

**X-RAY FLUORESCENCE (XRF) SCANNING OF LLYS ARTHUR EARTHWORK,  
PONTERWYD, CEREDIGION 2013.**

**Llys Arthur CD023**

**Report of fieldwork for Cadw, July 2013**



*Llys Arthur earthwork, aerial view from the north, November 2009 (Crown Copyright RCAHMW, AP\_2009\_3673).*



**Royal Commission on the Ancient and Historical Monuments of Wales, and the Institute of Geography  
and Earth Sciences, Aberystwyth University**

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**Report of fieldwork to Cadw July 2013**

**County:** Ceredigion

**Community:** Blaenrheidol

**NGR:** SN7865882505

**NPRN:** 303688

**Date of Survey:** February – March 2013

**Surveyed by:** n/a

**Report Authors:** Toby Driver and Keith Haylock

**Illustrations:** Toby Driver and Keith Haylock

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# Llys Arthur, Dyffryn Castell, Ponterwyd: Investigation and pXRF sampling of a potential Roman, early Medieval or Medieval earthwork enclosure

Toby Driver & Keith Haylock

## Summary

In late February and early March 2013, Keith Haylock, a doctoral student at Aberystwyth University's Institute for Geography and Earth Sciences, supervised by Dr Toby Driver (RCAHMW), undertook a 5m gridded sampling of the Llys Arthur earthwork with a hand-held pXRF scanner to sample for concentrations of metals in the subsoil. The hypothesis was that the earthwork may have Roman origins, despite being currently understood as a medieval moated site. If of Roman date, there is the potential that the strategic positioning of the site at the head of a valley pass, surrounded by ore-rich hills, may have been to control local mines or process their products. Provisional results show a concentration of lead and other metals within the enclosure, compared to low background levels beyond, very likely originating from anthropogenic activities. These results (Figure 10 & 11) suggest that metals, particularly lead, were being brought to Llys Arthur and utilised within the earthwork. Currently the reasons behind this concentration, and indeed the date of the enclosure, remain uncertain without further investigative work.

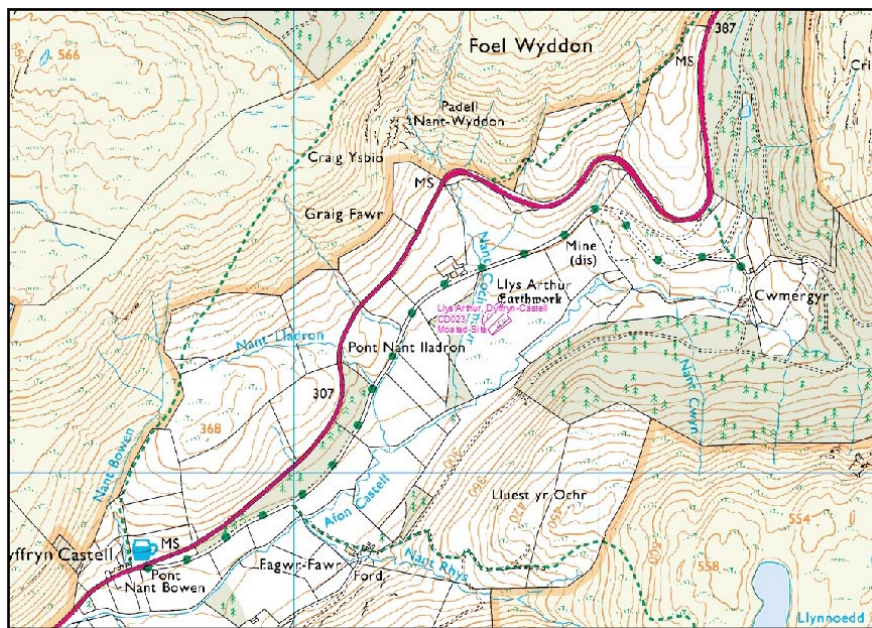


Figure 1: Location map (Crown Copyright RCAHMW. © Crown copyright. All rights reserved. RCAHMW. Ordnance Survey Licence number: 100017916, 2013).



Figure 2: Location of Llys Arthur from the south-west (lower centre, between forestry strips on valley floor), April 2013, showing the broad valley (Crown Copyright RCAHMW, AP\_2013\_1512).

### Historical introduction (TD)

Llys Arthur or ‘Arthur’s Court’, the enigmatic earthwork at the head of the Castell valley, first appears with that name on Lewis Morris’s 1748 map of the *Mannor of Perverth*. It was previously known by the descriptive name ‘cloddiau’ (S. Lloyd pers. comm.), and is simply referred to as ‘the Castle’ by the local who escorted George Borrow past the site in the mid-nineteenth century. Historically this narrative makes a useful contemporary reference to the site:

*‘Leaving the inn [at Dyffryn Castell]... I asked my companion, who spoke very fair English, why the place was called the Castle. ‘Because, sir,’ said he, ‘there was a castle here in the old time.’ ‘Whereabouts was it?’ said I. ‘Yonder,’ said the man, standing still and pointing to the right. ‘Don’t you see yonder brown spot in the valley? There the castle stood.’*

*‘But are there no remains of it?’ said I. ‘I can see nothing but a brown spot.’ ‘There are none, sir! But there a castle once stood, and from it the place we came from had its name, and likewise the river that runs down to Pont Erwyd.’ (George Borrow, *Wild Wales, Its people, language and scenery*. 1862. Chapter 88).*

Lewis Morris’ *Mannor of Perverth* map (Figure 1) shows Llys Arthur lying south-east of ‘Lluest Troed rhiw widdon’, a deserted farm (which survives today as an earthwork of a long house at SN 7863 8266) at the foot of Foel Wyddon. Llys Arthur lies just under a kilometre north-east of Fagwyr-fawr farm, this placename denoting a ‘great ruin’. With the recent discovery of a Romano-British villa at Abermagwr or *Abermagwyr* near Trawsgoed, and with the Roman connotations of magwyr or magor placenames elsewhere in Western Britain (Driver and Davies 2013, 46), the Fagwyr-fawr name near Llys Arthur potentially indicates a Roman origin for the earthwork.



Figure 3: *Llys Arthur (centre) depicted schematically on Lewis Morris' 1748 'Mannor of Perverth' map. (Crown Copyright NLW - NLW RM A118).*

The coincidence of the 'Wyddon' and 'fagwyr' placenames may further indicate human occupation or even metal exploitation here in later prehistory or Roman times. The metal mine at Ogof Wyddon (Witch's cave or Wizard's cave; NPRN 34008) near Machynlleth was shown, through excavation by the Early Mines Research Group, to have origins in the Bronze Age (Timberlake and Mason 1997). At its time of historic re-opening as a mine in 1856, knowledge of a man-made mine on site had apparently been lost; folk tales of 'ghosts, hobgoblins and fairies' were associated with this 'cave'. Simon Timberlake considers this to be a potential folk memory of the prehistoric metallurgy which took place here.

**The earthwork at Llys Arthur (TD)**



Figure 4: *Llys Arthur seen from the north-west, winter 2009 (Crown Copyright RCAHMW, AP\_2009\_3674).*



*Figure 5: Llys Arthur seen from the south-east, an opposite view from Figure 4 above. This view, taken in extreme drought in July 2006, provides crucial sub-surface information on the incomplete north-eastern side of the enclosure. While there is no earthwork present here today, this photograph shows evidence of previous flood events which have washed spreads of gravel across the site from the Nant Coch Mawr stream. On the north-east (right hand) side, the gravel has washed in a straight line across the open end of the earthwork, fossilising the position of a lost bank here, and a central entrance gap. The flood events also illustrate the low-lying, damp nature of the setting (Crown Copyright RCAHMMW, AP\_2006\_3775).*



*Figure 6: Llys Arthur, view of the enclosure from the north with the corner of the enclosure in the foreground (Crown Copyright RCAHMMW).*



Figure 7: *Llys Arthur, view of the earthwork from the south-west showing the central disturbed part of the south-western earthwork, where a range of buildings was constructed (Crown Copyright RCAHMW).*

The Llys Arthur earthwork lies towards the head of the Afon Castell valley at an altitude of 280m O.D., in an open tract of fairly level pasture. Surface topography and information derived from aerial photographs shows a considerable number of former stream channels across this upland tract prior to extensive drainage, and this must always have been a wet location.

The site is a rectangular embanked enclosure with rounded corners, about 55m north-east to south-west by 36m internally. It is set on almost level ground falling very gently to the south-east. On the south-west side the enclosure rests against & below a low, but pronounced scarp line. There is a central gap in the north-west side. There is no trace of a ditch except on the south-east side. Here there is a broad ditch, c.5m wide, with a broad counterscarp bank. The enclosure is presently incomplete on the east side, with seemingly no surface trace of any former or vestigial earthwork. However, Royal Commission aerial photographs taken under drought conditions on 27<sup>th</sup> July 2006 reveal sub-surface washes of gravel from previous flooding events of the Nant Coch Mawr (Figure 5). This parched detail clearly shows that gravel deposits were washed along the line of a now vanished earthwork, even marking the site of a now vanished central entrance gap in this side. Clearly the eastern rampart was systematically removed at some time in the past, perhaps to facilitate more open use of the interior as part of the wider pasture. Only geophysical survey would now reveal the footings of this former earthwork.

There are indications of a north-west to south-east range of buildings, at least 20m by 10m, in the western part of the interior but these footings appear to be intrusive, cutting into the former line of the earthwork (Figure 7).

The date of this interesting earthwork remains problematic. Previous fieldworkers have preferred to see it as a medieval moated site, especially given the broad ditch on the south side and range of rectangular building footings within. However, it would be highly unusual in a regional context, although it may be a rare survival of a medieval hospitium, or even a true Early Medieval Llys or court.

Its strategic position at the head of a valley, west of Cae Gaer Roman fort at the head of the Wye, suggests a Roman military origin, even if the site was subsequently remodelled for a different purpose. However, while the morphology of the earthwork, with its rounded corners, is of Roman appearance, the broad, squat nature of the earthwork

together with the broad southern ditch is more unusual. A workable hypothesis would be that the site began life as a Roman military site and was subsequently developed in the Early Medieval and Medieval periods, too useful and well positioned as a structure to be ignored by subsequent generations.

Outside the enclosure, some 35m due west of the western rampart, is a pronounced oval mound standing among former river channels which may be artificial in origin. One possible explanation is a Bronze Age burnt mound.

### **Scientific investigation of metal residues at Llys Arthur, 2013 (KH)**

Scheduled Monument Consent was granted by Cadw for limited invasive work to be carried out and the sampling strategy was as follows.

As the site was relatively level, sample points of 5 metre resolution were taken over the site with control sample taken to the east and west. In practice this required a 5 metre grid of pegs to be laid out across the earthwork (completed with tape and offset) with pXRF sample points taken at nominal 2.5m diagonal offsets from each and every 5m peg. The ground survey with the pXRF scanner to test for ores and imported metals on site required that the subsoil was exposed in a small section to the scanner. This required temporary removal of turf squares on the pre-defined grid for the assessment of 'hotspots'. Turf 'divots' were cut with a small spade, yielding holes c. 15cms square to subsoil depth c. 10-15cm max, and then promptly replaced. During the main survey, divots were pre-dug for the sake of efficiency so that sampling could proceed without interruption, being replaced within the hour. The sequence in Figure 8 shows how comprehensively the ground surface was restored once the divot is replaced.



Figure 8: *Replacing the turf divots after sampling, showing the speedy restoration of the pasture surface.*

### **Scientific results (KH)**

Geochemical data of soils element concentration was collected by the hand held Thermo Scientific Niton XLt 700 Analyser using a low power (1.0W) X-ray tube with Ag anode target (Thermo Electron Corporation), the internal calibration was as per the instructions in the relevant user guide (version 5.0 P/N500/905). The XLt 700 is capable of 3-sigma precision but maintaining the ability for fast data collection.

These data were taken on a pre-defined gridded section ~ 80 x 80 metres that yielded 270 sample points. To understand the trend of any metalliferous enrichment it was considered that a rapid method would be employed with sampling time of ~ 20 seconds per sample point. This created a map of the distribution and enrichment of elements. However, the short (20 second) sample time increased potential for pXRF rigor. Thus ~7% of the samples had soil lab-tested by atomic adsorption spectroscopy (AAS) to verify and further calibrate the pXRF results. All soil samples were within acceptable parameters ~10 -15% of pXRF for Pb and Zn.



These results were further compared to control points where background levels were used as a reference alongside the British Geological Survey's stream sediment and soils Atlas (2000) and Davies and Pavey's (1985) Welsh soil survey. In addition, specific Certified Reference Material (CRM) Till 4 and national institute of standards and technology (NIST) was used to verify the comparable extraction values of the pXRF and AAS.

Data was downloaded in the NDT software package and displayed as an Excel file. The final data, when presented, will not give detail of all the metals detected; however, it represents the main elements (metals which are associated to the mining and the standard background levels of manganese and iron which are ubiquitous). Control points were also taken at and below plough depth away from Llys Arthur, both at distance and increased elevation to negate any spread of contamination. This served to identify the areas of enrichment and metal types.

The initial site visit assessed the background levels of metalliferous elements *see figure and table 1*, suggest that the site perimeter shows only background levels and not elevated amounts of metals associated with the nearby pre-history and historic mining with a rich sphalerite deposits that where sought for lead and zinc.

### Initial sampling at Llys Arthur 18<sup>th</sup> Dec 2012

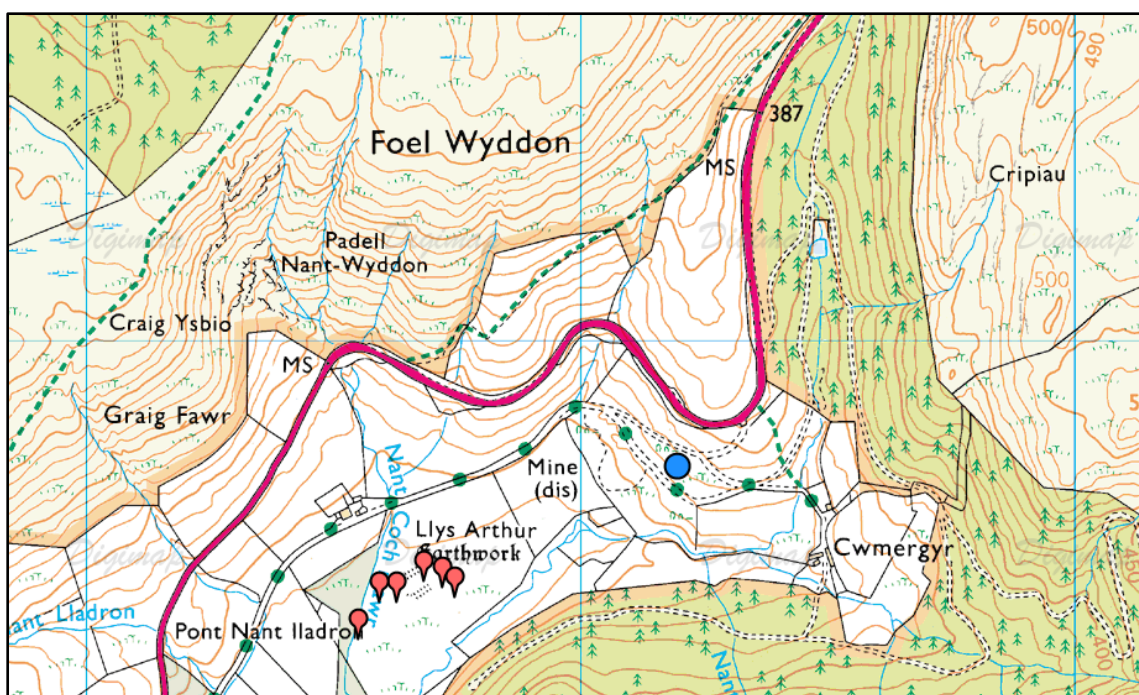


Figure 9: Llys Arthur: The initial site survey, sampling random mole hills and one sheep scrape (red points) returned only background levels of major element (Pb ~30ppm Fe 0.1 – 5% Cu ~15 ppm and Zn ~18 ppm , except on the proximal spoil tip (indicated in blue) where expected elevation was consistent with mining processes for Pb, Cu and Zn. The site is therefore relatively free of input from other proximal and distal areas associated with metal mining (Crown Copyright RCAHMW. © Crown copyright. All rights reserved. RCAHMW. Ordnance Survey Licence number: 100017916, 2013).

	Pb	Pb Error	Zn	Zn Error	Cu	Cu Error	Fe	Fe Error	Mn	Mn Error
<b>llys arthur-ss 01</b>	26.09	6.88	14.07	10.13	8.99	12.34	17059.73	282.78	155.32	65.26
<b>llys arthur-mh-01</b>	48.96	7.75	19.61	9.58	21.41	12.06	14163.71	240.53	163	58.72
<b>llys arthur-mh-02</b>	35.25	7.16	27.85	10.34	17.79	12.26	11033.44	220.88	68.39	52.82
<b>llys arthur-mh-03</b>	33.35	6.94	17.43	9.33	8.54	11.14	10860.25	213.91	72.44	52.41
<b>llys arthur-mh-04</b>	40.78	9.25	8.96	11.62	11.9	15.2	12845.45	288.36	141.11	71.97
<b>llys arthur-mh-05</b>	36.42	7.54	28.57	11.32	20.23	13.28	21220.45	314.78	118.63	65.86
<b>llys arthur-mh-06</b>	39.33	7.54	17.97	10.07	12.93	12.22	15402.03	261.59	40.36	55.32
<b>Gareg Lle spoiltip-01</b>	794.89	34.18	373.22	30.72	42.63	20.04	45454.83	557.89	441.53	116.56

Table 1: pXRF data from mole hills and sheep scrapes indicated by the red points on the map on figure 1 the blue point is the mine spoil from the local Gareg Lle mine (Copyright: Keith Haylock).

It must be considered that land improvement may have had some effect to this site as there has been work on diverting the Nant Coch Mawr to the west between 1960 and 1980 prior to this it coursed near to the earth work at the north western edge. However, there is enrichment of Pb and Zinc within the site suggesting anthropogenic action may be responsible.

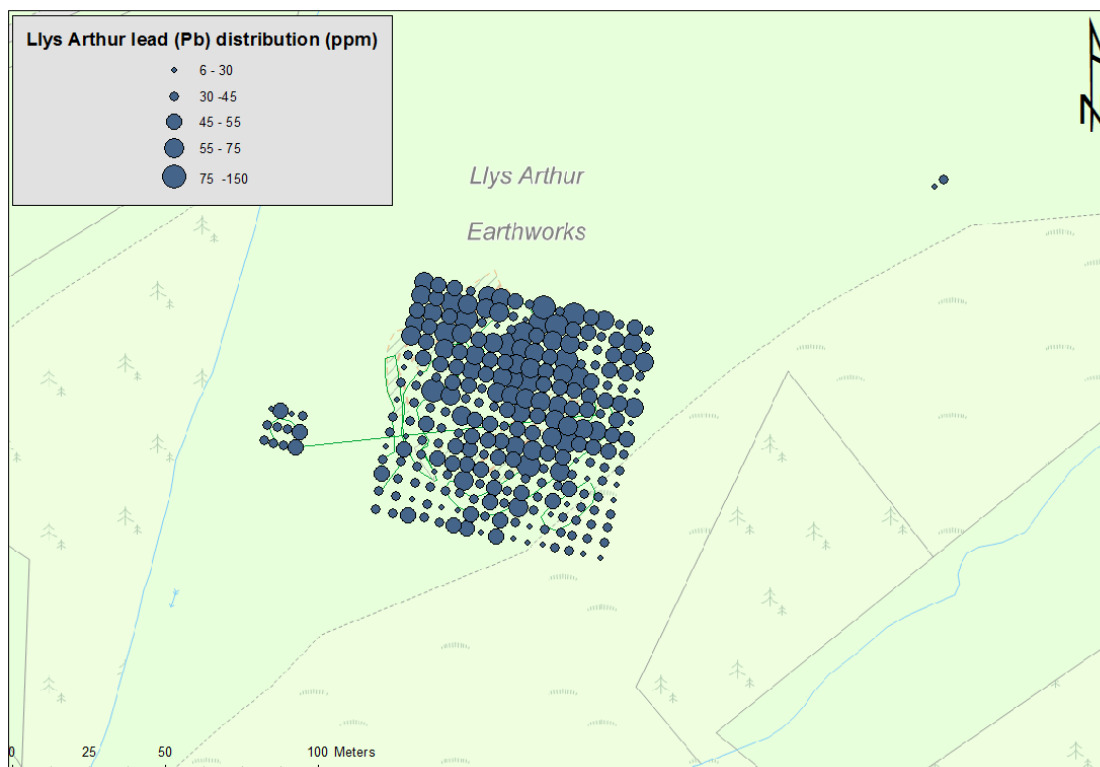


Figure 10: Lead (pb) distribution within the enclosure, revealing a higher concentration within the enclosure and immediately north, as opposed to the background levels some distance from the enclosure (small anomalies, upper right). That the concentration of lead at Llys Arthur is likely to be anthropogenic in origin is demonstrated by the fact

the anomalies clearly follow the straight sides of the enclosure interior, and fossilise the inner line of the now-vanished north-eastern side, despite the fact they were sampled from a regular 5m grid (Copyright: Keith Haylock).

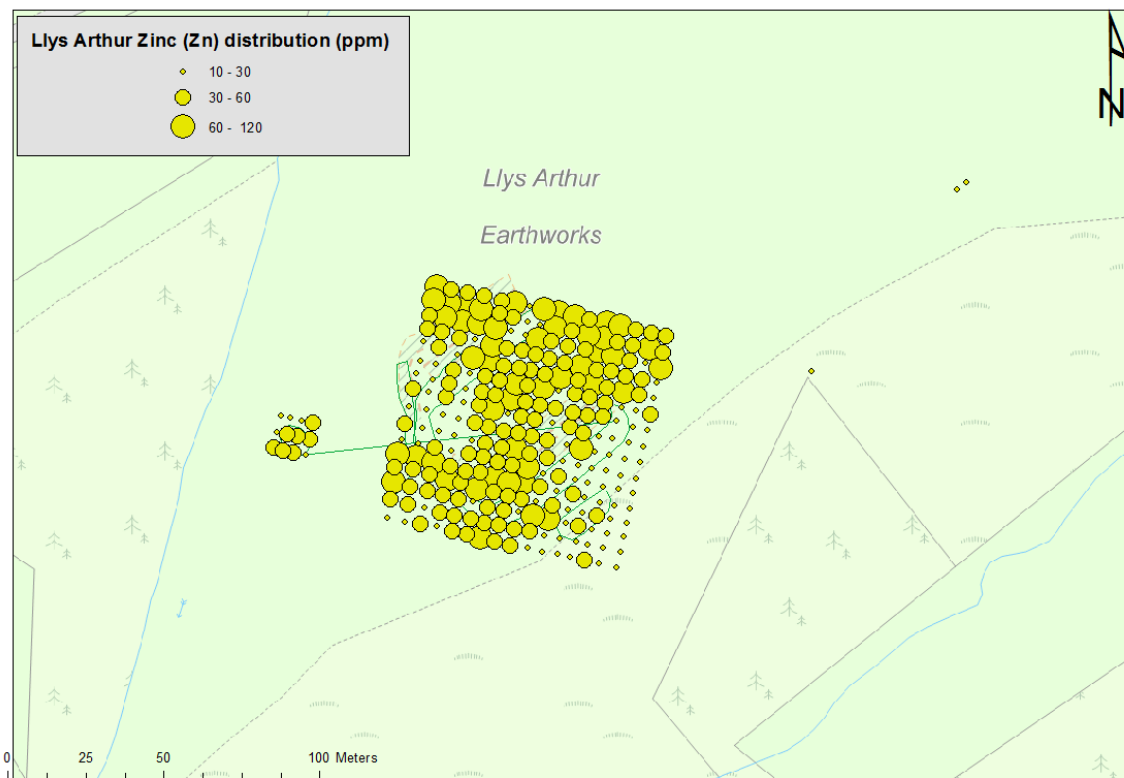


Figure 11: Zinc distribution within the enclosure. The lower southern corner of the earthwork can be clearly traced in zinc anomalies, which reduce dramatically outside the earthwork here, again suggesting some anthropogenic origin to the distribution (Copyright: Keith Haylock).

Further work is planned to assess the sites perimeter (~20m Circumference from the gridded area) to determine if the lead and zinc anomaly reduces at distance.

### Acknowledgments

The authors are indebted to the landowner Mr Gwyn Howell, Esgair yr hydd, for allowing access to his land, and to the Inspectorate at Cadw for granting Scheduled Monument Consent. Helen Burnham of Cadw provided useful information about the site's history and current management. Dr Jeffrey L. Davies has also provided useful information about the potential Roman date of the enclosure.

Llys Arthur can be seen from nearby public roads and footpaths but the earthwork itself lies on private land.

### References

- Driver, T. and Davies, J.L. 2012. Abermagwr Romano-British villa, Ceredigion, mid Wales: Interim report on its discovery and excavation. *Archaeologia Cambrensis* 160 (2011), 39-49.
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