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Land at Dafarn Newydd, Llangefni, Anglesey,



Archaeological Desk-Based Assessment

Nexus Heritage Report No: 3467.R02

Gwynedd Historic Environment Record Enquiry Reference Number: GATHER1184.

Gwynedd Historic Environment Record Event PRN: 45514

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Note on Transcriptions of Historic Maps

Historical mapping, both Ordnance Survey (OS) and individual cartographer's work relies on the accuracy of the data input into it and the projection used to produce a two dimensional image from three dimensional data. Techniques of survey have evolved and improved over the centuries but pre-OS maps are of widely varying quality and their accuracy is limited by the technology used to create them.

Creating an overlay of historic mapping (including first and second edition OS Maps) and modern OS data can never be completely accurate. Creating a good approximation relies on using digital technologies to estimate and extrapolate the projection, orientation and scale of original maps by correlating known points on the modern OS grid with the historic mapping. This georeferencing 'distorts' the historic mapping to fit the modern grid using a set of known points chosen by the cartographer/illustrator.

Modern digitally produced OS mapping has a stated accuracy tolerance. The most detailed mapping at 1:1,250 (urban) will have a relative error of $\leq \pm 0.5\text{m}$ up to 60m. On the ground that equates to an error between two points which are 60m apart on the ground 95% of the time the scaled measurement would be between 59.1m and 60.9m (paraphrased from <https://www.gov.uk/government/publications/land-registry-plans-the-basis-of-land-registryapplications/land-registry-plans-the-basis-of-land-registry-plans-practice-guide-40-supplement-1>.)

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1. INTRODUCTION

Nexus Heritage was commissioned by Owen Devonport Ltd. to prepare an archaeological assessment report in order to inform considerations for proposed holiday accommodation on land at Dafarn Newydd, Llangefni, Anglesey (hereafter the Site). The Site comprises pasture fields with small areas of woodland at the southern and western edges, towards the centre and bordering the Site to the south.

The archaeological assessment included desk-based research, a walk-over survey and a geophysical survey. The desk-based research, the walk-over survey and report compilation were undertaken by Nexus Heritage and the geophysical survey was undertaken by TigerGeo.

The GHER Enquiry Reference Number for the project is GATHER1184.

The GHER Event PRN is 45514

The archaeological assessment identified no known archaeological sites within the Site recorded in the regional and/or national databases.

The walk-over survey and geophysical survey identified 33 surface and sub-surface archaeological assets, hitherto uncatalogued by the regional and national authorities. These assets included 21 extant landscape features such as field boundaries in the form of dilapidated dry-stone walls, earth banks, ditches, hedges and coverts and 12 geophysical anomalies which represent probable infilled features of archaeological interest. Of note in the geophysical anomalies are sub-surface features which may represent evidence for a former field system that was superseded and relict before production of the Tithe Map in 1843. A number of fields are represented in the geophysical data as infilled boundary ditches, some of which have double-ditches. All these ditches are orthogonally offset to the present field system. The geophysical survey also detected buried signals characteristic of former cultivation in the form of ridge and furrow ploughing. A number of further sub-surface anomalies were detected by the geophysics survey, but their interpretations is less secure and whilst they may possibly represent features of archaeological interest there is much less certainty and the signals may represent features of no archaeological interest.

The survey detected a number of reduced magnetic intensity linear anomalies that can have multiple origins, including the voids of culverts, gravel or peat-filled ditches or the bases of stony banks. These may be linked to and/or be continuations of the buried infilled features of possible and probable archaeological interest. Survey anomalies with traits less representative of possible archaeological interest may represent infilled ditches typical of land divisions and enclosures but may also be more recent drainage features. These are identified as sub-surface features which may be of possible archaeological interest, but the identification is less secure.

A spread of magnetic debris which falls into the category of a possible archaeological feature can be associated with prehistoric burnt mound features (but which could be attributable to a concentration of modern debris) was located by the geophysical survey in the western part of the Site.

2. EVENT SUMMARY/CRYNODEB

Nexus Heritage was commissioned by Owen Devonport Ltd. in November 2019 to undertake an archaeological assessment and geophysical survey to assess the effect on the archaeological resource in relation to a proposed development on land at Dafarn Newydd, Llangefni, Anglesey.

A total of 47 sites of interest were identified within the assessment area, 33 of which were within the land proposed for development. The assessment concluded that the proposed development represented a threat to the 33 sites. The options open to Anglesey Council to further evaluate the archaeological resource under threat and/or for mitigation measures to counter the potential adverse effects have been identified and described.

Cyflogwyd Nexus Heritage gan Owen Devonport Ltd. ym mis Tachwedd 2019 i gynnal asesiad archeolegol ac arolwg geoffisegol er mwyn canfod yr effaith ar yr adnodd archeolegol mewn perthynas â datblygiad arfaethedig ar dir yn Dafarn Newydd, Llangefni, Ynys Môn.

Nodwyd 47 o safleoedd o ddiddordeb yn yr ardal asesu, roedd 33 o'r safleoedd hyn wedi'u cynnwys o fewn ffin y tir a gynigiwyd ar gyfer y datblygiad hwn. Daeth yr asesiad i'r casgliad bod y datblygiad arfaethedig yn fygythiad i 33 safle. Yr opsiynau sydd ar gael i Gyngor Ynys Môn yw cynnal gwerthusiad pellach mewn perthynas â'r adnodd archeolegol sydd dan fygythiad a / neu ddefnyddio mesurau lliniaru i gydbwysu'r effeithiau andwyol posibl a nodwyd ac a ddisgrifir.

3. AIMS AND OBJECTIVES

The objectives of this programme of works are defined in the document *Land at Dafarn Newydd, Llangefni, Anglesey, Written Scheme of Investigation for an Archaeological Desk-Based Assessment, Walk-Over Survey and Geophysical Survey* (Nexus Heritage 2019) which is reproduced at Appendix A.

- To locate and describe, by means of desktop analysis, a walkover survey, geophysical prospection archaeological features which may be present within the Site
- To make full and effective use of existing information to establish the archaeological significance of the Site
- To help inform future decision making, design solutions, further evaluation and mitigation strategies

As the presence/absence of archaeological remains is as yet unproven preparation of a destined research design was not possible during formulation of the aims and objectives, given the broad thrust of period-focussed and theme-focussed reproach imperatives in north-west Wales. However, one of likely principal archaeological interests at the Site could be evidence for the Pencraig estate, as expressed in the sinuous boundary shown on the tithe map of 1843. Pencraig was an estate of 186 acres near Llangefni, the origins of which can be traced to the medieval period.

Given recent archaeological discoveries in the vicinity other periods that may be represented in the archaeological record at the Site include the Neolithic, the Romano-British and the sub-Roman/early medieval and the research frameworks for these periods, and any allied themes such the palaeoenvironmental have been kept in mind (<https://archaeoleg.org.uk/areanorthwest.html>).

4. LEGISLATIVE AND PLANNING POLICY BACKGROUND

At an international level there are two principal agreements concerning the protection of the cultural heritage and archaeological resource – the UNESCO *Convention Concerning the Protection of World Cultural and Natural Heritage*¹ and the *European Convention on the Protection of the Archaeological Heritage*², commonly known as the Valetta Convention. The latter was agreed by the Member States of the Council of Europe in 1992, and also became law in 1992. It has been ratified by the UK, and responsibility for its implementation rests with Department for Culture Media and Sport.

Various principles and policies related to cultural heritage assets are set out in the Planning Policy Wales (PPW), Chapter 6 (edition 10, 2018) which guide local planning authorities and other decision takers with respect to the wider historic environment. The policy includes specific measures for World Heritage Sites, scheduled monuments, archaeological remains, listed buildings, conservation areas, local historic assets, historic parks and gardens and historic landscapes.

The following paragraph from Planning Policy Wales are particularly relevant and are quoted in full:

Paragraph 6.1.5 concerns planning applications:

The planning system must take into account the Welsh Government's objectives to protect, conserve, promote and enhance the historic environment as a resource for the general wellbeing of present and future generations. The historic environment is a finite, non-renewable and shared resource and a vital and integral part of the historical and cultural identity of Wales. It contributes to economic vitality and culture, civic pride, local distinctiveness and the quality of Welsh life. The historic environment can only be maintained as a resource for future generations if the individual historic assets are protected and conserved. Cadw's published Conservation Principles highlights the need to base decisions on an understanding of the impact a proposal may have on the significance of an historic asset.

Planning Policy Wales is supplemented by a series of Technical Advice Notes (TAN).

Technical Advice Note 24: The Historic Environment contains detailed guidance on how the planning system considers the historic environment during development plan, preparation and decision making on planning and listed building consent applications. TAN 24 replaces the following Welsh Office Circulars:

- 60/96 Planning and the Historic Environment: Archaeology
- 61/96 Planning and the Historic Environment: Historic Buildings and Conservation Areas
- 1/98 Planning and the Historic Environment: Directions by the Secretary of State for Wales

5. LOCATION, AND TOPOGRAPHICAL BACKGROUND

The Site comprises approximately 14.10ha of pasture land to the east of Llangefni, Anglesey and is centred on NGR SH 47471 75670 (Fig. 1). The Site is located immediately east of the recently constructed Llangefni Link Road and is irregular in shape, defined to the north-east by a minor road, Lon Cae Cwta, to the south by the B5420 Lon Penmynydd, with all other external and internal boundaries formed by hedgerows.

The Site comprises pasture fields with small areas of woodland at the southern and western edges and bordering the site to the west (Fig. 2). It has a southerly aspect, sloping from c. 50m OD at its northernmost point to c. 30m OD in the south.

The British Geological Survey classifies the superficial deposits as Till, Devensian - Diamicton. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. In a local environment previously dominated by ice age conditions <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>? The bedrock deposits are characterised as Clwyd Limestone Group - Limestone. Sedimentary Bedrock formed approximately 329 to 347 million years ago in the Carboniferous Period. Local environment previously dominated by shallow carbonate seas. There is no available borehole data for the Site or its immediate vicinity curated by the British Geological Survey and the mapped boreholes closest to the Site are labelled confidential/restricted.

6. ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Introduction

The following is a summary of the archaeological evidence found within a 1000m radius of the Site; this wider area is referred to as the 'Assessment Area'. The evidence has been compiled from the Gwynedd Historic Environment Record (GMHER), the National Monuments Record (NMR), Anglesey Archives and other documentary and cartographic sources. The data collected is considered to provide an indication of the character, distribution and survival of any known or potential archaeological assets within and in the vicinity of the Site and helps define significance and is augmented by the outcome of a walk-over survey and a geophysical survey.

In summary, the GHER identifies 14 heritage assets within the Assessment Area, but none within the Site. The Assessment has, however, noted that the Site contains geophysical anomalies which may reflect the presence of sub-surface archaeological remains. A secure identification of and the degree of survival of any archaeological remains associated with these geophysical anomalies is, however, a matter of conjecture as there has been no known ground-truthing undertaken on the Site.

Statutory and Non-Statutory Designations

Regional Historic Environment Record

GHER records 14 non-designated monument points within 1km of the Site centre, the locations of which are shown on Fig. 3. None of these monument points is coincident with the Site.

PRN Ref.	NAME	PERIOD
11105	Hirdrefaig House, Llanddyfnan	Post-Medieval
11144	Penraig Garden Doorway, Chapel Street, Llangefni	Post-Medieval
16073	Burnt Mound and Pit, Bryn Cefni	Bronze Age
17843	Roman Road, Proposed, Tal y Foel to Holyhead	Romano-British
19621	Token, Findspot, Llangefni	Modern
19700	Quarry and Limekiln, SW of Ty'n y Felin	Post-Medieval
2675	Capel Carnedd Maes Lidr, Site of, Tregarnedd	Medieval
2677	Stone Tool (Hammerstone), Findspot, Penraig	Prehistoric
31282	Pit and Linear Feature, N of Hirdre-faig Farm	Neolithic
31287	Cist Cemetery, NW of Tregarnedd Fawr	Medieval
5040	Stone Tool (Axe), Findspot, Clegyrdy Mawr	Prehistoric
58777	Line of the Post Road, from Ceint to Llangefni	Multi Period
74920	Ditches, Possible, Bryn Cefni	Unknown

74922	Rectilinear Feature, Possible, Bryn Cefni	Unknown
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National Monuments Record (Fig.4)

The NMR records 12 non-designated monument points (NPRN) within 1km of the Site centre, the locations of which are shown on Fig. 4. None of these monument points is coincident with the Site. The monuments range from extant or lost dwellings, places of worship and gardens.

NPRN Ref.	NAME	PERIOD
421442	ST JOSEPH'S CATHOLIC CHURCH, LLANGFNI	20th Century
96270	TREGARNEDD FAWR	Post Medieval
15783	PENCRAIG GARDEN DOOR, CHAPEL ST, LLANGFNI	Medieval
40335	CHAPEL STREET WINDMILL;MELIN WYNT-Y-CRAIG,GRAIG FAWR WINDMILL	Post Medieval
43553	CAPEL CARNEDD MAES LIDR	Medieval
265401	PENCRAIG, GARDEN, LLANGFNI	Post Medieval
265396	THE COTTAGE, NURSERY, LLANGFNI	Post Medieval
265440	TRE-GARNEDD;TREGARNEDD FAWR, GARDEN	Post Medieval
15720	HIRDREFAIG	Post Medieval
15781	PENGRAIG HALL	Post Medieval
409565	PENCRAIG LODGE	19th Century
422788	TY'N-Y-FELIN	Post Medieval

Heritage Recording Events

GHER records 14 Events within 1km of the Site. These Events range from casual observations to synthetic studies on a particular heritage theme, to watching briefs, evaluations excavations and desk-based assessments.

PRN Ref.	NAME	Type	Year
40447	Bryn Cefni Industrial Park Extension	Evaluation	1998
40538	<i>Roman Roads in North-West Wales</i>	Project Record	2005
40542	<i>Roman Roads in North-West Wales (Revision 4)</i>	Project Record	2007
40569	<i>Deserted Ecclesiastical Sites in North-west Wales: a Threat-Related Archaeological Assessment</i>	Project Record	2004
40586	<i>Bryn Cefni Industrial Park, Phase II, Plots 8 and 9: Watching Brief & Assessment</i>	Watching Brief	2002
40758	<i>Gwalchmai Booster to Bodffordd Link Water Main and Llangefni to Penmynydd Replacement</i>	Desk-Based Assessment	2008
41489	<i>Llwyn Ednyfed Fishery and Visitor Centre, Llangefni</i>	Desk-Based Assessment	2003

43670	Findspot	Casual Observation	2004
44112	<i>Gwalchmai Booster to Bodffordd Link Water Main & Llangefni to Penmynydd Replacement Main</i>	Excavation	2010
44557	<i>Early Celtic Societies in North Wales</i>	Project Record	2010
44593	<i>Peboc Biomass Energy Plant, Llangefni</i>	Desk-Based Assessment	2011
44653	<i>Concept Science Park, Lledwigan, Llangefni</i>	Desk-Based Assessment	2013
44832	<i>Medieval and Post-Medieval Roads in North-West Wales: Report on Scheduling Enhancement Study (Part 1: Report and Gazetteer).</i>	Desk-Based Assessment	2014
45324	<i>Bryn Cefni Infrastructure Works, Ynys Mon: Archaeological Assessment</i>	Desk-Based Assessment	2019

Historic and Archaeological Context and Cartographic Narrative

Different authorities define certain prehistoric and historic periods with variable beginning and end points. The GHER prefers the following temporal definitions:

Palaeolithic (prehistoric) 500,000 BC – 10,001 BC

Mesolithic (prehistoric) 10,000 BC – 4,001 BC

Neolithic (prehistoric) 4,000 BC – 2,351 BC

Bronze Age (prehistoric) 2,350 BC – 801 BC

Iron Age (prehistoric) 800 BC – 47 AD

Romano-British 48 AD – 409 AD

Post-Roman (Early Medieval) 410 AD – 1065 AD

Medieval 1066 AD – 1539 AD

Post-Medieval 1540 AD – 1900 AD

Modern 1901 AD – 2050 AD

Prehistoric and Romano-British Periods

Anglesey is rich in prehistoric ritual and funerary monuments. Later settlement in the form of Iron Age hillforts has been identified in the more elevated parts of the island. The internationally renowned Iron Age votive deposit at Llyn Cerrig Bach suggests that Anglesey was an important religious centre. The island was incorporated into the administrative and military fold of Roman Britain *c.* 78CE but investigated examples of settlement in the form of stone hut circles and artefacts indicates that life for the indigenous population changed little prior to, during and after the Romano-British period. As seen in the tables above and on Figs. 3 and 4 there are no known prehistoric or Romano-British archaeological remains at the Site. A Neolithic pit and linear feature

have been located to the north of Hirdre-faig Farm, *c.* 650m to the south-east of the Site and a Bronze Age burnt mound and pit have been identified *c.* 750m to the south-west of the Site at Bryn Cefni Industrial Park. Other such mounds are not unknown in Anglesey with examples at Coed Newydd and Tyddyn Isaf. Two find-spots of stone tools within 1km of the Site also help to relate to the existence of prehistoric activity in the locale. The suspected, but as yet unproven length of Roman Road, from Tal y Foel to Holyhead traverses the Assessment Area but its project alignment would not coincide with the Site.

Early Medieval, Medieval, Post-Medieval and Modern Periods

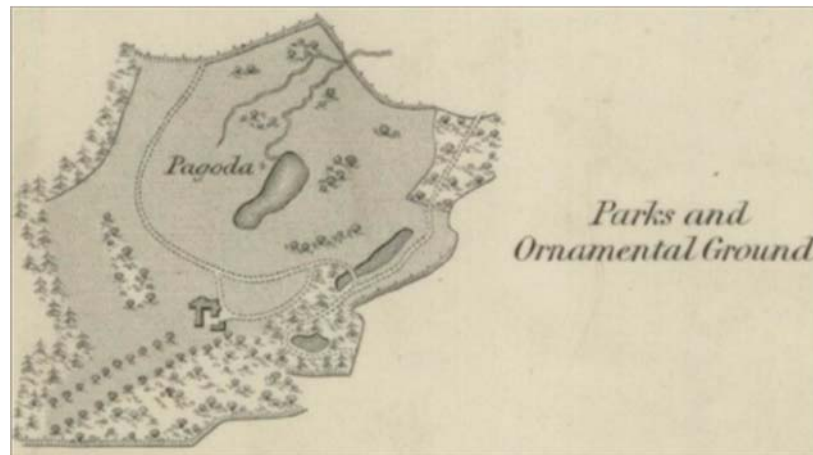
Following the Roman withdrawal Christian churches and monasteries as well as remote isolated hermitages were established on Anglesey. The river Cefni which flows through Llangefni was a landscape feature which acted as natural, physical boundary with the Malltraeth commote to the west and Menai commote to the west. The ecclesiastical authorities became the largest landowner in the medieval period and Cistercians were granted extensive land on the island in the 13th century. Following the dissolution much of the monastic land was sold locally. There is no evidence to suggest that during the medieval period Llangefni was a large settlement centre, which subsequently shrank and it is unlikely that the Site was developed during the medieval period. The Site has more than likely been open land, exploited agriculturally in one form or another for centuries. Llangefni expanded from a small village through the later 19th and 20th centuries and its eastward expansion is currently defined by the Site's western boundary which it shares with Coleg Menai Llangefni.

There are no known early medieval archaeological sites in the Assessment Area but two medieval sites are recorded - Capel Carnedd Maes Lidr, Site of, Tregarnedd, *c.* 400m to the south of the Site and a Cist Cemetery, north-west of Tregarnedd Fawr, *c.* 300m to the south of the Site. Post medieval sites in the Assessment Area include a dwelling, a garden doorway and a quarry. The multi-period post road from Ceint to Llangefni, which forms the southern boundary of the Site can trace its origins to the 16th century and remains in use today as the B4520 Pennymynydd Road.

The broad evolution of the Site during the later post-medieval and modern periods is traceable through an analysis of cartographic endeavours during the 19th and 20th centuries. The Ordnance Survey (OS), Surveyor's Drawing (Surveyor, Robert Dawson) of 1818 (Fig. 5) was produced at a small scale and the surveyed landscape includes the Site and the Pennymynydd Road. However, there are no details such as field boundaries and there is no evidence for any particular land management at the Site. There are no structures depicted on the Site. The larger scale map produced to accompany the apportionment of the rent-charge in lieu of tithes in the parish of Llangefni in the County of Anglesey (Surveyor, John Relph Haslam), 1843 (Fig. 6) improves on the initial effort of the OS in that field boundaries are depicted. The site ranges over two large fields, suggesting that the current division of the Site into five fields post-dates the mid-19th century. The states of cultivation of the fields are not recorded, but the field names, owners and occupiers are defined in the apportionment and the relevant details are provided on Fig. 6. There are no structures mapped within the Site. This map provides no meaningful data on the archaeological interest at the Site, other than the existence of field boundaries during the mid-19th century.

The OS map of 1888, produced at a scale of 1:10,000 (Fig. 7) shows the Site in considerable detail and the field boundaries and sylvan edges can be discerned. Two field boundaries have been added – increasing the number of fields within the Site at this time from two to four. The field boundary running south-west - north-east across the site is also labelled as a footpath. The

Pencreig estate¹ is to the west of the Site and benefits from a small expanse of parkland. In 1897 the Ordnance Survey published a *Characteristic Sheet for the Engraved Six Inch Maps of Great Britain* and as can be seen from the extract below, the grey shading indicates Parks and Ornamental Ground.



This suggests that the intent of the 1888 map was to depict the land at Pencreig as recognised park-land. This perhaps, somewhat belatedly, reflects the actual characteristics of the landscape as it was developed from the early-middle 19th century in order to extend and coalesce the landscaped parkland appearance. There is no evidence that there was an intent in the late 19th century to modify and manage the landscape of the Site in order to provide a distinct appearance related to the status of Pencreig associated with the notions and concepts of the county estate.

The OS 1:2,500 scale map of 1889 (Fig. 8) shows exceptional landscape detail, but does not depict any difference at the Site when compared to the 1:10,00 scale edition of the previous year. The OS 1:2,500 scale map of 1900 (Fig. 9) shows the addition of a field boundary on an approximate NW-SE alignment which divides the large field into two almost equal halves. The OS 1:2,500 scale map of 1920 (Fig. 10) shows no changes from the 1900 edition. The field boundaries in 2019 match exactly those mapped in 1900 and with the exception of the contraction to a stand of trees along the Site's western boundary and the addition of a stock compound in the Site's south-western corner, the Site has remained static.

LIDAR

AWAITING DATA

Historic Archaeological Photographs

As series of oblique and vertical aerial photographs dating from 1945 to 2015 was provided for examination by the Welsh Government Aerial Photographs Officer. The field boundaries correspond with the historic mapping but no additional features of potential archaeological interest were identified. It is possible to reproduce the photographs from 1945 (Fig. 11), 1947 (Fig. 12) and 1966 (Fig. 13).

¹ Pencreig was an estate of 186 acres. In the mid-18th century it was owned by Richard Poole and his wife Mary, the daughter of Robert Owen. In 1879, following the death of its then owner Sir Richard Waldie Griffith the estate passed to the wife of Colonel Bramston Smith of Dublin and then to her daughters, one of whom was married to Lieutenant Colonel Phibbs. By 1916 the estate was in the possession of Mrs. Phibbs' daughter, Mrs. H.T. Daniell. The Pencreig estate was sold in 1952. It was demolished and a housing estate and Coleg Menai Llangefni were established on the site.

Geophysical Survey

A geophysical survey of the Site has been undertaken (TigerGeo 2019) and the results are provided at Appendix B.

The survey was broadly successful but some areas within the fields could not be surveyed due to standing water and hazardous ground conditions and the field forming the western of the survey area could not be accessed due to localised flooding and extremely soft ground after several days of significant rainfall.

The interpretation of the geophysical results uses the qualifiers "probable" and "possible":

Probable - on the basis of the landscape, the geological background, the geophysical signal and the historic background there is a likelihood that the anomaly described as "probable" may represent a feature of archaeological interest

Possible - on the basis of the landscape, the geological background, the geophysical signal and the historic background an anomaly qualified as "possible" has a reduced likelihood that it may represent a feature of archaeological interest.

In the catalogue of geophysics results in Appendix B there are 11 "probables", 10 "possibles", 16 modern/geological features and 1 area of relict ridge and furrow cultivation. The "probables" and the relict ridge and furrow have been taken forward into the Site gazetteer as gazetteer nos. 1-12 (PRNs 81458-81469 incl.).

In summary there two distinct magnetic contexts, one associated with wetter ground to the west and the other with drier ground on the eastern slopes. The magnetic character and detectability of classes of feature has the potential to vary across the site.

The survey demonstrated evidence for former agricultural use of the land, including a field system of unknown chronological origin (geophysical "probables") which appears to have been removed prior to the production of the Tithe Map (1843) and later cultivation, possibly reflecting land improvements dating to the second half of the 19th century. The remains of a small quarry appears to be the only evidence for non-agricultural use of the land.

The narrow linear anomalies apparent in the geophysical survey results have the potential to represent infilled features of considerable antiquity and near the western edge of the survey there is a magnetic signal not inconsistent with modern rubbish but could conceivably be evidence for a prehistoric burnt mound.

Walk-Over Survey

The walk-over survey was undertaken in dry but overcast weather conditions with moderately good visibility. The surface conditions included areas of standing water, saturated ground but also less waterlogged areas, especially to the east and far west of the Site. Some areas within the fields could not be traversed due to the presence of livestock, standing water and hazardous ground conditions. The field boundaries were represented by ditches, banks, hedges and dry-stone walls. No extant earthworks or other features which may be considered of archaeological interest were observed within the fields, but 17 extant landscape features were identified and these have been taken forward into the Site gazetteer as gazetteer nos. 13-33 (PRNs 81470 -81490 incl.). The locations from which the representative photographs were taken are shown in Fig. 15 and the photographs are provided at Appendix C.

Summary

As demonstrated there are extant and suspected archaeological and historic landscape features on the Site. These newly identified features are tabulated in Appendix D. The actual survival of any sub-surface archaeological remains, should they exist, may, however, have been moderated by ground activity associated with agricultural improvement.

There are no known prehistoric sites within the Site but the potential for prehistoric remains, given the known prehistoric archaeological sites within 1km of the Site cannot be relegated to low and must be acknowledged as medium.

The potential for Roman and early medieval remains to survive *in-situ* within the Site is similarly considered to be low/negligible, reflecting the absence or low-intensity of known archaeological remains from this period in the vicinity. The greatest historic and archaeological interest at the Site derives from the construction, use disuse and re-establishment of a complex of land divisions at the Site, the earliest of which may date to the medieval period and the most recent of which still surviving as extant landscape features.

In terms of the applicable period research framework (Pannatt 2017) the suspected burnt mound, should it prove to be so, could take its place alongside the numerous burnt mounds identified in south-west and north-west Wales. Many in the south-west have been securely C¹⁴ dated to the Bronze Age. Several burnt mounds were investigated during the construction of the Pwllheli to Blaenau Ffestiniog Pipeline including a large site near Pentrefelin and a solitary example has been excavated at Llanfaethlu. Burnt mounds, whilst of intrinsic interest can also act as a proxy for settlement and any evidence of early Bronze Age settlement is important for an understanding of the archaeology of Wales and justifies identification and investigation where the opportunity arises.

For the earlier post-medieval 1539 to 1750 relevant research focus includes the topic of emerging tenurial changes and the degree to which these were generated by administrative change and how much, if any, this effect this had on agricultural practice, rural settlement and rural communities (Bezant and Bailey 2017). Whether the Site has the capacity to tease out physical changes in land use and map those changes against tenurial change from hereditary tenancies to more modern forms of tenancy and/or freehold is a valid question. Beyond this subject there is the topic of the relationships between people and environment and landscapes to explore, as well as the relationships between the documentary and physical evidence. Palaeoenvironmental evidence, should it survive, may also contribute to an investigation of the rural economy and any worthwhile data could be integrated with historical studies.

7. SIGNIFICANCE OF IDENTIFIED ARCHAEOLOGICAL ASSETS

It is important to note the use of language in the heritage sector. Unfortunately, considerable confusion can arise as a result of the same word or phrase by different authorities, but with alternative nuances or even basic meanings.

There are a number of different methodological approaches that can be used to estimate the significance of heritage assets, and the one used here proceeds on the basis that the significance is the sum of the cultural heritage values ascribed to the asset as defined in the Cadw document *Conservation Principles for the Sustainable Management of the Historic Environment in Wales* (2011). The cultural heritage significance is the sum of the four component values- aesthetic, communal, evidential and historical.

Cultural Heritage Value	the worth(s) which contribute to Heritage Significance
Evidential Value	the extent to which the physical fabric tells how and when a heritage asset was built, how it was used and how it has changed over time.
Historical Value	the way a heritage asset illustrates a particular past way of life or be associated with a specific person or event
Aesthetic Value	the design, construction and craftsmanship of a heritage asset.
Communal value	the particular significance to people for the commemorative, symbolic or spiritual value of a heritage asset, or for the part it has played in local cultural or public life
Heritage Significance	the sum of the cultural heritage values ascribed to the asset.

An assessment of the contributory values allows the heritage significance (interest) of the suspected archaeological assets to be gauged and assigned to one of the following categories.

Significance (Importance)	Description
International (Very Important)	World Heritage Sites. Archaeological sites or monuments of international importance,
National (Important)	Scheduled Ancient Monuments Undesignated archaeological assets of designate-able quality and importance
Regional/County (Medium Important)	Archaeological remains of regional/county importance
Local (Low Importance)	Archaeological remains of district/local importance and/or those sites compromised by poor preservation and/or poor survival of contextual associations
Negligible/None(Not Important)	Areas in which investigative techniques have produced no or only minimal evidence for archaeological remains, or where previous largescale disturbance or removal of deposits can be demonstrated.
Unknown	Archaeological sites whose importance cannot be determined with the information currently at hand. This can include sites where the extent of buried remains is unknown.

Not every heritage asset is provided with a detailed record of significance by local or national heritage agencies and not every heritage asset is necessarily identified on the relevant databases. In the absence of formal Statements of Significance for the following heritage assets, an attempt will be made to estimate their significance

Geophysical anomalies of probable archaeological interest (Gaz. 1- 12 [PRNs 81458-81469 incl.])

Extant landscape features (Gaz. 13-32 [PRNs 81470 -81482 incl.])

These assets will be treated to detailed examination and these are the assets for which a potential for harm could arise from development of the Site.

Geophysical Anomalies (Gaz. 1- 12 [PRNs 81458-81469 incl.])

These anomalies relate to now-redundant land divisions and will be considered collectively.

Component Values

Evidential – these assets have a low potential to yield evidence about past human activity and this reservoir of evidence, in the main, resides in their physical characteristics. The anomalies were hitherto indiscernible until the application of remote prospection techniques highlighted their existence. There are barriers to understanding and interpretation of the evidential value of these assets but the potential is broadly moderate to securely identify the archaeological worth assets and their functions.

Historical – the assets have a moderate-high illustrative value as past people, events and aspects of life can be connected through them to the present. The connection cannot currently be directly encountered and experienced and any accessibility is via proxy. The immediate historical value is therefore, effectively concealed from the wider community by the fact of private ownership and the absence of any opportunities for experience and appreciation of the assets. The particular motivations for the location of the assets and their form, beyond a need to divide the land is lost to history. The assets are not unique to the Site, infilled field boundaries are common features of the archaeological heritage of post-medieval landscape in Anglesey and therefore these features have a certain ubiquity. There are no especial qualities to these assets and whilst they aid interpretation of the past through making connections with, and providing insights into, past communities and their activities they provide few noteworthy insights into the personalities and motivations of owners and occupiers.

Aesthetic - Aesthetic value derives from the ways in which people draw sensory and intellectual stimulation from a place and in this respect these assets have a very low value. There is no facility for any sensory stimulation and intellectual engagement has hitherto been unavailable. The value of the assets to the community is perhaps low.

Communal - Communal value derives from the meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory and can be commemorative and/or symbolic. Very few individuals would draw elements of their identity from these assets or have emotional links to them– they are not collective, community monuments with immediate evocation of past lives and events and their capacity symbolise Anglesey's more recent history is muted.

Overall Significance – these assets are of low (local) significance.

Extant Landscape Features (Gaz. 13-32 [PRNs 81470 -81482 incl.]).

These assets are all related to the use and management of a landscape used for agricultural production and will be considered collectively.

Component Values

Evidential – these assets have a moderate potential to yield evidence about past human activity and this reservoir of evidence, in the main, resides in their broad survival as extant features the identities and functions of which are broadly appreciable. The field boundaries are clearly discernible as built features and provide a visual index for the management of land. The ability to understand and interpret the evidential value of these assets is moderate-high as the identification of the assets and their functions are broadly appreciable.

Historical – the assets have a moderate-high illustrative value as past people, events and aspects of life can be connected through them to the present. The connection can be directly encountered and experienced through the accessible familiarity of the assets as landscape features. However, the immediate historical value is somewhat concealed from the wider community by the fact of private ownership and the absence of opportunities for close-quarter experience and appreciation of the assets. The visibility of the assets is important and their location and form is intimately linked to a wider design brief motivated by the desires of the commissioning entity. The assets are not unique to the Site, lakes, field boundaries are common features of the post-medieval landscape in Anglesey and therefore these features have a ubiquity. There are no especial qualities to these assets and whilst they aid interpretation of the past through making connections with, and providing insights into, past communities and their activities they provide few noteworthy insights into the personalities and motivations of owners and occupiers.

Aesthetic - Aesthetic value derives from the ways in which people draw sensory and intellectual stimulation from a place and in this respect these assets score moderately. There is a clear, conscious hand of intent and design in the form and location of the assets – although there is little facility for selective autonomy in the location of a boundary wall and the topographic circumstance no doubt dictated the location of the walls and the retention/management of woodland. The manipulation of the landscape to provide a specific physical outcome is however, undeniable. The evolution of the assets since construction highlights a level of decay and abandonment and functional redundancy and the lack of maintenance of the original fabric has resulted in a broadly poor state of survival.

Communal - Communal value derives from the meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory and can be commemorative and/or symbolic. Few individuals would draw elements of their identity from these assets or have emotional links to them– they are not collective, community monuments with immediate evocation of past lives and events but they do symbolise a significant topic within Anglesey's recent history.

Overall Significance – these assets are of low (local) significance.

Taking into account evidential, historic, aesthetic and communal interests and the value of all the archaeological assets on the Site to this and future generations it is concluded that all the identified assets are of Low Significance.

8. PROPOSED DEVELOPMENT AND POTENTIAL ARCHAEOLOGICAL IMPACTS

The applicant wishes to promote the Site for development as holiday accommodation.

Direct Impacts

The assessment of the archaeological assets and archaeological potential of the Site has been undertaken in the knowledge of the uncertainties that arise when trying to assess a resource that is not wholly known and is often poorly understood. It should be noted that the assessment is partly based on information held in source repositories and published data. Neither of these represents exhaustive, comprehensive or necessarily reliable sources of information on the presence/absence of archaeological features. However, from the data available it is possible to offer a quantified and qualified estimation of the known archaeological resource, to determine the potential for as yet unknown or unrecorded archaeological features to be present and identify areas within the Site where activities are likely to have compromised the survival of archaeological assets. These factors have been taken into consideration during this preparation of this document.

There are no previously recorded, confirmed archaeological remains on the Site. However, the Site includes the sites of a number of landscape features in the form of ditches, earth banks, hedges, drystone walls, stone gate-posts and coverts of some historic interest. In addition, the geophysical survey has identified a number of sub-surface anomalies which may be of as possible or probable archaeological interest.

Preparatory and construction activities with the potential to impact upon archaeological remains include, ground remediation, excavations for the foundations of buildings, excavations for services such as drains and sewers and excavations in order to lay the sub-grade as a base for pedestrian paths and vehicle circulation areas. Site preparation works and construction may lead to substantial harm/total loss of archaeological assets on the Site of low significance with some limited potential to contribute to archaeological and/or historic research objectives.

With respect to pre-existing impacts which may have disturbed or destroyed hitherto unknown or unrecorded archaeological remains at the Site, there are none apparent, other than ploughing in the post-medieval and possible medieval periods which may have impacted on any subsurface remains which pre-date these periods.

Identifying Impact Criteria

A direct impact is a physical effect on an asset arising at the same time as and occurring as a consequence of physical changes to the asset. For example, groundworks associated with construction directly disturbing archaeological remains. With respect to archaeological assets the pathway of a direct impact usually leads to a predictable outcome – a greater or lesser physical impact which is detrimental to the preservation and survival of a part or whole of an asset. However, the impact pathway is nevertheless significant because pathways lend themselves to varying approaches to mitigation such as elimination, prevention, control, compensation and offsetting (see below). In addition impacts are considered beneficial or adverse; reversible or irreversible; short, medium or long term; and temporary or permanent.

Identifying the Magnitude of Direct Impacts to Archaeological Remains

For the purposes of assessing direct impacts to archaeological remains the pre-eminent characteristic of the impact is the scale to which the impact alters the asset. This can be gauged by cross-referencing the activities involved in the construction and operation of the assessment scheme with each known asset. In addition, the type of impact is judged in order to arrive at a magnitude. The scale ranges from negligible, through minor and moderate to major and the type of impact can be beneficial or adverse. A matrix can be completed which provides a rating based upon the scale and type of impact and extent or components of the assets affected. The magnitude of impact to individual archaeological sites is a matter of professional judgment and is based on a five-fold scale (major, moderate, minor, negligible and no change) based on the *Design Manual for Roads and Bridges* (Ref. 9.2). The range of impact magnitude is tabulated below.

Impact Magnitude	Description
Major Adverse	Total loss of asset
Major Beneficial	Comprehensive improvement to the asset through restoration or enhancement,
Moderate Adverse	Partial loss of or detrimental modification to the asset, but integrity of majority of asset remains
Moderate Beneficial	Improvement to asset condition/preservation through enhancement or protection,
Minor Adverse	Some measurable depreciation to the attributes and quality of asset
Minor Beneficial	Some measurable improvement to the attributes and quality of asset
Negligible Adverse	Very slight loss or detrimental alteration to asset
Negligible Beneficial	Very slight benefit to condition/preservation of asset
No change	No loss or alteration of asset, no discernible impact either adverse or beneficial

Factors in the Assessment of Magnitude of Impact to Archaeological Remains (based on DMRB, Vol. 11 Environmental Assessment, Section 3, Part 2, HA 208/7, Cultural Heritage)

The significance of the effect on assets is a combination of the importance of the remains and the magnitude of the impact. The significance of the effect is expressed using a nine-fold scale (Very Large, Large/Very Large, Moderate/Large, Moderate, Moderate/Slight, Slight/Moderate, Slight, Neutral/Slight and Neutral) based on the *Design Manual for Roads and Bridges*. The required combination for identified remains has been undertaken with the aid of a matrix, as shown in the table below, in order to assist judgements regarding importance and impact magnitude in order that a reasonable and balanced assessment of effect significance (either negative or positive) can be reached.

IMPORTANCE OF ARCHAEOLOGICAL ASSET	Very High	Neutral	Slight	Moderate/Large	Large/Very Large	Very Large
	High	Neutral	Slight	Moderate/Slight	Moderate/ Large	Large/Very Large
	Medium	Neutral	Slight/ Neutral	Slight	Moderate	Moderate/Large
	Low	Neutral	Neutral/ Slight	Slight/Neutral	Slight	Slight/Moderate
	Negligible	Neutral	Neutral	Neutral/Slight	Slight/Neutral	Slight
	Unknown	Neutral	Neutral	Neutral/Slight	Slight/Moderate	Moderate/Large
	No change	Negligible	Minor	Moderate	Major	
MAGNITUDE OF IMPACT TO ASSET						

Significance of Effect Matrix for Archaeological Remains (based on DMRB, Vol. 11 Environmental Assessment, Section 3, Part 2, HA 208/7, Cultural Heritage)

The assets identified during the assessment have been treated to an examination of significance of effect and the following tables provide the output of that examination along with recommendations for further assessment and mitigation as appropriate.

Gazetteer Nos: 1- 12 incl.	PRN: 81458 - 81469
Figures: Fig. 16 and figures 02a, 02b, 03 and 04 in Appendix C	Plates: -
NGR:	Period: Post-Medieval
<p>Description: Sub-surface geophysical anomalies characteristic of infilled ditches and an area of former cultivation in the form of preserved ridges and infilled, interjacent furrows. See Appendix C for details.</p> <p>Disgrifiad: Mae'n ymddangos bod anomaledau geoffisegol o dan y ddaear sy'n nodweddiadol o ffosydd wedi'u mewnlenwi ac ardal o hen amaethyddiaeth, yn gribau wedi'u cadw ac yn chwysol bridd mewnlenwi. Gweler Atodiad C am fanylion.</p> <p>It is probable that these feature would be impacted upon as a consequence of the proposed development. On the assumption that there would be a degree of as yet unspecified ground works for the proposed development and that the application of the precautionary principle suggests that the impact of such groundworks may lead to the total loss of the sub-surface remains then the outcome is estimated as a high adverse direct physical impact during construction resulting in a slight/moderate adverse significance of effect.</p> <p>It is recommended that a sample of the geophysical anomalies is investigated prior to impact to test for the presence/absence of archaeological remains and to test their character. Depending on the state of preservation, date of origin and use (if reasonably determinable) and the level of contribution to the regional research framework mitigatory measures may be warranted prior to impact.</p>	
Category of Importance: Low (local)	
Magnitude of Impact: Major Adverse	
Significance of Effect: Slight/Moderate Adverse	
Recommendations for further assessment: Ground-truthing a sample of the assets	
Recommendations for mitigation measures: To be determined upon results of the ground-truthing	

Gazetteer Nos: 13- 33	PRN: 81470 -81490
Figures: Fig. 16	Plates: - 1- 63
NGR:	Period: Post-Medieval
<p>Description: Extant landscape features in the form of field boundaries (ditches, earth banks, hedges, dry-stone walls), woodland (coverts) and gate posts.</p> <p>Disgrifiad: Nodweddion tirwedd sydd wedi goroesi ar ffurf ffiniau caeau (ffosydd, cloddiau daear, gwrychoedd, waliau cerrig-sych), coetir (dryslwyni) a physt gatau.</p> <p>It is probable that these feature would be impacted upon as a consequence of the proposed development. On the assumption that there would be a degree of as yet unspecified ground works for the proposed development and that the application of the precautionary principle suggests that the impact of such groundworks may lead to the partial loss of these landscape features then the outcome is estimated as a moderate adverse direct physical impact during construction resulting in a slight/moderate adverse significance of effect.</p> <p>No further assessment is warranted.</p> <p>It is recommended that a basic record be completed of these landscape features prior to impact, however the record presented in this document should be seen as being commensurate with a basic record level and as such no mitigatory measures are proposed.</p>	
Category of Importance: Low (local)	
Magnitude of Impact: Major Adverse	
Significance of Effect: Slight/Adverse	
Recommendations for further assessment: None	
Recommendations for mitigation measures: Basic record – complete.	

9. CONCLUSIONS

The Proposed Development on the Site takes the form of holiday accommodation. The density of any units is not yet specified and the groundworks required to establish the units provide vehicular access and services are not yet designed.

There are no registered World Heritage Sites (or WHS Buffer Zones), Scheduled Ancient Monuments, wholly or partly within in the Site. Therefore, this Assessment confirms that the Site does not contain any designated archaeological assets for which there would be a presumption in favour of preservation *in situ* and against development.

Prior to the commission of this assessment there were no known undesignated archaeological assets within the Site but the assessment has identified a number of potential archaeological remains at the Site which may contain reservoirs of information on previous human activity in the area.

This Assessment enables an informed, sustainable and responsible approach to development of land at the Site. The information provided meets the expectations of national policy in that the Site could reasonably be expected to have a potential for archaeological remains and the applicant has arranged for the preparation of a desk-based assessment and field evaluation by means of geophysical survey. These permit an understanding of the impact of the proposed development on the significance of those remains.

The Site is contains archaeological remains which are not nationally important and so the issue revolves around less significant archaeological remains, and the planning authority will need to weigh the relative importance of the archaeological remains against other factors, including the need for the proposed development. There is no indication that the Site has been identified in any development plans as of local importance for heritage reasons and containing heritage assets worthy of conservation.

It is concluded that there are no axiomatic reasons arising from archaeological considerations to refuse planning permission. Less significant archaeological assets may be harmed/lost as a consequence of the proposed development. However, the Council is not obliged to refuse consent in the light of such harms. Rather it must make a balanced judgement with respect to such less significant archaeological assets.

The relevant guidance in these matters (Chartered Institute for Archaeologists 2014) notes that while recommendations on further archaeological work may be justified, in most circumstances within the planning framework the provision or recommendations to the Local Planning Authority will be the responsibility of the relevant planning archaeologist. This document does not wish to prejudge the opinion of the Senior Planning Archaeologist of the Gwynedd Archaeological Planning Service, but it is considered appropriate and helpful to offer options for further assessment and the possibilities for reducing or mitigating harm, should planning permission be granted.

With respect to further assessment there is no justification for any further assessment of the extant landscape features. However, it would be within policy provision for the local planning authority to expect a sample of the geophysical anomalies to be investigated prior to impact in order to confirm the presence/absence of archaeological features and examine the nature of any archaeological remains. Such an investigation could be undertaken prior to determination of the planning application

or be mandated as a condition of consent, should any planning permission for the Site be forthcoming.

The local planning authority may also wish to ensure that any impacts to extant landscape features and/or archaeological remains are mitigated. In the first instance it would expect the applicant or the successors in title to endeavour to design a scheme which would preserve *in situ* as much of the heritage resource as possible. Where such preservation would be incompatible with the consented development it would be reasonable for the local planning authority to require the applicant or the successors in title to arrange for a programme of recording and reporting of the heritage resource on the Site prior to any irreversible impact to that resource. The data in this document represents an adequate record of the extant landscape features and a reasonable suite of archaeological attendances could be arranged should archaeological remains worthy of recording be found to exist on the Site.

The application of the mitigation measures would, where warranted by the local planning authority, reduce the significance of adverse effect. The residual effect of the proposed development on archaeological significance, would be within acceptable tolerances as a measures would be adopted to record and advance understanding of the significance of any archaeological asset affected in a manner proportionate to its importance and to make the evidence and archive publicly accessible. The record and understanding of the significance of the archaeological asset assuages harm and reduces the consequence and degree of that harm.

10. SOURCES

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Gwynedd Historic Environment Record

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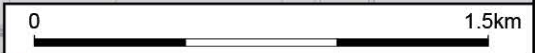
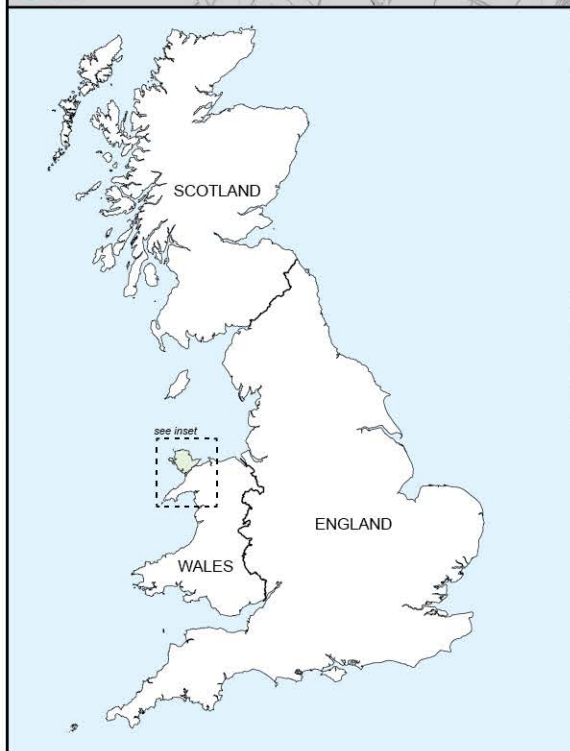
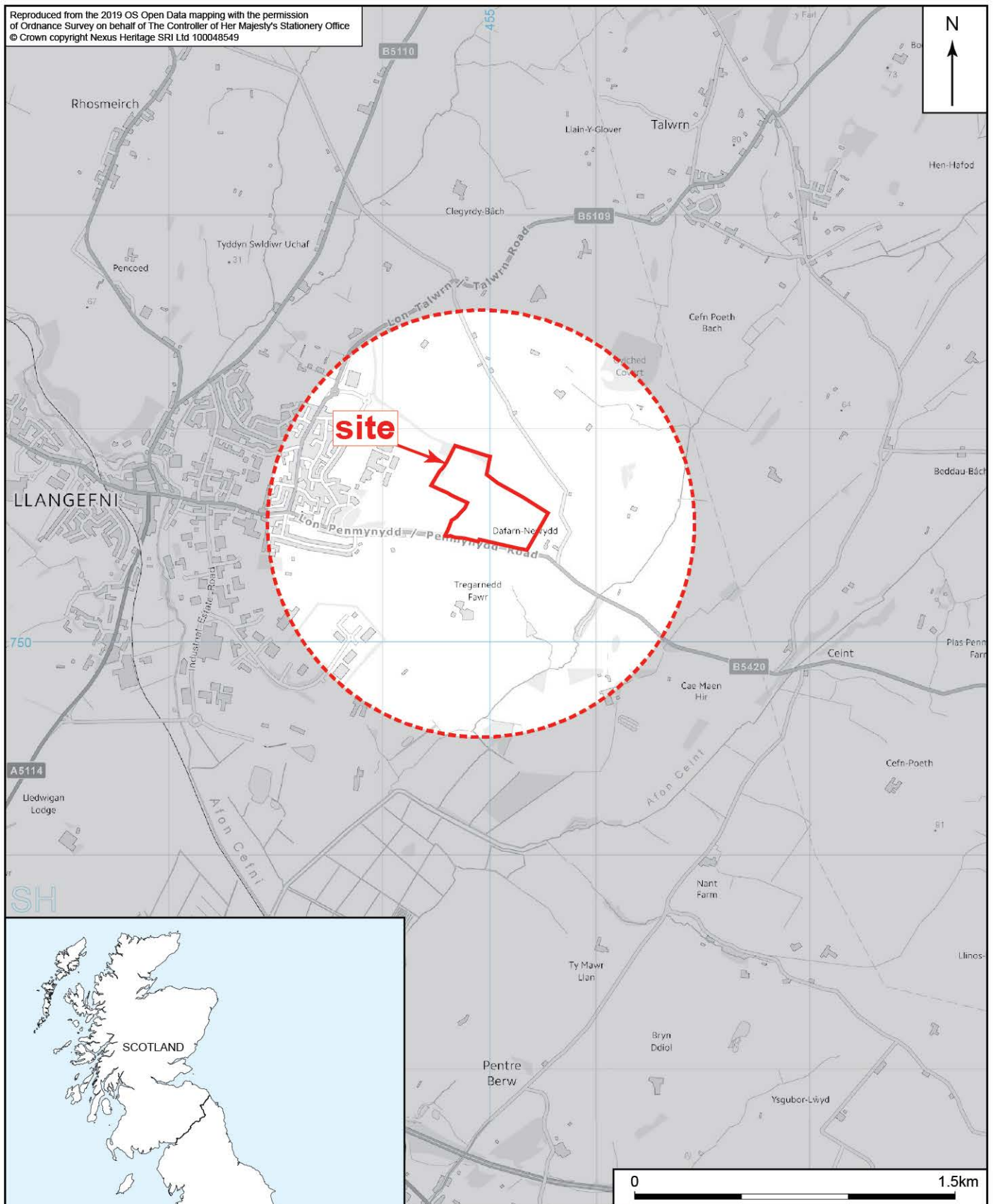
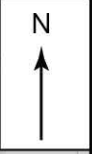
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FIGURES



 **NEXUS HERITAGE**

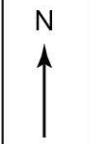
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**Land at Dafarn Newydd,
Anglesey**

DRAWING TITLE:
Site Location

DATE:
17/11/19

DRAWN BY:
ECMG

FIGURE:
1



 Site



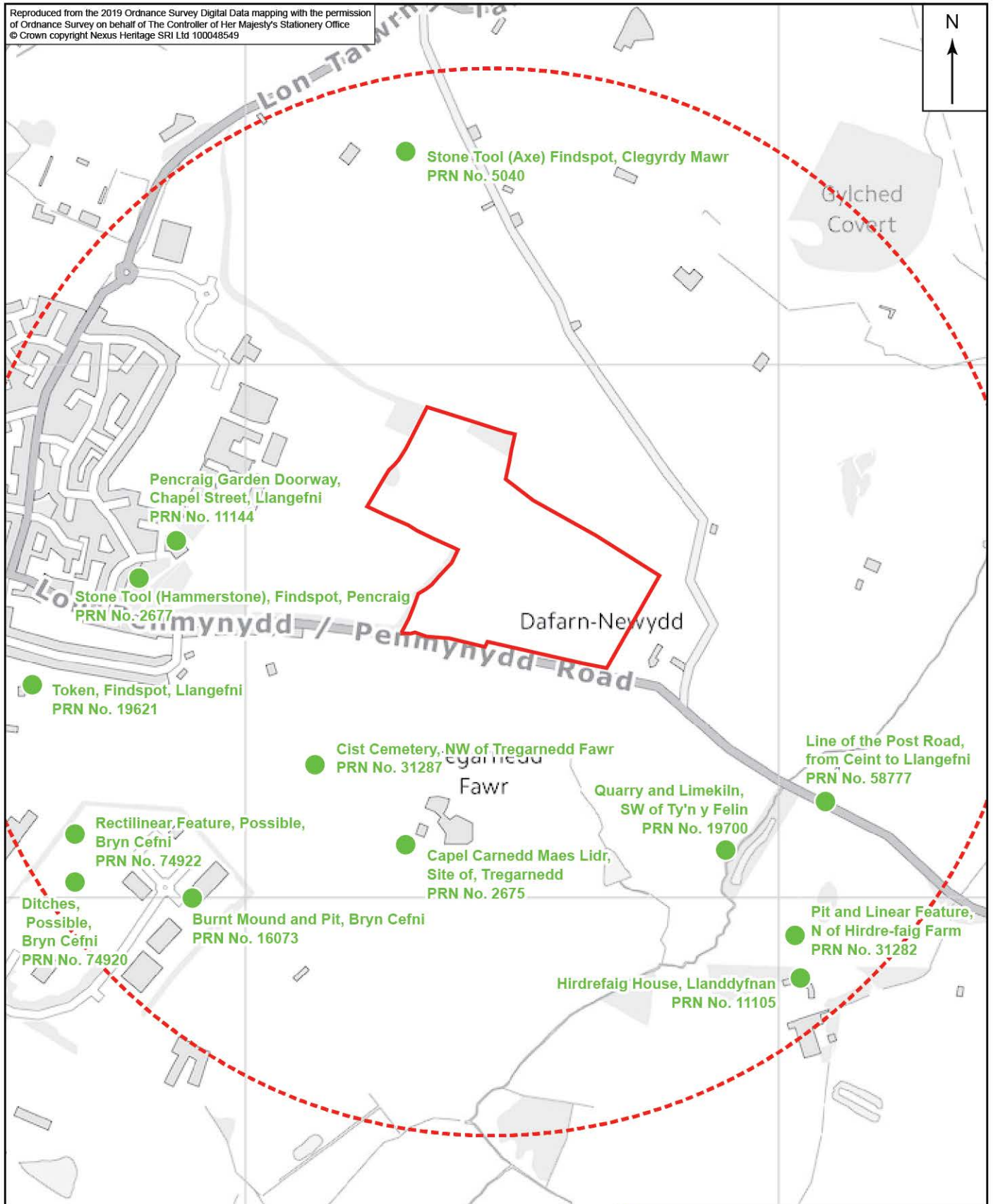
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Anglesey**

DRAWING TITLE:
Site Plan

DATE:
20/11/19

DRAWN BY:
ECMG

FIGURE:
2



-  Site
-  Assessment Area
-  Monument Assets from the Gwynedd Historic Environment Record



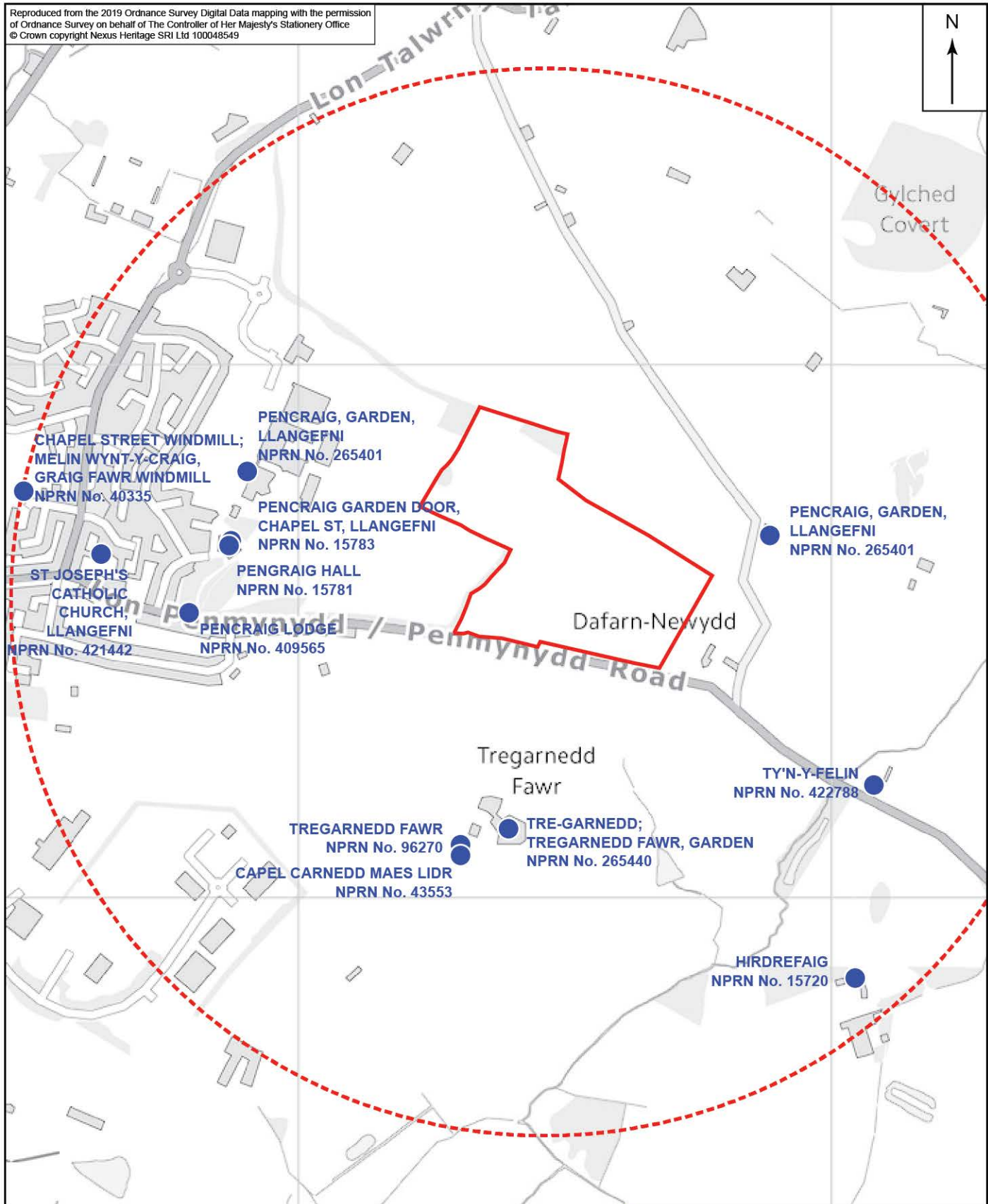
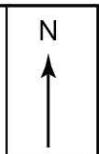
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 Land at Dafarn Newydd,
 Anglesey




DRAWING TITLE:
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 monument assets from the Gwynedd Historic
 Environment Record.

DATE:
 25/11/19

DRAWN BY:
 ECMG

FIGURE:
3



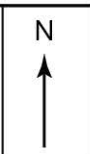
-  Site
-  Assessment Area
-  Monument Assets from the National Monument Record



PROJECT TITLE:
 Land at Dafan Newydd,
 Anglesey

DRAWING TITLE:
 Location of designated and non-designated
 monument assets from the National Monument
 Record

DATE: 25/11/19	DRAWN BY: ECMG	FIGURE: 4
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 Site



PROJECT TITLE:

**Land at Dafan Newydd,
Anglesey**

DRAWING TITLE:

**Ordnance Survey, Surveyor's
Drawing (Surveyor, Robert Dawson), 1818**

DATE:

25/11/19

DRAWN BY:

ECMG

FIGURE:

5



Tithe Map :

Field Number 178;
Field Name, Dafarn Newydd;
Occupier, Ebenezer Roberts;
Landowner, Griffiths Richard Esq.

Field Number 151;
Field Name, Pencraig;
Occupier, Richard Griffith Esq.,
Landowner Griffiths Richard Esq.

 Site

PROJECT TITLE:
**Land at Dafarn Newydd,
 Anglesey**

DRAWING TITLE:
*Map Accompanying Apportionment of the rent-charge in lieu of
 tithes in the parish of Llangefni in the County of Anglesey
 (Surveyor, John Relph Haslam), 1843.*

DATE:
 25/11/19

DRAWN BY:
 ECMG

FIGURE:
6



 Site



PROJECT TITLE:

**Land at Dafarn Newydd,
Anglesey**

DRAWING TITLE:

*Ordnance Survey, 1:10,000 Scale
Mapping, 1888*

DATE:

25/11/19

DRAWN BY:

ECMG

FIGURE:

7



 Site



PROJECT TITLE:
**Land at Dafan Newydd,
 Anglesey**

DRAWING TITLE:
*Ordnance Survey, 1:2,500 Scale
 Mapping, 1889*

DATE:
 25/11/19

DRAWN BY:
 ECMG

FIGURE:
8



 Site



PROJECT TITLE:
**Land at Dafan Newydd,
 Anglesey**

DRAWING TITLE:
*Ordnance Survey, 1:2,500 Scale
 Mapping, 1900*

DATE:
 25/11/19

DRAWN BY:
 ECMG

FIGURE:
9



 Site



PROJECT TITLE:

**Land at Dafan Newydd,
Anglesey**

DRAWING TITLE:

*Ordnance Survey, 1:2,500 Scale
Mapping, 1920*

DATE:

25/11/19

DRAWN BY:

ECMG

FIGURE:

10



 Site



PROJECT TITLE:
**Land at Dafan Newydd,
Anglesey**

DRAWING TITLE:
Aerial Photograph 1945

DATE:
28/11/19

DRAWN BY:
ECMG

FIGURE:
11



 Site



PROJECT TITLE:
**Land at Dafan Newydd,
Anglesey**

DRAWING TITLE:
*Aerial Photograph 1947
(Best Fit)*

DATE:
28/11/19

DRAWN BY:
ECMG

FIGURE:
12

05/66/104. ZEISS 0574 12" F5.6 1/300 7.500'



 Site



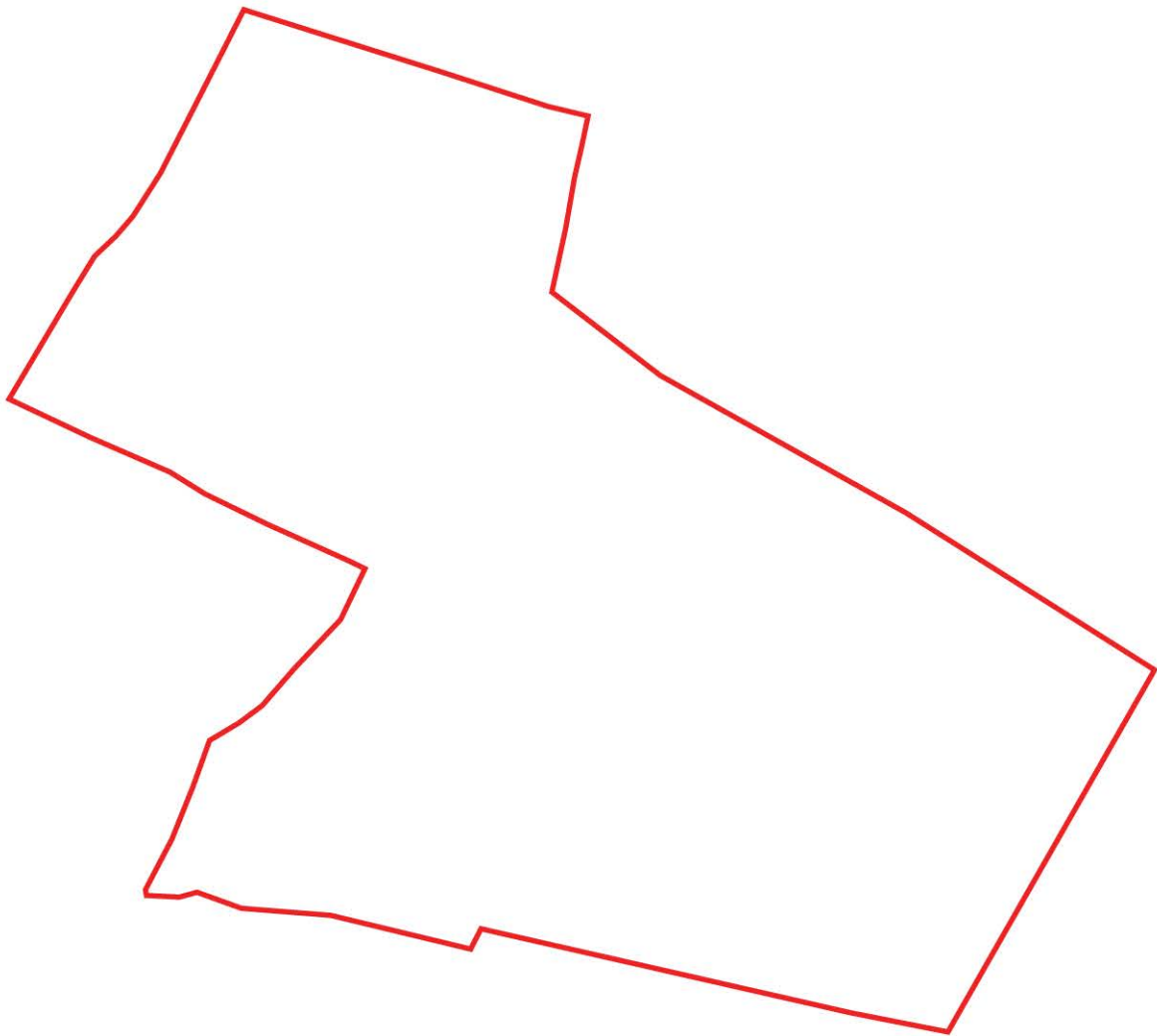
PROJECT TITLE:
**Land at Dafan Newydd,
Anglesey**

DRAWING TITLE:
Aerial Photograph 1966

DATE:
28/11/19

DRAWN BY:
ECMG

FIGURE:
13



 Site



NEXUS HERITAGE

PROJECT TITLE:

**Land at Dafan Newydd,
Anglesey**

DRAWING TITLE:

LiDAR Image

DATE:

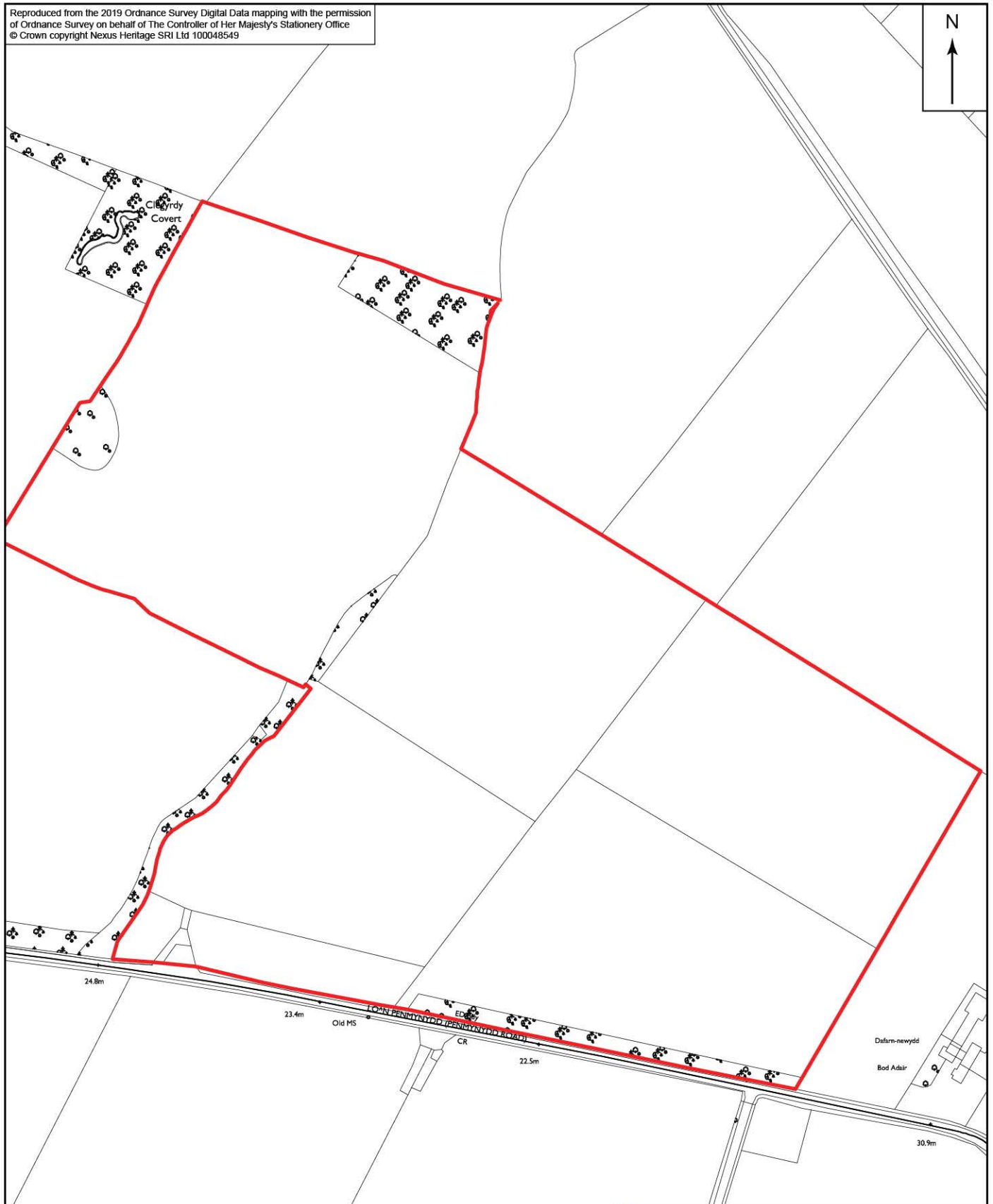
28/11/19



DRAWN BY:

ECMG

FIGURE:

14



-  Site
-  Location and Direction of Photographs



PROJECT TITLE:
**Land at Dafan Newydd,
Anglesey**

DRAWING TITLE:
Index Plan for Photographic Plates

DATE: 28/11/19	DRAWN BY: ECMG	FIGURE: 15
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APPENDICES

APPENDIX A
Specification



NEXUS
HERITAGE



Land at Dafarn Newydd, Llangefni, Anglesey,



Written Scheme of Investigation for an Archaeological Desk-Based Assessment, Walk-Over Survey and Geophysical Survey

Document No: 3467.R01a

Oct. 2019



Nexus Heritage Controlled Document – Commercial-in-Confidence

Document Number	3446.R01a	
Document Status	FINAL	
Prepared by:	Anthony Martin and Liz Gardner with contributions from Martin Roseveare	Date:24.10.19
Planning Archaeologist Check:	J. Emmett (GAPS)	Date: 24.10.19
Planning Archaeologist comment on 1 st draft	Incorrect citation of Archwilio and Coflein as sources suitable for commercial use, and outdated citation of Cynefin tithe should be amended.	
Rev. a	Anthony Martin	Date 24.10.19
Planning Archaeologist Approval		Date:



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Note on Transcriptions of Historic Maps

Historical mapping, both Ordnance Survey (OS) and individual cartographer's work relies on the accuracy of the data input into it and the projection used to produce a two dimensional image from three dimensional data. Techniques of survey have evolved and improved over the centuries but pre-OS maps are of widely varying quality and their accuracy is limited by the technology used to create them.

Creating an overlay of historic mapping (including first and second edition OS Maps) and modern OS data can never be completely accurate. Creating a good approximation relies on using digital technologies to estimate and extrapolate the projection, orientation and scale of original maps by correlating known points on the modern OS grid with the historic mapping. This georeferencing 'distorts' the historic mapping to fit the modern grid using a set of known points chosen by the cartographer/illustrator.

Modern digitally produced OS mapping has a stated accuracy tolerance. The most detailed mapping at 1:1,250 (urban) will have a relative error of $\pm 0.5\text{m}$ up to 60m. On the ground that equates to an error between two points which are 60m apart on the ground 95% of the time the scaled measurement would be between 59.1m and 60.9m (paraphrased from <https://www.gov.uk/government/publications/land-registry-plans-the-basis-of-land-registryapplications/land-registry-plans-the-basis-of-land-registry-plans-practice-guide-40-supplement-1>.)

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APPENDICES

APPENDIX A: *Dafarn, Newydd, Llangefni Brief for Archaeological Assessment and Evaluation*

INTRODUCTION

Owen Devonport Ltd. (hereafter the Client), acting on behalf of its client, has an interest in a parcel of land at Dafarn Newydd (hereafter the Site) and is considering promotion of the Site development of holiday accommodation,. In accordance with *Planning Policy Wales 10* (December 2018) and *TAN24: The Historic Environment* (May 2017), the Client has been advised that a staged programme of archaeological investigation is necessary to characterise the archaeological resource of the site. The purpose of this is to provide evidence to inform both the design of the development and future planning decisions.

Nexus Heritage is appointed as the Archaeological Consultant for this project and has prepared this document, which acts as a Specification for an archaeological desk-based assessment geophysical survey. TigerGeo is identified as the organisation which will undertake the programme of geophysical survey.

This Specification is designed to comply with the spirit and intent of *Brief for Archaeological Assessment and Evaluation*, prepared by the Gwynedd Archaeological Planning Service (hereafter GAPS).

A draft version of this document is offered for reference to Senior Planning Archaeologist of GAPS for review, with a view to securing approval.

TERMS AND CONDITIONS OF APPOINTMENT AND PERFORMANCE STANDARDS

Nexus Heritage acts as Archaeological Consultant to the Client. The archaeological desk-based assessment, walk-over survey and report compilation will be undertaken by Nexus Heritage and the geophysical survey will be undertaken by TigerGeo.

Nexus Heritage and TigerGeo operate in accordance with:

- The Chartered Institute for Archaeologist's *Code of Conduct* (2014 edition).
- The Chartered Institute for Archaeologist's *Code of Approved Practice for the Regulation of Contractual Arrangements in Field Archaeology* (2014 edition).
- The Chartered Institute for Archaeologist's *Standard and guidance for archaeological geophysical survey* (2014 edition)
- The Chartered Institute for Archaeologist's *Standard and Guidance for Historic Environment Desk-Based Assessment* (2017 edition).
- The European Association of Archaeologists *Principles of Conduct for Archaeologists Involved in Contract Archaeological Work* (1998).
- The Chartered Institute for Archaeologist's *Standard and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials* (2014 edition).
- The Chartered Institute for Archaeologist's *Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives* (2014 edition)
- The Wales Archaeological Trusts' document *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)*

LOCATION AND SITE INFORMATION

The Site comprises approximately 14.10ha of pasture land to the east of Llangefni, Anglesey and is centred on NGR SH 47471 75670 (Fig. 1). The site is located immediately east of the recently constructed Llangefni Link Road and is irregular in shape, defined to the north-east by a minor road, Lon Cae Cwta, to the south by the B5420 Lon Penmynydd, with all other external and internal boundaries formed by hedgerows.

The site comprises pasture fields with small areas of woodland at the southern and western edges and bordering the site to the west. It has a southerly aspect, sloping from *c.* 50m OD at its northernmost point to *c.* 30m OD in the south.

The British Geological Survey classifies the superficial deposits as Till, Devensian - Diamicton. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. In a local environment previously dominated by ice age conditions <http://mapapps.bgs.ac.uk/geologyofbritain/home.html?> The bedrock deposits are chartersied as Clwyd Limestone Group - Limestone. Sedimentary Bedrock formed approximately 329 to 347 million years ago in the Carboniferous Period. Local environment previously dominated by shallow carbonate seas. There are is no available borehole data forthe Site or its immediate vicinity curated by the British Geological Survey and the mapped boreholes closest to the Site are labelled confidential/restricted.



Fig. 2: Site Plan (reproduced from Ordnance Survey mapping with the permission of Ordnance Survey on behalf of HMSO © Crown Copyright Nexus Heritage-SRI Licence No. 100048549)

ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

The following archaeological and historic background is quoted from the GAPS *Brief for Archaeological Assessment and Evaluation*,

"The regional Historic Environment Record (HER) has no entries within the provisional site boundary, although ongoing analysis of Lidar data has identified possible enclosures and trackways in the landscape surrounding the site. The majority of field boundaries within the site are rectilinear, suggesting 19th century creation. One sinuous boundary is shown on the tithe map of 1843 as defining the boundary between the landholdings of Dafarn Newydd and the former Pencraig estate (now occupied by Coleg Llandrillo Menai), and may be of earlier origin. Aerial photographs and Ordnance Survey mapping suggest the field pattern and agricultural land use has remained unchanged since the late 19th century, indicating that any archaeological deposits are likely not to have been significantly disturbed.

Several recent development-led archaeological investigations have taken place in the immediate vicinity of the site. Most relevant are mitigation excavations undertaken in connection with the construction of the Llangefni Link Road and expansion of the adjacent Coleg Llandrillo Menai campus. This work recorded a burnt mound and a sub-Roman/early medieval cemetery of approx. 80 individuals with comparatively well-preserved skeletal remains due to the limestone burial environment (Archaeology Wales and Brython Archaeology, both forthcoming). Sections of the link road further south identified further burnt mounds, a Neolithic pit cluster, and an extensive complex of features associated with a Romano-British hut settlement (Brython Archaeology and Wessex Archaeology, both forthcoming).

A cist cemetery (interpreted as a family group) was also recorded during mitigation of the construction of a new water main approximately 300m south-west of the site (PRN 31287, Gwynedd Archaeological Trust report 885, August 2010). This site however had no surviving human remains, reflecting the variable preservation conditions of the locally diverse geology.

To the north-east, east and south-east of the site, staged evaluation carried out in advance of proposed infrastructure development identified settlement and agricultural evidence in the form of enclosures, discrete features and field systems (West Yorkshire Archaeology Service report 2982, June 2017 and Network Archaeology report 17023, July 2018). The work did not progress to full post-excavation analysis and this activity is so far undated, owing to the lack of artefacts typical of much of the archaeology of the region."

OBJECTIVES AND RESEARCH DESIGN

The objectives of this programme of works are:

- To locate and describe, by means of desktop analysis, a walkover survey, geophysical prospecting archaeological features which may be present within the development area
- To make full and effective use of existing information to establish the archaeological significance of the site
- To help inform future decision making, design solutions, further evaluation & mitigation strategies

As the presence/absence of archaeological remains is as yet unproven preparation of a destined research design is not possible, given the broad thrust of period-focussed and

theme-focussed reproach imperatives in north-west Wales. . However, until proven otherwise one of likely principal archaeological interests at the Site could be evidence of the establishment, evolution and use of the Pencraig estate, as expressed in the sinuous boundary shown on the tithe map of 1843. Pencraig was an estate of 186 acres near Llangefni, the origins of which can be traced to the medieval period. In the mid-18th century the estate was in the possession of Richard Poole and his wife Mary, the daughter of Robert Owen Pencraig. In 1879, following the death of its then owner Sir Richard Waldie Griffith the estate passed to the wife of Colonel Bramston Smith of Dublin and then to her daughters, one of whom was married to Lieutenant Colonel Phibbs of the Royal Irish Fusiliers and the other to Captain Newman of Cork. By 1916 the estate was in the possession of Mrs. Phibbs` daughter, Mrs. H.T. Daniell. The Pencraig estate was sold in 1952.

Given recent archaeological discoveries in the vicinity other periods that may be represented in the archaeological record at the Site include the Neolithic, the Romano-British and the sub-Roman/early medieval and the research frameworks for these periods, and any allied themes such the palaeoenvironmental will be kept in mind (<https://archaeoleg.org.uk/areanorthwest.html>).

DESK-BASED ASSESSMENT

A complete and coherent history of the site will be compiled utilising material not necessarily restricted to, but primarily sourced from the following.

- The Historic Environment Record (HER) maintained by Gwynedd Archaeological Trust;
- National Monuments Record of Wales
- The National Library of Wales
- The library of UCNW Bangor
- Ordnance survey historic mapping;
- Anglesey County Record Office/ Archives and Local Studies; (particularly record WD12 Pencraig estate deeds 1699-1967)
- Archaeological Data Service;
- Aerial photographs and satellite images;
- British Geological Survey mapping;
- and a number of on-line sources such as the Cof Cymru (<http://cadw.gov.wales/historicenvironment/recordsv1/cof-cymru/?lang=en>), (<https://places.library.wales/>), (<http://cynefin.archiveswales.org.uk/en/tithe-maps/>) and Historic Wales (<http://historicwales.gov.uk/>) databases.

A map progression of the area will be undertaken and available aerial photographic, satellite and Lidar evidence will be accessed.

Where appropriate the archive information will be supplemented with information from local libraries and specialist interest websites & journals.

In order to identify the character of archaeological remains in the vicinity of the site a search of the Gwynedd HER (hereafter GHER) will be conducted examining an area within a 1000m radius of the Site centre.

The RCAHMMW database of the site will be examined.

Online Lidar data will be consulted if available as will any aerial sources.

The desk-based assessment data collection will be carried out accordance with the relevant CIfA guidance and will allow as comprehensive a history as possible to be compiled. The history will be distilled into an archaeological deposit model taking into account the data collected and assessing the palaeoenvironmental potential, the palaeofaunal potential, the topographic potential and the artefactual potential of any likely archaeological deposits

WALK-OVER SURVEY

A site visit will be conducted and a photographic record will be compiled which will detail any above ground features of potential archaeological/historic interest and show the general topography of the site. The location of any features will be noted on a site plan.

Photographs will be undertaken using a 24 mega-pixel Nikon D3100 digital camera with a variety of standard and other lenses. Images will be captured in RAW format for subsequent processing into high resolution JPG and TIF files.

A handheld GPS will be used to accurately locate any surface features identified.

GEOPHYSICAL SURVEY

Objectives

The basic objective is to detect and define the extent of buried structures of archaeological interest. The resolution must be such that structures perhaps only 0.5m wide or diameter have a chance of being detected and that the anomalous field from them is sufficiently sampled so as to permit analysis of characteristics potentially diagnostic of different materials and structures.

Strips adjacent to any field boundaries will be left unsurveyed due to a combination of vegetation cover and the presence of metallic objects, which cause interference in the magnetic data. The exact widths of these strips will depend on the extent of any vegetation cover and the amount of interference that is produced but will be kept to a minimum.

A magnetic survey is one of the geophysical techniques commonly employed to identify certain types of sub-surface features. Geophysical surveys are usually non-intrusive and involve the measurement of the geophysical properties of the sub-surface. If a feature has different physical properties to the surrounding material then it may produce a measurable variation or anomaly. Interpretation of these anomalies can allow the identification of sub-surface features which may be created in the past and be of archaeological interest. Anomalies identified by a magnetic survey are located in plan. It is not usually possible to obtain reliable depth information on the features that cause the anomalies.

The accurate interpretation of geophysical data depends on the quality of the data collected and the knowledge and experience of the project personnel. It is necessary to use the most appropriate technology for the site specific aims and conditions but it should be noted that the identification of any sub-surface feature(s) depends on there being a measurable contrast between its physical properties and the surrounding material and so it is not possible to guarantee that all sub-surface features will be identified by a geophysical survey.

Resolution

Routine magnetic survey for general archaeological assessment purposes in the UK is traditionally specified with a 1.0m line separation as a compromise between resolution (and hence the detectability of features) and the time required for survey. A 0.25m along line interval for magnetic survey is widely accepted practice and in line with English Heritage guidance (David, 2008).

Survey Approach

The approach to be taken is that the entirety of the highlighted area in Fig. 2 will be surveyed using non-gradiometric magnetic survey. This is probably most efficient way of covering the requested area with geophysical survey. Some classes of feature may escape detection by this method alone but this is probably the most effective route to an overview of possible archaeological remains and their context.

Measured variable	Magnetic flux density / nT
Instrument	Array of Geometrics G858 Magmapper caesium magnetometers
Configuration	Non-gradiometric transverse array (4 sensors, ATV towed)
Sensitivity	0.03 nT @ 10 Hz (manufacturer's specification)
QA Procedure	Continuous observation
Spatial resolution	1.0m between lines, 0.25m mean along line interval

With respect to monitoring and quality assurance the instrumentation continuously displays all incoming data as well as line speed and spatial data resolution per acquisition channel during survey. Rest mode system noise is therefore easy to inspect simply by pausing during survey, and the continuous display makes monitoring for quality intrinsic to the process of undertaking a survey. Rest mode test results (static test) are available from the system.

Data Processing

All data processing is minimised and limited to what is essential for the class of data being collected, e.g. reduction of orientation effects, suppression of single point defects (drop-outs or spikes) etc. The initial processing uses proprietary software developed in conjunction with the multisensor acquisition system and includes sensor and GNSS data alignment and reduction of temporal variations through application of 1D temporal or 2D spatial filters depending upon what is required. Gridded data is ported as data surfaces into Manifold GIS for final imaging and detailed analysis. Additional specialist analysis is undertaken using proprietary software.

TigerGeo uses more advanced processing for magnetic data using potential field techniques standard to near-surface geophysics.

All archived data includes process metadata.

Limitations and Exclusions

The magnetic survey method requires the operator to walk over the site at a constant walking pace whilst holding or pushing/towing the instrument, alternatively the instrument may be towed behind a vehicle. The presence of an uneven ground surface, dense, high or mature vegetation or surface obstructions may mean that some areas cannot be surveyed. In some instances the equipment may be vehicle towed, assuming the ground conditions allow.

The depth at which features can be detected will vary depending on their composition, size, the surrounding material and the type of magnetometer used for the survey. In good conditions large, magnetic targets, such as buried drums or tanks can be located at depths of more than 4 m. Smaller targets, such as buried foundations or archaeological features can be located at depths of between 1 m and 2 m.

A magnetic survey is highly sensitive to interference from surface and near-surface magnetic 'contaminants'. Surface features such as metallic fencing, reinforced concrete, buildings or walls all have very strong magnetic signatures that can dominate readings collected adjacent to them. Identification of anomalies caused by sub-surface features is therefore more difficult or even not possible in the vicinity of surface and near-surface magnetic features.

The presence of made ground also has a detrimental effect on the magnetic data quality as this usually contains magnetic material in the form of metallic scrap and brick. Identification of features beneath made ground is still possible if the target feature is reasonably large and has a strong magnetic response but smaller features or magnetically weak features are unlikely to be identified.

A magnetic survey does not directly locate sub-surface features - it identifies variations or anomalies in the local magnetic field caused by features. It can be possible to interpret the cause of anomalies based on the size, shape and strength of response but it should be recognised that a magnetic survey produces a plan of magnetic variations and not a plan of all sub-surface features. Interpretation of the anomalies is often subjective and it is rarely possible to identify the cause of all magnetic anomalies. Geological or pedological (soil) variations or features can produce responses similar to those caused by anthropogenic features.

Anomalies identified by a magnetic survey are located in plan. It is not usually possible to obtain reliable depth information on the features that cause the anomalies.

It is acknowledged that the response of magnetic survey is dependent upon a soil's ability to support magnetic susceptibility enhancement and therefore the parent material and land use. The magnetic response will depend upon the variations in the deposits. Not all features will produce a measurable magnetic response and the effectiveness of a magnetic survey is also dependant on the site-specific conditions. It is not possible to guarantee that a magnetic survey will identify all sub-surface features.

REPORTING

After the completion of the desk-based assessment, walk-over survey and geophysical survey a report will be prepared. The report will, as appropriate, contain (but not necessarily be restricted to) the following:

- A table of contents
- An introduction with acknowledgements, including a list of all those involved in the project, the location and description of the site and the HER Enquiry Reference number, and HER Event number (Event PRN).
- A Welsh language Event Summary of the work undertaken and principal results.
- A Welsh language Asset Summary for each historic asset newly identified as a consequence of the work carried out for the project

- A statement of the project aims and objectives
- An account of the project methodology undertaken, with an assessment of the same
- A factual exploration of the history, development and use of the site to include archaeological deposit model
- Discussion and Conclusions (including an assessment of the potential for further archaeological investigation and recommendations for an appropriate future strategy)
- Maps and drawings
- References
- Appendix A - a copy of the design brief and agreed specification
- Appendix B - the geophysical report¹ to include a summary statement, greyscale data plots displayed at a scale appropriate to the size of site and types of anomalies that are present in the data. Where possible data will be presented on A3 sheets with continuous blocks of data being shown on a single sheet, general description of the types of anomaly present in the data plus details on any anomalies of interest
- Appendix C – an archive CD

One digital .pdf copy of a draft version of the report will be made available for comment within two weeks of the completion of the geophysical survey. Nexus Heritage will forward the draft report to the Client and the Senior Planning Archaeologist for review. Nexus Heritage will take into account any observations on the content of the draft report made by the Client and the Senior Planning Archaeologist during preparation of the final version of the report.

Report copies in the appropriate numbers, formats and media will be prepared and submitted to GAPS and the GHER

COPYRIGHT

Copyright to any commissioned reports and any other project documents prepared by the appointed service providers will be retained by the appointed service providers under the Copyright, Designs and Patents Act of 1988; excepting that an exclusive licence will be provided to the Client and Isle of Anglesey County Council (hereafter the Council) for the use of such documents by the Client and the Council in all matters directly relating to the project.

The copyright of this document remains with Nexus Heritage and TigerGeo, subject to the same exclusive licence.

CONFIDENTIALITY

Nexus Heritage and TigerGeo will treat as confidential all information obtained directly or indirectly in connection with the archaeological works and will not, without the prior consent

¹ Primary delivery of geophysical report items is as PDF files comprising the text and also the report images exported from the project GIS. In addition, digital report elements are available as vector and raster components exported from the GIS as geo-referenced objects. Images are available in GeoTIFF format and purely vector elements in AutoCAD R12 DXF format. Spatial database data is available in SHP file format.

of the Client, disclose any information relating to the project or publicise the project in any way.

HEALTH AND SAFETY

Nexus Heritage and TigerGeo will be responsible for obtaining all relevant certification regarding Health and Safety prior to any site works. TigerGeo will adhere to all relevant health and safety legislation and be guided by, *inter alia*, the *Health and Safety at Work Act* (1974), *Control of Substances Hazardous to Health (COSHH) Regulations* (2002), *Construction Design and Management (CDM) Regulations* (2015), *Management of Health and Safety at Work Regulations* (1999), the *Work at Height Regulations* (2005), the *Confined Spaces Regulations* (1997) and the *Personal Protective Equipment at Work Regulations* (2002).

While carrying out the archaeological works Nexus Heritage and TigerGeo will operate in accordance with all applicable Health and Safety Legislation.

Nexus Heritage and TigerGeo will provide its staff with all necessary protective clothing and equipment.

Should the staff of Nexus Heritage and/or TigerGeo discover contamination, such contamination may need to be dealt with by an appropriately qualified contractor. Nexus Heritage nor TigerGeo will not take responsibility for the removal of contaminated material from the Site.

Where contaminated material is present in the surface or near-surface deposits at the Site appropriate measures will be taken by Nexus Heritage and TigerGeo to ensure the health and safety of staff which may come into contact with contaminants. In case of encountering contaminated material, TigerGeo will inform Nexus Heritage immediately.

In the event of encountering contaminated material, it may be necessary for Nexus Heritage to produce a revised method statement. Nexus Heritage will forward the revised method statement to TigerGeo and the Planning Archaeologist for reference.

The UXO risk is unknown. Nevertheless, the staff of Nexus Heritage TigerGeo will familiarise themselves with appropriate the actions to be undertaken in the event of a suspected or actual UXO discovery. Appropriate actions in the event of UXO discovery are a vital part of the general safety requirement and contribute to evidencing conformity with the principles laid down in the CDM regulations 2015. All archaeological operatives working on the Site will receive a general briefing from Nexus Heritage concerning the identification of UXO what actions they should take to keep people and equipment away from such a hazard.

Nexus Heritage will submit a Health and Safety Plan (including a Risk Assessment) and/or a Risk Assessment Method Statement (RAMS) to the Client for verification before Site works commence. Nexus Heritage will take into account any comments made by the Client on its Health and Safety Plan (including a Risk Assessment) and/or a Risk Assessment Method Statement (RAMS).

ARCHIVE

The project archive will be assembled on a CD, which will accompany the report. The CD will include a copy of the brief, specification, final report all photographs supplied as individual image files and geophysical data.

MONITORING

Nexus Heritage will monitor the works for the Client's benefit and the Senior Planning Archaeologist will act on behalf of the Council. A minimum of one weeks' notice of the commencement of the archaeological evaluation will be given by Nexus Heritage to the Planning Archaeologist so that arrangements for monitoring can be made.

Reasonable access to the site works will be provided by TigerGeo to representatives of the Client and the Council in order to monitor the works. A site tour and opportunity to scrutinise site records will be provided to the monitors.

Nexus Heritage will ensure that any significant results recovered during the survey are brought to the attention of the Client who will notify the relevant organisations/authorities as soon as is practicably possible, and certainly within 24 hours.

Any monitoring visits or communications will be documented by Nexus Heritage and copied to the Client.

RESOURCES AND PROGRAMMING

The overall delivery of the project objectives will be managed by Anthony Martin, a Director of Nexus Heritage with over 30 years' experience in the heritage and archaeology sector. He is a Member of the Chartered Institute for Archaeologists and has a BA (Hons) in History and an MA in Scientific Methods in Archaeology. Anthony will undertake the desk-based assessment research and compile the report. Report illustrations will be prepared by Liz Gardner MA (Hons) MCIfA, MIA (Ireland)

The geophysical survey will be led by Mark Whittingham of TigerGeo. The survey team will be supervised by an experienced geophysicist / surveyor with at least one year's field experience of cart-based archaeological geophysical surveys and will be drawn from the Tiger Geo staff resource.

TigerGeo undertake surveys in accordance with set survey procedures and quality control guidelines. Collecting high quality to allow informed interpretations is the primary objective of TigerGeo.

TigerGeo is developing an Integrated Management System (IMS) towards ISO certification for ISO9001, ISO14001 and OHSAS18001/ISO45001 and has appointed Alan Ward of Bigfoot Services Limited as its ISO/HSE Technical Advisor. For work within the archaeological sector TigerGeo has been awarded ClfA (Chartered Institute for Archaeologists) Registered Organisation status.

A high standard of client-centred professionalism is maintained in accordance with the requirements of relevant professional bodies including the Geological Society of London (GeoSoc) and the Chartered Institute for Archaeologists (ClfA). Senior members of TigerGeo are professional members of the GeoSoc (FGS), ClfA (MCIfA & ACIfA grades) and other

appropriate bodies, including the European Association of Geoscientists and Engineers (EAGE) Near Surface Division (MEAGE) and the Institute of Professional Soil Scientists (MISoilSci). In addition TigerGeo is a member of EuroGPR and all ground penetrating and other radar work is in accordance with ETSI EG 202 730.

TigerGeo meets with ease the requirements of English Heritage in their 2008 Guidance "Geophysical Survey in Archaeological Field Evaluation" section 2.8 entitled "Competence of survey personnel". The management team at TigerGeo has over 30 years of combined experience of near surface geophysical project design, survey, interpretation and reporting, based across a wide range of shallow geological contexts. Added to this is the considerable experience of our lead geophysicists in a variety of commercial and academic roles. All geophysical staff have graduate and in many cases also post-graduate relevant qualifications pertaining to environmental geophysics from recognised centres of academic excellence.

During fieldwork there is always a fully qualified (to graduate or post-graduate level) supervisory geophysicist leading a team of other geophysicists and geophysical technicians, all of whom are trained and competent with the equipment they are working with. Data processing and interpretation is carried out by a suitably qualified and experienced geophysicist under the direct supervision and guidance of the Senior Geophysicist. All work is monitored and reviewed throughout by the Senior Geophysicist who will appraise all stages of a project as it progresses.

Data processing and interpretation adheres to the scientific principles of objectiveness and logical consistency. A standard set of approved external sources of information, e.g. from the British Geological Survey, the Ordnance Survey and similar sources of data, in addition to previous TigerGeo projects, guide the interpretive process. Due attention is paid to the technical constraints of method, resolution, contrast and other geophysical factors.

There is a strong culture of internal peer-review within TigerGeo, for example, all reports pass through a process of authorship, technical review and finally proof-reading before release to the client. Technical queries resulting from TigerGeo's work are reviewed by the Senior Geophysicist to ensure uniformity of response prior to implementing any edits, etc.

COMMUNICATION PATHS

Anthony Martin is identified as the Project Manager on behalf of Nexus Heritage.

Any questions or requests for clarification arising from examination of this document are to be submitted in writing to Nexus Heritage.

APPENDICES

APPENDIX A

Dafarn, Newydd, Llangefni Brief for Archaeological Assessment and Evaluation

BRIEF FOR ARCHAEOLOGICAL ASSESSMENT AND EVALUATION

Site: Dafarn Newydd, Llangefni

Date: 19th September 2019

National Grid Reference: 247570, 375740

Planning reference: Pre-application

Applicant: Owen Devenport Ltd (Agent)

This brief is only valid for six months after the above date. After this period Gwynedd Archaeological Planning Service should be contacted.

It is recommended that the contractor appointed to carry out the archaeological work visits the site of the proposed development and consults the regional Historic Environment Record (HER) for north-west Wales before completing their specification. Gwynedd Archaeological Planning Service cannot guarantee the inclusion of all relevant information in the brief.

Key elements specific to this brief have been highlighted.

1.0 Site Location and Description

- 1.1 The site is being considered for development for holiday accommodation, the details of which have yet to be finalised. In accordance with Planning Policy Wales 10 (December 2018) and TAN24: The Historic Environment (May 2017), a staged programme of archaeological investigation is necessary to characterise the archaeological resource of the site. The purpose of this is to provide evidence to inform both the final form of the development and future planning decisions. This brief sets out the scope of this programme.
- 1.2 The prospective application site comprises approximately 14.10ha of greenfield land to the east of Llangefni, county town of Anglesey, north Wales. The site is located immediately east of the recently constructed Llangefni Link Road and is irregular in shape, defined to the north-east by a minor road, Lon Cae Cwta, to the south by the B5420 Lon Penmynydd, with all other external and internal boundaries formed by hedgerows.
- 1.3 The site is occupied and surrounded primarily by pasture fields with small areas of woodland at the southern and western edges and bordering the site to the west. It has a southerly aspect, sloping gently from approx. 50m OD at its northernmost point to approx. 30m OD in the south. The geology of the site is described by the British Geological Survey as comprising glacial till over limestone; bedrock is relatively shallow, outcropping locally.
- 1.4 For the purposes of this brief, 'the site' is taken to comprise the whole of the land contained within the red line boundary defining the provisional application area.

2.0 Archaeological Background

- 2.1 The regional Historic Environment Record (HER) has no entries within the provisional site boundary, although ongoing analysis of Lidar data has identified possible enclosures and trackways in the landscape surrounding the site. The majority of field

boundaries within the site are rectilinear, suggesting 19th century creation. One sinuous boundary is shown on the tithe map of 1843 as defining the boundary between the landholdings of Dafarn Newydd and the former Pencraig estate (now occupied by Coleg Llandrillo Menai), and may be of earlier origin. Aerial photographs and Ordnance Survey mapping suggest the field pattern and agricultural land use has remained unchanged since the late 19th century, indicating that any archaeological deposits are likely not to have been significantly disturbed.

- 2.2 Several recent development-led archaeological investigations have taken place in the immediate vicinity of the site. Most relevant are mitigation excavations undertaken in connection with the construction of the Llangefni Link Road and expansion of the adjacent Coleg Llandrillo Menai campus. This work recorded a burnt mound and a sub-Roman/early medieval cemetery of approx. 80 individuals with comparatively well-preserved skeletal remains due to the limestone burial environment (Archaeology Wales and Brython Archaeology, both forthcoming). Sections of the link road further south identified further burnt mounds, a Neolithic pit cluster, and an extensive complex of features associated with a Romano-British hut settlement (Brython Archaeology and Wessex Archaeology, both forthcoming).
- 2.3 A cist cemetery (interpreted as a family group) was also recorded during mitigation of the construction of a new water main approximately 300m south-west of the site (PRN 31287, Gwynedd Archaeological Trust report 885, August 2010). This site however had no surviving human remains, reflecting the variable preservation conditions of the locally diverse geology.
- 2.4 To the north-east, east and south-east of the site, staged evaluation carried out in advance of proposed infrastructure development identified settlement and agricultural evidence in the form of enclosures, discrete features and field systems (West Yorkshire Archaeology Service report 2982, June 2017 and Network Archaeology report 17023, July 2018). The work did not progress to full post-excavation analysis and this activity is so far undated, owing to the lack of artefacts typical of much of the archaeology of the region.

3.0 Archaeological Requirements

- 3.1 This is a *brief* for the **first and second stages** of a programme of archaeological works to establish the archaeological resource of the site and assess its implications for proposed development, and vice versa. These initial stages will comprise: an **archaeological desk-based assessment**; and a **geophysical survey**.
- 3.2 It is anticipated that the results of these two stages will inform a subsequent stage of evaluation by trial trenching. The scope of this work (and any additional stages) will need to be the subject of a new detailed specification which will require prior approval by Gwynedd Archaeological Planning Service.
- 3.3 This *brief* should be used by the archaeological contractor as the basis for the preparation of a detailed written archaeological *specification*. Before the work commences, the specification must be submitted to the Gwynedd Archaeological Planning Service for approval.
- 3.4 The *specification* should contain, as a minimum, the following elements:
- details of the proposed works as precisely as is reasonably possible, indicating clearly on a plan their location and extent



- a research design which sets out the site-specific objectives of the archaeological works
- field methodology
- post-fieldwork methodology
- the level and grade of all key project staff
- details of external specialists
- a timetable for the proposed works, including contingency if appropriate
- the intended method of publication
- archive deposition
- reference to relevant legislation
- health and safety considerations
- monitoring procedures

4.0 Archaeological Programme Detail

Desk-based assessment detail

- 4.1 The assessment must consider the following:
- a) the nature, extent and degree of survival of archaeological sites, structures, deposits and landscapes within the study area through the development of an **archaeological deposit model**. This deposit model should reflect accurately the state of current knowledge and provide a research agenda for further work if necessary [See 4.2 below for further details]
 - b) the **significance** of any remains in their context locally, regionally and nationally
 - c) the **history** of the site [See section 4.3 below for further details]
 - d) the potential impact of any proposed development on the **setting** of known sites of archaeological importance.
- 4.2 Development of the **archaeological deposit model** will involve the following areas of research:
- a) collation and assessment of all relevant information held in the HER
 - b) assessment of all available grey literature reports and published accounts of archaeological work relevant to the site and its setting
 - c) assessment of all available aerial photographic, satellite and Lidar evidence: the main source of archaeological aerial photographic records is held at the Royal Commission on Ancient and Historical Monuments in Wales (RCAHMW), Aberystwyth
 - d) assessment of archive records held at the county archives, Llangefni, and as appropriate, RCAHMW and University College Bangor
 - e) assessment of the environmental potential of the archaeological deposits through existing data or by inference

- f) assessment of the faunal potential of the archaeological deposits through existing data or by inference
- g) assessment of the artefactual potential of the archaeological deposits through existing data or by inference
- h) assessment of any available geotechnical information for the area including the results of test pits and boreholes
- i) assessment of the present topography and land use of the area through maps and site inspection

4.3 Assessment of the **history of the site** will involve the following:

- a) a review of relevant published sources
- b) an analysis of relevant maps, plans and other relevant illustrative material. Cartographic evidence is held at the County Record Offices, including tithe maps, enclosure act plans, estate maps and all editions of the Ordnance Survey. Place and field-name evidence from these sources must be considered.
- c) an analysis of the historical documents (e.g. county histories, local and national journals and antiquarian sources) held in museums, libraries or other archives, in particular local history and archives library.
- d) a review of the aerial photographic evidence.

Archaeological field evaluation detail

4.4 The following non-destructive field evaluation techniques must be employed as part of this phase of work:

- Field visit / walk-over of all accessible areas.
- A geophysical survey of all feasible parts of the site. A low resolution magnetometer survey with sampling interval of 0.25m, traverse spacing of 1m, should be employed.

4.5 This work should be informed by the desk-based research. Previous work in the area suggests that the specified technique is likely to be effective, subject to implicit limitations in the ability to identify discrete and ephemeral features. The effectiveness of the selected technique should be established through a test area before undertaking survey of the whole area and alternative methods of evaluation considered if necessary.

4.6 Any variation to the agreed evaluation technique (for example in response to site constraints or observed poor suitability) must be agreed in advance with GAPS and the developer.

Report

4.7 The results must be presented in a pdf and/or a bound report and laid out in such a way that data and supporting text are readily cross-referenced. The HER Officer should be contacted to ensure that any sites or monuments not previously recorded in the HER are given a Primary Record Number (PRN) and that data structure is compatible with the HER.



- 4.8 All relevant aerial photographs, re-plots and historic maps must be included and be fully referenced. Any site photographs included in the report should be appropriately captioned and clearly located on a suitably scaled site plan. The final report should also include the following:
- a) a **bilingual** non-technical summary of the work undertaken and principal results
 - b) a copy of the design brief and agreed specification
 - c) a location plan based on current OS mapping at an appropriate scale
 - d) all identified features and significant finds plotted on an appropriately scaled site plan
 - e) a gazetteer of all located sites with full dimensional and descriptive detail including grid reference and, where possible, period
 - f) a full bibliography of sources consulted
 - g) an archive compact disc
- 4.9 Geophysical survey results should be presented graphically as grey scale plans and x/y trace plots, with interpretative plans at an appropriate scale, based on Ordnance Survey base mapping. Both raw and processed data should be provided. The plans should be complemented by analytical discussion of the results in the text, which should include a statement of confidence in the results and interpretation, with acknowledgement of any site specific or general limitations.
- 4.10 The report should include an assessment of the potential for further archaeological investigation and give recommendations for an appropriate future strategy.
- 4.11 The methodology for any subsequent phase of the archaeological programme must consider the use of the following techniques:
- a) alternative methods of ground survey
 - b) a programme of archaeological trial trenching, test pits and/or cores to investigate the archaeological deposit model in more detail
 - c) strip, map and sample
 - d) design modification to preserve remains *in situ*
 - e) archaeological building recording
 - f) archaeological excavation
 - g) archaeological survey / recording
 - h) archaeological watching brief on construction works
- 5.0 General requirements**
- 5.1 The archaeological programme must be undertaken by an appropriately qualified professional individual or organisation, fully experienced in work of this character.
- 5.2 Details, including the name, qualifications and experience of the project director and all other key project personnel (including specialist staff) should be communicated to the Gwynedd Archaeological Planning Service and all written work attributed to an author(s).

- 5.3 Contractors and subcontractors are expected to conform to standard professional guidelines. The following are of particular relevance to this project:
- Brown D. H., 2007. *Archaeological Archives: A guide to best practice in creation, compilation, transfer and curation*. Archaeological Archives Forum
 - English Heritage, 1991. *Management of Archaeological Projects (MAP2)*
 - English Heritage, 2006. *Management Of Research Projects in the Historic Environment (MORPHE)*
 - Richards, J. & Robinson, D., 2000. *Digital Archives from Excavation and Fieldwork: Guide to Good Practice* (Second Edition). The Archaeology Data Service Guide to Good Practice: Oxbow Books <http://ads.ahds.ac.uk/project/goodguides/excavation/>
 - Royal Commission on Ancient and Historic Monuments of Wales 2015 Guidelines for digital archives <http://www.rcahmw.gov.uk/media/681.pdf>
 - Schmidt, A. et al, 2016. *EAC Guidelines for the Use of Geophysics in Archaeology*
 - The Chartered Institute for Archaeologists, December 2014. *Code of Conduct*
 - The Chartered Institute for Archaeologists, December 2014. *Standard and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials*
 - The Chartered Institute for Archaeologists, January 2017. *Standard and Guidance for Historic Environment Desk-Based Assessment*
 - The Chartered Institute for Archaeologists, December 2014. *Standard and Guidance for Archaeological Geophysical Survey*
 - The Chartered Institute for Archaeologists, December 2014. *Standard and Guidance for Archaeological Field Evaluation*
 - The Chartered Institute for Archaeologists, December 2014. *Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives*
 - The Welsh Archaeological Trusts, October 2018. *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)*
- 5.4 Many people in North Wales speak Welsh as their first language, and many of the archive and documentary references are in Welsh. Contractors should therefore give due consideration to their ability to understand and converse in Welsh.
- 5.5 The archaeological contractor must satisfy themselves that all constraints to fieldwork have been identified, including the presence of livestock, siting of live services, Tree Preservation Orders and public footpaths. Gwynedd Archaeological Planning Service bears no responsibility for the inclusion or exclusion of such information within this brief.
- 5.6 Any changes to the specifications that the archaeological contractor may wish to make after approval should be communicated to Gwynedd Archaeological Planning Service and approved before implementation.
- 5.7 Care must be taken in dealing with human remains and the appropriate legislation and environmental health regulations followed. Gwynedd Archaeological Planning

Service and the local Coroner must be informed immediately if human remains are discovered.

- 5.8 The involvement of Gwynedd Archaeological Planning Service should be acknowledged in any report or publication generated by this project.
- 5.9 A full archive including plans, photographs, written material and any other material resulting from the project should be prepared in accordance with standard guidance. All plans, photographs and descriptions should be labelled, cross-referenced and lodged in an appropriate place (to be agreed with Gwynedd Archaeological Planning Service) within six months of the completion of the project.
- 5.10 A copy of the bound report or pdf must be sent to both the Development Control Archaeologist and the HER Officer, who will deposit the copy in the HER.
- 5.11 At least one further copy of the report will be required by the local planning authority and will need to be submitted by the applicant as part of any planning application. The contractor should ensure that the applicant is aware of this requirement and that the roles and processes for meeting this obligation are clearly understood.

6.0 Curatorial monitoring

- 6.1 The project will be monitored by Gwynedd Archaeological Planning Service to ensure the fulfilment of the brief and specifications. This will normally include reviewing the progress of reports and archive preparation. The archaeological contractor must inform Gwynedd Archaeological Planning Service in writing of the proposed start dates for the project and any subsequent phases of work.

7.0 Further information

- 7.1 This document outlines best practice expected for a programme of archaeological mitigation but cannot fully anticipate the conditions that will be encountered as work progresses. If requirements of the brief cannot be met they should only be excluded or altered after gaining written approval of the Gwynedd Archaeological Planning Service.
- 7.2 Further details or clarification of any aspects of the brief may be obtained from Gwynedd Archaeological Planning Service at the address below.

Jenny Emmett
Uwch Archaeolegydd Cynllunio – Senior Planning Archaeologist

Gwasanaeth Cynllunio Archaeolegol Gwynedd - Gwynedd Archaeological Planning Service
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APPENDIX B
Walk-Over Survey Photographs



Dafarn Newydd, Llangefni, Isle of Anglesey

Geophysical Survey Report
(Total Magnetic Intensity – Heritage)
Version 1.0

Project code: DNL191

Produced for:

Nexus Heritage

Lead Author:

MJ Roseveare, Senior Geophysicist
BSc(Hons) MSc MEAGE FGS MCIfA



6th November 2019



Dafarn Newydd, Llangefni, Isle of Anglesey

Digital data

Item and version	Sent to	Sent date
CAD – Vector Elements 1.0	Anthony Martin	6 th November 2019

Audit

Version	Author	Checked	Date
Interim			
1.0	MJ Roseveare, J Smith	ACK Roseveare	6 th November 2019

Project metadata

Project Code	DNL191
Client	Nexus Heritage
Fieldwork Dates	30 th - 31 st October 2019
Field Personnel	ACK Roseveare, MJ Roseveare
Data Processing Personnel	ACK Roseveare
Reporting Personnel	MJ Roseveare, J Smith
Report Date	6 th November 2019
Report Version	1.0

TigerGeo Limited

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EuroGPR Member 129, licensed to undertake radar survey in the UK by OFCOM – 1065067/1

This report and all associated data remain the exclusive property of TigerGeo Limited until paid for

Non-Technical Summary

TigerGeo was commissioned by Nexus Heritage to undertake a geophysical survey of land west of Dafarnnewydd, east of Llangefni town. The land is currently subject to archaeological assessment in advance of a proposed redevelopment. The magnetic survey was undertaken using an ATV-towed array of caesium vapour magnetometers, partly to allow wet and overgrown land to be traversed more successfully than would be possible on foot.

Survey covered an area of approximately ten hectares but a field within the west of the survey area could not be accessed due to localised flooding and extremely soft ground after several days of significant rainfall.

There are two distinct magnetic contexts, one associated with wetter ground to the west and the other with drier ground on the eastern slopes. The magnetic character and detectability of classes of feature has the potential to vary across the site.

There is evidence for former agricultural use of the land, including an undatable field system apparently removed prior to the Tithe Map and also what seems to be latter cultivation, perhaps after land improvements undertaken in the time between the Tithe Map and the late 1800s OS map editions. One of the post Tithe Map boundaries appears to cross the remains of a small quarry but that is the only evidence for non-agricultural use of the land.

A number of narrow linear anomalies have the potential to be ancient and near the western edge of the survey there is buried magnetic debris which while perhaps modern rubbish could also be, speculative, evidence for a burnt mound.

The limestone beneath the Till covering much of the site is karstic with active sinkholes observed during survey and magnetic evidence for at least two more.

Crynodeb Annhechnegol

Comisiynwyd TigerGeo gan Nexus Heritage i gynnal arolwg geoffisegol o'r tir i'r gorllewin o Dafarn-newydd, i'r dwyrain o dref Llangefni. Mae'r tir yn destun asesiad archaeolegol ar hyn o bryd, cyn i waith ailddatblygu arfaethedig gychwyn yno. Cynhaliwyd yr arolwg magnetig gan ddefnyddio ystod o fagnetomedrau anwedd caesiwm yn cael eu tynnu gan gerbyd pob tir (ATV), yn rhannol er mwyn gallu tramwyo tir gwlyb a thir a oedd wedi tyfu'n wyllt yn fwy llwyddiannus na'r hyn fyddai'n bosib ar droed.

Roedd yr arolwg yn edrych ar ardal oddeutu deg hectar, ond nid oedd yn bosib mynd at dir yng ngorllewin ardal yr arolwg oherwydd llifogydd lleoledig a thir hynod feddal wedi sawl diwrnod o lawiad sylweddol.

Ceir dau gyd-destun magnetig ar wahân. Mae un yn ymwneud â thir gwlypach i'r gorllewin a'r llall yn ymwneud â thir sychach ar y llethrau dwyreiniol. Mae potensial i gymeriad magnetig a datgeladwyedd dosbarthiadau nodweddion amrywio ar draws y safle.

Ceir tystiolaeth o ddefnydd amaethyddol o'r tir yn y gorffennol, gan gynnwys cyfundrefn caeau na ellir rhoi dyddiad arni ac yr ymddengys y cafwyd gwared arni cyn y Map Degwm, yn ogystal ag amaethu diweddarach - yn ôl pob golwg, o bosib yn dilyn gwelliannau i'r tir a wnaed yn y cyfnod rhwng y Map Degwm ac argraffiadau map OS diwedd degawd cyntaf y bedwaredd ganrif ar bymtheg. Ymddengys bod un o'r ffiniau o'r cyfnod wedi'r Map Degwm yn croesi olion chwarel fechan, ond dyna'r unig dystiolaeth o ddefnydd anamaethyddol o'r tir.

Mae potensial i nifer o anomaleddu llinellol cul fod yn rhai hynafol, a gerllaw ymyl gorllewinol yr arolwg ceir malurion magnetig claddedig a allai fod yn sbwriel modern ond a allai hefyd fod yn dystiolaeth o dwmpath llosg.

Mae'r calchfaen o dan y til sy'n gorchuddio llawer o'r safle yn garstig, a gwelwyd llyncdyllau gweithredol yn ystod yr arolwg, a cheir tystiolaeth fagnetig o ddau arall, o leiaf.



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Drawing	Title
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DWG 02b	1m Pseudo-Gradient Data
DWG 03	Interpretation
DWG 04	Interpretation – Vector Only

1 Introduction

TigerGeo was commissioned by Nexus Heritage to undertake a geophysical survey of land west of Dafarnnewydd, on the B5420 road heading east from PenCraig on the east side of Llangefni town. The land is currently subject to archaeological assessment in advance of a proposed redevelopment from pasture. The magnetic survey was undertaken using an ATV-towed array of caesium vapour magnetometers, partly to allow wet and overgrown land to be traversed more successfully than would be possible on foot.

Survey was undertaken across four fields, covering an area of approximately ten hectares. A fifth field, to the west, could not be accessed at the time of survey due to localised flooding of the only access after several days of significant rainfall. Accumulated surface water and liquidised mud meant that safe and practicable access into the field was not possible, there being concealed holes and ruts beneath the fluid surface which itself exceeded the wading depth of the ATV.

Overall, coverage in the fields that could be surveyed was better than expected.

Country	Wales
County	Sir Ynys Mon - Isle Of Anglesey
Nearest Settlement	Llangefni
Central Co-ordinates	247549, 375602

2 Context

2.1 Environment

Soilscapes Classification	Freely draining slightly acid but base-rich soils (7)
Superficial 1:50000 BGS	Till, Devensian – Diamicton (TILLD)
Bedrock 1:50000 BGS	Clwyd Limestone Group – Limestone (CLWYD)
Topography	Low lying land in the centre of the site, rises to the east and west
Hydrology	Free draining on slopes, overland drainage after high rainfall, waterlogged lower ground with established wetland
Current Land Use	Pasture
Historic Land Use	Mixed agricultural
Vegetation Cover	Grassland, patches of bramble and large areas of bog habitat

The two central lowest fields are both waterlogged with areas of established wetland across both. This was surveyed where safe and practicable to do so but inevitably some areas were not. The system used is able to traverse such ground and pull through the tall grasses associated with such ground but patches of tangled bramble and other scrubby colonising weeds had to be avoided. In practical terms this was limited mainly to the field margins and an area central to the northern middle field.

In the southern central field an active sinkhole with surface water draining into it is evidence for karst structures in the Carboniferous Clwyd Limestone; further, dry, examples were seen in the same field.

Higher up the eastern slopes a mixed unsorted Till was evident within the clearance banks defining the fields, with rounded and sub-rounded Snowdonia grits and other rocks mixed with eroded limestone. There is also some evidence for localised quarrying in the two eastern fields but for what purpose is unclear given the local predominance of Till material within field walls.

2.2 Heritage

The following text is copied from the Nexus Heritage WSI for the project, itself quoted from the GAPS "Brief for Archaeological Assessment and Evaluation":

"The regional Historic Environment Record (HER) has no entries within the provisional site boundary, although ongoing analysis of Lidar data has identified possible enclosures and trackways in the landscape

surrounding the site. The majority of field boundaries within the site are rectilinear, suggesting 19th century creation. One sinuous boundary is shown on the tithe map of 1843 as defining the boundary between the landholdings of Dafarn Newydd and the former Pencraig estate (now occupied by Coleg Llandrillo Menai), and may be of earlier origin. Aerial photographs and Ordnance Survey mapping suggest the field pattern and agricultural land use has remained unchanged since the late 19th century, indicating that any archaeological deposits are likely not to have been significantly disturbed.

Several recent development-led archaeological investigations have taken place in the immediate vicinity of the site. Most relevant are mitigation excavations undertaken in connection with the construction of the Llangefni Link Road and expansion of the adjacent Coleg Llandrillo Menai campus. This work recorded a burnt mound and a sub-Roman/early medieval cemetery of approx. 80 individuals with comparatively well-preserved skeletal remains due to the limestone burial environment (Archaeology Wales and Brython Archaeology, both forthcoming). Sections of the link road further south identified further burnt mounds, a Neolithic pit cluster, and an extensive complex of features associated with a Romano-British hut settlement (Brython Archaeology and Wessex Archaeology, both forthcoming).

A cist cemetery (interpreted as a family group) was also recorded during mitigation of the construction of a new water main approximately 300m south-west of the site (PRN 31287, Gwynedd Archaeological Trust report 885, August 2010). This site however had no surviving human remains, reflecting the variable preservation conditions of the locally diverse geology.

To the north-east, east and south-east of the site, staged evaluation carried out in advance of proposed infrastructure development identified settlement and agricultural evidence in the form of enclosures, discrete features and field systems (West Yorkshire Archaeology Service report 2982, June 2017 and Network Archaeology report 17023, July 2018). The work did not progress to full post-excavation analysis and this activity is so far undated, owing to the lack of artefacts typical of much of the archaeology of the region."

The Tithe Map shows none of the present field boundaries with the exception of one between the western field and the rest of the site, being labelled on the 1880s Edition OS mapping as a northern extension of Lodge Covert. By this date, the present field boundaries are in place which were seen to be largely formed by stone clearance so improvement of the land seems to have occurred in the intervening years, maybe under the influence of the Pencraig Estate mediately to the west.

3 Discussion

3.1 Character & Principal Results

3.1.1 Introduction

The following paragraphs represent an interpretive summary of the survey. The numbers in square brackets refer to individual anomalies described in detail in the catalogue below and shown on DWG 03 onwards.

3.1.2 Data

Data quality is good, in some ways better than expected given the ground conditions and vegetation in the central fields. The wet and overgrown margins of the central fields could not be accessed but overall this does not appear to have affected the interpretation of the site as a whole. Any small gaps relate to clumps of woody or straggly vegetation or the occasional area too wet or otherwise unsafe to traverse.

Magnetic contrast is overall moderate, lower in the wetter western parts but high in the eastern slopes. There is little motion or other noise in the data and much of the character of the data relates to land use and geological variation.

3.1.3 Geology, soils and environment

Given the range of soil hydrological contexts there is little reason to suppose the soil's magneto-chemistry will be the same across the site and indeed, the survey data demonstrates that it is not. The BGS G-Base data for available soil iron quotes 6.6% locally (5 km) which is huge compared to the more usual 2 – 4%, although the regional (15 km) average is 4.9%. These figures demonstrate that there is significant potential for high magnetic susceptibilities on site and hence a good chance that past disturbance of the soil will leave some long-term trace.

However, the hydrology needs to be factored in and various conflicting processes can be at work, none of which are well understood and all would require sampling and laboratory analysis for their impact at the site to be fully explored. It has been observed that long-term waterlogging can reduce the apparent susceptibility of the soil, presumably by slow conversion to less magnetic ionic forms of iron whereas cyclic wetting has been observed to strongly increase apparent susceptibility.

In addition, on sites where there is a transition from dry to wetter ground, as is the case here, there can be changes in soil type related to topographic variation that can also influence magnetic data. Low lying wetter ground may be associated with greater depths of colluvial material or alluvium if there is running water. Both of these will hold water differently from other soils and, even if the amount of available iron is the same, they may exhibit different magneto-chemistry. The fact these soils tend to accumulate over time means that features of archaeological interest, as well as being differently magnetic, can also be buried at relatively greater depths than elsewhere on site.

Here, the situation is complex; the lowest lying parts in the centre of the site are completely waterlogged and increased levels of soil moisture persist a little way up the eastern slopes, partly due to overland flow from springs to the north of the site. Above these areas, the soil is dry. It would be reasonable to expect that there are bands of alluvium to each side of the areas subjected to overland flow and especially within the shallow north to south valley that divides the western field from the rest of the site.

The texture of the magnetic intensity data varies approximately by topography and hence surface wetness; the lowest lying areas are associated with the weakest magnetic contrast [13], which rises to a maximum within the higher eastern slopes [18]. The change is, as expected, somewhere near the transition from waterlogged to drier ground. This implies that features clearly apparent in the higher regions may be less detectable in the lower despite physical continuity between the two. The fact that land improvement has taken place since the 1840s, the evidence being the clearance banks between the fields that are not evident on the Tithe Map, means that cultivation may also have occurred and therefore there is potential for colluvial build-up in the lower, wetter, regions of the eastern fields. While this may not be significant, it does imply

that earlier features could have become deeper buried. This is mitigated with this survey by the collection of non-gradiometric intensity data which lacks the sensitisation to shallow depths inherent to vertical gradiometric configurations. Intensity data is also better able to resolve complex alluvial and similar structures and therefore generally better for wetland areas.

Although Till is supposed to blanket much of the site and this appears to be verified by its presence throughout in field boundaries, its thickness is not known. A small quarry at [21] might imply the limestone is readily available at shallow depths plus the texture of the magnetic data would imply this. This has been seen to be karstic with sinkholes apparent in the central southern field, one of which had water flowing freely into it. Examination of the sides of this revealed Till deposits and the limestone itself was not visible, but it is evident that although drainage is generally impeded this is likely due to the clay nature of soils derived from the Till whereas the Till itself may be more permeable. The magnetic character of the surface soils will therefore depend to some extent upon the extent and composition of the Till and how this affects both drainage and geochemistry

At [33] and maybe also [38] in the northeast field there is evidence for further, larger, sinkholes, the former being associated with a circular impression and an enhanced magnetic intensity anomaly typical of deeper soil. At [6] in the southern central field, there is a possible buried structure or maybe something sinkhole-related and by association maybe the reduced magnetic intensity linear [7] is also related.

3.1.4 Land use

There are weak signs of former cultivation in the southern central field and the two eastern ones (e.g. at [20]) but nowhere is it particularly clear. It is masked or almost non-magnetic to the west and aligned with stronger anomalies from the limestone in the east. The fact that cultivation exists here might be unexpected but would be indicative of formerly drier conditions and therefore presumably a deterioration of drainage since improvements between 1840 and 1880?

There is a small quarry at [21], manifest as a slight depression ringed with spoil plus enhanced magnetic intensity in the base, likely due to a soil infill. This effect is similar to that seen in connection with a probable sink hole at [33].

In the wetter parts of the site there is evidence for land drains, clear examples being at [1] and [2], likely also [4] and maybe also [5].

3.1.5 Archaeology

There is good evidence for a former field system that was lost before production of the Tithe Map which shows a precursor to the existing one, fully realised prior to the late 1800s OS map editions.

A number of fields are represented, some with double-ditched boundaries (e.g. [16] and [35]) and all at an angle to the present system and also the former cultivation [20] which would suggest the latter to belong to a phase of improvement post-dating the Tithe Map. Most of the boundaries seem to be defined by ditch fills rather than wide clearance banks, e.g. [14] and [23], [28] – [30], [32] and [34]. Weaker evidence exists for another at [25].

There are some reduced magnetic intensity linear anomalies that can have a variety of causes, including the voids of culverts, gravel or peat-filled ditches or the bases of stony banks. The largest example is [15] that also seems to be part of the same layout of features as probable field boundary ditches [14] and others. In the same field, thinner curving anomalies [17] and [19] may also be of interest; if they are not recent drains then they could be remnants from earlier enclosures.

A spread of magnetic debris [3], close to the wettest part of the site and a probable former stream course, might be of interest if there is the possibility of burnt mound type features in this area.

A small number of undiagnostic isolated possible ditch fills exist, e.g. at [8], [9], [11] and [12]. One, [10], might be the corner of an otherwise invisible enclosure. Some, e.g. [8] or [9] may, from their position, be drainage related.

3.2 Catalogue

Cat ID	Data Class	Anomaly Class	Form Class	Feature Class	Feature Sub-Class	Comments
1	TMI	Variable	Linear continuous	- Agricultural	Drain	Probable field drain
2	TMI	Variable	Linear continuous	- Agricultural	Drain	Probable field drain, similar to [1]
3	TMI	Variable	Area		Highlight	Possible burnt mound
4	TMI	Variable	Linear continuous	- Agricultural	Drain	Probable field drain, similar to [1] and [2]
5	TMI	Reduced	Linear continuous (group)	- Fill		
6	TMI	Strong enhanced	Area		Fill	Probable strong magnetic fill, does not necessarily have any ferrous component. Possible sink hole
7	TMI	Reduced	Linear continuous	- Fill		
8	TMI	Enhanced	Linear continuous	- Fill	Ditch	Probable ditch fill
9	TMI	Enhanced	Linear continuous	- Fill	Ditch	Possible ditch fill
10	TMI	Enhanced	Linear continuous	- Fill	Ditch	Possible ditch fill
11	TMI	Enhanced	Linear continuous (group)	- Fill	Ditch	Group of possible ditch fills
12	TMI	Enhanced	Linear continuous (group)	- Fill	Ditch	Group of probable ditch fills, with [11] a possible enclosure?
13	TMI	Texture	Area		Natural	Geological character
14	TMI	Strong enhanced	Linear continuous	- Fill	Ditch	Probable ditch fill
15	TMI	Strong reduced	Linear continuous	- Fill		
16	TMI	Strong enhanced	Linear continuous	- Fill	Ditch	Probable ditch fills - double ditch field boundary
17	TMI	Reduced	Linear continuous	- Fill		
18	TMI	Texture	Area		Natural	Geological character
19	TMI	Reduced	Linear continuous	- Fill		Similar to [17]
20	TMI	Enhanced	Linear continuous (group)	- Agricultural	Cultivation	Former cultivation, possibly ridge and furrow
21	TMI	Strong variable	Area		Fill	Probable strong magnetic fill, does not necessarily have any ferrous component

Cat ID	Data Class	Anomaly Class	Form Class	Feature Class	Feature Sub-Class	Comments
22	TMI	Enhanced	Linear continuous	Fill	Ditch	Possible ditch fill, continuation of [14]
23	TMI	Enhanced	Linear continuous	Fill	Ditch	Probable ditch fill, likely continuation of [14] and [22]
24	TMI	Texture	Area	Natural		Area of geological change
25	TMI	Variable	Linear continuous	Fill		Possible linear fill
26	TMI	Reduced	Linear continuous	Fill		
27	TMI	Enhanced	Linear continuous	Fill	Ditch	Possible ditch fill
28	TMI	Strong enhanced	Linear continuous	Fill	Ditch	Probable ditch fill, similar to [14]
29	TMI	Enhanced	Linear continuous	Fill	Ditch	Possible ditch fill
30	TMI	Strong enhanced	Linear continuous	Fill	Ditch	Probable ditch fill, similar to [28]
31	TMI	Strong enhanced	Linear continuous	Fill	Ditch	Probable ditch fill, similar to [28] and [30]
32	TMI	Strong enhanced	Linear continuous	Fill		Probable ditch fill, similar to [28], [30] and [31]
33	TMI	Strong variable	Area	Fill		Probable strong magnetic fill, does not necessarily have any ferrous component. Possible sink hole
34	TMI	Strong enhanced	Linear continuous	Fill	Ditch	Probable ditch fill, similar to [28], [30], [31] and [32]. Likely continuation of [30]
35	TMI	Strong enhanced	Linear continuous	Fill	Ditch	Probable ditch fill, similar to [28], [30], [31], [32] and [34], but possible double ditch element southeast end
36	TMI	Enhanced	Linear continuous	Fill	Ditch	Possible ditch fill
37	TMI	Enhanced	Linear continuous	Fill	Ditch	Possible ditch fill
38	TMI	Strong variable	Area	Fill		Probable strong magnetic fill, does not necessarily have any ferrous component. Possible sink hole

3.3 Conclusions

Date coverage was surprisingly good given the waterlogged and vegetated state of the fields with the not-surveyed areas (ignoring the inaccessible western field) apparently unlikely to contribute anything of significance.

There are two distinct magnetic contexts, associated with wetter ground to the west and drier ground on the eastern slopes and therefore the magnetic character and detectability of classes of feature has the potential to vary across the site.

Many of the features apparent in the survey data are evidence for former agricultural use of the land,

including a field system apparently removed prior to the Tithe Map and what seems to be latter cultivation. This latter is perhaps within the context of land improvements between the Tithe Map and the late 1800s OS map editions given the appearance within that period of clearance banks creating the present field layout.

One of these seems to cross the remains of a small quarry but that is the only evidence for non-agricultural use of the land.

Earlier features are not obvious in the data but there are a number of narrow linear anomalies that do not fit into the field systems and therefore have the potential to be ancient. There is also no evidence of date for the newly discovered system of enclosure. Near the western edge of the survey there is possible, but speculative, evidence for a burnt mound although it could also be modern rubbish in a particularly boggy part of the field.

There are sink holes at various locations in the site, including one with water seen to enter it, other small holes in the central fields and maybe two more, both larger, in the northeast field.

3.4 Caveats

Geophysical survey is reliant upon the detection of anomalous values and patterns in physical properties of the ground, e.g. magnetic, electromagnetic, electrical, elastic, density and others. It does not directly detect underground features and structures and therefore the presence or absence of these within a geophysical interpretation is not a direct indicator of presence or absence in the ground. Specific points to consider are:

- some physical properties are time variant or mutually interdependent with others;
- for a buried feature to be detectable it must produce anomalous values of the physical property being measured;
- any anomaly is only as good as its contrast against background textures and noise within the data.

TigerGeo will always attempt to verify the accuracy and integrity of data it uses within a project but at all times its liability is by necessity limited to its own work and does not extend to third party data and information. Where work is undertaken to another party's specification any perceived failure of that specification to attain its objective remains the responsibility of the originator, TigerGeo meanwhile ensuring any possible shortcomings are addressed within the normal constraints upon resources.

4 Methodology

4.1 Magnetic Principles

4.1.1 Physical concepts

Magnetic survey for any purpose relies upon the generation of a clear magnetic anomaly at the surface, i.e. strong enough to be detected by instrumentation and exhibiting sufficient contrast against background variation to permit diagnostic interpretation. The anomaly itself is dependent upon the chemical properties of a particular volume of ground, its magnetic susceptibility and hence induced magnetic field, the strength of any remanent magnetisation, the shape and orientation of the volume of interest and its depth of burial. Finally the choice and configuration of measurement instrumentation will affect anomaly size and shape.

Sites present a complex mixture of these factors and for some the causative affects are not known. However, depth of burial and size are usually fairly constrained and background susceptibility can be estimated (or measured). The degree of remanent magnetisation is harder to predict and depends on both the natural magnetic properties of the soil and any chemical processes to which it has been subjected. Fortunately heat will raise the susceptibility of most soils and topsoil tends to be more magnetic than subsoil, by volume.

It is hard to draw reliable conclusions about what sort of geology is supportive of magnetic survey as there are many factors involved and in any case magnetic response can vary across geological units as well as being dependent upon post-deposition and erosional processes. In general a relatively non-magnetic parent material contrasting with a magnetisable erosion product, i.e. one which contains iron in the form of oxides and hydroxides, will allow archaeological structures to exhibit strong magnetic contrast against their surroundings and especially if the soil has been heated or subjected to certain processes of fermentation. In the absence of either, magnetic enhancement becomes entirely reliant upon the geochemistry of the soil and enhancement will often be weaker and more variable.

Analysis of the British Geological Survey (BGS) Geochemical Atlas (G-Base) for total soil iron reveals that for England and Wales 50% of the samples (the interquartile range) lie between 1.9% and 3.6% percentage iron with the median at 2.7%.

The principal magnetic iron mineral is the oxide magnetite which sometimes occurs naturally but is more often formed during the heating of soil. Subsequent cooling yields a mixture of this, non-magnetic oxide haematite and another magnetic oxide, maghaemite. Away from sources of heat, other magnetic iron minerals include the sulphides pyrite and greigite while in damp soils complex chemistry involving the hydroxides goethite and lepidocrocite can create strong magnetic anomalies. There are thus a number of different geochemical reaction pathways that can both augment and reduce the magnetic susceptibility of a soil. In addition, this susceptibility may exhibit depositional patterns unrelated to visible stratigraphy.

Most structures of archaeological interest detected by magnetic survey are fills within negative or cut features. Not all fills are magnetic and they can be more magnetic or less magnetic than the surrounding ground. In addition, it is common for fills to exhibit variable magnetic properties through their volume, basal primary silt often being more magnetic than the material above it due to the increased proportion of topsoil within it. However, a fill containing burnt soil may be much more magnetic than this primary silt and sometimes a feature that has contained standing water can produce highly magnetic silts through mechanical depositional processes (depositional remanent magnetisation, DRM).

A third structural factor in the detection of buried structures is the depth of topsoil over the feature. As fills sink, the hollow above accumulates topsoil and hence a structure can be detected not through its own magnetisation but through the locally deeper topsoil above it. The volume of soil required depends upon the magnetic susceptibility of the soil but just a few centimetres are often sufficient. Such a thin deposit can, however, easily be lost through subsequent erosion by natural factors or ploughing.

4.1.2 Instrumentation

The use of the magnetic sensors in non-gradiometric (vertical) configuration avoids measurement sensitisation to the shallowest region of the soil, allowing deeper structures, whether natural or otherwise to

be imaged within the sensitivity of the instrumentation. This also allows the detection of shallow broad variations in magnetic susceptibility that might have archaeological significance. Suppression of ambient noise and temporal trends is reduced and therefore need reduction during processing.

The theoretical slightly reduced lateral resolution inherent to using non-gradiometric sensor arrays is practically not an issue and especially if processing includes a vertical pseudo-gradient conversion. The non-gradiometric system is thus overall a more capable configuration than the short gradiometers often used for archaeological studies.

Caesium instrumentation has a greater sensitivity than fluxgate instruments, however, at the 10 Hz sampling rate used here this increase in sensitivity is limited to about one order of magnitude. Greater benefit is obtained from a better signal-to-noise ratio meaning that sub-nanoTesla measurement is more practically achieved.

The array system is designed to be non-magnetic and to contribute virtually nothing to the magnetic measurement, whether through direct interference or through motion noise.

4.2 Magnetic Survey

4.2.1 Technical equipment

Measured variable	Total Magnetic Intensity / nT
Instrument	Array of Geometrics G858 Magmapper caesium magnetometers
Configuration	Non-gradiometric transverse array (4 sensors, ATV towed)
Sensitivity	0.03 nT @ 10 Hz (manufacturer's specification)
QA Procedure	Continuous observation
Spatial resolution	1.0m between lines, 0.25m mean along line interval

4.2.2 Monitoring & quality assessment

The system continuously displays all incoming data as well as line speed and spatial data resolution per acquisition channel during survey. Rest mode system noise is therefore easy to inspect simply by pausing during survey, and the continuous display makes monitoring for quality intrinsic to the process of undertaking a survey. Rest mode test results (static test) are available from the system.

4.3 Magnetic Data Processing

4.3.1 Procedure

All data processing is minimised and limited to what is essential for the class of data being collected, e.g. reduction of orientation effects, suppression of single point defects (drop-outs or spikes) etc. The processing stream for this data is as follows:

Process	Software	Parameters
Measurement & GNSS receiver data alignment	Proprietary	
Temporal reduction, regional field suppression	Proprietary	Bandpassed 0.3 – 10.0s
Gridding	Surfer	Kriging, 0.25m x 0.25m
Smoothing	Surfer	Gaussian lowpass 3x3 data (0.75m)
Pseudo-gradient conversion	Proprietary	1m vertical

Potential field processing procedures are used where possible on gridded data from the above processing, allowing simulation of vertical gradient data, separation of deep and shallow magnetic sources, etc. The initial processing uses proprietary software developed in conjunction with the multisensor acquisition system. Gridded data is ported as data surfaces (not images) into Manifold GIS for final imaging, contouring and detailed analysis. Specialist analysis is undertaken using proprietary software.

4.4 Magnetic Interpretation

4.4.1 Introduction

Numerous sources are used in the interpretive process, which takes into account shallow geological conditions, past and present land use, drainage, weather before and during survey, topography and any previous knowledge about the site and the surrounding area. Old Ordnance Survey mapping is consulted and also older sources if available. Geological information (for the UK) is sourced only from British Geological Survey resources and aerial imagery from online sources. LiDAR data is usually sourced from the Environment Agency or other national equivalents, SAR from NASA and other topographic data from original survey.

Information from nearby surveys is consulted to inform upon local data character, variations across soils and near-surface geological contexts. Published data from other surveys may also be used if accompanied by adequate metadata.

Interpretation of magnetic data is undertaken using total intensity data, vertical pseudo-gradient and where relevant, shallow field, component models in parallel although for clarity only a subset of these may be presented in the report.

4.4.2 The contribution from geology and soils

On some sites, e.g. some gravels and alluvial contexts, there will be anomalies that can obscure those potentially of archaeological interest. They may have a strength equal to or greater than that associated with more relevant sources, e.g. ditch fills, but can normally be differentiated on the basis of anomaly form coupled with geological understanding. Where there is ambiguity, or relevance to the study, these anomalies will be included in this category.

Not all changes in geological context can be detected at the surface, directly or indirectly, but sometimes there will be a difference evident in the geophysical data that can be attributed to a change, e.g. from alluvium to tidal flat deposits, or bedrock to alluvium. In some cases the geophysical difference will not exactly coincide with the geological contact and this is especially the case across transitions in soil type.

Geophysical data varies in character across areas, due to a range of factors including soil chemistry, near surface geology, hydrology and land use past and present. These all contribute to the texture of the data, i.e. a background character against which all other anomalies are measured.

4.4.3 Agricultural inputs

Coherent linear dipolar enhancement of magnetic field strength marking ditch fills, narrow bands of more variable magnetic field or changes in apparent magnetic susceptibility, are all included within the category of former field boundaries if they correlate with those depicted on the Tithe Map or early Ordnance Survey maps. If there is no correlation then these anomaly types are not categorised as a field boundaries.

Banded variations in apparent magnetic susceptibility caused by a variable thickness of topsoil, depositional remanent magnetisation of sediments in furrows or susceptibility enhancement through heating (a by product of burning organic matter like seaweed) tend to indicate past cultivation, whether ridge-based techniques, medieval ridge and furrow or post medieval 'lazy beds'. Modern cultivation, e.g. recent ploughing, is not included.

In some cases it is possible to identify drainage networks either as ditch-fill type anomalies (typically 'Roman' drains), noisy or repeating dipolar anomalies from terracotta pipes or reduced magnetic field strength anomalies from culverts, plastic or non-reinforced concrete pipes. In all cases identification of a herring bone pattern to these is sufficient for inclusion within this category.

4.4.4 Features of archaeological interest

Any linear or discrete enhancement of magnetic field strength, usually with a dipolar character of variable strength, that cannot be categorised as a field boundary, cultivation or as having a geological origin, is classified as a fill potentially being of archaeological interest. Fills are normally earthen and include an often

invisible proportion of heated soil or topsoil that augments local magnetic field strength. Inverted anomalies are possible over non-earthen fills, e.g. those that comprise peat, sand or gravel within soil. This category is subject to the 'habitation effect' where, in the absence of other sources of magnetic material, anomaly strength will decrease away from sources of heated soil and sometimes to the extent of non-detectability.

Former enclosure ditches that contained standing water can promote enhanced volumetric magnetic susceptibility through depositional remanence and remain detectable regardless of the absence of other sources of magnetic enhancement.

Anything that cannot be interpreted as a fill tends to be a structure, or in archaeological terms, a feature. This category is secondary to fills and includes anomalies that by virtue of their character are likely to be of archaeological interest but cannot be adequately described as fills. Examples include strongly magnetic bodies lacking ferrous character that might indicate hearths or kilns. In some cases anomalies of ferrous character may be included.

On some sites the combination of plan form and anomaly character, e.g. rectilinear reduced magnetic field strength anomalies, might indicate the likely presence of masonry, robber trenches or rubble foundations. Other types of structure are only included if the evidence is unequivocal, e.g. small ring ditches with doorways and hearths. In some circumstances a less definite category may be assigned to the individual anomalies instead.

It is sometimes possible to define different areas of activity on the basis of magnetic character, e.g. texture and anomaly strength. These might indicate the presence of middens or foci within larger complexes. This category does not indicate a presence or absence of discrete anomalies of archaeological interest.

4.5 Glossary

Acronym / term	Type	Definition
A	Physical quantity	SI unit Amp of electric current
BGS	Organisation	British Geological Survey
CIfA	Organisation	Chartered Institute for Archaeologists
dB	Physical quantity	Decibel, unit of amplification / attenuation
DRM	Process	Depositional Remanent Magnetisation
EAGE	Organisation	European Association of Geoscientists and Engineers
EGNOS	Technology	European Geostationary Navigation Overlay Service
ERT	Technology	Electrical resistivity tomography
ETRS89	Technology	European Terrestrial Reference System (defined 1989)
ETSI	Organisation	European Telecommunications Standards Institute
EuroGPR	Organisation	European Ground Penetrating Radar Association, the trade body for GPR professionals
G-BASE	Data	British Geological Survey Geochemical Atlas
GeoSoc	Organisation	Geological Society of London, the chartered body for the geological profession
GNSS	Technology	Global Navigation Satellite System
GPR	Technology	Ground penetrating radar
GPS	Technology	Global Positioning System (US)
inversion	process	A combination of forward and backward modelling intended to construct a 2D or 3D model of the physical distribution of a variable from data measured on a 1D or 2D surface. It is fundamental to ERT survey
IP	Physical quantity	Induced polarisation (or chargeability) units mV/V or ms
m	Physical quantity	SI unit metres of distance
mbgl	Physical quantity	Metres below ground level
MHz	Physical quantity	SI unit mega-Hertz of frequency
MS	Physical quantity	Magnetic susceptibility, unitless
mS	Physical quantity	SI unit milli-Siemens of electrical conductivity

Acronym / term	Type	Definition
nT	Physical quantity	SI unit nano-Tesla of magnetic flux density
OFCOM	Organisation	The Office of Communications, the UK radio spectrum regulator
Ohm	Physical quantity	SI unit Ohm of electrical resistance
OS	Organisation	Ordnance Survey of Great Britain
OSGB36	Data	The OS national grid (Great Britain)
OSTN15	Technology	Current coordinate transformation from ETRS89 to OSGB36 co-ordinates
RDP	Physical quantity	Relative Dielectric Permittivity, unitless
RTK	Technology	Real Time Kinematic (correction of GNSS position from a base station)
s	Physical quantity	SI unit seconds of time
TMI	Physical quantity	Total magnetic intensity (measured flux density minus regional flux density)
TRM	Process	Thermo-Remanent Magnetisation
V	Physical quantity	SI unit Volt of electric potential
WGS84	Data	World Geodetic System (defined 1984)

4.6 Selected reference

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4.7 Archiving and dissemination

An archive is maintained for all projects, access to which is permitted for research purposes. Copyright and intellectual property rights are retained by TigerGeo on all material it has produced, the client having full licence to use such material as benefits their project. Where required, digital data and a copy of the report can be archived in a suitable repository, e.g. the Archaeology Data Service, in addition to our own archive.

The archive contains all survey and project data, communications, field notes, reports and other related material including copies of third party data (e.g. CAD mapping, etc.) in digital form. Many are in proprietary formats while report components are available in PDF format.



The client will determine the distribution path for reporting, including to the end client, other contractors, local authority etc., and will determine the timetable for upload of the project report to the OASIS Grey Literature library or supply of report or data to other archiving services, taking into account end client confidentiality.

TigerGeo reserves the right to display data rendered anonymous and un-locatable on its website and in other marketing or research publications.

5 Supporting information

5.1 Standards and quality (archaeology)

TigerGeo is developing an Integrated Management System (IMS) towards ISO certification for ISO9001, ISO14001 and OHSAS18001/ISO45001. For work within the archaeological sector TigerGeo has been awarded CIfA (Chartered Institute for Archaeologists) Registered Organisation status.

A high standard of client-centred professionalism is maintained in accordance with the requirements of relevant professional bodies including the Geological Society of London (GeoSoc) and the Chartered Institute for Archaeologists (CIfA). Senior members of TigerGeo are professional members of the GeoSoc (FGS), CIfA (MCIfA & ACIfA grades) and other appropriate bodies, including the European Association of Geoscientists and Engineers (EAGE) Near Surface Division (MEAGE) and the Institute of Professional Soil Scientists (MISoilSci).

In addition TigerGeo is a member of EuroGPR and all ground penetrating and other radar work is in accordance with ETSI EG 202 730.

The management team at TigerGeo have almost 50 years of combined experience of near surface geophysical project design, survey, interpretation and reporting, based across a wide range of shallow geological contexts. Added to this is the considerable experience of our lead geophysicists in a variety of commercial and academic roles. All geophysical staff have graduate and in many cases also post-graduate relevant qualifications pertaining to environmental geophysics from recognised centres of academic excellence.

During fieldwork there is always a fully qualified (to graduate or post-graduate level) supervisory geophysicist leading a team of other geophysicists and geophysical technicians, all of whom are trained and competent with the equipment they are working with. Data processing and interpretation is carried out by a suitably qualified and experienced geophysicist under the direct supervision and guidance of the Senior Geophysicist. All work is monitored and reviewed throughout by the Senior Geophysicist who will appraise all stages of a project as it progresses.

Data processing and interpretation adheres to the scientific principles of objectiveness and logical consistency. A standard set of approved external sources of information, e.g. from the British Geological Survey, the Ordnance Survey and similar sources of data, in addition to previous TigerGeo projects, guide the interpretive process. Due attention is paid to the technical constraints of method, resolution, contrast and other geophysical factors.

There is a strong culture of internal peer-review within TigerGeo, for example, all reports pass through a process of authorship, technical review and finally proof-reading before release to the client. Technical queries resulting from TigerGeo's work are reviewed by the Senior Geophysicist to ensure uniformity of response prior to implementing any edits, etc.

Work is undertaken in accordance with the high professional standards and technical competence expected by the Geological Society of London and the European Association of Geoscientists and Engineers.

All work for archaeological projects is also conducted in accordance with the following standards and guidance:

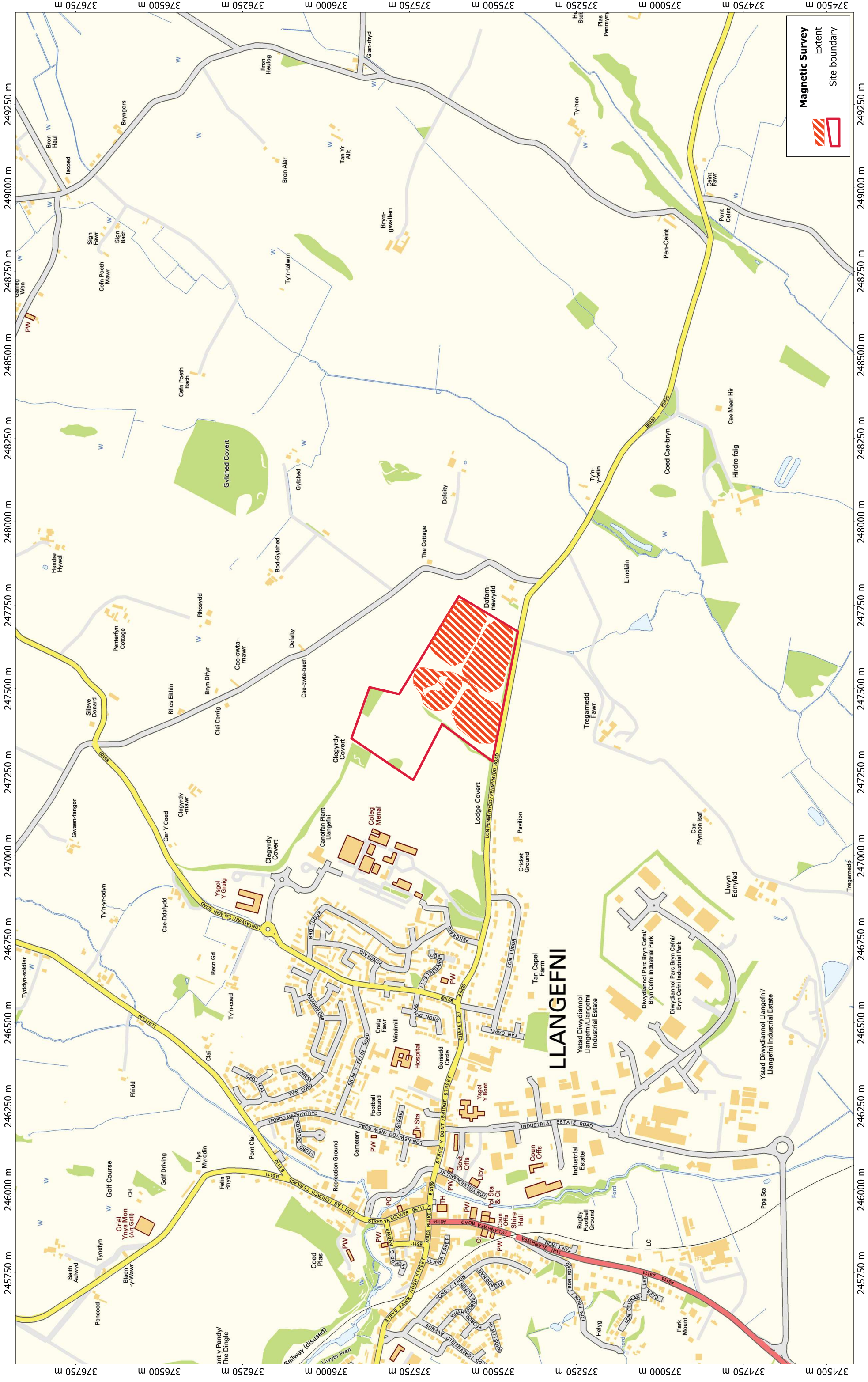
- David et al, "Geophysical Survey in Archaeological Field Evaluation", English Heritage, 2008;
- "Standard and guidance for Archaeological Geophysical survey", Chartered Institute for Archaeologists, 2014 (Updated 2016);

and TigerGeo meets with ease the requirements of English Heritage in their 2008 Guidance "Geophysical Survey in Archaeological Field Evaluation" section 2.8 entitled "Competence of survey personnel".

5.2 Key personnel

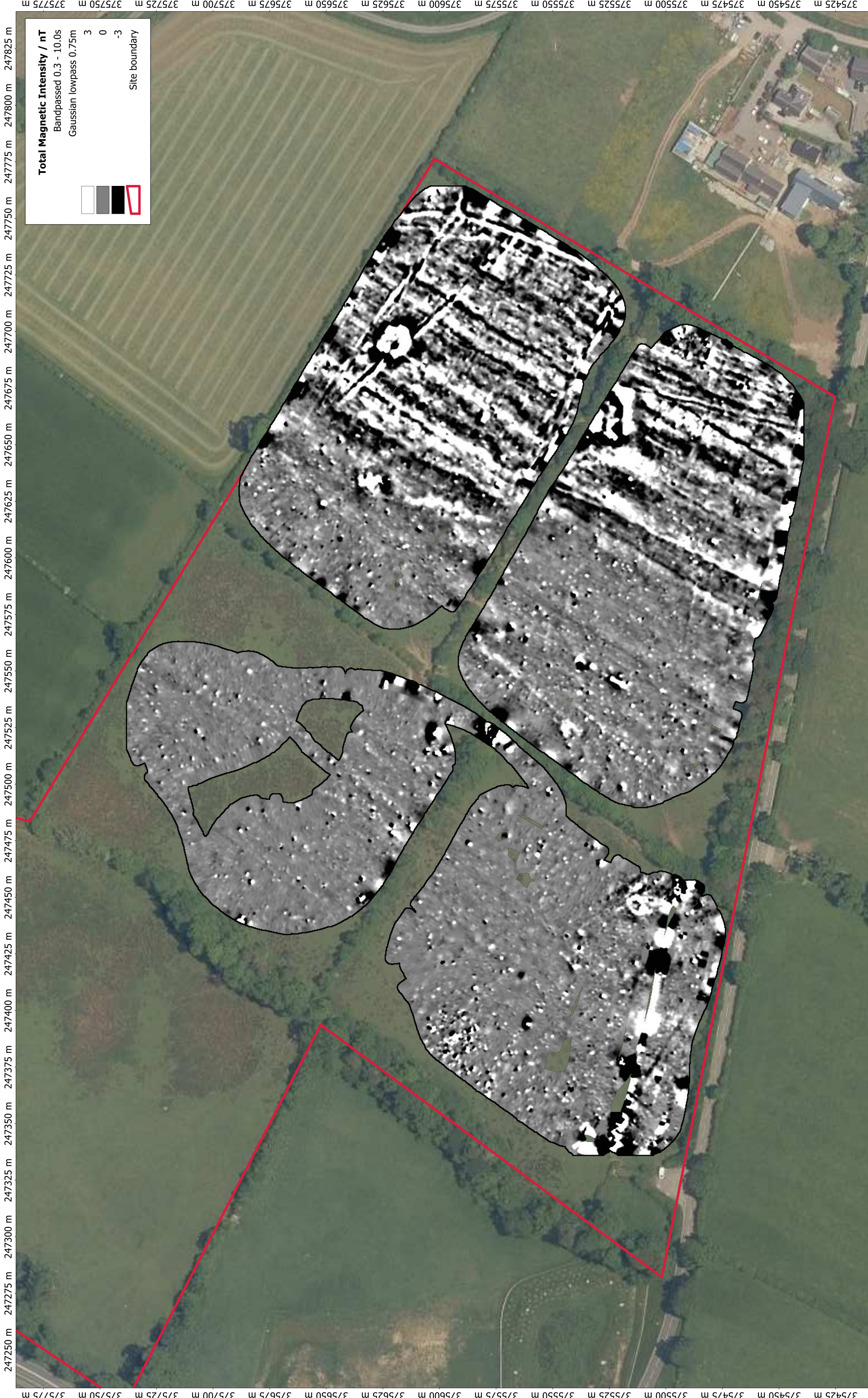
Martin Roseveare, MSc BSc(Hons) MEAGE FGS MCIfA	Senior Geophysicist, Director
<p>Martin specialised (MSc) in geophysical prospection for shallow applications and since 1997 has worked in commercial geophysics. Elected a GeolSoc Fellow in 2009 he is now working towards achieving CSci. A member of the European Association of Geoscientists & Engineers, he has served on the EuroGPR and CIfA GeoSIG committees and on the scientific committees of the 10th and 11th Archaeological Prospection conferences. He has reviewed papers for the EAGE Near Surface conference, was a technical reviewer of the Irish NRA geophysical guidance and is a founding member of the ISSGAP soils group. Professional interests include the application of geophysics to agriculture and the environment, e.g. groundwater and geohazards. He is also a software writer and equipment integrator with significant experience of embedded systems.</p>	
Anne Roseveare, BEng(Hons) DIS MISoilSci	Operations Manager, Environmental Geophysicist - Data Analyst
<p>On looking beyond engineering, Anne turned her attention to environmental monitoring and geophysics. She is a Member of the British Society of Soil Science (BSSS) and has specific areas of interest in soil physics & hydrology, agricultural applications and industrial sites. Amongst other contributions to the archaeological geophysics sector over the last 18 years, Anne was the founding Editor of the International Society for Archaeological Prospection (ISAP) and is a founding member of the ISSGAP soils group. Specifications, logistics, safety, data handling & analysis are integral parts of her work, though she is happily distracted by the possibilities of discovering lost cities, hillwalking and good food.</p>	
Jennifer Smith, MSc	Fieldwork Manager, Environmental Geophysicist
<p>Jen developed an interest in all aspects of topographical and geophysical survey whilst studying for a MSc in Archaeological Science at the University of Bristol. During her studies she obtained valuable experience in the use of and data analysis for various terrestrial geophysical techniques as well as develop her interest further by adding marine geophysical techniques to her working theoretical knowledge. She has worked as a near-surface geophysicist within archaeology for several years and has developed a good knowledge of UK geology. Outside of work, Jen is currently learning Java code but is easily distracted by keeping fit, exploring the world or some other hobby.</p>	
Daniel Lewis, MA BA(Hons) ACIfA	Consultant Archaeologist
<p>Daniel studied archaeology at the University of Nottingham and worked in field archaeology for many years, managing urban and rural fieldwork projects in and around Herefordshire. When the desk became more appealing he jumped into the world of consulting, working on small and large multi-discipline projects throughout England and Wales. At the same time, he returned to University, gaining an MA in Historic Environment Conservation. With over 15 years' experience in the heritage sector, Daniel has a diverse portfolio of skills. Here he ensures that geophysical work within the heritage sector is well grounded in the archaeology. His spare time includes much running up mountains</p>	
Luigi Benente, MSc	Consultant Environmental Geophysicist
<p>Luigi is an experienced geologist specialized in geophysics, who gained a blend of practical and technical experience within explorations carried out in Italy, Peru, Colombia, Ecuador, Mexico, Uzbekistan, Thailand and Nigeria. Resourceful and hardworking with a positive attitude in problem solving, he has the ability to lead a team through challenging tasks, organizing people and equipment in order to hit the goal in safety and with time conscious professionalism. He is attracted to discover hidden things within the earth and after celebrating with friends, good wine, good beer and lots of food he is able to repair most broken things...</p>	

Alexandra Gereaa, MSc, BSc, PhD Candidate	Geophysical Processor & Analyst
<p>Alexandra has a BSc in Geophysics and an MSc in Applied Geo-biology and started a PhD in the UK after living in Portugal for six months working on her master's degree. Since 2008 she has used most mainstream processing applications across electrical, magnetic and radar methods. She combines a love of nature and science and is currently studying plant roots in agricultural environments using geophysical methods. When not doing that she enjoys travelling, hiking, nature, yoga, books, foreign languages and cats. Two years ago she found a passion for electronics and started building different devices including intelligent gardening systems and coding in Python.</p>	



DNL191 Dafarn Newydd, Llangefni, Isle of Anglesey
DWG 01 - Site Location

Orthographic Scale: 1:10000 @ A3 Spatial Units: Meter. Do not scale off this drawing
File: DNL191.map Copyright TigerGeo Limited 2019 OS OpenData Crown Copyright & Database Right 2019



**DNL191 Dafarn Newydd, Llangefni, Isle of Anglesey
 DWG 02a - Total Magnetic Intensity (TMI) Data**

Orthographic Scale: 1:1500 @ A3 Spatial Units: Meter. Do not scale off this drawing
 File: DNL191.map Copyright TigerGeo Limited 2019

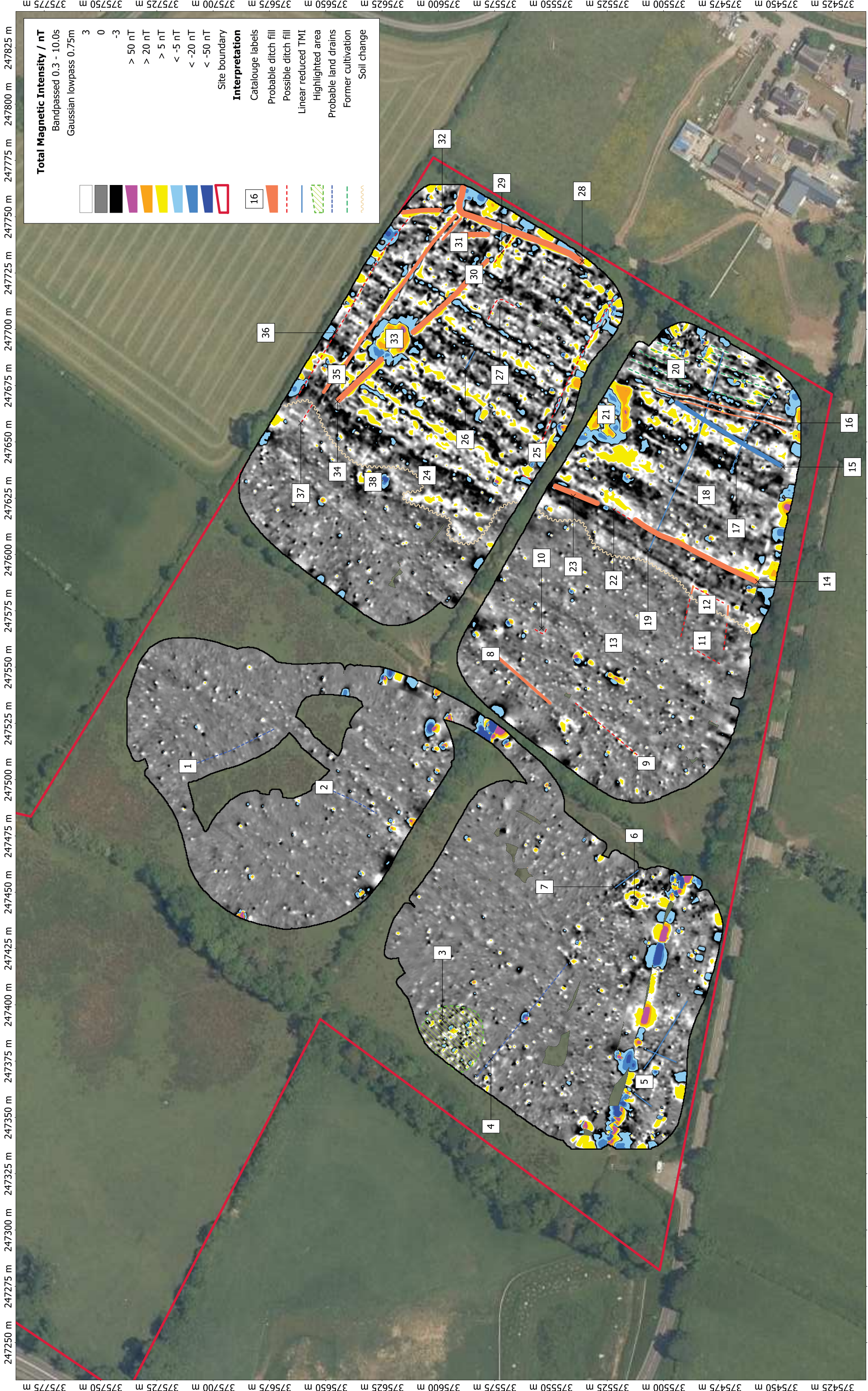




**DNL191 Dafarn Newydd, Llangefni, Isle of Anglesey
 DWG 02b - 1m Pseudo-Gradient (PSG) Data**

Orthographic Scale: 1:1500 @ A3 Spatial Units: Meter. Do not scale off this drawing
 File: DNL191.map Copyright TigerGeo Limited 2019





Total Magnetic Intensity / nT
 Bandpassed 0.3 - 10.0s
 Gaussian lowpass 0.75m

White	3
Light Grey	0
Black	-3
Dark Blue	> 50 nT
Blue	> 20 nT
Light Blue	> 5 nT
Yellow	< -5 nT
Orange	< -20 nT
Red	< -50 nT

Site boundary

Interpretation

- Catalogue labels
- Probable ditch fill
- Possible ditch fill
- Linear reduced TMI
- Highlighted area
- Probable land drains
- Former cultivation
- Soil change

DNL191 Dafarn Newydd, Llangefni, Isle of Anglesey
DWG 03 - Interpretation

Orthographic Scale: 1:1500 @ A3 Spatial Units: Meter. Do not scale off this drawing
 File: DNL191.map Copyright TigerGeo Limited 2019





APPENDIX C
Geophysical Survey Report



Plate 1: Sightline to the south across Field 1 towards the linear stand of trees forming the boundary with the B5420 Penymynydd Road (Gaz. 13) and the boundary with Field 3 (Gaz. 19).



Plate 2: Sightline to the east along the boundary between Fields 1 and 2 (Gaz. 16) towards the eastern boundary of Field 1 (Gaz. 17)



Plate 3: Sightline showing the drystone wall forming the eastern boundary of Field 3 and the western boundary of Field 1 (Gaz. 19)



Plate 4: Sightline showing the drystone wall forming the northern boundary of Field 3 and the southern boundary of Field 4 (Gaz. 20).



Plate 5: Sightline to the east towards the eastern boundary of Field 1 (Gaz. 17)



Plate 6: Sightline into the linear stand of trees forming the boundary with the B5420 Penymynydd Road (Gaz. 14) and the small earth bank topped with a post-and-rail fence (Gaz. 15).



Plate 7: Sightline to the west across Field 1 showing the downward slope towards the boundaries with Fields 2 and 4 (Gaz. 19)



Plate 8: Sightline to the south-west across Field 1 showing the downward slope towards the boundary with Field 3 (Gaz. 19) and the linear stand of trees forming the boundary with the B5420 Penymynydd Road (Gaz.14).



Plate 9: Sightline to the west along the northern boundary of Field 1 (Gaz. 16).



Plate 10: Sightline to the north-east across Field 2.



Plate 11: Sightline to the north along the western boundary of Field 2 (Gaz. 19)



Plate 12: Earth-bank field boundary forming the southern boundary of Field 2 (Gaz. 16).



Plate 13: Sightline to the north-west across Field 2



Plate 14: Sightline to the north-west across Field 2 showing the field boundary (Gaz. 18) and the boundary with Field 4 (Gaz. 19).



Plate 15: Sightline to the south-east across Field 2 showing the boundary with Field 1 (Gaz. 16) and the field boundary (Gaz. 17).



Plate 16: Sightline to the south along the western boundary of Field 2 (Gaz. 19)



Plate 17: Sightline showing the drystone wall forming the western boundary of Field 2 and the eastern boundary of Field 4 (Gaz. 19).



Plate 18: Detail of drystone wall construction (Gaz. 19)



Plate 19: Trapezoid stone gate post at the access point between Fields 2 and 4 (Gaz. 30).



Plate 20: Sightline to the east across Field 3.



Plate 21: Sightline to the south-west into the stock corral in Field 3.



Plate 22: Sightline to the east across Field 3.



Plate 23: Sightline to the north-east across Field 3.



Plate 24: Sightline to the west showing the access point between Fields 3 and 5 formed by opposing stone gate post (Gaz. 30 and 32)



Plate 25: Sightline to the south-east across Field 3



Plate 26: Sightline to the south in Field 3 along the hedge boundary forming the western edge of the Site (Gaz. 21).



Plate 27: Sightline looking north-west showing the earth bank boundary between Fields 3 and 4 (Gaz. 20).



Plate 28: Sightline to the south along the hedge boundary between Fields 3 and 1 (Gaz. 19)



Plate 29: Sightline to the north-west across Field 4



Plate 30: Sightline to the north along the boundary between Field 4 and Fields 1 and 2 (Gaz. 19)



Plate 31: Sightline to the west along the boundary between Fields 4 and 3 (Gaz. 20)



Plate 32: Sightline to the north showing the earth bank and hedge boundary between Fields 4 and 2 (Gaz. 19)



Plate 33: Sightline to the south-west across Field 4



Plate 34: Sightline to the west along the hedge boundary defining the northern boundary of the Site in Field 4 (Gaz. 18)



Plate 35: Sightline to the south-east across Field 4



Plate 36: Sightline to the north across Field 4



Plate 37: Sightline to the north along the boundary between Field 4 and 5 (Gaz. 22).

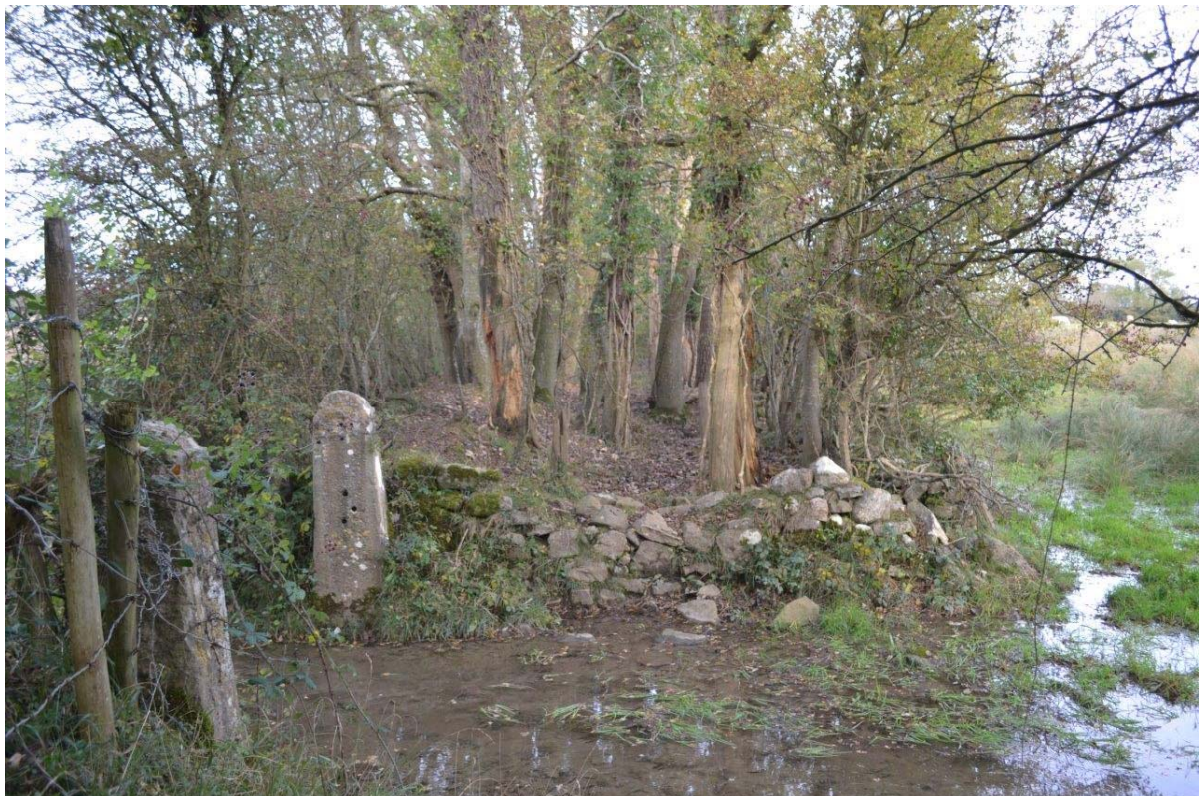


Plate 38: Sightline to the north into the blocked double-banked strip of woodland (Gaz. 23) along the western edge of Field 4. The access point between Fields 3 and 5 is provided by the gap between the two stone gateposts (Gaz. 31 and 32) in the left foreground



Plate 39: Sightline to the access point between Fields 3 and 5 is provided by the gap between the two stone gateposts (Gaz. 31 and 32)



Plate 40: Sightline to the north through the strip of woodland (Gaz. 23) along the western edge of Field 4. The woodland occupies a space defined by two parallel earth banks (Gaz. 22 and 24).



Plate 41: Earth bank (Gaz. 24) forming the western limb of the physical enclosure defining the strip of woodland along the western edge of Field 4.



Plate 42: Drystone wall forming part of the western limb of the physical enclosure defining the strip of woodland along the western edge of Field 4 (Gaz. 24).



Plate 43: Sightline to the north along the boundary between Fields 5 and 4 (Gaz. 22)



Plate 44: Sightline to the south-east towards the access point between Fields 5 and 4 (Gaz. 31 and 32)



Plate 45: Sightline to the west along the southern boundary of Field 5 (Gaz. 29). Coleg Menai Llangefni is skylined beyond the western boundary of Field 5 (Gaz. 28).



Plate 46: Sightline to the east showing the earth bank boundary (Gaz. 24) between Field 5 and the narrow stand of trees between Field 5 and Field 4 (Gaz. 23).



Plate 47: Sightline to the north showing the intersection of the eastern boundary of Field 5 (Gaz. 22), formed by a drystone wall and the fence (Gaz. 26) enclosing the woodland (Gaz. 25) in the north-eastern corner of Field 5.



Plate 48: Sightline to the west along the boundary (Gaz. 26) between Field 5 and the woodland (Gaz. 25) in its north-eastern corner



Plate 49: Sightline to the south along the boundary between Fields 5 and 4 (Gaz. 22).



Plate 50: Sightline to the south west across Field 5.



Plate 51: Sightline to the north into the woodland (Gaz. 25) in the north-eastern corner of Field 5 showing dry-stone wall boundary (Gaz. 26) reinforced by post-and-wire fence.



Plate 52: Sightline to the east along the northern boundary of Field 5 (Gaz. 27) towards the stand of trees in the north-eastern corner of Field 5 (Gaz. 25). These trees are mapped as a covert on the 1889 OS map.



Plate 53: Sightline to the south-east across Field 5. Note downward slope towards the eastern boundary of Field 5 (Gaz. 22).



Plate 54: Sightline to the south along the western boundary of Field 5 (Gaz. 28)



Plate 55: Sightline to the west showing the earth bank boundary forming the western boundary of Field 5 (Gaz. 28).



Plate 56: Sightline to the south along the western boundary of Field 5 (Gaz. 28) showing small stand of trees (Gaz. 33) projecting into Field 5 from its western boundary. These trees are the remnant of a covert shown on the 1889 OS map



Plate 57: Sightline to the south along the western boundary of Field 5 (Gaz. 28)



Plate 58: Sightline to the west showing the earth bank boundary forming the western boundary of Field 5 (Gaz. 28).



Plate 59: Sightline to the north along the western boundary of Field 5 (Gaz. 28) towards the small stand of trees (Gaz. 33) projecting into Field 5 from its western boundary. These trees are the remnant of a covert shown on the 1889 OS map



Plate 60: Sightline to the north-east across Field 5. The trees to the left (Gaz. 33) are the remnant of a covert shown on the 1889 OS map



Plate 61: Sightline to the east along the southern boundary of Field 5 (Gaz. 29)



Plate 62: Sightline to the south east showing the earth bank southern boundary of Field 5 (Gaz. 30).



Plate 63: Sightline to the south showing the drystone wall forming part of the southern boundary of Field 5 (Gaz. 29).

APPENDIX D
**List of Archaeological Features at the Site Newly Identified from the Walk-Over Survey and
Geophysical Survey**

Nexus Heritage Project Ref. 3467:			Project Name: Dafarn Newydd
Gwynedd Historic Environment Record Event PRN: 45514			
Gazetter of Newly Identified Heritage Assets			
Gazetteer No.	Historic Asset PRN	Summary Description	Crynodeb Disgrifiad
1	81458	Geophysical anomaly - probable ditch fill	Ffos derfyn
2	81459	Geophysical anomaly - group of probable ditch fills (possible enclosure)	Ffos derfyn (lloc ffosog)
3	81460	Geophysical anomaly - probable ditch fill	Ffos derfyn
4	81461	Geophysical anomaly – probable ditch fills, double ditch field boundary	Ffos derfyn
5	81462	Geophysical anomaly – former cultivation, possible ridge and furrow	Grwn a rych
6	81463	Geophysical anomaly – probable ditch fill	Ffos derfyn
7	81464	Geophysical anomaly – probable ditch fill	Ffos derfyn
8	81465	Geophysical anomaly – probable ditch fill	Ffos derfyn
9	81466	Geophysical anomaly – probable ditch fill	Ffos derfyn
10	81467	Geophysical anomaly – probable ditch fill	Ffos derfyn
11	81468	Geophysical anomaly – probable ditch fill	Ffos derfyn
12	81469	Geophysical anomaly – probable ditch fill	Ffos derfyn
13	81470	Extant landscape feature – field boundary	Terfyn y cae
14	81471	Extant landscape feature – stand of trees	Cuddfan
15	81472	Extant landscape feature – field boundary	Terfyn y cae
16	81473	Extant landscape feature – field boundary	Terfyn y cae
17	81474	Extant landscape feature – field boundary	Terfyn y cae
18	81475	Extant landscape feature – field boundary	Terfyn y cae
19	81476	Extant landscape feature – field boundary	Terfyn y cae
20	81477	Extant landscape feature – field boundary	Terfyn y cae
21	81478	Extant landscape feature – field boundary	Terfyn y cae
22	81479	Extant landscape feature – field boundary	Terfyn y cae
23	81480	Extant landscape feature – stand of trees	Cuddfan
24	81481	Extant landscape feature – field boundary	Terfyn y cae

25	81482	Extant landscape feature – stand of trees	Cuddfan
26	81483	Extant landscape feature – field boundary	Terfyn y cae
27	81484	Extant landscape feature – field boundary	Terfyn y cae
28	81485	Extant landscape feature – field boundary	Terfyn y cae
29	81486	Extant landscape feature – field boundary	Terfyn y cae
30	81487	Extant landscape feature – stone gate post	Postyn lliart
31	81488	Extant landscape feature – stone gate post	Postyn lliart
32	81489	Extant landscape feature – stone gate post	Postyn lliart
33	81490	Extant landscape feature – stand of trees	Cuddfan