1444

Bryn Cefni Infrastructure Works, Ynys Môn

Archaeological Assessment

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

Bryn Cefni Infrastructure Works, Ynys Môn

Archaeological Assessment

Historic Environment Record Event Primary Reference Number 45324

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Written by: Robert Evans & John Roberts

Front cover image: General view of bund along the northern edge of the site (archive referenc: G2577_013)

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Rev No.	**Summary of Changes**	**Ref Section**	**Purpose of Issue**

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CRYNODEB ANNHECHNEGOL

Comisiynwyd Ymddiriedolaeth Archaeolegol Gwynedd gan Egnïol Environmental Ltd, ar ran Llywodraeth Cymru, i ymgymryd ag asesiad archaeolegol o flaen gwaith datblygu arfaethedig yn Barc Diwydiannol Bryn Cefni, Llangefni, Ynys Môn. Roedd yr ardal ddatblygu yn cynnwys saith llain mewn porfa agored wedi'u hamgylchynu gan seilwaith parc busnes. Cynhaliwyd asesiad, gwerthusiad a lliniaru archaeolegol blaenorol yn yr ardal gyfagos cyn ac yn ystod datblygiad seilwaith parc presennol, a nodwyd tystiolaeth o weithgarwch cynhanesyddol ac weithgarwch ddiweddarach.

Mae'r ardal ddatblygu yn agos at Heneb Gofrestredig ganoloesol, a oedd yn ffocws canolog ar gyfer trefgordd Tregarnedd. Nodwyd bod yr heneb, sydd bellach yn rhan o fferm leol, wedi bod o werth hanesyddol uchel ac wedi ei gysylltu â digwyddiadau hanesyddol o bwys cenedlaethol megis rheol Tywysogion Cymru a'n dealltwriaeth o drefgorddau canoloesol a gweinyddiaeth llywodraeth leol.

Roedd yr asesiad yn cynnwys arolwg geoffisegol o'r ardal ddatblygu a nododd sawl anghysondeb, ond ni nodwyd unrhyw ymatebion magnetig a ddehonglwyd fel rhai o ddiddordeb archaeolegol diffiniol. Nodwyd ffiniau cynharach posibl, nad yw yn bresennol ar unrhyw fapio hanesyddol, fel anomaleddau llinol ar draws Plotiau C4 i C6. Nodwyd anomaleddau yn fynegol o weithgaredd amaethyddol, neu o weithgaredd yn gysylltiedig â'r parc diwydiannol, yn ogystal â thystiolaeth o aflonyddwch modern sy'n gysylltiedig yn uniongyrchol â'r parc. Awgrymodd canlyniadau o un ar bymtheg o byllau prawf geotechnegol bod tirlunio ac ailraddio helaeth wedi'i wneud yn ddiweddar gan fod y tir wedi'i wneud yn drwchus o dan uwchbridd tenau; roedd presenoldeb o fwnd mawr ar ben gogleddol y safle a nodwyd yn ystod yr arolwg cerdded yn cefnogi'r dehongliad hwn.

Nodwyd naw nodwedd archaeolegol yn yr ardal ddatblygu yn ystod yr asesiad. Argymhellir cofnod sylfaenol ar gyfer olion gweladwy dwy ffin maes blaenorol, tra bod briff gwylio yn cael ei argymell ar gyfer lleoliad hen chwarel a'r ddau anghysondeb geoffisegol sy'n dangos amaethyddiaeth neu weithgaredd diweddar sy'n gysylltiedig â'r parc. Argymhellir yr anomaleddau llinol sy'n awgrymu systemau caeau cynharach ar gyfer gwerthusiad archaeolegol cyn y gwaith datblygu neu liniaru gyda briff gwylio a/neu gloddio wedi'i dargedu yn ystod y gwaith tir, fel y mae anghysondeb yn awgrymu nodwedd unionlinellog bosibl, neu weithgarwch mor ddiweddar â'r parc.

Yn ogystal ag argymhellion y nodwedd, argymhellir briff gwylio cyffredinol hefyd ar gyfer y datblygiad cyfan i gymhwyso canlyniadau cyffredinol yr arolwg geoffisegol a'r pyllau prawf geotechnegol.

NON TECHNICAL SUMMARY

Gwynedd Archaeological Trust was commissioned by Egniol Environmental Ltd, on behalf of Welsh Government, to undertake an archaeological assessment in advance of proposed development works at Bryn Cefni Industrial Park, Llangefni, Ynys Môn. The development area comprised seven plots within open pasture surrounded by business park infrastructure. Previous archaeological assessment, evaluation and mitigation had been undertaken within the surrounding area in advance of and during existing park infrastructure development and evidence of prehistoric and later activity had been identified.

The development area is in close proximity to a medieval Scheduled Monument, which formed a central focus for the township of Tregarnedd. The monument, now part of a local farmstead, was noted to have been of high historical value and linked to nationally important historic events such as the rule of the Welsh Princes and our understanding of medieval townships and the administration of local government.

The assessment included a geophysical survey of the development area, which identified multiple anomalies, but did not identify any magnetic responses that were interpreted as being of definitive archaeological interest. Possible earlier boundaries, not present on any historic mapping, were identified as linear anomalies across Plots C4 to C6. Anomalies indicative of agricultural activity or activity associated with the industrial park were also identified, as well as evidence of modern disturbance directly associated with the park. The results from twenty one geotechnical test pits also suggested there had been recent extensive landscaping and regrading due to the presence of thick made ground beneath thin topsoil; the presence of a large bund at the northern end of the site identified during the walkover survey supported this interpretation.

Nine archaeological features were identified within the development area during the assessment. A basic record is recommended for the visible remains of two former field boundaries, whilst a watching brief is recommended for the location of a former quarry and the two geophysical anomalies indicative of agriculture or recent activity associated with the park. The linear anomalies suggesting earlier field systems are recommended for either archaeological evaluation in advance of development works or mitigation with a watching brief and/or targeted excavation during groundworks as is an anomaly suggesting a possible rectilinear feature, or equally more recent activity for the park.

As well as the feature recommendations, a general watching brief is also recommended for the development as a whole to qualify the overall results of the geophysical survey and geotechnical trial pits.

1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been commissioned by Egniol Environmental Ltd. on behalf of Welsh Government to undertake an archaeological assessment and evaluation (geophysical survey) in advance of proposed development works at Bryn Cefni Industrial Park, Ynys Môn (NGR SH46477494; Figure 01). The development area included plots C1, C2, C3, C4, C5, C6 and C7 as well as an access road extension, as detailed on Welsh Government Drawing No. 4509 (Figure 02). The plots were open pasture surrounded by industrial units and industrial park infrastructure. A number of archaeological assessment, evaluation and mitigation projects had already been completed for Bryn Cefni Industrial Park, including a previous assessment and targeted geophysical survey of the development plot in 1998 (GAT Report 302). The development plot was located to the immediate northeast of Scheduled Monument AN047, a medieval moated site, and the assessment included a description of the setting of the scheduled area in relation to the proposed development site, using the criteria established in *Setting of Historic Assets in Wales* (Cadw, 2017).

The assessment conformed to the guidelines specified in the Chartered Institute for Archaeologists *Standard and Guidance for Historic Environment Desk-Based Assessment* and (Chartered Institute for Archaeologists, 2014), as well as the *Setting of Historic Assets in Wales* (Cadw, 2017). In addition, the project was managed in accordance with *MoRPHE* (English Heritage 2015) and MAP2 (English Heritage, 1991).

The assessment was monitored by Gwynedd Archaeological Planning Services (GAPS) and GAT undertook the works in accordance with an approved written scheme of investigation (Appendix I). The Historic Environment Record Enquiry Reference Number for this project was GATHER1001 and the Event Primary Reference Number was 45324.

GAT is certified to ISO 9001:2015 and ISO 14001:2015 (Cert. No. 74180/B/0001/UK/En) and is a Registered Organisation with the Chartered Institute for Archaeologists and a member of the Federation of Archaeological Managers and Employers (FAME).

2 METHODOLOGY

2.1 Assessment (Desktop Study)

A desk-based assessment is defined as “a programme of study of the historic environment within a specified area or site on land, the inter-tidal zone or underwater that addresses agreed research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic and electronic information in order to identify the likely heritage assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of heritage….Significance is to be judged in a local, regional, national or international context as appropriate” (CIfA 2014, 4).

The desk-based assessment included the study of the following resources:

1. The regional Historic Environment Register ((HER) Gwynedd Archaeological Trust, Craig Beuno, Ffordd y Garth, Bangor, Gwynedd LL57 2RT) was examined for information concerning the study area, defined as plots C1, C2, C3, C4, C5, C6 and C7 as well as an access road, as detailed on Welsh Government Drawing No. 4509 (Figure 02). This included an examination of the core HER, the 1:2500 County Series Ordnance Survey maps and secondary information held within the HER, including the preceding assessment, evaluation and mitigation reports prepared by GAT, Amec Foster Wheeler and Brython Archaeology (cf. Sources Consulted). All identified features were mapped, described and added to a gazetteer of sites and the relative importance of the assets defined;
2. The National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, Plas Crug, Aberystwyth SY23 1NJ) were checked for sites additional to the HER;
3. Aerial photographs from the National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, National Monuments Record of Wales, Plas Crug, Aberystwyth SY23 1NJ) were examined for potential features and an on-line catalogue search of the National Library of Wales (Penglais Rd, Aberystwyth SY23 3BU) was completed;
4. Archive data, including primary and secondary sources, historic maps and estate maps wad examined at the regional archives (Archifau Ynys Môn / Anglesey Archives, Diwydiannol Bryn Cefni / Industrial Estate Rd, Llangefni LL77 7JA and Library), which included historic mapping including the local tithe map and schedule;

5. Light Detection and Ranging (LiDAR) data was examined from the Lle Geo-Portal at http://lle.gov.wales/home for information on potential surface features using digital terrain modelling and digital surface modelling. Digital Terrain Models (DTM) and Digital Surface Model (DSM) datasets at 1m resolution were available for this area (cf. Figure 06).

2.2 Walkover Survey

A walkover survey was undertaken on the 18th October 2018 within the assessment area as detailed on Figure 01 and Figure 02, incorporating plots C1, C2, C3, C4, C5, C6 and C7 as well as the access road extension route. A photographic record was maintained in RAW format using a digital SLR (Nikon D5100) camera set to maximum resolution (4,928 × 3,264; 16.2 effective megapixels) and were be converted to TIFF format for archiving using Adobe Photoshop; the photographic record was digitised in *Microsoft Access* using archive numbering system G2577_001 to G2577_030 (Appendix II).

2.3 Geophysical Survey

The geophysical survey was undertaken between the 14th and 19th December 2019 within the assessment area as detailed on Figure 01 and Figure 02, incorporating plots C1, C2, C3, C4, C5, C6 and C7 as well as the access road extension route. The survey was undertaken by *Sumo* Services on behalf of GAT using a using a Bartington Grad 601-2 dual fluxgate gradiometer with a 1.0m traverse interval and a 0.25m sample interval. The Bartington Grad 601 is a handheld instrument and readings were taken automatically during the traverse of the survey grid by the operator. The instrument detects variations in the earth's magnetic field caused by the presence of iron in the soil. This is usually in the form of weakly magnetized iron oxides which tend to be concentrated in the topsoil. Features cut into the subsoil and backfilled or silted with topsoil, therefore contain greater amounts of iron and can therefore be detected with the gradiometer. Strong readings are also produced by archaeological features such as hearths or kilns as fired clay acquires a permanent thermo-remnant magnetic field upon cooling. This material can also get spread into the soil leading to a more generalized magnetic enhancement around settlement sites. The gradiometer can detect anomalies down to a depth of approximately one meter. The magnetic variations are measured in nanoTeslas (nT). The earth's magnetic field strength is about 48,000 nT; typical archaeological features produce readings of below 15nT although burnt features and iron objects can result in changes of several hundred nT. The machine is capable of detecting changes as low as 0.1nT. Data is transferred from the on-board data-logger to a computer where it is compiled and processed. The data is presented as a grey scale plot where data values are represented by modulation of the intensity of a grey scale within a rectangular area corresponding to the data collection point within the grid. This produces a plan view of the survey and allows subtle changes in the data to be displayed. This is supplemented by an interpretation diagram showing the main anomalies with reference numbers linking the anomalies to descriptions in a written report.

2.4 Gazetteer

A gazetteer was compiled for all identified sites within and within proximity to the assessment based on information sourced from the regional HER; the gazetteer included the following:

1. Feature Number
2. Site name
3. PRN number
4. Grid reference
5. Period
6. Site type
7. Assessment category
8. Description
9. Impact
10. Recommendation for further assessment/evaluation
11. Recommendation for mitigatory measures

The following categories were used to define the assessment category of the archaeological asset:

Category A - Sites of National Importance.
Scheduled Monuments, Listed Buildings of grade II* and above, as well as those that would meet the requirements for scheduling (ancient monuments) or listing (buildings) or both. Sites that are scheduled or listed have legal protection, and it is recommended that all Category A sites remain preserved and protected *in situ*.

Category B - Sites of regional or county importance.
Grade II listed buildings and sites which would not fulfil the criteria for scheduling or listing, but which are nevertheless of particular importance within the region. Preservation *in situ* is the preferred option for Category B sites, but if damage or destruction cannot be avoided, appropriate detailed recording might be an acceptable alternative.

Category C - Sites of district or local importance.
Sites which are not of sufficient importance to justify a recommendation for preservation if threatened. Category C sites nevertheless merit adequate recording in advance of damage or destruction.

Category D - Minor and damaged sites.
Sites that are of minor importance or are so badly damaged that too little remains to justify their inclusion in a higher category. For Category D sites, rapid recording, either in advance of or during destruction, should be sufficient.

Category E - Sites needing further investigation.
Sites, the importance of which is as yet undetermined and which will require further work before they can be allocated to categories A - D are temporarily placed in this category, with specific recommendations for further evaluation. In this report several sites of unknown potential have been allocated to this category.

The impact of the proposed works on any asset were identified using the following impact criteria, defined either as *none, slight, unlikely, likely, significant, considerable or unknown* as follows:

None:

There is no construction impact on this asset.

Slight:

This has generally been used where the impact is marginal and would not by the nature of the site cause irreversible damage to the remainder of the asset, *e.g.* part of a trackway or field bank.

Unlikely:

This category indicates sites that fall within the band of interest but are unlikely to be directly affected. This includes sites such as standing and occupied buildings at the margins of the band of interest.

Likely:

Sites towards the edges of the study area, which may not be directly affected, but are likely to be damaged in some way by the construction activity.

Significant:

The partial removal of an asset affecting its overall integrity. Assets falling into this category may be linear features such as roads or tramways where the removal of part of the feature could make overall interpretation problematic.

Considerable:

The total removal of an asset or its partial removal which would effectively destroy the remainder of the site.

Unknown:

This is used when the location of the asset is unknown, but thought to be in the vicinity of the proposed works.

Definition of field evaluation techniques

Field evaluation is necessary to fully understand and assess most class E sites and to allow the evaluation of areas of land where there are no visible features but for which there is potential for sites to exist. Two principal techniques can be used for carrying out the evaluation: geophysical survey and trial trenching. Topographic survey may also be employed where sites are thought to survive as earthworks.

Geophysical survey most often involves the use of a magnetometer, which allows detection of some underground features, depending on their composition and the nature of the subsoil. Other forms of geophysical survey, including resistivity survey and ground penetrating radar might also be of use.

Trial trenching allows a representative sample of the development area to be investigated at depth. Trenches of appropriate size can also be excavated to evaluate category E sites. Trenching is typically carried out with trenches of between 20 to 30m length and 2m width. The topsoil is removed by machine and the resulting surface is cleaned by hand, recording features. Depending on the stratigraphy encountered the machine may be used to remove stratigraphy to deeper levels.

Definition of Mitigatory Recommendations

None:

No impact so no requirement for mitigatory measures.

Detailed recording:

This requires a full photographic record and measured survey prior to commencement of works.

Archaeological excavation may also be required depending on the particular feature and the extent and effect of the impact.

Basic recording:

Requiring a photographic record and full description prior to commencement of works.

Controlled Strip (Strip/Map/Sample):

The technique of Controlled Strip (Strip/Map/Sample) involves the examination of machine-stripped surfaces to identify archaeological remains. The stripping is undertaken under the supervision of an archaeologist. Stripping and removal of the overburden is undertaken in such as manner as to ensure damage does not take place to surfaces that have already been stripped, nor to archaeological surfaces that have not yet been revealed.

Stripping is undertaken in as careful a manner as possible, to allow for good identification of archaeological features. A small team of archaeologists will be responsible for subsequently further cleaning defined areas where necessary. Complex sites which cannot be avoided will need to be fully excavated.

Watching brief:

This is a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive.

Avoidance:

Features, which may be affected directly by the scheme, or during the construction, should be avoided. Occasionally a minor change to the proposed plan is recommended, but more usually it refers to the need for care to be taken during construction to avoid accidental damage to a feature. This is often best achieved by clearly marking features prior to the start of work.

Reinstatement:

The feature should be re-instated with archaeological advice and supervision.

2.5 Setting of Scheduled Monument AN047 in relation to the proposed development site

The setting of Scheduled Monument AN047 in relation to the proposed development site was assessed, using the guidance established in Setting of Historic Assets in Wales (Cadw, 2017). Setting is defined in the guidance as the broader landscape context into which the individual historic asset is set; this context includes physical and cultural factors specific to that location. For the purposes of the assessment, the setting was assessed using the following stages in the guidance document:

Stage 1: Identify the historic assets that might be affected by a proposed change or development

This was undertaken as follows:

- The location, size and scale of the proposed development was examined; and
- The location and nature of identified historic assets was considered.

Stage 2: Define and analyse the settings to understand how they contribute to the significance of the historic assets and, in particular, the ways in which the assets are understood, appreciated and experienced.

The setting of a historic asset is made up of:

- its current surroundings
- our present understanding and appreciation of the historic asset; and
- what (if anything) survives of its historic surroundings.

Stage 2 should clearly identify the key factors relating to setting which contribute to the significance of the historic asset. The Setting of Historic Assets in Wales (Cadw, 2017) provides a series of questions to help define the significance of the asset:

- How do the present surroundings contribute to our understanding and appreciation of the historic asset today?

- Thinking about when the historic asset was first built and developed:

    - what were its physical, functional and visual relationships with other structures/historic assets and natural features?

- what topographic or earlier features influenced its location/what was its relationship to the surrounding landscape/was it constructed to take advantage of significant views or to be a part of a significant view?

- Thinking about changes since the historic asset was built:
  - has its function or use changed? What is the current condition of the ringwork and how is it managed?
  - what changes have happened to the surrounding landscape/streetscape?
  - have changes happened because of changes to the historic asset or to its historical setting?
  - has the presence of the historic asset influenced changes to the landscape, for example, where a monument has been used as a marker in the layout of a field enclosure/ has the presence of the historic asset influenced the character of the surrounding landscape/streetscape/have historic and designed views to and from the historic asset changed?

- Thinking about the original layout of the historic asset and its relationship to its associated landscape:
  - were these relationships designed or accidental/how did these relationships change over time?
  - how do these relationships appear in the current landscape; are they visual or buried features?

- Are there other significant factors, such as historical, artistic, literary, place name or scenic associations, intellectual relationships (for example, to a theory, plan or design), or other non-visual factors such as sounds or smells that can be vital to understand the historic asset and its setting?.

Stage 2 also identifies the viewpoints from which the impact of the proposed change or development should be assessed, taking into account:

- views to, from and across the historic asset that were designed and developed when the historic asset was first created
- views to, from and across the historic asset which are linked with a time in its history

- important modern views to, from and across the historic asset – for example, popular visitor viewing points

2.6 Dissemination

Following completion of the stages outlined above, the following dissemination has been applied:

1. A copy of the GAT report has been provided to Egniol Environmental Ltd. and GAPS;

2. A paper and digital report will be submitted to the regional Historic Environment Record, Gwynedd Archaeological Trust along with all relevant digital information , in accordance with the *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (Version 1.1);

3. A digital report and archive (including photographic data) has been prepared for submission to the Royal Commission on Ancient and Historic Monuments Wales, in accordance with the *RCAHMW Guidelines for Digital Archives Version 1*. Digital information includes the photographic archive and associated metadata.

3 RESULTS

3.1 Desk based assessment

3.1.1 Statutory and non-statutory designations

The development site is to the immediate northeast of Scheduled Monument AN047 (Figure 01), which is a medieval moated enclosure, the construction of which is traditionally associated with a descendant of Ednyfed Fychan, Gruffydd ap Rhys, in the 14th century. There are no listed buildings within 1km of the study area, but there are numerous listed buildings within the town of Llangefni itself, the nearest being the shire hall 1.28km away to the north west (Ref: 5752; SH45917551).

The study area lies at the northern end of Historic Landscape Character Area (LCA) 15 *Afon Cefni* which is described as a 'broad, flat, open valley, the majority of which is on or below the 10m OD contour. Originally an area of tidal marsh, subject to inundation by the sea… At the northern end. It is crossed by the A5 and A55 trunk road corridor on a raised embankment, which isolates the northern section of the LCA. This northern area exhibits a marshier, low lying character and has a sense of isolation setting it apart from the remainder… The edges to the north are formed by higher ground and is typically improved agricultural grassland' (Anglesey Council 2011).

The area does not lie within an area of Outstanding Historic Interest in Wales (Cadw/ICOMOS 1998), nor are there any registered Parks or Gardens within 1km of the study area.

3.1.2 Environmental remains and soil morphology

The study area is located south of Llangefni and lies beyond the north-east reach of the Malltraeth Marsh. It lies between 10m and 25m OD in a valley watered by the Afon Cefni. The geology of the area consists of abroad ridge valley between harder limestone rocks, filled with marine alluvium. The limestone is generally covered with glacial clays and soils of the brown earth group, although the limestone outcrops at higher levels. The Carboniferous limestone is generally covered with typical alluvial gley soils of the Conway Association, and brown earths further to the north (BGS 1980), although at the highest point the limestone is seen to outcrop, and quarrying has taken place there (PRN 62164; NGR SH46747482). This geology is unlikely to produce any environmental remains of significance, unless associated with specific archaeological features.

3.2 *Historical and archaeological background*

3.2.1 Prehistoric and Roman

The *garnedd* part of the Tregarnedd place-name comes from a prehistoric burial mound (PRN 2733) described as ‘an extensive pile of stones, surrounded by a circle of stones about 86 yards in diameter [and] removed in 1822 (Lewis 1833). GAT completed a watching brief during the groundworks for Units 8 and 9 (GAT Reports 432 and 463). A Middle Bronze Age burnt mound (PRN 16073) was identified in the car park for Unit 9 in 2001, which included a timber-lined trough (Figure 01). The site of a possible prehistoric settlement has been identified at Ynys Cefni, a raised area on the edge of the Cefni estuary (PRN 2728). The location of the study area on the edge of Malltraeth Marsh would make it a favoured area for prehistoric settlement.

GAT completed an archaeological evaluation on several plots to the immediate south of the current proposed development, in advance of a separate scheme, which identified Roman remains (GAT Report 1108; cf. Figure 01). A geophysical survey and targeted trenching identified the remains of an enclosed settlement (PRN 36390) that was used into the 2nd century AD. The settlement enclosure was probably pentagonal in shape and defined by a single, rather small ditch. There appeared to have been at least one roundhouse inside as well as internal ditches, many small pits and other activity. The evaluation trenching also revealed a pit containing Neolithic artefacts (PRN 36389), with another adjacent, possibly contemporary pit. Documentary research supported the possibility that agricultural buildings (PRN 36388) within the development area are on the site of an earlier dwelling, possibly dating back to the 16th century. This location was subsequently developed as part of the Llangefni Link Road scheme, for which additional archaeological mitigation was completed by Wessex Archaeology (results not available at time of writing, but will be reviewed if accessible).

3.2.2 Medieval

Brython Archaeology identified 45 early medieval graves during topsoil stripping for the construction of section 1 of the Llangefni Link Road, in 2016 (Brython Archaeology Document Number B1604.03 DRAFT). The graves were located at NGR SH47247580, *c.*780m north of the current development site. Additional fieldwork was completed by *Archaeology Wales*, associated with the expansion of Coleg Menai that increased the number of graves to 87 (results not available at time of writing, but will be reviewed if accessible).

The development site is to the immediate northeast of Scheduled Monument AN047 (Figure 01), which is a moated enclosure of medieval date, the construction of which is traditionally associated with a descendant of Ednyfed Fychan, Gruffydd ap Rhys, in the 14th century. Medieval moated sites are rare in North Wales, and no other is known from Ynys Môn (GAT Report 302). The site lay within the township of Tregarnedd, occupying the eastern part of the parish of Llangefni, from which the 'Tre' part of the Tregarnedd place-name is likely to originate (Carr 1992, 21). This was a bond township, granted by Llywelyn ab Iorwerth to Ednyfed Fychan in the early 13th century, involving the delegation of the prince's authority over the resident bondmen with the consequent right to hold a court, which is believed to have been held at the manor house of Tregarnedd itself (*ibid.*). The soils at Tregarnedd, brown earths, have been described as 'one of the most fertile on the island' (Roberts 1958, 41-42), making the area a desirable one for settlement.

3.2.3 Post-Medieval

The township of Tregarnedd passed into the hands of the Mostyn family through marriage into the Gloddaith family. It remained as part of that estate until 1750, when it was sold to Owen Williams of Castellior, from whom it passed to his son Thomas Williams (the Copper King) who lived at Tregarnedd between 1786 and 1794, before being let out to tenants. The property was sold again in 1887 (Carr 1992, 48-49).

A former quarry (Primary Reference Number (PRN) 62162; now infilled) is located within plot C5. The former fields in the study area appeared to be of late 19th century date, and are not shown on the Llangefni tithe map of 1843. They were however present by the time of the 1st edition 25 inch Ordnance Survey map of 1889 (Figure 03).

GAT completed an archaeological assessment of the development area in 1998, followed by geophysical survey, targeted trenching and a watching brief of selected areas in advance of and during groundworks for the industrial park (GAT Report 302). The assessment included a walkover survey, which confirmed that the fields had been regularly ploughed and no earthworks were visible as upstanding features (*ibid.*: 04); parts of the area had been stripped of topsoil by the former landowner and field boundaries removed (*ibid.*: 05). The geophysical survey (magnetometer), trenching and watching brief primarily targeted the areas now developed (cf. Figure 04), including the current access road separating plot C1 from the remaining plots, as well as the area now occupied by Units 8 and 9 (cf. Figure 02). The geophysical survey included a 60m by 40m area south of plot C5, which identified three linear features of unknown origin. Evidence of post-medieval ploughing (PRN 62163) were identified in a surveyed area south of plot C7, as was an area of concentrated anomalies that was subsequently targeted by trenching to reveal a narrow drain and animal burrows (PRN 62164). Geophysical anomalies along the access road were also targeted by trial trenching but did not identify any archaeological activity. The watching brief during groundworks at the northern end of plot C2 and the area south of plot C7 did not identify any features but the watching brief along the access road to what are now Units 8 and 9 did identify two shallow clay-filled ditches at NGR SH46847494. Their function and date were undetermined, but they may continue into what is now plot C6. The archaeological works did not include plot C1 and a former quarry in plot C5 was not investigated as part of the archaeological evaluation and mitigation stages as it was outside the area to be developed at time.

GAT completed a watching brief on a development plot 80.0m west of the current scheme, in 2016 (GAT Report 1300; cf. Figure 01). Previous archaeological work (including GAT Report

302) suggested a rock outcrop at the south east corner of the site could be the site of a former prehistoric burial mound known from documentary evidence as Tregarnedd cairn (PRN 2733). The watching brief confirmed outcrop was natural in origin and no evidence for any constructed chambers or any other prehistoric activity were identified within the confines of the development area. The field boundaries were confirmed to be of 19th century date, and were mostly removed as part of the scheme.

3.3 Cartographic evidence

Two plots (171 and 174) are shown on the Llangefni tithe map of 1843 (Figure 05), which encompasses the study area and Tregarnedd. The moated site is shown in the bottom left hand corner of Plot 174. All the field boundaries shown subsequently are not shown on the tithe map, but that appears to be because only individual holdings are shown, and not each individual field, therefore they may have been present in 1843, as the boundaries shown do relate to the local field pattern. The fact that the plots relating to Tregarnedd are in many different hands suggests that the traditional estate lands associated with the manor have been broken up into many different holdings, although the landowner still owns the whole demesne. The details of the apportionment for the two plots are given below, with the numbers shown on the map (Figure 05).

Landowners	**Occupiers**	**Numbers Referring to the Plan**	**Name and Description of Land and Premeses**	**Quantities in Statute Measure**		
				A	**R**	**P**
William Thomas Peers Esquire	Richard Davies	171	Part of Tregarnedd	51	3	13
	Samuel Dew	174	Part of Tregarnedd	57	3	36

An examination of the First to Third Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheet of the area (Sheet XVIII.3, 1889, 1900 and 1920 respectively; cf. Figure 03) shows the development area as formerly five large rectangular or trapezoidal shaped fields next to Tregarnedd Farm, with Bryn Cefni farm to the west and semi-improved farmland further to the south (cf. Figure 04). A footpath is shown on all three editions running across the north easternmost field. The field system was subsequently removed as part of the establishment of the industrial park.

3.4 Geophysical Survey Results

The geophysical survey was undertaken by *Sumo* on behalf of GAT between the 14th and 19th December 2019 within the assessment area as detailed on Figure 01 and Figure 02, incorporating plots C1, C2, C3, C4, C5, C6 and C7 as well as the access road extension route. A copy of the survey report (*Sumo* Survey Report 13727) is included in Appendix III. No magnetic responses were identified that were interpreted as being of "definitive archaeological interest" (*Sumo* Survey Report 13727: 3). All magnetic responses interpreted as anomalies were assigned numerical labels (cf. Figure 08). The anomalies were subdivided into the following classifications:

3.4.1 Probable/Possible Archaeology

Anomalies [1] and [2] located in Plots C6/C7 and C4/C5 respectively were identified by *Sumo* as ditch-type responses that could have archaeological provenance and "may form part of a rectilinear enclosure or field system, though they could be of more recent origin and relate to medieval or post-medieval field boundaries" (*Sumo* Survey Report 13727: 3). These linear anomalies do not match the field boundaries visible on the First Edition Ordnance Survey 1-inch County Series Map of 1889 (Figure 03) or on the Llangefni Parish tithe map, published 1843 (Figure 05). Anomaly [2] also crosses the proposed location of the access road.

A partial rectilinear feature, anomaly [3], within Plot C7, could also relate to a wide ditch-type anomaly and appears to be parallel to the south-western extent of anomaly [1], but *Sumo* determined that it is also feasible that the response is of more modern origin, and it could be associated with the construction of the industrial park (*ibid.*).

3.4.2 Uncertain

Linear anomalies [4] to [5], located in Plot C5 (with anomaly 5 also crossing the proposed access road) could be interpreted as small hut circles and ditches respectively, but *Sumo* determined that the poor definition of the responses makes such an interpretation unlikely and they are more likely associated with agricultural activity.

Anomaly [6], located in Plot C3 at the northwestern end of the site, may be associated with the former quarry extraction.

Anomaly [7], in Plot C1, was interpreted as a possible result of agricultural activity.

3.4.3 Former Field Boundaries

Anomalies [8] and [9] were interpreted as former field boundaries, visible on the First Edition Ordnance Survey 1-inch County Series Map of 1889 (Figure 03).

3.4.4 Ferrous / Magnetic Disturbance

Anomaly [10], located in Plots C1, C6 and C7, was interpreted as either remnants of industrial park activity or localised variations in the underlying geology and superficial deposits.

Anomaly [11], in Plot C7, was interpreted as made ground associated with the construction of the industrial park.

3.5 Geotechnical Survey Results

Quantum Geotechnical were commissioned by Egniol Environmental Ltd. to undertake twenty-one geotechnical trial pits across Plots C1 to C7 and the access road. The locations of the trial pits are located in Figure 09 and the trial pit logs are reproduced as Appendix IV.

Collectively, the results identified a thin deposit of topsoil, sealing made ground that varied in thickness from 0.35m to 1.30m, which in turn sealed the glacial horizon. It appeared that in all cases these locations had been subject to landscaping and regrading that had removed the original topsoil as well as subsoil, with some of the made ground likely reflecting the deposition of material during the construction of the industrial park. Fragments of plastic, brick and concrete were identified within the made ground of certain trial pits. A large bund identified during the walkover along the northern end of the site in Plot C2 could suggest that some of the existing topsoil/subsoil was transferred here.

3.5.1 Plot C1

Four geotechnical test pits were excavated in Plot C1: TP19 to TP21. The topsoil measured 0.15m in thickness in all four test pits. Made ground varied in thickness from 0.35m to 0.65m, with the deeper made ground at the northwestern end, in TP19.

3.5.2 Plot C2

Two geotechnical test pits were excavated in Plot C2: TP3 and TP4. The topsoil measured 0.10m and 0.15m in thickness across the two test pits. Made ground varied in thickness from 0.55m to 0.80m and included fragments of sandstone, brick, plastic and limestone.

3.5.3 Plot C3

Two geotechnical test pits were excavated in Plot C3: TP5 and TP6. The topsoil measured 0.10m in thickness across both test pits. Made ground varied in thickness from 0.60m to 0.80m.

3.5.4 Plot C4

Two geotechnical test pits were excavated in Plot C4: TP7 and TP9. The topsoil measured between 0.10m and 0.15m in thickness across both test pits. Made ground varied in thickness from 0.80m to 1.05m.

3.5.5 Plot C5

Two geotechnical test pits were excavated in Plot C5: TP10 and TP12. The topsoil measured between 0.10m and 0.15m in thickness across in both test pits. Made ground varied in thickness from 0.80m to 0.85m.

3.5.6 Plot C6

Four geotechnical test pits were excavated in Plot C6: TP8, TP11, TP14 and TP15. The topsoil measured between 0.10m and 0.15m in thickness across in both test pits. Made ground varied in thickness from 0.65m to 1.30m.

3.5.7 Plot C7

Three geotechnical test pits were excavated in Plot C7: TP8, TP11, TP14 and TP15. The topsoil measured between 0.10m and 0.15m in thickness across in both test pits. Made ground varied in thickness from 0.65m to 1.30m.

3.6 Artefact potential

There are no known artefacts or findspots within the development area. Artefact potential is greater within the wider area, including the identification of prehistoric and Roman period activity to the south of the current development area (GAT Report 1108). Their significance and presence suggests that there is potential for artefact recovery; however, the development area appears to have been impacted by landscaping/regrading works associated with the existing industrial park and this could limit the potential for the recovery of artefacts, or reduce the significance of any artefacts recovered from all but secure archaeological contexts. The potential for the recovery of artefacts has therefore to be considered low.

3.7 Aerial photographs and LiDAR

LiDAR DTM and DSM datasets at 1m resolution were examined at the Lle Welsh Government data portal http://lle.gov.wales (Figure 06). The outline of the topography was clearly visible, showing Tregarnedd (AN047; PRN 2727) located just north of the alluvial silts of Malltraeth Marsh on the 10m contour, and the topographic setting of the study area clearly depicted. The outline of the moat at Tregarnedd, particularly on the southern and western side is visible, and the DTM data showed possible evidence for former buildings within the moat enclosure, although the many structures constructed here over time make this interpretation tentative. No additional information relating to the site of plots C1 to C7 was encountered.

Aerial photographs RAF 106G/UK 655 frames 3112 and 3113, taken on 13th August 1945 show the study area, albeit with some low cloud cover. The Scheduled Monument site at Tregarnedd itself is clear, and the area that is now Bryn Cefni Industrial Park is shown as intensively exploited agricultural fields, with many fields having been ploughed. The field boundaries match those shown on the First to Third Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheet XVIII.3 (cf. Figure 03). No additional archaeological assets were identified.

3.8 Setting of Scheduled Monument AN047 in relation to the proposed development site

3.8.1 Stage 1: Identify the historic assets that might be affected by a proposed change or development

The only previously known asset that is likely to be directly physically affected by the proposed development is a quarry site (PRN 62,162; SH46587498), a site identified on a previous GAT assessment of the study area (Richards and Davidson 1998). This is likely to be removed during the development of plot C5. Assets identified to the southeast have been previously assessed and archaeological mitigation carried out (PRNs 16,073; PRNs 62,163-4). Assets have also been identified during the construction of the Llangefni Link Road, although the details of these are not available at present. An early medieval cist cemetery site (PRN 31,287;SH47137525) was identified 530m north east of the study area, but this will be unaffected by the proposed development. The identification of these sites indicates that the study area is potentially very rich in archaeological remains.

The development site lies about 100m to the northeast of Scheduled Monument AN047 (Figure 01), which is a moated enclosure of medieval date, the construction of which is traditionally associated with a descendant of Ednyfed Fychan, Gruffydd ap Rhys, in the 14th century. There will be no direct impact upon this site. Medieval moated sites are rare in North Wales, and no other example is known from Ynys Môn (GAT Report 302). The development area is within the former medieval township of Tregarnedd, occupying the eastern part of the parish of Llangefni, from which the 'Tre' part of the Tregarnedd place-name is likely to originate (Carr 1992, 21). This was a bond township, granted by Llywelyn ab Iorwerth to Ednyfed Fychan in the early 13th century, involving the delegation of the prince's authority over the resident bondmen with the consequent right to hold a court, which is believed to have been held at the manor house of Tregarnedd itself (*ibid.*). The soils at Tregarnedd, brown earths, have been described as 'one of the most fertile on the island' (Roberts 1958, 41-42), making the area a desirable one for settlement.

3.8.2 Stage 2: Define and analyse the settings to understand how they contribute to the significance of the historic assets and, in particular, the ways in which the assets are understood, appreciated and experienced.

3.8.2.1 The current surroundings of the Tregarnedd Fawr Scheduled Monument

Tregarnedd Fawr moated site lies amongst former agricultural fields on the edge of the former Malltraeth marsh in a former low lying farming landscape, now on the south east perimeter of the Bryn Cefni Industrial Park. It is adjacent to the Llangefni Link Road which is currently being developed, about 1.35km south east of the town centre of Llangefni. The geology consists of a broad ridge valley between harder limestone rocks, filled with marine alluvium. The limestone is generally covered with glacial clays and soils of the brown earth group.

The location, size and scale of the proposed development was examined, and whilst the scale of any structures associated with the proposed development are currently unknown, they are likely to be of a similar character to those already developed to the east and west. With regards to plots C2 to C7, these are located between two areas that have already been developed and there is likely to be little additional visual impact either to or from the Scheduled Monument. Visual impact is more likely from area C1, which is the closest plot to the Scheduled Monument. However, the existing agricultural buildings at the Tregarnedd farmstead partly obscure the view and there are already a large attenuation pond and a sewage pumping station at the eastern end of C1 (Plates 18-20).

3.8.2.2 Our present understanding and appreciation of the Tregarnedd Fawr Scheduled Monument

The Tregarnedd Fawr Scheduled Monument (Ref: AN047) is classified as a moated site, a medieval high status and potentially defensive site type first introduced to Britain in the medieval period, becoming more common in the 13th and 14th centuries, with Tregarnedd traditionally ascribed to the 14th century (RCAHMW 1937, 91-92). The construction of the site is traditionally associated with a descendant of Ednyfed Fychan, Gruffydd ap Rhys, in the 14th century, although a recent evidence suggests that it may have been Gruffydd's father, Rhys, who was responsible for its construction (Carr 1992). These sites are very rare in North West Wales, and it is the only known example on Anglesey. Moated sites are more widespread in south Wales and in England.

The homestead moat is situated southeast of Llangefni on the edge of Malltraeth Marsh, enclosing an area of about 100m^2. The northwest and southwest sides survive in a fair condition, the others significantly destroyed. In places the single bank inside the ditch survives to a height of about 2m above the inside area. Some of the site on the North West side has been covered by 19th century farm buildings.

Tregarnedd Fawr was sited strategically and its topographic location is important for our understanding the sites function and the choice of its location. It lies within the medieval township of Tregarnedd within the parish of Llangefni, and forms a central strategic and high status place from which the exercise of the lordship could take place. Its location north of the Malltraeth Marsh on very good agricultural land will have meant that the owners were able to exploit both land and marine resources effectively.

3.8.2.3 What if anything survives of its historic surroundings?

Very little of the later medieval surroundings of Tregarnedd Fawr survive. There are no earthworks suggestive of an associated medieval settlement nearby. The closest known medieval site of broadly contemporary date is the parish church at Llangefni (PRN 2672/7010; SH45807592), which is located 1.53km away to the north-west, and a possible house platform (PRN 17,289; SH46307410), 740m to the south west, is possibly of medieval date. The area to the west of the Scheduled Monument has been heavily developed by Bryn

Cefni Industrial Park, to the north by the expansion in the 19th and 20th centuries by the town of Llangefni. Agricultural land survives to the south and south east, and the setting of the monument is therefore less affected in this direction. It is however an area of former marshland that has been drained in post-medieval times, so the medieval setting is likely to have been somewhat different. About 1.65km to the east higher ground in the vicinity of Penmynydd has a less interrupted view of the site across the former Malltraeth Marsh.

3.8.2.4 Significance

Conservation Principles (Cadw 2011, 10) identifies four component values which contribute to the significance of an historic asset: its **evidential** value; its **historical** value: its **aesthetic** value, and its **communal** value.

As a Scheduled Monument, the significance of Tregarnedd Fawr is rated as high. The monument is of national significance for its **evidential** value as a rare type of archaeological site that has significant potential to enhance our knowledge and understanding of medieval settlement. It is of high **historical** value as it is linked to nationally important historic events such as the rule of the Welsh Princes, and its role in our understanding of medieval townships and the administration of local government. Tregarnedd Fawr's **aesthetic** value derives from its formerly relatively isolated location on the intermediate landscape north of the Malltraeth marsh, however this has been much affected by later developments and must be considered moderate. Its **communal** value is high because of its historical links to the Welsh Princes and the local elites, their importance in Welsh culture and the significant role they played in shaping Welsh national identity. The primary contribution of the setting of the Tregarnedd Fawr Scheduled Monument to its significance is **evidential**.

3.9 Walkover survey

Plot C1 was and enclosed area located to the southeast of the business park access road and was separate from plots C2 to C7 (Plates 16-22). It was located within a former rectangular field and measured 1.45ha in size, immediately west of Scheduled Monument AN047 (Tregarnedd Fawr). A concrete track barrier ran along the northeastern edge of the plot, which led to a pumping station. The Tregarnedd Farm outbuildings that from part of the scheduled monument area were visible from the southeastern side of plot C1, on the other side of a large attenuation pond (Plates 19-20). The presence of the pumping station and track, as well as the attenuation pond confirmed that these portions of the plot have already been disturbed, with the open area limited to the central and southeastern ends of the plot. This open area was characterised by open grassland of mixed flora, including teasels, suggesting it had been recently stripped and/or disturbed (Plate 22). No archaeological features were identified and it appeared that the drain located during the 1998 assessment (PRN 62164; NGR SH46747482) at the northern end of the plot, is unlikely to still be present due to the business park infrastructure at that end. The north eastern side is also heavily affected by the new Llangefni link road infrastructure (Plate 21).

Plots C2 to C7 were not defined on the ground but were within a large open area of rough grassland, surrounded by existing business park infrastructure. Two access points were also extant at the southern and eastern end of the site respectively (Plates 1-2). The grassland stood to a height of 0.7m and was mixed with bramble, teasel, wild flowers, herb willow, nettles, patches of bracken and isolated immature trees, including ash and horse chestnut (Plates 3-15). Along the southwest boundary of the location for plots C7 and C5 (Figure 04), defunct industrial waste material, including rusting equipment, had been deposited (Plate 8). Along the northwest site boundary, an overgrown boundary line was visible that included a *clawdd* surmounted by hedgerow; the boundary line measured 0.5m high and 2.5m wide and the immature growth forming the hedgerow suggested it may not have been of any antiquity (Plate 10). A substantial soil bund, 2m high and 5m wide was also visible along the northern site boundary (Plate 12). The presence of this bund, as well as the mixed flora across the site, suggest the general area has been recently stripped and/or disturbed. No evidence for the former quarry (PRN 62162; NGR SH4658774985; Feature 5) in plot C5 was visible at ground level during the walkover survey.

Relict remains of two of the internal field boundaries located on the First to Third Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheet XVIII.3 were visible, including

the 30m long southwest to northeast field boundary at the south eastern end of the site [Features 1 and 2]. This boundary line was visible as a 0.7m high hedgerow grown wild, with a mixture of mature trees, including hawthorn and birch.

3.10 Gazetteer of features

The notation ‘A’ after a grid reference indicates the central point of a wider area in which the feature is located, and the notation ‘C’ indicates the centre point of an irregular or linear shaped feature.

Feature Number	1
Site name	Relict Former Field Boundary
PRN number	74, 664
Grid reference	SH 46697491 C
Period	Post-medieval
Site type	Field Boundary
Assessment category	C
Description	Relict remains of internal field boundaries located on the First to Third Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheet XVIII.3 were visible, including the 30m long southwest to northeast field boundary at the south eastern end of the site. This boundary line was visible as a 0.7m high hedgerow grown wild, with a mixture of mature trees, including hawthorn and birch (cf. Figure 03; Plates 4-5).
Impact	Considerable
Recommendation for further assessment/evaluation	None
Recommendation for mitigatory measures	Basic Recording

Feature Number	2
Site name	Relict Field Boundary
PRN number	74,665
Grid reference	SH46627500 C
Period	Post-medieval
Site type	Field Boundary
Assessment category	C
Description	Relict remains of the former northwest – southeast field boundary were noted. These were located on the First to Third Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheet XVIII.3 (Figure 03). This boundary line was interrupted, but a number of mature trees survived to indicate its route (Plate 9).
Impact	Considerable
Recommendation for further assessment/evaluation	None
Recommendation for mitigatory measures	Basic Recording

Feature Number	3
Site name	Sewage Pumping Station
PRN number	74,666
Grid reference	SH46777478
Period	Modern
Site type	Infrastructure
Assessment category	D
Description	A 13m by 8m railed enclosure with a concrete base orientated north east – south west and approached along a concrete track accessed from the road to the north-west (Figure 02; Plate 18). It is surrounded by high galvanised railings and contains a sewage pumping station, gated on the south western side.
Impact	Unknown
Recommendation for further assessment/evaluation	None
Recommendation for mitigatory measures	None

Feature Number	4
Site name	Attenuation Pond
PRN number	74,667
Grid reference	SH46747473
Period	Modern
Site type	Infrastructure
Assessment category	D
Description	A large attenuation pond, 80m by 24m, with concrete steps down into it on the north east side (Figure 02; Plates 19-20). It was orientated northeast-south west and situated against the south eastern boundary of C1. It is over 5m deep, but and was empty but not accessible on the site visit. It is of entirely modern construction and no archaeology could have survived its construction.
Impact	Unknown
Recommendation for further assessment/evaluation	None
Recommendation for mitigatory measures	None

Feature Number	5
Site name	Quarry, Bryn Cefni Industrial Park
PRN number	PRN 62164 (cf. Figure 01)
Grid reference	NGR SH46747482
Period	Post medieval
Site type	Quarry
Assessment category	C
Description	This field contained a small quarry at the topmost point. The quarry, which is shown on the OS map of 1887, had been partly filled in. (Richards and Davidson, 1998). It was not noted on the site visit for this project, but anomalies 4 to 5 identified in the geophysical survey (Appendix II) probably form part of this quarry.
Impact	Considerable
Recommendation for further assessment/evaluation	None
Recommendation for mitigatory measures	Watching brief during groundworks on the site.

Feature Number	6 [Anomalies 1 and 2 in geophysical survey report]
Site name	Possible ditches, Bryn Cefni Industrial Park
PRN number	PRN 74920 (cf. Figure 08)
Grid reference	NGR SH46687503 A
Period	Unknown
Site type	Probable Field Boundaries
Assessment category	E
Description	Three possible related ditches were identified on the geophysical survey, orientated northwest-southeast and northeast-southeast and located in plots C3 and C4 (Anomalies 1 and 2; Appendix III). The fact that the northwest-southeast one appears to abut the northeast-southwest ones suggests that they are related to each other and probably contemporary. Given the close proximity of known prehistoric, Roman and medieval remains these may relate to associated field systems. They could be later in date, but they certainly pre-date the 19th century mapping (Figures 03-05) and to have gone out of use by then.
Impact	Considerable
Recommendation for further assessment, evaluation or mitigation	Archaeological evaluation in advance of development works **OR** Mitigate with a watching brief and/or targeted excavation during groundworks

Feature Number	7 [Anomaly 3 in geophysical survey report]
Site name	Possible rectilinear feature, Bryn Cefni Industrial Park
PRN number	PRN 74921 (cf. Figure 08)
Grid reference	NGR SH46667492 C
Period	Unknown
Site type	Quarry
Assessment category	E
Description	A rectilinear feature of possible archaeological origin identified in the geophysical survey (Appendix III). It has been suggested that they relate to a rectilinear wide ditch, and may be parallel to the southwestern extent of the ditch-like feature 6. Whilst this feature is not certainly of archaeological origin and could be modern, it merits further investigation to evaluate its potential.
Impact	Considerable
Recommendation for further assessment, evaluation or mitigation	Archaeological evaluation in advance of development works **OR** Mitigate with a watching brief and/or targeted excavation during groundworks

Feature Number	8 [Anomaly 6 in geophysical survey report]
Site name	Possible rectilinear feature, Bryn Cefni Industrial Park
PRN number	PRN 74922 (cf. Figure 08)
Grid reference	NGR SH 46687512 C
Period	Unknown
Site type	Quarry
Assessment category	E
Description	A cluster of strong positive anomalies were identified in the geophysical survey (Appendix III). These appear to relate to additional quarrying or ground disturbance activity, suggesting that the quarrying identified in feature 5 may not relate to isolated activity.
Impact	Considerable
Recommendation for further assessment/evaluation	None
Recommendation for mitigatory measures	Watching brief during groundworks on the site.

Feature Number	9 [Anomaly 7 in geophysical survey report]
Site name	Linear and curvilinear anomalies, Bryn Cefni Industrial Park
PRN number	PRN 74923 (cf. Figure 08)
Grid reference	NGR SH46677415 – SH46717477
Period	Unknown
Site type	Possible ditches and enclosures
Assessment category	E
Description	A few curvilinear anomalies noted in area C1 as a result of the geophysical survey. These are very uncertain, and whilst they may be or archaeological origin are more likely to relate to modern agricultural activity.
Impact	Considerable
Recommendation for further assessment/evaluation	None
Recommendation for mitigatory measures	Watching brief during groundworks on the site.

4 CONCLUSION & RECOMMENDATIONS

4.1 Conclusion

An archaeological assessment and evaluation in advance of proposed development works at Bryn Cefni Industrial Park, Llangefni has been completed. The proposed development plots were open pasture surrounded by business units and business park infrastructure. The area of the proposed development was recently agricultural fields, the boundaries of which were evident on cartographic evidence from the 1843 Llangefni tithe map onwards. Previous archaeological assessment, evaluation and mitigation within the local area identified prehistoric, Roman and medieval activity. In general, it was also noted that the development area appeared to have been subject to recent landscaping and groundworks during the construction of existing park infrastructure. For plot C1 this was evident from the existing attenuation pond, bund and drainage works, whilst for plots C2 to C7, this was evident from bunds around the plot boundary, the uneven ground levels and the varied flora. This was supported further by the results of the geophysical survey and geotechnical test pits, which identified evidence of made ground of varying thickness. During the geophysical survey no magnetic responses were identified that were interpreted as being of definitive archaeological interest, but two anomalies were identified as possible remnants of earlier field systems, whilst further anomalies indicated either activity associated with agriculture or more recent activity associated with the industrial park.

The study area was noted to be in close proximity to a Scheduled Monument, the Tregarnedd moated site (AN047). This site has good surviving evidence of the structure of the former enclosing moat. A direct view of the site from Bryn Cefni Industrial Park is not possible due to the presence of 19th and 20th century agricultural infrastructure, and little of the medieval surrounding landscape was noted to survive. The setting of this was noted to have been affected by Bryn Cefni Industrial Park itself to the north and west, along with the sewage works to the west, but it was also noted to have been of high historical value as it is linked to nationally important historic events such as the rule of the Welsh Princes, and its role in our understanding of medieval townships and the administration of local government.

4.2 Recommendations

The area of plot C1, with the sewage pumping station and large attenuation pond present, has been subject to much recent intervention, and any former archaeology present is likely to have been heavily disturbed. Plots C2 to C7 have been subject to recent groundworks associated with the industrial park and the results from the geophysical survey and geotechnical test pits suggest this was fairly extensive and included field boundary removal and landscaping/regrading which resulted in the creation of a large soil bund against the eastern edge of the plot. The geophysical survey suggests some archaeological activity has survived, including the possible earlier field boundaries in Plots C4, C5 and C6.

Nine features were identified within the proposed development area. Two field boundaries, [Features 1 and 2], identified within areas C2 to C7, are recommended for a basic record. Features 3 and 4 are modern infrastructure supporting the industrial park and no further recommendations are made for these. A watching brief during main groundworks is recommended for the site of a former quarry [Feature 5] in Plot C5; and watching briefs are also recommended at the locations of Features 8 and 9, which represent the geophysical anomaly 6 in Plot C3 and anomaly 7 in Plot C1, respectively. These anomalies are associated with ground disturbance activities that are either agricultural in origin or also associated with quarrying. Feature 6, represented by geophysical anomalies 1 and 2 (possible ditches/field boundaries), located across Plots C4 to C6, is recommended for either archaeological evaluation in advance of development works or mitigation with a watching brief and/or targeted excavation during groundworks. Feature 7, represented by geophysical anomaly 3 (possible rectilinear feature), located in Plot C7 is also recommended for either archaeological evaluation in advance of development works or mitigation with a watching brief and/or targeted excavation during groundworks. As well as the feature recommendations, a general watching brief is also recommended for the development as a whole to qualify and mitigate the overall results of the geophysical survey and geotechnical trial pits.

5 SOURCES CONSULTED

5.1 Primary Sources

Aerial Photographic Unit, Welsh Government

Aerial photographs RAF 106G/UK 655 frames 3112 and 3113, taken on 13th August 1945

National Library of Wales

Tithe map and Apportionment of the parish of Llangefni, 1843

5.2 Secondary Sources

1. British Geological Survey 1980 *Soils of England and Wales. Soils of Wales Map 2*
2. Cadw, 2017. *Setting of Historic Assets in Wales*
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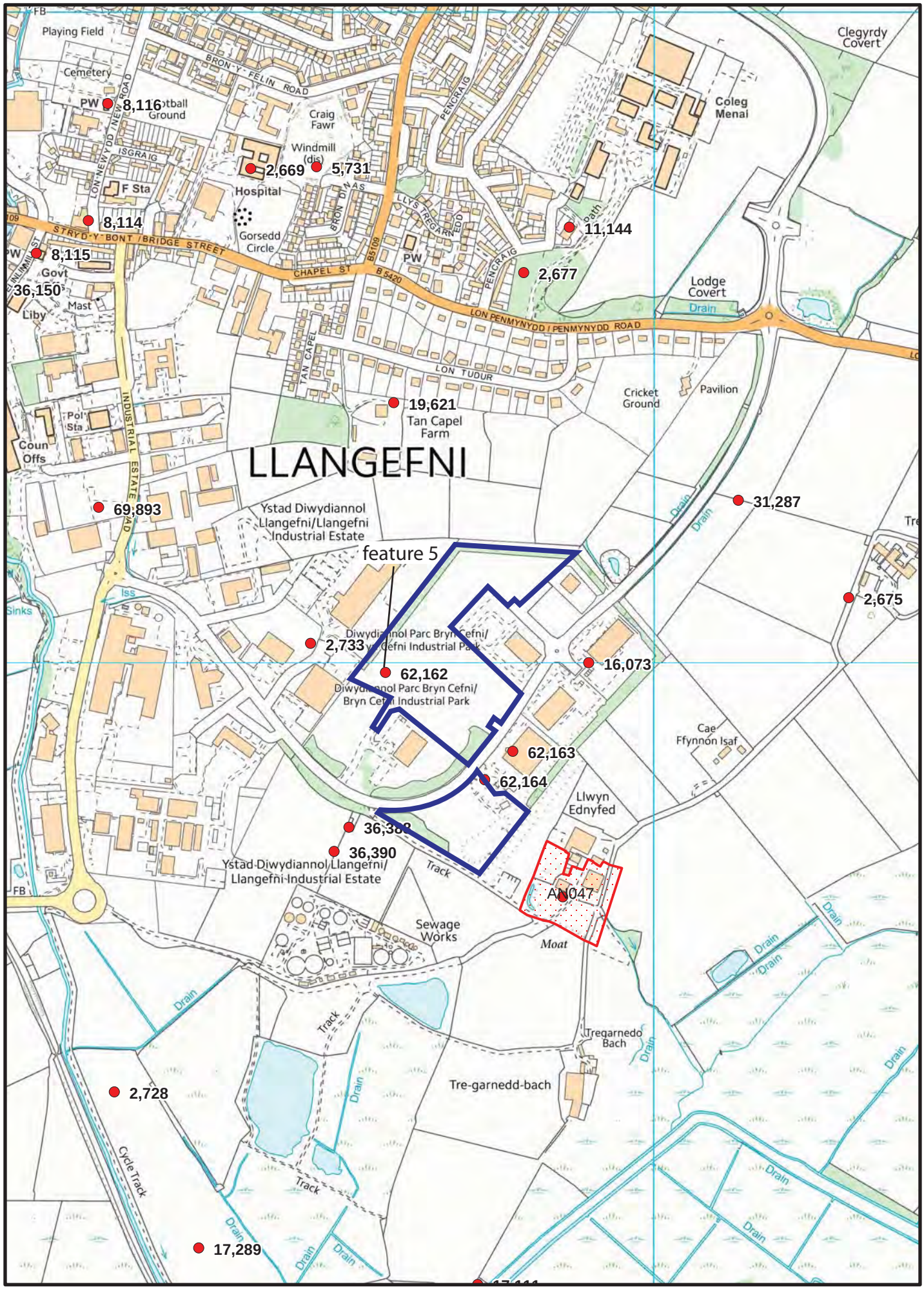

Figure 01: Location of assessment/evaluation area (outlined blue) and local archaeological features.
Based on Ordnance Survey 1:10000 County Series Map Sheets SH36.
Scale 1:10000 @ A4. © Crown Copyright. All Rights Reserved. License Number AI100020895.

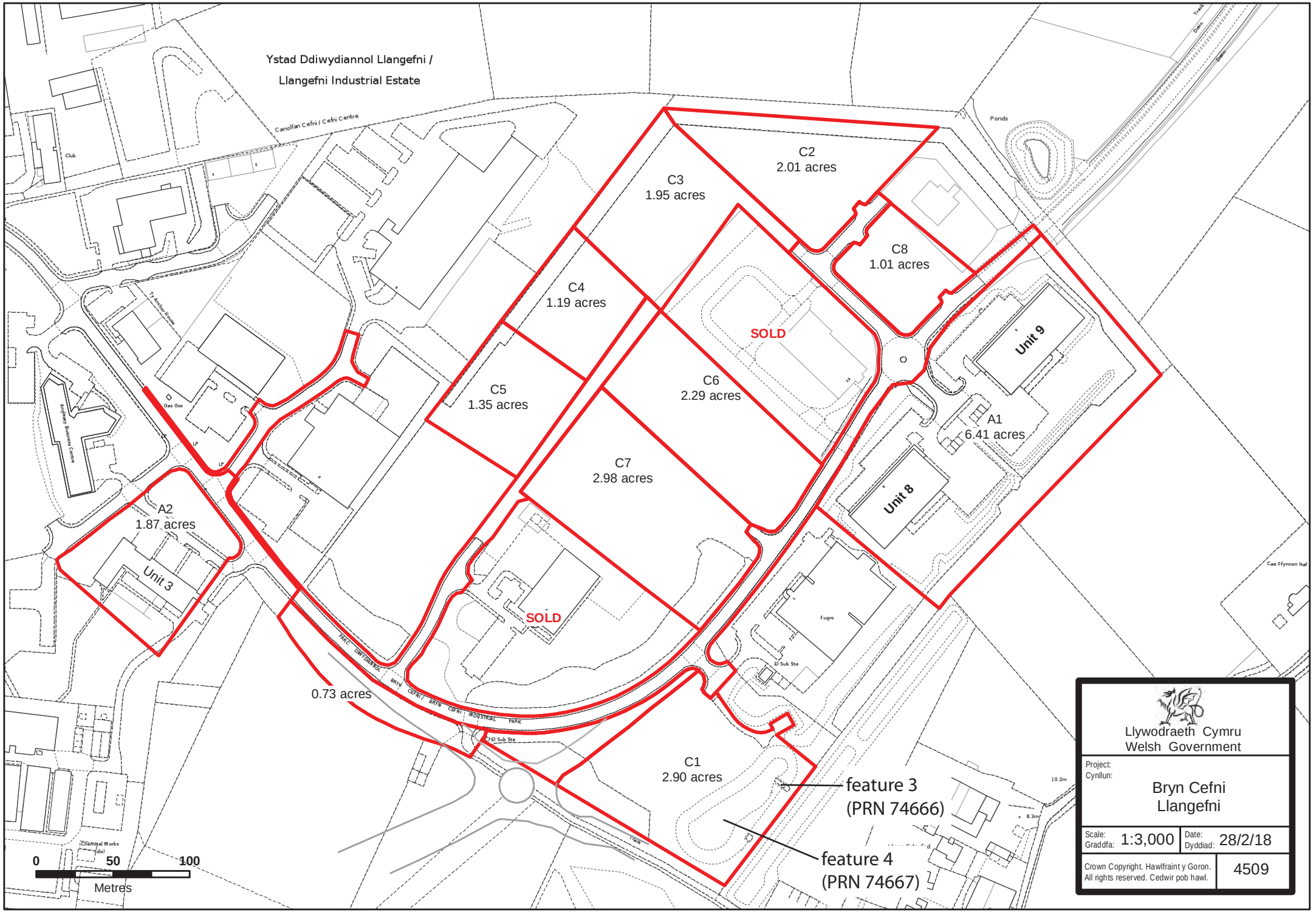

Figure 02: Reproduction of Welsh Government Drawing No. 4509

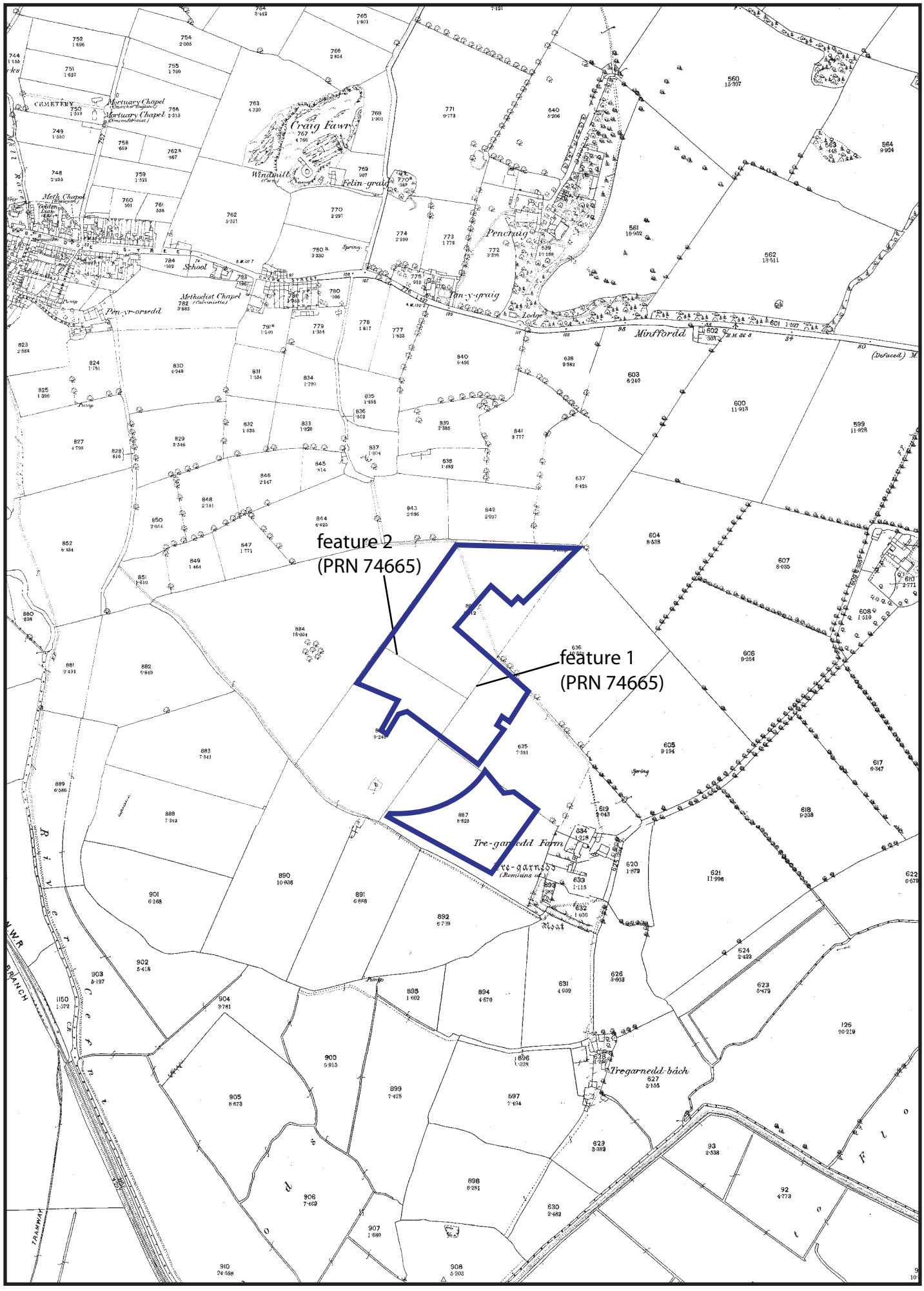

Figure 03: First Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheet XVIII.3, 1889 and location of the proposed development area (outlined blue). Scale: 1 to 5000@A4.

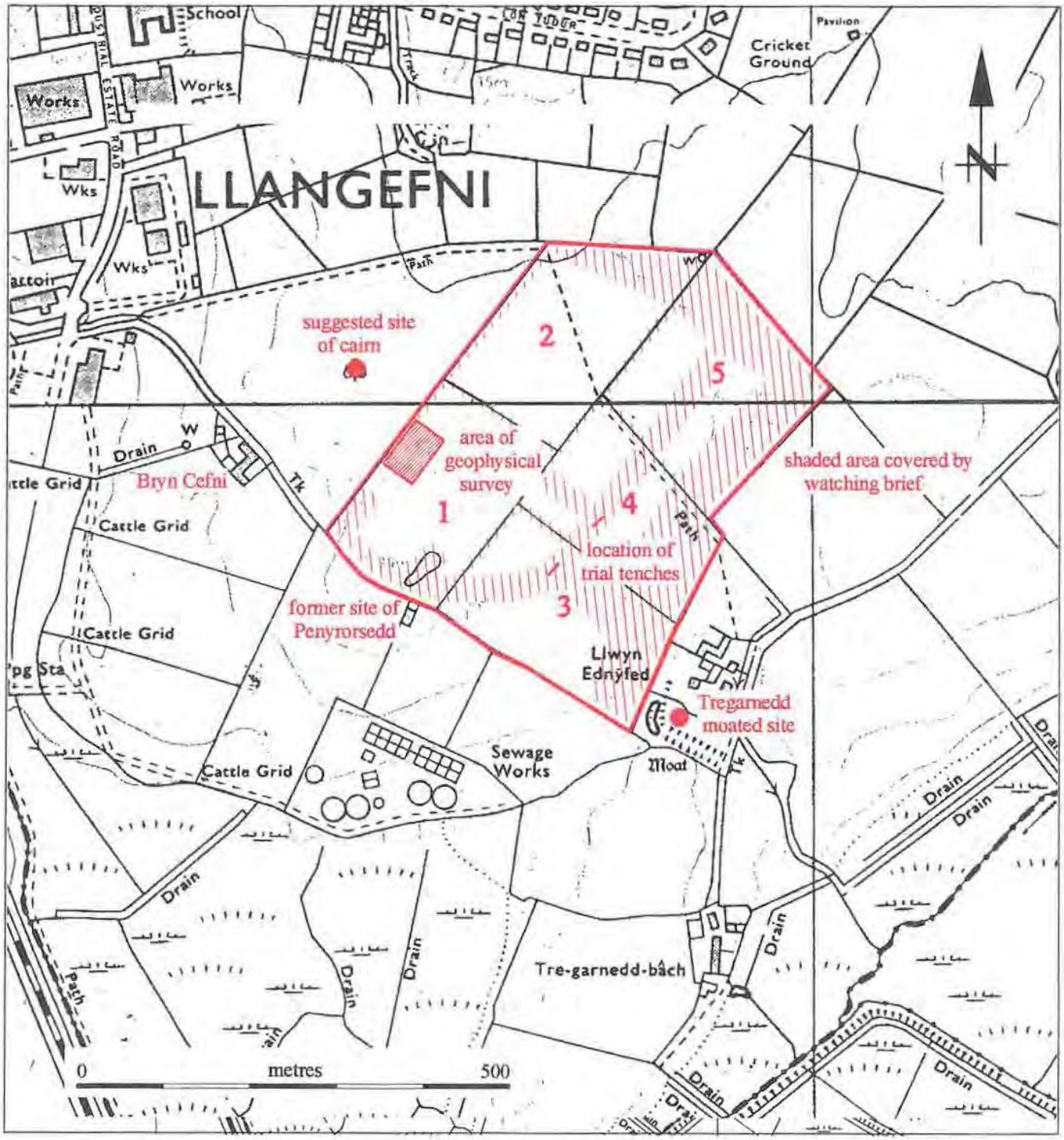

Figure 04: Reproduction of GAT Report 302 Figure 01, detailing assessment, evaluation and mitigation areas. The former fields are numbered 1 to 5.

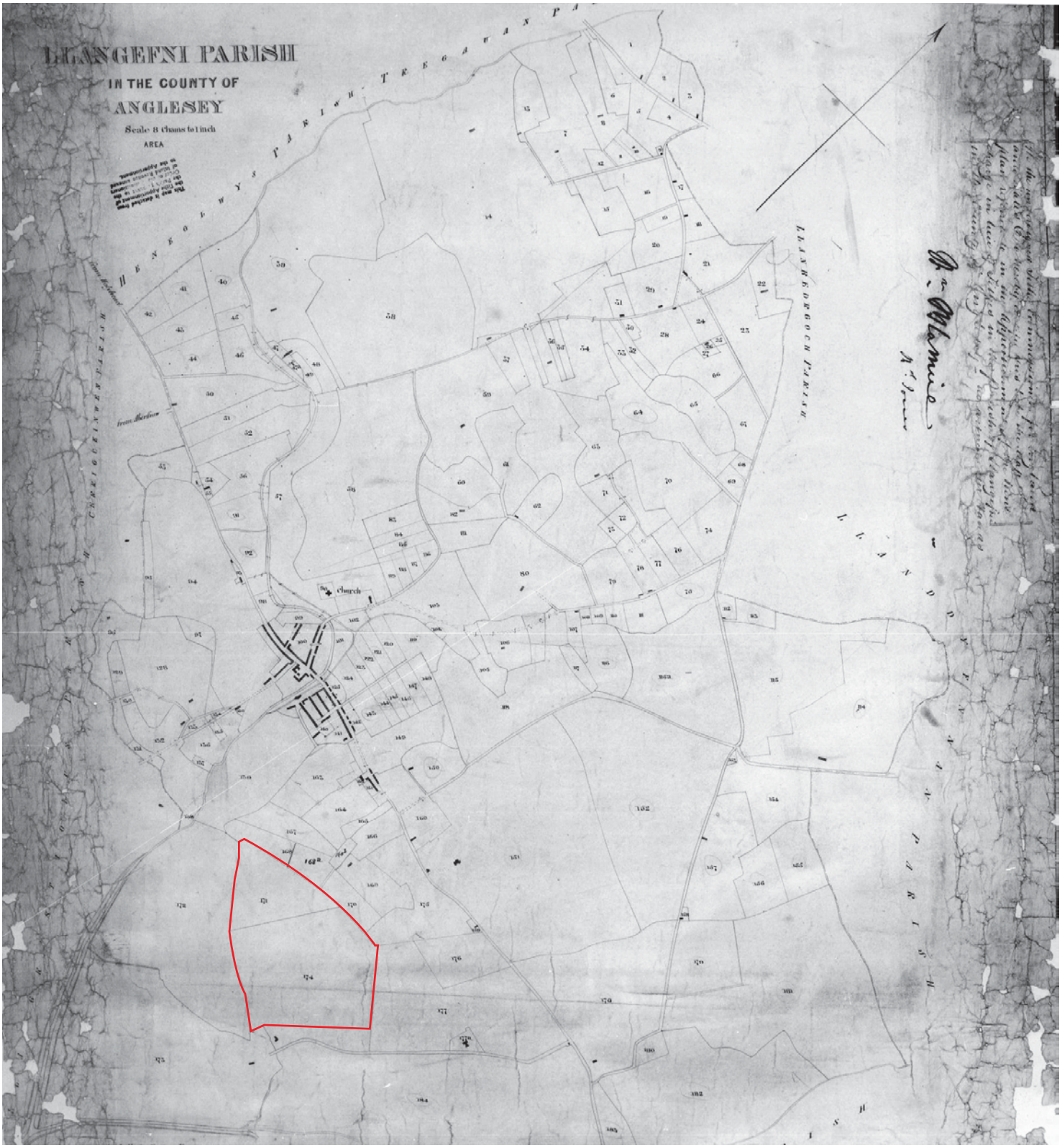

Figure 05: Reproduction of Llangefni Parish Tithe Map, published 1843. The general assessment area is highlighted in red. Not to scale (Source: NLW)

Figure 06: Composite DSM and DTM 1m Lidar Data of assessment area and immediate environs.

Figure 07: Reproduction of Sumo Survey Magnetometer - Greyscale Plots (Source: Sumo Survey Report 13727).

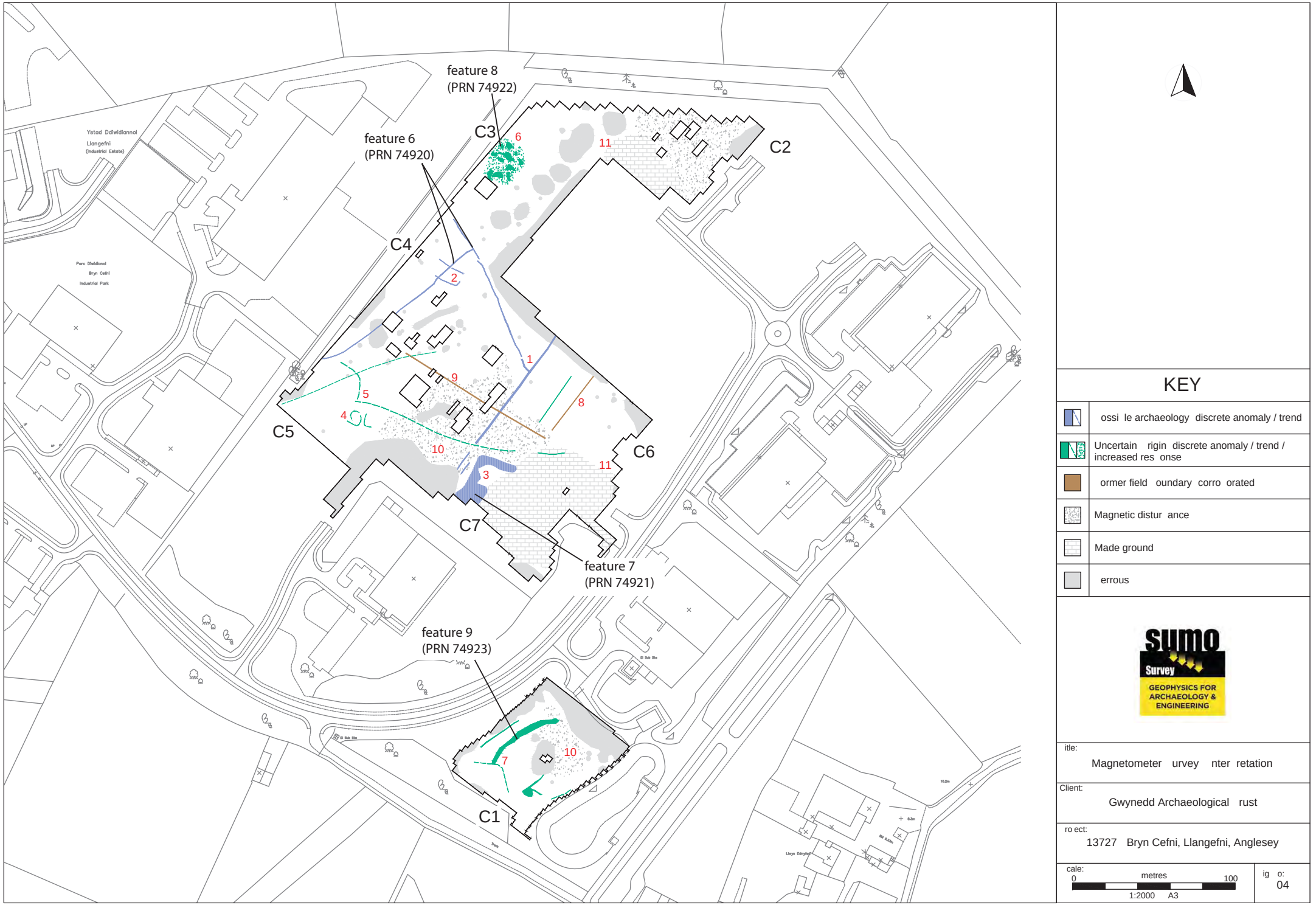

Figure 08: Reproduction of Sumo Survey Magnetometer – Interpretation Source: Sumo Survey Report 13727).

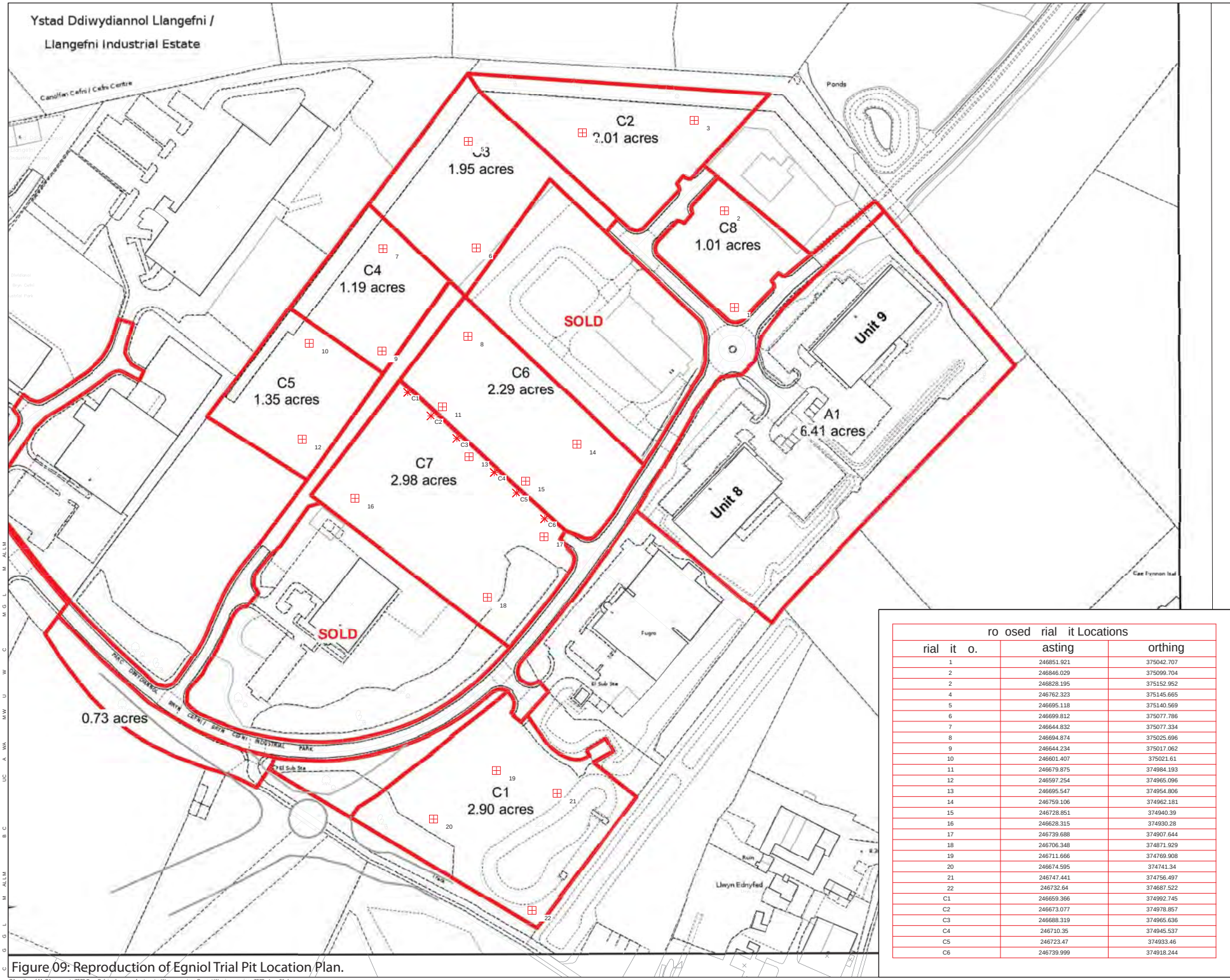

Figure 09: Reproduction of Egniol Trial Pit Location Plan.

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1	246851.921	375042.707
2	246846.029	375099.704
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5	246695.118	375140.569
6	246699.812	375077.786
7	246644.832	375077.334
8	246694.874	375025.696
9	246644.234	375017.062
10	246601.407	375021.61
11	246679.875	374984.193
12	246597.254	374965.096
13	246695.547	374954.806
14	246759.106	374962.181
15	246728.851	374940.39
16	246628.315	374930.28
17	246739.688	374907.644
18	246706.348	374871.929
19	246711.666	374769.908
20	246674.595	374741.34
21	246747.441	374756.497
22	246732.64	374687.522
C1	246659.366	374992.745
C2	246673.077	374978.857
C3	246688.319	374965.636
C4	246710.35	374945.537
C5	246723.47	374933.46
C6	246739.999	374918.244

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Plate 1: General view of the eastern site entrance to plots C2 to C7; scale: 1x1m (archive reference: G2577_001).

Plate 2: General view of southern site entrance; scale: not used (archive reference: G2577_030).

Plate 3: General view of the site entrance to plots C2 to C7; scale: 1x1m (archive reference: G2577_002).

Plate 4: View along the line of the former field boundary (Feature 01) running northeast to southwest visible on the First Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheet XVIII.3, 1889; scale: 1x1m (archive reference: G2577_003).

Plate 5: View along the line of the former field boundary running northeast to southwest (Feature 01) visible on the First Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheet XVIII.3, 1889, showing relict field boundary extant for a length of c.30m at the southwestern end; scale: 1x1m (archive reference: G2577_004).

Plate 6: General view across plots C2 to C7; scale: 1x1m (archive reference: G2577_005).

Plate 7: View along the southwest boundary of plots C5 and C7 showing the storage of industrial materials; scale: 1x1m (archive reference: G2577_006).

Plate 8: View along the route of the proposed access road; scale: 2x1m (archive reference: G2577_007).

Plate 9: As above but including remnants of former field boundary (Feature 02) represented by trees; scale: 1x1m (archive reference: G2577_009).

Plate 10: General view of northeastern portion of the site; scale: 1x1m (archive reference: G2577_011).

Plate 11: General view looking towards occupied unit between C6 and C8; scale: 1x1m (archive reference: G2577_012).

Plate 12: General view of bund and southeast boundary of Plot C2; scale: 1x1m (archive reference: G2577_014).

Plate 13: General view showing the current boundary of plot C2 with the current Parc Bryn Cefni infrastructure; scale: 1x1m (archive reference: G2577_015).

Plate 14: View of green fence boundary line defining sold plot near plot C4; scale: 1x1m (archive reference: G2577_017).

Plate 15: Profile view of site entrance; scale: 1x1m (archive reference: G2577_020).

Plate 16: View of entrance to plot C1; scale: 1x1m (archive reference: G2577_021).

Plate 17: View looking northeastwards across plot C1; scale: 1x1m (archive reference: G2577_022).

Plate 18: View of sewage pumping station within railings; scale: not used (archive reference: G2577_024).

Plate 19: View of large attenuation pond, with Tregarnedd to the rear behind modern boundary wall; scale: 1x1m (archive reference: G2577_026).

Plate 20: View of Tregarnedd Farm outbuildings from across an attenuation pond in C1; scale: 2x1m (archive reference: G2577_025).

Plate 21: View of northern boundary of plot C1 with modern post and wire fence and link road infrastructure; scale: not used (archive reference: G2577_027).

Plate 22: View along overgrown southwest boundary of plot C1; scale: not used (archive reference: G2577_028).

APPENDIX I

Approved written scheme of investigation, September 2018.

BRYN CEFNI INFRASTRUCTURE WORKS
(G2577)

WRITTEN SCHEME OF INVESTIGATION FOR ARCHAEOLOGICAL ASSESSMENT & EVALUATION (GEOPHYSICAL SURVEY)

Prepared for Egniol Environmental Ltd.

September 2018

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

Approvals Table				
	Role	**Printed Name**	**Signature**	**Date**
Originated by	Document Author	JOHN ROBERTS		04/10/18
Reviewed by	Document Reviewer	ROBERT EVANS		4/10/2018
Approved by	Principal Archaeologist	JOHN ROBERTS		04/10/18

Revision History			
Rev No.	**Summary of Changes**	**Ref Section**	**Purpose of Issue**
1	Edits further to feedback from Gwynedd Archaeological Planning Services	1, 2 and 3	approval

All GAT staff should sign their copy to confirm the project specification is read and understood and retain a copy of the specification for the duration of their involvement with the project. On completion, the specification should be retained with the project archive:

Name Signature Date

BRYN CEFNI INFRASTRUCTURE WORKS (G2577)

WRITTEN SCHEME OF INVESTIGATION FOR ARCHAEOLOGICAL ASSESSMENT & EVALUATION (GEOPHYSICAL SURVEY)

Prepared for *Egniol Environmental Ltd.*, September 2018

CONTENTS

1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been asked by Egniol Environmental Ltd. on behalf of Welsh Government to prepare a written scheme of investigation for an archaeological assessment and evaluation (geophysical survey) in advance of proposed development works at Bryn Cefni Industrial Park, Ynys Môn (NGR SH46477494; Figure 01). The development area includes plots C1, C2, C3, C4, C5, C6 and C7 as well as an access road extension, as detailed on Welsh Government Drawing No. 4509 (Figure 02). The plots are currently open pasture and are surrounded by business units and business park infrastructure. The assessment and evaluation will be undertaken from October 2018.

A number of archaeological assessment, evaluation and mitigation projects have already been completed for Bryn Cefni Industrial Park, including a previous assessment and targeted geophysical survey of the area in 1998 (GAT Report 302). Information from these reports and any subsequent reporting for the park and the Llangeni Link Road will be consulted as part of the current assessment and evaluation. The development plot is located to the immediate northeast of Scheduled Monument AN047, which is a medieval moated site and the assessment will include a description of the setting of the moated site in relation to the proposed development site.

The assessment will conform to the guidelines specified in the Chartered Institute for Archaeologists *Standard and Guidance for Historic Environment Desk-Based Assessment* (Chartered Institute for Archaeologists, 2014) and *Setting of Historic Assets in Wales* (Cadw, 2017), and the evaluation to Chartered Institute for Archaeologists *Standard and Guidance for Archaeological Geophysical Survey* (Chartered Institute for Archaeologists, 2014). The format of this written scheme of investigation corresponds to the requirements of section 2.3 of MoRPHE (English Heritage 2015) and to MAP2 (English Heritage, 1991, *Management of Archaeological Projects*). The assessment is scheduled to be completed in October 2018.

The assessment will be monitored by Gwynedd Archaeological Planning Services (GAPS); the content of this written scheme of investigation and all subsequent reporting by GAT must be approved by GAPS prior to final issue.

The Historic Environment Record Enquiry Reference Number for this project is GATHER1001 and the Event Primary Reference Number is 45324.

GAT is certified to ISO 9001:2015 and ISO 14001:2015 (Cert. No. 74180/B/0001/UK/En) and is a Registered Organisation with the Chartered Institute for Archaeologists and a member of the Federation of Archaeological Managers and Employers (FAME).

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

The proposed development is located within an area of known prehistoric, Roman and medieval archaeology. A former quarry (Primary Reference Number (PRN) 62162; now infilled) is located within plot C5.

An examination of the First to Third Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheet of the area (Sheet XVIII.3, 1889, 1900 and 1920 respectively; cf. Figure 03) shows the development area as formerly five large rectangular or trapezoidal shaped fields next to Tregarnedd Farm, with Bryn Cefni farm to the west and semi-improved farmland further to the south (cf. Figure 04). A footpath is shown on all three editions running across the northeasternmost field. The field system was subsequently removed as part of the establishment of the industrial park.

GAT completed an archaeological assessment of the development area in 1998, followed by geophysical survey, targeted trenching and a watching brief of selected areas in advance of and during groundworks for the industrial park (GAT Report 302). The assessment included a walkover survey, which confirmed that the fields had been regularly ploughed and no earthworks were visible as upstanding features (*ibid.*: 04); parts of the area had been stripped of topsoil by the former landowner and field boundaries removed (*ibid.*: 05). The geophysical survey (magnetometer), trenching and watching brief primarily targeted the areas now developed (cf. Figure 04), including the current access road separating plot C1 from the remaining plots, as well as the area now occupied by Units 8 and 9 (cf. Figure 02). The geophysical survey included a 60m by 40m area south of plot C5, which identified three linear features of unknown origin. Evidence of post-medieval ploughing (PRN 62163) were identified in a surveyed area south of plot C7, as was an area of concentrated anomalies that was subsequently targeted by trenching to reveal a narrow drain and animal burrows (PRN 62164). Geophysical anomalies along the access road were also targeted by trial trenching but did not identify any archaeological activity. The watching brief during groundworks at the northern end of plot C2 and the area south of plot C7 did not identify any features but the watching brief along the access road to what are now Units 8 and 9 did identify two shallow clay-filled ditches at NGR SH46847494. Their function and date were undetermined, but they may continue into what is now plot C6. The archaeological works did not include plot C1 and a former quarry in plot C5 was not investigated as part of the archaeological evaluation and mitigation stages as it was outside the area to be developed at time.

GAT subsequently completed another watching brief during the groundworks for Units 8 and 9 (GAT Reports 432 and 463). A Middle Bronze Age burnt mound (PRN 16073) was identified in the car park for Unit 9 in 2001, which included a timber-lined trough (Figure 01).

GAT completed an archaeological evaluation on several plots to the immediate south of the current proposed development, in advance of a separate scheme (GAT Report 1108; cf. Figure 01). A geophysical survey and targeted trenching identified the remains of an enclosed settlement (PRN 36390) that was used into the 2nd century AD. The settlement enclosure was probably pentagonal in shape and defined by a single, rather small ditch. There appeared to have been at least one roundhouse inside as well as internal ditches, many small pits and other activity. The evaluation trenching also revealed a pit containing Neolithic artefacts (PRN 36389), with another adjacent, possibly contemporary pit. Documentary research supported the possibility that agricultural buildings (PRN 36388) within the development area are on the site of an earlier dwelling, possibly dating back to the 16th century. This location was subsequently developed as part of the Llangefni Link Road scheme, for which additional archaeological mitigation was completed by Wessex Archaeologogy (results not available at time of writing, but will be reviewed if accessible).

Brython Archaeology identified 45 medieval graves during topsoil stripping for the construction of section 1 of the Llangefni Link Road, in 2016 (Brython Archaeology Document Number B1604.03 DRAFT). The graves were located at NGR SH47247580, *c.*780m north of the current development site. Additional fieldwork was completed by *Archaeology Wales*, associated with the expansion of Coleg Menai that increased the number of graves to 87 (results not available at time of writing, but will be reviewed if accessible).

The development site is to the immediate northeast of Scheduled Monument AN047 (Figure 01), which is a moated enclosure of medieval date, the construction of which is traditionally associated with a descendant of Ednyfed Fychan, Gruffydd ap Rhys, in the 14th century. Medieval moated sites are rare in North Wales, and no other is known from Ynys Môn (GAT Report 302).

GAT completed a watching brief on a development plot 80.0m west of the current scheme, in 2016 (GAT Report 1300; cf. Figure 01). Previous archaeological work (including GAT Report 302) suggested a rock outcrop at the south east corner of the site could be the site of a former prehistoric burial mound known from documentary evidence as Tregarnedd cairn (PRN 2733). The watching brief confirmed outcrop was natural in origin and no evidence for

any constructed chambers or any other prehistoric activity were identified within the confines of the development area.

3 METHODOLOGY

3.1 Assessment (Desktop Study)

A desk-based assessment is defined as “a programme of study of the historic environment within a specified area or site on land, the inter-tidal zone or underwater that addresses agreed research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic and electronic information in order to identify the likely heritage assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of heritage….Significance is to be judged in a local, regional, national or international context as appropriate” (CIfA 2014, 4).

The desk-based assessment will involve a study of the following resources:

1. The regional Historic Environment Register ((HER) Gwynedd Archaeological Trust, Craig Beuno, Ffordd y Garth, Bangor, Gwynedd LL57 2RT) will be examined for information concerning the study area, defined as plots C1, C2, C3, C4, C5, C6 and C7 as well as an access road, as detailed on Welsh Government Drawing No. 4509 (Figure 02). This will include an examination of the core HER, the 1:2500 County Series Ordnance Survey maps and any secondary information held within the HER, including the preceding assessment, evaluation and mitigation reports prepared by GAT, Amec Foster Wheeler and Brython Archaeology (cf. Sources Consulted). All identified features will be mapped, described and added to a gazetteer of sites and the relative importance of any sites defined;
2. The National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, Plas Crug, Aberystwyth SY23 1NJ) will be checked for sites additional to the HER;
3. Aerial photographs from the National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, National Monuments Record of Wales, Plas Crug, Aberystwyth SY23 1NJ) will be examined for potential features;
4. On-line catalogue search of the National Library of Wales (Penglais Rd, Aberystwyth SY23 3BU);
5. Archive data, including primary and secondary sources, historic maps and estate maps will be examined at the regional archives (Archifau Ynys Môn / Anglesey Archives, Diwydiannol Bryncefni / Industrial Estate Rd, Llangefni LL77 7JA and

Library). The examination of the archive data will include historic mapping including the local tithe map and schedule;

6. Light Detection and Ranging (LiDAR) data will be examined from the Lle Geo-Portal at http://lle.gov.wales/home for information on potential surface features using digital terrain modelling and digital surface modelling;
7. The assessment will include a description of the setting of Scheduled Monument AN047 in relation to the proposed development site, using the guidance established in *Setting of Historic Assets in Wales* (Cadw, 2017). Setting is defined in the guidance as the broader landscape context into which the individual historic asset is set; this context includes physical and cultural factors specific to that location. For the purposes of the assessment, the setting will be assessed using the stages in the guidance document, viz. Stage 1, “Identify the historic assets that might be affected by a proposed change or development”, and Stage 2, “Define and analyse the settings to understand how they contribute to the significance of the historic assets and, in particular, the ways in which the assets are understood, appreciated and experienced”;

3.2 Walkover Survey

A walkover survey will be undertaken that will incorporate the assessment area as detailed on Figure 01 and Figure 02, incorporating plots C1, C2, C3, C4, C5, C6 and C7 as well as the additional portion of the access road. All known and new archaeological features on the ground will be located and described them on GAT pro-formas (including the site of the former quarry in plot C5). The sites will then be added to the overall gazetteer and their relative importance defined. The potential for sub-surface archaeology will be estimated and defined.

A photographic record will be maintained in RAW format using a digital SLR set to maximum resolution (Nikon D3000; resolution: 3,872 × 2,592 [10.2 effective megapixels]) and photographic metadata table will be completed and included in the report. Photographic images will be archived in TIFF format; the archive numbering system will start from G2577_001. A handheld GPS unit will also be used during the walkover survey

3.3 Gazetteer

A gazetteer will be compiled for any identified sites within and within proximity to the specified route based on information sourced from the regional HER; the gazetteer will include:

1. Feature Number
2. Site name
3. PRN number
4. Grid reference
5. Period
6. Site type
7. Assessment category
8. Description
9. Impact
10. Recommendation for further assessment/evaluation
11. Recommendation for mitigatory measures

3.4 Geophysical Survey

3.4.1 Summary

The geophysical survey will incorporate plots C1, C2, C3, C4, C5, C6, C7 and the access road extension (Figure 02) and will be carried out in a series of 20m grids, which will be tied into the Ordnance Survey grid using a Trimble R8 high precision GPS system. The survey will be conducted using a Bartington Grad 601-2 dual fluxgate gradiometer with a 1.0m traverse interval and a 0.25m sample interval.

3.4.2 Instrumentation

The Bartington Grad 601-2 dual fluxgate gradiometer uses a pair of Grad-01-100 sensors. These are high stability fluxgate gradient sensors with a 1.0m separation between the sensing elements, giving a strong response to deeper anomalies. The instrument detects variations in the earth's magnetic field caused by the presence of iron in the soil. This is usually in the form of weakly magnetized iron oxides which tend to be concentrated in the topsoil. Features cut into the subsoil and backfilled or silted with topsoil, therefore contain greater amounts of iron and can therefore be detected with the gradiometer. This is a simplified description as there are other processes and materials which can produce detectable anomalies. The most obvious is the presence of pieces of iron in the soil or immediate environs which usually produce very high readings and can mask the relatively weak readings produced by variations in the soil. Strong readings are also produced by archaeological features such as hearths or kilns as fired clay acquires a permanent thermo-remnant magnetic field upon cooling. This material can also get spread into the soil leading to a more generalized magnetic enhancement around settlement sites. Not all surveys can produce good results as results can be masked by large magnetic variations in the bedrock or soil or high levels of natural background "noise" (interference consisting of random signals produced by material with in the soil). In some cases, there may be little variation between the topsoil and subsoil resulting in undetectable features. The Bartington Grad 601 is a hand held instrument and readings can be taken automatically as the operator walks at a constant speed along a series of fixed length traverses. The sensor consists of two vertically aligned fluxgates set 500mm apart. Their cores are driven in and out of magnetic saturation by a 1,000Hz alternating current passing through two opposing driver coils. As the cores come out of saturation, the external magnetic field can enter them producing an electrical pulse proportional to the field strength in a sensor coil. The high frequency of the detection cycle produces what is in effect a continuous output. The gradiometer can detect anomalies down

to a depth of approximately one meter. The magnetic variations are measured in nanoTeslas (nT). The earth's magnetic field strength is about 48,000 nT; typical archaeological features produce readings of below 15nT although burnt features and iron objects can result in changes of several hundred nT. The machine is capable of detecting changes as low as 0.1nT.

3.4.3 Data Collection

The gradiometer includes an on-board data-logger. Readings are taken along parallel traverses of one axis of a 20m x 20m grid. The traverse interval is 1.0m and readings are logged at intervals of 0.25m along each traverse. Marked guide ropes are used to ensure high positional accuracy during the high resolution survey. The data is transferred from the data-logger to a computer where it is compiled and processed using ArchaeoSurveyor2 software. The data is presented as a grey scale plot where data values are represented by modulation of the intensity of a grey scale within a rectangular area corresponding to the data collection point within the grid. This produces a plan view of the survey and allows subtle changes in the data to be displayed. This is supplemented by an interpretation diagram showing the main feature of the survey with reference numbers linking the anomalies to descriptions in the written report. It should be noted that the interpretation is based on the examination of the shape, scale and intensity of the anomaly and comparison to features found in previous surveys and excavations etc. In some cases the shape of an anomaly is sufficient to allow a definite interpretation e.g. a Roman fort. In other cases all that can be provided is the most likely interpretation. The survey will often detect several overlying phases of archaeological remains and it is not usually possible to distinguish between them. Weak and poorly defined anomalies are most 4 susceptible to misinterpretation due to the propensity of the human brain to define shapes and patterns in random background "noise". An assessment of the confidence of the interpretation is given in the text.

3.4.4 Data Processing

The data is presented with a minimum of processing although corrections are made to compensate for instrument drift and other data collection inconsistencies. High readings caused by stray pieces of iron, fences, etc. are usually modified on the grey scale plot as they have a tendency to compress the rest of the data. The data is however carefully examined before this procedure is carried out as kilns and other burnt features can produce similar readings. The data on some 'noisy' or very complex sites can benefit from 'smoothing'. Grey-scale plots are always somewhat pixellated due to the resolution of the

survey. This at times makes it difficult to see less obvious anomalies. The readings in the plots can therefore be interpolated thus producing more but smaller pixels and a small amount of smoothing based on a low pass filter can be applied. This reduces the perceived effects of background noise thus making anomalies easier to see. Any further processing is noted in relation to the individual plot.

3.4.5 Aims

The report will include a discussion of the grey scale plot and an interpretation of the any anomalies identified; these anomalies will be presented as either positive or negative, suggesting whether they could be cut features (ditches, pits etc.), or built sub-surface features (e.g., banks). Figures will be included for the grey scale plot and for the anomaly interpretation. The results of the geophysical survey will be used to inform further recommendations for archaeological evaluation and/or mitigation (if relevant).

3.5 Data processing and report compilation

Following completion of the stages outlined above, a report will be produced incorporating the following:

1. Front cover;
2. Inner cover;
3. Figures and Plates List;
4. Non-technical summary;
5. Introduction;
6. Methodology;
    i. Desk-based assessment;
    ii. Walkover survey;
    iii. Geophysical survey;
7. Results;
    a. Desk based assessment;
        i. Location and geological summary;
        ii. Statutory and non-statutory designations;
        iii. Environmental remains and soil morphology;
        iv. Historical and archaeological background;
        v. Cartographic evidence;
        vi. Artefact potential;
        vii. Aerial photographs and LiDAR;
        viii. Setting of Scheduled Monument AN047 in relation to the proposed development site;
    b. Gazetteer of features;
    c. Walkover survey;
    d. Geophysical survey;
8. Conclusions and recommendations;
    a. Conclusion;
    b. Table of sites and recommendations;
9. Acknowledgements;
10. Bibliography;
    a. Primary sources;
    b. Secondary sources;
11. Figures; inc.:
    - location plan;
    - historic mapping;
    - location plan with identified features;
    - grey scale plot;
    - anomaly identification and interpretation;
12. Appendix I (approved written scheme of investigation);
13. Appendix II (Sites listed on GAT Historic Environment Record);
14. Appendix III (Definition of mitigation terms);
15. Appendix IV Photographic metadata (walkover survey);

    Back cover.

Illustrations will include plans of the location of the study area and archaeological sites. Historical maps, when appropriate and if copyright permissions allow, will be included.

A full archive including plans, photographs, written material and any other material resulting from the project will be prepared. The archaeological assessment outlined in this written scheme of investigation will be submitted in draft format in October 2018; a final report will be submitted to the Historic Environment within six months of submitting the draft report (April 2019).

The following dissemination will apply:

- A paper report(s) plus digital report(s) will be provided to the client/consultant and GAPS (draft report then final report);

- A paper report plus a digital report will be provided to the regional Historic Environment Record, Gwynedd Archaeological Trust; this will be submitted within six months of project completion (final report only), along with any relevant, digital information such as the project database, GIS table(s) and photographs. All digital datasets submitted will conform to the required standards set out in Gwynedd Archaeological Trust's *Historic Environment Record (HER) Guidelines for Archaeological Contractors* (Version 1.3; draft) and *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (Version 1);

- A digital report and archive (including photographic and drawn) data will be provided to Royal Commission on Ancient and Historic Monuments, Wales (final report only), in accordance with the *RCAHMW Guidelines for Digital Archives Version 1*. Digital information will include the photographic archive and associated metadata;

4 PERSONNEL

The project will be managed by John Roberts, Principal Archaeologist GAT Contracts Section. The assessment will be completed by a project archaeologist who will have responsibility for completing the desk based assessment, maintaining the site archive, liaising with GAPS and *Egniol Environmental Ltd.*and submitting the draft report and final report. The project manager will be responsible for reviewing and approving the report prior to submission.

5 INSURANCE

5.1 Public/Products Liability

Limit of Indemnity- £5,000,000 any one event in respect of Public Liability
INSURER Aviva Insurance Limited
POLICY TYPE Public Liability
POLICY NUMBER 24765101CHC/UN/000375
EXPIRY DATE 21/06/2019

5.2 Employers Liability

Limit of Indemnity- £10,000,000 any one occurrence.
The cover has been issued on the insurers standard policy form and is subject to their usual terms and conditions. A copy of the policy wording is available on request.
INSURER Aviva Insurance Limited
POLICY TYPE Employers Liability
POLICY NUMBER 24765101 CHC / UN/000375
EXPIRY DATE 21/06/2019

5.3 Professional Indemnity

Limit of Indemnity- £5,000,000 in respect of each and every claim
INSURER Hiscox Insurance Company Limited
POLICY TYPE Professional Indemnity
POLICY NUMBER 9446015
EXPIRY DATE 22/07/2019

6 SOURCES CONSULTED

1. Cadw, 2017. *Setting of Historic Assets in Wales*
2. Davidson, A. 1998. Bryn Cefni Industrial Park Extension: Archaeological Assessment & Evaluation. Gwynedd Archaeological Trust Report No. 302
3. Davidson, A. 1998. Bryn Cefni Industrial Park, Unit 2: Results of Archaeological Evaluation. Gwynedd Archaeological Trust Report No. 312.
4. Davidson, A., Jones, M., Kenney, J., Rees, C. and Roberts, J. 2010. Gwalchmai booster to Bodffordd link water main and Llangefni to Penmynydd replacement: Archaeological Mitigation Report. Gwynedd Archaeological Trust Report No. 885.
5. English Heritage, 1991, Management of Archaeological Projects
6. English Heritage, 2015, Management of Research Projects in the Historic Environment (MoRPHE).
7. Evans, R. 2008. Gwalchmai booster to Bodffordd link water main and Llangefni to Penmynydd replacement: Archaeological Assessment. Gwynedd Archaeological Trust Report No. 738.
8. Evans, R. 2012 Peboc Biomass Energy Plant, Llangefni, Anglesey. Gwynedd Archaeological Trust Report No. 970.
9. *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (Version 1)
10. Gwynedd Archaeological Trust's *Historic Environment Record (HER) Guidelines for Archaeological Contractors* (Version 1.3; draft)
11. Kenney, J. 2002. Bryn Cefni Industrial Park Phase II, plots 8 and 9: Watching Brief Results. Gwynedd Archaeological Trust Report No. 432.
12. Kenney, J. and Cooke, R. 2013 Proposed Energy Generator, Peboc, Llangefni, Ynys Môn. Gwynedd Archaeological Trust Report No. 1108.
13. Kenny, J. 2018 Hedd yr Ynys Excavation, Lôn Fron, Llangefni, Anglesey. Gwynedd Archaeological Trust Report No. 1414.
14. Royal Commission on Ancient and Historic Monuments of Wales 2015 *Guidelines for digital archives*
15. Smith, G. 2002 Excavation of a Middle Bronze Age Burnt Mound and Associated Pit at Bryn Cefni Industrial Park, Llangefni, Anglesey 2001. Gwynedd Archaeological Trust Report No. 463.
16. Smith, S. 2016 Cerbydau Gwynfor Coaches, Llangefni Ynys Môn. Gwynedd Archaeological Trust Report No. 1300.
17. Standard and Guidance for Archaeological Geophysical Survey (Chartered Institute for Archaeologists, 2014).

18. Standard and Guidance for Historic Environment Desk-Based Assessment (Chartered Institute for Archaeologists, 2014).
19. Welsh Government Drawing No. 4509

FIGURE 01

Location of assessment/evaluation area (outlined blue) and local archaeological features. Based on Ordnance Survey 1:10000 County Series Map Sheets SH36. Scale 1:10000 @ A4. © Crown Copyright. All Rights Reserved. License Number Al100020895.

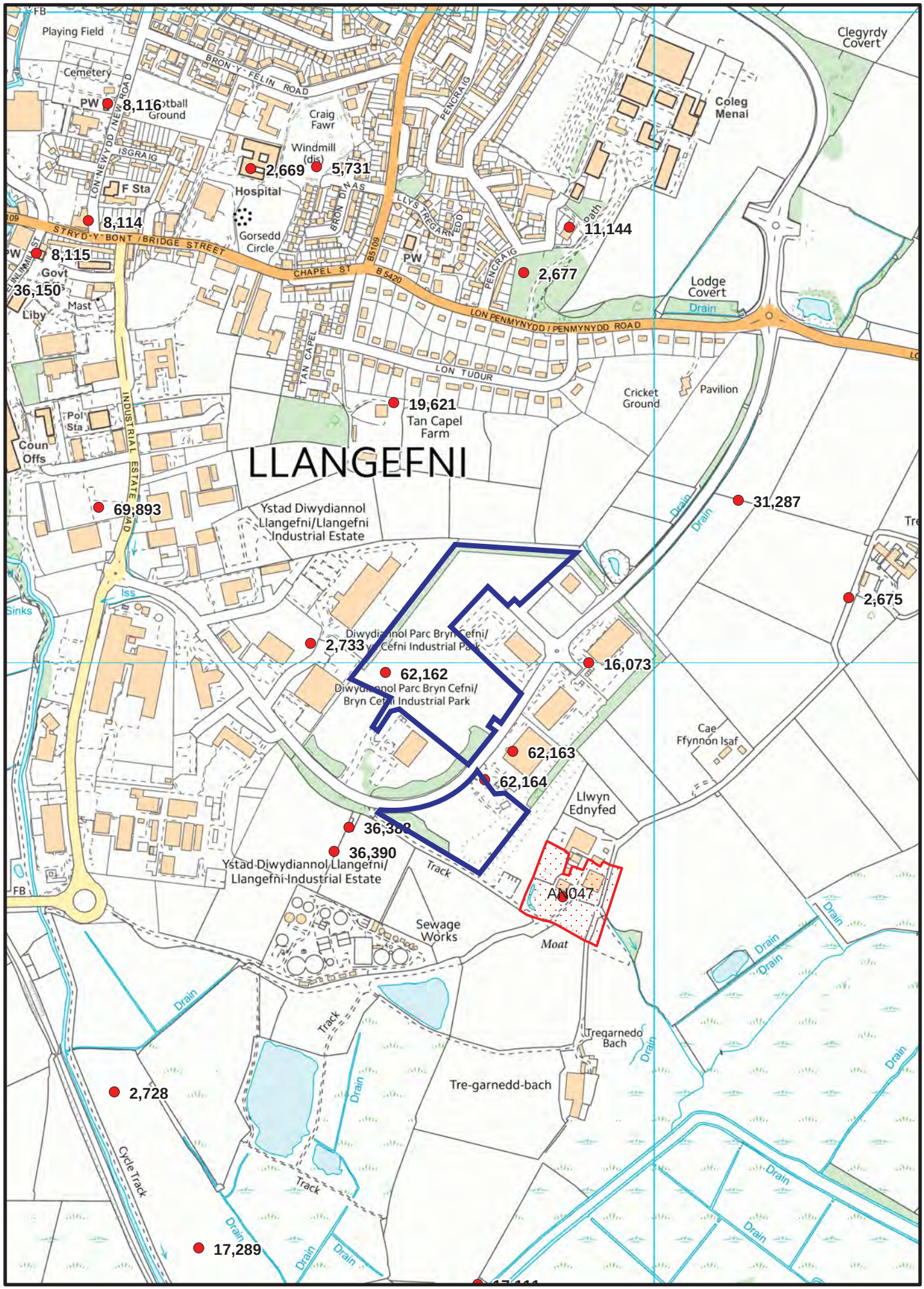
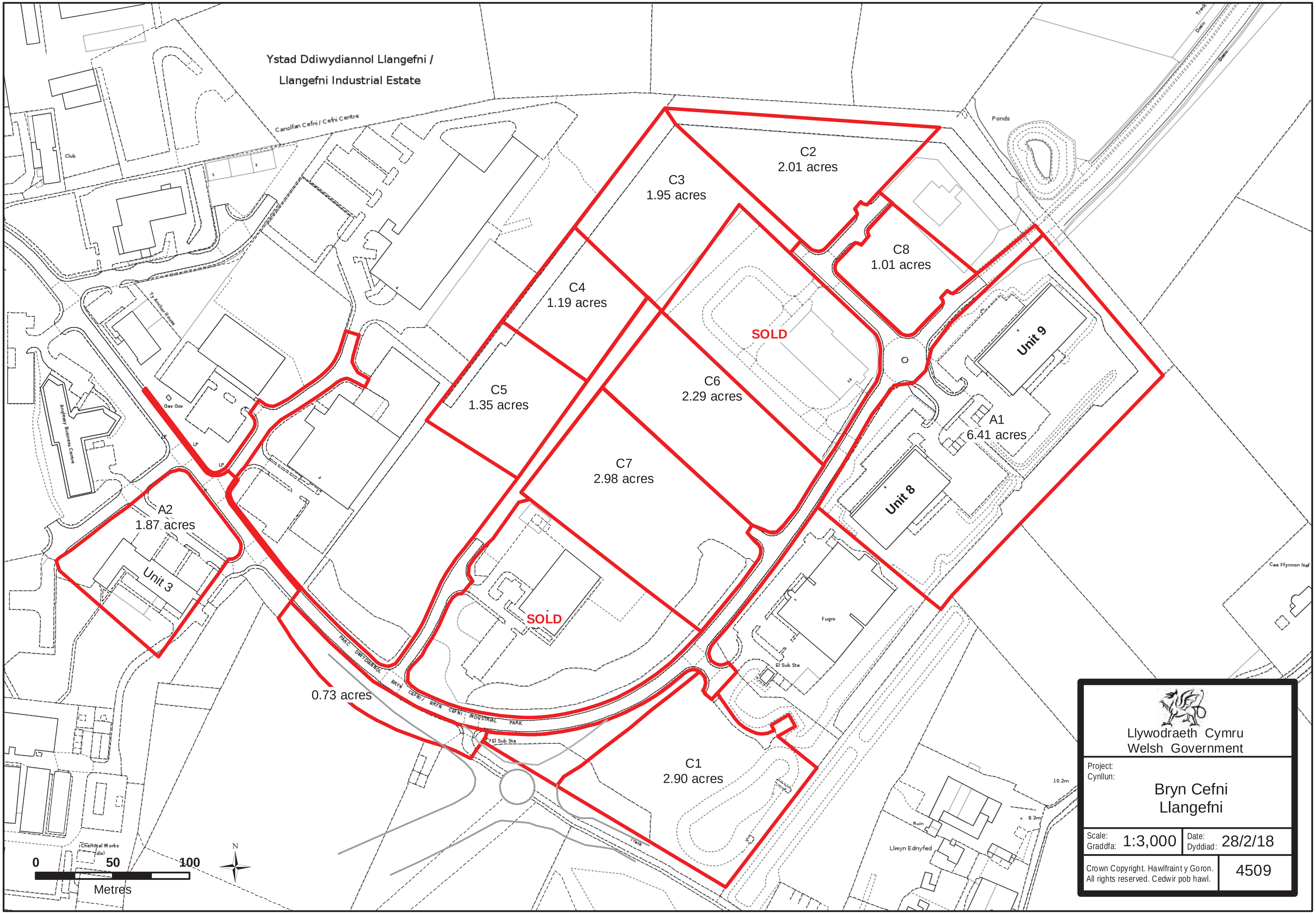


Figure 01: Location of assessment/evaluation area (outlined blue) and local archaeological features.
Based on Ordnance Survey 1:10000 County Series Map Sheets SH36.
Scale 1:10000 @ A4.

FIGURE 02

Reproduction of *Welsh Government Drawing No. 4509*



Ystad Ddiwydiannol Llangefni /
Llangefni Industrial Estate
Canolfan Cefni / Cefni Centre
Club
Ty Anchor House
Gas Gov
Anglesey Business Centre
Ponds
C2
2.01 acres
C3
1.95 acres
C8
1.01 acres
C4
1.19 acres
SOLD
C6
2.29 acres
C5
1.35 acres
A1
6.41 acres
Unit 9
Unit 8
C7
2.98 acres
A2
1.87 acres
Unit 3
SOLD
Fugro
El Sub Sta
PARC DWYDIANNOL BRYN CEFNI / BRYN CEFNI INDUSTRIAL PARK
0.73 acres
C1
2.90 acres
Cae Ffynnon Isaf
Llwyn Ednyfed
Ruin
Track
0
50
100
Metres
N
Llywodraeth Cymru
Welsh Government
Project:
Cynllun:
Bryn Cefni
Llangefni
Scale:
Graddfa:
1:3,000
Date:
Dyddiad:
28/2/18
Crown Copyright. Hawlfraint y Goron.
All rights reserved. Cedwir pob hawl.
4509

FIGURE 03

First Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheet XVIII.3, 1889 and location of assessment/evaluation area (outlined blue). Scale: 1 to 5000@A4.

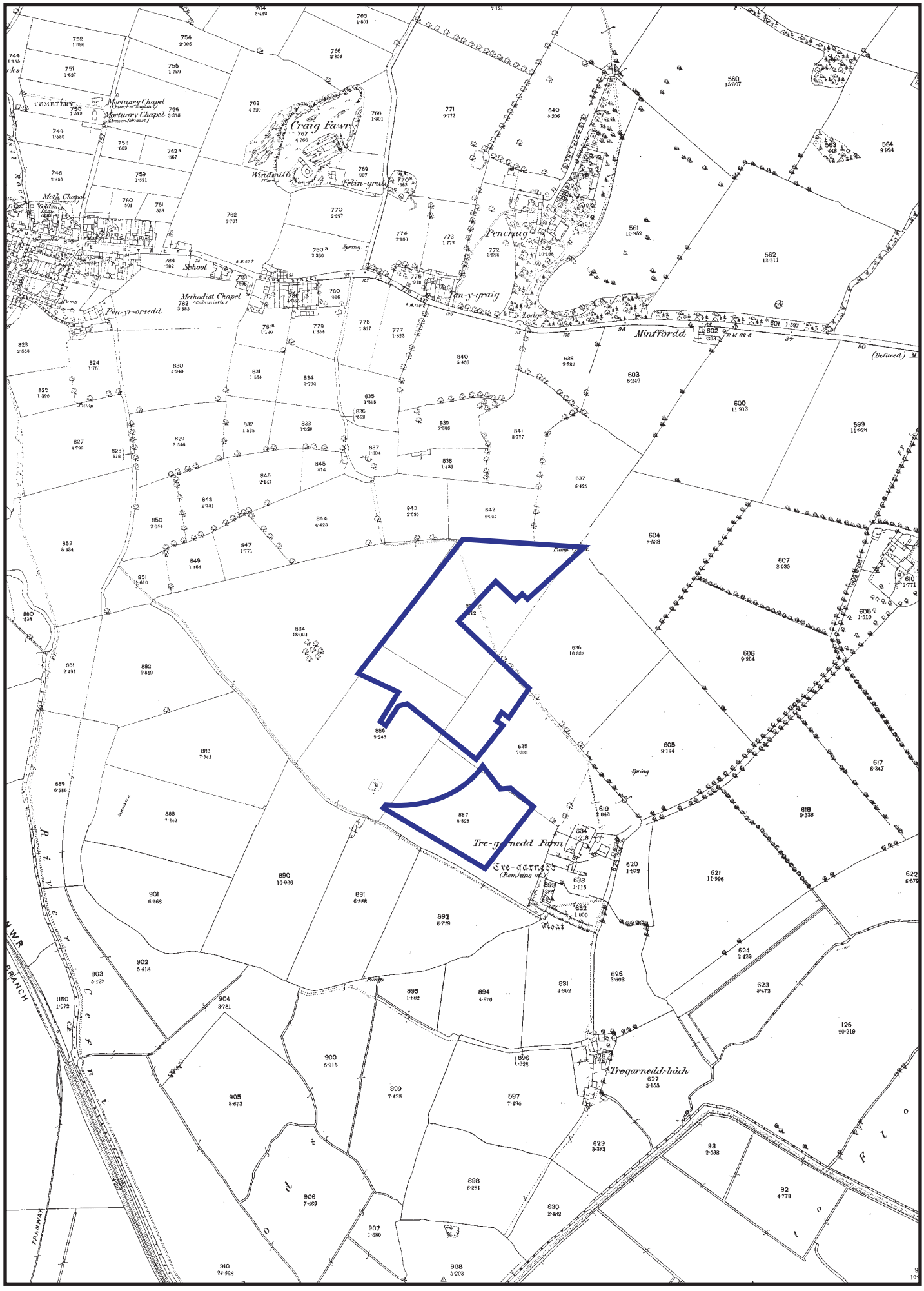


Figure 03: First Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheet XVIII.3, 1889 and location of assessment/evaluation area (outlined blue). Scale: 1 to 5000@A4.

FIGURE 04

Reproduction of GAT Report 302 Figure 01, detailing assessment, evaluation and mitigation areas. The former fields are numbered 1 to 5.

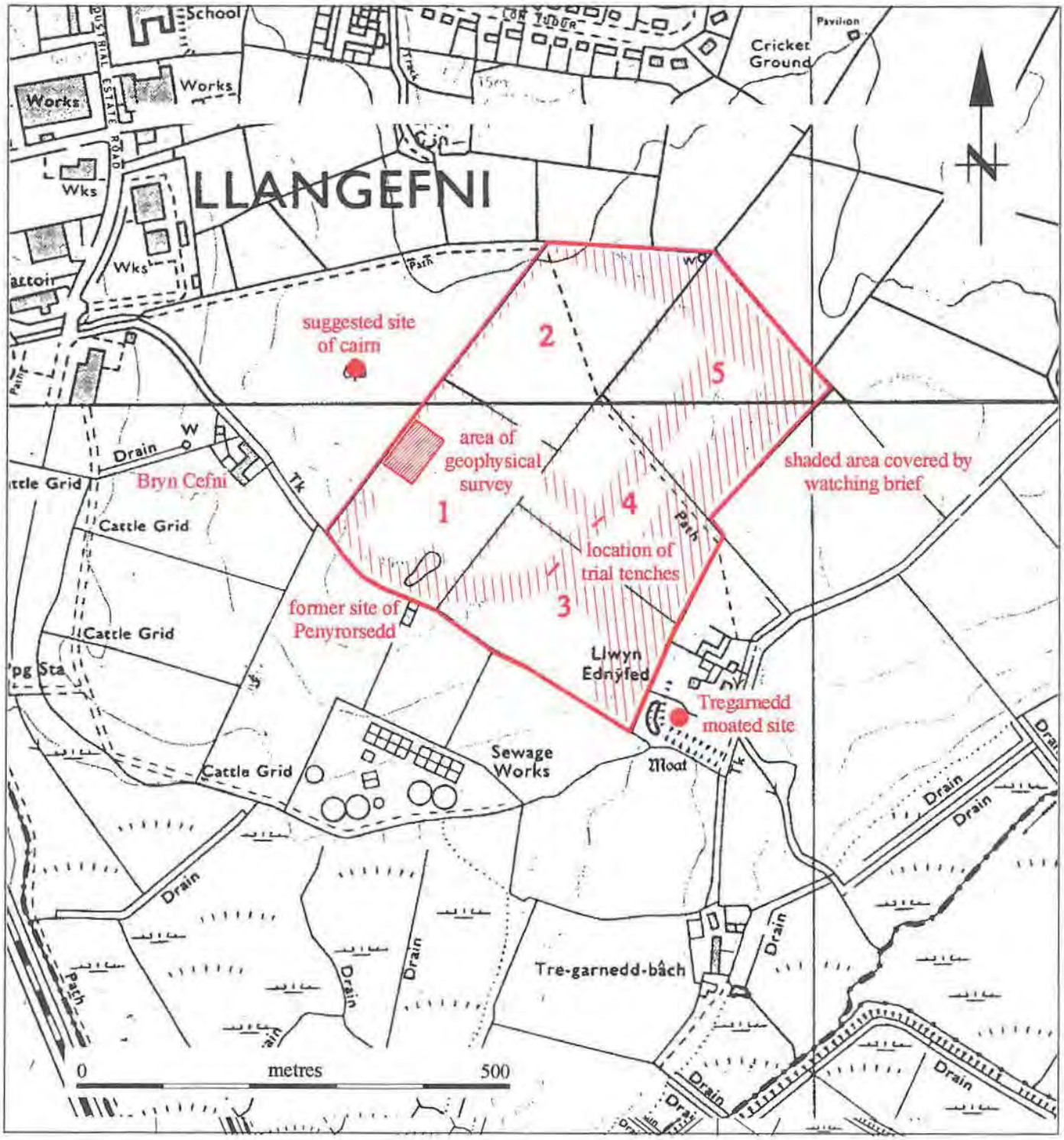


Figure 04: Reproduction of GAT Report 302 Figure 01, detailing assessment, evaluation and mitigation areas. The former fields are numbered 1 to 5.

APPENDIX II

Gwynedd Archaeological Trust Photographic Metadata

PHOTO RECORD NUMBER*	PROJECT NAME	SITE SUB-DIVISION	NGR*	DESCRIPTION*	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATE
G2577_001	Bryn Cefni Infrastructure Works	C2 to C7	SH46477494	General view of the SE site entrance to plots C2 to C7	n/a	SE	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	1
G2577_002	Bryn Cefni Infrastructure Works	C2 to C7	SH46477494	General view of the site entrance to plots C2 to C7	n/a	NW	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	3
G2577_003	Bryn Cefni Infrastructure Works	C2 to C7	SH46477494	View along the line of the former field boundary (Feature 01) running northeast to southwest visible on the First Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheet XVIII.3, 1889	n/a	NE	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	4

PHOTO RECORD NUMBER*	PROJECT NAME	SITE SUB-DIVISION	NGR*	DESCRIPTION*	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATE
G2577_004	Bryn Cefni Infrastructure Works	C2 to C7	SH46477494	View along the line of the former field boundary running northeast to southwest (Feature 01) visible on the First Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheet XVIII.3, 1889, showing relict field boundary extant for a length of c.30m at the southwestern end	n/a	SW	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	5
G2577_005	Bryn Cefni Infrastructure Works	C2 to C7	SH46477494	General view across plots C2 to C7	n/a	SW	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	6

PHOTO RECORD NUMBER*	PROJECT NAME	SITE SUB-DIVISION	NGR*	DESCRIPTION*	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATE
G2577_006	Bryn Cefni Infrastructure Works	C5 to C7	SH46477494	View along the southwest boundary of plots C5 and C7 showing the storage of industrial materials	n/a	SE	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	7
G2577_007	Bryn Cefni Infrastructure Works	C2 to C7	SH46477494	View along the route of the proposed access road	n/a	NNE	2x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	8
G2577_008	Bryn Cefni Infrastructure Works	C2 to C7	SH46477494	View along the north western end of the study area boundary	n/a	NE	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	
G2577_009	Bryn Cefni Infrastructure Works	C2 to C7	SH46477494	As above but including remnants of former field boundary (Feature 02) represented by trees	n/a	SW	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	9

PHOTO RECORD NUMBER*	PROJECT NAME	SITE SUB-DIVISION	NGR*	DESCRIPTION*	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATE
G2577_010	Bryn Cefni Infrastructure Works	C2 to C7	SH46477494	As above but including remnants of former field boundary represented by trees (Feature 02)	n/a	NW	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	
G2577_011	Bryn Cefni Infrastructure Works	C2 to C7	SH46477494	General view of northeastern portion of the site	n/a	SW	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	10
G2577_012	Bryn Cefni Infrastructure Works	C6 to C8	SH46477494	General view looking towards occupied unit between C6 and C8	n/a	W	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	11
G2577_013	Bryn Cefni Infrastructure Works	C2 to C7	SH46477494	General view of bund along the northern edge of the site	n/a	W	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	
G2577_014	Bryn Cefni Infrastructure Works	C2	SH46477494	General view of bund and southeast boundary of Plot C2	n/a	W	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	12

PHOTO RECORD NUMBER*	PROJECT NAME	SITE SUB-DIVISION	NGR*	DESCRIPTION*	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATE
G2577_015	Bryn Cefni Infrastructure Works	C2 to C7	SH46477494	General view showing the current boundary of plot C2 with the current Parc Bryn Cefni infrastructure	n/a	NE	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	13
G2577_016	Bryn Cefni Infrastructure Works	C2 to C7	SH46477494	General view showing the current boundary of plot C2 with the current Parc Bryn Cefni infrastructure	n/a	SW	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	
G2577_017	Bryn Cefni Infrastructure Works	C4	SH46477494	View of green fence boundary line defining sold plot near plot C4	n/a	SSW	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	14
G2577_018	Bryn Cefni Infrastructure Works	C2 to C7	SH46477494	General view across development plot	n/a	NE	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	
G2577_019	Bryn Cefni Infrastructure Works	C2 to C7	SH46477494	General view of the site showing the boundary	n/a	W	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	

PHOTO RECORD NUMBER*	PROJECT NAME	SITE SUB-DIVISION	NGR*	DESCRIPTION*	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATE
G2577_020	Bryn Cefni Infrastructure Works	C2 to C7	SH46477494	Profile view of site entrance	n/a	SW	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	15
G2577_021	Bryn Cefni Infrastructure Works	C1	SH46477494	View of entrance to plot C1	n/a	NE	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	16
G2577_022	Bryn Cefni Infrastructure Works	C1	SH46477494	View looking northeastwards across plot C1	n/a	SW	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	17
G2577_023	Bryn Cefni Infrastructure Works	C1	SH46477494	View of barrier and concrete track along northeastern edge of C1 heading to Tre-Garnedd (Scheduled Monument AN047)	n/a	NW	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	
G2577_024	Bryn Cefni Infrastructure Works	C1	SH46477494	View of sewage pumping station within railings	n/a	SW	not used	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	18

PHOTO RECORD NUMBER*	PROJECT NAME	SITE SUB-DIVISION	NGR*	DESCRIPTION*	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATE
G2577_025	Bryn Cefni Infrastructure Works	C1	SH46477494	View of Tregarnedd Farm outbuildings from across an attenuation pond in C1	n/a	NE	2x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	20
G2577_026	Bryn Cefni Infrastructure Works	C1	SH46477494	View of large attenuation pond, with Tregarnedd to the rear behind modern boundary wall	n/a	SSW	1x1m	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	19
G2577_027	Bryn Cefni Infrastructure Works	C1	SH46477494	View of northern boundary of plot C1 with modern post and wire fence and link road infrastructure	n/a	ENE	not used	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	21
G2577_028	Bryn Cefni Infrastructure Works	C1	SH46477494	View along overgrown southwest boundary of plot C1	n/a	WNW	not used	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	22

PHOTO RECORD NUMBER*	PROJECT NAME	SITE SUB-DIVISION	NGR*	DESCRIPTION*	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATE
G2577_029	Bryn Cefni Infrastructure Works	C1	SH46477494	General view of the entrance area to plot C1	n/a	NNE	not used	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	
G2577_030	Bryn Cefni Infrastructure Works	C2	SH46477494	General view of SW site entrance	n/a	SW	not used	Robert Evans	19/10/2018	Gwynedd Archaeological Trust	2

APPENDIX III

Reproduction of *Sumo* Services Report 13727, January 2019

GEOPHYSICAL SURVEY REPORT

GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Bryn Cefni, Llangefni, Anglesey

Client
Gwynedd Archaeological Trust

Survey Report
13727

Date
January 2019

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Cowburn Farm
Market Street
Thornton
Bradford
BD13 3HW
T: 01274 835016

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Worcestershire
WR8 0SA
T: 01684 592266

geophysics@sumoservices.com
www.sumoservices.com

GEOPHYSICAL SURVEY REPORT

Project name:
Bryn Cefni, Llangefni, Anglesey

SUMO Job reference:
13727

Client:
Gwynedd Archaeological Trust

Survey date:
14, 19 December 2019

Report date:
3 January 2019

Field co-ordinator:
Haydn Evans BA
Richard Fleming

Field Team:
Max Cooper BA
Clair Richardson BSc MPhil
Stephen Weston BA

Report written by:
Rebecca Davies BSc

CAD illustrations by:
Rebecca Davies BSc

Project Manager:
Simon Haddrell BEng AMBCS PCIfA

Report approved by:
Dr John Gater BSc DSc(Hon) MCIfA FSA

TABLE OF CONTENTS

LIST OF FIGURES

1 SUMMARY OF RESULTS

A detailed magnetometer survey was conducted over approximately 6 ha of grassland to the south-east of Llangefni, Anglesey. A few ditch-type anomalies of potential archaeological interest have been identified, possibly indicative of an enclosure or field system. Additional linear responses are of uncertain origin. Two former field boundaries have been mapped, along with areas of modern magnetic disturbance.

2 INTRODUCTION

2.1 Background synopsis

SUMO Geophysics Ltd were commissioned to undertake a geophysical survey of an area outlined for development. This survey forms part of an archaeological investigation being undertaken by **Gwynedd Archaeological Trust**.

2.2 Site details

NGR / Postcode	SH 464 749 / LL77 7XA
Location	The site is located to the north-west of Bryn Cefni Industrial Park, which lies at the south-east of Llangefni, Anglesey.
HER	Gwynedd Archaeological Trust
Unitary Authority	Ynys Mon
Parish	Llangefni
Topography	Mostly level
Current Land Use	Rough pasture
Geology	Solid: Clwyd Limestone Group - limestone is recorded across the majority of the site; Clwyd Limestone Group - sandstone and conglomerate (interbedded) is noted in the north. Superficial: Till, Devensian - diamicton (BGS 2019).
Soils	East Keswick 3 Association (541z) - well drained fine loamy soils often deep but sometimes over limestone (SSEW 1983).
Archaeology	The development area is in close proximity to a medieval Scheduled Monument (AN047), which formed a central focus for the township of Tregarnedd. The monument is now a local farmstead. An archaeological evaluation to the immediate south of the site identified Roman remains, while previous geophysical survey identified the remains of an enclosed settlement dated to the 2nd Century AD. The enclosure contained at least one round house, as well as internal ditches and pits. Evaluation trenching also revealed a pit containing Neolithic artefacts. A former quarry, now infilled, is located within plot C5 (GAT 2018).
Survey Methods	Magnetometer survey (fluxgate gradiometer)
Study Area	*c.* 6 ha

2.3 Aims and Objectives

To locate and characterise any anomalies of possible archaeological interest within the study area.

3 METHODS, PROCESSING & PRESENTATION

3.1 Standards & Guidance

This report and all fieldwork have been conducted in accordance with the latest guidance documents issued by Historic England (EH 2008) (then English Heritage), the Chartered Institute for Archaeologists (CIfA 2014) and the European Archaeological Council (EAC 2016).

3.2 Survey methods

Detailed magnetic survey was chosen as an efficient and effective method of locating archaeological anomalies.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1.0m	0.25m

More information regarding this technique is included in Appendices A and B.

3.3 Data Processing

The following basic processing steps have been carried out on the data used in this report:

De-stripe; de-stagger; interpolate

3.4 Presentation of results and interpretation

The presentation of the results includes a 'minimally processed data' and a 'processed data' greyscale plot. Magnetic anomalies are identified, interpreted and plotted onto the 'Interpretation' drawings.

When interpreting the results, several factors are taken into consideration, including the nature of archaeological features being investigated and the local conditions at the site (geology, pedology, topography etc.). Anomalies are categorised by their potential origin. Where responses can be related to other existing evidence, the anomalies will be given specific categories, such as: *Abbey Wall* or *Roman Road*. Where the interpretation is based largely on the geophysical data, levels of confidence are implied, for example: *Probable*, or *Possible Archaeology*. The former is used for a confident interpretation, based on anomaly definition and/or other corroborative data such as cropmarks. Poor anomaly definition, a lack of clear patterns to the responses and an absence of other supporting data reduces confidence, hence the classification *Possible*.

4 RESULTS

The survey has been divided into seven survey areas (Areas C1-C7) (pre-determined by the client), with Areas C2-C7 forming a larger, undivided plot. Specific anomalies have been given numerical labels [1] [2] *which appear in the text below, as well as on the Interpretation Figure.*

4.1 ***Probable / Possible Archaeology***

4.1.1 No magnetic responses have been recorded that could be interpreted as being of definite archaeological interest, however a number of ditch-type responses [1-2] could have archaeological provenance, given the close proximity of known prehistoric, Roman and medieval remains. These anomalies may form part of a rectilinear enclosure or field system, though they could be of more recent origin and relate to medieval or post-medieval field boundaries.

4.1.2 A partial rectilinear feature [3] is visible within Area C7, with its form suggesting it has an archaeological origin. The response could relate to a wide ditch-type anomaly and appears to be parallel to the south-western extent of the ditch-like feature of [1]. It is also feasible that the response is of more modern origin, and it could be associated with the construction of part of the Industrial Park or with the quarry.

4.2 ***Uncertain***

4.2.1 A few weak linear trends [4-5] are visible in plot C5. The close proximity of known archaeological features means such an explanation cannot be entirely ruled out, and it is possible that the anomalies relate to small hut circles [4] and ditches [5]. However, the very poor definition of the responses makes such an interpretation unlikely, they are more probably associated with the former quarry known to have been located in his area, or with agricultural activity.

4.2.2 A cluster of strong, discrete positive anomalies and associated increased magnetic response [6] are visible in plot C3 at the north-west of the site. Though of uncertain origin, it is possible that these anomalies relate to additional extraction activity, similar to plot C5, though their exact origin remains unclear.

4.2.3 A few linear and curvilinear anomalies [7] have been detected in Area C1. These are also of uncertain origin and could be a result of archaeological or agricultural activity.

4.3 ***Former Field Boundary***

4.3.1 Two linear anomalies [8-9] are related to former field boundaries, visible on the First Edition Ordnance Survey 1-inch County Series Map of 1889 (GAT 2018; Fig. 03).

4.4 *Ferrous / Magnetic Disturbance*

4.4.1 Two areas of magnetic disturbance [10] are visible in plots C6, C7 and C1. Though likely to have modern origins, i.e. a result of Industrial Park debris strewn across the areas, it is also possible that the disturbance is of natural origin, reflecting localised variations in the underlying geology and superficial deposits. An additional area of disturbance in plot C2 comprises higher amplitude responses and is likely to be modern.

4.4.2 Two areas of strong magnetic disturbance [11] are indicative of areas of made ground and are probably associated with the construction of the Industrial Park.

4.4.3 Ferrous responses close to boundaries are due to adjacent fences and gates. Smaller scale ferrous anomalies ("iron spikes") are present throughout the data and are characteristic of small pieces of ferrous debris (or brick / tile) in the topsoil; they are commonly assigned a modern origin. Only the most prominent of these are highlighted on the interpretation diagram.

5 DATA APPRAISAL & CONFIDENCE ASSESSMENT

5.1 Historic England guidelines (EH 2008) Table 4 states that the average magnetic response on limestone, plus interbedded sandstone and conglomerate is good but can vary. The results from this survey indicate the presence of possible ditch-type responses of archaeological origin along with old field boundaries. As a consequence, the technique is likely to have detected any archaeological features, if present.

6 CONCLUSION

6.1 The survey at Bryn Cefni has not identified any anomalies of definite archaeological origin, however a series of ditch-type responses could be of interest due to the close proximity of recorded prehistoric, Roman and medieval remains. A number of linear anomalies of uncertain origin have been mapped, along with an area of possible extraction acitivity. Areas of magnetic disturbance could be modern or natural, while areas of made ground associated with the construction of the Industrial Park are also visible in the data.

7 REFERENCES

BGS 2019 British Geological Survey, Geology of Britain viewer [Accessed 03/01/2019] *website*: (http://www.bgs.ac.uk/opengeoscience/home.html?Accordion1=1#maps)

CIfA 2014 *Standard and Guidance for Archaeological Geophysical Survey.* Amended 2016. CIfA Guidance note. Chartered Institute for Archaeologists, Reading http://www.archaeologists.net/sites/default/files/CIfAS%26GGeophysics_2.pdf

EAC 2016 *EAC Guidelines for the Use of Geophysics in Archaeology,* European Archaeological Council, Guidelines 2.

EH 2008 *Geophysical Survey in Archaeological Field Evaluation.* English Heritage, Swindon https://content.historicengland.org.uk/images-books/publications/geophysical-survey-in-archaeological-field-evaluation/geophysics-guidelines.pdf/

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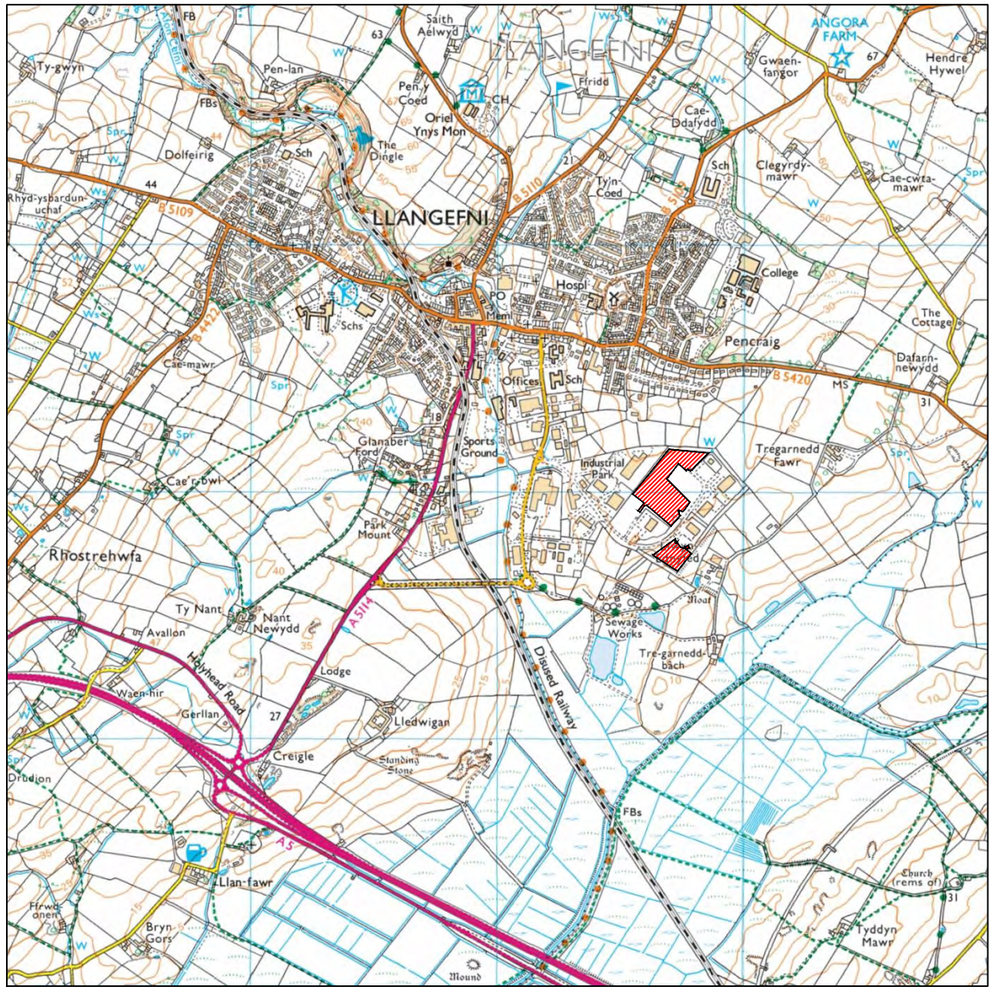
SSEW 1983 *Soils of England and Wales. Sheet 2, Wales*. Soil Survey of England and Wales, Harpenden.



N

Site Location

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

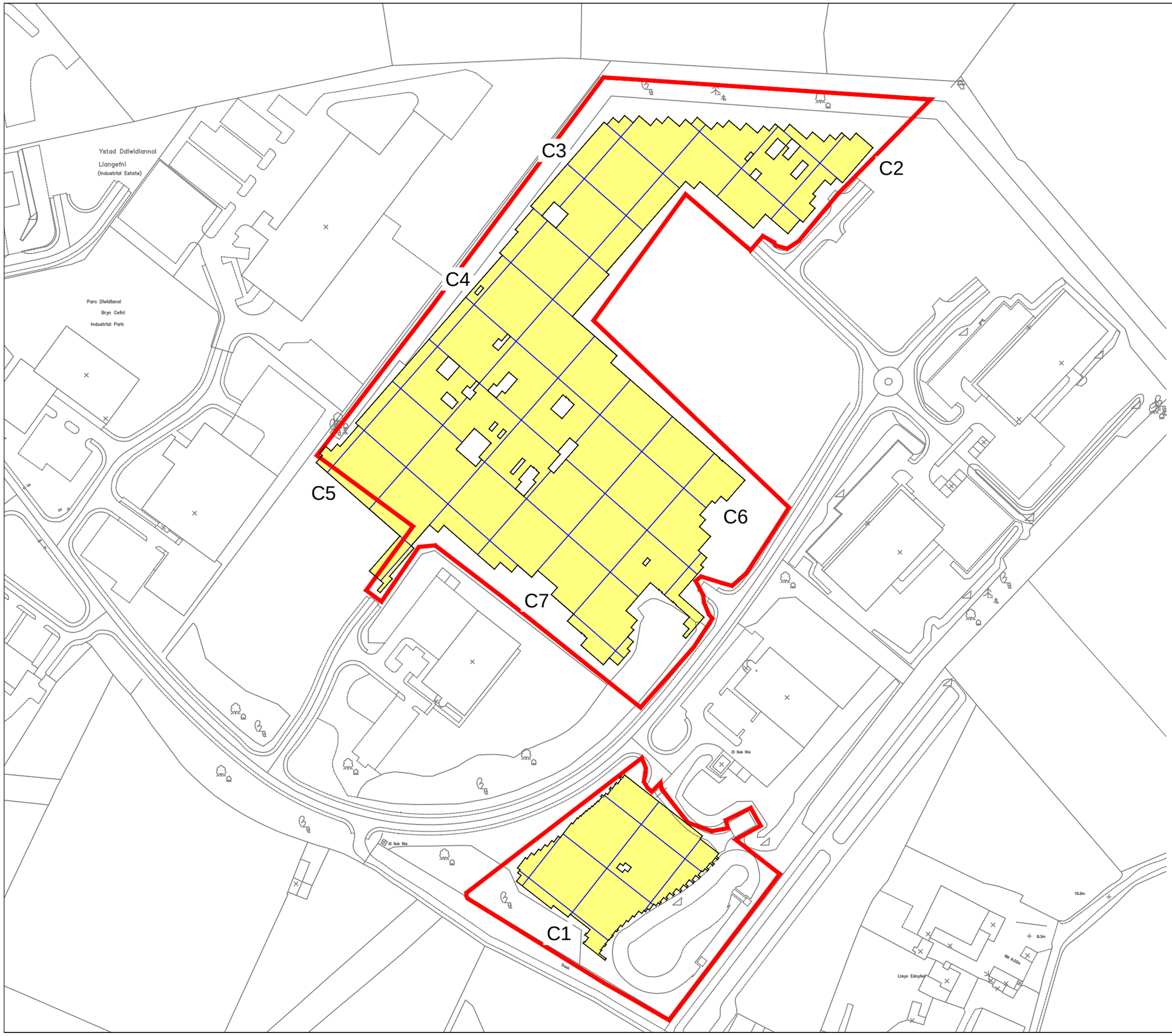
Title:
Site Location Diagram

Client:
Gwynedd Archaeological Trust

Project:
13727 - Bryn Cefni, Llangefni, Anglesey

Scale:
0 metres 1000
1:25000 @ A3

Fig No:
01



Survey Area - showing 30m grid

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Location of Survey Areas

Client:
Gwynedd Archaeological Trust

Project:
13727 - Bryn Cefni, Llangefni, Anglesey

Scale:
0 metres 100
1:2000 @ A3

Fig No:
02

N

+4nT

-2nT

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

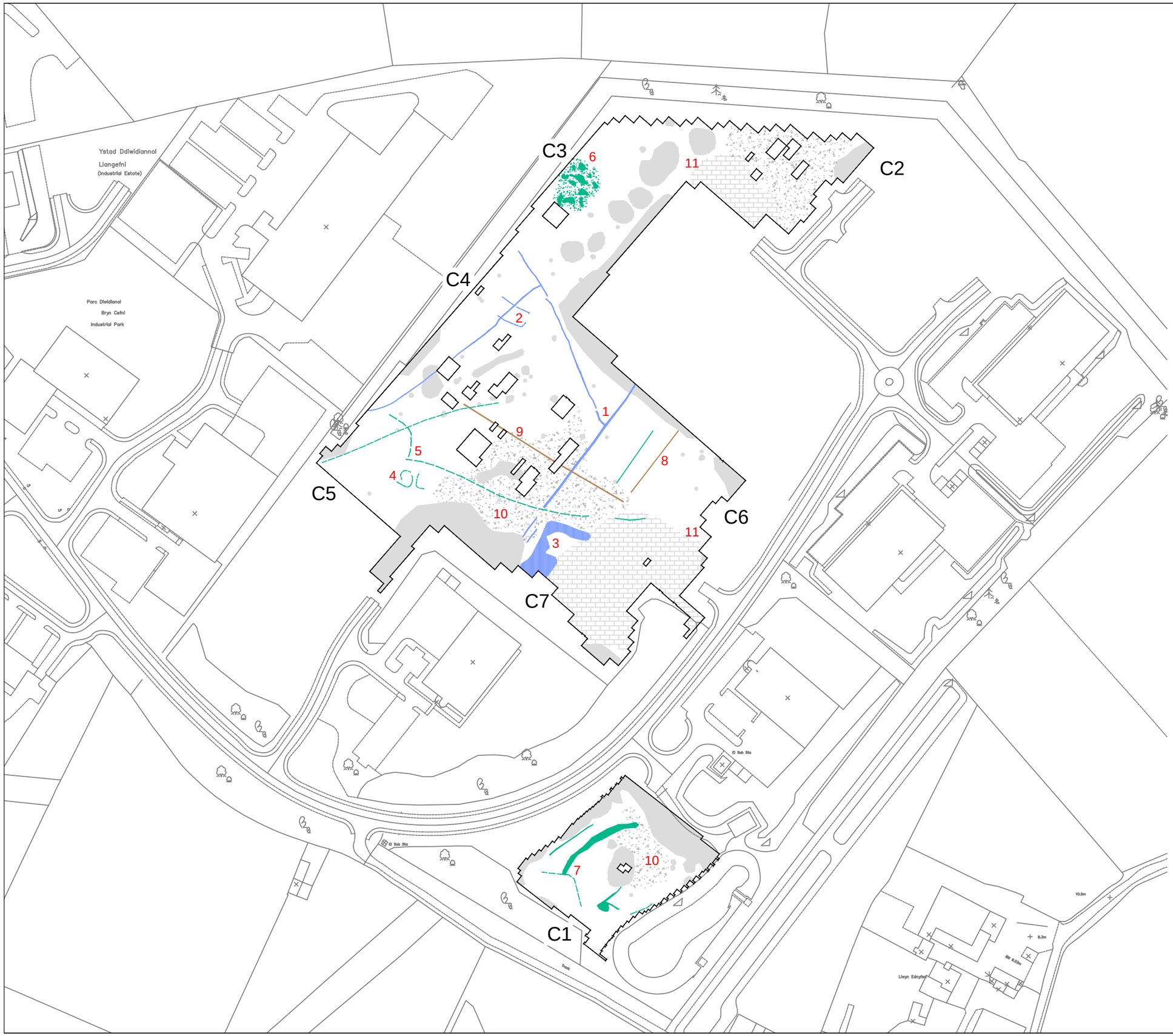
Title:
Magnetometer Survey - Greyscale Plots

Client:
Gwynedd Archaeological Trust

Project:
13727 - Bryn Cefni, Llangefni, Anglesey

Scale:
0 metres 100
1:2000 @ A3

Fig No:
03



KEY

	Possible archaeology (discrete anomaly / trend)
	Uncertain Origin (discrete anomaly / trend / increased response)
	Former field boundary (corroborated)
	Magnetic disturbance
	Made ground
	Ferrous

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Magnetometer Survey - Interpretation

Client:
Gwynedd Archaeological Trust

Project:
13727 - Bryn Cefni, Llangefni, Anglesey

Scale:
0 metres 100
1:2000 @ A3

Fig No:
04

N

+10nT

-10nT

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Minimally Processed Data - Greyscale Plots

Client:
Gwynedd Archaeological Trust

Project:
13727 - Bryn Cefni, Llangefni, Anglesey

Scale:
0 metres 100
1:2000 @ A3

Fig No:
05

APPENDIX IV

Reproduction of Quantum Geotechnical Trip Pit Logs TP01 to TP21, January 2019

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP1

Dates : 3/1/19 - 3/1/19

Location : Plot C8

Job Number : G40200

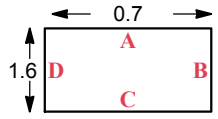
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.10	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.10)	
					0.10	MADE GROUND: Soft to firm light brown, gravelly CLAY with high cobble content and low boulder content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. Boulders of limestone. @0.90mbgl black peaty clay layer, 0.05-0.10m thick.		0.10	
					1.00			(1.00)	
1					1.10	Soft to firm, orangish brown, gravelly CLAY with low cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limestone. Cobble of sub-rounded, sandstone and limestone.		1.10	
					0.90			(0.90)	
2					2.00	Grey fractured LIMESTONE		2.00	
					0.10			(0.10)	
					2.10			2.10	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
Ty Berwig, Bynea, Llanelli
SA14 9ST
Tel: 01554744880
Fax: 01554776750
email: www.quantum-geotech.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	
RPG	J Phillips	1 Of 1	3	All measurements in metres unless otherwise stated

AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP2

Dates : 3/1/19 - 3/1/19

Location : Plot C8

Job Number : G40200

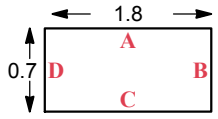
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thick-ness)	Description	Legend	Depth (Thick-ness)	
					0.10	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone, brick, concrete and limestone.		(0.10)	
					0.10	MADE GROUND: Soft brown, gravelly CLAY with high cobble content and low boulder content. Gravel is fine to coarse, rounded to sub-angular, sandstone, brick, concrete and limetstone. Cobbles of sub-rounded to sub-angular, concrete, brick, limestone and sandstone. Boulders of concrete. Refusal on concrete moved to TP2A		0.10	
					0.20			(0.20)	
					0.30			0.30	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
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RPG		1 Of 1	3	All measurements in metres unless otherwise stated

AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP2A

Dates : 3/1/19 - 3/1/19

Location : Plot C8

Job Number : G40200

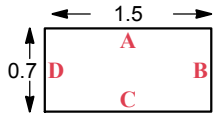
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.10	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.10)	
					0.10	MADE GROUND: Soft to firm light brown, gravelly CLAY with high cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone.		0.10	
					0.50			(0.50)	
					0.60	Soft to firm, grey, slightly sandy gravelly CLAY with medium cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limestone. Cobble of sub-rounded, sandstone and limestone.		0.60	
1					0.90			(0.90)	
					1.50	Firm to stiff greenish grey slightly gravelly CLAY with low cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limestone. Cobbles of rounded to sub-rounded sandstone and limestone.		1.50	
					0.60			(0.60)	
2					2.10	Grey fractured LIMESTONE		2.10	
					0.10			(0.10)	
					2.20			2.20	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
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RPG		1 Of 1	3	All measurements in metres unless otherwise stated

AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP3

Dates : 2/1/19 - 2/1/19

Location : Plot C2

Job Number : G40200

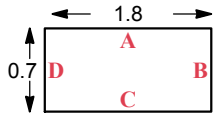
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thick-ness)	Description	Legend	Depth (Thick-ness)	
					0.10	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone, plastic and limestone.		(0.10)	
					0.10	MADE GROUND: Soft to firm reddish brown, slightly sandy gravelly CLAY with high cobble content and medium boulder content. Gravel is fine to coarse, rounded to sub-angular, sandstone, brick, plastic and limetstone. Cobbles of sub-rounded to sub-angular, limestone, brick and sandstone. Boulders of sandstone and limestone (Re-worked Natural)		0.10	
					0.80			(0.80)	
1					0.90	Soft to firm, greyish brown, slightly sandy, gravelly CLAY with high cobble content and low boulder content. Gravel is fine to coarse, sub-rounded to angular, sandstone and limestone. Cobble of sub-angular, sandstone and limestone. Boulders of sandstone and limestone		0.90	
					1.60			(1.60)	
2					2.50			2.50	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
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RPG		1 Of 1	3	All measurements in metres unless otherwise stated

AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP4

Dates : 2/1/19 - 2/1/19

Location : Plot C2

Job Number : G40200

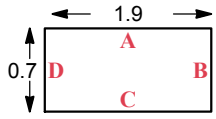
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.15	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.15)	
					0.15	MADE GROUND: Soft to firm reddish brown, slightly sandy gravelly CLAY with high cobble content and low boulder content. Gravel is fine to coarse, rounded to sub-angular, sandstone, brick, plastic and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. Boulders of sandstone (Re-worked Natural)		0.15	
					0.55			(0.55)	
					0.70	Soft to firm, greyish brown, slightly sandy, gravelly CLAY with medium cobble content and low boulder content. Gravel is fine to coarse, sub-rounded to angular, sandstone and limestone. Cobble of sub-angular, sandstone and limestone. Boulders of sandstone and limestone.		0.70	
1									
					1.80			(1.80)	
2									
					2.50			2.50	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
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Operator:	Logged By.	Sheet No.	m Per Page	
RPG		1 Of 1	3	All measurements in metres unless otherwise stated

AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP5

Dates : 2/1/19 - 2/1/19

Location : Plot C3

Job Number : G40200

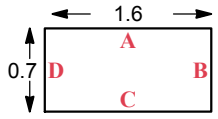
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.10	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.10)	
					0.10	MADE GROUND: Soft to firm reddish brown, slightly sandy gravelly CLAY with medium cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. (Re-worked Natural)		0.10	
					0.60			(0.60)	
					0.70	Weathered rock: Strong, grey, fractured LIMESTONE. Recovered as sub-angular to angular, Cobbles and Gravel		0.70	
1					0.30			(0.30)	
					1.00			1.00	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
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Operator:	Logged By.	Sheet No.	m Per Page	
RPG		1 Of 1	3	All measurements in metres unless otherwise stated

AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP6

Dates : 2/1/19 - 2/1/19

Location : Plot C3

Job Number : G40200

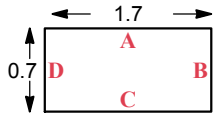
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.10	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.10)	
					0.10	MADE GROUND: Soft to firm reddish brown, slightly sandy gravelly CLAY with medium cobble content and low boulder content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone, Boulders of sandstone. (Re-worked Natural)		0.10	
					0.80			(0.80)	
1					0.90	Weathered rock: Strong, grey, fractured LIMESTONE. Recovered as sub-angular to angular, Cobbles and Gravel		0.90	
					0.60			(0.60)	
					1.50			1.50	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
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RPG		1 Of 1	3	All measurements in metres unless otherwise stated

AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP7

Dates : 2/1/19 - 2/1/19

Location : Plot C4

Job Number : G40200

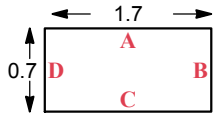
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.15	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.15)	
					0.15	MADE GROUND: Soft to firm reddish brown, slightly sandy gravelly CLAY with low cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. (Re-worked Natural)		0.15	
					1.05			(1.05)	
1					1.20	Weathered rock: Strong, grey, fractured LIMESTONE.		1.20	
					0.10	Recovered as sub-angular to angular, Cobbles and Gravel		(0.10)	
					1.30			1.30	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
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Operator:	Logged By.	Sheet No.	m Per Page	
RPG		1 Of 1	3	All measurements in metres unless otherwise stated

AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP8

Dates : 3/1/19 - 3/1/19

Location : Plot C6

Job Number : G40200

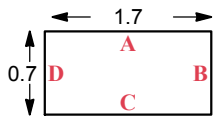
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thick-ness)	Description	Legend	Depth (Thick-ness)	
					0.10	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.10)	
					0.10	MADE GROUND: Soft to firm reddish brown, slightly sandy gravelly CLAY with medium cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. (Re-worked Natural)		0.10	
1					1.30			(1.30)	
					1.40	Strong grey mottled reddish brown conglomeritic LIMESTONE with sandstone sub-angular clasts.		1.40	
					0.10			(0.10)	
					1.50	Bedrock depth varied across the trial pit from 0.70 to 1.50mbgl		1.50	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
Ty Berwig, Bynea, Llanelli
SA14 9ST
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Fax: 01554776750
email: www.quantum-geotech.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	
RPG		1 Of 1	3	All measurements in metres unless otherwise stated

AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP9

Dates : 3/1/19 - 3/1/19

Location : Plot C4

Job Number : G40200

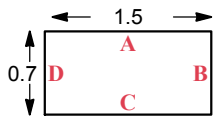
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.10	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.10)	
					0.10	MADE GROUND: Soft to firm reddish brown, slightly sandy gravelly CLAY with medium cobble content and low boulder content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. Boulders of limestone (Re-worked Natural)		0.10	
					0.80			(0.80)	
1					0.90	Very soft to soft, purplish brown, peaty slightly gravelly CLAY with low cobble content. Gravel is fine to coarse, sub-rounded to angular, sandstone, mudstone, tuff and limestone. Cobble of sub-angular, sandstone, tuff and limestone.		0.90	
					0.30			(0.30)	
					1.20	Grey mottled reddish brown weathered conglomeritic LIMESTONE with sandstone sub-angular clasts.		1.20	
					0.15			(0.15)	
					1.35			1.35	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
Ty Berwig, Bynea, Llanelli
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Operator:	Logged By.	Sheet No.	m Per Page	
RPG		1 Of 1	3	All measurements in metres unless otherwise stated

AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP10

Dates : 3/1/19 - 3/1/19

Location : Plot C5

Job Number : G40200

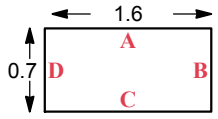
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.15	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.15)	
					0.15	MADE GROUND: Soft to firm reddish brown, slightly sandy gravelly CLAY with medium cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. (Re-worked Natural)		0.15	
					0.85			(0.85)	
1					1.00	Soft to firm, greyish brown, slightly sandy, gravelly CLAY with high cobble content. Gravel is fine to coarse, sub-rounded to angular, sandstone, mudstone, tuff and limestone. Cobble of sub-angular, sandstone, tuff and limestone.		1.00	
					0.80			(0.80)	
					1.80	Grey mottled reddish brown weathered conglomeritic LIMESTONE with sandstone sub-angular clasts.		1.80	
					0.20			(0.20)	
2					2.00			2.00	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

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AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP11

Dates : 3/1/19 - 3/1/19

Location : Plot C6

Job Number : G40200

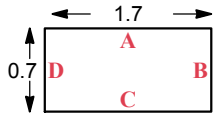
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.10	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.10)	
					0.10	MADE GROUND: Soft to firm reddish brown, slightly sandy gravelly CLAY with medium cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. (Re-worked Natural)		0.10	
					0.85			(0.85)	
1					0.95	Soft to firm, greyish brown, slightly sandy, gravelly CLAY with high cobble content. Gravel is fine to coarse, sub-rounded to angular, sandstone, mudstone and limestone. Cobble of sub-angular, sandstone and limestone.		0.95	
					1.45			(1.45)	
2					2.40	Grey mottled reddish brown weathered conglomeritic LIMESTONE with sandstone sub-angular clasts.		2.40	
					0.10			(0.10)	
					2.50			2.50	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

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AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP12

Dates : 3/1/19 - 3/1/19

Location : Plot C5

Job Number : G40200

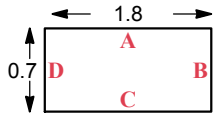
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.10	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.10)	
					0.10	MADE GROUND: Soft to firm reddish brown, slightly sandy gravelly CLAY with medium cobble content and low boulder content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. Boulders of limestone (Re-worked Natural)		0.10	
					0.80			(0.80)	
					0.90	Very soft to soft purplish brown brown mottled light yellowish brown, slightly gravelly peaty CLAY Gravel is fine to coarse, sub-rounded to angular, sandstone, tuff and limestone. @southwest end of trial pit Limesone is at 1.6 and slopes down to 2.2 across the pit.		0.90	
1									
					1.30			(1.30)	
2									
					2.20	Grey mottled reddish brown weathered conglomeritic crystalline LIMESTONE with sandstone sub-angular clasts.		2.20	
					0.10			(0.10)	
					2.30			2.30	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

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AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP13

Dates : 2/1/19 - 2/1/19

Location : Plot C7

Job Number : G40200

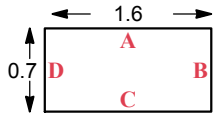
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thick-ness)	Description	Legend	Depth (Thick-ness)	
					0.15	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.15)	
					0.15	MADE GROUND: Soft to firm reddish brown, slightly silty slightly sandy gravelly CLAY with medium cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. (Re-worked Natural)		0.15	
					0.55			(0.55)	
1					0.70	Soft to firm, greyish brown, slightly sandy, gravelly CLAY with medium cobble content. Gravel is fine to coarse, sub-rounded to angular, sandstone and limestone. Cobble of sub-angular, sandstone and limestone.		0.70	
					0.80			(0.80)	
					1.50	Weathered rock: Strong, grey, fractured LIMESTONE. Recovered as sub-angular to angular, Cobbles and Gravel		1.50	
					0.15			(0.15)	
					1.65			1.65	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

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AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP14

Dates : 3/1/19 - 3/1/19

Location : Plot C6

Job Number : G40200

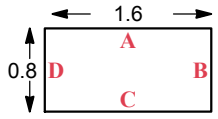
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.15	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.15)	
					0.15	MADE GROUND: Soft to firm reddish brown, slightly silty slightly sandy gravelly CLAY with low cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. (Re-worked Natural)		0.15	
					0.65			(0.65)	
1					0.80	Soft to firm, greyish brown, slightly sandy, gravelly CLAY with highcobble content and low boulder content. Gravel is fine to coarse, sub-rounded to angular, sandstone and limestone. Cobble of sub-angular, sandstone and limestone. Boulders of sandstone and limestone.		0.80	
					0.90			(0.90)	
					1.70	Grey mottled reddish brown weathered conglomeritic LIMESTONE with sandstone sub-angular clasts.		1.70	
					0.30			(0.30)	
2					2.00			2.00	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

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AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP15

Dates : 2/1/19 - 2/1/19

Location : Plot C6

Job Number : G40200

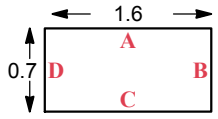
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.15	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.15)	
					0.15	MADE GROUND: Soft to firm reddish brown mottled yellowish brown, slightly silty slightly sandy gravelly CLAY with low cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. (Re-worked Natural)		0.15	
					0.75			(0.75)	
1					0.90	Soft to firm, grey, slightly sandy, gravelly CLAY. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone. Cobble of sub-angular, quartz, sandstone and limestone.		0.90	
					1.60			(1.60)	
2					2.50			2.50	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

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AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP16

Dates : 3/1/19 - 3/1/19

Location : Plot C7

Job Number : G40200

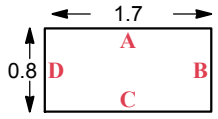
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.15	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.15)	
					0.15	MADE GROUND: Soft to firm reddish brown, slightly sandy gravelly CLAY with high cobble content and low boulder content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded, limestone and sandstone. Boulder of limestone (Re-worked Natural)		0.15	
					0.65			(0.65)	
1					0.80	Soft to firm, greyish brown, slightly sandy, gravelly CLAY with medium cobble content. Gravel is fine to coarse, sub-rounded to angular, sandstone, tuff and limestone. Cobble of sub-angular, sandstone, tuff and limestone.		0.80	
					0.90			(0.90)	
					1.70	Strong light brown with dark brown bands, fractured QUARTZITE.		1.70	
					0.30			(0.30)	
2					2.00			2.00	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
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AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP17

Dates : 3/1/19 - 3/1/19

Location : Plot C7

Job Number : G40200

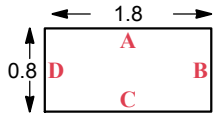
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.15	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.15)	
					0.15	MADE GROUND: Soft to firm reddish brown, slightly silty, slightly sandy, gravelly CLAY with low cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone, brick, plastic and limetstone. Cobbles of sub-rounded to sub-angular, limestone, brick and sandstone. (Re-worked Natural)		0.15	
					1.05			(1.05)	
1					1.20	MADE GROUND: Soft to firm, greyish brown, slightly sandy, gravelly CLAY with high cobble content and low boulder content. Gravel is fine to coarse, sub-rounded to angular, sandstone, brick, clay pipe and limestone. Cobble of sub-angular, sandstone and limestone. Boulders of limestone		1.20	
					0.80			(0.80)	
2					2.00	Soft to firm, greyish brown, slightly sandy, gravelly CLAY with medium cobble content. Gravel is fine to coarse, sub-rounded to angular, sandstone and limestone. Cobble of sub-angular, sandstone and limestone.		2.00	
					0.50			(0.50)	
					2.50			2.50	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

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AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP18

Dates : 2/1/19 - 2/1/19

Location : Plot C7

Job Number : G40200

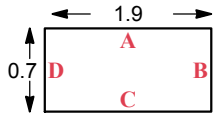
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.10	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.10)	
					0.10	MADE GROUND: Soft to firm reddish brown, slightly silty, slightly sandy gravelly CLAY with low cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. (Re-worked Natural)		0.10	
					1.10			(1.10)	
1					1.20	CONCRETE overlying and adjacent to Weathered LIMESTONE		1.20	
					0.20			(0.20)	
					1.40			1.40	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

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AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP19

Dates : 4/1/19 - 4/1/19

Location : Plot C1

Job Number : G40200

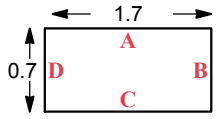
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.15	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.15)	
					0.15	MADE GROUND: Firm to stiff brown, gravelly CLAY with medium cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone, mudstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. (Re-worked Natural)		0.15	
					0.65			(0.65)	
1					0.80	Soft to firm reddish brown mottled brown slightly silty, gravelly CLAY with medium cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. @1.20mbgl small zone of orangish brown clay		0.80	
					0.70			(0.70)	
					1.50	Soft greyish brown gravelly CLAY and purplish brown slightly peaty CLAY with medium cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone.		1.50	
					0.60			(0.60)	
2					2.10	Soft to firm brown gravelly CLAY with high cobble content. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone. Cobbles of sub-rounded to sub-angular sandstone and limestone.		2.10	
					0.40			(0.40)	
					2.50			2.50	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

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AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP20

Dates : 4/1/19 - 4/1/19

Location : Plot C1

Job Number : G40200

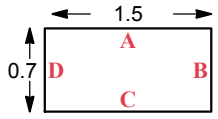
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.15	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.15)	
					0.15	MADE GROUND: Soft to firm reddish brown, slightly silty, slightly gravelly CLAY with low cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. (Re-worked Natural)		0.15	
					0.45			(0.45)	
					0.60	Grey slightly sandy gravelly CLAY with low cobble content and soft purplish brown peaty CLAY. Gravel is fine to coarse, rounded to sub-angularm limestone.		0.60	
1					0.68			(0.68)	
					1.28	Grey mottled reddish brown weathered conglomeritic crystalline LIMESTONE with sandstone sub-angular clasts.		1.28	
					0.12			(0.12)	
					1.40			1.40	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

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AGS

Contract : Bryn Cefni GI

Client : Welsh Government

Trial Pit No. TP21

Dates : 4/1/19 - 4/1/19

Location : Plot C1

Job Number : G40200

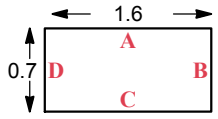
Engineer : Egniol

Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Depth (Thick-ness)	WATER
					0.15	TOPSOIL: Soft dark brown, sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, sandstone and limestone.		(0.15)	
					0.15	MADE GROUND: Firm to stiff dark reddish brown, slightly silty, slightly gravelly CLAY with low cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. (Re-worked Natural)		0.15	
					0.35			(0.35)	
					0.50	Firm to stiff reddish brown slightly silty, slightly gravelly CLAY with low cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone.		0.50	
1					0.60			(0.60)	
					1.10	Firm grey and brown slightly gravelly CLAY with low cobble content. Gravel is fine to coarse, rounded to sub-angular, sandstone and limetstone. Cobbles of sub-rounded to sub-angular, limestone and sandstone. @1.60mbgl increase in cobble and boulder content.		1.10	
					1.40			(1.40)	
2					2.50			2.50	

PLAN



Groundwater: No Groundwater Encountered

Stability: Stable

Shoring: N/A

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
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Operator:	Logged By.	Sheet No.	m Per Page	
RPG		1 Of 1	3	All measurements in metres unless otherwise stated

AGS

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