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Ynys Enlli Survey and Watching Brief

Report on 2015-16 results

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

Cadw

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1. INTRODUCTION

Ynys Enlli or Bardsey Island (centred on SH11322106) is located off the end of the Llŷn Peninsula, surrounded by famously strong tidal currents (figure 1). The archaeology of the island is considerable and varied. Mesolithic flints have been found in many areas of the island and the site of an Augustinian abbey is located towards the northern end of the island. There are numerous other sites ranging from prehistoric to modern, and these have been collated in the gazetteer of the Heritage Management Plan produced as part of this project (GAT report 1304, Kenney and Hopewell 2016).

Discussions between Gwynedd Archaeological Trust (GAT), Cadw and the Bardsey Island Trust (BIT) took place during 2013-14 regarding the production of a Heritage Management Plan to accompany a wider Conservation Management Plan. Concern was also expressed about areas of erosion, one of coastal erosion, and the other of a scheduled ancient monument. GAT undertook work from March 2014 to gather information for the HMP and to investigate some of the sites under threat. The results of the investigations have been reported in GAT reports 1176 (Kenney 2014) and 1232 (Kenney and Hopewell 2015).

The area around the abbey is one of the high priorities for investigation as nothing is known of the limits of the abbey precincts and the extent of possible survival of foundations and other remains. It was proposed to carry out a geophysical survey in this area in 2014 but the presence of crops on the fields to be investigated prevented that. The survey was therefore carried out in 2015, with more coordination to ensure that the fields were accessible.

The limits of the abbey precinct and medieval cemetery are not known. The only surviving upstanding masonry from the abbey is a 13th century tower-like building, which currently stands within a late 19th century graveyard. Farmyards and houses stand to the north, west and south-west of the tower and graveyard, with three fields to the east before the ground slopes steeply up to Mynydd Enlli. These fields are known as Cae Uchaf Nant, Cae Capel and Cae Gwenyn. Finds of human bones in the farmyards and gardens to the west and south-west, as well as excavated medieval burials under the ruined Tŷ Newydd (Arnold 1998), indicate the presence of a medieval cemetery on this side (figure 2).

Two phases of geophysical survey have been carried out in the fields to the east of the abbey. The first was by the Ancient Monuments Laboratory in 1973 using both magnetometer and widely-spaced traverses of resistivity. This investigated parts of the southernmost of the two fields (Cae Capel and Cae Gwenyn). The results are summarised in Arnold 1994 (Fig 37). The coarse resolution of the survey and the presentation of the results as trace plots and low resolution dot-density plans (AML 1973) are typical of surveys from this time. Both geophysical survey and computing were in their infancy and only large-scale anomalies could be detected.

The second phase of survey covered most of the northernmost field (Cae Uchaf Nant) in response to a planning application for a new cremation cemetery (Dawson and Roberts 2002). The survey was carried out using a Geoscan FM18 fluxgate gradiometer and a Geoscan RM18 earth resistance meter, both at a 1.0m x 0.5m sampling frequency. Basic technology has not progressed significantly since this survey and the equipment was capable of producing results that are comparable to current surveys. The software (Geoplot 3.0) and compatible printers produced relatively crude dot-matrix based shade plots making detailed re-assessment of the results from the plots in the report problematic.

The current project was designed to carry out a high-resolution gradiometer survey of three fields to the east, north-east and south-east of the abbey tower (figures 2 and 3) thus producing improved and consistent data across the whole area that can be presented as grey-scale plots. This can show low-intensity changes in the data in a way that was not possible with the earlier technologies.

While the geophysical survey was being carried out a cable trench was dug to the west and north of the abbey tower and the results of an archaeological watching brief are also included in this report. The opportunity has also been taken to include descriptions of finds brought to the attention of the project. A request from GAT was

included in the Summer edition of Y Cafn, the newsletter of the BIT, for information on finds discovered by visitors to the island. This resulted in additional sites being identified and some finds donated to Gwynedd Museum.

2. METHODOLOGY

2.1. Geophysical Survey

The survey was carried out by David Hopewell with assistance from Jane Kenney on 21st to 25th September 2015. The gird was laid out using a total station theodolite and was tied in to map features.

Instrumentation
The survey was carried out using a Bartington Grad601-2 dual Fluxgate Gradiometer. This 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 Grad601 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. It must therefore be stressed that a lack of detectable anomalies cannot be taken to mean that that there is no extant archaeology.

The Bartington Grad601 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 mu-metal 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.

Data Collection
The gradiometer incorporates an on-board data-logger. Readings in the surveys were taken along parallel traverses of one axis of a 20m x 20m grid. The traverse interval in the survey was 0.5m and readings were logged at intervals of 0.25m along each traverse giving 3200 readings per grid. This is double the resolution used for general prospection and is designed to resolve smaller-scale archaeological features and increase spatial accuracy. Survey lines with marks every metre were used along the traverses in order to maximise accuracy.

The survey grid was set out using a total station theodolite and located using fixed points that could be recognised on Ordnance Survey maps, in this case, the corners of buildings and field boundaries. No corrected GPS data was available for the area due to lack of 3G signal.

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 (figure 3) 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 (figure 4) 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.

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.

In the magnetic data 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. Large-scale spatial variation in the background magnetic field caused by bedrock can be reduced by using a high-pass filter. Large variations of more than about 20nT cannot, however, be compensated for. Grey-scale plots are always somewhat pixelated 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 smoothed using the "graduated shade" function in ArchaeoSurveyor 2. This calculates a continuously interpolated value for every pixel. Each pixel value is calculated by generating cubic spline curves from all the data points in both the X and Y axes. This reduces the perceived effects of background noise thus making anomalies easier to see. Any further processing is noted in relation to the individual plot.

Survey conditions
The two northernmost fields (Cae Uchaf Nant and Cae Capel) contained short grass and were ideal for survey apart from a little encroaching undergrowth around the field margins. The southernmost field (Cae Gwenyn) contained a sparse crop of oats and barley that was being left as food for migratory birds. Parts of the area were deeply rutted and infested with dense weeds. The use of survey-lines was essential here allowing the traverse speed to be dropped. This allowed most obstacles to be negotiated without significant positional inaccuracy. Added noise due to buffeting of the sensors by vegetation was inevitable as was occasional positional inaccuracy. This did not significantly affect the overall integrity of the results in this area.

2.2. Watching brief on trench around abbey

While the archaeologists were present on the island on 22nd September 2015 a trench was dug to lay an electricity cable from the solar panels on Tŷ Nesaf barn to Nant and Hendy to power the new electric fridges. The trench was dug by a mini-excavator with a toothed bucket (plate 1). The aim was to dig as close to the barns as possible to stay within the foundation trenches of the barns but there was already an electric cable near the Nant barn so the trench moved away from the wall here.

The trench was 0.4m wide and up to 0.5m deep, although generally 0.4m deep. Where features were exposed in the trench the sections and base of the trench were cleaned, so that not only could the features be seen but the deposits they were cut into were also visible. This involved cleaning most of the trench east of Nant Barn and a significant section south of Nant.

Photographs were taken of all features and significant deposits and a plan was drawn of the trench showing the location of the features. This was then superimposed on the map evidence. Due to the lack of warning that this trench was to be dug the plan was drawn as measured sketches tied in to buildings and walls from which the final plan could be drawn up. As no drawing equipment was available no sections were drawn.

A trench was also dug along the side of the track to the chapel but this was only about 100mm deep and did not expose any archaeological features.

2.3. Flint scatters and other new sites

A request was made in the Summer edition of Y Cafn, the newsletter of the BIT, for information on finds, especially flints, discovered by visitors to the island. This resulted in Dr Richard Kennedy, a long-time member of BIT and visitor to the island, bringing in documents and some finds relating to the discovery of flints on the island and the discovery of a possible shell midden. Some of these finds are already on the HER under PRN 7366 and where separated into individual sites for GAT report 1232 (Kenney and Hopewell 2015). However his notes gave additional information on these sites, including photographs of some flints not currently located (plate 15), allowing the database to be improved. He also had information on three new sites and donated finds from these to Gwynedd Museum. All this information was brought into Jane Kenney at GAT on 09/09/2015. The new sites are described below. The documents, including letters, have been included in the HER Further Information file for PRN 7366.

2.4. Archiving

The finds included in this report, along with those from previous phases of this project, have been donated to Gwynedd Museum, Bangor, with the exception of the annular brooch (PRN 59986), which is held by the Porter family.

The digital archive will be submitted to RCAHMW for long term curation and the report submitted to the Gwynedd HER.

3. RESULTS

3.1. Geophysical Survey

The results are presented as a grey-scale plot (figure 3) with the data clipped to +-5nT. The results were de-striped and a slight stagger error (positional mismatch of adjacent traverses) selectively corrected mostly in the southern field. An interpretation plot was produced showing the major geophysical anomalies (figure 4). Most iron spikes, recognisable as small half black and half white dots on the grey-scale plot, were ignored. These are caused by small ferrous objects in the soil such as nails and other rubbish and are usually derived from manuring, agriculture and casual losses particularly around settlements. Each transcribed anomaly was assigned a reference number and is described in the text.

General observations
In general, magnetic variation was low with almost all stronger readings being produced by pieces of iron in the soil or fences. An estimate of the range of archaeologically significant readings was produced by examination of a sample area with iron-spikes replaced by the median value. This produced a range of +-5nT at 2SD.

Detailed description
The northern field (Cae Uchaf Nant)
This field is most notable for its lack of variation compared to the rest of the survey. There were frequent iron-spikes and one positive anomaly (1) probably resulting from a magnetic glacial erratic in the substrate. A series of faint linear features running parallel to the field boundaries, shown as dotted lines (2) are best interpreted as the result of ploughing. Most of the features identified on the 2002 survey were not identified (Dawson and Roberts 2002, 10). Most notably, the increased sampling frequency and better graphics on the current survey did not allow a weak circular feature identified in the original survey to be identified. It now seems likely that this was the product of a cluster of iron spikes or a random variation in the soil. Dawson and Roberts' resistivity survey detected field drains that were not detected by the gradiometer surveys (ibid Figs 2 and 4).

The central field (Cae Capel)
Plate 2
A range of overlapping anomalies was detected in this field indicating several phases of activity. The gradiometer produces a two dimensional plan of all detected features. This does not usually allow any sequence of phasing to be reliably produced; the strongest anomalies are not necessarily closest to the surface. The most noticeable anomaly on the eastern side comprises two sides of an enclosure (3) running at roughly 90 degrees to each other. The anomaly is somewhat diffuse indicating that it is more likely to be a bank as opposed to a wall. The north-south element corresponds to a rounded scarp in the field. A second anomaly (4), also visible as a slight change in slope in the field, appears to have a similar origin. A diffuse circular anomaly (5) in the corner

of enclosure 3 is probably a natural geological variation. A weak negative anomaly (6) adjacent to this appears to form a square about 5.5m across. Negative anomalies are quite often associated with stone structures and this could therefore be interpreted as the foundations of a small stone building or if a cut feature, a small mortuary enclosure associated with a square barrow. It is however only partly visible and weak and could alternatively interpreted as a chance occurrence caused by intersecting plough scars. The western side of the survey is characterised by a series of overlapping anomalies, perhaps within an enclosure defined by either bank 4 at the north or a pair of fragmentary negative anomalies 7 and 8 to the north and south along with the edge of enclosure 3 to the east. Within this are a series of well-defined parallel anomalies with a spacing of about 2m (9). The large amount of activity in this area makes interpretation difficult. The area is crossed by a small negative anomaly (10) and partly masked by two more diffuse anomalies 11 and 12 that are probably geological. The activity in this area is different to that in enclosure 3 to the east. It could be interpreted in several different ways. The negative anomalies could be interpreted as stone building foundations that extend into the graveyard to the west. This is however far from certain and alternative interpretations include agriculture in the form of hand-dug cultivation terraces and disturbance associated with the construction of the graveyard. The anomalies give the impression that they continue into the area of the graveyard so relatively early origin seems likely.

Elsewhere in the field, two weak negative anomalies run at approximate right-angles to each other (14 and 15). These are aligned with the modern boundaries and could be interpreted as modern agricultural features. Feature 15 is, however, quite well-defined and an interpretation as a boundary wall cannot be ruled out. Feature 16 is narrow and linear and appears to run from a pipe at Tŷ Capel and is almost certainly modern. The field contains frequent iron-spikes. These are randomly spaced apart from an evenly spaced line of four (17), possibly the remains of a fence, and a closely spaced curving line (18) of slightly weaker anomalies possibly a drain or water supply. A few parallel linear anomalies shown as dotted lines probably indicate ploughing at some time in the use of the field.

The southernmost field (Cae Gwenyn)
Plate 3
This field contained a crop of barley and oats and was heavily rutted. It is regularly deeply trampled by cattle in the winter and at the southern end consists of a thin layer of rutted topsoil over bedrock. The most obvious anomaly is a negative, pair of parallel features caused by deep tractor ruts leading to a cattle feeding station in the southern end of the field (19). Two fragmentary and diffuse linear anomalies (20 and 21) are best interpreted as the remains of former field boundaries, predating the current cloddiau. Feature 20 could have formed a field with feature 3 in the central field.

Conclusions and recommendations
The three fields produced noticeably different results. The northern field was almost devoid of anomalies and showed no signs of any activity apart from recent agriculture. The central field, in contrast, clearly contains several phases of archaeological features. It is likely that some are related to modern agriculture but the density of anomalies indicates that there was a range of activity here. None of the anomalies are sufficiently well-defined to allow for definite interpretation, but it seems likely that there are some stone foundations and possible early boundaries. A faint square anomaly could be an early-medieval square barrow. The survey has demonstrated the presence of archaeology in this field but the interpretation should only be considered to be provisional.

The interpretation of the features needs to be tested by excavation. This would be relatively straightforward, with the positioning of trial-trenches determined by the geophysical results. This would initially only have to be enough to establish the presence and general nature of the features.

The southern field had clearly been extensively disturbed by both animals and farm machinery. Two possible early field boundaries were identified but no further features could be identified suggesting that this area had principally been used for agriculture.

The generally low levels of magnetic enhancement in the soils of the Island mean that the usual caveats that apply to geophysical surveys are particularly relevant. The surveys can only detect features where there is a discernible magnetic difference between the feature and the surrounding soil. A lack of geophysical anomalies cannot be taken to mean that there are no archaeological features present within the soil.

PRNs
Primary Record Numbers have been allocated to the main features described above. These are as follows:-

PRN	Anomaly No.	Site name	NGR
59957	4, 7, 8, 9	Possible enclosure, east of graveyard	SH1203722167 (C)
59965	Not confirmed in this survey	Geophysical anomalies, Cae Uchaf Nant	SH12052222 (C)
61119	3, 4	Field boundaries, Cae Capel	SH1204522173 (C)
61120	6	Possible square barrow, Cae Capel	SH1205422171
61121	20	Field boundary, Cae Gwenyn	SH1203422098 (C)
61122	21	Field boundary, Cae Gwenyn	SH1201722106 (C)

3.2. Watching brief on trench around abbey

See figure 5 for the route of trench and the location of features. For detailed descriptions of contexts see appendix I.

Trench east of the barns
The southern part of the trench to the east of the barns ran immediately adjacent to the barn wall and within the foundation trench for the wall (figure 5, plate 1). This foundation trench was filled with brown clayey loam containing slate pieces and stones with mortar adhering. About 0.2m below the surface within the foundation trench fill was found a collection of broken human bones. These included parts of two femurs, parts of a tibia, and a fragment of a pelvis. The bones were reburied in the cable trench in the location from which they came. These bones appeared to be from the legs of a burial cut through by the foundation trench for the barn and reburied when the barn had been built.

The topsoil to the east of the barns was a dark grey gritty silt with occasional stones, which was about 0.15m deep. This overlay three wall foundations identified in the trench. In the entrance to Tŷ Nesaf yard was a wall foundation (02) c.1.06m wide and 0.3m deep (plate 4). The wall foundation as seen in section was composed of 3 stones up to 0.3m long placed at roughly the same level with smaller stones and slabby fragments on top. The wall foundation rested in a gently sloping hollow within the top of layer (03). Deposit (03) was a dark grey silty loam about 0.3m deep but shallower under (02). This had only occasional small stones and no visible charcoal. It appeared to be an old ploughsoil or garden soil, and overlay the natural sub-strata, which in this part was a pale orange-brown clayey silt (04), with some stones and patches of outcropping broken bedrock. The surface of the natural was about 0.4m below the present ground surface.

A little further north and cut into (04) was a ditch [06] filled with a soft, slightly malleable mid brown clayey silt (05). The ditch seemed to be sealed by layer (03) and as only the top of the fill was exposed the depth and nature of the ditch could not be seen. The ditch was 1.5m wide and about 0.4m below the present ground surface.

Further north was a wall foundation (07) 0.95m wide and at least 0.3m deep (the base was not exposed in the trench) (plate 5). It was composed of angular and sub-angular stones up to 0.25m long, though most were smaller. Some were laid roughly level but most were not carefully placed. There was yellow-brown clay bonding between the stones. The wall foundation was sealed by (01) and appeared to have been built in a foundation trench. The cut of the trench [09] was not clear as its fill (08) was similar to layer (03), except that (08) contained more stones, however it appeared that trench [09] cut through layer (03). This was clearest on the southern side of wall (07). On the northern side of wall (07) was a layer similar to (03) but deeper and containing more charcoal and other material (plate 6). This layer (10) was also cut by the foundation trench [09]. Layer (10) was over 0.3m deep and its base was not exposed in the trench. It was a dark grey silty loam with numerous charcoal flecks and some lenses of charcoal. There were also lenses of marine shells and occasional fragments of animal bone.

At the northern limit of layer (10) was the foundation of another wall. This wall (11) was 0.8m wide and up to 0.4m high (plate 7). The stones appeared to be in a jumbled heap but one was laid flat, and there were traces of brown clay as a bonding between the stones. Like wall (7) this wall foundation appeared to be set in a trench [13], which cut through layer (10). The foundation trench was filled by a loose dark grey silty loam with small and medium stones.

North of and overlying wall (11) was a layer of rubble, composed of densely packed stone in a grey clayey silt matrix, with lenses of slate fragments and pockets of shells. This was seen along all the trench where it turned east to head towards Nant, until the bedrock rose to nearly the ground surface. It is probable that the rubble layer (14) covers an extensive area to the east of Nant/Hendy Barn.

Trench to Nant
The cable trench curved east away from the barns along the northern side of the track between Nant and the graveyard. In part of the western end of this part of the trench bedrock was only 0.1m below the ground surface, providing a solid base of the track into the field. Further east there was 0.15m of topsoil (16) and 0.18m of ploughsoil (17) above the natural orange brown silty clay (18).

Close to the corner of the front garden of Nant a stone-built culvert was exposed (24) (plate 8). This was capped with large slate slabs and has cables and a water pipe running down it. The culvert runs from a slate-lined water trough adjacent to the western wall enclosing the Newborough Cross.

Immediately south of Nant was a dense deposit of small and medium angular stones (22) in a dark grey silt. These seemed to fill a cut [23] the western side of which ran at an angle across the trench from north-west to south-east (plate 9). The stony fill was very wet and seemed to be actively carrying water. At the eastern side of the stony deposit (22) two stones (21) up to 0.5m long had been laid (plate 10). These appeared to form a kerb to the stony deposit but were not aligned to form a neat face. To the east of the stones was a deposit of dark grey silt with occasional stones (19). This seemed to fill a cut [20], only the eastern side of which was clear. Cut [20] may have been the same as cut [23] but they were differently aligned with [20] running nearly north-south (plate 11). Together these cuts and deposits seemed to represent drainage features, probably with cut [20] being an earlier drain replaced by cut [23] and its stony fill. The larger stones (21) were on the same alignment as cut [20] and presumably related to that phase, being later partly buried under the stony deposit (22). Cut [23] seemed to be still effectively acting as a land drain.

Trench to Ty Capel
A cable was also run to Tŷ Capel from the barns. This trench ran up the south side of the graveyard along the edge of the track. In this case the trench was only 100mm deep and did not disturb any archaeological deposits.

Artefacts
A sample of bones and shells were recovered from context (10) (plate 12). These consisted of 3 limpet shells and 6 periwinkle shells (total weight of shells = 38g); 8 pieces of bone and tooth weighing a total of 64g. The bone consisted of 3 pieces of sheep/goat rib, 2 skull fragments (probably sheep/goat), distal end of a sheep/goat humerus and a cattle tooth. No evidence of butchery was seen. The bone is very hard and in good condition, the tooth still had traces of tartar on the surface and the shells are fairly well-preserved. Limestone on the island and possibly mortar from the buildings above may mean that the soil is much less acid than normal for north-west Wales.

Radiocarbon dates
While it is possible that the wall foundations were related to the abbey, the foundations seem quite slight and poorly built for an abbey and it is possible that they are of a later date. There is a documentary reference to "Robert William's house" on the site of Tŷ Nesaf yard. The house itself seems to have stood on the site of the pig sty's inside the yard but it could have had related barns or sheds that may have flanked a narrower track past the abbey.

It was, therefore, important to determine the date of the walls and establish their significance, as they are vulnerable to damage under the track. The sheep/goat humerus (weighing 14.3g) and the cattle tooth (weighing 33g) from layer (10) were selected for radiocarbon dating. This layer, with its rubbish deposits indicating occupation in the area, was cut by the wall foundations and the dates were expected to give a *terminus post quem* date for the walls.

The samples were submitted to the Scottish Universities Environmental Research Centre (SUERC) Radiocarbon Dating Laboratory for accelerator mass spectrometry dating. The dating certificates are included as appendix II

The dating results are as follows:

Laboratory Code	Material	Context	Radiocarbon Age BP	Date cal AD (95% probability)
SUERC-65170 (GU39753)	sheep/goat humerus	Layer 10 – occupation/rubbish deposit below wall foundations	386 ± 33	1441-1663
SUERC-65174 (GU39754)	Cattle tooth	Layer 10 – occupation/rubbish deposit below wall foundations	1015 ± 32	908-1150

The date on the cattle tooth possibly relates to activity associated with the pre-Augustinian monastery, but the date on the sheep bone reflects 15th to 17th century activity. Two such different dates from the same context demonstrates mixing or disturbance of that deposit. The layers of shell and charcoal in the deposit did not suggest disturbance but it is possible that either this was a late deposit with some earlier material mixed in at the time of deposition or that a later bone has become embedded in the earlier deposit from the rubble layers above. Only further excavation can confirm the nature and origin of this deposit as well as its date and by association that of the walls.

The radiocarbon dates do however provide some useful information. The earlier date shows that material probably relating to the monastery does exist somewhere in the area. The very good preservation of the bones suggests information on diet, animal husbandry and economy should be recoverable from more extensive excavations.

Discussion

The features in the trench next to Nant appear to have been drainage features. Cut [23] seems still to be functioning to some extent to carry water. It must have been constructed before Nant and Hendy were built as it runs directly under the house, but may have been dug just before the houses were built to ensure drainage from the cemetery area. What appears to be the earlier feature, cut [20], was entirely infilled with silt and could have been out of use for a very long time. It is possible that this was a ditch or drain associated with the thirteenth century abbey, but no evidence in support of that was found.

The wall foundations are a significant find and suggest one or more buildings to the west of the abbey tower. The walls are represented only by the very bases of their foundations, which initially appear very shallow. However the level of the ground on which the abbey tower is built is considerably higher than the level of the track under which the wall foundations were found. This suggests that there has been extensive levelling and reduction of the ground here, probably when the barns were built in the 1870s. However the level of the natural boulder clay was clearly visible with a buried soil (03) and occupation deposit (10) on top of it. It seems unlikely that a soil layer would be much more than 0.5m deep, so perhaps relatively little has been removed from this western side of the track. The rough state of the foundations would therefore suggest fairly slight and poorly built walls.

The crude foundations raise the question whether these were actually for buildings relating to the abbey. Certainly wall (07) seems to continue the line of the north-north-west wall of the abbey tower. Projecting stones at the corner of this wall in the tower do indicate a continuation to the west. These projecting stones indicate that the western extension of the wall was only about 2m high and did not extend to the full height of the tower. In this case it is odd that there is no trace of a roof-line in the west-south-west wall of the tower.

While the rubble (14) appeared in section to overlie part of the wall foundation (11) it is perhaps more likely to be contemporary with the construction of the wall than to be rubble from its destruction. If the area north of (11) was fill with rubble after the walls had been demolished this must have been a low-lying, open area when the walls were standing and it would be expected that wall (11) would have a fully constructed face down to this level or the wall would have been very weak. Probably the rubble was used to level the area as the wall was being built so some rubble overlaid parts of the foundation but the wall itself was built on top.

There remains the possibility that the walls were not related to the abbey but to a house that preceded the present barns. Chris Arnold (Arnold 1994) records that the architect's plan for Nant and Hendy yard of 1872 show a rectangular building labelled as “Robert William's house”. The house itself seems to have stood on the site of the pig sty’s inside the yard but it could have had related barns or sheds that may have flanked a narrower track past the abbey.

The radiocarbon dates on bones from the occupation layer (10) pre-dating the walls unfortunately do not help to clarify this as the two dates are so different. More excavation work would be necessary to establish the nature and significance of these wall foundations. However the present work does show that these are just below the surface of the track and are vulnerable to damage by any works on or next to the track. These walls and other potential related archaeological deposits or structures must be considered when any future groundworks are proposed in this area.

PRNs
Primary Record Numbers have been allocated to the features described above in the cable trench. These are as follows:-

PRN	Context No.	Site name	NGR
61113	02	Wall, possibly part of Abbey, Ynys Enlli	SH1200322163
61114	06	Ditch, possibly part of Abbey, Ynys Enlli	SH1200322166
61115	07	Wall, possibly part of Abbey, Ynys Enlli	SH1200222169
61116	11	Wall, possibly part of Abbey, Ynys Enlli	SH1200122173
61117	24	Culvert, near Nant	SH1201022187
61118	20, 23	Drainage trench, possibly related to Abbey, Ynys Enlli	SH1201822188

3.3. Flint scatters and other new sites

For location of the sites see figure 1.

PRN 59976 Possible shell midden near Porth Solfach
NGR: SH1129421153 (approximate)
Period: Prehistoric?
Shells (winkles and limpets) were found eroding from the cliff edge just south-west of Porth Solfach by Dr Richard Kennedy in 1994 (plate 13). He also found some pieces of bone and tooth and a hand-made nail. Some stones projected from the section in the same area. Peter Hope Jones considered that the shells were natural and related to a raised beach, but the presence of bone as well does suggest an occupation layer or a midden. The shells seem to lie at the base of the build-up of soil and not far above the glacial boulder clay. Dr Kennedy has donated some shells and bone from this site to Gwynedd Museum.

PRN 59977 Flint core, west of Nant
NGR: SH11872233 (approximate)
Period: Mesolithic
A pyramidal flint core was found by Dr Richard Kennedy in 2009 (plate 14). It is described as being found sticking out of an eroding field wall in the lowlands west of Nant. Dr Kennedy pointed out the location as being close to where other flints have been recorded (PRN 16783).

The core is of pale brown flint with a small void containing crystals. It is 34mm high and the platform measures 30 x 25mm. It has a neat platform and quite a well formed pyramidal shape except where coarse material in the flint has caused a bad hinge fracture. The core is of a Mesolithic type (plate 14). Dr Kennedy has donated the core to Gwynedd Museum.

PRN 59978 Flints, Henllwyn
NGR: SH11352102 (approximate)
Period: Prehistoric
Four worked flints were found by Dr Richard Kennedy on 01/10/2009 (plate 14). They are described as being found "in Henllwyn 5cm below turf (from eroding edge)." The position given is approximate.

One piece is a fine, small blade suitable for a microlith. It has some "nibbling" on one edge but is not properly backed. Two of the pieces have been burnt. Dr Kennedy has donated the core to Gwynedd Museum.

PRN 3766 Flint collections
In the 1990s the warden on Ynys Enlli, Gwydion Morely, collected flint from various locations on the island. Dr Richard Kennedy was also interested in flints on the island and attempted to find out more about the flints that had been collected. He contacted Peter Hope Jones and Chris Arnold. Some flints were sent to Chris Arnold in 1995. He confirmed receiving them and suggested that they were Mesolithic. He intended to write a note on them for the BIT Annual Report and perhaps a note of an archaeological journal. It is not known if these notes were written or where the flints are now. Some flints were sent to Peter Hope Jones and in October 1996 he passed those to Frances Lynch, then of Bangor University. Frances wrote a description of the flints and had her students draw some of them. The location of the flints is not known but a copy of the report is held in Gwynedd Archaeological Trust (FI File PRN 7366). The report was reproduced in GAT report 1232 (Kenney and Hopewell 2015). This collection of flints has been referred to as "flints found by Dr Richard Kennedy" because he sought to get the collection studied, but the flints were originally collected by Gwydion Morely.

During this project the collection initially recorded as PRN 7366 has been divided into separate sites where locational information was available. These new sites are mentioned in GAT report 1232 (Kenney and Hopewell 2015) but additional information received from Dr Richard Kennedy has enabled slightly more refinement of the locations. Dr Kennedy also supplied photographs of the flints (plate 15) and letters relating to the collection which have allowed its movement to be traced. The documents provided by Dr Kennedy are now held by GAT and have been added to the Further Information File (FI File) for PRN 7366.

PRN 59986 Medieval annular brooch, Findspot, Mynydd Enlli
NGR: SH12262160 (approximate)
Period: Medieval
A small metal brooch (plate 16) was found by Rachel Porter on Mynydd Enlli. Photographs of this were sent to Mark Lodwick of the National Museums of Wales, who described it as "A medieval annular brooch, probably of 14th century date. Although the corrosion is dark-brown and is likely to be copper alloy, there is a chance that it made of silver" (Mark Lodwick pers. com. by email). The brooch is held by the Porter family.

4. CONCLUSIONS

The geophysical survey has located area of high archaeological potential in Cae Capel. The nature of the anomalies identified is unclear but small excavations could be targeted to investigate these anomalies and clarify their date and significance. Their location makes it likely that these features were related in some way to the medieval abbey or possibly even to the early monastery. If that is the case they would be of national significance.

The cable trench revealed the foundations of walls to the west of the abbey tower. Unfortunately the limited evidence exposed and the two radiocarbon dates obtained were unable to establish the significance and date of these walls but the possibility remains that they were related to the abbey.

5. COPYRIGHT

6. ACKNOWLEDGEMENTS

The project has been funded by Cadw and undertaken in partnership with Bardsey Island Trust Limited. We are grateful to Ian Halfpenny (Cadw) and to Richard Farmer (Bardsey Island Trust) for their help and advice, and to the Trust for providing accommodation on the island. The authors wish to thank Rhodri Evans for assistance with the accommodation, and Jo and Steve Porter for liaison about the state of the crops and grass and allowing

the geophysical survey to go ahead. Thanks are also due to Jo Porter for information on the annular brooch. Jane Kenney would like to thank Richard Kennedy for his information on his finds and the flints collected by Gwydion Morley.

7. REFERENCES

A.M.L., 1973. *Bardsey Island Geophysical Survey 1973* Ancient Monuments Laboratory (Gwynedd Archives CRO XD64 347)

Arnold, C.J. 1994. *The Archaeology of Bardsey: a survey*, unpublished report, University of Wales, Dept. of Extra Mural Studies, Newtown.

Arnold, C. J., 1998. 'Excavation of "Tŷ Newydd", Ynys Enlli (Bardsey Island), Gwynedd', *Archaeologia Cambrensis*, 147 (2001), 96-132

Dawson, T. and Roberts, J., 2002. *Report on the Geophysical Survey of Cae Uchaf Ynys Enlli, Gwynedd*, unpublished report, Centre for Environmental History and Policy, University of Saint Andrews

Kenney, J., 2014. *Ynys Enlli Coastal Erosion Survey: March 2014*, unpublished Gwynedd Archaeological Trust Report 1176

Kenney, J. and Hopewell, D., 2015. *Ynys Enlli Survey and Evaluation 2014-2015: Report on 2014-15 results*, unpublished Gwynedd Archaeological Trust Report 1232

Kenney, J. and Hopewell, D., 2016. *Ynys Enlli Heritage Management Plan*, unpublished Gwynedd Archaeological Trust Report 1304

8. APPENDIX I: LIST OF CONTEXTS RECORDED IN CABLE TRENCH

Context number	Description	Interpretation	Dimensions	Relationships
01	Dark grey gritty silt with c.10% rounded and angular stones	Topsoil	c. 0.15m deep	Overlies (02), (08), (12), (15)
02	Structure seen in section composed of angular and sub-angular stones up to 0.3m long. The 3 largest stones are placed at roughly the same level with smaller stones and slabby fragments on top. The stones rest in a hollow in (03) rather than in an obvious cut.	Wall foundation	c.1.06m wide and 0.3m deep	Covered by (01) and resting on (03)
03	Dark grey silty loam with occasional small stones and no obvious charcoal.	Buried soil layer (ploughsoil or garden soil)	c. 0.3m deep but shallower under (02)	Under (02) and cut by [09], overlies (05)
04	Pale orange-brown clayey silt, friable but quite compact, with some stones and patches of outcropping broken bedrock.	Natural substrate	0.4m below the present ground surface	Cut by [06]
05	Soft, slightly malleable mid brown clayey silt with few stones.	Fill of possible ditch [06]	1.5m wide, c.0.4m below present surface	Fill of [06], under (03)
06	Cut of possible ditch. Depth and nature of the sides not investigated.	Possible ditch	1.5m wide, c.0.4m below present surface	Filled by (05), cuts (04)
07	Structure composed of angular and sub-angular stones up to 0.25m long, though most were smaller. Some were laid roughly level but most were not carefully placed. There was yellow-brown clay bonding between the stones, especially towards the base of the trench.	Wall foundation	0.95m wide and at least 0.3m deep (base not exposed)	Under (08), built on base of [09]
08	Dark grey-brown gritty silt with c.25% small stones, mainly rounded and 1 beach cobble 0.15m long. Very similar to (03) but with more stones.	Fill of wall foundation cut	At least 0.3m deep	Fill of cut [09] over foundations (07). Under topsoil (01).
09	Indistinct cut, with near vertical sides. Base of cut not exposed.	Wall foundation cut	At least 0.3m deep	Filled by (07) and (08), cuts (03)
10	Dark grey silty loam with numerous charcoal flecks and some lenses of charcoal, also lenses of marine shells and occasional fragments of animal bone. Similar to (03).	Layer containing rubbish and evidence of occupation	Over 0.3m deep, full depth not investigated.	Cut by [09] and [13]
11	Structure composed of stones in a jumbled heap but one was laid flat, and there were traces of brown clay as a bonding between the stones.	Wall foundation	0.8m wide and up to 0.4m high	Under (12), built on base of [13]. Under (14)
12	Loose dark grey silty loam with c25% small stones and occasional medium stones.	Fill of wall foundation cut	At least 0.4m deep	Fill of cut [13] over foundations (11). Under topsoil (01).
13	Indistinct cut, with gradually sloping southern side, northern side	Wall foundation cut	At least 0.4m deep	Filled by (11) and (12),

	seems to have been lost due to deposition of (14). Base of cut not exposed.			cuts (10)
14	Extensive deposit of densely packed stone in a grey clayey silt matrix, with lenses of slate fragments and pockets of shells. This was seen along all the trench where it turned east to head towards Nant, until the bedrock rose to nearly the ground surface. It seems to directly overlie (11) with no evidence of a foundation cut on this side.	Rubble layer	At least 0.4m deep	Overlies (11), overlain by (15)
15	Orange brown sand with lenses of sub-rounded pebbles and some degraded mortar.	Sand layer, levelling?	0.2m deep	Under (01), over (14)
16	Dark grey silt with rounded pebbles.	Topsoil	0.15m deep	Overlies (17)
17	Dark grey silt with few stones.	Ploughsoil	0.18m deep	Under (16), probably over (19)
18	Orange brown silty clay, quite malleable with few stones.	Natural substrate (boulder clay)		Cut by [20], [23] and [25]
19	Dark grey silt with occasional stones, some angular. Soft and slightly malleable.	Fill of [20]		Probably sealed by (17) but hard to see. Under (21)
20	Western side of a cut into the natural. This side is straight and aligned nearly north-south. East side is either not visible or cut away by [23]	Cut of possible ditch or drain	At least 1.0m wide	Filled by (19), cuts (18)
21	Two stones (largest measures 0.5 x 0.26m), carefully laid. Possibly forming a kerb to the stony deposit (22) but they were not aligned to form a neat face.	Kerb?	0.5m wide, over 0.8m long	Over (19), under (22)
22	Dark grey silt with 90% medium and small angular stones, very densely packed. Carrying water.	Fill of [23]. Probable French drain fill.	2.4m wide	Over (21), fills [23]
23	Straight cut at angle to the trench, aligned north-west to south-east.	Probable drain	2.4m wide	Filled by (22), cuts (18)
24	Stone built culvert capped with large slate slabs. It has cables and a water pipe running down it. The culvert runs from a slate-lined water trough adjacent to the western wall enclosing the Newborough Cross.	Culvert	c.0.9m wide externally	Fills [25], under (16)
25	Cut for culvert, not investigated	Cut for culvert	c.0.9m wide	Filled by (24), cuts (18)

9. APPENDIX II: RADIOCARBON DATING CERTIFICATES

Scottish Universities Environmental Research Centre

Rankine Avenue, Scottish Enterprise Technology Park, East Kilbride, Glasgow G75 0QF, Scotland, UK
Director: Professor R M Ellam Tel: +44 (0)1355 223332 Fax: +44 (0)1355 229898 www.glasgow.ac.uk/suerc

RADIOCARBON DATING CERTIFICATE

08 February 2016

Laboratory Code	SUERC-65170 (GU39753)
Submitter	Jane Kenney Gwynedd Archaeological Trust Craig Beuno, Ffordd y Garth Bangor Gwynedd LL57 2RT
Site Reference	G2318, Ynys Enlli, abbey trench
Context Reference	Layer 10 - occupation deposit below wall foundations
Sample Reference	G2318/01
Material	bone : sheep/goat
$\delta^{13}C$ relative to VPDB	-19.3 ‰
$\delta^{15}N$ relative to air	8.8 ‰
C/N ratio (Molar)	3.3
Radiocarbon Age BP	386 ± 33

N.B. The above ^{14}C age is quoted in conventional years BP (before 1950 AD). The error, which is expressed at the one sigma level of confidence, includes components from the counting statistics on the sample, modern reference standard and blank and the random machine error.

The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal4).

Samples with a SUERC coding are measured at the Scottish Universities Environmental Research Centre AMS Facility and should be quoted as such in any reports within the scientific literature. Any questions directed to the Radiocarbon Laboratory should also quote the GU coding given in parentheses after the SUERC code. The contact details for the laboratory are email Gordon.Cook@glasgow.ac.uk or telephone 01355 270136 direct line.

Conventional age and calibration age ranges calculated by :- E Dunbar Date :- 08/02/2016

Checked and signed off by :- P. Naysmith Date :- 08/02/2016

University of Glasgow

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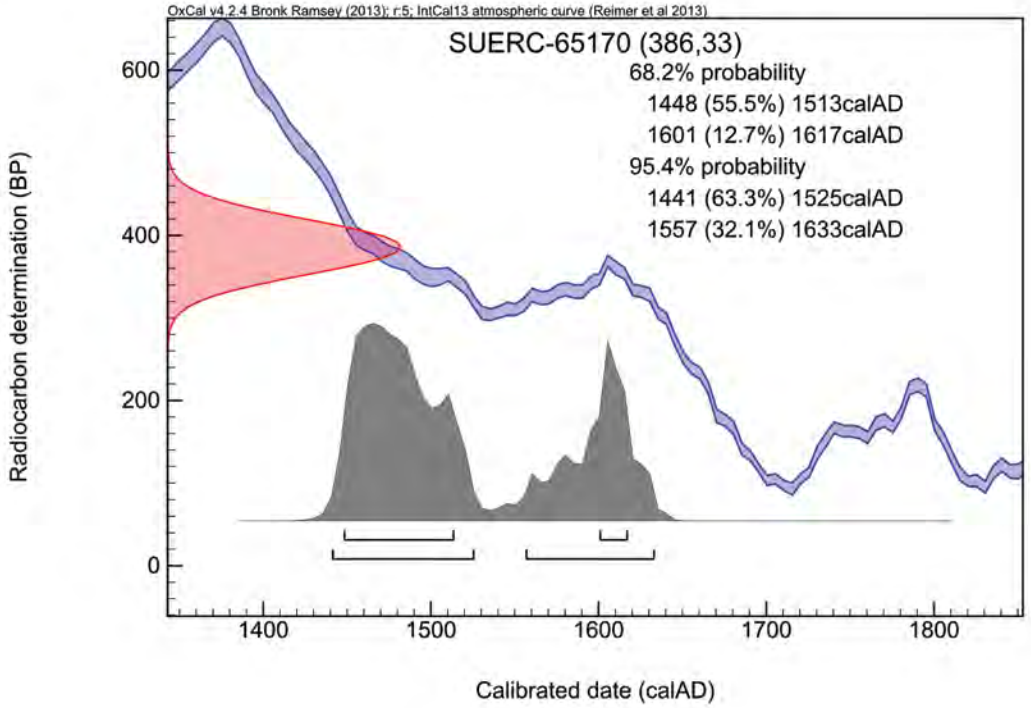
Calibration Plot



Scottish Universities Environmental Research Centre
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RADIOCARBON DATING CERTIFICATE

08 February 2016

Laboratory Code	SUERC-65174 (GU39754)
Submitter	Jane Kenney Gwynedd Archaeological Trust Craig Beuno, Ffordd y Garth Bangor Gwynedd LL57 2RT
Site Reference	G2318, Ynys Enlli, abbey trench
Context Reference	Layer 10 - occupation deposit below wall foundations
Sample Reference	G2318/02
Material	tooth : cattle
$\delta^{13}C$ relative to VPDB	-22.1 ‰
$\delta^{15}N$ relative to air	6.5 ‰
C/N ratio (Molar)	3.2
Radiocarbon Age BP	1015 ± 32

N.B. The above ^{14}C age is quoted in conventional years BP (before 1950 AD). The error, which is expressed at the one sigma level of confidence, includes components from the counting statistics on the sample, modern reference standard and blank and the random machine error.

The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal4).

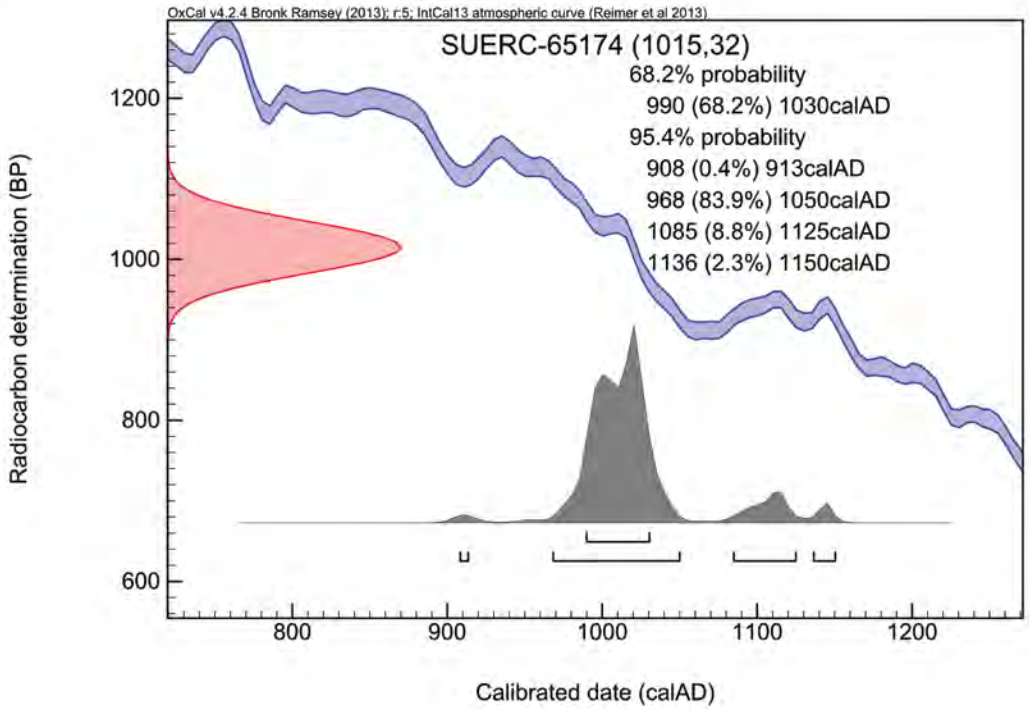
Samples with a SUERC coding are measured at the Scottish Universities Environmental Research Centre AMS Facility and should be quoted as such in any reports within the scientific literature. Any questions directed to the Radiocarbon Laboratory should also quote the GU coding given in parentheses after the SUERC code. The contact details for the laboratory are email Gordon.Cook@glasgow.ac.uk or telephone 01355 270136 direct line.

Conventional age and calibration age ranges calculated by :- E Dunbar Date :- 08/02/2016

Checked and signed off by :- P. Naysmith Date :- 08/02/2016

University of Glasgow

Calibration Plot



10. FIGURES AND PLATES

Figures

Plates

Figure 1. Ynys Enlli and its location with sites mentioned in this report

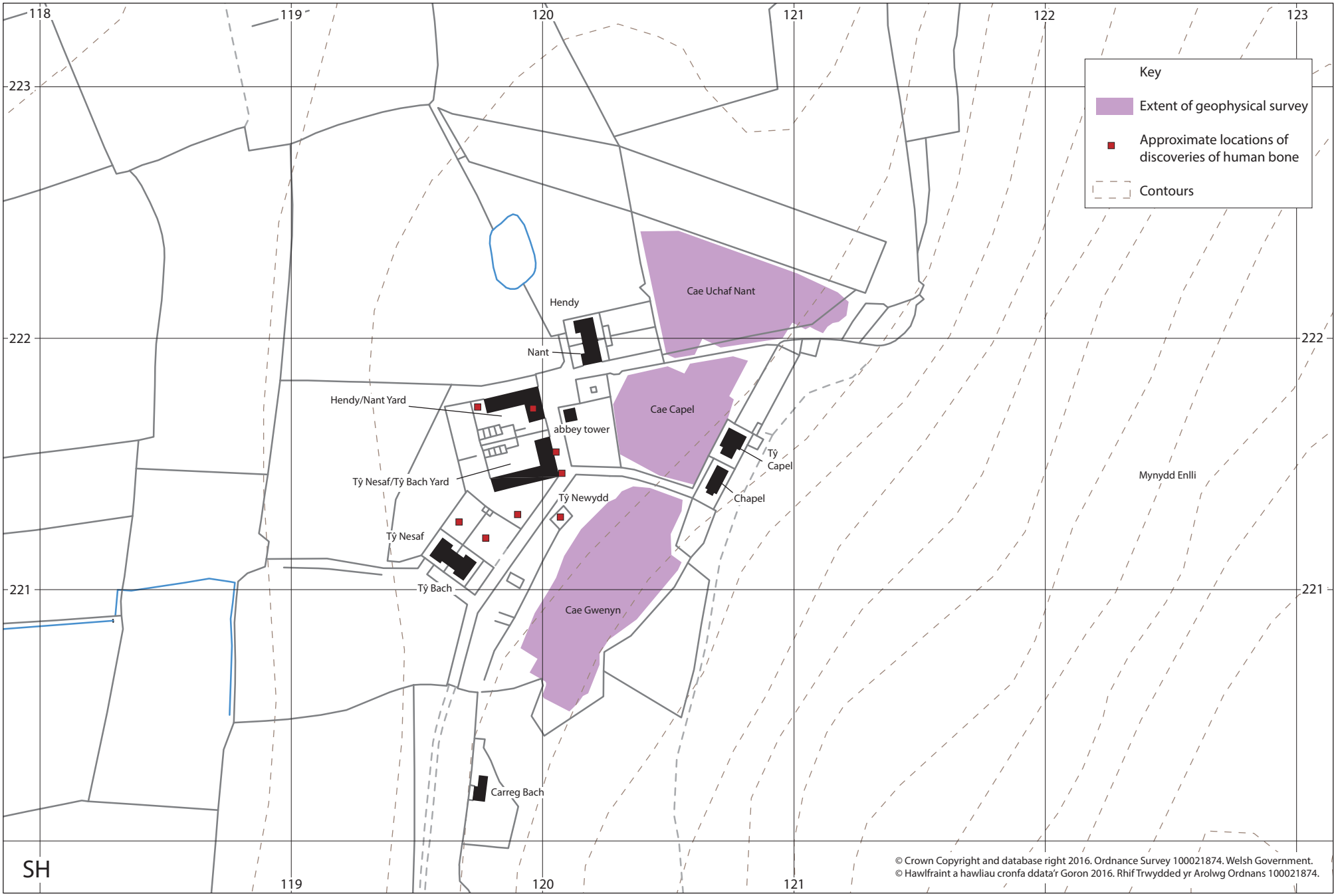


Figure 2. Area around the abbey tower showing location of geophysical survey

Figure 3. Ynys Enlli fluxgate gradiometer survey grey scale plot

Figure 4. Ynys Enlli fluxgate gradiometer interpretation plot

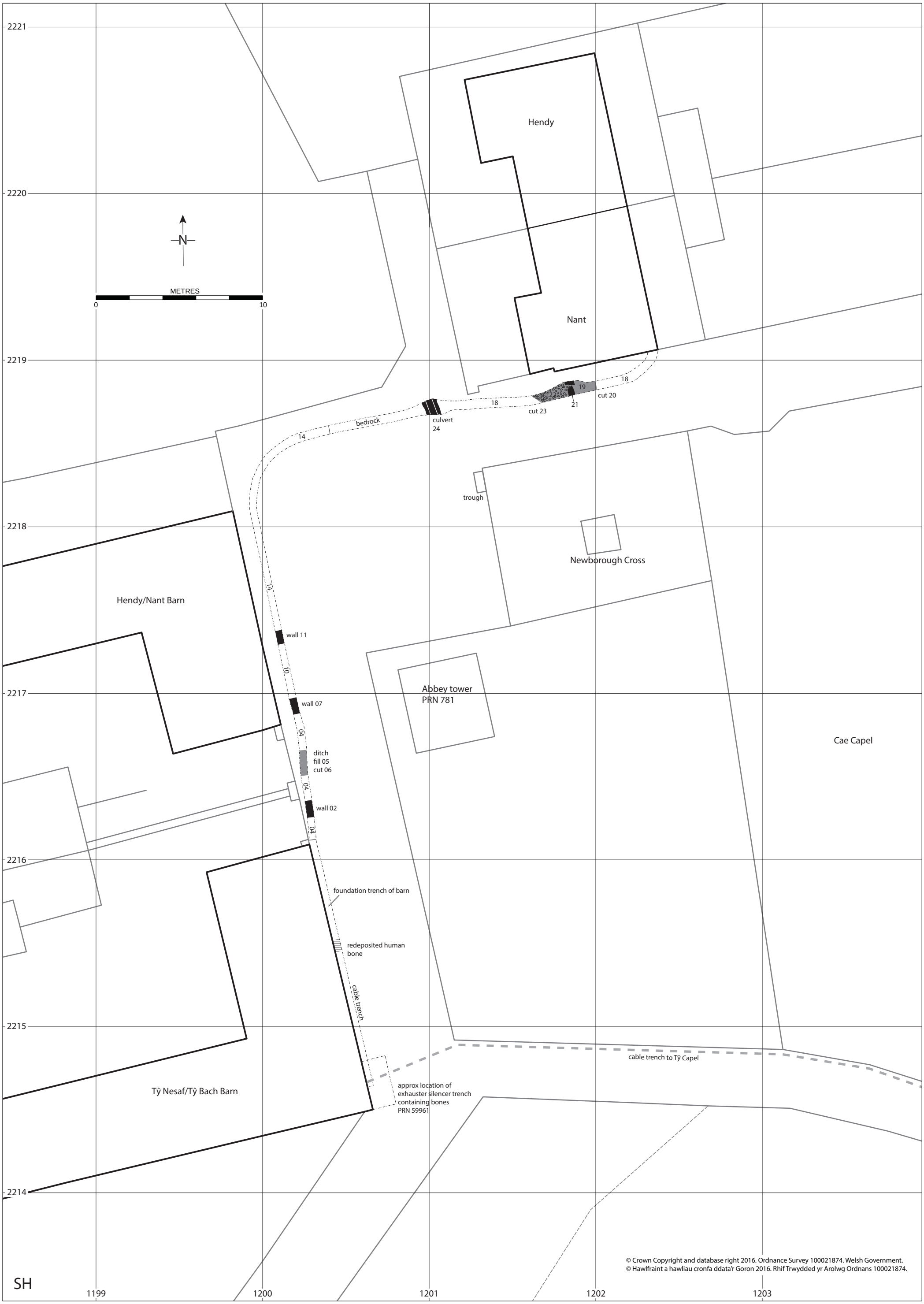


Figure 5. Cable trench and features exposed in it

Plate 1. Cable trench being dug along-side Tŷ Nesaf/Tŷ Bach Barn

Plate 2. Cae Capel with Cae Uchaf Nant in the background, from the south

Plate 3. Dave Hopewell surveying in Cae Gwenyn, despite the oats and barley

Plate 4. Wall foundation (02) in cable trench

Plate 5. Wall foundation (07) in cable trench, with layer (10) beyond

Plate 6. Layer (10) in cable trench

Plate 7. Wall foundation (11) in cable trench, with rubble (14) beyond

Plate 8. Culvert (24) in cable trench

Plate 9. Cut [23] with wet stony fill (22) in cable trench

Plate 10. Stones (21) between deposits (22) and (19) in cable trench

Plate 11. Cut [20] and deposit (19) in cable trench

Plate 12. Bone and shell from context (10)

Plate 13. Photograph by Dr Richard Kennedy in 1994 of shells eroding from the cliff section near Solfach (PRN 59976)

Plate 14. Flints found by Dr Richard Kennedy and donated to Gwynedd Museum

Plate 15. Photographs by Dr Richard Kennedy of selected flints found by Gwydion Morley (PRN 7366).
The numbers refer to sites, which are as follows:-
Site 1 - west coast below Carreg, PRN 59860
Site 2 - near Cafn Enlli, PRN 59938
Site 3 - Solfach, PRN 59939
Site 4 - near Carreg Fawr, PRN 59940
Site 5 - Solfach, PRN 59941
Site 6 - location unknown, part of PRN 7366
Site 7 - probably Trwyn yr Hwch, PRN 59943

Plate 16. medieval annular brooch found on Mynydd Enlli (PRN 59986)

Cadw

Llywodraeth Cymru
Welsh Government

Gwynedd Archaeological Trust
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