

CPAT Report No. 1820




Twmbarlwm

Archaeological Investigation



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Summary

A series of archaeological investigations were carried out at Twmbarlwm, Risca, Caerphilly County Borough (NGR ST2422092615) under the overall direction of the Clwyd-Powys Archaeological Trust. This involved a number of specialists, including Dr F Grant, who studied the palaeoecology of the site and C Matthews of Archaeological Survey West who carried out a geophysical survey of the monument. A UAV (drone) survey had already been carried out by Skywest Surveys in 2018, prior to the commissioning of the work by Cymdeithas Tymbarlwm Society, in association with Cadw.

Work commenced in 2019, but a combination of poor weather conditions and restrictions relating to the Covid-19 pandemic led to the postponement of some elements of the investigations until 2021, when the geophysical survey was completed and an excavation was carried out with the assistance of Cymdeithas Tymbarlwm Society volunteers.

The investigations were required to determine the effect of a large fire which impacted the vegetation cover and underlying topsoil in 2018. Subsequently, Cymdeithas Tymbarlwm Society, in association with Cadw, drew up a programme for the work which was intended to inform proposals for the restoration and revegetation of the site, and to improve its understanding and interpretation.

The products of the work comprised a detailed plan of the earthworks of the monument, an assessment of the palaeoecology of the area and a geophysical survey which hinted at the possibility of sub-surface features, but concluded that the responses had been impacted by the fire. The excavation showed that the earthworks, at least in part, appeared to be discontinuous and therefore possibly incomplete. Radiocarbon dates from the ditch fills provided dates in the late Iron Age and Neolithic; the former presumably denoting use as a hillfort and the latter possibly anomalous though potentially hinting at the possibility of an early phase as a causewayed enclosure.

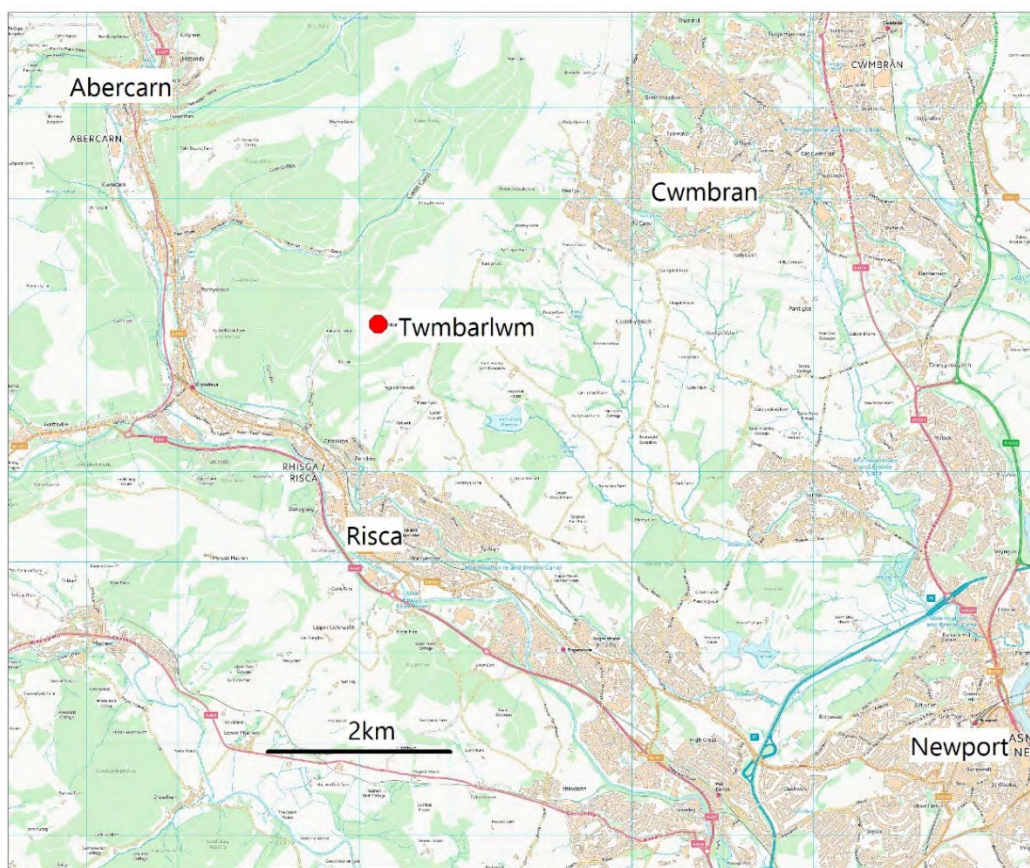
Crynodeb

A Welsh translation is now required of the summary for all projects undertaken in Wales. A draft report can be sent to the client without the translation, provided it includes 'Awaiting Welsh translation', and the draft PDF is watermarked with 'Draft'.

Remember to translate summaries for any new assets in a database or tabulated in the report.

1 Introduction

- 1.1. The Clwyd-Powys Archaeological Trust (CPAT) was engaged by Cymdeithas Twmbarlwm Society to undertake a programme of archaeological investigation at Twmbarlwm, Risca in Caerphilly County Borough (NGR ST2422092615). Twmbarlwm is a prominent hill and the scheduled monument (MM044) occupies a dominant position at the south-western terminus and highest point of the Mynydd Maen ridge. The monument comprises a univallate enclosure occupying approximately 4.14 ha, and a substantial mound, some 20m across and 8m high. The enclosure is conventionally understood as an Iron Age hillfort, with the mound interpreted as a medieval motte; however there has hitherto been no archaeological investigation of the site and there have been suggestions that the enclosure could be contemporary with the motte. Other features within the area of the scheduled monument include a possible burial mound, a pond and several possible hut-circles.



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Fig. 1: Location of Twmbarlwm

- 1.2. In 2018 a series of fires resulted in the loss of surface vegetation and degradation of the topsoil, and in the process exposed some of the features noted above. These are described more extensively below. Cymdeithas Twmbarlwm Society, in association with Cadw, drew up a programme of archaeological investigation in order to inform proposals for the restoration and revegetation of the site, and to improve its understanding and interpretation.
- 1.3. The investigations involved a variety of methods, as detailed below, and were significantly informed by two UAV (drone) surveys undertaken by Skywest Surveys on behalf of the Society in April and September 2018 (see fig. 2 in Appendix 1), which revealed much additional information relating to the enclosure and its contents.
- 1.4. The potential for palaeoenvironmental investigation of Twmbarlwm and the surrounding area was recognised early on and formed one part of the investigations. Work on this aspect comprised a preliminary palaeoecological assessment of sub-samples from three cores taken from Twmbarlwm and its surrounding area and was carried out by Dr F Grant. The results are detailed in Grant (2020);

at least one location was identified where further investigation might be considered useful in determining the vegetation history of the locality.

- 1.5. Geophysical survey was also used to assess the potential of the site for sub-surface archaeological features. This was carried out by Archaeological Survey West in 2019 and 2021 (Matthews 2021), the hiatus between being a result of the various restrictions relating to the Covid-19 pandemic. This is a separate report but the plans are reproduced here as Figs 15 and 16 for convenience. The main conclusion of the survey was that “Features of potential archaeological interest were identified across the site, however, the effects of the grass fires have significantly reduced the clarity of the data, especially on the south-facing side of the enclosure”.
- 1.6. One of the other main products of the investigations was the compilation of an annotated, interpretive plan of the monument, which was derived from the 3D UAV photogrammetric data model produced by SkyWest Surveys in 2018. This entailed ‘ground-truthing’ of the data model, and the results of this are provided as a conventional hachure plan of the earthworks and associated features (Fig. 17).
- 1.7. The final element of the investigations comprised a programme of excavations conducted with the aid of volunteers from Cymdeithas Tymbarlwm Society. This had to be delayed until 2021 owing to Covid-19 restrictions, and involved the excavation of three trenches across the earthworks which define the enclosure and two test pits in its interior to assess geophysical anomalies. Some of the locations excavated were varied from those originally proposed in the written scheme of investigations (Appendix 1) by agreement with Will Davies, the Cadw Inspector.



Fig. 2: Volunteers from Cymdeithas Tymbarlwm Society engaged in the excavation of Trench 1

2 Historical Background (Courtesy of Will Davies)

Early references and antiquarians

- 2.1. Whether you consider them to be Prehistoric, medieval or almost anything in between, the earthworks on Twmbarlwm are unknown to history until the post-medieval period when the hill began to appear in property deeds and the first cartographers and antiquarians first explored the historic county of Monmouthshire.
- 2.2. By the end of the medieval period Twmbarlwm lay within the Norman Lordship of Newport, initially created from the lowland, coastal portion of the Welsh territory of Gwynllwg between the Usk and

the Rhymney. The uplands of the Ebbw, Rhymney and Sirhowy to the north remained in Welsh hands until they were annexed by the de Clare family in the 1260s and became part of Newport. Until then Twmbarlwm would have stood somewhere on the boundary between Newport to the south, Welsh-held upland Gwynllwg to the north and the Lordship of Caerleon to the east, which fluctuated between Welsh and Norman control. In spite of its border location and prominence in the landscape Twmbarlwm does not seem to be mentioned in any medieval inquisitions or lordship accounts of land holdings and their boundaries although its presence in later deeds suggest that further careful study of early sources might locate some indirect references. It is this backdrop of shifting territories and power that should be borne in mind when considering some of the more recent interpretations of the monument explored below.

- 2.3. The remoteness of Twmbarlwm and much of the rest of the Ebbw and Sirhowy Valleys from the main 18th and 19th century tourist routes dictated that whilst it is clearly visible for many miles around there are relatively few antiquarian references as few actually visited it. As such, many of the most likely sources of information omit it entirely, notably Sir Joseph Bradney who died in 1933 leaving his monumental *History of Monmouthshire* incomplete at its final volume covering the Lordship of Newport and the former Welsh Gwynllwg.
- 2.4. Although some of the folkloric references to bees and wasps, the pool of avarice and even diggers into the mound being frightened by thunder relayed by Hando (1944), Roderick (1983, 1986), Palmer (1998), Barber (1983, 1987) etc may well have much earlier origins, Twmbarlwm's first documentary appearance, albeit of the hill only, is by Henry VIII's topographer and antiquarian John Leland. Leland visited the area between 1538-43, noting in passing during his account of the southern reaches of the Ebbw that '*...there is a very High Hille caulled Tumberlum*' (Itinerary Vol. III, 32), implying that he had only viewed it from a distance.
- 2.5. A few years later '*Tumberlow Hill*' appears as a mole-hill like lump on William Saxton's Map of 1577, followed by John Speed in around 1610. This corruption of presumably unfamiliar Welsh was followed numerous times and occasionally varied by subsequent cartographers, including '*Pentwynbarhen Hill*' (Robert Morden 1695), '*Tumberton Hill*' (Thomas Badeslade and William Henry Toms, 1742). Of these, John Cary (1787) appears to be the first to indicate the enclosure – or at least the higher summit at the end of the ridge rather than simply a schematic conical hill, and was closely followed on subsequent county maps. For those with a specific interest in this the early mapping of Monmouthshire is explored in detail with many examples by Michael (1985).
- 2.6. The first published description of the monument itself is in Archdeacon Coxe's *Historical Tour in Monmouthshire*. Few county antiquarians in Wales and the Marches provide so much useful information as this account, with Coxe's detailed descriptions being greatly enhanced by the engravings of Colt-Hoare and in this case by the remarkably accurate measured surveys of T.E. Morrice. This shows the mound, the small cairn on the lip of its ditch, the pond and three of the breaches or gaps on the western and south-western arc of its defences. Coxe assumed the mound to be the burial place of a fallen Silurian chieftan (1801, 75) and like other early writers i.e. Bradney, identified many of the motte and baileys in the county as 'British encampments'.
- 2.7. I know of no other 19th century descriptions of the monument but the Tithe map for Risca of 1843 depicts '*Mynydd Twyn Barlwyn*' in plot 191, when it was owned by John Jones Esq. and occupied by one Mary George along with extensive tracts of pasture around the southern sides of the hill. Here it is drawn in more schematic detail with the enclosure as an unbroken raised area but with the motte still distinguished at its eastern end. It is notable that the Tithe lists the summit as enclosed pasture distinct from the common land along the ridge to the north-east; field boundaries are drawn downslope from the enclosure, one apparently extending from the northern defences. The first edition Ordnance Survey drawn in the 1870s is similar to Morrice's plan with the exception that the southern gap in the defences is depicted a little further to the east and that the boundaries shown on the Tithe are reproduced.

The 20th century to the present.

- 2.8. The first archaeological descriptions of the site appeared in the early 20th century when the first great gazetteers of castles and hillforts were being compiled and by the middle of the century the great mound had become broadly accepted as a medieval motte rather than a barrow (e.g. Savory, 1950,

- Hogg & King 1963, Forde-Johnson 1976). The origin of the adjoining enclosure remains the subject of debate, most authorities favouring either an Iron Age hillfort, a very large castle bailey, or a bailey re-using an earlier hillfort. Beyond such basic identification more recent writers and researchers have explored in more detail a range of different scenarios for the likely date of establishment and function of both mound and enclosure, which are based upon a combination of the physical form and layout of the earthworks and their broader landscape and political context.
- 2.9. The monumental Royal Commission inventory on early Glamorgan castles favours an early post-Conquest date for the mound. It places Twmbarlwm into a group of undocumented mottes on the fringes of the uplands to the north of Cardiff with no clear manorial context, speculating that it may have formed part of a short lived chain of castles protecting the caput of Glamorgan Lordship at Cardiff prior to a regional Welsh resurgence in the 12th century (RCAHMW 1991, 21, 59). Geoff Mein comments on a John Sorrell aerial photograph, noting the irregular mounds of up-cast from the enclosure ditch to form the unfinished rampart, suggesting a ‘hasty’ and unfinished refortification of an Iron Age site to form a castle bailey (1997). Both Forde-Johnson (1976) and Hannah Wiggins in a Cadw-funded assessment of prehistoric enclosures in Monmouthshire (2006) both interpret the enclosure as an unfinished hillfort, Wiggins noting its apparently featureless interior. Neil Phillips (2006) undertook the first modern topographic survey as part of his PhD research on early castles in the region, observing that the mound itself had primarily been created through the excavation of the great rock-cut ditch rather than built up, and also accepted an Iron Age date for the enclosure. He concluded that the motte formed the base of an early ‘watch tower’, citing the lack of obvious contemporary settlement, its highly visible position and drawing comparison with a range of other hilltop mottes in the area. He does not attempt to place the site into its political or lordship context but does acknowledge an argument for a later date by Knight and others (see below).
- 2.10. Stuart Prior’s flawed and error-strewn Monmouthshire case study in his book on warfare and Norman castles expands upon the watch-tower hypothesis (2006). This cites Roman military theory and again draws superficial parallels with a range of other sites in the region, stating with some confidence that it was built ‘between 1135 to 1165’, ostensibly to protect the lowland Newport lordship from Welsh incursions, but without any supporting evidence. An alternative scenario but again without direct supporting evidence is that Twmbarlwm was associated with the annexation of the uplands of Gwynllwg into their Lordship of Newport in the 1260s by the Clare family (Whittle, 1992). The Clare theory was followed by Howell (2016), and Knight (2019), who interpret the enclosure as the remains of an unfinished castle bailey, again drawing attention to the irregular up-cast mounds of spoil for its incomplete rampart and the sharp profile of the ditches as evidence. Knight also notes similarities in location at the edge of its lordship to Gilbert II de Clare’s huge and equally lofty masonry castle at Morlais, albeit on an entirely different scale to Twmbarlwm. John Wiles also provides a description with measurements, noting the apparently remote location for a medieval castle, raising the possibility that it functioned as a hunting seat within Newport lordship (2008).
- 2.11. Finally, I include a quote from W.H. Greene, a 19th century journalist, antiquarian and prolific sketch artist who recorded many now vanished historical features in Newport and Monmouthshire. Whilst not directly referring to Twmbarlwm it is still very relevant to our project. Writing about the northern, Tranch end of Mynydd Maen he stated that ‘...if the present drought continues, it is possible that the mountain top may again take fire, and flare for weeks, as it did in the summer of 1868’. Damaging as it may have been, the hill recovered from this episode of burning and probably many other unrecorded ones. Moreover, the fires have presented us with an opportunity to better understand Twmbarlwm; firstly in exposing and enabling us to document previously unknown hut-like features within the enclosure. Secondly the forthcoming excavations will help to clarify the form and construction of the defences and these structures, potentially providing artefactual and dating evidence and with luck allowing us to move beyond some of the informed speculation above.

3 Excavation

- 3.1. The excavation was conducted in August 2021 in accordance with the Chartered Institute for Archaeologists’ (CIfA) *Standard and Guidance for Archaeological Excavation* (2014, updated in 2020). A total of five trenches were excavated, two of which - 4 and 5 - were 1m-square test pits, placed to assess geophysical anomalies. The three larger trenches investigated respectively: a bank and ditch terminal adjoining an apparent gap in the enclosure rampart (Trench 1); one of the sub-

circular features seen on the interior face of the enclosure bank (Trench 2); and the corresponding section of the enclosure ditch (Trench 3). The results from the five excavations are detailed below, plans and sections for trenches 1-3 are provided at the end of the report. The numbers in brackets refer to contexts within the site record and are those depicted on the plans.

Trench 1 (ST 24099 92496; 10m x 1.4m; Fig. 18)

- 3.2. The trench was placed on the south-west side of the enclosure, at a point where there is a terminal of both the bank and ditch of the intermittent rampart that defines its south side. The reason for the placement of the trench was to investigate whether this apparent terminal was authentic and not simply the result of later backfilling. The trench lay outside the area which had been burnt in 2018.
- 3.3. The natural subsoil in the trench was an orange silt (8), which had been cut through by the end of the enclosure ditch (9) towards the southern end of the trench, revealing an underlying stony silt on top of the local bedrock. On the north side of the ditch there was a layer of orange silty stone (6), up to 0.15m thick, which followed the ditch profile on that side only and so could perhaps be related to the construction phase of the earthworks. The base of the ditch contained a layer of grey-brown stony silt (7), up to 0.2m thick.



Fig. 3: Trench 1, showing the ditch approaching its terminal looking north-west. Photo CPAT 4936-0024

- 3.4. The ditch terminal was evident in the trench and it was clear that it had not been backfilled subsequent to its excavation, thereby denoting that the terminal was authentic (Fig. 3). Locally, the ditch was approximately 6.0m wide and 1.4m deep though this is not necessarily indicative of its typical dimensions owing to the proximity of the trench to the ditch terminal.
- 3.5. At the north end of the trench, the bank material was composed of orange silt containing small stones (5), up to 0.3m in thickness (Fig. 4). This was covered by a layer of brown silt (2), up to 0.25m thick, which continued down the slope into the ditch and was therefore of relatively late date. The surface soil (1) was a black peaty silt covered by turf, collectively 0.2m in thickness.



Fig. 4: The section through the enclosure bank in Trench 1, looking east. Photo CPAT 4936-0018



Fig. 5: The drystone wall at the southern end of Trench 1 looking south-west. Photo CPAT 4936-0015

- 3.6. A low stony bank was visible on the surface heading north-west from the trench to the next extant section of rampart and the southern end of the trench investigated this feature (Fig. 5). It proved to be a drystone wall (4), surviving to 0.36m high and overlying layer 2, so post-dating the enclosure. This had been subject to some later collapse, and was covered by the resulting rubble and brown silt (3), up to 0.4m thick. Layer 3 contained fragments of relatively modern glass, so it seems likely that the wall was a post-medieval boundary that had become redundant by the 19th or 20th-century.

Trench 2 (ST 24340 92688; 6m x 4m; Fig. 19)

- 3.7. The trench was placed to examine the easternmost of three sub-circular features that had been revealed by the 2018 burning on the internal face of the bank (26) on the northern side of the enclosure. Approximately half of the area occupied by the feature was initially examined to assess whether a stone-built structure was present (Fig. 6).



Fig. 6: The surface appearance of the 'sub-circular feature' looking north-east. Photo CPAT 4936-0039

- 3.8. Subsequently, a north-east/south-west aligned sondage, 1m wide, was excavated down to the natural subsoils and it was this which enabled the sequence of deposits to be understood (Fig. 7). The surface layer of the subsoil was a yellow silt (15), which contained fragments of coal. This was investigated by a small sondage at the south corner of the trench which showed that it was 0.15m thick and overlay a deposit of orange silt (16), greater than 0.2m in thickness and also containing coal.



Fig. 7: The sondage through the stone layer (12) looking north-east. Photo CPAT 4936-0086

- 3.9. At the north-east end of the north-east/south-west sondage two lenses of material were identified, probably material which was dug out of the ditch at an early stage of rampart construction. These comprised a lower layer of grey stony silt (14), up to 100mm thick, and an overlying orange stony silt (13) of the same maximum thickness.
- 3.10. Overlying layer 13 and the natural subsoil was an expanse of stone slabs, blocks and boulders (12) which contained some brown silt and was present throughout the trench, having a maximum thickness of 0.85m (Fig. 8). The stones had clearly been dug out of the rock-cut ditch (see Trench 3) and it was these which had given rise to the appearance of a circular feature on the surface. Careful examination of the stones revealed no evidence for the deliberate laying of them to form a structure and it was evident from the heavily voided nature of the deposit that many had been dumped randomly where they lay. If this is a defensive structure, it can be argued that the lack of structure suggests the process of construction was incomplete as there does not seem to have even been an attempt to pile the stones up more carefully to raise the height of the bank and improve its defensive properties. We are left with the question of the origin of the sub-circular features and it currently seems most likely on the excavated evidence that they are the result of later stone robbing forming hollows in the mass of rubble backing onto the bank. The presence of a few fragments of glass that seemed to have fallen into the voids between stones could indicate that this took place in the 19th or 20th centuries, but this is hypothetical.



Fig. 8: The heavily voided dump of stones forming layer 12, looking north-west. Photo CPAT 4936-0091

- 3.11. At the south-west end of the sondage, a layer of orange-brown silt (11), up to 50mm in thickness, overlay the stone layer and continued around the outer perimeter of the sub-circular feature. This deposit post-dated the rampart construction and was overlain by the modern surface soil, a dark grey-brown peaty silt (10), up to 0.25m thick.

Trench 3 (ST 24345 92696; 8m x 1m; Fig. 20)

- 3.12. With the exception of a 3m-gap, which was left to reduce the possibility of future erosion from the steep slope at the top of the bank into the ditch, this trench continued the line of the sondage in Trench 2. It encompassed the adjacent section of ditch and was excavated down to bedrock and the natural subsoils, no finds were recovered. Prior to the excavation, augering along the line of the trench had revealed what appeared to be charcoal in some of the ditch deposits and Trench 3 was dug to investigate these deposits.
- 3.13. The bedrock (25) was a shaly material identical to the stone found in layer (12) in Trench 2, which confirmed where that material had originated. The cut (27) for the ditch was rather irregular in profile as a result of the slabby nature of the rock which had meant that it was easier to remove it in layers and it was the south-west dipping angle of these which had been instrumental in creating the profile (Fig. 9). Above the bedrock at the south-west end of the trench were the same natural deposits that had been identified in Trench 2, namely a layer of orange silt (16), approximately 0.2m in thickness and the overlying yellow silt (15), 0.15m thick, which contained fragments of coal. Both of these had been truncated by the excavation of the ditch (27) (Fig. 10). Above layer 15 was the continuation of the stone and brown silt layer (12) forming the bank, also seen in Trench 2.



Fig. 9: The completed excavation of the ditch deposits revealing the nature of the underlying bedrock, looking north-east. Photo CPAT 4936-110



Fig. 10: The bedrock and natural silts at the south-west end of Trench 3, where they were truncated by the ditch, looking south-west. Photo CPAT 4936-0108

- 3.14. The earliest fill of the ditch was a very thin layer of mineralised silt (24), only 30mm thick, and this was overlain a layer of fine gravel (23), 50mm thick. It seemed likely that both of these were broadly contemporary with the excavation of the ditch and there may not have been a long gap in time between these and the deposition of the subsequent fill of loose shaly stone in grey silt (22), up to 0.5m thick – this material probably originating from the inner slope of the ditch and having eroded

into its present position after the ditch was dug. A layer of grey-brown silt (21), up to 0.3m thick and containing some charcoal, lay on this slope and almost butted fill 22 and it seems likely that these were of a similar age.



Fig. 11: The section through the ditch deposits, looking south. Photo CPAT 4936-107

- 3.15. A possible hiatus in the deposition of the ditch fills was indicated by a thin lens of charcoal-rich material (20), up to 30mm thick, above which the bulk of the ditch fill was represented by an orange-brown stony silt (19), up to 0.5m thick. Some flat stones in this followed the profile of the ditch, indicating that this layer may have been influenced by erosion from the bank down the south-west slope of the ditch (Fig. 11).
- 3.16. The uppermost fills of the ditch comprised a further thin lens of charcoal-rich silt (18), up to 50mm thick, above which the remainder of the ditch fill was represented by the surface soil, a black peat (17), up to 0.15m thick.
- 3.17. Samples of charcoal were obtained from contexts 20 and 21. These were sent to Archaeological Services Durham University for identification and to determine whether they were appropriate for radiocarbon dating. The context 20 material was ideal, being hazel stemwood and short-lived, while the material from context 21 was oak (a potentially long-lived species), which is not normally recommended for radiocarbon dating due to the possibility of the 'old wood effect'.
- 3.18. In the event, both samples were submitted for dating and the results are shown in Appendix 2 and noted on Fig. 20 for convenience. In summary, the charcoal from layer 20 (TWMBC20) gave a calibrated date in the late Iron Age (Beta 613898 175 cal BC – 8 cal AD at 2 sigma), while that from layer 21 (TWMBC21) gave a calibrated date in the Neolithic (Beta 613899 3315 – 2916 cal BC at 2 sigma).

Trench 4 (test pit) (ST 24331 92669; 1m x 1m)

- 3.19. The test pit was excavated as a small-scale investigation to assess the character of a large magnetic anomaly (one of those marked L on Fig 16) which had been identified by the geophysical survey, and

with a view to the possibility of further investigations if significant archaeological material was revealed. This and Trench 5 were located by Archaeological Survey West, who had carried out the geophysics, and lay within the area burnt in 2018.

- 3.20. The natural subsoil in the excavation was an orange silt (30), which was covered by 50mm of grey silt (29) with some iron panning. The surface soil was also 50mm thick and comprised a black peat (28). Cutting through layer 29 was a pit (31, see Fig. 12), approximately 0.3m in diameter, whose mixed silt and stone fill (32) also contained an iron tube. It was no doubt this tube that was responsible for the strong magnetic anomaly in the geophysics results.



Fig. 12: Trench 4, showing the iron tube. Photo CPAT 4936-0100

Trench 5 (test pit) (ST 24303 92660; 1m x 1m)

- 3.21. This test pit was excavated as another small-scale investigation to assess the character of a potential ring-shaped anomaly (one of those marked K on Fig 16) which had been identified by the geophysical survey, and with a view to the possibility of further investigations if significant archaeological material was revealed.
- 3.22. The natural subsoil was an orange silt (36), and this was covered by a layer of brown silt (35), 100mm thick, that was investigated by a half-section and contained no material of archaeological interest (Fig. 13). Overlying layer 35 was 50mm of grey silt (34), with some iron panning and the black peaty surface soil (33), 100mm thick.



Fig. 13: Trench 5, showing the half section through layer 35. Photo CPAT 4936-0102

4 Palaeoenvironmental assessment

- 4.1. Sampling took place on 21st October 2019. Two areas in particular had originally been suggested for palaeoenvironmental sampling; namely a “pond” in the northern part of the interior, and the lower ground on the ridge to the east and north-east of the motte. Unfortunately the pond was dry, and appears to have been regularly cleared with virtually no organic material suitable for sampling being present. Similarly, the area to the east and north-east was much disturbed, and contained no deposits deeper than 0.2m.
- 4.2. Using local knowledge, map evidence, and identifying areas of wetland vegetation, several potentially suitable sampling sites were located, within 1km of the monument. Although none contained significantly deep deposits (of 1m or more), sampling took place at three of these sites, identified as A, B & C.

Twmbarlwm A:

- 4.3. The soils on the hilltop, within the enclosure, are generally shallow, and have been extensively damaged by the fire. However, a small, isolated area of blanket peat, undamaged by burning, was identified slightly upslope to the south of the pond (grid reference ST2421 9261). Probing revealed a depth of material of approximately 0.25m. This area of blanket peat extended approximately 24m north-west to south-east to the pond edge x 9m north-east to south-west, and appears to represent accumulation within a shallow basin. The vegetation community is typical M17 *Scirpus* (*Trichophorum*) *cespitosum* – *Eriophorum vaginatum* blanket mire (Elkington et al. 2001, 40; Rodwell 1991), consisting of *Trichophorum cespitosum* (common deergrass), and *Eriophorum angustifolium* and *E.vaginatum* (cottongrass), all members of the sedge family (Cyperaceae) and *Sphagnum* spp. (bog moss). The surrounding, drier, area is characterised by *Molinia coerulea* (purple moor-grass) with *Vaccinium myrtillus* (bilberry).
- 4.4. The lowest part of the profile, reflecting the oldest deposits sub-sampled, demonstrates a local landscape dominated by heathland, with moderate areas of grassy open areas, and hazel scrub. There then follows a period of grassland expansion, with a consequent reduction in heathland. Wooded areas also begin to expand, probably reflecting a more regional expansion in oak-birch woodland. Mid profile a period of higher levels of microscopic charcoal occurs, implying burning of the local

vegetation. A reduction in alder and sedge pollen hint at increased dryness, with a possible short-lived expansion of drier heath. Bracken growth begins to increase after this burning episode. A peak in grass and herbs occurs at 0.06-0.07m, demonstrating increased areas of open grassland. Coupled with the appearance of large grass grains, this may suggest cereal cultivation locally, although the herb assemblage may equally imply increased pastoralism and grazing activity. The uppermost part of the profile demonstrates the landscape seen within and in the immediate environs of the monument today, dominated by upland heathland.

Twmbarlwm B:

- 4.5. A confined area of blanket mire was identified at ST2491 9284, on sloping ground c.0.5km to the north-east of the monument. This was sited immediately adjacent to a fence-line dividing the open area to the north and west, from a coniferous forestry plantation to the south and east. Mire vegetation consisted of *T. cespitosum*, *E. angustifolium*, *Sphagnum* spp. within an area of *P. aquilinum* (bracken), with occasional *Ulex europaeus* (gorse). A mature *Fagus sylvatica* (beech) tree was located on the fence-line to the north-east. The area of waterlogged organic deposition extended for approximately 38m south-west to north-east, and c.7m north-west to south-east. Probing identified deposits of up to 0.25m deep. A single core was extracted using the Russian corer from the deepest part at 324917 192849.
- 4.6. This profile depicts a local landscape of open grassland with fluctuating expanses of bracken, and low levels of heath, in the immediate area. Wooded areas are identified throughout, and generally display an increasing trend. Pollen indicating larch and/or Douglas Fir, and pine is present throughout the majority of the profile, identifying the coniferous plantation in the immediate vicinity of the sampling site. The beech pollen recorded probably reflects the presence of the beech tree currently growing close to the sampling site. Microscopic charcoal deposition is relatively high throughout, albeit with some variation. The location of the sampling point to the east of the dry heathland upland may account for the high levels of microscopic charcoal deposition on account of the prevailing wind.

Twmbarlwm C:

- 4.7. A small, spring-fed mire was identified on a shelf downslope to the east of the monument at ST24597 192669 (centred). Probing revealed a depth of material of up to 0.35m, extending for approximately 70m north-west to south-east, and c.25m south-west to north-east, although the area of deeper, *Sphagnum*-rich mire, was somewhat more confined. A single core was extracted using the Russian corer from the deepest part at ST24598 192661. The vegetation consisted of patches of willow scrub (*Salix cinerea*) on a *Sphagnum*-rich mire, containing *S. papillosum* (Papillose), *S. subnitens* (Lustrous), *S. capillifolium* (Acute-leaved), and *S. fallax* (Flat-topped). The sloping ground below the enclosure is dominated by a *P. aquilinum* and *M. coerulea* community on acidic podzolic soils.
- 4.8. This was the deepest core, and as such it is probable that the information it contains covers the longest time period. It does appear to contain a consistent record of change for the local vegetational history. The current counting levels of this assessment and the wider sampling regime employed for this profile may however mask significant vegetational changes. The presence of spherical carbonaceous particles (SCPs) in an upper sub-sample provides a proxy date for this part of the profile. Deposition of such particles begins in the mid nineteenth century AD, with a rapid increase in the mid twentieth century AD.
- 4.9. The lower part of the profile appears to describe a predominantly wooded local landscape, of hazel, birch, alder, oak and lime, holly, with only limited open grassy areas. There are disturbance indicators in the herb flora, implying human activity in the locale. Large grass grains were recorded in very low numbers towards the end of this phase, including a single grain referable to *Avena*-type, which suggests cultivation (or cereal processing) was taking place close by. There appears to be little burning in the local area, as microscopic charcoal deposition is low.
- 4.10. A period of heath expansion follows, with increased burning evident and an expansion of bracken, suggesting a change in landscape use.

- 4.11. The appearance of SCPs coincides with the increase in *Pinus* pollen and the appearance of *Larix*-type, resulting from the later post-Medieval and industrial period conifer plantations. Grassland expansion is evident in the upper part of the profile.

Discussion

- 4.12. The material from Twmbarlwm A is valuable in that it is the only material to originate from within the monument itself. It is unfortunate therefore that it is so shallow. However, despite its shallowness, it is intriguing, as it appears to depict vegetation change more varied than may be expected from a deposit of the very latest historical origin. If peat accumulation has been particularly slow in this area it is possible that a greater temporal range is represented than may be expected in such a shallow profile. A spot sample submitted for radiocarbon dating would allow an assessment of the age of the material being analysed.
- 4.13. There may also be some value in further investigating the material from Twmbarlwm C as it appears to reflect the greatest amount of change within the local vegetation, and probably the longest time period. As with Twmbarlwm A, a basal sub-sample submitted for radiocarbon dating would allow the profile to be more closely dated, (in addition to the proxy date suggested by the occurrence of SCPs.) Once the time period encompassed within the profile can be ascertained, a decision can be made as to whether additional pollen analysis is desirable. This would include closer interval sub-sampling, and a full pollen count of 4-500 grains.

5 Conclusions

- 5.1. The geophysical survey results indicated that there had been some impact on the magnetic signature of the deposits as a result of the 2018 fire, though the excavations showed little evidence of obvious physical changes. The geophysical anomalies investigated by test pitting were not identified as features of archaeological significance. The palaeoenvironmental assessment shows a relatively well-preserved pollen record, and some of the changes in environment identified by this evidence might date back thousands of years. Radiocarbon dating of some of the samples would be very helpful in linking these results with the physical remains of the monument.
- 5.2. A terminal of the bank and ditch of the enclosure was positively identified by the Trench 1 excavations and this could identify an entranceway through the bank and ditch, or a gap left during construction of the earthworks. The potential entrance is approximately 18m in width. Elsewhere, however, the geophysics results have been interpreted (Matthews 2021, 10) as providing evidence that some of the apparent gaps in the rampart had originally been ditches that were subsequently backfilled. Further excavation would be required to determine if this was a correct interpretation.
- 5.3. On the north-eastern side of the enclosure, Trench 2 showed clearly that there was no underlying structure to the sub-circular feature that had been interpreted as the site of a possible dwelling. It is most probable that the hollow represents no more than the later robbing of stone which had been dumped there following the excavation of the adjoining section of ditch, though when this robbing took place is uncertain. The lack of an ordered structure in the corresponding part of the enclosure bank could also be taken to support the hypothesis that the enclosure was unfinished, depending on whether it was originally intended to be defensive in nature, while the presence of a counterscarp bank could imply that there were two distinct phases to this section of the enclosure earthworks.
- 5.4. The ditch itself was the most significant part of the enclosure on the north-east and was rock-cut towards the base, having a width of approximately 7m and depth of about 4m from the base of the bank (see Fig. 14), where excavated in Trench 3. Two of the layers in the ditch fill were subject to radiocarbon dating. Of these, the earliest stratigraphically was context 21, which was a layer overlying (and therefore post-dating) the south-west side of the ditch cut and also overlying the dump of stone seen in Trench 2 which had presumably originated from the ditch. At first sight the date of 3315 – 2916BC seems anomalous, but if this is correct it has significant meaning for the origin of Twmbarlwm, in that it raises the

possibility that the earliest phase of the monument could be a causewayed enclosure. These monuments are characterised by intermittent ditch circuits and have a general date range of 4000-3300BC. This only just fits in with the date from context 21, but it should be remembered that this material certainly post-dates the ditch and was deposited over an unknown length of time, giving rather more leeway in the date.

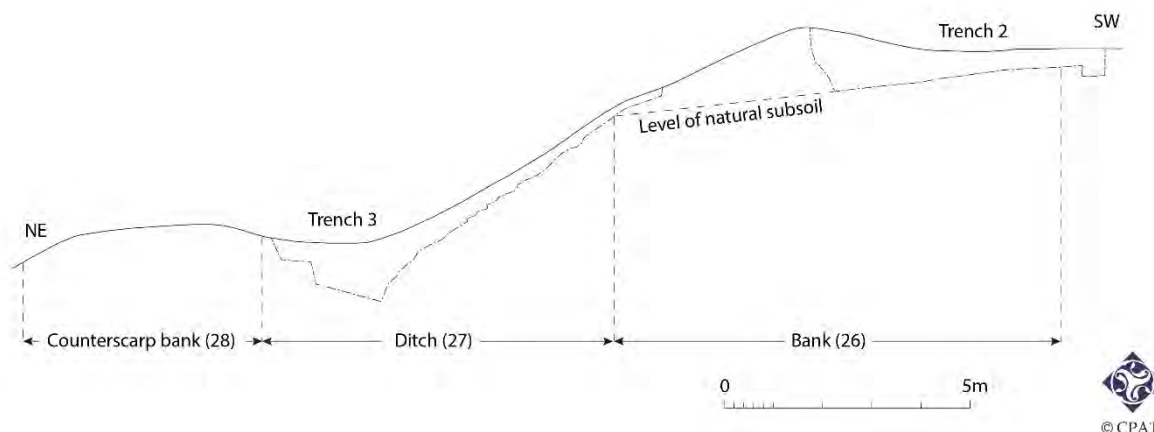


Fig. 14: Enclosure rampart profile at Trenches 2 and 3

- 5.5. Causewayed enclosures are, however, extremely uncommon, and this alone casts doubt on the interpretation, given that it relies on limited information. One supporting factor is the nature of the enclosure bank, which has mounds in a number of places (the ‘sub-circular features’ identified on Fig. 17). These could suggest excavation as a series of pits with causeways between, which may have been modified during Iron Age times into a semi-continuous ditch and bank.
- 5.6. Causewayed enclosures were described by Oswald (*et al* 2001, 1) as “... amongst the oldest, rarest and most enigmatic of all the ancient monuments known in the British Isles”, though it has to be said that the siting of Twmbarlwm would not be out of place amongst those enclosures which occupy upland locations. Oswald (*et al* 2001, 99-102) notes that some of these seemed to be deliberately sited in spectacular locations, overlooking lower ground and provides an interesting, almost poetic, description of their location which seems apposite for Twmbarlwm “...when looking away from the monuments across the low-lying ground, the sudden drop of the scarp slopes creates a sense of standing on the edge of the world”.
- 5.7. In contrast, the radiocarbon date from context 20, slightly later in the sequence and evidently an accumulation in the base of the ditch as it then was, places that material in the later Iron Age. The consequent interpretation of the Twmbarlwm enclosure as a hillfort, though presumably an unfinished one, is perhaps more easily acceptable and fits in with much of the earlier comment on the site. Whatever the truth of the situation at Twmbarlwm, the conjunction between a hillfort and a causewayed enclosure has been seen at a number of sites and it could be that the Iron Age date signifies the remodelling of an earlier enclosure. The counterscarp bank seen outside the ditch in a number of places could be a result of this type of activity.

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7 Archive deposition Statement

- 7.1. The project archive has been prepared according to the CPAT Archive Policy and in line with the CIfA *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives guidance* (2014). The digital archive only will be deposited with the Historic Environment Record, Glamorgan-Gwent Archaeological Trust and the paper/drawn/digital archive with the National Monuments Record (RCAHMW). The artefacts will be retained by Cymdeithas Tymbarlwm Society, subject to agreement, in due course.

Archive summary

78 digital photographs, CPAT film no 4710

111 digital photographs, CPAT film no 4936

Appendix 1: CPAT WSI 2095-1

1 Introduction

- 1.1. The Clwyd-Powys Archaeological Trust (CPAT) has been invited by Cymdeithas Tymbarlwm Society to undertake a volunteer-based programme of archaeological investigation at Twmbarlwm, Risca (NGR ST2422092615). Twmbarlwm is a prominent hill and scheduled monument (MM044) occupying a dominant position at the southern end and high point of the Mynydd Maen ridge. The monument comprises a univallate enclosure occupying approximately 4.14 ha, and a substantial mound, some 20m across and 8m high. The enclosure is conventionally understood as an Iron Age hillfort, with the mound interpreted as a medieval motte; however there has hitherto been no archaeological investigation of the site. Other features include a possible burial mound, a pond and several possible hut-circles.
- 1.2. In 2018 a series of fires resulted in the loss of surface vegetation and degradation of the topsoil, and in the process exposed some of the features noted above. These are described more extensively below. Cymdeithas Tymbarlwm Society, in association with Cadw, have drawn up a programme of archaeological investigation to examine the site in order to inform proposals for restoration and revegetation, and to improve understanding and interpretation.
- 1.3. This WSI sets out the full scope of archaeological works, including community-based work with local volunteers, which is intended to increase awareness of the site and understanding of its sensitivity.



Fig. 1. Ministry of Works plaque commemorating conservation work undertaken by the Manpower Services Commission at Twmbarlwm in 1984. The plaque is located at the foot of the motte and describes the enclosure as being 'thought to be an iron age hill fort but perhaps of medieval construction'

2 Objectives

- 2.1. The objectives of the investigation are:
- to provide a ground plan of the monument through a combination of aerial photogrammetry, topographic survey and remote sensing data;
 - to undertake specialist surveys – specifically geophysical survey and palaeoenvironmental sampling, together with a programme of auger coring;
 - to reveal by means of field excavation the nature, condition, significance and, where possible, the chronology of the cultural heritage within the areas described below;
 - to record any archaeological features identified during fieldwork;
 - to prepare a report outlining the results of the fieldwork;
 - to prepare a final publication of the results in an appropriate regional or national journal, depending on the nature and significance of any archaeology.
- 2.2 The investigation is also intended to involve, as much as possible, volunteers from the surrounding local communities. Cymdeithas Twmbarlwm Society will be the primary source of these volunteers, through their own membership and local networks and contacts. Some opportunities may also be offered for CPAT volunteers to join the fieldwork as appropriate.

3 Methodology

Survey

- 3.1. Survey work is intended to produce three outcomes.
- 3.2. An annotated, interpretive plan of the monument will be produced, which will be derived from the 3D UAV photogrammetric data model produced by SkyWest Surveys in 2018. This will entail additional ‘ground-truthing’ using a combination of conventional total-station survey and hand-held GPS units. The final output – in digital form and hard copy – will be a conventional hachure plan of the earthworks and associated features.
- 3.3. Geophysical survey will take place in the areas shown in Fig. 2. This will comprise magnetic survey of an area measuring 2.5 ha and a single day of trial resistivity covering the earthworks. The survey will be undertaken using a Bartington Fluxgate Gradiometer 601-2 with RM15 Geoscan multiplexer and Trimble R4 Rover with VRS Now correction. The survey style will be a 20/20m grid pattern; the grid will be established using GPS and bamboo flag markers (accuracy between 0.01m and 0.1m); readings will be taken on a 0.5m traverse with 0.25m intervals. The data will be processed using Terra Surveyor and presented through QGIS. This work will be subcontracted to Archaeological Survey West (ASW) Limited, and will be undertaken in accordance with the Chartered Institute for Archaeologists’ (CIfA) *Standard and Guidance for Geophysical Survey*.
- 3.4. Palaeoenvironmental sampling will be focussed on the pond in the centre of the site (Fig. 2), but with the possibility of taking control samples from other areas of boggy ground to the east and north-east of the motte. Up to 15 samples are allowed for, to be taken over a two-day period subject to the extent and nature of the waterlogged deposits in question.
- 3.5. In addition this preliminary survey phase will also include a programme of coring by auger, principally in the areas intended for trial excavation (see below) to determine the depth and likely nature of the deposits to be encountered. Transects across one or more rampart sections will also be taken to inform the restoration programme and any further research.

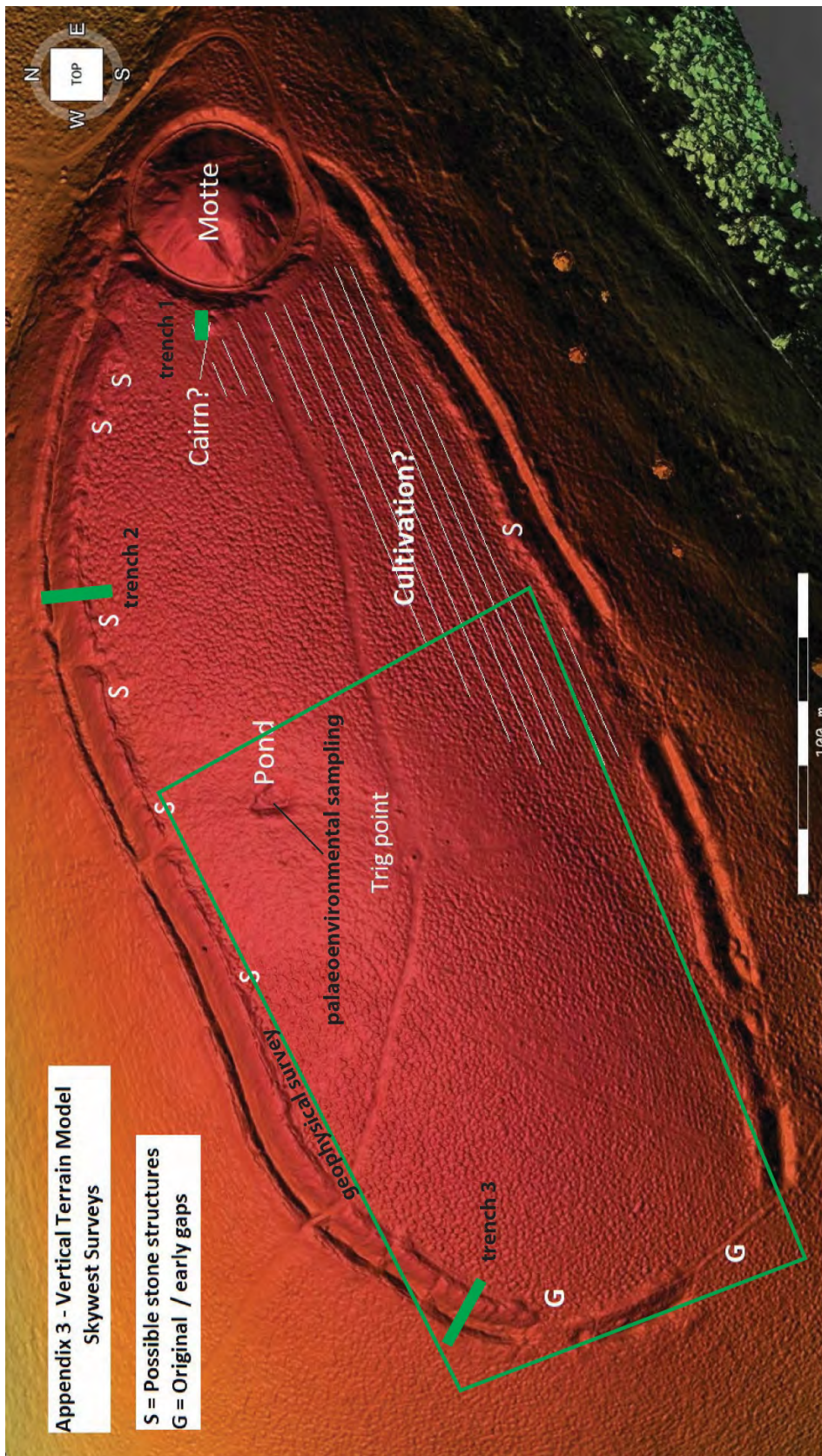


Fig. 2. Indicative locations of surveys and interventions, based on the vertical terrain model supplied by SkyWest Surveys. For rationale and scope of trenches, please see the text.

- 3.6. The results of the survey stage will be presented to Cymdeithas Twmbarlwm Society and Cadw as raw data and/or written reports in order to agree the subsequent fieldwork stage. Excavation will not proceed without this evidence having been considered, although formal final reporting of the topographic survey, geophysical survey, paleoenvironmental sampling and coring work will form part of the overall final report.

Excavation

- 3.7. The excavation will be conducted according to the Chartered Institute for Archaeologists' (CIfA) *Standard and Guidance for an Archaeological Excavation* (2014).
- 3.8. Excavation will take place in three primary locations. It is intended that each area is excavated, recorded and backfilled in a single week, minimising the risk of damage through illicit uncontrolled excavation by visitors to the site out of working hours. An additional (fourth) week has been allowed for as a contingency at the Society's request.
- 3.9. **Trench 1.** This is located on a small rounded cairn on the western lip of the motte ditch (Fig. 3). This cairn, which is approximately 3m across, has been interpreted as a possible prehistoric burial mound or alternatively as an abutment supporting a bridge to the summit of the motte. The mound has been disturbed in the centre, which may indicate antiquarian interest. The proposed trench will excavate across the southern side of the cairn, from a point near the centre to the probable edge; it will also examine the relationship between the cairn and the 'cultivation ridges' which are evident on this part of the site. These ridges may indicate arable land-use in antiquity, or they may relate to more recent forestry operations.



Fig. 3. The cairn (or bridge abutment) located on the western lip of the rock-cut ditch of the motte. This view is looking west from the summit of the motte. The 'cultivation ridges' can be seen clearly in the background.



Fig. 4. The intended location of Trench 3, a view looking south-west along the north-western rampart, with the putative 'round-house' structure evident to the left (south) of the rampart.

- 3.10. **Trench 2.** This is one of two trenches intended to investigate the ramparts, ditches and counterscarps of the outer enclosure. Trench 2 is a 'control trench' in an area undamaged by the 2018 fires. Resources do not permit a complete excavation across the full width of the earthwork, so it is envisaged that one or more discrete test pits will be excavated. The main aim is to determine the depth and character of deposits in the ditch (as well as their suitability for scientific dating techniques), and the extent of soil cover and erosion on the ramparts.
- 3.11. **Trench 3.** This is one of two trenches intended to investigate the ramparts, ditches and counterscarps of the outer enclosure. Trench 3 is intended to investigate the fire-damaged side of the rampart. It is also located at the site of one of the circular stone structures identified as potential round-houses (Fig. 4). Resources do not permit a complete excavation across the full width of the earthwork, so it is envisaged that one or more discrete test pits will be excavated. As well as investigating the nature of the stone 'round-house' structure, the principal objective is to determine the extent of fire damage by comparing the depth and character of deposits in the ditch (as well as their suitability for scientific dating techniques), and the extent of soil cover and erosion on the ramparts here with those observed in Trench 2.
- 3.12. All trenches will be entirely excavated by hand. The excavation of archaeological features or deposits will be undertaken by hand using the conventional techniques for archaeological excavation.
- 3.13. Where features of archaeological interest are identified they will be systematically investigated by hand with sufficient work being undertaken to determine their date, character and function, using the conventional techniques for archaeological excavation and in accordance with *CiFA Standard and Guidance*.
- All features will be located as accurately as possible on an overall plan of the development at an appropriate scale, showing boundaries depicted on Ordnance Survey mapping.
 - Contexts will be recorded on individual record forms, using a continuous numbering system, and be drawn and photographed as appropriate.
 - Stratigraphic units will be assigned a record number and entered along with a description on an individual record form or trench recording sheet as appropriate.

- Plans will be drawn on permatrace to a scale of 1:10, 1:20 or 1:50, as appropriate.
- All photography will be taken using a digital SLR camera with a minimum resolution of 12 megapixels, including a metric scale in each view, with views logged in a photographic register.
- In the event of human burials being discovered the Ministry of Justice will be informed. The remains will initially be left in situ, and if removal is required, a MoJ licences will be applied for under the Burial Act 1857.
- In the event of finding any artefacts covered by the provisions of the Treasure Act 1996, the appropriate procedures under this legislation will be followed.

Artefacts

- 3.14. All artefacts and environmental samples will be treated in a manner appropriate to their composition and a sampling strategy will be developed as appropriate:
- All stratified finds will be collected by context, or where appropriate, individually recorded in three dimensions. Unstratified finds will only be collected where they contribute significantly to the project objectives or are of particular intrinsic interest.
 - All finds and samples will be collected, processed, sorted, quantified, recorded, labelled, packed, stored, marked, assessed, analysed and conserved in a manner appropriate to their composition and in line with appropriate guidance.
 - Arrangements will be made to assess and study any artefacts, assemblages and environment samples.
 - Any artefacts recovered during the recording process will be deposited with the nearest regional or county Museum, subject to the permission of the owner. The artefacts will be deposited along with a copy of the site report including a detailed list of all artefacts recovered.

Site archive

- 3.15. The overall archive will conform to guidelines described in *Management of Research Projects in the Historic Environment* (MoRPHE), Historic England 2015, the ClfA (2014) *Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives* and *The National Standard and Guidance to Best Practice for Collecting and Depositing Archaeological Archives in Wales* (NPAAW, 2017) and *Guidance for the Submission of Data to the Welsh Historic Environment Records* (HERs) V1 (July 2018).
- 3.16. The paper and digital archive will be deposited with the National Monuments Record (NMR), RCAHMW, including a copy of the final report. This archive will include all written, drawn, survey and photographic records relating directly to the investigations undertaken. NMR Digital archives will follow the standard required by the RCAHMW (RCAHMW 2015). A copy of the digital archive only will also be lodged with the Historic Environment Record, Glamorgan-Gwent Archaeological Trust.

Report

- 3.17. Following the on-site work an illustrated report will be prepared containing conventional sections to include:
- Non-technical summary
 - Introduction
 - Site location
 - Archaeological Background
 - Evaluation
 - Conclusions
 - References
 - Appropriate appendices on archives and finds
- 3.18. The report summary will be provided in English and Welsh, in accordance with the *Guidance for the Submission of Data to the Welsh Historic Environment Records* (HERs) V1 (July 2018).

4 Resources and programming

- 4.1. The assessment will be undertaken by a team of skilled archaeologists under the overall supervision of Nigel Jones, a senior member of CPAT's staff who is also a Member of the Chartered Institute for Archaeologists (MCIfA). Fieldwork will be directed by Richard Hankinson, Senior Archaeologist, and also a Member of the Chartered Institute for Archaeologists (MCIfA). Richard has been responsible for the Cadw-funded 'Hillforts' project which has been running in the Clwyd-Powys region since 2016, and has included extensive excavations at Beacon Ring (Montgomeryshire). The team have developed considerable expertise in hillfort excavations, in particular in areas of current or former forestry. As well as Beacon Ring, work has also been undertaken on behalf of Cadw at Coed Fenni Fach (Brecon) and on behalf of Shropshire Council at Nesscliffe.
- 4.2. In addition to the CPAT team, Cadw historic environment branch staff have agreed to be involved. The CPAT Director Dr Paul Belford (FSA, MCIfA) will also closely monitor the work. Detailed CVs of all staff members are available on request.
- 4.3. An open weekend will take place towards the end of the fieldwork stage of the project; again this public archaeology element is something that CPAT has considerable experience of developing and delivering. Indeed CPAT is an educational charity whose sole object is the 'education of the public in archaeology', and has provided numerous outreach and engagement projects on behalf of Cadw and other funders. It is envisaged that Cymdeithas Twmbarlwn Society will provide an initial contact point and principal source for volunteers, although some CPAT volunteers may also be recruited to the project.
- 4.4. CPAT is also a CIfA Registered Organisation and as such agrees to abide by their *Code of Conduct* (2014) and the *Code of Approved Practice for the Regulation of Contractual Arrangements in Field Archaeology* (2014).
- 4.5. All report preparation will be completed by or with the assistance of the same field archaeologist(s) who conducted the fieldwork.
- 4.6. A provisional timetable for the work is as follows.

Survey stage (1 week)	start week commencing 2 September
Excavation stage (3 weeks)	start week commencing 7 October

The open weekend would therefore take place on or around 26/27 October, unless it proved necessary to invoke the contingency week of working in which case it would take place a week later. The date of the open weekend will be confirmed once the rest of the schedule is in place. Interim reporting will be completed within a month of the completion of fieldwork. Analysis of samples where subcontracted to third parties may take longer, but CPAT will advise Cymdeithas Twmbarlwn Society and Cadw of the likely timescales when indicated. These results will then be fed into a final report in due course.

- 4.7. The client is advised that should significant archaeological remains or artefacts be revealed additional services may be required for which a contingency should be allowed. The need for such contingencies, and their scope and potential cost, would be subject to discussions between CPAT, the client and the curator once the fieldwork has been completed. The following figures are therefore only for guidance and the final cost, should any of further services be required, may be more or less than the following figures which are included to provide an indication of the types of additional services and indicative costs which might be required:

Finds conservation etc	£285 per day
Finds specialist	£265 per day
Dating	£320 per date
Environmental specialist	£285 per day
Charcoal identification	£50 per sample
Interim Publication	<i>Archaeology in Wales</i> at no additional charge

- 4.8. Requirements relating to Health and Safety regulations will be adhered to by CPAT and its staff.

-

- 4.9. CPAT is covered by appropriate Public and Employer's Liability insurance, as well as Professional Indemnity insurance. Details are available on request.

P Belford

14 August 2019, revised 28 August 2019

Appendix 2: Radiocarbon dating results

BetaCal 4.20

Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL20)

(Variables: d13C = -23.2 o/oo)

Laboratory number **Beta-613898**

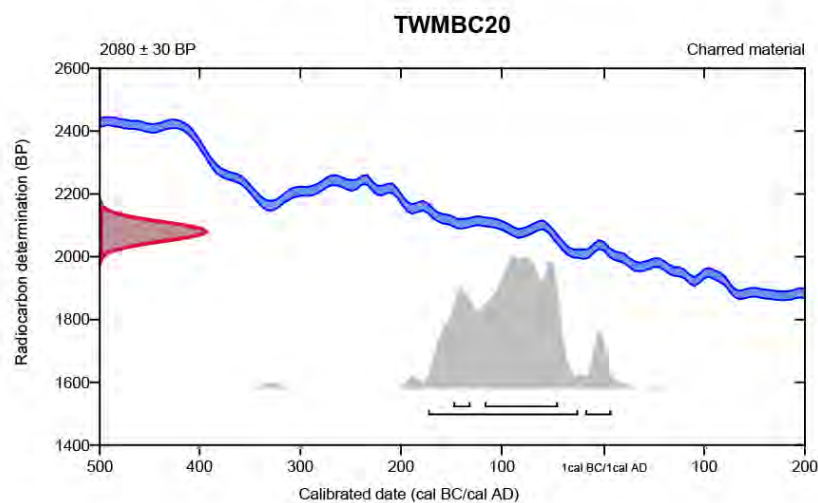
Conventional radiocarbon age **2080 ± 30 BP**

95.4% probability

(89.3%)	175 - 26 cal BC	(2124 - 1975 cal BP)
(6.1%)	19 cal BC - 8 cal AD	(1968 - 1942 cal BP)

68.2% probability

(57.4%)	119 - 46 cal BC	(2068 - 1995 cal BP)
(10.8%)	150 - 133 cal BC	(2099 - 2082 cal BP)



Database used
INTCAL20

References

References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. *Radiocarbon*, 51(1), 337-360.

References to Database INTCAL20

Reimer, et al., 2020, *Radiocarbon* 62(4):725-757.

Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • Email: beta@radiocarbon.com

BetaCal 4.20

Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL20)

(Variables: $\delta^{13}C = -24.2$ o/oo)

Laboratory number **Beta-613899**

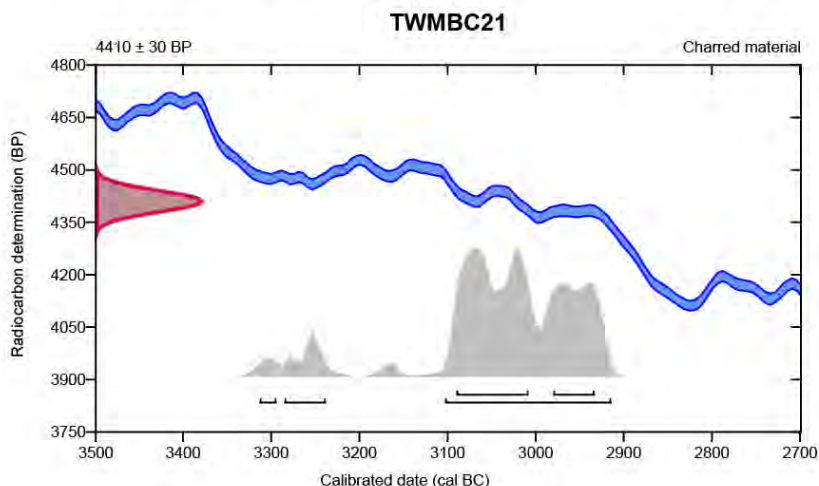
Conventional radiocarbon age **4410 ± 30 BP**

95.4% probability

(87.5%)	3105 - 2916 cal BC	(5054 - 4865 cal BP)
(6.2%)	3287 - 3240 cal BC	(5236 - 5189 cal BP)
(1.8%)	3315 - 3296 cal BC	(5264 - 5245 cal BP)

68.2% probability

(46.8%)	3092 - 3010 cal BC	(5041 - 4959 cal BP)
(21.4%)	2982 - 2935 cal BC	(4931 - 4884 cal BP)



Database used
INTCAL20

References

References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. *Radiocarbon*, 51(1), 337-360.

References to Database INTCAL20

Reimer, et al., 2020, *Radiocarbon* 62(4):725-757.

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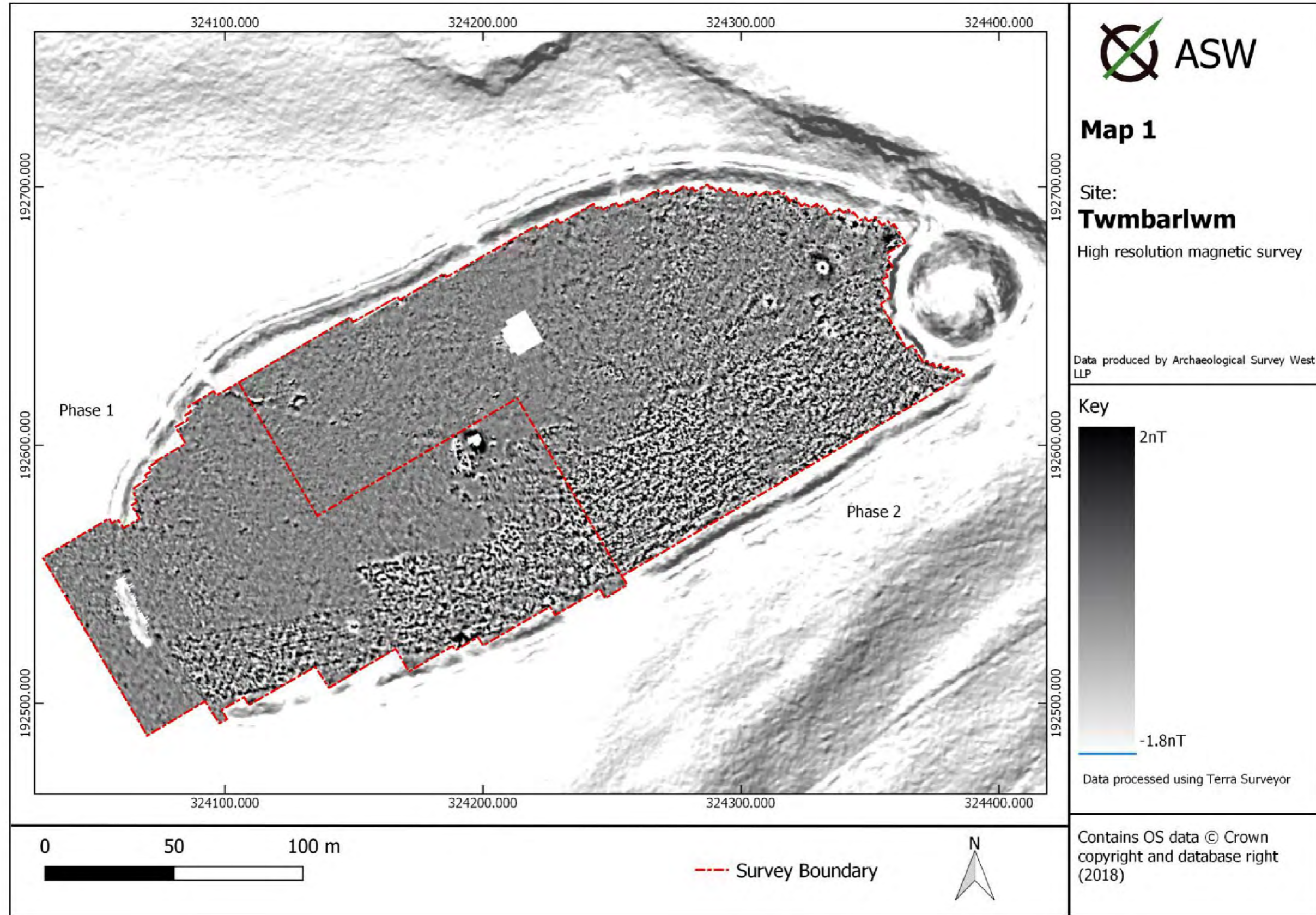


Fig. 15: Geophysics results

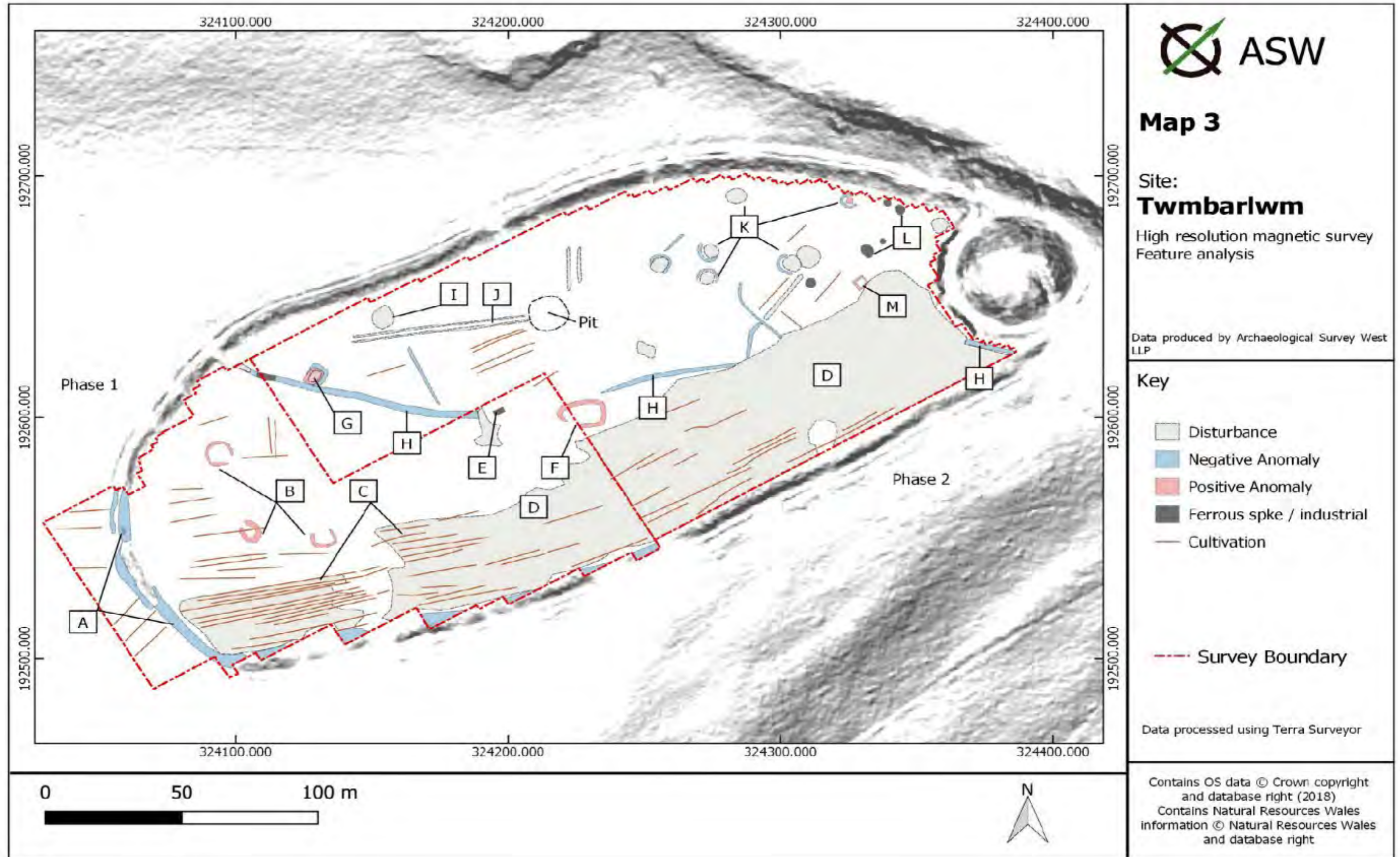


Fig. 16: Interpretation of the geophysics results

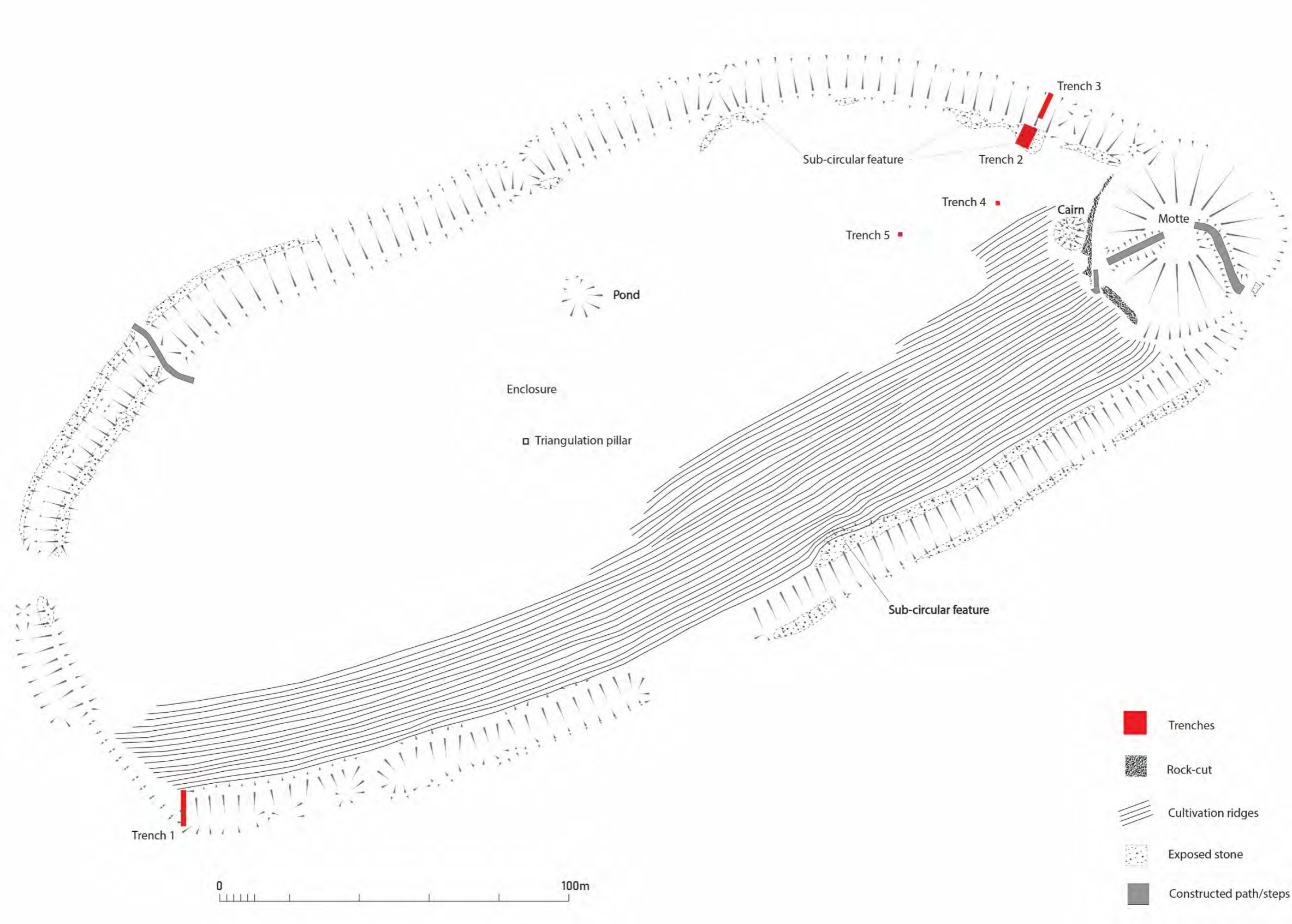


Fig. 17: Plan of Twmbarlwm showing the earthworks and excavation trenches

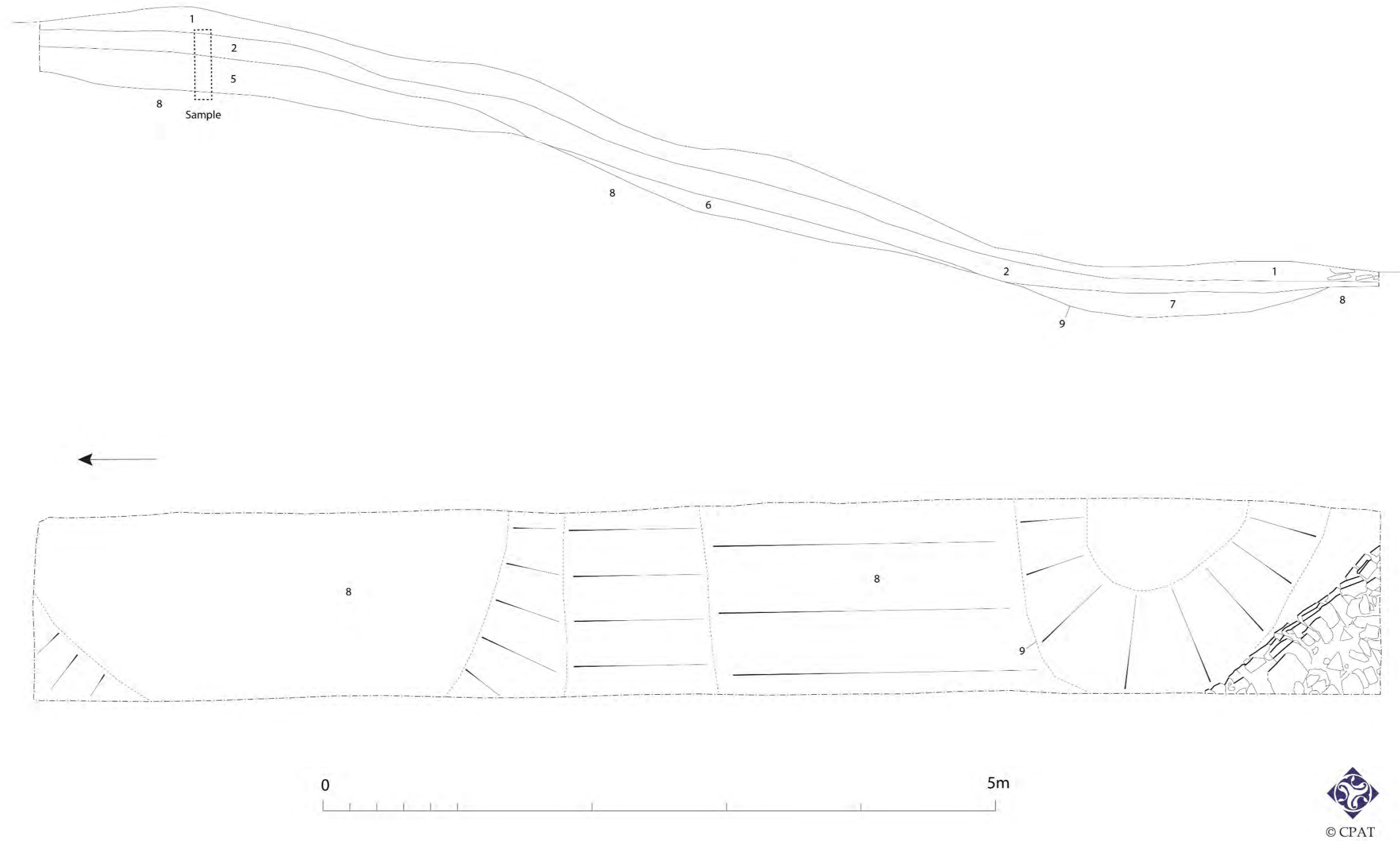


Fig. 18: Plan and Section of Trench 1

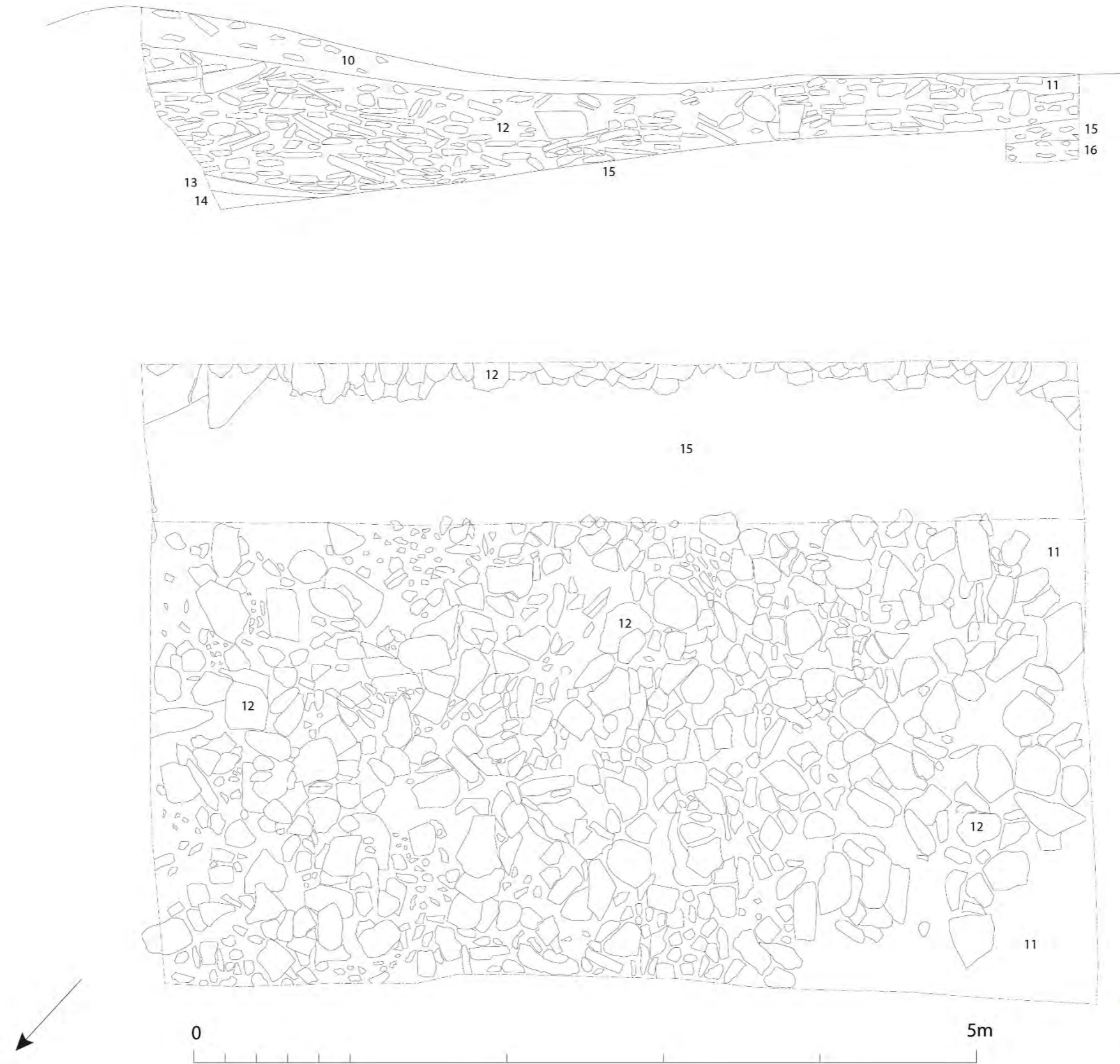


Fig. 19: Plan and Section of Trench 2

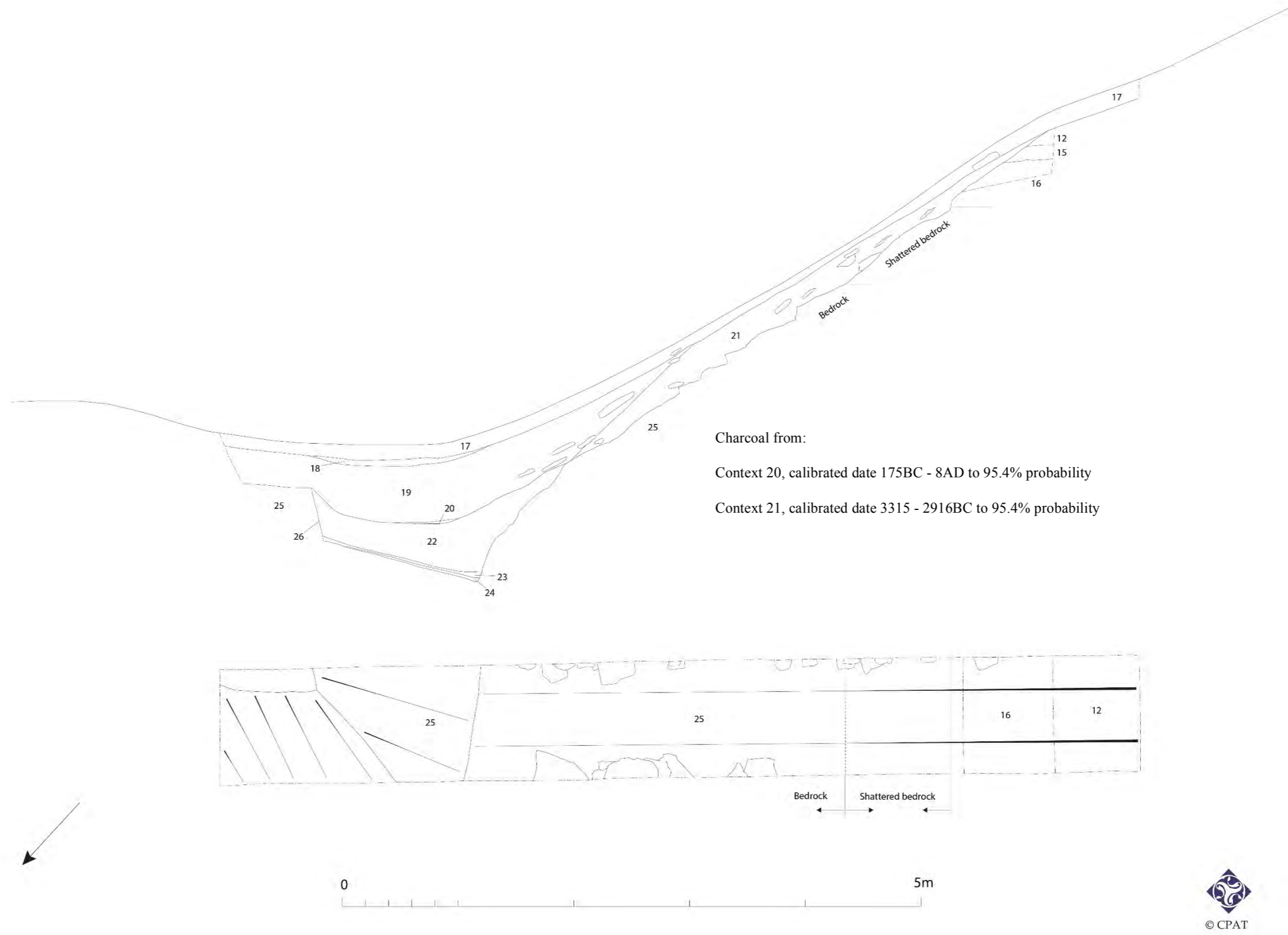


Fig. 20: Plan and Section of Trench 3