HIGH STATUS MEDIEVAL SITES
CASTELL CARNDOCHAN

Excavation report 2015-16

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

Cadw

Llywodraeth Cymru
Welsh Government

HIGH STATUS MEDIEVAL SITES
CASTELL CARNDOCHAN

Excavation report 2015-16

Project No. G2366

Report No. 1305

Prepared for: Cadw

March 2016

Written by: David Hopewell

Illustration by: David Hopewell and Neil McGuinness

Cover Photograph: Castell Carndochan (David Longley)

Cyhoeddwyd gan Ymddiriedolaeth Achaeolegol Gwynedd
Ymddiriedolaeth Archaeolegol Gwynedd
Craig Beuno, Ffordd y Garth,
Bangor, Gwynedd, LL57 2RT

Published by Gwynedd Archaeological Trust
Gwynedd Archaeological Trust
Craig Beuno, Garth Road,
Bangor, Gwynedd, LL57 2RT

Contents

Figures

Plates

G2366 HIGH STATUS MEDIEVAL SITES.

CASTELL CARNDOCHAN: CONSERVATION AND ASSESSMENT EXCAVATION

PRN 4977, Location SH84703065, Status SAM ME049

SUMMARY

Castell Carndochan is a little-known and under-recorded castle of the Welsh princes. Excavations in a rubble-covered 12.5m x 6m area in the southern part of the south of the castle revealed the entrance, a length of extant curtain wall and a small half-round tower.

1. INTRODUCTION

Castell Carndochan is a stone-built castle standing on a rocky eminence overlooking Llyn Tegid and the Lliw valley near Llanuwchllyn (Fig. 1). It is thought to have been built by either Llywelyn ap Iorweth or Llywelyn ap Gruffudd although no documentary evidence survives. The dating is based on similarity to other castles of this period and the presence of characteristic elongated D shaped towers found at Castell y Bere and Ewloe Castle (Avent 1983, 11). The site is currently visible as a pile of rubble with some protruding masonry. It has not changed substantially since it was planned by Hogg in 1955 (Fig 2). It was described in History of Merioneth Vol. II (Cathcart King and Kenyon in Smith J&L, 2001, p. 404) as "a neglected ruin at a particularly inaccessible site". It was noted that there has been little stone-robbing from the structure and most of the destruction appears to be natural, possibly in part due to the low lime content of the mortar. The site stands in a spectacular position on a steep crag overlooking low-lying land to the north east. In contrast, the approach from the south-west is relatively flat and is protected by a rock-cut ditch that also functioned as a source of stone for the construction of the castle. The site is mostly covered with tumbled stone but there is some visible masonry. The most obvious structure is an apsidal tower on the south-west extent of the castle. Walls enclosing the top of the hill abut this forming a small ward. There are the remains of a half-round or round tower at the north-east and a bank of rubble on the line of the southern curtain wall was interpreted as a half-round tower by Hogg (1955, 179). The interior contains a square building interpreted by Kenyon and King as an early tower predating the apsidal tower.

The current project began in 2014-15 with preliminary stabilisation works, a review of the stability of the site and recommendations for management and further work. In addition, five areas of clearance and limited excavation were undertaken (Fig. 3 and Hopewell 2015). Trenches 1 and 2 were excavated in order to clear loose stone as part of the stabilisation works. Trenches 3 to 5 aimed to assess the level of survival of masonry beneath the spread of rubble that extends across most of the site in order to test Cathcart King and Kenyon's assessment of the site: "its state of ruin is so

advanced that such activity [serious excavation or consolidation] might well prove to be of little value" (2001, 404). Two of the three trenches revealed well-preserved masonry thus demonstrating the potential for the recovery of information about the site through further excavation. In particular trench 3 revealed the lower courses of a small half-round tower (as suggested by Hogg) and an adjoining structure with masonry surviving to a height of at least 1.5m (see Fig. 3). The clearance was limited to the removal of obvious collapsed stone and associated gravel (the degraded remains of mortar) and no stratified deposits were investigated.

The aim of the 2015-16 phase of the project was to extend and more thoroughly excavate trench 3 with the aim of recovering details of any other structures in this area along with stratified datable material. It has been suggested that the entrance to the castle may be in this area and Cathcart King and Kenyon identified its investigation as the principal excavation priority on the site (ibid 407)

1.1 Copyright

2. BACKGROUND

2.1 Geology

The castle stands on a prominence above the Lliw valley formed from Ordovician acid ash-flow tuff of the Aran Fawddwy Formation (part of the Aran Volcanic Group). The lower ground to the north-east, including Llyn Tegid comprises, Ceiswyn Mudstones. The Aran Volcanic Group is a thick volcanic sequence with interbedded sedimentary rocks (BGS sheet 136 1986)

2.2 Historical background

An understanding of the castle is not possible without setting it in its historical context. Carndochan stands within the township of Pennant Lliw, in the parish of Llanuwchllyn and in the commote of Penllyn (Figs 4 and 5). This area was frequently on the ever-changing borders of Gwynedd and Powys throughout the medieval period. The commotal centre appears to have been at Bala, centred

on the (probable) Norman motte. The timber buildings of a royal llys and possibly the nucleated structures of a dependent bond township might be expected in the immediate vicinity of the motte with the associated royal hafodydd in the form of large-scale cattle pastures (vaccaries) in the highlands to the south-west of Llyn Tegid (GAT 2006).

The history of this area is inextricably linked to the fortunes of the various royal dynasties of Gwynedd and Powys. The following few paragraphs pick out some of the events that are pertinent to the more localised history of Penllyn and Castell Carndochan. Much of the following was drawn from J. Beverley Smith's *The Age of the Princes* in *History of Merioneth Vol II.* (Beverley Smith and Beverley Smith 2001) and R Avent's, *Castles of the Princes of Gwynedd* (1983).

The first phase of castle building in north Wales was by the Normans. In the 11th century the northern parts of Wales were riven by internal conflicts with competing dynasties within the kingdoms of Gwynedd, Powys and Deheubarth ruling by forceful exercise of power. The Normans in the form of Earl Hugh of Chester (formerly of Avranches) appear to have taken advantage of this instability and in 1075 advanced into north Wales from Chester and then from a base in Rhuddlan. Evidence from Domesday book 1086 shows that his nephew, Robert of Rhuddlan, had lordship over land between the Clwyd and the Conwy and also *Nortwales* which encompassed at least parts of Gwynedd. There were also incursions from Shrewsbury into Powys. This was the high point of Norman advances. The typical castles of this period were earthwork mottes with a timber tower and bailey and occasionally ringworks. This was a Norman style of building and mottes were built at many commotal centres during the incursions. The Welsh rulers adopted this style of building in the 12th century and there are about a dozen references in the Brut y Tywysogyon to Welsh lords building mottes. In many cases, without historical or archaeological evidence the origin of these structures is unknown (Avent, 4). It is, however, beyond the scope of this paper to discuss the earthwork castles in detail.

The Norman incursions achieved very little and the Anglo Saxon Chronicle remarked that the reign of William II had achieved no success, only destruction of men and waste of money.

The late 11th and early 12th centuries were dominated by shifting relations between Gruffydd ap Cynan, son of a Welsh father and Hiberno-Norse mother, and the Normans. After a long and eventful struggle Gruffydd consolidated power and Henry I acknowledged Gruffydd ap Cynan's authority over an extensive kingdom of Gwynedd including Llŷn, Eifionydd, Ardudwy and Arllechwedd probably in an attempt to bring stability to the region. Gruffudd, however, continued to try and expand his kingdom and the king considered that he was over-reaching his power and in

1114 launched an impressive show of his might with three armies entering the lands of the Welsh rulers. The king advanced along the Dee valley to rendezvous with a force moving north from Deheubarth at Tomen-y-Mur.

Gruffydd was obliged to pay homage to Henry and to pay a heavy fine, but retained his territory as a client ruler. The kingdom of Powys however continued to be in turmoil with a complex web of infighting, betrayal and divisions. Uchdryd ab Edwin may have had lordship over Penllyn and built an early Welsh castle at Cymer, which was soon destroyed. Maredudd ap Bleddyn finally exerted power of Powys but threatened Henry I which led to an invasion of Powys. Maredudd submitted to Henry and paid a fine of 10,000 cattle. Powys was finally stable and continued to be so under his son Madog ap Maredudd.

The spheres of influence of Powys and Gwynedd were fairly stable during the 12th Century. The cantref of Meirionnydd was divided with Powys holding Penllyn and Edeirnion with Pennant Lliw close to the border.

Two of the sons of Gruffudd ap Cynan, Owain Gwynedd and Cadwaladr ap Gruffudd, continued to put pressure on the Normans but soon came into conflict with each other and Cadwaladr was driven out. Madog was a strong ruler in Powys and relations with Gwynedd were generally stable. On his death in 1160 Owain moved into Edeirnion and Penllyn. Five years later Henry II moved up the Dee valley with a large force towards Corwen, perhaps in an attempt to dislodge Owain from his newly won territory but was forced into an ignominious retreat.

In 1170 Owain died and Gwynedd again entered a dynastic struggle and this continued for 30 years. The dominant force in Meirionnydd appears to have been Owain's illegitimate son Cynan and in turn, his two sons, Gruffudd ap Cynan and Maredydd ap Cynan who were lords of Meirionydd and Dunoding. In 1188 Giraldus Cambrensis recorded a castle belonging to the sons of Cynan at Deudreath (possibly Castell Aber Iâ near Portmeirion, but see following para.).

This appears to be the first phase of native castle building. Other castles appear to have been built by the sons and grandsons of Owain Gwynedd at this time. As noted above Giraldus Cambrensis records a castle at Deudraeth and another at Carn Fadryn on the Llyn Peninsular. The small fort at Garn Boduan may also belong to this phase of castle building along with Pen y Castell at Maenan (PRN 686). Beverley-Smith notes that Castell Aber Iâ is unlikely to be the castle identified by Giraldus Cambrensis because he locates it in Eifiyonydd north of Traeth Mawr and Traeth Bychan. An alternative location was suggested by Peter Crew the former Snowdonia National Park Archaeologist, at Pen y Garn, Prenteg (PRN 6016) overlooking the north side of Traeth Mawr

(Cathcart King and Kenyon 409 n46). Bluesky aerial photographic cover from 31/12/2006 (available on Google Earth) shows the possible foundations of a square tower, about 9m across. The earlier phase of Dolwyddelan is a simple square keep as is Dinas Emrys and both are thought to date from the 12th century. The central, square keep at Castell Carndochan also resembles these structures and could be contemporary, perhaps built by the sons of Cynan.

Dinas Emrys also appears to belong to this period and may even be one of the first castles built by the most well-known grandson of Owain Gwynedd (and cousin of the sons of Cynan) namely Llywelyn ap Iorwerth (Llywelyn Fawr) who became the dominant force in Gwynedd at the beginning of the 13th century (Beverley Smith 19-20). He was a powerful ruler but his expansion was initially checked by when he was he was defeated by King John in 1211 and he was forced to come to terms and relinquish territory.

Using a combination of military force and political alliances with the other Welsh princes and the barons opposing the King, Llywelyn began to expand his control in Wales. By the end of 1215 Llywelyn and his allies controlled most of the country and continued to do so until his death in 1240. Penllyn came under his control early in his campaigning. He is therefore another candidate for the construction of the square tower at Carndochan.

Three stone castles are commonly attributed to the early years of Llywelyn's rule (Avent 1983, 9-11). These stand on the southern and eastern borders of Gwynedd; Castell y Bere in the Dysynni valley, Castell Carndochan above the Lliw valley and Ewloe Castle in the very east of medieval Gwynedd. All of these castles contain distinctive towers with one square end and one apsidal end producing a distinctive elongated D shape in plan. This is thought to be a hybrid between the typical square or rectangular English keeps of the 12th century and the later round keeps. Functionally, the rounded end, protruding from the defences, provided an increased field of fire and was less susceptible than a square tower to undermining. The square end, protected by the defences, provided relatively spacious accommodation (ibid 11). The contemporary English castles were designed with protruding circular towers in order to provide covering fire along the line of curtain walls. The D shaped towers in Llywelyn's castles were linked by curtain walls but the overall designs seem to be dictated by the topography and do not provide an integrated system of defence (ibid 13).

Llywelyn's consolidation of power produced further castles at Deganwy, a replacement at Dolwyddelan and substantial English-influenced castles at Dolbadarn and Criccieth. The unusual stone-revetted motte and tower at Castell Prysor is also likely to date from this time but could be later (de Lewandowicz 1998). Hugh Brodie considers Llywelyn ap Iorwerth to have had the

opportunity, time and resources to have built some or all of the two or three phases of Castell Carndochan (2015, 234-237). The probable latest phase, the western apsidal tower, could alternatively belong to the early years of Llywelyn ap Gruffydd (below).

After Llywelyn ap Iorwerth's death in 1240 Wales was again fragmented with Dafydd ap Llywelyn doing homage to Henry III for Gwynedd while the king restored the hereditary rights of the two sons of Maredudd ap Cynan in Meirionydd. Dafydd imprisoned his older brother Gruffydd, and handed him over to Henry as a hostage. Gruffydd subsequently died while trying to escape from the tower of London. Dafydd died without issue in 1246 and was succeeded by his nephews Owain and Llywelyn ap Gruffydd with other claims by their younger brother Dafydd. Penllyn initially fell in the lordship of Owain and was again on the border of Gwynedd. Dafydd and Owain joined forces against the ambitious Llywelyn and were defeated at the Battle of Bryn Derwin in 1255.

Llywelyn ap Gruffydd (Llywelyn the last) became the dominant force across most of Wales. A turbulent decade saw him gain power over all but the very south of the country, and was eventually recognised as Prince of Wales by King Henry in the Treaty of Montgomery in 1267. For a detailed account see J. Beverly Smith *Llywelyn ap Gruffydd* (2014). Llywelyn either added to, modified or built further castles. He slighted Deganwy castle, which had been rebuilt by Henry III, after capturing it in 1263. He added a round tower and curtain wall to Ewloe castle, a second rectangular tower at Dolwyddelan and probably added to Criccieth Castle. It seems likely that he also added to Castell y Bere (Avent 22, Cathcart King and Kenyon, 404). He built a castle on the eastern edge of his territory near the river Severn at Dolforwyn and the earlier castle of Dinas Brân was reoccupied. Castell Carndochan would presumably have ceased to be a military priority as Llywelyn's power extended to the south so it seems unlikely that the later phase belonged to the latter part of his rule.

The treaty of Montgomery was the high point of Llywelyn's reign. The accession of Edward I to the English throne changed the political environment and Llywelyn allied himself with the Kings enemies and refused to do homage. Edward raised a large army and in 1276-7 and forced Llywelyn to come to terms and relinquish all his territories apart from Gwynedd Uwch Conwy. Penllyn yet again found itself on the border of Gwynedd. Dafydd ap Gruffydd allied himself with the King and was rewarded with two cantrefs and began to build the last castle of the Welsh princes at Caergwrle (Holt). Dafydd initiated a major uprising in 1282 and Llywelyn sided with his brother against Edward. Edward inevitably invaded again and Llywelyn after refusing to surrender was killed in December 1282. Castell y Bere was the last castle to surrender on 25 April 1283, effectively ending resistance to English rule.

Edward toured his realm in 1283 and is recorded that he passed through Llanuwchllyn and Prysor and although it is not named in the itinerary it is likely that he visited Castell Carndochan.

2.3 Castell Carndochan in Context

Castell Carndochan is not mentioned in any contemporary documents so its history and development can only be projected from morphological and circumstantial historical evidence unless some phased dating evidence is produced by excavation. The above history shows that the Penllyn and Ardudwy were repeatedly on the border of Gwynedd in times of conflict with the parish of Llanuwchllyn in a particularly exposed position. Carndochan is set in a strategically important site in the landscape. The Dee Valley to the north-east provides a corridor into England and appears to have been used as an invasion route from either Chester or the Marches several times. The strategic importance of this area is demonstrated by the concentration of military and defended sites in the area around Bala, from the Roman invasion fort at Llanfor to a concentration of four earthwork castles to the north of Llyn Tegid.

Carndochan is, however, set back from the most direct route into northern Snowdonia that runs to Tomen-y-Mur, a much used defensive position from Roman times to the Norman Invasions. The most obvious route runs along the Prysor and Tryweryn valleys past Castell Prysor. This route has to cross the watershed between two valleys and reaches a height of just over 400m. An alternative route, following the Roman road which runs along the Lliw valley below Carndochan, also appears to have been significant despite reaching a height of 520m near Blaen Lliw Uchaf. The Roman road across the uplands along this route is still well-preserved and shows little sign of heavy post-Roman erosion but is likely to have known about and would have been a metalled route into northern Snowdonia (Hopewell 2013). The presence of Castell Carndochan at the south-east end and Castell Prysor close to the point where it descends to the valley at the north-west suggests that it was still of strategic significance in the medieval period. Castell Carndochan also overlooks minor passes to the south-east over Bwlch y Groes and the former Roman road leading towards Vyrnwy. It does not overlook but stands at the junction between the above routes and the route running south-west (another Roman road) via Drws y Nant to the Mawddach valley and the coast.

The castle's setting in the landscape can also be seen in the context of the territory it aimed to influence. Its position commands views along the wide valley to the north-east containing Llyn Tegid and the commotal centre at Bala. Conversely its position on a dominant rocky eminence when seen from this direction allows it to be seen and identified as a place of power in the landscape from some distance away. Significantly its approach from the south-west is unspectacular and provides

easy access to the castle. Carndochan is one of the smallest and least sophisticated of the Welsh castles with relatively light defences; the defensive ditch does not extend beyond the south-west corner thus forming only a token barrier. Its function was therefore most likely to be to exert power over the southern part of the frequently contested commote of Penllyn and to overlook the converging routeways in the area. It certainly was not designed to defend against a substantial military force.

A detailed walkover survey of Cwm Lliw was carried out as part of the RCAHM Uplands Initiative and 38 long huts or building platforms, probably hafodydd, were identified demonstrating transhumance in the uplands around the castle, probably in the form of summer pasturage for cattle (Oxford Archaeology North 2012 18-19). A reference in a Lay Subsidy Roll of 1292-3 records that Madoc ap Iorwerth, a large landowner in Pennant Lliw, was taxed at over 30 shillings compared to the meagre average for Penllyn of four shillings, demonstrating a considerable income from farming (Beverly-Smith and Beverly-Smith 2001, 173).

3.0 METHODOLOGY

The 2014-15 phase of the project had demonstrated that there was well-preserved masonry beneath the piles of rubble that extend across most of the castle. One area to the south-east of the main south-western apsidal tower, initially investigated in Trench 3 of the 2014-15 phase (Fig. 3), was selected for more extensive excavation (Fig. 5). Topographically, this is the only place where an entrance could have passed through the walls of the castle without the construction of an extensive ramp. This is discussed by Cathcart King and Kenyon (407); Hogg had concluded that there was no entrance in this area and that the castle was accessed by a ladder or wooden ramp. Cathcart King and Kenyon recognise that this would be anomalous if compared to the other Welsh castles and conclude that the entrance is most likely to be “under the great mass of fallen masonry alongside the apsidal tower”.

A roughly rectangular area of 8.0m x 7.0m to the west of the outer face of the small half-round tower was specified for investigation in the scheduled monument consent. The excavation was carried out over 10 working days from 7th to the 18th September by the writer and Neil McGuinness from Gwynedd Archaeological Trust and a team of between 4 and 6 experienced volunteers. Consolidation work, comprising the stabilisation of the unstable masonry in the large apsidal tower using lime mortar was carried out at the same time under the auspices of Snowdonia National Park. This allowed on site supervision of any elements that required an archaeological input.

Most of the area designated for excavation was cleared of the surface layer of stone which was stored separately in order to allow reinstatement with lichen covered stone (Fig. 6 rectangular area in pink). This revealed large amounts of fallen stone much of which was in a matrix of rounded gravel (degraded mortar). A reduced area was then selected for further clearance which is shown as on Fig 6 in red and as the edge of excavation on Fig. 7. Further clearance of rubble and gravel overburden revealed the top of *in situ* masonry. Some of this was within the very extensive tumble from the apsidal tower to the west. The depth of the rubble on the western edge of the trench was estimated to be 2.7m falling to 1.1m at the eastern edge. This limited the area that could be safely excavated because it would not be safe to have unconsolidated rubble forming a steep or close-to-vertical trench edge. The eastern edge was excavated down to a depth of about 1.7m by stepping back, consolidating and battering the rubble face to either side of the exposed *in situ* masonry. There was clearly further rubble beneath this level but it could not be removed safely within the time available. In this area, one of the constraining factors to excavation was the volume of spoil and stone that was being produced. This needed to be stored within the monument and had to be, at least partly reinstated by hand, thus reducing the time available for excavation. An approximate depth of 0.7m of rubble was initially removed from a 1m wide strip along the east end of the site (Fig. 7)and then a 2m wide trench (Trench 1) was excavated down to pre-collapse stratified deposits at a depth of about 1.2m. These were sampled in a 1m-wide, L-shaped sondage (sub-trench 1a, Fig. 8). A 1.0m wide trench was also excavated across the ramparts in order to investigate the character and level of survival of the outer face.

The amount of rubble on the western side limited the depth of the excavation and stratified deposits beneath the rubble were not reached. The site and contexts were recorded both photographically and using a Trimble high precision GPS surveying system. Stone-by-stone drawings were transcribed from a 3D model produced in Agisoft PhotoScan. The software carries out photogrammetric processing of an overlapping array of digital images and generates an accurate and detailed georeferenced 3D model. This can generate vertical or horizontal orthographic projections. Orthographic (or orthogonal) projections are used in cartography; the point of perspective is at infinite distance thus avoiding perspective or parallax errors (Plates 1 and 2). Elevations and sections were drawn with the aid of orthographic projections from the 3D model with some details added by hand on site. Elevation drawings were produced of all standing masonry (Figs 9 to 16).

At the end of the project it was decided to explore a variety of management and consolidation options so the site was not fully reinstated (see management options below). The exposed masonry

and excavation trenches were covered with lightweight geotextile and partially backfilled in order to protect the site over the winter.

4. OUTREACH

The remoteness of the site made a large-scale outreach event impractical but an open day was held in the form of a Cadw Open Doors event on 15th September 2015. Groups of visitors, who had previously booked, were brought to bottom of the hill in a mini-bus and led on a guided walk to the site and around the excavations. Over 50 people made it to the site and the tours included an atmospheric evening twilight visit designed to accommodate local people with work commitments. The open day was featured on ITV news and S4C's current affairs programme Heno.

5. ACKNOWLEDGEMENTS

The open day was organised in conjunction with Snowdonia National Park. Thanks are due to Anita Daimond and Emily La Trobe Bateman from GAT and Jessica Enston and John G Roberts from SNP for arranging the tours, guiding people up the mountain and around the site and talking to the media.

The project was grant-aided by Cadw; thanks to Ian Halfpenny for supporting a the project. Many thanks are due to the landowner Gwyn Roberts for permission to work on the site.

The excavations were carried out by a hardy team of volunteers: John Burman, Jeff Marples, Beaver Hughes, Margaret Shakespeare, George Smith and Rhys Mwyn. Neil McGuinness from GAT assisted on site and produced the elevation drawings for the report

The conservation works were carried out by Alwyn Ellis and his team from Stonewyrcs Cyfyngedig. The conservation programme was arranged by John G Roberts (SNP) with technical advice from Mike Garner (Garner Southall Partnership) and were grant-aided by Cadw

6. RESULTS

Removal of the upper layer of rubble revealed standing walls comprising the outer face of the half-round tower (508) the curtain-wall (507, 517) and an entrance into the castle (504 and 506cFig. 7). The area around these could not be fully excavated for the reasons discussed above. Sub trench 1 was the only area that sampled deposits contemporary with the construction and use of the castle (Fig. 8). The results, arranged in associated context-groups, are described in the following sections:

6.1 Bedrock and natural deposits

Uneven bedrock (518) was encountered across most of sub-trench1/ 1a. The level of the rock was generally higher towards the north and west end of the trench. Pockets of natural silty-clay (516) survived in hollows in the rock. A buried loamy soil containing many stones (513) overlaid the bedrock at the north of the site.

6.2 Walls and construction contexts

Each stretch of wall was assigned a separate context number (504, 506-8 and 517). Upon investigation it was shown that 506, 507 and 517 were all bonded together and these were grouped together in context group 519.

Subtrench 1a was excavated down to the wall foundations (Figs 8 and 17). There was no evidence of a foundation trench for the curtain wall or half-round tower. Walls 507 and 508 were found to be standing on bedrock (518), shattered stone (520) or clayey soil. The shattered stone (520) was wedged into the uneven surface of the bedrock beneath the curtain wall (507). This appeared to be a deliberate levelling surface as opposed to being naturally shattered bedrock. Other stones, elsewhere in trench 1, appeared to have been set into the uneven bedrock, most notably a large edge-set stone (marked ES on Fig 8), presumably to infill some of the larger holes. The outer face of the half-round tower was built on bedrock in places but where encountered in trench 1a was built on a thin layer (1 or 2cm) of natural clay (516) which was in turn overlying the bedrock. Some of the hollows were filled with chips of local stone in a matrix of dark grey silt and mixed gravel (515). The chips were sharp-edged and unweathered apart from where they retained a cortex on one side. These did not resemble the stones naturally occurring in the subsoil and appeared to be debris from the shaping of stones during the building process. The deposit also contained a few fragments of medium-sized animal ribs (sheep/pig).

The walls survived to a fairly uniform height of about 1.4m from the contemporary ground surface. The 2014-15 phase of the excavations had uncovered an approximately right-angled corner between the outer face of the half-round tower and the curtain wall. It was suggested that this could have been the corner of a rectangular/square building (Hopewell 2015). Further excavation in 2015-16 indicated that this was not the case. The curtain wall (507) continued in a westerly direction from the tower for 3.0m before stepping out by 0.75m to produce a widening of the wall (517). The wider part of the wall continues for 1.5m before reaching an entrance through the curtain wall. The entrance was initially found to run through the wall at right-angles before turning a few degrees to the west (Plate 4). This deviation suggests that the path to the castle ran obliquely across the slope,

presumably to achieve a lower gradient. The inner face and entrance appeared to be one continuous build with no obvious joints. There was a collapse in the upper part of the face on the inner corner of the passage wall and a more serious collapse on the outer corner although only a small amount of masonry appeared to have been lost down to a low level. The latter collapse revealed a thick sandstone slab that had been incorporated into the wall 0.6m from the outer end of the passage. The upper side had two holes drilled in it containing rectangular-section iron mounts set in lead caulking (521, Plate 6). One of the iron mounts had both broken off level with the top of the stone and the other had pulled out of the lead. It is possible these were the remains of a hinge-mount. The twin mounts could indicate that the mount was bifurcated perhaps in order to prevent it from rotating in its socket. There was however no obvious wear on the top of the stone where the mount would have extended from the wall. A heavy door would presumably have exerted a lot of downward pressure on the outer end of the hinge and caused some wear or fracturing of the stone. An alternative interpretation could be that the mount was holding a wooden frame for the gate; the two mounting points could indicate an iron strap.

The relationship of the curtain wall (507) with the half-round tower (508) was not entirely clear. The outer face of the tower wall appeared to abut the curtain wall which seemed to be anomalous because the corresponding inner face of the tower continues beyond this alignment. It could indicate that the tower was inserted into the already existing curtain wall; this would have entailed the removal of at least a 4.5m length of the defences. Further investigation of this area is needed in order to find out if the curtain-wall facing continues into the core of the tower wall thus demonstrating a later insertion. It is alternatively possible that the apparent joint in the wall is merely a result of bad building technique and the curtain wall and tower belong to a single phase.

The inner corner of the western side of the entrance (504) was uncovered amid the very extensive collapse associated with the apsidal tower. The rubble close to the tower was about 3m deep making safe excavation difficult. A small trench was dug across the inner end of the entrance revealing stable mortared core-work and below this, well-preserved facing defining the inner end of the entrance passage. This shows that the entrance was 2.75m wide. Facing survived to an exposed height of 1.2m in the passage with at least another 0.5-1.0m buried within the rubble (Plate 5). If the level of the surfaces in sub-trench 1 is assumed to be similar to the level of the buried base of the wall it seems that the inner face of the curtain wall still stands to a height of around 2.65m as it approaches the apsidal tower. The projected line of the curtain wall suggests that it meets the outer face of the tower about 4.2m to the west of the corner. The entrance passage could only be traced

for 1.25m before being lost in a major collapse. No further investigation was possible in this phase of the work.

The wall construction was fairly uniform in the half-round tower, the inner face of the curtain wall and the entrance passageway. The facing was constructed from irregular stone blocks with a flat face laid parallel to the line of the wall. The wall was built to a vertical face and the stonework was roughly coursed. The stone was all local; either angular quarried stone or split field stone and had been roughly shaped where necessary to produce at least one flat face. Obvious facing stones were recovered from the rubble that had been worked to produce roughly square blocks. These may have been used as rough quoins. Fig 14 shows the inner face of the curtain wall (507). There had clearly been an attempt at rough coursing but the levelling layers contained large numbers of small galletting stones a technique dependent on using large quantities of mortar. The core-work contained irregular stones laid horizontally and was also mortar bonded. The outer face of the half-round tower (508) retained patches of mortar on the lower part of the wall. This could well be the remains of mortar render although it could alternatively be interpreted as a thin layer of mortar that has not been removed during the pointing process.

The bedrock/natural clay (516, 518), the lowest infill/construction-debris contexts (515, 520) and the base of the wall were overlaid by a deposit of hard set mortar (505, Fig. 7 and Plate 3). This was deepest against the wall and was deepest and widest in the corner between the half-round tower and the curtain wall. The deposit appeared to consist of mortar dropped during the construction or pointing of the wall that had then set in place. This appeared to be associated with both the curtain wall and the tower but did not extend all of the way along the tower wall. Two pieces of charcoal were retrieved from this deposit. It is thought likely that they were produced during the production of the lime and were submitted to SUERC for high precision radiocarbon dating.

The first was from a piece of bark which produced a date of 829BP+-18 or 1170 to 1258 cal AD (95.4%) and the second a from piece of birch which produced a date of 785 +-18 BP or 1220-1271 cal AD (95.4%). The full results are shown in appendix 1. The dates encompass the dates of all the probable builders of the castle so do not allow this phase of building to be attributed to an single ruler.

A 2m extension to the main trench was excavated, down to *in situ* masonry, across the line of the ramparts (Trench 2 Fig.8). Removal of a thin layer of turf on the wall top revealed in situ well-laid mortared core-work. The facing on the upper part of the outer face had been lost leaving a stable slope of surviving core. The lower 1.3m of the facing survived and was found to be standing directly

on bedrock at a level about 0.55m lower than the base of the inner face. The curtain wall was 2.25m thick. The outer face was constructed from large irregular blocks of stone. The small area of masonry that was uncovered in the trench appeared to be irregular and uncoursed with no galetting stones or surviving mortar. It was also built to a slight batter. As the above descriptions show the outer face was of a different construction to the Inner. The large blocks of stone and lack of reliance on mortar as a major component of the masonry may reflect the need for a stable wall resistant to undermining. The battered masonry may be a feature only found in the foundation courses; a similar masonry style exists in the apsidal tower at Castell y Bere. The collapse to the outside of the defences, which must have come from the curtain wall, was similar to that on the inside of the wall in that it contained considerable amounts of fine gravel derived from mortar. This suggests that the upper part of the wall was mortared throughout; this is also demonstrated by the surviving mortared core behind the line of the collapsed outer face.

6.3 The post-construction deposits

The bedrock and construction levelling layers were overlaid by a soft loamy deposit (511) containing variable amounts of angular stones, charcoal flecks and a few animal bones. This merged into a concentration of mortar crumbs (514) against the wall. The mortar crumbs were probably the product of initial weathering of the mortar or possibly the removal of semi-dry mortar during the final finishing of the masonry. The stony deposit (511) appeared to be a levelling layer, filling the lowest hollows and fissures in the uneven bedrock. The infilling probably remained quite wet due to lack of drainage. This deposit and the mortar crumbs (514) blended together possibly as a result of trampling, away from the immediate line of the wall.

6.4 Collapse

All of the construction deposits, levelling deposits and walls were covered by collapsed masonry. This was about 1m deep across the majority of the trench but became deeper (estimated c. 2.7m) on the western side where it was not fully excavated. The main section across the trench (Fig. 17) shows the nature of this deposit-group. A deeper section could not be recorded due to the loose nature of the rubble. The lower 0.1-0.15m of the collapse (512) comprised stones up to 0.25m in length in a mixed matrix including pockets of clean gravel, silt and somewhat loamy soil. There was little surviving mortar at this depth. Pieces of partly calcined limestone were, however, present indicating that the gravel was derived from decomposed mortar. The bulk of the collapse (503) consisted of a mixture of stones ranging from about 0.02m to 0.5m in length in a matrix of rounded gravel with variable amounts of fine sand, silt and mortar fragments. The upper part consisted of naturally

sorted stone; mixed stones from 0.1 to 0.5m in length with no matrix (502) and larger lichen-covered stones (501) on the surface.

This group of contexts represents an accumulation of material derived from the gradual collapse of the surrounding walls and buildings. There was no indication of any episodes of burning or undermining of walls that would indicate deliberate destruction. The deposits had clearly undergone some natural settling, grading and leaching out of lime. The upper deposits of matrix-free stone (501, 502) had clearly settled with the smaller stones at the bottom and with the gravel matrix washed out and deposited in the lower horizons. There were some lumps of mortar at all levels but the majority of the matrix in the main deposit (503) was fine rounded gravel. This formed about 30-35% of the deposit (estimated from the section drawing). This presumably includes material washed down from above thus giving an artificially high ratio. This gravel and associated sand and silts must have been the aggregate from lime mortar in the original construction. Accurate estimation of the original mortar to stone ratio depends on additional factors such as the proportion of matrix-free rubble and its void to stone ratio. This data is currently unavailable. It, however seems likely that the percentage of mortar is similar to that in modern fieldstone or rubble stone walls i.e. between 15 and 35% (Diller and Diller 2004, 658)

It was noted that there were no obvious remains of roofing materials in the rubble. A few concentrations of slate were recorded but these appeared to be shattered blocks from architectural details in the walls as opposed to roofing material. This may indicate that there was a thatched or wooden roof.

7. DISCUSSION

7.1 Lime mortar

The lack of surviving lime in these extensive deposits is significant. It has been noted in Cathcart King and Kenyon 397 405-6 that both Castell Carndochan and Castell y Bere are in unusually poor condition compared to many other contemporary castles such as Dinas Bran and do not survive above basement level. It is assumed that this is mostly due to the poor quality of the mortar used in their construction, both being some distance away from sources of limestone compared with Dinas Bran which stands close to extensive limestone deposits. Neaverson (1947, 38) recovered pieces of carboniferous limestone from the site, the nearest source for this would be 24km to the north-east at Hafod-y-calch near Corwen. Fragments of cockle shells in the gravel were also recovered. Shells, being mostly composed of calcium carbonate, can be used to produce lime and have also been used in mortar aggregate to work as a catalyst in the setting of the lime mortar mix, by providing a surface

or ‘nucleation site’ on which the lime reacts with carbon dioxide to form calcium carbonate (Historic Scotland 2014, 17). The presence of almost complete cockles suggests the former indicating a either a coastal source for the lime or the importing of shells to an inland kiln. The most direct route is to the south-west along Drys y Nant to the Wnion valley leading to the Mawddach estuary about 22km away. There are, however, no coastal sources of lime in this direction so it is possible that the lime or raw limestone came from further afield, the closest source being from the heartland of the Princes of Gwynedd in southern Anglesey. It would have been possible to bring either lime or limestone up the Mawddach estuary and then transport it the remaining 20km or so to Carndochan. It would presumably have been most efficient to process the limestone on the coast before the overland journey. It is worth noting that a lime kiln utilising a mixture of limestone and shells was excavated in the complex associated with the medieval Llys at Abergwyngregyn (GAT site records, publication forthcoming by J.G. Roberts SNP). This seems to be a rather round-about way of obtaining lime although post medieval kilns on the on the shore of the Mawddach demonstrate a later tradition (e.g. PRN 7976 Coed y Garth Lime Kiln) for producing lime from imported limestone.

An examination of the British Geological Survey map of north Wales (Howells 2008) shows that, as noted above, the closest deposits of carboniferous limestone occur in a band running from the Corwen/Llangollen area towards Oswestry and on southern Anglesey with the closest outcropping at Hafod-y-calch to the west of Corwen. This or even the widespread limestone close to Llangollen are the most obvious source of lime for the castle but, given the turbulent times when all or parts of it were built, this could have been in hostile territory and therefore unavailable. Shells have not been recorded in the large apsidal tower suggesting that this belongs to a different phase of construction and a that the lime comes from a different source i.e. from Corwen/Llangollen.

Most accounts of the castle have noted the presence of shells in the mortar and while they may be a significant marker, differentiating between various phases of construction, their source is less clear. . Several examples of shells embedded in the mortar have been recovered during the current phase of excavation, demonstrating that they were definitely used in the mortar mix. They are, however relatively scarce and may not have formed a major part of the mortar, and could have been imported from a different place from the limestone. They could even have been brought in with aggregate from the coast although this seems to be an unlikely source given the local availability of river gravels or glacial deposits. Detailed analysis of mortar from various places in the castle could help to locate a source for its various components.

No significant amounts of mortar have been recovered from the square keep so its composition is not known. It should be noted that limestone has, in later periods, been mined on the east side of

nearby Bala Lake (Llyn Tegid) at Bryniau Golau where there are very limited areas of Ordovician Cymerig Limestone . It is presumed that this source was undiscovered in the Medieval Period.

As noted above it is assumed that the reason for the disintegration of the castle was lack of lime in the mortar. Samples of surviving mortar from the walls or rubble were sent for basic analysis as part of the conservation process (see appendix 1). This showed that the composition was somewhat variable, but an aggregate to lime ratio of between 2:1 and 3:1 was found in all of the samples. This is perhaps a little low in lime for exposed mortar but should have produced durable mortar. Very hard mortar was encountered in the surviving core-work uncovered during the excavation. Despite this, none of the masonry, in particular facing, that had been close to the surface, retained any mortar. Mortar survived in the facing and core in more deeply buried areas. The binding element in lime mortar of the type found at Carndochan is calcium carbonate formed by the action of carbon dioxide in the air on slaked lime or calcium hydroxide. Calcium carbonate is weakly soluble in rainwater which is naturally slightly acidic due to the presence of carbonic acid. The presence of other chemicals in the parent limestone can produce a more durable set, using different chemical pathways, that is considerably more water resistant. These are termed hydraulic limes and are commonly used in foundations and permanently wet conditions.

It is possible that the lime at Carndochan was very weakly hydraulic making it unusually susceptible to attack by water particularly if used in a relatively low proportion. The limited amount of time in each year that is suitable for constructing lime-mortared masonry may also have been a factor. The mortar will not set in wet conditions and improperly set mortar may contain a high proportion of free lime (calcium hydroxide) which is soluble in water.

If the lime was weakly hydraulic some deterioration would be expected in the exposed conditions at 326m OD. This does not fully explain the almost total lack of lime in the majority of the collapsed matrix. Cathcart King and Kenyon suggest that lower ratios of lime were used in the mortar in the upper parts of the buildings at both Castell Carndochan and Castell y Bere. This is a plausible explanation although the masonry half way up a substantial tower would still have to bear a substantial weight. The building style in the areas examined during the 2015-16 project did not suggest that lack of lime was a major consideration, with heavily mortared wall core and roughly coursed masonry with thick levelling layers comprising small stones in a thick bed of mortar. This style of masonry is dependent on mortar for its stability and will tend to disintegrate if the lime is washed out.

The relative importance of the various factors in the construction and subsequent collapse of the building could be resolved or at least further informed by detailed chemical analysis of the mortar and limestone fragments in the debris. The analysis so far carried out was designed to determine the composition of aggregate for the consolidation work. More detailed analysis is more expensive and beyond the budget of this season's project. Further analysis would determine the chemical composition of the mortar and could possibly locate the source of the limestone used in the mortar production.

7.2 Structural summary

The two seasons of excavation have identified the plan and some details of the features previously obscured by rubble in the southern part of the castle. The first season recovered half of the plan of a small half-round tower similar in shape and scale to the north-eastern tower at Dolforwyn Castle in Powys. Smaller towers with a distinctly D-shaped or half-round plan also occur at Caergwrle (Hope) and Castell Dinas Bran. These seem to have a primarily military and lower status function and have very restricted internal areas that are notably different to the hall-like accommodation afforded by the larger towers which are basically rectangular with an apsidal end (Avent 1983, 11 and Brodie 2015 238-40). Brodie argues that there was a move in building practice toward smaller towers although does not include Carndochan in this sequence due to the lack of dating evidence. It seems likely that the small tower at Carndochan belongs to an earlier phase along with the curtain wall and possibly earlier square keep and predates the large apsidal tower. This phasing is, however, provisional and requires further confirmation.

The entrance appears to be fairly simple passage through the rampart with a thickening to the inner face and a gate at the outer end. This probably led to a terraced path running obliquely across the slope. Further excavation could uncover more details.

The 2015-16 excavation revealed stratified deposits beneath the rubble but failed to locate any closely datable remains. There may be more scope for occupation debris in and around the half-round tower.

7. 3 Recommendations for further work

The excavation area was previously visible only as a spread of rubble and was one of the most featureless areas of the castle. The removal of overlying rubble revealed very well-preserved masonry standing to a height of 1.4m or more. This was generally well preserved and stable. The original methodology for the excavation stated that the rubble should be reinstated leaving the site in its original state. The well-preserved masonry presented a second option, namely conservation by

repointing with lime mortar (where necessary) and leaving some or all of the upstanding masonry exposed. The area to the south-east of the large apsidal tower proved to be crucial to the interpretation of the castle, containing the entrance and a small half-round tower. The retention of exposed features in this area would greatly enhance the understandability of the monument.

The 2.7m wide entrance passes through the curtain wall between the two towers and is slightly extended at its inner eastern end by a thickening in the curtain wall. The western side of the passage was buried beneath a considerable amount of rubble and could only be partially investigated in the time available. Further clearance on the western side could provide additional evidence for a structural sequence with the apsidal tower and potentially allow the entrance to be used as an access point to the castle instead of the current path over the tower walls from the west. This could also allow rubble to be taken outside the castle during any further clearance work; the very limited area of open ground within the castle cannot accommodate large amounts of rubble and this would be better removed to the area to the south of the castle for storage.

The general form of the half-round tower the curtain wall and the entrance have now been determined but only a small area has been excavated down to stratified deposits and the structural relationships between the curtain wall and the two towers have yet to be confirmed.

A continued programme of excavation is proposed. This would prioritise the entrance in order to provide access and a means of removing stone from the site. It would initially assess the stability of the western side and remove some of the loading on the top of the passage wall. It is hoped that more extant masonry can be uncovered that will form a stable side to the entrance but a battered slope of rubble set back from the line of the passage wall could also provide a sufficiently stable edge if no extant masonry survives at the outer end. A reduction in the level of rubble in this area should improve general levels of stability and reduce loading on vulnerable masonry.

The excavation in the area examined in the 2015-16 season to the east of the entrance needs to be completed and the masonry consolidated. This would entail reducing the level of the rubble in the 2m x 3m area between trench 1 and the entrance passage and excavating any stratified deposits. This would provide access to the full depth of the wall facing for conservation.

It is anticipated that the conservation of the masonry will be carried out in conjunction with the Snowdonia National Park and use the same contractors (Stonewyrcs Cyfyngedig) and basic methodology as in the 2015-16 conservation in the apsidal tower. The masonry in this area is better preserved so will require little more than repointing. This will require careful work and a great attention to detail in particular to the retention of all galetting stones in their original positions. All

facing should therefore be recorded photographically to a high standard using a levelled camera with the sensor plane parallel with the wall face. A detailed methodology will have to be agreed with the stonemasons in advance. This may involve numbering and carefully replacing galetting stones in the isolated areas where they form levelling layers in deep beds of mortar.

The surface of the areas to be left open should be covered with at least 0.2m of stone and gravel from the excavation. This will have a fourfold purpose: It will protect any *in situ* surfaces or deposits, it will provide additional stability to the base of the walls, it will produce a level and safe surface for visitors to the monument and it will reduce the amount of left-over rubble and spoil from the excavation .

8. REFERENCES

Avent, R., 1983. *Cestyll Tywysogion Gwynedd: Castles of the Princes of Gwynedd* HMSO, Cardiff

Beverley Smith, J. and Ll. (eds) 2001. *A History of Merioneth, Volume 2: The Middle Ages* University of Wales Press

British Geological Survey 1986. *Sheet 136, Bala Solid 1:50,000*

Butler, L. 2010. "The Castles of the Princes of Gwynedd," in Williams and Kenyon (eds) (2010

Cathcart King, D. J., with Kenyon J. R., 2001. 'The Castles: A Study in Military Architecture' in Beverley Smith J. and Ll. 2001.

de Lewandowicz , M., 1998. A Survey of Castell Prysor, Meirionnydd *Archaeology in Wales* 38, 36-42

Diller, S. and J. 2004. *Craftsman's Construction Installation Encyclopaedia.* Craftsman Book Company, Carlsbad, California.

Fenton, R., 1917. *Tours in Wales (1804-1813)*, (ed John Fisher) Archaeologia Cambrensis, Supplementary Volume

Gwynedd Archaeological Trust, 2006. Historic Landscape Characterisation – Bala, Llyn Tegid

Historic Scotland 2014. *Lime Mortars in Traditional Buildings* National Conservation Centre Short Guide 6

Hogg, A. H. A. 1955. Castell Carndochan *Journal of the Merioneth Historical and Record Society* Vol II pt. III, 178-80

Hopewell, D., 2015 *High Status Medieval Sites - Castell Carndochan. Conservation and Assessment Excavation.* GAT report 1213

Howells M.F. 2008. *Wales* Regional Geology Guides, British Geological Survey

Neaverson, E ., 1947. *Mediaeval Castles in North Wales*

Neaverson, E., 1953-4. Mediaeval quarrying in north-eastern Wales Flintshire Historical Society Publications Vol.14 1953- 4

Oxford Archaeology North, 2012. *Uplands Initiative Field Projects 2011-12, Cwm Lliw Survey Area, North Wales* OA North for RCAHMW

RCAHMW, 1921. An Inventory of the Ancient Monuments in Wales and Monmouthshire: VI - County of Merioneth

Williams, D. M. and Kenyon, J. R. (eds), 2010. *The Impact of the Edwardian Castles in Wales.* Oxford: Oxbow Books

Fig 1 Castell Carndochn - Location

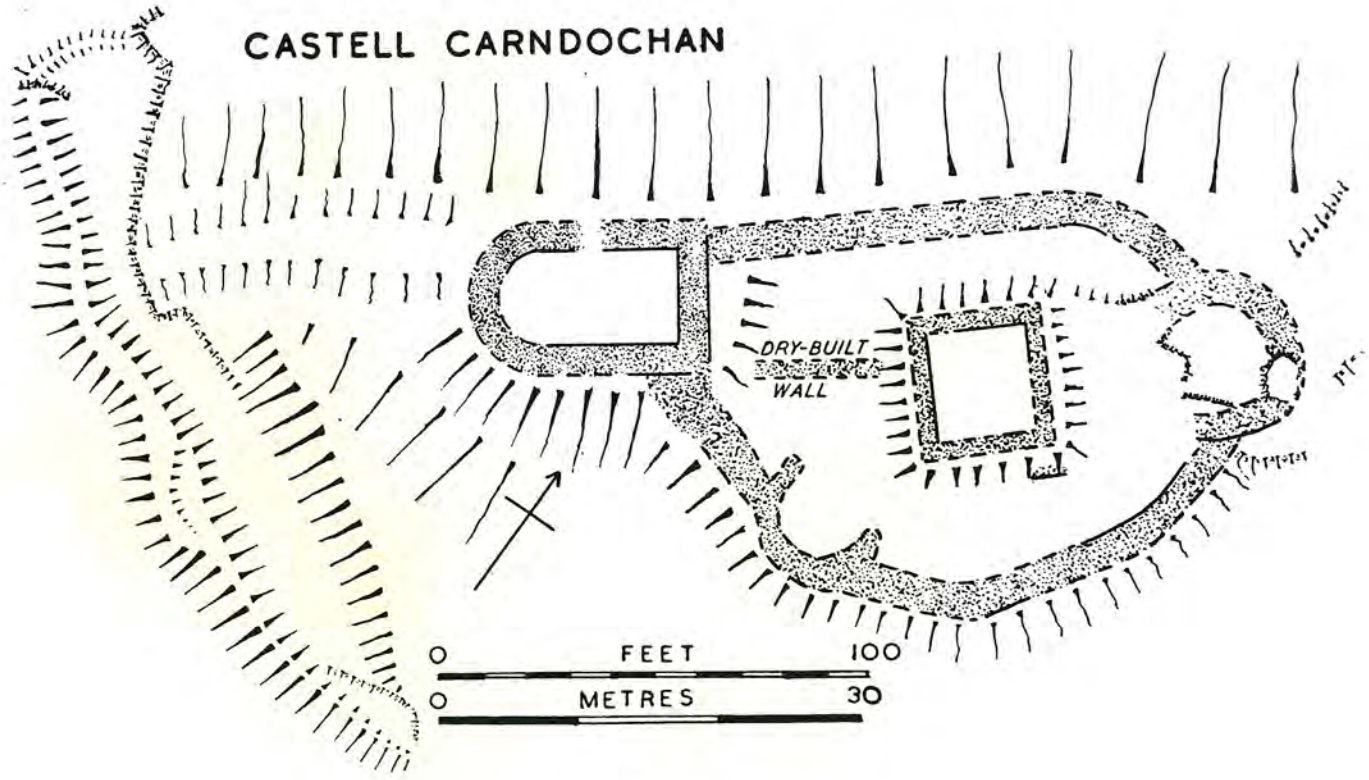


Fig. 2 Plan of Castell Carndochan (from Hogg 1955)

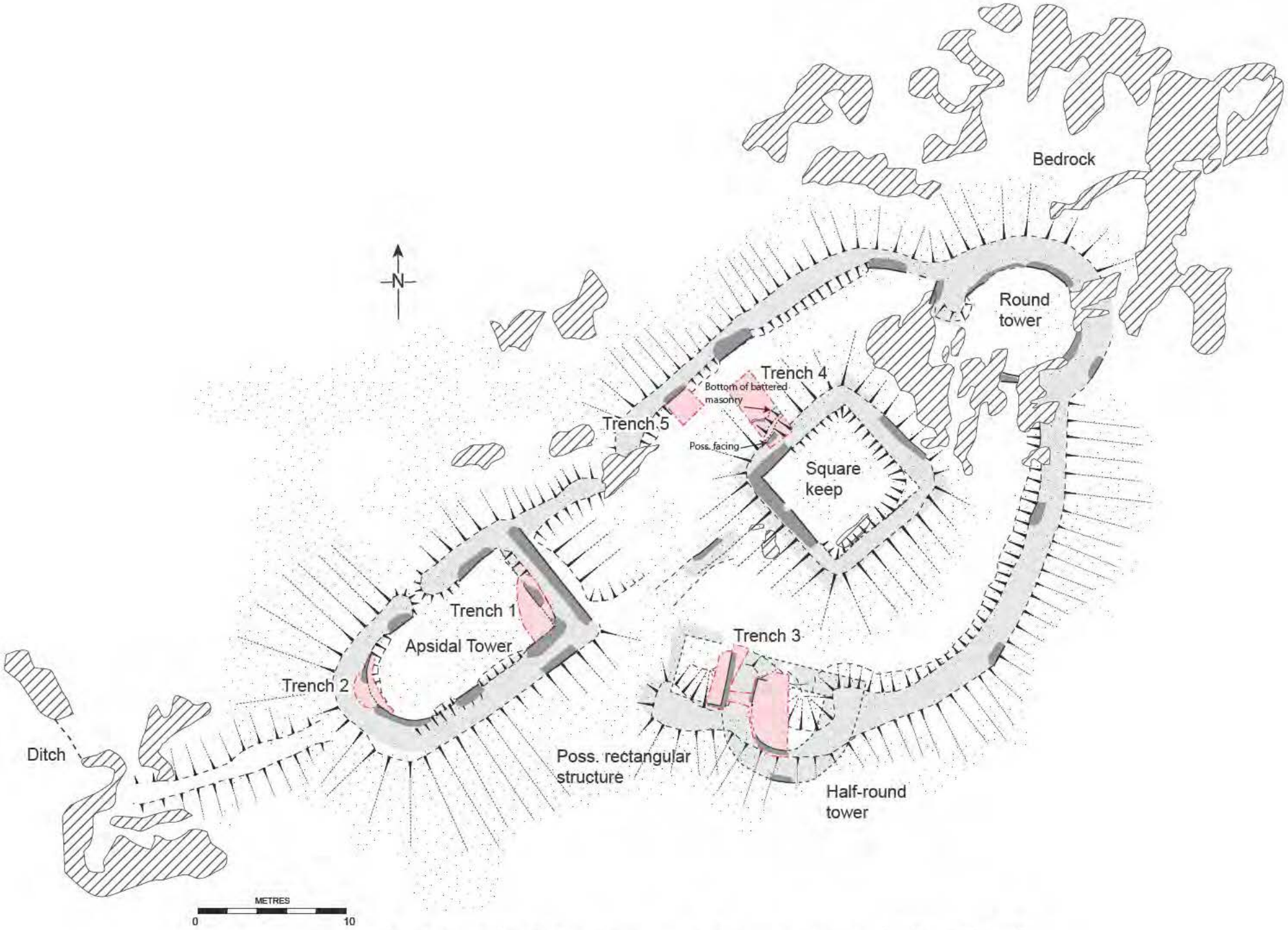


Fig. 3 Castell Carndochan showing areas of clearance and consolidation in 2014-15

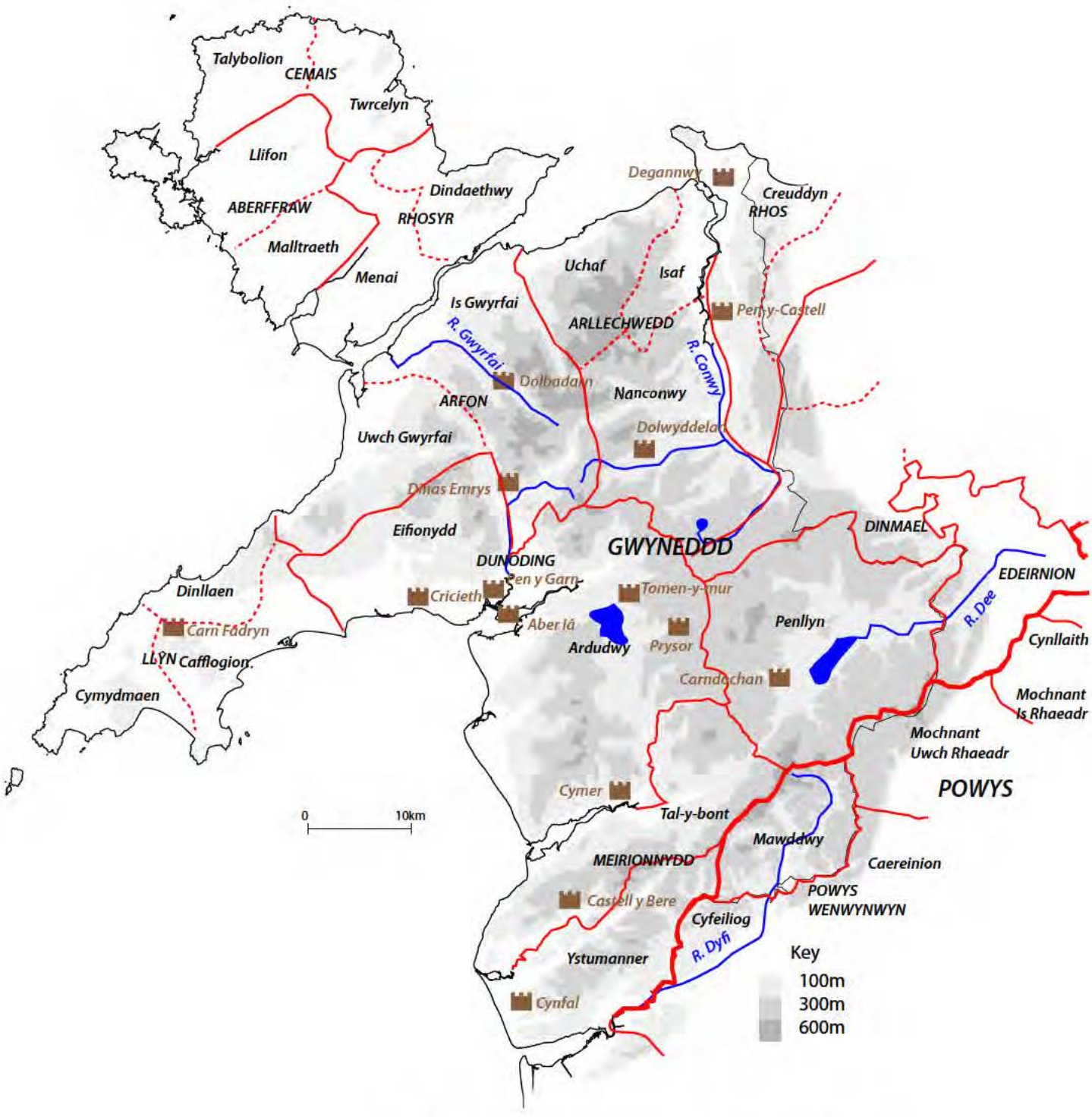


Fig. 4 Castles of the Welsh Princes and commotes in Gwynedd

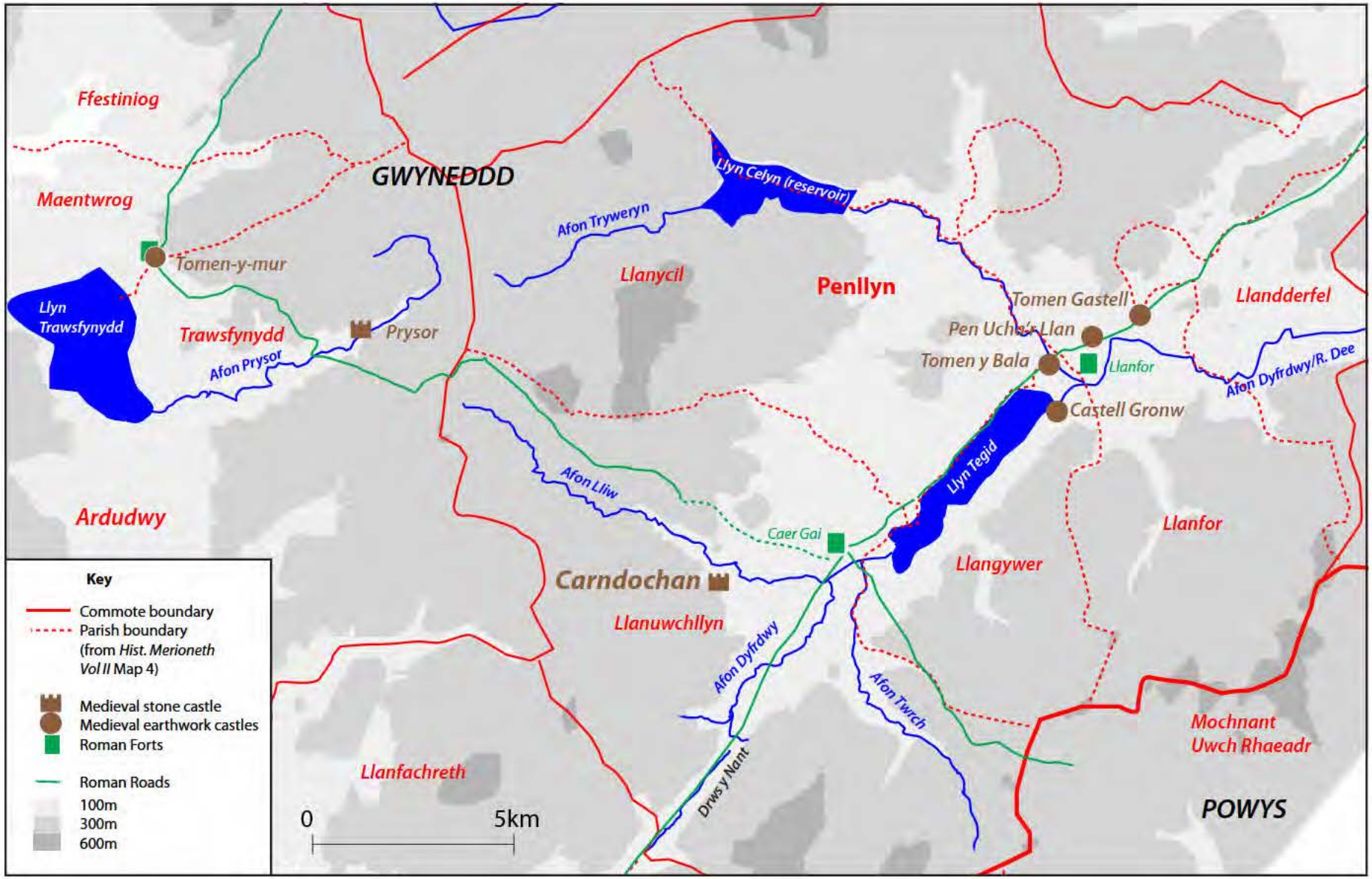


Fig. 5 Castell Carndochan and environs - historic and topographic features

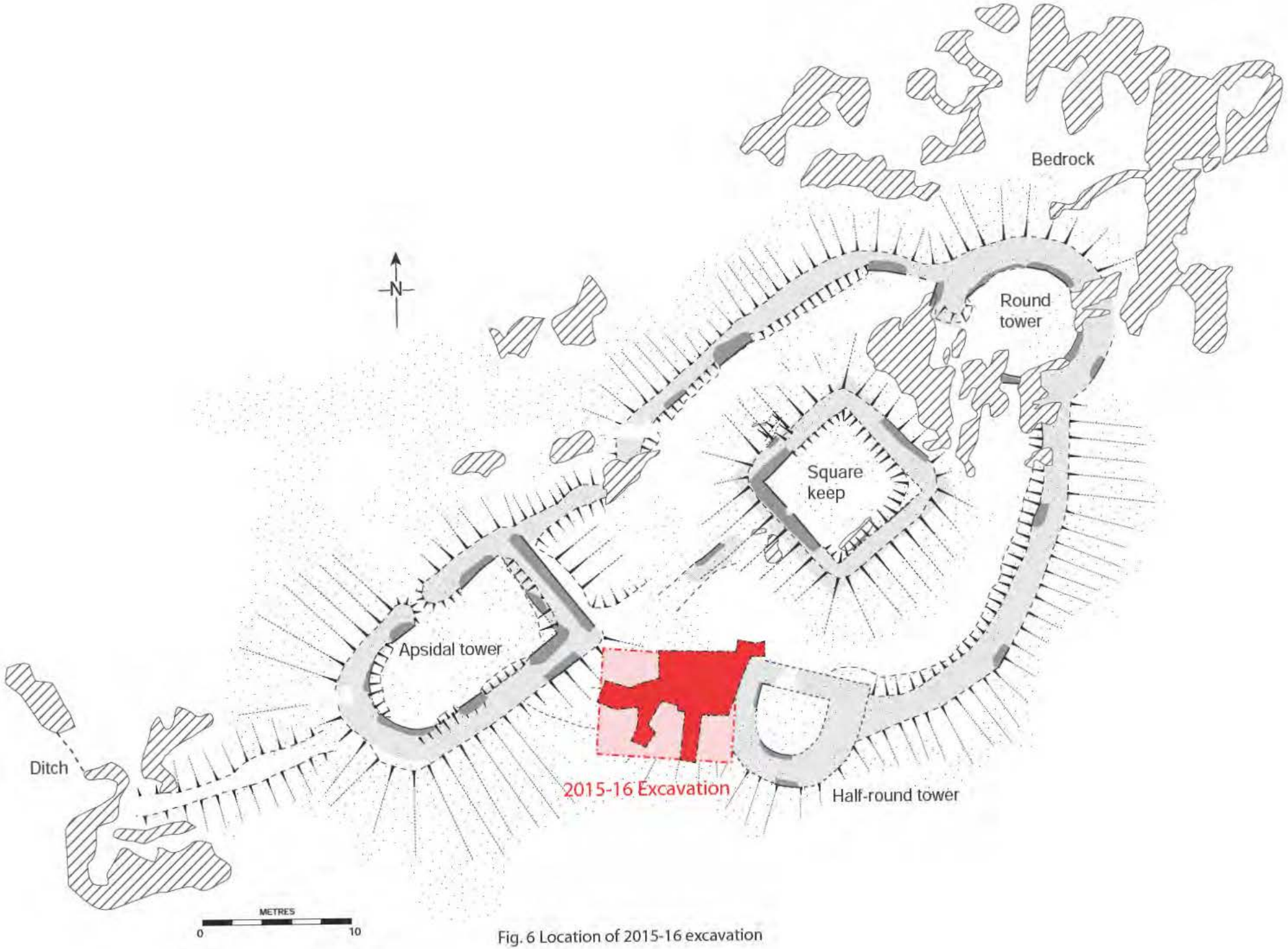


Fig. 6 Location of 2015-16 excavation

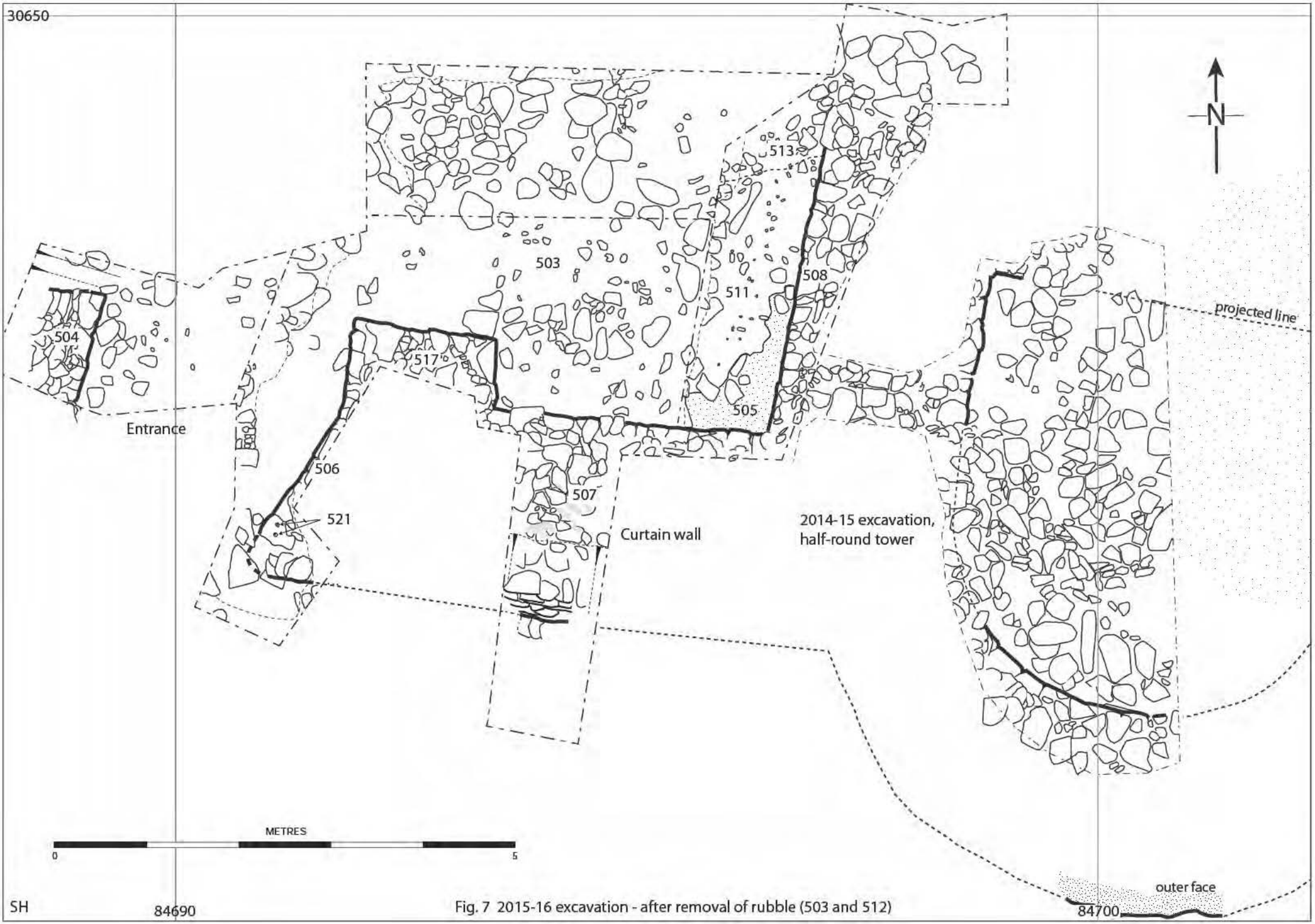


Fig. 7 2015-16 excavation - after removal of rubble (503 and 512)

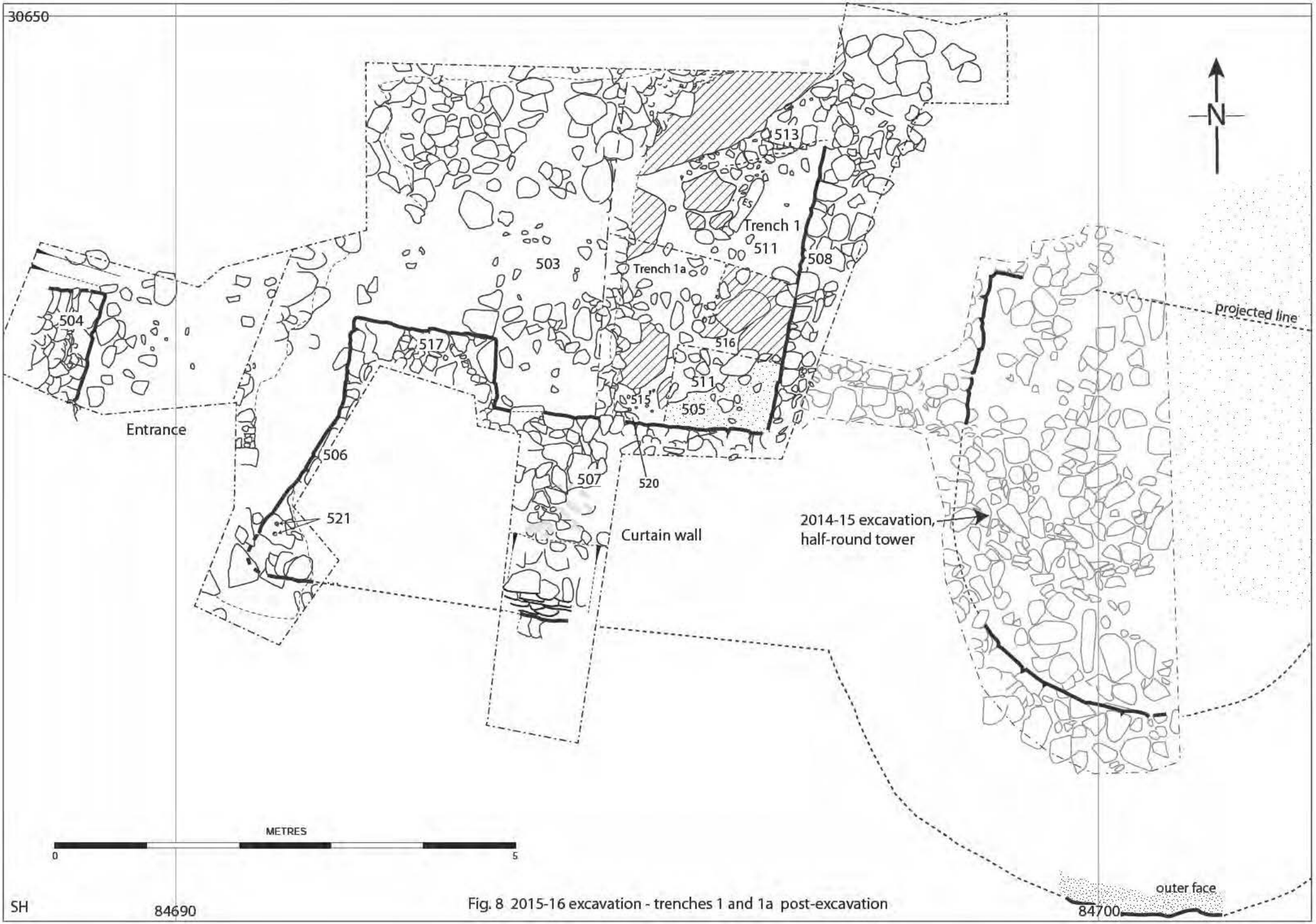


Fig. 8 2015-16 excavation - trenches 1 and 1a post-excavation

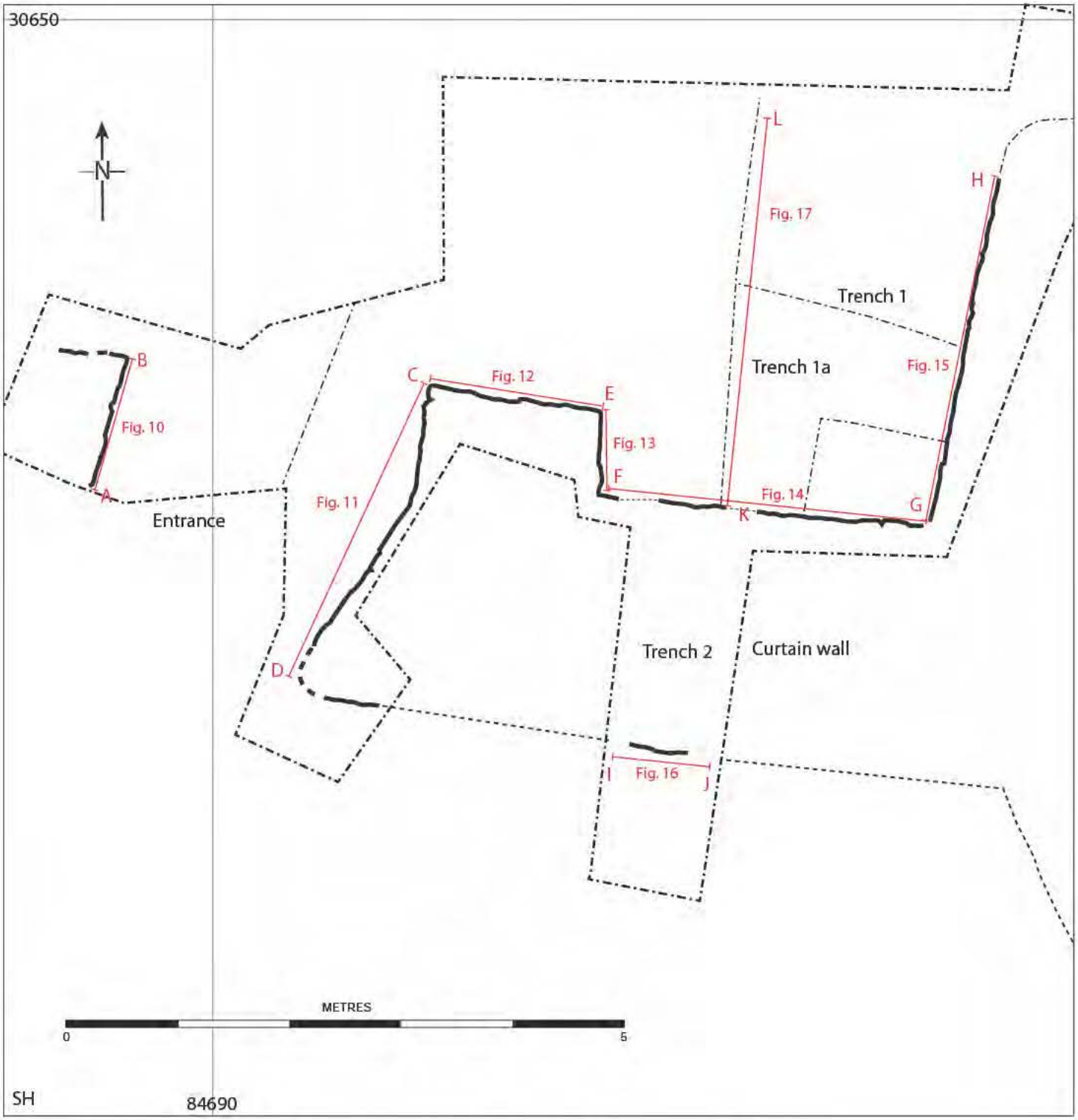


Fig. 9 2015-16 excavation - location of elevations and section

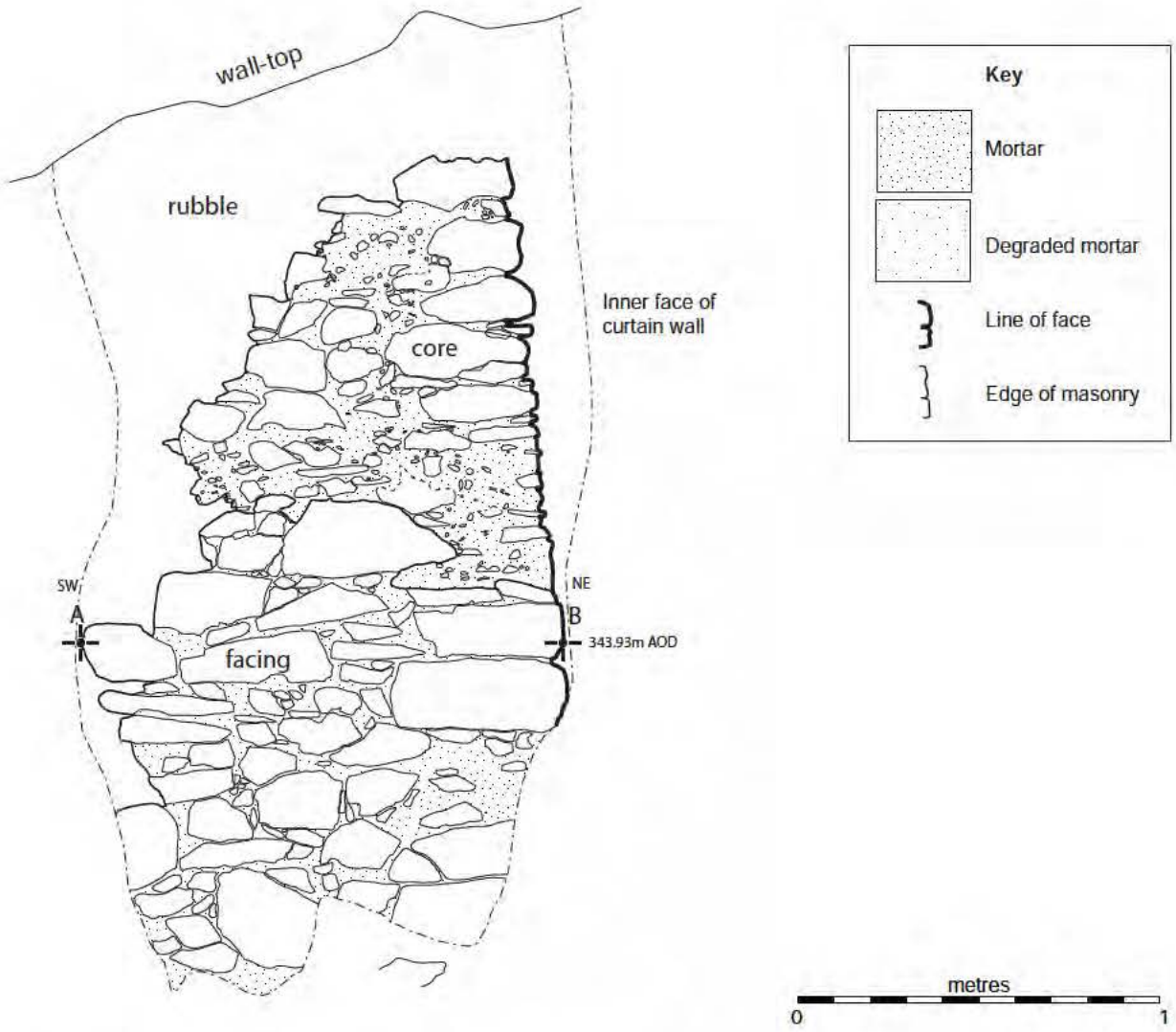


Fig. 10 W side of entrance (504), ESE facing elevation

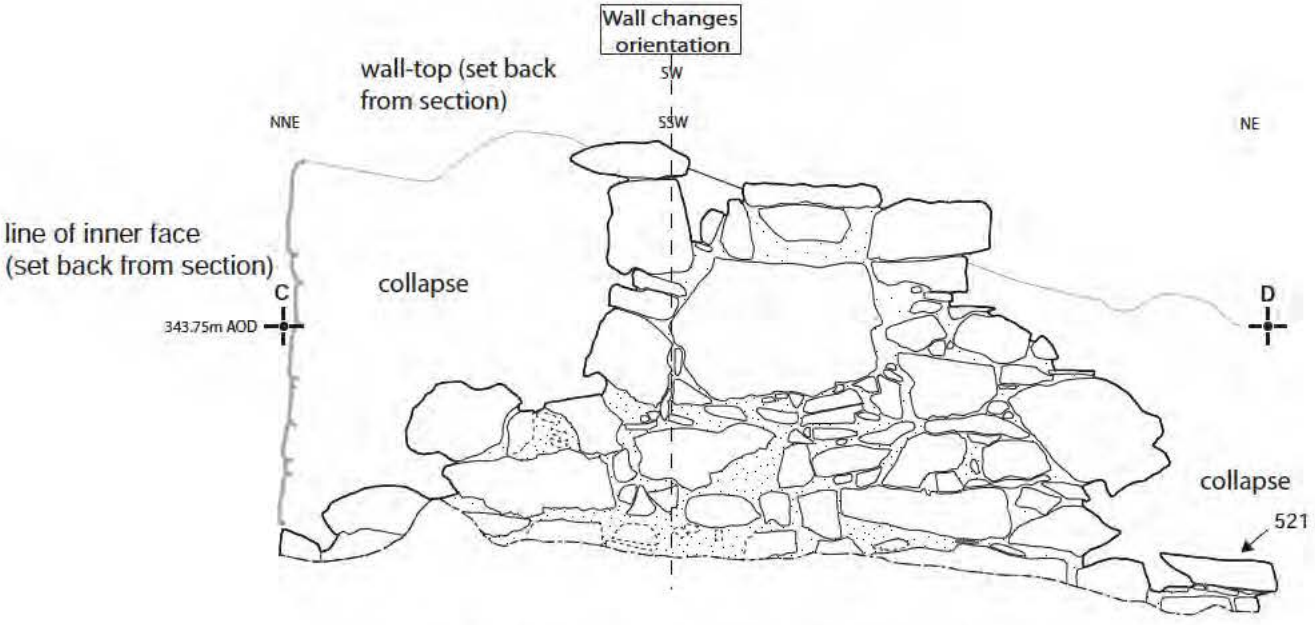


Fig. 11 E side of entrance (506), WNW facing elevation

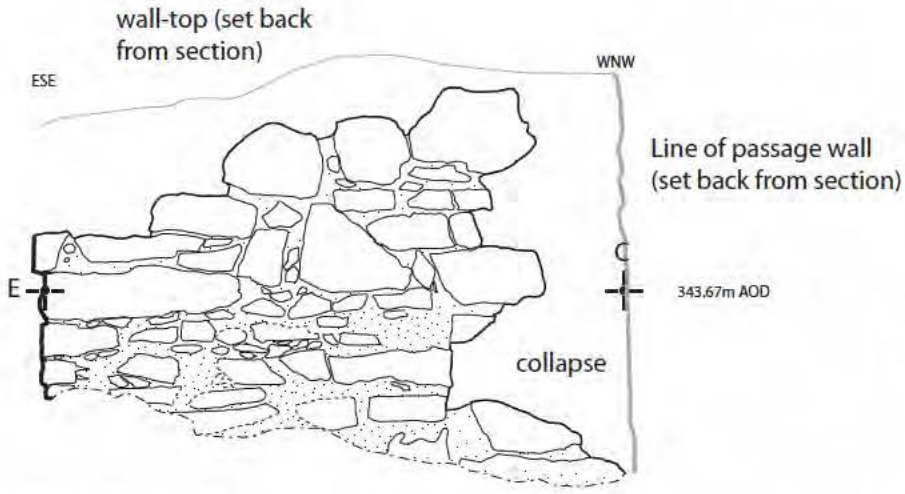
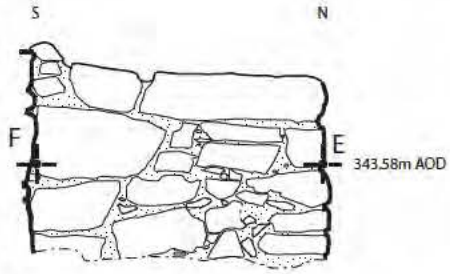


Fig. 12 Thickening in curtain wall (517), N facing elevation



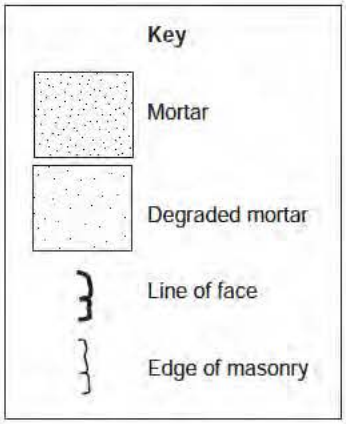


Fig. 13 Thickening in curtain wall (517), E facing elevation

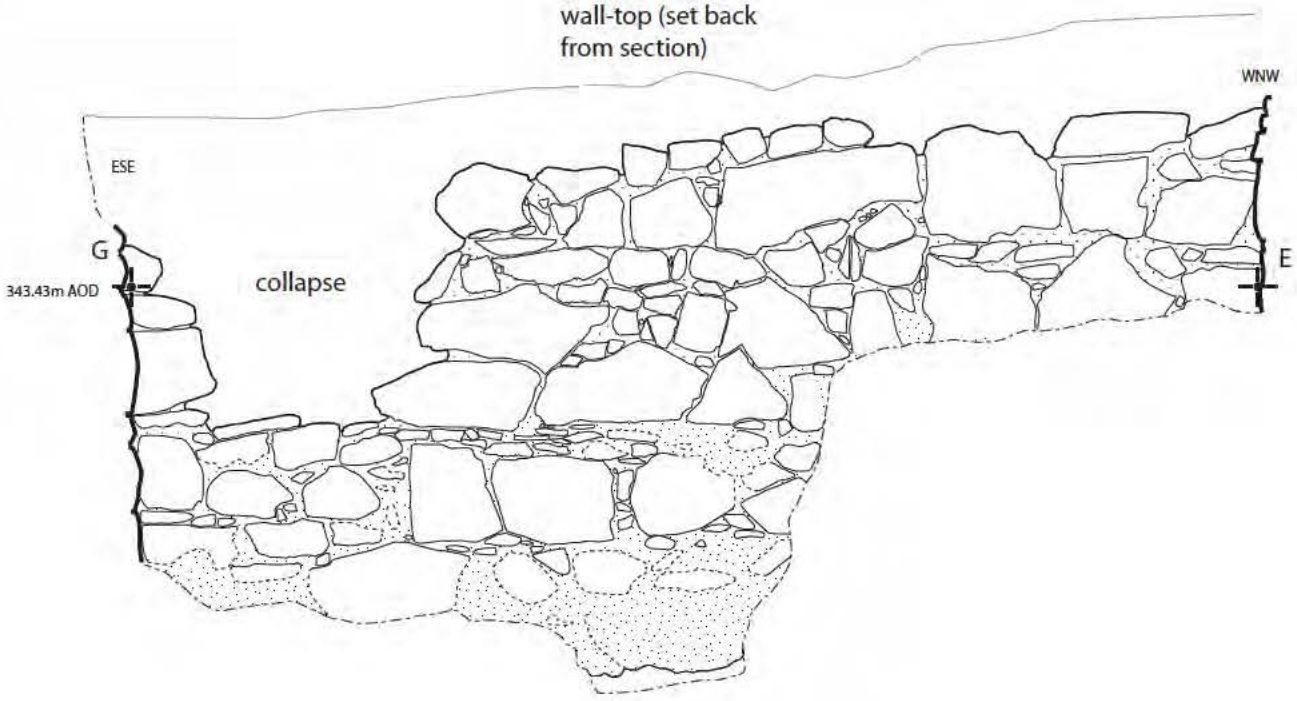


Fig. 14 Curtain wall (507), N facing elevation

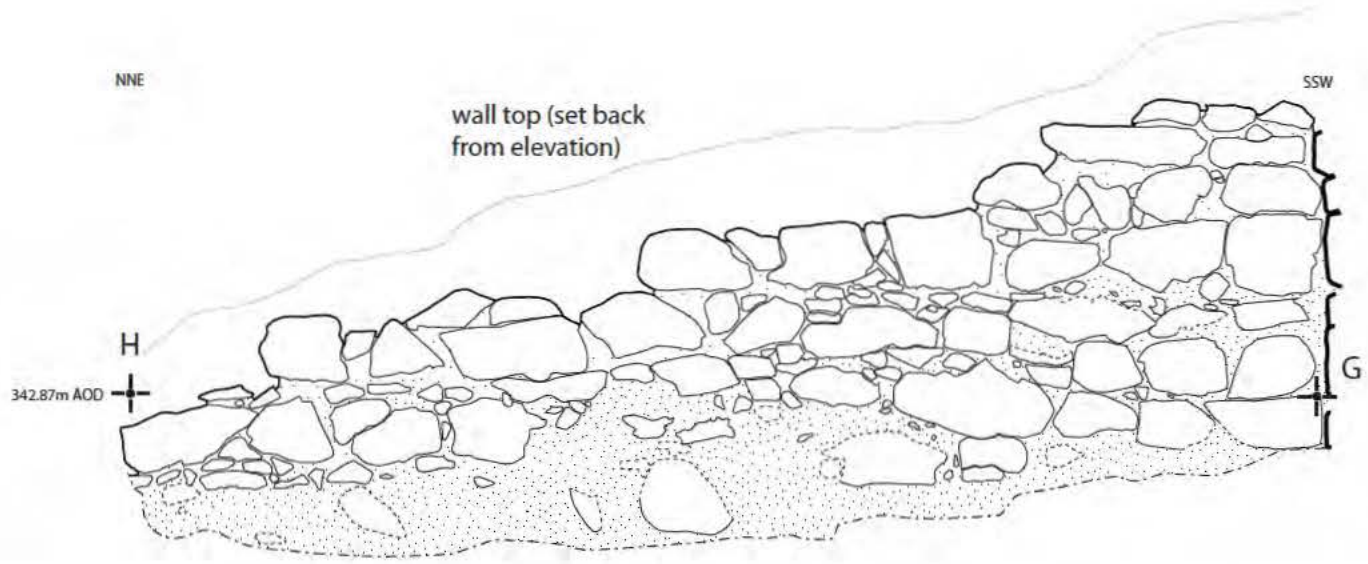


Fig. 15 Outer face of half-round tower (508), W facing elevation

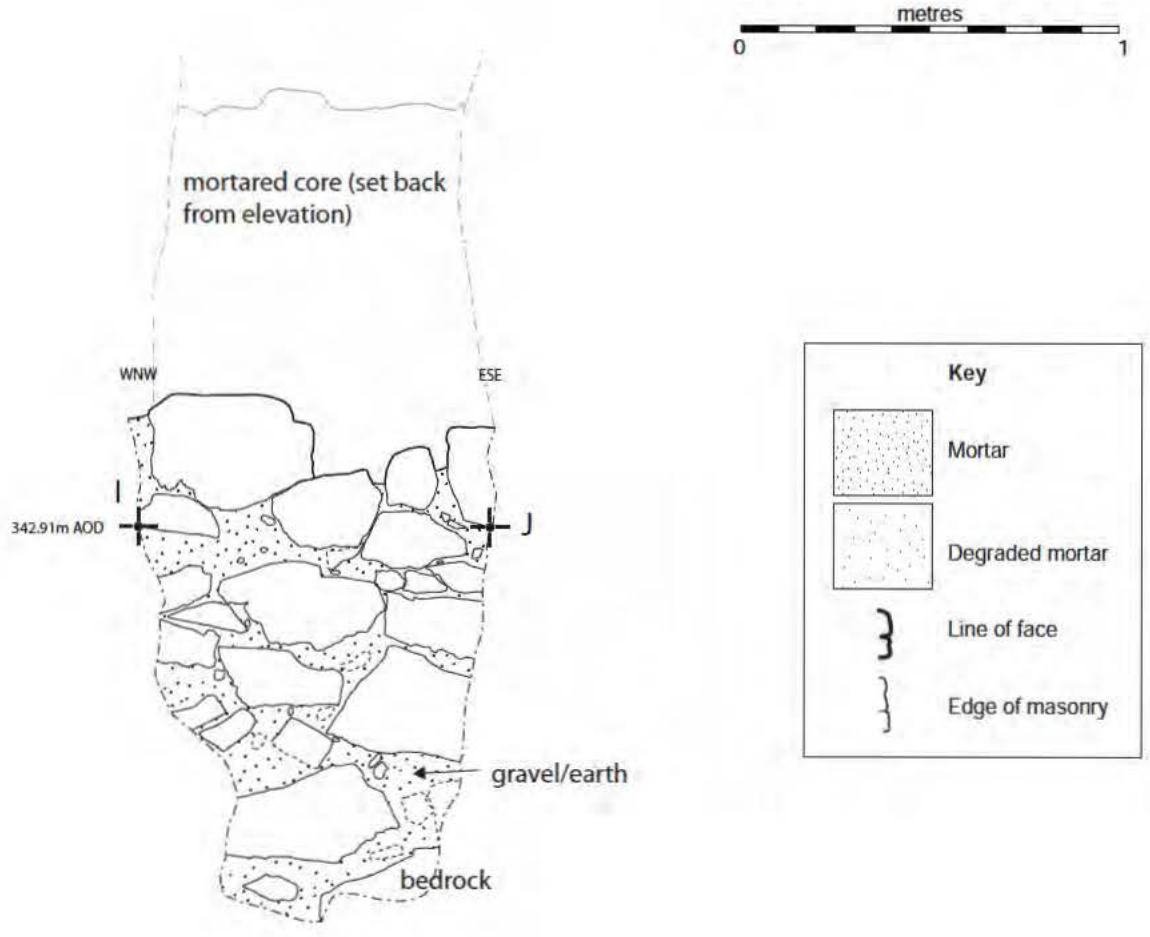


Fig. 16 outer face of curtain wall 507, S facing elevation

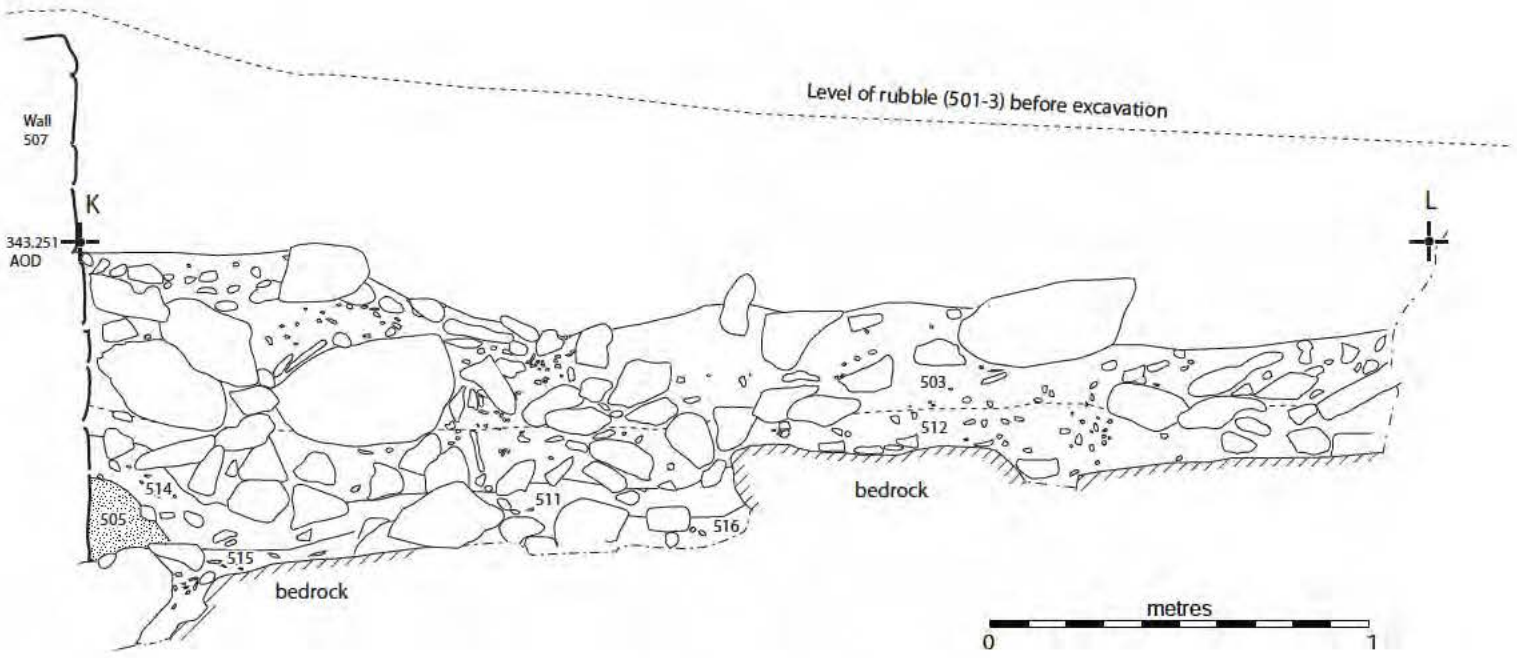


Fig. 17 Trench 1, E facing section

Plate 1 Orthographic projection of excavation after initial clearance of rubble

Plate 2 Orthographic projection of trenches 1 and 1a after excavation

Plate 3 Trench 1 showing mortar (505) at base of wall

Plate 4 East wall of entrance passage

Plate 5 Partly buried facing at the inner W side of the entrance passage

Plate 6 Partly collapsed outer end of the entrance showing possible hinge-mount (521)

APPENDIX 1 - RADIOCARBON DATING

Scottish Universities Environmental Research Centre

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

RADIOCARBON DATING CERTIFICATE

22 February 2016

Laboratory Code	SUERC-65738 (GU39546)
Submitter	David Hopewell Gwynedd Archaeological Trust Craig Beuno Garth Road Bangor LL57 2RT
Site Reference	Castell Carndochan
Context Reference	505
Sample Reference	G2366 01
Material	Charcoal
$\delta^{13}C$ relative to VPDB	-26.9 ‰
Radiocarbon Age BP	828 ± 18

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

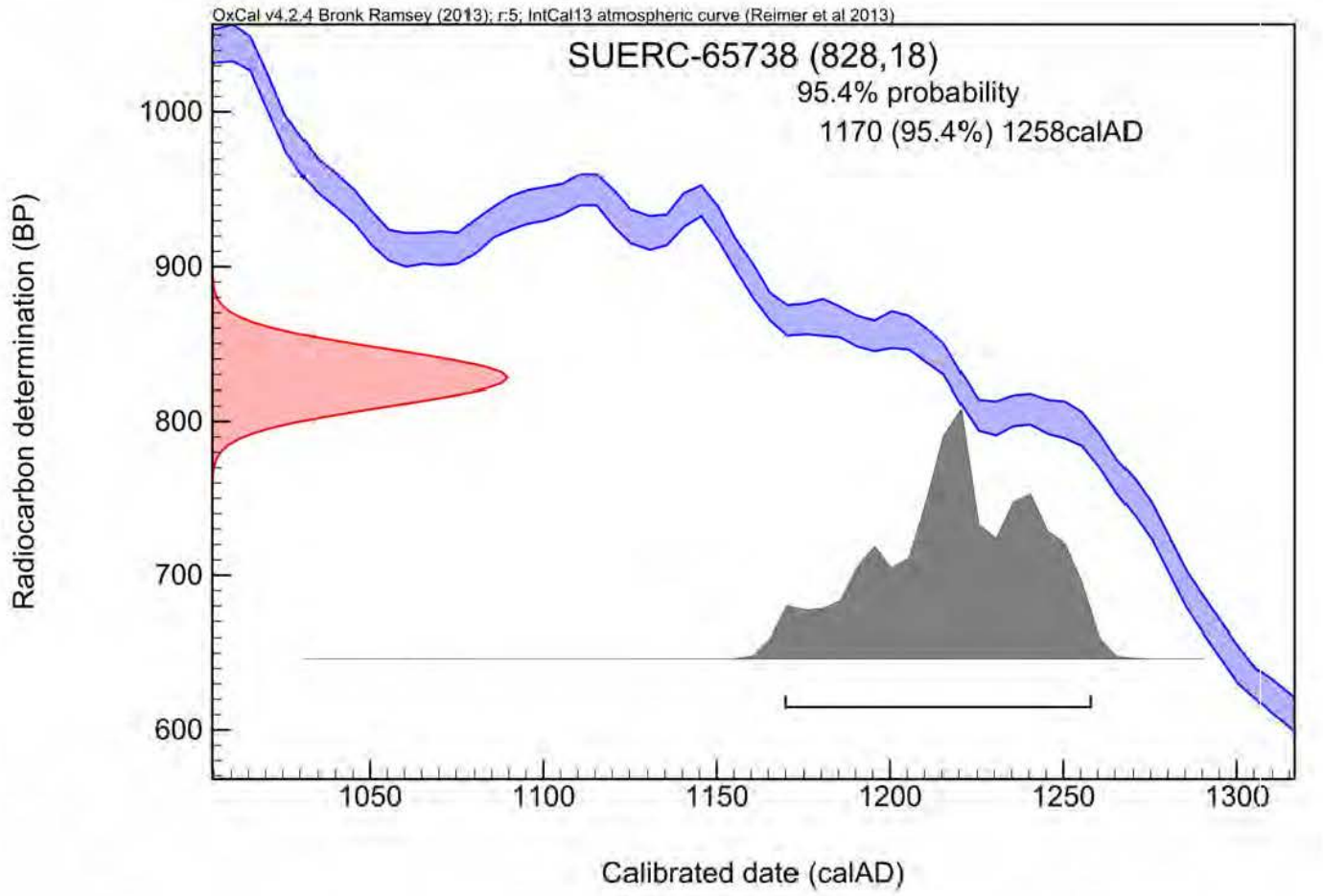
The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal4).

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

Conventional age and calibration age ranges calculated by :- E Dunbar Date :- 22/02/2016

Checked and signed off by :- B Tripney Date :- 22/02/2016

Calibration Plot



Scottish Universities Environmental Research Centre

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

RADIOCARBON DATING CERTIFICATE

22 February 2016

Laboratory Code	SUERC-65739 (GU39547)
Submitter	David Hopewell Gwynedd Archaeological Trust Craig Beuno Garth Road Bangor LL57 2RT
Site Reference	Castell Carndochan
Context Reference	505
Sample Reference	G2366 03
Material	Charcoal : Birch
$\delta^{13}C$ relative to VPDB	-26.8 ‰
Radiocarbon Age BP	785 ± 18

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

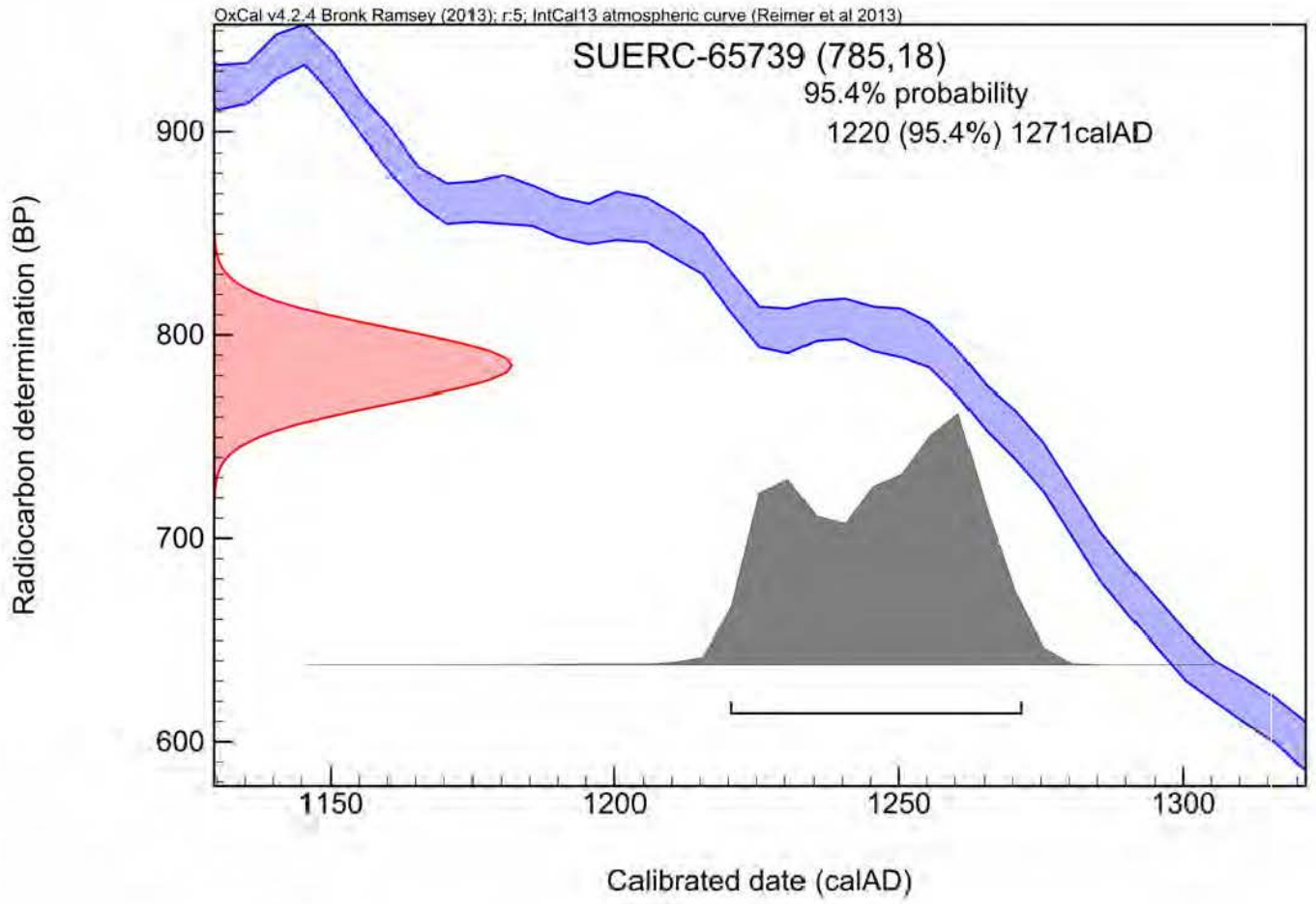
The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal4).

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

Conventional age and calibration age ranges calculated by :- E Dunbar Date :- 22/02/2016

Checked and signed off by :- B Tripney Date :- 22/02/2016

Calibration Plot



Gwynedd Archaeological Trust
Ymddiriedolaeth Archaeolegol Gwynedd

Craig Beuno, Ffordd y Garth, Bangor, Gwynedd. LL57 2RT
Ffon: 01248 352535. Ffacs: 01248 370925. email:gat@heneb.co.uk