

**TWO PROPOSED WIND TURBINES AT  
GLYN-YR-ODYN, NEAR FFOSTRASOL,  
CEREDIGION  
GEOPHYSICAL SURVEY 2014  
(NGR SN 36045 46078 &  
SN 36080 45980)**



Prepared by DAT Archaeological Services  
For: Hallmark Power Limited





## DYFED ARCHAEOLOGICAL TRUST

RHIF YR ADRODDIAD / REPORT NO. 2014/60  
RHIF Y PROSIECT / PROJECT RECORD NO. 107537

Rhagfyr 2014  
December 2014



# TWO PROPOSED WIND TURBINES AT GLYN-YR-ODYN, NEAR FFOSTRASOL, CEREDIGION GEOPHYSICAL SURVEY 2014

Gan / By

Charles Enright

*Paratowyd yr adroddiad yma at ddefnydd y cwsmer yn unig. Ni dderbynnir cyfrifoldeb gan Ymddiriedolaeth Archaeolegol Dyfed Cyf am ei ddefnyddio gan unrhyw berson na phersonau eraill a fydd yn ei ddarllen neu ddibynnu ar y gwybodaeth y mae'n ei gynnwys*

*The report has been prepared for the specific use of the client. Dyfed Archaeological Trust Limited can accept no responsibility for its use by any other person or persons who may read it or rely on the information it contains.*



**INVESTOR IN PEOPLE**  
**BUDDSODDWR MEWN POBL**

Ymddiriedolaeth Archaeolegol Dyfed Cyt  
Neuadd y Sir, Stryd Caerfyrddin, Llandeilo, Sir  
Gaerfyrddin SA19 6AF  
Ffon: Ymholiadau Cyffredinol 01558 823121  
Adran Rheoli Treftadaeth 01558 823131  
Ffacs: 01558 823133  
Ebost: [info@dyfedarchaeology.org.uk](mailto:info@dyfedarchaeology.org.uk)  
Gwefan: [www.archaeolegdyfed.org.uk](http://www.archaeolegdyfed.org.uk)

*Dyfed Archaeological Trust Limited*  
*The Shire Hall, Carmarthen Street, Llandeilo,*  
*Carmarthenshire SA19 6AF*  
*Tel: General Enquiries 01558 823121*  
*Heritage Management Section 01558 823131*  
*Fax: 01558 823133*  
*Email: [info@dyfedarchaeology.org.uk](mailto:info@dyfedarchaeology.org.uk)*  
*Website: [www.dyfedarchaeology.org.uk](http://www.dyfedarchaeology.org.uk)*

*Cwmni cyfyngedig (1198990) ynghyd ag elusen gofrestredig (504616) yw'r Ymddiriedolaeth.*  
*The Trust is both a Limited Company (No. 1198990) and a Registered Charity (No. 504616)*  
**CADEIRYDD CHAIRMAN: Professor B Burnham. CYFARWYDDWR DIRECTOR: K Murphy BA MCIfA**



**TWO PROPOSED WIND TURBINES, AT GLYN-YR-ODYN, NEAR  
FFOSTRASOL, CEREDIGION  
GEOPHYSICAL SURVEY**

**CONTENTS**

**CONTENTS**

<b>SUMMARY</b>	1
<b>1. INTRODUCTION</b>	2
<b>1.1 Project Commission</b>	2
<b>1.2 Scope of Project</b>	2
<b>1.3 Report Outline</b>	2
<b>1.4 Abbreviations</b>	2
<b>1.5 Illustrations</b>	2
<b>1.6 Timeline</b>	3
<b>2. THE SITE</b>	5
<b>2.1 Site Location</b>	5
<b>2.2 Archaeological Potential</b>	6
<b>3. METHODOLOGY</b>	8
<b>4. RESULTS AND DISCUSSION</b>	9
<b>5. CONCLUSIONS</b>	9
<b>6. SOURCES</b>	14

**FIGURES**

<b>Figure 1:</b>	Location map, based on the Ordnance Survey. Red crosses mark the proposed location of the turbines.	4
<b>Figure 2:</b>	Plan showing the archaeological and historical sites.	7
<b>Figure 3:</b>	Example of a dipole anomaly exhibited at Glyn-Yr-Odyn.	9
<b>Figure 4:</b>	General overview of survey area and geophysical results.	10
<b>Figure 5:</b>	Area 1 - Processed gradiometer greyscale survey data.	11
<b>Figure 6:</b>	Area 2 - Processed gradiometer greyscale survey data.	12

**TABLES**

<b>Tables 1:</b>	Archaeological and Historical Timeline for Wales.	4
------------------	---	---

**PHOTOGRAPHS**

<b>Photo 1:</b>	Photo 1: survey Area looking northeast.	5
-----------------	---	---

Two Proposed Wind Turbines, at Glyn-Yr-Odyn, Near Ffostrasol, Ceredigion  
Geophysical Survey

**TWO PROPOSED WIND TURBINES, AT GLYN-YR-ODYN, NEAR  
FFOSTRASOL, CEREDIGION  
GEOPHYSICAL SURVEY**

**SUMMARY**

*DAT Archaeological Services were commissioned by Hallmark Power Limited to undertake a geophysical survey of land at Glyn-Yr-Odyn, near Ffostrasol, Ceredigion. The geophysical survey was recommended following consultation on the initial planning application for two proposed wind turbines.*

*The proposed wind turbine site is located on the south facing slope of Gernos Mountain, near its peak, between 270m and 275m above sea level. Approximately 400m to the east lies a scheduled Prehistoric barrow cemetery (CD 218 / PRNs 5273, 5750 & 6254) and a possible cropmark site (PRN 5752) has been identified directly to the north of the proposed wind turbine site therefore there was considered a high potential for additional Prehistoric remains to exist. The prominent location close to the hill top also enhances the potential for possible Prehistoric activity. The aim of the geophysical survey was to provide a better indication of any such archaeology and enable targeting of any further archaeological mitigation requirements.*

*The survey area was approximately 2ha in size and the survey was conducted using a fluxgate gradiometer which detects variations in the earth's magnetic field. The site was surveyed on the 5<sup>th</sup> of December 2014.*

*Generally the survey detected a number of dipole anomalies that are typical on all sites. They usually represent modern ferrous debris such as brick, tile fragments, horse shoes and ploughshares. On this occasion no anomalies were detected that would indicate the presence of archaeology. However, this does not negate its potential to exist in the wider area. Only a limited area was surveyed around the proposed turbine locations which would sufficiently cover the main areas of potential ground disturbance that would occur from the development proposals.*

## **1. INTRODUCTION**

### **1.1 Project Commission**

1.1.1 DAT Archaeological Services Services were commissioned by Hallmark Power Limited to undertake a 2ha geophysical survey around the area of two proposed wind turbine sites on Gernos Mountain, Ceredigion.

1.1.2 The requirement for the geophysical survey was recommended by the archaeological advisors<sup>1</sup> to Ceredigion County Council following consultation on the initial planning application submitted by Hallmark Power Limited for the two proposed wind turbines and the preparation of a rapid Historic Environment Appraisal undertaken by DAT Archaeological Services.

1.2.3 The purpose of the geophysical survey is to provide a better indication of the archaeological potential of the site and enable targeting of any further archaeological mitigation requirements before or during the development. The results of the geophysical survey will be used to develop a Written Scheme of Investigation (WSI) for further mitigation at the site, should it be required.

### **1.2 Scope of the project**

1.2.1 A Written Scheme of Investigation (WSI) for the geophysical survey was prepared by DAT Archaeological Services prior to the commencement of these works. The WSI outlined the following aims of the survey:

- Provision of a written scheme of investigation to outline the methodology by which the geophysical survey should be undertaken;
- To identify the presence/absence of any archaeological deposits;
- To establish by geophysical survey, as far as is possible, the character, extent and date range for any archaeological deposits to be affected by the proposed ground works.
- To use the results of the geophysical survey to determine if any further archaeological mitigation would be required at the site either prior to or during construction of the two turbines in order to mitigate against any disturbance to archaeological remains from the proposals.

### **1.3 Report outline**

1.3.1 This report provides a summary and discussion of the geophysical survey and its results.

### **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). Gradiometer readings are measured in nanoTesla (nT).

### **1.5 Illustrations**

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

---

<sup>1</sup> *Dyfed Archaeological Trust Planning Services – Heritage Management.*

## 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 <sup>2</sup> –	1536 – 1750	
Industrial Period –	1750 – 1899	
Modern –	20 <sup>th</sup> century onwards	

**Table 1:** Archaeological and Historical Timeline for Wales.

<sup>2</sup> 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



**Figure 1:** Location map, based on the Ordnance Survey. Red crosses mark the proposed location of the turbines.

Reproduced from the Ordnance Survey 1:25,000 scale Landranger Map with the permission of The Controller of Her Majesty's Stationery Office, © Crown Copyright Dyfed Archaeological Trust Ltd., The Shire Hall, Carmarthen Street, Llandeilo, Carmarthenshire SA19 6AF. Licence No 100020930

## **2 THE SITE**

### **2.1 Location (Photo 1)**

- 2.1.1 The two proposed wind turbines are located at NGR SN 36045 46078 and SN 36080 45980 (See Figure 1), on the south facing slope of Gernos Mountain, near its peak, between 270m and 275m above sea level and commands panoramic views to the east, south and west.
- 2.2.2 The site is made up of an enclosed field system and is currently under pasture.



**Photo 1: Survey area looking northeast.**

## **2.2 Archaeological Potential**

- 2.2.1 The following information has been extracted from the Historic Environment Record (HER) held by Dyfed Archaeological Trust and the RCAHMW Coflein database. The information was included in the Historic Environment Appraisal undertaken by DAT Archaeological Services for the proposals (Meek 2014).
- 2.2.2 The proposed wind turbine site lies approximately 400m to the west of a known barrow cemetery which is a Scheduled Ancient Monument (SAM number CD218). The barrow cemetery consists of three barrows (PRN 5273, 6354 and 5750) set upon the southwest summit of Gernos Mountain. The diameter of each mound ranges from 15m to 17m and up to 0.7m in height.
- 2.2.3 A study of aerial Photographs of the area identified at least four oval crop marks (PRN 5752) within the immediate vicinity of the proposed turbines, but subsequent site visits and aerial photography have found no further evidence of these crop marks.
- 2.2.4 Other notable areas of archaeological interest include isolated areas of probable settlement (PRN 37819 and 37872).
- 2.2.5 Overall the archaeological potential of the site is greatest for Prehistoric remains. The high prominent positions with uninterrupted views and the proximity of the nearby barrow cemetery and cropmarks enhance the potential for Prehistoric activity.
- 2.2.6 Figure 2 illustrates the location of the wind turbines in relation to the nearby archaeological sites mentioned above.



**Figure 2:** Plan showing the archaeological and historical sites in close proximity. Rec crosses mark the location of the proposed turbines, blue stars mark known archaeological sites.

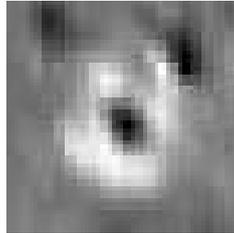
Reproduced from the Ordnance Survey 1:25,000 scale Landranger Map with the permission of The Controller of Her Majesty's Stationery Office, © Crown Copyright Dyfed Archaeological Trust Ltd., The Shire Hall, Carmarthen Street, Llandeilo, Carmarthenshire SA19 6AF. Licence No 100020930

### **3.0 METHODOLOGY**

- 3.1 A fluxgate gradiometer, which detects variations in the earth's magnetic field, with a DL601 data logger was used to conduct a detailed survey of the area of the proposed wind turbines. A sample interval of 0.25m (four readings per metre) was used with 1m wide traverses across 30m x 30m 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.
- 3.2 The survey grid was tied in to the local Ordnance Survey grid using measuring tapes along the field boundaries, off set measurements and hand held GPS.
- 3.3 The area comprises of two large pasture fields bounded by post and wire fences.
- 3.4 The data was processed using *Terrasurveyor 3.0* and 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.
- 3.5 The processed data has been presented as a grey-scale plots (Figures 4, 5 and 6) overlaid on local topographical features.
- 3.6 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.
- 3.7 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.

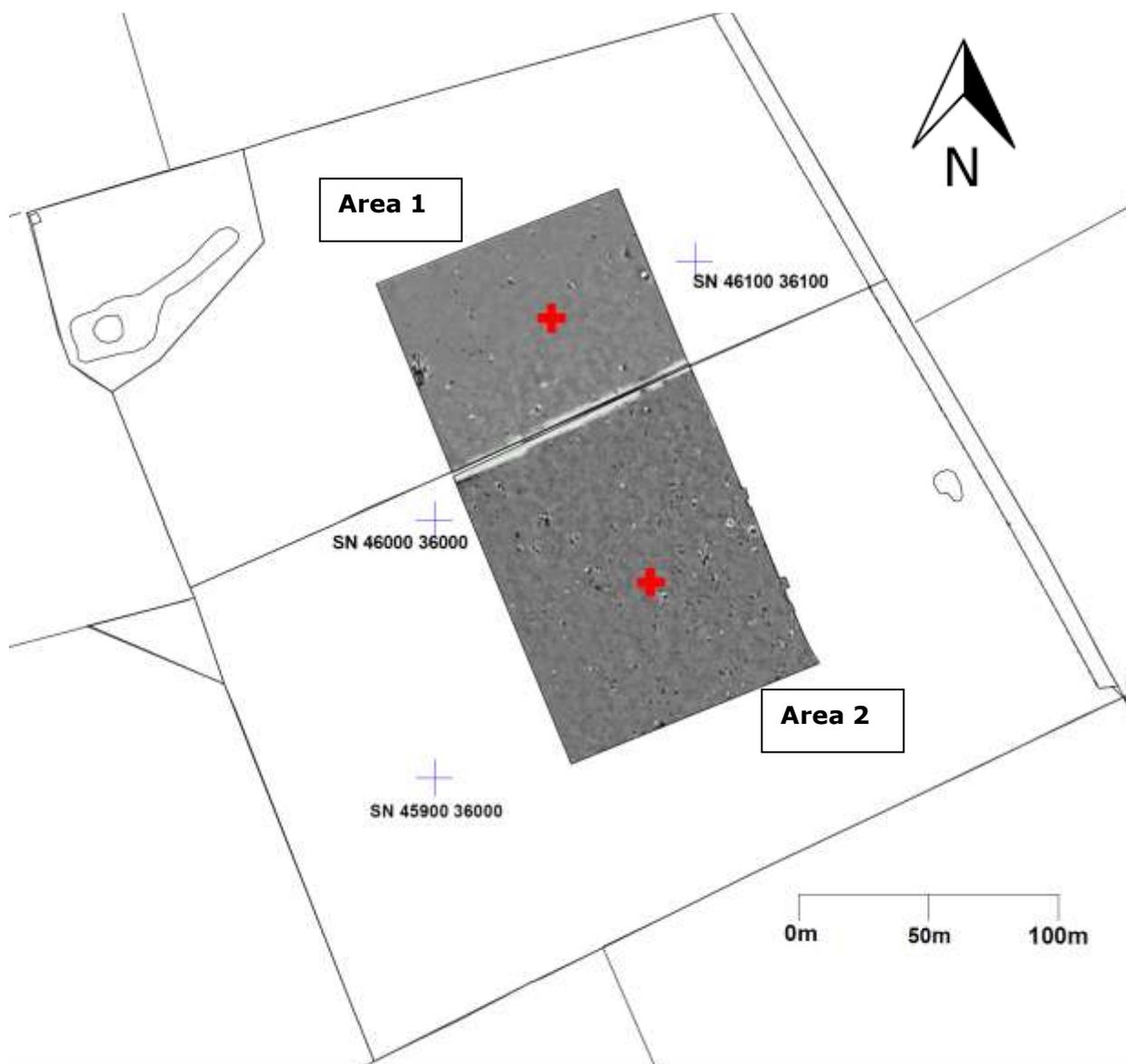
#### **4.0 RESULTS AND DISCUSSION**

- 4.1 Generally across the survey area a series of isolated discrete dipole anomalies have been detected by the gradiometer survey. These anomalies consist of a single positive response with a negative response forming a 'halo effect' around them (see Figure 2), they are of equal magnitude but of opposite polarity and caused by the same feature.

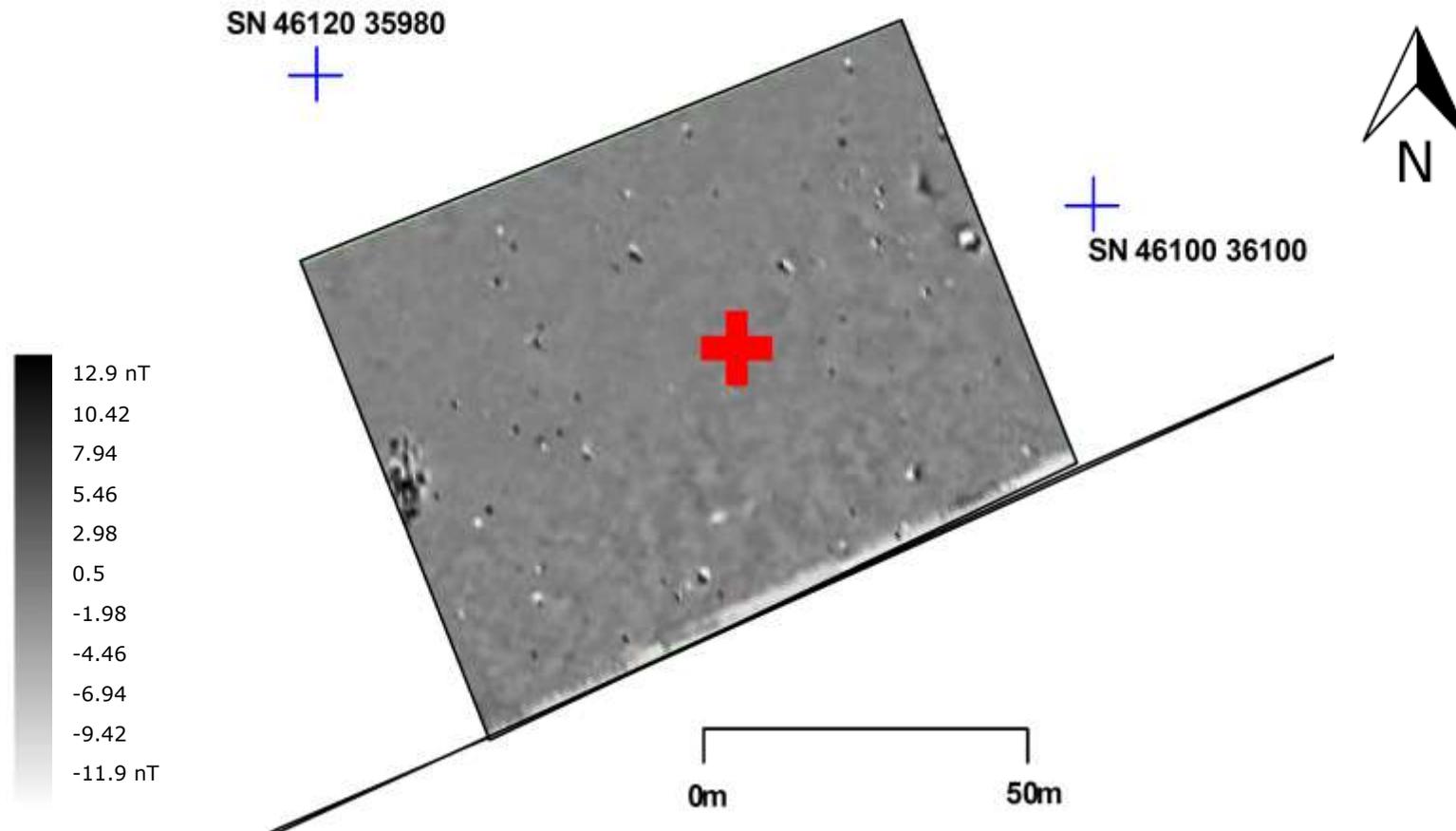


**Figure 3:** Example of a dipole anomaly exhibited at Glyn-Yr-Odyn.

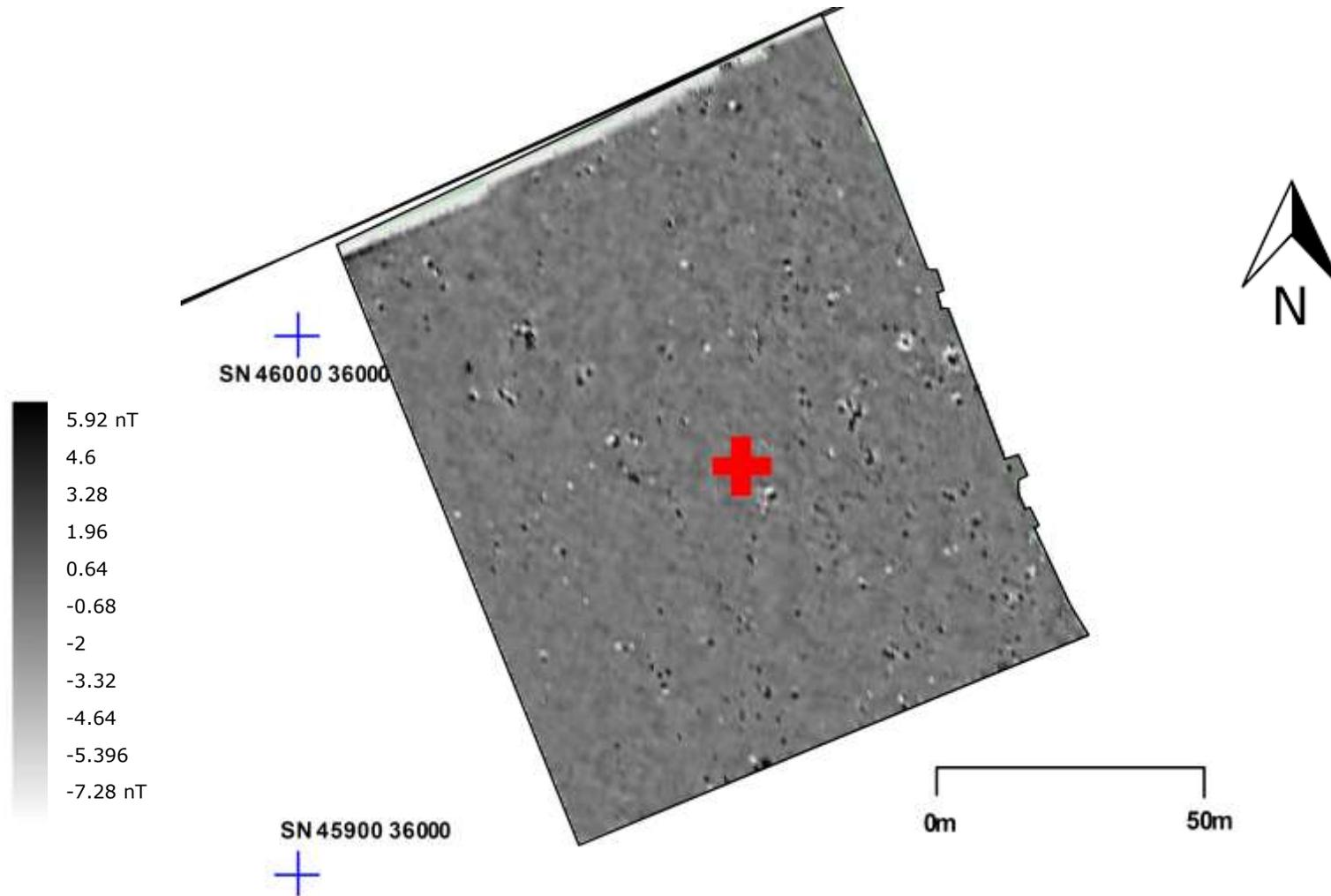
- 4.2 Dipole anomalies are a very common anomaly observed across a range of sites. They are usually the result of modern ferrous debris such as brick and tile fragments as well as horse shoes and plough shares, which lie just below or on the surface.
- 4.3 The survey appears to demonstrate that the site contains no archaeological remains. There are no indications of the cropmarks recorded as lying within the area. There are no indications of any earth cut remains (ditches) or any round barrows.
- 4.3 No further anomalies were detected of an archaeological nature.



**Figure 4:** General overview of survey area and geophysical results.  
Location of proposed wind turbines marked by red crosses.



**Figure 5: Area 1** - Processed gradiometer greyscale survey data. Red cross denotes the location of the proposed wind turbine.



**Figure 6: Area 2** - Processed gradiometer greyscale survey data. Red cross denotes the location of the proposed wind turbine.

## **5.0 CONCLUSION**

- 5.1 As expected the survey detected a number of dipole anomalies that are likely to be caused by modern ferrous debris.
- 5.2 Although no anomalies were detected that might indicate the presence of archaeology within the areas surrounding the wind turbines, this does not negate its potential to exist in the wider area. Known archaeological sites are located very nearby.
- 5.3 The size of the survey area was such that it covered the main areas that would be subject to disturbance from groundworks associated with the construction of the turbines. If archaeological features associated with the identified cropmark in the area or further barrows associated with a larger barrow cemetery on Gernos Mountain were present within the development area, there should have been some indication of these on the survey results. As a result it is concluded, as far as is possible from a geophysical survey, that no buried archaeological features such as ditches or pits lie within the area of the two proposed wind turbines.
- 5.4 It is possible that further barrows exist on the peak of the mountain plateau to the north of the turbine areas, as such a location is typically a prime site for a Prehistoric monument with panoramic views of the area. Although as noted with the scheduled Gernos Barrow cemetery, these monuments lie on the south and southwestern side of the plateau.

## **6 SOURCES**

### **Databases**

Dyfed Archaeological Trust Historic Environment Record, housed with Dyfed Archaeological Trust in The Shire Hall, Llandeilo, Carmarthenshire, SA19 6AF

### **Cartographic**

Ordnance Survey, 2003, 1:25 000, Ceredigion.

# **TWO PROPOSED WIND TURBINES, AT GLYN-YR-ODYN, NEAR FFOSTRASOL, CEREDIGION GEOPHYSICAL SURVEY 2014**

RHIF YR ADRODDIAD / REPORT NUMBER: 2014/60

**Ionawr 2015**

**January 2015**

Paratowyd yr adroddiad hwn gan / This report has been prepared by  
Charles Enright

Swydd / Position: Archaeologist DAT Archaeological Services

Llofnod / Signature .....  ..... Dyddiad / Date 07/01/15

Mae'r adroddiad hwn wedi ei gael yn gywir a derbyn sêl bendith  
This report has been checked and approved by

Fran Murphy

ar ran Ymddiriedolaeth Archaeolegol Dyfed Cyf.  
on behalf of Dyfed Archaeological Trust Ltd.

Swydd / Position: Project Manager DAT Archaeological Services

Llofnod / Signature .....  ..... Dyddiad / Date 07/01/15

Yn unol â'n nôd i roddi gwasanaeth o ansawdd uchel, croesawn unrhyw sylwadau  
sydd gennych ar gynnwys neu strwythur yr adroddiad hwn

As part of our desire to provide a quality service we would welcome any  
comments you may have on the content or presentation of this report

