HEOL LLWYN BEDW, HENDY, LLANELLI, CARMARTHENSHIRE:

GEOPHYSICAL AND TOPOGRAPHICAL SURVEY 2014

(NGR SN 57551 03800)

DAT Archaeological Services

Prepared by DAT Archaeological Services

For: Persimmon Homes West Wales

REGISTERED ORGANISATION CIfA

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Chwefror 2015
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Gan / By

Charles Enright

INVESTOR IN PEOPLE
BUDDSODDWR MEWN POBL

Ymddiriedolaeth Archaeolegol Dyfed Cyf
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
Gwefan: 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
*Website: www.*dyfedarchaeology*.org.uk*

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SUMMARY

DAT Archaeological Services were commissioned by Persimmon Homes West Wales to undertake a geophysical and topographic survey of land at Heol Llywn Bedw, Hendy, Llanelli, Carmarthenshire.

The geophysical survey was recommended after the Historic Environment Appraisal (DAT report No. 2014/57) identified a large flat area in the southeast corner of the development boundary. On its western side the ground is low lying and is bounded on its eastern side by a steep bank approximately 2m in height bounding a higher area of level ground to the east. There is no known date or obvious function of the earthwork, it may define a settlement or alternatively may be the remains of a former hedge bank.

The area enclosed by the bank is approximately 1.2ha in size comprising an open fallow field. The survey was conducted using a fluxgate gradiometer which detects variations in the earth's magnetic field. The site was surveyed on the 5th and 6th of February, 2015.

The geophysical survey detected a number of anomalies, although most were associated with modern sources of magnetic interference. A probable modern service was detected traversing the site from south to north and appearing to follow a very similar route to that of the bank. The bank itself remained elusive to this survey but this is almost certainly because it has been masked by the high amplitude signature of the modern service pipe.

No evidence of settlement activity was detected within the area enclosed by the bank in the raised area to the east. It is considered most likely that the bank is associated with an enclosed field system for agricultural purposes, utilising a naturally occurring topographic feature. The topographic survey enabled the dimensions of the bank to be accurately measured.

Overall it is thus considered unlikely that the area was used for settlement or other such archaeological activity. The low bank along the top of the ridge most likely represents only a former field boundary (as shown on the 1st edition Ordnance Survey map (Figure 9).

It is also possible that the bank has been partially removed or levelled following the installation of the large service trench which has been indicated by the geophysical survey running roughly north to south across the site area.

The results of the geophysical and topographic surveys indicate that the archaeological potential of the proposed residential development site at Heol Llwyn Bedw, Hendy is low to negligible.

1. INTRODUCTION

1.1 Project Commission

1.1.1 DAT Archaeological Services Services were commissioned by Persimmon Homes West Wales to undertake a geophysical survey at the site of the proposed housing development at Heol Llywn Bedw, Hendy, Llanelli, Carmarthenshire (NGR SN 57551 03800; Figure 1).

1.1.2 The geophysical and topographical survey was recommended following a Historic Environment Appraisal (HEA) prepared by DAT Archaeological Services in January 2015 (Report No. 2014/57; Day 2015). During preparation for the HEA a site walkover survey identified a large flat area in the southeast corner of the development boundary. On its western side the ground is low lying and somewhat boggy. This low lying area is bounded on its eastern side by a steep bank of approximately 1.5m to 2m in height bounding a higher area of level ground to the east. The area enclosed by the bank to its eastern side measures some 1.2ha in size (Day 2015). There is no known date or obvious function of the earthwork, it does appear on the 1st edition OS map (1879) but it has not been included on the 2nd edition OS map (1906). It was unclear if the feature could define a settlement or other form of anthropological activity or alternative may merely be the remains of a former hedge bank.

1.2.3 The results of the geophysical and topographical survey should provide a better indication of the archaeological potential of the site and enable informed decisions to be made on whether any further archaeological mitigation is necessary.

1.2 Scope of the project

1.2.1 A Written Scheme of Investigation (WSI) for a geophysical and topographic survey was prepared by DAT Archaeological Services prior to the commencement of works. The WSI was drawn up following initial consultation with the archaeological advisors to Carmarthenshire County Council:

- Provision of a written scheme of investigation to outline the methodology by which the geophysical and topographic survey should be undertaken.
- To identify the presence/absence of any archaeological deposits.
- To establish, by geophysical survey, 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 and topographic survey to determine if any further archaeological investigations should be carried out at the site prior to or during development.

1.3 Report outline

1.3.1 This report provides a summary and discussion of the geophysical and topographic surveys and their 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.

1.6 Timeline

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

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

Table 1: Archaeological and Historical Timeline for Wales.

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

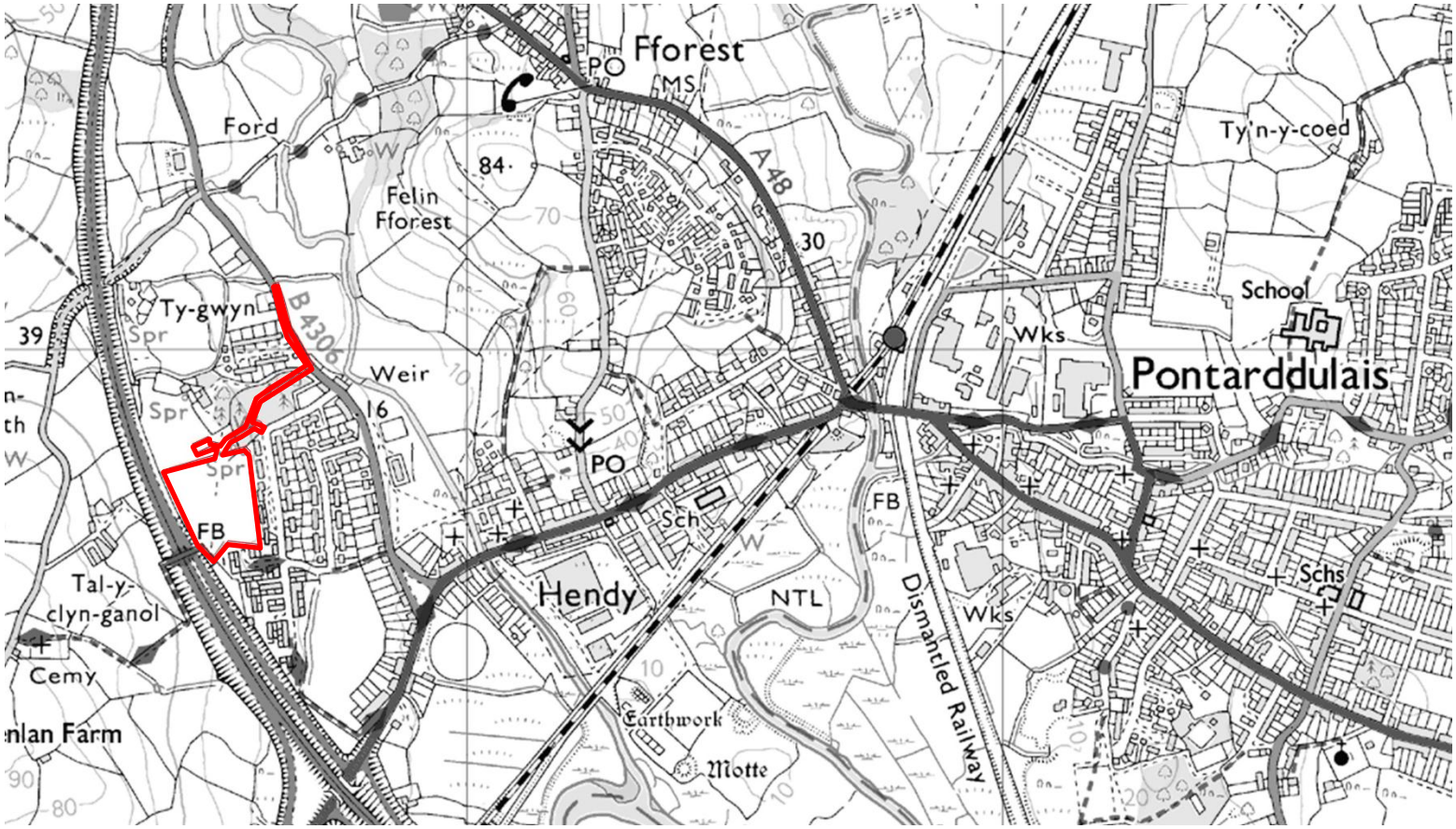


Figure 1: Residential development area bounded in red.

2. THE SITE

2.1 Location (Photo 1 and 2)

2.1.1 The proposed residential development is centred on NGR SN 57551 03800 covering an area of 4.07ha (Day 2015).

2.1.2 The site lies on uneven ground on an east-west slope, and is rough uncultivated ground, more than half of which is boggy (*ibid).*

2.1.3 The geophysical and topographical survey were conducted in the south-eastern corner of the proposed development area encompassing the area enclosed by the large earthwork boundary (eastern side of the main proposed residential area).

2.2 Archaeological Potential

2.2.1 A detailed 'Archaeological and Historical Background' section has been included within the Historic Environment appraisal '*Proposed Development on Land off Heol Llywn, Bedw, Hendy, Llanelli, Carmarthenshire'* (Report No. 2014/57; Day 2015) and is not reproduced here. However, the following summarises the archaeological potential of the site:

2.2.2 The proposed development site lies on the northwestern edge of the village of Hendy, which is approximately 6.5km northeast of the town of Llanelli. The development proposals cover an area of around 4.07ha, comprising a series of agricultural fields, centred on NGR SN 57551 03800. The M4 motorway runs north-south adjacent to the western boundary of the site. It is proposed that the main residential development will be located in the western part of the site area with access roads and landscaping to the north and northeast.

2.2.3 There are two Scheduled Ancient Monuments and three grade II listed buildings within 1.5km of the residential development site. The nearest Historic Landscape to the development site is over 13km away. No conservation area or registered Historic Park or Garden lies within the 1.5km study area. There are thirty three known archaeological sites recorded on the regional Historic Environment Record and the National Monument Record within a 1km radius of the site. One of these, a garden at Llwyn Gwern residential home, has a boundary with one of the fields in which the development is to take place.

2.2.4 A site walkover survey was conducted on 22nd December 2014 in order to further assess the physical and visual impact of the development. It was observed that groundworks for the residential development will have a physical impact on three archaeological features within the site: a well, a trackway that used to run between Tal-y-Clyn Ganol farm and the fields of the development site, and bank running along the western edge of the higher ground through the middle of the site area. The archaeological potential for hitherto unknown archaeological sites to be present within the proposed development area is considered to be low to moderate. This is partly due to its siting on southeast-facing ground in the vicinity of springs, and partly due to the presence of the earthwork bank bounding a platform of raised ground. The date, significance and function of this bank are unknown, but could be either a simple agricultural boundary or even potentially define an area of settlement or other activity on the higher ground.

3. METHODOLOGY

3.1 Geophysical Survey Methodology

3.1.1 A fluxgate gradiometer with a DL601 data logger was used to conduct the detailed survey, which detects variations in the earth's magnetic field. 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.

3.1.2 The survey grid was tied in to the local Ordnance Survey grid using a Trimble 5600 electronic distance measuring total station and theodolite (TST).

3.1.3 The survey was initially conducted with an east – west traverse across the entire survey area, the response to this survey was then tested by conducting a second survey along a north to south traverse over a representation of the survey area.

3.1.4 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.

3.1.5 The processed data has been presented as a grey-scale plot, overlaid on local topographical features. The main magnetic anomalies have been identified and an interpretation of those results is also given.

3.1.6 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.

3.1.7 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.

3.2 Topographical Survey

3.2.1 The topographical survey was conducted using a Trimble 5600 TST to acquire 3-dimensional data. It was conducted across the main area of the proposed residential development site to record changes in ground level between the eastern and western side of the site area and also to record the profile and layout of the bank.

3.2.2 Transects were recorded across the entire site area from east to west, with more detailed recording of the area of the change in ground level and embankment.

3.2.3 The TST has recorded 3-dimensional coordinates of the tops and bottoms of slopes and visible earthworks in the field. The data has been used to produce a contour map using approximate levels in relation to ordnance datum. A more general hachure plan has also been produced.

4. RESULTS AND DISCUSSION OF THE GEOPHYSICAL SURVEY

4.1 The site was surveyed on the 5th and 6th of February, 2015. The area of the geophysical surveys is illustrated in Figure 2.

4.2 The results of the geophysical survey are shown on Figure 3 (Area 1) and Figure 4 (Area 2) as a basic greyscale plot. Identified magnetic anomalies have been plotted onto the greyscale interpretation plots in Figures 5 and 6. It may be useful to refer to these greyscale plots in conjunction with the following description of results.

4.3 Within the survey areas a number of geophysical anomalies have been identified which can be grouped into four main categories of geophysical anomalies summarised in Table 2.

1.		A dipole anomaly consists of a single positive response with a negative response forming a 'halo effect', they are of equal magnitude but of opposite polarity and caused by the same feature. They are very common across a range of sites with no obvious cause and typically the result of modern ferrous debris.
2.		A positive linear anomaly with an associated negative shadow is the result of a single feature and typically caused by a modern services.
3.		A high amplitude magnetic disturbance is usually associated with magnetic interference from modern ferrous structures including fences, roads and buildings.
4.		Clusters of dipole responses represent magnetic debris which may have no obvious cause. Subtle responses may be associated with ground disturbance but higher amplitude readings may be associated with spreads of ferrous debris.
5.		A positive response can represent areas of magnetic enhancement and can be associated with ditches and former field boundaries.

Table 2: Summary of geophysical anomalies observed.

4.3 Generally across the survey area a series of isolated discrete dipole anomalies (solid red; Figures 5 & 6) have been detected. These anomalies consist of a single positive response with a negative response forming a 'halo effect' around them, they are of equal magnitude but of opposite polarity and caused by the same feature.

4.4 Dipole anomalies are a very common anomaly observed across a range of sites and 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.

4.5 Orientated virtually north to south along the survey area a positive linear anomaly can be seen with an associated negative shadow (red hatching;

Figures 5 & 6). A response such as this is almost certainly represents a modern service traversing the survey area. In the southwest corner of the survey area a second linear anomaly with a similar response, although somewhat magnetically weaker, can be seen apparently orientated southeast to northwest (Figure 6). This may be caused by yet another service but its low magnetic response may also suggest an earthwork like feature such as a former boundary.

4.6 Magnetic disturbance (blue hatchings; Figures 5 & 6) has occurred along the eastern boundary of the survey area and has been caused by the metal wire fence enclosing the rear gardens of the present residential development. This high amplitude response can be seen to extend several meters from its source and has the potential to mask more subtle archaeological features.

4.7 Towards the northwest corner of the survey area an area of magnetic disturbance has been detected (orange hatching; Figure 5), there is no obvious cause for this response and is most probably the result of a spread of modern ferrous debris located just beneath the surface.

4.8 A subtle positive anomaly (solid green; Figure 5) has been detected towards the southern boundary of the survey area. The anomaly is amorphous making it difficult to characterise but such responses are usually associated with areas of magnetic enhancement such as infilled ditches and field boundaries.

4.9 When the survey was conducted in Area 2 along an east to west traverse the positive linear anomaly with associated negative shadow orientated north to south has been detected again (Figure 6). A number of dipole anomalies have also been observed as well as a possible continuation of the possible service or ditch that was detected in the south west corner of Area 1 (Figures 5 & 6).

Figure 2: General overview of survey areas, green – Area 1, Blue - Area 2.

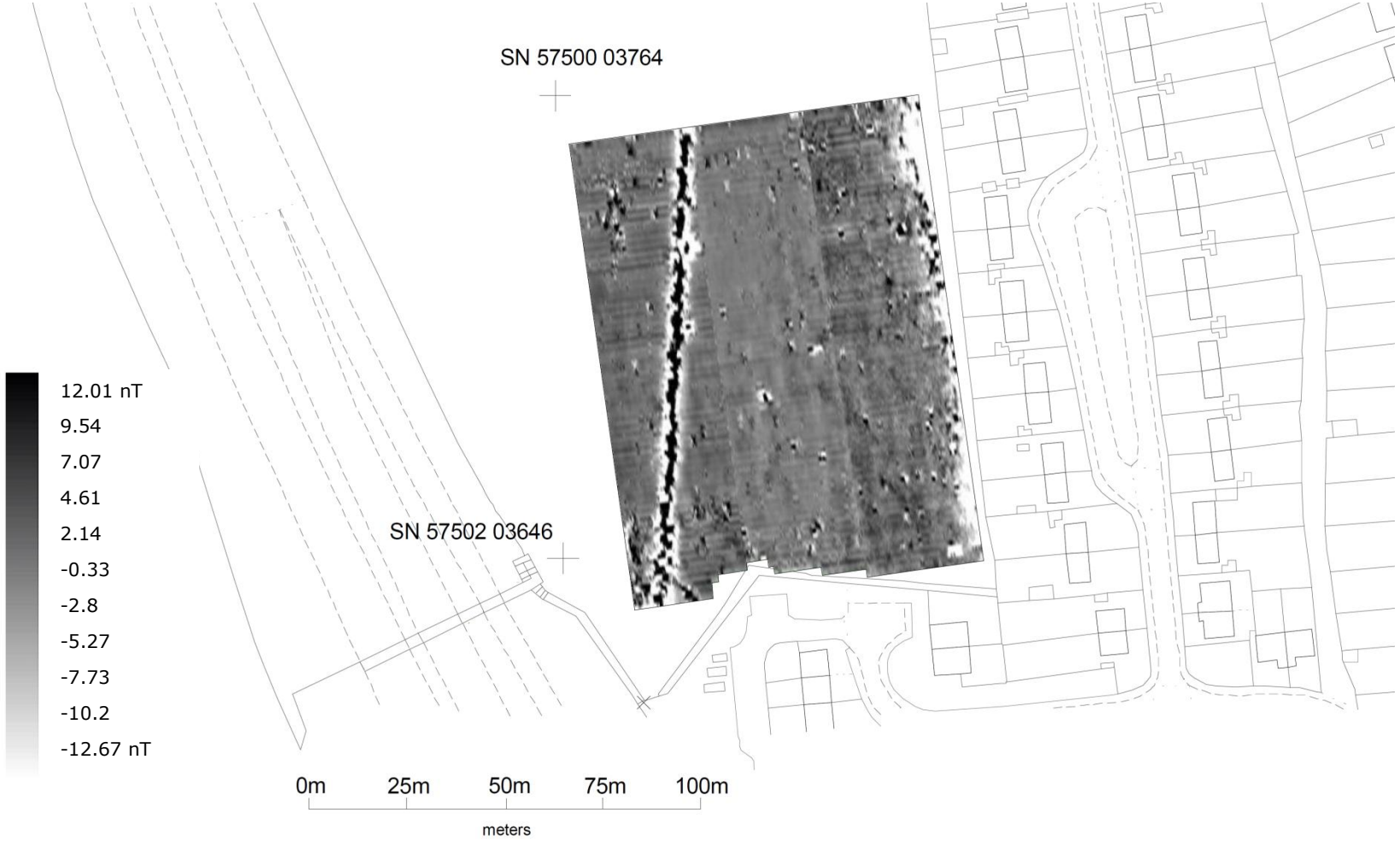


Figure 3: Processed greyscale survey data from Area 1.

Figure 4: Processed greyscale survey data from Area 2.

Figure 5: Processed gradiometer survey data – Area 1, greyscale, with interpretation. Red hatchings highlight probable services or ditches, blue and orange hatchings magnetic interference, solid red discrete dipole anomalies and green highlights the main positive anomalies.

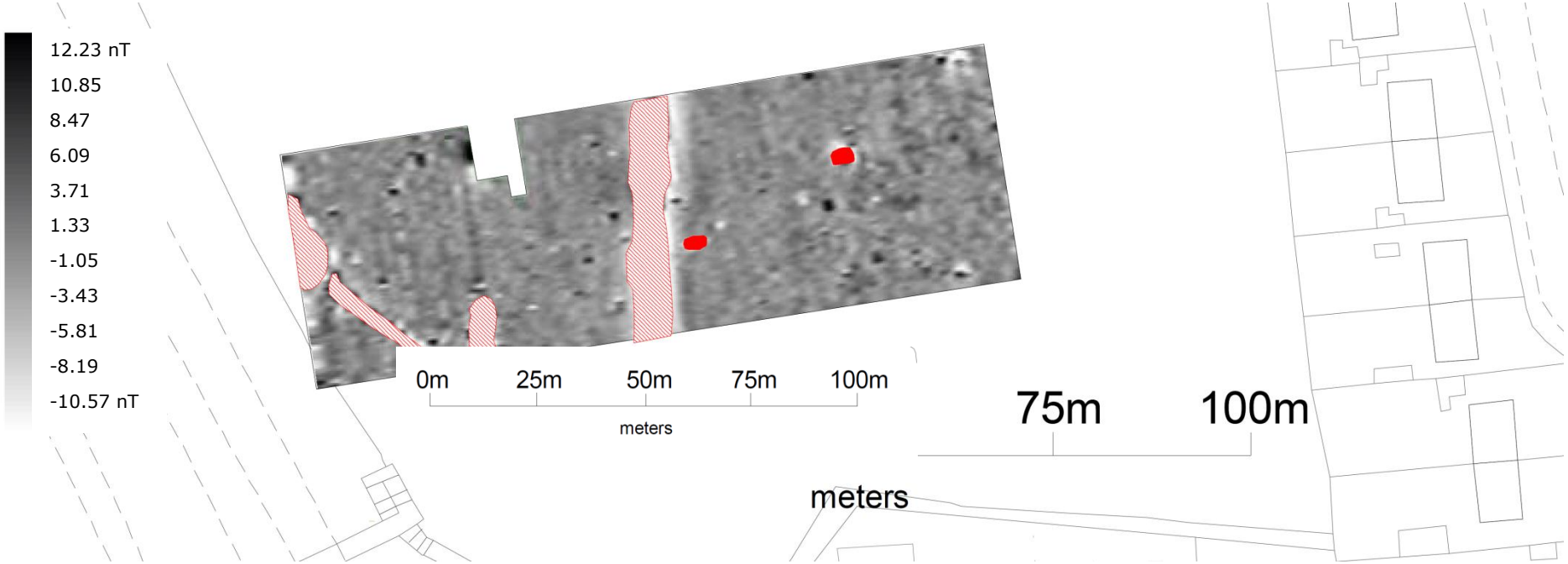


Figure 6: Processed gradiometer survey data – Area 1, greyscale, with interpretation. Red hatchings highlight areas of probable services/ditches and solid red indicates areas of discrete dipole anomalies.

5. TOPOGRAPHIC SURVEY (Figures 6 & 7)

5.1 The topographic survey shows that there is a general west to east downward slope across the area, running from around 36m aOD to the west to 30m to the east.

5.2 Running roughly north to south through the site is the distinct change in ground level between the east and west parts of the site. The ridge is a maximum of 2m in height roughly in the centre of the surveyed area (33.5m to the west and 35.5m to the east), but reduces to the north and south to around 1.2m difference. The survey demonstrates that the ground levels on the eastern and western side of the site are actually roughly comparable, rather than the western area being lower lying. This suggests that the ridge may have been formed by a geological fault line.

5.3 This ridge has been slightly enhanced through the addition of a bank along its edge, forming a boundary. The bank is relatively small and does not show up as clearly as expected on the survey. This would imply it was certainly not a defensive feature and most likely merely an agricultural boundary.

5.4 The topographic survey does confirm an area of relatively level ground directly to the east of the ridge in the centre of the surveyed area. Here the ground level is between 35.8m and 36m aOD.

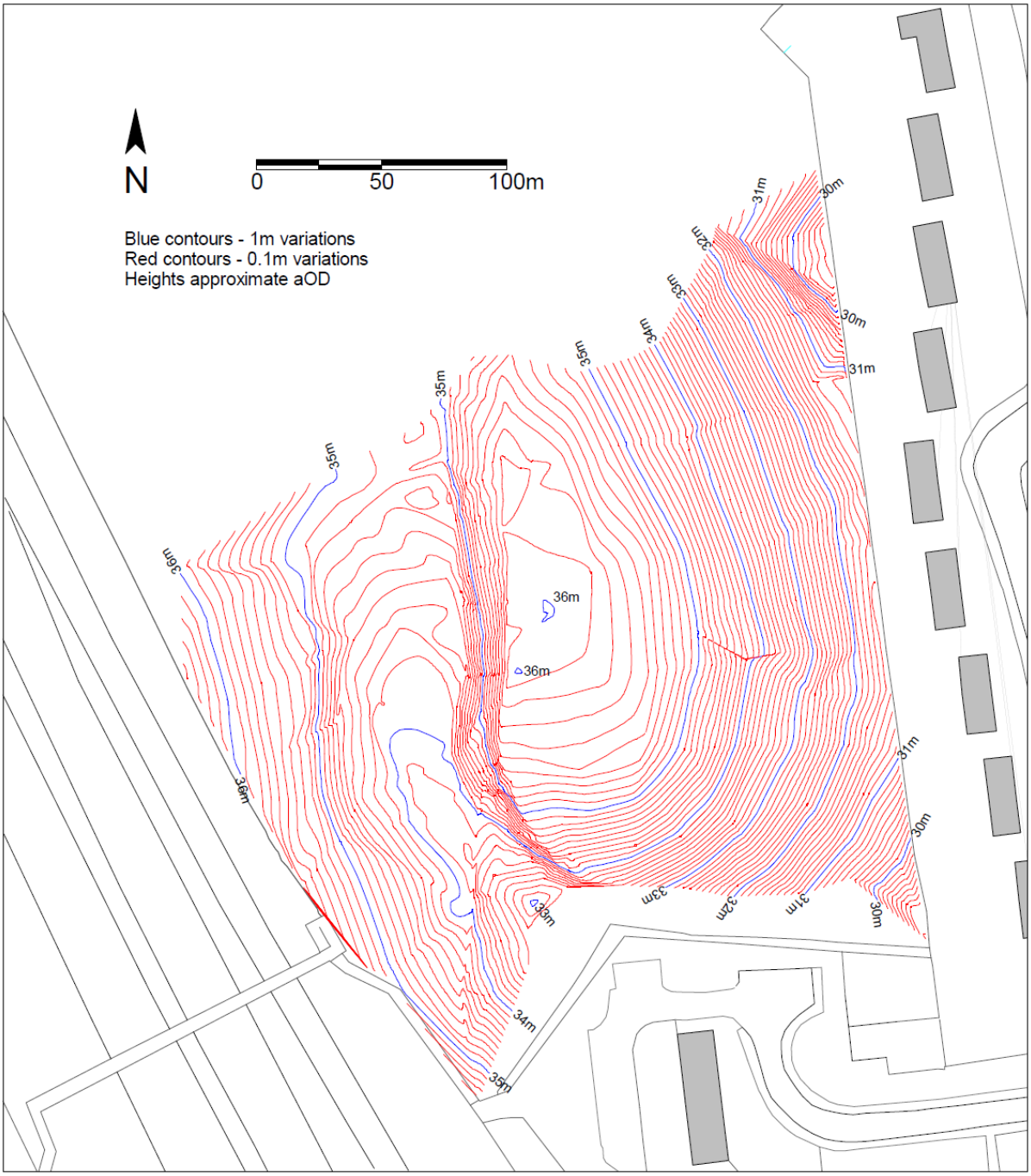


Figure 7: Contour plot showing topography of site area, including approximate levels above Ordnance Datum.

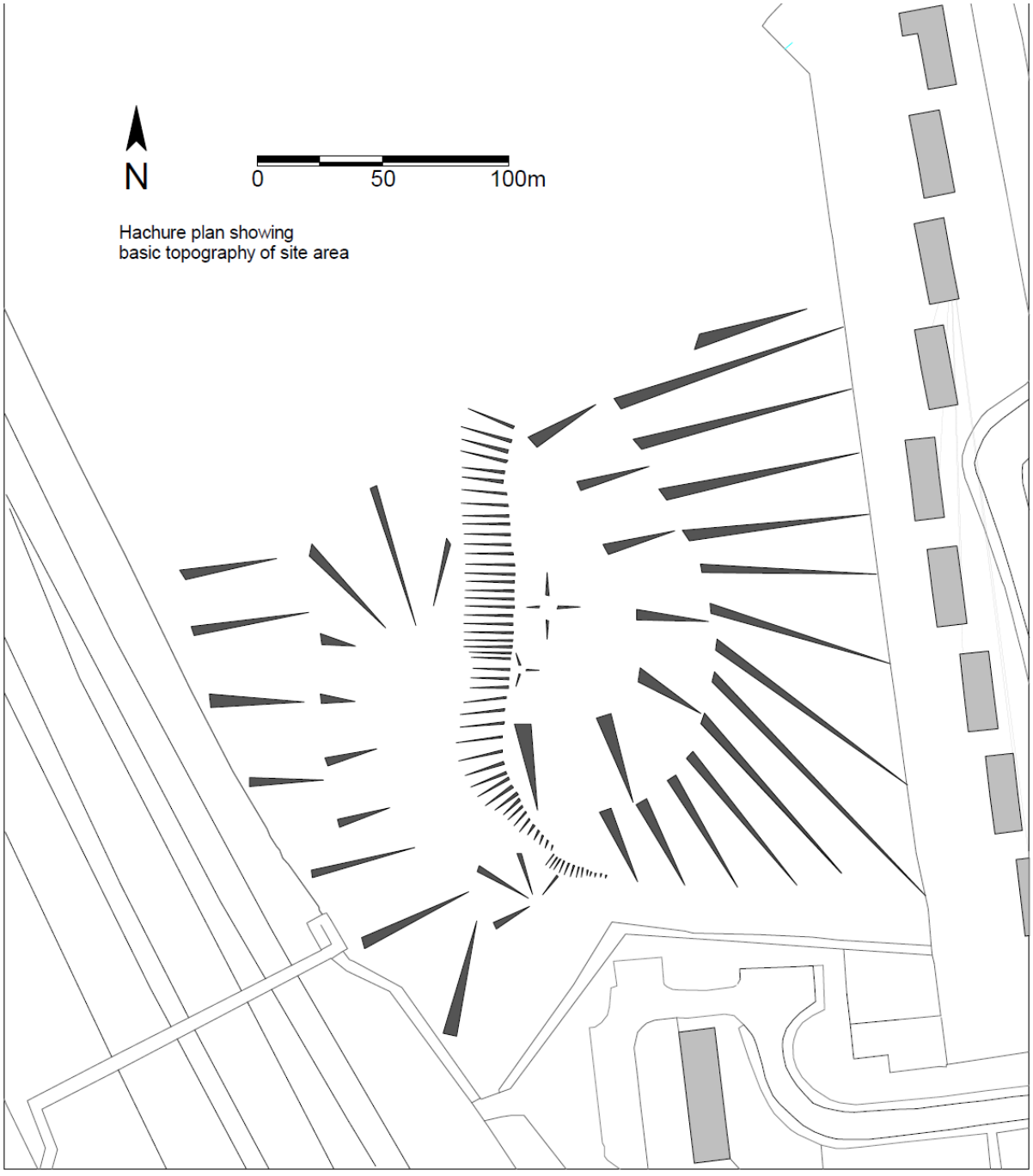


Figure 8: Hachure plot showing basic topography of site area

6. CONCLUSION

6.1 As expected the survey detected a number of dipole anomalies that are likely to be caused by modern ferrous debris.

6.2 The geophysical survey at Heol Llwyn, Hendy has found little evidence of archaeological activity that may indicate the function of the earth bank present at the site. The bank itself has proved elusive to the geophysical survey despite it being clearly visible in the 1st edition OS map (Figure 9).

6.3 A slightly enhanced area of magnetism has been detected, the location of which coincides with the bank at its most south western point but as the bank curves and begins to traverse northerly it appears that the probable modern service also follows a very similar route. The high amplitude signature exhibited from the modern service will almost certainly mask the more subtle signatures of the bank.

6.4 No evidence of settlement activity has been detected within the area of high ground to the east of the bank suggesting it may merely be associated with a former field boundary for agricultural purposes rather than enclosing a settlement.

6.5 Conducting the survey along a different traverse over a representation of the survey area strongly supports that the bank remains undetectable to this type of survey, most probably due to the modern service masking it.

6.6 The topographic survey indicates that the change in ground level through the centre of the site running roughly north to south is probably the result of a geological fault (possibly associated with underlying coal measures?).

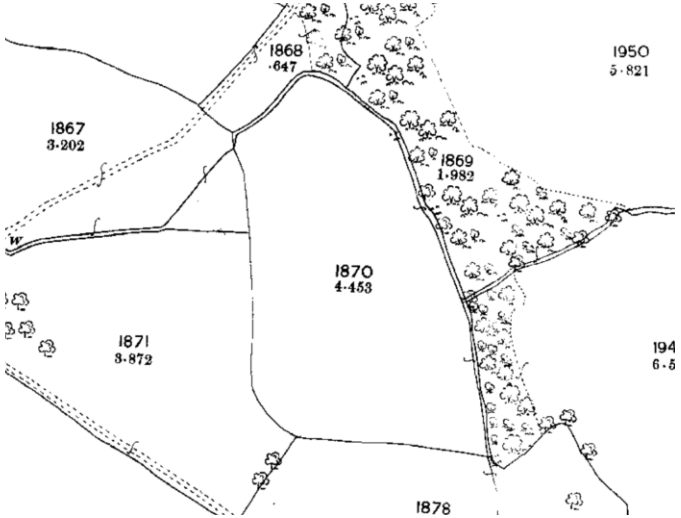
6.7 The area of relatively level ground on the eastern side of the ridge in the centre of the surveyed area does look a favourable spot for settlement or other archaeological activity. The geophysical survey indicates no such detectable activity, which should be visible, if present, due to the presence of hearths or other forms of cooking or heating.

6.8 Overall it is thus considered unlikely that the area was used for settlement or other such archaeological activity. The low bank along the top of the ridge most likely represents only a former field boundary (as shown on the 1st edition Ordnance Survey map (Figure 9).

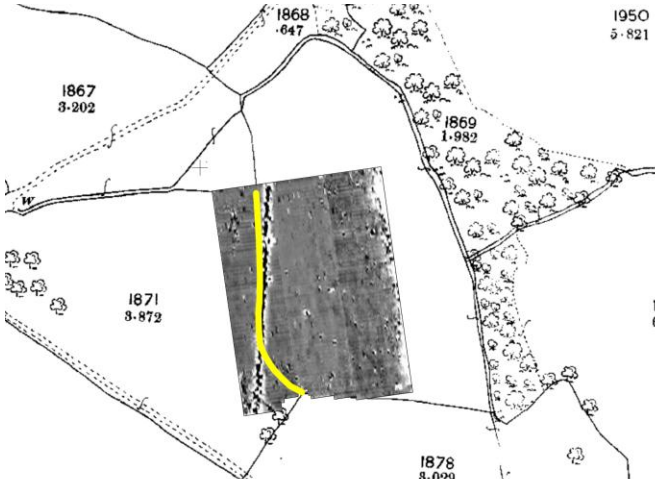
6.9 It is also possible that the bank has been partially removed or levelled following the installation of the large service trench which has been indicated by the geophysical survey running roughly north to south across the site area.

6.10 The results of the geophysical and topographic surveys indicate that the archaeological potential of the proposed residential development site at Heol Llwyn Bedw, Hendy is low to negligible.

(A)



(B)



(C)

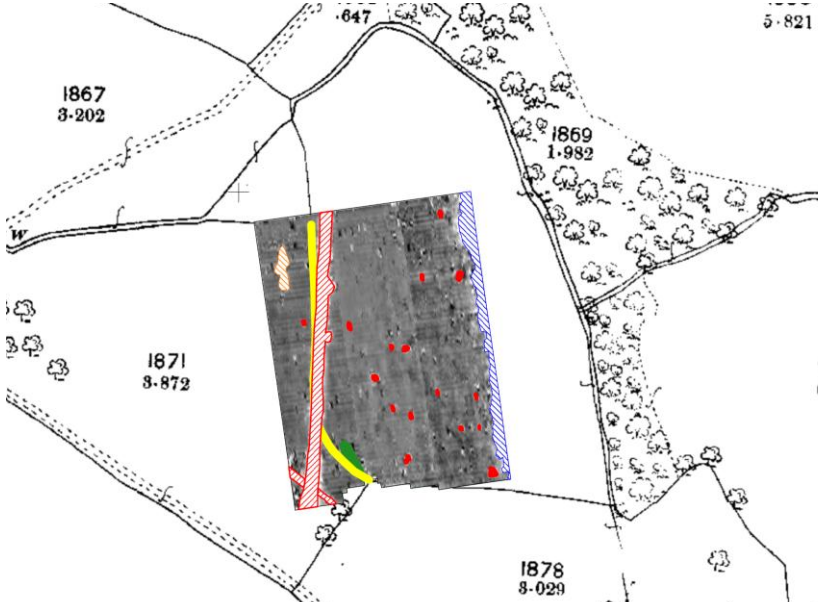


Figure 9: 1st edition OS Map with geophysical data overlay. (A) 1st edition OS map with bank clearly visible. (B) 1st edition OS map with geophysical greyscale plot overlay, the yellow line represents the route of the bank. (C) Geophysical interpretation – The modern service clearly follows the same route as the bank. The high amplitude response from the service is likely to mask any signature from the bank. A hint of the bank has been detected at its south western end (solid green)..

7 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, Carmarthenshire.

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

Charles Enright

Swydd / Position: Archaeologist DAT Archaeological Services

Llofnod / Signature ..... Dyddiad / Date 26/02/15

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

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

Swydd / Position: Project Manager DAT Archaeological Services

Llofnod / Signature ..... Dyddiad / Date 26/02/15

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

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