Proposed Sand and Gravel Quarry at Llecheiddior Uchaf, Bryncir

Archaeological Evaluation: Trial Trenching - Interim Report

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

Proposed Sand and Gravel Quarry Llecheiddior Uchaf, Bryncir, Gwynedd

Archaeological Evaluation: Trial Trenching - Interim Report

Project No. G2272

Report No. 1115

Prepared for: Mr John Ceri Evans

March 2013

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PROPOSED SAND AND GRAVEL QUARRY AT LLECHEIDDIOR UCHAF: ARCHAEOLOGICAL EVALUATION: TRIAL TRENCHING

Prepared for Mr John Ceri Evans, March 2013

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PROPOSED SAND AND GRAVEL QUARRY AT LLECHEIDDIOR UCHAF: ARCHAEOLOGICAL EVALUATION: TRIAL TRENCHING

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Summary

As part of a programme of archaeological evaluation Gwynedd Archaeological Trust (GAT) excavated eight evaluation trenches at the location of a proposed sand and gravel quarry at Llecheiddior Uchaf, Bryncir, Gwynedd. The trenches were located to specifically target features identified in a magnetometer geophysical survey conducted by GAT in an earlier phase of the evaluation. All trenches were located in open fields which have been proposed for quarrying.

The magnetometer survey identified numerous anomalies, most of which were interpreted as field boundaries and associated agricultural features. Trenching confirmed the presence and interpretation of three of these features, all of which were uncomplicated and shallow.

The feature which appeared to be of greatest archaeological significance was a small open ended square enclosure which was interpreted as a possible Roman barrow or early medieval mortuary enclosure. Excavation demonstrated that no grave was present in the interior of the feature and that the enclosure itself was fairly irregular, thus discounting the original interpretation. No artefacts were recovered but soil samples collected may provide evidence for date and function.

The trial trenching showed that the geophysical survey was successful in identifying substantial linear features, but also showed that the underlying geology produced anomalies, it is likely that discreet archaeological features remain unidentified.

It is recommended that soil samples collected are processed by floatation and suitable material radiocarbon dated to aid interpretation and inform further work.

As the quarrying operation expands into Phases 3 and 4a,b and c it is recommended that programmes of controlled stripping and intermittent watching briefs are implemented to evaluate and record known and unknown archaeology.

1.0 INTRODUCTION

Gwynedd Archaeological Trust was commissioned by Mr John Ceri Evans to undertake a programme of evaluation trenching at the site of a proposed sand and gravel quarry at Llecheiddior Uchaf, Bryncir (centred on NGR **SH 47514445**) 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.

The trial trenching programme involved the excavation of eight trenches located to target anomalies identified in a geophysical magnetometer survey undertaken as part of the staged evaluation (GAT Report 1074, see Appendix II). All trenches were located in the plots earmarked for Phase 03 and Phases 4a, b and c, trenching was not deemed necessary in Phases 1 and 2 as both areas had been subject to quarrying in the mid to late 20th century.

1.1 Specification and Project Design

The current evaluation programme (trial trenching) is the second stage of a programme of archaeological evaluation; preceded by a geophysical magnetometer survey of targeted areas, which was completed in September 2012 by GAT on behalf of Mark Roberts, Planning and Environmental Consultant (GAT Report 1074, see Appendix II). The geophysical survey evaluated a total of 11.75ha which included virtually the entire areas occupied by Phases 3, 4a, 4b and 4c, sample areas were also surveyed in Phases 1 and 2 which are considered to have low archaeological potential.

The trial trenches were used to test the geophysical results and establish the depth of archaeological features below the present surface. Trenching allowed for the assessment of the age and condition of features but was not intended as a method of fully characterising the archaeology of the area.

The aim of the current phase of evaluation was to establish the archaeological significance of the targeted features, to assess the impact of the development proposals

and to help inform future decision making and further archaeological evaluation and/or archaeological mitigation strategies.

Although a mitigation brief was not produced all stages of the work was monitored by Gwynedd Archaeological Planning Services (GAPS) who provided comment and feedback to all parties and approved all design documents.

This document reports on the preliminary results of the evaluation trenching, assesses those results and proposes further analysis necessary to allow the results to be adequately understood and reported to accepted standards. It conforms to the guidelines specified in the *IFA Standard and Guidance for Archaeological Evaluation* (Institute for Archaeologists, 1994, rev. 2001 & 2008).

2.0 ARCHAEOLOGICAL BACKGROUND

2.1 Archaeological Assessment

Govannon Consultancy completed an archaeological assessment of the proposed quarry areas in October 2011 (Report **281**, see Appendix III). 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. 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.

2.2 Archaeological Evaluation: Geophysical Survey

GAT completed a geophysical magnetometer survey of the four Phase areas in September 2012 (GAT Report 1074, see Appendix II). The survey was completed 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 survey was conducted using a *Bartington Grad 601-2 Dual Sensor fluxgate gradiometer* and carried out at standard resolution (1.0m traverse interval x 0.5 or 0.25m sample interval).

The geophysical survey targeted Phases 03 and 04 a, 04b and 04c in their entirety (Figure 01). Due to the previous quarry workings within the Phase 01 and 02 areas, the geophysical survey only targeted those areas that appeared not to have been disturbed by previous quarrying (based on previous information received).

The geophysical survey produced clear results with low levels of natural background noise and geological responses. It should however be stressed that, as with all geophysical surveys, it cannot be guaranteed that all archaeological features were detected.

The survey principally revealed a series of field boundaries that predate the earliest map evidence (1790). These formed 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. As the geophysical survey results show only the shape and magnetic strength of features, it was recommended in the report that the form, phasing, dating and level of survival of the boundaries should be investigated by a series of trial trenches as the next stage strategy.

Five additional discrete features were identified that could be potentially of regional or national archaeological importance. These comprised:

- two possible Bronze Age burnt mounds
- a possible prehistoric enclosure
- a possible Roman or medieval square barrow
- a possible prehistoric round barrow.

In all cases geophysical evidence is insufficient to provide a definite interpretation on its own and in all cases it is possible that anomalies are caused by more recent or non-archaeological factors, physical investigation was therefore recommended to allow definite interpretation and investigation of these features via trial trenching.

3.0 METHODOLOGY

3.1 Trench Locations

All trench locations were informed by the geophysical magnetometer survey (GAT Report 1074, Appendix II), for the location of individual trenches see figure 01.

Eight trenches were proposed, all of which were located in the Phase 3, 4a, 4b and 4c areas, each targeting specific anomalies from the magnetometer survey. One trench (Trench 4) was extended in order to gain better understanding of the features within.

3.1.1 Phase 3

Two trenches were located within the Phase 3 area.

Trench 1 measured 20m x 2m, orientated NNE – SSW, and was located to investigate feature 19 which was interpreted as being either an area of natural variation, dumped material or possible Bronze Age burnt mound.

Trench 7 measured 10m x 2m, orientated E – W, and was located to investigate feature 8 which was interpreted as either a pre 1790 field boundary or a modern service or drainage trench.

3.1.2 Phase 4a

Two trenches were located within the Phase 4a area.

Trench 5 measured 20m x 2m, orientated NE – SW, and was located to investigate feature 47 which was interpreted as a roughly circular anomaly, possibly modern disturbance or a prehistoric barrow.

Trench 6 measured 20m x 2m, orientated NNW – SSE, and was located to investigate feature 54 which were unknown anomalies located at or near the top of a natural mound.

3.1.3 Phase 4b

Two trenches were located within the Phase 4b area.

Trench 2 measured 20m x 2m, orientated NNW – SSE, and was located to investigate feature 35 which was interpreted a roughly circular anomaly, possibly an infilled hollow or plough damaged prehistoric settlement or enclosure.

Trench 3 measured 20m x 2m, orientated E – W, and was located to investigate feature 42 which was interpreted as either geological or a possible Bronze Age burnt mound.

3.1.4 Phase 4c

Two trenches were located within the Phase 4c area.

Trench 4 measured 5m x 4m, orientated N – S, and was located to investigate feature 31, a small square or rectangular anomaly. The feature was interpreted as either a barrow or medieval mortuary enclosure, or a modern feature or chance occurrence.

Trench 8 measured 10m x 2m, orientated ENE – WSW, and was located to investigate feature 28 which was interpreted as a former field boundary predating 1790 map evidence.

3.2 Specific Methodology

All trenches were opened with a 13 tonne 360˚ tracked excavator fitted with a toothless bucket, which gradually removed deposits in spits under constant archaeological control down to the level of the undisturbed glacial deposits. Where features were identified at a higher level these were left in place to be investigated by hand. Where the nature of the glacial deposits was not clear the excavator dug slightly into these to confirm their natural origin.

All trenches were hand cleaned sufficiently to photographically record the natural deposits and to check for any subtle features. Where significant archaeological deposits and features were identified these were manually cleaned, excavated and recorded to determine extent, function, date and relationship to adjacent features. Ditches and other linear features were investigated by excavating a single slot, if deemed necessary additional slots were excavated to further assess their character.

All finds were collected and where features or layers contained charcoal bulk soil samples were taken up to 20 litres of soil, depending on the size of the feature.

All trenches were planned, either using a Trimble R6 GNSS GPS or by hand at a scale of 1:50, and appropriate sections were drawn by hand, generally at a scale of 1:10.

A written record of the trenches and all identified features was completed on GAT pro-formas. Each trench and any significant features were recorded photographically, using a digital SLR camera set to maximum resolution.

The trenching was undertaken between the 19th of February and the 5th of March 2013 with backfilling of the trenches completed on the 6th of March 2013.

4.0 RESULTS

4.1 Quantification of Records, Finds and Samples

This section itemises the field records produced and the artefacts and ecofacts recovered.

Table 1: Total site records

Trench sheets	8 sheets
Day record sheets	9 sheets
Drawing sheet register	1 sheet
Drawing register	1 sheet
Find register	1 sheet
Environmental sample register	1 sheet
Plan and section drawings	8 drawings on 2 sheets
Digital survey plans	3 files
Digital photographs	71 shots

Table 2: Environmental samples and finds

Material	**No of items**
Bulk soil samples	3 samples (5 x 10 litre tubs)
Post medieval pot	4 pieces

4.2 Fieldwork Results

For detailed information on trenches and identified deposits see Appendix I.

4.2.1 Phase 3

4.2.1.1 Trench 1

NGR SH47294432

Trench 1 was located to investigate anomalies which were interpreted as either dumped material, natural variation or a Bronze Age burnt mound.

Upon opening the trench it was apparent that the natural glacial deposits were distinctly different than in all other trenches. Instead of clean sand and gravels the natural consisted of alternating bands of silt rich sand and deposits of mid to large cobble sized stones.

The only archaeological feature within the trench was a fairly amorphous, but steep sided, pit containing a large quantity of angular stone *(Plate 01)*. The southern end of the pit was excavated in order to evaluate the feature, this produced three sherds of post-medieval Buckley ware pottery, confirming its date. Due to the presence of angular

stones within the feature, along with the discovery of a portion of blasted stone in close proximity, it is believed that the feature is likely to be a stone-hole, the stone itself having been removed in an episode of land improvement. Land improvement was also evident in the thickness of soil in the area, which was much greater than in other parts of the site.

4.2.1.2 Trench 7

NGR SH47234436

Trench 7 was located to investigate a linear anomaly which did not correspond to any features seen in map evidence, believed to either be a pre 1790 field boundary or a modern service or drainage ditch.

The first feature identified in the trench was a geological trial hole which was not obvious on the magnetometer survey results. This appeared as a well defined rectangle of clean sand. The targeted feature was also identified in the western end of the trench. The linear was cleaned and photographed before a slot was excavated, revealing it to be a fairly wide and shallow 'V' profile ditch *(Plate 09)*. Two fairly large fragments of post-medieval Buckley ware pottery were recovered from the feature, one of which was within the northern section. The feature was slightly overcut during excavation due to animal burrows causing some confusion.

There is little doubt that the feature does represent a former field boundary ditch, although the presence of the Buckley ware, which appears to be 19th century in date, seems to suggest it may have been in use later than 1790.

4.2.2 Phase 4a

4.2.2.1 Trench 5

NGR SH47194469

Trench 5 was located to investigate a roughly circular anomaly which was interpreted as either an area of modern disturbance or a prehistoric barrow which could be of national or regional importance.

Natural gravels were encountered almost as soon as the trench was opened at its south-western limit, these sloped fairly steeply before being replaced by fairly fine sand which was covered by a layer of colluvium which appeared to be filling a natural hollow.

No archaeology was seen during the excavation of the trench but whilst cleaning the trench for photographing a number of layers, some showing signs of burning, were observed in the north-western facing section *(Plate 08)*. The section was cleaned, photographed and drawn at a scale of 1:20. A bulk soil sample was taken from the main deposit which was a mottled, light grey, clay rich silt containing some charcoal. It appeared that burrowing or root action may have had an impact on the deposit as patches of similar material and charcoal flecks could be seen in the colluvium below. No artefacts were recovered from or near the feature, it may be a possible to obtain a radiocarbon date if suitable material is recovered from the soil sample.

4.2.2.2 Trench 6
NGR SH47264472

Trench 6 was located to investigate anomalies which were on, or close to, the top of a prominent natural mound.

Excavation showed the soils to be very thin with the natural gravel generally being encountered at a depth of 0.2m – 0.3m. No archaeology was observed within the trench and very little variation could be seen in the natural gravel although it appears likely that the anomalies were the result of geological variation.

4.2.3 Phase 4b

4.2.3.1 Trench 2

NGR SH47064466

Trench 2 was located to investigate a roughly circular anomaly which was interpreted as either an area of quarrying, infilled hollow or a plough damaged prehistoric enclosure or settlement which would potentially be of regional or national importance.

Whilst locating the position of the trench it became evident that the area was very wet, with a shallow pond apparently corresponding with the interior of the circular anomaly. The natural sand was identified at a depth of 0.4m at the southern end of the trench, a layer of iron panning, which was later slotted by hand, was identified towards the centre of the trench. Excavation showed that the iron panning was sitting on a layer of mottled sandy silt which could possibly have been intentionally deposited in a shallow scoop but is more likely to be the result of natural silting. A deeper hollow was evident in the northern half of the trench which appeared to have silted up before being covered by a layer of topsoil, possibly indicating intentional infilling. Due to the rapid ingress of water into the trench it was not excavated to its full length of 20m, instead being abandoned at 18.5m *(Plate 02)*.

No definite archaeological activity was identified within the trench and the results of the trenching appear to confirm that the anomaly identified by the magnetometer survey was an infilled hollow which appears to have mainly silted naturally with some material being deposited over the site, probably during a recent episode of land improvement.

4.2.3.2 Trench 3

NGR SH47094474

Trench 3 was located to investigate an anomaly interpreted as either a possible geological variation or a Bronze Age burnt mound which could potentially be of regional importance.

Excavation of the trench did not reveal any evidence of archaeological activity. The underlying natural was shown to consist of sandy gravel with patches of clean sand, it is

likely that the anomaly identified by the magnetometer survey was caused by magnetic variation in the geology.

4.2.4 Phase 4c

4.2.4.1 Trench 4
See Figures 02, 02a, 02b, 02c
And Plates 03,04,05,06 and 07

NGR SH47074486

Trench 4 was located to investigate a small square or rectangular anomaly which was interpreted as either a barrow or medieval mortuary enclosure which would be of national or regional importance, or a chance occurrence or modern feature.
Initially a trench measuring 4m x 5m was located over the south eastern corner of the anomaly. During excavation it was clear that the area had been under plough as scars running roughly N – S were clearly visible in the interface between the topsoil and natural. The feature was clearly visible in the clean sand natural as a dark linear heading south-east – north-west for 4m before curving, almost at a right angle, to the north-east for 4m.

A slot was excavated across the south-east side of the feature in order to assess its character. It appeared that the linear was a well defined ditch measuring 0.78m wide and 0.5m deep which contained a number of fairly large sub rounded stones, one of which was quartz (Figure 02a). The north-east facing section of the slot was photographed and drawn at a scale of 1:10.

As requested by GAPS the trench was extended, to a size of 11m x 11m, to encompass the entire feature in order to gain better understanding of its the date, character and function. Once fully revealed it was clear that no grave or any other internal features were present, the only exception being an obvious animal burrow.

The northern portion of the feature appeared narrower, fairly irregular and on the whole less convincing as an archaeological feature than the south. Excavation of a slot across the terminus of the north-west side seemed to confirm that the feature was fairly amorphous and much shallower than in the first slot and it was also clear that no stones were present (Figure 02b). The section was photographed and drawn at a scale of 1:10, a bulk soil sample was collected in order to retrieve material for radiocarbon dating and macroscopic artefacts which may provide evidence of function.

Further cleaning showed that there was a gap in the north-eastern side of the feature suggesting that the south and north portions were in fact separate features, although it appeared likely that they were both related.

The terminus of the southern portion on the north-eastern side was excavated to assess its character. Again this appeared dramatically different to the profile seen in the first slot, being shallow and containing no stones. At the request of GAPS a fourth slot was excavated across the southern portion of the feature on the north-eastern side, this was intended to assess the character and to collect soil samples which could provide material suitable for radiocarbon dating. The feature was again shown to be shallow,

fairly irregular and damaged by burrowing animals (Figure 02c). The northern facing section was photographed and drawn at a scale of 1:10.

A slot was also excavated across a former boundary ditch which was located in the north-west corner of the trench. Although shallow the ditch was fairly well defined and was fairly steeply cut on the south-eastern edge, the north-western edge fairly shallow and gradual. No artefacts were noted within the fill and as no charcoal was present a soil sample was not collected. Despite the ditch being in fairly close proximity to the targeted feature there was no physical relationship between both.

4.2.4.2 Trench 8

NGR SH47034479

Trench 8 was located to investigate a linear anomaly which was interpreted as a former field boundary which must be earlier than 1790 in date as it predates map evidence.

The linear was clearly visible in the sand and gravel natural and the excavation of a slot across it showed that it had definite edges filled by a fairly homogenous fill of clay rich silt with signs of iron panning against the cut *(Plate 10)*. No artefacts were recovered during excavation and as no charcoal was observed soil samples were not collected.

The section of the ditch was photographed and drawn at a scale of 1:20, the trench was planned at a scale of 1:50.

5.0 SUMMARY AND CONCLUSIONS

The eight trenches excavated represent less than 0.5% of the area proposed for quarrying but along with the geophysical survey have shown that archaeology is present at the site and that there is good potential for survival. The geophysical magnetometer survey showed evidence of a multi period agricultural landscape, elements of which were known in living memory, and others that predate all documentary evidence. By trenching it was possible to confirm most of the interpretations of the geophysical survey.

The majority of the archaeological features were simple ditches which were easily excavated and recorded although only one, in Trench 7, provided dating evidence. As the land is likely to have been utilised for agriculture for over 5 millennia it is possible that the date of the undocumented boundaries varies greatly and only through excavation could accurate chronology be determined.

Although no definite function can currently be suggested for the feature identified in Trench 4 it is fairly certain that it was intentionally dug but there clear evidence that it has been severely affected by burrowing animals. The soil samples collected may provide charred plant remains which could be suitable for radiocarbon dates, if a date is obtained it may aid interpretation. Small artefacts may also be retrieved from the soil samples which could help to determine function and date.

The geophysical survey and trial trenching have shown that it is unlikely, though not impossible, that there are any substantial settlements or buildings in the proposed development area.

6.0 RECOMMENDATIONS

Prior to the commencement of quarrying it is recommended that the three bulk soil samples collected from trenches in the areas occupied by Phases 4a and 4c are processed in order to retrieve material that may be suitable for radiocarbon dating. If suitable material is present it is recommended that two dates are obtained from each sample in order to accurately date each deposit, this could potentially require the submission of six samples for radiocarbon dating. The results from this work would inform the final trial trenching report which will build on the information in this document, the information may also inform future work at the site.

It is also recommended that further work is undertaken before and during quarrying operations at the site.

There is little doubt that the area has been a desirable location for agriculture and settlement since the Neolithic period. The relatively high and flat plateau at the edge of marshland to the north, which is occupied by Phases 4b and 4c, has probably been utilised since first being cleared. There is a wealth of evidence for activity in close vicinity to the area during the Bronze Age, including a sickle found at Plas Llecheiddior (SH47504370), a looped palstave from Pant y Gwylliaid (SH46464491), urnfield or round barrow at Llystyn Farm (SH47974490), pottery from Penllystyn (SH48104480), and the gold lunula found NE of Llecheiddior Uchaf (SH47724476), all of which were discovered within a kilometre of the proposed quarry. It is possible that evidence of Neolithic activity within the same area has thus far gone undetected in terms of artefacts and structures due to their subtle nature. Neolithic activity can however be seen in pollen sequences taken in the area at both Cefn Graianog and Cors Gyfelog, 5km and 4km to the north respectively. Both show that there is clear evidence for human interference with the natural vegetation at around 3225 BC – 3075 BC, suggesting an episode of land clearance and arable farming in the area (Mason & Farsham, 1998). During the Neolithic and early Bronze Age it is likely that the dwellings occupied by those residing in the area would be of timber construction, the remains of which may not be detectable on geophysical surveys. The same is true of pit groups and other ephemeral features which can seem unsubstantial but are rich in artefacts and environmental material.

In order to avoid the loss of features of this kind it would be recommended that a programme of controlled stripping is implemented as the quarry expands into areas which have the greatest archaeological potential. The soil depths recorded across the site were generally shallow which poses the risk of archaeology being affected by heavy vehicle traffic. Because of this the areas deemed to have high or known archaeological potential would need to be stripped under constant archaeological supervision before any wheeled vehicles such as dumpers enter these areas.

As certain areas have already been quarried to some degree, and others are likely to have less potential, this method would not need to be implemented across the entire site.

It is recommended that the entire area of Phase 4b and Phase 4c are subject to a programme of controlled stripping.

Controlled stripping is also recommended for the north-western end of Phase 3 and the northern portion of Phase 4a.

An intermittent watching brief is recommended in the areas of Phases 3 and 4a not covered by controlled stripping.

No further work is recommended in Phase 1 and Phase 2.

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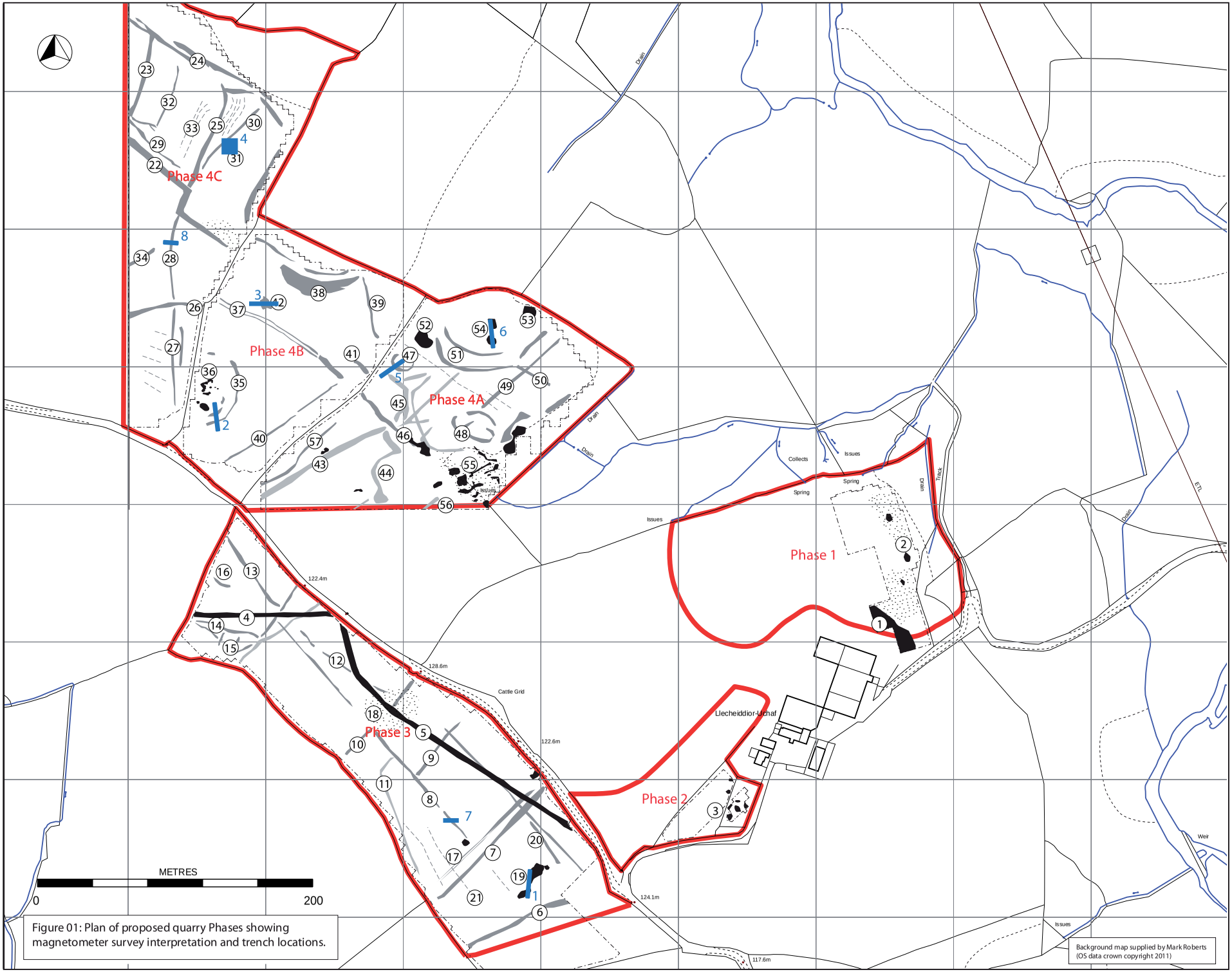


Figure 01: Plan of proposed quarry Phases showing magnetometer survey interpretation and trench locations.

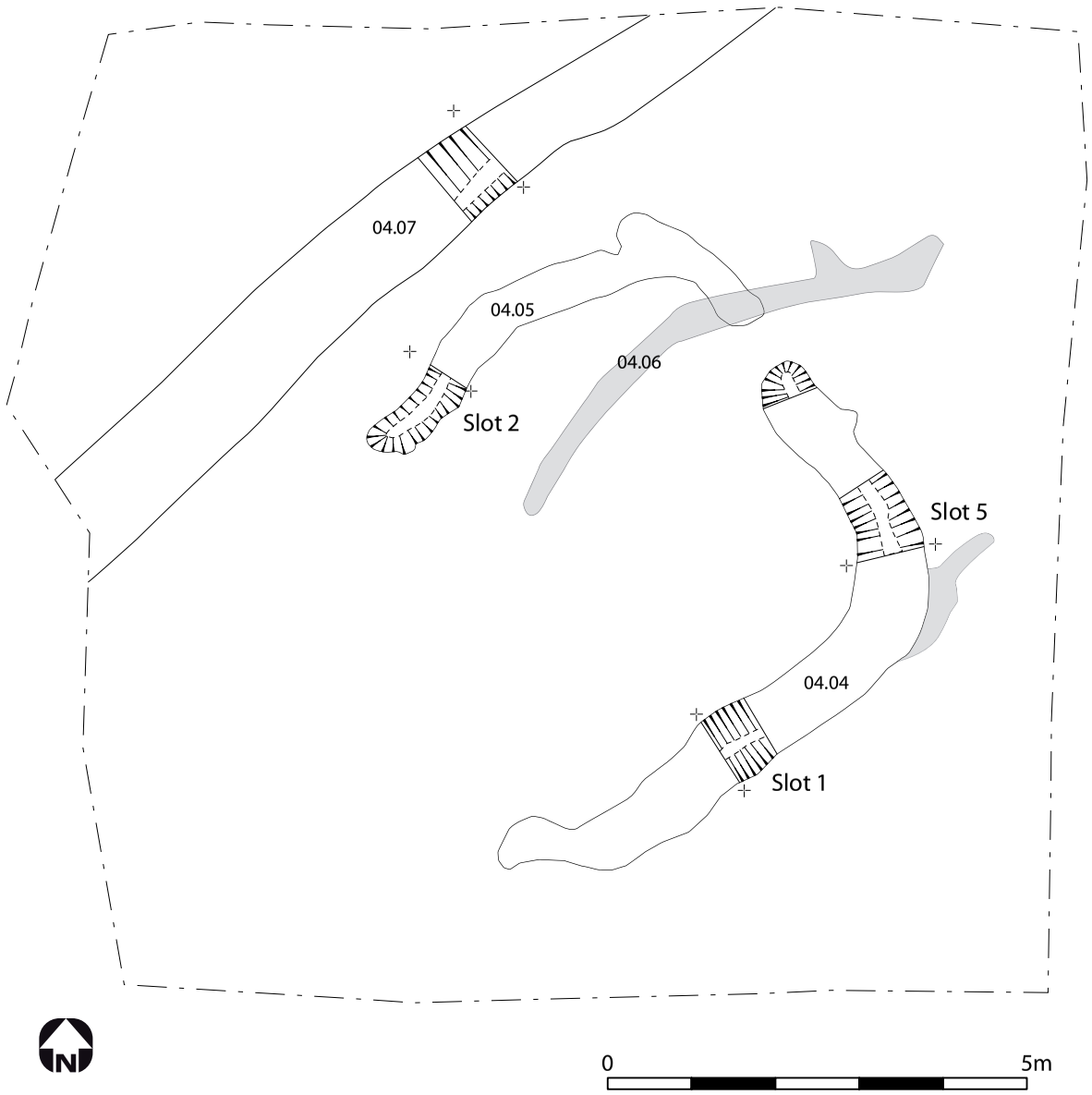


Figure 02: Plan of Trench 4 following extension showing all identified features

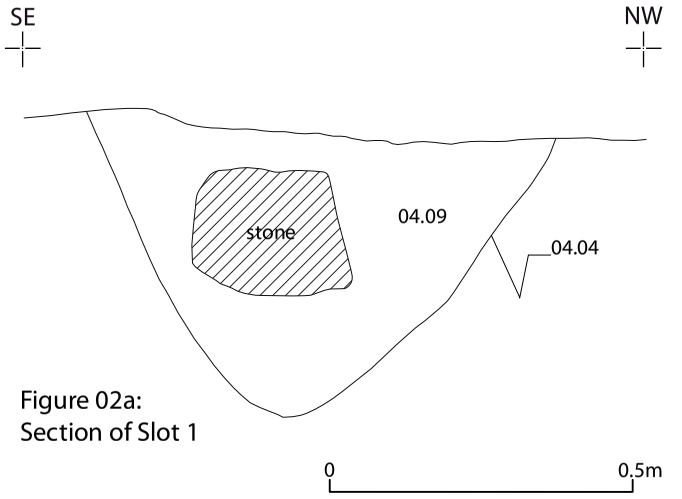


Figure 02a:
Section of Slot 1

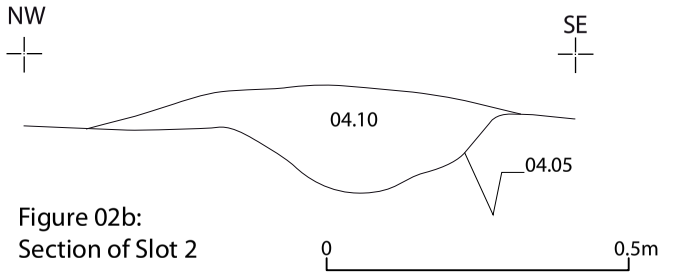


Figure 02b:
Section of Slot 2

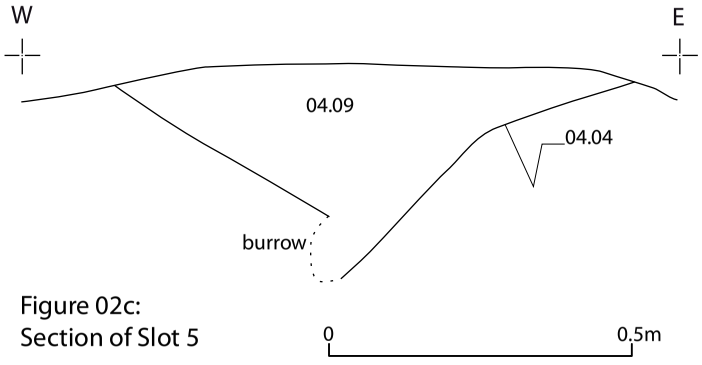


Figure 02c:
Section of Slot 5

Plate 01: Post medieval stone hole 01.04 in Trench 1, 1m scale, view from south

Plate 02: Post excavation shot of Trench 2 showing flooding, 1m scale, view from south

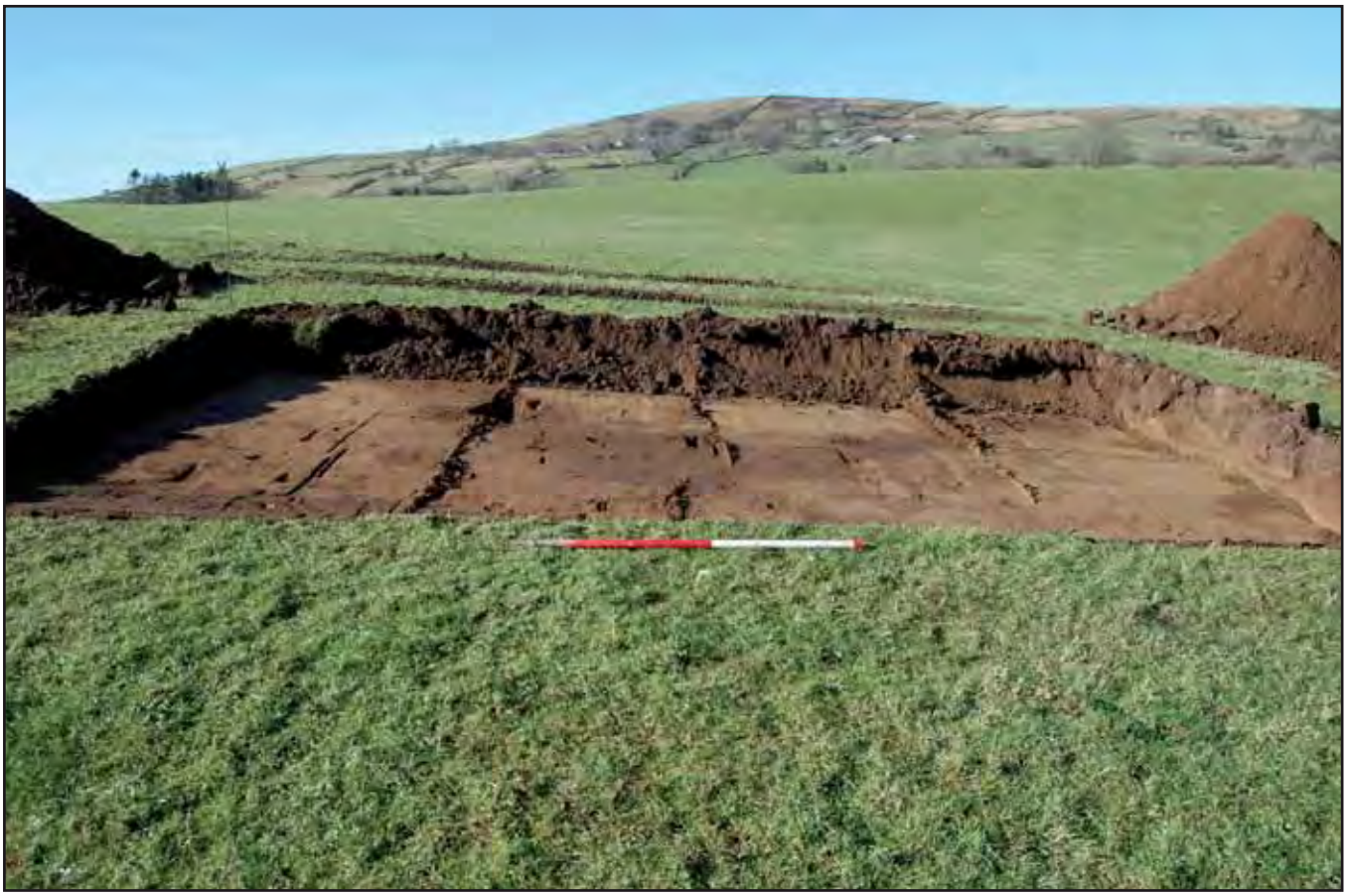


Plate 03: Trench 4 after opening, showing the corner of feature 04.04, 1m scale, view from south

Plate 04: Mid excavation shot of Slot 1 through 04.04 showing stones within fill, 1m scale, view from north-east

Plate 05: Section of Slot 1 through 04.04, Trench 4, 1m scale, view from north-east

Plate 06: General view of Trench 4 after extending, 1m scales, view from north-west

Plate 07: Section of Slot 2 through terminus of 04.05, Trench 4, 1m scale, view from south-west

Plate 08: Section of Trench 5 showing deposits and evidence of burning, 1m scale, view from north-west

Plate 09: Section of slot through ditch 07.05 in Trench 7, 1m scale, view from west

Plate 10: Section of slot through ditch 08.03 in Trench 8, 1m scale, view from north

Appendix I

Trench Details

Trench 1

Area: Phase 3
Size: 20m x 2m
Orientation: N-S
Max Depth: 0.5m

Located to investigate anomalies which were interpreted as being either natural geological variation, dumped material or a possible Bronze Age burnt mound. An irregular pit containing a large amount of angular stone was discovered in the trench, excavation showed that this was modern as sherds of Buckley ware pottery were present. A large fragment of drilled stone showed that blasting had taken place in the area, suggesting that the pit was a hole left by a blasted stone. Geological variation was also identified in the trench, explaining the geophysical anomalies.

Context No.	Depth below surface	Description
01.01	0	Topsoil, dark grey-brown sandy silt, some small stones
01.02	0.12m	Subsoil, dark brown-grey with slight yellow tinge, sandy silt with some pebble sized stones
01.03	0.4m	Natural, mid orange-grey silty sand with pockets of cobble/ large cobble sized stones
01.04		Modern pit, irregular shape with very steep sides, contained large amount of angular stone, three pieces of Buckley ware and coke retrieved, 2.6m x 1.3m, 0.6m deep
01.05	0.28m	Lower subsoil, light orange-yellow silty sand, moderate amount of stone

Trench 2

Area: Phase 4b
Size: 20m x 2m
Orientation: NNW-SSE
Max Depth: 1m

Located to investigate feature 35 which was interpreted a roughly circular anomaly, possibly an infilled hollow or plough damaged prehistoric settlement or enclosure. The feature was confirmed as a hollow which showed evidence of natural silting and possible intentional infilling.

Context No.	Depth below surface	Description
02.01	0	Topsoil, dark grey-brown sandy silt
02.02	0.24m	A possible dump of material filling a shallow scoop, mottled dark brown grey with iron panning and orange-yellow patches, sandy silt, 0.1m deep
02.03	0.4m	Natural, sandy gravel with patches of orange-yellow sand

Trench 3

Area: Phase 4b
Size: 20m x 2m
Orientation: E-W
Max Depth: 0.3m

Located to investigate feature 42 which was interpreted as either geological or a possible Bronze Age burnt mound. No archaeological features or significant geological variations were present in the trench.

Context No.	Depth below surface	Description
03.01	0	Topsoil, mid grey-brown coarse sandy silt
03.02	0.23m	Subsoil, light orange-yellow silty sand
03.03	0.33m	Natural, sandy gravel with patches of sand

Trench 4

Area: Phase 4c
Size: Initially 5m x 4m, extended to 11m x 11m
Orientation: N-S
Max Depth: 0.35m

Located to investigate feature 31, a small square or rectangular anomaly. The feature was interpreted as either a barrow or medieval mortuary enclosure, or a modern feature or chance occurrence. Excavation failed to provide datable artefacts but bulk soil samples were collected from 04.09 and 04.10, it is hoped that analysis of the samples will provide material suitable for radiocarbon dating which will aid interpretation.

Context No.	Depth below surface	Description
04.01	0	Topsoil, dark grey-brown sandy silt
04.02	0.2m	Subsoil/interface, mid orange-brown silty sand, plough scars
04.03	0.28m	Natural, generally clean yellow sand, gravelly patches at western limit of trench
04.04		Southern portion of square feature, roughly 'L' shaped in plan, irregular profile 0.8m wide and 0.5 – 0.25 m deep. Clearly affected by burrowing in places. Slot 1 contained 3 large cobble sized stones
04.05		Northern portion of square feature, roughly 'L' shaped in plan, fairly amorphous and shallow, 0.5m wide and 0.2m deep. Clearly affected by burrowing in places
04.06		Animal burrow which leads from the interior of the square feature to the north-eastern corner of the trench, cutting 04.05

04.07		Cut of former boundary ditch in north-western corner of trench, 1m wide and 0.2m deep, steep cut on SE edge, gradual on NW
04.08		Fill of 04.07, dark brown-orange silty sand
04.09		Fill of 04.04, dark yellow/orange brown silty sand, some slight charcoal flecks
04.10		Fill of 04.05, mottled dark-mid orange-grey brown silty sand, some charcoal flecks

Trench 5

Area: Phase 4a
Size: 20m x 2m
Orientation: NE-SW
Max Depth: 1.2m

Located to investigate a roughly circular anomaly, possibly modern disturbance or a prehistoric barrow. A number of deposits were identified in section after the excavation of the trench, no features were noted during the excavation. A bulk soil sample was collected from 05.03 for further analysis.

Context No.	Depth below surface	Description
05.01	0	Topsoil, dark orange-brown sandy silt
05.02	0.4m	Light yellow-brown slightly clayey sandy silt
05.03	0.44m	Mottled light yellow-grey clayey silt containing charcoal
05.04	0.5m	Possible area of bioturbation, dark brown-orange sandy clayey silt which contains patches of colluvium, 05.03, and charcoal
05.05	0.7m	Colluvium, mid yellow-orange sandy clayey silt containing some stones
05.06	0.9m	Natural, mid grey-yellow silty sand in most of trench, gravel at SW quarter

Trench 6

Area: Phase 4a
Size: 20m x 2m
Orientation: NNW-SSE
Max Depth: 0.6m

Located to investigate unknown anomalies located at or near the top of a natural mound. No archaeology or dramatic geological variation was noted in the trench.

Context No.	Depth below surface	Description
06.01	0	Topsoil, dark orange-brown sandy silt
06.02	0.3m	Natural, sandy gravel

Trench 7

Area: Phase 3
Size: 10m x 2m
Orientation: E-W
Max Depth: 0.6m

Located to investigate a linear anomaly interpreted as either a pre 1790 field boundary or a modern service or drainage trench. Excavation confirmed the presence of a shallow 'V' profile ditch which may have been a former boundary, pottery from the fill of the ditch suggests a date later than 1790.

Context No.	Depth below surface	Description
07.01	0	Topsoil, dark orange-brown sandy silt
07.02	0.25m	Subsoil/interface, mottled brown-orange sandy silt
07.03	0.35m	Natural, mottled yellow-orange silty sand, some gravel
07.04		Geo test pit, approx. 1.5m x 2.5m filled with re-deposited natural (clean sand)
07.05		Cut of ditch, shallow 'V' shaped profile, 2.1m wide and 0.4m deep, contained two rim sherds of Buckley ware
07.06		Fill of 07.05, dark grey-brown silty sand with occasional stones

Trench 8

Area: Phase 4c
Size: 10m x 2m
Orientation: ENE-WSW
Max Depth: 0.45m

Located to investigate a linear anomaly interpreted as a former field boundary predating 1790 map evidence. Anomaly was found to be a fairly shallow ditch, confirming the initial interpretation.

Context No.	Depth below surface	Description
08.01	0	Topsoil, dark grey-brown sandy silt
08.02	0.25m	Subsoil/interface, mottled orange-brown sandy silt
08.03		Cut of ditch, sides sharp on eastern edge and gradual on west, fairly rounded base, 1m wide and 0.3m deep
08.04		Fill of ditch, dark grey-brown clayey silt, slight signs of iron panning against cut
08.05	0.35m	Natural, in east end of trench was a dark grey-orange sandy gravel, at west end a mid grey-yellow silty sand with some clay

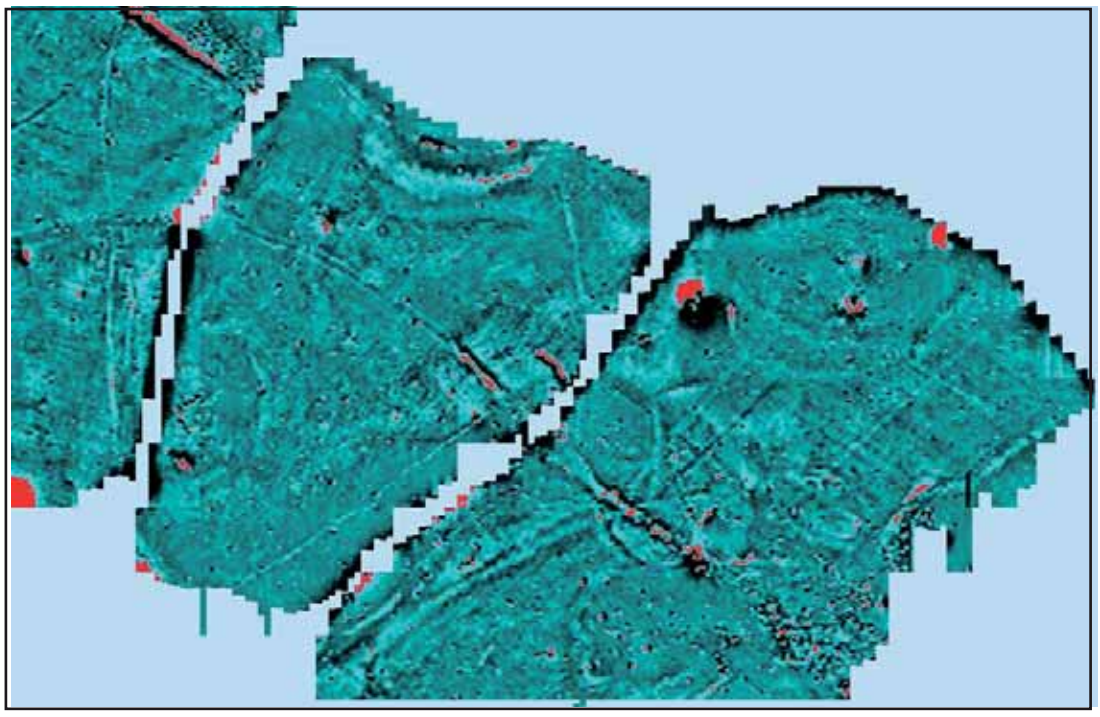
Appendix II

GAT Report 1074, G2272

Archaeological Evaluation:
Targeted Geophysics

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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PROPOSED SAND AND GRAVEL QUARRY AT LLECHEIDDIOR UCHAF, GARNDOLBENMAEN

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).

6.0 BIBLIOGRAPHY

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

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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

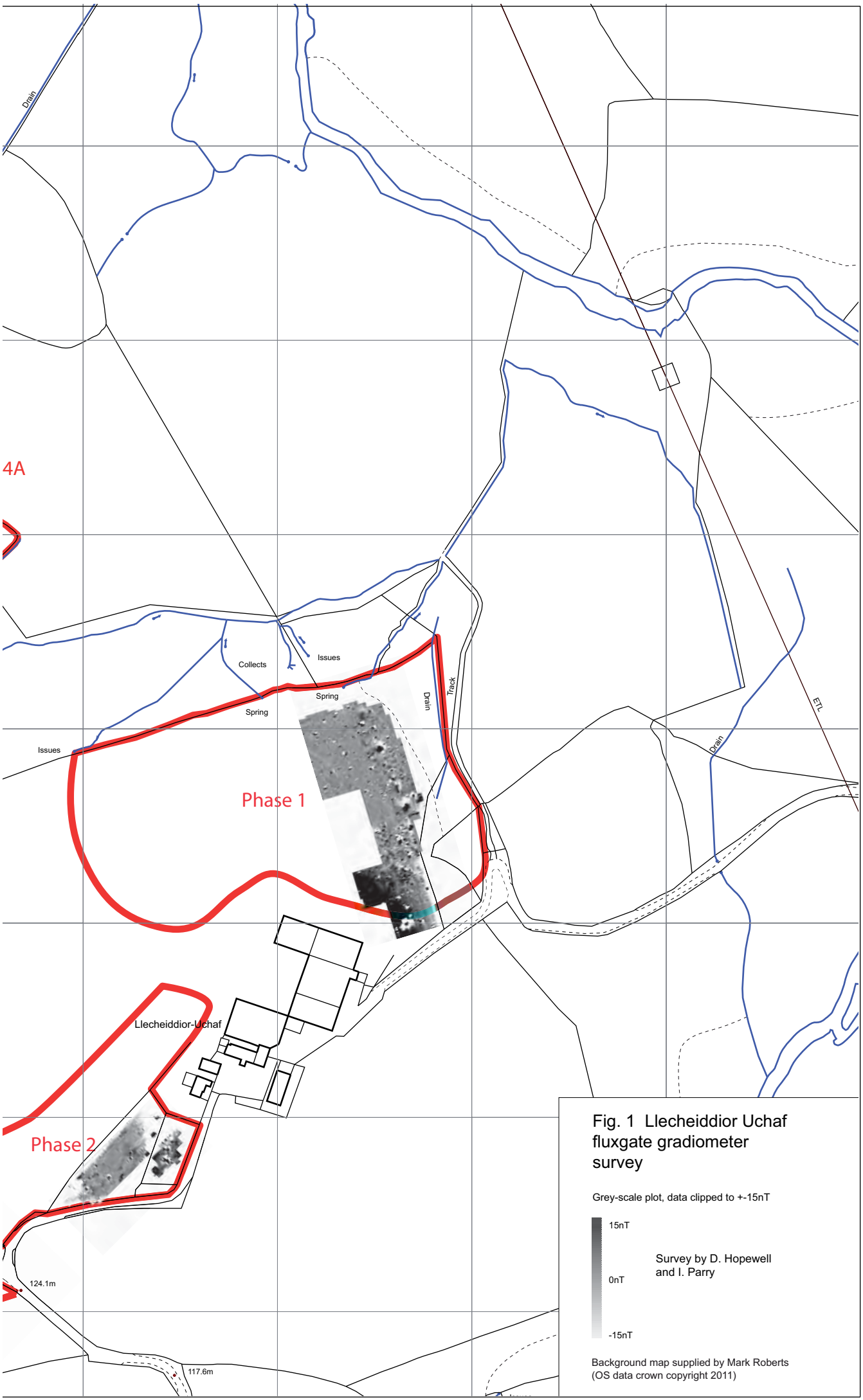

Fig. 1 Llecheiddior Uchaf fluxgate gradiometer survey

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
122.4m
128.6m
122.6m
Cattle Grid
Drain
Drain
Issues
METRES
0
200

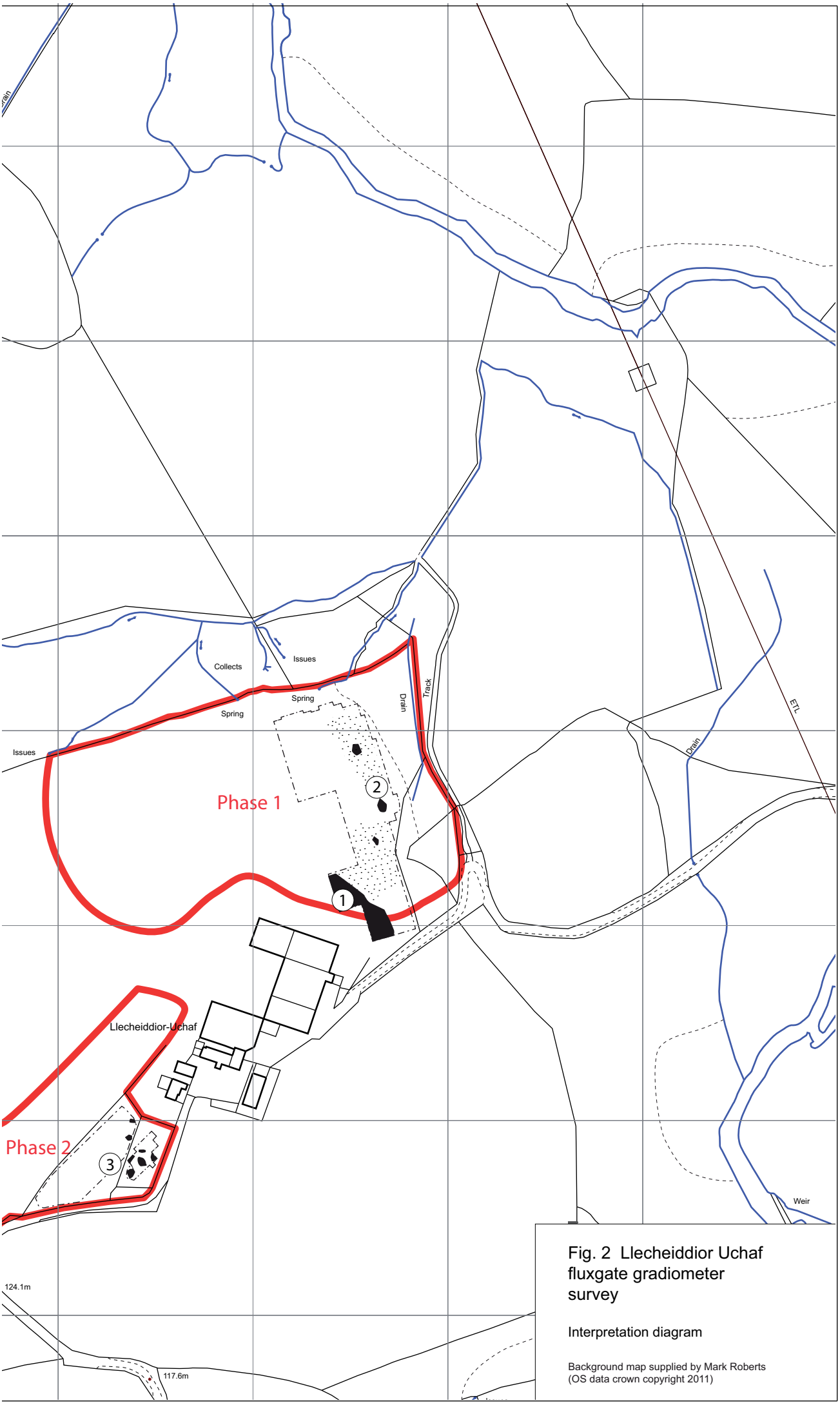

Fig. 2 Llecheiddior Uchaf fluxgate gradiometer survey

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

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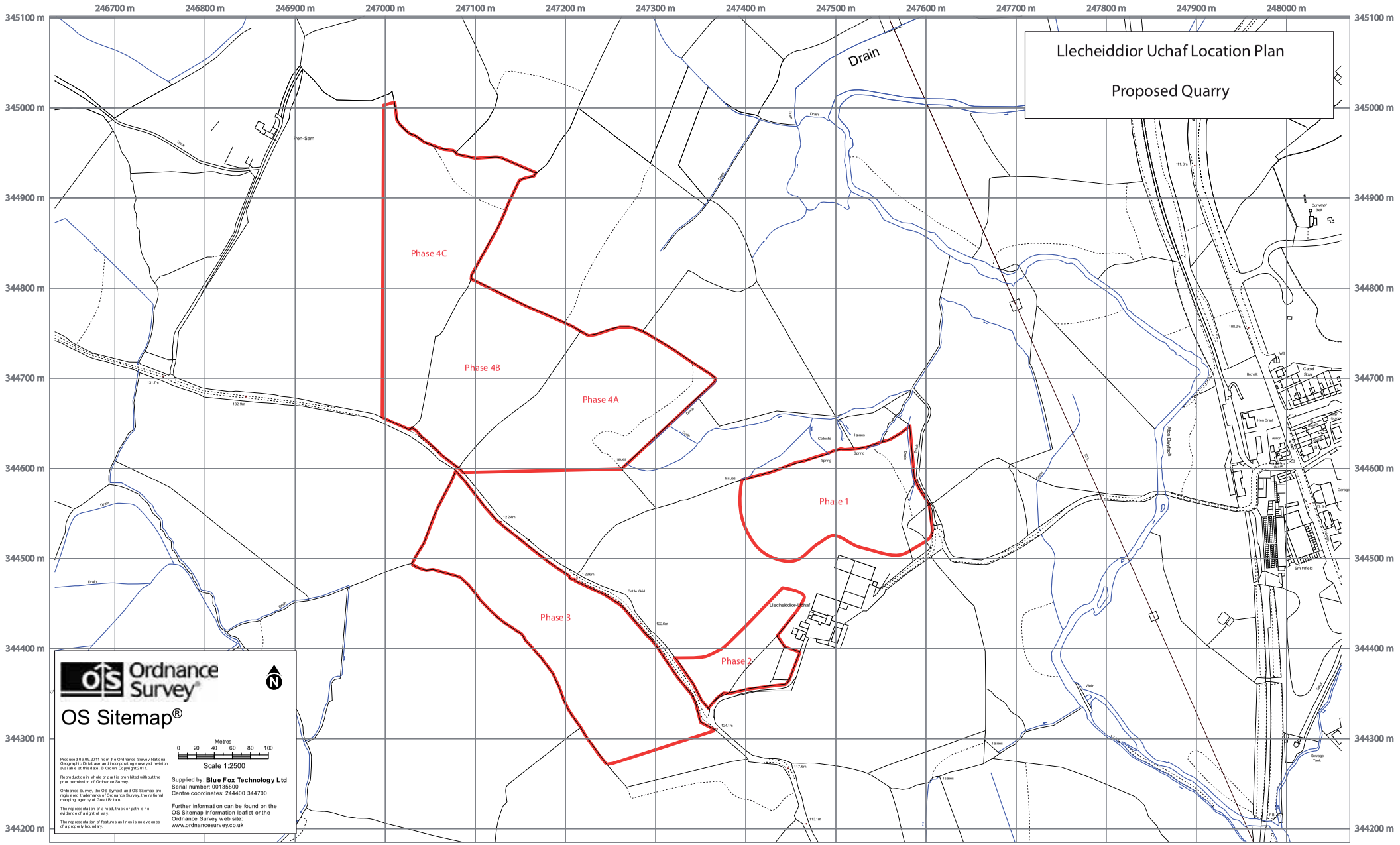

Figure 01: reproduction of map supplied by Mark Roberts, Planning and Environmental Consultant, detailing proposed new quarry areas. According to the information within Figurs 02 and 03, the Phase 01 and 02 have been partly quarried during the twentieth century

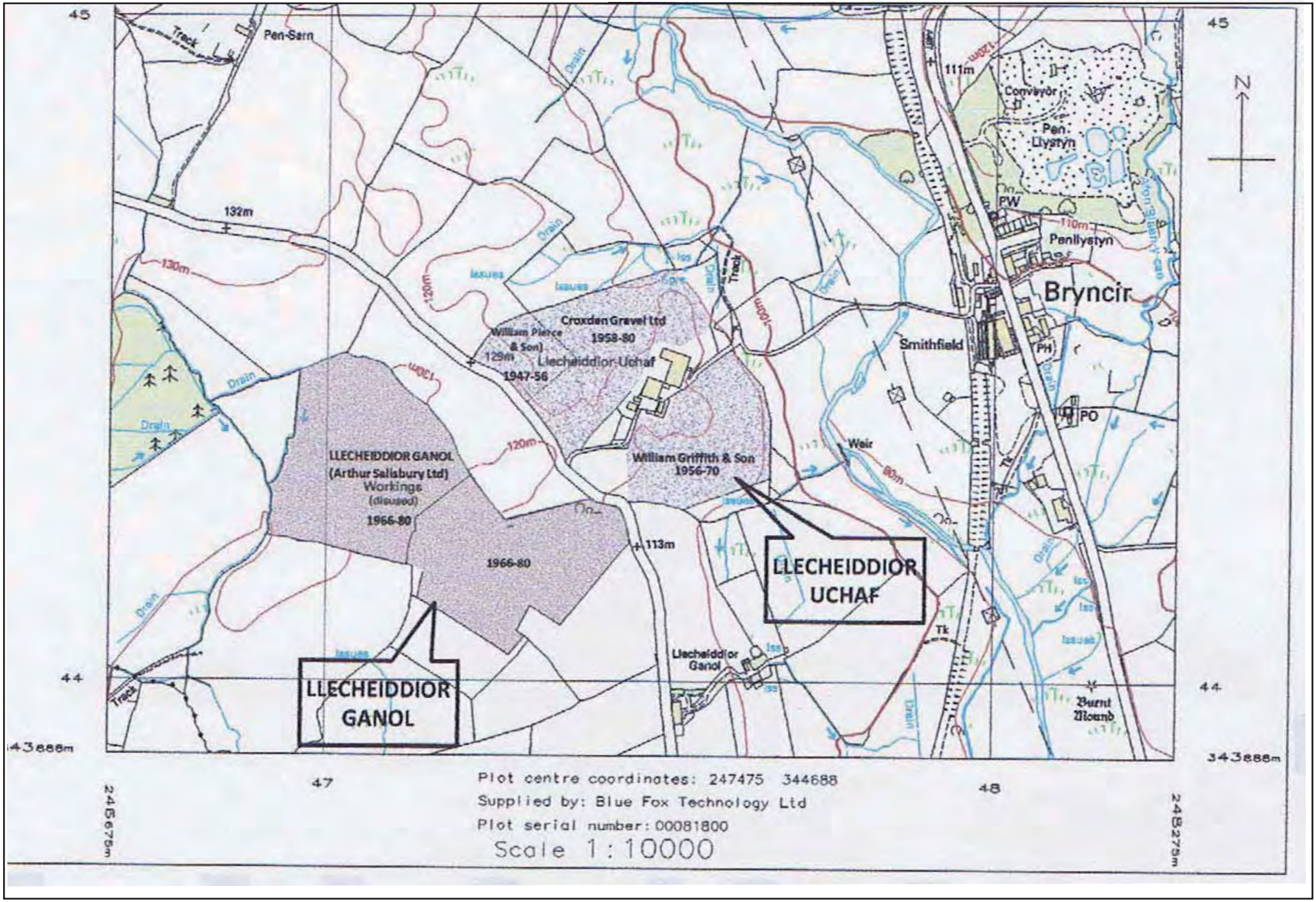

Figure 02: reproduction of map supplied by Mark Roberts, Planning and Environmental Consultant, of the plots/areas quarried during the twentieth century. The Lleicheiddior Ganol workings are outside the current proposals; the northern portion of the Lleicheiddior Uchaf workings incorporate parts of the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

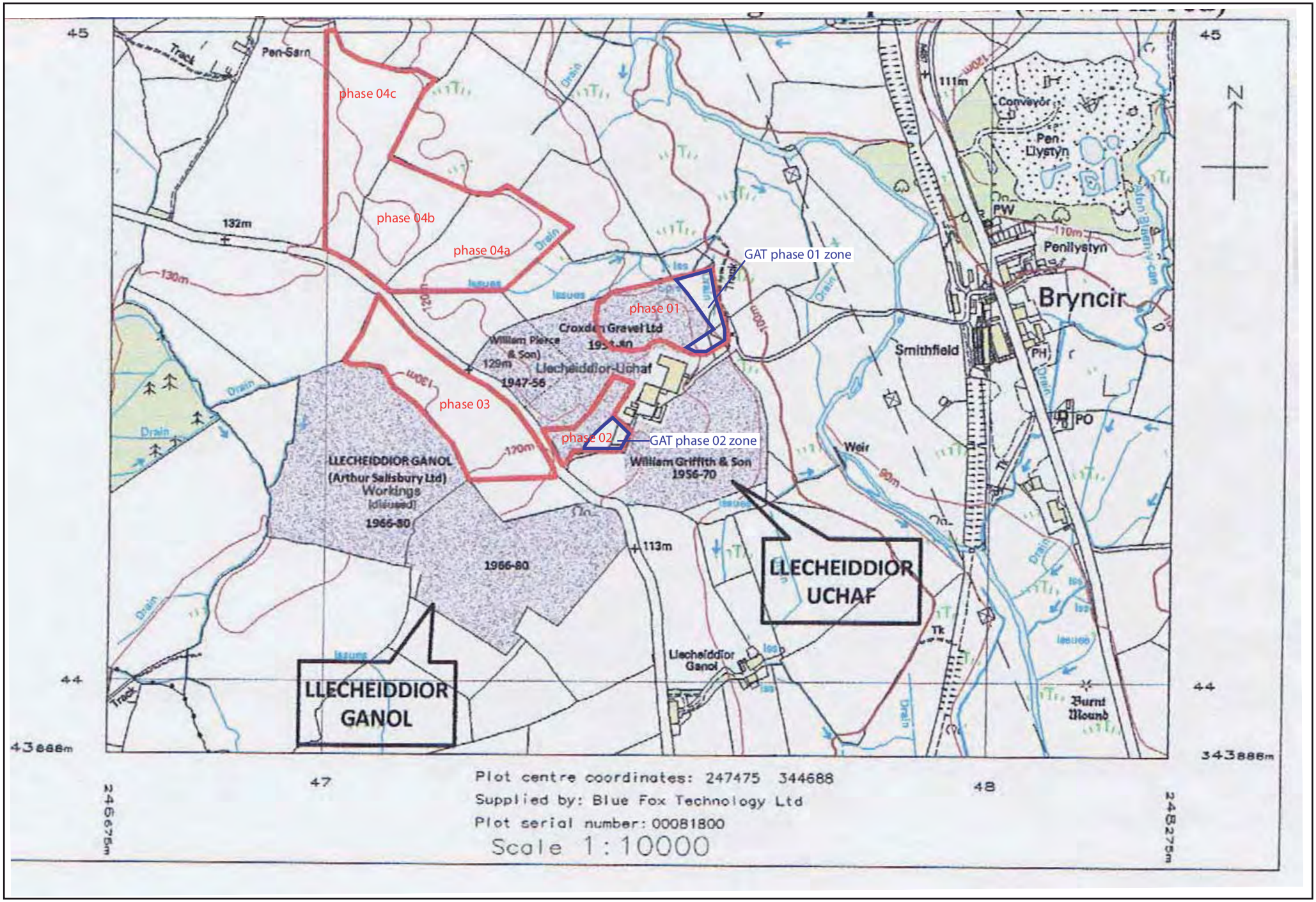

Figure 03: reproduction of map supplied by Mark Roberts, Planning and Environmental Consultant, of the plots/areas quarried during the twentieth century, with the proposed new areas superimposed in red. The GAT geophysical survey will target Phases 03 and 04 a, 04b and 04c in their entirety.
Due to the 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 III

Govannon 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).

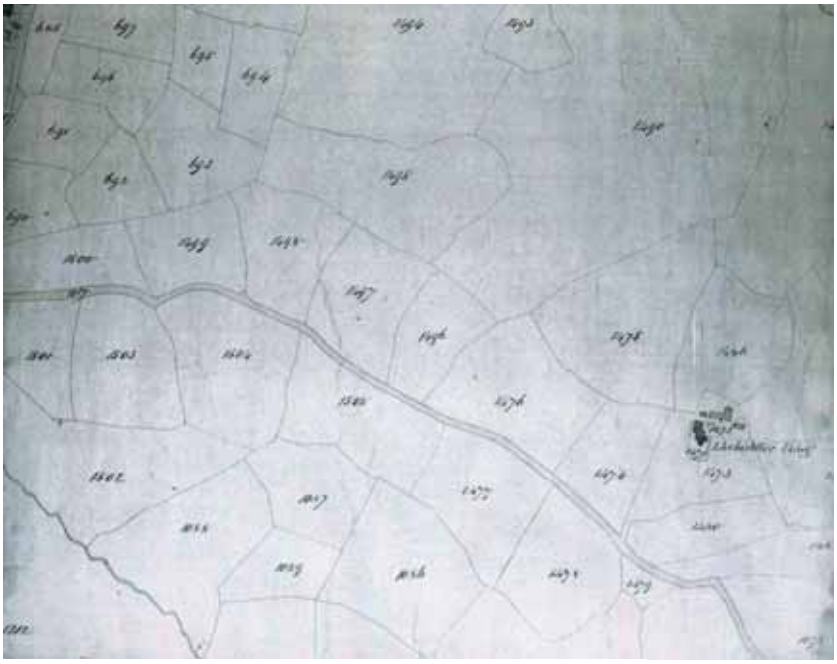
Map 1 NLW: ms Maps 97, p. 43

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

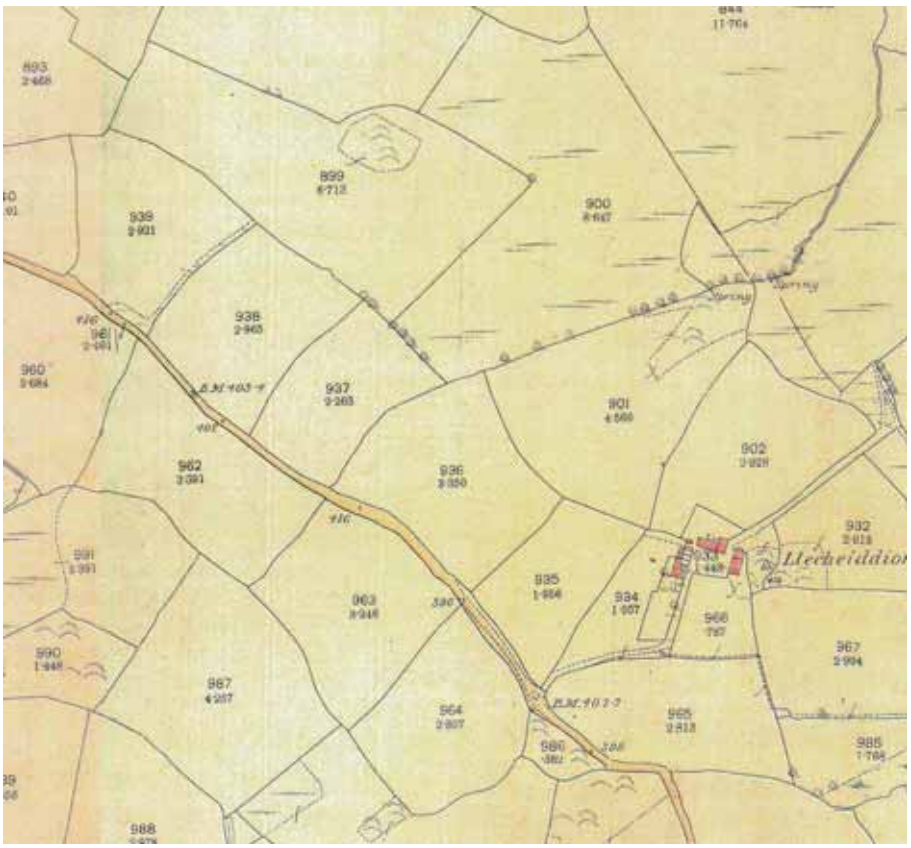
The schedule identifies field names thus:

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.

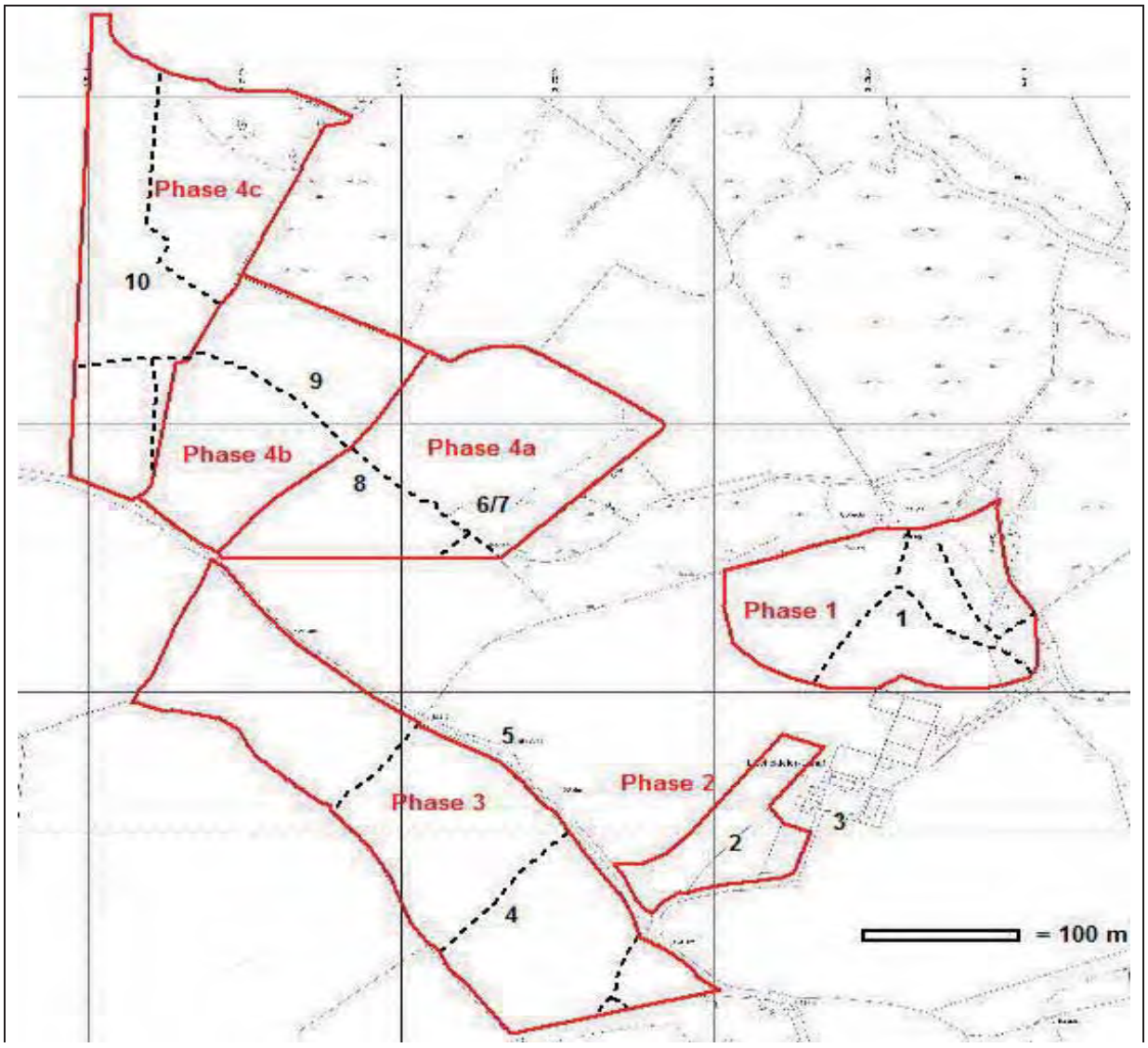


Map 3 25” ordnance survey of 1888


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

Fasham PJ, Kelly RS, Mason MA and White RB: *The Graeanog Ridge: The Evolution of a farming Landscape and its Settlement in North-west Wales* (CAA 1998)
Gresham C: *Eifionydd: A Study in Landownership from the medieval period to the present day* (Cardiff: University of Wales Press, 1973)
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Hemp WJ: 'Objects mostly of prehistoric date discovered near Beddgelert and near Brynkir station' *Proceedings of the Society of Antiquaries of London*, 2 series vol. 1 (1918) 166-83
Nash-Williams VE (revised ed. By MG Jarrett): *The Roman Frontier in Wales* (Cardiff: University of Wales Press, 1969)

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

(end of document)

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