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Archaeological Investigations at Ballylin Hillfort, Co. Limerick

WILLIAM O'BRIEN, NICK HOGAN & JAMES O'DRISCOLL

Ballylin hillfort near Ardagh is the largest prehistoric monument in Co. Limerick. This paper presents the results of an archaeological investigation conducted there in 2012 by a research team from University College Cork. The surface features of the hillfort are presented by aerial LiDAR survey, with geophysical prospection also undertaken at the site. The defences, including one of the original entrances, were excavated to recover dating evidence, and to understand details of design and construction. Radiocarbon results suggest the hillfort was built in or around the twelfth century BC, during the transition from the Middle to Late Bronze Age in Ireland.

Introduction

Ballylin hillfort is on the summit of a prominent hill on the eastern edge of the Mullaghareirk mountain range in west Limerick (Fig. 1; Plate 1). The 'Black Hill', as it is known locally, falls steeply to the east, with a panoramic view from the summit (243m OD) over the plains of central Limerick. The hill slopes more gently to the north, with the lower Shannon estuary visible in the distance. There is mountainous terrain to the west and south, facing Kerry and Cork respectively. The site is located in Ballylin townland, with a portion extending into the adjoining townlands of Kerrikyle and Glenville, 2km north-west of the village of Ardagh (ITM 525750/639520).

Despite its immense size (20.5ha), this hillfort only came to attention in 1981 when the Ordnance Survey of Ireland were conducting aerial reconnaissance in west Limerick. Their archaeologists surveyed the site, and the results were published that same year in the *Journal of the Royal Society of Antiquaries of Ireland.* This included a description of the surface features of the hillfort, supported by a contour plan, aerial photograph, and surface profiles across the 'defences' of both enclosures (Cody 1981, figs 13–15). The latter are described as consisting of a shallow ditch inside a low bank, with indications of an inner bank in places. Cody also identified a possible original entrance on the eastern side of the inner enclosure (*ibid.*, fig. 14c).

The 1981 survey did not record any early features inside the hillfort. This is partly because the interior is overgrown by bog vegetation, particularly on the northern side of the outer enclosure (Plate 2). Three circular features, each about 10m in diameter, were recorded near what is probably a later field bank in the north-west part of the outer enclosure (*ibid.*, 78). They are not visible today due to vegetation cover. No surface features are visible inside the inner enclosure, where an Ordnance Survey trigonometric pillar marks the summit of an otherwise flat area covered by thin blanket peat.

Arising from these findings, Ballylin hillfort was registered in the *Record of Monuments and Places* for Co. Limerick (RMP LI028-085). This also lists a small mound adjacent to the exterior of the outer enclosure on the eastern side of the hillfort (LI028-173). The significance of that mound remains to be established. No other fieldwork was

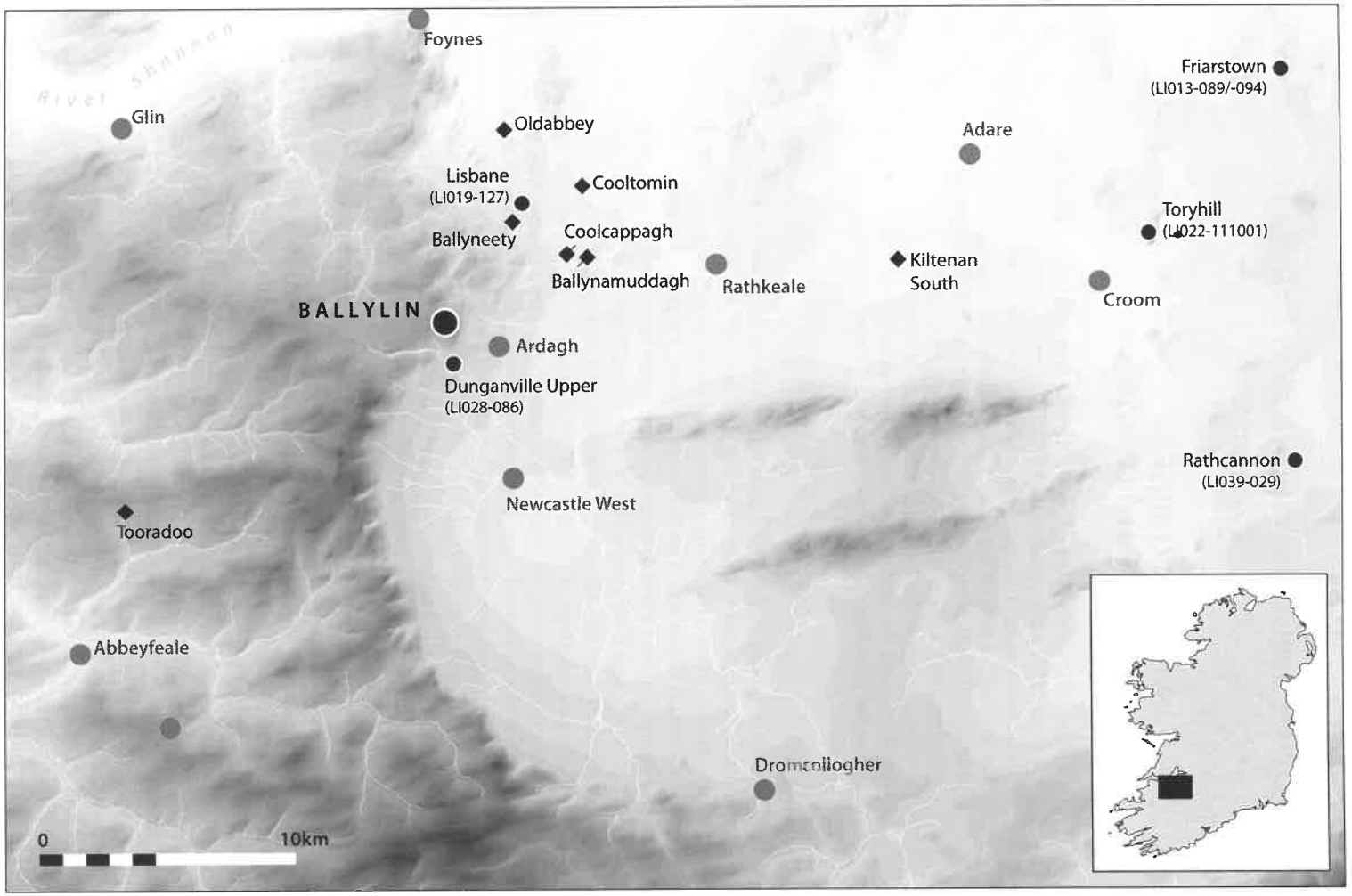


Fig. 1 Landscape setting of Ballylin hillfort, Co. Limerick, with location of other sites and artefact finds mentioned in the text.



Fig. 1 Landscape setting of Ballylin hillfort, Co. Limerick, with location of other sites and artefact finds mentioned in the text.



Plate 1 Satellite photograph (top: north) of Ballylin hillfort (source: Google Earth 2010).



Plate 2 Northern side of Ballylin hillfort, looking north-west from inner (foreground) to outer (arrow) enclosing elements.



Fig. 2 LiDAR slope model of Ballylin hillfort and environs (top: north).



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conducted at Ballylin prior to the present project. The site does feature in a general analysis of Bronze Age landscapes in North Munster (Grogan 2005b), aspects of which are discussed below.

This Project

The investigations at Ballylin are part of a larger research project on prehistoric hillforts in Bronze Age Ireland. In recent years survey and excavation has been conducted at nine other sites across southern Ireland, including Clashanimud, Co. Cork; Glanbane, Co. Kerry; Formoyle, Co. Clare; Toor More, Co. Kilkenny, and the sites of Hughstown, Rathnagree, Sruhaun, Tinoran and Spinans Hill 1 in Baltinglass, Co. Wicklow.

Archaeological Survey

A LiDAR survey of Ballylin hillfort was commissioned for this project (Fig. 2). This is a remote sensing technique particularly suited to surveying large areas of ground. The process involves the transmission of laser light energy from a unit mounted on an aircraft, and analysing the duration of flight and strength of the returning pulses to create a detailed three-dimensional model of the ground surface. As an archaeological tool LiDAR has the ability to rapidly map low-relief sites and landscapes, even those masked by trees and overgrowth given a sufficiently high survey resolution. The survey was carried out by BKS Ltd. who supplied a final bare-earth model dataset for the Ballylin study area covering 6 square km and amounting to some 24 million data points, which equates to a ground reading every 0.5m.

The LiDAR survey, supported by aerial and satellite photographs, followed by field-walking, confirms the basic description of this hillfort provided by Cody (1981). The hill is surrounded by two roughly concentric enclosures, placed 80–120m apart, each defined by a bank and ditch arrangement (Fig. 3). These earthworks survive as low-relief features accentuated by vegetation growth. The inner enclosure is intact, and measures 300m by 315m over an area of 7.5ha (18.5 acres). The outer enclosure is 500m by 525m over 13.5 hectares (33.4 acres), but is damaged by forestry on the north/north-east side, with the south-west side incorporated into modern field banks.

With a total area of 21 hectares (almost 52 acres), Ballylin is the largest prehistoric hillfort in Munster, and one of the most impressive in Ireland. Despite this, neither enclosure is depicted on the various editions of the Ordnance Survey six-inch (1:10,560) mapping. Cody discussed the possibility of a third enclosure, represented on those maps and in aerial photography by curving field banks outside and concentric with the northern, western and southern sides of the second enclosure (*ibid.*, 78, fig. 13). Archaeological excavation would be required to examine whether these are later field boundaries following the lower contours of the hill. Should a third enclosure be confirmed at Ballylin, which is probably unlikely, the hillfort would have a total site area of some 37ha.

The LiDAR survey confirmed Cody's identification of an entrance opening on the eastern side of the inner enclosure (Fig. 2 centre right). No corresponding entrance to the outer enclosure can be identified. The LiDAR does not indicate archaeological features in the interior of the hillfort, where dense heather growth hindered the ability of the technique to map the ground surface (Plate 2). Some circular features in the LiDAR results, particularly in the southern half of the site, are the result of thick pockets of gorse.

A magnetic gradiometry survey was carried out at Ballylin hillfort (O'Driscoll 2012). Owing to dense heather and gorse growth this was limited to a 3ha area (14% of the site), extending east from the summit to include the entrance to the inner enclosure, as well as a transect across the outer enclosure. The enclosing elements are imaged as contrasting

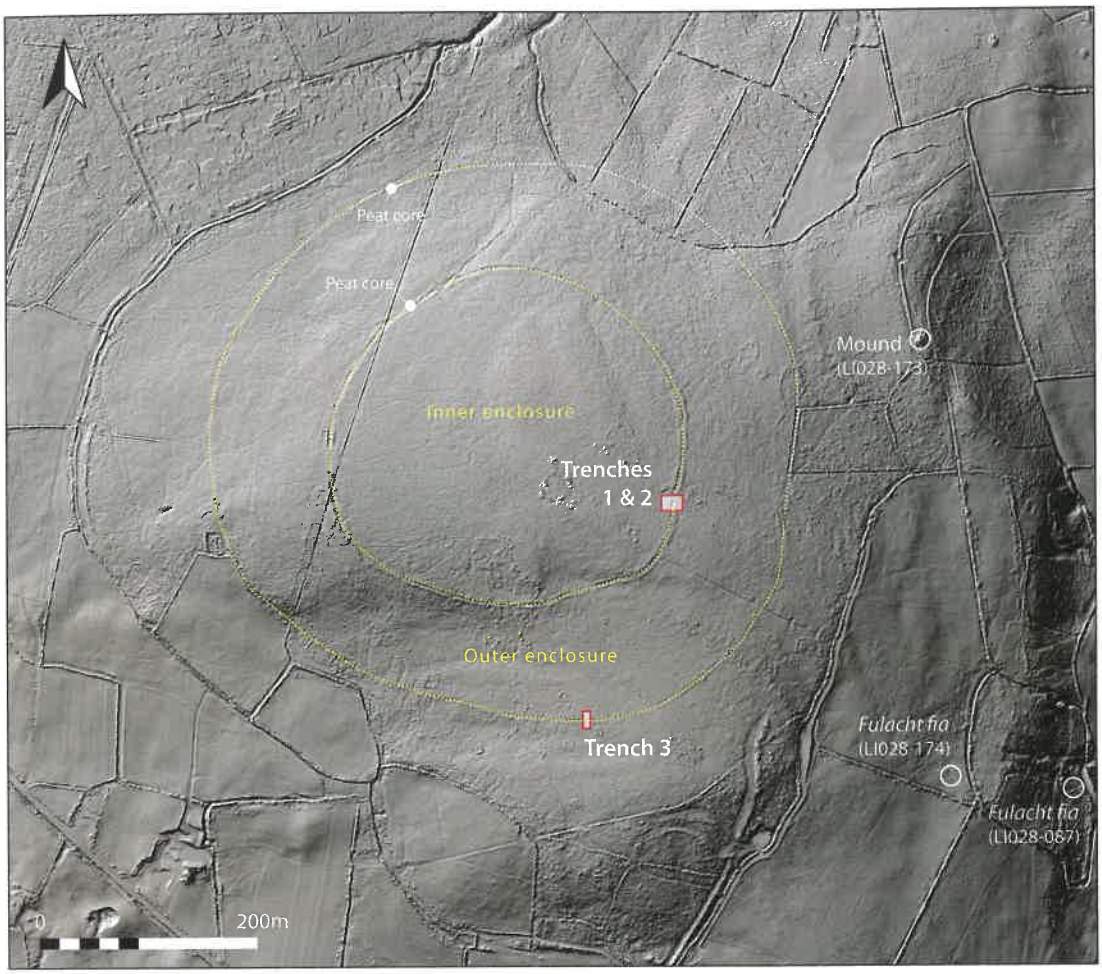


Fig. 3 Annotated hillshade model showing main features of Ballyin hillfort, excavation trenches, augered peat samples, and recorded archaeological sites in vicinity.

bands of high and low magnetic responses, as is the inner enclosure (Fig. 4). Some of the numerous point anomalies, particularly within the inner enclosure, may represent signatures of burning activity, or dug features such as pits and postholes. This remains, however, to be confirmed by excavation.

Archaeological Excavation

Three trenches were excavated at Ballylin hillfort over a four-week period in late summer 2012 (O'Brien 2016). Trenches 1 and 2 were located on the southern side of the aforementioned entrance to the inner enclosure (Fig. 3). Trench 3 was excavated across the line of the outer enclosure on the southern side of the hillfort. Prior to excavation both enclosing elements appeared to comprise a shallow ditch with indications of low banks on either side.

All three trenches were de-turfed by spade. An estimated 18m^3 of peat was removed from Trenches 1 and 2, with some 2.25m^3 from Trench 3. Subsequent excavation was



Fig. 4 Geophysical survey (magnetic gradiometry) on summit and south-east side of Ballylin hillfort. Entrance to inner enclosure (centre right).

carried out by hand, using small digging equipment. This involved detailed stratigraphic excavation and context-based recording, with full written descriptions, photography and scale drawings. On completion of this work the trenches were back-filled by hand.

Further investigation included the sampling of peat from the ditches of the inner and outer enclosures on the northern side of the hillfort (Fig. 3). This was done using a russian



Plate 3 Augering of ditch, northern side of inner enclosure.

auger to sample peat at a depth of 0.7–0.75m in these ditches (Plate 3). It was hoped to obtain radiocarbon results for this peat growth to serve as *terminus ante quem* dates for the ditches (see below).

Excavation Results: Inner Enclosure

A 10m (east–west) by 5m (north–south) cutting (Trench 1) was excavated across an original entrance on the eastern side of the inner enclosure (Fig. 5; Plate 4). A second cutting (Trench 2), measuring 2.5m square, was excavated as an extension to the northern side of Trench 1. There was a continuous growth of blanket peat across the entrance area, ranging 0.33–0.5m in thickness at the western side to 0.3–0.35m on the eastern side (Fig. 6). This comprised a mid brown fibrous peat, supporting *calluna*, *molinia* and other blanket bog vegetation (C.01), overlying a more humified dark brown peat (C.02). The removal of this peat exposed a thin gley surface (C.03) across the eastern end of the trench, formed by soil podzolization in acidic waterlogged conditions. The same leaching action led to the precipitation of iron oxides in the underlying stony B-horizon (C.23). This bright orange subsoil overlay broken (C.24) or solid bedrock.

Excavation beneath the inner bank and around the outer edges of the ditch exposed a thin layer of white/grey silt (C.22) with charcoal flecks in places. This represents an old ground surface that existed immediately prior to the hillfort construction.

Enclosing Elements

The excavated features in Trenches 1 and 2 include two low banks and an intervening ditch forming the southern side of the entrance, part of the ditch causeway and entrance passage, and two large postholes that were possibly part of a wooden gate arrangement.

The inner bank was created with subsoil and quarried bedrock extracted from the ditch (Plate 5). It measured 2.05m in width, with a maximum central height (eroded) of

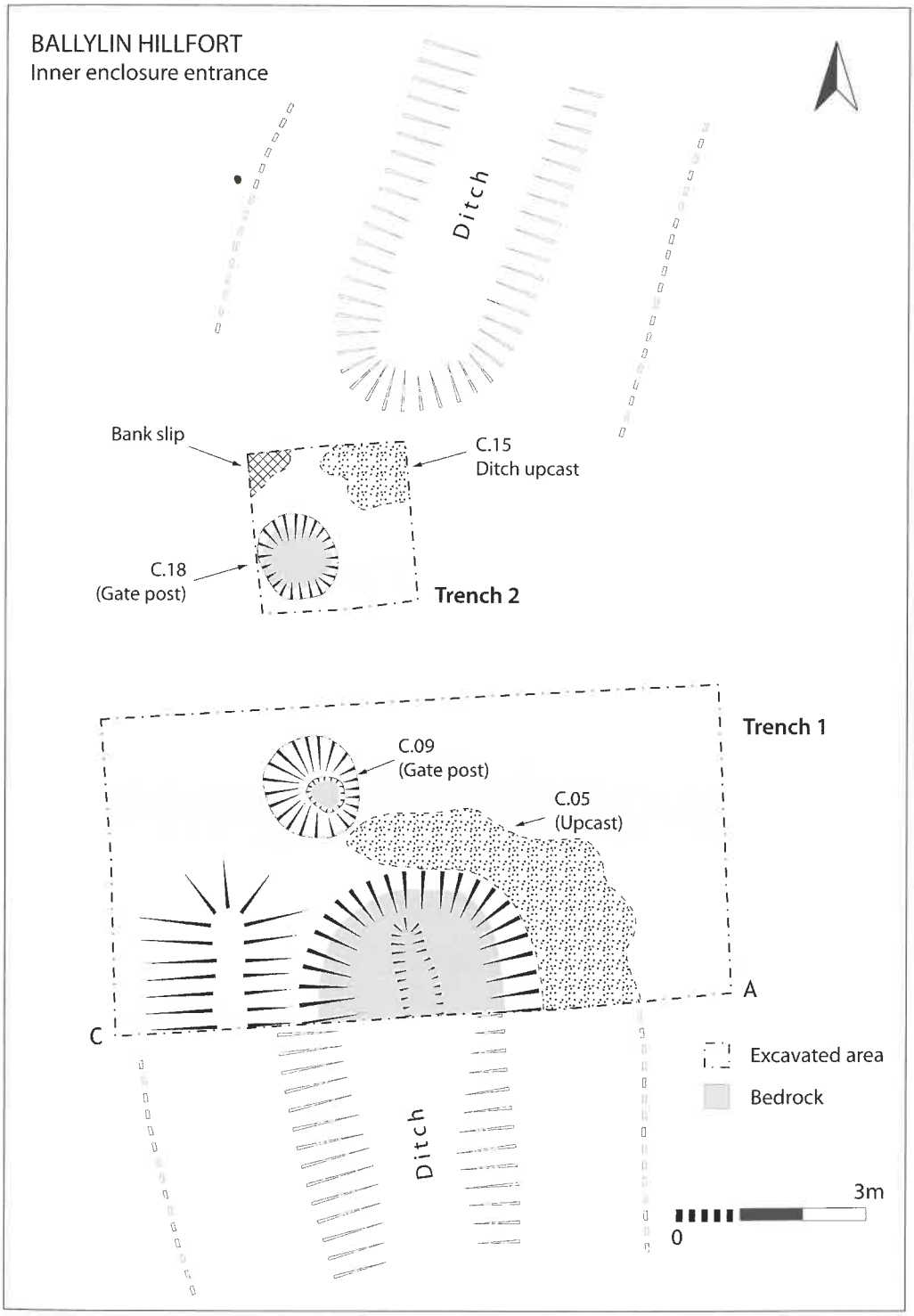


Fig. 5 Post-excavation plan of entrance to inner enclosure, Ballylin hillfort.

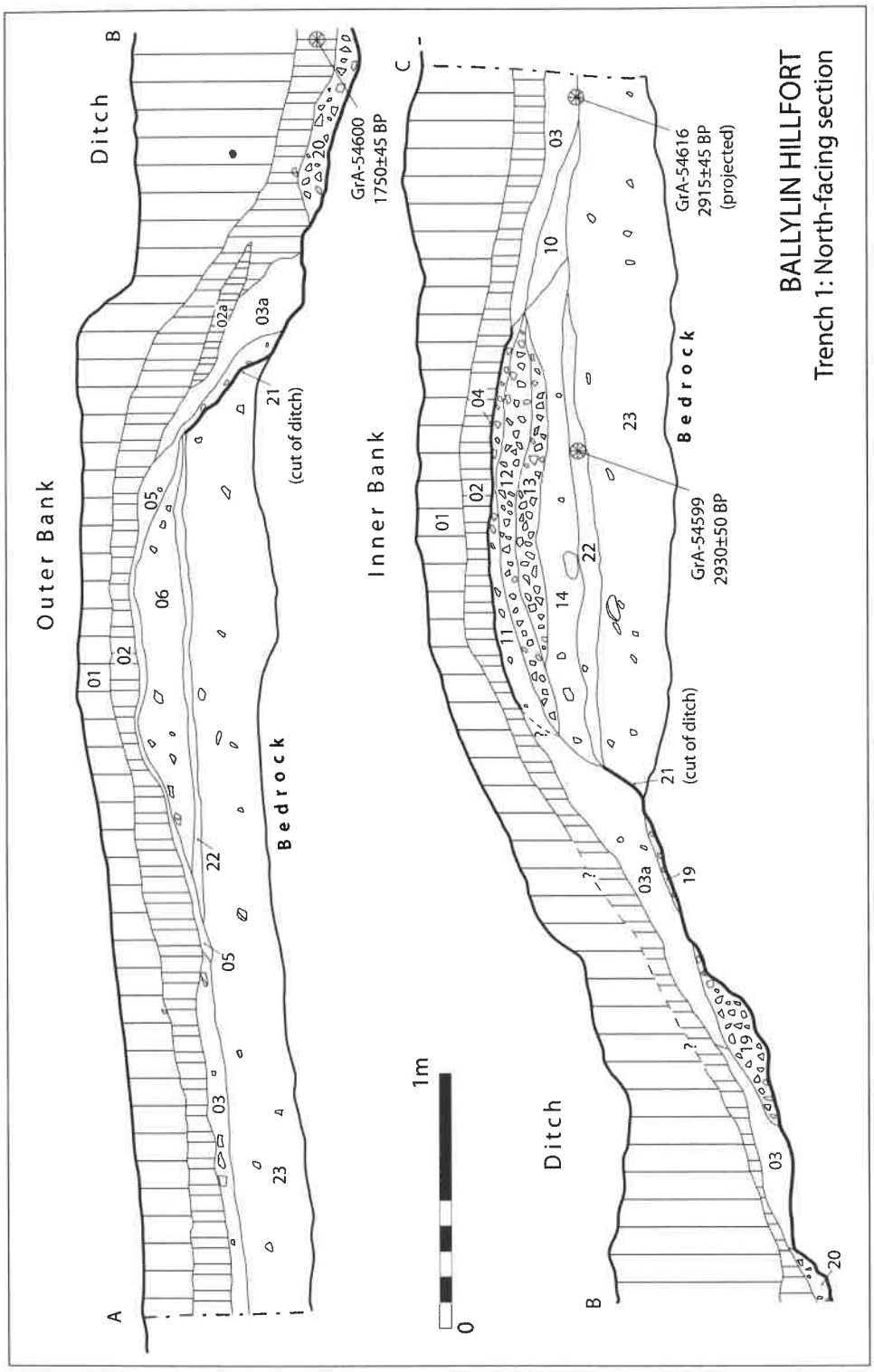


Fig. 6 Stratigraphic section, entrance to inner enclosure, Ballylin hillfort.



Plate 4 Excavation of Trench 1, entrance to inner enclosure. Note the ditch terminal (centre right) and fill of southern posthole (centre left), with an expansive view of the lowlands of central Limerick.



Plate 5 Excavation of Trench 1 (looking south), showing southern posthole and ditch terminal with low banks on either side (scale: 0.2m divisions).

BALLYLIN HILLFORT
Trench 1: North-facing section



Fig. 6 Stratigraphic section, entrance to inner enclosure, Ballylin hillfort.

0.35m. There is no evidence of stone facing, nor any indication of an associated palisade/fence. The bank was composed of five separate deposits overlying the old ground surface (Fig. 6). The upper part of the bank was gleyed, creating a hard surface (C.04). This overlay three successive deposits of broken stone (contexts 11, 12 and 13) extracted from the ditch and intermixed with silt sediment. The removal of C.13 exposed a deposit of orange/light brown silt (C.14), which formed the lower part of the bank. Context 14 contained very little *broken* stone, as it represents upcast from the upper part of the ditch where the latter was dug through B-horizon subsoil (C.23). There was some erosion on the inner (western) side and northern end of the bank, with a mixed deposit of light to dark brown stony silt (C.10) derived from slip of the main bank deposits (C.11 and C.12).

A 2.3m length of ditch terminal with a rounded end was fully excavated on the southern side of Trench 1 (Fig. 5; Plate 5). The ditch (C.21) is 3.5m wide at the surface and 1.6m at the base, with a depth of 0.89m to the modern surface. It was dug through 0.2–0.3m of orange B-horizon, with the lower part cut into bedrock. One unusual feature was a narrow channel, measuring 0.5–0.58m wide by 0.08–0.1m deep, along the centre of the ditch. This was deliberately cut into bedrock, sloping downwards from the lower side of the terminal to extend along the flat base of the ditch.

The fill sequence of this ditch began with a thin deposit of stony sediment (C.20) at the base (Fig. 6). It is not certain whether this represents erosion of the bedrock cut or a slippage of bank material. It was overlain by thin deposits of stony silt (C.19) along the western slope, probably caused by erosion of the bank. This was followed by a slow and uninterrupted accumulation of peat in the ditch to a central thickness of 0.63m.

There are indications of a low bank outside the ditch. Excavation in Trench 1 identified a deposit of soil and broken rock that had been extracted from the ditch around its northern and eastern sides (Fig. 6). This commenced with a spread of orange re-deposited B-horizon (C.06), overlain by dark brown stony silt with broken stone (C.05). Together, these deposits form a low bank on the outer edge of the ditch. There is probably a similar feature on the other side of the entrance, where a spread of dark brown stony sediment (C.15) was exposed along the northern side of Trench 2. This was similar in appearance to C.05, and probably represents the same type of ditch upcast forming a low external bank.

An examination of the material used to build the two banks confirms that they were constructed at the same time as the ditch. In both instances the lower bank material (C.06 outer bank; C.14 inner bank) comprised redeposited subsoil from the initial digging of the ditch. The upper bank deposits (C.05 outer bank; C.11, C.12 and C.13 inner bank) contained a significant amount of broken stone from the extraction of bedrock in the lower ditch. The presence of only minor amounts of slip in the ditch (C.21) indicates that these banks remained relatively stable after construction. There is no evidence of a stone revetment, probably because the banks were never substantial.

Entrance Passage

Two pits were discovered inside the ditch terminals in the entrance passage (Fig. 5). The southern example (C.09) was 1.2m from the north-west side of the southern ditch (Plate 5). It consisted of a vertical D–shaped cut in the B-horizon subsoil, measuring 0.55m (north-east/south-west) by 0.53m (north-west/south-east), with a central depth of 0.54m (Fig. 7). The fill (C.07) consisted of loose stony silt with only a few fragments of charcoal. The upper portion contained 19 large stones (C.08), many of which were inclined along the sides of the pit, as if used as packing for an upright post.

The northern posthole (C.18) was 2.1m from the edge of the northern ditch terminal. This feature was sub-circular in plan, with steeply sloping sides and an irregularly flat

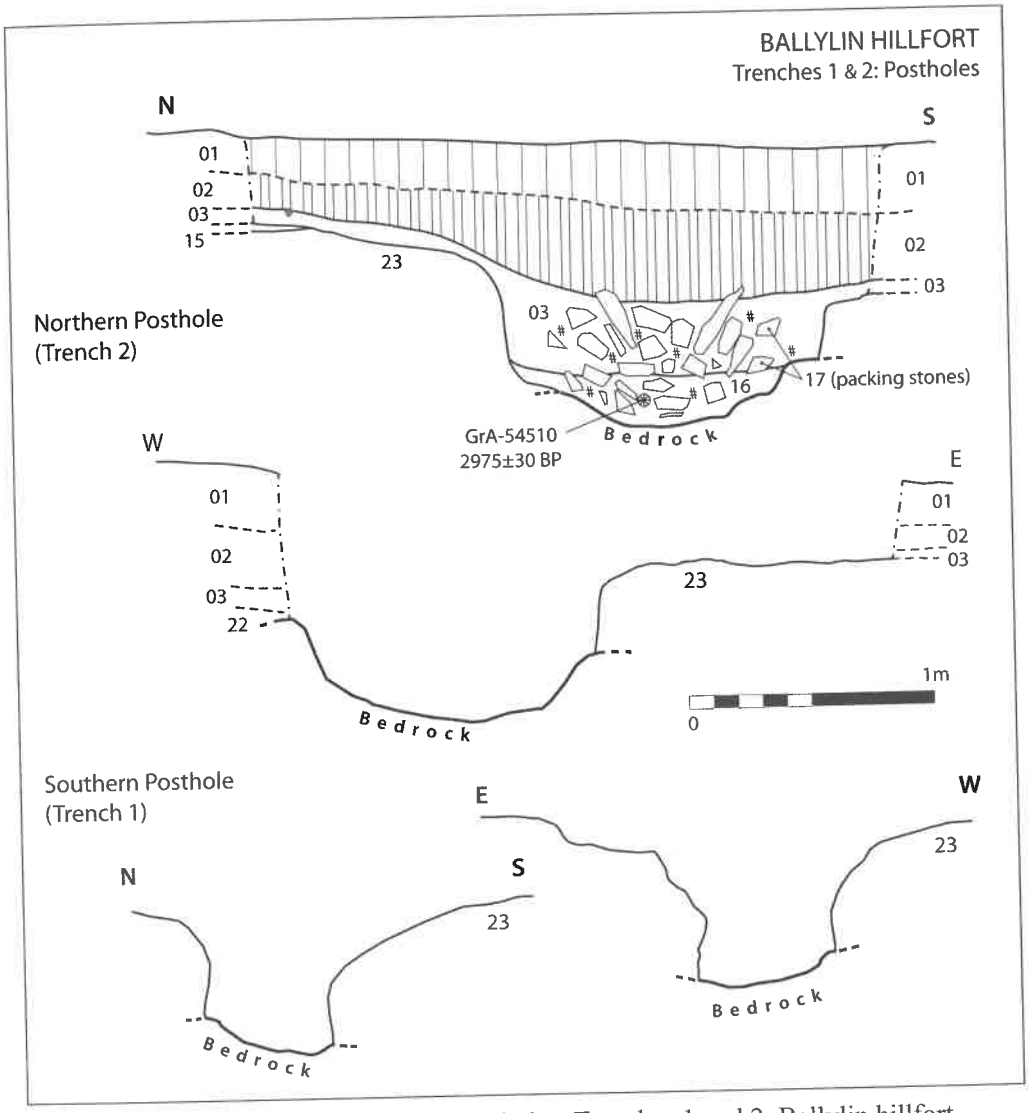


Fig. 7 Profiles across entrance postholes, Trenches 1 and 2, Ballylin hillfort.

base. The posthole measured 1.45m (north–south) by 1.33m, with a central depth of 0.6m (Fig. 7). It was dug through orange B-horizon (C.23), with the lower part cut into bedrock. The fill consisted of loose stony silt (C.16) with numerous flecks and small fragments of charcoal. It also contained 107 small to large sized stones (C.17) used as post packing. These stones were concentrated in the central area of the posthole, and the loose arrangement suggests they were displaced by removal of the northern gate post.

Occasional flecks of charcoal were found on the pre-peat gleyed surface (C.03) in the inner part of the entrance passageway. Three small concentrations were identified in the north-west corner of Trench 1, but there was no indication of a hearth or burnt surface. Charcoal from C.03, and from the old ground surface (C.22) under the bank slip (C.10), were sampled for radiocarbon dating (see below).

Table 1 List of excavation contexts, Trenches 1 and 2, Ballylin hillfort (summarised from O'Brien 2016).

Context 01.	Mid brown fibrous peat with blanket bog vegetation.
C.02.	Lower peat, dark brown/black, well humified and less fibrous than C.01.
C.02a	Lens of black peat, similar texture to C.02.
C.03.	Gleyed surface across trench; green/blue compact silt with charcoal flecks.
C.03a	Same as C.03, except looser with visible iron oxide enrichment.
C.04.	Gleyed surface of bank; thin layer of hard, dark brown, stony silt, with mottles.
C.05.	Dark brown stony silt along exterior edge of ditch; many small angular stones.
C.06.	Orange silt with grey mottles under C.05 on edge of ditch. Redeposited subsoil.
C.07.	Main fill of posthole (C.09); stony silt with broken stone and some charcoal.
C.08.	Packing stones from posthole (C.09); angular stones, 0.11–0.32m in length.
C.09.	D-shaped cut of southern posthole in subsoil, vertical sides and flat base.
C.10.	Dark brown stony silt; eroded from inner side and northern end of bank.
C.11.	Dark brown silt in upper part of bank; root-matted with some angular stones.
C.12.	Deposit of mid brown stony sediment under C.11 in upper part of bank.
C.13.	Green/light brown sandy silt under C.12 in lower bank, many angular stones.
C.14.	Orange/light brown silt forming lower part of bank; occasional rounded stones.
C.15.	Dark brown stony silt on north side of Trench 2; ditch upcast similar to C.05.
C.16.	Main fill of posthole (C.18); loose grey/brown stony silt, with some charcoal.
C.17.	Packing stones from posthole (C.18); angular stones, average length 0.12m.
C.18.	Sub-circular cut of northern posthole, steeply sloping sides to flat base.
C.19.	Thin deposit of stony silt on western slope of ditch; primary slip of bank.
C.20.	Thin deposit of stony silt at base of ditch; contained small angular stones.
C.21.	Cut of ditch (see main text for description).
C.22.	Spread of white/grey silt under bank slip, charcoal flecks; old ground surface.
C.23.	Orange, iron-enriched, stony silt forming B-horizon over broken bedrock.
C.24.	Patches of broken bedrock beneath B-horizon (C.23).

Excavation Results: Outer Enclosure

This investigation was conducted 205m south/south-west of Trench 1 on the southern side of the hillfort (Fig. 3). An 8m (east–west) by 3m (north–south) cutting (Trench 3) was excavated across the line of the outer hillfort enclosure (Fig. 8). This was visible before excavation as a 1.8m wide by 0.3m deep ditch, with a low bank (<0.4m high) on either side.

There was a continuous growth of blanket peat, ranging 0.55–0.6m in thickness at the western end to 0.25–0.3m on the eastern side of the trench (Fig. 9; Plate 6). As with Trench 1, this comprised an upper layer of mid brown, fibrous peat and surface vegetation (C.01), and a lower formation of more humified black peat (C.02). Removal of the peat exposed a thin gley surface (C.25) across the eastern end of the trench. This surface formed as a result of soil podzolization in acidic waterlogged conditions, leading to precipitation of iron oxides in the underlying stony B-horizon (C.36). It is notable that the B-horizon at the western end of the trench (C.38) was not visibly iron-enriched. The gley surface (C.25) was absent in that area, and instead there was a silt layer with a peaty texture (C.37). The reasons for this subsoil variation are unknown, but may be a consequence of impeded drainage due to the presence of the inner bank.

Excavation beneath both banks uncovered a thin layer of grey/white silt (C.35) representing an old ground surface pre-dating the hillfort construction. There was no charcoal

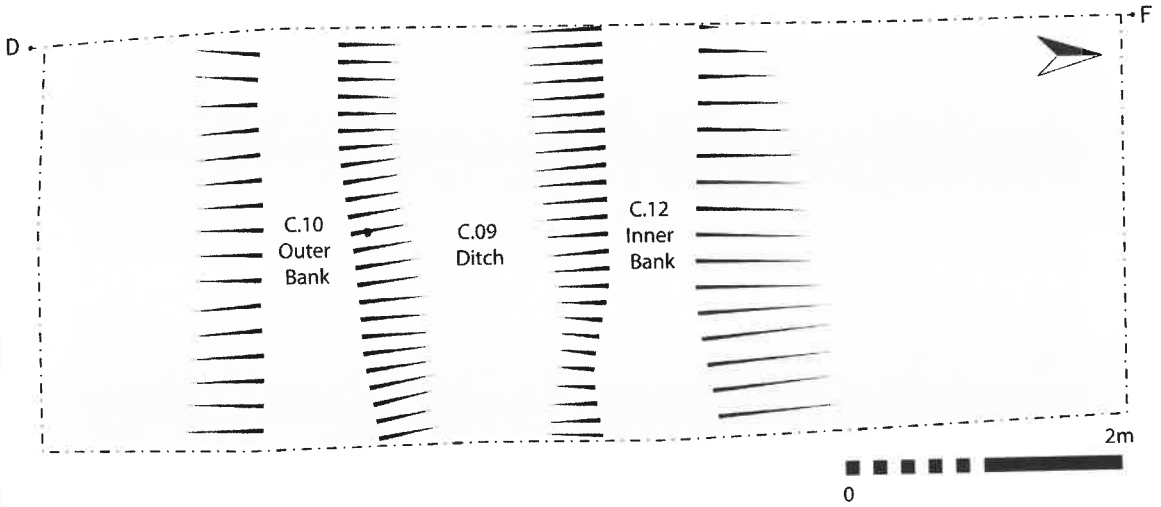


Fig. 8 Post-excavation plan of outer enclosing element, Trench 3, Ballylin.

nor any archaeological features visible in this surface. Outside of the banks, this surface had become incorporated into the gleyed layer (C.25) at the eastern end, and the peaty silt layer (C.37) at the western end.

Enclosing Elements

The archaeology of Trench 3 consists of a shallow ditch with low banks on both sides, but no other features (Fig. 8; Plate 6). The inner bank was 1.3m (southern side) to 1.6m (northern side) wide, with a central height (eroded) of 0.23m (southern end) to 0.35m (northern end). It was created using redeposited subsoil (C.34) extracted from the ditch, which was deposited on the old ground surface (C.35). The upper part of the bank had become gleyed, creating a hard surface (C.33). The core of the bank was mostly composed of soil, with only a few small stones. There is no evidence of a stone facing in this bank.

Excavation of a 2.9m length of the ditch across the centre of Trench 3 revealed it had steeply sloping sides and a rounded base. The ditch measured 1.4–1.8m in width, with a central depth of 0.85m from the modern ground surface. It was dug from the old ground surface (C.35) through the underlying subsoil (C. 36 and C.39). The base was formed by the latter, except along the eastern side where bedrock was exposed in places. There is no indication that the bedrock was quarried to any extent, which explains the absence of broken stone in the adjacent banks.

The fill sequence of this ditch began with a build-up of grey/white silt (C.30) from the weathering of C.39 along the lower ditch sides (Fig. 9). This 0.08–0.2m thick deposit of primary silt was followed by an inwash of iron-enriched silt (C.29), as well as slip from the exterior bank (C.26). It was followed by deposition of organic silt (C.28) that marked the transition from minerogenic to organic sedimentation. This culminated in the build-up of blanket peat in the ditch to a central thickness of 0.62m.

Excavation exposed a low bank of redeposited subsoil (C.32) bordering the exterior of the ditch (Fig. 8). This feature was 1.1m wide with a central (eroded) height of 0.15–0.17m. A low revetment of field stones (C.27), some 2–3 courses high, was built along a 0.3m wide ledge on the inner (western) side of the bank. A few of these stones were *in situ*, but most had fallen into the ditch.

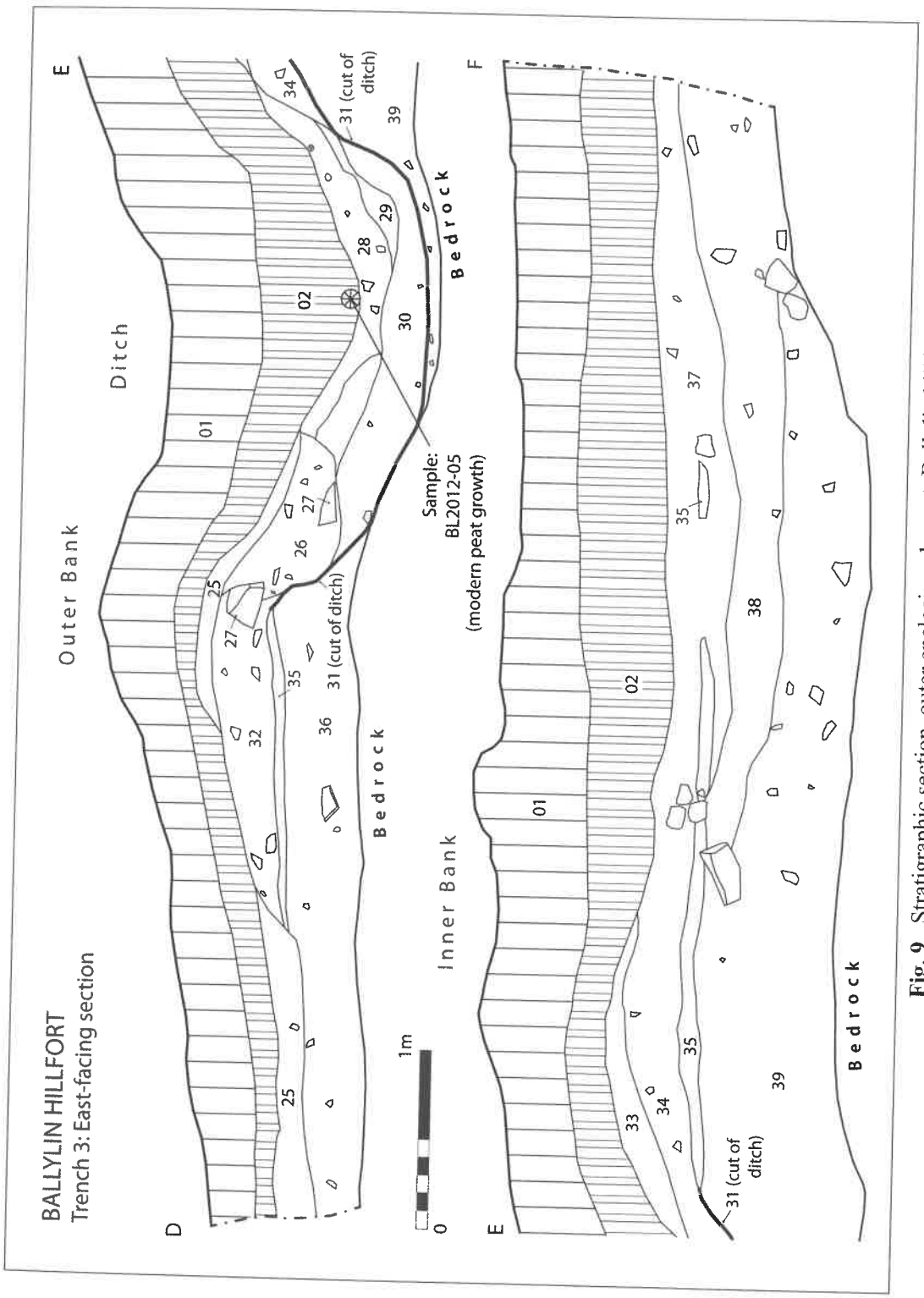


Fig. 9 Stratigraphic section, outer enclosing element, Ballylin hillfort.



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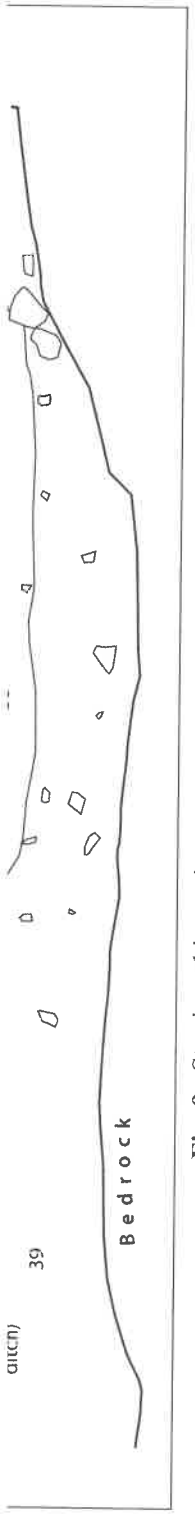


Fig. 9 Stratigraphic section, outer enclosing element, Ballylin hillfort.



Plate 6 Excavation of Trench 3 (looking south-east), showing ditch with low banks on either side (scale: 0.2m divisions).

Table 2 List of excavation contexts, Trench 3, Ballylin hillfort (summarised from O'Brien 2016).

C.25.	Hard gley at eastern end of trench; grey/light brown fibrous silt with rare stones.
C.26.	Dark brown silt with orange mottles on upper eastern side of ditch; bank slip.
C.27.	Deposit of 26 large stones along exterior slope of ditch; collapsed revetment.
C.28.	Inwash of mid brown silt under peat in centre of ditch; no stones or charcoal.
C.29.	Thin deposit of orange silt in lower ditch; inwash of fine sediment from bank.
C.30.	Compact grey/white silt with orange mottles, base of ditch; primary inwash silt.
C.31.	Cut of ditch (see main text for description).
C.32.	Compact light brown mottled silt; redeposited subsoil forming outer bank.
C.33.	Upper gleyed surface of inner bank; 0.02–0.06m in thickness.
C.34.	Compact grey/brown silt (green tinge) forming the main layer of inner bank.
C.35.	Thin layer of grey/white fine silt under both banks; old ground surface.
C.36.	Compact orange stony silt across east end of trench; iron-enriched B-horizon.
C.37.	Light brown peaty silt underlying peat (C.01/02) at western end of trench.
C.38.	Mid brown silt, with some stones; B-horizon subsoil, west end of trench.
C.39.	Layer of grey stony fine silt, west end of trench; C-horizon over bedrock (C.24).

Finds and Dating

No artifacts were recovered, and so the dating of the excavated features must rely on the radiocarbon method. Seven samples were submitted for AMS radiocarbon dating to the Centre for Isotope Research, University of Groningen. The sample details and results are as follows (calibration based on OxCal v.4.2.4; 95.4% confidence):

Trenches 1 and 2 (inner enclosure entrance)
Sample BL2012-01: Charcoal from fill of northern gate posthole (C.16). Wood species: oak.
GrA-54510; 2975±30 BP. Calibrated to 1368–1059 BC.

Sample BL2012-02: Charcoal from pre-bank surface (C.22). Wood species: hazel.
GrA-54599; 2930±50 BP. Calibrated to 1279–980 BC.

Sample BL2012-03: Peat sample from base of peat infill in ditch of inner hillfort enclosure.
GrA-54600; 1750±45 BP. Calibrated to 141–393 AD.

Sample BL2012-04: Charcoal from passageway of inner enclosure entrance (C.03). Wood species: willow.
GrA-54616; 2915±45 BP. Calibrated to 1258–979 BC.

Comment: Radiocarbon dates are available for three significant contexts in the entrance of the inner enclosure. These include similar results for charcoal found beneath bank slip (GrA-54599), in the northern post-hole (GrA-54510), and in the entrance passage (GrA-54616) of Trench 1. Taken together, the three results indicate a calibrated date range of 1258–1059 BC for the hillfort entrance. While the source and 'own age' of the charcoal is unknown, some connection is likely to the occupation, and possibly construction, of this hillfort. The calibrated date range of 141–393 AD for peat growth in the lower ditch (GrA-54600) indicates a time when the hillfort was probably abandoned.

Trench 3 (outer enclosure ditch)
Sample BL2012-05: Peat sample from base of peat infill in ditch of outer hillfort enclosure (east-facing section).
GrA-54953; 118.8±0.4% Act. C.

Comment: At first glance, this radiocarbon result points to peat growth in the modern era. This is unlikely as the sample was taken at a depth of 0.65m in the ditch. The most likely explanation is that the peat sample was contaminated by root penetration, and so the result should be discarded.

Augered peat samples
Sample BL2012-06: Peat from lower part of inner enclosure ditch (0.7–0.75m below modern ground) on north/north-west side of hillfort.
GrA-54954; 915±30 BP. Calibrated to 1030–1189 AD.

Sample BL2012-07: Peat from lower part of outer enclosure ditch (0.7–0.75m below modern ground) on the north/north-west side of hillfort.
GrA-54955; 315±30 BP. Calibrated to 1484–1648 AD.

Comment: These peat dates provide broad *terminus ante quem* age ranges for the hillfort ditches. The GrA-54954 result confirms the ditch of the inner enclosure is likely to be pre-medieval. GrA-54955 confirms the ditch of the outer enclosure must pre-date the sixteenth century AD. These results are of limited value, as it is likely that both samples were contaminated by later root penetration.

Discussion

Based on current knowledge of Irish hillforts, Cody (1981, 79) proposed an Iron Age date (500 BC– 500 AD) for Ballylin. In that context, the presence of what he regarded as internal ditches around both enclosures was significant, drawing comparisons with various 'royal sites' of the Iron Age, such as Ráth na Ríogh, Tara, Emain Macha (Navan Fort), Co. Armagh, and Dún Ailinne, Co. Kildare. This is not supported by the recent investigation at Ballylin, which confirms the site is earlier than those Iron Age enclosures, and should not be regarded as an internally ditched enclosure.

Ballylin Hillfort

The 2012 excavation yielded important information on the defences of the hillfort and one of its original entrances. Both enclosing elements were similar, comprised of a shallow ditch with a low bank on either side, and no indication of wooden fencing.

The ditch of the inner enclosure was the larger of the two, averaging 3.5m wide and 0.9m in depth. It consisted of a wide shallow trench with sloping sides and a flat base. The significance of a narrow rock-cut channel along the base is unclear, but it would have been too shallow to serve as a footing trench for fence posts. The regular shape suggests a drainage feature, however it is difficult to understand how this would have been effective at the bottom of a ditch, unless connected to the collection of drinking water in a sump feature located outside the excavation area.

The soil and broken rock extracted from the ditch was piled on the inside to create a low bank, now *c.*2m wide and 0.35m high. The absence of a significant amount of bank slip at the base of the ditch suggests that this feature was not significantly higher when first built. The same material was used to raise the northern and eastern edges of the ditch, in what might be termed an outer bank. The excavation of both bank features did not reveal evidence of palisade posts or other fencing features.

The ditch of the outer enclosure was only around 1.9m wide by 0.85m deep, with the low bank on either side not exceeding 0.35m in height. As the overall height of the enclosure was only 1–1.2m from base of ditch to top of the inner bank, this did not constitute a functional barrier in the sense of a fortification or animal enclosure. Despite their slight nature, the construction of these enclosures was labour intensive. The inner enclosure has a perimeter of 1.01km, the outer enclosure 1.65km, giving a combined length of some 2.65km of earthworks. The techniques used in the construction of this earthwork are unknown. This was a laborious process involving digging with wood and/or bone implements, none of which were found during excavation. There were no tool marks or traces of fire-setting on the bedrock surfaces of either enclosure ditch.

Excavation revealed important details about the entrance to the inner hillfort enclosure. This took the form of a narrow ditch causeway leading to a 5.5m wide opening in the bank. Two large postholes, spaced 2.2m apart, may have held posts for a wooden gate. The presence of packing stones in both pits indicates that they once held upright posts. The northern posthole (C.18) was significantly larger than its southern counterpart, which might indicate a larger post used to hang a gate. That said, it is difficult to see how a gate would have been functional with no palisade in the adjacent banks. As an alternative, upright posts may have been used to formally mark the hillfort entrance without any need for a gate. Whatever structure was used, the absence of post-pipes from *in situ* decay, or significant amounts of charcoal from burning, together with the jumbled arrangement of packing stones, indicates these posts were removed.

The excavation did not uncover evidence for the occupation of this hillfort, apart from some charcoal deposited at the entrance to the inner enclosure. No artifacts, food residues

or structural remains were found. This is due to the limited area excavated. There is no information on the abandonment of the hillfort or its subsequent history. The former is represented by the deliberate removal of two wooden posts at the entrance to the inner enclosure, and by the uninterrupted growth of blanket peat in the hillfort ditches.

Wider Landscape

Some general observations may be made on the cultural landscape context of Ballylin hillfort. Today, the site overlooks an area of fertile farmland to the east, a farmscape of small and large fields used mostly for cattle pasture. It is likely there have been considerable changes to this lowland environment over the past 3000 years, brought about by deforestation, land drainage and soil improvement connected to agriculture. This would have resulted in the destruction of many prehistoric settlements and ritual monuments, some of which may have been contemporary with the hillfort.

While pollen records are not available for the Ballylin area, Plunkett (2006) has presented results from a small bog at Moyreen, 7km to the north-west of the hillfort. There are indications there of intensified agriculture during the twelfth and eleventh centuries BC, at a time of fluctuating climatic conditions. Plunkett suggests this agricultural activity at Moyreen might be connected to a concentration of settlement in the hinterlands of Ballylin, an interpretation supported by the new dating evidence for the hillfort. She also observed a reduction in arable agriculture at Moyreen during the tenth century BC, corresponding to an apparent deterioration of climate (Plunkett 2006, 66, fig. 3).

There are few recorded sites or monuments of Bronze Age date in the environs of Ballylin hillfort. The *Record of Monuments and Places* for Co. Limerick lists 14 archaeological monuments within one kilometre of the hillfort. These include seven ringforts that are likely to be Early Medieval, and three enclosures of unknown age, but also possibly later than the hillfort. There is an unclassified (and undated) barrow (LI028-178) at the summit of a hill in Dunganville Upper townland, 1.25km to the south/south-west of the hillfort. Aso significant is a RMP record of four *fulachtaí fia* (LI028-087, LI028-089, LI028-174 and LI028-175) on the southeastern slopes of Ballylin hill. These water-boiling sites have a long chronology, with the majority now dated to the Bronze Age (Hawkes 2014). One of the Ballylin examples (LI028-174) was excavated in the 1980s, in the course of reclamation of fields directly below the hillfort (Fig. 3). There are no details available, though a radiocarbon analysis of 3400±60 BP (Grn-13153) was obtained for charcoal from one of three troughs at the site (information in Brindley *et al.* 1989/90, 7). The result is calibrated to 1881–1534 BC, placing this burnt mound in the Early Bronze Age, several centuries older that the nearby hillfort.

While no Bronze Age settlements are recorded close to Ballylin, a number were excavated on the 2002 Bord Gáis *Pipeline to the West* project (Grogan, O'Donnell and Johnston 2007). These include two structures of possible Late Bronze Age date at Ballincurra (*ibid.*, 238), and Middle Bronze Age occupation at Kiltenan South (*ibid.*, 289–90) and Knockuregare (*ibid.*, 293–7). A roundhouse dated 1620–1461 BC is recorded at Garryduff near Newcastle West. While this pre-dates Ballylin hillfort by several centuries, there are dates of 1381–1132 BC and 1371–1060 BC for two burnt mounds excavated at the same location (Delaney 2014). These are just some of a number of Middle and Late Bronze Age sites discovered in development-led archaeology projects in Limerick in recent years. Older excavations include the two enclosures excavated in 1974 at Aughinish Island, which are associated with coarse ware pottery and bronze metalwork of the Dowris phase (Kelly 1974). Bronze Age settlements are recorded at Lough Gur, including the Circle K and L enclosures (Grogan and Eogan 1987; Cleary

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2003), with occupation also of unenclosed house sites on Knockadoon (Ó Ríordáin 1954; Cleary 1995).

A review of published catalogues of swords (Eogan 1965), bronze hoards (Eogan 1983), gold (Eogan 1994) and socketed axeheads (Eogan 2000) of Middle to Late Bronze Age date does not indicate many significant finds within a 5km distance from the hillfort. This cannot be taken at face value, as such records are heavily influenced by circumstances of discovery and recording, as well as by the original depositional practices. Grogan (2005b, fig. 4.5) lists several examples of bronze metalwork in the general vicinity of Ballylin. These include a flanged axehead from Ardagh 2km to the east; while 5km to the north-east there are records of a rivet-hole spearhead from Ballynamuddagh, a socketed axe from Coolcappagh, and a chisel from Ballyneety (Fig. 1). The Ardagh axe is likely to pre-date Ballylin hillfort, while the other objects could be contemporary or slightly later in the Bronze Age. There is an apparent concentration of Middle to Late Bronze Age metalwork in the Oldabbey area near Shanagolden, 7km to the north of Ballylin, where a palstave, two socketed axeheads, and a socket-looped spearhead, among other objects were found in a bog (Eogan 1965, 72; Eogan 2000, 77).

There are no hoards of Middle or Late Bronze Age metalwork recorded in the vicinity of Ballylin. The most significant find is from Tooradoo, 16km south-west of the hillfort close to the Kerry border (Eogan 1983, 104, fig. 58a). This contains four penannular 'hair rings' of lead covered by gold foil, four plain bronze rings, two bronze rings with buffer-shaped projections, a lignite bead, and a necklace of 105 graduated amber beads. The Tooradoo hoard is likely to be Dowris phase (900–750 BC), and so probably later in date than Ballylin, though this is not certain as the full chronology of the hillfort occupation is not known. The absence of Bronze Age goldwork in the area is notable, though a bar-twisted gold torc (National Museum of Ireland SA1926:49) of Bishopsland Phase is recorded from Cooltomin, 7km north-east of the hillfort (information: Mary Cahill).

These discoveries suggest that Ballylin hillfort was probably part of a settlement landscape that included small farm holdings with roundhouses, *fulachtaí fia* used for feasting on special occasions, and monuments such as barrows and standing stones connected to funerary practice. The relationship of these different site types has been explained in terms of stratified societies corresponding to a hierarchy of settlement organization, at the apex of which is the hillfort (Grogan 2005b). It is not possible on present knowledge to advance a similar model for Ballylin hillfort. The radiocarbon result for a *fulacht fia* at Ballylin (see above) highlights the danger of assuming that prehistoric sites in proximity to the hillfort were part of the same settlement landscape.

Hillforts in Munster

Hilltop enclosure has a long history in Ireland, with different types of site dating from Neolithic to medieval times. The 'hillfort' is the best-known example, with approximately 100 recorded sites, which (Raftery 1972) classified as univallate (Class 1), multivallate (Class 2), and inland promontory forts (Class 3). Class 2 hillforts, such as Ballylin, are particularly interesting, as they are the largest prehistoric monuments in Ireland. They comprise two or three (rarely four) concentric enclosures, circular or oval in plan, spaced up to 100 m apart, and occasionally farther, along or across the natural contours of a hill or ridge, or on a cliff edge. The enclosing elements may include stone walls, earthen banks, ditches, as well as wooden fencing, used individually or in combination. There are as few as 23 confirmed or probable Class 2 examples, with 14 additional possible sites. These are distributed across Ireland, with a notable concentration in the north Munster/south Leinster region, including a well-known cluster in Baltinglass, Co. Wicklow.

Ballylin is the only prehistoric hillfort listed in the *Record of Monuments and Places* for Co. Limerick. A site at Lisbane, 6km to the north/north-east, listed as a hilltop enclosure (RMP LI019-127) is regarded by Raftery (1972) as a small Class 2 hillfort. Lisbane comprises two concentric oval enclosures, spaced 15–23m apart, with a overall diameter of 70m by 60m. Both enclosing elements consist of a single stone-faced earthen bank with a shallow external ditch (Westropp 1916–17, 29). The size and overall features of Lisbane question whether this is a prehistoric hillfort, comparable to sites such as Ballylin. The same is true of Dunganville Upper (LI028-086), 2km to the south of Ballylin, listed by Grogan (2005b, fig 4.7; table 7.6) as a hilltop enclosure, but possibly an early medieval ringfort. There are similar questions for sites in east Limerick, where the identification of hillforts at Rathcannon (LI039-029), Knockainy (LI032-139), Tory Hill (LI022-111001), and Friarstown (LI013-089 and LI013-094) remains uncertain (*ibid.*, table 7.1). A site that is likely to be of Bronze Age date is the inland promontory fort of Castle Gale (LI059A001) in Darragh More townland, Co. Limerick (Doody 2008, 540–1). Until such sites are excavated, Ballylin remains the only confirmed Class 2 hillfort in Limerick and, as such, is of particular significance for the Bronze Age prehistory of the region.

Class 2 hillforts are recorded at other locations in Munster. These include definite or probable sites at Clashanimud (CO096-034) and Carntigherna (CO035-049001) in Co. Cork; Glanbane, Co. Kerry (KE039-065); Formoyle (CL044-085) and Mooghaun (CL042-074001) in Co. Clare; Knigh (TN014-033002) and Curradobbin (TS079-024001) in Co. Tipperary. Other possible sites include Caherdrinny (CO019-097003) and Rath (CO067-001001) in Co. Cork; Knockanacuig, Co. Kerry (KE029-112001), and Liss, Co. Tipperary (TN034-070).

Recent excavation for this project confirms that Clashanimud hillfort was built 1214–1027 BC, while Glanbane between Killarney and Tralee was occupied 1118–929 BC. The same study revealed that Formoyle hillfort, near Broadford in south-west Clare, was occupied 1192–1004 BC. With Ballylin occupied 1258–1059 BC, this means that these four Class 2 hillforts in Munster were in use at various times during the twelfth and eleventh centuries BC (Fig. 10).

Attention must also be drawn to Mooghaun hillfort, on the other side of the lower Shannon estuary in south Clare. This is an impressive hillfort comprised of three concentric stone walls enclosing an area of 11ha. The excavator argued that the hillfort was built as a single design, most probably in the period 915–905 BC, preceded by activity around 925–915 BC with continued occupation to possibly 815 BC (Grogan 2005a, 240, fig. 7.10). Earlier activity is possible as there is a date of 1125–918 BC from the middle enclosure, with charcoal from under the outer bank dated 1255–917 BC.

Other parallels for Ballylin include the Class 2 hillforts excavated at Rathgall, Co. Wicklow (Raftery 1994), Haughey's Fort, Co. Armagh (Mallory and Baban 2014), Rahally, Co. Galway (Mullins 2008), and the sea cliff site of Dún Aonghasa on Inishmore, Aran (Cotter 2012). These sites represent similar power centres in other parts of Ireland, broadly contemporary with Ballylin in the later second millennium BC.

Significance of Ballylin Hillfort

The size and landscape setting of Class 2 hillforts represents a determined effort to create an imposing presence on the landscape. This is true of Ballylin hillfort with its striking location on the edge of a mountainous plateau overlooking the broad plains of central Limerick (Fig. 1). Whether the location is itself strategic in respect of a territorial boundary, or the control of movement across the landscape, is open to discussion. The size of

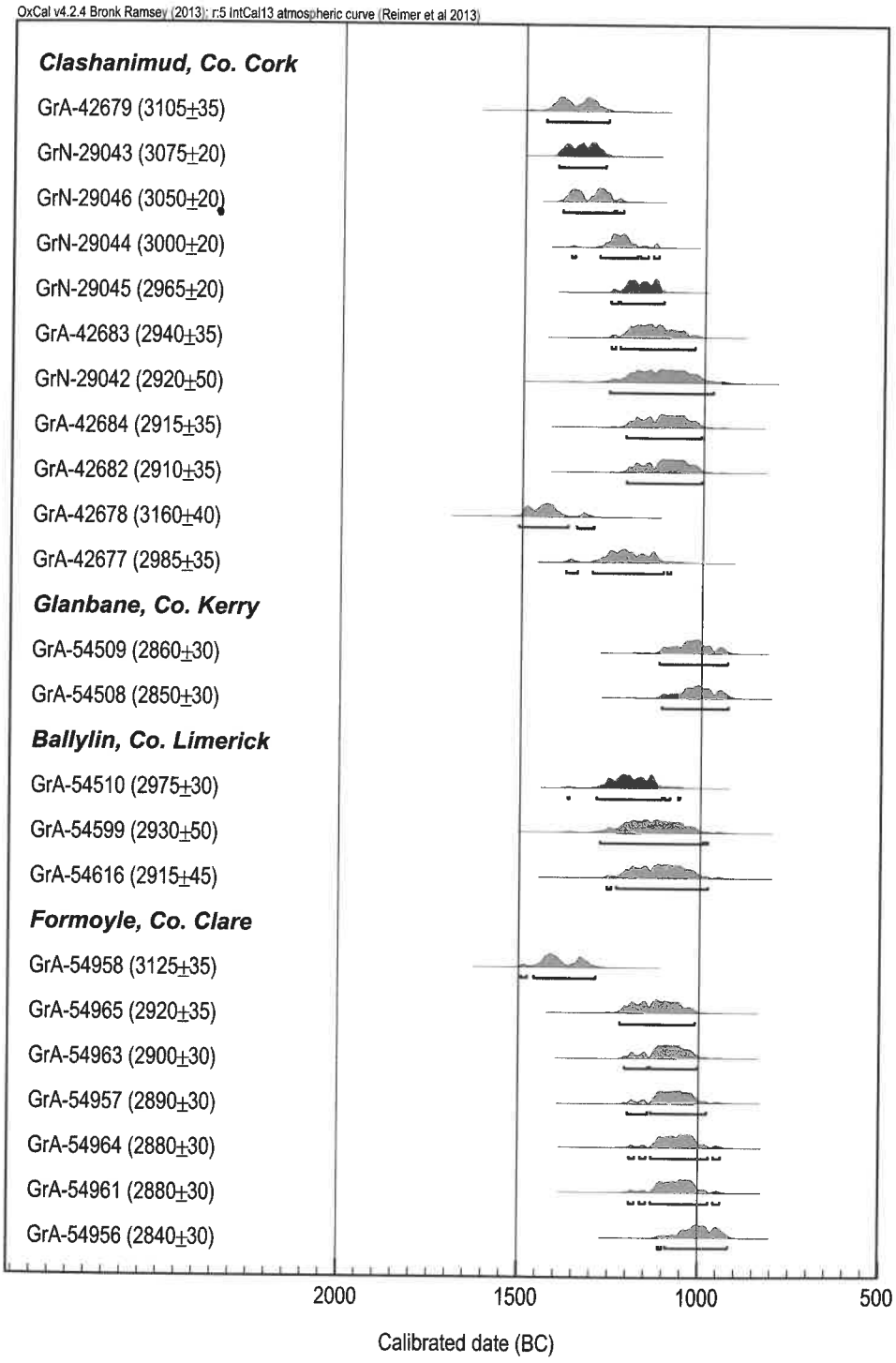


Fig. 10 Radiocarbon dates from Ballylin and other hillforts in Munster excavated in this project (calibration after OxCal v.4.2.4).

this hillfort must reflect some form of centralized leadership and a command of labour among the many small farming communities in the wider landscape.

As the name suggests, hillforts may have been built as defended strongholds or as refuge locations, but that is unlikely to be their sole purpose. Raftery (1994) questioned whether Ballylin should be seen as a 'fort', given the slight nature of the enclosing ditches. It would not be easy to defend such a large perimeter, though obviously this would depend on the number of warriors available for that purpose. The military role of Class 2 hillforts such as Ballylin may have been to deter and intimidate, where the imposing presence of the hillfort was a constant reminder of the power of that particular group and place. The use of multiple enclosures may represent a separation of activities rather than a layered defence strategy. One possibility is that the outer enclosure(s) was used for stockading livestock, with the innermost enclosure fortified for human protection. That seems to have been the case at Clashanimud hillfort in Cork, but is less certain in the case of Ballylin, where the defences of both enclosures are comparatively slight.

As in other parts of Europe, the construction of the hillfort in Ireland was partly connected to political instability, real or perceived threats, and a consequent need for security. A concern with security is manifest in other types of protected settlement during the Middle and Late Bronze Age, where banks and ditches, wooden fences and stone walls, were used to protect small farmsteads (Waddell 2010, 213–232). This coincided with the earliest use of the sword in Ireland around 1300–1100 BC, part of a new warrior culture with origins on the Continent (Thorpe 2013). The militarism of that era can be linked to a climate of territorial disputes and competition, where the aggrandizement and ambitions of warlords led to recurring warfare, often with catastrophic consequences for individual hillforts. This is evident at such hillforts as Clashanimud, Co. Cork, Toor More, Co. Kilkenny, and Rathnagree, Co. Wicklow, the burning of which provides an insight into the regional wars of the later Bronze Age in Ireland.

While the term itself emphasizes their defensive character, it is generally agreed that hillforts had a broader significance connected to the symbolic importance of the place. This may have been connected to high-status residence and seats of power, and their use as ceremonial centres and places of assembly, trading posts and food stores. None of the different 'functions' of hillforts are mutually exclusive, and while there has been much discussion on the defensive versus symbolic dimensions, it is recognised that these sites held many different layers of meaning for their builders and for later generations. The history of individual hillforts is contingent on unique cultural forces and historical events, which explains the variability among sites of differing age, function, and occupation history. To understand this further in the case of Ballylin would require large-scale excavation of the hillfort.

Conclusion

The aims of this investigation at Ballylin hillfort were achieved, namely to investigate the form and construction of the defences, and to recover dating evidence. The radiocarbon results indicate that the inner enclosure of the hillfort was built in or around the twelfth century BC, during the transition from the Middle to Late Bronze Age in Ireland. No evidence was found for human activity pre-dating the hillfort, or of later occupation. The date of the outer enclosure was not established, which means it is not certain whether the two enclosures were built as part of the same design or at different times.

The emergence of the Class 2 hillfort *c.*1400–1100 BC coincided with a strengthening of regional identities across Ireland. Sites such as Ballylin may be explained in terms of emergent chiefdoms controlling large territories, where the hillfort was a centre for high-

status residence, ceremony and assembly. While there is much variability in how these prominent places were used, they do seem to have been an important part of the visual display of power in Bronze Age Ireland. Ballylin hillfort is best understood as the central place of a chiefdom polity that controlled large parts of central and west Limerick around the twelfth century BC – a place of assembly and ceremony, of authority and rule.

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