1297

High Status Medieval Sites and their Environs 2015-2016

Tŷ Newydd Motte

Recording and Evaluation Excavation
Final report

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

Cadw

Llywodraeth Cymru
Welsh Government

High Status Medieval Sites and their Environs 2015-2016
Tŷ Newydd Motte

Recording and Evaluation Excavation Final Report

Project No. G2366

Report No. 1297

Prepared for: Cadw

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Cover photograph: Motte, ditch and southern bank in spring with monolith sample from ditch

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SUMMARY

Archaeological work was carried out at Tŷ Newydd motte, Llannor to record deposits in the motte ditch that had been subjected to erosion. A management plan has been produced to repair and mitigate the erosion and other potential disturbance to the monument. A topographic survey of the site was carried out as far as was possible given the vegetation cover. Geophysical surveys of the field east of the motte were carried out revealing linear anomalies that might have been related to a bailey or early field systems. A trench was dug to investigate the possible bailey, but this failed to find any defensive ditch or firm evidence of the existence of a bailey.

It appears that there was no bailey attached to the motte, and that earthworks east of the motte were related to an early, possibly Iron Age, field system. There was some doubt the bank around the south side of the motte, which may be a much later addition, rather than an original feature of the monument. The deposits in the eroded part of the motte ditch were recorded and samples taken. Analysis of the samples suggested that the ditch had been cleaned out after the abandonment of the motte and the development of woodland over the site. The surviving deposits were probably of post-medieval date. This supports the reuse of the motte as a moated garden feature related to Tŷ Newydd house.

Very few artefacts were recovered, with the most significant being a Neolithic leaf-shaped arrowhead, presumably a casual loss and not related to any features found during the excavations.

1. INTRODUCTION

Tŷ Newydd motte, also known as Y Mount (PRN 1532, NPRN 302309), is located within a small area of woodland near Llannor on the Llŷn Peninsula (SH 3465 3829) (figures 1, 2 and 11, plate 1). The trees mean that root action and wind-blown tree damage are on-going threats, and badgers have caused much disturbance of the site. The motte is surrounded by a ditch or moat, retained by a bank on the southern side. A field ditch runs into this moat, which carries water in wet weather. There is a breach in the southern bank to allow the water to flow out. Serious and on-going erosion was identified by Jamie Davies in 2013 and was described in his undergraduate thesis (Davies 2013a). Run-off after heavy rain had eroded a channel that was undercutting the motte and southern bank (plate 2). Cadw were concerned about the damage and wished to halt the erosion and develop a management plan for the site; this led to its investigation as part of this project.

The motte and an area of the field to the east are scheduled (CN096) (figure 2). The area to the east was included in the scheduling because earthworks suggested the possible presence of a bailey in this area. The Royal Commission report the presence of a cobbled area in this field (RCHAMW 1964, 82), possibly also supporting this idea. The opportunity was therefore also taken to investigate the possibility a bailey. Geophysical surveys using magnetometry (gradiometer) and resistivity were carried out and these informed the positioning of an evaluation trench to test the nature of the anomalies detected.

A report was produced on this work in January 2015 (Kenney and Hopewell 2015, GAT Report 1223). The current report is the final, completed version of that report including a specialist report on soil samples from the motte ditch and with the results from that work incorporated into the main conclusions. The management plan, devised by Andre Berry of AQB Historic Landscapes to repair the damage and prevent further erosion, was not carried out due to issues with funding (Andre Berry pers. comm. 30/11/2015). The management plan is included here as appendix IV.

2. METHODOLOGY

2.1. Aims and objectives

The aim of the work was to identify the level of erosion and its impact on the site, to record eroded surfaces and to devise a management plan for the site. The opportunity was taken to discover more about the site by investigating the possible bailey. The investigation involved gradiometer and resistivity surveys and a trial trench. The archaeological work was undertaken by Gwynedd Archaeological Trust (GAT) and the management plan, devised by Andre Berry of AQB Historic Landscapes, is included as appendix IV.

2.2. Geophysical survey

Introduction
The survey examined the fields to the north and east of Tŷ Newydd motte. All other areas around the monument were wooded and unsuitable for survey. The fields contained a slightly raised earthwork platform that had been interpreted as a bailey. The area around this consisted of wet grassland crossed by drainage ditches. Much of the supposed bailey had been previously surveyed by Jamie Davies (2013a, 25-46) as part of a project examining the earth and timber castles of the Llŷn Peninsula. The gradiometer results showed low levels of magnetic enhancement and a scatter of ferrous anomalies. The resistivity results detected the edge of the earthwork platform and this was assumed to be the limit of the bailey. A break or irregularity in the north-eastern side was interpreted as being an entrance. The interior contained some variations that were interpreted as the stone walls of a hall but the anomalies were diffuse and the interpretation requires further confirmation.

The previous survey examined an area of 60m x 40m that did not cover the entire area of the possible bailey and did not extend beyond it. Experience at other sites has shown that larger areas of survey can often allow anomalies to be seen in the context of the geophysical responses produced in the surrounding landscape and this can aid interpretation and reveal peripheral features. It was therefore decided to carry out larger areas of both gradiometer and resistivity survey covering the complete area of the putative bailey and as much of the environs of the motte as possible. Gradiometer survey is considerable quicker than resistivity and a larger area was surveyed. Much of the ground to the north-east of the raised platform was waterlogged making it unsuitable for resistivity survey.

The survey was carried out by David Hopewell and John Burman between 23/5/2014 and 6/6/2014. Conditions were generally good; the fields contained long grass but this was not a major hindrance to the survey.

Instrumentation
The magnetometry 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.

The resistivity survey was carried out with a Geoscan FM15 twin electrode array. Resistivity is a survey technique that uses probes to introduce an electrical current into the soil, measuring the resistance of the soil to the passage of the current. The twin electrode array actually uses four probes; a mobile pair is mounted a fixed distance apart on a frame. One of these probes introduces a current into the ground and the other takes a voltage measurement. A pair of stationary probes connected by long trailing leads provides a return path for the current probe and reference voltage for the voltmeter. This is then used to calculate the resistivity of the soil. Resistivity quantifies how strongly a given material opposes the flow of electric current. There are many factors that influence the resistivity of buried deposits, water content being the most obvious. A wet ditch fill will have a low resistivity compared to drier soil around it, stones in a wall, or a compacted gravel surface will probably have a higher resistivity. Unlike magnetometry, this technique is sensitive to climatic factors that alter the water content of the soil.

Data Collection
Both the gradiometer and resistivity meter include on-board data-loggers. Readings in the surveys were taken along parallel traverses of one axis of a 20m x 20m grid. The traverse interval in the gradiometer survey was 1.0m and readings were logged at intervals of 0.25m along each traverse giving 1600 readings per grid. The resistivity survey used the same traverse interval but readings were taken every metre. These are the standard resolutions for general archaeological prospection. The grid was set out using a Trimble R6 GPS system to an accuracy of +- 30mm.

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 (Fig. G1 and G3) 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 (Fig. G2 and G4) 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. The resistivity data is often processed using a high-pass filter. This reduces large-scale variation in the data caused by natural changes in the soil making smaller anomalies more visible. 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.

2.3. Excavation and recording

Between 15th and 19th September 2014 (inclusive) GAT carried out archaeological excavation and recording at the site. This included the excavation of a 20m by 2m evaluation trench across part of the possible bailey area and cleaning and recording the erosion sections in the motte ditch.

Evaluation trench
The trench was positioned using survey quality Global Positioning System (GPS) equipment to ensure that it was located over features identified in the geophysical surveys (figure 3). It was aligned west-south-west to east-north-east fairly close to the corner of a scarp visible as an earthwork on the ground. The east-north-eastern end of the trench extended beyond this scarp to investigate one or more potential ditches identified in this area in the geophysical surveys. The trench was opened with a mini-digger under constant archaeological supervision (plate 3). Topsoil and ploughsoil were removed by the mini-digger to expose the natural substrate and any archaeology dug into it. The topsoil was stored next to the trench and the area was reinstated once the excavation and recording was completed.

At the east-north-eastern end of the trench the machine was used to remove what was initially interpreted as ditch fill as a ditch was expected in this location. It very quickly became clear that the deposit was not ditch fill but a natural deposit and excavation with the machine was stopped, except for the very end of the trench where the machine was used to deliberately dig into the natural deposits to allow their nature to be recorded.

The entire length of the trench was then cleaned by hand and features identified were excavated by hand. These were recorded by notes on proforma context sheets, by photography and by hand drawn plans and sections at appropriate scales. A section was drawn along the full length of the west-north-western side of the trench. Photography used a digital camera set to the highest resolution. Most of this work was carried out by a small team of volunteers under professional supervision.

As the trench was almost entirely within the scheduled area this work was carried out under Scheduled Moment Consent.

As fewer features were found in the main trench than expected there was time for a small additional investigation. While recording the site for the Inventory the Royal Commission were told of an area of cobbles that had been found by the farmer to the east of the motte (RCHAMW 1964, 82). The location of this was pointed out as being at SH 3470 3832 (OS card SH 33 NW 5). This grid reference places the location of the cobbles within a hollow running across the site. As this appeared to be an unlikely place for a cobbled surface and it was assumed that the grid reference was not very precise. On the eastern side of this hollow was a slightly raised, fairly level area, which seemed much more likely to be the location of a cobbled surface. This area was outside the scheduled area so it was decided to dig two small trial pits in an attempt to locate the cobbling (see figure 3 for locations). The pits initially measured 1m by 1m and were dug by hand through the topsoil and ploughsoil to the undisturbed deposits below. The first pit dug (trench 2) contained no stones. The next pit (trench 3) contained numerous stones and this was expanded to 1m by 2m to investigate these a little more. Two small hollows were identified in the natural and these were fully excavated by hand but proved to be animal burrows. No further excavation was carried out and the stones were recorded in plan only. This trench was photographed and planned by hand.

All three trenches were located by survey quality GPS, and this equipment was also used to survey the visible earthworks in the immediate area of the potential bailey.

Recording the erosion in the motte ditch
The water erosion in the motte ditch had created several vertical faces and these were cleaned by hand to expose the deposits in section. The erosion had created a hollow in the side of the motte and this was squared off slightly to allow the relationships between the different layers to be seen and understood more easily, but removal of deposits was kept at a minimum to avoid making the erosion worse. Once cleaned the sections were photographed and drawn by hand at a scale of 1:10.

The tree cover prevented the use of the GPS equipment around the motte so stations were established with the GPS in the field to the east. These were used to locate a total station theodolite (TST) survey of the site. The TST was used to locate the drawn sections and to record the limit of the erosion scar. However this would have made little sense without having an accurate plan of the motte to show the context of these features. The present

digital OS mapping show the motte as a very regular feature lacking the detail visible on the ground. It was therefore decided to carry out as full a topographic survey of the motte as possible. This was hindered by the tree cover and much of the northern side was entirely inaccessible due to brambles and other dense vegetation. It cannot, therefore, claim to be a complete and definitive survey. The survey did not attempt to show all the detailed scarps and platforms covering the motte as the vast majority of these, if not all of them, are the result of badgers digging setts. A detailed record of these features may be worthwhile but would be best done once the trees on the motte have been felled and possibly a 3D model generated from photographs would provide the most accurate and efficient record.

2.4. Samples from the motte ditch deposits

Two bulk soil samples of 10 litres each were taken from the basal organic silt fills [4015] and [4014] of ditch [4007] for the recovery of biological remains. Three small monolith (box/kubiena) samples were taken to study the pollen in the basal layers. One soil monolith in a kubiena tin 20cm long (sample 01) was taken from the motte ditch to include basal layers 4014, 4015 and the underlying natural sand deposits 4016. Two additional samples were taken in smaller tins from layers 4014 and 4015 (samples 02 and 03). Two sediment samples were taken from sample 01 at 5-6cm and 10-11cm to assess the deposits for pollen and spores. Monolith samples 02 and 03 were not assessed. Radiocarbon dating of the basal deposits was considered but as argued below this was not considered to be worthwhile. The samples were processed by The Environmental Archaeology Consultancy and studied by specialists working with the Consultancy. See appendix III for the full report including methodology.

2.5. Report and archiving

This report describes the background and methodology of the project, the results of the fieldwork, and provides recommendations for scheduling and future research.

The digital archive generated from the project will be archived with the RCAHMW, who share with Historic Scotland a facility for the active curation of files.

2.6. Public engagement

A small team of experienced volunteers carried out much of the excavation and recording work under the supervision of two GAT staff (plate 4). An evening tour of the site was advertised for the public on 18th September, where Jane Kenney explained the archaeological work being carried out and the results found and Jamie Davies described the historical background of the site. This was attended by 6 people and was well received (plate 5).

2.7. Copyright

3. RESULTS

3.1. Geophysical survey

Gradiometer survey
Figures 4 and 5
There was an unusually low level of magnetic variation in the soil across the whole site. A scatter of iron spikes was detected, caused by small pieces of metallic iron in the soil; probably a result of material from the farmyard added to the topsoil during manuring. The variation in the soil was however in the range of +-3nT, compared to a typical variation of about +-15nT on most sites in north Wales. This is probably a result of low levels of natural magnetic iron oxides in the soil. The data on the grey-scale plot was clipped to +-3nT revealing a range of anomalies.

The edge of the earthwork platform was defined by a slight negative anomaly (1). The earthwork was also characterised by an increase in noise (2), either indicating magnetic enhancement from activity such as burning or a spread of material used to raise or level the ground surface.

A linear anomaly toward the north-east end of the survey area is visible on the ground as a silted ditch or former field boundary (3). A similar anomaly (4) in the field the north is probably another drain or former boundary. Two other narrow linear features in this area (5 and 6) meander slightly and are probably drains or ditches from an earlier phase of agriculture. Feature 5 although partially masked by noise appears to predate the current field boundary. The area to the west of these three linear features is considerably more magnetically noisy (7 and 8) than elsewhere on the survey, possibly a result of different agricultural practices in different former fields. A patch of increased enhancement at the north (9) is the result of a recent bonfire. Few other anomalies are visible, weak narrow linear features (10 and 11) are probably the result of ploughing or erosion from paths or wheel ruts.

Resistivity survey
Figures 6 and 7
A clear linear anomaly (12), probably a drain with a high moisture content, runs along the north-eastern edge of the survey. The only other clear anomaly is a curvilinear feature (13) running across the northern end of the possible bailey. This is a low resistivity anomaly suggesting a cut feature. A possible continuation (14) is intermittently visible along the southern side. The area bounded by these anomalies is generally more variable than elsewhere on the survey and has a higher resistivity probably as a result of being drier that the surrounding field. The variation is generally diffuse suggesting spreads of material or differential drying. Some very slight linear anomalies (15) were detected running at right angles to each other. There is a possibility that these could be building foundations but they are too weak to allow definite interpretation and could alternatively be interpreted as having an agricultural origin as a result of crossing plough marks.

Conclusions
The two surveys failed to produce any conclusive evidence about the nature of the earthwork platform previously interpreted as a bailey. The gradiometer survey detected ditches elsewhere in the fields, thus demonstrating a good potential for the detection of cut features in this area, but did not identify any clear anomaly around the earthwork. A slight increase of magnetic noise within the earthwork could indicate domestic or other activity but could equally be interpreted as a spread of material designed to raise the level of a small field above the level of the surrounding wetland. The resistivity survey emphasised the raised and drier nature of the feature but did not detect any definite defences. The faint rectangular or linear anomalies in the interior were to be targeted by the trial excavation.

The fact that two different surveys did not detect a substantial ditch or any other defensive structure is significant. Geophysical survey alone cannot, however, provide proof that a feature does not exist and the edge of the earthwork was also to be investigated by the trial trench.

3.2. Topographic survey, Lidar data and aerial photographs

The topographic survey showed that the motte was oval rather than circular (figure 3). The mound of the motte measures about 25m by 22m at its base and the summit measures about 11.6m by 4.6m. It is about 4.5m high. The motte is covered with shelves, platforms and ramps, but most of these are certainly the result of badgers digging sets and even the larger features may be the result of several badger spoil heaps combined. However a

more coherent ramp on the northern side of the motte could possibly be original, although this only runs up part of the mound and does not act as an access path from base to summit (plate 6).

The bank runs along the southern and south-western side of the monument, creating the impression of a ditch on this side, which is about 4m wide (plate 1). The "ditch" becomes wider towards the north-west where it appears not as a ditch but a broad hollow. This hollow is possibly over 13m wide at its widest point, although dense brambles prevented this area being inspected fully (plate 7). On the north-western to eastern side of the monument this ditch/hollow is dug into the slope with no bank and is up to about 3m deep. A field ditch runs into the northern side of this hollow.

The bank has a breach through it on the southern side, with large beech trees growing on either side of the breach. The Royal Commission (1964, 82) mention this breach, so it is not a very recent feature. The bank is up to 2.0m high on the downhill side, and at its widest point is 8.7m wide. The bank ends on the western side of the monument with a fairly neat terminus and is replaced, after a gap, by a very straight, narrow bank/wall running north-west to south-east. This continues the line of the north-eastern side of a level area that runs up to and past the western side of the monument. The bank is a fairly recent boundary bank or wall.

The level area has a long rectangular shape and is about 130m long and up to 15m wide. It runs north-west to south-east and continues the line of a track running into it from the north-west but the main area appears to be too wide to be a track. This area appears on the OS 25 inch maps (figure 7), where it is shown to be partially enclosed by walls and partially open into the garden of Tŷ Newydd. A path runs through this garden towards the motte, opening into this area, suggesting that the area was an integral part of the garden, possibly a lawn. At present its north-western end is blocked by a dump of stone rubble and it is very wet and over grown.

To the east of the motte a broad scarp (up to 2.0m high and about 10m) runs north-east apparently from the end of the bank around the monument (figure 3). It becomes much narrower and shallower towards its north-eastern end, where it turns north-west and becomes even slighter. This feature defines the limits of the proposed bailey (PRN 59861). The scarp forms one side of a shallow channel, which opens out at its south-eastern end. A linear anomaly detected by the resistivity survey (figure 7 (12)) ran along this channel. There is a slight curving scarp to the east of this channel, up to 0.3m high, and a shallow hollow near the southern boundary of the field. Other features further east in the field were not included in the detailed topographic survey but can be seen on the Lidar data supplied to the Gwynedd Historic Environment Record (HER) by National Resources Wales.

The lidar data (figures 9 and 10) show the most easterly scarp recorded in the topographic survey to be more of a right-angled corner than seen on the ground and part of a small enclosure, probably the corner of a field. Ridge and furrow can be seen crossing this and the scarps to the west. There are more linear features to the east running roughly parallel north-west to south-east. The clearest of these can also be seen on the ground and is the remains of a field boundary (centred on SH 34734 38341) seen on an aerial photograph of 1945 (Sortie 4535 frame 3134) (figure 11). One of the other linear features is shown on the same photograph as having the remains of a hedge and this is also a field boundary, going out of use at that time. These parallel boundaries are recorded as PRN 59862. Crossing the eastern boundary of this field an oval enclosure (SH 3480 3841, PRN 59863) can be seen measuring about 79m by 60m and defined by a low bank about 4.5m wide. This feature can be seen on the ground west of the field boundary. The bank is less than 0.1m high in most places and is rather disturbed but can be seen quite clearly. Between this feature and the linear features (PRN 59862) broad, low ridge and furrows (PRN 59864) can be seen on the ground, which are not visible on the lidar data. The ridges run north-west to south-east (centred on SH34773835), and are low and poorly defined but are about 7m wide, consistent with medieval ridge and furrow. The lidar also suggests south-west to north-east aligned ridge and furrow crossing the possible field boundary corners described above in the western part of the modern field.

About 280m to the north of the motte an arcing bank or scarp can be seen in the Lidar data (SH 34676 38592), which is 114m across and opens to the north. This is close to the location of an enclosure identified as a cropmark on an aerial photograph in 1990 (PRN 4383, NPRN 402183). A plan of this enclosure is given in Ward and Smith (2001, figure 2) and they describe it as "A sub-circular enclosure, approximately 50m in diameter", and interpret it as a "possible prehistoric or Romano-British settlement" (ibid, 9). The scarp shown on the Lidar is clearly larger than the original enclosure but may form a concentric line of defence around it. A slope model created by Jamie Davis from the Lidar data (Davis 2013, figure 13) reveals the original enclosure and does show that the outer scarp is concentric to this. In any case it appears to be too early in date to have any direct significance to the motte.

3.3. Evaluation trenches

See appendix II for full list of contexts with descriptions.

Trench 1 (centred on SH 34696 38309)
Figures 13 to 17, see figure 3 for location of trench
Under 0.42m of topsoil and ploughsoil an orange-brown natural silt (1003) was exposed (plate 8). This is the loess-like silt often found in north-west Wales and presumably deposited during peri-glacial conditions at the end of the last ice age. This silt covered the entire trench except the east-north-eastern end where deposits were very different. Just at the point where it was expected from the geophysical evidence (figure 5 (1), figure 7 (12)) that a ditch would be encountered a pale grey silt (1007) mottled with considerable iron and manganese oxides replaced (1003) (plate 9). This was initially thought to be ditch fill but on excavation it was seen to merge into a mottled yellow-brown silt (1029). Like (1007) this had numerous concretions of manganese oxide but it was crazed with ice cracks. Context (1029) in turn merged with (1026) below (plate 10). This was a very firm red-brown silt with mottling and crazing due to ice cracking. The ice cracking in these deposits, as well as their very clean and undisturbed nature, demonstrated that they were natural deposits. It appears that the broad shallow hollow running north-west to south-east across the field to the east of the motte was not a ditch but a natural channel. This seems to have been infilled in glacial or early post-glacial times by silt deposits that have then been subjected to frost cracking due to peri-glacial conditions.

Cutting into the edge of this channel on its western side was a terrace-like cut sloping at an angle of about 45 degrees [1021]. This seems to be the feature that has caused the earthwork, forming a corner near where the trench was dug. From its appearance in the trench it is likely that this feature is a lynchet, produced by ploughing cutting into the natural slopes and making a steeper, more clearly defined edge. The earthwork corner would therefore then appear to be the corner of a small field. At the base of the lynchet cut was a land drain [1027] with a neatly constructed stone lining (1023) (plate 11). This must have been constructed after the lynchet had developed and is likely to date from after the small field was incorporated into the larger present field. The base of the scarp, as the lowest point in this area of the field, was probably the most appropriate location for a drain. There was no visible trace of the land drain cutting through the lower, waterlogged ploughsoil (1021), but it seems highly unlikely that it was dug from the level of the natural and must have cut through the ploughsoil, but this cut having been backfilled with the same material and then ploughed was no longer visible in section.

No trace of a substantial ditch was therefore identified in the east-north-eastern end of the trench. However there were slight linear features running across the trench. Towards the east-north-eastern end were two roughly parallel shallow gullies ([1010] and [1017]). These ran north-west to south-east. Feature [1017] was quite well defined with shallow but quite steep sides and a flat base. It was 0.4m wide and 0.07m deep. Feature [1010] was much less clear and its sides were gradually sloping and often difficult to identify. It was up to 0.9m wide and 0.12m deep. Both were filled with orange brown silt with occasional stones and gravel, mottled with iron oxide. Feature [1017] had what appeared to be a stakehole [1019] cut into its base and may have been part of a fence line or other boundary feature forming the edge of the small field defined by lynchet [1021]. In this case [1010] was probably also related to the field boundary.

At the west-south-western end of the trench was another linear feature [1009] running straight across the trench from north-east to south-west (figures 14 and 16, plate 12). Although shallow this was quite well-defined with fairly steep sides and a flat base. It was 1m wide and 0.24m deep, and filled with orange brown silt with occasional stones. It is likely that this was an agricultural feature. There is a possibility that this feature was the beam slot for a building, but further excavation would be required to demonstrate this. Along the south-eastern side of this feature was a grey-brown silty deposit (1015) with iron oxide mottling, up to 0.5m wide and 0.12m deep. This was excavated as if it was the fill of a feature, but it was very poorly defined and was probably not a genuine feature but the result of leaching adjacent to gully [1009].

None of these features corresponded to the linear anomalies seen on the resistivity survey even though the trench was located to target the corner of one of the more distinct anomalies. The evidence from the excavation therefore suggests that these anomalies are not archaeological features. This is supported by one anomaly extending well down the scarp that probably defined the field in this area. It seems unlikely that a building would have been constructed on this slope without any trace being visible on the surface. It is therefore suggested that the resistivity anomalies are large frost cracks in the glacial deposits below the surface orange silt. Frost cracks are usually polygonal rather than having nearly 90 degree angles but they can be variable.

Trench 2
See figure 3 for location of trench
Trench 2 (located at SH 34709 38328) measured 1m by 1m and was dug to a depth of 0.34m. There was no differentiation between ploughsoil and topsoil and these deposits were 0.34m deep. Beneath the ploughsoil was a grey silt with occasional stones and iron oxide mottling. This seemed to be a natural deposit and no archaeological features were revealed. There was certainly no cobbled surface present.

Trench 3
Figure 18, see figure 3 for location of trench
Trench 3 (located at SH 34705 38333) measured 2m by 1m and was dug to a depth of 0.4m. The topsoil, the active organic horizon, was a dark grey silt (3001) and the ploughsoil (3002) was slightly lighter and contained considerable amounts of iron and manganese oxides forming concreted lumps. Under the ploughsoil was a deposit of stones (3003), in grey brown silt matrix. One stone was over 0.5m long and was a sloping flat slab (plate 13). The other stones are much smaller, no more than 0.2m long, and are sub-rounded. There was no clear patterning to their distribution. Natural (3004) was exposed in the north-eastern end of the trench and this was a yellow brown slightly clayey silt with iron and manganese oxide concretions. Two holes ([3006] and [3008]) were seen cut into the natural but on excavation these proved to be animal burrows.

The nature of the stone deposit could not be determined in the small test pit. It is possible that this formed the remains of the base of a field wall, although there was no firm evidence of the stones having been deliberately laid. The stones were too irregular for this to have been a deliberate cobbled surface but the stones in this area could have been encountered by the farmer and interpreted as a cobbled surface as related to RCAHMW. The test pit may therefore have located the position of this reported feature and could be the focus for future work in the area.

While no medieval finds were discovered a fine leaf-shaped flint arrowhead was recovered from this test pit. It was found near one of the animal burrows and may have been moved from its original location by burrowing but there is no evidence it was related to any archaeological feature and is probably just the result of casual loss.

3.4. Motte ditch deposits

Figures 19 to 22
The water erosion had formed an elongated irregular channel [4008] with steep sides, c.11m long, 2.8m wide max, and 0.88m deep cutting into the fills of the ditch and the natural below (plate 2). On the north-western side it had probably undermined an old badger burrow causing part of the lower side of the motte to collapse revealing a small area of the motte make-up.

Cleaning up the erosion sections revealed the sequence of ditch fills and showed that the ditch had been cut into deposits of clean sand that extended under the motte itself (plate 14). Similar deposits seen in different sections were given different context numbers until it could be demonstrated that they were the same deposit.

At the base of the sections was a clean friable light to mid brownish grey sand with iron oxide mottling (4006, 4015, and 4027/4020). There was an expectation that the ditch would be deep and defensive in character so it was initially thought that this deposit could be ditch fill. However it was too clean and entirely free from organic matter, making it appear very ancient. Work on exposing the sections also demonstrated that the sand continued under deposits that were convincing as *in situ* parts of the motte. It is therefore almost certain that this sand is a natural deposit, presumably a fluvio-glacial deposit forming a thick well-sorted layer over the boulder clay (plates 16-18).

The position of the erosion sections did not allow a profile of the ditch [4007/4029] to be seen and only one short section gave a good impression of the edge of the ditch. This showed a fairly steep side, although much of that was composed of the edge of the motte material. It appears that much of the ditch was created not by cutting down but rather by building the motte and the southern bank up. Little of the base of the ditch was seen apart from in one section where it appeared to be flat over all but with very prominent undulations. These were probably caused by people walking in the soft deposits in the base of the ditch and pushing up some of the natural deposits.

In the base of the ditch there was a thin deposit (4005/4015), about 0.15m thick, of light grey brown loamy sand. This may have been the start of the development of a turf layer before the ditch started filling in. Most of the ditch was filled by a soft very dark grey brown silt with abundant organic matter (4004, 4014, 4011, and 4030). This had clearly built-up in waterlogged conditions. Sealing this was a sequence of brown silts and silty sands that had eroded from the motte (plates 16-18).

The composition of the motte itself was only seen in a small area and here a layer of grey brown silt (4019) with small cobbles was overlaid by a light yellowish grey sand with occasional larger stones (4018) (plate 15). Between these was a brownish-grey silt with no stones (4024), which resembled a buried soil. This may indicate a pause in the construction of the motte but might be better interpreted as a lens of turf that is part of the construction or that had collapsed from the side of the motte during construction. The sandy deposits forming the motte support the idea that the natural sand running under the site was used in its construction.

3.5. Samples from the motte ditch deposits

Macrofossils
By J. Giorgi

Preservation of macrofossils was very good and in addition to seeds and fruits, potentially more fragile vegetative matter, for example leaf material, survived in the samples, as did small roundwood and twigs. The plant assemblages consisted largely of roundwood of variable size (twig to small branch size), leaf fragments and buds. There were a modest number of fruits, seeds and nuts representing a range of trees and shrubs; large trees including *Fagus sylvatica* (beech), *Alnus glutinosa* (alder), *Quercus* (oak), and smaller trees/large shrubs, for instance, *Corylus avellana* (hazel), *Rubus fruticosus/idaeus* (blackberry/raspberry) and cherry. The cherry stones may be from the wild larger *Prunus avium* (wild cherry) or the smaller and introduced species, *Prunus cerasus* (dwarf cherry). The other plants represented in the two assemblages may be found growing wild in a range of habitats although some may have been grown as garden plants, for example some of the *Stellaria* (stitchworts) and *Lychnis* (catchflies) species. A few of the plants in the assemblage, for example *Alnus*, *Carex* (sedge), are indicative of wet/damp ground. Insect remains were abundant in the samples, including dung beetle fragments, staphylinids, caddis larva head elements, and caddis larval cases.

The assessment produced botanical evidence of an environment characterised by both large and small trees, large and small shrubs, with no significant difference noted between the two plant assemblages. The habitat is not dissimilar to the current one with the presence of beech, oak and alder, raising the question as to whether the remains are of recent origin.

Pollen
By Rob Scaife

Pollen was well preserved and abundant in both of the samples assessed. Counts of 300 pollen grains were easily achieved. The assemblages are dominated by herbs with few trees and shrubs with the exception of *Alnus* (alder) which was probably a local constituent fringing the motte or on nearby wet ground. *Alnus* is the most important tree taxon with higher values in the upper sample (24%). There are small numbers of *Betula* (birch), *Pinus*, *Quercus* (oak) and *Fagus* (beech) and *Ilex* (holly) in the lower sample. The herb assemblages are diverse. Poaceae are dominant with high values (48% and 53%). The lower sample has small numbers of cereal type (2%). *Plantago lanceolata* (ribwort plantain) and other taxa of pastoral affinity are present including Lactucoideae (dandelion types), *Rumex* (docks), *Ranunculus* type (buttercups) and other less ecologically definable pollen taxa. Although a moat, the numbers of wet-ground taxa are few and aquatic macrophytes absent. Taxa recovered include Cyperaceae (sedges), *Hydrocotyle vulgaris* (marsh pennywort) and *Typha angustifolia* type (reed mace and bur reed).

The pollen evidence suggests that there was no standing water. Marsh taxa include fen type herbs, which implies that the on-site vegetation consisted of damp ground rather than a freshwater feature. Alder is the most important taxon and was probably growing in this damp habitat or, in adjacent wetland. The pollen suggests that in the vicinity of the motte was a local pastoral habitat. Small numbers of cereal pollen are also present. Ash, beech and holly are all present in the lower sample and, were probably growing in close proximity to the site.

No definite garden plants were identified but as these are mostly insect pollinated they are generally poorly represented. The absence of *Cannabis* type pollen (hemp) may indicate a post-medieval age, but such negative

evidence is not reliable. This was a common cultigen of the medieval period and frequently occurs in pollen diagrams of this period.

Discussion
By D. James Rackham

One of the primary objectives of the environmental analysis was to establish whether the ditch fills reflected early deposits that might be contemporary with the motte or the medieval period, or whether these deposits represented later fills, after the ditch had been 'cleaned' as part of a programme of landscaping the gardens around the nearby 17th century house and its later additions.

The dominance of tree and shrub macrofossil debris in both the primary and secondary ditch fills indicates that these species are local and almost certainly overhung the motte ditch or perhaps even grew in the ditch. Such a scenario would not have been allowed during the period when the motte was in use. We can therefore probably rule out the ditch deposits as being contemporary with the motte while it was in use. Although there is a little mineral residue present in the primary fill this is not sufficient to indicate any substantial erosion of the motte bank and outer ditch bank into the ditch. It is almost inconceivable that such a small coarse mineral component would be present in a ditch that had been open for many centuries unless the surrounding banks were extremely stable and well vegetated. There is a sharp boundary between the underlying 'natural' sands and the primary ditch fill and no indication of significant water-lain sediments. This implies a cleaning episode that cut right down to the 'natural' sands at a time when the banks of the motte and adjacent land were already wooded.

A 78g piece of slate from the primary fill may indicate a late date for this cleaning although given the degree of wear on the piece it could be derived from local diamicton (till/boulder clay) and not introduced by human activity.

Pollen can often give clues as to the broad date of deposits, and in the post-medieval period the advent of plantations for wood, specifically pine, can often be recognised by an increase in pine pollen in the deposits, as can exotics and introduced species such as walnut, a tree introduced to Britain during the Roman period. The pollen has not given a definitive answer but also affords some clues. To begin with it should be noted that a wooded landscape affords a canopy of leaves that reduces the pollen rain from more regional sources leading to the domination of local vegetation. Since the macrofossils indicate a probable tree canopy around the ditch then much of the pollen may reflect the local landscape rather than a more regional picture. Oak, beech, ash, holly and alder are all growing at the site today and present in the pollen assemblage, although alder is the dominant pollen type. Pine occurs at about 4%, enough to perhaps argue for a local source but not enough to be confident that it derives from plantations. *Cannabis* type pollen is recorded from the 12th century at Lyn Cororion, near Bangor, (Watkins 1990) and by Grant (2007) in probable 13-14th deposits in the Denbigh Moors. The absence of *Cannabis* type pollen, an indicator of the cultivation of hemp throughout much of the medieval period, from the two samples is perhaps suggestive of a post-medieval date but by no means reliable when based upon just two samples.

Finally the local history of beech in North Wales affords a possible clue to the date of the sediments. Beech pollen is noted in the primary fill and fruits and cupules are recorded as macrofossils in both fills so the tree is clearly present in the immediate vicinity during the build-up of these deposits. Historical records and to some extent palynological evidence suggests that beech did not appear in North Wales until the 18th century, or was very rare before that date. From this period onwards many thousands of trees were planted.

While no single piece of evidence can confidently date the deposits the combination of this evidence, while not conclusive, would point to the fills of the motte ditch being of post-medieval date, at least probably post 1600 AD. If this is the case then a radiocarbon date would give no further precision since the 'wiggle matching' for material after about 1620 AD will normally give a series of possible date ranges that may include 17th, 18th and 19th century ranges. Only medieval material is likely to give a reasonable date and the evidence would argue against this being the result. It was therefore concluded that no radiocarbon dates would be obtained from the material in the ditch.

Besides the possible date of the deposits the plant evidence gives a fairly clear indication of the immediate environment and elements in the nearby landscape. It is quite clear from the macrofossil remains that the banks of the motte and presumably the outer bank of the ditch were tree covered, essentially woodland, while the deposits were forming. By far the bulk of the fragmented vegetable matter is composed of leaf fragments and fragments of leaf skeleton indicative of tree and shrub leaves rather than herbaceous material. This combined

with the other macrofossil evidence for trees suggests that the immediate environment was very similar to that of the present day. The pollen evidence suggests the presence of birch, oak, ash, beech, holly, hazel, alder and pine, while the macrofossils show beech oak, alder hazel, blackthorn and cherry. Some of these are likely to represent local growth but beech, holly, cherry and pine may reflect plantings associated with the 17th century and later gardens around the house. There is a marked absence of aquatic plant species in the ditch fills but fragments of caddis fly larvae and their cases occur in numbers clearly indicating water. It is possible that a fairly stagnant water filled moat shaded and overhung with trees could have lacked most of the normal aquatic plant and invertebrate life that is common in open water.

The pollen evidence is equally lacking in aquatics, although marsh and damp ground are evident. There is a significant pastoral element, which is relatively lacking although not entirely absent from the plant macrofossils, suggesting nearby pasture but perhaps not adjacent to the ditch, and perhaps supported by the presence of dung beetles although these can obviously fly in. The cereal pollen could be an indicator of local arable but as noted above could derive from human or animal (cattle) faecal material, or even been blown in from nearby crop processing activities. The motte sits at the western end of a field which could easily have been the source for both the pastoral elements and the cereal pollen at different times in the past.

It would be possible to radiocarbon date some small roundwood from deposit 4015 but this is unlikely to add any precision to the current estimates of the date of the deposit. With a lack of precise dating it is difficult to argue for any further environmental work on the recovered samples. Detailed post-excavation analysis of the plant and insect macrofossils and the identification of the species of the wood recovered would also expand the interpretation of the local environment at the time the deposits were forming but without being able to tie this down much more precisely in terms of chronology such work has limited value. The authors of the specialist report therefore did not recommend any further study of the samples or radiocarbon dating of material from the basal fills of the ditch.

3.6. Finds

Very few finds were recovered from the site. Occasional sherds of post-medieval pottery from the topsoil were not retained, as they were considered to be of minimal archaeological value. As metal-detecting had not been proposed in the scheduled monument consent it was not possible to carry out a metal-detecting survey of the possible bailey area, but a metal-detector was used to recover metal objects from the spoil excavated from trench 1.

Seven iron objects were recovered from the topsoil and ploughsoil in trench 1 by metal detecting. These weigh a total of 284g and include 3 large hand-made nails (figure 23). As these are from the topsoil it is impossible to say if the nails originate from a structure nearby, a structure on the motte or whether they have been introduced in manure and could have come from Tŷ Newydd or other buildings in the area.

Arrowhead (PRN 59865)
By George Smith
A leaf-shaped arrowhead (SF01) was recovered from the ploughsoil (3002) in trench 3 ((SH34703833) see figure 18 for find location). It was found just adjacent to animal burrow [3006] and had probably been moved from its original location by burrowing, but the original location must have been close by. There were no features in trench 3 that could be associated with the arrowhead.

The leaf-shaped arrowhead is made of yellow-brown flint, 26mm long, 17mm broad and 2.5mm thick (figure 23). It is finely worked with shallow invasive, all-over, bifacial pressure flaking. No original cortex or primary flake surface remains. Parts of the edges have fine abrupt secondary flaking or rubbed edges to finish the shaping. The tip has been broken off by a clean snap break and the break has the same patina as the rest so probably is as old as the arrowhead itself, rather than more recent. The break is probably not an impact fracture so possibly accidental and not deliberate as some flake facets are truncated by the break and there has been no secondary flaking after the break occurred. The arrowhead would have been about 35mm long originally.

Artefacts of yellow-brown flint occur frequently in Mesolithic and Neolithic material from Llŷn and must derive from pebble flint available locally. This piece is very fresh and suggests that it had not been subject to surface exposure or to plough damage prior to being found. Arrowheads often occur as isolated examples, presumably through loss, or as broken examples, presumably discarded. The lack of other pieces of flint here suggests that this is an isolated loss, rather than part of settlement activity.

Leaf-shaped arrowheads are type artefacts of the Early Neolithic although examples have been found in Early Bronze Age contexts. Similar examples have been found at Early Neolithic chambered tombs on Anglesey and in Ardudwy and in an Early Neolithic settlement at Parc Bryn Cegin, Bangor. The shape of this example is the commonest type of leaf-shaped arrowheads and it falls midway in the overall size and shape class of recorded leaf-shaped arrowheads and the class 3B as described by Green (1984, 20-24). It is slightly on the small size of the mean and Green has recognised that smaller examples are commonest in Western Britain, probably as a result of the reliance on smaller pieces of raw material there (Green 1980, 67-68).

4. DISCUSSION

4.1. The motte and ditch

The topographic survey has improved the representation of the motte as existing OS surveys show a circular motte with a concentric ditch. The Royal Commission (RCAHMW 1964, 82) accurately noted the "large hollow excavated on the N.N.W.", rather than a concentric ditch of even width. Their interpretation of this hollow as a quarry for the motte is almost certainly correct. The slope of the hill would enable a ditch/quarry dug on the uphill side to supply enough material for the motte, and probably for the bank was well. By using the sloping ground less material would have been needed to create the motte as *in situ* material could be used for much of the height of the motte on the uphill side. This means that the ditch on the downhill side would not have had to be very deep, if it was needed at all.

The underlying bedrocks of this area are Ashgill Rocks; mudstones, siltstones and sandstones, but more importantly the superficial deposits are Quaternary tills, including "outwash sand and gravel deposits from seasonal and post glacial meltwaters" (Geology of Britain Viewer). Much of this part of the peninsula is covered by these deposits but they are very variable. The motte seems to have been deliberately located on a pocket of sand, making construction as quick and easy as possible.

The quarry hollow was converted into a ditch or even a moat by the addition of the bank on the southern and western sides. The present author (JK) has doubts about the date of bank and whether there was a complete ditch or moat around the motte when it functioned as a defensive site. The bank is essentially a dam and there is nothing to prevent attackers breaching it on the southern side and draining the moat, which in any case would not have been deep, making it seem a poor design defensively. Also only a recent, narrow, straight bank joins the main bank to the higher ground to the north, and then only after a gap (figure 3). The vegetation cover makes it difficult to search for an earlier bank continuing through here but none could be seen.

It is peculiar that the bank on the western side of the monument extends into the level area to the west, possibly a lawn, instead of this being designed around the monument. It almost appears that the eastern boundary of this possible lawn was designed to exclude the motte from the garden then, later, the bank was built over part of that boundary, causing the whole monument to be included as part of the garden. The construction of the bank with the inflowing field ditch would lead to the creation of a water-filled moat around the motte. It seems likely that the current breach in the southern side of the bank was originally an outflow, possibly with a sluice to control the water level. The gap between the western end of the main bank and the narrow bank would provide access from the garden to the moat. Mrs Jones of Murmur y Nant, who has lived near the site all her life, remembers stories of the ditch holding water and of small boats being used on the moat. However the OS 25 inch maps from 1st (1889) to 3rd (1918) edition show trees growing on the ditch, so it was not a water-filled moat at that time. The pollen and macrofossil samples recovered during this project also suggest marsh rather than open water.

It seems likely that the motte with a water-filled moat was incorporated as a garden feature for Tŷ Newydd at some point in its history. It is possible that the bank was originally constructed to create a water feature rather than part of the original defences. The deposits sampled from the ditch appear to be from after the motte was abandoned and had become over-grown. Earlier deposits are unlikely to survive as the clean sandy base of the ditch, with no erosion deposits, indicates that it had been cleaned out back to the natural sand. If a water feature was maintained into the 19th century the last clearing event could have been quite recent.

Tŷ Newydd is recorded on the OS card (OS card SH33NW13) as a late 17th century house with later additions but the Royal Commission suspect that it is the remains of, or replacement for, a larger house, which originally extended further east, making it centrally placed in relation to the gardens (NPRN 16971). The first reference to

the name ‘Y Tuy Newydd’, comes in 1648 from a marriage settlement, and the house was certainly on the current site by 1682 as a date stone with that date has been found in the house (Williams 1999). The square garden immediately to the south of the house might be the remains of a 17th century formal garden but the wider gardens appear more 18th century in style and it is within these that the moat might fit. A list of books belonging to Owen Lloyd junior, dating to 1690, includes 6 books on plants and gardening, suggesting that he was interested in gardening. He was about 20 when he left Tŷ Newydd to study in London, so possibly he had a hand in redesigning the garden in his youth. He only lived in Tŷ Newydd for a year after returning from London before moving to Bangor and then living in Llanllyfni (Williams 1999 and pers. com.). He therefore had little chance later in life to have created the garden. Whether Owen Lloyd was responsible for a formal garden at Tŷ Newydd or not his involvement with the house seems too early for him to have been responsible for creating the moat as part of an 18th century-style romantic garden landscape. The date this occurred, if indeed it is correct to see the bank as a later addition, is therefore unknown.

The current works have provided no dating evidence for the motte itself and its history is unclear. The history of this site has been considered in detail by Jamie Davies (2013a and b). He discovered an unpublished document in the RCAHMW archive suggesting that the site was occupied by one of the native elite of the area in the 12th or 13th century and proposing there may have been a timber dwelling on the site as a predecessor to Tŷ Newydd (the New House). It is still possible that some of the anomalies identified on the resistivity survey are the remains of a timber building, and that feature [1009] from the present excavation is a beam slot related to this. However the present work has been unable to prove this.

The motte itself is typical of the Norman period and although it may have been used later it is likely to have been constructed in the late 11th century. Davies concludes that it was unlikely to have been constructed during the week long raid of the Normans into the Llŷn Peninsula in 1075, which is the only documented record of Normans in the area (Davies 2013b, 98). He considers that the motte is likely to date from the 1081-1093 occupation by the Normans of north-west Wales, but it is also possible that the style of castle was rapidly adopted by local lords and that it was built then as a defence against the Normans or against other native lords. The sands on which the motte is build would have made its construction easy and fast, so it is possible that it was built quickly and used for only a short period in response to rapidly changing local conditions.

4.2. The proposed bailey

The evaluation trench failed to find a defensive ditch as would be expected if the land to the east of the motte held a bailey. In fact it suggested that the potential ditches detected on the gradiometer and resistivity surveys were not ditches but the remains of infilled palaeo-channels of probable late ice age or early post-glacial date. Certainly the main linear anomaly detected in the resistivity survey (figure 7 (12)) is produced by a channel of this type. The earthwork visible on the ground surface is best explained as the boundary of a small field enhanced by ploughing into a lynchet. The anomaly proposed as a possible southern boundary to a bailey on the resistivity survey does not correspond to any feature on the ground, which here is sloping away quite distinctly to the south. Some of the linear features identified inside the area also seem to fit awkwardly to the slope of the ground and the existing earthworks. The evidence from the evaluation trench suggests that these are not genuine archaeological features, but are probably geological. However the presence of some building remains cannot be ruled out. The fact that the gully [1009] aligned with one of the resistivity anomalies could possibly indicate that it was part of a large structure but might be most likely to indicate that these are agricultural furrows running across the site. The gradiometer survey picked up similar anomalies that are probably furrows or ploughmarks running almost at right angles, suggesting at least two phases of cultivation in this area. The strong magnetic signal picked up across this area by the gradiometer is likely to correspond to the orange, iron rich silt (1003) seen in the base of the trench.

It must be concluded that this work has disproved the existence of a bailey on this side of the motte and makes the existence of remains of undefended buildings less likely.

Trench 3 has located the possible reason for the report of a cobbled surface to the east of the motte. While the stone deposit does not appear to be a cobbled surface a much wider area would need to be excavated to be sure of its nature and origin, whether natural or man-made.

4.3. Other features

While there may not be a bailey in the field to the east of the motte there does seem to be remains of at least two phases of field systems. The scarp initially thought to define the bailey and another sub-rectangular scarp to the east are suggestive of small rectangular fields typical of Iron Age farming. The possibilities of these being early is supported by the traces of ridge and furrow seen on the Lidar data running right across these, not respecting their boundaries (figures 9 and 10). These early fields may be related to the sub-oval enclosure (PRN 59863), which is possibly Iron Age in character.

These ridges and furrows are probably medieval. Certainly the north-west to south-east ridge and furrow in the eastern part of the modern field is very suggestive of a medieval date. Many of the north-west to south-east field boundaries in this area appear to enclosed groups of ridges and preserve their alignment. The geophysical survey detected another boundary on the same alignment in the field to the north of the motte (figure 5, (4)). Further support for an open field in this area is given by the name of a farm to the south-east being called Llain-goetre. "Llain" is a term meaning "strip" used to refer to arable strip fields. There appears to have been open strip fields in this area, and although it is presumed that they are later in date than the construction of the motte, it is not impossible that these fields were first set out when the motte was in use, largely obliterating remains of earlier "celtic fields".

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Aerial photograph from Cardiff Aerial Photography Unit
Sortie 4535 (original sortie number 106G/UK 664), frame 3134, date 14th August 1945

7. APPENDIX I: Relevant NMR and HER records

7.1. List of sites on figure 1

HER

PRN	Site Name	Type	Period
439	Inscribed Stone, Holy Cross Church, Llannor	Inscribed Stone	Early Medieval
1532	Tŷ Newydd Motte and Bailey Castle, Llannor	Motte And Bailey	Medieval
1534	Standing Stone, Tir Gwyn	Standing Stone	Bronze Age
2264	Holy Cross Church, Llannor	Church	Medieval
3651	Flint Flakes, Findspot, Cae Maenhir	Findspot	Prehistoric
4383	Enclosure, W of Mela, Llannor	Enclosure	Prehistoric
6472	Bodfel Township	Township	Medieval
6532	Penmaencybi Medieval Township	Township	Medieval
6540	Penmaencyfail Medieval Township	Township	Medieval
7029	Llannor Parish Church	Church	Medieval; Post-Medieval
7312	Early Christian Burials, Llannor	Burial	Early Medieval
11939	Bodfel Hall, Boduan	Building	Post-Medieval
12271	Llanerch	Building	Post-Medieval
12586	Mela, Hay Barn	Building	Post-Medieval
35997	Tŷ Newydd Gardens, Llannor	Garden	Post-Medieval
35998	Pond and Leat, W of Tŷ Newydd	Pond	Post-Medieval

NMR

NPRN	Site Name	Type	Period
7017	Llannor Chapel (Bethania; Welsh Calvinistic Methodist)	Chapel	Post Medieval
7018	Pentre-Uchaf Calvinistic Methodist Chapel (Pentreuchaf), Pentre-Uchaf, Pwllheli	Chapel	Post Medieval
16971	Tŷ Newydd	House	Post Medieval
26047	Bodfel Hall, Llannor	Gatehouse	Post Medieval;17th Century
26705	Llanerch	House	Post Medieval?
31400	Mela, Hay Barn	Barn	Post Medieval?
86287	Bodvel Hall, Garden, Pwllheli	Country House Garden	Medieval?
86390	Gwninger; Cwning Gaer, Garden, Boduan	Country House Garden	Post Medieval
86507	Tŷ Newydd, Gardens, Llannor	Country House Garden	Post Medieval
301081	Holy Cross Church, Llannor	Church	Medieval; Post Medieval
302309	Y Mount	Motte	Medieval
308088	Tir-Gwyn, Standing Stone II (N)	Standing Stone	Bronze Age
402183	Mela, Cropmark enclosure west of	Enclosure	Unknown
406787	National School, Llannor	National School	Post Medieval
408479	Cottage Near Tŷ Newydd, Llannor	Cottage	Post Medieval
411677	Melin Llannor, Site of	Corn Mill	Post Medieval
417636	Hen Siop, Llannor	Building	Post Medieval

7.2. Details of sites at Tŷ Newydd

National Monuments Record

NPRN 16971: Tŷ Newydd, Llannor
Period: Post medieval
Thought to be a l.17th C. house with later additions. (source Os495card; SH33NW13)
The scale of the house does not seem appropriate for the extensive gardens that can be associated with it (Nprn86507). AP's (RCAHMW AP965035/46) appear to show traces of a larger structure immediately to the E, centrally placed in relation to the garden enclosure on the S (OS 1891). RCAHMW AP965035/45-6, J.Wiles 22.09.03

NPRN 86507: Tŷ Newydd, Gardens, Llannor
Period: Post medieval
1. An area of former gardens, c.170m E-W by 120m, to the S of Tŷ Newydd.
OS 1891 depicts a square enclosure, c.30m across, traces of which can be seen on AP in a pasture field (RCAHMW AP965035/45-6), immediately S of what may have been the site of a now vanished mansion (see Nprn16971). This axis is extended by an apparent open swathe through the wooded area, further to the S. The area around the motte (Nprn302309), on the SE, may have been included in the garden area. J.Wiles 22.09.03
2. This garden is depicted on the Second Edition Ordnance Survey 25-inch map of Caernarvonshire XXXII, sheet 15 (1900). Its main elements on that map include woodland, possible formal garden, walled garden and a possible viewing platform. C.H. Nicholas, RCAHMW, 10th August 2006.

NPRN 302309: Y Mount, Llannor
Period: Medieval
A ditched motte, c.27.4m in diameter and 6.1m high, having a summit area 8.0m in diameter. The ditch, counterscarped on the S, may have been wet. A cobbled area, c.40m ENE, may indicate the site of buildings. (source Os495card; SH33NW5)
This feature may have been involved in Tŷ Newydd park/gardens (Nprn86507). RCAHMW AP965035/45-6, J.Wiles 22.09.03

NPRN 402183: Mela, Cropmark enclosure west of
Period: Unknown
Cropmarks of a sub-circular ditched enclosure, about 50m in diameter, showing possible internal features, or structures. Source: Ward & Smith 2001 (Stud. Celt. 35), 1-87 [No.7].

NPRN 408479: Cottage near Tŷ Newydd, Llannor
Period: Post medieval
The cottage near Tŷ Newydd is a small, stone-built, one-and-a-half storey cottage. Modern mapping seems to indicate that it has been demolished. S.L. Evans RCAHMW 2008

Gwynedd Historic Environment Record

PRN 1532: Tŷ Newydd Motte and Bailey Castle, Llannor
Period: Medieval
Y Mount, SE of Tŷ Newydd, a motte at about 200ft above O.D. on ground falling gently to the SSE. A large hollow was excavated on the NNW furnished material for the motte and for a bank on the South and lower side to retain water from a small stream in the moat. It has a modern breach for drainage. No outworks can be traced nor an entrance, but a cobbled area is reported in the field to the east. (RCAHMW 1964, 82)
No change. The cobbled area to the east is not visible on the ground but the centre of it at SH34703832 was indicated by Mr J. Gwilym Jones, Mrs L .Williams. Published survey revised (25"). OS card SH33NW 5
No change. OS card SH33NW 5

PRN 4383: Enclosure, W of Mela, Llannor
Period: Prehistoric
Enclosure, roughly circular but probably not a ring ditch, visible as a dark-green parch-mark (ditch) in fields apparently grazed by sheep: dry-ness of surrounding area suggests it may be on a slight rise. Recognised and photographed by Musson and Thompson, 25/07/90.

PRN 35997: Tŷ Newydd Gardens, Llannor
Period: Post medieval
Walled garden and woodland shown on early OS maps. Motte and bailey perhaps incorporated into the garden (PRN 1532). (Ordnance Survey 1889, 1900 & 1918)

8. APPENDIX II: List of contexts from the Tŷ Newydd excavations and recording

8.1. Trench 1

Context no.	Type	Description	Interpretation
1001	Layer	Dark grey sandy silt with few stones	Topsoil
1002	Layer	Mid brown sandy silt with occasional small stones	Ploughsoil
1003	Layer	Friable orange-brown silt with occasional stones	Natural loess-like silt deposit, periglacial
1004	void	Renumbered as 1022	
1005	void	Renumbered as 1021	
1006	Layer	Stony deposit with very pale yellow-brown silt matrix, with lumps concreted by manganese oxide	Thin layer of stones collecting at base of ploughsoil and mixing with the top of the natural
1007	Layer	Pale grey silt mottled with considerable iron and manganese oxide, which creates very hard concreted lumps	Pale surface of natural silts
1008	Fill	Orange brown silt with occasional stones	Fill of [1009]
1009	Cut	Shallow, straight linear feature with fairly steep sides and flat base. Aligned NE-SW. 1m wide and 0.24m deep.	Probable agricultural feature, or perhaps a beam slot
1010	Cut	Shallow, fairly straight linear feature with gradually sloping sides and fairly flat base aligned NW-SE. NE side very indistinct. Up to 0.9m wide and 0.12m deep.	Shallow gully, probably agricultural
1011	Fill	Orange brown silt with occasional stones and gravel, mottled with iron oxide	Fill of [1010]
1012	void	Renumbered as 2002	
1013	void	Renumbered as 3001	
1014	void	Renumbered as 3002	
1015	Fill	Grey-brown silty sand with occasional small stones. Iron oxide mottling.	Fill of [1016]
1016	Cut	Shallow, rather irregular gully with gradually sloping sides and slightly undulating base. Aligned NE-SW. Up to 0.5m wide and 0.12m deep. Not well defined.	Shallow gully, probably agricultural or natural
1017	Cut	Shallow, straight linear feature with fairly steep sides and flat base. Aligned NW-SE. 0.4m wide and 0.07m deep.	Shallow gully, probably agricultural
1018	Fill	Orange brown silt with occasional stones and gravel, mottled with iron oxide	Fill of [1017]

Context no.	Type	Description	Interpretation
1019	Cut	Small sub-circular cut with tapering base. 0.17m diameter, 0.14m deep	Probable stakehole
1020	Fill	Yellowish grey silty sand	Fill of [1019]
1021	Cut	Straight, fairly steep cut edge facing ENE. No opposite side to the cut.	Lynchet/field edge terrace
1022	Layer	Pale grey-brown sandy silt with occasional stones.	Deposit to ENE of lynchet [1021], relict ploughsoil or alluvial deposit
1023	Structure	Small unworked stones lining land drain [1027]. Line of stones down each side and small capping stones over the top.	Land drain lining
1024	Cut	Irregular sub-circular hollow. 0.10m by 0.08m, 0.10m deep	Not convincing, just soft patch in natural
1025	Fill	Yellowish grey silty sand	Fill of [1024]
1026	Fill	Very firm red-brown silt with mottling and crazing due to ice cracking introducing a very pale silt into the cracks.	Natural deposit, possibly fluvio-glacial silt deposit subjected to periglacial frost action
1027	Cut	Linear feature with near vertical sides and flat base. Aligned NW-SE. 0.35m wide and 0.2m deep.	Land drain
1028	Fill	Soft dark grey sandy silt	Fill of land drain [1027]
1029	Layer	Mottled yellow-brown firm silt with few stones but many concreted lumps of manganese oxide. Crazed with ice cracks.	Natural deposit, possibly fluvio-glacial silt deposit subjected to periglacial frost action

8.2. Trench 2

Context no.	Type	Description	Interpretation
2001	Layer	Dark grey silt with few stones, 0.34m deep	Topsoil/ploughsoil
2002	Layer	Slightly clayey grey silt mottled with iron oxide	Natural deposit

8.3. Trench 3

Context no.	Type	Description	Interpretation
3001	Layer	Dark grey silt with few stones, 0.15m deep	Topsoil
3002	Layer	Dark grey silt with occasional stones and considerable amounts of manganese oxide concretions, 0.25m deep	Ploughsoil
3003	Layer	Deposit of stones in grey brown silt matrix. One stone is over 0.5m long and is a sloping flat slab. The other stones are much smaller, no more than 0.2m long, and are sub-rounded.	Stone deposit, too irregular to be a cobbled surface
3004	Layer	Yellow brown slightly clayey silt with iron and manganese oxide concretions	Natural
3005	Fill	Soft orange brown clayey sand with some stones	Fill of [3006]
3006	Cut	Small oval cut with irregular base leading to tunnel (0.12m diameter, 0.12m deep)	Animal burrow
3007	Fill	Soft orange brown clayey sand with some stones	Fill of [3008]
3008	Cut	Small sub-oval cut with irregular base leading to tunnel (0.22m diameter, 0.25m deep)	Animal burrow

8.4. Motte ditch

Context no.	Type	Description	Interpretation
4001	Layer	Thin layer of loose, dark brown leaf mould	Leaf mould (same as 4009)
4002	Layer	Soft light grey brown silty sand	General erosion deposit from motte (same as 4010)
4003	Fill	Mid grey brown sandy silt with occasional stones	Upper ditch fill containing eroded material from motte
4004	Fill	Soft very dark grey brown silt with occasional lenses of sandy loam. Abundantly organic.	Organic rich fill of ditch [4007] (same as 4014)
4005	Fill	Soft light grey brown loamy sand with occasional small stones	Basal deposit in ditch [4007], possible stabilisation layer/incipient turf layer (same as 4015)
4006	Layer	Friable light to mid brownish grey sand with iron oxide mottling	Natural sand deposit underlying motte (same as 4006)
4007	Cut	NW side fairly steep and base probably flat. Up to 0.7m deep	Cut for ditch around the motte (same as [4029])

Context no.	Type	Description	Interpretation
4008	Cut	Irregular cut with steep sides, c.11m long, 2.8m wide max, 0.88m deep	Erosion channel caused by water flowing in motte ditch
4009	Layer	Thin layer of loose, dark brown leaf mould	Leaf mould (same as 4001)
4010	Layer	Soft light grey brown silty sand	General erosion deposit from motte (same as 4002)
4011	Fill	Soft dark grey organic clayey silt	Organic fill of ditch [4029] but mixed with some erosion material from motte
4012	Layer	Red brown clayey silt with some organic matter	Erosion from motte
4013	Fill	Soft mid grey brown silt with occasional pebbles	Slump from motte or upper fill of ditch [4007]
4014	Fill	Soft very dark grey brown silt with occasional lenses of sandy loam. Abundantly organic.	Organic rich fill of ditch [4007] (same as 4004)
4015	Fill	Soft light grey brown loamy sand with occasional small stones	Basal deposit in ditch [4007], possible stabilisation layer/incipient turf layer (same as 4005)
4016	Layer	Friable light to mid brownish grey sand with iron oxide mottling	Natural sand deposit underlying motte (same as 4006)
4017	Layer	Dark brown organic silt	Soily slumped material, probably from badger sett.
4018	Layer	Light yellowish grey sand with occasional stones, sub-rounded cobbles up to 0.25m long	Motte material
4019	Layer	Grey brown silt with small cobbles up to 0.12m long	Motte material
4020	Layer	Yellow brown sand	Natural sand
4021	Layer	Soft red brown silt with few stones	Erosion deposit from motte
4022	Fill	Light grey clayey silt, very mixed with some very organic material and some pale clay	Upper fill of ditch [4029] mixed with eroded material from motte or ditch edge
4023	Fill	Soft red brown organic silt	Fill of ditch [4029]
4024	Layer	Brownish-grey silt with no stones	Thin lens between 4018 and 4019. Possible trace of buried soil or collapsed turf
4025	Fill	Soft red brown organic silt	Fill of ditch [4029]
4026	Fill	Yellow brown sandy silt	Lens of erosion overlying ditch fill
4027	Layer	Pale yellowish grey sandy silt with iron staining	Natural deposit

Context no.	Type	Description	Interpretation
4028	Layer	Soft mid brown organic silt	Erosion deposit
4029	Cut	N side seems fairly gradual but section cuts at a poor angle through the ditch, flat base except there are very pronounced undulations possibly caused by people walking in the soft deposits in the base of the ditch.	Cut for ditch around the motte (same as [4007])
4030	Fill	Soft very dark grey clayey silt, with high organic content	Fill of ditch [4029]

9. APPENDIX III: ENVIRONMENTAL ARCHAEOLOGY ASSESSMENT

TY NEWYDD: ENVIRONMENTAL ARCHAEOLOGY ASSESSMENT

John A. Giorgi[1], Rob G. Scaife[2] and D. James Rackham[3]

9.1. Introduction

Excavations and survey carried out by Gwynedd Archaeological Trust at Ty Newydd Motte included the cleaning of an eroded section across the ditch around the motte (Fig. 1; Kenney *et al* 2015). The deposits in the base of the ditch included well preserved waterlogged material so two bulk samples were taken from the basal organic silt fills [4015] and [4014] of ditch [4007] for the potential recovery of biological remains and three small monolith (box/kubiena) samples were taken, one from each layer (002 and 003 – Table 1, Fig. 1) and a third (001) spanning the two basal fills and including the underlying natural sand deposits (Fig. 2) the ditch was cut through. The samples were taken to establish the character of the local environment during the formation of these deposits and any indications of the date of the sediments.

The age of these ditch fills is not known, although the motte itself is thought to have been constructed in the late 11th century AD (Kenney *et al* 2015), and the recent archaeological work on the site considers that several features of the site are likely to be garden features of recent date associated with the incorporation of the motte into the garden landscape (Kenney *et al* 2015) and it is possible that the ditch fills sampled could be of recent date. This has been tackled through consideration of the pollen and macrofossils. Radiocarbon dating of the basal deposits was considered but as argued below this was not considered to be worthwhile.

Table 1. Environmental samples collected from the motte ditch at Ty Newydd

Sample	context	feature	Volume l.	Weight kg.
001	4014/4015/4016	Basal fills of ditch 4007	Monolith	-
002	4014	Secondary fill of ditch 4007	Kubiena tin	-
003	4015	Basal fill of ditch 4007	Kubiena tin	-
004	4014	Secondary fill of ditch 4007	7	6
005	4015	Basal fill of ditch 4007	8	8

9.2. Bulk samples

Methods

The volume of the two bulk soil samples was 7 and 8 litres and both were processed by flotation in a Siraf type tank (Williams 1973) using a 0.25mm flotation sieve and an internal residue mesh of 0.5mm. The organic fractions of the samples were washed over while the small mineral residues (Table 2) were dried and were sterile in terms of environmental and archaeological finds. Both samples, however, produced very large organic flots (over 1000ml), which were stored wet, a small sub-sample (150ml) from each being scanned for this assessment. The flots were scanned wet using a binocular microscope with a magnification up to x30, with the presence of environmental finds (i.e. waterlogged plant remains, insects, etc) being noted and their abundance and species diversity recorded on the assessment sheets.

Results

Sample 5 (4015) washed down to a small residue of mudstone and sand, with a worn lump of slate, but sample 4 (4014) produced virtually no mineral residue, just a little mudstone and sand (Table 2). The bulk of the material retained in both samples was organic, with wood and twigs particularly abundant. The two samples produced rich 'waterlogged' plant assemblages with Table 3 showing preliminary results from the assessment.

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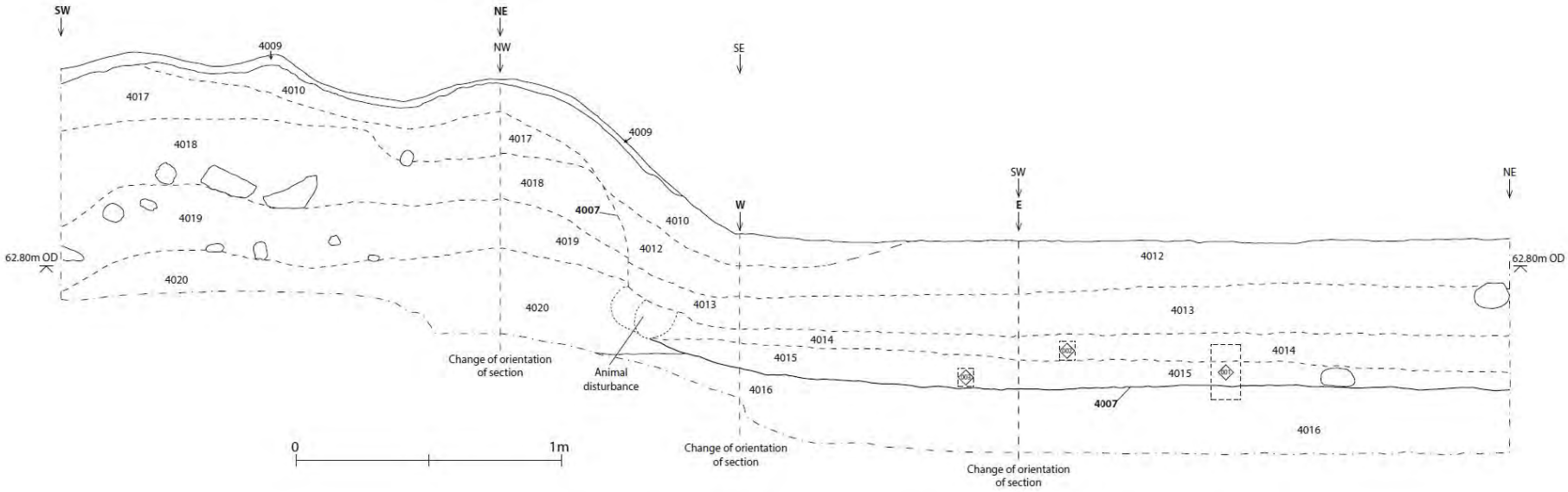

Figure 22. South-east facing and south-west section of 'ditch' and motte deposits

Fig. 1. *South-east facing and south-west section of the 'ditch' and motte deposits with the three small ditch monoliths marked. (Section supplied by GAT).*

Taxonomic order follows Stace (2001). This is not intended to be a comprehensive list of all the botanical remains in the two flots because only easily identifiable botanical material was recorded, mainly fruits and seeds unless otherwise specified. It does, however, provide an indication of the range of plant material present in the two samples. Preservation was very good and in addition to seeds and fruits, potentially more fragile vegetative matter, for example leaf material, survived in the samples, as did small roundwood and twigs.

***Fig. 2**. Profile sampled in monolith <001> with natural deposit 4016 at the base and 4015 and 4014 the primary and secondary fills of the motte ditch.*

Table 2. Assessment data for the bulk samples – Ty Newydd

sample	context	vol. l.	mineral residue wt g.	waterlogged flot vol ml	wood *	seeds */# waterlogged	insects *	
004	4014	7	4	1900	5	5/3	5	
005	4015	8	184	1700	5	5/3	5	Slate-78g

* frequency of items: 1=1-10; 2= 11-100; 3=101-250; 4=251-500; 5=500-1000; 6+>1000
# diversity as follows: 1=1-3; 2=4-10; 3=11-25; 4=26-50 taxa

The sample flots were not paraffin floated but a small portion of the flot was scanned and sorted for insect remains. On the basis of this small sample it is evident that insect remains are abundant in the sample and paraffin flotation would be required to concentrate these into a manageable size. The small group of scanned remains include dung

beetle fragments, staphylinids, caddis larva head elements, caddis larval cases and presumably many more remains if the whole sample was to be paraffin floated and sorted. The latter are an indicator that the ditch carried standing water for at least some part of the year, but not necessarily permanently.

9.3. Plant assemblages

By J.Giorgi

The plant assemblages consisted largely of round wood of variable size (twig to small branch size), leaf fragments (together with abcission pads) and buds, which it may be possible to identify further. There were a modest number of fruits, seeds and nuts (terms used in the broadest sense) representing a range of trees and shrubs; large trees including *Fagus sylvatica* (beech), *Alnus glutinosa* (alder), *Quercus* (oak), and smaller trees/large shrubs, for instance, *Corylus avellana* (hazel), *Rubus fruticosus/idaeus* (blackberry/raspberry) and cherry. The cherry stones may be from the wild larger *Prunus avium* (wild cherry) or the smaller and introduced species, *Prunus cerasus* (dwarf cherry).

Table 3. Botanical remains: assessment results from Ty Newydd motte ditch

	Context	4014	4015
	Sample number	4	5
	Volume soil processed (l)	7	8
	Flot vol (ml) (approx)	1700	1900
	Sub-sample scanned (ml)	150	150
Ranunculus spp.	buttercups	+	
Fagus sylvatica L.	beech fruits	++	++
F. sylvatica L.	beech cupule	++	+
Quercus spp.	oak involucre	+	
Alnus glutinosa (L.) Gaertn.)	alder catkins		+
Corylus avellana L.	hazelnut (whole)	+	
Chenopodium/Atriplex spp.	goosefoots/oraches	+	+
Rumex sp.	docks		+
Stellaria spp.	stitchworts		+
Lychnis spp.	catchflies	+	+
Silene spp.	campions	+	+
Viola spp.	violet	+	+
Rubus spp.	blackberry/raspberry	++	++
Potentilla spp.	cinquefoils		+
Prunus spinosa L.	sloe/blackthorn		
P. avium/cerasus	cherry	+	+
Prunus spp.		+	+
Carex spp.	sedge	+	
Poaceae indet.	grasses		++
Other vegetative material			
Leaf fragments		++++	+++
Leaf abcission pads		++	+
Bud fragments		++++	+++
Thorns		+	+
Moss		+	
Roundwood		++++	++++
Wood fragments/shavings		++++	++++
Insect fragments		++++	++++

Key: +=1-10; ++=11-50;+++=51-100;++++=>100 items

The other plants represented in the two assemblages may be found growing wild in a range of habitats although some may have been grown as garden plants, for example some of the *Stellaria* (stitchworts) and *Lychnis* (catchflies) species. A few of the plants in the assemblage, for example *Alnus*, *Carex* (sedge), are indicative of wet/damp ground. Other biological evidence in the two samples included a good number of insect (predominantly beetle) remains, which could provide additional evidence on the nature of the local habitat.

Discussion and recommendations
The assessment produced botanical evidence of an environment characterised by both large and small trees, large and small shrubs, with no significant difference noted between the two plant assemblages. The habitat is not dissimilar to the current one with the presence of beech, oak and alder, raising the question as to whether the remains are of recent origin. Examination of a larger fraction of the organic flots, together with more detailed analysis on the remains, may produce a wider species range and more detailed information on the character of the local environment, which could be augmented by an analysis of the beetle remains. Any pollen from the adjacent monolith could provide evidence on the regional environment. This work, however, should only be carried out if the sampled deposits are dated and a historical context is established for the remains. No further work is recommended if the remains are found to be of recent origin.

9.4. Pollen Assessment
By Rob Scaife

Two sediment samples from <001> (Fig. 2) at 5-6cm and 10-11cm have been examined to establish if sub-fossil pollen and spores are present and, if so to provide information on the local vegetation and environment and any indications of the age of the sediment. That is, medieval or post medieval in relation to a possible garden feature.

Pollen method
Standard techniques for pollen concentration of the sub-fossil pollen and spores were used on the two sediment sub-samples of 1.5 ml. volume (Moore and Webb 1978; Moore *et al*. 1992). Pollen counts of up to 300 grains per level were made for each sample. Taxonomy in general follows that of Moore and Webb (1978) modified according to Bennett *et al.* (1994) for pollen types and Stace (1991) for plant descriptions. These procedures were carried out in the Palaeoecology Laboratory of the School of Geography and Environment, University of Southampton.

The pollen data
Pollen is well preserved and abundant in both of the samples. Counts of 300 pollen grains were easily achieved. The assemblages are dominated by herbs with few trees and shrubs with the exception of *Alnus* (alder) in the latter which was probably a local constituent fringing the motte or on nearby wet ground. Pollen count data are given in Table 4 below.

Trees & shrubs: Alnus is the most important tree taxon with higher values in the upper sample (24%). There are small numbers of *Betula* (birch), *Pinus* (pine; esp. at 10-11cm), *Quercus* (oak) and *Fagus* (beech) and *Ilex* (holly) in the lower sample.

Herbs: The herb assemblages are diverse. Poaceae are dominant with high values (48% and 53%). The lower sample has small numbers of cereal type (2%). *Plantago lanceolata* (ribwort plantain) and other taxa of pastoral affinity are present including Lactucoideae (dandelion types), *Rumex* (docks), *Ranunculus* type (buttercups) and other less ecologically definable pollen taxa.

Marsh: Although a motte, the numbers of wet-ground taxa are few and aquatic macrophytes absent. Taxa recovered include Cyperaceae (sedges), *Hydrocotyle vulgaris* (marsh pennywort) and *Typha angustifolia* type (reed mace and bur reed).

Table 4. Pollen count data for samples from <001> at 5-6cm and 10-11cm – Ty Newydd motte ditch.

Sample	***5-6cm***	***10-11cm***
Monolith	<001>	<001>
Trees & Shrubs		
Betula	4	
Pinus	3	6
Quercus	5	9
Fraxinus		5
Fagus sylvatica		1
Ilex aquifolium		1
Alnus	73	45
Corylus avellana type	4	7
Erica		1
Herbs		
Poaceae	145	59

Cereal type		7
Poaceae (large non cult).	4	7
Ranunculaceae	1	
Ranunculus type		3
Brassicaceae Undiff.	6	7
Sinapis type	4	
Hornungia type		1
Dianthus type	3	2
Cerastium type		1
Fabaceae undiff.		1
Trifolium type		1
Potentilla type	1	1
Myosotis type		1
Apiaceae	1	3
Rumex	9	3
Scrophulariaceae		1
Plantago coronopus type	1	
Plantago lanceolata	15	
Rubiaceae		1
Bidens type	1	1
Lactucoideae	11	1
Marsh		
Cyperaceae	9	9
Caltha type		1
Hydrocotyle vulgaris		1
Typha angustifolia type		3
Unidentified/degraded	6	3
Ferns		
Equisetum		1
Pteridium aquilinum	20	13
Polypodium	2	1
Miscellaneous		
Pre-Quaternary palynomorphs	172	145

Ferns: Pteridium aquilinum (bracken) is most important with occasional *Equisetum* (horsetail fern) and *Polypodium* (polypody fern).

Miscellaneous: There are substantial numbers of reworked pre-Quaternary palynomorphs.

Interpretation

The vegetation can be considered in relation to the on-site and fringes of the motte and that from the surrounding landscape.

On-site: There is no evidence for standing water. Marsh taxa include fen type herbs; sedges, marsh pennywort and reed mace and/or bur reed. It is probable that a proportion of the grasses will also have come from this habitat. This implies that the on-site vegetation/habitat consisted of damp ground rather than a freshwater feature. Had the motte ditch silted up through natural progression? Alder is the most important taxon and was probably growing in this damp habitat or, in adjacent wetland. As a high pollen producer and anemophilous type, its numbers may be over represented and it is not possible to discern whether pollen here is from occasional local growth or from dominant carr type woodland in an adjacent valley floodplain or wetland.

Off-site: Herbs are dominant reflecting in general, a local pastoral habitat. Small numbers of cereal pollen are also present. However, given the depositional habitat/site, it is possible that the cereal pollen and possibly other taxa may be of secondary origin. That is, coming from dumped domestic material especially including faecal waste.

The arboreal component comprises small numbers of birch, pine, oak and hazel. These are all anemophilous taxa and are capable of long distance transport. The numbers here suggest that they were of little local significance. Ash,

beech and holly are all present in the lower sample (11-12cm) and, by contrast, are usually poorly represented in pollen assemblages. It is probable that these were growing in close proximity to the sample site. These may have been part of the gardens (see below).

The age of the samples: It has not been possible to determine whether the two samples are of medieval or later age or, whether the pollen is derived from a planted garden environment. No definite garden plants were identified even though the pollen counts were greater than for a basic/standard assessment. Wider visual scans of the slides were also made and these similarly failed to produce any definite garden elements. This is, however, not unusual since exotic taxa are frequently entomophilous and as such, are poorly if at all, represented in pollen spectra. Some points can, however, be made.

First, although negative evidence the absence of *Cannabis* type pollen (hemp) indicates a post-medieval age. This was a common cultigen of the medieval period and frequently occurs in pollen diagrams of this period. This is, of course, a tenuous line of evidence.

Second, the lower sample has a greater incidence of trees which include holly, beech and ash. As noted above, these pollen are from local growth and may derive from the grounds of the estate.

In spite of this, useful information has been obtained on the local vegetation and environment and given the good pollen preservation, the site would be suitable for additional and more detailed analysis.

9.5. Discussion

One of the primary objectives of the environmental analysis and any possible radiocarbon dating was to establish whether the ditch fills reflected early deposits that might be contemporary with the motte or the medieval period, or whether these deposits represented later fills, after the ditch had been 'cleaned' as part of a programme of landscaping the gardens around the nearby 17th century house and its later additions.

There are certain pragmatic considerations that impact on this question. The first is reflected by the dominance of tree and shrub macrofossil debris in both the primary and secondary ditch fills. This dominance clearly indicates that these species are local and almost certainly overhung the motte ditch or perhaps even grew in the ditch. Quite clearly such a scenario would not have been allowed during the period when the motte was in use. The banks of the motte and surrounding land would have been kept clear of trees and shrubs so that no cover was available to any potential aggressors. We can therefore probably rule out the ditch deposits as being contemporary with the motte while it was in use, but it would not take long for an abandoned motte to become overgrown, and finally wooded, particularly if sheep and cattle access to its banks was difficult, so that grazing did not occur. Secondly the primary fill is as dominated by this woodland debris as the secondary fill, and although a little mineral residue of mudstone and coarse sand is present in this primary fill this is not sufficient to indicate any substantial erosion of the motte bank and outer ditch bank into the ditch. It is almost inconceivable that such a small coarse mineral component would be present in a ditch that had been open for many centuries unless the surrounding banks were extremely stable and well vegetated with a stable mat of herbaceous vegetation, except within woodland where the seasonal fall of leaves and dead wood would have reduced surface erosion and also filled the ditch. There is a sharp boundary between the underlying 'natural' sands and the primary ditch fill (4015 – Fig. 2) and no indication of either significant waterlain sediments or a build-up of 'inwash' into the ditch, although the very fine sands that comprise the mineral element of 4015 clearly derive from the underlying layer 4016, presumably from the ditch bank and motte mound. This implies a cleaning episode that cut right down to the 'natural' sands at a time when the banks of the motte and adjacent land were already wooded. The 78g piece of slate from the primary fill unfortunately cannot give any confident clue to the deposits date since slate was quarried from the Roman period, and medieval quarrying is attested from the 12th century at Cilgwyn some 25 kilometres to the NE of the motte (http://www.archiveswales.org.uk/anw/get_collection.php?inst_id=39&coll_id=11009). However the industry does not develop into a commercial scale until the late 18th century (op cit) so it could be argued that slate arriving at the site is more likely to be associated with the construction of the 17th century or later house additions, although given the degree of wear on the piece it could be derived from local diamicton (till/boulder clay) and not introduced by human activity.

Pollen can often give clues as to the broad date of deposits, and in the post-medieval period the advent of plantations for wood, specifically pine, can often be recognised by an increase in pine pollen in the deposits, as can exotics and introduced species such as walnut, a tree introduced to Britain during the Roman period. The pollen has not given a definitive answer but also affords some clues. To begin with it should be noted that a landscape of the

character illustrated on the cover of the GAT report (Fig. 3 below taken from Kenney *et al* 2015) affords a canopy of leaves that reduces the pollen rain from more regional sources leading to the domination of local vegetation. Since the macrofossils indicate a probable tree canopy around the ditch then much of the pollen may reflect the local landscape rather than a more regional picture. Oak, beech, ash, holly and alder are all growing at the site today and present in the pollen assemblage, although alder is the dominant pollen type. Pine occurs at about 4%, enough to perhaps argue for a local source but not enough to be confident that it derives from plantations. *Cannabis* type pollen is recorded from the 12th century at Lyn Cororion, near Bangor, (Watkins 1990) and by Grant (2007) in probable 13-14th deposits in the Denbigh Moors. The absence of *Cannabis* type pollen, an indicator of the cultivation of hemp throughout much of the medieval period, from the two samples is perhaps suggestive of a post-medieval date but by no means reliable when based upon just two samples.

Finally the local history of beech in North Wales affords a possible clue to the date of the sediments. Beech pollen is noted in the primary fill and fruits and cupules are recorded as macrofossils in both fills so the tree is clearly present in the immediate vicinity during the build-up of these deposits. Godwin has reviewed the pollen evidence for beech in England and Wales and the historical evidence for the tree is presented in *Nature in Wales* (Linnard 1979). Grant (2007) records beech at Hiraethog, on the Denbigh Moors, but her diagram has an error and it is not possible to identify in which period it appears, although it is medieval or later. Godwin has no records of beech pollen from sites in North Wales in Flandrian pollen zone VIII and the historical review of Linnard (1979) notes a dearth of records for beech in north Wales. The 10th century laws of Hywel Dda in their northern version do not mention beech, but the southern versions do, 17th century observers note an absence of beech in North Wales, and historical records of beech in North Wales only appear in the 18th century, with indications that some of these were in recently established plantations. From this period onwards many thousands of trees were planted (op cit.). This combined with only a single beech place name in North Wales (op cit.) out of 32 welsh sites with beech related place names, most of which are concentrated in south-east Wales, suggests that beech in North Wales is largely a post-medieval planting, and trees in earlier periods were rare.

While no single piece of evidence can confidently date the deposits the combination of this evidence, while not conclusive, would point to the fills of the motte ditch being of post-medieval date, perhaps related to the laying out of a garden in the 18th century (Kenney *et al* 2015), but at least probably post 1600 AD. If this is the case then it is very likely that a radiocarbon date will give no further precision since the 'wiggle matching' for material after about 1620 AD will normally give a series of possible date ranges that may include 17th, 18th and 19th century ranges. Only medieval material is likely to give a reasonable date and the evidence would argue against this being the result.

Besides the possible date of the deposits the plant evidence gives a fairly clear indication of the immediate environment and elements in the nearby landscape.

It is quite clear from the macrofossil remains that the banks of the motte and presumably the outer bank of the ditch were tree covered, essentially woodland, while the deposits were forming. By far the bulk of the fragmented vegetable matter is composed of leaf fragments and fragments of leaf skeleton indicative of tree and shrub leaves rather than herbaceous material. This combined with the other macrofossil evidence for trees (Table 3) suggests that the immediate environment was very similar to that of the present day (Fig. 3 - the cover of the archaeological report is reproduced here for illustrative purposes). The pollen evidence suggests the presence of birch, oak, ash, beech, holly, hazel, alder and pine, while the macrofossils show beech oak, alder hazel, blackthorn and cherry. Some of these are likely to represent local growth but beech, holly, cherry and pine may reflect plantings associated with the 17th century and later gardens around the house. There is a marked absence of aquatic plant species in the ditch fills that would appear to contradict the anecdotal evidence that the 'moat' held water and small boats were used on it (Kenney *et al* 2015 - unless this applied to a different part of the moat to that sampled) but fragments of caddis fly larvae and their cases occur in the ditch fills in numbers clearly indicating water, but since this group can be found in small puddles, ponds and large water bodies, specific identification would be needed to be more specific about the aquatic habitat. It is possible that a fairly stagnant water filled moat shaded and overhung with trees could have lacked most of the normal aquatic plant and invertebrate life that is common in open water, but if there was sufficient water to float a boat then this seems unlikely. The deposits have clearly been wet, probably saturated, with at least seasonal standing water otherwise the organic remains would not have survived unless they are very recent. Species such as alder and sedges indicate damp ground rather than open water and it is probable that the ditch was locally water filled and perhaps just wet or damp ground in other areas.

Fig. 3. Motte, ditch and southern bank in spring – Taken from the cover of the archaeological report – Kenney *et al* 2015; courtesy of GAT)

The pollen evidence is equally lacking in aquatics, although marsh and damp ground are evident. There is a significant pastoral element, which is relatively lacking although not entirely absent from the plant macrofossils, suggesting nearby pasture but perhaps not adjacent to the ditch, and perhaps supported by the presence of dung beetles although these can obviously fly in. The cereal pollen could be an indicator of local arable but as noted above could derive from human or animal (cattle) faecal material, or even been blown in from nearby crop processing activities. The motte sits at the western end of a field which could easily have been the source for both the pastoral elements and the cereal pollen a different times in the past.

9.6. Conclusion

It is probable that the ditch fills relate to the later history of the motte, perhaps the 17th or 18th century gardens, or quite possibly more recent. They almost certainly formed after an episode when the ditch was cleaned of any earlier deposits and the motte and probably the adjacent ditch bank was 'wooded'. The ditch must have contained standing water at least seasonally for the caddis fly larvae to hatch and grow but a lack of aquatic plants would argue against permanent open water.

It would be possible to radiocarbon date some small roundwood from deposit 4015 but this is unlikely to add any precision to the current estimates of the date of the deposit. With a lack of precise dating it is difficult to argue for any further environmental work on the recovered samples although the monolith illustrated in Fig. 2 would permit the production of a short pollen diagram and may show a pattern of change which is perhaps suggested by the differences between the two samples presented in Table 4. Detailed post-excavation analysis of the plant and insect macrofossils and the identification of the species of the wood recovered would also expand the interpretation of the local environment at the time the deposits were forming but without being able to tie this down much more precisely in terms of chronology such work has limited value.

On balance the authors would not recommend any further study of the samples or radiocarbon dating of roundwood from the basal fills of the ditch unless it was considered of interest in the context of a post-medieval garden or the later history of the site.

9.7. Acknowledgements

The two bulk samples were processed by Trude Maynard and Angela Bain of the Environmental Archaeology Consultancy. Figures 1 and 3 have been taken from the GAT report on the archaeological investigations.

9.8. References

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10. APPENDIX IV: SITE MANAGEMENT PROPOSALS

TY NEWYDD MOTTE & BAILEY, LLANNOR: SCHEDULED ANCIENT MONUMENT CN096
N.G.R: SH 3465 3828

Site Management Proposals (v20 08 2014)

Andre Berry, AQB Historic Landscapes

10.1. Site Context

Located south-east of Ty Newydd, Llannor, the motte lies at about 61 metres AOD on ground falling gently to the south-south-east. A large hollow excavated on the north-north-west furnished material for the motte and for a bank on the south and lower side to retain water from a small stream in the moat. The bank has a modern breach for drainage. A bailey adjoins the motte to the east.

The motte is located within the northern arm of an 'L'-shaped block of semi-natural broadleaved woodland and supports a closed canopy (in descending order of number) of ash *Fraxinus excelsior*, sycamore *Acer pseudoplatanus*, wild cherry *Prunus avium* and beech *Fagus sylvatica*. Trees are mature/over-mature, with the ash and cherry, in particular, displaying clear signs of crown senescence. One cherry is windblown.
Beneath the canopy is a sparse ground cover, dominated by bluebell *Hyacinthoides non-scripta*. The motte displays extensive, historic burrowing, principally by badger *Meles meles*, with areas of terracing below burrows. Only one burrow appeared to be active at the date of the site visit for this report (Monday 11 August 2014).

Issues feed into the ditch of the motte from north and north-west. From the north, a field boundary ditch collects water from the higher pasture land to the north and north-east of the motte, feeding it into the ditch of the motte. This water flows around the ditch to the east of the motte, passing out through the modern breach created for drainage in the south bank. Erosion evidence suggests that this flow is subject to occasional episodes of spate, the modern drainage breach in the south bank then significantly impeding flow.

Issues entering the motte ditch from the north-west are more diffuse and there is no evidence of spate conditions being achieved.

The bailey to the east of the motte is under semi-improved pasture, the grazing let for cattle and sheep.

10.2. Site Management Issues

There are three identified, site management issues, in descending order of current significance:

1. Erosion caused by water flow around the east ditch of the motte;
2. Wind-blow hazard arising from the mature/over-mature tree cover;
3. Burrowing by badgers.

Water Erosion - evidence
As noted above, issues flowing around the ditch to the east of the motte are fed from a field boundary ditch that collects water from the higher pasture land to the north and north-east of the Scheduled Monument.

At the date of visiting the site to prepare this report (Monday 11 August 2014), the south-east quadrant of the motte ditch displayed an erosion gully *c.*13 metres in length and up to 1 metre in depth, water having cut through approximately 0.5 metre of organic ditch fill and 0.5 metre of the underlying base of the ditch. The gully is up to 1.5 metres in width. The down-cutting has destabilised the bank of the motte, there being a crescentic area of land slippage some 3 metres long by 1.5 metres in height.

The 'upstream' end of the erosion gully presents a vertical face some 0.4 metre in depth through the organic fill of the ditch down to the top of the underlying substrate, over which the issues 'cascade'.

The ‘downstream’ end of the erosion gully presents a ‘step’ some 0.3 metre higher than the eroded gully, immediately before the modern drainage breach in the south bank. The breach, itself, has two levels, the higher one assumed to have been deliberately cut in the past; and, a lower level that has tunnelled beneath the roots of a mature beech tree and is, in part, subterranean. There is no visible evidence to suggest that the undermining of the tree’s roots has in any way destabilised the tree.

The visible evidence suggests a single episode of high water or spate flow, potentially arising from a tightly-localised storm event over the higher land to the north and north-east of the motte. There is no visible evidence of erosion anywhere along the field boundary ditch to the north and east of the site. This leads to the assumption that the free flow of the water during spate has been impeded by the constricted nature of the modern drainage breach in the south bank of the motte. The water’s need to dissipate energy has therefore resulted in down-cutting, the organic fill of the motte ditch and the soft nature of the underlying substrate (neither of which are protected by vegetative cover) providing no resistance to erosion.

Although the visible evidence suggests a single erosion episode, predictions for climate change indicate that such high-intensity, closely-focussed storm events may become more frequent in future.

As a consequence, it is recommended that work be undertaken to provide some resistance to future water erosion and to reduce peak flow rates; or, if the latter is not feasible, to reduce the impedance to flow.

Water Erosion – recommended works
It is recommended that the eroded gully of the ditch be infilled and reprofiled to provide a channel for continued water flow. This will help to stabilise the margins of the gully and to provide a sacrificial, more erosion resistant surface against which high flow rates can dissipate their energy.

It is recommended that the profile of the existing gully be lined with Terram 1000 or similar, the Terram to be overlaid with Greenfix Type 700 Embankment Mat (http://greenfix.co.uk/wp- content/uploads/2013/12/Embankment-Mat-Type-700.pdf).

The Terram and Embankment Mat should be fixed to the underlying substrate using 300 mm long mild steel pins, at a density not exceeding 6 pins per square metre, particular attention being paid to the fixing of the edges of both.

The base of the lined gully should then be infilled with tipped water-worn gravel/stone of *c.*25 mm diameter, to a depth of *c.*150 mm at its lowest point, laid to a concave profile.

Over this, the gully should be infilled with tipped water-worn cobble stone of *c.*100 mm – 150 mm diameter, brought up to a depth of 700 mm at its lowest point, laid to a concave profile, the edges brought up to cover the underlying matting. As this material is tipped, gaps between cobbles should be infilled with water-worn gravel/stone of *c.*25 mm diameter, as necessary.

Over time, it is anticipated that this infill material will capture organic material and enable the establishment of some marginal vegetation to assist in stabilisation.

Water Erosion – field boundary ditch
To help reduce flow rates along the motte ditch at times of spate, it is recommended that a former drainage ditch running north to south across the pasture land to the east be re-opened (line A to B on Figure 1). This will feed into an existing field boundary ditch east-south-east of the motte and bailey, taking much of the water from land to the north-east.

This will substantially reduce the ‘catchment’ and therefore potential volume for water flowing along the motte ditch and obviate the need for modifications to the modern drainage breach through the motte’s south bank (discussed below).

Water Erosion – modern drainage breach
If recommendations to re-open a field ditch are progressed, no work is considered necessary to the modern drainage breach through the motte’s south bank.

However, if potential water flow along the motte ditch is not reduced by re-opening of the field ditch, it is considered necessary to modify the drainage breach so as to substantially reduce the impedance to flow at times of spate.

In this circumstance, it is recommended that the substrate to a depth of *c.*300 mm across the width of the bank north to south be hand dug out from the western margin of the drainage breach, to broaden the channel and create a concave profile.
This reprofiled channel should then be lined with Greenfix Type 700 Embankment Mat, secured using 200 mm mild steel pins at a density not exceeding 6 pins per square metre.

As the mature beech tree on the east of the modern drainage breach exhibits no signs of destabilisation from under-cutting, it is simply proposed to monitor its condition and for signs of movement over time.

Windblow hazard
As noted previously, the cover of mature/over-mature broadleaved trees is, for the most part, showing signs of crown senescence, with a number of broken and fallen limbs. One mature cherry has windblown.

As a consequence, it is recommended that all of the trees on the motte itself be felled, with the exception of one mature beech. Trees should be sectionally-felled in a controlled manner to prevent substantial penetrative and scuffing damage to the motte. Stumps should remain *in situ* and be treated with an approved herbicide to prevent regrowth. Any regrowth that does occur should be treated by wiping with an approved herbicide on an annual basis until such time as no further regrowth occurs.

Due to the identified presence of badgers (see below), felling operations should not be carried out between 1 December and 30 June; and, shall be fully in accordance with the Forestry Commission's published guidance *Forest Operations and Badger Setts* (Forestry Practice Guide 9, 1995).

Natural Resources Wales should be consulted to confirm that a licence is not required to undertake the recommended felling works.

All material arising from felling is to be removed from the area of the Scheduled Monument by hand. Trees to be felled are marked with a yellow paint spot.
As well as removing a potential windblow hazard, felling of the trees will increase light levels reaching the ground surface, promoting vegetative growth across the motte and ditch, to assist long-term site conservation.

Ongoing monitoring and intervention shall be required to control any invasive growth of trees and shrubs.

Badgers
Visible evidence suggests that badgers have, historically, been a significant problem, with an extensive network of burrows, together with terracing created from displaced soil. However, at the date of visiting the site to prepare this report (Monday 11 August 2014) only one burrow was found to be active.

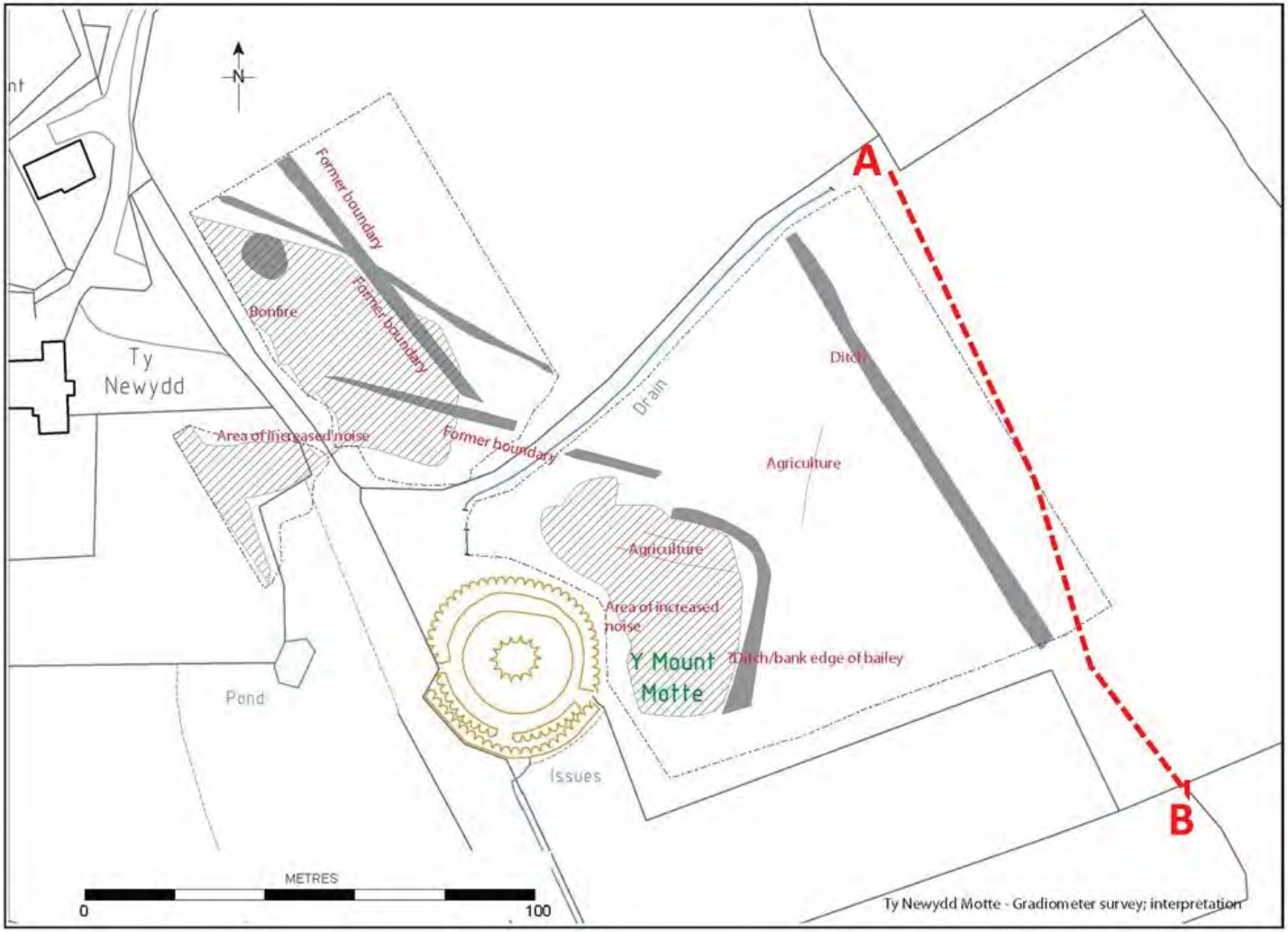
Badgers and their setts are protected under the Protection of Badgers Act 1992, which makes it illegal to kill, injure or take badgers or to interfere with a badger sett. The term 'badger sett' is normally understood to mean the system of tunnels and chambers, in which badgers live, and their entrances and immediate surrounds. The 1992 Act specifically defines a sett as "any structure or place which displays signs indicating current use by a badger".

Proposed tree felling shall need to be carried out fully in accordance with the Forestry Commission's published guidance *Forest Operations and Badger Setts* (Forestry Practice Guide 9, 1995), as noted above.

As current badger activity appears to be limited, it is recommended that sett use be monitored over time to establish the ongoing level of damage being caused.

It is considered that ground conditions, together with the nature of the land in the environs of the motte, will make it both difficult and expensive to effectively exclude badgers.

Figure 1: Field ditch proposed for re-opening



Based upon a plan prepared by Gwynedd Archaeological Trust

10.3. Photographs

General photographs

Ty Newydd Motte - north, 11.08.2014 (IMG_5262)

Ty Newydd Motte – east, 11.08.2014 (IMG_5213)

Ty Newydd Motte - south, 11.08.2014 (IMG_5221)

Ty Newydd Motte – west, 11.082014 (IMG_5256)

Photographs – eroded gully:

Eroded gully – general, looking west, 11.08.2014 (IMG_5215)

Eroded gully – general, looking east, 11.08.2014 (IMG_5224)

Eroded gully – 'cascade step' at east end, 11.08.2014 (IMG_5225)

Eroded gully – eroded profile, 11.08.2014 (IMG_5281)

Eroded gully – soil slip, 11.08.2014 (IMG_5222)

Photographs – drainage breach:

Drainage breach – right of image, in relation to eroded gully, 11.08.2014 (IMG_5239)

Drainage breach – showing undermined beech tree, 11.08.2014 (IMG_5238)

Photographs - Windblow

Windblown wild cherry, 11.08.2014 (IMG_5255)

Photographs – Badgers

Example of burrows, south-west, 11.08.2014 (IMG_5260)

Example of 'terracing' below burrows, south, 11.08.2014 (IMG_5272)

Example of 'terracing' below burrows, north-west, 11.08.2014 (IMG_5277)

Photographs – field ditch proposed for re-opening

Point 'A' on Figure 1, north, 11.082014 (IMG_5301)

Looking south from point 'A' on Figure 1, 11.08,2014 (IMG_5298)

Point 'B' on Figure 1, 11.08.2014 (IMG_5303)

11. FIGURES AND PLATES

Figures

Plates

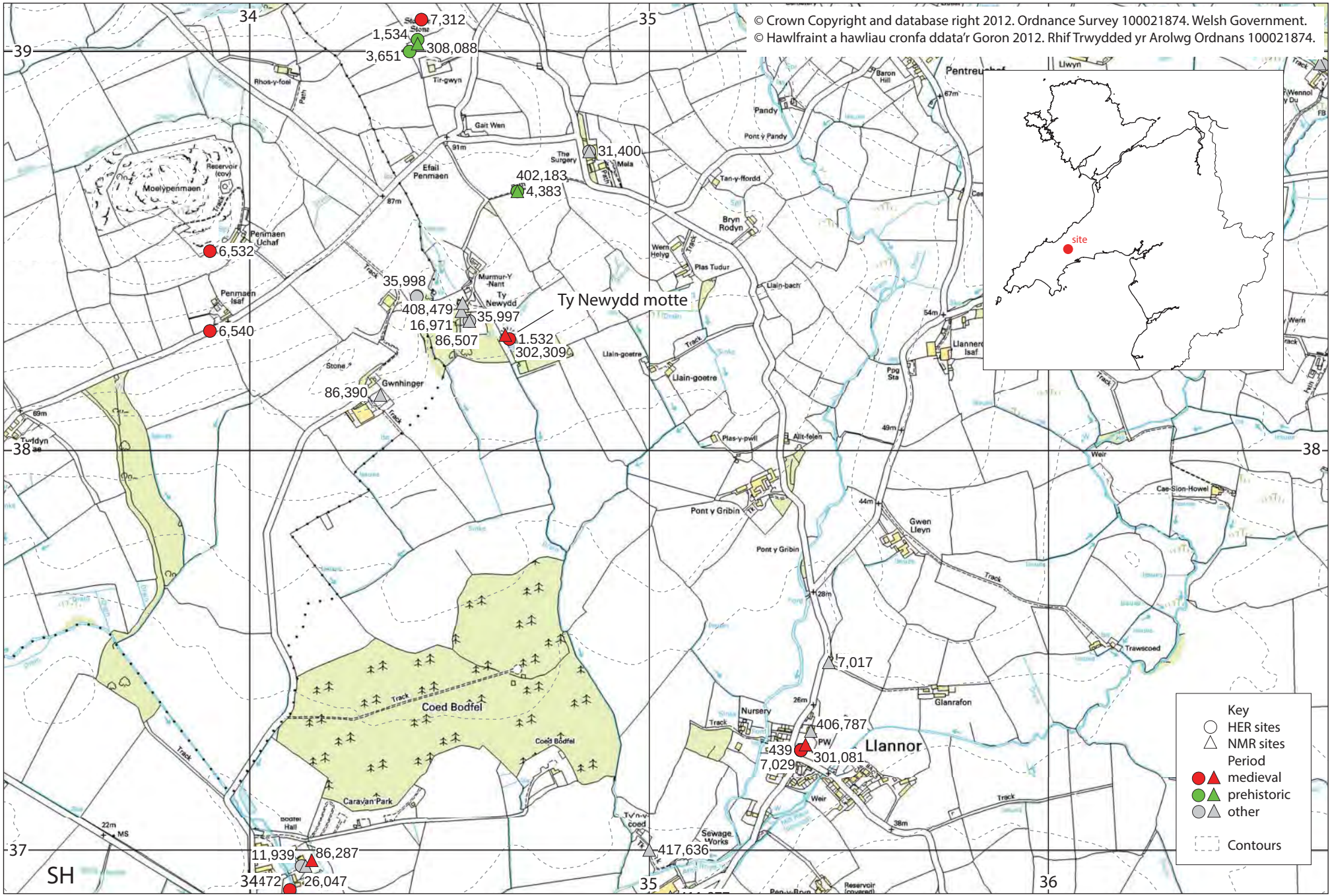


Figure 1. Location of the motte and other sites in the area (see appendix I for list of sites)

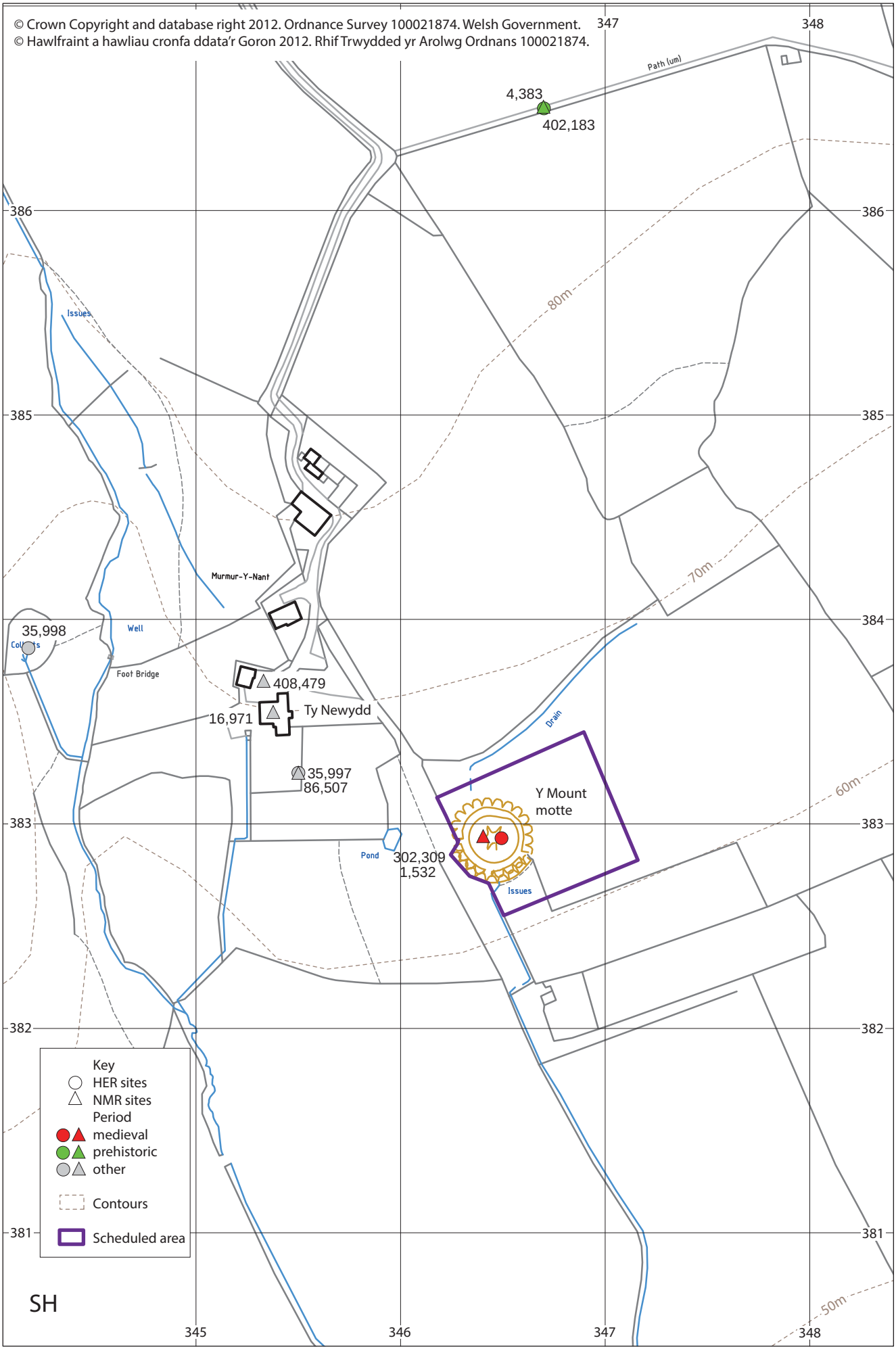


Figure 2. Detailed location of the motte and Tŷ Newydd

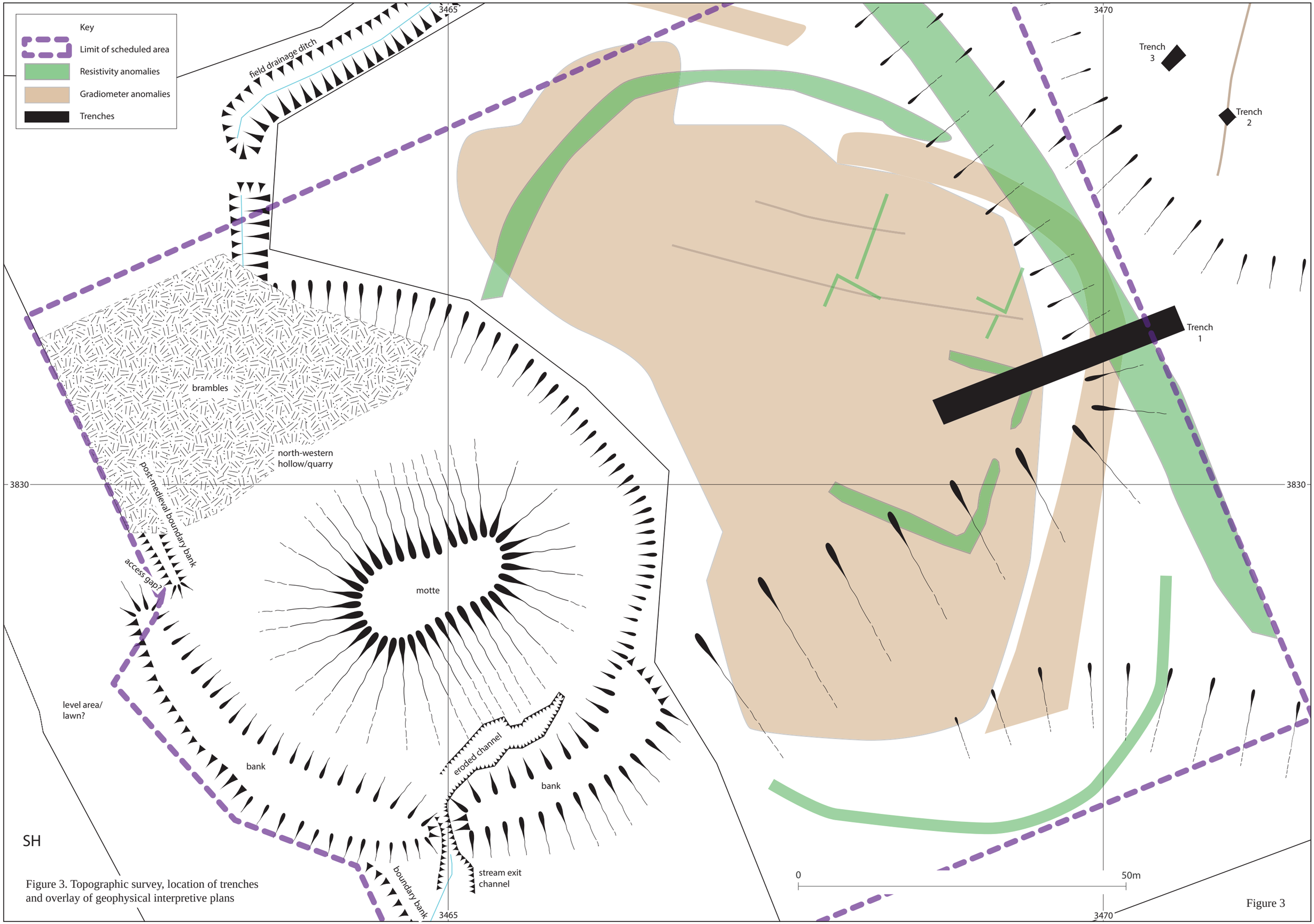


Figure 3. Topographic survey, location of trenches and overlay of geophysical interpretive plans

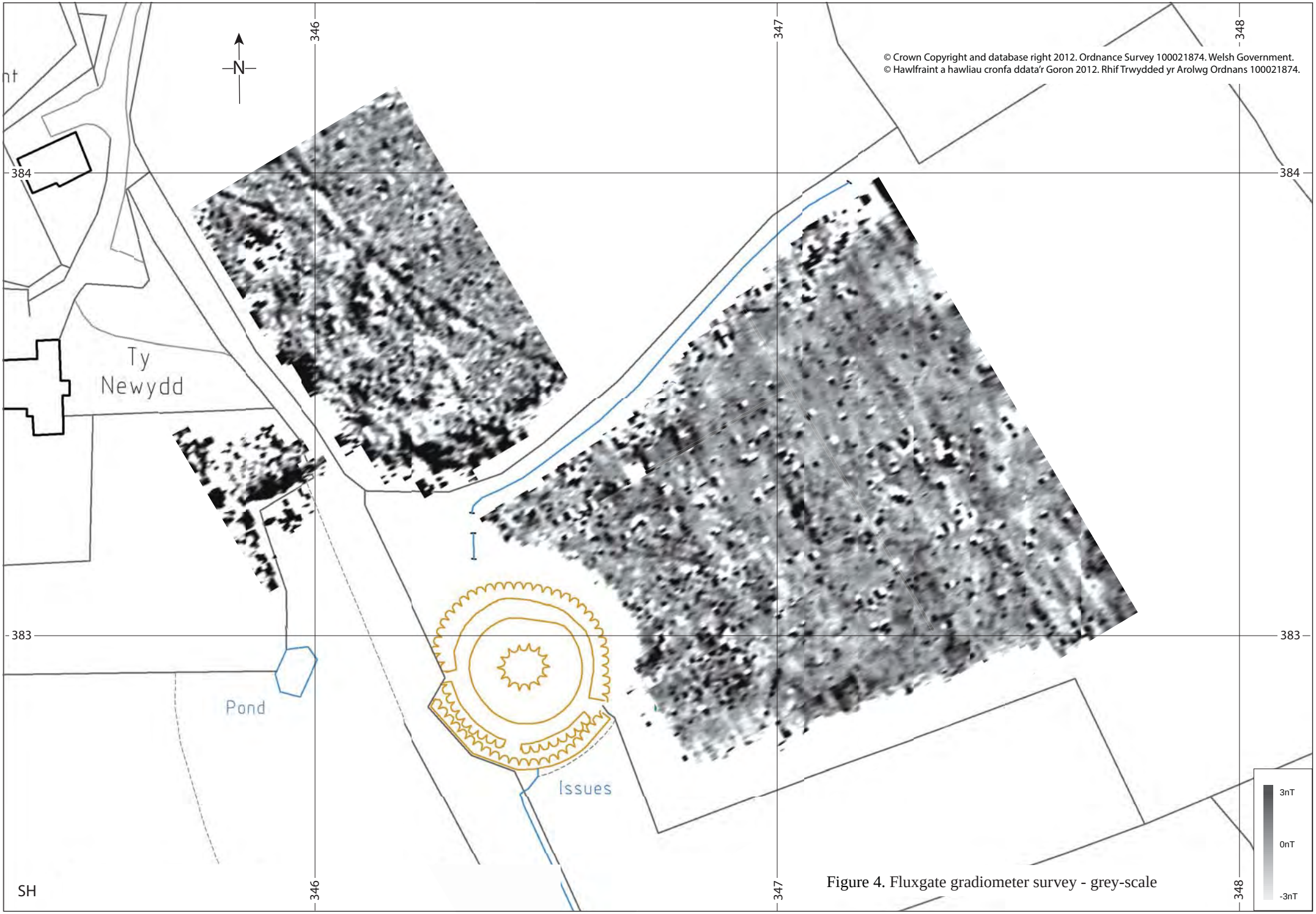


Figure 4. Fluxgate gradiometer survey - grey-scale

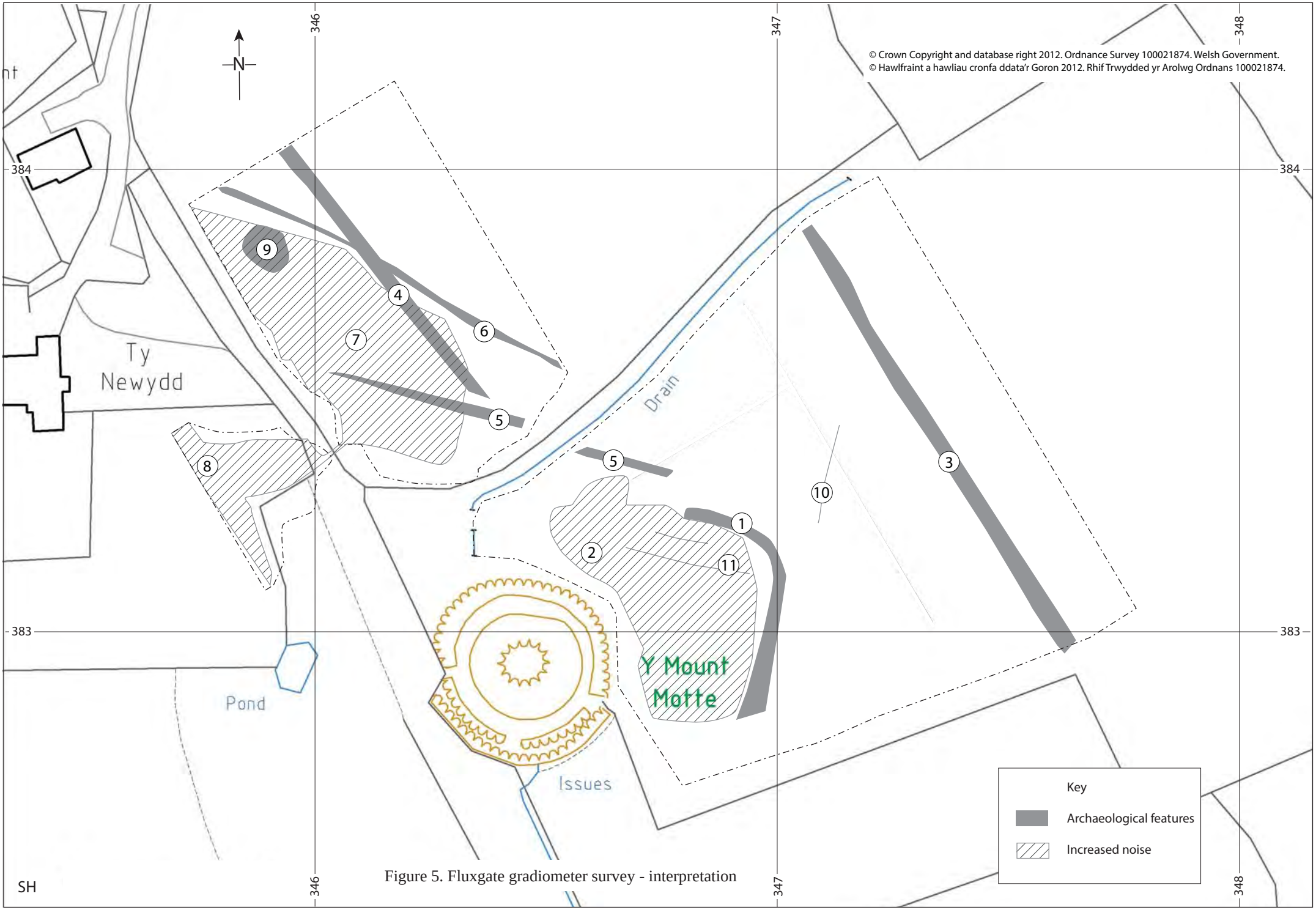


Figure 5. Fluxgate gradiometer survey - interpretation

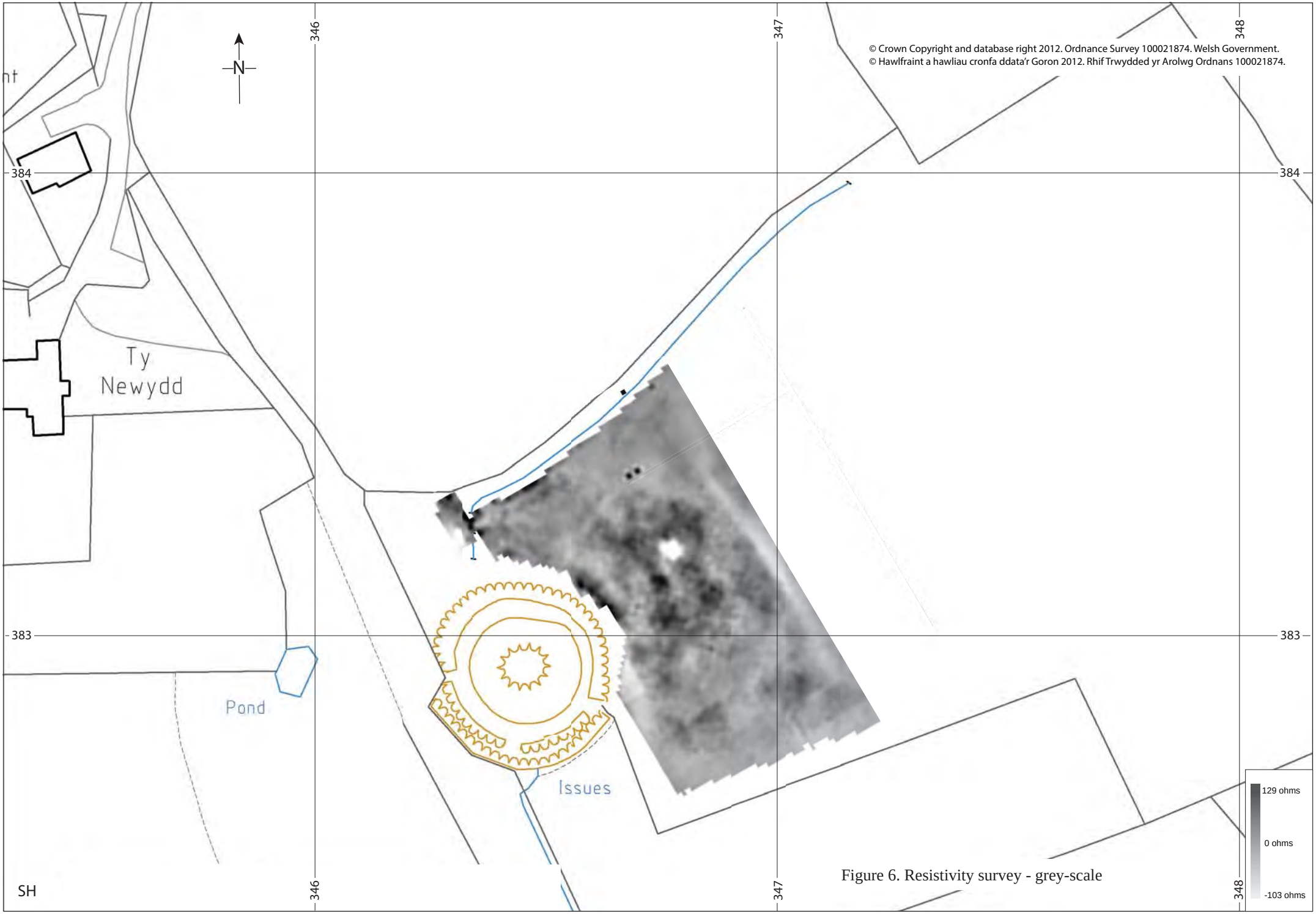


Figure 6. Resistivity survey - grey-scale

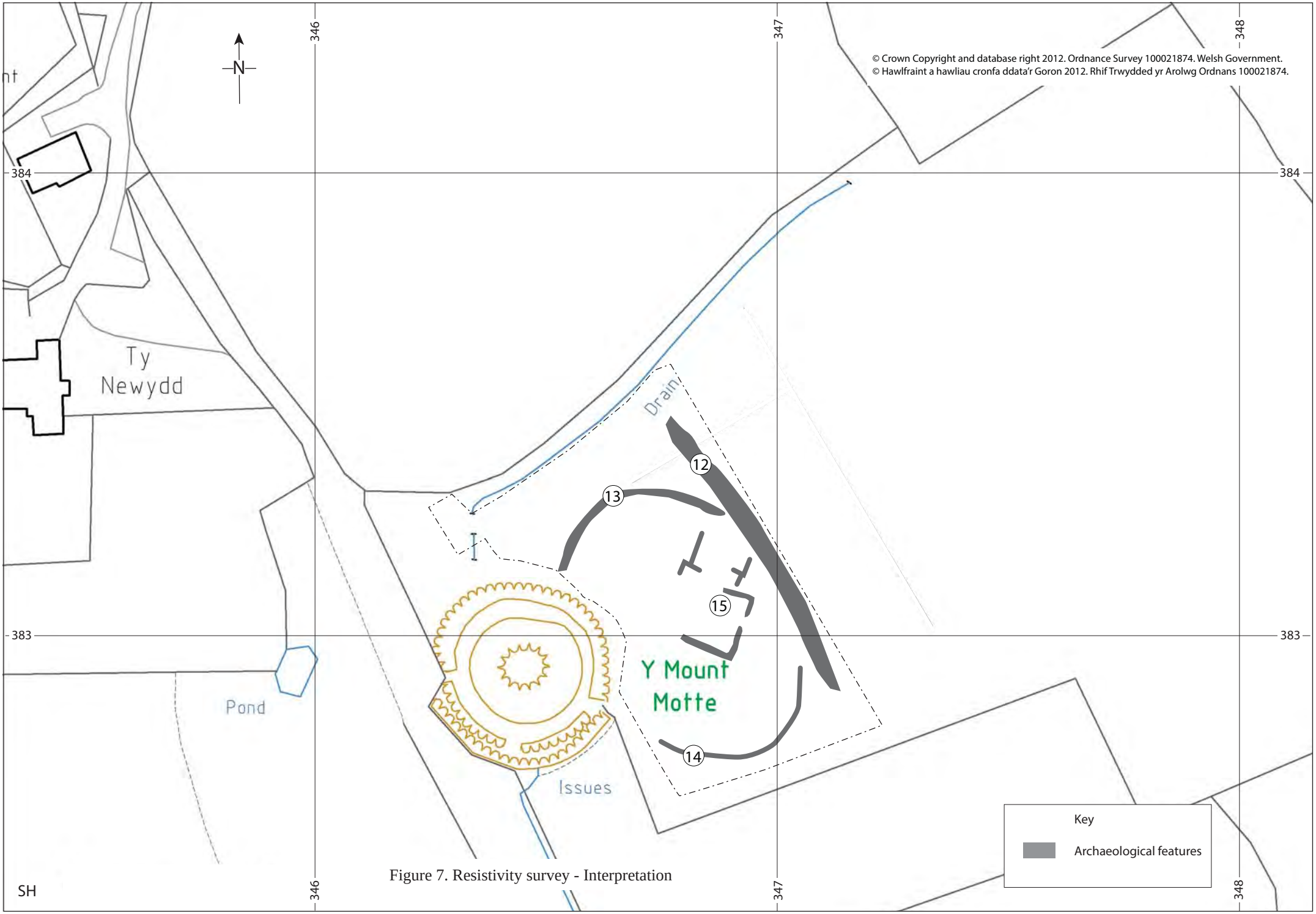


Figure 7. Resistivity survey - Interpretation

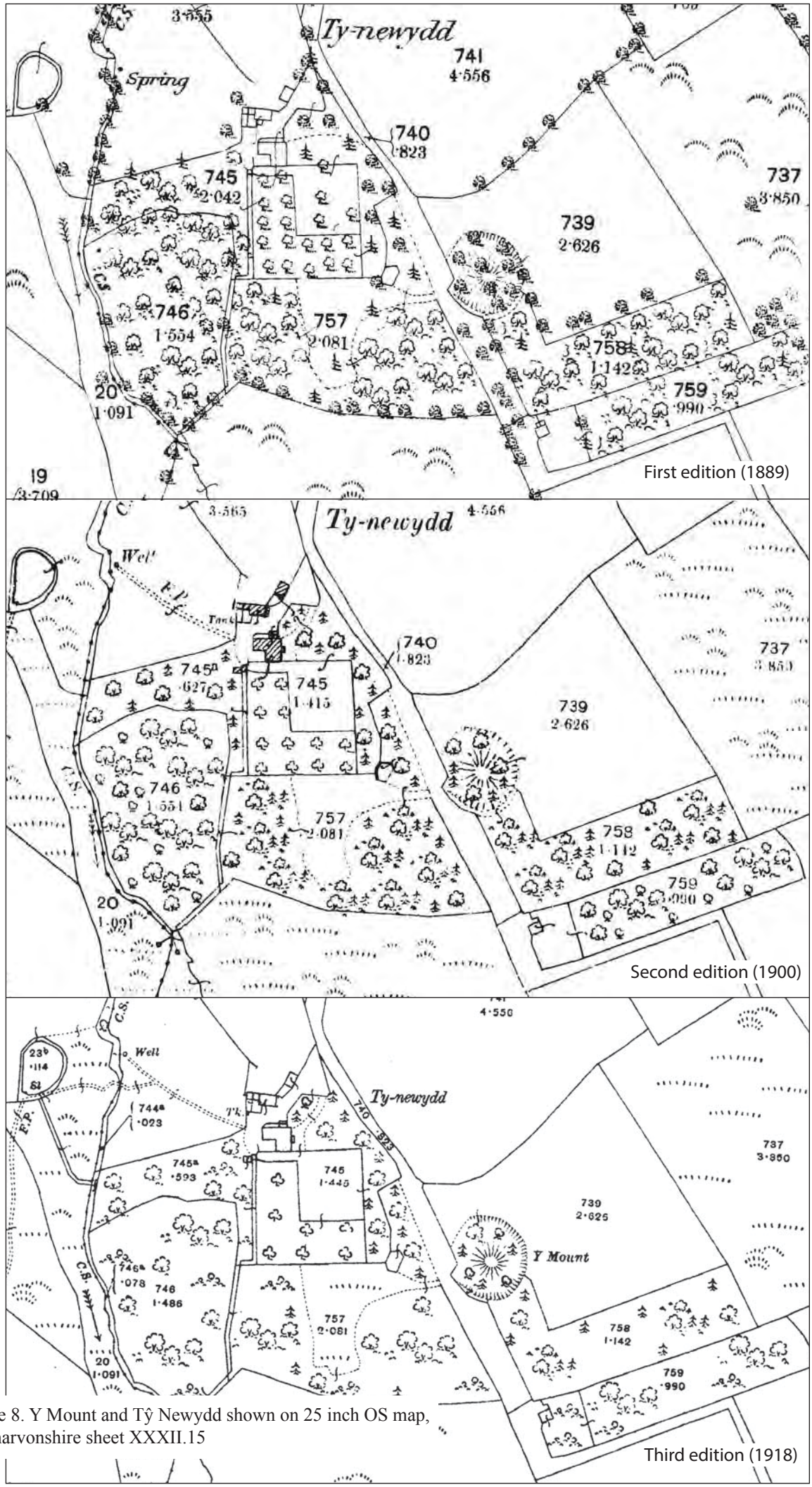


Figure 8. Y Mount and Tŷ Newydd shown on 25 inch OS map, Caernarvonshire sheet XXXII.15

Figure 9. Grey scale version of lidar data with enhanced contrast
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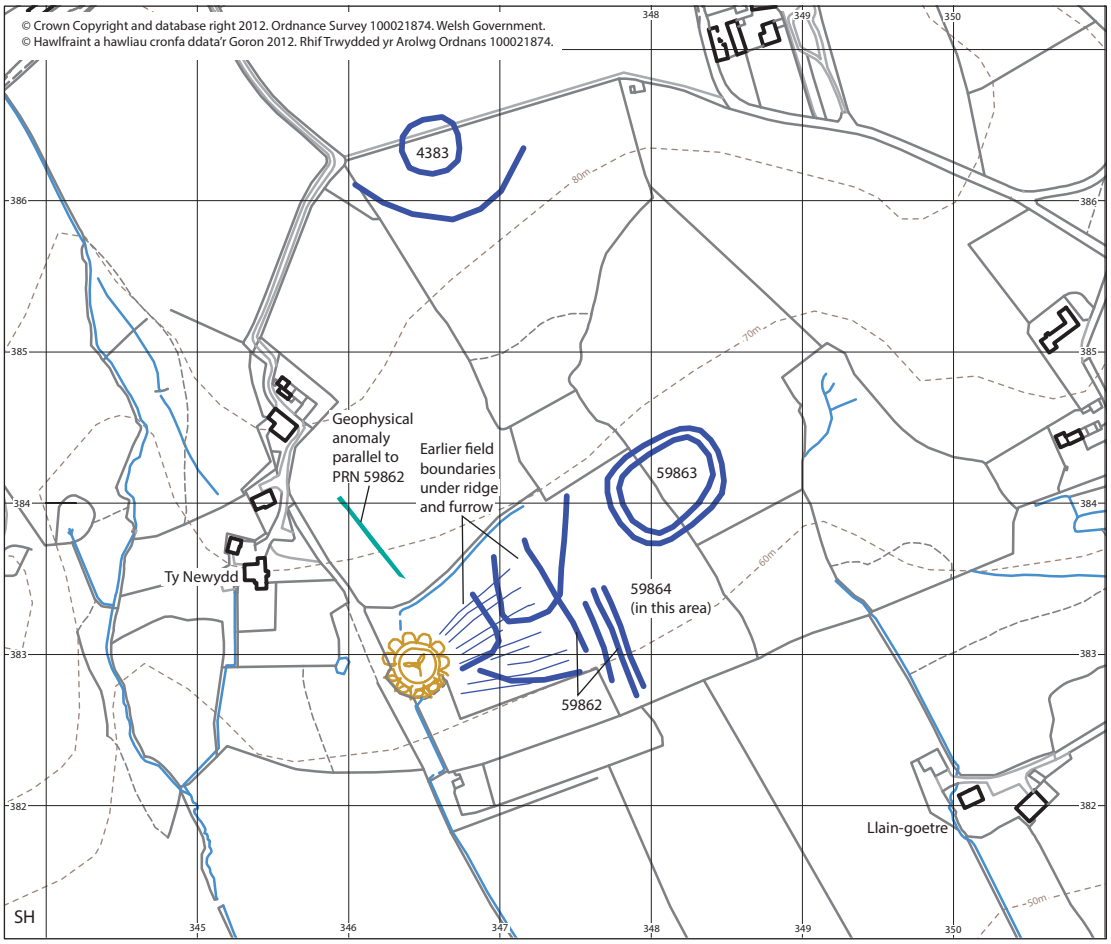

Figure 10. Transcription of lidar data (shown in dark blue).
(The numbers are PRNs referred to in the text)

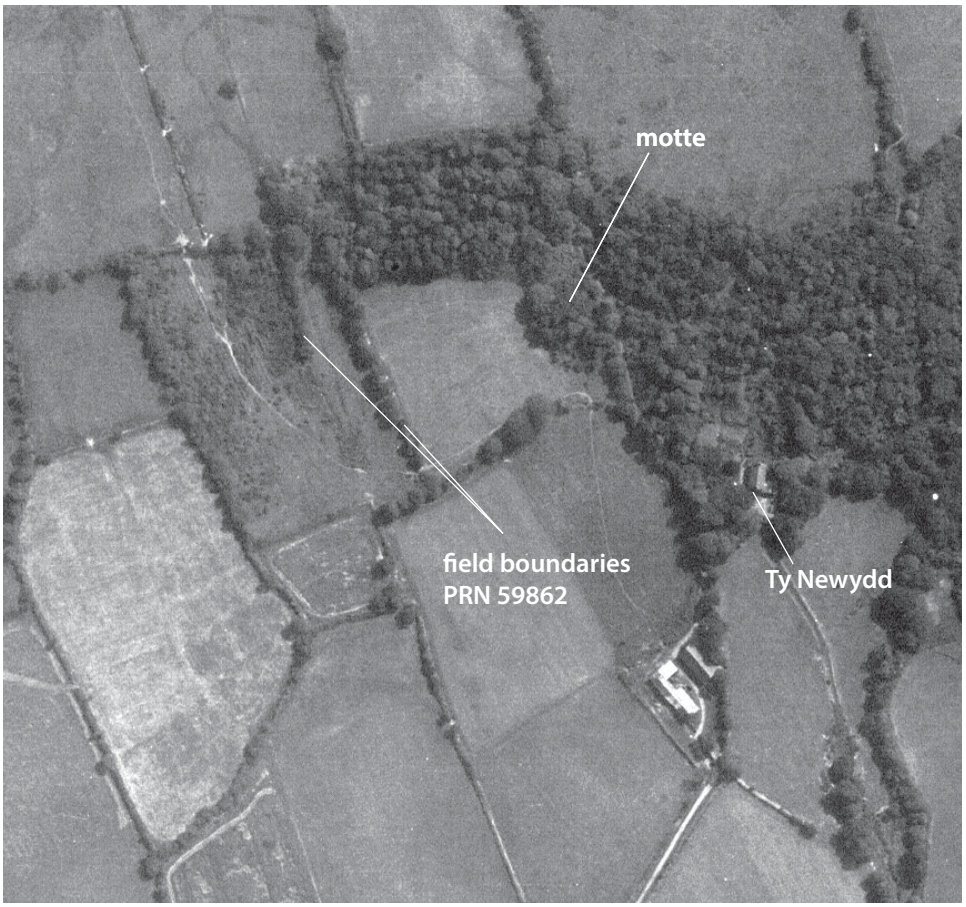

Figure 11. Aerial photograph dated 1945
(Sortie 4535 frame 3134, Cardiff Aerial Photographic Unit)

Figure 12. View of site on recent aerial photograph
(© Next Perspectives. Welsh Assembly Government 2014)

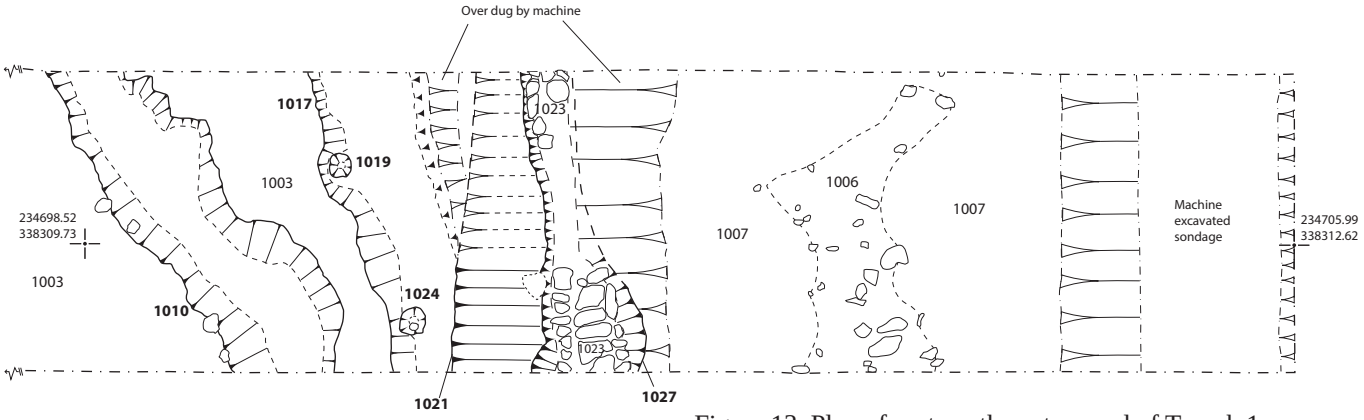

Figure 13. Plan of east-north-eastern end of Trench 1

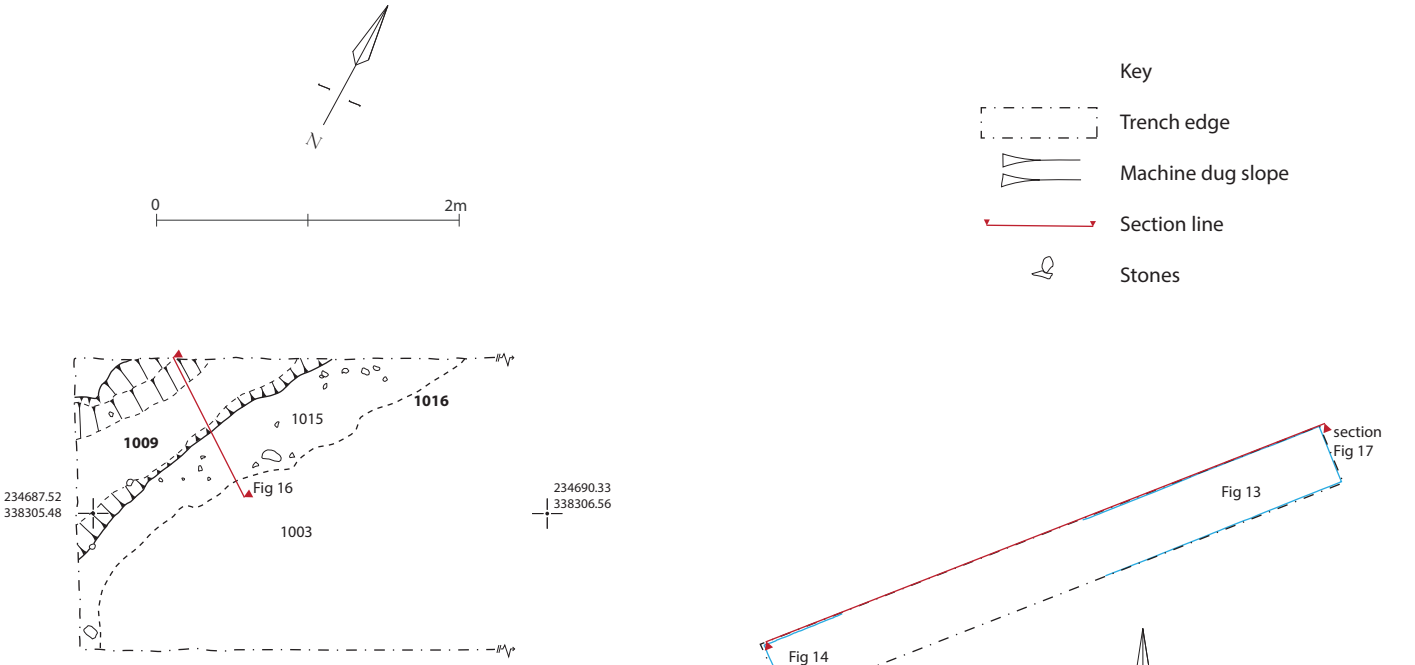

Figure 14. Plan of west-south-west end of Trench 1

Figure 15. Location of figures 13, 14 and 17 in Trench 1

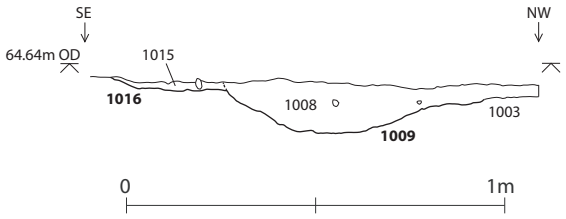

Figure 16. North-east facing section of feature [1009]

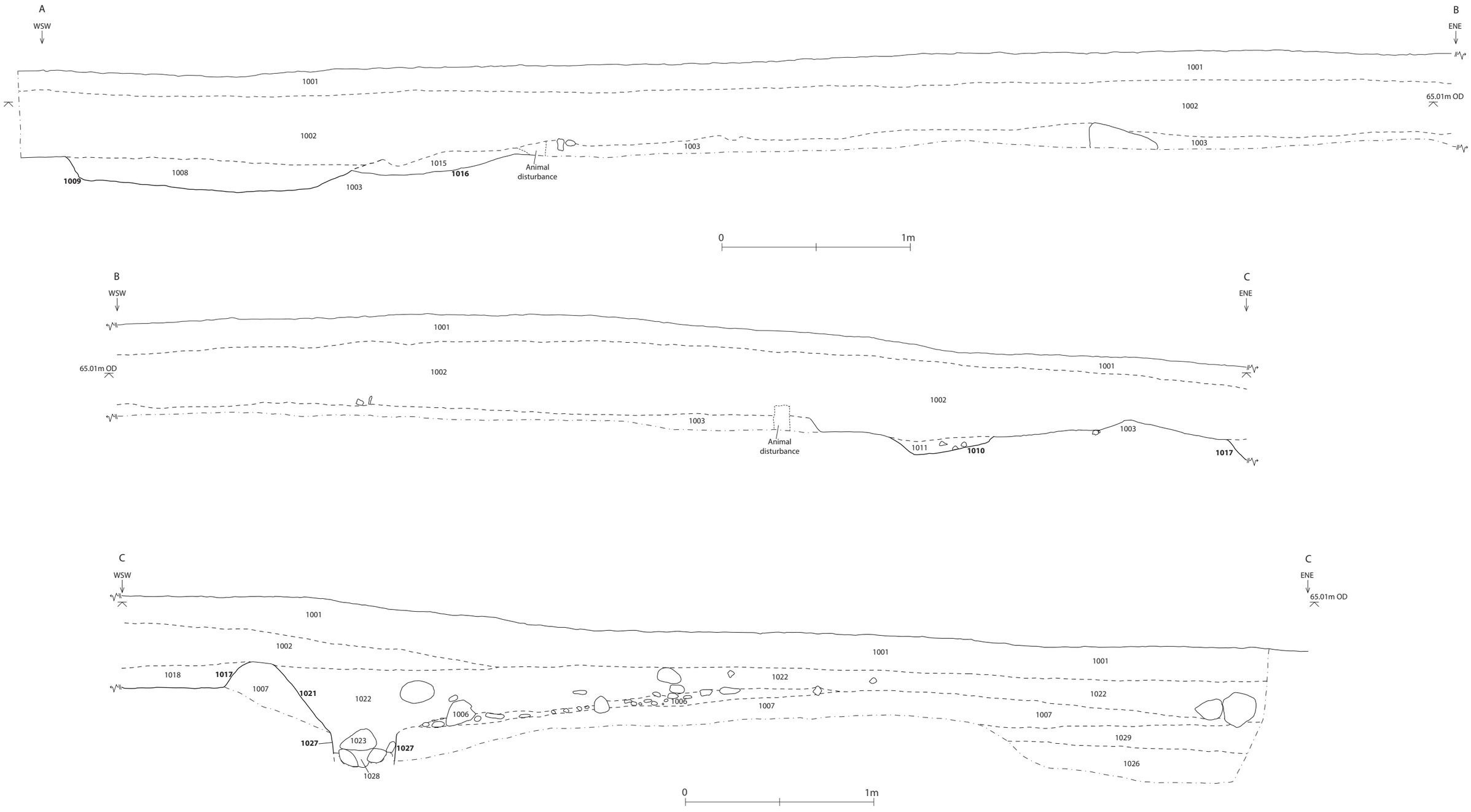

Figure 17. South-south-east facing section of Trench 1

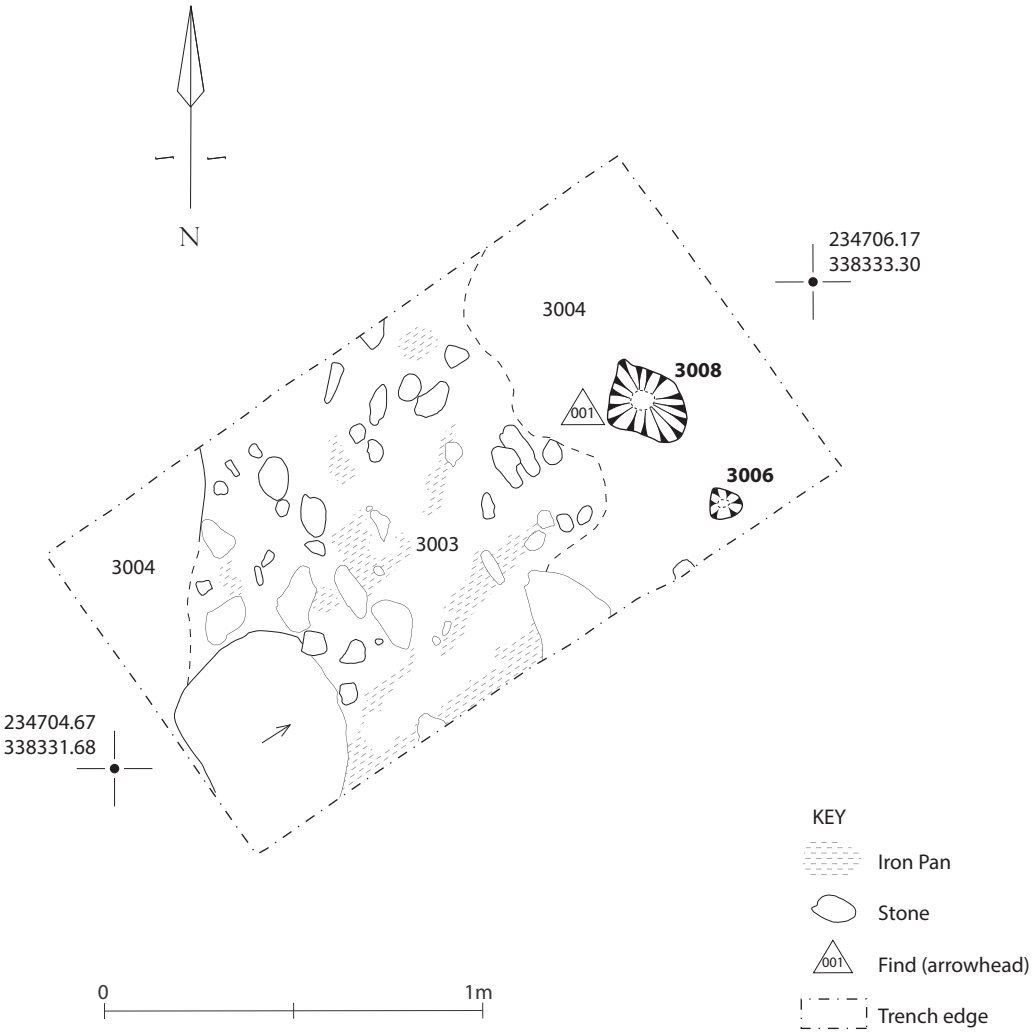

Figure 18. Plan of Trench 3

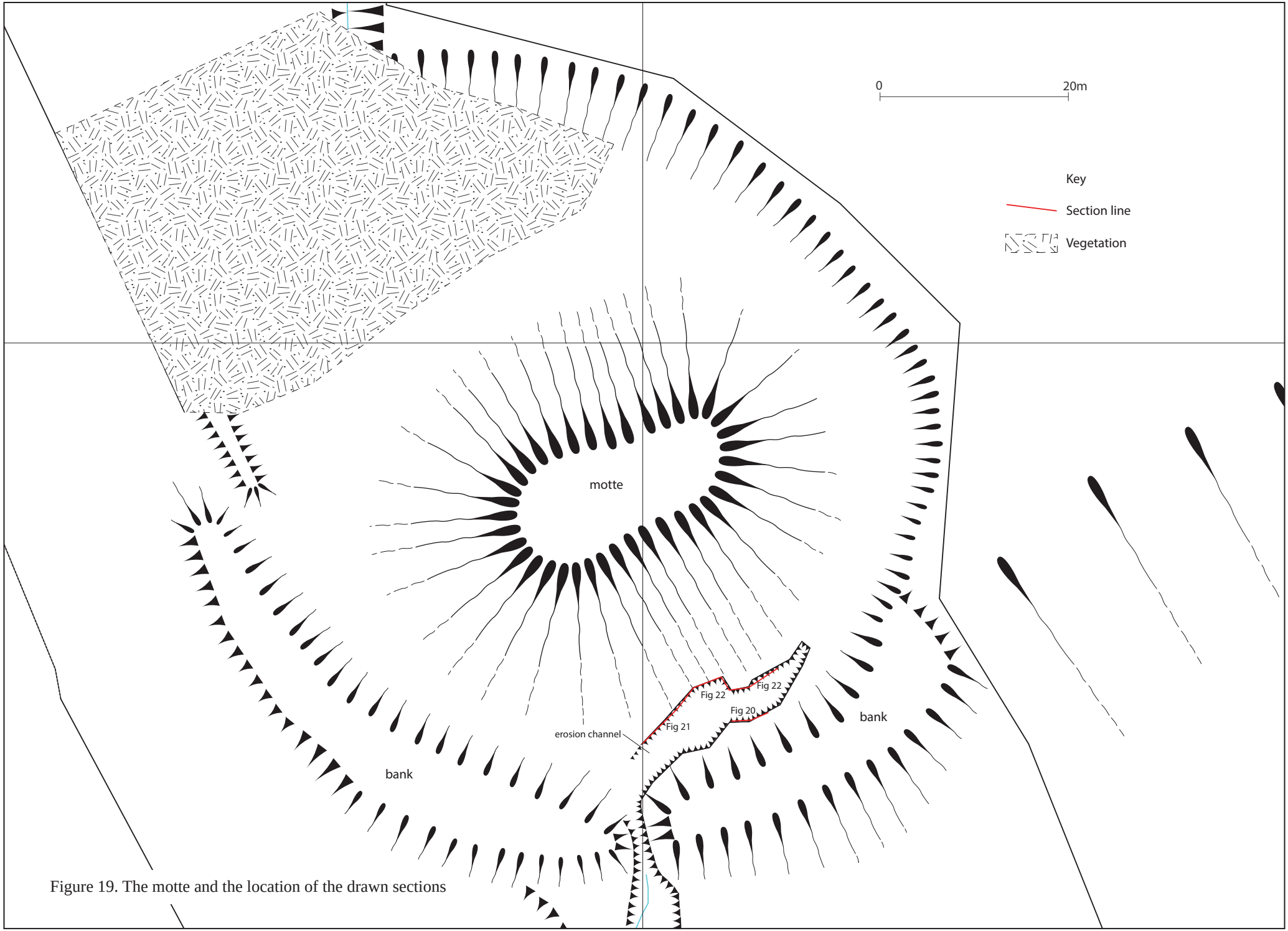

Figure 19. The motte and the location of the drawn sections

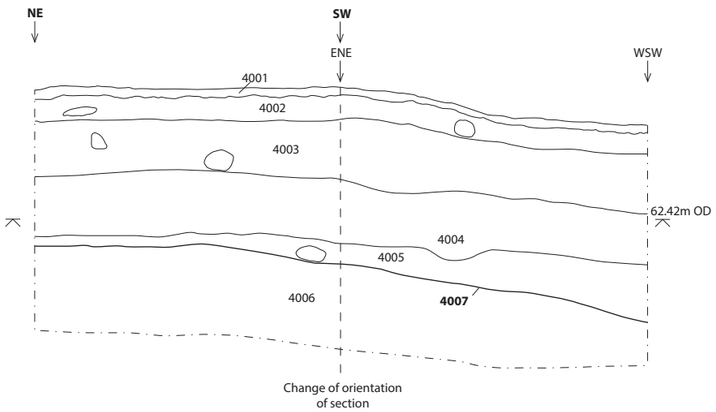

Figure 20. North facing section of motte ‘ditch’

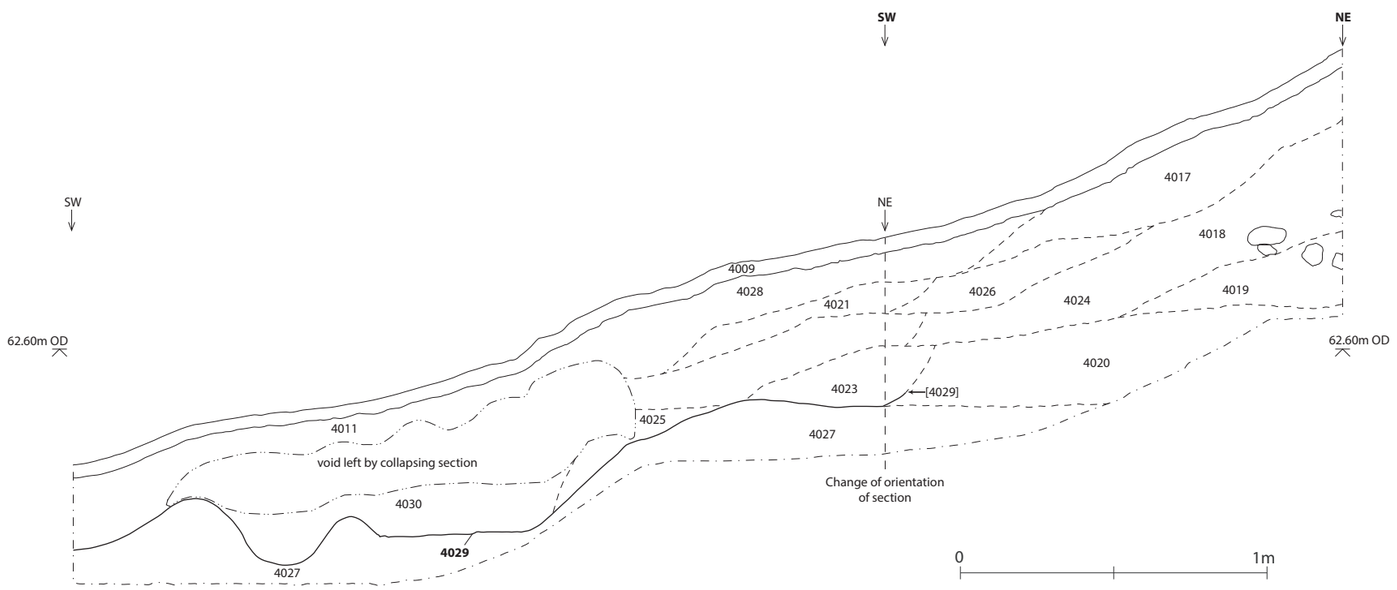

Figure 21. South-east facing section of ‘ditch’ and motte deposits

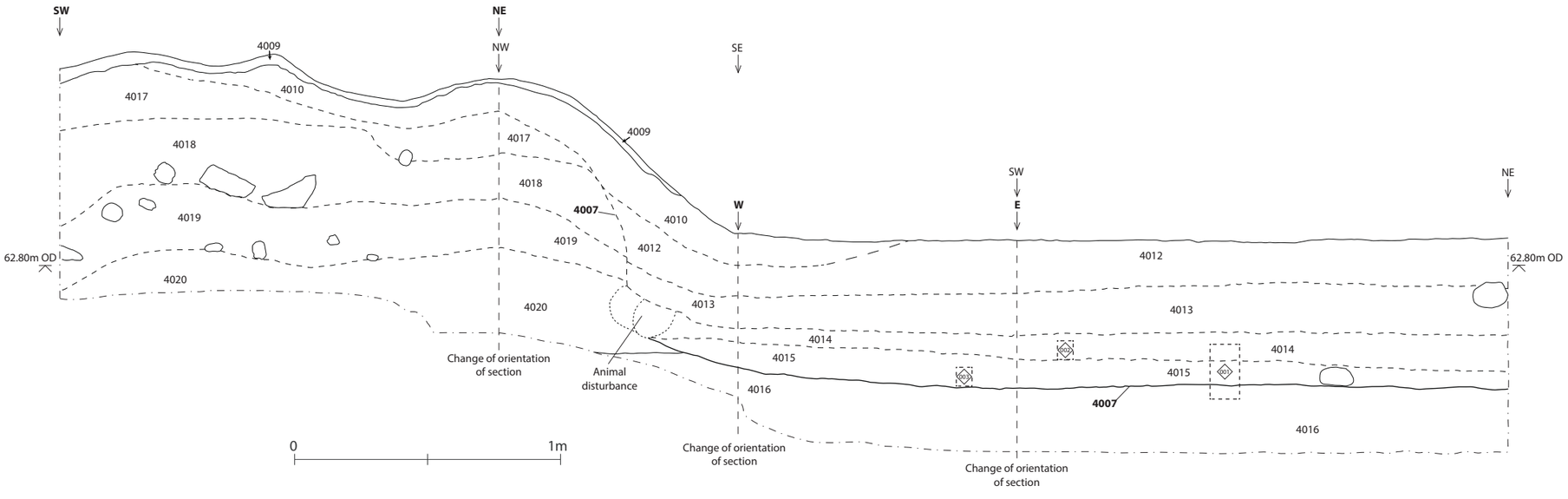

Figure 22. South-east facing and south-west section of ‘ditch’ and motte deposits

Figures 20 to 22

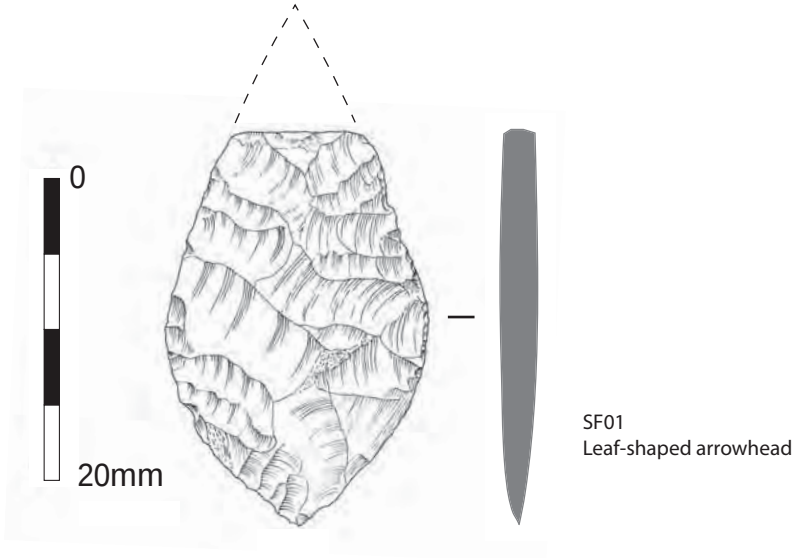

Figure 23. Finds from the excavations east of the motte

Plate 1. Motte, ditch and bank on southern side

Plate 2. Erosion channel at foot of southern side of motte

Plate 3. Mini-digger stripping topsoil and ploughsoil from trench 1 under archaeological supervision

Plate 4. Volunteers recording trench 1

Plate 5. Site tour on 18th September

Plate 6. Mounding and ramps on the motte probably all caused by badger activity

Plate 7. Large hollow on north-western side of motte showing vegetation cover

Plate 8. Context (1003), the natural silt over much of trench 1

Plate 9. Context (1007), the palaeochannel fill at the ENE end of trench 1

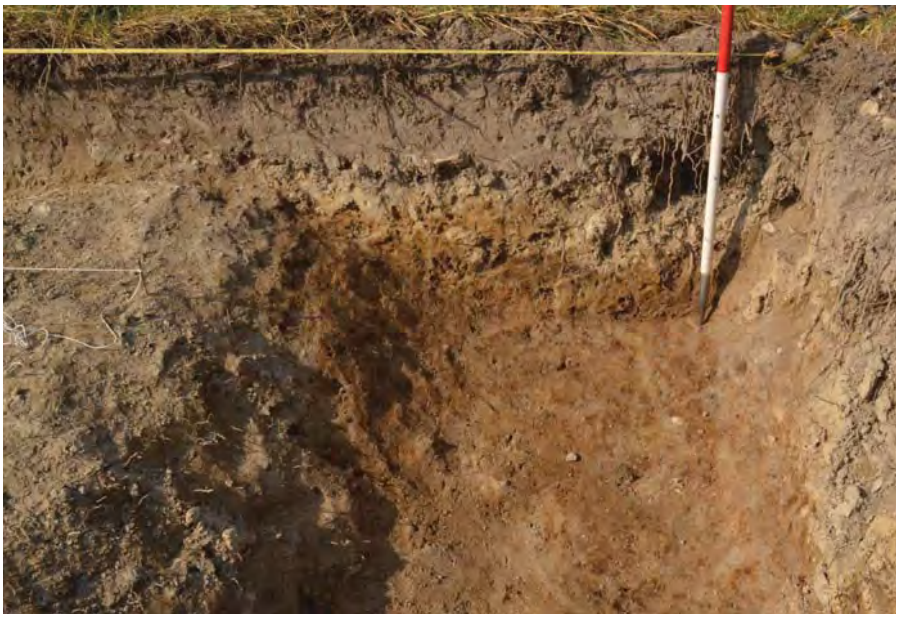

Plate 10. Palaeochannel deposits at the ENE end of trench 1 (contexts 1026 and 1029)

Plate 11. Stone lining (1023) of land drain [1027]

Plate 12. Linear feature [1009]

Plate 13. Stone deposit (3003) in trench 3

Plate 14. Erosion channel at base of motte cleaned up for recording

Plate 15. Deposits forming the motte revealed in section (contexts 4018 and 4019)

Plate 16. Section showing natural sand extending under motte deposits (see figure 22)

Plate 17. Section through ditch deposits and into natural sand (see figure 20)

Plate 18. Detail of ditch deposits (see figure 22)

Cadw

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