

**N18 Oranmore to Gort Archaeological Survey and Excavations
Contract**

Ministerial Directions Number A045

Site Registration Number E4801

**Final Excavation Report for a Sub-circular Structure with
Cereal Kilns at Toberbrackan**



Project Name	N18 Oranmore to Gort Archaeological Survey and Excavations
Ministerial Directions No.	A045
Site Registration No.	E4801
Townland name	Toberbrackan
Site Type	D-Shaped enclosure, structure, kilns and associated field systems
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Excavation Director	Finn Delaney
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Project Archaeologist	Jerry O'Sullivan

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Summary

The excavation and survey at Toberbrackan confirmed the presence of a D-shaped enclosure and an associated field system along with a smaller attached structure with at least two phases of construction. Two large cereal-drying kilns were revealed within the structure and some ridge-and-furrow cultivation was identified within the D-shaped enclosure. The excavation distinguished a stratigraphic relationship between the two kilns and the rebuilt section of the structure wall, however, it did not establish a direct stratigraphic relationship between the kilns and the original structure, between the structure and D-shaped enclosure or between the D-shaped enclosure and the field boundary walls. Based on construction details and spatial characteristics, a best fit sequence of activity has been proposed. A number of deposits possibly relating to the use of both kilns were identified. Five early medieval radiocarbon dates were obtained from hulled barley recovered from samples taken during the excavation. Four chert/flint fragments (E4801:3:2, E4801:3:6, E4801:21:1, and E4801:24:2) and two rubbing stones (E4801:3:1 and E4801:3:10) were recovered along with numerous fragments of burnt clay. One coin (E4801:3:4), a corroded nail fragment (E4801:18:1), one sherd of green glass (E4801:3:5) and animal bone fragments were also recovered during the excavation.

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Introduction

Description of scheme

The N18 Oranmore to Gort (Glenbrack to Rathmorrissey) national road scheme was approved by An Bórd Pleanála on 7th June 2007. The development will consist of approximately 27 km of roadway and all associated works. The area of archaeological investigations lies within the footprint of the proposed scheme as defined by the Compulsory Purchase Order (CPO) published by Galway County Council on 1st August 2006.

Topography, geology & hydrology

The underlying geology in the surrounding area is Carboniferous limestone of the Burren and Tubber formations bordered by Namurian shales and sandstones to the west in Clare and Devonian old red sandstone to the east in the Slieve Aughty uplands. Glacial till overlies the bedrock to varying depths (0–5 m) and the soils derived from the till are generally shallow brown earths. The topsoils are characteristically thin and dry but, enriched by the limestone parent material, support moderately good grass pastures. There are boulder fields and expanses of bedrock exposure typical of karst limestone country.

Some areas of low-lying grasslands, peat bogs, eskers, low rounded drumlins and karst limestone landforms are located within the road corridor. The height above sea level varies from less than 10 m to 40 m OD.

Turloughs and swallow-holes are features of areas with an underlying karst limestone bedrock which enables the ground water and water table to produce sometimes perplexing drainage systems.

Cultural landscape

The Archaeological Inventory of County Galway lists over 7100 known monuments (Conroy 1988, OPW 1993, 1). South County Galway contains a high proportion of the total number of sites recorded in the county overall.

There has most likely been continuous settlement in south County Galway since the end of the last glaciation. There are some examples of Neolithic tombs, and a possible Neolithic settlement site, which produced some lithic artefacts and pottery, was excavated by IAC Ltd at Rathwilladoon further south on the N18 from Gort to Crusheen. There is a high concentration of Bronze Age barrows in east Galway and numerous examples of burnt mounds in the vicinity of this road scheme. Early medieval ringforts and cashels are the most numerous monument type in this landscape and are recognised in placenames by the elements *lios*, *rath*, *caher* or *dún*. The Uí Fiachrach Aidhne were the dominant clan or faction in early medieval south Galway until the establishment of the Hiberno-Norman Lordship of Connacht by Richard de Burgo in the 1230s.

Following research, surveys and test excavations during Phase 1 of the current scheme a total of 22 archaeological sites within the road corridor were identified for excavation at Phase 2. The sites produced evidence that indicated human settlement in the south Galway region possibly from the Early Mesolithic up to the post-medieval and modern periods. The Mesolithic and Neolithic evidence was restricted to stone tool finds found on sites dating to later periods. The excavated sites included: 12 Bronze Age burnt mound sites, an early medieval cashel, two destroyed early medieval cashels and six post-medieval sites including tenant farmsteads, a clachan, a well and a lime kiln.

The townland of Toberbracken lies within the barony of Dunkellin and the civil parish of Killeely. It is a small townland to the east of Claringbridge which is described in the Ordnance Survey name books as having poor gravelly soil. The same source records the proprietor as being a Patrick Skerrett from Loughrea. The river Claran forms the northern boundary of the townland and the fair green marked on the Ordnance Survey maps is recorded by Lewis (1837, 577) as being the site of a fair in May and October. The October fair seems to have been dedicated to the buying and selling of turkeys. The townland is located between the landed estates of Lavally and Kilcornan. The small village of Toberbrackan is marked on the first edition Ordnance Survey map as a series of buildings straddling the north/south roadway in the south western corner of the townland.

The origin of the name Toberbrackan is associated with the site of a holy well and can be directly translated as the 'speckled well'. Lewis (1837) gives the translation as the well of the trout. Joyce (1867, 484) records that the stem *broach* signifies 'the haunt of badgers', which would give a translation of the 'well of the badgers'.

A number of recorded monuments are located in relatively close proximity to the newly identified site (Fig 1). A *leacht cuimhne* (GA095:077) or memorial stone is mounted on a plinth of mortared limestone rubble by the entrance to Lavally demesne. The tablet, dated 1712, commemorates some members of the Lynch family – one of the leading 'tribes' of medieval and early modern Galway (Blake 1918) – and may originally have been set by their house at Lavally or in a niche or opening in a demesne wall. The designed landscape around Kilcornan estate to the west is also a recorded monument (GA095:055).

The site of a tower house (GA095:145:001) located on rock outcrop and covered in woodland scrub 300 m to the south-west of the newly identified site is also a recorded monument. All that remains is the fragment of one wall protruding from a mound of rubble. The tower house was a seat of the O'Heynes and O'Donovan recorded in 1839 that 'nothing but a green mound now remains to indicate the site of Toberbrackan Castle' ('Letters' in Flanagan 1928). O'Donovan also recorded that this was one of three castles in the parish of Killeely that had been built by the Earl of Clanrickard, the others being in Lavally and Dunkellin. The site of a holy well and the eponymous *toberbrackan* is located close to ruins of the tower house.

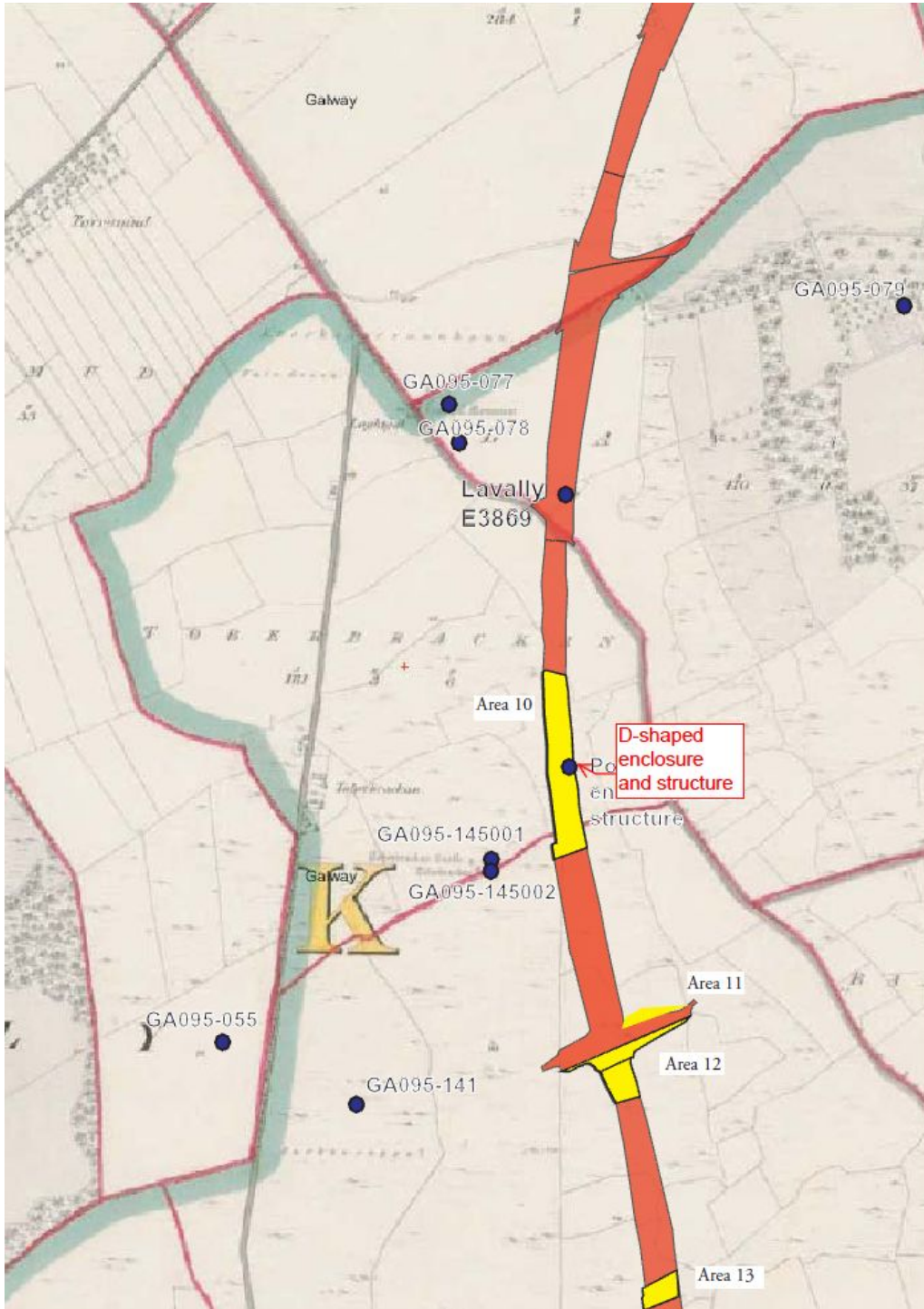


Figure 1 First edition Ordnance Survey map of Toberbrackan townland overlaid with the route of the proposed road, the RMP sites and the excavated sites

The well (GA095:145:002) is heavily overgrown but it is clearly a substantial masonry structure with a water-filled cavity below. This may have been the main well of the castle and is unlikely to have had any religious associations but may have had a longer use into antiquity. There is a *leacht cuimhne* or memorial stone plaque laid against the outer wall of the well. This is similar to the example described at the entrance to Lavally demesne but is an older example and is dated 1643. Again, it commemorates several members of the Lynch family, a leading Galway tribe.

The prehistoric period, in particular the late Neolithic and Early Bronze Age, is represented by a number of sites and stray finds found in the vicinity of the enclosure at Toberbracken. A Bronze Age presence in the area surrounding the newly identified site is highlighted by three stray finds recorded in the National Museum of Ireland's Topographical files: a stone mould for a spearhead is recorded from Toberbracken, a bronze halberd is recorded from Lavally and a Bronze age food vessel is recorded from a cist burial in Moyveela. The cist burial (GA095:152) was excavated by the National Museum in 1928.

Four burnt mounds were excavated in Moyveela and Ballinillaun during Phase 2 of the archaeological works associated with the scheme (Moyveela 1 E3883, Moyveela 2 E3884, Balinillaun 1 E3888 and Balinillaun 2 E3883). These excavations revealed Bronze Age dates and are another indicator of Bronze Age activity in the area.

Two wedge tombs from the Late Neolithic period are located in close proximity to the newly excavated site. The wedge tomb in Lavally (GA095:078) lies 540 m to the north-west and the example in Roevehagh lies 850 m to the south-west. Wedge tombs are the last in the sequence of Neolithic megalithic tombs and were constructed between 2300 – 2000 BC. They have a significant western distribution and there are notable groups of 'wedge tombs' of late Neolithic/early Bronze Age date on Slieve Aughty and the Burren. A study by Carleton Jones (1998) of the largest concentration of wedge tombs in the country, on Roughan Hill in the Burren, linked the wedge tombs to a series of farmsteads and field boundaries indicating an upstanding Bronze Age settlement pattern stretching across Roughan Hill. The settlements were distinguished by kidney-shaped enclosures with associated structures and field boundary walls.

Site Description

In advance of site clearance work a D-shaped enclosure, a smaller adjoining structure and two related field boundaries were identified by the monitoring archaeologist at Toberbrackan/Roevehagh (CH 7200 - 7700, NGR 144308, 221428 / 144367, 220943) (Fig 2). This was in an area which was excluded from earlier archaeological investigations due to the overgrown nature of the ground and the protruding karstic limestone bedrock. The location of the site was brought to the attention of the site engineer and the two tracked machine drivers who were clearing the trees and scrub. The area was avoided and the site was left undisturbed by the clearance work.

The D-shaped enclosure is located in a natural hollow on the eastern edge of the scheme footprint (Ch 7450 and NGR 144337,221178) (Fig 3). The site is located at 16 m OD. The general area is covered in a mature hazelwood mixed with other trees and bands of blackthorn, gorse and scrub. The limestone bedrock is never far from the surface and areas of limestone paving abound. Immediately south of the site there is an open area of very rough grazing and limestone rock outcropping. Sometime prior to the site clearance work the hazelwood covering the site had been cleared of the larger mature ash trees which may have aided the identification of the site. A thin covering of humic rich topsoil had accumulated in the natural hollow.

The site is located 250 m to the north of the townland boundary between Toberbrackan and Roevehagh and 160 m to the east of a tertiary road which marks the boundary between Toberbrackan and Lavally.

Methodology

An excavation area measuring 610 sqm, covering the D-shaped enclosure and smaller southern structure, was cleared of trees, scrub and overgrowth and the loose leaf litter and moss covering was removed (Plate 1). A 5 m grid was laid out across the excavation area, and was subsequently tied into the Irish national grid. A topographic survey of the surrounding area was undertaken and all the field boundaries were mapped.

The enclosure and structure were excavated by hand and recorded using the single-context recording system with plans and sections being produced at a scale of 1:20 or 1:10 as appropriate. A complete photographic record was maintained throughout the excavation.

All the archaeological deposits were sampled and all the finds and animal bone were recovered and treated appropriately.

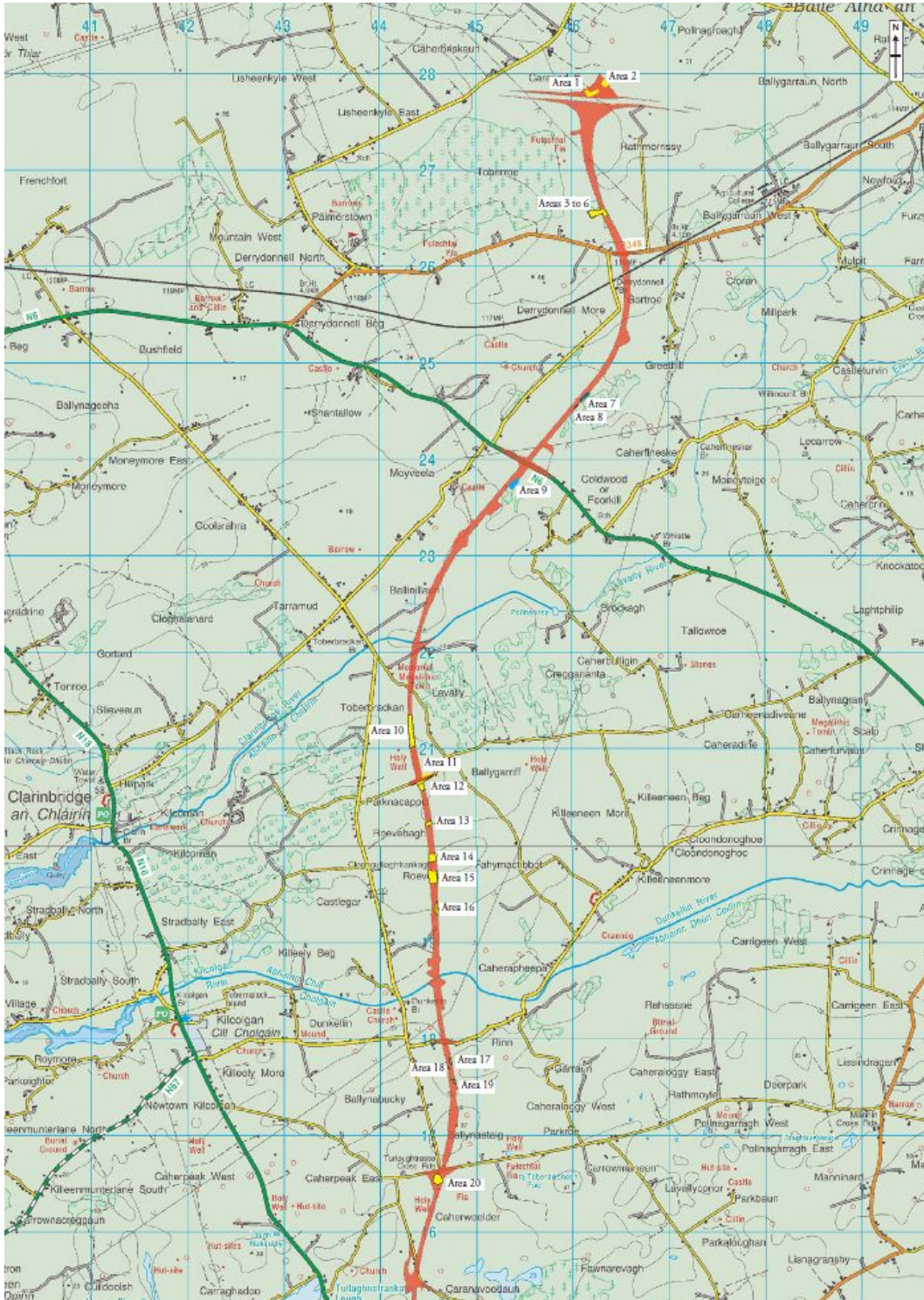


Figure 2 Map based on the Discovery Series Ordnance Survey mapping showing Area 10, where the site at Toberbrackan was located

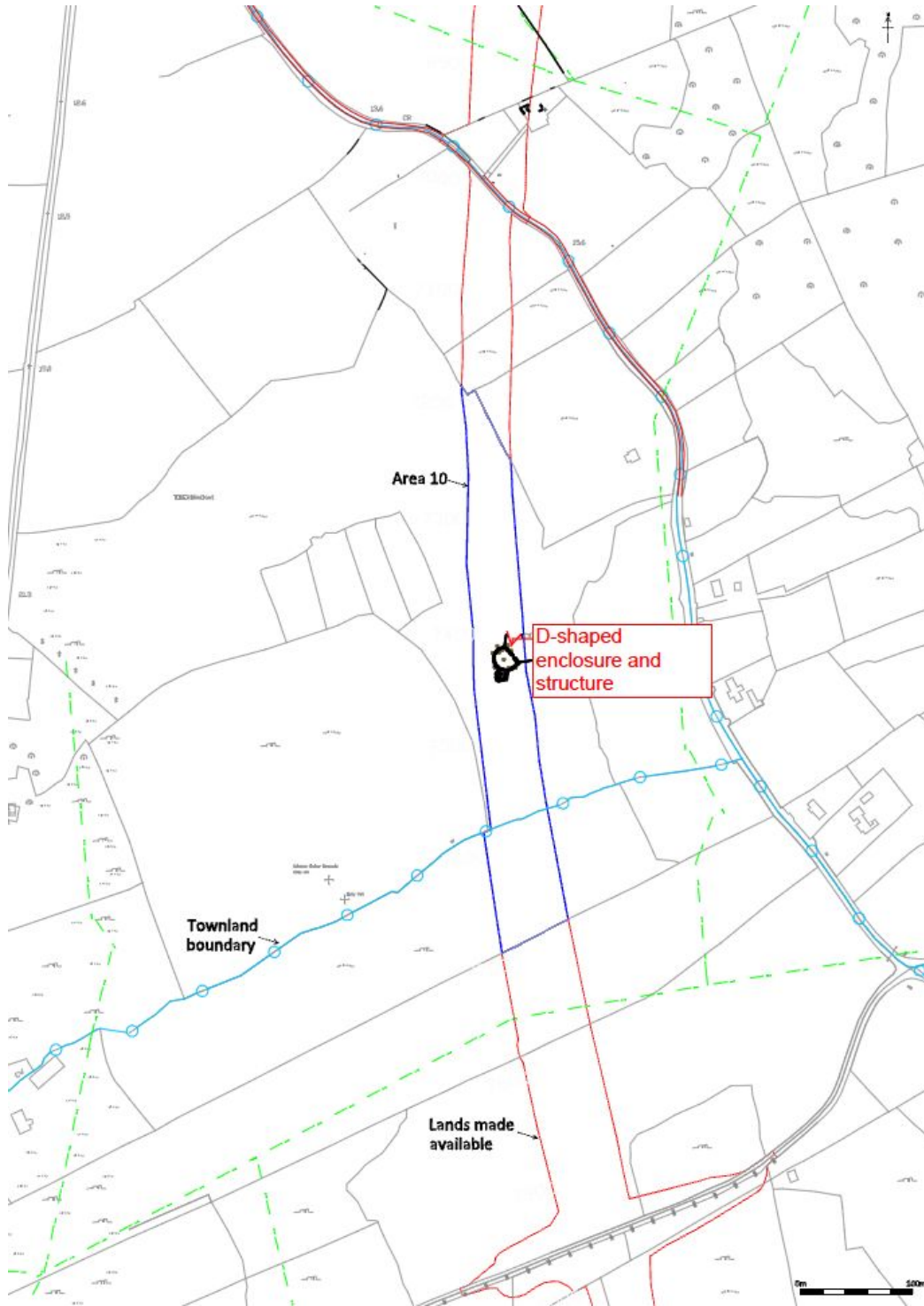


Figure 3 Location of the excavated site overlaid on the most recent Ordnance Survey mapping (2005)



Plate 1 Looking east across the site after initial tree clearance and cleaning

Results

The excavation and survey at Toberbrackan confirmed the presence of a D-shaped enclosure and an associated field system along with a smaller attached structure with at least two phases of construction. Two large cereal-drying kilns were revealed within the structure and some ridge-and-furrow cultivation was identified within the D-shaped enclosure (Figs 4 and 5). The excavation distinguished a stratigraphic relationship between the two kilns and the rebuilt section of the structure wall, however, it did not establish a direct stratigraphic relationship between the kilns and the original structure, between the structure and D-shaped enclosure or between the D-shaped enclosure and the field boundary walls. A best-fit sequence of activity has however been proposed based on construction details and the spatial characteristics and interrelatedness of the excavated features. A number of deposits possibly relating to the use of both kilns were identified. Five early medieval radiocarbon dates were obtained from hulled barley recovered from samples taken during the excavation. Four chert/flint fragments (E4801:3:2, E4801:3:6, E4801:21:1, and E4801:24:2) and two rubbing stones (E4801:3:1 and E4801:3:10) were recovered along with numerous fragments of burnt clay. One coin (E4801:3:4), a corroded nail fragment (E4801:18:1), one sherd of green glass (E4801:3:5) and animal bone fragments were also recovered during the excavation.

Natural deposits

The natural subsoil was an intermittent layer of compact orange silty clay (C.7) with occasional medium sized decayed stones. It overlay the natural grey gravels (C.8) which were intermixed with bands of sand and small to medium stones. The natural subsoil was intermittent and was not recorded on the higher areas within the excavation area. Heavily root included brown humic rich topsoil which also contained some small to medium stones was located across the excavation area. The topsoil was composed mostly of decaying leaf litter. It gradually built up across the site and became more compact over time. The topsoil lies on top of some of the stone collapse from both the D-shaped enclosure and the roughly circular structure but also lies below the stone collapse. This reflected its ongoing creation from the leaf litter created by the hazel woods.

Round-house/ kiln-house

A well-built wall composed of an inner (C.4) and an outer face (C.11) with a rubble core (C.12) formed a roughly circular structure which measured approximately 7 m in diameter (Plates 2 and 3) (Fig 6). The inner face was built with large undressed edge-set limestone slabs and boulders. The external face of the wall also consisted of large limestone boulders which, like the inner face, appear to have been laid on top of the underlying natural subsoil (C.7). The boulders are slightly smaller and rounder than the edge-set interior face. The external face survived in places to two courses in height. Some areas however were heavily disturbed by tree roots, especially to the north-west where the structure joins with D-shaped enclosure wall (C.5).

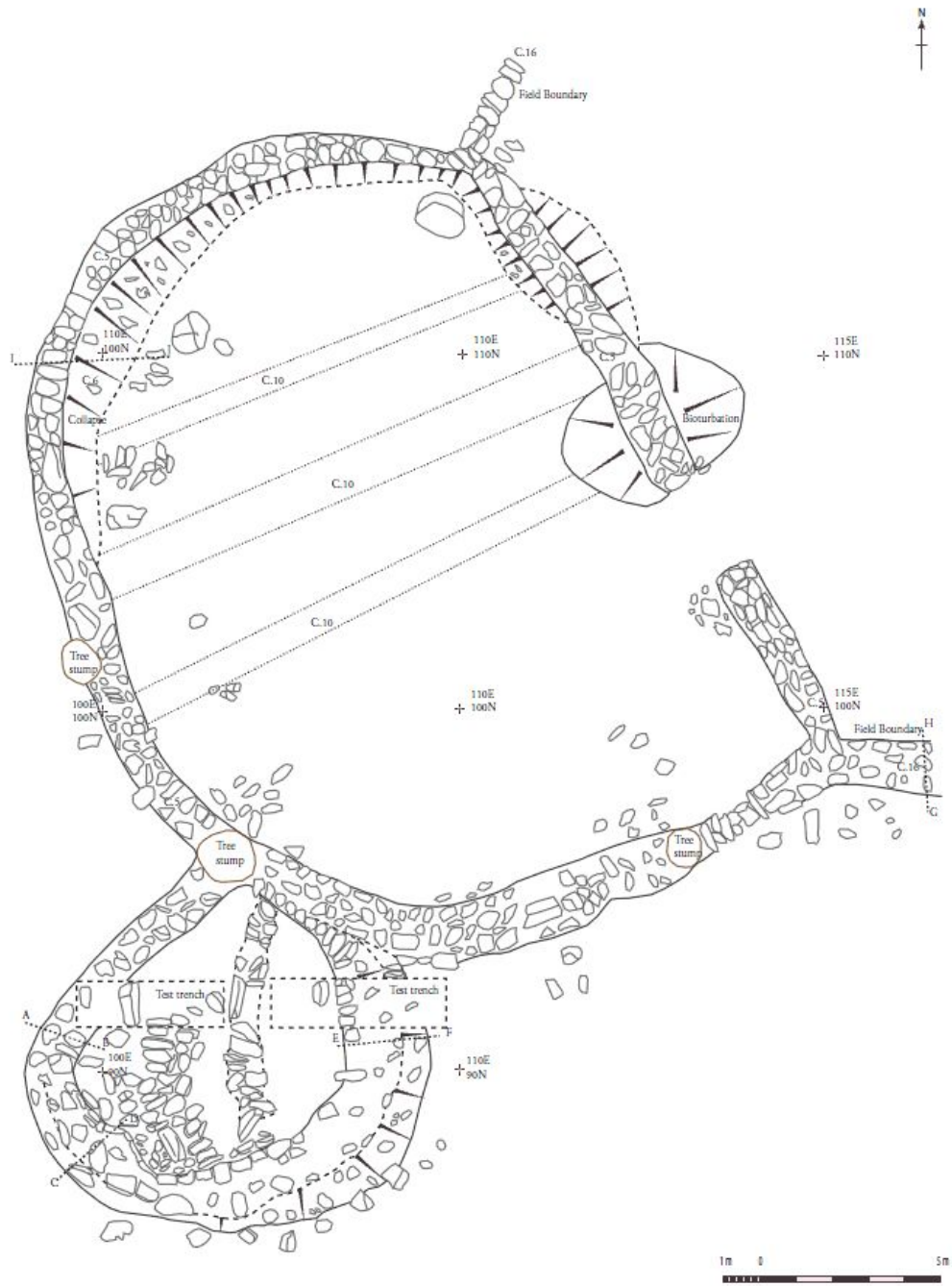


Figure 4 Mid-excavation plan of the site at Toberbrackan



Figure 5 Post-excavation plan of the small structure and the two cereal-drying kilns

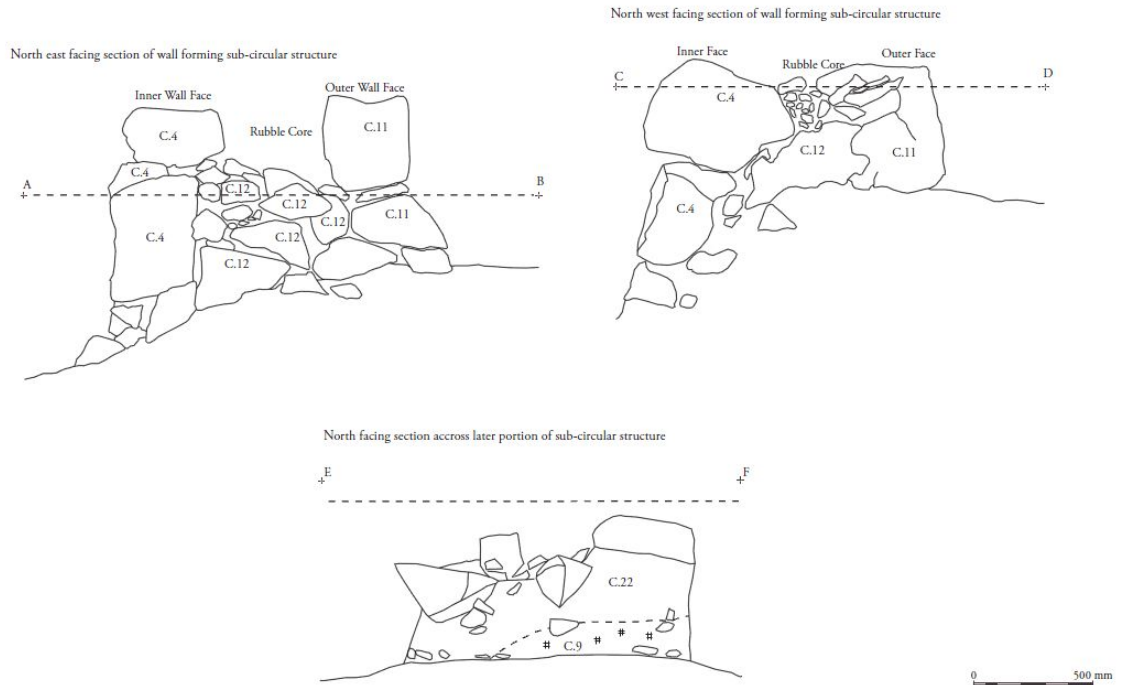


Figure 6 Sections A-B and C-D across the wall forming the sub-circular structure – possibly a round-house or a kiln-house and section E-F across the later section of the wall



Plate 2 Looking west across the small structure following clearance and removal of topsoil and collapsed stone



Plate 3 Looking south at a section through the structure wall showing the internal and external faces and rubble core

The wall was a substantial structure and was up to 1.5 m in width. A large upright pillar stone in the south-east corner may have formed part of an original entrance. A roughly circular pit (C.13) in the natural subsoil was identified in the south-east corner of the structure. The pit was located to the east of the upright pillar stone. A sample of hulled barley from the fill of this pit returned a radiocarbon date of cal AD 713–886 (Ub-16195). The pit may have functioned as a posthole and along with the upright pillar stone possibly represents the remains of a south-eastern entrance to the original structure. Alternatively the posthole may be associated with the kiln activity as it was located close to the southern drying bowl of Kiln 1. The pit was located below a charcoal-rich deposit (C.9) possibly derived from the kiln activity identified below the later repaired section of wall (C.22) forming the eastern side of the structure. Again, a sample of hulled barley from the deposit returned a radiocarbon cal AD 877–986 (UB-16194).

A 5 m section (C.22) on the eastern side of the wall has been replaced (Fig 6). This replacement ran from just to the east of the pillar stone to the north east-corner of the structure. Another possible entrance gap was noted in the northern section of the wall and was defined on its western side by a large stone which appeared to span the full width of the wall. A large tree stump however precluded a positive identification of an entrance gap at this location.

The width of the wall and its well-built nature suggest a substantial structure used either for settlement or agricultural/industrial purposes. The stratigraphic relationship between the structure and the D-shaped enclosure (C.5) could not be established

during the excavation. No internal features apart from the two kilns and a small possible posthole were identified during the excavation. No trace of any roofing material or roof supports was identified.

The topsoil within and surrounding the structure also contained animal bone, oyster shells, two rubbing stones (E4801:3:1 and E4801:3:10), two chert flakes (E4801:3:2 and E4801:3:6), burnt clay fragments, a bronze halfpenny dating to 1742 (E4801:3:4) and 1 green glass bottle fragment (E4801:3:5).

D-shaped enclosure

A D-shaped enclosure wall (C.5) was conjoined with the round-house, extending northward from it to enclose an area of approximately 300 sqm. A 2 m wide gap in the straight side along the north-east was found not to be original. The enclosing element consisted of a low (max 1 m high and 2 m wide) loose mound of collapsed moss-covered stone. The stones ranged in size from 0.4 to 1.2 m in length. There was no indication of either centrally set core stones or facing stones on either side (Fig 7). The wall had been partly rebuilt as a single course stone wall in places. The D-shaped enclosure may be directly related to the round-house to which it was attached. A stratigraphic relationship between the wall of the structure and the enclosure wall could not however be confirmed during the excavation.

Field boundary walls

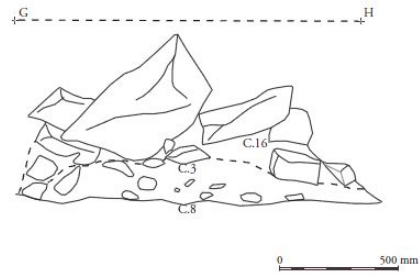
Two field boundary walls were of similar make up to the D-shaped enclosure and radiated from it to the north and east (Fig 7). On excavation the field boundary walls were shown to be approximately 1 m wide, slightly narrower than those forming the D-shaped enclosure but in all other respects were very similar. The walls extend to the east outside the CPO for the scheme and to the north, but were surveyed to the extent that this was possible, where the scrubwood allowed.

Kiln 2

A large dumbbell-shaped kiln (C.27) with the partial remains of the original stone lining (C.34) was cut into the natural subsoil and was centrally located within the roughly circular structure.. Two bowls to the north and south were connected by a flue (Figs 5 and 8). The bowls were set slightly off-centre to the west producing a 'spectacles shape' in plan. The southern bowl was cut up against the wall of the possible round-house or kiln-house to the south. A dark brown loose silty clay (C.37) which contained some burnt clay and animal bone fragments filled the space between the stone lining and the sides of the cut. Edge set limestone slabs (C.34) formed the straight eastern wall of the kiln. The stone lining was preserved up to 5 courses high at the eastern side of the southern chamber (Plate 4).

The cut for the kiln measured 4.9 m north/south, 2.4 m at its widest point in the southern bowl and was up to 1.15 m deep. The northern bowl measured 0.60 m north/south and was 0.90 m wide. The flue was 1.8 m long and 0.70 m wide and the southern bowl measured 0.90 m north/south and was 0.80 m wide.

East facing section of the field boundary to the south east of the D-shaped enclosure



South facing section across the D-shaped enclosure wall

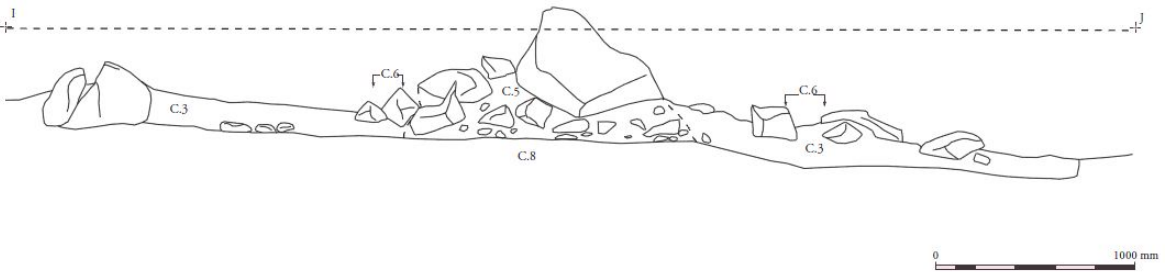
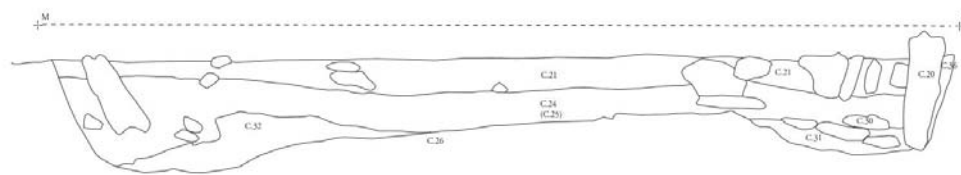


Figure 7 Section I-J across the D-shaped enclosure wall and section G-H across the field boundary radiating from the south-east corner of the enclosure

West facing section of Kiln 1



West facing section of Kiln 2

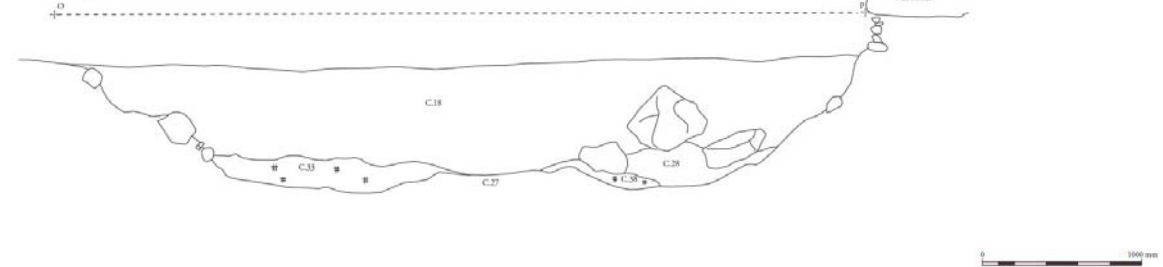


Figure 8 Section O-P along the length of Kiln 2 and section M-N along the length of Kiln 1



Plate 4 Looking south along Kiln 2 after the excavation of internal deposits and fills but prior to the removal of the stone lining

A shallow, creamy, white ash deposit (C.38) with flecks of charcoal and burnt clay was located at the base of the cut on the eastern side of the southern bowl up against the stone lining. A grey, loose, ash-like silty sand deposit (C.33) was located at the base of the northern bowl and along the flue. It contained occasional charcoal and burnt clay fragments. Hulled barley was used to return radiocarbon dates for both these deposits of cal AD 889–987 (UB-16198) and cal AD 894–1018 (UB-16197).

A light brown silty clay (C.28) was located towards the base of the flue and overlying the ash-like deposit (C.38) in the southern bowl. The upper fill of Kiln 2 was a mid

brown compact sandy silt (C.18) with some charcoal flecks. It was up to 0.9 m deep and contained some burnt clay fragments and animal bone.

The relationship between the kiln and the roughly circular structure is unclear. The structure may be directly associated with the use of the kiln and may have been built specifically as a kiln-house to shelter the cereal-drying activities from the natural elements. Alternatively it was an earlier structure that was adapted for use as a kiln-house.

In summary this kiln appeared to be the backfilled remains of an abandoned cereal-drying kiln which was centrally placed within a substantial well-built roughly circular stone-built structure. It consisted of a deep stone lined dumbbell-shaped kiln with a stokehole located in the northern bowl or chamber, an intervening flue, and a drying chamber located in the southern bowl. The charcoal-rich ash-like deposit (C.33) located at the base of the northern bowl or stokehole may be a primary deposit associated with the final firing of the kiln. The smaller ash-like deposit (C.38) in the southern bowl may also be a deposit resulting from the use of the cereal-drying kiln. A thin layer of silty clay (C.28) recorded in the flue and southern bowl may represent the gradual silting up of the kiln after abandonment. The deep mixed deposit of sandy silt (C.18) is probably a deliberate attempt to backfill the kiln after abandonment and prior to the construction of Kiln 1.

Kiln 1

This was the backfilled or silted-up remains of a dumbbell-shaped cereal-drying kiln (C.26) (Plate 5) (Figs 5 and 8). It was smaller and later than Kiln 2 which was located centrally within the stone structure. The cut for the kiln measured 5 m north/south, 1.7 m at its widest point in the northern bowl and was up to 0.6 m deep. Kiln 1 was located along the eastern wall of the structure. It consisted of a stone-lined kiln with a stokehole located in the northern bowl or chamber, an intervening flue, and a drying chamber located in the southern bowl. Loose stones at the mouth of the southern bowl or cereal-drying area may have acted as baffle stones which would have regulated the draw from the fire in the stokehole. A brown silty clay behind the stone lining of Kiln 1 was probably used to stabilise the stone lining during its construction.

A probable up-cast mound (C.36) consisting of re-deposited natural subsoil derived from material excavated while digging the cut for the kiln was located along its western edge. The mound partly covered the upper fill of the central Kiln 2 which means that Kiln 1 is likely to have been constructed after Kiln 2 was abandoned and backfilled.

Edge-set stones (C.20) line the southern bowl and the flue of Kiln 1 and partly line the eastern side of the northern bowl. The stones survive to three courses in the drying chamber at the southern end of the kiln. A number of loose stones were also identified at the mouth of the opening to the southern bowl. The flue measured 2.2 m in length and was 0.5 m wide. The southern bowl was 1.1 m from north to south and 0.9 m wide, and the northern bowl measured 0.9 m north/south and 0.9 m east/west. A dark brown loose silty clay, (C.35) which contained animal bone fragments filled the space between the stone lining and the sides of the cut.



Plate 5 Looking north along the length of Kiln 1 after the excavation of internal deposits and fills but prior to the removal of the stone lining

A 0.2 m deep basal deposit within the southern bowl of Kiln 1 was a greyish black loose silty clay (C.31) with frequent charcoal flecks. Hulled barley from a sample of this deposit returned a radiocarbon date of cal AD 1028–1155 (UB-16196). This was covered by a layer of flat stones (C.30) seemingly forming a surface across the base of the bowl. The charcoal-rich deposit at the base of the cereal-drying bowl and the flat stone surface above it were probably both related to the use of the kiln. The stone surface may represent a solid base for a cereal-drying rack or stand.

A deposit of light orange/yellow silty ash (C.32) with frequent charcoal fragments was noted at the base of the northern bowl and extended into the flue. This was possibly a primary deposit related to a fire in the stokehole of the kiln prior to its abandonment. The gravel underlying the deposit showed faint traces of *in situ* burning towards the mouth of the flue.

Loose, dark brown/black, silty clay (C.24) with frequent mollusc shells, animal bone, charcoal flecks, burnt clay fragments and a chert fragment (E4801:24:2) covered the lower deposits to a depth of 0.3 m along the full length of the kiln. There was a significantly higher proportion of mollusc shells and animal bone in the area covering the southern chamber. The upper fill of Kiln 1 was a grey/brown loose silty clay (C.21) with occasional animal bone and charcoal fragments. The fill was 0.2–0.3 m deep. One flint fragment (E4801:21:1) was recovered from it. The loose silty clay with

frequent mollusc shells and animal bone was probably a deliberate backfilling or silting up of the kiln after its abandonment. The animal bone and shells possibly relate to some form of occupation activity in the area surrounding the functioning kiln. The grey-brown soil which filled the upper levels of Kiln 1 for its whole length and width also probably represent a natural silting up of the upper portion of the kiln after it was abandoned.

The relationship between the kiln and the roughly circular structure is unclear. Kiln 1 is located beside the rebuilt portion of the structure and it is possible that the stones used to construct Kiln 1 (large edge-set limestone blocks) may have been taken from the original eastern wall of the structure. This portion of the wall was then later rebuilt with smaller stones in a different construction style.

Wall rebuild and underlying deposit

A grey/black charcoal-rich silty clay (C.9) was identified in the south-east corner of the possible round-house and runs under the rebuilt wall (C.22) to the east. The deposit contained small fragments of burnt clay. The deposit also covered the fill (C.14) of a small possible posthole (C.13) also located in the south-east corner of the possible round-house.

A 5 m long section of the roughly circular structure wall appears to have been rebuilt in a different construction style to the rest of the wall. It was located along the eastern side of the structure. It was built up against the large limestone pillar stone which forms part of the early wall. Long tapered limestone blocks were set crossways with the wider end forming the wall face. This later wall did not have a rubble core (Figs 5 and 6).

The later wall was located to the east of the round-house or kiln-house and a charcoal-rich deposit (C.9) was located below it. The charcoal-rich deposit was possibly associated with the use of Kiln 1. There was no evidence for *in situ* burning. It is possible that the original round-house wall was removed in order to build the second or later (Kiln 1) cereal-drying kiln after the first was back-filled and abandoned. At a later stage the wall was rebuilt in a different style to the rest of the structure.

Wall collapse

The D-shaped enclosure wall or 'mound wall' has been partly re-built but collapsed stone from the wall (C.6) lies intermittently around the interior and exterior of the wall (Fig 7). It is concentrated in the north-west sector where the topography appears to have created a greater collapse of the wall than elsewhere. The stone collapse is both overlain and underlain by the same brown humic-rich topsoil that covers the entire site.

There was a layer of stone collapse (C.2) on the interior and exterior of the possible round-house structure. There was a large internal concentration in the south-west corner of the structure. The topography and tree-root damage appears to be largely responsible for the collapse. The internal edge-set stones of the structure were

inclined to fall inwards, causing collapse of the wall, and this accounts for the particular concentration of collapse material in the south-west corner of the structure.

Ridge-and-Furrows

Three U-shaped furrow cuts (C.10) ran north-east/south-west across the northern half of the interior of the D-shaped enclosure. The cuts were 0.9 m–1.2 m wide and 0.15 m deep. They were parallel and the distance from the centre of one furrow to the centre of the next furrow was 3.7 m. The intervening ridges were flat. Both the ridges and furrows were covered in dark brown humic topsoil. The U-shaped furrows appear to represent spade-cut ridge-and-furrow cultivation, from the 18th/19th century. It was at this point in history when a vastly increased population led to the cultivation of extremely marginal land.

Artefacts

Four chert/flint fragments (E4801:3:2, E4801:3:6, E4801:21:1, and E4801:24:2) and two rubbing stones (E4801:3:1 and E4801:3:10) were recovered during the excavations. The larger rubbing stone is probably a fragment from a small quern stone. It is burnt and probably also smashed which is a recognisable Neolithic treatment of the artefact type. The small rubbing stone is made of granite which is a rare occurrence in south Galway and it may belong with the small quern stone. The small assemblage is likely to date to the second half of the Neolithic.

The numerous burnt clay fragments were examined by Eoin Grogan who concluded that they were not representative of coarse pottery but that they would have been fired at high temperatures and are probably associated with the superstructure of the kilns.

A George II, Irish half penny dating to 1742 (E4801:3:4), a corroded nail fragment (E4801:18:1) and one sherd of green glass (E4801:3:5) were recovered from the topsoil surrounding the sub-circular structure.

Plant Remains

Charred seeds were recovered from eleven of the samples from Toberbrackan. Comparisons between the samples from the two kilns indicated that the assemblages from both kiln were relatively similar. Most of the plant remains comprised cereal grains and small weed seeds. Barley was the most common cereal type found, making up more than three-quarters of the entire assemblage. Oat and wheat were also important, but rye was found in much smaller quantities. Large quantities of small weed seeds were found in some samples, despite the fact that larger weed seeds were not present. This suggests that either some crop processing by-products were used as tinder in the kiln, or that fine-sieving had not been carried out before the crop was burnt. The weed seeds were mostly plantains, docks/knotgrasses and goosefoots. These are common weeds of arable and waste ground and are often associated with human activity.

Charcoal

In total, 279 fragments were analysed from 14 samples. Six of the samples were from Kiln 1, four were from Kiln 2 and four were associated with the circular structure. Some contexts were represented by more than one sample. Three samples came from C.24, the charcoal-rich upper fill of Kiln 1. The charcoal assemblage from the kilns was dominated by ash which accounted for 56% of the fragment frequency. Hazel, Pomoideae type charcoal (includes rowan, whitebeam, hawthorn and crab apple); willow/ashpen, sloe/cherry, alder and birch were also represented.

The assemblage from the circular structure was considerably different to that from the kilns. Here, although ash again dominates the assemblage it is recorded at a lower level of 33% of the fragment frequency. Spindle, alder and sloe/cherry were all well represented. Pomoideae type charcoal was represented at much lower levels.

Most of the charcoal examined came from the two kilns where the assemblage was dominated by ash. The majority of the ash wood was from mature trees from closed woodland. A variety of other woods were also identified in smaller amounts. Fresh wood appears to have been used as no insect infestation was noted. Given the absence of oak, ash was probably the most common large tree in the area. The assemblage from the circular structure tells us little about the use of the building, however, the presence of spindle is of interest as it is poorly represented in both the charcoal and pollen records.

Animal bone

(Pending)

Radiocarbon Dates

Radiocarbon analysis was carried out by the 14 Chrono Centre in Queen's University Belfast.

Dates were calibrated using Calib Rev5.0.2 (©1986-2005 M.Stuiver & P.J. Reimer) and in conjunction with Stuiver & Reimer 1993 and Reimer et al. 2004.

Five early medieval radiocarbon dates were obtained from hulled barley recovered from samples taken during the excavation. The dates can be seen to confirm the kiln sequence identified during the excavation. Dates of cal AD 889–987 (UB-16198) and cal AD 894–1018 (UB-16197) were returned from the lower deposits of Kiln 2 and a date of cal AD 1028–1155 (UB-16196) was returned from the lowest deposit of Kiln 1. A date of cal AD 713–886 (UB-16195) was returned from the fill of a possible posthole related to the sub-circular building and a date of cal AD 877–986 (UB-16194) was returned from a deposit underlying the later section of the sub-circular building's wall.

Lab. Code	Context	Material	Years BP	δ 13 C	1 sigma calibrated AD	2 sigma calibrated AD	Period
UB-16194 C.	9	Hulled barley	1126± 23	-25.4	892-967	877-986	Early medieval
UB-16195 C.	14	Hulled barley	1217± 23	-23.4	773-867	713-886	Early medieval
UB-16196 C.	31	Hulled barley	944± 21	-25.3	1033-1151	1028-1155	Early medieval
UB-16197 C.	33	Hulled barley	1078±30	-22.7	899-1013	894-1018	Early medieval
UB-16198 C.	38	Hulled barley	1110± 24	-20	896-1073	889-1087	Early medieval

Discussion

A D-shaped enclosure, sub-circular structure and two early medieval cereal-drying kilns were excavated at Toberbrackan and two associated field boundary walls were also investigated. During the excavation a stratigraphic relationship could not be established between the sub-circular structure and the D-shaped enclosure or between the D-shaped enclosure and the field boundaries radiating from it. It seems likely however that all three are related and possibly contemporaneous.

Phasing

The excavation revealed that the earlier of the two kilns was placed centrally within the original sub-circular structure. The radiocarbon dates derived from hulled barley from primary deposits within the kilns confirms the stratigraphic sequence, with kiln 2 producing a slightly earlier date range.

The sub-circular structure had undergone at least one phase of reworking. Construction details revealed the presence of a later wall section to the east of the structure which was built over deposits relating to the use of the kilns. Interestingly the earliest radiocarbon date range came from the fill of a posthole possibly related to the construction or use of the sub-circular structure. While the fill was derived from deposits originating during the use of the kilns it does suggest that the posthole itself may predate the construction of the kilns.

There was no stratigraphic relationship established between the original sub-circular structure and the kilns however the earliest kiln was placed centrally within it. It is possible that the substantial well built sub-circular structure was re-used by the people who constructed and used the kilns. Alternatively the structure was built to accommodate the earliest kiln and was adapted at a later date perhaps to accommodate the later, Kiln 1. The substantial sub-circular structure was well built and could be seen as a Bronze Age or Iron Age round house. The construction technique of an inner and an outer face with a central stone filling is however similar to that used in the early medieval enclosures in the area such as the largely destroyed structures at Drumharsna South and Derrydonnell More and the settlement-cemetery at Owenbristy (Delaney & Tierney forthcoming).

Later phases on the site are represented by wall collapse or deliberate destruction of the sub-circular structure and the enclosing wall of the D-shaped enclosure. The U-shaped furrows recorded within the D-shaped enclosure appear to represent spade-cut ridge-and-furrow cultivation, from the 18th/19th-century.

Corn-drying kilns

According to O'Sullivan & Downey (2005, 33) corn drying kilns were often built into banks or slopes for stability. The sub-circular structure at Toberbrackan was built into the side of an east facing slope.

Monk and Kelleher (2005, 77) believe that corn-drying kilns were used to reduce the moisture content of harvested grain before storage as well as to facilitate it's

threshing and milling particularly in damp areas of the country. Cereal-drying kilns have a long period of use and date from the prehistoric period up to the 19th-century. They generally consist of a fire area or stokehole which is connected to a bowl or drying chamber by means of a flue. The use of a kiln required a calculated balance between the type of fuel, the length of flue and the direction and strength of the wind. Kilns are generally sited in gently sloping ground with the drying chamber upslope. Kiln 2 at Toberbrackan follows this layout with a gentle slope from the base of the stokehole up to the base of the drying bowl.

The Early Medieval Archaeological Project (EMAP) (O'Sullivan & Harney 2008, 176) discusses the tentative development of a chronology of kiln types based on their shape in plan. The chronology has been proposed by Monk & Kelleher (2005, 105) and developed and refined by Kinsella (2007b, 2). Oval and sub-oval kilns in this typology are believed to date from the late Iron Age up to the seventh century AD. The later figure-of-eight and dumbbell-shaped kilns date predominantly to AD 400–700 and have some overlap with the oval kilns occurring in the earlier period. Keyhole-shaped kilns are seen as dating from AD 800 up to the later medieval and post-medieval periods. This typology is largely based on a number of sites with multiple kiln excavations such as Colp West, Co. Meath, Solsborough, Co. Tipperary, Johnstown, Co. Meath, Raystown, Co. Meath and Glebe/Laughanstown, Co. Dublin, all of which are outlined in the EMAP publication (O'Sullivan & Harney 2008, 176, 177). All commentators agree that the typology can only be viewed as preliminary until a wider range of dates is available for all of the kiln types. The two dumbbell-shaped kilns at Toberbrackan dating to around the tenth and 11th centuries stretch the upper limits of the proposed chronology for these types of kilns. There is, however, a difficulty in generalising about kiln types based on less than rigid descriptors of ground plan shape.

According to EMAP the distribution of definite early medieval kilns has a clear eastern pattern with the counties Dublin, Meath, Louth and Kildare dominating (O'Sullivan & Harney 2008, 179). This distribution however is likely to reflect a bias in modern development. According to O'Sullivan and Downey (2005, 34) the distribution pattern of corn-drying kilns revealed by the first edition Ordnance Survey maps is predominantly one of survival in the north west and west.

There was an increase in arable farming in the first centuries AD most notably from the third century onwards and this led to large-scale deforestation. The pollen record from Lough Sheeauns in Co. Galway demonstrates that there was a noticeable increase in woodland clearance and corresponding intensive farming from AD 500 (Molloy and O'Connell 1991). This increase in farming activity in Co. Galway would presumably also have seen an increase in population and settlement sites which in turn would have necessitated an increase in the construction of corn-drying kilns.

Corn-drying kilns have been a feature of Irish agriculture from prehistoric times and are referred to from early Christian times in the early laws and lives of the saints. In fact early Irish laws state that kilns must not be placed within so many paces of the dwelling house due to the risk of fire (Evans 1957, 123). The annals record that in AD

751 half the grain stored at the monastery of Clonard was burnt in the Kiln (quoted in Edwards, 1990, 63).

A kiln complex associated with a distinct separate cereal processing area within an eight-century monastery in Hoddom, Drumfrieshire, Scotland revealed examples of kilns dating from seventh or eight century up to AD 1250 (Holden 2006). The results of the excavations have been used to chart the changes in corn drying practice, the cereals cultivated and something of the agricultural economy of the late first millennium and beyond.

A chronological typology was proposed with four distinct types of kilns recognised; the interesting point being that all but the latest examples were associated with either timber or stone built structures. Gailey (1970) in his discussion of early Irish laws makes the point that the essential difference between earlier and later Irish kilns was that the latter had at best a removable roof over the kiln bowl whereas the former seem to have been totally enclosed within special buildings.

Burnt clay fragments recovered within and surrounding the sub-circular structure at Toberbrackan were examined by Eoin Grogan. The clay fragments were not identified as crude pottery but were burnt at a very high temperature. The evidence from Hoddom (Holden 2006, 109) suggests that the bowls of the later kilns dating from the eleventh-century were lined with clay. This clay lining was provided so that the bowl may be easily swept. The early Irish laws list a broom along with a hide and a flail as part of the equipment of the kiln (Gailey 1970).

Kiln-houses associated structures and the evidence from Co.

Galway

Joint kiln and barn-type structures have been recorded in the Irish archaeological record. A rectangular structure at Ballyvee, Co. Antrim which measured 4 x 8 m may well have been a barn or grain store (Lynn 1974). A dumbbell-shaped kiln dated to the eleventh-century and an associated barn structure was excavated at Haynestown, Co. Louth (O'Sullivan 1993).

Closer to the site at Toberbrackan a kiln complex associated with a cashel at Carnmore West, in Co. Galway was excavated in advance of works associated with the N6 road scheme (Sutton forthcoming). Two keyhole/dumbbell-shaped kilns had been truncated by a large L-shaped kiln. The early kilns had produced dates around the eight and ninth century while the dates from the fills of the later kiln range from the eight to the 13th-century. The remains of a circular structure were located around the later L-shaped kiln, with an entrance visible on the eastern side, adjacent to the firing chamber. The wall construction was similar to the structure at Toberbrackan, with two rows of limestone and a rubble core. The structure measured 6.5 m x 7 m. In another similarity with Toberbrackan the plant remains analysis from the site revealed that barley was the dominant cereal processed.

Three stone-lined kilns with similar dimensions to the two kilns excavated at Toberbrackan were excavated at Curtaun, Co. Galway in advance of the N18 Crusheen to Gort scheme (Delaney 2007). Identified immediately to the west of the

kilns were the foundation trenches for a sequence of semi-circular structures which appeared to have acted as windbreaks or alternatively as a superstructure to the kilns.

Two cereal-drying kilns were excavated at Gortnaheen, Co. Galway in advance of the works associated with the N6 Galway to Ballinasloe road scheme (Collins forthcoming). The first kiln described as dumbbell-shaped was surrounded by a penannular enclosure and dated to around the ninth century. The second kiln was described as L-shaped in form and also seemed to be surrounded by an enclosure trench. This kiln was dated to around the 12th-century. In both cases the excavator Aisling Collins believed the enclosed area surrounding the kiln would have been used for threshing the cereal prior to drying. Collins cited Kelly's (1997, 240) assertion that threshing takes place at the drying-kiln.

Kelly in his *Early Irish Farming* (1997, 241) suggests that a reference to a kiln thirty feet in diameter may refer to a structure which contains a number of kilns and that the stone wall of a kiln is known as the *caisel* – a word remarkably similar to the Irish word for the large stone cashels or *caiseals* of the early medieval period. The similarity in construction of the small sub-circular structure surrounding the kilns at Toberbrackan and the excavated cashel sites at Drumharsna South, Derrydonnel More and Owenbristy has already been drawn

Plant remains and barley processing

The plant remains evidence from the primary fills at Toberbrackan are dominated by barley and contain large amounts of small sized weed seeds. The dominance of barley is paralleled at the dumbbell-shaped kiln at Gortnaheen and the kilns at Carnmore West. The absence of larger weed seeds suggest that some crop processing has been carried out, but that sieving to eliminate small weeds had not been concluded before the crop was burnt. Alternatively, these small weed seeds may have been removed from the crops during processing, set aside, and then used as tinder for the fire in the kiln. Holden (2006, 109) examined the plant remain evidence from the kilns at Hoddon and concluded that in many cases drying is undertaken in order to facilitate crop cleaning. In particular in the case of barley drying is done to enable the removal of the basal part of the coarse awns, a process generally known as humelling. Holden (2006, 110) quotes a study by MacDonald on the island of Uist in Scotland where a scheme for barley processing which saw kilning occurring after coarse riddling but before humelling was proposed. This process may explain the quantities of small weed seeds in the samples from the kilns at Toberbrackan.

Conclusion

The D-shaped enclosure, sub-circular structure and two corn-drying kilns at Toberbrackan can be seen as an early medieval grain processing complex. While the small structure, enclosure and related field system bears some resemblance to the Bronze Age settlements on the Burren at Roughan Hill (Jones 1998) the construction details of the sub-circular enclosure and the juxtaposition with the early medieval kilns would suggest that the complex as a whole was early medieval in origin. In light

of the early medieval kiln excavations at Hoddum in Scotland and the evidence from recent excavations in Co. Galway combined with the historic references to structures and specifically threshing areas along with the plant remains evidence the sub-circular structure at Toberbrackan can best be seen as a building associated with the use of the kilns. It may have provided shelter and a space to process the grain before and after drying in the kilns. The substantial structure may also have been used to store the processed grain. The excavations from Co. Galway also highlight the frequent association of kiln and kiln-house. The location of the kilns in a marginal area for corn growing reflects the expansion of settlement and agriculture towards the end of the early medieval period within the territory of the Uí Fiachrach Aidhne. The radiocarbon dates for the kilns at Toberbrackan seem to push back the upper limits of the dumbbell-shaped kilns within the emerging overall chronological framework for kiln types.

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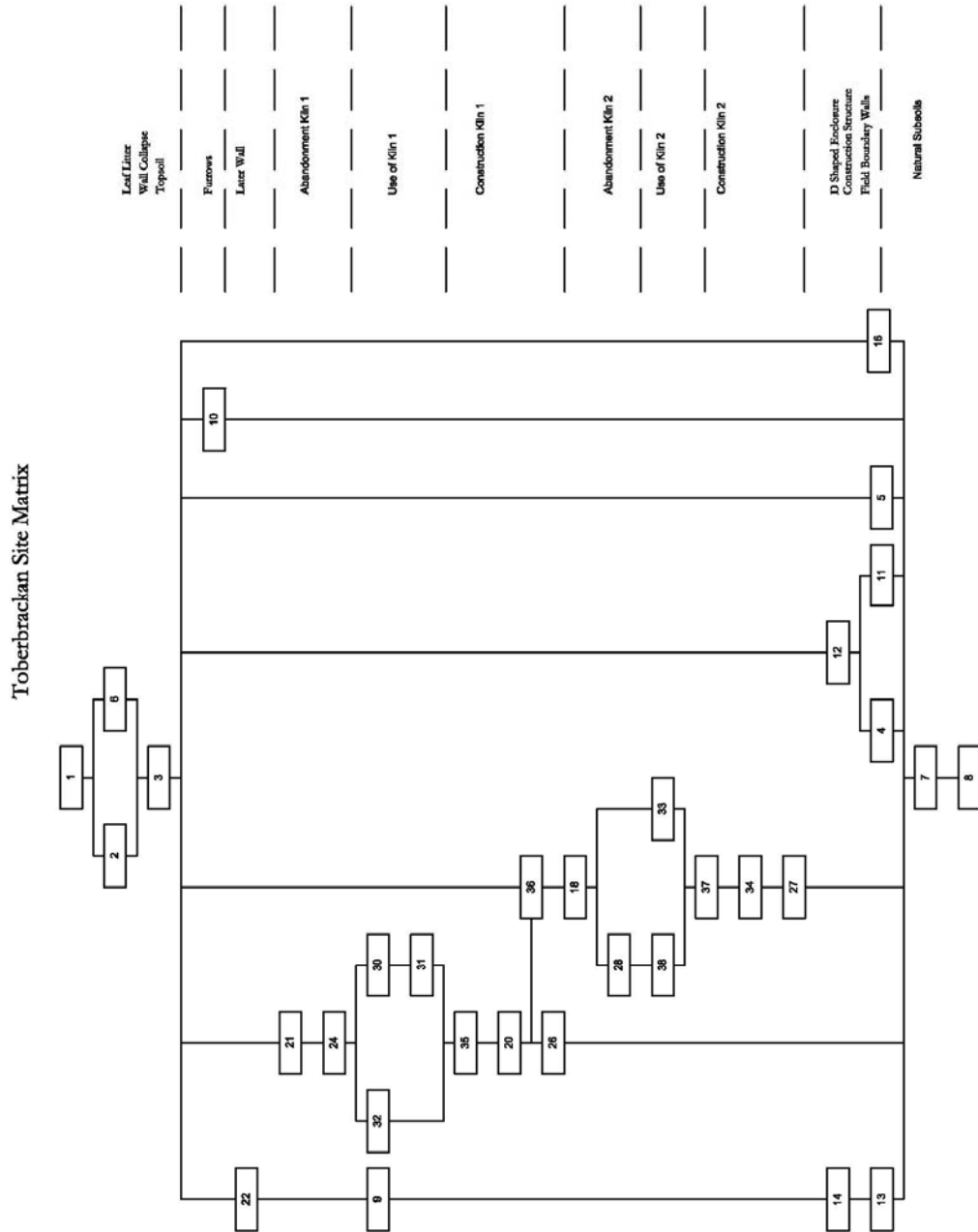
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Appendix 1 – Site Matrix



Appendix 2 - Context Register

Context #	Context Type	Short description
1	Layer	Layer of humic rich material. Loose dark brown black humic layer. Includes loose braches and low growth. Occasional small to medium stones. Covers the whole site.
2	Layer	Layer of stone collapse on the interior and exterior of the possible round house. Limestone oblong blocks ranging in length from 0.4 - 1.2 m in length and approx 0.25 m thick. Large internal concentration in the south west corner.
3	Layer	Brown humic topsoil, heavily root included and also containing some small to medium stones. Also contained animal bone, oyster shells, possible rubbing stones, chert flakes, burnt clay fragments, a bronze half penny dating to 1742 and 1 green glass bottle
4	Wall	Inner face of possible round house wall. Large undressed edge set limestone slabs and boulders forming a very roughly circular iner wall face (ranging fom 0.65 x 0.40 x 0.40 m to 1 x 0.90 x 0.30 m).
5	Wall	Wall of large D-shaped enclosure (20 m north-south x 15 m). Composed of loose limestone blocks 0.4 m to 1.2 m in length and 0.25m thick. More of a low mound of stone then a formal wall.
6	Deposit	Discontinuous layer of stone collapse from the D-shaped enclosure wall/mound. Most noticeable on the interior to the north west where the micro topography falls away to the east.
7	Subsoil	Fairly compact orange silty clay natural subsoil. Located intermittently across the site. It is located below the humic topsoil (C.3) and above the gravel (C.8).
8	Subsoil	Layer of grey/brown gravel subsoil. Located below the humic rich topsoil and the orange clay natural subsoil.
9	Deposit	Grey/ black charcoal rich silty clay. Located in the south-east corner of the possible round house and runs under the later wall to the east. The deposit contained small fragments of burnt clay. The deposit also covers the fill of a small possible posthole.
10	Furrow Cut	Three U-shaped furrow cuts run north-east/south-west across the northern half of the interior of the D-shaped enclosure. The cuts are 0.9 m - 1.2 m wide and 0.15 m deep.
11	Wall	External wall face of the possible house structure. Large limestone boulders set in a roughly circular plan to form the outside edge of a wall. The boulders are slightly smaller and rounder then the edge set interior face.
12	Wall	Rubble core between the two faced wall of the possible round house or kiln house. Small to medium limestone field stones fill the area between the outer and inner face of the wall. The stones are mixed throughout with brown humic soil (C.3).
13	Posthole Cut	Sub-circular posthole cut with moderately sharp sides and a gradual break of slope at base. The base itself is flat. Small stones form the sides to the east. Located in the interior south-east corner of the possible house structure.
14	Posthole Fill	Loose grey silty clay with charcoal flecks.
15	Deposit	Loose greyish dark brown sandy clay with root inclusions and occasional charcoal. Located in the south-west corner of grid square 100E, 90 N.

Context #	Context Type	Short description
16	Wall	Field boundary walls. Contiguous with south-east and northern corner of D-shaped enclosure. Composed of limestone field boulders. The walls were 0.8 - 1 m high and 1.2 - 2 m wide.
18	Fill	Upper fill of Kiln 2. Mid brown compact sandy silt with some charcoal flecks. Contains some burnt clay fragments and animal bone. Occasional small to medium stones. Some larger stones towards the base of the northern bowl.
20	Stone Lining	Stone lining of kiln 1. Setting of large limestone blocks lining the edge of kiln 1. Edge set stones line the southern bowl and the flue of kiln 1. The stones survive to three courses in the drying chamber to the south.
21	Fill	Upper fill of kiln 1. Grey brown loose silty soil with occasional bone and charcoal fragments. The fill was 0.2 - 0.3 m deep. One flint and one chert fragment were also recovered.
22	Wall	Later wall on eastern side of round house or kiln house structure. Long limestone block measuring approximately 0.60 x 0.25 x 0.15 m have been set lengthways to form a low stone wall.
24	Fill	Dark brown/black charcoal rich fill of kiln 1. Loose dark brown/black silty clay with frequent mollusc shells, animal bone charcoal flecks and burnt clay fragments. One chert fragment was also recovered. The fill contained mollusc shells and animal bone.
26	Cut	Cut of kiln 1. Classic 'dumb bell – shaped' kiln cut with rounded north and south bowls connected by a linear flue. Both the north and south bowls are slightly off-set to the west.
27	Cut	Cut of kiln 2. A dumbbell - shaped kiln cut with two bowls to the north and south connected by a flue. The bowls are set slightly off centre to the west (similar to kiln 1).
28	Fill	Light brown silty clay. Located towards the base of the flue and southern bowl of kiln 2.
30	Layer	Layer of flat stones seemingly forming a surface towards the base of the southern bowl of kiln 1. The individual stones measured approximately 0.2 m in length and were 0.1 m thick.
31	Deposit	Basal deposit within the southern bowl of kiln 1. It was a greyish black loose silty clay with frequent charcoal flecks.
32	Deposit	Possible ash deposit at base of the northern bowl of of kiln 1. Light orange/yellow silty ash with frequent charcoal fragments.
33	Deposit	White ash deposit in the northern bowl and flue of kiln 2. grey loose ash like silty sand with occasional charcoal and burnt clay fragments.
34	Stone Lining	Stone lining of kiln 2. Edge set limestone slabs form the straight eastern wall of the kiln (measuring 0.60 x 0.50 x 0.30 m). The wall curves eastward at each end to form the north and south chambers to form a spectacles shape in plan.
35	Fill	Fill behind stone lining of kiln 1. Loose dark brown silty clay containing three animal bone fragments. The fill was approximately 0.1 - 0.2 m thick. Only present where the stone lining survives.
36	Deposit	Natural subsoil up-cast from digging kiln 1. Yellow/brown compact gravelly silty clay which formed a slight mound to the west of kiln1 and overlay the upper fill (C.18) of kiln 2
37	Fill	Fill behind stone lining of kiln 2. Dark brown loose silty clay which contained some burnt clay and animal bone fragments. The fill was approximately 0.1 - 0.15 m thick.

Context #	Context Type	Short description
38	Deposit	Shallow ash deposit below C.28 in the base of the southern chamber of Kiln 2. Creamy white ash with flecks of charcoal and burnt clay. Located on the eastern side of the southern bowl against the stone lining.

Appendix 3 - Find Register

Find #	Context #	Artefact Type	Short Description
1	3	Possible rubbing stone	Broken granite stone. Found in C.3 at the base of wall C.4 on the interior of the possible structure. Possible rubbing stone.
2	3	Possible chert blade ?	Possible chert blade found at centre of interior of structure
3	3	Burnt clay Fragments	Small burnt clay fragments found on interior of structure
4	3	Coin	Half penny: Georgius II Rex/ Hibernia 1742?
5	3	Bottle fragment	Green glass bottle fragment found in wall collapse exterior to structure on southern side
6	3	Struck chert fragment	Black chert fragment from interior of structure
7	3	Burnt clay fragments	Burnt clay fragments from wall collapse on south east exterior of structure.
10	3	Burnt clay fragents	Burnt clay fragments from interior of structure
13	21	Flint fragment	Struck flint fragment from upper fill of southern end of kiln 1
14	21	Possible chert fragment	Possible chert fragment from upper fill of southern end of kiln 1
17	3	Burnt clay fragments	Burnt clay fragments from rubble collapse of wall on southern side of structure
18	3	Broken rubbing stone	Broken red sandstone with a smooth base. Possible rubbing stone from a saddle quern?
19	24	Burnt clay fragments	Burnt clay fragments from the northern chamber of kiln 1
20	3	Burnt clay fragments	Burnt clay fragments from C.3 surrounding the later section of wall C.22
21	24	Struck chert	Struck chert fragment from C.24 in northern chamber of kiln 1
22	18	Nail	Possible iron nail from upper levels of C.18 - Kiln 2
23	18	Burnt clay fragments	Burnt clay fragments from upper fill C.18 of kiln 2
24	9	Clay fragments	Burnt clay fragments from charcoal rich layer C.9 below later wall C.22
25	33	Burnt clay fragments	Burnt clay fragments from the ash deposit C.33 in kiln 2
26	37	Burnt clay fragments	Possible burnt clay fragments from behind the stone lining of Kiln 2

Appendix 4 - Charcoal analysis

By Mary Dillon

Introduction

Toberbrackan was excavated in advance of road works. The excavation found a D-shaped enclosure with two large cereal drying kilns and circular structure. Most of the samples came from the two kilns, with the remainder coming from the circular structure. All of the samples bar one contained charcoal (sample 36 from context 12). The results are considered in relation to past woodland environment, woodland exploitation and wood-type selection.

Methodology

Bulk soil samples were collected on site and were processed by the client. Two of the samples (S26 from C18 and S25 from C24) were taken as charcoal samples. All charcoal fragments measuring 2mm or greater in the transverse section were identified up to a maximum of thirty fragments per sample. Each fragment was prepared for microscopic examination by fracturing it by hand and thereby exposing a clean surface along transverse, radial and tangential planes. All three planes were examined at a range of magnifications (x100 to x400) under a Nikon metallurgical microscope. For reference literature Schweingruber was consulted (1990). The number and weight of fragments were recorded for each wood type.

The following details were also noted:

Ring curvature. The analysis of ring curvature can be regarded as broadly indicative of age, and this was noted during charcoal analysis. Ring patterns can also reveal woodland management such as coppicing

Insect infestation. Holes, round and larger than vessels, are usually regarded as caused by burrowing insects; their frequency was noted.

Results

In total, 279 fragments were analysed from 14 samples (Table 1 and 2). Six of the samples were from kiln 1, four were from kiln 2 and 4 were associated with the circular structure. Some contexts were represented by more than one sample. Three samples came from C24, the charcoal rich fill of Kiln 1. In Figs. 1 and 2 the percentage fragment frequency and percentage weight of the various wood types found in samples from the two kilns are shown while in Figs. 3 and 4 the same is shown for the circular structure.

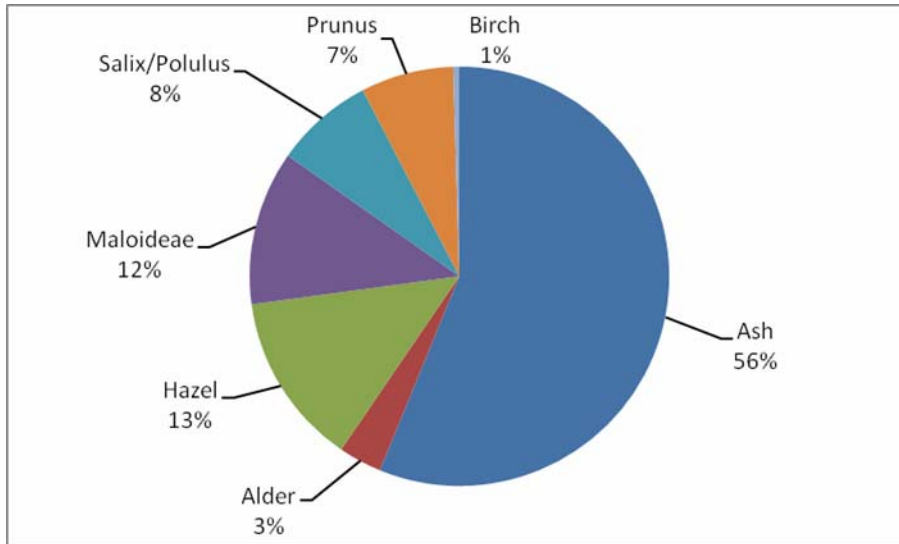


Fig. 1 Pie chart illustrates the percentage fragment frequency of wood types identified in samples from the two kilns

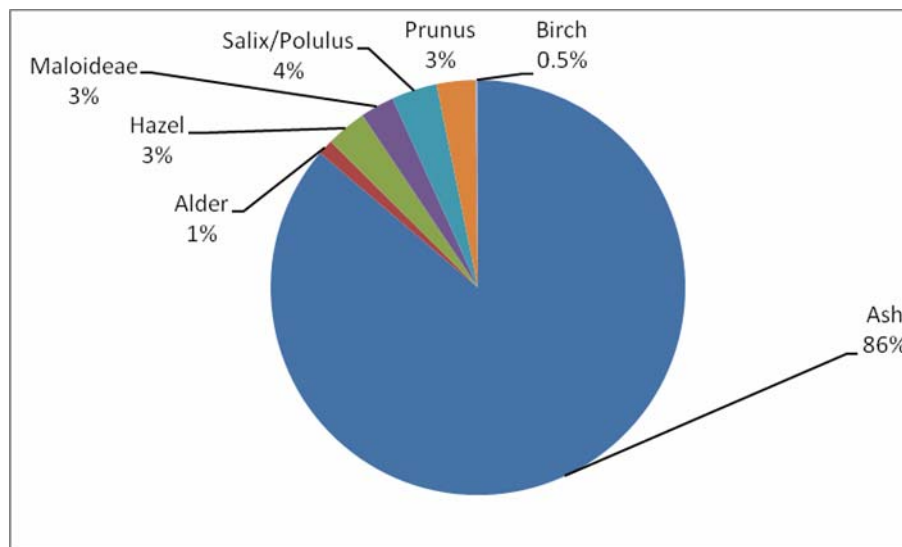


Fig. 2 Pie charts illustrates percentage weight of charcoal by wood types identified in samples from the two kilns

The assemblage from the kilns was dominated by ash (*Fraxinus excelsior*, 56%). Ash accounted for a massive 86% of the charcoal weight. This is because the two charcoal samples (as opposed to charcoal attained from bulk samples) contained very large chunks of charcoal, and both samples were 100% ash. Hazel (*Corylus avellana*, 13%), Maloideae (also known as pomoideae; 12%), *Salix/Populus* (willow/aspens; 8%), *Prunus* (7%), alder (*Alnus glutinosa*, 3%) and birch (*Betula* sp., 1%).

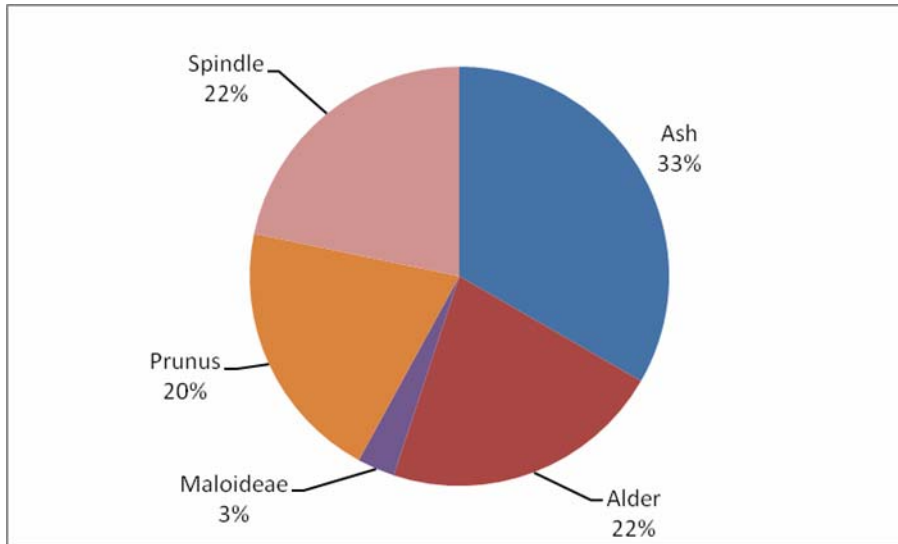


Fig. 1 Pie chart illustrates the percentage fragment frequency of wood types identified in samples from the circular structure

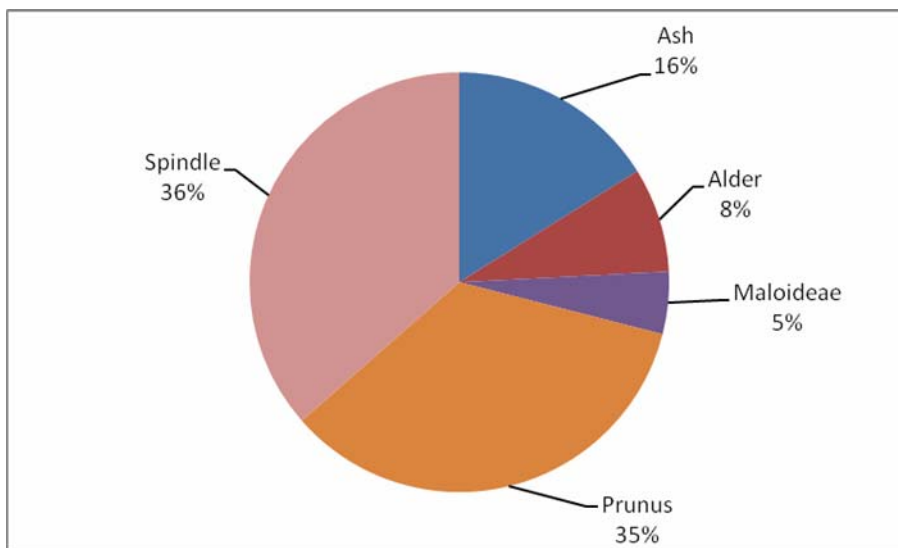


Fig. 2 Pie chart illustrates percentage weight of charcoal by wood types identified in samples from the circular structure

The assemblage from the circular structure is considerably different to that from the kilns. Here, although ash again dominates the assemblage it is recorded at a lower 33%. Spindle (*Euonymus europaeus*), alder and *Prunus* are well represented at 22%, 22% and 20% respectively. Maloideae is represented at 3%. When weight is taken into account, spindle and *Prunus* dominate the assemblage.

Discussion

The kilns

Most of the samples came from the two cereal drying kilns. Kilns needed fuel (primarily wood) to create fire (and subsequently hot air) to dry the cereals. The large amount of charcoal found in the samples is a reflection of this. None of the charcoal contained evidence of insect infestation. While insects do attack the wood of live trees this is, in comparison to attack on wood from dead trees, quite rare (Dajoz 2000, 496). Therefore, the wood used in the kiln firings was likely especially taken from woodlands for this purpose. Wood was not gathered from the forest floor nor was it recycled from old structures.

While charcoal found in kilns may be the remains of collapsed wattle structure, this is not reflected here. The ash which dominated the assemblage was, almost without exception, from mature trees (indicated by the ring curvature; Fig. 5). Fragments of charcoal from the other species represented were generally too small to note ring curvature.

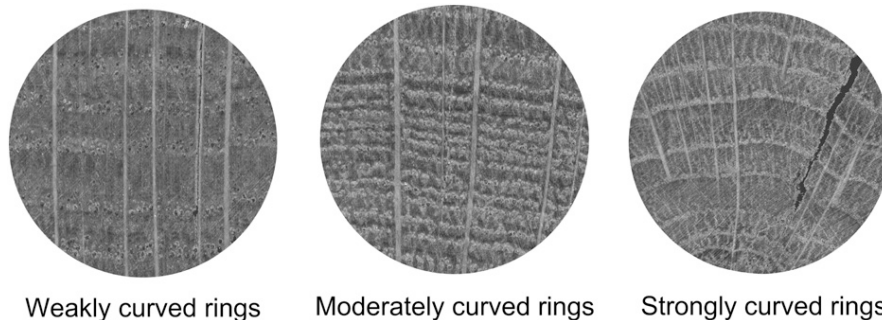


Fig. 5 Ring curvature. Weakly curved rings indicate the use of trunks or large branches (After Marguerie and Hunot 2007 1421, Fig. 3).

Also noted in the charcoal was the width of the rings, which can indicate if the wood came from trees growing in closed forest (generally narrow) or in open landscape (generally wide). Apart from C24, S25, the ash charcoal exhibited very narrow ring widths, indicating that the ash trees came from closed woodland. Again the fragments of the charcoal from the other species represented were too small to give much information on ring widths.

The assemblage from the kilns signifies that ash was the primary fuel used to fire the kilns. Ash burns well wet or dry so it does not need to be dried prior to use or left to season. The other woods recorded may have been used as kindling wood. It is likely that ash was readily available in the locality at the time. Interestingly, prior to excavation the site was covered by mature ash trees and hazel scrub, demonstrating that the soil type of the area is suitable to the growth of both trees. Given the

complete absence of oak ash was probably the most common large tree in the area at the time.

It is interesting to look at charcoal assemblages from other corn drying kilns. At Mackney ringfort, Co. Galway charcoal from a medieval corn drying kiln was examined. *Prunus* spp. was the dominant wood type in the kiln samples. This was followed by hazel wood, most of which came from twigs and very small branches (Dillon 2007). Two 7th century corn drying kilns at Randalstown produced a wide variety of charcoal. The assemblage here was dominated by Pomoideae wood type, hazel and holly (Dillon 2006). Charcoal analysis from two early medieval corn drying kilns at Charlesland Co. Wicklow, revealed that oak was the most common wood used. Also found in smaller amounts was hazel, *Prunus*, willow, holly and birch (ODonnell 2004). Charcoal identifications from medieval kilns at Corbally, Co. Kildare found that the dominant wood used in the kilns was hazel. Common species found were pomaceous fruitwood, holly and ash (Stuijts, 2002). The 13th Century corn drying kilns from Kilkenny town did not produce a lot of charcoal. Oak (47%) dominated the assemblage followed by *Prunus* type (21%). Ash, willow, birch, hazel and holly were recovered in lesser amounts. At Kilmainham 1C, Co. Meath ten cereal drying kilns were excavated from the late Iron Age/early medieval period. The charcoal assemblage here was dominated by hazel and oak (ODonnell 2010).

As one can see from these examples no pattern can be established in wood selection for corn drying kilns. Perhaps fuel selection for kilns didn't need to be too particular as high temperatures were not needed (unlike metal smelting for example, where high temperature achieving oak was the fuel of choice).

The circular structure

Three of the four samples from the circular structure contained charcoal. Sample 36 from context 12 contained no charcoal. The charcoal assemblage here was different from that from the kilns, although ash was also represented. Perhaps the most unusual factor about the assemblage was the amount of spindle wood which was represented. This tree does not often occur in the charcoal record. The spindle tree is a familiar sight today in South Galway and was presumably also common here in the past. As it is insect pollinated it does not appear in pollen records.

The charcoal assemblage tells us little about the use of the building. Although one sample came from a posthole, we know that the charcoal did not come from burnt posts as all the samples contained a mixture of species.

Conclusion

Most of the charcoal examined came from the two kilns where the assemblage was dominated by ash. The majority of the ash wood was from mature trees from a closed woodland. A variety of other woods was also identified in smaller amounts. Fresh wood appears to have been used as no insect infestation was noted. Given the absence of oak, ash was probably the most common large tree in the area (South Galway) in the past. The assemblage from the circular structure tells us little about the use of the building. However, the presence of spindle here is of interest as it is poorly represented in both the charcoal and pollen records.

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Appendix 5 – Plant remains analysis

By Penny Johnston

Introduction

This report details the results of macro-plant analysis from Toberbrackan, Co. Galway (E4801). The site comprised a stone enclosure with an internal structure that surrounded two stone-lined, dumbbell-shaped corn drying kilns. Most of the charred plant remains were recovered from within the kilns, or from nearby contexts.

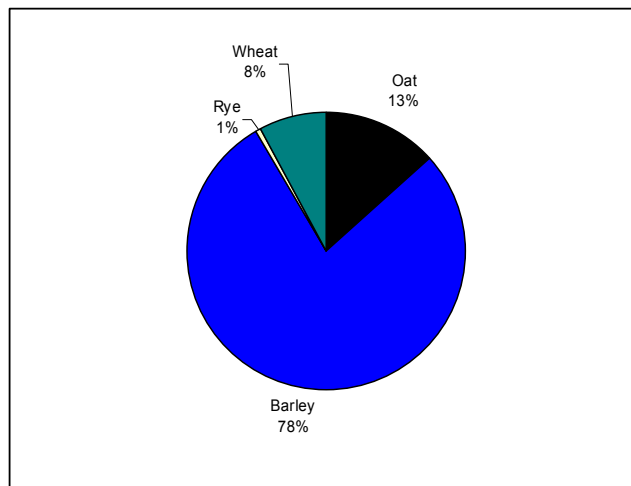
Methodology

Bulk soil samples were collected on site as bulk soil and were processed using a simple, bucket flotation method. The floating material (or 'flot') from each sample was collected in a stack of geological sieves (the stack comprised two separate mesh sizes, the largest was 1mm and the smallest was 250 μm). When all the carbonised material was collected the flot was then air-dried in paper-lined drying trays prior to storage in airtight plastic bags. A total of twelve samples were sieved and then scanned under low-powered magnification (x 10 to x 40) using a binocular microscope. The results of scanning are presented in Table 1 at the end of this report. Eleven samples contained plant remains and these were identified using the same magnification as used for scanning. Results are presented in Table 2 and nomenclature and taxonomic order follows Stace (1997). All the >1mm flots were sorted. In samples where more than 100 cereal items were found (C.9, C.18, C.24 and C.31) the >250 μm flots were also sorted.

Results

Charred seeds were recovered from eleven of the samples. Most of the plant remains comprised cereal grains and small weed seeds. The cereals were primarily barley (Figure 1).

Figure 1: Percentage cereal composition in samples from Toberbrackan, Co. Galway (E4801)



Large quantities of weed seeds were also recovered from two samples in particular (from C.31 and C.24), both fills of Kiln 1. The weed seeds were mostly plantains, docks/knotgrasses and goosefoots. These are common weeds of arable and waste ground and are often associated with human activity.

C.9 (S.1) – 212 cereal grains and 15 weed seeds

The plant remains from this sample, taken from a black, charcoal-rich layer that ran beneath a rebuilt wall. The sample included a small collection of hulled barley grains and a large amount of indeterminate cereal grains that could not be identified because the quality of preservation in this sample was not good. A small collection of weed seeds was found, including grasses, goosefoots and dock/knotgrasses, along with a small quantity of hazelnut shell fragments.

C.12 (S.36) – 3 cereal grains and 1 weed seeds

The small quantity of plant remains from this sample contained just three indeterminate cereal grains and one weed seed. It was taken from the rubble core of a possible round house or kiln house.

C.14 (S.4) – 41 cereal grains and 9 weed seeds

This sample contained a small amount of hulled barley grains and a larger quantity of indeterminate cereals. Weeds included goosefoots, dock/knotgrasses, plantains and grasses. The sample was taken from a possible post-hole.

C.18 (S.14) – 128 cereal grains and 17 weed seeds

This sample was taken from the fill of kiln 2. It included a large amount of hulled barley grains and an even larger quantity of indeterminate cereal grains. A small quantity of oat grains was also found as well as goosefoots, dock/knotgrass seeds and wild radish.

C.24 (S.13) – 14 cereal grains and 5 weed seeds

A small quantity of weed seeds and indeterminate cereals were recovered from this sample, taken from the fill of Kiln 1. Despite being a kiln fill, seeds were only found in small amounts in this sample.

C.24 (S.15) – 137 cereal grains and 182 weed seeds

Another sample from the same fill in Kiln 2 was much richer, containing quite a good collection of hulled barley grain and a relatively good quantity of oat grains. A much small amount of wheat was also found. The weed seeds included goosefoots, dock/knotgrasses, plantains and grasses.

C.31 (S.17) – 188 cereal grains and 1035 weed seeds

This sample was taken from the fill of kiln 1. It included a large quantity of weed seeds, many of which were very small. The absence of larger weed seeds suggest that some crop processing has been carried out, but that sieving to eliminate small weeds had not been concluded before the crop was burnt. Alternatively, these small weed seeds may have been removed from the crops during processing, set aside, and then used as tinder for the fire in the kiln. If this is the case, then they later

became mixed with a deposit of grain, since the quantity of grain found in this sample was quite large. It included a very small quantity of oat, wheat and possible rye grains. Most of the grains from this sample were, once again, identified as hulled barley grains. Preservation in this sample was good and there were relatively few indeterminate cereal grains in this sample.

C.32 (S.16) – 6 cereal grains and 4 weed seeds

This sample contained a small quantity of cereal grains and weed seeds. The identifiable cereals were primarily hulled barley. The sample was taken from the fill of kiln 1.

C.33 (S.) – 30 cereal grains and 7 weed seeds

This sample was taken from the fill of kiln 2. The plant remains included seeds from the dock/knotgrass plants and grass seeds. Cereals were mostly hulled barley, although these were only found in small quantities. Most of the cereal grains were not identifiable (Ceralia).

C.37 (S.33) – 37 cereal grains and 4 weed seeds

This sample contained the remains of dock/knotgrass seeds, 2 oat grains, some hulled barley, a possible rye grain and some grasses. The most common type of plant material were classified as indeterminate cereal grains. The sample was taken from the fill of kiln 2.

C.38 (S.34) – 21 cereal grains and 3 weed seeds

This sample was taken from the fill of kiln 2. It contained a small amount of weed seeds and some cereals, mostly identified as hulled barley.

The cereal assemblages from both kilns at Toberbrackan were predominantly made up of grains of barley (72% in Kiln 1 and 87% in Kiln 2). A smaller percentage of oats were recovered from both kilns (16% in Kiln 1 and 11% in Kiln 2). The main difference between the cereals from the two kilns is that wheat was a significant portion of the assemblage from Kiln 1, making 12% of the assemblage, whereas it was only 1% of the assemblage from Kiln 2.

Figure 2: Cereal composition in Kiln 1

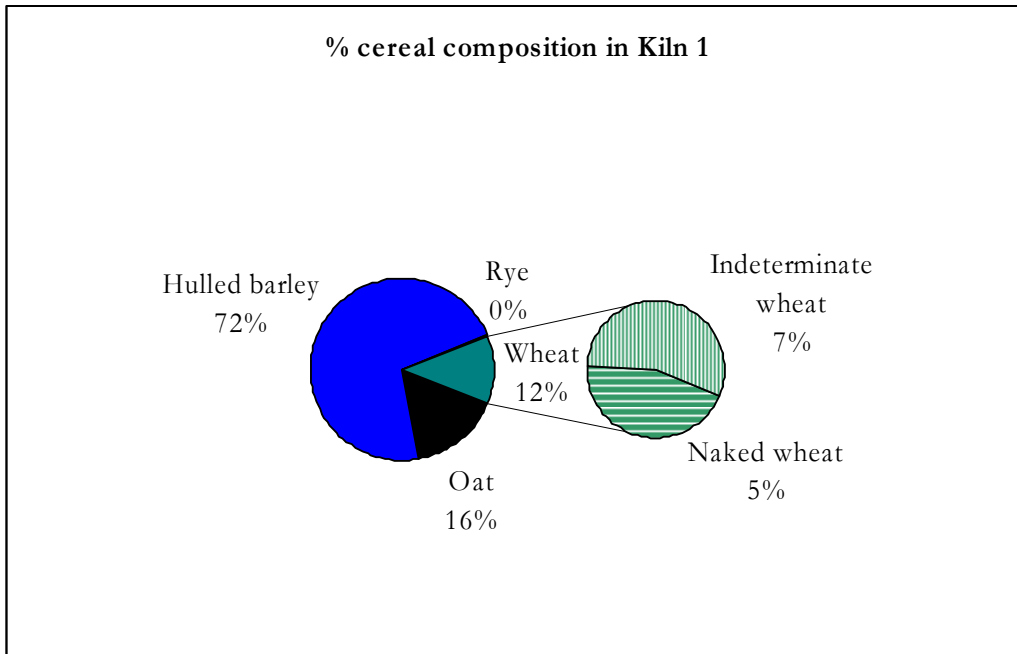
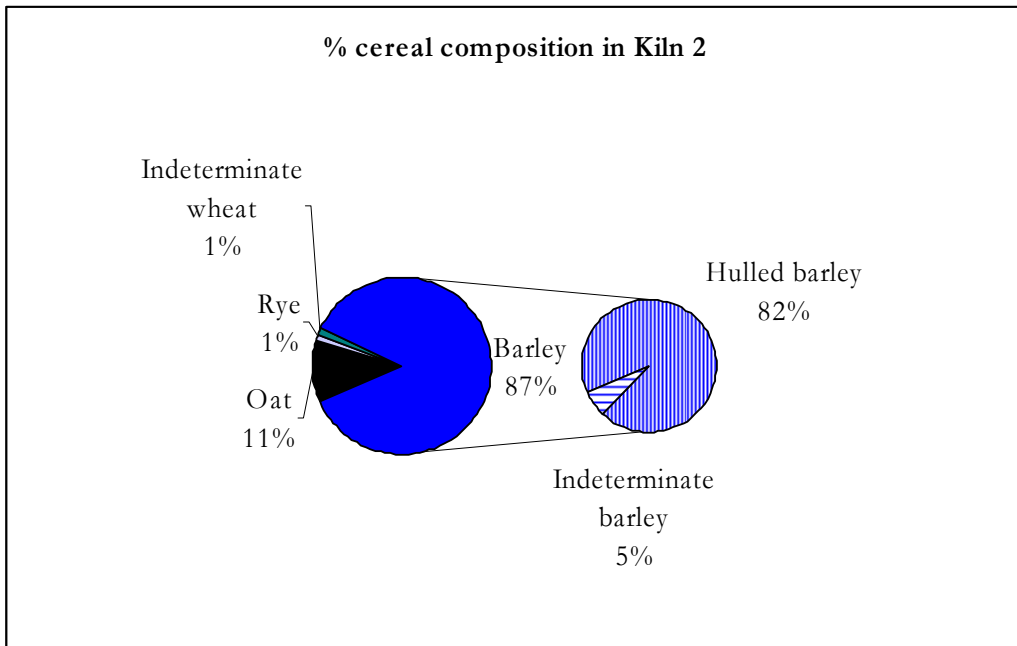
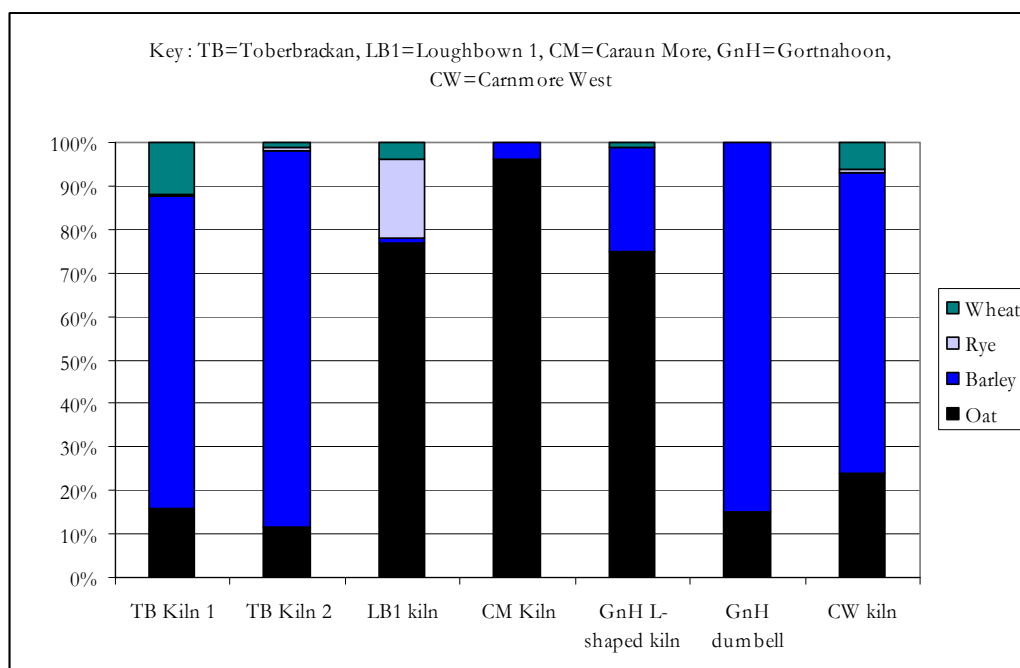


Figure 3: Cereal composition in Kiln 2



Comparative material from other kilns in Galway

There are a number of different kiln sites from Galway county where plant remains studies have been carried out (Toberbrackan, Loughbown 1, Caraun More, Gortnahoon and Carnmore West). Plotting the percentage cereal data from kilns at these sites indicates that the Toberbrackan remains are similar to those from the dumbbell-shaped kiln at Gortnahoon and the kiln at Carnmore West. In all these samples barley is the predominant cereal type and there are small portions of oat in each of the kilns (less than 20% apart from Carnmore West).



Non-technical summary

The plant remains from Toberbrackan, Co. Galway were examined. The results indicated that barley was the most common cereal type found, making up more than three-quarters of the entire assemblage. Oat and wheat were also important, but rye was found in much smaller quantities. Large quantities of small weed seeds were found in some samples, despite the fact that larger weed seeds were not present. This suggests that either some crop processing by-products were used as tinder in the kiln, or that fine-sieving had not been carried out before the crop was burnt. Comparisons between the samples from the two kilns excavated at Toberbrackan indicated that the assemblages from both kiln were relatively similar. An examination of kiln samples from other sites in Co. Galway suggested that the material from Toberbrackan had two comparisons at Gortnahoon and Carnmore West in terms of cereal composition. However, other kilns at Gortnahoon, Caraun More and

Loughbown 1 were quite different and contained large amounts of oats and relatively small quantities of barley.

Recommendations for retention

All the seeds and easily identifiable plant material from this site have been extracted from flots of the selected samples, apart from samples where only a fraction of the sample was sorted (listed in Table 2). The extracted plant remains are now stored in glass phials. It is recommended that these are submitted to the National Museum of Ireland (NMI) along with the artefacts from this site.

In order to comply in general with NMI guidelines, the Irish Archaeobotanical Discussion Group (IADG) recommends that glass tubes of plant remains are stored in plastic bags with labels loose within the bags. This means that there is no possibility that the labels could cause chemical contamination of the plant material in the future (thereby ensuring that they are available for future radiocarbon dating or other analyses). The material should be packed and stored in sturdy boxes to avoid breaking the glass phials.

It is recommended that all flots from this site are retained for potential study in the future. Although the plant remains have been extracted from these samples, other material such as charcoal has not all been extracted and charcoal studies were limited. These could offer a potentially valuable contribution to future research.

Context No	Sample No	Seeds	Charcoal	Mollusca	Insects	Puparia	Bone	Other
15	6	-	****	trace	-	-	-	roots
38	34	***	****	**	-	trace	-	roots, clay fragments
32	16	**	*	**	-	trace	-	roots
31	17	****	*	**	*	trace	trace	roots
14	4	***	*	**	-	-	trace	roots
24	13	**	*	****	-	trace	-	roots
9	1	****	***	*	*	trace	-	roots
12	36	*	trace	****	-	*	-	roots
18	14	****	****	***	-	trace	-	roots
33	27	***	****	**	-	-	-	roots
24	15	***	****	*	-	-	-	roots
37	33	**	****	****	-	-	-	roots

Table 1: Results from scanning the samples from Toberbrackan, Co. Galway (E4801)

	Wall >1mm 50%	Wall >250µm 100%	Rubble >1mm 100%	Post- hole >1mm 100%
Flot size				
Percentage sorted				
Context	9	9	12	14
Sample	1	1	36	4
Hazelnut shell fragments (<i>Corylus avellana</i> L.)	2	-	-	-
Indeterminate seeds from the goosefoot family (Chenopodiaceae)	1	4	-	3
Indeterminate seeds from the Knotgrass family (Polygonaceae)	7	-	-	1
Plantain (<i>Plantago</i> L. species)	-	-	-	1
Hulled barley grains (<i>Hordeum vulgare</i> L.)	22	-	-	8
Probable hulled barley grains cf (<i>Hordeum vulgare</i> L.)	5	-	-	-
Indeterminate cereal grains	185	-	3	33
Indeterminate grass seeds (Poaceae)	1	-	-	3
Indeterminate weed seeds	2	-	1	1

Table 2: Identified plant remains from Toberbrackan, Co. Galway (E4801)

Kiln 1 Kiln 1 Kiln 1 Kiln 1 Kiln 1 Kiln 1

Flot size	>1mm	>1mm	>250µm	>1mm	>250µm	>1mm
Percentage sorted	100%	100%	100%	50%	50%	100%
Context	24	24	24	31	31	32
Sample	13	15	15	17	17	16
Indeterminate seeds from the goosefoot family (Chenopodiaceae)	-	42	102	54	243	2
Corn Spurrey (<i>Spergula arvensis</i> L.)	-	-	-	-	1	-
Indeterminate seeds from the pink family (Caryophyllaceae)	-	-	-	-	1	1
Pale Persicaria (<i>Persicaria lapathifolia</i> (L.) Gray)	-	-	-	50	-	-
Black bindweed (<i>Fallopia convolvulus</i> (L.) Á. Löve)	-	16	-	28	-	-
Probable Sheep's sorrel (<i>Rumex</i> cf <i>acetosella</i> L.)	-	-	-	1	1	-
Indeterminate seeds from the Knotgrass family (Polygonaceae)	1	7	-	37	3	1
Wild radish (<i>Raphanus raphanistrum</i> L.) capsule	-	-	-	1	-	-
Hemp-nettle (<i>Galeopsis</i> L. species)	-	-	-	1	-	-
Plantain (<i>Plantago</i> L. species)	2	9	2	282	90	-
Cleavers (<i>Galium aparine</i> L.)	-	-	-	1	-	-
Nipplewort (<i>Lapsana communis</i> L.)	-	-	-	10	32	-
Probable Corn Marigold (<i>Chrysanthemum</i> cf <i>segetum</i> L.)	-	-	-	-	1	-
Indeterminate seeds from the daisy family (Asteraceae)	-	-	-	-	7	-
Oat grains (<i>Avena</i> L. species)	-	30	-	5	-	1
Hulled barley grains (<i>Hordeum vulgare</i> L.)	-	45	-	105	-	3
Probable hulled barley grains cf (<i>Hordeum vulgare</i> L.)	-	-	-	8	-	-
Possible rye grains (cf <i>Secale cereale</i>)	-	-	-	1	-	-
Probable free threshing wheat (<i>Triticum</i> cf <i>aestivum</i> L./ <i>turgidum</i> Desf./ <i>durum</i> L.)	-	7	-	5	-	-
Wheat grains (<i>Triticum</i> L. species)	-	8	-	7	-	-
Indeterminate cereal grains	14	46	1	57	-	2
Indeterminate grass seeds (Poaceae)	2	2	1	12	36	-
Indeterminate weed seeds	-	-	1	34	109	-

Table 2: Identified plant remains from Toberbrackan, Co. Galway (E4801) continued

Kiln 2 Kiln 2 Kiln 2 Kiln 2 Kiln 2

Flot size	>1mm	>250µm	>1mm	>1mm	>1mm
Percentage sorted	100%	100%	100%	100%	100%
Context	18	18	33	37	38
Sample	14	14	27	33	34
Indeterminate seeds from the goosefoot family (<i>Chenopodiaceae</i>)	3	-	-	-	2
Black bindweed (<i>Fallopia convolvulus</i> (L.) Á. Löve)	3	-	-	1	-
Probable Sheep's sorrel (<i>Rumex</i> cf <i>acetosella</i> L.)	-	-	1	-	-
Indeterminate seeds from the Knotgrass family (<i>Polygonaceae</i>)	9	-	1	1	-
Wild radish (<i>Raphanus raphanistrum</i> L.) capsule	1	-	-	-	-
Oat grains (<i>Avena</i> L. species)	5	-	3	2	1
Hulled barley grains (<i>Hordeum vulgare</i> L.)	42	-	9	15	12
Barley grains of indeterminate species (<i>Hordeum</i> species)	-	-	5	-	-
Barley rachis internodes (<i>Hordeum</i> spp.) indeterminate type	2	-	-	-	-
Possible rye grains (cf <i>Secale cereale</i>)	-	-	-	1	-
Wheat grains (<i>Triticum</i> L. species)	-	-	1	-	-
Indeterminate cereal grains	81	-	12	19	8
Indeterminate grass seeds (<i>Poaceae</i>)	1	-	1	2	-
Indeterminate weed seeds	-	-	4	-	1

Table 2: Identified plant remains from Toberbrackan, Co. Galway (E4801) continued