apply: 50% sample of each sub-circular feature, 10% sample of each linear feature (terminal ends and intersection points with other features will be prioritised). However, if more discrete features are identified, these will be 100% excavated as will any exposed segments of linear features. Any features that comprise a spread of material rather than a cut feature, will be completed in

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quadrants (if fully extant within the mitigation area) or 100% excavated if present as a discrete spread. Any structural features encountered will be cleaned and recorded but will not be removed;

- The location of the trenches, and any identified features, will be recorded using a GPS unit. Hand drawn plans will also be completed for any trenches containing archaeological activity; this will include a plan of the trench and features therein as well as individual plans/sections of features encountered. Any required plans or sections will be drawn at a minimum 1:10 scale using suitable permatrace;
- Should dateable artefacts and/or ecofacts be recovered, an **interim report** will be required summarising the fieldwork results, along with recommendations for any subsequent post-excavation assessment/analysis. Post-excavation assessment/analysis may include wet sieving of ecofact samples, followed by specialist assessment and radiocarbon dating, as well as the external assessment of diagnostic artefacts. Based on these results a **final report** will be prepared.

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3.2 Human Remains

Whilst human remains are not expected, if any human remains are identified that cannot be preserved in situ, any excavation will take place under appropriate regulations and with due regard for health and safety issues. In order to excavate human remains, a Ministry of Justice licence is required under Section *25* of the Burials Act 1857 for the removal of any body or remains of any body from any place of burial. In accordance with the Ministry of Justice licence, recovered remains will be reburied once the investigation and/or assessment/analysis are complete.

Non-fragmented skeletal remains will be excavated using wooden tools and collected and stored in polyethylene bags (with appropriate references for context, grave number, et al) and placed in a lidded cardboard archive box (note: separate boxes for each grave) and stored in a suitable manner. If significant quantities of human remains are encountered, a human osteologist should be contacted and appointed to advise the team during the fieldwork. The osteologist should also help to ensure that adequate post-excavation processing of human remains is carried out so that the material is in a fit state for assessment during the post-excavation stage. For inhumations, this will involve washing, drying, marking and packing.

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If human remains are recovered that are deemed suitable for further assessment/analysis, this will be completed in accordance with the osteologist's requirements and with *Human Bones from Archaeological Sites Guidelines for producing assessment documents and analytical reports* (Historic England, 2004).

3.3 Ecofacts

Should any archaeological features and/or sealed deposits be identified that are deemed suitable for post-excavation assessment and analysis, ecofact samples will be taken of not less than 40 litres for bulk samples, or 100% if the feature is smaller.

The samples will be subsequently assessed and analysed by an appropriate palaeoenvironmental specialist for plant species and charcoal, with the results used to inform agrarian practices and wood fuel use, as well as radiocarbon dating strategies.

Any ecofact assessment/analysis proposals will require additional resourcing and cost and will only be undertaken further to agreement with DAT and the client.

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3.4 Artefacts

Pottery sherds of 19th and 20th century date will be examined on site and the context from which they were retrieved noted but will not be retained. Diagnostic artefacts will be retained for further examination and identification. Any artefacts recovered will be treated according to guidelines issued by the UK Institute of Conservation (Watkinson and Neal 2001) in particular the advice provided within *First Aid for Finds* (Rescue 1999) and Historic England.

Any waterlogged artefacts (e.g. wood or leather) that are to be recovered for post-excavation assessment and analysis will be processed in accordance with *Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation* (Historic England, 2011). In such cases an external specialist will be contacted to agree an appropriate sampling and recovery strategy.

Any specialist assessment/analysis proposals will require additional resourcing and cost and will only be undertaken further to agreement with DAT and the client.

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All finds are the property of the landowner; however, it is recommend that all diagnostic artefacts are donated to an appropriate museum (in this case Carmarthenshire Archive Service, Parc Myrddin, Richmond Terrace, Carmarthen SA31 1DS), where they can receive specialist treatment and study. Access to finds must be granted to the Trust for a reasonable period to allow for analysis and for study and publication as necessary. Trust staff will undertake initial identification, but any additional advice would be sought from a wide range of consultants used by the Trust, including National Museums and Galleries of Wales at Cardiff. The archaeological contractor will be responsible

All finds of treasure must be reported to the coroner for the district within fourteen days of discovery or identification of the items. Items declared Treasure Trove become the property of the Crown, on whose behalf the Portable Antiquities Scheme acts as advisor on technical matters, and may be the recipient body for the objects.

The Treasure Valuation Committee, based at the British Museum, and informed by the Portable Antiquities Scheme, will decide whether they or any other museum may wish to acquire the object. If no museum wishes to acquire the object, then the Secretary of State will be able to disclaim it. When this happens, the coroner will notify the occupier and landowner that he intends to return the object to the finder after 28 days unless he receives

no objection. If the coroner receives an objection, the find will be retained until the dispute has been settled.

The archaeological contractor will contact the landowner (via client) for agreement regarding the transfer of artefacts to the relevant repository, which will subsequently be undertaken in accordance with their guidelines.

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3.5 Working Project Archive

Following the completion of the fieldwork, a working project archive will need to be created, based on following task list:

1. Pro-formas: all cross referenced and complete;
2. Photographic Metadata: site records cross-referenced with all pro-formas and photo numbers added to a digital project register (in *Microsoft Excel* or similar);
3. Survey data: downloaded and processed using an appropriate software package;
4. Sections (if relevant): all cross referenced and complete; drawing numbers added to a digital project register (in *Microsoft Excel* or similar);
5. Plans (if relevant): all cross referenced and complete drawing numbers added to a digital project register (in *Microsoft Excel* or similar);
6. Artefacts (if relevant): quantified and identified; added to a digital project register (in *Microsoft Excel* or similar);
7. Ecofacts (if relevant): quantified and register completed; added to a digital project register (in *Microsoft Excel* or similar);
8. Context register (if relevant): quantified and added to a digital project register (in *Microsoft Excel* or similar).

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This information will then form the final site archive data.

3.6 Reporting and Dissemination

A draft report will be submitted within one month of fieldwork completion and a final report will be submitted to the regional Historic Environment Record within six months of project completion. The report will include the following:

1. Non-technical summary (Welsh and English)
2. Introduction
3. Background
4. Methodology
5. Results
6. Conclusion
7. List of sources consulted.
8. Appendix I – approved GAT project specification
9. Appendix II – context register
10. Appendix III - photographic register
11. Appendix IV – drawing register
12. Appendix V - ecofact register
13. Appendix VI - artefact register
14. Appendix VII – Harris matrix
15. Appendix VIII – project specific selection strategy

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Illustrations will be included for any trenches containing archaeological activity; this will include a scaled plan of the trench and features therein as well as individual scaled plans/sections of features encountered. The report will also include any received specialist input (ecofacts and/or artefacts) as appendices.

On final approval, the following dissemination and archiving of the report and digital dataset will apply:

- A digital report(s) will be provided to the client and DAT (draft report then final report);
- A digital report will be provided to the regional Historic Environment Record; this will be submitted within six months of project completion (final report only), along with a digital dataset comprising an Event PRN summary. The report and dataset will be submitted in accordance with the required standards set out in *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (Version 1.1); and

- A digital report and digital archive dataset will be provided to Royal Commission on Ancient and Historic Monuments, Wales (final report only), in accordance with the *RCAHMW Guidelines for Digital Archives Version 1*. The dataset will be prepared in the format required by RCAHMW and will include:
    - Adobe PDF report final – File Information form (Microsoft Excel);
    - Microsoft Word report text final - File Information form (Microsoft Excel);
    - Photographic archive (TIFF format);
    - Photographic database (Microsoft Access);
    - Photographic metadata (detail) - File Information form (Microsoft Excel).
    - Photographic metadata (general) - File Information form (Microsoft Excel); and
    - Project Information form (Microsoft Excel).

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3.7 Selection Strategy

As defined in *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives* (Chartered Institute for Archaeologists, 2020) section 3.3.1, a project specific selection strategy and data management plan should be prepared. The Chartered Institute for Archaeologist (CIfA), have stated that it is “widely accepted that not all the records and materials collected or created during the course of an Archaeological Project require preservation in perpetuity. These records and materials constitute the Working Project Archive which will be subject to Selection, in order to establish what will be retained for long-term curation”. The aim of selection is to ensure that all the elements retained from the Working Project Archive for inclusion in the Archaeological Archive are appropriate to establish the significance of the project and support “future research, outreach, engagement, display and learning activities”. Selection should be “focused on selecting what is to be retained to support these future needs, rather than deciding what can be dispersed” and can be qualified by a selection strategy, which details the project-specific selection process, agreed by all parties (including DAT, client and/or landowner), which will be applied to a Working Project Archive prior to its transfer into curatorial care as the Archaeological Archive.

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The selection strategy will take into account:

- The aims and objectives of the project;
- The Written Scheme of Investigation;
- The Collecting Institution’s collection policy and/or deposition guidelines;
- Local and regional research frameworks;
- Relevant thematic or period specific research frameworks;
- The project’s Data Management Plan (DMP);
- Internal recording and reporting policies; and
- Material-specific guidance documents.

4 SOURCES CONSULTED

1. *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (Version 1.1)
2. Historic England, 2004. Human Bones from Archaeological Sites: Guidelines for producing assessment documents and analytical reports
3. Historic England, 2011. Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation
4. Historic England, 2015, Management of Research Projects in the Historic Environment (MoRPHE).
5. Murphy, K., 1995. Report on the Watching Brief on the Pontarddulais to Ammanford Gas Pipeline, Carmarthenshire. Dyfed Archaeological Trust.
6. Pratt, Dr E. 2021. Heritage Desk-Based Assessment Brynrhyd Solar Farm, Llanedi, Carmarthenshire.
7. Royal Commission on Ancient and Historic Monuments of Wales 2015 *Guidelines for digital archives*
8. Standard and Guidance for *Archaeological Field Evaluation* (Chartered Institute for Archaeologists, 2020).
9. Standard and Guidance for the collection, documentation, conservation and research of archaeological materials (Chartered Institute for Archaeologists, 2020).
10. SUMO Geophysics Ltd job ref: 02676, May 2021
11. WYAS Archaeological Services report no. 3616, July 2021.

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FIGURE 01

Location plan, denoting development area (outlined blue) and targeted trenching (red). Scale 1:15,000@A4. Background mapping reproduced from Ordnance Survey VectorMap District with the permission of H.M.S.O © Crown Copyright and database right 2021

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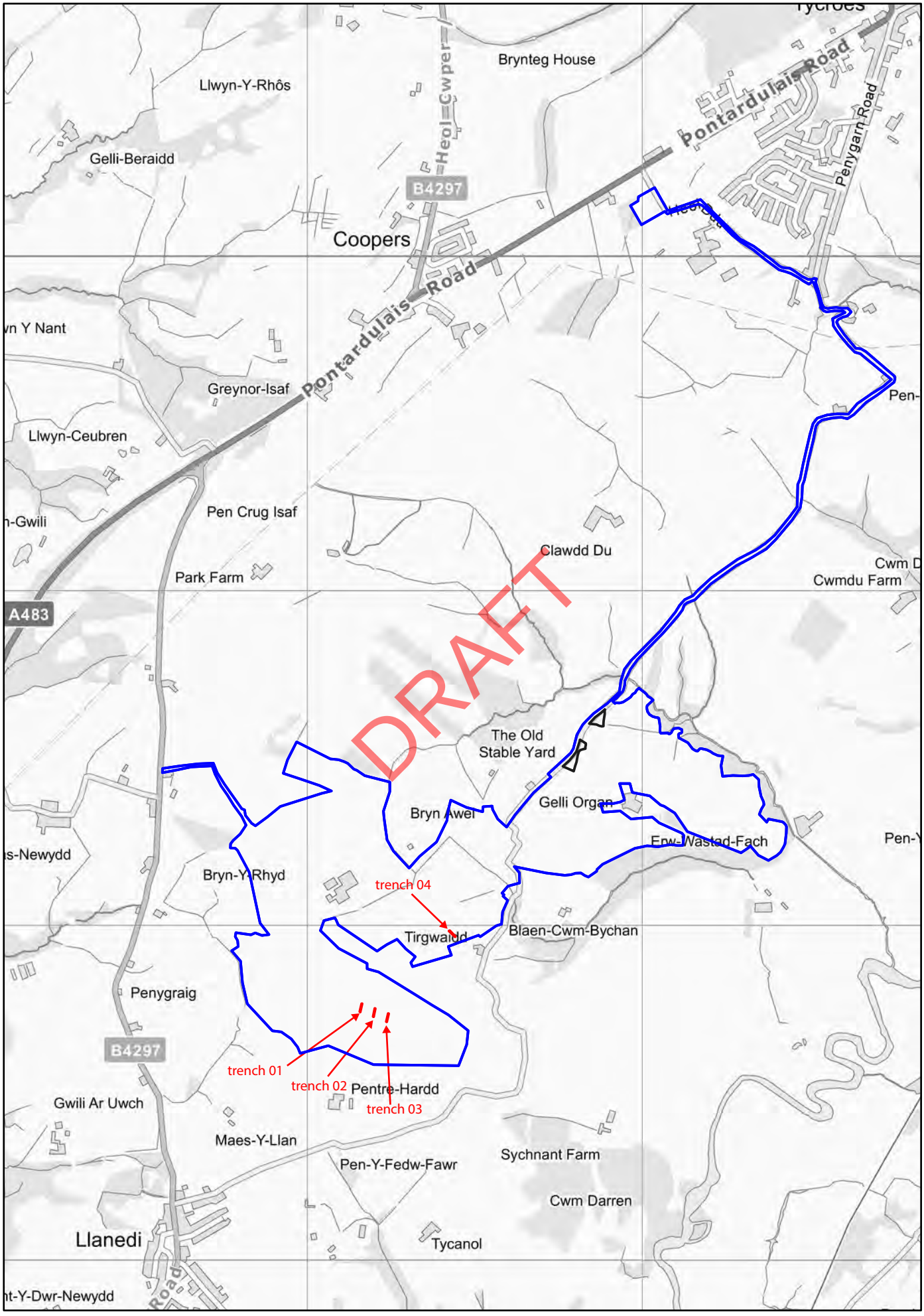

FIGURE 01: Location plan, denoting development area (outlined blue) and targeted trenching (red). Scale 1:15,000@A4.
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FIGURE 02

Reproduction of SUMO Geophysics Ltd, Project 02676 Figure 05 Magnetometer Survey – Interpretation, with trench locations added in red. Scale: as shown.

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