

Geophysical Survey:

Land to the rear of The Vicarage, Llanarth, Ceredigion

May 2025



Report No. 2376



Geophysical Survey: Land to the rear of The Vicarage, Llanarth, Ceredigion

May 2025

Prepared for Wales and West Housing Association

By
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Report No. 2376
Project No.2994

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Summary

In May 2025, Archaeology Wales Ltd was commissioned by Wales and West Housing Association to undertake a geophysical survey at land to the rear of The Vicarage, Llanarth, Ceredigion, centred on NGR SN 42163 57679.

The results indicate a very low probability for archaeological features. Rather, the site shows evidence of modern activity, especially in regard to magnetic debris on the northern and eastern parts of the site.

All work conformed to the Standard and Guidance for Archaeological Geophysical Survey (CIfA 2020).

Crynodeb

Ym mis Mai 2025, comisiynwyd Archaeology Wales Ltd gan Wales and West Housing Association i ymgymryd arolwg geoffisegol ar dir i'r cefn o'r Ficerdy, Llanarth, Ceredigion, wedi'i chanoli ar CGC SN 42163 57679.

Mae'r canlyniadau yn dynodi posibilrwydd isel iawn ar gyfer nodweddion archeolegol. Yn hytrach, mae'r safle yn dangos tystiolaeth o actifedd modern, yn enwedig o ran rwbwl magnetig yn y rhannau gogleddol a ddwyreiniol y safle.

Roedd yr holl waith yn cydymffurfio â'r Safon a'r Canllawiau ar gyfer Arolwg Geoffisegol Archeolegol (CIfA 2020).

1. Introduction

- 1.1.1. In May 2025, Archaeology Wales Ltd (henceforth - AW) was commissioned by Wales and West Housing Association (henceforth - the client) to undertake a geophysical survey on Land to the rear of The Vicarage, Llanarth, Ceredigion (henceforth – the site), centred on NGR SN 42163 57679.
- 1.1.2. The geophysical survey was part of a staged approach of archaeological investigations aimed at providing Heneb Development Management – Dyfed region (henceforth – HDM-DR), archaeological advisors to the Planning Authority, Ceredigion County Council with the information they are likely to request in respect of the proposed development within the proposed site.
- 1.1.3. The work was managed by Charley James-Martin MCIfA, AW Project Manager, and the site work was undertaken by Jennifer Muller MA ACIfA, Daniel Morgan MSc and Jerry Bond ACIfA. The survey was undertaken on the 2nd of May 2025.
- 1.1.4. All work conformed to the *Standard and Guidance for Archaeological Geophysical Survey* (CIfA 2020), and followed the methodology detailed by the Written Scheme of Investigation (WSI) (Muller 2025) prior to the survey. The WSI was approved by HDM-DR prior to the commencement of the survey.

2. Site Description

- 2.1.1. The proposed development is located on the north-western edge of the village of Llanarth (Figure 1). Set within a largely residential area, it is immediately south-west of St David's Church and graveyard. The site is centred on NGR SN 42163 57679.
- 2.1.2. The full area of proposed development is a sub-rectangular field on gently sloping ground down towards the southern end with established hedgerows

forming the outer boundaries.

- 2.1.3. The underlying geology consists of Mynydd Bach Formation – sandstone and mudstone – a sedimentary bedrock formed between 443.8 and 433.4 million years ago during the Silurian period (BGS 2025).

3. Archaeological and Historical Background

- 3.1.1. A review of historic mapping shows that no known features of archaeological interest have been sited within the development area. The first edition Ordnance Survey map shows the field was divided into two irregular fields when it was published in 1889 and remained as such at least into the 1960s.
- 3.1.2. The site lies within the core of the medieval settlement of Llanarth and sits between several historic assets, including the medieval parish church of St.David/St. Maelog (PRN 49330) and associated early medieval graveyard (PRN 49330), which lie 70m north-east of the proposed development area. This Grade II* Listed Building (LB9768) is noted as being a 14th – 15th century church that originally belonged to St Davids Cathedral. It was remodelled in 1871-2 by R.J. Withers (Cadw 1964). It was said to have been dedicated to the unknown St Fyllteg or Fylltug, but Browne Willis suggests a lost double dedication to St David and St Meilig.' It was listed as 'A fine medieval tower, good C19 detail to church and outstanding medieval font.' (ibid). Within the grounds of the churchyard was an Early Medieval inscribed stone (PRN 1843) of probable 9th -10th century date. This was later moved into the church.
- 3.1.3. Immediately to the west of the site is the Grade II Listed The Vicarage (LB 17719) and Coach-house and Stable Range at the Vicarage (LB 17720), both built in 1862 by R.J. Withers.

4. Aims and Objectives

- 4.1.1. The primary objective of the work was to locate and describe, by means of a geophysical survey, archaeological features that may be present within the development area.
- 4.1.2. The survey attempted to elucidate the presence/absence of archaeological material that might be affected by the proposed development scheme, in particular its character, distribution, extent and relative significance within the agreed areas.
- 4.1.3. The present report provides information which is sufficiently detailed to allow informed planning decisions to be made that can safeguard the archaeological resource. The information could be used to determine further archaeological investigation or appropriate mitigation strategies for any archaeological remains within the area to be implemented.
- 4.1.4. The survey was carried out in accordance with the approved Written Scheme of Investigation. All works were undertaken in accordance with the standard required by The Chartered Institute for Archaeologists' *Standard and Guidance for Archaeological Geophysical Survey* (2020) and current Health and Safety legislation.

5. Methodology

- 5.1.1. The site grid was located by an e-survey High Precision GNSS Receiver. All survey points were plotted onto an OS base map.
- 5.1.2. The survey was carried out using a Bartington Grad601-2 dual sensor fluxgate gradiometer. This instrument was chosen due to its proven efficient and effective method of locating sub-surface archaeological anomalies on

greenfield sites. The machine consists of two high stability fluxgate sensors 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 modified by heat, 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 enables the detection of material infilling subsurface archaeological features such as ditches, pits and structural remains. Data from this may be mapped at closely spaced regular intervals, to produce an image that may be interpreted to locate buried archaeological features (Aspinall et al 2011). Moreover, Fluxgate gradiometry has the advantage of being able to identify the broadest range of sub-surface archaeological feature types and can detect such anomalies at a range of soil depths (typically 0.3-1m).

- 5.1.3. 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 EAC Guidelines.
- 5.1.4. The survey mode was set to bi-directional (traverses walked alternately north-west/south-east). 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.
- 5.1.5. Following the completion of the detailed survey, processing and analysis took place using the Terra Surveyor v.3 software package. A composite of each detailed survey area was created and processed using Terra Surveyor v.3.0.37.1. Every effort has been made to reduce the instrument directional

sensitivity in the field rather than reliance on post data collection processing.

- 5.1.6. A limited number of standard operations can be carried out to process the data, including clipping and graduated shade. The data was analysed using a variety of parameters and styles and the most useful of these were saved as images and displayed using Adobe Illustrator software. The results have been presented at an appropriate scale tied to the Ordnance Survey National Grid. This was then used to produce interpretation figure.

6. Results

6.1. Introduction to the results

- 6.1.1. A number of response types with differing polarities were captured across the site. Polarity is the term used to describe the measurement of the magnetic response. Anomalies with positive polarity have values above 0nT, while anomalies with a negative polarity have values below 0nT. It is possible for anomalies to have values of both positive and negative polarity.
- 6.1.2. A number of terms are used below to describe the different types of anomalies recorded within the dataset. These are:
- Dipolar: these anomalies consist of a single positive anomaly with an associated negative response. There should be no separation between the two polarities of response. These anomalies will be created by a single feature and the interpretation will depend on the magnitude of the magnetic measurements.
 - Bipolar: these anomalies are comprised of both positive and negative responses. They can be made up of any number of positive and negative responses. The interpretation of the anomaly will depend on the magnitude of the magnetic field strength. A weak response may be caused

by a clay field drain while a strong response will probably be caused by a metallic service.

- Positive: These anomalies are usually related to backfilled cut features, where the fill material is magnetically enhanced compared to the surrounding matrix. These anomalies can be caused by features of archaeological origin, but they can also be caused by former field boundaries and ploughing. It is possible that some may be of natural origin.
- Positive anomaly with associated negative response: These responses are caused by a single feature. Such responses could be caused by the cables of modern services, although magnetically weaker responses could relate to earthworks and field boundaries.
- Negative: These anomalies are generally caused by raised earthen features where material has built up that has a lower magnetic magnitude relative to the background soil.
- Magnetic debris: this consists of numerous dipolar responses spread over an area. Weaker responses could represent general ground disturbance with stronger responses being more indicative of a spread of ferrous debris. Moderately strong responses may be the result of a spread of thermoremanent material such as bricks or ash.

6.2. Data and Limitations

- 6.2.1. The final processed data was good, but it was 'destriped' due to slightly increased bobbing of the sensors while walking throughout the largely uneven grounded field, particularly in the northern and eastern parts.
- 6.2.2. There were several small areas where data could not be collected. All these areas were due to poor walking conditions from significantly overgrown

ground that was unsuitable for traversing and was largely concentrated in the northeast and east areas of the field. The other area where data could not be collected was over a large, approximately 1m in diameter modern ditch/water channel cut into the field running from the southwest corner to the northeast corner, the purpose of which was to assist with the drainage of the field.

6.3. Interpretation

- 6.3.1. There is a regular spread of dipolar responses throughout much of the field (Figures 2 to 4). These were generally caused by ferrous materials or remanent magnetic materials such as brick and other CBM. Large concentrations of magnetic debris can be seen along the eastern field boundary; much of this is caused by the remnants of a modern post and wire fence. There are also two large areas of magnetic debris in the north-western corner of the field, likely caused by ferrous material.
- 6.3.2. Further magnetic debris and disturbance is present throughout the whole north-eastern quadrant of the field in the form of numerous dipolar responses (Figures 2 to 4). Given that this area produced both strong and weak responses it is likely that this was caused by a combination of ferrous debris as well as ground disturbance in the area. In addition to this, there was a modern concrete pad present on the surface, possibly the base of a shed or outbuilding. This type of structure would have certainly contributed to the magnetic signal that was present here.
- 6.3.3. There is a linear bipolar response running east to west across the central western side (Figures 2 to 4) of the field that turns directly north once reaching the centre of the field. This would indicate a possible modern buried service, though more substantial services usually give a much more definitive response.
- 6.3.4. The 1889, 1906 and 1953 Ordnance Survey maps all show that a field boundary

once ran from the centre of the western site boundary directly eastwards to the centre of the field. It then appears to turn 90° degrees and head directly north towards the northern site boundary. Though the linear anomaly is of a similar shape, it is located to the north of the former boundary. It should be noted that there is no sign of that former field boundary in the data or on the LiDAR hillshade model.

7. Discussion and conclusions

- 7.1.1. In May 2025, Archaeology Wales Ltd was commissioned by Wales and West Housing Association to undertake a geophysical survey on land to the rear of The Vicarage, Llanarth, Ceredigion, centred on NGR SN 42163 57679.
- 7.1.2. The survey covered the majority of the proposed development site, excluding small patches of land in the north-east, south-east and the drainage channel that ran south-east to north-west across of the site. The results indicate a lack of probable activity of archaeological origin, with the responses likely being associated with geology and modern ferrous disturbance.

8. Bibliography

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Schmidt, A., Linford, P., Linford, N., David, A., Gaffney, C., Sarris, A. and Fassbinder, J. 2016. *EAC Guidelines for the Use of Geophysics in Archaeology: Questions to Ask and Points to Consider*. Europae Archaeologiae Consilium Guidelines 1.

Maps Consulted

OS Six-inch to the Mile, Cardiganshire XXIV.NE, 1889.

OS six-inch to the Mile, Carmarthenshire XXIV.NE, 1906.

OS Six-inch to the Mile, Carmarthenshire XXIV.NE, 1953.



Figures

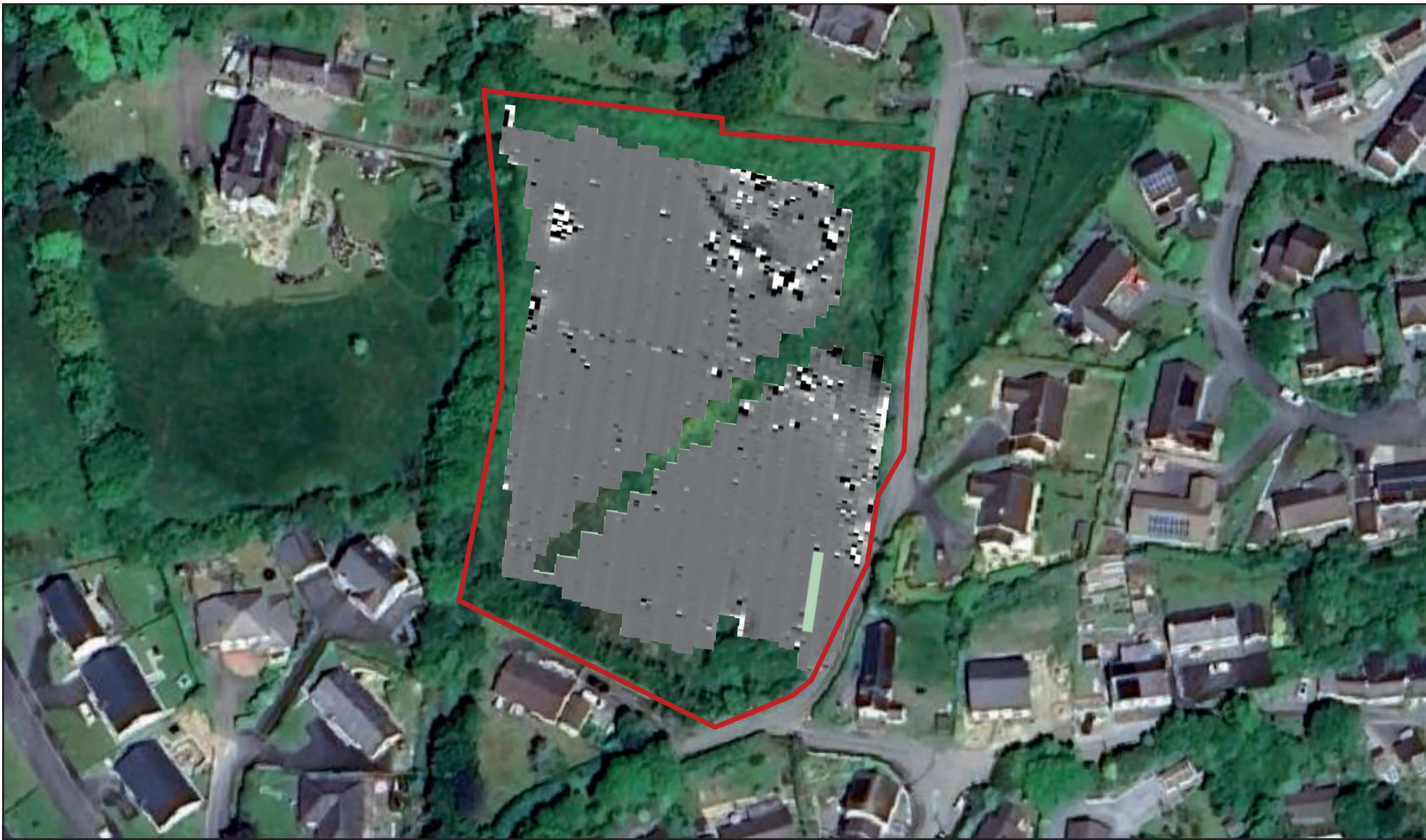
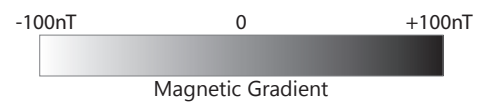


Figure 2. Raw magnetic gradiometric data

Google Earth (Airbus) Imagery 2024.



— Development Area



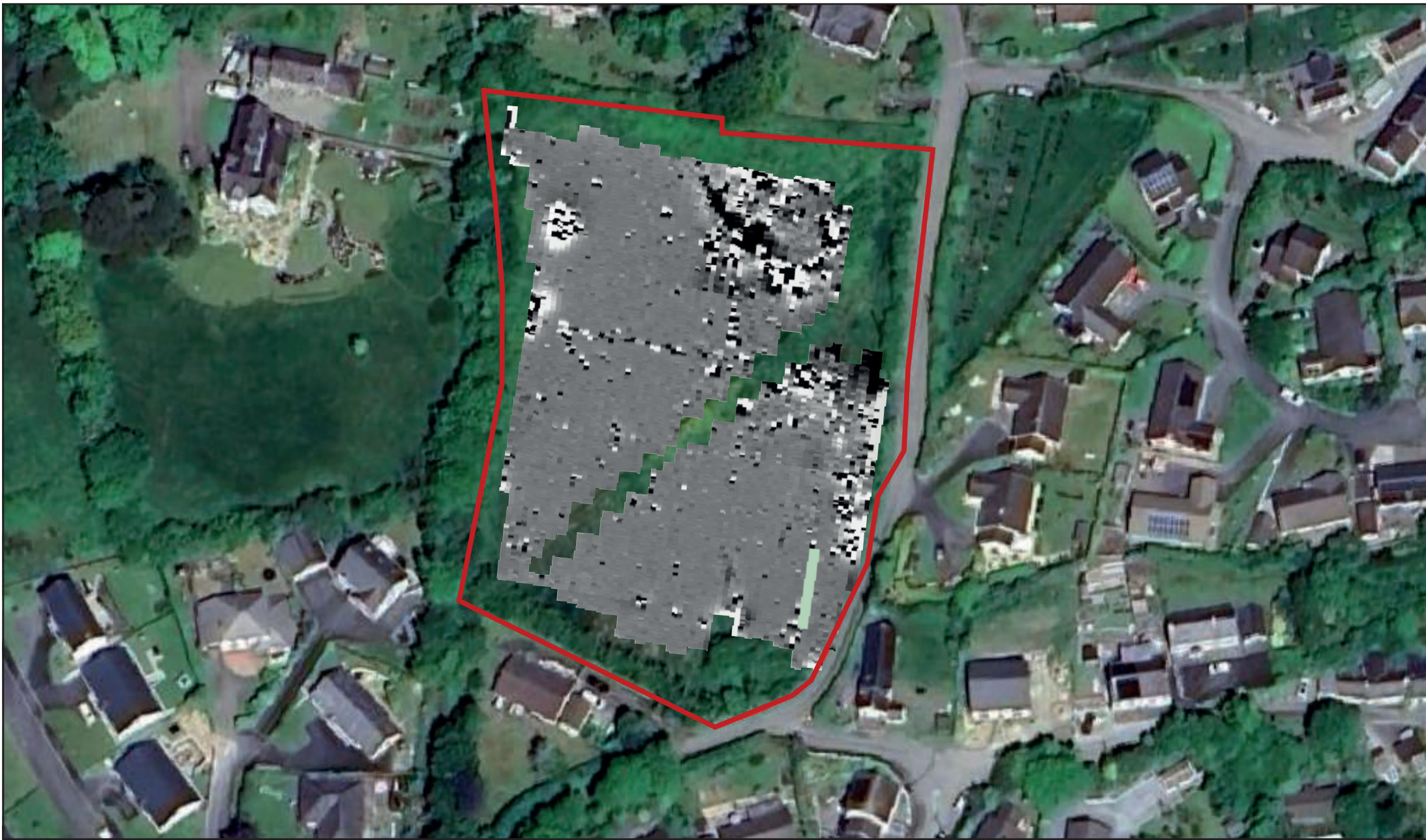


Figure 3. Processed magnetic gradiometry data presented at ± 10 nT

Google Earth (Airbus) Imagery 2024.

-10nT 0 +10nT



Magnetic Gradient

— Development Area



0 25m 50m



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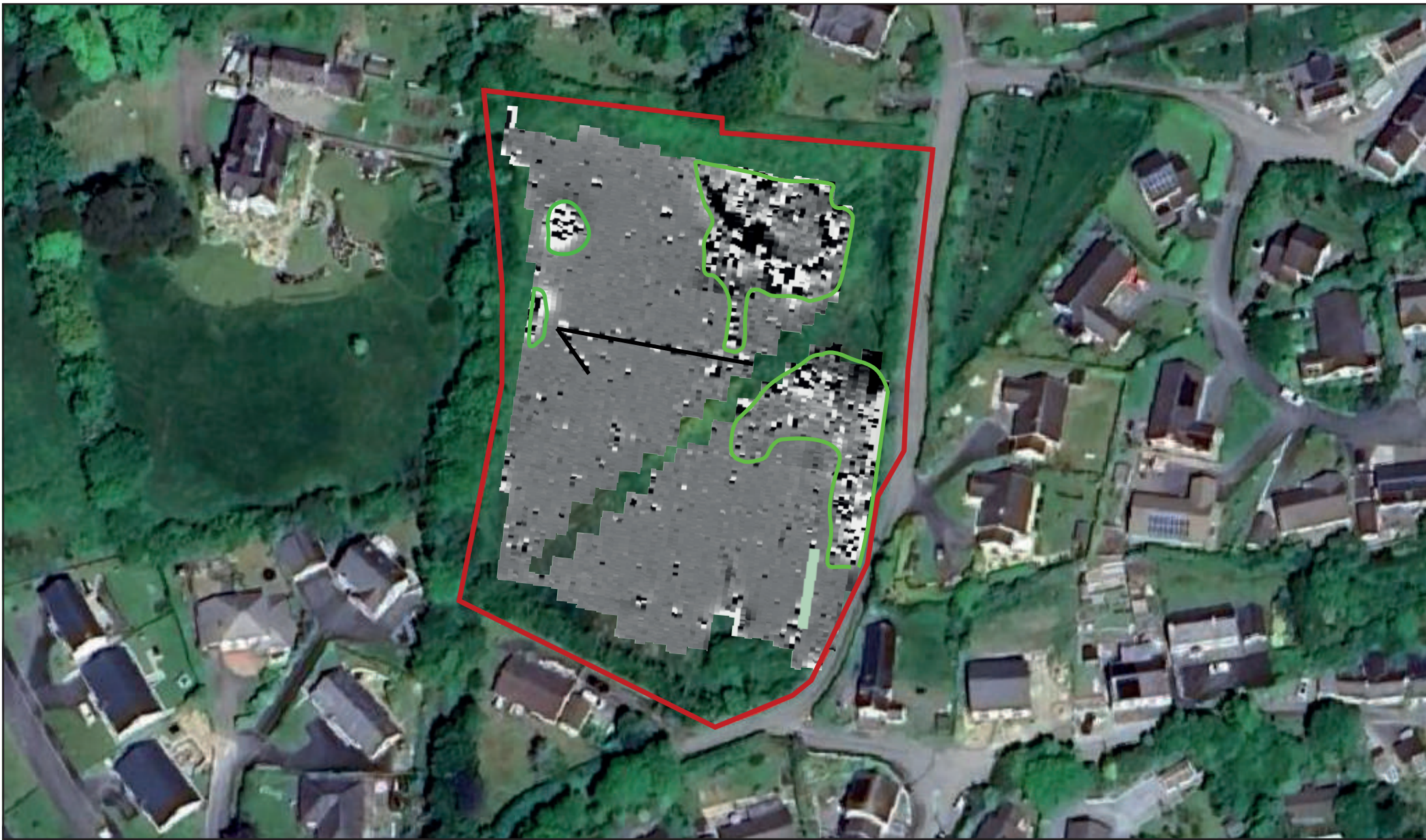
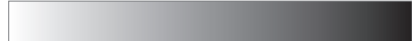


Figure 4. Processed magnetic gradiometry data presented at ± 10 nT with interpretation

Google Earth (Airbus) Imagery 2024.

-10nT 0 +10nT



Magnetic Gradient

- Development Area
- General/magnetic disturbance
- Buried services



0 25m 50m



ARCHAEOLOGY WALES



Appendix I: Data Management Plan

Section 1: Project Administration

Project ID / OASIS ID
2994
Project Name
Aylestone, Llanarth
Project Description
Geophysical survey on land to the rear of The Vicarage, Llanarth, Ceredigion centred on NGR SN 42163 57679
Project Funder / Grant reference
Wales and West Housing Association
Project Manager
Charley James-Martin – AW project manager charley@arch-wales.co.uk
Principal Investigator / Researcher
Archaeology Wales Ltd.
Data Contact Person
Rhiannon Philp, AW Post-excavation Manager rhiannon.philp@arch-wales.co.uk
Date DMP created
11/04/25
Date DMP last updated
13/05/25
Version
1
Related data management policies
This DMP is guided by the Project Brief, CifA Standards and guidance, trusted digital repository guidelines (RCAHMW) or other best practice guidance (see brief for details)

Section 2: Data Collection

What data will you collect or create?

The table below provides a summary of the data types, formats and estimated archive volume for data collected / created as part of this project. As the project progresses, more detail regarding files will be added to this DMP.

Type	Format	Estimated volume (Data Archived)
Text/documents	PDF (.pdf and .pdf/a)	1
Images	Photographs (.jpg)	19
GIS	Shapefiles (.shp plus associated files)	1
Geophysics data	.csv	TBC
	.xyz	TBC
	.tif	TBC
	.docx	TBC

How will the data be collected or created?

Data Standards / Methods

- Standard methods of data collection will be applied throughout the project, working to best practice guidance where applicable / available. In general, data acquisition standards are defined against RCAHMW Guidelines. Specific or additional guidance relevant to this project are listed below, and will
- Methods of collection are specified within the Project Design (see Archaeology Wales 2025) and will meet the requirement set out in the Project Brief, the organisation recording manual and relevant CIfA Standards and guidance.
- Where appropriate, project contributors external to the organisation will be required to include data standards, collection methodology and metadata with individual reports and data.
- Specific guidance:
 - Standard and Guidance for Geophysical Survey (CIfA, October 2020)

Data storage / file naming

- The data produced will be uploaded at regular intervals during the project as a way of backing up the information.
- The working project archive will be stored in a project specific folder on the internal organisational server. The internal organisation server is backed up to a cloud based storage system to maintain an up to date security copy of the organisation wide data.
- Project folders are named following established organisational procedures and the folder hierarchy and organisation devised will be understood by all members of staff involved in the project.

- Data collected will be downloaded and raw data will be stored in the appropriate folder.
- File naming conventions following established organisational procedures, based on RCAHMW file naming guidance, and include version control management.
- The data stored will be checked by the project manager regularly as a means of quality assurance.

Section 3: Documentation and metadata

What documentation and metadata will accompany the data?

- Data collected will include standard formats which maximise opportunities for use and reuse in the future (see Section 2, above).
- A RCAHMW metadata document will be included with the digital archive and include all data types included within the archive. A working copy will be kept on the organisational server in the Project Folder. A copy of the form containing HER required data will also be created.
- Data documentation will meet the requirement of the Project Brief, Museum Deposition Guidelines, Digital Repository Guidelines and the methodology described in the Project Design methodology.
- An archive catalogue documenting both physical and digital archive products will be maintained and submitted with both the Museum and Trusted Digital Repository

Section 4: Ethics and legal compliance

How will you manage any ethical, copyright and Intellectual Property Rights (IPR) issues?

- The project archive will include the names and contact details of individuals who intend to volunteer or participate in the excavation and post excavation stages. We have a GDPR compliant Privacy Policy which underpins the management of personal data; any personal data is managed through a secure cloud-based database and not retained on the project specific folders.
- Personal data will be removed from the archaeological project archive and permission to include individual's names in any reporting is gained prior to use.
- Copyright for all data collected by the project team belongs to the organisation, and formal permission to include data from external specialists and contractors is secured on the engagement of the specialist or contractor.
- Where formal permissions and/or license agreements are linked to data sharing, they will be included in the project documentation folders and will accompany the archaeological project archive.

Section 5: Data Security: Storage and Backup

How will the data be stored, accessed and backed up during the research?

- Organisational IT is managed by an external data management provider, who is also responsible for the management and verification of our daily back-ups and who supports access to security copies as needed
- Sufficient data storage space is available via the organisational server, which includes permissions-based access. The server is accessible by staff on and offsite through a secure log-in
- Off-site access to the project files on the organisation's server is provided to support back-up of raw data while fieldwork is ongoing. Where internet access for data back up is not possible, the raw data will be backed up to a separate media device (such as laptop and portable external hard drive).
- Project files will be shared with external specialists and contractors directly using the same system, with the wider project team gaining access to only the files needed using permissions-based access

Section 6: Selection and Preservation

Which data should be retained, shared, and/or preserved?

- The Selection Strategy and DMP will be reviewed and updated following the fieldwork. Updated documentation will be included in all reporting stages.
- Prior to deposition, the Selection Strategy and DMP will be updated and finalised in agreement with all project stakeholders (including the Local Planning Archaeologist, Client, Museum, RCAHMW).
- Selection will be informed by the Project Design, defined against the research aims, regional and national research frameworks, specialist advice and the significance of the project results.
- The project will be published as an online technical report (accessible via RCAHMW and as part of this the archive), with full access to research data.
- The data archive will be ordered, with files named and structured in a logical manner, and accompanied by relevant documentation and metadata, as outlined in Sections 2 and 3 of this DMP.
- Deselection will be undertaken automatically on any duplicate or unusable files, such as blurry or superfluous photographs.

What is the long-term preservation plan for the dataset?

- The digital archive will be deposited with the RCAHMW, which is working towards becoming a certified repository with Core Trust Seal.
- The archive will be prepared for deposition by the project team and the costs for the time needed for preparation, and the cost of deposition have been included in the project budget.

Have you contacted the data repository?

- RCAHMW have also been contacted as the intended repository for digital data.

Have the costs of archiving been fully considered?

- A costing estimate has been produced to allow for the preparation of the archive and has been included in the project budget.

Section 7: Data Sharing

How will you share the data and make it accessible?

- The digital archive repository and will be updated as the project progresses.
- The investigations are likely to result in a number of documents: Project Design and Final Report
- The final report is expected to be completed within three months of the completion of fieldwork.
- A final version of the project report will be supplied to the Historic Environment Record, and any data which they request can also be provided directly.
- The location (s) of the final Archaeological Archive will be included in the final report

Are any restrictions on data sharing required?

- A temporary embargo may be required on the sharing of the project results. If this is the case, specific details once agreed will be included in the updated version of this DMP and will be documented in the overarching Project Collection Metadata.
- Data specific requirements, ethical issues or embargos which are linked to particular data formats will be documented within the relevant metadata tables accompanying the project archive

Section 8: Responsibilities

Who will be responsible for implementing the data management plan?

- The Project Manager and Post Excavation Manager will be responsible for implementing the DMP, and ensuring it is reviewed and revised at each stage of the project.
- Data capture, metadata production and data quality is the responsibility of the Project Team, assured by the Project Manager and Post Excavation Manager.
- Storage and backup of data in the field is the responsibility of the field team.
- Once data is incorporated into the organisations project server, storage and backup is managed by an external company.
- Data archiving is undertaken by the project team under the guidance of the Post Excavation Manager, who is responsible for the transfer of the Archaeological Project Archive to the agreed repository.
- Details of the core project team can be found in the Project Design.



Appendix II: Written Scheme of Investigation

**Written Scheme of Investigation
for an Archaeological Geophysical Survey
at Land to the rear of The Vicarage, Llanarth, Ceredigion**

Project No: 2994

April 2025

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Summary

This Specification details the methodology for an archaeological geophysical survey on land at Land to the rear of The Vicarage, Llanarth, Ceredigion, centred on NGR SN 42163 57679. This Written Scheme of Investigation has been prepared by Archaeology Wales Ltd.

1. Introduction and Planning Background

- 1.1.1 This Written Scheme of Investigation has been prepared by Jennifer Muller ACIfA, Archaeology Wales Ltd (henceforth – AW) for Wales and West Housing Association (henceforth – ‘the Client’). It provides information on the methodology that will be employed by AW during a geophysical survey of the site.
- 1.1.2 The geophysical survey is being undertaken as part of a staged approach of archaeological investigations to provide Henneb Development Management – Dyfed region (henceforth HDM-DR) – archaeological advisors to the Planning Authority, Ceredigion County Council (henceforth – CCC) – with the information they are likely to request in respect of the proposed development that comprises plans for the construction of a residential development with associated works at Land to the rear of The Vicarage, Llanarth, Ceredigion (henceforth – the site), centred on NGR SN 42163 57679 (Figure 1).
- 1.1.3 The survey will provide a better understanding of the nature and potential archaeological resource of the area, the requirements for which are set out in Planning Policy Wales (Ed.12, February 2024), Section 6, and Technical Advice Note 24.
- 1.1.4 All work will conform to the *Standard and Guidance for Geophysical Survey* (CIIfA, October 2020) and be undertaken by suitably qualified staff to the highest professional standards.

2. Site Description

- 2.1.1 The proposed development located on the north-western edge of the village of Llanarth. Set within a largely residential area, it is immediately south-west of St David's Church and graveyard. The proposed development site is an irregular rectangular field on fairly level ground with established hedgerows forming the outer boundaries.
- 2.1.2 The underlying geology consists of Mynydd Bach Formation – sandstone and mudstone – a sedimentary bedrock formed between 443.8 and 433.4 million years ago during the Silurian period (BGS 2025).

3. Archaeological and Historical Background

- 3.1.1 Review of historic mapping shows that no known features of archaeological interest have been sited on this plot of land. The 1st edition OS map shows the field was divided into two irregular fields when it was published in 1889 and remained as such at least into the 1960s.
- 3.1.2 The site lies within the core of the medieval settlement of Llanarth and sits between several historic assets, including the medieval parish church of St.David/St. Maelog (PRN 49330) and associated early medieval graveyard (PRN 49330), which lie 70m north-east of the proposed development area. This Grade II* Listed Building (LB9768) is noted as being a 14th – 15th century church that originally belonged to St Davids Cathedral. It was remodelled in 1871-2 by R.J. Withers, who rebuilt the nave and chancel within the old walls, raising the roofs, with new windows and put the slated pyramid spire on the original tower (Cadw 1964). It was said to have been dedicated to the unknown St Fyllteg or Fylltug, but Browne Willis suggests a lost double dedication to St David and St Meilig.' It was listed as 'A fine medieval tower, good C19 detail

to church and outstanding medieval font.’ (ibid). Within the grounds of the churchyard was an Early Medieval inscribed stone (PRN 1843) of probable 9th-10th Century date. This was later moved into the church.

- 3.1.3 Immediately to the west of the site is the Grade II Listed The Vicarage (LB 17719) and Coach-house and Stable Range at the Vicarage (LB 17720), both built in 1862 by R.J. Withers.

4. Objectives

- 4.1.1 This WSI sets out the methodology to ensure that the geophysical survey will meet the standard required by The Chartered Institute for Archaeologist’s *Standard and Guidance for Archaeological Geophysical Survey* (2020).
- 4.1.2 The primary objective of the work will be to 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 within the agreed areas.
- 4.1.3 A report will be produced that will provide information which is sufficiently detailed to help inform a planning decision alongside other archaeological evaluative techniques (DBA, trial trenching, etc) as necessary. Together, the evaluative information could then be used to determine appropriate mitigation strategies for any archaeological remains within the area to be implemented prior to or during the proposed development if planning permission is given. The survey will also be carried out in accordance with the approved Specification.

5. Methodology for Geophysical Survey

- 5.1.1 The area to be surveyed will include all of the accessible development area. On-site adjustments may be required to avoid areas of magnetic interference or inaccessibility, for example: wire fencing, areas of dense undergrowth and steeper slopes which may prove unsuitable for survey.
- 5.1.2 The site and all survey points will be located by GPS and plotted onto an O.S. base map. 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.
- 5.1.3 Relatively level fields of low pasture provide good locations for this type of survey. Areas of significant slopes would preclude safe surveying, as would areas of dense vegetation.
- 5.1.4 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. All data will be downloaded while in the field onto a laptop computer.

5.2. Data processing and presentation

- 5.2.1 Following completion of the detailed survey, a composite of the survey area will be created and processed using the software package Terrasurveyor v.3. After downloading, the results will be plotted in 2D.
- 5.2.2 The most typical method of visualizing 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 both extremes of the data range. A variety of processing tools (including destriping and possibly despiking) will be used to enhance any potential archaeology. The mean level of each traverse of data will be reduced to zero and all grids matched so that there will be no differences between background levels. The data will be analysed using a variety of parameters and styles and the most useful of these will be saved as JPEG/TIFF images and displayed using Adobe Illustrator software.
- 5.2.3 The final results will be presented at an appropriate scale tied to the Ordnance Survey National Grid. A level of interpretation of these results will also be displayed.

5.3. Monitoring

- 5.3.1 The client and the archaeological curator 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.
- 5.3.2 Any changes to this Method Statement that AW may wish to make after approval will be communicated to the archaeological curator for approval.

6. Post-Fieldwork Programme

6.1.1 The post-fieldwork programme is a critical phase that transforms the raw survey data into meaningful archaeological information:

- 1) Data processing and analysis: The collected data undergoes rigorous processing and analysis to identify potential archaeological features. This involves advanced filtering techniques to remove noise and enhance subtle signals and the application of various visualisation methods to highlight different aspects of the data.
- 2) Report preparation: A comprehensive report will be produced, interpreting the geophysical anomalies in terms of their likely archaeological origin. This report will include:
 - A concise, non-technical summary of the results
 - Introductory statements and project background
 - Aims and purposes of the survey
 - Detailed methodology description
 - Processed survey results with accompanying explanations
 - Written interpretation of results with illustrated site plans
 - Discussion of the local and regional archaeological context
 - Conclusions and recommendations for further investigation if appropriate
 - Index to and location of the digital archive
 - Relevant bibliography
- 3) Client consultation: Draft reports will be submitted to the Client and Heneb Development Management – Dyfed region (henceforth HDM-DR) for review

and approval. Any necessary revisions or clarifications will be made based on their feedback.

- 6.1.2 The report and all relevant information will be submitted to the relevant Historical Environment Record following the guidelines and procedures laid out in the Guidance for the Submission of Data to the Welsh Historic Environment Records (Heneb 2024).

7. Site Archive

- 7.1.1 An ordered and integrated site 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), EAC Guidelines for the Use of Geophysics in Archaeology (Schmidt et al., 2015) and the National Monuments Record (Wales) agreed structure and be deposited with the National Monuments Records, held and maintained by the RCAHMW, Aberystwyth, upon completion of the project.
- 7.1.2 This archive will include all raw data, processed data, field notes, and other relevant documentation. Copies of all reports, the digital archive and an archive index will be deposited with the National Monuments Record, RCAHMW, and will be uploaded to the ADS.
- 7.1.3 Although there may be a period during which client confidentiality will need to be maintained, copies of all reports and the final archive will be deposited no later than six months after completion of the work.
- 7.1.4 Wherever the archive is deposited, this information will be relayed to the HER. A summary of the contents of the archive will be supplied to the HER.

8. Staff and Timetable

- 8.1.1 The geophysical survey will be carried out by AW. The overall management of the project will be carried out by Charley James-Martin MCIfA, AW Project Manager.
- 8.1.2 The work will be undertaken at the convenience of the client. HDM-DR will be notified once a start date has been agreed. Initial data plots may be available during the survey work, and a draft report will be issued within five to ten working days from the completion of the survey work.

9. Health and Safety

9.1. Risk Assessment

- 9.1.1 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 1999. A copy of the risk assessment will be kept on site and be available for inspection on request.
- 9.1.2 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.

9.2. Other Guidelines

- 9.2.1 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).

10. Insurance

- 10.1.1 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.

11. Quality Control

11.1. Professional Standards

- 11.1.1 AW maintains high standards of quality assurance in all its operations:
- 11.1.2 The geophysical survey will comply with guidelines outlined by English Heritage (now Historic England) (David et al. 2008), the Chartered Institute for Archaeologists (CIfA 2020) and Europae Archaeologiae Consilium (EAC) (Schmidt et al. 2016).
- 11.1.3 Work is carried out in accordance with BS 5930:2015+A1:2020 for site investigation.
- 11.1.4 Daily records will be maintained throughout the project for quality audit purposes, ensuring that all procedures remain effective and appropriate for the work being conducted.

11.2. Project Tracking

- 11.2.1 The designated AW manager will monitor all projects in order to ensure that agreed targets are met without reduction in quality of service.

12. Arbitration

- 12.1.1 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.

13. References

Chartered Institute for Archaeologists. 2014. *Standards and guidance for the collection, documentation, conservation, and research of archaeological materials*.

Chartered Institute for Archaeologists. 2014. *Standards and guidance for the collection, compilation, transfer and deposition of archaeological archives*.

Chartered Institute for Archaeologists. 2020. *Standards and guidance for archaeological geophysical surveys*.

James-Martin, Charley. 2022. *Written Scheme of Investigation for Geophysical Survey: Land North of Aylestone, Llanarth, Ceredigion*.

Schmidt AR, Linford P, Linford N, David A, Gaffney CF, Sarris A and Fassbinder J. 2015. *EAC Guidelines for the use of Geophysics in Archaeology: Questions to Ask and Points to Consider. EAC Guidelines 2*. Namur, Belgium: Europae Archaeologia Consilium (EAC), Association Internationale sans But Lucratif (AISBL). ISBN 978-963-9911-73-4. 135p.

Websites Consulted:

British Geological Survey, Geology viewer: <https://www.bgs.ac.uk/> - Accessed 11/04/25.

Maps Consulted:

Map of the parish of Llanarth in the County of Cardigan, 1839.

National Grid maps, 1944-1974: SN45NW – A. Surveyed / Revised: Pre-1930 to 1963, Published: 1964.

OS Six-inch England and Wales, 1842-1952: Cardiganshire Sheet XXIV.NE. Surveyed: 1887, Published: 1889.

Figures



Figure 1. Location of proposed development



0 250m 500m



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