

Archaeology Wales

Land to the rear of Cylch Peris, Llanon, Ceredigion

Geophysical Survey



By
Jennifer Muller


Report No. 1772


Archaeology Wales

Land to the rear of Cylch Peris, Llanon, Ceredigion

Geophysical Survey

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By
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Report No. 1772

March 2019

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Non-Technical Summary

This report results from a geophysical survey carried out by Archaeology Wales Ltd (AW) for Morgan Construction, following recommendations made by Dyfed Archaeological Trust – Development Management (DAT-DM), in their capacity as archaeological advisors to Ceredigion County Council (CCC). The survey was undertaken on the site of a proposed residential development on land to the rear of Cylch Peris, Llanon, Ceredigion SY23 5HN, centred on NGR SN 51886 67457. The planning application number is A190018.

The aim of the geophysical survey was to determine the nature and extent of any buried archaeological features within the proposed development area. The work was undertaken using a Bartington Grad601 dual fluxgate gradiometer.

The results appear to be largely associated with naturally-occurring features (geology), or discrete anomalies within the plough soil. One potential linear feature was identified, although interpretation was inconclusive it is suggested that it may be of limited archaeological interest.

The work was carried out to the Standard and Guidance set out by the Chartered Institute for Archaeologists for archaeological geophysical survey (CIfA 2014) and completed in accordance with EAC Guidelines for the Use of Geophysics in Archaeology (Historic England 2016).

Crynodeb

Mae'r adroddiad hwn yn ganlyniad i arolwg geoffisegol a gynhaliwyd gan Archaeology Cymru Cyf (AC) ar gyfer Morgan Construction, yn dilyn argymhelliad a wnaed gan Ymddiriedolaeth Archeolegol Dyfed – Rheoli Datblygiadau, yn ei chapasiti fel cynghorwyr archeolegol i Gyngor Sir Ceredigion. Cynhaliwyd yr arolwg ar safle datblygiad preswyl arfaethedig ar dir ger cefn Cylch Peris, Llan-non, Ceredigion SY23 5HN, sydd wedi'i leoli yn NGR SN 51886 67457. Y rhif cais cynllunio yw A190018.

Diben yr arolwg geoffisegol oedd pennu natur a hyd a lled unrhyw nodweddion archeolegol sydd wedi'u claddu yn yr ardal ddatblygu arfaethedig. Gwnaed y gwaith gan ddefnyddio gradiomedr fluxgate deuol Bartington Grad601.

Ymddengys bod y canlyniadau'n gysylltiedig gan fwyaf â nodweddion naturiol (daeareg), neu anomaleddau ar wahân o fewn pridd yr aradr. Nodwyd un nodwedd unionlin bosibl, er bod y dadansoddiad yn amhendant, awgrymir ei fod o bosibl o ddiddordeb archeolegol cyfyngedig.

Cynhaliwyd y gwaith i'r Safonau a'r Canllawiau a nodir gan Sefydliad Siartredig yr Archeolegwyr ar gyfer arolygon geoffisegol archeolegol (Sefydliad Siartredig yr Archeolegwyr 2014) ac fe'i cwblhawyd yn unol â Chanllawiau'r Pwyllgor Archwilio Amgylcheddol ar gyfer y Defnydd o Geoffiseg mewn Archeoleg (Historic England 2016).

1. Introduction

1.1 Location and scope of work

In February and March 2018, Archaeology Wales Ltd (AW) carried out a geophysical survey on the site of a proposed residential development on land to the rear of Cylch Peris, Llanon, Ceredigion SY23 5HN (henceforth – the site), centred on NGR SN 51886 67457 (Figure 1 and 2). The local planning authority is the Ceredigion County Council (henceforth – CCC), and the planning application number is A190018.

The site covers the southern half of a large agricultural field bounded by hedgerows that slopes gradually down to the west. The site lies at approximately 30mOD. To the south the site is bordered by residential development along Cylch Peris, and to the west is bordered by the A487.

Dyfed Archaeological Trust – Development Management (henceforth – DAT-DM), in their capacity as archaeological advisors to CCC, recommended that a geophysical survey of the site was undertaken prior to determination of any further mitigation requirements.

Subsequently, a Written Scheme of Investigation (WSI) was prepared by AW at the request of Morgan Construction. It provided information on the methodology to be employed by AW during a geophysical survey of the site. The WSI was submitted to, and approved by, DAT-DM, on behalf of the CCC, prior to the survey being undertaken.

The work was managed by Phil Poucher, Project Manager, and the site work was undertaken by Daniel Moore, Jennifer Muller and Christian Lindesay.

1.2 Site Description and Geology

The site, which covers an area of approximately 1.5 hectares, extends across the southern half of an agricultural field on the northern edge of Llanon, in Ceredigion. The field has been used as improved pasture and arable land in recent years. It is bounded by hedgerows, and slopes gradually down to the west. To the south the site is bordered by residential development along Cylch Peris, to the west the site is bordered by the A487, with agricultural land beyond. Agricultural land extends to the north and east. An overhead cable crosses the southern edge of the field.

The site lies at approximately 30mOD. To the east the land continues to rise, eventually reaching a high point of 150mOD approximately 1.3km to the east. To the west the land continues to fall gradually until it meets the Ceredigion coast approximately 800m to the west. Approximately 100m to the south the Afon Peris, a

relatively small watercourse, winds east – west towards the coast. The small settlement of Llanon is largely laid out along the main road to the south of the Peris, with offshoots along Stryd-yr-Ysgol to the east, and Stryd-yr-Eglwys to the west, which leads to St Ffraid’s church and the small settlement of Llansantffraid around it.

The underlying bedrock of the proposed development area comprises mudstones and sandstones of the Trefechan Formation, with the rising ground to the east part of the Mynydd Bach Formation. The bedrock is overlaid by mixed alluvial deposits along the route of the Afon Peris to the south, with Devensian diamicton to the north. The site may extend across both the deposits (BGS 2018).

1.3 Archaeological and Historical Background

As stated in the letter from DAT-DM to CCC, a number of prehistoric sites are recorded in the surrounding area, including Iron Age cropmark enclosures and a Neolithic findspot. Immediately to the west of the site also lies an undated double-ditched enclosure.

A number of Iron Age enclosures are recorded, both as visible earthworks, and as cropmarks, lying on higher ground around the northern edge of Llanon, including Troed-yr-rhiw enclosure (PRN 763) 250m northeast of the site; Porth-Mawr enclosure (PRN 36079) 250m southeast of the site; and Pant-Wilog enclosure (PRN 14245) 450m southeast of the site. To the west the aforementioned St Ffraid’s Church (PRN 50152) may have early medieval origins, and is first mentioned in 12th century documents. Llanon would also appear to be centred on a medieval settlement (PRN 12771), and an extensive system of strip field agriculture, typically medieval in origin, is still visible to the west of the village.

2. Aims and Objectives

2.1 Geophysical Survey

The geophysical survey was undertaken in order to:

- Locate and describe archaeological features that may be present within the development area. The archaeological work was designed to attempt to elucidate the presence or absence of archaeological material that might be affected by the scheme, in particular its character, distribution, extent and relative significance.
- Provide sub-surface data to inform any future on-site works.

3. Methodology

3.1 Geophysical Survey

A Bartington Grad601 dual-fluxgate gradiometer was used to undertake the survey. The machine consists of two high stability fluxgate sensors suspended on a single frame, accurately aligned, which can detect localised magnetic anomalies compared with the general magnetic background. When mapped in a systematic manner, this allows changes in the magnetic field resulting from differing features in the soil to be plotted. Previous research has shown that fired, or cut and backfilled archaeological features such as kilns and hearths, ditches and pits often have an anomalously higher magnetic susceptibility than the surrounding subsoil due to burning and biological processes. Data from this may be mapped at closely spaced regular intervals, to produce an image that may be interpreted to locate buried archaeological features (Clark, 1997) (Aspinall *et al*, 2011).

Detailed survey was carried out in grids of 30m x 30m along zig-zag traverses spaced at 1m intervals, recording data points spaced at 0.25m intervals to a maximum instrument sensitivity of 0.1nT in accordance with Historic England Guidelines. The survey mode was set to bi-directional (traverses walked alternately south-north/north-south). Incomplete survey lines resulting from irregular area boundaries or obstacles were completed using the 'dummy log' key. At regular intervals the data was downloaded in the field onto a laptop computer for storage and assessment.

3.2 Data Processing and Presentation

Following the completion of the detailed survey, processing and analysis took place using the TerraSurveyor v.3 software package. After downloading, the results were plotted in 2D. The most typical method of visualising the data is as a greyscale image. In a greyscale, each data point is represented as a shade of grey, from black to white at either extreme of the data range. A number of standard operations (including destriping) were carried out to process the data. The data was then analysed using a variety of parameters and styles and the most useful of these were saved as *TIF images and displayed using Adobe Illustrator software. Due to the presence of strong magnetic anomalies, the data displayed was clipped to a range of +/-10 nT to allow finer details to be discerned. The results of the survey were then overlaid onto a digital map of the study area. This was then used to produce interpretation figures.

All works were undertaken in accordance with the ClfA's Standards and Guidance for a Geophysical Survey (2014) and current Health and Safety legislation.

4. Geophysical Survey Results

4.1 Limitations

The survey was undertaken during a combination of periods of wet and sunny weather.

The presence of wire fencing and metal gates prevented surveying to the very edges of the field, as the metal would obscure more subtle magnetic readings taken in the vicinity. The presence of an electricity pole prevented surveying with 5m due to health and safety issues.

4.2 Results of the Survey (Figs 3 - 5)

General

The field produced faint responses, largely irregular or gently curvilinear in nature, which is very characteristic of background geological responses. One faint linear striation, running northwest to southeast, then turning to the northeast, was identified to the southwest, and this is discussed below.

The strongest magnetic responses in the field lay near the boundaries, where the gradiometer responded to the metal fencing and gates, the gateway into the field from the west being particularly noticeable.

There is a spread of discrete responses throughout the field. The even spread throughout the field, and largely dipolar readings, would suggest they represent possible small ferrous anomalies, characteristic of small pieces of ferrous debris in the ploughsoil.

Linear Features

One faint linear striation is noted (Feature 1; Figure 5) in the southwestern section of the field, characterised by a band of magnetically positive responses. Such responses are often indicative of cut features, although these features only vary slightly from the general background responses. As a linear feature it runs northwest to southeast for approximately 50m, and then appears to turn ninety-degrees to the northeast for approximately 15m.

5. Interpretation and Discussion

The field conditions and background responses would indicate good conditions at this site for carrying out a geophysical survey. The responses however would appear to be largely geological in nature, or relate to a spread of responses typical of agricultural plough soils.

The field produced one potential feature however, in the form of Feature 1. This faint linear anomaly may have archaeological origins, the responses suggesting a possible cut feature, with a possible right angle turn. It may also be worth noting that in the field directly west of the site, just across the A487, a pair of ditches have been recorded from aerial photographic images by the RCAHMS, of potential archaeological interest. These also (NPRN 419562) run northwest to southeast for approximately 168m, then turn in a 'curving corner' near the road. However, the curving corner would suggest these double ditches are unlikely to align with Feature 1, which gives no indication of being a double-ditched feature. Feature 1 does not closely correspond to former field boundaries visible on historic map sources, although the tithe map of 1846 does suggest smaller field units in this area prior to a reorganisation of the boundaries by the later 19th century. Unfortunately this later reorganisation makes it difficult to accurately locate the field boundaries depicted on the tithe map. Incidentally, the lack of any geophysical responses recording the former field boundary that ran roughly east – west just within the northern limits of the survey area (removed in the later 20th century) would suggest that subsequent ploughing activity may have removed below-ground remains of the boundary.

The location of Feature 1, both towards the base of the sloping ground, and close to the main field entrance, along with the generally faint and inconclusive responses, may indicate the feature is the result of ploughing activity or vehicle movements within the field and is therefore of limited archaeological interest.

Although the interpretation of Feature 1 is inconclusive, the general archaeological potential of the surrounding area may suggest development in such an area could benefit from archaeological mitigation, such as a watching brief, during construction works, in order to identify and record evidence of potential archaeological activity should it be present.

Bibliography and References

Aspinall, A, Gaffney, C & Schmidt, A. 2011, *Magnetometry for Archaeologists*. Altamira, London

Bevan, A (tithe commissioner) 1846 Llansaintffraed Parish Tithe Map

British Geological Society online map resource
(<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>)

Clark, A 1997, *Seeing Beneath the Soil: Prospecting Methods in Archaeology*. Routledge, Stroud

Chartered Institute for Archaeologists. 2014, *Standards and Guidance for a Geophysical Survey*

National Monument Record of Wales, (<https://coflein.gov.uk/en>)

Ordnance Survey 1888 County Series map, 1:2500



Figure 1: Location map, 1:40,000 @ A4

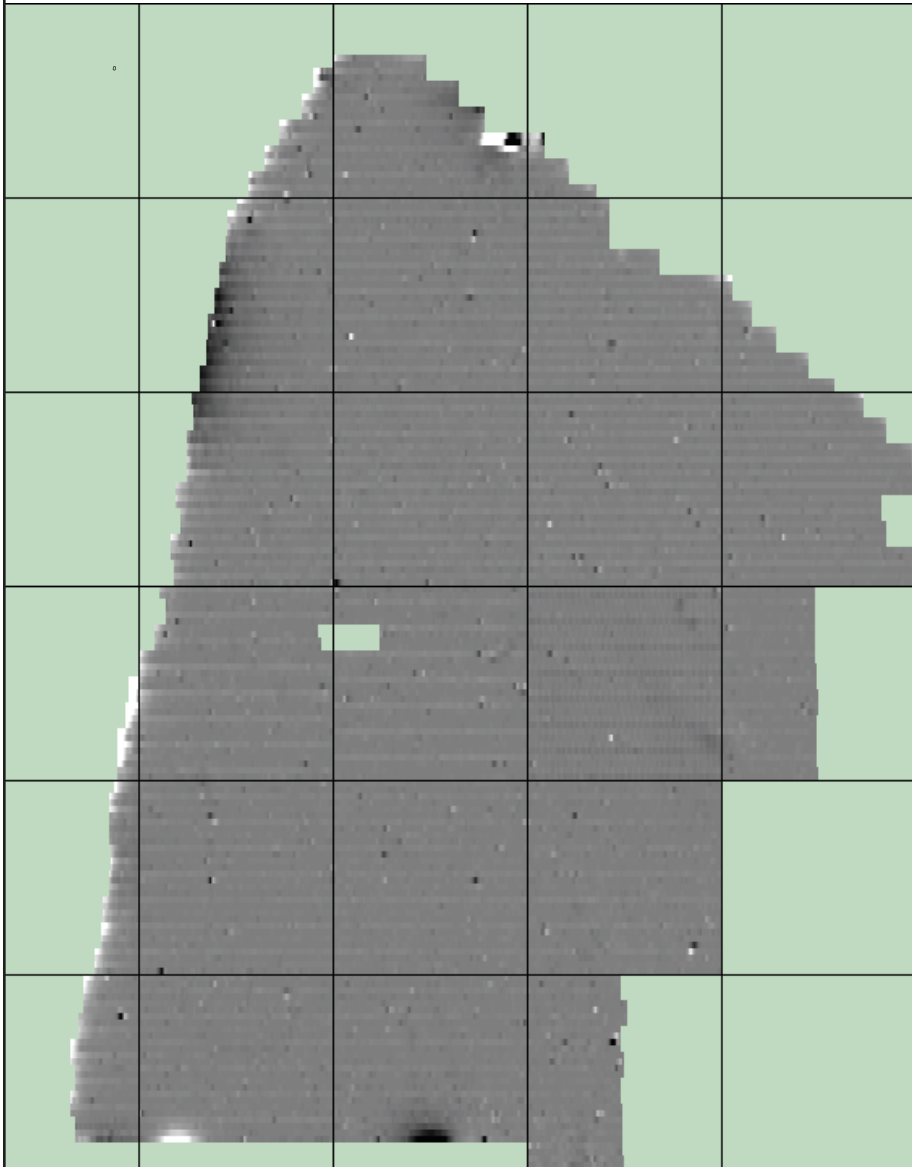
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Figure 3: Processed geophysical survey results, overlaid with topographical detail. The survey has been destriped, and clipped to a range of +/- 10nT 1:800 @ A4.

Unprocessed survey results



Process survey results, with additional Band Weight Equalisation



0m 50m

A scale bar is located at the bottom center of the figure. It consists of a horizontal line with alternating black and white segments. The text "0m" is positioned at the left end of the bar, and "50m" is positioned at the right end.

Figure 4: Geophysical survey results at differing levels of processing.



Figure 5: Interpretation layer of geophysical survey results. 1:800 @ A4.



Plate 1: Survey area, facing southeast. Residential development on Cylch Peris visible on the right.



Plate 2: Survey area, facing northeast. Troedyrhiw Iron Age enclosure lies on top of the high ground to the rear.



Plate 3: Survey area, facing northwest.



Plate 4: Survey area, facing southwest. St Ffraid's Church tower visible in the background.

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Wales

APPENDIX I
Written Scheme of Investigation

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Written Scheme of Investigation
For a Geophysical Survey:
Land to the rear of Cylch Peris, Llanon,
Ceredigion SY23 5HN

Prepared for:
Morgan Construction

Project No: 2704

February 2019

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NON TECHNICAL SUMMARY

This Written Scheme of Investigation (WSI) details the proposal for geophysical survey of land to the rear of Cylch Peris, Llanon, Ceredigion, as part of the determination of the planning application for residential development. It has been prepared by Archaeology Wales Limited for Morgan Construction.

1. Introduction

This Written Scheme of Investigation (WSI) details the methodology for a programme of archaeological mitigation (geophysical survey) to be undertaken at the site. The proposed development comprises plans for the construction of a new residential development on land to the rear of Cylch Peris, Llanon, Ceredigion SY23 5HN (henceforth – the site), centred on NGR SN 51886 67457 (Figure 1 and 2). The local planning authority is the Ceredigion County Council (henceforth – CCC), and the planning application number is A190018. The work is to be undertaken as part of the determination of the planning application.

The recommendations for a geophysical survey on the site have been proposed by Dyfed Archaeological Trust – Development Management (henceforth – DAT-DM), in their capacity as archaeological advisors to CCC. These recommendations are stated in a letter dated 4th February 2019 from DAT-DM to CCC in response to the planning application. The letter highlights the archaeological potential of the area, and goes on to state:

Therefore, in order to protect archaeological features and potentially preserve them in situ within the overall design, we recommend that an archaeological field evaluation is required from the applicant. This further information should be supplied prior to **the determination of the planning application...We envisage that** this work will involve a staged approach, which will include a geophysical survey of the site on the first instance. This may lead to further work including a programme of the trial trenching which will then inform any subsequent mitigation.

This WSI relates to the initial stage of geophysical survey on the site. It has been prepared by Philip Poucher, Archaeology Wales Ltd (henceforth - AW) at the request of Morgan Construction. It provides information on the methodology that will be employed by AW during a geophysical survey of the site. This WSI is to be approved by DAT-DM, on behalf of CCC, prior to the survey being undertaken. The purpose of the archaeological mitigation (geophysical survey) is to provide CCC with sufficient information regarding the nature of archaeological remains on the site of the development, the requirements for which are set out in Planning Policy (revised edition 10, 2018), Section 6.1 and Technical Advice Note (TAN) 24: The Historic Environment (2017).

All work will conform to the Standard and Guidance for Geophysical Survey (CIfA December 2014) and be undertaken by suitably qualified staff to the highest professional standards.

2 Site Description & Archaeological Background

The site, which covers an area of approximately 1.5 hectares, extends across the southern half of an agricultural field on the northern edge of Llanon, in Ceredigion. The field has been used as improved pasture and arable land in recent years. It is bounded by hedgerows, and slopes gradually down to the west. To the south the site is bordered by residential development along Cylch Peris, to the west the site is bordered by the A487, with agricultural land beyond. Agricultural land extends to the north and east. An overhead cable crosses the southern edge of the field.

The site lies at approximately 30mOD. To the east the land continues to rise, eventually reaching a high point of 150mOD approximately 1.3km to the east. To the west the land continues to fall gradually until it meets the Ceredigion coast approximately 800m to the west. Approximately 100m to the south the Afon Peris, a relatively small watercourse, winds east – west towards the coast. The small settlement of Llanon is largely laid out along the main road to the south of the Peris, with offshoots along Stryd-yr-Ysgol to the east, and Stryd-yr-Eglwys to the west, which **leads to St Ffraid's church and the small settlement of Llansantffraid around it.**

The underlying bedrock of the proposed development area comprises mudstones and sandstones of the Trefechan Formation, with the rising ground to the east part of the Mynydd Bach Formation. The bedrock is overlaid by mixed alluvial deposits along the route of the Afon Peris to the south, with Devensian diamicton to the north. The site may extend across both the deposits (BGS 2018).

As stated in the letter from DAT-DM to CCC, a number of prehistoric sites are recorded in the surrounding area, including an Iron Age cropmark enclosure and a Neolithic findspot. Immediately to the west of the site also lies an undated double-ditched enclosure.

A number of Iron Age enclosures are recorded, both as visible earthworks, and as cropmarks, around the northern edge of Llanon, including Troed-yr-rhiw enclosure (PRN 763) lying on higher ground overlooking the site to the east. To the west the **aforementioned St Ffraid's Church (PRN 50152) may have early medieval origins, and** is first mentioned in 12th century documents. Llanon would also appear to be centred on a medieval settlement (PRN 12771), and an extensive system of strip field agriculture, typically medieval in origin, is still visible to the west of the village.

3 Objectives

This WSI sets out a program of works to ensure that the geophysical survey will meet **the standard required by The Chartered Institute for Archaeologists' *Standard and Guidance for archaeological geophysical survey (2014).***

The primary objective of the work will be locate and describe, by means of geophysical survey, archaeological features that may be present within the development area. The proposed archaeological work will attempt to elucidate the presence of absence of archaeological material that might be affected by the scheme, in particular its character, distribution, extent and relative significance.

A report will be produced that will provide information which is sufficiently detailed to

allow informed planning decisions to be made that can safeguard the archaeological resource. The information could then be used to determine further archaeological investigation or appropriate mitigation strategies for any archaeological remains within the area to be implemented prior to or during the proposed development.

4 Methodology for geophysical survey

The area to be surveyed will include all of the accessible development area (see the attached plan, Figure 2). On-site adjustments may be required to avoid areas of magnetic interference or inaccessibility.

The site will be located by GPS. All survey points will be located with a total station or similar survey equipment and plotted onto an O.S. base map.

The on-site survey will be undertaken in a single phase lasting approximately two days. This will be followed by report production.

The survey will be carried out using a Bartington Grad601 Magnetometer. This is chosen as an efficient and effective method of locating archaeological anomalies on this type of site. The machine consists of two high stability fluxgates gradiometers suspended on a single frame, accurately aligned, that can detect localised magnetic anomalies compared with the general magnetic background. When mapped in a systematic manner this allows changes in the magnetic field resulting from differing features in the soil to be plotted. Strong magnetic anomalies will be generated by iron-based objects or areas of heat-activity, such as hearths and kilns. More subtle anomalies may be generated by changes, typically in the iron-oxide content, of underlying soils, compared to the natural subsoil. This helps to detect infilling material of features such as ditches and pits, as well as overlying material such as wall lines.

Relatively open fields of low vegetation, such as this site, provide ideal locations for this type of survey. The surface of the field is relatively uniform allowing rapid traverses and readings to be taken at consistent heights above the ground surface, and the upper topsoil is generally both neither deep enough to mask features cutting into the underlying subsoil, and unlikely to contain a significant amount of material that could interfere with the magnetic readings. The underlying geology of sandstone and mudstone, overlain with diamicton, is also unlikely to provide a strong magnetic response that could distort the readings.

Each survey area will be divided into 20m or 30m square grids along a common alignment. Within each grid, parallel traverses 1m apart will be walked at rapid pace along the same orientation. Instrument readings will be logged at 0.25m intervals, with an average cycle of 4 using an ST1 internal sample trigger. Incomplete survey lines resulting from irregular area boundaries or obstacles will be completed using the **"dummy log" key**.

Further survey information will be completed on the relevant pro-forma sheet. All data will be downloaded in the field into a laptop computer. The location of the grid corners will be recorded using a total station or similar survey equipment so that results can be accurately placed onto an OS map.

A composite of each detailed survey area will be created and processed using the software package *Terrasurveyor v.3*. A variety of processing tools will be used to enhance any potential archaeology. The final results will be presented at an appropriate scale tied to the Ordnance Survey National Grid.

5 Monitoring

DAT-DM will be contacted approximately one week prior to the commencement of site works, and subsequently once the work is underway.

Any changes to this WSI that AW may wish to make after approval will be communicated to DAT-DM for approval on behalf of the Planning Authority.

DAT-DM will be given access to the site so that they can monitor the progress of the work, they will be kept regularly informed about developments, both during the site works and subsequently during the post-fieldwork programme.

6 Post-fieldwork programme

Site archive

An ordered and integrated project archive will be prepared in accordance with *The National Standard and Guidance to Best Practice for Collecting and Depositing Archaeological Archives in Wales 2017* (National Panel for Archaeological Archives in Wales) and the guidelines of the Chartered Institute for Archaeologists upon completion of the project.

Final reporting

The client report will contain, as a minimum, the following elements:

- Concise non-technical summary of the results
- Description of, and reasoning behind, geophysical survey technique
- Detailed plans of the site and survey results
- Site illustrations, related to Ordnance Datum
- Written description
- Written interpretation of results along with illustrated interpreted site plan
- Statement of local and regional context
- Conclusions as appropriate
- Bibliography
- A copy of the AW Specification

Copies of the report will be sent to the Client, and a copy of the report will be sent to DAT-DM for approval. Following approval a copy will also be sent to CCC and the regional Historic Environment Record. Digital copies will be provided in pdf format if required.

The report and all relevant information will be submitted to the Historic Environment Record following the guidelines and procedures laid out in the *Guidance for the Submission of Data to the Welsh Historic Environment Records* (WAT 2018).

A summary report of the work will be submitted for publication to a national journal no later than one year after the completion of the work.

7 Resources and timetable

Standards

AW works to the standards and guidance provided by the *Chartered Institute for Archaeologists*. AW fully recognise and endorse the Chartered Institute for **Archaeologists' Code of Conduct**, *Code of Approved Practice for the Regulation of Contractual Arrangements in Field Archaeology* and the *Standard and Guidance for archaeological geophysical survey* currently in force. All employees of AW, whether corporate members of the Chartered Institute for Archaeologists or not, are expected to adhere to these Codes and Standards during their employment.

Staff

The project will be undertaken by suitably qualified AW staff. Overall management of the project will be undertaken by Philip Poucher MCIfA, AW Project Manager.

Equipment

The project will use a Bartington Grad601 set to standard specifications.

Timetable of archaeological works

The work will be undertaken at the convenience of the client. No start date has yet been agreed, but this it is anticipated to start soon after approval of this WSI, if possible the week commencing 25th February 2019.

Insurance

AW is fully insured for this type of work, and holds Insurance with Aviva Insurance Ltd and Hiscox Insurance Company Limited through Towergate Insurance. Full details of these and other relevant policies can be supplied on request.

Arbitration

Disputes or differences arising in relation to this work shall be referred for a decision **in accordance with the Rules of the Chartered Institute of Arbitrators' Arbitration Scheme for the Institute for Archaeologists** applying at the date of the agreement.

Health and safety

Prior to the commencement of work AW will carry out and produce a formal Health and Safety Risk Assessment in accordance with *The Management of Health and Safety Regulations 1992*. A copy of the risk assessment will be kept on site and be available for inspection on request. A copy will be sent to the client (or their agent as necessary) for their information. All members of AW staff will adhere to the content of this document.

AW will adhere to best practice with regard to Health and Safety in Archaeology as set out in the FAME (Federation of Archaeological Managers and Employers) health and safety manual *Health and Safety in Field Archaeology (2002)*.

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