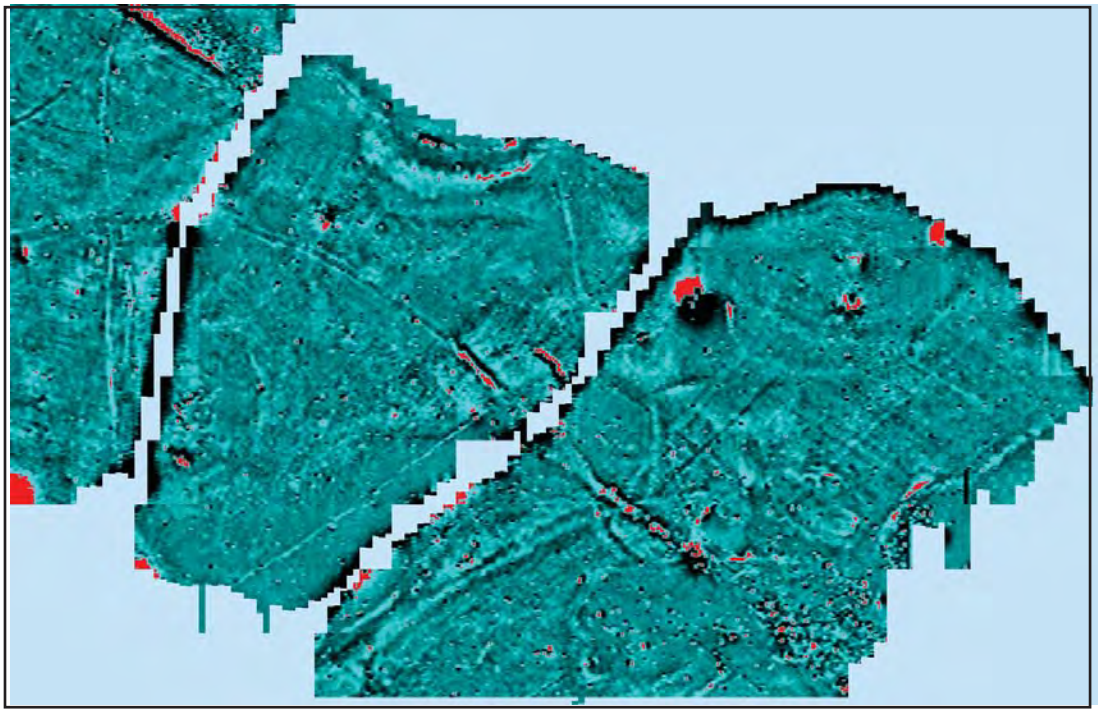
PROPOSED SAND AND GRAVEL QUARRY AT LLECHEIDDIOR UCHAF, GARNDOLBENMAEN

ARCHAEOLOGICAL EVALUATION: Targeted Geophysics (G2272)



Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

Proposed Sand and Gravel Quarry at Llecheiddior Uchaf, Garndolbenmaen

Archaeological Evaluation: Targeted Geophysics

Project No. G2272

Report No. 1074

Prepared for: Mark Roberts, Planning and Environmental Consultant

September 2012

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ARCHAEOLOGICAL EVALUATION: Targeted Geophysics (G2272)

Summary

An archaeological evaluation comprising 11.75ha of geophysical survey was carried out at Llecheiddior Uchaf. The survey mostly revealed features related to the agricultural and industrial history of the area although five relatively indistinct geophysical anomalies could indicate Roman or prehistoric activity.

1.0 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been asked by Mark Roberts, Planning and Environmental Consultant to carry out a programme of targeted archaeological evaluation (geophysics: standard resolution magnetometer survey) at the location of a proposed sand and gravel quarry at Llecheiddior Uchaf, Garndolbenmaen (centred on NGR SH 47514445). The archaeological evaluation is being undertaken as part of planning application C12/0495/36/MW.

The proposed quarry site comprises five irregular shaped enclosed fields located to the west, northwest and north of Llecheiddior Uchaf Farm (NGR SH47514445; cf. Figure 01). The quarry areas are divided into four general phases:

Phase 01 (NGR SH47474455C) – incorporates the northeastern end of a large irregular shaped plot and the majority of two small irregular shaped plots;

Phase 02 (NGR SH47404440C) – incorporates the southwestern end of a large irregular shaped plot and two small irregular shaped plots;

Phase 03 (NGR SH47194444C) – incorporates one irregular shaped plot;

Phase 04: subdivided into –
Phase 04a (NGR SH47204463C) – incorporates the northern end on an irregular shaped plot;
Phase 04b (NGR SH71044471C) – incorporates an irregular shaped plot;
Phase 04c (NGR SH47004481C) – incorporates the eastern end of an irregular shaped plot.

Much of the proposed Phase 01 and Phase 02 quarry workings have previously been quarried; the geophysical survey in this area only targeted the areas that have not previously been quarried.

A detailed brief has not been prepared for this stage by Gwynedd Archaeological Planning Service (GAPS). However GAPS, in response to the archaeological assessment of the proposed area completed by the Govannon Consultancy (Report 281), has stated that:

"Archaeological evaluation is required to determine the impact of the proposals on the buried archaeological resource. In accordance with national planning guidance (Planning Policy Guidance Wales 2011) and Welsh Office Circular 60/96 (Planning and the Historic Environment: Archaeology) paragraph 13 such archaeological evaluation work must be undertaken before any decision on a planning application is taken... This must include both intrusive and non-intrusive evaluation work consisting initially of a magnetometer survey of the application area supplemented by a targeted programme of archaeological trial trenching" (email correspondence received via Mark Roberts, Planning and Environmental Consultant).

The current design conforms to the guidelines specified in the IFA Standard and Guidance for Archaeological Evaluation (Institute for Archaeologists, 1994, rev. 2001 & 2008) & the Draft Standard and Guidance for Archaeological Geophysical Survey (Institute for Archaeologists, 2010). The full

project design including the archaeological assessment by Govannon Consultancy (Report 281), is included as an appendix to the present report. This contains all relevant project and historic mapping and historic background. This is not repeated in the main body of the report.

2.0 ARCHAEOLOGICAL BACKGROUND

Govannon Consultancy completed an archaeological assessment of the proposed quarry areas in October 2011 (Report 281; reproduced in Appendix I). The report concluded that:

The study area has been significantly altered by sand-extraction in the 1960s-1970s. This has affected the context of the only evident features that will be directly affected by the resumption of quarrying, namely the post-Medieval field boundaries. It is noted that these are significant at level C) in their own right, but in that their immediate vicinity will not have been ploughed, they have significant archaeological potential. These areas should be considered as part of feature 11 (sites of unknown location and potential within the development zone).

It is therefore noted that the area is potentially rich in buried features, particularly from Prehistory, exemplified by the discovery of Bronze Age artefacts and sites within the vicinity of the study area (Report 281: 14-15).

The known prehistoric archaeological activity within the local area is summarised on page 6 of the report and include “a gold lunula from Llecheiddior Uchaf itself (at SH 4775 4482 though not within the study area), pottery at SH 4810 4480, an urnfield at SH 4797 4490 and a bronze palstave from Mynydd Cennin at SH 4646 4491 (Report 281: 06).

In addition to the information in the Govannon Consultancy report regarding the twentieth century quarry extraction that took place within the proposed area, Mark Roberts, Planning and Environmental Consultant has provided GAT with a map detailing the location of the quarry phases (reproduced as Figure 02). These include:

The Llecheiddior Ganol quarry workings incorporating two fields that were located to the immediate south of the Phase 03 area, which were completed by Arthur Salisbury Ltd. between 1966 and 1980;

The Llecheiddior Uchaf quarry workings incorporating two fields either side of Llecheiddior Uchaf Farm. The northern field was initially worked by William Pierce & Son between 1947 and 1956; this was followed by Croxton Gravel Ltd between 1958 and 1980. The southern field was quarried by William Griffith & Son between 1956 and 1970.

The northern field within the historic Llecheiddior Uchaf quarry workings includes the current location for the proposed Phase 01 and Phase 02 quarry areas. The current information implies that these areas have already been disturbed by existing extraction works.

Gwynedd Archaeological Trust has received via the client’s consultant (Mark Roberts, Planning and Environmental Consultant) a copy of a letter form Mrs E C Jones of Llecheiddior Uchaf Farm, describing agricultural work completed by her late husband in 1961, across the land within the evaluation zone. The letter explains that in response to need for increased food production, “farmers were given generous grants for draining the land and amalgamating fields in order to achieve this aim. Fields were amalgamated to accommodate the ever larger tractors and farm machinery that were being manufactured…(T)he large 21 acre field…consisted of seven small fields at one time. The walls were earthen stone…and much of the walling had fallen to disrepair and had been replaced by wire fencing. The coming of the J.C.B. digger at the time meant that the fields could now be easily amalgamated by burying the remaining stones underground or ‘part walls’ being buried as they stood during the process of levelling a field….(dated 14/09/12). Specific reference is made in the letter to the amalgamation of what is currently designated as the Phase 03 plot into one irregular shaped field.

3.0 METHODOLOGY

The survey was carried out in a series of 20m grids, which were tied into the Ordnance Survey grid using a Trimble GPS system to an accuracy of 30mm. The surveys were conducted using a Bartington Grad 601-2 Dual Sensor fluxgate gradiometer. The surveys were carried out at standard resolution (1.0 m traverse interval x 0.25m sample interval).

3.0.1 Instrumentation

The Bartington Grad 601-2 dual Fluxgate Gradiometer uses a pair of Grad-01-100 sensors. These are high stability fluxgate gradient sensors with a 1.0m separation between the sensing elements, giving a strong response to deeper anomalies.

The instrument detects variations in the earth's magnetic field caused by the presence of iron in the soil. This is usually in the form of weakly magnetised iron oxides which tend to be concentrated in the topsoil. Features cut into the subsoil and backfilled or silted with topsoil therefore contain greater amounts of iron and can therefore be detected with the gradiometer. This is a simplified description as there are other processes and materials which can produce detectable anomalies. The most obvious is the presence of pieces of iron in the soil or immediate environs which usually produce very high readings and can mask the relatively weak readings produced by variations in the soil. Strong readings are also produced by archaeological features such as hearths or kilns because fired clay acquires a permanent thermo-remnant magnetic field upon cooling. This material can also get spread into the soil leading to a more generalised magnetic enhancement around settlement sites.

Not all surveys can produce good results as anomalies can be masked by large magnetic variations in the bedrock or soil or high levels of natural background "noise" (interference consisting of random signals produced by material within the soil). In some cases, there may be little variation between the topsoil and subsoil resulting in undetectable features.

The Bartington Grad 601 is a hand held instrument and readings can be taken automatically as the operator walks at a constant speed along a series of fixed length traverses. The sensor consists of two vertically aligned fluxgates set 1.0m apart. Their Mumetal cores are driven in and out of magnetic saturation by an alternating current passing through two opposing driver coils. As the cores come out of saturation, the external magnetic field can enter them producing an electrical pulse proportional to the field strength in a sensor coil. The high frequency of the detection cycle produces what is in effect a continuous output.

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

3.0.2 Data Collection

The gradiometer includes an on-board data-logger. Readings in the surveys are taken along parallel traverses of one axis of a 20m x 20m grid. The traverse interval is 0.5m. Readings are logged at intervals of 0.25m along each traverse.

3.0.3 Data presentation

The data is transferred from the data-logger to a computer where it is compiled and processed using ArchaeoSurveyor 2 software. The data is presented as a grey-scale plot where data values are represented by modulation of the intensity of a grey scale within a rectangular area corresponding to

the data collection point within the grid. This produces a plan view of the survey and allows subtle changes in the data to be displayed. This is supplemented by an interpretation diagram showing the main features of the survey with reference numbers linking the anomalies to descriptions in the written report. It should be noted that the interpretation is based on the examination of the shape, scale and intensity of the anomaly and comparison to features found in previous surveys and excavations etc. In some cases the shape of an anomaly is sufficient to allow a definite interpretation e.g. a Roman fort. In other cases all that can be provided is the most likely interpretation. The survey will often detect several overlying phases of archaeological remains and it is not usually possible to distinguish between them. Weak and poorly defined anomalies are most susceptible to misinterpretation due to the propensity for the human brain to define shapes and patterns in random background 'noise'. An assessment of the confidence of the interpretation is given in the text.

3.0.4 Data Processing

The data is presented with a minimum of processing although corrections are made to compensate for instrument drift and other data collection inconsistencies. High readings caused by stray pieces of iron, fences, etc are usually modified on the grey scale plot as they have a tendency to compress the rest of the data. The data is however carefully examined before this procedure is carried out as kilns and other burnt features can produce similar readings. The data on some noisy or very complex sites can benefit from 'smoothing'. Grey-scale plots are always somewhat pixellated due to the resolution of the survey. This at times makes it difficult to see less obvious anomalies. The readings in the plots can therefore be interpolated thus producing more but smaller pixels and a small amount of low pass filtering can be applied. This reduces the perceived effects of background noise thus making anomalies easier to see. Any Each anomaly was assigned a number, interpreted and the level of confidence of the interpretation was recorded as follows:

H – High, the anomaly can be recognized from its shape or form as a recognizable site type.
M- Medium, the anomaly can be provisionally allocated to a site type or more general category.
L- Low- Amorphous and weak anomalies that cannot be provisionally allocated to a site type.

The interpretation of archaeological anomalies depends on recognising the morphology of a feature in plan. Some archaeological anomalies can be identified with a high degree of confidence, e.g. the distinctive outline of a Roman fort. Most anomalies cannot however be interpreted with a high level of certainty. Linear ditches could be assigned to many periods and functions and very weak anomalies, for example those produced by prehistoric settlement and cemeteries can be difficult to distinguish from natural subsoil variations and periglacial features. There are therefore often several possible interpretations. Alternative interpretations are therefore noted in the table along with level of confidence. A cross reference to anomalies in the targeted surveys carried out by GAT is also included in the table.

3.0.5 Assessment of the importance of geophysical anomalies

Each anomaly was also assigned a category of importance. The criteria are based upon those used by the Welsh Assembly Government (WAG) when considering sites for protection as scheduled ancient monuments, as set out in the Welsh Assembly circular 60/96.

Category A - Sites of National Importance.

This category includes Scheduled Ancient Monuments and Listed Buildings of grade II* and above, as well as those sites that would meet the requirements for scheduling (ancient monuments) or listing (buildings) or both.

Sites that are scheduled or listed have legal protection, and it is recommended that all Category A sites remain preserved and protected *in situ*.

Category B - Sites of Regional Importance

This category includes grade II Listed Buildings and sites which would not fulfil the criteria for scheduling, but which are nevertheless of particular importance within the region. Preservation *in situ* is the preferred option for Category B sites, but if damage or destruction cannot be avoided, appropriate detailed recording might be an acceptable alternative.

Category C - Sites of District or Local Importance

These sites are not of sufficient importance to justify a recommendation for preservation if threatened, but nevertheless merit adequate recording in advance of damage or destruction.

Category D - Minor and Damaged Sites

These are sites, which are of minor importance, or are so badly damaged that too little remains to justify their inclusion in a higher category. For these sites rapid recording either in advance or during destruction, should be sufficient.

Category E - Sites needing further investigation

Sites, the importance of which is as yet undetermined and which will require further work before they can be allocated to categories A-D, are temporarily placed in this category, with specific recommendations for further evaluation. By the end of the assessment there should be no sites remaining in this category, unless they will not be affected by the proposed works. This category is particularly relevant to geophysical anomalies, many of which cannot be identified with certainty without additional assessment. In such cases the category can be shown with a potential range of importance e.g. E (A-C).

Category F – Non archaeological site

The interpretation of geophysical surveys usually requires all anomalies to be transcribed in order to demonstrate that the results have been completely assessed. Many anomalies are however caused by non-archaeological features such as geology, modern services (pipe trenches, buried cables etc.) and agricultural topsoil variations caused by recent ploughing and vehicle ruts. In Tables 1 and 2 these are assigned to a separate category *Category F – Non archaeological site.* This is not a WAG category as categories A to E specifically apply to archaeological sites. It is expected that all anomalies that can be reliably assigned to category F will be discounted from any further assessment.

Further processing would be noted in relation to the individual plot.

4.0 RESULTS

4.1 Survey conditions and locations

The survey was carried out in four separate areas or phases; in each case the grid was projected from a baseline using GPS surveying equipment.

4.1.1 Phase 1

Baseline: SH47515.35, 44517.94 to SH47492.50, 44594.61
A small area on sloping ground with much magnetic interference from buildings and discarded farm machinery. The eastern edge of the area was boggy and trampled by cattle and was not suitable for survey.

4.1.2 Phase 2

Baseline: SH 47395.91, 44370.56 to SH47424.06, 44398.97
A small area bisected by a field boundary. Partly overgrown and containing many ferrous objects such as discarded machinery.

4.1.3 Phase 3

Baseline: SH47071.75, 44582.43 to SH47370.76, 44287.47
A large field containing long grass. No major obstacles although a small area at the south-eastern end was overgrown and very steep and could not be surveyed.

4.1.4 Phase 4

Baseline: SH47000.00, 44995.298 to SH47000.00 44595.30
An area of three fields, one with uncut silage and two under pasture. Small areas in the north-eastern parts of 4c and 4a were overgrown, trampled and boggy and could not be surveyed. Field 4a was very steeply sloping in places and contained many discarded iron objects.

4.2 Results

The individual anomalies are described in Table 1, followed by a summary for each field.

Table 1: Geophysical anomalies detected in the surveys

Anomaly Number	Interpretation	Confidence	Importance	Alternative Interpretation	Confidence	Importance	Phase/area
1	Ferrous responses from buildings and scrap machinery	H	F				1
2	Isolated ferrous material and general disturbance at edge of former quarry	H	F				1
3	Isolated ferrous responses from scrap, fences, discarded machinery and a caravan.	H	F				2
4	Iron pipe	H	F				3
5	Iron pipe	H	F				3
6	Former field boundary, shown on 1790 estate map, 1841 tithe map and 1888/1919 OS maps	H	C-D				3
7	Former field boundary, shown on 1790 estate map, 1841 tithe map and 1888/1919 OS maps	H	C-D				3
8	Former field boundary predating map evidence (i.e. pre 1790), subdivision of 18th century fields	M	C	Drainage or modern service trench	M	F	3
9	Former field boundary, shown on 1790 estate map, 1841 tithe map and 1888/1919 OS maps	H	C-D				3
10	Former field boundary shown on 1888 25” inch OS	M	C				3

11	Former field boundary predating map evidence (i.e. pre 1790), subdivision of 18th century fields	M	C				3
12	Former field boundary predating map evidence (i.e. pre 1790), subdivision of 18th century fields	M	C				3
13	Former field boundary predating map evidence (i.e. pre 1790), subdivision of 18th century fields	M	C				3
14	Former field boundary, shown on 1790 estate map	H	C-D				3
15	A series of smaller subdivisions, either smaller fields or paddocks	M	C	Drainage	M	D	3
16	Fragment of a former boundary predating map evidence (i.e. pre 1790),	M	C-D				3
17	Track between two existing gateways	H	C				3
18	Area of noise, dumping or quarrying	M	D	Natural subsoil variation	L	F	3
19	Area of noise, not obviously ferrous, dumped material or natural variation	M	D-F	Area of noise, not obviously ferrous, Bronze Age burnt mound	L	B/E	3
20	Linear positive anomaly, drainage or plough scarring	M	D				3
21	Area of increased noise respecting field boundaries 5 and 6. Probably indicates deeper ploughing in these areas.	H	D				3
22	Strong linear anomaly. Former field boundary, shown on 1790 estate map, 1841 tithe map and 1888/1919 OS maps	H	C-D				4c
23	Former field boundary, shown on 1790 estate map, 1841 tithe map and 1888/1919 OS maps	H	C-D				4c
24	Former field boundary, shown on 1790 estate map, 1841 tithe map and 1888/1919 OS maps	M	C-D				4c

25	Former field boundary, shown on 1790 estate map, 1841 tithe map but not 1888/1919 OS maps. Slightly S-shaped boundary could indicate the remains of medieval strip fields.	H	B-C				4c
26	Former field boundary, shown on 1790 estate map, 1841 tithe map and 1888/1919 OS maps	H	C-D				4c
27	Former field boundary, shown on 1790 estate map, 1841 tithe map and 1888/1919 OS maps. The modern boundary to the east has been realigned.	H	C-D				4c
28	Former field boundary predating map evidence (i.e. pre 1790), subdivision of 18th century fields continuation of boundaries 25 and 27	H	C-D				4c
29	Narrow linear anomaly, perhaps a boundary predating 18th century fields. Probably same as 30	H	B-C	Modern drainage	L	D	4c
30	Narrow linear anomaly, perhaps a boundary predating 18th century fields. Probably same as 29	H	B-C	Modern drainage	L	D	4c
31	Small square or rectangular anomaly, possibly a barrow or medieval mortuary enclosure	L	A-B/E	Chance occurrence or modern feature	M	D-F	4c
32	Narrow linear anomaly, probably modern drainage or agriculture	M	D	Narrow linear anomaly, perhaps a boundary predating 18th century fields, possibly evidence for medieval strip fields.	L	B-C	4c
33	Parallel linear anomalies appearing to run up to and respect former boundaries 24 and 25. Perhaps medieval ridge and furrow. See also 25	M	B-C	More recent ploughing	M	D	4c
34	Negative linear anomaly, fragment of former boundary or drainage	M	D				4c

35	Roughly circular anomaly, possibly quarrying or an infilled hollow	M	D	Roughly circular anomaly, possibly the plough damaged remnants of a prehistoric enclosure or settlement	L	A-B/E	4b
36	Ferrous anomalies, near gateway therefore probably remains of former gates and fittings	H	D				4b
37	Former field boundary, shown on 1790 estate map, 1841 tithe map and 1888/1919 OS maps	H	C-D				4b
38	Large crescent-shaped anomaly, probably landscaping on the edge of bog	M	D				4b
39	Narrow linear anomaly, perhaps a boundary predating 18th century fields.	M	C	Drainage	M	D	4b
40	Narrow linear anomaly, perhaps a boundary predating 18th century fields.	M	C	Drainage	M	D	4b
41	Fragment of former boundary	M	C				4b
42	Area of noise, not obviously ferrous, perhaps geological	M	F	Area of noise, not obviously ferrous, Bronze Age burnt mound	L	B/E	4b
43	Wide diffuse linear anomaly, perhaps a former quarry trackway	M	D				4c
44	Irregular anomalies. Probably quarrying or ground disturbance. The SW part of this are appears to have been quarried or extensively disturbed.	H	D				4c
45	A mass of crossing linear anomalies. Probably different phases of quarry track-ways.	M	D				4c
46	Former field boundary, shown on 1790 estate map, 1841 tithe map and 1888/1919 OS maps	H	C-D				4c
47	Roughly circular anomaly, modern disturbance	M	D	Roughly circular anomaly, prehistoric barrow	L	A-B/E	4c

48	Irregular anomalies. Probably quarrying or ground disturbance.	H	D				4c
49	Linear anomaly, probably drainage	M	D				4c
50	Linear anomaly probably drainage with 49 and other faint linears in the vicinity	M	D				4c
51	Diffuse anomalies running around the line of the contour on a natural hillock. Probably erosion or soil creep, i.e. not archaeological	M	F				4c
52	Ferrous, animal feeder	H	F				4c
53	Ferrous, stays for pole	H	F				4c
54	Unknown anomalies on, or close to, top of natural mound	-	E				4c
55	Area of noise and ferrous anomalies. Discarded machinery and other objects dumped in boggy area	H	F				4c
56	Former field boundary, shown on 1790 estate map, 1841 tithe map and 1888/1919 OS maps	H	C-D				4c
57	Linear anomaly, probably a path or erosion at top of steep slope	M	D-F				4c

4.3 Individual area summaries

4.3.1 Phase 1

Only a small area was surveyed here, mostly on steeply sloping ground with very low archaeological potential. No features of archaeological significance were revealed.

4.3.2 Phase 2

This was again a small area, much of which was dominated by ferrous responses from discarded machinery and fences. No features of archaeological significance were revealed.

4.3.3 Phase 3

Most of the major anomalies with archaeological origins in this area (6, 7, 9 10, 14) can be demonstrated to be former field boundaries shown on the 1790 estate map, 1841 tithe map, and 1888 and 1919 Ordnance survey 25" maps. The map regression is included in the Archaeological Assessment Report (Govannon 2011) which is included as part of the appendix in this report. One boundary (9/10) was realigned between 1841 and 1888 and another (14) was removed between 1790 and 1841. Several further subdivisions (8, 11, 12, 13 and 16) were identified; all appear to be part of

the same field system and were presumably removed before the earliest map evidence. An area of random high non-ferrous readings (19) could be a result of thermoremnant magnetism. This type of anomaly could be caused by a Bronze Age burnt mound, a heap of heat-affected rock and charcoal usually interpreted as a cooking site. Given the amount of disturbance in the area around the former quarries, a more modern origin is a likely alternate interpretation. All other anomalies in this area can be fairly safely interpreted as being of modern or agricultural origin, in tandem with the known field amalgamation activity post-1961 (cf. para. 2)

4.3.4 Phase 4c

The major anomalies in this area could also be shown to be former field boundaries. Boundary 22 produced particularly strong readings, perhaps as a result of mineral panning. This and 27 were the only boundaries to survive until the 1888 OS map was produced. Most of the others (23, 24, 25 and 26) are shown on the estate and tithe maps. Only 28 and perhaps 34 appear to be subdivisions pre-dating the mapping. Boundary 25 is slightly curving in a characteristic shallow s-shape that could indicate the presence of medieval strip fields. Adjacent parallel anomalies, 32 and 33, could indicate medieval ridge and furrow ploughing and an additional boundary.

Two narrow anomalies 29 and 30 could be interpreted as a different phase of former boundaries or alternatively as modern drainage features. If they are early boundaries they would predate the 18th century or medieval features.

A small, fairly poorly-defined, 7m-square feature (31) could be significant. Small square anomalies such as this can sometimes indicate square Roman barrows or early-medieval mortuary enclosures. It is not well defined and could alternatively be interpreted as a chance crossing of agricultural features.

4.3.5 Phase 4b

A roughly circular anomaly (35) about 50m in diameter could be interpreted as a prehistoric enclosure or settlement. Its situation on a level shelf would be fairly typical. It is, however, somewhat uneven and poorly-defined. This suggests there could be an alternative explanation such as landscaping, filling in a natural hollow or even a small area of backfilled quarrying. It should be noted that it underlies the field boundary which would normally suggest an early date but the comparison of the line of the boundary on the 1888/1919 OS maps with its current alignment shows that it has been realigned to the east; feature 27 shows the original line. Feature 35 could therefore be of any date, a modern date is most likely but a prehistoric origin cannot be ruled out on the evidence of geophysical survey alone. An area of random high non-ferrous readings (19) could interpreted as another Bronze-age burnt mound, but as with anomaly 19, could alternatively be interpreted as modern.

One former boundary (37), shown on the map evidence, crosses this field. Two narrow linear features (39 and 40), similar to 29 and 30 in area 4c, could either be early boundaries or modern drainage. A broad crescent-shaped anomaly (39) suggests some landscaping at the north of the field.

4.3.6 Phase 4c

The geophysical survey results and general appearance of the field suggests that the disturbance and extraction associated with the former quarrying at Llecheiddior Uchaf extended across the lower south-western half of the field. The large diffuse linear anomaly (43) could be a former quarry trackway leading to a mass of crossing features (45), probably further disturbance from this activity. The remains of a former field boundary 46 appear to mark the edge of the major disturbance although most of the features in this area are best interpreted as being features associated with the quarry, drainage or agriculture. The following may, however, be of archaeological significance. Feature 56 is almost certainly a former field boundary shown on all phases of the map evidence. A circular anomaly (47) about 15m in diameter could be interpreted as a prehistoric barrow; it is better defined than the areas of disturbance in the area suggesting an archaeological feature. Its position at the base of a slope is not typical for a prehistoric funerary monument so a modern origin is possible. Two discrete areas of high readings (54) on top of a natural mound could be archaeological features but given the level of modern disturbance are most like to be modern.

5. CONCLUSIONS AND FURTHER RECOMMENDATIONS

The geophysical survey produced clear results with low levels of natural background noise and geological responses. It detected a wide range of different features and has therefore produced a fairly reliable assessment of the archaeological potential of the area. It should however be stressed that, as with all geophysical surveys, it cannot be guaranteed that all archaeological features have been detected.

The survey principally revealed a series of field boundaries that predate the earliest map evidence (1790). These form a typical post-medieval pattern of agriculture. Possible ridge and furrow in the north-western part of the survey could indicate a medieval origin. A few narrow anomalies could indicate earlier enclosure but more recent drainage is an equally likely interpretation. The geophysical survey results show only the shape and magnetic strength of features. It is recommended that the form, phasing, dating and level of survival of the boundaries should be investigated by a series of trial trenches.

Five additional discrete features were identified that could be potentially of regional or national archaeological importance. These comprise two possible Bronze Age burnt mounds, a possible prehistoric enclosure, a possible Roman or medieval square barrow and a possible prehistoric round barrow. In all cases the geophysical evidence is insufficient to provide a definite interpretation on its own and in all cases it is possible that the anomalies are caused by more recent or non archaeological factors. **Further physical information is needed to allow definite interpretation and investigation of these features using trial trenching is recommended**.

In conclusion the survey mostly detected features related to the agricultural use of the area. There are a few features that may relate to funerary or settlement but these are as yet unconfirmed. The survey did not detect any large-scale archaeology of national or regional importance (Category A and B sites).

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Mrs E C Jones, correspondence dated 14/09/12.


Sarn
Phase 4C
Phase 4B
Phase
Drain
Drain
122.4m
Phase 3
128.6m
Cattle Grid
122.6m
METRES
0
200

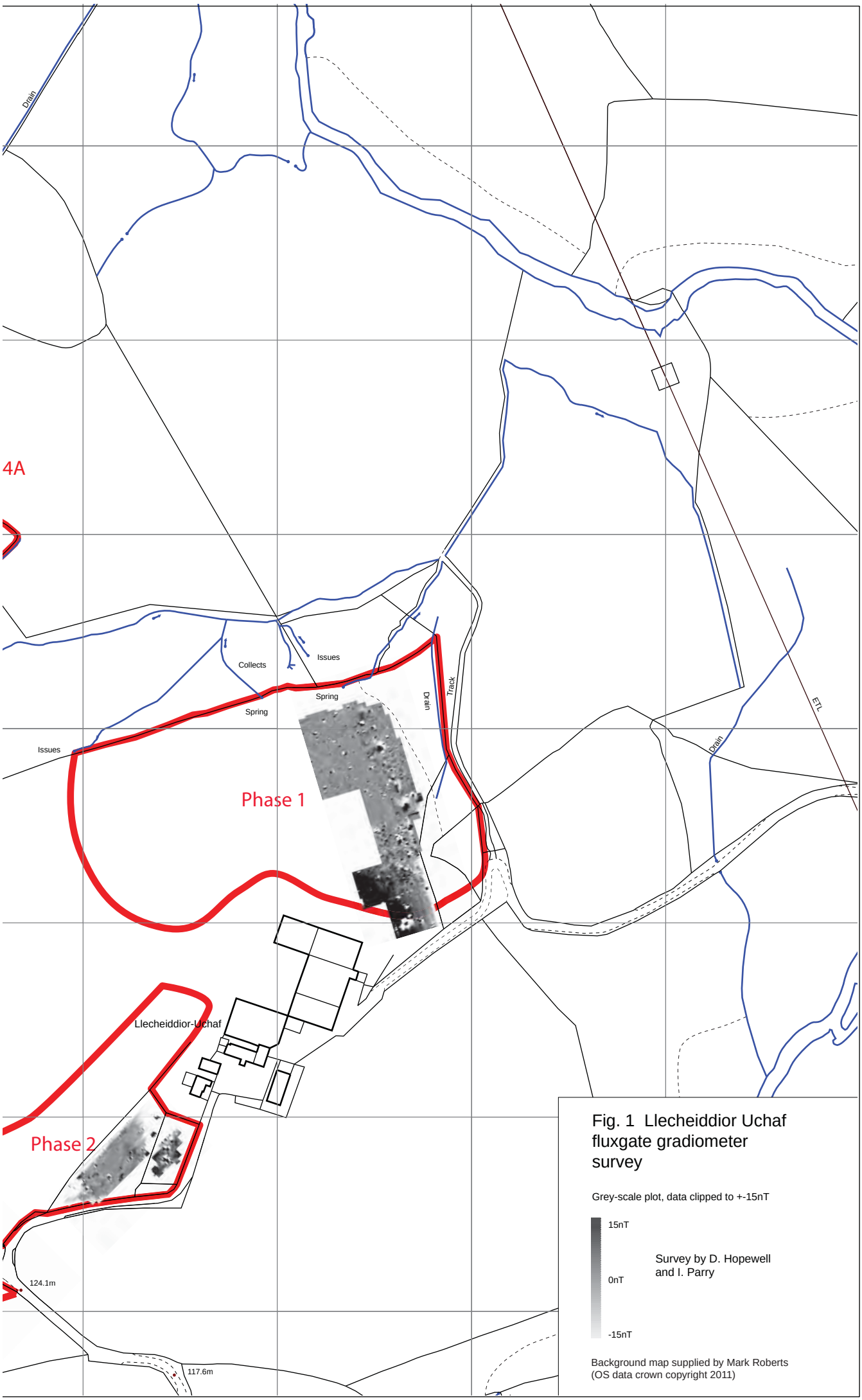

Fig. 1 Llecheiddior Uchaf fluxgate gradiometer survey

Grey-scale plot, data clipped to +-15nT

15nT

0nT

-15nT

Survey by D. Hopewell and I. Parry

Background map supplied by Mark Roberts
(OS data crown copyright 2011)


Sarn
Phase 4C
Phase 4B
Phase 4A
Phase 3
Drain
Drain
Issues
122.4m
128.6m
122.6m
Cattle Grid
METRES
0
200

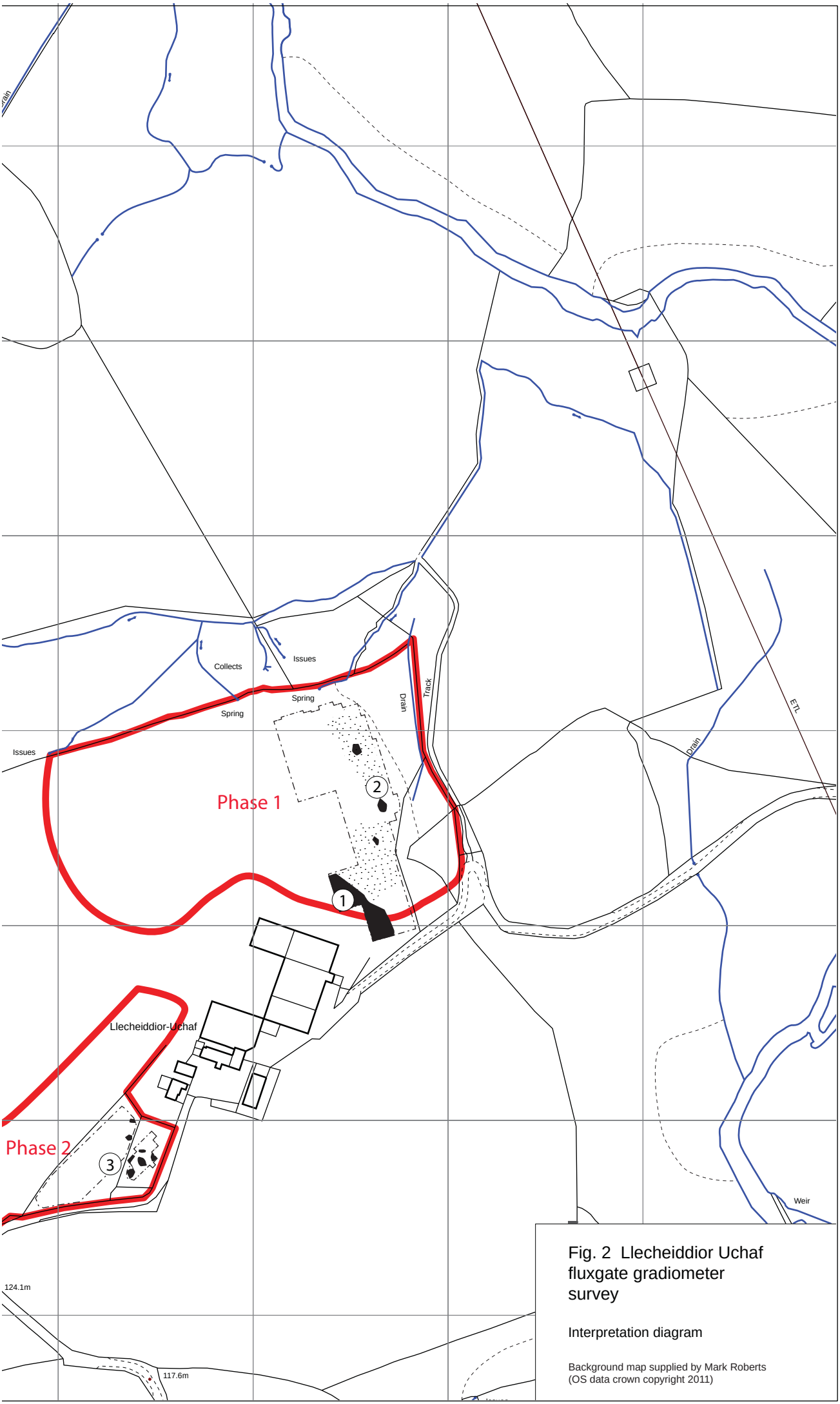

Fig. 2 Llecheiddior Uchaf fluxgate gradiometer survey

Interpretation diagram

APPENDIX

PROJECT DESIGN AND ARCHEOLOGICAL ASSESSMENT

PROPOSED SAND AND GRAVEL QUARRY AT
LLECHEIDDIOR UCHAF,
GARNDOLBENMAEN

PROJECT DESIGN FOR
PROJECT DESIGN FOR ARCHAEOLOGICAL EVALUATION:
Targeted Geophysics (G2272)

Prepared for

MARK ROBERTS
Planning and Environmental Consultant

July 2012

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

PROPOSED SAND AND GRAVEL QUARRY AT LLECHEIDDIOR UCHAF, GARNDOLBENMAEN

PROJECT DESIGN FOR ARCHAEOLOGICAL EVALUATION: Targeted Geophysics (G2272)

Prepared for *Mark Roberts, Planning and Environmental Consultant*, July 2012

1.0 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been asked by Mark Roberts, Planning and Environmental Consultant to provide a specification with costs for carrying out a programme of targeted archaeological evaluation (geophysics: standard resolution magnetometer survey) at the location of a proposed sand and gravel quarry at Llecheiddior Uchaf, Garndolbenmaen (centred on NGR **SH 47514445**). The archaeological evaluation is being undertaken as part of planning application **C12/0495/36/MW**.

The proposed quarry site comprises five irregular shaped enclosed fields located to the west, northwest and north of Llecheiddior Uchaf Farm (NGR **SH47514445**; cf. Figure 01). The quarry areas are divided into four general phases:

- Phase 01 (NGR **SH47474455C**) – incorporates the northeastern end of a large irregular shaped plot and the majority of two small irregular shaped plots;

- Phase 02 (NGR **SH47404440C**) – incorporates the southwestern end of a large irregular shaped plot and two small irregular shaped plots;

- Phase 03 (NGR **SH47194444C**) – incorporates one irregular shaped plot;

- Phase 04: subdivided into –
    - Phase 04a (NGR **SH47204463C**) – incorporates the northern end on an irregular shaped plot;
    - Phase 04b (NGR **SH71044471C**) – incorporates an irregular shaped plot;
    - Phase 04c (NGR **SH47004481C**) – incorporates the eastern end of an irregular shaped plot.

Note: the irregular shaped plot that incorporates part of the proposed Phase 01 and Phase 02 quarry workings has previously been quarried (cf. para. 2.0 for further information and Figure 02 for a location of previously quarried areas); it is intended that the geophysical survey in this area will target the areas that have not previously been quarried (cf. Figures 01 and 03).

A detailed brief has not been prepared for this stage by Gwynedd Archaeological Planning Service (GAPS). However GAPS, in response to the archaeological assessment of the proposed area completed by the *Govannon Consultancy* (Report **281**), has stated that:

> "(A)rchaeological evaluation is required to determine the impact of the proposals on the buried archaeological resource. In accordance with national planning guidance (*Planning Policy Guidance Wales 2011*) and Welsh Office Circular 60/96 (*Planning and the Historic Environment: Archaeology*) paragraph 13 such archaeological evaluation work must be undertaken **before** any decision on a planning application is taken... This must include both intrusive and non-intrusive evaluation work consisting initially of a magnetometer survey of the application area supplemented by a targeted programme of archaeological trial trenching" (email correspondence received via *Mark Roberts, Planning and Environmental Consultant*).

The current design conforms to the guidelines specified in the *IFA Standard and Guidance for Archaeological Evaluation* (Institute for Archaeologists, 1994, rev. 2001 & 2008) & the *Draft Standard and Guidance for Archaeological Geophysical Survey* (Institute for Archaeologists, 2010).

2.0 BACKGROUND

Govannon Consultancy completed an archaeological assessment of the proposed quarry areas in October 2011 (Report **281**; reproduced as Appendix I). The report concluded that:

> The study area has been significantly altered by sand-extraction in the 1960s-1970s. This has affected the context of the only evident features that will be directly affected by the resumption of quarrying, namely the post-Medieval field boundaries. It is noted that these are significant at level C) in their own right, but in that their immediate vicinity will not have been ploughed, they have significant archaeological potential. These areas should be considered as part of feature 11 (sites of unknown location and potential within the development zone).
>
> It is therefore noted that the area is potentially rich in buried features, particularly from Prehistory, exemplified by the discovery of Bronze Age artefacts and sites within the vicinity of the study area (Report **281**: 14-15).

The known prehistoric archaeological activity within the local area is summarised on page 6 of the report and include "a gold lunula from Llecheiddior Uchaf itself (at SH 4775 4482 though not within the study area), pottery at SH 4810 4480, an urnfield at SH 4797 4490 and a bronze palstave from Mynydd Cennin at SH 4646 4491 (Report **281**: 06).

In addition to the information in the Govannon Consultancy report regarding the twentieth century quarry extraction that took place within the proposed area, *Mark Roberts, Planning and Environmental Consultant* has provided GAT with a map detailing the location of the quarry phases (reproduced as Figure 02). These include:

- The *Lleicheiddior Ganol* quarry workings incorporating two fields that were located to the immediate south of the Phase 03 area, which were completed by Arthur Salisbury Ltd. between 1966 and 1980;

- The *Lleicheiddior Uchaf* quarry workings incorporating two fields either side of Lleicheiddior Uchaf Farm. The northern field was initially worked by William Pierce & Son between 1947 and 1956; this was followed by *Croxton Gravel Ltd* between 1958 and 1980. The southern field was quarried by William Griffith & Son between 1956 and 1970.

The northern field within the historic *Lleicheiddior Uchaf* quarry workings includes the current location for the proposed Phase 01 and Phase 02 quarry areas. The current information implies that these areas have already been disturbed by existing extraction works (excluding the areas visible on Figures 03).

3.0 METHOD STATEMENT

3.1 Standard Resolution Magnetometer Geophysical Survey

The survey will be carried out in a series of 20m grids, which will be tied into fixed local topographic features. The survey will be conducted using a *Bartington Grad 601-2 Dual Sensor fluxgate gradiometer*. The survey will be carried out at standard resolution (1.0m traverse interval x 0.5 or 0.25m sample interval.).

Note: The geophysical survey will target Phases 03 and 04 a, 04b and 04c in their entirety (Figure 01). Due to the previous quarry workings indicated on Figures 02 and 03, the geophysical survey will only target those areas within Phases 01 and 02 that appear not to have been disturbed by previous quarrying.

Note: Based on the results of the geophysical survey, additional recommendations may be made for further evaluation and/or mitigation. The scope and cost of such works will be addressed in future project designs (where applicable).

3.1.1 Instrumentation

The Bartington Grad 601-2 dual Fluxgate Gradiometer uses a pair of Grad-01-100 sensors. These are high stability fluxgate gradient sensors with a 1.0m separation between the sensing elements, giving a strong response to deeper anomalies.

The instrument detects variations in the earth's magnetic field caused by the presence of iron in the soil. This is usually in the form of weakly magnetised iron oxides which tend to be concentrated in the topsoil. Features cut into the subsoil and backfilled or silted with topsoil therefore contain greater amounts of iron and can therefore be detected with the gradiometer. This is a simplified description as there are other processes and materials which can produce detectable anomalies. The most obvious is the presence of pieces of iron in the soil or immediate environs which usually produce very high readings and can mask the relatively weak readings produced by variations in the soil. Strong readings are also produced by archaeological features such as hearths or kilns because fired clay acquires a permanent thermo-remnant magnetic field upon cooling. This material can also get spread into the soil leading to a more generalised magnetic enhancement around settlement sites.

Not all surveys can produce good results as anomalies can be masked by large magnetic variations in the bedrock or soil or high levels of natural background "noise" (interference consisting of random signals produced by material within the soil). In some cases, there may be little variation between the topsoil and subsoil resulting in undetectable features.

The Bartington Grad 601 is a hand held instrument and readings can be taken automatically as the operator walks at a constant speed along a series of fixed length traverses. The sensor consists of two vertically aligned fluxgates set 1.0m apart. Their Mumetal cores are driven in and out of magnetic saturation by an alternating current passing through two opposing driver coils. As the cores come out of saturation, the external magnetic field can enter them producing an electrical pulse proportional to the field strength in a sensor coil. The high frequency of the detection cycle produces what is in effect a continuous output.

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

3.1.2 Data Collection

The gradiometer includes an on-board data-logger. Readings in the surveys are taken along parallel traverses of one axis of a 20m x 20m grid. The traverse interval is 0.5m. Readings are logged at intervals of 0.25m along each traverse.

3.1.3 Data presentation

The data is transferred from the data-logger to a computer where it is compiled and processed using ArchaeoSurveyor 2 software. The data is presented as a grey-scale plot where data values are represented by modulation of the intensity of a grey scale within a rectangular area corresponding to the data collection point within the grid. This produces a plan view of the survey and allows subtle changes in the data to be displayed. This is supplemented by an interpretation diagram showing the main features of the survey with reference numbers linking the anomalies to descriptions in the written report. It should be noted that the interpretation is based on the examination of the shape, scale and intensity of the anomaly and comparison to features found in previous surveys and excavations etc. In some cases the shape of an anomaly is sufficient to allow a definite interpretation e.g. a Roman fort. In other cases all that can be provided is the most likely interpretation. The survey will often detect several overlying phases of archaeological remains and it is not usually possible to distinguish between them. Weak and poorly defined anomalies are most susceptible to misinterpretation due to the propensity for the human brain to define shapes and patterns in random background ‘noise’. An assessment of the confidence of the interpretation is given in the text.

3.1.4 Data Processing

The data is presented with a minimum of processing although corrections are made to compensate for instrument drift and other data collection inconsistencies. High readings caused by stray pieces of iron, fences, etc are usually modified on the grey scale plot as they have a tendency to compress the rest of the data. The data is however carefully examined before this procedure is carried out as kilns and other burnt features can produce similar readings. The data on some noisy or very complex sites can benefit from ‘smoothing’. Grey-scale plots are always somewhat pixellated due to the resolution of the survey. This at times makes it difficult to see less obvious anomalies. The readings in the plots can therefore be interpolated thus producing more but smaller pixels and a small amount of low pass filtering can be applied. This reduces the perceived effects of background noise thus making anomalies easier to see. Any further processing would be noted in relation to the individual plot.

Access onto land is to be arranged by the Clients.

3.2 Report

Following completion of the stages outlined above, a report will be produced incorporating all results and will include:

1. Introduction
2. Specification and Project Design
3. Methods and techniques
4. Archaeological Background
5. Results of **Geophysics Survey**
6. Summary and conclusions and further recommendations.
7. List of sources consulted.

4.0 STAFF

The project will be supervised by John Roberts, Acting Head of Contracts at the Trust. The work will be carried out by fully trained Project Archaeologists who are experienced in conducting project work and working with contractors and earth moving machinery. (Full CV's are available upon request).

5.0 HEALTH AND SAFETY

The Trust subscribes to the SCAUM (Standing Conference of Archaeological Unit Managers) Health and Safety Policy as defined in **Health and Safety in Field Archaeology** (2007).

6.0 INSURANCE

Liability Insurance - Aviva Policy 24765101CHC/00045

- Employers' Liability: Limit of Indemnity £10m in any one occurrence
- Public Liability: Limit of Indemnity £5m in any one occurrence

The current period expires 21/06/13

7.0 BIBLIOGRAPHY

Planning Application **C12/0495/36/MW**

Gwyn, Dr D. 2011. *LLECHEIDDIOR UCHAF: ARCHAEOLOGICAL ASSESSMENT*. Govannon Consultancy Report **281**

Institute for Archaeologists, 1994, rev. 2001 & 2008*Standard and Guidance for Archaeological Evaluation*

Institute for Archaeologists, 2010. *Draft Standard and Guidance for Archaeological Geophysical Survey*

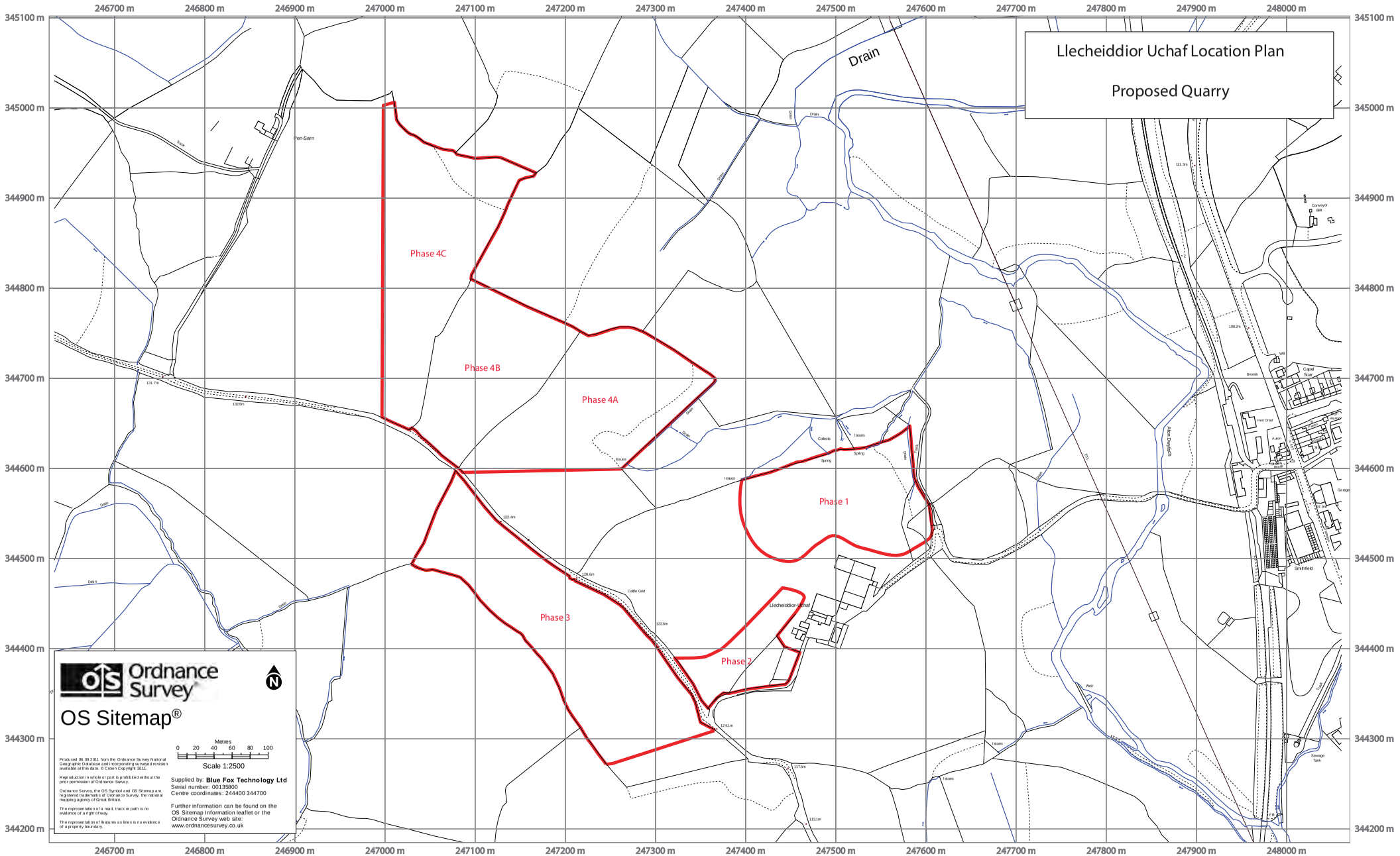

Figure 01: reproduction of map supplied by Mark Roberts, Planning and Environmental Consultant, detailing proposed new quarry areas. According to the information within Figurs 02 and 03, the Phase 01 and 02 have been partly quarried during the twentieth century

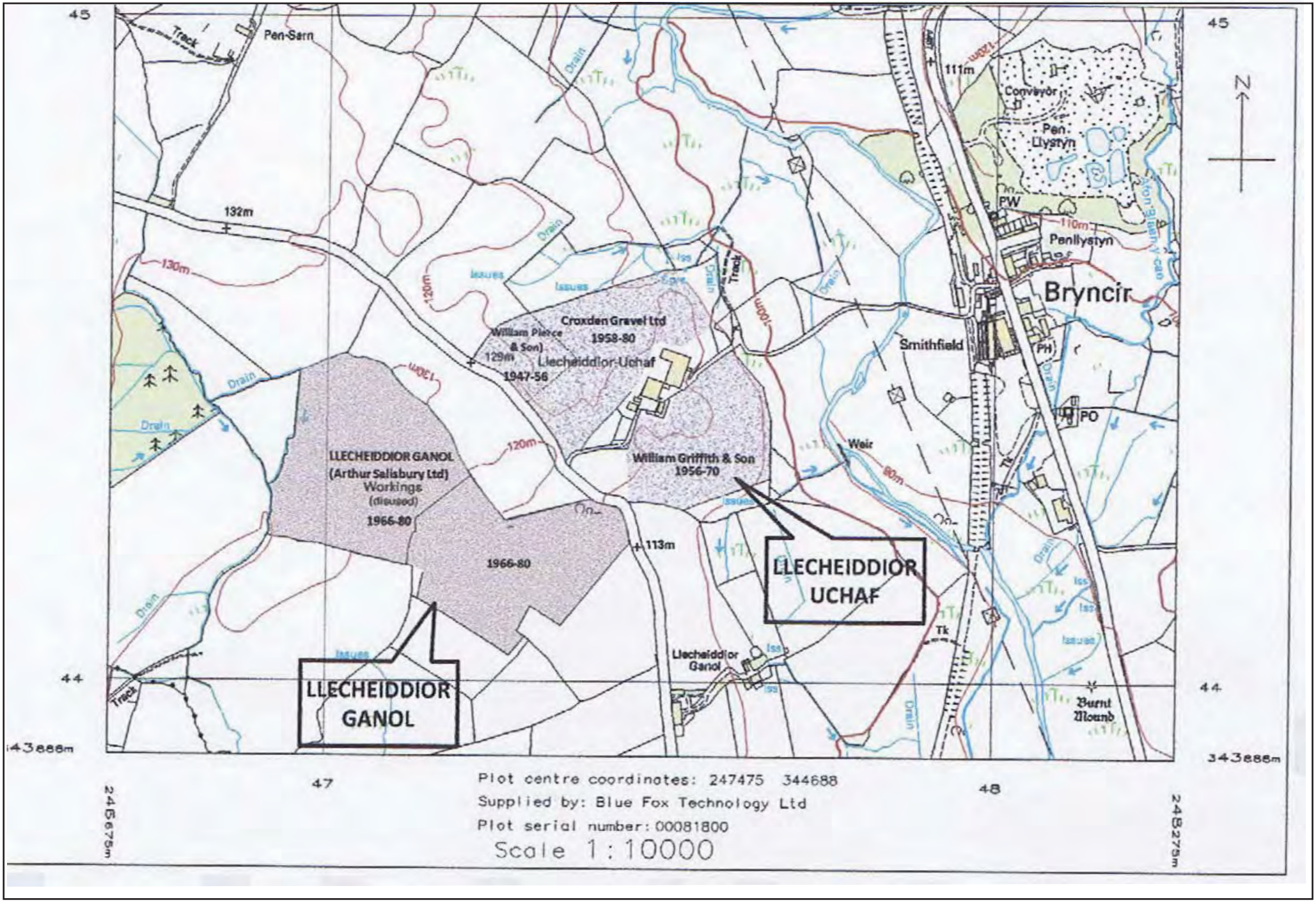

Figure 02: reproduction of map supplied by Mark Roberts, Planning and Environmental Consultant, of the plots/areas quarried during the twentieth century. The Lleicheiddior Ganol workings are outside the current proposals; the northern portion of the Lleicheiddior Uchaf workings incorporate parts of the proposed Phase 01 and Phase 02 areas (cf. Figures 01 and 03). NOT TO SCALE.

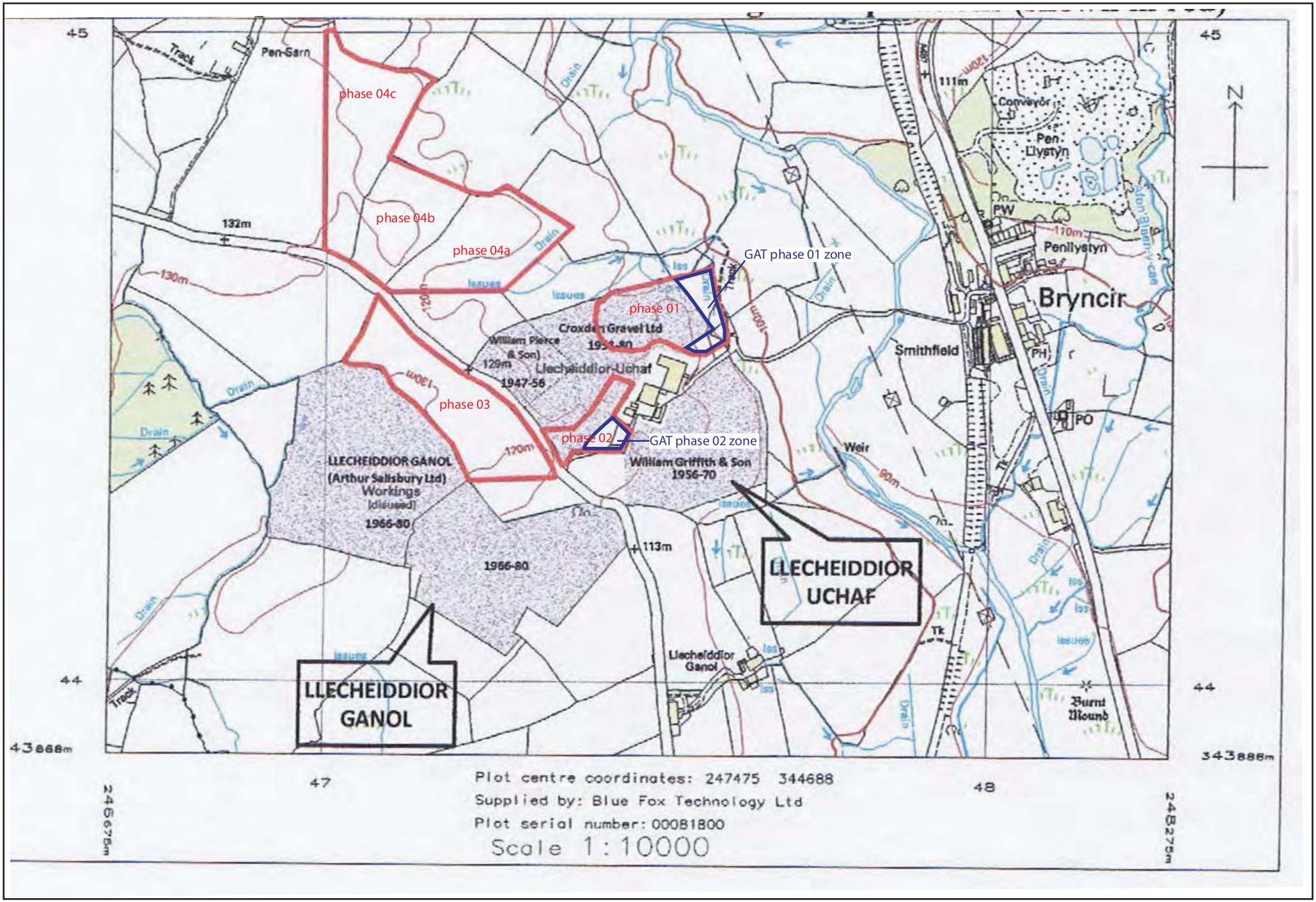

Figure 03: reproduction of map supplied by Mark Roberts, Planning and Environmental Consultant, of the plots/areas quarried during the twentieth century, with the proposed new areas superimposed in red. The GAT geophysical survey will target Phases 03 and 04 a, 04b and 04c in their entirety.
Due to the previous quarry workings indicated above, the geophysical survey will only target those areas within Phases 01 and 02 that appear not to have been disturbed by previous quarrying.NOT TO SCALE.

APPENDIX I

REPRODUCTION OF GOVANNON CONSULTANCY REPORT 281 LLECHEIDDIOR UCHAF: ARCHAEOLOGICAL ASSESSMENT

govannon consultancy

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LLECHEIDDIOR UCHAF
ARCHAEOLOGICAL ASSESSMENT

For Chwarel Bryncir – Prosesu Dwyfach Cyf.

October 2011
Govannon report 281

LLECHEIDDIOR UCHAF - ARCHAEOLOGICAL ASSESSMENT

Non-technical summary: the present document constitutes an archaeological assessment for lands at Llecheiddior Uchaf at Bryncir, Gwynedd to inform a Minerals Planning Application for the site sought by Chwarel Bryncir Quarry/Prosesu Dwyfach Processing Cyf. of Bryncir, Garndolbenmaen, Gwynedd. It has been carried out by Dr David Gwyn MIFA FSA of Govannon Consultancy. Ten sites were identified of which nine were ascribed to the Post-Medieval period and one to the Medieval. In addition, an extra category was created for buried sites and features. Of the total of eleven sites, one was ascribed to category B, six to category C, one to category D and three to category E.

Abbreviations

The following abbreviations are used in this report

CRO: Caernarfon Record Office
GAT: Gwynedd Archaeological Trust
HER: Historic Environment Record
NMR: National Monuments Record
RCAHMW: Royal Commission on the Ancient and Historic Monuments of Wales

INTRODUCTION

Govannon Consultancy has been commissioned by Chwarel Bryncir Quarry/Prosesu Dwyfach Processing Cyf. to carry out an archaeological assessment of lands at Llecheiddior Uchaf (the present document).

AIMS AND PURPOSE OF ASSESSMENT

The purpose of the assessment is to inform a Minerals Planning Application for the site sought by Chwarel Bryncir Quarry/Prosesu Dwyfach Processing Cyf. of Bryncir, Garndolbenmaen, Gwynedd.

METHODOLOGY

Outline approach

The Methodology followed in this assessment was the standard methodology set out by the Institute of Field Archaeologists. All work was carried out by Dr David Gwyn MA (Cantab.), PhD, MIFA, FSA. Known archival sources in the major research holdings were consulted, as was the HER and aerial photography curated by the GAT and the NMR curated by the RCAHMW, Aberystwyth. The advice of Ashley Batten, Development Control Officer at Gwynedd Archaeological Planning Services was sought and obtained. By arrangement with John Evans of Chwarel Bryncir Quarry/Prosesu Dwyfach Processing Cyf. and with the tenant of Llecheiddior Uchaf farm, the site was visited on 29 October 2011. Sites and features were assessed in terms of their archaeological significance, and mitigatory recommendations made.

Definition of archaeological significance

The following categories were used to define the significance of the archaeological resource:

Category A – sites of national importance

Scheduled Ancient Monuments, Listed Buildings and sites worthy of scheduling or listing *ie* those which would meet the criteria for scheduling or listing or both.

Sites which are scheduled or listed have legal protection, and it is recommended that all Category A sites remain preserved and protected *in situ*.

Category B – sites of regional or county importance

Sites which would not fulfil the criteria for scheduling or listing, but which are nevertheless of particular importance within the region

Preservation *in situ* is the preferred option for Category B sites, but if damage or destruction cannot be avoided, appropriate detailed recording might be an acceptable alternative.

Category C – sites of district or local importance

Category C sites nevertheless merit adequate recording in advance of damage or destruction

Category D – minor or damaged sites

Sites which are of minor importance or so badly damaged that too little remains to justify their inclusion in a higher category

For Category D sites, rapid recording, either in advance of, or during, destruction should be sufficient

Category E – sites needing further investigation

Sites whose importance is as yet undetermined and which will require further work before they can be allocated to categories A-D are temporarily placed in this category, with specific recommendations for further evaluation.

Definition of mitigatory recommendations

Where a feature of archaeological significance is affected, mitigation measures should be instituted in accordance with current policies. The various levels of recording are listed below, and appear in the Mitigation field for each of the sites in **6** below.

The mitigation proposals are divided into various levels of recording as set out below:

Level 1: minimal recording

a.) A photographic record of principal external views. The photographs should be dated and indexed. Negatives should be indexed and suitably stored for archive

b.) A brief summary description, related to the photographic record as appropriate

Level 2: basic recording

A photographic record of all principal elevations and selected features of particular interest. Photographs should be taken, as much as possible, at right angles to the face of the feature and should include a scale. There should be a few general photographs to set the site in context.

Photographs should be indexed as for Level 1 and related to a basic site plan which might be taken from a published o.s. map as appropriate.

b.) A simple description of the visible remains from the photographic record.

Level 3: basic recording with survey

As level 2 recording, but to include:

A measured survey of the ground plan of the site or structure at an appropriate scale (1:200 for buildings of 1:500 for larger areas where individual buildings are of no great significance.

Level 4: Full photographic record

A photographic record of all external and, if appropriate, internal elevations as well as any features of particular interest. The photographs should be taken, as far as is possible, at right angles to the face of the structure and should include a scale. They should be reproduced at a scale where, for example, individual stones may be identified. Steps should be taken to avoid distortion (eg by the use of a shift lens) and achieve a common scale. These photographs should be supplemented with general photographs showing the site in its setting, and, if composite

photographs are necessary to cover a large area of elevation, then general photographs of the feature should be included. The photographs should be indexed as for Level 1, and related to a plan.

A general description, and a description of principal features.

A measured survey of the ground plan of the building or site at an appropriate scale as for Level 3.

Level 5: Full record

This would normally include a full photographic record as described for Level 4, but would be supplemented by a measured survey surveyed to no more than a 1% error. The record may be supplemented by elevations and sections, where appropriate, drawn at a scale consistent with the plans. Individual features should also be surveyed and drawn to scale. The full record would include a detailed description, including measurements where necessary.

Watching brief

A watching brief may be recommended whilst below-ground intervention is carried out as part of a development.

Trial trenching

An archaeological evaluation including trial trenching may be recommended in advance of below-ground intervention.

FINDINGS OF THE DESK-TOP ASSESSMENT

Location, topography and geology

The study area is located within the Community of Clynnog and historic parish of Llanfihangel y Pennant, on the western slopes of the Dwyfach river, which gathers in the marshes around Gyfelog 4km to the north, and flows southwards to join the sea west of Criccieth. As such, the area has long formed a transport corridor between Arfon and Eifionydd, exemplified in the Roman road which passes Llecheiddior to the east, and its turnpike successors, the Caernarfon to Afonwen railway, and the modern A487 road. It has been suggested that the light gravel soil would have made the study area attractive to Prehistoric settlement by providing a terrain free of heavy tree cover and thick undergrowth (Gresham 200). Llecheiddior Uchaf farm-house is situated at SH 47492 44429

Sources for the history and archaeology of Llecheiddior Uchaf

Bibliographic records

The Medieval history of Llecheiddior Uchaf was found to have been published in detail by Dr Colin Gresham. No other bibliographic records were identified.

Archival holdings

The Llecheiddior collection held at Bangor University form 2046 items collated by R. H. Evans, a lecturer in Agriculture at the universities of Bangor and Reading and a keen local historian and archaeologist, mostly valuations for rent fixation or mortgage purposes, probate and public

utility schemes, from 1922 to 1939. The remaining items comprise reports on agricultural holdings in Caernarvonshire and other matters. They are not relevant to Llecheiddior Uchaf.

Existing archaeological records

Other than the discovery of a Bronze Age gold lunula (a crescent-shaped personal ornament) from within the immediate vicinity of the study area, now in the British Museum (*Inventory of Caernarvonshire* xlix*)*, no reference was found to the study area in either the Historic Environment Record curated by the Gwynedd Archaeological Trust and the National Monument Record curated by the Royal Commission on the Ancient and Historic Monuments of Wales, Aberystwyth within 3km ofLlecheiddior Uchaf

Nearby sites relevant to the present document are indicated in section ? following.

Historic Landscape evaluation

The study area forms part of the *Afon Dwyfach corridor* and the *Central Eifionydd fieldscape* in the CCW-sponsored LANDMAP historic landscape evaluation (to be completed)

STATEMENT OF RESULTS OF THE DESK-TOP ASSESSMENT

Prehistoric

There have been a considerable number of Bronze Age finds within the broader area around Llecheiddiuor Uchaf. These include a gold lunula from Llecheiddior Uchaf itself (at SH 4775 4482 though not within the study area), pottery at SH 4810 4480, an urnfield at SH 4797 4490 and a bronze palstave from Mynydd Cennin at SH 4646 4491. A burnt mound believed to be Bronze Age is located outside the study area at SH 4617 4945. As is typical, it is a crescent-shaped mound of shattered stones and charcoal, though it lacks the hearth and trough often found with these features. They have been interpreted as cooking points for hunting parties but alternative suggestions have included saunas, fulling, salt production and leather production.

Romano-British period

The Roman road from Segontium to Tomen y Mur occupied the eastern side of the Dwyfach valley in the vicinity of Bryncir, though its course has not been identified. The fort at Pen Llystyn (SH 481 449) immediately to the north of Bryncir village is believed to have been occupied in three phases, the first of which probably dates to 78CE and continued for about a decade. An incomplete reduced fort was abandoned after a short period, and a small fortlet was built over the northern quarter of the original fort, but it is unlikely that there was military occupation of the site after 150CE (Nash-Williams 101-3, Hopewell 6-7). The presence of a 6th-century inscribed stone at Llystyn Gwyn on the eastern bank of the Dwyfach indicates continuity into the Early Christian period.

Medieval

The Medieval history of Llecheiddior has been thoroughly researched by Dr Colin Gresham, whose findings are summarised here.

The study area formed part of the Medieval township of Llecheiddior, but when the parishes were formed in the 12th century, it was became an outlying part of Llanfihangel y Pennant, possibly because the priory of Beddgelert had land in the township (probably based around Pant Ddreiniog and Bwlch Gwyn) and served that parish. The *clas* at Clynnog also had land in the

township, including and encompassing the study area, and it is possible that the grantor of the land of Llecheiddior was Hywel Dda, the 10th century law-giver. The Extent of 1352 states that Llecheiddior contained some free land and one *gafael* of bond land in the tenure of *tirwelyaug* called Gafael Tegerin. The heirs of Gafael Tegerin were by then one single family and the holding had been divided between two sons, allowing the partition of the land by *cyfran*.

Gresham suggests that the free land belonging to Clynnog Fawr (including and encompassing the study area) were sold off in the second half of the 15th century. Morris Williams who owned Llecheiddior Uchaf in 1662 was a direct descendant of the Tegerin from whom the *gafael* took its name, and a distant cousin of the then owners of Llecheiddior Ganol. He was the last of the family of whom anything is known (Gresham 200-209).

Post-Medieval and Modern (1750-present day)

The mid-18th century to the present day has seen the development of agriculture and transport in the immediate environs of the study area, and the development of Bryncir into a small village. By 1798 Lord Newborough of Glynllifon was the owner of Llecheiddior Uchaf, and hence of the study area, with adjacent lands being owned by various other local estates – Gwynfryn to the south, and Trefan to the north-east (Gresham 209-11). A map of the farm dated 1790 confirms that it was tenanted by Morris Shone Ellis, and shows a field-scape recognisable in the modern landscape (NLW: ms Maps 97, p. 43).

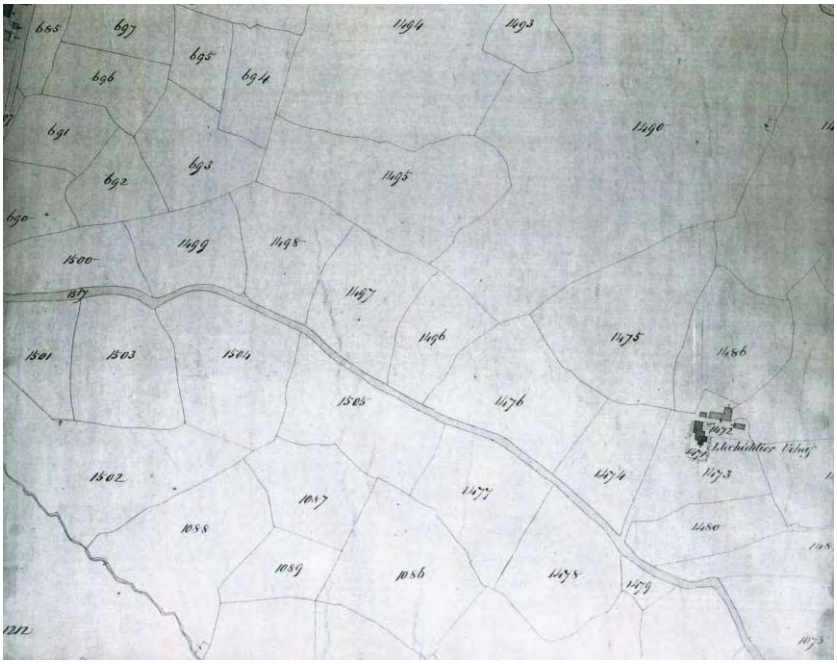
Map 1 NLW: ms Maps 97, p. 43

The schedule is as set out below:

1	House, garden, fold etc.		/
2	Llainfain		Meadow
3	Cae Syrens		Meadow
4	(blank)		Sandy Arable
5	Pant Mawr		Sharp Arable
6	Cae Garreg		Gravelly Arable
7	Cae Briwnt		Gravelly Pasture

8	(blank)		Sharp Pasture
9	(blank)		Sound Pasture
10	(blank)		Sound Pasture
11	(blank)		Rough Pasture part Boggy
12	(blank)		Cool Arable
13	(blank)		Cool Arable
14	(blank)		Sound Arable
15	(blank)		Sound Arable
16	Pant Ysgubor		Sharp Arable
17	Cae Tan y Gorland (sic)		Gravelly Arable
18	(blank)		Sound Pasture
19	(blank)		Meadow
20	(blank)		Meadow
21	Grove Issa		Cool Rough Pasture
22	Grove Issa		Coarse Pasture
23	Cae Gorse (sic)		Pasture
24	Gorse Issa		Meadow
25	Gorse Issa		Meadow
26	Gorse Issa		Coarse wet Pasture
27	(blank)		Meadow
28	(blank)		Meadow
29	Cae Lloia		Sharp Gravelly Arable
30	Cae Ysgufyrnog		Sharp Dry Arable
31	Bryn Mawr		Sound Arable
32	Cae Fron		Sound Pasture
33	Caer Wain		Sound Pasture
34	Cae Rallt		Arable

The tithe map of 1841, prepared by James Spooner and sons, shows a similar field-scape.



Map 2 Tithe map for Llanfihangel y Pennant from CRO

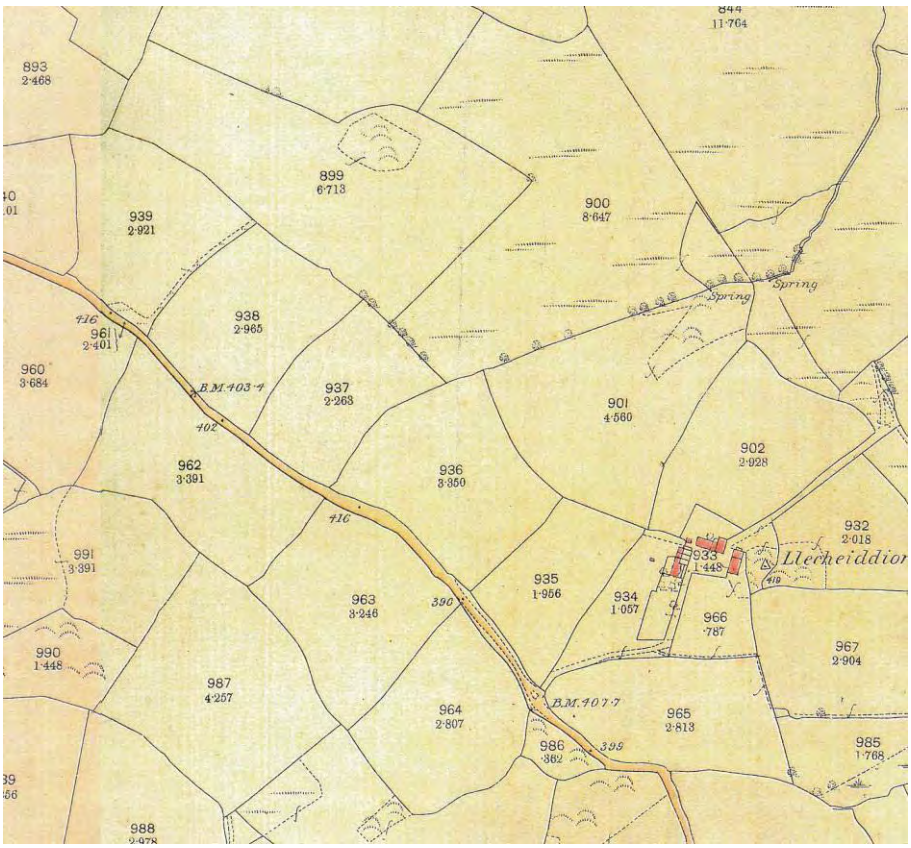
The schedule identifies field names thus:

Number	Holding	Owner	Occuper	Name	Use
1495	Llecheiddior Uchaf	Newborough	Maurice Wms	Cae Rodyn	
1494	Llecheiddior Uchaf	Newborough	Maurice Wms	Weirglodd Uchaf	
1496	Llecheiddior Uchaf	Newborough	Maurice Wms	Cae Main Bach	
1497	Llecheiddior Uchaf	Newborough	Maurice Wms	Pant Ysgubor	
1498	Llecheiddior Uchaf	Newborough	Maurice Wms	Cae Fawnog	
1499	Llecheiddior Uchaf	Newborough	Maurice Wms	Cae Crwn	
1493	Llecheiddior Uchaf	Newborough	Maurice Wms	Cae Ffridd Goch	
1492	Llecheiddior Uchaf	Newborough	Maurice Wms	Gaernon	
1490	Llecheiddior Uchaf	Newborough	Maurice Wms	Weirglodd Fawr	
1487	Llecheiddior Uchaf	Newborough	Maurice Wms	Gorse (sic) Ceffylau	
1486	Llecheiddior Uchaf	Newborough	Maurice Wms	Bryn Mawr ?Main	
1485	Llecheiddior Uchaf	Newborough	Maurice Wms	Cae Gorse (sic)	
1489	Llecheiddior Uchaf	Newborough	Maurice Wms	Weirglodd Newydd Uchaf	
1484	Llecheiddior Uchaf	Newborough	Maurice Wms	Gorse (sic) Llyn	
1482	Llecheiddior Uchaf	Newborough	Maurice Wms	Llain Wndwn	
1481	Llecheiddior Uchaf	Newborough	Maurice Wms	Cae Lloiau	
1480	Llecheiddior Uchaf	Newborough	Maurice Wms	Cae Tirion	
1479	Llecheiddior Uchaf	Newborough	Maurice Wms	Bachel y Kel (sic)	
1478	Llecheiddior Uchaf	Newborough	Maurice Wms	Pant Mawr	
1477	Llecheiddior Uchaf	Newborough	Maurice Wms	Cae Garrog	
1476	Llecheiddior Uchaf	Newborough	Maurice Wms	Cae Main Mawr	
1084	Llecheiddior Ganol	Nanney	Maurice Wms	Cae Rallt	
1085	Llecheiddior Ganol	Nanney	Edward Jones	Cae Rallt	
1083	Llecheiddior Ganol	Nanney	Edward Jones	?	
1082	Llecheiddior Ganol	Nanney	Edward Jones	Cae ?Mawr	
1076	Llecheiddior Ganol	Nanney	Edward Jones	Fawnog	
1077	Llecheiddior Ganol	Nanney	Edward Jones	Yr Ynys	
1079	Llecheiddior Ganol	Nanney	Edward Jones	Cae Garreg Isaf	
1080	Llecheiddior Ganol	Nanney	Edward Jones	Cae Garreg Uchaf	
1081	Llecheiddior Ganol	Nanney	Edward Jones	Illegible	
1078	Llecheiddior Ganol	Nanney	Edward Jones	Weirglodd Isaf	

Later maps are the 25" ordnance surveys of 1888 and 1919

The creation of a new turnpike route through Glan Dwyfach, replacing an earlier road through Garndolbenmaen, in the 1820s, and the building of the railway from Caernarfon to Afonwen in the 1860s prompted the growth of the village of Bryncir. Its one place of worship, Capel Soar, dates from the 19th century, as does the Brynkir Arms public house. A cattle mart was brought into being as the most convenient point of access to the main line railway network for farms in northern Eifionydd, and this survived the closure of the railway under the Beeching axe in 1968.

In 1919 Llecheiddior Uchaf was sold on behalf of the Newborough estate, reflecting the challenges faced by the major landowners in the uncertain economic climate of the late 19th and early 20th centuries and the problems posed by the war of 1914-1918.

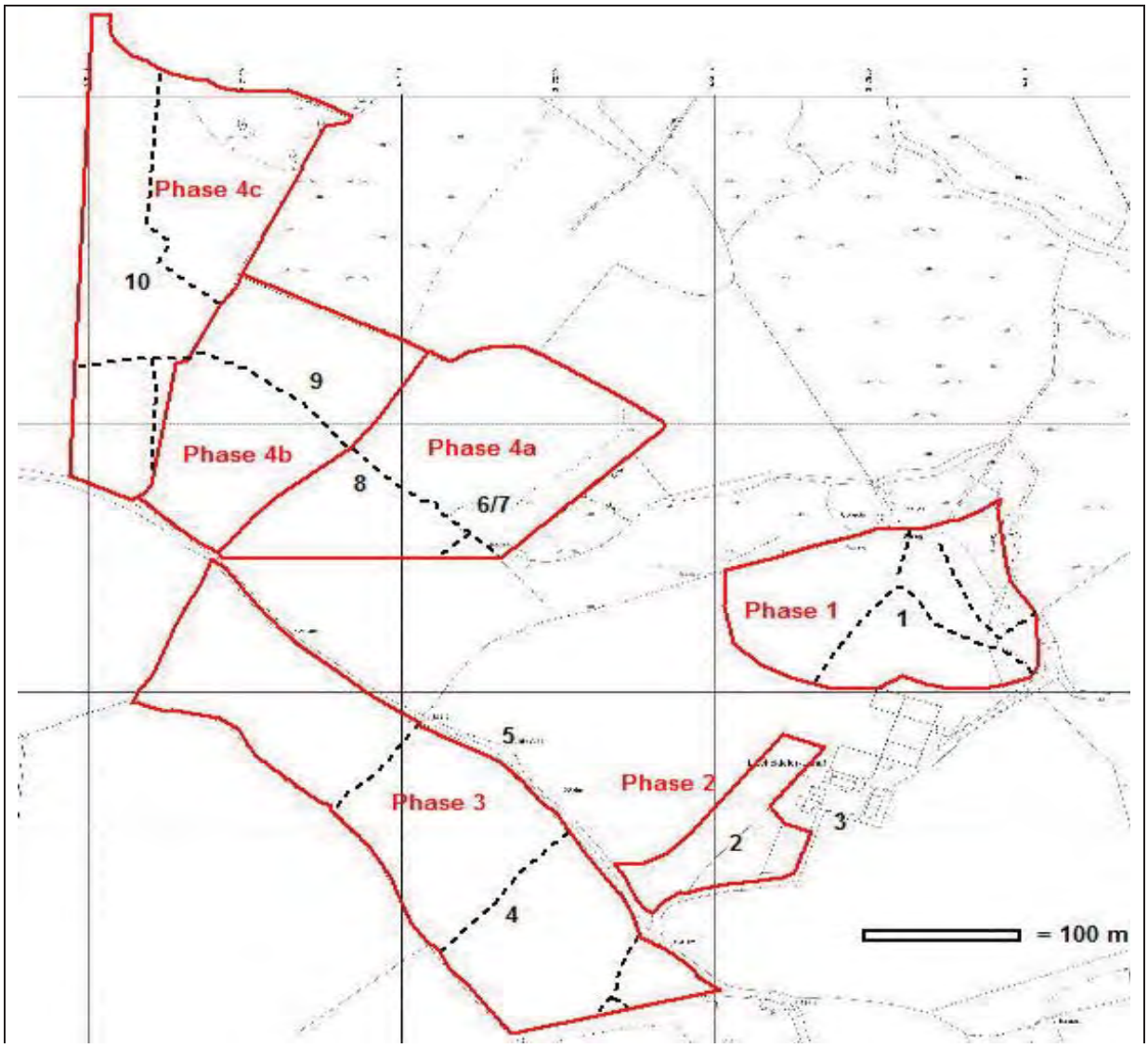


Map 3 25” ordnance survey of 1888

Map 4 25” ordnance survey of 1919

STATEMENT OF RESULTS OF FIELD-WORK

The site was visited on 29 October 2011. Conditions were good for field-work. Features were identified and located on a map (below), and selected features were photographed using a digital camera.



Map 5 Map of study area - copyright Geoperspectives

Phase 1

1 Field-boundaries

Location: SH 4753 4456 C
Period: Post-Medieval
Description: Field walls identified on maps up to 1918 but now removed
Significance: This feature is considered a Category D site
Threat: Removal by quarrying
Mitigation: None

Phase 2

2 Sand-pit

Location: SH 4739 4439 C
Period: Post-Medieval
Description: Existing quarrying from the 1960s-1970s has altered the appearance of this field, which preserves an obvious shelf to the south-east, reflecting the extent of removal.
Significance: This feature is considered a Category C site
Threat: Removal by quarrying
Mitigation: Level 1 recording

3 Road
Location: SH 4739 4435 C
Period: Post-Medieval
Description: A road giving access from the lane to the farm-house
Significance: This feature is considered a Category C site
Threat: Dame by quarry traffic
Mitigation: Level 1 recording

Phase 3

4 Field-boundaries
Location: SH 4722 4441 C
Period: Post-Medieval
Description: Cloddiau, the height of which is exaggerated by quarrying and subsequent landscaping to the south-west of the Phase 3 area.
Significance: This feature is considered a Category C site
Threat: Removal by quarrying
Mitigation: Level 1 recording

5 Road
Location: SH 4727 4445 C
Period: Medieval
Description: A laneway of possible Medieval origin connecting Cennin to the north of the study area with Glan Dwyfach to the south.
Significance: This feature is considered a Category B site
Threat: Disturbance by quarry traffic
Mitigation: Level 1 recording

Phase 4a

6 Building
Location: SH 4725 4469 (approx)
Period: Post-Medieval
Description: A structure identified on the 1790 map, possibly identical with **7** below
Significance: This feature is considered a Category E site
Threat: Removal by quarrying
Mitigation: Further investigation is required to develop a strategy for buried features; geophysical survey is likely to form this first stage of this process.

7 Kiln
Location: SH 4725 4469 (approx)
Period: Post-Medieval
Description: A site only identified by the field name Cae Rodyn (? Cae'r odyn) on the tithe

Significance: This feature is considered a Category E site
Threat: Removal by quarrying
Mitigation: Further investigation is required to develop a strategy for buried features; geophysical survey is likely to form this first stage of this process.

8 Field-boundaries
Location: SH 4725 4469 C
Period: Post-Medieval
Description: Part-surviving *cloddiau* around the area
Significance: This feature is considered a Category C site
Threat: Removal by quarrying
Mitigation: Level 1 recording

Phase 4b

9 Field-boundaries
Location: SH 4712 4472 C
Period: Post-Medieval
Description: Part-surviving *cloddiau* around the area
Significance: This feature is considered a Category C site
Threat: Removal by quarrying
Mitigation: Level 1 recording

Phase 4c

10 Field-boundaries
Location: SH 4704 4479 C
Period: Post-Medieval
Description: Part-surviving *cloddiau* around the area
Significance: This feature is considered a Category C site
Threat: Removal by quarrying
Mitigation: Level 1 recording

11 Buried features
Location: Unknown
Period: Prehistoric-Industrial and Modern
Description: Potential sites and feature only
Significance: These potential sites and features are considered a Category E site
Threat: Removal by quarrying
Mitigation: Further investigation is required to develop a strategy for buried features; geophysical survey is likely to form this first stage of this process.

CONCLUSIONS

The study area has been significantly altered by sand-extraction in the 1960s-1970s. This has affected the context of the only evident features that will be directly affected by the resumption of quarrying, namely the post-Medieval field boundaries. It is noted that these are significant at level C) in their own right, but in that their immediate vicinity will not have been ploughed, they have significant archaeological potential. These areas should be considered as part of feature **11**.

It is therefore noted that the area is potentially rich in buried features, particularly from Prehistory, exemplified by the discovery of Bronze Age artefacts and sites within the vicinity of the study area.

PROJECT ARCHIVE

Copies of the present document will be provided to the client and to Mark Roberts, Planning and Environmental Consultant of Colwyn Bay, and lodged with the HER and with the NMR.

BIBLIOGRAPHY

Published sources

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Unpublished sources

Hopewell D: *Roman Fort Environs 2002-2008* (Gwynedd Archaeological Trust Report G1632 [Report 479)

Archival holdings

Caernarfon Record Office

Tithe map and schedule for parish of Llanfihangel y Pennant
XSC/1004: Sale catalogue for Llecheiddior farm 1919
1889 and 1918 25" ordnance survey maps

National Library of Wales

ms Maps 97
Bangor University
Llecheiddior collection

Existing archaeological records

NMR files

Appendix – photographic record

Photograph 1 View from 7 looking east; Phase 2 area and feature 2 to the right

Photograph 2 Feature 7 – laneway, looking north

Photograph 3 Clawdd and gate (4), looking east from 7 into proposed Phase 3

Photograph 4 Cloddiau and field boundaries from 7 looking east; proposed Phase 1 to right

Photograph 5 Clawdd with Phase 4A in middle distance

Photograph 6 Cloddiau, recent boundaries and gate; access to proposed Phase 4C; proposed 4C to right

Photograph 7 Cloddiau (feature 4) on Phase 3, looking south3

Photograph 8 Clawdd (feature 4) on periphery of proposed Phase 3 area (to left of clawdd), showing exaggerated effect of quarrying to right of feature; looking south

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Gwynedd Archaeological Trust
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