

## Geophysical Survey:

### Ty'n Mynydd, Anglesey

April 2023



Report No. 2171

By

Jennifer Muller



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Report No.2171

Version	Date	Sections Revised	Prepared/Revised by	Checked & Authorised by
1	13.3.23	Original	Jennifer Muller	Irene Garcia Rovira MCIfA
2	28.4.23	Results and figures	Jennifer Muller	Rhiannon Philp BSc MA PhD

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#### Archaeology Wales Limited

Main Office, Unit D11.6 Treforest Industrial Estate

Pontypridd - CF37 5UR

Tel: +44 (0) 1686 440371

Email: [admin@arch-wales.co.uk](mailto:admin@arch-wales.co.uk)

Web: [arch-wales.co.uk](http://arch-wales.co.uk)



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## **Appendix 1** Written Scheme of Investigation



## Summary

*This report results from work carried out by Archaeology Wales Ltd (AW) for Natural Resources Wales (NRW) following recommendations made by Gwynedd Archaeological Planning Services (GAPS). It draws on the results of an investigative geophysical survey undertaken in association with the proposed development woodland creation scheme at Penmynydd Road, Four Crosses, Menai Bridge, Isle of Anglesey LL59 5RP (NGR SH 54169 73221).*

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

*The survey identified anomalies characteristic of archaeological features in six of the seven fields (Fields 1, 2, 3, 4, 6 and 7). Most of these anomalies are all representative of field boundaries of different construction and likely different time periods, most of which pre-date the 1846 Tithe map. In two of the fields (Field 1 and 5), remnants of historic field boundaries present in the Tithe map and 1st edition OS map were visible. It is possible that the positive, cut linears (F1, F3, possibly F4, F9, and F16) are older than the more distinct boundaries comprised of the negative response with accompanying positive responses. There is a good possibility that socket of the 'Standing Stone, Possible Site of, Fron' (GAT4309) is still intact in Field 4 (F12).*

*The work was carried out to the Standard and Guidance set out by the Chartered Institute for Archaeologists for archaeological geophysical survey (ClfA 2015) 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'r gwaith a wnaed gan Archaeology Wales Cyf (AW) ar gyfer Cyfoeth Naturiol Cymru yn dilyn argymhellion a wnaed gan Wasanaethau Cynllunio Archeolegol Gwynedd. Mae'n tynnu ar ganlyniadau arolwg geoffisegol archwiliol mewn cysylltiad â datblygiad y cynllun creu coetir arfaethedig yn Ffordd Penmynydd, Four Crosses, Porthaethwy, Ynys Môn LL59 5RP.

Amcan yr arolwg geoffisegol oedd pennu natur a hyd a lled unrhyw nodweddion archeolegol claddedig o fewn yr ardaloedd datblygu posibl yn y dyfodol. Gwnaed y gwaith gan ddefnyddio gradiomedr fluxgate deuol Grad601 Bartington.

Nododd yr arolwg anomaleddau sy'n nodweddiadol o nodweddion archeolegol o fewn chwech o'r saith cae (Caeau 1, 2, 3, 4, 6 a 7). Mae'r rhan fwyaf o'r anomaleddau oll yn cynrychioli ffiniau caeau wedi'u hadeiladu mewn ffyrdd gwahanol ac o gyfnodau gwahanol mae'n debygol, y mae'r rhan fwyaf ohonynt yn dyddio o gyfnod cyn argraffiad 1af y map OS. O fewn dau o'r caeau (Caeau 1 a 5), roedd gweddillion ffiniau caeau hanesyddol sy'n bresennol yn argraffiad 1af y map OS i'w gweld. Mae'n bosibl bod y llinellau cadarnhaol sydd wedi'u torri (F1, F3, a F4, F9 o bosibl, a F16) yn hŷn na'r ffiniau mwy amlwg sy'n cynnwys yr ymateb negyddol ynghyd â'r ymatebion cadarnhaol. Mae posibilrwydd da bod soced 'Maen Hir, Safle Posibl, Fron' (GAT4309) yn dal wedi goroesi yng Nghae 4 (F12).

Gwnaed y gwaith yn unol â'r Safonau a'r Canllawiau a nodwyd gan Sefydliad Siartredig yr Archeolegwyr ar gyfer arolwg geoffisegol archeolegol (Sefydliad Siartredig yr Archeolegwyr 2015) ac fe'i cwblhawyd yn unol â Chanllawiau Cyngor Archeolegol Ewrop ar y Defnydd o Geoffiseg mewn Archeoleg (Historic England 2016).

## **1. Introduction**

- 1.1.1 From 27<sup>th</sup> of February to the 3<sup>rd</sup> of March 2023, Archaeology Wales Ltd (AW) carried out a geophysical survey at Penmynydd Road, Four Crosses, Menai Bridge, Isle of Anglesey LL59 5RP (NGR SH 54169 73221) (Figures 1 and 2) (henceforth "the site").
- 1.1.2 The survey was undertaken in advance of a woodland creation scheme and following consultation with Gwynedd Archaeological Planning Services (GAPS) in their capacity as archaeological advisors to the Isle of Anglesey County Council (IACC).
- 1.1.3 A Written Scheme of Investigation (WSI) was prepared by Irene Garcia Rovira, Project Manager, Archaeology Wales Ltd (henceforth - AW), at the request of NRW. It provided information on the methodology to be employed during a geophysical survey of the site. The WSI was submitted to, and approved, by GAPS prior to the survey being undertaken.
- 1.1.4 The work was managed by Irene Garcia Rovira, AW Project Manager, and the site work was undertaken by Jennifer Muller MA, Daniel Morgan MA and Rachel Willmot.

## **2. Site description and geology**

- 2.1.1 The site occupies an area of 10.93 hectares over seven fields. It is located to the northwest of Menai Bridge, adjacent to the Pili Palas visitor attraction. Penmynydd road bounds the proposed site to the southwest, whilst all other boundaries are adjacent to open fields (Figure 2).
- 2.1.2 The underlying geology is composed of schist and glaucophane belonging to the Central Anglesey Shear Zone and Berw Shear Zone formed during the Ediacaran and Cambrian periods. The superficial soils are defined by

Till, Devensian – Diamicton formed during the Quaternary Period (BGS 2023).

### **3. Archaeological Background**

- 3.1.1 The site has been subjected to a Desk-Based Assessment (see GAT 2022 – Report 1952). The site is considered to have been a local agrarian landscape used since prehistory and through to post-medieval times.
- 3.1.2 A HER record, PRN 4309, is located within the proposed development area within Field 4. However, it is to be noted that it is the 'site' of a standing stone which is no longer in place. Prehistoric activity in the wider area exists largely in the form of funerary and settlement activity. Another two features were marked during the walkover survey including a hollow, a possible field boundary and plough marks.
- 3.1.3 There is no evidence for later prehistoric or medieval activity within the site and its surroundings, although it is adjacent to the historic route between Menai Bridge and Llangefni.

### **4. Aims and Objectives**

- 4.1.1 The primary objective of the work has been to locate and describe archaeological features that may be present within the survey area. The work attempts to elucidate the presence or absence of archaeological material that might be affected by the scheme, its character, distribution, extent and relative significance, providing sub-surface data to inform any future on-site works.
- 4.1.2 It is the aim of this report to provide information which is sufficiently detailed to allow the archaeological resource to be better understood. The information could then be used to help inform further archaeological work undertaken in association with the proposed development.

## **5. Methodology**

### **5.1 Geophysical Survey**

- 5.1.1 The survey was carried out using a Bartington Grad601-2 dual sensor fluxgate gradiometer. This instrument has been 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 sub-surface 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 (Clark 1997; Aspinall *et al* 2011).
- 5.1.2 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 The site was located by GPS. All survey points were located with the GPS and plotted onto an O.S. base map. Detailed survey was carried out in grids of 30m x 30m along zig-zag and parallel 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 northeast/southwest). 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.

## **5.2 Data Processing and Presentation**

- 5.2.1 Following the completion of the detailed survey, processing and analysis took place using the TerraSurveyor v.3 software package.
- 5.2.2 A composite of each detailed survey area has been created and processed using TerraSurveyor v.3.0.37.1. The report includes raw and unclipped data in greyscale. Every effort has been made to reduce the instrument directional sensitivity in the field rather than reliance on post data-collection processing.
- 5.2.3 The final results have been presented at an appropriate scale tied to the British National Grid.
- 5.2.4 The most typical method of visualising the data is as a greyscale image. In a greyscale plot, each data point is represented as a shade of grey, from black to white at extreme of the data range. A limited number of standard operations can be carried out to process the data, including clipping, destripping and graduated shade. The data was 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. The results of the survey were then overlaid onto a digital map of the study area. This was then used to produce interpretation figures.
- 5.2.5 All works were undertaken in accordance with the standard required by The Chartered Institute for Archaeologist's Standard and Guidance for Archaeological Geophysical Survey (update 2020) and current Health and Safety legislation.

## **6. Geophysics results**

### **6.1 Limitations**

- 6.1.1 The geophysical survey was undertaken during a period of cold, dry weather.
- 6.1.2 Certain areas were avoided, including Field 1: areas of deep mud due to tracker tyres and the immediate area around two electrical poles; Field 5: an area heavy with reeds and a pond; Field 7: a large area of boulders with a well and an area of unkempt grassland within which uneven ground was not clearly visible. In these limited situations, the 'dummy log' key was used, and no data collected.

### **6.2 Results (Figures 3 - 13)**

- 6.2.1 The seven fields comprising the survey are designated as Fields 1 - 7. The survey identified anomalies of probable archaeological origin in six of the fields (Fields 1, 2, 3, 4, 6 and 7) and possible archaeological origin in four of the fields (Fields 1, 3, 6 and 7). The probable archaeological features are likely field boundaries that pre-date the Tithe Map of 1846. Each anomaly will be described below in the order they were surveyed (starting with Field 1).
- 6.2.2 The anomalies are annotated on the fields' individual figures and are marked red where no previous boundary has been recorded, or green where they correspond with a historic boundary. Possible archaeological anomalies are marked in orange.
- 6.2.3 The survey recorded large spreads of magnetic debris throughout the site. This is comprised of many dipolar anomalies, which are positive points with a negative response, or vice versa. The survey also recorded large areas of natural diffuse depressions, which can be a result of underground depressions where water has created natural channels, or where rocks have

been displaced, allowing for a larger build-up of magnetic soils (marked in blue).

- 6.2.4 Other, single dipolar anomalies recorded throughout the survey may represent either isolated ferrous detritus, or thermoremanent magnetic materials, such as fragments of burnt stone, brick or tile.
- 6.2.5 Multiple positive points are also present throughout the survey. These represent natural and/or probably animal-made holes. Frequent animal burrows of varying sizes were noted by the surveyors while in the field.

#### **Field 1 (Figure 5)**

- 6.2.6 Anomalies characteristic of archaeological features, possibly a ditch or gully, as well as different types of field boundaries, were detected in several locations within Field 1. One positive linear (F1), representative of an infilled, cut feature, runs northwest-southeast for approximately 25m, and aligns with the southern part of the former field boundary present on the Ordnance Survey map (OS 1901). The rest of this field boundary is not visible, though a diffuse positive linear and loosely linear grouping of dipoles corresponds with the former boundary continuing to the southwest then turning northwest (F2). The discrepancies between the make-up of the linears forming the former boundary may suggest that it was created at different times and/or by different methods. Another weak positive linear similar in width and response to F1 lies to its west, but curves towards the northeast (F3). It measures about 19m long.
- 6.2.7 At the southeast end of the field, one slightly diffuse, positive curvilinear curves towards the east and towards another possible linear that runs northwest-southeast (F4). The second part of this group looks to be made up of a series of holes and has an accompanying negative response. It is much stronger response indicates this is likely a deeper depression in the



ground with stronger magnetic material, though it is unclear whether this would be human-made or natural.

6.2.8 At the southwest end of Field 1 is a straight negative linear about 50m long (F5). It runs east-northeast/west-southwest, and on its south side is a diffuse, positive linear. The strong negative response indicates something lower in magnetic susceptibility than the soil around it and could be anything from a buried wall to a non-magnetic cable.

6.2.9 At the north edge of the survey, within the northeast end of the field, there is a cluster of strong magnetic responses, both positive and negative (F6). Specifically, there are three positive points that are all of the same strength of response in a row within this cluster. Because the feature is not entirely visible due to its location within the survey, it is difficult to interpret. Therefore, this would be considered possible archaeology.

## **Field 2 (Figure 6)**

6.2.10 Field 2 contains two linear anomalies of an archaeological nature (F7 and F8). Both run northeast-southwest, though at slightly different angles, with the one to the south orientated slightly more west-southwest/east-northeast (F8). They appear to join at their western end. The linear on the northern side (F7), running the width of the field at 66m long, has a negative response with an accompanying positive response on either side; the linear on the southern side (F8), also running the width of the field and is 70m long, has a strong negative response with a positive response on its north side. These differences in their responses show different makeup and possibly different function.

6.2.11 F8 is similar to F5 in Field 1. The two linears are parallel to each other; in both cases, their positive responses are on the downhill side, where soils could have built up naturally over time, forming the higher magnetic response.

6.2.12 The linear F7 is more defined and is more likely an old field boundary. The weak negative response between the two weak positive responses could be the remains of a built-up bank which was truncated when the boundary was removed. In this area, field boundaries are often built-up banks, sometimes incorporating stone walls. They can have slight ditches on either side from the building up of the bank, and that would explain the positive response on either side.

6.2.13 In the bottom, southeast corner of the field, there is a small fragment of what looks like another field boundary similar in make-up to F7 (F9).

### **Field 3 (Figure 7)**

6.2.14 Field 3 also contains two linear features of an archaeological nature (F10 and F11). F10 is similar in its constitution to F7 in Field 2; it is a weak negative linear enclosed by weak positive linears on either side. It runs north-northwest/south-southeast from the top of the field for approximately 29m, where it then stops about 3/4 from the bottom of the field.

6.2.15 F11 is a slightly stronger positive linear, more likely a cut feature with a slight negative response on its north side, which could just be the remains of spoil when the ditch was dug. Starting beyond the west end of the field, it runs northeast-southwest for about 24m, then seems to fade as it runs towards F8. Just before it reaches F10 it appears to form some kind of endpoint with a slight negative point surrounded by a positive curvilinear.

6.2.16 Running somewhat parallel to F10 immediately north of F11, is another strongly positive linear anomaly, which seems to be made up of several points close together (F12). It is possible these are connected to F10, as F12 starts where F10 stops.

6.2.17 At the southern end of the survey is another positive linear similar to F11 (F13). However, it is not as distinct as F11, and may be a natural feature as it is slightly more diffuse and fades as it moves to the southwest.

- 6.2.18 There are two sub-circular anomalies to the northeast of F10 (F14 and F15). Both are faint but distinct curvilinears. F14 has a negative response, indicating that it is less magnetic than the soil around it and could be slightly raised. F15 has a positive response with a slight negative response on either side. This could indicate a dug gully.
- 6.2.19 Lastly, at the centre of the field, just to the east of F10, is a diffuse positive area bordered to the east by a negative area. This could be a natural depression in the ground, but due to the fact it is adjacent to F10, it is also possible that it could be a human-made feature.

#### **Field 4 (Figure 8)**

- 6.2.20 Field 4 contains two more probable field boundaries, including one that is in line with, and appears to be a continuation of, F10 from Field 3 (F17). F17 runs northwest-southeast, running for 46m before it intersects with another negative linear (F18) enclosed by two positive linears running northeast-southwest from F17 for about 33m. It appears that F17 continues northwards beyond its intersection with F18 for possibly another 26m. The response is very faint.
- 6.2.21 F18 fades out before the end of the field to the east, and there is no sign of it in Field 1, which is adjacent to the east side. It does continue to the southwest from F17, though there is no sign of it in Field 7, which lies adjacent on the west side.
- 6.2.22 The Gwynedd Archaeological Trust (GAT) HER lists a 'Standing Stone, Possible Site of, Fron' (GAT4309) as located in the northwest part of Field 4. This looks to be referenced from OS map Anglesey Sheet XIX.NE published in 1920, which lists a stone present in the field. Though the stone has never been seen, according to records on the HER, there is a circular negative anomaly, about 3m in diameter, with a slightly positive centre (F19) very close to where the stone is listed on the historic map. Standing stones,

whether for cattle or for any other purpose, are set into the ground. This circular area of negative magnetism could represent the build-up of earth that would have been packed around it to support it remaining upright.

### **Field 5 (Figure 9)**

- 6.2.23 Field 5 contains more natural, diffuse magnetic variations than the other fields (F20). This could be due to natural shallow depressions created where water has gathered regularly over time, affecting the bedrock. The field was visibly waterlogged at its central eastern side, evidenced by both a large area of reeds and a pond.
- 6.2.24 According to historic maps, Field 5 was once three different fields. One of those previous boundaries, also present in the 1846 Tithe map, was visible in the data collected (F21). F21 runs for at least 63m in a northwest-southeast direction. Its response is very faint but consists of a negative linear enclosed by positive linears.
- 6.2.25 At the southern end of F21 is an irregular-shaped dipole, which looks like the result of lightning-induced remanence (LIRM). Usually, lightning strikes leave a footprint shaped like a star. In this case, there is only one arm of a star, but the shape is quite definitive. In the historic maps, F21 would have met another boundary going to the west at this point. It is possible that it was once hit by lightning, which will create a permanent magnetisation of the soils and rocks immediately around the spot where it hit (Fassbinder 2015, 4).

### **Field 6 (Figure 10)**

- 6.2.26 Field 6 contains one anomaly of an archaeological nature (F14). Feature F22 is another probable field boundary, comprising the weak negative linear enclosed by two weak positive linears. This particular linear is slightly more

defined than others. It runs the width of Field 6, for at least 93m in a northeast-southwest direction. Field 3, which is adjacent to Field 6 on the east side, does contain a linear boundary running in the same direction (F11); however, it is of different construction and also occurs slightly further to the north, so they are likely unrelated.

- 6.2.27 There is one anomaly that is a possible archaeological feature. It sits at the southeast end and is visualised as at least four dipoles close together, with the highest resistance at the centre (F23). The response measures about 3.5m x 4m. This could simply be a place where there are a few pieces of ferrous material. However, it is a specific grouping of dipoles which is not that common unless it is a larger spread.

### **Field 7 (Figure 11)**

- 6.2.28 Field 7 is characterised by large, sub-rectangular areas of positive magnetisation (F24), which vary significantly in their strength of response. Some are highly magnetic, with a strong accompanying negative response. Others are weaker features, with a weak accompanying negative response. There are several options for their formation. These are possibly natural occurrences, due to glacial drift depositing Till (which can be made up of igneous and metamorphic boulders, gravels, clay and sand) that is under but near the surface (Gay, Jr. 2004). One other possibility is that these areas were quarried in the past to extract stone. The dug areas would have filled up with magnetic soils over time, resulting in positive zones. However, the strength of some of the responses seems too strong to account for simply infilled, cut pits. It is possible that the anomalies are the result of remnant magnetism, which would be caused by extreme heat (above Curie point) (Conyers, 2018). The results of these anomalies remain inconclusive. Unfortunately, their response masks any subtler features that might lie within their proximity.

- 6.2.29 At the northwest edge of the field are two linears running in a v-shape. The bottom linear is a very faint positive and negative response running together (similar to F5 and F8 but much subtler) west-southwest/east-northeast, and is about 11m long; the top linear, however, has a very strong magnetic positive response (F25) with a diffuse negative response on its north side and southwest side. It runs northwest-southeast for about 23m. The two are not necessarily connected.
- 6.2.30 There is one linear anomaly of a probable archaeological nature (F26) in Field 7. This is a weakly positive linear, representing an infilled, cut feature, running northwest-southeast from the southern part of the field for at least 62m.

## **7. Discussion and conclusions**

- 7.1.1 The works carried out by Archaeology Wales in from 27<sup>th</sup> February – 3<sup>rd</sup> March focussed on surveying 10.93 hectares of land located on the east side of Penmynydd Road, adjacent to Pili Palas at Four Crosses, Menai Bridge. The aim of the survey was to establish whether any features of archaeological potential were present within the site.
- 7.1.2 The survey identified anomalies characteristic of archaeological features in six of the seven fields (Fields 1, 2, 3, 4, 6 and 7). Most of these anomalies are all representative of field boundaries of different construction and likely different time periods, most of which pre-date the 1846 Tithe map. In two of the fields (Field 1 and 5), remnants of historic field boundaries present in the both the Tithe map and 1st edition OS map were visible.
- 7.1.3 It is possible that the positive, cut linears (F1, F3, possibly F4, F11, and F26) are older than the more distinct boundaries comprised of the negative response with accompanying positive responses.
- 7.1.4 There is a good possibility that the socket site of the missing standing stone (GAT4309) is still intact in Field 4 (F19).

- 7.1.5 Features of possible archaeological origin occurred in four of the fields (Fields 1, 3, 6 and 7), and were particularly abundant in Field 3.
- 7.1.6 Further archaeological investigations in the form of intrusive initiatives – trenching evaluation – are recommended in these areas to examine the presence/absence and nature of remains that might exist within this site.

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### **Maps consulted**

Llandesilio parish in the County of Anglesey 1846

OS County Series 1889 1:2500

OS County Series 1900 1:2500

OS County Series 1914 1:2500

OS map 1967-70 1:2500



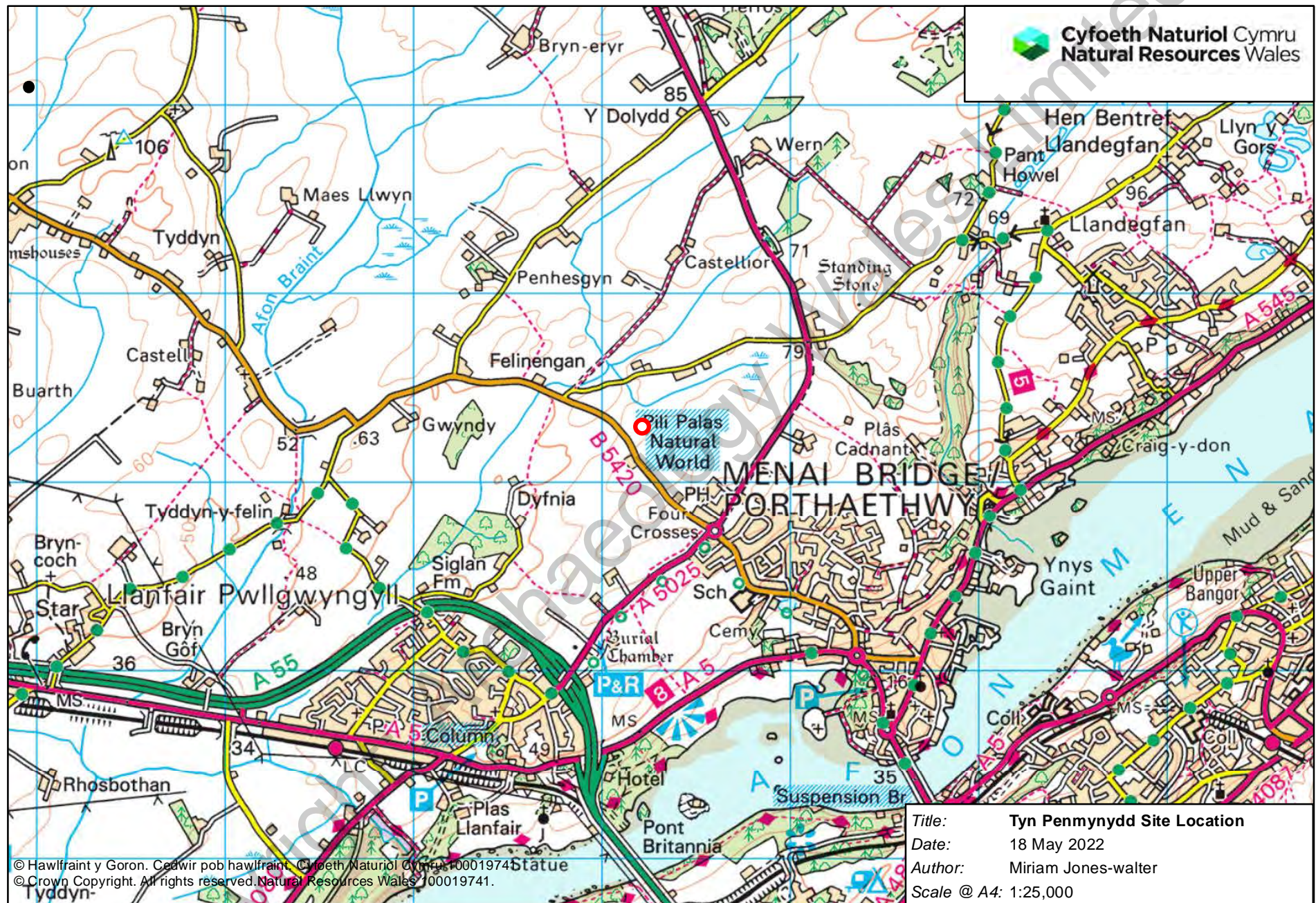


Figure 1. Site Location





Cyfoeth Naturiol Cymru  
Natural Resources Wales

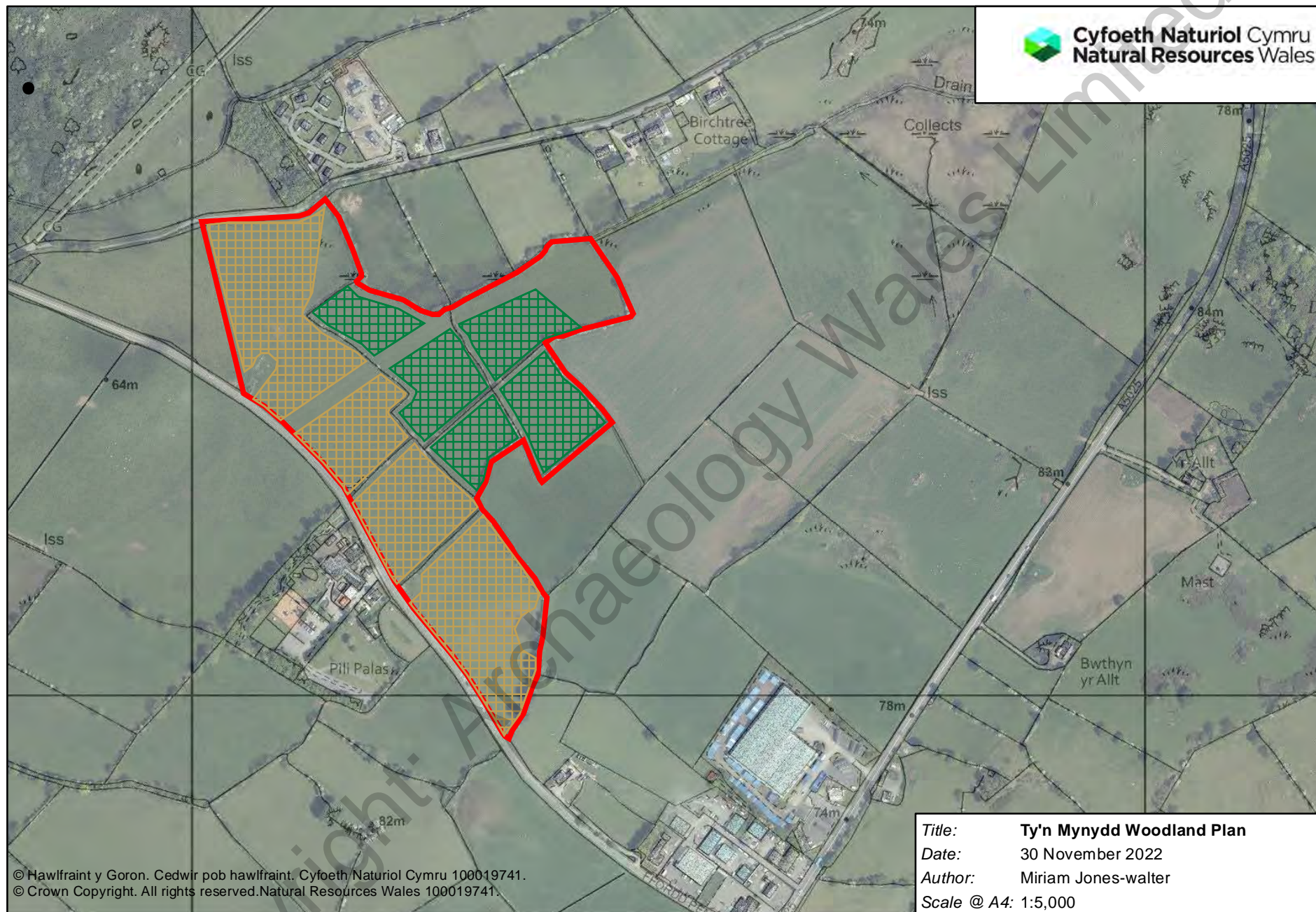


Figure 2. Proposed development area.





Figure 3. Greyscale plot of raw data gathered

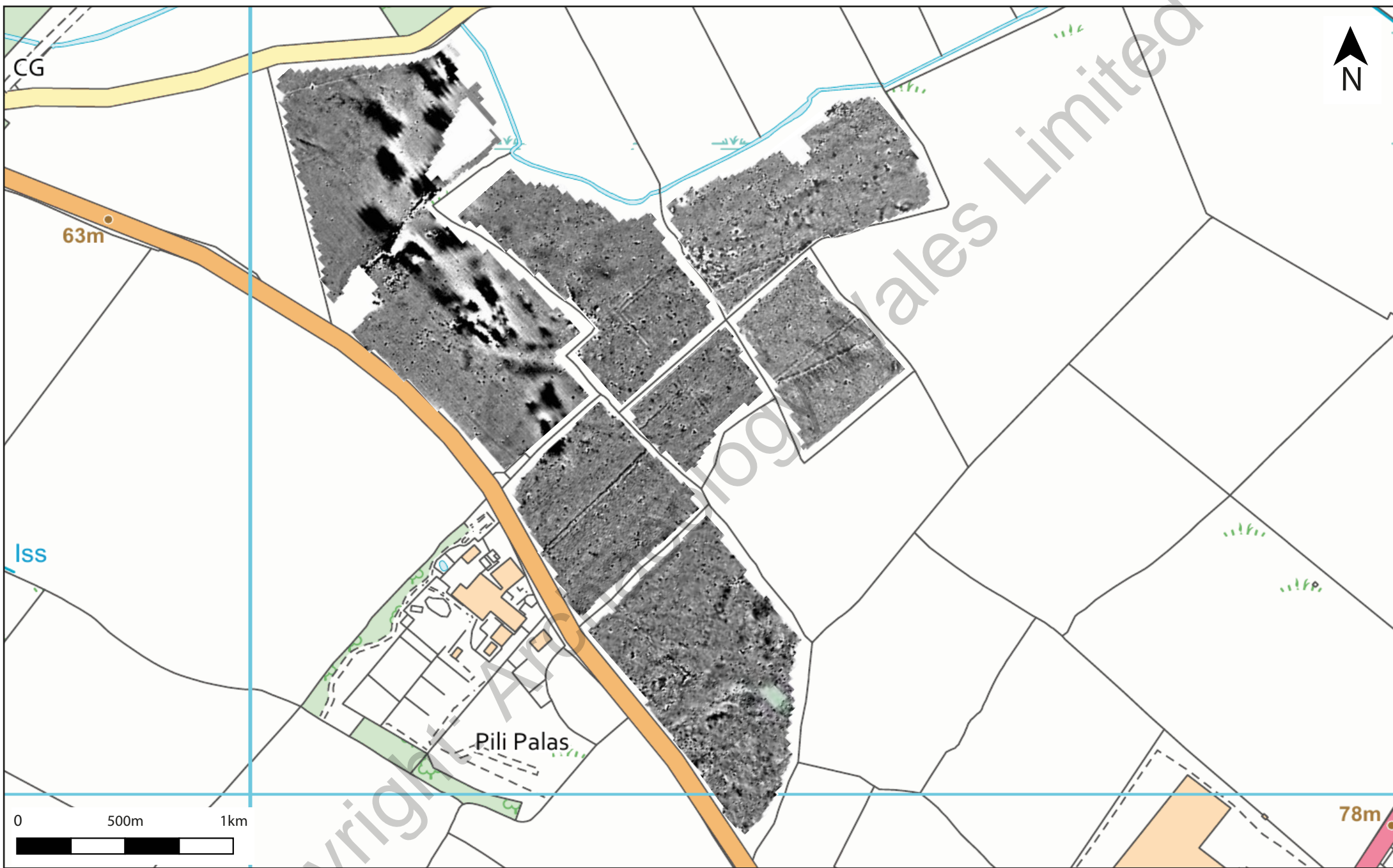


Figure 4. Processed data





Figure 5. Field 1 - Greyscale plot of processed data clipped to  $\pm 15$

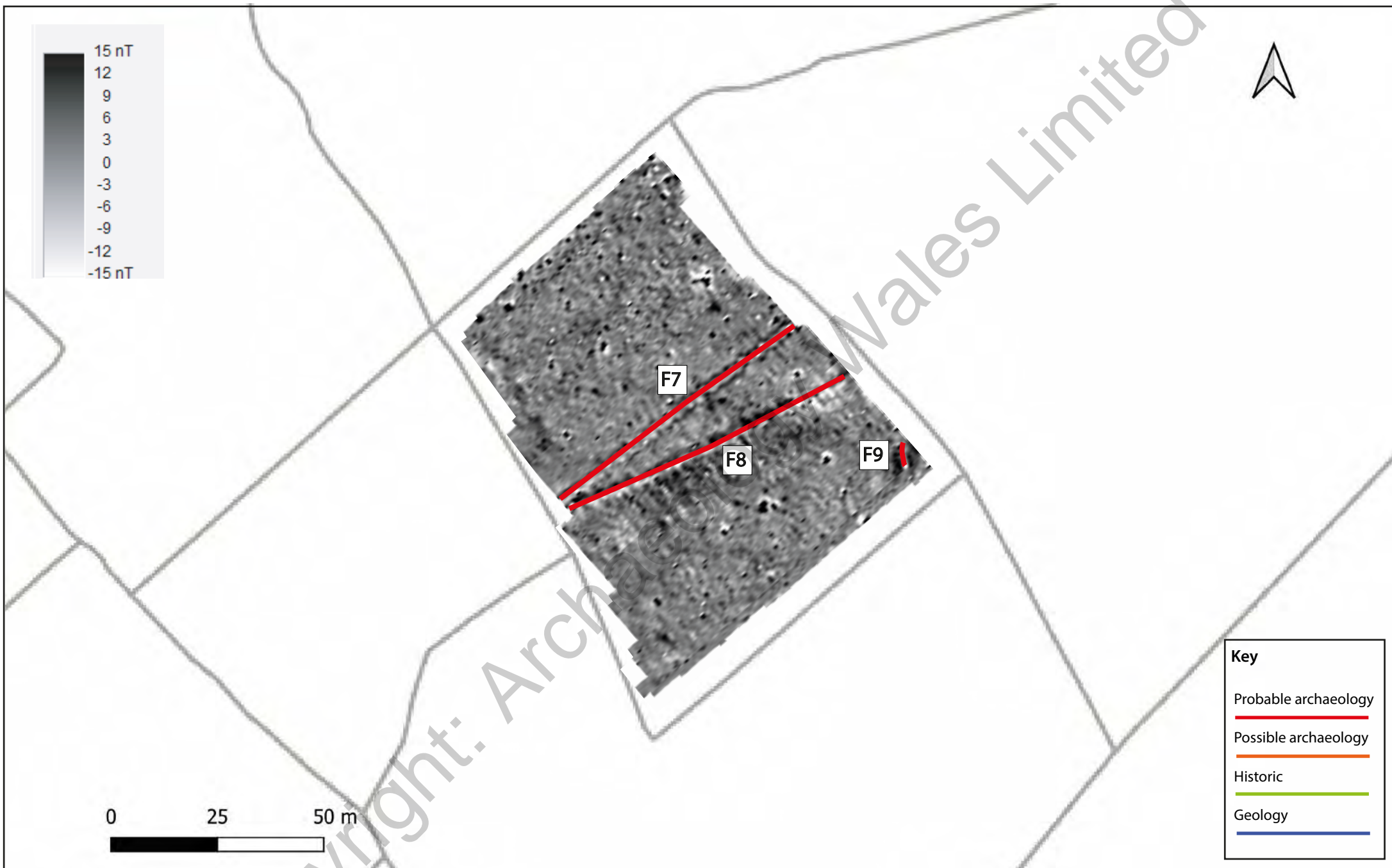


Figure 6. Field 2 - Greyscale plot of processed data clipped to  $\pm 15$



Figure 7. Field 3 - Greyscale plot of processed data clipped to  $\pm 15$





Figure 8. Field 4 - Greyscale plot of processed data clipped to  $\pm 15$



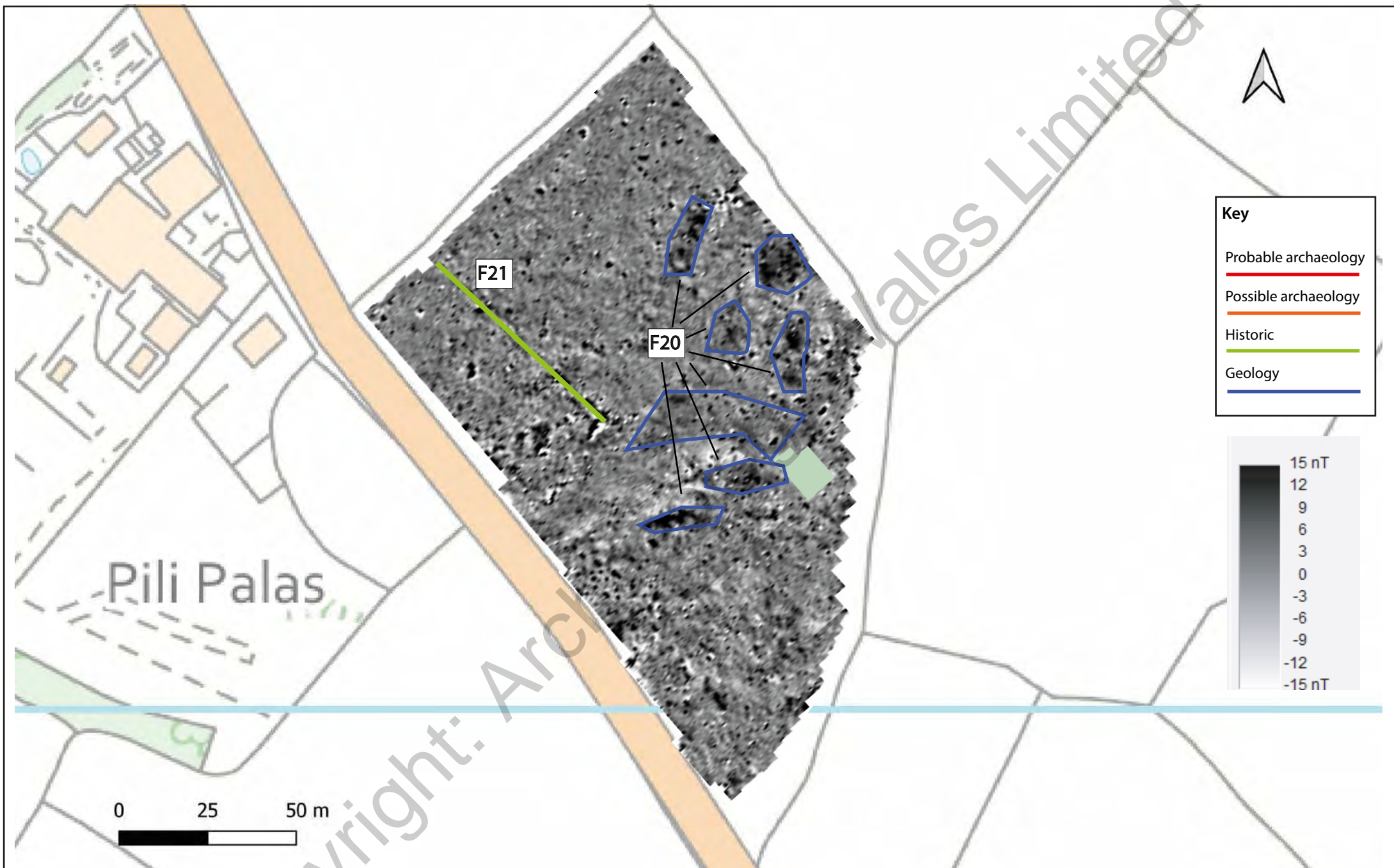


Figure 9. Field 5 - Greyscale plot of processed data clipped to  $\pm 15$



Figure 10. Field 6 - Greyscale plot of processed data clipped to  $\pm 15$





Figure 11. Field 7 - Greyscale plot of processed data clipped to  $\pm 30$

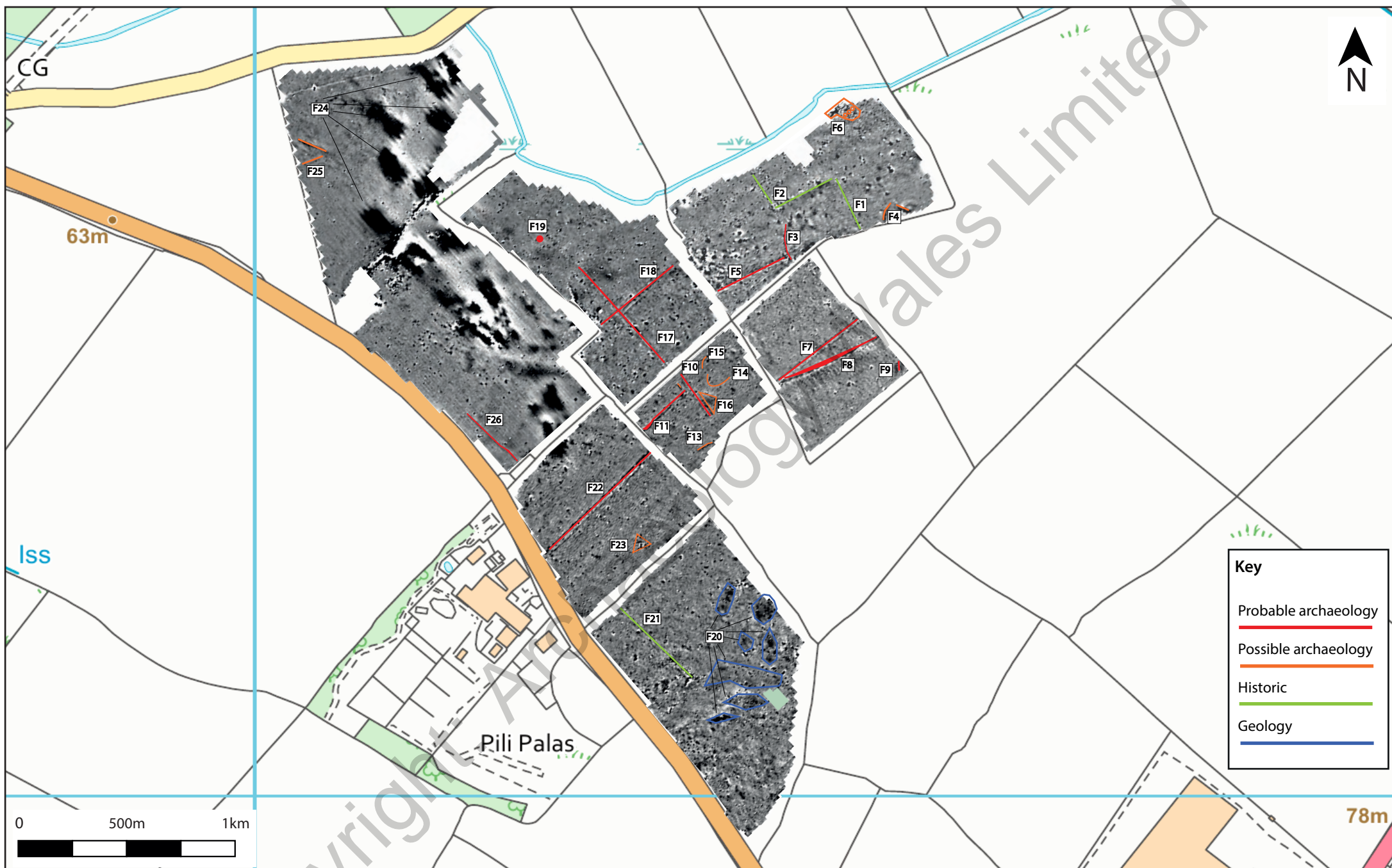


Figure 12. Whole site annotated over processed data  $\pm 15$  in Fields 1-6;  $\pm 30$  in Field 7



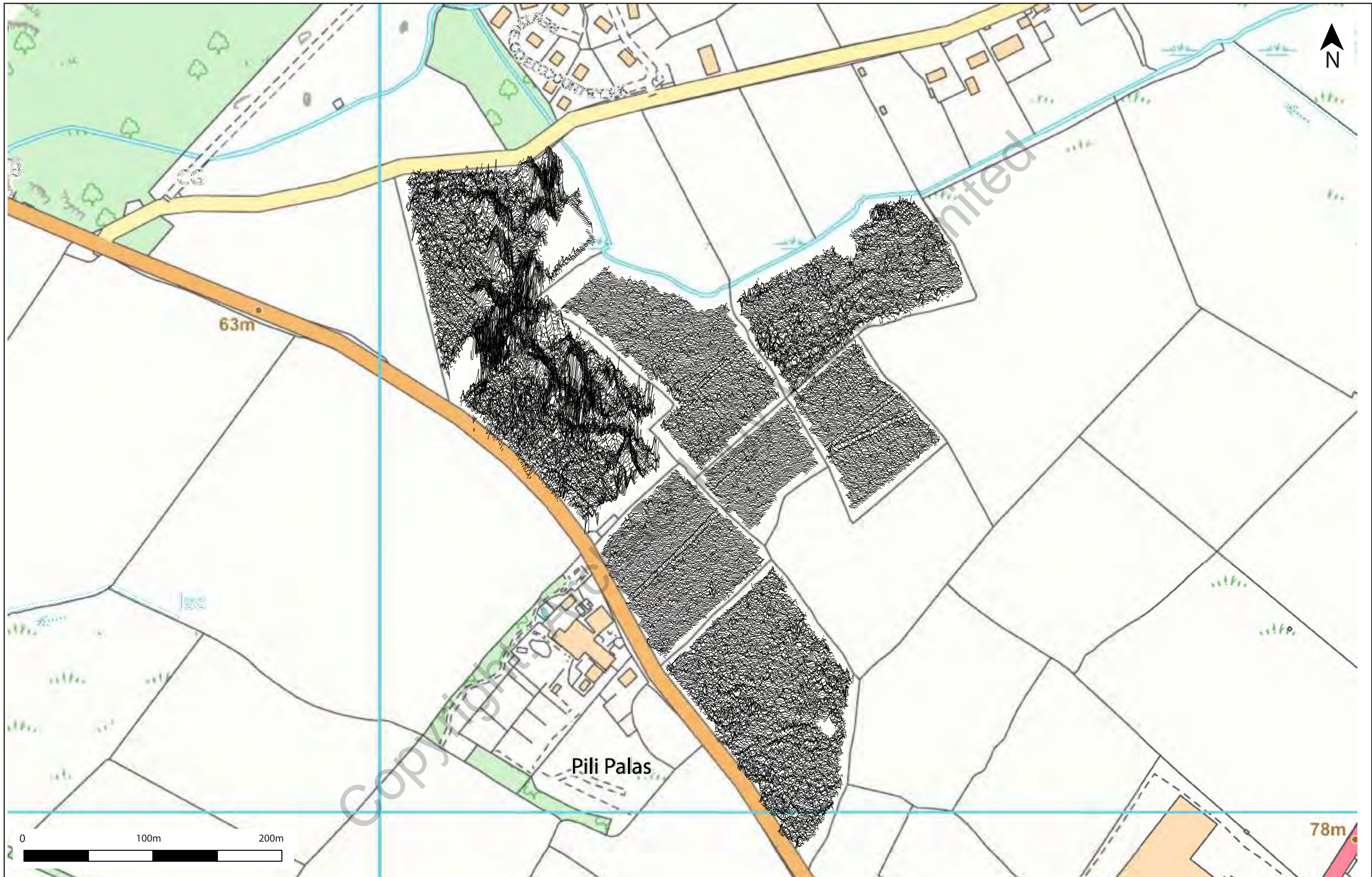


Figure x. XY Trace Plot clipped at  $\pm 15nT$



## **WRITTEN SCHEME OF INVESTIGATION FOR A GEOPHYSICAL SURVEY**

### **Ty'n Mynydd, Anglessey North Wales**

#### **Prepared for:**

Natural Resources Wales

#### **Planning Application Number:**

**Project No:** 3071

**February 2023**

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## **Summary**

*This Written Scheme of Investigation details a programme of geophysical survey to be undertaken by Archaeology Wales Ltd at the request of Natural Resources Wales (NRW).*

*All work will be undertaken in accordance with the standards and guidelines of the Chartered Institute for Archaeologists (2020).*

## **1. Introduction and planning background**

1.1.1. This Written Scheme of Investigation (WSI) details the methodology for a programme geophysical survey, to be undertaken in association with the proposed development woodland creation scheme at Penmynydd Road, Four Crosses, Menai Bridge, Isle of Anglesey LL59 5RP - NGR SH 54169 73221 (Figure 1).

1.1.2. The methodology set out in this WSI has been agreed with Gwynedd Archaeological Planning Services (GAPS) in their capacity as archaeological advisors to the Isle of Anglesey County Council (IACC).

1.1.3. The purpose of the archaeological mitigation is to provide the local planning authority 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 Wales (edition 11 - February 2021), and Technical Advice Note (TAN) 24. The work is to ensure that all buried artefacts and deposits are fully investigated and recorded if they are disturbed or revealed as a result of activities associated with the development.

1.1.4. This WSI has been prepared by Irene Garcia Rovira, Project Manager - Archaeology Wales Ltd at the request of NRW.

1.1.5. All work will be undertaken to the standards and guidance set by the Chartered Institute for Archaeologists (2020). AW is a Registered Organisation with the CIfA.



## 2. Site Description

2.1.1. The proposed development area (PDA) is located to the north-west of Menai Bridge. It is located adjacent to the Pili Palas visitor attraction. The PDA measures c 10.93 hectares and encompasses 7 fields. Penmynydd road bounds the proposed site to the south-west, whilst all other boundaries are adjacent to open fields (Figure 2).

2.1.2. The underlying geology is composed of Schist and glaucophane belonging to the Central Anglesey Shear Zone and Berw Shear Zone formed during the Ediacaran and Cambrian periods. The superficial soils are defined by Till, Devensian - Diamicton formed during the Quaternary Period (BGS 2023).

## 3. Historical and Archaeological background

3.1.1. The site has been subjected to a Desk-Based Assessment (see GAT 2022 - Report 1952). The site is considered to have been a local agrarian landscape used since prehistory to post-medieval times.

3.1.2. A HER record PRN 4309 appears located within the proposed development area. However, the actual stone is not longer in place. Prehistoric activity in the wider area exists largely in the form of funerary and settlement activity. Another two features were marked during the walkover survey including, a hollow, a possible field boundary and plough marks.

3.1.3. There is no evidence for later prehistoric or medieval activity within the site and its surroundings, although it is adjacent to the historic route between Menai Bridge and Llangefni.

## 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 Archaeologists' *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.
- 4.1.3. 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 will be used to determine further archaeological investigation (e.g. targeted trial trenching) at a pre-determination stage.

## 5. Fieldwork

- 2.1.1. 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.
- 2.1.2. 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.

2.1.3. 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.

2.1.4. 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.

2.1.5. Further survey information will be completed on the relevant proforma sheet. All data will be downloaded in the field into a laptop computer.

## **2.2. 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 either extreme 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.

## **6. Monitoring**

6.1.1. GAPS will be contacted with as much notice prior to the commencement of archaeological site works, and subsequently once the work is underway.

6.1.2. Any changes to the WSI that AW may wish to make after approval will be communicated to GAPS for approval on behalf of the Planning Authority.

6.1.3. Representatives of GAPS will be given access to the site so that they may monitor the progress of the survey. GAPS will be kept regularly informed about developments.

## **7. Post-fieldwork programme**

### **7.1. Final reporting**

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

- Concise non-technical bilingual 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

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

7.1.3. 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).

7.1.4. 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.

## **7.2. Site archive**

7.2.1. 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 2019* (National Panel for Archaeological Archives in Wales) and the guidelines of the Chartered Institute for Archaeologists upon completion of the project.

## **7.3. Archive deposition**

7.3.1. The final archive will, whenever appropriate, be deposited with a suitable receiving institution. 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.

7.3.2. Copies of all reports, the digital archive and an archive index will be deposited with the National Monuments Record, RCAHMW, Aberystwyth.

7.3.3. 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 GAPS.

## **8. Resources and timetable**

### **8.1. Standards**

8.1.1. 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.

### **8.2. Staff**

8.2.1. The project will be undertaken by suitably qualified AW staff. Overall management of the project will be undertaken by Irene Garcia Rovira MCIfA, AW Project Manager.

### **8.3. Equipment**

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

### **8.4. Timetable of archaeological works**

8.4.1. The work will be commence on the 27<sup>th</sup> of February 2023. AW will contact GAPS prior the commencement of works.

## **8.5. Insurance**

8.5.1. 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.

## **8.6. Arbitration**

8.6.1. 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.

## **8.7. Health and safety**

8.7.1. 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 is attached, and a copy 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.

8.7.2. 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).

## 9. References

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

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

Chartered Institute for Archaeologists. 2020. Standards and Guidance for Geophysical Surveys.

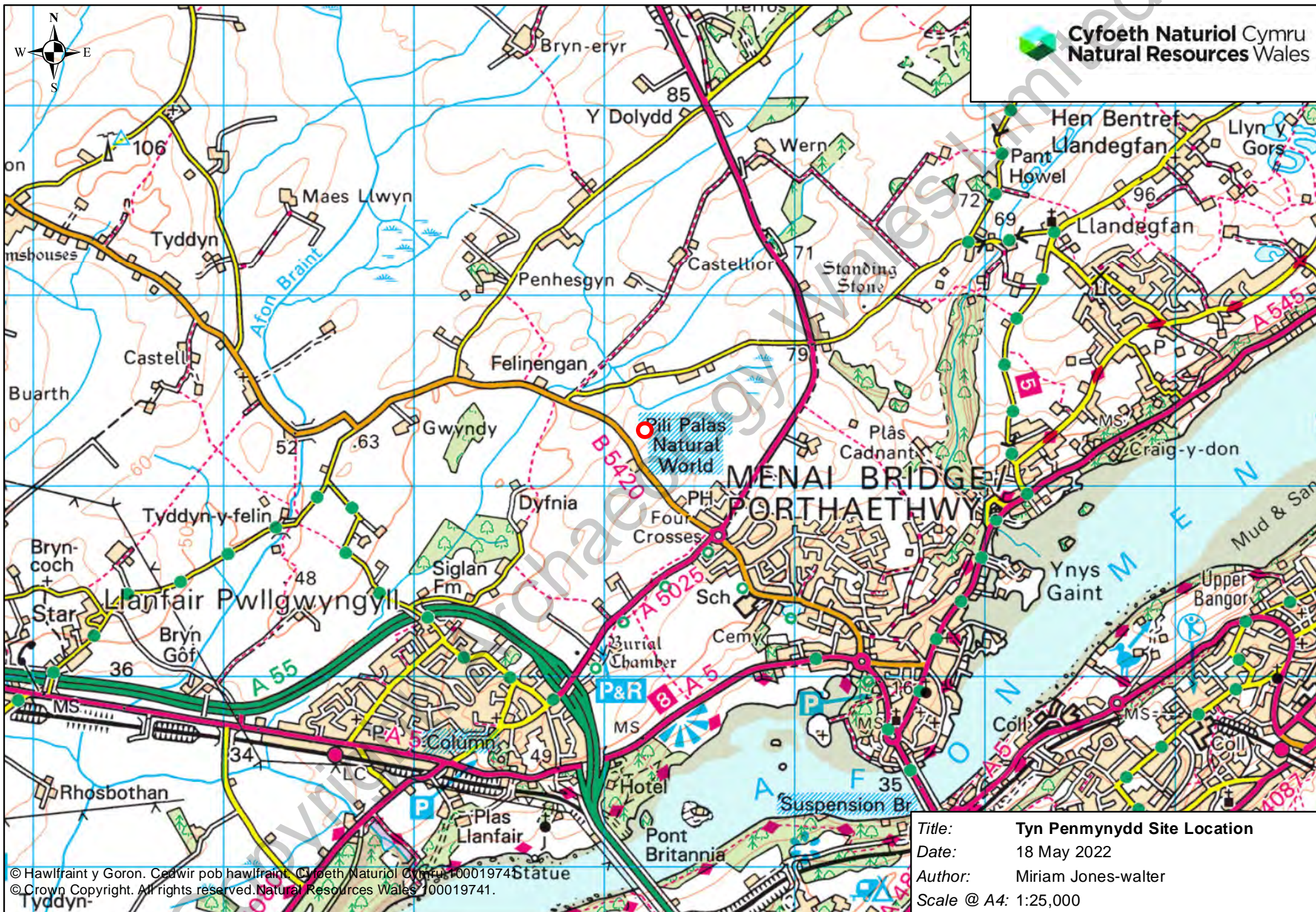
GAT. 2022. Cynllun creu coetiroedd, Ynys Mon / woodland creation scheme, Ynys Mon. Asesiad archeolegol /archaeological assessment. Report 1652.

National Panel for Archaeological Archives in Wales, 2019. The National Standard and Guidance to Best Practice for Collecting and Depositing Archaeological Archives in Wales

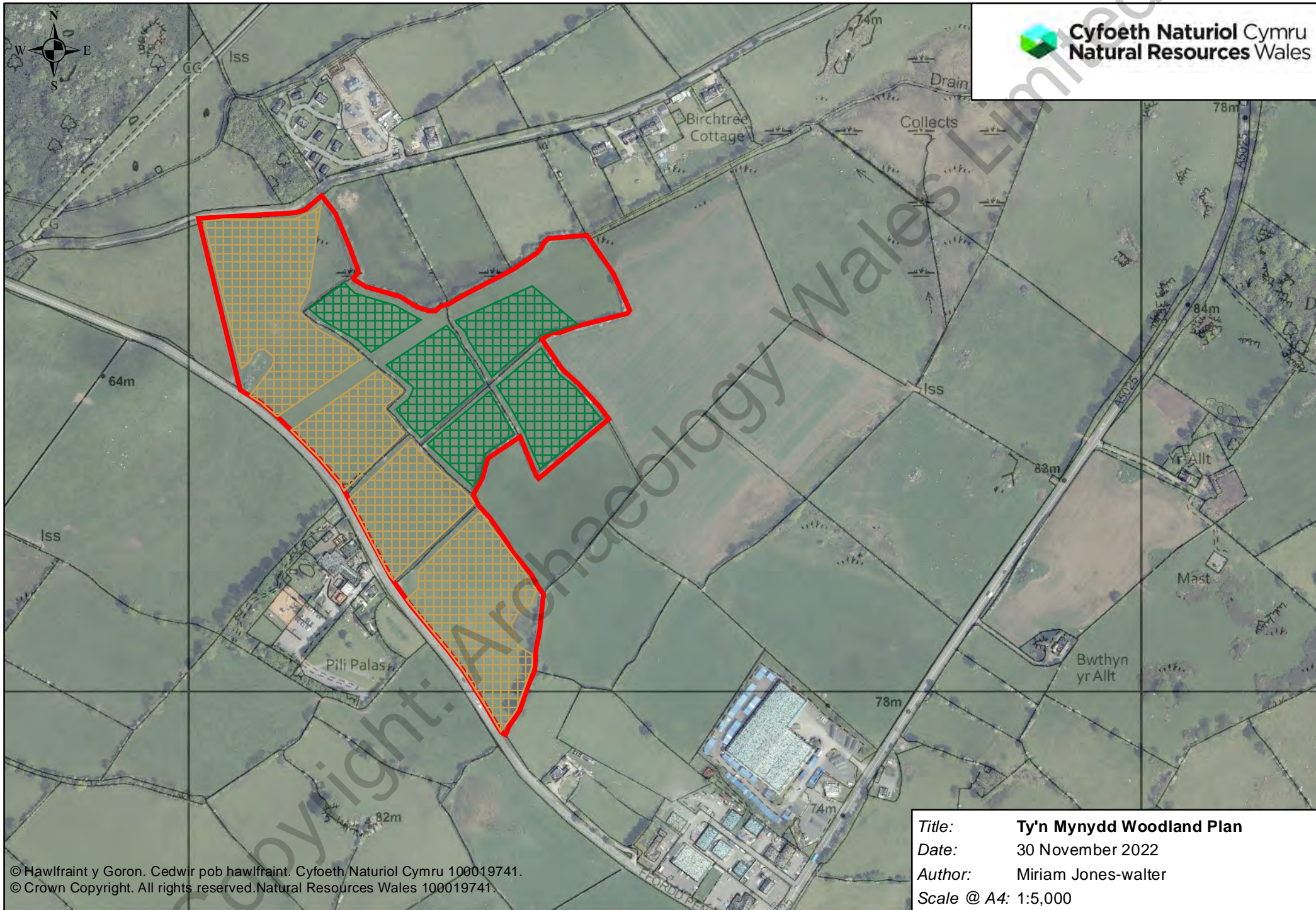
Welsh Archaeological Trusts, 2018. Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs).

British Geological Survey: Geology of Britain viewer: [www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html](http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html) (accessed 24/1/23)









**Cyfoeth Naturiol Cymru**  
**Natural Resources Wales**

**Title:** Ty'n Mynydd Woodland Plan  
**Date:** 30 November 2022  
**Author:** Miriam Jones-walter  
**Scale @ A4:** 1:5,000

# Data Management Plan

## Section 1: Project Administration

Project ID / OASIS ID
Project number: 3071 Site code: TMA/23/GEO
Project Name
Ty'n Mynydd, Anglesey
Project Description
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. 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 will be used to determine further archaeological investigation (e.g. targeted trial trenching) at a pre-determination stage.
Project Funder / Grant reference
Natural Resources Wales
Project Manager
Irene Garcia Rovira – AW project manager Irene@arch-wales.co.uk
Principal Investigator / Researcher
Same as above
Data Contact Person
Rhiannon Philp, AW Post-excavation Manager rhiannon.philp@arch-wales.co.uk
Date DMP created
13.02.23
Date DMP last updated
22.10.24
Version
Version 2
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)
Spreadsheets	Excel (.csv)	7
Text/documents	Word (.docx)	1
	PDF (.pdf and .pdf/a)	1
Images	Raw data geotifs (.tif)	7
	Photos (.jpeg)	60
GIS	Shapefiles (.shp plus associated files)	1 group

#### 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 RCAHMMW Guidelines. Specific or additional guidance relevant to this project are listed below and will be updated as the project progresses.
- Methods of collection are specified within the Project Design 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:
  - Chartered Institute for Archaeologists, 2019. Toolkit for Selecting Archaeological Archives.
  - Chartered Institute for Archaeologists, 2020. Standards and guidance for the creation, compilation, transfer and deposition of archaeological archives.
  - Chartered Institute for Archaeologists, 2020. Standards and guidance for the collection, documentation, conservation and research of archaeological materials.
  - Chartered Institute for Archaeologists, 2023. Standard for Archaeological Monitoring and Recording
  - Chartered Institute for Archaeologists, 2023. Universal Guidance for Archaeological Monitoring and Recording

##### 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 RCAHMMW 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 throughout the project. 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, RCAHMMW).
- 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 RCAHMMW 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 RCAHMMW, 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?

- RCAHMMW have are the intended repository for digital data. AW has an ongoing agreement with the repository.

### 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 museum and digital archive repository will be updated as the project progresses.
- The investigations are likely to result in the following documents: Geophysics Report
- The final report is expected to be completed within 3 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.