

# Gwastad Lane: geophysical survey

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## NON-TECHNICAL SUMMARY

The site lies in Upper Borth (site centre 260667 288397) south of Gwatsed Lane. A proposed development (A 2000789) at Gwasted Lane, Borth (SN 6065/8839) has been highlighted (letter from Dyfed Archaeological Trust of 18/11/20) as being located adjacent to the site of a cropmark enclosure and ring ditch. Consequently, a geophysical survey was required at the site in order to determine whether or not similar features were present in the development area. Planning permission (A 200789), subject to conditions, has been granted for the development of a 15 unit residential estate centred around an adopted road off the B4572.

The site lies on steeply sloping ground that is part of a general slope rising from north to south from the valley base. The survey was undertaken in February 2021 and is reported here. No invasive fieldwork was undertaken.

This survey was been designed to identify the presence, or not of archaeological features at the site. The potential presence of farmsteads near the site and the possible ring ditch indicates that cut and fill features as well as structural features such as walls may exist in the site vicinity. Consequently, a magnetometer survey has been undertaken to ascertain whether or not such features exist.

No discernible features were identified in the geophysical survey that would have been consistent with an interpretation of a buried wall, ditch or disturbed ground typically associated with prehistoric activity. The individual, isolated, small anomalies are consistent with signatures resulting from small, metallic objects possibly of agricultural origin. As a consequence no further monitoring of the site is required.

Gorwedd y safle yn Borth Uchaf (canol y safle 260667 288397) i'r de o Lôn Gwatsed. Mae datblygiad arfaethedig (A 2000789) yn Lôn Gwasted, Borth (SN 6065/8839) wedi ei amlygu (llythyr gan Ymddiriedolaeth Archeolegol Dyfed o 18/11/20) fel un sydd wedi ei leoli gerllaw safle nod cnydau a ffos gron. O ganlyniad, 'roedd angen arolwg geoffisegol ar y safle er mwyn penderfynu a oedd nodweddion tebyg yn bresennol ai peidio yn yr ardal ddatblygu. Mae caniatâd cynllunio (A 200789), gydag amodau, wedi'i roi ar gyfer datblygu stad breswyl o 15 uned wedi ei chanoli o amgylch ffordd fabwysiedig oddi ar y B4572.

Gorwedd y safle ar dir serth sy'n rhan o lethr cyffredinol sy'n codi o'r gogledd i'r de o waelod y dyffryn. Cynhaliwyd yr arolwg ym mis Chwefror 2021 ac adroddir yma. Ni chynhaliwyd unrhyw waith maes ymledol.

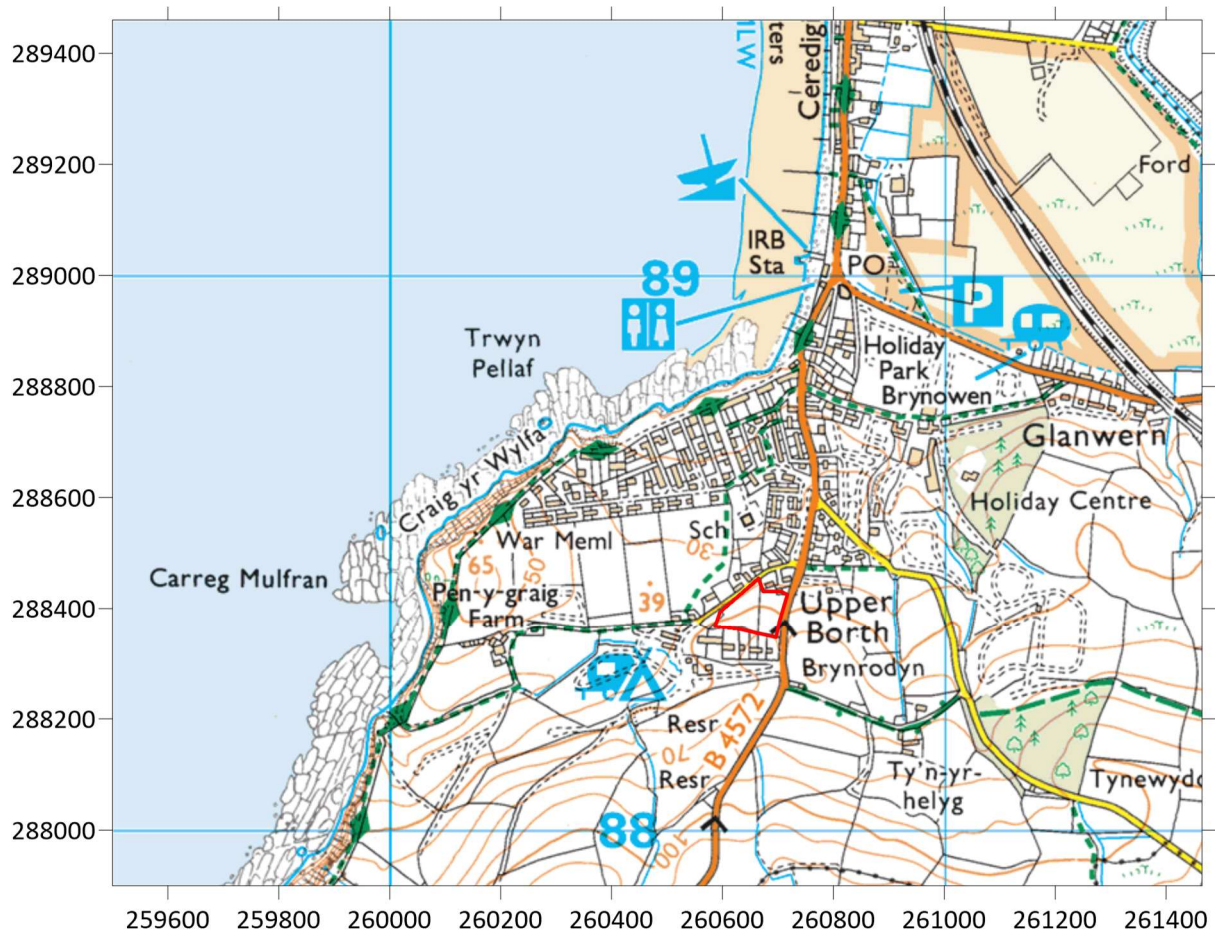
Cynlluniwyd yr arolwg hwn i ganfod presenoldeb, (neu ddim) nodweddion archeolegol ar y safle. Mae presenoldeb posibl ffermydd ger y safle a'r ffos gron bosibl yn dangos y gallai nodweddion torri a llenwi yn ogystal â nodweddion strwythurol megis waliau fodoli yng nghyffiniau'r safle. O ganlyniad, ymgwymerwyd ag arolwg magnetomedr i ganfod a oes nodweddion o'r fath yn bodoli ai peidio.

Ni nodwyd unrhyw nodweddion canfyddadwy yn yr arolwg geoffisegol a fyddai wedi bod yn gyson â dehongliad o wal gladdedig, ffos neu dir wedi'i aflonyddu sy'n gysylltiedig gyda

**gweithgaredd cynhanesyddol. Mae'r anomaledau bach, unigol, yn gyson â llofnodion sy'n deillio o wrthrychau bach, metelaidd o darddiad amaethyddol o bosibl. O ganlyniad nid oes angen monitro'r safle ymhellach.**

## 1.0 Site location

The site lies in Upper Borth (site centre 260667 288397) south of Gwatsed Lane (Figure 1). A proposed development (A 2000789) at Gwatsed Lane, Borth (SN 6065/8839) has been highlighted (letter from Dyfed Archaeological Trust of 18/11/20) as being located adjacent to the site of a cropmark enclosure and ring ditch. Such features can represent the remains of Pre-historic burial monuments, and are frequently found in groups. Consequently a geophysical survey was required at the site in order to determine whether or not similar features were present in the development area.



**Figure 1.** Site location plan (site outlined in red).

A geophysical survey was undertaken in February 2021 and is reported here. No invasive fieldwork was undertaken although the spoil from a series of excavated trial pits reveal a subsoil of shattered bedrock stones.

## 2.0 Designations

None known.

### **3.0 Context of the project**

Planning permission (A 200789), subject to conditions, has been granted for the development of a 15 unit residential estate centred around an adopted road off the B4572.

### **4.0 Geological/geomorphological and topographical background**

The site lies on steeply sloping ground that is part of a general slope rising from north to south from the valley base.

Bedrock at the site is formed of the Borth Mudstones Formation of Llandovery Epoch. Superficial deposits are absent at the site according to British Geological Survey mapping however Head deposits are mapped to the east and west of the site. Head deposits are typically mixtures of clay and gravel deposited across slopes during cold periods in the geological past. Isolated pockets of Head are likely to mantle the slopes of the study area in places.

The distribution of the Head deposits suggest that minor streams are intermittently present on both sides of the site.

### **5.0 Archaeological and historical background**

Three possible archaeological features lie adjacent to the site. These consist of two farmsteads. Gwastad-y-borg (SN 6063488452; PRN 122589) and Bryn-yr-odyn (SN 6052588329; PRN 122589). A possible ring ditch feature has also been noted at Ty'n-yr-Helyg (SN 6076088310; NPRN 403141).

### **6.0 General and specific aims of the survey**

This survey has been designed to identify the presence, or not of archaeological features at the site. The potential presence of farmsteads near the site and the possible ring ditch indicates that cut and fill features as well as structural features such as walls may exist in the site vicinity. Consequently a magnetometer survey has been undertaken to ascertain whether or not such features exist.

### **7.0 Relevant guidance**

The works outlined here followed best practice outlined in the CIFA "Standard and guidance for archaeological geophysical survey" 2014.

## 8.0 Survey methodology

**Health and Safety:** Fieldwork was undertaken following University of Wales Trinity Saint David Health and Safety regulations.

**Purpose:** Measuring the geomagnetic gradient signature of the ground and buried (anthropogenic derived) features that may exist therein.

**Equipment:** Bartington Grad601Dual probe gradiometer magnetometer (Figure 2). The Grad601 was deployed following recommended techniques outlined in standard guidance and practice for archaeological geophysical survey by English Heritage (EAC Guidelines for the Use of Geophysics in Archaeology, Schmidt et al., 2016). The two fluxgate gradiometers can detect localised magnetic anomalies such as buried structures compared to the general background magnetic signatures. Surveys were conducted using 30x30m grids with adaptations to these where either topography or above ground features (fences, hedges, roads) prohibited data gathering.



Figure 2 Bartinton Grad 601

### **Task 1 – Grid layout**

The field site was first surveyed by a land surveyor into which the geophysical survey was tied. The 30x30m grid was surveyed. The orientation of the grid was aligned NSEW. Within the grid, parallel traverses 1m apart were walked along the same direction following a pre-marked surveyors' tape. The instrument readings were logged at 0.25m intervals with an average cycle of 4 readings per second using an internal triggering system. Incomplete survey lines resulting from obstacles were completed using the 'dummy log' key in the data recorder and no known magnetic above ground feature was approached closer than 2m. A calibration 'base station' was established at the centre of the survey site for comparison of readings before and after acquisition.

### **Task 2 – Magnetic measurement**

- The instrument was located away from any known metallic or magnetic interference to establish a 'base station'. Follow manufactures guide to instrument calibration
- The survey was executed by measurements along lines with set pace based on the operators walking pace

### **Task 3 – Data upload**

On completion of the survey the data was upload from the field instrument to a laptop PC and correct x,y locations used to transform the data to OS-British National Grid. Files were then viewed and balancing of the two probes completed.

### **Task 4 – Data Presentation**

The data is presented in Figure 2 as gridded maps of magnetic gradient. The figure shows spot anomalies but no patterns of consistency across the area.





**Figure 3.** Magnetic Gradient survey data.

## 9.0 Data and interpretation

The land survey grid is shown in Appendix 2 together with the individual survey points acquired across the geophysical grid. The geophysical data was first balanced for differences between the gradient magnetometer pairs. The data was then converted to OSGB location from surveyors measurements at site. The resulting x,y, gradient text file was imported to ESRI ArcGIS and a kriging routine used to interpolate data to a grid from the line and station measurements. These were then displayed using a grey-scale ramp gradient between maximum and minimum values for the site (Figure 3). Some minor artefacts of line orientation were observable towards the edges of the fields where wire fences were close to the grids. Primary data is stored as x,y in OSGB and grid value in nT/m.

No discernible features were identified in the geophysical survey that would have been consistent with an interpretation of a buried wall, ditch or disturbed ground typically associated with prehistoric activity. The individual, isolated, small anomalies are consistent with signatures resulting from small, metallic objects possibly of agricultural origin.



## **10. Publication and dissemination proposals**

No publication of the data is proposed but the report will be supplied to the Dyfed Archaeological Trust.

## **11.0 Archive deposition**

Data is repository with the University of St Andrews with metadata available to ADS. The data will be sent to Dyfed Archaeological Trust for archive purpose.

## **12.0 Monitoring procedure**

No findings were made during the survey and consequently no monitoring is required.

## **Appendix 1. Staff**

*Prof. Martin R Bates, University of Wales Trinity Saint David.*

Archaeological training began at the Institute of Archaeology (now part of University College London) in 1981 for a BSc in Archaeology. PhD at Royal Holloway in 1990.

Practical training involved 2 years working in the late 1980's at the Museum of London digging in Greater London and within the city.

Teaching for 22 years at UWTSD. Currently Dr Bates is engaged in contract and research fields in field geoarchaeology and Palaeolithic archaeology. He has been involved in a number of major discoveries within the UK archaeological world including the Dover Bronze Age Boat, the Clactonian Elephant butchery site in Ebbsfleet, the Harnham terminal Lower Palaeolithic site near Salisbury and he discovered the Happisburgh human footprint in Norfolk (the oldest presently known in the world outside Africa).

*Prof. Charles R Bates, University of St. Andrews.*

Teaching of applied Geophysics at sub-honours and honours level with application to environmental investigation, hydrogeological appraisal, engineering studies and resource development. Application of high resolution geophysical survey techniques for near surface investigations and the use of geophysics in a multi-disciplinary team approach to environmental problem solving. Specific focus on the fields of *near surface, high resolution terrestrial geophysics* (archaeology, palaeo-environmental reconstruction, groundwater investigations, contamination mapping, structural investigations, climate change impact) and *marine, high resolution survey* (palaeo-landscape reconstruction, ecosystem evaluation, resource mapping, sediment dynamics). Recent archaeological research investigations include the use of multi-sensor techniques at iconic sites such as Stonehenge and the World Heritage sites in Orkney. Commercialization of applied geophysics for marine investigation of Special Areas of Conservation and offshore marine resource development both internationally and on the UK Continental Shelf.

## Appendix 2. Survey Plots

