

EARLY MEDIEVAL ARCHAEOLOGY PROJECT (EMAP2)  
Reconstructing the Early Medieval Irish Economy  
EMAP Report 5.1

# The Archaeology of Livestock and Cereal Production in Early Medieval Ireland, AD 400-1100



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and Aidan O'Sullivan

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**The Early Medieval Archaeology Project  
(EMAP):**

**Project Report 2011**

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By

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# Forward

EMAP Report 5.1 deals with the archaeological evidence for agriculture in early medieval Ireland. It is comprised of three sections. The first section provides a general overview of agriculture in early medieval Ireland through an examination of the various strands of evidence for agricultural production. It seeks to define the agricultural landscape of the period thus providing a context for the other parts of the report. The archaeological evidence for plant and animal remains is covered in fuller detail in sections two and three. Part two, prepared by Meriel McClatchie, evaluates the archaeobotanical and plant remains evidence for this period and includes a gazetteer of sites with seed assemblages, most of which is derived from the 'grey literature' and unpublished sources. Part three, prepared by Thomas Kerr, applies the same template to the zooarchaeological study of the period. As with the plant remains, most of these assemblages have not been previously published and are derived from the large body of 'grey literature' that has emerged during the last two decades. Both gazetteers are accompanied by a discursive overview of the material which demonstrates how this contributes to the understanding of the settlement economy of the period.

Both the plant remains and animal remains studies show that certain centuries within the early medieval era produce more settlement evidence than others. They also suggest that there are regional patterns of animal husbandry and cereal production present during the early medieval period. These findings indicate that there was a lower degree of uniformity in farming practice across Ireland than previously indicated, and imply that future research on early medieval period may need to acknowledge some degree of regionalism.

The authors would like to thank all those excavators and specialists whose reports are referred to prior to their final publication and especially the Heritage Council (INSTAR) which financed the project.

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## Section 1:

# The Farming Landscape of Early Medieval Ireland

### Introduction:

Early medieval Ireland was an overwhelmingly rural landscape, with individual farmsteads (raths and crannogs), fields, and route-ways set in a highly managed agricultural landscape. In this rural landscape, farming was the constant in people's daily lives. The majority of the community, especially the ordinary and un-free members of society, such as the low-status commoners, hereditary serfs and slaves, would have spent most of their lives at work in the fields - herding cattle, sheep and pigs, ploughing, sowing and harvesting crops, or building and repairing field-walls. In the home, the daily lives of men and women would have been dominated by domestic activities relating to agriculture, whether this was in terms of preparing milk and cheeses, grinding grain for flour, salting meats for winter storage, or spinning and weaving wool.

Agriculture, however, was not only important in terms of subsistence. It was also the key element in the organisation of early Irish society. Whether they were a lord or a slave, most people would have depended for their social status, subsistence and livelihood on the agricultural produce of the land. Kinship and community, social status and gender roles – these were all organised around the patterns of land-use and agricultural labour. For these reasons, agriculture and economy have to be seen as key aspects in the study of early medieval Irish society. Documentary sources emphasise the role of pastoral farming, particularly cattle farming, during the early medieval period, though the archaeological evidence for this is largely limited to post-consumption skeletal remains. Archaeological features representative of arable farming – fields, mills, kilns, etc. – however, suggest a more mixed pastoral/arable farming economy.

Faunal evidence indicates a diversification in livestock-rearing from the ninth century onwards, characterised primarily by a decline in the importance of cattle (McCormick and Murray 2007). Kerr (2007, 114-16; 2009, 72-74) shows a change in the settlement pattern at the same time with a growing preference, at least in the north of Ireland, for high-status settlement in good arable areas. The ninth century is also marked by a significant expansion in horizontal mill construction (Brady 2006, 39-68). Much of this evidence implies an increase in the importance of arable farming. The documentary evidence, especially the Saint's lives, suggests a strong association between monasteries and arable farming (Stout 1997, 129-30). Archaeological evidence for this association is provided by the presence of mills at monasteries such as Nendrum, Co. Down (McErlean and Crothers 2007); High Island, Co. Galway (Rynne 2000, 15-17); and Inismurray, Co. Sligo (O'Sullivan and Ó Carragáin 2008, 246-51), although, of these, only Nendrum has been dated. It has been noted that the early laws indicate that a miller is one of the 'functional grades' of the church and that mills 'should be seen as a characteristic component of an early Irish monastery' (McErlean and Crothers 2007, 433). The archaeological evidence for increased diversification, however, is not supported by the palynological data.

Modern studies 'demonstrate that, when a few metres from the edge of a cereal field, the value of cereal pollen falls sharply from levels as high value of 20% to about 1%, and is still detectable even at many hundred metres distance' (Hall 2000, 348). Thus pollen evidence from blanket bog cores, which would be expected to be a considerable distance from arable fields, can only record the extremes of cereal production and is incapable of recording more subtle, yet significant, changes and differences in farming economy. As such, Hall (2005) deliberately sampled areas near monastic settlements to see if the foundation of these sites affected farming intensity, especially in crop cultivation. She found no evidence for this – indeed the evidence indicates that monasteries were generally founded in places where arable

farming was already established. It was also noted that 'a comparison of evidence from the monastic and secular sites does not indicate change unique to monastic landscapes' (*ibid.* 11). The suggestion that ecclesiastical sites would have had a higher emphasis on arable farming is not presently supported by the pollen evidence.

Reviews of the pollen evidence for early medieval Ireland express a general consensus that, after a period of agricultural decline, forest clearance and agricultural expansion can be seen during the third and fourth centuries A.D. (Cole and Mitchell 2003; Hall 2000; Hall 2005; Plunkett 2007). This clearly predates the traditional arrival of Christianity in the fifth century. Occasionally wholesale forest clearance does not occur until much later. There was significant woodland clearance in Co. Antrim in the ninth century (Hall *et al.* 1993) and Parkes and Mitchell (2000) suggest similar clearance in Co. Offaly *c.* A.D. 800, however the Offaly profiles were not independently dated. Subsequent work in the same area cast doubts on the interpretation of a ninth century decline, but indicated a decline in tree pollen in the mid-thirteenth century (Hall 2003).

Apart from the areas of highlands and extensive bog cover, the pollen evidence for early medieval Ireland indicates a landscape of scrubby woodland and mixed farming, almost invariably dominated by pastureland. Large areas of extensive forest were rare. Ryan (2000, 33) draws attention to a ninth-century text that refers to only three forest wildernesses in Ireland – the woods of Cooley; Deicsiu in Tuirtre; and the Wood of Moithre in Connacht. Arable farming is present to some extent in nearly all areas, and although there is considerable local variation, significant regional or chronological trends in farming are difficult to identify.

## Fields and the Organisation of the Farming Landscape

The term '*field*' is problematic indicating different things at different times. Fowler (2002, 127) notes that the term is derived from the Old English *feld* which, prior to the tenth century, meant 'open country', to distinguish it from, for instance, woodland. The meaning of *feld* as cultivable land, however, only emerged at the end of the first millennium A.D. At this time 'field' did not imply enclosure but was instead applicable to an area of land. This distinction survives into the present day in certain regions, with a continuing differentiation between 'infield', i.e. the land around the farmstead which benefits largely from manuring and ploughing, and 'outfield', i.e. the, largely pastoral, remainder. It has been argued that the way in which these 'fields' were organised may imply the nature of the farming conducted and the overarching social structure. Meitzen (1895) categorised early field systems into two broad types – 'Celtic' and 'Germanic'. In the 'Celtic' system the land was owned by an individual farming homestead and was characterised by small enclosed fields (Patterson 1994, 104); while in the 'Germanic' system the land is owned communally by a nucleated village settlement and is characterised by a mixture of private enclosure and land divided broadly in infield and outfield which was farmed communally.

Archaeologically it is easier to create typologies of field types than to understand how they were used. Fowler (2002, 133), in the context of prehistoric and early-historic British fields, concludes that 'there is not much correlation between field-shape in time, process and product'. There is, however, still a tendency to divide fields into arable or livestock, which ignores the fact that use may have changed over ensuing years. While all arable land can make perfectly good grazing the reverse is not necessarily true, for example cultivated land was periodically left fallow and used as pasture, and the stubble-field produced after a crop is harvested makes good autumn grazing.

Individual 'fields' are recognised in the legal tracts of early medieval Ireland. The *Crith Gablach* (Law of Status) mentions the *airlise*, a rather restricted area of land that extended 'the length of a spear cast on every side' from the rath/farmstead (Kelly 1997, 368). Kelly (*ibid.* 369) speculates that 'the *airlise* of a typical farm contained various enclosures for grazing and cultivation including a garden'. Whereas the *Crith Gablach* is concerned with the trappings of status, the *Bretha Comaithchesa* (Law of Co-Tenancy) is more concerned with identifying individual property and resolving damages for trespass caused by a

neighbour or his/her livestock. This law tract therefore clearly defines what constitutes a legal boundary (discussed below), and also distinguishes between various grades of farmland. The *Bretha Comaithchesa* mentions farmlands called the '*faithche*' and the '*gort faithche*'. *Faithche* is generally translated as 'green' or 'infield' and seems to refer to an area in the vicinity of the rath, whereas '*gort faithche*' suggests a tilled field, perhaps a subdivision of the more general infield (Kelly 1997, 370). These fields are rather vaguely stated to have extended 'as far as the sound of a bell or the crowing of a cock reaches' (*ibid.*), presumably larger than the spear-cast that marked the *airlise*. Beyond this were lands described as '*sechtar faithch*' ('beyond the *faithche*') which Kelly concludes is the outfield. The texts, however, do not specify whether or not these various areas were enclosed. Fowler (2002, 131) concludes that the concept of a field essentially means, rather vaguely, 'an area of land to create a terrestrial space where agrarian functions can be pursued in reasonably controlled environmental circumstances', a definition that does not utilise the word 'enclosure'.

Enclosure can be desirable for two reasons. Firstly, where land was owned privately as was the case in early medieval Ireland, enclosure was necessary to demarcate ownership. Otherwise there will be chaos both in current management and the legal obligations of passing ownership from one generation to another. Secondly, while enclosure is not necessary for cultivation, it is necessary when livestock rearing and cultivation occur in tin close proximity. Livestock must be separated from cultivated lands and lands set aside for growing animal fodder. This could imply the use of formal grazing and cultivation enclosed fields. Alternatively, herds of domesticates could be supervised by shepherds during the day and kept in paddocks/corrals/animal enclosures or houses at night.

### ***Private Landholding***

As noted above the early texts provide detailed descriptions of various types of field boundaries of the period (O'Corrain 1986, 247-51; Kelly 1997, 372-78). There are four types; a ditch and bank (*clas*), a stone fence (*cora*), an oak fence (*dairimbe*), a 'bare fence', a post and wattle fence (*nochtaille* or *felmad*). The *cora* was to be three feet wide and four feet high. It was stated to be a 'wall of three stones' which Kelly (1997, 373-74) interprets as being of three coursed high. The tool used for its construction was a *soc* which Kelly (1997, 374) interprets this as a stone lever. O'Corrain (1986, 247) interprets this as being a plough share. He explains this interpretation by stating that a plough would have been used to create the line of the fence and by removing the sod providing a firmer foundation for the wall. McAfee (1997, 105) states that the topsoil should be removed in order to set the foundation course of a drystone wall but it is a likely that the use of a share refers to unearthing of the stones used in the wall construction during ploughing. The trench and bank boundary (*clas*) was to be made with a spade, the bank to be three feet high and the ditch three feet deep. It is almost impossible to identify these field monuments on a purely typological basis, since stone walls and earthen banks have been used throughout the history of farming in Ireland. The early medieval boundaries also share similar dimensions to post-medieval ones, for example the fences in Co. Leitrim at the turn of the nineteenth century were composed mainly of 'a drain from 4-6 feet wide and [a bank] of 3 or 4 feet' (McParlan 1802, 48).

The 'bare fence' was stated to be primarily for managing livestock a law tract stating that 'a small pig should not be able to penetrate because of its closeness, and an ox should not be able to penetrate because of its firmness and height' (Kelly 1997, 374-5). There is much detail of its construction. The vertical posts set eight inches apart, and the horizontal wattles arranged in three bands. The posts should be four feet high and project one foot above the upper band of wattle. This, in turn, was to be crowned with a crest of blackthorn (*cir draigin*). Three strikes of a mallet were to secure the vertical posts into the ground. The tool specified for its construction was the bill-hook. It may well be that this was a temporary, and perhaps movable, type of fence used primarily for controlling grazing by livestock. O'Corrain (1986, 250) supports such an interpretation. His reading of the text leads him to conclude that the stone and ditch and bank fences are regards as permanent but that the post and wattle fence was temporary, possible seasonal. The texts make a distinction between the types of land on which the fences are built although heir meaning is unclear. The stone and bank and ditch fences are built in the *nochtmachaire*

which literally means 'bare plane' while the post and wattle fence was to be built on the *lethmachaire* which means 'half plain'. O'Corrain (1986, 248-9) interprets the former as arable land and the latter as 'pastureland occasionally tilled'.

The final fence was that of oak which was to be used in woodland. Its method of construction is unclear as descriptions are confusing. Kelly (1997, 376) notes that it seemed to be of similar dimensions as the 'bare fence' but with oak posts. The fact that the axe was the specified tool of construction may imply the use of split oak planks. O'Corrain (1986, 250) suggest that the fence was made by felling a line of trees in woodland and using the surviving trunks as vertical posts for the fence. Again it had to be livestock proof as 'it had to be made so the oxen may not go through it because of its height nor the little animals [piglets?] because of its density' (*ibid.*). The purpose of this type of fence is unclear. The fact that it was meant to exclude grazing livestock might suggest that it was meant to protect the young shoots in areas of coppicing.

The fences of the *Bretha Comaithchesa* are mentioned in association with various 'fields' – *nethemain* ('cornland'); *diguin* ('enclosed meadow'); *athlumpaire* ('pasture field'); and *ethamain* ('grass field') – and differences are noted between winter (*geimreta*) and summer (*samrata*) grazing. There is also a distinction between *diguin* and *ethamain*, since they are both referred to separately in a section on trespass on winter grass, suggesting that the grass fields may not necessarily be enclosed (Richey 1879, 80-81). Most informative, however, are the sections on the fines for different forms of trespass onto another's property. Thus trespass on a field of winter grass draws the fine of two cows, if the field has a 'full fence' (*lán ime*); a cow and a heifer if the field has a 'half-fence' (*leth ime*); and a cow if there is no fence. The trespass on summer grazing has the same qualifications, but lower penalties – a cow;  $\frac{3}{4}$  of a cow; and a heifer respectively (*ibid.* 82-83). The fact that fines may still be awarded for trespass onto 'fields' which were not fenced in quite clearly indicates that enclosure was not necessary in the enforcing of private property rights during the early medieval period.

### ***Enclosure as an Indicator of Arable Land***

The early texts make it clear that ploughing was the normal way in which fields were prepared for the sowing of cereals (Kelly 1997, 468). The law tracts also imply that the regular plough team comprised four oxen. The *Críth Gablach* states that the *ócaire* owned one ox, i.e. quarter of a plough team (Macneill 1923, 287), thus four farmers would each contribute four oxen to the ploughing. Kelly (1997, 371) suggests that this implies co-ownership of a large open-field cultivation area with each farmer having separate strips, but also stresses (1988, 102) that this is indicative of co-operate farming and not collective farming, i.e. the produce was not pooled among the farmers involved. The crops were grown on large raised beds or ridges (*immaire*) separated by a drainage trench. One source describes these ridges as being eight feet in width although this is in an untypical context where the crops are being actually grown within a rath. Another text, however, suggests that the *immaire* width was equal to seven sods of the plough (Kelly 1997, 72). This would roughly equate with seven feet.

Ploughing can be undertaken most efficiently in an open landscape that avoids the creation of uncultivable headlands necessary for turning an ox team. The meagre documentary sources refer to cultivated fields having two (*ardchinne*) headlands and two sides, the former being short and the latter being long although the exact dimensions are not stated (Kelly 1997, 372). The fact that there were only two headlands implies that cross-ploughing was not practiced. As there is little evidence for the use of a mould board at this time (see below) it is likely, as Kelly (1997, 469) suggests, that 'much supplementary work had to be done with spades or mattocks before the seedbed was ready for sowing'. The optimal shape for a field where cross-ploughing was employed is square, whereas without cross-ploughing a long rectangular field is more desirable. In both instances the field should have parallel sides, otherwise uncultivated side areas, along with the headlands will occur. The presence of headlands for turning the plough team would imply an enclosed field, and these lynchets may survive as archaeological features. One needs to avoid the conclusion that cultivation necessitated field enclosures. An early seventeenth-

century (1623) observer in Ireland, for example, explains how 'enclosure' may be achieved without leaving permanent landscape features: 'Where wood is plentiful they hedge in all the corn with stakes and bushes and bushes and pull them down in winter and burn them, and the next year make up new hedges with bushes and the like' (O'Brien 1923, 33).

More affluent farmers, the *mruigfer*, who had their own plough-team, were expected to sow sixteen bushels of seed corn (Kelly 1997, 371). One could use this data to calculate the area of cultivation. An early fourteenth-century record for Cloncurry, Co. Kildare, records a seeding rate of five bushels/acre for wheat and twelve bushels for wheat (Murphy and Potterton 2011, 317). This seems high and the authors speculate that the size of the 'acre' in that particular record is in doubt, as the value attributed to the said land was exceptionally high. Contemporary records indicate seeding rates/acre of 2.8 bushels for wheat and 4.8 bushels for oats. Higher sowing rates of 3.5 bushels for wheat and 6 bushels for oats are recorded in the more intensively farmed better soils of eastern Kent (*ibid.*). This could be accounted for in one medium sized field of between *c.* 1.5 and 5 acres.

An efficient agricultural economy requires an organised and controlled farming landscape. This can, however take a number of forms, for example the crude separation of cultivated 'infield' and pastoral 'outfield'. In this sense enclosure may be taken as an indicator of arable farming, and as a way of protecting the crop from the livestock. Examples of this in later medieval Ireland may be seen in the transhumance practice known as boolying. In this system the animals, accompanied by herdsman, are driven off to summer pasture, often in the uplands, and were only brought back after the harvest to be wintered in the infield. The manure produced over this period may then be ploughed into the infield to improve the arable land once the livestock are moved back to summer grazing.

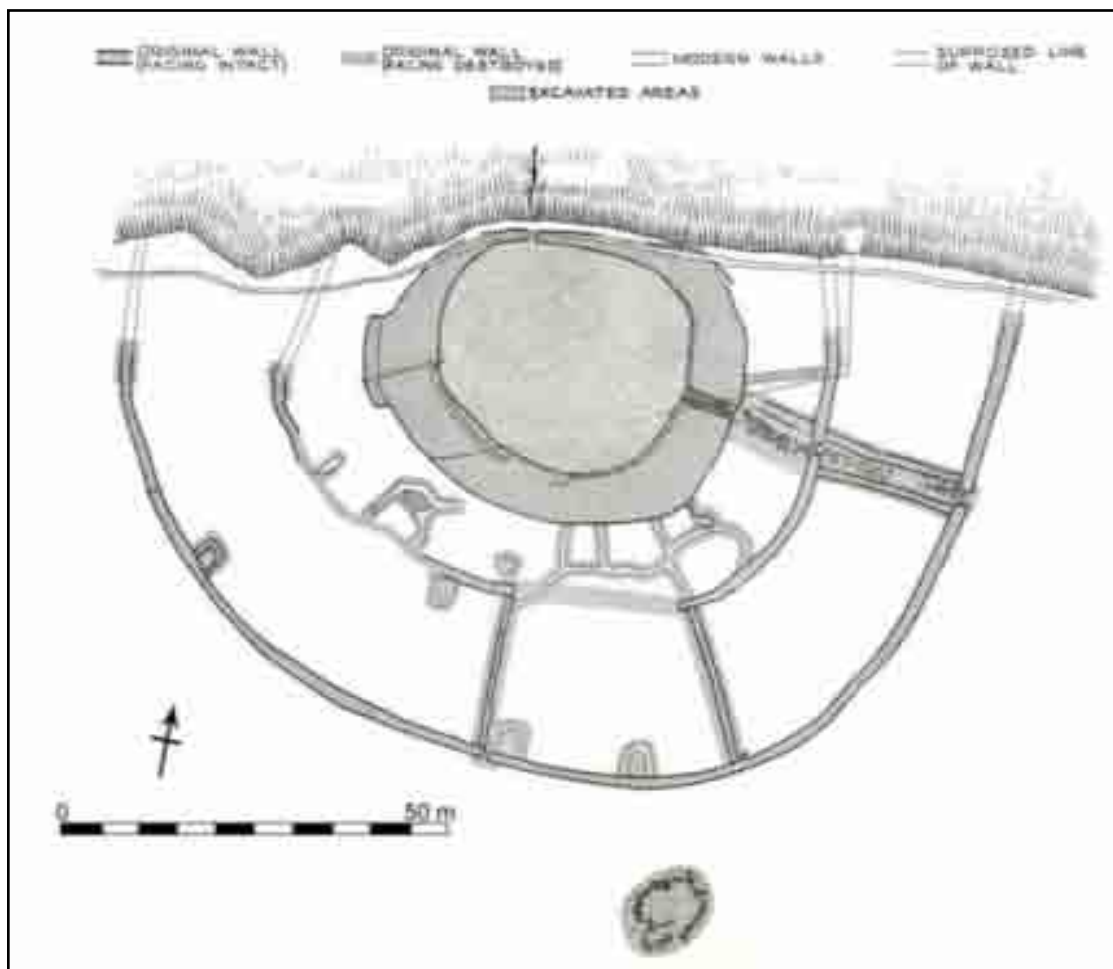
There is, however, little discussion of boolying in the early legal sources, although a similar outcome could be achieved by rigid supervision of the herds during the day and enclosing the herd at night. One thing the early medieval sources do note, however, is the fact that the Irish did not save hay (e.g. *Konung's Skuggsjá*, a Norse work written *c.* A.D. 1250 (Larson 1917); and Bede's *Ecclesiastical History*, written in the eighth century (Sherley-Price 1965, 39)). Instead, *etham ndíguin* (un-grazed 'preserved' grass) was used for winter fodder (Kelly 1997, 45-6). This also necessitated that cattle be kept away from the winter pasture during the summer growing months. Thus enclosure was also necessary for the management of pasture rather than simply separating livestock from cultivated crops. The modern equivalent of this is the use of growing turnips or brassicas as winter fodder. These are grown in permanent enclosed fields during the summer and with the cattle being allowed managed access to them by the use of temporary electric fences during the winter. It could well be that the wattle fences discussed in the law tracts (below) were used in this way.

Neither boolying nor the preservation of winter grass, however, produce the patchwork of small enclosed fields that covered most of Ireland from the eighteenth century through to the advent of more mechanised farming that necessitated larger fields. Law tracts, like the *Bretha Comaithchesa*, however, suggest that early medieval Ireland may have resembled this landscape tapestry, by describing in detail the division of land through the construction of banks and ditches, wooden fences and stone walls (O'Corrain 1983; Kelly 1997, 372-78). It is likely that there would have been significant regional variation with small permanent field being more a feature of the poorer stony parts of the country where field walls were essentially linear clearance cairns, made necessary by any attempt to cultivate the landscape rather than trying to attain 'enclosure'. While the early Irish law tracts 'tell us a great deal about field-boundaries' they say 'rather little about the fields themselves' Kelly (1997, 370). It is simply impossible on the basis of the documentary evidence to ascertain if the landscape was predominately 'enclosed' or 'unenclosed'.

# Archaeological Evidence for Field Boundaries and Enclosures

## *Fields at Raths/Ringforts/Cashels*

Many areas in Ireland, especially marginal areas, preserve the remains of fossilised fields. Field boundaries are, however, notoriously difficult to date. Stone walled field systems associated with cashels are often assumed to be contemporary (e.g. Norman and St. Joseph 1969, 57, 63) but this is by no means certain given that there is evidence for the enclosure of the Irish landscape dating back to the Neolithic (Caulfield 1986). Perhaps the most convincing is the circular arrangement of 'fields' surrounding Cahercommaun in Co. Clare (Fig. 1:1). In that instance the cobbled pathway extending outwards from the entrance of the cashel is bordered by some of the enclosure boundaries. The area immediately outside the wall is an open semicircular area with a projection, and may have comprised the *airlise* (green) of the cashel. Outside of this are small enclosed fields – the largest of which is approx. 90 x 20m (0.18ha). Given the gentle curvature of the long sides of this field it could potentially have been ploughed, although the field is relatively short, for example in later medieval Kildare relict fields were about 200m long and had headlands approximately 20m wide (Murphy and Potterton 2011, 298). The other fields along the outer perimeter of the site, however, are too small to be efficiently ploughed since the plough teams would have to have been turned at very short intervals. The fact that the one complete enclosure, to the south of the pathway, appears not to have a gate suggests that it was not used for livestock, and, as it is too short for ploughing, it is more likely that it was used as a garden enclosure.

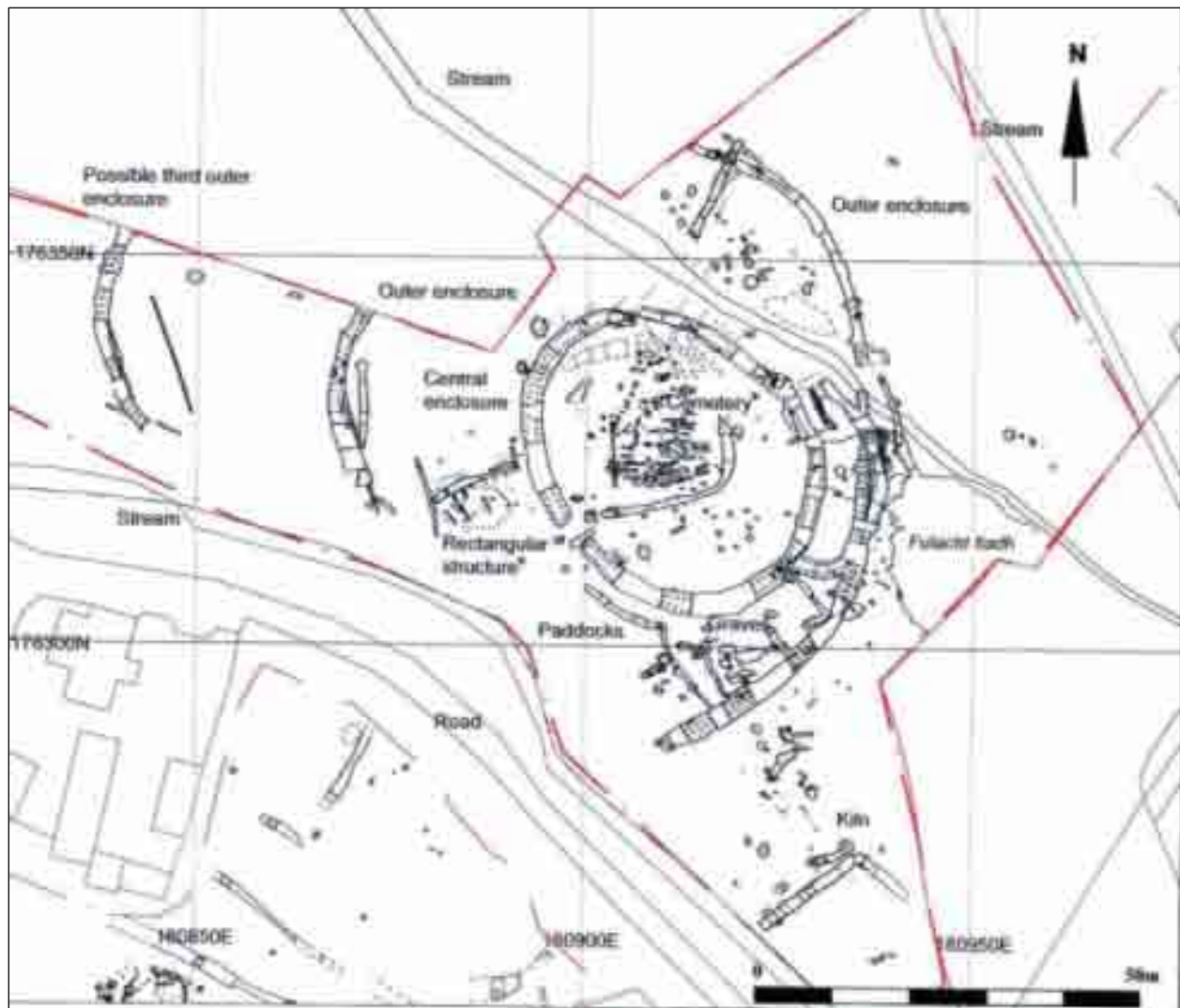


**Fig. 1:1. Cahercommaun, Co. Clare (Hencken 1939, 4)**



A similar arrangement of an outer circular enclosure can be seen at the eastern enclosure at Balriggeran, Co. Louth (Fig. 1:2) although no complete enclosures are extant and so field size cannot be calculated. As in the case of Cahercommaun a bounded pathway from the entrance leads through an outer circular enclosure which at some stage had been narrowed. Within the enclosure and to the east of the entrance were two superimposed D-shaped enclosures which the excavator suggested could be animal pens (Delaney 2010, 94). To the west of the entrance boundary and abutting it were four parallel ditches approx. 5m long and 3m apart. These may well be the remains of cultivation ridges which the documentary texts on occasion describe as being 8 feet wide (above). It is quite likely that this is a garden area.

**Fig. 1:2. Balriggeran, Co. Louth (Delaney 2010, 92)**



**Fig. 1:3 Carrigatogher, Co. Tipperary (Taylor 2010, 281)**

Recent large scale excavations, particularly those associated with motorway construction, have allowed the examination of the areas outside the enclosures of early medieval settlements, something that rarely occurred in the past. Possible examples of fields, such as those just discussed, are a rarity. Enclosures that can be convincingly regarded as raths generally provide little evidence for associated fields. At Newtownbalreagan, Co. Louth the only feature outside the rath is a large souterrain (Fig. 1:4). At Twomileborris, Co. Tipperary, a palisaded 'plectrum-shaped' enclosure (B) was overlain by a rath (A) which again had no associated field enclosures (Fig. 1:5). The area excavated around the apparent rath at Rochfort Demesne, Co. Westmeath was more limited than the previous examples but it also provided no evidence for associated fields (Fig. 1:6). Extensive trenches excavated outside the ditches of a bivallate rath at Raheens, Co. Cork failed to provide evidence for attached fields (Fig. 1:7) as was also the case at raths at Loughbown, Co. Galway (Fig. 1:8) and Magheraboy Co. Galway (Fig. 1:9). Evidence for fields were also absent outside the ditches of the raths at Mackney, Co. Galway (Fig. 1:10) or Lisanisk, Co. Monaghan (Fig. 1:11) although the areas excavated outside the enclosures was more limited than many of the examples already cited. The area excavated outside the bivallate rath at Cloonaghboy, Co. Mayo (Fig. 1:12) was also limited but there was no evidence for associated field patterns.



**Fig. 1:4. Newtownbalreagan, Co. Louth (Roycroft 2011, 7).**

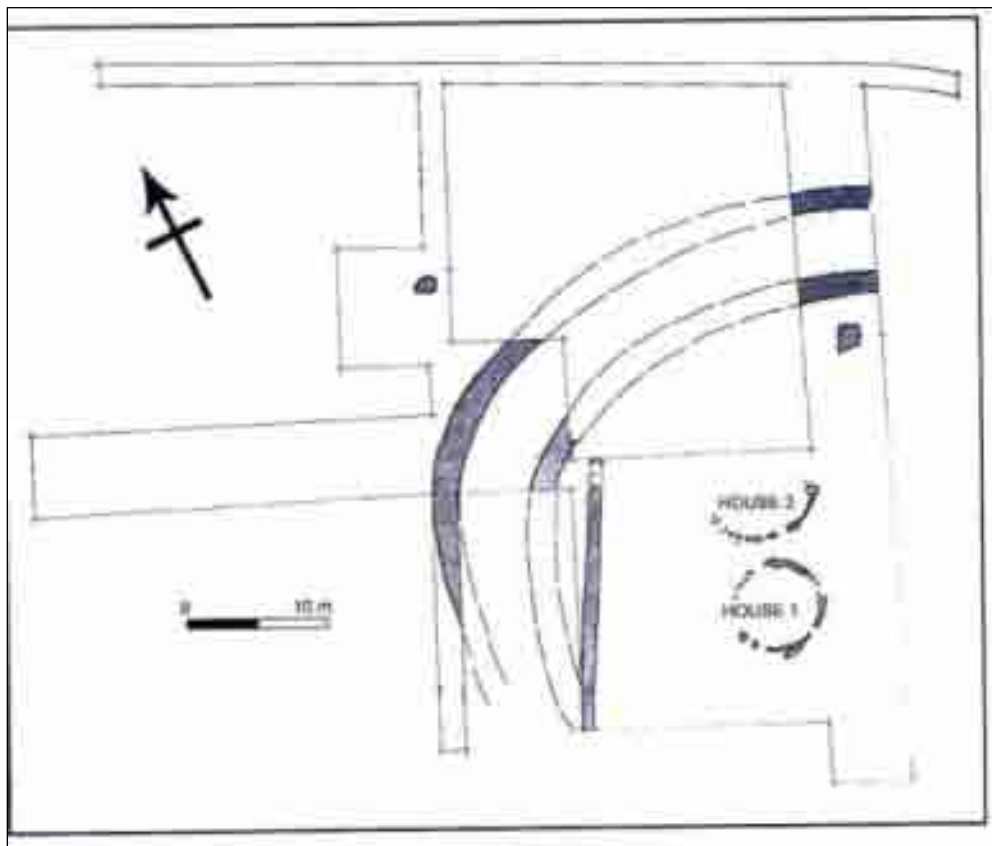


**Fig. 1:5. Twomileborris, Co. Tipperary (Ó Droma, 2008, 52).**

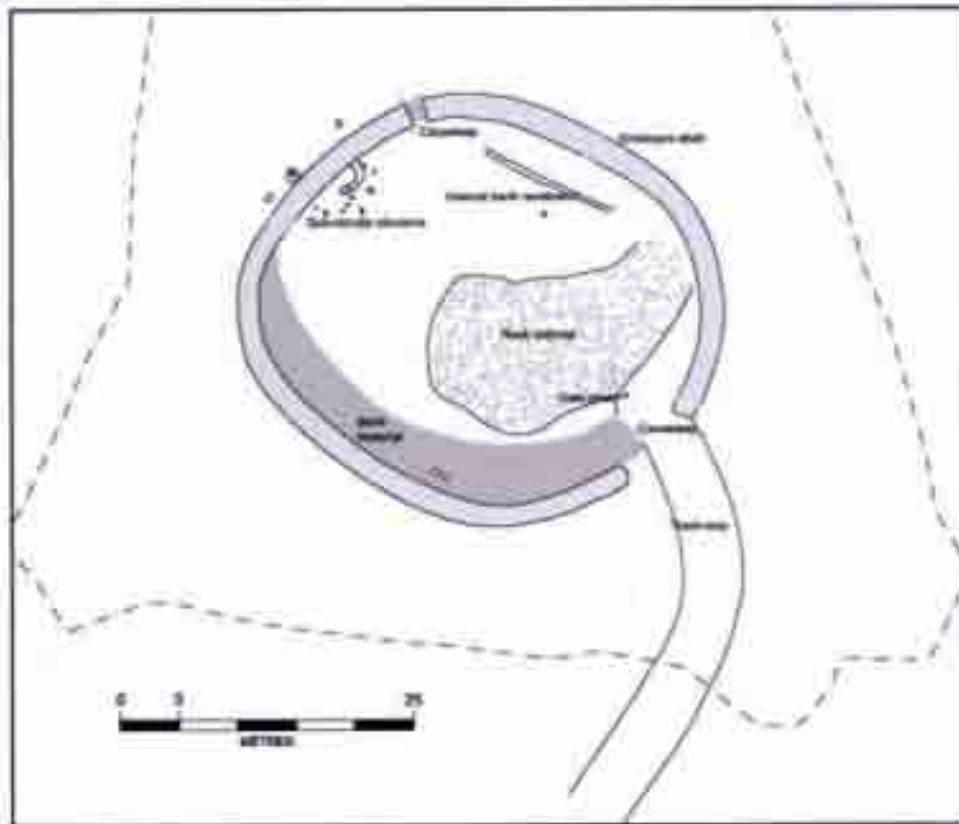




**Fig. 1:6. Rochefort Demesne, Co. Westmeath (Channing 2007, 112).**



**Fig. 1:7. Raheens, Cork (after Lennon 1993, 76)**



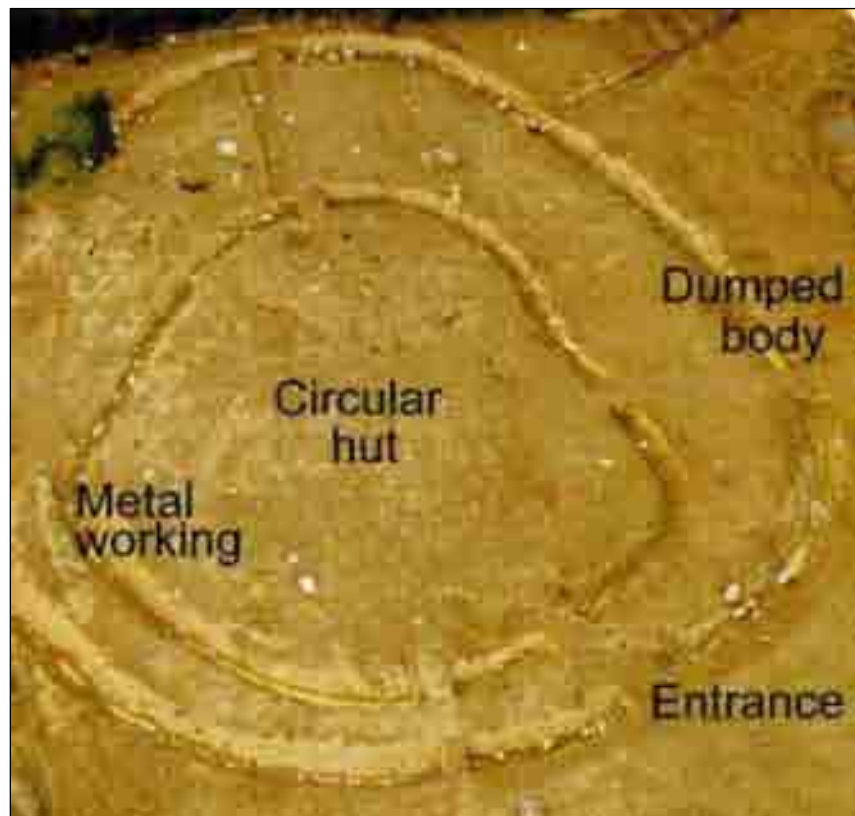
**Fig. 1:8. Loughbown (2), Co. Galway (After Bowler 2009, 29).**



**Fig. 1:9. Magheraboy, Co. Galway (Danaher 2007, 137).**

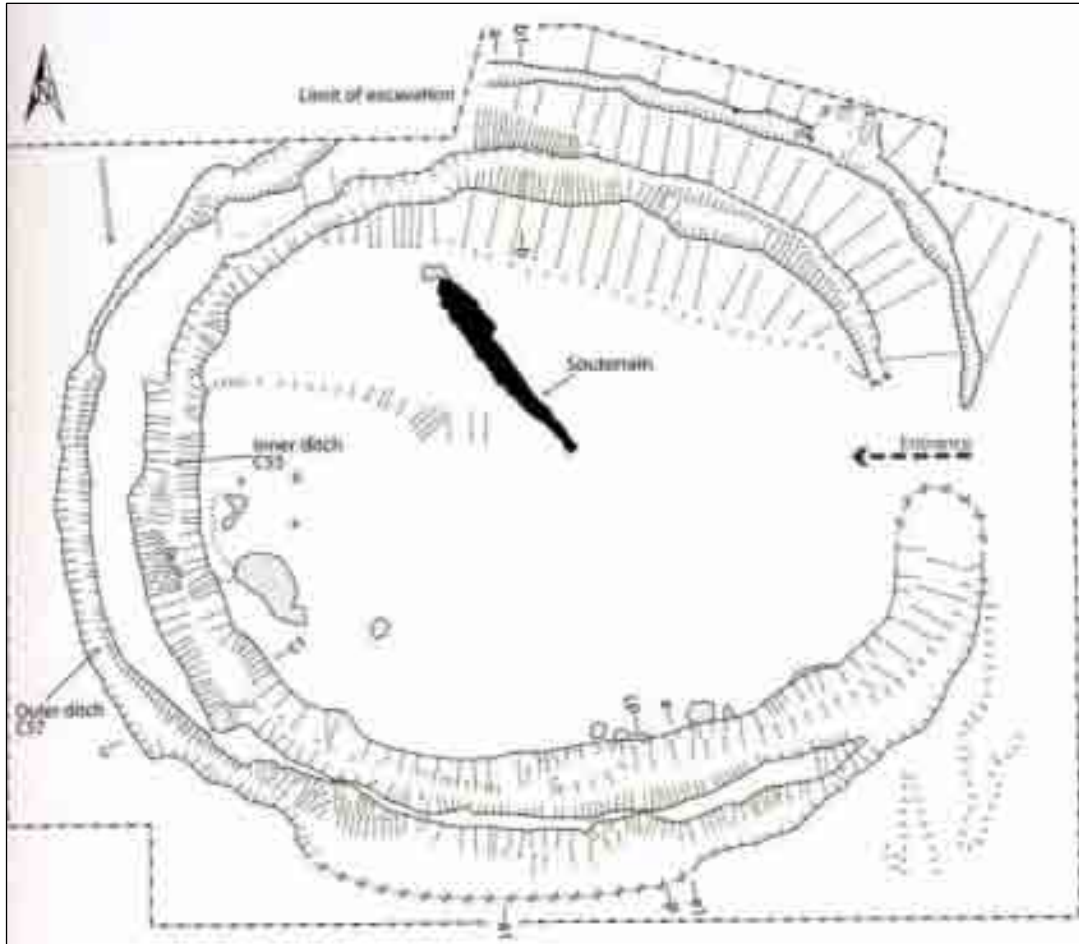


**Fig 1.10. Mackney, Co. Galway (after Delaney 2009, 69).**



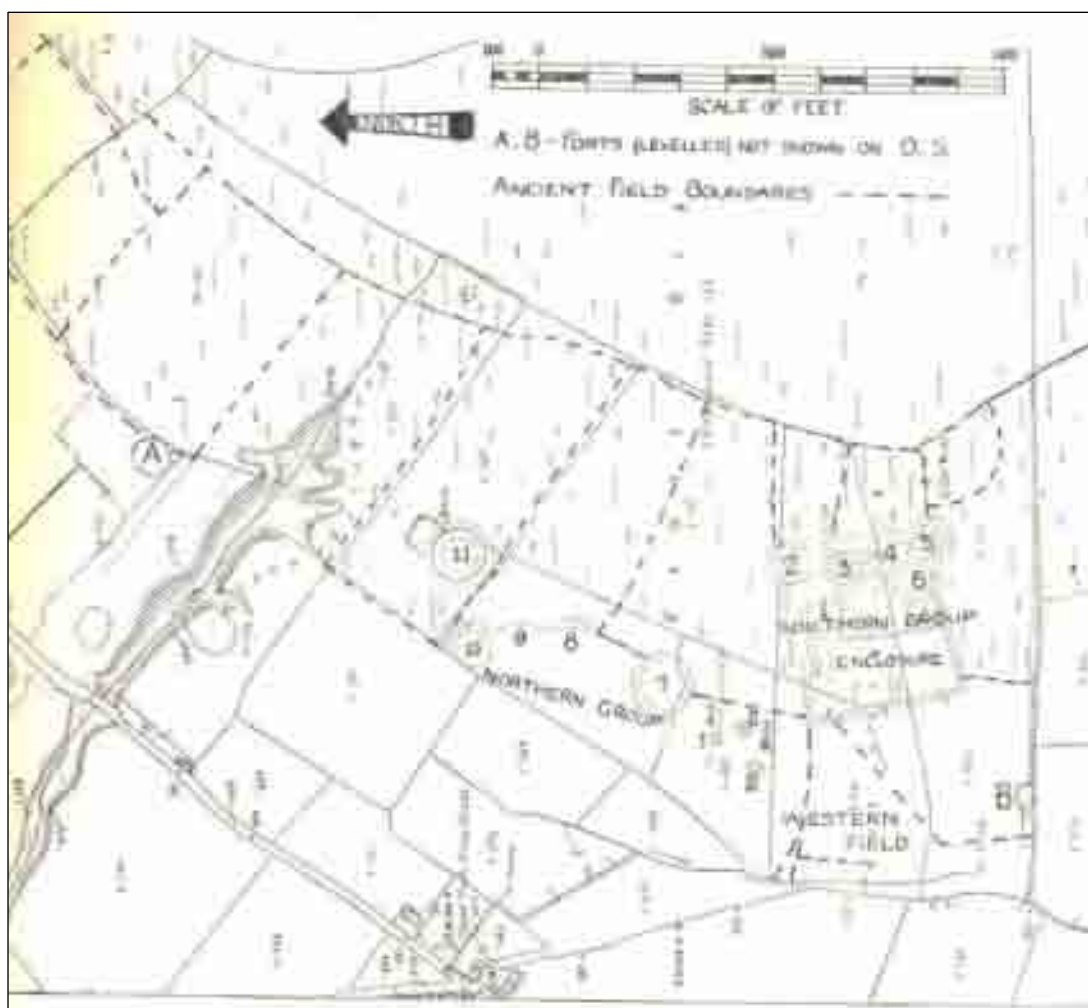
**Fig. 1:11 Lisanisk, Co. Monaghan (National Roads Authority (No date) N2 Carrickmines Bypass, County Monaghan: Archaeological discoveries.**





**Fig. 1:12. Cloonabhoy, Co. Mayo. (Gillespie and Kerrigan 2010, 322).**

Only one site has produced evidence of regular rectangular fields being directly attached to raths. The complex at Cush, Co. Limerick is exceptional in that it consists of two clusters of settlement with six conjoined raths in the southern group and five in the northern (Fig. 1:13). Ó Ríordáin identified a relict field system (denoted by dotted lines in Fig. 1:13) which he concluded were contemporary with the raths. The fields consisted of low denuded banks and associated ditches with an average depth of three feet which Ó Ríordáin (1940, 141) noted were 'essentially similar to those built by Irish farmers today'. The excavator examined some of the junctions between the raths and field ditches and noted that 'in each case the trench of the field fence cut into the side of the fosse or stopped immediately short of the fosse ... we thus had evidence that the builders of the field fences took cognisance of the existence of the fosses of the forts in a way which would suggest that the fosses were still un-silted when the field fences were built' (*ibid.* 142-43). If this interpretation is correct, the raths were set within a landscape of rectangular fields of 0.2 hectares - 0.3 hectares in area. The site, however, is clearly exceptional and the fields have not been independently dated. In general, however, there is little evidence that field systems are associated with raths.



**Fig. 1:13. Cush, Co. Limerick (Ó Ríordáin 1940, 85).**

Recent excavations have revealed several sites that vary from the typical rath template. The 'plectrum-shaped' enclosure at Newton, Co. Limerick (Fig. 1:14) is clearly not a rath on the basis of its morphology. Coyne (2006, 70-71) while arguing that it is a separate site-type acknowledges that it has 'shared characteristics with ringforts'. Kinsella (2010, 121) simply sees it as an aberration from the characteristic ringfort type, the morphology, perhaps, being influenced by local topographical considerations. In the present context, however, it can be noted that there was no evidence for field systems in the large areas excavated outside the site. The first two phases of the superimposed sub-oval enclosures at Johnstown, Co. Meath (Fig. 1:15) have many of the morphological attributes of a rath but the presence of burials from the early centuries of the medieval period onwards indicates that it was functionally quite different. Despite extensive excavation outside the enclosures, however, there was no evidence of contemporary associated field systems. The site also produced extensive evidence for industrial activity with the large quantity of animal bones present suggesting long term occupation (Carlin and Carlin 2008, 55-85). At Lowpark, Co. Mayo the settlement comprised two palisaded enclosures with a ditch being roughly concentric with Palisade 1 (Fig. 1:16). The excavators suggested that the ditch might have functioned as a *lios* and if Palisade 1 and the ditch were contemporaneous the site 'may be interpreted as a double enclosure similar to a high-status bivallate ringfort' (Gillespie and Kerrigan 2010, 249). A large area around the enclosures were excavated but again provided no evidence for contemporary fields. As in the case of raths, there is little evidence for the close association between these sites and field systems. The evidence indicates that early medieval secular settlements were generally located on open landscapes. Related enclosed fields, if they existed, must have been located at some distance from the settlements.





**Fig. 1:14. Newtown, Co. Limerick (Coyne 2006, 69).**



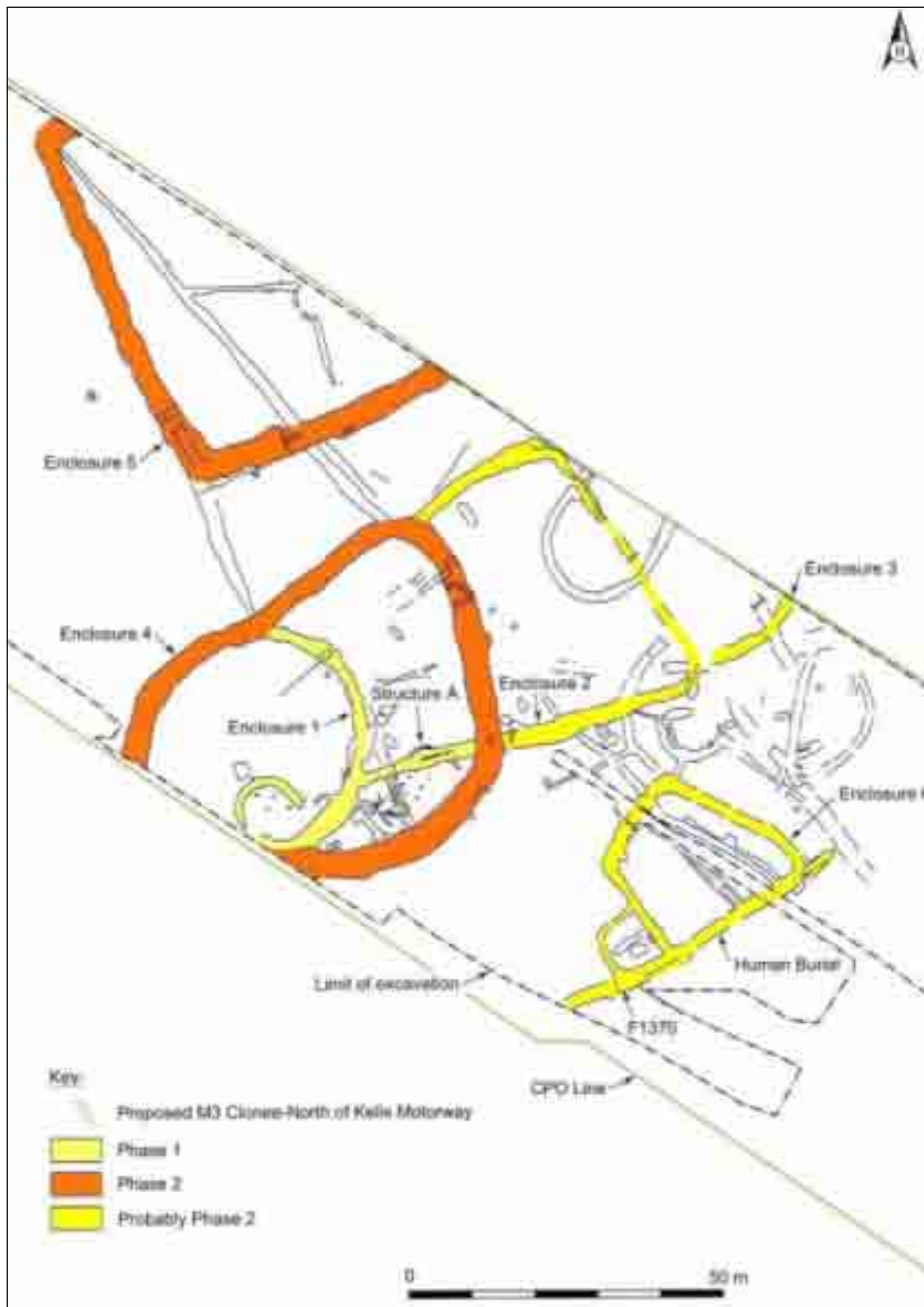
**Fig. 1:15. Johnstown, Co. Meath (Carlin *et al.* 2008, Fig. 4:2)**



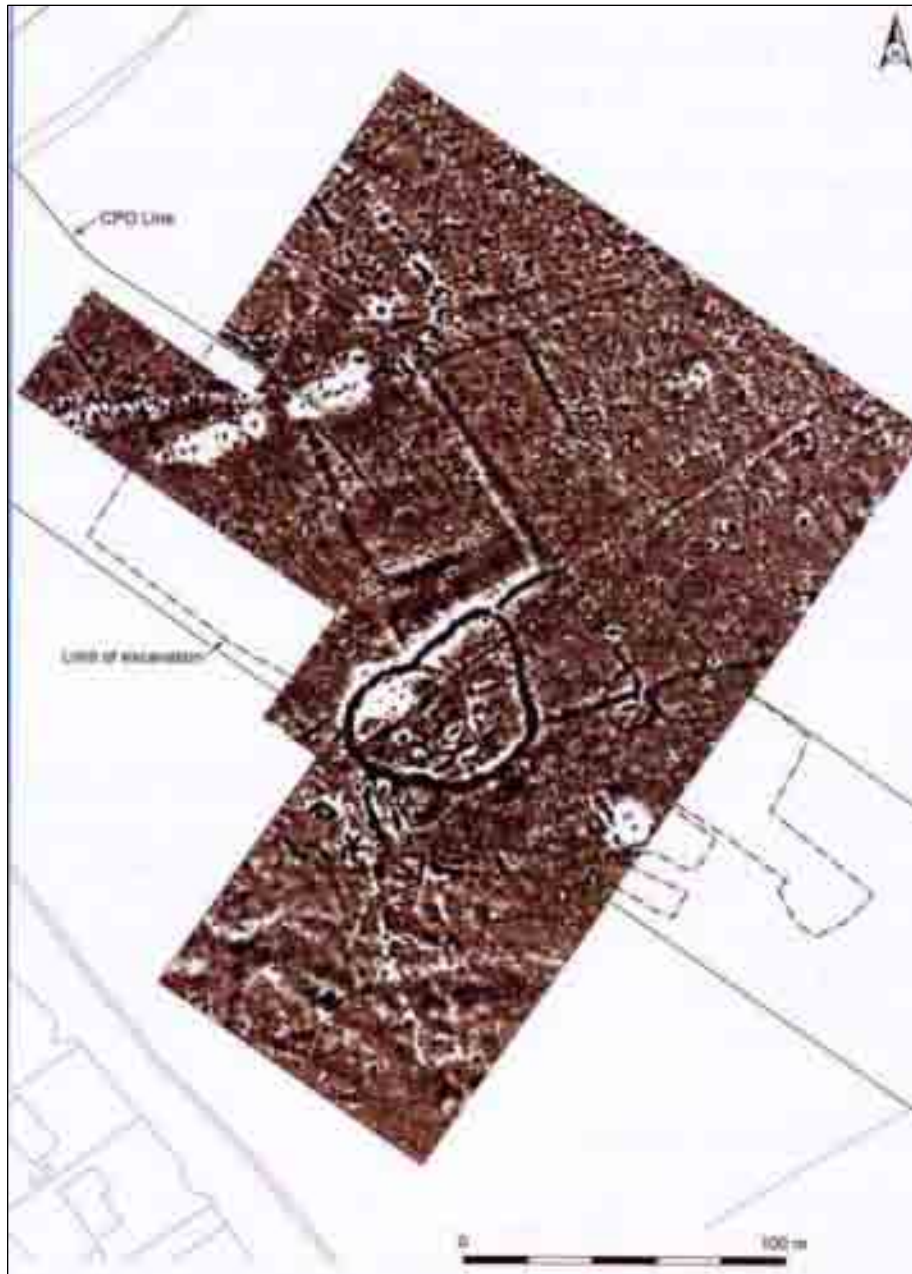
**Fig. 1:16. Lowpark, Co. Mayo (after Gillespie and Kerrigan 2006).**

### ***Fields at Settlements with Attached Enclosures***

Recent excavations have revealed a new settlement type or types which have extensive enclosures attached to a settlement core. Many of these evolved over a long period of time. Dowdstown 2, Co. Meath (Fig. 1:16) began life as a rath (Phase 1) dating to the sixth or early seventh century (Cagney and O'Hara 2009, 126-27). This in turn was replaced by a large D-shaped Enclosure 4 which dated to the late seventh/early ninth century. While the enclosures attached to the core are too small or irregularly shaped to function as fields suitable for ploughing, Enclosure 5 is a good candidate for such a field. This is a rectangular field which was radiocarbon dated indicated were contemporary with the D-shaped enclosure. The enclosure ditch was 3m deep and it had a causewayed entrance near its southwest corner. Geophysical analysis indicated that was 0.3ha in size and appears to have had a smaller rectangular field to its north. The fields, however, are located on a flat river meadow that would have been susceptible to annual flooding so one cannot assume that they were used for cultivation.

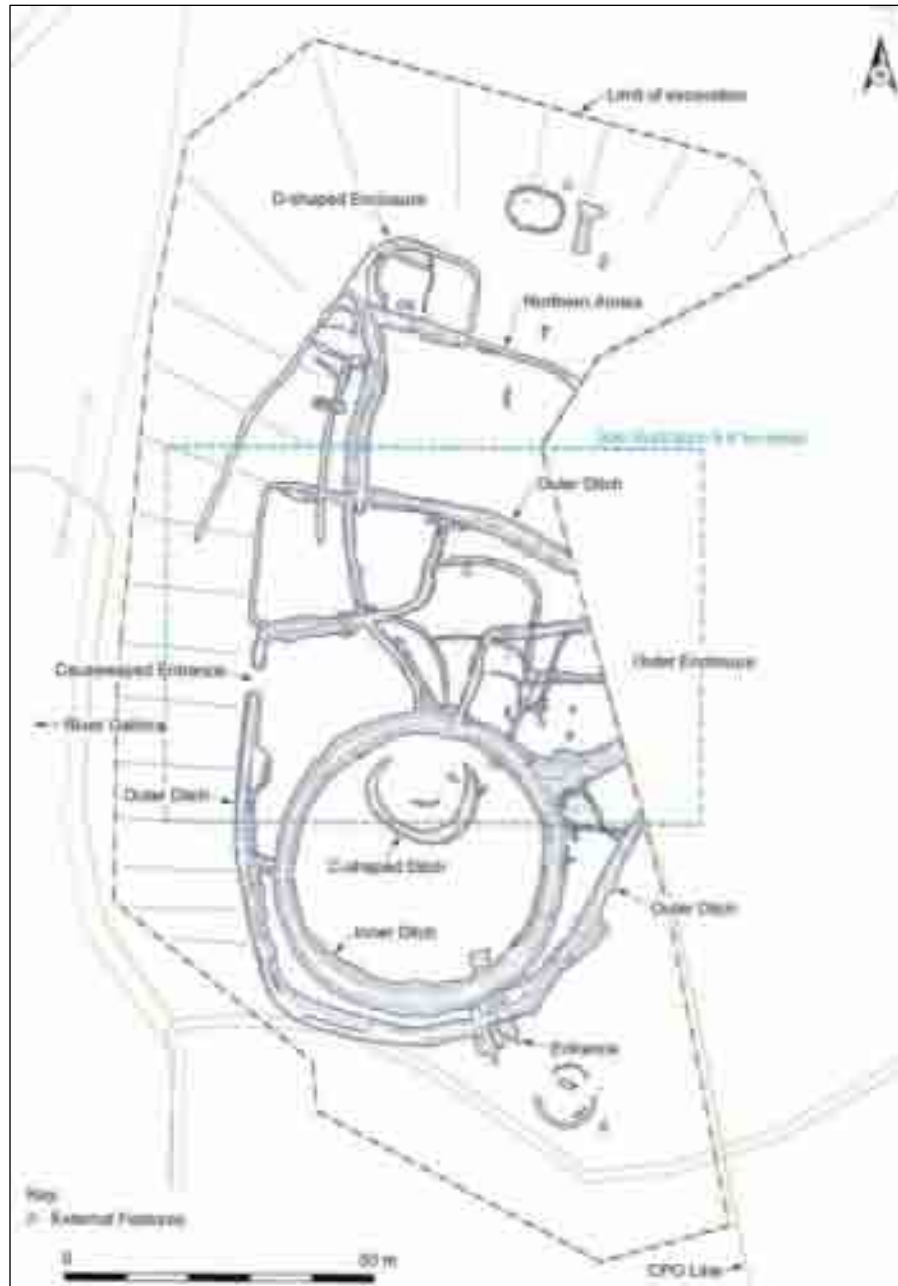


**Fig. 1:16. Dowdstown, Co Meath (Cagney and O'Hara 2009, Fig. 7.2).**



**Fig. 1:17 Dowdstown 2, Co. Meath (Cagney and O'Hara 2009, Fig. 7:1).**

Excavations revealed a series of outer enclosures and small annexes – about 0.1 hectares each – around the rath at Baronstown, Co. Meath (Linnane and Kinsella 2007, 57-59, 2009, 104-11) (Fig. 1:18), and similar small annexes have been found on other early medieval sites, such as Castlefarm, Co. Meath (O'Connell 2006, 19; 2009a, 47-51) (Fig. 1:19). A number of features were uncovered between the inner and outer ditches of an enclosure at Balriggeran, Co. Louth (Delaney 2010). These included a D-shaped enclosure and a square-shaped enclosure, both of which were interpreted as possible paddocks/animal pens. A number of smaller enclosures at Balriggeran (Fig.1:2) as well as the small enclosures/annexes at Baronstown and Castlefarm, were interpreted by the excavators as gardens for growing vegetables. They are too small to be used for ploughing and are most likely to be gardens. Since vegetables need a high degree of maintenance in the form of thinning, weeding and continual cropping, it would be expected that gardens would have been located near settlements.



**Fig. 1:19. Baronstown, Co. Meath (Linnane and Kinsella 2009, Fig 6:5).**

Evidence for fruit and vegetable growing is provided by the documentary sources and archaeobotanical study. The historical sources indicate that the range consumed was rather limited. The most important vegetables seem to have been beans and peas (Kelly 1997, 248-49) but the exact translation of terms used for other vegetables is unclear. The term '*cainnen*' has been identified as onion, garlic or leek, although Kelly (*ibid.* 251) prefers onion and suggests that '*borrlus*' refers to leek (*ibid.*). Cabbage and chives are also identified and, perhaps, celery (*ibid.*). The texts do not refer to herbs as such, apart from a single reference to some unidentified 'foreign herbs' used for medicinal purposes which Kelly (*ibid.* 257-58) feels may have been confused with mineral remedies. According to the documentary sources the only cultivated fruits consumed were apple and plum (*ibid.* 259-60). Non-food cultivated plants comprise woad, madder and flax (*ibid.* 264-70). See also Part 2 this volume.





**Fig. 1:19. Castlefarm, Co. Meath (O'Connell 2009, Fig. 3:1).**

### ***Fields and Enclosures: Conclusion***

There is little evidence that the early medieval Ireland landscape was characterised by an organised landscape of small fields. Rathes and associated settlement types appear to have been situated in open landscapes and the evidence for formal, enclosed cultivation fields is extremely limited. It is more likely that cultivation areas were temporary, enclosed by seasonal wattle or brushwood boundaries. While more permanent earthen and stone boundaries are described in early documentary there is little evidence for them in the archaeological record. The fields at Cush, Co. Limerick (Ó Riordáin 1940) and Ballyutoag, Co. Antrim (Williams 1984), if indeed of early medieval date, are exceptional. There is, however, extensive evidence for small enclosures being associated with some settlement types and it may well be that these are what the permanent boundaries described in the early texts were used for. It is likely that these enclosures were for gardens, corrals and for the most part should be regarded as 'farmyard' enclosures rather than fields.

## Tools and Tillage

### ***Plough and Harrow:***

As already noted, the early texts indicate that ploughing was the general method for the preparation of land for the planting of grain seed. The modern plough comprises three main elements that engage with the soil, the shoe, the coulter and the mould board. The most primitive, which contains a share only, can be designated an ard plough and was the type used in Ireland and elsewhere since the Neolithic period and the incorporation of the other elements did not occur until at a much later date.

The chronology of the development of the plough in Ireland has generally been rather speculative, usually inferred from other evidence and is heavily dependent on the perceived British chronology. It has been suggested that the improved plough, with heavy share and coulter was present in Roman Britain, for example, a coulter is known from a Roman context in Great Witcombe, Gloucestershire (Fowler 2002, 184). The evidence for the use of the mouldboard in the Roman world is less clear. They are not mentioned in Pliny the Elder's description of various types of ploughs, a source that mentions the use of the coulter (Humphrey *et al.* 1998, 104-5). Fowler (2002, 184) however, argues that that the ard was not superseded in Britain in Roman times and that the improved Roman plough was 'used perhaps only on the more advanced estates in the agriculturally richer parts of the province, like the Somerset/Gloucestershire area'. This improved plough then seems to disappear and does not appear again in Anglo-Saxon contexts before the tenth century (*ibid.*). Indeed, Anglo-Saxon manuscript illuminations dating to about A.D. 1000 clearly show the use of ards rather than improved ploughs.

Mitchell (1986, 153-54; 160-62) proposed an Irish chronology which had the coulter being introduced at about A.D. 300, coinciding with beginning for a period of forest clearance and arable expansion in the Irish pollen record. Mitchell saw further development in Ireland with the introduction of the mould board at about A.D. 600, believing erroneously that the mould board was illustrated on some seventh century Anglo-Saxon manuscript illumination (*ibid.* 160). Fowler (2002, 198-203) could find no evidence for the mouldboard in his extensive examination Anglo-Saxon illuminated manuscripts, and Langdon (1986, 75-76) argues that the plough depicted on the Bayeux Tapestry is a wheeled ard rather than a heavy plough with mouldboard. The date of the introduction of the mould board to Britain is unclear. Fowler (2002, 203-4) suggests it is likely to have occurred in the tenth century but Langdon (1986, 75-6) suggests that this may not have occurred until after the Norman Conquest. Brady (1993, 37), in his detailed analysis of the plough in early medieval Ireland has argued that the coulter did not appear in Ireland until about the tenth century, although this is based on a very small sample. The documentary evidence, however, supports this assessment (Kelly 1997, 470-71), as the earliest reference to its presence is in an eleventh century source. The introduction of the coulter in Ireland also seems to coincide with an increase in the size of the plough share, Brady's Class 3 (1993, 37; 41-42). The final development of the plough consists of the addition of mould board. There is no convincing documentary (Kelly 1997, 471) or archaeological evidence for the presence of the mould board in Ireland in the early medieval period, and the plough which included the coulter and mould-board may well be an Anglo-Norman introduction. There are problems, however, with this chronology. In order to break up soil successfully with an ard it is necessary to cross-plough, and the result of this should be that square fields were the optimal field shape (see above). The law tracts, which generally predate A.D. 800, however suggest that early medieval fields were rectangular in shape with headlands at their shorter ends (Kelly 1997, 372). This suggests that cross-ploughing did not occur and that a more sophisticated plough type existed during the early medieval period.

Only six coulters are known from Ireland. Given that a coulter essentially comprised a large bar of iron it is likely that damaged or broken would have been re-cycled in the forge for the making of smaller objects. Two of the coulters, Faughart Lower, Co. Louth (Buckley and McConway 2010, 53) and Massereene, Co. Antrim (Lynn 1973:0004), were found inserted into a plough socket indicating that they were being stored rather than discarded. Neither can be demonstrated to be of an early date. The

Massereene example is clearly late medieval in date and was found in the base of a ditch in association with everted-rim and green glazed pottery, and a hoard of early sixteenth century coins. It would seem that the coins and share and coulter were hidden in the ditch awaiting later retrieval. The date of the Faughart Lower coulter is not stated but it was found with a plough socket on the floor of a souterrain (Bowen and Dawkes 2008:839) that had been dug into the in-filled ditch of the rath in the final stages (Phase 4) of settlement. Associated finds included a quantity of souterrain ware (Buckley and McConway 2010, 53).

The coulter from Lough Kinale, Co. Westmeath, a crannog site, comes from what appears to be a twelfth century context (Kelly *et al.* 1987:37). A plough share was found at the same time but it is not clear if they were found closely together. The coulter from White Fort, Co. Down, was found on the primary floor of a rectangular house (Waterman 1956, 77, 84-85). Found along with souterrain ware, there were no closely datable associated, but the rectangular house and pottery suggest the latter centuries of the early medieval period. A coulter was found by metal detection from a probable Viking longphort on the River Shannon at Athlunkard, Co. Clare (Kelly and O'Donovan 1998, 14), and has no further contextual information. The Ballinderry I, Co. Westmeath coulter was found between a house and the crannog palisade (Hencken 1936, 139-40) in a context that can be confidently dated to the tenth or eleventh century (Johnston 1999, 68). This is probably the best dated coulter from Ireland. Ballinderry I had close associations with Viking Dublin and contained a range of Viking objects and there is a possibility that its occupants were a Viking or Hiberno-Scandinavian group (Johnston 1999, 69). On the basis of the Athlunkard and Ballinderry I examples it is tempting to suggest that the coulter is a Viking introduction to Ireland. The earliest documentary references to the coulter in Ireland are in eleventh- and twelfth-century sources (Kelly 1997, 470-71), which would support this later introduction. The recent discovery of a seventh-century English coulter, however, should not preclude the future discovery of earlier examples. This coulter was found during Gabor Thomas's excavations of a sunken building in Lyminge, Kent (<http://www.bbc.co.uk/news/uk-england-12997877>). Prior to this find it was generally accepted that the 'improved' plough was a much later development. Fowler (2002, 203) summarised the various strands of evidence when he concluded that 'variants in the basic ard appears regionally in parts of western Europe in the last century, possibly the last two centuries, of the millennium, including southern and eastern England, where the coulter certainly, and possibly a mouldboard, marked on what the present evidence seems to be a very belated development into the full blown "English" plough, framed and with or without a wheel, which had become common there by the [later] medieval period'.

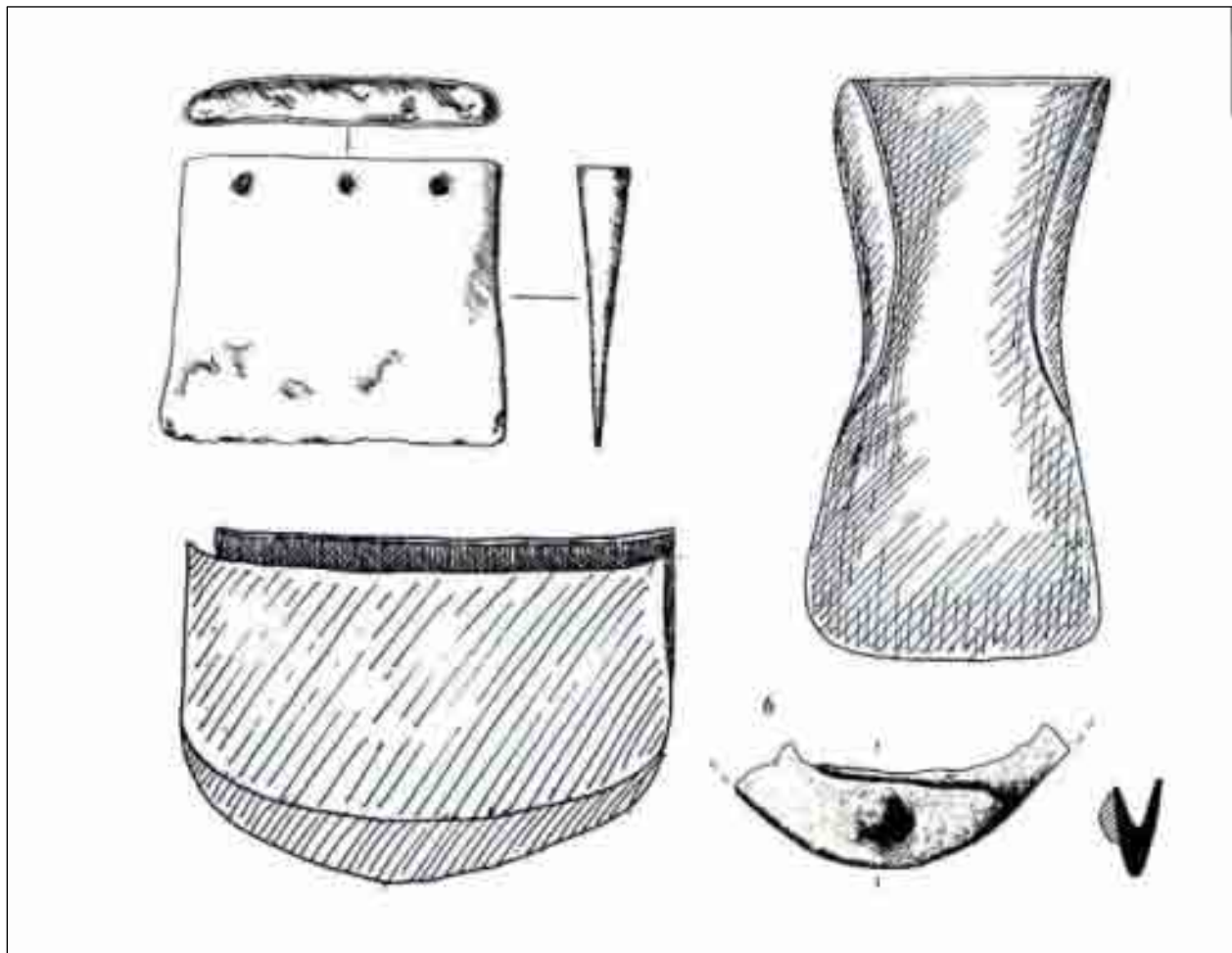
To date, no plough frame has been found in an early medieval date in Ireland. The documentary evidence, as discussed by Kelly (1997, 468-77), indicates that the coulter is late and there is no reference to either a mould board or a wheel in any of the sources. Early texts refer to the plough beam, yoke and *piscatal*, which seems to be the peg that attached the beam to the yoke (Kelly 1997, 472-4). Ploughing equipment also included a halter and an *esam* which could be used for attaching the yoke to the ox. As already noted, the documentary evidence indicates that the normal plough team consists of four oxen (Kelly 1997, 474). On the basis of admittedly undated bog finds of yokes from Ireland, Brady (1993, 32) argues that the oxen were yoked abreast rather than in tandem as has occurred in recent Shetland and Wales. Kelly (1997, 475-77) accepts that the documentary evidence tends to support this and there are suggestions that oxen were sometimes yoked six abreast in plough-teams.

After ploughing a harrow can be used for breaking up the clods and levelling the soil. In sub-recent Irish harrows the 'pins' are made of metal (Bell and Watson 2008, 119), but Fowler (2002, 170) illustrates a traditional Spanish example made entirely of wood. No harrows have been identified in the archaeological record but the early documentary sources indicate that they were in regular use (Kelly 1997, 478). The *Crith Gablach* states that the pairs of horses was used for harrowing, no doubt because it was a much lighter feat of traction than ploughing. An entry in the Annals of Ulster for A.D. 1013 shows that ploughing and harrowing occurred at the same time. In this account the king of Brega punished some Norse captives by yoking them to a plough, while two others were compelled to follow them with a harrow attached to their scrotums (Kelly 1997, 278).



It is extremely difficult to date cultivation ridges. A small number of sites uncovered cultivation furrows with associated early medieval occupation debris. A fragment of lignite bracelet was recovered from cultivation furrows at a settlement/cemetery site at Augherskea, Co. Meath (Baker 2007, 318) which produced a radiocarbon date of A.D. 890-1160 (2 $\sigma$ ) (Baker 2010, 6). Pieces of shale bracelet, a glass bead and an iron knife blade were also found in the fill of ridge-and-furrows at Ballyconneely/Ballygirreen, Co. Clare (Breen 2000:0047), but the most convincing evidence for early medieval cultivation is from Knowth (Site M), Co. Meath (Stout and Stout 2008) where furrows cut, and were cut by, radiocarbon-dated early medieval burials; some of these furrows also produced early medieval radiocarbon dates (*ibid.* 80). It is remarkable that arable farming was occurring within a cemetery which may well have included the remains of previous generations of the people doing the ploughing.

### **Hand Tools**



**Fig. 1:20. Spade shoes from Ballinderry II (top left), Dublin (lower left) and Waterford, and socketed spade from Dublin (Hencken 1942, 47; Scully 1997, 471; Wallace 1998, 206-7) – not to scale.**

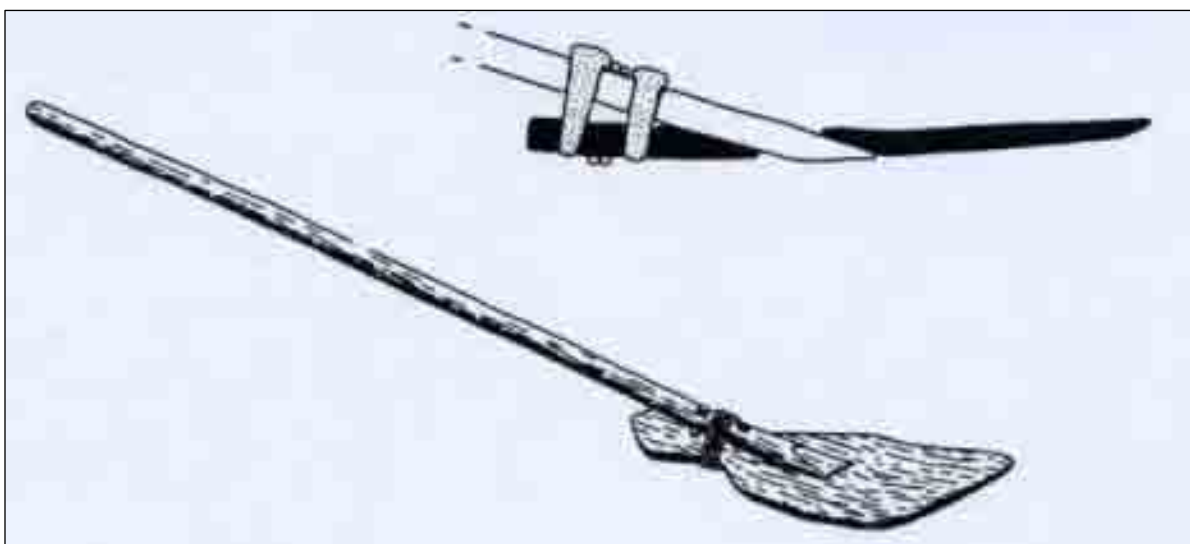
The early documentary sources record the use of the spade, shovel and mattock/hoe as cultivation tools. Kelly (1979, 465) argues that the etymology of the word for spade (*ramie*) indicates that it originated as an 'oar-shaped digging implement of wood'. No early medieval wooden spades have been to date been found, but a spade sheath from Ballinderry II (Hencken 1942, 47) indicates that the spade would have had a wooden blade capped with an iron socketed shoe 12 cm wide and 10 cm high. The Ballinderry shoe

has a straight edge but an example from Viking Dublin has a rounded edge, although Wallace (1998, 206) identified this as a 'shovel shoe'. Dublin also produced a completely different shove type in the form of socketed spade which would have been more durable than the 'shoe types'. Given that the spade must have been of universal use, it is surprising how few have been recovered from excavations. Amongst these are an example from Cherrywood, Co. Dublin (Ó Néill 1999:169) and a 'lost' example from Bofeenaun crannog, Co. Mayo (Moloney and Keane 1992:141) neither of which were illustrated in the respective excavation reports. The Ballinderry and Dublin spade shoe is rather small compared with Romano-British examples where the shoe tends to be u-shaped and covers the sides as well as the cutting edge of the implement (Rees 1997, 367). Spades similar to the socketed Dublin example are also known from Romano-British Contexts (Rees 1997, 383-88). Recently, an almost complete oaken spade was found at a horizontal mill at Kilbegly, Co Roscommon (Jackman 2009) (Fig. 1:21). The fact that it did not have a metal shoe may help explain the low incidence of spades on early medieval sites.



**Fig. 1:21. Oak spade from Kilbegly, Co. Roscommon (Valerie J Keeley Ltd – Jackman 2009, 16)**

The etymology of the word for spade (*slúasat*) also attests to having an original meaning as 'oar' or 'paddle' (Kelly 1997, 466). The shovel is essentially an oversized spoon used for moving loose material. It would have been vital for building cultivation beds after the soil had been ploughed and harrowed. The documentary sources references to its use for moving material rather than digging where they are used for clearing a paved path or for removing snow.



**Fig. 1:22. Early medieval composite spade (Morris 1981, 52).**

Morris (1981) identified fifteen examples that made up a separate bladed shovel type in early Ireland. (Fig. 1:22), but the only datable examples were from Viking age Dublin. Her study of British and Scandinavian examples led her to suggest that the type was a Scandinavian innovation. This would appear to be supported by a subsequent discovery from late twelfth-century Waterford (Hurley and McCutcheon 1997, 600-602). Bradley (1982), however, identified an example from Moynagh crannog found in the same context as E-ware, which could therefore be given a clear pre-Viking date of the seventh or eighth century; and an example from Chester indicates the type was in use in the Romano-British period (Rees 1979, 365, 417).

Early documentary sources do not differentiate between the mattock and the hoe (Kelly 1997, 467). Both have a right-angled digging blade but the mattock also includes an axe-type blade on the other side. Romano-British hoes have a flat blade on one side with some having two prongs on the other (Rees 1979, 338-47). Some have no blades but comprise a socketed head with two prongs at right-angles to the shaft. The early sources indicate that the 'mattock' was primarily for digging, and in recent times the mattock was also used on small farms for breaking up clumps of earth, as an alternative to the harrow (Bell and Watson 2008, 117-18). Early medieval Irish excavations have yet to produce any convincing examples of a mattock which is remarkable given that it is an extremely robust piece of metalwork. It may well be, however, that some of the tools identified as adzes might have been used as mattocks.

## **Cereal Production and Processing (see Section 2)**

### ***Introduction:***

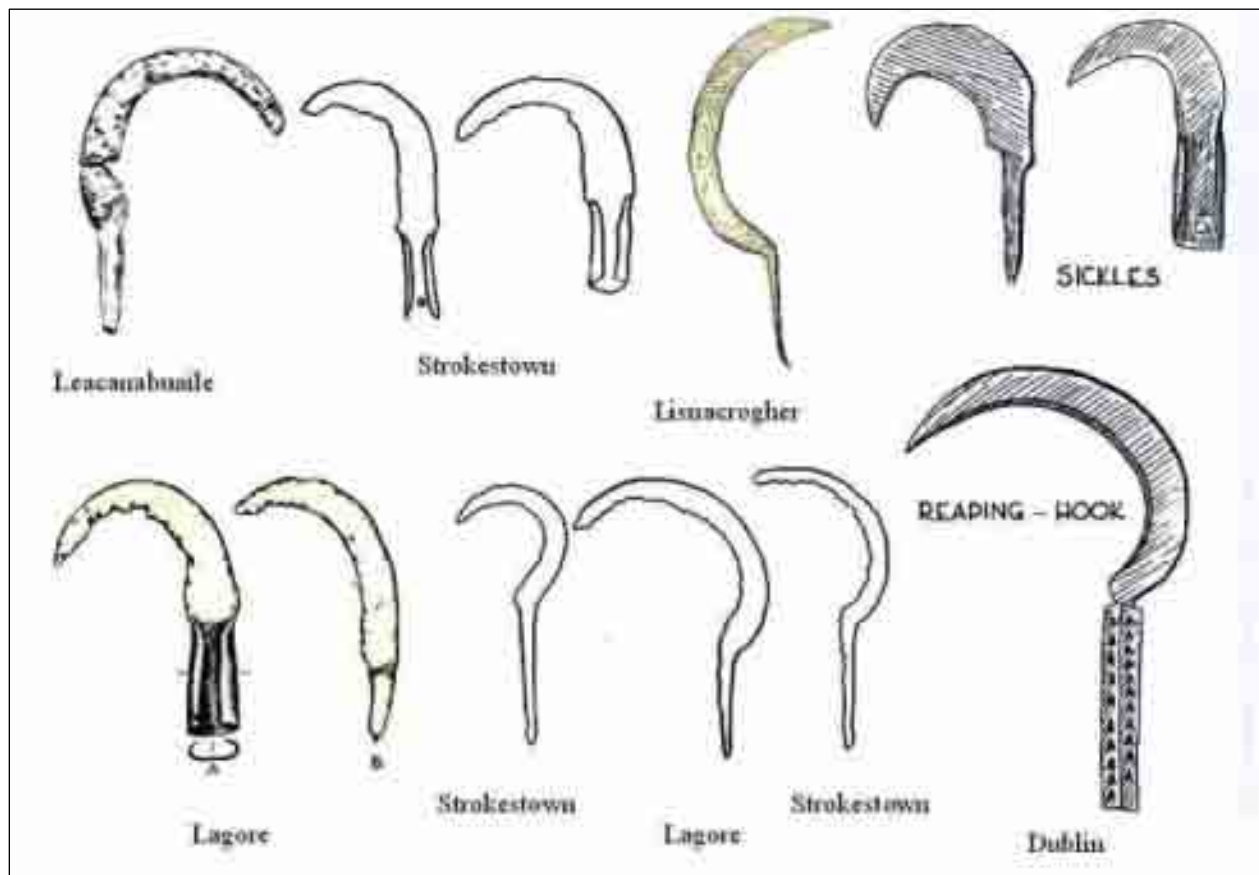
Cereals were the staple food of early medieval Ireland. The documentary evidence has produced extensive information about cereals which is augmented by the growing body of archaeo-botanical information which is discussed in detail by McClatchie in Part of this report (below). This section will deal with issues not discussed in Part 2.

Most of the cultivated plants recorded in the contemporary writings are not represented in the pollen or macroscopic early medieval plant record, for example, in the survey of the Munster material, Monk *et al.* (1998, 68) did not note any cultivated species other than cereals, although a waterlogged deposit at Augherskea, Co. Meath produced seeds of mint and 'cabbage/turnip/mustard' (Baker 2010, 7). The most comprehensive study of macroscopic plant remains are from tenth/early-eleventh century deposits from the Viking settlement in Fishamble Street, Dublin (Geraghty 1996). The main cereal noted was barley, followed by oat and wheat. The only other cultivated seeds present were flax, horse-pea, and apple (although some of the apple seed may be pear (*ibid.* 40). Walnut, which must have been imported, was present, as well as a range of native wild edible plants. Gardens seem to have been especially important in monasteries, and artificially deepened soils (plaggen soils) have only been found on early medieval ecclesiastical sites. The gardener is listed as one of the seven officers of the church (Kelly 1997, 251), and the French patron saint of gardeners is the Irish Saint Fiachra, who founded a monastery with a fine garden at Breuil near Meaux (Reeves-Smyth 1999, 108). There is no mention of gardeners being among the servants employed by a king or lord.

The early laws recognised that only certain lands were suitable for cereal growing, for example the *Cáin Aiclinne* deals specifically with barley growing. Unfortunately some of the terms used are obscure. It states that the land should be *ardtreichem* which Kelly (1997, 229) suggests might mean 'deep free-draining tilth'. It was to be manured, and the texts give the value of a year's dung of a milk cow or trained ox to be of greater value than other livestock (*ibid.*). This may refer to the quantity rather than the quality of said manure. Collins (2008) outlines a wide range of manures used in later periods in Ireland but the early law tracts only mention the dung of livestock for this purpose. The law makers were very conscious of the value of animal dung and a glossator notes that the value of the grass consumed by cattle was equal in value produced in dung (Kelly 2007, 139). The annual accumulation of dung heaps is a vital part of the arable farmers yearly cycle of duties. The texts indicate that dunghills were built in

farmyards, augmented by household waste and that the dung was transported into the cultivation fields on carts (Kelly 2007, 230, 364).

Crops were normally sown in spring with March being the referred month (Kelly 2007, 231). The twelfth-century *Vision of Mac Conglinne*, however, mentions the planting of winter rye (Meyer 1892, 84). Weeds were a constant problem with cereal growing and the law tracts mention a series of these but the identification of specific plants is problematic. McClatchie (Section 2) discusses the macro-plant evidence for crop weeds at the time. The early documentary sources provide little information on the actual mechanics of weeding, probably because it was such a routine process.



**Fig 1:23. Sickle or sickle-like tools from Leacanabuaile (left), Lagore and Dublin (Hencken 1950, 105; Ó Ríordain and Foy 1941, 91; Wallace 1998, 206). The Strokestown sickles are after Duignan (1944, 144) as is the Lagore example in the lower middle which is not included in the excavation report. The undated Lisnacrogher example is from Wood-Martin 1886, 176).**

Cereals were harvested in autumn, September being the principal month although this could be earlier if the weather was sufficiently good (Kelly 1997, 237). The texts also inform us that this was a communal activity undertaken by a *meithel* or reaping-party (*ibid.* 238). The large numbers of people who partook in these imply that families came together for this purpose. The laws also state that it was part of the base clients' duties to partake in the harvesting of the crops of a lord (*ibid.*). The tool used was the sickle, as the scythe was not present at this time (*ibid.* 480). As in the case of other agricultural tools sickles are relatively poorly represented in the archaeological record. There is a certain amount of confusion in terminology. Hencken (1950, 106-7) refers to the objects as bill hooks 'that might have served as sickles pruning hooks, etc.' (Fig 1:23). The Lagore examples seem to be too small to be efficient sickles since both are only 13 cm in height, and Edwards (1990, 61) agrees with their

designation as a bill hook. The Leacanabuaile example, by contrast, is much larger being about 26 cm in height (Ó Riordain and Foy 1941, 91). Wallace (1998, 207), in his examples from Viking Dublin, differentiates between a small sickle, which he suggest could have been used for thatching, and a larger sickle or reaping hook. In recent Irish farming a reaping hook has a smooth edge while that of a sickle was serrated (Bell and Watson 2008, 182).

The archaeological record is virtually silent in regard to the collection and storage of the harvested grain. The stalk may be cut either near the ears or the ground. When cut near the ears the remaining straw could then be left to be consumed as fodder or removed separately for thatching. Duignan (1944, 140) argues that the early medieval Irish cut corn in this way, although it is not clear on what he bases this conclusion; but Kelly (1997, 238) points to documentary evidence that the grain was put directly into a reaping-basket after it was cut. While the *Di Chetharslicht Athgabálae* records corn being stowed in ricks (*dais*) (Kelly 1997, 239), which, by implication, suggests that the stalks were cut near to the ground, the earliest unequivocal evidence for this form of harvesting and the subsequent production of a sheaf is in the tenth century. The Old Irish term for 'sheaf' (*punnann*) is an Old Norse loan word (*ibid.* 238-39). It is tempting on the linguistic basis to infer Viking influence in the popularisation of the harvest style of cutting stalks near the ground and making sheaves.

The archaeological evidence can perhaps contribute further to this debate. If the ears of corn were collected directly in a basket they would not have had the time to naturally dry out. This would necessitate the drying of the grains in a kiln. As is seen in Fig. 1:26, cereal-drying kilns begin to go out of use in the late eighth century. It is possible that this might relate to the increasing use of corn sheaves thus allowing the grain to dry naturally. An alternative interpretation to the decline in drying kilns is, however, discussed later.

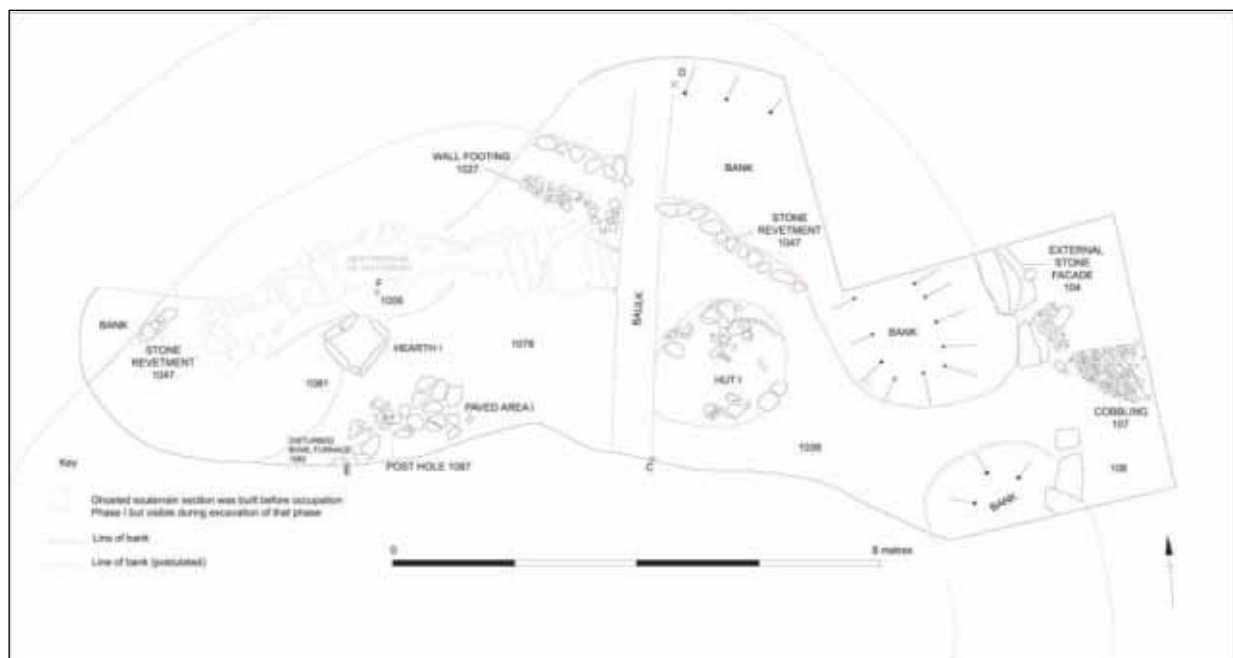
### ***Grain Processing:***

After grain is harvested it can either be threshed immediately or stored and threshed at a later date. It is possible that if the crop was small no storage was needed but in general it is more likely that at least some of the crop would need to be stored before threshing. In general the ricks of corn were stored in a space known as a 'stack yard', 'rick yard' or 'haggard'. In more recent time this area would also have included stored hay stacks but as hay was not saved in early medieval Ireland this area would comprise exclusively of 'corn' ricks. The stack yard was generally a sheltered area, and needed to be cordoned off from livestock, and the early texts also imply that chickens needed to be kept away from the corn ricks (O'Kelly 1997, 239). Sheaves in nineteenth/twentieth century Ireland were placed in layers with the stubble pointing outwards and the ears towards the centre. The sheaves were made waterproof by a covering of thatch tied with straw ropes, and, in case water percolated through, the sheaves were angled so that the water was drained outwards along the straws, rather than accumulating around the ears (Bell and Watson 2008, 109). Similar precautions appear to have been undertaken during the early medieval period since there is reference to the corn ricks being thatched (Kelly 1997, 239), and it is also likely that these early ricks were also designed for the through drainage of rainwater, since a legally 'proper' corn rick was to have two thirds of the sheaves at the bottom and one third at the top, thus creating a conical shape (*ibid.*).

In early modern times corn-ricks were frequently lifted off the ground on stone or metal posts to protect them from rats and mice. There is no reference to this in the texts and there is also a general absence of the 'four poster' features which are common in Iron Age and Anglo-Saxon Britain and are interpreted as fulfilling a similar function. The four post structure at the as yet unpublished site at Sallymount, Co. Limerick (Long 2009, 25 – see Animal Bones Gazetteer A416 or Plant Remains Gazetteer P203 for image) may, however, represent footings for a corn rick.

The early texts provide little information of threshing. Corn was threshed with a stick (*súsā*), and, although it is not clear when the two-piece flail was introduced, Kelly (2007, 481) notes that it was in

general use by the eleventh or twelfth century. In later times threshing occurred inside threshing barns but there is not documentary evidence for this structure in early medieval Ireland, for example it is unlikely that the rectangular structure at Sallymont (Long 2009, 2) was a roofed threshing barn because corn-drying kilns were located within it. Brunskill (2008, 28) notes that threshing requires adequate space, light, height and controlled ventilation, all of which requisites could be met by threshing outdoors on a dry still day. Since threshing often occurred in the late autumn and winter when the sheaves were removed from the corn ricks, such conditions may have been relatively rare. Given the absence of archaeological evidence for agricultural buildings that could have been used for threshing it might be argued that an effort was made to thresh as much of the crop as possible soon after harvesting. A threshing 'floor' needed to be a specially prepared piece of ground. Brunskill (2008, 40) noted that the ground had to be hard enough to withstand the beating of the flail and smooth enough to make sure that the grain could be swept up without loss. Alternatively an area covered with wooden boards, cobbling or stone flags could be used. While the laying of wooden boards would have been a temporary feature, areas of cobbling or stone flags should survive. Further examination of archaeological sites would be necessary to try and identify such features.



**Fig. 1:24. Drumadoon, Co. Antrim. Cereal store (Hut 1) (McSparron & Williams 2009)**

Corn needed to be stored in a dry place safe from animals. The early texts make frequent reference to the barn (*saball*) which might more correctly be described as a grain store. The laws state that a prosperous farmer (*bóaire*) owned a *sabhall* which was located near his house while the less prosperous farmer (*ócaire*) merely had a share in a barn. The *Life of St Columba* describes the saint blessing a barn containing two heaps of grain (Sharp 1999, 227), implying that this is a building that could be walked into. The law tracts also note the storage of grain within wicker baskets and it is noted that the *bóaire* was required to store some dried grain within his house. A circular clay and wicker structure, some 2m in diameter, at Drumadoon, Co. Antrim (McSparron and Williams 2009, 122-23) is almost certainly an early medieval grain-store (Fig 1:24). It contained nearly 20,000 charred oat grains along with a deposit of chaff. The presence of chaff within a grain store might seem unusual as the seed and chaff are separated during threshing. In many areas, however, it was believed that the storing of grain encased in chaff allowed for longer storages and acted as a deterrent to mice and insects (Sigaut 1988, 13-15). Perhaps grain was generally preserved in straw rope granaries as was often the case in Ireland during the recent past (Lucas 1956), and as such would leave little evidence in the archaeological record.

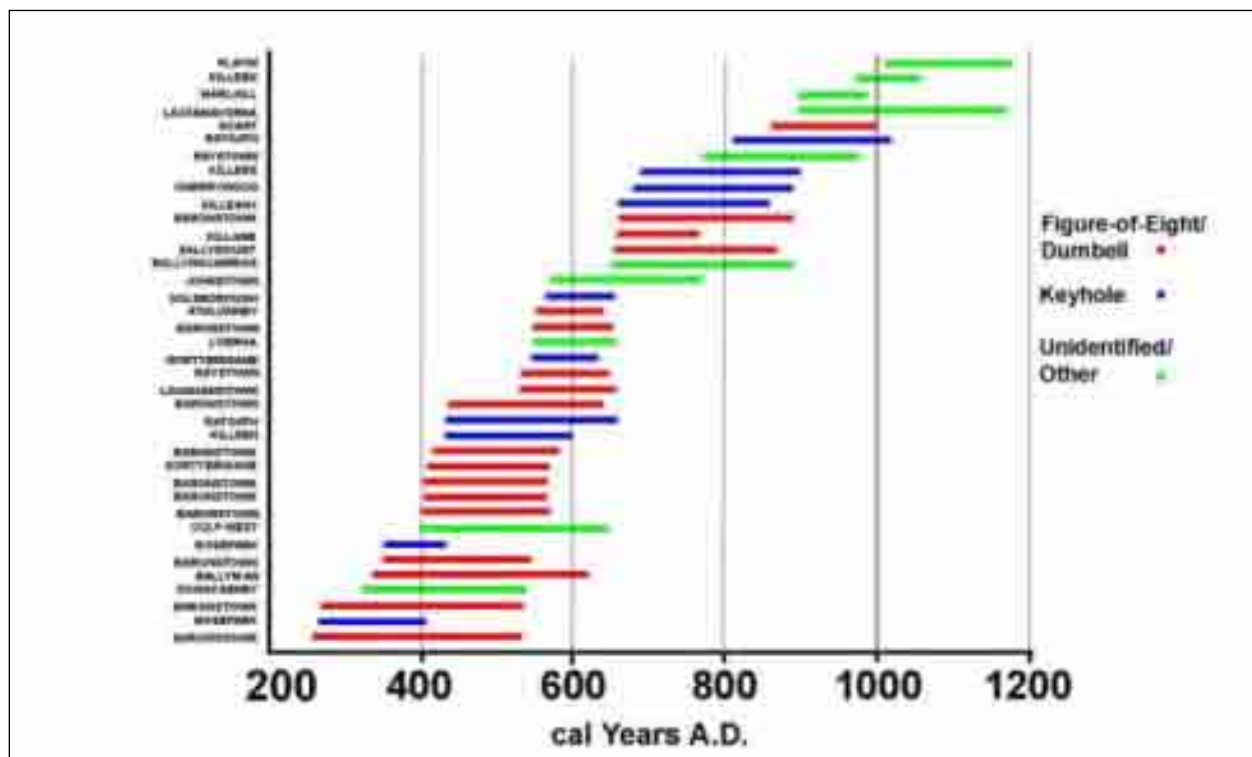


## ***Cereal-drying Kilns:***

Grain-drying kilns were in use along the fringes of Atlantic Europe from the prehistoric period until the late-nineteenth century, when they were gradually replaced by more advanced grain-drying machinery. Damp grain can easily spoil and cannot be easily processed in a mill as it would have a tendency to seize up and damage the works. The damp climate in Ireland made it especially necessary to dry grain before storage, consequently, such kilns were found wherever cereals were harvested and processed. They are a north-western 'coastal' European phenomenon and are, for instance, generally absent in Anglo-Saxon England. Although the Romans used corn drying kilns in England (Monk 1981) their use did not continue after the Roman period. It may well be that the idea of building kilns may have arrived from Britain during the Roman period. Apart from a possible Bronze Age example (Hackett 2010), they are absent prior to the late Iron Age in Ireland and it is likely that before this grain was dried within the domestic house, possibly in a container hanging from the rafters. Monk (1981, 217-18) has noted that experiments have shown that drying grain speeded up the process of grinding even when using a hand rotary quern. He noted that in recent times in northern Scotland grain was dried in pot over a fire before being ground in this way while in Ireland the practice was to 'roll grain in a wrapping of straw on heated stones' before grinding. The use of kilns from the late Iron Age onwards in Ireland is therefore a reflection of the intensification of cereal growing at this time. Early documentary sources make frequent reference to the use of kilns (Kelly 1997, 241-42), and the *Críth Gablach* indicates that some were part-owned by multiple owners (*ibid.*). These structures tended not to have been located within raths, so were rarely encountered during excavation before the development of road construction projects in recent years. The first overview of the archaeological evidence for Irish grain-drying kilns was published by Monk and Kelleher (2005) which was followed by a discussion of their chronology (Timpany *et al.* 2011).

At its most basic form, a kiln consists of a furnace with a flue that supplies hot air to the drying chamber. Archaeologists have defined kilns by their shape in plan, and there are five major typological groups – keyhole-shaped; figure-of-eight shaped; dumbbell shaped; 'L'- or comma-shaped; and pit/irregular-shaped kilns (Monk and Kelleher 2005). This typology is not rigid and there can be considerable overlapping of the types, for example the 'figure-of-eight' and 'dumbbell' differ only in the degree to which they are 'waisted' (*ibid.* 80). Two overlapping pits with burnt residue could also erroneously be interpreted as a kiln. Given the scarcity of pits on site of the period, however, it is likely that such mis-identifications are rare. Monk and Kelleher (2005, 105) noted that most excavated keyhole kilns tend to date to the later medieval and post-medieval periods, even though this shape of kiln is known in late-Roman Britain (*ibid.*). They also noted that the figure-of-eight kilns and dumbbell kilns were, 'in evolutionary terms, earlier than the keyhole types' (*ibid.*). Although this chronology is generally correct (Fig. 1:25), there are enough exceptions to this time-scale that make it impossible to definitively date a grain-drying kiln by typology alone. Many keyhole kilns, for example, produced early dates, e.g. A.D. 262-405, A.D. 348-435 (2 $\sigma$ ) (Rosepark, Co. Dublin (Carroll 2008, 26)), A.D. 420-600 (2 $\sigma$ ) (Killeen, Co. Meath (Baker 2009, 43, 60)), and A.D. 563-659 (Solsborough, Co. Tipperary (Murphy 2000:0965)) (Table 6.2). A radiocarbon date of A.D. 790-1030 (2 $\sigma$ ), however, was obtained from a keyhole kiln at Leggetsrath West, Co. Kilkenny (Lennon 2006, 47), suggesting that keyhole kilns were used throughout the early medieval period in Ireland. Dates from the figure-of-eight kilns appear to concentrate in the fifth and sixth centuries (Fig. 6.4), for example cereal grains from figure-of-eight shaped kilns found at Raystown, Co. Meath (Seaver 2006, 82), produced calibrated dates of A.D. 410-560; A.D. 570-660; and A.D. 380-550 (2 $\Sigma$ ) (O'Sullivan and Stanley 2006, 134); and three figure-of-eight kilns at Laughanstown, Co. Dublin (Seaver 2005, 58-59) produced closely-grouped dates of A.D. 530-650, A.D. 540-650 and A.D. 540-660 (2 $\sigma$ ) (O'Sullivan and Stanley 2005, 150). An 'hourglass-shaped' kiln – i.e. 'dumbbell type' – excavated near the ecclesiastical site of Ballyman, Co. Dublin (O'Brien 2005, 296-97) also produced an early calibrated radiocarbon date of A.D. 336-620. The shape of the kiln seems to be less important than the manner of its construction, and in general there seems to be a chronological progression from smaller earth-cut kilns to larger stone-lined constructions.

Figs. 1:25 and 1:26 indicate that the rate of construction of corn-drying kilns began to decline from the early ninth century onwards. The analysis of Timpany *et al.* (2011, Fig. 8) tends to show a decline after A.D. 500 but their method of displaying radio-carbon data may be flawed as it counts particular dates more than once and the poorer dates, i.e. those with large error margins, are counted more than the those with lesser error margins. The diagram in Timpany *et al.* suggests a data base of nearly 340 dates but the sample is significantly less although the exact number is not indicated. The displaying of the data at fixed dates can also presents an impression of spurious accuracy. In the analysis they attempt to correlate the dating data with known climatic change during the early medieval period. They suggest that the decline in kilns after A.D. 500 could be equated with the mid-sixth century climatic downturn (Timpany *et al.* 2011, 81) but it was more difficult to equate growth or declines in kiln activity with other periods of climatic change and conclude that 'comparison of the cereal-drying kiln data to climatic events produced only tentative evidence' (*ibid.* 82). When trying to equate growth and decline of kiln building with general increases and decreases of cereal production one is left with the problem with explaining their postulated decline in kiln use in the centuries after A.D. 500. Timpany *et al.* (2011, 82) argue that the keyhole kilns have a greater capacity than 'figure of eight' kilns and that their increase towards the later part of the period 'may reflect the centralising of populations and the communal use of kilns'. It would be interesting to explore this hypothesis further but it has yet to be shown that 'figure of eight' kilns are generally associated with isolated habitation sites and that the keyhole type with 'centres' of population. The suggestion that kiln chamber sizes became significantly larger in later periods also needs to be demonstrated.

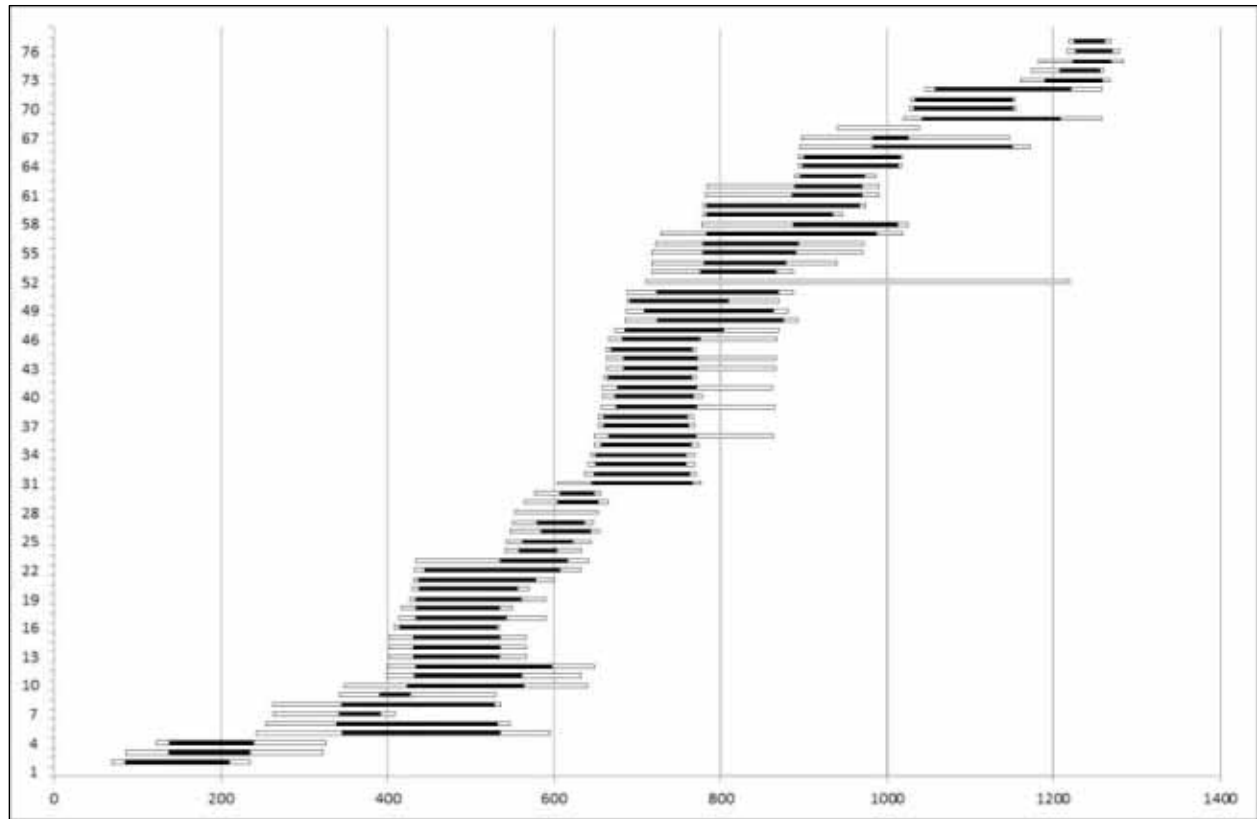


**Fig. 1:25. Radiocarbon Dates from sample of early medieval kilns with kiln types indicated (2 σ)**

Fig 1:26 presents the most up-to-date dating evidence for Irish kilns. It shows two periods of intensification in kiln building. The first is in the late-fifth and early-sixth century, while a second phase occurs in the eighth century. There is a clear decline in the rate of kiln building after A.D. 800, which coincides with the growth in the rate of mill building (below). It has been suggested above that a change in the way of harvesting grain, possibly during the eighth century, might have led to less demand for



kilns. Kelly (1997, 238) noted that the collecting of corn directly at harvest time in baskets gave way to making of sheaves which might have meant that more cereals were being dried naturally in the field than before thus lessening the need for kilns. Monk (1981, 217) has noted a direct association between the making of sheaves and corn drying when he stated that 'in southern Britain, in recent years at least, it has only been necessary to dry the crop artificially when the harvest has been too damp to allow it to dry in stooks in the field'.



**Fig 1:26. Radio-carbon dates for corn drying kilns a 1 and 2 $\sigma$ .**

### ***The location of kilns:***

Large numbers of kilns have been excavated in recent years, with over seventy being radiocarbon-dated to the early medieval period. They are generally absent from raths, and where found may well be secondary additions. Earlier excavated examples, for instance, the slate-roofed kiln at Ballycatteen, Co. Cork (Ó Ríordáin and Hartnett 1943, 11-12), or the keyhole kiln at Rathbeg, Co. Antrim which was associated with later medieval pottery (Warhurst 1969, 93), are unlikely to be contemporary with the initial construction of the sites. At Leggetsra West, Co. Kilkenny two kilns are located more than about 30m outside the ditches of a bivallate ringfort (see Animal Bones Gazetteer A293 or Plant Remains Gazetteer P147 for image). These kilns, however, are later than the building of the rath where the inner ditch produced fifth-/sixth-century pottery while the kilns were of a late-eighth to eleventh century and eleventh to thirteenth century date (Lennon 2006, 47-48). The kiln at the rath at Ballyvass, Co. Kildare is found within the enclosure, but is located within a disused souterrain, and produced a late-ninth/tenth-century and post-dates the rath which produced a late-seventh to early-ninth century date (Doyle 2009, 56-58). At Killane, Co. Tipperary a seventh/eighth-century kiln is located between the two circuits of a bivallate rath (Long 2009, 21-22) and is unlikely to be contemporary with the rath's construction since it appears to have been built into the outer ditch of the site. Kilns are also absent from the interior of recently excavated rath-like enclosures such as Newtown, Co. Limerick and Killickaweeney 1, Co. Meath.

The disassociation between grain-drying kilns and enclosed settlements may have derived from practical considerations. Evans (1957, 123) notes that the 'Laws' stipulate that kilns should be located away from dwelling houses but unfortunately does not quote his source. Kelly (1997) in his discussion of kilns on the basis of early historical sources does not mention this legal stipulation, but it may be a reflection of the potential fire hazard that kilns constituted. Unfortunately, early medieval Irish houses, because of their basket-like construction (Lynn and McDowell 2011, 598), will rarely leave remains that reach the threshold of archaeological visibility. It is difficult, therefore, to archaeologically assess this hypothesis, especially in the case of non-rath settlement, however, assuming that the dwelling houses would have been located within the central enclosures of the more complex enclosed sites of the period it would seem that Evan's suggestion is valid. For example the cereal-drying kilns at Balrothery, Co. Dublin were located at the bottom of a hill outside the site enclosure (Carroll 2008, 103) possibly because they constituted a fire hazard. The six kilns excavated at Johnstown 1, Co. Meath six kilns were all located outside the main enclosures (Clarke and Carlin 2008, 72); the several kilns at Raystown, Co. Meath were all located in 'outlying areas' (Seaver 2006, 82); and the kilns at Camlin, Co. Tipperary were also found outside the main enclosures of the cemetery settlement (Flynn 2009, 135). Several kilns were identified within a large enclosure at Gortygrigane, Co. Tipperary (Long 2009, 23-24; Long unpublished), but some of these appear to pre-date the enclosure and will be discussed in more detail below.

This apparent segregation of kilns and dwellings is sometimes even more evident, for example some kilns appear to be on isolated sites, un-associated with other settlement. The group of four figure-of-eight kilns at Loughanstown, Co. Dublin are several hundred metres from the nearest early medieval settlement (Seaver 2005, 51), and at Lowpark, Co. Mayo, a kiln dated between the tenth and twelfth century was located some 250m outside an early medieval enclosure (Gillespie and Kerrigan 2010, 277-81).

### ***Kilns and Associated Features:***

Kilns have generally been found in truncated contexts so associated features invariably comprise negative features such as pits, postholes and ditches. It cannot be demonstrated stratigraphically that they are contemporary so interpretation becomes problematic. This is especially the case in multiphase sites where continual development and reorganisation can result in a confusing array of features. There are some instances, however, where it is at least likely that the kilns are contemporary with adjacent features.

Dowdstown 2, Co. Meath began as a rath which was initially superseded by a large D-shaped enclosure that necessitated the partial re-cutting of the rath ditch. Further features, mostly ditched enclosures, extended northwards and eastwards from this enclosure during this expansion phase. One of these (Enclosure 6 in Cagney *et al.* 2009) (Fig. 1:27) consisted of a roughly trapezoidal area with a maximal internal width of 23m and minimum width of 16m (Cagney *et al.* 2009). To the southwest of this is a small sub-rectangular enclosure 8m x 8m, and located centrally within this is a Kiln (G). It could be suggested that the larger enclosure is a stack yard with a threshing floor while a contemporary kiln was located within the smaller adjacent Enclosure 9. There are seven other kilns on the site and some are located within enclosures that might be regarded as stack yards but the difficulty of establishing contemporaneity between the kilns and enclosure ditch makes the suggestion of direct association rather tenuous. Nevertheless, Enclosures 8 and 9 provide a good candidate for a set of enclosures associated with the management of cereal processing.

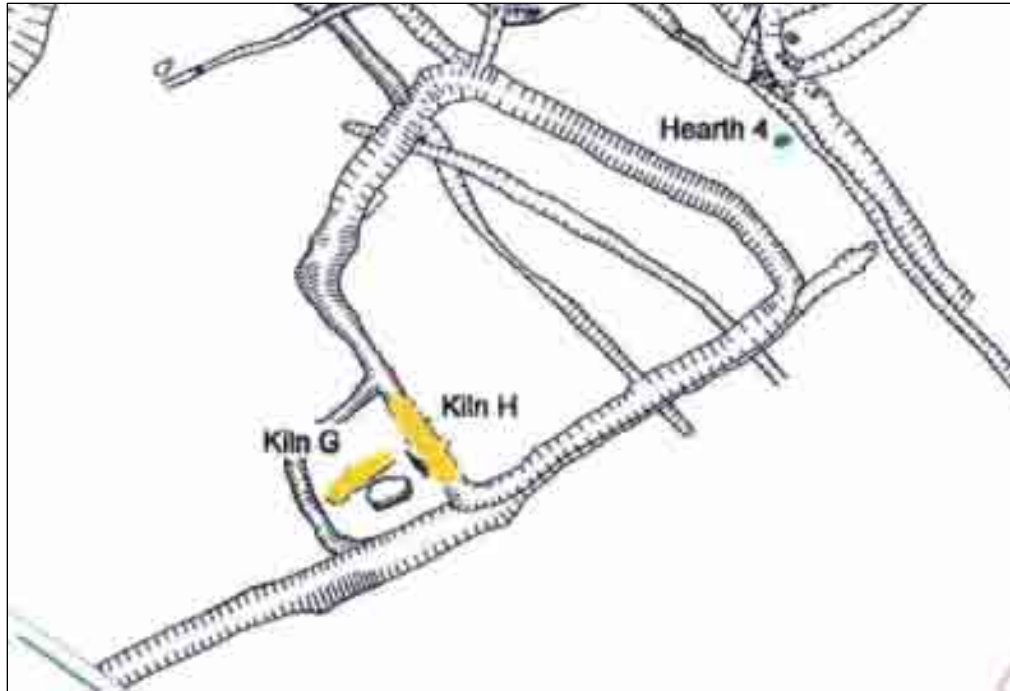


Fig 1:27. Dowdstown 1. Enclosures 8 and 9 (O'Hara *et al.* 2009, Fig. 13).

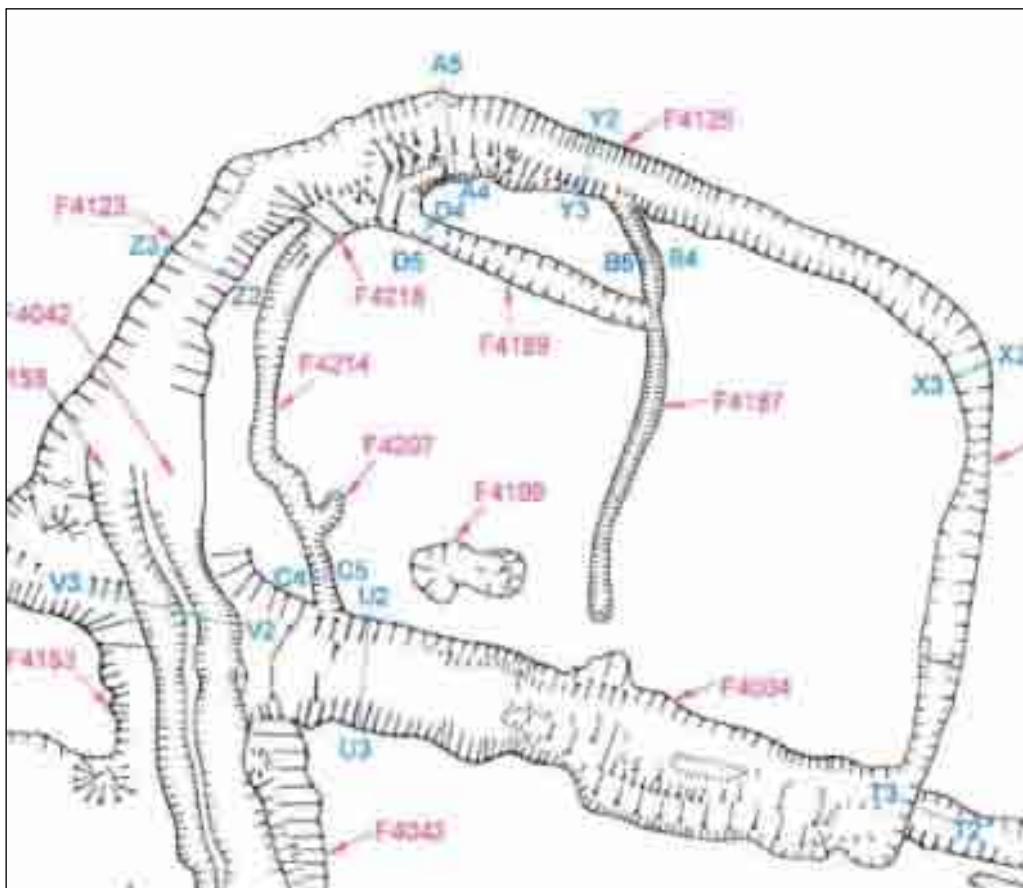
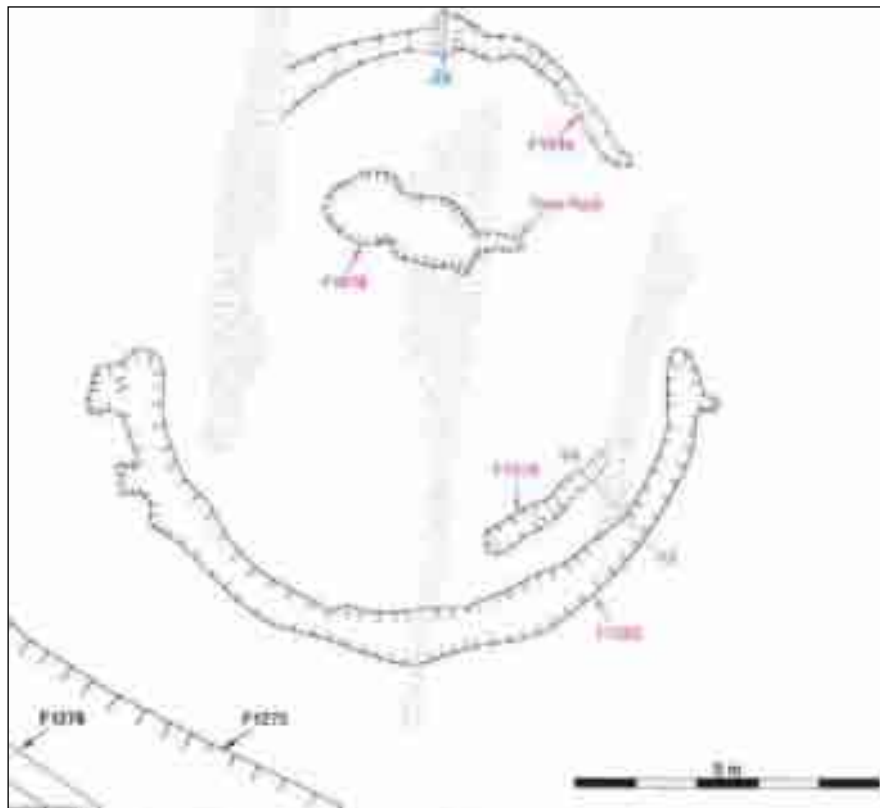


Fig. 1:28. D-shaped enclosure at Baronstown with kiln F4199 (Linnane and Seaver 2009, Fig. 20).

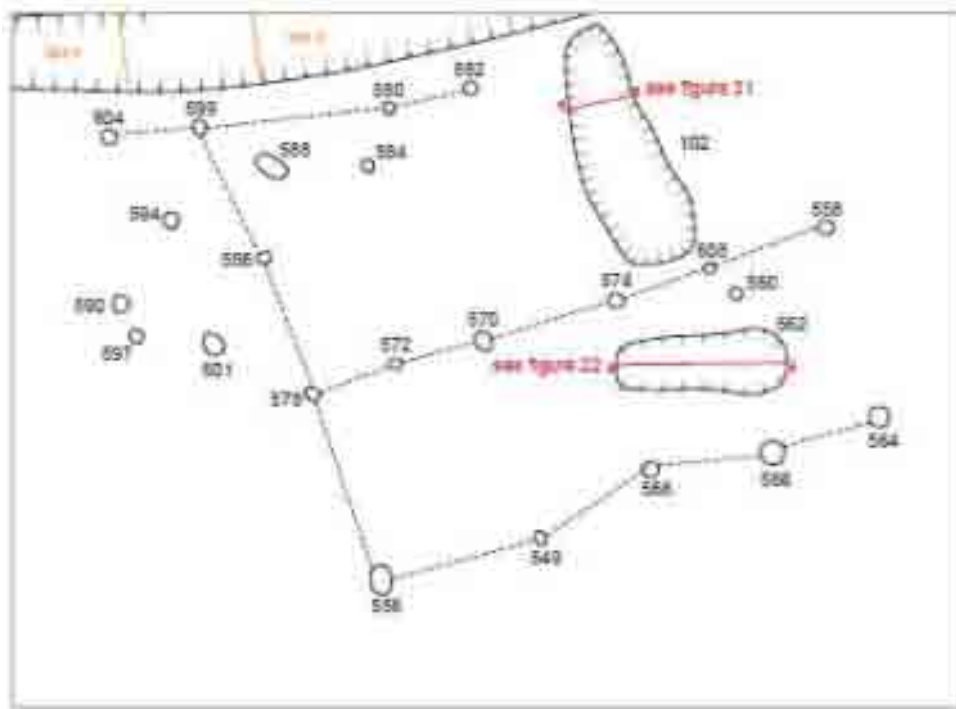
Baronstown, Co. Meath, like Dowdstown 1, contains a series of enclosures extending outwards from a rath. The site produced eight kilns, all of figure-of-eight type, and ranging in date from the fifth to the eighth century (Linnane and Kinsella 2009, 32). A D-shaped enclosure, with a maximum diameter of 18m, is located at northern end of the site. It is internally subdivided with a kiln in the western section (Fig. 1:28). The eastern section may have functioned as a stack yard and threshing area. At the southern end of the site a kiln (F1018) is located centrally within a heavily truncated circular enclosure which again may be a cereal processing area (Fig. 1:29). Some of the kilns at Baronstown (F3448, F1098 and F113) are located next to ditches and it may well be that there were built into the banks associated with the ditches thus affording a certain degree of shelter. The location of kilns within enclosures generally may have functioned as protection from wind as well as livestock. Monk and Kelleher (2005, 95) note that ideally the air at the location of the fire in a kiln should be 'stagnant' while there should be some airflow over the top of the kiln to ensure draw. The presence of low enclosures would facilitate the production of windless conditions in the fire pit.



**Fig. 1:29. Baronstown - circular enclosure with kiln (Linnane and Seaver 2009, Fig. 23).**

Sallymount, Co. Tipperary consists of an early medieval oval enclosure with rectangular annex and two 'dumb-bell' shaped cereal kilns which lie immediately outside the enclosure (Figs. 1:30 and 1:31). The site also included a four-post structure within the oval enclosure and a nine-post structure outside. These comprised substantial posts and Long (2009, 25) suggest that these may have been supports for grain stores. Immediately south of the four post feature was an L-shaped arrangement of postholes which the excavator suggested was a screen or windbreak. It may well have protected a threshing floor to protect it from the prevailing south-westerly winds. The two kilns were also located within what appears to be an apparent arrangement of screens, open at its eastern end (Fig. 1:30). These screens could have assisted the control of the kiln fires during the drying process. The complex at Sallymount could be interpreted as a protected stack yard containing a raised grain store and protected threshing floor. Immediately outside the enclosure were two kilns, with wind-break screens and associated nine-post structure which may

either be a support for a grain store or a corn rick. The rectangular annex may have been a livestock enclosure. Radiocarbon dating indicated an eighth/ninth century date for the complex.



**Fig. 1:30. Sallymount. Kilns and associated screens (Clarke and Long 2009, Fig. 20)**



**Fig. 1:31. Sallymount, Co. Tipperary – site plan (Clarke and Long 2009, Fig 3).**

## Mills and Milling

### ***Early Medieval Horizontal and Vertical Mills:***

Processing grain on a domestic scale could be undertaken with a hand quern, and this appears to have been the only method used in Ireland before the beginning of the early medieval period. More extensive processing, however, necessitated animal, wind or water power. Although animal-powered mills were the most commonly used method for grinding grain in Roman times in southern Europe, there is no evidence for them in early medieval Ireland; and there is no evidence for wind-powered mills in Ireland before the thirteenth century (Brady 2006, 43). The great majority of the early medieval watermills are powered by rivers, but three – Nendrum, Co. Down; Little Island, Co. Cork; and Knocknacarrage, Co. Galway – are tidal mills, while two – Kilbegley, Co. Roscommon; and Ballygarraiff, Co. Mayo – were powered by water fed from springs (Rynne 2009, 88-90). Excavations on early medieval Irish water mills tend to concentrate on the actual mill buildings and associated machinery. As such the excavated evidence for the wider layout of associated watercourses, such as the milldams and millponds, is much more restricted, with the exceptions of the monastic mills at Nendrum, Co. Down and High Island, Co. Galway along with Kilbegley, Co. Roscommon and Mashanaglass, Cork (Rynne 2009). The great majority of early medieval mills are of the horizontal wheeled type where the water was directed from a wooden flume or chute into the curved millwheel paddles, which in turn rotated the millwheel located in the upper part of the building. Rynne has further subdivided horizontal mills into single and double delivery chute types (2000, 19). Horizontal mills are discussed in detail in the early documentary sources (Mac Eoin 1981; Rynne 2000, 3-12), and appear to have emerged fully-fledged into the Irish landscape, with no obviously experimental forms having yet been discovered.

Rynne (2000) provides a detailed analysis of the construction, engineering and layout of early Irish mills, and has demonstrated the carefully chosen nature of their selected locations (Rynne 2009, 85). Early medieval horizontal mills demonstrate similarities with traditional mill construction across the Mediterranean world as far as the Balkans. Unfortunately in most of these areas there are few, if any, early examples contemporary with Irish mills to allow for comparative analysis to be undertaken. In fact the earliest examples of many aspects of watermill engineering documented in more modern European examples are to be found in the early Irish mills (Rynne 2000, 3).

Building on the previous work of Rynne (2000), Brady (2006) produced a general overview of the chronology and distribution of early medieval mills in Ireland. Brady's article includes a list of all known early and later medieval sites – a total of 97 mill sites. A detailed table of the most recent published list of *dated* Irish mills, and discussions of millstones and paddles from other sites, was produced by McErlean and Crothers (2007, 11) (Fig. 1:32). Rynne (2007c) considered Brady's figure to be an under-estimate because he did not include incidences of millstones found *near* streams, and more recently Rynne has suggested that there is evidence for about 130 mills, although he does not provide a revised list (2009, 85).

Vertical undershot watermills were described by Marcus Vitruvius Pollio in his first-century B.C. work, *De Architectura* (McErlean and Crothers 2007, 26), and are known from at least the third-century A.D. in Roman Britain (Rynne 2000, 17). In contrast the earliest excavated evidence for horizontal mills is from late-third/early-fourth century A.D. Tunisia (McErlean and Crothers 2007, 16). The two types of mill – vertical and horizontal – appear to have been adopted almost contemporaneously in Ireland. The publication of Nendrum, Co. Down (McErlean and Crothers 2007) provides the most detailed analysis of an Irish mill site. A horizontal tidal mill was built at Nendrum *c.* A.D. 619, with a second mill replacing it *c.* A.D. 789 (*ibid.* 25, 80). Although there are fewer excavated examples of early medieval vertical undershot mills – Little Island, Co. Cork; Morrett, Co. Laois; and Ardclloyne, Co. Cork (McErlean and Crothers 2007, 11); Killoteran, Co. Waterford (Murphy and Rathbone 2006, 26, 130) – the earliest of these (Little Island: dendrochronologically dated to A.D. 630) appear to have been built around the same time as the earliest dated horizontal mills (Nendrum: dendrochronologically dated to A.D. 619). The

vertical mill at Killoteran, Co. Waterford produced two calibrated radiocarbon dates of A.D. 410-650 and A.D. 340-600 (2 $\Sigma$ ) (Murphy and Rathbone 2006, 26, 130). This may imply that vertical mills were an earlier introduction into Ireland than horizontal mills, however it is not feasible to compare dendrochronological dates (which have a high degree of precision) with radiocarbon dates (which have a larger inbuilt margin of error). The majority of the 48 mills dated by the late-2000s were pre-tenth century in date and indicate an intense period of mill-building between A.D. 750 and A.D. 850 (Fig. 1:32). This hundred year period coincides with a change in emphasis from livestock to arable farming (McCormick and Murray 2007, 112-15). It may well be that the earliest mills were confined to monastic sites. Nendrum, Co. Down is a monastic site and the place names of Ballykilleen, Co. Offaly and Killoteran, Co. Waterford also imply ecclesiastical association. The growth in mills from the late eight century onwards is likely to reflect the expansion of the technology from the ecclesiastical world.

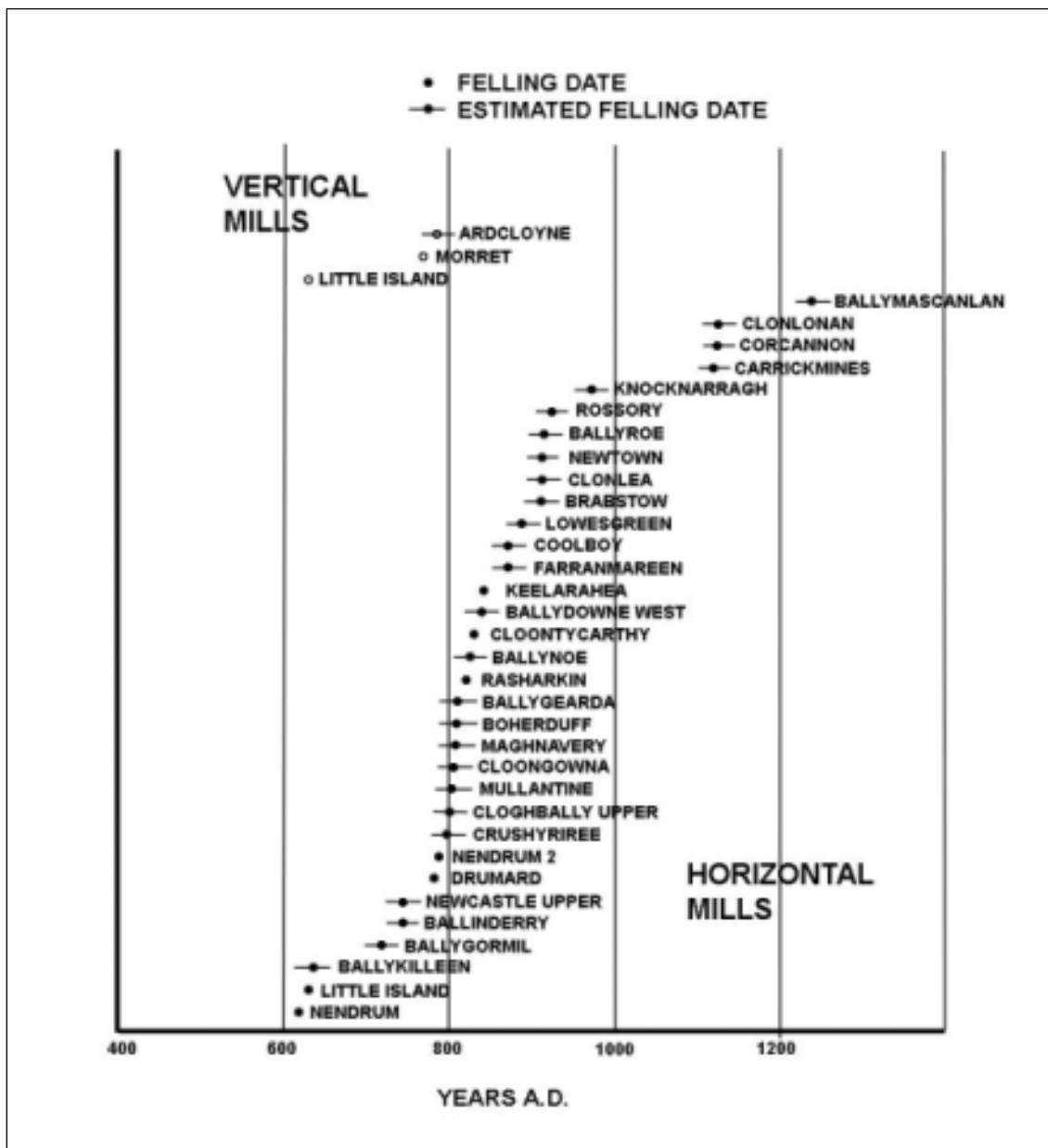


Fig. 1:32: Dendrochronological dates from mills (after McErlean and Crothers 2007, 11).

There appears to have been a concentration of milling activity in the south and south-east of the island (Brady 2006). Rynne (2007, 34), however, considers this distribution to be the product of systematic fieldwork in search of mills undertaken in the mid-twentieth century by Winedale, Fahy and O'Kelly, and extensive drainage schemes in the last decades of the twentieth century. A number of milling complexes excavated outside the south and south-east, such as Raystown, Co. Meath (Seaver 2006, 2010), would tend to support Rynne's argument. This site contains a series of eight watermills, found in association with grain-drying kilns, souterrains and a cemetery, and seems to be a specialised milling site involved in processing grain on an almost industrial scale.

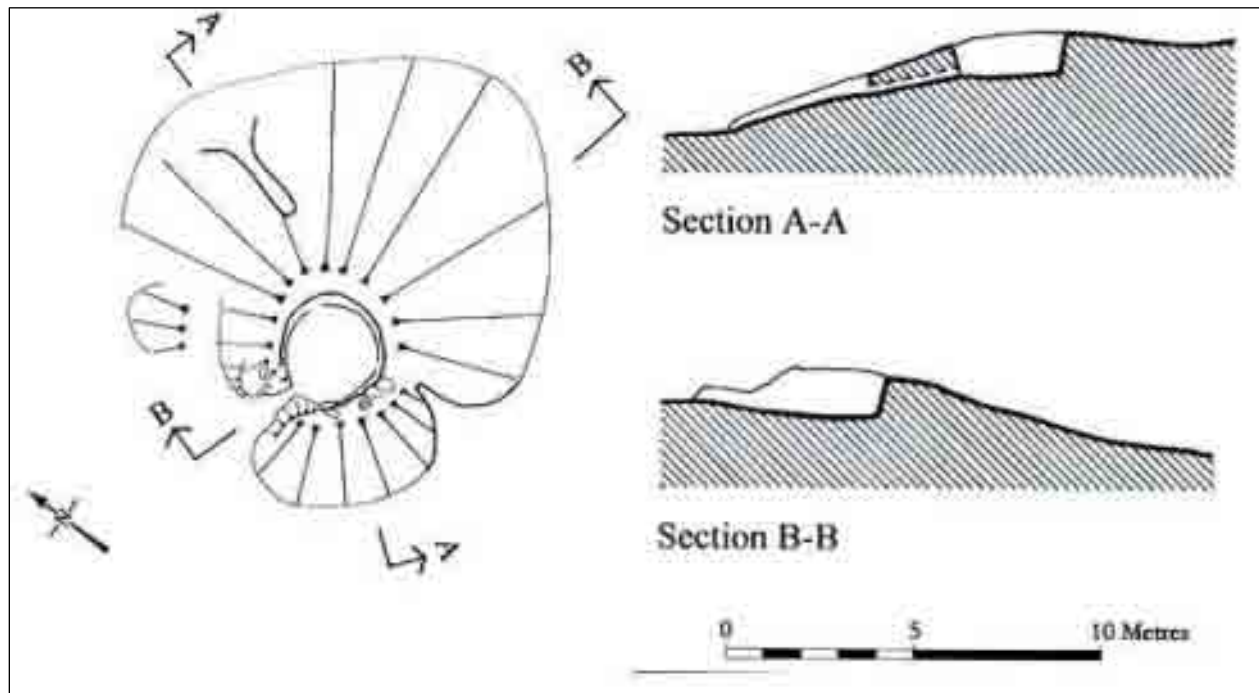


**Fig. 1:33 Mill complex at Ballyviggis, Co. Down (OS 1<sup>st</sup> edition, revision)**

A close, symbiotic relationship could have been expected for the use of grain-drying kilns and mills, with kilns providing moisture-reduced cereal to the mills where it would have had less chance of gumming-up the millstones. Damp grain is not a major problem with hand querns as the top quernstone can be easily lifted and cleaned although, as noted above, the drying of grain speeded up the process of hand milling. Millstones tend to be much larger than those of a rotary hand quern. McErlean and Crothers (2007, 191-94) noted that while quernstones had diameters of 0.30-0.50m, millstones regularly had diameters of up to 1.06m. Dismantling would be more difficult. More importantly, however, sudden clogging and jamming of the stones could cause the rynd bar to snap. This mechanism transferred the power of the spindle to the upper millstone, and so if it broke, the mill would have stopped working, and this would be a major problem to rectify. In the recent past kilns tended to be almost invariably associated with water mills (Fig. 1:33). As yet this association has not been demonstrated in the case of early medieval Irish mills. A possible exception is the kiln at the monastic site of Nendrum, Co. Down, which had a tidal mill dating to the early seventh century and a large, yet undated, grain kiln (Fig. 1:34). This kiln differs from those already discussed in that it is an above ground construction and has three separate flues which were alternatively used depending on wind direction. The drying chamber had a diameter of 2m, much larger than those already discussed (Monk and Kelleher 2005, 81). The only dated corn drying kiln of this type from Tullylish, Co. Down, is thirteenth century (Ivens 1987, 62) but others may well be of an earlier date. Being built above ground, unlike those already discussed, they would have left no archaeological record if destroyed, for example the Tullylish example owes its survival to the fact that it was built in a partially



filled monastic ditch. Methods for drying grain that left no archaeological record may also have been used at mill sites. (O'Laverty 1884, 234) describes how grain was dried at a windmill at Ballydargan, Co. Down before the introduction of tile kilns: 'a fire of turf was lit against a wall or ditch, branches of trees were placed in a slanting position against the top of the wall or ditch, over these wheat straw was closely spread, and upon this a layer of grain was spread, which, when it was dried by the heat, was carefully brushed down the straw into a winnowing-sheet, and replaced by a fresh of grain'.



**Fig. 1:34. Nendrum. Corn drying mill (McErlean and Crothers 2007 Fig12:21a: copyright NIEA).**

## Livestock Farming (see Section 3)

A detailed overview of the zooarchaeological evidence was produced by McCormick and Murray in 2007 and the evidence from recent excavations presented in Part 3 of the present report. The present discussion will be confined to more general issues regarding livestock. Cattle, more specifically cows, were of exceptional importance in the lives of the early Irish (Lucas 1989, 3-4). The cow was the basic unit of wealth and an individual's social status in this rigidly hierarchical society was dependant, to a large extent, on the number of cows at one's disposal. The giving and receiving of cows formed the basis of the contracts, i.e. '*taurchrecc*' (Kelly 1988, 32; Jaski 2000, 106), between members of different social ranks in society. These contracts formed the basis of stability within society. Fines, tribute, and dowries were generally paid in cows; and cattle-raiding was regarded more as a form of political competition than criminal activity. Some payments could also be made in silver, but the authors of the law tracts assume a consistent exchange-value for cattle (Kelly 1997, 57), thus acknowledging their position at the core of the value system. McCormick (1995a, 2008) argues that raths/ringforts were primarily built to protect cattle during times of raiding, thus reflecting the central role of cattle, and especially the milch cow, in the wealth system. Contemporary writings suggest that early cattle-farming was dominated by dairying, an impression confirmed by the age-slaughter pattern and sex-ratio of cattle from archaeological sites (McCormick 1992), and by the wide range of dairy products consumed during this period (Kelly 1997 323-30). In contrast the by-products of butchered cattle - i.e. meat, hides, and tallow - appear to be of less importance than live cattle and their by-products. The age-slaughter pattern of cattle can also indicate if a

site is a producer/consumer or simply a consumer site. The former is characterised by significant number of immature cattle being slaughtered while the latter tends to be dominated by older animals, for example, the majority of cattle slaughtered in Viking Dublin were older animals (McCormick and Murray 2007, 46), indicating that it was a consumer settlement and did not produce the beef that it consumed. Clonmacnoise had a similar age/slaughter pattern, indicating the site for the most part was provisioned by outside producers and not by its own herds (Soderberg 2004, 167-83; McCormick and Murray 2007, 209-17).

The vast quantities of cattle bones from excavations such as Lagore, Co. Meath (Hencken 1950, 225) led to the impression that cattle rearing completely dominated livestock farming, and that other livestock were kept in relatively minor quantities. Advances in zooarchaeological methodology, however, has shown that the livestock economy was of a more balanced nature than previously thought. This evidence from early medieval Ireland has recently been re-appraised by McCormick and Murray (2007), and it shows clear differences between the livestock economy of the sixth to eighth centuries, and that from later centuries. The distribution of livestock from sites dated *c.* A.D. 600-800 displays a remarkable consistency (*ibid.* 105). During these centuries there was an almost nationwide livestock economy, with cattle being of primary importance, followed by pig, and then sheep. Goat played a very minor role. From about A.D. 800 onwards, distribution of livestock from various sites begins to show much more diversity, and in many places cattle begin to lose their dominant role (*ibid.* 107). This change is equated with a decline in cattle being used as the currency standard and general basis of the wealth system. Other currencies, especially silver, began to gain significant economic importance around this time. As a consequence of this it has been argued that there is an expansion in grain production, which is superior way of generating independent economic wealth than cattle rearing (Kerr 2007, 117-18; McCormick and Murray 2007, 111-15). The great activity in mill building around the turn of the eighth century (Brady 2006, 49) provides complimentary evidence for the expansion in arable farming (Fig. 6.1), although admittedly the supporting evidence from pollen analysis has yet to be demonstrated (see above). The change in the livestock economy coincides with the beginning of the decline of the rath and the emergence of the raised rath in the northern part of the island (Kerr 2007, 98-99; Kerr 2009, 72-74). Slaves too, previously kept only on a domestic scale, became a commercial commodity with warfare now being characterized by the mass taking of prisoners (Holm 1986, 340-45). This is likely to have led to the expansion of the souterrain (Clinton 2001; McCormick and Murray 2007, 111-12) often located in new, unenclosed settlements.

The farm buildings listed in the early Irish legal texts are closely associated with livestock farming – *bótheg* (cow-house), *foil muc* (pig-sty), *lias láeg* (calf-pen) and *lias cáerach* (sheep-pen) (Kelly 1997, 365) – yet very little archaeological evidence for these structures has been discovered. The relative mildness of the Irish climate allowed cattle to be kept outdoors throughout the year, and this may account for the lack of cattle byres identified from the early medieval period. In the early-eighth century, the Saxon cleric Bede noted that: '[in Ireland] there is no need to store hay in summer for winter use' (Sherley-Price 1965, 39); and a similar statement was made in the *Konung's Skuggsjá*, a Norwegian work written *c.* A.D. 1250 – 'all through the winter the cattle find their feed in the open' (Larson 1917, 105). The few animal houses identified within raths include a lean-to at Ballyknockan, Co. Wicklow (Macalister 1943, 147), and an indeterminate number of 'outhouses' identified from stake-holes at Lisnagun, Co. Cork (O'Sullivan *et al.* 1998, 39). Such structures tend to be labelled as outhouses on the negative basis that they cannot be identified with human occupation. On the same basis, it is possible that a number of enclosures which produced almost no occupation debris may have actually been little more than cattle corrals, for example, Garryduff II, Co. Cork (O'Kelly 1963, 18-20), and the western enclosure at Balrigan, Co. Louth (Delaney and Roycroft 2003, 19; Delaney 2010). The best positive evidence for animal houses within raths, however, comes from insect material found at Deer Park Farms, Co. Antrim. The presence of dung beetles (*Carpelimus bilineatus*, *Aphodius prodromus* and *Cercyon analis*), animal fleas (*Damalinia ovis*, *D. bovis*, and *D. caprae*), and five sheep ticks (*Ixodes ricinus*), suggest that live animals were brought into the enclosure (Kenward and Allison 1994, 95-96). An environmental sample

from one building was found to contain 43 pig lice (*Haemotopinus apri* – a louse usually associated with wild boar (*ibid.* 96)) suggesting it may have been used as a slaughterhouse or pig-pen.

The decline in the social value of cattle has profound implications for the settlement patterns of the period. At Knowth, Co. Meath, for instance, the enclosed bivallate rath of the seventh/eighth centuries gives way to an unenclosed settlement which provided evidence for no less than nine souterrains and fifteen houses. This is a settlement created with an emphasis on the protection of people rather than cattle, and seems, at least superficially, to validate the settlement change proposed by McCormick and Murray (2007) and Kerr (2007; 2009). It is also likely that settlement change occurred earlier in Leinster where the influence of the Vikings, and their silver, was greatest. Stout (1997, 54) has shown that density of raths is lower in Leinster than elsewhere in the country. The hypothesis outlined above would suggest the rath went out of use earlier in Leinster and may have continued to have been built for considerable periods elsewhere in Ireland.

## **Conclusion**

A substantial amount of new archaeological evidence for agriculture in early medieval Ireland has been discovered in recent years. The general character of early medieval agriculture; the role of dairying; the role of arable crops and the place of farming in early Irish society have all been reconstructed from archaeological, environmental and historical evidence. There is also good evidence for early medieval fields and enclosures, for kilns and mills, for track ways and fisheries and other features. The well-known revolutions in early Irish farming can now be matched with a revolution of the scale and intensity of settlement and land-use in the Irish landscape, and the emergence of a better understanding of the real role of farming in social life and practice. Further work, however, is still required to understand the driving forces behind these changes in early medieval farming, and especially in trying to judge the impact of the responses to climatic deteriorations and ameliorations.

## Section 2:

# The Plant Remains from Early Medieval Ireland

### Introduction:

In order to investigate the nature of arable agriculture in early medieval Ireland, collation and analysis of non-wood plant macro-remains data from 60 excavated sites was carried out, comprising a total of 165 different phases/areas of activity. The non-wood plant macro-remains consist of charred and waterlogged remains of plants, such as cereal grains, cereal chaff, seeds of other crops, fruit stones, nutshell and weed seeds. Analysis of such remains can provide insights into past activities and environments, including food production and consumption (McClatchie 2007). Many of the examined sites were well-drained and produced only charred plant macro-remains. Plants that are more likely to come into contact with fire during food preparation and discard activities – such as cereals, arable weeds and nutshell – will often dominate charred assemblages. A number of sites that included waterlogged remains were also examined, providing an interesting contrast.

Data were derived from both published and unpublished sources, consisting mainly of excavation reports. Particular attention was paid to ensuring that the dataset was reliable, which involved verifying that each deposit at a site containing plant macro-remains was actually early medieval in date. This was an important objective in data collation, given that multi-period activity was uncovered at many locations. Where possible, data were analysed by phase/area at a site, rather than looking at results from each site as a whole – analysis by phase/area was favoured over analysis by site, as some sites were found to be occupied over several centuries during the early medieval period. Attention was also paid to the type of site and geographic location from which the data were derived. This study represents the first large-scale analysis of early medieval non-wood plant macro-remains where the data have been examined in such detail. The approaches outlined above enabled exploration of temporal and spatial trends in the data, providing new insights into agricultural activity at this time.

### Research Background:

The importance of cereals during the early medieval period is reflected in the range of evidence for arable activities at this time. Cereal remains have regularly been recorded in archaeological deposits of this period (Monk 1986; Monk 1991; Monk *et al.* 1998), and tools associated with soil preparation, harvesting and food processing are often recovered (for example Hencken 1936; 1942; Collins 1955; Farrell *et al.* 1989; Rynne 1998; Monk and Kelleher 2005; see Section 1). The cultivation, harvest and trade of cereal products are also frequently referred to in contemporary documentary sources (Kelly 1997, 229–47; 330–36, 480–85; Rynne 1998, 87). Cereals would have been cultivated for their food value; grains could have been used in a range of food products, including breads, gruels and porridges, as well as in brewing and as animal fodder (Kelly 1997, 82–3, 220, 226, 245; 330, 332–35; Sexton 1998). Cereal straw would have been utilised in structures, roofing and bedding (Kelly 1997, 111; 240). Cereals were additionally used as a form of currency, for example in food-rent (*ibid.* 219; 333).

This current study is focused on plant-macro-remains evidence for arable agriculture, particularly cereals. Archaeological evidence, as discussed below, indicates that a range of crops would have been grown during the early medieval period, including oat, barley, wheat, rye, flax and legumes. Barley and wheat have been cultivated in Ireland since the Early Neolithic period, and although oat and rye have occasionally been recorded in prehistoric deposits, it is thought that they only began to be cultivated in Ireland from the early medieval period (Monk 1986; McClatchie *et al.* 2009). The introduction of these

new crops at this time is therefore an important change in agricultural production. While the earliest evidence for flax dates to the Early Neolithic period (McClatchie *et al.* in preparation), there is little evidence for legumes in prehistoric Ireland, and they may also have been introduced by early medieval communities.

A number of general reviews of early medieval arable agriculture based upon plant-macro remains evidence have previously been carried out (for example, Monk 1986; Monk 1991; Monk *et al.* 1998). These reviews, containing evidence from up to 23 sites, indicate that barley and oat were the dominant cereals at this time, with less evidence for large-scale wheat and rye production. Where identifiable to species level, barley was most often of the six-row hulled variety, while a range of oat species was recorded, including common oat, bristle oat and wild oat (Monk 1991, 317). Flax was also recorded at more than one-third of sites (Monk 1991, 318). It is worth noting that only a small number of samples appear to have been analysed from many sites (six or less samples from more than 70% of examined sites in one study; Monk 1991, 318).

Contemporary documentary evidence also suggests that oat and barley would have been more commonly encountered during this period. A list of cereal types provided in the eighth-century law tract *Bretha Déin Chécht* places them in the following order: *cruithnecht* (bread wheat), *secal* (rye), *suillech* (spelt wheat?), *ibdach* (two-row barley?), *rúadán* (emmer wheat?), *éornae* (six-row barley) and *corcae* (oat) (Kelly 1997, 219). There are question marks attached a number of cereal types, as their identity is uncertain. This order represents the relative prestige of each type of cereal, which is correlated with a particular ranking in society. Bread wheat is equated with the rank of a superior king, bishop or chief poet whereas, at the other end of the scale, oat is equated with the commoner. Oat and barley are more often recovered from early medieval archaeological deposits in Ireland, reflecting, therefore, their lower status (Monk 1991). Bread wheat and rye are rarer in the archaeological record, as their status was perceived as being higher. Cereals were therefore regarded not just as a source of sustenance, but also as cultural symbols that could distinguish social classes (Fredengren *et al.* 2004). Peas and beans were both placed below the cereals in *Bretha Déin Chécht*, suggesting that they were of lesser social importance (Kelly 1997, 248), while flax was also often mentioned in historical sources (*ibid.* 269–70). A useful review relating to the consumption of cereal foodstuffs during the early medieval period was carried out by Sexton (1998), based primarily on information from historical sources. The use of different cereals in porridges, gruels and breads was outlined. Wheat (a perceived higher-status cereal) was noted as providing the basis for a good-quality loaf, while other cereals were used in flat-breads and heavier loaves. Sexton (1998, 82) also noted a particular association between barley bread and monastic communities in early medieval Ireland.

The potential for chronological variation within agricultural systems of the early medieval period has been alluded to (for example, Monk *et al.* 1998, 73), but has rarely been explored in detail. A recent study has, however, begun to address this issue, examining chronological variation in cereals from drying kilns at 18 sites in Co. Kildare (Timpany *et al.* 2011). Analysis of archaeobotanical data from these kilns, when combined with assigned date ranges (based upon radiocarbon dates from mainly short-lived species), indicated that barley was the dominant crop during the early medieval period until around A.D. 600, when it decreased in importance and oat became more significant (*ibid.* 79). Wheat was rarely the dominant crop during the entire early medieval period, particularly during the period A.D. 900–1200. This study suggests that changes in agricultural strategies did take place during the early medieval period, albeit relating to a limited area and one site type. The potential for regional variation in agriculture has also been addressed – one study, for example, focused on six sites in Munster (Monk *et al.* 1998). Unfortunately, the absence of a more extensive dataset precluded comparison of the Munster evidence with sites in other parts of Ireland (*ibid.* 74).

Since some of the reviews outlined above were carried out, many large-scale excavations of early medieval sites in Ireland have taken place, resulting in a much enlarged potential dataset. These excavations have often included comprehensive environmental analyses, accompanied by detailed radiocarbon dating programmes. Given this new wealth of evidence, an updated review is timely,

particularly one that separates out different phases of activity at sites that were occupied over many centuries.

## **Methodology:**

### ***Selection of Sites:***

Non-wood plant macro-remains data were collated from 60 excavated sites in order to achieve a representative overview. The locating and selection of suitable sites for analysis proved to be a lengthy process. Published and unpublished excavation reports were found through consultation of a range of resources. Previous EMAP gazetteers were examined for mention of the presence of plant remains at individual sites. Our attention was also drawn to a number of sites through research being carried out by Lisa Coyle at the School of Geography, Archaeology and Palaeoecology at Queen's University Belfast, where her research focuses on palynological evidence for farming during the first millennium A.D. Archaeologists at the National Roads Authority in the Republic of Ireland were also approached, and they were most helpful in providing access to recently completed excavation reports. The NRA online archaeology database was also consulted (<http://www.nra.ie/Archaeology/NRAArchaeologicalDatabase/>). Assistance was additionally sought from archaeobotanists and archaeologists working in Ireland, to whom we are grateful. EMAP has established an archive containing many early medieval excavation reports, but some recently completed projects have not yet been included. A considerable amount of time was therefore spent in finding suitable sites and data for analysis, which is primarily due to the lack of an easily searchable central archive of Irish excavation reports.

It was decided to focus mainly on unpublished or difficult-to-access data in order to make such evidence more accessible to the archaeology community and other interested parties. For this reason, some of the well-known and published urban excavations, such as those from Viking Waterford and Dublin (Tierney and Hannon 1997; Geraghty 1996) have not been included in this overview. Sites where all archaeological analyses and a final excavation report had been completed were prioritised – as full a record as possible was required for analyses carried out as part of this current study. A small number of well-known sites that have not been fully completed were, however, included, such as the enclosed settlements at Lisleagh, Co. Cork (Monk *et al.* 1998).

### ***Recording of Data:***

Where available, final excavation reports were consulted, and the relevant plant remains data were then extracted. Data relating to plant remains were often, but not always, contained in a separate specialist report. In these specialist reports, plant remains were usually listed by the context in which they were recorded. Where plant remains were found to be present in a context, information about this context was checked in the main excavation report to firstly ensure that it was actually early medieval in date, and secondly to determine if the remains could be assigned to any particular phase of activity during the site's occupation. The specialist reports often assigned contexts to various phases of activity, but we were conscious that this work may have been completed before final decisions on phasing had been made by the archaeologist, or even before the radiocarbon dating programme had been conducted. A number of the sites were found to be multi-period, containing pre- and post-early medieval activity. For these reasons, it was necessary to check that contexts that purported to be early medieval in date did actually relate to this period.

A table was constructed for each site in Microsoft *Excel*, detailing the plant remains recorded in each context. Where possible, contexts were assigned to specific phases/areas of activity at each site, based upon radiocarbon dates, stratigraphy and locational information. This enabled determination of changing trends in people-plant relationships at individual sites that may have been occupied for several centuries during the early medieval period. Tables were then constructed to show the plant remains recorded per phase of activity – these tables are provided later in this report. Available radiocarbon dates were also



noted. Most of the remains were preserved as a result of charring. Where remains were preserved by different methods of preservation at an individual site (i.e. by charring and waterlogging), the remains were listed separately according to method of preservation. Overview tables were also assembled for each site, showing the overall quantity of different types of remains during each phase. The overview tables include counts only of whole seeds/grains (although fragments are counted in the case of cereal chaff and hazelnut shell). A master table containing all data by phase was also constructed in order to allow inter-site comparisons.

It is unfortunate that a significant number of specialist reports did not record actual numbers of plant components present. Instead, these reports provided a scale of abundance (rare, occasional, abundant, etc.), which makes it rather difficult to complete inter-site comparisons beyond presence/absence analysis. In these cases, plant remains were recorded below as simply being present or absent, as different analysts employed differing scales of abundance (one person's rare might equate to another person's occasional, etc.). This style of reporting is more associated with an assessment plant remains report, rather than a final report, as the basic record (i.e. the number of components present) is not provided; unfortunately in a number of cases, a more detailed report was never prepared.

A list of all charred and waterlogged plants recorded from examined sites has been provided (see Appendix 1). The order and nomenclature of plants, except cereals, follows that of Stace's 1997 publication, *New flora of the British Isles*. The botanical terms for seeds (for example, seeds, achenes, mericarps, etc.) follow those assigned by Martin and Barkley (1961) in their *Seed identification manual*. The remains of lower plants, such as mosses, were not included in these lists or analyses.

## **Sites analysed:**

Plant remains data from a total of 60 excavated sites were collated, comprising a total of 165 different phases/areas of activity. Efforts were made to analyse data from many different parts of the island in order to achieve a representative dataset. The distribution of analysed sites is as follows: 7 sites in Ulster (12 phases of activity), 20 sites in Munster (40 phases of activity), 19 sites in Leinster (82 phases of activity) and 14 sites in Connacht (31 phases of activity). As can be seen in the map below ((Fig. 2.1), sites are widely distributed across the island, although there are concentrations of sites in certain areas. There are particular concentrations in counties Galway and Meath, for example, which is influenced by recent road schemes that have undertaken large numbers of archaeological excavations including environmental analyses. In some other areas of the island, fewer large-scale infrastructural projects have taken place, and excavated evidence is therefore less likely to be available.



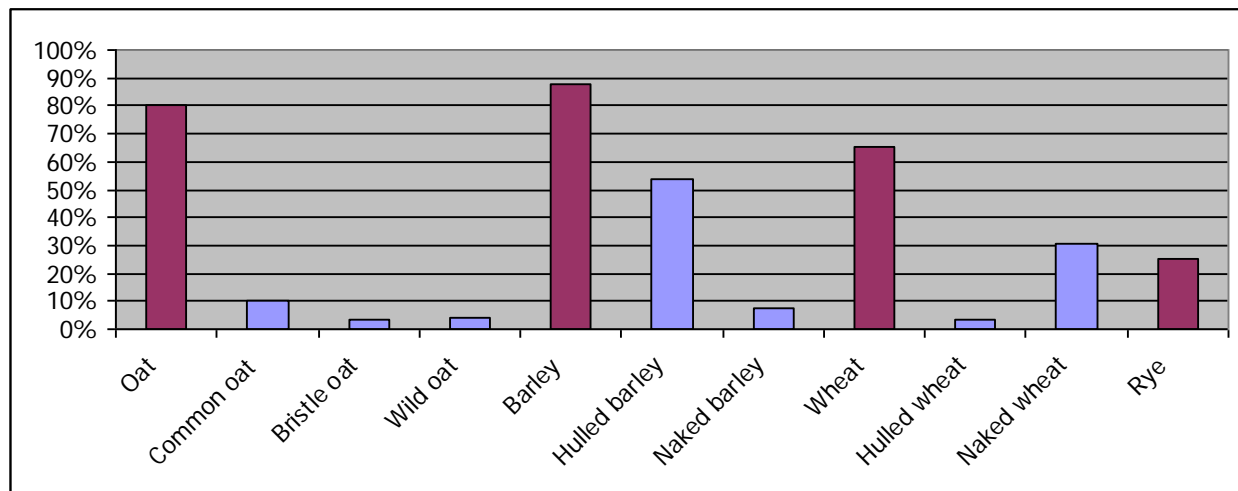
## Analyses

A range of analyses was carried out at phase level, examining the evidence from each separate phase/area of activity at sites. Analyses were focused on determining the overall relative occurrence and frequency of different plant types, as well as identifying potential trends relating to geographical location, site type and date range. Presence/absence analysis could be carried out for all sites. Unfortunately, due to the absence of quantified data from a number of sites, determination of dominant cereal types could not be carried in a number of cases. Similarly, radiocarbon dates were not available for all phases, which restricted the number of sites that could be investigated for temporal change. Despite these issues, this study has uncovered a number of new insights into early medieval agriculture in Ireland.

### ***Relative Occurrence of Different Cereal Types:***

Assessment of the types of crops recorded during each of the 165 phases of activity revealed that barley and oat were most often recorded, being found at 88% and 80% of locations respectively. Wheat was next, being found at 65% of locations, while rye was present at only 25% of locations (Fig. 2.2).

Assessment of the types of oat, barley and wheat species was more problematic, as many remains were not recorded to this level. In order to determine the species of oat remains, floret bases are required, as they contain diagnostic differences in their morphology. Unfortunately, floret bases were not always present, and the species of oat present could not, therefore, be determined. Where species was identified, common oat was most often found, followed by bristle oat and wild oat. The presence of wild oat at a number of sites demonstrates that even though oat was a cultivated crop during the early medieval period, some of these oat remains may represent the wild variety.



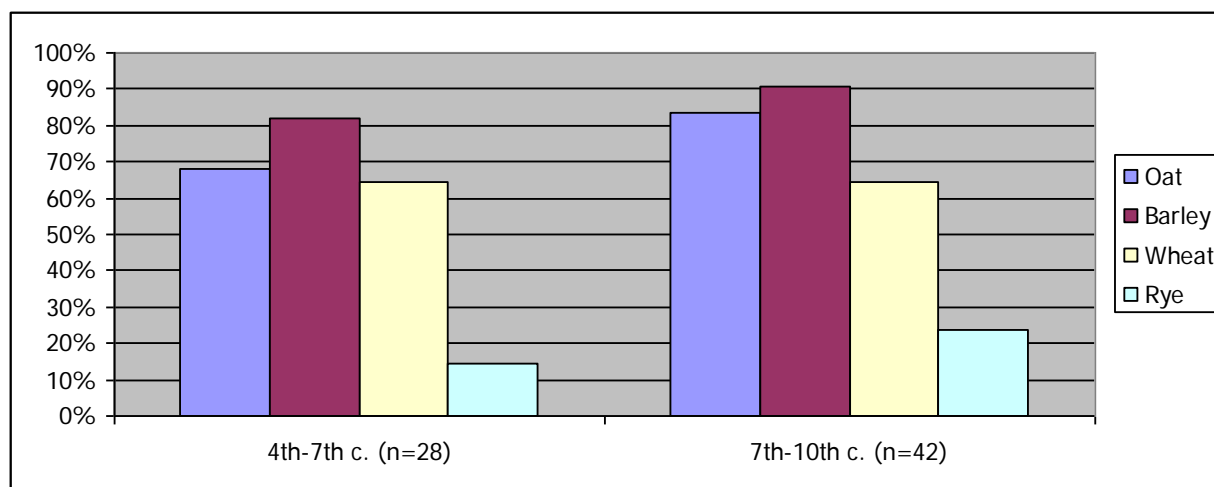
**Figure 2.2: Relative occurrence of cereal types** (total phases of activity n=165)  
(Purple = cereal genus; Blue = cereal species/variety)

Hulled barley appears to be more commonly recorded than naked barley, while naked wheat seems to be more often recorded than hulled wheat. In the case of barley, analysis of the grain can aid in determination of hulled or naked varieties, and chaff is not necessarily required; this is probably why there are more identifications of barley species when compared with other cereals. As well as being identified as either hulled or naked varieties, barley can also be of the six-row or two-row varieties. In both, the spikelets are present in groups of three, placed alternately along the stalk. In two-row barley, only the central spikelet is fertile, the outer (lateral) two being sterile. In six-row barley, all three spikelets (central and lateral) are fertile. In two-row barley, the ratio of straight to twisted grains should therefore

be 1:0 (lateral grains will be absent). In six-row barley, the ratio should be 1:2 (lateral grains will be present). Identification of straight/twisted grains can, however, be problematic within carbonised assemblages, due to morphological changes that can occur during charring. It is therefore possible that the relative importance of identified two- and six-row barley remains may be somewhat ambiguous. For this reason, assessment of the relative occurrence of six-row versus two-row barley has not been carried out as part of this current study, although it is worth noting that where such identification has been recorded, it is predominantly the six-row variety that is found – two-row barley was present at only one site (three phases of activity), while six-row barley was present at 21 sites (41 phases of activity).

In the case of wheat, chaff is required to confidently distinguish between different species (Hillman *et al.* 1996), and again chaff was often absent. A variety of hulled wheats was found, including einkorn, emmer and possible spelt wheats, although a number of identifications were based on grains rather than chaff. Naked wheats appear to consist mainly of bread wheat, with some evidence for remains that were identified to a bread/club wheat variety.

In order to investigate if temporal changes in cereal production could be determined, the evidence from phases of activity with radiocarbon dates was examined (Fig. 2.3). Unfortunately, clear boundaries (for example, 5<sup>th</sup>–6<sup>th</sup> centuries versus 7<sup>th</sup>–8<sup>th</sup> centuries versus 9<sup>th</sup>–10<sup>th</sup> centuries) could not be defined, as many of the calibrated date ranges spanned several centuries. It was therefore decided, where possible, to compare the remains from phases of activity dating to the 4<sup>th</sup>–7<sup>th</sup> centuries with remains from 7<sup>th</sup>–10<sup>th</sup> centuries. It is acknowledged that there is crossover between these two periods, but clearer separation would have resulted in too few data for comparison.



**Figure 2.3: Relative occurrence of cereal types during different time periods**  
(total phases of activity n=70)

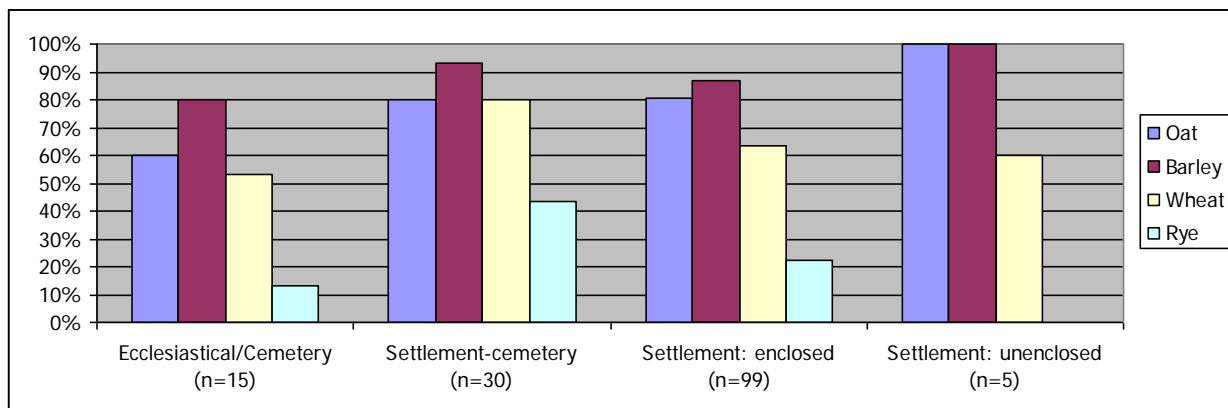
There does not seem to be a clear rise in any cereal type with a corresponding decrease in another. Rather, there appears to be a slight rise in the occurrence of oat, barley and rye, with little change in the occurrence of wheat. It is, however, interesting to note that a larger number of the sites date to the later period, perhaps reflecting a greater emphasis on arable agriculture during the later period.

In order to investigate if regional differences in the occurrence of cereal types could be established, the evidence from each phase of activity was examined (Fig. 2.4). It is notable that there were many more phases of activity examined from Leinster when compared with other areas. Barley continues to be the most commonly recorded cereal in all regions, followed by oat. Rye is found at a relatively small number of locations in all regions. Wheat does, however, appear to be more commonly found at locations in Leinster and Connacht, when compared with Ulster and Munster.



**Figure 2.4: Relative occurrence of cereal types by region** (total phases of activity n=165)

Investigation of any association of cereal types with various site types was also carried out (Fig. 2.5). It was decided to establish four categories, into which most phases of activity could be placed: ecclesiastical/cemetery, settlement-cemetery, enclosed settlement and unenclosed settlement. It is notable that there are many more phases of activity from enclosed settlements when compared with other site types. Barley continues to be the most commonly recorded cereal at all site types, closely followed by oat in all cases, except for ecclesiastical/cemetery sites, where there was a greater gap between barley and oat. Wheat was more often recorded at settlement-cemetery sites when compared with other site types. Rye was also found at a higher percentage of settlement-cemetery locations, and was rare at ecclesiastical/cemetery sites and absent from unenclosed settlements (although it should be noted that relatively few data were available for the latter site type).



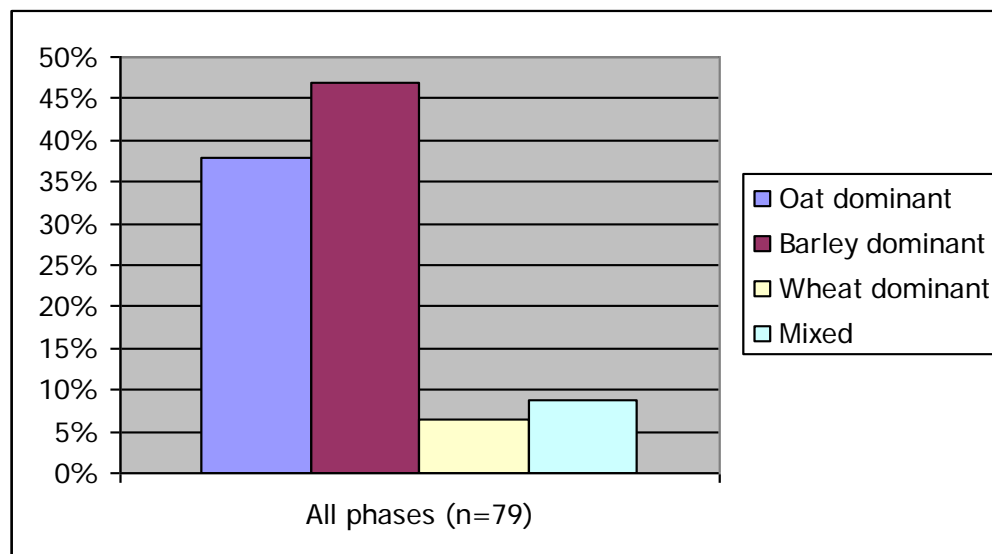
**Figure 2.5: Relative occurrence of cereal types by site type** (total phases of activity n=149)

### ***Relative dominance of cereal types:***

The analyses above examined the presence/absence of remains during different phases of activity at sites. It was decided, where possible, to also examine the relative dominance of cereal types by establishing which cereal type, if any, was dominant at different locations. This analysis was based on the number of cereal grains present in a phase of activity where more than 25 grains were recorded. In order for a cereal type to be deemed dominant, it was decided that it had to represent more than 50% of an assemblage, and it also had to be recorded at a level at least 10% higher than the next nearest cereal type. Assemblages were placed into a 'Mixed' category if these limits could not be reached, for example in a phase containing 42% oat, 38% wheat, 15% barley and 5% rye, or in a phase containing 52%

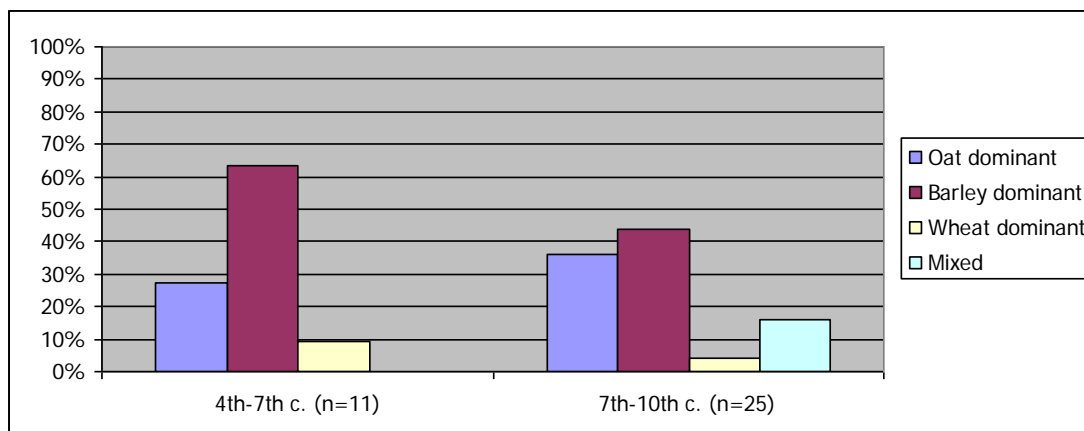
barley and 48% oat (Fig. 2.6). A total of 79 out of 165 phases of activity produced suitable data for analysis. It is notable that very large cereal assemblages were recorded in some phases of activity – for example, more than 10,000 cereal grains were found in a single well-dated phase of activity from the enclosed settlement at Dowdstown 2, Co. Meath (Archaeological Services University of Durham (ASUD) 2009a).

Barley was revealed as not only the crop type recorded at the greatest number of locations (see above analyses), but also was most often the dominant crop. Oat was the second most commonly occurring cereal on a presence/absence basis, and was also second in terms of dominance. Interestingly, while wheat was recorded at many sites, wheat was rarely the dominant crop. Although present in one-quarter of examined phases of activity, rye was not found to be the dominant crop at any location.



**Figure 2.6: Relative dominance of cereal types** (total phases of activity n=79)

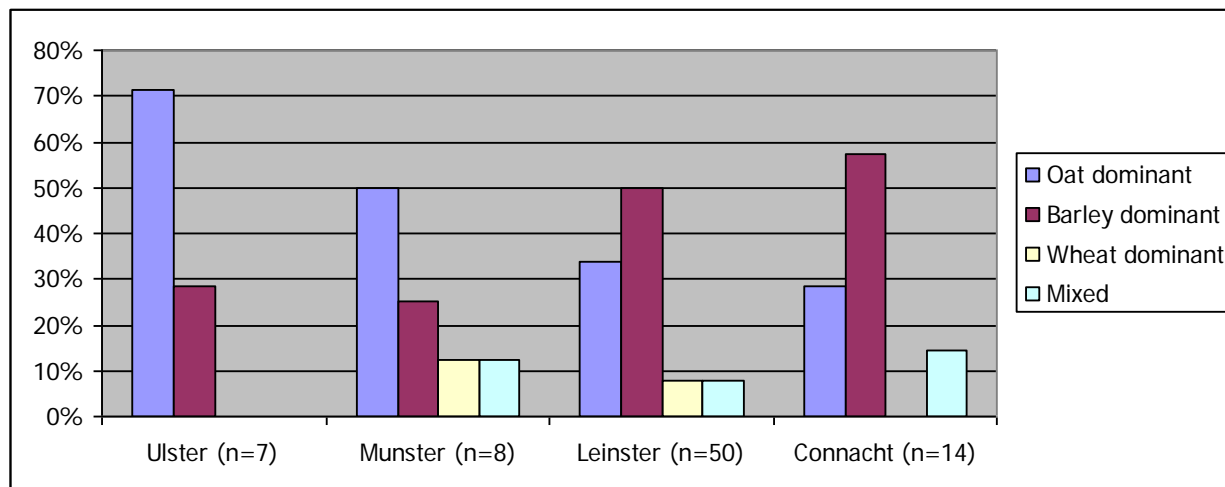
Analysis of cereal dominance by period (where radiocarbon dates were available) indicated that barley was much more likely to be dominant during the earlier period (Fig. 2.7). Oat was certainly established as a crop by this earlier stage, but was less often dominant. There appears to be a change by the later period, whereby oat was increasingly dominant and barley less so – while oat did not quite reach the levels of barley, it came quite close. Wheat was present during both periods, but appeared to be more often a constituent of mixed assemblages during the later period, rather than a dominant crop by itself.



**Figure 2.7: Relative dominance of cereal types by period** (total phases of activity n=36)

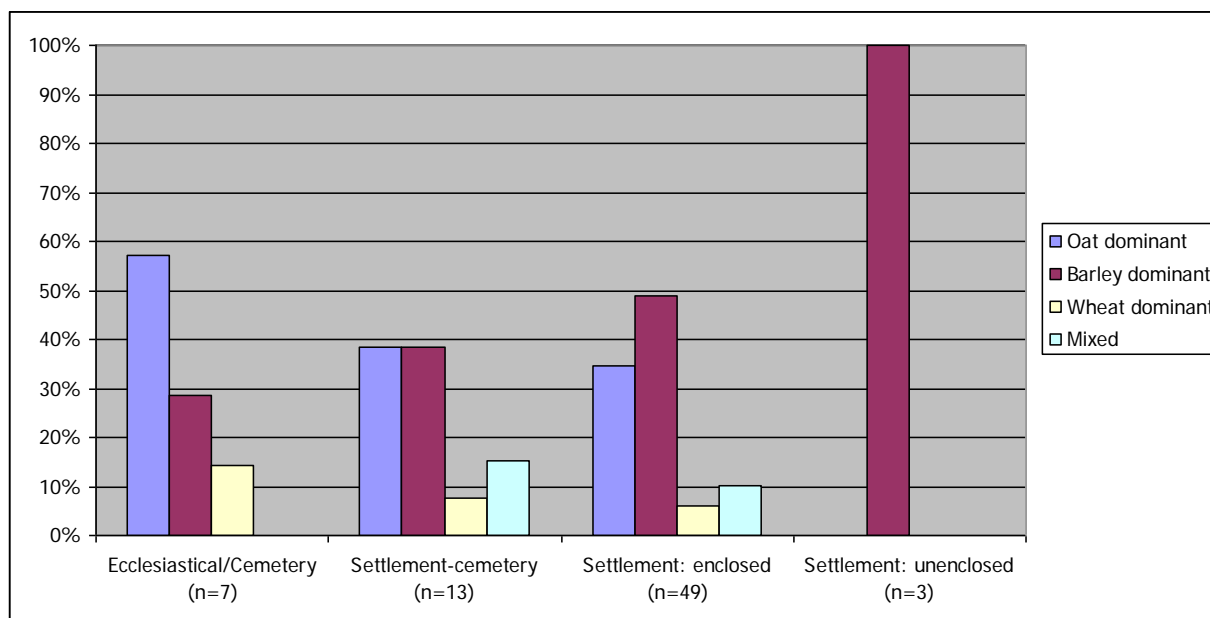


Analysis of cereal dominance by region suggests geographic differences, although it is acknowledged that the dataset is rather small in some cases (Fig. 2.8). Barley was more often dominant in Leinster and Connacht, while oat was more often dominant in Ulster and Munster (although the latter two have fewer assemblages). There also appears to be more variation in areas such as Leinster, when compared with Ulster, for example. While wheat was not the dominant crop at any locations in Connacht, wheat was an important constituent in some of the 'mixed' assemblages from this region.



**Figure 2.8: Relative dominance of cereal types by region**  
(total phases of activity n=79)

Analysis of cereal dominance by site type indicates that barley is more often dominant at enclosed and unenclosed settlements, while oat is of greater or equal importance at ecclesiastical/cemetery and settlement-cemetery locations (Fig. 2.9). A variety of crops was recorded at all site types except unenclosed settlements. It should be noted, however, that only a relatively small number of site types was available for analysis in a number of cases.

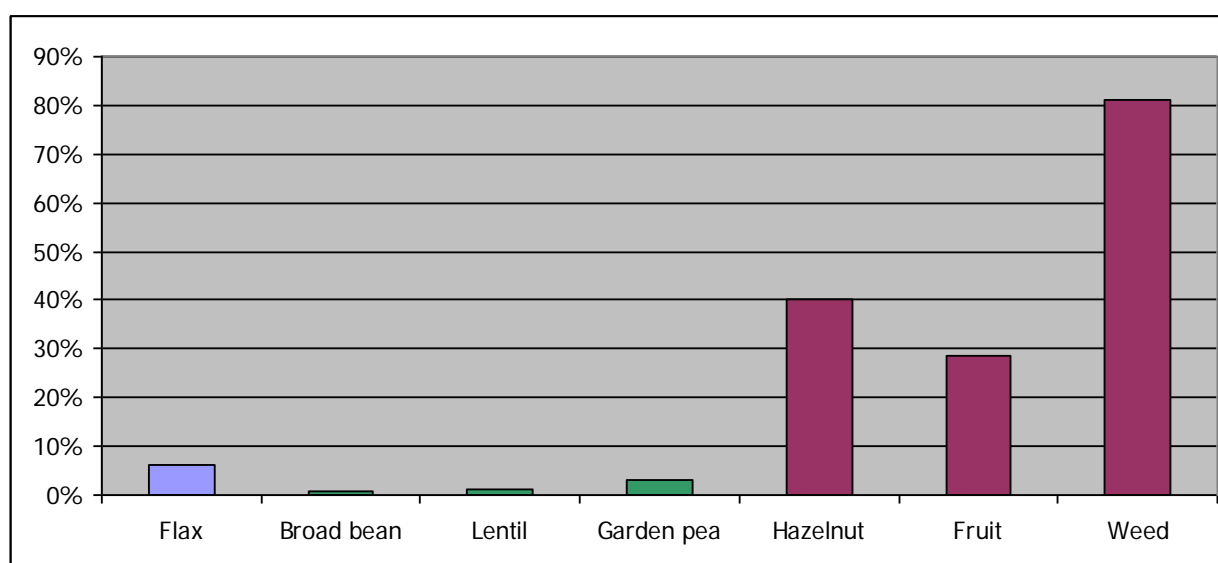


**Figure 2.9: Relative dominance of cereal types by region** (total phases of activity n=72)

### ***Relative Occurrence of Non-Cereal Crops and Wild Plants:***

As well as cereals, a variety of other crops was recorded at various locations, although in much smaller quantities. Flax and legumes were present in less than 10% of phases of activity (Fig. 2.10). The presence of lentil at one site (in two phases of activity) is interesting (Vaughan-Williams 2009), although it should be noted that lentil remains were recorded in larger quantities from later activity at this site, and it is possible that the few lentil seeds present in early medieval deposits may be intrusive, representing later activity.

Hazelnut and fruit remains, representing potentially gathered resources, were found in a significant number of phases of activity. Weeds were found at the vast majority of locations, and it should be remembered that plants that we would consider to be weeds, in modern terms, may have been viewed as useful by communities living in Ireland from the 5<sup>th</sup> to the 12<sup>th</sup> centuries. A number of 'weed' species may have been gathered for use in foods, medicines, cloth processing and dyeing, for example.



**Figure 2.10: Relative occurrence of non-cereal crops and wild plants**  
(total phases of activity n=165)

Where flax, pea and bean remains were recorded, they were more often found in later deposits (7<sup>th</sup>–10<sup>th</sup> centuries) when compared with earlier deposits (4<sup>th</sup>–7<sup>th</sup> centuries). Flax remains were more often found in Ulster (found in 17% of 12 phases of activity), with some evidence for their presence in Munster and Leinster. Peas and beans were more often found in Leinster (found in 6% of 82 phases of activity), with some evidence for their presence in Munster. Interestingly, both flax and legumes were absent from Connacht deposits. Flax remains were found at a range of site types, while peas and beans were present only at enclosed settlements. Both flax and legumes were absent from unenclosed settlements. Hazelnut, fruit and weed remains were found at all examined site types and in many different geographic areas, but interestingly, hazelnut was found to be particularly prevalent at unenclosed settlements (found in 100% of 5 phases of activity).

## Discussion

### *Overview:*

Analysis of this dataset has revealed a number of new insights into the nature of agricultural activity in early medieval Ireland. It is the largest and most comprehensive published study to date focusing on evidence from non-wood plant macro-remains. It is also the first large-scale study that has attempted to identify temporal and regional variation, based upon careful collation of a refined dataset. Instead of analysis being carried out at a site level, this study has examined the data at the level of each phase of activity at a site, informed by available radiocarbon dates and related archaeological evidence, such as stratigraphy. At the enclosed settlement of Derrinsallagh 3, Co. Laois (Archaeological Services University of Durham (ASUD) 2009b), for example, different cereals were dominant at different times during occupation of the site over a period of several centuries, indicating changing agricultural activities and underlining the need to examine data at the phase level of analysis. The detailed approaches employed for this study have the potential, therefore, to provide better insights into changing agricultural practices throughout the early medieval period.

While emerging trends have been identified, it is important to note that they should not be considered as definitive statements. Examination of temporal change in agricultural practices was somewhat constricted by availability of radiocarbon dates. Similarly, analysis of the types of crops dominant at different locations and times was restricted by available data – a lack of reporting of actual counts of remains in a number of cases meant that this analysis could not always be carried out. These constraints must be taken into account when considering some of the emerging trends. This highlights the need for achieving a sufficient number of radiocarbon dates during an excavation to enable identification of different phases of activity that might have taken place. It is perhaps of even greater importance that where plants remains are analysed, they should always be quantified and the raw counts provided – without such data, we are severely limited in our ability to carry out inter-site comparisons. Despite these caveats, emerging trends have been identified, and it is suggested that these can establish a basis for better understanding early medieval agriculture in Ireland, while also providing a model that can be tested and refined through future detailed analyses.

### *Cereals:*

A range of analyses was carried out the newly assembled dataset, revealing in some cases important new insights into agricultural activity. Cereal remains were recorded in the vast majority of phases of activity at sites. It is important to note that the mere presence of crops at a site does not indicate that the inhabitants were producers; they may instead have been consumers (producers being those involved in cultivation, and consumers being those receiving crops in a fully or semi-processed state). Communities may also have focused on the production of certain crop types, and then traded them with other communities for access to alternative crop types. It is therefore more appropriate to examine access to cereals, rather than assume crop production where cereals are present.

Analysis of the new dataset indicates that barley – mainly the hulled variety – was the primary crop of early medieval Ireland, followed closely by oat. It is interesting to note, however, that there may have been regional differences, in that oat may have been the predominant cereal in some areas of Munster and Ulster. Many assemblages were dominated by either barley or oat, with relatively few mixed assemblages. This may indicate some degree of specialisation in agricultural production/consumption, whereby communities tended to focus on one cereal or the other.

While wheat – often naked wheat, such as bread wheat – was present at many locations, it was rarely the predominant cereal. It appears, therefore, that while many different communities in many different

locations had access to wheat, the production and consumption of barley and oat were more significant. Rye appears to have been a minor crop at this time, being recorded at around one-quarter of all sites, but was never the dominant crop. Given that naked wheat and rye were accorded a higher social status in early medieval Ireland (Kelly 1997, 219), it is perhaps unsurprising that they were rarely dominant in the archaeological record. The regular presence of wheat at many sites (albeit often in small numbers) is, however, striking. It is therefore suggested that the mere presence of wheat and/or rye should not automatically accord a higher social status to that site. Perhaps we should instead reserve this accolade for the few securely dated sites where naked wheat is dominant, such as the enclosed settlement at Ballynacarriga 2, Co. Cork (Johnston 2011).

The predominance of oat and barley in early medieval Ireland may be related to their ecological and cultivation requirements. Oat is well suited to the Irish humid, wet climate and will tolerate poorer soils that may have discouraged the cultivation of other cereal types. The cultivation of barley is relatively low-risk, as barley will yield at least part of its crop even after a poor season. Barley will also grow equally well on light and heavy soils. The cultivation of naked wheat requires an increased input of labour and a better quality of soil than other cereals, as naked wheat is, ecologically, far more demanding. Its cultivation could not, therefore, yield a crop which, when compared to barley and oat, was as economically viable. Rye could, however, have been grown in environments that may not have had the potential to support wheat and barley in terms of soil texture and nutrients. The Civil Survey of 1654–6 states that an area of Longford had soils 'which are fitt only for rye and oates' (Simington 1961, 45–6), emphasising the association of rye with areas of limited agricultural productivity.

The species of barley, oat and wheat present were, in many cases, difficult to determine. It appears that hulled barley was more often found than naked barley, while naked wheat was more common than hulled wheat. A variety of oat species was recorded, including common oat, bristle oat and wild oat. Hulled cereals can be advantageous, particularly during storage, as the hull can provide a useful barrier against water and insect damage. The hull can, however, be difficult to remove if the grain is required for milling, for example. It is possible that hulled barley was more often used in activities where removal of the hull was not required, for example if used in fodder, brewing, and stewed in gruels and porridges. Indeed, the presence of sprouted grains of hulled barley at the enclosed settlement of Boyerstown 3, Co. Meath may represent the preparation of hulled barley for brewing at this location (Archaeological Services University of Durham (ASUD) 2009c). Naked barley, where present, was found at a variety of locations and site types. While historical records suggest a particular association between barley and ecclesiastical sites (for example, Kelly 1997, 344), analyses from this current study do not support this hypothesis – barley was often present, but less often dominant at these sites. Hulled wheat has similar advantages to hulled barley, but again is subject to the same difficulties in removing the hull. It is possible that naked wheat was preferred as it was easier to process in advance of milling, for example in the production of wheaten bread products.

Analyses suggest that barley was more often dominant during the earlier period (4<sup>th</sup>–7<sup>th</sup> centuries) when compared with the later period (7<sup>th</sup>–10<sup>th</sup> centuries). While barley continued to be dominant during the later period, the importance of oat increased at this time. A greater number of mixed assemblages were also recorded during this later period. When we also consider the evidence for a stronger association of non-cereal crops (such as flax and legumes) with the later period, it does seem that there may be increasing diversification in agricultural strategies during the later period. Diversification in crop production has many benefits, as it can reduce the risk of crop failure and also spread seasonal labour requirements (Halstead and O'Shea 1989). While historic texts indicate that crops were most often spring-sown (Kelly 1997, 231), the autumn-sowing of rye is suggested by the twelfth-century text *Aislinge Meic Con Glinne*, in a reference to 'a wild deer cropping a field of winter-rye (*gemšeco*) in the month of June' (Kelly 1997, 221). Autumn sowing of rye, and perhaps other crops on occasion, would have spread the agricultural work cycle over a longer period in the year, thereby reducing the risk of a 'bottleneck' in terms of work during the 'traditional' autumn harvest. It should also be considered that this more mixed evidence for the later period may represent changes in the management of agricultural

production at this time, for example rotation of different crops in order to maintain soil fertility (see discussion of legumes below).

It is notable that a greater number of examined archaeobotanical assemblages date to the later period, which may reflect an increase in the importance of cereal production at this time, as has been suggested in studies relating to animal bone from this period (McCormick and Murray 2007; McCormick 2008; Kerr 2007). It is, however, possible that this increase could instead reflect other changes in activity, perhaps in food preparation and deposition, or maybe in the detection of settlements, rather than changes in production levels – further consideration of this issue, perhaps supported by more detailed analysis of relevant radiocarbon dates, is required. Nevertheless, the changes that can be observed are even more interesting when we consider the archaeological evidence for changes in the processing of crops. A peak in the use of drying kilns seems to be strongly associated with the 5<sup>th</sup> and 6<sup>th</sup> centuries (O'Sullivan *et al.* 2010, 98). This was followed some time later by a peak in the construction of horizontal mills, which occurred during the 8<sup>th</sup> and 9<sup>th</sup> centuries (Brady 2006, 49). It is becoming increasingly clear, therefore, that agricultural change did occur during the early medieval period in Ireland, as can be seen from many different strands of evidence.

### ***Non-Cereal Crops: Flax and Legumes:***

The presence of flax and legume remains, albeit at a small number of locations, extends the variety of crops being farmed in early medieval Ireland, particularly during later centuries. Flax was found at a range of site types and locations, but there does appear to be a somewhat stronger association of flax with Ulster sites, representing an area that had a important association with flax production during later centuries (Hall 1989). The cultivation of flax would have provided fodder from the leaves, linen obtained from the stalks by retting, and oil from the crushed seeds. Oil from the seeds could have had a large number of uses, including cooking and lighting (Reynolds 1979, 66–67). Interestingly, evidence for flax-retting was recorded in a number of wells at the settlement-cemetery site of Castlefarm 1, Co. Meath (Archaeological Services University of Durham (ASUD) 2009d).

Flax was more often found in larger quantities and at a greater number of sites than legumes. It is possible that legumes were not entering the archaeological record to the same extent as other crops, such as cereals, as the legumes may have been less likely to come into contact with fire and thereby be preserved. It is therefore possible that legumes are, to some extent, under-represented in the archaeological record. It is interesting that in a number of phases of activity where peas and beans were present, they were associated with relatively large assemblages of naked wheat, such as at Ballynacarriga 2, Co Cork (Johnston 2011). It has already been noted that the cultivation of naked wheat requires an increased input of labour and a better quality of soil than other cereals. The cultivation of peas and beans is also useful beyond their ability to produce foodstuffs. The Leguminosae family, of which peas and beans are members, is of outstanding agricultural importance because the root nodules of these plants fix nitrogen in the soil, thus providing vital nutrition for plants such as cereals. Legumes are therefore particularly useful in crop-rotation systems, especially in the absence of artificial fertilisers. It is therefore possible that legumes were being increasingly cultivated as part of crop-rotation systems.

The presence of non-cereal crops seems to be more strongly associated with Leinster than elsewhere, with no evidence for flax or legumes from examined sites in Connacht. It is striking that peas and beans were recorded only at enclosed settlements. It is possible that in some instances these represent garden-type cultivation, which could have been carried out within the enclosure.

It is unclear if the lentil remains are in fact early medieval in date, given that the site where they were recorded – the ecclesiastical settlement of Clonfad 3, Co. Westmeath – contained much larger quantities of lentil remains in later deposits (Vaughan-Williams 2009). It is recommended that the lentil remains in the early medieval deposits at Clonfad 3 should be radiocarbon dated in order to ascertain their antiquity. If they are indeed early medieval in date, this would be a very interesting find. Kelly's review of historical

records relating to early medieval farming suggests that lentils were not cultivated in Ireland (1997, 248), although they were known to have been imported into Roman Britain (Hall and Huntley 2007). It is possible, therefore, that the lentils represent an imported crop, demonstrating trade links between Ireland and the wider world.

### ***Potentially Managed and Wild Plants:***

While cereals were dominant at many sites, there is also regular evidence for nut (particularly hazelnut), fruit (including berries and sloes), potential vegetable and weed remains. Nuts and fruits in particular would have thrived along the edges of ground cleared for cereal cultivation and settlement (Groenman van Waateringe 1983). The presence of hazelnut shells at many locations is likely to represent the collection of this nutritious foodstuff for consumption. Hazelnut collection is more often associated with prehistoric sites in Ireland (McComb and Simpson 1999), but documentary evidence exists to demonstrate the continued collection of hazelnuts throughout the early medieval period (Kelly 1997, 306).

Fruits would also have provided a useful resource, and a variety of fruits was recorded as part of this study, including raspberry, bramble, dewberry, sloe, haw and wild plum. Plants that we would consider to be weeds may have been utilised and perhaps even grown as leafy greens and root crops (Kelly 1997, 250–259), as represented by the archaeobotanical remains of wild radish and the cabbage family, for example. Other ‘weeds’ may also have been managed or gathered for use in activities such as medicines and dyeing (McClatchie 2003). It is noteworthy that evidence for nettle-retting was suggested at a number of wells in the settlement-cemetery site of Castlefarm 1, Co. Meath (Archaeological Services University of Durham (ASUD) 2009c).

It should be remembered that preservation by charring only was encountered at most sites. Charring is often biased in favour of plants that are more likely to come into contact with fire. Cereals, for example, may have been exposed to fire during the drying of crops and cooking activities, and such plants are therefore more likely to be represented in charred assemblages when compared with plants that are more often eaten raw or boiled, such as fruits and vegetables. It is therefore probable that communities would have made use of an even wider range of plants than that represented in the examined deposits. A remarkable insight into the range of wild plant taxa available to early medieval communities can be found at sites such as the mill site at Kilbegly 2, Co. Roscommon, where waterlogging of deposits enabled preservation of a much wider spectrum of plants when compared with the charred assemblage at this site.

## **Future Potential and Conclusions**

This study represents a preliminary examination of a new early medieval agricultural dataset. A variety of analyses has been carried out, but this was limited by time constraints – only five months was available to collate, record and analyse all data. Further detailed analyses could be carried out, including investigation of the presence of cereal chaff, which may highlight crop-processing activities at individual sites. Analysis of potential arable weeds may also provide information on how cultivation plots were managed through analysis of ecological characteristics of the weeds (Bogaard 2002; Bogaard and Jones 2007). A further recent development in archaeological science is the exploration of palaeo-diets and agricultural reconstruction through the analysis of crop stable isotope ratios. The practice of manuring (use of animal dung as fertiliser to enhance crop yields) causes substantial enrichment of crop <sup>15</sup>N ratios, which can be detected through the scientific analysis of charred cereal grains (Bogaard *et al.* 2007). Stable isotope analysis of these grains could therefore provide new insights into agricultural practices in early medieval Ireland. There also appear to be many more weed species found at early medieval sites when compared with prehistoric periods, perhaps reflecting the introduction of plants through trade of cultivated produce. Examination of the range and level of new introductions would represent another worthwhile avenue of research.



A number of sites might benefit from more intensive radiocarbon dating programmes in order to determine phasing at sites that were occupied over many centuries – annual plants such as cereal remains are particularly suitable for AMS  $^{14}\text{C}$  dating, as they will not be subject to the old-wood effect and, unlike wood, are unlikely to have been curated to any great extent. Finally, comparison of these new plant macro-remains results with pollen studies would provide a more integrated picture of farming systems and landscape management in early medieval Ireland.

A variety of new insights into early medieval agriculture in Ireland has been elucidated through this current study. Barley and oat are confirmed as the primary crops of early medieval Ireland, with the potential for regional preferences highlighted. While wheat was present at many sites, it does not appear to have been the primary crop in most cases. Rye seems to represent a minor crop in all locations where it was found. As well as the cereals, evidence was found for other crops, such as flax and legumes, the latter being more often associated with eastern sites in Ireland. There is increased evidence for crops during later periods in early medieval Ireland, both in terms of the number of sites where they were recovered and also the range of crops cultivated. This detailed study has therefore provided a better basis for understanding farming systems during this period, and has also highlighted potential evidence for both temporal and regional variation in the record.

## **Acknowledgements:**

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## Appendix 1:

### Charred and waterlogged plant remains recorded

Botanical name	Common name	Components
CHARRED CROPS		
<i>Avena sativa</i> L.	Common oat	grain, floret base, lemma
<i>Avena strigosa</i> Schreb.	Bristle oat	grain, lemma
<i>Avena fatua</i> L.	Wild oat	grain, floret base, lemma
<i>Avena</i> spp.	Oat	grain, floret base, palea, lemma, twisted awn, awn, floret base, pedicel, straw
<i>Hordeum vulgare</i> subsp. <i>vulgare</i> var. <i>nudum</i>	Six-row naked barley	grain
<i>Hordeum vulgare</i> subsp. <i>vulgare</i>	Six-row hulled barley	grain, lemma
<i>Hordeum vulgare</i> subsp. <i>distichum</i>	Two-row hulled barley	grain
<i>Hordeum vulgare</i> var. <i>nudum</i>	Naked barley	grain
<i>Hordeum vulgare</i> L.	Hulled barley	grain
<i>Hordeum vulgare</i> subsp. <i>vulgare</i>	Six-row barley	grain, rachis internode
<i>Hordeum vulgare</i> L.	Barley	grain, rachis internode, culm node
<i>Triticum monococcum</i> L.	Einkorn wheat	grain
<i>Triticum dicoccum</i> Schübl.	Emmer wheat	grain
<i>Triticum spelta</i> L.	Spelt wheat	grain
<i>Triticum aestivum</i> L.	Bread wheat	grain, rachis internode
<i>Triticum aestivum/compactum</i> L.	Bread/Club wheat	grain
<i>Triticum aestivum/durum/turgidum</i> L.	Naked wheat	grain, rachis
<i>Triticum</i> spp.	Wheat	grain, glume base, awn, rachis internode
<i>Secale cereale</i> L.	Rye	grain, rachis internode
Cerealialia	Indet. cereal	grain, spikelet fork, glume base, twisted awn, lemma, palea, rachis internode, culm internode, culm node, culm base, straw
<i>Linum usitatissimum</i> L.	Flax	seed
CHARRED LEGUMES		
<i>Vicia faba</i> L.	Broad bean	seed
<i>Lens culinaris</i> Medik.	Lentil	seed
<i>Pisum sativum</i> L.	Garden pea	seed
<i>Pisum</i> spp.	Garden pea	seed
CHARRED NUTS/FRUITS		

<i>Corylus avellana</i> L.	Hazelnut	shell
<i>Rubus idaeus</i> L.	Raspberry	nutlet
<i>Rubus fruticosus</i> agg.	Bramble	nutlet
<i>Rubus</i> spp.	Brambles	nutlet
<i>Prunus spinosa</i> L.	Sloe	stone
<i>Prunus</i> spp.	Cherries	stone
<i>Sorbus aucuparia</i> L.	Rowan	seed
<i>Crataegus monogyna</i> Jacq.	Haw fruit	nutlet
<i>Crataegus</i> spp.	Haw fruit	nutlet
<i>Sambucus nigra</i> L.	Elder	seed
<i>Sambucus</i> spp.	Elders	seed
CHARRED WEEDS/OTHER		
<i>Pteridium aquilinum</i> (L.) Kuhn	Bracken	frond
<i>Pinus</i> spp.	Pines	seed
<i>Nymphaea alba</i> L.	White water-lily	seed
<i>Ranunculus acris</i> L.	Meadow buttercup	achene
<i>Ranunculus repens</i> L.	Creeping buttercup	achene
<i>Ranunculus bulbosus</i> L.	Bulbous buttercup	achene
<i>Ranunculus lingua</i> L.	Greater spearwort	achene
<i>Ranunculus flammula</i> L.	Lesser spearwort	achene
<i>Ranunculus</i> spp.	Buttercups	achene
<i>Thalictrum</i> spp.	Meadow-rues	seed
<i>Papaver rhoeas</i> L.	Common poppy	seed
<i>Urtica dioica</i> L.	Common nettle	achene
<i>Urtica urens</i> L.	Small nettle	achene
<i>Quercus</i> spp.	Oaks	bud
<i>Chenopodium album</i> L.	Fat-hen	utricle
<i>Chenopodium</i> spp.	Goosefoots	utricle
<i>Atriplex hortensis</i> L.	Garden orache	utricle
<i>Atriplex patula</i> L.	Common orache	utricle
<i>Atriplex</i> spp.	Oraches	utricle
Chenopodiaceae	Goosefoot family	utricle
<i>Montia fontana</i> L.	Blinks	seed
<i>Stellaria media</i> (L.) Vill.	Common chickweed	seed
<i>Stellaria graminea</i> L.	Lesser stitchwort	seed
<i>Stellaria</i> spp.	Stitchworts	seed
<i>Cerastium</i> spp.	Mouse-ears	seed
<i>Spergula arvensis</i> L.	Corn spurrey	seed
<i>Agrostemma githago</i> L.	Corncockle	seed
<i>Silene latifolia</i> Poir.	White campion	seed
<i>Silene dioica</i> (L.) Clairv.	Red campion	seed
<i>Silene</i> spp.	Campions	seed
Caryophyllaceae	Pink family	seed
<i>Persicaria bistorta</i> (L.) Samp.	Common bistort	achene
<i>Persicaria amphibia</i> (L.) Gray	Amphibious bistort	achene
<i>Persicaria maculosa</i> Gray	Redshank	achene
<i>Persicaria lapathifolia</i> (L.) Gray	Pale persicaria	achene
<i>Persicaria hydropiper</i> (L.) Spach	Water-pepper	achene
<i>Persicaria mitis</i> (Schränk) Opiz ex Assenov	Tasteless water-pepper	achene
<i>Persicaria minor</i> (Huds.) Opiz	Small water-pepper	achene
<i>Persicaria</i> spp.	Knotweeds	achene

<i>Polygonum aviculare</i> L.	Knotgrass	achene
<i>Polygonum</i> spp.	Knotgrasses	achene
<i>Fallopia convolvulus</i> (L.) Á. Löve	Black-bindweed	achene
<i>Rumex acetosella</i> L.	Sheep's sorrel	achene
<i>Rumex acetosa</i> L.	Common sorrel	achene
<i>Rumex longifolius</i> DC.	Northern dock	achene
<i>Rumex crispus</i> L.	Curled dock	achene
<i>Rumex conglomeratus</i> Murray	Clustered dock	achene
<i>Rumex obtusifolius</i> L.	Broad-leaved dock	achene
<i>Rumex palustris</i> Sm.	Marsh dock	achene
<i>Rumex</i> spp.	Docks	achene
Polygonaceae	Knotweed family	achene
<i>Viola riviniana</i> Rchb.	Common dog-violet	seed
<i>Viola tricolor</i> L.	Wild pansy	seed
<i>Viola</i> spp.	Violets	seed
<i>Capsella bursa-pastoris</i> (L.) Medik.	Shepherd's-purse	seed
<i>Thlaspi arvense</i> L.	Field penny-cress	seed
<i>Brassica napus</i> L.	Rape/Swede	seed
<i>Brassica nigra</i> (L.) W.D.J. Koch	Black mustard	seed
<i>Brassica</i> spp.	Cabbage	seed
<i>Sinapis arvensis</i> L.	Charlock	seed, pod
<i>Sinapis</i> spp.	Mustards	seed
<i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>	Wild radish	pod
<i>Raphanus</i> spp.	Radishes	seed
Brassicaceae	Cabbage family	seed
<i>Calluna vulgaris</i> (L.) Hull	Heather	leaf, stem
<i>Potentilla anserina</i> L.	Silverweed	nutlet
Rosaceae	Rose family	seed
<i>Vicia</i> spp.	Vetches	seed
<i>Lathyrus</i> spp.	Pea	seed
<i>Medicago</i> spp.	Medicks	seed
<i>Trifolium</i> spp.	Clovers	seed
Fabaceae	Pea family	seed
<i>Euonymus europaeus</i> L.	Spindle	seed
<i>Euphorbia helioscopia</i> L.	Sun spurge	seed
<i>Cuscuta europaea</i> L.	Greater dodder	seed
<i>Lithospermum arvense</i> L.	Field gromwell	nutlet
<i>Myosotis arvensis</i> (L.) Hill	Field forget-me-not	nutlet
<i>Lamium</i> spp.	Dead nettles	nutlet
<i>Galeopsis tetrahit</i> L.	Common hemp-nettle	nutlet
<i>Galeopsis</i> spp.	Hemp-nettles	nutlet
<i>Thymus vulgaris</i> L.	Garden thyme	nutlet
<i>Mentha</i> spp.	Mints	nutlet
Lamiaceae	Dead-nettle family	nutlet
<i>Plantago lanceolata</i> L.	Ribwort plantain	seed
<i>Plantago</i> spp.	Plantains	seed
<i>Galium palustre</i> L.	Common marsh-bedstraw	seed
<i>Galium aparine</i> L.	Cleavers	seed
<i>Galium spurium</i> L.	False cleavers	seed
<i>Galium</i> spp.	Bedstraws	seed
<i>Carduus</i> spp.	Thistles	achene

<i>Cirsium</i> spp.	Thistles	achene
<i>Centaurea</i> spp.	Knapweeds	achene
<i>Lapsana communis</i> L.	Nipplewort	achene
<i>Leontodon autumnalis</i> L.	Autumn hawkbit	achene
<i>Leontodon</i> spp.	Hawkbits	achene
<i>Sonchus asper</i> (L.) Hill	Prickly sow-thistle	achene
<i>Taraxacum</i> sect. <i>Ruderalia</i> Kirschner, H. Øllg. & Stepanek	Dandelions	achene
<i>Crepis biennis</i> L.	Rough hawk's-beard	achene
<i>Anthemis arvensis</i> L.	Corn chamomile	achene
<i>Anthemis cotula</i> L.	Stinking chamomile	achene
<i>Chrysanthemum segetum</i> L.	Corn marigold	achene
<i>Tripleurospermum inodorum</i> (L.) Sch. Bip.	Scentless mayweed	achene
<i>Senecio jacobaea</i> L.	Common ragwort	achene
Asteraceae	Daisy family	achene
<i>Eleocharis</i> spp.	Spike-rushes	achene
<i>Blysmus compressus</i> (L.) Panz. Ex Link	Flat-sedge	achene
<i>Carex panicea</i> L.	Carnation sedge	achene
<i>Carex</i> spp.	Sedges	achene
Cyperaceae	Sedge family	achene
<i>Festuca</i> spp.	Fescues	grain
<i>Lolium temulentum</i> L.	Darnel	grain
<i>Poa annua</i> L.	Annual meadow-grass	grain
<i>Arrhenatherum elatius</i> var. <i>bulbosum</i> (Willd.) St-Amans	False oat-grass	tuber
<i>Arrhenatherum</i> spp.	False oat grass	grain
<i>Bromus</i> spp.	Bromes	grain
Poaceae	Grass family	grain, culm node, culm
Indeterminate	Indeterminate	seed

**Table: Charred plant remains recorded**

Botanical name	Common name	Components
WATERLOGGED CROPS		
<i>Triticum aestivum</i> L.	Bread wheat	grain
<i>Linum usitatissimum</i> L.	Flax	seed
WATERLOGGED NUTS/FRUITS		
<i>Quercus</i> spp.	Acorn	shell
<i>Corylus avellana</i> L.	Hazelnut	shell
<i>Rubus idaeus</i> L.	Raspberry	nutlet
<i>Rubus fruticosus</i> agg.	Bramble	nutlet
<i>Rubus caesius</i> L.	Dewberry	nutlet
<i>Rubus</i> spp.	Brambles	nutlet
<i>Prunus spinosa</i> L.	Sloe	stone
<i>Prunus domestica</i> L.	Wild plum	stone
<i>Crataegus monogyna</i> Jacq.	Haw fruit	nutlet
<i>Crataegus</i> spp.	Haw fruit	nutlet
<i>Sambucus nigra</i> L.	Elder	seed
<i>Sambucus</i> spp.	Elders	seed
WATERLOGGED WEEDS/OTHER		

<i>Pteridium aquilinum</i> (L.) Kuhn	Bracken	frond
<i>Pteridium</i> spp.	Bracken	frond
<i>Nymphaea alba</i> L.	White water-lily	seed
<i>Ranunculus acris</i> L.	Meadow buttercup	achene
<i>Ranunculus repens</i> L.	Creeping buttercup	achene
<i>Ranunculus bulbosus</i> L.	Bulbous buttercup	achene
<i>Ranunculus sceleratus</i> L.	Celery-leaved buttercup	achene
<i>Ranunculus lingua</i> L.	Greater spearwort	achene
<i>Ranunculus flammula</i> L.	Lesser spearwort	achene
<i>Ranunculus</i> spp.	Buttercups	achene
<i>Papaver</i> spp.	Poppies	seed
<i>Fumaria</i> spp.	Fumitories	seed
<i>Urtica dioica</i> L.	Common nettle	achene
<i>Urtica urens</i> L.	Small nettle	achene
<i>Betula</i> spp.	Birches	nutlet
<i>Alnus glutinosa</i> (L.) Gaertn.	Alder	nutlet
<i>Alnus</i> spp.	Alders	nutlet
<i>Chenopodium glaucum</i> L.	Oak-leaved goosefoot	utricle
<i>Chenopodium rubrum</i> L.	Red goosefoot	utricle
<i>Chenopodium vulvaria</i> L.	Stinking goosefoot	utricle
<i>Chenopodium album</i> L.	Fat-hen	utricle
<i>Chenopodium</i> spp.	Goosefoots	utricle
<i>Atriplex</i> spp.	Oraches	utricle
Chenopodiaceae	Goosefoot family	utricle
<i>Stellaria media</i> (L.) Vill.	Common chickweed	seed
<i>Stellaria graminea</i> L.	Lesser stitchwort	seed
<i>Cerastium arvense</i> L.	Field mouse-ear	seed
<i>Cerastium</i> spp.	Mouse-ears	seed
<i>Lychnis flos-cuculi</i> L.	Ragged robin	seed
<i>Agrostemma githago</i> L.	Corncockle	seed
<i>Silene</i> spp.	Campions	seed
Caryophyllaceae	Pink family	seed
<i>Persicaria amphibia</i> (L.) Gray	Amphibious bistort	achene
<i>Persicaria maculosa</i> Gray	Redshank	achene
<i>Persicaria lapathifolia</i> (L.) Gray	Pale persicaria	achene
<i>Persicaria hydropiper</i> (L.) Spach	Water-pepper	achene
<i>Persicaria minor</i> (Huds.) Opiz	Small water-pepper	achene
<i>Polygonum aviculare</i> L.	Knotgrass	achene
<i>Polygonum</i> spp.	Knotgrasses	achene
<i>Fallopia convolvulus</i> (L.) Á. Löve	Black-bindweed	achene
<i>Rumex acetosella</i> L.	Sheep's sorrel	achene
<i>Rumex crispus</i> L.	Curled dock	achene
<i>Rumex</i> spp.	Docks	achene
Polygonaceae	Knotweed family	achene
<i>Malva</i> spp.	Mallows	seed
<i>Viola</i> spp.	Violets	seed
<i>Sinapis</i> spp.	Mustards	seed
<i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>	Wild radish	pod
<i>Raphanus</i> spp.	Radishes	pod
<i>Calluna vulgaris</i> (L.) Hull	Heather	fragment
Primulaceae	Primrose family	seed

Rosaceae	Rose family	thorn
<i>Potentilla fruticosa</i> L.	Shrubby cinquefoil	nutlet
<i>Potentilla palustris</i> (L.) Scop.	Marsh cinquefoil	nutlet
<i>Potentilla sterilis</i> (L.) Garcke	Barren strawberry	nutlet
<i>Potentilla</i> spp.	Cinquefoils	nutlet
<i>Vicia</i> spp.	Vetches	seed
<i>Lathyrus</i> spp.	Pea	seed
<i>Trifolium</i> spp.	Clovers	seed
<i>Epilobium</i> spp.	Willowherbs	seed
<i>Ilex aquifolium</i> L.	Holly	nutlet
<i>Euphorbia</i> spp.	Spurges	seed
<i>Acer campestre</i>	Field maple	seed
<i>Geranium</i> spp.	Crane's-bills	seed
<i>Aethusa cynapium</i> L.	Fool's parsley	mericarp
<i>Conium maculatum</i> L.	Hemlock	mericarp
<i>Apium nodiflorum</i> (L.) Lag.	Fool's water-cress	mericarp
<i>Heracleum sphondylium</i> L.	Hogweed	mericarp
<i>Torilis japonica</i> (Houtt.) DC.	Upright hedge parsley	mericarp
<i>Hyoscyamus niger</i> L.	Henbane	seed
Solanaceae	Nightshade family	seed
<i>Menyanthes trifoliata</i> L.	Bogbean	seed
<i>Myosotis arvensis</i> (L.) Hill	Field forget-me-not	nutlet
<i>Stachys</i> spp.	Woundworts	nutlet
<i>Lamium</i> spp.	Dead nettles	nutlet
<i>Galeopsis tetrahit</i> L.	Common hemp-nettle	nutlet
<i>Galeopsis</i> spp.	Hemp-nettles	nutlet
<i>Ajuga reptans</i> L.	Bugle	nutlet
<i>Prunella vulgaris</i> L.	Selfheal	nutlet
<i>Mentha aquatica</i> L.	Water mint	nutlet
<i>Mentha</i> spp.	Mints	nutlet
Lamiaceae	Dead-nettle family	nutlet
<i>Veronica</i> spp.	Speedwells	seed
<i>Galium</i> spp.	Bedstraws	seed
<i>Veronica hederifolia</i> L.	Ivy-leaved speedwell	seed
<i>Carduus</i> spp.	Thistles	achene
<i>Cirsium</i> spp.	Thistles	achene
<i>Centaurea</i> spp.	Knapweeds	achene
<i>Lapsana communis</i> L.	Nipplewort	achene
<i>Sonchus asper</i> (L.) Hill	Prickly sow-thistle	achene
<i>Sonchus</i> spp.	Sow-thistles	achene
<i>Crepis</i> spp.	Hawk's-beards	achene
<i>Artemisia</i> spp.	Mugworts	achene
<i>Anthemis cotula</i> L.	Stinking chamomile	achene
<i>Senecio</i> spp.	Ragworts	achene
Asteraceae	Daisy family	achene
<i>Potamogeton</i> spp.	Pondweeds	nutlet
<i>Zannichellia palustris</i> L.	Horned pondweed	seed
<i>Lemna</i> spp.	Duckweeds	seed
<i>Juncus</i> spp.	Rushes	seed
<i>Eleocharis palustris</i> (L.) Roem. & Schult.	Common spike-rush	achene
<i>Scirpus</i> spp.	Wood club-rush	achene



<i>Cladium mariscus</i> (L.) Pohl	Great fen-sedge	achene
<i>Carex hirta</i> L.	Hairy sedge	achene
<i>Carex</i> spp.	Sedges	achene
Cyperaceae	Sedge family	achene
<i>Poa</i> spp.	Meadow-grasses	grain
Poaceae	Grass family	grain, pericarp
Sparganiaceae	Bur-reed family	seed
<i>Typha</i> spp.	Bulrushes	seed
Indeterminate	Indeterminate	seed, seed coat, fibre, thorn

**Table: Waterlogged plant remains recorded**

## Section 3:

### The Animal Remains from Early Medieval Ireland

Livestock farming in Ireland during the early medieval period was dominated by the three main domesticates – cattle, sheep and pigs. This is supported by the contemporary legal tracts, saints' lives and other written sources, and is clearly replicated in the zooarchaeological remains uncovered from excavations. Other domesticates, such as horses, goats, and poultry are occasionally mentioned in contemporary written sources, but appear far more rarely in the archaeological record.

#### Literature Background:

The written records provide a plethora of references to farming practice, livestock and the wider farming economy. These have been succinctly collated in Fergus Kelly's magisterial *'Early Irish Farming'* (1997). The law tracts from the early medieval period describe a society which is strictly hierarchical, and in which livestock farming plays an important role in obtaining and maintaining social distinctions. Tracts codified in the late-seventh century/early-eighth century like the *Críth Gablach* (Law of Status) and the *Uraicecht Becc* (Little Grammar) (MacNeill 1923, 271) list the property requirements for different social grades. Aside from the outline of house-size or food render payable to the lord, these laws also list the number of different livestock species that each grade should keep. Thus, in the farmer grade (*bóaire* – lit. 'cattle lord'), the *ócaire*, who seems to be a starting out farmer, should maintain seven cows, one bull, seven pigs, one boar (MacNeill has 'brood sow'), seven sheep and one ox (Richey 1879, 305; MacNeill 1923, 286); whereas the *bóaire* should have twenty cows, two bulls, six bullocks, 20 hogs, four 'housefed hogs' (*tuircc forais*) and two sows, and 20 sheep (Richey 1879, 311).

The importance of cattle, and specifically milking cows or milch cows (*bó mlicht*), in early medieval Ireland has long been recognised (Kelly 1988; Lucas 1989; Kelly 1997). Cattle formed the basis of the *'taurchrecc'*, the contract between individuals of differing social status (Kelly 1988, 32; Jaski 2000, 106), and the numbers of cattle owned/borrowed directly correlated to an individual's wealth and prestige. This in turn was reflected by the *sét* ('honour price') which the laws set on individuals of different status, for example, the *Bretha Déin Chécht* states that an *ócaire* should receive a yearling bullock (*dartaíd*) as compensation for a facial injury, while the grade below him, the *fer midboth*, should receive a perfect sheep (*caera inraic*) for the same damage (Kelly 1997, 75).

The written sources also include information which could not be achieved from the skeletal remains, for example the colouration of cattle. While most cattle are referred to as 'black' (probably similar to the native Dexter or Kerry breeds), there are also descriptions of crimson-red (*flann*), flame-red (*derc*) and brown (*donn*) cattle, as well as 'brindled' (*riabach*) cattle of mixed colour, through often with a white-back (*druimfhionn*) and a red, grey or black body (probably similar to modern Drimmon, Irish Moiled or Shorthorn breeds) (Kelly 1997, 31-32). White cattle also seem to have been held in high esteem (*ibid.*). While there is no indication that these differences in colouration are related to different breeds, in the modern sense, there is a suggestion that the references to white red-eared cattle (*bó find áuderg*) may relate to a distinct, valuable type (*ibid.* 33).

Contemporary writings suggest that early cattle-farming was dominated by dairying, an impression confirmed by the age-slaughter pattern and sex-ratio of cattle from archaeological sites (McCormick 1992b). Aside from milk, the Irish law tracts include cream (*úachtar*), butter (*imb*) and buttermilk (*bláthach*) as part of the food render due to a lord by a client (Kelly 1997, 323-30). A wide range of cheeses are also described in writings from this period, ranging from *tanag*, a very hard cheese, through to *maothal*, which had the consistency of jellified beestings (Ó Sé 1948, 82). In contrast there are very few early medieval references to beef cattle and 'a herd of bullocks would have been an unthinkable

phenomenon' (Lucas 1989, 4). This does not mean that beef was not eaten – the law tract *Di Astud Chirt Agus Dligid* mentions fat cows (*bó méth*) and cows ready for slaughter (*bó marta*) (Kelly 1997, 53) – but beef did not make up a substantial or significant part of the everyday diet of the common man. The by-products of butchered cattle – i.e. meat, hides, and tallow – also appear to be of less importance than live cattle and their by-products.

Sheep appear to have been predominantly valued for their fleece, for example an untitled law tract on the defects of cattle and sheep (Kelly 1997, 506-8) states that wool should be uniformly white, black or dun and that the fleece should be long, straight and easy to shear. Mutton or lamb, however, was also eaten. A wether (*molt*) was included in the *Cáin Aicillne* as part of the summer and autumn food rents (*ibid.* 72) and there are also literary references to wethers being used as a feasting animal. In the *Old Woman of Beare*, a poem dated c. A.D. 800, the eponymous character laments that 'no wethers were killed for my wedding' (*ni marbtar muilt dom banais*) (Murphy 1962, 76); and there is a description in the *Aislinge Meic Con Glinne* of a feast that included 'boiled mutton [wether]' (*muilt bruith*) (Jackson 1990, 38). A reference in the same work to 'fair white porridge made with pure sheep's milk' implies that ewes were also milked (*ibid.* 13). Goats (*gabor*) are mentioned in a few of the law tracts, but seem to have been of little importance (Kelly 1997, 78).

Pigs occasionally appear in legal tracts with a fine value (*dire*), but not as regularly as cattle or sheep. They were kept solely for their meat and lard and the pig is traditionally seen as the feasting animal in Ireland (Lucas 1989, 4). A flitch of bacon was included in the food renders of the *Cáin Aicillne* (Kelly 1997, 85), and the death of a fat pig (*bás muicce léithe*) is, along with the death of a salmon and the death of a robber, described as one of the three deaths that are better than life (Meyer 1906, 12). Pigs, being omnivores, are described as being fed household swill (Dillon 1952, 70); and the commentary on the *Cáin Lánamna* records pigs fattened on corn and milk (Kelly 1997, 82).

Horses are mentioned in law tracts, for example the *Críth Gablach* states that the *bóaire* (large farmer) should own a riding horse (*each sliasta*) (Richey 1879, 311). While horses often seem to have been used as means of transportation – this was when plough teams were composed of oxen – the work pony (*capall fognamo*) also appears to have been used to carry loads, presumably in panniers (Kelly 1997, 94). It is unlikely that horses were bred for meat at this time since the eating of horse-flesh was proscribed by the church (Gwynn 1914, 147).

There are a small number of references to poultry from the early medieval period. Hens are included in the currency system, for example a clocking hen (*cerc céin dothas*) is worth twice the value of a cock (Kelly 1997, 102). Other domestic fowl mentioned in these law tracts include geese (*géd*), ducks (*lachu*), doves (*colum*) and (possibly) peacocks (*gésachtach*) (*ibid.* 105-8).

## Zooarchaeological Background:

Prior to the emergence of 'scientific' archaeology in the inter-war period, faunal remains, and other ecofacts tended to be largely ignored by the excavators. The fate of the Dunbell rath group in Co. Kilkenny is probably representative of what happened on many archaeological sites over the years. Here the raths were being systematically destroyed by the landowner, who was quarrying the sites for animal bone which was then converted into bone fertiliser. A visitation from the Society of Antiquaries rescues a number of artefacts, and mentions the destruction of an enormous quantity of animal bones. Although cattle, deer, horse, pig and poultry were all identified, there was no attempt made to quantify any of the remains (Prim 1852-3).

Various methods of quantification have been used for the analysis of faunal remains in Ireland since then. Early methods were based on rough estimations of bulk, for example 6,096 kg of animal bone was recovered from Carraig Aille, Co. Limerick (Ó Riordáin 1949; Hyland & Stelfox 1949), and 22,700 kg of animal bone was recorded for Lagore, Co. Meath (Hencken 1950). This methodology had a bias towards

larger species, with heavier bone mass, and, as such, cattle regularly constituted 70%-90% of the identified faunal remains.

In the early days of scientific archaeology in Ireland, the majority of animal bone reports were compiled by Arthur Wilson Stelfox from the Natural History Museum in Dublin. Stelfox, however, was more interested in the 'exotic' fauna rather than the domestic, and, as such, his reports often focus on the presence of wild birds or mammals rather than the quantifications of domesticates. This rather haphazard approach to quantification can be seen for example at Leacanabuaile, Co. Kerry, where cattle are said to make up 90% of the assemblage (Stelfox 1941), but there is no indication of either the numerical total involved, or the percentages of other domesticates. Bone identification in the Republic of Ireland was subsequently carried out by Geraldine Stout, also from the Natural History Museum, but, as with Stelfox, her reports typically list the species present without any useful quantifiable data, although estimated percentage frequencies of the different species are sometimes given, which allows a degree of assessment of inter-site variability (e.g. Ballinderry I and II).

During the 1950s Margaret Jope, who worked largely on zooarchaeological material from Northern Ireland, began to tabulate not only fragments frequencies by species and element, but also estimates of what she called 'approximate number of animals' (Jope 1954, 152). This is what is now generally termed the 'minimum number of individuals' (MNI). The MNI method essentially attempts to estimate the minimum number of individuals of a species that would have to be slaughtered in order to account for the bones in a given assemblage. There are, however, many methods that can be used to arrive at such an MNI determination, and in early instances the methodology used is often not explicitly stated. Modern methods of quantification became established in Ireland with the publication of Louise van Wijngaarden-Bakker's 1974 report on the bones from the Beaker levels at Newgrange, and much of the work subsequently undertaken follows this methodology. The methodology employed by van Wijngaarden-Bakker (1974) draws on Chaplin (1971) and groups identifiable bones by species and element which are then counted to give the 'number of identifiable fragments' total. Each group of elements is then sided, and the frequency of proximal and distal epiphyses counted. From this data an estimate of the minimum number of elements, and hence the MNI required to account for the bones, is determined.

This methodology is best suited to large assemblages of bone from a limited number of contexts. Sample aggregation of fragment totals, and especially MNI values, can alter the absolute taxonomic abundance and the ratio of one taxon to another, particularly where multiple small units are combined (Plug and Plug 1990). The number of bones counted can also depend on their degree of fragmentation, which can be directly related to butchery and taphonomic factors. In general, the bones of large animals tend to produce more fragments than those of smaller animals, thus weighting the frequency of bone fragments in favour of larger animals. Additionally, retrieval strategies often create a bias towards larger bones, since, in the absence of universal sieving on a site, smaller bones will inevitably be overlooked. The subjectivity and personal preferences of the analyst can also be added to the equation, for example some count rib fragments, whereas others do not. These issues all make it difficult to use fragment values as a dependable method for inter-site comparisons.

It is therefore not surprising that the most reliable methodology for quantification of animal bone assemblages from archaeological excavations is a subject of debate. There are a broad range of opinions and equally as many different recording methodologies employed by bone analysts (e.g. Ringrose 1993; Moreno-Garcia *et al.* 1996; O'Connor 2000). As a result, many specialists within the discipline confine their inter-site comparisons to other comparable assemblages they have recorded using the same quantification methods.

## **Archaeological Record:**

Almost a quarter of a million animal bones have been recorded from almost 120 early medieval sites excavated in Ireland since 1930 (Figs. 3.01a-c). These range from seven bones identified at Carrowdotia,

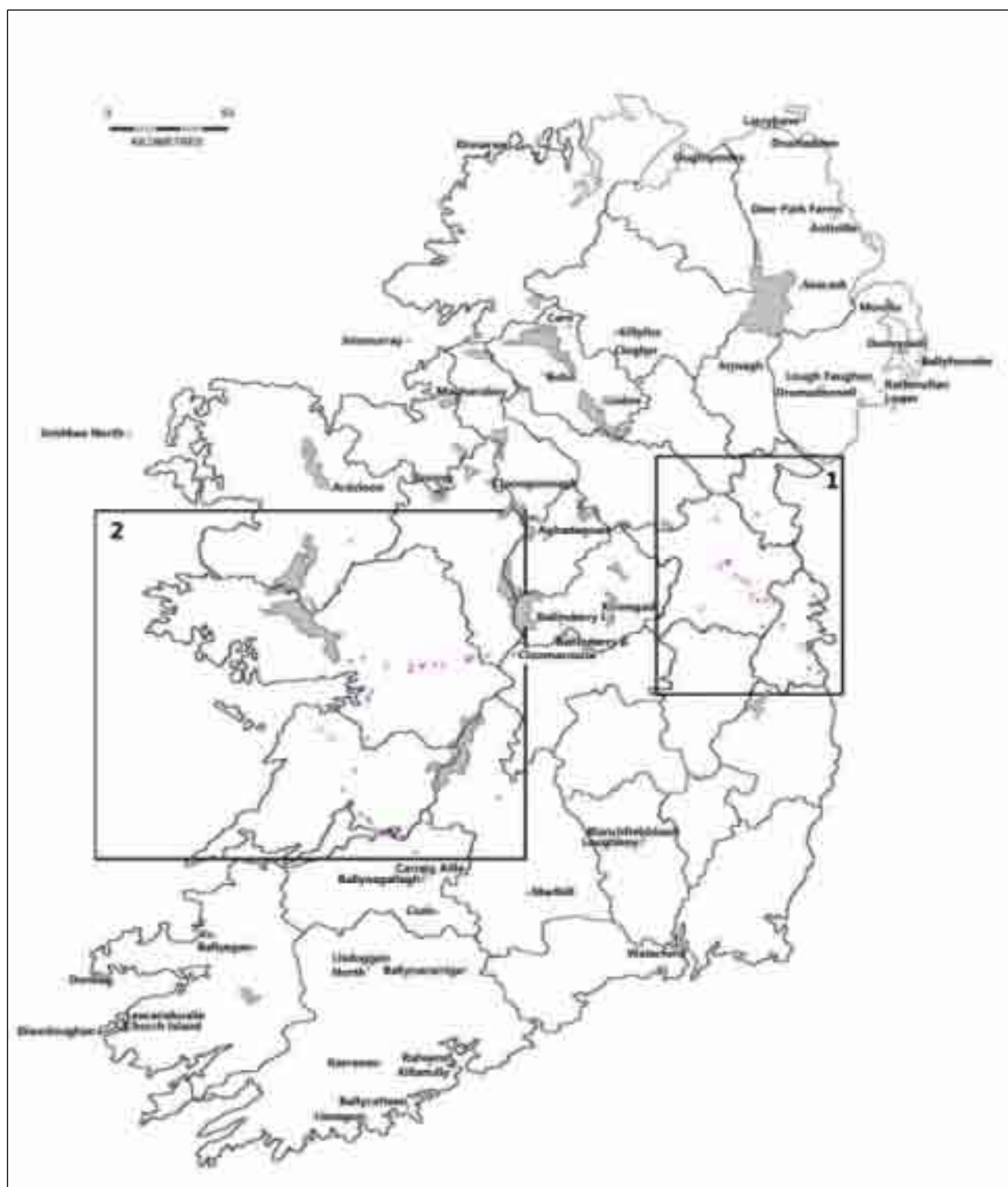
Co. Clare (Anthony 2006), through to over 26,000 identified bones from Clonmacnoise, Co. Offaly (Soderberg 2003; 2004a; 2004b). On other occasions, however, the presence of animal bones was merely noted in the excavation report with no further discussion of numbers or species present, e.g. Ardclon, Co. Mayo (Roche 1956) or Antiville, Co. Antrim (Waterman 1971). These differing recording methodologies make it difficult to cross-compare site reports from different individuals and different decades.

This study has attempted to investigate the faunal reports from early medieval sites and contexts that produced a statistically significant quantity of bones, and which were also able to be dated with reasonable precision. For comparative purposes the sites/phases were placed within chronological bands that spanned two centuries, e.g. 5<sup>th</sup>/6<sup>th</sup> century, 6<sup>th</sup>/7<sup>th</sup> century, etc. Thus a calibrated radiocarbon date of A.D. 434-671 from Phase 1-2 at Boyerstown, Co. Meath placed it in the 6<sup>th</sup>/7<sup>th</sup> century band, and a date of A.D. 635-806 placed Phase 3 at Boyerstown into the 7<sup>th</sup>/8<sup>th</sup> C band.

Advances in zooarchaeological study and theory in recent years have been outlined in McCormick and Murray (2007) who argue for a clear difference between the faunal remains (and hence the concomitant livestock economy) of the sixth to eighth centuries, and that from later centuries. The distribution of livestock from sites dated *c.* A.D. 600-800 displays a remarkable consistency (*ibid.* 105). During these centuries there was an almost nationwide livestock economy, with cattle being of primary importance, followed by pig, and then sheep. Goat played a very minor role. From about A.D. 800 onwards, distribution of livestock from various sites begins to show much more diversity, and in many places cattle begin to lose their dominant role (*ibid.* 107). This change is equated with a decline in cattle being used as the currency standard and general basis of the wealth system. Other currencies, especially silver, began to gain significant economic importance around this time. As a consequence of this it has been argued that there is an expansion in grain production, which is superior way of generating independent economic wealth than cattle rearing (Kerr 2007, 117-18; McCormick and Murray 2007, 111-15). The great activity in mill building around the turn of the eighth century (Brady 2006, 49) provides complimentary evidence for the expansion in arable farming, and coincides with the beginning of the decline of the rath and the emergence of the raised rath in the northern part of the island (Kerr 2007, 98-99; Kerr 2009, 72-74).

This study is able to test the claims put forward by McCormick and Murray (2007), and also is able to pose five key questions:-

- (1): Do the faunal remains indicate a change in the composition of the farming economy in Ireland during the early medieval period?
- (2): Do the faunal remains indicate a regional pattern in the farming economy in Ireland during the early medieval period?
- (3): Do the faunal remains indicate a change in the size of domesticates in Ireland during the early medieval period?
- (4): Can the age/death pattern of the cattle bones be related to changes in farming practice?; and
- (5): Can the age/death pattern of the sheep bones be related to changes in farming practice?

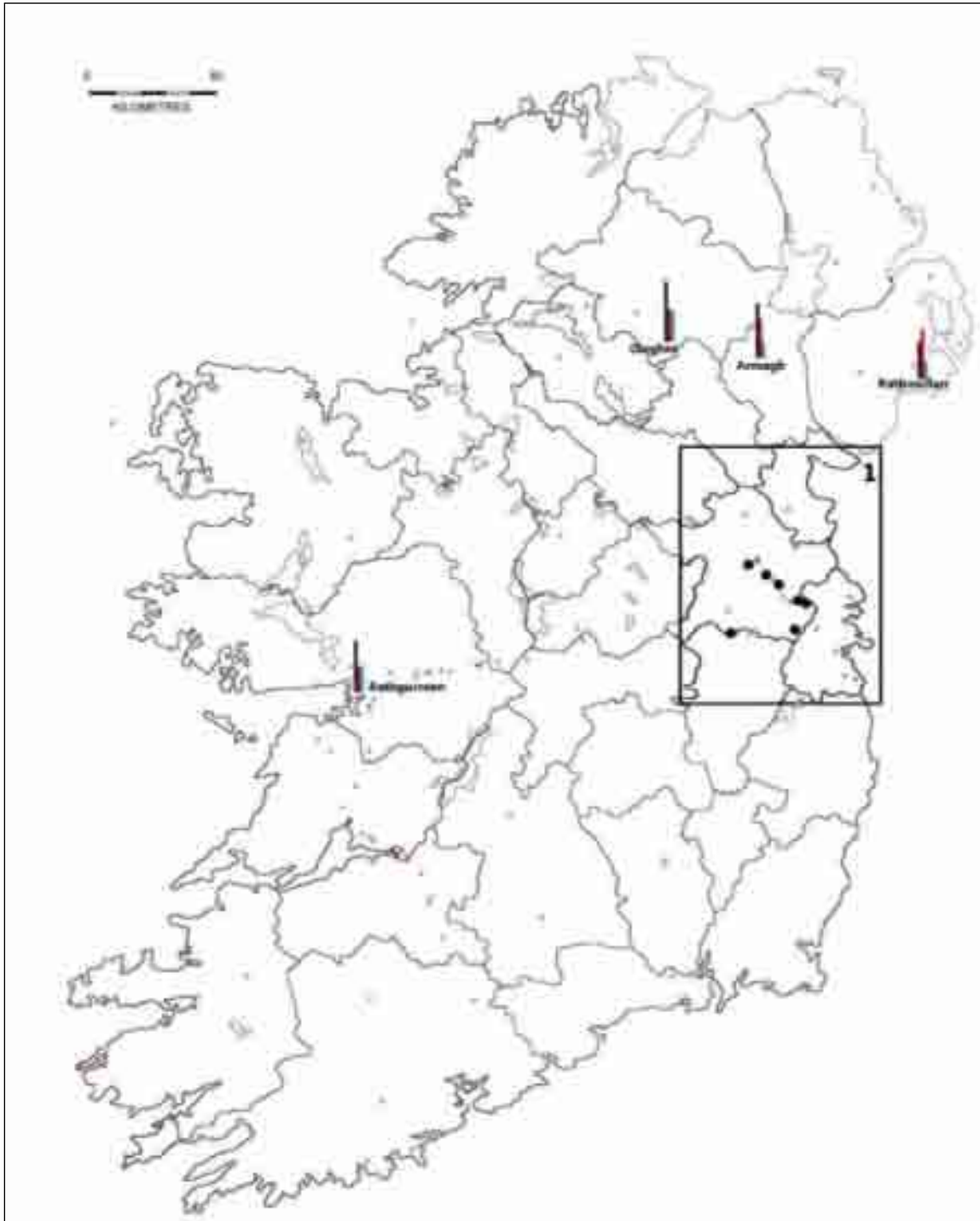


**Fig. 3.01a: Distribution map of early medieval sites with faunal reports in Ireland (see 3.01b and 3.01c for insets).**

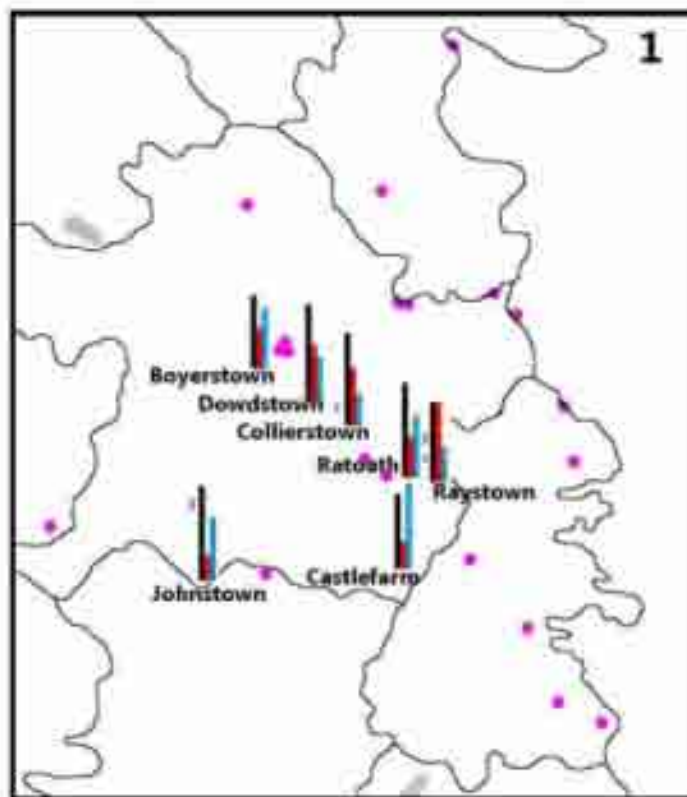




**(1): Do The Faunal Remains Indicate A Change in The Composition of The Farming Economy in Ireland During The Early Medieval Period?**



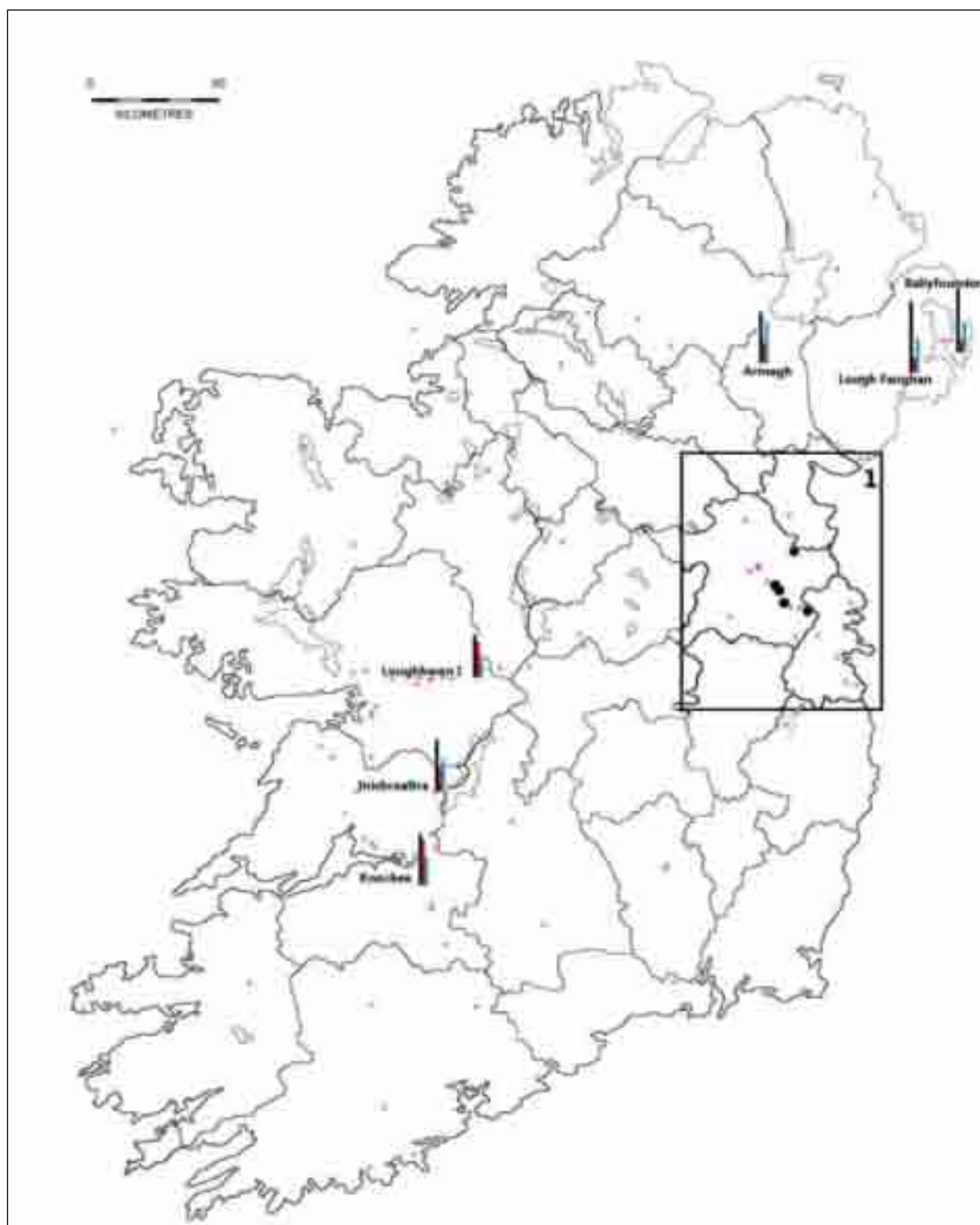
**Fig. 3.02a: MNI for three main domesticates (Black = Cattle; Red = Sheep/Goat; Blue = Pig) for 5<sup>th</sup>/6<sup>th</sup> Century (see Fig. 3.02b for inset).**



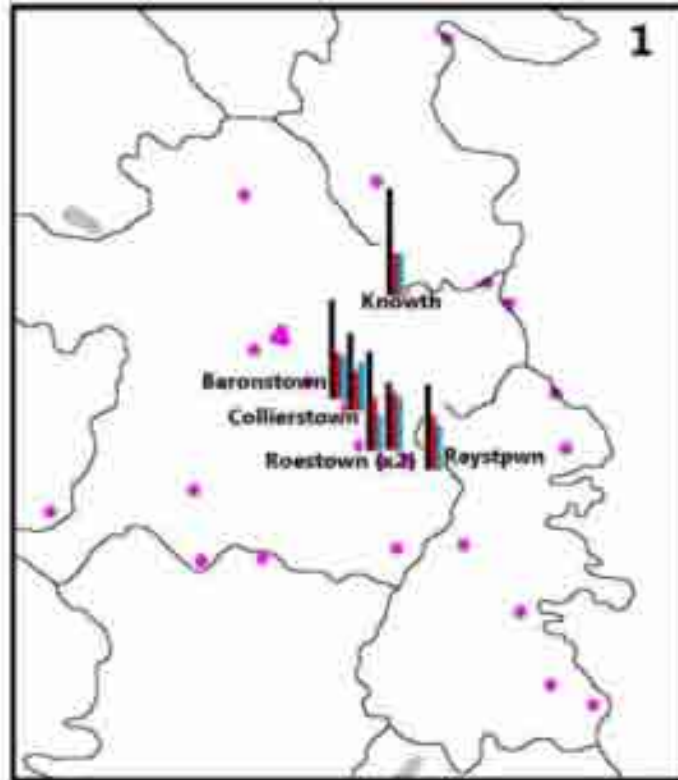
**Fig. 3.02b: MNI for three main domesticates (Black = Cattle; Red = Sheep/Goat; Blue = Pig) for 5<sup>th</sup>/6<sup>th</sup> Century.**

This study was able to draw together animal reports from 115 excavated early medieval sites in Ireland (Figs. 3.01a-c). Of these, approximately 75% came from contexts that were radiocarbon dated, or that were able to be phased into a relative and absolute site chronology based on the respective stratigraphic relationships. A number of these reports, however, only contained nominal faunal evidence, largely due to the impact of the underlying geology. This number was again reduced when the presence of MNI as compared to NISP was taken into consideration. As discussed above, NISP refers to the numbers of identified bone fragments recovered, whereas MNI gives the numbers of individual animal species present, dependant on certain skeletal remains. These differences in calculation requirements mean that there are more faunal reports which include NISP rather than MNI (although a large number provide both figures). There are 76 faunal reports which give the NISP figure from 119 contexts. The MNI is listed in 49 faunal reports, containing 84 phases or contexts which fulfil the size and dating criteria. In order to compare these sites each phase was placed within a broad chronological band based on the radiocarbon dates from the relevant contexts.

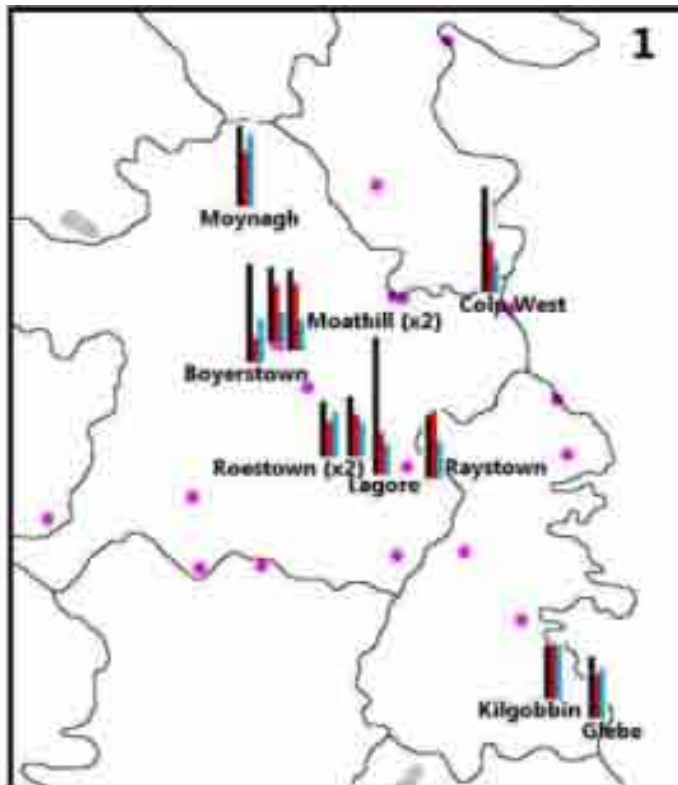
Based on these criteria it was possible to produce distribution maps of the MNI for the three dominant domesticates – cattle, sheep/goats, and pigs – by chronological band (Figs. 3.02a-b; 3.03a-b; 3.04 a-b; 3.05a-b; 3.06a-b; 3.07a-b; 3.08a-b). These maps show both a geographical and chronological bias to the data. The excavations along the M3 in the 2000s have produced a large amount of archaeological data, including large numbers of animal bones. This is clearly evident in the distribution maps, where a separate map had to be produced to represent the faunal remains from Co. Meath and north Co. Dublin. It is also clear from these distribution maps that there is a concentration of dated phases to the chronological bands which span the 7<sup>th</sup>/8<sup>th</sup> century and the 8<sup>th</sup>/9<sup>th</sup> century. Indeed 42% of the faunal reports with MNI resolved fall into these time brackets.



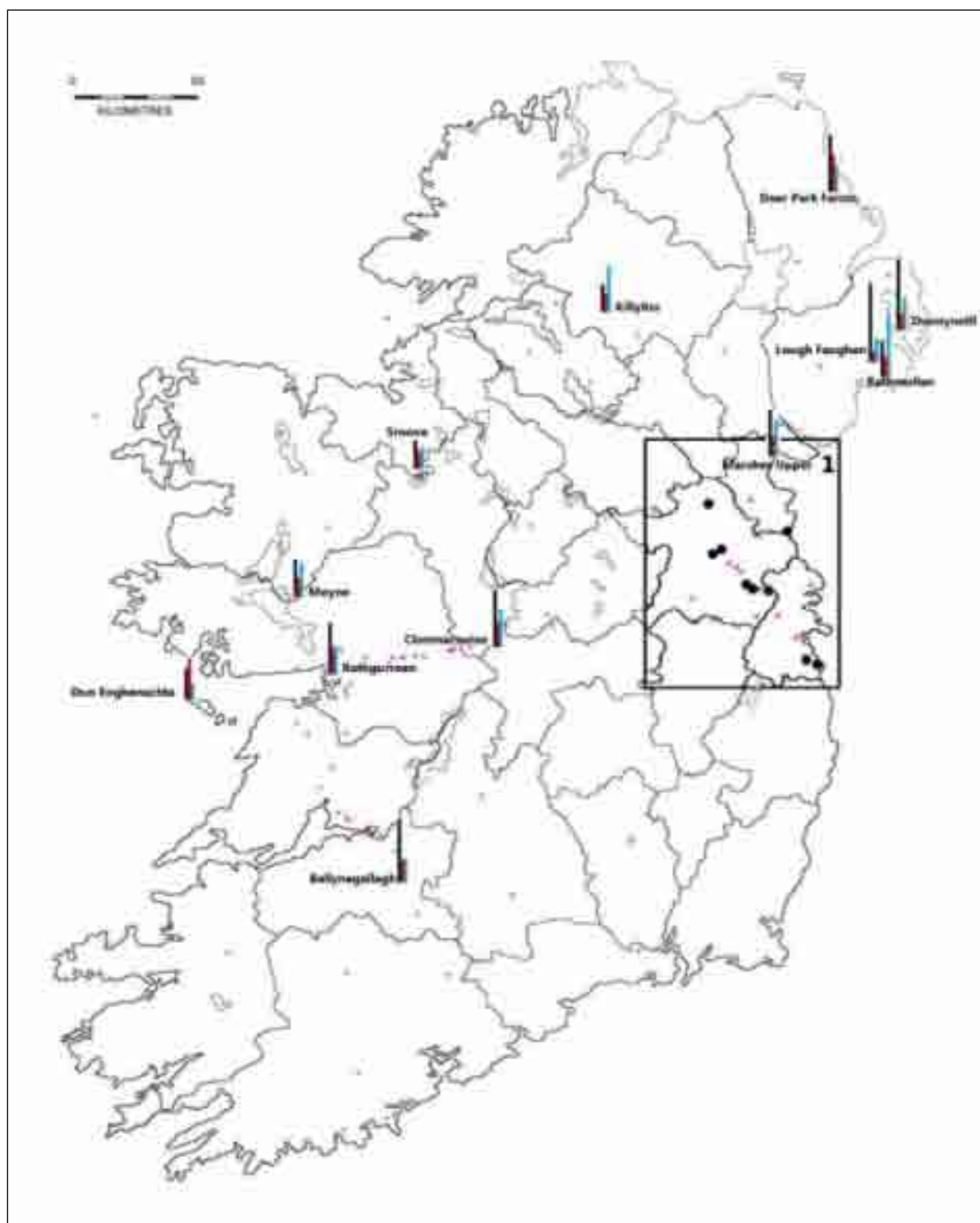
**Fig. 3.03a: MNI for three main domesticates (Black = Cattle; Red = Sheep/Goat; Blue = Pig) for 6<sup>th</sup>/7<sup>th</sup> Century (see Fig. 3.03b for inset).**



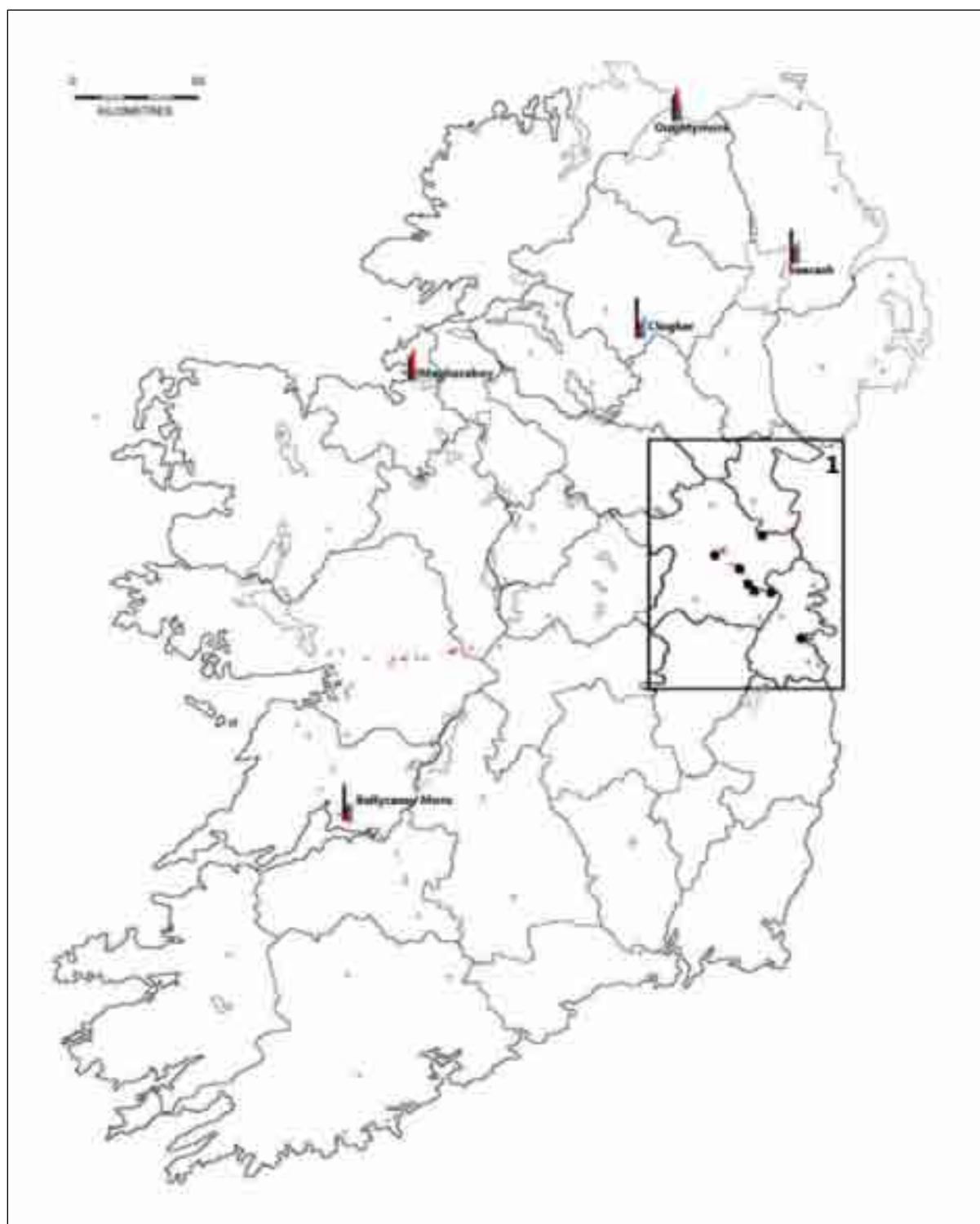
**Fig. 3.03b: MNI for three main domesticates (Black = Cattle; Red = Sheep/Goat; Blue = Pig) for 6<sup>th</sup>/7<sup>th</sup> Century.**



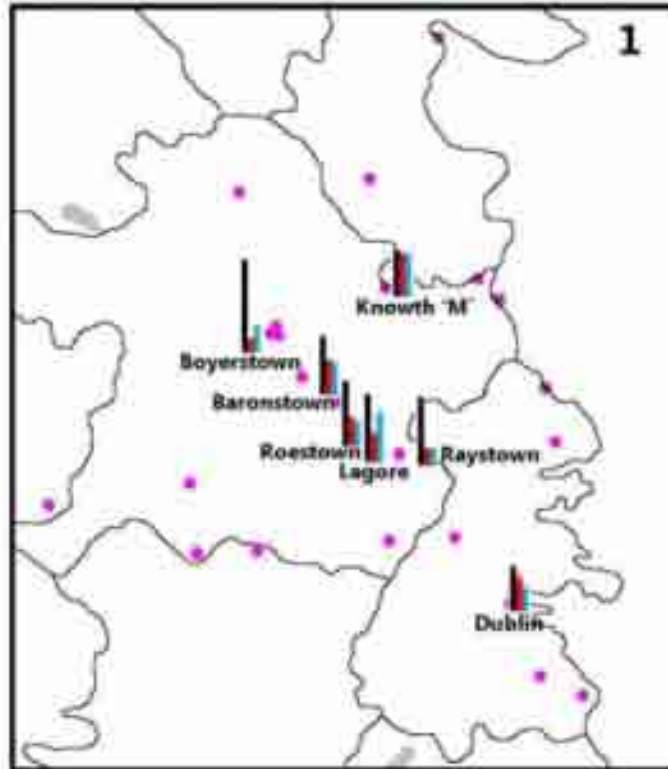
**Fig. 3.04b: MNI for three main domesticates (Black = Cattle; Red = Sheep/Goat; Blue = Pig) for 7<sup>th</sup>/8<sup>th</sup> Century.**



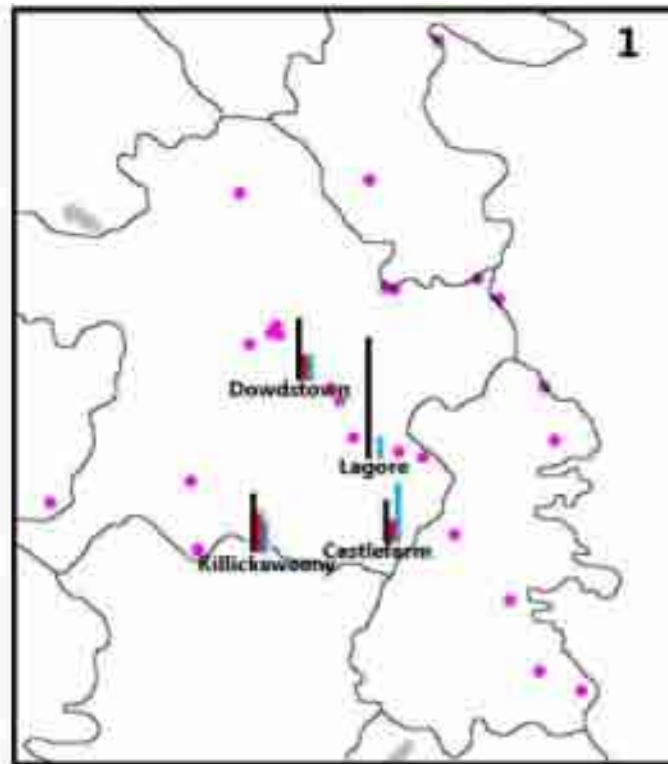
**Fig. 3.04a: MNI for three main domesticates (Black = Cattle; Red = Sheep/Goat; Blue = Pig) for 7<sup>th</sup>/8<sup>th</sup> Century (see Fig. 3.04b for inset).**



**Fig. 3.05a: MNI for three main domesticates (Black = Cattle; Red = Sheep/Goat; Blue = Pig) for 8<sup>th</sup>/9<sup>th</sup> Century (see Fig. 3.05b for inset).**

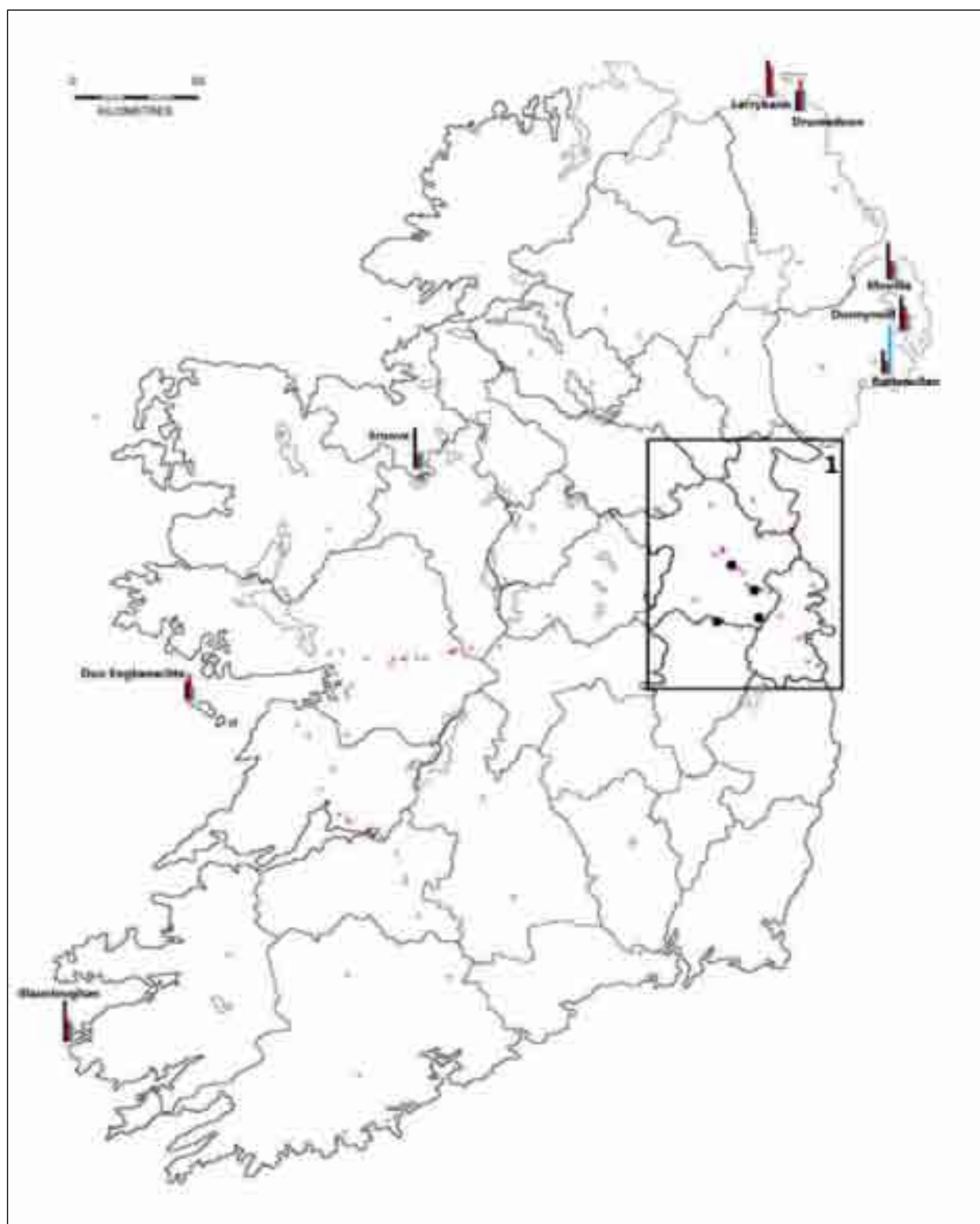


**Fig. 3.05b: MNI for three main domesticates (Black = Cattle; Red = Sheep/Goat; Blue = Pig) for 8<sup>th</sup>/9<sup>th</sup> Century.**



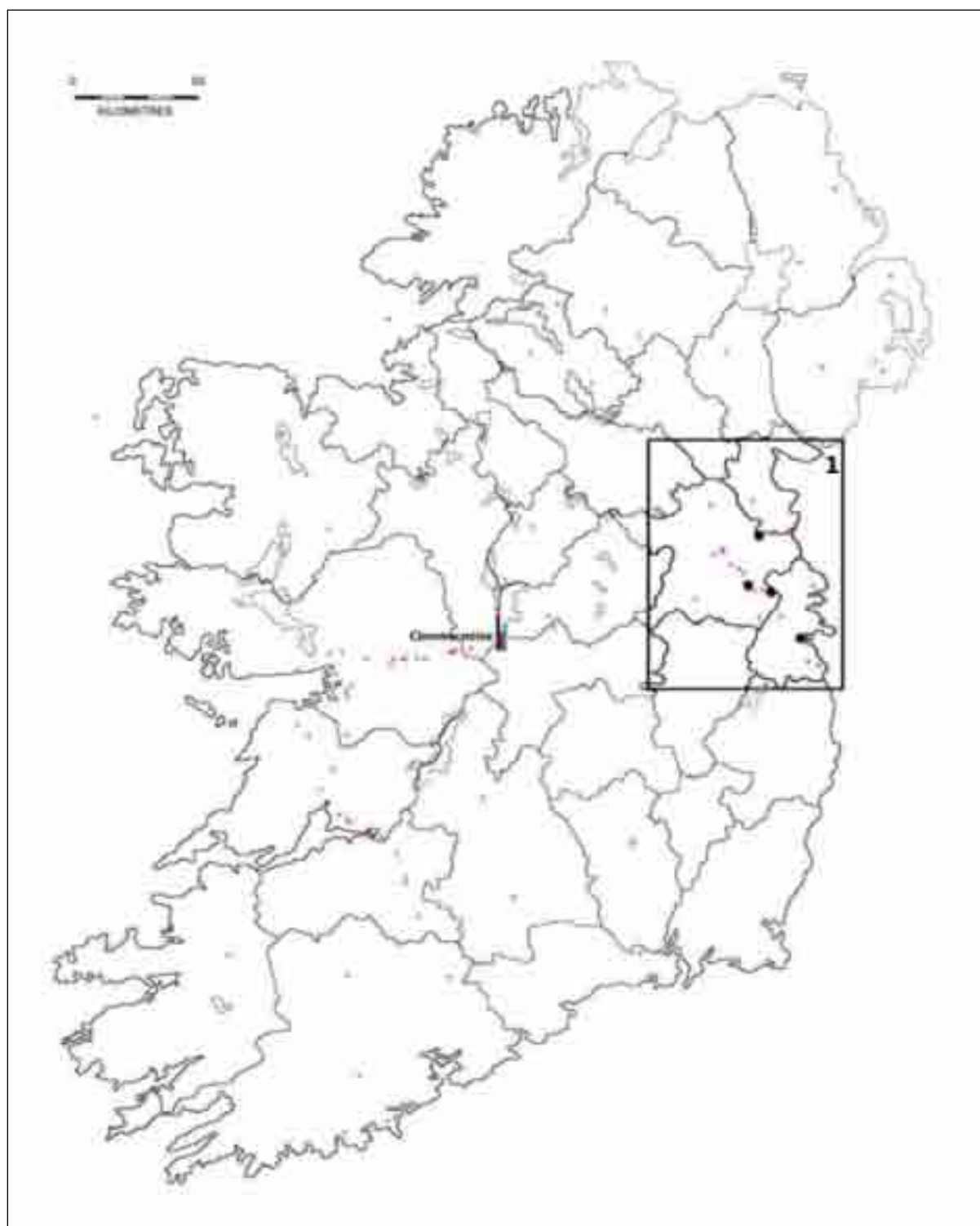
**Fig. 3.06b: MNI for three main domesticates (Black = Cattle; Red = Sheep/Goat; Blue = Pig) for 9<sup>th</sup>/10<sup>th</sup> Century.**



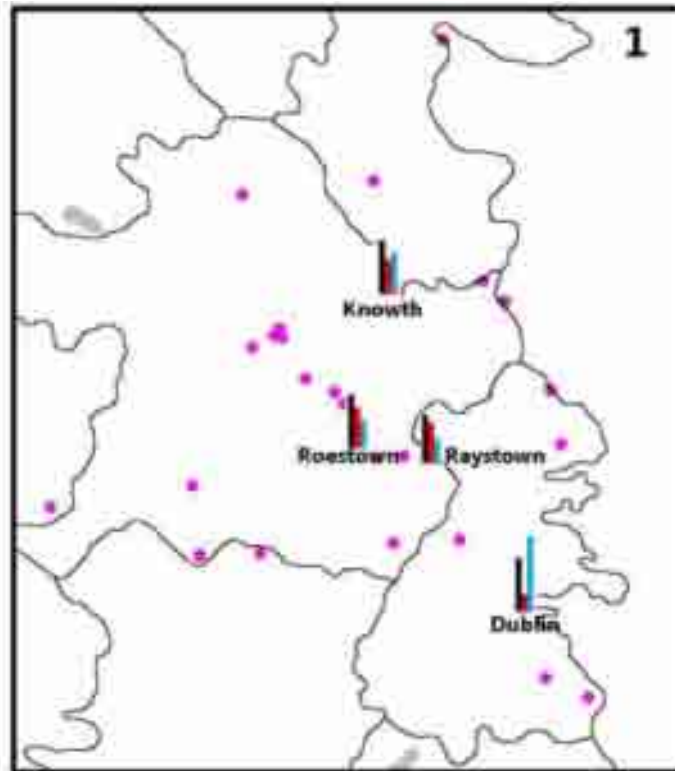


**Fig. 3.06a: MNI for three main domesticates (Black = Cattle; Red = Sheep/Goat; Blue = Pig) for 9<sup>th</sup>/10<sup>th</sup> Century (see Fig. 3.06b for inset).**

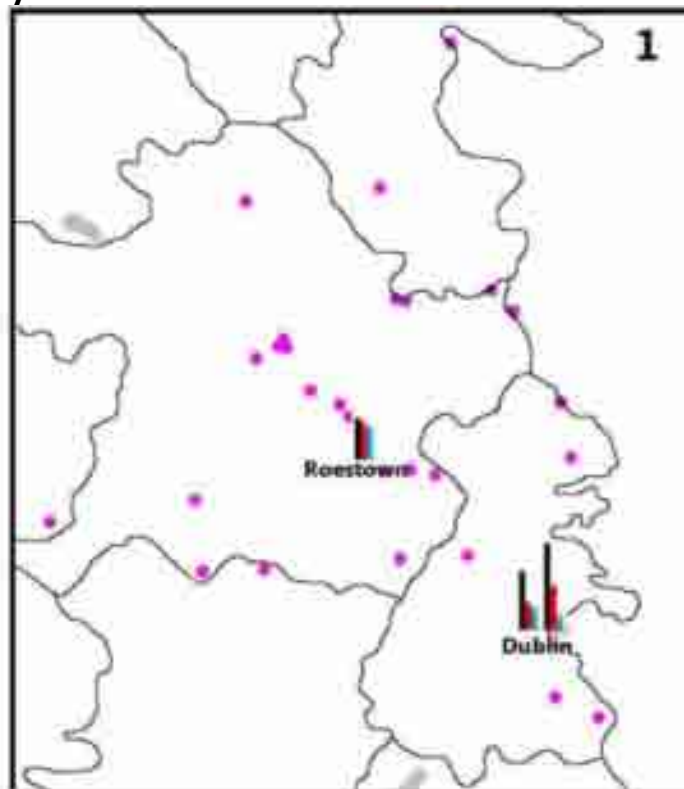




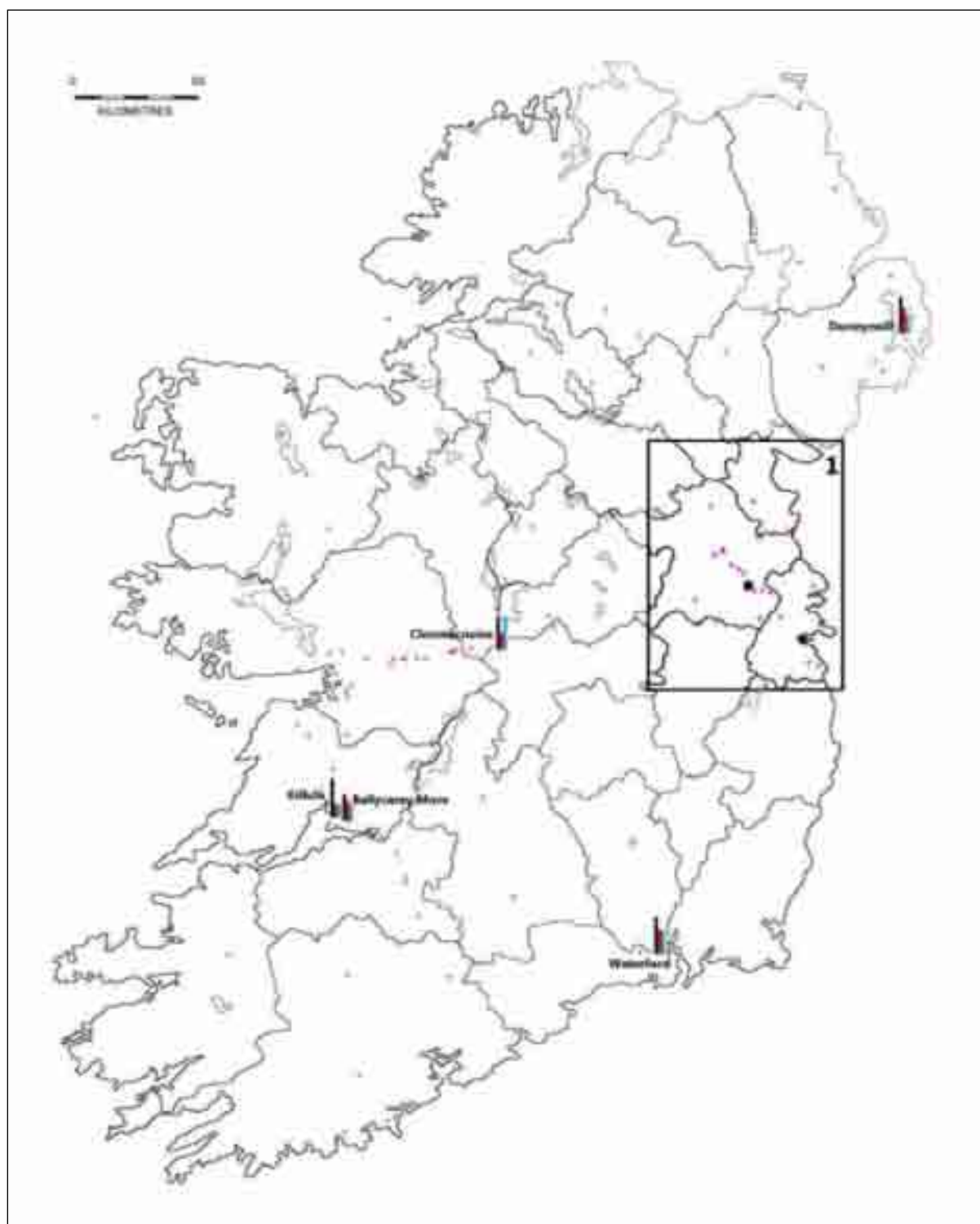
**Fig. 3.07a: MNI for three main domesticates (Black = Cattle; Red = Sheep/Goat; Blue = Pig) for 10<sup>th</sup>/11<sup>th</sup> Century (see Fig. 3.07b for inset).**



**Fig. 3.07b: MNI for three main domesticates (Black = Cattle; Red = Sheep/Goat; Blue = Pig) for 10<sup>th</sup>/11<sup>th</sup> Century.**

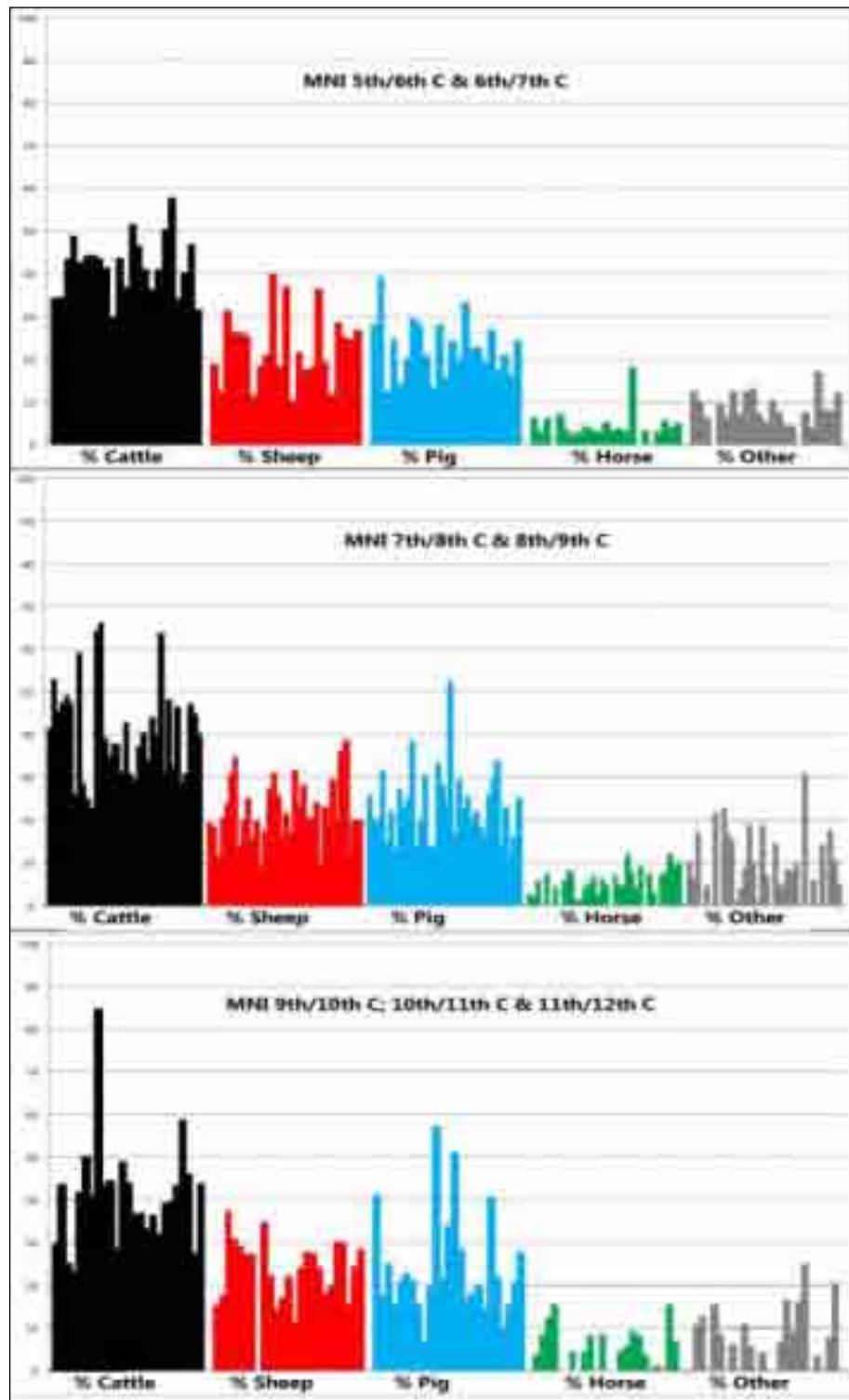


**Fig. 3.08b: MNI for three main domesticates (Black = Cattle; Red = Sheep/Goat; Blue = Pig) for 11<sup>th</sup>/12<sup>th</sup> Century.**



**Fig. 3.08a: MNI for three main domesticates (Black = Cattle; Red = Sheep/Goat; Blue = Pig) for 11<sup>th</sup>/12<sup>th</sup> Century (see Fig. 3.08b for inset).**

Figures 3.02-3.08 give a geographical and chronological representation of the MNI from early medieval excavations, however they are difficult to use for comparative and interpretive studies. A condensed series of histograms (Fig. 3.09) makes this process a little more achievable.



**Fig. 3.09: MNI by site**

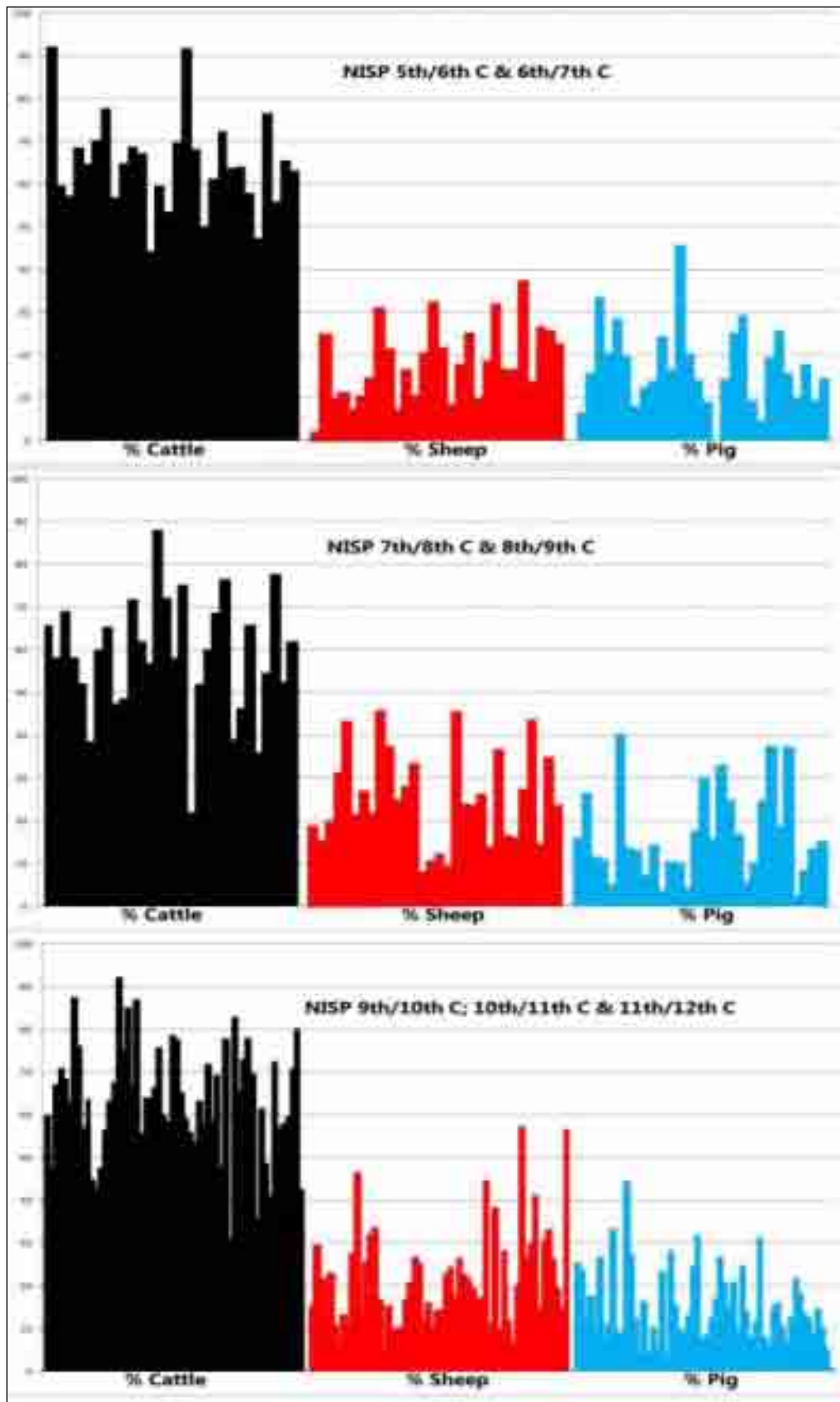
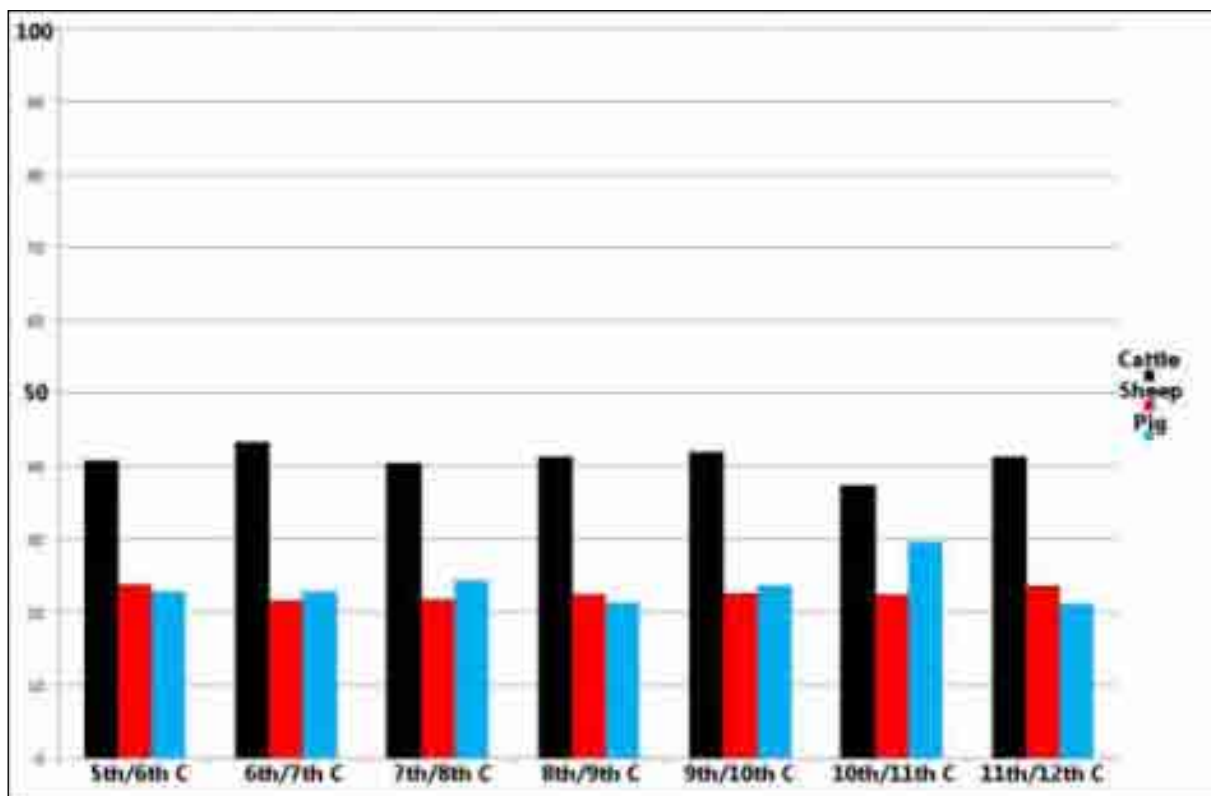


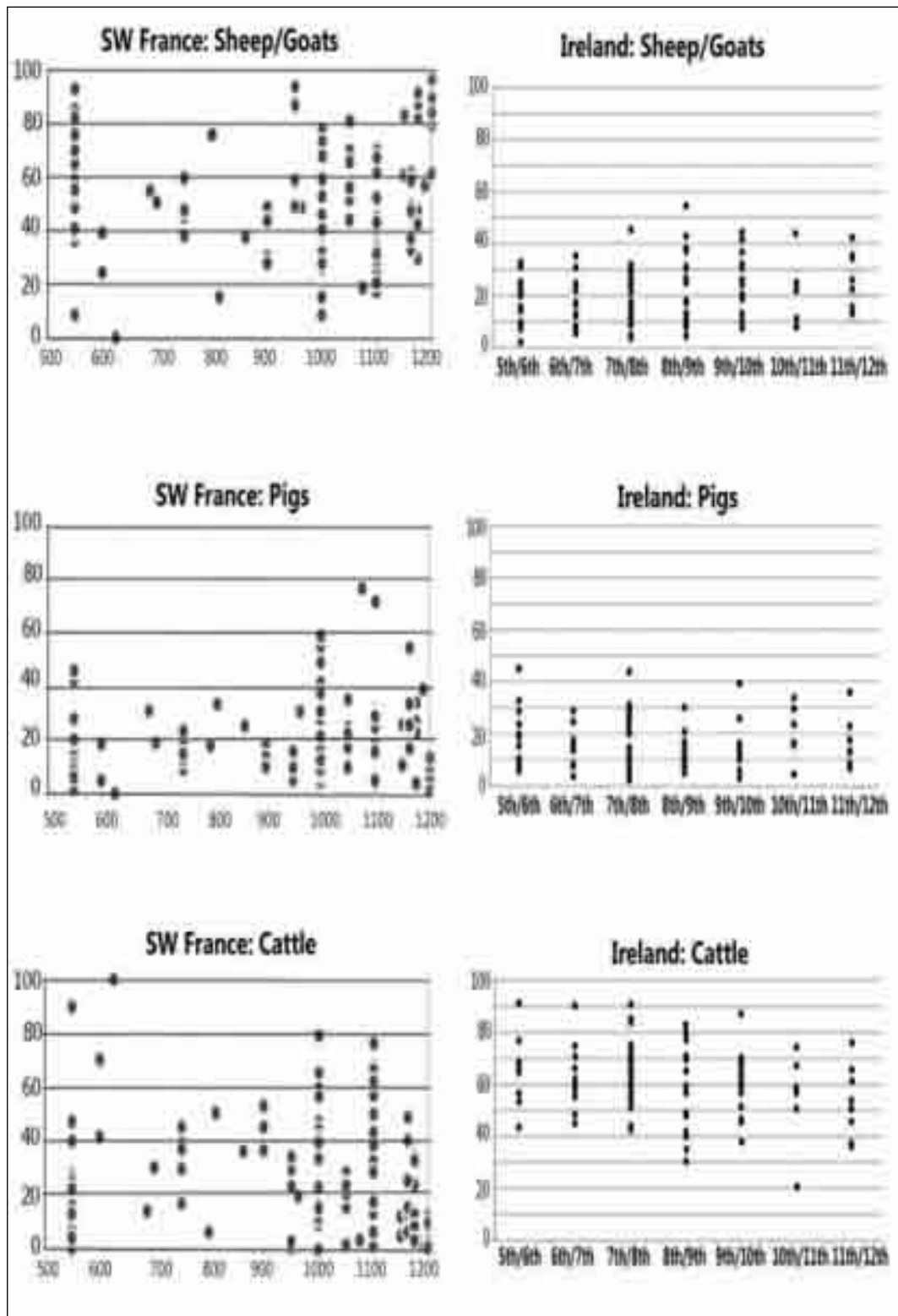
Fig. 3.10: NISP by site

For comparative purposes, the MNI histograms (Fig. 3.09) may be compared to similar histograms produced for NISP (Fig. 3.10). It is clear from comparing the MNI and NISP from the same chronological band that there are more sites which have produced NISP results than MNI figures, and that cattle appear more dominant in the NISP figures than in the equivalent MNI. This is due to the better survival of skeletal remains from a large animal, as opposed to those from a smaller one. Figures 3.09 and 3.10 show high degrees of variation which makes it difficult to try to pick out any chronological variations, although it seems clear that cattle are the major species by MNI throughout these seven centuries, and that sheep and pigs are roughly co-equivalent with each other. A simplified version of Fig. 3.09, with the percentage MNI for cattle, sheep and pigs averaged out by chronological band, was produced (Fig. 3.11).

Figures 3.11 shows that the average MNI for cattle is generally around the 40% mark through all the early medieval period, and that the average MNI for both sheep and pigs is in the low 20% range. The one exception to this would appear to be the 10<sup>th</sup>/11<sup>th</sup> century dates where pig is significantly higher and cattle fall below the 40% mark. As can be seen in Figs. 3.07a-b, however, this is a band which includes only five sites, one of which is urban (Dublin), and one of which may be described as a 'monastic town' (Clonmacnoise). This general trend of cattle dominant throughout the early medieval period is not replicated in faunal remains from other areas of northwest Europe at this time (Figs. 3.12 and 3.13).



**Fig. 3.11: MNI averaged by chronological band.**



**Fig. 3.12: NISP of Sheep, Pigs and Cattle from early medieval samples in Le Languedoc-Rousillon (SW France) (after Rodet-Belarbi 2011) and comparative NISP from Ireland**

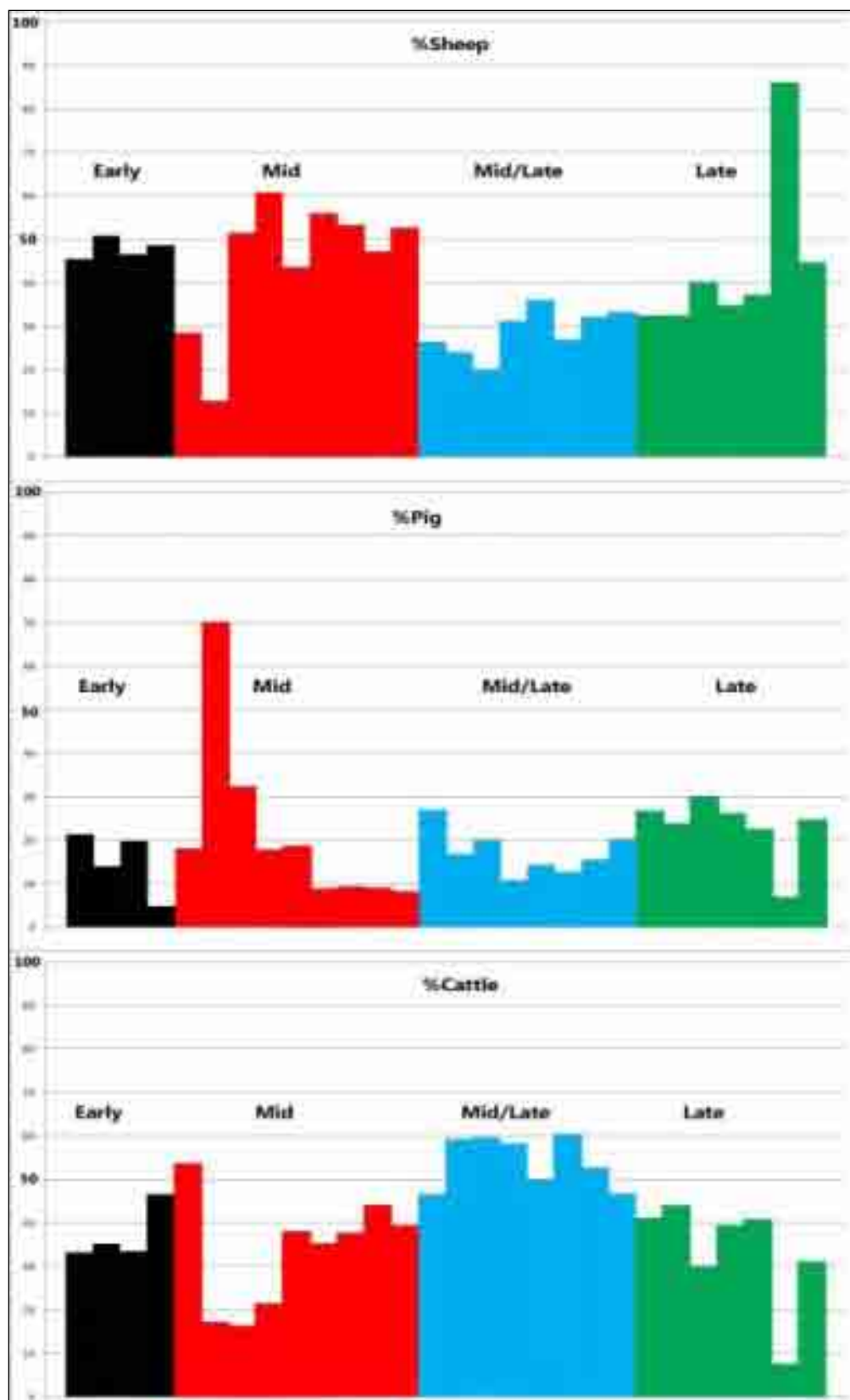
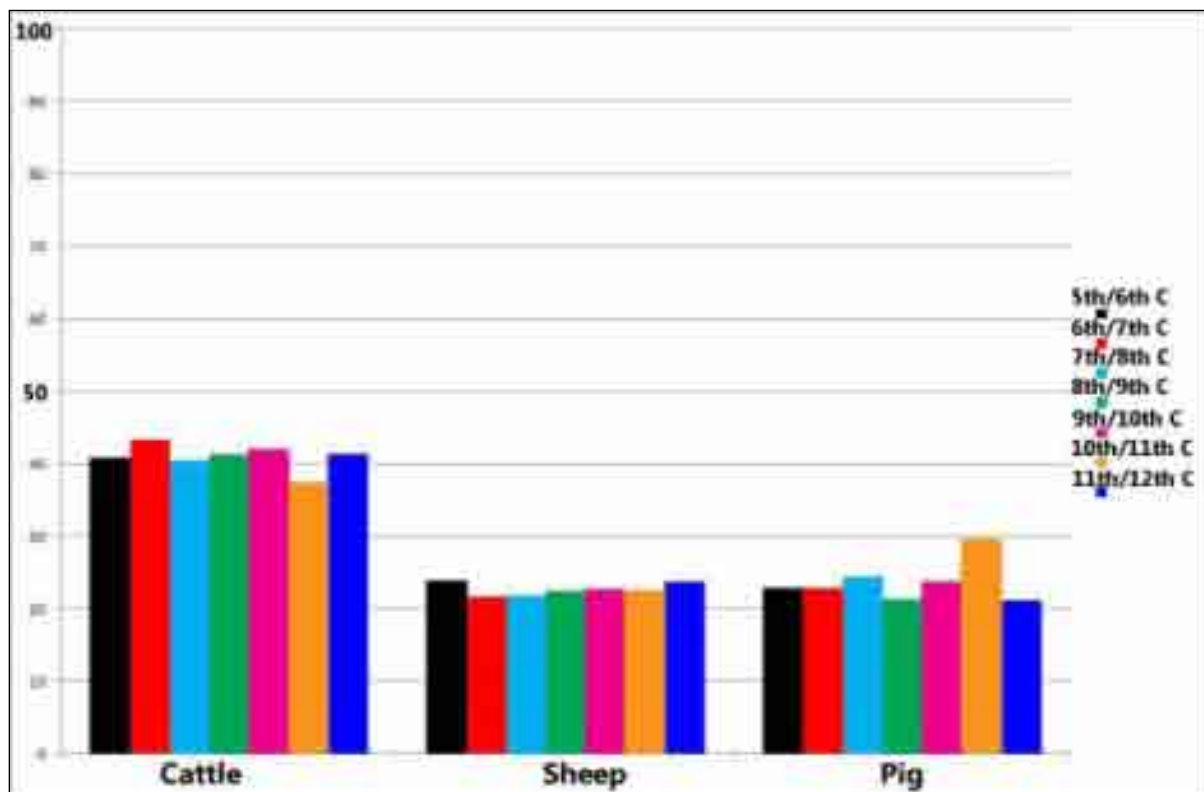


Fig. 3.13: MNI by percentage from Anglo-Saxon sites (after O'Connor 2011)

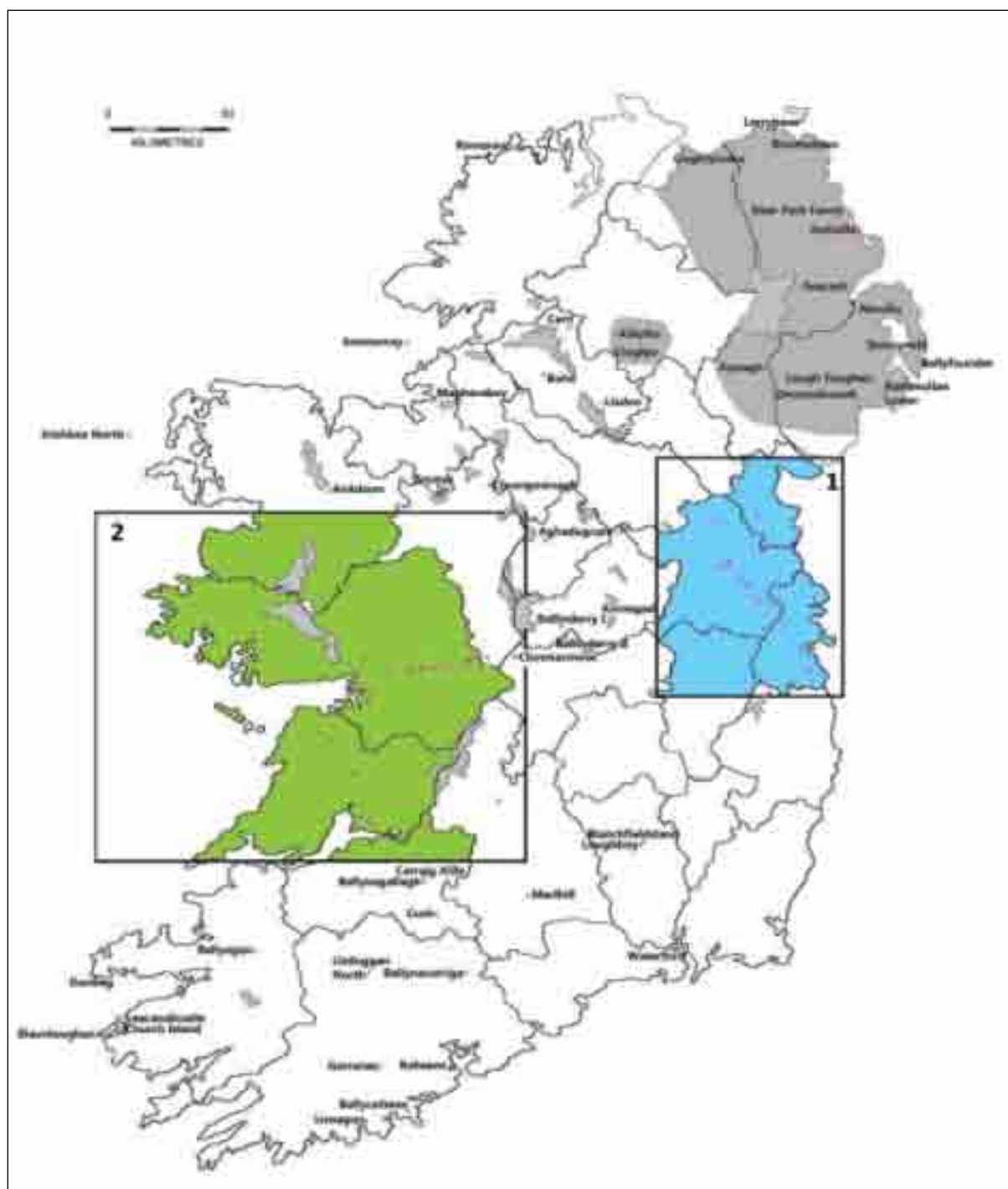


The faunal evidence from Anglo-Saxon England and the early medieval southwest of France show some similarities. In both cases sheep are the most abundant species in the earliest phases (roughly comparable to the 5<sup>th</sup>/6<sup>th</sup> century band in Ireland). Cattle, on the other hand, become more important at a later date, but sheep seemingly regain precedence by the end of the early medieval period. This is very different to the position suggested by the Irish material, where cattle comprise the dominant species throughout this period. The different emphasis on livestock between these regions seems to support the role of cattle in Ireland, not merely as an element of the farming economy, but rather as an important symbol of wealth and prestige.

The apparent continuity of the farming economy in Ireland, as represented by the relative percentages of the three major domesticates in Fig. 3.11, is more sharply defined in Fig. 3.14. This figure quite clearly shows that there is little variation in the average percentages of the MNI of cattle, sheep and pigs over these centuries. These findings are in contradistinction to the arguments put forward by Kerr (2007; 2009) and McCormick and Murray (2007) who suggested that there was a movement away from cattle-dominated farming after *c.* A.D. 800. This may be due to the increase in the number of faunal assemblages studied in the interim period, however this increase is associated with a large degree of regional bias, especially in favour of the excavations along the M3 in Co. Meath, and, to a lesser extent, along the M6 in Co. Galway. To test whether regionalism influenced the faunal record, the island was subdivided into three groups – Ulster; Meath/Dublin; and the West (Fig. 3.15) – all of which had reasonable numbers of excavated sites. The northwest, southwest and southeast were not able to be included in this regional study because of insufficient numbers of suitable sites.



**Fig. 3.14: Average MNI by species**



**Fig. 3.15: The three regional study areas – Ulster (grey); Meath/Dublin (blue); the West (green).**

## (2): Do The Faunal Remains Indicate A Regional Pattern in The Farming Economy in Ireland During The Early Medieval Period?

When comparing the three regional study areas, it was found that only Ulster and Meath/Dublin both produced sites with sufficient numbers of sites with MNI that could be averaged and compared (Fig. 3.16), whereas the sites in the West region could only be compared at the NISP level (Fig. 3.17).

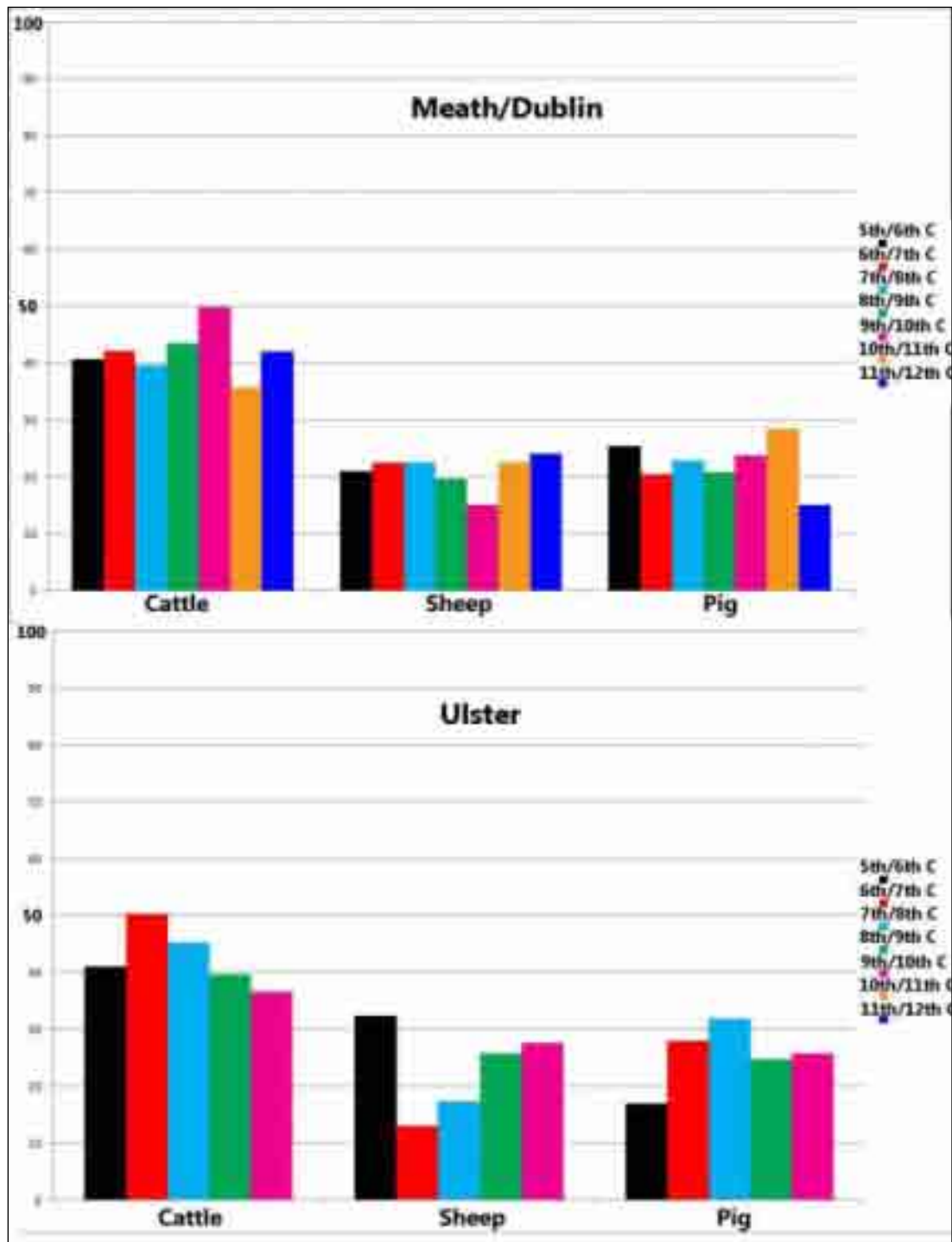


Fig. 3.16: Average MNI by species in Meath/Dublin and Ulster

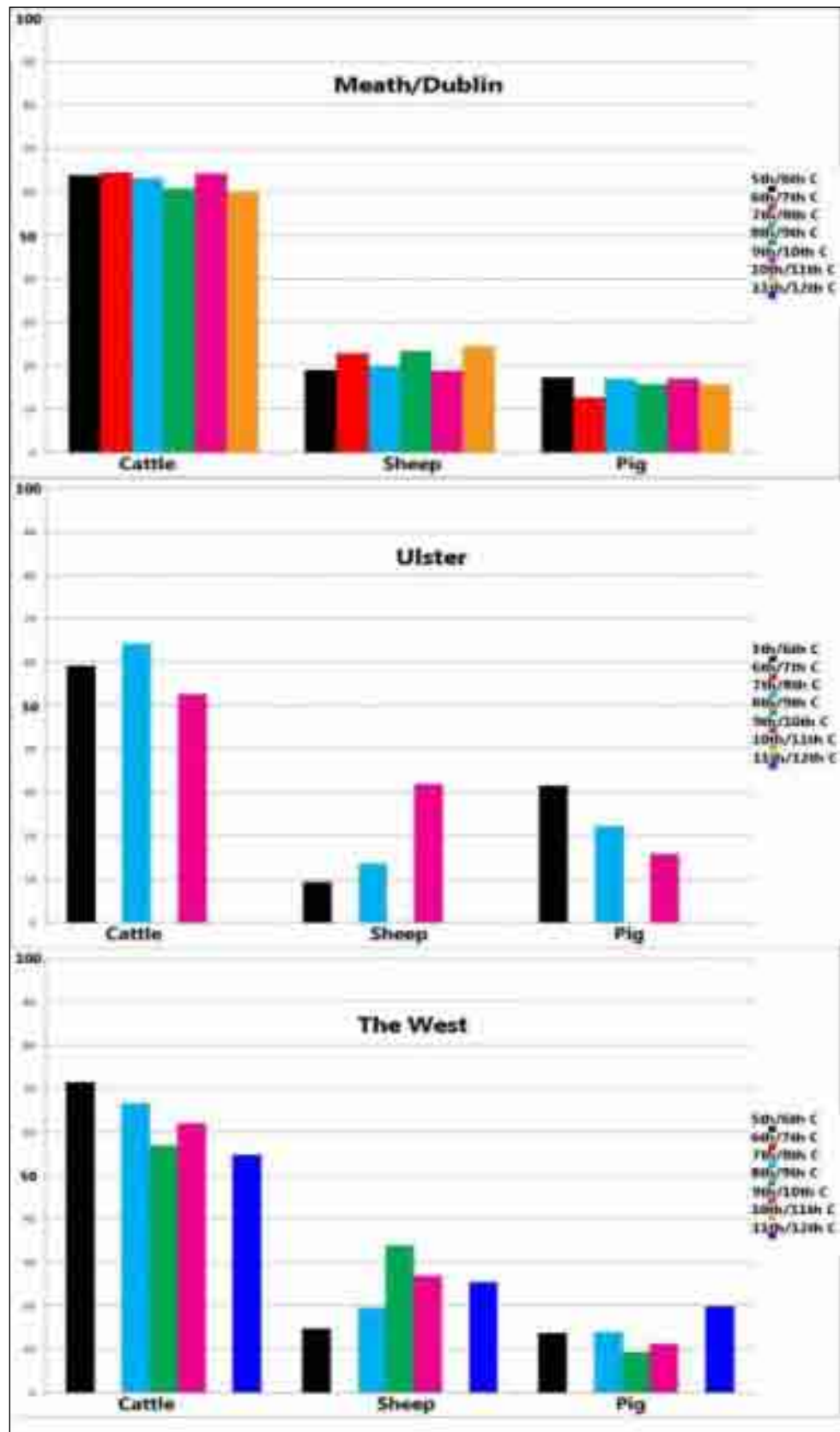
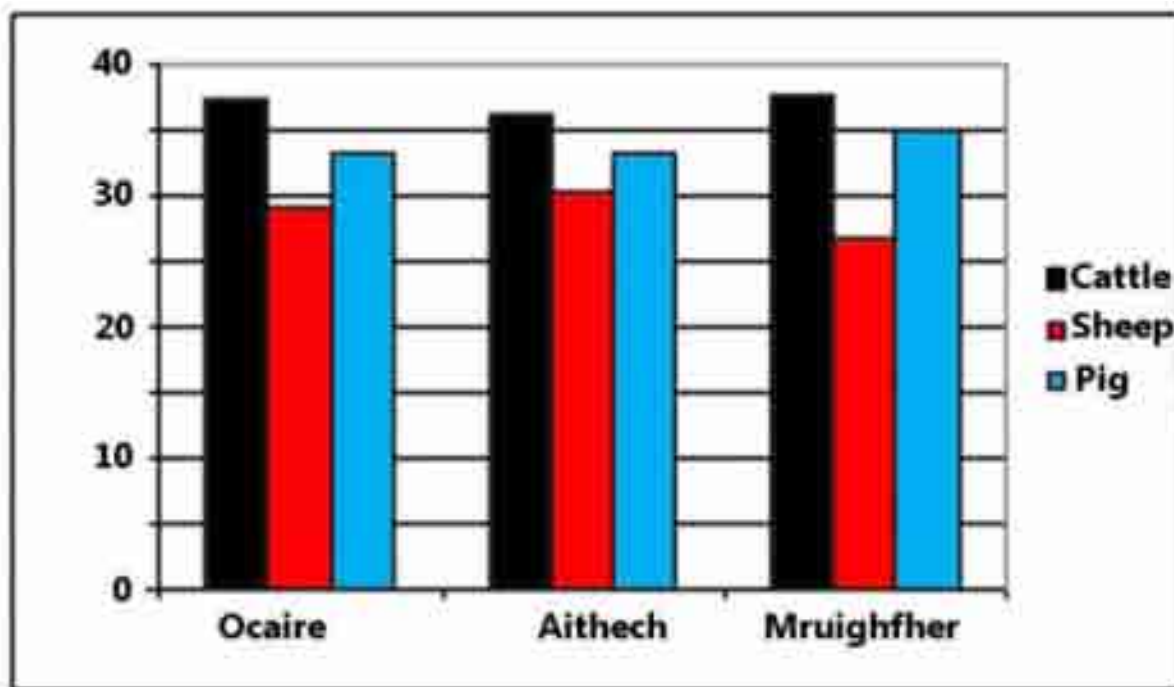


Fig. 3.17: Average NISP by species in Meath/Dublin, Ulster and the West.

The impact of the recent excavations in the Meath/Dublin region on the island-wide average is quite clear when Fig. 3.14 is compared with Fig. 3.16. The results from Ulster, however, show a very different pattern. Here cattle peak in percentage MNI terms in the 6<sup>th</sup>/7<sup>th</sup> century and subsequently reduce in percentage importance while sheep and pigs increase. By the 8<sup>th</sup>/9<sup>th</sup> century sheep and pigs comprise over 50% of the percentage MNI in Ulster, whereas they are running at just over 40% in Meath/Dublin. A similar regional trend is seen in the NISP figures from the West, where cattle percentages slowly decline over the early medieval period while, at the same time, pig and sheep percentages increase (Fig. 3.17). This is sharp contrast to the NISP figures from Meath/Dublin which closely reflect the MNI figures from this region.

The clear regional differences shown in Figs 3.16 and 3.17 raise current and future problems when dealing with animal bone assemblages from early medieval Ireland. The Meath/Dublin assemblages show very little variation across these centuries, with the exception of the 9<sup>th</sup>/10<sup>th</sup> century data, which is skewed by the inclusion of MNI from Lagore (which is based on recovered skulls, thus heavily favouring cattle). In contrast both Ulster and the West show a large amount of variation in the faunal assemblages, with sheep, and to a lesser extent, pig, becoming increasingly present in the remains, as opposed to the Meath/Dublin area where the proportions seem more fixed. This may be the result of local environmental conditions, for example the grasslands of the wider Boyne Valley are ideal for raising cattle, whereas those of north Antrim or mid-Galway are better suited for sheep grazing. It has also been suggested that farming in early medieval Ireland may have been constrained by various law tracts on status, e.g. the *Críth Gablach*, which outlined the numbers of cattle, sheep, pigs, etc. an individual had to have to maintain his social status. These are converted to percentages in Fig. 3.18.



**Fig. 3.18: Percentages of cattle, sheep and pig by *bóaire* (farmer) grade according to *Críth Gablach*.**

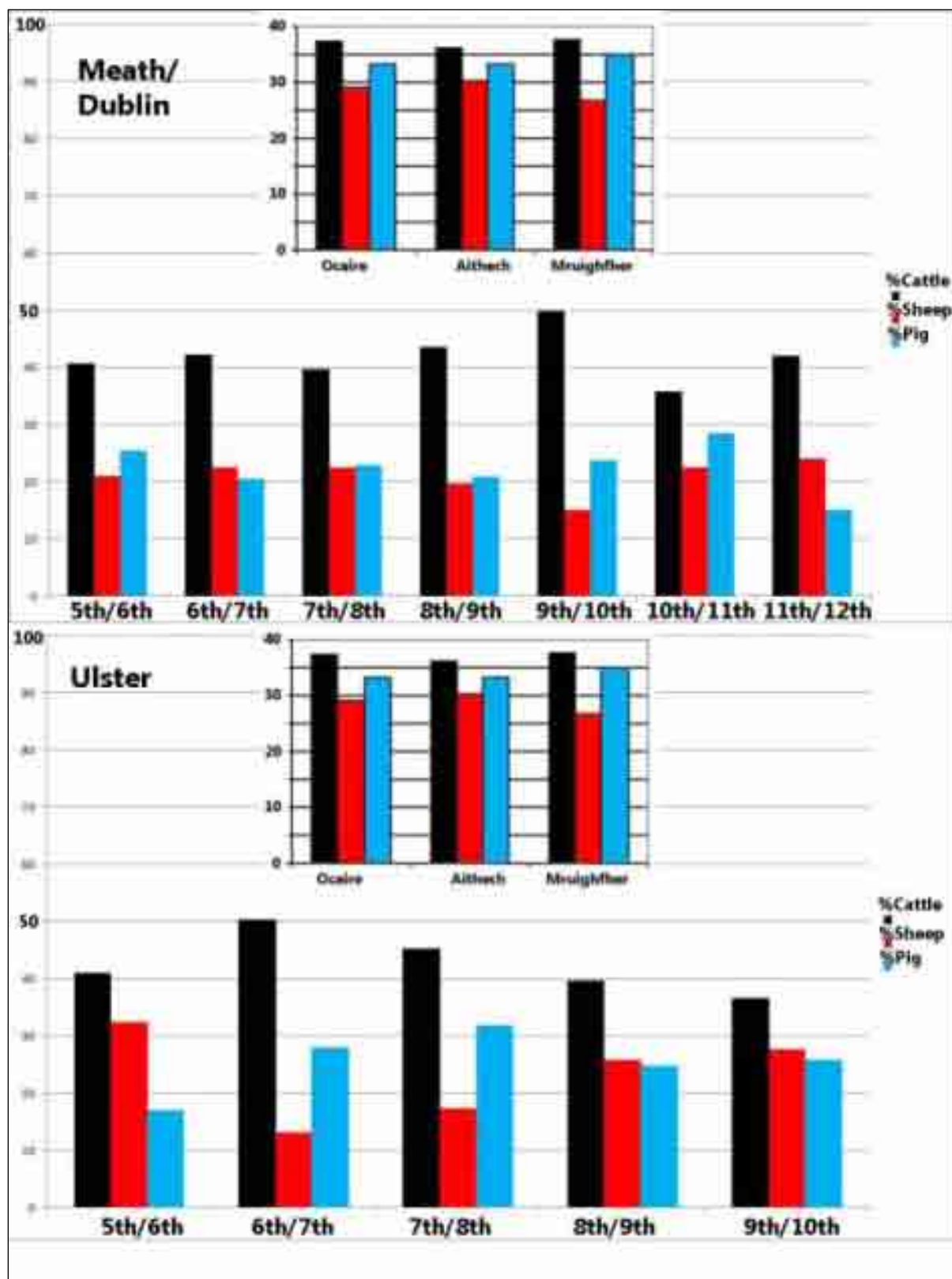


Fig. 3.19: Average MNI in Meath/Dublin and Ulster regions arranged chronologically with *Críth Gablach* inset for comparison.

None of the chronological MNI averages shown in Fig. 3.19 matches exactly with the *Críth Gablach* ideal since pig does not seem to be as well represented in the assemblages as the literature would indicate. The ranking order of quantity of livestock indicated in the *Críth Gablach*, i.e. cattle, pig, sheep, does however seem to be largely followed in the Meath/Dublin region, and is not really changed until the 11<sup>th</sup>/12<sup>th</sup> century. Ulster is a very different story, with the order of importance of livestock only following the *Críth Gablach* in the 6<sup>th</sup>/7<sup>th</sup> century and 7<sup>th</sup>/8<sup>th</sup> century. This may well be highly significant since the language of the *Críth Gablach* suggests that it was probably codified around the late-seventh/early-eighth century (MacNeill 1923, 271). Thus, when the *Críth Gablach* was being written down, its livestock requirements were reflected in the animal assemblages of both Meath/Dublin and Ulster. It has been argued that the movement away from this close correlation between the legal livestock requirements and the faunal remains may represent increasing regionalisation of the farming economy, with individuals focused on producing livestock suitable for the area, rather than adopting the material trappings of a hierarchical grade (McCormick and Murray 2007). The fact that the Meath/Dublin region still largely conforms to these hierarchical norms long after they have ceased to be relevant to Ulster or to the West, may also suggest a difference in the political structures, or aspirations of the inhabitants of these areas. This potential divergence in the farming economy and social reality between different regions in Ireland during the early medieval period may have wider implications for those regions which could not be studied in this manner. Although it is likely that the northwest would fall into the Ulster/West regional model, it is possible that southeast Ireland would be more similar to the Meath/Dublin model. It does, however, seem increasingly clear that a larger degree of regionality must be factored in when dealing with early medieval Ireland.

### (3): Do The Faunal Remains Indicate A Change in The Size of Domesticates in Ireland During The Early Medieval Period?

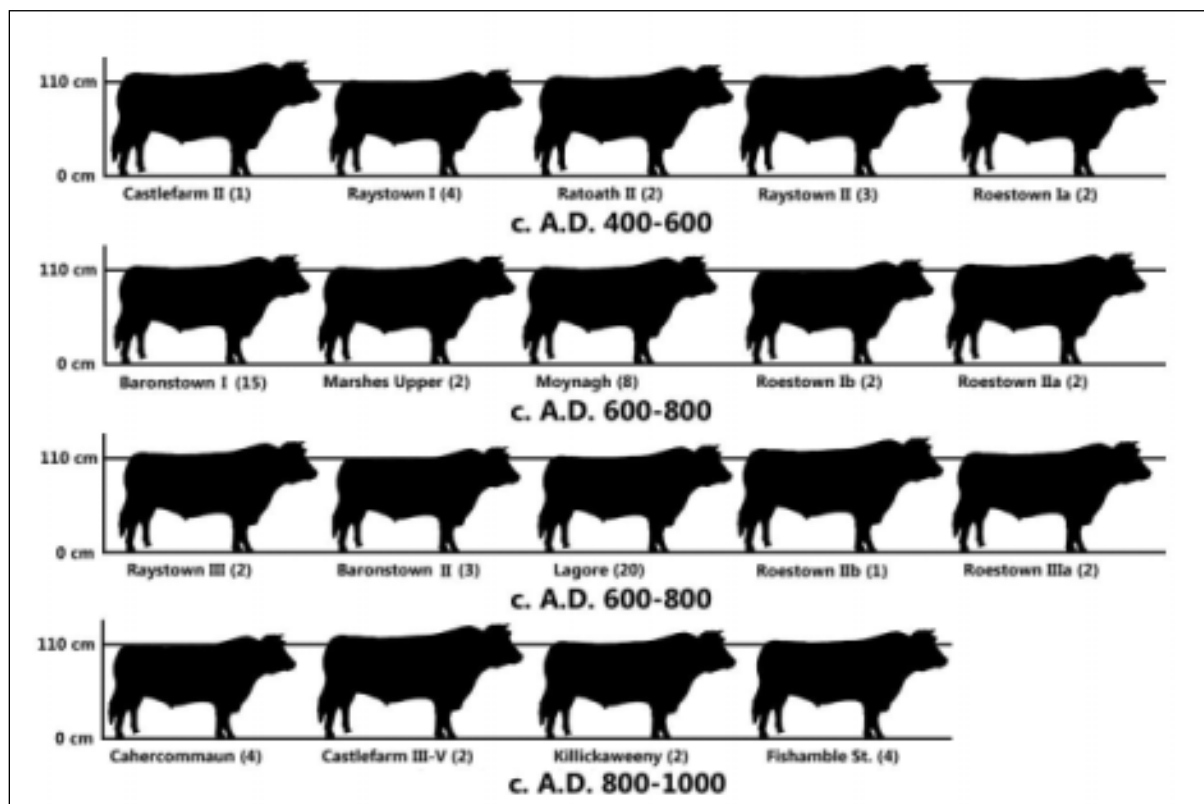
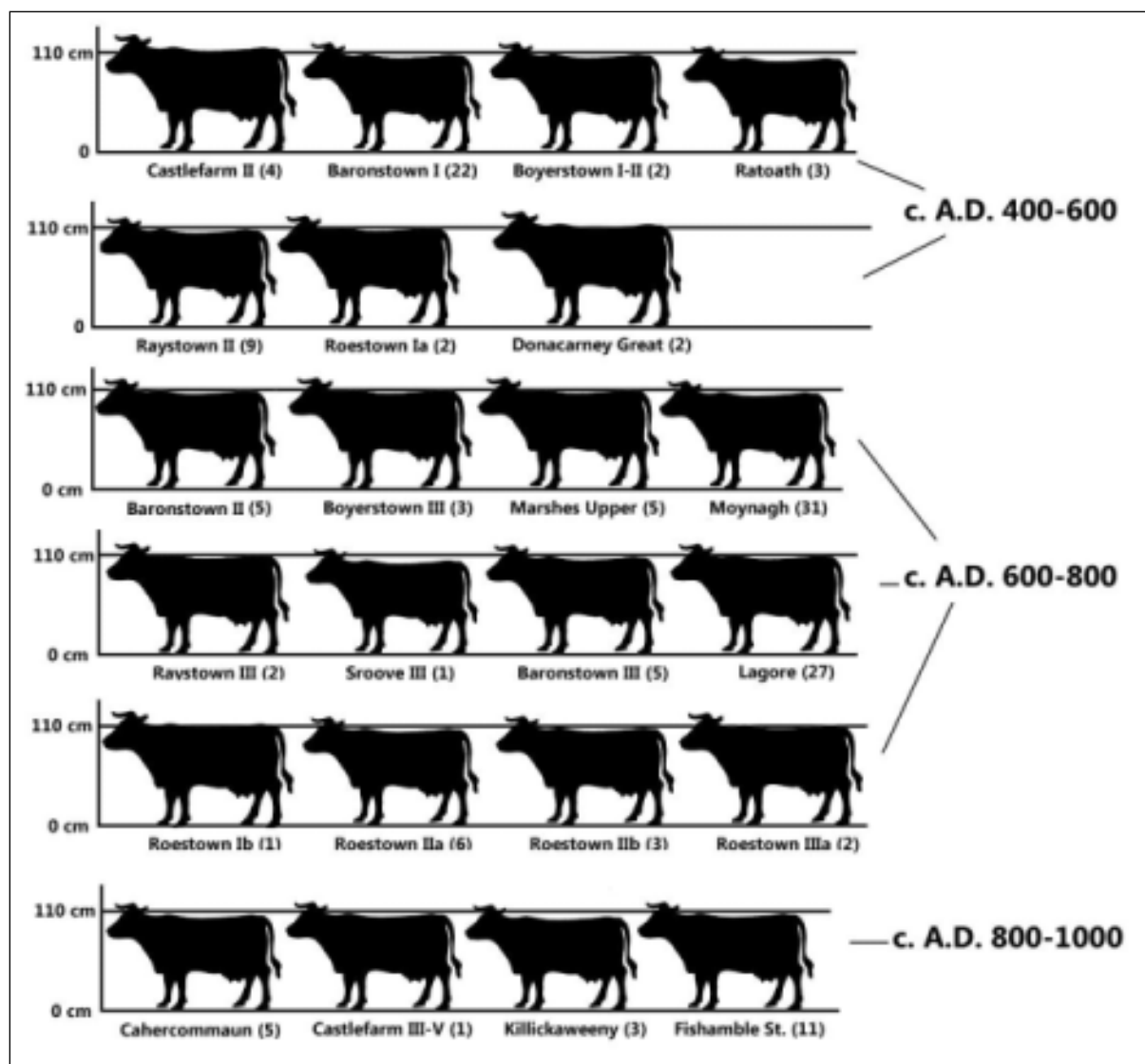


Fig. 3.20: Estimated withers heights of bulls.

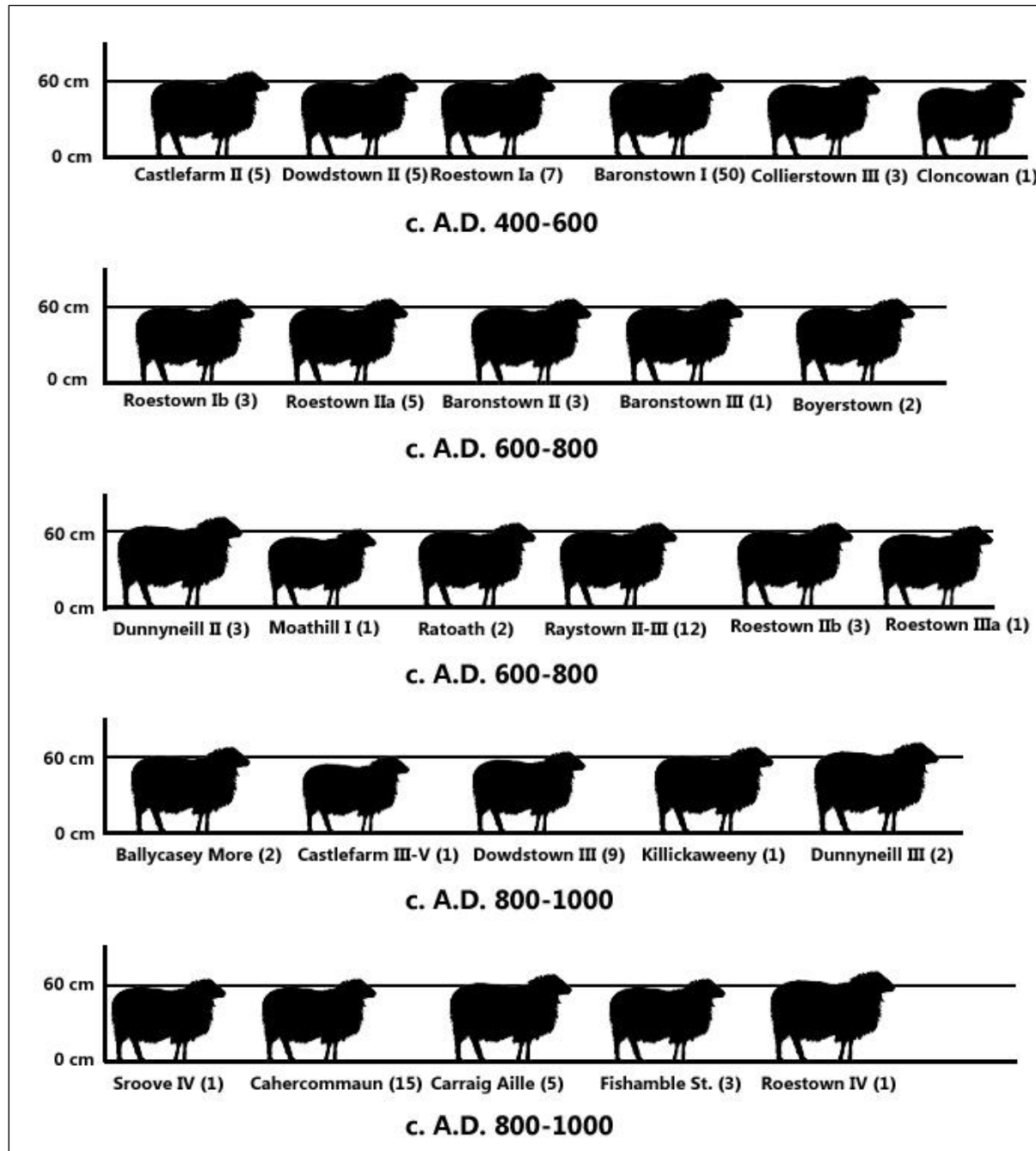


**Fig. 3.21: Estimated withers heights for cows.**

It has been shown by previous works that there is a difference in the stature of livestock from the prehistoric period through to the late medieval (e.g. Jewell 1962; O'Connor 2000, 118). Generally this takes the form of larger animals during the Bronze Age, smaller animals during the Iron Age/early medieval period, and then an increase in animal size again (e.g. Jewell 1962; Barker 1985, 30-31). The estimated withers height (also called the estimated shoulder height) of an animal is calculated by applying a multiplication factor developed by Fock (1966) (as detailed in von den Driesch and Boessneck (1974, 336)), to the 'greatest length' measurement of certain skeletal elements, usually metacarpals or metatarsals, but tibia are also used. Since sexual dimorphism is present in cattle, i.e. the males are larger and heavier than the females, it is important to sex the individual in order to compare estimated withers heights. It is possible to sex cattle by the comparing the ratios of breadth and length on a metacarpal (Higham 1969; Grigson 1982; Thomas 1988), which can also be used to produce an estimated withers height. When these criteria were applied to material from dateable phases it was found that 19 dateable phases produced estimated withers heights for bulls (Fig. 3.20), and 23 dateable phases produced estimated withers heights for cows (Fig. 3.21). These show very little, in any, variation in size over the early medieval period. Where there does appear to be greater variation, this is largely due to an individual sample, rather than a site/phase average, for example the large bull from Castlefarm phase II,



or the small cow from Sroove phase III. Similar work was done on the estimated withers heights of sheep (Fig. 3.22), however these individuals were not able to be sexed. As with cattle, the estimated withers heights of sheep show little variation throughout the early medieval period, and the three small sheep (Clancowan phase I, Moathill phase I, and Castlefarm phase III-V) are all single samples from the site/phase, and may relate to lambs/yearlings rather than mature sheep.



**Fig. 3.22: Estimated withers height for sheep.**

#### **(4): Can The Age/Death Pattern of The Cattle Bones be Related to Changes in Farming Practice?**

It is possible to estimate the age of death of an individual from various aspects of the faunal assemblage. This is generally referred to as the 'age of slaughter', although it is possible that some of these individuals died of natural causes rather than being killed for meat, for example the neo-natal piglets at Killyliss, Co. Tyrone (McCormick 1984, 29). The age of death is estimated either by toothwear or by the absence of fused epiphyses on the ends of bones. Toothwear patterns have been standardised for cattle, sheep and pigs by Higham (1967), Payne (1973; 1987) and Grant (1982). These guides may then be used to date individual teeth (preferably the third molar or M3) or mandibles. The benefit of this methodology is that teeth in a mandible obviously come from one individual, however teeth often survive where bone does not, leading in many cases to numbers of loose teeth being dated, and thus the possibility of replicating the data by recording elements from the same individual twice.

Epiphyseal fusion is used to estimate *survival* rates, rather than *death* rates. Fusion rates have been standardised by Silver (1969), for example the distal end of a cattle humerus usually fuses between 10 and 18 months, whereas the same element on a sheep is usually fused by 10 months. The benefit of using fusion data over tooth wear is that bones are more likely to be retrieved from excavation than loose teeth. There are, however, a number of problems with using epiphyseal fusion, not least of which is the probable replication of data. The accepted procedure splits the various skeletal elements into 'early', 'mid', and 'late' fusion groups which are then dealt with separately. Femurs, for example, are discussed in the 'late' fusion group where the ratio of fused to unfused are calculated. It is clear, however, that since cattle femurs fuse in the fourth year of life, an unfused femur may belong to anytime prior to this, and could equally be discussed in the 'early' or 'mid' fusion bracket. As such, it is necessary to treat these fusion bands as individual data sets (O'Connor 2000, 96), which enables cross-comparison between sites, but makes it rather difficult to create an age of slaughter profile for a single site based solely on the epiphyseal fusion record. Another major issue with dating by epiphyseal fusion rather than tooth wear is that the fusion record tends to emphasise the presence of younger animals. It becomes redundant once the animal has hit full physical maturity when all bones are fused, where tooth wear continues through the animal's life and thus allows the recognition of mature and elderly animals.

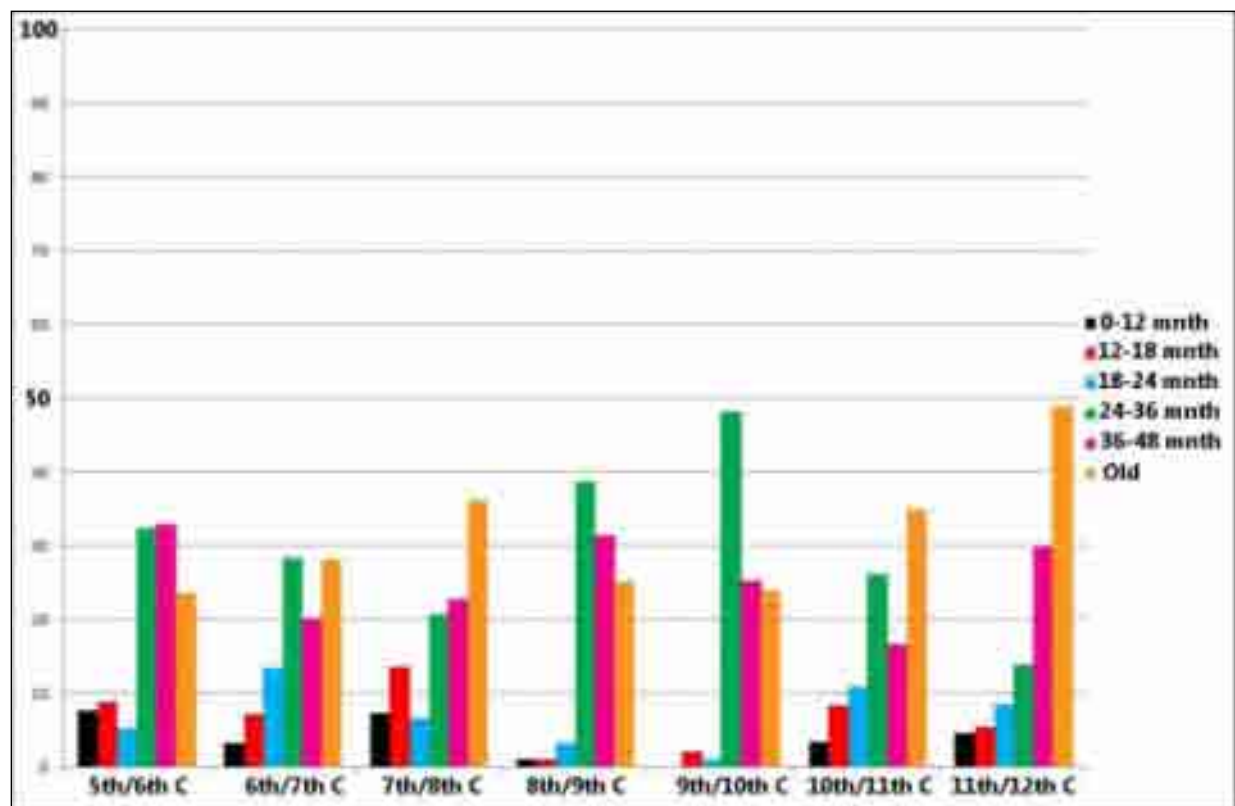
It may be possible to separate dairy herds from beef herds during the early medieval period in Ireland based on age of slaughter dates (McCormick 1983; 1992b). Contemporary literary sources and comparative anthropological/ethnological studies it is clear that the milch cow required the presence of her calf before she would let down her milk (McCormick 1992b, 202). For example the *Vita* of Saint Cainnech relates how, when a wolf ate a calf that was suckling on two cows, Cainnech compelled it to return every day at morning and evening milking and stand in the place of the calf. The cow licked the wolf as though it were her own calf and let down her milk (Heist 1965, 197-98). Where a local saint was not available to perform a miracle, a calfskin stuffed with straw was used to encourage the cow to lactate (Lucas 1989, 46). As such, early medieval dairy herds would probably not have killed calves before the winter of their first year, i.e. when they were between six months and nine months old.

There are 42 phases from 24 sites that produced a statistically valid sample of toothwear dates for cattle and that may be placed within an absolute chronological framework. These phases have been averaged by century (Fig. 3.23) and by tooth age (Fig. 3.24). It is clear from the toothwear data shown in Fig. 3.24, for example, that cattle deaths do not occur in substantial numbers until the animals reach their third year. This level of subtlety and precision is not reflected in the similar fusion data histogram (Fig. 3.26) which shows a lower survival rate for cattle into their third and fourth year than that for cattle in their earlier years. Based solely on the toothwear data, it would appear that dairying was widely practised in Ireland during the early medieval period, but that it may have been even more intensively practised in the 8<sup>th</sup>/9<sup>th</sup> and 9<sup>th</sup>/10<sup>th</sup> centuries, when the percentage of estimated cattle deaths of individuals under 24

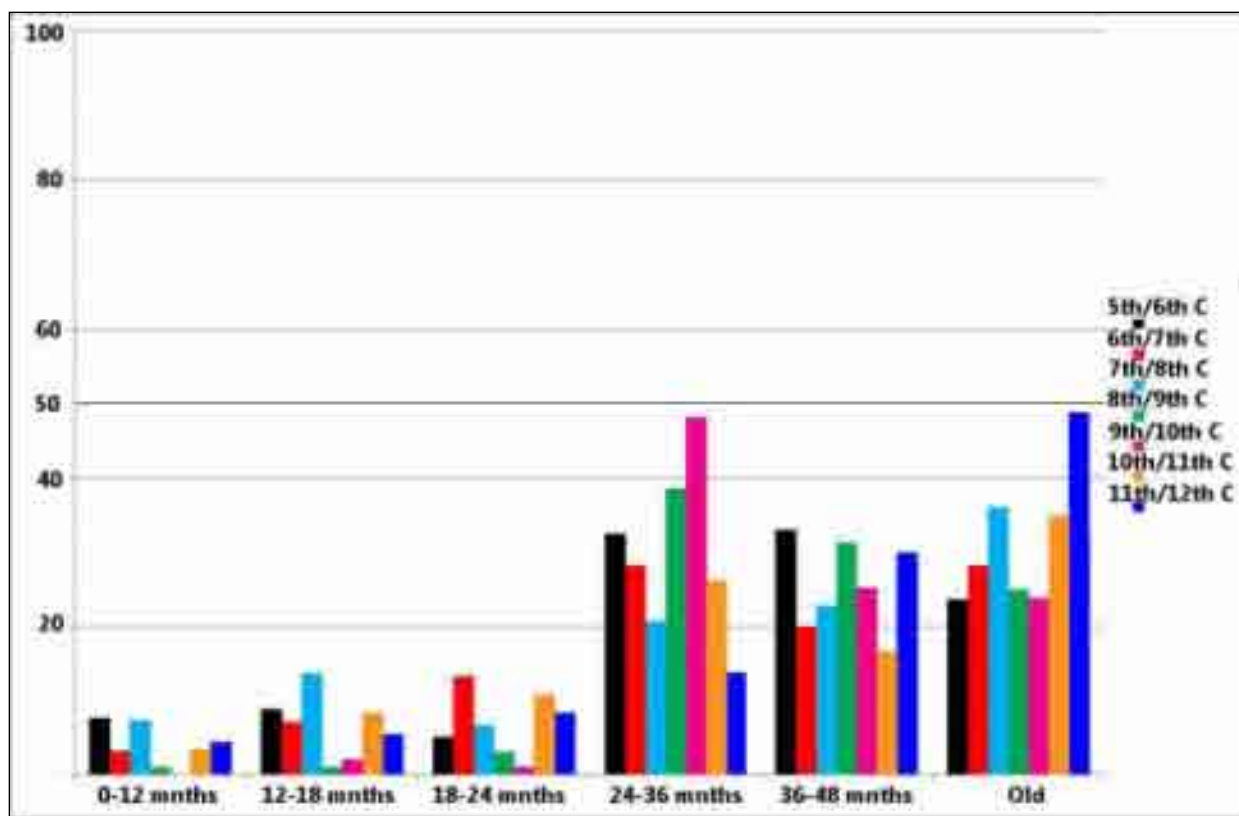
months old is extremely low (Fig. 3.23). These figures are, however, only based on five sites/phases, and only 20 of the 42 toothwear phases have any recorded toothwear from the first year of a calf's life.

It has also been argued that the age-slaughter pattern of an assemblage may be used to indicate whether a site is a producer/consumer or simply a consumer site (e.g. Payne 1973; Davis 1987). This argument is best represented in Ireland by cattle remains, since they have a longer life span than sheep, and is probably least relevant to pigs since they are bred solely for meat. In a 'production site' there would be a spread of ages represented including calves and immature cattle, whereas a site where cattle are consumed but not reared tends to be dominated by older animals (e.g. Soderberg 2003; McCormick and Murray 2007, 60). Faunal remains from urban excavations unsurprisingly reflect their position as consumption sites, for example Hiberno-Norse Dublin (McCormick & Murray 2007, 46) or Waterford (McCormick 1997), but a similar age-slaughter distribution was recognised at the major ecclesiastical site of Clonmacnoise, Co. Offaly, suggesting that the animals were not reared in the immediate vicinity (Soderberg 2003, 167-83; McCormick & Murray 2007, 209-17).

The toothwear data also suggests that a higher percentage of cattle were killed in old age at the start of the second millennium, than during the rest of the early medieval period. This ties in with the rise of urbanism during these centuries, and indeed the assemblages from the 10<sup>th</sup>/11<sup>th</sup> and 11<sup>th</sup>/12<sup>th</sup> centuries are heavily influenced by Dublin and Waterford, as well as by the 'monastic town' of Clonmacnoise and the 'emporium' of Dunneville (Fig. 3.27).



**Fig. 3.23: Average toothwear in cattle arranged by chronological bands.**



**Fig. 3.24: Average toothwear in cattle arranged by tooth age.**

A total of 47 dated phases from 29 sites produced a statistically valid sample of epiphyseal fusion dates for cattle and these have also been averaged by century (Fig. 3.25) and by fusion date (Fig. 3.26). These figures give survival rates, and seem to reflect some of the findings from the toothwear analysis, for example there is a high survival rate for young cattle in the 8<sup>th</sup>/9<sup>th</sup> century (Fig. 3.25), echoing the very low death rate for young cattle indicated by toothwear (Fig. 3.23). The equally low death rate for young cattle in the 9<sup>th</sup>/10<sup>th</sup> century, as indicated by toothwear, however, does not seem to be replicated by the epiphyseal fusion data, and similarly the clear increase in the percentage of older animals killed in the 11<sup>th</sup>/12<sup>th</sup> century is also not clearly defined by the fusion data. Thus, while toothwear estimates for age of death seem to support a dairying economy and an increasingly 'urban' environment (or at least the increasing presence of consumption sites), the fusion data is far more ambivalent.

While it seems clear that there is a general trend towards the emergence of more 'consumer' sites over the early medieval period, when the data for 'old' cattle is reviewed on an individual site basis (Fig. 3.27) it seems that there are some interesting trends. Unsurprisingly the Hiberno-Norse sites of Waterford and Dublin are included in Fig. 3.27, as well as the 'monastic town' of Clonmacnoise and the 'emporium' of Dunnynneill, but a number of enclosure settlements in Co. Meath also have an age-slaughter pattern which seems to reflect 'urbanism'. Thus sites like Baronstown, Roestown, Dowdstown and Ratoath all produced animal consumption assemblages which bear close similarity in their ageing structure to the more accepted urban or proto-urban centres.

When dealing with the MNI and NISP of species found in early medieval assemblages, it is evident that there is a strong regional element present in this material. This is represented in Figs. 2.28 and 2.29 which compare the epiphyseal fusion data from the Meath/Dublin region to that from the rest of the island. The lack of relevant sites with sufficient toothwear data meant that it was not possible to examine this on a regional basis.

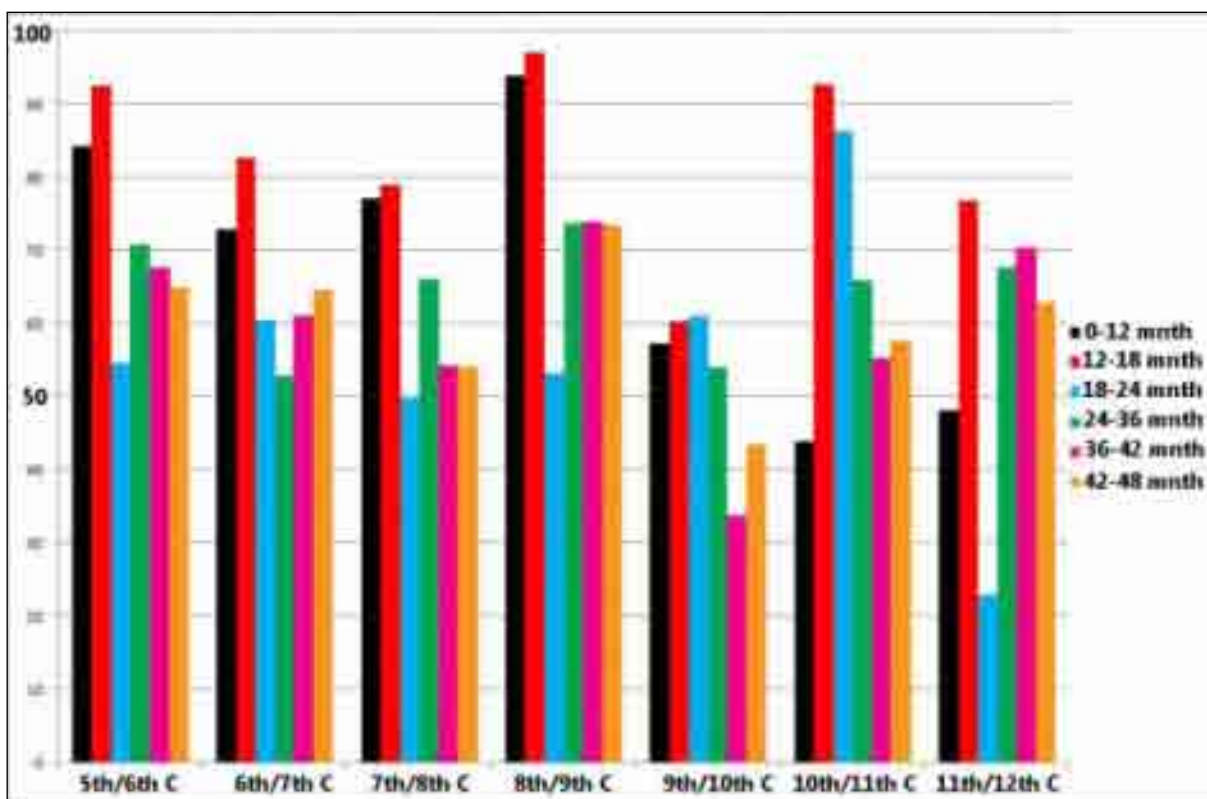


Fig. 3.25: Average epiphyseal fusion in cattle arranged by chronological bands.

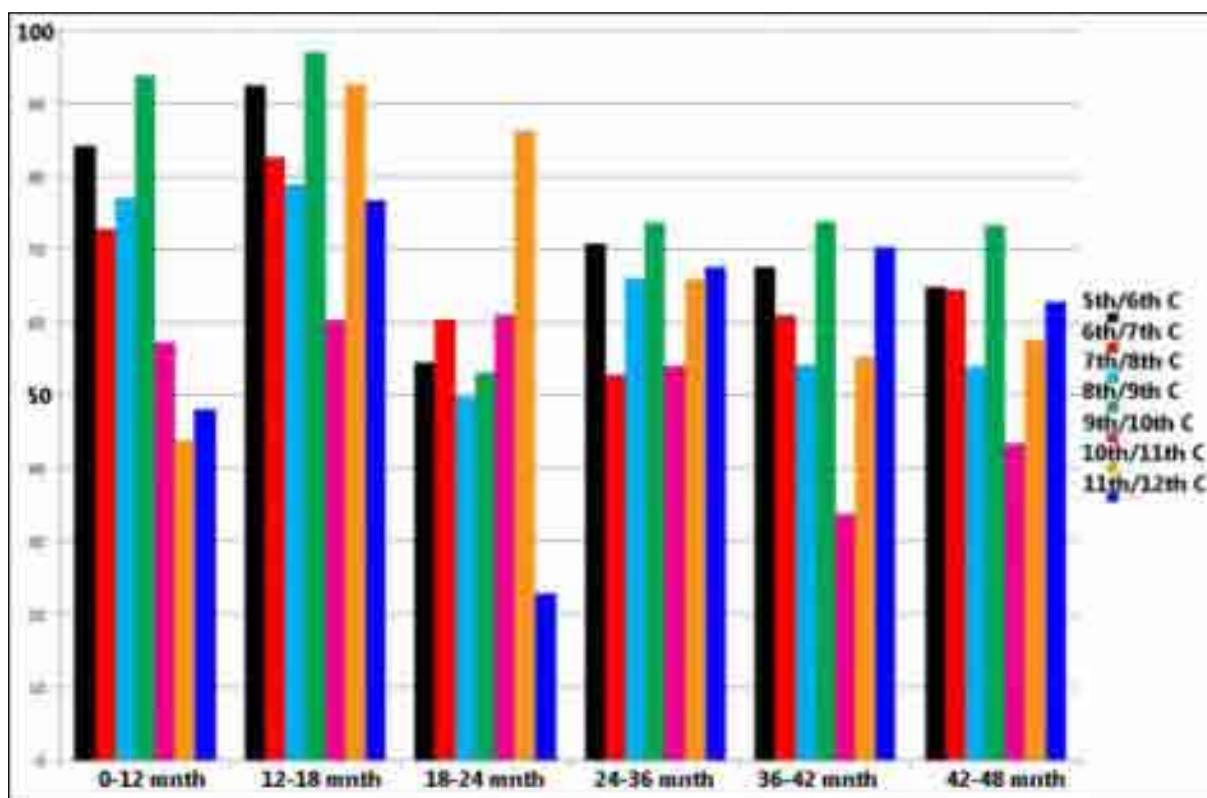
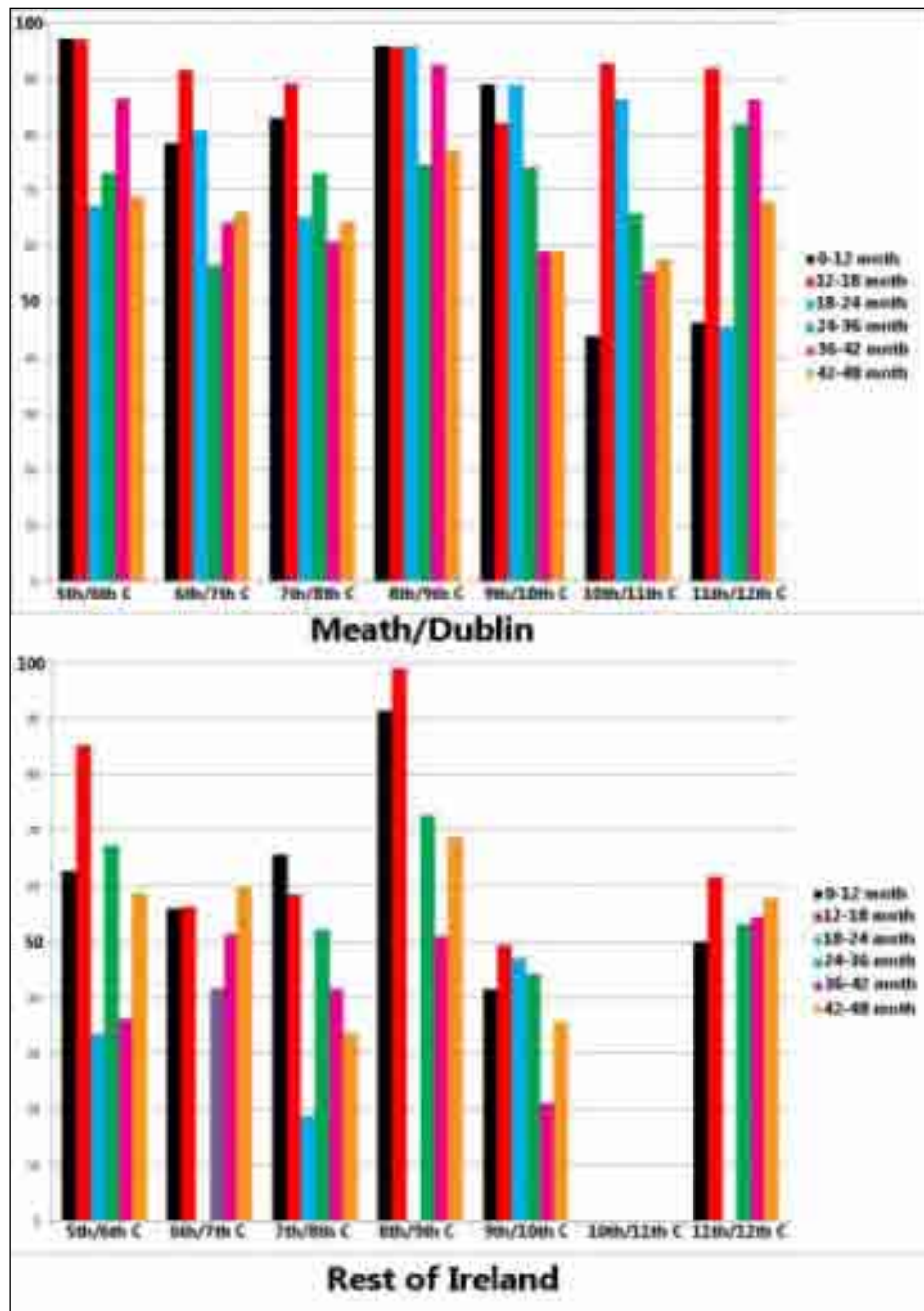


Fig. 3.26: Average epiphyseal fusion in cattle arranged by fusion age.

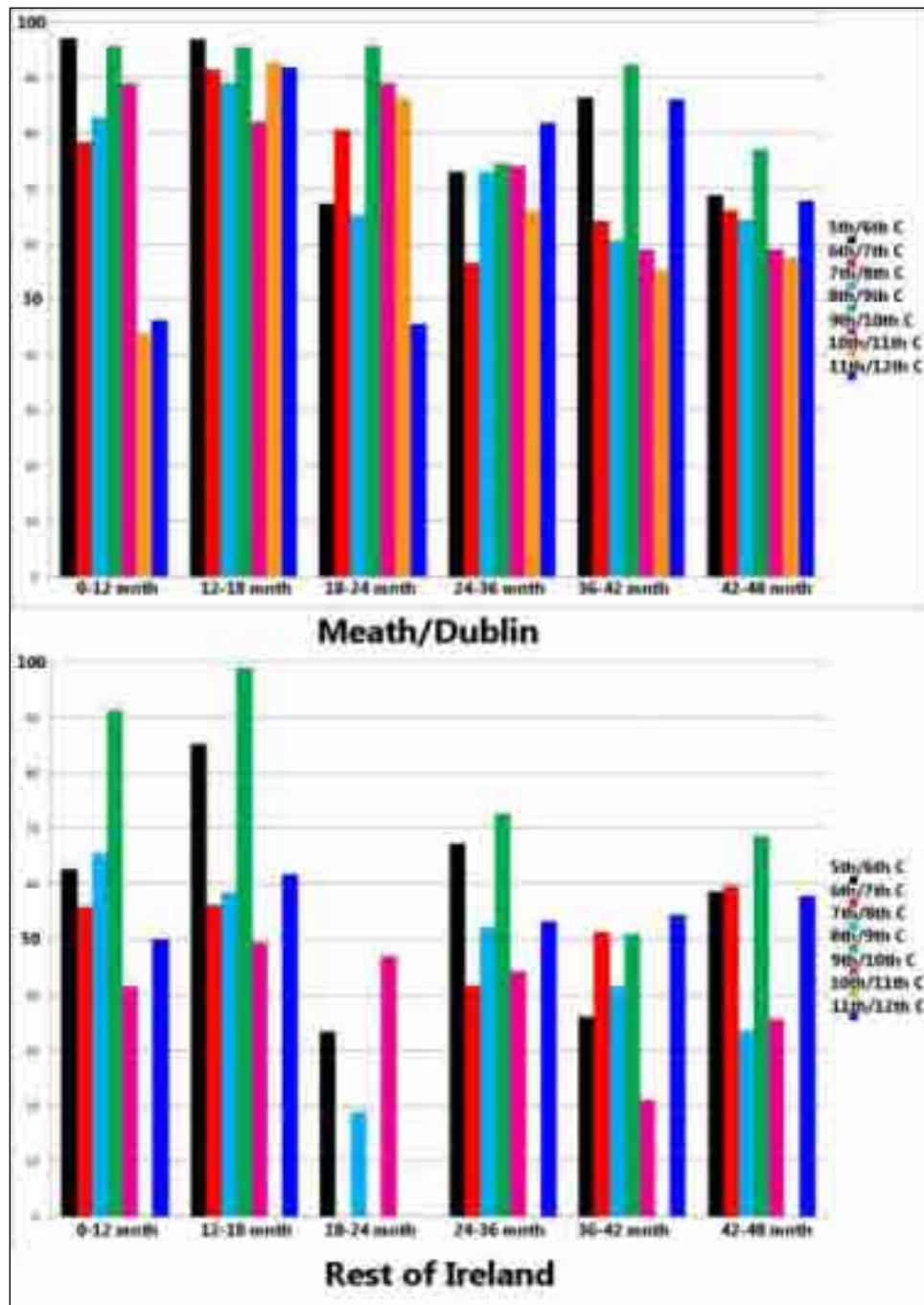




**Fig. 3.28: Average epiphyseal fusion in cattle arranged by region and chronological bands.**

The Meath/Dublin data in Fig. 3.28 falls into three main phases – the 5<sup>th</sup>/6<sup>th</sup> century through to the 7<sup>th</sup>/8<sup>th</sup> century; the 8<sup>th</sup>/9<sup>th</sup> and 9<sup>th</sup>/10<sup>th</sup> century; and the 10<sup>th</sup>/11<sup>th</sup> and 11<sup>th</sup>/12<sup>th</sup> century. The early phase is marked by a high survival rate for young cattle (up to 18 months old), and a poor survival rate for older animals. This is further exaggerated in the middle phase, and by contrast the later phase appears to be signified by deaths in the first year of life and a higher relative proportion of older cattle. It is tempting to interpret the early phase as being indicative of milk production, perhaps hitting its apogee in the middle phase, whereas the third phase is more indicative of consumption sites, probably heavily influenced by the establishment of Viking Dublin during this period. The fusion data from the rest of Ireland is less coherent, although the 8<sup>th</sup>/9<sup>th</sup> century results mirror the assemblage proportions from the Meath/Dublin region at this time and is probably indicative of dairying.





**Fig. 3.29: Average epiphyseal fusion in cattle arranged by region and by fusion age.**

The impact of urbanism on the slaughter of cattle can be seen in Fig. 3.30. In the 11<sup>th</sup>/12<sup>th</sup> century, for example, the survival rate of cattle in their third year and older in the Meath/Dublin region falls in the 70%-80% range, whereas outside this region it is in the 50%-60% range. The higher death rate among old cattle in the 11<sup>th</sup>/12<sup>th</sup> century is also graphically depicted in the toothwear analysis (Figs. 3.23 and 3.24). Interestingly the highest rates of survival in older cattle are found in the 8<sup>th</sup>/9<sup>th</sup> century, in both the Meath/Dublin region and the rest of Ireland, although this is not replicated in the toothwear patterns. These centuries coincide with some of the most complex phases of settlement at sites like Dowdstown and Baronstown in Co. Meath, and may be another indicator of the consumer-driven focus that a number of these sites appear to have had.



## (5): Can The Age/Death Pattern of The Sheep Bones be Related to Changes in Farming Practice?

Unlike pigs, which are only fully utilised upon death, sheep and cattle both provide valuable by-products while still alive. Both can provide milk, which then may be processed in various ways, but sheep also provide an annual harvest of wool. It has been argued that a predominance of juvenile animals may indicate that sheep were being raised for meat; whereas an abundance of older animals may indicate the importance of these secondary products to the farming economy (Davis 1987, 158). This increase in older animals is seen most especially from the 9<sup>th</sup>/10<sup>th</sup> century onwards in Fig. 3.30, and a gradual movement away from young deaths is noticeable in Fig. 3.31. The toothwear data suggests that there was a change in sheep farming in the early medieval period, which consisted in animals being kept alive longer. This may possibly be connected with wool production, potentially to service demand in the new urban areas. Woollen textiles were undoubtedly created for domestic use, but there are also documentary records for export of these goods from Ireland, e.g. there is a reference in the *Liber Eliensis* (II.32) during the late-tenth century to 'traders from Ireland [who] landed at the little city which is called Cambridge with various wares and cloaks...' (Fairweather 2005, 130).

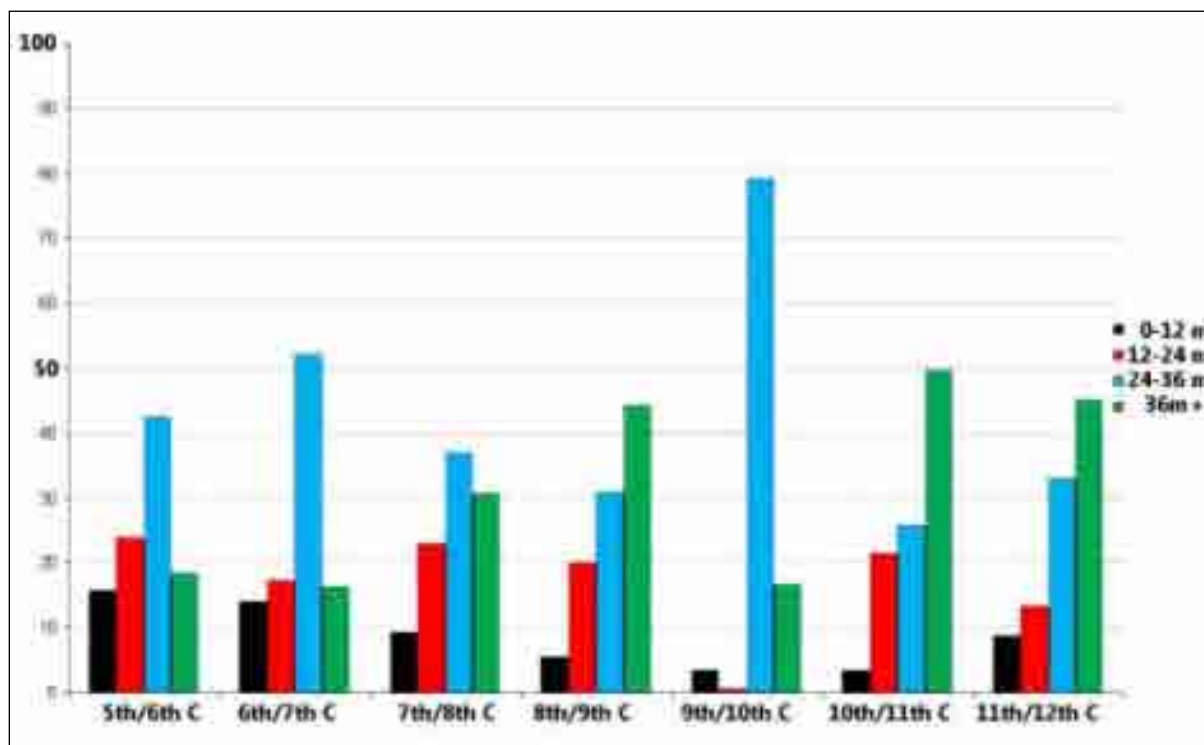
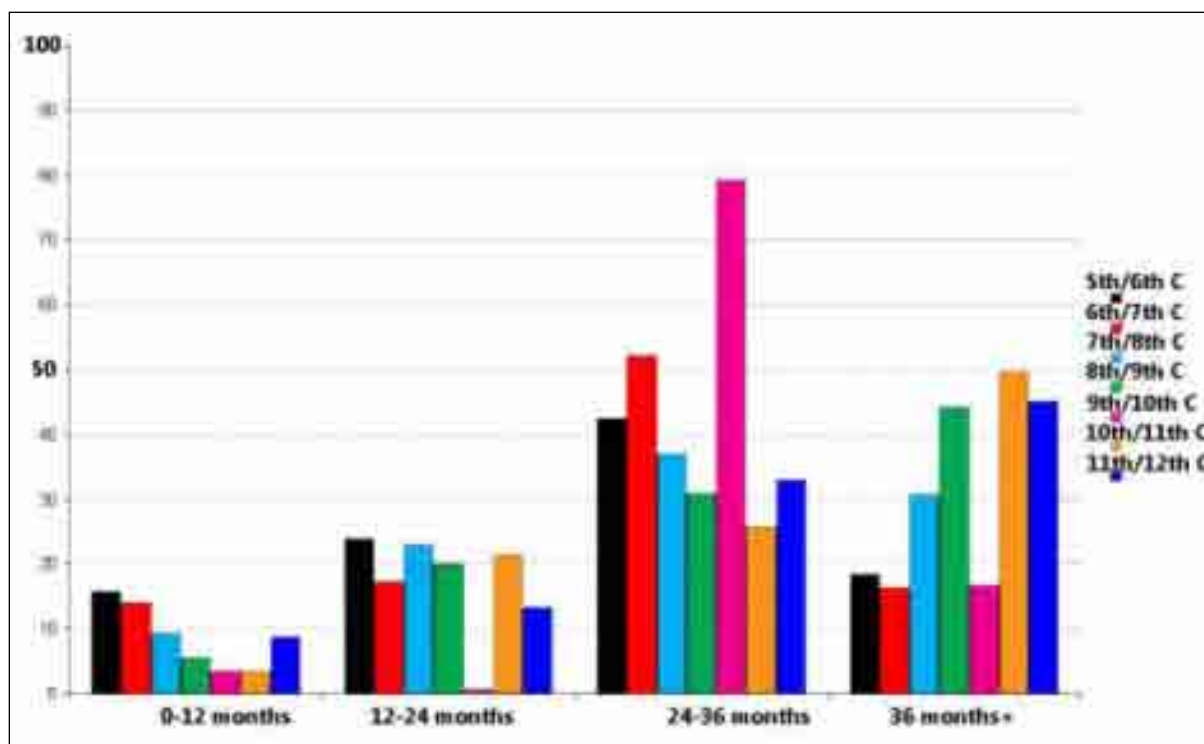


Fig. 3.30: Average toothwear in sheep arranged by chronological bands.



**Fig. 3.31: Average toothwear in sheep arranged by tooth age.**

## Discussion:

The faunal reports from early medieval excavations in Ireland have provided a vast amount of data about the farming economy and, potentially, the wider socio-economic and political frameworks. These data sets were interrogated and tested for five main hypotheses:-

- (1): Do the faunal remains indicate a change in the composition of the farming economy in Ireland during the early medieval period?
- (2): Do the faunal remains indicate a regional pattern in the farming economy in Ireland during the early medieval period?
- (3): Do the faunal remains indicate a change in the size of domesticates in Ireland during the early medieval period?
- (4): Can the age/death pattern of the cattle bones be related to changes in farming practice?; and
- (5): Can the age/death pattern of the sheep bones be related to changes in farming practice?

The excavations undertaken prior to major infra-structural works in the 2000s have facilitated the study of the zooarchaeology of early medieval Ireland. The major early medieval excavations from this decade, however, were predominantly focused along the routes of motorway projects, and thus faunal reports from the M3 excavations in Co. Meath, and the M6 excavations in Co. Galway, show a heavy preponderance. These reports now substantially outnumber the faunal reports from counties Antrim and Down which formed the bulk of the corpus of scientific reports since the 1970s, and which have heavily influenced discussion on the archaeological evidence for early medieval farming for at least three decades. The impact of the motorway excavations, however, has been less important in the south-east and south-west of Ireland, through a mixture of smaller numbers of roadworks and an underlying geology that was adverse to bone survival. Although some small bone samples were recorded from these areas, they were generally too small to be statistically valid, and could not be used to draw further conclusions. There is, therefore, a sample bias towards counties Meath, Galway, Antrim and Down, which creates inherent problems in any interpretation of the faunal remains.

While the average faunal report from Ireland as whole does not show a great deal of change *c.* A.D. 400 to *c.* A.D. 1100, there are clear differences evident when the reports are re-examined on a regional basis. The samples from counties Meath and Dublin show a reasonable continuation of farming practice, as indicated by the death assemblages. The relative proportions of the three major domesticates from this area appears to correlate with the livestock requirements found in early Irish law tracts, such as the *Críth Gablach*. While there is a similar correlation with the *Críth Gablach* in Ulster and the West during the seventh and eighth centuries, it appears that this represents an interruption of the farming economy in the West and in Ulster during these centuries. In earlier, and later, centuries the death assemblages from sites in these areas suggest that livestock were reared on a regional suitability basis, rather than in accordance with the rather artificial requirements of the *Críth Gablach*. The existence of regional trends in the livestock assemblages may be explained by both socio-economic and political factors. It is not surprising that different parts of the island of Ireland had different priorities in livestock farming, since that is the nature of farming today. Thus areas which produce good grasslands, like modern Co. Meath, are more suitable to cattle-raising than areas which are dominated by upland grazing or bogs. The fact that there was an apparent attempt to create a uniform farming economy during the seventh and eighth centuries is a testimony to the strength of the social hierarchies at this time. Whether the requirements of the *Críth Gablach* were ever more than a legal fiction, or whether they were actually achieved in the other Irish provinces during this time is a moot point, but there does seem to be a reversion to regionalism from the ninth century onwards. This may be related to a movement away from the socio-political order ordained in the *Críth Gablach*, or it may be related to the economic realities that different soils have differing livestock potential. The similarities between the livestock patterns in Meath and Dublin throughout these centuries may then reflect either the continuation of the socio-political hierarchies here, as opposed to further north and west, or it may equally reflect the most efficient stocking strategy for this area.

The age-death patterns in sheep suggest a shift away from treating sheep primarily as a producer of meat, to treating sheep as a producer of wool (and probably milk), with meat almost as a secondary product. This is supported by the fact that the meat from sheep is most regularly referred to as coming from *muilt*, or wethers (i.e. castrated males), perhaps indicating that the females were retained for breeding, milking and shearing. The movement towards a sheep-dominated economy is most clearly seen in Ulster and the west of Ireland, but there is a general island-wide trend towards older animals, suggesting that wool production became increasingly important in all regions through the early medieval period.

The age-death patterns in cattle produced mixed results. This data was produced from both toothwear analysis, which records age of death of the animal, and epiphyseal fusion dates, which deal with survival rates. As such there is a dichotomy between what these results are actually recording. Toothwear is possibly weaker at identifying juvenile deaths than the fusion data, but is better at identifying death ages for adult/mature cattle. This has implications on attempts to identify dairying through the age-slaughter patterns. While there are very clear markers for low death-rates among young cattle in the toothwear, the fusion data has nowhere near as clear a pattern. Both toothwear and fusion data, however, give similar signals when dealing with older cattle (although the subtleties may be obfuscated between these two methodologies). These generally indicate that cattle are killed at a later age in the latter centuries of the early medieval period than they were in the earlier part. This has been taken to imply that the occupants of this site were largely end-consumers, rather than producers, of the meat from the older cattle. When these sites are subject to more close investigation it seems that, unsurprisingly, they are heavily influenced by urban sites (Dublin and Waterford), as well as the 'monastic town' of Clonmacnoise. The 'emporium' at Dunnyneill also falls within this bracket (although with a very small sample), as well as the possible high status site of Knowth. This pattern is also partially reflected in the 8<sup>th</sup>/9<sup>th</sup> century. This period is largely pre-Viking and so would traditionally be considered as being pre-urban. Fusion data from the high status site of Clogher gives a fusion survival rate of 41% for older animals, but this is dwarfed by the figures from sites like Baronstown (80%), Castlefarm (73%) and Roestown (77%). The fusion data for older animals is replicated in the toothwear analysis where the percentage of cattle over four

years old killed at both Baronstown and Roestown is 37.5%, while Dowdstown numbers 45.5%. This can be compared to the figure of 48.1% achieved from the faunal remains at Clonmacnoise at the same time. These results stand in sharp contrast to figures of 23.8%, 12% and 18.2% from early phases at Dowdstown, Collierstown and Raystown. It seems probable, therefore, that the age-slaughter signal from these settlement enclosures in Co. Meath at this time may be representative of a greater than expected number of end-consumers. These settlement complexes show evidence for multiple phases, spanning many centuries, and in some cases are the foci for burials. The role and function of these sites is still a matter for debate (e.g. Kinsella 2010), however the phase complexity, burial activity, and now the age-slaughter signal of a number of these sites suggests that they may represent some form of clustered settlement, or 'proto-village'.

The major findings from the study of faunal remains in early medieval Ireland are a strong element of regionalism in the farming landscape, and the identification of possible 'proto-urban' sites. Both of these findings require further research to corroborate these results, but, if valid, they have profound implications in the study of early medieval Ireland.

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## **Aghaloo Church, Rousky, Co. Tyrone**

Grid Ref: **26633/35493**

SMR No: **TYR 060:016**

Reference: **Carver 2007; Plunkett 2007**

Aghaloo church and an associated D-shaped graveyard are situated on the top of a drumlin at a height of approximately 100m OD, commanding views in all directions. Archaeological investigations were carried out in a field approximately 50m to the north-east of the church in advance of the installation of a slurry tank.

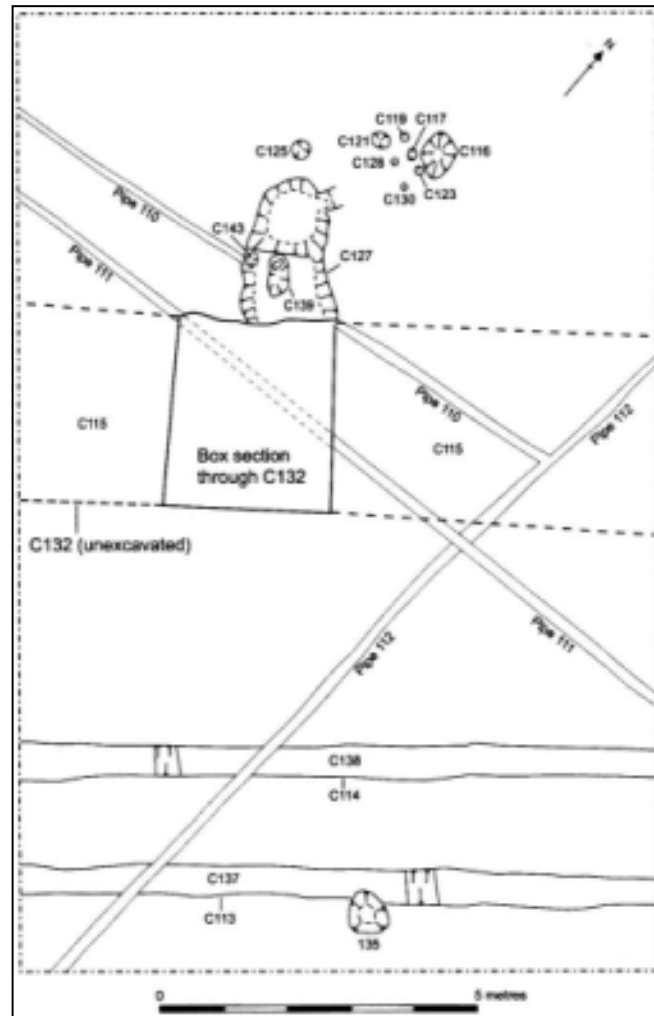
Three main phases of activity were identified. Phases 1 and 2 were radiocarbon dated to the early medieval period (6<sup>th</sup> to 7<sup>th</sup> centuries). Phase 1 was represented by a drying kiln (C.127), a group of post- and stake-holes, as well as a pit (C.116). The kiln was somewhat disturbed, but is thought to have originally been dumbbell-shaped. During Phase 2, a linear field boundary (C.132) was cut into the drying kiln. A 2m-wide cutting was excavated across the linear field boundary to ascertain its character and date, and a small-scale geophysical survey was also carried out to define the wider limits of the linear cut. Phase 3 consisted of later agricultural activity, such as furrows and pits, probably constructed over a period of several hundred years, during which time the linear cut was deliberately in-filled with clay, and a deposit of clay was also spread over the site.

The drying kiln contained a fragment of possible hearth ceramic. Small quantities of slag remains were found elsewhere, suggesting that metalworking was taking place in the vicinity of the site. Charred cereal remains (predominantly oat) were found in kiln deposits and elsewhere. Occasional small fragments of unidentifiable calcined bone were also recorded in early medieval deposits.

### **Plant remains**

Analysis of 10 deposits provided evidence for a large charred plant remains assemblage. A total of 4497 cereal grains, 8 cereal chaff fragments, 3 hazelnut shell fragments and 31 weed seeds were recorded. Fruit remains were absent.

Cereal remains were recorded in different phases of activity. A variety of crops was present, including oat, hulled barley, naked barley, six-row barley and wheat. The weed remains may represent arable weeds and plants that were growing locally.



**Plan of excavations at Aghaloo Church (after Carver 2007, 84)**

### Radiocarbon dates

Reimer, P.J., Baillie, M.G.L., Bard, E., Bayliss, A., Beck, J.W., Bertrand, C.J.H., Blackwell, P.G., Buck, C.E., Burr, G.S., Cutler, K.B., Damon, P.E., Edwards, R.L., Fairbanks, R.G., Friedrich, M., Guilderson, T.P., Hogg, A.G., Hughen, K.A., Kromer, B., McCormac, G., Manning, S., Bronk Ramsey, C., Reimer, R.W., Remmele, S., Southon, J.R., Stuiver, M., Talamo, S., Taylor, F.W., van der Plicht, J. & Weyhenmeyer, C.E. 2004. IntCal04 terrestrial radiocarbon age calibration, 0–26 cal kyr BP. Radiocarbon, 46, 1029–58.

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
UB-7186	Phase 1: Cereal grain from Pit C.116	1503±32 BP	A.D. 436–489; <b>A.D. 530–639.</b>
UB-7187	Phase 1: Cereal grain from Kiln C.127	1452±33 BP	<b>A.D. 556–651.</b>

### Overview

- Phase 1: Kiln and associated features (9 deposits)
  - Large quantity of cereal grains (predominantly oat, with smaller quantities of barley and occasional wheat).
  - Occasional cereal chaff, hazelnut shell fragments and weed seeds.
- Phase 2: Field boundary (1 deposit)

- Significant quantity of cereal grains (predominantly oat, with smaller quantities of barley).

Phase	Cereal (grain)	Cereal (chaff)	Hazelnut (shell frag)	Weed (seed)	Date
<b>Phase 1: Kiln and associated features</b>	4238	8	3	31	A.D. 436–489; <b>A.D. 530–639.</b> <b>A.D. 556–651.</b>
<b>Phase 2: Field boundary</b>	259				

#### Overview of all plant groups (total deposits n=10)

Phase	Oat (grain)	Barley (grain)	Wheat (grain)
<b>Phase 1: Kiln and assoc. features</b> (n=3818)	77.55%	22.21%	0.24%
<b>Phase 2: Field boundary</b> (n=236)	75.42%	24.58%	0.00%

#### Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	Six-row naked barley (grain)	Six-row hulled barley (grain)	Naked barley (grain)	Hulled barley (grain)	Six-row barley (grain)	Barley (grain)
<b>Phase 1: Kiln and associated features</b>	2961	17	81	86	304	35	325
<b>Phase 2: Field boundary</b>	178	3	1	10	9	2	33

#### Detail of oat and barley remains

Phase	Wheat (grain)	cf. Wheat (grain)	Barley/Wheat (grain)	Wheat/Rye (grain)	Indet. cereal (grain)	Indet. cereal (twisted awn)	Indet. cereal (lemma)
<b>Phase 1: Kiln and associated features</b>	9	1	6	1	412	1	7
<b>Phase 2: Field boundary</b>				1	22		

#### Detail of wheat and indeterminate cereal remains

Phase	Phase 1: Kiln and associated features	Phase 2: Field boundary
<b>Pink family</b> (seed): Caryophyllaceae	1	
<b>Redshank</b> (achene frag): <i>Persicaria maculosa</i>	13	
cf. <b>Small water-pepper</b> (achene): <i>Persicaria cf. minor</i>	5	
<b>Knotgrasses</b> (achene): <i>Polygonum</i> spp.	7	
<b>Docks</b> (achene): <i>Rumex</i> spp.	3	
<b>Dead-nettle family</b> (nutlet): Lamiaceae	1	
<b>Ribwort plantain</b> (seed): <i>Plantago lanceolata</i>	1	

#### Detail of weed remains

## **Ballybrowney Lower (Site 1), Co. Cork**

Grid Ref: **179146/090645**

SMR No: **N/A**

Reference: **Cotter 2005; Cotter 2006; Akeret & Jacques 2006**

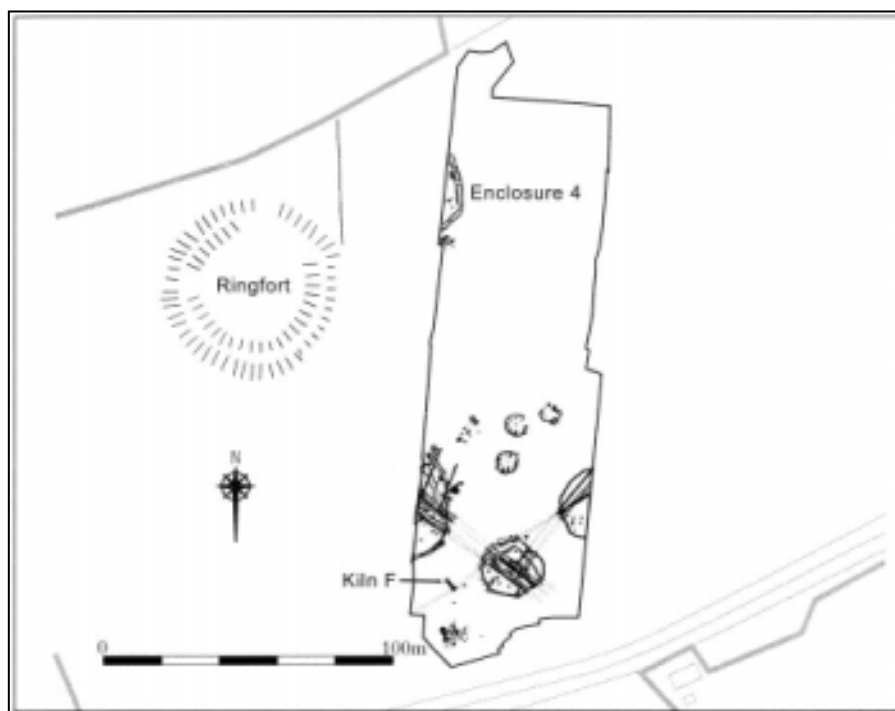
Archaeological investigations were carried out at Ballybrowney Site 1 in advance of construction of the N8 Rathcormac to Fermoy bypass. Multi-period activity was uncovered. A Bronze Age settlement complex contained three circular enclosures and three unenclosed circular houses (Phases 1–2). The site appears to have been abandoned during the Late Bronze Age to Early Iron Age period (Phase 3). During the Late Iron Age to early medieval period (Phase 4), an enclosure (Enclosure 4) and a kiln (Structure F) were constructed. An unexcavated enclosure was also located nearby. Phase 5 included undated ditches, perhaps constructed during the medieval period, while Phase 6 represented 18<sup>th</sup> to 19<sup>th</sup> century ditch and drain construction.

Only the south-east corner of Enclosure 4 was excavated. Geophysical survey of the adjacent area outside the road-take suggested that the sub-rectangular enclosure measured approximately 40m x 32m in extent. Two radiocarbon dates indicated that Enclosure 4 was occupied during the Late Iron Age and early medieval periods, although it is thought that the earlier Late Iron Age radiocarbon date (Beta-201052; 1800±40 BP) may be residual, and the enclosure dates only to the early medieval period (6<sup>th</sup> to 9<sup>th</sup> century). Fragments of iron slag were recovered from the enclosure ditch, suggesting that iron-smelting activities took place in the vicinity. Cereal remains (predominantly oat) were recovered from the enclosure ditch and kiln. Kiln F was keyhole-shaped (radiocarbon dated to 7<sup>th</sup> to 8<sup>th</sup> century) and was located towards the southern end of the site. A possible dumbbell-shaped kiln (Structure G) was also located to the north, although this kiln was undated.

### **Plant remains**

Analysis of three deposits provided evidence for several hundred charred cereal grains, as well as charred weed seeds. The exact quantities of remains were not recorded in most cases – comments on general ubiquity were instead provided, which have been noted below. Cereal chaff, hazelnut shell and fruit remains were absent.

A variety of cereals was present, including oat and hulled barley. The weed seeds are likely to represent plants that were growing locally, or perhaps plants growing alongside the cereals.



**Figure: Plan of excavations at Ballybrowney Lower, Site 1 (after Cotter 2005, 40)**  
**Radiocarbon dates**

Reimer, P.J., Baillie, M.G.L., Bard, E., Bayliss, A., Beck, J.W., Bertrand, C.J.H., Blackwell, P.G., Buck, C.E., Burr, G.S., Cutler, K.B., Damon, P.E., Edwards, R.L., Fairbanks, R.G., Friedrich, M., Guilderson, T.P., Hogg, A.G., Hughen, K.A., Kromer, B., McCormac, G., Manning, S., Bronk Ramsey, C., Reimer, R.W., Remmele, S., Southon, J.R., Stuiver, M., Talamo, S., Taylor, F.W., van der Plicht, J. & Weyhenmeyer, C.E. 2004. IntCal04 terrestrial radiocarbon age calibration, 0–26 cal kyr BP. Radiocarbon, 46, 1029–58.

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
Beta-203724	Phase 4: Charcoal from Enclosure 4 ditch	1330±70 BP	<b>A.D. 597–876.</b>
Beta-201043	Phase 4: Charcoal from Kiln F	1340±50 BP	<b>A.D. 604–778.</b>

### Overview

- Phase 4: Enclosure 4 (2 deposits)
  - Contained approximately 14 oat grains and one barley grain, as well as indeterminate cereal grains.
- Phase 4: Kiln F (1 deposit)
  - Contained several hundred oat grains and a smaller quantity of hulled barley grains
  - Weed remains also present.

Phase	Oat (grain)	Hulled barley (grain)	Barley (grain)	Indet. cereal (grain frag)	Wild radish (pod): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>	Date
<b>Phase 4: Enclosure 4</b>	P		1	P		<b>A.D. 597– 876.</b>
<b>Phase 4: Kiln F</b>	P	P			P	<b>A.D. 604– 778.</b>

### Detail of all plant groups (total deposits n=3)

P = present

**Ballyegan, Co. Kerry**Grid Ref: **09660/11100**SMR No: **KE039-023**Reference: **Byrne 1991; Monk *et al.* 1998.**

Excavation revealed the partial outline of the walls of a cashel, with associated internal structures and a souterrain. External features, for example an external corn-drying kiln, animal corral and field boundaries, were also discovered.

The cashel was roughly sub-circular in plan and had internal dimensions of 30m x 35m. No evidence of a formal entrance was discovered, although it was suggested that the remains of a cobbled surface in the south-east area of the site may indicate the location of the original entrance. The fragmentary remains of five possible structures were uncovered in the interior. Four were identified by the remains of truncated stake- and postholes; the fifth was identified by the remains of a stone wall with an associated hearth. Extensive disturbance made it impossible to establish the size and shape of these structures.

An L-shaped stone-lined souterrain containing two levels and linked to a natural cave was revealed inside the cashel. The remains of an articulated horse skeleton were recovered from collapsed material of one of its chambers, and a type of iron ploughshare dated to the tenth century was recovered in the basal backfill layer of the souterrain passage. Two of the internal structures were truncated by the souterrain, while one of them post-dated its construction.

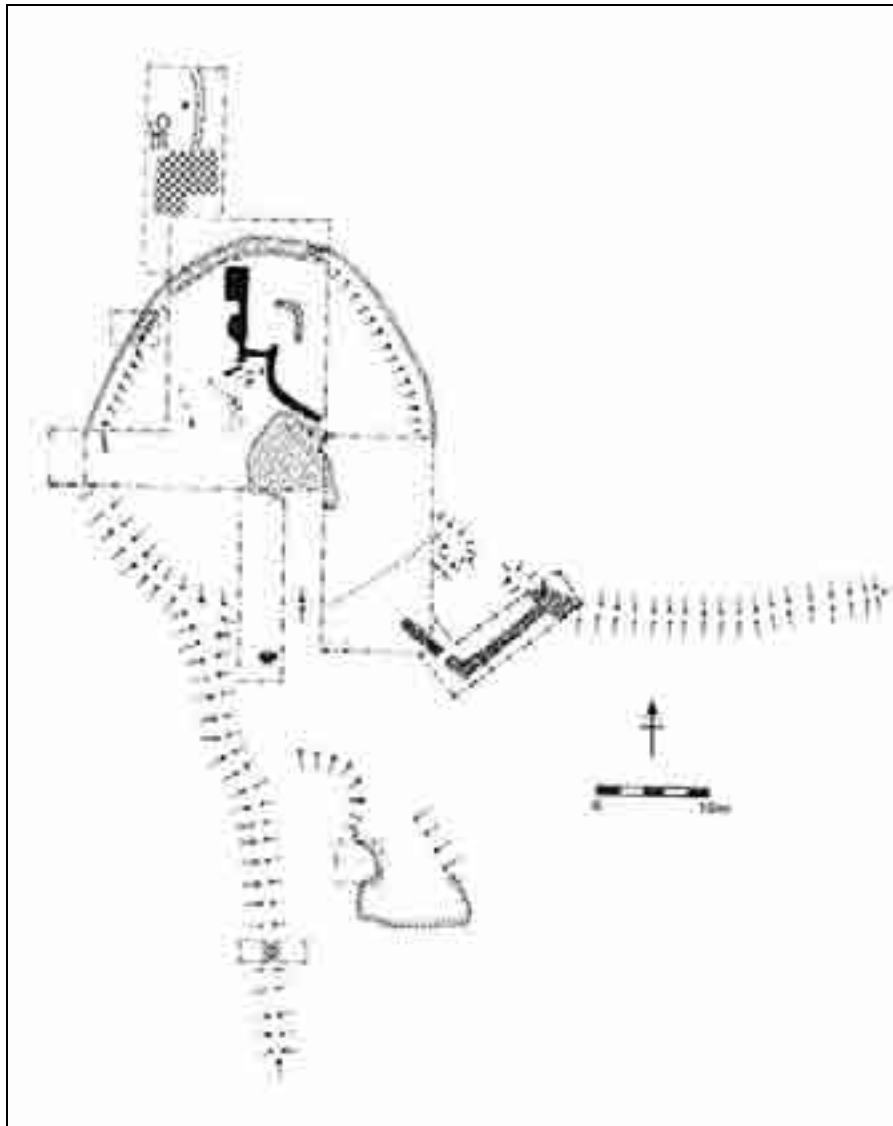
Four fragmented bone combs, a bone gouge, five iron knives, a possible awl and a fibula brooch fragment, a bronze strap fitting, two shale bracelet fragments, a stone spindle whorl, an unfinished rotary quernstone and a fragment of another and a large quantity of hone-stones and other sharpening stones were recovered in various contexts on site.

**Plant remains**

Analysis of an unknown quantity of deposits provided evidence for charred cereal grains and flax seeds. The exact quantities of remains were not recorded – comments on general ubiquity were instead provided, which have been noted below. Archaeobotanical analysis of deposits from this site had not been completed by the time the excavation report was published (Byrne 1991, 14). A later study of plant remains from the Munster area referred to some of the plant types recorded at this site (Monk *et al.* 1998), but the full results have not been published. As a result, it is unclear if cereal chaff, nutshell, fruit and weed remains were present or absent from deposits at this site. Radiocarbon dates were unavailable. The plant remains appear to be associated with various early medieval deposits at this site.

According to the results that are available from this site, a variety of cereals was present, including oat, barley, wheat and rye. The presence of flax remains extends the variety of crops recorded.





**Plan of site showing areas excavated (after Byrne 1991, 7)**

### Overview

- Miscellaneous
  - Oat grains were predominant, with a significant quantity of barley grains also recorded. Wheat and rye grains were present in smaller quantities.
  - Occasional flax remains were also recorded.

Phase	Cereal (grain)	Flax (seed)
<b>Misc.</b>	P	P

### Overview of all plant groups

P = present

Phase	Oat (grain)	Barley (grain)	Wheat (grain)	Rye (grain)
<b>Misc.</b>	P	P	P	P

### Detail of all cereal remains

P = present

## **Ballynacarriga (Site 2), Co. Cork**

Grid Ref: **181545/102601**

SMR No: **CO027-109**

Reference: **Johnston 2011**

Archaeological investigations were carried out at Ballynacarriga Site 2 in advance of construction of the N8 Fermoy to Mitchelstown bypass. An early medieval D-shaped enclosure was found to be located on the edge of a limestone reef. The enclosure ditch (radiocarbon dated to the 7<sup>th</sup> to 9<sup>th</sup> centuries) enclosed the northern and eastern sides, while the edge of the reef was located on the western side. No convincing enclosing element was recorded on the south-western side. The internal diameter of the enclosure measured 47m.

A number of early medieval structures and other features were located within the enclosure. Structure 1 (rectangular in plan) was located in the centre of the site, while Structure 2 was located to the north-east. A small group of pits, possibly associated with metal-working, was located to the north-west of Structure 2. Another group of pits was located 10m to the south of Structure 2. Radiocarbon dates from the structures and pits spanned the 6<sup>th</sup> to the 9<sup>th</sup> centuries.

A previously known early medieval dry-stone built souterrain (radiocarbon dated to the 6<sup>th</sup> to 7<sup>th</sup> centuries) was excavated in the north-western area of the site (CO027-109). It comprised an entrance, long passage and corbelled circular chamber. The entrance faced towards the south-east. Five post-holes were located around the area of the entrance and may have formed a shelter or structure.

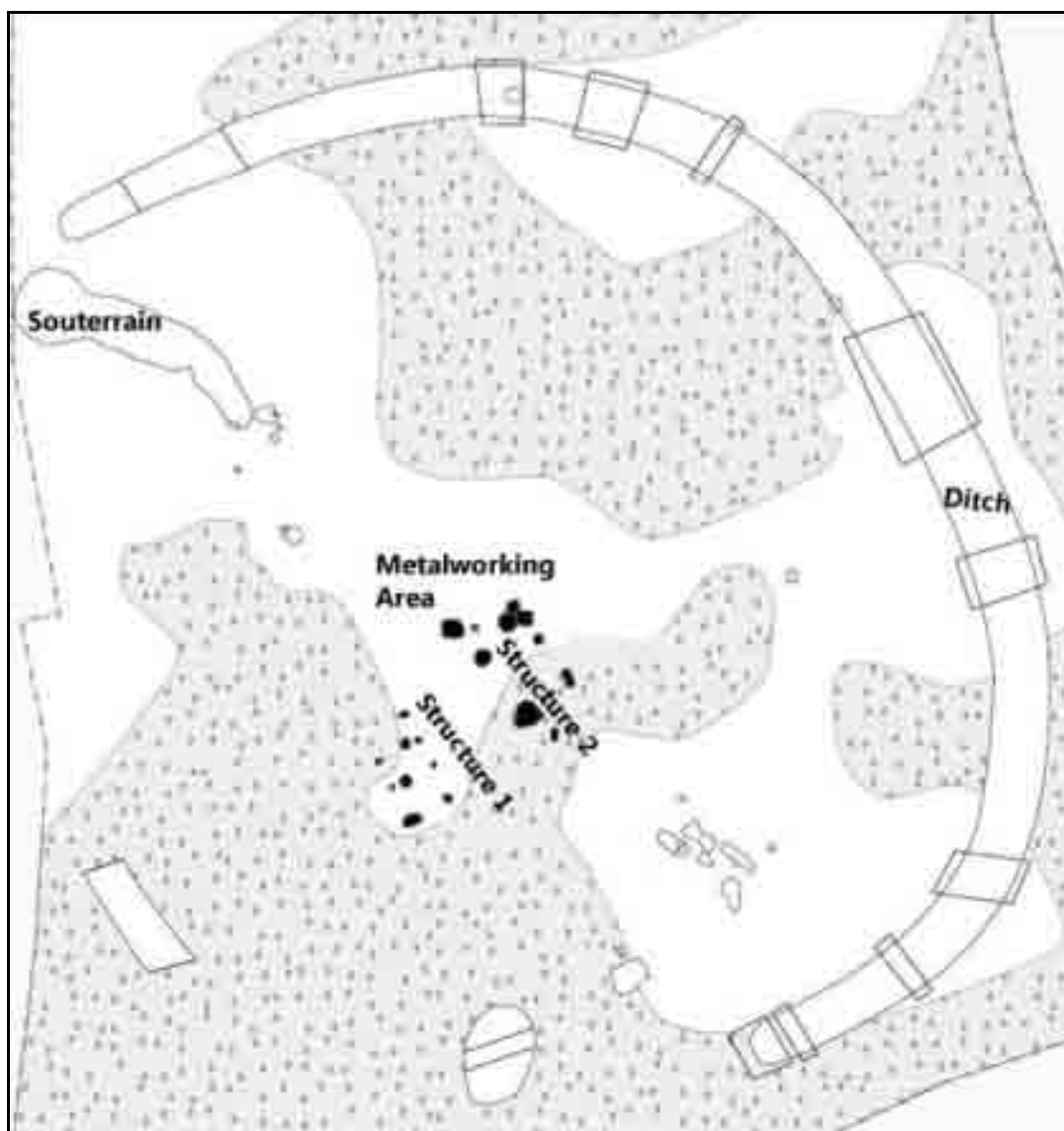
Following radiocarbon dating, two pits were assigned to an early modern phase of activity at the site (UB-12974; 297±19 BP). They were located close to the entrance of the enclosure.

Lithic stone tools dating to later Neolithic period were recovered from secondary contexts at this site. Three coarse stone tools dating to the early medieval period were recovered from the enclosure ditch and the souterrain. The small quantity of metalworking remains included slag from both iron smelting and smithing – the slag remains were recovered from the ditch, souterrain and features associated with Structure 2. The ditch appears to have been used as a repository for food waste. Over 2500 animal bones were recorded (predominantly cattle), as well as charred plant remains (predominantly wheat and including pea). Other artefacts, some of which may be associated with later activity, were recovered from the various areas of the site, including iron knife blades, iron keys, worked bone pieces, metal buckles and glazed red earthenware.

### **Plant remains**

Analysis of 30 deposits provided evidence for a total of 547 charred cereal grains, 1 charred cultivated legume seed, 8 charred hazelnut shell fragments, 3 charred fruit seeds and 35 charred weed seeds. Cereal chaff remains were absent. The presence of indeterminate seeds from the Fabaceae family (pea) may represent cultivated legumes or weeds.

Cereals were recorded in different areas/phases of activity. A variety of crops was present, including oat, barley, naked wheat and rye. The weed remains may represent arable weeds and plants that were growing locally.



**Excavations at Ballynacarriga 2, Co. Cork (after Kiely & Lehane 2011).**

## **RADIOCARBON DATES**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Lab Code</b>	<b>Sample</b>	<b>14C Years BP</b>	<b>Calib. 2 <math>\sigma</math></b>
UB-10501	Hazelut shell from ditch (C5)	1265 $\pm$ 26	<b>A.D. 668-782;</b> A.D. 789-810; A.D. 848-852.
UB-13152	Pomoideae from post-hole (C121)	1454 $\pm$ 23	<b>A.D. 567-646.</b>
UB-13153	Hazel from pit (C221)	1243 $\pm$ 20	<b>A.D. 686-784;</b> <b>A.D. 786-827;</b> A.D. 839-864.
UB-13154	Pomoideae from lower souterrain fill (C303)	1428 $\pm$ 20	<b>A.D. 596-654.</b>
UB-13155	Hazel from post-hole (C136)	1204 $\pm$ 20	<b>A.D. 772-888.</b>

## Overview

- Enclosure ditch (12 deposits)
  - Large quantity of cereal grains (predominantly naked wheat, with smaller quantities of oat, and occasional barley and rye).
  - Occasional legume, hazelnut, fruit and weed remains.
- Structures, Pits (11 deposits)
  - Small quantity of cereal grains (including barley and oat).
  - Occasional hazelnut and weed remains.
- Souterrain (7 deposits)
  - Small quantity of cereal grains (including oat, barley, wheat and possible rye).
  - Occasional hazelnut and weed remains.

Phase	Cereal (grain)	Legume (seed)	Hazelnut (shell frag)	Fruit (seed)	Weed (seed)	Date
<b>Enclosure ditch</b>	488	1	5	3	27	<b>A.D. 668–782;</b> A.D. 789–810; A.D. 848–852.
<b>Structures, Pits</b>	30		1		3	<b>A.D. 567–646.</b> <b>A.D. 772–888.</b> A.D. 686–784; A.D. 786–827; A.D. 839–864.
<b>Souterrain</b>	29		2		5	<b>A.D. 596–654.</b>

### Overview of all plant groups (total deposits n=30)

Phase	Oat (grain)	Barley (grain)	Wheat (grain)	Rye (grain)
<b>Enclosure ditch</b> (n=264)	34.85%	4.55%	60.23%	0.38%
<b>Structures, Pits</b> (n=23)				
<b>Souterrain</b> (n=13)				

### Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	Barley (grain)	cf. Barley (grain)	Naked wheat (grain)	cf. Naked wheat (grain)	Wheat (grain)
<b>Enclosure ditch</b>	92	12	5	128		31
<b>Structures, Pits</b>	7	16				
<b>Souterrain</b>	7	3			1	2

### Detail of oat, barley and wheat remains

Phase	Rye (grain)	cf. Rye (grain)	Indet. cereal (grain)
<b>Enclosure ditch</b>	1		219
<b>Structures, Pits</b>			7
<b>Souterrain</b>		1	15

### Detail of rye and indeterminate cereal remains

Phase	Enclosure ditch	Structures, Pits	Souterrain
<b>Garden pea</b> (seed): <i>Pisum</i> spp.	1		
<b>Haw fruit</b> (nutlet): <i>Crataegus monogyna</i>	1		
<b>Elder</b> (seed): <i>Sambucus nigra</i>	2		
<b>Knotweed family</b> (achene): Polygonaceae	4		2
<b>Pea family</b> (seed): Fabaceae	7		
<b>Plantains</b> (seed): <i>Plantago</i> spp.	2		
<b>Cleavers</b> (seed): <i>Galium aparine</i>		2	
<b>Sedge family</b> (achene): Cyperaceae			1
<b>Grass family</b> (grain): Poaceae	10		
<b>Indeterminate</b> (seed)	4	1	2

**Detail of legume, fruit and weed remains**

## **Ballynagallagh, Co. Limerick**

Grid Ref: **16440/13920**

SMR No: **N/A**

Reference: **McClatchie 2006**

A large oval crop-mark enclosure revealed occupational activity from the late-sixth century through to the twelfth century A.D. The earliest activity consisted of an unenclosed settlement of late-sixth/seventh-century circular houses. A number of features – a possible palisade trench; a track-way and associated pits – produced radiocarbon dates in the seventh/eighth century, and this appears to precede a late-eighth/ninth-century double palisaded enclosure. The final occupation phase was indicated by an eleventh/twelfth-century ditch and track-way.

The earliest feature on the site consisted of a post-built circular house (I) with an estimated diameter of 8m. This returned a 2 $\Sigma$  calibrated date of A.D. 570-674. The northern arc of a second post-built circular house (II) was excavated to its west and had an estimated diameter of 4.50-5m. Its proximity to the other houses might suggest that both are roughly contemporary.

A linear trench was excavated beside the large circular house and may have supported a light fence-like structure set in a stony bedding trench. This feature returned a 2 $\Sigma$  calibrated date of A.D. 649-807. Finds from this feature included chert, flint, a whetstone and a stone axe fragment. A two-metre wide trackway containing animal bone fragments, as well as chert and flint debitage, pre-dated the phase II enclosure and produced a 2 $\Sigma$  calibrated date of A.D. 661-772, roughly contemporary with the linear feature. A number of pits (0.25m deep) containing quantities of animal bone and charcoal fragments were recorded to the east of the linear trench and may have also been used as refuse dumps. Two were stone-lined and may have been used initially as storage areas. Animal bone from one pit produced a 2 $\Sigma$  calibrated date of A.D. 682-905.

A large double palisaded enclosure with an extrapolated perimeter of 380m post-dated the circular houses and north-south linear fence and track-way. Both palisades appear to have been contemporary and radiocarbon dates from the innermost places its construction between A.D. 765 and 897.

The final early medieval phase consisted of two track-ways, a shallow ditch and pits. The metalled track-way was identified as a linear stony band, and animal bone from its upper level produced a 2 $\Sigma$  calibrated date of A.D. 1016-1179. Another stone track-way was identified inside the enclosure. This stone spread post-dated a partially excavated ditch feature (2.10m wide and over 0.75m deep). Animal bone from the fill of the pit/ditch produced a 2 $\Sigma$  calibrated date of A.D. 1032-1210 indicating that it was roughly contemporary with the stone spread. Another large undated pit (over 1m deep) contained a large quantity of animal bone suggesting that it was used as a dump in its final stages.

The artefacts from the site were limited to stone and metal and included whet-, rubber- and hone-stones, a clay bead, curved lignite bracelet, possible lignite pendant, iron rods, copper-alloy tube and a copper-alloy clip as well as a large flint and chert lithic assemblage. Evidence for iron/metalworking was indicated by a small quantity of iron slag (65g), a furnace bottom, a possible clay mould and two small fragments of fired clay, possibly from furnace lining.

Cattle dominated the large faunal assemblage at the site and were followed by sheep, pig, wild bird, dog, frog, cat, horse and woodmouse in descending order. Butchery marks and the evidence for complete carcasses from the three main livestock animals indicate that slaughtering and butchery were carried out within the confines of the enclosure. A range of crops was recorded, consisting mainly of oat and barley, with a lesser quantity of wheat.

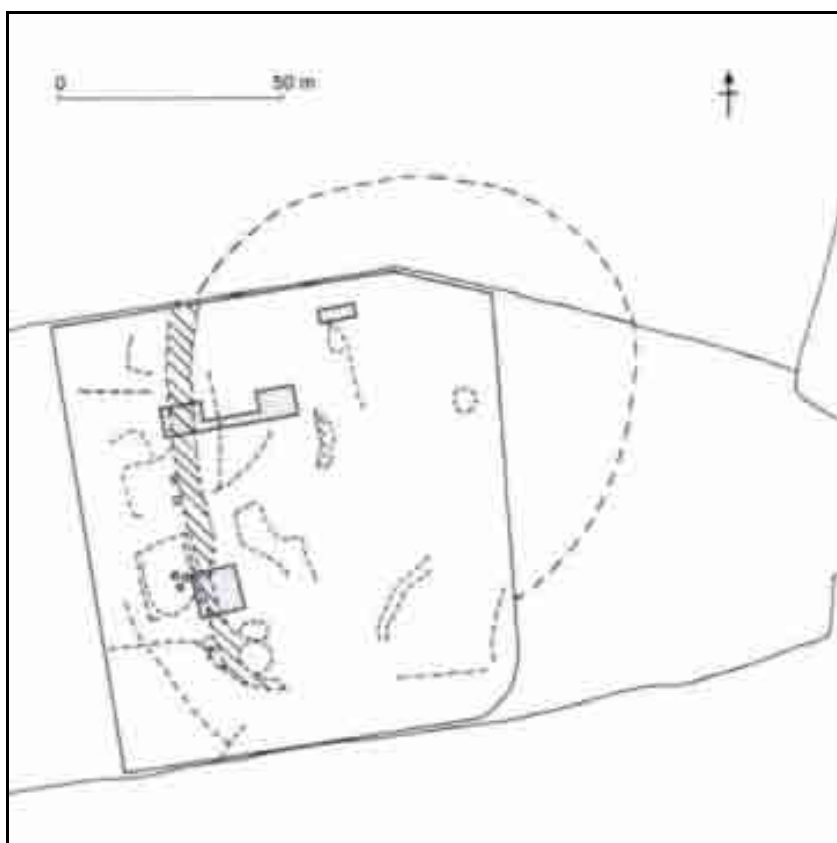
The large palisaded enclosure at Ballynagallagh is quite unique in the Irish archaeological record as early medieval 'ringforts' or 'ráths' are generally much smaller (Stout 1997, 15). A partially excavated oval-ditched enclosure (70m by 52m) at Killederdadrum, Co. Tipperary had evidence for internal

circular structures, a deliberately backfilled ditch and a possible bank palisade; similar features which are also found at Ballynagallagh.

### Plant remains

Analysis of 22 deposits provided evidence for a total of 50 charred cereal grains, 2 charred nutshell fragments and 10 charred weed seeds. Cereal chaff and fruit remains were absent.

Cereal remains were present in several areas/phases of activity. A variety of cereals was recorded, including oat, naked barley, hulled barley and possible naked wheat. The weed remains may represent arable weeds and plants that were growing locally. The hazelnut remains were recorded by the excavator in pits associated with the linear trench (this material was not noted in the archaeobotanical report).



**Plan of areas of excavation and magnetometry survey (after Cleary 2006, 4)**

### Radiocarbon Dates.

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
GrN-28572	Animal bone from post-hole from circular house inside trench 3 – F38	1405 $\pm$ 40 BP	<b>A.D. 570-674</b>
GrN-28574	Animal bone from a north-south linear trench inside trench 3 – F66	1300 $\pm$ 40 BP	<b>A.D. 649-781</b> A.D. 791-807
GrN-23169	Animal bone from first stone track-way inside trench 3 – F29	1300 $\pm$ 30 BP	<b>A.D. 661-730</b> <b>A.D. 735-772</b>

GrN-28573	Animal bone from oval pit inside trench 3 – F41	1200±60 BP	<b>A.D. 682-905</b> A.D. 912-970
GrN-23170	Animal bone from slot-trench of enclosing inner palisade inside trench 3 – F49	1200±35 BP	A.D. 693-748 <b>A.D. 765-897</b> A.D. 922- 941
GrN-28570	Animal bone from upper level of track-way in trench 1. – F2	950±40 BP	<b>A.D. 1016-1179</b>
GrN-28571	Animal bone from partially excavated pit/ditch in trench 2 – F22	910±40 BP	<b>A.D. 1032-1210</b>

### Overview

- House (3 deposits)
  - Contained a small number of oat and wheat grains, as well as a weed seed.
- Linear trench – fence (4 deposits)
  - Contained a slightly larger quantity of cereal grains, predominantly oat, as well as barley (naked and hulled) and wheat.
  - Hazelnut shell fragments and a weed seed were also present.
- Palisade (7 deposits)
  - Contained a small number of oat and hulled barley grains, as well as a weed seed.
- Miscellaneous deposits (8 deposits: post-holes, layers and pits)
  - Comprises deposits that are thought to be early medieval but could not be directly associated with any of the other phases of activity.
  - Contained a small number of oat, hulled barley and possible naked wheat grains, as well as weed seeds.

Phase	Cereal (grain)	Hazelnut (shell)	Weed (seed)	Date
<b>House</b>	4		1	<b>A.D. 570–674</b>
<b>Linear trench</b>	21	2	1	<b>A.D. 649–781;</b> A.D. 791–807
<b>Palisade</b>	7		1	A.D. 693–748; <b>A.D. 765–897;</b> A.D. 922– 941
<b>Misc.</b>	18		7	

### Overview of plant groups (total deposits n=22)

Phase	Oat (grain)	cf. Oat (grain)	Naked barley (grain)	Hulled barley (grain)	Barley (grain)	cf. Naked wheat (grain)	Wheat (grain)	Indet. cereal (grain)
<b>House</b>	1						1	2
<b>Linear trench</b>	13		1	2	1		1	3
<b>Palisade</b>	2	1		1				3
<b>Misc.</b>	7			7		1		3

### Detail of cereal remains



Phase	House	Linear trench	Palisade	Misc.
<b>Meadow buttercup</b> (achene): <i>Ranunculus acris</i>				1
<b>Buttercups</b> (achene): <i>Ranunculus</i> spp.			1	
<b>Oraches</b> (utricle): <i>Atriplex</i> spp.				2
cf. <b>Knotgrass</b> (achene): <i>Polygonum</i> cf. <i>aviculare</i>				1
<b>Common sorrel</b> (achene): <i>Rumex acetosa</i>				1
<b>Wild radish</b> (pod fragment): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>	1			
<b>Vetches</b> (seed): <i>Vicia</i> spp.				1
Indeterminate		1		1

#### Detail of weed remains

**Ballyutoag, Co. Antrim**Grid Ref: **32738/37954**SMR No. **ANT 056:085**Reference: **Williams 1984**

Ballyutoag is a collection of early medieval houses contained within enclosure ditches in the uplands and above agriculturally rich soils. Houses A and B within, Enclosure 1 (Fig. 1), were studied and shown to have been occupied contemporaneously. The circular House A went through four phases of construction and rebuilding (Fig. 2). These phases have been dated by radiocarbon from charcoal associated with the relevant period hearths. The radiocarbon dates (UB-2594) for Phase 3 and (UB-2596) for Phase 4 fit comfortably with the evidence of finds and structural remains. These structures appear to have been built from the local basalt – the Phase 3 house had basalt door pillars; and the Phase 4 house had wall footings of basalt.

Unfortunately the dates for Phases 1 and 2 (UB-2638) and (UB-2637), respectively are somewhat anomalous, and as a consequence the date for the earliest occupation of House A, and the duration of use of this house is not entirely clear.

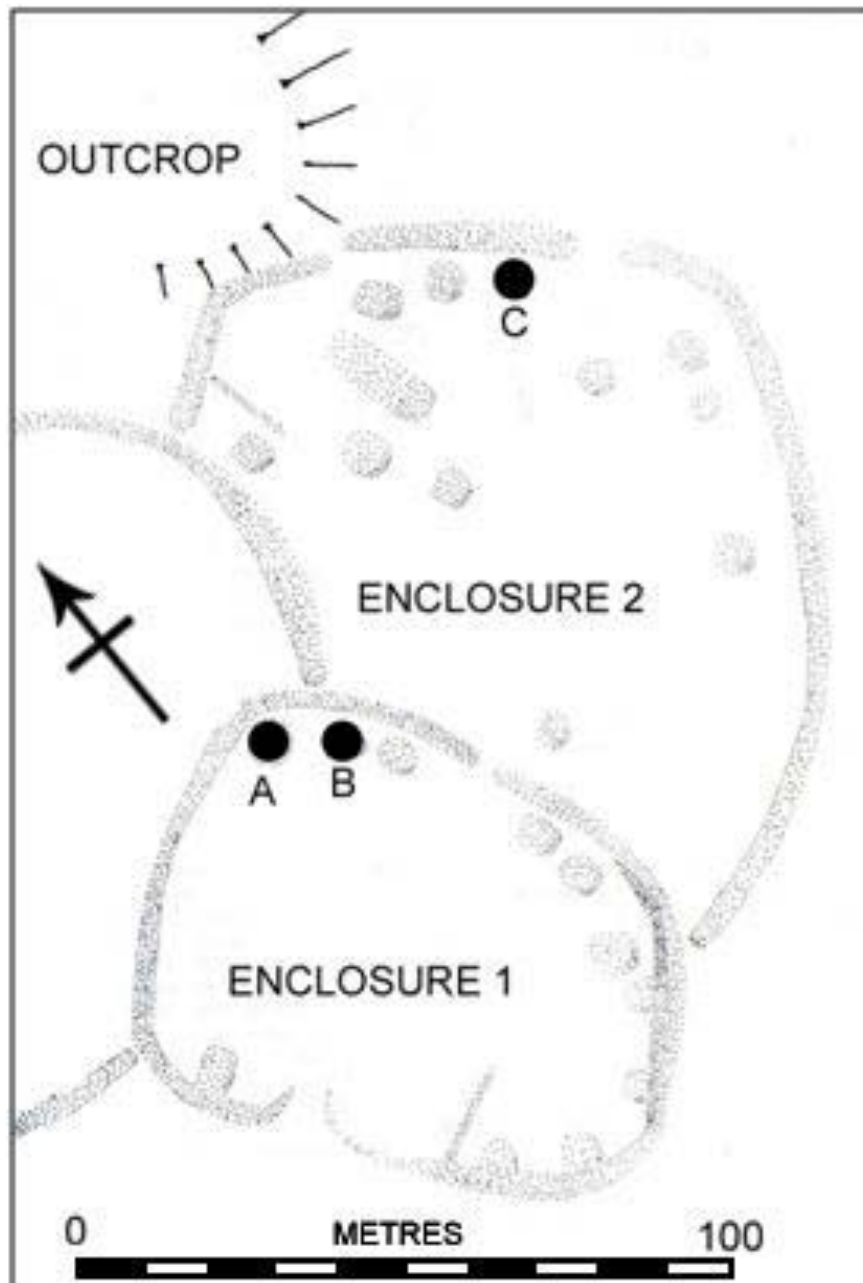
The major finds from these various occupation phases were souterrain ware (Phase 1 – 22; Phase 2 – 14; Phase 3 – 12; Phase 4 – 174), and flakes of worked flint (Phase 1 – 50; Phase 2 – 47; Phase 3 – 117; Phase 4 – 162). Environmental samples from the various hearths revealed the presence of cereal grains – predominantly barley, with some oat, and one wheat-seed.

The radiocarbon date (UB-2595) for the hearth in House B seems to indicate that this related closely with the Phase 4 at House A, and the artefacts recovered were similar (seven sherds of souterrain ware, and nine flint fragments). No evidence for occupation was found in the excavation of House C. The landscape setting of the hut sites and low number of finds suggests that Ballyutoag was an upland early medieval transhumance settlement.

**Plant macro-remains**

Analysis of five deposits provided evidence for charred cereal grains and charred hazelnut shell fragments. The exact quantities of remains were not recorded – comments on general ubiquity were instead provided, which have been noted below. Cereal chaff, fruit and weed remains were absent.

The cereal types recorded included oat, six-row barley and wheat. It is not clear from which phase of activity the samples were derived, although most appear to be associated with hearths at this site. Analysis was carried out Mick Monk, but the plant remains report was produced by the excavator.



Plan of enclosures at Ballyutoag, Co. Antrim (after Williams 1984, 39).

## Radiocarbon Dates

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
UB-2594	Charcoal-Top Clay Bank 29	1370±80	<b>A.D. 538-872</b>
UB-2595	Charcoal-Hearth 5	1175±55	<b>A.D. 693-748;</b> A.D. 765-984
UB-2596	Charcoal-hearth F40	1230±70	<b>A.D. 662-900;</b> A.D. 917-966
UB-2636	Charcoal-hearth F38	1240±80	<b>A.D. 654-904;</b> A.D. 913-970
UB-2637	Charcoal-Hearth 24	1285±100	<b>A.D. 594-975</b>
UB-2638	Charcoal-Hearth 8	1005±115	A.D. 779-794; <b>A.D. 800-1254</b>

## Overview

- Miscellaneous phase (5 deposits)
  - Contained a small quantity of cereal grains – barley (including six-row barley) was predominant, followed by oat, and then wheat.
  - Also a substantial quantity of hazelnut shell fragments.

Phase	Cereal (grain)	Hazelnut (shell frag)
<b>Misc.</b>	P	P

## Overview of plant groups (total deposits n=5)

P = present

Phase	Oat (grain)	Six-row barley (grain)	Barley (grain)	Wheat (grain)
<b>Misc.</b>	P	P	P	1

## Detail of cereal remains

**Boyerstown (Site 3), Co. Meath**Grid Ref: **283319/266223**SMR No: **N/A**Reference: **Archaeological Services University of Durham (ASUD) 2009; Clarke 2009**

The site consists of an early medieval farmscape, comprised of rath and associated enclosures. Three major phases have been identified. The earliest phase (Phase 1) consists of the rath, and then the construction of the large, rectangular-shaped enclosure, Enclosure 1 (Phase 2). There appears to have been activity on site contemporary with the rath, but prior to the construction of Enclosure 1 since one of the ditches in the annex to the north of, and truncated by, Enclosure 1 returned a date of A.D. 436–649. There was little excavation done around the rath site, and thus Phase 3 focuses on the expansion, and possible subdivision, of Enclosure 1. This includes the small shallow, narrow, curvilinear enclosure annexed onto the northeast corner of Enclosure 1 and dated to A.D. 598–767. Phase 4 is marked by the construction of the more substantial enclosure, Enclosure 2, located to the east of Enclosure 1.

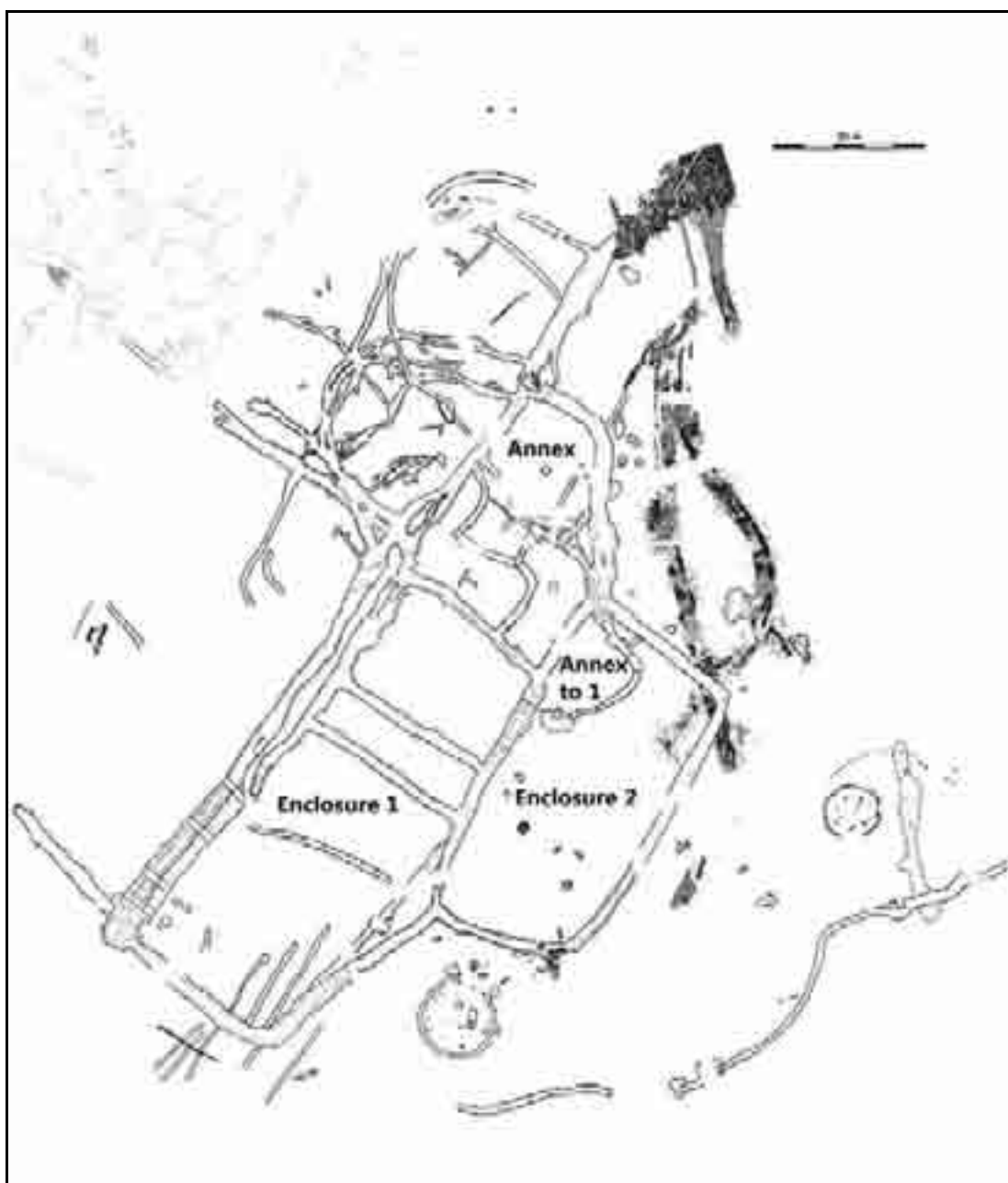
Enclosure 1 was located a significant distance from the possible rath, and may have functioned as a livestock enclosure associated with the rath. It is possible, however, that Enclosure 1 was used as a specialized garden of sorts to grow and cultivate various crops. Enclosure 2 was sub-rectangular in shape. This enclosure and its associated ditches were more substantial than those associated with Enclosure 1. Finds recovered included metal fragments and slag. Two clusters of activity were identified: the first consisted of four pit features that were located within the southeastern extent of the enclosure. Stone, charcoal and cremated bone were recovered from three of these features. Three small stakeholes were associated with one of these pit features and it is likely that this feature functioned as a hearth, while it is likely that the other pit features functioned as refuse pits. The second cluster of activity was located south of the ditch that defined Enclosure 2 to the west and consisted of four irregular-shaped pits. The function of this enclosure is also unclear. It would seem reasonable to suggest that it had a similar function to that of Enclosure 1, and thus it is likely that this enclosure was also used as a field system.

It is difficult to categorise Boyerstown 3 since the excavation concentrated on the portion of the site associated with agricultural activity. It has been concluded that the enclosures and associated ditches at Boyerstown 3 represent the remnants of contemporary and successive field systems. The regularity of shape and form noted in the construction of Enclosures 1 and 2 would suggest that they were for a particular function and may have been used for crop growth.

**Plant remains**

Analysis of 114 deposits provided evidence for a very large charred plant remains assemblage. A total of 16,434 cereal grains, 3211 cereal chaff fragments, 1 flax seed, 4 legume seeds, 40 hazelnut shell fragments, 14 fruit seeds and 960 weed seeds were recorded.

Cereals were recorded in many different areas/phases of activity. A variety of crops was present, including common oat, wild oat, hulled barley, six-row barley, bread wheat, rye, flax, pea and bean. The weed remains may represent arable weeds and plants that were growing locally.



**Boyerstown 3, Co. Meath (after Clarke 2009)**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
Beta-219006	Sheep tooth from linear ditch	1410±40 BP	<b>A.D. 569-671</b>
Beta-219007	Cattle tooth from curvilinear ditch	1370±40 BP	<b>A.D. 599-712;</b> A.D. 746-767.
Beta-219008	Cattle tooth – Enclosure 2 ditch	1210±40 BP	<b>A.D. 687-895;</b> A.D. 925-936.

Beta-219009	Horse tibia – annex to Enclosure 1	1340±40 BP	<b>A.D. 637-772.</b>
Beta-219210	Cattle radius- pre-Enclosure 1	1490±40 BP	A.D. 436-489; A.D. 513-516; <b>A.D. 530-648.</b>
Beta-247108	<i>Maloideae</i> charcoal – kiln	1220±40 BP	<b>A.D. 685-892</b>
Beta-247109	Oak charcoal – Structure 1	1300±40 BP	<b>A.D. 649-781;</b> A.D. 791-807.
Beta-247395	Charred barley- kiln	1420±40 BP	<b>A.D. 564-666.</b>
Beta-241317	Cattle mandible – circular enclosure	1300±40 BP	<b>A.D. 649-781;</b> A.D. 791-807.
Beta-247211	<i>Malaoideae</i> charcoal – primary fill of rath	1500±40 BP	A.D. 434-492; A.D. 508-519; <b>A.D. 528-643.</b>
Beta-247396	Charred barley grain – kiln	1270±40 BP	<b>A.D. 662-828;</b> A.D. 838-866.

## Overview

- Phase 1
  - Ringfort (3 deposits): small quantity of cereal grains (oat, hulled barley and wheat) and weed remains.
  - Linear ditch (1 deposit): small quantity of cereal grains (oat and hulled barley) and weed remains.
  - Kiln (4 deposits): large quantity of cereal grains and chaff (predominantly oat, also frequent hulled barley and occasional bread wheat). Also occasional nut and fruit remains, as well as frequent weed remains.
- Phase 2
  - Enclosure 1 (11 deposits): large quantity of cereal grains and chaff (predominantly oat, also frequent hulled barley and occasional wheat). Also occasional fruit and weed remains.
- Phase 3
  - Enclosure annexes (9 deposits): relatively large quantity of cereal grains (predominantly oat, also frequent hulled barley and occasional wheat). Also occasional cereal chaff, nut, fruit and weed remains.
  - Structure 1 (11 deposits): large quantity of cereal grains (predominantly hulled barley, accompanied by oat and wheat). Also occasional cereal chaff and weed remains.
  - Circular enclosure (10 deposits): small quantity of cereal grains (predominantly hulled barley, accompanied by oat and wheat). Also occasional nut, fruit and weed remains.
  - Kiln (1 deposit): large quantity of cereal grains and chaff (predominantly oat, including common oat and wild oat, as well as occasional hulled barley and bread wheat). Also occasional weed remains.
- Phase 4
  - Enclosure 2 (17 deposits): contained the widest range of crops from any phase of activity. A very large quantity of cereal grains and chaff was recorded (predominantly oat, as well as frequent hulled barley, and occasional wheat and rye). The presence of sprouted barley grains may represent malting, or may alternatively have resulted from the grains being located in a damp environment. Also occasional flax, broad bean, nut and fruit remains, in addition to frequent weeds.
- Phase 5
  - Comprises deposits that are thought to be early medieval in date, but could not be directly associated with any of the other phases of activity.

- Miscellaneous pits (10 deposits): large quantity of cereal grains and chaff (predominantly hulled barley, as well as frequent oat – including common oat – and bread wheat). Also occasional garden pea and frequent weed remains.
- Miscellaneous hearths (21 deposits): very large quantity of cereal remains and chaff (predominantly hulled barley, as well as frequent oat and occasional bread wheat). The presence of sprouted barley grains may represent malting, or may alternatively have resulted from the grains being located in a damp environment. Also occasional possible garden pea, nut and fruit, as well as frequent weed remains.
- Miscellaneous ditches (16 deposits): relatively large quantity of cereal grains. (predominantly oat, as well as frequent hulled barley and occasional wheat). Also occasional cereal chaff, nut and weed remains.

		<b>Cereal (grain)</b>	<b>Cereal (chaff)</b>	<b>Flax (seed)</b>	<b>Legume (seed)</b>	<b>Nut (shell)</b>	<b>Fruit (seed)</b>	<b>Weed (seed)</b>	<b>Date A.D.</b>
<b>Phase 1</b>	Ringfort	13						1	434–492; 508–519; 528–643.
	Linear ditch	5						2	436–489; 513–516; <b>530–648.</b>
	Kiln F824	1760	95			1	2	104	<b>564–666.</b>
<b>Phase 2</b>	Enclosure 1	1234	97				3	22	
<b>Phase 3</b>	Enclosure 1 annexes	227	2			7	2	15	<b>599–712;</b> 746–767. <b>637–772.</b>
	Structure 1	1586	14					35	<b>685–892.</b> <b>649–781;</b> 791–807.
	Circular enclosure	28				1	1	18	<b>649–781;</b> 791–807.
	Kiln F1148	785	783					34	<b>662–828;</b> 838–866.
<b>Phase 4</b>	Enclosure 2	3003	188	1	1	22	5	72	<b>687–895;</b> 925–936.
<b>Phase 5</b>	Misc. pits	2130	1658		1			351	
	Misc. hearths	5543	373		2	3	1	283	
	Misc. ditches	120	1			6		23	

**Overview of all plant groups (total deposits n=114)**

		<b>Oat</b>	<b>Barley</b>	<b>Wheat</b>	<b>Rye</b>
<b>Phase 1</b>	Ringfort (n=13)				
	Linear ditch (n=5)				
	Kiln F824 (n=1750)	66.91%	31.71%	1.37%	0.00%
<b>Phase 2</b>	Enclosure 1 (n=1232)	53.81%	43.02%	3.17%	0.00%
<b>Phase 3</b>	Enclosure 1 annexes (n=227)	60.35%	37.00%	2.64%	0.00%
	Structure 1 (n=1586)	15.64%	83.04%	1.32%	0.00%
	Circular enclosure (n=28)	7.14%	89.29%	3.57%	0.00%
	Kiln F1148 (n=784)	88.01%	7.91%	4.08%	0.00%
<b>Phase 4</b>	Enclosure 2 (n=2996)	54.17%	42.56%	3.24%	0.03%
<b>Phase 5</b>	Misc. pits (n=2118)	25.45%	54.72%	19.83%	0.00%



	Misc. hearths (n=5511)	39.41%	59.12%	1.47%	0.00%
	Misc. ditches (n=120)	52.50%	40.00%	7.50%	0.00%

**Percentage of cereal grain types recorded in each phase of activity** (where >25 total grains recorded) n=total number of grains recorded that were identifiable to genus

		<b>Common oat</b> (floret base)	<b>Wild oat</b> (floret base)	<b>Oat</b> (grain)	<b>Oat</b> (grain frag)	<b>Oat</b> (palea/ lemma)	<b>Oat</b> (awn)	<b>Oat</b> (floret)	<b>Oat</b> (pedicel)
<b>Phase 1</b>	Ringfort			5	2				
	Linear ditch			2					
	Kiln F824			1171	601	7	72		
<b>Phase 2</b>	Enclosure 1			663	327	9	70		1
<b>Phase 3</b>	Enclosure 1 annexes			137	76				
	Structure 1			248	154		14		
	Circular enclosure			2	2				
	Kiln F1148	2	1	690	811	31	742		1
<b>Phase 4</b>	Enclosure 2			1623	117	55	118		
<b>Phase 5</b>	Misc. pits	1		539	312	26	849		7
	Misc. hearths			2172	939	31	209	3	
	Misc. ditches			63	29		1		

#### Detail of oat remains

		<b>Hulled barley</b> (grain)	<b>Hulled Barley</b> (sprouted grain)	<b>Hulled barley</b> (grain frag)	<b>Six-row Barley</b> (rachis)	<b>Barley</b> (grain)	<b>Barley</b> (rachis)
<b>Phase 1</b>	Ringfort	7					
	Linear ditch	3					
	Kiln F824	555		91			11
<b>Phase 2</b>	Enclosure 1	530		183			8
<b>Phase 3</b>	Enclosure 1 annexes	84		6			
	Structure 1	1317		328			
	Circular enclosure	25		4			
	Kiln F1148	62		17			2
<b>Phase 4</b>	Enclosure 2	1255	14	77		6	3
<b>Phase 5</b>	Misc. pits	1159		265	2		66
	Misc. hearths	3219	38	392	11	1	67
	Misc. ditches	48		2			

#### Detail of barley remains

		<b>Bread wheat</b> (rachis)	<b>Wheat</b> (grain)	<b>Wheat</b> (grain frag)	<b>Wheat</b> (glume base)	<b>Wheat</b> (awn)	<b>Rye</b> (grain)
<b>Phase 1</b>	Ringfort		1				
	Linear ditch						
	Kiln F824	1	24				
<b>Phase 2</b>	Enclosure 1		39				
<b>Phase 3</b>	Enclosure 1 annexes		6				
	Structure 1		21				
	Circular enclosure		1				
	Kiln F1148	4	32				
<b>Phase 4</b>	Enclosure 2		97				1
<b>Phase 5</b>	Misc. pits	681	420			13	
	Misc. hearths	4	81	2	1		
	Misc. ditches		9				

#### Detail of wheat and rye remains

		<b>Indet. cereal</b> (grain)	<b>Indet. cereal</b> (grain frag)	<b>Indet. cereal</b> (culm internode)	<b>Indet. cereal</b> (culm node)	<b>Indet. cereal</b> (culm base)
<b>Phase 1</b>	Ringfort			2		
	Linear ditch					
	Kiln F824	10		29	4	
<b>Phase 2</b>	Enclosure 1	2	5	204	2	2
<b>Phase 3</b>	Enclosure 1 annexes			79	1	1
	Structure 1			156		
	Circular enclosure			11		
	Kiln F1148	1				
<b>Phase 4</b>	Enclosure 2	7	3	396	8	1
<b>Phase 5</b>	Misc. pits	12		360	2	11
	Misc. hearths	32	13	689	34	
	Misc. ditches			37		

#### Detail of indeterminate cereal remains

		<b>Broad bean</b> (seed): <i>Vicia faba</i>	<b>Garden pea</b> (seed): <i>Pisum sativum</i>	<b>cf. Garden pea</b> (seed): cf. <i>Pisum sativum</i>	<b>Hazelnut</b> (shell frag): <i>Corylus avellana</i>	<b>Bramble</b> (nutlet): <i>Rubus fruticosus</i>	<b>Cherries</b> (stone)	<b>Haw fruit</b> (nutlet): <i>Crataegus monogyna</i>	<b>Elder</b> (seed): <i>Sambucus nigra</i>
<b>Phase 1</b>	Ringfort								
	Linear ditch								
	Kiln F824				1				2
<b>Phase 2</b>	Enclosure 1							2	1
<b>Phase 3</b>	Enclosure 1 annexes				7			2	
	Structure 1								
	Circular enclosure				1			1	
	Kiln F1148								
<b>Phase 4</b>	Enclosure 2	1			22	2	1		2
<b>Phase 5</b>	Misc. pits		1						
	Misc. hearths			2	3			1	
	Misc. ditches				6				

#### Detail of legume, nut and fruit remains

	<b>Phase 1</b>	<b>Phase 1</b>	<b>Phase 1</b>	<b>Phase 2</b>	<b>Phase 3</b>	<b>Phase 3</b>	<b>Phase 3</b>	<b>Phase 3</b>	<b>Phase 4</b>	<b>Phase 5</b>	<b>Phase 5</b>	<b>Phase 5</b>
	Ringfort	Linear ditch	Kiln F824	Enclosure 1	Enclosure 1 annexes	Structure 1	Circular enclosure	Kiln F1148	Enclosure 2	Misc. pits	Misc. hearths	Misc. ditches
<b>Meadow/Creeping/Bulbous buttercup</b> (achene): <i>Ranunculus acris/repens/bulbosus</i>					1					2	1	1
cf. <b>Greater spearwort</b> (achene): <i>Ranunculus</i> cf. <i>lingua</i>			1									
<b>Lesser spearwort</b> (achene): <i>Ranunculus flammula</i>			1									
<b>Common nettle</b> (achene): <i>Urtica dioica</i>			1					2		1		
<b>Small nettle</b> (achene): <i>Urtica urens</i>											2	
<b>Fat-hen</b> (utricle): <i>Chenopodium album</i>			2		1	7		5	12	65	12	

<b>Fat-hen</b> (utricle frag): <i>Chenopodium album</i>										38		
<b>Goosefoots</b> (utricle): <i>Chenopodium</i> spp.											3	
<b>Oraches</b> (utricle): <i>Atriplex</i> spp.			3							3		
<b>Blinks</b> (seed): <i>Montia fontana</i>				1	1		1			1	2	
<b>Common chickweed</b> (seed): <i>Stellaria media</i>							1		1	3		
<b>Corn spurrey</b> (seed): <i>Spergula arvensis</i>						1					1	
<b>Corncockle</b> (seed frag): <i>Agrostemma githago</i>				1								
<b>Redshank</b> (achene): <i>Persicaria maculosa</i>			2	1	1	7	1	1	7	3	7	
<b>Redshank</b> (achene frag): <i>Persicaria maculosa</i>				1		3					14	
<b>Pale persicaria</b> (achene): <i>Persicaria lapathifolia</i>										1		
<b>Knotgrass</b> (achene): <i>Polygonum aviculare</i>			1		2					5	2	
<b>Knotgrass</b> (achene frag): <i>Polygonum aviculare</i>										1		
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>			3	3	1	7	1		10	15	34	
<b>Black-bindweed</b> (achene frag): <i>Fallopia convolvulus</i>			7	1	8			1		7	33	
<b>Docks</b> (achene): <i>Rumex</i> spp.		1	26	5	3	2	12	4	10	74	64	19
<b>Shepherd's-purse</b> (seed): <i>Capsella bursa-pastoris</i>											7	
<b>Field penny-cress</b> (seed): <i>Thlaspi arvense</i>										1		
<b>Black mustard</b> (seed): <i>Brassica nigra</i>											1	
<b>Cabbage</b> (seed): <i>Brassica</i> spp.								2	1		12	
<b>Cabbage</b> (seed frag): <i>Brassica</i> spp.										1		
<b>Charlock</b> (seed): <i>Sinapis arvensis</i>										23		
<b>Charlock</b> (pod frag): <i>Sinapis arvensis</i>										26		
<b>Cabbages/Mustards</b> (seed): <i>Brassica/Sinapis</i> spp.						1						
<b>Wild radish</b> (pod frag): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>								1		1		
<b>Vetches/Pea</b> (seed): <i>Vicia/Lathyrus</i> spp.			1	3	1	2		1	2	4	5	
<b>Medicks</b> (seed): <i>Medicago</i> spp.				1			1		1	1	2	
<b>Clovers</b> (seed): <i>Trifolium</i> spp.			1						1		1	
<b>Field gromwell</b> (nutlet): <i>Lithospermum arvense</i>											1	
<b>Common hemp-nettle</b> (nutlet): <i>Galeopsis tetrahit</i>			2					1		2	3	
<b>Common hemp-nettle</b> (nutlet frag): <i>Galeopsis tetrahit</i>										2	2	
<b>Hemp-nettles</b> (nutlet): <i>Galeopsis</i>						1						

<b>Ribwort plantain</b> (seed): <i>Plantago lanceolata</i>			17	1		2		1		3	6	
<b>Cleavers</b> (seed): <i>Galium aparine</i>										1		
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>			1					3	6	5		
<b>Hawkbits</b> (achene): <i>Leontodon</i> spp.										1		
<b>Prickly sow-thistle</b> (achene): <i>Sonchus asper</i>												1
<b>Dandelions</b> (achene): <i>Taraxacum</i> sect. <i>Ruderalia</i>			1					1				
<b>Corn marigold</b> (achene): <i>Chrysanthemum segetum</i>			5									
<b>Scentless mayweed</b> (achene): <i>Tripleurospermum inodorum</i>		1	11	2		1		6	3	94	4	
<b>Daisy family</b> (achene): Asteraceae			1	1	1						7	
<b>Spike-rushes</b> (achene): <i>Eleocharis</i> spp.										2		
<b>Flat-sedge</b> (achene): <i>Blysmus compressus</i>									1		13	
<b>Sedges</b> (achene): <i>Carex</i> spp.			1	1					4	1	28	1
cf. <b>Darnel</b> (grain): <i>Lolium cf. temulentum</i>			8		1				3	3	36	
<b>Annual meadow-grass</b> (grain): <i>Poa annua</i>			1			2						
<b>False oat-grass</b> (tuber): <i>Arrhenatherum elatius</i> var. <i>bulbosum</i>										1		
<b>Bromes</b> (grain): <i>Bromus</i> spp.			1						1		1	
<b>Grass family</b> (grain): Poaceae	1		13	3	2	2	1	7	9	36	28	1
<b>Grass family</b> (culm frag): Poaceae					1	1		3	2	15	13	3

#### Detail of weed remains

## **Cahircalla More (Site 128), Co. Clare**

Grid Ref: **132511/175537**

SMR No: **N/A**

Reference: **Fryer 2006; Taylor 2006a**

A ditched enclosure (internal diameter of 38m by 37m) was identified at Cahircalla More during topsoil stripping. Radiocarbon dating of a cattle limb bone from the ditch fill suggested that it had been in-filled during the sixth or seventh century, and it is suggested that the original banks may have been ploughed-out during the post-medieval period. Various artefacts - a piece of the upper stone of a rotary quern, iron tool, possibly a chisel, fragments of iron slag, and four smithing hearth bottoms - were recovered from the ditch fill.

Prehistoric activity on site consisted of a single oval pit with cremated bone and several finds in secondary contexts- worked quartz fragments, struck chert and a small amount of possibly Late Bronze Age pottery from the plough soil as well as struck chert and a small amount of cremated bone from the early medieval field ditches. This latter evidence suggests that at least one prehistoric cremation burial on the site was disturbed by the subsequent early medieval activity.

The remains of a small oval structure (internal dimensions of 6.3m by 4.4m) defined by three short lengths of curvilinear gully were excavated at the southern end of the enclosure. The gully segments were typically 0.65m wide and 0.40m deep and contained fills with large quantities of charcoal and iron slag as well as animal bone. A radiocarbon date obtained from a grain of cereal from the foundation slots produced a similar date to that produced for the ditch in-fill.

The ditched enclosure was an integral part of a large pattern of rectangular fields defined by five broadly linear ditches to the north and west. Trenches were excavated across the five ditches which measured between 0.5-1.2m wide and 0.25-0.65m deep and contained generally steep sides and slightly concave bases.

Finds from the ditch fills included a copper-alloy ring pin, whetstones, including a pin-sharpening stone, a small quantity of iron slag, animal bone fragments, a mini-anvil stone, oyster shell, and the above mentioned prehistoric struck chert, worked quartz and cremated human bone. Cereal grain samples from the fill of two of the ditches produced radiocarbon dates ranging from the seventh century to the twelfth century, indicating that these ditches may have been backfilled at different times.

Smithing was the principle early medieval ironworking. Analysis of the slag from the oval building indicates that smithing was being undertaken inside this structure. Smithing hearth bottoms - four from the enclosing ditch and two from the ploughsoil - and a mini anvil from a field ditch were associated with this activity. A possible iron ore fragment was also recovered from the enclosure ditch and suggests that limited smelting may have also been undertaken on the site. Cereal cultivation was also indicated by the two quernstones, field patterns and large quantity of grains, particularly from oats and barley as well as rye, wheat and quantities of weed seeds.

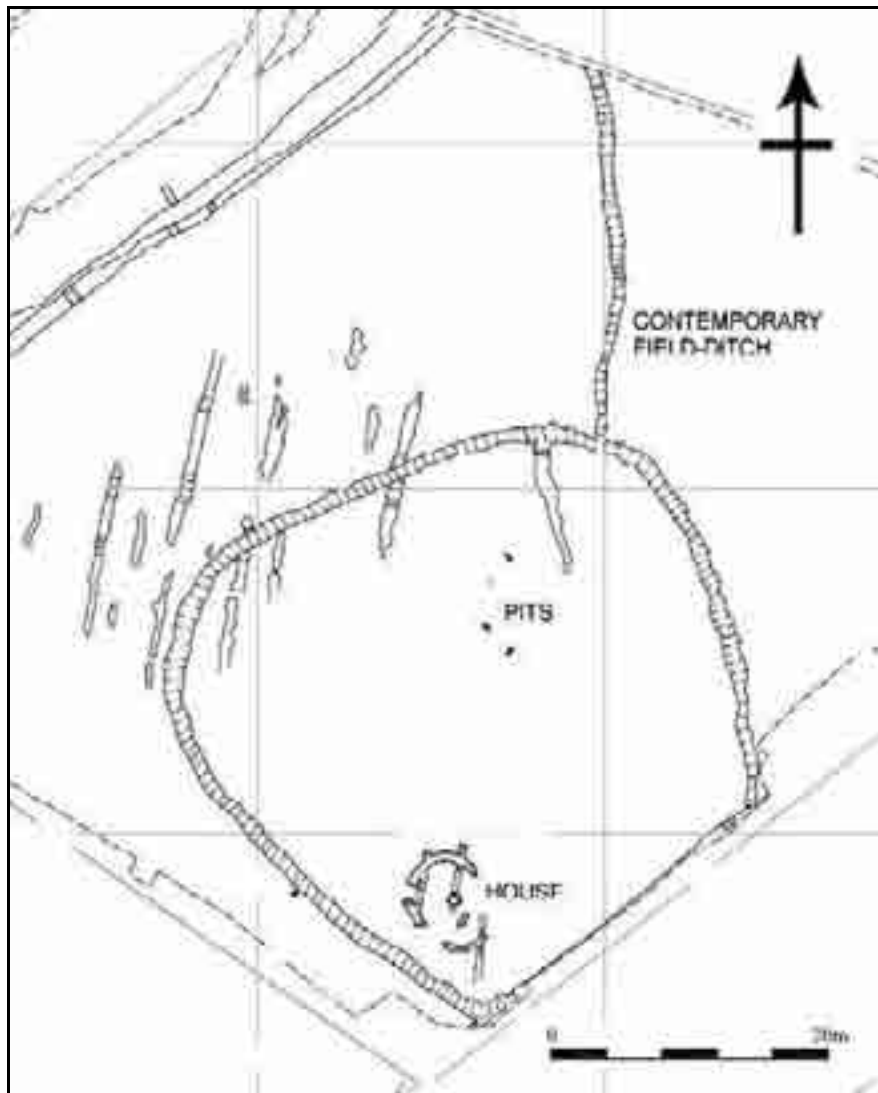
### **Plant remains**

Analysis of 20 deposits provided evidence for charred cereal grains, charred nutshell fragments, charred fruit seeds and charred weed seeds. The exact quantities were not recorded in most cases – the remains from only three deposits were selected for full quantification. Comments on general ubiquity were instead provided, which have been noted below. Cereal chaff was absent.

Cereals were associated with several phases of activity. A variety of cereals was present, including oat, barley, wheat and possible rye. The weed remains may represent arable weeds and plants that were growing locally.

Three other deposits containing plant remains could not be assigned to any particular phase of activity at Cahircalla More. These deposits contained plant types not recorded elsewhere, including

wild oat chaff, grains of possible six-row barley and rye, and weed seeds. While these remains may be early medieval, in the absence of clear stratigraphic or dating evidence, they have not been recorded below.



**Plan of enclosure, house and field boundaries at Cahircalla More, Co. Clare (after Taylor 2006).**

#### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
Beta-207730	Charred cereal seeds from fill of field ditch	1000 $\pm$ 40 BP	<b>A.D. 975-1155</b>
Beta-211571	Cattle limb bone from fill of enclosure ditch	1470 $\pm$ 40 BP	A.D. 467-481 <b>A.D. 534-655</b>
Beta-211572	Charred cereal seeds from foundation slot of oval structure	1430 $\pm$ 40 BP	<b>A.D. 559-662</b>

Beta-211573	Charred cereal seeds from fill of field ditch	1250±40 BP	<b>A.D. 674-874</b>
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### Overview

- Phase 1: Enclosure ditch and interior (16 deposits)
  - Contained a large number of cereal grains – barley appears to have been predominant, with smaller quantities of oat, wheat and possible rye.
  - A large quantity of hazelnut shell fragments was present, as well as fruit and weed remains.
- Phase 2: Ditch C.210 (1 deposit)
  - Contained a small number of fruit and weed seeds only. This represents the only phase of activity where cereals were absent, although it should be noted that only one deposit from this phase was examined.
- Phase 3: Ditch C.125 (3 deposits)
  - Contained a small number of barley grains.

Phase	Cereal (grain)	Hazelnut (shell)	Fruit (seed)	Weed (seed)	Date
<b>Phase 1: Enclosure ditch and interior</b>	P	P	P	P	A.D. 467–481; <b>A.D. 534–655.</b> <b>A.D. 559–662.</b>
<b>Phase 2: Ditch C.210</b>			P	P	<b>A.D. 674–874.</b>
<b>Phase 3: Ditch C.125</b>	P				<b>A.D. 975–1155.</b>

### Overview of plant groups (total deposits n=20)

P = present

Phase	Oat (grain)	cf. Oat (grain)	Barley (grain)	Wheat (grain)	cf. Wheat (grain)	cf. Rye (grain)	Indet. cereal (grain)	cf. Indet. cereal (grain)
<b>Phase 1: Enclosure ditch and interior</b>	P	P	P	P	2	1	P	
<b>Phase 2: Ditch C.210</b>								
<b>Phase 3: Ditch C.125</b>			P				P	P

### Detail of cereal remains

Phase	<b>Cherries</b> (stone): <i>Prunus</i> spp.	<b>Haw fruit</b> (nutlet): <i>Crataegus monogyna</i>
<b>Phase 1: Enclosure ditch and interior</b>	P	
<b>Phase 2: Ditch C.210</b>		P
<b>Phase 3: Ditch C.125</b>		

### Detail of fruit remains



Phase	Phase 1: Enclosure ditch and interior	Phase 2: Ditch C.210	Phase 3: Ditch C.125
cf. <b>Black-bindweed</b> (achene): cf. <i>Fallopia convolvulus</i>	2		
<b>Vetches/Pea</b> (seed): <i>Vicia/Lathyrus</i> spp.	P		
<b>Cleavers</b> (seed): <i>Galium aparine</i>	P		
cf. <b>Spindle</b> (seed): cf. <i>Euonymus europaeus</i>		P	
<b>Indeterminate</b> (seed)	4	P	

**Detail of weed and wood remains**

**Caraun More, Co. Galway****Grid reference: 163612/225276**SMR No: **N/A**Reference: **Dillon 2009; Seaver & Conran 2009**

The site of Caraun More was uncovered during roadworks which revealed a multi-period site with features from the Bronze Age, Iron Age the early medieval period and the post-medieval period. These represent a range of domestic, agricultural and industrial activity. The majority of the evidence comes from the early/late medieval periods and these activities included crop production, cereal processing, the herding and slaughter of livestock, gathering of food stuffs, fishing and metal-working. The watercourses suggest an industrial aspect which in all likelihood represents milling activity.

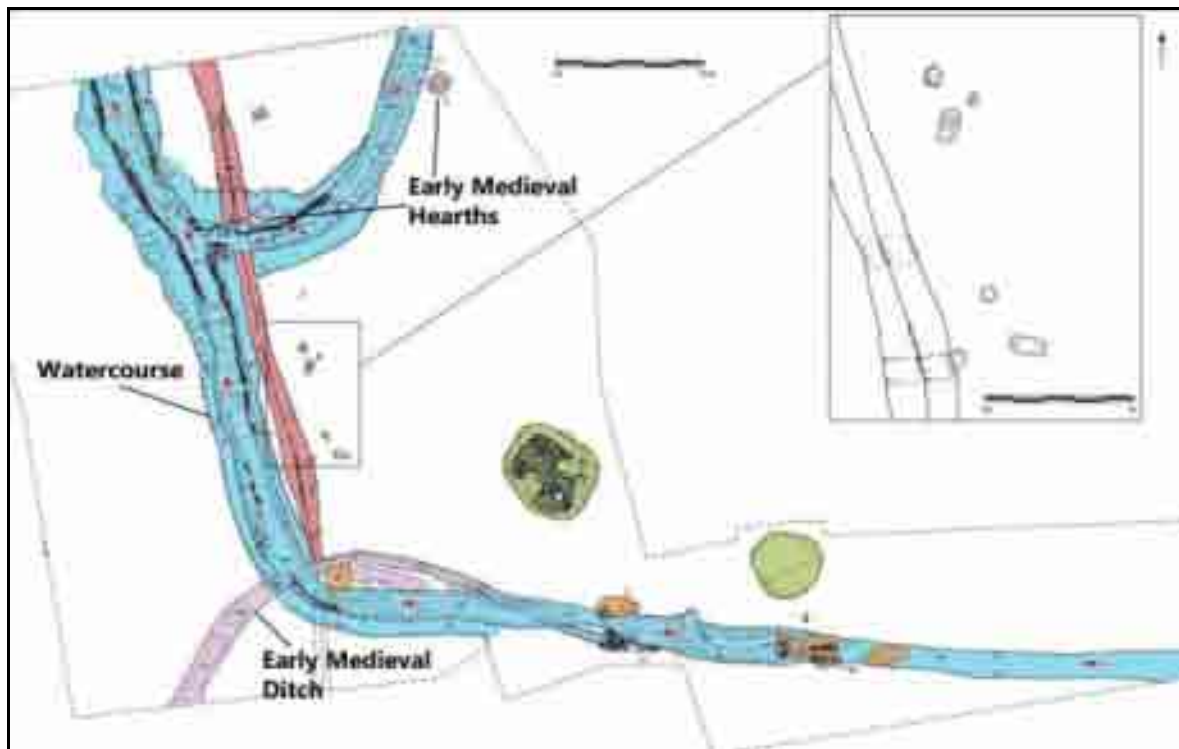
The early medieval archaeology is represented by two hearths which returned evidence for barley seeds and oat grains. A date of A.D. 432-617 was achieved from associated charcoal. A curvilinear enclosure ditch also appears to be early medieval in date and a cattle bone from the basal ditch silts produced a date of A.D. 595-657. It is possible that this ditch represents the extent of an early medieval enclosure, but this was almost completely destroyed by a modern field boundary as well as by a system of watercourses which dominated the excavated area. These ditches were revetted with stone and have been interpreted as millraces for a mill complex possibly located downslope from the site. A date of A.D. 1263-1395 was returned for charcoal (blackthorn) from an upper deposit, and carbonised cereal grain from the kiln which truncated the watercourses has been dated to A.D. 1159-1293. Since these ditches were well silted up by the 13<sup>th</sup> century this system of watercourses appears to have functioned in the early medieval period.

Finds from the possible enclosure ditch included a bone toggle, an iron stick-pin, an iron fish-hook, a chert flake, and a twisted copper wire bracelet. The stick-pin and bracelet within the upper deposits suggest that the ditch was constructed prior to the 6<sup>th</sup>-century.

**Plant remains**

Analysis of 4 deposits provided evidence for a substantial charred plant remains assemblage. A total of 656 cereal grains, 2 cereal chaff fragments, 5 hazelnut shell fragments and 151 weed seeds were recorded. Fruit remains were absent.

A variety of crops was present, including oat and barley. The weed remains may represent arable weeds and plants that were growing locally.



**Plan of excavations at Caraun More, Co. Galway (after Seaver & Conran 2009).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
WK21339	Charcoal from hearth	1516±35 BP	<b>A.D. 432-497; A.D. 502-617</b>
UBA-10319	Cattle bone from ditch	1423±23 BP	<b>A.D. 595-657</b>
Wk20205	Charcoal from upper fill of watercourse	678±42 BP	<b>A.D. 1263-1328; A.D. 1341-1395</b>
Beta-241007	Carbonised grain from kiln cut into watercourse	780±40 BP	<b>A.D. 1159-1293</b>

### **Overview**

- Phase 3a – Ditches, Hearths (4 deposits)
  - Contained a large quantity of cereal grains and occasional cereal chaff (predominantly barley, with smaller quantities of oat).
  - Also large quantity of weed remains and occasional hazelnut shell fragments.

<b>Phase</b>	<b>Cereal (grain)</b>	<b>Cereal (chaff)</b>	<b>Hazelnut (shell frag)</b>	<b>Weed (seed)</b>	<b>Date</b>
<b>Phase 3a: Ditch, Hearths</b>	656	2	5	151	A.D. 432-497; A.D. 502-617. <b>A.D. 595-657.</b>

**Overview of all plant groups (total deposits n=4)**

Phase	Oat (grain)	Barley (grain)
<b>Phase 3a: Ditch, Hearths</b> (n=648)	20.68%	79.32%

**Percentage of cereal grain types recorded in each phase of activity**

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	cf. Oat (grain)	Barley (grain)	Barley (rachis internode)	Indet. cereal (grain)
<b>Phase 3a: Ditch, Hearths</b>	134	3	514	2	5

**Detail of cereal remains**

Phase	Phase 3a: Ditch, Hearths
<b>Goosefoot family</b> (utricle): <i>Chenopodiaceae</i>	1
<b>Pale persicaria</b> (achene): <i>Persicaria lapathifolia</i>	2
<b>Knotweeds</b> (achene): <i>Persicaria</i> spp.	21
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>	2
cf. <b>Sheep's sorrel</b> (achene): <i>Rumex</i> cf. <i>acetosella</i>	8
<b>Knotweed family</b> (achene): <i>Polygonaceae</i>	115
<b>Cabbage family</b> (seed): <i>Brassicaceae</i>	1
<b>Sedges</b> (achene): <i>Carex</i> spp.	1

**Detail of weed remains**

## **Carnmore West, Co. Galway**

Grid Ref: **140817/227982**

SMR No: **N/A**

Reference: **Dillon 2008**

Excavations were undertaken in the interior and vicinity of a cashel (55m in diameter) prior to roadworks. These uncovered an annex to the cashel that measured approximately 40m x 35m, and two cereal-drying kilns situated 30m to the west.

The cashel walls were constructed using two rows of large limestone blocks with a rubble core, and two walls which extended into the cashel interior may have represented access to the walls or been the remains of demolished buildings. An entrance from the cashel into the annex was identified and was delimited by two post-holes cut into bedrock a small uneven cobbled surface. Charcoal from one of these postholes produced a radiocarbon date of A.D. 576-655.

A small number of randomly distributed pits and post-holes were excavated in the interior of the cashel. One of these appears to have been used as a grain storage pit and was radiocarbon dated to A.D. 710-889. A pit-drop entrance to a souterrain was also discovered, but, since the souterrain extended beyond the roadtake, this feature was not fully excavated. Charcoal from the base of the silt layer in the souterrain returned a date of A.D. 665-859, and the souterrain appears to have been used as a grave for domestic animals in recent years, with the skeleton of a modern dog and equine located in the entrance. A rock-cut hearth was discovered immediately to the south of the souterrain. The hearth contained charcoal and animal bone, but appears to have been associated with no other features, except for its close proximity with the souterrain. Two samples from the hearth produced radiocarbon dates of A.D. 720-949 and A.D. 772-965.

A 2m wide gap between the outer face of the cashel and the western wall of the annex would appear to have functioned as the original entrance to the complex. This gap was flanked by two postholes, the fills of which returned very similar radiocarbon dates of A.D. 676-869 and A.D. 688-883. The interior of the annex seems to have been disturbed by post-medieval ploughing.

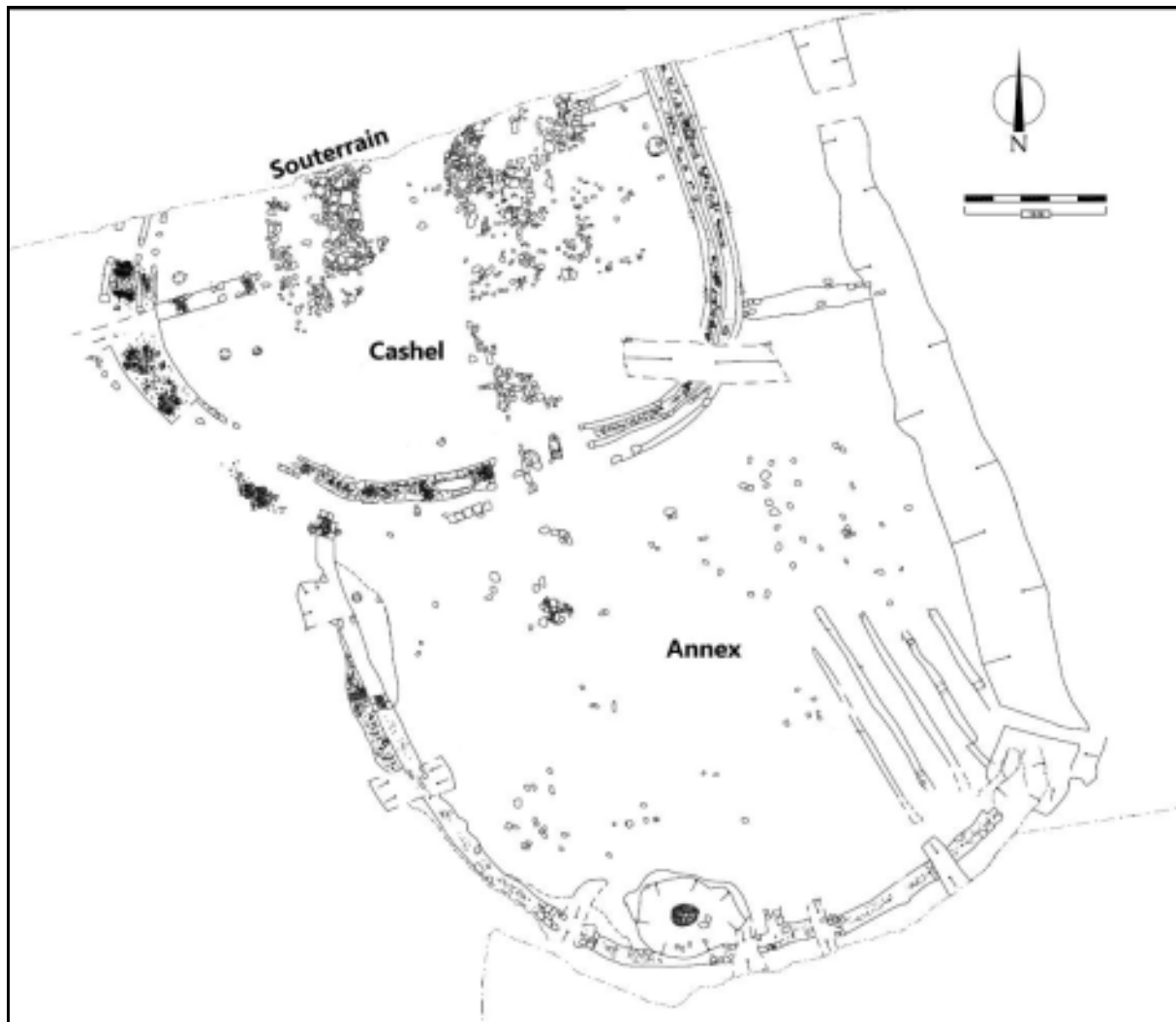
Two keyhole/dumbbell shaped kilns, truncated by a large L-shaped kiln, were located to the west of the annex. These earlier kilns returned possible contemporary dates of A.D. 687-881 and A.D. 665-859. The later kiln had a drystone built drying chamber and the flue was constructed with lintels and uprights of limestone. 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. Charcoal samples from this kiln produced dates of A.D. 1045-1258 and A.D. 1057-1156. Samples of grain taken from the flue of the later kiln, however, suggest an earlier date – A.D. 723-972 (UBA-7872); A.D. 657-865 (UBA-7870) and A.D. 641-770 (UBA-7868) – suggesting reworking of deposits associated with the earlier kilns.

A number of finds and samples were taken from the rubble collapse of the wall. The outer collapse contained two pieces of clay associated with metal production, a pre-10<sup>th</sup>-century whittle-tanged knife and a ferrous spearhead most likely dated to the early medieval period. The spearhead was recovered from close to the base of the wall collapse, suggesting that it was most likely left here during the occupation of the enclosure. Two fragments of rotary quern were also found in the wall collapse. A fragment of grained black shale bracelet was uncovered from the entranceway between the cashel and the annex; and two knives recovered from the interior of the cashel probably dated between the 10<sup>th</sup> and 15<sup>th</sup> centuries.

### **Plant remains**

Analysis of 20 deposits provided evidence for a substantial charred plant remains assemblage. A total of 996 cereal grains, 2 cereal chaff fragments, 27 hazelnut shell fragments, 2 fruit seeds and 248 weed seeds were recorded. The provenance of some deposits containing plant remains could not be ascertained, and they have not, therefore, been recorded below.

Cereals were recorded in several areas/phases of activity. A variety of crops was present, including oat, barley, naked wheat and rye. The weed remains may represent arable weeds and plants that were growing locally.



**Plan of excavations at Carnmore West, Co. Galway (Sutton 2008).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
UBA-7684	Charcoal from posthole C71 annex entrance	1250 $\pm$ 32 BP	<b>A.D. 676-832;</b> A.D. 836-869
UBA-7686	Charcoal from hearth C67	1188 $\pm$ 31 BP	A.D. 720-741; <b>A.D. 769-899;</b> A.D. 919-949
UBA-7687	Charcoal from hearth C67	1180 $\pm$ 31 BP	<b>A.D. 772-900;</b> A.D. 917-965
UBA-7688	Charcoal from souterrain entrance	1268 $\pm$ 31 BP	<b>A.D. 665-783;</b> A.D. 788-817; A.D. 843-859

UBA-7689	Charcoal from truncated kiln	1274±32 BP	<b>A.D. 662–782;</b> A.D. 789–812; A.D. 845–856.
UBA-7872	Charcoal from later kiln flue	1175±40 BP	A.D. 723–740; <b>A.D. 770–972</b>
UBA-7871	Charcoal from later kiln chamber	864±35 BP	<b>A.D. 1045–1095;</b> <b>A.D. 1119–1141;</b> <b>A.D. 1147–1258</b>
UBA-7870	Charcoal from early kiln chamber	1280±44 BP	<b>A.D. 657–828;</b> A.D. 838–865
UBA-7869	Charcoal from posthole C81 annex entrance	1230±34 BP	<b>A.D. 688–754;</b> <b>A.D. 758–883</b>
UBA-7868	Charcoal from early kiln chamber	1340±34 BP	<b>A.D. 641–723;</b> <b>A.D. 739–770</b>
UBA-7867	Charcoal from truncated kiln chamber	1233±34 BP	<b>A.D. 687–881</b>
UBA-7866	Charcoal from posthole C85 in entranceway	1432±28 BP	<b>A.D. 576–655</b>
UBA-7865	Charcoal from pit C125	1214±26 BP	A.D. 710–746; <b>A.D. 766–889</b>
UBA-7864	Charcoal from later kiln chamber	944±27 BP	<b>A.D. 1027–1156</b>

### Overview

- Cashel, Annex, Souterrain (5 deposits)
  - Contained cereal grains (predominantly barley, with smaller quantities of wheat, and occasional oat and rye).
  - Occasional cereal chaff, hazelnut shell fragments, and fruit and weed remains.
- Kilns, Phase 1 (14 deposits)
  - Activity at three kilns that appears to be broadly contemporary.
  - Contained cereal grains (predominantly barley, with smaller quantities of oat, and occasional wheat and rye).
  - Large quantity of weed seeds, and occasional hazelnut shell fragments and fruit remains.
- Kilns, Phase 2 (1 deposit)
  - Activity at the firing chamber of a kiln that appears to be later than activity at nearby kilns.
  - Contained a large quantity of cereal grains (predominantly oat, with smaller quantities of barley, and occasional wheat and rye).
  - Large quantity of weed seeds, and occasional cereal chaff and hazelnut shell fragments.

Phase	Cereal (grain)	Cereal (chaff)	H/nut (shell frag)	Fruit (seed)	Weed (seed)	Date (A.D.)
<b>Area A: Cashel, Annex, Souterrain</b>	156	1	18	1	3	<b>665–783;</b> 788–817; 843–859. 720–741; <b>769–899;</b> 919–948. <b>772–900;</b> 917–965. 710–746; <b>766–889. 676–832;</b> 836–869. 688–754; 758–883. <b>576–655.</b>
<b>Area B: Kilns, Phase 1</b>	230		6	1	144	<b>657–828;</b> 838–865. <b>641–723;</b> 739–770. 723–740; <b>770–972. 687–881. 662–782;</b> 789–812; 845–856.
<b>Area B: Kilns, Phase 2</b>	610	1	3		101	988–1051; 1082–1126; 1136–1152. 1045–1095; 1119–1141; 1147–1258.

### Overview of all plant groups (total deposits n=20)

Phase	Oat (grain)	Barley (grain)	Wheat (grain)	Rye (grain)
<b>Area A: Cashel, Annex, Souterrain</b> (n=114)	4.39%	67.54%	26.32%	1.75%
<b>Area B: Kilns, Phase 1</b> (n=162)	22.84%	67.28%	8.64%	1.23%
<b>Area B: Kilns, Phase 2</b> (n=557)	52.24%	38.78%	7.72%	1.26%

#### Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	Barley (grain)	Barley (rachis internode)	Naked wheat (grain)	Wheat (grain)
<b>Area A: Cashel, Annex, Souterrain</b>	5	77	1	30	
<b>Area B: Kilns</b>	37	109		12	2
<b>Area B: Kilns, Phase 2</b>	291	216		43	

#### Detail of oat, barley and wheat remains

Phase	Rye (grain)	cf. Rye (grain)	cf. Rye (rachis internode)	Indet. cereal (grain)
<b>Area A: Cashel, Annex, Souterrain</b>	2			42
<b>Area B: Kilns</b>	2	1		67
<b>Area B: Kilns, Phase 2</b>	7		1	53

#### Detail of rye and indeterminate cereal remains

Phase	Area A: Cashel, Annex, Souterrain	Area B: Kilns	Area B: Kilns, Phase 2
<b>Bramble</b> (nutlet): <i>Rubus fruticosus</i>		1	
<b>Sloe</b> (stone): <i>Prunus spinosa</i>	1		
<b>Fat-hen</b> (utricle): <i>Chenopodium album</i>		1	
<b>Goosefoot family</b> (utricle): Chenopodiaceae	1	36	1
<b>Pale persicaria</b> (achene): <i>Persicaria lapathifolia</i>		8	14
<b>Knotweeds</b> (achene): <i>Persicaria</i> spp.		16	8
cf. <b>Black-bindweed</b> (achene): <i>Fallopia</i> cf. <i>convolvulus</i>		6	3
cf. <b>Sheep's sorrel</b> (achene): <i>Rumex</i> cf. <i>acetosella</i>		3	
<b>Knotweed family</b> (achene): Polygonaceae		70	67
<b>Plantains</b> (seed): <i>Plantago</i> spp.	1	1	1
<b>Cleavers</b> (seed): <i>Galium aparine</i>			2
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>		1	
<b>Corn marigold</b> (achene): <i>Chrysanthemum segetum</i>		1	
<b>Daisy family</b> (achene): Asteraceae			5
<b>Indeterminate</b> (seed)	1	1	

#### Detail of fruit and weed remains



## **'Carraig Aille II' (Lough Gur td), Co. Limerick**

Grid Ref: **165345/140643**

SMR No: **LI032-053003**

References: **Ó Ríordáin 1948-50; Jessen & Helbaek 1944**

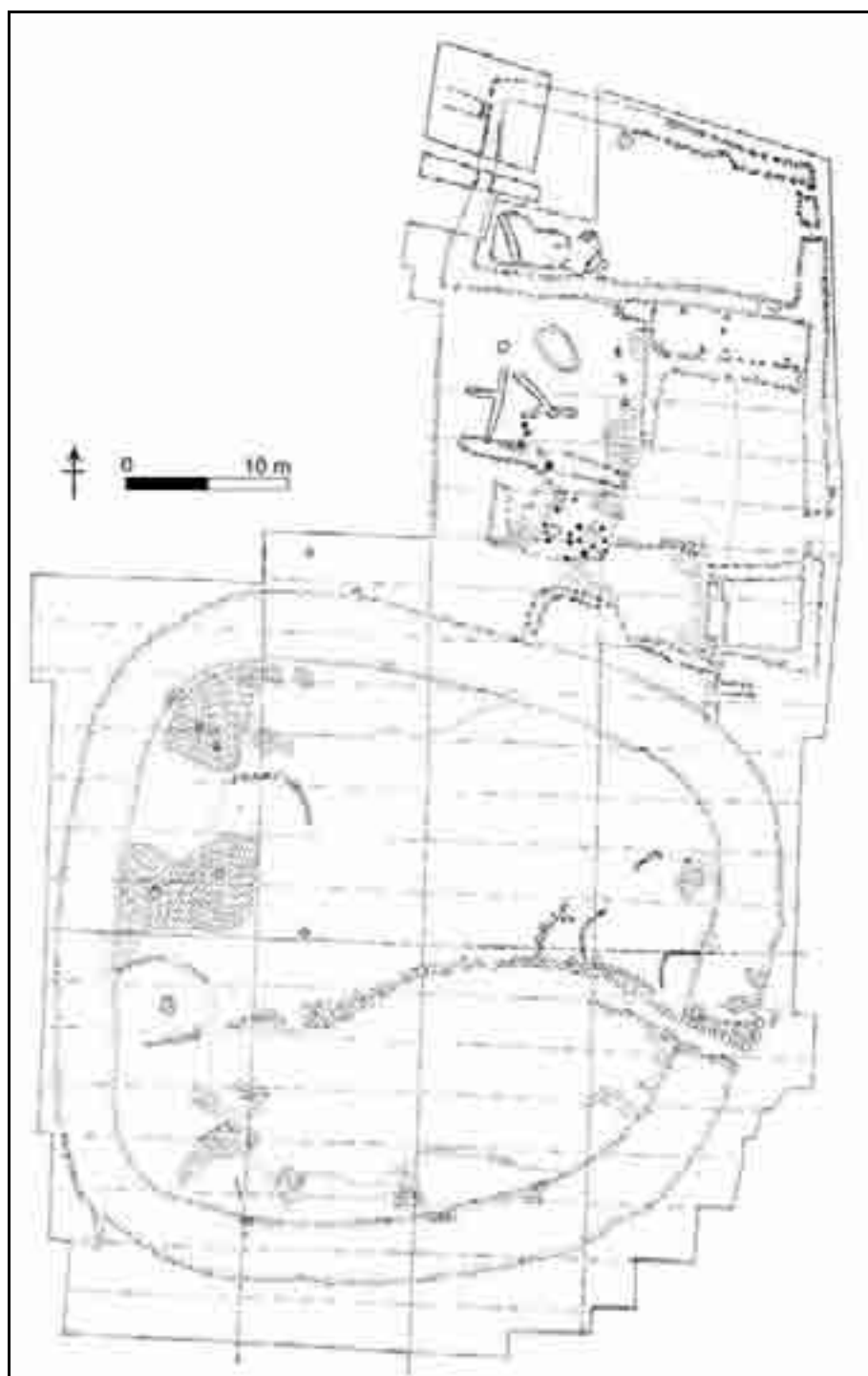
Carraig Aille II enclosed an area approximately 47m in diameter. The eastern entrance was defined by areas of paving and cobbling and contained a recess on either side of the entrance which may have supported a gate-structure. Successive layers of occupation debris, clay floors, hearths and multiple phases of metallurgy were uncovered in the interior. The early houses on site appear to have been round or curvilinear in form, and were probably wooden framed, while the later houses were rectangular in shape and stone built.

Few of the finds from Carraig Aille II could be confidently correlated with any of the successive occupation layers and only gave a general dating for the site. A hoard of silver objects (dated to the tenth century) and a silver ingot have been interpreted as Viking, as has the bronze terminal mount for a drinking-horn. On the basis of the artefacts, Carraig Aille II may have been occupied between the eighth and late-tenth/eleventh centuries.

### **Plant remains**

Analysis of one deposit provided evidence for charred flax seeds and weed seeds. Cereal, fruit and nut remains were absent.

The quantity of flax seeds was not recorded, but was mentioned as being "numerous" (Jessen & Helbaek 1944, 25). The weed seeds are likely to represent arable weeds. Radiocarbon dates were not available for this site.



**Plan of Carraig Aille II, Co. Limerick (after Ó Ríordáin 1948-50, plate II).**

<b>Phase</b>	<b>Flax (seed)</b>	<b>Corn spurrey (seed): <i>Spergula arvensis</i></b>
<b>Houses to north of cashel</b>	P	7

**Detail of plant remains (total deposits n=1)**

P = present

**Carrowkeel, Co. Galway**Grid Ref: **159326/223949**SMR No: **GA097-066**Reference: **Lyons 2009; Wilkins & Lalonde 2009.**

Three main phases of occupation were discovered during excavation – a series of ditches of Neolithic date; an early medieval enclosure associated with a cemetery; and later cultivation. The main early medieval enclosure ditch defined an area 65m by 47m at the top of the hill. Traces of three contemporary and parallel ditches appear to have subdivided this enclosure and delineated the eastern edge of a burial area that contained 158 individuals. The fill layers from the ditches suggest a gradual natural silting, followed by a deliberate in-filling of the ditch, possibly as a result of field clearance.

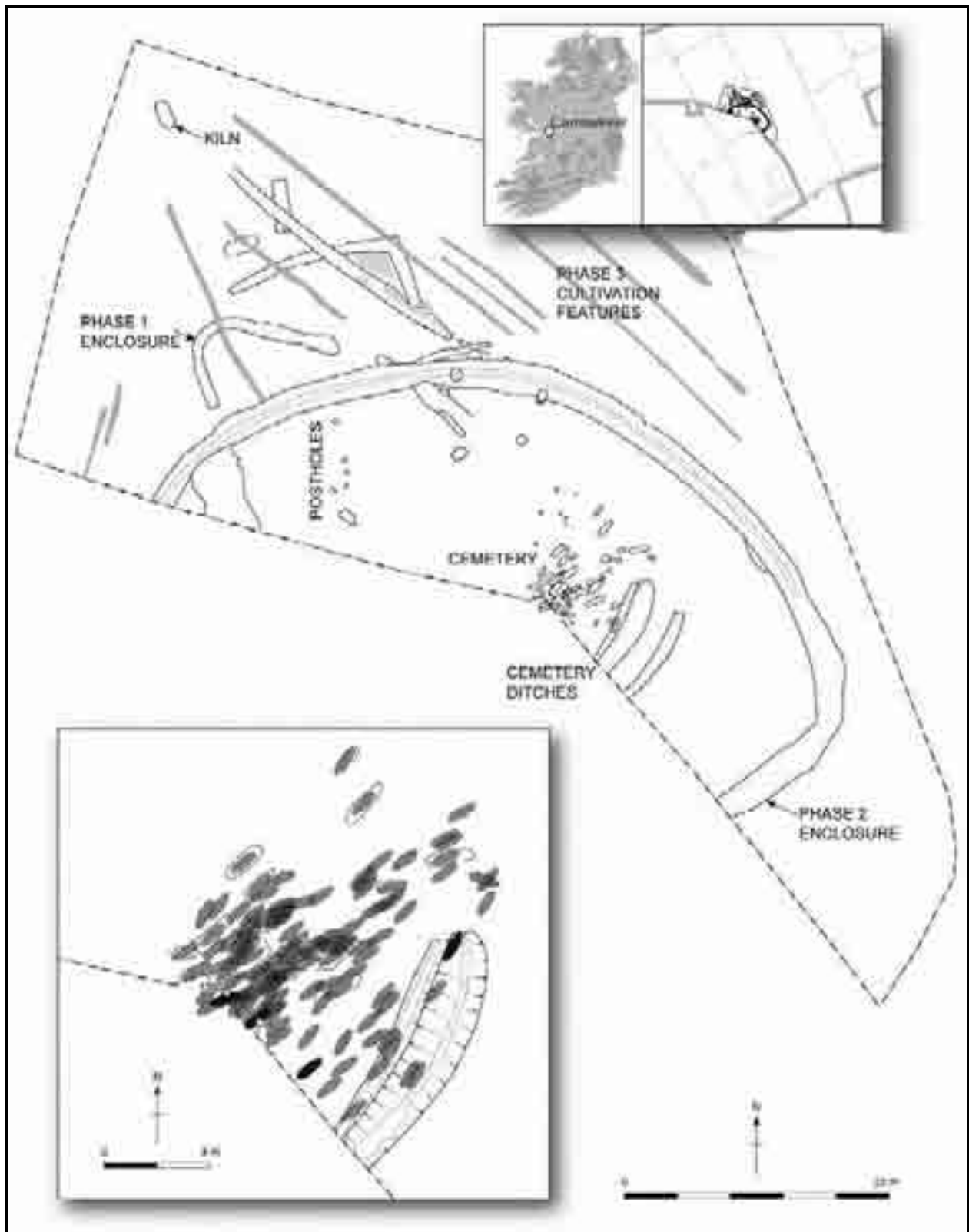
The site appears to have been a focus for burials between *c.* A.D. 650 and *c.* A.D. 1050, and there are few structural features from this phase. These consisted mainly of two (or three) 'cooking pits' associated with burning and animal bone.

**Plant remains**

Analysis of 22 deposits provided evidence for charred cereal grains, cereal chaff fragments, hazelnut shell fragments and weed seeds. The exact quantities of remains were not recorded in most cases – comments on general ubiquity were instead provided, which have been noted below. Fruit remains were absent.

Cereals were recorded in a number of areas/phases of activity. A variety of crops was present, including oat, barley and wheat. The weed remains may represent arable weeds or plants that were growing locally.

Plant remains from an additional four deposits were recorded in the plant remains report (Lyons 2009), but it was not clear if these deposits date to the early medieval period. As a result, these plant remains have not been recorded below.



Plan of Enclosure at Carrowkeel, Co. Mayo (after Wilkins & Lalonde 2008, 58).

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
GU-15326	Mouse bone from ditch pre-infill	1245 $\pm$ 45 BP	<b>A.D. 674–882.</b>
GU-15327	Mouse bone from ditch pre-infill	1115 $\pm$ 35 BP	A.D. 784–787; A.D. 824–841; <b>A.D. 862–1016.</b>
UB-7410	Foetus	499 $\pm$ 29 BP	<b>A.D. 1400–1447.</b>
UB-7411	Child	1129 $\pm$ 31 BP	A.D. 782–788; A.D. 812–845; <b>A.D. 857–989.</b>
UB-7412	Adult male	1186 $\pm$ 32 BP	A.D. 721–741; <b>A.D. 770–899;</b> A.D. 918–952; A.D. 959–960.
UB-7413	Foetus	1148 $\pm$ 31 BP	A.D. 780–792; <b>A.D. 804–975.</b>
UB-7414	Child	1156 $\pm$ 31 BP	<b>A.D. 779–794;</b> <b>A.D. 798–906;</b> <b>A.D. 911–971.</b>
UB-7416	Infant	1125 $\pm$ 31 BP	A.D. 783–788; A.D. 814–844; <b>A.D. 859–991.</b>
UB-7417	Adult female	1228 $\pm$ 31 BP	<b>A.D. 689–752;</b> <b>A.D. 761–884.</b>
UB-7418	Infant	1214 $\pm$ 31 BP	<b>A.D. 693–748;</b> <b>A.D. 765–890.</b>
UB-7419	Foetus	638 $\pm$ 30 BP	<b>A.D. 1284–1329;</b> <b>A.D. 1340–1396.</b>
UB-7420	Adult female	1264 $\pm$ 31 BP	<b>A.D. 667–783;</b> A.D. 787–823; A.D. 841–861.
UB-7422	Foetus	815 $\pm$ 31 BP	<b>A.D. 1169–1269.</b>
UB-7423	Adult male	1244 $\pm$ 32 BP	<b>A.D. 682–872.</b>
UB-7424	Child	1182 $\pm$ 32 BP	A.D. 726–737; <b>A.D. 771–900;</b> A.D. 918–964.
UB-7425	Adolescent	1250 $\pm$ 34 BP	<b>A.D. 676–870.</b>
UB-7426	Infant	830 $\pm$ 31 BP	<b>A.D. 1159–1265.</b>
UB-7427	Adult female	940 $\pm$ 31 BP	<b>A.D. 1024–1161.</b>
UB-7428	Adult male	906 $\pm$ 31 BP	<b>A.D. 1038–1208.</b>
UB-7429	Child	1104 $\pm$ 31 BP	<b>A.D. 885–999;</b> A.D. 1002–1013.
UB-7430	Child	1185 $\pm$ 31 BP	A.D. 723–740; <b>A.D. 770–899;</b> A.D. 918–951.
UB-7431	Child	1193 $\pm$ 34 BP	A.D. 710–746; <b>A.D. 766–899;</b> A.D. 919–949.

UB-7432	Child	1261±33 BP	<b>A.D. 668-827;</b> A.D. 839-864.
UB-7433	Adult female	954±31 BP	<b>A.D. 1022-1156.</b>
UB-7434	Infant	1215±32 BP	<b>A.D. 692-749;</b> <b>A.D. 764-890.</b>
UB-7435	Child	1203±32 BP	A.D. 694-701; A.D. 707-747; <b>A.D. 765-895;</b> A.D. 926-936.
UB-7436	Adult male	1193±31 BP	A.D. 716-743; <b>A.D. 768-897;</b> A.D. 921-943.
UB-7437	Infant	949±32 BP	<b>A.D. 1023-1158.</b>
UB-7438	Adult male	935±31 BP	<b>A.D. 1024-1165.</b>
UB-7439	Child	1168±32 BP	<b>A.D. 775-903;</b> <b>A.D. 915-968.</b>
UB-7440	Adult male	1301±31 BP	<b>A.D. 660-772.</b>
UB-7441	Adult female	1182±31 BP	A.D. 728-736; <b>A.D. 771-900;</b> A.D. 918-962.
UB-7442	Child	907±30 BP	<b>A.D. 1037-1192;</b> A.D. 1196-1207.
UB-7443	Adult female	1305±34 BP	<b>A.D. 658-773.</b>
UB-7444	Child	1113±32 BP	A.D. 832-836; <b>A.D. 869-1015.</b>
UB-7445	Adult female	1196±35 BP	A.D. 694-701; A.D. 707-747; <b>A.D. 765-898;</b> A.D. 920-946.
UB-7446	Infant	1223±33 BP	<b>A.D. 689-752;</b> <b>A.D. 761-887.</b>
UB-7447	Foetus	1193±33 BP	A.D. 712-745; <b>A.D. 767-898;</b> A.D. 920-947.
UB-7448	Adult female	1249±31 BP	<b>A.D. 678-832;</b> A.D. 836-869.
UB-7449	Child	1113±32 BP	A.D. 832-836; <b>A.D. 869-1015.</b>
UB-7482	Child	1127±32 BP	A.D. 782-788; A.D. 812-845; <b>A.D. 857-991.</b>
UB-7483	Foetus	1227±31 BP	<b>A.D. 689-752;</b> <b>A.D. 761-884.</b>

## Overview

- Phase 1: Pre-enclosure and cemetery (4 deposits)
  - Contained cereal grains, including barley, as well as hazelnut and weed remains.
- Phase 2a: Enclosure – Ditch (1 deposit)
  - Contained possible cereal grains.
- Phase 2b: Enclosure – Ditches (9 deposits)
  - Contained cereal grains, including barley and possible wheat, as well as hazelnut remains.
- Phase 2c: Enclosure – Pits (5 deposits)
  - Contained cereal grains, including oat, barley and wheat.

- Phase 2: Cemetery Phase 1 – Burials (2 deposits)
  - Contained cereal grains, including barley, and possible cereal chaff.
- Phase 2: Cemetery Phase 3 – Burials (1 deposit)
  - Contained cereal grains.

Phase	Cereal (grain)	Cereal (chaff)	Hazelnut (shell frag)	Weed (seeds)	Date (A.D.)
<b>Phase 1: Pre-enclosure and cemetery</b>	P		P	P	
<b>Phase 2a: Enclosure – Ditch</b>	P				
<b>Phase 2b: Enclosure – Ditches</b>	P		P		<b>674–882; 784–787; 824–841; 862–1016.</b>
<b>Phase 2c: Enclosure Pits</b>	P				
<b>Phase 2: Cemetery Phase 1 – Burials</b>	P	P			<b>658–773; 660–772; 667–783; 787–823; 841–861; 668–827; 839–864; 676–870; 678–832; 836–869; 682–872; 689–752; 761–884; 689–752; 761–884; 689–752; 761–887; 692–749; 764–890; 693–748; 765–890; 694–701; 707–747; 765–895; 926–936; 694–701; 707–747; 765–898; 920–946; 710–746; 766–899; 919–949; 712–745; 767–898; 920–947; 716–743; 768–897; 921–943; 721–741; 770–899; 918–952; 959–960; 723–740; 770–899; 918–951; 726–737; 771–900; 918–964; 728–736; 771–900; 918–962; 775–903; 915–968; 779–794; 798–906; 911–971; 782–788; 812–845; 857–991.</b>
<b>Phase 2: Cemetery Phase 3 – Burials</b>	P				<b>1022–1156; 1023–1158; 1024–1161; 1024–1165; 1037–1192; 1196–1207; 1038–1208; 1159–1265; 1169–1269.</b>

**Overview of all plant groups (total deposits n=22)** P = Present

Phase	Oat (grain)	Barley (grain)	Wheat (grain)	cf. Wheat (grain)
<b>Phase 1: Pre-enclosure and cemetery</b>		P		
<b>Phase 2a: Enclosure – Ditch</b>				
<b>Phase 2b: Enclosure – Ditches</b>		P		P
<b>Phase 2c: Enclosure – Pits</b>	P	P	P	
<b>Phase 2: Cemetery Phase 1 – Burials</b>		P		
<b>Phase 2: Cemetery Phase 3 – Burials</b>				

**Detail of oat, barley and wheat remains**

<b>Phase</b>	<b>Indet. cereal</b> (grain)	cf. <b>Indet. cereal</b> (grain)	cf. <b>Indet. cereal</b> (chaff frag)
<b>Phase 1: Pre-enclosure and cemetery</b>	P		
<b>Phase 2a: Enclosure – Ditch</b>		P	
<b>Phase 2b: Enclosure – Ditches</b>	P		
<b>Phase 2c: Enclosure – Pits</b>	P		
<b>Phase 2: Cemetery Phase 1 – Burials</b>	P		P
<b>Phase 2: Cemetery Phase 3 – Burials</b>	P		

**Detail of indeterminate cereal remains**

<b>Phase</b>	<b>Hazelnut</b> (shell frag)	cf. <b>Hazelnut</b> (shell frag)	<b>Knotgrasses</b> (achene): <i>Polygonum</i> spp.
<b>Phase 1: Pre-enclosure and cemetery</b>	P		P
<b>Phase 2a: Enclosure – Ditch</b>			
<b>Phase 2b: Enclosure – Ditches</b>	P	P	
<b>Phase 2c: Enclosure – Pits</b>			
<b>Phase 2: Cemetery Phase 1 – Burials</b>			
<b>Phase 2: Cemetery Phase 3 – Burials</b>			

**Detail of hazelnut and weed remains**



## **Castlefarm (Site 1), Co. Meath**

Grid reference: **300394/241605**

SMR: **N/A**

Reference: **Archaeological Services University of Durham (ASUD) 2009; O'Connell & Clarke 2009.**

Castlefarm was a multi-phase settlement/cemetery site that was dated to between the fifth and thirteenth centuries. The primary D-shaped enclosure at Castlefarm (Phase II) – constructed sometime between the mid fifth and mid seventh centuries – had dimensions of 90m by 70m. At least seven burials – extended with heads to the west – were associated with the initial phase. They were located outside the enclosure, and both adults and children (male and female) were represented. Artefacts from the ditch in this phase included a bone knife handle with ring and dot decoration, iron knife blades and copper-alloy ringed pins.

The initial enclosing ditch was re-cut on a number of occasions between the seventh and eighth centuries (Phases IIb and IIc). Artefacts from this period included dress items such as ringed pins, bone pins and lignite bracelets, as well as worked bone and antler as well as a variety of iron knives.

The site was considerably enlarged between A.D. 771 and A.D. 975 by the construction of an outer enclosure (Phase III). The D-shaped enclosure was re-cut on its eastern side and the site was expanded to the southwest, west and north. The finds assemblage was comparable to earlier phases and included a variety of dress and functional artefacts. An enclosure annex was subsequently constructed at the south of the site (Phase IV).

The final early medieval modifications to the enclosure occurred between the late eighth and early eleventh centuries (Phase V). This phase involved a re-cut to the outer enclosure ditch and the incorporation of the enclosure annex. Artefacts included omega pins and penannular brooches and substantial quantities of animal bone were present in the ditch-fills. The latter was present in large quantities throughout the early medieval phases.

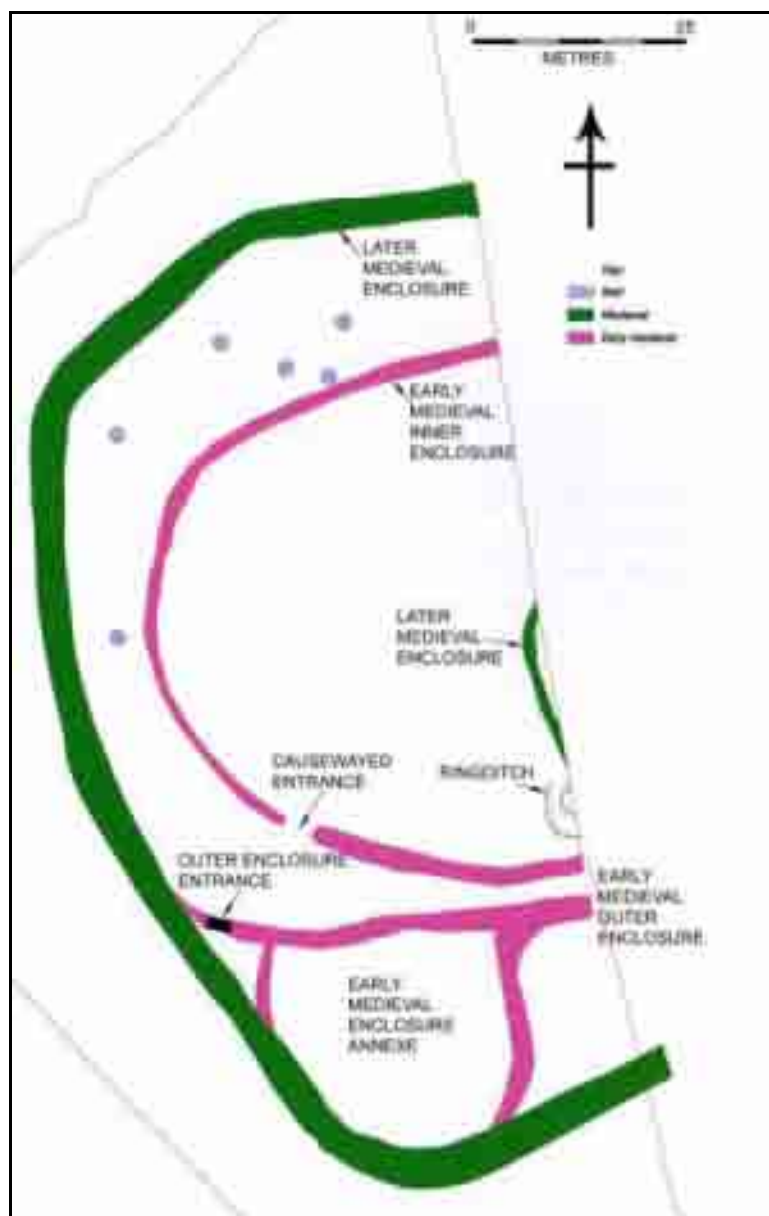
Later medieval activity was evident through a re-cut of the outer enclosure ditch and small-scale industrial activity within the inner and outer enclosure ditches. Material culture – in the form of artefacts and animal bone – was not present in large quantities during this phase.

Centuries of subsequent agricultural activity meant that very little survived internally within the enclosures at Castlefarm. Small-scale ironworking was evident by the presence of three possible bowl furnaces, a charcoal production pit and the occurrence of iron waste or slag. One of the bowl furnaces was dated to A.D. 564-666 while the charcoal production pit was formed later between A.D. 1035-1225. Evidence for non-ferrous metalworking was also small and included two rough globules of molten copper and a possible copper ingot. Cereal processing was evident in the form of a figure-of-eight-shaped cereal-drying kiln and the fragments of two rotary quernstones. Charcoal from the second fill of the kiln was dated to A.D. 662-828.

### **Plant remains**

Analysis of 128 deposits provided evidence for a large charred and waterlogged plant remains assemblage. A total of 1064 charred and waterlogged cereal grains, 109 charred cereal chaff fragments, 57 charred and waterlogged flax seeds, 426 charred and waterlogged hazelnut shell fragments, 3271 charred and waterlogged fruit seeds and 3500 charred and waterlogged weed seeds were recorded.

Cereals were recorded in a variety of areas/phases of activity. A range of crops was present, including common oat, hulled barley, six-row barley, bread wheat and rye. The presence of flax and nettle remains in a number of wells was interpreted as evidence for the use of these wells in flax- and nettle-retting activities. The weed remains may represent arable weeds and plants that were growing locally.



**Enclosures at Castlefarm, Co. Meath (after O'Connell 2006, 19).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Phase</b>	<b>Context</b>	<b>Lab Code</b>	<b><sup>14</sup>C Age</b>	<b>Calib. 2 σ</b>
Ila	Right femur shaft fragment from burial 1	Beta 229298	1570±40 BP	<b>A.D. 409-575</b>
Ila	Left fibula shaft fragment from burial 7	Beta 229299	1530±40 BP	<b>A.D. 427-608</b>
Ila	F212: Animal bone from primary fill of inner enclosure ditch	Beta 220131	1500±40 BP	<b>A.D. 434-492; A.D. 508-519; A.D. 528-643</b>
Ilb	F201: Cattle metapodial bone from fill of inner enclosure ditch	Beta 246932	1280±40 BP	<b>A.D. 658-786; A.D. 787-824;</b>

				A.D. 841-861.
IIb	F486: Charcoal from second re-cut of inner enclosure ditch	Beta 246936	1370±40 BP	<b>A.D. 599-712;</b> A.D. 746-767
IIc	F199: Maloideae charcoal from fill of inner enclosure ditch	Beta 246931	1300±40 BP	<b>A.D. 658-783;</b> A.D. 787-824; A.D. 841-861
IIc	Right femur shaft fragment from burial 10	Beta 229300	1280±40 BP	<b>A.D. 658-783;</b> A.D. 787-824; A.D. 841-861
III	F214: Animal bone from fill of outer enclosure ditch	Beta 220132	1170±40 BP	A.D. 727-737; <b>A.D. 771-975</b>
Va	F298: Animal bone from primary fill of outer enclosure ditch re-cut	Beta 220133	1160±40 BP	<b>A.D. 775-979</b>
Vb	F800: Ash charcoal from fill of outer enclosure ditch re-cut	Beta 246940	1180±40 BP	A.D. 717-743; <b>A.D. 768-907;</b> A.D. 911-971.
Vc	F92: Ash charcoal from fill of outer enclosure ditch re-cut	Beta 246929	1130±40 BP	A.D. 780-792; <b>A.D. 803-992.</b>
?	F949: Charcoal from basal fill of bowl furnace C943	Beta-246945	1420±40 BP	<b>A.D. 564-666</b>
?	F527: Charcoal from fill of charcoal-rich production pit C511	Beta-246938	880±40 BP	<b>A.D. 1035-1225;</b> A.D. 1234-1238; A.D. 1248-1251
?	F685: Grain from fill of figure-of-eight-shaped cereal-drying kiln	Beta-246939	1270±40 BP	<b>A.D. 662-828;</b> A.D. 838-866
	F175: Blackthorn charcoal from fill of outer enclosure ditch re-cut	Beta-246930	930±40 BP	<b>A.D. 1023-1187;</b> A.D. 1199-1206.
	F299: Hazel wood from Well 2 (F281)	Beta-246933	1230±40 BP	<b>A.D. 684-887.</b>
	F387: Hazel charcoal from Well 3 (F318)	Beta-246935	1300±40 BP	<b>A.D. 649-781;</b> A.D. 791-807.
	F807: Ash charcoal from Well 4 (F734)	Beta-246941	1190±40 BP	A.D. 694-700; A.D. 708-747; A.D. 765-902; A.D. 916-967.
	F816: Ash charcoal from Well 5 (F780)	Beta-246942	1270±40 BP	<b>A.D. 662-828;</b> A.D. 838-866.
	F851: Ash charcoal from Well 6 (F823)	Beta-246943	1240±40 BP	<b>A.D. 680-882.</b>
	F1026: Ash charcoal from Well 9 (F1027)	Beta-246946	1260±40 BP	<b>A.D. 668-832;</b> A.D. 836-869.
	F1097: Maloideae charcoal from Well 8 (F948)	Beta-246947	1580±40 BP	<b>A.D. 402-568.</b>

## Overview

- Phase 2: Inner enclosure ditch (4 deposits)
  - Contained a small quantity of cereal grains (barley).
  - Occasional hazelnut shell and weed remains also present.
- Phase 3: Outer enclosure ditch (5 deposits)
  - Contained a small quantity of cereal grains (barley, oat and wheat).
  - Occasional hazelnut shell also present.

- Phase 5: Outer enclosure extension (16 deposits)
  - Contained a small quantity of cereal grains (barley, oat and possible bread wheat).
  - Large quantity of fruit and weed remains (mostly waterlogged) also present, as well as hazelnut shell.
- Wells (37 deposits)
  - Contained a small quantity of cereal grains and chaff (predominantly oat, including common oat, as well as barley and bread wheat).
  - Large quantity of fruit and weed remains (mostly waterlogged), as well as hazelnut shell and flax remains.
- Kiln/Smithing hearths (6 deposits)
  - Contained a large quantity of cereal grains (predominantly barley, with smaller quantities of wheat and oat, and occasional rye).
  - Occasional hazelnut shell, fruit and weed remains also present.
- Charcoal production pit (1 deposit)
  - Contained a large quantity of cereal grains (predominantly oat, with smaller quantities of wheat and barley, and occasional rye).
  - Occasional fruit and weed remains also present.
- Enclosure interior & between ditches (27 deposits)
  - Contained a large quantity of cereal grains, predominantly oat and wheat, with smaller quantities of barley.
  - Flax, hazelnut, fruit and weed remains also present.
- Miscellaneous (32 deposits)
  - These deposits are likely to be early medieval in date, but there is no clear stratigraphic or radiocarbon evidence to confirm this.
  - Contained a large quantity of cereal grains and chaff, predominantly oat, with smaller quantities of barley and wheat.
  - Hazelnut, fruit and weed remains also present.

Phase	Cereal (grain)	Cereal (chaff)	Flax (seed)	Hazelnut (shell)	Fruit (seed)	Weed (seed)	Date (A.D.)
<b>Phase 2: Inner enclosure ditch</b>	4			4		1	<b>409–575; 427–608; 658–783;</b> 787–824; 841–861; 434–492; 508–519; 528–643; <b>658–783;</b> 787–824; 841–861; <b>599–712;</b> 746–767; <b>649–781;</b> 791–807.
<b>Phase 3: Outer enclosure ditch</b>	14			1			727–737; <b>771–975.</b>
<b>Phase 5: Outer enclosure extension</b>	23			71	2062	1656	<b>775–979;</b> 717–743; 768–907; 911–971; 780–792; <b>803–992; 1023–1187;</b> 1199–1206.
<b>Wells</b>	40	2	56	253	1074	1696	<b>402–568; 649–781;</b> 791–807; <b>662–828;</b> 838–866; <b>668–832;</b> 836–869; <b>680–882; 684–887;</b> 694–700; 708–747; 765–902; 916–967.
<b>Kiln/ Smithing hearths</b>	400			1	3	36	<b>662–828;</b> 838–866; <b>564–666.</b>

<b>Charcoal production pit</b>	237				1	4	<b>1035–1225</b> ; 1234–1238; 1248–1251.
<b>Enclosure interior &amp; between ditches</b>	186		1	50	30	59	
<b>Misc.</b>	160	107		46	101	48	

**Overview of all plant groups (total deposits n=128)**

Phase	Oat (grain)	Barley (grain)	Wheat (grain)	Rye (grain)
<b>Phase 2: Inner enclosure ditch</b> (n=4)				
<b>Phase 3: Outer enclosure ditch</b> (n=14)				
<b>Phase 5: Outer enclosure extension</b> (n=19)				
<b>Wells</b> (n=29)	58.62%	17.24%	24.14%	0.00%
<b>Kiln/ Smithing hearths</b> (n=337)	9.79%	71.22%	18.10%	0.89%
<b>Charcoal production pit</b> (n=224)	58.04%	9.82%	31.70%	0.45%
<b>Enclosure interior &amp; between ditches</b> (n=136)	35.29%	25.74%	38.97%	0.00%
<b>Misc.</b> (n=111)	42.34%	27.93%	29.73%	0.00%

**Percentage of cereal grain types recorded in each phase of activity**

(where >25 total grains recorded) n=total number of grains recorded that were identifiable to genus

Phase	Common oat (florete base)	Oat (grain)	Six-row hulled barley (grain)	Hulled barley (grain)	Barley (grain)	Flax (seed)
<b>Phase 2: Inner enclosure ditch</b>					4	
<b>Phase 3: Outer enclosure ditch</b>		3			9	
<b>Phase 5: Outer enclosure extension</b>		5			7	
<b>Wells</b>	1	17			5	
<b>Kiln/ Smithing hearths</b>		33	7	16	217	
<b>Charcoal production pit</b>		130			22	
<b>Enclosure interior &amp; between ditches</b>		48		2	33	1
<b>Misc.</b>		47		1	30	

**Detail of charred oat, barley and flax remains**

Phase	Bread wheat (rachis)	cf. Bread wheat (grain)	Wheat (grain)	Rye (grain)	Indet. cereal (grain)
<b>Phase 2: Inner enclosure ditch</b>					
<b>Phase 3: Outer enclosure ditch</b>			2		
<b>Phase 5: Outer enclosure extension</b>		6	1		4
<b>Wells</b>	1	3	3		11

<b>Kiln/ Smithing hearths</b>		53	8	3	63
<b>Charcoal production pit</b>		71		1	13
<b>Enclosure interior &amp; between ditches</b>		31	22		50
<b>Misc.</b>	107	25	8		49

**Detail of charred wheat, rye and indeterminate cereal remains**

<b>Phase</b>	<b>cf. Bread wheat (grain)</b>	<b>Flax (seed)</b>
<b>Phase 2: Inner enclosure ditch</b>		
<b>Phase 3: Outer enclosure ditch</b>		
<b>Phase 5: Outer enclosure extension</b>		
<b>Wells</b>	1	56
<b>Kiln/ Smithing hearths</b>		
<b>Charcoal production pit</b>		
<b>Enclosure interior &amp; between ditches</b>		
<b>Misc.</b>		

**Detail of waterlogged cereal and flax remains**

<b>Phase</b>	<b>Phase 2</b>	<b>Phase 3</b>	<b>Phase 5</b>	<b>Wells</b>	<b>Kiln &amp; SH</b>	<b>Charcoal PP</b>	<b>Encl. int. &amp; BD</b>	<b>Misc.</b>
<b>Hazelnut</b> (shell frag)	4	1	5	40	1		50	46
<b>Bramble</b> (nutlet): <i>Rubus fruticosus</i>							1	
<b>Sloe</b> (stone): <i>Prunus spinosa</i>				6			7	
<b>Goosefoots</b> (utricle): <i>Chenopodium</i> spp.				1				
<b>Knotgrass</b> (achene): <i>Polygonum aviculare</i>					3			
<b>Docks</b> (achene): <i>Rumex</i> spp.				1	14		2	
<b>Hemp-nettles</b> (nutlet): <i>Galeopsis</i> spp.					1			
<b>Ribwort plantain</b> (seed): <i>Plantago lanceolata</i>					5		1	
<b>Cleavers</b> (seed): <i>Galium aparine</i>			3		2			1
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>				1	4		1	
<b>Scentless mayweed</b> (achene): <i>Tripleurospermum inodorum</i>					1			
<b>Sedges</b> (achene): <i>Carex</i> spp.				1				
<b>Grass family</b> (grain): Poaceae				1			7	11
<b>Indeterminate</b> (seed)								1

**Detail of charred hazelnut, fruit and weed remains**

Phase	Phase 2	Phase 3	Phase 5	Wells	Kiln & SH	Charcoal PP	Encl. int. & BD	Misc.
<b>Hazelnut</b> (shell frag)			66	213				
<b>Raspberry</b> (nutlet): <i>Rubus idaeus</i>			9	104				
<b>Bramble</b> (nutlet): <i>Rubus fruticosus</i>			1067	848	2		16	90
<b>Sloe</b> (stone): <i>Prunus spinosa</i>			17	31			1	
<b>Wild plum</b> (stone): <i>Prunus domestica</i>			1					
<b>Haw fruit</b> (nutlet): <i>Crataegus monogyna</i>			6	7				
<b>Elder</b> (seed): <i>Sambucus nigra</i>			962	78	1	1	5	11
<b>Celery-leaved buttercup</b> (achene): <i>Ranunculus sceleratus</i>			4	1				
<b>Lesser spearwort</b> (achene): <i>Ranunculus flammula</i>				1				
<b>Buttercups</b> (achene): <i>Ranunculus</i> spp.			152	91	1	1	2	2
<b>Fumitories</b> (seed): <i>Fumaria</i> spp.	1		1	1		1	13	11
<b>Common nettle</b> (achene): <i>Urtica dioica</i>			815	613			25	11
<b>Small nettle</b> (achene): <i>Urtica urens</i>				124				
<b>Fat-hen</b> (utricle): <i>Chenopodium album</i>				2				
<b>Goosefoots</b> (utricle): <i>Chenopodium</i> spp.			1	3				1
<b>Common chickweed</b> (seed): <i>Stellaria media</i>			12	51				1
<b>Lesser stitchwort</b> (seed): <i>Stellaria graminea</i>			4					
<b>Pink family</b> (seed): Caryophyllaceae							1	
<b>Redshank</b> (achene): <i>Persicaria maculosa</i>				71				
<b>Pale persicaria</b> (achene): <i>Persicaria lapathifolia</i>				1				
<b>Knotgrass</b> (achene): <i>Polygonum aviculare</i>			5	5				
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>				6			1	
<b>Docks</b> (achene): <i>Rumex</i> spp.			64	365			1	1
<b>Violets</b> (seed): <i>Viola</i> spp.			1	1				
<b>Wild radish</b> (pod): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>			3	3				
<b>Primrose family</b> (seed): Primulaceae				1				
<b>Rose family</b> (thorn): Rosaceae			364	1				
<b>Willowherbs</b> (seed): <i>Epilobium</i> spp.			4					
<b>Holly</b> (nutlet): <i>Ilex aquifolium</i>			1					
<b>Field maple</b> (seed): <i>Acer campestre</i>			2					

<b>Crane's-bills</b> (seed): <i>Geranium</i> spp.			1					
<b>Fool's parsley</b> (mericarp): <i>Aethusa cynapium</i>			19	43				1
<b>Hemlock</b> (mericarp): <i>Conium maculatum</i>			54	72			1	2
<b>Fool's water-cress</b> (mericarp): <i>Apium nodiflorum</i>			72					1
<b>Hogweed</b> (mericarp): <i>Heracleum sphondylium</i>			9					
<b>Upright hedge parsley</b> (mericarp): <i>Torilis japonica</i>			10	1				
<b>Henbane</b> (seed): <i>Hyoscyamus niger</i>			3	13			1	
<b>Nightshade family</b> (seed): Solanaceae			1	7				1
<b>Woundworts</b> (nutlet): <i>Stachys</i> spp.			241	16	1		2	
<b>Dead nettles</b> (nutlet): <i>Lamium</i> spp.				18				
<b>Hemp-nettles</b> (nutlet): <i>Galeopsis</i> spp.			13	10				2
<b>Selfheal</b> (nutlet): <i>Prunella vulgaris</i>			3	3				
cf. <b>Water mint</b> (nutlet): <i>Mentha</i> cf. <i>aquatica</i>			2					
<b>Dead-nettle family</b> (nutlet): Lamiaceae			8				1	
<b>Ivy-leaved speedwell</b> (seed): <i>Veronica hederifolia</i>					2			
<b>Thistles</b> (achene): <i>Carduus/Cirsium</i> spp.			51	33				
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>			8	39	1			
<b>Prickly sow-thistle</b> (achene): <i>Sonchus asper</i>			35	58	1			1
<b>Daisy family</b> (achene): Asteraceae				1				
<b>Horned pondweed</b> (seed): <i>Zannichellia palustris</i>			13	1				
<b>Sedges</b> (achene): <i>Carex</i> spp.			41	36		2		

**Detail of waterlogged hazelnut, fruit and weed remains**



## **Church Island (Ballycarbery West td, Valentia Island), Co. Kerry**

Grid Ref: **043050/078550**

SMR No: **KE079-032**

Reference: **Scannell 1958; O'Kelly 1958**

Church Island is a very small island at the mouth of Valentia harbour on the northern side of the Iveragh peninsula. The site is connected to the nearby island of Beginish by a sandbar at low tide. The original excavations revealed a series of early medieval churches, buildings, burials and an enclosing cashel with associated habitation and ironworking evidence. Further excavations in 2004-05 exposed an elaborate terraced shrine mound on a high rocky knoll on the island.

Early monastic activity consisted of a wooden church and circular wooden hut; both were probably contemporary with each other though there was no archaeological evidence to confirm this. The primary habitation refuse from the wooden roundhouse contained charcoal, winkle, limpet shells, animal bone and a large quantity of iron slag. A possible furnace-base inside the area of the subsequent stone-built roundhouse belonged to the primary occupation phase.

The second phase of monastic activity consisted of a rectangular stone oratory and a circular stone house (House 1). An internal spread of habitation refuse from the stone-built roundhouse contained shells, carbonized grain and animal and fish bone, as well as a hearth of burnt material just inside the door. Finds from the circular stone house and its associated habitation refuse included a quernstone, shale axe, net-sinker, whet-stone, three pieces of flint, bronze strip, fourteen large brad-like iron nails, seven iron knives and two perforated bone points.

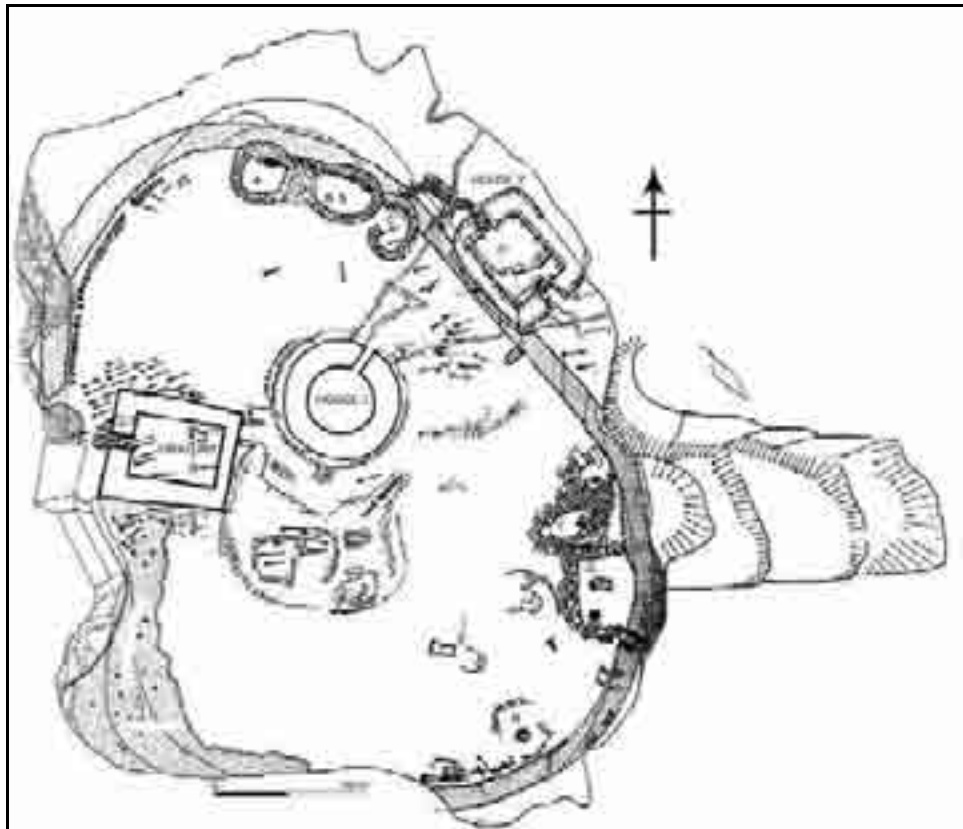
The third phase of monastic activity consisted in the construction of a rectangular stone house (House 2) and an enclosing cashel wall. Both this house and the enclosing cashel wall post-dated the circular stone house as they were built upon the deposit of refuse associated with this building, but the circular stone house was still in use after the cashel wall was built since the spread of refuse continued to build up for a height of 1m against the wall's inner face. The floor of the rectangular house was covered with a layer of habitation refuse consisting mainly of limpet and periwinkle shells with some animal and fish bone. Finds associated with the rectangular house included two hammer-stones, perforated stone, two pieces of flint, bronze strip, eight large brad-like iron nails and a socketed iron spade or mattock.

The final occupation phase consisted of post-monastic squatter activity involving the erection of a series of rough shelters or wind-breaks on the northern, eastern and south-eastern tips of the island as well as inside the rectangular stone house (Houses A-H). The shelters partly overlay the cashel walls. Sherds of late-thirteenth/fourteenth-century glazed pottery were found associated with the evidence for the shelter inside the rectangular stone house and indicate a possible medieval date for this phase of activity.

### **Plant remains**

Analysis of three deposits provided evidence for charred cereal grains and chaff, as well as charred fruit and weed seeds. The exact quantities of remains were not recorded in most cases – comments on general ubiquity were instead provided, which have been noted below. Nutshell remains were absent. Radiocarbon dates were unavailable.

A variety of cereals was present, including bristle oat, possible barley, wheat and possible rye. The weed seeds may represent plants that were growing locally, as well as plants that may have been growing alongside the cereals.



**Plan of Church Island, Co. Kerry (after O'Kelly 1958, Plate XVII).**

### Overview

- Phase 2: Stone oratory (1 deposit)
  - Wheat grains appear to have been dominant, with smaller quantities of possible rye grains recorded.
  - Weed remains also present.
- Phase 2: Circular stone house (2 deposits)
  - Oat grains and chaff were present (including bristle oat), as well as possible barley grains.
  - Occasional fruit and weed remains also recorded

Phase	Cereal (grain)	Cereal (chaff)	Fruit (seed)	Weed (seed)
<b>Phase 2: Stone oratory</b>	P			P
<b>Phase 2: Circular stone house</b>	P	P	3	2

### Overview of all plant groups (total deposits n=3)

P = present

Phase	Bristle oat (grain)	Oat (straw)	cf. Barley (grain)	Wheat (grain)	cf. Rye (grain)
<b>Phase 2: Stone oratory</b>				P	P
<b>Phase 2: Circular stone house</b>	P	P	P		

### Detail of cereal remains

Phase	Phase 2: Stone oratory	Phase 2: Circular stone house
<b>Haw fruit</b> (nutlet): <i>Crataegus</i> spp.		3
<b>Redshank</b> (achene): <i>Persicaria maculosa</i>	3	
<b>Sheep's sorrel</b> (achene): <i>Rumex acetosella</i>	3	
<b>Curled dock</b> (achene): <i>Rumex crispus</i>		2
<b>Daisy family</b> (achene): Asteraceae	2	
<b>False oat grass</b> (grain): <i>Arrhenatherum</i> spp.	P	

**Detail of fruit and weed remains**

### **Clonfad (Site 3), Co. Westmeath**

Grid reference: **240599/240591**

SMR No: **WM032-089**

Reference: **Vaughan-Williams 2009; Stevens 2009**

Topsoil stripping and subsequent excavation prior to road construction uncovered a hitherto unknown ecclesiastical enclosure near to a disused graveyard and ruined church. The site was located on the eastern slope of a low hillside, just to the south-east of Lough Ennell, which formed the traditional western boundary of the kingdom of Meath.

At least two concentric enclosure ditches were revealed during excavation – the outer ditch (3m wide and 1.7m deep) enclosed an area 200-220m in diameter; and the inner ditch (2.8m wide and 1.3m deep) enclosed an area 100-110m in diameter. Radiocarbon dates show this ditch was backfilled before the ninth century (see below). A smaller enclosure (around 50m in diameter) surrounded the ruined church site, and this lay in the middle of the larger enclosures, suggesting that the early medieval site may originally have consisted of three enclosures, the innermost of which has survived around the upstanding church and graveyard (Fig. 1).

Excavation revealed a series of phases of occupation on the site. Phase 1, the early monastic phase, produced evidence for further subdivision of the enclosures, which may have been associated with controlling the flow of a stream through the site. This phase produced occupation remains such as postholes, refuse-pits, cobbled areas, a possible workshop, and wells. There was evidence for substantial industrial activity associated with this phase, e.g. bone-working (for combs), button/bead manufacture, and textile production. The most significant industry, however, would appear to have been metalworking, and 1.7 tonnes of waste was recovered from the site, giving evidence for both ironworking and bronze-working. Ceramic crucibles, stone/clay moulds, tuyères, and bog ore deposits were all found in the outer ditch fills, and in the vicinity of large furnace bowls located on the side of the stream which flowed through the site. The earliest furnace on site was radiocarbon dated to the seventh/eighth century (see below). Metalworking on the site appears to have been associated with the construction, and brazing, of ecclesiastical hand-bells.

The site carried on in use during the Anglo-Norman period (Phase 2), and through into the post-medieval period (Phase 3), when the church was abandoned and a walled graveyard created.

Over 600 finds were recovered from the site, including iron tools, iron blades, an iron ringed pin; a bronze ringed pin; coins; bone pins; rotary quernstones; and a lignite bracelet.

### **Plant remains**

Analysis of five deposits provided evidence for a total of 161 charred cereal grains, 4 charred legume seeds and 39 charred weed seeds. Cereal chaff, hazelnut shell and fruit remains were absent.

A variety of cereals was present, including oat, hulled barley, wheat and possible rye. The presence of lentil remains is unusual in such an early context. It should be noted, however, that lentils were also recovered in medieval deposits at this location. It is possible, therefore, that the lentils recorded in early medieval deposits may actually be intrusions from later activity. The weed remains are likely to represent arable weeds and plants that were growing locally.



**Plan of excavations at Clonfad, Site 3 (after Stevens 2009, Figure 6)**

### **Radiocarbon dates**

Reimer, P.J., Baillie, M.G.L., Bard, E., Bayliss, A., Beck, J.W., Bertrand, C.J.H., Blackwell, P.G., Buck, C.E., Burr, G.S., Cutler, K.B., Damon, P.E., Edwards, R.L., Fairbanks, R.G., Friedrich, M., Guilderson, T.P., Hogg, A.G., Hughen, K.A., Kromer, B., McCormac, G., Manning, S., Bronk Ramsey, C., Reimer, R.W., Remmele, S., Southon, J.R., Stuiver, M., Talamo, S., Taylor, F.W., van der Plicht, J. & Weyhenmeyer, C.E. 2004. IntCal04 terrestrial radiocarbon age calibration, 0–26 cal kyr BP. Radiocarbon, 46, 1029–58.

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
UBA-8680	Phase 1a: Oak charcoal from Inner ditch C.508	1579±20 BP	<b>A.D. 427–538.</b>
GrA-33802	Phase 1b: Animal bone from Furnace C.464	1335±35 BP	<b>A.D. 643–771.</b>
UBA-8679	Phase 1c: Oak charcoal from Inner enclosing ditch C.605	1235±31 BP	<b>A.D. 688–878.</b>
UBA-8218	Phase 1c: Oak charcoal from Outer enclosing ditch C.101, Level II	1281±30 BP	<b>A.D. 662–779;</b> A.D. 795–800.
UBA-8219	Phase 1c: Hazel and alder charcoal from Outer enclosing ditch C.101, Level II	1231±31 BP	A.D. 688–753; A.D. 760–882.
UBA-8217	Phase 1c: Oak charcoal from Outer	1224±33 BP	A.D. 689–752;

	enclosing ditch C.101, Level III		A.D. 761–886.
UBA-8216	Phase 1c: Pomoideae, willow, alder and blackthorn charcoal from Outer enclosing ditch C.101, Level III	1199±30 BP	A.D. 713–745; <b>A.D. 767–895</b> ; A.D. 925–937.
GrA-33804	Phase 1c: Animal bone from Waste dump C.498	1215±35 BP	A.D. 689–752; A.D. 761–891.
UBA-8221	Phase 1c: Oak and ash charcoal from Waste dump C.498	1187±23 BP	<b>A.D. 774–894</b> ; A.D. 928–933.
GrA-33803	Phase 1c: Animal bone from Waste dump C.498	1165±35 BP	A.D. 775–907; A.D. 911–971.
UBA-8220	Phase 1c: Oak, willow and blackthorn charcoal from Pit C.462	1206±33 BP	A.D. 692–749; <b>A.D. 764–894</b> ; A.D. 929–932.

### Overview

- Phase 1a: Well (1 deposit)
  - Contained cereal grains (predominantly wheat, with a smaller quantity of oat and occasional barley) and lentils.
  - Occasional weed remains also recorded.
- Phase 1c: Ditches, Well, Pit (4 deposits)
  - Contained cereal grains (predominantly barley, with a smaller quantity of wheat and occasional rye) and lentils.
  - Weed remains also recorded.

Phase	Cereal (grain)	Legume (seed)	Weed (seed)	Date (A.D.)
<b>Phase 1a</b>	33	2	2	<b>427–538.</b>
<b>Phase 1c</b>	128	2	37	<b>688–878; 662–779</b> ; 795–800; 688–753; 760–882; 689–752; 761–886; 713–745; <b>767–895</b> ; 925–937; 689–752; 761–891; <b>774–894</b> ; 928–933; 775–907; 911–971; 692–749; <b>764–894</b> ; 929–932.

### Overview of all plant groups (total deposits n=5)

Phase	Oat (grain)	Barley (grain)	Wheat (grain)	cf. Rye (grain)
<b>Phase 1a</b> (n=30)	40.00%	3.33%	56.67%	0.00%
<b>Phase 1c</b> (n=72)	0.00%	66.67%	30.56%	2.78%

### Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	cf. Oat (grain)	Hulled barley (grain)	cf. Barley (grain)
<b>Phase 1a</b>	12	1	1	
<b>Phase 1c</b>			48	22

### Detail of oat and barley remains

Phase	Emmer/Bread wheat (grain)	Wheat (grain)	Barley/Wheat (grain)	cf. Rye (grain)	Lentil (seed): <i>Lens culinaris</i>
<b>Phase 1a</b>	17		2		2
<b>Phase 1c</b>		22	34	2	2

### Detail of wheat, rye and legume remains

<b>Phase</b>	<b>Phase 1a</b>	<b>Phase 1c</b>
cf. <b>Pines</b> (seed): cf. <i>Pinus</i> spp.		1
<b>Oraches</b> (utricle): <i>Atriplex</i> spp.		1
<b>Goosefoot family</b> (utricle): Chenopodiaceae		1
<b>Small water-pepper</b> (achene): <i>Persicaria minor</i>	1	
<b>Sheep's sorrel</b> (achene): <i>Rumex acetosella</i>	1	
<b>Cabbages/Mustards</b> (seed): <i>Brassica/Sinapis</i> spp.		1
<b>Stinking chamomile</b> (achene): <i>Anthemis cotula</i>		2
<b>Grass family</b> (grain): Poaceae		32

**Detail of tree and weed remains**

## **Collierstown (Site 1), Co. Meath**

Grid reference: **294743/258825**

SMR: **N/A**

Reference: **Archaeological Services University of Durham (ASDU) 2009; O'Hara 2009**

Excavations at Collierstown revealed a cemetery in use from the mid-fifth until the late-ninth century. Four main phases of burial were identified.

The earliest burial at Collierstown was a female, dated to A.D. 423-594, who was centrally placed within an area defined by two shallow curvilinear ditches that formed an approximately circular enclosure. A low mound may have covered this grave because later burials were inserted into stratigraphically higher levels. A further eight inhumations, extended west-east and in dug and partially stone-lined graves, were interred centrally within the Phase 1 enclosure and represent the first phase of burial activity at Collierstown. A sherd of Late Roman Amphorae (B//ware) found in the ditch fills of the primary burial supports the late-fifth/sixth-century date from the radiocarbon dating.

A series of curvilinear, segmented ditches were dug during Phase 2. Many of these cut through and maintained the shape of Enclosure 1. The earliest curvilinear ditch was radiocarbon dated to A.D. 427-608. High status artefacts from this ditch included a whalebone sword hilt, two sherds of Phocaean Red Slip Ware (late-fifth/sixth century) and a fragment of E ware (mid-sixth/seventh century). Another two of the curvilinear ditches included fragments of Late Roman Amphorae (B//ware). One of the contexts from the LRA was retrieved returned a radiocarbon date of A.D. 402-568, suggesting a contemporary deposition. Ditch re-cuts included burnt and un-burnt animal bone and a tiny quantity of slag which suggests possible evidence for iron working at the site during this phase.

Phase 3 is marked by a partially surviving ditch which would have defined a circular-shaped enclosure which was extensively truncated by the Phase IV enclosure. This ditch contained a large number of dumped or naturally accumulated deposits. Finds included Late Roman Amphorae (B//ware) pottery and fragments of iron objects. The ditch provided two radiocarbon dates of A.D. 569-671 and A.D. 559-662. The burials from this phase were dated to A.D. 540-654 and A.D. 687-895.

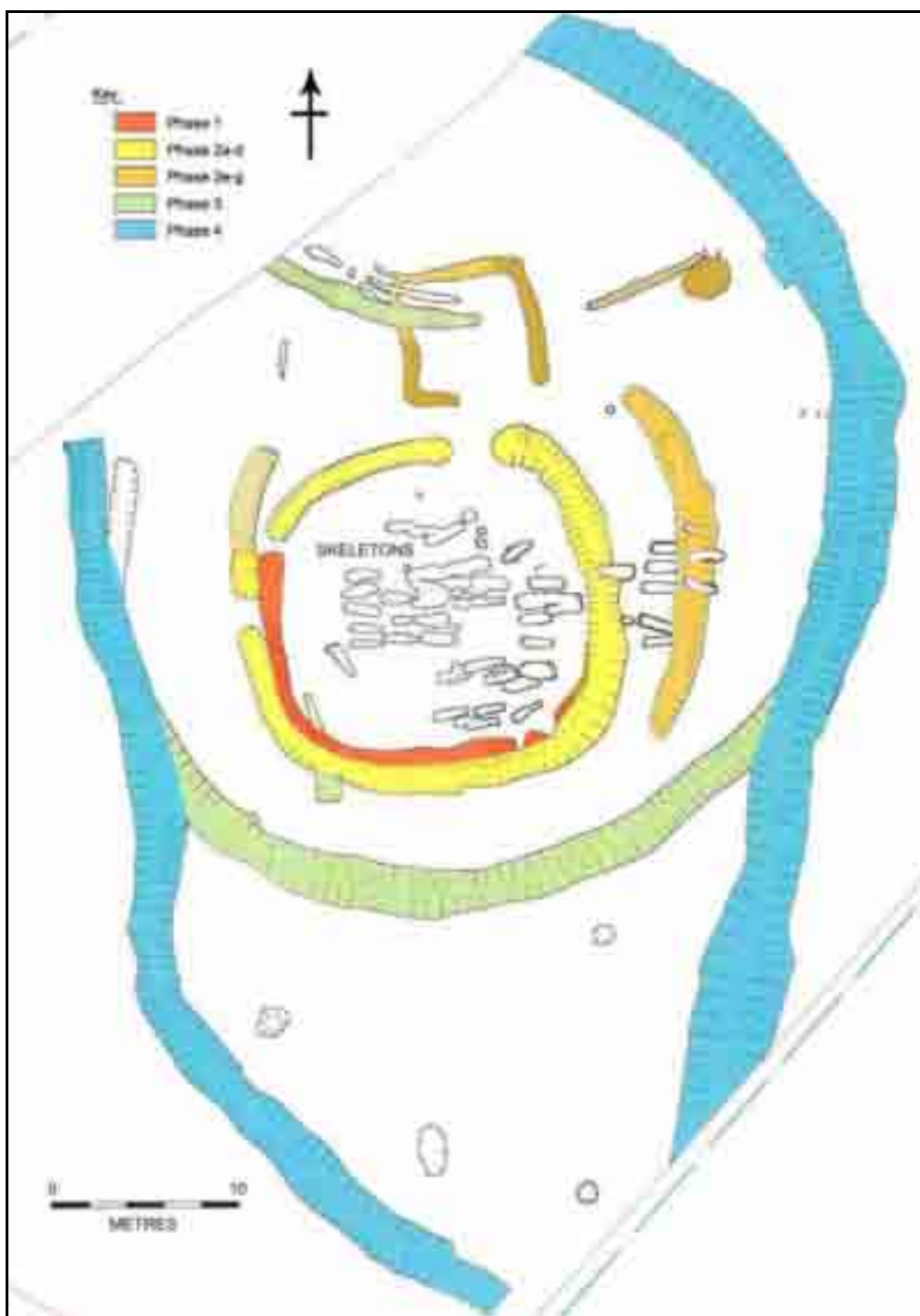
The final enclosure phase consisted of a re-cut to the Phase 3 enclosure and an extension of the site southwards in the form of a triangular-shaped enclosure. The radiocarbon date of A.D. 402-568 returned from charcoal from this ditch may have come from a re-worked deposit.

## **Plant remains**

Analysis of 18 deposits provided evidence for a large charred and waterlogged plant remains assemblage. A total of 1708 charred cereal grains, 37 charred cereal chaff fragments, 2 charred flax seeds, 112 charred weed seeds, 18 waterlogged fruit seeds and 619 waterlogged weed seeds were recorded. The presence of seeds from the Fabaceae family (pea) may represent cultivated legumes or weeds. Hazelnut remains were absent. The waterlogged remains were preserved as a result of waterlogged conditions in a number of features, such as ditches and gullies.

Cereals were recorded in several early medieval phases of activity. A variety of cereal types was present, including common oat, hulled barley, six-row barley and wheat. The weed remains are likely to represent arable weeds and plants that were growing locally.





**Phases at Collierstown, Co. Meath (after O'Hara 2009).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Huguen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
Beta-250161	Human bone from central	1550±40 BP	<b>A.D. 423-594</b>

	and primary female burial 48		
Beta-247009	Charcoal from fill of Phase II enclosure ditch	1530±40 BP	<b>A.D. 427-608</b>
Beta-247207	Charcoal from fill of Phase II enclosure ditch	1580±40 BP	<b>A.D. 402-568</b>
Beta-247005	Human bone from burial 47	1530±40 BP	<b>A.D. 427-608</b>
Beta-247008	Human bone from burial 58	1550±40 BP	<b>A.D. 423-594</b>
Beta-247001	Human bone from burial 1	1550±40 BP	<b>A.D. 423-594</b>
Beta-247007	Human bone from grave of burial 54	1430±40 BP	<b>A.D. 559-662</b>
Beta-241296	Charcoal from fill of Phase III enclosure ditch	1410±40 BP	<b>A.D. 569-671</b>
Beta-247011	Wood from fill of Phase III enclosure ditch	1430±40 BP	<b>A.D. 559-662</b>
Beta-247002	Human bone from burial 13	1210±40 BP	<b>A.D. 687-895;</b> A.D. 925-936
Beta-247003	Human bone from burial 18	1460±40 BP	<b>A.D. 540-654</b>
Beta-247010	Charcoal from fill of Phase IV enclosure ditch	1580±40 BP	<b>A.D. 402-568</b>

### Overview

- Phase 1 (2 samples)
  - Contained a small quantity of cereal grains, including wheat.
  - Also occasional flax seeds, and waterlogged and charred weed seeds.
- Phase 2 (7 samples)
  - Contained a large quantity of cereal grains. Barley was predominant, including six-row hulled barley, with much smaller quantities of oat recorded.
  - Charred and waterlogged weed seeds were also present, as well as one waterlogged fruit seed.
- Phase 3 (2 samples)
  - Contained a small quantity of cereal grains, including wheat and barley.
  - Also waterlogged weed seeds.
- Phase 4 (4 samples)
  - Contained a small quantity of cereal grains, including oat and barley.
  - A large quantity of waterlogged weed seeds was also recorded, as well as occasional charred weed seeds and waterlogged fruit seeds.
- Miscellaneous (3 samples)
  - Comprises deposits that are thought to be early medieval but could not be directly associated with any of the other phases of activity.
  - Contained a large quantity of cereal grains and occasional cereal chaff. Oat grains and chaff were predominant (including common oat), with smaller quantities of barley grains recorded (including six-row hulled barley).
  - Charred and waterlogged weed seeds were also present, as well as one waterlogged fruit seed.

Phase	Cereal (grain)	Cereal (chaff)	Flax (seed)	Fruit (seed)	Weed (seed)	Date
<b>Phase 1</b>	7		2		91	<b>A.D. 423-594.</b>
<b>Phase 2</b>	910			1	81	<b>A.D. 427-608.</b> <b>A.D. 402-568.</b> <b>A.D. 423-594.</b> <b>A.D. 427-608.</b>
<b>Phase 3</b>	4				39	<b>A.D. 423-594.</b> <b>A.D. 569-671.</b> <b>A.D. 559-662.</b> <b>A.D. 559-662.</b>
<b>Phase 4</b>	16			16	444	<b>A.D. 540-654.</b> <b>A.D. 687-895;</b> A.D. 925-936. <b>A.D. 402-568.</b>
<b>Misc.</b>	771	37		1	76	

**Overview of all plant groups (total deposits n=18)**

	Oat (grain)	Barley (grain)
<b>Phase 1</b> (n=1)		
<b>Phase 2</b> (n=533)	1.88%	98.12%
<b>Phase 3</b> (n=2)		
<b>Phase 4</b> (n=10)		
<b>Misc.</b> (n=754)	84.48%	15.52%

**Percentage of cereal grain types recorded in each phase of activity**

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Common oat (floret base)	Oat (grain)	Oat (twisted awn)	Oat (floret base)	Wheat (grain)
<b>Phase 1</b>					1
<b>Phase 2</b>		10			
<b>Phase 3</b>					1
<b>Phase 4</b>		2			
<b>Misc.</b>	3	637	26	8	

**Detail of oat and wheat remains**

Phase	Six-row hulled barley (grain)	Hulled barley (grain)	Six-row barley (grain)	Barley (grain)	Indet. Cereal (grain)
<b>Phase 1</b>					6
<b>Phase 2</b>	1	17	47	458	377
<b>Phase 3</b>				1	2
<b>Phase 4</b>				8	6
<b>Misc.</b>		6	6	105	17

**Detail of barley and indeterminate cereal remains**

Phase	Phase 1	Phase 2	Phase 3	Phase 4	Misc.
<b>Buttercups</b> (achene): <i>Ranunculus</i> spp.		1			
<b>Goosefoots</b> (utricle): <i>Chenopodium</i> spp.		6			
<b>Common chickweed</b> (seed): <i>Stellaria media</i>					1
<b>Redshank</b> (achene): <i>Persicaria maculosa</i>		17			41
<b>Docks</b> (achene): <i>Rumex</i> spp.		4			7
<b>Pea family</b> (seed): Fabaceae		2			
<b>Ribwort plantain</b> (seed): <i>Plantago lanceolata</i>		1			
<b>Scentless mayweed</b> (achene): <i>Tripleurospermum inodorum</i>	2				
<b>Sedges</b> (achene): <i>Carex</i> spp.		18			
<b>Grass family</b> (grain): Poaceae		1		10	
<b>Indeterminate</b> (seed)				1	

#### Detail of charred weed remains

Phase	Phase 1	Phase 2	Phase 3	Phase 4	Misc.
<b>Bramble</b> (nutlet): <i>Rubus fruticosus</i>		1		8	
<b>Elder</b> (seed): <i>Sambucus nigra</i>				8	1
<b>White water-lily</b> (seed): <i>Nymphaea alba</i>	68	20	25	149	19
<b>Buttercups</b> (achene): <i>Ranunculus</i> spp.	1	2	1	37	1
<b>Poppies</b> (seed): <i>Papaver</i> spp.					1
<b>Common nettle</b> (achene): <i>Urtica dioica</i>	3		4	82	1
<b>Small nettle</b> (achene): <i>Urtica urens</i>				3	
<b>Common chickweed</b> (seed): <i>Stellaria media</i>				2	
<b>Ragged robin</b> (seed): <i>Lychnis flos-cuculi</i>				2	
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>		1			
<b>Docks</b> (achene): <i>Rumex</i> spp.	7		1	13	
<b>Cinquefoils</b> (nutlet): <i>Potentilla</i> spp.		1		5	
<b>Crane's-bills</b> (seed): <i>Geranium</i> spp.				1	
<b>Hemlock</b> (mericarp): <i>Conium maculatum</i>		1		2	1
<b>Upright hedge parsley</b> (mericarp): <i>Torilis japonica</i>		1		16	
<b>Henbane</b> (seed): <i>Hyoscyamus niger</i>			1	24	
<b>Bogbean</b> (seed): <i>Menyanthes trifoliata</i>	3			7	
<b>Woundworts</b> (nutlet): <i>Stachys</i> spp.				5	1
<b>Dead-nettle family</b> (nutlet): Lamiaceae	1			6	
<b>Thistles</b> (achene): <i>Carduus/Cirsium</i> spp.	3	2	1	24	2
<b>Prickly sow-thistle</b> (achene): <i>Sonchus asper</i>	3	1		28	
<b>Pondweeds</b> (nutlet): <i>Potamogeton</i> spp.	1		1	6	1
<b>Duckweeds</b> (seed): <i>Lemna</i> spp.	1			9	
<b>Great fen-sedge</b> (achene): <i>Cladium mariscus</i>			4	8	
<b>Sedges</b> (achene): <i>Carex</i> spp.			1	4	

#### Detail of waterlogged fruit and weed remains

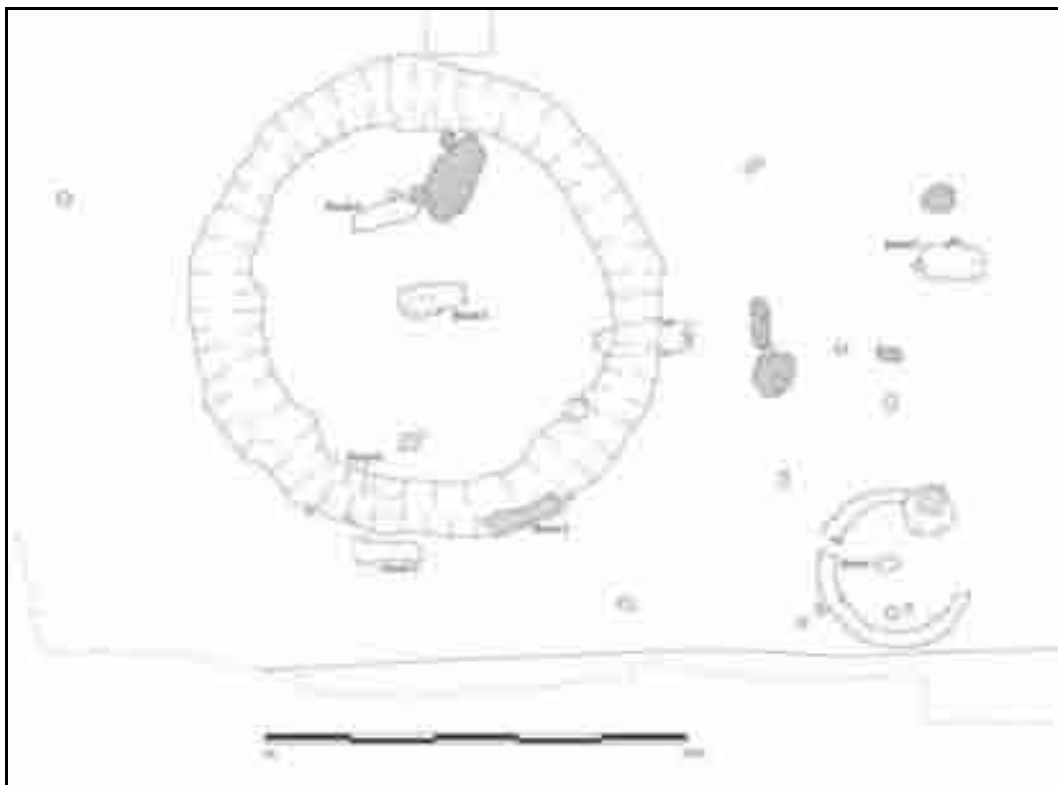
**Cross, Co. Galway**Grid Ref: **164775/225449**SMR No: **N/A**Reference: **Dillon 2009; Mullins 2009**

Excavations in advance of roadworks revealed a prehistoric cemetery which was re-used during the early medieval period. The main archaeological feature from the early medieval period is a sub-circular ring-ditch approximately 14.5m in diameter. This ring-ditch truncated earlier burials, and would appear to have been constructed in association with Burial 4, located in the centre of the enclosed area, which dates *c.* A.D. 400-559. An incomplete human skeleton (Burial 6) overlay the secondary fill of the ring-ditch, suggesting that it had at least partially silted-up by the sixth century.

A smaller ring-ditch, measuring approximately 4.8m in diameter, was located to the southeast of the large ring-ditch. This ditch also appears to have been early medieval in date, based on its relationship to the central burial, Burial 1, which has been radiocarbon dated to A.D. 439-648. A yellow glass bead recovered from the fill also suggests that this ditch was exposed during the early medieval period.

**Plant remains**

Analysis of 2 deposits provided evidence for a total of 6 charred cereal grains (barley and wheat) and 1 charred hazelnut shell fragment. Cereal chaff, fruit remains and weed remains were absent.



**Early medieval burials at Cross ring-ditch, Co. Galway (after Mullins 2009)**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
Wk21248	Human bone from Burial 1	1489±38 BP	A.D. 439-486; <b>A.D. 532-647</b>
Wk21253	Human bone from Burial 2	1538±39 BP	<b>A.D. 427-601</b>
Wk21250	Human bone from Burial 3	1581±38 BP	<b>A.D. 405-563</b>
Wk21249	Human bone from Burial 4	1587±38 BP	<b>A.D. 400-559</b>
Wk21254	Human bone from Burial 5	1604±38 BP	A.D. 359-361; <b>A.D. 382-552</b>
Wk21251	Human bone from Burial 6	1628±39 BP	<b>A.D. 338-539</b>
Wk21252	Human bone from Burial 7	1674±38 BP	<b>A.D. 253-434;</b> A.D. 493-506; A.D. 521-526
Beta-241006	Burnt human bone from F137	2080±40 BP	<b>200 B.C. – A.D. 3</b>
Beta-241088	Burnt human bone from F186	2990±40 BP	1385 B.C. -1332 B.C.; <b>1325 B.C. – 1113 B.C.;</b> 1099 B.C. -1088 B.C.; 1062 B.C. -1060 B.C.

## Overview

- Ring-ditch 1 and associated Burial 4 (1 deposit)
  - Small quantity of wheat and barley grains, as well as one hazelnut shell fragment.

Phase	Barley (grain)	Wheat (grain)	Indet. cereal (grain)	Hazelnut (shell frag)	Date
<b>Ring-ditch 1, Burial 4</b>	2	3	1	1	<b>A.D. 400–559.</b> <b>A.D. 405–563.</b> <b>A.D. 338–539.</b> <b>A.D. 427–601.</b> A.D. 359–361; <b>A.D. 382–552.</b>

**Detail of all plant remains (total deposits n=2)**

**Curtaun (Site 1), Co. Galway**Grid Ref: **142125/195440**SMR No: **N/A**Reference: **Cobain 2010; Delaney 2010**

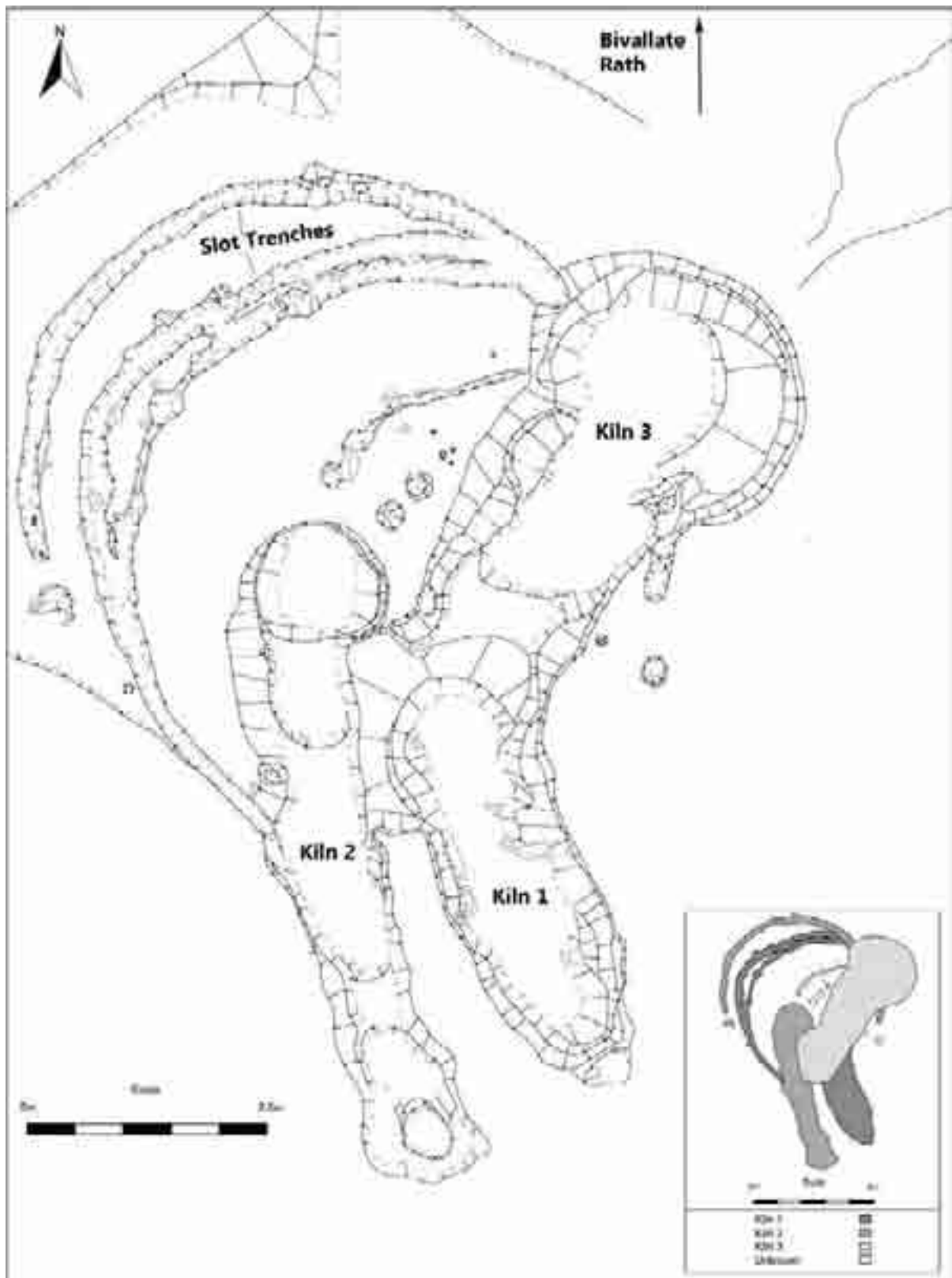
Excavations were undertaken adjacent to a bivallate rath in advance of roadworks. The early medieval / medieval features on this site consisted of three kilns, associated slot trenches, postholes and stakeholes.

Kiln 1 was the earliest of three kilns found on the site and had a keyhole shape in plan. A date of A.D. 674-870 was produced from charcoal in the use layers of the kiln chamber. The structure was backfilled with material containing cattle bones and bones from sheep/goats. Kiln 2 was also keyhole shaped and was dated to A.D. 779-947. As with Kiln 1, the backfill of Kiln 2 include bones from domesticates. The third kiln was in use during the high medieval period, and produced a radiocarbon date of A.D. 1218-1270. It appears to have been reused as a fox holt or den. Four curvilinear slot trenches located to the west of the kilns were likely to have supported the walls of a roofed superstructure covering the drying chamber.

**Plant remains**

Analysis of 3 deposits provided evidence for a small charred plant remains assemblage. A total of 21 cereal grains, 36 hazelnut shell fragments and 1 weed seed was recorded. Cereal chaff and fruit remains were absent.

Cereals were recorded in the kilns and associated deposits. Given the small quantity of remains, an extraordinary variety of crops was present, including oat, hulled barley, naked barley, six-row barley, einkorn wheat, emmer wheat and naked wheat. The weed remains may represent arable weeds or plants that were growing locally.



Plan of kilns at Curtaun 1, Co. Galway (after Delaney 2010)



## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UBA-12710	Charcoal from Kiln 1	1252 $\pm$ 37 BP	<b>A.D. 674-870</b>
UBA-12711	Charcoal from slot trench at Kiln 1	1211 $\pm$ 24 BP	A.D. 717-743; <b>A.D. 768-888</b>
UBA-12712	Barley from Kiln 2	1165 $\pm$ 18 BP	A.D. 779-794; <b>A.D. 800-899;</b> <b>A.D. 919-947</b>
UBA-12709	Hazel from Kiln 3	790 $\pm$ 20 BP	<b>A.D. 1218-1270</b>

### Overview

- Kilns 1 & 2 (3 deposits)
  - Small quantity of cereal grains (including oat, hulled barley, naked barley, six-row barley, einkorn wheat, emmer wheat and naked wheat).
  - Occasional hazelnut shell fragments and weed remains.

Phase	Cereal (grain)	Hazelnut (shell frag)	Weed (seed)	Date
<b>Kilns 1 &amp; 2</b>	21	36	1	<b>A.D. 674–870.</b> A.D. 717–743; <b>A.D. 768–888.</b> A.D. 779–794; A.D. 800–899; A.D. 919–947.

### Overview of all plant groups (total deposits n=3)

Phase	Oat (grain)	Six-row hulled barley (grain)	Naked barley (grain)	Barley (grain)
<b>Kilns 1 &amp; 2</b>	3	6	1	3

### Detail of oat and barley remains

Phase	Einkorn wheat (grain)	Emmer wheat (grain)	Naked wheat (grain)
<b>Kilns 1 &amp; 2</b>	1	3	4

### Detail of wheat

Phase	Grass family (grain): Poaceae	Grass family (grain frag): Poaceae
<b>Kilns 1 &amp; 2</b>	1	15

### Detail of weed remains

### **Derrinsallagh (Site 3), Co. Laois**

Grid Ref: **225446/185940**

SMR No: **N/A**

Reference: **Archaeological Services University of Durham (ASUD) 2009; Lennon 2009**

Archaeological investigations were carried out at Derrinsallagh Site 3 in advance of construction of the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill road scheme. Multi-period activity was discovered, representing non-continuous activity from the Neolithic period until the post-medieval period.

Subsoil formation was recorded as Period 1. The earliest recorded human activity (Period 2, Phase 1) was a cluster of Neolithic post-holes/pits containing sherds of carinated bowls and lithics. During the Late Bronze Age (Period 2, Phase 2), two sub-rectangular structures were built. Further activity also took place during the Late Bronze Age (Period 2, Phase 3) consisting of cremation pits, some of which were found to contain burnt human bone fragments.

The early medieval and medieval phases of activity at this site (Period 2, Phase 4) included construction of an early medieval univallate circular enclosure with a simple earth-cut east-facing entrance. No indication of an enclosing bank or palisade was found. The presence of internal divisions within the enclosure, a gated entrance, pits, bowl furnaces and seven drying kilns was interpreted as representing farming activity within the enclosure, rather than domestic occupation. Arcs of post-holes within the enclosure suggest the presence of shelters/structures, although no complete structure was recorded. Radiocarbon dating has shown that the enclosure area was in use from the early medieval period (from the 7<sup>th</sup> century) through to the medieval period (15<sup>th</sup> century). Early medieval activity included a drying kiln cut into the backfilled ditch and a pit near the enclosure. A radiocarbon date from a horse bone at the base of the ditch indicated that the ditch was still in use towards the end of the early medieval period. Additional radiocarbon dates from other drying kilns showed that agricultural activity continued around the enclosure area from the 12<sup>th</sup> to the 15<sup>th</sup> centuries. Post-medieval activity (Period 2, Phase 5) was also recorded, including a drainage ditch, pits, post-holes and stake-holes. The final phase of activity (Period 3, Phase 1) was abandonment of the site and formation of topsoil.

Artefactual remains from the enclosure area included iron knife blades and a rotary quern stone. Cattle was dominant in the animal bone assemblage, while different cereals (oat, barley and wheat) were dominant at various times and locations in early medieval deposits. The presence of peas extends the range of crops available during early medieval occupation of the enclosure.

### **Plant remains**

Analysis of 35 deposits provided evidence for a very large charred plant remains assemblage. A total of 25,635 cereal grains, 611 cereal chaff fragments, 774 legume seeds, 106 hazelnut shell fragments, 1 fruit seed and 4197 weed seeds were recorded.

Cereals were present in a number of locations. A variety of crops was present, including common oat, wild oat, hulled barley, bread wheat and rye. The weed remains may represent arable weeds and plants that were growing locally.

The plant remains from Phases 4a and 4b can be securely dated to the early medieval period. Plant remains were also recorded in a number of other deposits in the vicinity of the enclosure, but it is not clear if these date to the early medieval period (Phase 4) or later periods. These remains have been recorded below.



**Plan of excavations at Derrinsallagh, Site 3 (after Lennon 2009, Figure 6)**

### Radiocarbon dates

Reimer, P.J., Baillie, M.G.L., Bard, E., Bayliss, A., Beck, J.W., Bertrand, C.J.H., Blackwell, P.G., Buck, C.E., Burr, G.S., Cutler, K.B., Damon, P.E., Edwards, R.L., Fairbanks, R.G., Friedrich, M., Guilderson, T.P., Hogg, A.G., Hughen, K.A., Kromer, B., McCormac, G., Manning, S., Bronk Ramsey, C., Reimer, R.W., Remmele, S., Southon, J.R., Stuiver, M., Talamo, S., Taylor, F.W., van der Plicht, J. & Weyhenmeyer, C.E. 2004. IntCal04 terrestrial radiocarbon age calibration, 0–26 cal kyr BP. Radiocarbon, 46, 1029–58.

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
GU-16137	Blackthorn and alder charcoal from Period 1, Phase 4a, Pit C.328 associated with Kiln C.110	1260 $\pm$ 35 BP	<b>A.D. 668–829;</b> A.D. 837–866.
GU-16140	Ash charcoal from Period 1, Phase 4a, exterior Pit C.644	1210 $\pm$ 35 BP	A.D. 689–752; A.D. 761–894; A.D. 930–931.
?	Horse bone from Period 1, Phase 4b, enclosure ditch re-cut C.33	1015 $\pm$ ? BP	?
GU-16136	Willow charcoal from Period 1, Phase 4b, Kiln C.203	960 $\pm$ 35 BP	<b>A.D. 1017–1159.</b>

### Overview

- Period 2, Phase 4a: Kiln C.110, Exterior Pit C.644 (5 deposits)
  - Contained a large quantity of cereal grains – barley was predominant, with smaller quantities of oat and wheat, as well as occasional rye.
  - A large number of weed seeds was recorded, with hazelnut shell and occasional cereal chaff also present.
- Period 2, Phase 4b: Re-cut of enclosure ditch, Kiln C.203/107 (6 deposits)
  - Contained cereal grains – oat and barley was predominant, with smaller quantities wheat, as well as occasional rye.
  - A large number of weed seeds was recorded, with occasional hazelnut shell and cereal chaff also present.

- Period 2, possible Phase 4: Enclosure ditches (4 deposits)
  - Contained a very large quantity of cereal grains – oat was predominant, with occasional barley and wheat.
  - A large quantity of cereal chaff and weed remains was recorded, with occasional hazelnut shell also present.
- Period 2, possible Phase 4: Enclosure interior (6 deposits)
  - Contained cereal grains – wheat was predominant, with smaller quantities of barley and oat – in addition to peas.
  - Weed seeds and hazelnut shell were also recorded.
- Period 2, possible Phase 4: Enclosure exterior (14 deposits)
  - Contained a large quantity of cereal grains – wheat was predominant, with occasional barley, oat and rye – as well as a large quantity of peas.
  - A large number weed seeds was recorded, with occasional cereal chaff, hazelnut shell and fruit remains also present.

Phase	Cereal (grain)	Cereal (chaff)	Legume (seed)	Hazelnut (shell frag)	Fruit (seed)	Weed (seed)	Date (A.D.)
<b>Period 2, Phase 4a: Kiln C.110, Exterior Pit C.644</b>	1715	3		55		518	<b>668–829</b> ; 837–866; 689–752; 761–894; 930–931.
<b>Period 2, Phase 4b: Re-cut of enclosure ditch, Kiln C.203/107</b>	336	4		3		579	<b>1017–1159.</b>
<b>Period 2, possible Phase 4: Enclosure ditches</b>	14502	564		17		2716	
<b>Period 2, possible Phase 4: Enclosure interior</b>	368		72	23		49	
<b>Period 2, possible Phase 4: Enclosure exterior</b>	8714	40	702	8	1	335	

**Overview of all plant groups (total deposits n=35)**

Phase	Oat (grain)	Barley (grain)	Wheat (grain)	Rye (grain)
<b>Period 2, Phase 4a: Kiln C.110, Exterior Pit C.644</b> (n=1427)	14.09%	71.97%	13.81%	0.14%
<b>Period 2, Phase 4b: Re-cut of enclosure ditch, Kiln C.203/107</b> (n=323)	46.13%	43.03%	10.53%	0.31%
<b>Period 2, possible Phase 4: Enclosure ditches</b> (n=12742)	94.58%	4.41%	1.01%	0.00%
<b>Period 2, possible Phase 4: Enclosure interior</b> (n=308)	10.06%	26.62%	63.31%	0.00%
<b>Period 2, possible Phase 4: Enclosure exterior</b> (n=7560)	1.94%	3.92%	94.13%	0.01%

**Percentage of cereal grain types recorded in each phase of activity**

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

<b>Phase</b>	<b>Common oat</b> (floret base)	<b>Wild oat</b> (floret base)	<b>Oat</b> (grain)	<b>Oat</b> (twisted awn)
<b>Period 2, Phase 4a: Kiln C.110, Exterior Pit C.644</b>	3		201	
<b>Period 2, Phase 4b: Re-cut of enclosure ditch, Kiln C.203/107</b>			149	
<b>Period 2, possible Phase 4: Enclosure ditches</b>	512	16	12051	3
<b>Period 2, possible Phase 4: Enclosure interior</b>			31	
<b>Period 2, possible Phase 4: Enclosure exterior</b>			147	

**Detail of oat remains**

<b>Phase</b>	<b>Hulled barley</b> (grain)	<b>Barley</b> (grain)	<b>Barley</b> (rachis)	<b>Rye</b> (grain)
<b>Period 2, Phase 4a: Kiln C.110, Exterior Pit C.644</b>	9	1018		2
<b>Period 2, Phase 4b: Re-cut of enclosure ditch, Kiln C.203/107</b>	1	138		1
<b>Period 2, possible Phase 4: Enclosure ditches</b>	6	556	1	
<b>Period 2, possible Phase 4: Enclosure interior</b>		82		
<b>Period 2, possible Phase 4: Enclosure exterior</b>	9	287		1

**Detail of barley and rye remains**

<b>Phase</b>	<b>Bread wheat</b> (rachis)	<b>cf. Bread wheat</b> (grain)	<b>Wheat</b> (grain)	<b>Indet. cereal</b> (grain)	<b>Indet. cereal</b> (rachis)	<b>Indet. cereal</b> (culm node)
<b>Period 2, Phase 4a: Kiln C.110, Exterior Pit C.644</b>		130	67	288		
<b>Period 2, Phase 4b: Re-cut of enclosure ditch, Kiln C.203/107</b>			34	13	2	2
<b>Period 2, possible Phase 4: Enclosure ditches</b>		12	117	1760		32
<b>Period 2, possible Phase 4: Enclosure interior</b>		100	95	60		
<b>Period 2, possible Phase 4: Enclosure exterior</b>	40	7065	51	1154		

**Detail of wheat and indeterminate cereal remains**

Phase	Period 2, Phase 4a: Kiln C.110, Exterior Pit C.644	Period 2, Phase 4b: Re-cut of enclosure ditch, Kiln C.203/107	Period 2, possible Phase 4: Enclosure ditches	Period 2, possible Phase 4: Enclosure interior	Period 2, possible Phase 4: Enclosure exterior
<b>Garden pea</b> (seed): <i>Pisum sativum</i>				72	702
<b>Haw fruit</b> (nutlet): <i>Crataegus monogyna</i>					1
<b>Fat-hen</b> (utricle): <i>Chenopodium album</i>	7	6	1		4
<b>Goosefoots</b> (utricle): <i>Chenopodium</i> spp.	1		1		1
<b>Redshank</b> (achene): <i>Persicaria maculosa</i>	125	32	52		31
<b>Pale persicaria</b> (achene): <i>Persicaria lapathifolia</i>		1	1		3
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>	3	1	19		23
<b>Docks</b> (achene): <i>Rumex</i> spp.	14	3	35	1	18
<b>Wild radish</b> (pod frag): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>	17	1	48		19
<b>Vetches</b> (seed): <i>Vicia</i> spp.				1	2
<b>Hemp-nettles</b> (nutlet): <i>Galeopsis</i> spp.	6				
<b>Ribwort plantain</b> (seed): <i>Plantago lanceolata</i>	4				
<b>Cleavers</b> (seed): <i>Galium aparine</i>			1	1	
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>	6	1	1		
<b>Scentless mayweed</b> (achene): <i>Tripleurospermum inodorum</i>		1			
<b>Sedges</b> (achene): <i>Carex</i> spp.	1	1			1
<b>Grass family</b> (grain): Poaceae	334	532	2557	46	233

**Detail of legume, fruit and weed remains**

## Derrydonnell More, Co. Galway

Grid Ref: **146551/225358**

SMR No: **GA096:085**

Reference: **Dillon 2010; McMorran & Delaney 2010.**

Archaeological investigations were carried out at Derrydonnell More in advance of construction of the N18 Oranmore to Gort road scheme. A known destroyed and levelled cashel was located at this site (GA096-085). The foundation level of the non-circular cashel wall, which consisted of inner and outer faces with an internal rubble core, was partly traced around the perimeter of a low knoll. An internal stone feature (C.7) was identified below a stone deposit that covered the entire interior of the site. A well-preserved baluster-headed ringed pin, dating from the 7<sup>th</sup> to 8<sup>th</sup> centuries, and a crinoid fossil possible bead of potentially similar date were recovered from the topsoil. A small quantity of cereal remains was also present in deposits at this site. Radiocarbon dating was not carried out.

### Plant remains

Analysis of 2 deposits provided evidence for a small charred plant remains assemblage, consisting of two cereal grains (identified as barley/wheat). Cereal chaff, hazelnut shell, fruit remains and weed remains were absent. Radiocarbon dates were unavailable.



**Plan of excavations at Derrydonnell More (after McMorran and Delaney 2010, 10)**

### Overview

- Cashel (2 deposits)
  - Small quantity of cereal grains (identified to a barley/wheat category).

Phase	Barley/Wheat (grain)
Cashel	2

**Detail of all plant remains (total deposits n=2)**

## **Dowdstown (Site 2), Co. Meath**

Grid reference: **289684/262547**

SMR No: **N/A**

Reference: **Archaeological Services University of Durham (ASUD) 2009; Cagney *et al.* 2009**

Excavations at Dowdstown revealed a large early medieval enclosed settlement. The initial phase of construction between the mid-fifth and mid-seventh centuries consisted of a circular enclosure. This was succeeded by a complex of field enclosures and annexes dating to the eighth/ninth centuries. Two structures and a large number of cereal-drying kilns were also recorded.

The earliest feature on site was a circular enclosure (Enclosure 1) measuring 32m in internal diameter that was dated A.D. 426-600. Finds associated with this early phase included an iron knife, a bone knife handle and decorated bead, a quern stone fragment, fragments of iron objects and assorted struck flints. The enclosure ditch was re-cut twice between the mid-sixth and mid-seventh centuries. Artefacts were few and included a fragment of copper alloy, a bone pin, and a possible clay loom weight.

A rectangular multi-phase enclosure (Enclosure 2) was annexed onto the eastern side of the circular enclosure. Artefacts included a worked stone, a piece of quartz, an iron fragment and a number of flints. It is likely that this was contemporary with the circular enclosure and with Enclosures 4 and 5.

The next phase at Dowdstown 2 consisted of the amalgamation of Enclosures 1 and 2 into a larger 'D'-shaped enclosure (Enclosure 3). The initial construction of the 'D'-shaped enclosure has been dated to A.D. 680-882 and finds from the initial ditch cut included a fragment of a copper alloy strap attachment, an iron knife, a bone comb fragment and a fragment of lignite. This enclosure was re-cut between the mid-seventh and late-eighth centuries. Artefacts included a decorative ring from a tinned copper alloy pin, an iron bill hook, iron knife fragments, and fragments of iron objects. The second re-cut displayed potential evidence for a causewayed entrance to the east as this had not been located in earlier excavation.

A multi-phase rectangular enclosure (Enclosure 4), measuring 40m x 24m, was annexed onto Enclosure 2 and continued in use throughout the 'D'-shaped enclosure's (Enclosure 3) lifetime. Re-cuts of this enclosure's ditch revealed a copper alloy pin shaft and a needle. A small sub-circular enclosure (Enclosure 5) – 18m in diameter – was located to the east of the above enclosures and enclosed a hearth and a kiln. The ditch fill included small quantities of charred cereal and animal bone.

A large multi-phase rectangular enclosure (Enclosure 6) was located to the north of these enclosures. The ditch was dug in the seventh century and very few finds were associated with this phase. These included an iron knife and a copper alloy loop-headed pin shaft. This large enclosure may have functioned as a floodplain-enriched meadow for cattle during the summer.

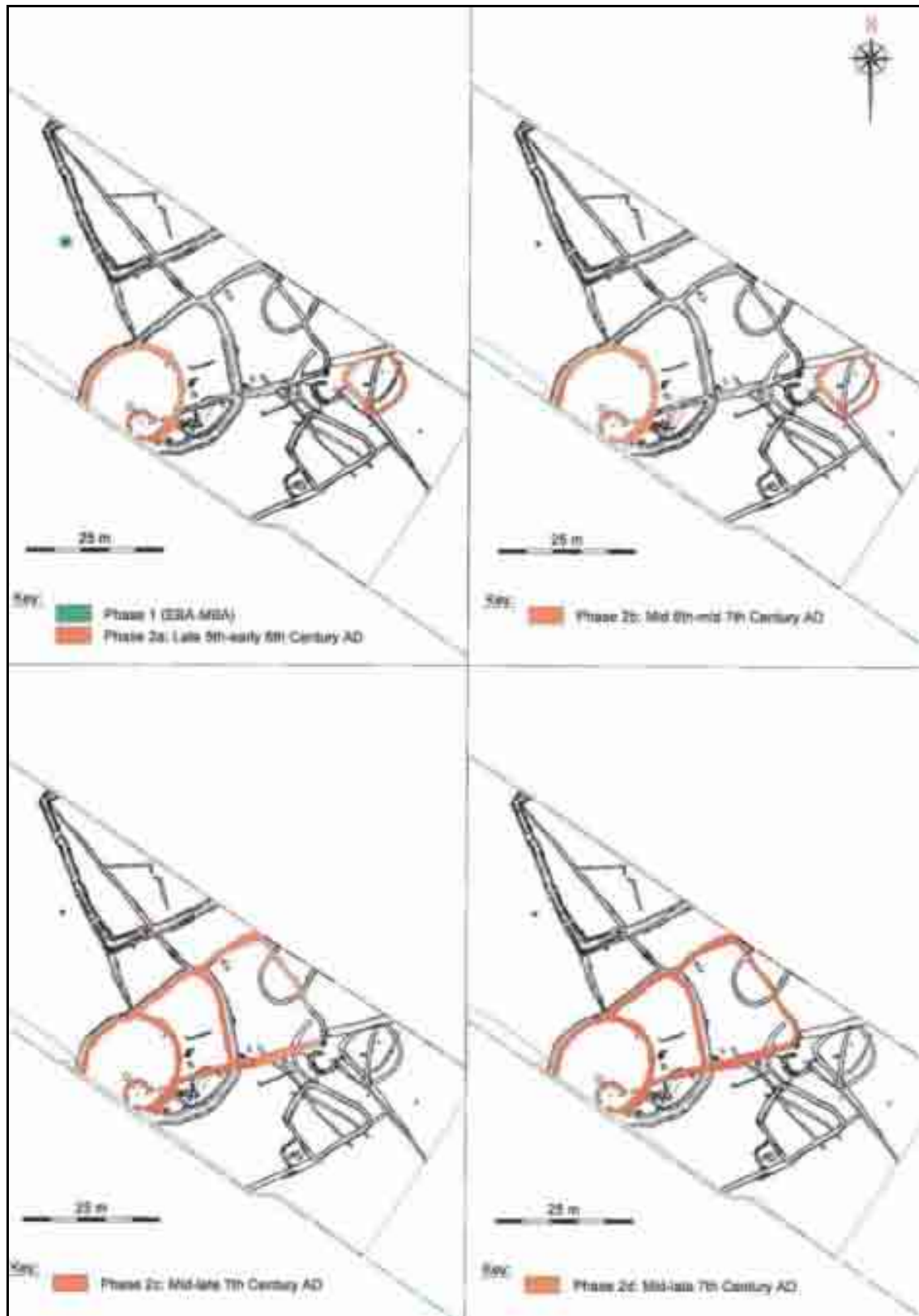
Two poorly preserved structures were identified at Dowdstown 2. The first, (Structure A), was a possibly square, or rectangular, post-built structure and survived to a maximum length of 10m. It was cut by Enclosure 2 and, therefore, predated it. Charred barley grain from one of its postholes was dated to A.D. 553-658 indicating that it was contemporary with Enclosure 1. The structure may have served as a barn or grain store because charred grain was recovered from a number of associated deposits. A collection of 11 postholes clustered together internally within Enclosure 1 suggest the second structure, but the floor plan was not discernable. One posthole was dated to A.D. 689-899 suggesting that any structure was contemporary with Enclosure 3.

### **Plant remains**

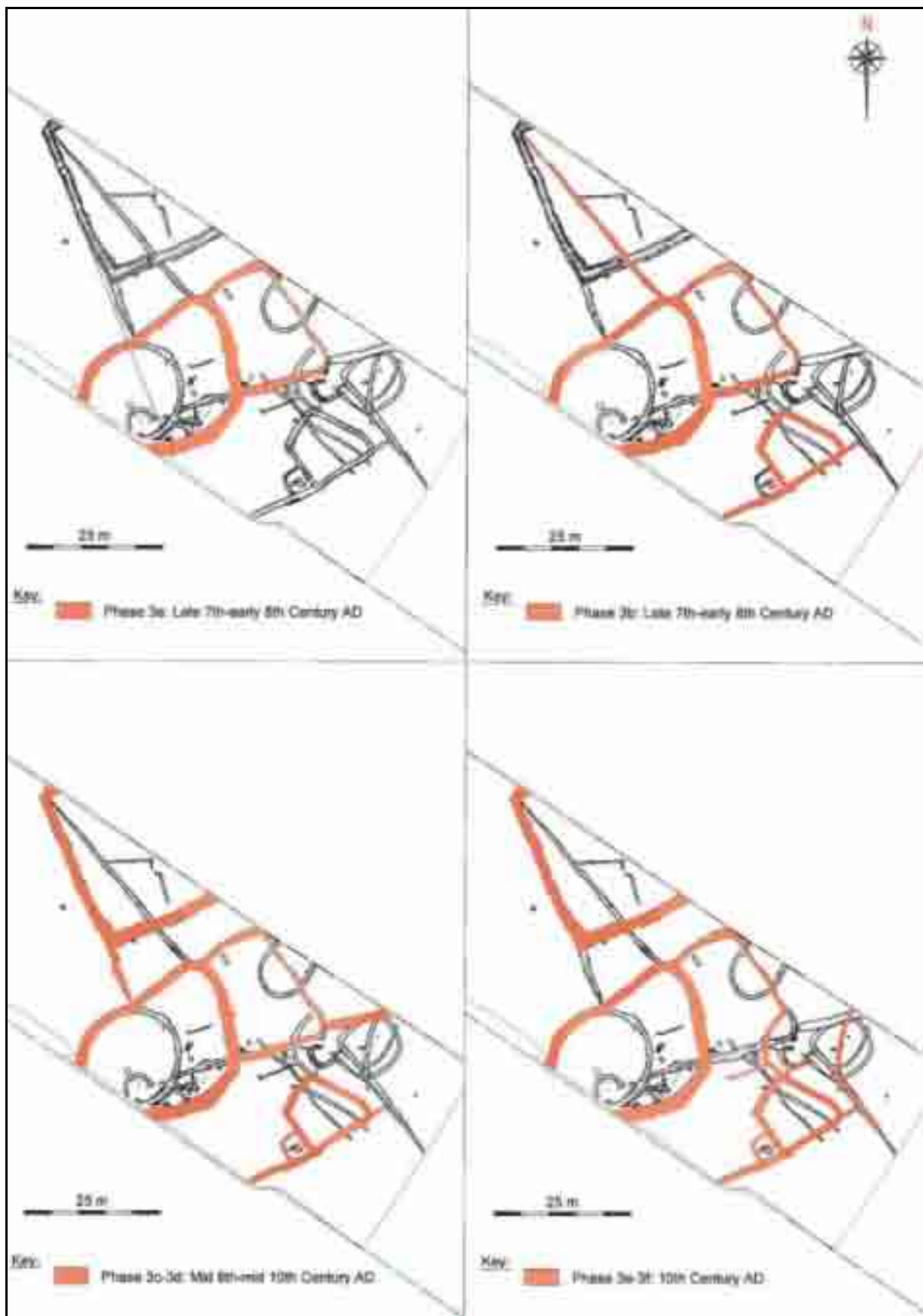
Analysis of 153 deposits provided evidence for a very large charred plant remains assemblage. A total of 40,977 cereal grains, 126 cereal chaff fragments, 1 fruit seed and 2524 weed seeds were recorded. Hazelnut shell fragments were absent.



Cereals were recorded in almost all phases of activity. A variety of crops was present, including oat, naked barley, hulled barley, six-row barley and wheat. The weed remains may represent arable weeds and plants that were growing locally.



Phases at Dowdstown, Co. Meath (in Cagney *et al.* 2009)



Phases at Dowdstown, Co. Meath (in Cagney *et al.* 2009)

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
QUB-7039	F496: Animal bone from primary fill of Enclosure 1	1454±33 BP	<b>A.D. 554-651</b>
Beta-220119	F442: Animal bone from primary fill of Enclosure 1	1540±40 BP	<b>A.D. 426-600</b>
Beta-220117	F328: Animal bone from primary fill of re-cut Enclosure 1 ditch	1240±40 BP	<b>A.D. 680-882</b>
Beta-220120	F548: Animal bone from primary fill of Enclosure 3	1300±40 BP	<b>A.D. 649-781;</b> A.D. 791-807
QUB-7009	F336: Animal bone from fill of Enclosure 6	1369±33 BP	<b>A.D. 605-691;</b> A.D. 750-762
Beta-247068	F721: Fill of posthole associated with Structure A	1440±40 BP	<b>A.D. 553-658</b>
Beta-247072	F1476: Fill of posthole associated with Structure B	1200±40 BP	<b>A.D. 689-752;</b> <b>A.D. 761-899;</b> A.D. 919-948
Beta-247069	Cereal grain from oval-shaped cereal-drying kiln (Kiln A)	1180±40 BP	A.D. 717-743; <b>A.D. 768-907;</b> <b>A.D. 911-971</b>
Beta-247071	Cereal grain from oval-shaped cereal-drying kiln (Kiln C)	1340±40 BP	<b>A.D. 637-772</b>
Beta-247070	Cereal grain from cereal-drying kiln (Kiln H)	1320±40 BP	<b>A.D. 648-774</b>
Beta-220118	F388: Animal bone from fill of Enclosure 6	1570±40 BP	<b>A.D. 409-575.</b>
Beta-247066	Human bone from Burial 1	960±40 BP	A.D. 996-1006; <b>A.D. 1012-1166.</b>

## Overview

### ➤ Phase 2

- Phase 2a – Enclosure ditches (6 deposits): very large quantity of cereal grains and chaff (predominantly barley, including hulled, six-row and naked varieties; also smaller quantities of oat and wheat). Significant quantity of weed remains.
- Phase 2b – Ditches/gullies, Structure A (14 deposits): substantial quantity of cereal grains (predominantly barley, including hulled and six-row varieties; also occasional oat and wheat). Occasional weed remains.
- Phase 2c – Enclosure and other ditches (13 deposits): very large quantity of cereal grains and occasional chaff (predominantly barley, including hulled and six-row varieties; also smaller quantities of oat and wheat). Significant quantity of weed remains and one fruit seed.
- Phase 2d – Enclosure and other ditches/gullies (4 deposits): very large quantity of cereal grains and occasional chaff (predominantly barley, including hulled, six-row and naked varieties; also smaller quantities of oat and wheat). Large quantity of weed remains.

- Phase 3
  - Phase 3a – Ditches (10 deposits): significant quantity of cereal grains (predominantly barley, including hulled and six-row varieties; also occasional oat and wheat). Occasional weed remains.
  - Phase 3b – Enclosure and other ditches (7 deposits): large quantity of cereal grains (predominantly barley, including hulled and six-row varieties; also smaller quantities of oat and wheat). Large quantity of weed remains.
  - Phase 3c – Enclosure and other ditches/gullies, Kilns, Pits/post-holes (37 deposits): very large quantity of cereal grains and occasional chaff (predominantly barley, including hulled and six-row varieties; also smaller quantities of oat and wheat). Large quantity of weed remains.
  - Phase 3d – Enclosure ditches, Structure B, Kilns, Post-holes (12 deposits): large quantity of cereal grains and occasional chaff (predominantly barley, including hulled and six-row varieties; also smaller quantities of oat and wheat). Occasional weed remains.
  - Phase 3e – Enclosure and other ditches (2 deposits): occasional cereal grains (barley). Also occasional weed remains.
  - Phase 3f – Enclosure ditches (2 deposits): very large quantity of cereal grains and occasional chaff (predominantly barley, including hulled and six-row varieties; also smaller quantities of oat). Significant quantity of weed remains.
- Phase 4
  - Burial 1 (1 deposit): one cereal grain (indeterminate cereal).
- Phase 5
  - Ditches/gullies, Tree-bole (5 deposits): significant quantity of cereal grains (predominantly barley, including hulled and six-row varieties; also smaller quantities of oat and wheat). Significant quantity of weed remains.
- Miscellaneous
  - Kilns, Hearths, Pits, Gullies, etc. (40 deposits): comprises deposits that are thought to be early medieval but could not be directly associated with any of the other phases of activity.
  - Very large quantity of cereal grains and occasional chaff (predominantly barley, including hulled and six-row varieties; also smaller quantities of oat and wheat). Large quantity of weed remains.

Phase	Cereal (grain)	Cereal (chaff)	Fruit (seed)	Weed (seed)	Date
<b>Phase 2a</b>	6232	66		151	<b>A.D. 426–600.</b>
<b>Phase 2b</b>	372			33	<b>A.D. 553–658. A.D. 554–651.</b>
<b>Phase 2c</b>	7346	8	1	187	
<b>Phase 2d</b>	5552	21		697	
<b>Phase 3a</b>	208			44	<b>A.D. 680–882.</b>
<b>Phase 3b</b>	1076			142	
<b>Phase 3c</b>	10611	18		623	<b>A.D. 409–575. A.D. 605–691;</b> A.D. 750–762. <b>A.D. 637–772. A.D.</b> <b>648–774. A.D. 649–781;</b> A.D. 791–807.
<b>Phase 3d</b>	1447	4		35	A.D. 689–752; A.D. 761–899; A.D. 919–948. A.D. 717–743; A.D. 768– 907; A.D. 911–971.
<b>Phase 3e</b>	4			2	
<b>Phase 3f</b>	4248	8		84	
<b>Phase 4</b>	1				A.D. 996–1006; <b>A.D. 1012–1166.</b>
<b>Phase 5</b>	537			95	
<b>Misc.</b>	3343	1		431	

**Overview of all plant groups (total deposits n=153)**

Phase	Oat (grain)	Barley (grain)	Wheat (grain)
<b>Phase 2a</b> (n=5632)	2.41%	96.32%	1.26%
<b>Phase 2b</b> (n=323)	6.50%	92.57%	0.93%
<b>Phase 2c</b> (n=6570)	9.09%	78.17%	12.74%
<b>Phase 2d</b> (n=5379)	18.42%	78.77%	2.81%
<b>Phase 3a</b> (n=97)	25.77%	62.89%	11.34%
<b>Phase 3b</b> (n=946)	13.11%	75.58%	11.31%
<b>Phase 3c</b> (n=9363)	12.91%	79.96%	7.12%
<b>Phase 3d</b> (n=1149)	12.01%	86.34%	1.65%
<b>Phase 3e</b> (n=2)			
<b>Phase 3f</b> (n=4248)	7.02%	92.98%	0.00%
<b>Phase 4</b> (n=0)			
<b>Phase 5</b> (n=477)	11.95%	80.92%	7.13%
<b>Misc.</b> (n=2798)	9.15%	84.02%	6.83%

#### Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	Naked barley (grain)	Hulled barley (grain)	Six-row barley (grain)	Barley (grain)
<b>Phase 2a</b>	136	4	360	257	4804
<b>Phase 2b</b>	21		15	11	273
<b>Phase 2c</b>	597		426	285	4425
<b>Phase 2d</b>	991	44	309	343	3541
<b>Phase 3a</b>	25		7	4	50
<b>Phase 3b</b>	124		32	17	666
<b>Phase 3c</b>	1209		518	344	6625
<b>Phase 3d</b>	138		208	108	676
<b>Phase 3e</b>					2
<b>Phase 3f</b>	298		250	170	3530
<b>Phase 4</b>					
<b>Phase 5</b>	57		21	20	345
<b>Misc.</b>	256		97	71	2183

#### Detail of oat and barley remains

Phase	Wheat (grain)	Indet. cereal (grain)	Indet. cereal (spikelet fork)	Indet. cereal (glume base)	Indet. cereal (rachis internode)	Indet. cereal (culm node)
<b>Phase 2a</b>	71	600		57	8	1
<b>Phase 2b</b>	3	49				
<b>Phase 2c</b>	837	776			8	
<b>Phase 2d</b>	151	173		19		2
<b>Phase 3a</b>	11	111				
<b>Phase 3b</b>	107	130				
<b>Phase 3c</b>	667	1248	1	15	1	1
<b>Phase 3d</b>	19	298		2		2
<b>Phase 3e</b>		2				
<b>Phase 3f</b>				8		
<b>Phase 4</b>		1				
<b>Phase 5</b>	34	60				
<b>Misc.</b>	191	545				1

#### Detail of wheat and indeterminate cereal remains

Phase	Phase 2a	Phase 2b	Phase 2c	Phase 2d	Phase 3a	Phase 3b	Phase 3c	Phase 3d	Phase 3e	Phase 3f	Phase 4	Phase 5	Misc.
<b>Brambles</b> (nutlet): <i>Rubus</i> spp.			1										
<b>Meadow buttercup</b> (achene): <i>Ranunculus acris</i>							2						1
<b>Buttercups</b> (achene): <i>Ranunculus</i> spp.					1								
<b>Meadow-rues</b> (seed): <i>Thalictrum</i> spp.				2									
<b>Common poppy</b> (seed): <i>Papaver rhoeas</i>	1	3		4			10	1		1		1	4
<b>Fat-hen</b> (utricle frag): <i>Chenopodium album</i>	1		24			2	13	1				1	28
<b>Goosefoots</b> (utricle): <i>Chenopodium</i> spp.	28	3	3	46	2		7	2	1	8		3	10
<b>Common orache</b> (utricle): <i>Atriplex patula</i>	1		2	4		11	10					11	8
<b>Common chickweed</b> (seed): <i>Stellaria media</i>	16	4		3	3	1	8			1		10	7
<b>Common bistort</b> (achene): <i>Persicaria bistorta</i>	8			1									
<b>Redshank</b> (achene): <i>Persicaria maculosa</i>	6		1	29			12	1				7	1
<b>Pale persicaria</b> (achene): <i>Persicaria lapathifolia</i>		1	2	9		1	13						1
<b>Water-pepper</b> (achene): <i>Persicaria hydropiper</i>				2									
<b>Tasteless water-pepper</b> (achene): <i>Persicaria mitis</i>				1									2
<b>Small water-pepper</b> (achene): <i>Persicaria minor</i>	1	1	6	4		13	53	1				1	12
<b>Knotgrass</b> (achene): <i>Polygonum aviculare</i>	2	2	3	10	1	8	24	1		8		1	1
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>			8			7	23					3	3
<b>Common sorrel</b> (achene): <i>Rumex acetosa</i>		2	6	20			32	3		40		2	9
<b>Northern dock</b> (achene): <i>Rumex longifolius</i>	9			23	4	2	34	3	1			2	10
<b>Curled dock</b> (achene): <i>Rumex crispus</i>	3	1	7	25	4	1	33	6		8		3	2
<b>Clustered dock</b> (achene): <i>Rumex conglomeratus</i>							1					7	1
<b>Broad-leaved dock</b> (achene): <i>Rumex obtusifolius</i>				1			1						
<b>Marsh dock</b> (achene): <i>Rumex palustris</i>					1			1		1			
<b>Docks</b> (achene): <i>Rumex</i> spp.			33	6	1	2	61	6				5	165
<b>Knotweed family</b> (achene): Polygonaceae	10		3	20			10	1					20
<b>Black mustard</b> (seed):	5	11	3	9	6	2	35					7	29

<i>Brassica nigra</i>													
<b>Cabbage</b> (seed): <i>Brassica</i> spp.	8			9	4	1		2				1	4
<b>Silverweed</b> (nutlet): <i>Potentilla anserina</i>	16												
<b>Pea</b> (seed): <i>Lathyrus</i> spp.	1												
<b>Field forget-me-not</b> (nutlet): <i>Myosotis arvensis</i>													1
<b>Hemp-nettles</b> (nutlet): <i>Galeopsis</i> spp.			8	2	1		12						3
<b>Garden thyme</b> (nutlet): <i>Thymus vulgaris</i>			1				1						
<b>Mints</b> (nutlet): <i>Mentha</i> spp.				1	1								
<b>Dead-nettle family</b> (nutlet): Lamiaceae			1	5	1								2
<b>Cleavers</b> (seed): <i>Galium aparine</i>	2		1	278	2		16					3	5
<b>Autumn hawkbit</b> (achene): <i>Leontodon autumnalis</i>												1	
<b>Dandelions</b> (achene): <i>Taraxacum</i> sect. <i>Ruderalia</i>				1	1							1	1
<b>Rough hawk's-beard</b> (achene): <i>Crepis biennis</i>	3		2	35	1	2	36						5
<b>Scentless mayweed</b> (achene): <i>Tripleurospermum inodorum</i>		1	62	91	2	77	130	5				22	79
<b>Daisy family</b> (achene): Asteraceae	3				4								
<b>Carnation sedge</b> (achene): <i>Carex panicea</i>				2	1		1						
<b>Sedges</b> (achene): <i>Carex</i> spp.	8						3						1
<b>Fescues</b> (grain): <i>Festuca</i> spp.	17	3	2	15	1	3	20	1		17			2
<b>Annual meadow-grass</b> (grain): <i>Poa annua</i>		1		32	1	7	16					1	10
<b>Bromes</b> (grain): <i>Bromus</i> spp.	1		9	2		2	4					1	4
<b>Grass family</b> (grain): Poaceae	1			5	1		2					1	

#### Detail of fruit and weed remains

**Dromthacker, Co. Kerry**Grid Ref: **085917/116236**SMR No: **KE029-095**Reference: **McClatchie 2008; Cleary 2008**

An excavation at Dromthacker in advance of a new university campus at Tralee revealed a univallate enclosure with two internal buildings preceded by an unenclosed settlement associated with a small structure and gully. The site was situated on the south-westerly face of a gradually rising ridge (58m OD) between the Big River and a tributary of the River Lee.

Pre-enclosure activity was indicated by a series of postholes, stakeholes and pits on the eastern side of the site. The post and stakes defined a structure 3.8m by 3m. An internal pit and a paved surface, which extended from the interior of the building to the east, were also located. This paved area was cut by a gully (14.6m long by 0.9m wide and 0.4m deep) and was interpreted as a drain for keeping the environs of the building dry. A hone-stone was recovered from the paved surface, while two others were also identified within the fill of the gully. Charcoal from the gully produced a radiocarbon date range in the fifth/sixth century (see below).

The Phase 1 unenclosed settlement (Fig. 1) was overlain by an introduced clay layer which was interpreted as a levelling-up of part of the site prior to the construction of the Phase 2 oval enclosure (19m by 24m internally). The enclosure bank survived to a maximum height of 0.75m and maximum width of 2.25m. The ditch associated with it was U-shaped with a surface width of 2.7m. There was no indication of basal silting, indicating that the ditch was either cleaned out periodically or in-filled shortly after excavation; excavation revealed that it had been partially in-filled in antiquity.

The original entrance was not located, and a south-eastern entrance blocked in the 1980s was associated with modern paving. Two pits and a posthole - supporting a possible gate-post - were excavated in this area, and were interpreted as a possible original entrance, however the ditch was however continuous in this area and these features may represent pre-enclosure activity. The pits were bowl-shaped and contained iron slag, charcoal and fire-shattered stones. One also contained partly vitrified clay, possibly belonging to the clay surrounding a *tuyère*.

Phase 2 occupation was mainly confined to the eastern and southern sections of the enclosure interior and had surviving remains of at least two post-built buildings with internal stakeholes (Fig. 2). Structure 1 was located in the south-east and had an estimated internal diameter of 7.5m. A stone-spread on the south-western side was interpreted as marking the building's entrance. Structure 2 was recorded 2m north-east of Structure 1. It was an oval-shaped building with an estimated long axis of 8.5m and contained an internal hearth.

A series of external stakeholes and pits were excavated within the enclosure interior. One pit between the two structures (but on the same stratigraphic level) contained dumped ironworking material and charred plant remains. Charcoal from this pit produced a radiocarbon date range in the sixth/seventh century (see below). A pit in the northern area had evidence for *in situ* burning and contained burnt bone, saddle quern fragments, charcoal, iron slag, a bi-chrome glass bead and a blue glass bead.

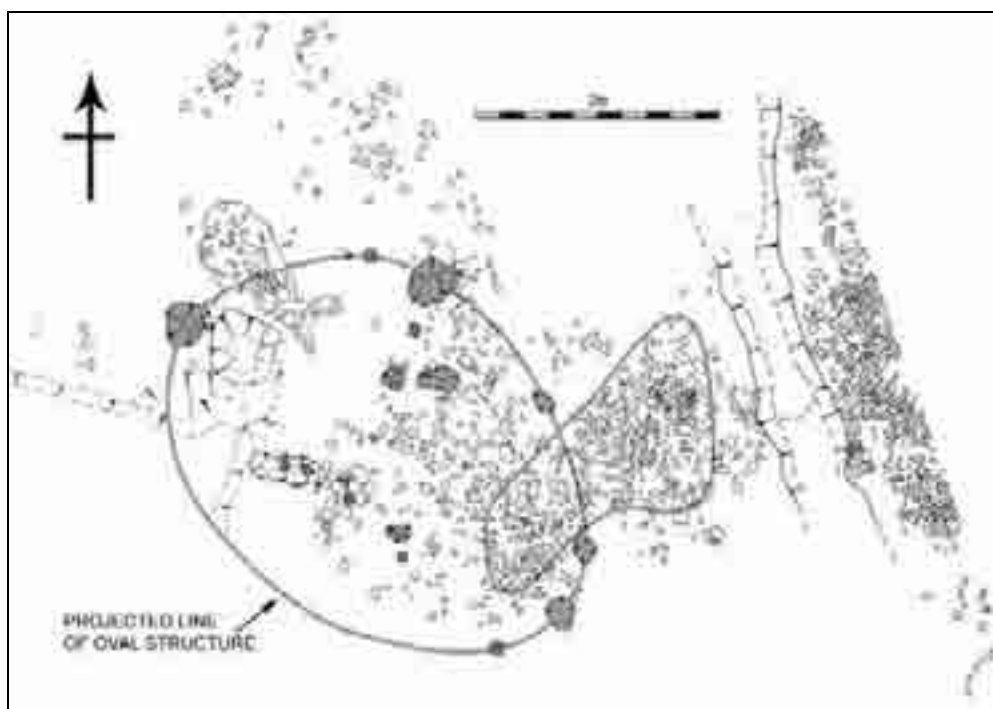
The radiocarbon dates from the two phases suggest that there was not any significant time interval between the initial unenclosed settlement and the subsequent construction of the enclosure and associated structures.

**Plant macro-remains**

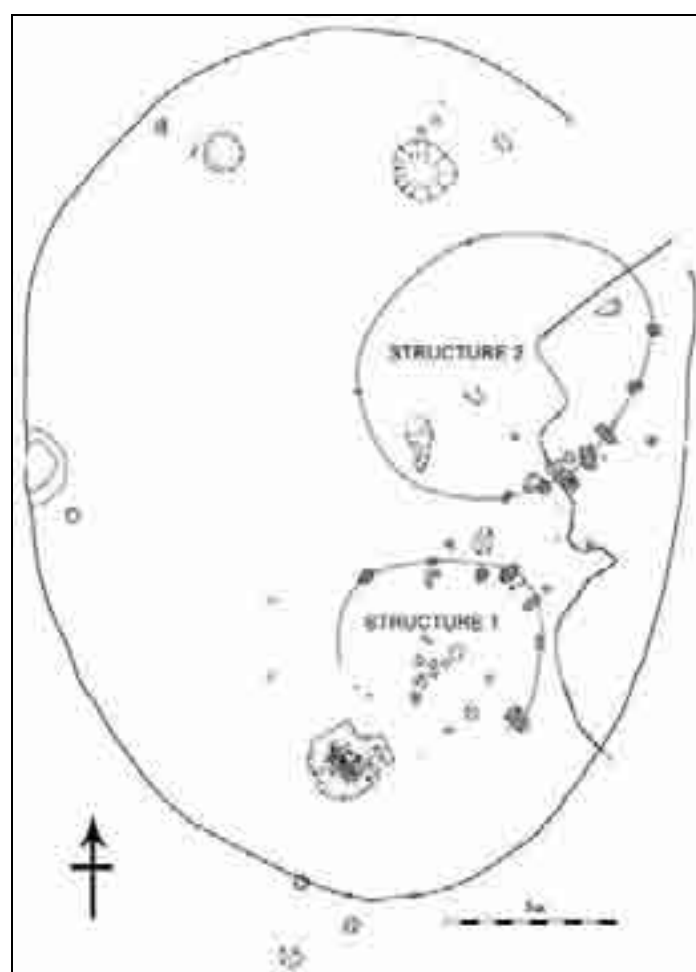
Analysis of five deposits provided evidence for a total of 6 charred cereal grains, 81 charred fruit seeds and 148 charred weed seeds. Cereal chaff and nut remains were absent.

Cereals were recorded in both Phase 1 and Phase 2 deposits. Phase 1 deposits contained only barley, while Phase 2 deposits contained both barley and wheat. The weed remains may represent arable weeds and plants that were growing locally.





**Plan of Phase 1 house at Dromthacker, Co. Kerry (after Cleary 2008, 24).**



**Phase 2 structures at Dromthacker, Co. Kerry (after Cleary 2008, 32).**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
GrN23798	Charcoal from Phase I gully fill	1520 $\pm$ 30 BP	<b>A.D. 433-495</b> <b>A.D. 504-609</b>
GrN23797	Charcoal from fill of pit between Phase 2 Buildings	1480 $\pm$ 25 BP	<b>AD 545-637</b>

## Overview

- Phase 1: Pre-enclosure (2 deposits)
  - Contained a small number of barley grains, as well as a large number of weed seeds.
- Phase 2: Enclosure (3 deposits)
  - Contained a small number of barley and wheat grains, a large number of fruit seeds – mainly brambles – and occasional weed seeds.

Phase	Cereal (grain)	Fruit (seed)	Weed (seed)	Dates
<b>Phase 1:</b> Pre-enclosure	4		144	A.D. 433–495; A.D. 504–609.
<b>Phase 2:</b> Enclosure	2	81	4	<b>A.D. 545–637</b>

## Overview of all plant groups (total deposits n=5)

Phase	Barley (grains)	Wheat (grains)
<b>Phase 1:</b> Pre-enclosure	4	
<b>Phase 2:</b> Enclosure	1	1

## Detail of barley and wheat remains

Phase	Phase 1: Pre-enclosure	Phase 2: Enclosure
<b>Brambles</b> (nutlet): <i>Rubus</i> spp.		80
<b>Elder</b> (seed): <i>Sambucus nigra</i>		1
<b>Knotgrasses</b> (achene): <i>Polygonum</i> spp.		1
<b>Rape/Swede</b> (seed): <i>Brassica napus</i>	109	
<b>Charlock</b> (seed): <i>Sinapis arvensis</i>	35	3

## Detail of fruit and weed remains

## **Drumadonnell, Co. Down**

Grid Ref: **32439/33915**

SMR No: **DOW 035:053**

Reference: **Weir 2001; McSparron 2001**

Excavation revealed the presence of a hearth and associated post-hole settings, as well as a second hearth which did not appear to have been associated with the layout of post-holes. Dating of charcoal from both of the hearths gave an early medieval date and it is suggested that the post-holes may have represented a roundhouse-type structure.

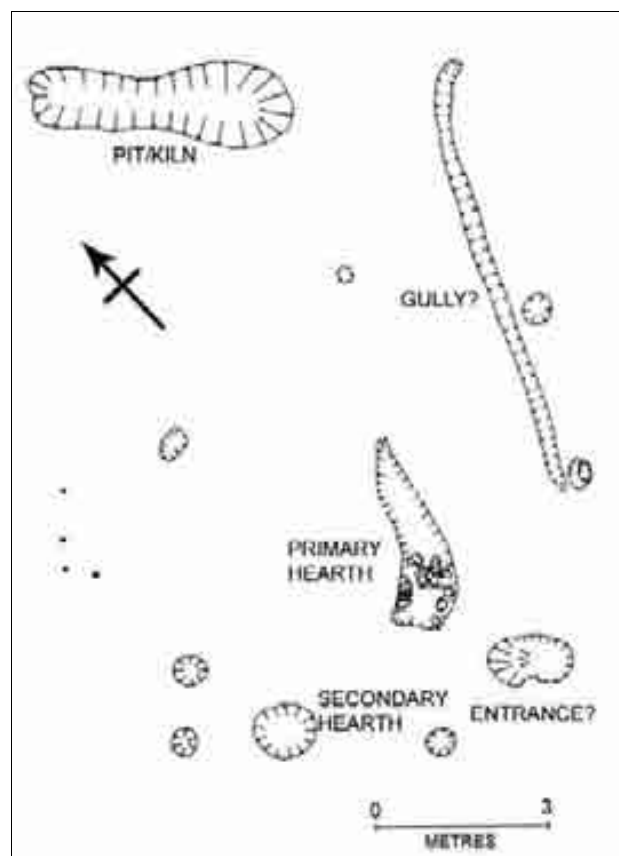
A number of sherds of souterrain-ware pottery were found on site, but there is also some evidence (two non-souterrain-ware pottery sherds and the nature of the seed assemblage in the bottom of a pit/kiln) that the site was occupied in the Bronze Age.

### **Plant macro-remains**

Analysis of 11 deposits provided evidence for a total of 167 charred cereal grains, 25 charred hazelnut shell fragments, 1 charred fruit seed and 1 charred weed seed. Cereal chaff was absent.

Cereal remains were recorded in different phases of activity. A variety of cereal types was present, including oat, hulled barley, six-row barley and possible wheat. Barley was the predominant cereal type, with smaller quantities of oat and occasional possible wheat. The weed remains may represent plants that were growing locally and arable weeds that were growing alongside the cereals.

A small quantity of what appear to be Bronze Age plant remains were also recorded in a nearby deposit, providing evidence for earlier activity at this location. The Bronze Age plant remains were rather different, in that naked barley was present and oat was absent. The Bronze Age remains have not been recorded below.



**Unenclosed House at Drumadonnell, Co. Down (after McSparron 2001, 49).**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
N/A	Charcoal from lower fill of primary hearth	N/A	<b>A.D. 705-1005.</b>
N/A	Charcoal from secondary hearth	N/A	<b>A.D. 680-980</b>

## Overview

- Phase 1: Hearth C.104 (2 deposits)
  - Contained the largest quantity of cereal grains, as well as occasional hazelnut shell fragments.
  - Barley, including six-row hulled barley, was the predominant cereal type, with smaller quantities of oat present.
- Phase 2: Hearth C.111 (6 deposits)
  - Contained cereal grains, as well as occasional hazelnut shell fragments and a fruit seed.
  - Barley, including six-row hulled barley, was the predominant cereal type, with smaller quantities of oat present.
- Miscellaneous (3 deposits)
  - Contained a smaller number of cereal grains, as well as occasional hazelnut shell fragments and a weed seed.
  - Barley, including six-row hulled barley, oat and occasional possible wheat were present.

Phase	Cereal (grain)	Hazelnut (shell frag)	Fruit (seed)	Weed (seed)	Date
<b>Phase 1:</b> Hearth C.104	105	8			<b>A.D. 705–1005.</b>
<b>Phase 2:</b> Hearth C.111	39	10	1		<b>A.D. 680–980.</b>
<b>Misc.</b>	23	7		1	

## Overview of plant remains (total deposits n=11)

Uncalibrated dates were not provided in the excavation report. It is unclear which calibration programme was used in the dates reported above.

Phase	Oat (grain)	Barley (grain)
<b>Phase 1: Hearth C.104</b> (n=105)	37.14%	62.86%
<b>Phase 2: Hearth C.111</b> (n=38)	34.21%	65.79%
<b>Misc.</b>		

## Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	cf. Oat (grain)	Six-row hulled barley (grain)	Barley (grain)	cf. Barley (grain)
<b>Phase 1: Hearth C.104</b>	22	17	29	36	1
<b>Phase 2: Hearth C.111</b>	11	2	3	21	1
<b>Misc.</b>	5	1	9	2	

**Detail of oat and barley remains**

<b>Phase</b>	<b>cf. Wheat</b> (grain)	<b>cf. Oat/Rye</b> (grain)	<b>Indet. cereal</b> (grain)	<b>Indet. cereal</b> (grain frag.)
<b>Phase 1: Hearth C.104</b>				16
<b>Phase 2: Hearth C.111</b>		1		
<b>Misc.</b>	4		2	15

**Detail of wheat and indeterminate cereal remains**

<b>Phase</b>	<b>Sloe</b> (stone): Prunus spinosa	<b>Grass family</b> (grain): Poaceae
<b>Phase 1: Hearth C.104</b>		
<b>Phase 2: Hearth C.111</b>	1	
<b>Misc.</b>		1

**Detail of fruit and weed remains**

**Drumadoon, Co. Antrim**Grid Ref: **31467/44046**SMR No: **ANT 009:042**Reference: **Plunkett 2009; McSparron & Williams 2009**

Excavation of a mound partially destroyed by the landowner revealed a banked enclosure, 14m x 5m, on the mound summit. This bank had a stone-faced external façade, and there was evidence for a cobbled entranceway and metalled interior surface (Phase I). The construction of the souterrain appears to have occurred during this phase of occupation. Human habitation is indicated by the presence of a hearth, and a circular hut which was associated with deposits of burnt wattle-and daub. Souterrain-ware (242 sherds) was found in this occupation layer, as well as two iron nails, an iron spearhead, and a copper alloy clasp. The bank was later levelled to create an artificial platform upon which a second hearth and paved area were constructed (Phase II). Souterrain-ware (54 sherds) was also found in this occupation layer.

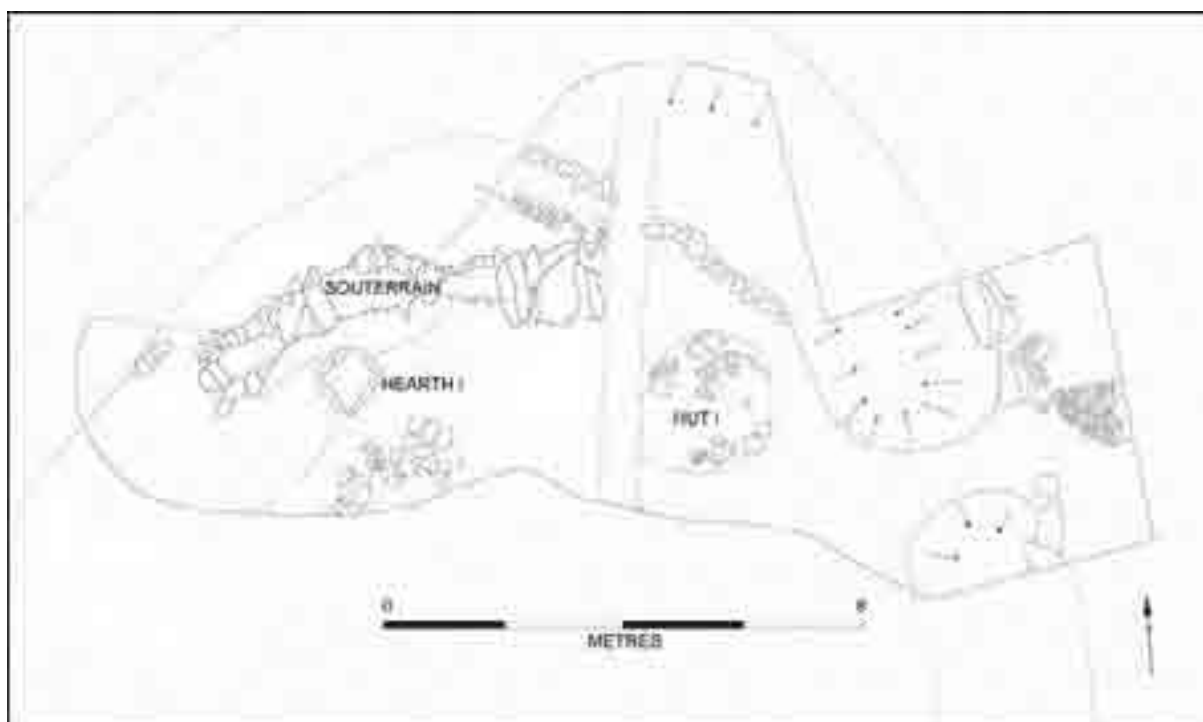
The interior of the site was levelled again, and the external bank was strengthened by the addition of an internal stone revetment (Phase III). A sub-circular hut was identified in this occupation phase, which appears to relate to the construction of an Anglo-Norman motte. A copper-alloy bell-shrine of possible twelfth-century date was discovered in a void within the souterrain fill. A silver half-penny of Henry III (dating to 1247-1272) was also found in this phase. Over two hundred pottery sherds were recovered – the majority (134) were identified as souterrain-ware; a large number (85) were identified as possible souterrain-ware; and fourteen were identified as thirteenth/fourteenth-century Everted-Rim ware.

**Plant macro-remains**

Analysis of 12 deposits provided evidence for a total of 4223 charred cereal grains, a large quantity of charred cereal chaff, 6 charred flax seeds, 24 charred hazelnut shell fragments and 415 charred weed seeds. The presence of seeds from the Fabaceae family (pea) may represent cultivated legumes or weeds. Fruit remains were absent.

A variety of cereal types were present, including common/bristle oat, naked barley, hulled barley, six-row barley, possible wheat and possible rye. Cereal grains were recorded in several phases of activity, while cereal chaff was identified only in Phase 1 occupation deposits. In most cases, the quantity of chaff remains was not recorded, but was noted as being present in large quantities. It was noted that further chaff remains may have been preserved in deposits from other phases, but were overlooked during the processing of soil samples.

The majority of weed remains were recorded in Phase 1 occupation deposits. The weed seeds are likely to represent plants growing alongside the cereals, as well as weeds that were growing locally. It was noted that the identified weed species include tall, erect plants, as well as shorter species, suggesting that cereals were harvested low on the stalk. It was also noted that a number of the weed species can thrive under a spring cultivation regime, suggesting that the cereals were sown at this time.



**Phase I occupation at Drumadoon, Co. Antrim (after McSparron & Williams 2009, 121).**



**Phase II occupation at Drumadoon, Co. Antrim (after McSparron & Williams 2009, 125).**

## Radiocarbon Dates

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
UB-6414	Charred cereal grains from Hearth II	1185±30	A.D. 724-739; <b>A.D. 771-899</b> ; A.D. 919-949
UB-6416	Charred cereal grains from basal fill of souterrain	1152±30	A.D. 779-792; <b>A.D. 803-972</b>
UB-6417	Charred cereal grains from Hearth I	1186±30	A.D. 723-740; <b>A.D. 770-899</b> ; A.D. 919-948
UB-6418	Charred cereal grains from Hut I	1199±30	A.D. 713-745; <b>A.D. 767-895</b> ; A.D. 925-937
UB-6993	Human femur in gravel capping souterrain	1260±29	<b>A.D. 670-783</b> ; A.D. 787-823; A.D. 841-861

## Overview

- Souterrain (2 deposits)
  - Contained a large number of cereal grains – oat was the predominant cereal type, with smaller quantities of barley and occasional possible wheat.
  - Occasional hazelnut shell and weed remains also present.
- Phase 1 occupation (8 deposits)
  - Deposits from this phase produced the largest quantity of remains. In the case of one deposit, a representative sub-sample was examined, due to the large quantity of remains. If all grains had been counted, it was suggested that approximately 10,000 grains were present in deposits from this phase.
  - Contained a very large number of cereal grains and cereal chaff – oat, including common/bristle oat, was the predominant cereal type, with smaller quantities of barley and occasional possible rye.
  - Also contained a large quantity of weed remains, as well as occasional flax seeds.
- Phase 2 occupation (2 deposits)
  - Contained a large number of cereal grains – oat was the predominant cereal type, although barley was also significant, with occasional possible rye.
  - Occasional flax seeds, hazelnut shell fragments and weed seeds also present.

Phase	Cereal (grain)	Cereal (chaff)	Flax (seed)	Hazelnut (shell)	Weed (seed)	Date
<b>Souterrain</b>	235			11	1	A.D. 779-792; <b>A.D. 803-972</b> . <b>A.D. 670-783</b> ; A.D. 787-823; A.D. 841-861.
<b>Phase 1 occupation</b>	3834	P	3		409	A.D. 723-740; <b>A.D. 770-899</b> ; A.D. 919-948. A.D. 713-745; <b>A.D. 767-895</b> ; A.D. 925-937.
<b>Phase 2 occupation</b>	154		3	13	5	A.D. 724-739; <b>A.D. 771-899</b> ; A.D. 919-949.

**Overview of all plant groups (total deposits n=12)** P = present



Phase	Oat (grain)	Barley (grain)	cf. Wheat (grain)	cf. Rye (grain)
<b>Souterrain</b> (n=227)	91.63%	7.93%	0.44%	0.00%
<b>Phase 1 occupation</b> (n=3807)	96.01%	3.97%	0.00%	0.03%
<b>Phase 2 occupation</b> (n=144)	74.31%	25.00%	0.00%	0.69%

**Percentage of cereal grain types recorded in each phase of activity**

n=total number of grains recorded that were identifiable to genus

Phase	Common/Bristle oat (floret base)	Oat (grain)	cf. Wheat (grain)	cf. Rye (grain)
<b>Souterrain</b>		208	1	
<b>Phase 1 occupation</b>	410+	3655		1
<b>Phase 2 occupation</b>		107		1

**Detail of oat, wheat and rye remains**

+ P = unquantified material also present

Phase	Six-row naked barley (grain)	Six-row hulled barley (grain)	Naked barley (grain)	Hulled barley (grain)	Six-row barley (grain)	Barley (grain)
<b>Souterrain</b>	1	1	9		1	6
<b>Phase 1 occupation</b>	7	10	69	26	1	38
<b>Phase 2 occupation</b>			14	4		18

**Detail of barley remains**

Phase	Indet. cereal (grain)	Indet. cereal (twisted awn)	Indet. cereal (lemma/ palea)	Indet. cereal (culm node)	Indet. cereal (straw frag)	Indet. cereal (chaff)
<b>Souterrain</b>	8					
<b>Phase 1 occupation</b>	27	8+ P	P	1	7	1+ P
<b>Phase 2 occupation</b>	10					

**Detail of indeterminate cereal remains**

Phase	Souterrain	Phase 1 occupation	Phase 2 occupation
<b>Buttercups</b> (achene): <i>Ranunculus</i> spp.		1	
<b>Fat-hen</b> (utricle): <i>Chenopodium album</i>		2	
<b>Stitchworts</b> (seed): <i>Stellaria</i> spp.		1	
cf. <b>Mouse-ears</b> (seed): cf. <i>Cerastium</i> spp.		1	
<b>Corn spurrey</b> (seed): <i>Spergula arvensis</i>		84	
<b>Redshank</b> (achene): <i>Persicaria maculosa</i>		12	
<b>Knotgrass</b> (achene): <i>Polygonum aviculare</i>		2	
<b>Knotgrasses</b> (achene): <i>Polygonum</i> spp.		5	
<b>Sheep's sorrel</b> (achene): <i>Rumex acetosella</i>		24	
<b>Dock</b> (achene): <i>Rumex</i> spp.		18	
cf. <b>Wild pansy</b> (seed): <i>Viola</i> cf. <i>tricolor</i>		1	

cf. <b>Black mustard</b> (seed): <i>Brassica</i> cf. <i>nigra</i>		1	
<b>Cabbage</b> (seed): <i>Brassica</i> spp.		1	
<b>Heather</b> (leaf and stem): <i>Calluna vulgaris</i>		6	
<b>Pea family</b> (seed): Fabaceae		2	
<b>Dead nettles</b> (nutlet): <i>Lamium</i> spp.		3	
cf. <b>Hemp-nettles</b> (nutlet): cf. <i>Galeopsis</i> spp.		26	
<b>Ribwort plantain</b> (seed): <i>Plantago lanceolata</i>		77	1
<b>Bedstraws</b> (seed): <i>Galium</i> spp.			3
<b>Thistles</b> (achene): <i>Cirsium</i> spp.		1	
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>		97	
<b>Corn marigold</b> (achene): <i>Chrysanthemum segetum</i>		23	
cf. <b>Common ragwort</b> (achene): <i>Senecio</i> cf. <i>jacobaea</i>		5	
<b>Bromes</b> (grain): <i>Bromus</i> spp.		19	
<b>Grass family</b> (grain): Poaceae	1	3	
<b>Indeterminate</b> (seed)			1

#### Detail of weed remains

**Giltspur, Co. Wicklow**Grid Ref: **325287/215981**SMR No: **WI008-005**Reference: **Johnston 2006; Cryerhall & Moriarty 2006.**

An area of archaeological potential was uncovered during pre-development topsoil stripping. This area, sited on a gradual slope, was found to contain a keyhole-shaped corn-drying kiln, a sub-rectangular post-built structure (Fig. 1), and two associated cut features.

The sub-rectangular structure (5m by 4m) was built on a terrace cut into the hillside. Three of the walls were defined by postholes, and the fourth wall appears to have consisted of a horizontal sill beam supported by stone foundations. Some of the larger structural postholes were re-worked, evidence for posts being replaced. A post-built 'porch', with eighteen stakeholes (presumably for a wicker-wall), was located at the entrance to the house; and an internal division, interpreted as a wicker-screen, was represented by a linear slot trench with postholes at either end. The interior of the structure had a metallised surface and a hearth.

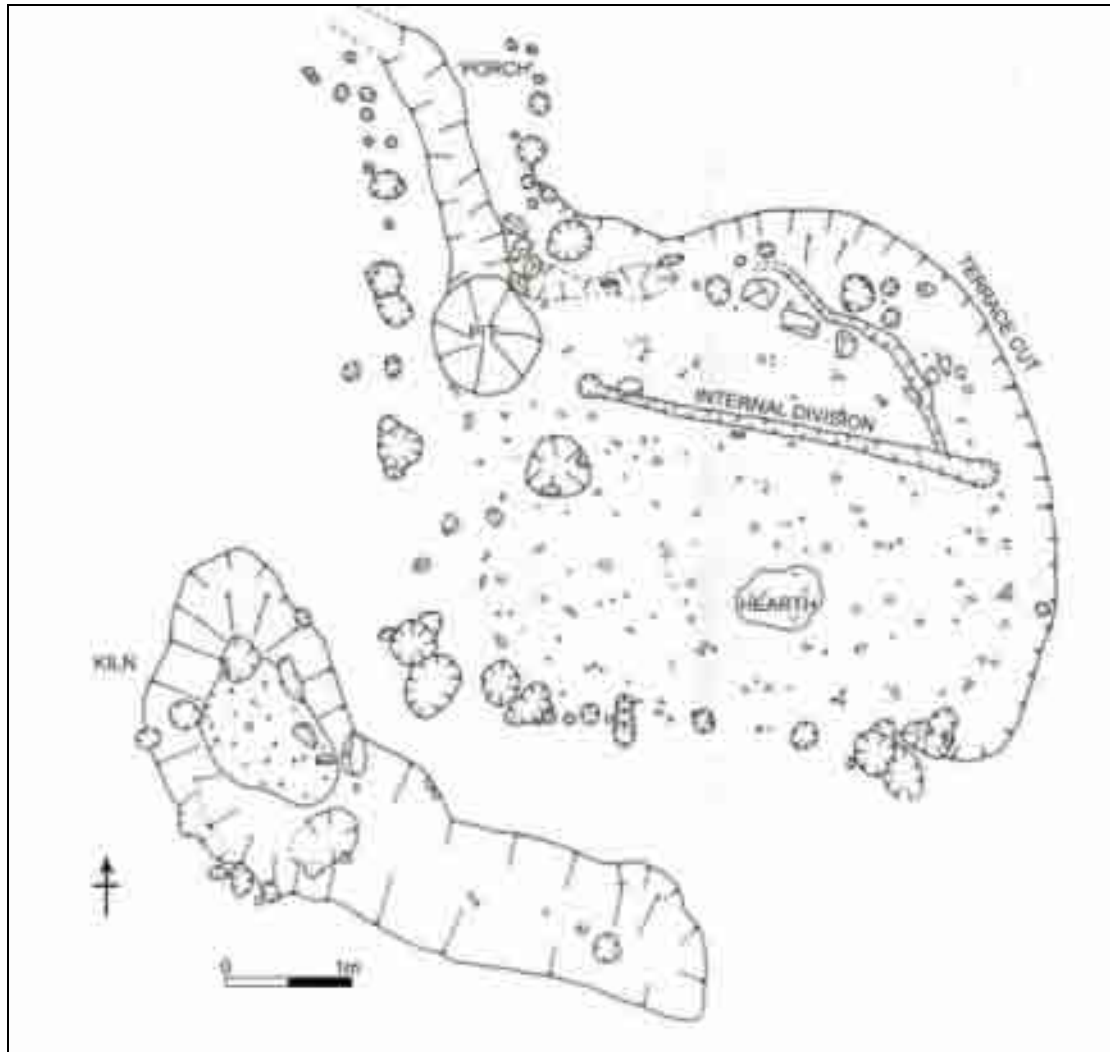
Radiocarbon dates suggest that the corn-drying kiln (which appears to have been largely associated with oats) and the structure may have been synchronous (see below). The lack of artefacts recovered from the structure led the excavator to interpret the building as a possible *saball* or barn. This interpretation may be supported by a pit with charred barley grains located just inside the entrance to the structure, however the internal division and the hearth located in the structure equally suggest that structure may have had a domestic function.

Of the two cut features, one would appear to have been an old field boundary; and the second, located up-slope from the house and kiln, would appear to have functioned as a drain to deflect rainwater.

**Plant remains**

Analysis of 2 deposits provided evidence for a total of 720 charred cereal grains, 4 charred cereal chaff fragments, 4 charred hazelnut shell fragments and 40 charred weed seeds. Fruit remains were absent.

A variety of crops was present, including oat, six-row barley and naked wheat. The weed remains may represent arable weeds and plants that were growing locally.



**Plan of sub-rectangular structure and kiln at Giltspur, Co. Wicklow (after Cryerhall & Moriarty 2006)**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
?	Charcoal from burnt kiln	?	A.D. 940-1040*
?	Charcoal from post-hole in structure	?	A.D. 860-1000†
?	Charcoal from pit with charred barley	?	A.D. 780-990‡

- \*84.7% probability.
- †94.3% probability
- ‡95.4% probability

### **Overview**

- Structure and kiln (2 deposits)
  - Contained a large quantity of cereal grains, as well as occasional chaff – barley was predominant, with a smaller quantity of oat and occasional wheat present.
  - Occasional hazelnut shell fragments and weed seeds were also recorded.

Phase	Cereal (grain)	Cereal (chaff)	Hazelnut (shell frag)	Weed (seed)	Date
Structure and kiln	720	4	4	40	A.D. 780–990. A.D. 860–1000. A.D. 940–1040.

#### Overview of all plant groups (total deposits n=114)

Uncalibrated dates were not provided in the excavation report. It is unclear which calibration programme was used in the dates reported above.

Phase	Oat (grain)	Barley (grain)	Wheat (grain)
Structure and kiln (n=346)	17.63%	77.46%	4.91%

#### Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	Six-row barley (rachis internode)	Barley (grain)	Naked wheat (grain)	Wheat (grain)	Indet. cereal (grain)	Indet. cereal (rachis internode)
Structure and kiln	61	2	268	3	14	374	2

#### Detail of cereal remains

Phase	Structure and kiln
<b>Fat-hen</b> (utricle): <i>Chenopodium album</i>	1
<b>Goosefoot family</b> (utricle): Chenopodiaceae	5
<b>Corn spurrey</b> (seed): <i>Spergula arvensis</i>	1
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>	2
cf. <b>Sheep's sorrel</b> (achene): <i>Rumex</i> cf. <i>acetosella</i>	6
<b>Knotweed family</b> (achene): Polygonaceae	3
<b>Field penny-cress</b> (seed): <i>Thlaspi arvense</i>	1
<b>Plantains</b> (seed): <i>Plantago</i> spp.	1
Cleavers ( <b>seed</b> ): <i>Galium aparine</i>	4
<b>Thistles/Knapweeds</b> (achene): <i>Cirsium/Centaurea</i> spp.	1
cf. <b>Corn marigold</b> (achene): <i>Chrysanthemum</i> cf. <i>segetum</i>	2
<b>Grass family</b> (grain): Poaceae	3
<b>Indeterminate</b> (seed)	10

#### Detail of weed remains

**Glebe (Site 43), Co. Dublin**Grid reference: **322892/223620**SMR: **N/A**References: **Johnston 2007a; Johnston 2007b; Seaver 2007**

Excavations at Glebe revealed a circular early medieval enclosed settlement and associated field system dating between the late-seventh and late-ninth centuries A.D. Earlier cereal processing was also evident in the form of four cereal-drying kilns, two of which returned radiocarbon dates from the mid-sixth and mid-seventh centuries.

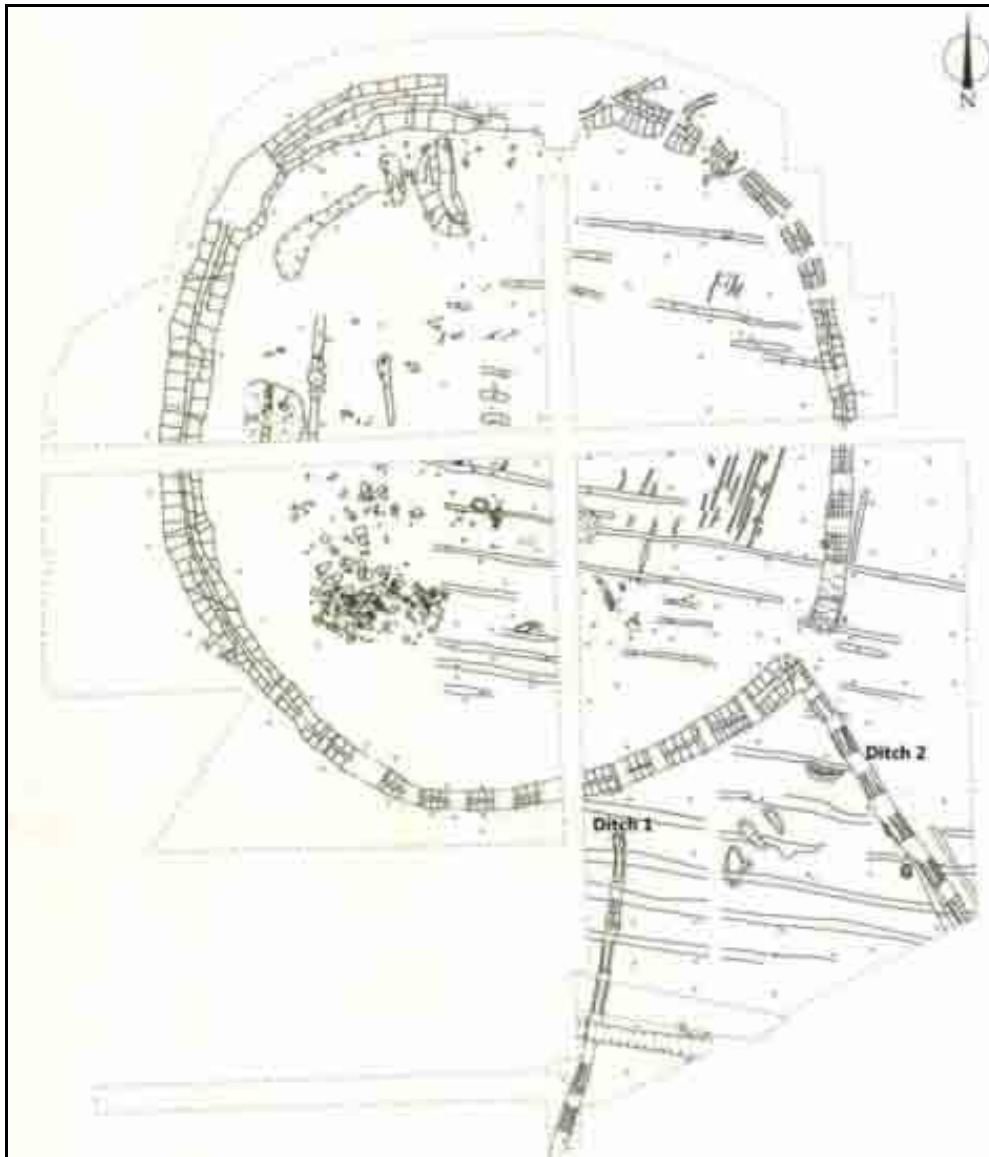
The enclosure measured 46m in internal diameter. A portion of bank survived on the western side while there was evidence for a post-built fence or palisade on the northern side of the enclosure, which was possibly constructed after the erosion of the bank. The interior was heavily ploughed, but a cluster of postholes, a hearth and a pit, were which may possibly denote the area of a former dwelling. Two smaller ditches radiated from the enclosure to the south and represented field enclosures. Material from a posthole marking one of the boundaries was dated between the late-seventh and late-ninth centuries. Four 'figure-of-eight' cereal-drying kilns were situated to the west of the enclosed settlement in the townland of Laughanstown (Site 42). Two returned radiocarbon dates between the mid sixth and mid seventh centuries, which probably places this agricultural activity before the construction of the settlement enclosure (see below for radiocarbon dates).

A reasonable number of artefacts were recovered from the site including ringed pin fragments, bone pins, blue glass beads, a stone spindle whorl, and iron slag. Possible ecclesiastical connections, with the nearby monastic site at Tully, were indicated by the presence of inscribed pieces of wood. One featured a raised cross, while another contained an inscription of the word *Deo* and a *chi-rho* symbol.

**Plant remains**

Analysis of 8 deposits provided evidence for a total of 34 charred cereal grains, 6 charred nutshell fragments, 1 charred fruit seed and 9 charred weed seeds. Cereal chaff was absent.

Cereals were present in deposits from both examined phases of activity. A variety of cereals was present, including oat, barley and possible emmer wheat. The weed remains may represent arable weeds and plants that were growing locally.



**Glebe, Co. Dublin (after Seaver 2007).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
OxA-12814	Charcoal (Poimoideae) from structure associated with cereal-drying kiln (Site 42)	1473±32 BP	<b>A.D. 543-645</b>
OxA-12816	Seeds from cereal-drying kiln (site 42)	1460±32 BP	<b>A.D. 551-648</b>
OxA-12718	Charcoal (Prunus?) from hearth	1263±26 BP	<b>A.D. 669-782;</b> A.D. 789-812; A.D. 845-855
OxA-12720	Charcoal (Poimoideae) from occupation deposit under bank	1244±27 BP	<b>A.D. 684-832;</b> A.D. 836-869

OxA-12719	Charcoal (Poimoidae) from posthole fill of field ditch	1321±27 BP	<b>A.D. 653-721; A.D. 741-770</b>
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#### Overview

- Phase 2 – ringfort and boundaries (3 deposits)
  - Contained oat, barley and possible emmer wheat grains
  - Also small quantity of hazelnut shell and weed seeds.
- Phase 3 – later phase of activity (5 deposits)
  - Contained a smaller quantity of cereal grains – including oat, possible barley and possible emmer wheat.
  - Also small quantity of hazelnut shell, fruit and weed remains.

Phase	Cereal (grain)	Hazelnut (shell frag)	Fruit (seed)	Weed (seed)	Date
<b>Phase 2</b>	24	2		3	A.D. 653–721; A.D. 741–770. <b>A.D. 684–832;</b> A.D. 836–869.
<b>Phase 3</b>	10	4	1	6	<b>A.D. 669–782;</b> A.D. 789–812; A.D. 845–855.

#### Overview of plant groups (total deposits n=8)

Phase	Oat (grain)	Barley (grain)	cf. Barley (grain)	cf. Emmer wheat (grain)	Wheat (grain)	Indet. Cereal (grain)	cf. Indet. Cereal (grain)
<b>Phase 2</b>	1	1		1	1	20	
<b>Phase 3</b>	2		1	1		5	1

#### Detail of cereal remains

Phase	Phase 2	Phase 3
<b>Raspberry/Bramble</b> (nutlet): <i>Rubus idaeus/fruticosus</i>		1
<b>Goosefoot family</b> (utricle): Chenopodiaceae	1	1
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>	1	
<b>Knotweed family</b> (achene): Polygonaceae	1	1
<b>Grass family</b> (grain): Poaceae		3
<b>Indeterminate</b> (seed)		1

#### Detail of fruit and weed remains



## **Gortnahoon, Co. Galway**

Grid Ref: **171950/225740**

SMR No: **N/A**

Reference: **Dillon 2009; O'Carroll & Petervary 2009.**

Excavation undertaken prior to roadworks identified two cereal-drying kilns, pits and stone-lined pits at four closely-spaced locations within the townland of Gortnahoon. A kiln/furnace in Area 1 (2650-2200 cal. B.C.) and a pit in Area 2 (1880-1640 cal. B.C.) returned Bronze Age dates.

Early medieval features in Area 2 consisted of a dumb-bell shaped stone lined kiln with an enclosing penannular trench and associated features, dated *c.* A.D. 717-940; and an L-shaped kiln in Area 3 returned a radiocarbon date of A.D. 1161-1268. Two of the three stone-lined, semi-subterranean structures in Area 3 produced early medieval dates – Structure A (A.D. 678-885); Structure B (A.D. 1022-1216) – and it seems likely that the undated Structure C also belongs to this phase. The stone structures seem to have been too large to have functioned as 'sunken floor buildings' in the Viking tradition, and instead have been tentatively interpreted as food stores, analogous to cellars set beneath (now absent) wooden structures. No houses or hearths were found, but it is suggested that settlement occurred close-by. Frequent lumps of ironworking waste material, which was possibly from a badly-preserved smelting or smithing hearth, and a ditch containing waste from this activity (A.D. 776-969) also shows early medieval activity on site.

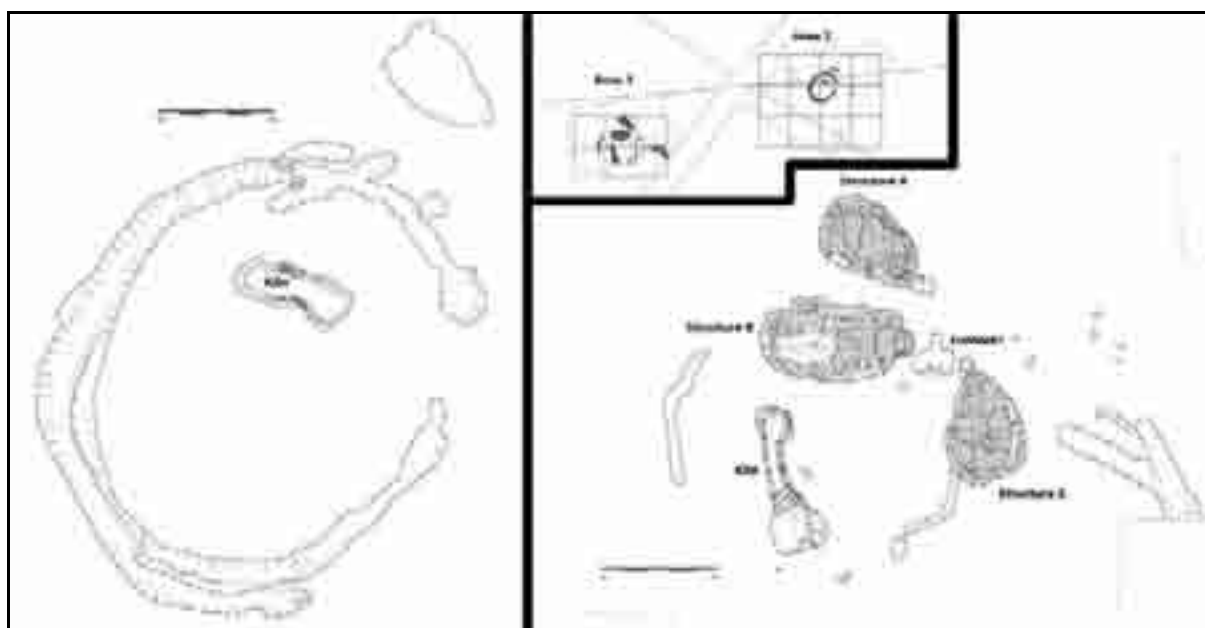
A fragment of a rotary quern was recovered from a pit at the entrance to Structure A and a Class E bone comb (*c.* 9<sup>th</sup>/10<sup>th</sup> C.) in fragmentary condition was found on the lower step of Structure B.

### **Plant remains**

Analysis of 27 deposits provided evidence for a large charred plant remains assemblage. A total of 1462 cereal grains, 4 cereal chaff fragments, 85 hazelnut shell fragments, 1 fruit seed and 63 weed seeds were recorded.

A variety of crops was present, including oat, six-row barley and naked wheat. The weed remains may represent arable weeds and plants that were growing locally.

A number of deposits at this site could not be assigned to any particular phase of activity. The plant remains listed below derive only from deposits that are known to be early medieval in date.



**Areas 2 and 3, Gortnahoon, Co. Galway (after O'Carroll & Petervary 2009).**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
Wk21331	Charcoal from Structure B	933±36 BP	<b>A.D. 1022-1181</b>
Wk21332	Charcoal from Structure B	902±44 BP	<b>A.D. 1030-1216</b>
Wk21334	Charcoal from Structure A	1238±43 BP	<b>A.D. 678-885</b>
Wk22888	Seed from kiln basal fill Area 2	1195±30 BP	A.D. 717-743; <b>A.D. 768-896;</b> A.D. 923-940
Wk22889	Seed from kiln fill Area 3	823±33 BP	<b>A.D. 1161-1268</b>
Wk22890	Seed from ditch fill with metal-working waste	1166±32 BP	<b>A.D. 776-903;</b> <b>A.D. 914-969</b>

## Overview

- Structure, Kiln and Ditches (27 deposits)
  - Large quantity of cereal grains (predominantly barley, with smaller quantities of oat and occasional naked wheat.).
  - Hazelnut shell fragments also recorded, as well as occasional cereal chaff, and fruit and weed seeds.

Phase	Cereal (grain)	Cereal (chaff)	Hazelnut (shell frag)	Fruit (seed)	Weed (seed)	Date (A.D.)
<b>Structure, Kiln and Ditches</b>	1462	4	85	1	63	717-743; <b>768-896</b> ; 923-940; <b>678-885</b> ; 776-903; 914-969.

### Overview of all plant groups (total deposits n=27)

Phase	Oat (grain)	Barley (grain)	Wheat (grain)
<b>Structure, Kiln and Ditches</b> (n=1225)	13.55%	85.22%	1.22%

### Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	Six-row barley (rachis internode)	Barley (grain)	Naked wheat (grain)	Indet. cereal (grain)	Indet. cereal (culm node)
<b>Structure, Kiln and Ditches</b>	166	3	1044	15	237	1

### Detail of cereal remains

Phase	Structure, Kiln and Ditches
<b>Bramble</b> (nutlet): <i>Rubus fruticosus</i>	1
<b>Oraches</b> (utricle): <i>Atriplex</i> spp.	4
<b>Goosefoot family</b> (utricle): Chenopodiaceae	3
<b>Pale persicaria</b> (achene): <i>Persicaria lapathifolia</i>	2
<b>Knotweeds</b> (achene): <i>Persicaria</i> spp.	1
cf. <b>Sheep's sorrel</b> (achene): <i>Rumex</i> cf. <i>acetosella</i>	1
<b>Knotweed family</b> (achene): Polygonaceae	32
<b>Wild radish</b> (pod): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>	10
<b>Dead-nettle family</b> (nutlet): Lamiaceae	1
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>	1
<b>Sedges</b> (achene): <i>Carex</i> spp.	7
<b>Indeterminate</b> (seed)	1

#### Detail of fruit and weed remains

## **Gortybrigane (Site 2), Co. Tipperary**

Grid Ref: **171534/167895**

SMR No: **N/A**

Reference: **Haston 2010; Clark & Long 2010**

Archaeological investigations were carried out at Gortybrigane Site 2 in advance of construction of the N7 Nenagh to Limerick road scheme. Five different areas of archaeological activity were excavated. Area A contained a number of modern furrows and a modern field boundary. Area B contained a Late Bronze Age burnt mound. Area C consisted of an isolated shallow spread of heat-shattered stone and charcoal. Area D contained a network of modern drains. Area E contained multi-period activity, including a Middle Bronze Age structure (Phase 1), an Iron Age pit (Phase 2) and a substantial early medieval enclosure (Phase 3). Evidence for post-medieval and modern agricultural activity, in the form of plough furrows and drainage ditches, was also recorded in a number of areas.

A small number of early medieval features – including kilns and a possible smithing hearth – pre-dated construction of the early medieval enclosure. These features were radiocarbon dated to the 5<sup>th</sup> to 6<sup>th</sup> centuries (Phase 3a). Construction of the enclosure ditch followed, which was radiocarbon dated to the 6<sup>th</sup> to 7<sup>th</sup> centuries (Phase 3b). The internal diameter of the sub-circular enclosure measured 66m. No definite evidence for a bank was identified. A significant portion of the enclosure was located beyond the road-take, and geophysical work was carried out to better understand the extent of the site. Another kiln was also constructed at this time. A causewayed entrance was recorded on the north-eastern side of the enclosure, with unusual extensions of the enclosing ditch projecting towards the interior of the site, forming an entrance 'passage'. This entrance feature was later modified and the ditch close to the entrance area was re-cut – this activity was radiocarbon dated to the 7<sup>th</sup> to 9<sup>th</sup> centuries (Phase 3c). A nearby hearth also dated to this phase of activity. The final phase of early medieval activity at this site was radiocarbon dated to the 8<sup>th</sup> to 10<sup>th</sup> centuries (Phase 3d), which comprised Structure 2 – a rectangular structure – and other nearby features.

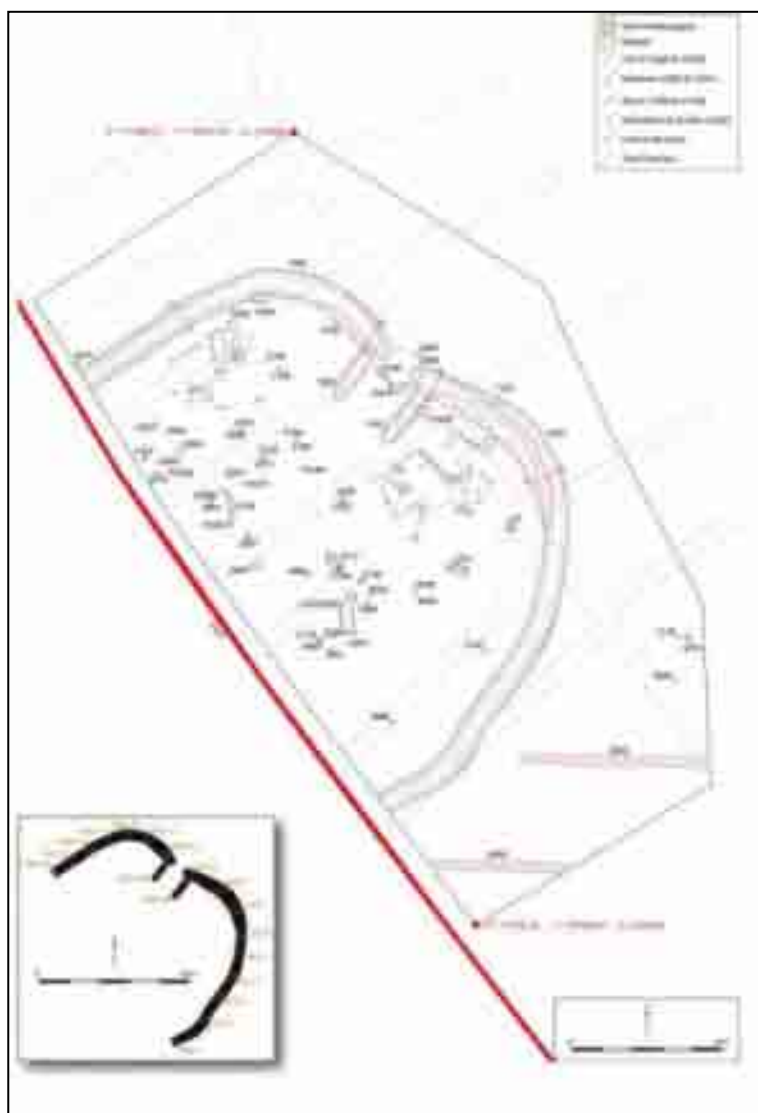
Features identified within the enclosure represented structural remains, cereal-related activities and metalworking. In terms of artefactual evidence, cereal processing was suggested by the presence of cereal remains (predominantly barley and oat) and quern stones, while metalworking was represented by slag remains, hammerscale and tuyere fragments.

### **Plant remains**

Analysis of 16 deposits provided evidence for a total of 353 charred cereal grains, 6 charred cereal chaff fragments, 20 charred hazelnut shell fragments and 34 charred weed seeds. Fruit remains were absent.

Cereals were recorded in several phases of activity. A variety of crops was present, including bristle oat and hulled barley. The weed remains may represent arable weeds and plants that were growing locally.

There appear to be a number of inconsistencies between the plant remains report (Haston 2010) and the main text of the excavation report (Clark & Long 2010). There are several instances where the recovery of plant remains from certain contexts was mentioned in the main report, but these remains were not recorded in the plant remains report. The data below reflect the evidence from the plant remains report only. It is therefore possible that further plant remains were recovered from this site.



**Plan of excavations at Gortybrigane, Site 2, Area E (after Clark and Long 2010, Figure 7)**

### Overview

- Phase 3a: Pre-enclosure – kilns, metalworking (3 deposits)
  - Consisted of cereal grains – hulled barley was predominant, with occasional oat also recorded.
- Phase 3b: Enclosure (4 deposits)
  - Small quantity of cereal grains, including hulled barley and oat.
- Phase 3c: Enclosure re-cut (6 deposits)
  - Large number of cereal grains (similar quantities of hulled barley and oat, including bristle oat) and occasional possible bristle oat chaff.
  - Smaller quantities of hazelnut shell fragments and weed seeds.
- Phase 3d: Structure 2 (3 deposits)
  - Small quantities of hulled barley grains and weed seeds.

Phase	Cereal (grain)	Cereal (chaff)	Hazelnut (shell frag)	Weed (seed)	Date (A.D.)
<b>Phase 3a: Pre-enclosure – kilns, metalworking</b>	69				<b>408–536; 417–536; 430–570</b>

<b>Phase 3b: Enclosure</b>	14				<b>535–617; 538–619; 542–633; 594–656</b>
<b>Phase 3c: Enclosure re-cut</b>	264	6	20	30	<b>676–772; 695–696; 709–747; 766–881; 723–740; 770–890.</b>
<b>Phase 3d: Structure 2</b>	6			4	<b>778–898; 920–945.</b>

**Overview of all plant groups (total deposits n=16)**

<b>Phase</b>	<b>Oat (grain)</b>	<b>Barley (grain)</b>
<b>Phase 3a: Pre-enclosure – kilns, metalworking (n=69)</b>	7.25%	92.75%
<b>Phase 3b: Enclosure (n=14)</b>		
<b>Phase 3c: Enclosure re-cut (n=256)</b>	49.61%	50.39%
<b>Phase 3d: Structure 2 (n=6)</b>		

**Percentage of cereal grain types recorded in each phase of activity**

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

<b>Phase</b>	<b>Bristle oat (grain)</b>	<b>cf. Bristle oat (chaff)</b>	<b>Oat (grain)</b>	<b>Hulled barley (grain)</b>	<b>Indet. cereal (grain)</b>
<b>Phase 3a: Pre-enclosure – kilns, metalworking</b>			5	64	
<b>Phase 3b: Enclosure</b>			4	10	
<b>Phase 3c: Enclosure re-cut</b>	4	6	123	129	8
<b>Phase 3d: Structure 2</b>				6	

**Detail of cereal remains**

<b>Phase</b>	<b>Phase 3a: Pre-enclosure – kilns, metalworking</b>	<b>Phase 3b: Enclosure</b>	<b>Phase 3c: Enclosure re-cut</b>	<b>Phase 3d: Structure 2</b>
<b>Redshank</b> (achene): <i>Persicaria maculosa</i>			3	
<b>Common sorrel</b> (achene): <i>Rumex acetosa</i>			1	
<b>Wild radish</b> (pod): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>			23	
<b>Common hemp-nettle</b> (nutlet): <i>Galeopsis tetrahit</i>			1	
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>			2	4

**Detail of weed remains**

## **Illaunloughan, Co. Kerry**

Grid Ref: **03620/07330**

SMR No: **KE087-036**

Reference: **Marshall & Walsh 2005; Plunkett, Bentley & Collins 2005; G. Plunkett, pers. comm.**

Illaunloughan is a small island between Valentia Island and the Kerry mainland which was occupied by a monastic community between the mid-/late-seventh century and mid-ninth century. Four phases of use were identified – two in the early medieval period (Phases 1 and 2); one in the late medieval period (Phase 3); and one post-medieval (Phase 4).

Phase 1, dated to the mid-seventh/mid-eighth centuries, consisted of three sod-walled domestic huts (A, B and C), an oratory, a shrine and burials. Huts A and B were contemporary and charcoal from the central hearth of Hut B produced a seventh/eighth century date. A deep garden soil covered much of the western half of the island and suggests the growing of vegetables during the first phase of the monastic settlement. Hut C was interpreted as the earliest structure on the site and was found beneath a midden belonging to a hut from Phase 2. It appears to have been used primarily for industrial purposes when Huts A and B were occupied. A localized area of metalworking debris revealed evidence for the designing and casting of copper-/bronze-alloy brooches and pins. Over 80 fragments of clay moulds as well as a carved bone motif were recovered from the debris.

A sod-walled oratory, succeeded by a small oratory/shrine structure was excavated partly beneath the Phase 2 dry-stone oratory. A number of closely-spaced graves were placed behind the eastern wall of the primary sod oratory and appear to have been associated with this structure. Two stone cists containing the remains of two adults and one infant were sealed beneath the shrine on the northern side of the island and were dated to the late-seventh/late-eighth centuries.

Phase 2 dated to the eighth/ninth centuries and comprised a dry-stone hut (D), a dry-stone oratory, a stone reliquary shrine, and burials. Hut D was a circular structure with corbelled walls and a possible internal hearth. A cattle bone recovered from under the base of the hut gave a construction date in the eighth/ninth century, though a date later than the early-ninth century was viewed as improbable by the excavators from associated burial evidence. The principal phase 2 ecclesiastical structures consisted of a dry-stone oratory, an integrated stone *leacht* and a gable-shaped shrine surrounded by a raised rectangular mound.

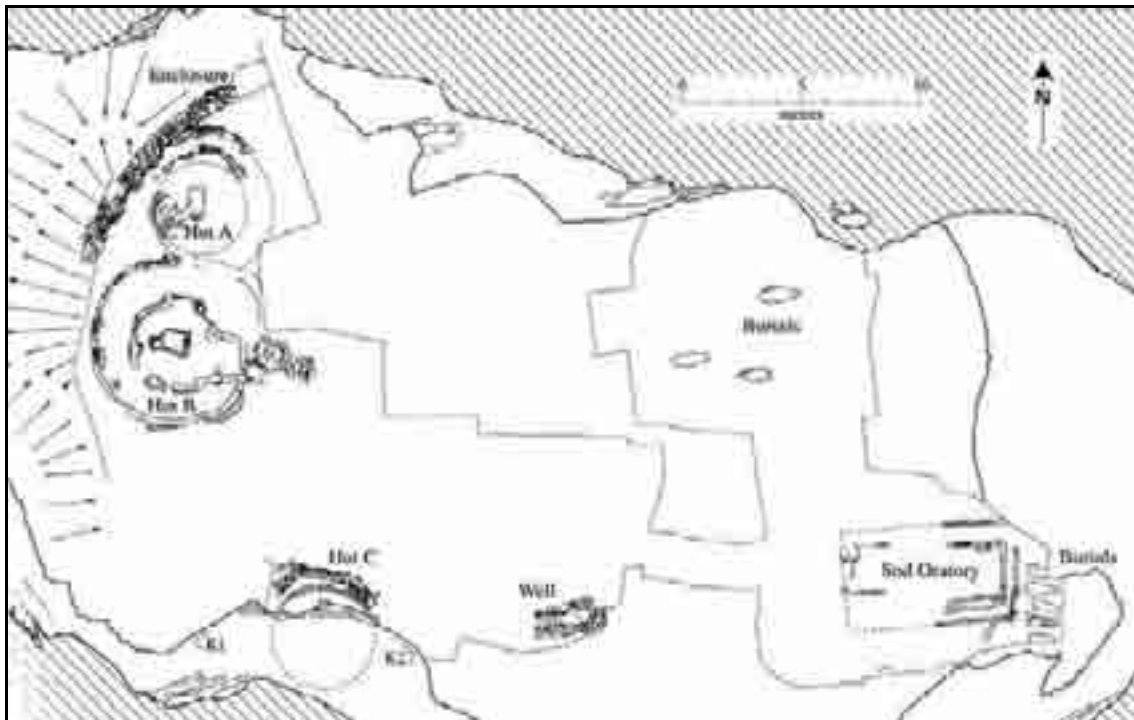
Phase 3 dated to the late medieval period and consisted of the re-use of the dry-stone oratory and Hut D and approximately 25 burials in the space between both buildings; and Phase 4 consisted of a post-medieval *ceallunach* ('infant burial ground') of over 100 burials.

Many of the early medieval artefacts were recovered from the midden deposits of Hut D. Finds included iron knives, barrel-padlock keys, shears, awls and punches, three glass beads, a quernstone (or possible cross shaft) and a large number of whetstones. A number of Hiberno-Scandinavian artefacts (e.g. a silver Viking coin (c. 1020-35), a perforated whetstone, a hollow bone cylinder and a suspension mechanism for a balance) were also recovered.

### **Plant macro-remains**

Analysis of 7 deposits provided evidence for a total of 652 charred cereal grains, 10 charred cereal chaff fragments, 1 charred fruit seed and 183 charred weed seeds. The presence of a seed from the Fabaceae family (pea) may represent cultivated legumes or weeds. Hazelnut shell remains were absent.

Cereal remains were present in both examined phases of activity. A variety of cereal types was present, including oat, naked barley, hulled barley, six-row barley, and possible bread/club wheat. The weed seeds are likely to represent plants growing alongside the cereals, as well as weeds that were growing locally.



Plan of the Period 1 settlement at Illaunlaughan, Co. Kerry (after Marshall & Walsh 2005, 12).



Plan of the Period 2 settlement at Illaunlaughan, Co. Kerry (after Marshall & Walsh 2005, 38).



## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

(\* - calibrated with marine reservoir effect: KA Hughen, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, PJ Reimer, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1059-1086.)

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-4106	Scallop shell associated with stone cists (Phase 1)	1508 $\pm$ 45 BP	<b>*A.D. 742-1049</b>
UB-4357	Charcoal from fill of hearth inside Hut B (Phase 1)	1346 $\pm$ 32 BP	<b>A.D. 638-719</b> A.D. 742-769
UB-4104	Bone from adult human skeleton in cist beneath gable shrine (Phase 1)	1245 $\pm$ 18 BP	<b>A.D. 685-783</b> A.D. 788-823 A.D. 841-860
OxA-10132	Bone from infant skeleton inside cist) beneath gable shrine (Phase 1)	1308 $\pm$ 33 BP	<b>A.D. 657-730</b> <b>A.D. 735-772</b>
UB-4107	Bone from adult human skeleton (Sk. 188) in a cist beneath gable shrine (Phase 1)	1290 $\pm$ 22 BP	<b>A.D. 667-730</b> <b>A.D. 735-772</b>
UB-4103	Bone from human skeleton (Sk. 120) near oratory (Phase 2)	1191 $\pm$ 22 BP	<b>AD 775-891</b>
UB-3860	Cattle bone from under the base of the NW side of the drystone hut D (Phase 2)	1172 $\pm$ 34 BP	<b>A.D. 773-905</b> <b>A.D. 912-970</b>
OxA-10133	Burnt seeds ( <i>Avena Strigosa</i> ) from ash deposit near western and northern walls of drystone oratory (Post-monastic)	698 $\pm$ 29 BP	<b>A.D. 1263-1308</b> <b>A.D. 1361-1386</b>
UCLA-2874A	Charcoal from refuse beneath a stone blockage in western doorway of drystone oratory (Post-monastic)	520 $\pm$ 45 BP	<b>A.D. 1309-1360</b> <b>A.D. 1386-1449</b>
UCLA-2873H	Charcoal from fill of stone-lined pit at east end of interior of drystone oratory (Post-monastic). Sample contained ironworking residues.	365 $\pm$ 55 BP	<b>A.D. 1445-1641</b>
UCLA-2873E	Carbonised material from occupation deposits inside the drystone hut D (Post-monastic)	315 $\pm$ 45 BP	<b>A.D. 1464-1654</b>

## Overview

- Phase 1 (3 deposits)
  - Contained a small number of cereal grains, including oat and six-row barley
  - Small quantity of weed and fruit remains also present.
- Phase 2 (4 deposits)
  - Contained a much larger quantity of cereal grains and occasional chaff – oat was predominant, with smaller quantities of barley and wheat. In the case of barley, naked barley appears to have been the predominant barley type, while most of wheat appears to be of the bread/club variety.
  - Large number of weed seeds also present.

Phase	Cereal (grain)	Cereal (chaff)	Fruit (seed)	Weed (seed)	Date
Phase 1	6		1	24	<b>*A.D. 742–1049. A.D. 638–719;</b> A.D. 742–769. <b>A.D. 685–783;</b> A.D. 788–823; A.D. 841–860. A.D. 657–730; A.D. 735–772. A.D. 667–730; A.D. 735–772.
Phase 2	646	10		159	<b>A.D. 775–891.</b> A.D. 773–905; A.D. 912–970.

**Overview of all plant groups (total deposits n=7)**

Phase	Oat (grain)	Barley (grain)	Wheat (grain)
Phase 1 (n=4)			
Phase 2 (n=461)	63.34%	26.25%	10.41%

**Percentage of cereal grain types recorded in each phase of activity**

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	Six-row naked barley (grain)	Six-row hulled barley (grain)	Naked barley (grain)	Six-row barley (grain)	Barley (grain)	Barley (rachis internode)
Phase 1	1				1	2	
Phase 2	292	13	1	59		48	3

**Detail of oat and barley remains**

Phase	cf. Bread/Club wheat (grain)	cf. Wheat (grain)	Indet. cereal (grain)	Indet. cereal (culm node)	Indet. cereal (straw frag)
Phase 1			2		
Phase 2	48	3	182	2	5

**Detail of wheat and indeterminate cereal remains**

Phase	Phase 1	Phase 2
<b>Rowan</b> (seed): <i>Sorbus aucuparia</i>	1	
<b>Common nettle</b> (achene): <i>Urtica dioica</i>	1	
<b>Fat-hen</b> (utricle): <i>Chenopodium album</i>		1
<b>Lesser stitchwort</b> (seed): <i>Stellaria graminea</i>		1
<b>Stitchworts</b> (seed): <i>Stellaria</i> spp.		16
<b>Mouse-ears</b> (seed): <i>Cerastium</i> spp.		1
<b>Corn spurrey</b> (seed): <i>Spergula arvensis</i>		1
cf. <b>White champion</b> (seed): <i>Silene</i> cf. <i>latifolia</i>		2
<b>Red champion</b> (seed): <i>Silene dioica</i>		5
<b>Campions</b> (seed): <i>Silene</i> spp.	1	
<b>Pink family</b> (seed): Caryophyllaceae	1	6
<b>Knotgrasses</b> (achene): <i>Polygonum</i> spp.	2	3
<b>Sheep's sorrel</b> (achene): <i>Rumex acetosella</i>		5
<b>Docks</b> (achene): <i>Rumex</i> spp.	2	52
<b>Charlock</b> (seed): <i>Sinapis arvensis</i>		3
<b>Vetches</b> (seed): <i>Vicia</i> spp.		14
<b>Pea family</b> (seed): Fabaceae		1
cf. <b>Greater dodder</b> (seed): cf. <i>Cuscuta europaea</i>	1	
<b>Dead nettles</b> (nutlet): <i>Lamium</i> spp.		2

<b>Ribwort plantain</b> (seed): <i>Plantago lanceolata</i>		2
<b>Cleavers</b> (seed): <i>Galium aparine</i>		1
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>		1
cf. <b>Corn chamomile</b> (achene): <i>Anthemis</i> cf. <i>arvensis</i>		17
<b>Daisy family</b> (achene): Asteraceae	2	2
cf. <b>Sedges</b> (achene): cf. <i>Carex</i> spp.		1
<b>Grass family</b> (grain): Poaceae		9
<b>Indeterminate</b> (seed)	14	13

**Detail of fruit and weed remains**

## **Johnstown (Site 1), Co. Meath**

Grid reference: **27698/24047**

SMR No: **ME048-031**

Reference: **Johnston 2004; Clarke & Carlin 2008; Clarke 2010.**

A multi-period settlement-cemetery and industrial site was discovered at Johnstown, Co. Meath. There were two foci for human activity - the first was a succession of enclosures that respected an Iron Age burial mound; the second area was outside the enclosure and consisted of a mill-race ditch and the site's final use as a *cillín* in the post medieval period.

A succession of three enclosures centred on the burial mound. One of the earliest depositions included the incomplete remains of three adults in a charnel pit beneath the mound, and burials associated with the mound were dated between the late-fourth and late-seventh centuries. In total, 398 inhumations were found associated with the enclosures.

The primary enclosure was sub-oval and measured 59m in diameter; the ditch was dated to A.D. 432-651. The second enclosure ditch (53m x 54m) was dug sometime between the fifth and seventh centuries and was abandoned before the end of the ninth century. Finds from this phase included iron slag, an arrowhead, a smith's hammer-head, fragments of souterrain ware and a copper alloy ringed pin.

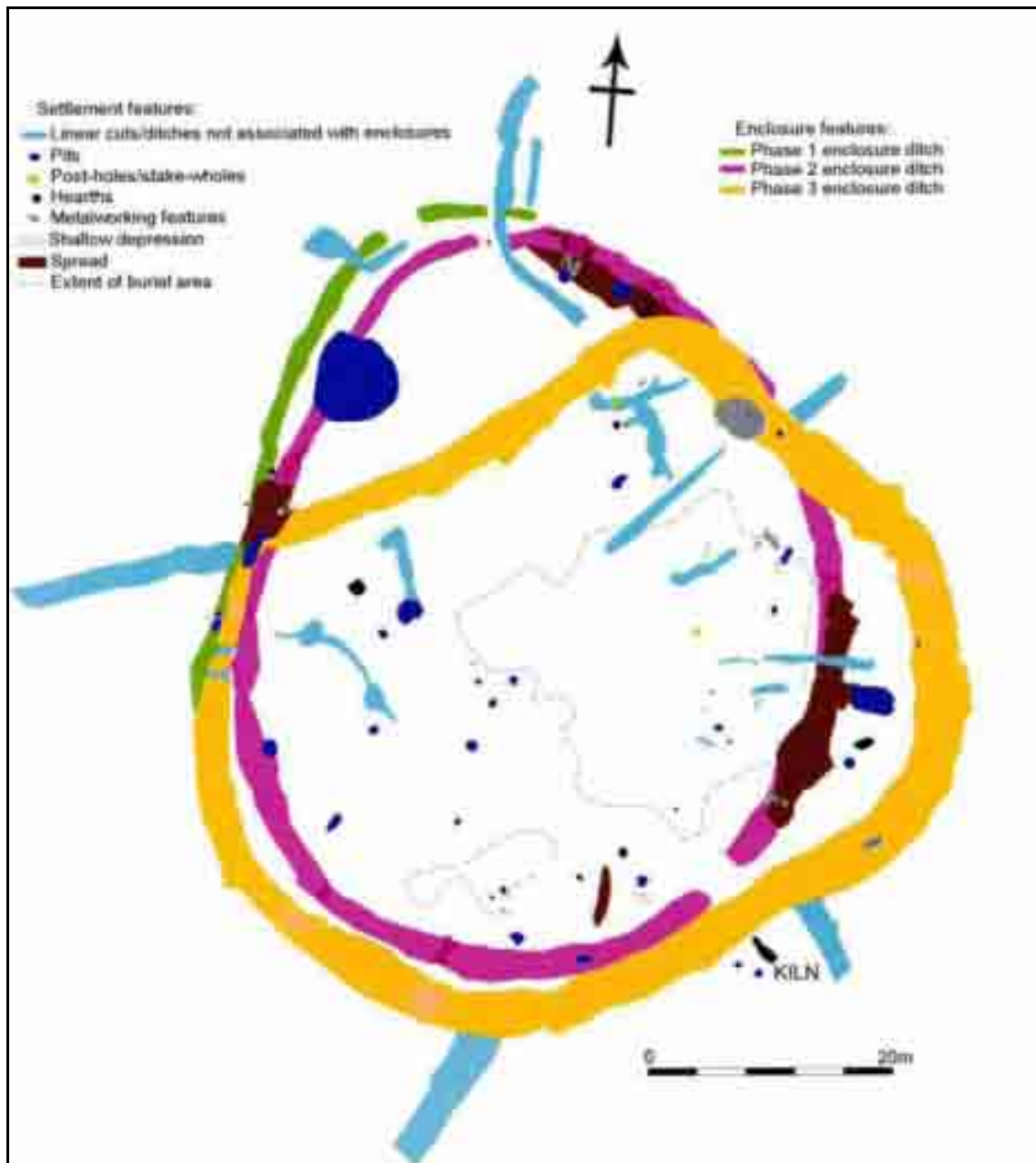
The final enclosure was D-shaped and measured 47.5m x 61m. The enclosure was probably created in the ninth or tenth centuries before it was abandoned sometime between the fifteenth and seventeenth centuries. Finds were similar to earlier phases including iron waste and a range of functional and personal items. The succession of enclosures would appear to have been created to accommodate the expansion of the cemetery.

Settlement evidence at Johnstown 1 survived as refuse pits, hearths, gullies, spreads and cobbled surfaces distributed throughout the interior of the enclosures. Dwelling evidence was mainly dated between the ninth and fifteenth centuries. Iron working produced over 2000kg of metallurgical waste. Other ironworking features included bowl furnaces and smithing hearths which demonstrated that both raw iron and finished artefacts were produced. Seven ironworking areas were identified and the majority were outside the enclosures. The earliest dated metallurgical activity was dated to A.D. 250-538, and ironworking continued to be practised in different areas of the site until the seventeenth century.

### **Plant remains:**

Analysis of 14 deposits provided evidence for a large charred and waterlogged plant remains assemblage. A total of 3434 charred cereal grains, 16 charred cereal chaff fragments, 222 charred weed seeds, 235 waterlogged fruit seeds and 7 waterlogged weed seeds were recorded. Nutshell was absent. The presence of seeds from the Fabaceae family (pea) may represent cultivated legumes and/or weeds. The waterlogged remains were preserved as a result of waterlogged conditions in a number of ditches.

A variety of cereals was recorded, including oat (common and possible wild winter varieties), six-row barley, wheat (emmer, possible spelt and naked varieties) and rye. The weed remains appear to represent plants that were growing locally, as well as arable weeds.



Plan of phases at Johnstown, Co. Meath (after Clarke & Carlin 2008).

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
Beta-177959	Animal bone from Phase 1 enclosure ditch	1490 $\pm$ 60 BP	<b>A.D. 432-498;</b> <b>A.D. 501-651</b>
Beta-177960	Animal bone from primary context of Phase 2 enclosure ditch	1470 $\pm$ 60 BP	<b>A.D. 433-494;</b> A.D. 505-523; <b>A.D. 526-661</b>
Beta-180653	Human bone from Burial 269 in middle fill of Phase 3 enclosure ditch	930 $\pm$ 70 BP	<b>A.D. 990-1228;</b> A.D. 1232-1242; A.D. 1247-1251
Beta-178197	Human bone from charnel pit containing partial remains of at least three disarticulated adults. Associated with central burial mound	1560 $\pm$ 70 BP	A.D. 349-368; <b>A.D. 379-641</b>
Beta-184610	Human bone from Burial 33 associated with central burial mound	1460 $\pm$ 70 BP	<b>A.D. 430-670</b>
Beta-184704	Human bone from Burial 128 in proximity to the mound	1240 $\pm$ 40 BP	<b>A.D. 680-882</b>
Beta-184702	Human bone from Burial 26 in proximity to mound	1100 $\pm$ 40 BP	A.D. 828-839; <b>A.D. 866-1021</b>
Beta-178196	Human bone from Burial 118 at eastern edge of mound	790 $\pm$ 50 BP	A.D. 1058-1064; A.D. 1069-1071; <b>A.D. 1155-1292</b>
Beta-176808	Charcoal from occupational deposit overlying Phase I and II enclosure ditches	1230 $\pm$ 60 BP	<b>A.D. 664-898;</b> A.D. 920-947
Beta-181478	Charcoal from a refuse pit	1010 $\pm$ 60 BP	A.D. 894-929; <b>A.D. 932-1162</b>
Beta-177963	Animal bone from possible animal enclosure ditch	930 $\pm$ 60 BP	A.D. 996-1006; <b>A.D. 1012-1221</b>
Beta-184701	Charred material from metallurgical pit to east of enclosures	1660 $\pm$ 60 BP	<b>A.D. 250-538</b>
Beta-181479	Charred material from metallurgical pit within enclosure	1520 $\pm$ 60 BP	<b>A.D. 423-642.</b>
Beta-184700	Charcoal from a smelting furnace	1200 $\pm$ 60 BP	<b>A.D. 682-905;</b> A.D. 912-970
Beta-176807	Charcoal from furnace within base of Phase III enclosure ditch	840 $\pm$ 60 BP	<b>A.D. 1042-1107;</b> <b>A.D. 1117-1276</b>
Beta-176810	Charcoal from kiln F996	1380 $\pm$ 60 BP	<b>A.D. 560-730;</b> A.D. 735-772.
Beta-176809	Charcoal spread F768	1280 $\pm$ 60 BP	<b>A.D. 653-881</b>
Beta-178194	Human bone from Burial 25 near mound	1390 $\pm$ 50 BP	<b>A.D. 561-710;</b> A.D. 747-766.
Beta-178195	Human bone from Burial 110 associated with mound	1560 $\pm$ 70 BP	A.D. 349-368; <b>A.D. 379-641.</b>
Beta-178198	Human bone from Burial 219 near mound	1460 $\pm$ 50 BP	A.D. 441-484; <b>A.D. 533-662.</b>
Beta-178199	Human bone from Burial 280 near	820 $\pm$ 50 BP	A.D. 1048-1085;

	mound		A.D. 1123-1138; <b>A.D. 1150-1281.</b>
Beta-180650	Human bone from Burial 42 near mound	1410±60 BP	<b>A.D. 536-720;</b> A.D. 742-769.
Beta-184613	Human bone from Burial 249 near mound	1200±60 BP	<b>A.D. 682-905;</b> A.D. 912-970.
Beta-184703	Human bone from Burial 34 near mound	1240±40 BP	<b>A.D. 680-882.</b>
Beta-184706	Human bone from Burial 166 near mound	1270±70 BP	<b>A.D. 645-896;</b> A.D. 923-940.

### Overview

- Enclosure ditch – Phase 3 (4 samples)
  - Contained a significant quantity of cereal remains. Wheat was predominant, with smaller quantities of oat, barley and rye recorded.
  - Also produced charred weed seeds, and waterlogged fruit and weed remains.
- Settlement – kilns/pits/ditches (10 samples)
  - Contained a large quantity of cereal remains. In contrast with deposits from the enclosure ditch, oat was predominant here, with smaller quantities of barley, wheat and rye recorded.
  - Also produced a large quantity of charred weed and waterlogged fruit remains, as well as occasional waterlogged weed remains.

Phase	Cereal (grain)	Cereal (chaff)	Fruit (seed)	Weed (seed)	Date (A.D.)
<b>Enclosure ditch: Phase 3</b>	843	1	66	28	1042–1107; 1117–1276; <b>990–1228</b> ; 1232–1242; 1247–1251.
<b>Settlement (Kilns/Pits/Ditches)</b>	2591	15	169	201	<b>250–538; 423–642; 560–730</b> ; 735–772; <b>682–905</b> ; 912–970; 894–929; <b>932–1162</b> ; 996–1006; <b>1012–1221.</b>

### Overview of all plant groups (total deposits n=14)

Phase	Oat (grain)	Barley (grain)	Wheat (grain)	Rye (grain)
<b>Enclosure ditch: Phase 3</b> (n=342)	7.89%	3.80%	87.72%	0.58%
<b>Settlement (Kilns/Pits/Ditches)</b> (n=1317)	80.41%	16.40%	3.11%	0.08%

### Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Enclosure ditch: Phase 3	Settlement (Kilns/Pits/Ditches)
<b>Common oat</b> (floret base)		4
cf. <b>Winter wild oat</b> (floret base)		1
<b>Oat</b> (grain)	27	1059
cf. <b>Oat</b> (grain)	35	250
<b>Six-row barley</b> (rachis internode)		9
<b>Barley</b> (grain)	13	216
cf. <b>Barley</b> (grain)		43
<b>Oat/Barley</b> (grain)		13
<b>Emmer wheat</b> (grain)	1	
cf. <b>Emmer wheat</b> (grain)	2	

cf. <b>Spelt wheat</b> (grain)	3	
<b>Naked wheat</b> (grain)	37	1
cf. <b>Naked wheat</b> (grain)	17	
<b>Emmer/Naked wheat</b> (grain)	6	
<b>Spelt/Naked wheat</b> (grain)	4	
<b>Wheat</b> (grain)	230	40
<b>Rye</b> (grain)	2	1
cf. <b>Rye</b> (grain)	4	29
<b>Wheat/Rye</b> (grain)	6	
<b>Indet. cereal</b> (grain)	456	939
<b>Indet. cereal</b> (rachis)	1	1

#### Detail of cereal remains

Phase	Enclosure ditch: Phase 3	Settlement (Kilns/Pits/Ditches)
<b>Fat-hen</b> (utricle): <i>Chenopodium album</i>		1
<b>Goosefoot family</b> (utricle): Chenopodiaceae	3	6
<b>Corn spurrey</b> (seed): <i>Spergula arvensis</i>		1
<b>Pale persicaria</b> (achene): <i>Persicaria lapathifolia</i>		5
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>		11
cf. <b>Sheep's sorrel</b> (achene): <i>Rumex</i> cf. <i>acetosella</i>	1	4
<b>Knotweed family</b> (achene): Polygonaceae		11
<b>Wild radish</b> (pod): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>	2	
<b>Pea family</b> (seed): Fabaceae		27
<b>Dead-nettle family</b> (nutlet): Lamiaceae		3
<b>Plantains</b> (seed): <i>Plantago</i> spp.		5
cf. <b>Cleavers</b> (seed): <i>Galium</i> cf. <i>aparine</i>	2	1
<b>Grass family</b> (grain): Poaceae	17	116
<b>Indeterminate</b> (seed)	1	5

#### Detail of charred weed remains

Phase	Enclosure ditch: Phase 3	Settlement (Kilns/Pits/Ditches)
<b>Raspberry</b> (nutlet): <i>Rubus idaeus</i>	1	3
<b>Elder</b> (seed): <i>Sambucus nigra</i>	65	166
<b>Fool's parsley</b> (mericarp): <i>Aethusa cynapium</i>	1	
<b>Thistles/Knapweeds</b> (achene): <i>Cirsium/Centaurea</i> spp.		2
<b>Sedge family</b> (achene): Cyperaceae	1	2
<b>Indeterminate</b> (seed)		1

#### Detail of waterlogged fruit and weed remains



## **Kerlogue, Co. Wexford**

Grid Ref: **305250/119200**

SMR No: **N/A**

Reference: **McClatchie 2007a; 2007b; McLoughlin 2003**

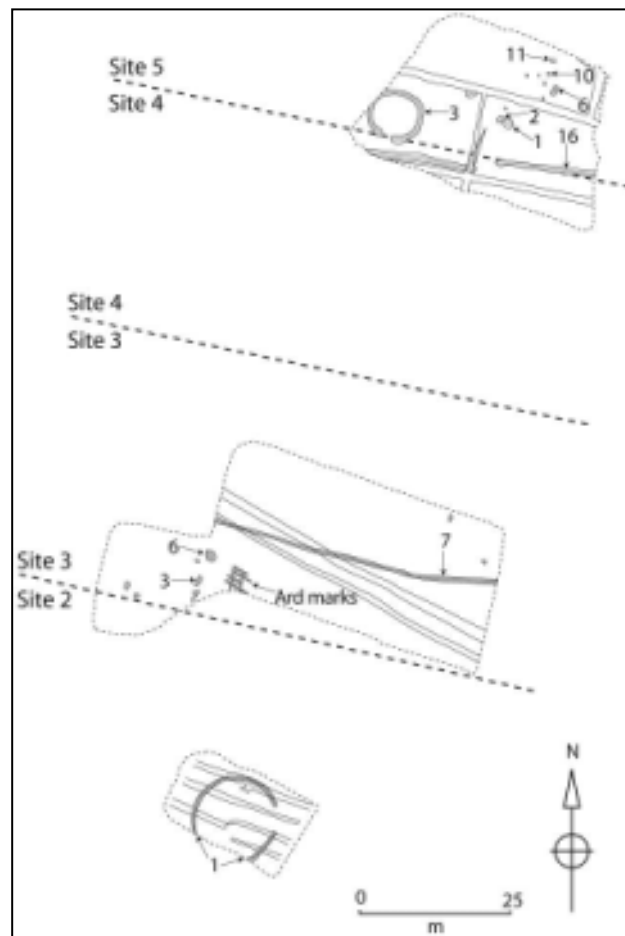
Archaeological investigations were carried out at Kerlogue in advance of a development. The site is located less than 2km to the south of Wexford town and around 0.7km from the modern shoreline. Four areas of archaeological activity were recorded – Sites 2, 3, 4 and 5. Site 2 comprised a circular structure of Iron Age date, with numerous associated internal features. Excavations at Site 3 revealed Early Neolithic pits, a possible Iron Age gully and evidence for cultivation in the form of ard-marks. Sites 4 and 5 produced a range of features, including Early Neolithic pits, a possible Early Bronze Age penannular ring ditch, possible Iron Age gullies and early medieval pits.

Two early medieval pits were recorded at Site 5 (C.1 and C.2), and these pits were radiocarbon dated to the 5<sup>th</sup> to 6<sup>th</sup> centuries. It is thought that these large oval pits may have functioned as cooking pits or hearths, as the base of each pit was burnt, and both pits contained cereal remains (predominantly barley).

### **Plant remains**

Analysis of 4 deposits provided evidence for a large charred plant remains assemblage. A total of 1512 cereal grains, 9 hazelnut shell fragments and 22 weed seeds were recorded. Cereal chaff and fruit remains were absent.

A variety of crops was present, including oat, hulled barley, six-row barley and possible naked wheat. The weed remains may represent arable weeds and plants that were growing locally.



**Plan of excavations at Kerlogue (after McClatchie 2007)**

## Radiocarbon dates

Reimer, P.J., Baillie, M.G.L., Bard, E., Bayliss, A., Beck, J.W., Bertrand, C.J.H., Blackwell, P.G., Buck, C.E., Burr, G.S., Cutler, K.B., Damon, P.E., Edwards, R.L., Fairbanks, R.G., Friedrich, M., Guilderson, T.P., Hogg, A.G., Hughen, K.A., Kromer, B., McCormac, G., Manning, S., Bronk Ramsey, C., Reimer, R.W., Remmele, S., Southon, J.R., Stuiver, M., Talamo, S., Taylor, F.W., van der Plicht, J. & Weyhenmeyer, C.E. 2004. IntCal04 terrestrial radiocarbon age calibration, 0–26 cal kyr BP. Radiocarbon, 46, 1029–58.

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
Wk-13725	Site 5, Pit C.1	1541 $\pm$ 38 BP	<b>A.D. 427–598.</b>

## Overview

- Pits (4 deposits)
  - Large quantity of cereal grains (predominantly hulled barley, including the six-row variety, with smaller quantities of oat and possible naked wheat).
  - Occasional hazelnut shell fragments and weed seeds.

Phase	Cereal (grain)	Hazelnut (shell frag)	Weed (seed)	Date
<b>Pits</b>	1512	9	22	<b>A.D. 427–598.</b>

## Overview of all plant groups (total deposits n=4)

Phase	Oat (grain)	Barley (grain)	Wheat (grain)
<b>Pits</b> (n=1494)	1.20%	96.05%	2.74%

## Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Six-row hulled barley (grain)	Hulled barley (grain)	Hulled barley (grain frag)	Barley (grain)	Barley (grain frag)
<b>Pits</b>	710	709	77	16	526

## Detail of barley remains

Phase	Oat (grain)	Oat (grain frag)	cf. Naked wheat (grain)	Barley/Wheat (grain)	Indet. cereal (grain frag)
<b>Pits</b>	18	2	41	18	3604

## Detail of oat, wheat and indeterminate cereal remains

Phase	Pits
<b>Redshank</b> (achene): <i>Persicaria maculosa</i>	21
<b>Redshank</b> (achene frag): <i>Persicaria maculosa</i>	3
<b>Knotgrasses</b> (achene): <i>Polygonum</i> spp.	1
<b>Knotgrasses</b> (achene frag): <i>Polygonum</i> spp.	1
<b>Grass family</b> (culm node frag): Poaceae	1

## Detail of weed remains

## **Kilbegly (Site 2), Co. Roscommon**

Grid Ref: **190038/230053**

SMR No: **N/A**

Reference: **Lyons 2010; Jackman 2010**

Excavation near the church at Kilbegly revealed a previously unknown early medieval horizontal mill, with undercroft (wheel-pit), flume, millpond, tail-race and other features preserved in their original location.

The millpond was roughly square in shape and was bounded to the west by a line of post-and-wattle fencing. A fragment of hazel from the collapsed fence was radiocarbon dated to A.D. 677-777 (UBA-12854). Another post-and-wattle fence from the overflow channel also bounded the northern edge of the millpond. A fragment of hazel wattle from this post-and-wattle fence was radiocarbon dated to A.D. 694-882 (UBA-12858). Post-and-wattle built millraces connecting the millpond with the mill complex produced radiocarbon dates of A.D. 695-881 (UBA-12855) and A.D. 673-804 (UBA-12856). A yew chip from the early silting deposit was radiocarbon dated to A.D. 717-893 (UBA-12860).

The overflow channel drained excess water from the millpond and conducted it into the tailrace to prevent flooding. It was formed by two parallel wattle fences made of alder with some examples of ash, birch, oak and willow. A sample of pomoideae wood dated the structure to A.D. 682-870 (UBA-12817), and a fragment of hazel wattle was dated to A.D. 772-891 (UBA-12821). Another piece of pomideae wood from a second possible overflow channel was radiocarbon dated to A.D. 661-771 (UBA-12822).

The millpond fed directly into the wooden flume, a large piece of oak carved into a rectilinear box shape that funnelled the water onto the millwheel. A piece of oak wood working waste from the packing of the flume was radiocarbon dated to A.D. 683-866 (UBA-12859), and a small fragment of oak which had broken off the flume was radiocarbon dated to A.D. 775-887 (UBA-12857). After the site fell into disuse, the flume began to fill and become blocked with sediments. A fragment of willow from this context was radiocarbon dated to A.D. 719-892 (UBA-12825).

Traditionally the mill building itself is divided into two: the upper floor known as a millhouse and the lower floor known as the undercroft or wheel-pit. The millhouse would have contained the millstones and a hopper (the funnel type apparatus that fed the grain into the millstones). The lower floor of the building, usually termed the undercroft or wheel-pit, was found in an excellent state of preservation and possibly represents one of the best preserved examples of early medieval timber-framed buildings in Ireland. The uppermost timber of the northern wall, T107, was radiocarbon dated to A.D. 432-600 (UBA-12819). After abandonment the undercroft would have quickly filled with various water-borne soil deposits. The initial silting layer had inclusions of small wooden chips and fragments with a fragment of *Prunus* wood being radiocarbon dated to A.D. 412-539 (UBA-12824). The next layer that accumulated within the undercroft included a number of artefacts: two wooden paddles from the wheel hub, a 'pick-shaped' wooden implement, a discoid stone weight or gaming piece made from locally sourced black shale, and a fragment of cattle bone. The uppermost deposit included a fragment of oak brushwood that had presumably been washed into this context and was radiocarbon dated to A.D. 535-646 (UBA-12816).

Once the water had passed through the undercroft it drained into the tail-race. Approximately 5.5 m south of the undercroft the base of the tailrace abruptly dropped 0.3m-0.4m in height. This steep drop in conjunction with a slight widening of the sides accommodated a number of timbers that formed a platform structure. A number of the timbers appear to have facets and features, such as dowel holes, which have no clear function as part of the platform. These features on the planks may be indicative of the timbers being re-used and recycled from another structure, possibly an earlier mill located on site. This interpretation of re-use seems to be supported by the dendrochronological dating of two of these timbers which suggested that one came from a tree felled in the mid-sixth century, while the other was felled in the early-seventh century.

Post-abandonment, the tailrace was filled by a number of deposits. A fragment of worked birch wood from this context was radiocarbon dated to A.D. 427–547 (UBA-12820). This early date may be the result of redeposition of sediments within the tailrace since it appears to predate the construction of the timber platform. A fragment of worked birch wood from the upper fill of the tailrace was radiocarbon dated to A.D. 688-876 (UBA-12818).

The location of contemporary wood-working near to the mill was identified and hazel chips from this area produced a radiocarbon date of A.D. 663-771 (UBA-12853).

A number of domestic early medieval artefacts were recovered from the site, including a copper-alloy ringed-pin, withy ropes, fragments of leather (possibly from a bag or shoe), a whetstone/knife sharpener, a wooden spade, possible gaming piece/token and bracelet fragments made from locally sourced shale.

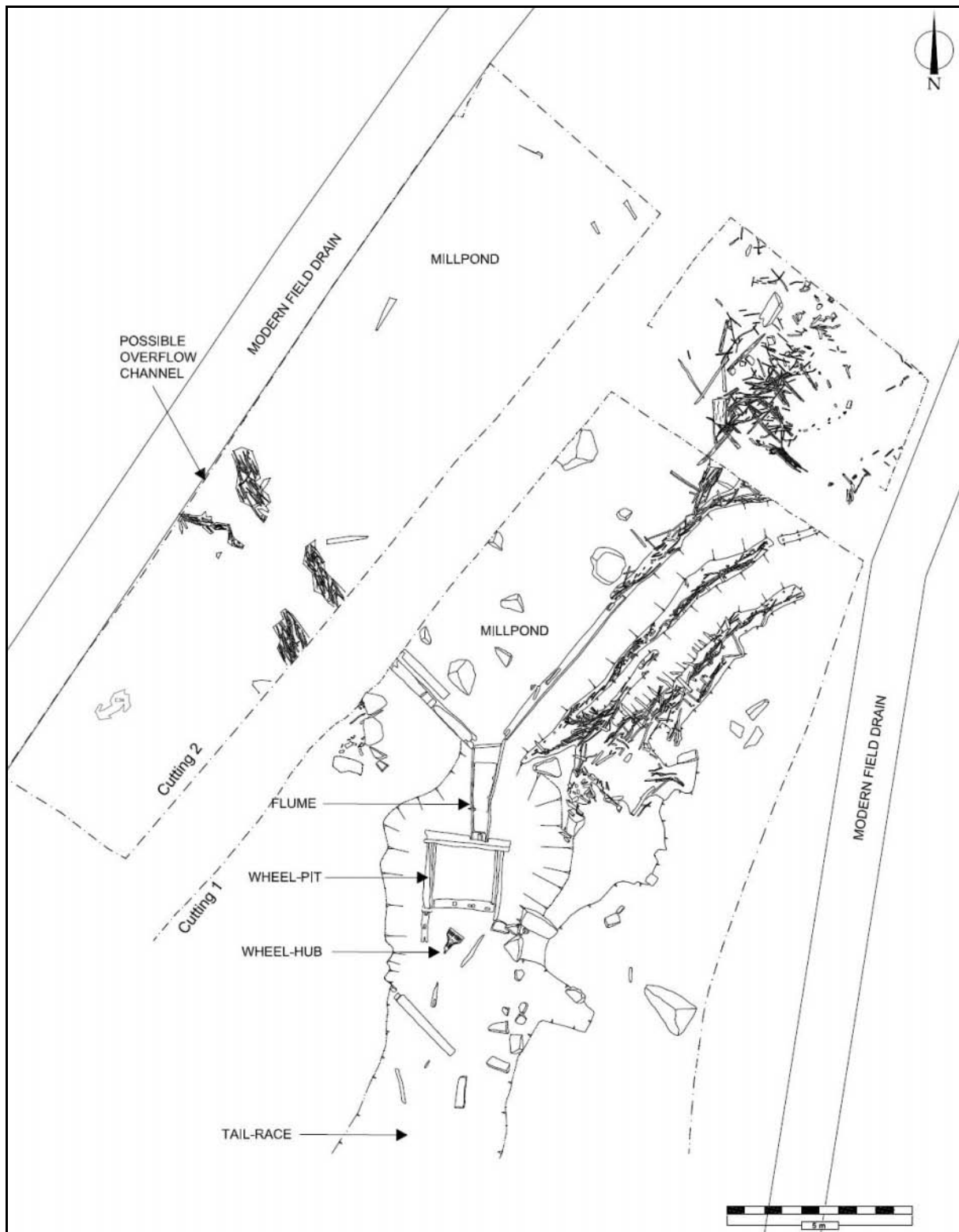
### **Plant remains**

Analysis of 187 samples from 41 contexts provided evidence for a large waterlogged plant remains assemblage, with a smaller quantity of charred plant remains also recorded. Charred cereal grains, waterlogged nutshell, waterlogged fruit remains, and waterlogged and charred weed remains were identified. The exact quantities of remains were not recorded in most cases – comments on general ubiquity were instead provided, which have been noted below.

With regard to the cultivated remains, hulled barley and oat were present. The weed remains may represent arable weeds and plants that were growing locally, some of which were perhaps gathered for use.

### **Dendrocronological Dates**

<b>Sample</b>	<b>Date</b>	<b>Estimated Felling Date</b>
T289 - tailrace	A.D. 367-591	A.D. 601
T293- tailrace	A.D. 350-524	A.D. 534



**Plan of excavations of horizontal mill at Kilbegley, Co. Roscommon (after Jackman 2010)**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
UBA-12816	Oak from upper fill of undercroft (C15)	1486±30 BP	<b>A.D. 535-646</b>
UBA-12817	Wood from wattle overflow channel (C33)	1245±30 BP	<b>A.D. 682-870</b>
UBA-12818	Birch from tailrace (C38)	1236±30 BP	<b>A.D. 688-876</b>
UBA-12819	Oak from wall of undercroft ((C45)	1530±30 BP	<b>A.D. 432-497; A.D. 502-600</b>
UBA-12820	Birch from tailrace (C51)	1565±22 BP	<b>A.D. 427-547</b>
UBA-12821	Hazel from wattle overflow channel (C33)	1198±23 BP	<b>A.D. 772-891</b>
UBA-12822	Wood (C62)	1303±22 BP	<b>A.D. 661-724; A.D. 738-771</b>
UBA-12823	Ash wood from beneath posts of wattle wall (C66)	1352±23 BP	<b>A.D. 643-689; A.D. 754-760</b>
UBA-12824	Wood chips from base of undercroft (C67)	1595±28 BP	<b>A.D. 412-539</b>
UBA-12825	Willow from flume (C79)	1202±26 BP	A.D. 719-742; <b>A.D. 769-892</b>
UBA-12853	Hazel to east of millpond (C10)	1298±23 BP	<b>A.D. 663-727; A.D. 737-771</b>
UBA-12854	Hazel from wattle fence (C23)	1265±20 BP	<b>A.D. 677-777</b>
UBA-12855	Birch from wattle fence (C26)	1225±20 BP	A.D. 695-699; <b>A.D. 708-747; A.D. 766-881</b>
UBA-12856	Alder from wattle fence (C29)	1262±22 BP	<b>A.D. 673-780; A.D. 792-804</b>
UBA-12857	Oak from flume (C30)	1199±20 BP	<b>A.D. 775-887</b>
UBA-12858	Hazel from wattle overflow channel (C35)	1225±22 BP	A.D. 694-701; <b>A.D. 707-747; A.D. 765-882</b>
UBA-12859	Oak from below flume (C68)	1246±24 BP	<b>A.D. 682-828; A.D. 838-866</b>
UBA-12860	Yew chip from base of millpond (C69)	1202±27 BP	A.D. 717-743; <b>A.D. 768-893</b>

## Overview

- Mill (187 deposits)
  - Hulled barley was the predominant crop recorded, with smaller quantities of oat also present. The cereals were found in only a small number of deposits.
  - An extraordinary quantity and variety of waterlogged weed and fruit remains were recorded, as well as nutshell remains.
  - Occasional charred weed remains were also present.

Phase	Cereal (grain)	Nut (shell frag)	Fruit (seed)	Weed (seed)	Date (A.D.)
Mill	P	P	P	P	After A.D. 534 (Dendro). After A.D. 601 (Dendro). <b>412–539; 427–547;</b> 432–497; 502–600; <b>535–646; 643–689;</b> 754–760; 661–724; 738–771; 663–727; 737–771; <b>673–780;</b> 792–804; <b>677–777;</b> <b>682–870; 682–828;</b> 838–866; <b>688–876;</b> 694–701; 707–747; 765–882; 695–699; 708–747; 766–881; 717–743; <b>768–893;</b> 719–742; <b>769–892;</b> <b>772–891; 775–887.</b>

**Overview of all plant groups (total deposits n=187)** P = present

Phase	Mill
Oat (grain)	P
Hulled barley (grain)	P
Barley (grain)	P
Indet. cereal (grain)	P
Ribwort plantain (seed): <i>Plantago lanceolata</i>	P

#### Detail of charred remains

Phase	Mill
Acorn (shell frag): <i>Quercus</i> spp.	P
Hazelnut (shell frag)	P
Indet. nut (shell frag)	P
Raspberry (nutlet): <i>Rubus idaeus</i>	P
Bramble (nutlet): <i>Rubus fruticosus</i>	P
Dewberry (nutlet): <i>Rubus caesius</i>	P
Brambles (nutlet): <i>Rubus</i> spp.	P
Brambles (nutlet frag): <i>Rubus</i> spp.	P
Sloe (stone): <i>Prunus spinosa</i>	P
Haw fruit (nutlet): <i>Crataegus</i> spp.	P
Elder (seed): <i>Sambucus nigra</i>	P
Elders (seed frag): <i>Sambucus</i> spp.	P

#### Detail of waterlogged nut and fruit remains

Phase	Mill
Bracken (frond frag): <i>Pteridium aquilinum</i>	P
Bracken (frond frag): <i>Pteridium</i> spp.	P
Meadow buttercup (achene): <i>Ranunculus acris</i>	P
Creeping buttercup (achene): <i>Ranunculus repens</i>	P
Bulbous buttercup (achene): <i>Ranunculus bulbosus</i>	P
cf. Celery-leaved buttercup (achene): <i>Ranunculus</i> cf. <i>sceleratus</i>	P
Greater spearwort (achene): <i>Ranunculus lingua</i>	P
Buttercups (achene): <i>Ranunculus</i> spp.	P
Birches (nutlet): <i>Betula</i> spp.	P
Alder (nutlet): <i>Alnus glutinosa</i>	P
Oak-leaved goosefoot (utricle): <i>Chenopodium glaucum</i>	P
cf. Red goosefoot (utricle): <i>Chenopodium</i> cf. <i>rubrum</i>	P
Stinking goosefoot (utricle): <i>Chenopodium vulvaria</i>	P
Fat-hen (utricle): <i>Chenopodium album</i>	P
Goosefoots (utricle): <i>Chenopodium</i> spp.	P
Goosefoot family (utricle frag): <i>Chenopodiaceae</i>	P

<b>Common chickweed</b> (seed): <i>Stellaria media</i>	P
<b>Field mouse-ear</b> (seed): <i>Cerastium arvense</i>	P
<b>Amphibious bistort</b> (achene): <i>Persicaria amphibia</i>	P
<b>Pale persicaria</b> (achene): <i>Persicaria lapathifolia</i>	P
<b>Water-pepper</b> (achene): <i>Persicaria hydropiper</i>	P
<b>Small water-pepper</b> (achene): <i>Persicaria minor</i>	P
<b>Knotgrass</b> (achene): <i>Polygonum aviculare</i>	P
<b>Knotgrasses</b> (achene): <i>Polygonum</i> spp.	P
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>	P
<b>Sheep's sorrel</b> (achene): <i>Rumex acetosella</i>	P
<b>Curled dock</b> (achene): <i>Rumex crispus</i>	P
<b>Docks</b> (achene): <i>Rumex</i> spp.	P
<b>Knotweed family</b> (achene frag): Polygonaceae	P
<b>Mallows</b> (seed): <i>Malva</i> spp.	P
<b>Violets</b> (seed): <i>Viola</i> spp.	P
<b>Mustards</b> (seed): <i>Sinapis</i> spp.	P
<b>Wild radish</b> (pod): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>	P
<b>Radishes</b> (pod frag): <i>Raphanus</i> spp.	P
<b>Shrubby cinquefoil</b> (nutlet): <i>Potentilla fruticosa</i>	P
cf. <b>Shrubby cinquefoil</b> (nutlet): <i>Potentilla</i> cf. <i>fruticosa</i>	P
cf. <b>Marsh cinquefoil</b> (nutlet): <i>Potentilla</i> cf. <i>palustris</i>	P
<b>Barren strawberry</b> (nutlet): <i>Potentilla sterilis</i>	P
<b>Cinquefoils</b> (nutlet): <i>Potentilla</i> spp.	P
<b>Cinquefoils</b> (nutlet frag): <i>Potentilla</i> spp.	P
<b>Vetches/Pea</b> (seed): <i>Vicia/Lathyrus</i> spp.	P
cf. <b>Vetches/Pea</b> (seed): cf. <i>Vicia/Lathyrus</i> spp.	P
<b>Clovers</b> (seed): <i>Trifolium</i> spp.	P
<b>Spurges</b> (seed frag): <i>Euphorbia</i> spp.	P
<b>Crane's-bills</b> (seed): <i>Geranium</i> spp.	P
<b>Fool's parsley</b> (mericarp): <i>Aethusa cynapium</i>	P
<b>Field forget-me-not</b> (nutlet): <i>Myosotis arvensis</i>	P
<b>Dead nettles</b> (nutlet): <i>Lamium</i> spp.	P
cf. <b>Common hemp-nettle</b> (nutlet): <i>Galeopsis</i> cf. <i>tetrahit</i>	P
<b>Hemp-nettles</b> (nutlet frag): <i>Galeopsis</i> spp.	P
cf. <b>Bugle</b> (nutlet): <i>Ajuga</i> cf. <i>reptans</i>	P
<b>Speedwells</b> (seed): <i>Veronica</i> spp.	P
<b>Bedstraws</b> (seed): <i>Galium</i> spp.	P
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>	P
<b>Sow-thistles</b> (achene): <i>Sonchus</i> spp.	P
<b>Hawk's-beards</b> (achene): <i>Crepis</i> spp.	P
<b>Mugworts</b> (achene): <i>Artemisia</i> spp.	P
<b>Ragworts</b> (achene): <i>Senecio</i> spp.	P
<b>Daisy family</b> (achene): Asteraceae	P
<b>Daisy family</b> (achene frag): Asteraceae	P
<b>Wood club-rush</b> (achene): <i>Scirpus</i> spp.	P
<b>Sedges</b> (achene frag): <i>Carex</i> spp.	P
<b>Grass family</b> (grain): Poaceae	P
<b>Grass family</b> (pericarp): Poaceae	P
cf. <b>Grass family</b> (pericarp frag): cf. Poaceae	P
cf. <b>Bur-reed family</b> (seed): cf. Sparganiaceae	P
cf. <b>Bulrushes</b> (seed): cf. <i>Typha</i> spp.	P
<b>Indeterminate</b> (seed coat/fibre)	P

**Detail of waterlogged weed remains**



## **Kill St Lawrence, Co. Waterford**

Grid Ref: **261329/109174**

SMR No: **WA 017-005**

Reference: **Carrott *et al.* 2004; O'Connell 2004.**

An early ecclesiastical site in Kill St. Lawrence, excavated in advance of road realignment, revealed two concentric enclosing ditches as well as a series of external and internal ditches, pits, deposits and possible hearths/post-holes. The excavation site was directly east of the remains of the church and graveyard on a slight rise of ground at 18m OD in a generally low-lying landscape.

The outer enclosure ditch had an extrapolated diameter of approximately 110m. No evidence of an internal bank was uncovered. Along the southern side of the enclosure, the ditch measured 6m wide at the top and 0.74m deep and had generally a shallow stepped profile with a flat base. Along the northern side of the enclosure, the ditch was 2.8m wide at the top and 1.38m deep and had generally steeply sloping sides and a V-shaped profile. The fills of the ditch contained occasional inclusions of charcoal. Charred material (wood species identity unknown) from the basal fill of the outer enclosing ditch returned a seventh/eighth-century date (see below).

A second ditch was uncovered parallel to the outer enclosure ditch and measured 1.8m wide at the top and 0.58m deep with steeply sloping sides and a concave base. Inclusions of charcoal and five pieces of slag were recovered within its basal fill. This previously unidentified inner enclosure was concentric with the outer enclosure, and had an extrapolated diameter of 60m. No evidence of an internal bank was recovered. Two sections of the inner ditch was excavated and revealed that it measured between 1.9m-2.3m wide and 0.85m-0.96m deep and contained inclusions of charcoal and a flint flake within its fills.

Settlement activity within the enclosure was suggested by the excavation of a variety of features including pits, deposits and possible hearths/post-holes. Twelve roughly sub-circular pits were excavated within the interior and had average maximum dimensions of 0.8m. Charred material was recovered from the primary fill of one of the pits and returned a fourth/sixth-century date (see below). This pit appears to pre-date the construction of the outer enclosure ditch, however this date, derived from oak charcoal, may have been subjected to the 'old wood' effect as it was not possible to determine whether the charred material derived from twigs or trunks of great age.

Three unidentified seeds, a single fragment of charred hazel nut shell, and three fragments of burnt animal bone (either pig or sheep/goat) were recovered from the fill of another pit in the enclosure interior. Three possible hearths/post-holes with an average diameter of 0.25m were situated close together within the inner enclosure and contained charcoal-rich fills. Four irregular to sub-rectangular deposits were also excavated within the enclosure and had average dimensions of 1.3m by 1m. No evidence for burials was revealed within the enclosure.

A number of features comprising two deposits, four pits and one ditch were revealed outside the enclosure ditches. The ditch was approximately one metre wide and orientated east-west. The pits were sub-circular or oval in plan and had an average diameter of 0.3m. The two deposits were sub-circular in plan and had an average diameter of 0.23m.

### **Plant remains**

Analysis of 1 deposit provided evidence for a single charred hazelnut shell fragment. Uncharred seeds were also recorded in a number of deposits, but it is thought that they represent modern contaminants.

Following processing of the soil samples by the archaeology team, the flots were examined, suspected plant remains were extracted, and the extracted material was then sent to the specialist team for analysis. It is suggested that this may have influenced the very small quantity of remains recorded, as non-specialists may not have recognised and extracted all types of preserved plant remains, particularly abraded and fragmented remains.

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
Beta- 183612	Charred material from basal fill of outer enclosing ditch	1310 $\pm$ 40 BP	<b>A.D. 647-778</b>
Beta-183613	Charred material from fill of internal pit	1620 $\pm$ 40 BP	<b>A.D. 344-541</b>

## Overview

- Enclosure ditches and interior occupation (1 sample)
  - Contained one charred hazelnut shell fragment.

Phase	Hazelnut (shell frag)	Date
Enclosure ditches and interior occupation	1	<b>A.D. 344–541.</b> <b>A.D. 647–778.</b>

**Detail of plant remains recorded (total deposits n=1)**

## **Killalane (Site 2), Co. Tipperary**

Grid Ref: **175743/170737**

SMR No: **N/A**

Reference: **Haston 2009; Stewart 2009; Clarke & Long 2009a.**

Archaeological investigations were carried out at Killalane Site 2 in advance of construction of the N7 Nenagh to Limerick road scheme. Eight different areas of archaeological activity were excavated.

Area A contained a large burnt spread and troughs, from which an early medieval radiocarbon date was secured (9<sup>th</sup> to 11<sup>th</sup> centuries). Area B contained the foundation trench of a demolished vernacular cottage and associated field boundaries.

Area C produced a double-ditched enclosure – this feature was radiocarbon dated to the Iron Age to early medieval periods (3<sup>rd</sup> to 9<sup>th</sup> centuries). A Late Bronze Age radiocarbon date was also returned from the inner ditch, but it is thought that this date relates to residual material, representing earlier activity elsewhere. The internal diameter of the enclosure measured approximately 32m. No definite evidence for a bank was recorded. Many features were recorded within the interior of the enclosure, including two large entrance post-holes (possibly representing a gate feature), a drying kiln, a curvilinear gully (possible remains of a structure), a possible water management feature (possible well or sump) and associated drainage ditches. Interior features were radiocarbon dated to the 7<sup>th</sup> to 9<sup>th</sup> centuries. Geophysical survey was also undertaken on the portion of the site outside the road take to establish the extent of the site. Relatively few artefacts were recorded in Area C, although the presence of a quern stone, along with cereal remains (predominantly oat), indicates that cereal-related activity was taking place.

Area D contained no features of archaeological significance. Area E contained a number of irregular pits and post-holes, one of which was radiocarbon dated to the Late Bronze Age. Area F produced a large burnt mound, which was radiocarbon dated to the Middle Bronze Age, as well as a stone-lined drying kiln, which was radiocarbon dated to the post-medieval period. Area G contained two charcoal-production pits and two possible waste pits – one of the charcoal-production pits was radiocarbon dated to the transition between the early medieval and the medieval periods (10<sup>th</sup> to 12<sup>th</sup> centuries). Area H did not contain any features of archaeological significance. Post-medieval to modern agricultural activity was also recorded in a number of areas at this site.

### **Plant remains**

Analysis of 15 deposits provided evidence for a total of 206 charred cereal grains, 13 charred hazelnut shell fragments, 1 charred fruit seed and 21 charred weed seeds. Cereal chaff remains were absent.

Cereals were recorded in both the enclosure ditches and interior. A variety of crops was present, including oat and hulled barley. The weed remains may represent arable weeds and plants that were growing locally.

Two specialist reports on the plant remains were produced: an assessment (Stewart 2009) and a final report (Haston 2009). There are, however, a number of inconsistencies between these two reports. There are several instances where the recovery of plant remains from certain contexts was listed in the assessment report, but these remains were not recorded in the final report. The main text of the excavation report (Clark & Long 2009) appears to reflect the data from the assessment rather than then the final plant remains report. For the purposes of this entry, data from the final plant remains report only have been listed. It is therefore possible that further plant remains were recovered from this site.



**Plan of excavations at Killalane, Site 2, Area C (after Clark & Long 2009a, Figure 8)**

### **Radiocarbon Dates:**

Reimer, P.J., Baillie, M.G.L., Bard, E., Bayliss, A., Beck, J.W., Bertrand, C.J.H., Blackwell, P.G., Buck, C.E., Burr, G.S., Cutler, K.B., Damon, P.E., Edwards, R.L., Fairbanks, R.G., Friedrich, M., Guilderson, T.P., Hogg, A.G., Hughen, K.A., Kromer, B., McCormac, G., Manning, S., Bronk Ramsey, C., Reimer, R.W., Remmele, S., Southon, J.R., Stuiver, M., Talamo, S., Taylor, F.W., van der Plicht, J. & Weyhenmeyer, C.E. 2004. IntCal04 terrestrial radiocarbon age calibration, 0–26 cal kyr BP. Radiocarbon, 46, 1029–58.

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
UBA-15472	Pomoideae charcoal from Enclosure inner ditch C.4005 (Area C)	1666 $\pm$ 30 BP	A.D. 258–298; <b>A.D. 319–433</b> ; A.D. 496–502.
UBA-12035	Alder charcoal from Enclosure outer ditch C.4002, basal fill (Area C)	1796 $\pm$ 23 BP	<b>A.D. 133–259</b> ; A.D. 285–286; A.D. 294–322.
UBA-15469	Hulled barley grain from Enclosure outer ditch C.4002, lower fill (Area C)	1223 $\pm$ 24 BP	A.D. 694–702; A.D. 707–747; A.D. 765–884.
UBA-15471	Hazel charcoal from Enclosure outer ditch C.4002, upper fill (Area C)	1204 $\pm$ 23 BP	A.D. 725–738; <b>A.D. 771–889</b> .
UBA-12037	Hazelnut shell from Enclosure outer ditch C.4002, upper fill (Area C)	1199 $\pm$ 22 BP	<b>A.D. 772–891</b> .
UBA-9931	Rye grain from interior Kiln C.4502 (Area C)	1321 $\pm$ 24 BP	A.D. 654–717; A.D. 743–768.
UBA-12038	Hazelnut shell from interior Drain C.4521 (Area C)	1252 $\pm$ 20 BP	<b>A.D. 679–783</b> ; AD.789–813; A.D. 844–857.
UBA-12039	Pomoideae charcoal from interior Water management feature C.4514 (Area C)	1355 $\pm$ 21 BP	<b>A.D. 645–684</b> .
UBA-12040	Hazelnut shell from interior Entrance post-hole C.4522 (Area C)	1249 $\pm$ 20 BP	<b>A.D. 681–783</b> ; A.D. 788–821;

			A.D. 842–859.
UBA-12032	Hazel charcoal from Burnt mound trough C.19 (Area A)	1095±26 BP	<b>A.D. 891–1012.</b>
UBA-12041	Hazel charcoal from Charcoal-production pit C.5006 (Area G)	1006±21 BP	<b>A.D. 987–1146.</b>

## Overview

- Enclosure ditches (6 deposits)
  - Some of the lower fills of these ditches appear to be Iron Age, while others are early medieval.
  - Small number of cereal grains, including hulled barley and oat.
  - Occasional hazelnut shell fragments and a fruit seed also present.
- Enclosure interior, including kiln (9 deposits)
  - Substantial number of cereal grains – oat was predominant, with a smaller quantity of hulled barley.
  - Occasional hazelnut shell fragments and weed seeds also recorded.

Phase	Cereal (grain)	Hazelnut (shell frag)	Fruit (seed)	Weed (seed)	Date (A.D.)
<b>Enclosure ditches</b>	8	9	1		258–298; <b>319–433</b> ; 496–502; <b>133–259</b> ; 285–286; 294–322; 694–702; 707–747; 765–884; 725–738; <b>771–889</b> ; <b>772–891</b> .
<b>Enclosure interior</b>	198	4		21	654–717; 743–768; <b>679–783</b> ; 789–813; 844–857; <b>645–684</b> ; <b>681–783</b> ; 788–821; 842–859.

## Overview of all plant groups (total deposits n=15)

Phase	Oat (grain)	Barley (grain)
<b>Enclosure ditches</b> (n=8)		
<b>Enclosure interior</b> (n=198)	85.00%	15.00%

**Percentage of cereal grain types recorded in each phase of activity** (where >25 total grains recorded) n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	Hulled barley (grain)	Indet. cereal (grain)
<b>Enclosure ditches</b>	2	4	2
<b>Enclosure interior</b>	153	27	18

## Detail of cereal remains

Phase	Enclosure ditches	Enclosure interior
<b>Haw fruit</b> (nutlet): <i>Crataegus monogyna</i>	1	
<b>Fat-hen</b> (utricle): <i>Chenopodium album</i>		1
<b>Common chickweed</b> (seed): <i>Stellaria media</i>		1
<b>Redshank/Pale persicaria</b> (achene): <i>Persicaria maculosa/lapathifolia</i>		8
<b>Knotgrass</b> (achene frag): <i>Polygonum aviculare</i>		1
<b>Common sorrel</b> (achene): <i>Rumex acetosa</i>		2
<b>Common dog-violet</b> (seed): <i>Viola riviniana</i>		1
<b>Charlock/Wild radish</b> (pod): <i>Sinapis arvensis/Raphanus raphanistrum</i> ssp. <i>Raphanistrum</i>		1
<b>Field forget-me-not</b> (nutlet): <i>Myosotis arvensis</i>		1
<b>Common hemp-nettle</b> (nutlet): <i>Galeopsis tetrahit</i>		2
<b>Ribwort plantain</b> (seed): <i>Plantago lanceolata</i>		3

## Detail of fruit and weed remains

**Killanully, Co. Cork**Grid Ref: **169240/063628**SMR No: **CO086-047**Reference: **Tierney 1995; Mount 1995.**

A univallate early medieval enclosure and souterrain, and a post-medieval rectangular enclosure were excavated in Killanully townland in advance of a limestone quarry extension. The site was located on the crest of an east-west ridge near its north-western end at 41m OD and overlooking the valley of the Owenboy River. The excavation of the whole site revealed that the enclosure and souterrain were primarily occupied between the eighth/tenth centuries A.D and were associated with iron smelting and cereal-cultivation.

The early medieval enclosure was oval in plan (25m by 36m), and was enclosed by a low bank, 1.5m thick and 0.35m high. The excavated ditch was V-shaped and rock-cut and measured 1.95m wide and 1.05m deep. Two fills were identified within the ditch and contained a quantity of animal bone. The eastern entrance was a simple uncut causeway 3.5m wide between the two ditch terminals and had no indication of any postholes which may have supported a gate. A small quantity of animal bone, a sherd of post-medieval pottery, and a fragment of an iron key shaft were excavated inside the southern ditch terminal.

Evidence for a truncated layer containing occasional flecks of charcoal and fragments of burnt bone were identified beneath the south-west portion of the bank indicated some form of occupation before the enclosure was built. Animal bone and a tuyère fragment within the enclosing bank indicated the presence of a furnace on the site before or during the construction of the enclosing bank.

Intensive modern cultivation and the erosion of soil down the hill slope had destroyed any evidence for houses or hearths inside the enclosure. A stone-lined souterrain was located in the south-western area of the site and consisted of a single curving passage 11.3m long, 0.4-0.9m wide and at most 1.85m below the present ground surface. The structure was unroofed except for one stone lintel and was built using alternating orthostats of upright stone slabs along its southern section and dry-stone walling for the most part in the northern section. A quantity of charcoal in the interstices of the stones along the northern section produced a radiocarbon date from the tenth to the thirteenth century (see below).

The souterrain contained five fills. The original floor of the souterrain was heavily trampled and contained animal bone, molluscs, charcoal, a piece of cinder from a furnace and a bone barrel-bead. An occupation deposit that infiltrated the souterrain through the entrance and was contemporary with the use of the souterrain was discovered overlying the original floor. A quantity of animal bone, single hazelnut shell, charred barley, fat-hen, molluscs and charcoal as well as a whetstone, iron band, iron fragment and 25g of metal ore were recovered from this context. A sample of charcoal from this deposit returned a radiocarbon date in the late-eighth to late-tenth centuries (see below). This occupation deposit lay beneath the primary souterrain backfill or demolition deposit of the souterrain which contained the remains of the dry stone walling and lintel stones as well as animal bone, a stone disc, iron slag and a piece of iron ore.

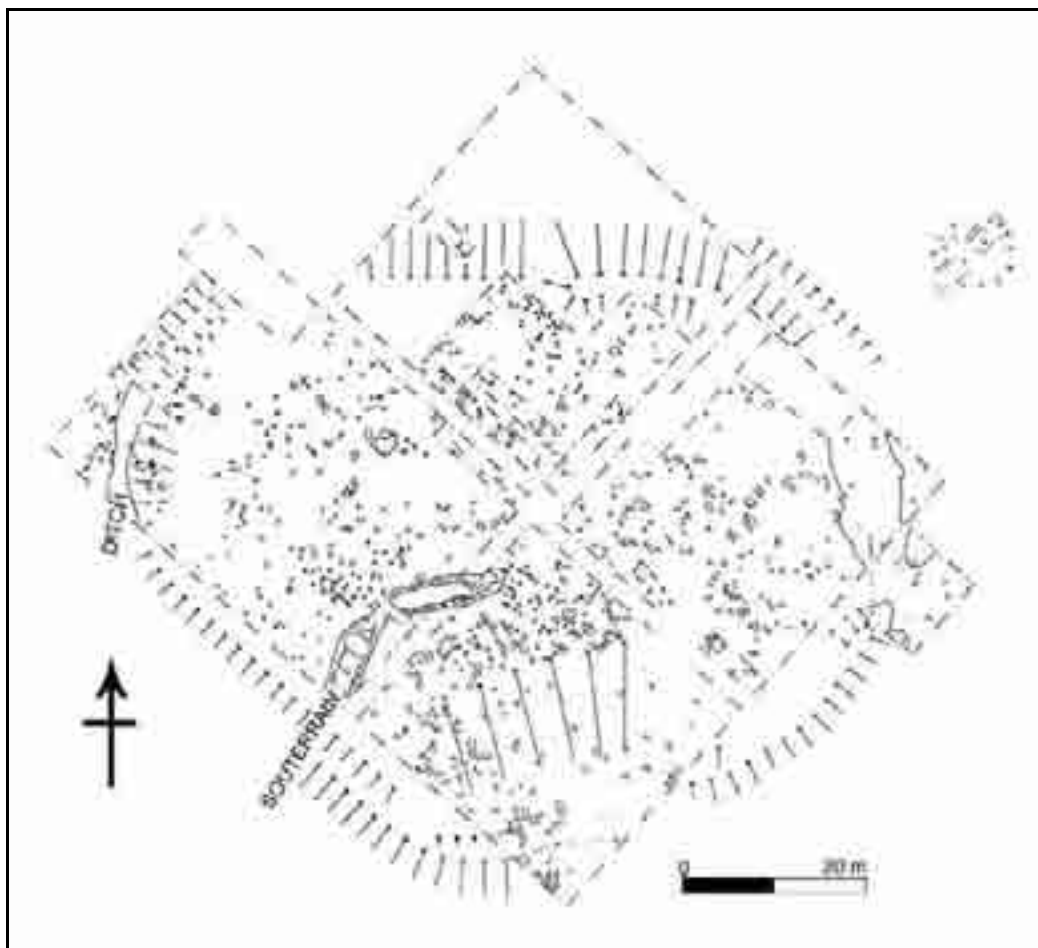
A corn-drying kiln consisting of a deep circular pit (1.25m by 1.15m, and 0.8m deep) with a flue (0.6m long) was excavated in the western side of the enclosure. The fills of the furnace pit contained a large quantity of iron slag, animal bone, charcoal, two iron nails, charred barley and fat-hen. Charred cereals and weeds were uncovered at the heavily burnt base of the kiln. An irregular slot (1m long by 0.5m wide and 1m-1.15m deep) was excavated 1.5m east of the corn-drying kiln and contained fragments of burnt cattle bone, charcoal, three charred oat grains and one charred weed. A radiocarbon determination from a large piece of charcoal returned a calibrated two sigma radiocarbon date of A.D. 689-888. A pit (0.85m by 0.3m at the top & 0.3m deep) was situated close to the souterrain and contained animal bone and iron slag.

A horizon layer situated directly beneath the sod but significantly overlying the interior features in the south-western part of the site contained a large quantity of animal bone, iron slag, iron ore and various stone and metal artefacts, displaced from their primary context due to the modern cultivation. Finds from this displaced layer included a knife blade, an iron pin with remains of ringed head, an iron shears, iron nails and spikes and a possible part of a blowpipe, five whetstones, two stone discs and various late finds.

### **Plant remains**

Analysis of nine deposits provided evidence for charred cereal grains, charred hazelnut shell fragments and charred weed seeds. Cereal chaff and fruit remains were absent. In most cases, the exact quantities of remains were not stated in the plant remains report. The main excavation report did occasionally mention quantities, but these did not always correlate with the types of remains recorded in the plant remains report. Evidence from the plant remains report only has been noted below.

Cereal grains were present in several areas/phases of activity. A variety of cereals was recorded, including oat, barley and possible wheat. The weed remains may represent plants that were growing alongside the cereals and in the background environment of the site.



**Plan of Killanully, Co. Cork (after Mount 1995, 124).**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-3647	Charcoal from fill of slot, 1.5m east of corn-drying kiln	1222 $\pm$ 34 BP	<b>A.D. 689-752</b> <b>A.D. 761-888</b>
UB-3648	Charcoal from the dry-stone walling of the souterrain	969 $\pm$ 97 BP	<b>A.D. 889-1260</b>
UB-3649	Charcoal from occupation layer inside souterrain	1155 $\pm$ 38 BP	<b>A.D. 777-975</b>

## Overview

- Souterrain (3 deposits)
  - Contained indeterminate cereal grains, as well as hazelnut shell and weed remains.
- Kiln F.6 (4 deposits)
  - Contained a large quantity of cereal grains, including barley and possible wheat, as well as weed seeds.
- Misc. (2 deposits)
  - Contained oat grains and weed remains.

Phase	Cereal (grain)	Hazelnut (shell)	Weed (seed)	Date
<b>Souterrain</b>	P	P	P	<b>A.D. 889–1260. A.D. 777–975.</b>
<b>Kiln F.6</b>	P		P	
<b>Misc.</b>	P		P	A.D. 689–752; A.D. 761–888.

## Overview of all plant groups (total deposits n=9)

P = present

Phase	Oat (grain)	Barley (grain)	cf. Wheat (grain)	Barley/Wheat (grain)	Indet. cereal (grain)	Indet. cereal (grain frag)
<b>Souterrain</b>					P	
<b>Kiln F.6</b>		P	P	P		P
<b>Misc.</b>	P					

## Detail of cereal remains

Phase	Souterrain	Kiln F.6	Misc.
<b>Goosefoot family</b> (utricle): Chenopodiaceae	P	P	
<b>Knotweed family</b> (achene): Polygonaceae	P		
<b>Indeterminate</b>	64		P

## Detail of weed remains



## **'Killederdadrum' (Lackenavorna td), Co. Tipperary**

Grid Ref: **194800/172110**

SMR No: **TN027-100**

Reference: **Monk 1984; Manning 1984.**

Excavation of a large univallate enclosure (72m x 52m) revealed circular houses, a corn-drying kiln, a possible souterrain and a mainly post-medieval cemetery. Two parallel low banks with external ditches ran westwards from this enclosure and may have formed an annex to the main enclosure. A small vessel of E ware (c. 7<sup>th</sup> C.) was recovered in a re-deposited context in an upper fill of these annex ditches. The entrance to the main enclosure consisted of a causeway across the ditch, flanked by two pairs of large post-holes which may have held the gate-posts. Two smaller pits along the eastern face of the entrance bank suggest that this side may have been supported by a fence or revetment.

A wooden roundhouse (House 1) with a possible northern annex was excavated at the western end of the enclosure. Internal features included two hearths, four post-holes for roof supports and a pit containing a bronze pin. Other finds included two iron knives, a perforated stone disc, a hone-stone, a rotary grinding stone and a sliver of sawn antler.

Two smaller roundhouses were identified on the north side of the enclosure. House 3 replaced House 2 with apparently little time lapse. A slightly curving slot trench pre-dated the two houses and may have formed part of an earlier structure/fence. A charcoal sample from the wall trench of House 2 produced a radiocarbon date of A.D. 1157-1394, though this significantly post-dates the early medieval date suggested by the artefactual remains.

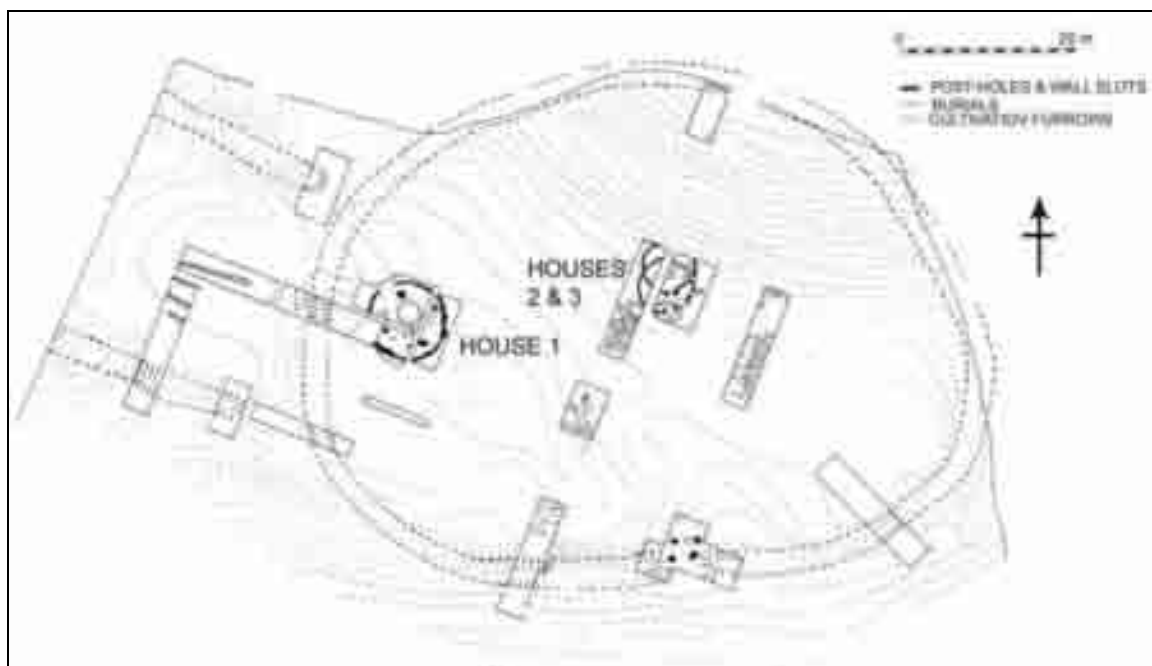
A possible corn-drying kiln cut into the inner slope of the southern enclosure ditch contained a black layer of carbonized grain similar to that recovered inside the fill of the enclosing ditch. A double row of stones running west along the ditch may represent the demolished remains of the kiln's flue. A radiocarbon date from the grain in the kiln produced a date of A.D. 895-1172.

The post-medieval cemetery consisted of roughly 80 excavated burials. These burials rarely disturbed each other suggesting that there were gravemarkers.

### **Plant remains**

Analysis of three deposits provided evidence for charred cereal grains and chaff, as well as charred weed seeds. The quantities recovered were not recorded in most cases – comments on general ubiquity were instead provided, which have been noted below. Fruit and nutshell remains were absent.

A variety of cereals was present, including common oat, bristle oat, wild oat, hulled barley, six-row barley, possible wheat and rye. The weed seeds are likely to represent plants that were growing locally, as well as plants that may have been growing alongside the cereals.



**Plan of excavated areas at Killeaderdardrum, Co. Tipperary (after Manning 1984, 241)**

### Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
GU-1511	Carbonised grain from fill of corn-drying kiln in Cutting 1.	1000±60 BP	A.D. 895-925 <b>A.D. 937-1172</b>
GU-1513	Charcoal from wall trench of House 2	745±65 BP	<b>A.D. 1157-1325</b> A.D. 1344-1394

### Overview

- Enclosure ditch and interior (3 deposits)
  - Oat grains and chaff were predominant (including common oat, bristle oat and wild oat). Six-row hulled barley grains and chaff were also present, as well as possible wheat and rye grains.
  - Weed seeds were also recorded.

Phase	Cereal (grain)	Cereal (chaff)	Weed (seed)	Date
<b>Enclosure ditch and interior</b>	P	P	P	A.D. 895–925, <b>A.D. 937–1172.</b>

### Overview of all plant groups (total deposits n=3)

P = present

Phase	Common oat (grain + lemma)	cf. Common oat (grain + lemma)	Bristle oat (grain + lemma)	Wild oat (grain + lemma)	cf. Wild oat (grain + lemma)	Oat (grain)
<b>Enclosure ditch and interior</b>	P	P	P	P	P	P

#### Detail of oat remains

Phase	Six-row hulled barley (grain + lemma)	Barley (grain)	cf. Barley (grain)	cf. Wheat (grain)	Rye (grain)	Indet. cereal (straw frag)
Enclosure ditch and interior	P	P	1	2	P	P

#### Detail of barley, wheat and rye remains

Phase	Enclosure ditch and interior
Wild radish (pod fragment): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>	1
Vetches (seed): <i>Vicia</i> spp.	P
cf. Ribwort plantain (seed): <i>Plantago</i> cf. <i>lanceolata</i>	P
Indeterminate (seed)	P

#### Detail of weed remains

**Killickaweeny, Co. Kildare**Grid Ref: **283859/240679**SMR No: **N/A**References: **Johnston 2005; Walsh 2005; Walsh 2008.**

Excavation revealed two phases of occupation on site. The earlier phase was defined by an incomplete curvilinear ditch which survived to a length of 30m. An incomplete L-shaped ditch associated with this early phase was interpreted as the boundary of a livestock enclosure. These ditches appear to have been deliberately in-filled with occupation rubbish, and were cut through by the ditch of the later occupation phase.

The main occupation phase was defined by a 'heart-shaped' ditch, approximately 200 m long. Four structures were excavated in the interior of this enclosure – a circular post-built structure (A); slot-trenches for wattle walls for a sub-rectangular building (B); similar foundations for a circular building (C); and a rectangular structure defined by postholes at the corner (D). Structure A was interpreted as the main dwelling, while structure C was interpreted as an outhouse for livestock, and it is suggested that the sub-rectangular structures on site may have been influenced by Viking houses.

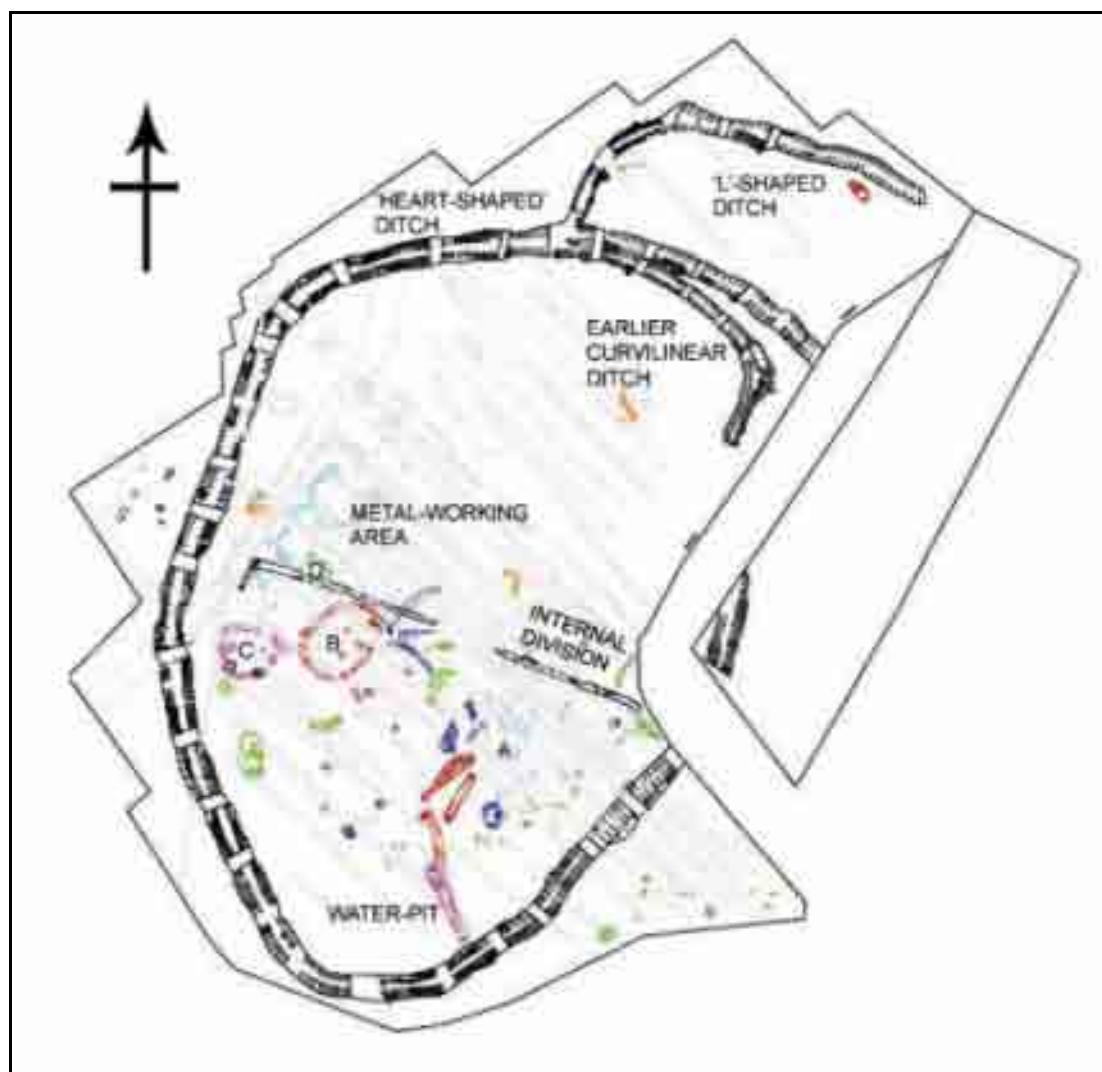
Industrial activity appears to have been concentrated in specific areas of the interior. These are indicated by six bowl furnaces, refuse pits including industrial waste (86kg of iron slag), and a possible cistern, which may have been associated with metalworking. Slag and hammerscale were recovered from the fill of the structure B, and it is suggested that this may have been a metalworking workshop; structure D was also interpreted as metalworking workshop, perhaps roofed, but with only a wall along one side.

The finds from this site included four penannular-ring headed pins; sixteen iron knives; five glass beads; a (possible) pair of iron shears; and a rotary grindstone.

**Plant remains**

Analysis of 12 deposits provided evidence for a large charred and waterlogged plant remains assemblage. A total of 85 charred cereal grains, 1 charred cereal chaff fragment, 41 charred nutshell fragments, 2 charred fruit seeds, 15 charred weed seeds, 241 waterlogged fruit seeds and 7129 waterlogged weed seeds were recorded. The waterlogged remains were preserved as a result of waterlogged conditions in a number of features, such as ditches and pits.

Cereals were mainly confined to the Area A pits, with few cereal remains recorded elsewhere. A variety of cereals was present, including oat, hulled barley, wheat and possible rye. Most of the weed remains appear to represent plants that were growing locally, while occasional possible arable weeds were also present.



**Plan of Killickaweeny, Co. Kildare (after Walsh 2008, 28).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
Beta-18557	Main fill of earlier phase ditch	1350±60 BP	<b>A.D. 569-782;</b> A.D. 790-809.
Beta-185555	Charcoal from upper fill of main ditch	1010±70 BP	<b>A.D. 888-1186;</b> A.D. 1200-1205.
Beta-185550	Charcoal from pit	1280±60 BP	<b>A.D. 653-881.</b>
Beta-185549	Charcoal from pit.	1270±60 BP	<b>A.D. 656-886.</b>
Beta-185553	Charcoal from posthole in Structure B	1220±50 BP	<b>A.D. 673-897;</b> A.D. 922-942.
Beta-185551	Charcoal from pit.	1300±60 BP	<b>A.D. 644-876.</b>
Beta-185556	Charcoal from gully.	1260±50 BP	<b>A.D. 665-878.</b>
Beta-185554	Charcoal from pit	1250±60 BP	<b>A.D. 657-894;</b> A.D. 928-934.
Beta-185553	Charcoal from pit	1260±60 BP	<b>A.D. 656-890.</b>

Beta-185558	Charcoal from metalworking hearth.	1090±60 BP	<b>A.D. 778-1032.</b>
GU-11625	Charcoal from metalworking hearth.	1320±50 BP	<b>A.D. 618-782;</b> A.D. 789-812; A.D. 845-856.

### Overview

- Phase 2 – Ditch A (2 samples)
  - Contained a very large quantity of waterlogged remains (weeds and fruits), as well as one charred possible oat grain.
- Phase 2 – Area A pits (5 samples)
  - Contained charred remains only.
  - Produced a relatively large quantity of cereal remains (mainly grains, with one chaff fragment). Barley was predominant, with smaller quantities of oat and wheat, and occasional possible rye recorded.
  - Hazelnut shell fragments were also present, as well as small quantities of fruit and weed seeds.
- Phase 2 – Area B pits (5 samples)
  - Contained a large quantity of waterlogged remains (weeds and fruits), as well as two charred cereal grains (hulled barley and wheat), a charred fruit seed and a charred weed seed.

Phase	Cereal (grain)	Cereal (chaff)	Nut (shell frag)	Fruit (seed)	Weed (seed)	Date
<b>Phase 2: Ditch A</b>	1			206	6996	<b>A.D. 888–1186;</b> A.D. 1200–1205.
<b>Phase 2: Area A pits</b>	82	1	41	1	14	<b>A.D. 653–881.</b> <b>A.D. 656–886.</b>
<b>Phase 2: Area B pits</b>	2			36	134	<b>A.D. 656–890.</b> <b>A.D. 657–894;</b> A.D. 928–934.

### Overview of all plant groups (total deposits n=12)

Phase	Oat (grain)	Barley (grain)	Wheat (grain)	cf. Rye (grain)
<b>Ditch A (n=1)</b>				
<b>Area A pits (n=32)</b>	28.13%	43.75%	25.00%	3.13%
<b>Area B pits (n=2)</b>				

### Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain + floret base)	Oat (grain)	Oat (grain frag)	cf. Oat (grain)	Hulled barley (grain)	Barley (grain)	Oat/Barley (grain)
<b>Ditch A</b>				1			
<b>Area A pits</b>	1	8	1		3	11	1
<b>Area B pits</b>					1		

### Detail of oat and barley remains

Phase	Wheat (grain)	Wheat (grain frag)	cf. Rye (grain)	Indet. cereal (grain)	Indet. cereal (culm node)
Ditch A					
Area A pits	8	1	1	49	1
Area B pits	1				

#### Detail of wheat, rye and indeterminate cereal remains

Phase	Hazelnut (shell frag)	Indet. nut (shell frag)	Cherries (stone frag): <i>Prunus</i> spp.	cf. Haw fruit (nutlet): <i>Crataegus monogyna</i>
Ditch A				
Area A pits	39	2		1
Area B pits			1	

#### Detail of charred nut and fruit remains

Phase	Ditch A	Area A pits	Area B pits
Goosefoot family (utricle): Chenopodiaceae		1	
Knotweed family (achene): Polygonaceae		1	1
Rose family (seed): Rosaceae		2	
Grass family (grain): Poaceae		1	
Indeterminate (seed)		9	

#### Detail of charred weed remains

Phase	Bramble (nutlet): <i>Rubus fruticosus</i>	Elder (seed): <i>Sambucus nigra</i>
Ditch A	201	5
Area A pits		
Area B pits	35	

#### Detail of waterlogged fruit remains

Phase	Ditch A	Area A pits	Area B pits
Meadow/Creeping buttercup (achene): <i>Ranunculus acris/repens</i>	60		4
Common nettle (achene): <i>Urtica dioica</i>	6135		89
Goosefoot family (utricle): Chenopodiaceae	5		
Pink family (seed): Caryophyllaceae			13
Pale persicaria (achene): <i>Persicaria lapathifolia</i>			2
Knotweed family (achene): Polygonaceae	25		10
Common hemp-nettle (nutlet): <i>Galeopsis tetrahit</i>	460		2
Hemp-nettles (nutlet): <i>Galeopsis</i> spp.	120		
Mints (nutlet): <i>Mentha</i> spp.	20		
Dead-nettle family (nutlet): Lamiaceae	21		
Thistles/Knapweeds (achene): <i>Cirsium/Centaurea</i> spp.	75		
Nipplewort (achene): <i>Lapsana communis</i>			1
Daisy family (achene): Asteraceae	35		
Rushes (seed): <i>Juncus</i> spp.			4
Grass family (grain): Poaceae			2
Indeterminate (seed)	40		6
Indeterminate (thorn)	30		

#### Detail of waterlogged weed remains

## **Knowth Site M, Co. Meath**

Grid reference: **29984/27387**

SMR No: **ME019-069**

Reference: **Johnston & O'Donnell 2008; Stout & Stout 2008.**

Research excavations at Knowth Site M revealed a settlement-cemetery dating between the sixth and tenth centuries. A third, outer enclosure was constructed potentially after the tenth century.

The settlement/cemetery was enclosed by two sub-circular ditches. The inner enclosure defined an area measuring 48m x 40m. The ditch was excavated in five locations and contained similar fills. Charcoal was present in many of the ditch fills, and artefacts included part of a polished stone axe, a flint side and end scraper, iron slag and a fragment of an undecorated bone comb. A blue glass bead and a fragment of a gilt Anglo-Saxon mount were discovered in topsoil above the ditch. Bone and charcoal from the inner enclosure ditch produced a date between the late sixth and mid seventh century.

The inner enclosure ditch may have been further delimited by a wall that survived to a height of three courses, followed the edges of two trenches. A date of A.D. 767-896 indicates that it fell into disuse at some point during this time. The second trench was cut by the above example. A highly decorated Hiberno-Scandinavian bronze strap end with interlaced decoration on both sides was located in a layer below the subsoil and overlying the initial trench. A final trench, located to the west of the first trench and which contained similar fills, produced iron knife fragments. A date of A.D. 877-998 was obtained from its upper fill.

The second enclosure was oval in plan and concentric with the inner enclosure. Evidence for an internal bank was also present in certain places. It had an external diameter of 74m x 62.5m. The ditch was situated between 9m and 10m outside the inner enclosing ditch. Charcoal from its primary fill produced a date of A.D. 662-780. The only find was an iron disc.

Fifty two burials were revealed in the central and southern areas of the inner and second enclosures. Finds associated with these burials were limited and included a stone ball, a flint flake and fragments of two iron nails. A sherd of E ware was found in the interior, and two of the graves were dated to A.D. 597-673 and A.D. 856-989.

A potential trapezoidal structure located at the western section of the inner enclosure was defined by four roughly circular pits. Charcoal from a posthole fill produced a date of A.D. 561-652. Habitation evidence was evident in the south-eastern area between the inner and second enclosing ditches. Excavation revealed a platform defined by a curving trench and some pits. Artefacts within the soft dark clay that overlay the platform included a toggle-like object made from a sperm whale's tooth, worked horn and a small worked bone fragment.

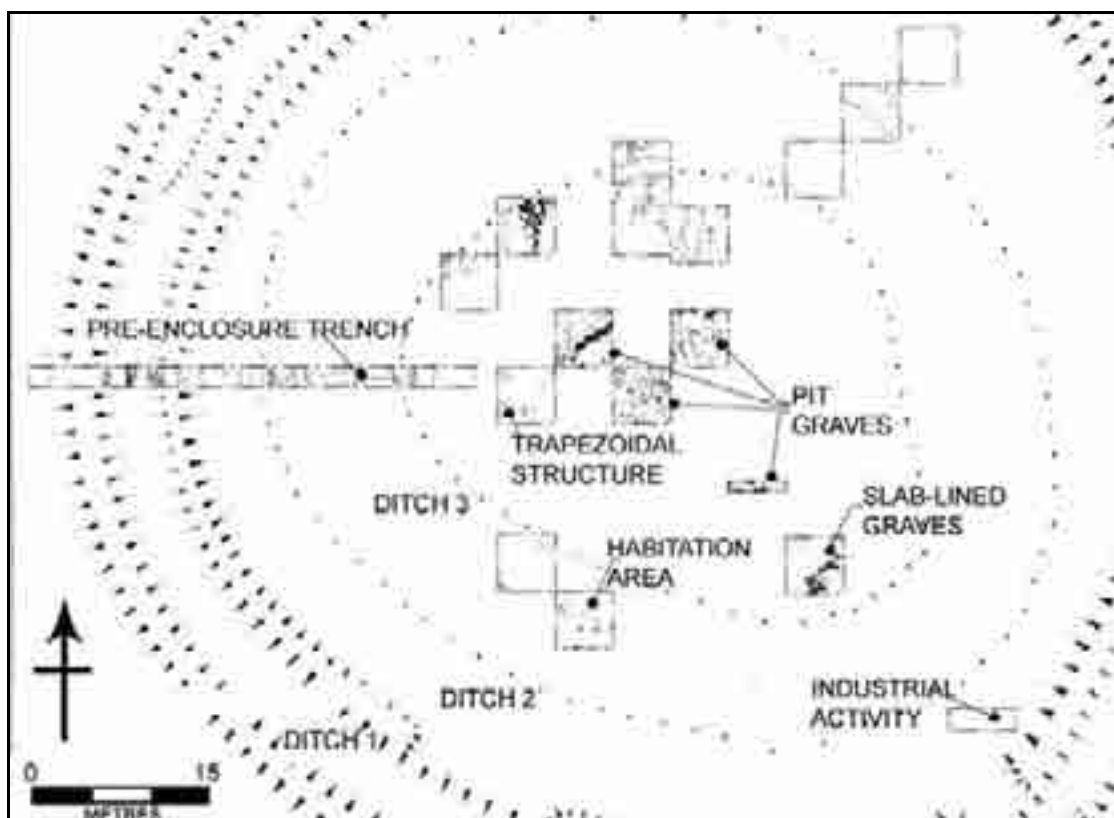
The third, outer enclosure was eccentric to the two inner enclosures and consisted of two banks with an intervening ditch. It measured 110m in diameter and, although it has not been dated, it is believed to post-date the two inner enclosures.

## **Plant remains**

Analysis of eight deposits provided evidence for a total of more than 3260 charred cereal grains, 65 charred cereal chaff fragments and 229 charred weed seeds. The exact quantity of cereal grains was not determined in all cases. The presence of seeds from the Fabaceae family (pea) may represent cultivated legumes or weeds. Nut and fruit remains were absent.

Cereals were recorded in a number of different locations. A variety of crops was present, including common oat, hulled barley, six-row barley, possible emmer wheat and bread wheat. The weed remains are likely to represent arable weeds and plants that were growing locally.





**Excavated Areas at Knowth 'M', Co. Meath (after Stout & Stout 2008, 8)**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
UB-7019	Bone and charcoal from inner enclosure ditch	1427±32 BP	<b>A.D. 573-658</b>
UB-6587	Fill from trench (E70) associated with wall	1198±31 BP	A.D. 712-745; <b>A.D. 767-896;</b> A.D. 923-940
UB-7018	Upper fill of trench to west of wall and associated trenches	1112±30 BP	<b>A.D. 877-998;</b> A.D. 1002-1013
UB-7020	Charcoal from primary fill of second enclosure ditch	1277±30 BP	<b>A.D. 662-780;</b> A.D. 792-805
UB-6571	Charcoal from grave B84	1396±32 BP	<b>A.D. 597-673</b>
UB-6578	Charcoal from grave H14	1130±32 BP	A.D. 782-789; A.D. 810-847; <b>A.D. 856-989</b>
UB-6566	Charcoal from post-pipe related to potential trapezoidal structure	1448±31 BP	<b>A.D. 561-652</b>
UB-6579	Charcoal from trench related to agricultural activity	1467±31 BP	<b>A.D. 548-645</b>

UB-6573	Charcoal from trench related to agricultural activity	1224±32 BP	<b>A.D. 690–886</b>
UB-6569	Charcoal spread F11c	1301±31 BP	<b>A.D. 660–772.</b>
UB-6580	Post-hole A31	1461±33 BP	<b>A.D. 549–648.</b>
UB-7022	Post-hole L25a	1347±32 BP	<b>A.D. 637–718;</b> A.D. 742–769.

### Overview

- Enclosure ditches/trenches (3 samples)
  - Contained the largest quantity of cereal remains (grains and chaff).
  - Oat was predominant (including common oat), with smaller quantities of barley and wheat recorded (including hulled barley, six-row barley and bread wheat).
  - A significant number of weed seeds was also recorded.
- Enclosure interior: burials (1 sample)
  - Oat grains were predominant, with smaller quantities of barley and wheat present (including hulled barley and possible emmer wheat).
  - Weed seeds were also present.
- Enclosure interior: structures etc. (4 samples)
  - Unlike deposits in other areas of the site, barley grains were predominant (including hulled barley), with smaller quantities of oat and wheat recorded.
  - Weed seeds were also present.

Phase	Cereal (grain)	Cereal (chaff)	Weed (seed)	Date
<b>Enclosure ditches/trenches</b>	2605+	65	129	<b>A.D. 573–658. A.D. 662–780;</b> A.D. 792–805. A.D. 712–745; <b>A.D. 767–896;</b> A.D. 923–940. <b>A.D. 877–998;</b> A.D. 1002–1013.
<b>Enclosure interior: burials</b>	352		62	<b>A.D. 597–673.</b> A.D. 782–789; A.D. 810–847; <b>A.D. 856–989.</b>
<b>Enclosure interior: structures etc.</b>	303		38	<b>A.D. 549–648. A.D. 561–652. A.D. 548–645.</b> A.D. 690–751; A.D. 761–886. <b>A.D. 637–718;</b> A.D. 742–769.

### Overview of all plant groups (total deposits n=8)

Phase	Oat (grain)	Barley (grain)	Wheat (grain)
<b>Enclosure ditches/trenches</b> (n=2605)	90.56%	7.83%	1.61%
<b>Enclosure interior: burials</b> (n=254)	85.04%	14.17%	0.79%
<b>Enclosure interior: structures etc.</b> (n=66)	30.30%	65.15%	4.55%

### Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Common oat (floret base)	Oat (grain)	cf. Oat (grain)	Hulled barley (grain)	Six-row barley (rachis internode)	Barley (grain)	cf. Barley (grain)
Enclosure ditches/trenches	21	2359		64	16	140	
Enclosure interior: burials		216		13		23	
Enclosure interior: structures etc.		20	16	40		3	3

#### Detail of oat and barley remains

Phase	cf. Emmer wheat (grain)	Bread wheat (rachis internode)	Naked wheat (grain)	Wheat (grain)	Indet. cereal (grain)	Indet. cereal (rachis internode)	Indet. cereal (culm node)
Enclosure ditches/trenches		3	1	41	P	11	14
Enclosure interior: burials	1			1	98		
Enclosure interior: structures etc.				3	218		

#### Detail of wheat and indeterminate cereal remains

P = present

Phase	Enclosure ditches/ trenches	Enclosure interior: burials	Enclosure interior: structures etc.
<b>Buttercups</b> (achene): <i>Ranunculus</i> spp.	1		
<b>Goosefoot family</b> (utricle): Chenopodiaceae			1
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>			1
cf. <b>Sheep's sorrel</b> (achene): <i>Rumex</i> cf. <i>acetosella</i>	16	14	7
<b>Knotweed family</b> (achene): Polygonaceae	50	4	10
<b>Pea family</b> (seed): Fabaceae			1
<b>Cleavers</b> (seed): <i>Galium aparine</i>	1	2	
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>		1	
<b>Daisy family</b> (achene): Asteraceae	2		
<b>Sedge family</b> (achene): Cyperaceae	14	1	6
<b>Bromes</b> (grain): <i>Bromus</i> spp.	3	1	
<b>Grass family</b> (grain): Poaceae	28	33	8
<b>Indeterminate</b> (seed)	14	6	4

#### Detail of weed remains

## **'Leggetsrath', Blanchfieldsland, Co. Kilkenny**

Grid Ref: **252377/155958**

SMR No: **N/A**

Reference: **Akeret & Jaques 2005; Akeret, Jaques & Carrott 2005; Lennon 2005.**

An enclosure defined by concentric ditches was uncovered during top-soil stripping. The inner ditch enclosed an area of 34m x 32m, with a 3m wide entrance to the northeast. Slot trenches were found either side of the entrance in the inner ditch, and it is possible that these held upright timbers which were then removed or rotted *in situ*. These timbers may have acted as a defensive feature, or to retain the earthen bank. A possible palisade trench may also have existed on the east side of the site.

Two sherds of Late Roman Amphora (Bii) pottery, dating from the late fifth-mid sixth centuries, were recovered from the middle of the inner ditch, and a radiocarbon date of A.D. 569-809 was returned from animal bones in the lower fill. The outer ditch measured 54m in diameter and a radiocarbon date of A.D. 689-983 was recovered from a fill of the re-cut ditch. The upper ditch fill disclosed a number of metal objects (two iron blades, iron rod and copper alloy rod) and sherds of Saintonge pottery.

A portion of a third curving ditch which respected the enclosure was also discovered further down slope. Several shallow linear ditches ran off this feature, and it is suggested that these may represent early field boundaries. A blue-glass bead recovered from one of these would place these in the early medieval period. Two corn-drying kilns were later superimposed over these boundaries, but may also belong to the early medieval period.

The only feature excavated in the centre of the enclosure was an enigmatic pit (3m long x 1.2m deep). Two postholes were cut into the north and southwest corners of the pit, and it is possible that these originally supported a roof; four courses of rudimentary stonework were uncovered in the northern face of the pit. Environmental remains included pig bone, fish bone (trout, eel and salmon) and small bird bone. A bone comb, a gaming piece and a perforated stone were also recovered from this pit, while an iron blade was found in the upper fill. Another shallow pit was cut into the upper fills of the large pit. Bones of sheep, bird and fish were recovered from this pit, as well as grains of barley and wheat, and pieces of iron slag.

There was no evidence of an enclosing bank. The excavator suggests that the ditches are contemporary, but also raises the possibility that the outer ditch represents an expansion of the site.

### **Plant remains**

Analysis of 18 deposits provided evidence for a large quantity of charred cereal grains, cereal chaff fragments and weed seeds. The exact quantities of remains were not recorded in most cases – comments on general ubiquity were instead provided, which have been noted below. Hazelnut shell and fruit remains were absent.

Cereals were recorded in a number of locations. A variety of crops was present, including common oat, naked barley, hulled barley, naked wheat and rye. The weed remains may represent arable weeds and plants that were growing locally.

Plant remains from an additional deposit were recorded (Akeret and Jacques 2005), but it was not clear if this material dates to the early medieval period. As a result, these plant remains have not been recorded below.



**Plan of Leggetsrath, Co. Kilkenny (after Lennon 2005)**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
Beta-205166	Fill of inner ditch.	1350 $\pm$ 60 BP	<b>A.D. 569-782;</b> A.D. 790-809
Beta-205167	Corn-drying kiln	900 $\pm$ 70 BP	A.D. 1020-1258
Beta-205168	Basal fill of outer ditch (re-cut)	1180 $\pm$ 60 BP	A.D. 689-752; <b>A.D. 761-983.</b>
Beta-205169	Corn-drying kiln	1100 $\pm$ 60 BP	A.D. 778-1025
UBA-8171	Cattle bone from basal fill of ditch	1210 $\pm$ 21 BP	A.D. 723-740; <b>A.D. 770-886.</b>

## Overview

- Area 1, Phase 1: Ringfort (5 deposits)
  - Small quantity of cereal grains, including oat, barley and wheat grains.
  - Occasional weed seeds also recorded.
- Area 2, Phase 1: Field boundary (1 deposit)
  - Contained cereal grains and chaff. Oat, including common oat, was predominant, with smaller quantities of wheat and rye present.
  - Weed remains also recorded.
- Area 2, Phase 2: Pits (6 deposits)
  - Large quantity of cereal grains, with chaff also recorded. Barley was predominant, including hulled and naked varieties, with smaller quantities of oat and naked wheat present.
  - Weed seeds also recorded.
- Area 2, Phase 2: Kiln C.95 (3 deposits)
  - Large quantity of cereal grains, with chaff also recorded. Cereal types included common oat, hulled barley, naked wheat and rye.
  - Weed seeds also recorded.
- Area 2, Phase 2: Kiln C.72 (3 deposit)
  - Large quantity of cereal grains, with chaff also recorded. Cereal types included oat, hulled barley and naked wheat.
  - Weed seeds also recorded.

Phase	Cereal (grain)	Cereal (chaff)	Weed (seed)	Date
<b>Area 1, Phase 1: Ringfort</b>	P		4	<b>A.D. 569–782;</b> A.D. 790–809. A.D. 689–752; <b>A.D. 761–983.</b>
<b>Area 2, Phase 1: Field boundary</b>	P	P	P	
<b>Area 2, Phase 2: Pits</b>	P	P	P	
<b>Area 2, Phase 2: Kiln C.95</b>	P	P	P	<b>A.D. 778–1025.</b>
<b>Area 2, Phase 2: Kiln C.72</b>	P	P	P	<b>A.D. 1020–1258.</b>

### Overview of all plant groups (total deposits n=18)

P = Present

Phase	Common oat (grain)	Common oat (grain frag)	Oat (grain)	Naked barley (grain)	Hulled barley (grain)	Barley (grain)	Barley (rachis)
<b>Area 1, Phase 1: Ringfort</b>			6			P	
<b>Area 2, Phase 1: Field boundary</b>		P	P				
<b>Area 2, Phase 2: Pits</b>			P	P	P	P	P
<b>Area 2, Phase 2: Kiln C.95</b>	P	P	P		P	P	
<b>Area 2, Phase 2: Kiln C.72</b>			P		P		

### Detail of oat and barley remains

Phase	Naked wheat (grain)	Naked wheat (rachis)	Naked wheat (chaff frag)	Wheat (grain)	Rye (grain)	Rye (chaff frag)	Indet. cereal (grain)	Indet. cereal (chaff frag)
<b>Area 1, Phase 1: Ringfort</b>				P			P	
<b>Area 2, Phase 1: Field boundary</b>				P	P	P		
<b>Area 2, Phase 2: Pits</b>		P						
<b>Area 2, Phase 2: Kiln C.95</b>	P	P	P		P			
<b>Area 2, Phase 2: Kiln C.72</b>	P			P			5	P

**Detail of wheat, rye and indeterminate cereal remains**

Phase	Area 1, Phase 1: Ringfort	Area 2, Phase 1: Field boundary	Area 2, Phase 2: Pits	Area 2, Phase 2: Kiln C.95	Area 2, Phase 2: Kiln C.72
<b>Small nettle</b> (achene): <i>Urtica urens</i>			1		
<b>Goosefoot family</b> (utricle): Chenopodiaceae	2				
<b>Knotgrasses</b> (achene): <i>Polygonum</i> spp.			1		
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>				P	1
<b>Docks</b> (achene): <i>Rumex</i> spp.		P	2	P	
<b>Knotweed family</b> (achene): Polygonaceae			2		
<b>Violets</b> (seed): <i>Viola</i> spp.				P	
<b>Wild radish</b> (pod): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>				P	
<b>Wild radish</b> (pod frag): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>		P			
<b>Hairy Tare/Smooth Tare</b> (seed): <i>Vicia hirsuta/tetrasperma</i>				P	
<b>Vetches/Pea</b> (seed): <i>Vicia/Lathyrus</i> spp.				P	
cf. <b>False cleavers</b> (seed): <i>Galium</i> cf. <i>spurium</i>			1		
<b>Thistles</b> (achene): <i>Carduus/Cirsium</i> spp.				P	
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>				P	
<b>Bromes</b> (grain): <i>Bromus</i> spp.				P	
<b>Grass family</b> (grain): Poaceae		P		P	
<b>Indeterminate</b> (seed)	2		P	P	P

**Detail of weed remains**

## **Lisleagh I, Co. Cork**

Grid Ref: **178752/106497**

SMR No: **C0027-029**

Reference: **Monk *et al.* 1998; Monk 1988; Monk 1995.**

A landscape research project was established in the Lisleagh area in 1981 in order to investigate the nature of early medieval enclosed settlements. The project sought to examine chronological, functional and social relationships between clustered 'ringforts'. Two adjacent enclosures – located approximately 40m from each other – were chosen for excavation: Lisleagh 1 and Lisleagh 2.

There was some evidence for pre-enclosure activity at Lisleagh 1, consisting of a hearth, stake-hole alignments, and ceramic and stone artefacts, which appear to date to the Neolithic and/or Bronze Age periods. The first enclosure on the site, with a diameter of approximately 38m, was constructed during the early medieval period. It was soon levelled and replaced by a larger enclosure measuring approximately 63m in diameter, with a 2m-deep ditch and an impressive enclosing bank and palisade. The entrance was relatively simple. The enclosure was not maintained – the palisade rotted and was not replaced. Despite one re-cut, the ditch was allowed to silt up to around half of its depth and was also used as a dump for iron-working waste.

The interior of the enclosure contained a number of stake and wattle-built roundhouses, with at least two pairs showing evidence of having been conjoined for at least part of their existence. At least two of the structures appear to have been burnt down, in at least one case accidentally. Another structure was constructed over the ditch of the earlier enclosure. It appears that seven to eight structures were built in total – it is not clear how many co-existed, but they do seem to have been repaired and maintained over time. An unusual pit may represent a backfilled souterrain entrance.

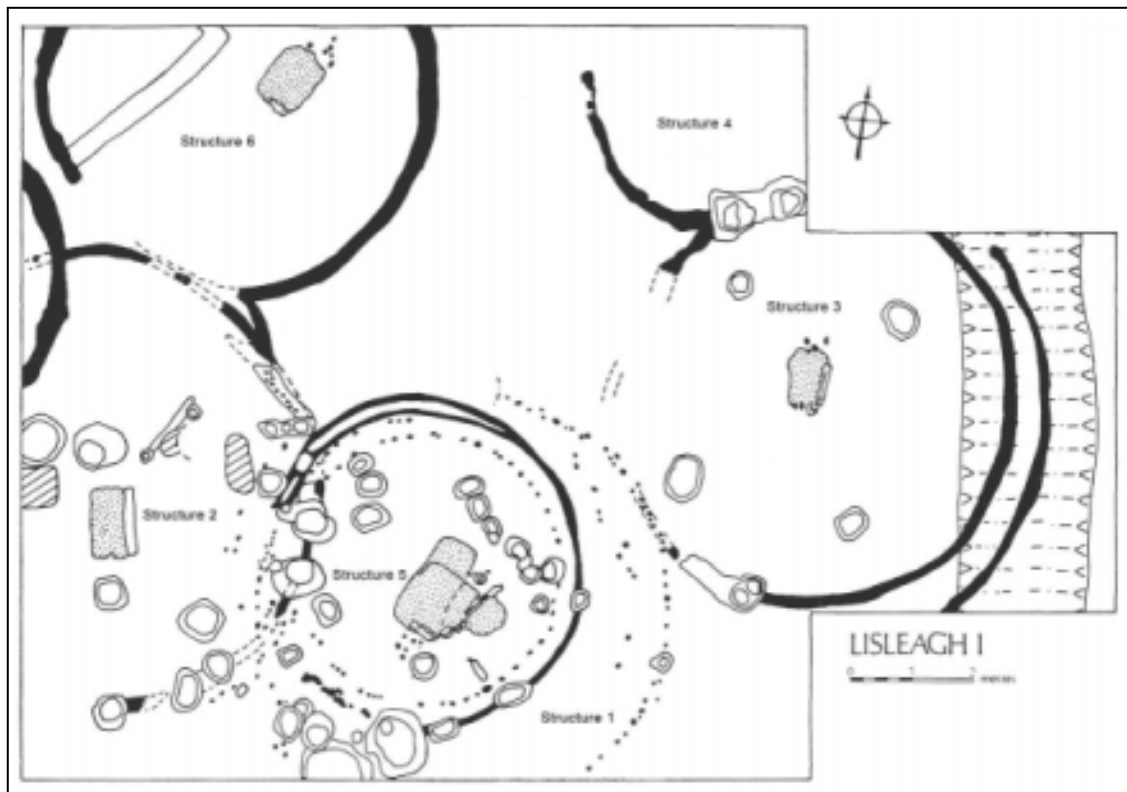
While radiocarbon dates for Lisleagh 1 have yet to be published, there has been some general reference to the dates (Monk 1995, 107; 1998, 37). When combined with the artefactual evidence, including two ring pins and a rectangular buckle, it appears that early medieval settlement began during the 6<sup>th</sup>/7<sup>th</sup> century and continued until the 9<sup>th</sup> century. Animal bone was rare, although some cattle, sheep and pig bones were recorded. A loom weight and perforated stone discs (possible spindle-whorls) may indicate wool-processing, while bone-working was also recorded. Large quantities of charred cereal remains were also present (oat and barley were predominant), as well as rotary quern fragments. Few metal implements were found, although there was considerable evidence for slag remains, as well as an interior bowl furnace.

### **Plant remains**

Analysis of an unknown quantity of deposits provided evidence for charred cereal grains. The exact quantities are not available. A study of plant remains from the Munster area referred to some of the plant types recorded at this site (Monk *et al.* 1998), but final analysis of the remains does not appear to have been completed. As a result, it is unclear if cereal chaff, nutshell, fruit and weed remains were present or absent from deposits at this site. Radiocarbon dates were unavailable. The plant remains appear to be associated with various early medieval deposits at this site.

According to results that are available from this site, a variety of cereals was present, including oat, barley, wheat and rye.





**Plan of excavations at Lisleagh 1 (after Monk 1988, 58)**

### Overview

- Miscellaneous
  - Barley and oat grains were predominant, with smaller quantities of wheat and rye present.

Phase	Oat (grain)	Barley (grain)	Wheat (grain)	Rye (grain)
Misc.	P	P	P	P

### Detail of cereal remains

P = present

## **Lisleagh II, Co. Cork**

Grid Ref: **178827/106444**

SMR No: **CO027-03001**

Reference: **Monk *et al.* 1998; Monk 1995.**

Lisleagh II was excavated as part of a University College Cork research dig over a number of seasons. Excavation revealed an early medieval enclosure, and a later ditched enclosure with an external wooden palisade. The site was situated midway along a spur of ground just below 150m OD, which terminates the Kilworth hills and faces south and west over the broad sweep of the Blackwater valley. Despite intensive modern cultivation and truncation, a large number of structural features were identified within the interior of the site.

The site originally consisted of an enclosure (58m by 63m), enclosed by a bank, the basal layers of which survived to a height of 0.75m. The rest of the bank had been subsequently backfilled into the ditch, and this backfill lay beneath a burnt charcoal horizon which had covered the site. Eventually, a steady infill of cultivation had levelled the fills of the ditch up to the ground surface. The entrance of the original enclosure was identified along the western perimeter. At the entrance area, a paved surface was revealed beneath a deep humus rich deposit containing areas of burning. One posthole and a large indented pivot-stone, excavated on the edge of the northern terminus of the bank, indicate the presence of a gate-structure.

After the original enclosure fell out of use, the central area of the site was encircled by a shallow ditch and an external wooden palisade, interpreted as a cattle enclosure. The ditch was 'V'-shaped and 1.03m wide and 0.77m deep. After a short space of time, it was deliberately backfilled with organic material, animal bone, ironworking debris and charcoal. At least one round house was built upon remains of the backfilled ditch and indicates subsequent occupation on the site.

A narrow trench containing traces of contiguous upright timbers were found immediately outside, and encircling, this ditch and may have been contemporary with this structure. The palisade trench had cut through the remains of the original bank and suggests that the fence changed over time from a log-built palisade to a flimsy stake-fence. The lack of occupation evidence overlying the palisade suggests that this enclosure was used for a longer period than the bank-and-ditched enclosure.

The wall plans of at least four round houses were excavated in the enclosure interior. They were built using a variety of construction techniques from deep stakes to slot trenches supporting large posts and stakeholes. One structure contained a possible porch which cut an earlier round building containing an inner line of conjoined upright planks with a shallow slighter outer wall, possibly of wattle. Several arcs and alignments of stakeholes were also identified through none formed any coherent pattern.

A dry-stone built souterrain was revealed within the north-eastern quadrant. It appears to have been surrounded by burnt wooden posts. It may have had a timber roof as the backfill contained no long lintels though did reveal a layer of burnt material in one of the primary fills which could represent the remains of a wooden roof. The souterrain was backfilled in a series of stages and within its heavily burnt deposits revealed a number of finds including slag, furnace bottom fragments, hone stones, several metal artefacts and an iron knife blade. Though the souterrain had cut the remains of a house, the excavation of several stakeholes in the upper fill of the souterrain suggests continued occupation after the structure fell out of use.

An extensive stony deposit was excavated within the western interior of the enclosure and had been presumably laid to raise and level up this half of the site. Its surface was cut by a number of post pits and stakeholes though these were at a less density than any other part of the site.

Several pits were excavated within the interior, one of which revealed a possible ring-pin. A number of shallow pits in the south-eastern area of the enclosure contained large quantities of slag and appear to have been involved in ironworking. One pit in this area surrounded by a concentration of loose slag as well as a heavily iron stained mixed spread was interpreted as a possible bowl furnace.

Finds from the site were fewer than that recovered on Lisleagh I. Considerable evidence for ironworking and metalworking was identified as was a large quantity of animal bone. The recovery of charred grains of six-row hulled barley, oats, rye and flax seeds as well as quern stones indicate a mixed agricultural economy at the site.

### Plant remains

Analysis of an unknown quantity of deposits provided evidence for charred cereal grains, hazelnut shell fragments and weed remains. The exact quantities of remains were not recorded in most cases. A study of plant remains from the Munster area referred to some of the plant types recorded at this site (Monk *et al.* 1998), but final analysis of the remains does not appear to have been completed. As a result, it is unclear if cereal chaff and fruit remains were present or absent from deposits at this site. Radiocarbon dates were unavailable. The plant remains appear to be associated with various early medieval deposits at this site.

According to the results that are available from this site, a variety of cereals was present, including oat (some of which was identified as possible bristle oat), barley, wheat and rye.

### Overview

- Miscellaneous
  - Oat grains were predominant, with significant quantities of barley grains also recorded. Wheat and rye grains were present in small quantities.
  - Other remains included hazelnut shell fragments, bracken frond fragments and weed seeds.

Phase	Cereal (grain)	Hazelnut (shell frag)	Bracken (frond frag): <i>Pteridium aquilinum</i>	Indet. weed (seed)
<b>Misc.</b>	P	P	P	P

### Overview of all plant groups

P = present

Phase	cf. Bristle oat (grain)	Oat (grain)	Barley (grain)	Wheat (grain)	Rye (grain)
<b>Misc.</b>	P	P	P	P	P

### Detail of cereal remains

**'Lisnagun' (Darrary td), Co. Cork**

Grid Ref: **141819/042115**

SMR No: **CO135-031001**

References: **Monk 1998; O'Sullivan *et al.* 1998.**

Excavations at Lisnagun revealed a univallate enclosure with an external diameter of 53m. There was also evidence for a central round house, various outbuildings, three souterrains and other structures and features. The phasing of the site was difficult to establish as modern ridge and furrow cultivation had truncated almost all the features and stratigraphic evidence.

Possible stakeholes, pits and a shallow interrupted ditch were discovered beneath the enclosure banks. The ditch had steep sides and a U-shaped base and measured 1.3m wide and 0.5m deep. A rock-cut trench also traversed the outer south-eastern entrance area. The evidence was too slight to establish whether these features at Lisnagun represented part of a pre-enclosure field system or the remains of an earlier settlement enclosure.

A possible round house, defined by a shallow circular gully or trench (0.15m deep and with an overall diameter of 5.7m), was excavated in the centre of the enclosure. A concentration of stakeholes and linear slot-trenches excavated on either side of the primary entrance were interpreted as small rectilinear outbuildings.

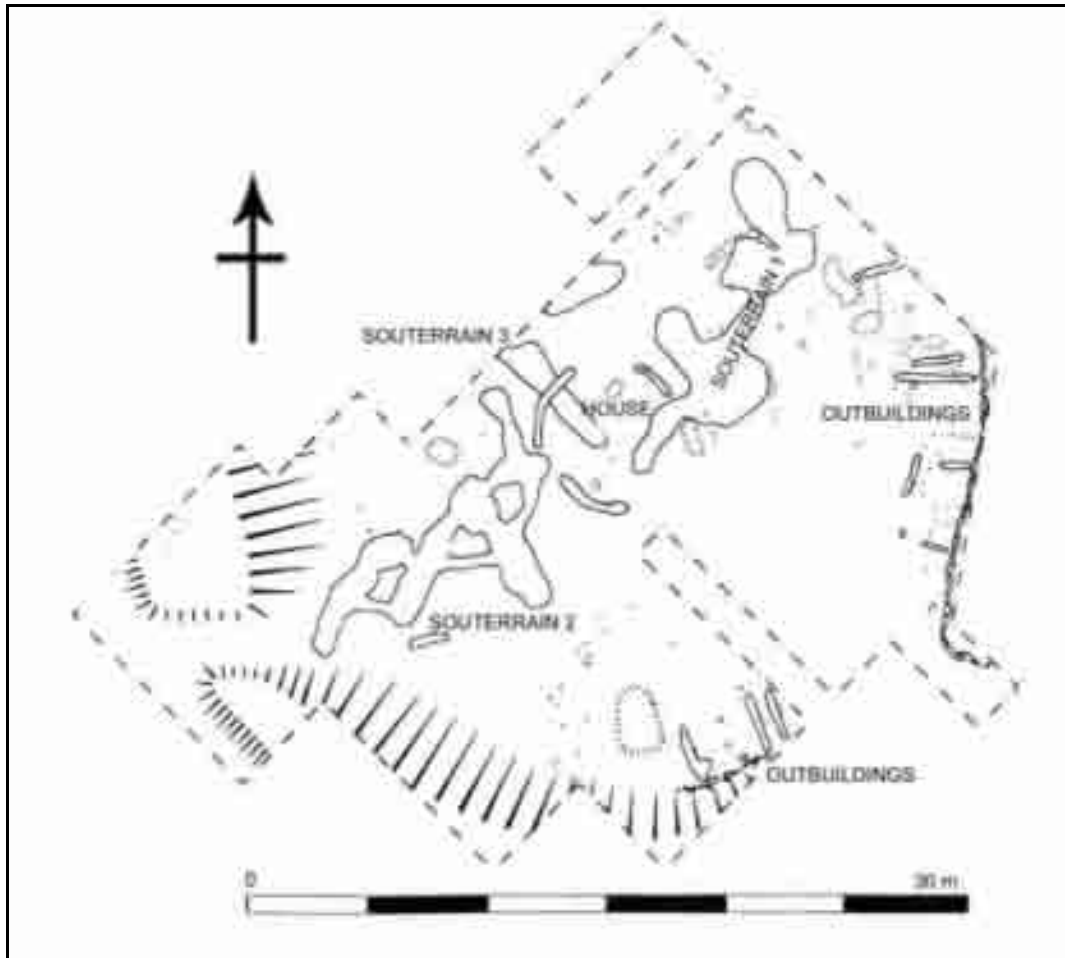
Three earth-cut souterrains were located in the interior of the site. Burnt sediments, probably hearth debris, from the backfilled entrance to Souterrain I yielded a radiocarbon date spanning the late-ninth/tenth centuries and was regarded as a *terminus ante quem* date for the construction of the souterrain. The siting of the entrance of two of the souterrains (I and III) within the circumference of the gully of the possible round house, tentatively suggests that at least one may have been entered from this structure.

It appears that the three souterrains represent a gradual succession of use and replacement than a single activity phase. One of the chambers of Souterrain I was later adapted as a stone-lined pit after the other creep-ways and chambers were backfilled. Finds from the backfill inside the souterrains included burnt sediments from wood charcoal, hazel nut shells, animal bone and shellfish fragments as well as various iron objects, iron slag, a blue glass bead, possible hone and hammer-stones and large perforated stones.

**Plant remains**

Analysis of 43 deposits provided evidence for charred cereal grains and chaff, charred flax seeds, charred hazelnut shell fragments, charred fruit seeds and charred weed seeds. The exact quantities of remains were not recorded in most cases – comments on general ubiquity were instead provided, which have been noted below. The plant remains appear to be associated with various early medieval deposits at this site.

A variety of cereals was present, including oat, barley, wheat and rye. The presence of flax extends the range of cultivars available. The weed seeds are likely to represent plants that were growing locally, as well as plants that may have been growing alongside the cereals.



**Plan of interior of Lisnagun, Co. Cork (after O'Sullivan *et al.* 1998, 38).**

### Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
UB-3178	Charcoal from domestic debris in backfilled entrance of Souterrain 1	1110±35 BP	A.D. 785; A.D. 828–838; <b>A.D. 866–1017.</b>

### Overview

- Miscellaneous
  - Oat grains were predominant, with significant quantities of barley grains also recorded. Wheat and rye grains were present in small quantities.
  - Flax seeds were also recorded.
  - Other remains included hazelnut shell, fruit and weed remains.

Phase	Cereal (grain)	Cereal (chaff)	Flax (seed)	Hazelnut (shell)	Fruit (seed)	Weed (seed)	Date
Misc.	P	P	P	P	P	P	A.D. 785–785; A.D. 828–838; <b>A.D. 866–1017.</b>

**Overview of all plant groups (total deposits n=43) P = present**

Phase	Oat (grain)	Oat (twisted awn)	Barley (grain)	Wheat (grain)	Rye (grain)	Indet. cereal (rachis)	Indet. cereal (straw frag)
Misc.	P	P	P	P	P	P	P

#### Detail of cereal remains

Phase	Brambles (nutlet): <i>Rubus</i> spp.	Haw fruit (nutlet): <i>Crataegus</i> spp.	Elders (seed): <i>Sambucus</i> spp.
Misc.	P	P	P

#### Detail of fruit remains

Phase	Misc.
<b>Redshank</b> (achene): <i>Persicaria maculosa</i>	P
<b>Knotgrasses</b> (achene): <i>Polygonum</i> spp.	P
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>	P
<b>Docks</b> (achene): <i>Rumex</i> spp.	P
cf. <b>Charlock</b> (seed): cf. <i>Sinapis arvensis</i>	P
<b>Radishes</b> (seed): <i>Raphanus</i> spp.	P
<b>Vetches</b> (seed): <i>Vicia</i> spp.	P
<b>Plantains</b> (seed): <i>Plantago</i> spp.	P
<b>Bromes</b> (grain): <i>Bromus</i> spp.	P

#### Detail of weed remains

## **Lough Faughan Crannog (Ballyrolly td), Co. Down**

Grid Ref: **34464/34114**

SMR No: **DOW 037:050**

Reference: **Morrison 1955; Collins 1955.**

Excavations on the crannog of Lough Faughan, Co. Down produced some late medieval pottery and an early thirteenth-century coin, but they revealed that the site was mostly early medieval in date, occupied between the seventh and tenth centuries A.D.

The early medieval crannog survived as a low circular mound, 36m in diameter. It was constructed by laying down a sub-structural layer of brushwood and peat over a marshy deposit on the lakebed. There was some domestic refuse found in these structural levels, as well as a single hearth interpreted as a fireplace used by the crannog builders (although it is conceivable that this was an actual early occupation horizon). Finds from the structural layers included whetstones, two crucible sherds, a wooden object, sawn antler cuttings, an iron shield boss, a small circular iron pan, an iron shears, a barrel padlock key and an unfinished comb.

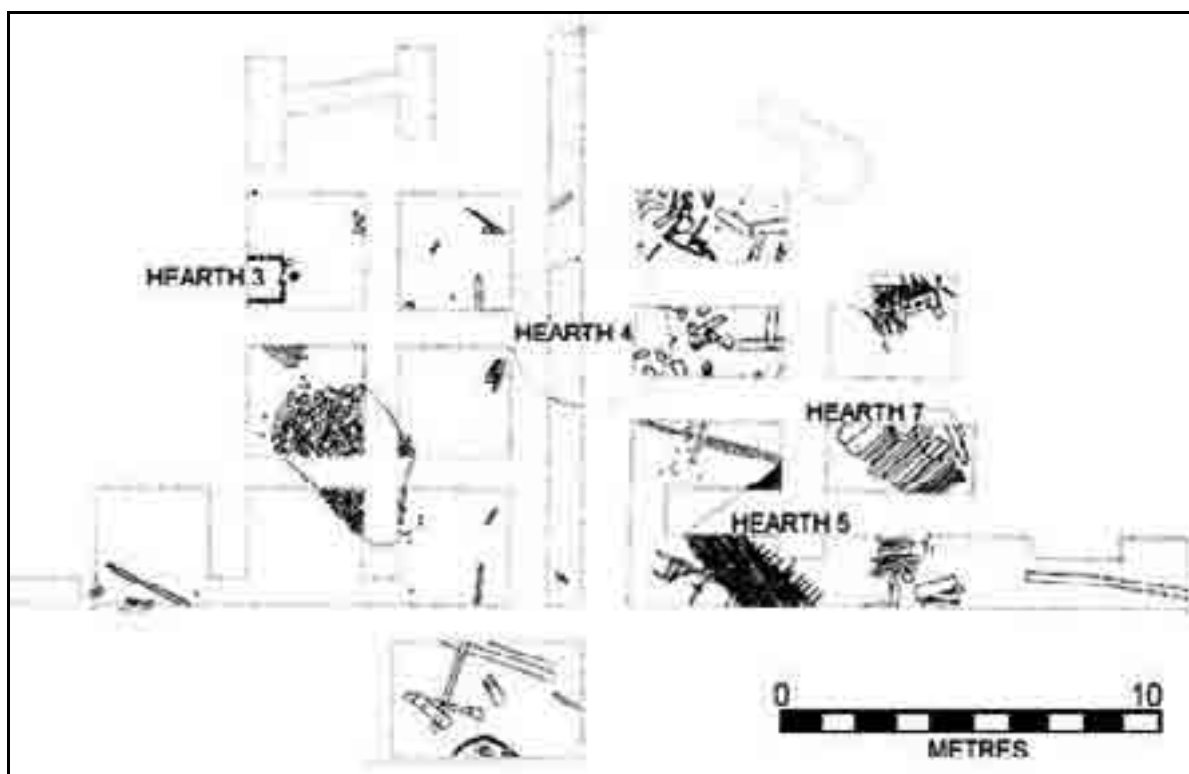
The primary occupation surface revealed hearths surrounded by stone kerbing and associated with spreads of timbers. The site's largest hearth was 4.5m in diameter, and finds included a bone pin and a sherd of Roman Samian ware (often perceived as a magical or medicinal item in the early middle ages). It seems likely that this 'hearth' could be re-interpreted as an early medieval house floor. Some of the other hearths were industrial rather than domestic, and iron and bronze slag, crucibles and a clay mould for casting bronze pins were found there.

The primary crannog occupation layers produced 230 sherds of souterrain ware, and had evidence for textile-working - discs used in weaving, hand distaffs, four spindle whorls and an antler peg. Evidence for metalworking included crucibles (pyramidal with triangular mouth) and moulds for casting bronze pins. Items of personal adornment included a pennanular brooch, pin, needle, bone pins, lignite bracelets, finger rings, glass beads, glass vessels and a glass armlet.

The uppermost occupation surface was enclosed within a stone revetment or wall, of three courses of stone with a straight outer face. This wall may only have been constructed on the north side of the crannog, perhaps to alleviate slumping. There were some early medieval objects within this occupation material, as well as some sherds of medieval pottery probably dated to the thirteenth century).

### **Plant macro-remains**

Analysis of one deposit provided evidence for a large quantity of charred oat and barley grains and chaff. The exact quantities of remains were not recorded – comments on general ubiquity were instead provided, which have been noted below. Hazelnuts were mentioned in the accompanying specialist report on slag remains from this excavation, but it is unclear if they derive from early medieval or later deposits. Fruit and weed remains were not recorded. Radiocarbon dates were not available for this site.



**Plan of Lough Faughan crannog, Co. Down (after Collins 1955)**

### Overview

- Below gravel spread in central area of crannog (1 deposit)
  - Contained a large quantity of cereal remains, consisting of oat and barley.
  - Oat was predominant, a small percentage of which was identified as common oat and wild oat.
  - Another species of oat – bristle oat – was mentioned in an image of the cereal remains within the excavation report (Plate IX). Bristle oat was not, however, referred to in the text of the plant remains report. It was decided to record bristle oat in the table below, given its mention in an image from the excavation report.
  - In another image of the cereal remains (Plate IX), at least some of the barley grains appear to be of the hulled variety, although this is not mentioned in the text of the plant remains report. Hulled barley has not been recorded in the table below.

Phase	Common oat (grain + floret base)	cf. Common oat (grain)	Bristle oat (grain + indet. chaff)	Wild oat (grain + floret base)	Oat (grain)	Barley (grain + indet. chaff)	Barley (grain)
Below central gravel spread	P	P	P	P	P	P	P

### Detail of plant remains (total deposits n=1)

P = present



## **Loughbown (Site 1), Co. Galway**

Grid Ref: **182163/228944**

SMR No: **GA087-178**

Reference: **Tierney & Dillon 2009; Bower 2009.**

Excavation revealed a site enclosed by two ditches – the inner enclosure measured 42m in diameter, and the outer ditch enclosed an area with a diameter of 63m. A linear ditch, truncated by the outer ditch of the enclosure, produced a Bronze Age radiocarbon date. This ditch appears to have remained open throughout the early medieval period as an iron knife blade (dated by the excavator to the ninth to fourteenth century) was also found in this feature.

Some bone from the earliest fill of the outer ditch returned a radiocarbon date in the sixth/seventh century. The upper fill was overlain by metalworking spoil, suggesting that the ditch had been in-filled by the time iron-working was conducted in this area. Dates from one of the three smithing hearths would indicate that this occurred in the eleventh/twelfth century.

The inner ditch showed evidence of two subsequent phases of re-cutting and the skeleton of a juvenile human was found in the western terminus of this ditch. The lack of cut features to the rear of this ditch led the excavator to suggest the presence of a contemporary bank, some evidence of which may be seen in the in-fill of the ditch. Two corn-drying kilns were cut into the in-fill of the inner ditch, and radiocarbon dates from one of these suggest that this occurred around the fourteenth century.

Two possible structures were identified in the interior of the site. Structure A was trapezoidal in shape (indicated by eleven postholes), and had an occupation layer that contained charred cereals and hazelnuts. This structure may potentially have acted as a gate-house. Structure B comprised five postholes and a slot trench arranged in an L-shape; animal bones, burnt clay, and charred cereal remains were recovered from this structure. Another area of occupation debris was indicated to the north of Structure B. This had been truncated during excavation, but revealed charcoal, shell, bone, slag and cereal remains, as well as an iron fish hook and a ringed pin. A stone-built souterrain was also discovered in this area, and this produced a large number of animal bones (largely cattle and sheep/goat).

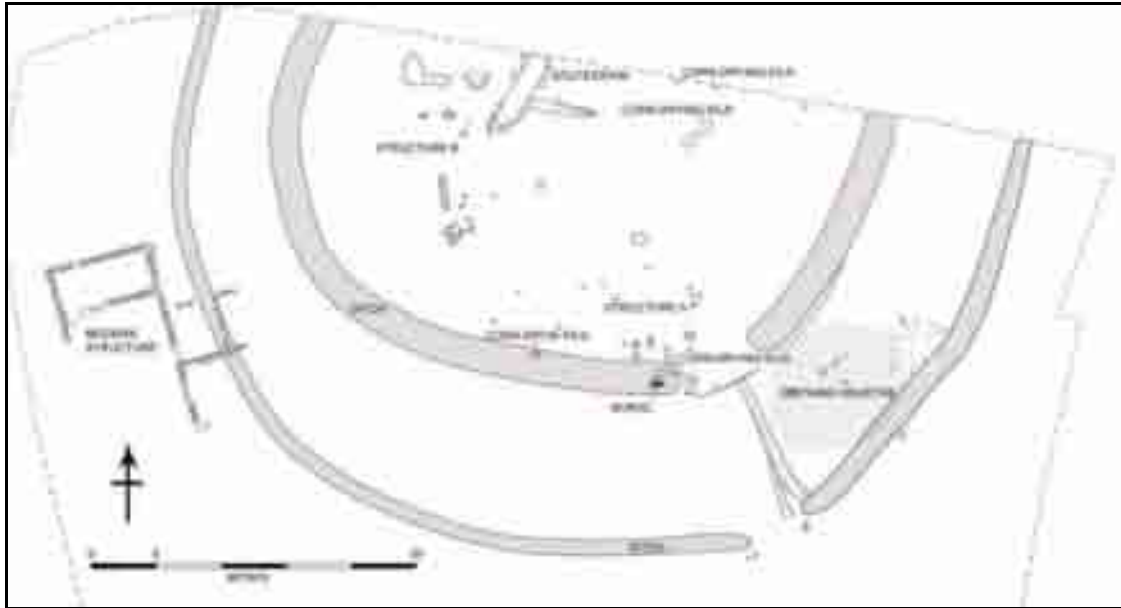
Other finds from site included fragments of eight quernstones, a silver penny of Edward I (1272-1307), two iron bars, a copper alloy ring, a copper stud fragment, and six other fragments of copper alloy.

### **Plant macro-remains**

Analysis of 44 deposits provided evidence for a total of 757 charred cereal grains, 18 charred hazelnut shell fragments, 1 charred fruit seed and 34 charred weed seeds. The presence of seeds from the Fabaceae family (pea) may represent cultivated legumes or weeds. Cereal chaff was absent.

Cereal remains were recorded in different areas/phases of activity, although in differing quantities. A variety of cereal types was present, including oat, barley and naked wheat. The weed remains may represent plants that were growing locally and arable weeds that were growing alongside the cereals.

Two levels of archaeobotanical analysis were carried out: scanning of all samples, and full analysis of four early medieval samples. Full counts of extracted remains were not completed for all of the samples that were scanned. There appears to be a small number of inconsistencies in the plant remains report, e.g. deposits that are mentioned in the text, but not in the taxa lists; incorrect context/sample numbers. In these cases, the results listed below have been extracted from the taxa list, rather than the text. The terms naked/free-threshing wheat and bread wheat appear to be interchangeable in the plant remains report – naked wheat has been used below to describe these remains. The material from a further 18 deposits appears to date to the medieval period and has not been listed below.



**Plan of Excavation at Loughbawn (1), Co. Galway, showing relevant features (after Bower 2009, 42).**

#### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
UB-7362	Charcoal from basal fill of outer ditch	1444±32 BP	<b>A.D. 563-653.</b>
UB-7363	Charcoal from fill of smithing hearth	863±31 BP	<b>A.D. 1047-1088;</b> <b>A.D. 1122-1139;</b> <b>A.D. 1149-1257.</b>
UB-7364	Charcoal from fill of linear ditch	2881±32 BP	1193-1171 B.C.; 1169-1143 B.C.; <b>1132-973 B.C.;</b> 958-938 B.C.
UB-7365	Charcoal from layer in outer bank	614±30 BP	<b>A.D. 1294-1401.</b>
UB-7366	Charcoal from fill of corn-drying kiln	644±29 BP	<b>A.D. 1282-1327;</b> <b>A.D. 1342-1395.</b>
UB-7367	Charcoal from fill of gully in entrance	1572±30 BP	<b>A.D. 419-554.</b>
UBA-8096	Bone from human burial	1138±29 BP	A.D. 782-789; A.D. 810-848; <b>A.D. 855-983.</b>

#### **Overview**

- Phase 2: Entrance (1 deposit)
  - Contained just one cereal grain, which was identified as wheat/barley.
- Phase 2: Inner ditch (12 deposits)
  - Contained the largest quantity of cereal grains, as well as a hazelnut shell fragment and weed seeds.
  - Similar quantities of oat, barley and naked wheat remains were present.
- Phase 2: Structures (19 deposits)
  - Contained cereal grains, as well as hazelnut shell and weed remains.
  - Oat was predominant, with smaller quantities of barley and naked wheat recorded.
- Phase 2: Souterrain (12 deposits)
  - Contained a large quantity of cereal grains, as well as occasional hazelnut shell fragments and a fruit seed.
  - Oat was predominant, with smaller quantities of barley and naked wheat recorded.

Phase	Cereal (grain)	Hazelnut (shell frag)	Fruit (seed)	Weed (seed)	Date
<b>Phase 2: Entrance</b>	1				<b>A.D. 419–554.</b>
<b>Phase 2: Inner ditch</b>	357	1		31	A.D. 782–789; A.D. 810–848; <b>A.D. 855–983.</b>
<b>Phase 2: Structures</b>	123	3		3	
<b>Phase 2: Souterrain</b>	276	14	1		

**Overview of plant remains (total deposits n=44)**

Phase	Oat (grain)	Barley (grain)	Wheat (grain)
<b>Phase 2: Entrance</b> (n=0)			
<b>Phase 2: Inner ditch</b> (n=264)	34.85%	34.85%	30.30%
<b>Phase 2: Structures</b> (n=47)	68.09%	23.40%	8.51%
<b>Phase 2: Souterrain</b> (n=162)	69.14%	20.37%	10.49%

**Percentage of cereal grain types recorded in each phase of activity**

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	cf. Oat (grain)	Barley (grain)	Naked wheat (grain)	Wheat (grain)	Barley/Wheat (grain)	Indet. cereal (grain)
<b>Phase 2: Entrance</b>						1	
<b>Phase 2: Inner ditch</b>	92	4	92	80		1	88
<b>Phase 2: Structures</b>	32		11	4		24	52
<b>Phase 2: Souterrain</b>	112		33	15	2	5	109

**Detail of cereal remains**

Phase	Phase 2:	Phase 2:	Phase 2:	Phase 2:
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	Entrance	Inner ditch	Structures	Souterrain
<b>Bramble</b> (nutlet): <i>Rubus fruticosus</i>				1
<b>Campions</b> (seed): <i>Silene</i> spp.		1		
cf. <b>Sheep's sorrel</b> (achene): <i>Rumex</i> cf. <i>acetosella</i>		3		
<b>Docks</b> (achene): <i>Rumex</i> spp.		1	1	
<b>Knotweed family</b> (achene): Polygonaceae		3		
<b>Pea family</b> (seed): Fabaceae		20		
<b>Plantains</b> (seed): <i>Plantago</i> spp.			1	
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>		2		
<b>Daisy family</b> (achene): Asteraceae		1		
<b>Grass family</b> (grain): Poaceae			1	

#### Detail of fruit and weed remains

**Mackney, Co. Galway**Grid Ref: **183745/229417**SMR No: **N/A**Reference: **Dillon 2009; Delaney 2009.**

The site consisted of a partially destroyed enclosure (55.64m in diameter). Excavation revealed three main phases of occupation on site. The earliest phase of occupation was indicated by the presence of two fire pits, and a number of linear features, all of which underlay the later enclosure bank. A radiocarbon date from charcoal associated with one of these fire-pits suggests that the bank was constructed *c.* A.D. 771-899. This date is almost identical to one of the dates returned from the ironworking area (A.D. 775-900) which suggests that at least some ironworking may have been conducted on site prior to the construction of the bank.

The second phase of occupation was marked by the construction of the enclosure ditch. The lower ditch fills were composed of silts, presumably from gradual slippage, but a series of higher ditch fills, composed of medium to large sub-rounded stones, would appear to represent the collapsed remains of the stone revetment from the outer face of the bank. A similar stone revetment appears to have existed on the interior face of the bank. A series of large postholes, found at the entrance, have been interpreted as either representing a gateway into the enclosure, or possibly as the remains of a more substantial gatehouse structure.

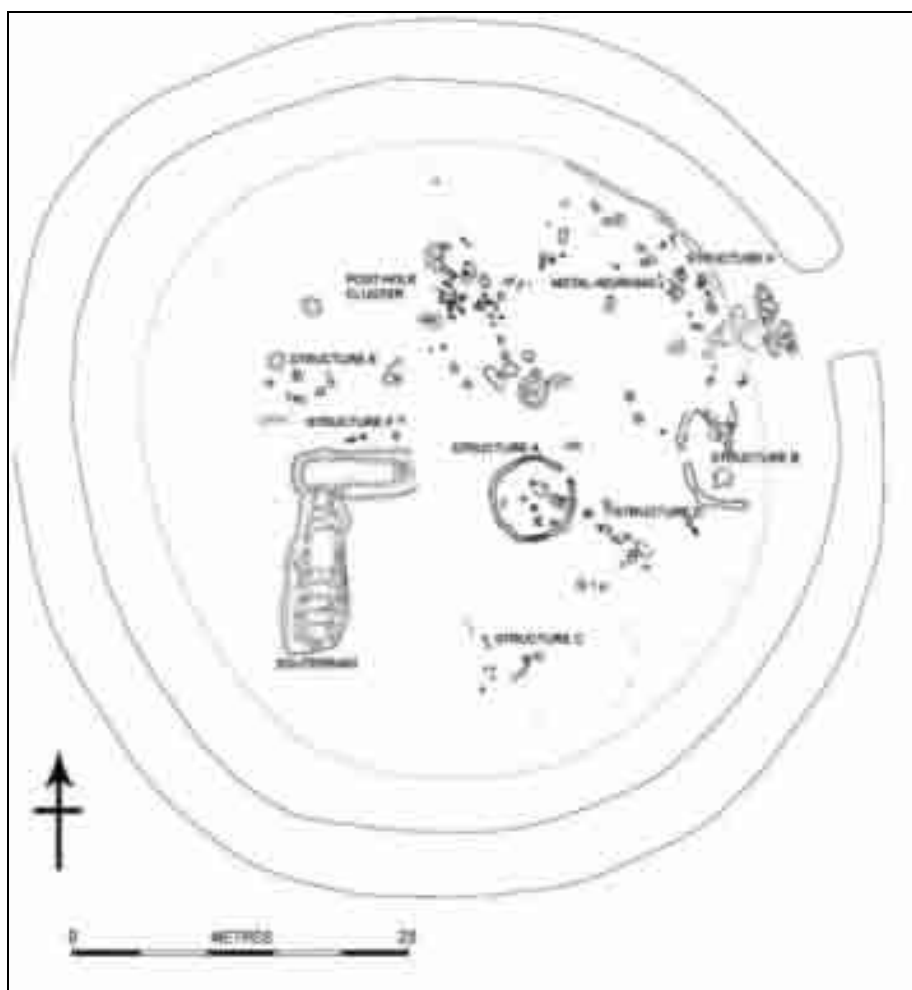
A number of structures were identified in the interior. The foundation trench for the roundhouse, Structure A (5.4m in diameter), appears to have been divided into eight straight sections, which may represent the presence of wooden foundation planks. A porch and possible roof-supports were also indicated by the pattern of postholes. The partial remains of another roundhouse, (Structure C (4.48m in diameter), were also indicated by a curvilinear foundation trench. As with Structure A, this had some evidence for internal sub-division. A possible curvilinear lean-to structure, (Structure B), was also identified. This structure measured 3.8m x 8.4m and appeared to use the bank as a rear wall; a hearth was located within this building. Another curvilinear structure, (Structure E), which was composed of six postholes with a central post, was identified in the north-west of the interior. It appeared to have been open to the north and may have constituted a shelter or wind-break. Patterns of postholes also identified two rectilinear structures in the interior – a rectangular building (Structure D); and an L-shaped structure (Structure F). Other groups of postholes were uncovered, but these could not be identified with possible structures. A dry-stone built souterrain was constructed during this phase, and may have been associated with House F.

A series of bowl furnaces/smithing hearths were also identified to the north of the entrance. Dates from these features range from the ninth/tenth century, to the eleventh/twelfth century. Two series of postholes found in the vicinity of this metalworking area are presumably related to workshops, but the pattern of these could not be clearly identified.

The final phase of use of the site takes place in the later medieval period when four large fire pits were dug into the interior of the site. Three radiocarbon dates place them in the fourteenth to seventeenth centuries. The site was then used as quarry, before being utilised as a *cillín* – 143 infant skeletons were recovered during excavation. Few finds were directly attributable to the early medieval phase, but these included three iron knife blades, an iron bar, and an iron 'tool'. A silver penny of Henry III (1216-1272), and two un-dated bone 'toggles' were also found in site.

**Plant remains**

Analysis of 36 deposits provided evidence for a total of 667 charred cereal grains, 1 charred cereal chaff fragment, 60 charred hazelnut shell fragments and 188 charred weed seeds. Fruit remains were absent. The presence of seeds from the Fabaceae family (pea) may represent cultivated legumes or weeds. Cereals were present in deposits from both examined phases of activity. A variety of cereals was present, including oat, barley and naked wheat. The weed remains may represent arable weeds and plants that were growing locally.



**Plan of Excavation at Mackney, Co. Galway, showing relevant features (after Delaney 2009, 56).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
UB-7368	Charcoal from later fire-pit	524 $\pm$ 30 BP	A.D. 1323-1347; <b>A.D. 1392-1442.</b>
UB-7369	Charcoal from later fire-pit	484 $\pm$ 28 BP	<b>A.D. 1409-1448.</b>
UB-7370	Charcoal from later fire-pit	385 $\pm$ 29 BP	<b>A.D. 1443-1523;</b> <b>A.D. 1559-1563;</b> <b>A.D. 1570-1631.</b>
UB-7371	Charcoal from double bowl-furnace	1173 $\pm$ 30 BP	<b>A.D. 775-900;</b> A.D. 917-965.
UB-7372	Charcoal from post-hole C861	702 $\pm$ 30 BP	<b>A.D. 1261-1308;</b> <b>A.D. 1361-1386.</b>
UB-7373	Charcoal from later occupation layer C765	377 $\pm$ 30 BP	<b>A.D. 1446-1525;</b> <b>A.D. 1557-1632.</b>
UB-7374	Charcoal from fire-pit	1183 $\pm$ 29 BP	A.D. 728-736; <b>A.D. 771-899;</b> A.D. 919-949.

UB-7375	Charcoal from hearth	365±30 BP	<b>A.D. 1449-1528;</b> <b>A.D. 1545-1546;</b> <b>A.D. 1551-1634.</b>
UB-7376	Charcoal from metal-working feature	991±31 BP	<b>A.D. 988-1054;</b> <b>A.D. 1078-1153.</b>

### Overview

- Phase 1 – Pre-bank (2 deposits)
  - Contained a small number of oat and wheat grains, as well as weed seeds.
- Phase 2 – Ringfort (34 deposits)
  - Contained a large number of cereal grains, as well as cereal chaff, hazelnut shell fragments and weed seeds.
  - Oat was predominant, with significant quantities of barley and naked wheat also recorded.

Phase	Cereal (grain)	Cereal (chaff)	Hazelnut (shell frag)	Weed (seed)	Date (A.D.)
<b>Phase 1: Pre-bank</b>	2			13	728–736; <b>771–899</b> ; 919–949.
<b>Phase 2: Ringfort</b>	665	1	60	175	<b>775–900</b> ; 917–965; 988–1054; 1078–1153.

### Overview of plant groups (total deposits n=36)

Phase	Oat (grain)	Barley (grain)	Wheat (grain)
<b>Phase 1: Pre-bank</b> (n=2)			
<b>Phase 2: Ringfort</b> (n=574)	51.39%	27.35%	21.25%

### Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	cf. Oat (grain)	Barley (grain)	Naked wheat (grain)	Wheat (grain)	Indet. cereal (grain)	Indet. cereal (culm node)
<b>Phase 1: Pre-bank</b>	1			1			
<b>Phase 2: Ringfort</b>	295	3	157	116	6	88	1

### Detail of cereal remains

Phase	Phase 1: Pre-bank	Phase 2: Ringfort
<b>Garden orache</b> (utricle): <i>Atriplex hortensis</i>		2
<b>Oraches</b> (utricle): <i>Atriplex</i> spp.		3
<b>Goosefoot family</b> (utricle): Chenopodiaceae		1
<b>Pale persicaria</b> (achene): <i>Persicaria lapathifolia</i>		1
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>		2
<b>Knotweed</b> family (achene): Polygonaceae	1	25
<b>Wild radish</b> (pod): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>	3	2
<b>Pea family</b> (seed): Fabaceae	2	107
<b>Plantains</b> (seed): <i>Plantago</i> spp.		3
<b>Cleavers</b> (seed): <i>Galium aparine</i>		2
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>	4	8
<b>Daisy family</b> (achene): Asteraceae		1
<b>Grass family</b> (grain): Poaceae	3	18

### Detail of weed remains

**Magheraboy (Site 2B), Co. Sligo**Grid Reference: **16860/33500**SMR No: **N/A**Reference: **Carrot & Hall 2007; O'Neill 2005.**

An enclosure (external diameter of 40m) was discovered during topsoil stripping. The site had been truncated by later agricultural activity, and none of the bank survived. A continuous deposit of large stones in the upper layers of the ditch fill may represent a stone wall built upon the bank, but it may also represent the stone revetment for its presumed earthen bank. The ditch had no evidence for maintenance and appears to have been allowed to naturally silt up over the life-time of the site.

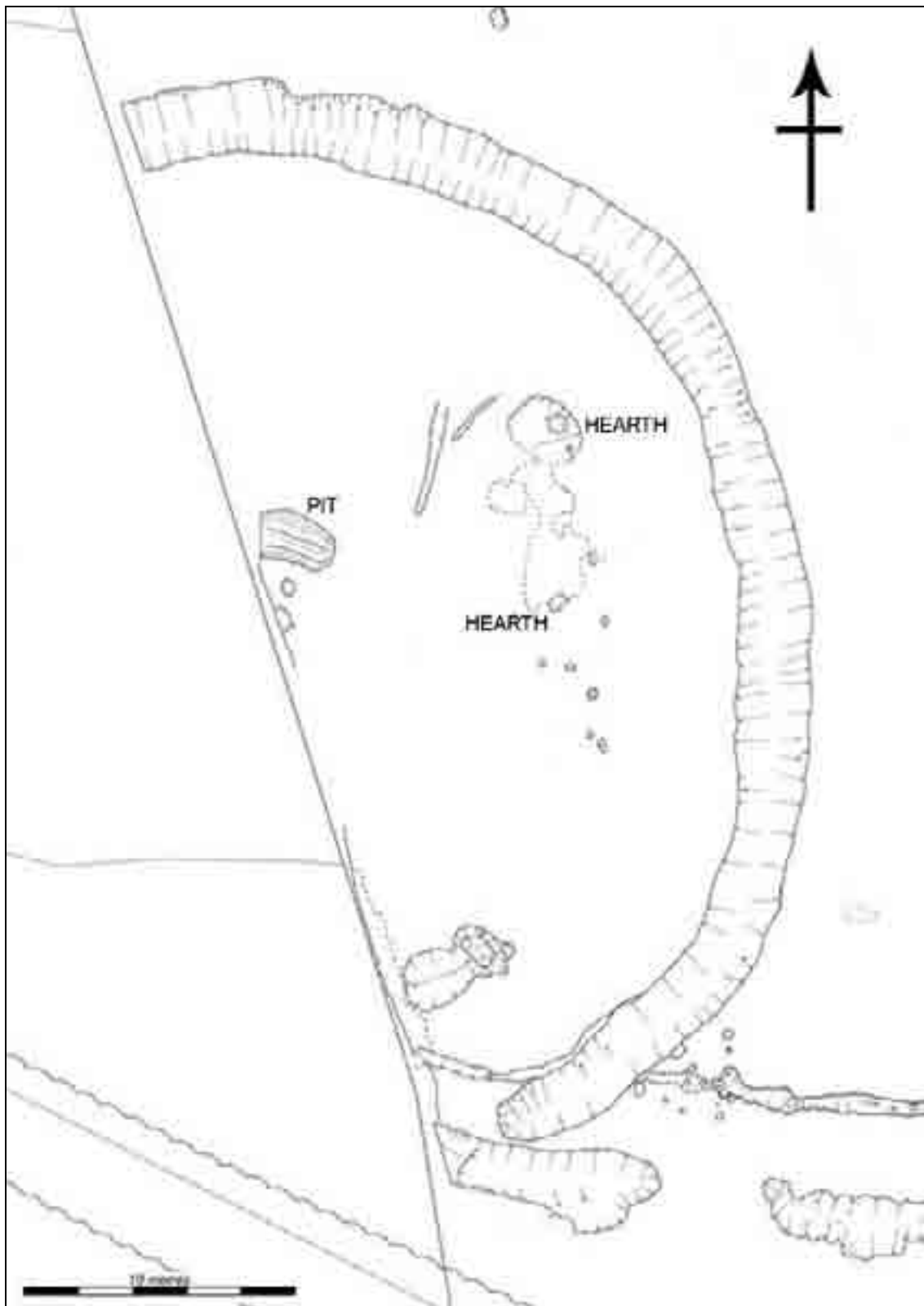
The interior of the site produced no evidence for a formal structure, although these may have existed in the unexcavated half of the site. The excavated half contained a series of pits, two hearths and several possible postholes. The fill of one of these pits contained part of a rotary quernstone and charred barley grains.

The only early medieval finds from the site were a blue glass bead and a copper-alloy ring pin. Charred grain from the pit produced a radiocarbon date of A.D. 685-892; and charcoal from the two hearths produced dates of A.D. 694-1017 and A.D. 1040-1271. A general construction date was obtained from immediately above the primary silting of the ditch (see below), although unfortunately this date had a large error of  $\pm 80$  years.

**Plant remains**

Analysis of three deposits provided evidence for charred cereal grains. The exact quantities of remains were not recorded in most cases – comments on general ubiquity were instead provided, which have been noted below. A variety of cereals was present, including barley, oat and bread/club wheat. Cereal chaff, nutshell, fruit and weed remains were absent from examined deposits.





Outline plan of Magheraboy, Co. Sligo (after O'Neill 2005).

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
Beta-197650	Pit	1170 $\pm$ 40 BP	A.D. 727-737; <b>A.D. 771-975</b>
Beta-197651	Deposit within Linear Feature	1240 $\pm$ 40 BP	<b>A.D. 680-882.</b>
Beta-197652	Charcoal spread over hearth.	1130 $\pm$ 70 BP	A.D. 709-747; <b>A.D. 766-1024.</b>
Beta-197654	Deposit in ditch	1340 $\pm$ 80 BP	<b>A.D. 566-881</b>
Beta-197655	Pit	830 $\pm$ 60 BP	A.D. 1043-1104; <b>A.D. 1118-1279.</b>

## Overview

- Phase 6 – early medieval enclosure (3 deposits)
  - Barley grains were predominant (>50 present), with a smaller quantity of oat and bread/club wheat grains also recorded.

Phase	Oat (grain)	Barley (grain)	Bread/Club wheat (grain)	Date
<b>Phase 6</b>	P	P	P	A.D. 727-737; <b>A.D. 771-975.</b> <b>A.D. 680-882.</b> A.D. 709-747; <b>A.D. 766-1024.</b> <b>A.D. 556-876.</b>

## Detail of all cereal remains

P = present

### **Manusmore (Site 102), Co. Clare**

Grid Ref: **137380/173160**

SMR No: **N/A**

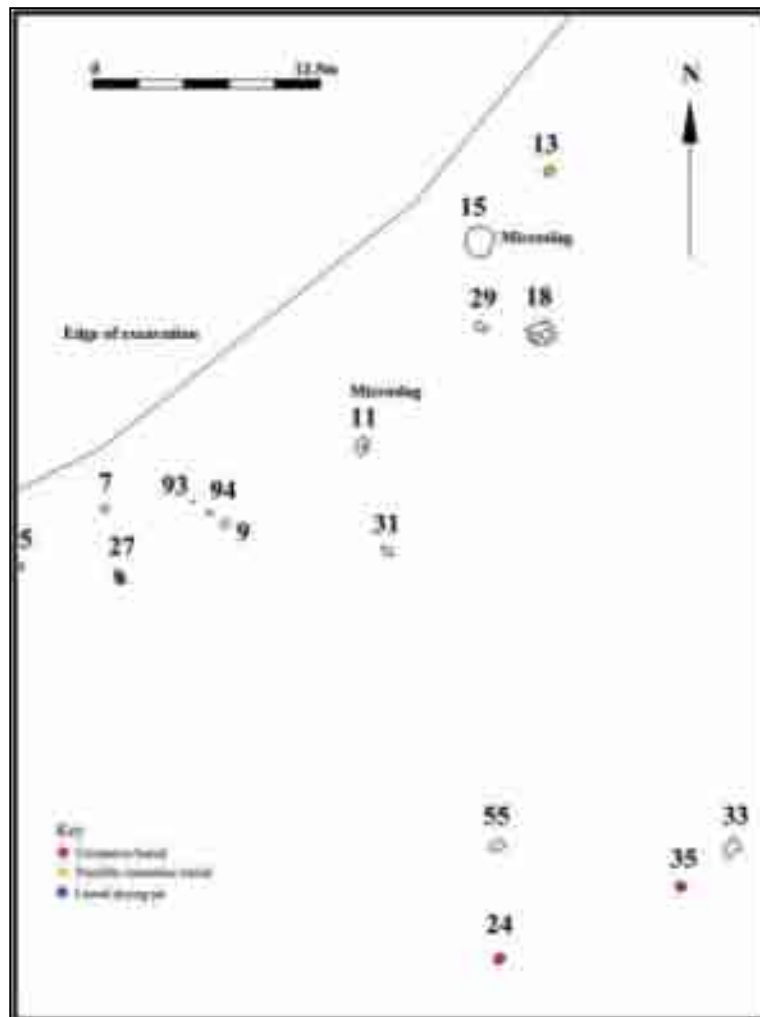
Reference: **Fryer 2006; Hull 2006.**

Archaeological investigations were carried out at Manusmore Site 102 in advance of construction of the N8 Ennis Bypass and N85 Western Relief Road. Evidence for pits containing cremation burials was recorded – these pits were radiocarbon dated to the Late Bronze Age to Early Iron Age transition. An early medieval hearth (C.27) containing food remains was also present. This feature was radiocarbon dated to the 7<sup>th</sup> to 9<sup>th</sup> centuries and contained cereal remains (predominantly barley). Other features at the site, typically small pits, are thought to be related to prehistoric funerary activity.

#### **Plant remains**

Analysis of 1 deposit provided evidence for a large charred plant remains assemblage. A total of 1460 cereal grains, 4 cereal chaff fragments and 8 weed seeds were recorded. Hazelnut shell and fruit remains were absent.

A variety of crops was present, including wild oat, six-row barley and possible wheat. The weed remains may represent arable weeds and plants that were growing locally.



**Plan of excavations at Manusmore, Site 102, northern area (after Hull 2006, Figure 4)**

## Radiocarbon Dates:

Reimer, P.J., Baillie, M.G.L., Bard, E., Bayliss, A., Beck, J.W., Bertrand, C.J.H., Blackwell, P.G., Buck, C.E., Burr, G.S., Cutler, K.B., Damon, P.E., Edwards, R.L., Fairbanks, R.G., Friedrich, M., Guilderson, T.P., Hogg, A.G., Hughen, K.A., Kromer, B., McCormac, G., Manning, S., Bronk Ramsey, C., Reimer, R.W., Remmele, S., Southon, J.R., Stuiver, M., Talamo, S., Taylor, F.W., van der Plicht, J. & Weyhenmeyer, C.E. 2004. IntCal04 terrestrial radiocarbon age calibration, 0–26 cal kyr BP. Radiocarbon, 46, 1029–58.

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
Beta-211586	Barley grain from Hearth C.27	1220 $\pm$ 40 BP	<b>A.D. 685–892.</b>

## Overview

- Hearth (1 deposit)
  - Large quantity of cereal grains (predominantly barley, including six-row barley, with smaller quantities of oat, including wild oat, and occasional wheat).
  - Occasional cereal chaff and weed seeds present.

Phase	Cereal (grain)	Cereal (chaff)	Weed (seed)	Date
<b>Hearth</b>	1460	4	8	<b>685–892 A.D.</b>

## Overview of all plant groups (total deposits n=1)

Phase	Oat (grain)	Barley (grain)	cf. Wheat (grain)
<b>Hearth</b> (n=1378)	26.56%	73.29%	0.15%

## Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Wild oat (floret base)	Oat (grain)	Oat (floret base)
<b>Hearth</b>	2	366	2

## Detail of oat remains

Phase	Six-row barley (grain)	Barley (grain)	cf. Wheat (grain)	Indet. cereal (grain)
<b>Hearth</b>	10	1000	2	82

## Detail of barley, wheat and indeterminate cereal remains

Phase	Black-bindweed (achene): <i>Fallopia convolvulus</i>	Wild radish (pod frag): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>
<b>Hearth</b>	2	6

## Detail of weed remains

## **Millockstown, Co. Louth**

Grid reference: **29770/28750**

SMR: **LH017-054**

Reference: **Monk 1986; Manning 1986.**

An excavation at Millockstown revealed a D-shaped enclosure (Phase I), which was replaced by a smaller circular enclosure (Phase II), and a final and larger, D-shaped enclosure with two souterrains (Phase III). This final phase was associated with a cemetery.

The Phase I enclosure (65m x 56m) was defined by a ditch, but no evidence for a bank survived. Charcoal from one of the occupation spreads was radiocarbon dated to A.D. 322-609. The only find from this phase, from another habitation spread, was the terminal and part of the ring of a zoomorphic penannular brooch which dates to the third century.

The Phase II bank-and-ditched enclosure was constructed centrally within the Phase I enclosure. It measured 37m in diameter and contained a hearth and a spread of carbonised grain. No radiocarbon dates were available for this phase so all that can be surmised is that the enclosure was constructed between Phase I and Phase III.

Phase III witnessed the construction of a final, and much bigger, D-shaped enclosure which replaced the first two enclosures. It measured 40m x 100m and was associated with two souterrains, a cemetery and two pits. Charcoal from the ditch returned a very broad radiocarbon date of A.D. 576-1024.

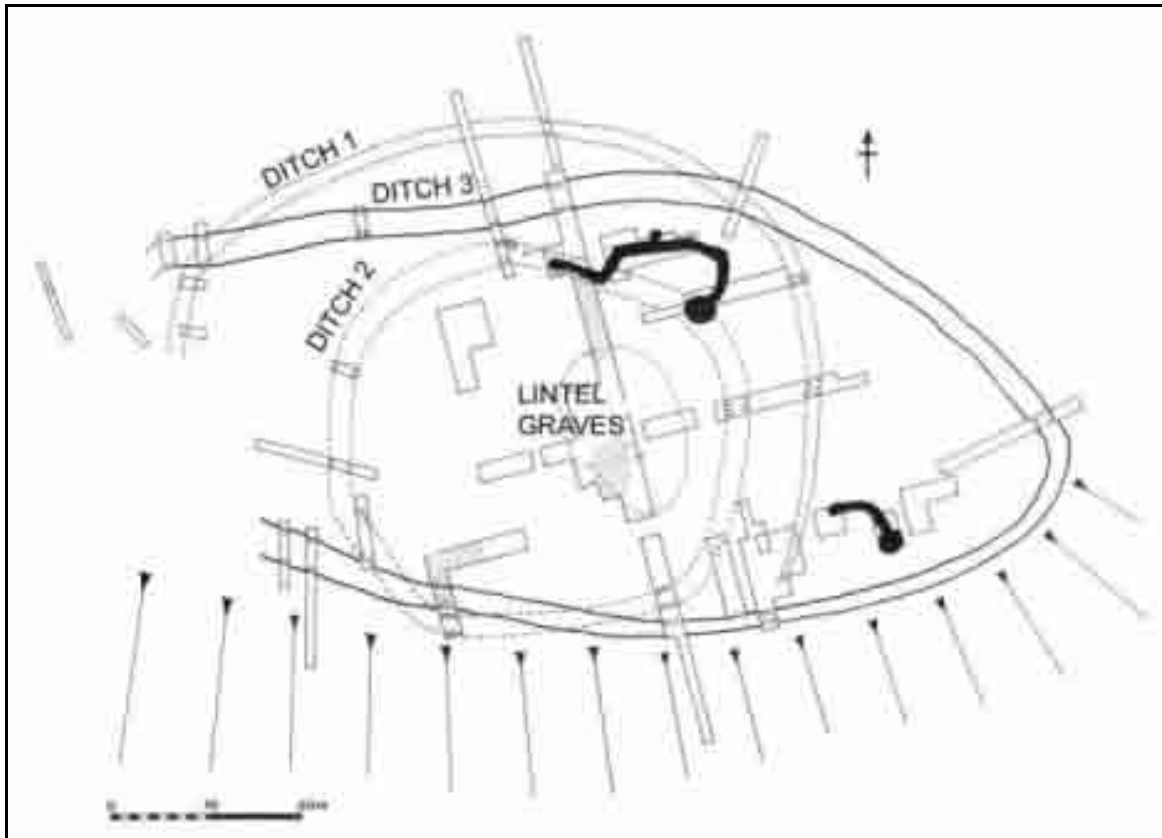
Two souterrains were associated with Phase III. Souterrain 1 was of dry-stone construction and was situated outside the Phase I and Phase II enclosures, but within the final enclosure, so may be contemporary with the latter. The second souterrain was situated 40m to the north-west of Souterrain 1. Souterrain 2 definitely post-dated the second enclosure because it cut into the backfilled ditch, while it ran parallel with the Enclosure III ditch which suggests the latter was already in existence when the souterrain was constructed.

A fragment of souterrain ware was recovered in a context that post-dated Enclosure II and this pottery generally dates between the eighth and tenth centuries. The presence of two stick pins, one a club-headed type, shows that Souterrain II was open between the mid-eleventh and thirteenth centuries. The lack of late medieval pottery from the site strongly indicates that the earlier date range should be favoured. Therefore, when the artefactual evidence is combined with the Enclosure III radiocarbon date, the final phase at Millockstown probably occurred between the eighth and eleventh centuries.

## **Plant remains**

Analysis of two deposits provided evidence for charred cereal grains and chaff, a charred possible flax seed and charred weed remains. The exact quantities of remains were not recorded in most cases – comments on general ubiquity were instead provided, which have been noted below. Nutshell and fruit remains were absent.

Cereals were recorded in different phases of activity. A variety of cereals was present, including common oat, wild oat, hulled barley, six-row barley, wheat and possible rye.



**Plan of Millockstown, Co. Louth (after Manning 1986, 139).**

### Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Huguen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
GU-1781	Charcoal from Phase I occupation layer	1595±70 BP	A.D. 260-284; <b>A.D. 322-609</b>
GU-1782	Charcoal from Phase III enclosure ditch	1240±125 BP	<b>A.D. 576-1024</b>

### Overview

- Phase 2 – Small circular enclosure (1 deposit)
  - Consisted mainly of cereal remains and chaff, including six-row hulled barley (which was predominant), common oat and wild oat.
  - Weed remains also present.
- Phase 3 – Souterrain (1 deposit)
  - Contained a smaller quantity but wider range of cereal grains, including oat (which was predominant), six-row hulled barley, wheat and possible rye.
  - Possible flax was also present, as well as weed remains.

Phase	Cereal (grain)	Cereal (chaff)	cf. Flax (seed)	Weed (seed)	Date
<b>Phase 2:</b> Small circular enclosure	P	P		P	
<b>Phase 3:</b> Souterrain	P		1	P	<b>A.D. 576–1024.</b>

**Overview of all plant groups (total deposits n=2)** P = present

Phase	Common oat (lemma base)	Wild oat (lemma base)	Oat (grain)	Six-row hulled barley (grain)	Six-row hulled barley (lemma)	Barley (grain)
Phase 2: Small circular enclosure	P	P	P	P	P	P
Phase 3: Souterrain			P	P		

#### Detail of oat and barley remains

Phase	Wheat (grain)	cf. Rye (grain)
Phase 2: Small circular enclosure		
Phase 3: Souterrain	P	1

#### Detail of wheat and rye remains

Phase	Phase 2: Small circular enclosure	Phase 3: Souterrain
<b>Buttercups</b> (achene): <i>Ranunculus</i> spp.		P
<b>Goosefoot family</b> (utricle): <i>Chenopodiaceae</i>	P	
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>	P	
<b>Docks</b> (achene): <i>Rumex</i> spp.		P
<b>Field penny-cress</b> (seed): <i>Thlaspi arvense</i>		P
<b>Charlock</b> (seed): <i>Sinapis arvensis</i>		P
<b>Sedges</b> (achene): <i>Carex</i> spp.	P	
<b>Grass family</b> (grain): <i>Poaceae</i>	P	

#### Detail of weed remains

### **Monanny (Site 1), Co. Monaghan**

Grid Ref: **284260/305240**

SMR No: **MO031-024**

Reference: **Lyons 2009; Walsh 2009.**

Archaeological excavations were carried out at Monanny Site 1 in advance of construction of the N2 Carrickmacross to Aclint road re-alignment. This site was a focus for human activity over several millennia, and a number of distinct phases of archaeological activity were identified: three Early Neolithic houses, with associated features, such as pits and hearths (Phase 1); a Bronze Age burnt mound and pits (Phase 2); an early medieval drying kiln (Phase 3); a medieval burial (Phase 4); and post-medieval agricultural features (Phase 5).

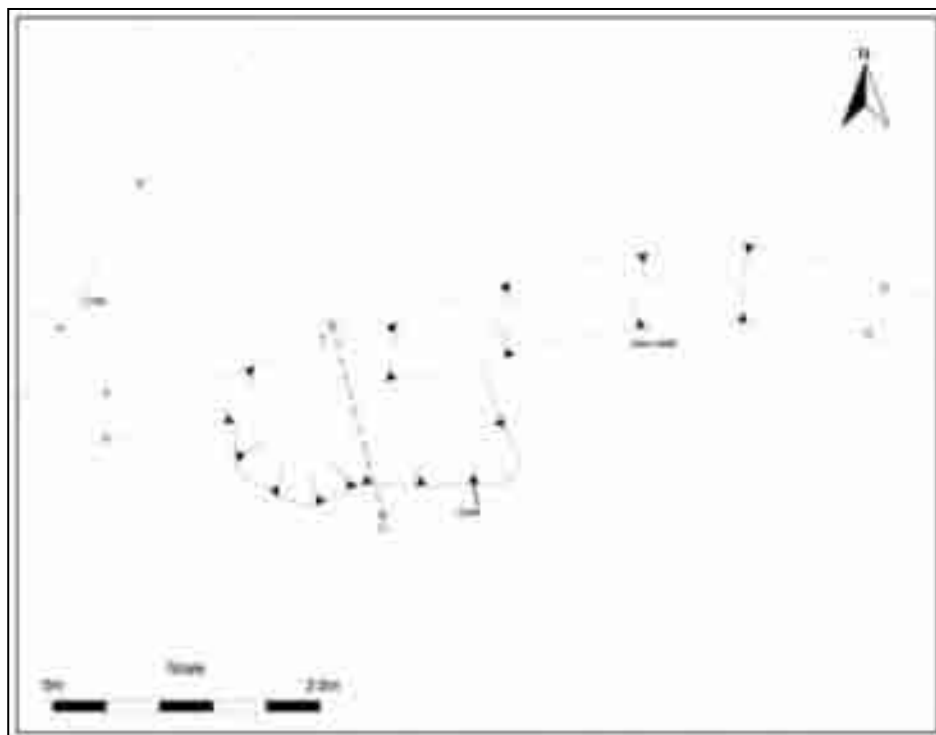
The Phase 3 early medieval drying kiln (C.648) consisted of an irregularly shaped pit, interpreted as being possibly dumbbell-shaped in plan. The kiln contained one main charcoal-rich deposit with a series of levels of burning at its base. Several hundred charred cereal grains – predominantly barley – were recorded in the main fill. Only 12 bones were recovered from the kiln, none of which could be identified to species or element. Radiocarbon dating of charred cereal and wood remains from the main fill of the kiln indicated that the kiln was in use during a period between the 5<sup>th</sup> and 7<sup>th</sup> centuries AD.

The kiln may have been contemporary with and perhaps associated with a nearby enclosure (RMP MO031:013), located immediately to the north of the site, or perhaps activity at the early medieval burial ground at Cloghally Upper 1, located c. 150m to the south-east of Monanny 1.

### **Plant remains**

Analysis of one deposit provided evidence for a total of more than 677 charred cereal grains, charred hazelnut shell fragments, 4 charred fruit seeds and 15 charred weed seeds. The exact quantity of cereal grains was not determined in all cases. Cereal chaff was absent from the examined deposit.

A variety of crops was present, including oat, naked barley, hulled barley and wheat. The weed remains are likely to represent arable weeds and plants that were growing locally.



**Plan of excavations at Monanny, Site 1 (after Walsh 2009, Figure 21)**



## Radiocarbon dates

Reimer, P.J., Baillie, M.G.L., Bard, E., Bayliss, A., Beck, J.W., Bertrand, C.J.H., Blackwell, P.G., Buck, C.E., Burr, G.S., Cutler, K.B., Damon, P.E., Edwards, R.L., Fairbanks, R.G., Friedrich, M., Guilderson, T.P., Hogg, A.G., Hughen, K.A., Kromer, B., McCormac, G., Manning, S., Bronk Ramsey, C., Reimer, R.W., Remmele, S., Southon, J.R., Stuiver, M., Talamo, S., Taylor, F.W., van der Plicht, J. & Weyhenmeyer, C.E. 2004. IntCal04 terrestrial radiocarbon age calibration, 0–26 cal kyr BP. Radiocarbon, 46, 1029–58.

Sample No.	Context	14C Date	Cal. 2 $\sigma$
Wk-17347	Phase 3: Oat grain from Kiln C.648	1546 $\pm$ 35 BP	<b>A.D. 419–603.</b>
Wk-17340	Phase 3: Hazel, blackthorn and Pomoideae charcoal from Kiln C.648	1512 $\pm$ 39 BP	A.D. 433–495; A.D. 504–634.

## Overview

- Phase 3: Kiln C.648 (1 sample)
  - Contained a large quantity of cereal grains.
  - Barley was predominant (including hulled and naked varieties), with much smaller quantities of oat and wheat present.
  - Occasional fruit and weed remains were also recorded.

Phase	Cereal (grain)	Hazelnut (shell)	Fruit (seed)	Weed (seed)	Date
<b>Phase 3: Kiln C.648</b>	677+	P	4	15	A.D. 433–495; A.D. 504–634. <b>A.D. 419–603.</b>

## Overview of all plant groups (total deposits n=1)

Phase	Oat (grain)	Naked barley (grain)	Hulled barley (grain)	Barley (grain)	Wheat (grain)	Indet. Cereal (grain)
<b>Phase 3: Kiln C.648</b>	36	26	123	492	P	P

## Detail of cereal remains

P = present

Phase	Phase 3: Kiln C.648
<b>Brambles</b> (nutlet): <i>Rubus</i> spp.	1
<b>Cherries</b> (stone): <i>Prunus</i> spp.	3
<b>Pale persicaria</b> (achene): <i>Persicaria lapathifolia</i>	2
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>	10
<b>Bedstraws</b> (seed): <i>Galium</i> spp.	2
<b>Grass family</b> (grain): Poaceae	1

## Detail of fruit and weed remains

**Oughtymore, Co. Londonderry**Grid Ref: **26616/43638**SMR No: **LDY 001:002**Reference: **Monk 1984; Mallory & Woodman 1984.**

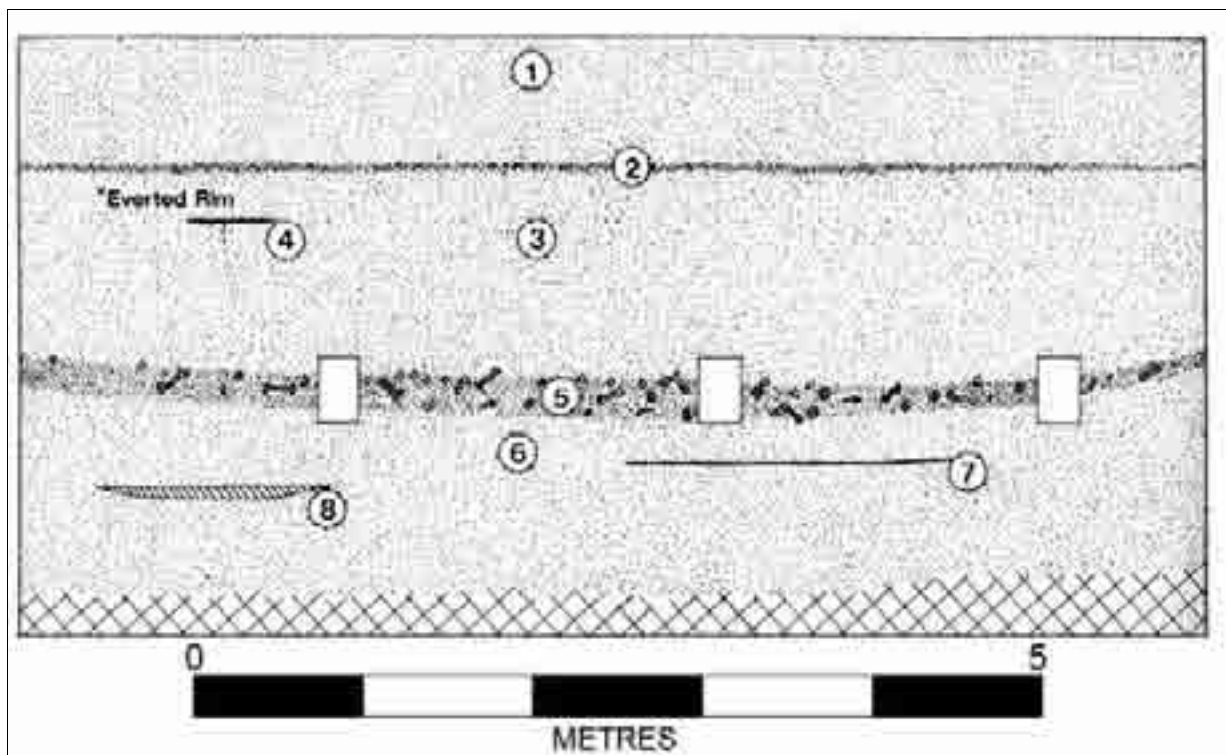
The site was located in a sand cliff overlooking the Lough Foyle estuary and was in danger of being completely destroyed by coastal erosion. The main archaeological horizon consisted of a substantial occupation deposit that contained 20 sherds of souterrain-ware, as well as fragments of a blue glass bracelet and a lignite bracelet, two bone comb fragments and part of an antler ring.

It was suggested by the excavators that the early medieval inhabitants of the site at Oughtymore may have represented a social class inferior to those who dwelt in raths, and that they may have held their land on tenure from the church.

**Plant macro-remains**

Analysis of nine deposits provided evidence for a total of 19 charred cereal grains and 9 charred weed seeds. It is not clear from which contexts the plant remains were derived; they have therefore been grouped below. Cereal chaff, nutshell and fruit remains were absent.

The weed seeds are likely to represent plants that were growing alongside the cereals and perhaps in the background environment around the midden.



**Section of midden at Oughtymore, Co. Londonderry (after Mallory & Woodman 1984, 52).**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-2442	'Carbon sample' from early medieval occupation layer	1295 $\pm$ 40 BP	<b>A.D. 651-782;</b> A.D. 789-811; A.D. 847-854.
UB-2443	'Carbon sample' from layer of burning underlying occupation layer	1480 $\pm$ 30 BP	<b>A.D. 541-642.</b>

## Overview

- Miscellaneous (9 deposits)
  - Contained a small number of rye and barley grains, as well as occasional weed seeds.

Phase	Cereal (grain)	Weed (seed)
<b>Misc.</b>	19	9

## Overview of all plant groups (total deposits n=9)

Phase	Barley (grain)	cf. Barley (grain)	Rye (grain)	cf. Rye (grain)
<b>Misc.</b>	3	1	14	1

## Detail of cereal remains

Phase	Misc.
<b>Black-bindweed</b> (seed): <i>Fallopia convolvulus</i>	1
cf. <b>Cabbage family</b> (seed): Brassicaceae	8

## Detail of weed remains

**Rahally, Co. Galway**Grid Ref: **166007/225872**SMR No: **GA086-211**Reference: **Dillon 2009; Mullins 2009.**

Excavations were undertaken in advance of roadworks in the vicinity of a bivallate rath (GA086-211). This uncovered a Bronze Age hillfort, as well as a neighbouring univallate rath (Ditch 2) and an annex to the bivallate rath (Ditch 8).

The univallate rath had an internal diameter of 32m, and seems to have had an 8m wide entrance in the southwest. A series of small, concentric, cut features were found within the univallate rath. A curvilinear gully consisting of three truncated segments was identified approximately 3m inside Ditch 2. This gully may have aided drainage by collecting water draining from the now destroyed internal ringfort bank. A second curvilinear gully measuring 2 m in length may represent the location of a destroyed structure within the enclosure. Four pits were found within this enclosure and may have functioned as refuse pits or storage pits.

The possible annex to the bivallate rath located on the top of the hill defined a sub-circular enclosure that measures approximately 38m x 40m. One ditch terminus identified in the south probably represents an entrance to the annex though this was not investigated as it lay outside the limit of the excavation. There was no stratigraphic relationship established between this enclosure and the adjacent bivallate rath (GA086-211), however Ditch 8 may represent an annex to this site, or it may alternatively represent a separate, univallate rath similar to Ditch 2. Three radiocarbon dates have been returned from Ditch 8. A basal fill returned an early date of A.D. 20-210. This was derived from a fragment of oak charcoal, which may have been influenced by the 'old wood effect'. Cattle bone from a secondary fill of this ditch produced a date of A.D. 659-779, and charcoal from the secondary fill yielded a date of A.D. 1026-1175.

There is no clear evidence for diagnostic internal structures. A shallow, linear, stony deposit that occurred along the interior of Ditch 8 in the northwest corner may represent the remains of an internal bank, and four rubbish/grain storage pits were also identified.

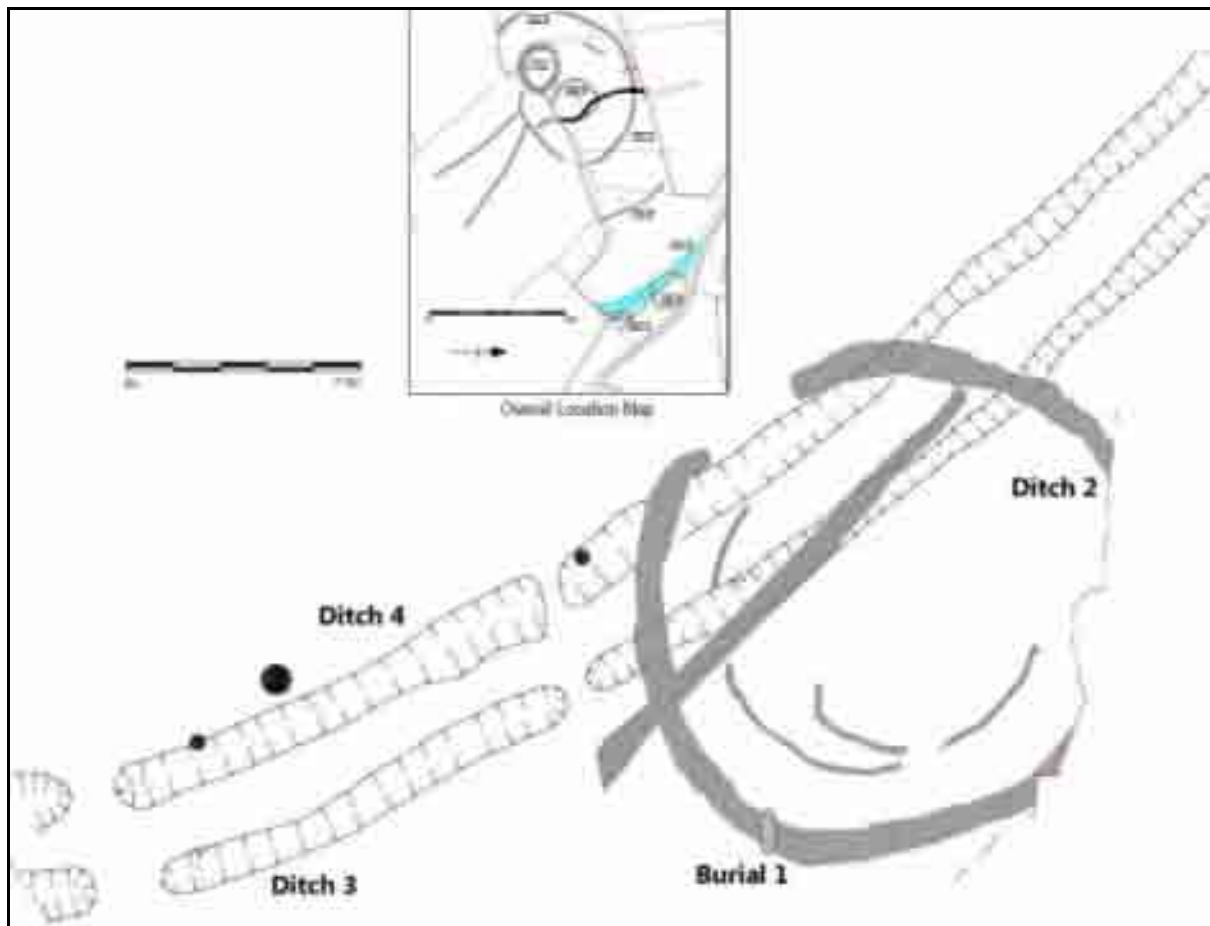
Three human burials were inserted into the in-fill of ditches 2 and 8, and thus post-date these enclosures. Burial 1, inserted into the univallate ditch, was dated to A.D. 892-1023, suggesting that the rath had fallen out of use by the 9<sup>th</sup>/10<sup>th</sup> century. Although a residual Iron Age date was obtained from a basal fill of Ditch 8 the earliest medieval date from a secondary fill suggests that this annex enclosure was in use by A.D. 659-778. A further date from the upper ditch fills suggests it was abandoned by A.D. 1026-1175. This seems to be supported by the dating of the burials inserted into the ditch – Burial 2 was dated to A.D. 992-1156, and Burial 3 was dated to A.D. 1019-1185.

Diagnostic finds from the univallate ditch include a melon bead, a pewter finger ring and multiple bone comb fragments. The melon bead represents a continuation of an earlier Iron Age type and the pewter ring was probably in circulation for some time before it was deposited in the ditch. The bone comb fragments, however, suggest a 10<sup>th</sup>-century or later date. Of the small finds retrieved from Ditch 8, the glass bead and the penannular brooch (8<sup>th</sup>/9<sup>th</sup> century) represent the best datable finds.

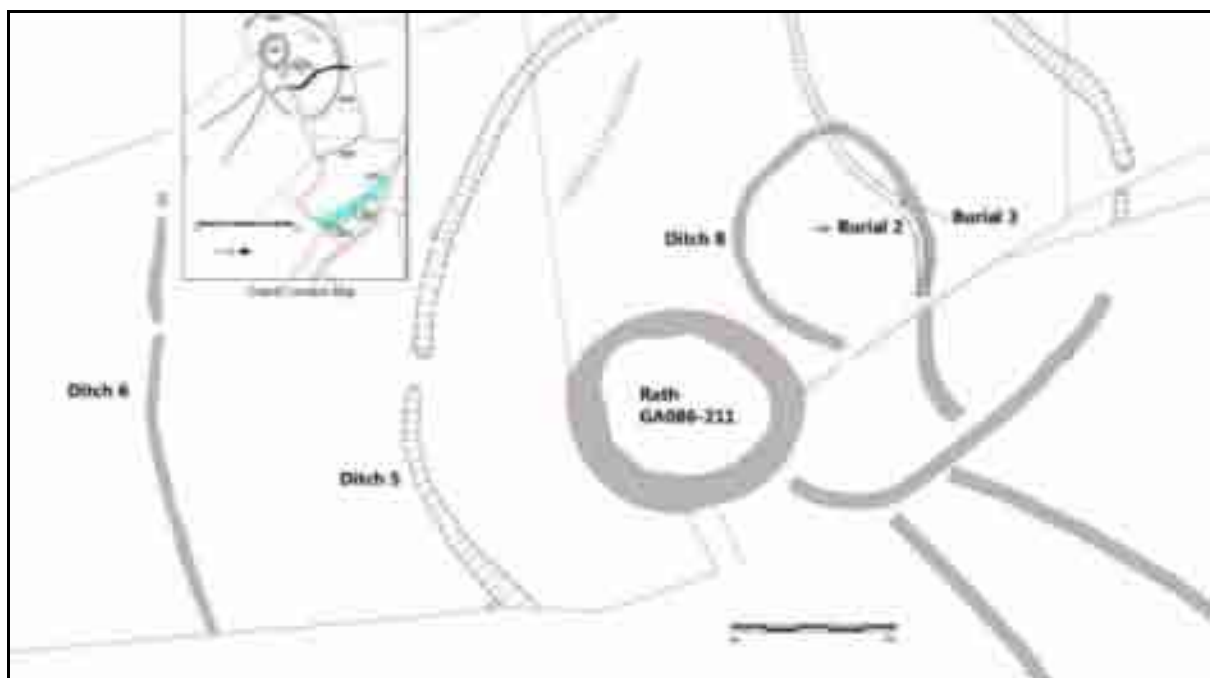
**Plant remains**

Analysis of 19 deposits provided evidence for a total of 122 charred cereal grains, 1 charred fruit seed and 2 charred weed seeds. Cereal chaff and hazelnut shell remains were absent.

Cereals were recorded in several areas/phases of activity. A variety of crops was present, including oat, barley and naked wheat. The weed remains may represent arable weeds and plants that were growing locally.



Plan of univallate rath at Rahally, Co. Galway (after Mullins 2009).



Plan of annex to bivallate rath at Rahally, Co. Galway (after Mullins 2009).

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
Wk22637	Charcoal from basal fill Ditch 6	2826±30 BP	1108-1105 B.C.; 1076-1065 B.C.; <b>1056-902 B.C.</b>
UB-7244	Charcoal from secondary fill Ditch 5	2756±32 BP	994-989 B.C.; <b>979-827 B.C.</b>
Wk22636	Charcoal from basal fill Ditch 3	2509±30 BP	<b>787-538 B.C.</b>
Wk22642	Charcoal from interior of Ditch 8 linear fill	2200±30 BP	<b>375-192 B.C.</b>
Wk22644	Charcoal from basal fill Ditch 8	1911±30 BP	<b>A.D. 20-140;</b> A.D. 148-172; A.D. 194-210
Wk22638	Charcoal from ringfort Ditch 2 secondary fill	1225±30 BP	<b>A.D. 690-750;</b> <b>A.D. 762-885</b>
Wk22640	Charcoal from small pit in Ditch 2	1239±30 BP	<b>A.D. 687-873</b>
Beta-241478	Human bone Burial 1	1070±40 BP	<b>A.D. 892-1023</b>
Beta-241479	Human bone Burial 2	980±40 BP	<b>A.D. 992-1156</b>
Wk22639	Charcoal from pit F181	973±30 BP	<b>A.D. 1016-1155</b>
Wk22641	Charcoal from secondary fill Ditch 8	926±30 BP	<b>A.D. 1026-1175</b>
Beta-2414780?	Human bone Burial 3	940±40 BP	<b>A.D. 1019-1185</b>
UB-7245	Charcoal in vicinity of central bank	884±29 BP	<b>A.D. 1043-1105;</b> <b>A.D. 1118-1218</b>
Wk22646	Charcoal from basal fill dumbbell kiln	775±30 BP	<b>A.D. 1216-1280</b>
Wk22645	Charcoal from posthole fill in Ditch 8	361±30 BP	<b>A.D. 1450-1529;</b> <b>A.D. 1543-1634</b>
UBA-10318	Cattle bone from secondary fill Ditch 8	1298±32 BP	<b>A.D. 661-773.</b>

## Overview

- Phase 3: Ringfort (5 deposits)
  - Small quantity of cereal grains, including oat and barley.
  - One fruit seed also present.
- Phase 3: Possible ringfort annex (11 deposits)
  - Slightly larger quantity of cereal grains (predominantly naked wheat, with barley and oat also present).
  - Two weed seeds were also recorded.
- Phase 2: Miscellaneous pits (3 deposits)
  - Larger quantity of cereal grains (predominantly barley, with occasional naked wheat).

Phase	Cereal (grain)	Fruit (seed)	Weed (seed)	Date
Phase 3: Ringfort	13	1		<b>A.D. 687–873.</b> A.D. 690–750; A.D. 762–885.
Phase 3: Possible ringfort annex	44		2	<b>A.D. 661–773.</b> <b>A.D. 1026–1175.</b>
Phase 3: Misc. pits	65			<b>A.D. 1016–1155.</b>

Overview of all plant groups (total deposits n=19)

Phase	Oat (grain)	Barley (grain)	Wheat (grain)
Phase 3: Ringfort (n=8)			
Phase 3: Possible ringfort annex (n=26)	26.92%	30.77%	42.31%
Phase 3: Misc. pits (n=42)	0.00%	95.24%	4.76%

Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	Barley (grain)	Naked wheat (grain)	Indet cereal. (grain)
Phase 3: Ringfort	1	7		5
Phase 3: Possible ringfort annex	7	8	11	18
Phase 3: Misc. pits		40	2	23

Detail of cereal remains

Phase	Elder (seed): <i>Sambucus nigra</i>	Redshank (achene): <i>Persicaria maculosa</i>	Knotweed family (achene): Polygonaceae
Phase 3: Ringfort	1		
Phase 3: Possible ringfort annex		1	1
Phase 3: Misc. pits			

Detail of fruit and weed remains

## **Raheenagurren West (Site 26), Co. Wexford**

Grid Ref: **316494/158024**

SMR No: **N/A**

Reference: **Johnston 2011; Breen 2011.**

Archaeological investigations were carried out at Raheenagurren West Site 26 in advance of construction of the N11 Gorey to Arklow Link Road. Activity radiocarbon dated to the Early Bronze Age period was recorded at this site (Phase 1), including a row of three burnt mounds alongside a stream, each with at least one trough, and two shallow pits (one of which contained Beaker pottery). Early–Middle Bronze Age pottery was also recorded in other areas of the site, some of which had become incorporated into later deposits. Early medieval activity (Phase 2) was represented by a group of kilns, while a number of post-medieval spade-cultivation furrows were also recorded.

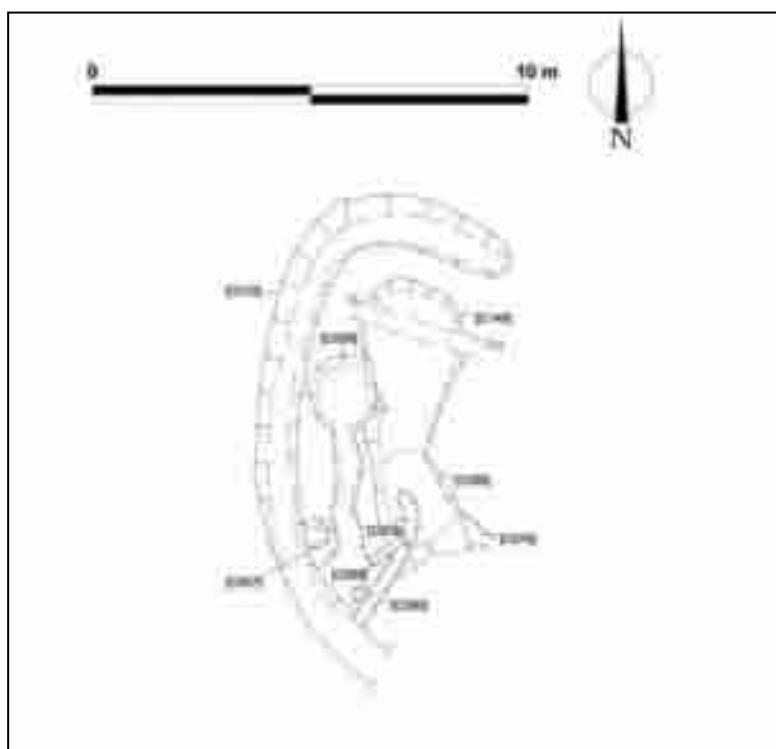
The group of three early medieval drying kilns was radiocarbon dated to the 8<sup>th</sup> to 12<sup>th</sup> centuries. The kilns were surrounded on three sides by a shallow gully. Kiln C.50 was built first, reconstructed at least once, then eventually replaced by the other two kilns. Fragments of querns, a millstone and a plough pebble were associated with the kilns, while large quantities of cereal grains (predominantly oat) were also recorded. It was suggested that the kilns may be associated with a nearby enclosure.

### **Plant remains**

Analysis of 14 deposits provided evidence for a large charred plant remains assemblage. A total of 5256 cereal grains, 9 hazelnut shell fragments, 1 fruit seed and 445 weed seeds were recorded. Cereal chaff remains were absent.

A variety of crops was present, including oat, hulled barley, naked wheat and rye. The weed remains may represent arable weeds and plants that were growing locally.

Two deposits from a ditch near the kilns were not dated. It is likely that they are contemporary with the kilns. They cannot, however, be attributed to a specific phase of activity.



**Plan of excavations at Raheenagurren West, Site 26, kilns (after Breen 2011, Figure 6)**



## Radiocarbon Dates:

Reimer, P.J., Baillie, M.G.L., Bard, E., Bayliss, A., Beck, J.W., Bertrand, C.J.H., Blackwell, P.G., Buck, C.E., Burr, G.S., Cutler, K.B., Damon, P.E., Edwards, R.L., Fairbanks, R.G., Friedrich, M., Guilderson, T.P., Hogg, A.G., Hughen, K.A., Kromer, B., McCormac, G., Manning, S., Bronk Ramsey, C., Reimer, R.W., Remmele, S., Southon, J.R., Stuiver, M., Talamo, S., Taylor, F.W., van der Plicht, J. & Weyhenmeyer, C.E. 2004. IntCal04 terrestrial radiocarbon age calibration, 0–26 cal kyr BP. Radiocarbon, 46, 1029–58.

Sample No.	Context	14C Date	Cal. 2 $\sigma$
GU-22555	Phase 2a: Oat grain from Kiln C.50	1120 $\pm$ 30 BP	A.D. 784–787; A.D. 824–842; <b>A.D. 862–994.</b>
GU-22557	Phase 2b: Oat grain from Kiln C.9	880 $\pm$ 30 BP	A.D. 1043–1106; A.D. 1118–1221.
GU-22546	Phase 2b: Alder/Willow charcoal from Kiln C.78	930 $\pm$ 30 BP	<b>A.D. 1025–1168.</b>

## Overview

- Phase 2a: Kiln (F.6) (7 deposits)
  - Contained cereal grains (predominantly oat, with occasional hulled barley and wheat).
  - Occasional hazelnut shell and weed remains.
- Phase 2b: Kilns (F.4) (5 deposits)
  - Very large quantity of cereal grains (predominantly oat, with occasional hulled barley, wheat and rye).
  - Large quantity of weed remains, and occasional hazelnut shell and fruit remains.
- Miscellaneous (Ditch F.7) (2 deposits)
  - Large quantity of cereal grains (predominantly oat, with smaller quantities of hulled barley).
  - Occasional weed remains.

Phase	Cereal (grain)	Hazelnut (shell frag)	Fruit (seed)	Weed (seed)	Date
<b>Phase 2a: Kiln</b>	192	5		4	A.D. 784–787; A.D. 824–842; <b>A.D. 862–994.</b>
<b>Phase 2b: Kilns</b>	4087	4	1	430	A.D. 1043–1106; A.D. 1118–1221. <b>A.D. 1025–1168.</b>
<b>Misc.</b>	977			11	

## Overview of all plant groups (total deposits n=14)

Phase	Oat (grain)	Barley (grain)	Wheat (grain)	Rye (grain)
<b>Phase 2a: Kiln</b> (n=160)	96.88%	2.50%	0.63%	0.00%
<b>Phase 2b: Kilns</b> (n=2748)	99.24%	0.22%	0.47%	0.07%
<b>Misc.</b> (n=551)	65.88%	34.12%	0.00%	0.00%

## Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	Hulled barley (grain)	Naked wheat (grain)	Wheat (grain)	Rye (grain)	Wheat/Rye (grain)	Indet. cereal (grain)
Phase 2a: Kiln	155	4	1				32
Phase 2b: Kilns	2727	6	8	5	2	2	1337
Misc.	363	188					426

#### Detail of cereal remains

Phase	Phase 2a: Kiln	Phase 2b: Kilns	Misc.
<b>Haw fruit</b> (nutlet): <i>Crataegus monogyna</i>		1	
<b>Meadow buttercup/Creeping buttercup</b> (achene): <i>Ranunculus acris/repens</i>		1	1
<b>Goosefoot family</b> (utricle): Chenopodiaceae		40	6
<b>Corn spurrey</b> (seed): <i>Spergula arvensis</i>		5	
<b>Corncockle</b> (seed): <i>Agrostemma githago</i>		1	
<b>Pale persicaria</b> (achene): <i>Persicaria lapathifolia</i>		20	
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>		67	
cf. <b>Sheep's sorrel</b> (achene): <i>Rumex</i> cf. <i>acetosella</i>		6	1
<b>Knotweed family</b> (achene): Polygonaceae	1	122	3
<b>Wild radish</b> (pod): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>		1	
<b>Hemp-nettles</b> (nutlet): <i>Galeopsis</i> spp.		1	
<b>Dead-nettle family</b> (nutlet): Lamiaceae		2	
<b>Plantains</b> (seed): <i>Plantago</i> spp.		2	
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>		2	
cf. <b>Corn marigold</b> (achene): <i>Chrysanthemum</i> cf. <i>segetum</i>		69	
<b>Daisy family</b> (achene): Asteraceae		1	
<b>Sedge family</b> (achene): Cyperaceae		3	
<b>Grass family</b> (grain): Poaceae	1	58	
<b>Indeterminate</b> (seed)	2	29	

#### Detail of fruit and weed remains

**Ratoath, Co. Meath**Grid reference: **30135/25215**SMR No: **N/A**Reference: **Lyons 2005; Wallace 2010**

Excavation revealed a circular enclosure, 40m in internal diameter, associated enclosures, and evidence for burial, agricultural and industrial activity. The primary ditch fill of the main enclosure returned a date of A.D. 547-655, while an upper fill was dated to A.D. 647-778. A potential outer enclosure ditch approximately 14m west of the settlement-cemetery enclosure was detected.

A number of ditches, gullies and pits were uncovered which spanned the fourth to tenth centuries. No coherent plan for any domestic structures was identified but some of the gullies and slot trenches undoubtedly supported timber buildings. A substantial east-west slot-trench returned a radiocarbon date of A.D. 809-989 which was chronologically later than a date taken from the upper fill of the enclosure ditch. Another gully, which formed part of a boundary to the cemetery on its western side, was dated to A.D. 685-892.

A large volume of iron smithing slag was recovered from the fills of two L-shaped ditches immediately to the north of the enclosure, and from the south of the main enclosure. Two dates from the ditch fills ranged from A.D. 427-608 to A.D. 637-772. This larger ditch formed an annexe with two other smaller ditches which enclosed a large charcoal spread and a small keyhole-shaped kiln (dated to A.D. 431-600).

A cemetery was found to the south-east of the complex. Forty nine burials were identified - 32 adults, 13 juveniles, three infants and five deposits of disarticulated human remains – including that of a young female (dated A.D. 668-832) buried with a copper-alloy neck-ring similar to one found at a cemetery in Norfolk.

Several variously-shaped cereal-drying kilns were also identified to the east of the enclosure and they produced large quantities of cereal grains. A large example with a baffle stone was dated to A.D. 860-1018 while a teardrop-shaped and a figure-of-eight-shaped kiln both produced Iron Age dates.

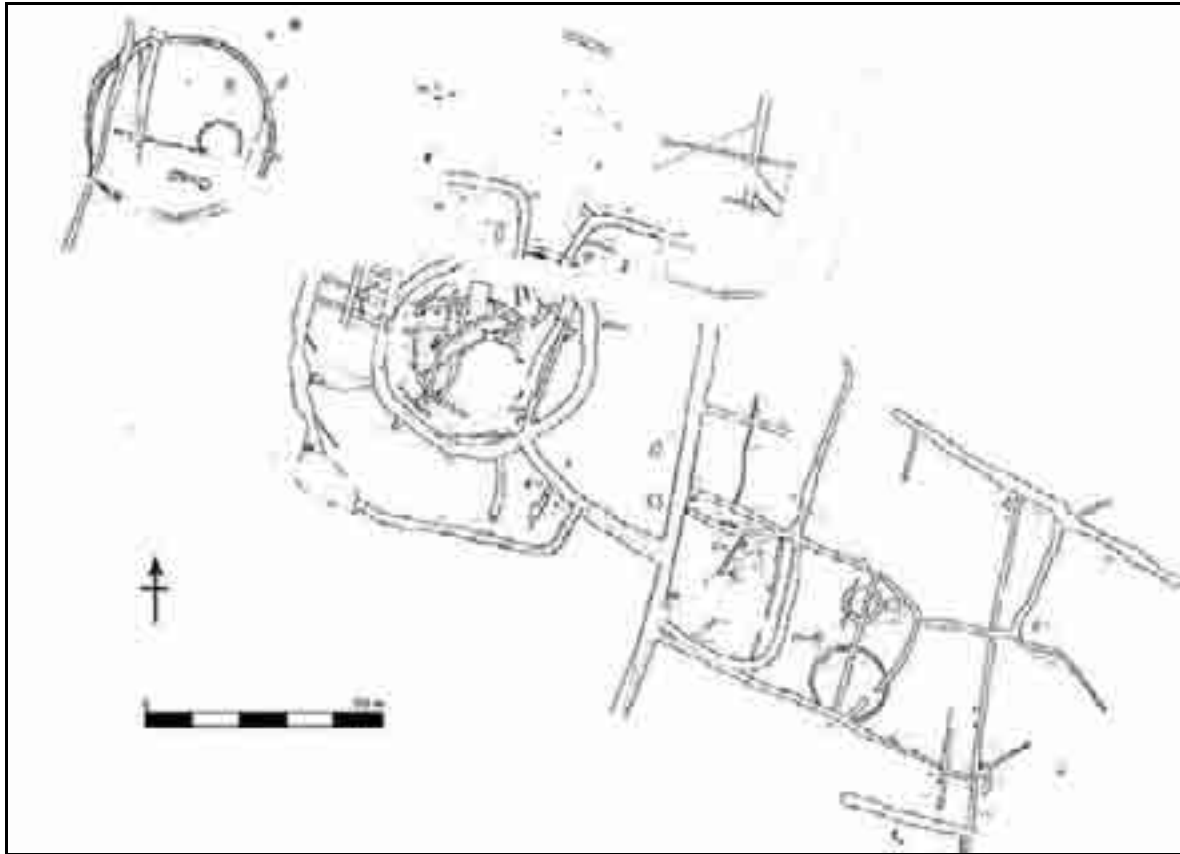
A number of unstratified finds included bone tools associated with weaving, a spindle whorl, lignite bracelet fragments, a blue glass bead, a fragment of an amber bead and two bone comb fragments. A sherd of E ware was also found in the enclosure area.

**Plant remains**

Analysis of 16 deposits provided evidence for a large charred plant remains assemblage. A total of 9896 cereal grains, an undetermined quantity of cereal chaff fragments, 2 fruit seeds and 46 weed seeds were recorded. Hazelnut shell remains were absent.

Cereals were recorded in several early medieval phases of activity. A variety of crops was present, including oat, hulled barley (six-row and two-row), bread/club wheat and rye. The weed remains may represent arable weeds and plants that were growing locally.

The final excavation report has not yet been completed, and information on the contexts from which the plant remains derived was taken from a published review of the site (Wallace 2010). Plant remains from an additional 12 deposits in five features were recorded in the plant remains report (Lyons 2005), but it was not clear if these deposits date to the early medieval period. These plant remains have not been recorded below.



**Plan of enclosures at Ratoath, Co. Meath (after Wallace 2010).**

#### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
Beta-196367	Bone from small ringditch	2870±40 BP	1193-1171 B.C.; 1168-1143 B.C.; <b>1132- 922 B.C.</b>
UB-6539	Charcoal from cereal-drying kiln	1867±36 BP	<b>A.D. 70-235</b>
UB-6538	Charcoal from cereal-drying kiln	1812±35 BP	A.D. 90-100; <b>A.D. 124-261;</b> A.D. 281-325
Beta-196364	Bone from large ringditch	1790±40 BP	<b>A.D. 127-345</b>
Beta-198517	Bone from oval pit	1630±40 BP	A.D. 268-271; <b>A.D. 335-540</b>
Beta-198519	Bone from north-south slot-trench	1600±40 BP	<b>A.D. 383-560</b>
UB-6546	Carbonised grain from pit	1589±35 BP	<b>A.D. 403-551</b>
UB-6542	Charcoal from slot-trench	1569±35 BP	<b>A.D. 416-565</b>
Beta-198510	Bone from east-west ditch	1530±40 BP	<b>A.D. 427-608</b>
UB-6543	Carbonised seed from cereal-drying kiln	1532±35 BP	<b>A.D. 431-600</b>
Beta-196362	Bone from curvilinear ditch	1490±60 BP	<b>A.D. 432-498;</b> <b>A.D. 501-651</b>

UB-6540	Charcoal from linear feature	1501±38 BP	<b>A.D. 435-491;</b> <b>A.D. 509-518;</b> <b>A.D. 528-642</b>
Beta-196366	Bone from linear ditch	1490±40 BP	A.D. 436-489; A.D. 513- 516; <b>A.D. 530-648</b>
Beta-198518	Bone from curved ditch	1480±40 BP	A.D. 441-455; A.D. 460-484; <b>A.D. 533-651</b>
Beta-196371	Bone from linear ditch	1410±60 BP	<b>A.D. 536-720;</b> A.D. 742-769
Beta-198522	Bone from enclosure ditch	1450±40 BP	<b>A.D. 547-655</b>
Beta-196363	Bone from linear ditch	1410±40 BP	<b>A.D. 569-671</b>
Beta-196369	Bone from linear ditch	1380±40 BP	<b>A.D. 582-694;</b> A.D. 704-705; A.D. 748-765
Beta-198520	Bone from curved feature outside enclosure	1310±80 BP	<b>A.D. 585-894;</b> A.D. 929-931
UB-6544	Carbonised grain from pit	1390±34 BP	<b>A.D. 597-680</b>
Beta-198512	Bone from north-south ditch	1350±40 BP	<b>A.D. 614-723;</b> A.D. 739-770
Beta-198509	Bone from east-west ditch	1340±40 BP	<b>A.D. 637-772</b>
Beta-198513	Bone from curvilinear ditch	1310±40 BP	<b>A.D. 647-778</b>
Beta-198516	Bone from enclosure ditch	1320±40 BP	<b>A.D. 648-774</b>
Beta-198523	Bone from enclosure ditch	1310±40 BP	<b>A.D. 647-778</b>
Beta-198511	Bone from ditch	1300±40 BP	<b>A.D. 649-781;</b> A.D. 791-807
Beta-196365	Bone from linear ditch	1260±40 BP	<b>A.D. 668-832;</b> A.D. 836-869
UB-6545	Carbonised grain from possible furnace	1225±34 BP	<b>A.D. 688-753;</b> <b>A.D. 760-886</b>
Beta-198515	Bone from ditch	1220±40 BP	<b>A.D. 685-892</b>
Beta-198521	Bone from slot-trench	1220±40 BP	<b>A.D. 685-892</b>
UB-6541	Charcoal from re-cut of slot-trench	1131±35 BP	A.D. 782-790; <b>A.D. 809-989</b>
Beta-196368	Seed from cereal-drying kiln	1110±40 BP	A.D. 783-787; A.D. 817-843; <b>A.D. 860-1018</b>
Beta-198514	Bone from curvilinear ditch	910±40 BP	<b>A.D. 1032-1210</b>
Beta-196372	Re-cut of ditch	740±60 BP	<b>A.D. 1166-1319;</b> A.D. 1351- 1390
Beta-198505	Bone from burial 25	1570±40 BP	<b>A.D. 409-575</b>
Beta-198504	Bone from burial 12	1540±40 BP	<b>A.D. 426-600</b>
Beta-198508	Bone from burial 54	1490±40 BP	A.D. 436-489; A.D. 513-516; <b>A.D. 530-648</b>
Beta-198506	Bone from burial 27	1450±40 BP	<b>A.D. 547-655</b>
Beta-196361	Bone from burial 34	1410±40 BP	<b>A.D. 569-671</b>
Beta-198507	Bone from burial 51	1300±40 BP	<b>A.D. 649-781;</b> A.D. 791-807
Beta-196360	Bone from burial 38	1260±40 BP	<b>A.D. 668-832;</b> A.D. 836-869

## Overview

- Phase 3a: Kiln and pit (4 deposits)
  - Large quantity of cereal grains (predominantly barley, with much smaller quantities of oat, and occasional wheat and rye).
  - Occasional weed seeds also present.
- Phase 3b: Pit (3 deposits)
  - Large quantity of cereal grains (predominantly barley, with smaller quantities of oat, and occasional wheat and rye).
  - Cereal chaff and occasional weed seeds also present.
- Phase 3d: Ditch and possible furnace (9 deposits)
  - Large quantity of cereal grains (predominantly barley, with much smaller quantities of oat and wheat, and occasional rye).
  - Cereal chaff, and occasional weed and fruit remains also present.

Phase	Cereal (grain)	Cereal (chaff)	Fruit (seed)	Weed (seed)	Date
<b>Phase 3a</b>	1292			4	A.D. 268–271; <b>A.D. 335–540</b> . <b>A.D. 383–560</b> . <b>A.D. 409–575</b> . <b>A.D. 403–551</b> . <b>A.D. 416–565</b> . <b>A.D. 426–600</b> . <b>A.D. 427–608</b> . <b>A.D. 431–600</b> . A.D. 432–498; A.D. 501–651.
<b>Phase 3b</b>	970	P		5	A.D. 435–491; A.D. 509–518; A.D. 528–642. A.D. 436–489; A.D. 513–516; <b>A.D. 530–648</b> . A.D. 436–489; A.D. 513–516; <b>A.D. 530–648</b> . A.D. 441–455; A.D. 460–484; <b>A.D. 533–651</b> . <b>A.D. 536–720</b> ; A.D. 742–769. <b>A.D. 547–655</b> . <b>A.D. 547–655</b> . <b>A.D. 569–671</b> . <b>A.D. 569–671</b> . <b>A.D. 582–694</b> ; A.D. 704–705; A.D. 748–765. <b>A.D. 585–894</b> ; A.D. 929–931. <b>A.D. 597–680</b> .
<b>Phase 3d</b>	7634	P	2	37	<b>A.D. 649–781</b> ; A.D. 791–807. <b>A.D. 649–781</b> ; A.D. 791–807. <b>A.D. 668–832</b> ; A.D. 836–869. <b>A.D. 668–832</b> ; A.D. 836–869. A.D. 688–753; A.D. 760–886. <b>A.D. 685–892</b> . <b>A.D. 685–892</b> . A.D. 780–791; <b>A.D. 806–985</b> .

### Overview of all plant groups (total deposits n=16)

P = present

Phase	Oat (grain)	Barley (grain)	Wheat (grain)	Rye (grain)
<b>Phase 3a</b> (n=942)	5.84%	92.78%	1.06%	0.32%
<b>Phase 3b</b> (n=596)	32.89%	63.26%	2.18%	1.68%
<b>Phase 3d</b> (n=3793)	4.80%	90.83%	4.01%	0.37%

### Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	Oat (palea/lemma)	Oat (awn)
<b>Phase 3a</b>	55		
<b>Phase 3b</b>	196	1	P
<b>Phase 3d</b>	182	48	P

### Detail of oat remains

Phase	Six-row hulled barley (grain)	Two-row hulled barley (grain)	Hulled barley (grain)	Barley (grain)	Barley (rachis internode)	Barley (culm node)
Phase 3a	50	22	217	585		
Phase 3b	23	4	43	307		
Phase 3d	529	250	1830	836	47	4

#### Detail of barley remains

Phase	Bread/Club wheat (grain)	Wheat (grain)	Wheat (glume base)	Rye (grain)	Indet. (grain)	cereal
Phase 3a	8	2		3	350	
Phase 3b		13		10	374	
Phase 3d	143	9	1	14	3841	

#### Detail of wheat, rye and indeterminate cereal remains

Phase	Phase 3a	Phase 3b	Phase 3d
<b>Elder</b> (seed): <i>Sambucus nigra</i>			2
<b>Goosefoots</b> (utricle): <i>Chenopodium</i> spp.	3		2
<b>Common chickweed</b> (seed): <i>Stellaria media</i>			1
<b>Redshank/Pale persicaria</b> (achene): <i>Persicaria maculosa/lapathifolia</i>			3
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>		3	16
cf. <b>Clustered dock</b> (achene): <i>Rumex</i> cf. <i>conglomerates</i>		1	
<b>Knotweed family</b> (achene): Polygonaceae	1		
<b>Wild radish</b> (pod): <i>Raphanus raphanistrum</i> ssp. <i>Raphanistrum</i>			3
<b>Hemp-nettles</b> (nutlet): <i>Galeopsis</i> spp.			3
<b>Ribwort plantain</b> (seed): <i>Plantago lanceolata</i>		1	
<b>Bedstraws</b> (seed): <i>Galium</i> spp.			1
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>			7
<b>Bromes</b> (grain): <i>Bromus</i> spp.			1

#### Detail of fruit and weed remains

## **Raystown (Site 21), Co. Meath**

Grid reference: **304976/251474**

SMR No: **N/A**

Reference: **Lyons 2009a; 2009b; Seaver 2005; Seaver 2006; Seaver 2009; Seaver 2010.**

A number of early medieval phases were identified at Raystown. The initial activity was focused on a penannular burial enclosure (22m x 18m) on top of the ridge that was dated between the fourth and sixth centuries. Eight of the twenty radiocarbon-dated human burials came from this phase and six of these were clustered close to the centre of the enclosure. One of them cut the ditch and was dated to A.D. 432-602 which suggests that the ditch was back-filled by the end of the sixth century. Broadly contemporary cereal-drying kilns were situated to the south and north-east of the burial ground.

During Phase II (A.D. 500-700) a 50m diameter outer burial enclosure was dug around the original cemetery enclosure. A rim fragment of an imported continental glass vessel – dating between the fifth and seventh centuries – came from the lower plough-soil within the enclosure while a date of A.D. 654-779 was obtained from the northern part of the enclosure ditch. Further burials were placed in the newly expanded area. Settlement evidence belonging to this phase was identified to the north of the cemetery and consisted of several gullies and an earth-cut souterrain. Post-holes along the latter's passageways indicate that it was roofed and it had a circular chamber with a ring of post-holes cut into the floor and walls. Cereal grain from one of the post-holes was dated between the mid sixth and mid seventh centuries. There was considerable arable activity in the northern and southern parts of the site during this phase. Four figure-of-eight-shaped cereal drying kilns were present; two in each area. The southern kilns were associated with gullies which drained into a substantial ditch that was possibly the tailrace of a mill.

Phase III (A.D. 600-800) was identified by the construction of a sub-rectangular enclosure around the burial ground and northern habitation area. The ditch was open between the mid seventh and early ninth centuries and a rare iron horse snaffle was retrieved from its fill. A stone-built souterrain also belonged to this phase. Cereal processing was important during this phase, and two watermills were constructed - Southern Mill 1 was radiocarbon dated to A.D. 660-782; and Southern Mill 4 returned a date of A.D. 653-772.

In Phase IV (A.D. 700-900) the Phase III enclosure was backfilled and settlement continued in the southern section of the site. A new substantial mill in the southern mill complex, Southern Mill 5, was constructed, and large-scale cereal processing was evident for the first time in the northern part of the site. Northern Mill 1 was constructed, with a millrace that utilised the east-west part of the sub-rectangular enclosure, and a stone stone-built cereal-drying kiln in the northern habitation area was dated to A.D. 799-975. The burial enclosure contained in use, and a single burial from this phase was dated to A.D. 766-898.

A second water mill (Northern Mill 2) replaced the initial mill in the northern part of the site during Phase V (A.D. 900-1150). It was constructed between A.D. 887-1017 and used a different water-source from the one used by Northern Mill 1. It was abandoned during the twelfth century. Another mill – the Central Mill – was constructed and cut many of the main features in the southern area during Phase V. It is likely that the Southern Mill Complex had fallen out of use by this time. Settlement evidence during this phase included a hearth and a baking-slab, gullies and metalling, slot-trenches of a possible rectangular building and a further series of hearths that were associated with this building. A single burial in the cemetery – dating to A.D. 809-989 – belongs to this phase.

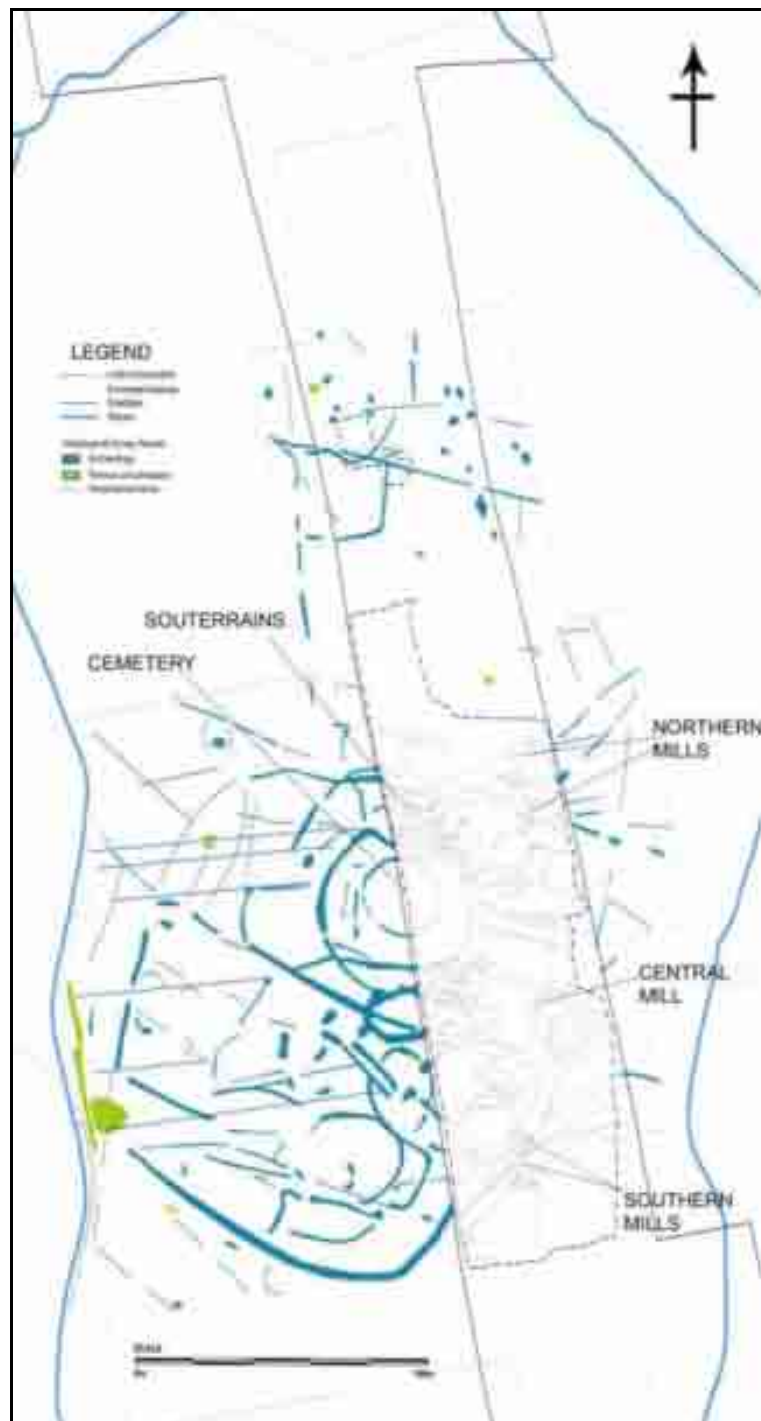
The presence of a late-eleventh/mid-twelfth-century stickpin within the burial ground suggests the possibility that burial continued in use into the 1100s, and the presence two candle holders dating between the mid eleventh and thirteenth centuries suggest that there was still some form of settlement there at this time. The small quantities of late medieval pottery recovered from the site, however, suggest that it was abandoned during the twelfth century.



### Plant remains

Analysis of 98 deposits provided evidence for a large charred and waterlogged plant remains assemblage. Several thousand charred cereal grains were recorded, as well as charred cereal chaff fragments, hazelnut shell fragments and weed seeds. Waterlogged fruit and weed remains were also present. The exact quantities of remains were not recorded in many cases – comments on general ubiquity were instead provided, which have been noted below.

Cereals were recorded in several early medieval phases of activity. A variety of crops was present, including common oat, bristle oat, hulled barley, bread/club wheat and rye. The weed remains may represent arable weeds and plants that were growing locally.



Plan of Raystown, Co. Meath (after Seaver 2006, 77).

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
Wk-17910	Single barley grain from sub-rectangular enclosure	1295 $\pm$ 36 BP	<b>A.D. 654-779;</b> A.D. 794-801
Wk-16823	Human bone from articulated burial within ringditch	1647 $\pm$ 33 BP	A.D. 263-277; <b>A.D. 329-467;</b> <b>A.D. 480-533</b>
Wk-16306	Human bone from articulated burial within ringditch	1528 $\pm$ 33 BP	<b>A.D. 432-602</b>
Wk-16821	Human bone from articulated burial south of ringditch	1425 $\pm$ 33 BP	<b>A.D. 573-660</b>
Wk-16307	Human bone from articulated burial within ringditch.	1334 $\pm$ 34 BP	<b>A.D. 644-724;</b> <b>A.D. 738-771</b>
Wk-16309	Human bone from articulated burial cutting ringditch with blue glass bead	1130 $\pm$ 35 BP	A.D. 782-789; <b>A.D. 809-989</b>
Wk-16310	Human bone from articulated burial outside ringditch	1195 $\pm$ 34 BP	A.D. 695-696; A.D. 709-747; <b>A.D. 766-898;</b> A.D. 920-947
Wk-16302	Charcoal from fill of pit cut by souterrain	1249 $\pm$ 53 BP	<b>A.D. 665-887</b>
Wk-16294	Charcoal from a circular pit north of the western souterrain	1284 $\pm$ 40 BP	<b>A.D. 656-783;</b> A.D. 788-820; A.D. 842-859
UB-6521	Oak timber from Southern Mill 1	1279 $\pm$ 32 BP	<b>A.D. 660-782;</b> A.D. 790-809
UB-6522	Oak timber from Southern Mill 4	1315 $\pm$ 35 BP	<b>A.D. 653-730;</b> <b>A.D. 735-772</b>
UB-6523	Oak timber from Southern Mill 5	1206 $\pm$ 35 BP	<b>A.D. 691-750;</b> <b>A.D. 763-895;</b> A.D. 926-935
Wk-16300	Burnt oak in feature within southern mill complex	1188 $\pm$ 37 BP	A.D. 713-745; <b>A.D. 767-901;</b> A.D. 917-966
UB-6524	Oak timber from Northern Mill 2	1096 $\pm$ 35 BP	<b>A.D. 887-1017</b>
Wk-16295	Charcoal from backfill of Northern Mill 2	938 $\pm$ 32 BP	<b>A.D. 1023-1164</b>
Wk-17907	Oat grain from cereal-drying kiln	1575 $\pm$ 30 BP	<b>A.D. 418-551</b>
Wk-17908	Wheat grain from cereal-drying kiln	1428 $\pm$ 30 BP	<b>A.D. 576-657</b>
Wk-16296	Blackthorn charcoal from fill of cereal-drying kiln	1151 $\pm$ 35 BP	A.D. 779-794; <b>A.D. 799-975</b>
Wk-16303	Blackthorn charcoal from	958 $\pm$ 32 BP	<b>A.D. 1021-1156</b>

	Northern Mill 1		
Wk-16304	Willow charcoal from Northern Mill 1	1109±31 BP	<b>A.D. 881-1013</b>
Wk-16308	Human bone from burial cutting ringditch	1412±34 BP	<b>A.D. 579-665.</b>
Wk-16819	Human bone from burial south of ringditch	1574±35 BP	<b>A.D. 414-562.</b>
Wk-16820a	Human bone from burial south of ringditch	1363±36 BP	<b>A.D. 608-709;</b> A.D. 747-766.
Wk-16820b	Human bone from burial within ringditch	1312±38 BP	<b>A.D. 652-774.</b>
Wk-16822	Human bone from burial cutting ringditch	1510±34 BP	A.D. 434-492; A.D. 507-519; A.D. 527-634.
Wk-16825	Human bone from burial within ringditch	1537±34 BP	<b>A.D. 430-596.</b>
Wk-16826a	Human bone from burial within ringditch	1451±35 BP	<b>A.D. 553-652.</b>
Wk-16826b	Human bone from burial within ringditch	1482±35 BP	A.D. 465-482; <b>A.D. 534-649.</b>
Wk-16827	Human bone from burial within ringditch	1491±35 BP	A.D. 441-455; A.D. 460-484; <b>A.D. 533-645.</b>
Wk-16828	Human bone from burial within ringditch	1496±36 BP	A.D. 437-488; <b>A.D. 530-644.</b>
Wk-17906	Cereal grain from ringditch deposit	1576±30 BP	<b>A.D. 417-550.</b>
Wk-17909	Cereal grain from kiln containing burial	1607±37 BP	A.D. 358-363; <b>A.D. 382-547.</b>
Wk-17911	Animal bone from outer burial enclosure	1320±31 BP	A.D. 652-725; A.D. 738-771.
Wk-17912	Animal bone from early gully in northern habitation area	1463±36 BP	<b>A.D. 544-649.</b>
Wk-17913	Animal bone from Northern Mill race 2	1436±32 BP	<b>A.D. 568-656.</b>
Wk-17914	Animal bone from sub-rectangular enclosure	1283±32 BP	<b>A.D. 659-780;</b> A.D. 793-803.
Wk-17915	Animal bone from Northern Mill 2 Headrace	1427±35 BP	<b>A.D. 569-660.</b>
Wk-17916	Animal bone from sub-rectangular enclosure	1352±40 BP	<b>A.D. 612-722;</b> A.D. 740-770.
Wk-17917	Animal bone from outer burial enclosure	1349±31 BP	<b>A.D. 637-715;</b> A.D. 744-768.
Wk-17918	Human bone from Burial B210820	1586±32 BP	<b>A.D. 410-546.</b>
Wk-17919	Human bone from Burial B210944	1531±31 BP	A.D. 432-498; A.D. 501-599.
Wk-17920	Human bone from Burial B210907 cutting ringditch	1524±31 BP	A.D. 432-496; A.D. 502-605.
Wk-17921	Human bone from Burial B210954	1448±35 BP	<b>A.D. 556-654.</b>
Wk-17922	Human bone from Burial B210854	1598±36 BP	<b>A.D. 392-547.</b>
Wk-18197	Barley grain from backfill	1345±29 BP	<b>A.D. 642-712;</b>

	behind western souterrain wall		A.D. 746–767.
Wk-18198	Barley grain from hearths overlying ditch	1096±28 BP	<b>A.D. 890–997</b> ; A.D. 1004–1012.
Wk-18199	Oat grain from kiln	1474±33 BP	<b>A.D. 541–646.</b>
Wk-18200	Wheat grain from pit in southern habitation area	1264±32 BP	<b>A.D. 667–783</b> ; A.D. 787–824; A.D. 841–861.
Wk-18201	Oat grain from pit in southern habitation area	1253±30 BP	<b>A.D. 674–828</b> ; A.D. 838–866.
Wk-18202	Bread wheat grain from post-hole associated with eastern souterrain	1492±30 BP	A.D. 445–445; <b>A.D. 465–482</b> ; A.D. 534–644.
Wk-18203	Ash charcoal from junction of boundary and Southern Mill race 4/5	1235±36 BP	<b>A.D. 686–881.</b>

### Overview

- Phase 1 (3 deposits)
  - Contained several hundred charred cereal grains – predominantly hulled barley, with smaller quantities of oat, and occasional wheat and rye.
  - Occasional charred weed seeds also present.
- Phase 2 (38 deposits)
  - Contained large quantity of charred cereal grains – predominantly hulled barley, with smaller quantities of oat (including common and bristle oat), and occasional wheat and rye.
  - Occasional charred cereal chaff (barley), hazelnut shell fragments and weed seeds also present.
- Phase 3 (9 deposits)
  - Contained several hundred charred cereal grains – predominantly hulled barley, with smaller quantities of oat and occasional wheat.
  - Occasional charred hazelnut shell fragments and waterlogged weed seeds also present.
- Phase 4 (9 deposits)
  - Contained several thousand charred cereal grains – predominantly hulled barley, with smaller quantities of oat (including common oat), and occasional wheat and rye.
  - Occasional charred and waterlogged weed seeds, and waterlogged fruit seeds also present.
- Phase 5 (11 deposits)
  - Contained small quantity of cereal grains, including barley, oat, wheat and possible rye.
  - Occasional charred and waterlogged weed seeds, and waterlogged fruit seeds also present.
- Phase 1–5 (28 deposits)
  - Contained several thousand charred cereal grains – predominantly hulled barley, with smaller quantities of oat (including common oat) and wheat, and occasional rye.
  - Charred cereal chaff, charred hazelnut shell fragments, charred and waterlogged weed seeds, and waterlogged fruit seeds also present.

Phase	Cereal (grain)	Cereal (chaff)	Hazelnut (shell frag)	Fruit (seed)	Weed (seed)	Date (A.D.)
<b>Phase 1</b>	P				P	263–277; 329–467; 480–533; 358–363; <b>382–547; 392–547; 410–546; 418–551; 417–550; 414–562; 430–596; 432–498; 501–599; 432–602; 432–496; 502–605; 437–488; 530–644.</b>
<b>Phase 2</b>	P	P	P		P	434–492; 507–519; 527–634; 445–445; <b>465–482; 534–644; 441–455; 460–484; 533–645; 465–482; 534–649; 541–646; 544–649; 553–652; 556–654; 573–660; 579–665; 637–715; 744–768; 652–725; 738–771.</b>
<b>Phase 3</b>	P		P		P	<b>576–657; 608–709; 747–766; 612–722; 740–770; 642–712; 746–767; 644–724; 738–771; 659–780; 793–803; 654–779; 794–801; 652–774; 660–782; 790–809; 667–783; 787–824; 841–861; 674–828; 838–866; 691–750; 763–895; 926–935.</b>
<b>Phase 4</b>	P			P	P	<b>656–783; 788–820; 842–859; 686–881; 695–696; 709–747; 766–898; 920–947; 713–745; 767–901; 917–966; 779–794; 799–975; 782–789; 809–989.</b>
<b>Phase 5</b>	P			P	P	<b>568–656; 569–660; 890–997; 1004–1012.</b>
<b>Phase 1–5</b>	P	P	P	P	P	

#### Overview of all plant groups (total deposits n=98)

P = Present

Phase	Common oat (grain)	Bristle oat (grain)	Oat (grain)	Oat (palea/lemma)	cf. Oat (grain)
<b>Phase 1</b>			P		
<b>Phase 2</b>	P	P	P		P
<b>Phase 3</b>			P		
<b>Phase 4</b>	198		P		
<b>Phase 5</b>			P		
<b>Phase 1–5</b>	394		P	P	

#### Detail of oat remains

Phase	Hulled barley (grain)	Barley (grain)	Barley (rachis internode)	Barley (culm node)	Bread/Club wheat (grain)	Wheat (grain)	Wheat (rachis internode)	cf. Wheat (grain)
<b>Phase 1</b>	378	P			1			
<b>Phase 2</b>	865	P	P		8	P		P
<b>Phase 3</b>	246	P			20	P		P
<b>Phase 4</b>	1429	P			88	P		
<b>Phase 5</b>		P				P		
<b>Phase 1–5</b>	3079	P	P	P	289	P	P	P

#### Detail of barley and wheat remains

Phase	Rye (grain)	cf. Rye (grain)	Indet. cereal (grain)
Phase 1	1		P
Phase 2	P		P
Phase 3			P
Phase 4	7		P
Phase 5		P	P
Phase 1–5	P		P

#### Detail of rye and indeterminate cereal remains

Phase	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 1–5
<b>Fat-hen</b> (utricle): <i>Chenopodium album</i>				1		2
<b>Goosefoots</b> (utricle): <i>Chenopodium</i> spp.						P
<b>Amphibious bistort</b> (achene): <i>Persicaria amphibia</i>						69
<b>Redshank/Pale persicaria</b> (achene): <i>Persicaria maculosa/lapathifolia</i>		7		1		9
<b>Knotgrasses</b> (achene): <i>Polygonum</i> spp.	P	P			P	P
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>	1			6		36
<b>Sheep's sorrel</b> (achene): <i>Rumex acetosella</i>		10		1		
<b>Wild radish</b> (pod): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>		P				
<b>Common marsh-bedstraw</b> (seed): <i>Galium palustre</i>				2		
<b>Cleavers</b> (seed): <i>Galium aparine</i>						3
<b>Bedstraws</b> (seed): <i>Galium</i> spp.	P	P				
<b>Sedges</b> (achene): <i>Carex</i> spp.		12				

#### Detail of charred weed remains

Phase	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 1–5
<b>Brambles</b> (nutlet): <i>Rubus</i> spp.				P	P	
<b>Sloe</b> (stone): <i>Prunus spinosa</i>				P		
<b>Elder</b> (seed): <i>Sambucus nigra</i>				P		
<b>Elders</b> (seed): <i>Sambucus</i> spp.				P	P	P
<b>Bracken</b> (frond frag): <i>Pteridium aquilinum</i>						P
<b>Buttercups</b> (achene): <i>Ranunculus</i> spp.				P	P	P
<b>Alders</b> (nutlet): <i>Alnus</i> spp.				P		P
<b>Goosefoots</b> (utricle): <i>Chenopodium</i> spp.				P	P	P
<b>Oraches</b> (utricle): <i>Atriplex</i> spp.				P	P	P
<b>Campions</b> (seed): <i>Silene</i> spp.				P		
<b>Knotgrasses</b> (achene): <i>Polygonum</i> spp.			P	P	P	P
<b>Docks</b> (achene): <i>Rumex</i> spp.			P		P	P
<b>Heather</b> (frag): <i>Calluna vulgaris</i>						P
<b>Cinquefoils</b> (nutlet): <i>Potentilla</i> spp.				P		
<b>Hemp-nettles</b> (nutlet): <i>Galeopsis</i> spp.				P		
<b>Sedges</b> (achene): <i>Carex</i> spp.				P	P	P
<b>Meadow-grasses</b> (grain): <i>Poa</i> spp.					P	
<b>Grass family</b> (grain): Poaceae				P		

#### Detail of waterlogged fruit and weed remains

## **Rosepark, Balrothery, Co. Dublin**

Grid reference: **32020/26121**

SMR: **DU005-013**

References: **Johnston 2008; Carroll 2008.**

Excavations at Rosepark, Balrothery, Co. Dublin revealed a hilltop multi-phase enclosure complex from approximately the late Iron Age until the eighth/ninth century A.D. An unenclosed habitation site, consisting of seven souterrains, succeeded the hilltop settlement but was abandoned prior to the arrival of the Anglo-Normans.

Phase I was marked by the digging of an enclosure ditch (Ditch G) on the summit of the hill. Only 12m of the ditch was excavated, which contained animal bone, charcoal (dated to A.D. 259-411) and iron slag. The remainder of the ditch may have been removed due to the digging of later ditches A and F. Contemporary agricultural activity occurred at the base of the hill as two cereal-drying kilns produced similar radiocarbon dates. The remainder of the kilns were undated but it is likely that many were contemporary. A number of possible huts may also date to this phase as they were truncated by a Phase II ditch (Ditch E). Phase I was largely devoid of artefacts except for a possible iron axehead.

In Phase II, during the fifth/sixth century, an inner (Ditch A) and outer ditch (Ditch B) were excavated on the hilltop. A linear ditch (Ditch E) also extended eastwards from Ditch B while a large house was constructed at this time between the inner and outer enclosures. An entranceway, represented by parallel trenches, was located to the east of the outer enclosure. Ditch A contained large quantities of charcoal and its lower fill was dated to A.D. 431-607. E ware sherds were identified in its upper fill and can be dated between the mid sixth and seventh centuries. It is likely that the outer enclosure was contemporary with the inner enclosing ditch as it related to Ditch E which cut a number of the Phase I features. Only a few finds came from Ditch B, including a possible iron belt buckle and a bone needle, while the only find from Ditch E was an iron escutcheon.

The hilltop enclosure was extensively modified between the sixth and eighth centuries during Phase III. Ditch F was largely a re-cut of Ditch A, the inner enclosure of the Phase II site. A new outer enclosure, Ditch C, was dug but was not as extensive as the previous outer enclosure. However, it showed evidence for an associated stone-revetted bank. Charcoal from Ditch C was dated to A.D. 671-778, while E ware was recovered from both ditches A and C. Other finds from the upper fill of Ditch C included an iron belt buckle, a bronze pin, a knife and a loom weight. Ditch J was likely a continuation of Ditch C and it also probably had a related stone-revetted bank. The ratio of the three main animal domesticates was similar to Phase II.

The disarticulated remains of three adults were found in a shallow pit on top of the hill. One of the individuals was dated to A.D. 582-694. This burial activity may relate to the latter part of Phase II or Phase III

The Phase III outer enclosure enclosed two souterrains while a further five were located further downhill from the hilltop enclosure. The enclosed souterrains may relate to this phase or, alternatively and more likely, they all belong to Phase IV. This phase dated from the ninth century until the arrival of the Anglo-Normans. The souterrains possibly represent a movement from enclosed to open settlement at this point and it appears that the hilltop enclosure was abandoned by the eighth or ninth centuries. Some of the souterrains were used, after their abandonment, as cereal-drying kilns.

### **Plant remains**

Analysis of nine deposits provided evidence for charred cereal grains and chaff, as well as charred hazelnut fragments and weed seeds. The exact quantities were not recorded in most cases – the taxa lists seem to have been omitted from both the published report (Johnston 2008) and the unpublished excavation report. As a result, some plant taxa may be missing from the tables below. Fruit remains appear to have been absent.

A variety of cereals was present, including common oat, hulled barley, six-row barley and naked wheat. It is not clear from which phase of activity the naked wheat and common oat were derived, as they were mentioned in the overview of results, rather than being associated with individual deposits. Overall, barley was predominant, comprising more than three-quarters of the cereal remains present. Oat was occasionally dominant in individual deposits. The presence of germinated barley grains suggests that at least some of the barley was being prepared for malting.

The weed seeds are likely to represent plants that were growing locally, as well as plants that may have been growing alongside the cereals. Weeds of the Chenopodiaceae (goosefoot) family were most commonly recorded, with seeds from the Polygonaceae (knotweed) and Asteraceae (daisy) families also present.



**Phase I at Rosepark, Co. Dublin (after Carroll 2008, 24)**





**Phase II at Rosepark, Co. Dublin (after Carroll 2008, 30).**



**Phase III at Rosepark, Co. Dublin (after Carroll 2008, 52).**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
UB-4808	Charcoal from fill of Phase I Ditch G	1693±22 BP	<b>A.D. 259-296;</b> <b>A.D. 321-411</b>
UB-4807	Charcoal from cereal drying kiln (Kiln 1)	1689±15 BP	A.D. 262-279; <b>A.D. 326-410</b>
UB-4809	Charred cereal grains from cereal drying kiln (Kiln 2)	1639±21 BP	<b>A.D. 343-440;</b> A.D. 486-531
OxA-11472	Charcoal from lower fill of Phase II Inner Enclosure (Ditch A)	1524±36 BP	<b>A.D. 431-607</b>
UB-4810	Charcoal from Phase III outer enclosure (Ditch C)	1269±23 BP	<b>A.D. 671-778</b>
Beta-236600	Human bone from shallow pit	1380±40 BP	<b>A.D. 582-694;</b> A.D. 704-705; A.D. 748-765

## Overview

- Phase 1: Kilns and Structures (5 deposits)
  - Contained cereal grains and chaff, hazelnut shell and weeds.
  - Hulled barley and six-row barley were present. A number of the barley grains were germinated.
- Phase 2: Ditch A: kiln (1 deposit)
  - Contained indeterminate cereal grains and weed seeds.
- Phase 3: Ditch C (1 deposit)
  - Contained oat and barley grains.
- Phase 4: Later kiln: kiln (1 deposit)
  - Contained oat and barley grains, as well as weed seeds.
- Miscellaneous: (1 deposit)
  - Comprises a deposit that is thought to be early medieval but could not be directly associated with any of the other phases of activity.
  - Contained one hulled barley grain.

	Cereal (grain)	Cereal (chaff)	Hazelnut (shell frag)	Weed (seed)	Date
<b>Phase 1: Kilns and Structures</b>	P	P	P	P	A.D. 259–296; A.D. 321–411. A.D. 262–279; <b>A.D. 326–410.</b> <b>A.D. 343–440;</b> A.D. 486–531.
<b>Phase 2: Ditch A</b>	P			P	<b>A.D. 431–607.</b>
<b>Phase 3: Ditch C</b>	P				<b>A.D. 671–778. A.D. 582–694;</b> A.D. 704–705; A.D. 748–765.
<b>Phase 4: Later kiln</b>	P			3	
<b>Misc.</b>	1				

**Overview of all plant groups (total deposits n=9)** P = present

	<b>Oat</b> (grain)	<b>Hulled barley</b> (grain)	<b>Six-row barley</b> (rachis internode)	<b>Barley</b> (grain)	<b>Barley</b> (germinated grain)	<b>Indet. cereal</b> (grain)	<b>Indet. cereal</b> (chaff)
<b>Phase 1: Kilns and Structures</b>		P	P	P	P	P	P
<b>Phase 2: Ditch A</b>						P	
<b>Phase 3: Ditch C</b>	P			P		P	
<b>Phase 4: Later kiln</b>	P			P			
<b>Misc.</b>		1					

**Detail of cereal remains**

## **Sallymount (Site 1), Co. Limerick**

Grid Ref: **166527/160525**

SMR No: **N/A**

Reference: **Haston 2011; Clarke & Long 2009.**

Extensive early medieval activity was identified at Sallymount, Co. Limerick, represented by a sub-circular enclosure and an attached sub-rectangular enclosure. The sub-circular enclosure would seem to have had a domestic function. A structure consisting of four posts 2m apart arranged in a square (Structure 2) was identified in the interior of the enclosure. A charred hazelnut shell from the fill of one of these holes produced a radiocarbon date of A.D. 671-772 (UBA-12268). No features were identified within the four-post structure; however the ground surface was compacted and slightly stonier than the surrounding area suggesting its use as a floor. A probable hearth was located to the north of this structure and returned a calibrated date range of A.D. 557-644 (UBA-12269).

Seven stakeholes were recorded approximately 1 m to the south of the four-post structure. They were roughly aligned in a north/south direction and arranged in a fashion that could indicate they supported some kind of wattle structure/screen. Another, more substantial fence or screen was located between Structure 2 and the entrance to the enclosure.

The enclosure ditch was re-cut and the entrance causeway remodelled, probably in the seventh century – a charred grain returned a radiocarbon date of A.D. 581-664 (UBA-12265). Three refuse pits were cut into the re-deposited material within the ditch. These contained food refuse as well as tiny un-diagnostic fragments of slag and spheroidal hammerscale from metalworking. A hazelnut from one of these pits was radiocarbon dated to A.D. 653-766 (UBA-12267), while charcoal from another pit produced a radiocarbon date of A.D. 572-646 (UBA-12273). A curvilinear feature truncated the eastern side of the original sub-circular enclosure ditch. Radiocarbon dating of this feature returned a calibrated date of A.D. 677-774 (UBA-12275).

Shortly after the construction of the sub-circular enclosure two additional ditches were excavated to create a sub-rectangular enclosure annexed to the original one. Organic material from the basal layers of these ditches produced dates of A.D. 581-650 (UBA-12280), while the upper fill of the ditches produced dates of A.D. 673-772 (UBA-12271) and A.D. 679-775 (UBA-12272). The sub-rectangular enclosure would appear to have a more industrial focus and deposits in the ditch included evidence of smithing hearths/furnace bottoms, fragments of slag and corroded iron, as well as two fragments of chert debitage, one fragment of flint debitage and two fragments of quartz debitage.

Two postholes located just inside the causeway entrance in the south of the sub-rectangular enclosure were probably related to a gate structure. Three clusters of postholes and pits were located in the interior of this enclosure. These contained fragments of slag and had evidence for hearths, and would appear to have had some industrial function.

Structure 3, approximately 4 m x 2.50 m, was located just outside this enclosure. This structure was defined by a series of postholes, one of which produced a radiocarbon date of A.D. 612-661 (UBA-12281). The fill of these postholes included slag, flake hammerscale, spheroidal hammerscale, and furnace lining. Two features located in the interior of this structure have been interpreted as smithing hearths associated with metalworking.

Structure 4 was also located just south of the sub-rectangular enclosure and consisted of two dumbbell-shaped cereal-drying kilns set inside a structure surrounded by a series of postholes. A central wall separated the structure into two parts, each one containing a kiln. The kiln deposits returned radiocarbon dates of A.D. 653-770 (UBA-9935) and A.D. 688-870 (UBA-9934).

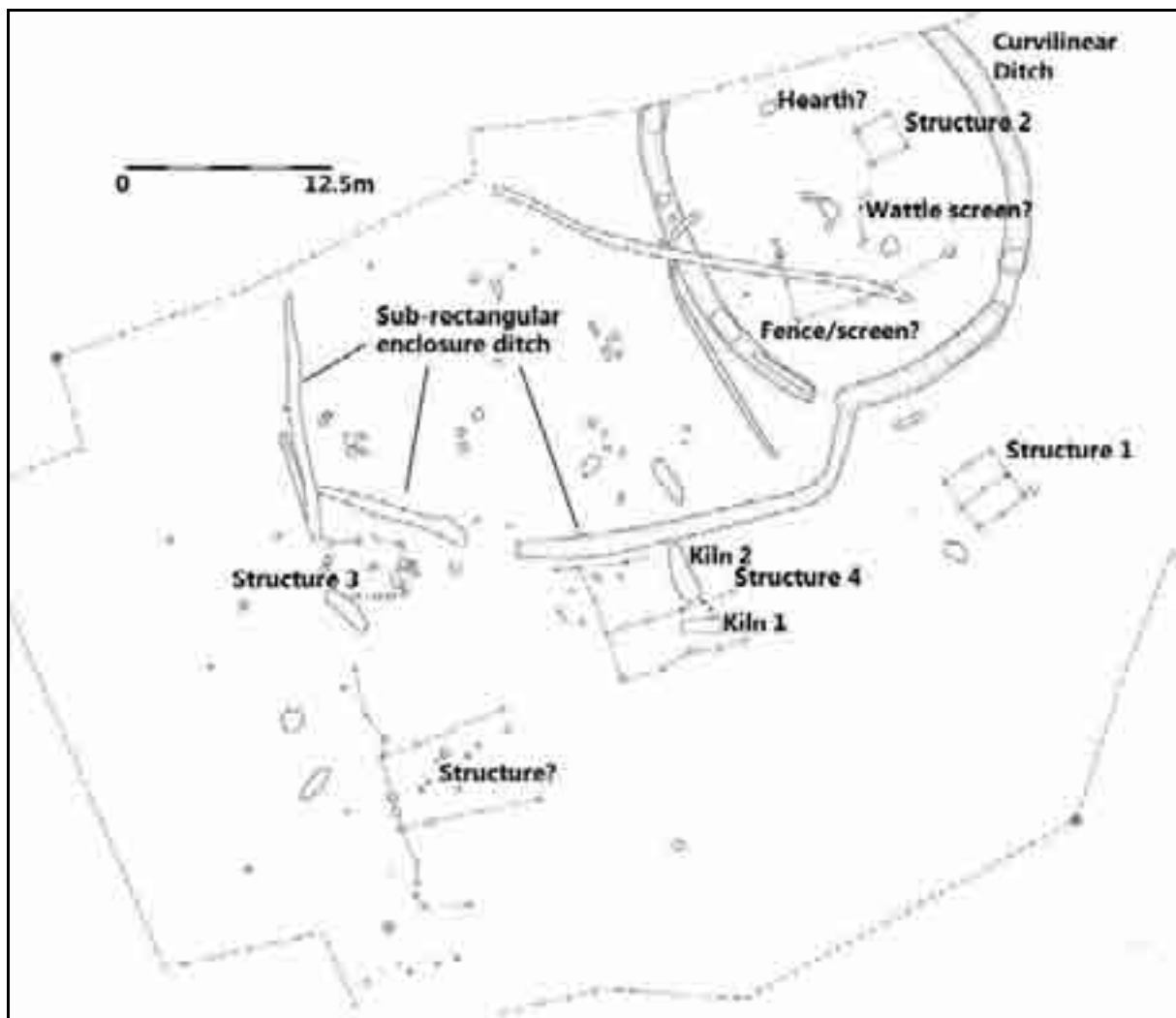
It is tentatively suggested that an alignment of at least 11 postholes and features to the south of Structure 3 may have formed another structure. The shape of the structure represented by the features discussed below is unclear though they seem to reflect one long alignment of postholes with a northwest/southeast orientation combined with several shorter northeast/southwest alignments. The structure measured approximately 11 m long and 6 m wide.

### Plant remains

Analysis of 11 deposits provided evidence for a total of 107 charred cereal grains, 2 hazelnut shell fragments and 17 weed seeds. Cereal chaff and fruit remains were absent.

Cereals were recorded in a number of locations. A variety of crops was present, including oat, hulled barley and bread/club wheat. The weed remains may represent arable weeds and plants that were growing locally.

There appear to be a number of inconsistencies between the plant remains report (Haston 2011) and the main text of the excavation report (Clark & Long 2011). There are several instances where the recovery of plant remains from certain contexts was mentioned in the main report, but these remains were not recorded in the plant remains report. The data below reflect the evidence from the plant remains report only. It is therefore possible that further plant remains were recovered from this site.



Enclosures at Sallymount, Co. Limerick (after Clarke & Long 2009)

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
UBA-9934	Charred hazelnut C592 – basal fill of cereal-drying kiln 1	1239±24 BP	<b>A.D. 688-870</b>
UBA-9935	Charred barley C123 – basal fill of cereal-drying kiln 2	1320±26 BP	<b>A.D. 653-721;</b> <b>A.D. 741-770</b>
UBA-12265	Charred cereal C12 – recut of curvilinear ditch	1413±33 BP	<b>A.D. 581-664</b>
UBA-12266	Charcoal C52 – basal fill of curvilinear ditch	1501±22 BP	A.D. 470-478; <b>A.D. 535-624</b>
UBA-12267	Hazelnut C54 – upper fill of waste pit	1327±21 BP	<b>A.D. 653-710;</b> A.D. 747-766
UBA-12268	Hazelnut C211 – fill of posthole Structure 2	1284±23 BP	<b>A.D. 671-772</b>
UBA-12269	Hazelnut C224 – deposit in hearth	1464±25 BP	<b>A.D. 557-644</b>
UBA-12270	Charcoal C6 – tertiary fill of curvilinear ditch	1684±24 BP	A.D. 259-285; A.D. 288-292; <b>A.D. 322-419</b>
UBA-12271	Hazelnut C71 – fill of sub-rectangular enclosure ditch	1282±20 BP	<b>A.D. 673-730;</b> <b>A.D. 735-772</b>
UBA-12272	Hazelnut C82 – fill of sub-rectangular enclosure ditch	1270±19 BP	<b>A.D. 679-775</b>
UBA-12273	Charcoal C85 – fill of waste pit	1451±21 BP	<b>A.D. 572-646</b>
UBA-12274	Charred wheat C317 – fill of posthole	2781±28 BP	<b>1004-888 B.C.;</b> 883-844 B.C.
UBA-12275	Hazelnut C269 – fill of sub-rectangular enclosure ditch	1275±20 BP	<b>A.D. 677-774</b>
UBA-12276	Hazelnut C292 – fill of posthole	1279±21 BP	<b>A.D. 674-773</b>
UBA-12277	Hazelnut C317 – fill of posthole	3262±23 BP	<b>1612-1493 B.C.;</b> 1475-1461 B.C.
UBA-12278	Charcoal C323 – fill of pit	2735±32 BP	971-960 B.C.;; <b>934-813 B.C.</b>
UBA-12279	Charcoal C325 – fill of posthole	1649±21 BP	<b>A.D. 337-434;</b> A.D. 493-506; A.D. 523-526
UBA-12280	Charcoal C121 – fill of sub-rectangular enclosure ditch	1439±21 BP	<b>A.D. 581-650</b>
UBA-12281	Charcoal C423 – fill of posthole Structure 3	1400±19 BP	<b>A.D. 612-661</b>
UBA-12282	Emmer C523 – fill of posthole Structure 1	1653±29 BP	A.D. 261-281; <b>A.D. 325-440;</b> A.D. 486-531
UBA-12283	Charcoal C119 – upper fill of sub-rectangular enclosure ditch	1716±23 BP	<b>A.D. 255-392</b>
UBA-15462	Charcoal C111 – basal fill of sub-rectangular enclosure ditch	1622±26 BP	<b>A.D. 387-535</b>

## Overview

- Structure 1 (3 deposits)
  - This structure dates to the Iron Age/early medieval transition.
  - Predominantly oat grains, with smaller quantities of hulled barley and bread/club wheat.
  - One weed seed also recorded.
- Deposits cut into sub-circular ditch (2 deposits)
  - Sub-circular ditch appears to date to the Iron Age, but deposits were cut into the ditch during the early medieval period.
  - Contained a small number of cereal grains, including oat and hulled barley.
- Structures 3 & 4, Possible Structure (5 deposits)
  - Included two kilns in Structure 4.
  - Contained a similar number of cereal grains when compared with Structure 1, although in this case, hulled barley and oat were recorded in rather similar quantities.
  - Weed seeds and hazelnut shell fragments were also present.
- Miscellaneous post-hole (1 deposit)
  - Contained one indeterminate cereal grain.

Phase	Cereal (grain)	Hazelnut (shell frag)	Weed (seed)	Date
<b>Structure 1</b>	49		1	A.D. 261–281; <b>A.D. 325–440</b> ; A.D. 486–531.
<b>Deposits cut into sub-circular ditch</b>	5			<b>A.D. 581–664. A.D. 653–710</b> ; A.D. 747–766. <b>A.D. 572–646. A.D. 677–774.</b>
<b>Structures 3 &amp; 4, Possible structure</b>	52	2	16	<b>A.D. 612–661.</b> A.D. 653–721; A.D. 741–770. <b>A.D. 688–870.</b>
<b>Misc.</b>	1			<b>A.D. 337–434</b> ; A.D. 493–506; A.D. 523–526.

### Overview of all plant groups (total deposits n=11)

Phase	Oat (grain)	Barley (grain)	Wheat (grain)
<b>Structure 1</b> (n=42)	92.86%	2.38%	4.76%
<b>Deposits cut into sub-circular ditch</b> (n=2)			
<b>Structures 3 &amp; 4, Possible structure</b> (n=41)	56.10%	43.90%	0.00%
<b>Misc.</b> (n=0)			

### Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	Hulled barley (grain)	Bread/Club wheat (grain)	Indet. cereal (grain)
<b>Structure 1</b>	39	1	2	7
<b>Deposits cut into sub-circular ditch</b>	1	1		3
<b>Structures 3 &amp; 4, Possible structure</b>	23	18		11
<b>Misc.</b>				1

### Detail of cereal remains

<b>Phase</b>	<b>Structure 1</b>	<b>Deposits cut into sub-circular ditch</b>	<b>Structures 3 &amp; 4, Possible structure</b>	<b>Misc.</b>
<b>Fat-hen</b> (utricle): <i>Chenopodium album</i>	1		12	
<b>Redshank</b> (achene): <i>Persicaria maculosa</i>			1	
<b>Common sorrel</b> (achene): <i>Rumex acetosa</i>			1	
<b>Sun spurge</b> (seed): <i>Euphorbia helioscopia</i>			1	
<b>Ribwort plantain</b> (seed): <i>Plantago lanceolata</i>			1	

**Detail of weed remains**



**Scart (Site 20), Co. Kilkenny**Grid reference: **256788/122394**SMR No: **N/A**Reference: **McClatchie 2010; McClatchie pers. Comm; Monteith 2010.**

Archaeological investigations were carried out at Scart Site 20 in advance of construction of the N9/N10 Kilcullen to Waterford road scheme. Three early medieval dumbbell-shaped drying kilns were discovered, two of which have been radiocarbon dated to the 8<sup>th</sup> to 10<sup>th</sup> and 9<sup>th</sup> to 12<sup>th</sup> centuries respectively. The kilns are located immediately to the north of a recorded enclosure and possible souterrain (KK040-05201-02).

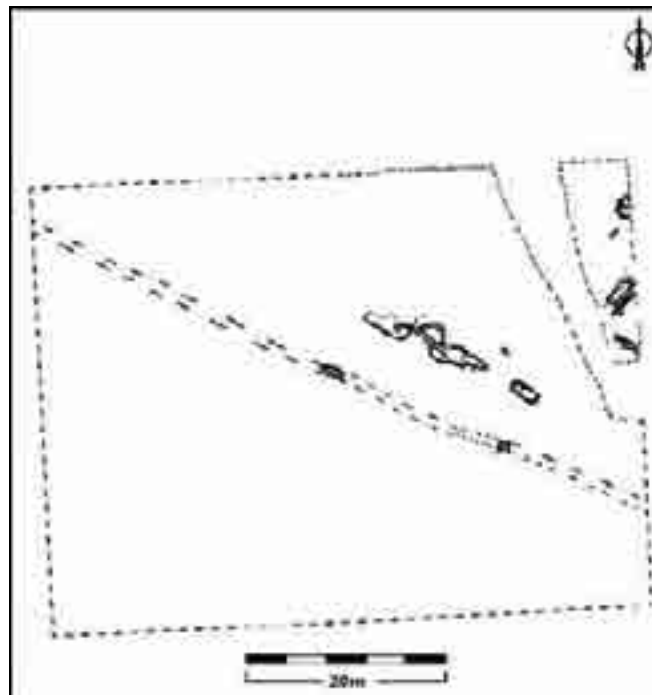
Two of the kilns (C.1 and C.3) contained substantial quantities of charred cereal grains (predominantly oat), with another kiln (C.15) producing a smaller quantity of remains. Each kiln was oval or slightly 'waisted' in plan, with almost vertical sides and a flattened base. Burning was recorded at the base of each kiln, and charcoal analysis revealed that oak was the principal fuel. One of the kilns was located close to a small hearth, while another contained a post-hole in its base, as well as two linear slot trenches nearby, potentially representing the foundation of an associated structure. Animal bone fragments recovered from some of the kiln fills may represent waste or may have been added to fires to aid combustion.

A fourth kiln (C.20), which showed three phases of use and re-modelling, was slightly later in date, being radiocarbon dated to the 12<sup>th</sup> to 13<sup>th</sup> centuries. A further possible kiln (C.16), which was undated, was located nearby.

**Plant remains**

Analysis of 3 deposits provided evidence for a large charred plant remains assemblage. A total of 4570 cereal grains, 3 cereal chaff fragments, 31 hazelnut shell fragments and 144 weed seeds were recorded. Fruit remains were absent.

A variety of crops was present, including oat, barley (hulled and six-row varieties) and possible naked wheat. The weed remains may represent arable weeds and plants that were growing locally.



**Plan of excavations at Scart, Site 20 (after Monteith 2010, Figure 8)**

## Radiocarbon Dates:

Reimer, P.J., Baillie, M.G.L., Bard, E., Bayliss, A., Beck, J.W., Bertrand, C.J.H., Blackwell, P.G., Buck, C.E., Burr, G.S., Cutler, K.B., Damon, P.E., Edwards, R.L., Fairbanks, R.G., Friedrich, M., Guilderson, T.P., Hogg, A.G., Hughen, K.A., Kromer, B., McCormac, G., Manning, S., Bronk Ramsey, C., Reimer, R.W., Remmele, S., Southon, J.R., Stuiver, M., Talamo, S., Taylor, F.W., van der Plicht, J. & Weyhenmeyer, C.E. 2004. IntCal04 terrestrial radiocarbon age calibration, 0–26 cal kyr BP. Radiocarbon, 46, 1029–58.

Sample No.	Context	14C Date	Cal. 2 $\sigma$
Poz-25473	Phase 1: Oat grain from Kiln C.3	1125 $\pm$ 30 BP	A.D. 783–787; A.D. 817–843; <b>A.D. 860–991.</b>
Poz-25579	Phase 1: Oat grain from Kiln C.1	1030 $\pm$ 35 BP	A.D. 897–921; <b>A.D. 942–1044;</b> A.D. 1097–1119; A.D. 1142–1147.

## Overview

- Phase 1: Kilns
  - Large quantity of cereal grains and occasional chaff (predominantly oat; smaller quantities of possible naked wheat and barley – hulled and six-row).
  - Also significant quantity of weed remains and occasional hazelnut shell fragments.

Phase	Cereal (grain)	Cereal (chaff)	Hazelnut (shell)	Weed (seed)	Date (A.D.)
<b>Phase 1: Kilns</b>	4570	3	31	144	783–787; 817–843; <b>860–991</b> ; 897–921; <b>942–1044</b> ; 1097–1119; 1142–1147.

## Overview of all plant groups (total deposits n=3)

Phase	Oat (grain)	Barley (grain)	Wheat (grain)
<b>Phase 1: Kilns</b> (n=4407)	93.62%	2.97%	3.40%

## Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	Oat (grain frag)	Oat (floret base)	Six-row hulled barley (grain)	Hulled barley (grain)	Hulled barley (grain frag)	Barley (grain)
<b>Phase 1: Kilns</b>	4126	1689	3	42	62	3	27

## Detail of oat and barley remains

Phase	cf. Naked wheat (grain)	Wheat (grain)	Barley/Wheat (grain)	Barley/Wheat (grain frag)	Indet. cereal (grain frag)
<b>Phase 1: Kilns</b>	144	6	163	94	286

## Detail of wheat and indeterminate cereal remains

Phase	Phase 1: Kilns
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>	12
<b>Knotgrasses/Docks</b> (achene): <i>Polygonum/Rumex</i> spp.	16
<b>Wild radish</b> (pod): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>	59
<b>Wild radish</b> (pod frag): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>	42
cf. <b>Vetches/Pea</b> (seed frag): cf. <i>Vicia/Lathyrus</i> spp.	1
<b>Bedstraws</b> (seed): <i>Galium</i> spp.	4
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>	53
<b>Grass family</b> (culm frag): Poaceae	1

#### Detail of weed remains

### **Skahanagh North (Site 3), Co. Cork**

Grid Ref: **177510/085940**

SMR No: **CO 053-10**

Reference: **Akeret & Jacques 2006; Murphy 2006.**

Topsoil stripping in advance of road construction revealed a series of archaeological features including a sixth/seventh century enclosure and a C-shaped structure. The levelled enclosure was most likely of univallate construction and had an approximate internal diameter of 22m. No evidence for an enclosing bank was identified during the excavation, but a curvilinear section of the western portion of the ditch was excavated. This was U-shaped in profile (maximum dimensions of 3.4m wide and 1.2m deep) with sloping sides and a flat base, and had a 4.0m wide entrance at its northwest end.

This ditch contained four main fills. Charcoal from the basal fill produced a radiocarbon date in the seventh century (see below); and a metal object was recovered from its top fill. A stone deposit (2m in diameter and 0.2m in depth) was found within the top fill of the ditch at the northwest end.

A C-shaped structure was situated to the southwest of the enclosure and was contemporary with it. It was roughly contemporary though pre-dated by a number of internal pits, deposits and features. The earliest features comprised two sub-circular charcoal-rich deposits containing oxidized clay and seeds- mainly oats followed by barley. There was no evidence for *in situ* burning and these deposits may represent the dumping of fire debris.

Two gullies, one hearth and a pit represented the next phase of activity pre-dating the C-shaped structure. One curvilinear gully splaying outwards at its southward extent was identified as a flue of a possible kiln. Cereal grains- primarily oats as well as wheat- were found in its basal fill. A pit filled with fire-debris cut this feature and may have destroyed its hearth.

A second gully or flue (0.5m by 2m and 0.2m in depth) truncated the first gully but did not extend beyond it, so it is likely that these features were broadly contemporary and in use together. Both gullies were cut by the C-shaped foundation trench. If indeed these features were the flues of kilns, they were then out of use before the area was enclosed.

A sub-circular pit and a partially stone-lined hearth were roughly contemporary with the gullies. The sub-circular pit (1.5m by 1.12m and 0.3m deep) contained charcoal, oxidized clay and sandstone and was used to dispose of fire-debris. The hearth (1.5m by 0.8m and 0.3m deep) was also cut by the C-shaped trench and contained charcoal, burnt bone and cereal grains, mainly oats followed by barley. Charcoal from its fill produced a date in the seventh to ninth century range (see below). The C-shaped trench enclosed a space with a diameter of 7m by 9m internally and 10m by 10m externally. It is unclear if the structure was a roofed dwelling though it instead may have been erected to act as a wind break shielding the internal hearths and pits from the prevailing south-westerly winds. The location of an entrance, 3.7m wide to the north-east facing the enclosure supports this interpretation. Charcoal, burnt bone, carbonized wood and a large quantity of cereal grains (primarily oats, barley and some wild plants) were recovered from its eight deposits were recovered, and a radiocarbon date in the in the seventh to ninth century range (see below) was recorded from the charcoal.

Roughly contemporary with the C-shaped foundation trench were two internal pits and two pits to the southeast. The internal features comprised a pit containing a hearth and a sequence of fire debris which cut the earlier gully and a sub-circular pit. Charcoal, oxidized clay and a large quantity of cereal grains were recovered from the various deposits within the sequence of fire debris. The pit (3.5m by 1.3m and 0.8m deep) truncated the enclosing C-shaped trench and was the latest feature on the site. The hearth (1.2m by 0.2m and 0.2m deep) was stone-lined and cut into the southeast side of the pit. It had a heavily oxidized base and contained charcoal, burnt bone carbonized wood and a large quantity of seeds, primarily those of oats followed by barley. A second pit (0.8m in diameter and 0.4m deep) was cut into the top fill of this pit. Two burnt fragments of bone and a copper-alloy implement, most likely used as an ear scraper or a type of grooming implement, was recovered from

its lower fill. Charcoal from its lower fill produced a radiocarbon date in the sixth/seventh century (see below).

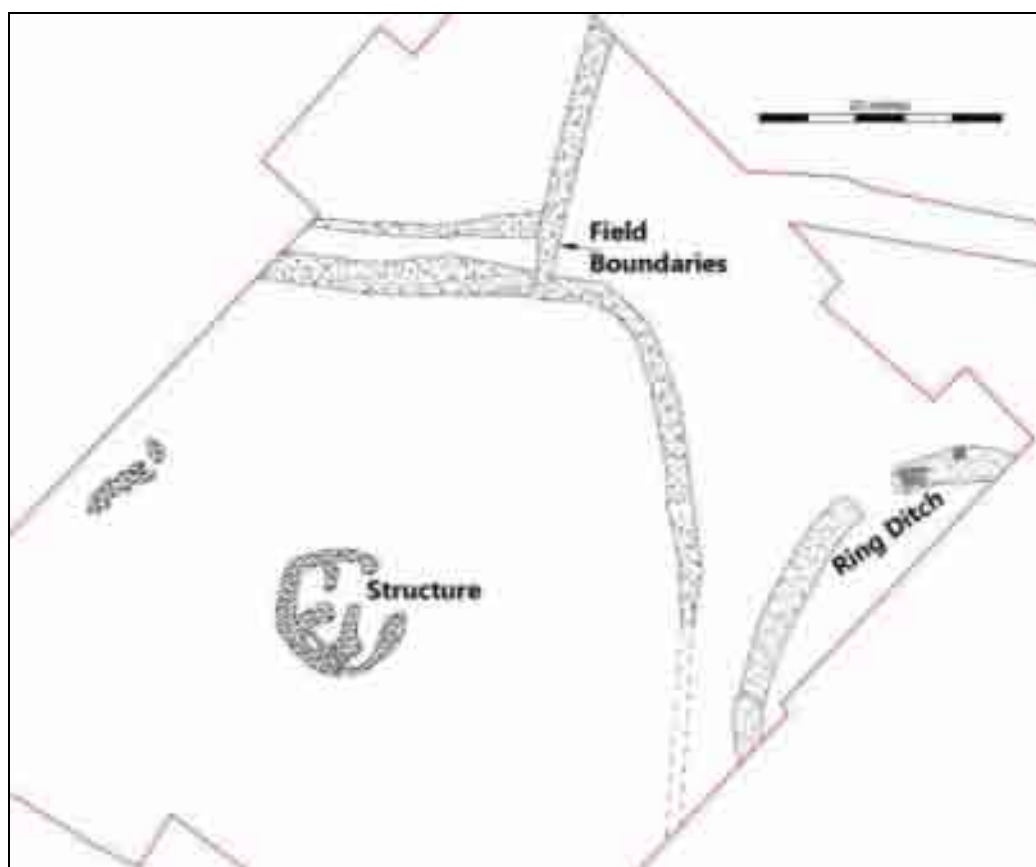
Two sub-oval pits to the southeast were excavated, one of which contained a hearth at its base, from which charcoal, burnt bone and a large quantity of seeds- primarily oats and barley- was recovered. An oak sample from its fill produced a radiocarbon date in the seventh to ninth century range (see below). Two other possible sub-circular hearths were located to the west of the C-shaped structure. The first hearth contained charcoal, burnt bone fragments and oxidized clay within its fills; and the other possible hearth contained charcoal and small stones.

Fire debris, burnt bone and a large quantity of grains (principally oats and to a lesser extent barley, with smaller amounts of rye, wheat and wild plants) indicate that the area to the southwest was used for food preparation and cooking. The possible kiln flues tentatively indicate cereal-drying in this area as well. The small quantity of burnt bone could not be identified to species but contained both large mammal (assumed to be cattle, horse or large deer) and medium-sized mammal (assumed to be sheep/goat, pig or small deer). The few finds from the site consisted of modern ceramic sherds, a metal object and two copper-alloy implements.

### **Plant remains**

Analysis of 12 deposits provided evidence for more than 1000 charred cereal grains, as well as occasional charred cereal chaff and weed remains. The exact quantities of remains were not recorded in most cases – comments on general ubiquity were instead provided, which have been noted below. Hazelnut shell and fruit remains were absent.

A variety of cereals was present, including common oat, hulled barley, wheat and rye. The weed seeds are likely to represent plants that were growing locally and plants growing alongside the cereals.



**Plan of Skahanagh North, Co. Cork (after Murphy 2006)**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
Beta - 201060	Charcoal- identified as oak- from fill of C-shaped trench	1240 $\pm$ 60 BP	<b>A.D. 660-896</b> A.D. 923-940
Beta - 201061	Charcoal- identified as oak- from fill of hearth to the southeast of C-shaped trench	1240 $\pm$ 70 BP	<b>A.D. 657-899</b> A.D. 918-954 A.D. 956-961
Beta - 201062	Charcoal- identified as ash, hazel and oak- from lower fill of secondary pit cut into top fill of pit	1440 $\pm$ 50 BP	A.D. 471-477 <b>A.D. 535-673</b>
Beta - 201063	Charcoal- identified as oak- from hearth inside C-shaped structure	1290 $\pm$ 60 BP	<b>A.D. 649-878</b>
Beta - 201064	Charcoal- identified as ash- from basal fill of enclosing ditch	1380 $\pm$ 40 BP	<b>A.D. 582-694</b> A.D. 704-705 A.D. 748-765

## Overview

- C-shaped structure (12 deposits)
  - Contained a large quantity of cereal grains and occasional cereal chaff. Oat remains were predominant, some of which were identified as common oat. Hulled barley was present in smaller quantities, while wheat and rye were occasionally recorded.
  - Weed remains were also present.

Phase	Cereal (grain)	Cereal (chaff)	Weed (seed)	Date
<b>C-shaped structure</b>	P	P	P	A.D. 471–477, <b>A.D. 535–673</b> , <b>A.D. 649–878</b> , <b>A.D. 660–896</b> , A.D. 923–940, <b>A.D. 657–899</b> , A.D. 918–954, A.D. 956–961.

## Overview of all plant groups (total deposits n=12)

P = present

Phase	Common oat (florete base)	Oat (grain)	Hulled barley (grain)	Barley (grain)	Wheat (grain)	Rye (grain)
<b>C-shaped structure</b>	2	P	P	P	1	1

## Detail of cereal remains

Phase	C-shaped structure
<b>Oaks</b> (bud): <i>Quercus</i> spp.	1
<b>Knotweeds</b> (achene): <i>Persicaria</i> spp.	2
<b>Docks</b> (achene): <i>Rumex</i> spp.	1
<b>Wild radish</b> (pod): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>	P
<b>Cleavers</b> (seed): <i>Galium aparine</i>	P

## Detail of wood and weed remains

## **Sroove (Lough Gara td), Co. Sligo**

Grid Reference: **170055/299996**

SMR No: **SL046-029**

References: **McClatchie 2002; Fredengren 2002.**

Sroove crannog was a small, multi-phase crannog, 15m in diameter and 1.2m high, situated on the western shore of Lough Gara. The crannog was originally located in very shallow water (presently exposed as a water meadow due to modern drainage), on top of an earlier stone causeway.

Phase 1 is represented by a stone-built causeway leading out into the lake, 18m in length. The causeway was built over blue lake clays, and a sandy surface produced by trampling lay on its upper surface. There were a few fragments of animal bone (cattle, pig and sheep) from its surface. Its date is unknown.

Phase 2 was an early medieval wooden crannog with a stone causeway, palisade and house. The phase's brushwood floor produced a radiocarbon date of A.D. 776-966. The site was enclosed within a circular palisade, measuring 17m in diameter, of double and single rows of ash-wood posts driven to a depth of 0.40m into the clay. There was a possible rectangular jetty at the north side of the crannog. After the construction of the palisade, an oval to rectangular house with rounded corners was built on the crannog's surface. This house measured 6.5m by 8m internally, and was defined by closely-spaced posts and was protected by stones on the lake side. The house's floor was a thick (0.20m) layer of hazel brushwood, intermixed with clay. The floor produced evidence for blackberries and a small number of oat grains, as well as animal bone. Overall, there were 1511 pieces of bone in Phase 2 deposits (only 8.82% of site total), representing at least four cattle (two adults, two juveniles), four sheep/goat, three pig, one young horse, and one deer. There was a possible entrance (1m wide) at the southwest wall of the house, effectively hidden from view from the probable crannog entrance (at the causeway). A possible hearth was represented by a fire-reddened stone at the centre of the house. Outside the house, the space between it and the palisade was narrow. Finds from Phase 2 included a bone pin (found in stone packing at the house wall), a thumb-scraper of flint (a probable late Neolithic/early Bronze Age type) near a post and a black chert arrowhead found in floor clays. These objects were probably carried onto the site.

Phase 3 was a stony-surfaced crannog, with radiocarbon dates from A.D. 717-1176. The crannog surface was rebuilt with a floor of flagstones and smaller boulders, in two/three layers, with an outer deck of timbers laid around the edges of the site. Although there was no clear structural evidence for a house, palaeoecological and other studies suggest that there was a house on this floor. The hearth was re-used, suggesting a strong symbolic link with the previous phase's house. This phase of the hearth contained a small number of grains from four different types of cereals. Remains of blackberry, raspberry, sloe and elder were also found in Phase 3 deposits. The palisade may have been pulled up towards the end of this phase. There were also large amounts of animal bone found, particularly in front of the door of the house and to the left towards the lake. This comprised a major proportion of the site's bone assemblage (56%), representing the remains of at least sixteen cattle, twelve pig, eight sheep, six horse, one deer, one wild duck, and one hare. Finds from inside the house in this phase are more representative of personal possessions, including a lignite bracelet, a comb fragment from near the fireplace, bone beads, as well as iron nails and a bone pin towards the back of the house. There was also a small bone needle and knife found at the back of the house. There were also finds from outside the house, including iron nails, the head of a ringed pin and bronze studs from a leather strap.

Phase 4 was an open stony platform devoted to iron working, with radiocarbon dates between A.D. 663 and A.D. 969. The site had a uniform floor of stone and bone, and was covered with small, shattered and fire-cracked stones (0.10m thick). The stones were mixed with animal bones, suggesting that this was a deliberate floor deposit. There was no house on the platform, which was probably open to the air. There was no palisade, suggesting a decreasing role of the island's boundary. There was a bowl-shaped depression in the southwest corner of the crannog, possibly in origins a furnace for iron-working, set in a floor of fire-cracked stones. There was some iron slag in

this area, although there were not large amounts. A heavy stone may have been used as an anvil. There were deposits of animal bone all over the site (comprising 30% of the site assemblage), with large amounts comprising a floor at the eastern edge of the crannog. The bone was frequently fragmented, suggesting that it had been walked into the crannog's surface. The Phase 4 burned and unburnt bone included at least 20 cattle, nine pig, seven sheep, four horse, one deer and one dog. Cereal remains were not recorded from this phase of activity, although fruit remains were present. Finds from across the site included an antler ring, smooth white stones (possibly used in crafts), a tracked stone (for sharpening pins) and a lignite bracelet in the sand.

Phase 5 was the final phase of occupation in the early medieval period, possibly no later than A.D. 1000. A stone cairn was constructed across the site, with angular stones and boulders laid on it, with a mid-cairn on the lakeward site. It is possible that it had a superstructure of planks or that it was unfinished.

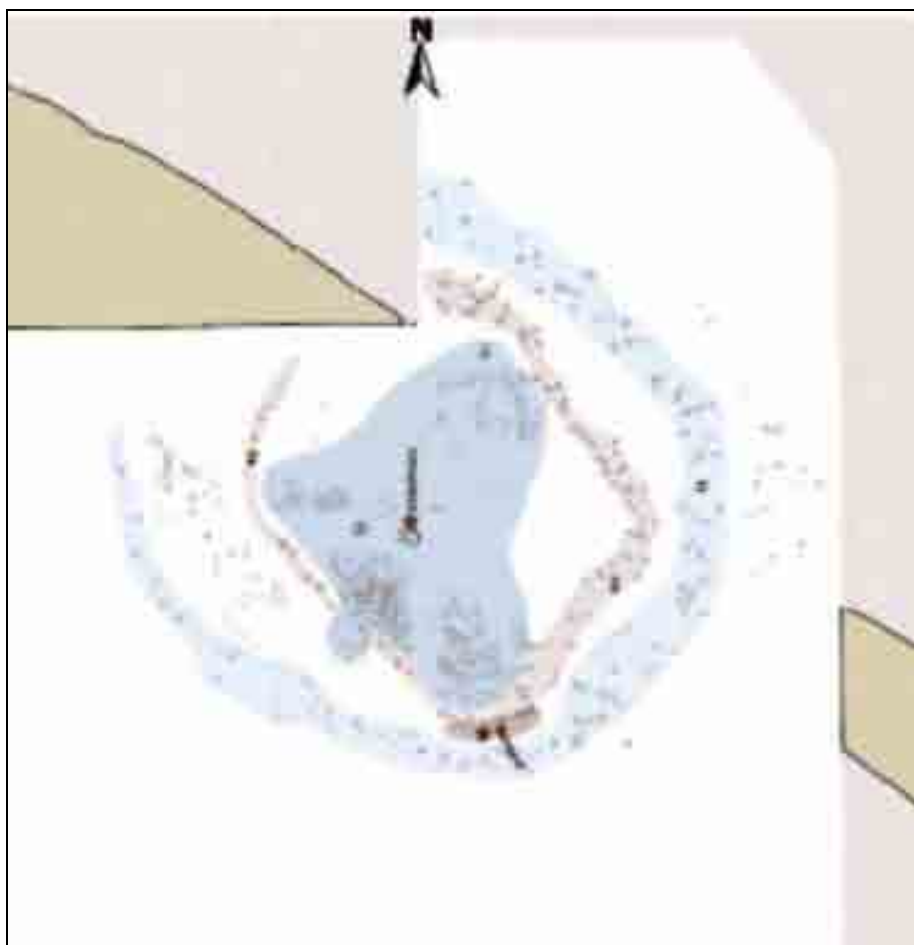
### **Plant remains**

Analysis of five deposits provided evidence for a total of 10 charred cereal grains, 6 charred weed seeds, 155 waterlogged fruit seeds and 125 waterlogged weed seeds. Cereal chaff was absent. Nut remains were also absent from the examined deposits, although the excavator noted that hazelnut shell was observed in some of the Phase 2 deposits – it is unclear if these remains were charred or waterlogged.

Cereal grains were present in deposits from Phases 2 and 3. Despite the small number of cereal grains recorded, four different cereal types were represented: oat, barley, wheat and rye. The weed seeds are likely to represent plants there were growing locally, as well as plants that may have been growing alongside the cereals.

There appear to be a number of inconsistencies in the dating/phasing of deposits when one compares the analytic text with the stratigraphic report for the excavation (Fredengren 2002). Data from the stratigraphic report have been presented below.





**Phase II at Sroove, Co. Sligo (after Fredengren 2002)**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Huguen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
Gr-25306	Phase 4: Cattle bone from fire-cracked stone floor (F18)	1290±30 BP	<b>A.D. 663-775</b>
Gr-25309	Phase 2: Vertical wooden post from southern house wall (F4)	1240±30 BP	<b>A.D. 686-873</b>
Gr-25267	Phase 3: Wood from timber floor (F13)	1180±40 BP	<b>A.D. 717-743; A.D. 768-907; A.D. 911-971</b>
Gr-25367	Phase 2: Wood from brushwood floor (F6)	1170±30 BP	<b>A.D. 776-901; A.D. 917-966</b>
Gr-25308	Phase 3: Wood from timber floor (F13)	1170±30 BP	<b>A.D. 776-901; A.D. 917-966</b>
Gr-23305	Phase 4: Charcoal from fire-cracked stone floor (F18)	1160±30 BP	<b>A.D. 778-903; A.D. 914-969</b>

Gr-25266	Phase 2: Wooden vertical peg from western house gable (F4)	1110±25 BP	<b>A.D. 888-988</b>
ST-14697	Phase 2: Vertical wooden post from southern palisade (F3)	1260±120 BP	<b>A.D. 581-1016.</b>
ST-14696	Phase 3: Wood from timber floor (F13)	1035±80 BP	A.D. 781-790; <b>A.D. 808-1176.</b>

### Overview

- Phase 2 – crannog (1 deposit)
  - Contained a small number of oat grains.
  - Also waterlogged fruit and weed seeds, and occasional charred weed seeds.
- Phase 3 – rebuilt crannog (3 deposits)
  - Contained a small number of oat, barley, wheat and rye grains.
  - Also occasional charred weed seeds, and larger quantities of waterlogged fruit and weed seeds.
- Phase 4 – stone platform (1 deposit)
  - Cereal remains were absent.
  - Contained a significant quantity of waterlogged fruit and weed seeds.

Phase	Cereal (grains)	Fruit (seed)	Weed (seed)	Dates
<b>Phase 2</b>	2	14	47	<b>A.D. 581-1016. A.D. 686-873. A.D. 888-988.</b> A.D. 776-901; A.D. 917-966.
<b>Phase 3</b>	8	58	41	A.D. 717-743; A.D. 768-907; A.D. 911-971. A.D. 776-901; A.D. 917-966. A.D. 781-790; <b>A.D. 808-1176.</b>
<b>Phase 4</b>		83	43	<b>A.D. 663-775. A.D. 778-903;</b> A.D. 914-969.

### Overview of plant groups (total deposits n=5)

Phase	Oat (grain)	Barley (grain)	Wheat (grain)	Rye (grain)
<b>Phase 2</b>	2			
<b>Phase 3</b>	3	3	1	1
<b>Phase 4</b>				

### Detail of cereal remains

Phase	Phase 2	Phase 3	Phase 4
<b>Raspberry</b> (nutlet): <i>Rubus idaeus</i>	3	8	2
<b>Bramble</b> (nutlet): <i>Rubus fruticosus</i>	11	47	81
<b>Brambles</b> (nutlet frag): <i>Rubus</i> spp.	1	48	10
<b>Sloe</b> (stone): <i>Prunus spinosa</i>		1	
<b>Elder</b> (seed): <i>Sambucus nigra</i>		2	

### Detail of waterlogged fruit remains

Phase	Phase 2	Phase 3	Phase 4
<b>Fat-hen</b> (utricle): <i>Chenopodium album</i>	1	2	
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>	3		

### Detail of charred weed remains

Phase	Phase 2	Phase 3	Phase 4
<b>Bulbous buttercup</b> (achene): <i>Ranunculus bulbosus</i>	4		
<b>Buttercups</b> (achene): <i>Ranunculus</i> spp.		3	
<b>Common nettle</b> (achene): <i>Urtica dioica</i>	3	6	5
<b>Small nettle</b> (achene): <i>Urtica urens</i>			1
<b>Mouse-ears</b> (seed): <i>Cerastium</i> spp.		1	
<b>Corncockle</b> (seed): <i>Agrostemma githago</i>			1
<b>Pale persicaria</b> (achene): <i>Persicaria lapathifolia</i>		1	4
<b>Sheep's sorrel</b> (achene): <i>Rumex acetosella</i>	27		
<b>Docks</b> (achene): <i>Rumex</i> spp.	5	20	21
<b>Cinquefoils</b> (nutlet): <i>Potentilla</i> spp.	1	1	
cf. <b>Bedstraws</b> (seed): cf. <i>Galium</i> spp.		1	
<b>Stinking chamomile</b> (achene): <i>Anthemis cotula</i>			1
<b>Common spike-rush</b> (achene): <i>Eleocharis palustris</i>			1
<b>Hairy sedge</b> (achene): <i>Carex hirta</i>	1		
<b>Sedges</b> (achene): <i>Carex</i> spp.	2	6	9

#### Detail of waterlogged weed remains

**Toberbrackan, Co. Galway**Grid Ref: **144337/221178**SMR No: **N/A**Reference: **Johnston 2010; Delaney, F. 2010.**

Archaeological investigations were carried out at Toberbrackan in advance of construction of the N18 Oranmore to Gort road scheme (Glenbrack to Rathmorrissey). A D-shaped enclosure was discovered, as well as an associated field system and a smaller attached structure with at least two phases of construction. Two large drying kilns were found within the structure, while evidence for ridge-and-furrow cultivation was recorded within the enclosure. Five early medieval radiocarbon dates were obtained from cereal grains, indicating activity from the 8<sup>th</sup> to the 12<sup>th</sup> centuries.

The enclosing element of the D-shaped enclosure consisted of a low, loose mound of collapsed moss-covered stone. The wall enclosed an area of approximately 300 m<sup>2</sup>. Two field boundary walls radiated from the north and the east of the enclosure, and were of similar composition. A stratigraphic relationship between the D-shaped enclosure and the adjoining structure could not be determined. A well-built wall – composed of inner and outer faces with a rubble core – formed the roughly circular structure, which measured approximately 7m in diameter. A structural element of the structure was radiocarbon dated to the 8<sup>th</sup> to 9<sup>th</sup> centuries, while a deposit beneath the wall was radiocarbon dated to the 9<sup>th</sup> to 10<sup>th</sup> centuries. A section of the eastern side of the wall appears to have been replaced, suggesting that there were at least two phases of construction.

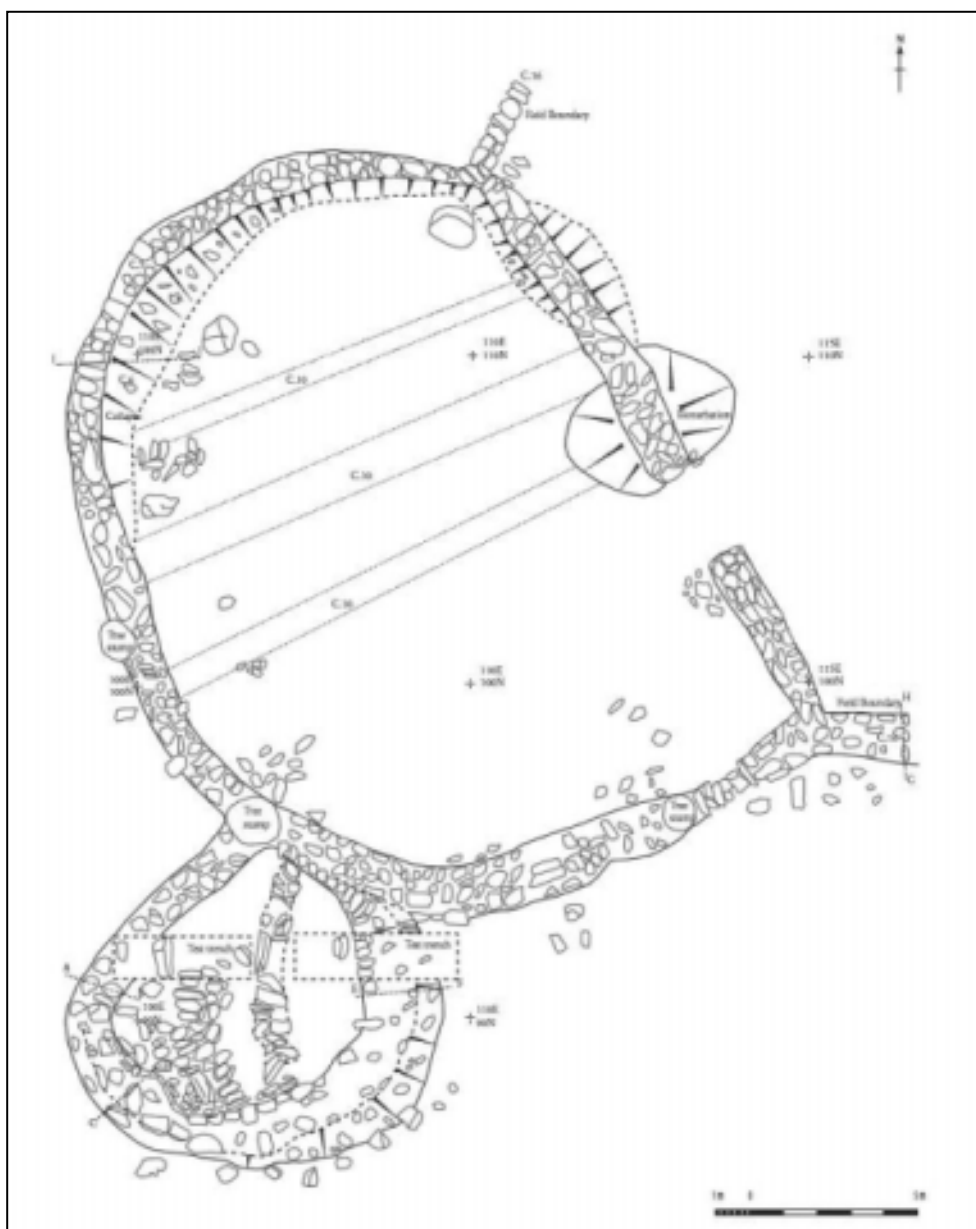
A large dumbbell-shaped kiln (C.27; Kiln 2) was centrally located within the roughly circular structure. Two radiocarbon dates from this kiln suggest activity during the 9<sup>th</sup> to 11<sup>th</sup> centuries. A slightly later dumbbell-shaped kiln (C.26; Kiln 1), which was radiocarbon dated to the 11<sup>th</sup> to 12<sup>th</sup> centuries, was also located within the structure.

Four chert/flint fragments and two rubbing stones were recovered, as well as many fragments of burnt clay. Animal bone fragments were also recorded, in addition to a substantial cereal assemblage, which was dominated by barley.

**Plant remains**

Analysis of 11 deposits provided evidence for a large charred plant remains assemblage. A total of 817 cereal grains, 2 cereal chaff fragments, 2 hazelnut shell fragments and 1282 weed seeds were recorded. Fruit remains were absent.

Cereals were recorded in several phases of activity. A variety of crops was present, including oat, hulled barley, possible naked wheat and possible rye. The weed remains may represent arable weeds and plants that were growing locally.



**Plan of excavations at Toberbrackan (after Delaney 2010, 11)**

### Radiocarbon dates

Reimer, P.J., Baillie, M.G.L., Bard, E., Bayliss, A., Beck, J.W., Bertrand, C.J.H., Blackwell, P.G., Buck, C.E., Burr, G.S., Cutler, K.B., Damon, P.E., Edwards, R.L., Fairbanks, R.G., Friedrich, M., Guilderson, T.P., Hogg, A.G., Hughen, K.A., Kromer, B., McCormac, G., Manning, S., Bronk Ramsey, C., Reimer, R.W., Remmele, S., Southon, J.R., Stuiver, M., Talamo, S., Taylor, F.W., van der Plicht, J. & Weyhenmeyer, C.E. 2004. IntCal04 terrestrial radiocarbon age calibration, 0–26 cal kyr BP. Radiocarbon, 46, 1029–58.

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-16195	Phase 1: Hulled barley grain from roundhouse wall post-hole C.13	1217 $\pm$ 23 BP	A.D. 713–745; <b>A.D. 767–886.</b>
UB-16194	Phase 1: Hulled barley grain from roundhouse deposit C.9 beneath wall	1126 $\pm$ 23 BP	<b>A.D. 878–986.</b>
UB-16197	Phase 1: Hulled barley grain from Kiln 2 (C.27), northern flue and bowl	1078 $\pm$ 30 BP	A.D. 894–927; A.D. 935–1018.
UB-16198	Phase 1: Hulled barley grain from Kiln 2 (C.27), southern chamber	1110 $\pm$ 24 BP	<b>A.D. 889–987.</b>

UB-16196	Phase 2: Hulled barley grain from Kiln 1 (C.26), southern bowl	944±21 BP	<b>A.D. 1028–1059; A.D. 1063–1155.</b>
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#### Overview

- Phase 1: Round-house (3 deposits)
  - Large quantity of cereal grains (all hulled barley where identified to genus level).
  - Occasional hazelnut shell fragments and weed seeds.
- Phase 1: Kiln 2 (4 deposits)
  - Large quantity of cereal grains (predominantly hulled barley, with smaller quantities of oat, and occasional wheat and possible rye).
  - Occasional cereal chaff and weed remains.
- Phase 2: Kiln 1 (4 deposits)
  - Large quantity of cereal grains (predominantly hulled barley, with smaller quantities of oat and wheat, and occasional possible rye).
  - Very large quantity of weed seeds.

Phase	Cereal (grain)	Cereal (chaff)	Hazelnut (shell frag)	Weed (seed)	Date
<b>Phase 1: Round-house</b>	256		2	25	A.D. 713–745; <b>A.D. 767–886.</b> <b>A.D. 878–986.</b>
<b>Phase 1: Kiln 2</b>	216	2		31	A.D. 894–927; A.D. 935–1018. <b>A.D. 889–987.</b>
<b>Phase 2: Kiln 1</b>	345			1226	A.D. 1028–1059; A.D. 1063–1155.

#### Overview of all plant groups (total deposits n=11)

Phase	Oat (grain)	Barley (grain)	Wheat (grain)	cf. Rye (grain)
<b>Phase 1: Round-house</b> (n=35)	0.00%	100.00%	0.00%	0.00%
<b>Phase 1: Kiln 2</b> (n=96)	11.46%	86.46%	1.04%	1.04%
<b>Phase 2: Kiln 1</b> (n=225)	16.00%	71.56%	12.00%	0.44%

#### Percentage of cereal grain types recorded in each phase of activity

(where >25 total grains recorded)

n=total number of grains recorded that were identifiable to genus

Phase	Oat (grain)	Hulled barley (grain)	cf. Hulled barley (grain)	Barley (grain)	Barley (rachis internode)
<b>Phase 1: Round-house</b>		30	5		
<b>Phase 1: Kiln 2</b>	11	78		5	2
<b>Phase 2: Kiln 1</b>	36	153	8		

#### Detail of oat and barley remains

Phase	cf. Naked wheat (grain)	Wheat (grain)	cf. Rye (grain)	Indet. cereal (grain)
<b>Phase 1: Round-house</b>				221
<b>Phase 1: Kiln 2</b>		1	1	120
<b>Phase 2: Kiln 1</b>	12	15	1	120

#### Detail of wheat, rye and indeterminate cereal remains

Phase	Phase 1: Round-house	Phase 1: Kiln 2	Phase 2: Kiln 1
<b>Goosefoot family</b> (utricle): <i>Chenopodiaceae</i>	8	5	443
<b>Corn spurrey</b> (seed): <i>Spergula arvensis</i>			1
<b>Pink family</b> (seed): <i>Caryophyllaceae</i>			2
<b>Pale persicaria</b> (achene): <i>Persicaria lapathifolia</i>			50
<b>Black-bindweed</b> (achene): <i>Fallopia convolvulus</i>		4	44
cf. <b>Sheep's sorrel</b> (achene): <i>Rumex</i> cf. <i>acetosella</i>		1	2
<b>Knotweed family</b> (achene): <i>Polygonaceae</i>	8	11	49
<b>Wild radish</b> (pod): <i>Raphanus raphanistrum</i> ssp. <i>raphanistrum</i>		1	1
<b>Hemp-nettles</b> (nutlet): <i>Galeopsis</i> spp.			1
<b>Plantains</b> (seed): <i>Plantago</i> spp.	1		385
<b>Cleavers</b> (seed): <i>Galium aparine</i>			1
<b>Nipplewort</b> (achene): <i>Lapsana communis</i>			42
cf. <b>Corn marigold</b> (achene): <i>Chrysanthemum</i> cf. <i>segetum</i>			1
<b>Daisy family</b> (achene): <i>Asteraceae</i>			7
<b>Grass family</b> (grain): <i>Poaceae</i>	4	4	53
<b>Indeterminate</b> (seed)	4	5	144

**Detail of weed remains**

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## Aghadegnan, Co. Longford

Grid Ref: **N13387688 (21338/27688)**

SMR No: **LF013-013**

References: **Carroll 1991; Carroll 1992; Carroll 1993.**

Excavation revealed a number of phases of enclosure on the site. The earliest phase included a roundhouse, defined by a double arc of post-holes (although these probably represent consecutive phases of construction). This building may have been contemporary with another small circular post-built structure, interpreted as an animal pen, as both were cut by a later palisade trench that pre-dated the bank-and-ditched enclosure.

Iron-working appears to have been undertaken between the in-filling of the palisade trench, and the construction of the bank-and-ditched enclosure. A series of post-holes outlined a circular structure with associated charcoal spreads, and may represent a workshop; charcoal and iron slag were found in the upper fill of the earlier palisade trench. Radiocarbon dates from these contexts (see below) suggest a late-fifth/early-sixth century date for this phase of occupation. There is also evidence, in the form of a possible 'ore-roasting pit', charcoal and slag, for iron-working being carried on in the interior of the later banked-and-ditched enclosure.

A radiocarbon date (UB-3451) obtained from bone in the basal layer of the bank (A.D. 577-661) suggests a late-sixth/seventh century date for the construction of the bank-and-ditched enclosure. Although over 500 post-holes were discovered on site, no internal structures can be definitively associated with this phase on occupation. There was evidence for a roundhouse in the interior (approximately 5.60m in internal diameter) which may have been rebuilt at least once, but this structure was undated and may have been associated with the unenclosed settlement which existed pre-palisade trench.

A waterlogged area of the enclosure ditch revealed the evidence for wooden slats (one of which was radiocarbon dated to the seventh/eighth century), which may have functioned as a lining for the ditch, but series of stone-packed post-emplacements found in the ditch suggest that a more substantial feature, such as a revetment or fence may have been present.

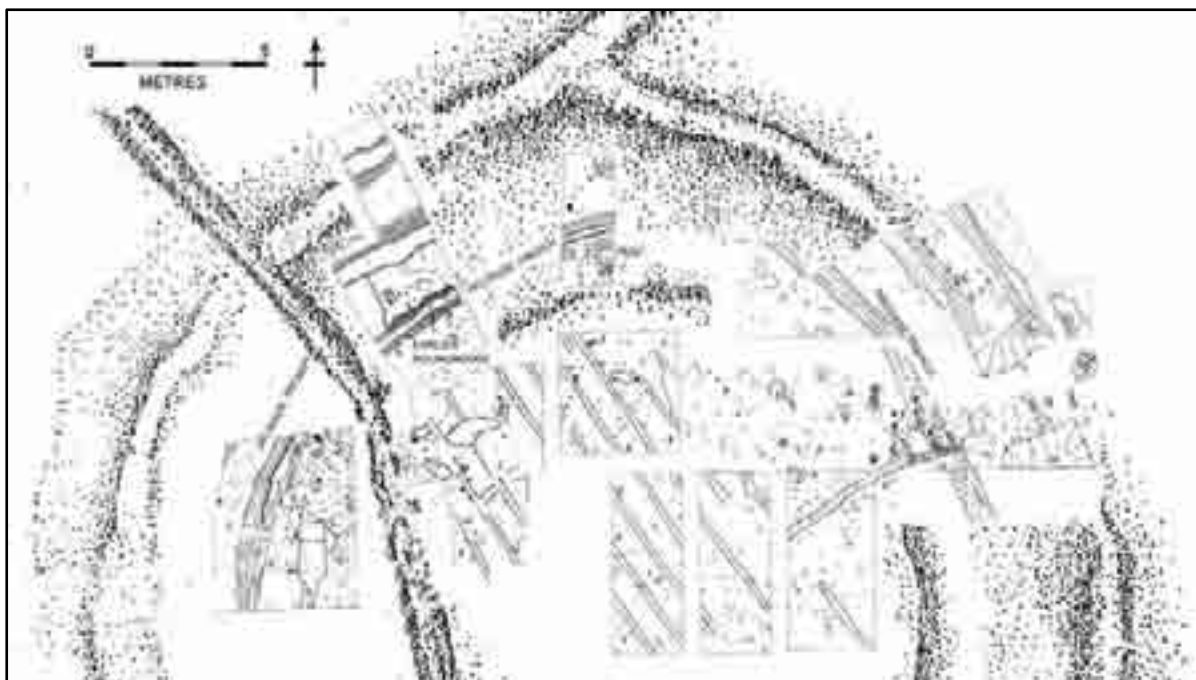
Only a few finds were recovered from the site. A fragment of a cross-engraved stone was found in the lower layers of the bank (which would have been obtained from the upper layer of the ditch cut), and a possible iron-headed pin was found in a similar context in another cutting.

## ANIMAL BONES

A total of 1,010 bones and fragments were recovered from the site, of which 38% (389) could be identifiable to species level.

Phase	Cattle	Sheep/ Goat	Pig	Horse	O. M.	Context	Date
<b>Palisaded Enclosure</b>	45	0	3	2	10	Palisade Trench	<i>*A.D. 411-543</i>
	13	1	1	3	1	Under Bank	
<b>Rath</b>	9	0	0	0	65	Bank	<b>A.D. 577-661.</b>
	74	69	12	5	65	Basal Ditch Fill	A.D. 720-741; <b>A.D. 769-897;</b> A.D. 922-943.
	8	1	0	32	3	Ditch Fill (F53)	
	5	2	0	2	1	Ditch Fill (F55)	

**Bone fragments by phase at Aghadegnan, Co. Longford (O.M. = 'Other Mammal'; \* = modelled date for start of phase).**



Excavated areas at Aghadegnan, Co. Longford (after Carroll 1991 & 1993)

### Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-3451	Bone from basal layer of bank	1421 $\pm$ 32 BP	<b>A.D. 577-661.</b>
UB-3452	Charcoal from iron working in enclosure	1073 $\pm$ 45 BP	<b>A.D. 877-1033.</b>
UB-3453	Charcoal from post-hole in enclosure	516 $\pm$ 32 BP	A.D. 1324-1345; <b>A.D. 1393-1444.</b>
UB-3454	Charcoal from iron-working area on top of palisade trench fill	1551 $\pm$ 33 BP	<b>A.D. 425-580.</b>
UB-3455	Charcoal from burning near iron-working area on top of palisade trench fill	1475 $\pm$ 21 BP	<b>A.D. 552-637.</b>
UB-3456	Charcoal at ditch edge	1289 $\pm$ 32 BP	<b>A.D. 659-778.</b>
UB-3458	Wooden slat from ditch 'revetment'	1270 $\pm$ 21 BP	<b>A.D. 676-776.</b>
UB-3459	Charcoal from iron-working area on top of palisade trench fill	1552 $\pm$ 49 BP	<b>A.D. 410-606.</b>
UB-3461	Charcoal from 'pen' cut by palisade trench	1597 $\pm$ 71 BP	A.D. 259-285; A.D. 288-292; <b>A.D. 322-607.</b>
UB-3468	Bone from base of ditch	1191 $\pm$ 30 BP	A.D. 720-741; <b>A.D. 769-897;</b> A.D. 922-943.

**Antiville, Co. Antrim**Grid Ref: **D39130328 (33913/40328)**SMR No: **ANT 040:042**Reference: **Waterman 1971**

A souterrain was discovered during work on a marshy area of a golf course. Upon further excavation this was found to have been associated with a rectangular stone-built house and an enclosing, largely destroyed, bank and a ditch.

Three phases of occupation were evident within this enclosure. The first phase appears to have ended with the burning of a structure, evidenced by a mass of burnt clay. In Phase II a rectangular dry-stone-wall built dwelling, with rounded corners, was erected. The south wall was shared between the house and the souterrain passage. The dwelling was partially paved, and a hearth was located west-of-centre. Charcoal, sherds of souterrain ware, and flints were recovered from the floor of this building. The souterrain was entered through the south-west corner of the Phase II house. It contained the staves and bases of several wooden vessels (preserved in peat); and the skeleton of a young human male.

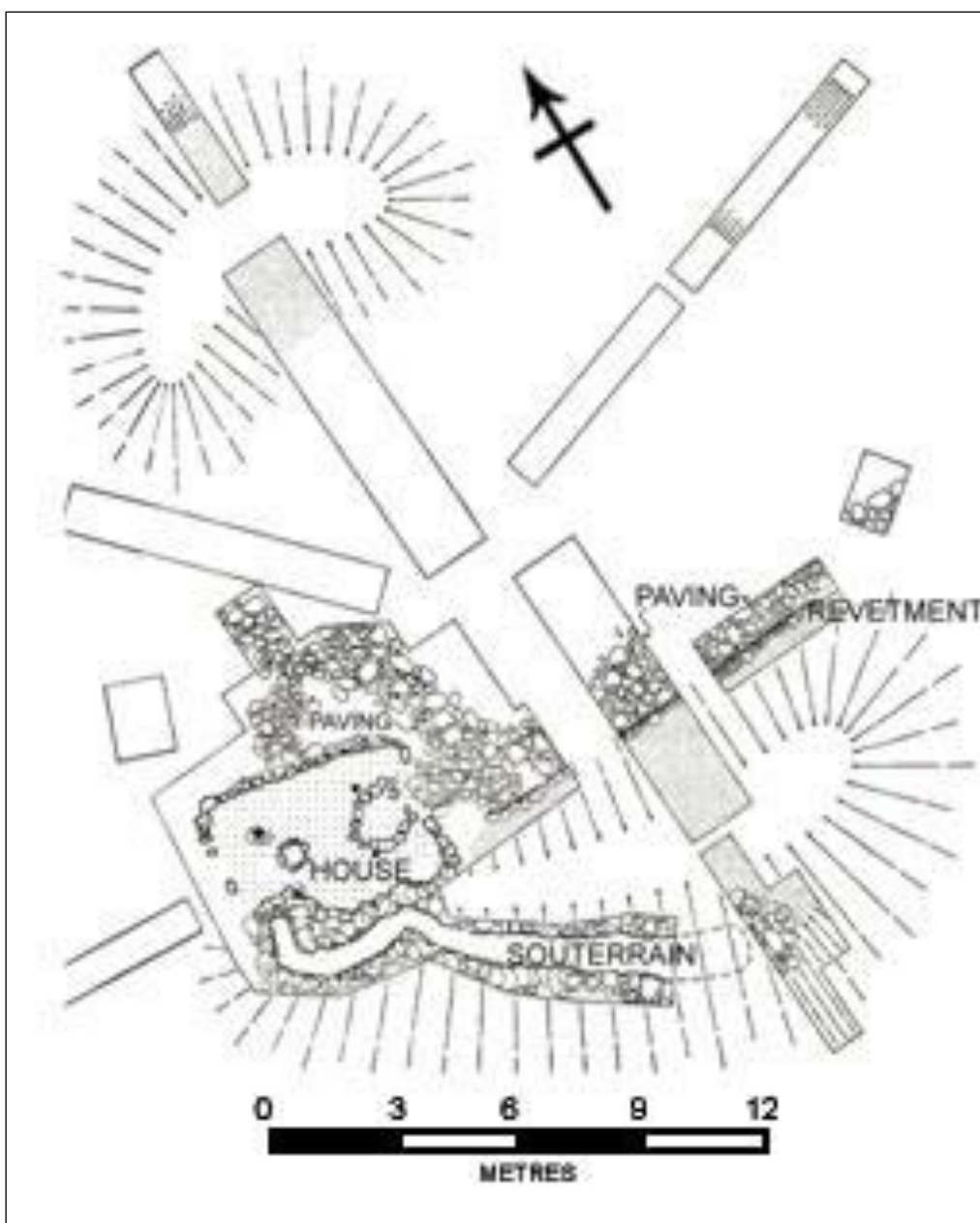
In Phase III the floor of the Phase II house was deliberately covered in peat to a depth of 0.22m, and a hearth was set into the floor. The original structural timbers appear to have been retained, but the original entrance was blocked by a possible corn-drying kiln, and a new entrance was opened up. Sherds of souterrain ware, a broken lignite bracelet, and flints were discovered on this secondary floor.

**Animal Bones:**

Animal bones are mentioned in a number of contexts in the site, but are not quantified or identified.

Phase	Material	Context	Date
Phase II	'Numerous animal bones'	Ditch fill	
	'A few animal bones'	House floor	
	'Mixed animal bones'	Souterrain fill	
Phase III	'Scattered animal bones'	Secondary floor	<b>A.D. 678-895;</b> A.D. 927-935

**Bones remains from Antiville, Co. Antrim**



**Plan of Antiville, Co. Antrim.**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-589	Charcoal in secondary floor deposit	1220 $\pm$ 45 BP	<b>A.D. 678-895;</b> A.D. 927-935

**Ardcloon, Co. Mayo**Grid Ref: **M26879737 (126877/297373)**SMR No: **MA070-072**Reference: **Rynne 1956; Roche 1956**

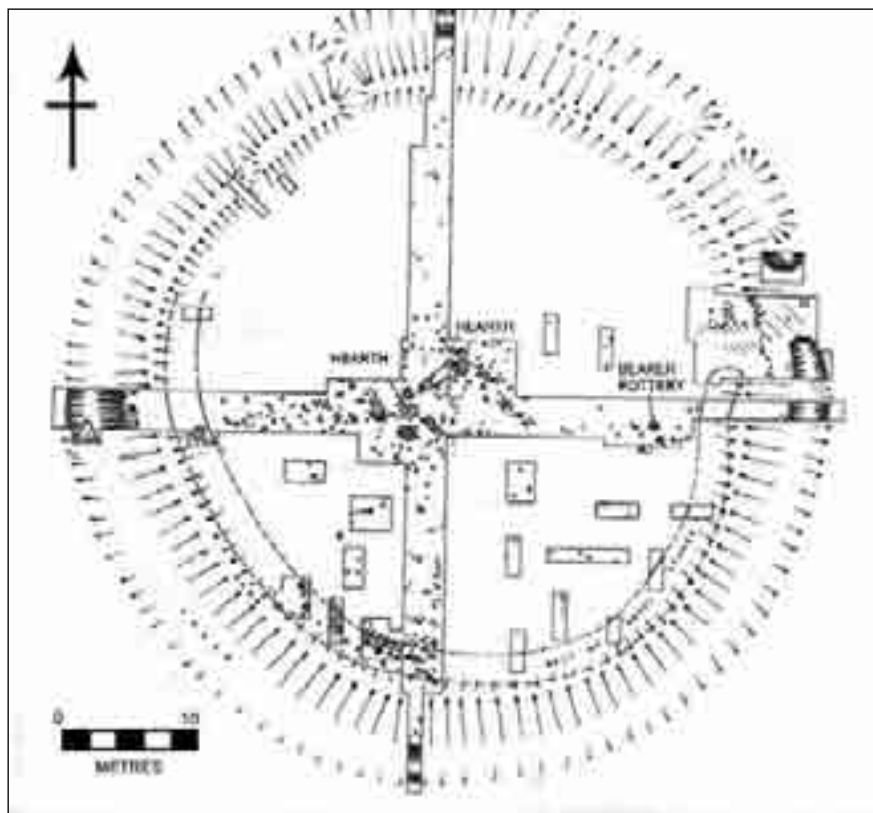
The site consists of a bank-and-ditched enclosure set on the summit of a hill, enclosing a central area of 40m-45m in diameter. Excavation revealed that the lower layers of the bank were constructed from the upcast of the ditch, and that the remainder of the bank was built up from material from elsewhere. The inner face of the bank was supported by a stone revetment, and a deposit of stones in the bottom of the ditch was interpreted as remains of a revetment for the outer face of the bank. The ditch appears to have been allowed to silt up gradually, although in the western stretch it was used as a dump for material from the interior of the site including animal bone and iron slag.

There was little structural evidence in the interior. Two hearths were identified, and a bronze pin found from one of these provided the only diagnostic dating evidence from the site (A.D. 7<sup>th</sup>/8<sup>th</sup> C.). A number of possible post-holes were also identified (including one which contained two sherds of Beaker pottery), but no structural pattern was able to be discerned. The only other finds of significance from this site included an iron knife blade and four pieces of unrefined lead ore.

**Animal Bones:**

Phase	Material	Context	Date
Rath	Sheep (largest %); cattle; horse; pig; red deer; dog; cat.	Ditch	
	Cattle; pig; sheep	Hearth	7 <sup>th</sup> /8 <sup>th</sup> C

**The faunal remains are listed on a presence/absence basis.**



**Plan of Excavated Area at Ardclloon, Co. Mayo (after Rynne 1956, 203).**

**Armagh (Armagh City td.), Co. Armagh**Grid Ref: **H87444511 (28744/34511)**SMR No: **ARM 012:066**References: **Crothers 1999; Gaskell-Brown & Harper 1984; Higgins 1984; Hurl 2003; Lynn 1988; Lynn & McDowell 1988; Matthews 2000.**

The streets around the cathedral of St Patrick's in Armagh have been the subject of a number of excavations which uncovered evidence for early medieval settlement within the early ecclesiastical enclosure. Excavations at Castle Street in 1968 revealed a substantial 'v'-shaped ditch which had been modified at least twice. The earliest phase was ended when material from an outer bank was used to partially in-fill the ditch – the remains of two human burials were included in this fill; and evidence for bronze working (metal fragments, crucibles and ingot moulds) were found in the layers above and below the human remains. By the end of the early medieval period the ditch appears to have been used as a rubbish dump for industrial activity ongoing on site – crucibles, clay moulds, trial pieces and enamel were all found in this area. A stone causeway was built next to the ditch at this time, and three post-holes associated with this have been interpreted as a possible fence.

A number of pits uncovered within the enclosure near this causeway appear to have industrial (or possible domestic) function. Finds from one pit (F) included a bronze pin engraved with birds, a jet bracelet and souterrain-ware. A possible workshop (G) was uncovered, and along with industrial finds such as enamel stick and iron shears, imported material (E-ware sherds and part of a Teutonic glass cone-beaker) were also found. The remains of a wattle-and-daub structure were also excavated (D), which may have acted as a wind-break for the workshop area.

Excavations throughout the 1970s and 1980s in the Scotch Street area revealed evidence for a large Early Medieval cemetery, as well as industrial debris (lignite, glass and amber working), and some settlement evidence (souterrain-ware and some possible structural features). Excavations at Upper English Street uncovered the terminals of a ditch, sealed by a layer which contained sherds of souterrain-ware, and cut into by a second ditch (which contained sherds of everted-rim ware). Industrial activity was identified in the form of metal-working (slag, crucibles and furnace bottoms), and a series of post-holes, stake-holes and hollows may be representative of structures. A ring-ditch which contained slag and charcoal was excavated at Abbey Street. This was radiocarbon dated to the eighth- to tenth-century. Over 2000 sherds of pottery were recovered from this excavation, of which 68 were identified as souterrain-ware or everted-rim ware.

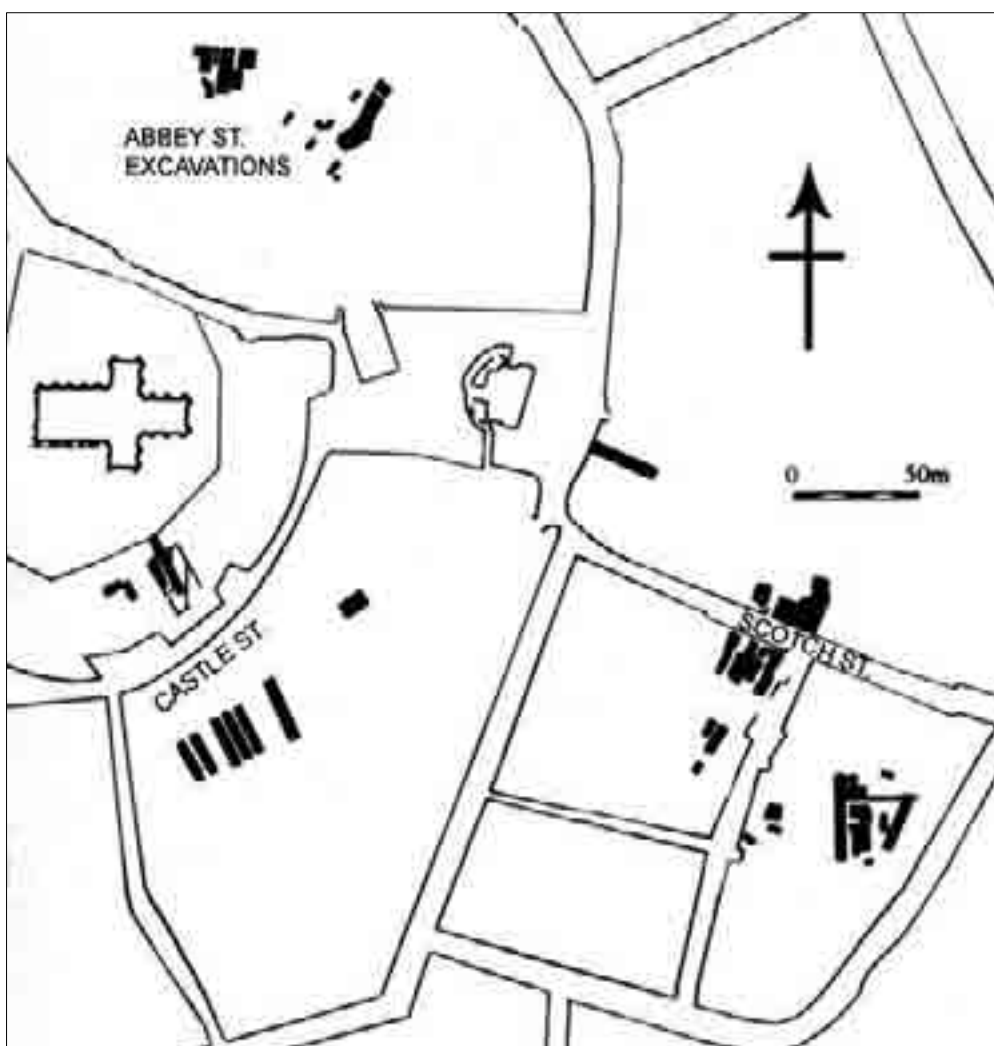
Although substantial evidence for industrial activity (iron-working, bronze-working, lignite-working, glass-working, enamel-working, and amber-working) has been uncovered in these excavations, there is very little archaeological evidence for early medieval settlement. Continuous occupation on the hill in Armagh appears to have significantly truncated and destroyed the remains of earlier settlement.

**Animal Bones:**

A total of 1051 fragments of animal bone were recovered, of which 539 (51%), were identifiable to species level.

Context		Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Dog	Date
Castle Street – Iron Age/Christian Transition	NISP	50	8	15	2	7	15	<b>A.D. 212-577</b>
	MNI	7	3	5	1	2	1	
Castle Street – Early Medieval	NISP	204	33	97	2	6	1	<b>A.D. 427-725</b>
	MNI	26	11	21	2	2	1	

**NISP and MNI from excavations on Cathedral Hill, Armagh.**



**Early Medieval excavations in centre of Armagh City (after Matthews 2000, 220).**

### **Radiocarbon Dates: Castle Street**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
UB-283	Twigs from bottom of primary ditch cut	1660 $\pm$ 80 BP	A.D. 176-190; <b>A.D. 212-577</b>
UB-284	Charcoal overlying human remains in ditch fill	1845 $\pm$ 85 BP	20 B.C. – 12 B.C.; <b>1 B.C. – A.D. 388</b>
UB-285	Carbonized twigs from pit dug into upper ditch fill	1430 $\pm$ 85 BP	<b>A.D. 427-725;</b> A.D. 738-772.

### **Radiocarbon Dates: Abbey Street**

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
UB-3769	Charcoal from ring-ditch	1219 $\pm$ 68 BP	<b>A.D. 667-968</b>



**Radiocarbon Dates: Scotch Street**

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
UB-2437	Wood from grave G	1510 $\pm$ 50 BP	<b>A.D. 432-638</b>
UB-2438	Wood from grave G	1400 $\pm$ 40 BP	<b>A.D. 572-678</b>
UB-2439	Charcoal from fire pit (F11)	1685 $\pm$ 30 BP	A.D. 258-299; A.D. 318-422

**Animal Bone Appendix:**

<b>Approx age (months)</b>	<b>Unfused</b>	<b>Fused</b>	<b>% Fused</b>
12-18	3	25	89
24-36	3	4	57
36-48	11	15	58

**Epiphyseal fusion data for cattle**

**Ballinderry I, Co. Westmeath**  
**Early Medieval Crannog**

Grid reference: **N19884262 (219884/242620)**

SMR No: **WM030-118**

Reference: **Hencken 1936; Roche & Stelfox 1936**

The discovery of a Viking sword in 1928 brought Ballinderry I to the attention of the National Museum, and the site was subsequently excavated by the Harvard expedition in 1932. The crannog produced occupation evidence for the tenth and eleventh centuries A.D., with intermittent activity on the site until the seventeenth century.

*Phase 1 – Pre-crannog occupation (late tenth-century A.D.)*

A rectangular log platform (6m x 6m), defined at its edges by a circular palisade (7m in diameter) of posts, was constructed at this time. There were two superimposed hearths (layers of grey clay and charcoal), and it is possible that this was also a rectangular house, perhaps similar to timber houses in Hiberno-Scandinavian Dublin. Finds included two socketed spearheads, various metal objects, as well as an assemblage of artefacts that were of a distinctively Viking character; including a Viking long bow, two iron Viking spearheads, an iron Viking sword, an iron Viking battle axe, two glass linen smoothers and an iron strike-a-light. There was also a collection of objects that could be described as Hiberno-Scandinavian (with good parallels from tenth-century Dublin), including a decorated yew-wood gaming board, motif pieces, a kite brooch, ringed pins, a hanging lamp, a wooden zoomorphic terminal and a copper-alloy strap end.

*Phase 2 – Primary crannog (early to mid-eleventh-century A.D.)*

A deposit of sterile, black peat was laid over the previous occupation, and a 'classic', modestly sized crannog, with a circular palisade (15m diameter), a circular house and a surrounding timber decking, were constructed during this phase. Finds from the substructure of Phase 2 included copper-alloy pin fragments and a plain-ringed loop-headed pin; finds from the occupation layer of Phase 2 included an iron plough coulter, a socketed pronged tool and two iron rings. Finds from the earliest phase of the house included a copper-alloy pennanular brooch (tenth-century type), a bronze pin and a blue glass bracelet; finds from the intermediate phase of the house included a silver kite-shaped brooch and three ringed pins; and finds from the final phase of the house included an iron spearhead and a single-sided comb.

*Phase 3 – Primary crannog (mid eleventh-century A.D.)*

The crannog was enlarged at this time, with a massive pile palisade (26m x 32m), a defined entrance to the southeast, a quay and a brushwood floor. A sterile peat layer was placed over the centre, burying the previous, abandoned house, and a wattle screen was laid down and the site was enlarged to the east with layers of peat and brushwood.

*Phase 4 – Reconditioning of site (mid to late eleventh-century A.D.)*

Two houses were constructed at this time, the palisade was repaired, and the entrance was blocked, suggesting that the crannog was now surrounded by water. The interior of the site was levelled off with peat and branches. There were various hearths within the site which have been interpreted as the floor of houses. There was a large, centrally placed 'hearth' of ashes that developed in two stages. This could have been a rectangular house floor. There were also two hearths at the northeast edge of the site, with rectilinear plank floors and fireplaces. An oak plank palisade was inserted in those places where the pile palisade was in need of repair, particularly on the eastern side of the site (where the piles were tilting dramatically). Finds from this phase included an iron knife, a crutch-head ringed pin, a boat fragment, a bone pin and a wooden tub. It is also possible that a bronze hanging lamp was lost outside the palisade at this stage.

*Phase 5 – Site abandonment (late eleventh-century A.D.)*

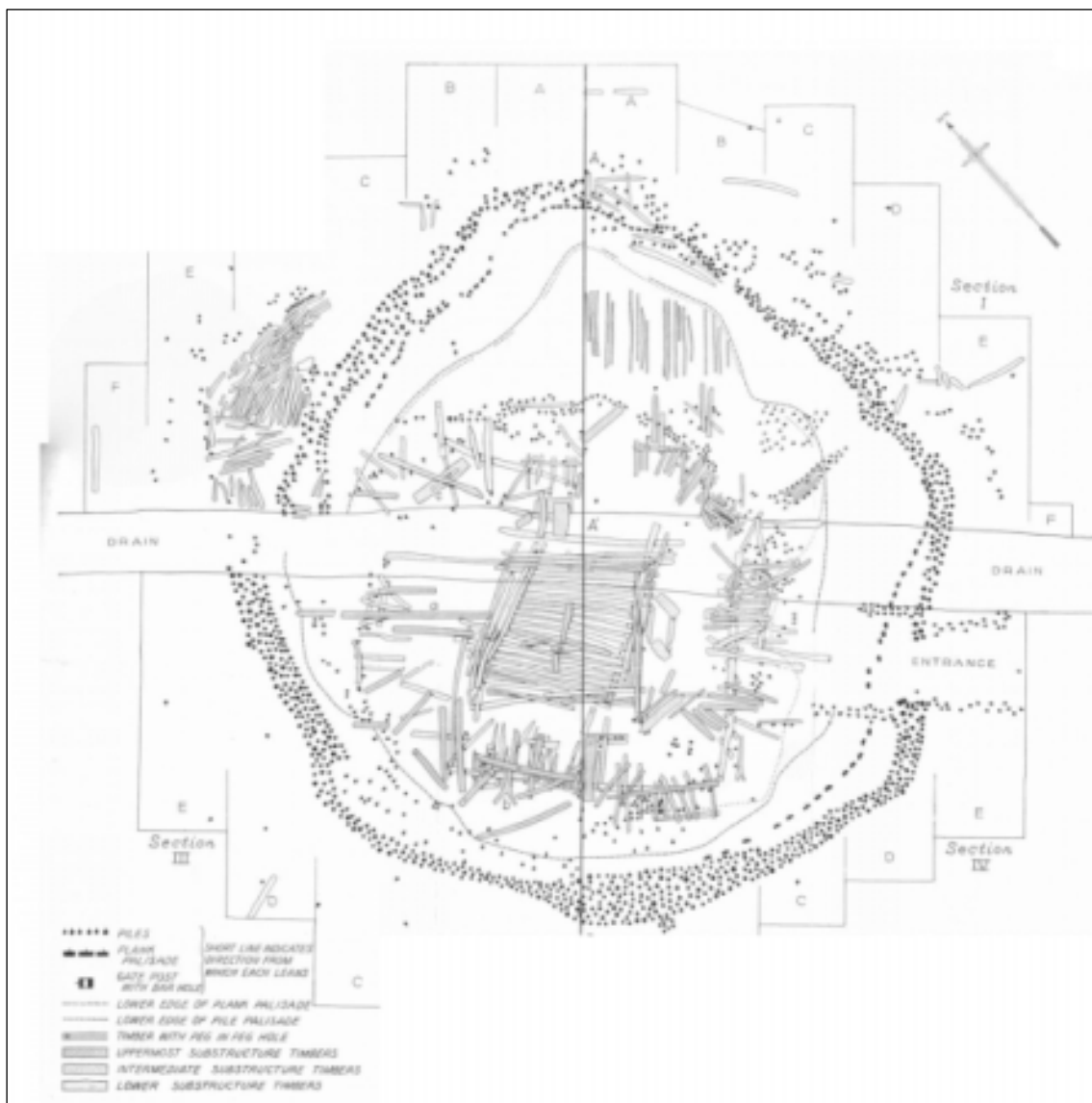
A dark humus layer over the late hearths marked the abandonment of the site. There was a layer of gravel over this, which was succeeded by a thick superficial layer. There was some transitory activity on the site in the late middle ages, with a thirteenth-century axe-head deposited outside the crannog near the quay.

### Animal Bones:

The site produced about 850kg of animal bones over half of which came from outside the palisade. The remainder were found either associated with the two houses on the crannog or in the layers underlying them.

Phase	Context	Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Date
<b>Phase 1</b>	House I	73.5	8.0	16.5	1.0	1.0	Late-10 <sup>th</sup> C
<b>Phase 2</b>	Fill over House I	72.0	4.0	21.5	1.5	1.0	Early-mid 11 <sup>th</sup> C
<b>Phase 4</b>	Hearth	70.0	4.5	23.5	1.0	1.0	Mid-late 11 <sup>th</sup> C
	Upper House Levels	57.0	4.5	37.5	0.5	0.5	
<b>Misc</b>	Miscellaneous	77.0	6.0	14.0	2.0	1.0	
	Bag#4	12	6	13	1	1	

'Rough estimation of percentage of food bulk' by phases at Ballinderry I, Co. Westmeath (Bag#4 represents MNI)



Plan of Ballinderry I, Co. Westmeath – Phase 1 (after Hencken 1936, Plate XIII)

## **'Ballinderry II' (Ballynahinch td.), Co. Offaly**

Grid Ref: **N21663886 (221665/238869)**

SMR No: **OF001-001**

Reference: **Hencken 1941-42; Stelfox 1941-42.**

The site had been known since the nineteenth century, when it was dug into by treasure hunters and antiquarians searching for objects, and was excavated by the Harvard expedition in 1933.

### *Phase 1 – Late Bronze Age site*

In Phase 1, Hencken proposed that the Late Bronze Age settlement had a single large rectangular structure and several post clusters. The finds included bronze and stone artefacts and the sherds of several pottery vessels. The animal bone from the site included cattle, pig, sheep/goat, horse, red deer, badger, otter, crane, wild duck and cat.

### *Phase 2 – early medieval pre-crannog occupation phase (sixth century A.D.)*

In Phase 2, the area was apparently used as an open-air site for cooking, bathing and the processing of antler and deer bone, potentially associated with aristocratic red deer hunting. There were also 11 circular wicker structures, 1.0-2.2m in diameter, set into the ground. There was also an 'outer hearth' on a small rise, with logs at the base, with stone, gravel, sand and ashes filling the pit. Chronologically diagnostic finds from Phase 2 included a copper-alloy pin (sixth/seventh century date), sherds of 'E'-ware (sixth/seventh century A.D.), a zoomorphic pennanular brooch (sixth-century date, found under timber floors of the later crannog). The outer hearth produced gaming pieces, bone dice, glass beads and a bronze drinking horn terminal. Finds from beneath the later crannog's house floor included the bronze pennanular brooch, a bronze armlet with twisted inlay, bone objects, whetstones, rubbing stones and a Type 3 pennanular brooch.

### *Phase 3 – early medieval crannog (ninth century AD)*

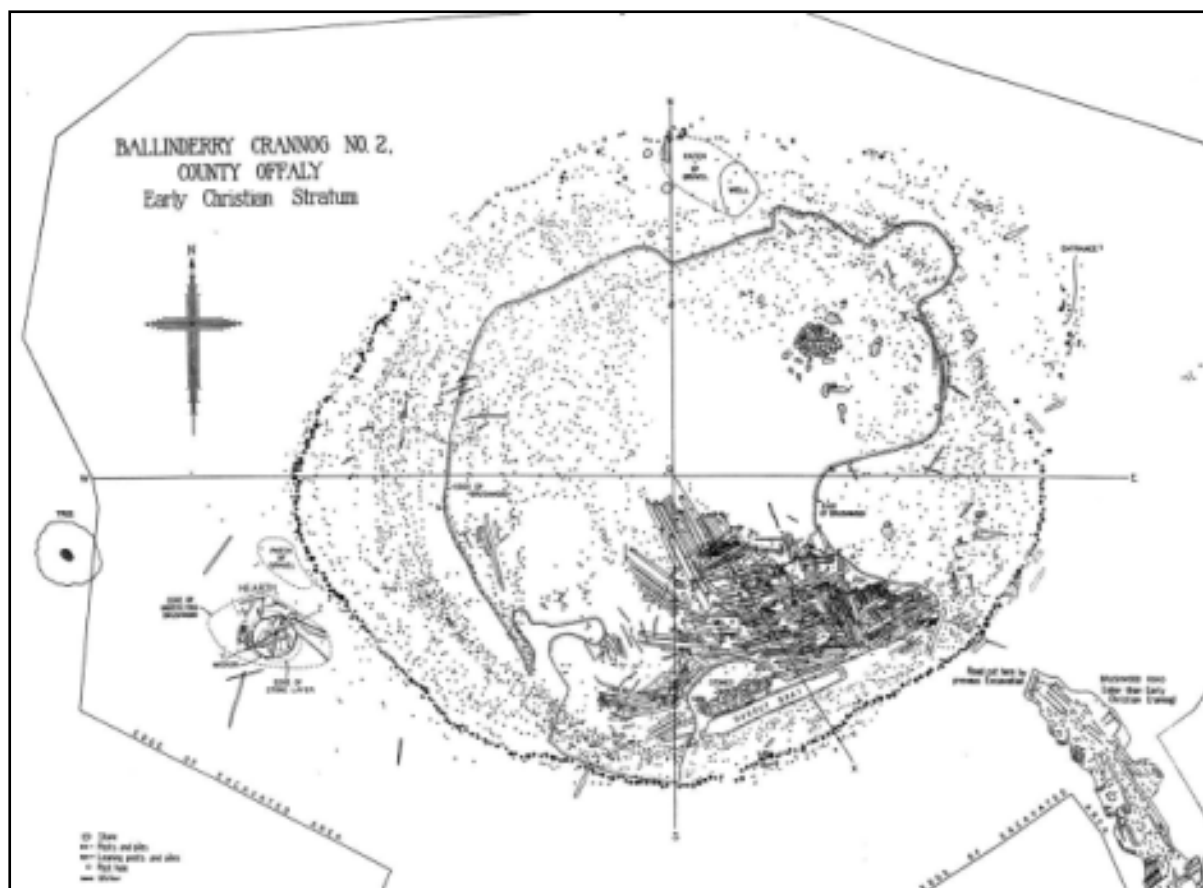
In the Phase 3 occupation (dating to the ninth century A.D.), there was an early medieval crannog 'proper', with extensive evidence for domestic and industrial activity. The early medieval crannog had a palisade with an entrance, a laid surface of stone and brushwood and some evidence for internal houses, although these were badly disturbed by nineteenth century treasure hunting and antiquarian diggings.

The early medieval crannog produced a large numbers of finds. A dug-out boat was found beside the house area, between the inner and outer palisades. The site also produced such high-status items as pennanular brooches (ninth-century types), two ringed pins (ninth/tenth century date) and stick pins. There were also many items of personal adornment, including beads, bone combs, pins and bone cylinders (and some bone gaming pieces). Leather shoes and textiles were found outside the palisade as were agricultural tools, sword and spearheads. There were also fragments of eight rotary querns and two whole lower stones from querns.

### **Animal Bones:**

This pre-occupation surface (Phase 2) produced a large amount of red deer bone, many with erupted antlers indicating that they had been killed in the winter. The animal bones were Phase 3 were found primarily outside the crannog palisade, apparently as food dump, although huge quantities were also found inside the palisade. The animal bone was primarily of cattle (90%), with smaller amounts of pig, horse (some broken) and small amounts of hare, rabbit, badger, otter, dog and cat. There were also bones of jay, heron, duck, pintail duck, tufted duck, goose and fowl.

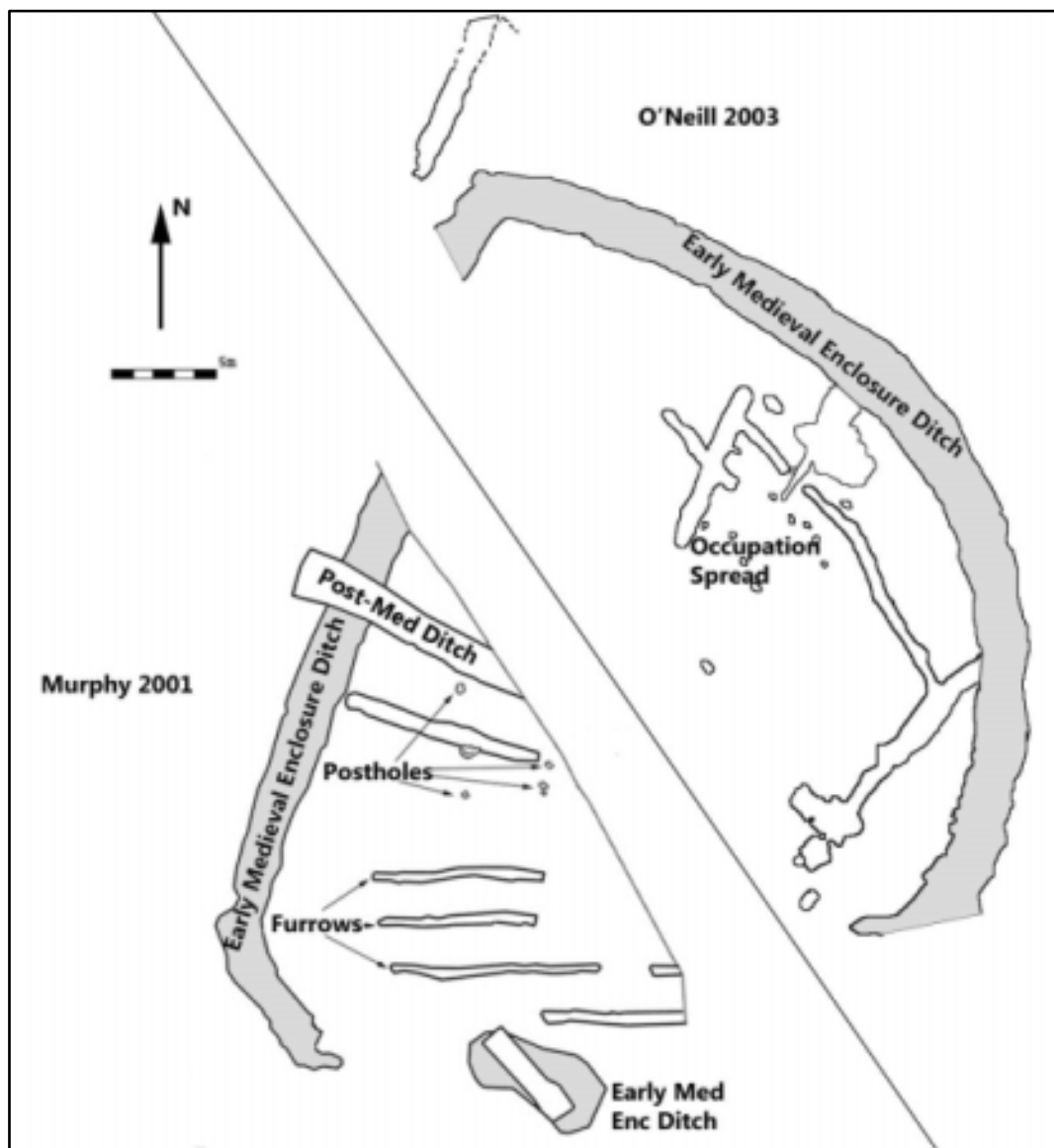
<b>Phase</b>	<b>Cattle</b>	<b>Sheep/Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Red Deer</b>	<b>Date</b>
<b>Phase 2</b>					30%	6 <sup>th</sup> C
					27	
<b>Phase 3</b>	70-90%	1-8%	10-20%	0.5-3.5%	0.5-3.0%	9 <sup>th</sup> C



**Ballycasey More, Co. Clare**Grid Ref: **142306/163097**SMR No: **CL 51:176**References: **Murphy 2001; O'Neill 2003**

The site was uncovered during topsoil stripping and was excavated in two parts in 2001 and 2003. It has been described as a 'D-shaped' enclosure, or possibly a 'plectrum-shaped' enclosure. Very little archaeological evidence for occupation was found in the first excavation, with the exception of three postholes and a whetstone in the ditch, however the second excavation revealed a possible paved surface associated with postholes, and covered by a spread of occupation material. This spread contained large numbers of animal bones as well as two glass beads, four bone gouges, whetstones, a fragment of a bone needle and a fragment of a bone weaving plaque.

From the second excavation it was clear that the ditch had been re-cut around the end of the millennium, and the original entrance replaced by a new one. The production and trade of goat-hides has been suggested as the main activity during this later phase of occupation.



**Ballycasey more, Co. Clare (after O'Neill 2003)**

### Animal Bones:

A total of 6,616 fragments of bone were recovered from the 2003 excavation, of which 24% were identified to species. The majority of these came from the primary ditch cut and the re-cut, as well as an occupation spread.

Phase	Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Red Deer	Other	Context	Date
Phase 1	82	14	17	7	1	-	-	-	Primary Ditch	<b>A.D. 682-982</b>
	132	16	15	3	4	-	10	44	Primary ditch (2001)	<b>A.D. 682-982</b>
	226	64	51	5	-	-	11	-	Occupation Spread	<b>A.D. 778-1025</b>
Phase 2	372	67	49	28	9	2	12	4	Ditch re-cut	<b>A.D. 985-1213</b>

### Bone fragments from three main concentrations.

Phase	Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Red Deer	Fox	Context	Date
Phase 1	5	1	2	1	1	-	-	-	Primary Ditch	<b>A.D. 682-982</b>
Phase 1	6	4	3	1	-	-	1	-	Occupation Spread	<b>A.D. 778-1025</b>
Phase 2	8	6	5	2	1	1	1	1	Ditch re-cut	<b>A.D. 985-1213</b>

### MNI from three main concentrations.

### RADIOCARBON DATES

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
Beta-159635	Animal bone from original ditch cut	1190 $\pm$ 70 BP	<b>A.D. 682-982</b>
Beta-178774		1220 $\pm$ 60 BP	<b>A.D. 669-899;</b> A.D. 918-954; A.D. 957-961
Beta-178740		1120 $\pm$ 60 BP	<b>A.D. 775-1022</b>
Beta-178678	Charcoal from occupation spread	1100 $\pm$ 60 BP	<b>A.D. 778-1025</b>
Beta-178769	Ditch re-cut	960 $\pm$ 60 BP	<b>A.D. 985-1213</b>

## Animal Bone Appendix

Element	Fusion age (months)	Primary Ditch		Occupation Spread		Ditch Re-cut	
		Fused	Unfused	Fused	Unfused	Fused	Unfused
Scapula	0-10	2	-	6	-	11	1
Pelvis	0-10	-	-	4	-	6	1
Humerus d	12-18	3	1	5	-	6	-
Radius p	12-18	2	-	1	-	5	-
Metacarpal d	24-36	-	-	-	-	1	-
Tibia d	24-36	1	1	1	1	5	1
Metatarsal d	24-36	3	-	-	1	-	-
Femur p	36-42	2	-	3	-	4	-
Calcaneus	36-42	-	-	1	1	-	1
Humerus p	42-48	1	-	-	-	1	-
Radius d	42-48	2	-	2	-	-	-
Femur d	42-48	1	-	2	-	1	-
Tibia p	42-48	1	-	3	-	-	1

### Epiphyseal fusion for cattle.

Element	GL	E. W. H (cm)
Humerus	227.4	108.5
Metacarpal	185.4	113.5

### Estimated shoulder height of cattle.

Context	Element/Measurement	Min	Max	Mean	No
Primary Ditch	<b>Humerus</b>				
	GLC	227.4	-	-	1
	Bp	87.6	-	-	1
	Bd	64.4	-	-	1
	BT	63.3	-	-	1
	<b>Radius</b>				
	Bd	64.3	-	-	1
	<b>Metacarpal</b>				
	Bp	47.4	49.9	48.7	2
	<b>Femur</b>				
	Bp	99.7	-	-	1
	<b>Tibia</b>				
	Bd	54.3	-	-	1
	<b>Astragalus</b>				
	GLI	55.9	-	-	1
	GLm	50.2	-	-	1
	Dm	30.0	-	-	1
	Bd	34.1	-	-	1
	<b>Metatarsal</b>				
	Bd	49.0	53.6	50.9	3
	<b>Phalanx 1</b>				
	Glpe	49.2	58.4	53.8	2
	Bp	25.3	26.3	25.8	2
	SD	21.3	23.1	22.2	2
	Bd	24.1	25.6	24.9	2
Occupation Spread	<b>Scapula</b>				
	SLC	49.8	51.6	50.7	2
	GLP	60.6	61.0	60.8	2



	<b>Humerus</b>				
	Bd	67.9	72.3	70.1	2
	BT	64.4	70.1	66.8	3
	<b>Radius</b>				
	Bp	69.7	-	-	1
	Bd	62.3	-	-	1
	<b>Ulna</b>				
	DPA	54.7	-	-	1
	<b>Metacarpal</b>				
	Bd	53.4	-	-	1
	<b>Tibia</b>				
	Bd	58.6	-	-	1
	<b>Astragalus</b>				
	GLi	55.6	60.9	58.9	4
	GLm	52.5	54.7	53.9	3
	Di	31.7	33.8	33.2	4
	Dm	30.7	33.5	32.3	3
	Bd	34.7	39.0	36.9	3
	<b>Metatarsal</b>				
	Bp	41.1	-	-	1
	<b>Phalanx 1</b>				
	Glpe	54.0	54.8	54.4	2
	Bp	25.7	31.1	28.4	2
	SD	23.0	25.0	24.0	2
	<b>Phalanx 2</b>				
	Bp	30.7	-	-	1
	SD	23.0	-	-	1
	Bd	24.4	-	-	1
<b>Ditch Re-cut</b>	<b>Scapula</b>				
	GLP	56.1	62.0	58.4	3
	LG	47.9	50.5	49.5	4
	<b>Humerus</b>				
	Bd	60.0	-	-	1
	BT	62.3	63.0	62.5	2
	<b>Ulna</b>				
	DPA	49.0	62.3	55.7	2
	<b>Metacarpal</b>				
	GL	185.4	-	-	1
	Bp	46.9	50.9	48.3	4
	Bd	51.4	-	-	1
	<b>Pelvis</b>				
	LA	59.8	60.9	60.4	2
	LAR	50.9	-	-	1
	<b>Tibia</b>				
	Bd	57.3	66.2	61.8	2
	<b>Astragalus</b>				
	GLi	57.7	61.4	59.6	2
	GLm	51.9	55.6	53.8	2
	DI	31.1	35.2	33.2	2
	Dm	30.4	33.7	32.1	2
	Bd	35.9	42.5	39.2	2
	<b>Phalanx 1</b>				
	Bd	24.1	25.6	24.9	2
	<b>Phalanx 2</b>				
	GL	33.2	37.3	35.3	2

	Bp	24.2	26.1	25.2	2
	SD	19.6	20.0	19.8	2
	Bd	19.7	19.8	19.8	2

#### Cattle biometrics from three main samples

Higham Wear Stage	Approx Age (months)	Primary Ditch	Occupation Spread	Ditch re-cut
6	4-5	-	-	1 (F)
11	9-10	-	-	3
20	21-23	-	-	1 (M)
22	25-27	1	-	1
23	27-29	-	1	-
24+	30+	-	-	1

#### Pig age slaughter based on tooth eruption and wear (Higham 1967)

Element	Fusion age (months)	Primary Ditch		Occupation Spread		Ditch Re-cut	
		Fused	Unfused	Fused	Unfused	Fused	Unfused
Scapula	0-12	-	-	4	-	-	-
Pelvis	0-12	3	-	1	-	-	-
Humerus d	12-24	-	-	1	-	-	-
Radius p	12-24	-	1	-	-	-	-
Metacarpal d	12-24	1	1	-	-	-	-
Tibia d	12-24	1	-	-	1	1	-
Humerus p	30-42	-	-	-	1	-	-
Ulna	30-42	1	-	-	1	-	-
Calcaneus	30-42	-	-	-	1	-	-

#### Epiphyseal fusion data for pigs.

Context	Element/ Measurement	Min	Max	Mean	No.
<b>Primary ditch</b>	<b>Ulna</b>				
	DPA	32.2	-	-	1
	<b>Pelvis</b>				
	LAR	29.4	31.7	30.6	2
	<b>Tibia</b>				
	Bd	25.9	-	-	1
<b>MC III</b>					
	GL	69.0	-	-	1
<b>Occupation Spread</b>	<b>Scapula</b>				
	SLC	22.7	23.8	23.3	2
	GLP	33.4	34.3	33.9	2
	<b>Ulna</b>				
	DPA	29.2	30.2	29.7	2
<b>Ditch re-cut</b>	<b>Tibia</b>				
	Bd	27.9	-	-	1

#### Pig biometrics from three main samples

Context	Element/ Measurement	Min	Max	Mean	No.
<b>Primary ditch</b>	<b>Metacarpal</b>				
	Bd	23.8	-	-	1
	<b>Femur</b>				
	Bp	38.3	-	-	1
<b>Occupation Spread</b>	<b>Humerus</b>				

	Bd	24.8	-	-	1
	BT	24.5	-	-	1
	<b>Radius</b>				
	GL	141.6	-	-	1
	Bp	26.7	28.3	27.5	2
	SD	15.0	-	-	1
	Bd	25.6	-	-	1
<b>Ditch re-cut</b>	<b>Metacarpal</b>				
	Bp	18.2	19.0	18.6	2
	<b>Metatarsal</b>				
	Bp	15.0	-	-	1

**Sheep/goat biometrics from three main samples.**

	<b>Primary Ditch</b>		<b>Occupation Spread</b>		<b>Ditch Re-cut</b>	
<b>Element</b>	<b>Fused</b>	<b>Unfused</b>	<b>Fused</b>	<b>Unfused</b>	<b>Fused</b>	<b>Unfused</b>
Scapula	-	-	-	-	1	-
Humerus d	-	-	1	-	1	-
Radius p	1	-	3	-	1	-
Radius d	-	1	1	1	-	-
Metacarpal d	1	-	-	-	-	1
Pelvis	-	-	2	-	-	-
Femur p	1	-	-	1	-	-
Tibia d	1	-	-	2	-	1
Calcaneus	-	-	-	-	-	1

**Epiphyseal fusion data for sheep/goats.**

<b>Element</b>	<b>GL</b>	<b>E. W. H (cm)</b>
Radius	141.6	56.9
Metacarpal		56.2

**Estimated shoulder height of sheep.**

## **Ballycatteen Fort, Co. Cork**

Grid Ref: **W58194591 (158198/045919)**

SMR No: **CO124-034**

References: **Ó Ríordáin & Hartnett 1943-4; Power 1989.**

The excavation on a trivallate (or possibly quadrivallate) enclosure at Ballycatteen uncovered three souterrains, a stone built kiln and occupation surfaces defended by a complex of multiple gates and palisades at its southern entrance. The innermost entrance to the enclosure consisted of two gates and a palisade inside the crest of the inner bank which encircled the site. A thick black organic deposit was uncovered immediately inside the area defined by the wooden palisade, and represented the earliest habitation deposit. This layer produced datable material in the form of sixty sherds of E Ware pottery (which generally may be dated to the 7<sup>th</sup> century).

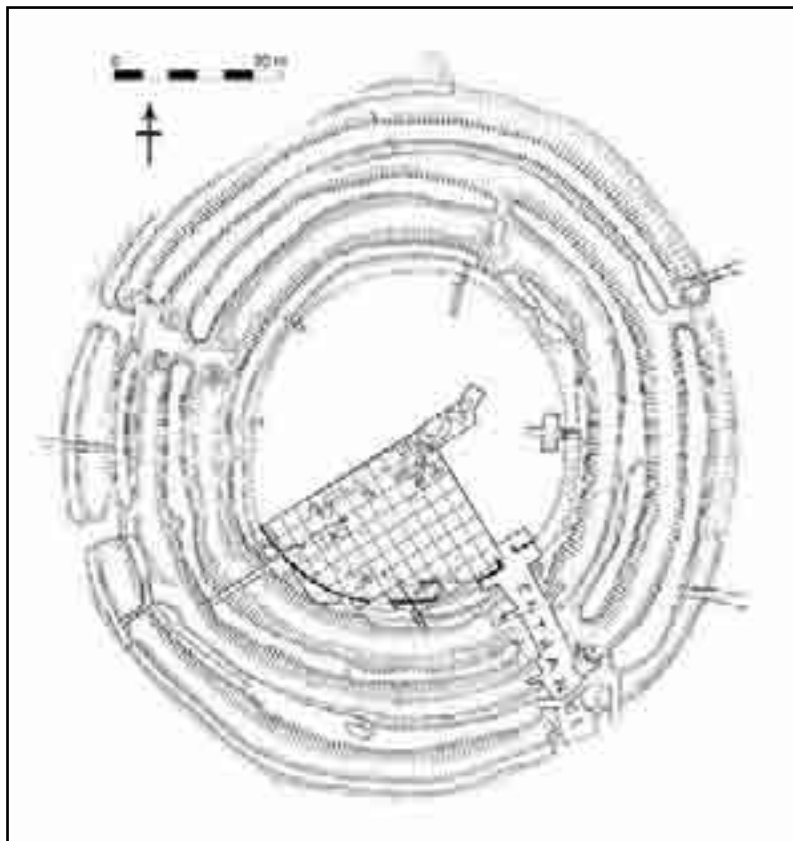
Three dry-stone built souterrains were excavated in the interior of the site. Though early medieval finds were recovered in the habitation evidence at the centre of the site and inside the souterrains, the absence of E Ware pottery in suggests that these structures were later in date than the black habitation deposit found immediately inside the palisade in the southwest quadrant.

### **Animal Bones**

A small quantity of un-burnt animal bone belonging to cattle (11 fragments) and sheep (or goat) (1 mandible and teeth) was recovered from the bottom of the palisade trench and in the lower layers of the souterrain fills.

Context	Cattle	Sheep/Goat	Date
Palisade Trench	11	1	Late-6 <sup>th</sup> – 7 <sup>th</sup> C.

### **Bone fragments from Ballycatteen, Co. Cork**



**Plan of Ballycatteen, Co. Cork (after Ó Ríordáin, S. P. & P. J. Hartnett 1943-4, plate 1).**

**Ballyegan, Co. Kerry**Grid Ref: **Q966110 (09660/11100)**SMR No: **KE039-023**Reference: **Byrne 1991; McCarthy 1998.**

Excavation revealed the partial outline of the walls of a cashel, with associated internal structures and a souterrain. External features, for example an external corn-drying kiln, animal corral and field boundaries, were also discovered.

The cashel was roughly sub-circular in plan and had internal dimensions of 30m x 35m. No evidence of a formal entrance was discovered, although it was suggested that the remains of a cobbled surface in the south-east area of the site may indicate the location of the original entrance. The fragmentary remains of five possible structures were uncovered in the interior. Four were identified by the remains of truncated stake- and postholes; the fifth was identified by the remains of a stone wall with an associated hearth. Extensive disturbance made it impossible to establish the size and shape of these structures.

An L-shaped stone-lined souterrain containing two levels and linked to a natural cave was revealed inside the cashel. The remains of an articulated horse skeleton were recovered from collapsed material of one of its chambers, and a type of iron ploughshare dated to the tenth century was recovered in the basal backfill layer of the souterrain passage. Two of the internal structures were truncated by the souterrain, while one of them post-dated its construction.

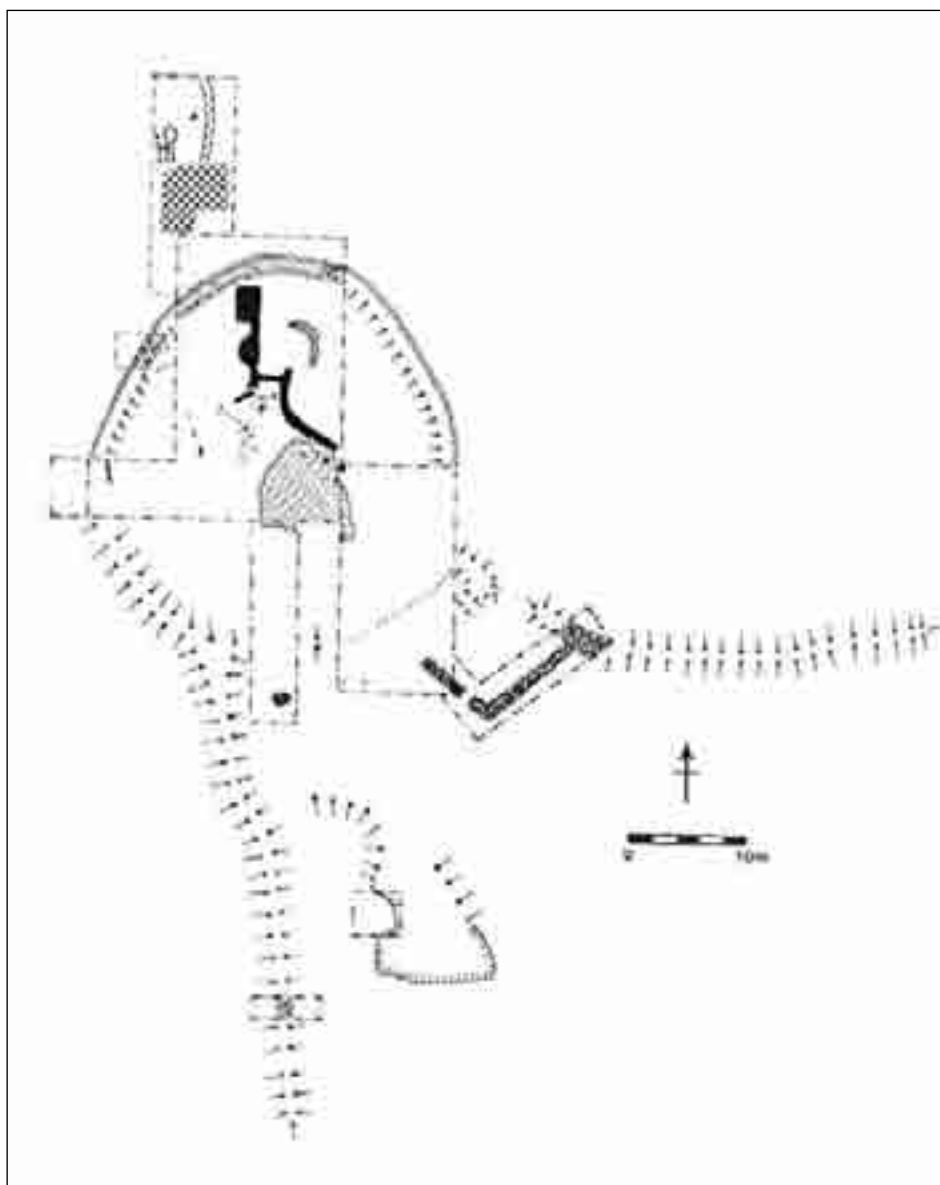
Four fragmented bone combs, a bone gouge, five iron knives, a possible awl and a fibula brooch fragment, a bronze strap fitting, two shale bracelet fragments, a stone spindle whorl, an unfinished rotary quernstone and a fragment of another and a large quantity of hone-stones and other sharpening stones were recovered in various contexts on site.

**Animal Bones:**

The bone report for Ballyegan is not included in the excavation report, but the raw figures are included in a later publication.

<b>Cattle</b>	<b>Sheep/Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Deer</b>	<b>Dog</b>	<b>Date</b>
272	275	60	9	1	8	?

**NISP from Ballyegan, Co. Kerry**



**Plan of Ballyegan, Co. Kerry showing areas excavated (after Byrne 1991, 7)**

**Ballyfounder, Co. Down**Grid Ref: **J62074954 (36207/34954)**SMR No: **DOW 032:014**Reference: **Waterman 1958**

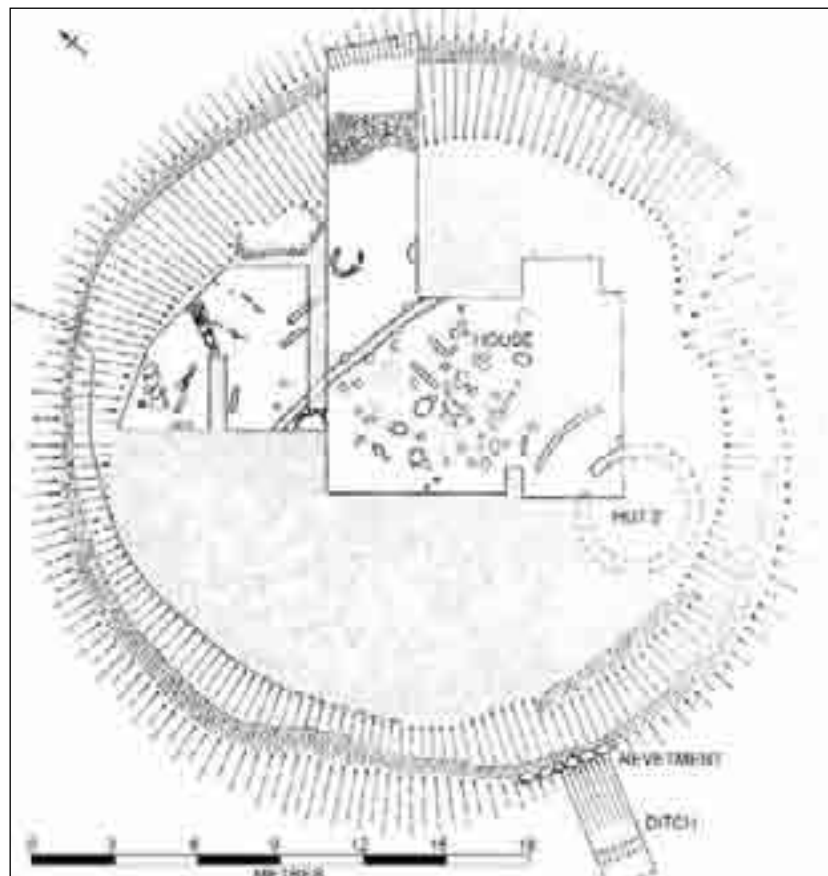
Erosion by cattle revealed that of a 4m high mound was constructed of accumulated occupation layers. A number of postholes marked the presence of a timber building, possibly circular in plan, and approximately 5.4m in diameter. A hearth and cooking pit were uncovered within this general area, as were associated finds of souterrain ware and some burnt bone. A second building, also possibly circular in plan, was uncovered to the south of the central structure. The site was later reoccupied during the Anglo-Norman period.

A bronze pin, part of a bone comb, souterrain ware pottery and a fragment of E Ware pottery from a bi-conical pot (late-6<sup>th</sup>/7<sup>th</sup> century) were discovered in the early medieval occupation layer. A fragmentary iron ploughshare, chisel and door-hinge were also attributed to this phase, but may belong to the later phase.

**Animal Bones:**

Cattle and pig were the dominant species in both occupation phases, and, although sheep was present in the primary occupation in small proportion (12.3%), it was absent from the secondary level. In the primary occupation red deer was present in very small proportion (1.7%) and horse was represented by a single molar. The primary occupation level contained several young oxen, indicated by immature bones and deciduous premolars; one pig mandible was not fully mature.

Phase	Cattle	Sheep/ Goat	Pig	Horse	Deer	Other	Date
Phase 1	136	29	63	1	4	2	Late-6 <sup>th</sup> – 10 <sup>th</sup> C.

**MNI of Species Present in early Medieval Layers**

**Excavation of Ballyfounder, Co. Down (after Waterman 1958, 40).**

**Ballynacarriga, Co. Cork**Grid Ref: **181545/102601**SMR No: **C0027-109**Reference: **Kiely & Lehane 2011; McCarthy 2011**

The site consists of a D-shaped enclosure. There was no evidence of a palisade, but as the enclosing elements were so poorly preserved this could not be fully discounted.

Two structures were identified in the interior - Structure 1 was rectangular in plan and measured 3.8 m by 2.6-2.9 m. It was constructed of seven post-holes, but it was not possible to locate the entrance to the structure. Structure 2 was located 4.5 m north-east of Structure 1. It was also rectangular in plan and measured 3.9 m in length by 2.7 m in width.

A dry-stone corbel-built souterrain, comprising of an entrance, a passage and a chamber, was located in the north-western quadrant of the enclosure. The early-7<sup>th</sup> century date for the souterrain, achieved from *Pomoideae* sp. (hawthorn, apple, etc.), is very early for this type of structure, and may well come from material brought into the souterrain by rabbit burrowing. A series of small pits were also scattered around the interior of the site. Some of these may have functioned as hearths or furnaces – there is evidence for iron-working in some of these areas - whereas others may have only been refuse pits.

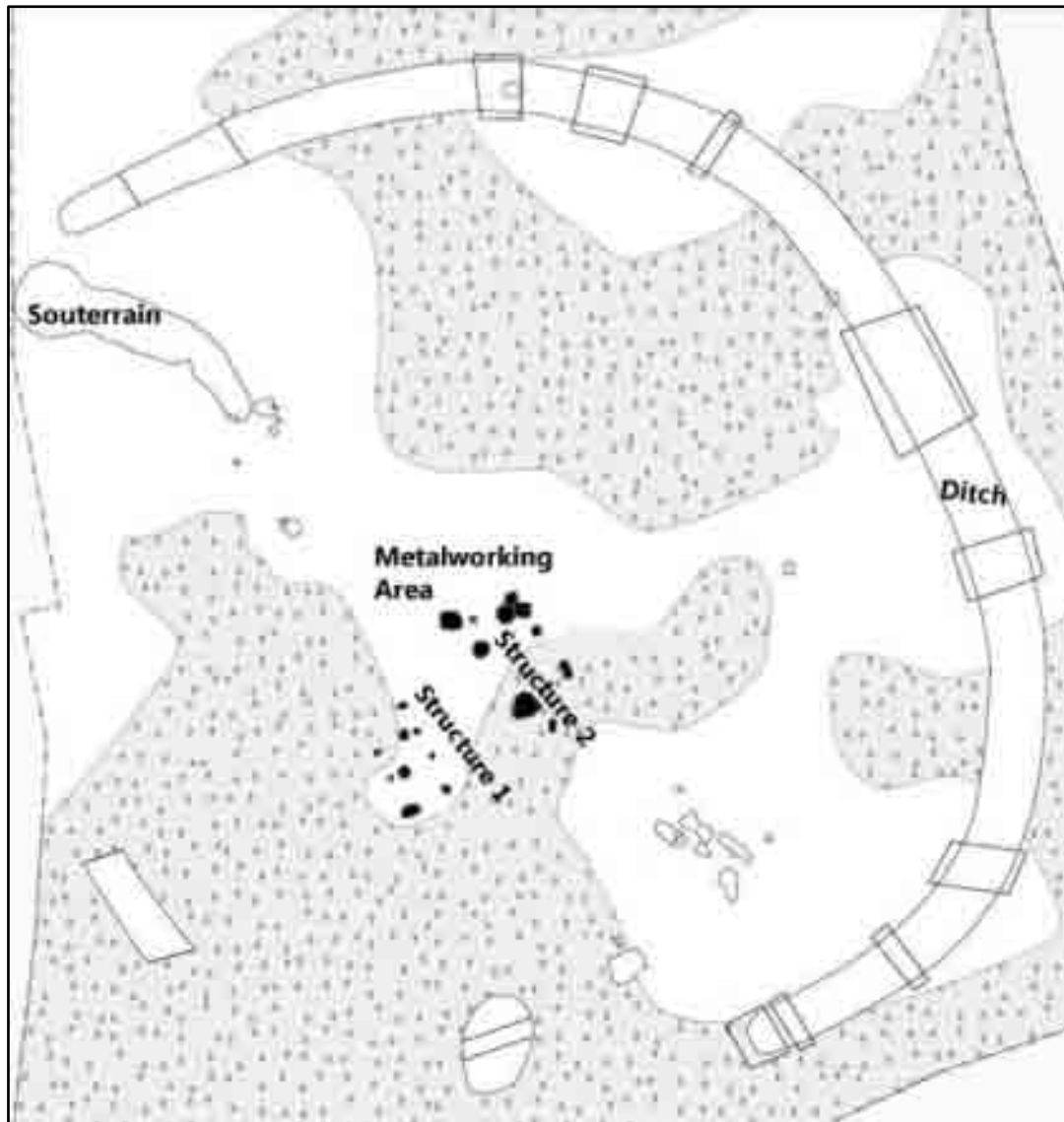
**Animal Bones:**

The majority of the animal bones (2,072 or 76% of the total) were recovered from the ditch. Fragmentation rates are extremely high resulting in large amounts of indeterminate fragments and specimens that can only be classified into size-groupings, and only 14% of the bones were able to be identified to species level. Epiphyseal fusion data indicates that over 82% of cattle were between three to four years of age at slaughter. The small available evidence for sheep/goats suggests that they too were slaughtered when mature, although a two month old lamb was discovered in the souterrain. The pig bones from the ditch represented the remains of five individuals - two adult males; two individuals less than six months of age at slaughter; and a neo-nate.

Context	Cattle	Sheep/ Goat	Pig	Horse	Deer	Hare	L. M.	M. M	Date
Basal Ditch Fills	51	16	23	-	-	-	340	354	<b>A.D. 668-782;</b> A.D. 789-810; A.D. 848-852.
Medial Ditch Fills	63	6	3	-	17	6	129	41	
Upper Ditch fills	29	2	4	4	-	-	57	20	
						<b>Rabbit</b>			
Souterrain	84	67	44	-	15	88	62	127	<b>A.D. 596-654.</b>

**Animal bones fragments from Ballynacarriga, Co. Cork (L.M. = Large Mammal; M.M. = Medium Mammal).**





**Excavations at Ballynacarriga 2, Co. Cork (after Kiely & Lehane 2011).**

## **RADIOCARBON DATES**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Lab Code</b>	<b>Sample</b>	<b>14C Years BP</b>	<b>Calib. 2 <math>\sigma</math></b>
UB-10501	Hazelut shell from ditch (C5)	1265 $\pm$ 26	<b>A.D. 668-782;</b> A.D. 789-810; A.D. 848-852.
UB-13152	Pomoideae from post-hole (C121)	1454 $\pm$ 23	<b>A.D. 567-646.</b>
UB-13153	Hazel from pit (C221)	1243 $\pm$ 20	<b>A.D. 686-784;</b> <b>A.D. 786-827;</b> A.D. 839-864.
UB-13154	Pomoideae from lower souterrain fill (C303)	1428 $\pm$ 20	<b>A.D. 596-654.</b>
UB-13155	Hazel from post-hole (C136)	1204 $\pm$ 20	<b>A.D. 772-888.</b>

**Ballynagallagh, Co. Limerick**Grid Ref: **R644392 (16440/13920)**SMR No: **N/A**Reference: **Cleary 2006; McCarthy 2006**

A large oval crop-mark enclosure revealed occupational activity from the late-sixth century through to the twelfth century A.D. The earliest activity consisted of an unenclosed settlement of late-sixth/seventh-century circular houses. A number of features – a possible palisade trench; a track-way and associated pits – produced radiocarbon dates in the seventh/eighth century, and this appears to precede a late-eighth/ninth-century double palisaded enclosure. The final occupation phase was indicated by an eleventh/twelfth-century ditch and track-way.

The earliest feature on the site consisted of a post-built circular house (I) with an estimated diameter of 8m. This returned a 2 $\Sigma$  calibrated date of A.D. 570-674. The northern arc of a second post-built circular house (II) was excavated to its west and had an estimated diameter of 4.50-5m. Its proximity to the other houses might suggest that both are roughly contemporary.

A linear trench was excavated beside the large circular house and may have supported a light fence-like structure set in a stony bedding trench. This feature returned a 2 $\Sigma$  calibrated date of A.D. 649-807. Finds from this feature included chert, flint, a whetstone and a stone axe fragment. A two-metre wide trackway containing animal bone fragments, as well as chert and flint debitage, pre-dated the phase II enclosure and produced a 2 $\Sigma$  calibrated date of A.D. 661-772, roughly contemporary with the linear feature. A number of pits (0.25m deep) containing quantities of animal bone and charcoal fragments were recorded to the east of the linear trench and may have also been used as refuse dumps. Two were stone-lined and may have been used initially as storage areas. Animal bone from one pit produced a 2 $\Sigma$  calibrated date of A.D. 682-905.

A large double palisaded enclosure with an extrapolated perimeter of 380m post-dated the circular houses and north-south linear fence and track-way. Both palisades appear to have been contemporary and radiocarbon dates from the innermost places its construction between A.D. 765 and 897.

The final early medieval phase consisted of two track-ways, a shallow ditch and pits. The metalised track-way was identified as a linear stony band, and animal bone from its upper level produced a 2 $\Sigma$  calibrated date of A.D. 1016-1179. Another stone track-way was identified inside the enclosure. This stone spread post-dated a partially excavated ditch feature (2.10m wide and over 0.75m deep). Animal bone from the fill of the pit/ditch produced a 2 $\Sigma$  calibrated date of A.D. 1032-1210 indicating that it was roughly contemporary with the stone spread. Another large undated pit (over 1m deep) contained a large quantity of animal bone suggesting that it was used as a dump in its final stages.

The artefacts from the site were limited to stone and metal and included whet-, rubber- and hone-stones, a clay bead, curved lignite bracelet, possible lignite pendant, iron rods, copper-alloy tube and a copper-alloy clip as well as a large flint and chert lithic assemblage. Evidence for iron/metalworking was indicated by a small quantity of iron slag (65g), a furnace bottom, a possible clay mould and two small fragments of fired clay, possibly from furnace lining.

Cattle dominated the large faunal assemblage at the site and were followed by sheep, pig, wild bird, dog, frog, cat, horse and woodmouse in descending order. Butchery marks and the evidence for complete carcasses from the three main livestock animals indicate that slaughtering and butchery were carried out within the confines of the enclosure. A range of crops was recorded, consisting mainly of oat and barley, with a lesser quantity of wheat.

The large palisaded enclosure at Ballynagallagh is quite unique in the Irish archaeological record as early medieval 'ringforts' or 'ráths' are generally much smaller (Stout 1997, 15). A partially excavated oval-ditched enclosure (70m by 52m) at Killeaderdadrú, Co. Tipperary had evidence for internal circular structures, a deliberately backfilled ditch and a possible bank palisade; similar features which are also found at Ballynagallagh.

### Animal Bones:

The faunal assemblage consists of 2,524 bones, 98% of which come from the seventh and eighth century levels. Less than 30% of the bones could be positively identified.

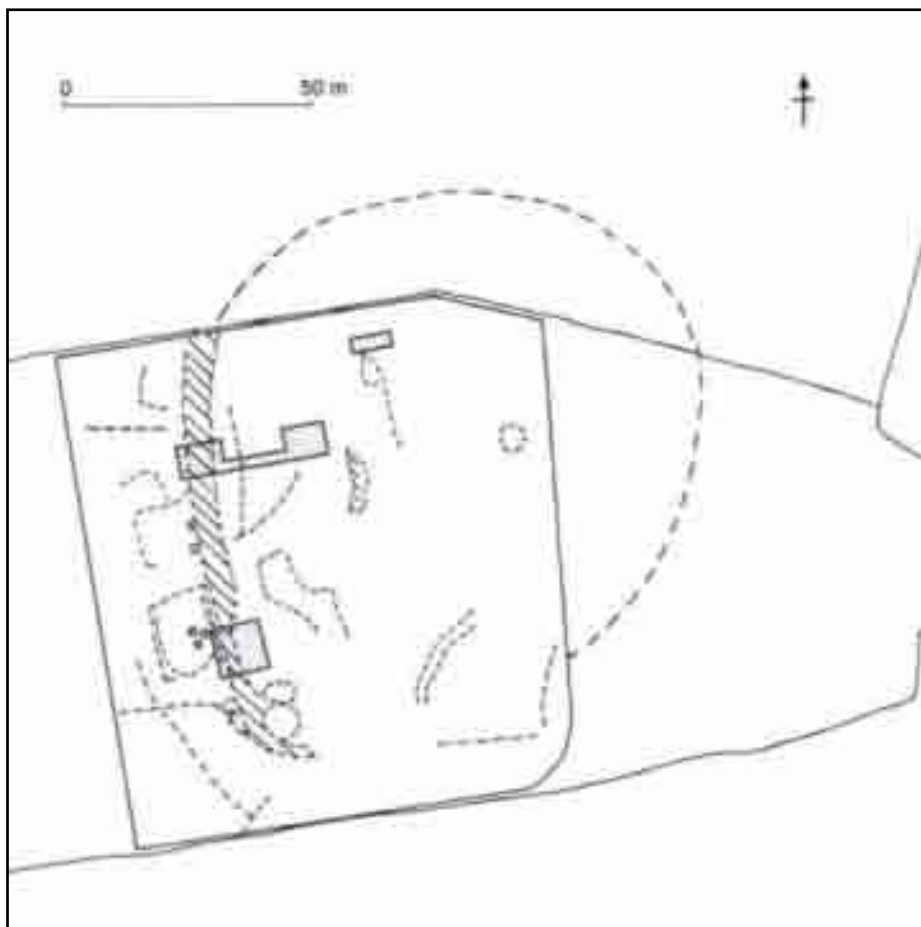
	Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	L. M.	M. M.	Date
NISP	406	129	71	1	8	1	513	571	c. 7 <sup>th</sup> /8 <sup>th</sup> C
% NISP	65.9	20.9	11.5	0.2	1.3	0.2			
MNI	26	9	10	1	2	1			
% MNI	53.1	18.4	20.4	2.05	4	2.05			

**NISP and MNI *estimated from published report* from Ballynagallagh, Co. Limerick.**

Age-slaughter data from cattle mandibles indicate that the individuals were around four years old at slaughter; and epiphyseal fusion shows a similar pattern, with 78% of the bones belonging to individuals that were slaughtered between 2 ½ and 4 years old.

Epiphyseal fusion data from sheep bones shows that just over 45% of the bones belonged to individuals that were slaughtered between 2 ½ and 4 years of age, although there is also evidence for the death of newborn lambs and lambs less than 1 year old.

Age-slaughter patterns for pigs show that most were killed at a juvenile stage, with only a few older animals kept for breeding.



**Plan of areas of excavation and magnetometry survey (after Cleary 2006, 4)**

## Radiocarbon Dates.

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
GrN-28572	Animal bone from post-hole from circular house inside trench 3 –F38	1405±40 BP	<b>A.D. 570-674</b>
GrN-28574	Animal bone from a north-south linear trench inside trench 3 –F66	1300±40 BP	<b>A.D. 649-781</b> A.D. 791-807
GrN-23169	Animal bone from first stone track-way inside trench 3 –F29	1300±30 BP	<b>A.D. 661-730</b> <b>A.D. 735-772</b>
GrN-28573	Animal bone from oval pit inside trench 3 –F41	1200±60 BP	<b>A.D. 682-905</b> A.D. 912-970
GrN-23170	Animal bone from slot-trench of enclosing inner palisade inside trench 3 – F49	1200±35 BP	A.D. 693-748 <b>A.D. 765-897</b> A.D. 922- 941
GrN-28570	Animal bone from upper level of track-way in trench 1. –F2	950±40 BP	<b>A.D. 1016-1179</b>
GrN-28571	Animal bone from partially excavated pit/ditch in trench 2 –F22	910±40 BP	<b>A.D. 1032-1210</b>

## **Baronstown, Co. Meath**

Grid reference: **N94405936 (294401/259365)**

SMR: **N/A**

Reference: **Linnane 2009; Sloane 2009; Linnane & Kinsella 2007**

A large early medieval enclosure complex was excavated at Baronstown. Artefacts were relatively scarce for a site of this scale but a successful mixed-agriculture economy was evident by a large animal bone assemblage and the presence of a number of cereal-drying kilns.

The first early medieval phase at Baronstown was defined by the construction of a circular enclosure ditch which had an internal diameter of 40m. This ditch was subsequently recut during later phases of occupation, and the enclosed area reduced in size. Few of the original internal structures survived, the most significant of which was a 'C'-shaped enclosure that may have slightly post-dated the construction of the Phase 1 enclosure ditch. An outer enclosure – that enclosed the Phase 1 enclosure – was dug at approximately the same time as the 'C'-shaped enclosure. All of these structures were re-cut on at least one occasion. The entrance into the circular and outer enclosure appears to have consisted of a substantial wooden bridge built over the ditches. Successive layers of metallurgy were found in the area to the south of the outer ditch, and a scatter of pits and postholes in the vicinity may indicate the location of a timber gatehouse.

A complex sequence of dividing ditches and gullies, which created small plots, was situated to the north and west of the circular enclosure and mostly within the outer enclosure. Their stratigraphic relationships were difficult to determine and they were also, unfortunately, devoid of datable material and chronologically diagnostic artefacts. The ditches probably functioned as drainage channels and may also have demarcated vegetable and/or cereal plots. It is likely that they were related to the later expansion of the site when the outer enclosure was constructed.

Further enclosure activity occurred to the north of the outer enclosure consisting of a northern annex and smaller 'D'-shaped enclosure. The primary fill of the annex ditch was dated to A.D. 564-666 which is earlier than the dates from the outer enclosure. This could be interpreted as an anomaly because the annex ditch respected the outer enclosure. However, it is also possible that this was an external plot or field that was contemporary with the circular enclosure and it was subsequently cut by/appended onto the later outer enclosure.

Two oval enclosures were revealed beyond the confines of the outer enclosure. The enclosure to the north – radiocarbon dated to A.D. 383-560 – was oval, with internal dimensions of 8.2m x 5.93m. Two lengths of curving ditch that formed an oval enclosure were situated to the south of the site. This had internal dimensions of 9m north-south by 8.2m east-west. A radiocarbon date of A.D. 530-648 was retrieved from the structure. A cereal-drying kiln was located in the latter and one of the enclosure's gullies from the former contained charcoal, cereal grains, chaff from cultivated oats and barley as well as weed seeds. It is likely therefore that the enclosures were related to arable activity, such as cereal processing, rather than features that enclosed or defined a dwelling.

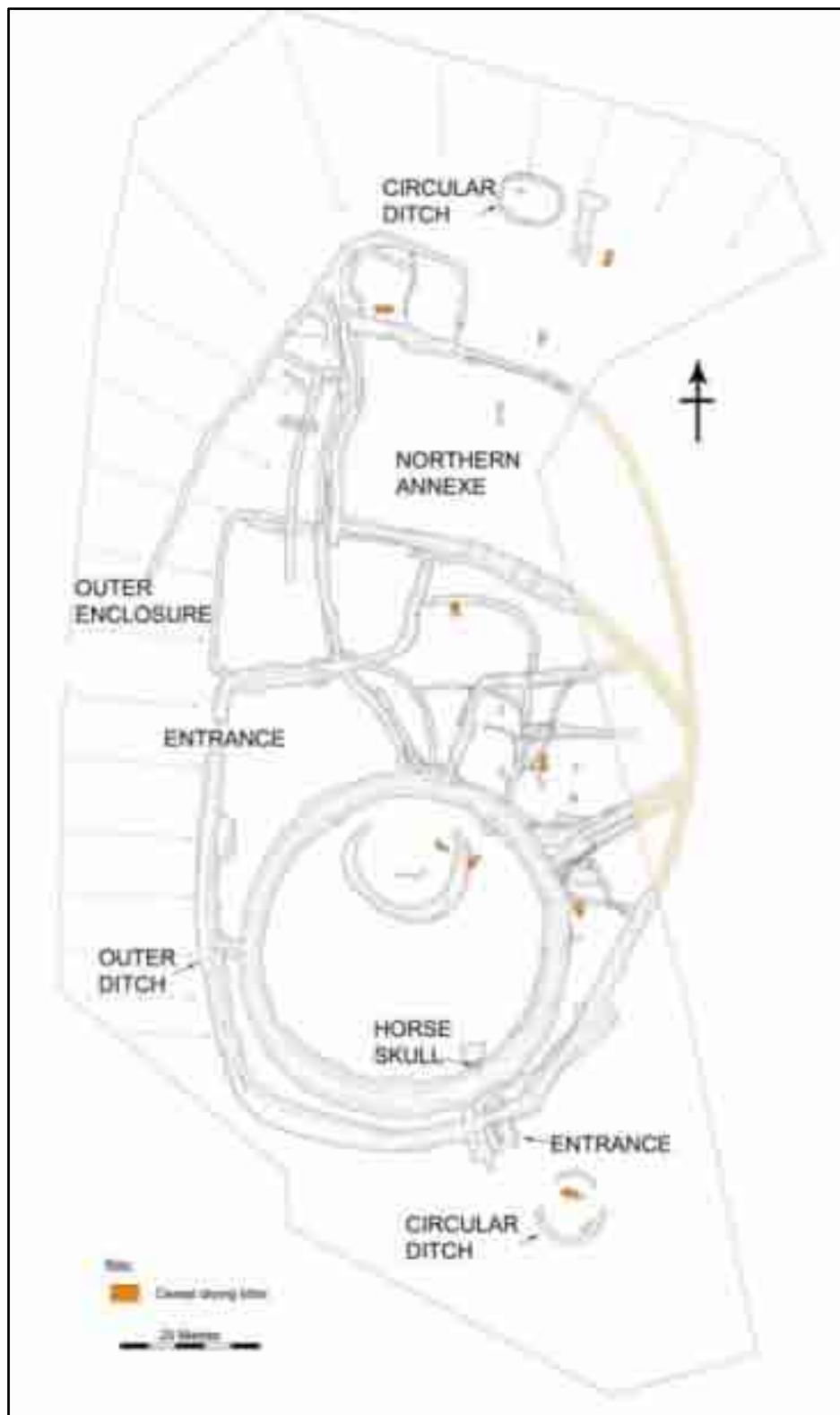
The finds assemblage from Baronstown was small. Personal dress items included a ringed pin, nine bone pins, a bird-headed brooch (which dates to the seventh century), a glass bead, a composite bone comb fragment and a fragment of curved tubing from a bracelet. Functional items included iron blades, a needle, a spindle whorl, a spherical lead weight with broken iron attachment and various fragments of unidentifiable objects. Due to the waterlogged nature of the circular enclosure ditch, 308 wooden artefacts were recovered including bucket and barrel staves, a near intact turned wooden bowl and an associated wooden scoop. The nature of the wooden artefacts, often broken or degraded, indicated that the inner enclosure ditch was used as a repository for domestic waste material. Iron slag was also present in a number of contexts although no metallurgical features were present. This suggests that much of the ironworking process occurred off-site but in the proximity to the settlement.

### Animal Bones:

The total NISP from Baronstown 1 amounted to 6,443 fragments, and the MNI assemblage was 353.

Phase		Cattle	Sheep/ Goat	Pig	Horse	Deer	Dog	Cat	Other	Date
1										<i>c. 540-660</i>
	NISP	3014	790	626	200	-	107	39	2	
	%NISP	63.1	16.5	13.1	4.2	-	2.2	0.8	0.04	
	MNI	110	51	47	9	-	9	7	2	
	%MNI	46.8	21.7	20.0	3.8	-	3.8	3.0	0.8	
2										<i>c. 640-940</i>
	NISP	650	142	147.5	45	1	9	16	-	
	%NISP	64.3	14.0	14.6	4.5	0.1	0.9	1.6	-	
	MNI	20	12	11	2	1	2	2	-	
	%MNI	40	24	22	4	2	4	4	-	
3a										<i>c. 640-940</i>
	NISP	39	12	15	4	-	1	1	-	
	%NISP	54.2	16.7	20.8	5.6	-	1.4	1.4	-	
	MNI	2	2	1	1	-	1	1	-	
	%MNI	25	25	12.5	12.5	-	12.5	12.5		
3b										<i>c. 640-940</i>
	NISP	123	29	13	4	-	2	-	-	
	%NISP	72	16.9	7.6	2.3	-	1.2	-	-	
	MNI	6	2	2	1	-	1	-	-	
	%MNI	50.0	16.7	16.7	8.3	-	8.3	-	-	
4										<i>6<sup>th</sup>-9<sup>th</sup> C.</i>
	NISP	102	19	11	5	1	3	-	-	
	%NISP	72.4	13.4	7.8	3.5	0.7	2.1	-	-	
	MNI	3	2	2	1	1	1	-	-	
	%MNI	30	20	20	10	10	10	-	-	

### NISP and MNI from Baronstown, Co. Meath



Plan of Baronstown, Co. Meath (after Linnane & Kinsella 2007).

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
Beta-252086	1284: Animal bone from primary fill of circular enclosure ditch	1460±40 BP	<b>A.D. 540-654</b>
Beta-252084	1045: Animal bone from upper fill of circular enclosure ditch	1090±40 BP	<b>A.D. 880-1022</b>
Beta-252087	2215: Animal bone from primary fill of 'C'-shaped enclosure	1330±40 BP	<b>A.D. 645-772</b>
Beta-252085	1048: Animal bone from primary fill of outer enclosure ditch	1210±40 BP	<b>A.D. 687-895;</b> A.D. 925-936
Beta-247023	3426: Hazel from fill of outer enclosure ditch	1230±40 BP	<b>A.D. 684-887</b>
Beta-252091	4094: Animal bone from primary fill of northern annex ditch	1420±40 BP	<b>A.D. 564-666</b>
Beta-252088	3017: Barley from fill of oval enclosure	1600±40 BP	<b>A.D. 383-560</b>
Beta-252083	1019: Animal bone from fill of oval structure	1490±40 BP	A.D. 436-489; A.D. 513-516; <b>A.D. 530-648</b>
Beta-247021	2292: Hazel from fill of hearth	940±40 BP	<b>A.D. 1019-1185</b>
Beta-247019	2143: Charred oat grain from fill of hearth	1610±40 BP	A.D. 349-368; <b>A.D. 379-547</b>
Beta-247022	3421: Charred barley grain from fill of hearth	1230±40 BP	<b>A.D. 684-887</b>
Beta-247027	4163: Charred barley grain from fill of hearth	1660±40 BP	<b>A.D. 257-301;</b> <b>A.D. 317-443;</b> A.D. 448-463; A.D. 483-532
Beta-247014	1024: Charred barley grain from fill of cereal-drying kiln	1280±40 BP	<b>A.D. 658-783;</b> A.D. 787-824; A.D. 841-861
Beta-247016	1106: Charred barley grain from fill of cereal-drying kiln	1450±40 BP	<b>A.D. 547-655</b>
Beta-247017	1151: Ash from fill of kiln	1580±40 BP	<b>A.D. 402-568</b>
Beta-247018	1347: Charred barley grain from fill of kiln	1580±40 BP	<b>A.D. 402-568</b>
Beta-247020	2182: Maloideae from fill of kiln	1500±40 BP	<b>A.D. 434-492;</b> <b>A.D. 508-519;</b> <b>A.D. 528-643</b>
Beta-247024	3447: Hazel from fill of kiln	1580±40 BP	<b>A.D. 402-568</b>
Beta-247026	3563: Hazel from fill of kiln	1560±40 BP	<b>A.D. 415-584</b>
Beta-247028	4202: Charred barley grain from fill of kiln	1640±40 BP	A.D. 263-277; <b>A.D. 330-537</b>



## Animal Bones Appendix:

### Cattle:

Higham MWS	Approx Age (months)	Phase				
		1	2	3a	3b	4
1	Foetal					
2	Birth/3wks					
3	1-4					
4	5-6					
5	6-7					
6	7-9					
7	8-13	1				
8	15-16	16				
9	16-17	3				1
10	17-18	1				
11	18-24				1	
12	24	6	1		1	
13	24-30	9	1			
14	30	1	2			
15	30-31	6				
16	31-32	1				
17	32-33	5				
18	36	1				
18/19	36-38					
19	38	2	1		1	
20	40	19	5	1	2	
21	40-50	1				
22	50	16	3		1	
23	Over 50	18	3	1		
23+		6				
		112	16	2	6	1

### Mandibular wear stages in cattle

		Age Month	Phase 1		Phase 2		Phase 3a		Phase 3B		Phase 4	
			F	Un	F	Un	F	Un	F	Un	F	Un
<b>Early</b>	M-podium p	Pre-birth	328	2	56	1	4	-	11	-	5	1
	Acetabulum	6-10	83	22	13	2	1	-	3	1	4	-
	Scapula d	7-10	131	9	28	2	1	-	6	-	3	-
	Humerus d	12-18	124	22	28	1	1	-	1	-	5	-
	Radius p	12-18	145	14	16	4	3	-	7	-	6	-
	Phalanx 1&2 p	18-24	111	12	48	3	-	-	7	-	2	-
	<b>Total</b>		<b>922</b>	<b>81</b>	<b>189</b>	<b>13</b>	<b>10</b>	<b>-</b>	<b>35</b>	<b>1</b>	<b>25</b>	<b>1</b>
	<b>%</b>		<b>91.9</b>	<b>8.1</b>	<b>93.6</b>	<b>6.4</b>	<b>100</b>	<b>-</b>	<b>97.3</b>	<b>2.7</b>	<b>96.2</b>	<b>3.8</b>
<b>Mid</b>	Tibia d	24-36	103	56	25	10	3	-	3	3	-	1
	M-podium d	24-36	176	101.5	33	17	1	2	7	1	2.5	2
	Calcaneum p	36-42	31	25	10	1	3	-	2	-	-	-
	<b>Total</b>		<b>310</b>	<b>182.5</b>	<b>68</b>	<b>28</b>	<b>7</b>	<b>2</b>	<b>12</b>	<b>4</b>	<b>2.5</b>	<b>3</b>
	<b>%</b>		<b>63</b>	<b>37</b>	<b>70.6</b>	<b>29.4</b>	<b>77.8</b>	<b>22.2</b>	<b>75</b>	<b>25</b>	<b>46</b>	<b>54</b>
<b>Late</b>	Humerus p; radius d; ulna p; femur p & d; tibia p.	42-48	262	161	57	21	1	-	24	6	9	6
	<b>Total</b>		<b>262</b>	<b>161</b>	<b>57</b>	<b>21</b>	<b>1</b>	<b>-</b>	<b>24</b>	<b>6</b>	<b>9</b>	<b>6</b>
	<b>%</b>		<b>61.9</b>	<b>38.1</b>	<b>73.1</b>	<b>26.9</b>	<b>100</b>	<b>-</b>	<b>80</b>	<b>20</b>	<b>60</b>	<b>40</b>

### Epiphyseal fusing of cattle bones.

<b>Bone/Measurement</b>	<b>No.</b>	<b>Mean</b>	<b>Min.</b>	<b>Max.</b>	<b>StD</b>	<b>CV</b>
<b>Scapula</b>						
GLP	105	62.65	32.2	76.8	6.68	0.11
SLC	82	46.27	20.6	64.5	6.52	0.14
<b>Humerus</b>						
SD	12	31.88	28.8	36.1	2.05	0.06
BT	62	66.62	59.6	78.1	3.93	0.06
HTC	107	29.30	25.2	34.5	1.60	0.05
<b>Radius</b>						
GL	13	256.42	239.7	277	11.93	0.05
SD	16	37.41	31.2	44.9	3.14	0.08
<b>Metacarpal</b>						
GL	40	183.67	157	200	7.82	0.04
BP	97	51.63	41.7	66.2	4.91	0.10
SD	41	30.29	24.9	36.1	3.18	0.11
Bd	58	55.74	46.6	68.5	4.78	0.09
B@F	59	51.49	44.4	61.7	4.25	0.08
<b>Pelvis</b>						
LA	59	63.5	55.7	73.4	3.74	0.06
<b>Tibia</b>						
GL	5	316.38	301	339.5	14.53	0.05
SD	8	34.46	33.3	36.4	1.07	0.03
Bd	83	57.14	52.6	68.3	3.00	0.05
<b>Astragalus</b>						
GLi	78	59.44	50.4	64.9	2.84	0.05
GLm	82	54.58	50	59.9	2.23	0.04
Bd	78	38.63	31.4	49.2	3.08	0.08
Dm	63	33.48	28.4	49.3	2.87	0.09
Di	70	33.23	29.3	37.1	1.74	0.05
<b>Calcaneum</b>						
GL	18	122.51	115.8	144.7	6.85	0.06
<b>Metatarsal</b>						
GL	55	209.41	195.7	226.8	7.19	0.03
Bp	132	42.91	34.8	52.6	2.97	0.07
SD	58	24.23	21.2	29.8	1.83	0.08
Bd	72	50.37	44	64	3.96	0.08

#### Phase 1 cattle measurements

<b>Bone/Measurement</b>	<b>No.</b>	<b>Mean</b>	<b>Min.</b>	<b>Max.</b>	<b>StD</b>	<b>CV</b>
<b>Scapula</b>						
GLP	17	64.11	55.9	73.1	4.09	0.06
SLC	11	43.75	34	48.9	4.97	0.11
<b>Humerus</b>						
BT	8	68.6	64.8	77.2	4.19	0.06
HTC	21	30.24	26.9	36.8	2.29	0.08
<b>Metacarpal</b>						
GL	11	182.97	169	195	7.81	0.04
BP	19	54.69	48.4	62.2	3.74	0.07
SD	7	30.43	26.3	34.1	3.33	0.11
Bd	14	56.30	50.5	63.5	3.84	0.07
B@F	17	51.95	48	58.9	3.77	0.07
<b>Pelvis</b>						
LA	6	62.55	50.7	73.6	8.36	0.13
<b>Tibia</b>						
Bd	18	56.86	52.3	64.1	2.44	0.04

<b>Astragalus</b>						
GLi	12	59.6	54.2	63.4	3.06	0.05
GLm	13	54.25	48.9	57.5	2.74	0.05
Bd	13	38.43	33.7	43	2.67	0.07
Dm	9	289.6	30.4	34.2	1.56	0.01
Di	13	33.34	28.9	36.6	2.02	0.06
<b>Calcaneum</b>						
GL	6	123.6	119	128	3.86	0.03
<b>Metatarsal</b>						
GL	6	211.75	200	237	13.37	0.06
Bp	18	43.28	39	51.3	2.77	0.06
SD	6	23.9	22.1	27.8	2.01	0.08
Bd	9	49.02	45.7	57.3	3.32	0.07

## Phase 2 cattle measurements

### Sheep:

			Phase 1		Phase 2		Phase 3a		Phase 3b		Phase 4	
		Age months	F	Un	F	Un	F	Un	F	Un	F	Un
<b>Early Fusing</b>	Metapodium p	Pre-birth	116	-	16	-	1	-	6	-	2	1
	Humerus d	3-10	43	2	11	-	2	-	1	-	-	-
	Radius p	3-10	61	3	16	-	2	-	1	-	-	-
	Scapula d	6-8	36	2	2	-	2	-	-	-	1	-
	Acetabulum	6-10	33	-	5	-	-	-	-	-	2	-
	Phalanx 1&2	6-16	-	-	-	-	-	-	2	-	-	-
	<b>Total</b>		<b>289</b>	<b>7</b>	<b>50</b>	<b>-</b>	<b>7</b>	<b>-</b>	<b>10</b>	<b>-</b>	<b>5</b>	<b>1</b>
	<b>%</b>		<b>97.6</b>	<b>2.4</b>	<b>100</b>	<b>-</b>	<b>100</b>	<b>-</b>	<b>100</b>	<b>-</b>	<b>83</b>	<b>17</b>
<b>Middle Fusing</b>	Tibia d	15-24	70	20	11	1	-	1	1	-	3	-
	Metapodium d	18-28	40	34	4	2	1	-	-	1	-	-
	Calcaneum p	30-36	2	-	1	-	-	-	-	-	-	-
	<b>Total</b>		<b>112</b>	<b>54</b>	<b>16</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>-</b>
	<b>%</b>		<b>67.3</b>	<b>32.7</b>	<b>84.2</b>	<b>15.8</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>100</b>	<b>-</b>
<b>Late Fusing</b>	Femur p; humerus, p; radius, d	30-42	12	13	-	-	-	-	-	-	-	-
	Ulna p; femur, d; tibia, p	36-42	56	68	4	6	-	-	1	1	1	3
	<b>Total</b>		<b>68</b>	<b>81</b>	<b>4</b>	<b>6</b>	<b>-</b>	<b>-</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>
	<b>%</b>		<b>45.6</b>	<b>54.4</b>	<b>40</b>	<b>60</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>50</b>	<b>25</b>	<b>75</b>

## Epiphyseal fusing of sheep bones.

Higham MWS	Approx Age months	Phase				
		1	2	3a	3b	4
5	4		1			
9	9-10	8		1		
10	10-11	2				
12	12-21	1				
13	21-24	6				
14	25-26	10	1	1	1	
15	26-28	3				
16	Mature	4	1			
17	Adult	13	10		1	1
		<b>47</b>	<b>13</b>	<b>2</b>	<b>2</b>	<b>1</b>

#### Mandibular wear stages in sheep

Bone/Measurement	No.	Mean	Min.	Max.	StD	CV
<b>Scapula</b>						
GLP	31	28.50	26	32.6	1.98	0.07
SLC	39	16.90	13.7	21	1.69	0.10
<b>Humerus</b>						
SD	5	12.78	11.8	15.2	1.44	0.11
BT	33	24.33	22.3	28	1.51	0.06
HTC	42	12.29	10.4	14.5	0.85	0.07
<b>Radius</b>						
GL	11	131.8	124	140.4	5.45	0.04
Bp	56	27.74	23.9	33.7	2.05	0.07
SD	13	15.05	12.8	24.9	3.06	0.20
<b>Metacarpal</b>						
GL	16	114.91	101.8	126.2	6.99	0.06
BP	50	20.26	18	23.3	1.26	0.06
SD	21	12.69	11.1	14.5	1.01	0.08
Bd	19	23.23	20.6	25.7	1.37	0.06
Dtm	17	10.18	8.7	11.3	0.66	0.06
DtL	18	9.26	7.9	10.4	0.59	0.06
Ddm	17	12.98	11.1	14.4	0.91	0.07
Ddl	16	12.74	11.2	14.1	0.75	0.06
BFdm	18	10.63	9.4	11.7	0.64	0.06
BFdl	18	10.38	9.2	11.7	0.69	0.07
<b>Pelvis</b>						
LA	29	25.25	22.8	27.9	1.25	0.05
<b>Tibia</b>						
SD	16	13.36	11.3	16	1.36	0.10
Bd	63	23.55	20.8	26.1	1.23	0.05
<b>Astragalus</b>						
Bd	5	16.88	15.5	18.5	1.19	0.07
<b>Metatarsal</b>						
GL	15	122.94	103.5	132	7.66	0.06
Bp	50	18.13	15.7	19.9	1.00	0.06
SD	17	10.96	9.7	12.8	0.84	0.08
Bd	16	21.48	19.4	23.6	1.24	0.06

#### Phase 1 sheep measurements

<b>Bone/Measurement</b>	<b>No.</b>	<b>Mean</b>	<b>Min.</b>	<b>Max.</b>	<b>StD</b>	<b>CV</b>
<b>Humerus</b>						
BT	10	26.5	24.6	28.8	1.08	0.04
HTC	10	13.15	11.8	14.1	0.6	0.05
<b>Radius</b>						
Bp	14	28.06	25.2	32.2	2.04	0.07
<b>Metacarpal</b>						
BP	6	20.67	19.8	22.6	0.99	0.05
<b>Pelvis</b>						
LA	5	25.62	24.7	26.4	0.68	0.03
<b>Tibia</b>						
Bd	10	23.65	21.5	25.9	1.42	0.06
<b>Metatarsal</b>						
Bp	9	18.4	16.6	19.6	1.02	0.06

### Phase 2 sheep measurements

### Pigs

<b>Higham MWS</b>	<b>Approx age months</b>	<b>Phase</b>				
		<b>1</b>	<b>2</b>	<b>3a</b>	<b>3b</b>	<b>4</b>
1	Foetal					
2	Birth -1wk					
3	1-4 wks					
4	4-7 wks					
5	2-4					
6	4-5	5				
7	5-6					
8	6-7			1		
9	7-8					
10	8-9					
11	9-10	6				
12	10-11	1				
13	11-12				1M	
14	12-14					
15	14-15					
16	15-16	1M				
17	16-17					
18	17-19	7+2M	3+1M			1F
19	19-21	4+3M+1F	2+1M			
19/20	19-23	1				
20	21-23	9+1M+1F	2+2M	1		1
21	23-25	8+1F	1			
22	25-27	1+1M				
23	27-29	1				
24	30+	2				
25	Adult					
26	Late Maturity					
27	Old	1				
		<b>57</b>	<b>11</b>	<b>2</b>	<b>1</b>	<b>2</b>

### Mandibular wear stages in pigs

			Phase 1		Phase 2		Phase 3a		Phase 3b		Phase 4	
		Age	F	Un	F	Un	F	Un	F	Un	F	Un
<b>Early</b>	Metapodium p	Fused pre-birth	8.5	-	7	-	-	-	-	-	-	-
	Scapula d; radius p, acetabulum; Phalanx 2 p	12	115	16	21	2	3	-	2	1	-	-
	Humerus d	12-18	37	5	6	-	1	-	-	-	2	-
	<b>Total</b>		<b>160.5</b>	<b>21</b>	<b>34</b>	<b>2</b>	<b>4</b>	<b>-</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>-</b>
	<b>%</b>		<b>88.4</b>	<b>11.6</b>	<b>94.4</b>	<b>5.6</b>	<b>100</b>	<b>-</b>	<b>66.7</b>	<b>33.3</b>	<b>100</b>	<b>-</b>
<b>Mid</b>	Tibia, d; Phalanx 1, p	24	24	30	10	8	1	-	1	-	2	1
	Metapodium d	24-27	5.5	11	2	1.5	-	-	-	-	-	-
	Calcaneum p	24-30	-	1	-	2	-	-	-	-	-	-
	<b>Total</b>		<b>29.5</b>	<b>42</b>	<b>12</b>	<b>11.5</b>	<b>1</b>	<b>-</b>	<b>1</b>	<b>-</b>	<b>2</b>	<b>1</b>
	<b>%</b>		<b>41.3</b>	<b>58.7</b>	<b>51.1</b>	<b>48.9</b>	<b>100</b>	<b>-</b>	<b>100</b>	<b>-</b>	<b>67</b>	<b>33</b>
<b>Late</b>	Ulna, p	36-42	1	21	-	3	-	-	-	-	-	1
	Humerus p; radius d, femur, tibia p	42	8	80	-	7	-	-	-	-	-	2
	<b>Total</b>		<b>9</b>	<b>101</b>	<b>-</b>	<b>10</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3</b>
	<b>%</b>		<b>8.2</b>	<b>91.8</b>	<b>-</b>	<b>100</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>100</b>

#### Pig epiphyseal fusion

Bone/Measurement	No.	Mean	Min.	Max.	StD	CV
<b>Scapula</b>						
GLP	32	33.05	27.9	36.9	1.80	0.05
SLC	46	21.12	17.5	24.9	1.62	0.08
<b>Humerus</b>						
BT	28	27.93	25.1	31.7	1.45	0.05
HTC	34	17.91	16	20.4	1.08	0.06
Bd	27	37.71	34.1	41	2.00	0.05
<b>Radius</b>						
BpP	26	26.70	23.4	28.9	1.54	0.06
<b>Pelvis</b>						
LA	35	28.54	24.2	34.5	2.60	0.09
<b>Tibia</b>						
Bd	16	28.21	26.4	30.5	1.20	0.04

#### Phase 1 pig measurements

Bone/Measurement	No.	Mean	Min.	Max.	StD	CV
<b>Radius</b>						
BpP	6	27.28	25.1	29	1.40	0.05
<b>Pelvis</b>						
LA	8	28.51	26.2	30.1	1.47	0.05
<b>Tibia</b>						
Bd	10	28.23	26.4	29.7	0.90	0.03

#### Phase 2 pig measurements

Species	Phase	I.D.	Element	E.W. H. (cm)
Cattle	1	37	MC1 (F)	105.6
Cattle	1	94	MC1 (F)	117.7
Cattle	1	330	MC1 (F)	110.1
Cattle	1	388	MC1 (F)	106.1
Cattle	1	969	MC1 (F)	108.5
Cattle	1	1143	MC1 (F)	108.5
Cattle	1	1200	MC1 (F)	108.4
Cattle	1	1282	MC1 (F)	111.3
Cattle	1	1528	MC1 (F)	107.4
Cattle	1	1566	MC1 (F)	106.8
Cattle	1	1803	MC1 (F)	108.9
Cattle	1	2232	MC1 (F)	106.8
Cattle	1	2384	MC1 (F)	113.4
Cattle	1	2457	MC1 (F)	116.4
Cattle	1	2497	MC1 (F)	109.7
Cattle	1	2939	MC1 (F)	108.4
Cattle	1	3197	MC1 (F)	108.5
Cattle	1	3536	MC1 (F)	112.3
Cattle	1	4045	MC1 (F)	108.2
Cattle	1	4317	MC1 (F)	109.2
Cattle	1	4440	MC1 (F)	109.8
Cattle	1	5870	MC1 (F)	114.0
Cattle	2	5467	MC1 (F)	111.0
Cattle	2	5469	MC1 (F)	111.2
Cattle	2	5526	MC1 (F)	115.8
Cattle	2	6067	MC1 (F)	101.4
Cattle	2	6307	MC1 (F)	117.0
Cattle	3A	2683	MC1 (F)	111.2
Cattle	3B	735	MC1 (F)	105.5
Cattle	1	370	MC1 (M)	98.1
Cattle	1	628	MC1 (M)	125.0
Cattle	1	1369	MC1 (M)	120.0
Cattle	1	1388	MC1 (M)	111.6
Cattle	1	1488	MC1 (M)	123.8
Cattle	1	1710	MC1 (M)	123.1
Cattle	1	1787	MC1 (M)	115.4
Cattle	1	2917	MC1 (M)	111.6
Cattle	1	2972	MC1 (M)	113.8
Cattle	1	2973	MC1 (M)	120.6
Cattle	1	3835	MC1 (M)	113.6
Cattle	1	3877	MC1 (M)	114.4
Cattle	1	3929	MC1 (M)	113.8
Cattle	1	4223	MC1 (M)	121.6
Cattle	1	4645	MC1 (M)	111.9
Cattle	2	5558	MC1 (M)	111.8
Cattle	2	5632	MC1 (M)	109.4
Cattle	2	6482	MC1 (M)	115.0
Cattle	4	6355	MC1 (M)	114.8
Cattle	4	6370	MC1 (M)	124.4
Cattle	1	1683	MC1 (I)	111.7
Cattle	1	3624	MC1 (I)	108.3
Cattle	1	4226	MC1 (I)	110.1
Cattle	2	5283	MC1 (I)	115.5
Cattle	2	5468	MC1 (I)	112.1
Cattle	2	5528	MC1 (I)	107.8
Cattle	3B	1184	MC1 (I)	108.9
Cattle	1	148	MT1	109.0
Cattle	1	201	MT1	115.1
Cattle	1	238	MT1	114.7
Cattle	1	386	MT1	122.1
Cattle	1	539	MT1	119.2
Cattle	1	665	MT1	116.2
Cattle	1	666	MT1	108.3
Cattle	1	692	MT1	111.2
Cattle	1	715	MT1	112.9
Cattle	1	799	MT1	106.7

Cattle	1	909	MT1	108.5
Cattle	1	914	MT1	111.2
Cattle	1	924	MT1	117.9
Cattle	1	1260	MT1	113.9
Cattle	1	1368	MT1	109.4
Cattle	1	1483	MT1	116.6
Cattle	1	1489	MT1	112.4
Cattle	1	1520	MT1	106.7
Cattle	1	1711	MT1	117.2
Cattle	1	1784	MT1	117.9
Cattle	1	1785	MT1	117.7
Cattle	1	1786	MT1	112.4
Cattle	1	1881	MT1	110.6
Cattle	1	977	MT1	112.5
Cattle	1	2005	MT1	117.2
Cattle	1	2025	MT1	112.3
Cattle	1	2038	MT1	111.2
Cattle	1	2039	MT1	113.0
Cattle	1	2185	MT1	111.2
Cattle	1	2211	MT1	116.1
Cattle	1	2438	MT1	111.8
Cattle	1	2456	MT1	118.8
Cattle	1	2461	MT1	114.9
Cattle	1	2543	MT1	111.3
Cattle	1	2674	MT1	117.2
Cattle	1	3006	MT1	117.6
Cattle	1	3193	MT1	110.1
Cattle	1	3198	MT1	116.1
Cattle	1	3199	MT1	116.6
Cattle	1	3296	MT1	120.7
Cattle	1	3503	MT1	110.3
Cattle	1	3707	MT1	114.8
Cattle	1	3860	MT1	112.5
Cattle	1	3930	MT1	123.6
Cattle	1	4232	MT1	122.5
Cattle	1	4250	MT1	111.0
Cattle	1	4384	MT1	116.4
Cattle	1	4444	MT1	115.0
Cattle	1	4462	MT1	113.7
Cattle	1	4463	MT1	117.7
Cattle	1	4664	MT1	109.7
Cattle	1	4689	MT1	113.4
Cattle	1	4896	MT1	114.9
Cattle	1	4909	MT1	109.6
Cattle	1	6483	MT1	115.7
Cattle	2	5405	MT1	115.0
Cattle	2	5406	MT1	113.3
Cattle	2	5477	MT1	109.9
Cattle	2	5768	MT1	116.1
Cattle	2	6128	MT1	109.0
Cattle	2	6481	MT1	129.2
Cattle	3B	5023	MT1	116.1
Cattle	1	88	RA	111.8
Cattle	1	846	RA	114.6
Cattle	1	1198	RA	117.6
Cattle	1	1587	RA	107.2
Cattle	1	1909	RA	107.5
Cattle	1	2179	RA	106.2
Cattle	1	3000	RA	119.1
Cattle	1	3014	RA	113.0
Cattle	1	3372	RA	113.5
Cattle	1	3514	RA	107.2
Cattle	1	3869	RA	103.1
Cattle	1	4757	RA	103.3
Cattle	1	4933	RA	109.2
Cattle	2	5198	RA	117.0
Cattle	5	5989	RA	118.6
Cattle	1	267	TI	117.1

Cattle	1	594	TI	106.3
Cattle	1	4257	TI	109.7
Cattle	1	4258	TI	108.8
Cattle	1	4814	TI	103.8
Cattle	2	5386	TI	107.6
Cattle	2	6162	TI	108.7
OVA	1	272	HU	49.8
OVA	1	1952	HU	49.6
OVA	1	2070	HU	61.2
O	1	395	RA	54.3
O	1	497	RA	53.2
O	1	1392	RA	54.8
O	1	1472	RA	52.3
O	1	1492	RA	51.3
O	1	1964	RA	50.0
O	1	1965	RA	49.8
O	1	2158	RA	52.4
O	1	2226	RA	56.4
O	1	3235	RA	55.8
O	1	3628	RA	52.5
O	1	149	MC1	57.8
O	1	368	MC1	49.8
O	1	391	MC1	55.5
O	1	953	MC1	55.3
O	1	1038	MC1	58.0
O	1	1041	MC1	57.7
O	1	1162	MC1	58.0
O	1	1842	MC1	56.6
O	1	2138	MC1	59.7
O	1	2141	MC1	53.2
O	1	2504	MC1	50.9
O	1	2844	MC1	60.6
O	1	2923	MC1	52.5
O	1	3404	MC1	61.7
O	1	3405	MC1	54.0
O	1	4176	MC1	57.7
O	2	5502	MC1	56.0
O	2	5531	MC1	55.1
O	3A	6011	MC1	56.2
O	1	393	FE	51.9

O	1	2161	FE	55.4
OVA	1	694	TI	60.9
OVA	1	1148	TI	60.4
OVA	1	1963	TI	51.8
O	1	673	MT1	59.0
O	1	906	MT1	59.9
O	1	907	MT1	56.5
O	1	1109	MT1	56.8
O	1	1285	MT1	55.8
O	1	1286	MT1	53.4
O	1	1888	MT1	54.9
O	1	1960	MT1	47.0
O	1	2144	MT1	57.8
O	1	2531	MT1	51.8
O	1	3401	MT1	54.5
O	1	3402	MT1	55.1
O	1	3421	MT1	59.9
O	1	4222	MT1	59.8
O	1	6531	MT1	54.9
O	2	6442	MT1	62.2
Horse	1	352	RA	133.9
Horse	1	354	RA	134.0
Horse	1	270	MC1	129.2
Horse	1	437	MC1	132.0
Horse	1	1507	MC1	131.4
Horse	1	1508	MC1	130.3
Horse	1	1504	FE	128.5
Horse	1	1505	TI	135.2
Horse	1	1506	TI	135.4
Horse	1	351	MT1	130.8
Horse	1	637	MT1	121.5
Horse	1	1509	MT1	129.0
Horse	1	2139	MT1	120.5
Horse	1	4180	MT1	135.5
Horse	1	4323	MT1	135.9
Horse	1	4590	MT1	136.4
Horse	2	5556	MT1	131.7

### Estimated withers heights



## **Beginish, Co. Kerry**

Grid Ref: **V42587873 (042588/078739)**

SMR No: **KE079-031**

Reference: **O'Kelly 1956; Roche 1956; O'Kelly 1961; Sheehan *et al.* 2001.**

An early medieval settlement consisting of eight houses, fifteen cairns, eight animal shelters and two poorly constructed structures lying within a network of low stone field walls were identified at the eastern end of Beginish island. The site may have originally been associated with the monastery at Church Island, but it appears to have been re-used as a maritime way-station by a Hiberno-Scandinavian community.

O'Kelly suggested an early medieval occupation phase and an Hiberno-Scandinavian one (although this later phase has since been subdivided into a tenth century phase; and an eleventh/early-twelfth century one). The primary occupation phase consisted of five circular buildings, fifteen cairns, six animal shelters and all but four of the field walls. The five circular houses appear to have been built directly on the turf surface of the original boulder clay and were marked only by the remnants of their foundation courses. Excavations at House 2 revealed a later structure within this building, which in turn appears to have been cannibalised for field walls. No internal hearths or habitation refuse was recovered within either structure.

After an accumulation of sand, the primary settlement appears to have been abandoned for a period of time before an Hiberno-Scandinavian settlement was built on the site. The earliest Hiberno-Scandinavian settlement was represented by two roughly rectangular structures (House 6 and House 7), dated to around the tenth century. Finds from near these buildings included a probable tenth-century soapstone bowl, a type of tenth-century ringed pin produced in Hiberno-Scandinavian Dublin, a hollow bone cylinder commonly found in Hiberno-Scandinavian urban contexts, and a type of rotary whetstone found in the North Atlantic Scandinavian region.

The second Hiberno-Scandinavian settlement was at House 1, and was dated to the eleventh/early-twelfth centuries. House 1 consisted of a sunken-floored dry-stone built circular house (11m externally) with central hearth with a smaller rectangular adjunct (4.5m x 3m internally) with its own hearth. It represented a unique mix of architectural concepts from the native Irish and Hiberno-Scandinavian urban building traditions.

A lintel from the stone-lined eastern entrance bore a runic inscription dating to A.D. 1050 or perhaps later. Finds from the habitation deposits inside the main circular building included a polished bone or ivory cruciform-headed pin of Scandinavian character, an eleventh/thirteenth-century bone comb, an eleventh/twelfth-century bronze disc-headed pin of Scandinavian type, three bone points, an antler ring, four iron knives, a line sinker and two net sinkers.

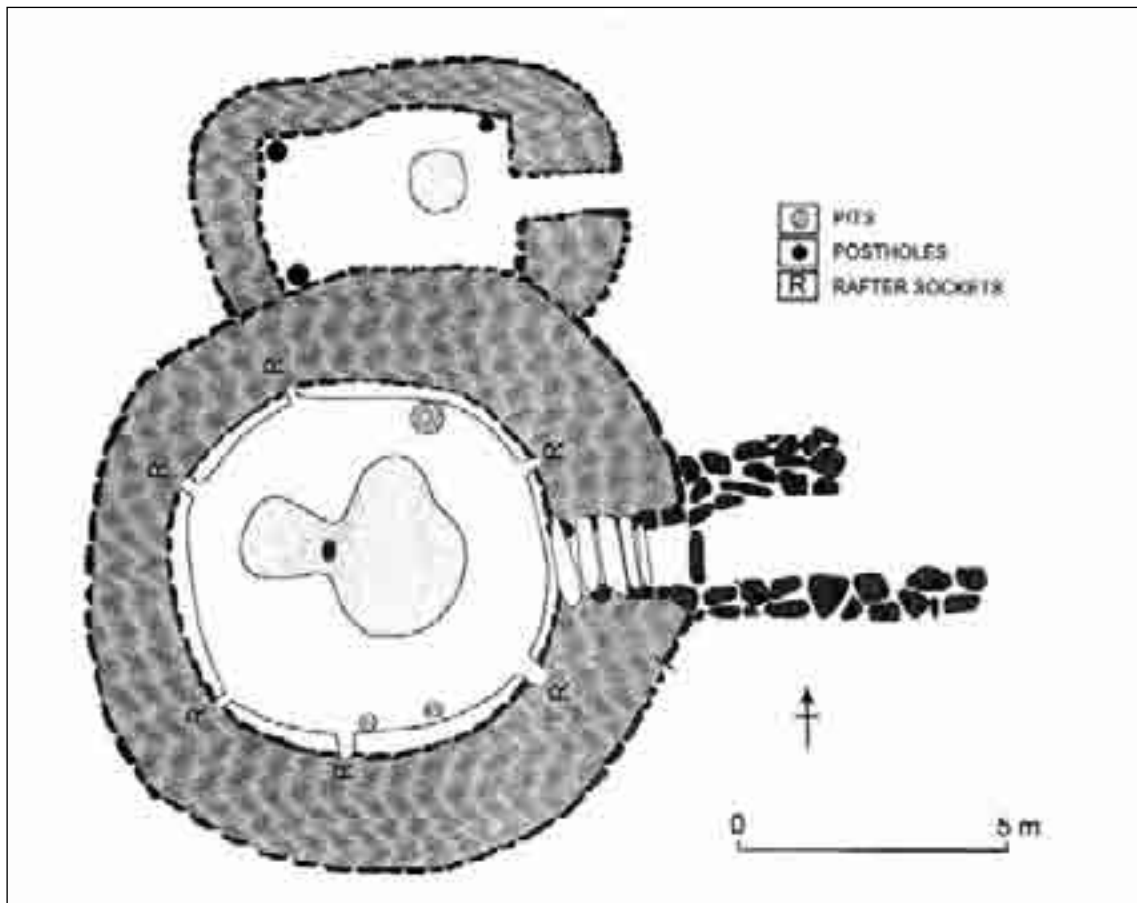
Numerous lumps of iron slag as well as vitrified clay from the lining of a small furnace and some fragments of *tuyères* were recovered in a scatter of charcoal at the western end of the settlement. Middens of limpet and periwinkle were associated with almost every building on the site from both phases.

Tillage appears to have been practiced during the earliest occupation phase though a greater emphasis on stock-raising during the second period was suggested by the recovery of cattle, pig and sheep bone from inside House 1; and fishing was also practiced during the second period as indicated by fish bone and the net and line sinkers from House 1.

### **Animal Bones:**

Only the presence of animal bones was recorded from House 1, and not the quantities of species present.

<b>Context</b>	<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Dog</b>	<b>Cat</b>	<b>Red Deer</b>	<b>Bird</b>	<b>Fish</b>	<b>Date</b>
House 1	Yes	Yes	Yes	Yes	Yes	-	Yes	Yes	<i>c. A.D. 1050</i>



Plan of House 1 at Begenish, Co. Kerry (after O'Kelly 1954-6, 164)

## **Betaghstown, Co. Meath**

Grid references: **O159/730, O1560/7320, 31490/27340, 31570/27325, 31564/27331**

SMR No: **ME021-010, ME021-019**

Reference: **Eogan 1998.**

Excavations occurred initially in Betaghstown in the late 1970s and an intensification of development from the late 1990s produced further archaeological investigations that revealed a range of features dating from prehistory until the post medieval period. Early medieval activity is present in the form of settlement and burial evidence. Many of the excavations occurred on part of – and adjacent to – a low ridge overlooking the sea just south of the village of Betaghstown.

Initial excavations at Betaghstown revealed a small cemetery and a Bronze Age cist burial to its west (**ME021-010**). The former consisted of 16 graves which potentially date to the late prehistoric and early medieval periods. The majority were extended inhumations in unlined graves and two were stone-lined. An iron object, perhaps a strap end, was found in one of the graves containing the skeleton of a child. Two of the burials were in crouched positions and two later extended burials were in slab-lined graves, one of which cut into one of the crouched inhumations. One of the former was accompanied by two penannular brooches, dating to the late Iron Age, and an iron belt buckle. A stone axe pendant was suspended from the neck and a bronze plate, perforated at each end, seems to have served as a hair ornament. Remains of two types of textile and of a hair net were present in the grave.

Excavation – in advance of a residential and commercial development – approximately 20 years after Kelly's investigations revealed three main phases of archaeological activity to the south of the above cemetery. These consisted of a Neolithic timber circle, an early Bronze Age flat cemetery and a larger cemetery that extended along the top of the ridge. The latter consisted of 55 extended west-east inhumations. The majority were buried in simple stone-lined pits although three burials were interred in lintel graves and six were found in slab-lined graves. The cemetery cut the earlier Neolithic timber circle and likely dates to the late prehistoric and early medieval periods.

An archaeological assessment in advance of a proposed residential development site at Narrow Ways in Betaghstown revealed the partial remains of two disarticulated skeletons potentially dating between the late prehistoric and early medieval periods.

Further testing and excavation in the areas in proximity to the above sites revealed a burnt mound trough with associated midden and roasting pits, linear ditches, an unstratified skeleton, possible cremation pits and a series of curvilinear ditches that enclosed a souterrain. The souterrain was situated in the northern area of the enclosure and was constructed of water-rolled stones. Several habitation layers were recorded. A decorated bone comb was found in association with a stone floor at the western terminus where the entrance was potentially located.

The most recent excavations at Betaghstown uncovered a curving ditch, which probably formed a complete enclosure, near the above cemetery (**ME021-010**). It was filled with shell, animal bone and pieces of waste flint. This ditch enclosed three large oval-shaped pits that were probably the remains of refuse pits. Charred plant remains – identified as hulled barley and oats – and charred wood – identified as apple, cherry/plum, willow, ash and hazel – were recovered from the pits. One of the pits was dated to A.D. 430-620. Four roughly circular pits were identified to the north of the ditch. A scatter of small charcoal and oxidised clay spreads were also identified across the site. Charcoal recovered from one of the spreads returned a radiocarbon date of A.D. 550-660.

### **Animal Bones**

Animal bone – identified as cattle, sheep, pig, horse, dog, deer and cat – was recovered from the features in this area of the site and the assemblage is typical of occupation debris from a nearby settlement. The molluscan remains also represent food debris and were predominantly cockles and mussels.

## Bettystown, Co. Meath

Grid Ref: **31564/27331**

SMR No: **ME021-010; ME021-014**

References: **Murphy 2008; Tommasino 2008.**

Excavations were undertaken prior to a building development. These uncovered a portion of an early medieval ring-ditch, a hearth with associated stakeholes, pits, postholes and a series of linear features. A fragment of early medieval bone comb was found in one of the pits, and a cattle radius from the ring-ditch was dated *c.* A.D. 890-1030.

The hearth is evidence for domestic activity on site. The two stakeholes beside it may have supported a roasting spit, and the surrounding postholes, though not indicative of dwelling, may have served as a windbreak. Another possible windbreak may be represented by the curvilinear ditch located to the southwest of the hearth.

The curvilinear at Bettystown appears to be rather difficult to classify. It enclosed an area approximately 15m in diameter, so would appear to be too large for a roundhouse; however two postholes and a slot trench in the ditch, and the lack of a bank suggests it was not a rath, or animal enclosure. As such the excavator interpreted it as a ring-ditch, possibly enclosing a central burial. Although these, associated with a central barrow, are a common feature of the Bronze Age, recent work has shown that they continue in use into the early medieval period. The early medieval date from this ditch may therefore come from when it was re-used as a the location for a possible palisade.

### Animal Bones:

A total of 147 recordable fragments were recovered from the ring-ditch

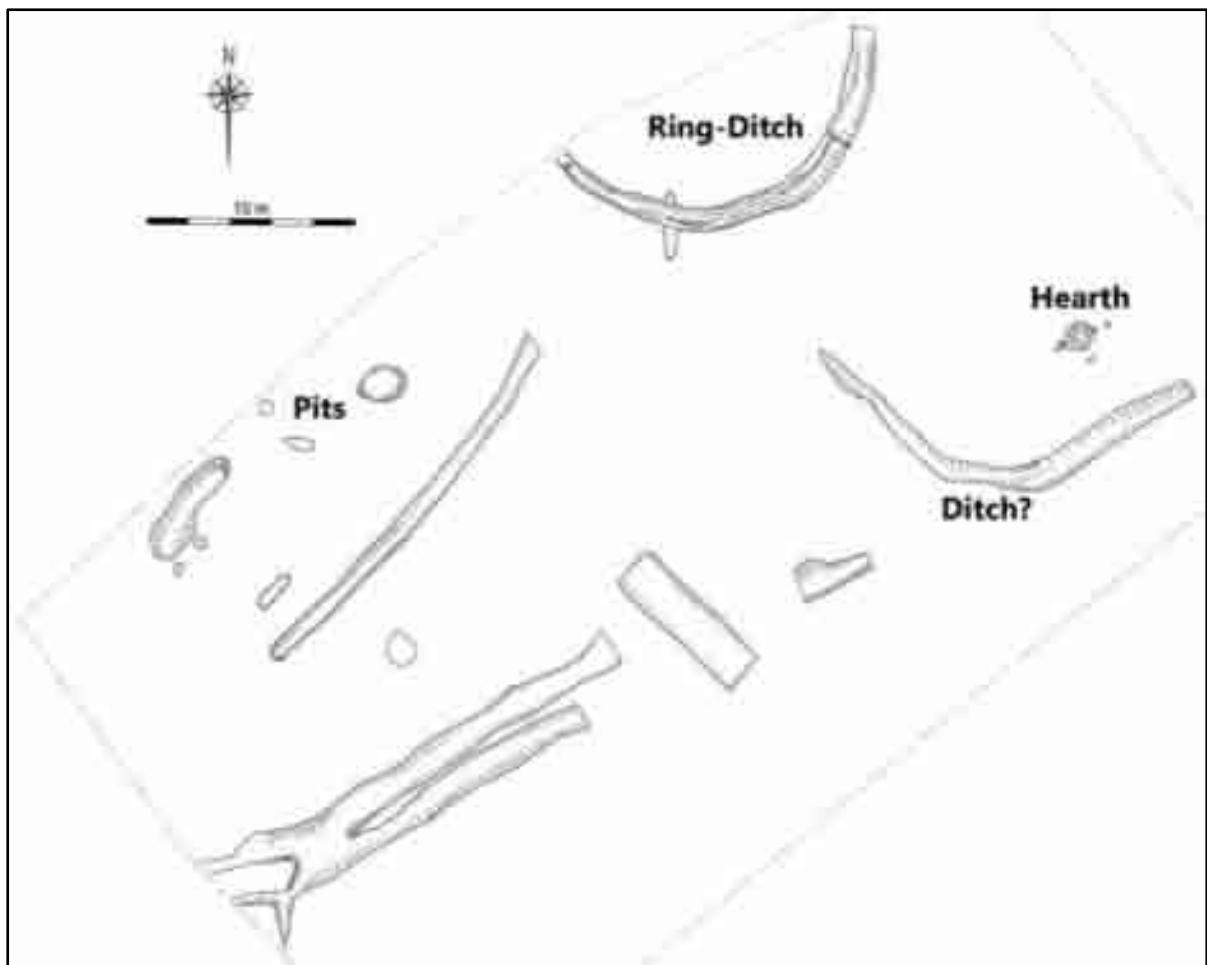
	<b>Cattle</b>	<b>Sheep/Goat</b>	<b>Pig</b>	<b>Horse</b>
NISP	78	44	9	7
%NISP	56.5	31.9	6.5	5
MNI	4	3	3	1
%MNI	36.4	27.3	27.3	9

### NISP and MNI from Bettystown, Co. Meath

### Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
SUERC-17370	Animal bone from ring-ditch	1055 $\pm$ 35 BP	A.D. 895-925; <b>A.D. 936-1027</b>



Plan of excavated features at Bettystown, Co. Meath (after Murphy 2008)

### Animal Bones Appendix:

Element	NISP	dp4	P4	M1	M2	M1/2	M3	Higham MWS	Est. age (mnths)
LMT	2	-	-	-	-	-	-	-	
LMT	1	-	-	-	-	-	a	13	24-30
LMT	1	-	-	-	-	-	c	17	32-33
LMT	1	-	-	-	-	-	j	23	50+
LMT	1	-	-	-	-	b	-	-	-
LMT	2	-	-	-	-	c	-	-	-
LMT	1	-	-	-	-	d	-	-	-
LMT	1	-	-	-	-	e	-	-	-
LMT	1	-	-	-	-	g	-	-	-
LMT	1	-	-	-	-	j	-	-	-
LMT	1	-	-	-	-	k	-	-	-
LMT	1	-	-	-	-	l	-	-	-
LMT	1	-	-	-	l	-	k	-	-
MN	1	-	-	m	l	-	-	-	-
MN	1	j	-	-	-	-	-	-	-
MN	1	j	-	b	-	-	-	-	-

### Tooth Wear Stages and Mandible Wear Stages for early medieval cattle from Bettystown, Co. Meath

Fusion	Element	Age in months	No. Fused	No. Unfused
Early	MC1 prox	Before birth	5	-
	MT1 prox	Before birth	1	-
	PH1 prox	Before birth	4	-
	PH2 prox	Before birth	1	-
	PE prox	6-10	2	-
	SC prox	7-10	1	-
	HU dist	12-18	3	-
	Ra prox	12-18	1	-
	<b>Total</b>		<b>18</b>	<b>-</b>
	<b>%</b>		<b>100</b>	<b>-</b>
Middle	MC1 dist	24-30	4	-
	TI dist	24-30	5	1
	MT1 dist	33-36	1	-
	CA	36-42	-	1
	<b>Total</b>		<b>10</b>	<b>2</b>
	<b>%</b>		<b>83.3</b>	<b>16.6</b>
Late	HU prox	42-48	2	-
	RA dist	42	1	-
	UL ole	42-48	1	1
	Fe prox	42-48	1	-
	<b>Total</b>		<b>5</b>	<b>1</b>
	<b>%</b>		<b>83.3</b>	<b>16.6</b>

### Epiphyseal fusion of cattle bones from Bettystown, Co. Meath

Element	NISP	dp4	P4	M1	M2	M1/2	M3	Higham MWS	Est. age (months)
LMT	1	-	-	-	-	-	-	-	-
LMT	2	-	-	-	-	6A	-	-	-
LMT	1	-	-	-	-	7A	-	-	-
LMT	1	-	-	-	-	8A	-	-	-
LMT	1	14L	-	-	-	-	-	-	-
MN	1	-	-	-	-	-	-	-	-
MN	1	-	-	10A	9A	-	2A	14	25-26
MN	1	-	12S	15A	10A	-	11G	17	Adult
MN	1	-	8A	10A	9A	-	11G	17	Adult
MN	1	-	9A	9A	-	-	-	-	-
MN	1	23L	-	9A	6A	-	-	12	12-21

**Tooth Wear Stages and Mandible Wear Stages for early medieval sheep from Bettystown, Co. Meath**

Fusion	Element	Age in months	No. Fused	No. Unfused
Early	MC prox	Before birth	3	-
	MT prox	Before birth	1	-
	SC prox	6-8	2	-
	HU dist	3-10	3	-
	Ra prox	3-10	3	-
	<b>Total</b>		<b>12</b>	<b>-</b>
	<b>%</b>		<b>100</b>	<b>-</b>
Middle	TI dist	15-24	2	-
	MT dist	18-28	1	-
	<b>Total</b>		<b>3</b>	<b>-</b>
	<b>%</b>		<b>100</b>	<b>-</b>
Late	HU prox	36-42	2	-
	RA dist	36-42	1	2
	UL ole	36-42	-	1
	Fe prox	30-42	1	-
	<b>Total</b>		<b>4</b>	<b>3</b>
	<b>%</b>		<b>57.1</b>	<b>42.8</b>

**Epiphyseal fusion of sheep bones from Bettystown, Co. Meath**

Fusion	Element	Age in months	No. Fused	No. Unfused
Early	PE prox	12	2	-
	<b>Total</b>		<b>2</b>	<b>-</b>
	<b>%</b>		<b>100</b>	<b>-</b>
Late	RA dist	42	-	1
	FE prox	42	-	2
	FE dist	42	1	-
	<b>Total</b>		<b>1</b>	<b>3</b>
	<b>%</b>		<b>25</b>	<b>75</b>

**Epiphyseal fusion of pig bones from Bettystown, Co. Meath**

Element	NISP	dp4	P4	M1	M2	M1/2	M3	Higham MWS	Est. age (mnths)
MN	1	-	b	-	-	-	-	-	-

**Tooth Wear Stages in loose mandibular teeth from early medieval pigs at Bettystown, Co. Meath**

Element	Measurement	Min.	Max.	No.	Mean
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HC	Wmin	-	-	1	33.3
	Wmax	-	-	1	46.1
MC1	SD	26.1	28.6	3	27.4
	Bp	47.9	53.1	4	48.1
	Bd	53.1	57.8	2	55.4
MT1	GL	-	-	1	206
	SD	-	-	1	25.4
	Bp	-	-	1	43.9
	Bd	-	-	1	44.0
SC	SLC	-	-	1	47.5
	GLP	-	-	1	64.9
AS	GLi	-	-	1	60.4
	GLm	-	-	1	54.5
	Bd	-	-	1	37.3
	Dm	-	-	1	31.9
	DI	-	-	1	32.7
HU	BT	65	65	28	65
	HCT	28.8	28.8	4	28.8
TI	SD	-	-	1	35.1
	Bd	54.2	57.3	3	55.5
PH1	GL	52.8	56.6	2	54.7
	Bp	-	-	1	28.4
	Bd	24.7	25.4	2	25.0

#### **Biometrics of cattle bones from Bettystown, Co. Meath**

<b>Element</b>	<b>Measurement</b>	<b>Min.</b>	<b>Max.</b>	<b>No.</b>	<b>Mean</b>
RA	Bp	-	-	1	26.5
HC	Wmin	-	-	1	18.3
	Wmax	-	-	1	29.1
MT1	Bp	-	-	1	16.7
SC	SLC	-	-	1	17.3
	GLP	-	-	1	29.2
HU	BT	-	-	1	26.7
	Bd	-	-	1	27.6
	HCT	-	-	1	12.8
TI	SD	12.8	13.8	2	13.3
	Bd	23.2	24.1	2	23.6

#### **Biometrics of sheep bones from Bettystown, Co. Meath**

<b>Element</b>	<b>Measurement</b>	<b>Min.</b>	<b>Max.</b>	<b>No.</b>	<b>Mean</b>
PE	LA	29.8	31.0	2	30.4

#### **Biometrics of pig bones from Bettystown, Co. Meath**

<b>Element</b>	<b>Measurement</b>	<b>Min.</b>	<b>Max.</b>	<b>No.</b>	<b>Mean</b>
PH1	GL	-	-	1	79.6
	Bp	-	-	1	50.1
	Bd	-	-	1	40

#### **Biometrics of horse bones from Bettystown, Co. Meath**



**'Boho' (Carn td.), Co. Fermanagh**

Grid Ref: **H12814440 (21281/34440)**

SMR No: **FER 210:030**

Reference: **Proudfoot 1953; Jope 1953**

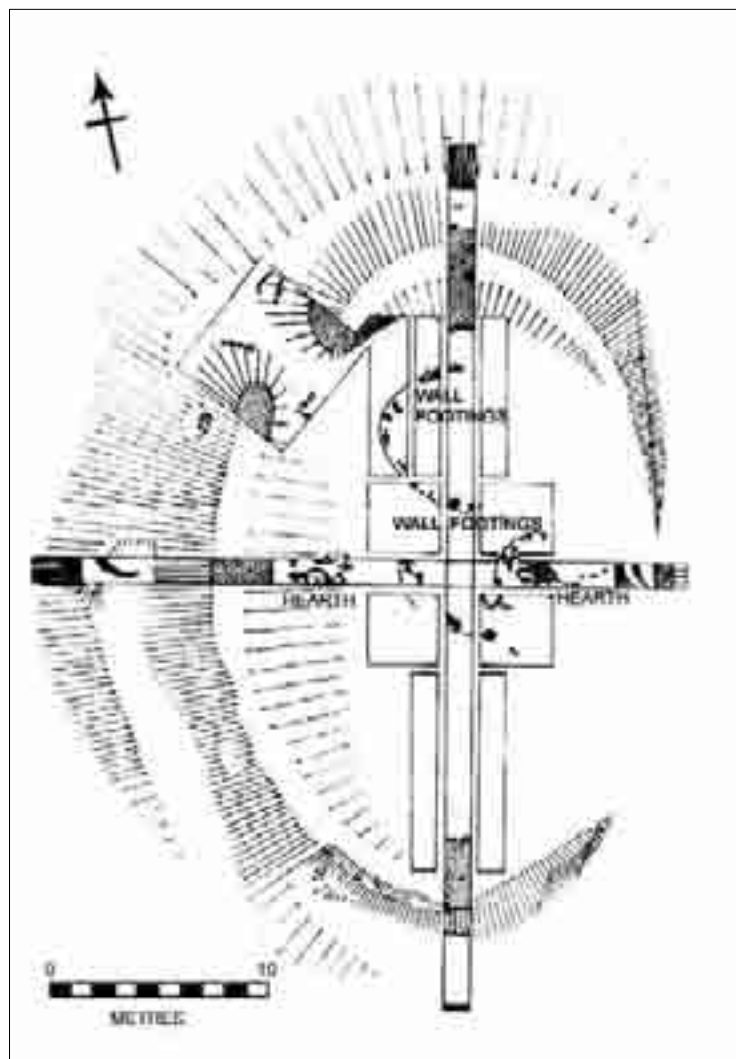
Excavation on the bank of the enclosure suggests that it was built over two phases – with an original gravel and turf bank, which may have been heightened by a stone-faced turf bank. Stone scatters in the centre of the enclosure were interpreted as representing hut-bases, presumably with turf walls which were strengthened by upright wooden posts (several postholes were found along the lines of these wall footings). Two hearths were also excavated which may have been used for iron smelting, since iron slag was found on site.

**Animal Bones:**

A total of 223 bones were identified, and, with the exception of six bones of red deer, these were all of domesticates. Examination of the teeth showed the presence of cattle, pigs and sheep of less than three years.

Context	Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Fowl	Date
Enclosure	150	17	45	4	6	1	?

**Bone fragments identified at Boho, Co. Fermanagh**



**Enclosure at Boho, Co. Fermanagh (after Proudfoot 1953, facing 44).**

**Boyerstown 3, Co. Meath**Grid Ref: **283319/266223**SMR No: **N/A**References: **Clarke 2009; Foster 2009.**

The site consists of an early medieval farmscape, comprised of rath and associated enclosures. Three major phases have been identified. The earliest phase (Phase 1) consists of the rath, and then the construction of the large, rectangular-shaped enclosure, Enclosure 1 (Phase 2). There appears to have been activity on site contemporary with the rath, but prior to the construction of Enclosure 1 since one of the ditches in the annex to the north of, and truncated by, Enclosure 1 returned a date of A.D. 436–649. There was little excavation done around the rath site, and thus Phase 3 focuses on the expansion, and possible subdivision, of Enclosure 1. This includes the small shallow, narrow, curvilinear enclosure annexed onto the northeast corner of Enclosure 1 and dated to A.D. 598–767. Phase 4 is marked by the construction of the more substantial enclosure, Enclosure 2, located to the east of Enclosure 1.

Enclosure 1 was located a significant distance from the possible rath, and may have functioned as a livestock enclosure associated with the rath. It is possible, however, that Enclosure 1 was used as a specialized garden of sorts to grow and cultivate various crops. Enclosure 2 was sub-rectangular in shape. This enclosure and its associated ditches were more substantial than those associated with Enclosure 1. Finds recovered included metal fragments and slag. Two clusters of activity were identified: the first consisted of four pit features that were located within the southeastern extent of the enclosure. Stone, charcoal and cremated bone were recovered from three of these features. Three small stakeholes were associated with one of these pit features and it is likely that this feature functioned as a hearth, while it is likely that the other pit features functioned as refuse pits. The second cluster of activity was located south of the ditch that defined Enclosure 2 to the west and consisted of four irregular-shaped pits. The function of this enclosure is also unclear. It would seem reasonable to suggest that it had a similar function to that of Enclosure 1, and thus it is likely that this enclosure was also used as a field system.

It is difficult to categorise Boyerstown 3 since the excavation concentrated on the portion of the site associated with agricultural activity. It has been concluded that the enclosures and associated ditches at Boyerstown 3 represent the remnants of contemporary and successive field systems. The regularity of shape and form noted in the construction of Enclosures 1 and 2 would suggest that they were for a particular function and may have been used for crop growth.

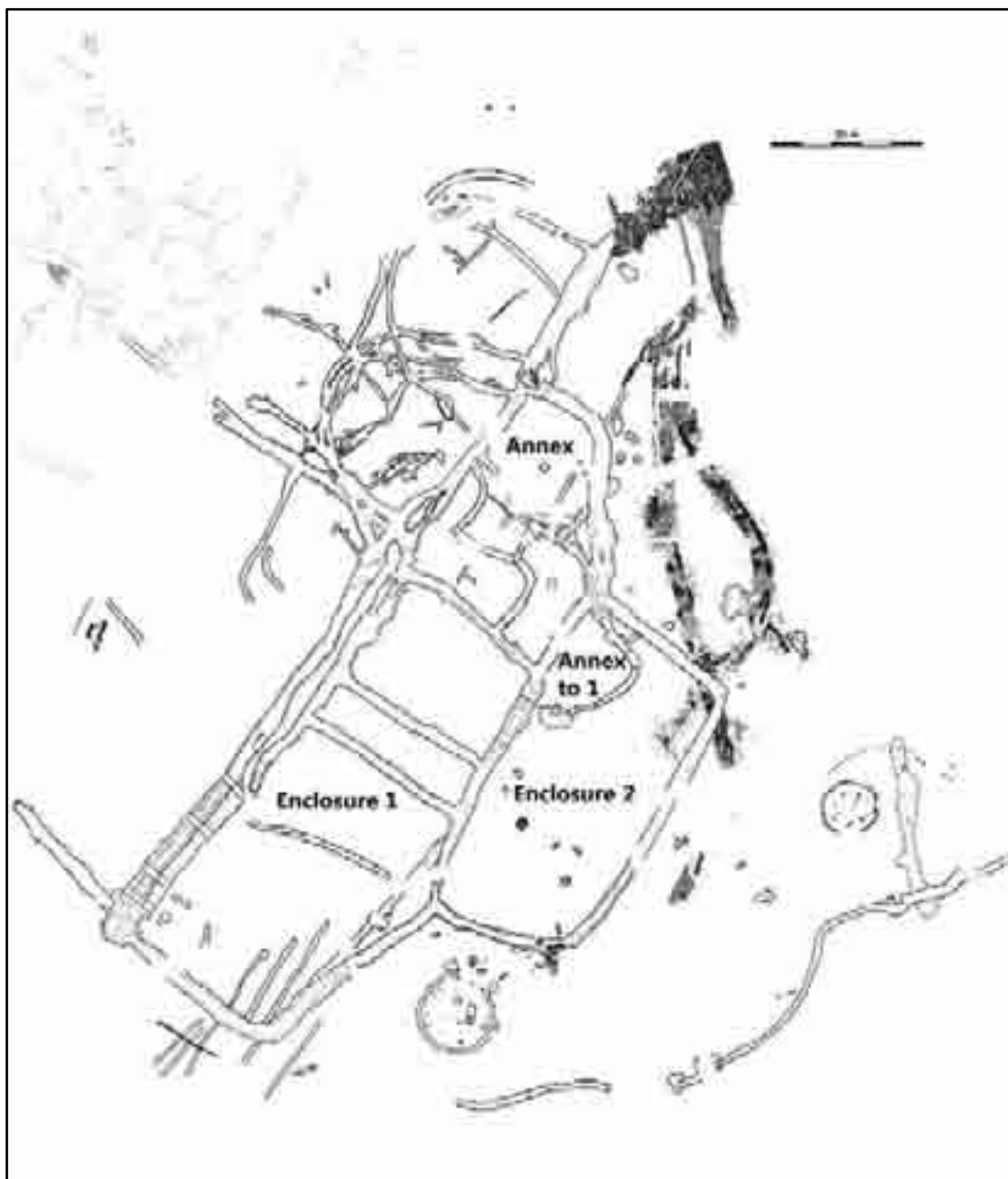
**Animal Bones:**

A total of 2012 fragments were considered 'countable' and phased while 10 fragments were 'non-countable'. A large majority of the fragments were in good condition (92%), while the remaining 8% were either classified as excellent, fair, or poor.

	<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Deer</b>	<b>Dog</b>	<b>Cat</b>	<b>Date</b>
<b>Phase 1-2 (Rath)</b>								<b>A.D. 434-671</b>
<b>NISP</b>	397.5	164.5	105	24	-	19	7	
<b>%NISP</b>	55.4	22.9	14.6	3.3		2.6	1.0	
<b>MNI</b>	11	6	9	2	-	3	1	
<b>%MNI</b>	35.5	19.4	29.0	6.5	-	9.7	3.2	
<b>Phase 3 (Enclosure 1)</b>								<b>A.D. 635-806</b>
<b>NISP</b>	453	75	111	27	2	15	2	
<b>%NISP</b>	66.1	10.9	16.2	3.9	0.3	2.2	0.3	
<b>MNI</b>	16	4	7	2	1	4	1	
<b>%MNI</b>	45.7	11.4	20.0	5.7	2.9	11.4	2.9	

<b>Phase 4 (Enclosure 2)</b>								<b>A.D. 687-937</b>
<b>NISP</b>	114	13	11	8	-	-	-	
<b>%NISP</b>	78.1	8.9	7.5	5.5	-	-	-	
<b>MNI</b>	7	1	2	1	-	-	-	
<b>%MNI</b>	63.6	9.1	18.2	9.1	-	-	-	
<b>Phase 5 (Misc. ditches)</b>								<b>?</b>
<b>NISP</b>	221.5	38	24	7	-	8	-	
<b>%NISP</b>	76.5	13.1	8.3	2.4	-	2.8	-	
<b>MNI</b>	8	5	3	1	-	1	-	
<b>%MNI</b>	44.4	27.8	16.7	5.6	-	5.6	-	

#### NISP and MNI – Phases 1-5



Boyerstown 3, Co. Meath (after Clarke 2009)

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
Beta-219006	Sheep tooth from linear ditch	1410 $\pm$ 40 BP	<b>A.D. 569-671</b>
Beta-219007	Cattle tooth from curvilinear ditch	1370 $\pm$ 40 BP	<b>A.D. 599-712;</b> A.D. 746-767.
Beta-219008	Cattle tooth – Enclosure 2 ditch	1210 $\pm$ 40 BP	<b>A.D. 687-895;</b> A.D. 925-936.
Beta-219009	Horse tibia – annex to Enclosure 1	1340 $\pm$ 40 BP	<b>A.D. 637-772.</b>
Beta-219210	Cattle radius- pre-Enclosure 1	1490 $\pm$ 40 BP	A.D. 436-489; A.D. 513-516; <b>A.D. 530-648.</b>
Beta-247108	<i>Maloideae</i> charcoal – kiln	1220 $\pm$ 40 BP	<b>A.D. 685-892</b>
Beta-247109	Oak charcoal – Structure 1	1300 $\pm$ 40 BP	<b>A.D. 649-781;</b> A.D. 791-807.
Beta-247395	Charred barley- kiln	1420 $\pm$ 40 BP	<b>A.D. 564-666.</b>
Beta-241317	Cattle mandible – circular enclosure	1300 $\pm$ 40 BP	<b>A.D. 649-781;</b> A.D. 791-807.
Beta-247211	<i>Malaioideae</i> charcoal – primary fill of rath	1500 $\pm$ 40 BP	A.D. 434-492; A.D. 508-519; <b>A.D. 528-643.</b>
Beta-247396	Charred barley grain – kiln	1270 $\pm$ 40 BP	<b>A.D. 662-828;</b> A.D. 838-866.

**Animal Bone Appendix:  
Cattle**

Phase	Element	Grant TWS	Higham MWS
<b>1-2</b>	P4	j	N/A
	M1/2	e	N/A
	M1/2	b	N/A
	M1/2	f	N/A
	M1/2	b	N/A
	M1/2	g	N/A
	M1/2	g	N/A
	M1/2	c	N/A
	M1/2	b	N/A
	M1/2	g	N/A
	M1/2	d	N/A
	M1/2	a	N/A
	M1/2	e	N/A
	M1/2	c	N/A
	M1/2	b	N/A
	M1/2	a	N/A
	M1/2	c	N/A
	M1/2	a	N/A
	M1/2	c	N/A
	M1/2	c	N/A
	M1/2	l	N/A
	M1/2	n	N/A
	M1/2	g	N/A
	M3	f	20
	M3	d	18
	M3	c	17
	M3	e	19
	M3	h	22
	M3	c	17
	M3	h	22
	M3	b	16
<b>3</b>	M1/2	g	N/A
	M1/2	f	N/A
	M1/2	a	N/A

Phase	Element	Grant TWS	Higham MWS
<b>3</b>	M1/2	a	N/A
	M1/2	f	N/A
	M1/2	c	N/A
	M1/2	a	N/A
	M1/2	b	N/A
	M1/2	f	N/A
	M1/2	e	N/A
	M1/2	f	N/A
	M1/2	f	N/A
	M1/2	c	N/A
	M1/2	g	N/A
	M3	e	19
	M3	d	18
	M3	f	20
	M3	e	19
	M3	f	20
	M3	b	16
	M3	c	17
<b>4</b>	M1/2	d	N/A
	M1/2	c	N/A
	M1/2	e	N/A
	M3	g	21
	M3	g	21
	M3	e	19
	M3	d	18
	M3	b	16
<b>5</b>	M1/2	d	N/A
	M1/2	b	N/A
	M1/2	b	N/A
	M1/2	b	N/A
	M1/2	d	N/A
	M1/2	b	N/A
	M3	f	20
	M3	d	18
	M3	d	18

**Tooth and mandible wear stages for loose mandibular cattle tooth following Grant (1982, 92) and Higham (1967, 104).**

			Phase 1-2		Phase 3		Phase 4		Phase 5	
	Element	Age (months)	F	Un	F	Un	F	Un	F	Un
<b>Early</b>	Humerus d	12-18	12	-	19	1	3	-	12	-
	Radius p	12-18	9	-	21	-	6	-	10	-
	Scapula p.	7-10	14	-	20	1	4	-	10	-
	Phalanx (1&2) p	18-24	8	-	19	1	1	-	2	1
	<b>Total</b>		<b>43</b>	<b>-</b>	<b>79</b>	<b>3</b>	<b>14</b>	<b>-</b>	<b>34</b>	<b>1</b>
	<b>%</b>		<b>100</b>	<b>-</b>	<b>96</b>	<b>3.7</b>	<b>100</b>	<b>-</b>	<b>97.1</b>	<b>2.9</b>
<b>Mid</b>	Tibia, d.	24-36	6	4	9	4	5	-	9	2
	M-podium, d	24-36	16	1	23	2	4	1	7	2
	Calcaneum, p	36-42	9	-	9	-	1	-	6	-
	<b>Total</b>		<b>31</b>	<b>5</b>	<b>41</b>	<b>6</b>	<b>10</b>	<b>1</b>	<b>22</b>	<b>4</b>
	<b>%</b>		<b>86.1</b>	<b>13.9</b>	<b>87.2</b>	<b>12.8</b>	<b>90.9</b>	<b>9.1</b>	<b>85</b>	<b>15</b>
<b>Late</b>	Humerus p	42-48	1	-	6	1	1	-	2	-
	Radius, d; ulna p	42-48	4	4	6	3	-	-	9	1
	Femur	42-48	11	5	20	9	2	-	11	3
	Tibia , p	42-48	2	3	7	3	-	-	6	-
	<b>Total</b>		<b>18</b>	<b>12</b>	<b>39</b>	<b>16</b>	<b>3</b>	<b>-</b>	<b>28</b>	<b>4</b>
	<b>%</b>		<b>60.0</b>	<b>40.0</b>	<b>70.9</b>	<b>29.1</b>	<b>100</b>	<b>-</b>	<b>88</b>	<b>12</b>

**Number of fused (fused and fusing) and unfused cattle specimens classified under early, middle, or late-fusing stages following Reitz and Wing (1999, 76).**

Phase	Element	#	Min	Max	Mean	StD
	<b>Scapula</b>					
3	GLP	7	58.5	70	62.5	4.2
3	SLC	7	46.3	56.2	50.7	3.9
	<b>Humerus</b>					
1-2	HTC	5	37.3	41.9	38.7	1.9
3	HTC	5	35.5	48.7	40.7	3.9
1-2	BT	5	65.1	69.7	67.2	2.1
3	BT	5	63.9	76.4	69.5	5
	<b>Metatarsal</b>					
1-2	BP	7	39.6	48.3	44.2	3.2
3	Bp	7	39.2	47.9	42.7	2.7
5	Bp	5	49.5	60.5	53.5	4.5
1-2	Bd	6	45	53.3	49.2	3.2
3	Bd	8	47.7	53.2	49.2	1.8
5	SD	5	23.6	29.2	24.8	2.4
	<b>Tibia</b>					
1-2	Bd	5	54.6	58.9	56.3	1.7
	<b>Metacarpal</b>					
3	Bp	6	47.3	52.5	50.8	1.7
5	Bp	5	49.5	60.5	53.5	4.5
	<b>Astragalus</b>					
3	Gli	10	55.4	63	60.3	2.6
3	Glm	10	50.2	57.3	54.4	2.2
3	Bd	13	30	41.8	42.7	2.7

**Summary of Cattle measurements**

Phase	Element	GL	Sex	ESH (cm)
1-2	MC1	183	F	109.8
1-2	MT1	217	N/A	118.3
1-2	MC1	177	F	106.2
3	MT1	215	N/A	117.2
3	MC1	187.5	F	112.5
5	MC1	184	F	110.4
5	MC1	195	F	117

**Estimated shoulder heights for cattle based on greatest length of metapodials after Fock (1966) as detailed in von den Driesch and Boessneck (1974, 336).**

Phase	Element	Bd	Sex
<b>1-2</b>	Metacarpal	53.2	F
<b>1-2</b>	Metacarpal	51.2	F
<b>3</b>	Metacarpal	51.7	F
<b>5</b>	Metacarpal	53.7	F
<b>5</b>	Metacarpal	51.7	F

**Sex determination for cattle metapodia**

### Sheep/Goat

Phase	Element	Payne TWS	Higham MWS
<b>1-2</b>	M1/2	10A	N/A
	M1/2	10A	N/A
	M1/2	4A	N/A
	M1/2	9A	N/A
	M1/2	5A	N/A
	M1/2	5A	N/A
	M1/2	9A	N/A
	M3	8G	16
	M3	12G	17
	M3	11G	17
	M3	5A	14
	M3	8G	15
	M3	8G	15
	M3	13G	18
<b>3</b>	M1/2	2A	N/A
	M1/2	5A	N/A
	M3	8G	15
<b>4</b>	dP4	-	15
	P4	8A	15
	M1	10A	15
	M2	9A	15
	M3	4A	15
<b>5</b>	M3	8G	16

**Tooth wear stages for loose mandibular sheep/goat teeth after Payne (1973 and 1987) and mandible wear stages assigned following Higham (1967, 106).**

Phase	Min	Max	Mean	#
Phase 1-2	50.9	63.2	56.6	6

**Estimated sheep shoulder heights (cm)**

			Phase 1-2		Phase 3		Phase 4		Phase 5	
	Element	Age (mnths)	F	Un	F	Un	F	Un	F	Un
<b>Early</b>	Humerus d; radius p	3-10	10	3	9	-	-	-	3	-
	Scapula p.	6-8	2	-	5	2	-	-	2	-
	Phalanx (1&2) p	6-16	11	1	1	1	-	-	-	-
	<b>Total</b>		<b>23</b>	<b>4</b>	<b>15</b>	<b>3</b>	-	-	<b>5</b>	-
	<b>%</b>		<b>85.2</b>	<b>14.8</b>	<b>88.2</b>	<b>16.7</b>	-	-	<b>100</b>	-
<b>Mid</b>	Tibia, d.	15-24	-	3	5	2	-	-	1	-
	M-podium, d	18-28	4	7	-	1	-	-	-	-
	Calcaneum, p	30-36	-	-	2	-	-	-	1	-
	<b>Total</b>		<b>4</b>	<b>10</b>	<b>7</b>	<b>3</b>	-	-	<b>2</b>	-
	<b>%</b>		<b>28.6</b>	<b>71.4</b>	<b>70</b>	<b>30</b>	-	-	<b>100</b>	-
<b>Late</b>	Femur	30-42	-	7	1	2	-	1	-	1
	Ulna p	30-42	1	3	1	-	-	-	-	-
	Radius d	30-42	2	2	1	-	-	-	-	-
	Tibia p	30-42	1	1	2	1	1	-	1	-
	<b>Total</b>		<b>4</b>	<b>13</b>	<b>5</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
	<b>%</b>		<b>23.5</b>	<b>76.5</b>	<b>62.5</b>	<b>37.5</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>

**Number of fused (fused and fusing) and unfused sheep specimens classified under early, middle, or late-fusing stages following Reitz and Wing (1999, 76).**

#### **Pig**

			Phase 1-2		Phase 3		Phase 4		Phase 5	
	Element	Age (mnths)	F	Un	F	Un	F	Un	F	Un
<b>Early</b>	Humerus d	12-18	5	1	9	-	2	-	4	-
	Radius p	12-18	2	-	4	-	-	-	-	-
	Scapula p.	23	7	1	9	-	-	-	-	-
	<b>Total</b>		<b>14</b>	<b>2</b>	<b>22</b>	-	<b>2</b>	-	<b>4</b>	-
	<b>%</b>		<b>87.5</b>	<b>12.5</b>	<b>100</b>	-	<b>100</b>	-	<b>100</b>	-
<b>Mid</b>	Tibia, d.	24	2	3	3	1	2	1	-	-
	M-podium, d	24-27	1	1	1	-	-	-	1	-
	Calcaneum, p	24-30	1	-	1	-	-	-	-	-
	Phalanx 1 p	24	-	1	-	-	-	-	-	-
	<b>Total</b>		<b>4</b>	<b>5</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	-
	<b>%</b>		<b>44.4</b>	<b>55.6</b>	<b>83</b>	<b>17</b>	<b>67</b>	<b>33</b>	<b>100</b>	-
<b>Late</b>	Ulna p	36-42	-	2	-	1	-	-	-	-
	Humerus p	36-42	-	1	-	-	-	-	-	-
	Radius, d	42	-	-	-	-	-	-	-	-
	Femur	42	1	-	-	4	-	-	-	1
	Tibia , p	42	-	1	-	1	-	-	-	1
	<b>Total</b>		<b>1</b>	<b>4</b>	-	<b>6</b>	-	-	-	<b>2</b>
	<b>%</b>		<b>20</b>	<b>80</b>	-	<b>100</b>	-	-	-	<b>100</b>

**Number of fused (fused and fusing) and unfused pig specimens classified under early, middle, or late-fusing stages following Reitz and Wing (1999, 76).**



Phase	Male	Female	Total
<b>1-2</b>	5	1	6
<b>3</b>	5	3	8
<b>4</b>	3	-	3
<b>5</b>	1	-	1

**Sex determination for pigs based on canines.**

Phase	Element	#	Min	Max	Mean	StD
<b>3</b>	<b>Humerus</b>					
	HTC	6	24.8	27.2	26.2	0.9
	BT	6	29.1	31.5	29.9	0.9
	Bd	5	35.1	38.2	36.4	1.3

**Summary of Pig Measurements**

**'Cahercommaun Fort', (Tullycommon td.), Co. Clare**

Grid Ref: **R28199649 (128190/196496)**

SMR No: **CL010-064003**

Reference: **Hencken 1938a; Hencken 1938b; Hencken 1950; Ó Floinn 1999; Ó Donnabháin 1980; Cotter 1999.**

Cahercommaun is an inland cliff-top fort comprised of a roughly circular enclosure with concentric limestone walls. The area between the first and third walls yielded no significant archaeological deposits and it was suggested that this area was intended primarily for agricultural use. The imposing inner wall surrounding the living quarters was higher and more massive than the two others with a maximum thickness of 8.5m and height of 4.5m. Excavations in the interior uncovered a guard room, several irregular stone structures and hearths as well as two souterrains beneath a general deposit consisting of stones and black earth mixed with bits of charcoal and animal bone.

Ó Floinn's re-evaluation of the metalwork from the site suggests the material-culture can be broadly divided into four early medieval phases. Phase 1 was dated to the fifth/sixth century and included stratified deposits containing imported pottery (Late Roman Amphora (B ware)) and an iron penannular brooch. Phase 2 dated to the later sixth/seventh century (e.g. imported E ware pottery and a copper-alloy penannular brooch); and Phase 3 to the later seventh-eighth century (e.g. an enamelled ring brooch and bowl-shaped spindle-whorls). The final phase (Phase 4) was dated to the ninth and tenth centuries and contained early Viking age artefacts, including a silver brooch.

Cotter's reassessment of Hencken's excavations and Ó Floinn's artefact analysis has identified three early medieval phases. The first consisted of a pre-souterrain fifth/sixth-eighth century phase (Ó Floinn's Phase 1, 2 and 3). The main occupation phase was dated to the ninth century (Ó Floinn's Phase 4) and consisted of the stone structures and both souterrains. The final phase (later ninth/tenth century) involved the re-flooring of the southern area of the cashel and the construction of another structure.

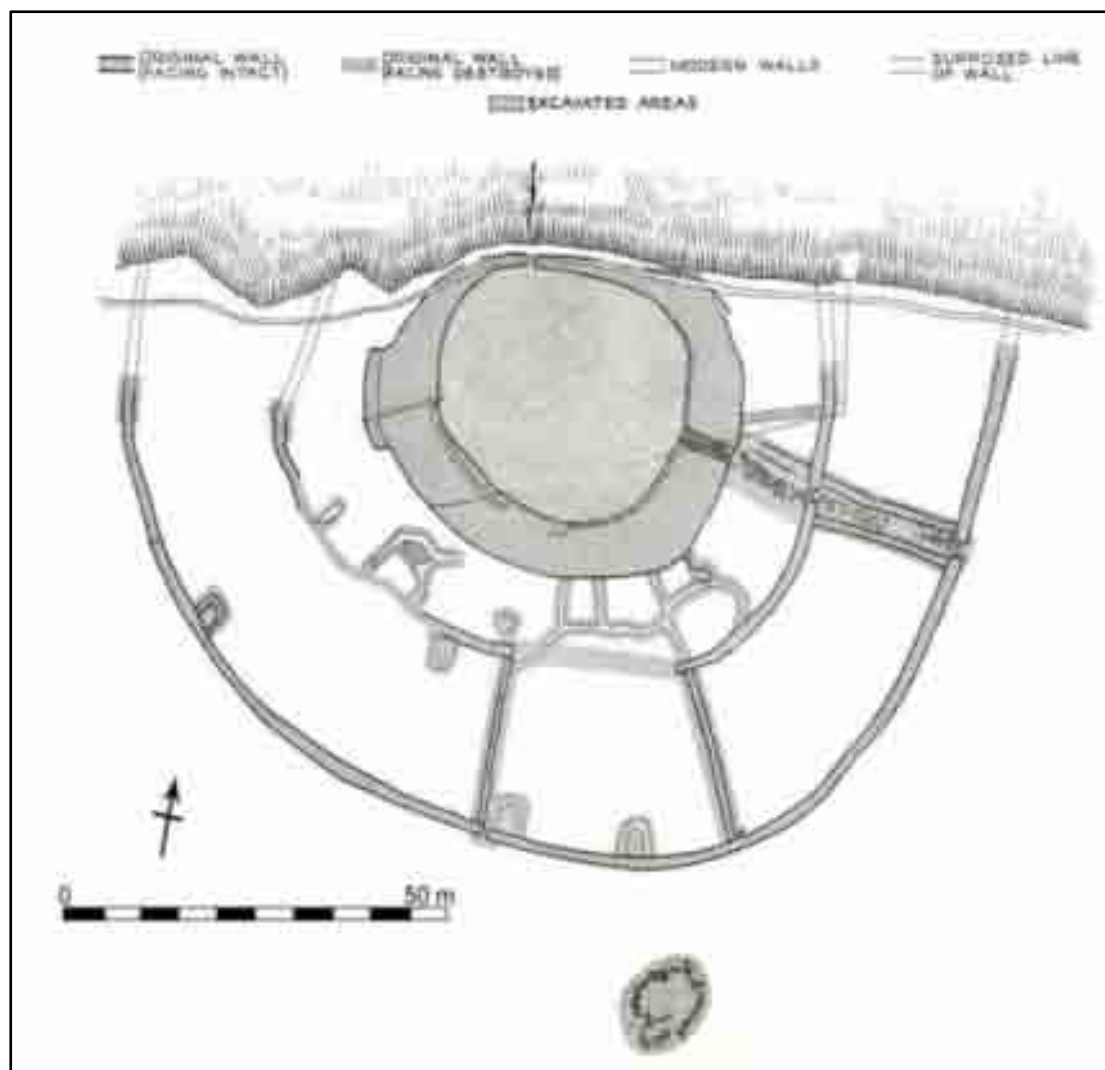
Though a large collection of artefacts were recovered during the excavation, very few were actually stratified because of the extensive infilling of the site. A large iron hook, socketed iron knife and a decorated silver brooch were found beside a human skull inside one of the souterrains. Objects belonging to a later period included a single-edged sword, pronged and socketed tool, bone button and pieces of rotary and saddle querns. Tanged iron knives and pieces of rotary querns were found in both earlier and later deposits. A modest quantity of iron slag was recovered scattered throughout the fort, mostly in un-stratified contexts though small cakes were identified in layers of ashes inside one of the souterrains and in a number of hearths inside the inner circular stone enclosure. Evidence for textile production can also be posited due to the relatively large collection of spindle whorls recovered. No pottery was identified though wooden vessels were at least present on the site as attested by the recovery of iron bucket-handles and two iron clamps of wooden bucket hoops like those recovered on Ballinderry Crannog, No. 1.

**Animal Bones:**

A vast quantity of animal bone (4183 kg) was recovered inside the inner enclosure of the fort. The species present are represented as a percentage – although it is not clear what this is a percentage of. It could refer to a crude MNI, or to the potential carcass weight (as at Ballinderry I).

Phase	Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Date
	95%	1%	<1%	1.5%	<1.5%	

**Species percentages from Cahercommaun Fort**



**Plan of Cahercommaun Fort, Co. Clare**

### Animal Bones Appendix:

GL	Bp	Bd	Sd	S.I.	Sex	E.W.H.
179.9	51.9	51.9	26.9	15.0	F	107.9 cm
189.1	59.3	61.1	35.9	19.0	M	118.2 cm
173.9	56.1	59.2	34.2	19.7	M	108.7 cm
174.6	58.6	61.3	34.9	20.0	M	109.1 cm
179.7	51.2	51.9	29.3	16.3	F	107.8 cm
175.7	55.2	56.9	34.2	19.5	M	109.8 cm
180.6	51.0	52.9	29.6	16.4	F	108.4 cm
173.5	-	50.0	25.4	14.6	F	104.1 cm
184.7	50.5	52.0	27.9	15.1	F	110.8 cm

### Cattle Metacarpal Measurements (mm)

	LI	Bp	Bd	Sd	E.W.H
Metacarpal	206.1	44.5	46.6	31.1	132.1 cm
Metacarpal	207.5	44.9	44.0	29.8	133.0 cm
Metacarpal	207.6	46.1	44.3	30.9	133.1 cm
Metatarsal	253.3	45.0	44.1	28.8	135.0 cm

### Horse measurements (mm)

Metacarpals	GL	Bp	Bd	Sd
Sheep	126.5	23.4	25.4	13.6
	122.8	23.3	24.7	13.4
	120.6	22.8	23.8	14.5
	118.6	22.5	25.2	12.8
	116.6	22.2	24.5	13.0
	114.2	22.9	25.1	15.6
	113.8	22.5	25.7	15.6
	113.6	19.8	22.3	12.8
	109.8	20.5	21.8	11.6
	108.7	19.5	23.1	12.2
	106.8	19.3	22.3	12.6
	106.3	23.4	25.1	14.8
	104.1	19.7	22.6	11.6
	102.9	21.0	23.4	12.5
	100.6	19.5	20.8	11.1
Goat	114.1	23.0	25.8	15.7
	109.3	24.8	28.4	17.4
	101.6	22.3	25.6	15.3

### Sheep/Goat Metacarpals (mm)

## **Caherconnell, Co. Clare**

Grid Ref: **123600/199500**

SMR: **CL009-03010**

Reference: **Comber & Hull 2010; Murray 2010.**

The enclosure at Caherconnell is a circular, dry-stone cashel measuring 42m in external diameter, with walls up to 3m wide at the base and reaching 3m in height. The inner face of the wall has been rebuilt in several places—as evident in the vertical and angled setting of the replaced stones. The modern interior of the cashel is visibly raised above that of the external ground surface, an average of 0.9m in the difference. The interior is divided in two by the remains of a partly grassed-over dry-stone wall running roughly east–west across the site. Though the edges of this wall are masked by collapse, it is possible to identify the original double-faced wall with a rubble core, approximately 1–1.3m wide. This wall is probably quite late in date, perhaps contemporary with Structure A.

Two structures are present in the interior - Structure A, a rectangular stone-built structure (10m x 5m internally), situated just inside the north wall of the cashel; and Structure B, a sub-rectangular structure (7.5m x 5m internally), built up against the north-west wall of the cashel. Its interior is subdivided by a rather flimsy dry-stone wall.

The wall that divides the cashel interior does not run up to the cashel wall, and instead there is a gap, roughly 5m from the cashel wall, with a sunken area. This hollow may represent a souterrain or an area of collapse from the adjacent cashel wall.

Three relevant archaeological phases were identified - Phase I continued beneath the cashel wall, therefore presumably pre-dating it; Phase II was the main construction and occupation phase; and Phase III which was marked by the construction of Structure A and the re-ordering of the interior of the cashel.

### **Animal Bones**

Phase	Cattle	Sheep/ Goat	Pig	Horse	Cat	Hare	Date
I	1	5	-	-	-	-	10 <sup>th</sup> /11 <sup>th</sup> C
II	133	125	83	2	5	4	11 <sup>th</sup> /12 <sup>th</sup> C

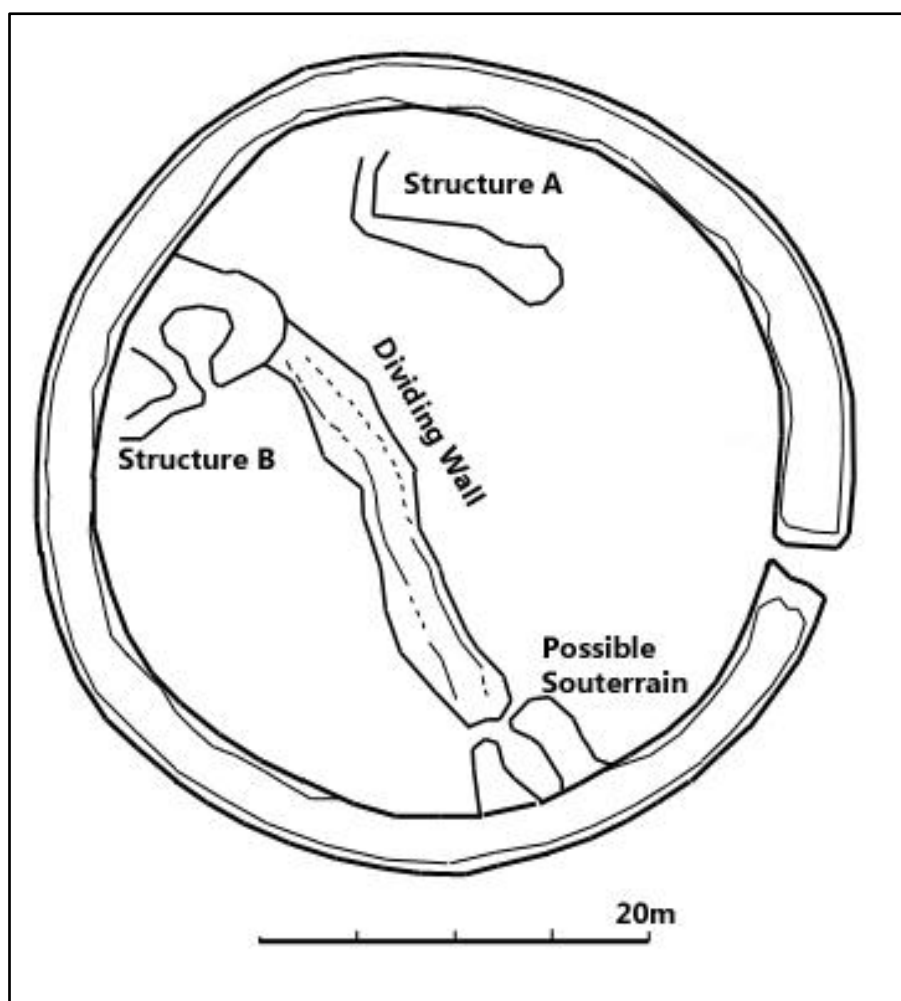
### **NISP from Early Medieval contexts at Caherconnell, Co. Clare**

The full range of skeletal elements for cattle, sheep and pig were recorded from Phase II, indicating that the animals must have been killed in or close to the cashel and that all parts of the carcass were brought on site and presumably utilised. Evidence of butchery was largely limited to the cattle bones and included chop and knife marks, indicative of dismemberment and de-fleshing.

Phase	Taxa	dp2	dp3	dp4	P2	P3	P4	M1	M2	M3	MWS	Est. Age (mon)
II	Bos	p	p	j	-	-	-	f	H	-	9/10	16-18
II	Bos	-	-	-	-	-	-	X	b	C	12	24
II	Ovis	-	-	-	A	p	14A	15A	9a	11G	17	Adult
II	Sus	X	X	g	-	-	-	b	C	-	11/12	9-11
II	Sus	-	-	-	-	-	-	X	X	E	19	19-21

### **Tooth eruption and wear data for ageable cattle (*Bos*), sheep (*Ovis*) and pig (*Sus*) mandibles from Early Medieval contexts.**

Metrical data was restricted and included just two distal metacarpals, probably from cows (distal breadth <55mm) and one estimated withers height of 114.6cm, which falls within the recorded range of cattle stature from medieval Ireland (McCormick and Murray 2007, 79–81).



**Plan of Caherconnell, Co. Clare.**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
UBA-8562	Sheep bone from Phase III	384 $\pm$ 33	<b>A.D. 1442-1525;</b> <b>A.D. 1556-1632</b>
UBA-8563	Charred hazelnut from cashel occupation phase	944 $\pm$ 44	<b>A.D. 1017-1188;</b> A.D. 1199-1206.
UBA-8564	Animal bone from pre-cashel phase	1021 $\pm$ 32	A.D. 901-916; <b>A.D. 967-1046;</b> A.D. 1090-1121; A.D. 1139-1149.
UBA-8565	Charred hazelnut from cashel occupation phase	447 $\pm$ 51	<b>A.D. 1400-1524;</b> A.D. 1558-1631.
UBA-9068	Cattle femur from cashel occupation phase	898 $\pm$ 18	<b>A.D. 1044-1099;</b> <b>A.D. 1119-1142;</b> <b>A.D. 1147-1210.</b>

**Cahircalla More, Co. Clare**Grid Ref: **R32517553 (132511/175537)**SMR No: **N/A**Reference: **Hull 2003; Hull & Taylor 2005; Hull & Taylor 2007; Taylor 2004; Taylor 2006**

A ditched enclosure (internal diameter of 38m by 37m) was identified at Cahircalla More during topsoil stripping. Radiocarbon dating of a cattle limb bone from the ditch fill suggested that it had been in-filled during the sixth or seventh century, and it is suggested that the original banks may have been ploughed-out during the post-medieval period. Various artefacts - a piece of the upper stone of a rotary quern, iron tool, possibly a chisel, fragments of iron slag, and four smithing hearth bottoms - were recovered from the ditch fill.

Prehistoric activity on site consisted of a single oval pit with cremated bone and several finds in secondary contexts- worked quartz fragments, struck chert and a small amount of possibly Late Bronze Age pottery from the plough soil as well as struck chert and a small amount of cremated bone from the early medieval field ditches. This latter evidence suggests that at least one prehistoric cremation burial on the site was disturbed by the subsequent early medieval activity.

The remains of a small oval structure (internal dimensions of 6.3m by 4.4m) defined by three short lengths of curvilinear gully were excavated at the southern end of the enclosure. The gully segments were typically 0.65m wide and 0.40m deep and contained fills with large quantities of charcoal and iron slag as well as animal bone. A radiocarbon date obtained from a grain of cereal from the foundation slots produced a similar date to that produced for the ditch in-fill.

The ditched enclosure was an integral part of a large pattern of rectangular fields defined by five broadly linear ditches to the north and west. Trenches were excavated across the five ditches which measured between 0.5-1.2m wide and 0.25-0.65m deep and contained generally steep sides and slightly concave bases.

Finds from the ditch fills included a copper-alloy ring pin, whetstones, including a pin-sharpening stone, a small quantity of iron slag, animal bone fragments, a mini-anvil stone, oyster shell, and the above mentioned prehistoric struck chert, worked quartz and cremated human bone. Cereal grain samples from the fill of two of the ditches produced radiocarbon dates ranging from the seventh century to the twelfth century, indicating that these ditches may have been backfilled at different times.

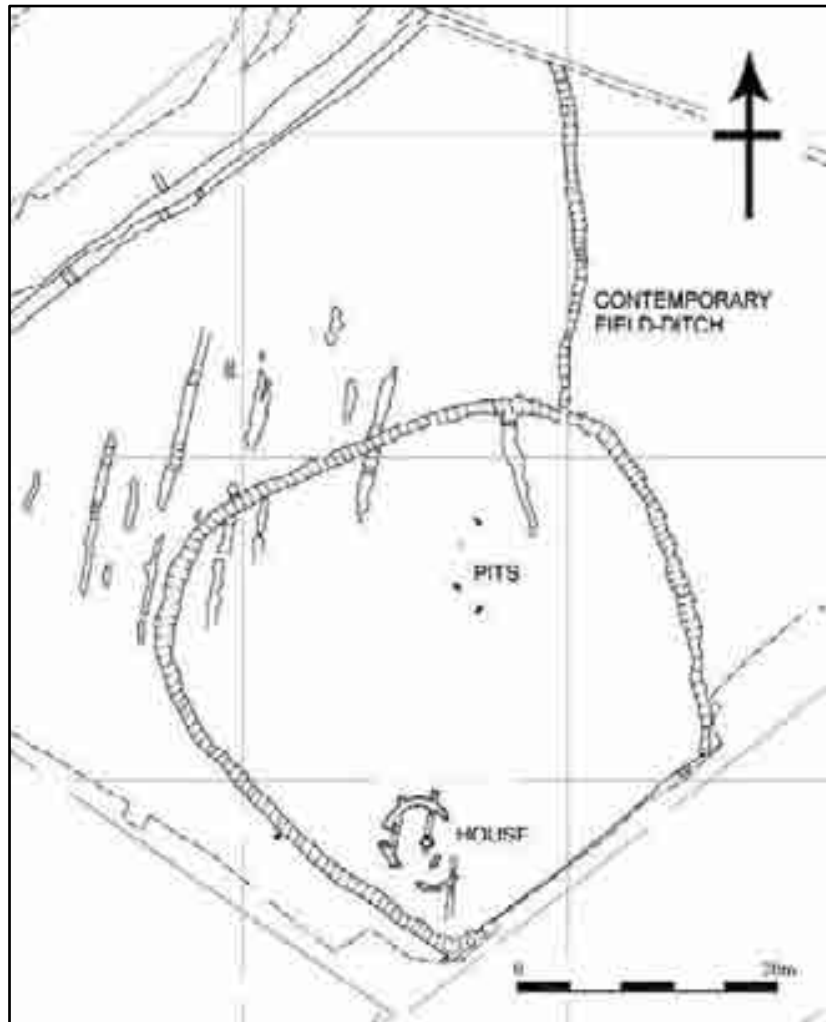
Smithing was the principle early medieval ironworking. Analysis of the slag from the oval building indicates that smithing was being undertaken inside this structure. Smithing hearth bottoms - four from the enclosing ditch and two from the ploughsoil - and a mini anvil from a field ditch were associated with this activity. A possible iron ore fragment was also recovered from the enclosure ditch and suggests that limited smelting may have also been undertaken on the site. Cereal cultivation was also indicated by the two quernstones, field patterns and large quantity of grains, particularly from oats and barley as well as rye, wheat and quantities of weed seeds.

**Animal Bones:**

A number of animal bones were found in the enclosure ditch and in the associated linear field ditches. Although these are listed by context, the analysis of the early medieval faunal assemblage was not available.

Context	Cattle	Sheep/ Goat	Pig	Horse	Deer	L. M.	Date
Enclosure Ditch	33+	-	-	-	Yes	16	A.D. 467-481 <b>A.D. 534-655</b>
House Ring gully	2	-	-	-	-	-	<b>A.D. 559-662</b>
Field Ditch	2	-	-	-	-	45	<i>Late-7<sup>th</sup>-12<sup>th</sup> C</i>

#### Animal Bone Fragments from Cahircalla More, Co. Clare.



**Enclosure, house and boundaries at Cahircalla More, Co. Clare (after Taylor 2006).**

#### Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
Beta-207730	Charred cereal seeds from fill of field ditch	1000 $\pm$ 40 BP	<b>A.D. 975-1155</b>
Beta-211571	Cattle limb bone from fill of enclosure ditch	1470 $\pm$ 40 BP	A.D. 467-481 <b>A.D. 534-655</b>
Beta-211572	Charred cereal seeds from foundation slot of oval structure	1430 $\pm$ 40 BP	<b>A.D. 559-662</b>
Beta-211573	Charred cereal seeds from fill of field ditch	1250 $\pm$ 40 BP	<b>A.D. 674-874</b>



**Caraun More, Co. Galway**Grid Ref: **163612/225276**SMR No: **N/A**References: **Seaver & Conran 2009; Bermingham 2009**

The site of Caraun More was uncovered during roadworks which revealed a multi-period site with features from the Bronze Age, Iron Age the early medieval period and the post-medieval period. These represent a range of domestic, agricultural and industrial activity. The majority of the evidence comes from the early/late medieval periods and these activities included crop production, cereal processing, the herding and slaughter of livestock, gathering of food stuffs, fishing and metal-working. The watercourses suggest an industrial aspect which in all likelihood represents milling activity.

The early medieval archaeology is represented by two hearths which returned evidence for barley seeds and oat grains. A date of A.D. 432-617 was achieved from associated charcoal. A curvilinear enclosure ditch also appears to be early medieval in date and a cattle bone from the basal ditch silts produced a date of A.D. 595-657. It is possible that this ditch represents the extent of an early medieval enclosure, but this was almost completely destroyed by a modern field boundary as well as by a system of watercourses which dominated the excavated area. These ditches were revetted with stone and have been interpreted as millraces for a mill complex possibly located downslope from the site. A date of A.D. 1263-1395 was returned for charcoal (blackthorn) from an upper deposit, and carbonised cereal grain from the kiln which truncated the watercourses has been dated to A.D. 1159-1293. Since these ditches were well silted up by the 13<sup>th</sup> century this system of watercourses appears to have functioned in the early medieval period.

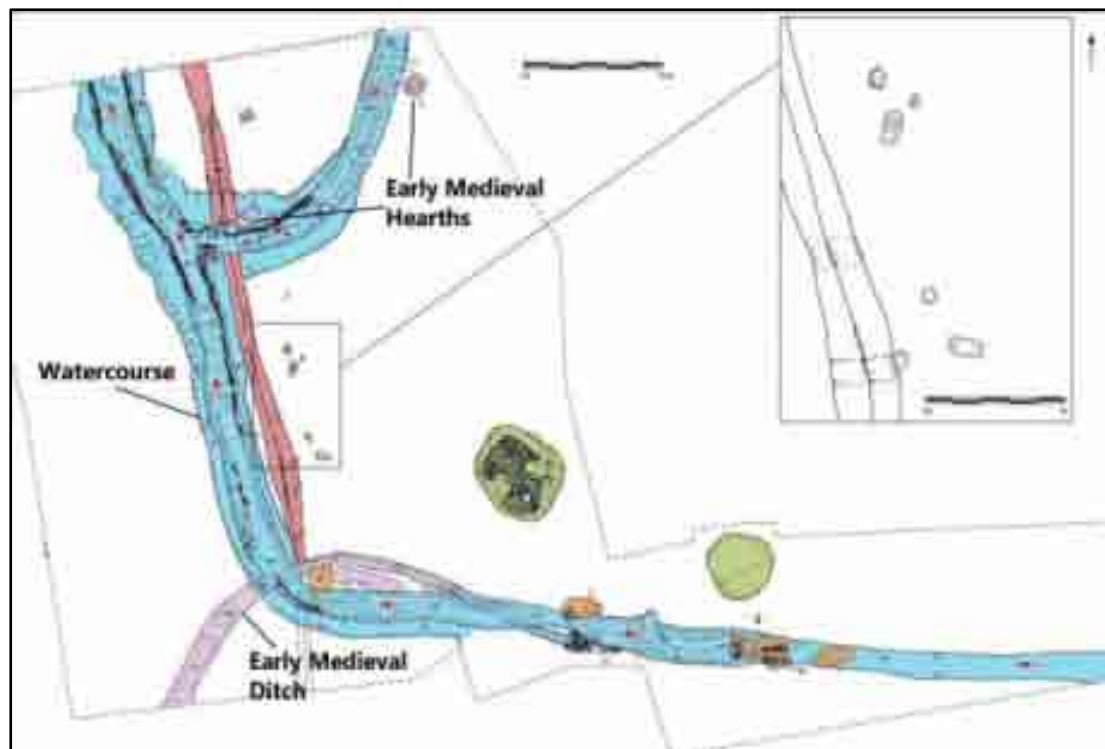
Finds from the possible enclosure ditch included a bone toggle, an iron stick-pin, an iron fish-hook, a chert flake, and a twisted copper wire bracelet. The stick-pin and bracelet within the upper deposits suggest that the ditch was constructed prior to the 6<sup>th</sup>-century.

**Animal Bones:**

The total fragment count amounts to 2790, comprising 451 identifiable and 2339 unidentifiable fragments. Of these, 77% of the total fragments came from the early medieval curvilinear ditch; no identifiable bones were discovered associated with the early medieval hearths.

Species	Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Date
NISP	230	76	30	1	7	7 <sup>th</sup> /8 <sup>th</sup> /9 <sup>th</sup> ?

**NISP from Caraun More, Co. Galway.**



**Plan of excavations at Caraun More, Co. Galway (after Seaver & Conran 2009)**

#### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
WK21339	Charcoal from hearth	1516 $\pm$ 35 BP	<b>A.D. 432-497; A.D. 502-617</b>
UBA-10319	Cattle bone from ditch	1423 $\pm$ 23 BP	<b>A.D. 595-657</b>
Wk20205	Charcoal from upper fill of watercourse	678 $\pm$ 42 BP	<b>A.D. 1263-1328; A.D. 1341-1395</b>
Beta-241007	Carbonised grain from kiln cut into watercourse	780 $\pm$ 40 BP	<b>A.D. 1159-1293</b>

#### **Appendix:**

<b>Cattle fusion (Silver 1969)</b>	<b>age in months</b>	<b>Unfused</b>	<b>Fused</b>	<b>Indet.</b>
scap; rad.px; pel.; hum.d	6-10	1 (10%)	10 (90%)	7
mc.d; tib.d; mt.d	18-28	2 (29%)	5 (71%)	1
rad.d; fem.d; hum.px; fem.px; tib.px; ulna; calcaneus	30-42	7 (47%)	8 (53%)	7

**Epiphyseal fusion data for cattle bones.**

### **Carn, Co. Fermanagh**

Grid Ref: **H2312063490 (223120/363490)**

SMR No: **FER 154:046**

References: **Brannon 1982; Collins 1980.**

The site consisted of a 'D-shaped' stone-walled enclosure which was destroyed by quarrying. Excavation was undertaken pre-destruction on the line of the rubble bank and in the interior. Finds were scarce, but consisted of a couple of hammerstones, a small carved bone disc (interpreted as a spindle whorl), and a saddle-quern which appears to have been re-used in the wall. The spindle whorl is the only diagnostically early medieval artefact found on site. Quantities of iron slag were also recovered from the site, but were not stratigraphically secure.

#### **Animal Bones:**

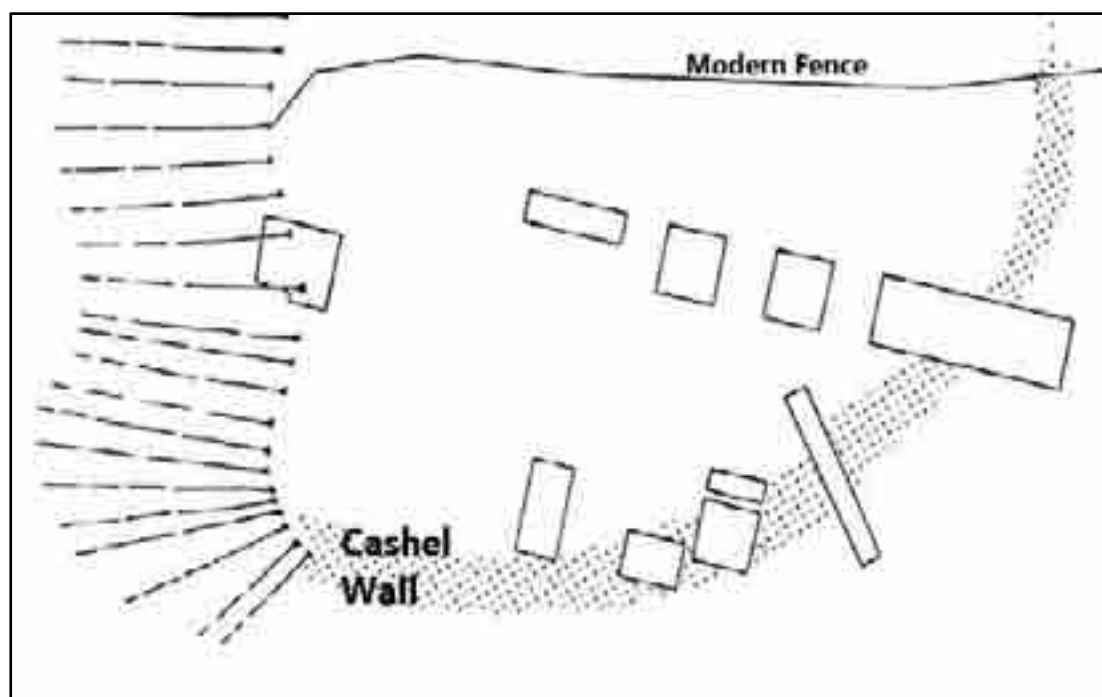
Over 2,000 were discovered during the excavation, of which the majority came from the topsoil and unstratified contexts. Two bone assemblages came from archaeologically relevant deposits – the bank layers (469 bones fragments or 19% of site total); and the pre-bank layer (320 fragments or 13% of the site).

Phase	Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Red Deer	Date
Bank	92	7	10	7	6	1	-	?
Pre-Bank	69	14	7	-	-	-	5	?

#### **NISP from Carn, Co.Fermanagh**

Phase	Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Red Deer	Date
Bank	7	1	2	1	1	1	-	?
Pre-Bank	4	2	2	-	-	-	-	?

#### **MNI from Carn, Co.Fermanagh**



**Excavations at Carn, Co. Fermanagh (after Brannon 1982, 61).**

## **Carnmore West, Co. Galway**

Grid Ref: **140817/227982**

SMR No: **GA083-012**

References: **Sutton 2008; Miller 2008.**

Excavations were undertaken in the interior and vicinity of a cashel (55m in diameter) prior to roadworks. These uncovered an annex to the cashel that measured approximately 40m x 35m, and two cereal-drying kilns situated 30m to the west.

The cashel walls were constructed using two rows of large limestone blocks with a rubble core, and two walls which extended into the cashel interior may have represented access to the walls or been the remains of demolished buildings. An entrance from the cashel into the annex was identified and was delimited by two post-holes cut into bedrock a small uneven cobbled surface. Charcoal from one of these postholes produced a radiocarbon date of A.D. 576-655.

A small number of randomly distributed pits and post-holes were excavated in the interior of the cashel. One of these appears to have been used as a grain storage pit and was radiocarbon dated to A.D. 710-889. A pit-drop entrance to a souterrain was also discovered, but, since the souterrain extended beyond the roadtake, this feature was not fully excavated. Charcoal from the base of the silt layer in the souterrain returned a date of A.D. 665-859, and the souterrain appears to have been used as a grave for domestic animals in recent years, with the skeleton of a modern dog and equine located in the entrance. A rock-cut hearth was discovered immediately to the south of the souterrain. The hearth contained charcoal and animal bone, but appears to have been associated with no other features, except for its close proximity with the souterrain. Two samples from the hearth produced radiocarbon dates of A.D. 720-949 and A.D. 772-965.

A 2m wide gap between the outer face of the cashel and the western wall of the annex would appear to have functioned as the original entrance to the complex. This gap was flanked by two postholes, the fills of which returned very similar radiocarbon dates of A.D. 676-869 and A.D. 688-883. The interior of the annex seems to have been disturbed by post-medieval ploughing.

Two keyhole/dumbbell shaped kilns, truncated by a large L-shaped kiln, were located to the west of the annex. These earlier kilns returned possible contemporary dates of A.D. 687-881 and A.D. 665-859. The later kiln had a drystone built drying chamber and the flue was constructed with lintels and uprights of limestone. 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. Charcoal samples from this kiln produced dates of A.D. 1045-1258 and A.D. 1057-1156. Samples of grain taken from the flue of the later kiln, however, suggest an earlier date – A.D. 723-972 (UBA-7872); A.D. 657-865 (UBA-7870) and A.D. 641-770 (UBA-7868) – suggesting reworking of deposits associated with the earlier kilns.

A number of finds and samples were taken from the rubble collapse of the wall. The outer collapse contained two pieces of clay associated with metal production, a pre-10<sup>th</sup>-century whittle-tanged knife and a ferrous spearhead most likely dated to the early medieval period. The spearhead was recovered from close to the base of the wall collapse, suggesting that it was most likely left here during the occupation of the enclosure. Two fragments of rotary quern were also found in the wall collapse. A fragment of grained black shale bracelet was uncovered from the entranceway between the cashel and the annex; and two knives recovered from the interior of the cashel probably dated between the 10<sup>th</sup> and 15<sup>th</sup> centuries.

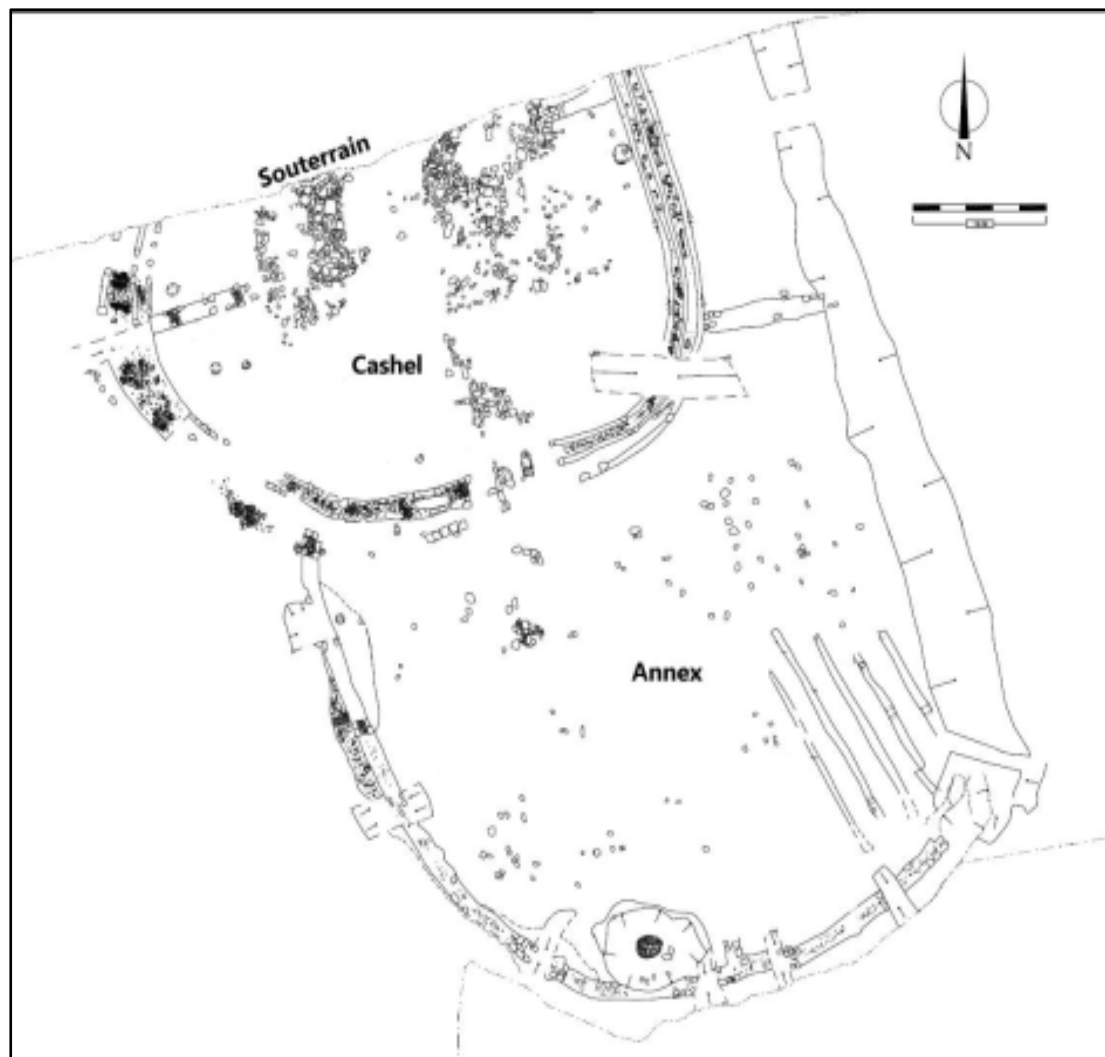
### **Animal Bones:**

A total of 2577 fragments of animal bone were examined from 46 contexts recovered during excavations at Carnmore West. Preservation varied considerably between contexts and there

were a considerable number of fragments unidentifiable within the assemblage. Almost twenty percent of the assemblage was made up of loose teeth, and epiphyseal fusion and tooth-wear data was minimal.

Species	Cattle	Sheep/ Goat	Pig	Horse	Dog	Red Deer	Date
NISP	588	252	57	187	12	2	8 <sup>th</sup> /9 <sup>th</sup> C?

**NISP by species from Carnmore West, Co. Galway.**



**Plan of excavations at Carnmore West, Co. Galway (Sutton 2008)**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UBA-7684	Charcoal from posthole C71 annex entrance	1250 $\pm$ 32 BP	<b>A.D. 676-832;</b> A.D. 836-869
UBA-7686	Charcoal from hearth C67	1188 $\pm$ 31 BP	A.D. 720-741; <b>A.D. 769-899;</b> A.D. 919-949

UBA-7687	Charcoal from hearth C67	1180±31 BP	<b>A.D. 772-900;</b> A.D. 917-965
UBA-7688	Charcoal from souterrain entrance	1268±31 BP	<b>A.D. 665-783;</b> A.D. 788-817; A.D. 843-859
UBA-7689	Charcoal from truncated kiln	1274±32 BP	<b>A.D. 662-782;</b> A.D. 789-812; A.D. 845-856.
UBA-7872	Charcoal from later kiln flue	1175±40 BP	A.D. 723-740; <b>A.D. 770-972</b>
UBA-7871	Charcoal from later kiln chamber	864±35 BP	<b>A.D. 1045-1095;</b> <b>A.D. 1119-1141;</b> <b>A.D. 1147-1258</b>
UBA-7870	Charcoal from early kiln chamber	1280±44 BP	<b>A.D. 657-828;</b> A.D. 838-865
UBA-7869	Charcoal from posthole C81 annex entrance	1230±34 BP	<b>A.D. 688-754;</b> <b>A.D. 758-883</b>
UBA-7868	Charcoal from early kiln chamber	1340±34 BP	<b>A.D. 641-723;</b> <b>A.D. 739-770</b>
UBA-7867	Charcoal from truncated kiln chamber	1233±34 BP	<b>A.D. 687-881</b>
UBA-7866	Charcoal from posthole C85 in entranceway	1432±28 BP	<b>A.D. 576-655</b>
UBA-7865	Charcoal from pit C125	1214±26 BP	A.D. 710-746; <b>A.D. 766-889</b>
UBA-7864	Charcoal from later kiln chamber	944±27 BP	<b>A.D. 1027-1156</b>

**'Carraig Aille I' (Lough Gur td.), Co. Limerick**

Grid Ref: **R65284070 (165285/140703)**

SMR No: **LI032-053001**

Reference: **Ó Riordáin 1949; Hyland & Stelfox 1949.**

**'Carraig Aille II' (Lough Gur td.), Co. Limerick**

Grid Ref: **R65344064 (165345/140643)**

SMR No: **LI032-053003**

Reference: **Ó Riordáin 1949; Hyland & Stelfox 1949.**

**The 'Spectacles' (Lough Gur td.), Co. Limerick**

Grid Ref: **R64654149 (164653/141497)**

SMR No: **LI032-014012**

Reference: **Ó Riordáin 1949; Hyland & Stelfox 1949.**

Carraig Aille I is a stone cashel with evidence for early medieval internal structures, hearths and finds as well as a considerable quantity of animal bone. The site was situated 40m from Carraig Aille II, another stone cashel with evidence for intensive internal habitation and associated external houses and enclosures.

Carraig Aille I enclosed an oval area approximately 43m in diameter. The eastern entrance contained a possible wooden gate defined by a trench extending between two recesses on either side of the entrance passage, with a post-hole at the outer corner of the northern side of the entrance interpreted as a possible gate-post of an outer gate. Paved areas were identified inside the enclosure walls, and a series of hearths and traces of rectangular houses were associated with these paved areas.

Carraig Aille II enclosed an area approximately 47m in diameter. The eastern entrance was defined by areas of paving and cobbling and contained a recess on either side of the entrance which may have supported a gate-structure. Successive layers of occupation debris, clay floors, hearths and multiple phases of metallurgy were uncovered in the interior. The early houses on site appear to have been round or curvilinear in form, and were probably wooden framed, while the later houses were rectangular in shape and stone built.

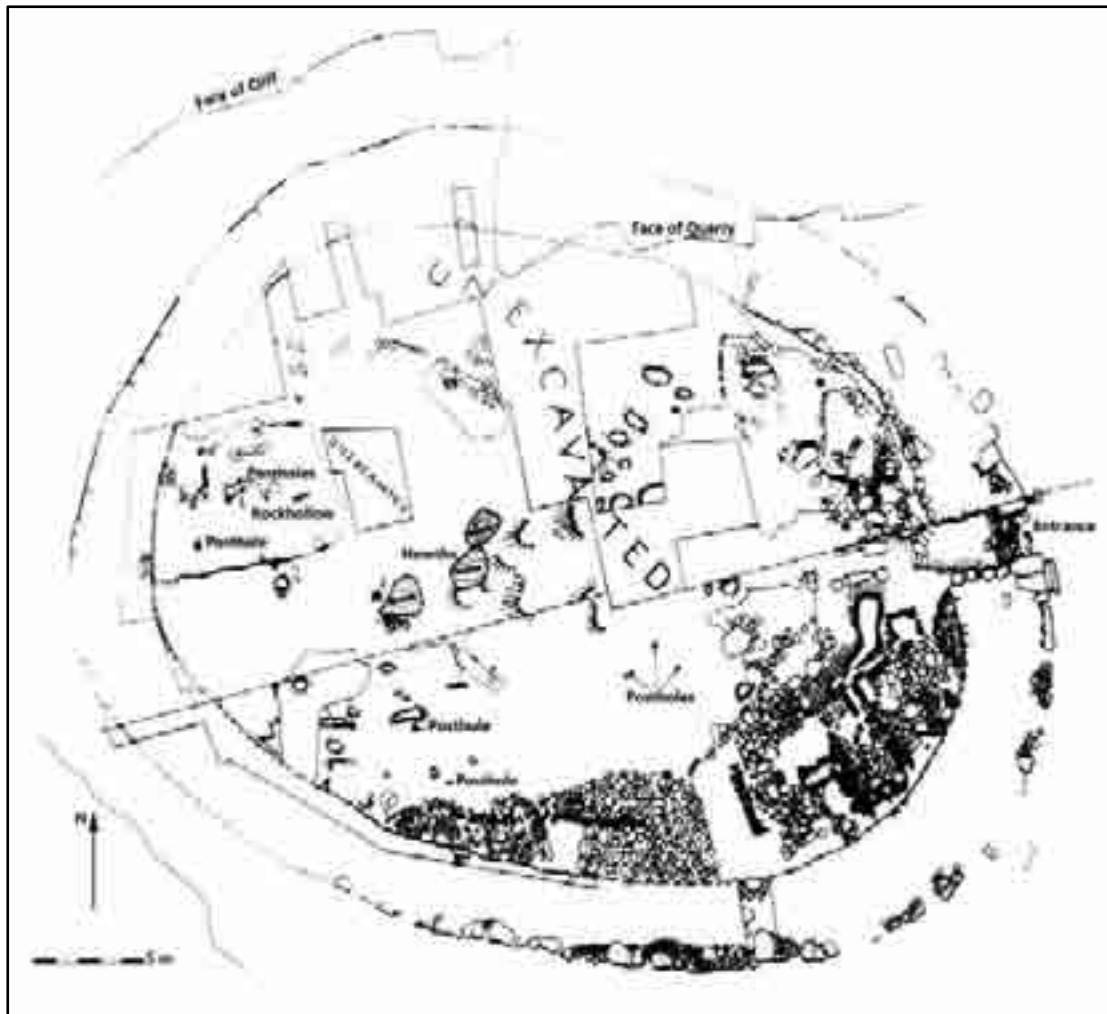
Few of the finds from Carraig Aille II could be confidently correlated with any of the successive occupation layers and only gave a general dating for the site. A hoard of silver objects (dated to the tenth century) and a silver ingot have been interpreted as Viking, as has the bronze terminal mount for a drinking-horn. On the basis of the artefacts, Carraig Aille II may have been occupied between the eighth and late-tenth/eleventh centuries.

The 'Spectacles' is an unenclosed early medieval settlement containing one rectangular and two circular houses as well as an animal shelter and other structures within an arrangement of small and large early medieval field systems. The fields around the houses were enclosed by parallel fences. These enclosed fields were very small (average area  $\frac{1}{7}$  of an acre) and may have contained the tillage patches belonging to the houses. Larger enclosed spaces further away from the houses on the upper hill-side were interpreted as field systems for cattle.

**Animal Bones:**

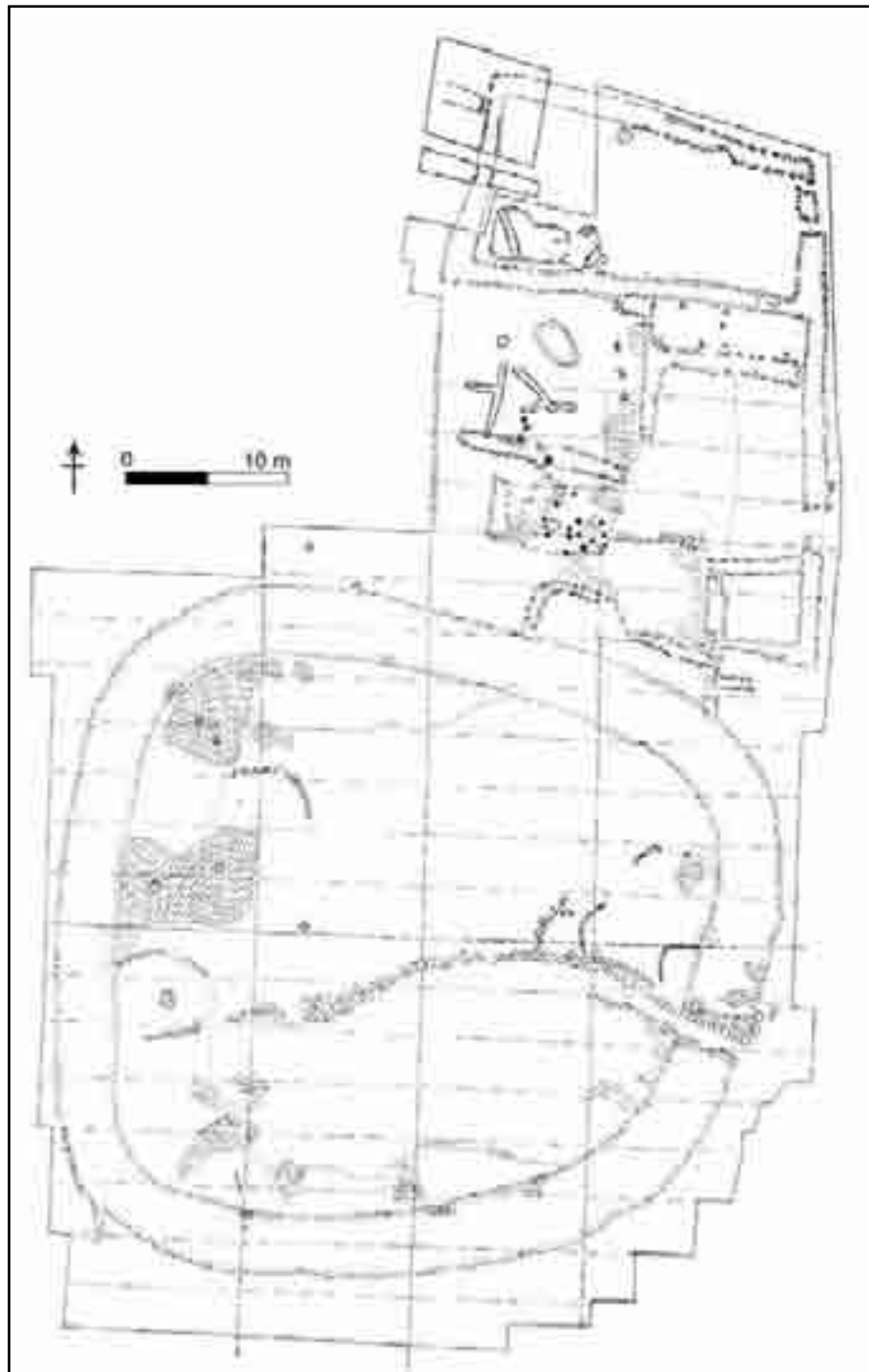
Approximately six tons of animal bones were recovered from these sites in Lough Gur townland. Almost four tons were recovered from Carraig Aille II and two tons were recovered from Carraig Aille I. The report is little more than a list of species present and does not differentiate between the two sites. Cattle comprised 90% of the total, with the remainder largely divided between sheep and pig, though small numbers of red deer, cat, dog and badger, fox, hare and ferret were also identified. It has been argued that the 'ferret' may

actually have been stoat, the only native Irish mustelid. A quarter of a ton of animal bone was recovered from 'The Spectacles', with cattle accounting for the bulk followed by pig and sheep (goat) and to a lesser extent horse and dog.



**Plan of Carraig Aille I, Co. Limerick (after Ó Ríordáin 1949, plate III).**





**Plan of Carraig Aille II, Co. Limerick (after Ó Ríordáin 1949, plate II).**



**Plan of 'The Spectacles', Co. Limerick (after Ó Ríordáin 1949, plate XII).**

**Appendix:**

<b>GL</b>	<b>Bp</b>	<b>Bd</b>	<b>Sd</b>
133.1	24.3	25.9	15.7
118.7	20.6	23.7	14.1
113.9	22.8	27.3	14.9
105.8	18.3	21.1	12.4

**Sheep Metacarpal measurements (mm)**

### **Carrowdotia, Co. Clare**

Grid reference: **136850/182830**

SMR/RMP Number: **CL026:033**

Reference: **Taylor 2006; Anthony 2006**

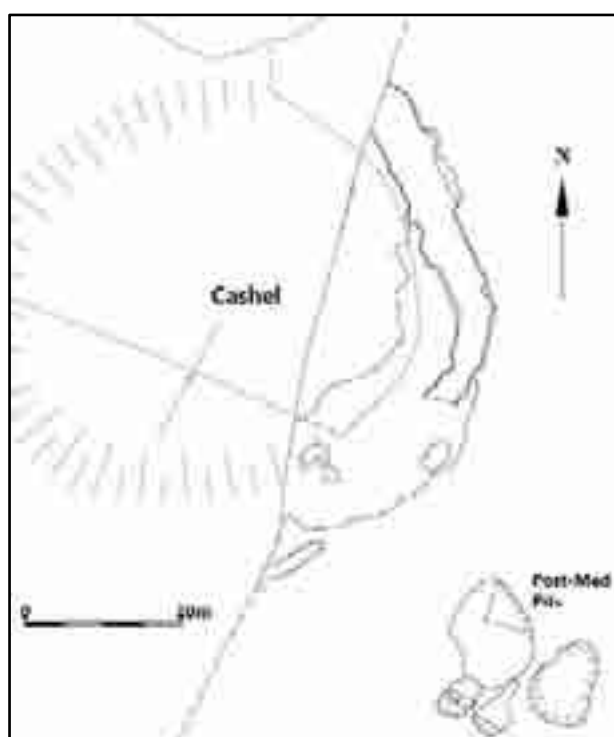
Excavation revealed a curvilinear bank created by scraping the hill-top. A cashel wall, constructed with internal and external faces of large, unworked stones, surrounding a rubble core, was subsequently built over this bank. A single cow tooth was the only artefact discovered from the cashel itself, however part of a rotary quern stone was recovered from the topsoil overlying the bank. The interior of the monument was almost entirely archaeologically sterile, with the exception of a steep-sided pit created by quarrying the bedrock. A few small fragments of burnt clay were recovered from this pit, and charcoal from the same deposit produced a  $^{14}\text{C}$  date of  $1480 \pm 40$  BP.

#### **Animal Bone:**

Only seven pieces of bone were recovered from four contexts. A horse premolar, and two cattle molars were recovered, also a single human molar. A section of cattle femur with 2 sawn edges was recovered from the topsoil and it was interpreted as either a practice piece of bone working or sawing. Only a single piece of large ungulate limb bone was burnt.

Context	Description	Species	Comment
55	Fill of quarry pit	Horse	Tooth
50	Topsoil	Cow	Femur – 2 sawn edges
92	Cashel wall	Cow	Tooth
95	Topsoil?	Cow	Tooth
95	Topsoil?	Cow	Tooth
95	Topsoil?	Human	Tooth
95	Topsoil?	Cow Size	2 limb bones

#### **Animal remains from Carrowdotia, Co. Clare**



**Plan of excavations at Carrowdotia, Co. Clare (after Taylor 2006).**

**Carrowkeel, Co. Galway**Grid Ref: **M59322394 (159326/223949)**SMR No: **GA097-066**Reference: **Lalonde & Tourunen 2007; Wilkins & Lalonde 2008.**

Three main phases of occupation were discovered during excavation – a series of ditches of Neolithic date; an early medieval enclosure associated with a cemetery; and later cultivation. The main early medieval enclosure ditch defined an area 65m by 47m at the top of the hill. Traces of three contemporary and parallel ditches appear to have subdivided this enclosure and delineated the eastern edge of a burial area that contained 158 individuals. The fill layers from the ditches suggest a gradual natural silting, followed by a deliberate in-filling of the ditch, possibly as a result of field clearance.

The site appears to have been a focus for burials between *c.* A.D. 650 and *c.* A.D. 1050, and there are few structural features from this phase. These consisted mainly of two (or three) 'cooking pits' associated with burning and animal bone.

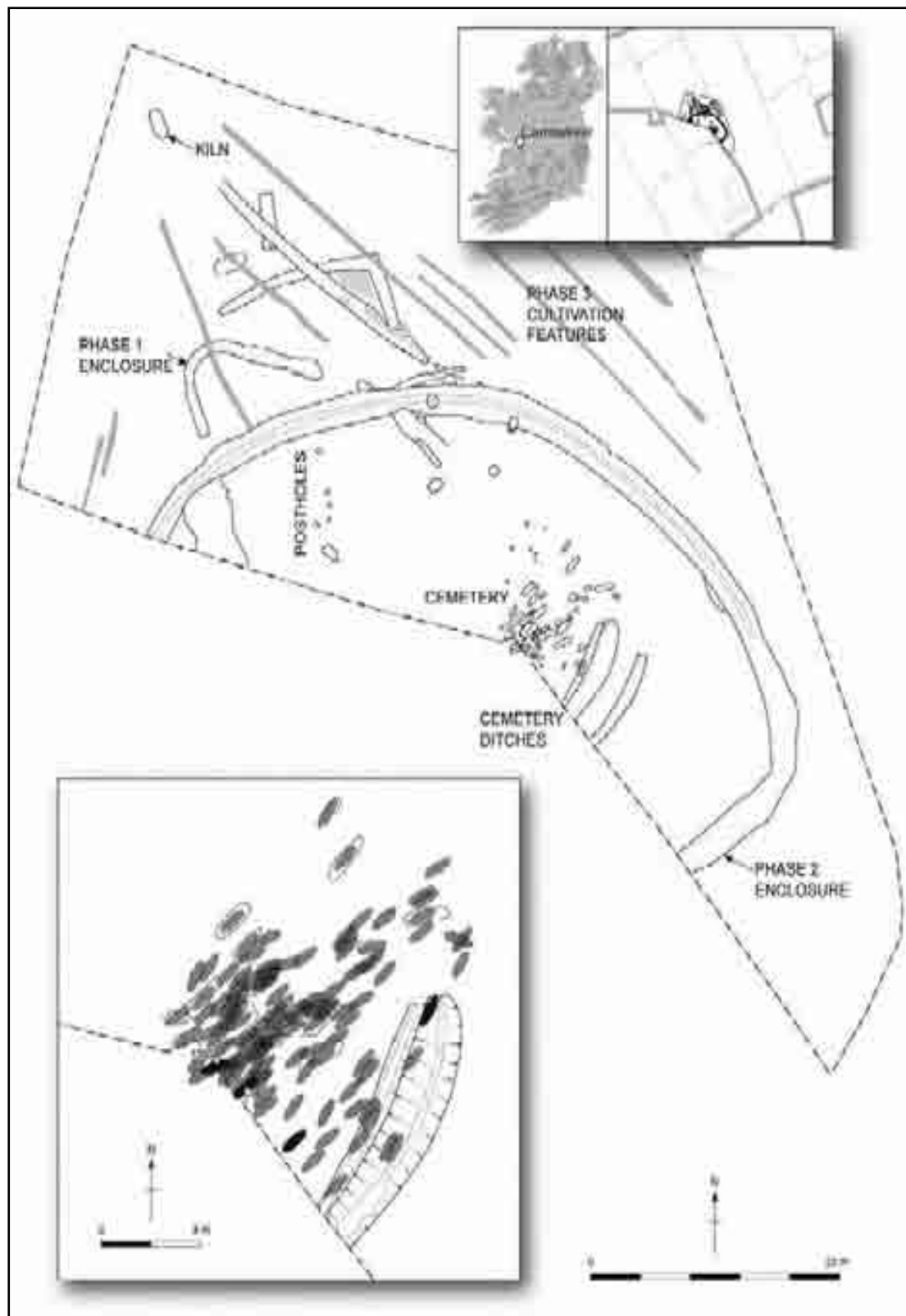
**Animal Bones:**

A large number of animal bones (13,631) were recovered from the early medieval phase – and over 2,000 were identified to species. A large number of bird, small mammal and lizard bones were recovered. The hunting of wild animals did not play an important role in the economy, nor did fishing. Bones of domestic fowl, quail and possibly red grouse are likely to represent consumed birds. Bones of larger songbirds like thrushes may also indicate consumption. Two mandibles, <sup>14</sup>C-dated to A.D. 860-1020 and A.D. 670-890, give the earliest date for house mice in Ireland.

The nature of the assemblage - including neo-natals – suggests that there was a viable settlement on site, rather than it being the result of feasting associated with the burial site.

<b>Phase</b>	<b>Cattle</b>	<b>Sheep/Goat</b>	<b>Pig</b>	<b>Date</b>
Phase 2 – Early Med Enclosure	232	57	47	<i>c.</i> A.D. 650- <i>c.</i> A.D. 1050

**NISP from Carrowkeel, Co. Galway**



Plan of Enclosure at Carrowkeel, Co. Mayo (after Wilkins & Lalonde 2008, 58).

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
GU-15326	Mouse bone from ditch pre-infill	1245 $\pm$ 45 BP	<b>A.D. 674–882.</b>
GU-15327	Mouse bone from ditch pre-infill	1115 $\pm$ 35 BP	A.D. 784–787; A.D. 824–841; <b>A.D. 862–1016.</b>
UB-7410	Foetus	499 $\pm$ 29 BP	<b>A.D. 1400–1447.</b>
UB-7411	Child	1129 $\pm$ 31 BP	A.D. 782–788; A.D. 812–845; <b>A.D. 857–989.</b>
UB-7412	Adult male	1186 $\pm$ 32 BP	A.D. 721–741; <b>A.D. 770–899;</b> A.D. 918–952; A.D. 959–960.
UB-7413	Foetus	1148 $\pm$ 31 BP	A.D. 780–792; <b>A.D. 804–975.</b>
UB-7414	Child	1156 $\pm$ 31 BP	<b>A.D. 779–794;</b> <b>A.D. 798–906;</b> <b>A.D. 911–971.</b>
UB-7416	Infant	1125 $\pm$ 31 BP	A.D. 783–788; A.D. 814–844; <b>A.D. 859–991.</b>
UB-7417	Adult female	1228 $\pm$ 31 BP	<b>A.D. 689–752;</b> <b>A.D. 761–884.</b>
UB-7418	Infant	1214 $\pm$ 31 BP	<b>A.D. 693–748;</b> <b>A.D. 765–890.</b>
UB-7419	Foetus	638 $\pm$ 30 BP	<b>A.D. 1284–1329;</b> <b>A.D. 1340–1396.</b>
UB-7420	Adult female	1264 $\pm$ 31 BP	<b>A.D. 667–783;</b> A.D. 787–823; A.D. 841–861.
UB-7422	Foetus	815 $\pm$ 31 BP	<b>A.D. 1169–1269.</b>
UB-7423	Adult male	1244 $\pm$ 32 BP	<b>A.D. 682–872.</b>
UB-7424	Child	1182 $\pm$ 32 BP	A.D. 726–737; <b>A.D. 771–900;</b> A.D. 918–964.
UB-7425	Adolescent	1250 $\pm$ 34 BP	<b>A.D. 676–870.</b>
UB-7426	Infant	830 $\pm$ 31 BP	<b>A.D. 1159–1265.</b>
UB-7427	Adult female	940 $\pm$ 31 BP	<b>A.D. 1024–1161.</b>
UB-7428	Adult male	906 $\pm$ 31 BP	<b>A.D. 1038–1208.</b>
UB-7429	Child	1104 $\pm$ 31 BP	<b>A.D. 885–999;</b> A.D. 1002–1013.
UB-7430	Child	1185 $\pm$ 31 BP	A.D. 723–740; <b>A.D. 770–899;</b> A.D. 918–951.
UB-7431	Child	1193 $\pm$ 34 BP	A.D. 710–746; <b>A.D. 766–899;</b> A.D. 919–949.
UB-7432	Child	1261 $\pm$ 33 BP	<b>A.D. 668–827;</b> A.D. 839–864.

UB-7433	Adult female	954±31 BP	<b>A.D. 1022-1156.</b>
UB-7434	Infant	1215±32 BP	<b>A.D. 692-749;</b> <b>A.D. 764-890.</b>
UB-7435	Child	1203±32 BP	A.D. 694-701; A.D. 707-747; <b>A.D. 765-895;</b> A.D. 926-936.
UB-7436	Adult male	1193±31 BP	A.D. 716-743; <b>A.D. 768-897;</b> A.D. 921-943.
UB-7437	Infant	949±32 BP	<b>A.D. 1023-1158.</b>
UB-7438	Adult male	935±31 BP	<b>A.D. 1024-1165.</b>
UB-7439	Child	1168±32 BP	<b>A.D. 775-903;</b> <b>A.D. 915-968.</b>
UB-7440	Adult male	1301±31 BP	<b>A.D. 660-772.</b>
UB-7441	Adult female	1182±31 BP	A.D. 728-736; <b>A.D. 771-900;</b> A.D. 918-962.
UB-7442	Child	907±30 BP	<b>A.D. 1037-1192;</b> A.D. 1196-1207.
UB-7443	Adult female	1305±34 BP	<b>A.D. 658-773.</b>
UB-7444	Child	1113±32 BP	A.D. 832-836; <b>A.D. 869-1015.</b>
UB-7445	Adult female	1196±35 BP	A.D. 694-701; A.D. 707-747; <b>A.D. 765-898;</b> A.D. 920-946.
UB-7446	Infant	1223±33 BP	<b>A.D. 689-752;</b> <b>A.D. 761-887.</b>
UB-7447	Foetus	1193±33 BP	A.D. 712-745; <b>A.D. 767-898;</b> A.D. 920-947.
UB-7448	Adult female	1249±31 BP	<b>A.D. 678-832;</b> A.D. 836-869.
UB-7449	Child	1113±32 BP	A.D. 832-836; <b>A.D. 869-1015.</b>
UB-7482	Child	1127±32 BP	A.D. 782-788; A.D. 812-845; <b>A.D. 857-991.</b>
UB-7483	Foetus	1227±31 BP	<b>A.D. 689-752;</b> <b>A.D. 761-884.</b>

## **Castlefarm, Co. Meath**

Grid reference: **300394/241605**

SMR: **N/A**

Reference: **O'Connell 2006; O'Connell & Clark 2009; Foster 2009.**

Castlefarm was a multi-phase settlement/cemetery site that was dated to between the fifth and thirteenth centuries. The primary D-shaped enclosure at Castlefarm (Phase II) – constructed sometime between the mid fifth and mid seventh centuries – had dimensions of 90m by 70m. At least seven burials – extended with heads to the west – were associated with the initial phase. They were located outside the enclosure, and both adults and children (male and female) were represented. Artefacts from the ditch in this phase included a bone knife handle with ring and dot decoration, iron knife blades and copper-alloy ringed pins.

The initial enclosing ditch was re-cut on a number of occasions between the seventh and eighth centuries (Phases IIb and IIc). Artefacts from this period included dress items such as ringed pins, bone pins and lignite bracelets, as well as worked bone and antler as well as a variety of iron knives.

The site was considerably enlarged between A.D. 771 and A.D. 975 by the construction of an outer enclosure (Phase III). The D-shaped enclosure was re-cut on its eastern side and the site was expanded to the southwest, west and north. The finds assemblage was comparable to earlier phases and included a variety of dress and functional artefacts. An enclosure annex was subsequently constructed at the south of the site (Phase IV).

The final early medieval modifications to the enclosure occurred between the late eighth and early eleventh centuries (Phase V). This phase involved a re-cut to the outer enclosure ditch and the incorporation of the enclosure annex. Artefacts included omega pins and penannular brooches and substantial quantities of animal bone were present in the ditch-fills. The latter was present in large quantities throughout the early medieval phases.

Later medieval activity was evident through a re-cut of the outer enclosure ditch and small-scale industrial activity within the inner and outer enclosure ditches. Material culture – in the form of artefacts and animal bone – was not present in large quantities during this phase.

Centuries of subsequent agricultural activity meant that very little survived internally within the enclosures at Castlefarm. Small-scale ironworking was evident by the presence of three possible bowl furnaces, a charcoal production pit and the occurrence of iron waste or slag. One of the bowl furnaces was dated to A.D. 564-666 while the charcoal production pit was formed later between A.D. 1035-1225. Evidence for non-ferrous metalworking was also small and included two rough globules of molten copper and a possible copper ingot. Cereal processing was evident in the form of a figure-of-eight-shaped cereal-drying kiln and the fragments of two rotary quernstones. Charcoal from the second fill of the kiln was dated to A.D. 662-828.

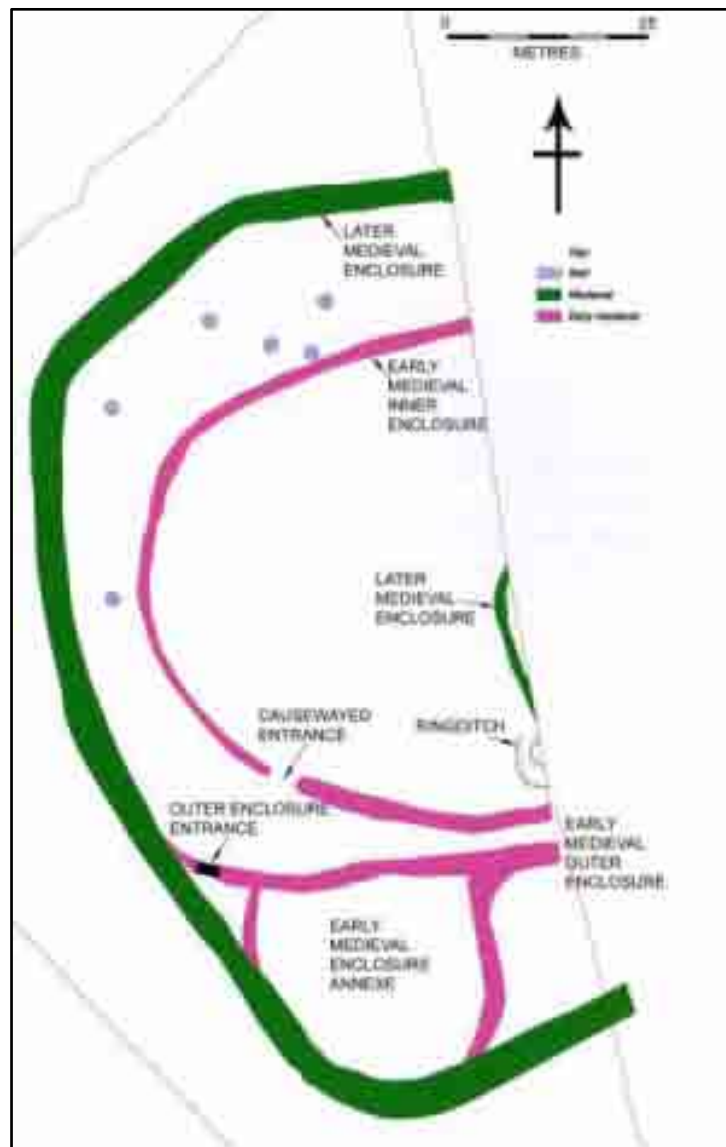


### Animal Bones:

There is a peak of tooth wear during Phase II for the 5-15 month period, yet there is also a large proportion over the 32 month period.

Phase	Cattle	Sheep	Pig	Horse	Deer	Dog	Cat	Other	Date
<b>II</b>									
<b>NISP</b>	1191	196	692	36	13	132	31	2	<b>A.D. 410-756</b>
<b>% NISP</b>	51.9	8.5	30.2	1.6	0.6	5.8	1.4	0.08	
<b>MNI</b>	44	16	50	4	2	6	3	2	
<b>%MNI</b>	34.6	12.6	39.4	3.1	1.6	4.7	2.4	1.6	
<b>III-V</b>									<b>A.D. 763-983</b>
<b>NISP</b>	755.5	198.5	341	59	8	55	11	-	
<b>%NISP</b>	52.9	13.9	23.9	4.1	0.6	3.9	0.8	-	
<b>MNI</b>	25	13	35	3	1	5	3	-	
<b>%MNI</b>	29.4	15.3	41.2	3.5	1.2	5.9	3.5	-	

**NISP and MNI from Castlefarm 1, Co. Meath (dates of phasing from O'Connell & Clark 2009, 60).**



**Enclosures at Castlefarm, Co. Meath (after O'Connell 2006, 19).**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Phase	Context	Lab Code	<sup>14</sup> C Age	Calib. 2 $\sigma$
Ila	Right femur shaft fragment from burial 1	Beta 229298	1570 $\pm$ 40 BP	<b>A.D. 409-575</b>
Ila	Left fibula shaft fragment from burial 7	Beta 229299	1530 $\pm$ 40 BP	<b>A.D. 427-608</b>
Ila	F212: Animal bone from primary fill of inner enclosure ditch	Beta 220131	1500 $\pm$ 40 BP	<b>A.D. 434-492;</b> <b>A.D. 508-519;</b> <b>A.D. 528-643</b>
Ilb	F201: Cattle metapodial bone from fill of inner enclosure ditch	Beta 246932	1280 $\pm$ 40 BP	<b>A.D. 658-786;</b> A.D. 787-824; A.D. 841-861.
Ilb	F486: Charcoal from second re-cut of inner enclosure ditch	Beta 246936	1370 $\pm$ 40 BP	<b>A.D. 599-712;</b> A.D. 746-767
Ilc	F199: Maloideae charcoal from fill of inner enclosure ditch	Beta 246931	1300 $\pm$ 40 BP	<b>A.D. 658-783;</b> A.D. 787-824; A.D. 841-861
Ilc	Right femur shaft fragment from burial 10	Beta 229300	1280 $\pm$ 40 BP	<b>A.D. 658-783;</b> A.D. 787-824; A.D. 841-861
III	F214: Animal bone from fill of outer enclosure ditch	Beta 220132	1170 $\pm$ 40 BP	A.D. 727-737; <b>A.D. 771-975</b>
Va	F298: Animal bone from primary fill of outer enclosure ditch re-cut	Beta 220133	1160 $\pm$ 40 BP	<b>A.D. 775-979</b>
Vb	F800: Ash charcoal from fill of outer enclosure ditch re-cut	Beta 246940	1180 $\pm$ 40 BP	A.D. 717-743; <b>A.D. 768-907;</b> A.D. 911-971.
Vc	F92: Ash charcoal from fill of outer enclosure ditch re-cut	Beta 246929	1130 $\pm$ 40 BP	A.D. 780-792; <b>A.D. 803-992.</b>
?	F949: Charcoal from basal fill of bowl furnace C943	Beta-246945	1420 $\pm$ 40 BP	<b>A.D. 564-666</b>
?	F527: Charcoal from fill of charcoal-rich production pit C511	Beta-246938	880 $\pm$ 40 BP	<b>A.D. 1035-1225;</b> A.D. 1234-1238; A.D. 1248-1251
?	F685: Grain from fill of figure-of-eight-shaped cereal-drying kiln	Beta-246939	1270 $\pm$ 40 BP	<b>A.D. 662-828;</b> A.D. 838-866
	F175: Blackthorn charcoal from fill of	Beta-246930	930 $\pm$ 40 BP	<b>A.D. 1023-1187;</b> A.D. 1199-1206.

	outer enclosure ditch re-cut			
	F299: Hazel wood from Well 2 (F281)	Beta-246933	1230±40 BP	<b>A.D. 684–887.</b>
	F387: Hazel charcoal from Well 3 (F318)	Beta-246935	1300±40 BP	<b>A.D. 649–781;</b> A.D. 791–807.
	F807: Ash charcoal from Well 4 (F734)	Beta-246941	1190±40 BP	A.D. 694–700; A.D. 708–747; A.D. 765–902; A.D. 916–967.
	F816: Ash charcoal from Well 5 (F780)	Beta-246942	1270±40 BP	<b>A.D. 662–828;</b> A.D. 838–866.
	F851: Ash charcoal from Well 6 (F823)	Beta-246943	1240±40 BP	<b>A.D. 680–882.</b>
	F1026: Ash charcoal from Well 9 (F1027)	Beta-246946	1260±40 BP	<b>A.D. 668–832;</b> A.D. 836–869.
	F1097: Maloideae charcoal from Well 8 (F948)	Beta-246947	1580±40 BP	<b>A.D. 402–568.</b>

## Animal Bones Appendix:

The largest amount of animal bone recovered from Castlefarm 1 came from Phase II which produced 2293 identifiable fragments and a MNI of 127 animals.

### Cattle

Phase	Element	Grant TWS	Higham MWS
<b>II</b>	P4	e	21
	M1/2	h	N/A
	M1/2	a	N/A
	M1/2	d	N/A
	M1/2	a	N/A
	M1/2	b	N/A
	M1/2	f	N/A
	M1/2	g	N/A
	M1/2	g	N/A
	M1/2	f	N/A
	M1/2	f	N/A
	M1/2	g	N/A
	M1/2	a	N/A
	M1/2	a	N/A
	M1/2	h	N/A
	M1/2	h	N/A
	M1/2	f	N/A
	M1/2	f	N/A
	M1/2	h	N/A
	M1/2	a	N/A
	M1/2	e	N/A
	M1/2	c	N/A
	M1/2	c	N/A
	M1/2	c	N/A
	M1/2	k	N/A
	M1/2	b	N/A
	M1/2	h	N/A
	M1/2	g	N/A
	M1/2	k	N/A
	M1/2	j	N/A
	M1/2	a	N/A
	M1/2	d	N/A
	M1/2	b	N/A
	M1/2	e	N/A
	M1/2	f	N/A
	M1/2	g	N/A
	M1/2	g	N/A
	M1/2	e	N/A
	M1/2	b	N/A
	M1/2	d	N/A
	M1/2	d	N/A
	M1/2	d	N/A
	M1/2	l	N/A
	M1/2	a	N/A
	M1/2	d	N/A
	M1/2	b	N/A
	M1/2	c	N/A
	M1/2	a	N/A
	M1/2	e	N/A
	M1/2	b	N/A
	M1/2	a	N/A
	M1/2	g	N/A
	M1/2	f	N/A
	M1/2	b	N/A
	M1/2	c	N/A
	M1/2	d	N/A
	M1/2	a	N/A
	M1/2	d	N/A

Phase	Element	Grant TWS	Higham MWS
<b>II</b>	M1/2	b	N/A
	M1/2	a	N/A
	M1/2	a	N/A
	M1/2	a	N/A
	M1/2	a	N/A
	M1/2	g	N/A
	M1/2	k	N/A
	M1/2	b	N/A
	M1/2	b	N/A
	M1/2	a	N/A
	M1/2	f	N/A
	M1/2	e	N/A
	M1/2	g	N/A
	M1/2	b	N/A
	M1/2	c	N/A
	M1/2	c	N/A
	M1/2	f	N/A
	M1/2	c	N/A
	M1/2	f	N/A
	M1/2	e	N/A
	M1/2	g	N/A
	M1/2	k	N/A
	M3	j	23
	M3	m	23
	M3	d	18
	M3	h	22
	M3	m	23
	M3	d	18
	M3	b	16
	M3	a	15
	M3	d	18
	M3	b	16
	M3	g	21
	M3	e	19
	M3	e	19
	M3	e	19
	M3	h	22
	M3	f	20
	M3	C	17
	M3	E	19
<b>III-V</b>	P4	c	21
	P4	c	21
	P4	h	22
	M1/2	b	N/A
	M1/2	c	N/A
	M1/2	e	N/A
	M1/2	g	N/A
	M1/2	b	N/A
	M1/2	g	N/A
	M1/2	c	N/A
	M1/2	g	N/A
	M1/2	c	N/A
	M1/2	f	N/A
	M1/2	a	N/A
	M1/2	b	N/A

Phase	Element	Grant TWS	Higham MWS
<b>III-V</b>	M1/2	b	N/A
	M1/2	d	N/A
	M1/2	e	N/A
	M1/2	d	N/A
	M1/2	b	N/A
	M1/2	e	N/A
	M1/2	a	N/A
	M1/2	g	N/A
	M1/2	b	N/A
	M1/2	b	N/A
	M1/2	a	N/A
	M1/2	b	N/A
	M1/2	b	N/A
	M1/2	d	N/A
	M1/2	g	N/A
	M1/2	c	N/A

Phase	Element	Grant TWS	Higham MWS
<b>III-V</b>	M1/2	c	N/A
	M1/2	f	N/A
	M1/2	c	N/A
	M1/2	g	N/A
	M1/2	f	N/A
	M1/2	c	N/A
	M1/2	c	N/A
	M1/2	a	N/A
	M3	j	20
	M3	c	17
	M3	b	16
	M3	h	22
	M3	b	16
	M3	b	16
	M3	h	22
	M3	f	20
	M3	a	14

**Tooth wear stage for loose mandibular cattle tooth following Grant (1982, 92).**

			<b>Phase II A.D. 410-756</b>		<b>Phases III-V A.D. 763-983</b>	
<b>Fusing</b>	<b>Element</b>	<b>Age (month)</b>	<b>Fused</b>	<b>Unfused</b>	<b>Fused</b>	<b>Unfused</b>
<b>Early</b>	Humerus d	12-18	30	6	41	2
	Radius p	12-18	53	-	23	-
	Scapula p	7-10	60	-	37	-
	Phalanx (1&2) p	18-24	25	4	27	4
	<b>Total</b>		<b>168</b>	<b>10</b>	<b>128</b>	<b>6</b>
	<b>%</b>		<b>94.4</b>	<b>5.6</b>	<b>95.5</b>	<b>4.5</b>
<b>Middle</b>	Tibia d	24-36	34	11	21	8
	Metapodium d	24-36	26	13	17	9
	Calcaneus d	36-42	29	2	10	-
	<b>Total</b>		<b>89</b>	<b>26</b>	<b>48</b>	<b>17</b>
	<b>%</b>		<b>77.4</b>	<b>22.6</b>	<b>73.8</b>	<b>26.2</b>
<b>Late</b>	Humerus p; radius d; femur; tibia p	42-48	96	33	67	26
	<b>Total</b>		<b>96</b>	<b>33</b>	<b>67</b>	<b>26</b>
	<b>%</b>		<b>74.4</b>	<b>25.6</b>	<b>72.9</b>	<b>27.1</b>

**Number of fused (fused and fusing) and unfused cattle specimens classified under early, middle, or late-fusing stages following Reitz and Wing (1999, 76).**

Phase	Element	Bd	Sex
<b>II</b>	Metacarpal	56.1	Indet
	Metacarpal	44.1	F
	Metacarpal	52.8	F
	Metacarpal	53.5	F
	Metacarpal	53.7	F
	Metacarpal	63.1	M
	Metacarpal	52.6	F
	Metacarpal	52.3	F
<b>III-V</b>	Metacarpal	57.4	Indet
	Metacarpal	51.3	F
	Metacarpal	51.5	F
	Metacarpal	63.1	M
	Metacarpal	61.4	M

**Sex determination for cattle metacarpals based on Bd measurements (McCormick 1997, 822).**

Phase	Element	GL	Gender	E.S.H. (cm)
II	MT1	215	N/A	117.2
II	MC1	211	F	126.6
II	MC1	194.3	F	116.6
II	MT1	200	N/A	109
II	MC1	186.5	F	111.9
II	MC1	184.1	F	110
II	MC1	198.4	M	124
II	RA	247	N/A	106.2
II	MT1	208.5	N/A	113.6
II	MT1	207.2	N/A	112.9
II	RA	256	N/A	110.1
III-V	RA	299	N/A	128.6
III-V	FE	299.5	N/A	96.7
III-V	MC1	171.3	N/A	107.1
III-V	MT1	200	N/A	109
III-V	MC1	181.1	M	124
III-V	MC1	172.2	F	108.7
III-V	MT1	219.1	N/A	119.4
III-V	MT1	217	N/A	118.3
III-V	MT1	205.5	N/A	112
III-V	MC1	196	M	119.9

**Estimated shoulder heights (von den Driesch and Boessneck (1974, 336)).**

	Element	Measurement	No.	Min	Max	Mean	STD
<b>Phase II</b>	Scapula	GLP	26	55.8	77.2	63.5	4.9
		SLC	28	42.7	63.4	51.7	4.6
	Humerus	HTC	12	37	44.6	41	2
		BT	12	76.9	49.3	67.4	8.6
	Metacarpal	Bp	17	36.9	64.7	50.9	6.6
		Bd	8	44.1	63.1	53.5	5.2
		GL	5	184.1	211	194.8	10.7
	Pelvis	LA	16	46.3	64.6	57.7	6.7
	Tibia	Bd	22	44.6	60.4	54.6	3.9
	Astragalus	GLI	24	49.6	63.5	59.7	3.2
		GLm	22	50.9	58.3	55.1	1.7
		Bd	23	33	45.1	38.5	2.7
	Metatarsal	Bp	12	36.7	44.8	42	2.8
		Bd	6	46.9	58.2	53.1	5.4
		SD	6	24.1	29.4	25.9	2.1
<b>Phase III-V</b>	Scapula	GLP	12	55.3	67.3	61.4	3.9
		SLC	13	43.1	53.2	49.4	3.3
	Humerus	HTC	16	36.4	49	41	3.7
		BT	14	55.8	81.3	69	6
	Metacarpal	Bp	11	43.6	60	52.8	4.6
		Bd	5	51.3	63.1	56.9	5.5
	Pelvis	LA	8	50.4	65.1	57.7	5.5
	Tibia	Bd	13	51.1	62.7	54.9	3.1
	Astragalus	GLI	13	55.1	67.2	60	3.6
		GLm	12	50.4	60.4	55.1	2.5
		Bd	13	30.7	43.7	37.5	3.1
	Metatarsal	Bp	21	35.6	52.5	42.2	3.5
		Bd	5	46.1	61.8	51.7	6.2
		SD	14	19.7	30.9	24.2	3

**Summary of cattle measurements.**

## Sheep/Goat

Phase	Element	Payne TWS	Higham MWS
<b>II</b>	M1/2	11A	N/A
	M1/2	2A	N/A
	M1/2	5A	N/A
	M1/2	2A	N/A
	M1/2	9A	N/A
	M1/2	2A	N/A
	M1/2	7A	N/A
	M1/2	8A	N/A
	M1/2	2A	N/A
	M3	2A	14
	M3	2A	14
	M3	2A	14
	M3	11G	17

Phase	Element	Payne TWS	Higham MWS
<b>III-V</b>	M1/2	5A	N/A
	M1/2	2A	N/A
	M1/2	9A	N/A
	M1/2	10A	N/A
	M1/2	6A	N/A
	M1/2	8A	N/A
	M1/2	2A	N/A
	M1/2	11A	N/A
	M1/2	4A	N/A
	M1/2	7A	N/A
	M3	8G	16
	M3	12G	17
	M3	13G	17
	M3	4A	15

**Tooth wear stages for loose mandibular sheep/goat teeth after Payne (1973 and 1987) and mandible wear stages assigned following Higham (1967, 106).**

The majority of sheep/goat were above stage 12 (12-21 months), although there was also a small presence of sheep/goat aged 1.5-3 months (Higham 1967, 104).

Fusing	Element	Age (Mon)	Phase II		Phases III-V	
			Fused	Unfused	Fused	Unfused
<b>Early</b>	Humerus d	3-10	6	1	11	2
	Scapula p	6-8	7	-	5	-
	Phalanx (1&2) p	6-16	7	4	5	1
	<b>Total</b>		<b>20</b>	<b>5</b>	<b>21</b>	<b>3</b>
	<b>%</b>		<b>80</b>	<b>20</b>	<b>87.5</b>	<b>12.5</b>
<b>Middle</b>	Tibia d	15-24	15	3	11	-
	Metapodium p	18-28	1	1	2	11
	Calcaneus p	30-36	4	1	2	1
	<b>Total</b>		<b>20</b>	<b>5</b>	<b>15</b>	<b>12</b>
	<b>%</b>		<b>80</b>	<b>20</b>	<b>55.6</b>	<b>44.4</b>
<b>Late</b>	Femur	30-42	-	2	3	8
	Humerus p; Ulna p; Radius d; Tibia p.	36-42	6	3	24	8
	<b>Total</b>		<b>6</b>	<b>5</b>	<b>27</b>	<b>16</b>
	<b>%</b>		<b>54.5</b>	<b>45.5</b>	<b>62.8</b>	<b>37.2</b>

**Number of fused (fused and fusing) and unfused sheep specimens classified under early, middle, or late-fusing stages following Reitz and Wing (1999, 76).**

Phase	Element	GL/GLI	E.S.H. (cm)
II	CA	47.2	50.9
II	RA	157.3	63.2
II	CA	51.7	55.7
II	RA	152.3	61.2
II	RA	140	56.3
III-V	CA	46.9	50.6

**Estimated shoulder height for sheep and sheep/goat based on greatest lateral length of astragalus and greatest lateral length of metacarpal after Teichert as detailed in Von den Driesch and Boessneck (1974, 339).**

Element	Measurement	No.	Min	Max	Mean	St Dev
<b>Phase II</b>						
<b>Pelvis</b>	LA	9	30.8	35.2	32.8	1.6
<b>Tibia</b>	Bd	12	21.9	24.1	23	0.82
<b>Metatarsa I</b>	Bp	5	16.5	19.1	18.1	1.1
<b>Phase III-V</b>						
<b>Humerus</b>	HTC	7	16.2	30	20.5	5.5
	BT	7	17.4	27.6	23.6	4.3
<b>Tibia</b>	Bd	11	21.9	24.6	23.1	0.9

**Summary of sheep/goat measurements.**

**Pig**

Phase	Grant TWS					Higham MWS
	dP4	P4	M1	M2	M3	
<b>II</b>		b	e	b	U	17
		A	A	A	g	25
		b	e	c	U	15
			X	b	E	19
		b	f	c	X	14
		b	e	X		14
		d	X			18
		b	c	b	V	18
		b	l	e	b	21
			X			5
	c		b	A	X	9
	e	X	e	a	U	14
		c	e	b	E	19
			X	c	X	14
		b	X			17
			X			5
	c	X	b	X		9
	e			X	c	22
		g	e	c	E	19
			a	X		9
	c		X	b	E	19
				X	b	21
		c	e	b	E	19
		b	e	d	a	20
		e	m	j	c	22
			d			9
		a	f	b	X	14
		A	E	A	A	7
		b	E	X		12
	m		d			9
			X	b	E	19
			X	A	j	27
		X	b	V	X	11
		X	a	X		9
		b	A	b	X	14
		c	d	b	A	14
	b		b			9
				X	b	21
		X	c	e	U	14
		X	f	A	A	10
				X	a	20
			X	c	E	19
		e	m	k	d	23
				X	b	21
		c	m	f	b	21
			A	a	X	14
				X	a	20



Phase	Grant TWS					Higham MWS
	dP4	P4	M1	M2	M3	
<b>II</b>		x	c	A	E	19
		A	f	X		9
			g	a	A	14
	g		a	X		9
			X	j	c	22
		X	c	b	A	17
		A	a	A	A	9
			X	f	a	20
	h		A	A	A	3
		d	l	e	b	21
		b	j	c	X	14
		b	k	b	A	17
		b	A	X		17
		A	e	b	A	15
		X	f	b	X	14
		A	A	b	A	15
		X	a	A	A	9
		X	k	d	a	20
		X	f	c	a	20
		b	X			17
		X	k	A	A	10
		b	k	d	A	17
		X	c	A	X	9
		A	a	E	X	12
		b	e	b	A	14
		b	A	b	A	14
		f	m	g	c	22
		b	l	c	E	19
		X	c	A	X	9
		X	h	X		9
			X	a	A	14
	j		b	X		9
			a			9
		d	a	E		12
<b>III-V</b>		e	l	h	c	21
		c	g	l	X	17
			X	a	A	14
		X	d	A	b	21
	f		A	X		5
		c	k	k	E	19
		A	b	A		9
		b	f	b	X	14
		b	d	c	A	14
		X	A	a	A	14
		a	f	c	X	14
	k		e	a	X	14
		X	A	b	A	14
			X	d	E	15
		c	g			17
	d		A	X		5
	d		A	X		5
			A	b	A	14
			X	b	a	20
			b			9
		d	m	f		17
		b	g	X		17
		b				17
		E	A	g		14
		E	A	X		7
		b	X			17
		X	A	A	E	19
				X	a	20
		c	A	X		17
				X	c	22
			X	b	A	14
		b	g	b	X	14

Phase	Grant TWS					Higham MWS
	dP4	P4	M1	M2	M3	
III-V		c	j	d	X	17
		c				17
				x	d	14
		E	e	a		14
		c	m	e		21
		X	A	b	X	14
					b	21
		X	a	X		10
		b	j			14
			m	e		17
	b	X				17
			A	f	c	9
	e		b	A	A	9
		X	e	a	X	14

**Tooth wear stage for pig teeth in mandibles following Grant (1982, 94) and mandible wear stages assigned following Higham (1967, 105).**

Fusing	Element	Age (months)	Phase II		Phases III-V	
			Fused	Unfused	Fused	Unfused
<b>Early</b>	Humerus d	12-18	28	4	14	-
	Radius p	12	23	-	14	-
	Scapula p	12	52	4	28	-
	Phalanx 2 p	12	1	-	-	1
	<b>Total</b>		<b>104</b>	<b>8</b>	<b>56</b>	<b>1</b>
	<b>%</b>		<b>92.9</b>	<b>7.1</b>	<b>98.2</b>	<b>1.8</b>
<b>Middle</b>	Tibia d	24	13	9	6	6
	Metapodium d	24-27	5	8	3	4
	Calcaneus p	24-30	9	2	3	-
	Phalanx 1 p	24	-	2	1	1
	<b>Total</b>		<b>27</b>	<b>21</b>	<b>13</b>	<b>11</b>
	<b>%</b>		<b>56.2</b>	<b>43.8</b>	<b>54.2</b>	<b>45.8</b>
<b>Late</b>	Ulna p; Humerus p	36-42	25	15	10	3
	Radius d; Femur; tibia p	42	5	35	1	13
	<b>Total</b>		<b>30</b>	<b>50</b>	<b>11</b>	<b>16</b>
	<b>%</b>		<b>37.5</b>	<b>62.5</b>	<b>40.7</b>	<b>59.3</b>

**Number of fused (fused and fusing) and unfused pig specimens classified under early, middle, or late-fusing stages following Reitz and Wing (1999, 76).**

Phase	Male	Female	Total
<b>II</b>	22	16	38
<b>III-V</b>	10	13	23

**Sex determination for pig based on morphological characteristics of mandibular and maxillary canine teeth.**

Element	Measurement	No	Min	Max	Mean	St Dev
<b>Phase II</b>						
<b>Scapula</b>	GLP	11	31.2	37.8	34	2.4
	SLC	14	21.6	25.9	23.9	1.6
<b>Humerus</b>	HTC	9	25.4	28.7	27.4	1.1
	BT	11	24.3	32.9	31	2.4
	Bd	9	35.5	39.1	38	1.5
<b>Pelvis</b>	LAR	15	25.4	58.4	32.5	7.4
<b>Tibia</b>	Bd	5	26.3	31.2	28.4	1.9
<b>Phase III-V</b>						
<b>Scapula</b>	GLP	8	28.1	36.8	33.3	3
	SLC	8	20.7	26.7	23.6	2
<b>Humerus</b>	HTC	8	24.8	29.7	27.7	1.9
	BT	8	27.7	31.7	30.8	2.3
	Bd	8	36.2	41.5	38.2	2.1
<b>Tibia</b>	Bd	6	25.2	28.4	26.8	1.1

### Summary of pig measurements

### Horse

Phase	Element	GLI	E.S.H. (cm)
II	MT1	263.3	140.3

**Estimated shoulder height for horse based on greatest lateral length of metacarpal after Kiesewalter (1888) as detailed in von den Driesch and Boessneck (1974, 333).**

**Castlegar, Co. Mayo**Grid Ref: **M35647631 (135642/276311)**SMR No: **MA101-026**Reference: **Zajac & Scully 2004.**

The site consists of a sub-circular area, 48m x 40m, enclosed by a slight bank, and a shallow ditch. Excavation revealed that the ditch had been backfilled in three stages. Although the upper fill appeared to be modern, it was possible that the earlier fills may have been done deliberately after the abandonment of the rath. The interior of the site was badly degraded and had been largely destroyed by ridge-and-furrow agriculture. A souterrain was discovered within the bounds of the enclosing ditch, along with a narrow cobbled walkway, which presumably linked it to a (now destroyed) above-ground structure.

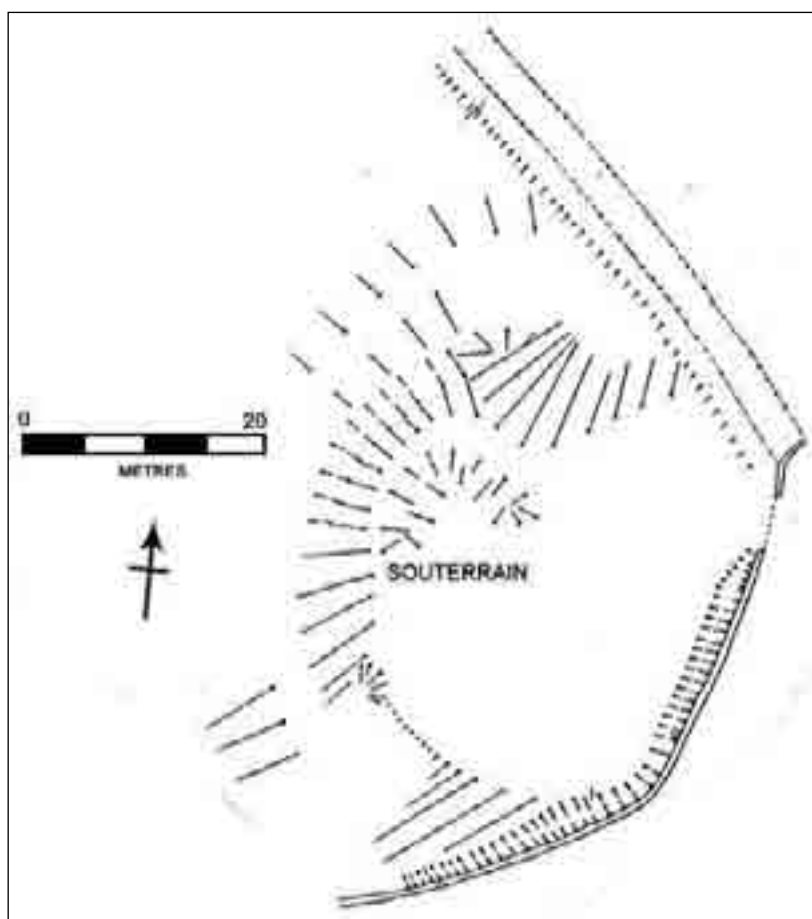
Finds from the site included five blue-glass beads; a fragment of a decorated blue-glass bracelet; whet stones; a bone knife handle; the broken base of a rotary quern; the fragment of a millstone; and a possible loom weight.

**Animal Bones:**

A total of 1667 animal bones were recovered from the ditch – these may be generally grouped into three phases.

Context	Cattle	Sheep	Pig	Horse	Rabbit	LM	MM	Unid	Date
<b>Basal Ditch Fill</b>	54	19	9	1	1	79	87	172	
<b>Mid-Ditch Fill</b>	153	21	31	2	-	13 8	53	404	<b>A.D. 764-972</b>
<b>Upper Ditch Fill/ Abandon</b>	35	10	8	1	233	57	24	54	<b>A.D. 888-1028</b>

**NISP from Castlegar, Co. Mayo (LM= Large Mammal; MM = Medium-sized Mammal).**



**Plan of enclosure at Castlegar, Co. Mayo (after Zajac & Scully 2004, 25).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
UB-4701	Bone - abandonment fill	1067 $\pm$ 43 BP	<b>A.D. 888-1028.</b>
UB-4702	Bone - main ditch fill	1186 $\pm$ 51 BP	A.D. 692-749; <b>A.D. 764-972.</b>
UB-4703	Bone – from gravel in ditch side	1141 $\pm$ 44 BP	<b>A.D. 778-988.</b>
UB-4704	Animal bone ditch bottom	1182 $\pm$ 44 BP	A.D. 710-746; <b>A.D. 766-973.</b>

**Cherryhound, Co. Dublin**

Grid Ref: ?

SMR No: **N/A**Reference: **McGowan 2004.**

Excavation uncovered what appears to be a nucleated industrial site. The first phase of activity occurred within an enclosure defined by post-holes on its southern and eastern sides and a steep-sided slot-trench to the west - sherds of probable souterrain ware were recovered from two post-holes or small pits in the northern part of this enclosure. The bounded area appears to have contained a raised structure (interpreted as a possible grain silo) supported by a U-shaped concentration of stakeholes and postholes. It seems possible that metal was worked on site since several sherds of a crucible were found, along with small fragments of copper or copper-alloy in a nearby pit feature; two linear trenches just outside the enclosure contained a charcoal-rich deposit with a very high proportion of heat-shattered stones.

The second phase of activity was centred on a cereal-drying kiln uncovered in the western part of the site. This kiln had silted up and then been cleaned out and reused on several occasions.

The bulk of the faunal remains were recovered from Phase 1 features and from sieved samples.

**Animal Bones:**

Phase	Cattle	Sheep/ Goat	Pig	Red Deer	Black Rat	Bird	Date
Phase 1	27	2	5	1	5	2	?

**NISP of animal species from Cherryhound, Co. Dublin.**

No positive goat bones were noted amongst the caprine elements; fish bones were also absent and no pathologies or butchery marks were represented amongst the excavated assemblage. Evidence of gnawing was found on two cattle longbones, providing indirect evidence for dog at the site and just three 'countable' elements showed signs of burning.

## **Church Island (Ballycarbery West td., Valentia Island), Co. Kerry**

Grid Ref: **V43057855 (043050/078550)**

SMR No: **KE079-032**

Reference: **O'Kelly 1958; Hayden 2004; Hayden 2005**

Church Island is a very small island at the mouth of Valentia harbour on the northern side of the Iveragh peninsula. The site is connected to the nearby island of Beginish by a sandbar at low tide. The original excavations revealed a series of early medieval churches, buildings, burials and an enclosing cashel with associated habitation and ironworking evidence. Further excavations in 2004-05 exposed an elaborate terraced shrine mound on a high rocky knoll on the island.

Early monastic activity consisted of a wooden church and circular wooden hut; both were probably contemporary with each other though there was no archaeological evidence to confirm this. The primary habitation refuse from the wooden roundhouse contained charcoal, winkle, limpet shells, animal bone and a large quantity of iron slag. A possible furnace-base inside the area of the subsequent stone-built roundhouse belonged to the primary occupation phase.

The second phase of monastic activity consisted of a rectangular stone oratory and a circular stone house (House 1). An internal spread of habitation refuse from the stone-built roundhouse contained shells, carbonized grain and animal and fish bone, as well as a hearth of burnt material just inside the door. Finds from the circular stone house and its associated habitation refuse included a quernstone, shale axe, net-sinker, whet-stone, three pieces of flint, bronze strip, fourteen large brad-like iron nails, seven iron knives and two perforated bone points.

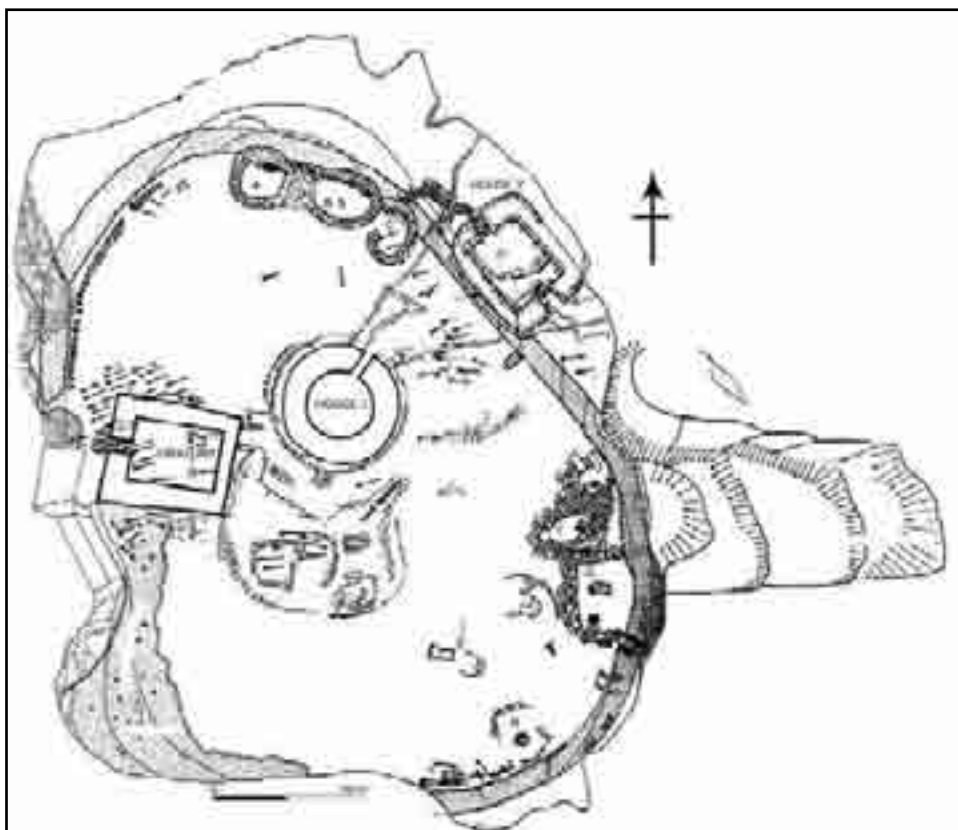
The third phase of monastic activity consisted in the construction of a rectangular stone house (House 2) and an enclosing cashel wall. Both this house and the enclosing cashel wall post-dated the circular stone house as they were built upon the deposit of refuse associated with this building, but the circular stone house was still in use after the cashel wall was built since the spread of refuse continued to build up for a height of 1m against the wall's inner face. The floor of the rectangular house was covered with a layer of habitation refuse consisting mainly of limpet and periwinkle shells with some animal and fish bone. Finds associated with the rectangular house included two hammer-stones, perforated stone, two pieces of flint, bronze strip, eight large brad-like iron nails and a socketed iron spade or mattock.

The final occupation phase consisted of post-monastic squatter activity involving the erection of a series of rough shelters or wind-breaks on the northern, eastern and south-eastern tips of the island as well as inside the rectangular stone house (Houses A-H). The shelters partly overlay the cashel walls. Sherds of late-thirteenth/fourteenth-century glazed pottery were found associated with the evidence for the shelter inside the rectangular stone house and indicate a possible medieval date for this phase of activity.

### **Animal Bones:**

The faunal assemblage from O'Kelly's excavations included the remains of cattle, pig, sheep, goat, small horse or pony and rabbit as well as the bones of cod, seal, otter, gannet, cormorant, goose, ducks, sparrows and finches. These largely came from a midden that predates the building of the enclosure wall and rectangular house. No attempt was made to quantify the faunal material.

Evidence for oats barley, wheat and rye were recovered from deposits inside the circular stone house and oratory and indicate the importation of cereal grains from the mainland.



**Plan of Church Island, Co. Kerry (after O'Kelly 1958, Plate XVII).**



**Clogher (Clogher Demesne td.), Co. Tyrone**Grid Ref: **H53875133 (25387/35133)**SMR No: **TYR 058:033**Reference: **Bonner 2001; Warner 1971; Warner 1972; Warner 1973; Warner 1973; Warner 1974; Warner 1975; Warner 1979; Warner 2000.**

Excavations were undertaken over a number of seasons on the hilltop fort at Clogher, Co. Tyrone. The site is located to the rear of the modern cathedral, and had long been assumed to be the royal site of the Airghialla tribes of mid-Ulster. Excavations through the bank, and interior, of the internal enclosure revealed a multiplicity of phases and features. The earliest internal enclosure would appear to have been delimited by a palisade trench, 30m in diameter, with an associated wide external ditch. A low external bank beyond the ditch may have been timber-framed and also may show evidence for another external palisade. The rim sherd of a small amphora from this phase suggests that the site had prestigious, international contacts, and a sherd of mid-sixth century Late Roman Amphora (B ware), and a D type penannular brooch were found in the upper fill of the ditch. Large quantities of fragments of penannular brooches, and a late-Roman bronze bracelet, have been interpreted as evidence for a brooch factory.

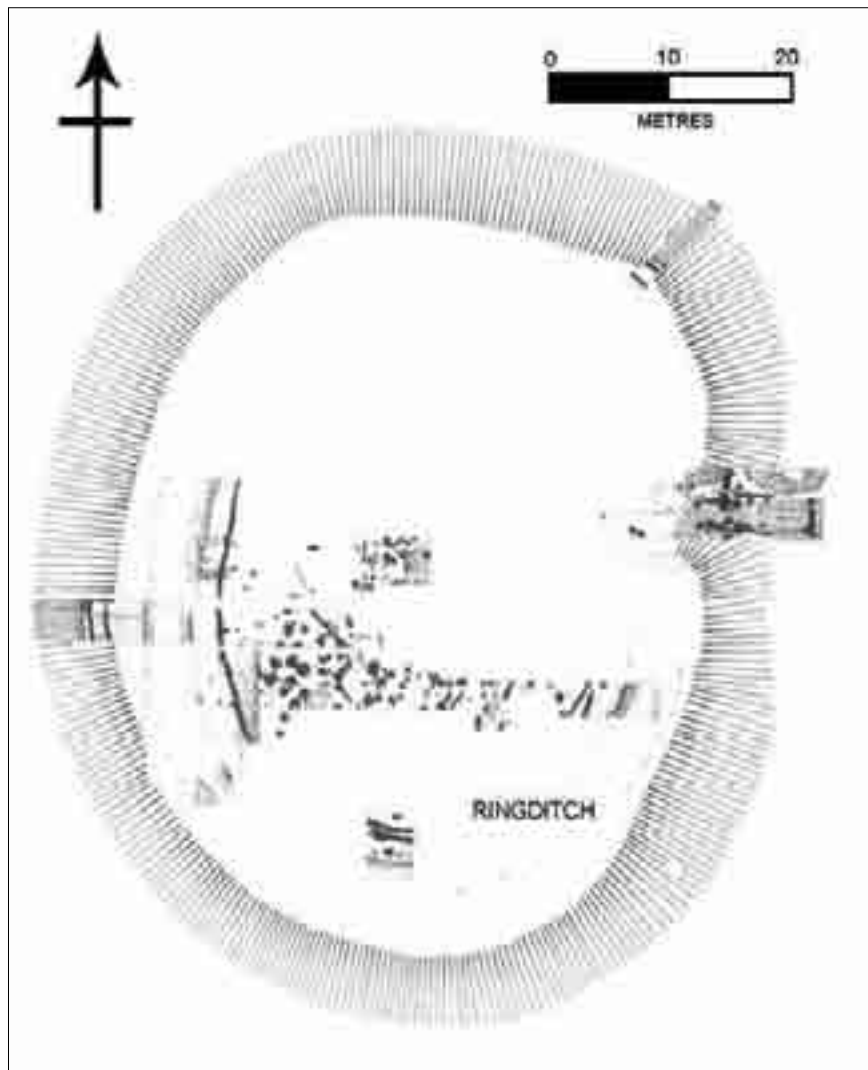
The earlier ditch was in-filled with yellow clay (the 'Clogher Yellow Layer'), and a large dump bank was created outside the circuit of this ditch. Sherds of E ware sealed by this bank suggest a sixth/mid-seventh-century construction date. A possible rectangular building of post-and-slot construction was found within the interior of this enclosure; and a huge circular building (40m across) which has been interpreted as the *rigtech*, or royal house. There was evidence for bronze-working within the enclosure, and iron- and glass-working were conducted inside the hilltop fort, but outside the enclosure. The construction of the 'inauguration mound' would appear to date to this phase of occupation.

**Animal Bones:**

Cuttings A, X and S produced 16,409 mammal bone fragments of which a total of 8,796 (54%) were identifiable to species level.

Phase	Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Cat	Dog	Date
<b>ERF-A</b>								<b>A.D. 447-662</b>
<b>NISP</b>	429	56	198	13	5	1	-	
<b>%NISP</b>	61.1	8.0	28.2	1.9	0.7	0.1	-	
<b>MNI</b>	17	2	9	2	1	1	-	
<b>%MNI</b>	58.6	6.9	20.7	6.9	3.4	3.4	-	
<b>ERF-X</b>								
<b>NISP</b>	606	55	259	13	-	1	3	
<b>%NISP</b>	64.7	5.9	27.6	1.4	-	0.1	0.3	
<b>MNI</b>	13	4	6	1	-	1	1	
<b>%MNI</b>	50	15.4	23.1	3.8	-	3.8	3.8	
<b>LRF-A</b>								<b>A.D. 649-897</b>
<b>NISP</b>	262	25	48	5	-	-	-	
<b>%NISP</b>	77.1	7.4	14.1	1.5	-	-	-	
<b>MNI</b>	7	3	4	1	-	-	-	
<b>%MNI</b>	46.7	20.0	26.7	6.7	-	-	-	
<b>LRF-X</b>								
<b>NISP</b>	221	14	51	4	-	-	-	
<b>%NISP</b>	76.2	4.8	17.6	1.4	-	-	-	
<b>MNI</b>	6	2	3	1	-	-	-	
<b>%MNI</b>	50.0	16.7	25.0	8.3	-	-	-	

**NISP & MNI from 'Early' and 'Late' rath phases at Clogher, Co. Tyrone.**



Excavation plan of Clogher, Co. Tyrone (after Bonner 2001, 19).

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-835	Primary silting of ringditch	1515 $\pm$ 120 BP	<b>A.D. 251-715;</b> A.D. 744-768.
UB-838	Early ringditch fill	1770 $\pm$ 65 BP	A.D. 88-103; <b>A.D. 122-411.</b>
UB-841	Later ringditch fill	1770 $\pm$ 90 BP	<b>A.D. 53-436;</b> A.D. 489-510; A.D. 517-529.
UB-842	Late ringfort occupation	1635 $\pm$ 65 BP	<b>A.D. 255-559.</b>
UB-844	Charcoal with iron smelting	1555 $\pm$ 45 BP	<b>A.D. 415-598.</b>
UB-2033	Late ringditch fill=2034	1725 $\pm$ 115 BP	<b>A.D. 61-566.</b>
UB-2034	Late ringditch fill=2033	1670 $\pm$ 70 BP	<b>A.D. 218-553.</b>
UB-2035	Early ringfort Occupation	1440 $\pm$ 45 BP	<b>A.D. 544-662.</b>
UB-2036	Earliest ringfort occupation	1710 $\pm$ 75 BP	A.D. 133-444; <b>A.D. 447-464;</b> A.D. 482-533.
UB-2037	Mid ringditch fill	2185 $\pm$ 45 BP	<b>383 B.C. – 152 B.C.;</b> 138 B.C. – 113 B.C.
UB-2038	Ringfort occupation	1260 $\pm$ 70 BP	<b>A.D. 649-897;</b> A.D. 921-944.
UB-2176	Assoc with quartz pebbles	1335 $\pm$ 65 BP	<b>A.D. 596-830;</b> A.D. 836-868.

## Animal Bones Appendix:

### Cattle:

Higham Eruption Stage	Approx Age (Months)	No	%
14	30	1	17
20+	40+	5	83

### ERF - Cattle Age Slaughter based on Tooth Eruption and Wear

Element	Approx age (Months)	ERF- A		ERF-X		LRF-A		LRF-X	
		F	U	F	U	F	U	F	U
Scapula; pelvis	0-10	22	1	25	1	11	-	10	-
Humerus d; radius p	12-18	24	2	19	-	18	-	9	-
Metacarpal d; tibia d; metatarsal d	24-36	21	6	18	5	5	2	11	1
Femur p; calcaneus	36-42	12	8	13	17	9	4	2	4
Humerus p; Radius d; Femur d; Tibia p	42-48	13	18	9	6	4	9	5	4

### Age/slaughter criteria for cattle based on Silver (1969, 285-86).

Phase	Element	#	Min	Max	Mean	S. D.
	<b>Scapula</b>					
ERF	GLP	10	64.2	73.6	67.2	3.1
ERF	LG	10	52.5	60.7	56.0	50.1
ERF	SLC	5	47.1	56.4	50.1	4.2
LRF	GLP	7	59.2	75.5	63.2	5.7
LRF	LG	7	49.0	59.5	54.0	3.8
LRF	SLC	45.2	-	-	-	-
	<b>Humerus</b>					
ERF	Bt	7	66.6	74.2	70.1	2.9
LRF	Bt	7	66.5	71.6	68.6	2.1
	<b>Radius</b>					
ERF	Bp	6	66.4	74.6	71.3	2.7
LRF	Bp	3	68.3	73.3	70.7	2.5
	<b>Metacarpal</b>					
ERF	GL	2	185.0	189.0	187.0	2.8
ERF	Bp	2	53.1	54.3	53.7	0.8
ERF	Bd	4	52.0	53.4	52.5	0.6
ERF	Sd	2	28.1	29.0	28.6	0.9
LRF	GL	2	178.0	181.0	179.5	2.1
LRF	Bp	2	49.7	51.3	50.5	1.1
LRF	Bd	4	51.3	53.4	52.7	1.0
LRF	Sd	2	24.9	27.5	26.2	1.8
	<b>Tibia</b>					
ERF	Bp	1	86.9	-	-	-
ERF	Bd	16	51.8	63.2	56.9	3.1
LRF	Bd	5	53.1	57.0	55.0	1.7
	<b>Calcaneus</b>					
ERF	GL	7	117.4	135.5	122.6	6.2
	<b>Astragalus</b>					
ERF	GL1	10	55.7	64.9	59.9	2.8
ERF	Bd	10	36.0	43.9	38.6	2.3
LRF	GL1	2	56.2	62.9	59.6	4.7

LRF	Bd	2	37.9	42.8	40.4	3.5
	<b>Metatarsal</b>					
ERF	GL	2	206.0	213.0	209.5	4.9
ERF	Bp	3	43.9	48.6	45.8	2.5
ERF	Bd	3	47.6	53.2	49.8	3.0
ERF	Sd	2	27.3	28.3	27.8	0.7
LRF	GL	1	204.0	-	-	-
LRF	Bp	2	36.8	41.9	39.4	3.6
LRF	Bd	1	46.0	-	-	-
LRF	Sd	1	20.9	-	-	-

### Cattle Biometrics

Phase	Bd (mm)	Sex
ERF	52.2	F
	52.2	F
	52.0	F
	53.4	F
LRF	53.2	F
	51.3	F
	53.4	F
	53.0	F

### Cattle sex determination based on metacarpal distal widths.

Phase	Bp (mm)	Sex
ERF	66.4	F
	72.0	F
	71.5	F
	74.	F
	72.4	F
	70.6	F
LRF	70.6	F
	73.3	F
	68.3	F

### Cattle sex determination based on radius proximal widths.

Phase	Element	GL	Mult. Factor	E.W.H. (cm)
ERF	Metacarpal	181-185 (#=2)	6.12	110.8-113.2
	Metatarsal	206-213 (#=2)	5.45	112.3-116.1
LRF	Metacarpal	178	6.12	108.9
	Metatarsal	204	5.45	111.2

### Estimated withers heights for cattle based on metacarpals and metatarsals

### Sheep:

Element	Approx age (Months)	ERF- A		ERF-X		LRF-A		LRF-X	
		F	U	F	U	F	U	F	U
Scapula; Pelvis; Humerus d; Radius p	0-10	7	-	11	-	5	-	1	-
Tibia d	18-24	1	-	2	-	1	-	-	-
Radius d	30-36	1	-	1	1	1	-	-	-
Femur d; Tibia p	36-42	1	1	1	1	-	-	-	1

### Age slaughter data for sheep based on epiphyseal fusion (Silver 1969, 285-86)

Phase	Element	#	Min	Max	Mean	S. D.
	<b>Humerus</b>					
ERF	Bt	3	25.9	27.5	26.8	0.8
	<b>Tibia</b>					
LRF	Bd	1	25.0			

### Sheep Biometrics

### Pigs:

Higham Eruption Phase	Approx Age (months)	#	%
18	17-19	6	43
19	19-21	3	21
20	21-23	4	29
22	25-27	1	7

### Pig slaughter based on tooth eruption and wear.

Element	Approx age (Months)	ERF- A		ERF-X		LRF-A		LRF-X	
		F	U	F	U	F	U	F	U
Scapula; pelvis; humerus d; radius p	0-12	25	-	23	1	11	-	7	-
Metacarpal d; tibia d; metatarsal d	12-24	2	6	3	6	-	1	2	1
Ulna; femur p; femur d; tibia p	30-42	2	6	2	5	-	2	-	3

### Age slaughter data for pig based on epiphyseal fusion (Silver 1969, 285-86)

Phase	Element	#	Min	Max	Mean	S. D.
	<b>Scapula</b>					
ERF	GLP	3	32.0	34.1	33.3	1.1
ERF	LG	3	27.6	29.1	28.3	0.8
ERF	SLC	3	21.1	22.3	21.7	0.6
LRF	GLP	4	32.2	35	33.2	1.3
LRF	LG	4	27.4	30.5	29	1.3
LRF	SLC	3	21.8	22.5	22.1	0.4
	<b>Humerus</b>					
ERF	Bt	6	26.8	30.1	28.6	1.4
	<b>Tibia</b>					
ERF	Bd	5	27.6	32.3	29.6	2
	<b>Calcaneus</b>					
ERF	GL	1	75.9			

### Pig Biometrics

Phase	Element	GL	Mult. Factor	E.W.H. (cm)
ERF	Calcaneus	75.9	9.34	70.9

### Estimated withers heights for pigs based on calcaneus.

**Horse:**

Phase	Element	#	Min	Max	Mean	S. D.
	<b>Humerus</b>					
ERF	GL	1	276.0	-	-	-
ERF	Bd	1	70.0	-	-	-
ERF	Bt	2	66.2	70.4	68.3	3.0
ERF	Bd	1	31.2	-	-	-
	<b>Pelvis</b>					
ERF	LAR	1	58.6	-	-	-
	<b>Tibia</b>					
ERF	Bd	1	69.6	-	-	-
ERF	Sd	1	38.4	-	-	-
	<b>Astragalus</b>					
ERF	GL1	1	55.2	-	-	-
LRF	GL1	1	54.3	-	-	-
	<b>Phalanx 1</b>					
ERF	GL	2	86.3	87.8	87.1	1.1

**Horse biometrics**

Phase	Element	GL	Mult. Factor	E.W.H. (cm)
ERF	Humerus	276	4.87	134.4

**Estimated withers heights for horses based on humerus.**

**Cloncowan, Co. Meath**Grid reference: **N75494931 (275497/249316)**SMR No: **ME042-031**Site director: **Baker 2007a; Baker 2007b; Pipe 2007.**

Excavations on a hilltop at Cloncowan revealed a Bronze Age ringditch and an early medieval pennanular ditched enclosure located within the bounds of the earlier site. This location subsequently became the focus for burials around the end of the first millennium, some of which truncated the earlier pennanular ditch. A number of artefacts, including a bone spindle-whorl, a fragment of bone pendant, and metal chain links, were recovered from the pennanular ditch, but some of these appear to have been associated with the later funerary activity rather than the occupation phase.

The funerary phase, which incorporated a re-cut of the ditch, contained 13 burials. Three further graves were enclosed by the penannular ditch. There was no consistency in their alignment and eight were interred in graves that truncated the cut of the ditch. Ear-muff stones were present by the head in one grave while another contained a pillow-stone. The burials have been preliminarily identified as five adults, seven juveniles and four neonates.

**Animal Bones:**

The animal bone recovered from the site consisted of 688 fragments, the vast majority of which (502 fragments) came from the early medieval pennanular ditch.

Context	Cattle	Sheep/ Goat	Pig	Dog	Red Deer	Deer	LM	MM	Date
Pennanular Ditch	207	30	58	38	1	1	103	64	<b>A.D. 424-604</b>

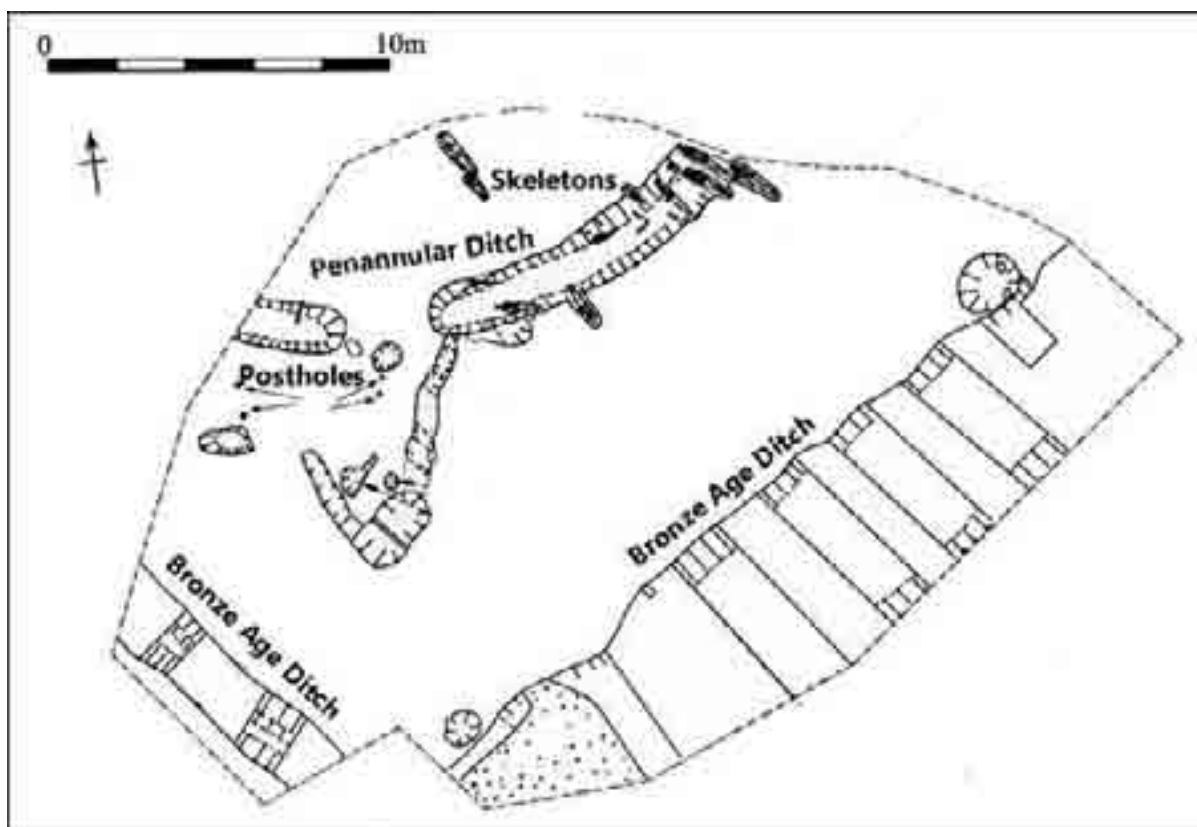
**NISP from Cloncowan, Co. Meath (LM= Large Mammal; MM= Medium-sized Mammal).**

**Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
UB-4991	Intrusive charcoal from upper fill of pennanular ditch	3104±40 BP	<b>1450-1267 B.C.</b>
UB-4990	Burnt bone from penannular ditch (F8)	1538±42 BP	<b>A.D. 424-604</b>
UB-4992	Oak charcoal from pennanular ditch	1555±24 BP	<b>A.D. 429-561</b>
UB-6373	Skeleton 2	946±33 BP	<b>A.D. 1022-1160</b>
UB-6371	Skeleton 5	843±31 BP	A.D. 1055-1076; <b>A.D. 1154-1263</b>
UB-6372	Skeleton 14	992±31 BP	<b>A.D. 987-1053;</b> <b>A.D. 1079-1153</b>





**Excavation at Cloncowan, Co. Meath (after Baker 2007b, 321).**

#### **Animal Bones Appendix:**

Stature was calculated only from a single sheep tibia recovered from the pennanular ditch. This bone measured 190mm in greatest length, giving an estimated withers height of 57.2cm - 58.1cm using a conversion factor quoted by von den Driesch and Boessneck (1974).

<b>Species</b>	<b>Bone</b>	<b>Approx. Age (months)</b>	<b>Fused</b>	<b>Unfused</b>	<b>% Fused</b>
<b>Cattle</b>	Metacarpal d	24-36	3	1	75%
	Vertebra, cervical	<5.0	2	1	66.7%
	Phalanx 1 d		5		100%
	Scapula d.	0-10	4	1	80%
	Humerus p	42-48	3		100%
	Humerus d	12-18	2		100%
	Femur, d	42-48	2	1	66.7%
	Metacarpal p	Pre-natal	1		100%
	Metatarsal p	Pre-natal	9		100%
	Metatarsal, d	24-36	1		100%
	Tibia d	24-36		2	0%
	Phalanx 1, p	18-24	4		100%
	Phalanx 2 p	18-24	1		100%
	Phalanx 2, d		1		100%
	Radius p	12-18	3	2	60%
	Radius d	42-48	2	2	50%
	Metapodial d	24-36	2		100%
	Calcaneus p	36-42		2	0%

	Vertebra, thoracic		1		100%
<b>Pig</b>	Humerus d	0-12	1		100%
	Phalanx 2, d		1		100%
	Phalanx 2, p	12	1		100%
	Tibia, d	12-24		2	0%
	Radius, p	0-12	2		100%
	Calcaneus, p	30-42		1	0%
	Ulna, p	30-42		1	0%
	Fibula, d			1	0%
	Femur, p	30-42		1	0%
	Scapula, d	0-12		1	0%
	Metapodial, p		2		100%
	Metapodial, d	24-27		1	0%
<b>Sheep/Goat</b>	Femur, p		1		100%
	Humerus, d	0-10	2		100%
	Metacarpal, d		1		100%
	Phalanx 2, p	6-16	1		100%
	Phalanx 2, d		1		100%
	Scapula, d	0-10	1	1	50%
	Phalanx 1, d		1		100%
	Phalanx 1, p	6-16	1		100%
	Tibia, d	15-24	2	1	66.7%
	Radius, p	30-36	2		100%
	Tibia, p	36-42	1		100%
	Metatarsal, p		1		100%

**Epiphyseal fusion by species from the pennanular ditch at Cloncowan, Co. Meath.**

<b>Context</b>	<b>Species</b>	<b>Bone</b>	<b>Nos.</b>	<b>Sex</b>
Pennanular Ditch	Pig	Mandible	3	M; F; F
Pennanular Ditch	Pig	Mandibular	1	F
Pennanular Ditch	Pig	Mandibular canine	1	M
Pennanular Ditch	Pig	Mandible	1	M
Pennanular Ditch	Deer	Antler	2	M; M

**Sex determination**

## **Clonmacnoise, Co. Offaly**

Grid Ref: **N011308 (20110/23080)**

SMR No: **OF005-004; OF005-058.**

References: **Soderberg 2003, Soderberg 2004a; Soderberg 2004b; Boland & O'Sullivan 1997; Kenny 1983; King 1990; King 1991; King 1992a; King 1992b; King 1993; King 1994; King 1995; King 1996; King 1997; King 1998; King (ed.) 1998; King (ed.) 2003; Manning 1994; Manning 1995; Moore 1996; Murphy 2003; O'Sullivan & Boland 1998; O'Sullivan & Boland 2000; Trodd 1998.**

Rescue excavations were conducted beside the round tower in 1989, and in the location of the 'New Graveyard' in the 1990s. Four phases of activity belonging to the early medieval period were discovered beside the round tower. These included the remains of wicker-built circular huts, as well as artefact remains such as part of a two-sided comb and a bone trial piece with interlace and fretwork patterns.

Excavations at the 'new graveyard' at Clonmacnoise revealed much about the domestic and industrial aspects to the monastery. This can be generally divided into three phases – Phase 1 which consists of stakeholes, but no discernable structures; Phase 2 which contains nearly all the structural material; and Phase 3, which coincides with the abandonment of Phase 2. At least five domestic structures were discovered during the course of these excavations. The earliest remains have been interpreted as the remnants of a wicker-walled roundhouse. This structure was replaced by another roundhouse, which survives in the form of a section of wall, a hearth and a clay floor. There is evidence elsewhere in the 'new graveyard' that roundhouses were replaced by rectangular buildings, some of which appear to have had an internal division. A number of these later buildings appear to have external enclosed yards or gardens, and one rectangular 'sod house' with an external occupation area was dated to between the seventh and twelfth centuries.

Most of the structures on the site appear to be contemporary with, and adjacent to, a metalled roadway which ran into the monastic enclosure. Radiocarbon dates from the post-road phase gave a twelfth/thirteenth century date, with other radiocarbon dates suggesting that the settlement developed in the seventh century and carried on for subsequent centuries

Over 4,000 artefacts were recovered during the excavation seasons at the 'new graveyard'. These included iron objects (e.g. knives, rings, pins, fishhooks), iron weapons (an axe-head, a sword pommel, and an armour piercing arrow-head) and bronze objects (e.g. wire, loop-headed pin, tweezers, needle, pins, buckle, and off-cuts). High status metals were also recovered (e.g. a fragmentary crucible with a speck of gold, and a silver ingot). Glass and enamel artefacts were also discovered (e.g. blue glass beads, a green glass bead, a yellow glass bead, fragments of a blue glass bracelet, and a blue enamel bracelet fragment). Imported material was present in the form of sherds of E-ware, fragments of green porphyry, pieces of jet, and Hiberno-Scandinavian and Anglo-Saxon coins. Many of the finds discovered point towards industrial activity on site. Crucibles, tuyères, mould fragments and slag indicate metal-working; spindle whorls indicate textile production; and off-cuts of bone and antler suggest bone-working and comb manufacture.

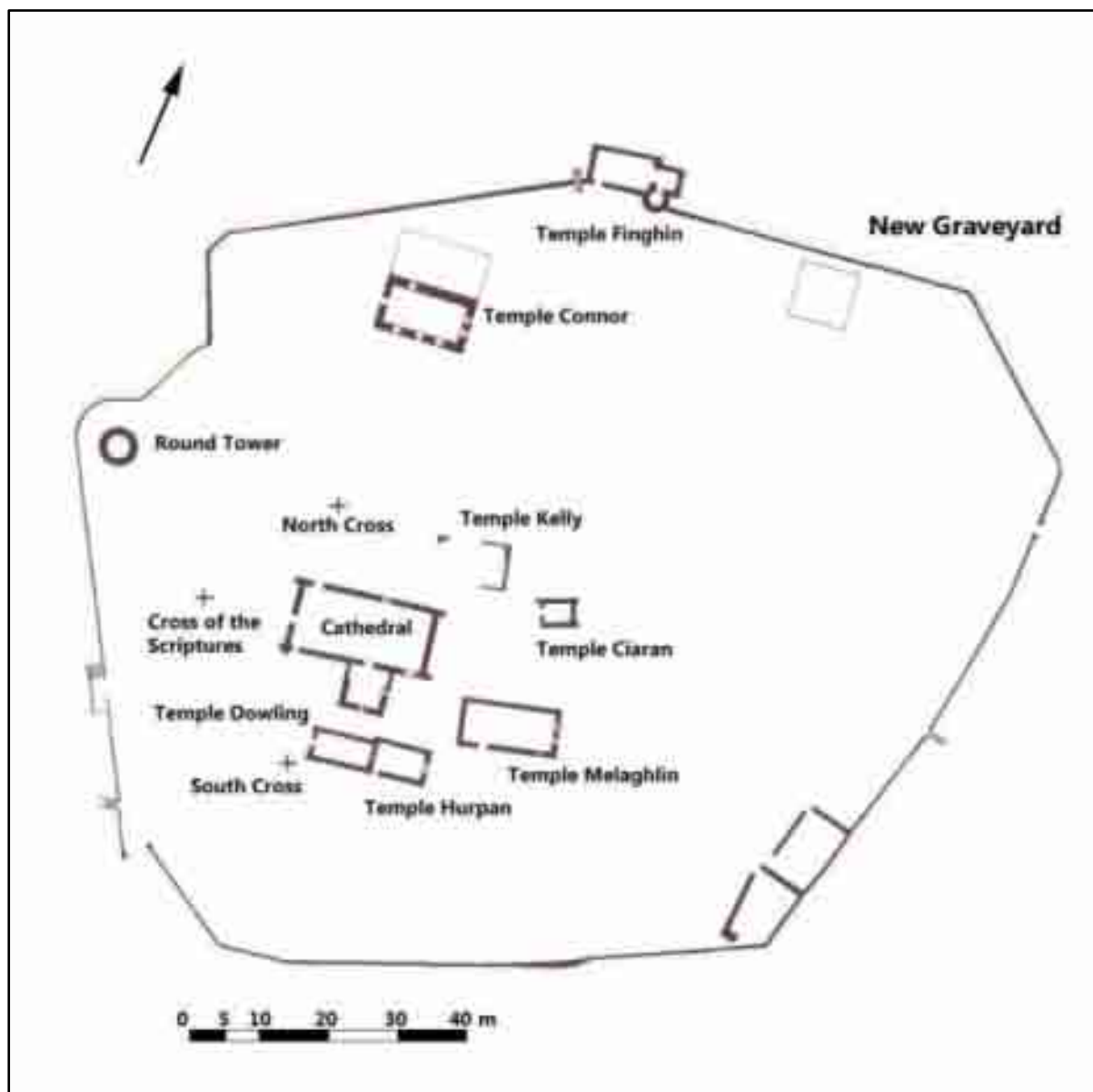
## **Animal Bones:**

The analysed faunal assemblage is comprised of finds from the 'new graveyard'.

Phase		Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Red Deer	Other	Date
<b>Phase 1</b>	NISP	3178	518	1346	43	152	43	99	19	<b>c. A.D. 600-800</b>
	%	60	9.8	25.4	0.8	1.0	0.8	1.9	0.4	
	MNI	116	51	77	2	3	4	4	4	
	%	44.4	19.5	29.5	0.8	1.1	1.5	1.5	1.6	

<b>Phase 2</b>	NISP	4731	979	2453	55	44	45	91	4	<b>c. A.D. 900-1000</b>
	%	55.7	11.5	29.9	0.6	0.5	0.5	1.1	0.3	
	MNI	149	74	113	3	3	2	5	3	
	%	42.3	21.0	32.1	0.9	0.9	0.6	1.4	0.9	
<b>Phase 3</b>	NISP	5241	1896	4249	81	152	117	188	29	<b>c. A.D. 1000-1300</b>
	%	43.8	15.9	35.5	0.7	1.3	1.0	1.6	0.5	
	MNI	153	75	156	4	8	9	3	6	
	%	37.0	18.1	37.7	1.0	1.9	2.2	0.7	1.3	

**NISP and MNI from the New Graveyard at Clonmacnoise, Co. Offaly (phasing based on King).**



**Plan of Clonmacnoise, Co. Offaly, showing location of the 'New Graveyard'**

### Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
Gr-?	After abandonment of road	860 $\pm$ 20 BP	A.D. 1056-1075; <b>A.D. 1154-1224.</b>
Gr-?	Pre-house construction platform	1255 $\pm$ 45 BP	<b>A.D. 669-876.</b>
Gr-?	Pre-house construction platform	1330 $\pm$ 20 BP	<b>A.D. 652-695;</b> A.D. 698-707; A.D. 748-765.
Gr-?	Pre-house construction platform	1285 $\pm$ 25 BP	<b>A.D. 669-773.</b>

### Animal Bones Appendix:

Higham MWS	Estimated (Months)	Age	Phase 1	Phase 2	Phase 3
1	Foetal	-	-	-	-
2	0-1 week	-	-	-	-
3	1-4	-	-	-	-
4	5-6	-	-	-	-
5	6-7	-	-	-	-
6	7-9	-	-	-	-
7	8-13	-	-	-	1
8	15-16	-	-	-	-
9	16-17	1	3	1	-
10	17-18	5	1	-	-
11	18-24	2	1	-	-
12	24	2	3	-	-
13	24-30	4	5	9	-
14	30	2	5	2	-
15	30-31	6	3	4	-
16	31-32	7	2	-	-
17	32-33	3	2	1	-
18	36	2	2	4	-
19	38	5	2	4	-
20	40	7	6	15	-
21	40-50	1	5	1	-
23	Over 50	8	9	9	-
		7	14	13	-
		4	11	9	-
		1	3	2	-
	Total	67	77	75	-

**Cattle age/slaughter cased on tooth eruption and wear.**

Higham MWS	Estimated (Months)	Age	Phase 1	Phase 2	Phase 3
1-2	0-6 weeks	-	-	-	-
3	1 ½-3	-	-	-	-
4	3	-	-	-	-
5	4	-	-	-	-
6	5	-	-	-	-
7	5-7	-	-	-	-
8	7-9	-	-	-	-
9	9-10	-	-	-	-
10	10-11	-	-	-	-
11	11-12	1	-	1	-
12	12-21	2	3	8	-
13	21-24	2	1	8	-
14	25-26	4	-	17	-
15	26-28	1	-	3	-
16+	28+	-	7	29	-
	Total	10	11	66	-

**Sheep age/slaughter cased on tooth eruption and wear.**

Higham MWS	Estimated (Months)	Age	Phase 1	Phase 2	Phase 3
1	Foetal	-	-	-	-
2	0-1 week	-	-	-	-
3-4	1-7 weeks	-	-	-	-
5-8	2-7	-	-	-	-
9	7-8	-	1	3	-
10	8-9	-	2	-	-
11	9-10	-	2	-	-
12	10-11	-	-	4	-
13	11-12	1	3	2	-
14-17	12-17	11	12	18	-
18	17-19	5	14	15	-
19	19-21	3	8	16	-
20	21-23	6	5	9	-
21	23-25	4	14	18	-
22	25-27	2	7	16	-
23	27-29	2	1	3	-
24+	30+	1	2	9	-
	Total	35	71	113	

**Pig age/slaughter cased on tooth eruption and wear.**

#### **Cattle Sexing:**

About three quarters (73%) of the complete cattle metacarpals from Phase 1 (n.11) fall into the female cluster (following McCormick 1987a). Following the parameters for assessing sex based on metapodial distal breadths only (McCormick 1992a), 62% of the 24 specimens fall into the female range. The cattle sexing data for Phase 2 is more difficult to interpret. Both the whole and the distal metacarpal data show an unusually large number of specimens that do not fit into either of the male and female cluster.

## Clonmoney West, Co. Clare

Grid Ref: **143104/162317**

SMR: **N/A**

Reference: **McQuade 2001b; Murphy & O'Neill 2001.**

A wall, 30m long and average width of 2.2m, was uncovered during topsoil stripping. Finds included an incised rotary quernstone, a roof tile, and a silver penny of Edward III (1344-1351). The wall overlay a deposit that contained a copper-alloy ring-pin (8<sup>th</sup>/9<sup>th</sup> C.) and a flake of polished stone axe.

### Animal Bones:

Of the 192 bones recovered from the wall, only 33 pieces were able to be identified to species.

Context		Cattle	Sheep/ Goat	Pig	Horse	Date
Early Medieval Wall	NISP	24	3	5	1	c. 9 <sup>th</sup> -12 <sup>th</sup> C.
	MNI	1	1	1	1	

**NISP and MNI from early medieval contexts at Clonmoney West, Co. Clare.**



**Medieval wall at Clonmoney West, Co. Clare.**

### Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
Beta-161999	Charcoal sample from under wall.	1610 $\pm$ 60 BP	A.D. 260-282; <b>A.D. 324-583.</b>

### Animal Bones Appendix:

None of the sheep or horse remains could be aged, but a proximally fused radius, a distally unfused radius and an unfused calcaneus were present from cattle aged between 18 and 24 months. The pig canines were from a boar, and the molar wear suggests he was over 12 months old.

### Biometrics by Species:

#### Cattle

Bone/Measurement	Min	Max	Mean	No.
<b>Scapula</b>				
GLP	59	71.9	64.8	3
LG	51.2	52.2	51.8	4
BG	39.9	45.5	41.6	4



<b>Humerus</b>				
BT	65.4	70	67.1	3
Bd			72.8	1
<b>Radius</b>				
Bp	61.5	72.1	67.2	3
BFp	62.8	65	63.9	2
BD			57	1
<b>Pelvis</b>				
LA	59	68	62.7	3
<b>Tibia</b>				
Bp			82.8	1
GL			32	1
Bd	51.5	55	53.1	5
<b>Metatarsal</b>				
Bd			48.5	1
<b>Astragalus</b>				
GLI			34	1
Bd			39	1

### Sheep/Goats

<b>Bone/Measurement</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>No.</b>
<b>Scapula</b>				
GLP			31.3	1
BG			20	1
<b>Humerus</b>				
BT			29.3	1
Bd	25	29.8	27.4	2

### Pig

<b>Bone/Measurement</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>No.</b>
<b>Radius</b>				
BP			27	2

### Horse

<b>Bone/Measurement</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>No.</b>
<b>Humerus</b>				
Bp			82.9	1
<b>Radius</b>				
Bp			72.4	1
BFp			67.5	1
BD			40.4	1
BFd			36.6	1
<b>Pelvis</b>				
LA	63.4	64.1	63.7	2
LAR	54	59.4	57.5	3
<b>Ulna</b>				
LO			72.7	1
SDO			43.4	1
Bd	51.5	55	53.1	5
<b>Phalanx 1</b>				
Bp			46.5	1

## **Cloongownagh, Co. Roscommon**

Grid Ref: **M90649997 (190644/299970)**

SMR No: **RO011-160002**

Reference: **Lennon & Henry 2000; Lennon & Henry 2001**

A large, sub-rectangular earthwork (64m in diameter, and defined by a ditch (2.3m in width and 1m to 1.55m in depth)) was identified during field-walking. Excavation of half of the enclosure was required in order to facilitate road building.

A number of phases of occupation were identified under excavation, ranging from the prehistoric (there was evidence for Neolithic, Bronze Age and Iron Age occupation), through the early medieval period, and into the post-medieval.

An earthen bank (2.75m to 3.5m in width) appears to have been constructed around this time within the ambit of a prehistoric ditch which also appears to have been re-cut during the early medieval period. Radiocarbon dates from the basal fills of the ditch, below the re-cut, suggest that it had originally been excavated during the Iron Age. The later bank appears to have been created from the up-cast from the re-cut of the ditch, and overlay a refuse pit which included a broken rotary quernstone and animal bone. A seventh/eighth century date was recovered from burnt bone from this pit (see below), giving a *terminus ante quem* for the construction of the banked enclosure.

The interior of the enclosure had been damaged by subsequent agriculture and the early medieval structural remains consist of two possible postholes and four slot-trenches. The main feature that could be clearly identified to the early medieval period was a linear trench of unknown length (the trench extended into the unexcavated portion of the site). The excavated part of this trench (9.2m long by 1.10m wide by 1.1m deep) was filled with a series of silts and clays, into which were set a series of upright posts and wooden planks, one of which was radiocarbon dated to the eighth/ninth century (see below). Three other slot-trenches were uncovered in the interior, including one which may have been associated with a series of postholes.

Iron slag and a fragment of a quernstone were recovered from the fill of the early medieval re-cut ditch. Radiocarbon dates from the upper layers of the ditch fill suggest that the early medieval site may have been abandoned by the eleventh or twelfth century.

### **Animal Bones:**

<b>Cattle</b>	<b>Sheep/Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Date</b>
415	28	33	9	7 <sup>th</sup> /8 <sup>th</sup> C

### **Animal bone fragments from Cloongownagh, Co. Roscommon**



**Location of possible early medieval structures at Cloongownagh, Co. Roscommon (after Lennon & Henry 2001).**

#### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
UCD-00106	Wooden plank from slot trench	1305±67 BP	A.D. 623-628; <b>A.D. 631-884.</b>
UCD-00107	Wooden plank from slot trench	1185±80 BP	<b>A.D. 673-991.</b>
UCD-00108	Ditch in-fill	1050±80 BP	A.D. 779-794; <b>A.D. 801-1161.</b>
UCD-00111	Ditch in-fill	1180±80 BP	<b>A.D. 674-994.</b>
UCD-00113	Burnt bone from pit under bank	1360±67 BP	<b>A.D. 550-782;</b> A.D. 789-811; A.D. 846-855.
Quoted in Lennon & Henry 2000	Wooden plank from slot trench	1165±45 BP	A.D. 723-740; <b>A.D. 770-984.</b>
Quoted in Lennon & Henry 2000	Burnt bone from pit under bank	1339±50 BP	<b>A.D. 604-778.</b>
Quoted in Lennon & Henry 2000	Organic material from basal fill of ditch	2270±60 BP	483-466 B.C.; <b>416-169 B.C.</b>
Quoted in Lennon & Henry 2000	Organic material from basal fill of ditch	2370±60 BP	756-684 B.C.; <b>669-360 B.C.;</b> 274-260 B.C.

## Animal Bones Appendix:

### Cattle:

Bone	Measurement	Min.	Max.	Mean	No.
<b>Scapula</b>					
	GLI	44.3	74.4	63.6	5
	SLC	34.7	69.4	55.5	4
<b>Humerus</b>					
	Bd			60.1	1
	Bt	87.2	91.4	89.3	2
	Bp			95.6	1
<b>Tibia</b>					
	Bd			57.1	1
<b>Astragalus</b>					
	GLI			64.2	1
<b>Calcaneus</b>					
	GL			141.3	1
	Bd			37.6	1

### Cattle bones measurements

### Sheep:

Bone	Measurement	Min.	Max.	Mean	No.
<b>Tibia</b>					
	Bd	19.3	23.6	21.4	
	Sd			14.1	1

### Sheep bones measurements

### Pig:

Bone	Measurement	Min.	Max.	Mean	No.
<b>Calcaneus</b>					
	GL	71.1	71.1	71.1	2
	Bd	25.7	25.7	25.7	2

### Pig bones measurements

## Collierstown 1, Co. Meath

Grid reference: **N94745882 (294743/258825)**

SMR: **N/A**

Reference: **O'Hara 2008; O'Hara 2009; Foster 2009**

Excavations at Collierstown revealed a cemetery in use from the mid-fifth until the late-ninth century. Four main phases of burial were identified.

The earliest burial at Collierstown was a female, dated to A.D. 423-594, who was centrally placed within an area defined by two shallow curvilinear ditches that formed an approximately circular enclosure. A low mound may have covered this grave because later burials were inserted into stratigraphically higher levels. A further eight inhumations, extended west-east and in dug and partially stone-lined graves, were interred centrally within the Phase 1 enclosure and represent the first phase of burial activity at Collierstown. A sherd of Late Roman Amphorae (B// ware) found in the ditch fills of the primary burial supports the late-fifth/sixth-century date from the radiocarbon dating.

A series of curvilinear, segmented ditches were dug during Phase 2. Many of these cut through and maintained the shape of Enclosure 1. The earliest curvilinear ditch was radiocarbon dated to A.D. 427-608. High status artefacts from this ditch included a whalebone sword hilt, two sherds of Phocaean Red Slip Ware (late-fifth/sixth century) and a fragment of E ware (mid-sixth/seventh century). Another two of the curvilinear ditches included fragments of Late Roman Amphorae (B// ware). One of the contexts from the LRA was retrieved returned a radiocarbon date of A.D. 402-568, suggesting a contemporary deposition. Ditch re-cuts included burnt and un-burnt animal bone and a tiny quantity of slag which suggests possible evidence for iron working at the site during this phase.

Phase 3 is marked by a partially surviving ditch which would have defined a circular-shaped enclosure which was extensively truncated by the Phase IV enclosure. This ditch contained a large number of dumped or naturally accumulated deposits. Finds included Late Roman Amphorae (B// ware) pottery and fragments of iron objects. The ditch provided two radiocarbon dates of A.D. 569-671 and A.D. 559-662. The burials from this phase were dated to A.D. 540-654 and A.D. 687-895.

The final enclosure phase consisted of a re-cut to the Phase 3 enclosure and an extension of the site southwards in the form of a triangular-shaped enclosure. The radiocarbon date of A.D. 402-568 returned from charcoal from this ditch may have come from a re-worked deposit.

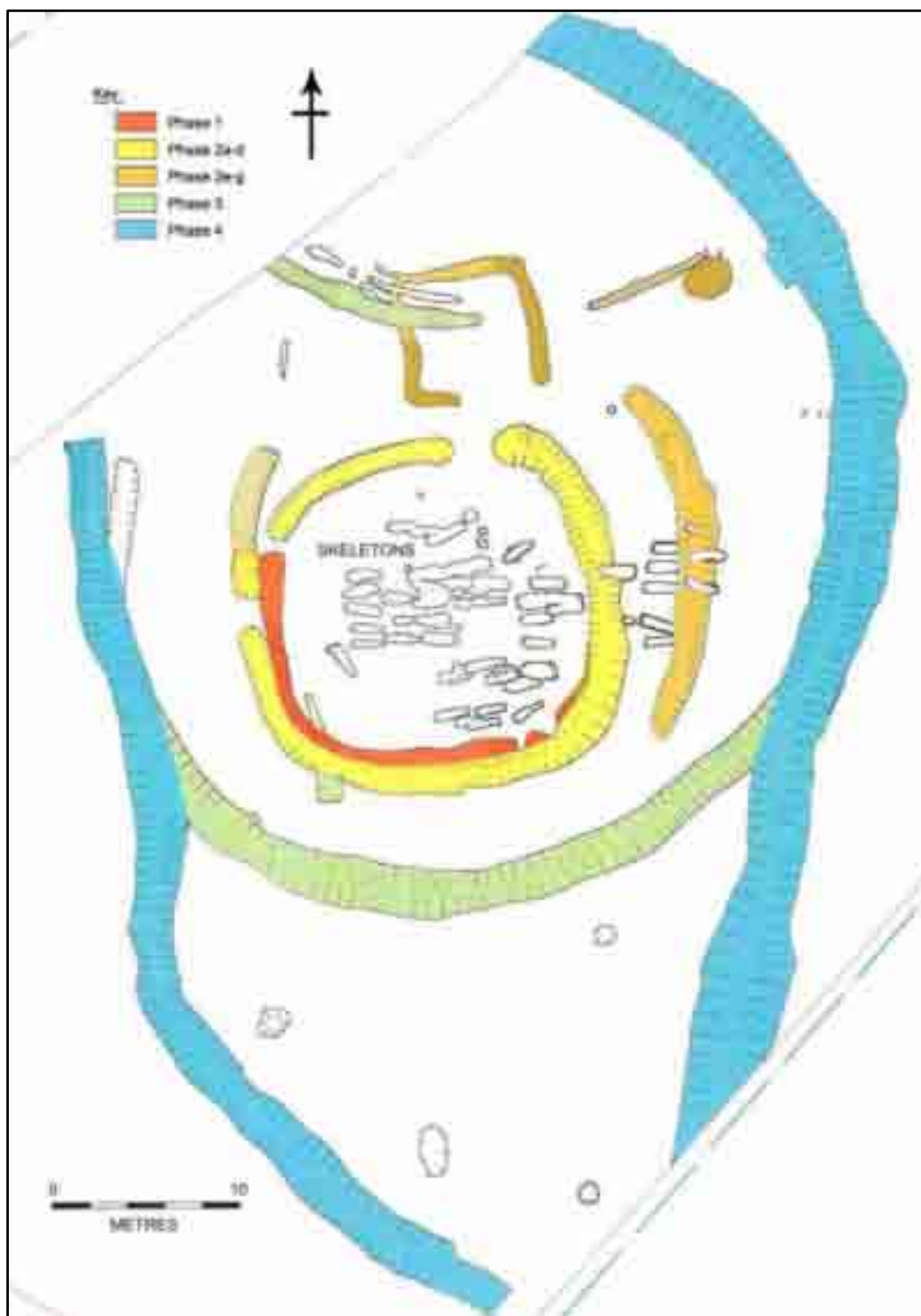
### Animal Bones:

Of the bone fragments recovered, 1185 were countable. The site director suggested that the remains from Phase 2 may represent periodic funerary feasting, however when this seems unlikely when the meat values were calculated for cattle, sheep/goat, and pig from this phase.

Phase	Cattle	Sheep/ Goat	Pig	Horse	Dog	Red Deer	Cat	Date
<b>1</b>								<b>A.D. 401-569</b>
<b>NISP</b>	33	3	5	2	-	-	-	
<b>%NISP</b>	76.7	7.0	11.6	4.7	-	-	-	
<b>MNI</b>	3	1	1	1	-	-	-	
<b>%MNI</b>	50	16.7	16.7	16.7	-	-	-	
<b>2</b>								<b>A.D. 427-606</b>
<b>NISP</b>	370	72	36.5	14	14	2	1	
<b>%NISP</b>	72.6	14.1	7.2	2.7	2.7	0.4	0.2	
<b>MNI</b>	15	10	5	2	2	1	1	
<b>%MNI</b>	41.7	27.8	13.9	5.6	5.6	2.8	2.8	
<b>3</b>								<b>A.D. 559-663</b>
<b>NISP</b>	334	86	42	33	4	-	-	
<b>%NISP</b>	66.9	17.2	8.4	6.6	0.8	-	-	
<b>MNI</b>	8	4	5	4	1	-	-	

<b>%MNI</b>	36.4	18.2	22.7	18.2	4.5	-	-	
<b>4</b>								<b>?</b>
<b>NISP</b>	62	16	7	11	5	-	-	
<b>%NISP</b>	61.4	15.8	6.9	10.9	5.0	-	-	
<b>MNI</b>	5	3	2	1	1	-	-	
<b>%MNI</b>	41.67	25.00	16.67	8.33	8.33	-	-	

**Number of Identifiable specimens (NISP) by element and species (Dating of phases after Foster 2009)**



**Phases at Collierstown, Co. Meath (after O'Hara 2009).**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
Beta-250161	Human bone from central and primary female burial 48	1550±40 BP	<b>A.D. 423-594</b>
Beta-247009	Charcoal from fill of Phase II enclosure ditch	1530±40 BP	<b>A.D. 427-608</b>
Beta-247207	Charcoal from fill of Phase II enclosure ditch	1580±40 BP	<b>A.D. 402-568</b>
Beta-247005	Human bone from burial 47	1530±40 BP	<b>A.D. 427-608</b>
Beta-247008	Human bone from burial 58	1550±40 BP	<b>A.D. 423-594</b>
Beta-247001	Human bone from burial 1	1550±40 BP	<b>A.D. 423-594</b>
Beta-247007	Wood from grave of burial 54	1430±40 BP	<b>A.D. 559-662</b>
Beta-241296	Charcoal from fill of Phase III enclosure ditch	1410±40 BP	<b>A.D. 569-671</b>
Beta-247011	Wood from fill of Phase III enclosure ditch	1430±40 BP	<b>A.D. 559-662</b>
Beta-247002	Human bone from burial 13	1210±40 BP	<b>A.D. 687-895;</b> A.D. 925-936
Beta-247003	Human bone from burial 18	1460±40 BP	<b>A.D. 540-654</b>
Beta-247010	Charcoal from fill of Phase IV enclosure ditch	1580±40 BP	<b>A.D. 402-568</b>

## Animal Bone Appendix:

### Cattle:

Phase	Element	Grant TWS	Higham MWS
1	M1/2	e	N/A
2	dP4	e	N/A
	P4	a	N/A
	M1/2	b	N/A
	M1/2	b	N/A
	M1/2	b	N/A
	M1/2	c	N/A
	M1/2	f	N/A
	M1/2	f	N/A
	M1/2	h	N/A
	M1/2	h	N/A
	M1/2	j	N/A
	M1/2	j	N/A
	M1/2	h	N/A
3	P4	b	N/A
	P4	d	N/A
	M1/2	a	N/A
	M1/2	b	N/A
	M1/2	c	N/A
	M1/2	d	N/A
	M1/2	d	N/A
	M1/2	d	N/A
	M1/2	e	N/A
	M1/2	f	N/A
	M1/2	f	N/A
	M1/2	f	N/A
	M1/2	g	N/A
	M1/2	g	N/A
	M1/2	g	N/A
	M1/2	j	N/A
	M3	f	17
	M3	g	17
	M3	g	17
	M3	e	16

Tooth wear stages for loose mandibular cattle teeth following Grant (1982, 92).

Phase	Grant TWS					Higham MWS
	dP4	P4	M1	M2	M3	
<b>1</b>	-	g	-	k	h	22
	h	-	f	d	V	14
<b>2</b>	-	X	e	E	U	9
	-	-	X	k	m	23
	-	f	A	A	X	8
	-	f	K	X	-	8
	-	g	X	-	-	21
	-	j	f	g	X	17
	-	X	f	c	X	11
	-	-	j	k	X	11
	A	-	A	A	A	0
	e	-	c	b	X	7



	e	-	c	b	X	7
	e	-	c	b	X	7
	-	g	c	-	-	21
	-	g	A	g	-	21
	g	-	a	X	-	3
	-	c	g	c	c	11
	-	e	A	A	b	16
	-	A	d	X	-	7
	j	-	g	X	-	8
	K	A	C	u	X	8
	m	V	e	h	X	11
<b>3</b>	-	X	h	h	A	11
	-	d	h	x	-	22
	-	j	m	k	X	23
	-	X	k	k	g	18
	f	A	A	X	-	3
<b>4</b>	-	X	c	a	X	11
	-	X	l	g	e	17
	-	-	g	b	X	11

**Tooth wear stages for cattle teeth in mandibles following Grant (1982, 92) and mandible wear stages assigned following Higham (1967, 104).**

Fusion	Element	Age (months)	Phase 1		Phase 2		Phase 3		Phase 4	
			Fused	Unfused	Fused	Unfused	Fused	Unfused	Fused	Unf'd
<b>Early</b>	Humerus d	12-18	-	-	3	-	1	-	1	-
	Radius p	12-18	1	-	3	-	2	-	-	-
	Acetabulum	12-18	-	-	1	-	1	-	2	-
	Metapodium p	Pre-birth	7	-	14	-	14	1	12	-
	Phalanx (1&2) p	18-24	1	-	4	3	2	2	1	-
	<b>Total</b>		<b>9</b>	<b>-</b>	<b>25</b>	<b>3</b>	<b>20</b>	<b>3</b>	<b>16</b>	<b>-</b>
	<b>%</b>		<b>100</b>	<b>-</b>	<b>89.3</b>	<b>10.7</b>	<b>87.0</b>	<b>13.0</b>	<b>100</b>	<b>-</b>
<b>Mid</b>	Tibia d	24-36	1	-	1	1	1	2	1	-
	Metapodium d	24-36	2	-	3	4	1	2	4	1
	Calcaneum p	36-42	-	-	2	-	2	-	2	-
	<b>Total</b>		<b>3</b>	<b>-</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>4</b>	<b>7</b>	<b>1</b>
	<b>%</b>		<b>100</b>	<b>-</b>	<b>54.5</b>	<b>45.5</b>	<b>50.0</b>	<b>50.0</b>	<b>87.5</b>	<b>12.5</b>
<b>Late</b>	Humerus p; radius, d; ulna; femur; tibia p.	42-48	2	1	8	6	10	3	4	4
	<b>Total</b>		<b>2</b>	<b>1</b>	<b>8</b>	<b>6</b>	<b>13</b>	<b>3</b>	<b>4</b>	<b>4</b>
	<b>%</b>		<b>66.7</b>	<b>33.3</b>	<b>57.1</b>	<b>42.9</b>	<b>81.3</b>	<b>18.8</b>	<b>50.0</b>	<b>50.0</b>

**Number of fused (fused and fusing) and unfused cattle specimens classified under early, middle, or late-fusing stages following Reitz and Wing (1999, 76).**

Phase	Element	Bd	Sex
2	Metacarpal	52.6	F
	Metacarpal	51.6	F
	Metacarpal	52.6	F
3	Metacarpal	54.5	F
	Metacarpal	62.6	M
4	Metacarpal	67.3	M
	Metacarpal	45.4	F

**Sex determination for cattle metacarpals based in Bd measurements (McCormick 1997, 822).**

Phase	Element	Number	Min	Max	Mean	St Dev
	<b>Metacarpal</b>					
2	Bp	9	46.1	57.5	50.6	3.6
	<b>Astragalus</b>					
2	GLI	7	53.4	63.1	57.7	3.6
3	GLI	6	27.7	63.5	54.6	13.4
2	GLm	5	53.9	58.3	55.8	2
3	GLm	6	23.9	55.8	44.3	15
	<b>Metatarsal</b>					
2	Bp	6	40.7	?	43.5	4.1
3	Bp	6	23.9	55.8	44.3	15
	<b>Tibia</b>					
3	Bd	8	24.9	59.4	51.2	10.9

### Summary of cattle measurements

### Sheep:

Phase	Payne TWS					Higham MWS
	dP4	P4	M1	M2	M3	
<b>1</b>	-	2A	10A	10A	2A	14
<b>2</b>	-	X	A	7A	A	12
	-	16L	11A	A	8G	17
	-	5A	12A	11A	X	12
	-	7A	8A	X	-	14
	-	7A	9A	9A	U	14
	-	9A	9A	8A	5A	15
	-	X	10A	9A	5A	15
	-	X	9A	14A	8G	15
	16L	8A	11A	X	-	7
	17L	A	8A	9A	X	11
	18L	-	6A	10A	8G	7
	18L	X	A	9A	-	12
	22L	14S	9A	X	-	7
	-	X	A	A	A	-
	-	4A	6A	6A	X	12
<b>3</b>	-	12S	12A	9A	2A	14
	-	13L	10A	9A	9A	14
<b>4</b>	-	5A	7A	X	-	14

**Tooth wear stage for sheep/goat teeth in mandibles after Payne (1973 and 1987) and mandible wear stages assigned following Higham (1967, 106).**

Fusion	Element	Age (months)	Phase 1		Phase 2		Phase 3		Phase 4	
			Fused	Unfused	Fused	Unfused	Fused	Unfused	Fused	Unf'd
<b>Early</b>	Humerus d	3-10	-	-	3	-	6	-	2	-
	Scapula p	6-8	-	-	4	-	1	-	1	-
	Pelvis	3-10	-	-	1	-	1	-	-	-
	Phalanx (1&2) p	6-16	-	-	-	-	10	2	-	-
	Metapodium p	6-10	1	-	7	-	8	-	1	-
	<b>Total</b>		<b>1</b>	-	<b>15</b>	-	<b>26</b>	<b>2</b>	<b>4</b>	-
	<b>%</b>		<b>100</b>	-	<b>100</b>	-	<b>92.9</b>	<b>7.1</b>	<b>100</b>	-
<b>Mid</b>	Tibia d	15-24	1	-	5	-	7	-	2	-
	Metapodium d	18-28	-	-	1	1	2	1	1	-
	Calcaneum p	30-36	-	-	-	1	2	-	-	-
	<b>Total</b>		<b>1</b>	-	<b>6</b>	<b>2</b>	<b>11</b>	<b>1</b>	<b>3</b>	-

	%		100	-	75	25	91.7	8.3	100	-
Late	Femur p; humerus p	30-42	-	-	-	-	-	-	-	-
	Radius d; femur d; tibia p	36-42	-	-	3	5	10	-	3	1
	<b>Total</b>		-	-	<b>3</b>	<b>5</b>	<b>10</b>	-	<b>3</b>	<b>1</b>
	%		-	-	<b>37.5</b>	<b>62.5</b>	<b>100</b>	-	<b>75</b>	<b>25</b>

Number of fused (fused and fusing) and unfused sheep specimens classified under early, middle, or late-fusing stages following Reitz and Wing (1999, 76).

Phase	Element	GL/GLI	E.S.H (cm)
3	AS	27.7	58.0
3	AS	25.1	52.6
3	MC1	112.9	55.2
3	MC1	113.5	55.4

Estimated shoulder height for sheep and sheep/goat based on greatest lateral length of astragalus and greatest lateral length of metacarpal after Teichert as detailed in Von den Driesch and Boessneck (1974, 339).

Phase	Element	Number	Min	Max	Mean	St. Dev
2	<b>Tibia</b>					
	Bd	6	20.4	24.8	22.5	1.9

Summary of sheep/goat measurements.

Pig:

Phase	Grant TWS					Higham MWS
	dP4	P4	M1	M2	M3	
1	-	X	E	U	U	6
2	-	A	A	E	X	11
	-	c	f	c	X	21
3	-	-	X	f	c	22
	-	-	f	d	X	15
	-	-	X	d	b	21
	-	b	U	X	-	17
	-	b	f	A	X	17
	-	f	m	f	c	22
	-	X	f	c	U	17
4	-	c	k	n	g	22
	-	X	m	n	g	22
	-	d	A	e	X	15

Tooth wear stage for pig teeth in mandibles following Grant (1982, 94) and mandible wear stages assigned following Higham (1967, 105).

Fusion	Element	Age (months)	Phase 1		Phase 2		Phase 3		Phase 4	
			Fused	Unfused	Fused	Unfused	Fused	Unfused	Fused	Unf'd
Early	Humerus d	12-18	-	-	1	-	4	1	-	-
	Scapula p	12	-	-	4	1	1	-	-	-
	Pelvis	12	1	-	4	-	-	-	-	-
	Phalanx 2 p	12	-	-	-	-	2	2	-	-
	Metapodium p	Pre-birth	-	-	0.5	-	-	-	-	-
	<b>Total</b>		<b>1</b>	-	<b>9.5</b>	<b>1</b>	<b>7</b>	<b>3</b>	-	-
	%		<b>100</b>	-	<b>90.5</b>	<b>9.5</b>	<b>70</b>	<b>30</b>	-	-
Mid	Tibia d	24	-	-	-	-	-	1	1	-
	Metapodium d	24-27	-	-	1	-	-	-	-	-
	Calcaneum	24-30	-	-	-	-	-	-	-	-

	p									
	Phalanx 1 p	24	-	-	-	-	2	-	-	-
	<b>Total</b>		-	-	<b>1</b>	-	<b>2</b>	<b>1</b>	<b>1</b>	-
	<b>%</b>		-	-	<b>100</b>	-	<b>66.7</b>	<b>33.3</b>	<b>100</b>	-
<b>Late</b>	Ulna p; humerus p	36-42	-	-	1	2	1	-	-	-
	Radius d; femur; tibia p	42	-	-	1	3	-	1	-	-
	<b>Total</b>		-	-	<b>1</b>	<b>5</b>	<b>1</b>	<b>1</b>	-	-
	<b>%</b>		-	-	<b>16.7</b>	<b>83.3</b>	<b>50</b>	<b>50</b>	-	-

**Number of fused (fused and fusing) and unfused pig specimens classified under early. Middle or late-fusing stages following Reitz and Wing (1999, 76).**

Phase	Element	GL	Sex	E.S.H (cm)
<b>1</b>	MT1	209.9	N/A	114.4
<b>1</b>	MT1	227.3	N/A	123.9
<b>2</b>	MC1	181	F	110.8
<b>2</b>	MC1	178.1	F	109.1
<b>2</b>	MC1	180.9	F	110.8
<b>3</b>	MT1	204.2	N/A	111.3
<b>4</b>	MC1	192	M	117.6

**Number of fused (fused and fusing) and unfused pig specimens classified under early. Middle or late-fusing stages following Reitz and Wing (1999, 76).**

Phase	Number of Elements	Element	Sex
<b>3</b>	1	Mandible	M
<b>3</b>	1	Loose Mandibular Tooth	F
<b>4</b>	1	Loose Mandibular Tooth	F
<b>4</b>		Loose Mandibular Tooth	M

**Sex determination for pig based on morphological characteristics of mandibular and maxillary canine teeth.**

**Horse:**

Phase	Element	GLI	E.S.H (cm)
<b>1</b>	MC1	219	140.4
<b>2</b>	MC1	201	128.8
<b>3</b>	MC1	220	139.9
<b>3</b>	MC1	214	137.2

**Estimated shoulder height for horse based on greatest lateral length of metacarpal after Kiesewalter (1888) as detailed in von den Driesch and Boessneck (1974, 333).**

### **Colp West, Co. Meath**

Grid reference: **O11797415 (31179/27415)**

SMR No: **ME020-043**

Reference: **Clarke & Murphy 2001; Gowen 1988; McQuade 2001.**

Excavations at Colp West revealed an enclosure complex with at least seventeen cereal-drying kilns, postholes, spreads and pits. The early medieval phases included a primary circular enclosure and six variously shaped associated enclosures. Some of the kilns were dated to this period. Earlier archaeological evidence included a Bronze Age enclosure, hut and pits, an Iron Age enclosure, cereal-drying kilns and a range of other features.

The circular enclosure and a southern annex represented the first phase of early medieval occupation at Colp West. Another, not fully excavated, oval enclosure was possibly contemporary with Phase I. Finds included a bronze pin, two knife blades and a whetstone fragment, while a fragmentary bone comb was recovered from the fill of the souterrain in the circular enclosure. The relative lack of domestic material suggests that both of these sites may have functioned as livestock enclosures, and the evidence for the existence of a possible timber palisade has been taken as further support for this interpretation. Charcoal from silting of the circular enclosure ditch was dated to A.D. 604-725; the southern oval annex was dated to A.D. 563-688.

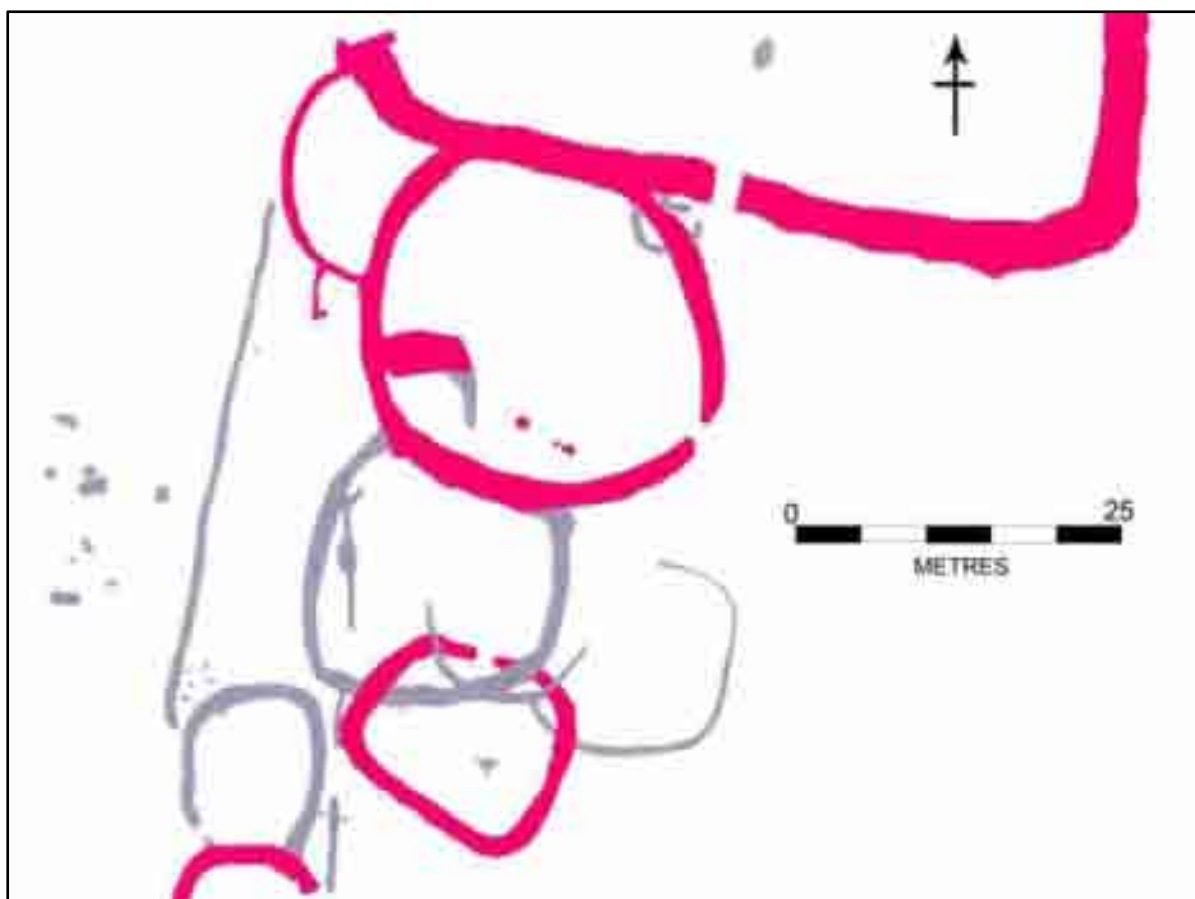
During Phase II, a large sub-rectangular enclosure was annexed onto the northern side of the circular enclosure. Animal bone from the ditch fill was dated to A.D. 618-772. The southern oval enclosure was replaced by a second sub-rectangular enclosure which produced a similar date of A.D. 604-725. No contemporary features were evident in the northern enclosure, and only evidence for a palisade was found in the southern one survived. As with Phase I, these have been interpreted as possible fields or livestock enclosures.

### **Animal Bones:**

A total of 2,882 fragments were recovered, of which 1,177 (approximately 41%) were identified to species and skeletal element. The vast majority of these came from Phase II. The only ageing data were obtained from an unfused cattle scapula (<10 months), and a proximally fused femur (>42 months). Metrical data from Phase II indicates that the shoulder heights of the cattle ranged from 1.10-1.20m.

Phase		Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Dog	Cat	Bird	Date
Phase I	NISP	14	7	1	-	-	-	-	-	<b>A.D. 563-725</b>
Phase II	NISP	708	122	102	39	2	19	5	4	<b>A.D. 604-772</b>
	MNI	33	16	10	5	1	2	1	3	

### **NISP and MNI from Colp West, Co. Meath**



**Enclosures at Colp West (after Clarke & Murphy 2001).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
UB-4673	Animal bone from silting of circular enclosure ditch	1357±44 BP	<b>A.D. 604-725;</b> A.D. 738-771
UB-4674	Animal bone from ditch-fill of southern circular enclosure (annexed onto circular enclosure)	1397±44 BP	<b>A.D. 563-688;</b> A.D. 755-756
UB-4675	Animal bone from ditch-fill of northern sub-rectangular enclosure (annexed onto circular enclosure).	1345±44 BP	<b>A.D. 618-730;</b> <b>A.D. 735-772</b>
UB-4672	Animal bone from ditch-fill of southern sub-rectangular enclosure (replaced initial southern annex)	1357±44 BP	<b>A.D. 604-725;</b> A.D. 738-771
Beta-159619	Charcoal from cereal-drying kiln	1630±80 BP	<b>A.D. 242-595</b>
Beta-159620	Charcoal from cereal-drying kiln	1560±70 BP	A.D. 349-368; <b>A.D. 379-641</b>
Beta-159621	Charcoal from cereal-drying kiln	1550±60 BP	<b>A.D. 399-634</b>
Beta-159618	Charcoal from cereal-drying kiln	1530±70 BP	<b>A.D. 400-649</b>

## Animal Bone Appendix:

### Cattle:

	Approx Age of Fusion (months)	Unfused	Fused	% Fused
<b>Scapula, pelvis</b>	7-10	5	81	94.1
<b>Radius, p; humerus, d; phalanx d.</b>	12-18	17	86	83.5
<b>Tibia d; metapodia d.</b>	24-36	22	84	79.3
<b>Calcaneus; femur, p.</b>	36-42	20	25	55.5
<b>Radius, d; ulna; tibia, p; femur, d.; humerus p.</b>	42-48	36	55	60.4

### Cattle fusion ages

Cattle were sexed on the Bd of fused metacarpals – 71% (10) were female.

Bone/Measurement	Min.	Max.	Mean	No
<b>Scapula</b>				
GLP	58.9	78.3	65.1	18
LG	47.6	63.5	53.4	15
BG	40.1	60.6	54.4	12
<b>Humerus</b>				
BP	76.7	79.4	78.1	3
GL	241.0	252.0	246.5	2
BT	63.5	69.1	65.6	7
Bd	71.1	76.0	72.75	6
<b>Radius</b>				
Bp	70.3	74.3	71.4	8
SD	33.4	35.8	34.8	3
Bd	61.3	73.5	65.1	7
<b>Pelvis</b>				
LA	57.9	65.5	61.2	5
SH	34.3	36.6	35.4	2
<b>Femur</b>				
Bp	95.1	106.0	99.8	5
GL	323.0	331.0	327.0	2
SD	28.3	31.2	29.4	3
Bd	79.5	91.5	82.2	5
<b>Tibia</b>				
Bp	75.6	84.2	80.9	3
GL			328.0	1
SD	31.8	32.1	31.9	2
Bd	54.7	61.8	56.7	12
<b>Metacarpal</b>				
Bp	47.5	66.9	55.8	10
GL	188.0	198.5	191.1	5
SD	25.8	34.2	29.6	8
Bd	50.1	64.2	55.2	16
<b>Metatarsal</b>				
Bp	39.4	51.1	43.0	?
GL	194.0	220.0	210.8	13
SD	22.3	31.5	24.9	9
Bd	47.5	61.5	50.1	19
<b>Astragalus</b>				
GLi	56.0	66.5	64	8

Bd	36.2	44.2	38.2	9
<b>Astragalus – P 1</b>				
GLi	58.3	59.4	58.9	2
Bd	37.7	43.2	40.5	2
<b>Calcaneus</b>				
GL	118.8	135.4	123.9	4

#### Cattle biometrics

#### Sheep:

	<b>Approx Age of Fusion (months)</b>	<b>Unfused</b>	<b>Fused</b>	<b>% Fused</b>
<b>Scapula; radius, p; humerus, d; pelvis</b>	8-10	2	13	86.7
<b>Tibia d; metapodia d.</b>	18-28	6	10	62.5
<b>Radius, d; ulna; tibia, p; femur, p; femur, d.; humerus p; calcaneus.</b>	30-42	7	7	50.0

#### Sheep fusion ages

<b>Bone/Measurement</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>No</b>
<b>Scapula</b>				
BG	17.2	17.4	17.3	2
<b>Humerus</b>				
BP			47.4	1
Bd	25.7	28.3	26.8	3
<b>Radius</b>				
Bd	27.1	28.4	27.7	2
<b>Femur</b>				
Bd			39.7	1
<b>Tibia</b>				
Bp	31.2	39.6	35.4	2
GL			162.0	1
Bd	20.2	34.2	25.1	1
<b>Metacarpal</b>				
Bp	19.3	19.4	19.3	2
GL			111.0	1
Bd			22.0	1
<b>Metatarsal</b>				
Bp	16.5	18.2	17.3	4
GL			116.2	1
Bd	20.2	34.2	25.1	5

#### Sheep biometrics

#### Pig:

	<b>Approx Age of Fusion (months)</b>	<b>Unfused</b>	<b>Fused</b>	<b>% Fused</b>
<b>Scapula; radius, p; humerus, d; pelvis; phalanx</b>	12	8	10	56.0
<b>Tibia d; metapodia d.; calcaneum; phalanx 1; fibula d.</b>	24-30	11	2	16.7
<b>Radius, d; ulna; tibia, p; femur, p; femur, d.; humerus p</b>	36.42	16	1	5.9

#### Pig fusion ages



<b>Bone/Measurement</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>No</b>
<b>Scapula</b>				
GLP	27.9	32.2	30.6	5
LG	21.8	25.3	23.9	4
BG	22.1	23.4	22.6	5
<b>Humerus</b>				
Bd	36.4	38.6	37.4	3
<b>Radius</b>				
Bp	27.1	27.3	27.2	2
<b>Pelvis</b>				
LA			28.3	1
SH			34.3	1
<b>Ulna</b>				
BPC	16.8	21.6	17.6	3
SDO	21.2	29.8	25.9	3
<b>Astragalus</b>				
GLi			38.8	1

### Pig biometrics

### Horse

<b>Bone/Measurement</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>No</b>
<b>Scapula</b>				
GLP			87.4	1
LG			53.8	1
BG			38.3	1
<b>Humerus</b>				
BP			82.1	1
GL			279.0	1
<b>Radius</b>				
Bp	75.1	80.7	77.5	4
BFP	68.6	73.2	71.1	4
GL			304.0	1
Bd			70.4	1
<b>Tibia</b>				
Bd	66.9	70.4	68.6	2
Dd	406.	43.2	41.9	
<b>Metacarpal</b>				
Bp	45.2	476	46.4	2
GL			215.0	1
SD	44.8	48.2	46.5	2
Bd	30.8	31.7	31.2	2
<b>Metatarsal</b>				
Bp			48.4	1
GL	252.0	259.0	255.5	2
Dd	20.7	24.6	23.3	3
Bd	44.8	49.4	47.1	2

### Horse biometrics

**Coolagh, Co. Galway**Grid Ref: **135890/227188**SMR No: **N/A**References: **Hardy 2008; Miller 2008.**

Excavation in advance of road building indicated the presence of a large early medieval cashel (53.5m x 60.2m) with an entrance to the east. The external width of the enclosing wall varies from 2.1m-2.6 m and had a surviving height of 1.1m-1.4m. There is very little evidence for internal structures although one round stone-built feature (Structure A) was recorded in the western half and may represent a roundhouse (6.75m x 6m). This structure, however, seems to have been void of any hearth, pit, post- or stakeholes. Two later limekilns (Structures B & C) were also recorded in the western half of the enclosure.

The entrance to the cashel was located on the eastern side of the site and consisted of a simple passage through the bank. It measured 3.3m x 2.3m east/west and was identifiable by the placing of two large limestone orthostats perpendicular to the kerbing placed across the bank. Two large square-cut post-holes were recorded at the entrance within the interior of the perpendicular orthostats.

Radiocarbon dates obtained from charcoal samples taken from underneath the stone circular structure, two post-holes close to the cashel entrance and from a layer beneath the large lime kiln have produced a date range from the late 7<sup>th</sup> century to early 10<sup>th</sup> century A.D.

A large curving outer annex wall was visible within the dense ash and hazel growth to the south. It survived for a length of 120 m enclosing a large sub-oval area to the south and southeast of the cashel. About half way along the annex wall two large stones were positioned perpendicular across the wall at a distance of 5m apart in much the same way as was recorded with the cashel entrance.

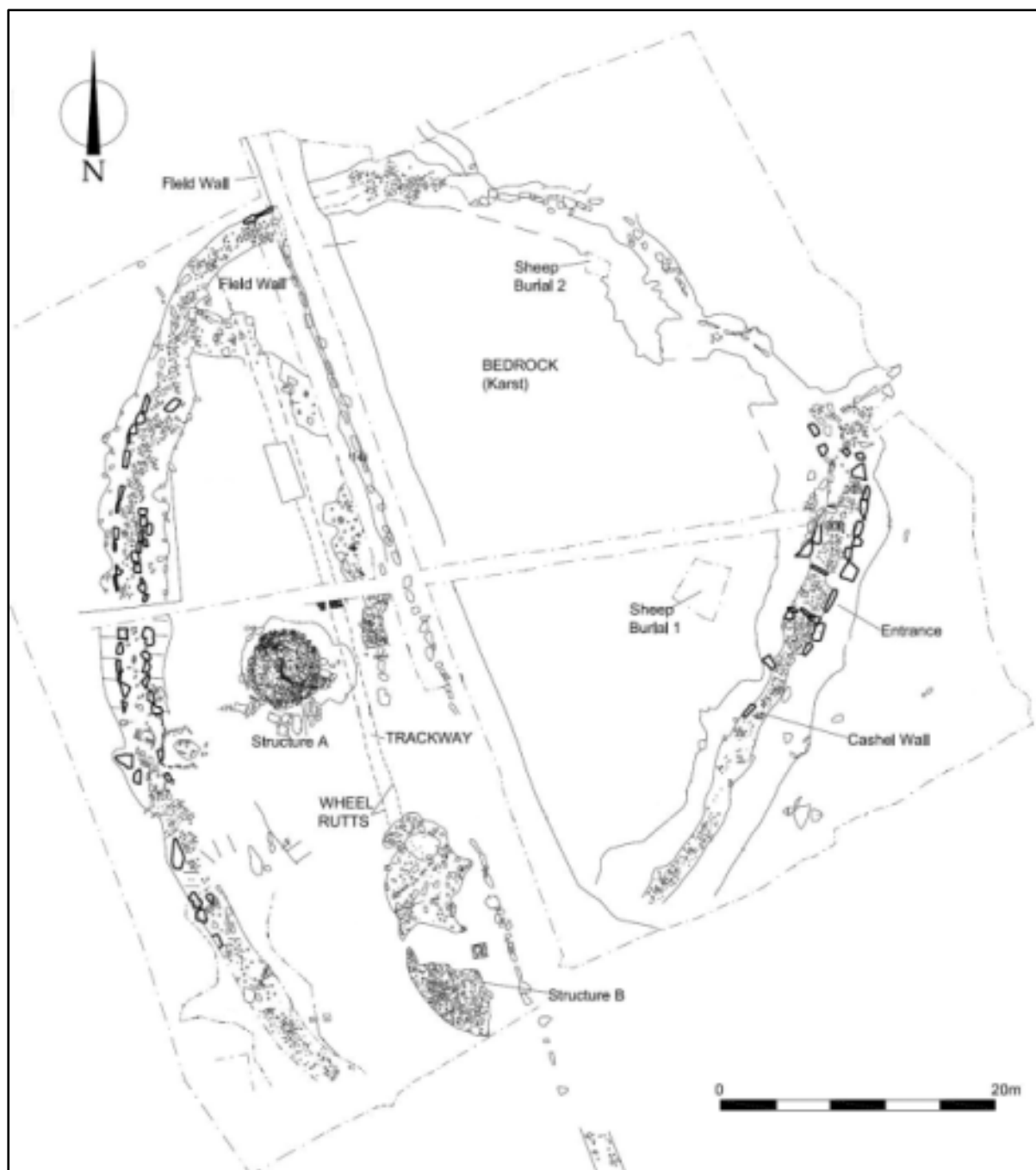
Two fragments of laminated shale bracelet were found at the cashel, as well as a number of possible pounding, polishing and rubbing stones, suggesting that bracelets may have been produced on site during the early medieval period.

**Animal Bones:**

There were 893 fragments of animal bone examined from 20 contexts recovered during excavations at Coolagh. The preservation of the assemblage was mixed and over 50% of the assemblage was unidentifiable to species. Epiphyseal fusion and toothwear data was minimal, providing limited information concerning age at death patterns in the assemblage.

Species	Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Dog	Date
NISP	285	82	43	12	3	7	8 <sup>th</sup> /9 <sup>th</sup> C?
MNI	4	3	2				

**NISP and MNI from Coolagh, Co. Galway.**



Plan of Coolagh, Co. Galway (after Hardy 2008).

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-7690	Charcoal from under Structure A C29	1322 $\pm$ 32 BP	<b>A.D. 651-725; A.D. 738-771</b>
UB-7691	Charcoal from posthole in cashel entrance C49	1231 $\pm$ 32 BP	<b>A.D. 688-754; A.D. 758-882</b>
UB-7692	Charcoal from posthole in cashel entrance C51	2744 $\pm$ 35 BP	975 B.C. – 953 B.C.; <b>945 B.C. - 814 B.C.</b>
UB-7693	Charcoal under lime kiln	1152 $\pm$ 32 BP	A.D. 779-793; <b>A.D. 801-973</b>

## Appendix:

		Cattle	Sheep/Goat	Pig
Early	Unfused	-	1	-
	Just Fused	1	-	-
	Fused	13	6	1
Later	Unfused	-	1	2
	Just Fused	-	-	-
	Fused	3	2	1
Last	Unfused	1	4	1
	Just Fused	2	-	-
	Fused	4	1	-

## Summary of epiphyseal fusion from Coolagh, Co. Galway

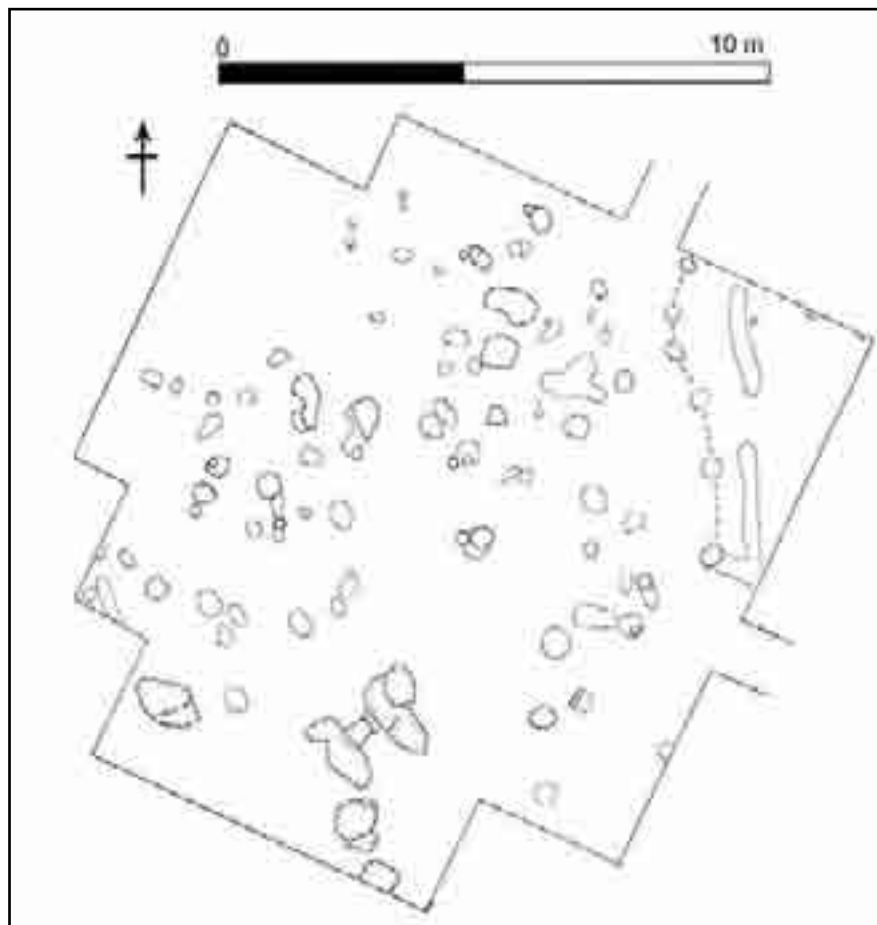
**Croom East, Co. Limerick**Grid Ref: **R505590 (15050/15900)**SMR No: **LI030-022**Reference: **Shee-Twohig 1977.**

Excavations were undertaken at a univallate rath with a diameter of 30m externally at Croom East. These revealed a possible internal structure as well as other pits, postholes and features dug into the boulder clay beneath this habitation deposit. The postholes did form any recognizable plan of a structure. An iron knife with traces of a riveted bone handle was recovered from a pit in the northwest quadrant of the site; and a plano-convex side-plate from a bone comb decorated with dot-and-circle motifs was found in the same area. A bronze penannular ring and a fragment of iron slag or possible furnace bottom were also found on site.

**Animal Bone:**

A quantity of animal bone (99 fragments) was recovered from the enclosing ditch and central area. Estimated withers heights from the skeletal remains of a horse and a dog gave values of 120-128cm and 56.8cm respectively. A cattle humerus fragment was from a very juvenile animal; and a pig scapula was identified from a foetus or new-born piglet.

	Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Date
<b>NISP</b>	32	13	5	2	45	2	<b>?</b>
<b>% NISP</b>	32	13	5	2	45	2	
<b>MNI</b>	3	2	2	1	1	1	
<b>% MMI</b>	30	20	20	10	10	10	

**NISP and MNI from Croom East, Co. Limerick****Plan of structure at Croom East, Co. Limerick**

**Animal Bone Appendix:**

<b>Cattle</b>		
Radius	Proximal Width	68.7
	Proximal depth	32.9
Metatarsal	Distal Width	49.8
	Distal depth	27.9
Phalanx 1	Total Length	60.0
		61.2
	Proximal Width	29.9
	Distal Width	25.3
		24.7
<b>Sheep/Goat</b>		
Femur	Proximal Width	44.9
	Proximal Depth	23.2
<b>Horse</b>		
Radius	Distal Width	75.0
	Distal Depth	43.5
Metatarsal	Total Length	230-240
	Proximal width	47.4
	Proximal Depth	45.6
	Withers Height	120-128 cm

**Biometrics by species**

## Cross, Co. Galway

Grid Ref: **164775/225449**

SMR No: **N/A**

References: **Mullins 2009; Bermingham 2009**

Excavations in advance of roadworks revealed a prehistoric cemetery which was re-used during the early medieval period. The main archaeological feature from the early medieval period is a sub-circular ring-ditch approximately 14.5m in diameter. This ring-ditch truncated earlier burials, and would appear to have been constructed in association with Burial 4, located in the centre of the enclosed area, which dates *c.* A.D. 400-559. An incomplete human skeleton (Burial 6) overlay the secondary fill of the ring-ditch, suggesting that it had at least partially silted-up by the sixth century.

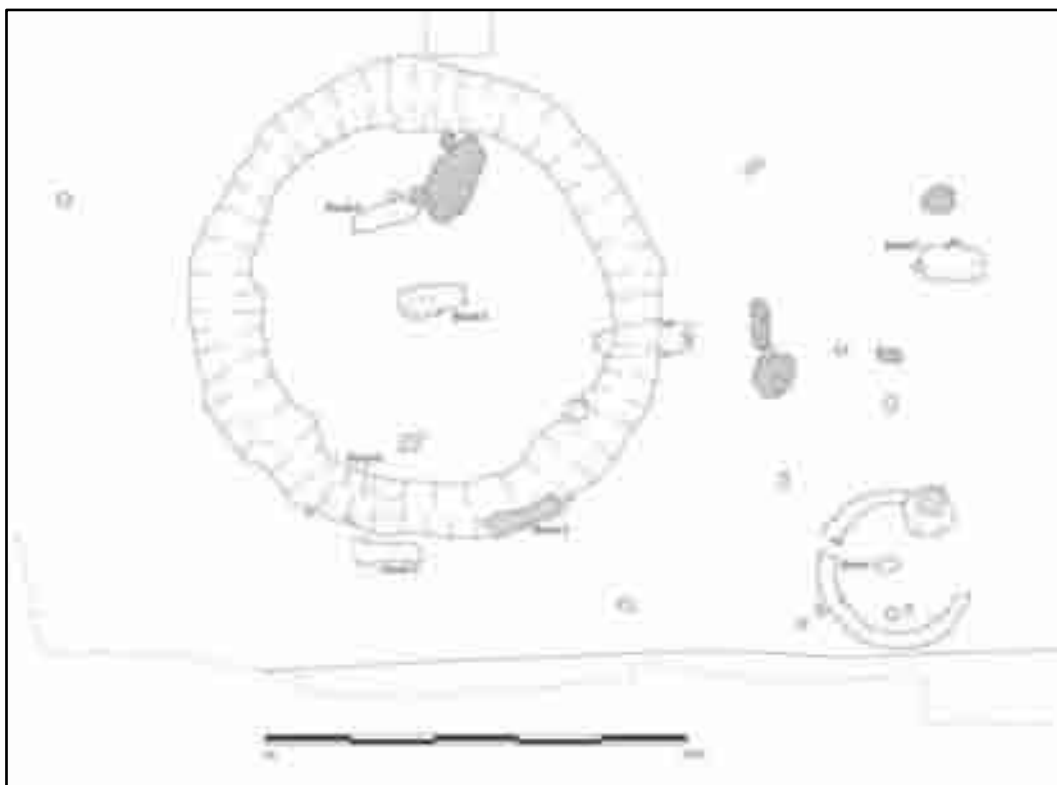
A smaller ring-ditch, measuring approximately 4.8m in diameter, was located to the southeast of the large ring-ditch. This ditch also appears to have been early medieval in date, based on its relationship to the central burial, Burial 1, which has been radiocarbon dated to A.D. 439-648. A yellow glass bead recovered from the fill also suggests that this ditch was exposed during the early medieval period.

### Animal Bone:

The total fragment count for Cross was 2025, comprising 110 identifiable and 1915 unidentifiable fragments. Based on a simple fragment count, the majority of the assemblage (95%) appears to be unidentifiable. Animal bone recovered from the large ring-ditch amounted to 207 fragments of unburnt bone representing cattle, horse, pig and sheep/goat. Teeth were the best-preserved skeletal elements with horse and pig represented by teeth alone. Animal bone retrieved from the small ditch fills yielded a small number of cattle, sheep/goat and pig bones.

Species	Cattle	Sheep/ Goat	Pig	Horse	Dog	Unident	Date
NISP	37	20	8	5	1	1044	5 <sup>th</sup> /6 <sup>th</sup> C.

### Species/element representation from the ring ditches, inhumations & the pit



**Early medieval burials at Cross ring-ditch, Co. Galway (after Mullins 2009)**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
Wk21248	Human bone from Burial 1	1489 $\pm$ 38 BP	A.D. 439-486; <b>A.D. 532-647</b>
Wk21253	Human bone from Burial 2	1538 $\pm$ 39 BP	<b>A.D. 427-601</b>
Wk21250	Human bone from Burial 3	1581 $\pm$ 38 BP	<b>A.D. 405-563</b>
Wk21249	Human bone from Burial 4	1587 $\pm$ 38 BP	<b>A.D. 400-559</b>
Wk21254	Human bone from Burial 5	1604 $\pm$ 38 BP	A.D. 359-361; <b>A.D. 382-552</b>
Wk21251	Human bone from Burial 6	1628 $\pm$ 39 BP	<b>A.D. 338-539</b>
Wk21252	Human bone from Burial 7	1674 $\pm$ 38 BP	<b>A.D. 253-434;</b> A.D. 493-506; A.D. 521-526
Beta-241006	Burnt human bone from F137	2080 $\pm$ 40 BP	<b>200 B.C. – A.D. 3</b>
Beta-241088	Burnt human bone from F186	2990 $\pm$ 40 BP	1385 B.C. -1332 B.C.; <b>1325 B.C. – 1113 B.C.;</b> 1099 B.C. -1088 B.C.; 1062 B.C. -1060 B.C.



**Curtaun 1, Co. Galway**Grid Ref: **142125/195440**SMR No: **GA128-043**References: **Delaney 2010; Geber 2010.**

Excavations were undertaken adjacent to a bivallate rath in advance of roadworks. The early medieval / medieval features on this site consisted of three kilns, associated slot trenches, postholes and stakeholes.

Kiln 1 was the earliest of three kilns found on the site and had a keyhole shape in plan. A date of A.D. 674-870 was produced from charcoal in the use layers of the kiln chamber. The structure was backfilled with material containing cattle bones and bones from sheep/goats. Kiln 2 was also keyhole shaped and was dated to A.D. 779-947. As with Kiln 1, the backfill of Kiln 2 include bones from domesticates. The third kiln was in use during the high medieval period, and produced a radiocarbon date of A.D. 1218-1270. It appears to have been reused as a fox holt or den. Four curvilinear slot trenches located to the west of the kilns were likely to have supported the walls of a roofed superstructure covering the drying chamber.

**Animal Bones:**

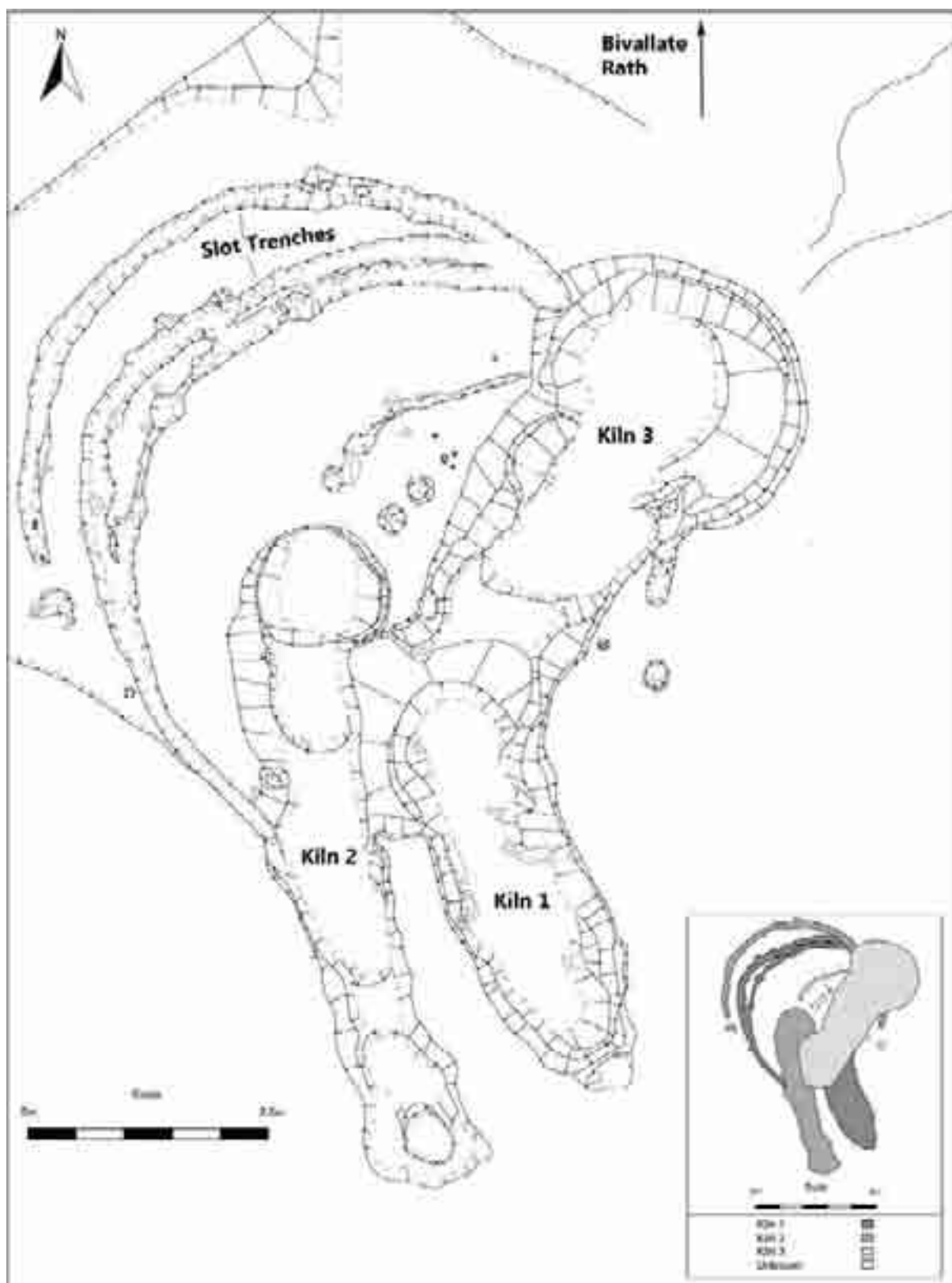
A total of 418 animal bones were recovered from the kilns, of which less than 30 could be identified to the four major domesticates. Many of the bones appear to be natural in origin and were likely introduced at a time when Kiln 3 was used as a fox den.

Species	Cattle	Sheep/ Goat	Pig	Horse	Date
NISP	10	16	2	1	8 <sup>th</sup> /9 <sup>th</sup> C?

**NISP from Curtaun 1, Co. Galway****Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UBA-12710	Charcoal from Kiln 1	1252 $\pm$ 37 BP	<b>A.D. 674-870</b>
UBA-12711	Charcoal from slot trench at Kiln 1	1211 $\pm$ 24 BP	A.D. 717-743; <b>A.D. 768-888</b>
UBA-12712	Barley from Kiln 2	1165 $\pm$ 18 BP	A.D. 779-794; <b>A.D. 800-899;</b> <b>A.D. 919-947</b>
UBA-12709	Hazel from Kiln 3	790 $\pm$ 20 BP	<b>A.D. 1218-1270</b>



# **Animal Bones Appendix:**

Species	Sample	Element	Side	Bp	SD	GLI	BPC	DPA	SDO	GB	Bd
Bos	136	Tibia	R	71.65							
Bos	141	Ulna	L				37.6	56.21	49.73		
O/C	23	Astrag.	R								15.4 3
O/C	42	Astrag.	R			22.43					13.5 2
O/C	73	Coxae	L								
O/C	75	Calc.	R							19.30	
O/C	132	Tibia	L		14.14						

**Biometrics for cattle and sheep/goats from Curtaun 1, Co. Galway**

## **Cush, Co. Limerick**

Grid Ref: **R69802580 (169800/125800)**

SMR No: **LI048-034---**

Reference: **Ó Riordáin 1939-40; Stelfox 1939-40.**

An early medieval landscape containing a large number of settlement enclosures, with internal occupation evidence, structures and souterrains, together with a complex pattern of rectangular field systems was excavated at Cush. Considerable evidence for Bronze Age burial activity was also uncovered and comprised five cremation urn burials within the northwest sector of Cush 5 in the southern group, Tumulus I (to the south of Cush 7), and a small cist burial with two food vessels. Ó Riordáin claimed that the burials inside Enclosure 5 were later than the occupation of the enclosure though this has since been debunked by reinterpretation of the stratigraphy.

The southern group of early medieval enclosures cover three acres and consist of a six conjoined sites (1-6) associated with a sub-rectangular area, 'the enclosure', delimited by a ditch and bank to the west. Cush 1 consists of a counterscarp enclosure on the northwest side of the southern group with a diameter of 39.6m externally. No definite plan of any structure was identified in the interior, though a group of postholes in the southeast had a roughly semi-circular outline. Three hearths were uncovered - two associated with the northwest cluster of postholes, and one with the southeast - and a silted-up stone-lined souterrain was found in the southwest of the enclosure.

Cush 2 is another counterscarp enclosure which contained the remains of a small timber and clay house defined by two postholes and an irregular setting of stones. A stone-lined hearth was located in the centre of the site and was associated with a small number of burnt bones, and many postholes (presumably representing a structure or a sequence of structures, the form of which could not be identified). Two shallow storage pits and a souterrain were also uncovered in the centre of the interior.

Cush 3 consists of a bivallate enclosure. Several postholes were identified in the southern and south-eastern side of the interior and appear to have formed rectangular houses - the best defined having dimensions of 4.9m by 3.7m. A silted-up stone-lined C-shaped souterrain was discovered in the northern half of the interior, and a possible timber structure associated with the souterrain entrance was indicated by a series of postholes.

Cush 4 consists of a univallate enclosure with a hearth in the centre of the interior, and a series of flat stones forming the base of a wall of a possible structure in the north of the interior. A large stone-lined souterrain was uncovered south of the hearth and the approach to its opening was defined by a series of postholes. Several postholes were uncovered between the hearth and the souterrain, but no complete building plan could be identified.

Cush 5 consists of a bivallate enclosure. Successive phases of occupation were uncovered in the interior. The earliest house appears to have been a dry-stone-walled circular house. There were also traces of wooden-framed houses - one circular and one rectangular - and portions of paving were identified across the site possibly contemporary with one of these wooden houses. A souterrain-type structure comprising two long compartments connected by a narrow passage was uncovered in the northeast of the enclosure.

Cush 6 was formed by the area bounded within the outer banks-and-ditches of Cush 4 and 5, can contained the burnt remains of a rectangular wattle-and-daub building (6.7m by 4.3m).

The site of the rectangular 'enclosure' has its own bank-and-ditch on three sides, with the fourth side formed by enclosures 1-6. A line of twelve postholes identified inside the bank appear to have formed part of a structure, built possibly to strengthen the bank at this point. A possible stone-and-timber roundhouse was partly covered by the collapse of the banks of the 'enclosure'; and a rectangular house (7m x 3m) of stone-and-turf construction was excavated in the southern interior of the 'enclosure'. A further three structures were excavated in the 'enclosure'. One rectangular structure (5.5m x 4.3m) was constructed in part directly over the stone-and-turf house; another consisted of a

post-built rectangular sunken structure with an irregular partition running through its centre; and the final house was identified by bands of charcoal which formed no definite plan.

One further house was uncovered in the area of the 'western field' adjacent to the 'enclosure'. It was similarly built to the stone-and-timber roundhouse and comprised a roughly circular structure (4m diameter) with stone-and-organic walls and a compact internal clay floor. Associated with this building were numerous small postholes to its west which may represent the remains of other successive houses on the site.

The earthworks of the northern group consisted of four enclosures (7-10) within a modern field of over three acres with a further unexcavated site (11) situated in the next field. The enclosures of the northern group were connected with each other through a bank between Cush 7 and Cush 8, and a section of arcing bank and ditch between Cush 8 and Cush 10.

Cush 7 consists of a bivallate enclosure (43m overall diameter) with partial traces of occupation deposits, substantially destroyed by later agriculture. Cush 8 consists of the partial surviving remains of a trivallate enclosure. Two stone-lined souterrains were located at the south and north end of the enclosure, one of which had a timber-built entrance defined by four postholes. Three structures were identified in the interior - one defined by a roughly rectangular group of postholes with an associated hearth; one defined by an irregular group of postholes; and the remains of a circular wattle-built structure defined by arcs of stakeholes.

Cush 9 consists of a small section of bank and ditch in the form of an arc extending between Cush 8 and Cush 10. Except for a few postholes, there were no structural remains associated with the site. Cush 10 consists of a trivallate enclosure. A series of wall-trenches within the interior outlined a number of rectilinear features, and a curved wall-trench excavated at the end a souterrain appears to have formed part of a protecting structure.

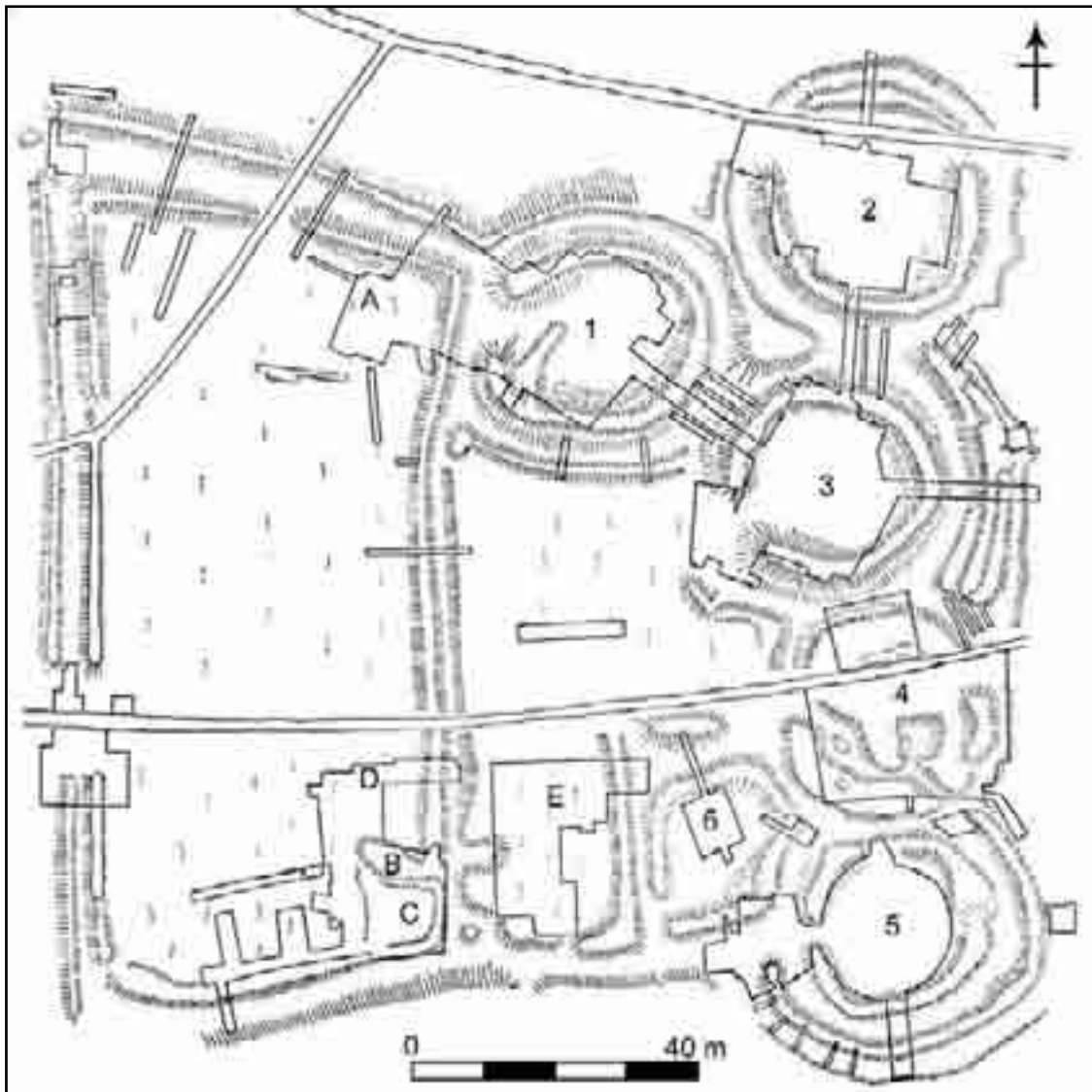
General finds from the site included around thirty fragments of jet bracelets, four iron knives, iron nails and over fifty whet-stones. Three possible rubbers of saddle querns and a considerable quantity of rotary querns fragments - Cush10 (26), Cush 1 (12), Cush 5 (9), Cush 3 and Cush 4 (7 each), House B (6), Cush 9 (3) and Cush 6 (3) were also recovered. Sixteen pounds of iron slag was also recovered mainly from Cush 4, Cush 6 and Cush 7 with some pieces also found on Cush 3 and Cush 10.

#### **Animal Bones:**

The acidity of the soil accounted for the lack of animal bones from the various enclosures, and those recovered were largely fragmentary.

<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Dog</b>	<b>Hare</b>	<b>Corncrake</b>
30+	5	3	1	1	1	1

**Number of fragments from Cush, Co. Limerick**



**Southern Group of Enclosures at Cush, Co. Limerick (after Ó Ríordáin 1939–1940, plate XIV). Numbers indicate enclosures; Letters indicate houses.**

**Deer Park Farms, Co. Antrim**Grid Ref: **D28660878 (32866/40878)**SMR No: **ANT 034:005**Reference: **Lynn & McDowell 2011; McCormick & Murray 2011.**

The site consisted of a raised mound (25m in diameter on top, and 6m high), set on a north-facing slope. The site was completely excavated as it was to be removed under a farm improvement scheme. Excavation revealed eleven phases of occupation, and the presence of at least 46 contemporaneous and consecutive structures between 5.0m and 8.0m in diameter.

Although there was some evidence for prehistoric occupation (Phase I), the first early medieval occupation phase (Phase II) was represented by a 'ring-ditch', enclosing an area 22.5m x 25m. Two pairs of postholes (one on the line of the outer edge of the ditch and the other pair just inside the inner edge) have been interpreted as representing a gateway into the site. If this interpretation is correct, it would presuppose the presence of an upstanding feature (either an earthen bank or a wooden fence) which would have been associated with the circuit of the ditch. No such feature was identified during excavation. This phase is dated *c.* A.D. 660-750. The ring-ditch appears to have been in-filled prior to the construction of House Omega, and ironworking slag and a furnace bottom were found in this in-fill. A radiocarbon date derived from this material (see below) overlaps with date ranges derived from structures within the enclosure, suggesting the possibility that some of these structures may have been contemporary with the ring-ditch.

The earlier ring-ditch was replaced by a banked-and-ditched enclosure, of which only the bank remains (the ditch presumably having been destroyed by the subsequent creation of the mounded enclosure). The bank enclosed a slightly larger area than the ring-ditch (26m in diameter), and had a stone-revetted inner face. The entranceway to this enclosure had an up-hill lie, and seems to have followed that of the ring-ditch. This was presumably not an issue at the time, as water could have drained away into the ditch, but in later phases this resulted in the lower occupation layers becoming water-logged. A number of house structures, related to this enclosure, suggest that there were various phases of construction and abandonment during this phase of occupation (Phases III-VIb). The earlier houses are circular in plan, and are indicated by series of stakeholes, representing the uprights of wicker-walled structures. At least one of these buildings has evidence for internal subdivisions. Roundhouses continued to be built within the enclosure, but there are also examples of 'figure-of-eight' houses, built in a similar fashion. Some of these also show further internal divisions, and, in the better preserved houses, the water-logged conditions allowed possible bedding areas to be identified by the build-up of organic material. Excavations also revealed that the timber door jambs and lintels were regularly recycled and re-used on new structures.

The interior of the enclosure appears to have been raised in stages, with part of the enclosure still being occupied while the remainder was heightened by 1m (Phases VII-IX). This entailed the deliberate burial of earlier structures, and the construction of new buildings on this raised area. By the time the entire enclosure was raised, it stood 2m above the old ground surface, and was surrounded by a wide, deep, stone-revetted ditch. The subsequent occupation area on top of the stone-revetted mound was slightly smaller than that of the earlier enclosure (20m x 22m). The earliest houses built on the mound appear to have been 'figure-of-eight' shaped, but roundhouses were also present during this phase. Some of these structures appear to have incorporated stone into their construction, and one of the last houses built during this phase would appear to be stone-built and rectangular.

The mound was subsequently raised again by at least 1.5m ('Souterrain Period'). An entranceway was identified, but no trace of a surrounding fence, bank or wall was detected. Two dry-stone-walled souterrains were constructed into the built-up mound, and, although no other structures survived from this period, it is presumably the case that these souterrains were associated with houses.

The waterlogged conditions of the site meant that quantities of organic material survived, including shoe leather, animal and human hair, and wicker walls. These conditions were also conducive to the

survival of insect material, including animal and human lice; as well as plant material, including fragments of woad pods, and flax fibres.

A large number of glass objects were found on site including 85 glass beads, two fragments of glass bracelets, three amber beads, and an inlaid glass stud. A glass-topped iron pin was also found on site. Crucible and tuyère fragments suggest that glass-working may have been undertaken on site. There was evidence for iron working and iron tools were identified (knives, billhooks and shears). Other finds included three amber beads; a bronze brooch; a millstone and two wooden paddles; fragments of wooden vessels, and quantities of souterrain ware.

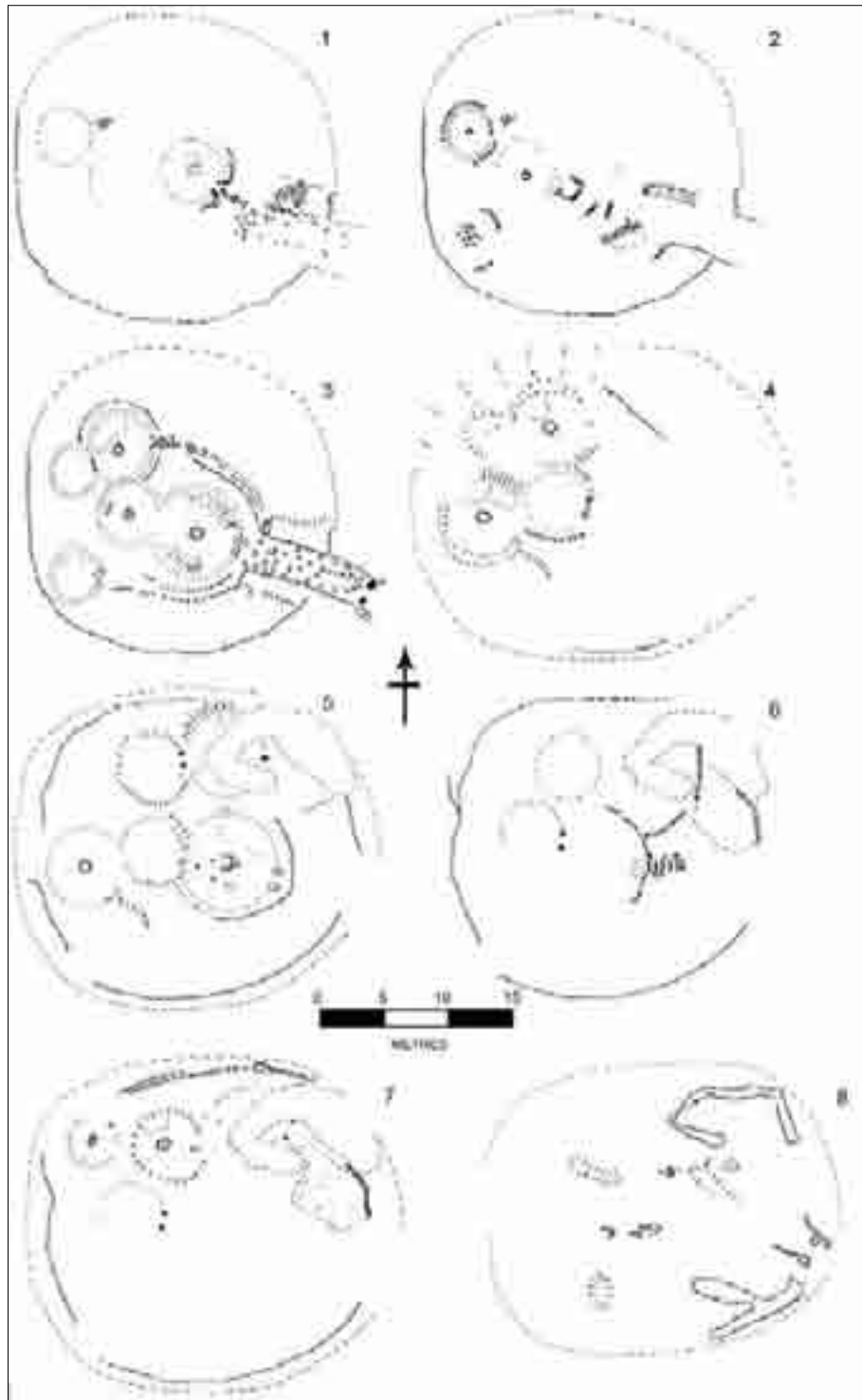
### **Animal Bones:**

The majority of the faunal material is from the waterlogged horizons of the site (Phases I-V) which date from the mid-seventh century to the mid-eighth century A.D. These phases belong to the original rath phase and predate the heightening of the site to create a raised rath. The acidic soil conditions elsewhere on site means that there were few bones found on the non-waterlogged levels.

Phase		Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Hare	Fox	Date
I-V									A.D. 660-760
	NISP	1807	318	1047	61	28	2	1	
	Agg. MNI	55	23	41	6	4	1	1	
	%	42	17.5	31.3	4.6	3	<1	<1	
	Act. MNI	42	18	31	3	2	1	1	
	%	42.9	18.4	31.6	3.1	2	1	1	
VI									A.D. 700-780
	NISP	478	91	284	21	12	1	-	
	Agg. MNI	5	4	3	2	1	-	-	
	%	33.3	26.7	20	13.3	6.7	-	-	
	Act. MNI	5	3	3	1	1	-	-	
	%	38.4	23.1	23.1	7.7	7.7	-	-	

**NISP and Aggregate and Actual MNI from Deer Park Farms, Co. Antrim.**





**Plans of phases from Deer Park Farms, Co. Antrim. 1-3 from univallate phase; 4-7 from raised phase; 8 is associated with the souterrain construction (after McDowell 2004, [1] 38; [2] 41; [3] 43; [4] 50; [5] 50; [6] 53; [7] 57; [8] 60)**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Phase	Context	<sup>14</sup> C Date	Cal. 2 σ
UB-3064	Phase III	Wall stakes of house Iota	1295±16 BP	<b>A.D. 666-723;</b> <b>A.D. 739-770.</b>
UB-3065		Soil & Charcoal	1229±14 BP	<b>A.D. 709-746;</b> <b>A.D. 766-875.</b>
UB-3066		Sample 749	1302±15 BP	<b>A.D. 664-718;</b> <b>A.D. 742-769.</b>
UB-3081	Phase V	Wicker from wall of Theta	1311±18 BP	<b>A.D. 659-716;</b> <b>A.D. 744-768.</b>
UB-3082	Phase VIb	Wicker from wall of Eta	1291±17 BP	<b>A.D. 668-725;</b> <b>A.D. 738-771.</b>
UB-3083	Phase VIa	Wicker from wall of Zeta	1280±17 BP	<b>A.D. 675-730;</b> <b>A.D. 735-772.</b>
UB-3084	Phase IV	Wicker from wall of Kappa	1312±20 BP	<b>A.D. 658-718;</b> <b>A.D. 742-769.</b>
UB-3093		Wooden threshold of O2	1269±16 BP	<b>A.D. 683-774.</b>
UB-3199	Phase VII-IX	Withies from structure H	1181±14 BP	A.D. 779-794; <b>A.D. 800-891.</b>
UB-3200		Wicker from wall of D	1258±14 BP	<b>A.D. 687-776.</b>
UB-3201	Phase VII-IX	Wicker from wall of Z	1171±14 BP	A.D. 779-793; <b>A.D. 801-895;</b> A.D. 925-937.
UB-3217		Cut-off river channel	1408±43 BP	<b>A.D. 563-676.</b>
UB-4192		Ring ditch	1258±22 BP	<b>A.D. 673-782;</b> A.D. 789-811; A.D. 848-852.
UB-4193		Charred twigs-context 685	1142±34 BP	A.D. 780-791; <b>A.D. 805-982.</b>
UB-4194		Charred twigs-context 7936	1313±38 BP	<b>A.D. 652-774.</b>
UB-4195		Charcoal- context 5d	1219±25 BP	A.D. 695-699; <b>A.D. 708-747;</b> <b>A.D. 765-886.</b>
UB-4196		Charred twigs-context 182	1189±31 BP	A.D. 719-742; <b>A.D. 769-898;</b> A.D. 920-947.
UB-4197		Charred twigs-context 9	1273±24 BP	<b>A.D. 670-777.</b>
UB-4953		Outer rings of oak	925±39 BP	<b>A.D. 1024-1188;</b> A.D. 1198-1206.

### Animal Bones Appendix:

Higham Stage	Approx. age (months)	No.	%
4/5	5-7	7	13.2
6	7-9	1	1.9
8	15-18	3	5.7
9	16-17	6	11.3
10	17-18	1	1.9
11	18-24	3	5.7
12	24	4	7.5
13	24-30	6	11.3
14	30-	2	3.8
16	31-32	3	5.7
17	32-33	1	1.9
20+	40+	16	30.2

### Cattle age/slaughter pattern

Element	Approx. age of fusion (months)	Fused	Unfused
Pelvis	7-10	15	9
Humerus, d; Radius, p	10-18	33	24
Tibia, d; Metacarpal, d; Metatarsal, d	24-36	16	10
Femur p; Calcaneus, p	36-42	10	17
Humerus, p; Radius, d; Ulna, p; Femur d; Tibia, p	42-48	14	32

### Epiphyseal fusion of cattle bones from Phase IV.

Element		No.	Min.	Max.	Mean	StD.
Scapula						
	GLP	13	56.3	70.0	62.6	4.17
	SLC	12	42.8	53.9	48.3	4.24
Humerus						
	Bt	13	60.5	73.2	67.2	4.70
Radius						
	GL	2	243.1	255.9	249.5	-
	Bp	14	65.5	81.9	71.7	3.86
Metacarpal						
	GL	1	-	-	172.6	-
	Bp	12	41.9	55.4	50.1	3.42
	Bd	5	48.5	57.1	52.4	3.09
	SD	1	-	-	26.9	-
Tibia						
	GL	2	309.1	318.1	210.0	-
	Bp	7	75.1	85.9	79.7	4.39
	Bd	20	48.5	60.8	54.1	2.81
	SD	2	30.1	32.9	31.5	-
Calcaneus						
	GL	2	117.6	118.7	118.2	-
Metatarsal						
	GL	2	202.9	203.2	203.1	-
	Bp	6	40.1	45.2	41.8	2.05
	Bd	5	46.6	56.5	49.0	4.22
	SD	2	22.1	23.7	22.9	-

### Cattle bone measurements

Element	GL (mm)	Multiplication Factor	Estimated withers height (cm)
Radius	243.1	4.30	104.5
	255.9	4.30	110.0
Metacarpal	172.6	6.00	103.6
Tibia	301.9	3.45	104.2
	318.1	3.45	109.7
Metatarsal	202.9	5.45	110.6
	203.2	5.45	110.7

**Estimated cattle withers height from Deer Park Farms**

#### **Sheep/Goat:**

Higham Stage	Eruption	Approx. age (months)	Phases IV-V	Phase VI
10	M2	10-11	2	-
12	M2	12-21	3	-
13	M3	21-24	6	1
14	M3	25-26	2	-
16+	M3	28+	6	2

**Sheep/Goat age distribution based on tooth eruption and wear.**

Element	Approx. age of fusion (months)	Phases IV-V	Phase VI
Metatarsal, d	Pre-natal	-	1
Pelvis; Humerus, d; Radius, p	10	10	-
Tibia, d; Metacarpal, d	18-24	4	3
Femur, p; Calcaneus, p	30-36	1	4
Radius, p; Ulna, p	36	5	-
Humerus, p; Femur, d; Tibia, p	36-42	3	3

**Epiphyseal fusion of sheep/goat bones.**

#### **Pig:**

Higham Stage	Approx. age (months)	No.	%
5	2-4	1	1.4
6	4-5	1	1.4
12	10-11	2	2.8
14-17	12-17	6	8.4
18	17-19	15	21.1
19	19-21	10	14.1
20	21-23	19	26.8
21	23-25	7	9.9
22	25-27	5	7.0
23	27-29	3	4.2
24+	30+	2	2.8

**Pig age/slaughter pattern**

Element		No.	Min.	Max.	Mean	StD.
Scapula						
	GLP	4	32.3	37.3	34.2	2.21
	SLC	4	21.8	24.8	23.1	1.25
Humerus						
	Bd	2	35.0	37.9	36.5	-
	Bt	3	26.1	27.1	26.7	0.53
Radius						
	Bp	3	35.6	28.2	26.6	1.38
Metacarpal III						
	GL	1	-	-	70.0	-
Metacarpal IV						
	GL	2	69.7	73.9	71.8	-
Pelvis						
	LAR	9	27.3	30.9	28.8	1.12
Tibia						
	Bd	9	25.3	30.3	27.6	1.62
Calcaneus						
	GL	1	-	-	-	-
Astragalus						
	GLI	8	36.1	40.1	38.5	1.63
	Bd	8	21.0	24.3	22.9	1.03
Metatarsal III						
	GL	1	-	-	72.1	-

#### Pig bone measurements

Element	Approx. age of fusion (years)	Fused	Unfused
Humerus, d; Radius, p; Pelvis	1	14	9
Tibia, d; Metacarpal, d	2	10	8
Metatarsal, d	2 ¼	1	7
Humerus, p; Radius, d; Ulna, p; Femur, p & d; Tibia, p	3 ½	-	23

#### Epiphyseal fusion of pig bones from Phase IV.

#### Horse:

Element	GLI	Bp	Bd	SD	E.W.H. (cm)
Metacarpal	206.1	50.1	46.2	30.0	132.1
	207.1	50.6	46.2	30.8	132.8
Metatarsal	249.5	51.5	46.1	29.7	133.0
	249.7	51.8	45.2	30.9	133.1

#### Horse bone measurements and estimated withers height.

**Donacarney Great, Co. Meath**Grid Ref: **31395/27445**SMR No: **N/A**References: **Rathbone & O'Reilly 2008; Tourunen 2007.**

Excavations in advance of a housing development uncovered a number of archaeological features, including eight refuse pits, four 'pits', three possible cereal-drying kilns and a shallow curvilinear feature. A radiocarbon sample from a cattle phalanx found in one of the refuse pits produced an Iron Age/early medieval date; and the types of cereal found within the kilns also suggest an early medieval date.

**Animal Bones:**

A total of 1715 animal bones were recovered from the refuse pits on site. The bones appear to be larger than the average early medieval size, perhaps implying that they were from a later date, or may represent the selection of larger animals for slaughter at this site.

Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	LM	MM	Unident	Date
425	54	27	31	1	2	274	33	867	

**NISP from Donacarney Great, Co. Meath**

**Plan of excavated features at Donacarney Great, Co. Meath (after Rathbone & O'Reilly 2008)**

**Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
SUERC-16816	Cattle bone from pit	1650 $\pm$ 35 BP	A.D. 261-281; <b>A.D. 325-467;</b> A.D. 480-533

## Animal Bones Appendix:

### Cattle:

	GL/GLi	SD/GLm	Dd	Bp	Bd	BT
Calcaneus	121					
	125					
Humerus						86.9
						69.3
						72.6
						80.2
						66.9
MC	201	26.4	23.7	52.8	53.0	
	185	28.3	20.6	52.6	53.7	
MT					59.3	
				44.3	51.9	
					47.8	
Radius	275					
Talus	63.1					
	67.1	61.7			45.6	
	62.1	57.7			40.9	
	61.5					
	59.4	56.2			39.4	
Tibia					57.9	
					63.1	
					56.4	
					55.6	
					54.6	
					63.2	
					59.2	
					61.2	

### Cattle biometrics from Donacarney Great, Bettystown, Co. Meath.

pd4	PM4	M1	M2	M3	Age Class
h	-	E	-	-	J
-	-	-	f	b	A2
l	-	-	-	-	-
-	-	-	-	g	A3
j	-	-	-	-	-
j	-	g	b	-	SA
l	-	-	-	-	-
-	-	-	f	b	A2
-	-	h	f	-	
-	f	l	j	g	A3
-	-	-	k	g	A3
-	-	g	a	-	SA
-	d	k	k	j	E
h	-	d	-	-	-
j	-	f	V	-	l
h	-	d	-	-	-
j	-	-	-	-	-

### Cattle tooth wear from Donacarney Great, Bettystown, Co. Meath

Element	Measurement (GL)	Sex	E.W.H. (cm.)
Metacarpal	201	F	120.6
	185	F	111.0
Radius	275	-	118.3

**Estimated withers height of cattle from Donacarney Great, Bettystown, Co. Meath.**

Element	Fused	Closing	Unfused
Scapula	8	-	-
Humerus dist	10	1	1
Radius prox	8	-	-
<b>Total</b>	<b>26</b>	<b>1</b>	<b>1</b>
MC dist	2	-	1
MT dist	3	-	1
Tibia dist	9	-	2
<b>Total</b>	<b>14</b>	<b>-</b>	<b>4</b>
Humerus prox	3	1	1
Radius dist	4	-	2
Ulna prox	-	-	1
Femur prox	3	-	2
Femur dist	3	-	-
Tibia prox	2	-	1
Calcaneus	2	-	1
<b>Total</b>	<b>17</b>	<b>1</b>	<b>8</b>

**Epiphyseal fusion of cattle bones from Donacarney Great, Bettystown, Co. Meath**

**Sheep/Goat:**

pd4	PM4	M1	M2	M3	Age Class
h	-	f	c	-	SA
g	-	d	-	-	
-	j	k	-	-	-
-	-	-	-	g	A3
-	j	k	g	g	A3

**Sheep/Goat tooth wear from Donacarney Great, Bettystown, Co. Meath**

	GL/GLi	SD/GLm	Dd	Bp	Bd	BT
Humerus						27.8
						25.6
						24.7
						28.2

**Sheep biometrics from Donacarney Great, Bettystown, Co. Meath.**

Element	Fused	Closing	Unfused
Scapula	2	-	-
Humerus dist	4	-	-
<b>Total</b>	<b>6</b>	<b>-</b>	<b>-</b>
Humerus prox	-	-	2
Radius dist	-	-	1
Femur prox	-	-	1
<b>Total</b>	<b>-</b>	<b>-</b>	<b>4</b>

**Epiphyseal fusion of sheep/goat bones from Donacarney Great, Bettystown, Co. Meath**



**Pig:**

pd4	PM4	M1	M2	M3	Age Class
-	-	-	b	E	SA2
-	-	-	f	c	A2

**Pig tooth wear from Donacarney Great, Bettystown, Co. Meath**

Element	Fused	Closing	Unfused
Scapula	1	-	-
Humerus dist	1	-	1
Radius prox	2	-	-
<b>Total</b>	<b>4</b>	<b>-</b>	<b>1</b>
Tibia dist	2	-	-
<b>Total</b>	<b>2</b>	<b>-</b>	<b>-</b>
Ulna prox	-	-	1
<b>Total</b>	<b>-</b>	<b>-</b>	<b>1</b>

**Epiphyseal fusion of pig bones from Donacarney Great, Bettystown, Co. Meath**

**Horse:**

	GL/GLi	SD/GLm	Dd	Bp	Bd	BT
MC					47.9	

**Horse biometrics from Donacarney Great, Bettystown, Co. Meath.**

**Doonloughan, Co. Galway**Grid Ref: **L580459 (05800/24590)**SMR No: **N/A.**Reference: **Murray *et al.* in press; Hamilton-Dyer unpub'd; Murray 1999**

The sites at Doonloughan were identified while sampling midden. Two excavated trenches at Doonloughan 3 revealed an area of burning (radiocarbon dated to A.D. 662-807), and the remains of four stakes, and the possible remains of a fifth. Finds from this site consisted of a plain bronze penannular brooch, a small piece of worked antler, and an iron knife blade.

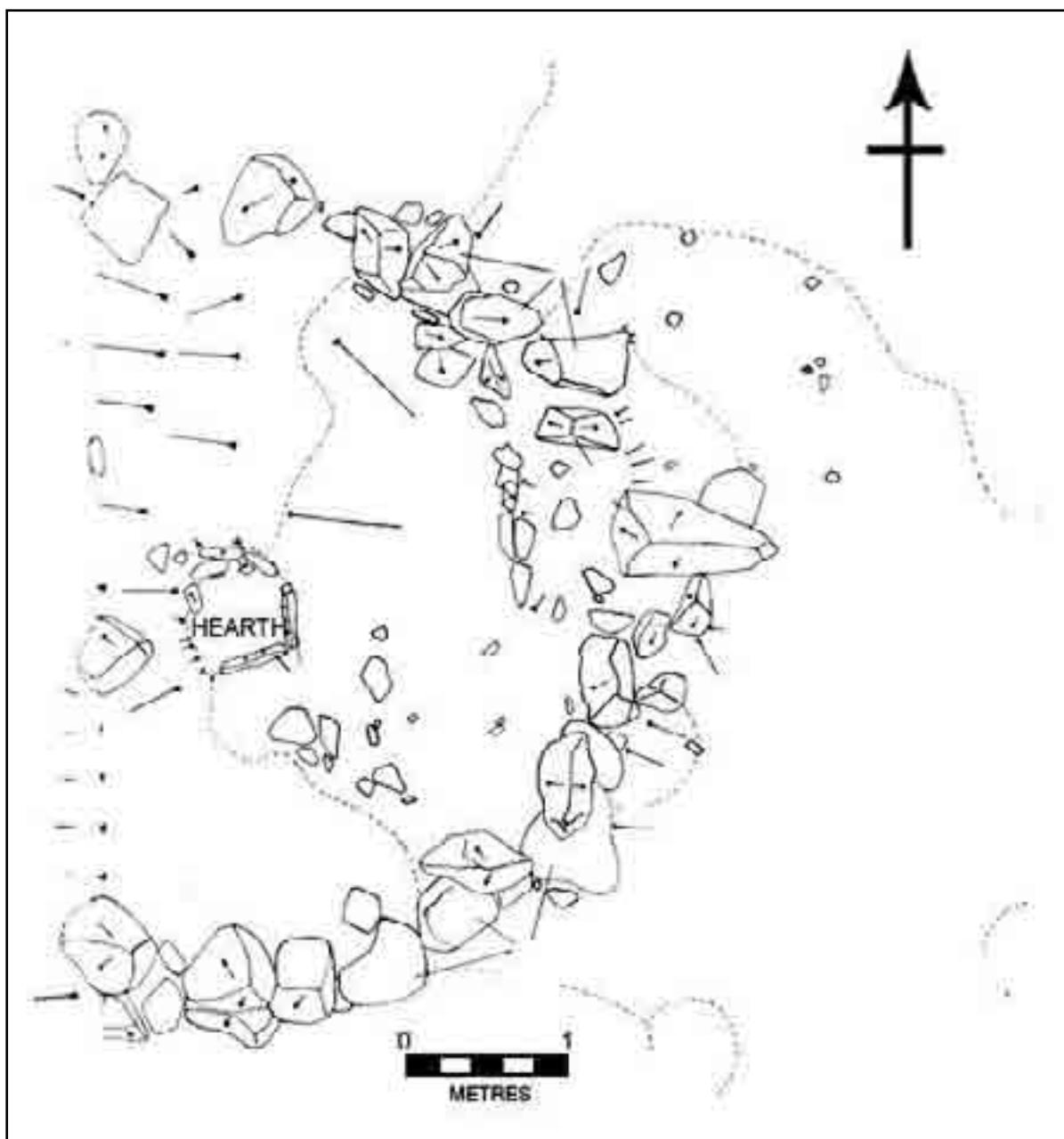
A further two trenches excavated at Doonloughan 11 uncovered the lower stone courses of a house of sub-circular shape (4.4m in diameter). It is suggested that these stones may have acted as anchors for a wicker-walled structure. Shells of dogwhelks (*Nucella lapillus*), from which purple dye may have been extracted, were found in these sites, as well as two glass beads and a flint core.

**Animal Bones:**

Given the coastal location of the site it is not surprising that a relatively large quantity of fish bones, and a small quantity of mammal bones, were recovered from the site. Despite the wide range of species at Doonloughan there is no evidence for deep-water fishing. Doonloughan 3 produced sixteen identifiable mammal bone fragments of cattle, sheep/goat and pig, along with eleven burnt fragments of red deer antler.

	<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Dog</b>	<b>Fish</b>	<b>Date</b>
NISP	48	64	1	1	1	314	A.D. 713-1040
%NISP	41.7	55.7	0.9	0.9	0.9	100	
MNI	2	2	1	1	1	-	

**Mammal NISP and MNI and Fish NISP from Doonloughan 11.**



Plan of house at Doonloughan 11, Co. Galway (after Murray *et al.* forthcoming).

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

(\* - calibrated with marine reservoir effect: KA Hughen, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, PJ Reimer, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1059-1086.)

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-3640	Burnt wicker from Square 1	1025 $\pm$ 26 BP	A.D. 904-912; <b>A.D. 971-1038.</b>
UB-4317	Charcoal from Doonloughan 3	1276 $\pm$ 30 BP	<b>A.D. 662-781</b> ; A.D. 791-807.
UB-4327	<i>Patella</i> sp. from Doonloughan 11	1600 $\pm$ 30 BP	<b>*A.D. 713-987.</b>
UB-4324	<i>Littorina littorea</i> from Doonloughan 11	1524 $\pm$ 23 BP	<b>*A.D. 794-1040.</b>
UB-4325	<i>Nucella lapillus</i>	1819 $\pm$ 30 BP	<b>*A.D. 494-752</b> ; *A.D. 758-761.
UB-4002	<i>Nucella lapillus</i>	1780 $\pm$ 35 BP	<b>*A.D. 548-801.</b>
UB-4073	<i>Nucella lapillus</i>	1756 $\pm$ 45 BP	<b>*A.D. 560-846.</b>

## **Dowdstown 2, Co. Meath**

Grid reference: **N89686254 (289684/262547)**

SMR No: **N/A**

Reference: **Cagney *et al.* 2009; Kinsella 2008; Coles 2009.**

Excavations at Dowdstown revealed a large early medieval enclosed settlement. The initial phase of construction between the mid-fifth and mid-seventh centuries consisted of a circular enclosure. This was succeeded by a complex of field enclosures and annexes dating to the eighth/ninth centuries. Two structures and a large number of cereal-drying kilns were also recorded.

The earliest feature on site was a circular enclosure (Enclosure 1) measuring 32m in internal diameter that was dated A.D. 426-600. Finds associated with this early phase included an iron knife, a bone knife handle and decorated bead, a quern stone fragment, fragments of iron objects and assorted struck flints. The enclosure ditch was re-cut twice between the mid-sixth and mid-seventh centuries. Artefacts were few and included a fragment of copper alloy, a bone pin, and a possible clay loom weight.

A rectangular multi-phase enclosure (Enclosure 2) was annexed onto the eastern side of the circular enclosure. Artefacts included a worked stone, a piece of quartz, an iron fragment and a number of flints. It is likely that this was contemporary with the circular enclosure and with Enclosures 4 and 5.

The next phase at Dowdstown 2 consisted of the amalgamation of Enclosures 1 and 2 into a larger 'D'-shaped enclosure (Enclosure 3). The initial construction of the 'D'-shaped enclosure has been dated to A.D. 680-882 and finds from the initial ditch cut included a fragment of a copper alloy strap attachment, an iron knife, a bone comb fragment and a fragment of lignite. This enclosure was re-cut between the mid-seventh and late-eighth centuries. Artefacts included a decorative ring from a tinned copper alloy pin, an iron bill hook, iron knife fragments, and fragments of iron objects. The second re-cut displayed potential evidence for a causewayed entrance to the east as this had not been located in earlier excavation.

A multi-phase rectangular enclosure (Enclosure 4), measuring 40m x 24m, was annexed onto Enclosure 2 and continued in use throughout the 'D'-shaped enclosure's (Enclosure 3) lifetime. Re-cuts of this enclosure's ditch revealed a copper alloy pin shaft and a needle. A small sub-circular enclosure (Enclosure 5) – 18m in diameter – was located to the east of the above enclosures and enclosed a hearth and a kiln. The ditch fill included small quantities of charred cereal and animal bone.

A large multi-phase rectangular enclosure (Enclosure 6) was located to the north of these enclosures. The ditch was dug in the seventh century and very few finds were associated with this phase. These included an iron knife and a copper alloy loop-headed pin shaft. This large enclosure may have functioned as a floodplain-enriched meadow for cattle during the summer.

Two poorly preserved structures were identified at Dowdstown 2. The first, (Structure A), was a possibly square, or rectangular, post-built structure and survived to a maximum length of 10m. It was cut by Enclosure 2 and, therefore, predated it. Charred barley grain from one of its postholes was dated to A.D. 553-658 indicating that it was contemporary with Enclosure 1. The structure may have served as a barn or grain store because charred grain was recovered from a number of associated deposits. A collection of 11 postholes clustered together internally within Enclosure 1 suggest the second structure, but the floor plan was not discernable. One posthole was dated to A.D. 689-899 suggesting that any structure was contemporary with Enclosure 3.

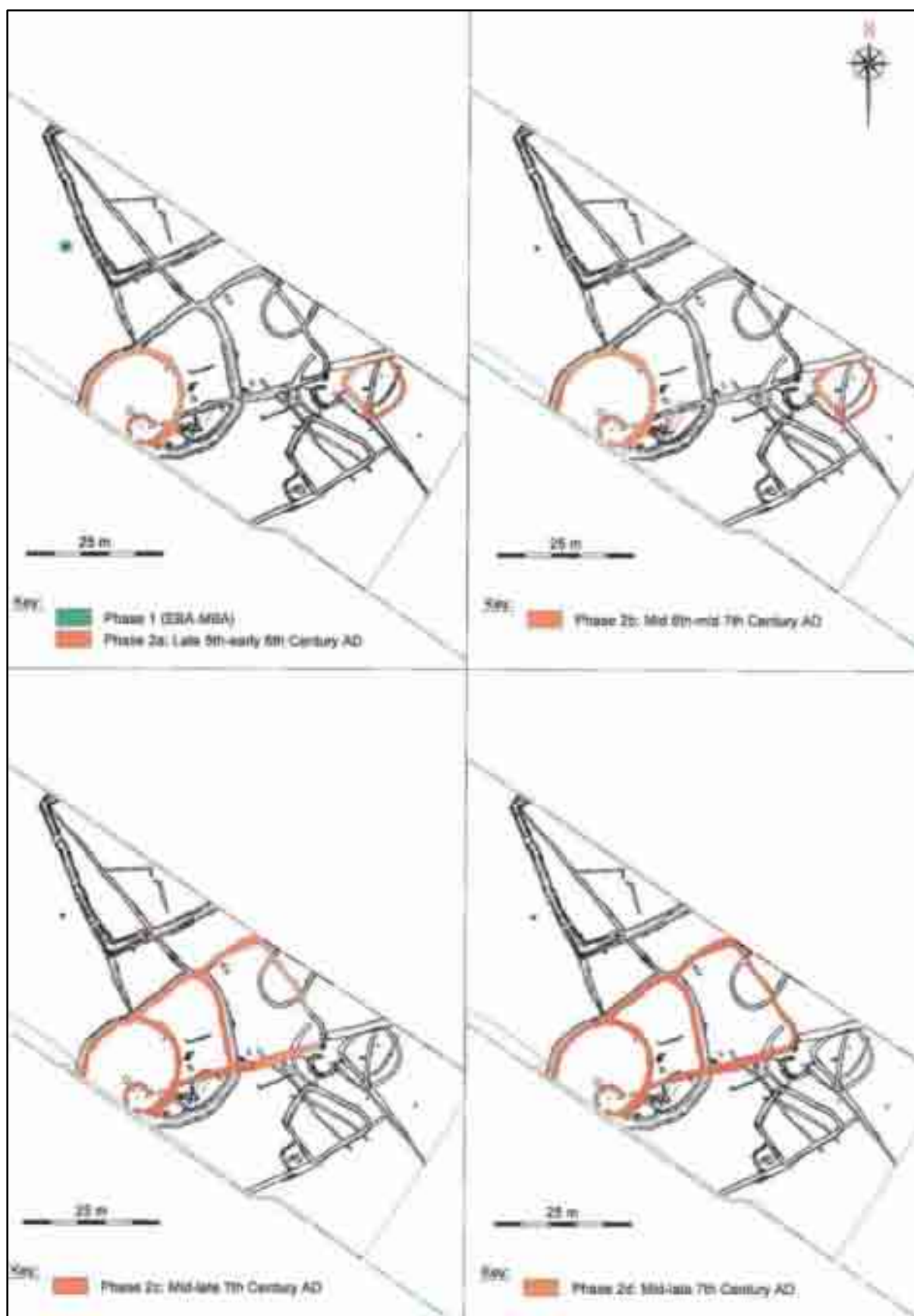
### Animal Bones:

A total of 4276 countable bone fragments and one non-countable fragment were recorded on the database, with 54 from modern features, and 209 not able to be assigned to phase.

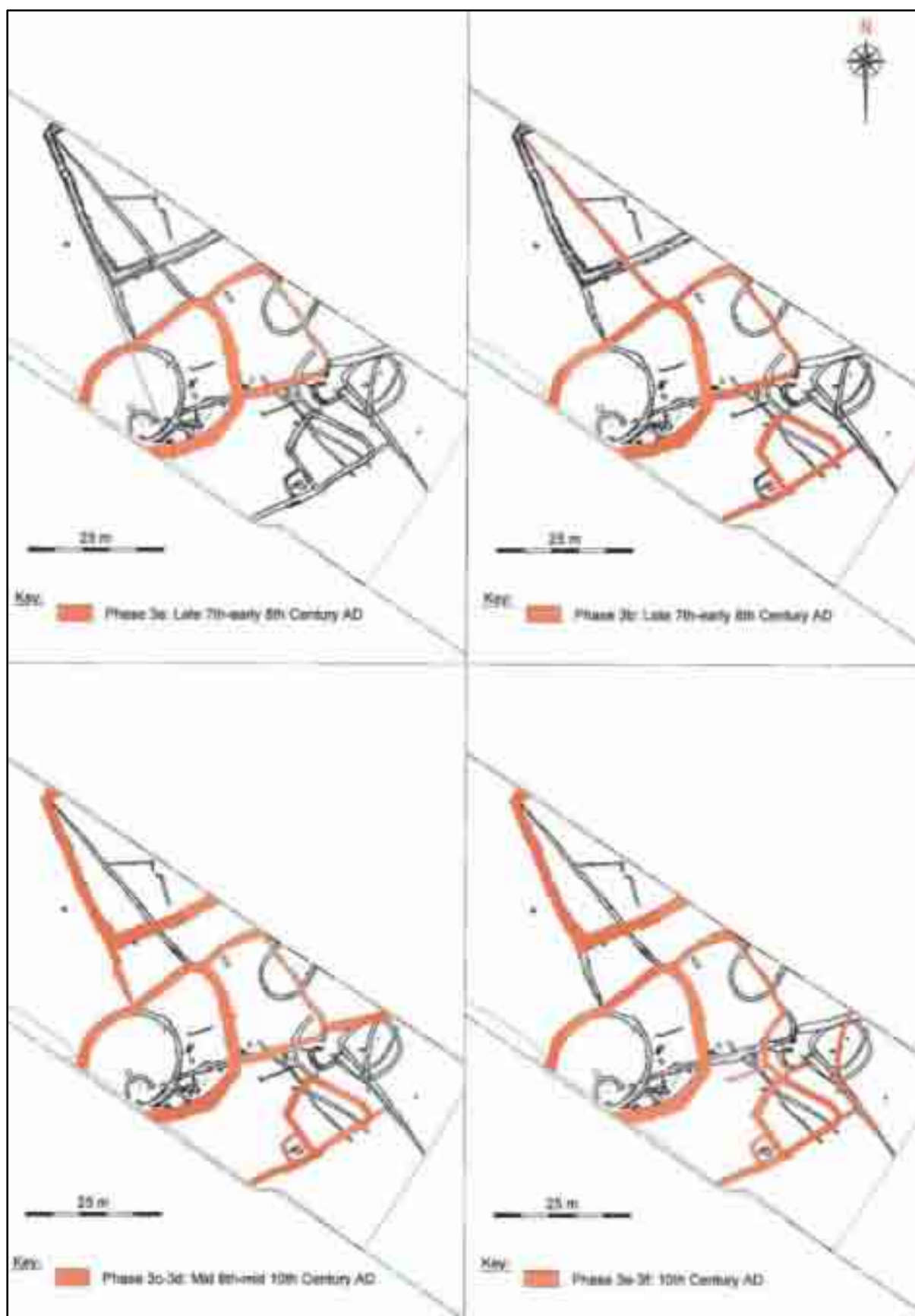
Phase	Phase	Cattle	Sheep/ Goat	Pig	Horse	Dog/ Wolf	Cat	Deer	Other	Date
<b>2</b>	<b>NISP</b>	1201.5	392	257	39	34.5	6	-	3	A.D. 426-651
	<b>%NISP</b>	62.2	20.3	13.3	2	1.8	0.3	-	0.1	
	<b>MNI</b>	40	23	18	3	3	2	-	1	
	<b>%MNI</b>	44	25.6	20	3.3	3.3	2.2	-	1.1	
<b>3</b>	<b>NISP</b>	1239.5	353	206.5	126	95	5	2	31	A.D. 680-990
	<b>%NISP</b>	60.2	17.2	10	6.1	4.6	0.3	0.1	1.5	
	<b>MNI</b>	37	15	15	7	5	1	1	4	
	<b>%MNI</b>	43.5	17.6	17.6	8.2	5.9	1.2	1.2	4.7	

### NISP and MNI from Dowdstown, Co. Meath

There is a difference in cattle slaughter age between the two phases. In Phase 2 the majority of cattle were killed between 2 and 3 years old, whereas in Phase 3 the majority were over 40 months old before being killed.



**Phases at Dowdstown, Co. Meath**



**Phases at Dowdstown, Co. Meath**



## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
QUB-7039	F496: Animal bone from primary fill of Enclosure 1	1454 $\pm$ 33 BP	<b>A.D. 554-651</b>
Beta-220119	F442: Animal bone from primary fill of Enclosure 1	1540 $\pm$ 40 BP	<b>A.D. 426-600</b>
Beta-220117	F328: Animal bone from primary fill of re-cut Enclosure 1 ditch	1240 $\pm$ 40 BP	<b>A.D. 680-882</b>
Beta-220120	F548: Animal bone from primary fill of Enclosure 3	1300 $\pm$ 40 BP	<b>A.D. 649-781;</b> A.D. 791-807
QUB-7009	F336: Animal bone from fill of Enclosure 6	1369 $\pm$ 33 BP	<b>A.D. 605-691;</b> A.D. 750-762
Beta-247068	F721: Fill of posthole associated with Structure A	1440 $\pm$ 40 BP	<b>A.D. 553-658</b>
Beta-247072	F1476: Fill of posthole associated with Structure B	1200 $\pm$ 40 BP	<b>A.D. 689-752;</b> <b>A.D. 761-899;</b> A.D. 919-948
Beta-247069	Cereal grain from oval-shaped cereal-drying kiln (Kiln A)	1180 $\pm$ 40 BP	A.D. 717-743; <b>A.D. 768-907;</b> <b>A.D. 911-971</b>
Beta-247071	Cereal grain from oval-shaped cereal-drying kiln (Kiln C)	1340 $\pm$ 40 BP	<b>A.D. 637-772</b>
Beta-247070	Cereal grain from cereal-drying kiln (Kiln H)	1320 $\pm$ 40 BP	<b>A.D. 648-774</b>
Beta-220118	F388: Animal bone from fill of Enclosure 6	1570 $\pm$ 40 BP	<b>A.D. 409-575.</b>
Beta-247066	Human bone from Burial 1	960 $\pm$ 40 BP	A.D. 996-1006; <b>A.D. 1012-1166.</b>

## Animal Bone Appendix:

### Cattle:

Fusion	Element	Age (months)	Phase 2		Phase 3	
			Fused	Unfused	Fused	Unfused
<b>Early</b>	Humerus d	12-18	29	2	52	2
	Scapula d	7-10	52	4	45	-
	Radius p	12-18	49	2	61	2
	Acetabulum	6-10	9	-	13	-
	Metapodium p	Pre-birth	56	4	113	3
	Phalanx 1 p	18-24	44	7	448	4
	Phalanx 2 p	18-24	13	1	11	-
	<b>Total</b>		<b>252</b>	<b>20</b>	<b>343</b>	<b>11</b>
	<b>%</b>		<b>93</b>	<b>7</b>	<b>97</b>	<b>3</b>
<b>Middle</b>	Tibia d	24-30	40	11	41	6
	Metapodium d	24-36	49	12	63	14
	Calcaneum p	36-42	11	3	5	2
	<b>Total</b>		<b>100</b>	<b>26</b>	<b>109</b>	<b>22</b>
	<b>%</b>		<b>79</b>	<b>21</b>	<b>83</b>	<b>17</b>
<b>Late</b>	Humerus p	42-48	7	2	20	2
	Radius d	42-48	21	7	30	6
	Ulna p	42-48	4	4	16	4
	Femur p	42	27	5	21	6
	Femur d	42-48	14	4	19	2
	Tibia p	42-48	21	7	21	6
	<b>Total</b>		<b>94</b>	<b>29</b>	<b>127</b>	<b>26</b>
	<b>%</b>		<b>76</b>	<b>24</b>	<b>83</b>	<b>17</b>

Cattle fusion table (Reitz and Wing 1999, 76).

Phase	Grant TWS					Higham MWS
	dP4	P4	M1	M2	M3	
<b>2</b>	-	A	A	X	-	N/A
	j	-	X	-	-	N/A
	j	-	X	-	-	N/A
	l	-	X	-	-	N/A
	j	X	-	-	-	N/A
	-	-	X	H	X	N/A
	-	X	A	A	-	N/A
	j	-	X	-	-	N/A
	-	X	A	g	X	N/A
	-	A	A	-	-	N/A
	-	-	A	X	-	N/A
	f	-	E	X	-	5
	j	-	b	-	-	7
	h	-	c	-	-	7
	k	-	j	X	-	7
	j	-	b	X	-	7
	c	-	c	X	-	7
	j	-	c	-	-	7
	K	-	j	X	-	7
	j	-	b	-	-	7
	j	-	b	-	-	7
	j	-	c	V	-	8
	h	-	d	V	-	8
	j	-	g	E	-	9
	j	-	g	A	-	10

Phase	Grant TWS					Higham MWS
	dP4	P4	M1	M2	M3	
	j	-	c	A	-	10
	j	-	g	a	A	10
	-	A	l	A	X	10
	-	c	g	g	X	11
	l	E	h	f	X	11
	h	-	g	c	X	11
	-	A	A	A	-	11
	-	g	k	k	X	11
	m	H	j	h	X	11
	j	-	g	b	-	11
	j	-	f	E	-	13
	h	g	f	X	-	13
	k	-	g	H	X	13
	j	-	h	H	-	13
	A	-	A	k	A	14
	-	g	k	k	A	14
	-	c	k	k	X	17
	-	-	-	X	C	17
	-	X	g	A	D	18
	-	A	A	X	-	19
	-	-	X	g	e	19
	-	b	h	g	f	20
	-	A	l	k	A	20
	-	f	k	k	g	21
	-	-	X	h	g	21
	-	X	k	j	h	22
	-	f	g	X	-	22
	-	h	A	X	-	23
	-	j	-	l	l	23
	-	g	k	k	j	23
<b>3</b>	h	-	X	-	-	N/A
	-	A	A	-	-	N/A
	A	V	K	g	b	N/A
	j	-	A	X	-	N/A
	h	-	X	-	-	N/A
	j	-	B	-	-	N/A
	j	-	D	C	-	8
	-	-	X	H	-	9
	j	-	C	E	X	9
	j	-	G	E	-	9
	-	X	K	h	-	11
	A	-	F	V	C	12
	-	X	A	A	X	13
	-	f	G	X	-	13
	-	X	K	h	H	13
	-	A	A	X	-	13
	-	-	A	l	A	14
	-	A	A	A	A	19
	-	X	L	k	h	22
	X	f	G	X	-	22
	-	g	X	-	-	22
	-	-	-	X	j	23
	-	h	N	m	l	23
	-	A	A	n	l	23

**Cattle mandible tooth data following Grant tooth wear stages (1982) and mandible wear stages after Higham (1967).**

Phase	Element	Grant TWS	Higham MWS
<b>2</b>	Dp4	b	N/A
	Dp4	j	N/A
	Dp4	j	N/A
	Dp4	j	N/A
	Dp4	j	N/A
	Dp4	j	N/A
	Dp4	j	N/A
	Dp4	j	N/A
	Dp4	j	N/A
	Dp4	k	N/A
	Dp4	k	N/A
	Dp4	k	N/A
	Dp4	k	N/A
	Dp4	k	N/A
	Dp4	k	N/A
	P4	b	N/A
	P4	b	N/A
	P4	f	N/A
	P4	f	N/A
	P4	f	N/A
	P4	f	N/A
	P4	f	N/A
	P4	f	N/A
	P4	g	N/A
	M12	E	N/A
	M12	E	N/A
	M12	a	N/A
	M12	a	N/A
	M12	a	N/A
	M12	b	N/A
	M12	b	N/A
	M12	b	N/A
	M12	b	N/A
	M12	b	N/A
	M12	c	N/A
	M12	c	N/A
	M12	c	N/A
	M12	c	N/A
	M12	d	N/A
	M12	d	N/A
	M12	f	N/A
	M12	f	N/A
	M12	g	N/A
	M12	g	N/A
	M12	g	N/A
	M12	g	N/A
	M12	g	N/A
	M12	g	N/A
	M12	g	N/A
	M12	g	N/A
	M12	g	N/A
	M12	g	N/A

Phase	Element	Grant TWS	Higham MWS
	M12	g	N/A
	M12	g	N/A
	M12	g	N/A
	M12	g	N/A
	M12	g	N/A
	M12	g	N/A
	M12	h	N/A
	M12	h	N/A
	M12	j	N/A
	M12	j	N/A
	M12	j	N/A
	M12	j	N/A
	M12	k	N/A
	M12	k	N/A
	M12	k	N/A
	M12	k	N/A
	M12	k	N/A
	M3	a	15
	M3	b	16
	M3	c	17
	M3	f	20
	M3	f	20
	M3	g	21
<b>3</b>	M3	g	21
	M3	g	21
	M3	g	21
	M3	g	21
	M3	g	21
	M3	j	23
	M3	k	23
	M3	k	23
	Dp4	b	N/A
	Dp4	c	N/A
	Dp4	h	N/A
	Dp4	h	N/A
	Dp4	h	N/A
	Dp4	j	N/A
	Dp4	j	N/A
	Dp4	j	N/A
	Dp4	j	N/A
	Dp4	j	N/A
	Dp4	j	N/A
	Dp4	j	N/A
	Dp4	j	N/A
	Dp4	k	N/A
	Dp4	k	N/A
	P4	a	N/A
	P4	b	N/A
	P4	f	N/A
	P4	f	N/A
	P4	f	N/A
	P4	g	N/A
	P4	h	N/A

Phase	Element	Grant TWS	Higham MWS
3	M12	a	N/A
	M12	a	N/A
	M12	a	N/A
	M12	b	N/A
	M12	b	N/A
	M12	b	N/A
	M12	b	N/A
	M12	b	N/A
	M12	b	N/A
	M12	b	N/A
	M12	b	N/A
	M12	c	N/A
	M12	c	N/A
	M12	d	N/A
	M12	f	N/A
	M12	f	N/A
	M12	g	N/A
	M12	g	N/A
	M12	g	N/A
	M12	g	N/A
	M12	g	N/A
	M12	h	N/A
	M12	j	N/A
	M12	j	N/A
	M12	j	N/A
	M12	j	N/A
	M12	j	N/A
	M12	j	N/A
	M12	j	N/A
	M12	j	N/A
	M12	k	N/A
	M12	k	N/A
	M12	k	N/A

Phase	Element	Grant TWS	Higham MWS
3	M12	k	N/A
	M12	k	N/A
	M12	k	N/A
	M12	k	N/A
	M12	k	N/A
	M12	k	N/A
	M12	k	N/A
	M12	k	N/A
	M12	k	N/A
	M12	k	N/A
	M12	l	N/A
	M12	l	N/A
	M12	l	N/A
	M12	m	N/A
	M3	a	15
	M3	b	16
	M3	b	16
	M3	d	18
	M3	f	20
	M3	g	21
	M3	g	21
	M3	g	21
	M3	g	21
	M3	g	21
	M3	g	21
	M3	J	23
	M3	J	23
	M3	J	23
	M3	J	23
	M3	J	23
	M3	J	23
	M3	K	23

**Cattle loose tooth wear data following Grant tooth wear stages (1982) and mandible wear stages after Higham (1967).**

Phase	Bd Measurement	Sex
2	49.2	F
	49.4	F
	49.4	F
	49.8	F
	51.1	F
	51.6	F
	52.7	F
	53.1	F
	53.8	F
	53.9	F
	54.9	F
	55.4	F
	56.1	Unident
	60.1	M
	63.7	M

Phase	Bd Measurement	Sex
3	47.2	F
	47.8	F
	49.5	F
	49.9	F
	50	F
	50.8	F
	50.9	F
	51.2	F
	51.3	F
	51.6	F
	51.9	F
	53	F
	53.2	F
	53.2	F
	53.3	F
	53.3	F
	53.6	F
	56.6	Unident
	57.3	Unident
	57.3	Unident
	60.7	M
	64.6	M

**Cattle metacarpal Bd measurements following McCormick and Murray (2007).**

Element	Measurement	Number	Mean	Min	Max	St. Dev
<b>Phase 2</b>						
Astragalus	GLI	23	61	54.5	65.1	2.6
Astragalus	GLm	20	55.6	51.3	60.4	2.2
Astragalus	BD	22	39.8	35.4	45.8	2.56
Humerus	SD	5	32.5	24.3	36.6	4.75
Humerus	BT	11	67.7	62.2	71.7	3.12
Humerus	HTC	14	39.2	36.3	42.9	1.65
Metacarpal	BP	13	54.8	49.1	63.9	5.5
Metacarpal	SD	11	29.2	26.4	36.3	2.8
Metacarpal	BD	15	53.6	49.2	63.7	4.1
Metatarsal	GL	6	214.2	200	227.7	10.1
Metatarsal	BP	12	45.3	41.9	52.2	3.22
Metatarsal	SD	12	24.9	20.9	28.7	2
Metatarsal	BD	14	51.1	47.5	58	3.32
1 <sup>st</sup> Phalanx	GL	21	56.2	49	65.7	3.9
1 <sup>st</sup> Phalanx	BP	6	28.4	26.3	34.4	3.2
1 <sup>st</sup> Phalanx	SD	12	24.1	19.9	27.4	2.39
1 <sup>st</sup> Phalanx	BD	8	26.5	23.6	28.6	1.7
Scapula	GLP	10	58.9	50.3	76	7.76
Scapula	SLC	8	47.3	35.2	53.5	5.76
Tibia	BD	18	56.8	53.2	59.7	2.03
<b>Phase 3</b>						
Astragalus	GLI	26	59.9	56.1	65.5	2.66
Astragalus	GLM	25	54.5	50.6	59.9	2.4
Astragalus	BD	22	38.1	34.8	43.8	2.5
Humerus	BT	19	69.1	61.9	77.4	5.1
Humerus	HTC	21	39.6	33.8	46.2	3.28
Metacarpal	GL	7	186.6	179.9	199	6.9

Metacarpal	BP	25	50.8	39.8	57.2	3.4
Metacarpal	SD	19	29.2	25.7	37.3	2.8
Metacarpal	BD	20	53	47.2	64.6	4.15
Metatarsal	BP	19	43.4	37.9	49.5	2.9
Metatarsal	SD	14	24.3	22.6	30.1	2.03
Metatarsal	BD	5	50.8	48.2	59.7	5
1 <sup>st</sup> Phalanx	GL	20	54.3	47.2	60.4	3.6
1 <sup>st</sup> Phalanx	BP	5	26.6	22.1	30.3	3
1 <sup>st</sup> Phalanx	SD	9	22.9	20.5	24.9	1.44
Radius	SD	6	35.2	32	36.8	1.7
Scapula	GLP	13	55.9	50.3	67.1	5.7
Scapula	SLC	11	47.2	43.3	51.1	2.45
Tibia	SD	6	34.8	30.3	42.4	4.29
Tibia	BD	24	54.97	28	64	7.08

**Summary of measurements for cattle for Phase 2 and 3 following von den Driesch (1976) and Payne and Bull (1988).**

Phase	Element	E.W.H. (cm)
2	Femur	101.3
	Femur	102
	Metacarpal	115.5
	Metacarpal	112.9
	Metacarpal	110.3
	Metacarpal	110
	Metatarsal	109
	Metatarsal	121.2
	Metatarsal	118.2
	Metatarsal	114.3
	Metatarsal	113.6
	Radius	109.2
	Radius	113.5
	Radius	128.1
	Tibia	104.8
	Tibia	107.7
3	Metacarpal	113.6
	Metacarpal	115.8
	Metacarpal	117
	Metacarpal	110.4
	Metacarpal	110.2
	Metacarpal	111.4
	Metacarpal	121.9
	Metatarsal	122.6
	Metatarsal	112.5
	Metatarsal	118.9
	Radius	111.8
	Radius	108.8
	Tibia	104
	Tibia	110.4
	Tibia	107

**Estimated withers heights for cattle following von den Driesch and Boessneck (1974).**

## Sheep/Goats:

Fusion	Element	Age (months)	Phase 2		Phase 3	
			Fused	Unfused	Fused	Unfused
<b>Early</b>	Humerus d	3-10	20	2	21	1
	Scapula p	6-8	25	3	18	1
	Radius p	3-10	19	3	16	1
	Acetabulum	6-10	5	-	4	-
	Metapodium p	Pre-birth	32	4	31	2
	Phalanx 1 p	6-16	3	1	4	1
	<b>Total</b>		<b>104</b>	<b>13</b>	<b>94</b>	<b>6</b>
	<b>%</b>		<b>89</b>	<b>11</b>	<b>94</b>	<b>6</b>
<b>Middle</b>	Tibia d	15-24	20	5	22	2
	Metapodium d	18-28	5	13	12	6
	Calcaneum p	30-36	4	2	3	1
	<b>Total</b>		<b>29</b>	<b>20</b>	<b>37</b>	<b>9</b>
	<b>%</b>		<b>59</b>	<b>41</b>	<b>80</b>	<b>20</b>
<b>Late</b>	Humerus p	36-42	1	4	1	-
	Radius d	36-42	3	4	3	-
	Ulna p	36-42	5	3	1	1
	Femur p	30-42	2	2	1	-
	Femur d	36-42	1	1	2	-
	Tibia p	36-42	-	9	5	1
	<b>Total</b>		<b>12</b>	<b>23</b>	<b>13</b>	<b>2</b>
	<b>%</b>		<b>34</b>	<b>66</b>	<b>87</b>	<b>13</b>

Sheep/goat fusion table (Reitz and Wing 1999, 76)

Phase	Payne TWS					Higham MWS
	dP4	P4	M1	M2	M3	N/A
<b>2</b>	14L	X	-	-	-	N/A
	-	X	A	X	-	N/A
	-	8A	A	X	-	N/A
	-	A	A	X	-	N/A
	13L	-	X	-	-	N/A
	-	X	8A	X	-	6
	17L	-	A	X	-	7
	14L	-	5A	X	-	7
	A	-	6A	X	-	7
	16L	-	8A	-	-	7
	23L	-	10A	X	-	7
	-	8A	9A	X	-	7
	16L	-	7A	X	-	7
	16L	-	7A	X	-	7
	13L	-	2A	-	-	7
	18L	-	9A	-	-	7
	-	A	7A	V	-	9
	16L	-	5A	C	-	9
	16L	-	4A	C	-	9
	-	X	A	A	X	10
	-	V	8A	7A	E	10
	20L	-	9A	7A	A	12
	16L	-	7A	4A	-	12
	17L	-	9A	8A	X	12
	16L	-	9A	6A	-	12
	21M	-	8A	6A	X	12
	17L	-	8A	2A	-	12
	-	X	10A	9A	X	12
	18L	-	9A	7A	X	12



	17L	-	9A	8A	X	12
	-	15A	14A	X	-	13
	-	A	9A	7A	X	13
	16L	-	9A	2A	C	13
	-	9A	9A	X	-	14
	-	9A	12A	9A	X	14
	-	X	9A	8A	A	14
	-	9A	12A	9A	X	14
	-	X	9A	9A	2A	15
	-	-	X	9A	11G	16
	-	12S	11A	9A	7G	16
	-	-	-	-	7G	16
	-	X	12A	9A	11G	16
3	-	X	A	X	-	N/A
	-	A	A	X	-	N/A
	-	A	8A	X	-	N/A
	-	12S	A	X	-	N/A
	-	7A	9A	X	-	7
	16L	-	7A	X	-	7
	17L	-	9A	X	-	7
	-	8A	10A	X	-	7
	18L	-	9A	E	-	10
	-	A	A	A	-	11
	-	5A	9A	A	X	13
	-	12S	9A	9A	X	14
	-	9A	11A	X	-	14
	-	A	A	X	-	14
	-	-	X	A	A	14
	-	-	-	X	2A	15
	-	X	10A	9A	10G	16
	-	-	-	9A	9G	16
	-	-	-	9A	7G	16
	-	12S	14A	11A	11G	16
	-	-	-	11A	11G	16
	-	12S	11A	A	11G	16
	-	X	15A	11A	11G	16
	-	-	-	10A	11G	16
	-	X	11A	9A	10G	16
	-	-	-	-	8G	16

**Sheep/goat mandible tooth wear data following Payne tooth wear stages (1973 and 1969) and mandible wear stages after Higham (1967).**

Element	Measurement	Number	Mean	Min	Max	St. Dev
<b>Phase 2</b>						
Humerus	BT	7	25.1	24.1	27.9	1.29
Humerus	HTC	9	15.5	14.7	16.8	0.65
Metacarpal	BP	11	21.4	20.1	23.7	1.06
Metacarpal	SD	6	13.9	12.5	15.3	0.9
Scapula	GLP	13	29.2	27.8	32.9	1.57
Scapula	SLC	14	16.98	14.9	22.5	1.11
Tibia	BD	18	22.8	20.1	25.9	1.83
<b>Phase 3</b>						
Humerus	BT	10	25.9	24.2	27.9	1.25
Humerus	HTC	9	16.4	14.9	17.5	0.96
Metacarpal	BP	8	20.48	18.6	22.1	1.4
Metacarpal	SD	5	13.2	11.4	14.3	1.17
Metacarpal	BD	5	24	22.5	24.8	0.94
Metatarsal	BP	10	17.8	14.6	19.8	1.5
Scapula	GLP	8	29.03	27.1	30	1.16
Scapula	SLC	11	17.4	13.5	20.8	1.8
Tibia	BD	13	23.2	21	26.1	1.4

**Summary of measurements for sheep/goat for Phase 2 and 3 following von den Driesch (1976) and Payne and Bull (1988).**



Phase	Element	Payne TWS	Higham MWS
	M12	8A	N/A
	M12	8A	N/A
	M12	8A	N/A
	M12	9A	N/A
	M12	9A	N/A
	M12	9A	N/A
	M12	9A	N/A
	M12	9A	N/A
	M12	9A	N/A
	M12	9A	N/A
	M12	9A	N/A
	M12	9A	N/A
	M12	9A	N/A
	M12	9A	N/A
	M12	9A	N/A
	M12	9A	N/A
	M12	13A	N/A
	M3	2A	15
	M3	2A	15
	M3	5A	15
	M3	7G	16
	M3	7G	16

Phase	Element	Payne TWS	Higham MWS
	M3	8G	16
	M3	9G	16
	M3	9G	16
	M3	10G	16
	M3	10G	16
	M3	11G	16
	M3	11G	16
	M3	11G	16
	M3	11G	16
	M3	11G	16
	M3	11G	16
	M3	11G	16
	M3	11G	16
	M3	11G	16
	M3	11G	16
	M3	11G	16
	M3	11G	16

**Sheep/goat loose tooth wear data following Payne tooth wear stages (1973 and 1969) and mandible wear stages after Higham (1969).**

#### Pigs:

Fusion	Element	Age (months)	Phase 2		Phase 3	
			Fused	Unfused	Fused	Unfused
<b>Early</b>	Humerus d	12-18	10	3	10	3
	Scapula p	12	12	4	10	1
	Radius p	12	3	2	3	1
	Acetabulum	12	8	1	6	-
	Metapodium p	Pre-birth	18	-	5	1
	Phalanx 2 p	12	-	-	1	1
	<b>Total</b>		<b>51</b>	<b>10</b>	<b>35</b>	<b>7</b>
	<b>%</b>		<b>84</b>	<b>16</b>	<b>83</b>	<b>17</b>
<b>Middle</b>	Tibia d	24	1	6	-	-
	Metapodium d	24-27	-	13	2	5
	Calcaneum p	24-30	1	3	1	-
	Phalanx 1 p	24	1	1	-	2
	<b>Total</b>		<b>3</b>	<b>23</b>	<b>3</b>	<b>7</b>
	<b>%</b>		<b>12</b>	<b>88</b>	<b>30</b>	<b>70</b>
<b>Late</b>	Ulna p	36-42	1	8	-	4
	Humerus p	42	-	4	-	2
	Radius d	42	-	2	-	2
	Femur p	42	1	9	-	5
	Femur d	42	1	7	3	3
	Tibia p	42	1	7	-	1
	<b>Total</b>		<b>4</b>	<b>36</b>	<b>3</b>	<b>17</b>
	<b>%</b>		<b>10</b>	<b>90</b>	<b>15</b>	<b>85</b>

**Pig fusion table (Reitz and Wing 1999, 76)**

	Grant TWS					Higham MWS
Phase	dP4	P4	M1	M2	M3	
2	-	A	X	-	-	N/A
	d	X	-	-	-	N/A
	f	-	-	-	-	N/A
	c	-	-	-	-	N/A
	-	A	b	X	-	N/A
	-	c	X	-	-	N/A
	d	-	X	-	-	5
	-	-	V	-	-	6
	a	-	H	-	-	7
	k	-	c	-	-	9
	-	X	c	A	-	11
	-	c	e	c	-	11
	-	A	e	A	X	12
	-	-	-	-	V	12
	-	b	e	b	E	13
	-	X	e	b	X	14
	-	b	e	b	-	14
	-	a	e	c	-	14
	-	X	e	b	X	14
	-	a	X	-	-	17
	-	a	f	b	C	17
	-	b	A	A	-	17
	-	X	e	b	V	18
	-	X	c	b	C	18
	-	-	X	b	E	19
	-	b	f	c	A	19
	-	b	g	d	E	19
	-	-	-	e	b	21
	-	X	A	e	b	21
	-	-	-	X	b	21
	-	-	X	f	b	21
3	A	-	X	-	-	N/A
	C	-	V	-	-	6
	D	-	a	X	-	9
	-	a	f	X	-	10
	K	-	e	X	-	10
	-	A	d	C	X	11
	-	-	c	E	-	12
	-	X	b	E	X	12
	-	b	e	c	C	12
	-	-	X	g	b	14
	-	A	A	X	-	16
	-	b	j	c	X	17
	-	b	-	-	-	17
	-	-	-	-	V	18
	-	-	e	X	V	18
	-	b	f	d	E	19
	-	b	g	c	E	19
	-	-	X	d	H	19
	-	-	X	h	b	21
	-	b	j	e	b	21
	-	-	X	g	b	21

	-	-	X	g	b	21
	-	X	k	d	b	21
	-	X	A	e	b	21
	-	-	-	X	b	21
	-	d	l	f	b	21
	-	A	g	e	c	22

**Pig mandible tooth wear data following Grant tooth wear stages (1982) and mandible wear stages after Higham (1967).**

Phase	Element	Grant TWS	Higham MWS
2	dP4	e	N/A
	P4	b	N/A
	M12	a	N/A
	M12	a	N/A
	M12	a	N/A
	M12	a	N/A
	M12	c	N/A
	M12	d	N/A
	M12	e	N/A
	M3	b	21
	M3	b	21
	M3	b	21
	M3	d	23
	M3	d	23
3	P4	a	N/A
	P4	b	N/A
	P4	b	N/A
	M12	a	N/A
	M12	a	N/A
	M12	a	N/A
	M12	b	N/A
	M12	b	N/A
	M12	c	N/A
	M12	e	N/A
	M12	l	N/A
	M3	C	18
	M3	a	20
	M3	a	20
	M3	a	20
	M3	a	20
	M3	a	20
	M3	b	21
	M3	b	21
	M3	e	24

**Pig loose tooth wear data following Grant tooth wear stages (1982) and mandible wear stages after Higham (1967).**

Phase	Sex	Number of Canines
2	F	9
2	M	12
3	F	10
3	M	10

**Sexing of Pig Canines**

Element	Measurement	Number	Mean	Min	Max	St. Dev
Phase 2						
Humerus	BD	6	30.8	28.2	36.1	2.78
Scapula	GLP	6	31.6	28.7	33.9	2.27
Scapula	SLC	6	19.9	17.7	21.9	1.57

**Summary of measurements for pig for Phase 2 following von den Driesch (1976) and Payne and Bull (1988).**

**Horse:**

Phase	Element	E.W.H (cm)
2	Metacarpal	142.3
3	Metacarpal	135.9
	Metacarpal	148.7

**Estimated withers heights for Horse following von den Driesch and Boessneck (1974).**

### **Drumadonnell, Co. Down**

Grid Ref: **J24393915 (32439/33915)**

SMR No: **DOW 035:053**

Reference: **McSparron 2001; Murphy 2001**

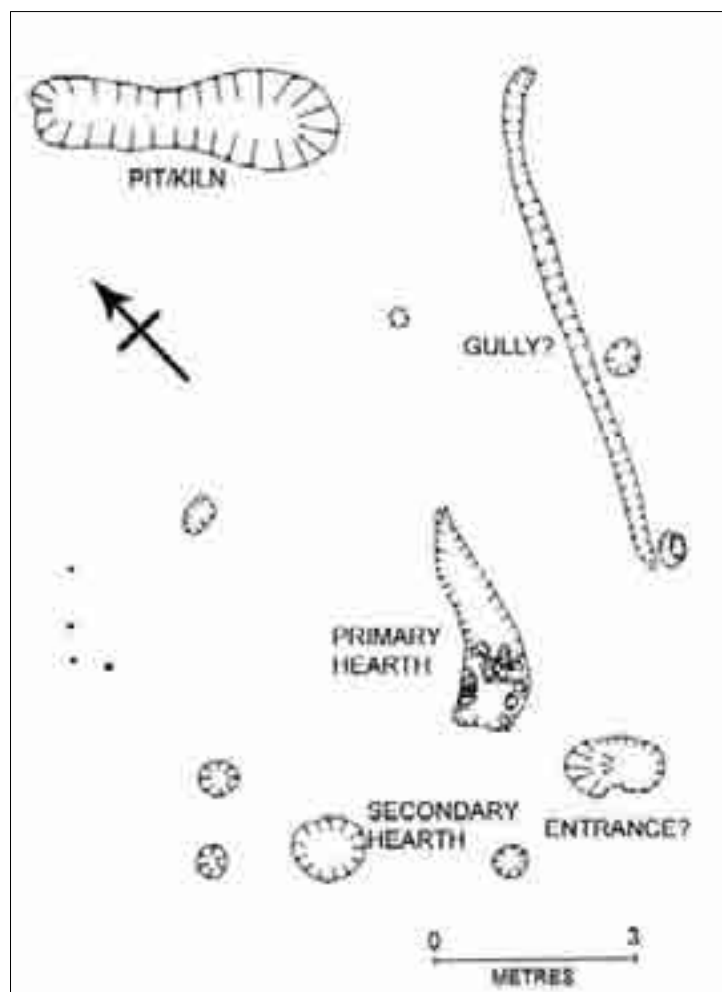
Excavation revealed the presence of a hearth and associated post-hole settings, as well as a second hearth which did not appear to have been associated with the layout of post-holes. Dating of charcoal from both of the hearths gave an early medieval date and it is suggested that the post-holes may have represented a roundhouse-type structure. A number of sherds of souterrain-ware pottery were found on site, but there is also some evidence (two non-souterrain-ware pottery sherds and the nature of the seed assemblage in the bottom of a pit/kiln) that the site was occupied in the Bronze Age.

### **Animal Bones:**

A total of 2415 fragments of burnt bone were recovered. The bones were in a highly fragmentary condition resulting in the vast majority of fragments (98%) being unidentifiable to either species or bone type.

	<b>Cattle</b>	<b>Sheep/Goat</b>
NISP	7	3

**NISP from Drumadonnell, Co. Down**



**Unenclosed House at Drumadonnell, Co. Down (after McSparron 2001, 49).**

### Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
N/A	Charcoal from lower fill of primary hearth	N/A	<b>A.D. 705-1005.</b>
N/A	Charcoal from secondary hearth	N/A	<b>A.D. 680-980</b>



**Drumadoon, Co. Antrim**Grid Ref: **D16744046 (31467 44046)**SMR No: **ANT 009:042**Reference: **McSparron & Williams 2009; Beglane 2009.**

Excavation of a mound partially destroyed by the landowner revealed a banked enclosure, 14m x 5m, on the mound summit. This bank had a stone-faced external façade, and there was evidence for a cobbled entranceway and metalled interior surface (Phase I). The construction of the souterrain appears to have occurred during this phase of occupation. Human habitation is indicated by the presence of a hearth, and a circular hut which was associated with deposits of burnt wattle-and daub. Souterrain-ware (242 sherds) was found in this occupation layer, as well as two iron nails, an iron spearhead, and a copper alloy clasp. The bank was later levelled to create an artificial platform upon which a second hearth and paved area were constructed (Phase II). Souterrain-ware (54 sherds) was also found in this occupation layer.

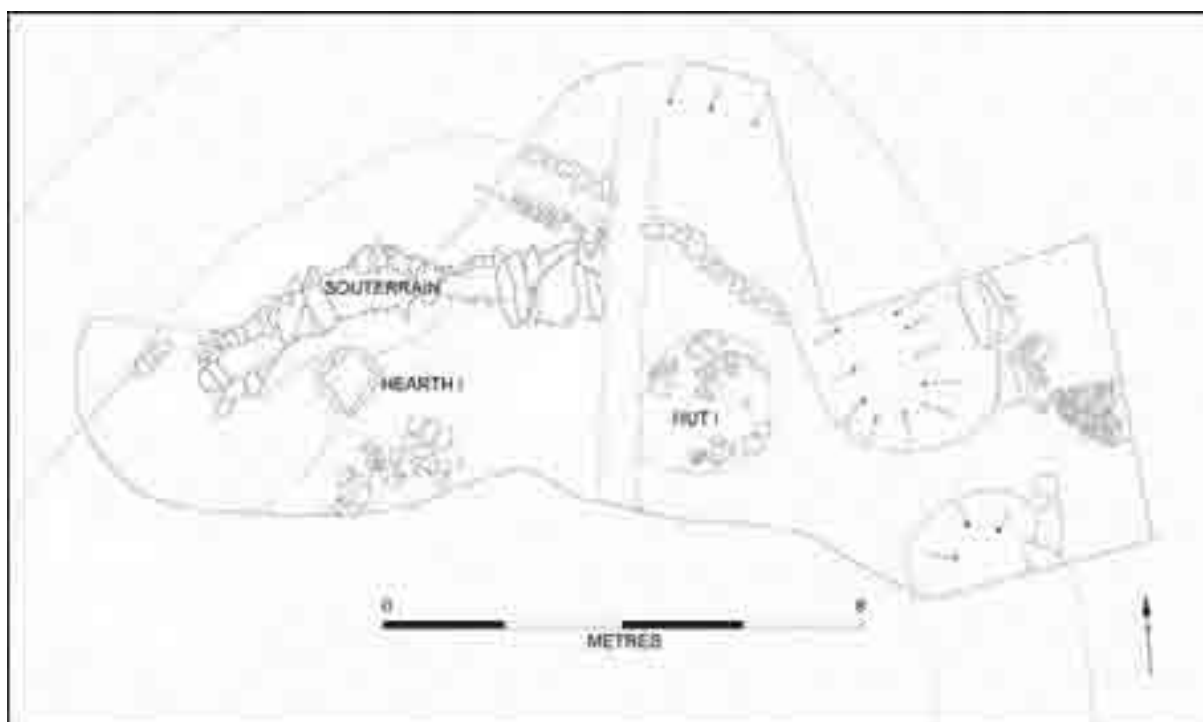
The interior of the site was levelled again, and the external bank was strengthened by the addition of an internal stone revetment (Phase III). A sub-circular hut was identified in this occupation phase, which appears to relate to the construction of an Anglo-Norman motte. A copper-alloy bell-shrine of possible twelfth-century date was discovered in a void within the souterrain fill. A silver half-penny of Henry III (dating to 1247-1272) was also found in this phase. Over two hundred pottery sherds were recovered – the majority (134) were identified as souterrain-ware; a large number (85) were identified as possible souterrain-ware; and fourteen were identified as thirteenth/fourteenth-century Everted-Rim ware.

**Animal Bones:**

In total, 497 identified countable fragments were recorded from Drumadoon, the majority of which came from the Anglo-Norman and modern/disturbed deposits. The majority of the bones recovered were highly fragmentary, and none came from ditches, middens or pits, suggesting that the recovered material was incidental rubbish.

Phase		Cattle	Sheep/ Goat	Pig	Horse	Date
Phase I	NISP	25	7	7	1	A.D. 767-895
	%NISP	62.5	17.5	17.5	2.5	
	MNI	1	2	2	1	
	%MNI	16.7	33.3	33.3	16.7	
Souterrain	NISP	41	28	7	2	A.D. 803-972
	%NISP	52.6	35.9	9.0	2.6	
	MNI	2	3	1	1	
	%MNI	28.6	42.9	14.3	14.3	
Phase II	NISP	20	11	2	-	A.D. 771-899
	%NISP	60.6	33.3	6.1	-	
	MNI	1	2	1	-	
	%MNI	25	50	25	-	

**NISP and MNI from early medieval phases at Drumadoon, Co. Antrim.**



**Phase I occupation at Drumadoon, Co. Antrim (after McSparron & Williams 2009, 121).**



**Phase II occupation at Drumadoon, Co. Antrim (after McSparron & Williams 2009, 125).**

## Radiocarbon Dates

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-6414	Charred cereal grains from Hearth II	1185 $\pm$ 30	A.D. 724-739; <b>A.D. 771-899</b> ; A.D. 919-949
UB-6416	Charred cereal grains from basal fill of souterrain	1152 $\pm$ 30	A.D. 779-792; <b>A.D. 803-972</b>
UB-6417	Charred cereal grains from Hearth I	1186 $\pm$ 30	A.D. 723-740; <b>A.D. 770-899</b> ; A.D. 919-948
UB-6418	Charred cereal grains from Hut I	1199 $\pm$ 30	A.D. 713-745; <b>A.D. 767-895</b> ; A.D. 925-937
UB-6993	Human femur in gravel capping souterrain	1260 $\pm$ 29	<b>A.D. 670-783</b> ; A.D. 787-823; A.D. 841-861

## Animal Bones Appendix:

### Cattle

Fusion data for the early medieval phases at Drumadoon suggests that approximately half the cattle were killed in the age range 6–18 months, whilst the other half were killed as adults over 4 years.

One female metacarpal was identified from Phase I.

### Sheep

Phase	dP2	dP3	dP4	P2	P3	P4	M1	M2	M3	MWS	Age
Phase 2	-	-	-	A	P	9A	10A	-	-	E/F/G	2-6 yrs
Phase 2	-	-	-	0	A	9A	9A	9A	9A	E	2-3 yrs
Phase 2	-	-	-	A	P	9A	9A	9A	6G	F	3-4 yrs
Souterrain	P	P	14L	-	-	-	7A	V	-	C	6-12 mnths
Souterrain	-	-	-	A	P	12S	12A	9A	11G	G	4-6 yrs
Souterrain	A	A	22L	0	0	0	9A	5A	A	D	1-2 yrs

### Sheep age at slaughter based on tooth wear.

A left and a right metatarsal from the souterrain fill both gave estimated withers heights of 57cm.

### Pig

Phase	dP2	dP3	dP4	M1	M2	Age
Souterrain	A	P	U	C	-	2 months

### Pig age at slaughter based on tooth wear.

### Horse

One metacarpal from the early medieval phases gave an estimated withers height of 128cm.

**Drumharsna South, Co. Galway**Grid Ref: **143182/211382**SMR No: **GA113-121**References: **Hegarty & Delaney 2010; McCarthy 2010.**

The footprint of the cashel wall was identified during excavation. This demarcated an area with a maximum external diameter of 35m and a maximum internal diameter of 23.5m. A 4m wide break to the south-south-east probably represents the location of the cashel entrance. Some remains of the cashel wall were identified below a short segment of the townland boundary wall. These remains included large facing stones separated by a rubble core which measured 4.6 m in width.

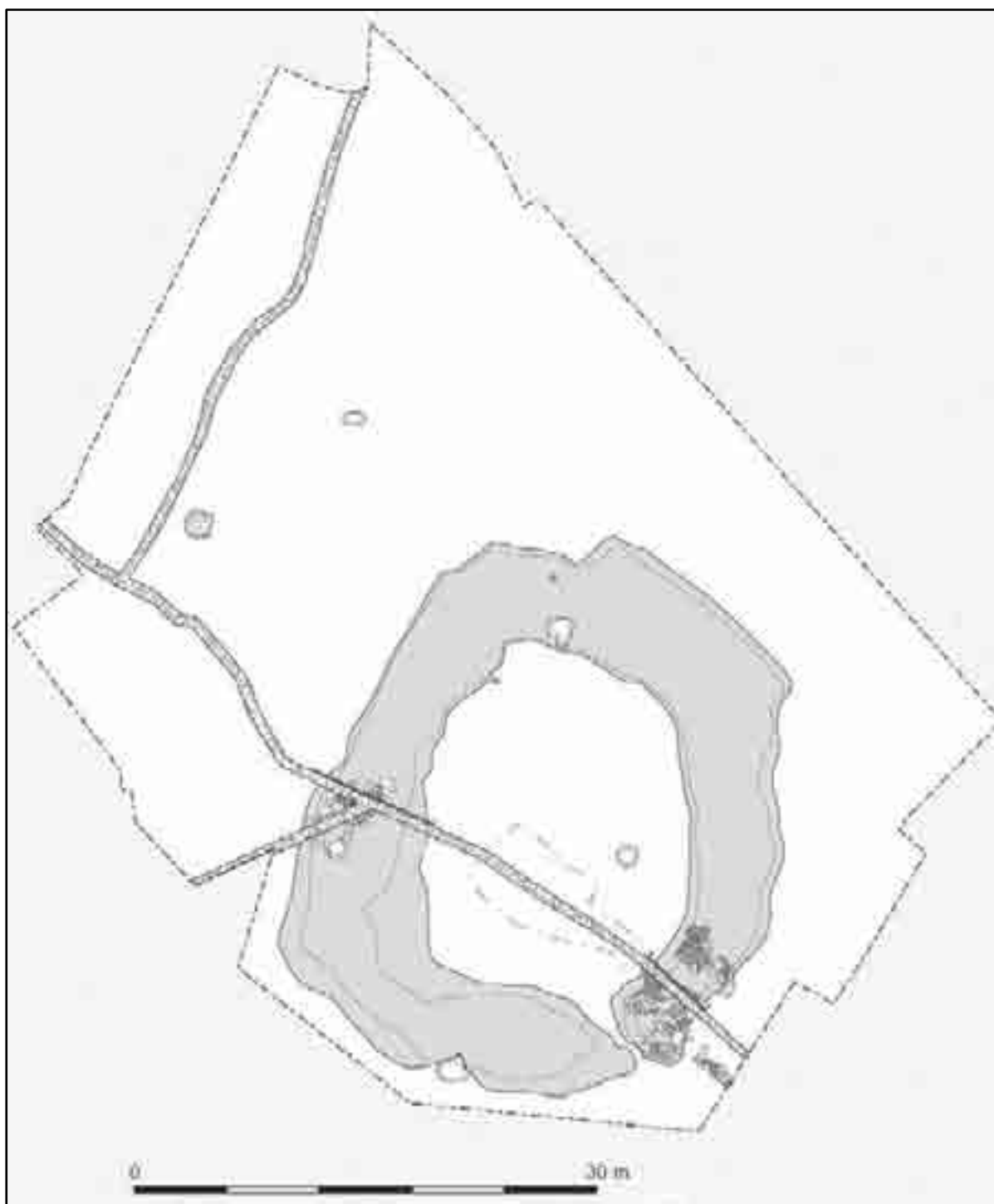
A very large deep pit was located towards the north-west of the excavation area. This pit was circular in plan measuring 1.8m in diameter and 1.1m in depth and was possibly contemporary with the cashel. It may have been used as a storage or rubbish pit.

**Animal Bone:**

A total of 462 animal bones were recovered during the excavation. Over half of the assemblage came from two topsoil layers and the general size of the bones along with the observed butchery marks indicate that these do not relate to the primary phase of activity at the site. The uppermost fill of the pit produced 28 bones of which 13 were identified to species. These were all identified as cattle and included nine skull fragments, the unfused distal portion of a radius and three teeth. Stone deposits possibly associated with the cashel wall produced 31 animal bones but only seven could be identified – four cattle bones (three teeth) and three sheep bones. In the absence of dating evidence – and given the high degree of contamination by modern finds from the adjacent settlement – this assemblage should be dismissed for purposes of early medieval zoological studies.

Species	Cattle	Sheep/ Goat	Pig	Horse	LM	MM	Date
NISP	169	80	4	12	96	99	?

**NISP from Drumharsna, Co. Galway.**



Post-excavation plan of Drumharsna South, Co. Galway (after Hegarty & Delaney 2010).

## Dublin - Chancery Lane

Grid reference: **315365/233772**

SMR: **DU018-020(82, 83)**

Reference: **Murray 2007; Walsh 2009.**

Excavations were undertaken in the Bride St/Chancery Lane area of Dublin over a number of years. Two burials found at Bride Street and dated A.D. 726-979 and A.D. 877-1001 would appear to post-date the earlier occupation deposits there. The radiocarbon dates for settlement and burials at Chancery Lane span the years A.D. 680-964.

A metalled laneway ran across the site, demarcated to the north by a drainage gully; a 14C date from a pig skull which overlay the road surface suggests use during the mid-ninth century. This early medieval road cut through an earlier burial, dated A.D. 684-885. At least one structure, indicated by a post-and-stake-hole line and a hearth in Bride Street, lay along the line of the road. A further series of stake-holes, shallow pits and gullies which respected the roadway may indicate fences, or perhaps crude huts. The roadway appears to have gone out of use by the tenth century.

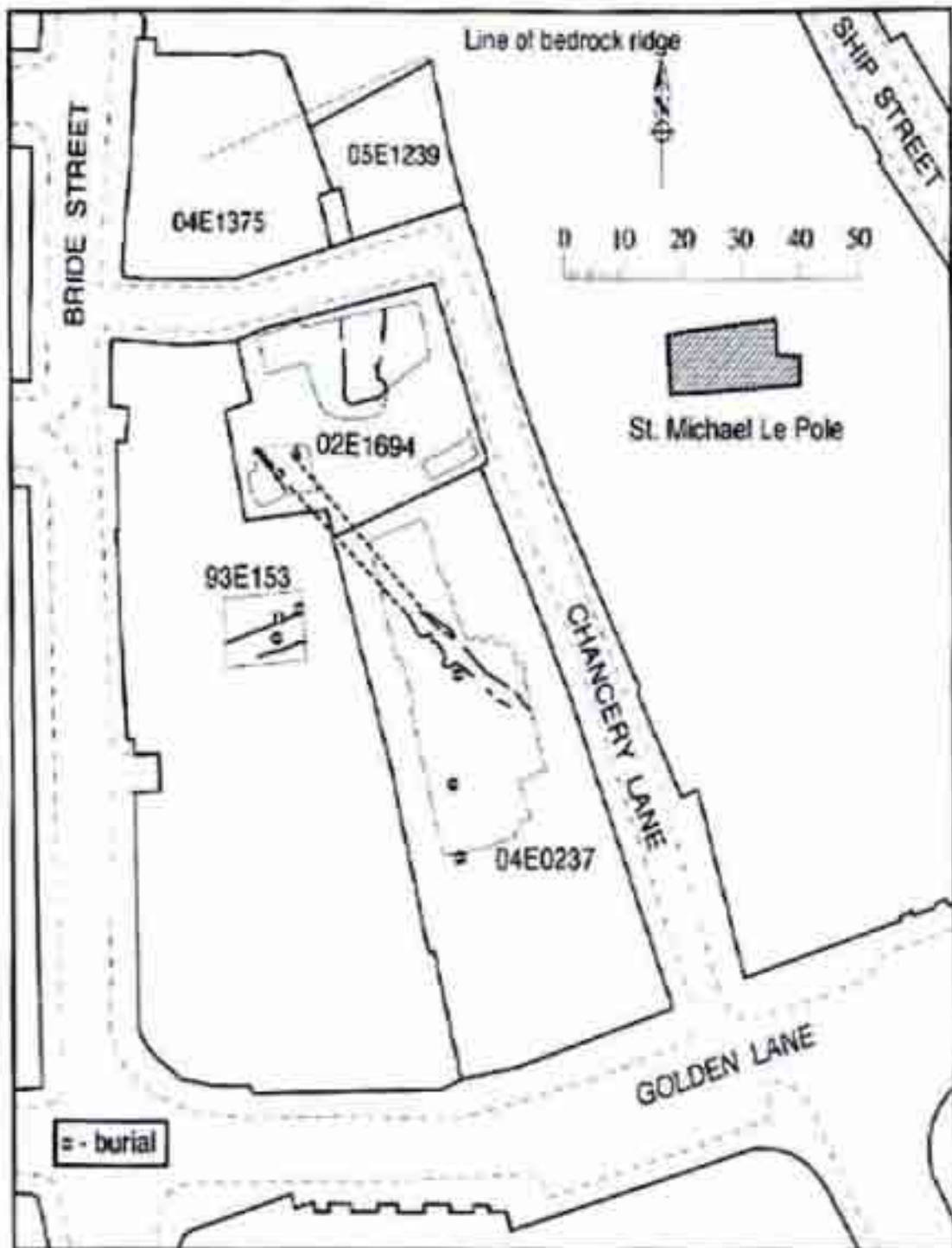
Few artefacts were recovered from the earliest, roadway, phase. These consisted of two hollow bone cylinders and the fragment of a lignite bracelet; a possible ring-pin was recovered from the later, Viking layer.

### Animal Bones:

A total of 1313 were identified to species from excavations at Chancery Lane, Dublin.

Phase		Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Cat	Dog	Date
I									8 <sup>th</sup> /9 <sup>th</sup> C.
	NISP	70	30	14	-	1	3	1	
	%NISP	58.8	25.2	11.8	-	0.8	2.5	0.8	
	MNI	4	3	2	-	1	2	1	
	%MNI	33.3	25	16.7	-	8.3	16.7	8.3	
II									11 <sup>th</sup> /12 <sup>th</sup> C
	NISP	256	62	72	4	1	24	2	
	%NISP	60.8	14.7	17.1	1.0	0.2	5.7	0.5	
	MNI	11	5	4	1	1	5	1	
	%MNI	40.7	18.5	3.7	14.8	3.7	18.5	3.7	

**NISP and MNI from early medieval phases at Chancery Lane, Dublin.**



Location of early medieval road at Chancery Lane, Dublin (after Walsh 2009)

## Radiocarbon Dates

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
UB-6336	Human bone	N/a	<b>A.D. 780-964</b>
UB-6370	Human bone	N/a	<b>A.D. 721-894</b>
UB-6369	Human bone	N/a	<b>A.D. 680-883</b>
UB-6367	Human skull from burial truncated by road	N/a	<b>A.D. 684-885</b>

## Animal Bone Appendix:

### Cattle:

	Element	Age (months)	Fused	Unfused
Early Fusion	humerus d., radius p.	12-18	10	1
	phalanx 1 & 2 p.	18-24	31	3
	<b>%</b>		<b>91</b>	<b>9</b>
Middle Fusion	tibia d., metapodials d.	24-36	30	5
	Calcaneus p	36-42	5	-
	<b>%</b>		<b>88</b>	<b>13</b>
Late Fusion	humerus p., radius d., ulna p., femur p., femur d., tibia p.,	42-48	20	9
	<b>%</b>		<b>69</b>	<b>31</b>

**Epiphyseal fusion data for cattle grouped into early- middle- and late-fusing stages after Reitz and Wing (2001, Table 3.5).**

Phase	dp4	P4	M1	M2	M3	Higham MWS	estimated age in months
8 <sup>th</sup> -9 <sup>th</sup> C	0	X	X	k	l	23+	50+
11-12 <sup>th</sup> C	0	X	k	k	g	20	40
11-12 <sup>th</sup> C	0	A	k	k	j	22	50
11-12 <sup>th</sup> C	0	X	X	A	k	23	50+
11-12 <sup>th</sup> C	0	j	m	X	X	20-23	40-50+
11-12 <sup>th</sup> C	0	X	X	X	l	23+	50+

**Cattle mandibular tooth eruption and wear from early medieval phases after Grant (1982) and mandibular wear stages (MWS) after Higham (1976). X= mandible section absent; A= alveolus (post-mortem tooth loss).**



Phase	Element		No.	Min	Max	Mean	St Dev
11-12 <sup>th</sup> C	AS	GLI	15	55.6	65.7	60.9	2.7
11-12 <sup>th</sup> C	AS	Bd	15	33.1	45.3	39.5	3.2
11-12 <sup>th</sup> C	HC	Wmin	8	33.3	49	40.7	6.1
11-12 <sup>th</sup> C	HC	Wmax	7	42.9	63.7	52.4	8
11-12 <sup>th</sup> C	MC1	B@F	10	46.5	56.6	51.4	3.6
11-12 <sup>th</sup> C	MC1	Bd	10	50.1	62.1	55.9	4.4
11-12 <sup>th</sup> C	MT1	Bd	8	46.3	54.7	49.6	2.8
11-12 <sup>th</sup> C	MT1	B@F	8	42.7	51.3	46.4	2.8

**Summary of cattle post-cranial measurements (in mm) after von den Driesch (1976). Only measurements with seven or more records are included.**

**Sheep:**

Phase	dp4	P4	M1	M2	M3	Higham MWS	estimated age in months
8 <sup>th</sup> -9 <sup>th</sup> C	22L	0	9A	7A	V	13	13-24
8 <sup>th</sup> -9 <sup>th</sup> C	0	5A	9A	7A	X	14-15	25-28
11-12 <sup>th</sup> C	16L	0	9A	2A	C	13	13-24
11-12 <sup>th</sup> C	0	X	X	7A	2A	14	25-26
11-12 <sup>th</sup> C	0	14A	15A	9A	11G	17	adult
11-12 <sup>th</sup> C	0	14A	15A	9A	11G	17	adult

**Sheep and sheep/goat** tooth eruption and wear after Payne (1973 and 1987) and mandibular wear stages (MWS) after Higham (1976). X= mandible section absent.

**Pig:**

Phase	C	dp4	P4	M1	M2	M3	Higham MWS	estimated age in months
8 <sup>th</sup> -9 <sup>th</sup> C	0	0	d	h	X	X	21-22	23-27
11-12 <sup>th</sup> C	0	0	X	b	V	0	10-12	8-11
11-12 <sup>th</sup> C	0	f	0	c	X	X	11-12	9-11
11-12 <sup>th</sup> C	Fa	0	e	k	g	d	22	25-27

**Pig** tooth eruption and wear after Grant (1982) and mandible wear stages (MWS) after Higham (1967). X= mandible section absent; A= alveolus (post-mortem tooth loss); F= female; Fa= female alveolus; M= male.

		Age in mths	8 <sup>th</sup> -9 <sup>th</sup> C		11 <sup>th</sup> -12 <sup>th</sup> C	
			No. fused	No. unfused	No. fused	No. unfused
<b>Early fusing</b>	humerus d.	12-18	1	1	3	2
	radius p.	12	0	0	0	0
	<b>TOTAL early fusing</b>		<b>1</b>	<b>1</b>	<b>3</b>	<b>2</b>
<b>Middle fusing</b>	tibia d., phalanx 1 p.	24	2	0	4	4
	metapodium d.	24-27	0	1	3	6
	calcaneus p.	24-30	0	1	0	1
	<b>TOTAL middle fusing</b>		<b>2</b>	<b>2</b>	<b>7</b>	<b>11</b>
<b>Late fusing</b>	ulna p.	36-42	0	0	0	0
	humerus p., radius d., femur p.& d., tibia p.	42	0	2	2	8
	<b>TOTAL late fusing</b>		<b>0</b>	<b>2</b>	<b>2</b>	<b>8</b>

**Epiphyseal fusion data for pigs grouped into early-, middle- and late-fusing stages after Silver (1969, table A) and Reitz and Wing (1999, table 3.5).**

**Birds:**

Feature	Date	geese	ducks	fowl	diver	buzzard	crow	indet.	Totals
F23	8 <sup>th</sup> -9 <sup>th</sup>	1	1	9	-	-	-	-	<b>11</b>
F25	?10 <sup>th</sup>	-	-	4	-	-	-	-	<b>4</b>
F26	?10 <sup>th</sup>	3	-	4	-	-	-	-	<b>7</b>
F29	?10 <sup>th</sup>	1	-	22	-	-	-	1	<b>24</b>
F34	?10 <sup>th</sup>	1	-	-	-	-	-	-	<b>1</b>
F19	early Anglo-Norman	12	-	49	-	2	1	-	<b>64</b>
F16	Anglo-Norman	1	-	-	-	-	-	-	<b>1</b>
F17	Anglo-Norman	2	-	-	-	-	-	-	<b>2</b>
F12	early Anglo-Norman	3	-	9	1	-	-	-	<b>13</b>
	<b>Total</b>	<b>24</b>	<b>1</b>	<b>97</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	

**Range and frequency of birds.**

## Dublin - Fishamble Street

Grid reference: **O15003400 (31500/23400)**

SMR: **N/A**

References: **Wallace 1992; McCormick 1987; O'Sullivan 1990**

The tenth-century town of Dublin developed from its original mid-ninth century position and expanded to the west and south. The most eastern part of mid-ninth century settlement was abandoned and replaced by an industrial area while the western part of the excavated area at Essex Street West and Exchange Street Upper witnessed an intensification of settlement. Approximately at the same time, and directly to the west, Fishamble Street and Wood Quay were developing.

Excavations at Fishamble Street revealed a series of nine banks running along the south side of the River Liffey. The earliest banks were low – approximately 1m high – and probably functioned as flood banks. These appear similar to the ninth-century floodbanks below and may date to the middle or later part of the century. A more substantial feature (Bank 2) was built in the tenth century along the high water line. It was bonded in mud and a cobbled pathway was present inside and parallel to the bank along its eastern stretch. By the eleventh century a considerable bank had been constructed with gravel, stone and earth, reinforced with post-and-wattle screens and crowned with a palisade fence. Finally, in the beginning of the twelfth century, a stone wall was built along the earlier earthen embankment at Fishamble Street.

House plots on Fishamble Street were evident from the tenth century. The plots were divided by post-and-wattle fences, and, while these remained largely unchanged for over 200 years, the positions of houses and outbuildings inside these plots were regularly changed. Pathways of wicker, timber or stone connected the houses to the street.

Industrial activity also took place in this area, as evidenced by the presence of unworked amber, waste chips and unfinished objects.

### Animal Bones:

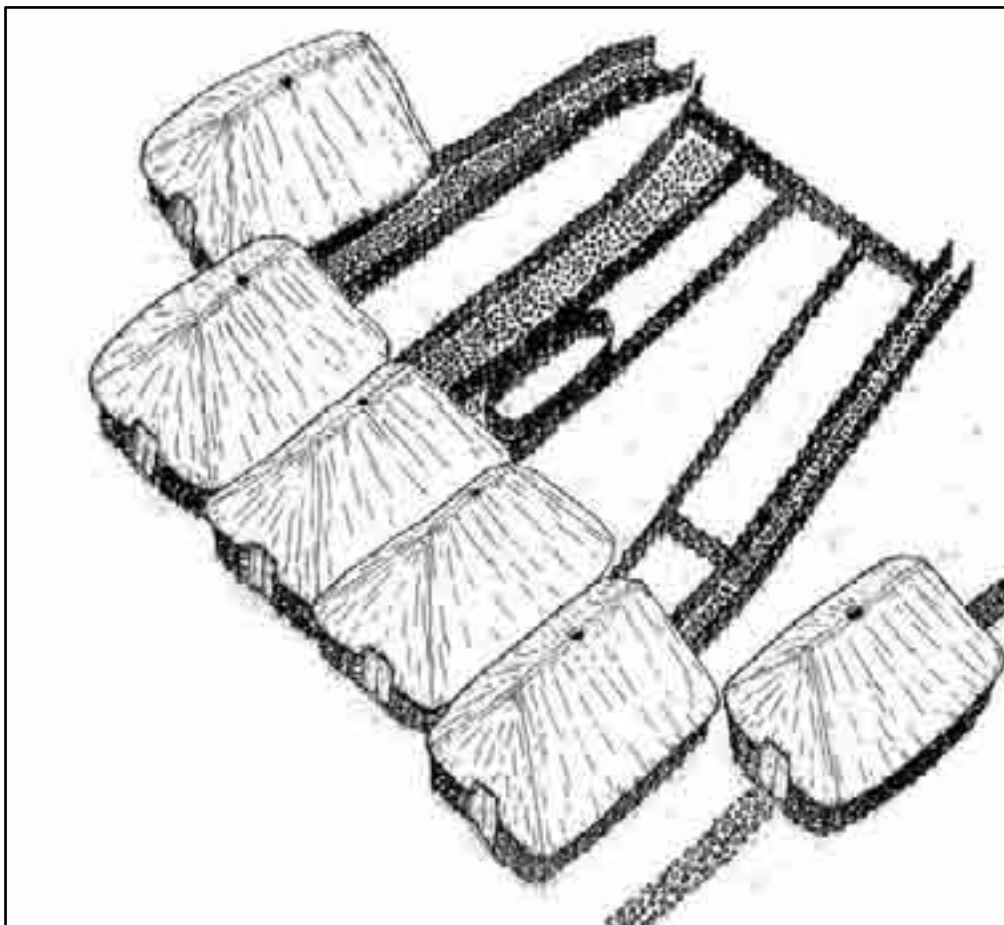
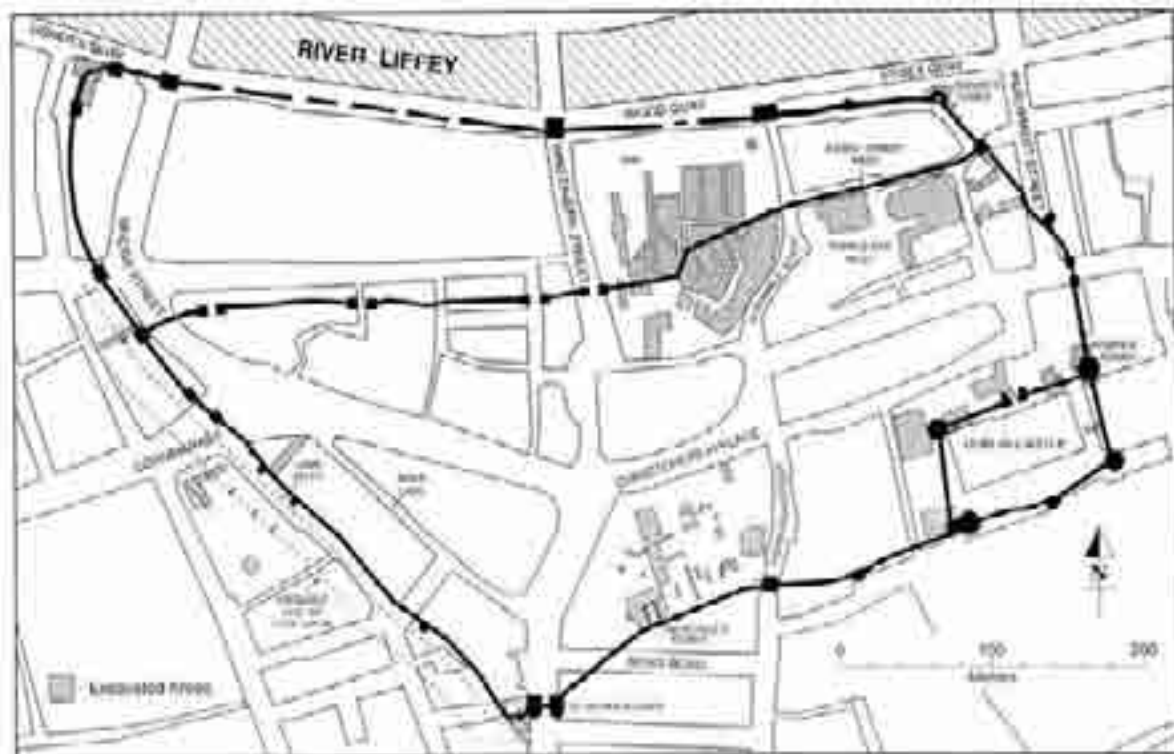
The sample consisted of nearly 40,000 identifiable fragments excluding vertebrae and ribs. It was possible to compare the diet of neighbours at five levels, i.e. 3, 5, 7, 8 and 9. Genetic material from the Fishamble Street cattle showed that they were genetically similar to the old breeds of Ireland and Britain and different to those of Scandinavia.

Level	Cattle		Pig		Sheep/Goat		Horse		Other	
	#	%	#	%	#	%	#	%	#	%
<b>12</b>	7	31.8	9	40.9	3	13.6	-	-	3	13.6
<b>11</b>	25	36.2	20	29.0	16	23.2	1	1.4	7	8.7
<b>10</b>	33	32.4	50	49.0	13	12.7	1	1.0	5	5
<b>9</b>	69	29.9	118	51.1	28	12.1	2	0.9	14	5.9
<b>8</b>	25	24.3	62	60.2	11	10.7	-	-	5	4.8
<b>7</b>	55	27.6	113	56.8	20	10.1	1	0.5	10	5
<b>6</b>	32	29.4	62	56.9	7	6.4	-	-	8	7.3
<b>5</b>	60	37.5	74	46.2	17	10.6	1	0.6	8	4.8
<b>4</b>	52	43.7	51	42.9	13	10.9	1	0.8	2	1.6
<b>3</b>	64	43	66	44.3	12	8.1	2	1.3	5	3.4
<b>2</b>	35	49.3	26	36.6	6	8.5	1	1.4	3	4.2
<b>1</b>	35	44.9	32	41.0	7	9.0	1	1.3	3	3.9

### Aggregate MNI from different levels at Fishamble Street, Dublin.

	Cattle	Sheep/Goat	Pig	#
<b>10<sup>th</sup>/early 11<sup>th</sup> C</b>	36.8%	11.4%	51.0%	1338
<b>Early 12<sup>th</sup> C</b>	58.8%	11.3%	29.9%	97

### Chronological distribution of MNI of major domesticates.



## Animal Bones Appendix:

### Cattle:

Level	0-3 yrs	>3 yrs	#
9	47%	53%	36
7	39%	61%	26
6	58%	42%	24
5	37%	63%	27
4	39%	61%	44
3	45%	55%	38
1	56%	44%	27
1-12	47%	53%	262

### Cattle ages/level where mandible samples >20.

Higham Stage	Wear Stage M3	Approx. Age (months)	#	%
3		1-4	3	1.1
4		5-5	13	5.0
5		6-7	11	4.2
6		7-9	5	1.9
7		8-13	7	2.7
8		15-16	4	1.5
9		16-17	9	3.4
10		17-18	4	1.5
11		18-24	9	3.4
12		24	6	2.3
13		24-30	10	3.8
14	A	30	3	1.1
15	B	30-31	11	4.2
16	C	31-32	12	4.6
17	D	32-33	9	3.4
18	E	36	6	2.3
19	F	36-38	2	0.8
20	G		61	23.2
-	H		7	2.7
-	J		21	8.0
-	K		41	15.6
-	L		5	1.9
-	M		3	1.1

### Cattle age/slaughter by tooth wear

Approx. Age (months)	Bone	Fused	Unfused	% Fused
7-10	Scapula	501	52	90.6%
	Pelvis	431	25	94.5%
12-18	Humerus d	634	68	90.3%
	Radius p	606	29	95.4%
24-30	Metacarpal d	361	99	78.5%
	Tibia d	482	122	79.8%
27-36	Metatarsal d	317	104	75.3%
36-42	Calcaneus	325	125	72.2%
42	Femur p	389	170	69.6%
42-48	Humerus p	233	91	71.9%

	Radius d	360	182	66.4%
	Femur d	309	112	73.4%
	Tibia p	304	219	58.1%
	Ulna p	126	93	57.5%

### Epiphyseal fusion of cattle bones.

Bone/Measurement	No.	Min.	Max.	Mean	S.D.	Var.
<b>Scapula</b>						
GLP	127	55.2	79.8	64.6	4.7	22.4
LG	127	44.7	68.6	54.0	4.4	19.0
SLC	79	41.0	61.8	50.	5.2	27.3
<b>Humerus</b>						
Dp	2	66.3	88.2			
Bd	10	64.8	91.3	74.2	7.5	55.5
Bt	77	57.5	80.8	68.4	5.1	25.5
<b>Radius</b>						
GL	20	242.0	296.0	265.2	17.0	289.4
Bp	100	60.2	88.9	75.7	5.0	25.0
Bd	21	54.5	86.0	67.2	7.4	54.5
Sd	20	33.8	45.3	38.2	2.9	8.2
<b>Ulna</b>						
GL	2	262.0	281.0	271.0	9.1	91.0
BPC	11	71.3	83.7	75.3	3.1	9.9
<b>Metacarpal</b>						
GL	174	162.0	203.0	181.4	6.9	48.0
Bp	201	45.9	64.5	53.4	4.0	15.7
Bd	219	46.1	68.9	54.6	4.8	22.6
Sd	172	22.0	36.9	29.3	2.8	8.0
<b>Pelvis</b>						
LA	30	52.1	63.9	58.6	2.4	5.7
<b>Femur</b>						
Bp	30	102.0	129.0	108.5	7.5	55.8
Bd	30	80.0	98.6	87.5	6.3	39.3
<b>Tibia</b>						
GL	7	273.0	351.1	309.8	22.6	511.1
Bp	51	79.9	96.1	87.3	3.8	14.8
Bd	224	44.8	66.7	57.0	3.5	12.3
Sd	7	22.5	54.9	34.0	10.0	99.7
<b>Calcaneus</b>						
GL	236	111.7	174.0	125.5	7.6	57.1
<b>Astragalus</b>						
GLI	231	48.0	68.2	60.4	2.6	6.9
Bd	229	27.5	49.6	38.9	2.8	8.1
<b>Metatarsal</b>						
GL	154	188	233	206.4	7.5	56.4
Bp	180	37.5	52.9	44.0	2.9	8.5
Bd	186	42.0	61.0	50.6	3.8	14.2
Sd	148	20.8	33.9	26.4	2.5	6.4

### Cattle bone measurements

GL	Bp	Bd	Sd	S.I.	Sex	E.W.H.
196	61.1	61.3	33.1	16.8	M	122.5 cm
186	578.9	60.7	32.3	17.3	M	116.5 cm
182	63.0	65.6	37.3	20.4	M	113.8 cm
175	56.4	32.3	60.7	17.3	M	109.4 cm
192	54.5	55.6	30.7	15.9	F	115.2 cm
190	54.5	55.5	39.3	15.9	F	114.0 cm
187	51.2	51.6	28.4	15.1	F	112.2 cm
186	53.4	54.3	29.9	16.0	F	111.6 cm
183	53.7	54.7	27.7	15.1	F	109.8 cm
183	50.5	53.5	28.6	15.6	F	109.8 cm
183	50.5	15.1	27.6	15.0	F	109.8 cm
176	50.0	51.4	27.8	15.7	F	105.6 cm
175	-	49.4	26.9	15.3	F	105.0 cm
173	49.6	51.8	28.4	16.4	F	103.8 cm
170	49.7	50.5	28.3	16.6	F	102.0 cm

**Cattle metacarpals measurements (mm), gender identification and estimated withers heights (cm)**

GL	Bp	Bd	Sd	S.I.
185.0	51.5	51.4	29.1	15.730
181.0	52.4	52.2	27.7	15.304
191.0	54.1	53.5	27.6	14.450
181.0	51.6	50.9	30.0	16.575
197.0	60.9	65.5	36.2	18.376
192.0	56.9	54.4	31.9	16.615
172.0	59.2	62.0	34.4	20.000
186.0	52.4	52.6	26.3	14.140
191.0	63.9	65.7	35.6	18.639
180.0	50.1	48.9	27.0	15.000
179.0	50.6	48.9	26.4	14.749
196.0	64.5	66.4	35.6	18.163
180.0	52.9	56.5	30.3	16.833
181.0	51.3	53.4	29.9	16.519
170.0	48.9	51.2	26.9	15.824
178.0	52.3	53.2	28.1	15.787
175.0	55.8	57.1	31.1	17.771
179.0	49.4	49.3	26.3	14.693
190.0	57.1	59.4	32.0	16.842
203.0	60.5	60.0	33.5	16.502
169.0	49.9	50.5	26.1	15.444
190.0	52.2	53.4	30.7	16.158
181.0	57.9	58.0	31.9	17.624
185.0	54.0	56.1	30.8	16.649
177.0	51.9	52.6	26.8	15.141
176.0	56.6	57.6	31.5	17.898
182.0	51.4	53.1	29.6	16.264
187.0	54.9	56.6	29.0	15.508
186.0	56.8	59.8	33.8	18.172
176.0	49.1	51.8	27.9	15.852
179.0	49.4	53.8	28.7	16.034
181.0	50.6	51.3	26.5	14.641
191.0	63.9	64.6	34.9	18.272
185.0	50.5	52.0	28.9	15.622
182.0	56.7	-	30.0	16.484

GL	Bp	Bd	Sd	S.I.
175.0	49.9	47.8	26.7	15.257
176.0	49.5	49.9	26.1	14.830
180.0	51.1	53.1	30.1	16.722
190.0	52.6	55.2	30.1	15.842
192.0	59.9	64.4	33.9	17.656
194.0	61.3	63.4	32.6	16.804
173.0	56.8	58.9	31.5	18.208
180.0	51.1	50.6	28.0	15.556
178.0	50.6	52.9	26.9	15.112
201.0	61.0	63.0	36.2	18.010
180.0	51.9	51.9	28.8	16.000
183.0	59.9	65.2	35.4	19.344
190.0	55.6	53.8	27.3	14.368
171.0	62.1	68.9	35.9	20.994
173.0	52.8	53.9	28.9	16.705
177.0	49.9	50.3	26.3	14.859
188.0	59.1	64.8	32.9	17.500
177.0	50.1	53.1	27.3	15.424
189.0	54.0	52.6	29.1	15.397
181.0	51.4	53.1	28.0	15.470
180.0	50.9	50.1	27.0	15.000
190.0	51.2	54.0	28.7	15.105
182.0	52.8	51.2	28.3	15.549
183.0	52.1	51.9	27.7	15.137
167.0	48.9	51.2	26.3	15.749
178.0	56.3	57.9	29.9	16.798
180.0	54.1	54.1	29.1	16.167
178.0	53.7	54.1	28.8	16.180
178.0	50.6	50.5	27.1	15.225
185.0	51.0	52.4	27.2	14.703
177.0	48.0	50.6	25.9	14.633
182.0	59.4	66.1	34.1	18.736
171.0	55.1	56.4	31.4	18.363
175.0	50.0	51.5	30.2	17.257
183.0	55.1	52.3	27.9	15.246

GL	Bp	Bd	Sd	S.I.
183.0	58.5	63.9	33.9	18.525
185.0	48.1	53.4	29.5	15.946
167.0	55.1	59.1	34.0	20.359
180.0	57.6	60.9	33.6	18.667
178.0	51.4	50.7	26.3	14.775
188.0	53.2	56.5	29.8	15.851
184.0	61.3	63.1	33.0	17.935
180.0	59.0	61.1	33.3	18.500
181.0	49.9	50.8	28.9	15.967
179.0	53.1	53.1	29.2	16.313
192.0	51.5	53.2	27.8	14.479
179.0	54.9	55.1	29.8	16.648
178.0	51.9	53.0	28.9	16.236
180.0	52.9	51.0	29.1	16.167
182.0	50.9	51.5	27.6	15.165
183.0	51.0	52.8	27.1	14.809
175.0	51.8	53.2	27.3	15.600
178.0	51.4	51.2	27.3	15.337
185.0	52.6	53.6	29.1	15.730
180.0	52.3	53.1	26.4	14.667
190.0	54.1	52.5	27.8	14.632
181.0	50.0	50.8	28.1	15.525
176.0	49.5	52.8	28.9	16.420
178.0	46.1	54.0	28.3	15.899
172.0	57.9	61.0	33.9	19.709
176.0	51.3	51.1	28.6	16.250
186.0	51.6	52.5	28.0	15.054
176.0	-	62.4	32.9	18.693
178.0	50.8	50.9	22.2	12.472
181.0	51.1	51.1	22.7	12.541
171.0	47.3	46.1	25.5	14.912
175.0	49.4	51.1	26.8	15.314
182.0	50.4	52.0	30.5	16.758
191.0	-	51.1	27.8	14.555
172.0	47.1	48.8	26.9	15.640
177.0	47.5	49.9	27.3	15.424
191.0	52.1	52.9	27.9	14.607
193.0	58.0	61.4	33.0	17.098
173.0	49.2	49.4	25.6	14.798
162.0	45.9	49.8	27.0	16.667
179.0	50.5	51.8	31.1	17.374
185.0	51.4	49.6	27.6	14.919
173.0	56.4	56.6	32.0	18.497
170.0	49.6	51.7	29.3	17.235
185.0	54.4	53.8	29.9	16.162
183.0	-	58.3	32.0	17.486
180.0	52.1	55.3	28.3	15.722
200.0	63.1	68.2	36.9	18.450
179.0	52.3	54.4	30.3	16.927

GL	Bp	Bd	Sd	S.I.
196.0	61.5	63.9	34.1	17.398
182.0	50.5	52.7	28.6	15.714
186.0	55.0	53.9	30.9	16.613
186.0	53.1	52.0	27.6	14.839
173.0	52.6	54.4	29.9	17.283
174.0	52.4	54.5	30.0	17.241
183.0	48.5	50.1	26.3	14.372
176.0	58.5	59.6	32.5	18.466
184.0	53.7	54.0	27.5	14.946
170.0	50.5	51.3	26.5	15.588
186.0	51.3	52.9	29.2	15.699
175.0	49.2	51.3	30.0	17.143
186.0	52.6	51.9	29.5	15.860
186.0	54.1	54.9	31.9	17.151
184.0	53.1	52.7	32.0	17.391
177.0	59.9	65.9	34.6	19.548
186.0	53.9	52.6	27.4	14.731
187.0	53.5	51.9	25.9	13.850
184.0	59.5	64.9	27.0	14.674
180.0	51.1	53.2	27.6	15.333
172.0	48.3	49.5	22.0	12.791
185.0	46.2	59.9	32.6	17.622
176.0	48.5	49.9	26.1	14.830
186.0	56.1	56.5	31.2	16.774
178.0	50.5	53.6	27.9	15.674
186.0	58.9	60.3	32.2	17.312
180.0	52.4	55.2	30.9	17.167
192.0	59.5	60.2	30.9	16.094
171.0	51.1	50.7	26.9	15.731
182.0	51.9	51.7	29.2	16.044
181.0	48.6	49.0	25.6	14.144
177.0	49.5	50.5	25.9	14.633
183.0	53.1	53.5	30.0	16.393
177.0	49.6	49.9	28.1	15.876
172.0	49.1	50.4	27.9	16.221
187.0	51.9	52.8	27.8	14.866
171.0	49.5	52.5	28.6	16.725
185.0	55.6	55.2	31.1	16.811
173.0	53.5	54.4	31.0	17.919
188.0	52.9	53.9	30.2	16.064
182.0	51.8	52.4	28.3	15.549
172.0	53.1	54.3	31.3	18.198
181.0	52.4	53.7	28.4	15.691
192.0	53.1	54.3	27.3	14.219
185.0	50.7	51.4	26.7	14.432
184.0	50.1	50.4	26.1	14.185

#### Cattle metacarpal measurements



**Sheep/Goat:**

Higham Stage	Approx. Age (months)	No.	%
4	3	1	0.9
5	4	2	1.7
6	5	4	3.5
7-8	5-9	9	7.8
9	9-10	1	0.9
10-11	10-12	2	1.7
12	12-21	22	19.1
13	21-24	13	11.3
14	25-26	24	20.9
15+	26+	37	32.2

**Age/slaughter pattern of sheep/goats based on tooth eruption**

Element	% Fused	% Unfused	No.
Humerus p	46.9	53.1	32
Humerus d	97.4	2.6	78
Radius p	96.4	3.6	111
Radius d	44.9	55.1	69
Ulna p	64.3	35.7	14
Metacarpal d	48.7	51.3	78
Pelvis	1.1	98.9	93
Femur p	35.0	6.5	40
Femur d	30.0	70.0	40
Tibia p	42.3	57.7	52
Tibia d	68.1	31.9	116
Metatarsal d	58.9	41.1	95

**Epiphyseal fusion data for sheep/goats**

Bone/Measurement	No.	Min.	Max.	Mean	S.D.	Var.
<b>Scapula</b>						
GLP	23	25.9	32.4	28.6	1.8	3.1
LG	23	20.1	25.3	22.2	1.5	2.3
SLC	22	14.9	21.4	17.4	1.4	2.0
<b>Humerus</b>						
GL	2	115.3	129.1	122.2		
Dp	2	36.6	39.1	37.8		
Bd	7	24.1	28.1	26.8	1.4	2.0
Bt	7	23.4	27.6	25.9	1.3	1.8
Sd	2	12.4	13.5			
<b>Radius</b>						
GL	9	125.3	137.7	130.9	4.7	21.6
Bp	11	24.9	29.3	26.9	1.5	2.3
Bd	9	22.4	25.3	24.5	0.9	0.9
Sd	9	12.9	14.6	13.8	0.8	0.6
<b>Metacarpal</b>						
GL	25	101.9	123.5	114.3	5.9	35.2
GP	16	18.3	22.0	19.8	1.1	1.2
Bd	20	21.3	25.2	22.7	1.1	1.1
SD	16	10.6	14.5	12.8	1.2	1.5
<b>Femur</b>						
Bp	5	35.8	41.8	38.6	2.4	6.1

<b>Tibia</b>						
GL	3	177.0	189.0	183.0		
Bp	3	35.1	37.9	36.8	1.5	2.3
Bd	2	22.6	24.0	23.3		
Sd	2	11.9	12.3	12.1		
<b>Astragalus</b>						
GLI	1			24.1		
Bd	1			15.6		
<b>Metatarsal</b>						
GL	18	102.7	129.9	119.0	7.0	49.7
Bp	18	15.6	19.6	17.4	1.0	1.0
Bd	18	19.8	22.6	21.1	0.9	0.8
Sd	16	9.6	11.7	10.5	6.4	4.1

#### Sheep bone measurements

GL	Bp	Bd	Sd	S.I.
108.0	19.5	21.5	14.5	13.426
107.5	18.4	22.4	10.6	9.860
109.5	17.9	20.9	11.9	10.868
113.5	20.1	22.9	12.1	10.661
101.9	18.9	22.1	12.1	11.874
105.5	18.3	21.6	12.5	11.848
113.9	20.3	22.1	12.1	10.623
122.3	20.9	23.9	13.3	10.875
123.5	22.0	24.6	13.7	11.093
113.6	20.2	23.3	13.6	11.972
115.0	19.9	22.2	13.4	11.652
123.1	22.0	24.3	14.4	11.698
117.1	18.6	21.3	11.1	9.479
108.4	20.5	22.7	14.1	13.007
116.5	20.0	21.3	11.7	10.043
116.6	21.1	22.9	12.3	10.549
113.1	19.6	21.1	12.6	11.141
112.9	21.2	24.1	13.6	12.046
106.2	18.5	21.3	12.4	11.676
119.9	21.4	24.0	13.2	11.009
113.1	19.2	22.9	11.9	10.522
119.1	20.4	23.5	13.9	11.671

#### Sheep metacarpal measurements

	GL	Bp	Bd	Sd	E.W.H.
<b>Sheep</b>	112.5	19.5	23.3	13.0	55.0 cm
	100.6	19.8	20.9	11.1	54.1 cm
	114.0	20.9	24.6	13.1	55.7 cm
<b>Goat</b>	120.5	23.2	25.9	13.3	69.3 cm
	112.5	23.9	26.9	15.9	64.7 cm

#### Sheep/Goat metacarpals measurements (mm) and estimated withers height (cm)

<b>Bone/Measurement</b>	<b>No.</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>S.D.</b>	<b>Var.</b>
<b>Scapula</b>						
GLP	1			26.9		
LG	1			20.6		
SLC	1			16.9		
<b>Metacarpal</b>						
GL	2	107.5	114.4	110.9		
GP	2	23.2	23.5	23.3		
Bd	2	26.5	26.9	26.7		
SD	2	15.1	16.1	15.6		
<b>Metatarsal</b>						
GL	4	117.9	124.9	120.2	3.2	10.5
Bp	4	19.1	19.9	19.4	0.3	0.1
Bd	4	23.0	28.9	25.1	2.6	6.8
Sd	4	11.4	14.2	12.9	1.2	1.6

#### **Measurements of goat bones**

<b>GL</b>	<b>Bp</b>	<b>Bd</b>	<b>Sd</b>	<b>S.I.</b>
114.4	23.2	26.9	16.1	14.073
107.6	20.1	21.9	13.9	12.918
112.5	20.6	21.8	11.8	10.489
107.5	23.5	26.5	15.1	14.047
106.1	19.6	21.9	13.0	12.253

#### **Goat metacarpal measurements**

#### **Pig:**

<b>Higham Stage</b>	<b>Approx. Age (months)</b>	<b>No.</b>	<b>%</b>
1	Foetal	1	0.1
5	2-4	1	0.1
6	4-5	7	0.7
7	5-6	5	0.5
8	6-7	3	0.3
9	7-8	7	0.7
10	8-9	7	0.7
11	9-10	138	14.3
12	10-11	73	7.6
13	11-12	40	4.2
14-17	12-17	50	5.2
18	17-19	126	13.1
19	19-21	178	18.5
20	21-23	80	8.3
21	23-25	106	11.0
22	25-27	73	7.6
23	27-29	39	4.0
24+	30+	30	3.1

#### **Pig ageing data based on tooth eruption**

Approx. Age (months)	Eruption Stage	Female		Male	
		#	%	#	%
8-12	10-13	4	3.6	9	12.3
12-17	14-17	2	1.8	3	4.1
17-19	18	11	9.8	18	24.7
19-21	19	13	11.6	27	37.0
21-23	20	12	10.7	10	13.7
23-25	21	26	23.2	6	8.2
25-27	22	24	21.4	-	-
27-29	23	12	10.7	-	-
30+	24+	8	9.6	-	-

#### Sex/Age distribution among older pigs

Approx. Age (months)	Bone	Fused	Unfused	% Fused
12	Scapula	109	42	72.2%
	Pelvis	199	54	78.6%
	Radius p.	374	56	86.9%
	Humerus d.	245	68	78.3%
24	Tibia d.	311	294	51.4%
	Metacarpal d.	124	220	36.0%
27	Metatarsal d.	119	304	28.1%
24-32	Calcaneus	17	86	16.5%
36-42	Ulna	30	267	10.1%
42	Humerus p.	11	109	9.2%
	Radius d.	13	218	5.6%
	Femur p.	14	131	9.6%
	Femur d.	18	193	8.5%
	Tibia p.	21	226	8.5%

#### Epiphyseal fusion data for pig bones

Bone/Measurement	No.	Min.	Max.	Mean	S.D.	Var.
<b>Teeth</b>						
M3	177	23.8	37.9	30.2	1.7	5.2
<b>Scapula</b>						
GLP	51	31.1	40.2	34.0	2.1	4.3
LG	51	24.7	32.4	28.7	2.0	4.0
SLC	43	20.0	27.9	22.6	1.6	2.5
<b>Humerus</b>						
GL	1			176.0		
Dp	2	55.0	56.9	55.9		
Bd	105	27.6	42.6	37.3	2.1	4.6
Bt	125	25.1	33.3	28.6	1.6	2.5
Sd	1			14.6		
<b>Radius</b>						
GL	7	128.2	144.0	134.9	5.8	34.1
Bp	86	24.9	31.6	27.9	1.4	2.1
Bd	7	16.4	29.3	30.9	1.6	2.5
Sd	6	15.9	20.0	17.1	4.4	21.8
<b>Metacarpal III</b>						
GL	59	63.2	84.1	69.5	3.5	12.3
<b>Metacarpal IV</b>						
GL	50	57.7	77.0	68.8	3.5	12.2

<b>Pelvis</b>						
LAR	84	25.9	32.9	29.5	1.6	2.5
<b>Femur</b>						
GL	1			197.0		
Bp	3	48.9	51.1	50.0	1.1	1.2
Bd	3	39.3	47.9	43.4	4.3	18.5
<b>SD</b>	1			16.5		
<b>Tibia</b>						
GL	12	166.0	196.0	177.1	8.2	66.9
Bp	9	42.1	49.9	44.6	2.4	5.6
Bd	197	24.7	33.9	27.9	1.6	2.5
Sd	12	16.7	19.9	18.2	1.1	1.1
<b>Calcaneus</b>						
GL	16	65.5	82.5	73.7	4.1	17.1
<b>Astragalus</b>						
GLI	37	34.3	41.8	38.5	1.9	3.5
Bd	32	21.1	26.1	23.4	1.6	2.5
<b>Calcaneus</b>						
GL	16	65.5	82.5	73.7	4.1	17.1
<b>Metatarsal II</b>						
GL	47	70.2	81.5	75.3	2.6	6.8
Metatarsal IV						
GL	48	68.6	90.3	80.8	4.9	23.7

#### Pig bone measurements

#### Horse:

Bone/Measurement	No.	Min.	Max.	Mean
<b>Scapula</b>				
GLP	1			78.9
LG	1			47.2
SLC	1			53.7
<b>Humerus</b>				
GL	1			264
Dp	1			92.2
Bd	1			75.0
Sd	1			35.2
<b>Radius</b>				
Bp	1			81.9
<b>Metacarpal</b>				
GL	1			209
GP	1			50.9
Bd	1			49.9
SD	1			33.5
<b>Tibia</b>				
Bd	1			67.5
<b>Astragalus</b>				
GLI	2	51.9	57.0	54.5
<b>Metatarsal</b>				
GL	1			228
Bp	1			42.5
Bd	1			41.2
Sd	1			28.0

#### Horse bone measurements

**'Dun Emer', Lusk, Co. Dublin**

Grid Reference: **32081/25418**

SMR No: **N/A**

Reference: **Giacometti 2007a; Lynch 2007.**

A large east-west running field boundary appears to mark the first early medieval phase on site. This has been tentatively dated *c.* A.D. 650. This boundary was integrated into the subsequent enclosure complex as the northern ditch of the main and eastern enclosures, and the southern ditch of the Northern Enclosure. The Main Enclosure encompassed an area 38m x 32m; while the Eastern Enclosure was smaller at 21m x 19m. The Northern Enclosure was the smallest of the three (9m x 8m) and its surrounding ditches appear to have been deepened during the lifetime of the nearby kiln.

There is no causeway across the ditches into the Main Enclosure. Two symmetrical depressions on the outer edge of the southern ditch, and two postholes on its inner side have been interpreted as evidence for supports for a timber bridge structure. Another possible 'bridge' was tentatively identified over the west ditch of the Main Enclosure. A cobbled or metalled surface appears to have been deliberately laid in the ditch of the Main Enclosure during the occupation of the site, although the purpose of this feature remains unclear. Animal bones, shell and slag was noted amid and beneath this cobbled surface, and one fragment of Dublin Type Ware (dating from the 12<sup>th</sup>/14<sup>th</sup> centuries was found in the upper fill of the ditch. This was the only dateable artefact recovered from the ditch, but would appear to have been introduced into the ditch by later agricultural activity. A curvilinear ditch that ran across the site on an east-west orientation may belong to this phase of use. This feature generally followed the course of the ditches forming the southern sides of the eastern enclosure and main enclosure, and cut through the uppermost fills of these ditches. It is likely that this later ditch was originally dug when the early medieval enclosure ditches were almost filled up, but still visible.

There are a number of structural features associated with this enclosure complex. Two probable house structures have been identified in the interior of the Main Enclosure. Structure A was defined by 16 postholes centred on a hearth, creating a semi-circular or oval feature approximately 6m wide. Two shallow stakeholes located next to the scorched pit may be evidence of the uprights associated with a cooking spit. Seven postholes found to the south and west of Structure A did not form any obvious pattern or structure, however a very tentative interpretation may be that they formed two lines for fences, which may have created a pen in the corner of the enclosure. Structure B was outlined by 20 postholes forming a roughly oval shape approximately 11m in length and 7m wide.

A large deep pit (1.70m in diameter and 1.40m deep) to the south of the Eastern Enclosure shows signs of having been filled with water. A narrow snaking drain ran into the pit from the south-west and would appear to be contemporary with the pit and in simultaneous use. The pit has been interpreted as a cistern or well for the provision of clean drinking water.

A large bowl-shaped kiln was found 10m north of the Northern Enclosure. Three postholes were noted around the kiln - two around the flue - which may indicate the presence of a structure over the kiln or of a raised drying platform over the bowl. Another two small keyhole-shaped kilns were found - one to the west of the Main Enclosure, and another to the southeast.

The enclosure complex appears to have been taken deliberately dismantled at the end of its occupation phase. Radiocarbon dating of small fragments of charcoal from the lower portion of the ditches returned a range of possible dates for this abandonment, with the most likely spanning the years A.D. 758-883 and A.D. 765-890. Wooden structural supports were removed intentionally, rather than being burnt down or allowed to rot naturally, as all of the post sockets were clean and contained no charcoal. The large posts supporting the bridge into the main enclosure seemed to have been removed before the ditch was allowed to fill in, suggesting the farmstead was dismantled as the inhabitants were leaving. Although the enclosures were not occupied, the land in and around it continued to be managed, and was probably cultivated and used as pasture. Temporary hearths were found in the uppermost portions of the ditch, and charcoal from one of these was radiocarbon dated to A.D. 803-972. These hearths were located almost at the top of the in-filled enclosure ditch, and the date indicates that the enclosure ditches were completely silted up by the end of the tenth century.

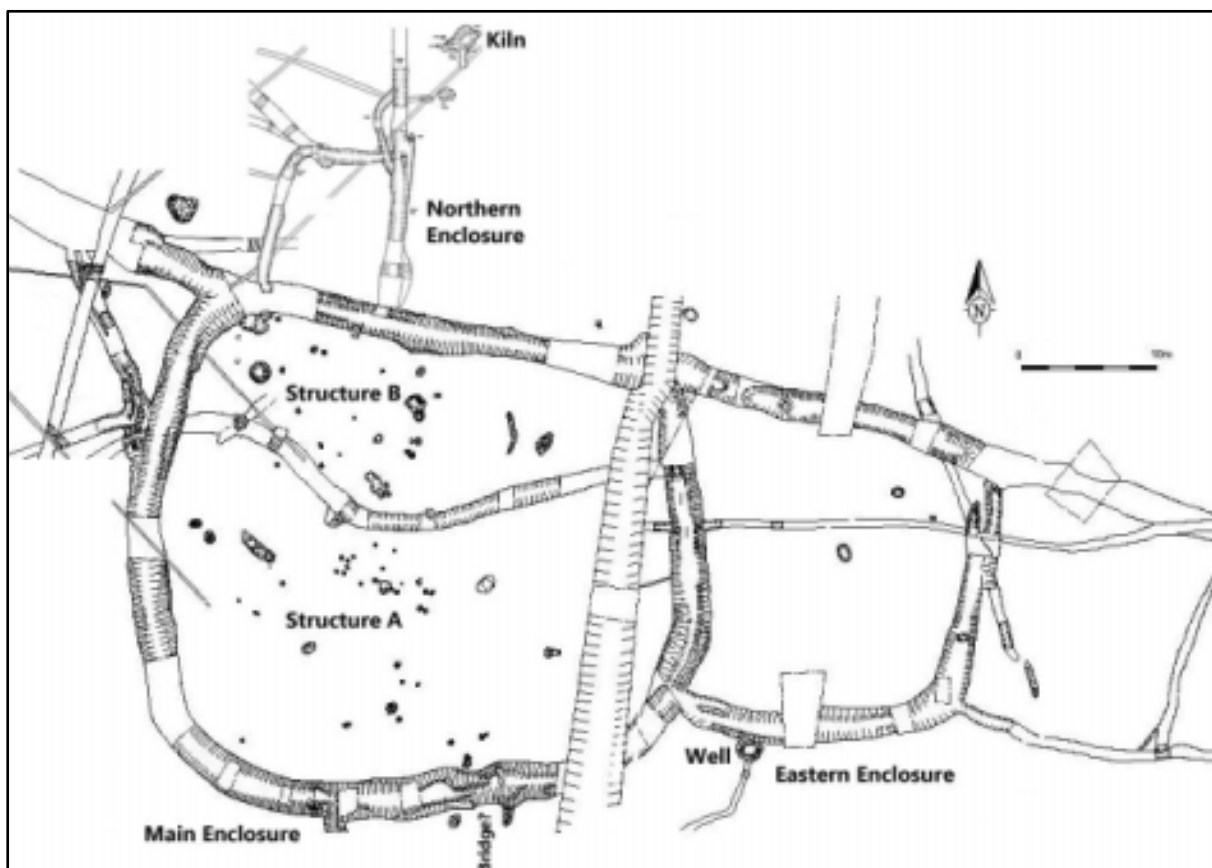
### Animal Bones:

In total, 2,661 animal bones were recovered from the site, but as a result of poor soil conditions, only 50% were identifiable.

Context	Cattle	Sheep/ Goat	Pig	Horse	Deer	Dog	Cat	Hare	Date
Fill of early curvilinear ditch	3	-	-	-	-	-	-	-	
Eastern Enclosure ditch	8	2	-	-	-	-	1	-	A.D. 688-890.
Re-cut of Main Enclosure Ditch	6	4	2	-	-	-	-	1	A.D. 688-890?
Above cobbles in Main Enclosure Ditch	12	7	6	3	2	3	-	1	c. 9 <sup>th</sup> C
Upper fill of Main Enclosure Ditch	9	5	3	-	-	2	-	-	A.D. 780-972
Late Ditch	3	2	-	-	-	-	-	-	

### MNI from features at 'Dun Emer', Co. Dublin

No deer antler bones were recovered, suggesting that the animals were being used as a meat source.



Plan of main enclosure at Dun Emer, Lusk, Co. Dublin (after Giacometti 2007a)

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-7143	Hearth in Structure A	1398 $\pm$ 32 BP	<b>A.D. 596-672</b>
UB-7144	Hearth dump in upper layer of ditch	1151 $\pm$ 30 BP	A.D. 780-792; <b>A.D. 803-972</b>
UB-7145	Eastern ditch	1214 $\pm$ 31 BP	<b>A.D. 693-748;</b> <b>A.D. 765-890.</b>
UB-7146	Hearth (C213)	3907 $\pm$ 35 BP	<b>2478-2288 B.C.</b>
UB-7147	Ditch (C68)	2509 $\pm$ 33 BP	<b>789-536 B.C.;</b> 533-521 B.C.
UB-7148	Posthole	1246 $\pm$ 32 BP	<b>A.D. 681-870</b>
UB-7149	Large kiln	1337 $\pm$ 32 BP	<b>A.D. 644-721;</b> <b>A.D. 741-770.</b>
UB-7150	Small kiln	1288 $\pm$ 32 BP	<b>A.D. 658-779</b>
UB-7151	Eastern ditch	1230 $\pm$ 34 BP	<b>A.D. 688-754;</b> <b>A.D. 758-883.</b>

## Animal Bones Appendix:

Species	Element	Estimated age of slaughter
Cattle	Metatarsal	Neonate
	pM1-3	>3 weeks
	pM3	>3 weeks
	Scapula	7-10 mnths
	Humerus, d (U)	12-18 mnths
	M 2-3	<15 mnths
	Phalanx, p (U)	<15-18 mnths
	M2	15-18 mnths
	M2	15-18 mnths
	Metacarpal, d (U)	18 mnths
	Tibia, d (U)	<24 mnths
	Mandible	24-30 mnths
	M1-2	24-30 mnths
	Femur, p (U)	36-42 mnths
	Femur, p (U)	36-42 mnths
	Tibia, p (U)	<4 yrs
	Tibia, p (U)	<4 yrs
Sheep	Pelvis (U)	<5 mnths
	Metatarsal, d (U)	20-24 mnths
	Metatarsal, d (U)	20-24 mnths
	Femur, p (U)	<42 mnths
Pig	Mandible	10-15 mnths
	Mandible	16-22 mnths
	M3	<18-24 mnths
	M3	<18-24 mnths
Horse	PM & M	18 yrs +

## Age of slaughter/death of domesticates at Lusk, Co. Dublin



**Dún Eoghanachta, Inis Mór, Co. Galway**Grid Ref: **8116/21137**SMR: **GA110-020---**Reference: **Cotter 1995; Murray 1999; Jones 2004; McCormick & Murray 2007.**

Dún Eoghanachta is a univallate stone fort, 26m in internal diameter, located on Inis Mór in Co. Galway. Radiocarbon dating suggests that the site was constructed *c.* A.D. 650-800, and occupation carried through into the tenth and early eleventh century.

The enclosing stone wall of the fort was 'repaired' during the 19<sup>th</sup> century, and three structures stand in the interior. The largest (Structure C) is rectangular in plan and may be medieval or later in date. Structure B is conjoined to the south side of Structure C and also rectangular in plan. It consists of a lean-to abutting the fort wall and the structure partly obstructs a set of steps in the rampart. Structure A also abuts the west wall of the fort and is irregular in plan. The north wall and the doorway in the east wall are partly obscured by a build-up of rubble.

Excavations beneath the occupation surface in Structure C revealed midden dumps that produced an iron ring-headed pin, an amber bead and a slotted-and-pointed iron tool. These dumps were probably contemporary with the construction of the fort. Spreads of darker charcoal-rich soil may represent the remains of hearths.

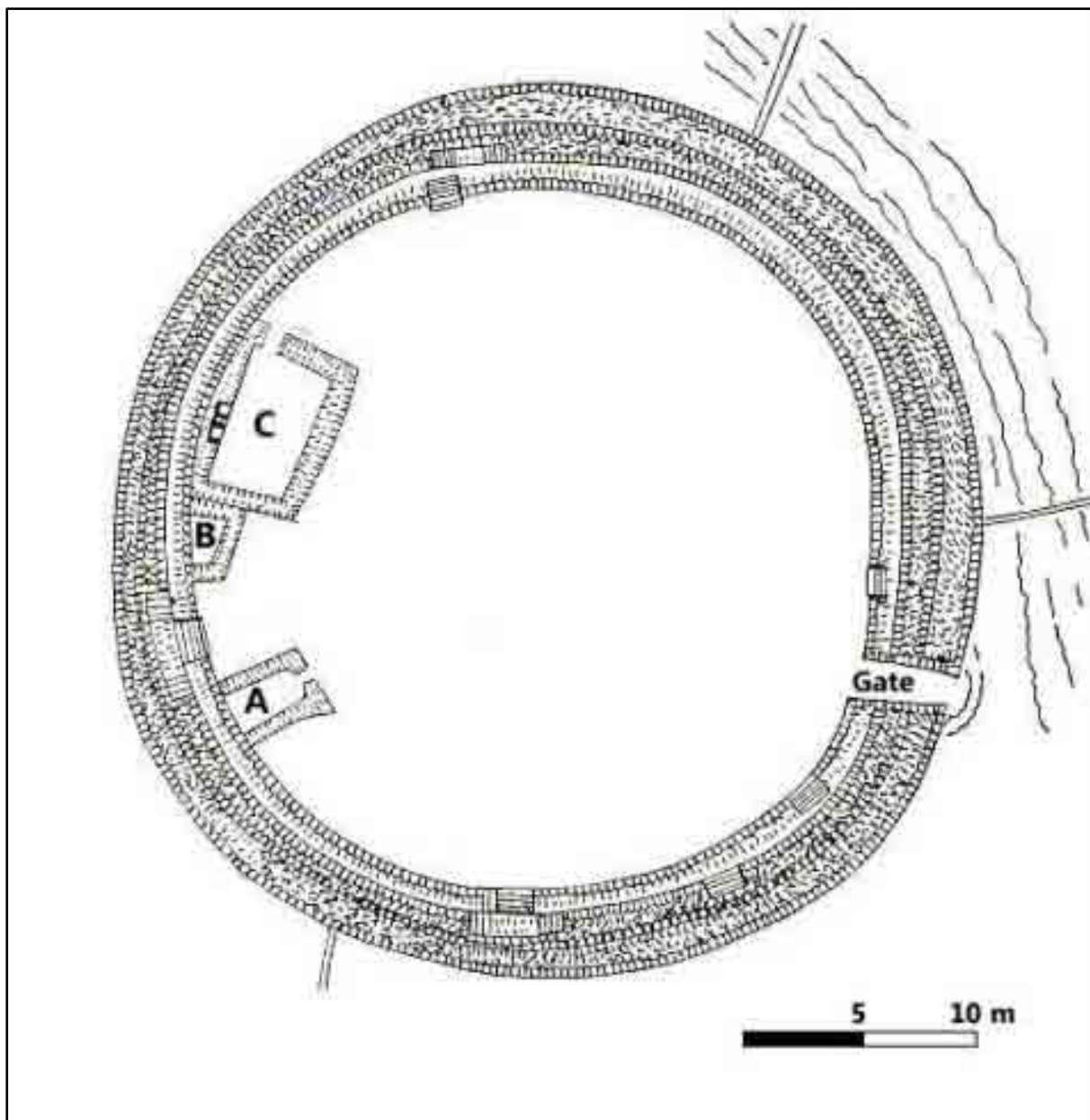
**Animal Bones:**

The mammal bone assemblage from Dún Eoghanachta amounted to 1172 fragments. These have been analysed in three groups based on the site stratigraphy - Levels 1 and 2; Level 3; and Level 4.

Phase		Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Red Deer	Seal	Otter	Date
1 & 2	NISP	443	458	89	15	15	-	3	8	5	
	% NISP	42.8	44.2	8.6	1.4	1.4	-	0.3	0.8	0.5	
	MNI	6	8	3	1	2	-	1	1	1	
	% MNI	26.1	34.6	13	4.4	8.7	-	4.4	4.4	4.4	
3	NISP	24	17	2	1	8	-	-	-	-	
	% NISP	46.2	32.7	3.8	1.9	15.4	-	-	-	-	
	MNI	2	1	1	1	1	-	-	-	-	
4	NISP	30	28	3	22	-	1	-	-	-	
	% NISP	35.7	33.3	3.6	26.2	-	1.2	-	-	-	
	MNI	1	3	1	1	-	1	-	-	-	

**NISP and MNI from Dún Eoghanachta, Co. Galway**

Two sheep/goat mandibles indicated age at death at around 25-26 months and at 28 months or older. The presence of unfused epiphyses of various bovine bones was noted indicating the presence of some very young calves. The one estimated shoulder height for dog was calculated as 23.9 cm.



**Dún Eoghanachta, Co. Galway (after Westropp 1910, 19).**

**'Dunbeg Fort' (Fahan td.), Co. Kerry**

Grid Ref: **V35219726 (035219/097269)**

SMR No: **KE052-270001**

Reference: **Barry 1981; Soergel-Harbison 1981**

Excavations at Dunbeg Fort revealed that the site's defensive ditches and banks and internal stone buildings were mostly likely occupied between the eighth and eleventh centuries with some earlier evidence for activity in the late Bronze Age.

The fort itself consists of a stone-built structure (*clochán*) defended by an inner stone rampart and an outer line of five ditches and four banks. A souterrain leads from the rampart entrance under part of the causeway through the earthen defences. The fort's interior was almost completely excavated and trenches were cut across the earthen defences, rampart, causewayed entrance and souterrain.

The earliest phase of activity on the site consisted of a shallow 'U'-shaped ditch which partly underlay the inner stone rampart. Associated with the ditch were a possible dry-stone wall and wattle fence, indicated by a collapse of stone and a layer of charcoal along the length of the ditch. One copper nail was recovered from the topmost layer of the ditch, and a sample from the charcoal layer of the ditch produced a Late Bronze Age/early Iron Age date.

Four lines of early medieval banks remain extant. These were up to 3m wide, with traces of palisade trenches identified on the external crests of Banks 1 and 2. Charcoal from the base of Ditch 1 indicated that it was in use in the eighth/ninth centuries A.D. The inner stone rampart was constructed in two phases. Phase 1 involved the construction of the inner half of the wall and Phase 2 involved the addition of further supports to the entrance, the deepening of Ditch 1, and the construction of a dry-stone wall against the outer face of the Phase 1 rampart.

The dry-stone-built souterrain extends for some 16.50m in a south-west to north-east direction from within the stone rampart entrance out under the line of the entrance causeway and terminating 2.0m south of the outer face of Bank 2. Several section of the souterrain was excavated though no original earthen floor level or artefacts were recovered.

A large dry-stone building (*clochán*) was excavated in the interior of the fort. Its walls were circular shaped externally and rectangular internally and are unlikely to have supported a corbelled roof. Its northwest lintelled doorway was linked with the rampart entrance by a flagged pathway, and the floor of the entrance was lined with several flagstones which extended for 1.40m into the interior of the building. Two phases of activity were identified within this building. The Phase 1 features consisted of a hearth, scatters of stakeholes, areas of burning, a shallow trench and a possible foundation trench for the southern wall. The hearth contained charcoal, animal bone and ash and was associated with a series of stakeholes, indicative of structural supports. Charcoal from the first period of activity produced a radiocarbon date range in the tenth/eleventh centuries. It is possible that the first phase coincided with the construction of the building as there was no evidence for internal structural supports and it is unlikely that such a structure of such size supported a corbelled roof.

The Phase 2 activity was more extensive than Phase 1 and consisted of a habitation concentrated around two central hearths as well as a pit along the southern wall, an area of flagstones inside the northern door and scatters of stakeholes and six-postholes across the interior, except for the north-eastern quadrant. The radiocarbon date from the charcoal from the habitation deposit suggests that both Phase 1 and 2 occupation layers were of short duration and occurred around the tenth century. Finds from the second occupation comprised a possible quern stone and rough pestle and an undecorated stone spindle-whorl. A possible cleat nail was also located in the topsoil of a cutting inside the building.

### Animal Bones:

Almost all of the 814 bone fragments found at Dunbeg were broken into very small fragments, and only 60 fragments (7.4%) were capable of identification.

Phase	Cattle	Sheep/ Goat	Pig	Red Deer	Date
Phase 1	3	9	9	-	A.D. 891-1263
Phase 2	9	16	9	1	A.D. 937-1030

### NISP from phases 1 and 2 at the *clochán*, Dunbeg Fort, Co. Kerry.

There was no evidence for horse and little evidence for fishing.

#### Cattle.

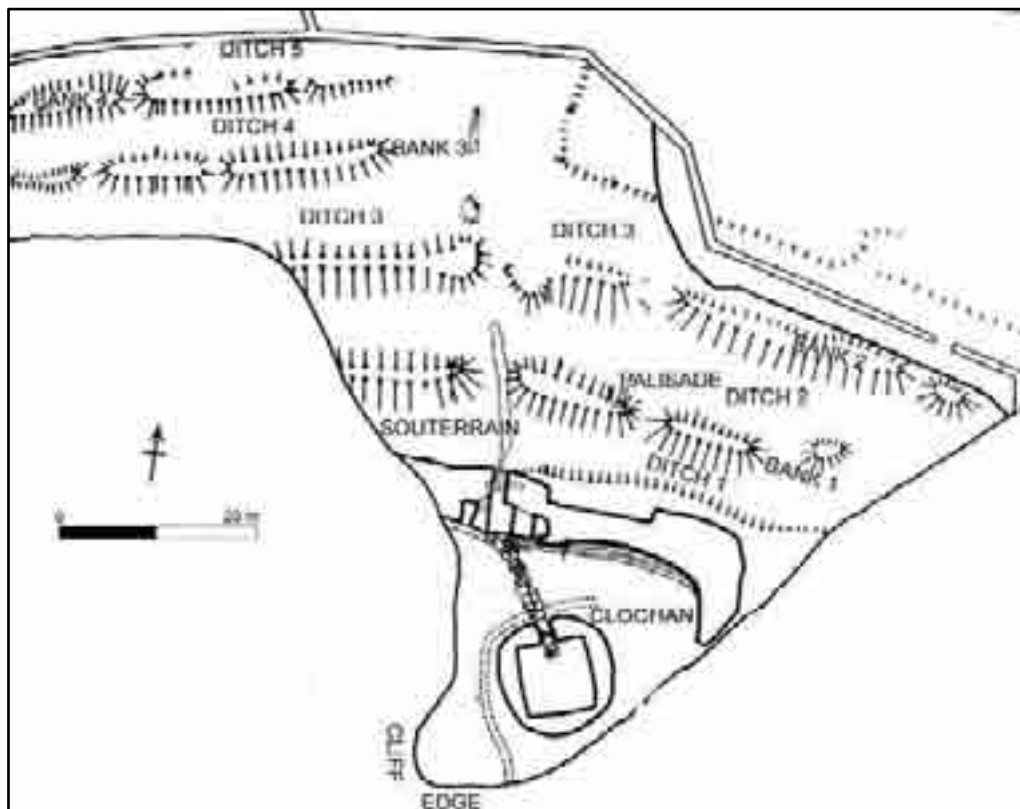
One fragment of a femur diaphysis from Phase 1 comes from a young animal which was scarcely more than 2 years old, while one proximal tibia can be ascribed to an adult beast. Teeth from Phase 2 belong to two animals more than 3½ years old and to two further animals of less than a year old.

#### Sheep/goat.

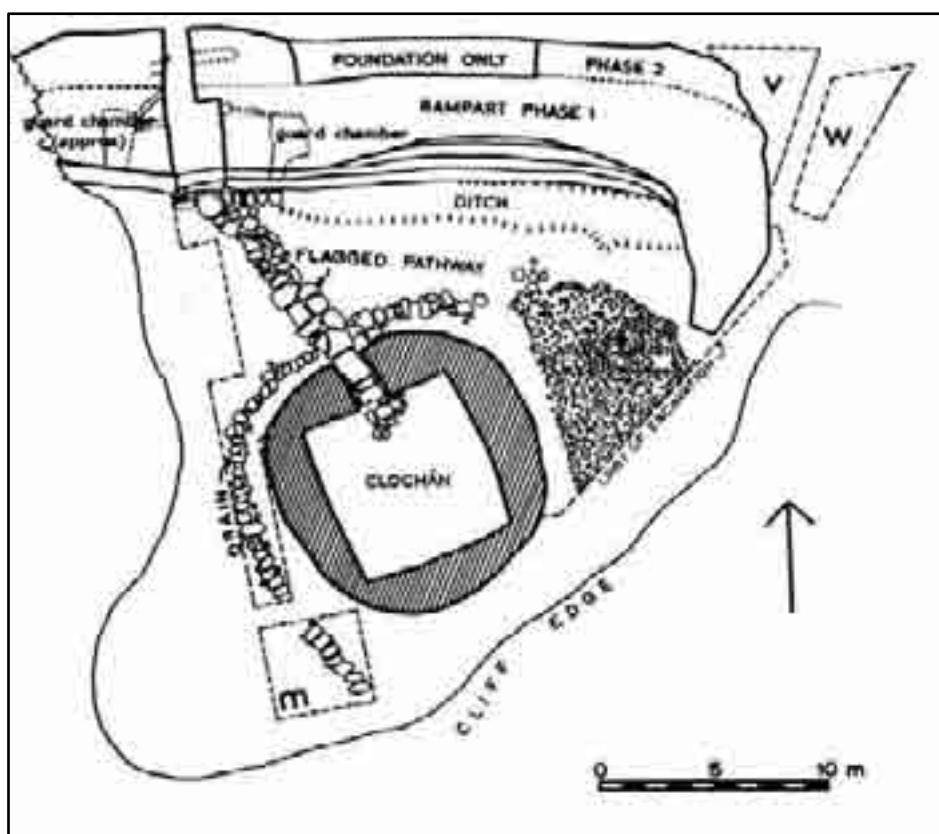
The surfaces of the teeth from Phase 2 show traces of medium wear, suggesting that they belong to a 4-5-year-old animal, and a distal metacarpus diaphysis belonging to a six-month-old animal and a third phalanx belonging to a new-born lamb were also found from this phase.

#### Pig.

Infantile lumbar vertebrae and an unfused phalanx would appear to belong to two separate piglets.



Plan of Dunbeg promontory fort, Co. Kerry (after Barry 1981, 301).



Plan of rampart and fort interior at Dunbeg, Co. Kerry (after Barry 1981, 302).

#### Radiocarbon Dates:

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
UB-2215	Wood charcoal from base of Ditch 1	1150±75 BP	<b>A.D. 691-749;</b> A.D. 763-1018.
UB-2216	Charcoal from inside shallow ditch, partly underlying the inner stone rampart	2535±35 BP	<b>799 – 721 B.C.;</b> <b>694-540 B.C.</b>
UB-2217	Charcoal from Phase 1 of clochán	960±100 BP	<b>A.D. 891-1263.</b>
UB-2218	Charcoal from habitation deposit from Phase 2 of clochán	1050±35 BP	A.D. 895-925; <b>A.D. 937-1030.</b>
UB-2219	?	1150±75 BP	A.D. 691-749; <b>A.D. 763-1018.</b>

## **'Dunnyneil Island' (Dunnyneil Islands td.), Co. Down**

Grid Ref: **J54745384 (35474/35384)**

SMR No: **DOW 024:035**

References: **McCormick et al. 2002; McCormick & Macdonald 2003; McCormick & Macdonald 2004; Beglane 2005.**

The site is a double-banked enclosure, approximately 30m in diameter, set on the top of the larger of the Dunnyneil Islands in Strangford Lough. A smaller 'annex' was added to this enclosure, and it is possible that further annexes may have been destroyed by tidal action.

Excavations in the north of the enclosure revealed a number of structural features including the rubble collapse of the inner revetment of the bank, a curvilinear gully, a hearth, and two linear features (possibly representing a palisade). A second trench placed through the banks and ditch was not able to establish their chronology, although they would appear to be roughly contemporary.

A further six trenches revealed that the site had a long period of use. Possible earlier enclosure features were found under the inner bank, as well as un-associated prehistoric material. The early medieval enclosures appear to have been abandoned in the seventh or eighth century, possibly as a result of the collapse of Merovingian trade networks, and the site was then not re-occupied until the eleventh or twelfth century.

The artefactual remains from the site (especially the three sherds of E ware and the fragment of Germanic glass claw-beaker) suggest that activity was on-going on the island in the sixth/mid-seventh century. This date is supported by a probable penannular brooch fragment (dated to the early-seventh century). These imported materials, and the relative lack of domestic material, suggests that the enclosure may have functioned as an *emporium*, rather than a high-status occupation site. A fragment of a crucible, four fragments of slag and two fragments of copper alloy also suggest that metalworking occurred on site.

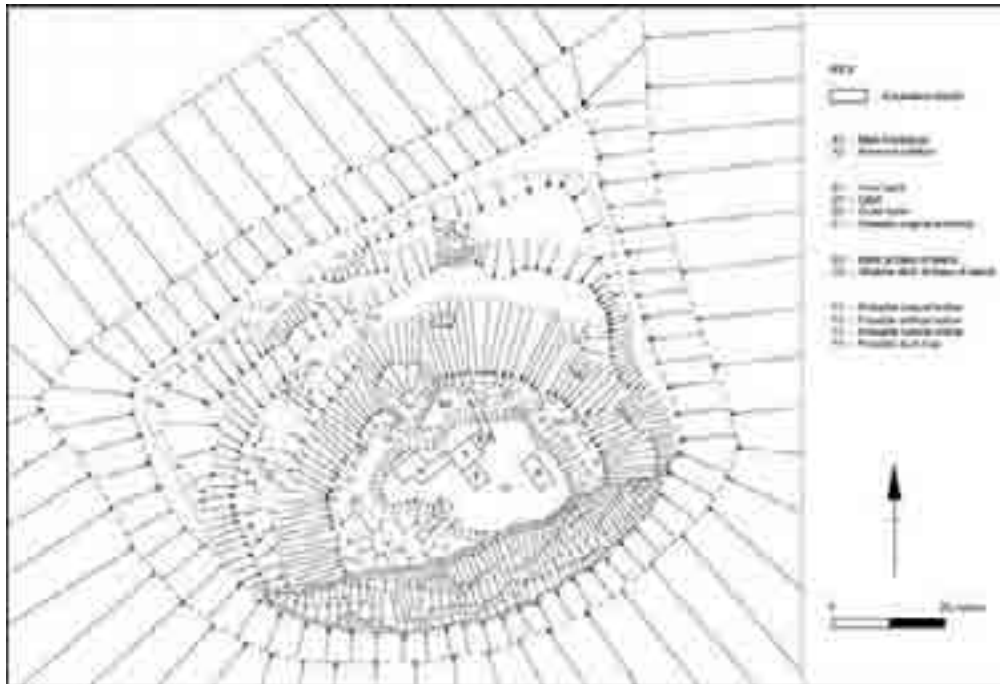
### **Animal Bones:**

In total 4792 bones and teeth were identified, although much of the material was highly fragmentary, with very few whole long bones present.

Phase		Cattle	Sheep/ Goat	Pig	Horse	Dog	Red Deer	Hare	Date
Phase 2	NISP	230	70	238	-	-	-	-	7 <sup>th</sup> /8 <sup>th</sup> C
	% NISP	42.8	13.0	44.2	-	-	-	-	
	MNI	13	3	6	-	-	-	-	
	% MNI	59.1	13.6	27.3	-	-	-	-	
Phase 3	NISP	187	104	195	-	1	1	-	9 <sup>th</sup> /10 <sup>th</sup> C
	% NISP	38.3	21.3	40.0	-	0.2	0.2	-	
	MNI	10	7	5	-	1	1	-	
	% MNI	41.7	29.2	20.8	-	4.2	4.2	-	
Phase 4	NISP	755	577	784	5	1	4	1	Mid-11 <sup>th</sup> C
	% NISP	35.5	27.1	36.9	0.2	0.05	0.2	0.05	
	MNI	36	25	18	1	1	1	1	
	% MNI	43.4	30.1	21.7	1.2	1.2	1.2	1.2	

### **NISP & MNI by phase at Dunnyneill, Co. Down**

There is a shift in emphasis between cattle slaughter between Phases 2 and 3 and Phase 4. This suggests a change from the consumption of prime beef to tougher, older meat of lower economic value and hence status, suggesting that the Phase 4 inhabitants were of a lower status than those during Phases 2 and 3.



**Plan of Dunnynell Island, Co. Down (after McCormick & Macdonald 2003, 15).**



**Excavations on Dunnynell Island, Co. Down (McCormick & Macdonald 2003, 30).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
UB-4918	Animal bone from occupation layer.	1195±22 BP	<b>A.D. 774-891</b>
UB-4919	Animal bones from fill of ditch.	1292±20 BP	A.D. 667-728; A.D. 736-772.

## Animal Bone Appendix:

### Cattle

Age Group	Percentage killed in each age group				
	Phase 1	Phase 2	Phase 3	Phase 4	Topsoil
Sample Size	86	109	65	290	127
Neo-/prenatal	0.0	0.0	0.0	0.0	0.0
6-18 mnth	24.0	18.2	30.8	23.2	10.6
24-36 mnnt	16.0	39.0	40.1	19.0	34.8
36-48 mnth	21.8	17.9	0.0	8.7	0.9
Over 48 mnth	38.2	25.0	29.2	49.0	53.7

### Fusion age by groups

Phase	Context	Toothwear stage					Age (Months)
		P4	M1	M2	M3	MWS	
Phase 1	213	g	k	k	h	45	50
Phase 2	424	g	m	l	m	49	>50
Phase 4	408	A	m	l	l	47	>50
Phase 4	603	X	P(l)	k	k	47	>50
Phase 4	802	0	k	l	g	43	40-50
Topsoil	801	0	(l)	k	j	45	>50

### Cattle mandible wear data (based on Grant (1982) with ages based on Higham (1967))

Age in months	Number of Teeth						Percentage of Teeth				
	1-4	5-30	30-40	40-50	50+	Total	1-4	5-30	30-40	40-50	50+
Phase 2	-	-	-	1	1	2	-	-	-	50	50
Phase 3	-	-	1	-	-	1	-	-	100	-	-
Phase 4	1	3	2	1	4	11	9.1	27.3	18.2	9.1	36.4

### Cattle age at slaughter based on dp4 and M3 attrition

Phase	Female Bd < 56mm	Male Bd > 58mm	Indeterminate 56mm < Bd < 58mm
Phase 1	1	0	
Phase 2	1	0	
Phase 3	2	0	
Phase 4	2	1	
Topsoil	1	1	1
<b>Total</b>	<b>7</b>	<b>2</b>	<b>1</b>

### Sex of cattle based on distal metacarpals

Phase	Element	Average	Max	Min	SD	No
Phase 2	Metacarpal	113.4	114.0	112.8	0.9	2
Phase 3	Metatarsal	113.6	113.6	113.6	0.0	1
Phase 4	Metacarpal	112.8	112.8	112.8	0.0	1
Phase 4	Metatarsal	116.8	118.5	115.2	2.3	2

### Estimated withers heights of cattle



**Sheep:**

Age Group	Percentage killed in each age group				
	Phase 1	Phase 2	Phase 3	Phase 4	Topsoil
<b>Sample Size</b>	<b>22</b>	<b>36</b>	<b>43</b>	<b>256</b>	<b>125</b>
<b>Neo-/prenatal</b>	-	-	-	-	-
<b>3-16 mnth</b>	8.33	5.26	-	10.53	3.51
<b>16-36 mnnt</b>	11.67	-	75.00	19.98	20.49
<b>36-42 mnth</b>	5.00	41.40	-	6.78	15.39
<b>Over 42 mnth</b>	75.00	53.33	25.00	62.71	60.61

**Sheep fusion data by phase**

Phase No.	Rec No.	Context	dp4	P4	M1	M2	M3	Payne MWS	Age Group
Phase 2	4279	416	0	9A	10A	9A	11G	G	4-6 yr
Phase 2	3944	416	0	9A	9A	A	0	E	2-3 yr
Phase 2	4277	416	0	8A	9A	X	0	E	2-3 yr
Phase 2	4278	416	0	7A	9A	X	0	E	2-3 yr
Phase 3	2965	102 Spit	13L	X	0	0	0	C	6-12 mth
Phase 3	3625	304	0	2A	X	0	0	D	1-2 yr
Phase 4	3299	402	0	9A	9A	9A	X	F	3-4 yr
Phase 4	3773	405	0	8A	X	0	0	E	2-3 yr

**Mandible wear stages for sheep (base on Payne 1973)**

Phase	Element	Average	Max	Min	SD	No
Phase 2	Radius	60.30	60.30	60.30	0.00	1
Phase 2	Astragalus	60.44	62.14	58.74	2.41	2
Phase 3	Astragalus	60.25	64.86	55.79	3.12	9
Phase 4	Metacarpal	53.2	53.2	53.2	0.00	1
Phase 4	Astragalus	57.98	66.91	46.49	4.47	29
Phase 4	Calcaneus	56.75	60.99	52.21	3.28	9

**Estimated Withers Heights of Sheep**

**Pig:**

Age Group	Percentage killed in each age group				
	Phase 1	Phase 2	Phase 3	Phase 4	Topsoil
<b>Sample Size</b>	<b>73</b>	<b>123</b>	<b>91</b>	<b>262</b>	<b>126</b>
<b>Neo-/prenatal</b>	-	-	-	-	-
<b>12-18 mnth</b>	22.22	27.27	21.05	16.22	18.60
<b>24-30 mnnt</b>	52.78	54.36	57.74	64.51	47.25
<b>36-42 mnth</b>	19.44	0.98	3.03	4.02	10.15
<b>Over 42 mnth</b>	5.56	17.39	18.18	15.25	24.00

**Pig fusion data by phase**

<b>Phase No</b>	<b>Context</b>	<b>Sex</b>	<b>P4</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>MWS</b>	<b>Higham age (months)</b>
Phase 1	428	-	P	H	O	O	4	6-7
Phase 1	510	-	a	e	b	C	18	17-19
Phase 1	809	-	b	H	d	a	19	21-23
Phase 1	215	-	a	f	b	X(V)	20	17-19
Phase 1	213	-	a	j	b	X(H)	25	19-21
Phase 1	510	-	X	f	d	X(b)	27	23-25
Phase 2	807	-	O	a	c	c	22	25-27
Phase 2	416	-	a	d	a	O(C)	16	17-19
Phase 2	426	M	d	O	O	O	28	25-27
Phase 2	206	-	a	f	O	O	20	17-19
Phase 4	506	-	X	e	a	C	17	17-19
Phase 4	806	F	a	d	a	X(E)	18	19-21
Phase 4	506	-	b	d	a	O(E)	18	19-21
Phase 4	504	-	O	A(e)	c	C	19	17-19
Phase 4	803	-	b	f	b	H	22	19-21
Phase 4	506	-	a	f	c	A(H)	23	19-21
Phase 4	803	-	X	e	c	a	24	21-23
Phase 4	802	-	b	e	c	a	24	21-23
Phase 4	802	F	b	A	O	O(a)	25	21-23
Phase 4	204	-	X	j	c	X(a)	28	21-23
Phase 4	506	-	c	h	e	O(a)	29	21-23
Phase 4	203	-	d	k	O	O(a)	30	21-23
Phase 4	408	-	d	k	g	c	36	25-27

**Pig Mandible Wear and sex from canine (C)**

<b>Phase</b>	<b>Element</b>	<b>Average</b>	<b>Max</b>	<b>Min</b>	<b>SD</b>	<b>No</b>
<b>Phase 2</b>	<b>Astragalus</b>	69.99	75.90	63.19	4.67	5
<b>Phase 3</b>	<b>Astragalus</b>	64.80	64.80	64.80	-	1
<b>Phase 4</b>	<b>Calcaneus</b>	65.19	65.19	65.19	-	1
<b>Phase 4</b>	<b>Astragalus</b>	70.61	76.61	62.29	4.64	11

**Estimated withers height of pigs**

**Wild pig:**

<b>Phase</b>	<b>Context</b>	<b>Element</b>	<b>Side</b>	<b>Part</b>	<b>Measurements</b>						
					<b>GLI</b>	<b>Bp</b>	<b>Bd</b>	<b>BT</b>	<b>H T C</b>	<b>GL P</b>	<b>SL C</b>
Phase 2	108	Femur	R	Dist							
Phase 2	108	Metatar 4	R	Dist							
Phase 2	110	Radius	L	Dist							
Phase 3	102	Phalanx 2	U	Comp							
Phase 4	102/104	Metacar 3	R	Prox							
Phase 4	104	Radius	R	Prox		31.6					

**Wild pig bones**

### **Farranablake East, Co. Galway**

Grid Ref: **150280/225914**

SMR No: **GA096-089**

References: **Janes & Lalonde 2008; Tourunen 2008.**

Archaeological excavations were conducted on a circular drystone-walled enclosure constructed of limestone blocks. A spread of limestone rubble and large stones was identified along the base of the interior face of the enclosure wall and was interpreted as the collapsed inner face and upper courses.

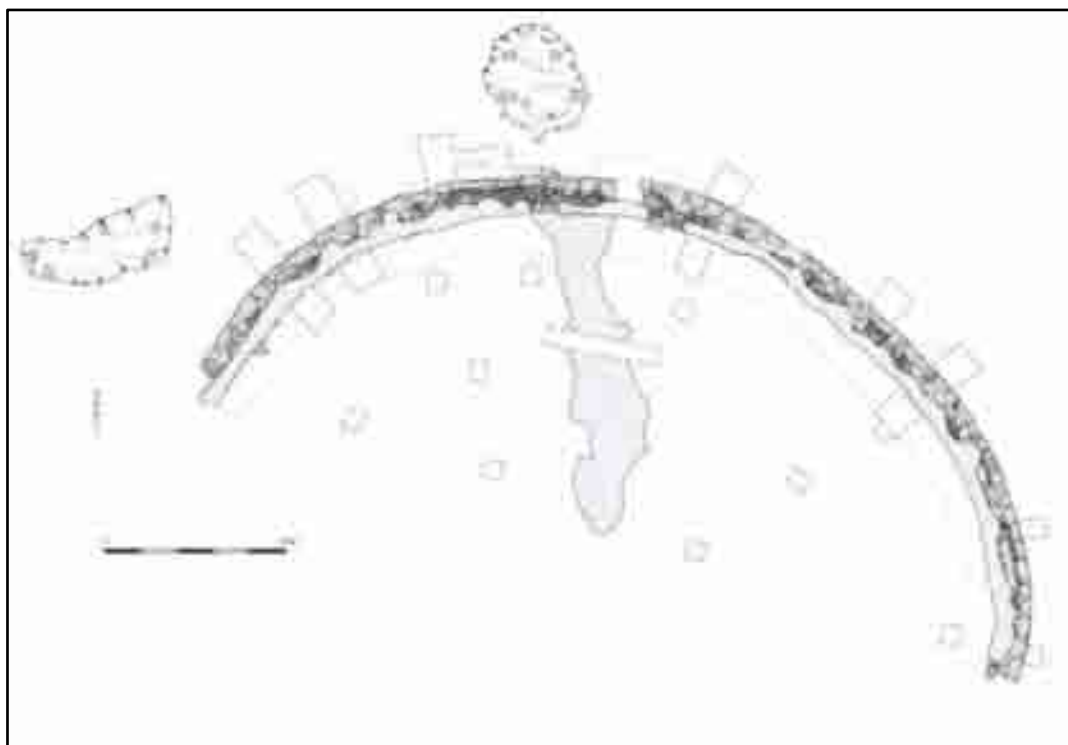
No diagnostic artefacts were uncovered, and, on typological grounds, Farranablake East was typologically classed as a cashel. The circular enclosure is a classic example of a 'cashel', however the absence of any domestic features such as hearths, or structural walls/post holes would suggest a non-domestic use.

### **Animal Bones:**

A total of 715 animal bones were analysed from Farranablake East, Co. Galway. Of these, 311 specimens derived from articulated sheep and dog skeletons. Due to the small size of the material, no detailed age or sex analysis was possible. One fragmented cattle mandible included a worn first molar (Grant, 1982, stage I) and comes from an elderly individual. The presence of milk teeth and eruption of the first molar in a goat mandible indicates an age of little over six months; and another fragmentary mandible, identified as sheep or goat, comes from an individual over two years of age. One piece of pig mandible comes from an animal under 22 months of age. The articulated sheep recovered is possibly of post-medieval date.

Species	Cattle	Sheep/ Goat	Pig	Horse	Dog	Date
NISP	54	33 (+ 1 articulated sheep skeleton)	8	11	1 articulated skeleton	?

### **NISP from Farranablake, Co. Galway**



**Probable cashel at Farranablake east, Co. Galway (after Janes & Lalonde 2008)**

**Animal Bones Appendix:**

<b>Species</b>	<b>Element</b>	<b>GL</b>	<b>Bp</b>	<b>Bd</b>	<b>SD</b>	<b>DD</b>	<b>GLpe</b>	<b>GLI</b>	<b>GLm</b>	<b>E.W.H.</b>
Bos	Talus			35.3				58.8	55.0	
O/C	M/carp	134.0	27.0	29.8	16.1	10.7				65.5 cm
O/C	Phalx 1			13.1			39.2			

**Biometrics of cattle and sheep/goats from Farranablake, Co. Galway**

**Garranes td. ('Lisnacaheragh Fort'), Co. Cork**Grid Ref: **W47336400 (147337/064003)**SMR No: **CO084-084**Reference: **Ó Riordáin 1941-2; Stelfox 1941-2.**

Excavations at the impressive trivallate enclosure in Lisnacaheragh revealed an elaborate entrance structure as well as early occupation evidence, extensive craft-working activity and imported late fifth/sixth-century pottery.

The site has an overall diameter of 110m and contains three irregular banks and ditches enclosing an interior space about 67m in diameter. Excavations in the 1930s focused on the eastern entrance. This was defended by three irregularly spaced wooden gates between the ends of the outer and inner banks, and two trenches which may have supported a palisade extended between the ends of the inner bank and the fourth and innermost gate.

The principal phase of habitation was associated with a dark charcoal-rich deposit immediately inside and to the north of the eastern entrance and along the southern sides of the interior. A large collection of small postholes of no coherent plan were found in this deposit, as well as a range of finds including two glass beads and a pin from a bronze penannular brooch and various domestic objects.

Iron and bronze manufacturing was carried on in the interior, with finds of iron slag, crucibles, clay and stone moulds, iron pincers and awls, a bronze ingot and a bronze casting 'jet' or 'pour'. Fragments of enamel fused to crucibles and an uncut millefiori rod also suggest enamelling and the working of millefiori on site. Other finds included a bronze button, bronze brooch, bronze pins, possible clay lamp, iron shears, amber beads and fragments of glass beads and vessels.

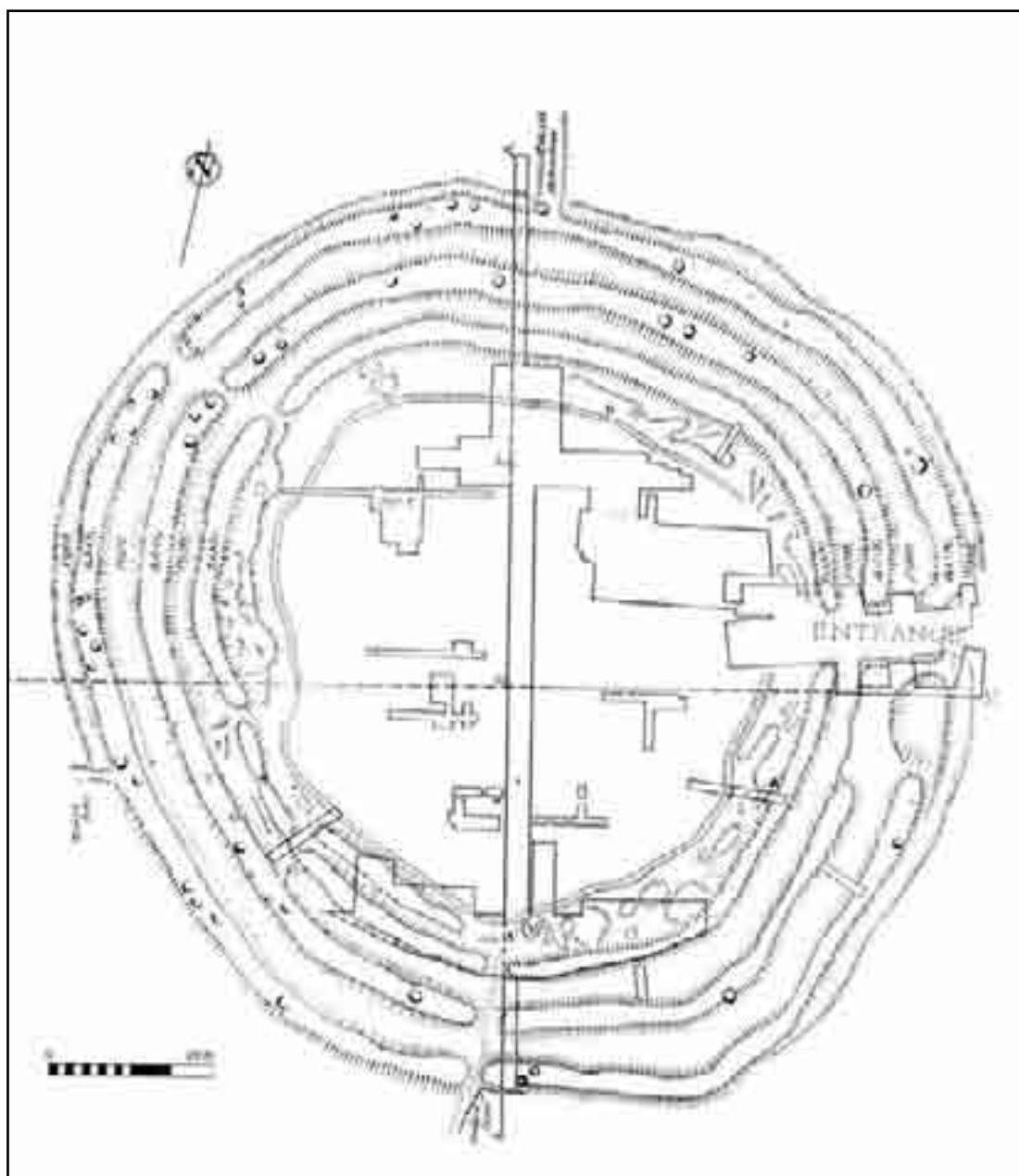
The pottery assemblage is the strongest indicator that the main phase of occupation at the site was during the later-fifth and sixth century A.D. A large quantity of Late Roman Amphora sherds (250) imported from the eastern Mediterranean during the late-fifth to mid-sixth centuries A.D. was recovered from the dark charcoal rich deposit. The site also revealed a sherd of Phocaeian Red Slip Ware (A ware) (c. 500 A.D.), which often accompanied these amphorae from the eastern Mediterranean. Sherds of a possible red slipped 'platter' have also been subsequently identified within the rich pottery assemblage.

**Animal Bones:**

The acid soil meant that only a few small fragments of bone survived.

<b>Cattle</b>	<b>Sheep/Goat</b>	<b>Pig</b>	<b>Horse</b>
40+	3	13	5

**Fragments from Garranes, Co. Cork**



Plan of Garranes, Co. Cork (after Ó Ríordáin 1941-2).

**Glebe (Site 43), Co. Dublin**Grid reference: **322892/223620**SMR: **N/A**Reference: **Seaver 2005; Seaver 2007; Strid 2004.**

Excavations at Glebe revealed a circular early medieval enclosed settlement and associated field system dating between the late-seventh and late-ninth centuries A.D. Earlier cereal processing was also evident in the form of four cereal-drying kilns, two of which returned radiocarbon dates from the mid-sixth and mid-seventh centuries.

The enclosure measured 46m in internal diameter. A portion of bank survived on the western side while there was evidence for a post-built fence or palisade on the northern side of the enclosure, which was possibly constructed after the erosion of the bank. The interior was heavily ploughed, but a cluster of postholes, a hearth and a pit, were which may possibly denote the area of a former dwelling. Two smaller ditches radiated from the enclosure to the south and represented field enclosures. Material from a posthole marking one of the boundaries was dated between the late-seventh and late-ninth centuries. Four 'figure-of-eight' cereal-drying kilns were situated to the west of the enclosed settlement in the townland of Laughanstown (Site 42). Two returned radiocarbon dates between the mid sixth and mid seventh centuries, which probably places this agricultural activity before the construction of the settlement enclosure (see below for radiocarbon dates).

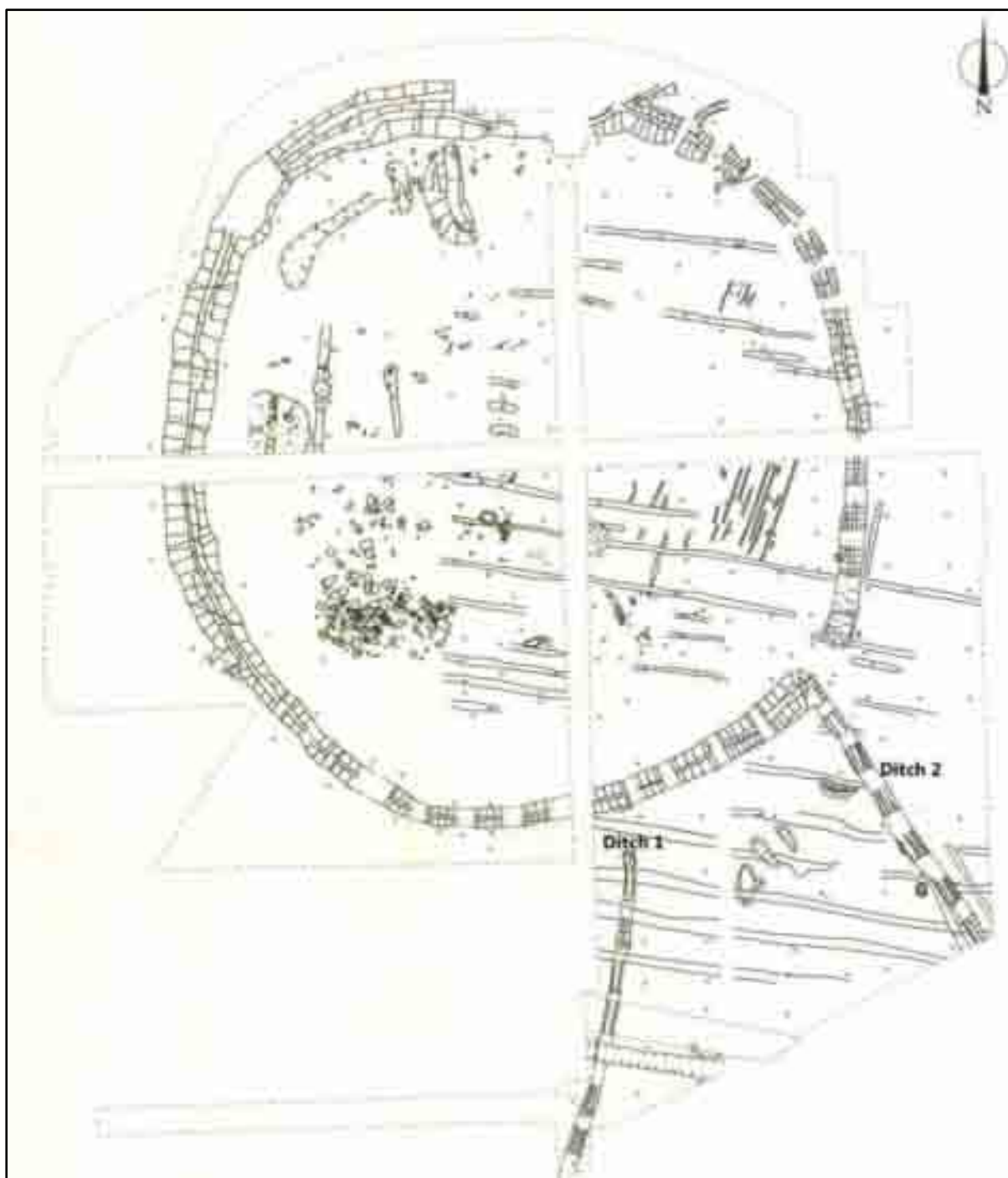
A reasonable number of artefacts were recovered from the site including ringed pin fragments, bone pins, blue glass beads, a stone spindle whorl, and iron slag. Possible ecclesiastical connections, with the nearby monastic site at Tully, were indicated by the presence of inscribed pieces of wood. One featured a raised cross, while another contained an inscription of the word *Deo* and a *chi-rho* symbol.

**Animal Bones:**

The bone assemblage from the early medieval phases (2 and 3) consisted of 2712 bones, of which 32% could be determined to species. Of the 201 sheep/goat bones, 15 were identified as sheep and 2 as goat.

Phase		Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Red Deer	Date
2 & 3	NISP	376	201	215	20	19	4	12	A.D. 669-832
	%NISP	44.3	23.7	25.4	2.4	2.2	0.5	1.4	
	MNI	10	7	8	2	3	1	3	
	%MNI	29.4	20.6	23.5	5.9	8.8	2.9	8.8	

**NISP and MNI from Glebe, Co. Dublin**



Glebe, Co. Dublin (after Seaver2007)



## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
OxA-12814	Charcoal (Poimoidae) from structure associated with cereal-drying kiln (Site 42)	1473 $\pm$ 32 BP	<b>A.D. 543-645</b>
OxA-12816	Seeds from cereal-drying kiln (Site 42)	1460 $\pm$ 32 BP	<b>A.D. 551-648</b>
OxA-12718	Charcoal (Prunus?) from hearth	1263 $\pm$ 26 BP	<b>A.D. 669-782;</b> A.D. 789-812; A.D. 845-855
OxA-12720	Charcoal (Poimoidae) from occupation deposit under bank	1244 $\pm$ 27 BP	<b>A.D. 684-832;</b> A.D. 836-869
OxA-12719	Charcoal (Poimoidae) from posthole fill of field ditch	1321 $\pm$ 27 BP	<b>A.D. 653-721;</b> <b>A.D. 741-770</b>

## Animal Bone Appendix:

### Cattle:

	Unfused	In Fusion	Fused	% Unfused
<b>Early Fusion (&lt;1.5 yrs)</b>				
Acetabulum	1			
Humerus d.			9	
Radius p.	1		13	
Phalanx 2			5	
<i>Early Fusion Subtotal</i>	<i>2</i>		<i>27</i>	<i>7%</i>
<b>Mid-Fusion (2-2.5 yrs)</b>				
Metacarpal d.			3	
Tibia d.	3	1	11	
Metatarsal d.			1	
Phalanx 1	3		10	
Indet. Metapodial d.	2			
<i>Mid-Fusion Subtotal</i>	<i>8</i>	<i>1</i>	<i>25</i>	<i>24%</i>
<b>Late Fusion (&gt;3 yrs)</b>				
Humerus p.	1		1	
Radius d.		1	3	
Ulna p.	1	1		
Femur p.	1		6	
Femur d.	1	3	1	
Tibia p.	1	2	4	
Calcaneus	3		1	
<i>Late Fusion Subtotal</i>	<i>8</i>	<i>7</i>	<i>16</i>	<i>30%</i>

### Epiphyseal fusion in cattle

<b>Bone/Measurement</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>No.</b>
<b>Astragalus</b>				
Bd	38.7	40.9	39.9	3
GLi	58.2	65.0	62.3	3
GLm	53.2	58.6	56.4	3
<b>Calcaneus</b>				
GB	34.0	38.5	36.25	2
<b>Humerus</b>				
BT	59.6	73.6	65.4	3
Bd	66.0	84.0	74.2	3
<b>Metacarpal</b>				
GL	178.0	182.0	180.0	2
Bp	47.9	58.0	52.9	2
Bd	51.4	59.5	55.5	2
SD	28.6	33.3	30.9	2
<b>Phalanx 1</b>				
Bd	22.1	28.6	26.2	9
<b>Radius</b>				
GL	248.5	286.0	267.25	2
Bp	68.9	82.6	75.3	6
Bd	63.3	74.9	70.9	3
BFp	64.7	73.9	69.9	4
<b>Tibia</b>				
GL	313.0	356.0	334.5	2
Bd	53.7	62.4	57.6	10

#### **Cattle biometrics**

#### **Sheep:**

	Very Young	Unfused	In Fusion	Fused	% Unfused
<b>Early Fusion (&lt;1 yr)</b>					
Scapula	1				
Humerus d.			1	4	
Radius p.				2	
Phalanx 1		1	1	4	
Phalanx 2		1		3	
<i>Early Fusion Subtotal</i>	<i>1</i>	<i>2</i>	<i>2</i>	<i>13</i>	<i>17%</i>
<b>Mid-Fusion (1-2 yrs)</b>					
Metacarpal d.		1		4	
Tibia, d.		1		2	
<i>Mid-Fusion Subtotal</i>		<i>2</i>		<i>6</i>	<i>25%</i>
<b>Late Fusion (&gt;3 yrs)</b>					
Radius d.				3	
Ulna d.				1	
Femur p.	1	1			
Tibia, p.				1	
Calcaneus p.				2	
<i>Late Fusion Subtotal</i>	<i>1</i>	<i>1</i>		<i>7</i>	<i>22%</i>

#### **Epiphyseal fusion in sheep**

<b>Bone/Measurement</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>No.</b>
<b>Humerus</b>				
Bd	25.5	27.0	26.2	3
<b>Radius</b>				
Bd			28.8	1
<b>Tibia</b>				
Bd	24.8	24.9	24.8	3

### Sheep biometrics

#### Pig:

	Very Young	Unfused	In Fusion	Fused	% Unfused
<b>Early Fusion (&lt;1 yr)</b>					
Humerus d.		1		2	
Radius p.				4	
Phalanx 2				1	
<i>Early Fusion Subtotal</i>		<i>1</i>		<i>7</i>	<i>13%</i>
<b>Mid-Fusion (1-2.5 yrs)</b>					
Metacarpal d.		2			
Tibia, d.		3	1	2	
Fibula d.		1			
Calcaneus		1			
Metatarsal d.				1	
<i>Mid-Fusion Subtotal</i>		<i>7</i>	<i>1</i>	<i>3</i>	<i>58%</i>
<b>Late Fusion (&gt;3 yrs)</b>					
Humerus p.	1	1			
Femur d.		1			
Fibula p.		2			
<i>Late Fusion Subtotal</i>	<i>1</i>	<i>4</i>			<i>100%</i>

### Epiphyseal fusion in pigs

#### Horse:

<b>Bone/Measurement</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>No.</b>
<b>Metacarpal</b>				
Bd			43.4	1
<b>Tibia</b>				
Bd			72.3	1

### Horse Biometrics

**Gortnahoon, Co. Galway**Grid Ref: **171950/225740**SMR No: **N/A**References: **O'Carroll & Péterváry 2009; Bermingham 2009.**

Excavation undertaken prior to roadworks identified two cereal-drying kilns, pits and stone-lined pits at four closely-spaced locations within the townland of Gortnahoon. A kiln/furnace in Area 1 (2650-2200 cal. B.C.) and a pit in Area 2 (1880-1640 cal. B.C.) returned Bronze Age dates.

Early medieval features in Area 2 consisted of a dumb-bell shaped stone lined kiln with an enclosing penannular trench and associated features, dated *c.* A.D. 717-940; and an L-shaped kiln in Area 3 returned a radiocarbon date of A.D. 1161-1268. Two of the three stone-lined, semi-subterranean structures in Area 3 produced early medieval dates – Structure A (A.D. 678-885); Structure B (A.D. 1022-1216) – and it seems likely that the undated Structure C also belongs to this phase. The stone structures seem to have been too large to have functioned as 'sunken floor buildings' in the Viking tradition, and instead have been tentatively interpreted as food stores, analogous to cellars set beneath (now absent) wooden structures. No houses or hearths were found, but it is suggested that settlement occurred close-by. Frequent lumps of ironworking waste material, which was possibly from a badly-preserved smelting or smithing hearth, and a ditch containing waste from this activity (A.D. 776-969) also shows early medieval activity on site.

A fragment of a rotary quern was recovered from a pit at the entrance to Structure A and a Class E bone comb (*c.* 9<sup>th</sup>/10<sup>th</sup> C.) in fragmentary condition was found on the lower step of Structure B.

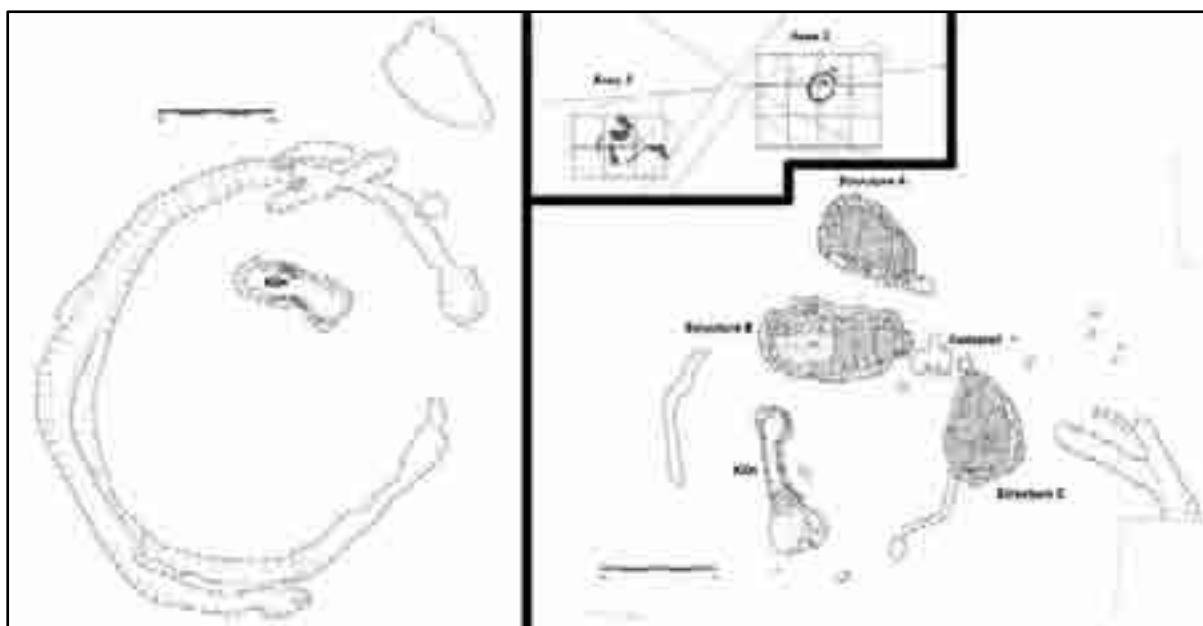
**Animal Bones:**

Animal bones were recovered from a number of contexts associated with the three stone-built structures in Area 3. Structure A produced 167 fragments of bone, of which 25 were identifiable to species. The assemblage is poorly preserved with loose teeth accounting for almost 40% of the identifiable fragments. The assemblage from Structure B comprised 48 identifiable fragments and 181 unidentifiable fragments; and the Structure C assemblage comprised 110 fragments.

The majority of identifiable fragments appear to derive from non-meat bearing bones, e.g. cranial elements such as horns and loose teeth and lower limb bones such as metapodia, phalanges, calcaneus and astragali. This might suggest that only primary butchery waste was deposited on site with meatier joints on the bone taken elsewhere. Red deer is represented by six fragments of antler tine from Structures A and B, and these remains suggest that antler was worked or stored on site, rather than venison being consumed by the inhabitants.

<b>Feature</b>	<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Red Deer</b>	<b>Date</b>
Structure A	9	9	4	1	4	8 <sup>th</sup> /9 <sup>th</sup> C
Structure B	25	20	1	-	2	11 <sup>th</sup> /12 <sup>th</sup> C
Structure C	18	5	-	1	-	?

**NISP of animal bones from structures in Area 3, Gortnahoon, Co. Galway**



**Areas 2 and 3, Gortnahoon, Co. Galway (after O'Carroll & Petervary 2009).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
Wk21331	Charcoal from Structure B	933±36 BP	<b>A.D. 1022-1181</b>
Wk21332	Charcoal from Structure B	902±44 BP	<b>A.D. 1030-1216</b>
Wk21334	Charcoal from Structure A	1238±43 BP	<b>A.D. 678-885</b>
Wk22888	Seed from kiln basal fill Area 2	1195±30 BP	A.D. 717-743; <b>A.D. 768-896;</b> A.D. 923-940
Wk22889	Seed from kiln fill Area 3	823±33 BP	<b>A.D. 1161-1268</b>
Wk22890	Seed from ditch fill with metal-working waste	1166±32 BP	<b>A.D. 776-903;</b> <b>A.D. 914-969</b>

## **Illaunloughan, Co. Kerry**

Grid Ref: **V362733 (03620/07330)**

SMR No: **KE087-036**

Reference: **Marshall & Walsh 1994; Marshall & Walsh 2005; Marshall 2003; Murray & McCormick 2005; Hamilton-Dyer 2005; O'Sullivan 2005; McLoughlin & Murray 2005; Murray *et al.* 2004.**

Illaunloughan is a small island between Valentia Island and the Kerry mainland which was occupied by a monastic community between the mid-/late-seventh century and mid-ninth century. Four phases of use were identified – two in the early medieval period (Phases 1 and 2); one in the late medieval period (Phase 3); and one post-medieval (Phase 4).

Phase 1, dated to the mid-seventh/mid-eighth centuries, consisted of three sod-walled domestic huts (A, B and C), an oratory, a shrine and burials. Huts A and B were contemporary and charcoal from the central hearth of Hut B produced a seventh/eighth century date. A deep garden soil covered much of the western half of the island and suggests the growing of vegetables during the first phase of the monastic settlement. Hut C was interpreted as the earliest structure on the site and was found beneath a midden belonging to a hut from Phase 2. It appears to have been used primarily for industrial purposes when Huts A and B were occupied. A localized area of metalworking debris revealed evidence for the designing and casting of copper-/bronze-alloy brooches and pins. Over 80 fragments of clay moulds as well as a carved bone motif were recovered from the debris. A sod-walled oratory, succeeded by a small oratory/shrine structure was excavated partly beneath the Phase 2 dry-stone oratory. A number of closely-spaced graves were placed behind the eastern wall of the primary sod oratory and appear to have been associated with this structure. Two stone cists containing the remains of two adults and one infant were sealed beneath the shrine on the northern side of the island and were dated to the late-seventh/late-eighth centuries.

Phase 2 dated to the eighth/ninth centuries and comprised a dry-stone hut (D), a dry-stone oratory, a stone reliquary shrine, and burials. Hut D was a circular structure with corbelled walls and a possible internal hearth. A cattle bone recovered from under the base of the hut gave a construction date in the eighth/ninth century, though a date later than the early-ninth century was viewed as improbable by the excavators from associated burial evidence. The principal phase 2 ecclesiastical structures consisted of a dry-stone oratory, an integrated stone *leacht* and a gable-shaped shrine surrounded by a raised rectangular mound.

Phase 3 dated to the late medieval period and consisted of the re-use of the dry-stone oratory and Hut D and approximately 25 burials in the space between both buildings; and Phase 4 consisted of a post-medieval *ceallunach* ('infant burial ground') of over 100 burials.

Many of the early medieval artefacts were recovered from the midden deposits of Hut D. Finds included iron knives, barrel-padlock keys, shears, awls and punches, three glass beads, a quernstone (or possible cross shaft) and a large number of whetstones. A number of Hiberno-Scandinavian artefacts (e.g. a silver Viking coin (*c.* 1020-35), a perforated whetstone, a hollow bone cylinder and a suspension mechanism for a balance) were also recovered.

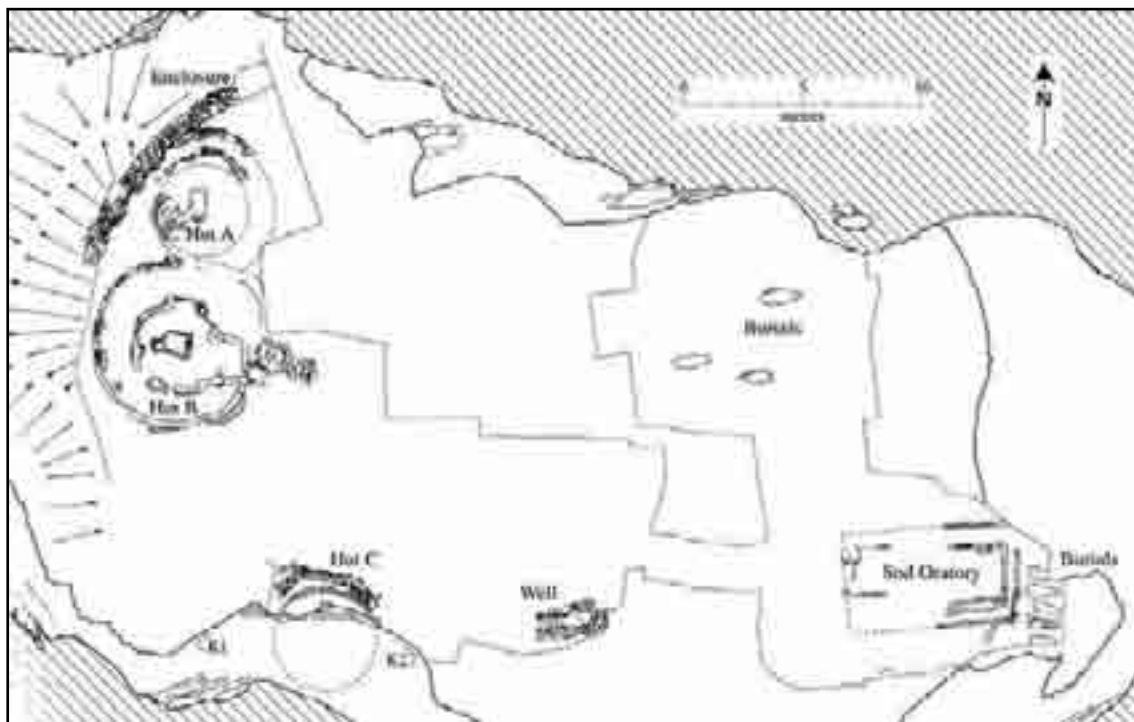
### **Animal Bones:**

Given the small size of the island, the domesticates cannot have been reared on-site and must have been imported, either from the mainland or the adjacent larger island of Valencia. The ageing data for cattle and sheep is characterised by a high occurrence of unfused bones indicating that a relatively high proportion of very young animals were present.

Phase		Cattle	Sheep/ Goat	Pig	Horse	Whale	Date
Phase 1	NISP	374	210	80	3	-	A.D. 638-772
	% NISP	56.1	31.6	12.2	0.1	-	
	MNI	6	9	3	1	-	

	% MNI	29	43	14	5	-	
Phase 2	NISP	493	221	111	5	1	A.D. 773-970
	% NISP	59.4	26.5	13.4	0.6	0.1	
	MNI	7	9	2	1	1	
	% MNI	33	43	9	5	5	

**NISP and MNI from Illaunloughan, Co. Kerry**



**Plan of the Period 1 settlement at Illaunloughan, Co. Kerry (after Marshall & Walsh 2005, 12).**



**Plan of the Period 2 settlement at Illaunloughan, Co. Kerry (after Marshall & Walsh 2005, 38).**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

(\* - calibrated with marine reservoir effect: KA Hughen, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, PJ Reimer, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1059-1086.)

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-4106	Scallop shell associated with stone cists (Phase 1)	1508 $\pm$ 45 BP	<b>*A.D. 742-1049</b>
UB-4357	Charcoal from fill of hearth inside Hut B (Phase 1)	1346 $\pm$ 32 BP	<b>A.D. 638-719</b> A.D. 742-769
UB-4104	Bone from adult human skeleton in cist beneath gable shrine (Phase 1)	1245 $\pm$ 18 BP	<b>A.D. 685-783</b> A.D. 788-823 A.D. 841-860
OxA-10132	Bone from infant skeleton inside cist) beneath gable shrine (Phase 1)	1308 $\pm$ 33 BP	<b>A.D. 657-730</b> <b>A.D. 735-772</b>
UB-4107	Bone from adult human skeleton (Sk. 188) in a cist beneath gable shrine (Phase 1)	1290 $\pm$ 22 BP	<b>A.D. 667-730</b> <b>A.D. 735-772</b>
UB-4103	Bone from human skeleton (Sk. 120) near oratory (Phase 2)	1191 $\pm$ 22 BP	<b>AD 775-891</b>
UB-3860	Cattle bone from under the base of the NW side of the drystone hut D (Phase 2)	1172 $\pm$ 34 BP	<b>A.D. 773-905</b> <b>A.D. 912-970</b>
OxA-10133	Burnt seeds ( <i>Avena Strigosa</i> ) from ash deposit near western and northern walls of drystone oratory (Post-monastic)	698 $\pm$ 29 BP	<b>A.D. 1263-1308</b> <b>A.D. 1361-1386</b>
UCLA-2874A	Charcoal from refuse beneath a stone blockage in western doorway of drystone oratory (Post-monastic)	520 $\pm$ 45 BP	<b>A.D. 1309-1360</b> <b>A.D. 1386-1449</b>
UCLA-2873H	Charcoal from fill of stone-lined pit at east end of interior of drystone oratory (Post-monastic). Sample contained ironworking residues.	365 $\pm$ 55 BP	<b>A.D. 1445-1641</b>
UCLA-2873E	Carbonised material from occupation deposits inside the drystone hut D (Post-monastic)	315 $\pm$ 45 BP	<b>A.D. 1464-1654</b>



## **Inishcealtra, Co. Clare**

Grid Ref: **R69895023 (169896/185023)**

SMR No: **CL029-009---**

References: **de Paor 1997; de Paor & Glenn 1995; Wilson 2009.**

The ecclesiastical remains situated in the eastern and south-eastern part of the island consist of a round tower, two churches, two oratories and other buildings, a large collection of crosses and cross-slabs and an extensive system of enclosures and paths defined by earthworks and dry-stone walls.

The excavated archaeology from the monastic phase dates primarily from the tenth to the thirteenth centuries. This early phase of the monastery is largely defined by a limited number of early artefacts. These include a small enamelled object, possibly from a seventh/eighth-century reliquary, a sandstone grave-slab with an incised *Chi-Rho* cross, and a few sherds of E ware and a sherd of Late Roman Amphora 1 (*Bi*). A bronze openwork brooch (dated *c.* A.D. 800) found in the primary silt of a small quadrangular enclosure around St. Brigid's church indicates that this feature was constructed in the ninth century.

A sequence of rectangular earthen oratories, predating a large late-twelfth century circular house, was excavated to the immediate west of the round tower. These were roughly contemporary with a small north-south rectangular timber structure aligned within the partial remains of a rectangular enclosure. This structure, rebuilt on a number of occasions, was interpreted as a possible shrine, and appears to have been replaced by a small roughly mortared stone structure. It is suggested that this structure dates to the tenth/eleventh century.

Numerous traces of circular wooden and earthen structures were identified in the vicinity of the round tower and St. Caimin's church. Two large circular houses, roughly 10m in diameter, were clearly identified to the southwest of the round tower, and one of these buildings contained a hearth which concealed a hoard of 21 early Norman coins from the reigns of Stephen (1135-1154) and Henry II (1154-1189).

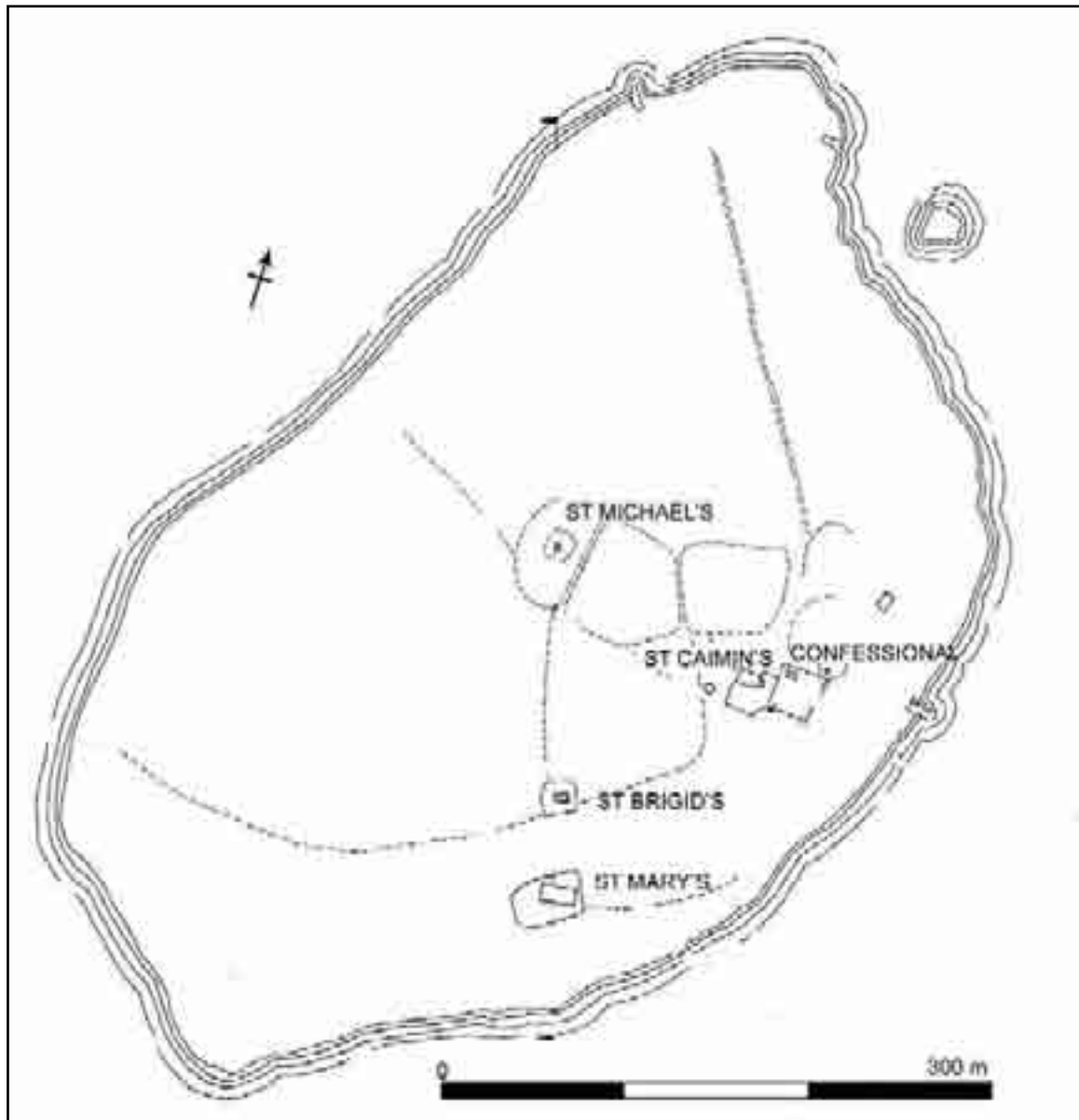
A possible eleventh/twelfth-century rectangular structure and traces of flimsy circular wooden structures were excavated within a lightly fenced early eleventh-thirteenth century ovoid enclosure to the north of the 'Confessional'. Bronze-working evidence (e.g. stone motif pieces, bronze waste and bronze scraps with late-eleventh/early-twelfth century 'Ringerike' ornament) were associated with a number of the huts within the enclosure. The area to the west and southwest of the round tower revealed numerous pits and working hollows with evidence for ironworking (mainly slag and bloom), principally dating to the twelfth and thirteenth centuries. Numerous whetstones, iron bolts, knife blades, nails, burnt bone, mortar and slag were also recovered from this area.

### **Animal Bones:**

The animal bone assemblage from Inishcealtra produced just under 2,000 identifiable bone fragments. The incomplete nature of the excavation archive meant that the assemblage could not be split into chronological phases, nor could the excavated contexts be tied to specific areas.

	<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Deer</b>	<b>Dog</b>	<b>Cat</b>	<b>Bird</b>	<b>Hare</b>
<b>NISP</b>	998	253	422	36	56	2	6	1	4
<b>%NISP</b>	56.1	14.2	23.7	2.0	3.1	0.1	0.3	0.1	0.2
<b>MNI</b>	32	15	20	2	4	1	1	1	2
<b>%MNI</b>	41.0	19.2	25.6	2.6	5.1	1.3	1.3	1.3	2.6

**NISP and MNI from Inishcealtra, Co. Clare**



Plan of Inishcealtra, Co. Clare (after De Paor 1997).

## Animal Bones Appendix:

### Cattle:

Higham MWS	Estimated age (months)	No.
11	18-24	1
18	36	2
19	38	1
22	50	2

### Cattle age-slaughter based on mandibular tooth eruption and wear

Age in Months	Element	Fused	Unfused
0-10	Scapula	20	2
	Pelvis	-	-
12-18	Humerus d	26	3
	Radius p	18	1
	<b>Total</b>	<b>64</b>	<b>6</b>
	<b>%</b>	<b>91.4</b>	<b>8.6</b>
24-30	Metacarpal d	7	2
	Tibia d	21	5
	<b>Total</b>	<b>28</b>	<b>7</b>
	<b>%</b>	<b>80</b>	<b>20</b>
27-36	Metatarsal d	7	-
	<b>Total</b>	<b>7</b>	<b>-</b>
	<b>%</b>	<b>100</b>	<b>-</b>
36-42	Femur p	23	10
	Calcaneum	8	9
	<b>Total</b>	<b>31</b>	<b>19</b>
	<b>%</b>	<b>62</b>	<b>38</b>
42-48	Humerus p	9	1
	Radius d	4	1
	Femur d	9	4
	Tibia p	16	3
	<b>Total</b>	<b>38</b>	<b>9</b>
	<b>%</b>	<b>80.9</b>	<b>19.1</b>

### Epiphyseal fusion of cattle bones

Element	Measurement	#	Mean	Max	Min	St. Dev
Scapula	GLP	16	58.2	73.6	44.8	7.35
	SLC	12	39.72	49.9	38.2	2.89
Humerus	BT	17	65.75	73.7	58.5	4.12
	Bd	15	69.48	84.2	67	5.16
Radius	Bp	9	60.16	84.8	65.7	6.01
Metacarpal	Bp	15	46.4	57.6	41.9	4.35
Tibia	Bd	18	49.32	60.5	33.8	6.80
Astragalus	GLI	31	57.89	64	48.5	3.38
	Bd	22	35.56	42	33.1	2.47
Metatarsal	Bp	20	43.56	51.2	37.9	3.93
Phalanx 1	GLI	13	53.8	58.3	40	4.93

### Cattle Biometrics

### Sheep/Goat:

Age in Months	Element	Fused	Unfused
0-10	Scapula	3	3
	Pelvis	-	-
	<b>Total</b>	<b>3</b>	<b>3</b>
	<b>%</b>	<b>50</b>	<b>50</b>
18-24	Metacarpal d	1	-
	Tibia d	7	-
	<b>Total</b>	<b>8</b>	<b>-</b>
	<b>%</b>	<b>100</b>	<b>-</b>
30-36	Calcaneum	6	3
	<b>Total</b>	<b>6</b>	<b>3</b>
	<b>%</b>	<b>66.7</b>	<b>33.3</b>
36	Radius d	3	1
	Ulna	-	2
	<b>Total</b>	<b>3</b>	<b>3</b>
	<b>%</b>	<b>50</b>	<b>50</b>
36-42	Femur d	-	3
	Tibia p	3	-
	<b>Total</b>	<b>3</b>	<b>3</b>
	<b>%</b>	<b>50</b>	<b>50</b>

### Epiphyseal fusion of sheep bones

Element	Measurement	#	Mean	Max	Min	St. Dev
Scapula	SLC	8	18.78	27.2	15.1	3.89
Humerus	BT	8	24.22	30.8	16.2	4.05
	Bd	7	29.24	39	23.3	6.38
Metacarpal	Bp	5	20.91	24.9	19.6	2.25
Tibia	Bd	6	22.05	23.5	18.9	1.65
Astragalus	GLI	5	26.82	33.6	22.7	4.44
Calcaneum	GLI	5	36.78	57.5	15.4	18.63

### Sheep Biometrics

### Pig:

Higham MWS	Estimated Age (months)	#
6	4-5	1
11	9-10	2
18	17-19	4
20	21-23	3
22	25-27	1
23	27-29	1
24	30+	1
26	Late Maturity	1

### Pig age-slaughter based on mandibular tooth eruption and wear

Age in Months	Element	Fused	Unfused
0-12	Scapula	13	15
	Pelvis	1	-
12	Humerus d	23	7
	Radius p	4	2
	<b>Total</b>	<b>41</b>	<b>24</b>
	<b>%</b>	<b>63.1</b>	<b>36.9</b>
24	Metacarpal d	1	4
	Tibia d	3	-
	<b>Total</b>	<b>4</b>	<b>4</b>
	<b>%</b>	<b>50</b>	<b>50</b>
42	Humerus p	2	2
	Radius d	1	-
	Ulna	1	4
	Femur p	1	3
	Femur d	-	3
	Tibia p	2	2
	<b>Total</b>	<b>7</b>	<b>14</b>
	<b>%</b>	<b>33.3</b>	<b>66.7</b>

#### Epiphyseal fusion of pig bones

Element	Measurement	#	Mean	Max	Min	St. Dev
Scapula	GLP	18	30.14	35.6	18.6	4.79
	SLC	22	19.55	26.1	14.4	3.19
Humerus	BT	28	26.63	35.60	22.6	2.30
	Bd	18	34.71	38.5	28.9	2.27
	SD	9	13.83	16.3	10.2	1.82
Radius	Bp	6	25.76	30.25	23.1	2.52
Calcaneum	GLI	6	57.85	65.4	48.9	6.06

#### Pig Biometrics

**Inishkea North, Co. Mayo**Grid Ref: **F57002253 (057009/322530)**SMR No: **MA023-014001-6**Reference: **Henry 1945; Henry 1952; Stelfox 1945; Roche 1952**

The site consists of a small island-based ecclesiastical community. Three mounds (known locally as 'baileys') were located in the area around the focal church, and these were the subject of investigation over a number of seasons. Three corbelled, stone-built houses were excavated. House A was rectangular in shape, and rather flimsily built. Finds included an iron knife; a whale-bone disc; three bone pins; and a broken quernstone. Houses B and C had a beehive profile. Finds from House B included three silver pennies of Henry II/Richard I (i.e. late-twelfth century); and a human skeleton was found buried beneath House C, with another one found just outside it. Finds included a dagger and several other pieces of iron; a bone bead; a bone comb; a bone spindle-whorl; and fragments of the scapula of an adult whale which appears to have been used as a chopping block.

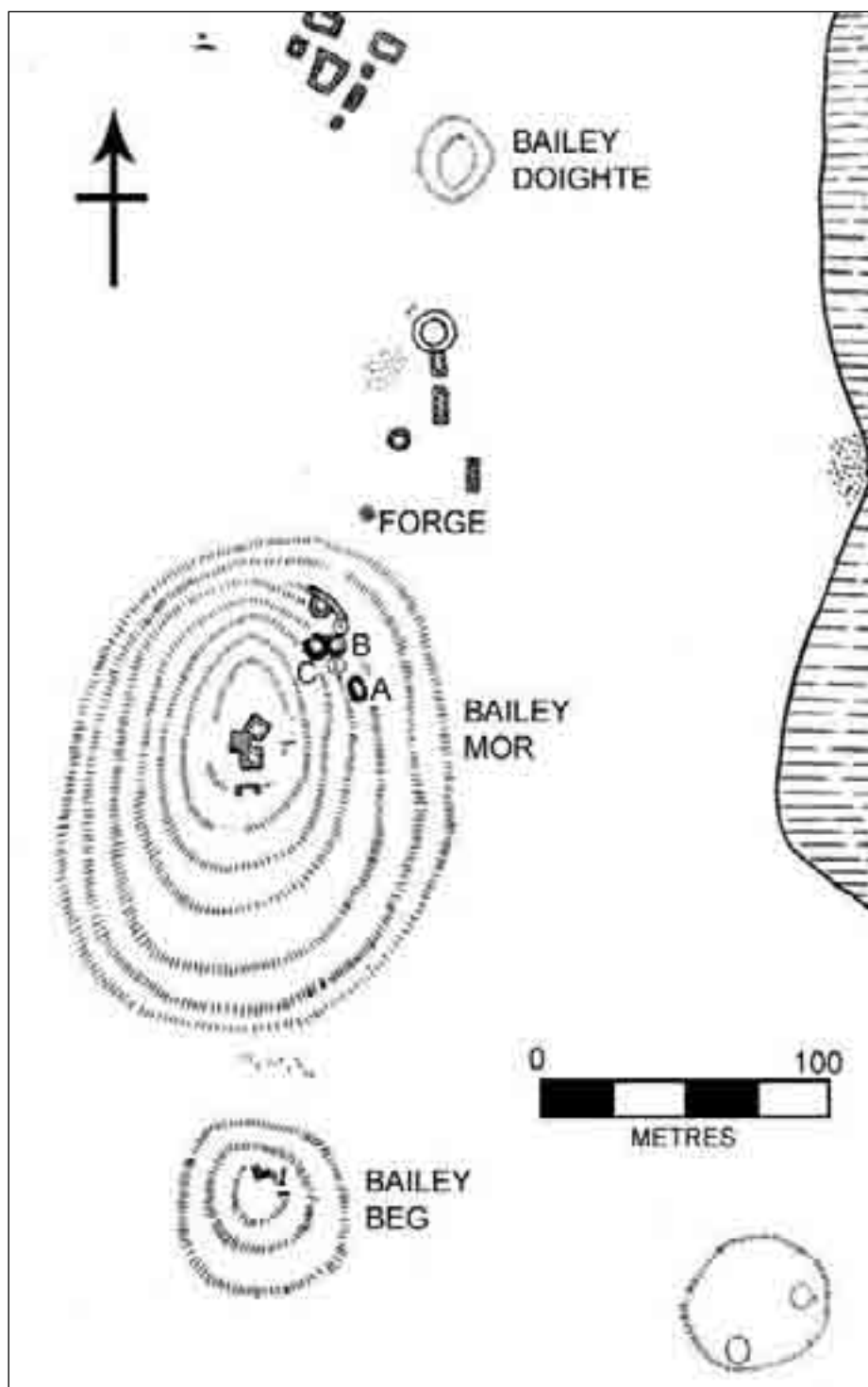
A possible forge was identified, but not fully excavated. Large numbers of iron clinker was recovered from this area. Later excavations uncovered mounds of broken *Nucella (Purpura) lapillus* (dog-whelk) shells, both in rubbish heaps, and also within a structure which must have been used as a dye-house.

**Animal Bones:**

There was no attempt made to quantify the faunal remains from Inishkea North. The remains show a regular use of coastal resources

Feature	Cattle	Sheep/ Goat	Pig	Horse	Cat	Red Deer	Hare	Whale	Seal	Fish	Bird
Site 2 House A	X	X	X	-	-	-	-	-	X	X	X
Site 2 House C	X	X	-	X	X	-	X	-	X	X	X
Site 2 Raised Area	X	X	X	X	X	X	-	X	-	-	x
Site 3 House A	X	X	X	X	-	X	-	-	-	X	X

**Presence of animal bones in features at Inishkea North, Co. Mayo**



Plan of Site 2 at Inishkea North, Co. Mayo (after Henry 1945, 133).

**Inishmurray, Co. Sligo**Grid Reference: **G57355415 (157356/354152)**SMR No: **SL001-007006**Reference: **O'Sullivan J & Ó Carragáin 2008; O'Sullivan T 2008.**

Excavations on the island of Inishmurray focused primarily on the monastic/ecclesiastical sites on the island, and their utilisation as a focus for medieval pilgrimages. Human burials at the *leachta* (dry-stone built altars) at Relickoran and Ollamurray, for example, returned radiocarbon dates from the tenth century through to the sixteenth. The early phase coincides well with the first reference to the site of Inishmurray in the *Annals of Ulster* at A.D. 751.

The excavation at the *leacht* at Trahanareear uncovered an earlier dry-stone built monastic cell partially preserved beneath the later altar. From the remains it was possible to estimate an internal diameter of 1.8m, and, the relative narrowness of the walls led the excavators to suggest that this building may have been roofed with turf or thatch, rather than being a corbelled 'beehive' hut. This interpretation appears to be supported by the discovery of a central posthole in a paved-area of this cell which had survived beneath the *leacht*. The most intriguing find from this structure was two sherds of a green glass vial found in the wall cavity. These have been identified as either belonging to a seventeenth or eighteenth apothecary's perfume flask; or alternatively as representing the remains of an Imperial Roman '*lacrymar*' – which would have been used to catch the tears of mourners at a funeral. It has also been argued to be of Byzantine or even Frankish manufacture. Subsequent testing was unable to definitively verify the age of this glass vessel, and thus it remains an enigma.

**Animal Bones:**

The animal bone assemblage from Relickoran is not quantified, and appears to come from a mixture of early medieval, high medieval, and modern contexts. The high percentage of domestic fowl discovered at Relickoran (75%) is more in common with high medieval sites.

Site	Cattle	Sheep/ Goat	Domestic Fowl	Rabbit	Kittiwake	Date
Relickoran	X	X	X	X	X	?

**Presence of animal bone by species at Relickoran, Inishmurray, Co. Sligo**



## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

## Relickoran:

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-4635	Burial 13 under <i>leacht</i>	1036 $\pm$ 43 BP	<b>A.D. 893-1046</b> ; A.D. 1091-1121; A.D. 1140-1148.
UB-4636	Burial 6	1174 $\pm$ 48 BP	A.D. 711-746; <b>A.D. 766-982.</b>
AA-37260	Human bone at base of <i>leacht</i>	940 $\pm$ 50 BP	<b>A.D. 1018-1209.</b>
UB-6443	Burial 1	921 $\pm$ 32 BP	<b>A.D. 1027-1185</b> ; A.D. 1203-1205.
AA-37261	Human bone at base of <i>leacht</i>	905 $\pm$ 50 BP	<b>A.D. 1024-1219.</b>
UB-6447	Burial 7	891 $\pm$ 30 BP	<b>A.D. 1041-1108</b> ; <b>A.D. 1116-1216.</b>
UB-6446	Burial 6	819 $\pm$ 31 BP	<b>A.D. 1166-1267.</b>
UB-6445	Burial 3	686 $\pm$ 31 BP	<b>A.D. 1267-1315</b> ; <b>A.D. 1355-1389.</b>
UB-6444	Burial 2	560 $\pm$ 29 BP	<b>A.D. 1309-1361</b> ; <b>A.D. 1386-1427.</b>
UB-6448	Burial 8	379 $\pm$ 29 BP	<b>A.D. 1445-1524</b> ; <b>A.D. 1558-1631.</b>
UB-6450	Burial 10	303 $\pm$ 29 BP	<b>A.D. 1490-1603</b> ; <b>A.D. 1611-1651.</b>
UB-6449	Burial 9	286 $\pm$ 29 BP	A.D. 1495-1507; <b>A.D. 1511-1601</b> ; <b>A.D. 1616-1663.</b>

## Ollamurray:

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\Sigma$
AA-46344	Charcoal under <i>leacht</i>	1135 $\pm$ 45 BP	<b>A.D. 778-992.</b>
AA-46345	Charcoal under <i>leacht</i>	1190 $\pm$ 55 BP	A.D. 689-752; <b>A.D. 761-972.</b>

## Johnstown 1, Co. Meath

Grid reference: **N76984047 (27698/24047)**

SMR No: **ME048-031**

Reference: **Clarke 2010; Clarke & Carlin 2008; Boner 2003**

A multi-period settlement-cemetery and industrial site was discovered at Johnstown, Co. Meath. There were two foci for human activity - the first was a succession of enclosures that respected an Iron Age burial mound; the second area was outside the enclosure and consisted of a mill-race ditch and the site's final use as a *cillín* in the post medieval period.

A succession of three enclosures centred on the burial mound. One of the earliest depositions included the incomplete remains of three adults in a charnel pit beneath the mound, and burials associated with the mound were dated between the late-fourth and late-seventh centuries. In total, 398 inhumations were found associated with the enclosures.

The primary enclosure was sub-oval and measured 59m in diameter; the ditch was dated to A.D. 432-651. The second enclosure ditch (53m x 54m) was dug sometime between the fifth and seventh centuries and was abandoned before the end of the ninth century. Finds from this phase included iron slag, an arrowhead, a smith's hammer-head, fragments of souterrain ware and a copper alloy ringed pin.

The final enclosure was D-shaped and measured 47.5m x 61m. The enclosure was probably created in the ninth or tenth centuries before it was abandoned sometime between the fifteenth and seventeenth centuries. Finds were similar to earlier phases including iron waste and a range of functional and personal items. The succession of enclosures would appear to have been created to accommodate the expansion of the cemetery.

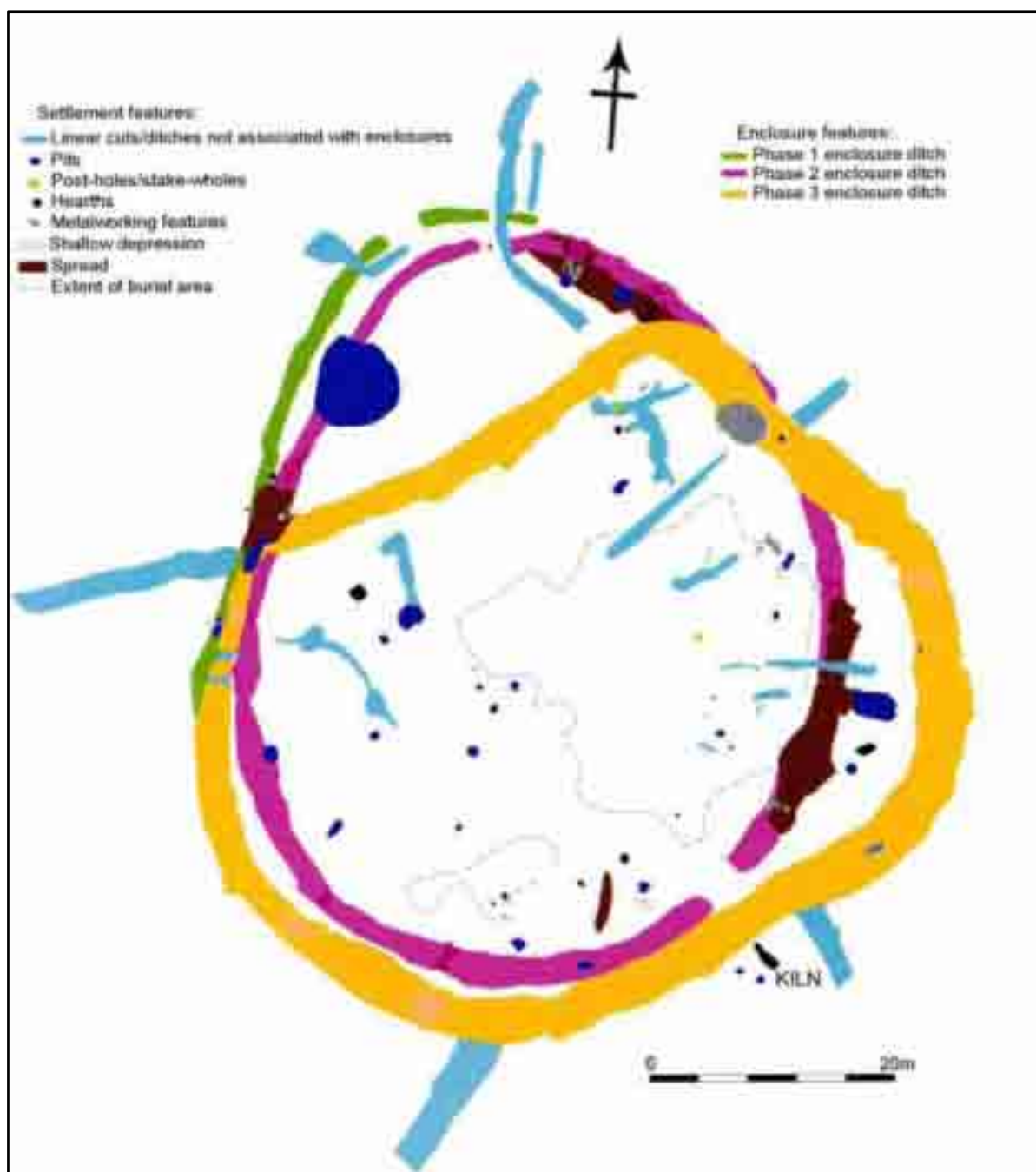
Settlement evidence at Johnstown 1 survived as refuse pits, hearths, gullies, spreads and cobbled surfaces distributed throughout the interior of the enclosures. Dwelling evidence was mainly dated between the ninth and fifteenth centuries. Iron working produced over 2000kg of metallurgical waste. Other ironworking features included bowl furnaces and smithing hearths which demonstrated that both raw iron and finished artefacts were produced. Seven ironworking areas were identified and the majority were outside the enclosures. The earliest dated metallurgical activity was dated to A.D. 250-538, and ironworking continued to be practised in different areas of the site until the seventeenth century.

### Animal Bones:

The animal bones from Johnstown were derived largely from the three main enclosures which represent successive phases of activity at the site. Phases 1 and 2 produced 8,742 mammal bone fragments in total, of which 2,959 (34%) could be identified at species level (excluding ribs and vertebrae).

Phase		Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Red Deer	Hare	Date
<b>1</b>										<b>A.D. 432-651</b>
	NISP	579	73	230	6	4	1	3	-	
	%NISP	64.6	8.1	25.7	0.7	0.4	0.1	0.3	-	
	MNI	13	5	10	1	1	1	2	-	
	%MNI	39.4	15.2	30.3	3.0	3.0	3.0	6.1	-	
<b>2</b>										<b>A.D. 433-661</b>
	NISP	1372	131	461	22	26	33	15	2	
	%NISP	66.5	6.4	22.4	1.1	1.3	1.6	0.7	0.1	
	MNI	26	5	16	1	2	3	1	1	
	%MNI	47.3	9.1	29.1	1.8	3.6	5.5	1.8	1.8	

**NISP and MNI from enclosure phases 1 and 2 at Johnstown, Co. Meath**



Plan of phases at Johnstown, Co. Meath (after Clarke & Carlin 2008).

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
Beta-177959	Animal bone from Phase 1 enclosure ditch	1490 $\pm$ 60 BP	<b>A.D. 432-498;</b> <b>A.D. 501-651</b>
Beta-177960	Animal bone from primary context of Phase 2 enclosure ditch	1470 $\pm$ 60 BP	<b>A.D. 433-494;</b> A.D. 505-523; <b>A.D. 526-661</b>
Beta-180653	Human bone from Burial 269 in middle fill of Phase 3 enclosure ditch	930 $\pm$ 70 BP	<b>A.D. 990-1228;</b> A.D. 1232-1242; A.D. 1247-1251
Beta-178197	Human bone from charnel pit containing partial remains of at least three disarticulated adults. Associated with central burial mound	1560 $\pm$ 70 BP	A.D. 349-368; <b>A.D. 379-641</b>
Beta-184610	Human bone from Burial 33 associated with central burial mound	1460 $\pm$ 70 BP	<b>A.D. 430-670</b>
Beta-184704	Human bone from Burial 128 in proximity to the mound	1240 $\pm$ 40 BP	<b>A.D. 680-882</b>
Beta-184702	Human bone from Burial 26 in proximity to mound	1100 $\pm$ 40 BP	A.D. 828-839; <b>A.D. 866-1021</b>
Beta-178196	Human bone from Burial 118 at eastern edge of mound	790 $\pm$ 50 BP	A.D. 1058-1064; A.D. 1069-1071; <b>A.D. 1155-1292</b>
Beta-176808	Charcoal from occupational deposit overlying Phase I and II enclosure ditches	1230 $\pm$ 60 BP	<b>A.D. 664-898;</b> A.D. 920-947
Beta-181478	Charcoal from a refuse pit	1010 $\pm$ 60 BP	A.D. 894-929; <b>A.D. 932-1162</b>
Beta-177963	Animal bone from possible animal enclosure ditch	930 $\pm$ 60 BP	A.D. 996-1006; <b>A.D. 1012-1221</b>
Beta-184701	Charred material from metallurgical pit to east of enclosures	1660 $\pm$ 60 BP	<b>A.D. 250-538</b>
Beta-181479	Charred material from metallurgical pit within enclosure	1520 $\pm$ 60 BP	<b>A.D. 423-642.</b>
Beta-184700	Charcoal from a smelting furnace	1200 $\pm$ 60 BP	<b>A.D. 682-905;</b> A.D. 912-970
Beta-176807	Charcoal from furnace within base of Phase III enclosure ditch	840 $\pm$ 60 BP	<b>A.D. 1042-1107;</b> <b>A.D. 1117-1276</b>
Beta-176810	Charcoal from kiln F996	1380 $\pm$ 60 BP	<b>A.D. 560-730;</b> A.D. 735-772.
Beta-176809	Charcoal spread F768	1280 $\pm$ 60 BP	<b>A.D. 653-881</b>
Beta-178194	Human bone from Burial 25 near mound	1390 $\pm$ 50 BP	<b>A.D. 561-710;</b> A.D. 747-766.
Beta-178195	Human bone from Burial 110 associated with mound	1560 $\pm$ 70 BP	A.D. 349-368; <b>A.D. 379-641.</b>
Beta-178198	Human bone from Burial 219 near mound	1460 $\pm$ 50 BP	A.D. 441-484; <b>A.D. 533-662.</b>
Beta-178199	Human bone from Burial 280 near mound	820 $\pm$ 50 BP	A.D. 1048-1085; A.D. 1123-1138; <b>A.D. 1150-1281.</b>
Beta-180650	Human bone from Burial 42 near	1410 $\pm$ 60 BP	<b>A.D. 536-720;</b>

	mound		A.D. 742-769.
Beta-184613	Human bone from Burial 249 near mound	1200±60 BP	<b>A.D. 682-905;</b> A.D. 912-970.
Beta-184703	Human bone from Burial 34 near mound	1240±40 BP	<b>A.D. 680-882.</b>
Beta-184706	Human bone from Burial 166 near mound	1270±70 BP	<b>A.D. 645-896;</b> A.D. 923-940.

## Animal Bones Appendix:

### Cattle:

Fusion	Element	Approx Age (Months)	Phase 1		Phase 2	
			Fused	Unfused	Fused	Unfused
<b>Early</b>	Pelvis	7-10	11	2	22	1
	Humerus d; Radius p	10-18	27	2	56	1
	<b>Total</b>		<b>38</b>	<b>4</b>	<b>78</b>	<b>2</b>
	<b>%</b>		<b>90.4</b>	<b>9.6</b>	<b>97.5</b>	<b>2.5</b>
<b>Mid</b>	Metacarpal, d; Tibia, d; Metatarsal d	24-36	22	6	39	14
	<b>Total</b>		<b>22</b>	<b>6</b>	<b>39</b>	<b>14</b>
	<b>%</b>		<b>75.6</b>	<b>24.4</b>	<b>73.6</b>	<b>26.4</b>
<b>Late</b>	Femur, p; Calcaneus	36-42	7	3	8	7
	Humerus p; Radius d; Ulna p; Femur d; Tibia p	42-48	15	3	23	10
	<b>Total</b>		<b>22</b>	<b>6</b>	<b>31</b>	<b>17</b>
	<b>%</b>		<b>75.6</b>	<b>24.4</b>	<b>64.6</b>	<b>35.4</b>

### Epiphyseal fusion data for cattle bones

Higham TWS	Approx Age (Months)	Phase 1	Phase 2
5	6-7	-	2
6	7-9	-	1
8	15-16	1	-
9	16-17	1	2
11	18-24	-	1
12	24	-	2
14	24-30	1	-
15	30-31	-	-
18	36	-	-
20	40	-	1
22	50	-	-

### Cattle age distribution based on tooth eruption and wear after Higham (1967).

Phase	Element	#	Min	Max	Mean	S.D
	<b>Scapula</b>					
1	SLC	5	44.3	52.2	48.6	3.1
1	GLP	4	58.8	61.6	60.2	1.5
1	LG	6	49.1	55.5	52.3	2.9
2	SLC	12	43.4	60.1	49.5	5.7
2	GLP	10	60.0	75.0	64.7	4.8
2	LG	11	50.3	61.4	54.1	3.6
	<b>Humerus</b>					
1	Bd	6	70.4	82.7	74.2	4.5
1	BT	7	61.0	69.3	66.6	2.8
1	HTC	9	27.2	33.4	29.8	1.9
2	GLC	2	235.9	242.8	239.4	4.9
2	Bp	2	90.8	94.8	92.8	2.8
2	Bd	15	62.5	82.9	71.4	5.4
2	BT	15	62.4	79.4	69.5	4.4
2	HTC	22	27.3	33.1	30.0	1.7
	<b>Radius</b>					
1	GL	1	256.4	-	-	-
1	Bp	10	62.9	77.2	72.2	4.8
1	SD	1	36.4	-	-	-
1	Bd	2	61.6	61.6	61.6	0.0
2	GL	2	254.5	278.0	266.3	16.6
2	Bp	8	67.5	83.6	77.7	5.4
2	SD	2	37.2	38.1	37.7	0.6
2	Bd	10	59.3	79.0	67.7	6.4
	<b>Ulna</b>					
1	DPA	5	44.7	60.0	53.3	6.4
2	DPA	10	54.8	68.5	59.7	4.8
2	SDO	1	48.6	-	-	-
	<b>Metacarpal</b>					
1	GL	2	174.6	179.0	176.8	3.1
1	Bp	3	45.4	56.0	51.9	5.7
1	SD	2	30.3	31.5	30.9	0.8
1	BFd	2	54.9	57.7	56.3	2.0
1	BFdm	1	28.3	-	-	-
1	Ddm	1	30.3	-	-	-
1	BFdl	1	26.2	-	-	-
1	Ddl	1	29.2	-	-	-
2	GL	4	176.5	189.0	184.4	5.7
2	Bp	8	67.5	83.6	77.7	5.4
2	SD	4	28.2	33.4	30.4	2.2
2	BFd	4	52.3	62.4	56.6	4.3
2	B@F	3	48.8	57.6	52.4	4.6
2	BFdm	2	25.7	26.7	26.2	0.7
2	Ddm	2	28.5	31.4	30.0	2.1
2	BFdl	3	24.5	25.0	24.8	0.3
2	Ddl	3	27.6	30.0	29.1	1.3
	<b>Pelvis</b>					
1	LA	1	53.0	-	-	-
1	LAR	1	48.2	-	-	-
2	LA	4	63.6	67.7	65.8	1.7
2	LAR	4	49.3	55.4	51.7	2.6
	<b>Tibia</b>					
1	GL	1	308.4	-	-	-

1	Bp	1	78.4	-	-	-
1	SD	1	33.3	-	-	-
1	Bd	10	53.9	62.2	56.7	2.5
2	GL	1	318.5	-	-	-
2	SD	1	33.0	-	-	-
2	Bd	11	51.3	61.3	55.1	2.7
	<b>Astragalus</b>					
1	GLI	4	58.8	66.8	62.1	3.5
1	GLm	4	52.9	60.6	56.4	3.3
1	DI	3	32.9	37.4	34.5	2.5
1	Dm	4	32.4	35.2	34.0	1.4
1	Bd	4	37.1	42.6	38.7	2.6
2	GLI	22	57.6	67.1	62.3	2.5
2	GLm	21	51.4	60.5	56.4	2.2
2	DI	21	32.0	37.5	34.8	1.2
2	Dm	19	32.7	38.0	34.9	1.3
2	Bd	20	36.1	45.6	39.9	2.5
	<b>Calcaneus</b>					
1	GL	2	122.0	125.0	123.5	2.1
2	GL	3	122.3	137.6	130.1	7.7
	<b>Metatarsal</b>					
1	GL	1	202.4	-	-	-
1	Bp	4	40.6	47.4	43.1	3.0
1	SD	1	25.5	-	-	-
1	Bfd	2	48.3	58.2	53.3	7.0
1	B@F	1	45.4	-	-	-
1	BFdm	1	23.9	-	-	-
1	Ddm	1	28.8	-	-	-
1	BFdl	1	22.0	-	-	-
1	Ddl	1	28.0	-	-	-
2	GL	16	196.9	214.1	207.2	6.1
2	Bp	28	38.0	53.4	53.9	3.2
2	SD	16	25.0	32.2	26.8	1.9
2	Bfd	18	47.4	62.2	51.2	4.2
2	B@F	16	44.4	56.3	48.4	3.7
2	BFdm	17	22.5	31.2	24.8	2.6
2	Ddm	17	26.5	34.7	30.0	2.3
2	BFdl	18	21.2	28.0	23.6	1.9
2	Ddl	17	26.1	32.0	28.7	1.7
	<b>Phalanx 1</b>					
1	Glpe	6	52.3	59.4	54.3	2.6
1	Bp	6	24.0	30.7	27.2	2.3
1	SD	5	23.2	27.2	24.5	1.6
1	Bd	5	24.9	27.5	26.2	1.0
2	Glpe	16	49.6	62.8	54.2	3.1
2	Bp	17	25.3	33.3	28.0	2.5
2	SD	15	20.5	29.8	23.3	2.4
2	Bd	15	22.3	30.5	24.9	2.3
	<b>Phalanx 2</b>					
1	GL	3	35.8	40.0	37.6	2.2
1	Bp	3	26.4	32.5	28.6	3.4
1	SD	3	20.6	25.4	22.8	2.4
1	Bd	3	20.3	27.0	22.6	3.8
2	GL	10	32.8	38.2	35.2	1.6
2	Bp	11	23.8	29.5	26.4	1.6

2	SD	10	20.0	23.6	21.4	1.3
2	Bd	10	18.7	29.0	21.0	3.0
	<b>Phalanx 3</b>					
1	DLS	3	53.5	77.3	68.6	13.1
1	LD	3	42.0	59.2	52.9	9.5
1	MBS	3	18.0	23.6	21.5	3.0
2	DLS	4	59.3	80.2	68.7	8.7
2	Ld	4	47.3	58.0	50.7	4.9
2	MBS	5	19.3	26.0	22.2	2.7

**Cattle metrical information (mm), after von den Driesch**

Phase	Element	GL (mm)	Mult. Factor	E.S.H. (cm)
1	Radius	256.4	4.30	110.3
	Metacarpal	174.6	6.25	109.1
	Metacarpal	179.0	6.0	107.4
	Tibia	308.4	3.45	106.4
	Metatarsal	202.4	5.45	110.3
2	Humerus	235.9 (GLC)	4.77	112.5
	Humerus	242.8 (GLC)	4.77	115.8
	Radius	254.5	4.30	109.4
	Radius	278.0	4.30	119.5
	Metacarpal	176.5	6.0	105.9
	Metacarpal	184.2	6.12	112.7
	Metacarpal	188.0	6.12	115.1
	Metacarpal	189.0	6.0	113.4
	Tibia	318.5	3.45	109.9
	Metatarsal	196.9	5.45	107.3
	Metatarsal	197.1	5.45	107.4
	Metatarsal	200.9	5.45	109.5
	Metatarsal	201.0	5.45	109.5
	Metatarsal	202.0	5.45	110.1
	Metatarsal	203.8	5.45	111.1
	Metatarsal	206.4	5.45	112.5
	Metatarsal	209.3	5.45	114.1
	Metatarsal	209.6	5.45	114.2
	Metatarsal	209.8	5.45	114.3
	Metatarsal	211.5	5.45	115.3
	Metatarsal	212.1	5.45	115.6
	Metatarsal	213.1	5.45	116.1
	Metatarsal	213.2	5.45	116.2
	Metatarsal	214.0	5.45	116.6
	Metatarsal	214.1	5.45	116.7

**Estimated shoulder heights (ESH) for cattle after Fock and Malolsci (von den Driesch & Boessneck 1974, 336). Where possible, metacarpals were sexually determined (after McCormick 1992) and a multiplication factor of 6.0 was used for females and 6.25 for males. The multiplication factor for unsexed metacarpals is the averages of the male and female values (6.12).**

Phase	Females	Males
1	2	1
2	7	4

**Sex determination for cattle based on pelvises.**



Phase	Metacarpal BFd (mm)	Sex
1	54.9	F
	57.7	M
2	52.3	F
	55.1	F
	56.2	Indet
	62.4	M

**Sex determination for cattle based on metacarpal distal widths.**

**Sheep/Goat:**

Higham TWS	Approx age (months)	Phase 1	Phase 2
9	9-10	-	-
12	12-21	1	-
13	21-24	-	2
14	25-26	-	1
16+	28+	-	1

**Age distributions for sheep based on tooth eruption and wear after Higham (1967).**

Phase	Element	#	Min	Max	Mean	S.D
	<b>Scapula</b>					
2	SLC	1	19.0	-	-	-
2	GLP	1	30.6	-	-	-
	<b>Humerus</b>					
1	Bd	3	23.7	25.5	24.5	0.9
1	BT	3	22.9	24.0	23.5	0.6
2	GLC	1	122.5	-	-	-
2	Bp	1	41.0	-	-	-
2	Bd	2	27.0	28.0	27.5	0.7
2	BT	3	26.9	29.2	27.8	1.3
	<b>Radius</b>					
1	Bp	2	25.7	27.8	26.8	1.5
2	Bp	3	26.1	29.1	27.6	1.5
	<b>Metacarpal</b>					
2	Bp	3	18.5	21.4	19.6	1.6
	<b>Pelvis</b>					
1	LA	1	24.0	-	-	-
1	LAR	1	21.4	-	-	-
	<b>Tibia</b>					
1	Bd	4	20.4	26.0	23.6	2.3
2	Bd	4	21.4	23.5	22.4	0.9
	<b>Metatarsal</b>					
1	Bp	1	17.2	-	-	-
	<b>Phalanx 2</b>					
2	GL	1	20.0	-	-	-

**Sheep/Goat metrical information (mm), after von den Driesch (1976).**

Element	Approx Age (months)	Phase 1		Phase 2	
		Fused	Unfused	Fused	Unfused
Pelvis; Humerus d; Radius p	0-10	14	-	9	1
Tibia d	18-24	6	1	6	1
Radius d; Femur p; calcaneus	30-36	-	-	-	2
Humerus p; Femur d; Tibia p	36-42	-	1	2	-

**Epiphyseal fusion data for sheep and sheep/goat after Silver (1969, 285-286).**

**Pig:**

Higham TWS	Approx Age (months)	Phase 1	Phase 2
7	5-6	-	1
11	9-10	1	3+F
12	10-11	1	-
18	17-19	3	-
19	19-21	-	1
20	21-23	2	1
21	23-25	M	-
22	25-27	2	3
23	27-29	-	-
24+	30+	-	F

**Pig age distribution based on tooth eruption and wear after Higham (1967).**

Phase	Element	GLi (mm)	Mult. Factor	E.S.H. (cm)
1	Calcaneus	69.7 (GL)	9.34	65.1
2	Astragalus	41.0	17.9	73.4
		41.6	17.9	74.5

**Estimated shoulder heights (ESH) for pig after Teichert (von den Driesch & Boessneck 1974, 341)**

Element	Approx Age (Months)	Phase 1	Phase 2	Fused	Unfused
		Fused	Unfused		
Pelvis	0-12	14	-	10	-
Humerus d; radius p; Metacarpal d; Tibia, d; Metatarsal d	12-24	15	11	37	24
Calcaneus; Humerus p; Radius d; Femur; Ulna; Tibia p	30-42	1	2	9	26

**Epiphyseal fusion data for pigs (based on Silver 1969, 285-86).**

Phase	Element	#	Min	Max	Mean	S.D
	<b>Scapula</b>					
1	SLC	5	19.9	24.0	21.8	1.5
1	GLP	3	32.8	34.5	33.4	0.9
2	SLC	8	20.4	27.2	23.3	2.1
2	GLP	6	32.3	35.4	33.5	1.5
	<b>Humerus</b>					
1	Bd	4	37.0	42.7	39.3	2.5
1	BT	4	31.2	36.7	33.3	2.5
1	HTC	4	17.7	21.2	19.5	1.5
2	Bd	11	32.4	41.1	37.3	2.5
2	BT	10	24.7	32.0	29.8	2.2
2	HTC	11	14.3	20.0	17.7	1.4
	<b>Radius</b>					
1	Bp	5	23.8	27.9	25.7	1.5
2	Bp	14	23.6	28.8	26.5	1.7
	<b>Ulna</b>					
1	DPA	5	29.7	39.8	34.4	4.5
1	SDO	2	24.1	24.7	24.4	0.4
2	DPA	8	28.7	38.0	33.1	3.5
2	SDO	5	22.9	27.6	25.3	1.8
	<b>Pelvis</b>					
1	LA	4	31.4	34.0	33.0	1.1
1	LAR	5	28.9	33.5	31.2	1.9
2	LA	6	30.5	35.3	32.4	2.0
	<b>Tibia</b>					
1	Bd	5	26.5	30.7	28.5	1.9
2	Bd	4	27.6	28.4	28.0	0.3
	<b>Astragalus</b>					
1	GLI	2	41.0	41.6	41.3	0.4
1	GLm	2	37.6	38.0	37.8	0.3
2	GLI	3	39.3	42.9	40.7	2.0
2	GLm	3	36.0	39.9	37.6	2.1
	<b>Calcaneus</b>					
1	GL	1	69.7	-	-	-
	<b>Metatarsal</b>					
2	GL	1	74.4	-	-	-
	<b>Phalanx 1</b>					
1	GL	1	31.4	-	-	-
1	Bp	1	15.0	-	-	-
1	SD	1	12.0	-	-	-
1	Bd	1	13.4	-	-	-

**Pig metrical information (mm), after von den Driesch (1976).**

**Horse:**

Phase	Element	LI (mm)	Mult. Factor	E.S.H. (cm)
1	Metacarpal	207.9	6.41	133.3
	Metacarpal	213.9	6.41	137.1
2	Metatarsal	243.8	5.33	129.9

**Estimated shoulder heights for horse, after Kiesewalter (quoted in von den Driesch and Boessneck 1974, 333).**

## **Kilbegly, Co. Roscommon**

Grid Ref: **190038/230053**

SMR No: **N/A**

References: **Jackman 2010; Svensson 2010.**

Excavation near the church at Kilbegly revealed a previously unknown early medieval horizontal mill, with undercroft (wheel-pit), flume, millpond, tail-race and other features preserved in their original location.

The millpond was roughly square in shape and was bounded to the west by a line of post-and-wattle fencing. A fragment of hazel from the collapsed fence was radiocarbon dated to A.D. 677-777 (UBA-12854). Another post-and-wattle fence from the overflow channel also bounded the northern edge of the millpond. A fragment of hazel wattle from this post-and-wattle fence was radiocarbon dated to A.D. 694-882 (UBA-12858). Post-and-wattle built millraces connecting the millpond with the mill complex produced radiocarbon dates of A.D. 695-881 (UBA-12855) and A.D. 673-804 (UBA-12856). A yew chip from the early silting deposit was radiocarbon dated to A.D. 717-893 (UBA-12860).

The overflow channel drained excess water from the millpond and conducted it into the tailrace to prevent flooding. It was formed by two parallel wattle fences made of alder with some examples of ash, birch, oak and willow. A sample of pomoideae wood dated the structure to A.D. 682-870 (UBA-12817), and a fragment of hazel wattle was dated to A.D. 772-891 (UBA-12821). Another piece of pomideae wood from a second possible overflow channel was radiocarbon dated to A.D. 661-771 (UBA-12822).

The millpond fed directly into the wooden flume, a large piece of oak carved into a rectilinear box shape that funnelled the water onto the millwheel. A piece of oak wood working waste from the packing of the flume was radiocarbon dated to A.D. 683-866 (UBA-12859), and a small fragment of oak which had broken off the flume was radiocarbon dated to A.D. 775-887 (UBA-12857). After the site fell into disuse, the flume began to fill and become blocked with sediments. A fragment of willow from this context was radiocarbon dated to A.D. 719-892 (UBA-12825).

Traditionally the mill building itself is divided into two: the upper floor known as a millhouse and the lower floor known as the undercroft or wheel-pit. The millhouse would have contained the millstones and a hopper (the funnel type apparatus that fed the grain into the millstones). The lower floor of the building, usually termed the undercroft or wheel-pit, was found in an excellent state of preservation and possibly represents one of the best preserved examples of early medieval timber-framed buildings in Ireland. The uppermost timber of the northern wall, T107, was radiocarbon dated to A.D. 432-600 (UBA-12819). After abandonment the undercroft would have quickly filled with various water-borne soil deposits. The initial silting layer had inclusions of small wooden chips and fragments with a fragment of *Prunus* wood being radiocarbon dated to A.D. 412-539 (UBA-12824). The next layer that accumulated within the undercroft included a number of artefacts: two wooden paddles from the wheel hub, a 'pick-shaped' wooden implement, a discoid stone weight or gaming piece made from locally sourced black shale, and a fragment of cattle bone. The uppermost deposit included a fragment of oak brushwood that had presumably been washed into this context and was radiocarbon dated to A.D. 535-646 (UBA-12816).

Once the water had passed through the undercroft it drained into the tail-race. Approximately 5.5 m south of the undercroft the base of the tailrace abruptly dropped 0.3m-0.4m in height. This steep drop in conjunction with a slight widening of the sides accommodated a number of timbers that formed a platform structure. A number of the timbers appear to have facets and features, such as dowel holes, which have no clear function as part of the platform. These features on the planks may be indicative of the timbers being re-used and recycled from another structure, possibly an earlier mill located on site. This interpretation of re-use seems to be supported by the dendrochronological dating of two of these timbers which suggested that one came from a tree felled in the mid-sixth century, while the other was felled in the early-seventh century.

Post-abandonment, the tailrace was filled by a number of deposits. A fragment of worked birch wood from this context was radiocarbon dated to A.D. 427–547 (UBA-12820). This early date may be the result of redeposition of sediments within the tailrace since it appears to predate the construction of the timber platform. A fragment of worked birch wood from the upper fill of the tailrace was radiocarbon dated to A.D. 688-876 (UBA-12818).

The location of contemporary wood-working near to the mill was identified and hazel chips from this area produced a radiocarbon date of A.D. 663-771 (UBA-12853).

A number of domestic early medieval artefacts were recovered from the site, including a copper-alloy ringed-pin, withy ropes, fragments of leather (possibly from a bag or shoe), a whetstone/knife sharpener, a wooden spade, possible gaming piece/token and bracelet fragments made from locally sourced shale.

### **Animal Bones:**

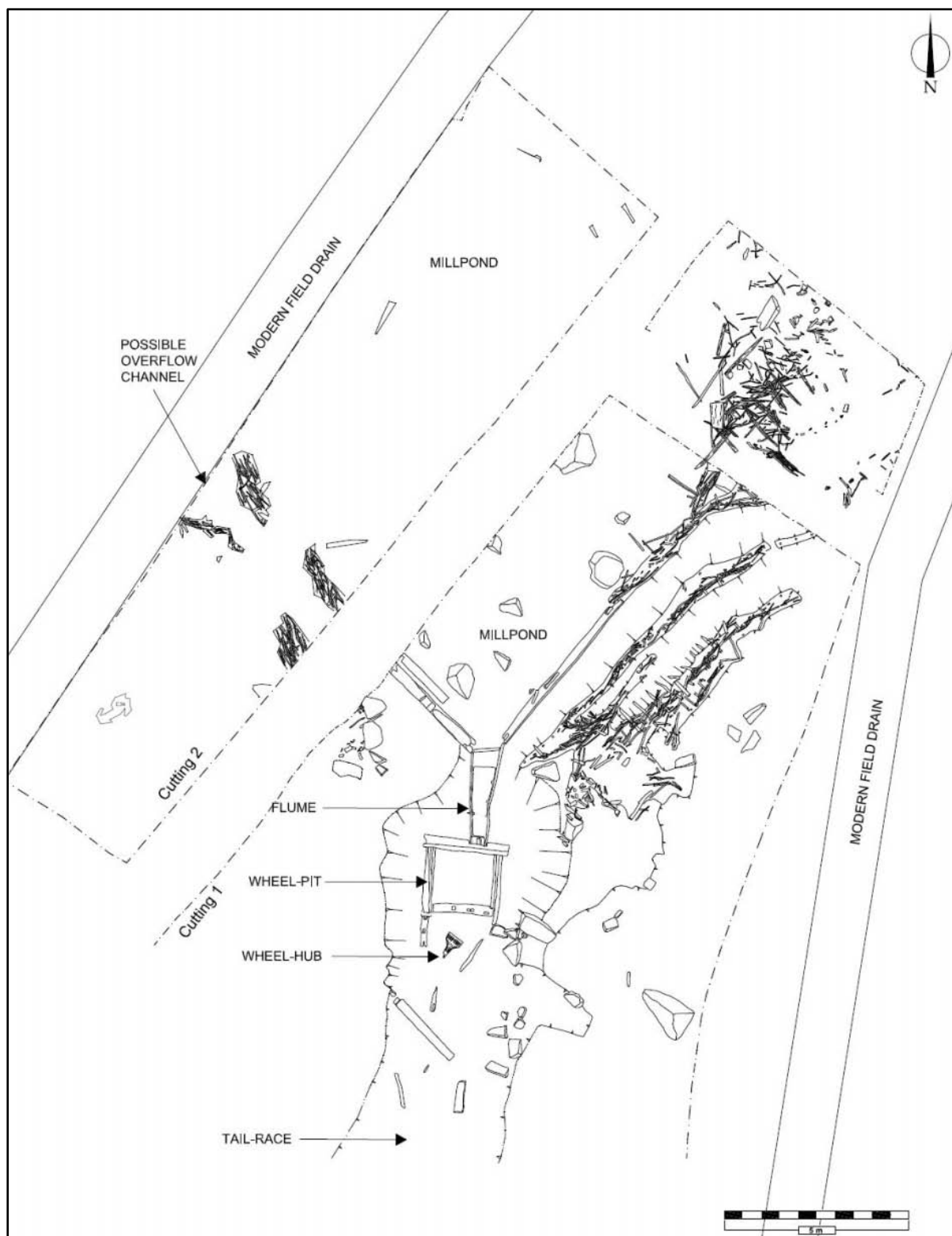
The animal bone material consisted of 7.0 kg of bone, or 537 fragments, of which 197 were associated with the mill. Only 9% of the bones could be identified to species. All bones analysed were fully grown, which suggests there were no very young animals that were butchered or died on the site. The cattle bone giving epiphyseal fusion data suggests animal(s) over two years of age at death, and a sheep bone suggests animal(s) over 2 ½ years of age at death.

	<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Red Deer</b>	<b>Unidentified</b>	<b>Date</b>
							7 <sup>th</sup> /8 <sup>th</sup> C.
NISP	17	9	1	8	3	159	
MNI	1	1	1	1	1	-	

### **NISP and MNI from Kilbegly, Co. Roscommon**

### **Dendrocronological Dates**

<b>Sample</b>	<b>Date</b>	<b>Estimated Felling Date</b>
T289 - tailrace	A.D. 367-591	A.D. 601
T293- tailrace	A.D. 350-524	A.D. 534



**Plan of excavations of horizontal mill at Kilbegley, Co. Roscommon (after Jackman 2010)**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UBA-12816	Oak from upper fill of undercroft (C15)	1486 $\pm$ 30 BP	<b>A.D. 535-646</b>
UBA-12817	Wood from wattle overflow channel (C33)	1245 $\pm$ 30 BP	<b>A.D. 682-870</b>
UBA-12818	Birch from tailrace (C38)	1236 $\pm$ 30 BP	<b>A.D. 688-876</b>
UBA-12819	Oak from wall of undercroft ((C45)	1530 $\pm$ 30 BP	<b>A.D. 432-497; A.D. 502-600</b>
UBA-12820	Birch from tailrace (C51)	1565 $\pm$ 22 BP	<b>A.D. 427-547</b>
UBA-12821	Hazel from wattle overflow channel (C33)	1198 $\pm$ 23 BP	<b>A.D. 772-891</b>
UBA-12822	Wood (C62)	1303 $\pm$ 22 BP	<b>A.D. 661-724; A.D. 738-771</b>
UBA-12823	Ash wood from beneath posts of wattle wall (C66)	1352 $\pm$ 23 BP	<b>A.D. 643-689; A.D. 754-760</b>
UBA-12824	Wood chips from base of undercroft (C67)	1595 $\pm$ 28 BP	<b>A.D. 412-539</b>
UBA-12825	Willow from flume (C79)	1202 $\pm$ 26 BP	A.D. 719-742; <b>A.D. 769-892</b>
UBA-12853	Hazel to east of millpond (C10)	1298 $\pm$ 23 BP	<b>A.D. 663-727; A.D. 737-771</b>
UBA-12854	Hazel from wattle fence (C23)	1265 $\pm$ 20 BP	<b>A.D. 677-777</b>
UBA-12855	Birch from wattle fence (C26)	1225 $\pm$ 20 BP	A.D. 695-699; <b>A.D. 708-747; A.D. 766-881</b>
UBA-12856	Alder from wattle fence (C29)	1262 $\pm$ 22 BP	<b>A.D. 673-780; A.D. 792-804</b>
UBA-12857	Oak from flume (C30)	1199 $\pm$ 20 BP	<b>A.D. 775-887</b>
UBA-12858	Hazel from wattle overflow channel (C35)	1225 $\pm$ 22 BP	A.D. 694-701; <b>A.D. 707-747; A.D. 765-882</b>
UBA-12859	Oak from below flume (C68)	1246 $\pm$ 24 BP	<b>A.D. 682-828; A.D. 838-866</b>
UBA-12860	Yew chip from base of millpond (C69)	1202 $\pm$ 27 BP	A.D. 717-743; <b>A.D. 768-893</b>

## Appendix:

Context	Species	Element	Bp	BFd	B@F
37	Cattle	MC III+ IV	-	50.4	24.8
51	Red Deer	MC III +IV	31.6	-	-
67	Horse	MC III	47.5	-	-

**Biometrics from Kilbegly, Co. Roscommon (mm)**

# **'St Gobban', Kilgobbin, Stepside, Co. Dublin**

Grid reference: **O18902440 (31890/22440)**

SMR: **DU025-016**

Reference: **Bolger 2008; Larsson 2004a-c; Strid 2004.**

Excavations in two fields directly to the west and south of the early medieval church of Kilgobbin revealed evidence for settlement, agriculture and industry. This evidence included curvilinear and linear ditches, slot trenches, post and stake-holes, and pits. The earliest phase predated the enclosure ditches and consisted of a circular slot-trench and pit. No finds were recovered from this phase.

The second phase consisted of a north-south-orientated ditch and a concentration of post-holes in the northern part of the excavated area. The relationship between the two was unclear but the former may have been a field boundary. Artefacts indicative of settlement and metalworking associated with this phase included two possible copper-alloy pins a clay mould fragment.

A curving ditch was revealed in Phase III and it defined a circular area approximately 37m in diameter. It was evident that the ditch did not enclose the church or graveyard. Phase IV, however, was related to the ecclesiastical site. A large curvilinear ditch was revealed which defined a circular or sub-circular enclosure. This cut the Phase III enclosure and it would have encircled all, or a large section, of the present church and graveyard. The ditch was back-filled before another enclosure was created that enlarged the space. An annexe was created at the southern end and this defined an area of industrial activity which included metalworking features, slag and crucible fragments. A number of pits also produced metalworking debris. The artefacts from this phase included a selection of iron and copper-alloy pins, a polychrome bead fragment, a lignite bracelet and a highly ornate copper-alloy clasp.

Further excavation at the north-west of the site revealed probable early medieval activity. Two ditches, from the first phase, appeared to define a large sub-rectangular enclosure that extended beyond the excavation limit. Occupation was evident by the presence of large amounts of animal bone, a possible refuse pit and artefacts from the upper fill of one of the ditches. The finds included iron knives, a possible shears, and both iron and copper-alloy studs or mounts. It is probable that this enclosure is related to the enclosure activity described above but their chronological relationship cannot be determined until radiocarbon dates are available.

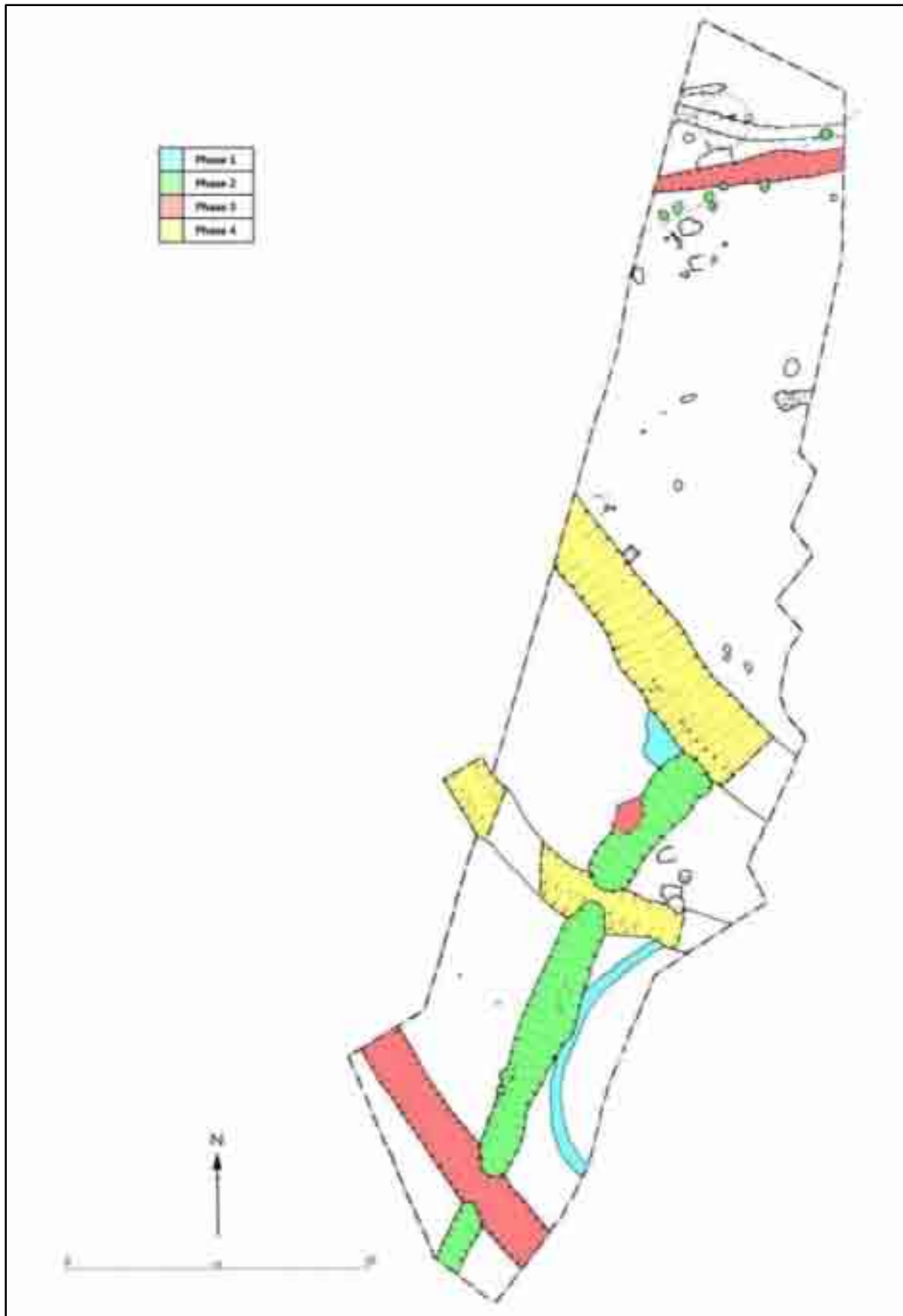
Excavation to the south of the church identified further multi-phase activity. Additional ditches were revealed, as well as a number of cereal-drying kilns, which may relate to the church's agricultural activities. Phase I consisted of a linear ditch and the remains of hearth at its base. There was a marked increase in farming activity during Phase II including the creation of a sub-rectangular field enclosure and two cereal-drying kilns. Additional phases were late medieval in date, based on the occurrence of pottery sherds within the ditches.

## **Animal Bones:**

<b>Species</b>	<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Dog</b>	<b>Cat</b>	<b>Date</b>
<b>NISP</b>	126	31	30	9	4	2	7 <sup>th</sup> /8 <sup>th</sup> C
<b>MNI</b>	3	3	3	1	1	1	

**NISP and MNI from Kilgobbin, Co. Dublin**





**Plan of phases at Kilgobbin, Co. Dublin (after Bolger 2008)**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
UB-6455	Fill of ditch C3	1267±31 BP	<b>A.D. 665-783;</b> A.D. 788-820; A.D. 842-859
UB-6458	Fill of pit C31	1317±31 BP	<b>A.D. 653-726;</b> <b>A.D. 737-771</b>
UB-6457	Fill of ditch C14	1285±32 BP	<b>A.D. 659-779;</b> A.D. 794-801
UB-6486	Fill of ditch C21	1222±34 BP	<b>A.D. 689-752;</b> <b>A.D. 761-888</b>
UB-6456	Fill of ditch C8	1226±32 BP	<b>A.D. 689-752;</b> <b>A.D. 761-885</b>
UB-6487	Fill of pit C70	1185±34 BP	A.D. 720-741; <b>A.D. 770-900;</b> A.D. 918-964
UB-6488	Fill of ditch C21	970 ± 33 BP	<b>A.D. 1015-1157</b>
UB-6459	Fill of ditch C44	1219±30 BP	<b>A.D. 693-748;</b> <b>A.D. 764-887</b>
UB-6462	Fill of ditch C302	1302±31 BP	<b>A.D. 660-730;</b> <b>A.D. 735-772</b>
UB-6460	Fill of kiln 1	1297±30 BP	<b>A.D. 663-772</b>
UB-6461	Fill of kiln 2	1296±49 BP	<b>A.D. 649-827;</b> <b>A.D. 839-864</b>

## Appendix:

Bone/Measurement	Min	Max	Mean	No.
<b>Radius</b>				
Bp			58.0	1

### Cattle biometrics from Kilgobbin, Co. Dublin.

Bone/Measurement	Min	Max	Mean	No.
<b>Metacarpal</b>				
Bd			44.9	1
<b>Tibia</b>				
Bd			69.9	1

### Horse biometrics from Kilgobbin, Co. Dublin.

**Killanully, Co. Cork**Grid Ref: **W69246362 (169240/063628)**SMR No: **CO086-047**Reference: **Mount 1995**

A univallate early medieval enclosure and souterrain, and a post-medieval rectangular enclosure were excavated in Killanully townland in advance of a limestone quarry extension. Excavation revealed that the enclosure and souterrain were primarily occupied between the eighth/tenth centuries A.D and were associated with iron smelting and cereal-cultivation. The early medieval enclosure was oval in plan (25m x 36m), and was enclosed by a low bank, 1.5m thick and 0.35m high. The excavated ditch was V-shaped and rock-cut and measured 1.95m wide and 1.05m deep. Two fills were identified within the ditch and contained a quantity of animal bone. The eastern entrance was a simple uncut causeway 3.5m wide between the two ditch terminals and had no indication of any postholes which may have supported a gate. A small quantity of animal bone, a sherd of post-medieval pottery, and a fragment of an iron key shaft were excavated inside the southern ditch terminal.

Evidence for a truncated layer containing occasional flecks of charcoal and fragments of burnt bone were identified beneath the south-west portion of the bank indicated some form of occupation before the enclosure was built. Animal bone and a tuyère fragment within the enclosing bank indicated the presence of a furnace on the site before or during the construction of the enclosing bank.

Intensive modern cultivation and the erosion of soil down the hill slope had destroyed any evidence for houses or hearths inside the enclosure. A stone-lined souterrain was located in the south-western area of the site and consisted of a single curving passage 11.3m long, 0.4-0.9m wide and at most 1.85m below the present ground surface. The structure was unroofed except for one stone lintel and was built using alternating orthostats of upright stone slabs along its southern section and dry-stone walling for the most part in the northern section. A quantity of charcoal in the interstices of the stones along the northern section produced a radiocarbon date from the tenth to the thirteenth century (see below).

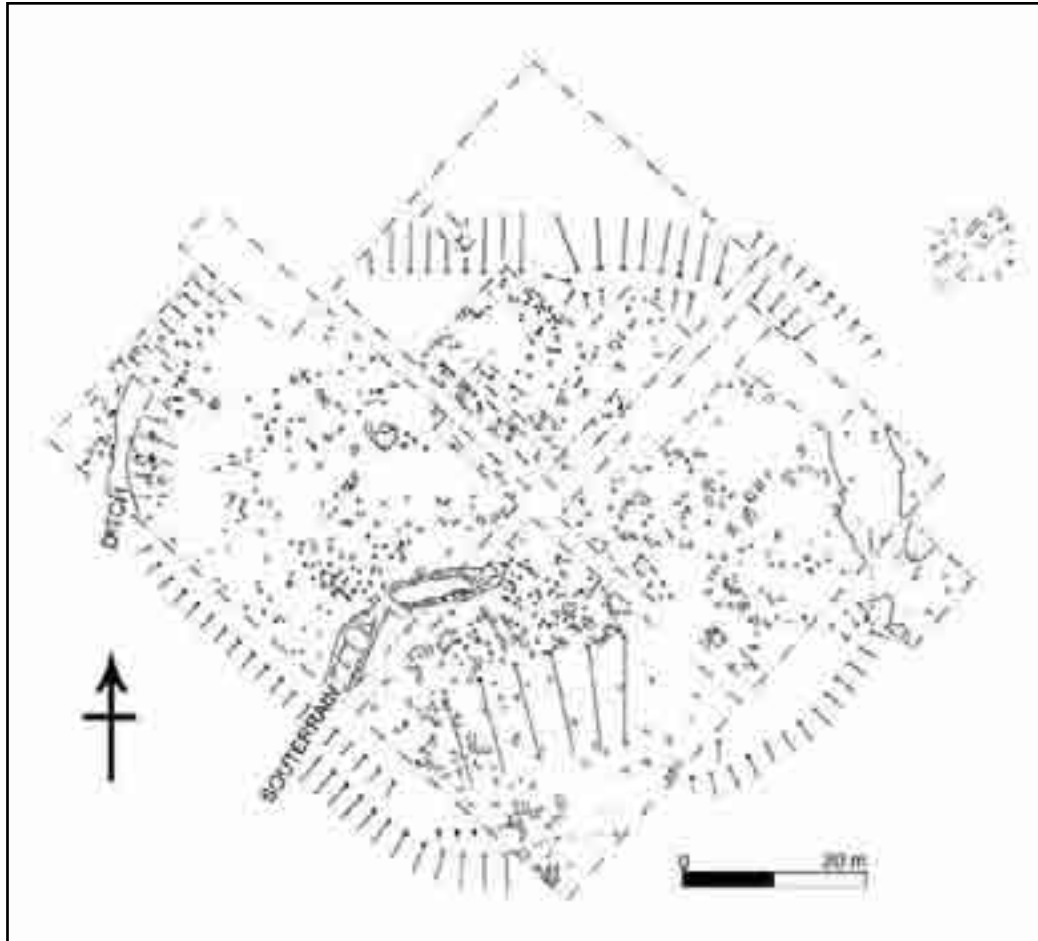
The souterrain contained five fills. The original floor of the souterrain was heavily trampled and contained animal bone, molluscs, charcoal, a piece of cinder from a furnace and a bone barrel-bead. An occupation deposit that infiltrated the souterrain through the entrance and was contemporary with the use of the souterrain was discovered overlying the original floor. A quantity of animal bone, single hazelnut shell, charred barley, fat-hen, molluscs and charcoal as well as a whetstone, iron band, iron fragment and 25g of metal ore were recovered from this context. A sample of charcoal from this deposit returned a radiocarbon date in the late-eighth to late-tenth centuries (see below). This occupation deposit lay beneath the primary souterrain backfill or demolition deposit of the souterrain which contained the remains of the dry stone walling and lintel stones as well as animal bone, a stone disc, iron slag and a piece of iron ore.

A corn-drying kiln consisting of a deep circular pit (1.25m by 1.15m, and 0.8m deep) with a flue (0.6m long) was excavated in the western side of the enclosure. The fills of the furnace pit contained a large quantity of iron slag, animal bone, charcoal, two iron nails, charred barley and fat-hen. Charred cereals and weeds were uncovered at the heavily burnt base of the kiln. An irregular slot (1m long by 0.5m wide and 1m-1.15m deep) was excavated 1.5m east of the corn-drying kiln and contained fragments of burnt cattle bone, charcoal, three charred oat grains and one charred weed. A radiocarbon determination from a large piece of charcoal returned a calibrated two sigma radiocarbon date of A.D. 689-888. A pit (0.85m by 0.3m at the top and 0.3m deep) was situated close to the souterrain and contained animal bone and iron slag.

A horizon layer situated directly beneath the sod but significantly overlying the interior features in the south-western part of the site contained a large quantity of animal bone, iron slag, iron ore and various stone and metal artefacts, displaced from their primary context due to the modern cultivation. Finds from this displaced layer included a knife blade, an iron pin with remains of ringed head, an iron shears, iron nails and spikes and a possible part of a blowpipe, five whetstones, two stone discs and various late finds.

### Animal Bones:

The assemblage was highly fragmentary and no MNI count was undertaken. On numbers of fragments recovered, sheep were most numerous, followed by pig, cattle, deer, dog and horse. Although the sheep remains mainly consisted of teeth, epiphyseal fusion from at least three skeletal elements suggests that lambs less than one year old were killed/died on site. The pig, cattle and deer remains were also largely represented by teeth.



**Plan of Killanully, Co. Cork (after Mount 1995, 124).**

### Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-3647	Charcoal from fill of slot, 1.5m east of corn-drying kiln	1222 $\pm$ 34 BP	<b>A.D. 689-752</b> <b>A.D. 761-888</b>
UB-3648	Charcoal from the dry-stone walling of the souterrain	969 $\pm$ 97 BP	<b>A.D. 889-1260</b>
UB-3649	Charcoal from occupation layer inside souterrain	1155 $\pm$ 38 BP	<b>A.D. 777-975</b>

**'Killederdadrum' (Lackenavorna td.), Co. Tipperary**

Grid Ref: **R94807211 (194800/172110)**

SMR No: **TN027-100**

Reference: **Manning 1984; McCormick 1984.**

Excavation of a large univallate enclosure (72m x 52m) revealed circular houses, a corn-drying kiln, a possible souterrain and a mainly post-medieval cemetery. Two parallel low banks with external ditches ran westwards from this enclosure and may have formed an annex to the main enclosure. A small vessel of E ware (c. 7<sup>th</sup> C.) was recovered in a re-deposited context in an upper fill of these annex ditches. The entrance to the main enclosure consisted of a causeway across the ditch, flanked by two pairs of large post-holes which may have held the gate-posts. Two smaller pits along the eastern face of the entrance bank suggest that this side may have been supported by a fence or revetment.

A wooden roundhouse (House 1) with a possible northern annex was excavated at the western end of the enclosure. Internal features included two hearths, four post-holes for roof supports and a pit containing a bronze pin. Other finds included two iron knives, a perforated stone disc, a hone-stone, a rotary grinding stone and a sliver of sawn antler.

Two smaller roundhouses were identified on the north side of the enclosure. House 3 replaced House 2 with apparently little time lapse. A slightly curving slot trench pre-dated the two houses and may have formed part of an earlier structure/fence. A charcoal sample from the wall trench of House 2 produced a radiocarbon date of A.D. 1157-1394, though this significantly post-dates the early medieval date suggested by the artefactual remains.

A possible corn-drying kiln cut into the inner slope of the southern enclosure ditch contained a black layer of carbonized grain similar to that recovered inside the fill of the enclosing ditch. A double row of stones running west along the ditch may represent the demolished remains of the kiln's flue. A radiocarbon date from the grain in the kiln produced a date of A.D. 895-1172.

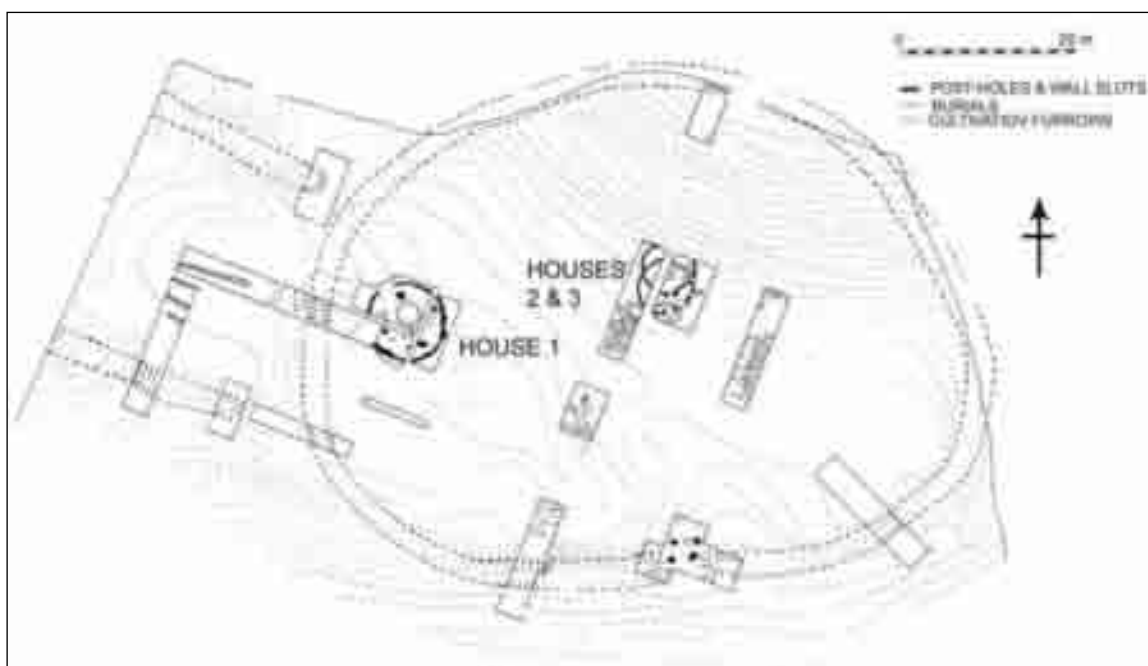
The post-medieval cemetery consisted of roughly 80 excavated burials. These burials rarely disturbed each other suggesting that there were gravemarkers.

**Animal Bones:**

Only a small number of bones were found during the excavation and these survived in a very poor condition due to adverse soil conditions. Most of the bones were from the ditch fill while a smaller group came from House 1. The assemblage was dominated by cattle teeth from immature animals.

	<b>Cattle</b>	<b>Sheep/Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Red Deer</b>	<b>Date</b>
NISP	23	1	1	1	2	7 <sup>th</sup> /8 <sup>th</sup> C?

**NISP from Killederdadrum, Co. Tipperary**



**Plan of excavated areas at Killeaderdardrum, Co. Tipperary (after Manning 1984, 241)**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
GU-1511	Carbonised grain from fill of corn-drying kiln in Cutting 1.	1000±60 BP	A.D. 895-925 <b>A.D. 937-1172</b>
GU-1513	Charcoal from wall trench of House 2	745±65 BP	<b>A.D. 1157-1325</b> A.D. 1344-1394

**Killickaweeny, Co. Kildare**Grid Ref: **N83854067 (283859/240679)**SMR No: **N/A**Reference: **Walsh & Harrison 2003; Walsh 2005; Walsh 2008; Lofqvist 2004.**

Excavation revealed two phases of occupation on site. The earlier phase was defined by an incomplete curvilinear ditch which survived to a length of 30m. An incomplete L-shaped ditch associated with this early phase was interpreted as the boundary of a livestock enclosure. These ditches appear to have been deliberately in-filled with occupation rubbish, and were cut through by the ditch of the later occupation phase.

The main occupation phase was defined by a 'heart-shaped' ditch, approximately 200 m long. Four structures were excavated in the interior of this enclosure – a circular post-built structure (A); slot-trenches for wattle walls for a sub-rectangular building (B); similar foundations for a circular building (C); and a rectangular structure defined by postholes at the corner (D). Structure A was interpreted as the main dwelling, while structure C was interpreted as an outhouse for livestock, and it is suggested that the sub-rectangular structures on site may have been influenced by Viking houses.

Industrial activity appears to have been concentrated in specific areas of the interior. These are indicated by six bowl furnaces, refuse pits including industrial waste (86kg of iron slag), and a possible cistern, which may have been associated with metalworking. Slag and hammerscale were recovered from the fill of the structure B, and it is suggested that this may have been a metalworking workshop; structure D was also interpreted as metalworking workshop, perhaps roofed, but with only a wall along one side.

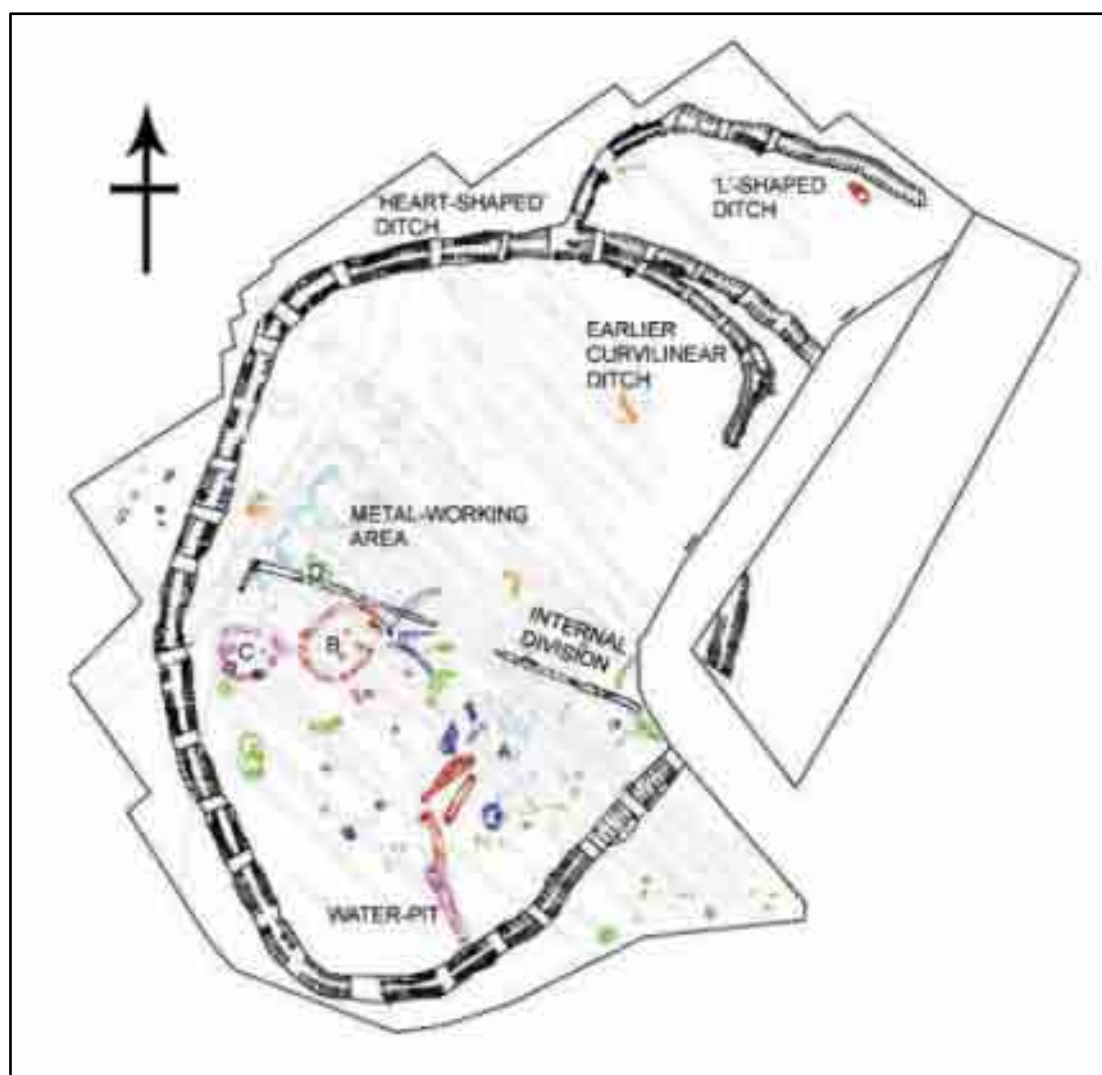
The finds from this site included four penannular-ring headed pins; sixteen iron knives; five glass beads; a (possible) pair of iron shears; and a rotary grindstone.

**Animal Bones:**

A total of 9,043 animal bones were discovered, of which 2,284 fragments were able to be identified to species. Although bones were listed by context, it was not possible to recreate the MNI of individual species by phase.

	<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Dog</b>	<b>Cat</b>	<b>Bird</b>	<b>Hare</b>	<b>Red Deer</b>	<b>Rat</b>	<b>Date</b>
NISP	1330	440	267	31	123	10	71	7	1	3	
%NISP	58.2	19.3	11.7	1.4	5.39	0.4	3.1	0.3	0.04	0.13	
MNI	27	18	14	3	4	1	6	2	1	1	

**NISP and MNI from Killickaweeny, Co. Kildare.**



**Plan of Killickaweeny, Co. Kildare (after Walsh 2008, 28).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
Beta-18557	Main fill of earlier phase ditch	1350±60 BP	<b>A.D. 569-782;</b> A.D. 790-809.
Beta-185555	Charcoal from upper fill of main ditch	1010±70 BP	<b>A.D. 888-1186;</b> A.D. 1200-1205.
Beta-185550	Charcoal from pit	1280±60 BP	<b>A.D. 653-881.</b>
Beta-185549	Charcoal from pit.	1270±60 BP	<b>A.D. 656-886.</b>
Beta-185553	Charcoal from posthole in Structure B	1220±50 BP	<b>A.D. 673-897;</b> A.D. 922-942.
Beta-185551	Charcoal from pit.	1300±60 BP	<b>A.D. 644-876.</b>
Beta-185556	Charcoal from gully.	1260±50 BP	<b>A.D. 665-878.</b>
Beta-185554	Charcoal from pit	1250±60 BP	<b>A.D. 657-894;</b> A.D. 928-934.
Beta-185553	Charcoal from pit	1260±60 BP	<b>A.D. 656-890.</b>



Beta-185558	Charcoal from metalworking hearth.	1090±60 BP	<b>A.D. 778-1032.</b>
GU-11625	Charcoal from metalworking hearth.	1320±50 BP	<b>A.D. 618-782;</b> A.D. 789-812; A.D. 845-856.

## Animal Bones Appendix:

### Cattle

Age of Fusion	Unfused		Closing		Fused	
	No.	%	No.	%	No.	%.
<b>7-10 mnths</b>	3	11	-	-	24	89
<b>12-18 mnths</b>	9	18	-	-	40	82
<b>18-24 mnths</b>	3	11	-	-	25	89
<b>2-2 ½ yrs</b>	10	21	2	5	35	74
<b>3 ½ -4 yrs</b>	19	39	1	2	29	59
<b>Total</b>	44		3		153	

### Epiphyseal fusion of cattle bone

Element	Measurement	No	Min	Max	Mean
<b>Astragalus</b>	GLI	9	53.7	61.7	58.9
	Glm	9	48.1	56.6	53.7
	DI	8	32.8	39.3	36.0
	Bd	10	30.3	39.1	35.4
<b>Calcaneus</b>	GL	1			118.6
	GB	1			43.0
<b>Femur</b>	Bd	1			81.2
<b>Humerus</b>	Bd	9	66.2	81.7	73.3
	Bt	3	64.8	71.2	67.9
<b>Metacarpus</b>	GL	5	172	188	180.6
	Bp	10	43.3	58.5	51.25
	Bd	10	49	61.7	54.0
	SD	4	25	35.6	30.7
<b>Metatarsus</b>	GL	2	210	219	214.5
	Bp	7	35.4	44.2	40.7
	Bd	2	49.5	50.4	49.9
	SD	3	22	24.5	23.0
<b>Phalanx 1</b>	GLpe	12	50.2	61.7	54.0
	Bp	14	15.9	30.9	24.4
	Bd	16	20.9	30.8	25.13
	SD	13	18.1	29.6	22.56
<b>Phalanx 2</b>	GL	12	32.5	36.8	34.26
	Bp	17	22.7	30.3	26.4
	Bd	14	18.1	24.4	21.19
	SD	14	17.2	23.9	20.15
<b>Phalanx 3</b>	DLS	10	48.3	71.1	62.04
	MBS	13	16.1	21.5	18.96
	Ld	11	37.9	53.4	46.64
<b>Radius</b>	Bp	8	60.5	74.4	67.7
	Bd	2	60.5	66.3	63.4
<b>Scapula</b>	GLP	9	53.8	66.4	60.25
	SLC	14	30.2	48.0	41.83

	BG	9	37.1	44.6	41.44
<b>Tibia</b>	Bd	6	53.1	54.9	53.9
<b>Ulna</b>	LO	1			83.3

#### Summary of cattle biometrics.

Element	GL	Bp	Bd	SD	Sex	Mult. Factor	EWB/ESH	Mult. Factor	EWB/ESH
<b>Metacarpus</b>	177	46.7	49	25	F	GL x 6.03	106.7	GL x 6	106.2
	187	58.5	60.2	35.6	M?	GL x 6.03	118.4	GL x 6	116.9
	179	49.7	51.2	27	F/O	GL x 6.03	107.9	GL x 6	107.4
	172	49.4	52.8	-	F	GL x 6.03	103.7	GL x 6	103.2
	188	59.2	-	35.3	M	GL x 6.03	119	GL x 6	117.5
<b>Metatarsus</b>	210	43.5	49.4	22.6	-	GL x 5.475	114.9	GL x 5.45	114.4
	219	41.9	50.4	24.6	-	GL x 5.475	119.9	GL x 5.45	119.3

#### Estimated shoulder heights (cm) for cattle

It was possible to use only 16 pelvic bones in a sex-estimation. 11 of these (69%) were judged to be females. Five of the pelvic bones (31%) were from possible males. From the measurements of the 12 horn cores it shows that 10 (83%) are from female and two are from male. Seven (64%) out of the 11 metacarpals that were possible to measure were judged to be from females while two (18%) were from possible females. The remaining two (18%) metacarpals were judged to be from two males.

#### Sheep/Goats

Age of Fusion	Unfused		Closing		Fused	
	No.	%	No.	%	No.	%.
<b>6-10 months</b>	6	27	-	-	16	73
<b>13-24 months</b>	8	22	-	-	28	78
<b>30-36 months</b>	6	75	-	-	2	25
<b>36-42 months</b>	5	56	-	-	4	44
<b>Total</b>	25				50	

#### Epiphyseal fusion of sheep bone

Element	Measurement	No	Min	Max	Mean
<b>Astragalus</b>	GLI	2	26.2	26.4	26.3
	Glm	2	24.5	24.9	24.7
	DI	1			14.8
	Bd	1	16.8	17.1	16.95
<b>Humerus</b>	Bd	1			23.7
<b>Metacarpus</b>	Bp	4	18.2	25.5	21.2
	Bd	3	21.9	28.6	25.1
	SD	1			11.9
<b>Metatarsus</b>	GL	1			124.7
	Bp	3	18.3	21.0	19.8
	Bd	1			21.9
	SD	1			11.1
<b>Phalanx 1</b>	GLpe	7	28.4	39.5	32.1
	Bp	7	8.3	14.9	12.1
	Bd	6	7.5	13.5	11.4
	SD	6	9.2	11.3	10.4
<b>Radius</b>	Bp	1			25.3
	SD	1			18.3
<b>Scapula</b>	GLP	5	17.5	35.2	27.9

	SLC	4	17	21.6	18.35
	BG	6	15.8	22.7	18.85
<b>Tibia</b>	Bp	2	34.8	38.7	36.7
	Bd	4	22.2	23.9	23.3
	SD	4	12.2	18.0	13.8

#### Summary of sheep biometrics.

Only one metatarsal, retrieved from the fill (C120) of a linear feature (C27), could be used in estimating the size of a sheep/goat in Killickaweeny. The Greatest Length (GL) of the metatarsal was 124.7mm and the estimated shoulder heights (ESH) came to 56.61cm. Only four hip bones and one frontal bone were possible to use when determining the gender of the animals. Two hip bones were from males/ram while the other two hip bones and the frontal bone was from a female/ewe.

#### Pig

Age of Fusion	Unfused		Closing		Fused	
	No.	%	No.	%	No.	%.
<b>0-1 yr</b>	10	40	-	-	15	60
<b>2 yrs</b>	11	92	-	-	1	8
<b>2 ½ yrs</b>	3	100	-	-	-	-
<b>3 ½ yrs</b>	22	100	-	-	-	-
<b>Total</b>	46				16	

#### Epiphyseal fusion of pig bone

Element	Measurement	No	Min	Max	Mean
<b>Calcaneus</b>	GL	1			61
	GB	1			17.8
<b>Humerus</b>	Bd	2	37.1	37.5	37.3
	Bt	1			30.6
<b>Metatarsus 3</b>	Bp	1			13.2
<b>Metatarsus 4</b>	Bp	1			13.9
<b>Phalanx 1</b>	Bd	1			13.4
<b>Phalanx 3</b>	DLS	1			22.1
	MBS	1			8.6
	Ld	1			19.8
<b>Scapula</b>	GLP	3	28.9	31.7	30.1
	SLC	4	16.7	20.6	18.95
	BG	3	19	21.1	20.1
<b>Ulna</b>	SDD	1			26.0
	DPA	1			35.1

#### Summary of pig biometrics.

The bone material from Killickaweeny only contained one calcaneus of a juvenile pig that could be used in estimating the stature. This individual was younger than 2-2.5 years. The Greatest Length (GL) of the metatarsal was 61mm (GLI:  $61 \times 9.34 + 26.0 = 595.74$ . After Teichert, 1966) and the estimated shoulder height (ESH) of this juvenile pig came to 59.57cm.

Sixteen canines were retrieved at Killickaweeny and the material showed an overabundance of males; fifteen tusks were retrieved from boars while only one canine from a sow was found.

## Horse

Age of Fusion	Unfused		Closing		Fused	
	No.	%	No.	%	No.	%.
9-24 mnths	-	-	-	-	9	100
24-36 mnths	-	-	-	-	-	-
36-42 mnths	1	33	-	-	2	67
40-60 mnths	1	50	1	50	-	-
Total	2		1		11	

### Epiphyseal fusion of horse bone

The presence of a few very worn teeth; P4, M1-3 and a second M3, indicates that one individual was at least 15 years old and probably older. Further teeth; I2, I3, C show the presence of a 4-8 year old horse.

Element	GL	GLi	Bp	Dp	Bd	GLP	BG	Mult.	E.S.H
Humerus					64.7				
Humerus					76.6				
M/carpal III					41.5				
M/carpal III			46.1	30.1					
M/carpal III					41.0				
M/tarsal III	275	272			50.2			5.33	144.9
Scapula						84.1	45.4		

### Horse biometrics and estimated shoulder height.

**Killulla, Co. Clare**Grid Ref: **R40056504 (140054/165049)**SMR No: **N/A**Reference: **Murphy & Danaher 2001; McQuade 2001**

Topsoil stripping at Killulla revealed a multi-phase archaeological landscape comprised of a late Bronze Age building, hearth and *fulacht fiadh*, an early medieval ditched enclosure and a small post-medieval metalworking complex. Charcoal from the gully fill and posthole fill of a circular post-built hut and external hearth produced Late Bronze Age/Early Iron Age dates. This structure was later truncated by the early medieval ditched enclosure.

The ditched enclosure was only partially excavated and had a diameter of 38m internally and 42m externally. The ditch appears to have been refilled with the same material that had been originally dug from it, and the lack of silting indicates that this material was re-deposited into the ditch shortly after its construction. Finds from the enclosing ditch included a fragment of a rotary quern, a possible socketed spearhead and fragments of two human skulls as well as a large quantity of animal bone. A dated charcoal sample from the secondary fill of the ditch indicated that the ditch was backfilled in the eleventh/twelfth century.

The interior of the enclosure was only partially investigated and the few features from this area mostly comprised post-medieval drainage ditches, furrows and pits of unknown date. Other than two other internal postholes, no other features could be possibly associated with the occupation phase of the ditched enclosure though many may survive outside the limit of the excavation area.

**Animal Bones:**

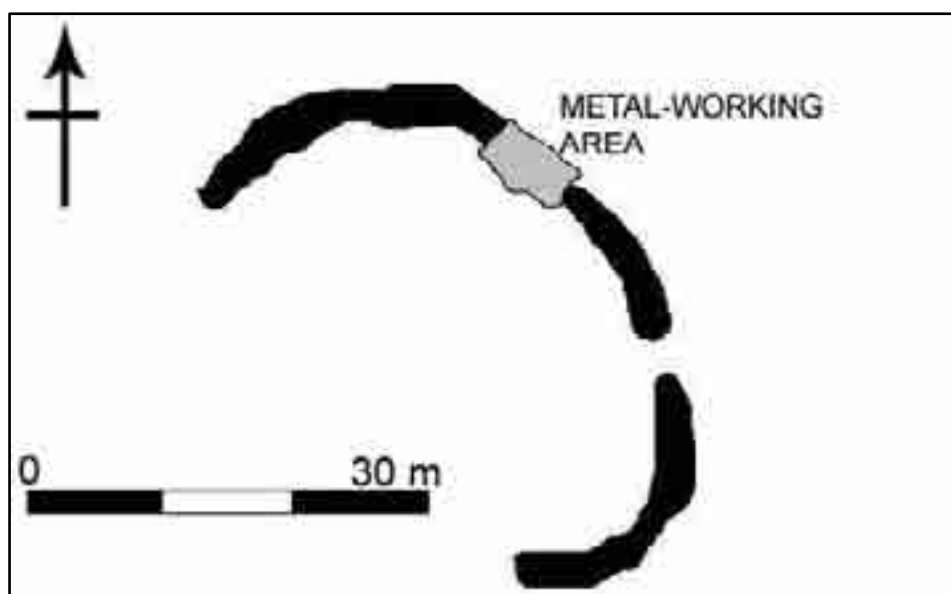
A total of 2,607 bone fragments were recovered, of which 873 (33.5%) were identified to species. Of these 199 came from the early medieval occupation.

	<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Dog</b>	<b>Deer</b>	<b>L.M</b>	<b>M.M.</b>	<b>Date</b>
NISP	106	20	11	15	1	2	34	10	c. 11 <sup>th</sup> /12 <sup>th</sup> C.
MNI	6	2	2	2	1	-	-	-	

**NISP and MNI from the ringditch at Killulla, Co. Clare****Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
Beta-159622	Charcoal from secondary fill of ditched enclosure	950±40 BP	<b>A.D. 1016-1179</b>



Plan showing enclosure and metal-working area at Killula, Co. Clare (after Murphy & Danaher 2001).

## Animal Bones Appendix:

### Cattle

Bone Type	Fusion Age	Unfused	Fused	% Fused
Scapula	7-10 months	0	6	100
Pelvis	-	0	7	100
Radius p.	12-18 months	0	5	100
Humerus d.	-	0	5	100
Phalanx d.		0	1	100
Tibia d.	24-30 months	1	3	75
Metacarpal d.	-	0	2	100
Metatarsal d.	27-36 months	0	2	100
Femur p.	36-42 months	0	2	100
Radius d.	42-48 months	1	1	50
Femur d.		3	4	57
Humerus p.		0	3	100

### Epiphyseal fusion of cattle bones

Bone/Measurement	Min	Max	Mean	No
<b>Scapula</b>				
GLP	59	71.9	64.8	3
LG	51.2	52.2	51.8	4
BG	39.9	45.5	41.6	4
<b>Humerus</b>				
BT	65.4	70	67.1	3
BD			72.8	1
<b>Radius</b>				
Bp	61.5	72.1	67.2	3
BFp	62.8	65	63.9	2
<b>Pelvis</b>				
LA	59	68	62.7	3
<b>Tibia</b>				

Bp			82.8	1
GL			320	1
Bd	51.5	55	53.1	5
<b>Metatarsal</b>				
Bp			48.5	1
<b>Astragalus</b>				
GLI			34	1
Bd			39	1

#### Cattle biometrics

#### Sheep/Goat

<b>Bone/Measurement</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>No</b>
<b>Scapula</b>				
GLP			31.3	1
BG			20	1
<b>Humerus</b>				
BT			29.3	1
BD	25	29.8	27.4	2

#### Sheep/Goat biometrics

An unfused metatarsal represented a sheep under 20 months old. Proximally fused radius and humerus bones provided ages over 10 and 42 months respectively.

#### Pig

<b>Bone/Measurement</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>No</b>
<b>Radius</b>				
Bp			27	2

#### Pig biometrics

A proximally fused radius and distally fused tibia provided minimum ages of 12 and 24 months respectively. Male (1) and Female (1) pigs were identified by their canines.

#### Horse

<b>Bone/Measurement</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>No</b>
<b>Humerus</b>				
Bp			82.9	1
<b>Radius</b>				
Bp			72.4	1
BFp			67.5	1
Bd			40.4	1
BFd			36.6	1
<b>Pelvis</b>				
LA	63.4	64.1	63.7	2
LAR	54	59.4	57.5	3
<b>Ulna</b>				
LO			72.7	1
SDO			43.4	1

#### Horse biometrics

**Killyliss, Co. Tyrone**Grid Ref: **H41816101 (24181/36101)**SMR No: **TYR 050:007**Reference: **Ivens 1984; McCormick 1984.**

The site consisted of a sub-rectangular enclosure (approximately 42m in diameter) with an external counterscarp bank, set on top of a small drumlin. The interior of the site had been damaged by subsequent agricultural activity, resulting in many truncated or substantially destroyed features. An area of cobbling and a single stake-hole were found in the interior of the enclosure, and a stone-packed gully and associated post-holes were interpreted as the remains of a small roundhouse or hut. Human whipworm eggs were found in a large pit just to the south of this house, suggesting that this feature may have acted as a latrine pit. A shallow gully surrounding this pit may indicate that the latrine was contained within a structure of some sort.

A substantial trench (0.9m deep) encircled most of the interior. This feature was sealed by early medieval occupation layers, and has been interpreted as a possible palisade trench associated with the earlier occupation. Excavations on the ditch and banks revealed methods of construction – the inner bank appears to have been built by a series of gangs; and the ditch appears originally to have been fitted with a wattle lining. The waterlogged conditions of the ditch meant that various organic materials survived from the early medieval occupation phase. These included 44 fragments of leather which seemed to mainly come from several shoes, as well as the remnants of a split-rail and wattle fence, which was assumed to have originally surmounted the inner bank before collapsing into the ditch.

About 30 sherds of souterrain-ware were found on site, the majority of which (28) were from a single vessel. These were discovered in a context which pre-dated the construction of the banks and ditches, suggesting that the earlier occupation of the site also took place during the early medieval period. Two iron knives were found in the early medieval contexts, and a short iron sword was recovered from the latrine pit.

**Animal Bones:**

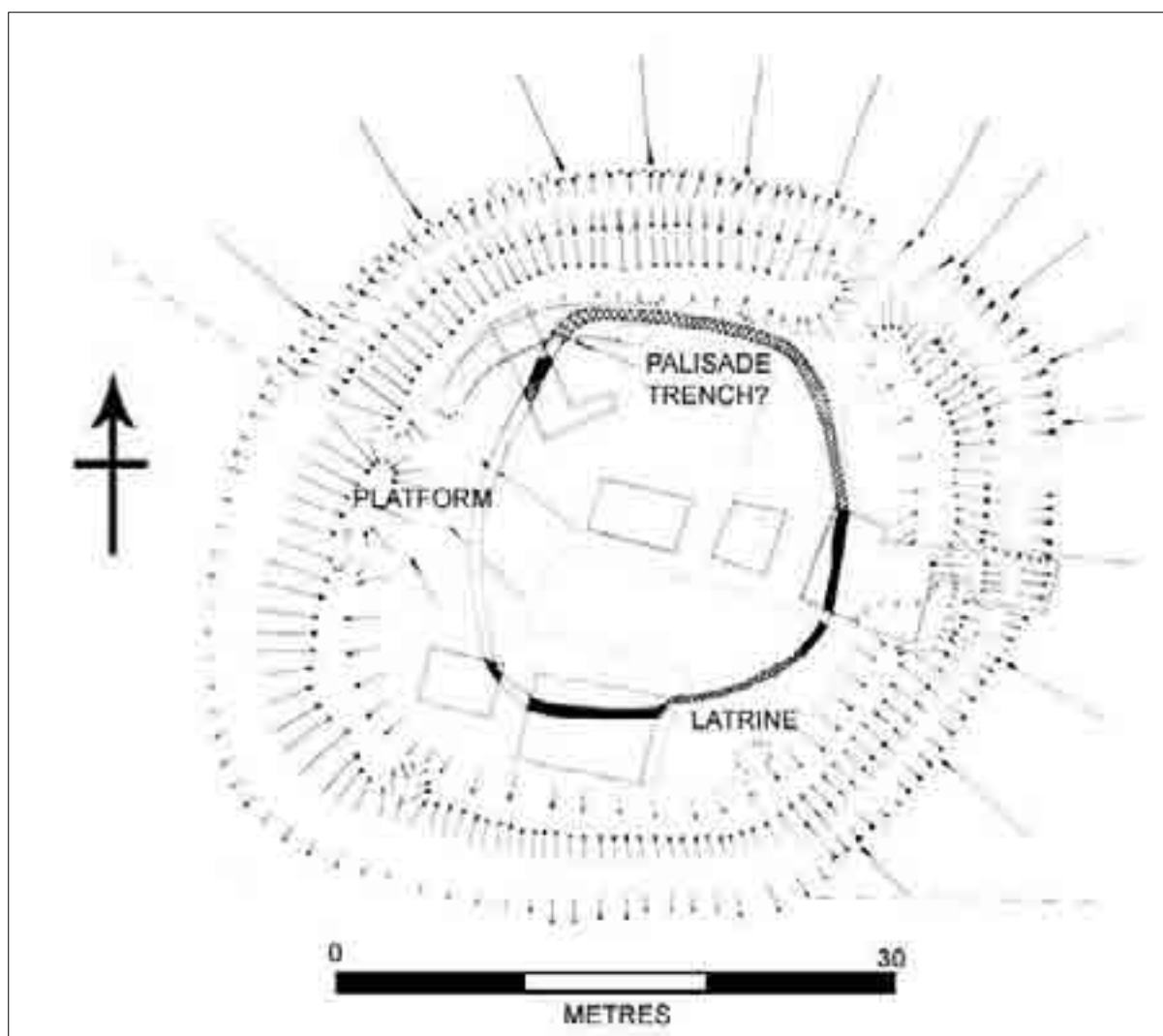
The excavation at Killyliss produced a very small sample of animal bone. Most were found in the bottom of the ditch but small amounts were also present in the interior of the rath. The latter were very fragmented and few were identifiable.

	<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Cat</b>	<b>Red Deer</b>	<b>Date</b>
NISP	15	3	2	1	1	1	A.D. 560-856?
MNI	3	2	5	1	1	1	

**NISP and MNI from Killyliss, Co. Tyrone**

The presence of three neonatal pig skeletons in the ditch indicates that sows were kept within the rath during farrowing.





**Excavated area at Killyliss, Co. Tyrone (after Ivens 1984, 12).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
UB-2620	Timber from latrine pit	1180 $\pm$ 60	A.D. 689-752; <b>A.D. 761-983.</b>
UB-2621	Split-oak palisade post from ditch.	1355 $\pm$ 65	<b>A.D. 560-782;</b> A.D. 789-812; A.D. 845-856.
UB-2623	Burnt planking from 'above ground souterrain'.	1140 $\pm$ 55	<b>A.D. 772-1017.</b>

## **Animal Bone Appendix:**

### **Cattle:**

On the basis of the state of epiphyseal fusion two of the three identified individuals were older than three and a half years of age at the time of death. The third, which was represented by a complete femur, came from a very immature individual.

<b>GL</b>	<b>Bp</b>	<b>Bd</b>	<b>SD</b>	<b>E.W.H (cm)</b>
239	66.7	58.3	32.2	102.8
244	72.3	62.1	35.9	104.9

### **Cattle radii measurements, and estimated withers height (E.W.H)**

### **Pig:**

Four of the five identified individuals had been dead at birth or died immediately afterwards, and three complete neo-natal skeletons were found together on the inner face of the ditch.

### **Sheep/Goat:**

Two sheep/goat bones were present representing a mature and a very young individual.

### **Horse:**

Horse was represented by the fused proximal end of a femur which indicates that the individual was greater than three years of age at the time of death.

**Kiltiernan, Co. Galway**Grid Reference: **143727/214102**SMR No: **GA103-143001**Reference: **Waddell & Clyne 1995; McCarthy 1995**

The site consists of a circular ecclesiastical enclosure defined by a stone wall. This enclosure is approximately three acres in area, and is subdivided into other smaller units, some of which may be contemporary with the original enclosure, while others are substantially later.

The focus of the enclosure was a pre-Romanesque church set within a walled square enclosure, of 30.5m<sup>2</sup> in area. This enclosure was found to have delimited a graveyard, and some of the burials would appear to pre-date the church.

Up to ten house sites were identified within the enclosure, three of which were excavated during the 1950s. The probable remains of a souterrain were also identified.

House I (7m x 4m) was set up against the inner face of the enclosure wall. Finds from this structure included three clay pipe bowls, post-medieval pottery and iron slag. House II (15.9m x 4.3m) was substantially larger. It was not interpreted as belonging to the primary occupation phase. Finds included green glass and a clay pipe stem. House III (8.5m x 6.5m) returned an early medieval bronze strap mount, three crucible fragments and two clay pipe stems.

**Animal Bones:**

The site was excavated in the 1950s and was not radiocarbon dated. The types of finds returned from the excavated houses suggest that the site was still occupied during the late medieval period, through into more recent centuries. It is possible that the animal bones recovered from these features may not all belong to the early medieval occupation phases.

Feature	Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Dog
House I	5	8	2	-	1	-
House II	136	178	11	22		-
House III	79	33	-	2		-
Cemetery	340	106	3	13	3	11
Church	90	40	-	2	-	2
Enclosure Wall	33	39	-	2	-	2

**NISP from features at Kiltiernan, Co. Galway**

**Kinnegad, Co. Westmeath**Grid Ref: **259342/245027**SMR: **WM027-070**Reference: **Crumlish 2007; Kieran 2007; Beglane 2008.**

The site consisted of a barely extant rath, enclosing an area 29.5m x 29m. A number of internal features were noted at the site. Internal features included three bowl furnaces and a possible house site.

**Animal Bones:**

The assemblage contained 120 mammal bones and 3 bird bones.

	<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Dog</b>	<b>Date</b>
NISP	58	7	4	43	8	
%NISP	48.3	5.8	3.3	35.8	6.7	
MNI	5	1	1	3	1	
%MNI	45.5	9.1	9.1	27.3	9.1	

**NISP and MNI from Kinnegad, Co. Westmeath****Animal Bone Appendix:****Cattle**

<b>Fusion Age</b>	<b>% of Total</b>
Neonatal	0
Birth to 7-12 months	20
12-24 months	9
24-36 months	4
36-48 months	0
48 months +	67

**Cattle age at slaughter based on fusion data**

<b>Context</b>	<b>Side</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>MWS</b>	<b>Age Group</b>
48	R	g	P		20-32	24-33 mth
47	R		d	E	24	24-30 mth
P – Present, E - Erupting						

**Cattle age at slaughter based on mandible data****Sheep**

<b>Context</b>	<b>Species</b>	<b>Element</b>	<b>Side</b>	<b>P2</b>	<b>P3</b>	<b>P4</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>MWS</b>	<b>Age</b>
5	Sheep/ Goat	Mandible	R	A	P	12S	10A	9A	X	FG	3-6 years
A – Alveolus, P – Present, E – Erupting, X-Broken											

**Sheep age at slaughter based on mandible data****Pig data**

<b>Context</b>	<b>Element</b>	<b>Side</b>	<b>P3</b>	<b>P4</b>	<b>M1</b>	<b>MWS</b>	<b>Age</b>
47	Mandible	R	A	b	A	18-28	17-25 mth
A – Alveolus							

**Pig age at slaughter based on mandible data**

## Horse data

Context	Group	Element	Side	Tooth	Crown Height (mm)	Age (yrs)
26	1	Mandible	R	M2	21.1	18-19
26	1	Mandible	R	P4	29.6	14-15
26	1	Mandible	R	M1	24.7	13-14
70		Loose mand tooth	U	M1/M2	31.9	9.75-14
26		Loose max tooth	U	M1/M2	58.3	7-9.5
70		Loose max tooth	U	P3/P4	61.4	6-7.75
95		Loose mand tooth	U	P3/P4	63.1	6-7.5
47		Loose max tooth	U	M3	63.5	7-8
48		Loose max tooth	U	P3/P4	68.6	6-7.75
48		Loose max tooth	U	P3/P4	57.6	7.5-9.75
48	2	Cranium	R	P2	46.2	8-9
48	2	Cranium	R	P3	56.1	8-9
96		Loose mand tooth	U	M3	76.7	3-4
96		Loose mand tooth	U	M1/M2	75.7	4-6
96		Loose mand tooth	U	M1/M2	81.7	2-4.5
96		Loose mand tooth	U	P3/P4	83.4	3-4.5
96		Loose mand tooth	U	P3/P4	90.8	3-4.5
96		Loose mand tooth	U	P3/P4	83.9	3-4.5
96		Loose mand tooth	U	P3/P4	88.8	3-4.5
96		Loose mand tooth	U	M1/M2	86.2	2-4.5
96		Loose mand tooth	U	M1/M2	85.2	2-4.5
96		Mandible	L	P2	>65	3-4
96		Mandible	R	P2	>61	3-4

### Horse age at slaughter based on mandible data and crown height

The ageing data suggests at least three horses, one aged 4-4½, the second aged 7-8 years and the third an older animal aged 13-19 years at the time of its death.

A horse metacarpal from C5, upper fill of the ditch C6 gave an estimated withers heights of 135cm (13.3 hands) and a metatarsal from C48, the basal fill of the ditch gave an estimated withers height of 130cm (12.8 hands).

**Knockea, Co. Limerick**Grid Ref: **R61294945 (161299/149455)**SMR No: **LI013-111002**Reference: **O'Kelly 1967; Roche 1967.**

The excavation comprised full investigation of a small enclosure (Site I) and a trial-trench across an adjacent platform enclosure (Site II).

Site I consisted of a burial enclosure (18m x 18m). There was no entrance opening, however, a causeway of stones built across the ditch create an entrance passage, 1.5m wide. A line of large postholes spaced 1m apart were uncovered all the way around the spine of the enclosing bank, 1m from the inner facing. An inhumation cemetery of at least 66 burials was uncovered. There were no associated grave-goods except a possible strike-a-light, but finds from the enclosure included a bone comb fragment, four strike-a-lights and an ornamented pebble.

The adjacent Site II consisted of the partial remains of an early medieval platform enclosure. Two phases of activity were uncovered in the excavated trial-trench. In the early phase the site appears to have been enclosed by a primary ditch. The entrance was through an uncut causeway at the southern end and was defined by one post-hole which may have supported a gate. Partial remains of twelve huts were identified in the interior - these appeared to be of wattle construction, although a number also had wall-trenches and postholes. The buildings were not all of the same date with many of the structures clearly cutting each other or displaying some evidence for repair. The remains of two of these huts (J and K) possibly pre-dated the primary enclosure. Two of the houses were described rectangular or sub-rectangular in shape and two as circular. Two of the structures contained internal hearths.

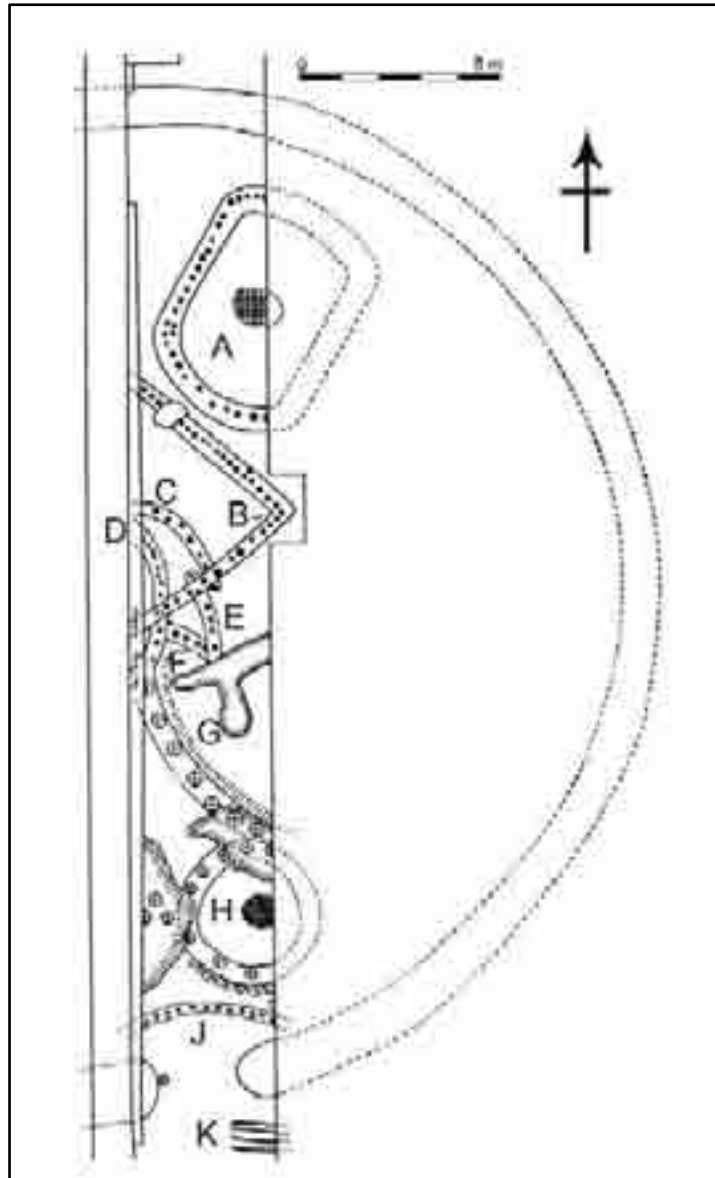
In the later phase, a new ditch was dug outside the earlier ditch (which may have filled up by this stage), and a bank was built. The bank was revetted internally and externally by a wooden palisade identified as two concentric trenches with postholes. The partial remains of an angular wattle house with a roughly circular pit inside it were identified partly overlying the filled-up secondary ditch at the northern end. The sides of the internal pit were oxidized indicating *in situ* firing.

A number of domestic finds were recovered from the primary phase structures and habitation refuse and included an iron pin or needle, two iron knives, five hones, one bone 'scoop', and a bone handle. There was also evidence for industrial activity in the first phase in the form of two furnace bottoms and fragments of a tuyère. A blue glass bead, one iron awl, two bone pins, one bone point, a fragment of a jet bracelet and fragments of four quern stones comprised the finds from the later phase.

**Animal Bones:**

<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Red Deer</b>	<b>Dog</b>	<b>Fox</b>	<b>Rook</b>
9	8	5	P	P	1	P	P

**MNI from Knockea (Site II), Co. Limerick (P=present)**



**Plan of Phase 1 at Site II, Knockea, Co. Limerick showing sequences of huts (A-K) (after O'Kelly 1967, 85).**

## Knowth, Co. Meath

Grid reference: **N99677343 (299674/273437)**

SMR No: **ME019-030**

Reference: **Eogan 1968; Eogan 1974; Eogan 1977; McCormick & Murray 2007.**

Knowth is a large multi-period burial and settlement complex that was utilised from the Neolithic until post medieval times. During the early medieval period, there were two main phases of activity on the site – a bivallate raised enclosure; and an unenclosed settlement.

The Neolithic passage tomb mound was the focus of the first early medieval phase at Knowth. During the seventh and eighth centuries two concentric ditches were excavated into the mound. No internal domestic features were identified but both occupational and dating evidence was present in the enclosure ditches and mostly within the outer enclosure ditch.

Artefacts from this phase included a sherd of E ware and a single-edged bone comb from the lower fills of the inner enclosure ditch. The former demonstrates that the inner enclosure was in use between the sixth and mid-seventh centuries. Bronze items included a potential ear scoop, two possible spoons and three penannular brooches with zoomorphic terminals. A melon bead was also uncovered.

A small mixed cemetery of crouched, flexed and extended burials was associated with the passage tomb, some contemporary with this first early medieval phase. The final group of burials included three seventh- and eighth-century disturbed extended inhumations.

The first phase of early medieval activity at Knowth ceased by the end of the eighth century and occupational evidence during the following century is absent. In the tenth century a large unenclosed settlement was established. This included 15 houses, nine souterrains, five metalworking areas, cobbled and paved surfaces and many hearths. The houses were rectangular with rounded corners and some examples had central hearths on stone floors; and some of the souterrains were associated with the houses.

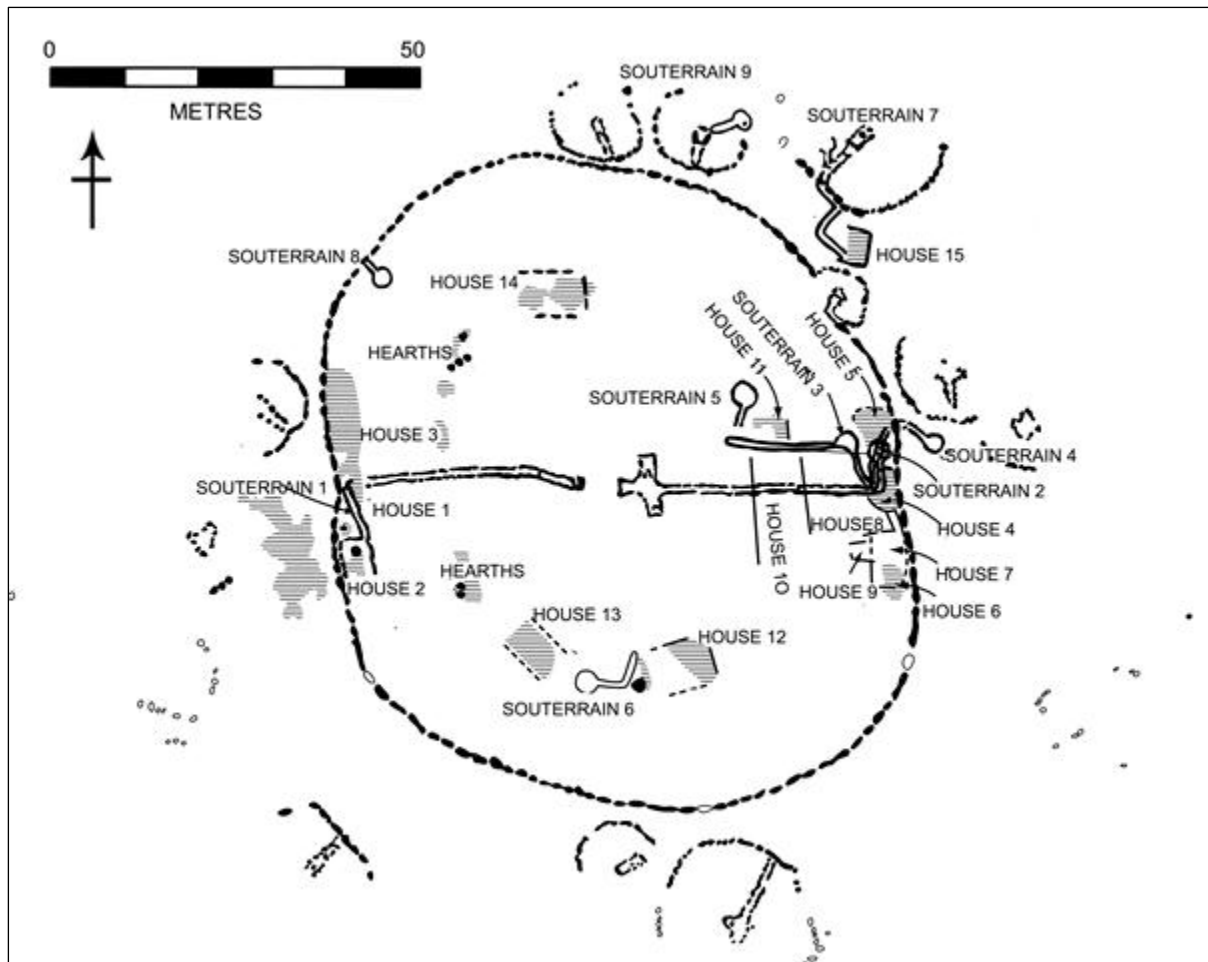
Many crafts and industries were practised on the site, including ironworking, bronze-working, gold-working and enamelling, as well as stone-working, bone-working and antler-working. Leather and textile also appears to have been produced on site. Artefacts from this phase were more abundant than that of the earlier phase and included many items of personal adornment. These included a range of metal ringed and stick pins dating between the tenth and thirteenth centuries, bone pins, belt buckles, bone combs and jet bracelets. Functional items were represented by iron knives, needles, seven quern stone fragments, grindstones, a horse bridle and flint scrapers.

### Animal Bones:

	Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Deer	Fox	Otter	Hare	Date
<b>Phase I</b>											<i>c. 6<sup>th</sup>/7<sup>th</sup> C.</i>
<b>NISP</b>	723	188	218	37	13	3	3	2	1	2	
<b>% NISP</b>	60.8	15.8	18.3	3.1	1.1	0.3	0.3	0.2	0.1	0.2	
<b>MNI</b>	47	18	18	3	2	1	1	1	1	1	
<b>% MNI</b>	51.1	19.5	19.6	3.3	2.2	1.1	1.1	1.1	1.1	1.1	
<b>Phase II</b>											<i>c. 10<sup>th</sup> C</i>
<b>NISP</b>	412	189	195	41	4	6	2	-	-	-	
<b>% NISP</b>	48.5	22.3	23.0	4.8	0.5	0.7	0.2	-	-	-	
<b>MNI</b>	17	11	13	2	1	1	1	-	-	-	
<b>% MNI</b>	37.0	23.9	28.3	4.3	2.2	2.2	2.2	-	-	-	

### NISP and MNI by species from Knowth, Co. Meath





**Plan of Early Medieval Phases at Knowth, Co. Meath (after McCormick & Murray 2007, 5).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
GRN-15370	Burial 7	1920±60 BP	<b>42 B.C. - A.D. 231</b>
GRN-15371	Burial 8	1960±30 BP	<b>39 B.C. - A.D. 87;</b> A.D. 104-121
GRN-15372	Burial 10	2095±20 BP	<b>175-50 B.C.</b>
GRA-13595	Burial 21	1921±50 BP	38-27 B.C.; 25-9 B.C.; <b>3 B.C. - A.D. 218</b>
GRN-15384	Burial 11/12	1355±20 BP	<b>A.D. 646-682</b>
GRN-1471	Burial 14	1270±25 BP	<b>A.D. 668-779;</b> A.D. 794-801

**Animal Bones Appendix:**  
**Cattle**

Higham MWS	Est. Age (months)	Phase I	Phase II
1	Foetal	-	-
2	0-1 wk	-	-
3	1-4	-	-
4	5-6	-	-
5	6-7	-	1
6	7-9	-	1
7	8-13	1	1.5
8	15-16	-	0.5
9	16-17	-	4
10	17-18	2	2
11	18-24	1	10
12	24	2.5	7.5
13	24-30	1.5	5.5
14	30	1	1
15	30-31	2	1
16	31-32	1	1
17	32-33	1	-
18	36	1	-
19	38	1	2
20	40	1	7.5
21	40-50	-	0.5
22	50	1	3
23	50+	1	5
Grant I		2	4
Grant m			3
		<b>20</b>	<b>61</b>

**Cattle age-slaughter based on tooth eruption and wear.**

Fusion	Element	Est. Age (months)	Phase I		Phase II	
			Fused	Unfused	Fused	Unfused
Newborn	Scapula p; Pelvis	7-10	83	8	197	28
	<b>%</b>		<b>91.2</b>	<b>8.8</b>	<b>87.6</b>	<b>12.4</b>
Early	Humerus d; Radius p	12-18	67	4	186	32
	Phalanx 1 & 2 p	18-24	13	3	135	13
	<b>Total</b>		<b>80</b>	<b>7</b>	<b>321</b>	<b>45</b>
	<b>%</b>		<b>92</b>	<b>8</b>	<b>87.7</b>	<b>12.3</b>
Middle	Tibia d; Metapodials d	24-36	37	30	144	89
	Calcaneum p	36-42	11	11	31	40
	<b>Total</b>		<b>48</b>	<b>41</b>	<b>175</b>	<b>129</b>
	<b>%</b>		<b>53.9</b>	<b>46.1</b>	<b>57.6</b>	<b>42.4</b>
Late	Humerus p; Radius d; Ulna p; Femur p; Femur d; Tibia p	42-48	35	27	111	83
	<b>%</b>		<b>56.5</b>	<b>43.5</b>	<b>57.2</b>	<b>42.8</b>

**Epiphyseal fusion of cattle bones**

Phase	Bone	GL	Bp	Bd	SD	E.W.H.
<b>I</b>	Metacarpal	178	-	52.8	34.0	109
<b>I</b>	Metacarpal	179	-	49.1	27.9	110
<b>I</b>	Metacarpal	180	47.5	52.7	28.6	110
<b>I</b>	Metatarsal	200	-	-	25.2	109
<b>I</b>	Metatarsal	205	41.6	49.8	27.8	112
<b>I</b>	Metatarsal	216	42.3	51.0	24.9	118
<b>II</b>	Metacarpal	193	54.9	55.2	29.4	118
<b>II</b>	Metacarpal	190	54.7	51.2	28.1	116
<b>II</b>	Metacarpal	197	52.2	54.7	30.0	121
<b>II</b>	Metatarsal	200	-	45.2	23.5	109
<b>II</b>	Metatarsal	201	-	46.8	23.1	110
<b>II</b>	Metatarsal	211	41.4	49.4	23.4	115
<b>II</b>	Metatarsal	213	39.9	48.7	28.0	116

#### Cattle metapodiae measurements

Phase	Element	M/ment	No.	Mean	Min	Max	StD
I	Scapula	GLP	48	6069	49	80.2	6.49
		SLC	43	44	30.2	55	5.67
	Humerus	BT	23	67.47	51.2	72.1	2.65
		HTC	29	30.57	28.3	34.7	1.4
	Radius	Bp	16	73.64	65.4	88	5.59
	Metacarpal	Bp	7	51.5	48.5	54.5	2.62
		Bd	7	53.3	51.9	56.1	1.45
	Tibia	Bd	15	56.04	51.7	68.4	4.18
	Astragalus	GLI	28	60.5	54.2	68.1	2.88
		Bd	35	38.74	33	44.2	2.46
II		Dm	28	32.73	29	35.7	1.73
		Bp	10	41.58	35	48.2	4.19
	Scapula	GLP	104	61.24	49.2	78.9	5.89
		SLC	98	45.5	32.3	60	6.66
	Humerus	BT	76	68.63	57.7	80.5	4.44
		HTC	87	31.25	27	36.7	1.77
	Radius	Bp	44	72.67	63.5	84.7	4.6
	Metacarpal	GL	7	180.7	176.4	188.7	4.05
		Bp	31	53.8	43.5	66.4	4.86
		Bd	26	53.17	49.5	63.2	3.24
		SD	8	30	27.6	34	2.25
	Tibia	Bd	55	56.1	26	65.8	5.6
	Astragalus	GLI	93	60.72	54.6	67.7	2.28
		Bd	100	38.8	33.7	46.3	2.45
		Dm	85	32.66	28	37.2	1.83
	Calcaneum	GL	19	120.1	112.5	126.8	4.08
	Metatarsal	Bp	24	42.24	29.5	52.1	4.04
		Bd	23	51.68	45.6	61.3	4.09

#### Cattle biometrics summary

## Sheep

Higham MWS	Est. Age (months)	Phase I	Phase II
1	Foetal	-	0.5
2	Birth-6 wks	-	0.5
3	1.5-3	-	-
4	3	-	-
5	4	1	0.5
6	5	-	0.5
7	5-7	-	0.5
8	7-9	-	1
9	9-10	0.5	1
10	10-11	1.5	1.5
11	11-12	-	1
12	12-21	2	9.5
13	21-24	3	11
14	25-26	12	20.5
15	1	9.5	
16	Mature	1	11
17	Adult	3	13.5
18	Old	-	-
		<b>25</b>	<b>82</b>

Sheep age-slaughter based on tooth eruption and wear.

Fusion	Element	Est. Age (months)	Phase I		Phase II	
			Fused	Unfused	Fused	Unfused
Newborn	Scapula p; Pelvis	6-8	21	-	72	1
	<b>%</b>		<b>22.3</b>		<b>76.6</b>	<b>1.1</b>
Early	Humerus d; Radius p	10	26	1	139	3
	Phalanx 1 & 2 p	13-16	2	-	70	8
	<b>Total</b>		<b>28</b>	<b>1</b>	<b>209</b>	<b>11</b>
	<b>%</b>		<b>96.6</b>	<b>3.4</b>	<b>95</b>	<b>5</b>
Middle	Tibia d; Metapodials d	18-28	15	3	126	47
	<b>%</b>		<b>83.3</b>	<b>16.7</b>	<b>72.8</b>	<b>27.2</b>
Late	Calcaneum p; Femur p	30-36	3	1	31	19
	Humerus p; Radius d; Ulna p; Femur d; Tibia p	36-42	8	7	46	78
	<b>Total</b>		<b>11</b>	<b>8</b>	<b>77</b>	<b>97</b>
	<b>%</b>		<b>57.9</b>	<b>42.1</b>	<b>44.3</b>	<b>55.7</b>

Epiphyseal fusion of sheep bones

	Phase	Bone	GL	Bp	Bd	Sd
<b>Sheep</b>	I	Metatarsal	122.2	17.8	21.5	11.8
	II	Metacarpal	106.0	21.1	22.6	12.6
	II	Metacarpal	109.4	20.8	23.1	13.4
	II	Metatarsal	116.9	18.5	22.9	12.5
	II	Metatarsal	133.1	17.9	22.5	12.0
	II	Metatarsal	132.6	-	24.2	13.9
<b>Goat</b>	II	Metatarsal	117.5	18.5	23.2	12.3

#### Sheep/Goat metapodial measurements

Phase	Element	M/ment	No.	Mean	Min	Max	StD
I	Scapula	GLP	18	28.3	23.9	32	2.3
		SLC	19	17.25	15.1	20	1.34
	Humerus	BT	13	26.0	23.1	28.3	1.71
		HTC	14	13.16	11.4	17	1.36
	Radius	Bp	6	27.4	25	28.6	1.49
	Tibia	Bd	9	24.17	23.1	26.8	1.27
II	Scapula	GLP	71	28.5	20.8	32.2	2.45
		SLC	74	17.6	13.3	20.7	1.54
	Humerus	BT	66	25.7	21.1	29.8	1.78
		HTC	70	12.9	11	14.8	0.85
	Radius	Bp	44	27.48	22.1	32.6	2.03
	Metacarpal	GL	10	113.4	104	12..5	6.11
		Bp	30	20.43	17.8	22.8	1.37
		SD	10	12.79	11.7	15	1.15
	Astragalus	GLI	13	25.5	22.1	29.4	2.17
		Bd	12	16.65	14	18.8	1.47
		Dm	10	14.82	12.6	18.1	1.76
	Calcaneum	GL	12	49.85	46	53	2.09
	Tibia	Bd	74	23.51	20.8	26.4	1.28
	Metatarsal	GL	9	117.9	107	130.4	8.15
		Bp	36	17.68	13.4	20	1.38
		SD	9	11.4	10	12.6	0.80
		Bd	10	22.4	20	24	1.45

#### Sheep biometrics summary

#### Pig

Higham MWS	Est. Age (months)	Phase I	Phase II
1	Foetal	-	-
2	0-1 wk	-	-
3	1-4 wks	-	-
4	4-7 wks	-	-
5	2-4	-	-
6	4-5	-	1
7	5-6	-	-
8	6-7	-	3
9	7-8	-	-
10	8-9	-	-
11	9-10	3	4
12	10-11	-	4
13	11-12	-	2
14	12-14	-	-
15	14-15	-	-
16	15-16	-	-
17	16-7	-	2.5

18	17-19	2	25.5
19	19-21	12	56.5
20	21-23	4	14.5
21	23-25	-	3
22	25-27	-	4
23	27-29	-	1
24	30+	-	2
25	Adult	-	-
26	Late Maturity	-	-
27	Old	-	-
		<b>21</b>	<b>123</b>

**Pig age-slaughter based on tooth eruption and wear.**

Fusion	Element	Est. Age (months)	Phase I		Phase II	
			Fused	Unfused	Fused	Unfused
Early	Humerus d	12-18	-	16	7	2
	Radius p	12	4	-	23	2
	Phalanx 2 p	12	-	-	5	4
	<b>Total</b>		<b>9</b>	<b>-</b>	<b>44</b>	<b>13</b>
	<b>%</b>		<b>100</b>	<b>-</b>	<b>77.2</b>	<b>22.8</b>
Middle	Tibia d; Phalanx 1 p	24	7	3	24	15
	Metapodials d	24-27	-	3	6	32
	Calcaneum p	24-30	1	1	1	19
	<b>Total</b>		<b>8</b>	<b>7</b>	<b>31</b>	<b>66</b>
	<b>%</b>		<b>53.3</b>	<b>46.7</b>	<b>32.0</b>	<b>68.0</b>
Late	Ulna p	36-42	-	4	-	10
	Humerus p; Radius d; Femur p; Femur d; Tibia p	42	1	7	6	64
	<b>Total</b>		<b>1</b>	<b>11</b>	<b>6</b>	<b>74</b>
	<b>%</b>		<b>8.3</b>	<b>91.7</b>	<b>7.5</b>	<b>92.5</b>

**Epiphyseal fusion of pig bones**

Phase	Element	M/ment	No.	Mean	Min	Max	StD
I	Scapula	GLP	10	31.5	25.6	33.2	2.2
		SLC	9	20.73	18	2.2	1.17
	Pelvis	LAR	14	29.2	25.8	31.9	1.8
II	Scapula	GLP	49	32.1	24.7	36.4	2.31
		SLC	54	21.62	18.2	25	1.68
	Humerus	BT	25	28.3	25	33.3	2.06
		HTC	31	18.77	17.1	22.2	1.13
	Pelvis	LAR	39	28.97	25.4	32.2	1.82
	Astragalus	GLI	16	38	35.6	40.7	1.67

**Pig biometrics summary**

## **Knowth 'Site M', Co. Meath**

Grid reference: **N99847387 (29984/27387)**

SMR No: **ME019-069**

Reference: **Stout & Stout 2008; Hughes 2008; Boner 2008.**

Research excavations at Knowth Site M revealed a settlement-cemetery dating between the sixth and tenth centuries. A third, outer enclosure was constructed potentially after the tenth century.

The settlement/cemetery was enclosed by two sub-circular ditches. The inner enclosure defined an area measuring 48m x 40m. The ditch was excavated in five locations and contained similar fills. Charcoal was present in many of the ditch fills, and artefacts included part of a polished stone axe, a flint side and end scraper, iron slag and a fragment of an undecorated bone comb. A blue glass bead and a fragment of a gilt Anglo-Saxon mount were discovered in topsoil above the ditch. Bone and charcoal from the inner enclosure ditch produced a date between the late sixth and mid seventh century.

The inner enclosure ditch may have been further delimited by a wall that survived to a height of three courses, followed the edges of two trenches. A date of A.D. 767-896 indicates that it fell into disuse at some point during this time. The second trench was cut by the above example. A highly decorated Hiberno-Scandinavian bronze strap end with interlaced decoration on both sides was located in a layer below the subsoil and overlying the initial trench. A final trench, located to the west of the first trench and which contained similar fills, produced iron knife fragments. A date of A.D. 877-998 was obtained from its upper fill.

The second enclosure was oval in plan and concentric with the inner enclosure. Evidence for an internal bank was also present in certain places. It had an external diameter of 74m x 62.5m. The ditch was situated between 9m and 10m outside the inner enclosing ditch. Charcoal from its primary fill produced a date of A.D. 662-780. The only find was an iron disc.

Fifty two burials were revealed in the central and southern areas of the inner and second enclosures. Finds associated with these burials were limited and included a stone ball, a flint flake and fragments of two iron nails. A sherd of E ware was found in the interior, and two of the graves were dated to A.D. 597-673 and A.D. 856-989.

A potential trapezoidal structure located at the western section of the inner enclosure was defined by four roughly circular pits. Charcoal from a posthole fill produced a date of A.D. 561-652. Habitation evidence was evident in the south-eastern area between the inner and second enclosing ditches. Excavation revealed a platform defined by a curving trench and some pits. Artefacts within the soft dark clay that overlay the platform included a toggle-like object made from a sperm whale's tooth, worked horn and a small worked bone fragment.

The third, outer enclosure was eccentric to the two inner enclosures and consisted of two banks with an intervening ditch. It measured 110m in diameter and, although it has not been dated, it is believed to post-date the two inner enclosures.

### **Animal Bones:**

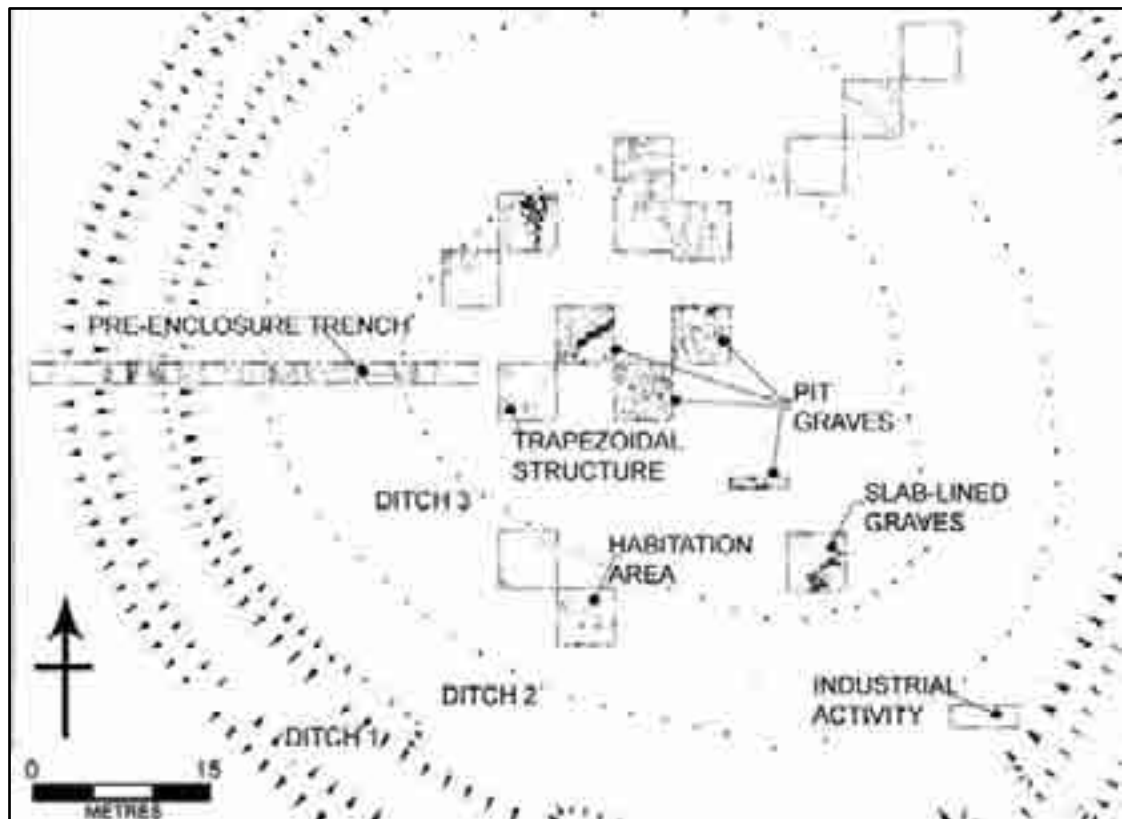
The assemblage (2002) consists of 419 recorded mammal bone fragments, of which 308 were identified to species. Almost 40% of the ovacaprine material was able to be positively identified as sheep.

	<b>Cattle</b>	<b>Sheep/Goat</b>	<b>Sheep</b>	<b>Pig</b>	<b>Horse</b>	<b>Dog</b>	<b>Hare</b>	<b>Date</b>
<b>NISP</b>	<b>243</b>	<b>65</b>	<b>39</b>	<b>62</b>	<b>7</b>	<b>1</b>	<b>2</b>	<b>8<sup>th</sup>/9<sup>th</sup> C</b>
<b>%NISP</b>	58%	15.51	9.30	14.80	1.67	0.24	0.48	
<b>MNI</b>	11	<10		<10	1	1	1	

**NISP and MNI from 2002 assemblage**

Feature		Cattle	Sheep/ Goat	Pig	Horse	Date
<b>Trench E70</b>	<b>NISP</b>	100	3	24	13	A.D. 767-886
	<b>% NISP</b>	71.4	2.1	17.1	9.3	

#### NISP from Trench E70



**Excavated Areas at Knowth 'M', Co. Meath (after Stout & Stout 2008, 8)**

#### Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
UB-7019	Bone and charcoal from inner enclosure ditch	1427±32 BP	<b>A.D. 573-658</b>
UB-6587	Fill from trench (E70) associated with wall	1198±31 BP	A.D. 712-745; <b>A.D. 767-896;</b> A.D. 923-940
UB-7018	Upper fill of trench to west of wall and associated trenches	1112±30 BP	<b>A.D. 877-998;</b> A.D. 1002-1013
UB-7020	Charcoal from primary fill of second enclosure ditch	1277±30 BP	<b>A.D. 662-780;</b> A.D. 792-805
UB-6571	Charcoal from grave B84	1396±32 BP	<b>A.D. 597-673</b>
UB-6578	Charcoal from grave H14	1130±32 BP	A.D. 782-789; A.D. 810-847; <b>A.D. 856-989</b>
UB-6566	Charcoal from post-pipe	1448±31 BP	<b>A.D. 561-652</b>



	related to potential trapezoidal structure		
UB-6579	Charcoal from trench related to agricultural activity	1467±31 BP	<b>A.D. 548-645</b>
UB-6573	Charcoal from trench related to agricultural activity	1224±32 BP	<b>A.D. 690-886</b>
UB-6569	Charcoal spread F11c	1301±31 BP	<b>A.D. 660-772.</b>
UB-6580	Post-hole A31	1461±33 BP	<b>A.D. 549-648.</b>
UB-7022	Post-hole L25a	1347±32 BP	<b>A.D. 637-718;</b> A.D. 742-769.

## Animal Bones Appendix (2002 assemblage):

### Cattle:

Element	Measurement	#	Min	Max	Mean	S.D.
Scapula	LG	9	40.5	60.1	51.4	5.5
	BG	9	36.5	71.2	48.4	13.3
	GLP	9	42.1	64.8	51.5	7.3
	SLC	6	48.0	60.5	52.1	4.9
Humerus	BP	1	77.7	77.7	77.7	-
	BD	3	74.1	77.8	75.9	-
Radius	BP	7	60.2	73.0	67.5	4.6
	BD	3	61.0	68.8	64.2	-
	GL	1	34.0	-	31.3	-
	SD	2	28.6	34.0	47.0	16.3
Metacarpal	BP	7	40.0	55.2	49.3	-
	BD	2	46.0	52.5	-	-
	GL	1	178.0	-	-	-
	SD	1	2.9	-	-	-
Pelvis	SH	1	42.2	-	-	-
	LA	2	64.8	70.7	67.8	-
Femur	BD	1	81.2	-	-	-
Tibia	BD	3	53.8	61.2	57.5	-
	SD	1	-	35.5	-	-
Metatarsal	BP	5	40.1	48.8	43.1	3.0
	BD	5	47.0	58.3	51.6	3.7
	GL	2	20.3	220.3	21.4	-
	SD	4	23.3	26.5	24.6	1.2
Astragalus	GL	10	52.7	68.2	60.2	4.2
	GB	8	51.8	56.5	54.1	1.4
Phalanx 1	BP	7	24.7	27.4	26.0	5.8
	BD	5	22.7	26.3	24.9	1.3
	GL	5	53.3	57.0	55.1	1.3
	SD	6	20.7	23.9	22.2	1.3
Phalanx 2	BP	2	25.9	26.4	26.2	-
	BD	3	18.3	23.6	21.1	-
	GL	3	36.4	37.5	37.0	-
	SD	1	21.8	-	-	-

### Cattle biometrics

Analysis from the cattle mandible sample (which consisted of 20 specimens – 4 represented by loose teeth only) suggests that 70% of the population were killed before the age of 2½ years.

### Sheep/Goats

Element	Measurement	#	Min	Max	Mean	S.D.
Scapula	LG	1	22.1	-	-	-
	BG	1	17.6	-	-	-
	GLP	1	28.7	-	-	-
	SLC	1	16.4	-	-	-
Humerus	BP	1	39.9	-	-	-
	BD	6	24.0	34.9	27.1	3.4
	GL	1	136.0	-	-	-
	SD	1	14.1	-	-	-
Radius	BP	4	26.0	30.1	27.8	1.5

	BD	1	27.5	-	-	-
	GL	1	124.6	-	-	-
	SD	2	13.4	-	-	-
Metacarpal	BP	7	19.7	22.4	21.4	1.6
	BD	2	23.0	23.5	23.3	-
	GL	1	107.7	-	-	-
	SD	2	12.3	18.9	15.6	-
Pelvis	SH	3	12.6	21.7	15.9	-
	LA	2	24.2	30.8	27.5	-
Tibia	BP	1	33.4	-	-	-
	BD	4	22.2	26.3	24.4	1.7
	SD	2	11.5	13.7	12.6	-
Astragalus	GL	1	24.6	-	-	-
	GB	1	23.0	-	-	-
Phalanx 1	BP	1	11.0	-	-	-
	BD	1	8.5	-	-	-
	GL	1	23.8	-	-	-

### Sheep/Goat biometrics

The combined sheep/goat fusion evidence is based on a sample of 33 elements. Nine were older than 24-36 months at the time of slaughter. The combined caprovine mandibular evidence was provided by 14 specimens, nine of which were loose teeth. Three of the complete mandibles indicate a 2-6 month age of slaughter; one example from both the 1-2 year and 6-8 year age stage were also noted.

Element	Measurement	#	Min	Max	Mean	S.D.
Scapula	LG	2	28.5	28.5	28.5	
	BG	2	23.5	25.2	23.5	
	GLP	2	34.0	35.0	34.7	
	SLC	2	21.8	22.6	22.2	
Humerus	BD	1	25.2	-	-	
Tibia	BP	1	35.2	-	-	
	BD	2	24.2	25.0	24.6	
Astragalus	GL	1	39.0	-	-	
	GB	1	37.0	-	-	

### Pig biometrics

The fusion evidence for pigs is based on just 17 elements of which 13 (76%) were fused. Six of these elements were 24 months or older at the time of slaughter. The mandibular evidence is based on a sample of 7 specimens, one of which was under a year old – the remainder were less than 24 months at the time of slaughter.

## **Lagore (Lagore Big td.), Co. Meath**

Grid reference: **N98615284 (298619/252846)**

SMR No: **ME038-027**

Reference: **Hencken 1950; Stelfox 1938**

Lagore crannog survived as a large mound measuring 41m across, located at the eastern end of a now drained lake. Excavations revealed that the crannog was occupied between the seventh and early eleventh centuries A.D. and historical sources have traditionally been used to identify it with the historical site *Loch Gabor*, the early medieval residence of the kings of *Brega* of the southern Uí Néill.

The Period 1a occupation phase was compacted and driven into the lake muds by the weight of the later crannog. This phase may have had houses, hearths, piles, wooden platforms, brushwood and wattle mats and occupation debris. Period 1a produced some Roman pottery (including *Terra Sigillata*) and seventh-century pottery, an iron sword, a seventh-century gold ornament and a seventh/eighth-century horse bit. Period 1b, one of several successive phases after the first occupation, produced Romano-British pottery, evidence for a seventh/eighth-century work-shop for making glass studs and a seventh/eighth-century bronze disc.

Period II and Period III produced few finds to enable close dating of the site. Hencken felt that the Period II occupation probably ended with the destruction by Lagore described by the Annals of Ulster for A.D. 934. The end of Period III and the probable abandonment of the site probably occurred in the late tenth or early eleventh century A.D.

The excavations produced huge amounts of early medieval finds. There was extensive evidence for bronze working at Lagore, particularly in the seventh-century and the tenth-century phases of occupation. The site produced pieces of copper ore, sandstone ingot moulds and moulds for bronze rings, clay crucibles, *tuyères*, spilt bronze waste and scrap pieces of sheet bronze. Bronze artefacts from the site included bronze pennanular brooches, zoomorphic pennanular brooches, decorated bronze belt buckles and strap ends, bronze pins and ringed pins, bronze bowls and rings. There were also some on-site blacksmithing and ironworking, with large amounts of iron slag in the period II occupation and ironworking floors in the Period II and Period III phases. Iron pennanular brooches and pins may have been made there. Objects of finer metals included gold filigree ornament and silver bracelets. There was also evidence for glass-working, with moulds for glass studs occurring, but other finds included glass bracelets and armlets, glass rods, millefiori, enamel and a large number of glass beads. The glass beads were decorated in a range of ways, in blue, white, yellow, khaki and green. The beads varied in shape from annular, to segmented, dumb-bell and melon shaped. There were also large amounts of lignite bracelets. Imported European objects included Roman glass fragments, amber and E ware pottery. Animal bones were used as motif-pieces to work out designs for metalworking.

The excavations at Lagore produced 200 human bones from lower levels or the seventh-century Period 1a phase of occupation of the crannog, many were from headless bodies. Fourteen human skulls with cut occipita indicated the beheading of victims, while other bodies were scattered about the edge of the site. It is possible that these were early medieval in date, but it is also possible that they are in fact prehistoric burials. Two iron collars with chains, a possible leg-iron and an iron trident have been interpreted as means of controlling hostages or slaves. Weaponry included a range of different types of iron swords. There were twelve iron spearheads, leaf-shaped and shouldered, including a Viking spearhead with an ornamented socket. There were also spear-butts, ferrules and iron shield bosses, while iron horse-bits were also found.

### **Animal Bones:**

Lagore crannog produced huge amounts of animal bone, fifty thousand pounds of bone (20 tons) were recovered from the excavations and the nineteenth-century antiquarian accounts describe similar huge amounts being removed for fertiliser.

Phase	Skulls	Cattle	Sheep/ Goat	Pig	Horse	Dog	Fox	Date
Ia								7 <sup>th</sup> C.
	No.	45	23	11	2	-	-	
	%	61.4	26.1	12.5				
Ib								Late-7 <sup>th</sup> /early-8 <sup>th</sup> C
	No.	103	22	21	1	1	1	
	%	70.5	15.1	14.4				
II								8 <sup>th</sup> /9 <sup>th</sup> C.
	No.	52	22	38	-	-	-	
	%	46.4	19.6	33.9	-	-	-	
III								9 <sup>th</sup> /10 <sup>th</sup> C
	No.	11	-	2	-	-	-	
	%	84	-	16	-	-	-	

#### **Animal skulls from Lagore crannog, Co. Meath**

The report on the bones from Lagore has no discussion of the individual species, and only mentions wild animals in passing.



**Ground Plan of Lagore crannog, Co. Meath (after Hencken 1950).**

## Animal Bones Appendix:

### Cattle:

GL	Bp	Sd	Bd	S.I.	Sex	E.W.H.
190	51.8	29.2	52.9	15.3	F	116
185	51.5	29.7	52.4	16.0	F	113
193	50.7	28.7	52.2	14.8	F	118
187	50.2	28.7	52.2	14.8	F	114
182	49.1	21.4	50.8	11.7	F	111
187	54.2	29.1	52.7	15.5	F	114
192	51.6	28.1	52.7	15.5	F	118
190	52.5	27.4	52.5	14.4	F	116
191	51.7	27.5	51.1	14.3	F	117
181	49.1	26.7	53.7	14.7	F	111
185	54.5	27.0	53.8	14.5	F	113
178	51.8	26.8	50.5	14.3	F	109
185	50.7	28.0	51.6	15.1	F	113
191	51.4	21.7	52.3	11.3	F	117
176	47.5	25.5	49.5	14.4	F	108
191	51.5	26.4	52.3	13.8	F	117
190	50.3	28.3	52.1	14.8	F	116
180	47.0	26.9	51.5	14.9	F	110
182	50.1	27.5	50.6	15.1	F	111
186	52.4	27.6	54.6	14.8	F	114
196	52.1	28.2	54.3	14.3	F	120
186	49.8	28.6	51.4	15.3	F	114
180	57.0	33.0	59.1	18.3	M	110
193	56.3	32.9	58.6	17.0	M	118
198	60.8	34.2	63.6	17.2	M	121
191	59.7	34.1	62.4	17.8	M	117
197	61.1	35.3	62.5	17.9	M	121
190	60.5	34.6	61.3	18.2	M	116
185	58.6	34.3	62.3	18.5	M	113
196	61.7	38.2	65.9	19.4	M	120
190	64.2	36.0	65.7	18.9	M	116
185	58.6	34.3	62.3	18.5	M	113
196	61.7	38.2	65.9	19.4	M	120
190	64.2	36.0	35.7	18.9	M	116
184	49.9	25.1	51.5	13.6	F	113
193	54.9	31.3	54.6	16.2	M	118
186	51.8	29.0	53.9	15.5	F	114
175	53.5	29.3	53.9	16.7	F	107
180	56.2	33.0	63.3	18.3	M	110
197	61.9	36.2	65.6	18.3	M	121
194	62.0	34.8	65.1	17.9	M	119
203	59.6	33.0	64.5	16.2	M	124
191	62.2	37.8	66.5	19.7	M	117
188	65.1	38.1	66.9	20.0	M	115
204	60.0	32.9	64.2	16.1	M	125
174	49.4	27.5	50.0	15.8	F	106
175	49.2	25.3	49.5	14.4	F	107

## Cattle metacarpal measurements

Element	GL	Bp	Bd	Sd	Bt
Humerus	148.6	43.8	30.7	15.1	28.6
	143.3	42.8	31.0	15.5	28.4
	143.2	40.7	31.0	16.2	28.4
	141.7	39.0	28.8	14.3	26.2
	141.0	43.6	31.1	15.9	29.2
	140.8	39.2	29.0	14.4	27.3
	139.1	41.3	39.7	15.2	27.9
	138.8	42.6	31.8	15.6	29.0
	138.6	41.6	29.2	15.8	27.3
	138.0	41.1	28.2	15.8	27.2
	137.8	43.0	29.0	15.3	27.5
	137.5	41.1	29.2	15.1	27.4
	137.2	40.6	32.1	16.4	27.8
	137.1	41.4	30.7	14.2	27.9
	136.6	39.4	27.0	15.2	26.2
	136.3	42.9	30.6	15.9	28.0
	135.8	42.5	27.2	14.7	26.8
	133.7	42.8	32.5	15.0	28.6
	133.2	42.4	28.8	14.4	27.0
	132.0	40.2	30.1	15.3	27.6
	130.5	35.8	24.9	12.6	24.1
	130.0	41.8	30.2	14.4	27.7
	129.6	39.2	28.6	14.3	26.7
	128.1	37.7	27.3	13.9	25.2
	127.6	37.2	27.4	12.5	24.4
	126.9	37.7	27.6	14.0	25.9
	125.7	38.7	27.9	13.8	26.3
	124.3	36.1	26.3	12.5	23.7
	123.8	34.9	27.0	13.0	24.2
	121.7	37.7	26.8	13.4	25.3
	121.0	37.7	25.3	12.9	25.1
	117.9	37.6	25.5	13.4	23.5
	159.9	30.3	28.5	17.1	
	158.1	30.2	26.8	16.9	
	157.9	29.2	28.1	17.2	
	156.8	30.2	28.6	16.9	
	155.6	28.4	28.9	17.3	
	151.9	31.3	29.6	18.3	
	150.8	32.0	29.1	17.4	
	150.2	32.6	28.7	16.2	
	148.2	29.7	27.1	17.3	
	147.6	30.9	28.0	16.1	
	149.8	29.1	27.8	16.2	
	149.6	29.1	28.0	17.0	
	147.3	33.4	28.8	17.7	
	145.0	27.7	25.5	15.8	
	144.2	27.6	27.5	16.8	
	139.5	28.3	26.6	15.6	
	139.1	28.8	28.4	18.6	
	136.8	30.1	27.9	16.3	
	135.6	26.7	26.1	15.4	
	134.7	29.1	-	16.4	
	134.1	27.7	26.1	16.9	
	133.6	25.9	24.0	14.5	
	133.4	25.9	25.1	14.3	
	132.6	26.4	25.0	15.6	
	132.4	26.5	24.0	14.3	
	131.2	26.0	25.6	13.8	
	130.3	25.4	23.7	14.2	
	124.2	29.7	27.4	16.4	
Metacarpal	130.7	21.7	22.7	13.1	
	129.7	22.6	24.7	14.0	
	127.0	22.0	24.7	14.7	
	126.9	22.5	25.0	13.2	
	126.3	22.1	25.1	14.9	

Element	GL	Bp	Bd	Sd	Bt
Metacarpal	125.3	21.4	24.0	14.2	
	125.1	20.6	22.6	13.0	
	124.8	22.3	23.7	14.4	
	124.0	21.4	23.3	13.7	
	123.8	22.1	25.9	15.3	
	123.4	21.7	23.3	14.7	
	123.1	22.9	24.4	13.7	
	122.7	20.5	23.2	13.4	
	122.6	22.8	25.3	13.9	
	121.8	22.4	24.5	13.9	
	121.8	20.4	21.7	11.6	
	120.9	21.5	24.2	13.7	
	120.2	20.2	22.8	13.0	
	119.4	21.0	23.8	14.2	
	118.7	21.8	23.2	13.1	
	118.7	21.2	23.8	13.9	
	118.6	20.3	24.2	13.8	
	118.5	21.7	22.8	14.1	
	118.5	20.6	21.9	12.4	
	118.1	20.8	25.2	15.1	
	117.3	21.8	24.3	13.4	
	117.3	21.1	23.2	13.6	
	117.3	20.1	22.8	13.1	
	117.3	20.0	23.5	13.2	
	117.1	20.8	23.9	13.9	
	116.8	20.4	23.3	14.0	
	116.4	20.7	23.3	12.8	
	116.0	18.9	21.1	10.8	
	115.8	21.2	22.8	11.7	
	115.8	20.6	21.5	13.1	
	115.7	19.2	22.4	13.0	
	115.5	19.8	22.7	12.4	
	115.2	21.4	23.8	14.6	
	115.2	21.0	23.3	13.2	
	114.9	21.0	23.4	14.1	
	114.5	19.0	20.4	11.5	
	114.2	20.6	22.4	12.5	
	113.9	20.3	22.0	12.7	
	113.2	19.1	21.3	12.3	
	112.6	18.2	20.9	11.2	
	112.6	17.8	21.5	11.8	
	112.3	20.8	22.6	12.8	
	111.2	22.0	24.3	14.7	
	109.8	14.7	22.2	12.7	
	109.6	20.8	23.7	13.7	
	108.5	19.5	21.1	12.8	
	108.0	19.5	21.9	12.5	
	107.3	18.8	20.9	12.2	
	107.1	19.3	21.8	12.7	
	104.8	19.9	21.7	13.1	
	104.7	18.9	20.7	11.2	
	104.3	20.0	22.9	12.8	
Femur	176.1	44.0	39.3	17.3	
	176.1	43.8	37.4	16.9	
	175.4	42.5	35.4	15.5	
	174.9	45.3	36.0	16.0	
	173.9	42.9	37.2	15.0	
	173.3	44.3	35.3	15.8	
	172.5	44.9	36.9	16.9	
	171.1	45.4	36.3	14.6	
	171.1	43.7	36.2	17.1	
	170.1	43.0	36.4	16.5	
	169.9	44.3	35.6	15.8	
	168.9	42.1	35.7	14.9	
	168.6	44.9	36.8	16.2	

Element	GL	Bp	Bd	Sd	Bt
Femur	168.5	43.8	36.9	15.7	
	165.5	42.4	43.8	16.0	
	160.0	38.7	33.3	13.6	
	159.1	42.7	34.4	15.8	
	158.2	38.9	2205	14.2	
	157.9	39.9	34.7	13.8	
	155.7	40.7	34.4	13.2	
	154.8	42.4	33.4	13.5	
	151.5	38.9	30.8	13.8	
	151.0	39.8	32.6	14.5	
	149.9	39.3	33.9	12.6	
	149.0	36.8	32.9	14.6	
Tibia	220.5	42.1	27.2	14.7	
	216.1	39.9	25.9	14.9	
	211.2	40.6	24.8	14.1	
	210.1	41.6	26.5	15.6	
	209.4	42.3	27.3	14.4	
	208.1	40.0	24.6	13.3	
	207.1	39.7	24.9	14.1	
	205.5	42.1	26.7	14.4	
	204.5	40.2	25.7	14.3	
	204.4	39.9	24.7	13.1	

Element	GL	Bp	Bd	Sd	Bt
Tibia	203.2	37.9	24.0	13.8	
	202.9	41.3	26.7	15.3	
	202.3	39.8	25.5	15.3	
	200.1	39.9	25.9	14.9	
	199.5	38.0	24.7	13.9	
	197.2	38.9	24.3	14.4	
	197.1	38.5	26.0	14.2	
	196.9	40.6	25.1	15.5	
	194.7	39.6	24.6	14.1	
	189.1	39.0	23.8	13.8	
	186.9	39.4	23.3	12.5	
	183.2	37.3	23.5	13.3	
	182.6	36.7	22.1	12.9	
	180.8	40.2	25.2	13.6	
	180.0	35.8	22.1	12.6	
	179.5	34.6	22.1	12.2	
	174.9	34.6	21.9	11.6	
	173.6	33.3	21.6	11.9	
	172.0	33.8	22.9	12.8	
	170.6	35.5	23.3	13.4	

### Sheep biometrics

LI	Bp	Bd	Sd	E.W.H.
221.1	50.0	48.2	33.6	141.7 cm
197.2	46.0	45.2	32.5	126.4 cm
221.7	50.0	48.9	32.7	142.1 cm
194.4	46.9	45.9	32.1	124.6 cm
191.0	44.8	40.1	28.5	122.4 cm
210.5	50.2	47.1	33.0	134.9 cm
206.1	46.6	46.1	32.5	132.1 cm
204.6	48.0	49.1	33.5	131.1 cm
203.8	42.1	40.3	25.3	130.6 cm
211.5	45.2	45.7	30.0	135.6 cm
203.8	46.0	43.0	29.1	130.6 cm
214.9	46.8	43.5	30.1	147.8 cm
198.6	42.5	44.1	29.1	127.3 cm

### Horse metacarpal measurements



### **'Larrybane' (Knocksoghey td.), Co. Antrim**

Grid Ref: **D04824512 (30482/44512)**

SMR No. **ANT 004:005**

Reference: **Childe 1936; Proudfoot & Wilson 1961-2; Jope 1961-2.**

The site is a promontory fort which was partially excavated by V.G. Childe in 1935, and was fully excavated in 1954. No structural remains of house walls were discovered in the interior, however, some roughly cobbled floors were found which suggest that the houses may have been rectangular.

An iron ring, nail and sickle were found on site, and the presence of slag suggests that ironworking was undertaken on site. The exotic material found on site – a fragment of bronze, a glass bangle, and an amber bead – are possible indicators of external trade. Around 1500 sherds of souterrain ware are recorded for the site. Proudfoot and Wilson suggested a ninth/tenth century date for the occupation of the site.

### **Animal Bones:**

The animal bones from the site were mainly mammal bones, but there were a small number of bird bones: domestic fowl, starling, shag, and gull (possibly large herring gull), and one mollusc shell (*Patella vidgata* L.). The number of fish bones, mostly cod, was larger than usual on this type of site but still not numerous.

	Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Dog	Cat	Hare	Date
NISP	211	204	32	7	14	1	1	1	c. 9 <sup>th</sup> /10 <sup>th</sup> C.
%NISP	44.7	43.3	6.8	1.5	3.0	0.2	0.2	0.2	
MNI	20	16	3	2	2	1	1	1	
%MNI	43.5	34.8	6.51	4.34	4.34	2.17	2.17	2.17	

### **NISP and MNI from Larrybane, Co. Antrim.**

The cattle teeth included 15 deciduous lower 3rd premolars indicating that 8 of the animals were less than 2 years old, and one mandible had a 1st molar only just cut through, belonging to a calf of approximately 6 months.



**Plan of Excavations at Larrybane, Knocksoy, Co. Antrim (after Proudfoot & Wilson 1961-2, 92).**

**Leacanabuaile (Kimego West td.), Co. Kerry**

Grid Ref: **V44578079 (044571/080797)**

SMR No: **KE079-016**

Reference: **Ó Riordáin & Foy 1941; Stelfox 1941, 95-96**

The site at Leacanabuaile consisted of a collapsed stone enclosure. The excavation cleared the enclosure interior of collapsed stone and debris exposing evidence for six buildings, a souterrain and a wall chamber.

Four houses and the partial remains of another two structures were identified within the interior of the stone enclosure. House A was a round stone building with an internal diameter of 4.5m. The excavation of seven postholes in its interior suggested that the structure may have been narrowed by corbelling to a certain distance before being roofed by means of thatch or other material, supported on posts set in the floor.

House B was a rectangular structure with rounded corners (7.1m x 6.15m) built against House A. Four large postholes in the interior suggest that the roof was completed by means of some form of a timber or thatched construction. Seven stakeholes from the interior were interpreted as supports for 'pot-hangers or for some other domestic purpose'.

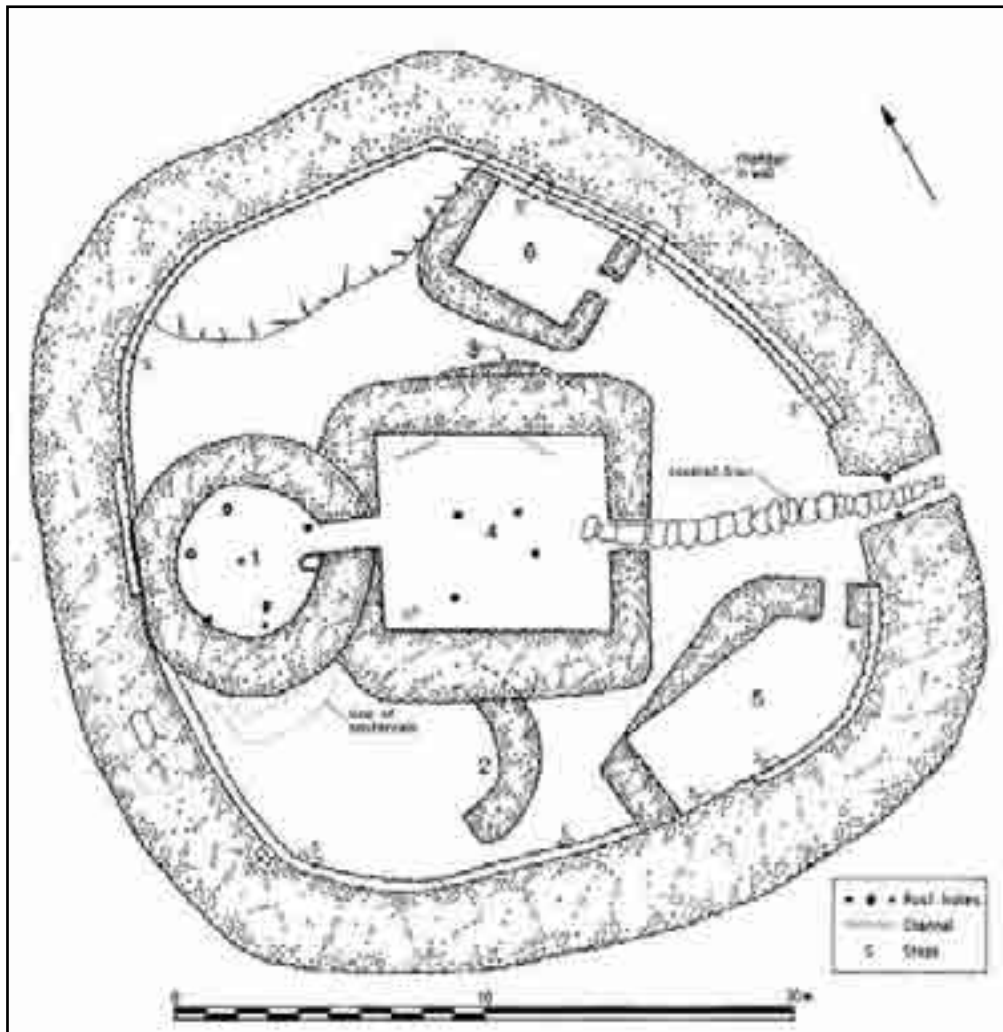
House C was another rectangular building with rounded corners (4m x 3.35m) that utilised the enclosure wall as one of its side walls. House D post-dated House B as its walls had to be narrowed from 1.2m to 0.3m thick beside House B to leave a passage between both buildings.

A souterrain was exposed running from under the western enclosure wall to an aperture in the interior of House A. Evidence for an intermural chamber within the enclosure wall was also revealed immediately outside House C entrance. Both features were integral with the construction of the enclosure.

Evidence for textile work and cereal processing was found on site, and iron slag indicates that ironworking took place as well. Domestic finds include three iron knives, two iron nails, seven whetstones, flint and quartz fragments, a stone disc, a stone mortar, four bone combs, an iron pin, a bronze ring-headed pin.

**Animal Bones:**

Cattle bone constituted almost 90% of the bulk of the bones recovered on the site. Relatively large quantities of sheep (or goat) bones were identified. Pig bones were rarer than is usual in middens, and were mostly of young individuals. Bones of red deer, grey seal, horse, dog and badger were also identified, as well as bones belonging to various birds - duck (teal/garganey), heron, puffin and cormorant, and possible razorbill and barnacle goose.



Plan of Leacanabuile Stone Fort, Co. Kerry (after O'Sullivan & Sheehan 1996).

**'Leggetsrath', Blanchfield Island, Co. Kilkenny**

Grid Ref: **S52385596 (252377/155958)**

SMR No: **N/A.**

Reference: **Lennon 2005; Lennon 2006; Beglane 2005**

An enclosure defined by concentric ditches was uncovered during top-soil stripping. The inner ditch enclosed an area of 34m x 32m, with a 3m wide entrance to the northeast. Slot trenches were found either side of the entrance in the inner ditch, and it is possible that these held upright timbers which were then removed or rotted *in situ*. These timbers may have acted as a defensive feature, or to retain the earthen bank. A possible palisade trench may also have existed on the east side of the site.

Two sherds of Late Roman Amphora (Bii) pottery, dating from the late fifth-mid sixth centuries, were recovered from the middle of the inner ditch, and a radiocarbon date of A.D. 569-809 was returned from animal bones in the lower fill. The outer ditch measured 54m in diameter and a radiocarbon date of A.D. 689-983 was recovered from a fill of the re-cut ditch. The upper ditch fill disclosed a number of metal objects (two iron blades, iron rod and copper alloy rod) and sherds of Saintonge pottery.

A portion of a third curving ditch which respected the enclosure was also discovered further down slope. Several shallow linear ditches ran off this feature, and it is suggested that these may represent early field boundaries. A blue-glass bead recovered from one of these would place these in the early medieval period. Two corn-drying kilns were later superimposed over these boundaries, but may also belong to the early medieval period.

The only feature excavated in the centre of the enclosure was an enigmatic pit (3m long x 1.2m deep). Two postholes were cut into the north and southwest corners of the pit, and it is possible that these originally supported a roof; four courses of rudimentary stonework were uncovered in the northern face of the pit. Environmental remains included pig bone, fish bone (trout, eel and salmon) and small bird bone. A bone comb, a gaming piece and a perforated stone were also recovered from this pit, while an iron blade was found in the upper fill. Another shallow pit was cut into the upper fills of the large pit. Bones of sheep, bird and fish were recovered from this pit, as well as grains of barley and wheat, and pieces of iron slag.

There was no evidence of an enclosing bank. The excavator suggests that the ditches are contemporary, but also raises the possibility that the outer ditch represents an expansion of the site.

**Animal Bones:**

In total, 574 countable fragments of bone were identified and recorded. The majority of the bones were found in the enclosure ditches and in the slot trenches at the entrance to the enclosure.

Context	Cattle	Sheep/ Goat	Pig	Horse	Deer	Dog	Cat	Hare	Date
Enclosure	6	3	3	1	2	2	1	2	<i>c. late 6<sup>th</sup> C.</i>
Entrance	2	3	2	1	1	1	-	1	?

**Animal bone fragments from Leggetsrath, Co. Kilkenny.**



**Plan of Leggetsrath, Co. Kilkenny (after Lennon 2005)**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
Beta-205166	Fill of inner ditch.	1350±60 BP	<b>A.D. 569-782;</b> A.D. 790-809
Beta-205167	Corn-drying kiln	900±70 BP	A.D. 1020-1258
Beta-205168	Basal fill of outer ditch (re-cut)	1180±60 BP	A.D. 689-752; <b>A.D. 761-983.</b>
Beta-205169	Corn-drying kiln	1100±60 BP	A.D. 778-1025
UBA-8171	Cattle bone from basal fill of ditch	1210±21 BP	A.D. 723-740; <b>A.D. 770-886.</b>

## Animal Bone Appendix

### Cattle:

Neo/prenatal	6-18 months	24-36 months	36-48 months	48 months+
-	21%	-	40.5%	38.5%

#### Summary of epiphyseal fusion rates for cattle.

Age Group	<15mth	15-30mth	30-50mth	>50mth
Mandibles		4		2

#### Cattle tooth eruption and wear

### Sheep:

Neo/prenatal	6-18 months	24-36 months	36-48 months	48 months+
-	40	22	-	38

#### Summary of epiphyseal fusion rates for sheep.

Age Group	<1 yr	1-2yrs	2-4yrs
Mandibles	2	2	2

#### Sheep tooth eruption and wear

### Pig:

Neo/prenatal	6-18 months	24-36 months	36-48 months	48 months+
-	44	31	25	-

#### Summary of epiphyseal fusion rates for pigs.

	Age Group (months)					Notes
	0-12	12-18	19-24	25-30	30+	
Number	-	3	3	2	-	1 male 17-19 mnths old
Time of Year	-	Summer	Winter	Summer	-	

#### Pig tooth eruption and wear

**'Lisdoo' (Castle Balfour Demesne td.), Co. Fermanagh**Grid Ref: **H36273313 (23627/33313)**SMR No: **FER 246:015**Reference: **Brannon 1981-2; Collins 1980.**

The site consisted of a bivallate enclosure, the interior of which was badly degraded by subsequent agricultural activity. A (possible) portion of a souterrain passage was discovered from which the articulated skeleton of a young male was recovered.

Excavations in the inner ditch revealed that it had originally been approximately 2m deep while the outer ditch was found to be about 1.5m deep. Excavation through the bank and internal ditch revealed a layer of charcoal beneath the construction phase of the bank which was associated with a series of stakeholes, perhaps suggestive of an earlier palisaded enclosure.

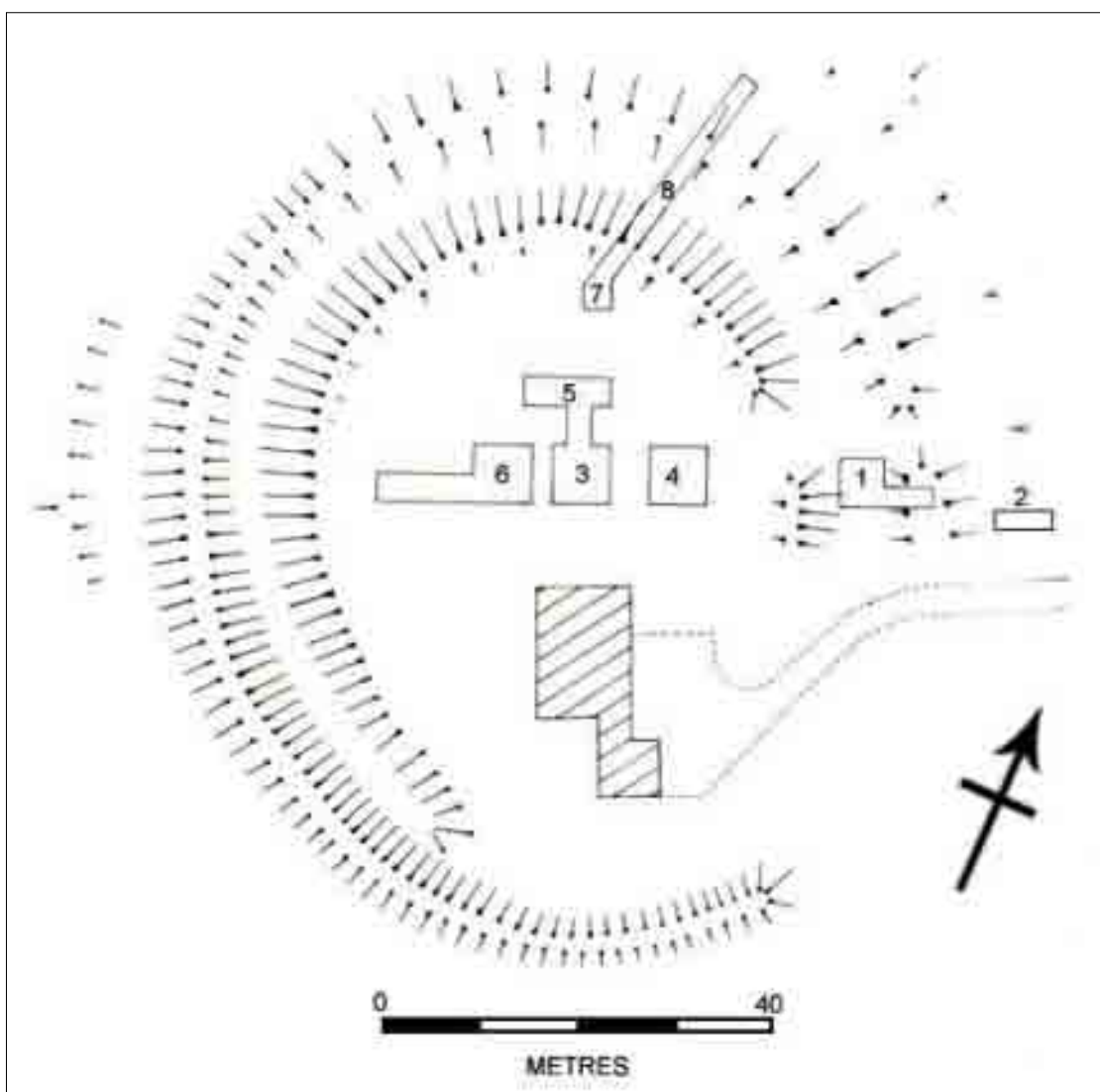
A single sherd of E<sub>1</sub> ware was found in the occupation layer of the enclosure, suggesting a seventh-century date, and a number of examples of coarse ware (crannog ware or souterrain ware), were also found. The only other notable finds were six sherds of a crucible from the upper fill of the inner ditch.

**Animal Bones:**

A total of 1421 bones were recovered from the site. These were divided into three stratigraphical groups. The analysis shows a decrease in cattle over time, however, this is more marked in the MNI than it is in the NISP.

Group		Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Dog	Other	Date
Early									7 <sup>th</sup> C
	NISP	73	8	5	1	-	-	1	
	%NISP	83	9	6	1	-	-	1	
	MNI	4	2	1	1	-	-	1	
	%MNI	44.5	22.2	11.1	11.1	-	-	11.1	
Middle	NISP	61	11	15	1	-	-	-	
	%NISP	69	13	17	1	-	-	-	
	MNI	3	2	3	1	-	-	-	
	%MNI	33.33	22.21	33.33	11.1				
Late	NISP	256	23	77	9	13	3	3	
	%NISP	67	6	20	2	3	0.8	0.8	
	MNI	10	5	18	2	4	2	3	
	%MNI	22.7	11.4	40.9	4.5	9.1	4.5	6.9	

**NISP and MNI from stratigraphical groups at Lisdoo, Co. Fermanagh**



**Plan of Lisdoo, Co. Fermanagh (after Brannon 1981-2, 54).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
UB-2202	Charcoal from under bank	1655±45 BP	A.D. 258-298; <b>A.D. 319-472;</b> <b>A.D. 476-534.</b>



### **Lisduggan North 1, 2 & 3, Co. Cork**

Grid Refs: **R42740326 (142746/103269); R43190338 (143195/103381);  
R43160335 (143163/103353)**

SMR Nos: **CO023-157; CO023-158; CO023-159**

Reference: **Twohig 1990; McCormick 1990.**

Two levelled univallate enclosures were investigated in advance of quarry developments. One of these contained evidence for an outer palisade and three buildings together with habitation debris (Lisduggan 1); while the other one was interpreted as a livestock enclosure (Lisduggan 2). Another univallate enclosure (Lisduggan 3) was excavated in the summer of 1973. Earlier field patterns, as well as another livestock enclosure, were also identified at this site.

Lisduggan 1 was approximately elliptical in plan (60m x 45m), and excavation through its bank and ditch revealed a palisade trench 0.5m wide and 0.3m deep on the outer face of the enclosure bank. The densest habitation deposits was revealed in the southwest quadrant where three houses, identified as dark bands containing a mixture of soil, charcoal and bone and the charred remains of a few post-holes, were revealed. House 1 was more or less circular in plan with an average diameter of 6m; House 2 was roughly circular in plan and had roughly the same diameter of House 1; House 3 overlay House 2 and was rectangular in form (7m x 5.5m).

Various objects were recovered within the habitation deposits associated with the buildings, hearths and gravel spreads. These included fragments of spindle-whorls, crucibles, flint objects, a rotary quern upper-stone, a blue glass bead, two sherds of E-ware, whetstones, a piece of amber, a bronze buckle and iron knives.

Lisduggan 2 was roughly circular in plan and had an average diameter of about 50m. The only feature uncovered in this enclosure was a short length of a cobbled pathway.

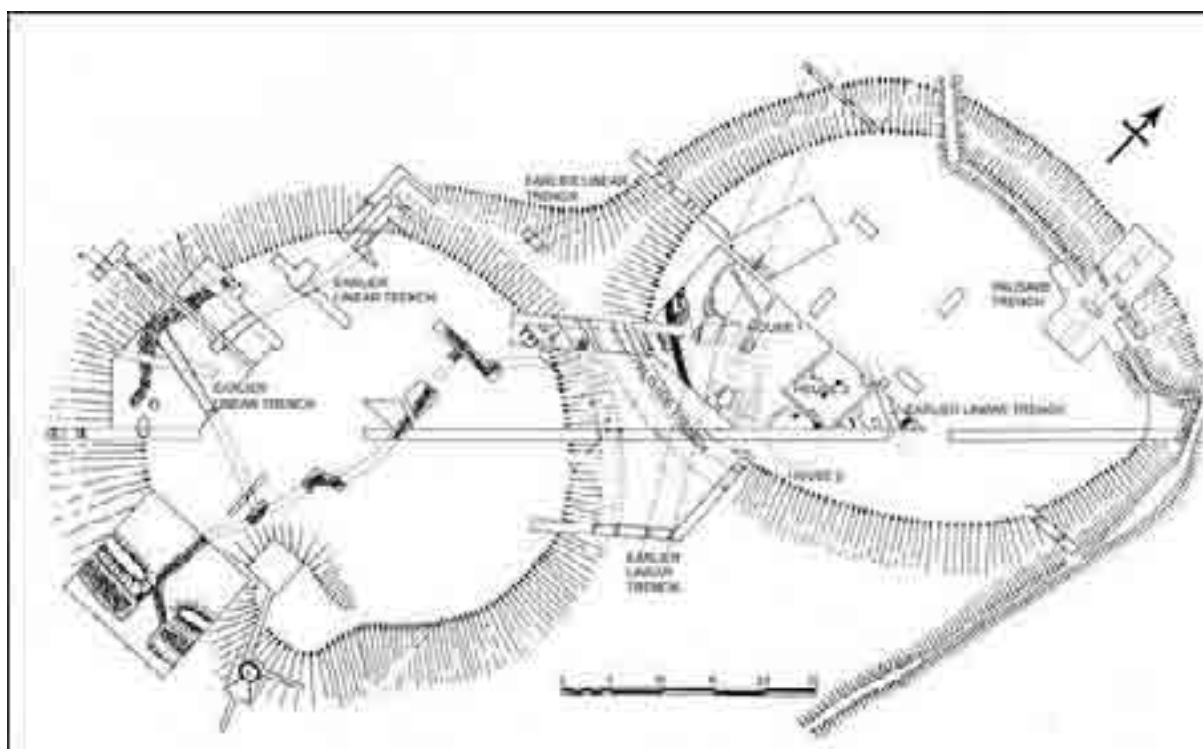
Lisduggan 3 was roughly circular and had an average diameter of 45m internally. The enclosing bank appeared to have been constructed in two phases, and the causewayed entrance was roughly contemporary with the secondary bank phase. Though the interior had been extensively disturbed by subsequent ridge and furrow cultivation, it was possible to identify a rectangular structure (7m x 6m) in the centre of the enclosure. Except for a blue glass bead, a flint perforator/scraper and a whetstone, there was no evidence for any habitation structures, artefacts or debris within or in the vicinity of the rectangular structure strengthening its interpretation as a livestock pen.

### **Animal Bones:**

Acidic soil conditions meant that very little bone material was found. As such very few bones (12) were identifiable.

<b>Cattle</b>	<b>Sheep/Goat</b>	<b>Pig</b>	<b>Date</b>
1	10	1	7 <sup>th</sup> /8 <sup>th</sup> C?

**NISP from Lisguddan 1, Co. Cork.**



Plan of Lisduggan 1 and 2, Co. Cork (after Twohig 1990, plan 1).

**'Lisnagun' (Darrary td.), Co. Cork**  
Grid Ref: **W41814211 (141819/042115)**  
SMR No: **CO135-031001**  
Reference: **O'Sullivan *et al.* 1998**

Excavations at Lisnagun revealed a univallate enclosure with an external diameter of 53m. There was also evidence for a central round house, various outbuildings, three souterrains and other structures and features. The phasing of the site was difficult to establish as modern ridge and furrow cultivation had truncated almost all the features and stratigraphic evidence.

Possible stakeholes, pits and a shallow interrupted ditch were discovered beneath the enclosure banks. The ditch had steep sides and a U-shaped base and measured 1.3m wide and 0.5m deep. A rock-cut trench also traversed the outer south-eastern entrance area. The evidence was too slight to establish whether these features at Lisnagun represented part of a pre-enclosure field system or the remains of an earlier settlement enclosure.

A possible round house, defined by a shallow circular gully or trench (0.15m deep and with an overall diameter of 5.7m), was excavated in the centre of the enclosure. A concentration of stakeholes and linear slot-trenches excavated on either side of the primary entrance were interpreted as small rectilinear outbuildings.

Three earth-cut souterrains were located in the interior of the site. Burnt sediments, probably hearth debris, from the backfilled entrance to Souterrain I yielded a radiocarbon date spanning the late-ninth/tenth centuries and was regarded as a *terminus ante quem* date for the construction of the souterrain. The siting of the entrance of two of the souterrains (I and III) within the circumference of the gully of the possible round house, tentatively suggests that at least one may have been entered from this structure.

It appears that the three souterrains represent a gradual succession of use and replacement than a single activity phase. One of the chambers of Souterrain I was later adapted as a stone-lined pit after the other creep-ways and chambers were backfilled. Finds from the backfill inside the souterrains included burnt sediments from wood charcoal, hazel nut shells, animal bone and shellfish fragments as well as various iron objects, iron slag, a blue glass bead, possible hone and hammer-stones and large perforated stones.

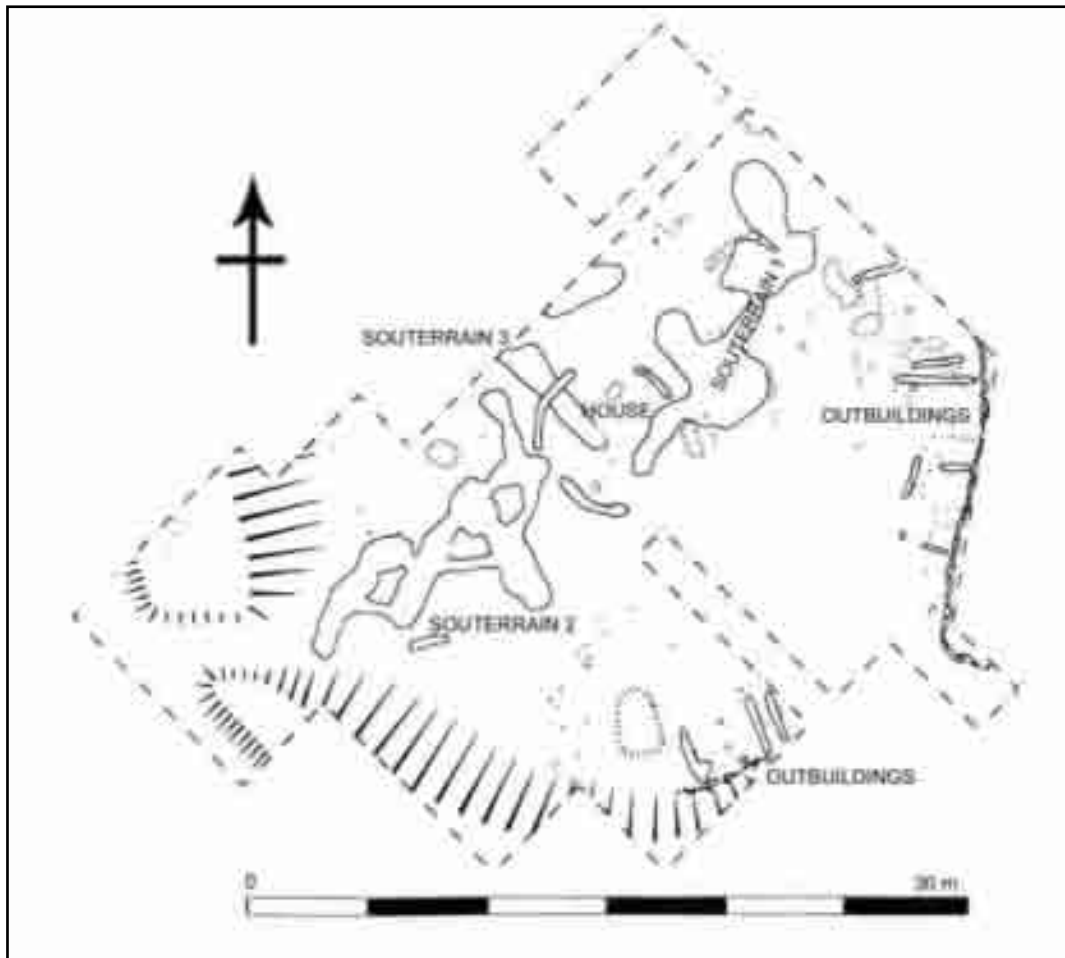
### **Animal Bones:**

A total of 179 bones were recovered, but only 11 (6%) were diagnostic to species. Of these only nine were from the early medieval phase and consisted solely of teeth and a red deer antler

<b>Cattle</b>	<b>Sheep/Goat</b>	<b>Pig</b>	<b>Red Deer</b>	<b>Date</b>
2	5	1	1	8 <sup>th</sup> /9 <sup>th</sup> C ?

### **Identified bone fragments from Lisnagun, Co. Cork**

All of the sheep teeth showed signs of early wear, indicating that the animals were at least 2 years old at time of death; the cattle molars were heavily worn and must have belonged to a relatively old animal; and the pig molar came from an animal under 1 year old.



**Plan of interior of Lisnagun, Co. Cork (after O'Sullivan *et al.* 1998, 38).**

#### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
UB-3178	Charcoal from domestic debris in backfilled entrance of Souterrain 1	1110 $\pm$ 35	A.D. 785; A.D. 828-838; <b>A.D. 866-1017.</b>

### **'Lough Faughan Crannog' (Ballyrolly td.), Co. Down**

Grid Ref: **J44644114**

SMR No: **DOW 037:050**

Reference: **Collins 1955; Jope 1955.**

Excavations on the crannog of Lough Faughan, Co. Down produced some late medieval pottery and an early thirteenth-century coin, but they revealed that the site was mostly early medieval in date, occupied between the seventh and tenth centuries A.D.

The early medieval crannog survived as a low circular mound, 36m in diameter. It was constructed by laying down a sub-structural layer of brushwood and peat over a marshy deposit on the lakebed. There was some domestic refuse found in these structural levels, as well as a single hearth interpreted as a fireplace used by the crannog builders (although it is conceivable that this was an actual early occupation horizon). Finds from the structural layers included whetstones, two crucible sherds, a wooden object, sawn antler cuttings, an iron shield boss, a small circular iron pan, an iron shears, a barrel padlock key and an unfinished comb.

The primary occupation surface revealed hearths surrounded by stone kerbing and associated with spreads of timbers. The site's largest hearth was 4.5m in diameter, and finds included a bone pin and a sherd of Roman Samian ware (often perceived as a magical or medicinal item in the early middle ages). It seems likely that this 'hearth' could be re-interpreted as an early medieval house floor. Some of the other hearths were industrial rather than domestic, and iron and bronze slag, crucibles and a clay mould for casting bronze pins were found there.

The primary crannog occupation layers produced 230 sherds of souterrain ware, and had evidence for textile-working - discs used in weaving, hand distaffs, four spindle whorls and an antler peg. Evidence for metalworking included crucibles (pyramidal with triangular mouth) and moulds for casting bronze pins. Items of personal adornment included a pennanular brooch, pin, needle, bone pins, lignite bracelets, finger rings, glass beads, glass vessels and a glass armlet.

The uppermost occupation surface was enclosed within a stone revetment or wall, of three courses of stone with a straight outer face. This wall may only have been constructed on the north side of the crannog, perhaps to alleviate slumping. There were some early medieval objects within this occupation material, as well as some sherds of medieval pottery probably dated to the thirteenth century).

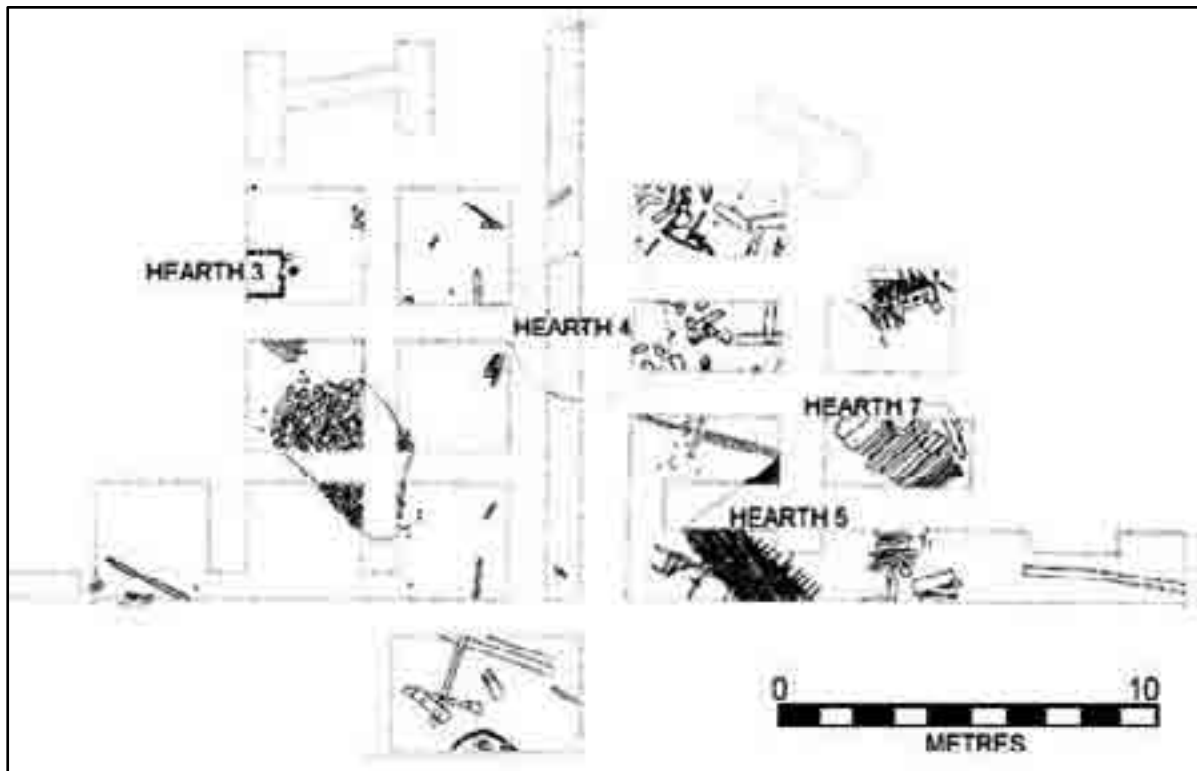
#### **Animal Bones:**

The animal remains from the crannog are considered in three groups: those from the structural levels; those from the habitation levels; and a miscellaneous medieval group from the upper habitation levels.

<b>Phases</b>		<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Deer</b>	<b>Fowl</b>	<b>Date</b>
<b>Structural Levels</b>								6 <sup>th</sup> C?
	<b>NISP</b>	59	17	26	-	19	-	
	<b>MNI</b>	15	3	7	-	1	-	
	<b>%MNI</b>	56	16	24	-	4	-	
<b>Habitation Level</b>								7 <sup>th</sup> /8 <sup>th</sup> C
	<b>NISP</b>	256	38	89	2	14	5	
	<b>MNI</b>	53	7	16	1	3	1	
	<b>%MNI</b>	65	9.5	22.5	0.5	1.25	1.25	
<b>Misc. Levels</b>								c. 14 <sup>th</sup> C
	<b>NISP</b>	222	27	93	-	2	-	
	<b>MNI</b>	49	5	20	-	1	-	
	<b>%MNI</b>	64.8	7.9	27	-	0.3	-	

**NISP and MNI from Lough Faughan crannog, Co. Down.**

The only bird bones from the site were five bones of a large domestic fowl, occurring in the habitation levels. The good-sized spurs on the tarsometatarsals suggest that it was kept as a fighting cock.



**Plan of Lough Faughan crannog, Co. Down (after Collins 1955)**

#### **Animal Bones Appendix:**

The evidence from the cattle teeth suggested that there were no animals of any great age: none of the teeth showed very much wear. Many of the mandibles and skull fragments showed the 3rd molar not fully erupted. One mandible had the 1st and 2nd molars just erupting, suggesting an animal of perhaps 2 years. Several of the mandibles carried a deciduous 3rd premolar, indicating animals of less than 2-3 years by modern standards.

The 3rd molars of pigs were frequently not fully erupted, indicating animals of 1 to 2 years.

The only fish bone from the site came from the habitation levels and was of a marine gadid, probably cod. The tip of a sperm whale tooth ('back tooth') was also found.

**Loughbown (1), Co. Galway**  
**Early Medieval Settlement Enclosure.**  
 Grid Ref: **M82162894 (182163/228944)**  
 SMR No: **GA087-178**  
 Reference: **Bower 2009; McCarthy 2009.**

Excavation revealed a site enclosed by two ditches – the inner enclosure measured 42m in diameter, and the outer ditch enclosed an area with a diameter of 63m. A linear ditch, truncated by the outer ditch of the enclosure, produced a Bronze Age radiocarbon date. This ditch appears to have remained open throughout the early medieval period as an iron knife blade (dated by the excavator to the ninth to fourteenth century) was also found in this feature.

Some bone from the earliest fill of the outer ditch returned a radiocarbon date in the sixth/seventh century. The upper fill was overlain by metalworking spoil, suggesting that the ditch had been in-filled by the time iron-working was conducted in this area. Dates from one of the three smithing hearths would indicate that this occurred in the eleventh/twelfth century.

The inner ditch showed evidence of two subsequent phases of re-cutting and the skeleton of a juvenile human was found in the western terminus of this ditch. The lack of cut features to the rear of this ditch led the excavator to suggest the presence of a contemporary bank, some evidence of which may be seen in the in-fill of the ditch. Two corn-drying kilns were cut into the in-fill of the inner ditch, and radiocarbon dates from one of these suggest that this occurred around the fourteenth century.

Two possible structures were identified in the interior of the site. Structure A was trapezoidal in shape (indicated by eleven postholes), and had an occupation layer that contained charred cereals and hazelnuts. This structure may potentially have acted as a gate-house. Structure B comprised five postholes and a slot trench arranged in an L-shape; animal bones, burnt clay, and charred cereal remains were recovered from this structure. Another area of occupation debris was indicated to the north of Structure B. This had been truncated during excavation, but revealed charcoal, shell, bone, slag and cereal remains, as well as an iron fish hook and a ringed pin. A stone-built souterrain was also discovered in this area, and this produced a large number of animal bones (largely cattle and sheep/goat).

Other finds from site included fragments of eight quernstones, a silver penny of Edward I (1272-1307), two iron bars, a copper alloy ring, a copper stud fragment, and six other fragments of copper alloy.

### **Animal Bones:**

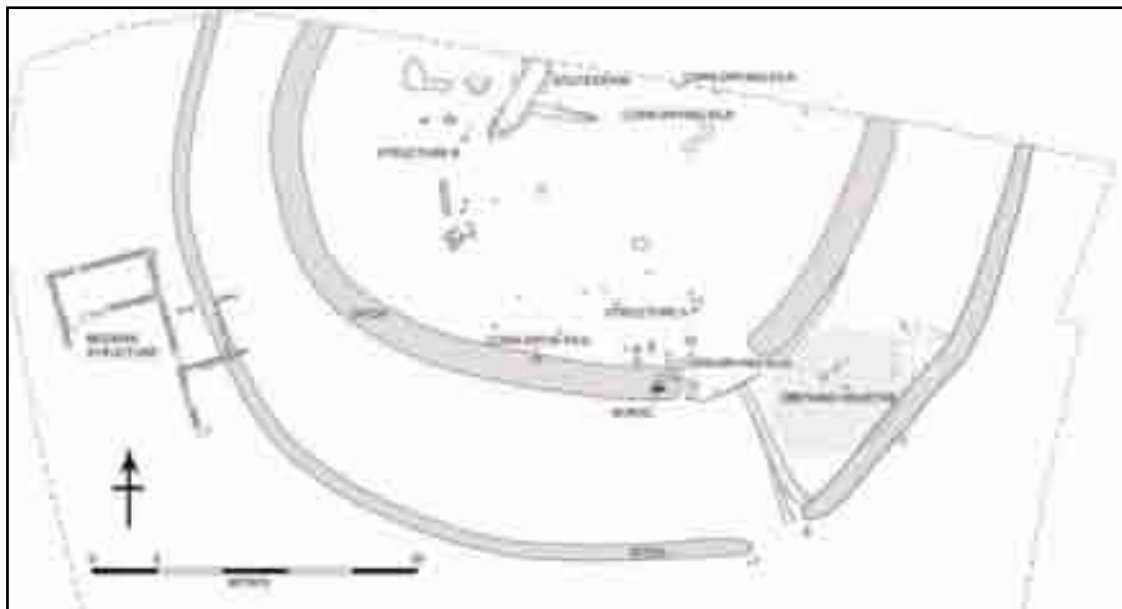
A total of 4,883 animal bones and 69 bird bones were recovered from contexts that could be assigned to specific phases.

Phase		Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Deer	L.M	M.M	Date
Outer Ditch – primary cut	NISP	13	8	6	3				30	24	A.D. 563-653
Inner Ditch- primary cut	NISP	284	227	92	9	301	12	1	504	746	
	MNI	12	10	6	1	3	2	1	-	-	
	%MNI	34.3	28.6	17.1	2.85	8.6	5.7	2.85			
Inner Ditch- re-cut	NISP	18	4	4	1	-	-	-	45	30	A.D. 782-983.
Souterrain	NISP	121	103	37	15	-	3	-	166	210	?

**NISP and MNI from Loughbown I, Co. Galway (L.M = Large Mammal; M.M = medium-sized mamal)**

The cattle limb bones from the inner ditch were mostly fused distally representing individuals over at least over two years old. Five metapodial bones were unfused distally and belonged to animals slaughtered between 2 - 2.5 years of age and two humeri came from individuals less than 12-18 months at death. The evidence from the cattle remains from the souterrain indicated that most cattle were kept to at least 3-4 years of age.

Sheep bones with unfused epiphyses from individuals between 1-2 years of age were present in the inner ditch, although by far the majority of remains belonged to mature animals.



**Plan of Excavation at Loughbawn (1), Co. Galway, showing relevant features (after Bower 2009, 42).**

### Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
UB-7362	Charcoal from basal fill of outer ditch	1444±32 BP	<b>A.D. 563-653.</b>
UB-7363	Charcoal from fill of smithing hearth	863±31 BP	<b>A.D. 1047-1088;</b> <b>A.D. 1122-1139;</b> <b>A.D. 1149-1257.</b>
UB-7364	Charcoal from fill of linear ditch	2881±32 BP	1193-1171 B.C.; 1169-1143 B.C.; <b>1132-973 B.C.;</b> 958-938 B.C.
UB-7365	Charcoal from layer in outer bank	614±30 BP	<b>A.D. 1294-1401.</b>
UB-7366	Charcoal from fill of corn-drying kiln	644±29 BP	<b>A.D. 1282-1327;</b> <b>A.D. 1342-1395.</b>
UB-7367	Charcoal from fill of gully in entrance	1572±30 BP	<b>A.D. 419-554.</b>
UBA-8096	Bone from human burial	1138±29 BP	A.D. 782-789; A.D. 810-848; <b>A.D. 855-983.</b>



**Loughbown (2), Co. Galway**Grid Ref: **M81732872 (181730/228729)**SMR No: **GA087-177**Reference: **Bower 2009;**

The site consists of a banked-and-ditched enclosure, 37m x 48m. Radiocarbon dates from the construction phase suggest that material from an earlier Iron Age site may have been re-worked into the early medieval bank. Excavation of the enclosure bank revealed postholes along the inner and outer faces of the bank, and these were interpreted as evidence for wooden shoring. This wooden facing may have been complimented by a facing of small limestone stones on the interior face of the bank. A metallated entrance-way was revealed, associated with two large postholes for the gate.

Around 60% of the site interior was composed of exposed bedrock, thus there were few structural remains. An area of activity was however identified in the northwest of the interior, consisting of a slot trench, ten postholes (in an irregular pattern), and three pits. A radiocarbon date of A.D. 1022-1164 was returned from associated charcoal.

Few finds were recovered from this site, leading the excavator to suggest it may have been used as a cattle corral. These consisted of an incomplete shale/lignite bracelet; a quernstone; an iron knife-blade; and a flint flake and hammer stone.

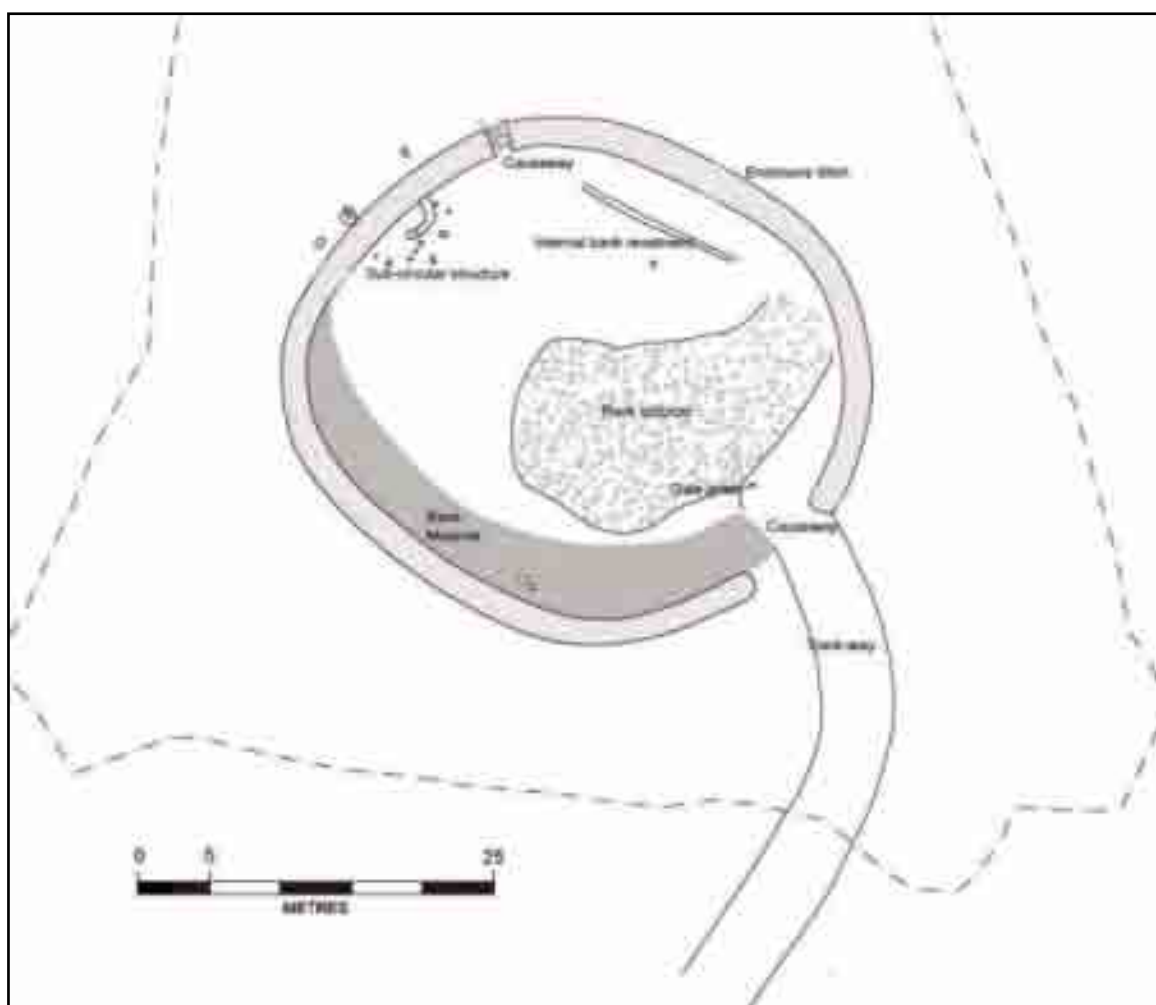
**Animal Bones:**

In total, 1166 bones were recovered during the excavations. Almost half of the bones (528) came from the occupation area, although only seven of these could be identified to species.

Context	Cattle	Sheep/ Goat	Pig	Dog	Cat	LM	MM	Date
Ditch	3			3		11		
Gatepost	1	1	1			9		
Bank Material	6			27		17		
Bank Revetment	2							
Posthole C91							1	
Primary fill of ditch	38	27	2	2		66	32	
Occupation spread		7					70	
Posthole C16					77			A.D. 1022-1164?
Secondary fill of ditch	3					3		

**NISP from Loughbown II, Co. Galway**

Epiphyseal fusion data from the major limb bones indicates that cattle were mostly killed between 2.5 to 3.5 years although younger individuals were also slaughtered.



**Plan of Excavation at Loughbawn (2), Co. Galway, showing relevant features (after Bower 2009, 30).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
UBA-8103	Bone from base of ditch	1159 $\pm$ 29 BP	<b>A.D. 778-903; A.D. 914-969.</b>
UBA-7360	Charcoal from bank-fill	2245 $\pm$ 33 BP	<b>392-345 B.C.; 323-205 B.C.</b>
UBA-7361	Charcoal from lower bank fill.	2162 $\pm$ 34 BP	<b>361-272 B.C.; 263-102 B.C.</b>
UBA-7759	Charcoal from ditch	342 $\pm$ 32 BP	<b>A.D. 1467-1640.</b>
UBA-7760	Charcoal from post-hole in occupation area	941 $\pm$ 33 BP	<b>A.D. 1022-1164.</b>
UBA-7758	Charcoal from fill of slot-trench of sub-circular structure	2266 $\pm$ 24 BP	<b>396-352 B.C.; 295-228 B.C.; 221-211 B.C.</b>

## Loughboy, Co. Kilkenny

Grid Ref: **S51445382 (25144/15382)**

SMR No: **KK019-040; KK019-041**

Reference: **Cotter 1999; McCarthy 1999.**

Excavations uncovered a sub-rectangular enclosure (41m x 35m), which was later expanded by the addition of a secondary ditch, thus enclosing an oval-shaped area of 52m x 39m. Two charcoal spreads were uncovered in the interior of the site, from which fragments of iron slag and a fragment of a bone comb were found. An iron-working hearth was also located within the interior, from which 35 pieces of iron slag was recovered. A cemetery of at least 20 individuals was discovered in the south-east of the interior.

### Animal Bones:

In total 1,318 animal bones were recovered from the excavation, of which 633 were identified to species. These could be divided into two phases – the early medieval phase associated with the enclosure, which accounted for 80% of the material; and a later phase associated with the burials.

Phases	Cattle	Sheep/ Goat	Pig	Dog	Large Mammal	Medium Mammal	Date
Primary Ditch – F1	297	54	40	3	249	103	A.D. 565-674.
Secondary Ditch – F6	39	6	4	1	16	10	

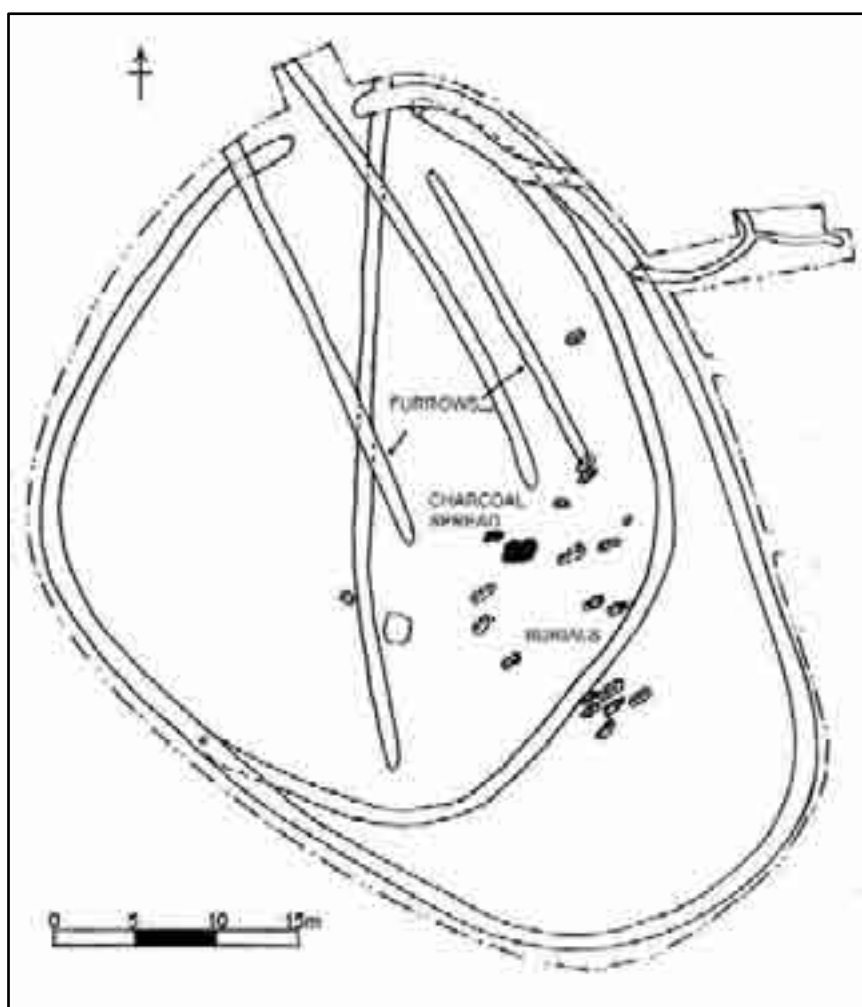
### NISP from ditches at Loughboy, Co. Kilkenny

The height of the sheep was calculated for a single metacarpus and indicated an individual of 0.56m. The available dating evidence from teeth showed that a few cattle and sheep were slaughtered when young, but most mandible represent mature adults – of those where the 3<sup>rd</sup> molar was worn, many were in late wear stages, suggesting the presence of old cows and ewes. The sheep bones were all from mature animals. Pigs were mostly slaughtered in their 2<sup>nd</sup>/3<sup>rd</sup> years, though two very worn lower M3s probably represent breeding stock.

### Radiocarbon Dates

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-4465	Animal Bone	1408 $\pm$ 42 BP	<b>A.D. 565-674.</b>
UB-4466	Charcoal	1589 $\pm$ 55 BP	A.D. 346-371; <b>A.D. 377-596.</b>
UB-4467	Human Bone	1345 $\pm$ 42 BP	<b>A.D. 618-729;</b> <b>A.D. 735-772.</b>



**Plan of Enclosure KK019-040 at Loughboy, Co. Kilkenny (after Cotter 1999).**

**Mackney, Co. Galway**Grid Ref: **M83742941 (183745/229417)**SMR No: **N/A.**Reference: **Delaney 2009; McCarthy 2009.**

The site consisted of a partially destroyed enclosure (55.64m in diameter). Excavation revealed three main phases of occupation on site. The earliest phase of occupation was indicated by the presence of two fire pits, and a number of linear features, all of which underlay the later enclosure bank. A radiocarbon date from charcoal associated with one of these fire-pits suggests that the bank was constructed *c.* A.D. 771-899. This date is almost identical to one of the dates returned from the ironworking area (A.D. 775-900) which suggests that at least some ironworking may have been conducted on site prior to the construction of the bank.

The second phase of occupation was marked by the construction of the enclosure ditch. The lower ditch fills were composed of silts, presumably from gradual slippage, but a series of higher ditch fills, composed of medium to large sub-rounded stones, would appear to represent the collapsed remains of the stone revetment from the outer face of the bank. A similar stone revetment appears to have existed on the interior face of the bank. A series of large postholes, found at the entrance, have been interpreted as either representing a gateway into the enclosure, or possibly as the remains of a more substantial gatehouse structure.

A number of structures were identified in the interior. The foundation trench for the roundhouse, Structure A (5.4m in diameter), appears to have been divided into eight straight sections, which may represent the presence of wooden foundation planks. A porch and possible roof-supports were also indicated by the pattern of postholes. The partial remains of another roundhouse, (Structure C (4.48m in diameter), were also indicated by a curvilinear foundation trench. As with Structure A, this had some evidence for internal sub-division. A possible curvilinear lean-to structure, (Structure B), was also identified. This structure measured 3.8m x 8.4m and appeared to use the bank as a rear wall; a hearth was located within this building. Another curvilinear structure, (Structure E), which was composed of six postholes with a central post, was identified in the north-west of the interior. It appeared to have been open to the north and may have constituted a shelter or wind-break. Patterns of postholes also identified two rectilinear structures in the interior – a rectangular building (Structure D); and an L-shaped structure (Structure F). Other groups of postholes were uncovered, but these could not be identified with possible structures. A dry-stone built souterrain was constructed during this phase, and may have been associated with House F.

A series of bowl furnaces/smithing hearths were also identified to the north of the entrance. Dates from these features range from the ninth/tenth century, to the eleventh/twelfth century. Two series of postholes found in the vicinity of this metalworking area are presumably related to workshops, but the pattern of these could not be clearly identified.

The final phase of use of the site takes place in the later medieval period when four large fire pits were dug into the interior of the site. Three radiocarbon dates place them in the fourteenth to seventeenth centuries. The site was then used as quarry, before being utilised as a *cillín* – 143 infant skeletons were recovered during excavation.

Few finds were directly attributable to the early medieval phase, but these included three iron knife blades, an iron bar, and an iron 'tool'. A silver penny of Henry III (1216-1272), and two un-dated bone 'toggles' were also found in site.

## Animal Bones:

Just over 4300 animal bones were recovered from the early medieval phase of the site, mainly of domesticates.

Context	Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Deer	LM	MM	Date
Ditch	848	274	357	57	173	4	17	1012	518	9 <sup>th</sup> /10 <sup>th</sup> C
Souterrain	408	159	80	6	75	-	-	182	135	9 <sup>th</sup> /10 <sup>th</sup> C

**NISP from main assemblages at Mackney, Co. Galway (LM=Large mammal; MM=medium-sized mammal).**

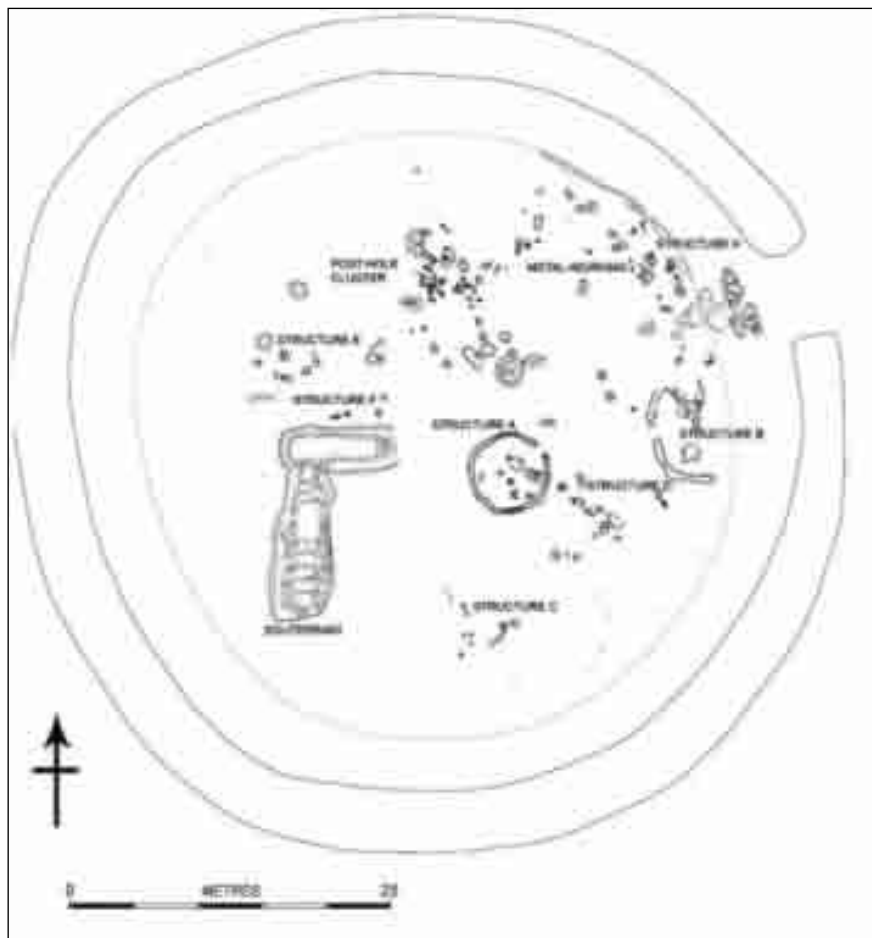
The main cattle slaughter age seems to have been in the second and third years, with fewer cattle reaching advanced adulthood.

Most of the sheep bones come from individuals of intermediate age, neither young nor old enough to suggest that the animals were being kept primarily for their wool. Few lamb bones were recovered and the indications are that most sheep were kept up to 2 years of age.

Pig bones were largely immature (1-2 years) and fragmentary.

Butchery marks associated with dismemberment of the carcass were present on four horse bones indicating that horseflesh was occasionally processed though not to the same extent as beef, mutton and pork. Ageing data indicated that all horses had reached adulthood.

The scarcity of red deer bones suggested that venison rarely contributed to the food supply of the ringfort.



**Plan of Excavation at Mackney, Co. Galway, showing relevant features (after Delaney 2009, 56).**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-7368	Charcoal from later fire-pit	524 $\pm$ 30 BP	A.D. 1323-1347; <b>A.D. 1392-1442.</b>
UB-7369	Charcoal from later fire-pit	484 $\pm$ 28 BP	<b>A.D. 1409-1448.</b>
UB-7370	Charcoal from later fire-pit	385 $\pm$ 29 BP	<b>A.D. 1443-1523;</b> <b>A.D. 1559-1563;</b> <b>A.D. 1570-1631.</b>
UB-7371	Charcoal from double bowl-furnace	1173 $\pm$ 30 BP	<b>A.D. 775-900;</b> A.D. 917-965.
UB-7372	Charcoal from post-hole C861	702 $\pm$ 30 BP	<b>A.D. 1261-1308;</b> <b>A.D. 1361-1386.</b>
UB-7373	Charcoal from later occupation layer C765	377 $\pm$ 30 BP	<b>A.D. 1446-1525;</b> <b>A.D. 1557-1632.</b>
UB-7374	Charcoal from fire-pit	1183 $\pm$ 29 BP	A.D. 728-736; <b>A.D. 771-899;</b> A.D. 919-949.
UB-7375	Charcoal from hearth	365 $\pm$ 30 BP	<b>A.D. 1449-1528;</b> <b>A.D. 1545-1546;</b> <b>A.D. 1551-1634.</b>
UB-7376	Charcoal from metal-working feature	991 $\pm$ 31 BP	<b>A.D. 988-1054;</b> <b>A.D. 1078-1153.</b>

**Magheraboy, Co. Sligo**Grid Reference: **G68603500 (16860/33500)**SMR No: **N/A.**Reference: **O'Neill 2005; Beglane 2005.**

An enclosure (external diameter of 40m) was discovered during topsoil stripping. The site had been truncated by later agricultural activity, and none of the bank survived. A continuous deposit of large stones in the upper layers of the ditch fill may represent a stone wall built upon the bank, but it may also represent the stone revetment for its presumed earthen bank. The ditch had no evidence for maintenance and appears to have been allowed to naturally silt up over the life-time of the site.

The interior of the site produced no evidence for a formal structure, although these may have existed in the unexcavated half of the site. The excavated half contained a series of pits, two hearths and several possible postholes. The fill of one of these pits contained part of a rotary quernstone and charred barley grains.

The only early medieval finds from the site were a blue glass bead and a copper-alloy ring pin. Charred grain from the pit produced a radiocarbon date of A.D. 685-892; and charcoal from the two hearths produced dates of A.D. 694-1017 and A.D. 1040-1271. A general construction date was obtained from immediately above the primary silting of the ditch (see below), although unfortunately this date had a large error of  $\pm 80$  years.

**Animal Bones:**

The site produced a small sample of animal bones (189), largely dominated by teeth (106).

	<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Red Deer</b>	<b>Date</b>
NISP	93	50	20	6	21	Late 7 <sup>th</sup> -11 <sup>th</sup> C
%NISP	49	26	11	3	11	
MNI	4	5	2	1	2	
%MNI	29	36	14	7	14	

**NISP and MNI from Magheraboy, Co. Sligo**

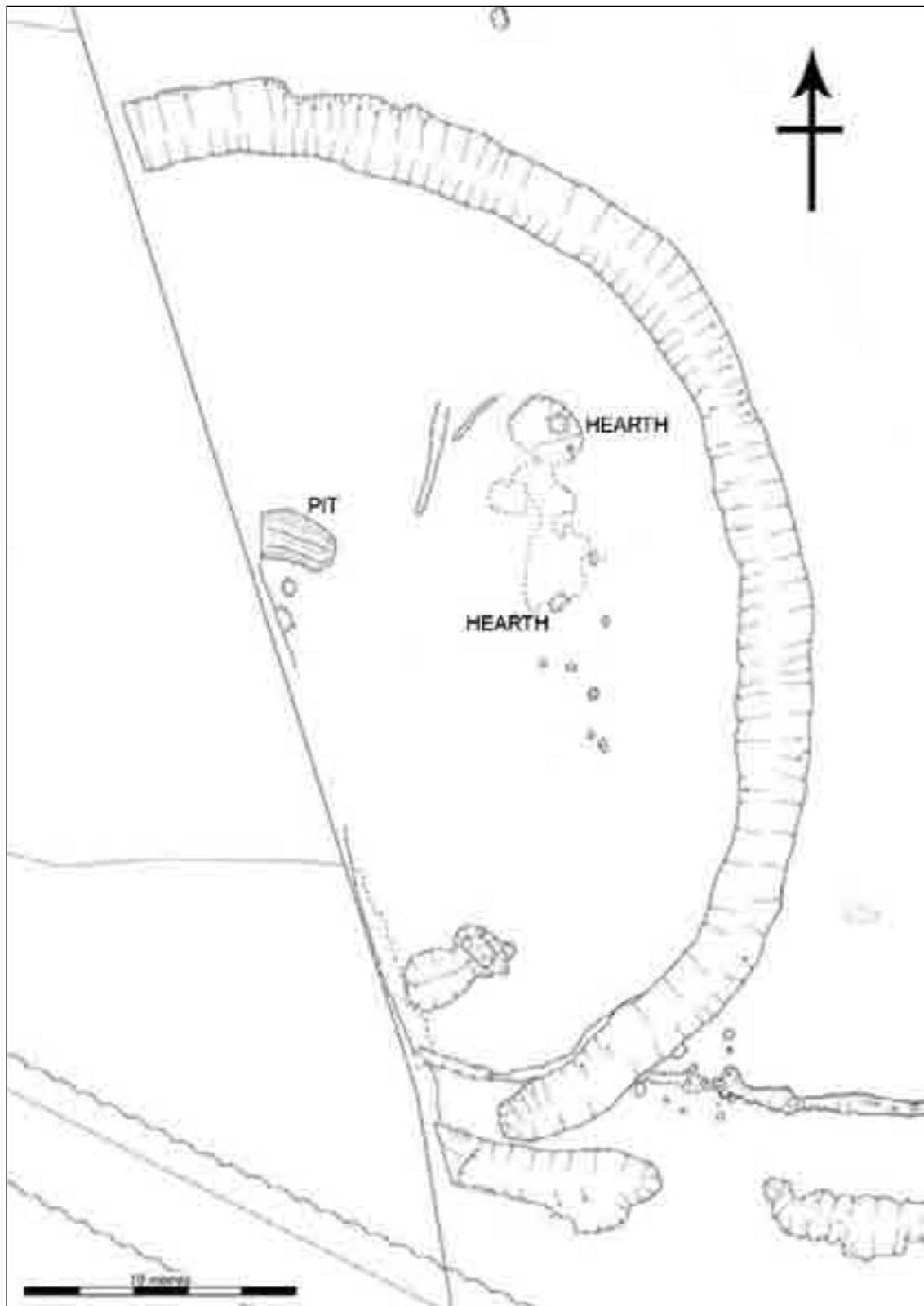
Deer bones are usually only found in small numbers, typically 1-4% by MNI, of early medieval sites. The 14% MNI recorded from Magheraboy may indicate that hunting was important on this site, however this is based on a relatively small sample size.

**Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
Beta-197650	Pit	1170 $\pm$ 40 BP	A.D. 727-737; <b>A.D. 771-975</b>
Beta-197651	Deposit within Linear Feature	1240 $\pm$ 40 BP	<b>A.D. 680-882.</b>
Beta-197652	Charcoal spread over hearth.	1130 $\pm$ 70 BP	A.D. 709-747; <b>A.D. 766-1024.</b>
Beta-197654	Deposit in ditch	1340 $\pm$ 80 BP	<b>A.D. 566-881</b>
Beta-197655	Pit	830 $\pm$ 60 BP	A.D. 1043-1104; <b>A.D. 1118-1279.</b>





Outline plan of site (after O'Neill 2005).

## Animal Bones Appendix:

### Cattle:

Element	Age at Fusion (months)	Fused	Unfused
Metatarsal p	Pre-birth	1	-
Metacarpal p	Pre-birth	2	-
Scapula	7-10	4	1
Pelvis p	7-10	1	1
Pelvis d	7-10	1	1
Humerus d	12-18	1	-
Radius p	12-18	2	-
Metacarpal d	24-30	-	1
Metatarsal d	27-36	1	-
Femur p	42	3	-
Humerus p	42-48	1	-
Radius d	42-48	-	2

### Epiphyseal fusion date for cattle bones

Element	Tooth						MWS	Age (months)
	dp4	P4	M1	M2	M1/2	M3		
LMT	c	-	-	-	-	-	4-11	6-18
LMT	-	-	-	-	U	-	1-18	<24
LMT	-	-	-	-	c	-	10-23	15-30
LMT	g	-	-	-	-	-	10-27	17-30
Mandible (r)	j	-	f	A	-	-	19	24+
LMT	-	-	-	-	j	-	29-42	24-50
LMT	-	-	-	-	f	-	18-30	30-31
LMT	-	-	-	-	k	-	34-47	33-50+
LMT	-	-	-	-	l	-	41-50	40+
LMT	-	-	-	-	-	h	41-80	50
Mandible (l)	-	A	m	k	-	A	46-47	50+
Mandible (r)	-	h	m	k	-	k	47	50+
LMT	-	-	-	-	-	k	46+	50+
LMT	-	-	-	-	-	k	46+	50+

### Cattle tooth eruption and wear

Age Group	<18 mnths	18-24 months	24-50 months	>50 months
Mandibles		1		2
Loose Mandibular Teeth	1	3	3	4

### Summary of cattle tooth eruption and wear

Element	GL	GLi	Bp	Bd	DL
Astragalus		55.7		37.3	30.9
Calcaneus	120.3				
Metacarpal			51.0		
Metatarsal			42.2		

### Cattle measurements

**Sheep:**

Element	Age at Fusion (months)	Fused	Unfused
<b>Metapodium p</b>	Prenatal	2	-
<b>Humerus d</b>	3-10	1	-
<b>Scapula</b>	6-8	5	-
<b>Pelvis p</b>	6-10	-	1
<b>Pelvis d</b>	6-10	-	1
<b>Tibia d</b>	15-24	1	-
<b>Metapodium d</b>	18-28	-	2
<b>Femur p</b>	30-42	1	-
<b>Femur d</b>	36-42	-	1

**Epiphyseal fusion date for sheep bones**

Element	Teeth				Payne MWS	Age (yrs)
	dp4	P4	M1/2	M3		
LMT				10G	F	3-4
LMT				11G	G	4-6
LMT			7A			½-3
LMT			8A			½-3
LMT			9A			2-4
LMT			9A			2-4
LMT			12A			3-10
LMT			9A			1-6
LMT			9A			2-4
LMT				11G	G	4-6
LMT				4A	E	2-3
LMT			9A			2-4
LMT			2A			½-2
LMT	17L					1-2
LMT	7M					2month-1
Mandible		12S				3-6

**Sheep tooth eruption and wear**

Age Group	<6months	6months-3yrs	3yrs-6yrs	>6yrs
Number of Teeth	1	7	7	1

**Summary of sheep tooth eruption and wear**

Element	GLI	Bp	Bd	DL	GLP	SLC
<b>Astragalus</b>	25.0		15.8	13.1		
<b>Metatarsal</b>		15.9				
<b>Scapula</b>					26.7	15.0

**Sheep measurements**

**Pig:**

Element	Age of fusion (months)	Fused	Unfused
Scapula	12	1	1
Pelvis p	12	1	-
Pelvis d	12	1	-
Radius p	12	1	-

**Pig fusion data**

Element	Teeth							MWS	Age (mnths)
	dp2	dp3	dp4	P4	M1	M2	M3		
Mandible (l)		A	d					3-11	6-12
Mandible (l)	A	P	d					3-11	6-12
Mandible (r)	A	P	d		A			3-11	6-12
Mandible (r)		A	f		A			6-12	9-19
Mandible (r)					e	a	A	17-18	17-19
LMT					U				6-7
LMT					U				6-7

**Pig tooth eruption and wear**

Age Group	6months	6-12 months	12-19 months	>19 months
Mandibles	-	3	2	-
LMT	2	-	-	-

**Summary of pig tooth eruption and wear**

**Marlhill I, Co. Tipperary**Grid reference: **206093/133230**SMR No: **N/a**Reference: **Molloy 2009; Geber 2009.**

Two early medieval features were uncovered during excavations at Marlhill, Co. Tipperary – a sub-rectangular structure, and a ditch.

The structure was located north of and partially truncated the upper fills of an earlier ringbarrow. Material from one of the structural postholes returned a date of A.D. 434-643. The structure was sub-rectangular in plan and measured 6.60m in length, and had its southern and eastern edges defined by a slot trench. Two centrally placed intercutting pits are likely to have held central roof supports. A well-defined entrance was located along the northern wall of the structure, and an inhumation burial was located in the entrance. This burial produced a date of A.D. 674-874. A second burial was identified 4.50m to the north of the structure. This burial produced a radiocarbon date of A.D. 776-980.

A ditch was identified to the east of the structure, though it was only partially exposed and continued beyond the limits of the excavation. A deposit from the in-fill of the ditch produced a radiocarbon date of A.D. 649-857, suggesting that it may have been contemporary with the occupation of the house structure.

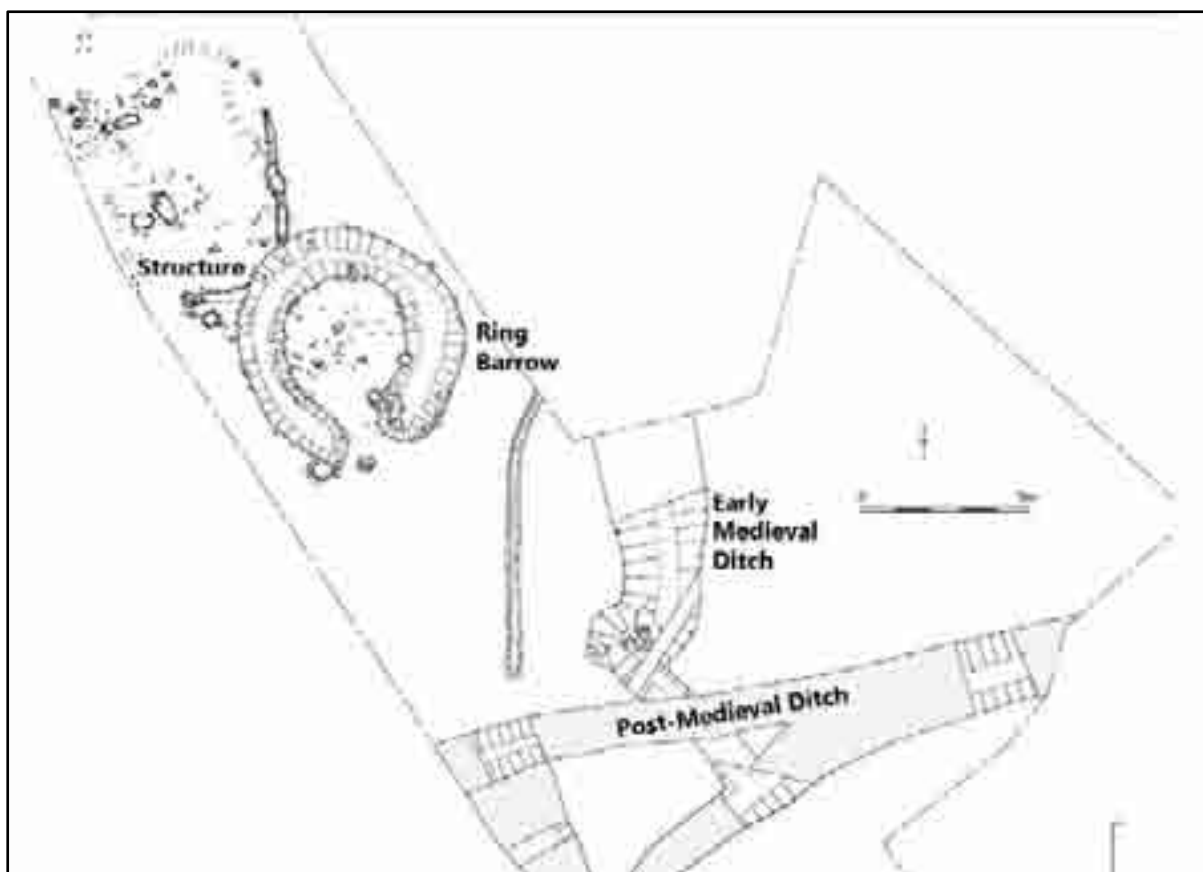
Only two early medieval artefacts were identified - a flat stone disc and a whetstone/honestone both recovered from the early medieval ditch. A number of stone discs found during excavations in York were suggested to have been lids for wooden or ceramic vessels. These all dated from the late ninth to the mid-eleventh century.

**Animal Bones:**

The medieval phase produced 344 fragments.

	<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Dog</b>	<b>LM</b>	<b>MM</b>	<b>Date</b>
NISP	111	13	4	4	7	35	15	7 <sup>th</sup> /8 <sup>th</sup> C
MNI	6	-	1	1	1	-	-	

**NISP and MNI from early medieval phase at Marlhill, Co. Tipperary.**



**Plan of features at Marlhill I, Co. Tipperary (after Molloy 2009)**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
Beta-231089	Animal bone –F27	2100±40 BP	346-320 B.C.; <b>206-36 B.C.;</b> 30-20 B.C.; 12-1 B.C.
Beta-231090	Human burial in entrance to rectangular structure –F59	1250±40 BP	<b>A.D. 674-874</b>
Beta-231092	Human burial to north of structure –F235	1150±40 BP	<b>A.D. 776-980</b>
Beta-233934	Hazel from posthole to southeast of rectangular structure- F14	1460±40 BP	<b>A.D. 540-654</b>
Beta-233935	Hazel & oak from posthole in structure –F61	1500±40 BP	<b>A.D. 434-492;</b> <b>A.D. 508-519;</b> <b>A.D. 528-643</b>
Beta-232706	Pomaceae –F18	1980±40 BP	87-78 B.C.; <b>55 B.C. – A.D. 91;</b> A.D. 99-124.
UB-7841	Blackthorn from ditch –F162	1298±43 BP	<b>A.D. 649-783;</b> A.D. 788-813; A.D. 844-857.

## Animal Bones Appendix:

### Cattle:

	Unfused	In Fusion	Fused	% Unfused
Early (<1 ½ yrs)	-	-	4	-
Mid (2-2 ½ yrs)	1	-	2	33.33
Late (>3 yrs)	2	-	3	40.00

### Epiphyseal fusion data for cattle bones.

Element	Measurement	No.	Min.	Mean	Max.	Std
Scapula						
	SLC	1	-	49.17	-	-
	GLP	1	-	62.99	-	-
	BG	1	-	41.72	-	-
	LG	1	-	48.41	-	-
Humerus						
	GLC	1	-	227.0	-	-
	Bd	4	69.33	75.66	84.08	6.49
	BT	4	65.24	68.72	74.12	4.31
Ulna						
	BPC	1	-	41.04	-	-
	DPA	1	-	57.25	-	-
	SDO	1	-	50.34	-	-
Metacarpal						
	Bp	1	-	47.65	-	-
	SD	1	-	26.63	-	-
Femur						
	SD	1	-	31.03	-	-
Tibia						
	Dd	1	-	42.41	-	-
	Bd	1	-	55.15	-	-
Metatarsal						
	SD	1	-	21.62	-	-

### Cattle bone measurements (mm).

### Sheep:

	Unfused	In Fusion	Fused	% Unfused
Early (<1 yr)	-	-	2	-
Mid (1-2 yrs)	-	-	1	-
Late (>3 yrs)	-	-	-	-

### Epiphyseal fusion data for sheep bones.

Element	Measurement	No.	Min.	Mean	Max.	StD
Radius						
	BFp	1	-	26.82	-	-
	Bp	1	-	29.09	-	-
	GL	1	-	145.58	-	-
	SD	1	-	16.65	-	-
	BFd	1	-	23.20	-	-
	Bd	1	-	25.35	-	-
Ulna						
	BPC	1	-	14.33	-	-
	DPA	1	-	27.98	-	-
	SDO	1	-	23.48	-	-
Tibia						
	SD	1	-	12.07	-	-

**Sheep bone measurements (mm).**

**Pig:**

Element	Measurement	No.	Min.	Mean	Max.	StD
Humerus						
	Sd	1	-	16.44	-	-

**Pig bone measurements (mm).**



**Marlhill II, Co. Tipperary (E2268)**Grid Reference: **206257/133293**SMR No.: **N/A**Reference: **Moriarty 2007; Geber 2007.**

The site consisted of a sub-circular enclosure that contained a number of features including a corn drying kiln, a hearth and a drainage gully. A large keyhole shaped kiln was also identified immediately to the south of the enclosure. The enclosure gully was probably designed to control water drainage in the vicinity of the central kiln and also to signifying ownership.

The enclosure was defined by a pennanular gully that enclosed an area 16m x 12m. A heavily disturbed, partially stone-lined oblong kiln was centrally placed within this sub-circular enclosure. Two postholes at the northern end of the kiln may have been associated with some form of superstructure such as a drying rack. A charcoal sample from this kiln gave a radiocarbon date of A.D. 782–990, though this could probably be more constrained to A.D. 855-990.

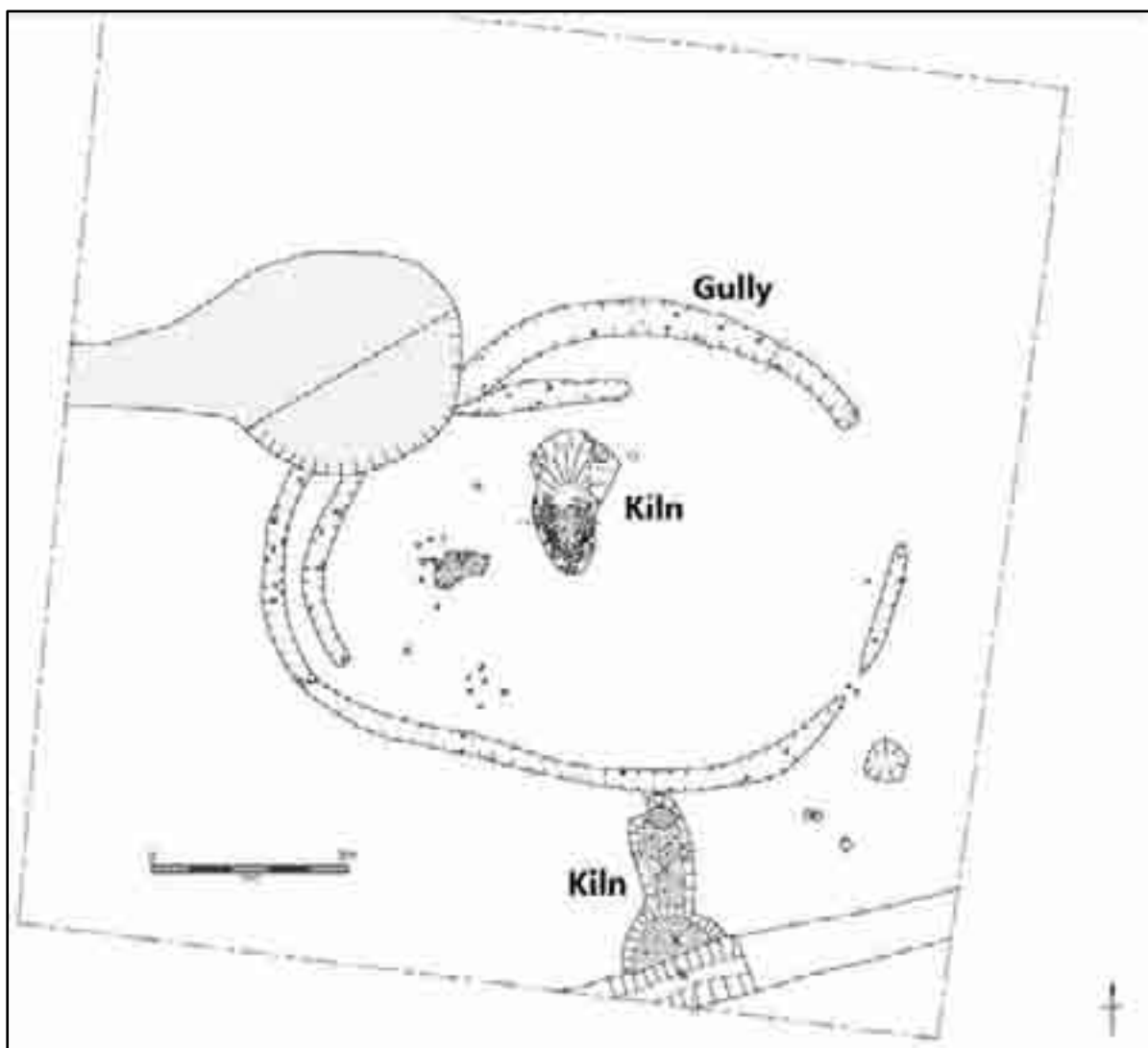
A second corn-drying kiln was identified immediately outside of the sub-circular enclosure. This kiln was keyhole shaped in plan. Two postholes identified halfway along the base of the kiln flue may have been related to activity associated with the kiln.

**Animal Bones:**

A total of 20 fragments from the two gullies were analysed.

<b>Cattle</b>	<b>Sheep/Goat</b>	<b>Indeterminate</b>	<b>Date</b>
4	2	14	c. 9 <sup>th</sup> /10 <sup>th</sup> C

**NISP from Marlhill (E2268), Co. Tipperary**



**Plan of gullies and kilns at Marlhill II, Co. Tipperary (after Moriarty 2007).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
UB-7201	Hazel from central kiln	1129 $\pm$ 33 BP	A.D. 782-789; A.D. 810-848; <b>A.D. 855-990.</b>

### **Marshes Upper, Co. Louth**

Grid reference: **J066049 (30660/30490); J060048 (30600/30480); J064065 (30640/30650); J06130551 (30613/30551); J058051 (30580/30510); J05850517 (305855/305175); J05640504 (305640/305040); J058051 (30580/30510); J057050 (30570/30505)**

SMR: **LH007-080; LH007-081; LH007-120; LH007-092; LH007-107**

Reference: **Gowen 1992; McCormick 1992; McCormick & Crone 2002.**

Archaeological investigations at Marshes Upper revealed an intensely settled early medieval landscape, most notable for the presence of ten souterrains. The souterrains were both enclosed and unenclosed and dating evidence – both radiocarbon and artefactual – suggests they were utilised between the seventh and twelfth centuries. Other features included an extensive field system, a cereal-drying kiln and a structure.

The earliest excavation uncovered a souterrain and a small stone hut. Artefacts recovered included over 50 sherds of souterrain ware, an iron belt-buckle and a plain bronze strap-end. Eight Hiberno-Scandinavian silver pennies, dating to A.D. 995-1000, were also recovered from the fill of the souterrain entrance. Another unenclosed souterrain was excavated the following year (1981). A doorway, comprised of wooden jambs recessed into the side-walls and mortised into a lintel beam, was present 7m inside the entrance and the outline of a wooden sill was visible on the floor. The artefacts included approximately 50 sherds of souterrain ware, about twelve whetstones, a chert leaf-shaped arrowhead, a small bronze ring-pin and a bronze cruciform belt-buckle tongue with decorated red glass terminals.

Excavation in 1982 revealed five dry-stone souterrains and associated enclosures known as Marshes Upper 3 and 4. Site 3 consisted of two souterrains (A and B) and an enclosure. Souterrain A had two jamb slots, which probably supported posts for a gate or door, positioned between the first and second turns in the passage. Primary material from the entrance contained large quantities of charcoal and an iron nail. The former produced an un-calibrated radiocarbon date of A.D. 688±55. Souterrain B was smaller than Souterrain A. It was rougher in construction than Souterrain A and contained a number of defensive features such as a drop hole. Finds included fifteen sherds of souterrain ware, fragments from a bone comb and the remains of a neonatal pig.

The enclosure (55m x 60m) completely encircled Souterrain A while it stopped short, on either side, of Souterrain B. A causewayed entrance was present to the north and the ditch varied in width and depth between 1.2m and 2m, and 0.2m and 1.4m respectively. No evidence for a bank survived. Finds included sherds of souterrain ware and three sherds of E ware.

Site 4 at Marshes Upper revealed three souterrains and an enclosure. Souterrain A contained a sherd of souterrain ware and a quernstone fragment. Souterrain B contained lots of charcoal, with an un-calibrated radiocarbon date of A.D. 848±50. A number of finds included souterrain ware sherds, a jet bracelet fragment, two hammer stones, a bronze stick pin and a bone comb. Souterrain C lay outside the enclosure and produced a large volume of iron slag, a furnace bottom, a bronze mount and sherds of souterrain ware. The latter were from the same pot as those found in Souterrain B which suggests a contemporary deposition of the finds at both sites.

A large enclosure (100m x 80m) and souterrain (Marshes Upper Site 5), excavated in 1982, had been largely destroyed by quarrying. A few fragments of souterrain ware and animal bone were retrieved from the middle ditch fill and there was evidence for some re-cuts to the ditch. The dry-stone built souterrain consisted of a ramped entrance and the lower courses of a beehive chamber. Fragments of souterrain ware were found in a deposit above the chamber floor and inside the passage entrance.

Another dry-stone souterrain was in 1995. No finds were discovered during excavation.

Excavations in Marshes Upper in 2002 revealed further evidence for early medieval activity including another souterrain, field systems and a structure.

The dry-stone souterrain was discovered during archaeological monitoring. Charcoal from the souterrain was radiocarbon dated to A.D. 384-694.

A number of ditches were revealed that comprised a system of rectangular early medieval fields measuring approximately 50m x 80m. Finds included probable fragments of souterrain ware and small quantities of hazel charcoal and worked flint. The charcoal was radiocarbon dated to A.D. 684-887. Small amounts of flint debitage, iron slag, bloom and a small iron object were also retrieved from the surface of the ditch-fill. Earlier agricultural activity was also present in the form of a cereal-drying kiln. The fire chamber was heavily oxidised around the base and a small alder timber was radiocarbon dated to A.D. 311-548.

Excavation also revealed the remains of a post-built oval structure. A number of external pits containing small amounts of charcoal and cremated animal bone were also uncovered and were probably refuse pits. A sample from one of the pits produced a radiocarbon date of A.D. 946-1214.

### Animal Bones:

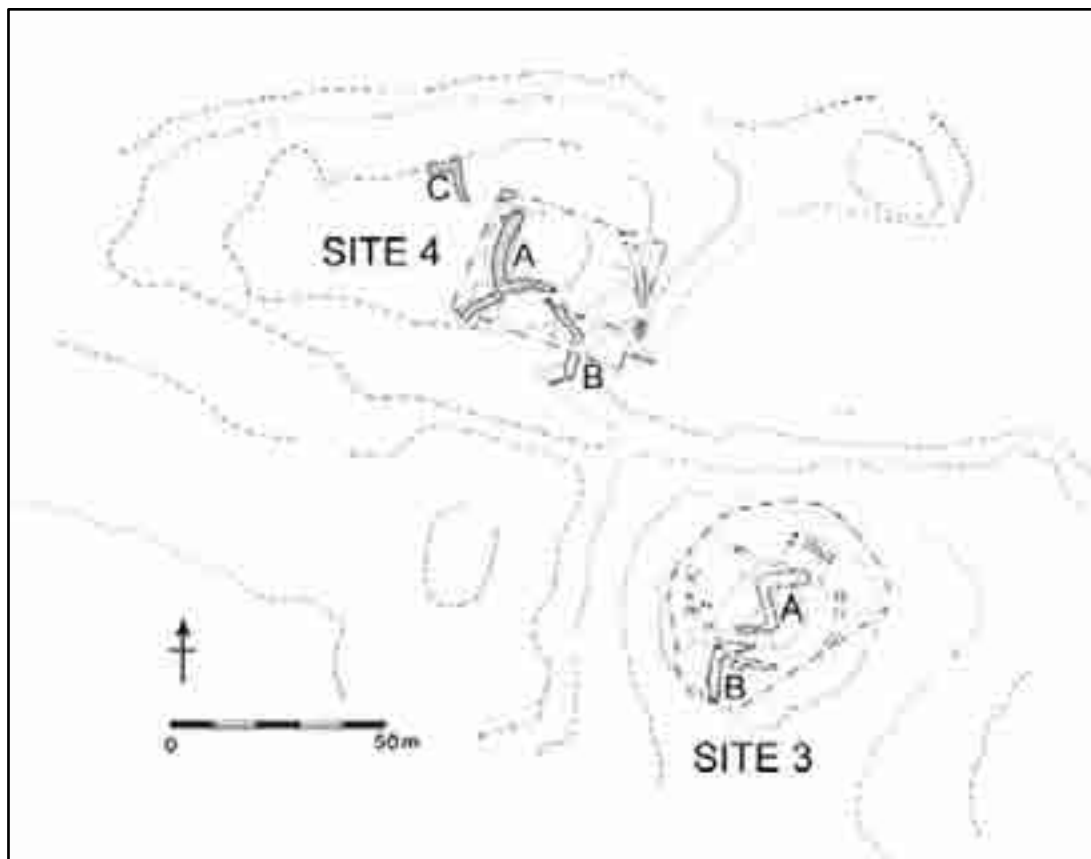
Most of the faunal assemblage came from Marshes Upper Site 3. Adverse soil conditions meant that the bones survived in a very poor state and the ageing data was consequently very limited.

	Cattle	Sheep/ Goat	Pig	Horse		Dog	Cat	Whale	Bird	Date
<b>Site 3 – Ditch</b>					<b>Red Deer</b>					7 <sup>th</sup> /8 <sup>th</sup> C.
Fragments	716	167	236	16	2	57	3	5	11	
Frag %	58	13.5	19.1	1.3	-	4.6	-	-	0.9	
MNI	18	8	14	2	1	2	1	1		
<b>Site 3 – Pit</b>					<b>Hare</b>					7 <sup>th</sup> /8 <sup>th</sup> C.
Fragments	64	33	42	1	1	-	1	1	3	
Frag %	42.4	21.9	27.8	0.7	0.7	-	0.7	0.7	2.0	
MNI	3	2	1	1	-	-	-	1	-	
<b>Site 4 – Ditch</b>					<b>Red Deer</b>					
Fragments	57	13	4	1	-	-	-	3	2	
Frag %	71.3	16.3	5	1.3	-	-	-	3.8	2.5	
MNI	3	2	1	1	-	-	-	1	-	
<b>Site 3 – Primary Souterrain B</b>					<b>Rodent</b>					7 <sup>th</sup> /8 <sup>th</sup> C.
Fragments	2	3	145	1	2	-	5	-	23	
Frag %	1.1	1.7	80.1	0.6	1.1	-	2.8	-	12.7	
MNI	1	1	8	1	1	-	1	-	-	
<b>Site 3 – Blocking Souterrain B</b>					<b>Rabbit</b>					7 <sup>th</sup> /8 <sup>th</sup> C.
Fragments	14	37	14	3	1	-	22	2	45	
Frag %	8.8	23.3	8.8	1.9	0.6	-	12.3	1.3	28.3	
MNI	4	3	2	1	1	-	3	1	-	
<b>Site 3 – Blocking Souterrain A</b>										A.D. 633-743
Fragments	39	12	7	1	-	-	1	-	17	
Frag %	50	15.4	9	1.3	-	-	1.3	-	21.8	
MNI	3	2	2	1	-	-	1	-	-	
<b>Site 4 – Floor Souterrain B</b>										A.D. 798-898
Fragments	1			-	-	-	-	-	-	
Frag %	1.6			-	-	-	-	-	-	

### NISP and MNI from Marshes Upper, Co. Louth.

About 80% of the fragments from the floor of Souterrain B on Site 3 consisted of pig remains. These remains were all neonatal or very young individuals, providing evidence for farrowing on or near the

site, and it was suggested that the souterrain was used as a farrowing pen during the early medieval period.



**Plan of Marshes Upper 3 & 4, Co. Louth (after Gowen 1992, 57).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Huguen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
Beta-170297	Charcoal in souterrain	1480±90 BP	<b>A.D. 384-694;</b> A.D. 703-706; A.D. 748-765
Beta-170303	Charcoal from field enclosure re-cut	1230±40 BP	<b>A.D. 684-887</b>
Beta-170370	Charcoal from alder timber within cereal-drying kiln	1640±60 BP	A.D. 255-306; <b>A.D. 311-548</b>
Beta-170305	Charcoal from pit beside structure	980±70 BP	A.D. 898-920; <b>A.D. 946-1214</b>

## Animal Bone Appendix:

### Cattle

Bone/ Measurement	Min.	Max.	Mean	No.	Sex	Average Withers Height
<b>Metatarsal</b>						
GL	207	216	212	3	Female	113.6 cm
GL			201	1	Male	111.6 cm
Bp	40.3	43.9	41.9	3	Female	
Bp			40.0	1	Male	
Bd	46.1	53.5	49.3	3	Female	
Bd			48.9	1	Male	
Sd	22.6	24.1	23.3	3	Female	
Sd			24.9	1	Male	
S.I.	10.9	11.2	11.0	3	Female	
S.I.			12.4	1	Male	
<b>Metacarpal</b>						
GL	181	182	181.5	2	Female	108.9
GL			196	1	Male	122.5
Bp	51.6	52.1	51.8	2	Female	
Bp			66.9	1	Male	
Bd	51.0	54.4	52.7	2	Female	
Bd			68.6	1	Male	
Sd	25.9	30.2	28.0	2	Female	
Sd			35.5	1	Male	
S.I.	14.3	16.6	15.5	2	Female	
S.I.			18.1	1	Male	

### Cattle biometrics

Approx. Age (months)	No.	%
8-13	1	6.3
15-16	2	12.5
16-17	3	18.8
17-18	2	12.5
24	1	6.3
31-32	1	6.3
40+	6	37.3

### Cattle age/slaughter

	GL	Bp	Bd	Sd	S.I.	Sex	E.W.H
Metatarsal	216	43.9	53.5	24.1	11.2	F	115.6 cm
	207	40.3	48.3	22.6	10.9	F	110.7 cm
	214	41.4	46.1	23.3	11.0	F	114.5 cm
	201	40.0	48.9	24.9	12.4	M	111.6 cm
Metacarpal	196	66.9	68.6	35.5	18.1	M	122.5 cm
	182	52.1	54.4	30.2	16.6	F	109.2 cm
	181*	51.6	51.0	25.9	14.3	F	108.6 cm

### Cattle metapodia from ditch (Site 3).

**Pig:**

<b>Souterrain B</b>			<b>Ditch</b>	
<b>Approx. (Months)</b>	<b>Age</b>	<b>No</b>	<b>Approx. Age (Months)</b>	<b>No</b>
Foetal		3	14-17	1
0-1		2	21-23	10
1-2		2	25-27	2
2-4		1	27-29	1
5-6		1	30+	1

**Pig age/slaughter**

<b>Bone/ Measurement</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>No.</b>
<b>Scapula</b>				
GPL	33.3	35.1	34.5	3
SLC	19.5	23.3	21.4	8
<b>Teeth</b>				
Lower M3	29.6	34.4	31.5	9

**Biometrics of pigs in ditch (Site 3)**

## Millockstown, Co. Louth

Grid reference: **N977875 (29770/28750)**

SMR: **LH017-054**

Reference: **Manning 1986; McCormick 1986.**

An excavation at Millockstown revealed a D-shaped enclosure (Phase I), which was replaced by a smaller circular enclosure (Phase II), and a final and larger, D-shaped enclosure with two souterrains (Phase III). This final phase was associated with a cemetery.

The Phase I enclosure (65m x 56m) was defined by a ditch, but no evidence for a bank survived. Charcoal from one of the occupation spreads was radiocarbon dated to A.D. 322-609. The only find from this phase, from another habitation spread, was the terminal and part of the ring of a zoomorphic penannular brooch which dates to the third century.

The Phase II bank-and-ditched enclosure was constructed centrally within the Phase I enclosure. It measured 37m in diameter and contained a hearth and a spread of carbonised grain. No radiocarbon dates were available for this phase so all that can be surmised is that the enclosure was constructed between Phase I and Phase III.

Phase III witnessed the construction of a final, and much bigger, D-shaped enclosure which replaced the first two enclosures. It measured 40m x 100m and was associated with two souterrains, a cemetery and two pits. Charcoal from the ditch returned a very broad radiocarbon date of A.D. 576-1024.

Two souterrains were associated with Phase III. Souterrain 1 was of dry-stone construction and was situated outside the Phase I and Phase II enclosures, but within the final enclosure, so may be contemporary with the latter. The second souterrain was situated 40m to the north-west of Souterrain 1. Souterrain 2 definitely post-dated the second enclosure because it cut into the backfilled ditch, while it ran parallel with the Enclosure III ditch which suggests the latter was already in existence when the souterrain was constructed.

A fragment of souterrain ware was recovered in a context that post-dated Enclosure II and this pottery generally dates between the eighth and tenth centuries. The presence of two stick pins, one a club-headed type, shows that Souterrain II was open between the mid-eleventh and thirteenth centuries. The lack of late medieval pottery from the site strongly indicates that the earlier date range should be favoured. Therefore, when the artefactual evidence is combined with the Enclosure III radiocarbon date, the final phase at Millockstown probably occurred between the eighth and eleventh centuries.

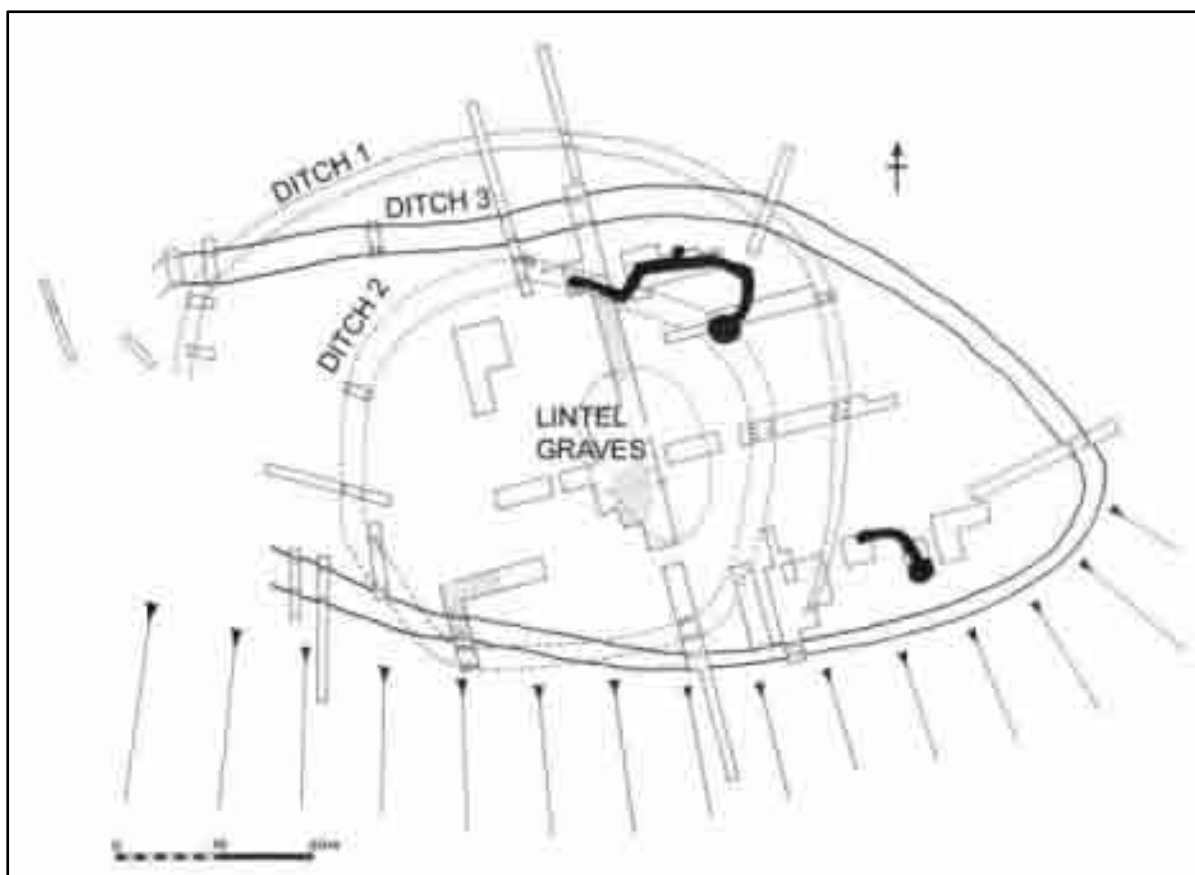
### Animal Bones:

Only a small sample of bones was found and these survived in very poor condition.

Context/ Phase		Cattle	Sheep/ Goat	Pig	Horse	Cat	Dog	Date
Cutting F	NISP	42	5	4	4	-	-	
Cutting N	NISP	26	-	2	2	-	-	
<b>Phase I</b>	MNI	5	1	3	2	-	-	A.D. 322-609
Cutting G	NISP	24	1	3	1	1	-	
<b>Phase II</b>	MNI	2	1	1	-	1	-	c. 7 <sup>th</sup> -8 <sup>th</sup> C
Fill Ditch 3	NISP	43	6	9	2	-	-	
Souterrain 1	NISP	7	10	3	2	-	1	
<b>Phase III</b>	MNI	4	3	3	2	-	1	c. 8 <sup>th</sup> -11 <sup>th</sup> C

**NISP and MNI by phase from Millockstown, Co. Louth**





**Plan of Millockstown, Co. Louth (after Manning 1986, 139).**

#### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
GU-1781	Charcoal from Phase I occupation layer	1595±70 BP	A.D. 260-284; <b>A.D. 322-609</b>
GU-1782	Charcoal from Phase III enclosure ditch	1240±125 BP	<b>A.D. 576-1024</b>

### Animal Bones Appendix:

A complete cattle tibia from Phase 1 gave an estimated withers height of 114.4cm.

Species/Bone/Phase	Min	Max	Mean	No.
<b>Cattle</b>				
<b>Tibia - Phase 3</b>				
GL			332.0	1
<b>M3 – Phase 3</b>				
Length	36.1	38.2	37.2	2
<b>Astragalus – Phase 3</b>				
GLL			63.2	1
<b>Pig</b>				
<b>Tibia –Phase 3</b>				
Bd	26.9	27.8	27.35	2
<b>M3 –Phase 2</b>				
Length			32.8	1

### Biometrics from Millockstown, Co. Louth

### Moathill 1, Co. Meath

Grid Reference: **28595/26775**

SMR No: **ME025-023**

Reference: **Giacometti 2007; Beglane 2007.**

A number of early medieval sites were excavated in the townland of Moathill, Co. Meath. These were identified as Navan 1, Navan 2 and Navan 3, although they are better defined as Moathill 1, 2 and 3. Moathill 1 comprised a defended farmstead residence and numerous additional enclosures around it which were used as animal pens and as spaces for craft-working (blacksmithing, cereal-processing, butchery, etc.). This site can be further divided into the Upper and Lower area.

The Upper Area probably represents a small enclosed domestic farmstead defined by a ditch to the east that followed the hill contours. Based on the limited evidence available, this enclosure appears to have had a diameter of 20-25m. The main entrance to the enclosure was clearly defined and contained a slot-trench that may have been associated with a gate or similar entrance structure. Inside the settlement enclosure, five fire-pits, fire-pit dumps, occasional postholes and part of a rectangular structure were identified. Only one artefact was recovered from this portion of the site, a possible bracelet of copper alloy. Two radiocarbon dates from the enclosure and structure returned identical ranges of late sixth century to mid-seventh century.

Several distinct areas of craft-working and processing (the Lower Area) were identified at the base of the hill below the farmstead enclosure. From west to east, these were: (i) a long-lived curving ditch incorporating a fire-pit and water management features; (ii) a series of inter-cutting linear drainage features possibly dating to Phase II; (iii) a cluster of three craft-huts, one of which replaced an earlier one; and (iv) a short-lived area of casual ironworking. A ditch with a distinctive curve to the west of the larger boundary ditch seems to have been in use for a long period of time. Frequent evidence of maintenance and alterations found along its base demonstrated that it was well maintained. The burnt pit located at the west of the ditch contained numerous episodes of burning noted in the pit fills, which confirms that the pit was used over and over again and suggested that it was not constructed simply to enclose or for carrying water. The post-holes and deeper gully to the east of the ditch may have formed a structure such as a sluice, to manage and limit the flow of water through the ditch. No evidence for the purpose of the ditch was found, although it must have been used in a process involving both heat and water, perhaps cereal processing of some sort.

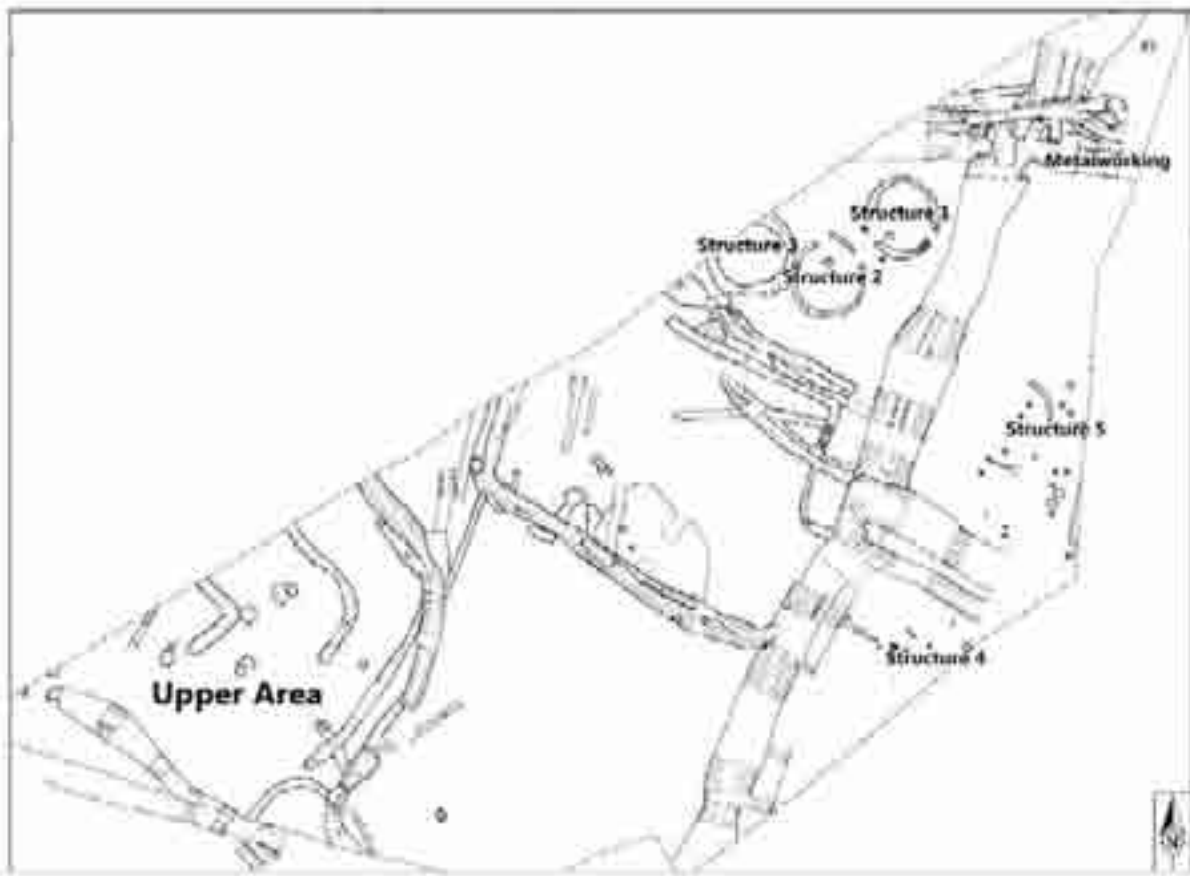
This ditch also contained the most interesting (if mixed) artefact assemblage, consisting of several fragments of post-medieval pottery, three tanged iron knives or knife blades and a bone pin. The pin and knives might suggest a broad early medieval date sometime in the first millennium; the settlement appears to have fallen out of use in the ninth century, and was abandoned by the time of the construction of the Anglo-Norman Navan motte.

### Animal Bones:

A total of 655 countable elements were recovered from archaeological contexts. In addition to the mammal remains, one bird bone was recovered from the fill of the large boundary ditch from Phase 2. Two mollusc shells were also recovered.

		Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Red Deer	Fox	Date
Lower Area-Phase 1	NISP	15	0	2	1	2	0	0	0	c. 7 <sup>th</sup> /8 <sup>th</sup> C.
	%NISP	75.0	0.0	10.0	5.0	10.0	0.0	0.0	0.0	
Lower Area-Phase 2		128	43	15	8	3	11	0	0	
	%NISP	61.5	20.7	7.2	3.8	1.4	5.3	0.0	0.0	
Lower Area (1+2)	MNI	7	4	1	1	2	2	-	-	
	%MNI	41.2	23.5	5.9	5.9	11.8	11.8	0.0	0.0	
Upper Area	NISP	200	100	35	13	4	0	1*	2	7 <sup>th</sup> C
Upper Area	%NISP	56.3	28.2	9.9	3.7	1.1	0.0	0.3*	0.6	
Upper Area	MNI	6	6	4	1	1	-	1*	1	
	%MNI	30.0	30.0	20.0	5.0	5.0	0.0	5.0*	5.0	

**NISP and MNI from Moathill, Co. Meath (\*shed antler only)**



**Plan of excavated areas at Moathill, Co. Meath (after Giacometti 2007).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Area</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
UB-7572	Upper Area	C202 – entrance	1404±30 BP	<b>A.D. 596-667</b>
UB-7573	Upper Area	C149 – fill of Pit	1413±30 BP	<b>A.D. 587-664</b>
UB-7574	Lower Area – Phase 1	C216- boundary ditch 239	1203±31 BP	A.D. 695-699; A.D. 708-747; <b>A.D. 765-894;</b> A.D. 927-935
UB-7575	Lower Area – Phase 1	C41- ditch junction C70	1261±31 BP	<b>A.D. 669-784;</b> A.D. 787-825; A.D. 840-862
UB-7576	Lower Area – Phase 1	C16- fill of ditch 15	1227±31 BP	<b>A.D. 689-752;</b> <b>A.D. 761-884</b>
UB-7577	Lower Area – Phase 1	C124 – fill of postholes 120-3	1188±33 BP	A.D. 717-743; <b>A.D. 768-899;</b> A.D. 918-953; A.D. 958-961.
UB-7578	Lower Area - medieval	C22 – Structure 1 – medieval iron-working hut	365±30 BP	<b>A.D. 1449-1528;</b> <b>A.D. 1545-1546;</b> <b>A.D. 1551-1634</b>
UB-7579	Lower Area – Phase 1	C20- fill of pit 14	1546±32 BP	<b>A.D. 427-584</b>

## Animal Bones Appendix:

### Cattle:

Area	Element	Side	dp2	dp3	dp4	P2	P3	P4	M1	M2	M3	MWS	Age (Months)
Lower	Mandible	L	A	A	h	0	0	0	X	0	0	12-24	17-30
Lower	Mandible	L	P	P	j	0	0	0	X	0	0	8-29	15-30
Lower	Mandible	L	0	0	0	0	0	X	m	k	X	46-47	50+
Lower	Mandible	L	0	0	n	P	P	E	k	g	b	34	31-32
Lower	Mandible	R	P	P	j	0	0	0	f	X	0	18-19	24
Lower	Mandible	R	A	A	g	0	0	0	H	X	0	4-5	7-9
Lower	Mandible	R	0	0	0	P	P	H	k	g	b	34-35	31-32
Lower	LMT	U	0	0	0	0	0	0	0	0	j	45-47	50+
Lower	LMT	U	0	0	0	0	0	0	0	0	d	34-38	36
Lower	LMT	U	0	0	h	0	0	0	0	0	0	12-24	17-30
Lower	LMT	U	0	0	j	0	0	0	0	0	0	8-29	15-30
Lower	LMT	U	0	0	0	0	0	0	0	0	f	38-42	40
Lower	LMT	U	0	0	k	0	0	0	0	0	0	23-26	24-30
Lower	LMT	U	0	0	j	0	0	0	0	0	0	8-29	15-30
Lower	LMT	U	0	0	h	0	0	0	0	0	0	12-24	17-30
Lower	LMT	U	0	0	0	0	0	0	0	0	a	30	30-31
Lower	LMT	U	0	0	0	0	0	0	0	0	g	38-43	40-50
Upper	Mandible	L	0	0	0	A	A	g	0	0	0	41-50	50+
Upper	Mandible	L	P	P	g	0	0	0	H	0	0	4-5	7-9
Upper	Mandible	L	0	P	f	0	0	0	V	0	0	2-4	5-6
Upper	Mandible	L	0	X	j	0	0	0	b	C	0	8	15-16
Upper	Mandible	R	P	P	j	0	0	0	H	0	0	4-5	7-9
Upper	Mandible	R	P	P	j	0	0	0	b	A	0	8-10	15-18
Upper	Mandible	R	P	P	j	0	0	0	f	X	0	18-19	24
Upper	Mandible	R	P	P	g	0	0	0	H	0	0	4-5	7-9
Upper	LMT	U	0	0	j	0	0	0	0	0	0	8-29	15-30
Upper	LMT	U	0	0	j	0	0	0	0	0	0	8-29	15-30
Upper	LMT	U	0	0	j	0	0	0	0	0	0	8-29	15-30
Upper	LMT	U	0	0	0	0	0	0	0	0	k	48-50	50+
Upper	LMT	U	0	0	n	0	0	0	0	0	0	~35	32-36

### Age/slaughter for cattle based on toothwear

Area	Element	Age of fusion (months)	No. Fused	No. unfused	% Fused
Lower	Metatarsal p	before birth	3	0	100
	Metacarpal p	before birth	7	0	100
	Scapula	7-10	9	1	90
	Pelvis p	7-10	1	0	100
	Pelvis d	7-10	3	0	100
	Humerus d	12-18	6	1	85.7
	Radius p	12-18	7	1	87.5
	Phalanx 1	18-24	3	1	75.0
	Phalanx 2	18-24	2	1	66.7
	Metacarpal d	24-30	1	0	100
	Tibia d	24-30	5	1	83.3
	Metatarsal d	27-36	5	0	100
	Calcaneus p	36	0	1	0
	Femur p	42	2	0	100

	Humerus p	42-48	2	1	66.7
	Radius d	42-48	3	1	75.0
	Ulna	42-48	-	-	0
	Femur d	42-48	3	0	100
	Tibia p	42-48	1	1	50.0
Upper	Metatarsal p	before birth	3	0	100
	Metacarpal p	before birth	3	0	100
	Scapula	7-10	3	0	100
	Pelvis p	7-10	6	0	100
	Pelvis d	7-10	3	1	75.0
	Humerus d	12-18	0	1	0
	Radius p	12-18	6	1	85.7
	Phalanx 1	18-24	4	0	100
	Phalanx 2	18-24	2	0	100
	Metacarpal d	24-30	2	1	66.7
	Tibia d	24-30	6	1	85.7
	Metatarsal d	27-36	2	1	66.7
	Calcaneus p	36	1	0	100
	Femur p	42	2	2	50.0
	Humerus p	42-48	1	1	50.0
	Radius d	42-48	5	2	71.4
	Ulna	42-48	0	1	0
	Femur d	42-48	2	0	100
	Tibia p	42-48	4	2	66.7

#### Epiphyseal fusion data for cattle bones

Area	Age Group (months)	No. fused	No. Unfused	Total	% fused	% unfused	% killed
Lower	Neo/prenatal	10	0	10	100.00	0.00	0.00
	7-12	13	1	14	92.86	7.14	7.14
	12-24	18	4	22	81.82	18.18	11.04
	24-36	11	2	13	84.62	15.38	0.00
	36-48	11	3	14	78.57	21.43	3.25
	48+	-	-	-	-	-	78.57
Upper	Neo/prenatal	6	0	6	100.00	0.00	0.00
	7-12	12	1	13	92.31	7.69	7.69
	12-24	12	2	14	85.71	14.29	6.59
	24-36	11	3	14	78.57	21.43	7.14
	36-48	14	8	22	63.64	36.36	14.94
	48+	-	-	-	-	-	63.64

#### Summary of cattle age at slaughter from Moathill, Co. Meath.

Element	Estimated withers height (cm)
Metacarpal	113
Metatarsal	116
Radius	114

#### Estimated withers heights for cattle

Only one metacarpal was suitable for sexing. This was from an adult female.

**Sheep:**

Area	Element	Age of fusion (months)	No. Fused	No. unfused
Lower	Metapodium p	Prenatal	6	0
	Humerus d	3-10		
	Radius p	3-10	1	0
	Scapula	6-8	3	0
	Pelvis p	6-10	3	0
	Pelvis d	6-10	2	0
	Phalanx 1 and 2	6-16	1	0
	Tibia d	15-24	2	0
	Metapodium d	18-28		
	Calcaneus p	30-36		
	Ulna p	36-42	0	1
	Femur p	30-42		
	Humerus p	36-42		
	Radius d	36-42	0	1
	Femur d	36-42	1	0
	Tibia p	36-42		
Upper	Metapodium p	Prenatal	2	10
	Humerus d	3-10	5	4
	Radius p	3-10	1	4
	Scapula	6-8	2	2
	Pelvis p	6-10	2	3
	Pelvis d	6-10	4	2
	Phalanx 1 and 2	6-16		
	Tibia d	15-24	3	4
	Metapodium d	18-28	0	10
	Calcaneus p	30-36	0	1
	Ulna p	36-42	0	3
	Femur p	30-42	0	5
	Humerus p	36-42	0	4
	Radius d	36-42	1	5
	Femur d	36-42	0	4
	Tibia p	36-42	1	5

**Epiphyseal fusion data for sheep bones**

Area	Age Group (months)	No. fused	No. Unfused	Total	% fused	% unfused	% killed
Lower	Neo/prenatal	6	0	6	100.00	0.00	0.00
	3-16	10	0	10	100.00	0.00	0.00
	16-36	2	0	2	100.00	0.00	0.00
	36-42	1	2	3	33.33	66.67	66.67
	42+	-	-	-	-	-	33.33
Upper	Neo/prenatal	2	10	12	16.67	83.33	83.33
	3-16	14	15	29	48.28	51.72	0.00
	16-36	3	15	18	16.67	83.33	0.00
	36-42	2	26	28	7.14	92.86	9.52
	42 +	-	-	-	-	-	7.14

**Summary of cattle age at slaughter from Moathill, Co. Meath.**

Area	Element	Side	dp4	P2	P3	P4	M1	M2	M12	M3	MWS	Age (Years)
L	LMT	U	0	0	0	0	0	0	0	6G	F	3-4
L	LMT	U	0	0	0	0	0	0	0	5A	E	2-3
L	Mandible	L	0	A	A	A	8A	5A	0	A	D	1-2
U	LMT	U	0	0	0	0	0	0	0	2A	E	2-3
U	LMT	U	0	0	0	0	0	0	0	11G	GH	4-8
U	LMT	U	0	0	0	0	0	0	0	U	A-D	<2
U	LMT	U	0	0	0	0	0	0	0	U	A-D	<2
U	Mandible	L	H	0	0	0	X	0	0	0	A	0-2mth

#### Age/slaughter for sheep based on toothwear

Element	Estimated withers height (cm)
Radius	51.5

#### Estimated withers heights for sheep

#### Pig:

Area	Element	Age of fusion (months)	No. Fused	No. unfused
Lower	Scapula	12	1	0
	Humerus d	12-18	1	0
	Phalanx 1	24	1	1
	Tibia d	24	0	1
	Calcaneus p	24-30	0	1
	Femur p	42	0	1
	Femur d	42	0	1
Upper	Metapodium p	Pre natal	1	0
	Scapula	12	7	0
	Pelvis p	12	2	0
	Pelvis d	12	2	0
	Humerus d	12-18	2	0
	Phalanx 1	24	1	0
	Tibia d	24	1	0
	Calcaneus p	24-30	0	1
	Ulna p	36-42	0	2
	Femur p	42	0	1
	Femur d	42	0	1
	Tibia p	42	1	1

#### Epiphyseal fusion data for pig bones

Area	Age Group (months)	No. fused	No. Unfused	Total	% fused	% unfused	% killed
Lower	12-18	0	0	0	0.00	0.00	0
	18-30	2	0	2	100.00	0.00	2
	30-42	1	3	4	25.00	75.00	1
	42+	0	2	2	0.00	100.00	0
	12-18	-	-	-	-	-	-
Upper	Neo/prenatal	1	0	1	100.00	0.00	0.00
	12-18	13	0	13	100.00	0.00	0.00
	18-30	2	1	3	66.67	33.33	33.33
	30-42	1	5	6	16.67	83.33	50.00
	42+	-	-	-	-	-	16.67

#### Summary of pig age at slaughter from Moathill, Co. Meath.



Area	Element	BT	HTC	GLP	SLC
Lower	Humerus	28.2	17.6		
Lower	Scapula				21.6
Upper	Scapula				25.8
Upper	Scapula			31.5	20.1
Upper	Scapula				19.5
Upper	Scapula				19.4
Upper	Scapula				23.8
Upper	Scapula			20.0	

#### Pig measurements

	Male	Female
Lower Area	2	1
Upper Area	3	0

#### Pig sex based on canine teeth

#### Horse:

Area	Element	Tooth	Height (mm)	Age (Yrs)
Lower	Loose max tooth	P2	48.4	7-8
Lower	Loose max tooth	P2	45.9	8-9
Lower	Loose max tooth	P3-P4	63.3	6-7.75
Lower	Loose max tooth	P3-P4	61.5	6-7.75
Lower	Loose mand tooth	P3-P4	41.6	8.25-10.25
Upper	Loose tooth	UNERUPTED CHEEK TOOTH		<~4
Upper	Loose tooth	UNERUPTED CHEEK TOOTH		<~4
Upper	Loose tooth	UNERUPTED CHEEK TOOTH		<~4
Upper	Loose max tooth	P3-P4	56.5	7.5- 9.75
Upper	Loose max tooth	P3-P4	63+	3-7.75
Upper	Loose mand tooth	M3	Barely worn	2.5-4.5
Upper	Loose mand tooth	P2	<10	>16
Upper	Mandible	dp3	Stage 3	4m-3yr

#### Age/death for horses based on tooth wear

	Age (Years)			
	<4.5	3-7.75	6-11	>16
Lower Area mandibles		-		
Lower Area loose teeth		-	5	
Upper Area mandibles	1		-	
Upper Area loose teeth	4	1	-	1

#### Horse age at death or slaughter based on toothwear

Area	Element	Side	GH	GB	Bp	BFd
Lower	Astragalus	R	55.4	59.7	0	50.9
Lower	Radius	L			78.1	0

#### Horse bone measurements

**Moathill 2 & 3, Co. Meath**Grid Reference: **28600/26800**SMR No: **N/A**Reference: **Halliday 2006; Beglane 2009.**

The excavation of Moathill 2 indicated multi-phase activity on the site, with part of two separate enclosures being recorded. The first ditch was presumed to be circular in shape and was truncated by a larger rectangular enclosure from which a fragment of bone comb was retrieved. The later ditch is presumed to date to the early medieval period. No definite date was attained for the earlier ditch, but it is possible that it was prehistoric in date. This enclosure appears to have contained burials and which may be broadly contemporary with the occupation of Moathill 1. A kiln and a series of parallel intercutting ditches excavated at the north-east end of the site yielded no datable evidence.

Moathill 3 was located to the south of Site 2 and a number of features of archaeological significance were resolved, including part of a probable prehistoric ring-ditch burial with central cremation pit, two kilns and a probable early medieval D-shaped enclosure, with evidence of two highly truncated circular structures within the confines of the enclosure and two kilns outside the perimeter.

**Animal Bones:**

A total of 514 elements were recorded; several human bones were also recovered.

Phase		Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Fox	Date
1									c. 7 <sup>th</sup> C.
	NISP	96	54	9	3	-	11	-	
	%NISP	55.5	31.2	5.2	1.7	-	6.4	-	
	MNI	4	4	2	1	-	1	-	
	%MNI	33.3	33.3	16.7	8.3	0.0	8.3	-	
2									8 <sup>th</sup> C.
	NISP	139	35	22	7	9	0	1	
	%NISP	65.3	16.4	10.3	3.3	4.2	-	0.5	
	MNI	7	5	2	1	1	0	1	
	%MNI	41.2	29.4	11.8	5.9	5.9	-	5.9	

**NISP and MNI from Moathill 2, Co. Meath.**

	Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Fox	Date
								8 <sup>th</sup> C.
NISP	59	9	10	8	3	15	0	
%NISP	56.7	8.7	9.6	7.7	2.9	14.4	0.0	
MNI	4	1	1	1	1	2	0	
%MNI	40.0	10.0	10.0	10.0	10.0	20.0	0.0	

**NISP and MNI from Moathill 3, Co. Meath.**

## Animal Bone Appendix:

### Cattle:

Tooth Eruption (mnths)	Moathill 2 – Phase 1	Moathill 2 – Phase 2	Moathill 3
<6	-	-	-
6-18	-	1	-
15-30	2	-	-
24-36	-	1	-
36-50	4	4	3
>50	3	2	2

#### Cattle age at slaughter based on tooth eruption and wear

Fusion data (mnths)	Moathill 2 – Phase 1	Moathill 2 – Phase 2	Moathill 3
Neonatal	-	-	-
7-12	-	-	-
12-24	-	20%	-
24-36	60%	5%	-
37-48	-	40%	-
48+	40%	35%	-

#### Cattle age at slaughter based on fusion data

Site/Phase	Estimated withers height (cm)
Moathill 2 – Phase 1	117
Moathill 3	110

#### Estimated withers height of cattle.

### Sheep:

Fusion data (mnths)	Moathill 2 – Phase 1	Moathill 2 – Phase 2	Moathill 3
Neonatal	-	-	-
3-16	9%	-	-
16-36	25%	38%	-
36-42	-	62%	-
42+	66%	-	-

#### Sheep age at slaughter based on fusion data

### Pig:

In this case a relatively small number of pig bones were suitable for fusion analysis, but generally indicated that pigs were killed as juveniles. A single mandible from Moathill 3 came from a female pig aged 19-21 months and a third molar from the same phase was from an individual aged 21-23 months.

	Male	Female
Moathill 2 – Phase 1	2	-
Moathill 2 – Phase 2	1	-
Moathill 3	1	1

#### Sex distribution of pig canine teeth and alveoli

**Horse:**

<b>Site/Phase</b>	<b>Context</b>	<b>Tooth</b>	<b>Age (Yrs)</b>
Moathill 2: Phase 2	2091	P3 - M2	11.75 - 20
Moathill 2: Phase 2	2049	P3/4	6 - 7.75
Moathill 3	3022	P3-M2; P3/4; P3/4	<=4; 4.5 - 6.5;3-4
Moathill 3	3031	M1/2	4 - 6

**Horse age at death based on toothwear**

<b>Site/Phase</b>	<b>Estimated withers height (cm)</b>
Moathill 2 – Phase 1	134
Moathill 3	128

**Estimated withers height of horse.**

### **Movilla Abbey, Movilla td., Co. Down**

Grid Reference: **350360/374446**

SMR No: **DOW 006:013**

Reference: **Ivens 1984; Higgins 1984**

Excavations were undertaken at Movilla Abbey, a ruined Augustinian priory set on the site of an earlier Irish monastic community. Several thousand sherds of souterrain ware indicated intense occupation in the last centuries of the first millennium A.D., and there is a great number and great complexity of small post- and stake-holes, pits and gullies found in the earliest levels, but no convincing evidence of the original building outlines.

Considerable amounts of slag were found from almost all contexts, and the many fragments of crucible suggest bronze-working was practised. The finds of scrap copper alloy, copper alloy rivets and nails, and trial pieces provide valuable confirmation of this interpretation. The glass objects demonstrate quite unequivocally that there was at least an industry producing composite objects such as beads, even if the glass was manufactured elsewhere and imported to Movilla Abbey. The location of an industrial area next to the medieval church suggests that the heart of the early medieval monastery was elsewhere.

There appears to be no change of material culture which could be correlated with the Anglo Norman invasion of Ulster - in fact the life of the Abbey seems to have remained unchanged until the 13th century, when everted-rim, and wheel thrown glazed pottery appear.

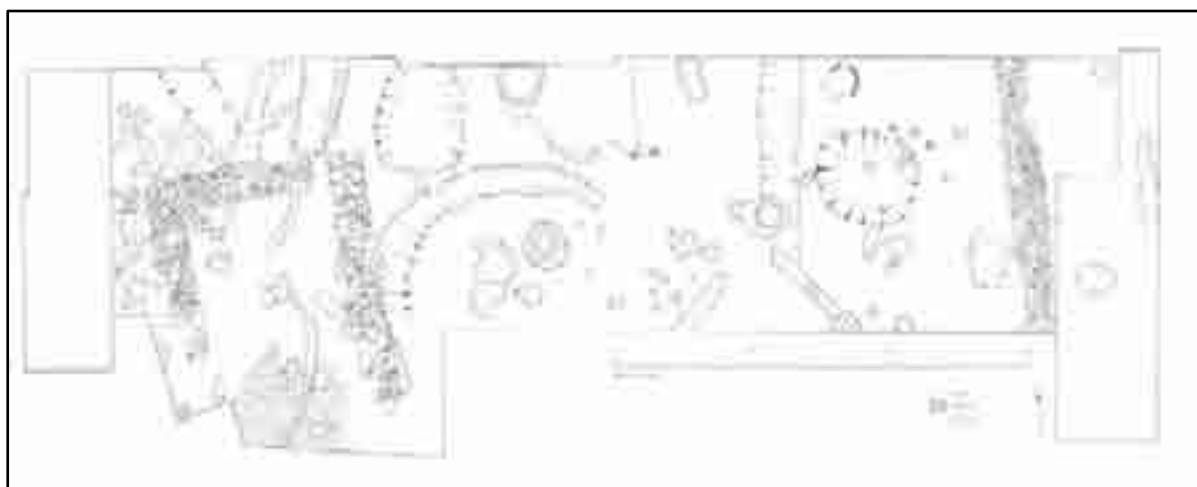
### **Animal Bones**

The excavations yielded 4363 fragments of animal bone - a high proportion of fragments (68.2%) was completely unidentifiable, and a further 3-9% came from ribs and vertebrae which were not identified to species level. The bones were analysed within two broad chronological phases: early medieval and 13<sup>th</sup>/14<sup>th</sup> centuries.

	<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Dog</b>	<b>Fowl</b>	<b>Date</b>
NISP	126	57	21	5	6	3	c. A.D. 800-1000
MNI	16	8	7	3	2	2	
%MNI	42.1	21	18.4	7.9	5.3	5.3	

### **NISP and MNI from early medieval phases at Movilla Abbey, Co. Down**

Three fish bones from large cod (*Gadhus morhus*) were also found.



**Plan of excavations at Movilla Abbey, Co, Down (after Ivens 1984, fig 18).**

**Animal Bones Appendix:**

	Fused	Unfused	% Fused
12 months	-	-	-
24 months	1	-	100
42 months	-	-	-

**Epiphyseal fusion in pigs**

	Tooth	Wear (after Grant)
Cattle	M1/2	g
Sheep	d4	g
Pig	M2	f
	M2	d
	M2	a

**Tooth Wear**

## **Moynagh Lough, Co. Meath**

Grid reference: **N81988555 (281980/285559)**

SMR No: **ME005-099**

Reference: **Bradley 1982-3; Bradley 1984; Bradley 1985-6; Bradley 1990-1; Bradley 1994-5; Bradley 1997; McCormick 1987.**

Moynagh Lough, Co. Meath had been occupied in the Late Mesolithic, and in the early and late Bronze Age, followed by a hiatus in the Iron Age. In the early medieval period, there were several phases of occupation from the late-sixth to the ninth century A.D., with a sequence of palisades, circular houses and evidence for on-site metalworking, the trade of exotic goods, diet and economy. There were at least six phases of occupation in the early medieval period, each marked by a re-deposited layer of peat and possibly representing a generation of activity. The crannog varied in size through these phases of occupation, but in general terms it measured 40m x 32m.

Phase U was the earliest phase in the early medieval period, probably dating to the late-sixth/seventh centuries A.D. There was a small circular hut (3m in diameter), with an arc of post-and-wattles (2.9m by 1.9m), a charcoal-rich floor, and a spud-stone to hold a door at the south side. There were also gravel spreads on the east side of the crannog, potentially the earliest of the early medieval occupation layers. Finds from the vicinity of the hut included E ware (sixth/mid-seventh-century imported pottery); an iron shield boss; and a rectangular bronze mount (similar to the escutcheons on the Sutton Hoo hanging bowl). Finds from the gravel spread included two Merovingian glass bottles and a bronze spatula for removing their contents, all sixth/seventh century in date. At the south side, there were bone combs and amber beads.

Phase V is represented by a group of refuse layers, but no structures are reported. The phase is interpreted as dating to the mid-/late-seventh century A.D. Finds included a rim-sherd of E ware, a bronze disc-pendant pin, a bronze pennanular brooch with birds head terminals, double-sided bone combs, glass beads and a leather shoe.

Phase W was occupied *c.* A.D. 690-720. It had a small circular house (3m in diameter). A significant industrial feature included a pit, cut into the peat and filled with ash and a bowl furnace. There were also a series of un-phased middens outside the site's Palisade 2 on the north, east and west sides. These layers of habitation debris were evidently the 'rubbish tip' of the crannog. They were rich in animal bones, and they also produced a large number of small finds, including a pennanular brooch, small pieces of gold filigree and objects of wood and leather, including a separate-bladed shovel.

Phase X (*c.* A.D. 720-748) was primarily significant for the evidence for metalworking and industrial production. A re-used timber from the timber pathway produced a dendrochronological date of A.D. 625. There was a roundhouse, about 7.5m in diameter, located between two metalworking areas (1 and 2). Finds from Metalworking Area 1 included a pottery vessel, pieces of baked clay, crucible sherds, and fragments of two-piece clay moulds and motif-pieces. There was also an iron stake, used for beating metal. Metalworking Area 2 produced four major features - a furnace, a stone-lined area of clay, a spread of compacted pebbles and a dump of metalworking debris. Finds from Metalworking Area 2 included slag, a whetstone, eight flints, a lump of yellow enamel, amber beads and chips, a bronze pin and button, two iron knives, a head of a bone pin and two cut pieces of horn. There were also 67 crucible sherds, three heating trays and 600 mould fragments (1.7 kg in total weight). They included 400 featureless mould fragments, 100 plain impressed pieces and 60 decorated pieces. The moulds were used for the production of brooches, mounts, studs (of types found on decorated shrines) and other decorated objects. Ingots were introduced onto the site, placed in crucibles, melted in the furnace and poured into the moulds. The furnace was used on at least eight occasions. The moulds may have been cooled nearby on the pebbled area, post-casting work and mould making may have been carried out on a pink clay and cobbled spread. The spatial organisation of the metalworkers' areas can thus be recognised.

In Phase Y (*c.* A.D. 748 - *c.* A.D. 780) the crannog had two roundhouses, a large oak palisade and a furnace-pit, with finds including crucibles, a clay mould, clay nozzles and a bronze ingot. The palisade was of hewn and cleft oak tightly placed together in a trench. The palisade construction dates to A.D.

748. The largest house (Roundhouse 1) was a substantial circular structure, 11.2m in external diameter. There were at least 250 internal posts, representing internal partitions, beds and benches. Finds from this roundhouse included eight tanged iron knives, three iron key handles, a socketed iron spearhead, a bone spear-point, stone hones, iron nails, spindle whorls. The house also produced such finds as a bronze pseudo-pennanular ring, a spiral headed bronze ring, two ringed iron pins, ball and spatula headed bone pins, two bronze finger rings, bone comb plates, glass beads, eight jet bracelet fragments, a bone gaming piece, 114 pieces of flint (many being strike-a-lights) and a bronze drinking horn terminal. The second house was smaller, approximately 5.2m in diameter and it also had a stone-lined hearth, but the occupation layer was less apparent. Finds associated with the furnace included three complete crucibles, 50 crucible sherds, three heating trays, a clay mould fragment, baked clay nozzles and a bronze ingot.

Phase Z (c. A.D. 780-810) was the uppermost, surviving occupation surface and had been greatly disturbed by modern bulldozing during attempted land reclamation in the 1980s. There were the remains of an oak palisade, a foundation layer of re-deposited peat and a single charcoal spread. The palisade was constructed of young oak roundwood trunks. These posts probably had wattles woven around them where they stood above the ground. The crannog would have been 36-40m across. Finds from this layer included three tanged iron knives, two complete crucibles and sherds of others, part of a rotary quern-stone, a bone comb fragment, a glass bead, a chunk of amber and four jet bracelet fragments.

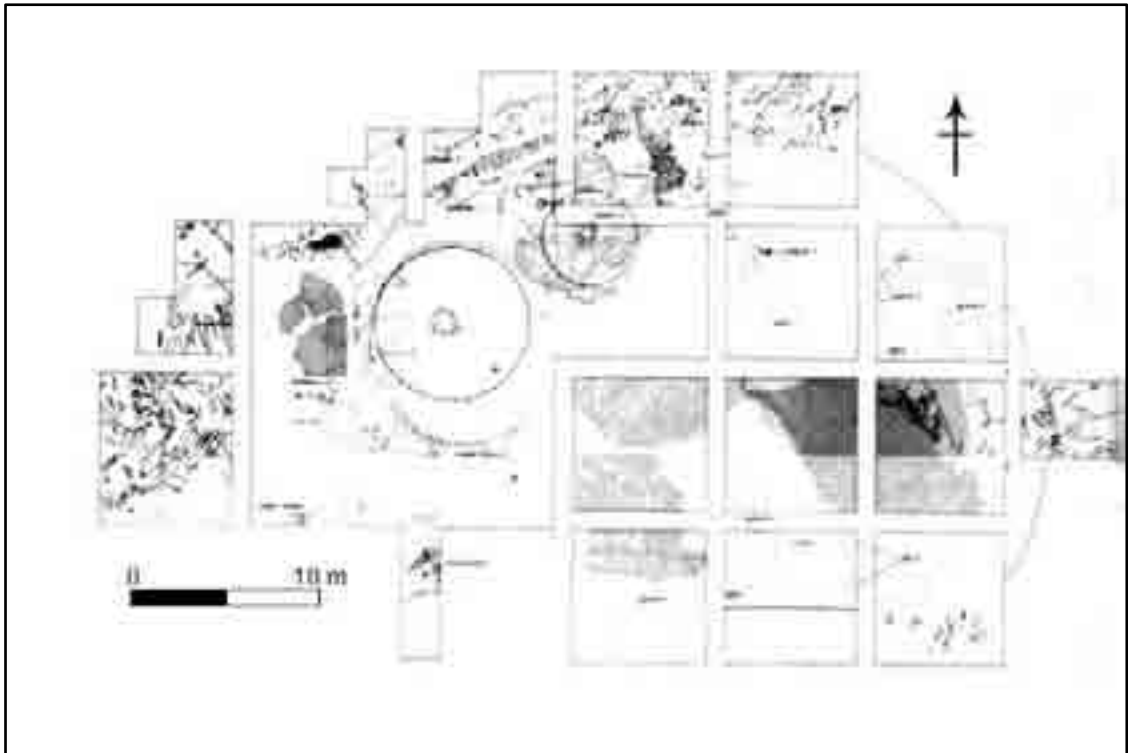
### Animal Bones:

Over 20,000 bones were identified to species from Moynagh crannog. Most of the bones came from former lake muds outside the palisade and it is clear that most of the food refuse on the site was disposed of by being thrown into the lake.

Phase		Cattle	Sheep/ Goat	Pig	Horse	Dog/ Wolf	Cat	Red Deer	Hare	Date
Phase W (D)										c. A.D. 690-720
	NISP	4739	835	1580	85	31	2	8	-	
	%NISP	65.1	11.5	21.7	1.2	0.4	<0.1	0.1	-	
	MNI	104	58	96	4	3	1	1	-	
	%MNI	39	21.7	36	1.5	1.1	0.4	0.4	-	
Phase X (L)										c. A.D. 720-748
	NISP	1505	303	477	35	1	-	2	1	
	%NISP	64.8	13.0	20.5	1.5	<0.1	-	0.1	<0.1	
	MNI	33	13	14	4	1	-	1	1	
	%MNI	33	13	14	4	1	-	1	1	
Phase X? (A2)										c. A.D. 720-748
	NISP	1201	216	533	27	2	16	-	1	
	%NISP	60.2	10.8	26.7	1.4	0.1	0.8	-	0.1	
	MNI	29	13	18	3	1	1	-	1	
	%MNI	43.9	19.7	27.3	4.5	1.5	1.5	-	1.5	
Phase Y House K										c. A.D. 748-780
	NISP	489	477	486	3	-	-	-	1	
	%NISP	33.6	32.8	33.4	0.2	-	-	-	0.1	
	MNI	12	21	16	1	-	-	-	1	
	%MNI	23.5	41.2	31.4	2.0	-	-	-	2.0	
Phase Z (A1)										c. A.D. 780-810
	NISP	467	397	359	12	3	-	-	-	
	%NISP	37.7	32.1	29.0	1.0	0.2	-	-	-	
	MNI	11	30	16	2	1	-	-	-	
	%MNI	18.3	50	26.7	3.3	1.7	-	-	-	

**NISP and MNI from Moynagh crannog, Co. Meath.**





**Plan of Moynagh Lough crannog (after Bradley 1991).**

## Animal Bones Appendix:

### Cattle:

Higham Stage	Wear Stage of M3	Approx. age (months)	No.	%
3		1-4	1	0.5
4		5-6	2	1.0
5		6-7	5	2.6
6		7-9	3	1.5
7		8-13	19	9.7
8		15-16	20	10.3
9		16-17	8	4.1
10		17-18	16	8.2
11		18-24	17	8.7
12		24	19	9.7
13		24-30	12	6.2
14	A	30	7	3.6
15	B	30-31	5	2.6
16	C	31-32	5	2.6
17	D	32-33	3	1.5
18	E	36	4	2.1
19	F	36-40	2	1.0
20	G		21	10.8
	H		2	1.0
	J		7	3.6
	K		11	5.6
	L		1	0.5
	M		5	2.6

### Mandibulae tooth eruption for cattle.

Approx. age fusion (months)	Bone Element	Fused		Unfused	
		No.	%	No.	%
<b>7-10</b>	Scapula	147	91.3	14	8.7
	Pelvis	104	76.5	32	23.5
<b>12-18</b>	Humerus d	117	74.5	40	25.5
	Radius p	135	98.5	2	1.5
<b>24-30</b>	Metacarpal d	25	46.3	29	53.7
	Tibia d	58	42.6	78	57.4
<b>27-36</b>	Metatarsal d	19	48.7	20	51.3
<b>36-42</b>	Calcaneus	59	43.1	78	56.9
<b>42</b>	Femur p	44	35.2	81	64.8
<b>42-48</b>	Humerus p	21	43.8	27	56.2
	Radius d	46	41.1	66	58.9
	Femur d	28	38.9	44	61.1
	Tibia p	28	64.7	32	53.3
	Ulna p	18	36.7	31	63.3

### Epiphyseal fusion of cattle bones

Element	Measurement	No.	Min.	Max.	Mean	S.D.	Var.
<b>Scapula</b>							
	GLP	154	43.8	75.8	61.2	5.15	26.4
	SLC	120	37.2	57.5	45.9	4.63	21.3
<b>Humerus</b>							
	Bd	6	69.3	84.2	74.8	5.36	23.9
	Bt	23	62.7	74.5	67.6	3.33	10.6
<b>Radius</b>							
	GL	7	255	295	263.3	12.63	159.6
	Bp	75	62.8	87.0	73.6	4.74	22.5
	Bd	12	60.9	73.1	65.6	4.40	19.4
	SD	9	32.8	41.8	37.4	2.90	8.4
<b>Metacarpal</b>							
	GL	40	170	205	183.8	6.86	45.9
	Bp	55	47.1	62.0	53.0	3.55	12.4
	Bd	43	48.6	65.2	54.7	4.18	17.0
	Sd	39	27.3	36.2	29.5	2.48	6.0
<b>Pelvis</b>							
	LA	10	55.0	60.7	57.9	1.78	2.9
<b>Femur</b>							
	Bp	2	102.6	105.2	103.9		
<b>Tibia</b>							
	GL	9	289	339	309.6	14.09	176.5
	Bp	17	81.1	97.1	88.0	6.15	35.6
	Bd	92	51.1	66.7	56.0	2.98	8.8
	SD	7	31.5	37.8	34.2	1.90	3.1
<b>Metatarsal</b>							
	GL	25	195	217	207.2	7.88	9.2
	Bp	37	33.9	49.1	42.5	3.63	9.2
	Bd	28	45.6	60.8	50.5	4.09	16.7
	SD	25	21.9	29.4	24.7	1.98	3.9
<b>Calcaneus</b>							
	GL	63	106.0	143.2	124.2	7.55	56.1
<b>Astragalus</b>							
	GLI	63	56	65.5	59.9	1.97	3.9
	Bd	36	34.3	43.5	38.2	1.88	3.5

#### Cattle bone measurements (mm)

GL	Bp	Bd	Sd	Sex	E.W.H.
182	48.8	50.4	-	-	111
170	47.1	48.6	28.3	F	104
170	49.7	51.5	29.0	F	104
176	49.9	49.5	27.9	F	108
176	55.4	53.0	28.4	F	108
177	52.5	54.0	28.1	F	108
178	49.1	52.2	27.7	F	109
178	53.7	55.9	31.3	F	109
178	53.2	54.9	30.3	F	109
179	52.6	53.2	29.1	F	110
179	50.6	52.0	27.3	F	110
179	48.8	49.9	26.1	F	110
179	50.9	51.1	28.1	F	110
180	49.6	54.9	28.1	F	110
180	50.6	51.5	27.9	F	110

182	48.5	50.4	27.8	F	111
183	54.8	55.9	29.5	F	112
183	51.9	57.1	27.6	F	112
183	49.5	50.5	25.0	F	112
184	51.1	53.6	29.6	F	113
184	51.6	54.3	28.1	F	113
184	50.1	15.1	27.5	F	113
185	50.6	52.7	28.1	F	113
185	52.1	54.4	31.4	F	113
185	53.3	53.8	29.3	F	113
186	51.9	53.1	28.3	F	114
186	54.0	56.4	30.0	F	114
187	54.1	57.2	31.1	F	114
187	51.3	53.4	29.5	F	114
188	51.9	52.4	27.5	F	115
192	52.9	53.6	29.1	F	118
196	53.1	55.1	28.5	F	120
183	62.0	63.1	36.2	M	112
184	58.3	63.9	33.6	M	113
190	59.5	59.9	35.1	M	116
190	60.8	65.7	34.6	M	116
191	51.5	53.0	27.6	M	117
193	60.6	59.1	33.1	M	118
195	56.4	58.3	29.9	M	119
205	60.2	61.4	33.0	M	125

#### Cattle metacarpal measurements

#### Sheep/Goat:

Higham Stage	Approx. Age (months)	No.	%	Months
5	4	2	1.7	Jul
6	5	1	0.9	Aug
7	5-7	2	1.7	Aug-Oct
9	9-10	4	3.4	Dec-Jan
10/11	10-12	6	5.1	Jan-Mar
12	12-21	42	35.9	Mar-Dec
13	21-24	15	12.8	Dec-Mar
14	25-26	13	11.1	Mar-May
15+	26+	32	27.4	-

#### Age/slaughter pattern for sheep based on tooth eruption.

Bone	Measurement	No.	Min.	Max.	Mean	S.D.	Var.
<b>Scapula</b>							
	GLP	103	26.2	33.3	29.3	1.83	3.33
	SLC	101	14.2	21.0	17.6	1.42	1.99
<b>Humerus</b>							
	GL	6	116.1	146.2	134.1	10.18	86.4
	Dp	2	41.5	41.9	41.7		
	Bd	39	22.3	29.5	27.5	1.39	1.87
	Bt	40	22.5	27.6	25.6	1.43	2.01
<b>Radius</b>							
	GL	35	122.3	163.0	139.9	9.92	95.59
	Bp	91	23.6	36.6	28.0	2.14	4.52
	Bd	33	22.4	29.0	26.4	1.65	2.65

	SD	23	13.1	17.1	15.1	1.09	1.14
<b>Metacarpal</b>							
	GL	27	105.4	127.1	116.2	6.45	40.06
	Bp	28	20.5	22.6	21.0	0.88	0.74
	Bd	26	20.2	25.2	23.4	1.20	1.38
	Sd	27	11.1	14.4	12.3	0.94	0.85
<b>Pelvis</b>							
	LA	76	19.9	26.2	23.3	1.37	1.86
<b>Femur</b>							
	GL	7	149	178	164.9	9.76	81.60
	Bp	8	38.4	44.5	42.3	2.12	3.93
	Bd	7	32.9	38.2	35.3	2.23	4.25
	SD	7	16.2	14.0	15.1	0.74	0.47
<b>Tibia</b>							
	GL	14	188	206	193.4	11.67	126.53
	Bp	17	31.8	40.8	37.8	2.68	6.75
	Bd	109	21.1	27.1	23.9	1.62	3.60
	SD	14	11.7	15.7	13.6	1.22	1.83
<b>Metatarsal</b>							
	GL	20	115.2	140	125.3	6.79	43.83
	Bp	22	16.5	19.9	18.2	0.89	0.76
	Bd	20	20.6	24.3	22.0	1.22	1.41
	SD	20	9.9	12.8	11.4	0.93	0.81
<b>Calcaneus</b>							
	GL	9	47.3	57.3	51.5	3.43	10.43

#### Sheep bone measurements (mm)

GL	Bp	Bd	Sd
105.4	19.0	20.2	11.4
109.5	19.9	23.1	12.7
109.8	20.2	21.4	11.6
110.9	20.5	22.9	13.1
111.8	-	25.0	13.5
112.4	21.6	24.2	14.4
113.5	21.6	22.9	13.8
115.1	20.2	23.3	12.6
115.3	21.5	21.9	11.1
115.5	-	24.6	14.5
116.1	20.8	23.4	13.9
116.5	19.7	23.5	13.6
116.7	19.5	-	12.6
116.9	21.9	24.1	13.2
117.0	21.5	23.9	13.5
117.9	21.7	24.2	13.7
118.4	20.9	21.1	12.9
118.8	21.2	23.4	13.1
119.6	21.1	23.1	14.0
120.6	22.6	23.3	13.9
121.5	21.5	24.1	13.1
121.5	20.7	23.6	14.0
121.9	21.6	24.9	14.0
125.6	21.3	24.1	13.6
126.2	20.8	22.7	13.3
127.1	22.1	23.9	12.6

#### Sheep metacarpal measurements

**Pig:**

Higham Stage	Approx Age (months)	#	%
4	4-7 weeks	1	0.4
5	2-4	1	0.4
6	5-6	2	0.8
7	5-6	2	0.8
9	7-8	5	2.1
11	9-10	11	4.6
12	10-11	2	0.8
13	11-12	1	0.4
14-17	12-17	15	6.2
18	17-19	87	36.1
19	19-21	29	12.0
20	21-23	46	19.1
21	23-25	12	5.0
22	25-27	10	4.1
23	27-29	7	2.9
14+	>29	10*	4.1

**Ageing data for pigs based on tooth eruption.**

Approx Age (months)	Female		Male	
	#	%	#	%
14-17	1	2.7	2	4.8
17-19	13	35.1	19	45.2
19-21	5	13.5	7	16.7
21-23	12	32.4	7	16.7
23-25	4	10.8	-	-
25-27	2	5.4	2	4.8
27-29	-	-	2	4.8
30+	-	-	3	7.1

**Sex/Age distribution among older pigs.**

Bone	Measurement	No.	Min.	Max.	Mean	S.D.	Var.
<b>Teeth</b>							
	M3	30	29.0	35.9	30.8	1.86	3.36
<b>Scapula</b>							
	GLP	104	29.6	36.3	32.3	1.97	3.87
	SLC	101	19.0	24.8	21.4	1.49	2.22
<b>Humerus</b>							
	Bd	88	34.3	42.8	37.6	2.08	4.29
	Bt	87	26.2	39.3	28.9	2.25	5.00
<b>Radius</b>							
	Bp	39	24.1	28.9	26.6	1.37	1.84
<b>Pelvis</b>							
	LAR	149	21.6	36.8	28.9	1.77	3.13
<b>Femur</b>							
	GL	1			202		
	Bp	1			52.5		
	SD	1			18.9		
<b>Tibia</b>							
	Bd	33	25.6	29.6	27.8	1.144	1.27
<b>Astragalus</b>							

	GLI	13	36.6	40.5	38.1	2.22	4.57
	BD	3	23.3	25.5	24.1	1.24	1.03

#### Pig bone measurements (mm)

#### Horse:

Bone	Measurement	No.	Min.	Max.	Mean	S.D.	Var.
<b>Scapula</b>							
	GLP	11	81.0	93.5	89.1	4.24	89.09
	SLC	7	52.4	63.5	60.4	4.12	60.43
<b>Humerus</b>							
	Bd	1			72.8		
	Bt	1			70.9		
<b>Radius</b>							
	GL	1			320		
	Bp	1			71.4		
	Bd	5	65.1	77.8	71.1	4.80	18.394
	SD	1			31.7		
<b>Metacarpal</b>							
	GLI	4	192	218	209.8	12.12	110.19
	Bp	3	47.2	48.5	47.9	0.66	0.29
	Bd	3	45.4	49.5	48.1	2.37	3.74
	Sd	3	31.2	32.8	32.2	0.90	0.54
<b>Pelvis</b>							
	LA	4	58.9	65+	61.3	2.61	5.11
<b>Femur</b>							
	Bp	1			116.3		
<b>Tibia</b>							
	Bd	7	65.3	74.2	69.5	2.85	6.99
<b>Metatarsal</b>							
	GLI	4	248	260	255.3	5.25	20.69
	Bp	4	45.8	51.1	48.3	2.21	3.65
	Bd	4	45.5	50.9	48.0	2.39	4.29
	SD	4	28.8	31.9	30.4	1.34	1.34
<b>Calcaneus</b>							
	GL	1			98.1		
<b>Astragalus</b>							
	GLI	2	54.3	55.0			

#### Horse bone measurements (mm)

	GLI	Bp	Bd	Sd
Metacarpal	192	47.2	45.4	32.8
Metacarpal	217	48.0	49.5	32.7
Metacarpal	218	48.5	49.5	31.2
Metacarpal	212	-	-	-
Metatarsal	248	48.7	48.9	31.0
Metatarsal	258	48.7	46.7	29.9
Metatarsal	260	51.1	50.9	31.9
Metatarsal	255	45.8	45.5	28.8

#### Horse metapodials measurement

**Moyne, Co. Mayo**Grid Ref: **M255674949 (125678/249491)**SMR No: **MA123-060002**Reference: **Manning 1987; McCormick 1987; Maliepaard 1987.**

The site consisted of a large enclosure (135m x 125m) and a ruined church, surrounded by a stone-wall. A series of trenches excavated inside the enclosure revealed the presence of early medieval ditches. The ditches may have been associated with the ecclesiastical site however it is also possible that they were associated with an earlier secular site, which may have preceded the foundation of the church.

Finds from these trenches included a number of un-diagnostic objects, but nevertheless the types of artefacts which are generally associated with early medieval sites - four iron knives; a piece of worked bone; iron slag; a piece of sheet bronze; an iron pruning hook; half of a set of iron shears; and an iron disc-headed pin.

**Animal Bones:**

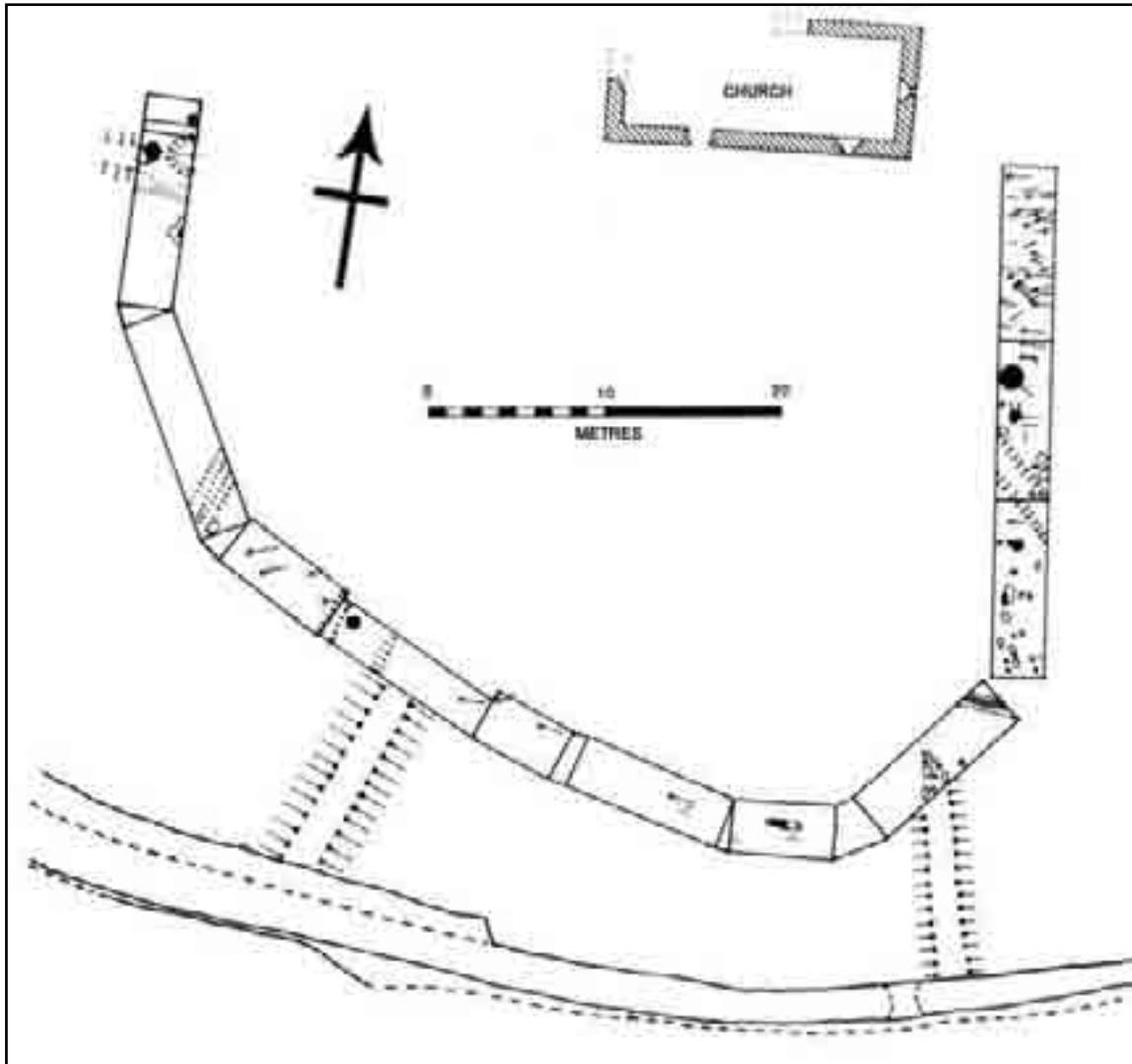
The limited excavations at Moyne produced a relatively small assemblage of animal bones from six distinct contexts, with the largest group (F12) consisting of less than 400 bones.

Context		Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Other	Date
<b>F12</b>	NISP	191	7	102	2	36	4	7 <sup>th</sup> /8 <sup>th</sup> C
	%NISP	55.8	2.0	29.8	0.6	10.1	1.2	
	MNI	7	2	6	1	2	4	
<b>F3</b>	NISP	26	31	17	-	-	-	
	%NISP	35.1	42.0	23.0	-	-	-	
	MNI	2	3	2	-	-	-	
<b>F5</b>	NISP	6	1	2	1	1	-	
	MNI	1	-	1	1	-	-	
<b>F2</b>		3	1	1	-	-	-	

**NISP and MNI from early medieval contexts at Moyne, Co. Mayo.**

The relatively high incidence of red deer is unusual for early medieval sites. While antler was present, it comprised less than half of the noted deer total so venison was obviously consumed.





**Plan of excavated area at Moyne, Co. Mayo (after Manning 1987, 46).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
GU-1783	Human bone from lintel grave	1090±85 BP	A.D. 713-745; <b>A.D. 767-1057;</b> A.D. 1076-1154.

## Animal Bones Appendix:

### Cattle:

Bone	Approx Age in Months	Fused	Unfused
<b>Scapula, Pelvis</b>	7-10	10	-
<b>Radius p, Humerus d</b>	12-18	8	-
<b>Metacarpal, d, Tibia d</b>	24-30	3	2
<b>Metatarsal d</b>	27-36	-	2
<b>Femur, Calcaneus</b>	36-42	3	1
<b>Radius d, Tibia p</b>	42-48	1	2

### Epiphyseal fusion of cattle bones from F12

The small number of mandibles shows that calves were at least occasionally slaughtered. Two mandibular fragments were of cattle of approx. 24-30 months of age, while a third was approx. 32-3 months at time of death. A mandible from the upper fill of F3 was, however, of an animal of approximately 5-6 months of age at time of death.

Bone	Min.	Max.	Mean	No.	E.W.H. (cm)
<b>Scapula</b>					
Glp	62.8	71.1	265	3	
LG	55.1	60.3	57.7	2	
SLC	48.5	51.2	49.5	3	
<b>Humerus</b>					
Bd			75.3	1	
Bt	66.4	79.1	72.4	3	
<b>Radius</b>					
Bp	73.5	88.5	81	2	
<b>Metacarpal</b>					
GL			192	1	106.2
Bp	54.0	59.4	56.7	2	
Bd			52	1	
Sd			23.9	1	
<b>Metatarsal</b>					
Gl			195		117.5
Bp			41		
Sd			24.3		
<b>Calcaneus</b>					
GL			132.3		
<b>Astragalus</b>					
GLI	56.6	60.9	59	3	
Bd	36.4	38.1	37.3	3	

### Summary of measurements of cattle bones and estimated withers height (E.W.H.)

**Pig:**

<b>Bone</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>No.</b>
<b>Teeth</b>				
Lower m3			34.0	1
Tibia				
Bd			30.9	1
<b>Humerus</b>				
Bt			31.1	1

**Measurements of pig bones**

Four pig mandibular fragments provided ageing data. Three were of pigs aged approximately 17-27 months while the fourth was of an animal of approximately 4-7 weeks of age.

**Oughtymore, Co. Londonderry**Grid Ref: **C66163638 (26616/43638)**SMR No: **LDY 001:002**Reference: **Mallory & Woodman 1984;**

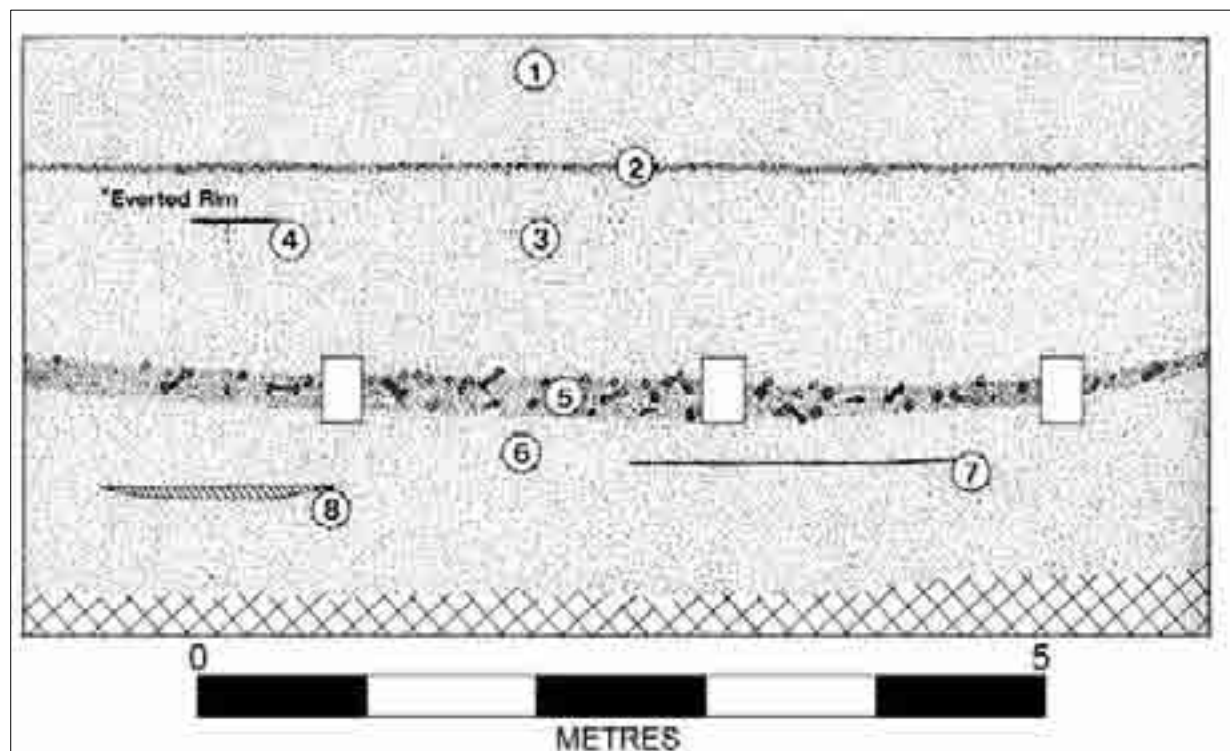
The site was located in a sand cliff overlooking the Lough Foyle estuary and was in danger of being completely destroyed by coastal erosion. The main archaeological horizon consisted of a substantial occupation deposit that contained 20 sherds of souterrain-ware, as well as fragments of a blue glass bracelet and a lignite bracelet, two bone comb fragments and part of an antler ring.

It was suggested by the excavators that the early medieval inhabitants of the site at Oughtymore may have represented a social class inferior to those who dwelt in raths, and that they may have held their land on tenure from the church.

**Animal Bones:**

Although the number of unidentifiable bone fragments exceeds 1700, the moisture in the midden reduced the bones to an extremely soft condition and made recovery particularly difficult. As a result only 304 bones and teeth were able to be identified.

	Cattle	Sheep/ Goat	Pig	Horse	Date
<b>NISP</b>	174	99	27	4	A.D. 651-854
<b>%NISP</b>	57.2	32.6	8.9	0.13	
<b>MNI</b>	4	5	3	1	
<b>%MNI</b>	30.8	38.5	23.1	7.7	

**NISP and MNI from Oughtymore, Co. Londonderry**

**Section of midden at Oughtymore, Co. Londonderry (after Mallory & Woodman 1984, 52).**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-2442	'Carbon sample' from early medieval occupation layer	1295 $\pm$ 40 BP	<b>A.D. 651-782;</b> A.D. 789-811; A.D. 847-854.
UB-2443	'Carbon sample' from layer of burning underlying occupation layer	1480 $\pm$ 30 BP	<b>A.D. 541-642.</b>

## Animal Bones Appendix:

Species	Element	Approx. age of slaughter
Cattle	Radius, p (U)	12-18 mnths
	Humerus, d (F)	12-18 mnths
	Femur, d (F)	42-48 mnths
Sheep	Phalanx (U)	Immature
	M3	18 mnths
	M3	18 mnths
Pig	-	Neonate
	M3	18 mnths
Horse	Femur, d (U)	<42 mnths

The identified fish species were cod (30), plaice/flounder (10), eel (80), salmon/sea trout (2) and probable haddock (1).

**Owenbristly, Co. Galway**Grid Reference: **142872/211898**SMR No: **N/a**Reference: **Lehane & Dleaney 2010; McCarthy 2010.**

The site consisted of an area 44m in diameter defined by a large drystone enclosure or cashel. A number of pits, postholes and possible hearths were identified toward the centre of the enclosure; an animal tooth from the upper fill of one of these four large pits returned a radiocarbon date of A.D. 603-682.

A clearly defined cemetery area was also identified in the eastern and south-eastern sector of the enclosure. Ninety-five individuals were identified within the cemetery and one individual was found within the enclosure wall. The cemetery contained 39 simple pit graves and 26 slab-lined graves with or without lintels. The northern half of the cemetery was arranged in two to three north/south rows of east/west burials. An extensive programme of radiocarbon dating was undertaken and, based on the results of this programme and on the stratigraphic sequence and the character of the burials, 75 have been assigned to an early medieval burial phase ranging from A.D. 550-970, with a concentration of burials dating to the period A.D. 640-800.

The orderly north/south rows of burials were interrupted by a series of pits and postholes which represented a wooden structure – possibly a small church. The charcoal-rich fills of two of the postholes on the northern wall of this building returned radiocarbon dates spanning A.D. 580-649 and A.D. 619-667.

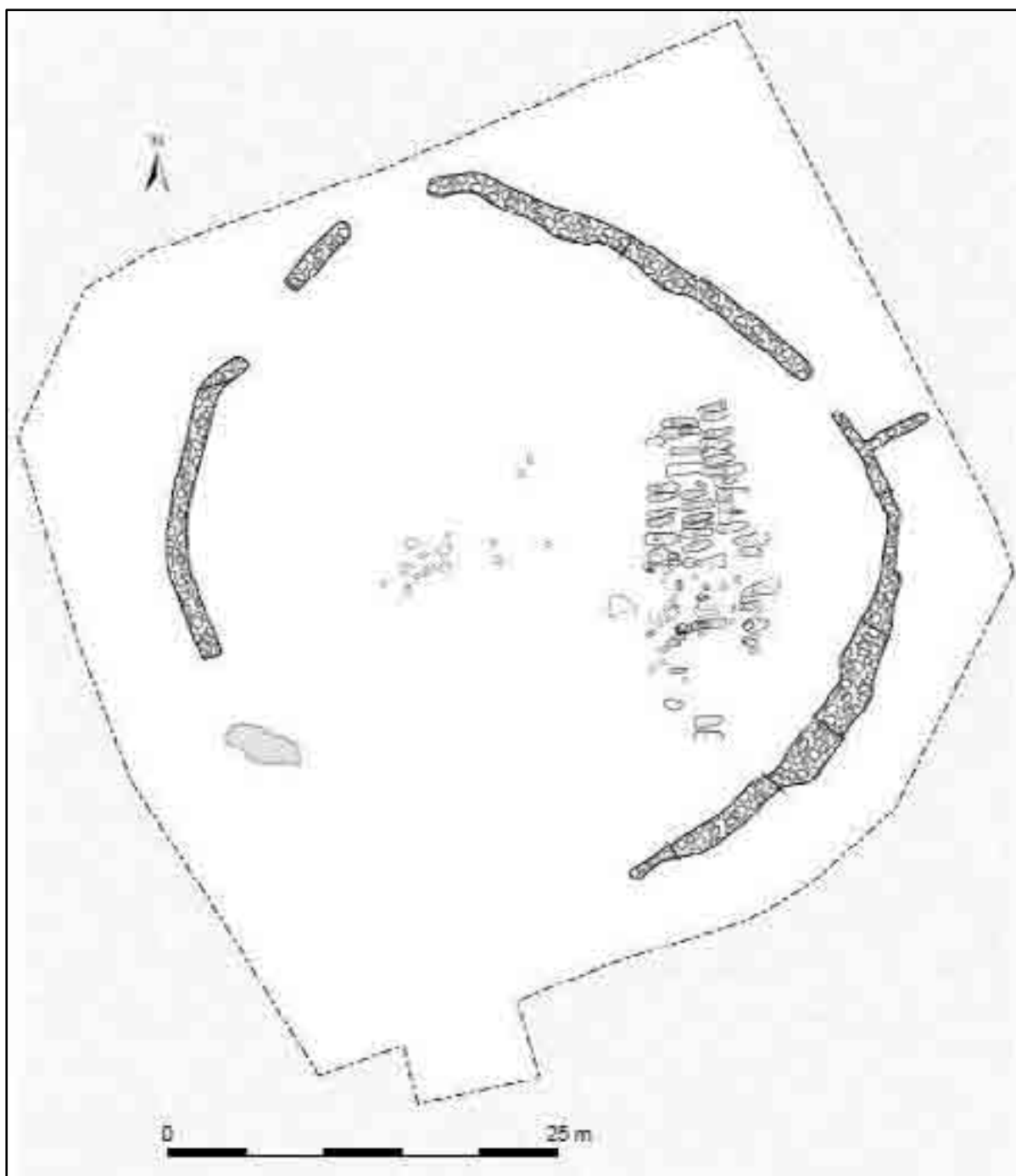
The finds from the site consisted of several bone and metal pins, a bone-handled iron knife, several other iron knife or blade fragments, several possible whetstones, a plain metal ring – possibly from a horse bridle – two blue glass beads, two fragments of a lignite wristband and several rotary quern fragments. The stone macro tools are predominantly associated with craftworking activities, and a small quantity of slag residues point towards on-site metalworking dominated by blacksmithing.

**Animal Bones:**

An assemblage of 2588 animal bones was examined.

Feature	Cattle	Sheep/ Goat	Pig	Horse	Dog	Deer	LM	MM	Date
Grave Fills	108	14	15	-	-	-	130	60	7 <sup>th</sup> /8 <sup>th</sup> C
Surface Deposits	595	105	60	9	3	4			
Enclosing Wall	92	17	3	1	1	-	98	34	
Pits/Postholes	34	12	7	-	-	-	72	58	

**NISP from features at Owenbristly, Co. Galway.**



Cashel and cemetery at Owenbrist, Co. Galway (after Lehane & Delaney 2010)

## **Animal Bones**

### **Grave fills**

The pig mandible and most of the teeth came from an individual less than two years of age at death.

### **Pits and postholes**

The only animal to be present in any quantity was cattle, with 34 of the 53 identified bones being of this species. A humerus, femur, metatarsus and calcaneum were all unfused proximally and distally representing individuals between 2.5 and 3.5 years of age. Sheep and pig were poorly represented in the pit and posthole contexts with teeth again being the most common elements. Again the pig bones belonged to an individual less than two years of age at slaughter.

### **Surface deposits**

The bulk of the remains came from deposits surrounding the graves with three deposits (C.28, C.29, C.73) in particular containing large amounts of animal bone. There was a high incidence of burning and charring in the samples from this area of the site indicating that the bones represent the remains of cooked meat joints.

Cattle:

Ageing data was scarce but there were sufficient bones with fused epiphyses to show that most individuals were over 2.5 years of age and probably older at slaughter. An unfused scapula indicated that young animals were also slaughtered for their meat.

Sheep:

A few bones with unfused epiphyses were present, although by far the majority came from mature animals.

### **The Enclosing Wall**

A total of 246 fragments of animal bone were recovered from the enclosing cashel wall. The identified sample included the remains of cattle, sheep/goat, pig, horse and dog.

Cattle provided 92 fragments the most numerous regions present being loose teeth, skull head and lower parts of the limbs. Sheep were represented by 17 bones and all of these came from C.40. Loose teeth and fragments of mandible were common. Few bones with unfused epiphyses were present, suggesting that the individuals present had reached maturity before being killed. There were negligible amounts of pig bones with the three identified specimens belonging to an individual slaughtered between 1–2 years of age.

The other mammal species present in the wall features were horse and dog. The distal portion of a horse scapula was recovered from C40 and a dog tooth was present in C.39.



## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-11218	Rib	1143 $\pm$ 34 BP	A.D. 780-791; <b>A.D. 805-981</b>
UB-11219	Rib	197 $\pm$ 27 BP	<b>A.D. 1650-1685;</b> <b>A.D. 1732-1805</b> <b>A.D. 1928-present</b>
UB-11220	Rib	1460 $\pm$ 32 BP	<b>A.D. 551-648</b>
UB-11221	Frontal bone	519 $\pm$ 34 BP	A.D. 1321-1349; <b>A.D. 1391-1445</b>
UB-11222	Rib	1184 $\pm$ 26 BP	<b>A.D. 773-897;</b> A.D. 922-942
UB-11223	Rib	1407 $\pm$ 30 BP	<b>A.D. 594-666</b>
UB-11224	Rib	590 $\pm$ 26 BP	<b>A.D. 1300-1368;</b> <b>A.D. 1381-1411</b>
UB-11225	Tibia	1214 $\pm$ 28 BP	A.D. 694-699; A.D. 708-747; <b>A.D. 765-889</b>
UB-11226	Femur	1175 $\pm$ 20 BP	<b>A.D. 778-895;</b> A.D. 925-937
UB-11227	Tibia	1370 $\pm$ 18 BP	<b>A.D. 642-672</b>
UB-11228	Rib	337 $\pm$ 35 BP	<b>A.D. 1468-1642</b>
UB-11229	Femur	1330 $\pm$ 24 BP	<b>A.D. 651-712;</b> A.D. 746-767.
UB-11230	Cranium	519 $\pm$ 34 BP	A.D. 1321-1349; <b>A.D. 1391-1445.</b>
UB-11231	Petrous process	747 $\pm$ 34 BP	<b>A.D. 1219-1290</b>
UB-11232	Rib	1255 $\pm$ 24 BP	<b>A.D. 674-783;</b> A.D. 788-820; A.D. 842-859.
UB-11233	Rib	1402 $\pm$ 33 BP	<b>A.D. 590-671</b>
UB-11234	Fibula	1208 $\pm$ 17 BP	<b>A.D. 772-885</b>
UB-11235	Rib	1290 $\pm$ 17 BP	<b>A.D. 668-726;</b> <b>A.D. 737-771</b>
UB-11236	Rib	630 $\pm$ 16 BP	<b>A.D. 1292-1323;</b> <b>A.D. 1346-1393</b>
UB-11237	Parietal bone	1326 $\pm$ 20 BP	<b>A.D. 654-709;</b> A.D. 747-766
UB-11238	Rib	1263 $\pm$ 17 BP	<b>A.D. 683-776</b>
UB-11239	Rib	1309 $\pm$ 18 BP	<b>A.D. 660-717;</b> <b>A.D. 743-768</b>
UB-11240	Rib	1404 $\pm$ 29 BP	<b>A.D. 598-666</b>
UB-11241	Rib	1349 $\pm$ 29 BP	<b>A.D. 640-711;</b> A.D. 746-766
UB-11242	Rib	1407 $\pm$ 32 BP	<b>A.D. 588-668</b>
UB-11243	Rib	1264 $\pm$ 29 BP	<b>A.D. 667-783;</b> A.D. 788-818; A.D. 842-859
UB-11244	Humerus	1301 $\pm$ 29 BP	<b>A.D. 660-730;</b> <b>A.D. 735-772</b>
UB-11245	Ribs	1306 $\pm$ 30 BP	<b>A.D. 658-730;</b>

			<b>A.D. 735-772</b>
UB-11246	Rib	1335±31 BP	<b>A.D. 646-720; A.D. 742-769</b>
UB-11247	Ulna	1373±24 BP	<b>A.D. 619-678</b>
UB-11248	Humerus	1457±36 BP	<b>A.D. 548-651</b>
UB-11249	Occipital bone	516±21 BP	<b>A.D. 1401-1440</b>
UB-11251	Fibula	1150±27 BP	A.D. 780-791; <b>A.D. 806-972</b>
UB-11252	Femur	1635±38 BP	A.D. 267-272; <b>A.D. 335-538</b>
UB-11253	Humerus	1392±25 BP	<b>A.D. 609-667</b>
UB-11254	Radius	1329±23 BP	<b>A.D. 651-712;</b> A.D. 746-766
UB-11255	Rib	1242±35 BP	<b>A.D. 682-876</b>
UB-11256	Ulna	1237±20 BP	<b>A.D. 689-752; A.D. 761-870</b>
UB-11258	Femur	1213±22 BP	A.D. 719-742; <b>A.D. 769-886</b>
UB-11493	Rib	1473±21 BP	<b>A.D. 554-639</b>
UB-12368	Tibia	1398±22 BP	<b>A.D. 610-663</b>
UB-12369	Fibula	1351±22 BP	<b>A.D. 644-689;</b> A.D. 754-757
UB-12370	Fibula	1402±27 BP	<b>A.D. 602-665</b>
UB-12371	Rib	1424±22 BP	<b>A.D. 596-656</b>
UB-12366	Charcoal from posthole	1385±19 BP	A.D. 619-628; <b>A.D. 631-667</b>
UB-12367	Charcoal from posthole	1442±20 BP	<b>A.D. 580-649</b>
UB-12372	Animal Bone (281)	1123±23 BP	<b>A.D. 883-985</b>
UB-12373	Animal Bone (403)	1382±32 BP	<b>A.D. 603-682</b>

**Rahally, Co. Galway**Grid Ref: **166007/225872**SMR No: **GA086-211**References: **Mullins 2009; Hamilton-Dyer 2009.**

Excavations were undertaken in advance of roadworks in the vicinity of a bivallate rath (GA086-211). This uncovered a Bronze Age hillfort, as well as a neighbouring univallate rath (Ditch 2) and an annex to the bivallate rath (Ditch 8).

The univallate rath had an internal diameter of 32m, and seems to have had an 8m wide entrance in the southwest. A series of small, concentric, cut features were found within the univallate rath. A curvilinear gully consisting of three truncated segments was identified approximately 3m inside Ditch 2. This gully may have aided drainage by collecting water draining from the now destroyed internal ringfort bank. A second curvilinear gully measuring 2 m in length may represent the location of a destroyed structure within the enclosure. Four pits were found within this enclosure and may have functioned as refuse pits or storage pits.

The possible annex to the bivallate rath located on the top of the hill defined a sub-circular enclosure that measures approximately 38m x 40m. One ditch terminus identified in the south probably represents an entrance to the annex though this was not investigated as it lay outside the limit of the excavation. There was no stratigraphic relationship established between this enclosure and the adjacent bivallate rath (GA086-211), however Ditch 8 may represent an annex to this site, or it may alternatively represent a separate, univallate rath similar to Ditch 2. Three radiocarbon dates have been returned from Ditch 8. A basal fill returned an early date of A.D. 20-210. This was derived from a fragment of oak charcoal, which may have been influenced by the 'old wood effect'. Cattle bone from a secondary fill of this ditch produced a date of A.D. 659-779, and charcoal from the secondary fill yielded a date of A.D. 1026-1175.

There is no clear evidence for diagnostic internal structures. A shallow, linear, stony deposit that occurred along the interior of Ditch 8 in the northwest corner may represent the remains of an internal bank, and four rubbish/grain storage pits were also identified.

Three human burials were inserted into the in-fill of ditches 2 and 8, and thus post-date these enclosures. Burial 1, inserted into the univallate ditch, was dated to A.D. 892-1023, suggesting that the rath had fallen out of use by the 9<sup>th</sup>/10<sup>th</sup> century. Although a residual Iron Age date was obtained from a basal fill of Ditch 8 the earliest medieval date from a secondary fill suggests that this annex enclosure was in use by A.D. 659-778. A further date from the upper ditch fills suggests it was abandoned by A.D. 1026-1175. This seems to be supported by the dating of the burials inserted into the ditch – Burial 2 was dated to A.D. 992-1156, and Burial 3 was dated to A.D. 1019-1185.

Diagnostic finds from the univallate ditch include a melon bead, a pewter finger ring and multiple bone comb fragments. The melon bead represents a continuation of an earlier Iron Age type and the pewter ring was probably in circulation for some time before it was deposited in the ditch. The bone comb fragments, however, suggest a 10<sup>th</sup>-century or later date. Of the small finds retrieved from Ditch 8, the glass bead and the penannular brooch (8<sup>th</sup>/9<sup>th</sup> century) represent the best datable finds.

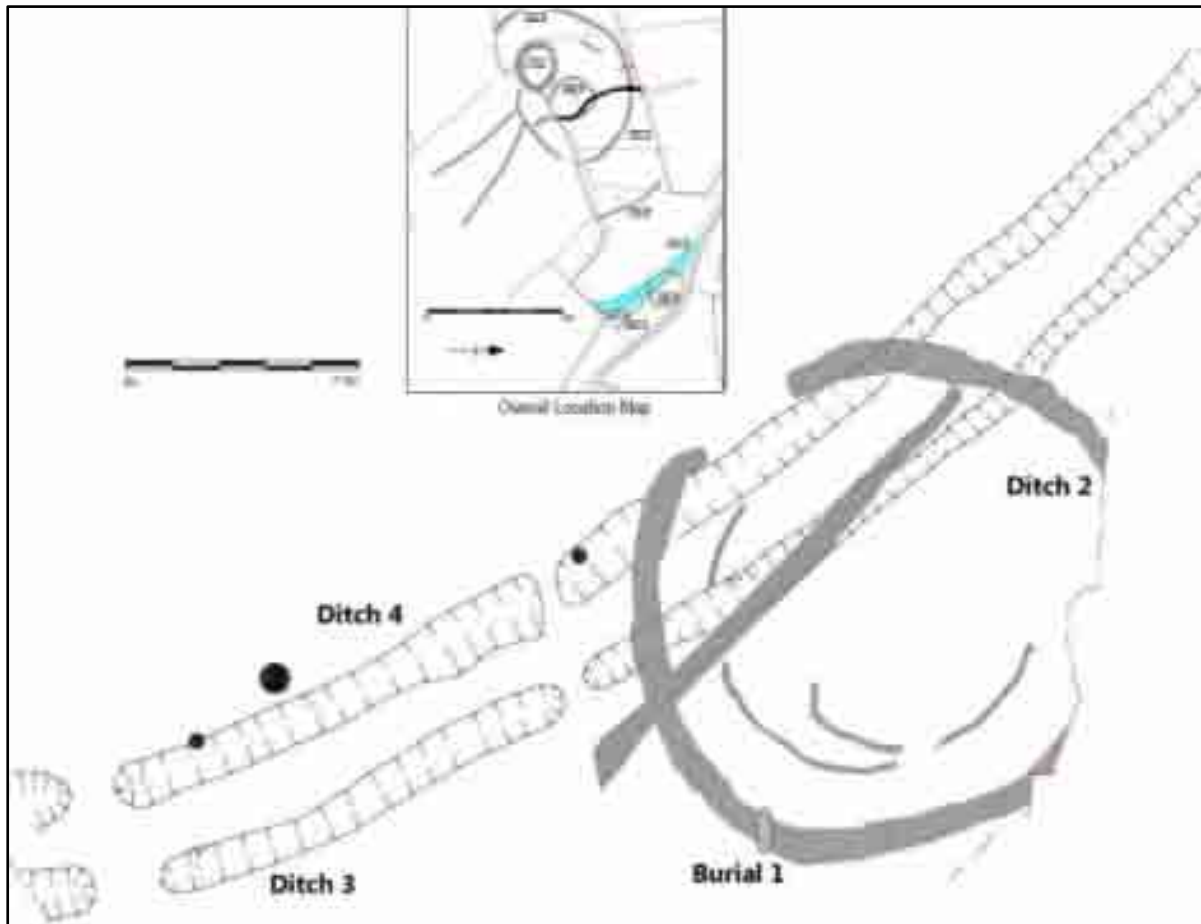
**Animal Bones:**

The total NISP of animal bones from Rahally was 5,305. These were roughly evenly divided between the Bronze Age occupation and the early medieval. The univallate rath ditch produced a large amount of animal bone, 1280 specimens. A notable feature of this assemblage is the high number of red deer remains, presumably linked to antler-working. Ditch 8 produced a smaller collection of animal bone than Ditch 2.

Several of the cattle bones were measurable and include six metapodia giving estimated withers heights of 105.7 cm to 116.6 cm. Two limb bones are sufficiently complete to calculate shoulder heights for dogs. These give estimated heights of 50.9 and 51.5 cm respectively.

Feature	Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Dog	Hare	LM	MM	Date
Ditch 2	214	40	26	29	134	44	2	435	62	7 <sup>th</sup> /8 <sup>th</sup> C?
Ditch 8	226	41	21	20	9	57	-	255	36	7 <sup>th</sup> /8 <sup>th</sup> C?
Other	42	18	4	5	3	-	-	65	16	

# **NISP from early medieval phases at Rahally, Co. Galway**



**Plan of univallate rath at Rahally, Co. Galway (after Mullins 2009)**



**Plan of annex to bivallate rath at Rahally, Co. Galway (after Mullins 2009)**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
Wk22637	Charcoal from basal fill Ditch 6	2826±30 BP	1108-1105 B.C.; 1076-1065 B.C.; <b>1056-902 B.C.</b>
UB-7244	Charcoal from secondary fill Ditch 5	2756±32 BP	994-989 B.C.; <b>979-827 B.C.</b>
Wk22636	Charcoal from basal fill Ditch 3	2509±30 BP	<b>787-538 B.C.</b>
Wk22642	Charcoal from interior of Ditch 8 linear fill	2200±30 BP	<b>375-192 B.C.</b>
Wk22644	Charcoal from basal fill Ditch 8	1911±30 BP	<b>A.D. 20-140;</b> A.D. 148-172; A.D. 194-210
Wk22638	Charcoal from ringfort Ditch 2 secondary fill	1225±30 BP	<b>A.D. 690-750;</b> <b>A.D. 762-885</b>
Wk22640	Charcoal from small pit in Ditch 2	1239±30 BP	<b>A.D. 687-873</b>
Beta-241478	Human bone Burial 1	1070±40 BP	<b>A.D. 892-1023</b>
Beta-241479	Human bone Burial 2	980±40 BP	<b>A.D. 992-1156</b>
Wk22639	Charcoal from pit F181	973±30 BP	<b>A.D. 1016-1155</b>
Wk22641	Charcoal from secondary fill Ditch 8	926±30 BP	<b>A.D. 1026-1175</b>
Beta-2414780?	Human bone Burial 3	940±40 BP	<b>A.D. 1019-1185</b>
UB-7245	Charcoal in vicinity of central bank	884±29 BP	<b>A.D. 1043-1105;</b> <b>A.D. 1118-1218</b>
Wk22646	Charcoal from basal	775±30 BP	<b>A.D. 1216-1280</b>

	fill dumbbell kiln		
Wk22645	Charcoal from posthole fill in Ditch 8	361±30 BP	<b>A.D. 1450-1529; A.D. 1543-1634</b>
UBA-10318	Cattle bone from secondary fill Ditch 8	1298±32 BP	<b>A.D. 661-773</b>

#### Animal Bones Appendix:

	<b>element</b>	<b>fused</b>	<b>unfused</b>
Group 1	distal scapula	24	2
	pelvis acetabulum	16	1
Group 2	proximal radius	13	2
	distal humerus	15	1
	proximal phalanx	17	-
Group 3	distal metapodial	16	4
	distal tibia	12	3
Group 4	femur	8	2
	proximal tibia	6	1
	proximal calcaneus	1	-
	distal radius	3	-
	proximal humerus	4	2
	ulna	-	2
<b>totals</b>		<b>135</b>	<b>20</b>

#### Epiphyseal fusion of cattle bones from early medieval contexts at Rahally, Co. Galway

Group 1	7-10 months	93.0	7.0
Group 2	12-18 months	93.8	6.3
Group 3	24-36 months	80.0	20.0
Group 4	42-48 months	75.9	24.1

#### Survival percentages in cattle at Rahally, Co. Galway

	<b>element</b>	<b>fused</b>	<b>unfused</b>
Group 1	distal scapula	4	-
	pelvis acetabulum	2	-
	proximal radius	1	-
	distal humerus	4	-
Group 2	proximal phalanx	1	-
Group 3	distal metapodial	1	-
	proximal calcaneus	1	-
	distal tibia	1	-
Group 4	femur	3	3
	proximal tibia	1	1
	distal radius	-	1
	proximal humerus	1	1
	ulna	-	2
<b>totals</b>		<b>20</b>	<b>8</b>

#### Epiphyseal fusion of sheep bones from early medieval contexts at Rahally, Co. Galway

Group 1	6-10 months	100	-
Group 2	12 months	100	-
Group 3	15-30 months	100	-
Group 4	30-42 months	38.5	61.5

#### Survival percentages in sheep at Rahally, Co. Galway

**Raheens I, Co. Cork**

Grid Ref: **W76566358 (176569/063589)**

SMR No: **CO087-047**

Reference: **Lennon 1993; McCarthy 1994.**

Raheens I was recorded on the First Edition of the Ordnance Survey 6" maps, although it appears to have been subsequently levelled in the nineteenth century. The excavation revealed two concentric ditches, 4.0m apart, which had diameters of 34m internally and 45m externally. There was no direct evidence for associated banks. A gradually curving trench was identified immediately inside the inner enclosing ditch and was tentatively interpreted as a slot beam trench for a wooden palisade. Several sherds of unglazed pottery, possible early medieval French ware, were recovered in one of the upper fills of the trench and suggest that this backfill took place in either the last stages of occupation or after the site was abandoned.

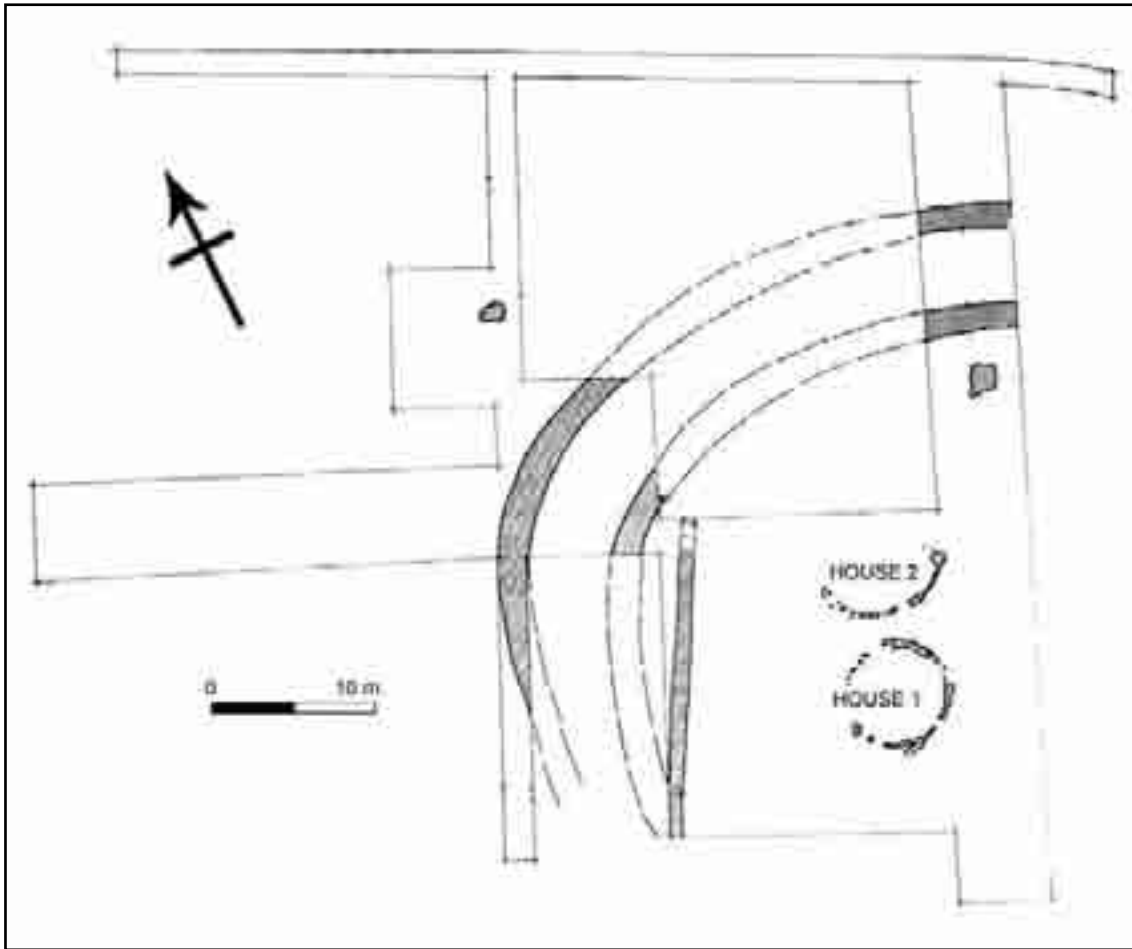
The principal internal features were the two round houses. House 1 and House 2 measured 5m and 6m in diameter respectively and appear to have been principally constructed using slot-trenches and double lines of stakeholes. The entrances to House 1 and House 2 were along the southern and south-eastern sides. No indications of a hearth or internal supports or divisions were uncovered in either structure though these were probably destroyed by recent ploughing activity.

Several dug features were identified but the lack of occupation deposits made stratigraphic associations impossible. A square shaped pit (2m by 2m, and 0.80m deep) was excavated close to the inner ditch and contained a considerable amount of charcoal, a perforated hone stone and an iron knife blade. Two post-pits were situated in the western corners of the pit and may have provided some form of superstructure for this possible storage pit. Phasing of the site was impossible as extensive modern ploughing activity had removed all occupation debris and truncated almost all the features.

A total of thirteen struck flint including one possible Bronze Age tanged and barbed arrowhead were finally recovered on the site.

**Animal Bones:**

The soil conditions meant that only 21 bones were identified to species at Raheens I. Twenty bones belonged to cattle, and, of these, 19 came from a large pit. These may belong to a single individual and may represent the primary butchery waste.



Plan of excavated area at Raheens I, Co. Cork (after Lennon 1993, 76)



## **Raheens II, Co. Cork**

Grid Ref: **W76366348 (176361/063481)**

SMR No: **CO087-046**

Reference: **Lennon 1994; McCarthy 1994**

Raheens II had a diameter of 28m and was enclosed by a much denuded bank. The main ditch fill constituted a single phase of backfilling. A total of eleven structures, some almost complete and others with sections surviving, were uncovered in the interior of the site. All the structures were circular except for one sub-rectangular example. The sub-rectangular structure (4.60m by 6.50m), as well as six other circular structures (4.5m-5.6m), was suitably large in diameter to have functioned as domestic dwellings. Four other structures were smaller in diameter (2.4m-3.5m) and may have been used as outhouses or storage buildings. A burnt layer containing charred hazel twigs, oak charcoal fragments and burnt hazel nut shells as well as several fragments of a shale bracelet partially covered one of the structures and may have resulted from the destruction of its roof or side walls. No evidence of hearths or fire settings was found in association with the structures.

The structures were not all contemporary with each other, and appeared to pre-date the souterrains which belonged to the later activity on the site. Two of these souterrains were excavated and a further one surveyed. Souterrain 1 was situated towards the southern area of the interior and consisted of a single chamber built using vertically and horizontally-laid limestone slabs. A substantial posthole, circular in outline was identified at the base of the souterrain and may have been used as a structural support during the erection of the structure. Souterrain 2 was situated on the northern side of the enclosure and contained a long narrow entrance running from a single chamber into the eastern side of the interior. The possible remains of an uncompleted souterrain (3) were identified in the north-west area of the interior. The backfill of the feature consisted of occupation debris, animal bone (sheep and cattle), shellfish (oyster, whelk and periwinkle), fish bone and charcoal. A polished stone bead was recovered from the up-cast material of one of the souterrains on site.

A small number of un-stratified finds from the site consisted of two hone stones from the top soil and a perforated stone disc from under the spread of bank material which had been deposited after the site was levelled in modern times.

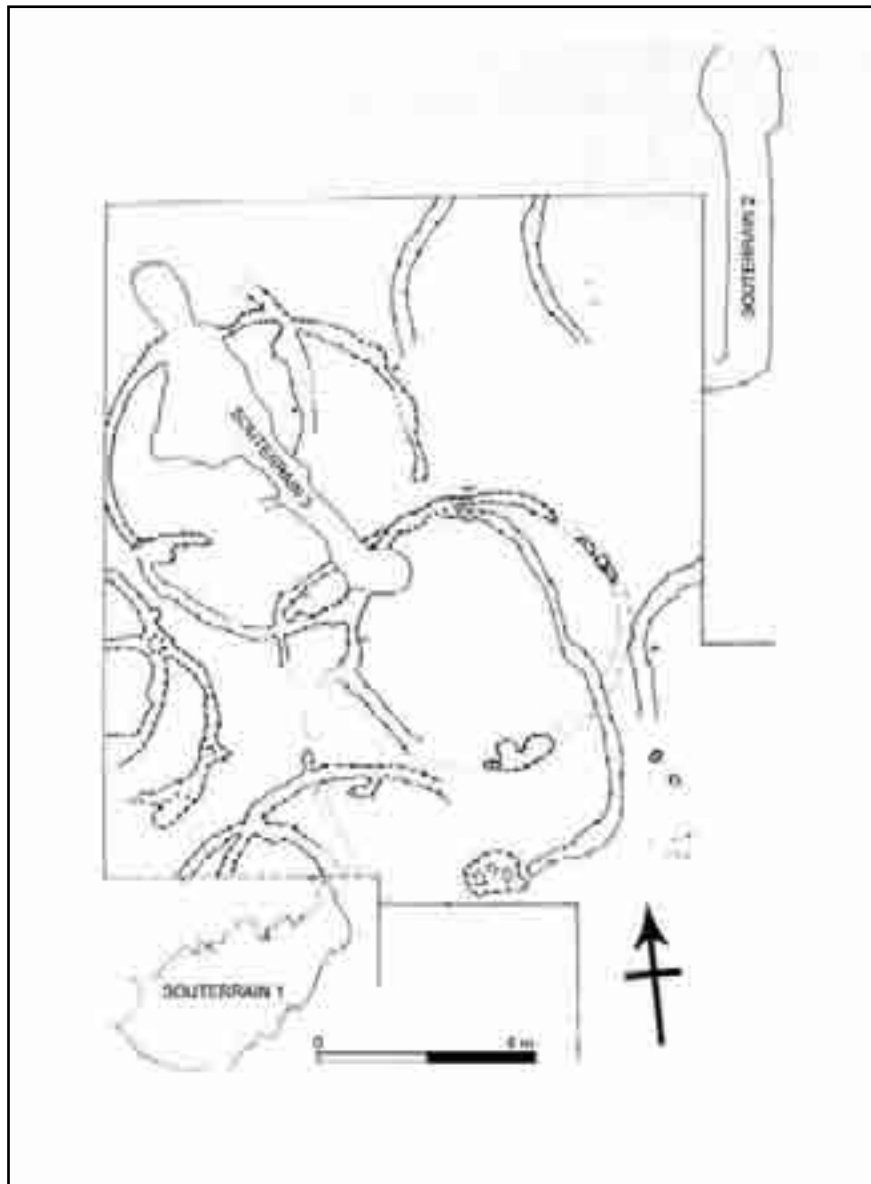
### **Animal Bones:**

A quantity of animal bone fragments was recovered, the majority belonging to the backfill of the two excavated souterrains. Only 26 of the 425 bones recovered from the interior of the enclosure at Raheens II could be identified to species.

	<b>Cattle</b>	<b>Sheep</b>	<b>Pig</b>	<b>Dog</b>	<b>Bird</b>	<b>Fish</b>	<b>Other</b>	<b>Unident</b>	<b>Date</b>
Enclosure	11	15	-	-	1	-	75	84	?
Souterrain 1	15	9	30	14	-	-	137	17	?
Souterrain 2	13	3	1	-	-	2	7	-	?

### **NISP from features in Raheens II, Co. Cork.**

At least three pigs from Souterrain 1 would appear to have been very young, whereas the remainder of the bones came from animals between 2 and 3 years old. At least four cattle were present in Souterrains 1 and 2 – two ranged in age from 1½ - 2½ years old; one was a small calf; and one was over four years old. The sheep appear to have been kept to at least 2½ years old before being slaughtered.



Plan of some of houses and souterrains at Raheens II, Co. Cork (after Lennon 1994, 52).

**Rathgurreen, Co. Galway**Grid Reference: **F37872002 (13787/22002)**SMR No: **GA095-009**Reference: **Comber 2002; Murray 2002.**

The enclosure at Rathgurreen consisted of an inner enclosure with an internal diameter of 49m, and an outer enclosure with an internal diameter of 76m. Like many bivallate enclosures, excavation revealed that the site had originally been a univallate enclosure, however, unlike the vast majority of such sites Rathgurreen was converted into a bivallate enclosure by building a second series of vallation inside the original univallate enclosure. Both sets of banks were faced internally and externally with dry-stone walls. A suggested 'fighting terrace' or palisade trench had been identified in previous visual surveys of the outer bank, however in excavation this was revealed to be a result of the gradual settling of the bank material between the dry-stone walls that formed the inner and outer faces of the earthen bank. There was some evidence of possible metallurgy in the interior of the site, but no structural remains were identified during excavation. A number of pits were excavated in the interior, some of which may have functioned as rubbish pits, but others may have been used for iron-smelting.

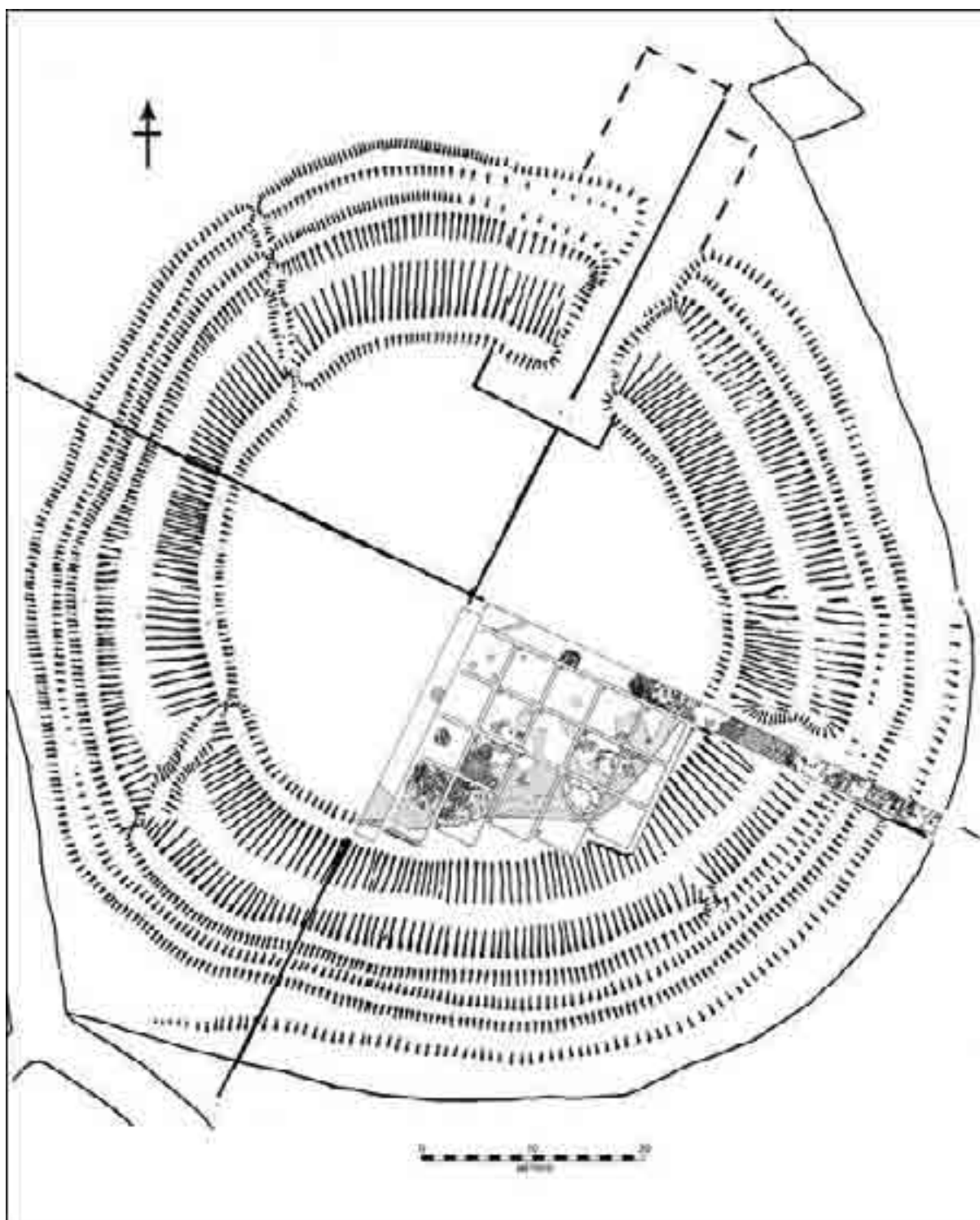
The artefactual remains, therefore, constitute the majority of information from this site. Finds from the univallate phase included a bronze pin; a decorated bronze ring; two bronze links; and a fragment of bronze. Bronze working appears to have been undertaken on site and sherds of clay crucibles found from this phase may relate to this. The discovery of a shell midden of dog-whelks suggests that purple dye was produced on site. A sherd of E-ware, and a possible painted clay bead were also recovered from the early phase. Bronze-working may have also been carried on during the bivallate phase; ironworking appears to have been practised throughout the life of the site as iron slag was found for both phases. Finds from the bivallate phase included fragments of an iron knife; an iron pin; possibly an iron triskele-shaped object; and possibly an iron penannular brooch – both the latter are unprovenanced. Parts of tuyères with green/red vitreous material and/or slag were found from this phase. The presence of a Roman-type pottery oil lamp, like the sherd of E-ware from the earlier phase, suggests that Rathgurreen had some access to imported goods in the seventh/eighth centuries. There are some problems, however, with fitting the oil-lamp into the later phase, and it is suggested that it may have been a curated item on site, having been imported perhaps during the earlier phase.

**Animal Bones:**

The study was conducted on a faunal assemblage which had been collected over fifty years previously, and was therefore subject to loss and disintegration during this time period.

Phase		Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Hare	Red Deer	Date
Phase I										A.D. 408-659.
	NISP	441	108	108	13	1	1	2	-	
	%NISP	65.5	16.0	16.0	2.0	0.1	0.1	0.3	-	
	MNI	10	5	5	1	1	1	1	-	
	%MNI	42	21	21	4	4	4	4	-	
Phase II										A.D. 660-860
	NISP	877	306	164	28	6	4	1	6	
	%NISP	63.0	22.0	11.8	2.0	0.4	0.3	0.1	0.4	
	MNI	18	9	10	2	2	1	1	1	
	%MNI	41	20	23	5	5	2	2	2	

**NISP and MNI from Rathgurreen, Co. Galway.**



Excavated area at Rathgurreen, Co. Galway (after Comber 2002, 141, 158-9)

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Huguen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

(\* - calibrated with marine reservoir effect: KA Huguen, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, PJ Reimer, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1059-1086.)

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UB-4323	Bone- Phase 2- in inner ditch	1275 $\pm$ 36 BP	<b>A.D. 660-783;</b> A.D. 788-821; A.D. 842-860
UB-4331	Shell- Phase 1- under inner bank	1925 $\pm$ 30 BP	<b>*A.D. 408-659.</b>

## Animal Bones Appendix:

### Cattle:

Fusion data for cattle bones from both phases indicated that the majority of cattle were over two years old when killed. A metacarpal from the interior of Phase II had an unfused proximal epiphysis, while Pit 7 produced two neonate humeri and a tibia.

Four withers height values were calculated and ranged between 111.1cm and 122.1cm.

### Sheep/Goat:

The sheep/goat fusion data suggested that the majority of sheep killed were over two years of age. Two neonate sheep humeri and one neonate tibia were recovered from Phase I, while an unfused proximal metacarpal from Phase II indicated the presence of a second neonate lamb.

Species	Element	Approx. age of slaughter
Sheep/goat	M2	11-12 months
	Mandible	28 months
	Mandible	28 months
	Mandible	28 months

### Age of slaughter based on sheep mandible and tooth wear.

### Pig:

Bone	Approx Age of Fusion	Phase I		Phase II	
		No. Fused	No. Unfused	No. Fused	No. Unfused
Humerus, d. Radius, p.	1 yr	7	-	9	-
Metacarpal, d. Tibia, d.	2 yrs	1	5	5	4
Metatarsal d.	2.25 yrs	1	-	-	-
Humerus, p., Radius, d., Ulna, Femur, p & d., Tibia, p.	3½ yrs	1	7	-	8

### Epiphyseal fusion of pig bones

**Rathmullan Lower, Co. Down**Grid Ref: **J47753736 (34775/33736)**SMR No: **DOW 044:016**Reference: **Lynn 1981-2; Collins 1981-2.**

The site was a man-built mound (8m high) with a faint surrounding. Excavation revealed a number of distinct phases of occupation dating from the Early Medieval period through to Anglo-Norman occupation.

The earliest identified occupation phase (Phase I) contained a series of post-holes and stake-holes which, in association with the curvilinear drip-gullies, were interpreted as the remains of one or more wooden or wattle-built roundhouses. It was not possible to identify whether this settlement was enclosed by an earthwork or fence at this time. An early date (mid-fifth to mid-seventh century) was obtained from charcoal in the hearth of one of these houses, and this date coincides with the late-sixth/seventh-century date suggested by the discovery of two sherds of imported E-ware in the occupation layer.

The primary occupation phase was then buried under a dump of topsoil. This appears to have been used as a platform on which a wattle-walled roundhouse (approximately 8m in diameter) was constructed. The Phase II roundhouse was almost directly built over the location of the earlier roundhouse, perhaps indicating continuity of settlement.

The site was remodelled again and there is evidence for the construction of a structure of rectangular-plan structure with stone-footings. It seems probable that this structure was built in association with the souterrain which was constructed at this time. Two radiocarbon dates from this phase suggest occupation in the ninth/tenth centuries.

The Phase III structures were later covered by an enigmatic spread of boulders, which may represent the footings for rectangular-shaped clay buildings. This phase is unlikely to have ended earlier than the eleventh century, and may indeed belong wholly, or partly, to the twelfth century.

The site was raised by 2m c. A.D. 1200 when it was transformed into an Anglo-Norman motte, and was later increased in height by a further metre.

Souterrain-ware dominated the pottery finds from the Early Medieval site, with the sole exception of the two sherds of 'E'-ware from the Phase 1 occupation. A number of quern-stones (probably of Mourne granite) were uncovered from Phase 2; two mill stones (of Scrabo sandstone) were also recovered, though these would appear to have been associated with the later motte phase. Large numbers of iron objects (mainly nails) and a number of copper alloy objects (mainly clothing pins) were also found in the various Early Medieval occupation layers.

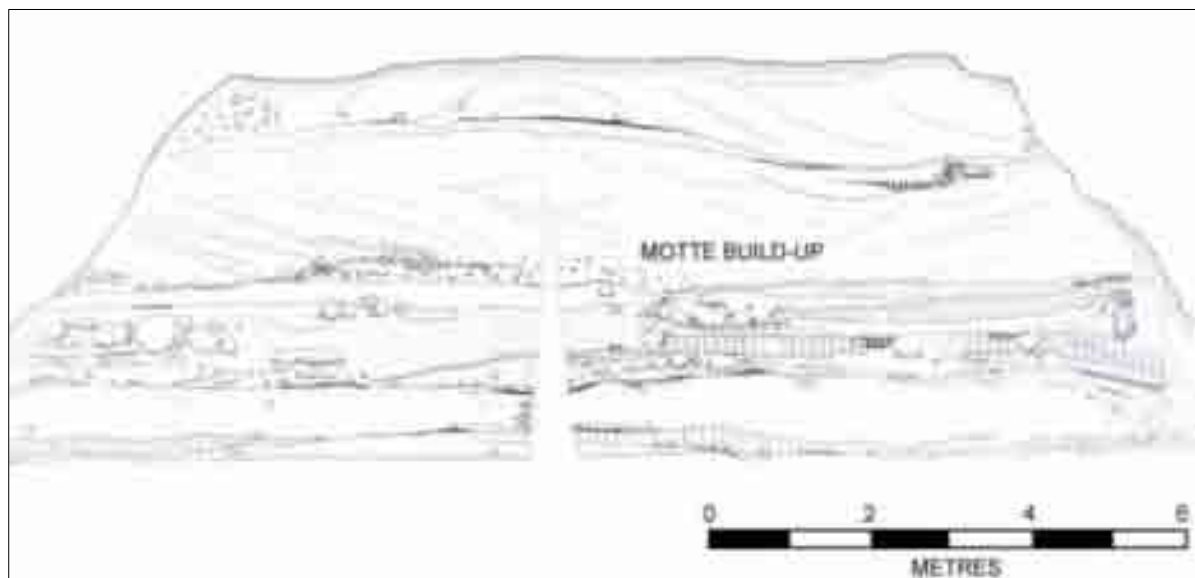
**Animal Bones:**

Some 1200 bone fragments were recovered from Phase I, of which 41% were identifiable. Phase II produced 3500 bone fragments, (46% identifiable), and 1115 bone fragments came from Phases III and IV, of which 49% were identifiable. The quantification is limited to the three major domesticates. Remains of red deer suggest that they were being utilised for food.

Phase		Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Red Deer	Whale	Date
I										A.D. 438-643
	%NISP	41.4	9.6	42.7	P	P	P	P (9)	-	
	MNI	9	4	12	-	-	-	-	-	
II										?
	%NISP	56	23	16	P	P	P	P	P	
	MNI	20	34	11	-	-	-	-	-	

Phase III/IV										A.D. 780-1014
	%NISP	51	30	9	P	P	P	P	P	
	MNI	8	16	4	-	-	-	-	-	

**Percentage NISP and MNI from Rathmullan Lower, Co. Down.**



**Section of Rathmullan, Co. Down (after Lynn 1981-2, facing 70).**

#### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
UB-2524	Charcoal from Anglo-Norman motte phase	1165 $\pm$ 55	A.D. 695-698; A.D. 708-747; <b>A.D. 765-990.</b>
UB-2525	Charcoal from souterrain infill	1085 $\pm$ 20	<b>A.D. 895-925;</b> <b>A.D. 936-1014.</b>
UB-2526	Charcoal from Phase 1 hearth.	1500 $\pm$ 40	<b>A.D. 438-492;</b> <b>A.D. 508-519;</b> <b>A.D. 528-643.</b>
UB-2527	Charcoal from floor of Phase 3 house	1130 $\pm$ 40	A.D. 780-792; <b>A.D. 803-992.</b>

## Animal Bones Appendix:

### Cattle:

Cattle age slaughter in Phase I would appear to focus on the younger animals, with about 50% killed before reaching 2½ years. In Phases II and III, however, the slaughter age is raised to between 2½ and 3½ years.

Phase	SLC	GLP	LG	BG
1	4.36	5.80	4.85	4.0
2	-	5.98	5.02	4.24
3-4	4.79	6.39	5.57	4.56
5	-	6.3	4.96	4.28
7	-	-	-	-

### Scapula Measurements

Phase	Bd	BT
1	8.31	7.16
2	7.67	6.95
3-4	7.80	6.87
5	7.9	6.5
7	-	-

### Humerus Measurements

Phase	Bd	Dd
1	5.53	-
2	5.75	4.23
3-4	5.9	4.27
5	5.4	-
7	6.1	-

### Tibia Measurements

Phase	GL	Bp	SD	BD
1	-	4.46	2.3	-
2	20.6	4.26	2.34	5.01
3-4	20.5	4.10	2.4	4.79
5	-	4.43	-	5.04
7	-	-	-	-

### Metacarpal Measurements

### Sheep/Goat

Few sheep in Phase I were slaughtered before the age of 18-24 months, and most were killed before reaching 42 months. A similar pattern seems to be repeated in Phase II where most animals survived until about 30 to 36 months.

Phase	SLC	GLP	LG	BG
1	1.92	3.01	2.32	1.93
2	-	3.15	2.64	2.09
3-4	-	-	-	-
5	-	-	-	-
7	-	2.6	2.2	1.5

### Scapula Measurements



Phase	Bp	Bd	BT
1	-	2.73	2.64
2	3.20	2.82	2.62
3-4	-	-	-
5	-	2.64	2.65
7		2.6	2.4

#### **Humerus Measurements**

Phase	GL	BFp	Bp	BFd	Bd
1	-	2.62	2.82	-	2.7
2	15.06	2.69	2.99	2.84	2.85
3-4	-	-	-	-	-
5	13.85	2.52	2.71	2.26	2.45
7	-	2.3	2.5	-	-

#### **Radius Measurements**

Phase	Bp	Bd	Dd
1	3.6	2.36	-
2	4.0	2.37	1.81
3-4	-	2.33	2.3
5	-	2.43	1.88
7	-	-	-

#### **Tibia Measurements**

#### **Pig**

In both Phases II and III the pigs appear to have been slaughtered around 36 months. Few of the pigs were slaughtered before the age of 18 to 24 months, however most were killed at or about 36 months, with very few individuals surviving past this age.

Phase	SLC	GLP	LG	BG
1	-	-	-	-
2	-	3.30	2.54	2.3
3-4	2.02	-	-	-
5	2.1	3.3	-	2.3
7	-	3.3	2.6	2.1

#### **Scapula Measurements**

Phase	BPC
1	-
2	1.96
3-4	1.91
5	1.77
7	-

#### **Ulna Measurements**

## Ratoath, Co. Meath

Grid reference: **O01355215 (30135/25215)**

SMR No: **N/A**

Reference: **Wallace 2010; Beglane undated.**

Excavation revealed a circular enclosure, 40m in internal diameter, associated enclosures, and evidence for burial, agricultural and industrial activity. The primary ditch fill of the main enclosure returned a date of A.D. 547-655, while an upper fill was dated to A.D. 647-778. A potential outer enclosure ditch approximately 14m west of the settlement-cemetery enclosure was detected.

A number of ditches, gullies and pits were uncovered which spanned the fourth to tenth centuries. No coherent plan for any domestic structures was identified but some of the gullies and slot trenches undoubtedly supported timber buildings. A substantial east-west slot-trench returned a radiocarbon date of A.D. 809-989 which was chronologically later than a date taken from the upper fill of the enclosure ditch. Another gully, which formed part of a boundary to the cemetery on its western side, was dated to A.D. 685-892.

A large volume of iron smithing slag was recovered from the fills of two L-shaped ditches immediately to the north of the enclosure, and from the south of the main enclosure. Two dates from the ditch fills ranged from A.D. 427-608 to A.D. 637-772. This larger ditch formed an annexe with two other smaller ditches which enclosed a large charcoal spread and a small keyhole-shaped kiln (dated to A.D. 431-600).

A cemetery was found to the south-east of the complex. Forty nine burials were identified - 32 adults, 13 juveniles, three infants and five deposits of disarticulated human remains – including that of a young female (dated A.D. 668-832) buried with a copper-alloy neck-ring similar to one found at a cemetery in Norfolk.

Several variously-shaped cereal-drying kilns were also identified to the east of the enclosure and they produced large quantities of cereal grains. A large example with a baffle stone was dated to A.D. 860-1018 while a teardrop-shaped and a figure-of-eight-shaped kiln both produced Iron Age dates.

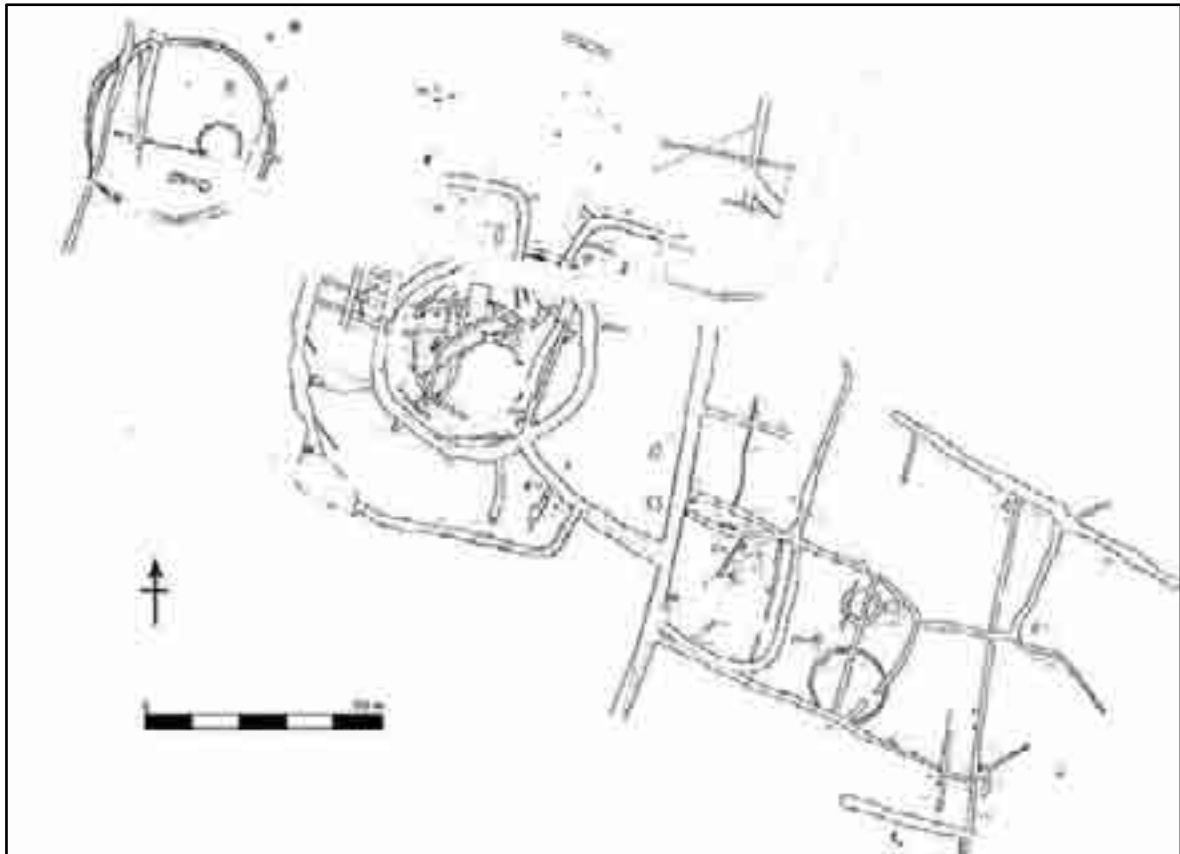
A number of unstratified finds included bone tools associated with weaving, a spindle whorl, lignite bracelet fragments, a blue glass bead, a fragment of an amber bead and two bone comb fragments. A sherd of E ware was also found in the enclosure area.

### Animal Bones:

In total, 2730 identified mammal bones were recovered.

Phase		Cattle	Sheep/ Goat	Pig	Horse	Dog	Cat	Deer	Date
Early									5 <sup>th</sup> /7 <sup>th</sup> C
	NISP	1119	383	378	38	19	4	1	
	%NISP	57.6	19.7	19.5	2.0	1.0	0.2	0.05	
	MNI	31	13	20	2	3	1	1	
	%MNI	43.7	18.3	28.2	2.8	4.2	1.4	1.4	
Late									7 <sup>th</sup> /9 <sup>th</sup> C
	NISP	48	15	23	1	-	-	1	
	%NISP	54.5	17.0	26.1	1.1	-	-	1.1	
	MNI	3	2	2	1	-	-	1	
	%MNI	33.3	22.2	22.2	11.1	-	-	11.1	

### NISP and MNI from Ratoath, Co. Meath



**Plan of enclosures at Ratoath, Co. Meath (after Wallace 2010).**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46: 1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
Beta-196367	Bone from small ringditch	2870 $\pm$ 40 BP	1193-1171 B.C.; 1168-1143 B.C.; <b>1132- 922 B.C.</b>
UB-6539	Charcoal from cereal-drying kiln	1867 $\pm$ 36 BP	<b>A.D. 70-235</b>
UB-6538	Charcoal from cereal-drying kiln	1812 $\pm$ 35 BP	A.D. 90-100; <b>A.D. 124-261;</b> A.D. 281-325
Beta-196364	Bone from large ringditch	1790 $\pm$ 40 BP	<b>A.D. 127-345</b>
Beta-198517	Bone from oval pit	1630 $\pm$ 40 BP	A.D. 268-271; <b>A.D. 335-540</b>
Beta-198519	Bone from north-south slot-trench	1600 $\pm$ 40 BP	<b>A.D. 383-560</b>
UB-6546	Carbonised grain from pit	1589 $\pm$ 35 BP	<b>A.D. 403-551</b>
UB-6542	Charcoal from slot-trench	1569 $\pm$ 35 BP	<b>A.D. 416-565</b>
Beta-198510	Bone from east-west ditch	1530 $\pm$ 40 BP	<b>A.D. 427-608</b>
UB-6543	Carbonised seed from cereal-drying kiln	1532 $\pm$ 35 BP	<b>A.D. 431-600</b>
Beta-196362	Bone from curvilinear ditch	1490 $\pm$ 60 BP	<b>A.D. 432-498;</b> <b>A.D. 501-651</b>

UB-6540	Charcoal from linear feature	1501±38 BP	<b>A.D. 435-491;</b> <b>A.D. 509-518;</b> <b>A.D. 528-642</b>
Beta-196366	Bone from linear ditch	1490±40 BP	A.D. 436-489; A.D. 513- 516; <b>A.D. 530-648</b>
Beta-198518	Bone from curved ditch	1480±40 BP	A.D. 441-455; A.D. 460-484; <b>A.D. 533-651</b>
Beta-196371	Bone from linear ditch	1410±60 BP	<b>A.D. 536-720;</b> A.D. 742-769
Beta-198522	Bone from enclosure ditch	1450±40 BP	<b>A.D. 547-655</b>
Beta-196363	Bone from linear ditch	1410±40 BP	<b>A.D. 569-671</b>
Beta-196369	Bone from linear ditch	1380±40 BP	<b>A.D. 582-694;</b> A.D. 704-705; A.D. 748-765
Beta-198520	Bone from curved feature outside enclosure	1310±80 BP	<b>A.D. 585-894;</b> A.D. 929-931
UB-6544	Carbonised grain from pit	1390±34 BP	<b>A.D. 597-680</b>
Beta-198512	Bone from north-south ditch	1350±40 BP	<b>A.D. 614-723;</b> A.D. 739-770
Beta-198509	Bone from east-west ditch	1340±40 BP	<b>A.D. 637-772</b>
Beta-198513	Bone from curvilinear ditch	1310±40 BP	<b>A.D. 647-778</b>
Beta-198516	Bone from enclosure ditch	1320±40 BP	<b>A.D. 648-774</b>
Beta-198523	Bone from enclosure ditch	1310±40 BP	<b>A.D. 647-778</b>
Beta-198511	Bone from ditch	1300±40 BP	<b>A.D. 649-781;</b> A.D. 791-807
Beta-196365	Bone from linear ditch	1260±40 BP	<b>A.D. 668-832;</b> A.D. 836-869
UB-6545	Carbonised grain from possible furnace	1225±34 BP	<b>A.D. 688-753;</b> <b>A.D. 760-886</b>
Beta-198515	Bone from ditch	1220±40 BP	<b>A.D. 685-892</b>
Beta-198521	Bone from slot-trench	1220±40 BP	<b>A.D. 685-892</b>
UB-6541	Charcoal from re-cut of slot-trench	1131±35 BP	A.D. 782-790; <b>A.D. 809-989</b>
Beta-196368	Seed from cereal-drying kiln	1110±40 BP	A.D. 783-787; A.D. 817-843; <b>A.D. 860-1018</b>
Beta-198514	Bone from curvilinear ditch	910±40 BP	<b>A.D. 1032-1210</b>
Beta-196372	Re-cut of ditch	740±60 BP	<b>A.D. 1166-1319;</b> A.D. 1351-1390
Beta-198505	Bone from burial 25	1570±40 BP	<b>A.D. 409-575</b>
Beta-198504	Bone from burial 12	1540±40 BP	<b>A.D. 426-600</b>
Beta-198508	Bone from burial 54	1490±40 BP	A.D. 436-489; A.D. 513-516; <b>A.D. 530-648</b>
Beta-198506	Bone from burial 27	1450±40 BP	<b>A.D. 547-655</b>
Beta-196361	Bone from burial 34	1410±40 BP	<b>A.D. 569-671</b>
Beta-198507	Bone from burial 51	1300±40 BP	<b>A.D. 649-781;</b> A.D. 791-807
Beta-196360	Bone from burial 38	1260±40 BP	<b>A.D. 668-832;</b> A.D. 836-869

## Animal Bones Appendix:

### Cattle:

	Number of mandibles					
<i>Age Group (months)</i>	<7	7-13	13-24	24-36	36-50	>50
Early Phase	3	1	6	8	4	12
%	8.8	2.9	17.6	23.6	11.8	35.3
Late Phase		1	1			2
%	0	25	25	0	0	50

#### Cattle age at slaughter based on mandible data

Age Group	Early Phase	Late Phase
Neo/prenatal	0.0	0.0
7-12 months	13.6	0.0
12-24 months	0.0	0.0
24-36 months	20.2	50.0
36-48 months	0.0	0.0
Over 48 months	66.2	50.0

#### Cattle age at slaughter based on fusion data

Estimated Withers Height (cm)	Early Phase	Late Phase
100-105	1 (102)	
106-110	3	
111-115	5	
116-120	6	1 (118)
120-125	3	1 (122)
Average	115 cm	

#### Summary of estimated withers height (cm) for cattle.

Metacarpal Bd	Female	Indet.	Male	E.W.H.
50-53	6			110 cm.
53.1-56	3			102 cm; 110 cm.
56.1-58		1		
58.1-61			1	
61.1-64				
64.1-67			3	117 cm.; 118 cm.

#### Summary of cattle gender (based on metacarpal bd) and estimated withers heights.

### Sheep:

	Number of mandibles Corrected count per Payne (1973)				
Age Group	<1 yr	1-2yrs	2-4yrs	4-6yrs	>6yrs
Early Phase	9.75	8.87	5.15	4.23	0
%	34.8	31.7	18.4	15.1	0.0
Late Phase	0	1	0	0	0
%	0.0	100.0	0.0	0.0	0.0

#### Sheep age at slaughter based on mandible data

Age group	Early Phase	Late Phase
Neo/prenatal	0.0	0.0
3-16 months	8.6	0.0
16-36 months	18.0	75.0
36-42 months	11.4	0.0
Over 42 months	61.9	25.0

#### Sheep age at slaughter based on fusion data

Element	E.W.H (cm)
Metatarsal	54
Metcarpal	57

#### Estimated withers height of sheep from Early Phase

#### Pigs

	Early Phase					Late Phase				
Age Group (Months)	0-12	12-19	19-25	25-30	>30	0-12	12-19	19-25	25-30	>30
Males	1	4	1	0	0	0	0	1	0	0
Females	0	0	0	1	0	0	1	0	0	0
Total	5	8	11	3	0	0	1	1	0	0

#### Pig age at slaughter based on mandible data

	Early Phase	Late Phase
Neo/prenatal	0.0	0.0
12-18 months	19.2	0.0
18-30 months	54.1	75.0
30-42 months	20.0	25.0
Over 42 months	6.7	0.0

#### Pig age at slaughter based on fusion data

	Early Phase		Late Phase	
	Male	Female	Male	Female
Mandibles with canine	9	1	1	1
Crania with canine	2			
Loose mandibular teeth	21	9	3	
Loose maxillary teeth	9	5	1	
<b>Total</b>	<b>41</b>	<b>15</b>	<b>4</b>	<b>1</b>

#### Sexing of pigs by phase

## Horse

Age (Years)	Early Phase	Late Phase
<5		
5-7	1	
8-10	4	1
11-13	3	
14-18	1	
18-20		
>20	2	

### Horse age at death or slaughter from loose teeth and mandibles

One horse metacarpal from the Early Phase gave a value of 140cm, or 13.8 hands.

## **Raystown, Co. Meath**

Grid reference: **O04975147 (304976/251474)**

SMR No: **N/A**

Reference: **Seaver 2005; Seaver 2006; Seaver 2010; Murray 2007.**

A number of early medieval phases were identified at Raystown. The initial activity was focused on a penannular burial enclosure (22m x 18m) on top of the ridge that was dated between the fourth and sixth centuries. Eight of the twenty radiocarbon-dated human burials came from this phase and six of these were clustered close to the centre of the enclosure. One of them cut the ditch and was dated to A.D. 432-602 which suggests that the ditch was back-filled by the end of the sixth century. Broadly contemporary cereal-drying kilns were situated to the south and north-east of the burial ground.

During Phase II (A.D. 500-700) a 50m diameter outer burial enclosure was dug around the original cemetery enclosure. A rim fragment of an imported continental glass vessel – dating between the fifth and seventh centuries – came from the lower plough-soil within the enclosure while a date of A.D. 654-779 was obtained from the northern part of the enclosure ditch. Further burials were placed in the newly expanded area. Settlement evidence belonging to this phase was identified to the north of the cemetery and consisted of several gullies and an earth-cut souterrain. Post-holes along the latter's passageways indicate that it was roofed and it had a circular chamber with a ring of post-holes cut into the floor and walls. Cereal grain from one of the post-holes was dated between the mid sixth and mid seventh centuries. There was considerable arable activity in the northern and southern parts of the site during this phase. Four figure-of-eight-shaped cereal drying kilns were present; two in each area. The southern kilns were associated with gullies which drained into a substantial ditch that was possibly the tailrace of a mill.

Phase III (A.D. 600-800) was identified by the construction of a sub-rectangular enclosure around the burial ground and northern habitation area. The ditch was open between the mid seventh and early ninth centuries and a rare iron horse snaffle was retrieved from its fill. A stone-built souterrain also belonged to this phase. Cereal processing was important during this phase, and two watermills were constructed - Southern Mill 1 was radiocarbon dated to A.D. 660-782; and Southern Mill 4 returned a date of A.D. 653-772.

In Phase IV (A.D. 700-900) the Phase III enclosure was backfilled and settlement continued in the southern section of the site. A new substantial mill in the southern mill complex, Southern Mill 5, was constructed, and large-scale cereal processing was evident for the first time in the northern part of the site. Northern Mill 1 was constructed, with a millrace that utilised the east-west part of the sub-rectangular enclosure, and a stone stone-built cereal-drying kiln in the northern habitation area was dated to A.D. 799-975. The burial enclosure contained in use, and a single burial from this phase was dated to A.D. 766-898.

A second water mill (Northern Mill 2) replaced the initial mill in the northern part of the site during Phase V (A.D. 900-1150). It was constructed between A.D. 887-1017 and used a different water-source from the one used by Northern Mill 1. It was abandoned during the twelfth century. Another mill – the Central Mill – was constructed and cut many of the main features in the southern area during Phase V. It is likely that the Southern Mill Complex had fallen out of use by this time. Settlement evidence during this phase included a hearth and a baking-slab, gullies and metalling, slot-trenches of a possible rectangular building and a further series of hearths that were associated with this building. A single burial in the cemetery – dating to A.D. 809-989 – belongs to this phase.

The presence of a late-eleventh/mid-twelfth-century stickpin within the burial ground suggests the possibility that burial continued in use into the 1100s, and the presence two candle holders dating between the mid eleventh and thirteenth centuries suggest that there was still some form of settlement there at this time. The small quantities of late medieval pottery recovered from the site, however, suggest that it was abandoned during the twelfth century.



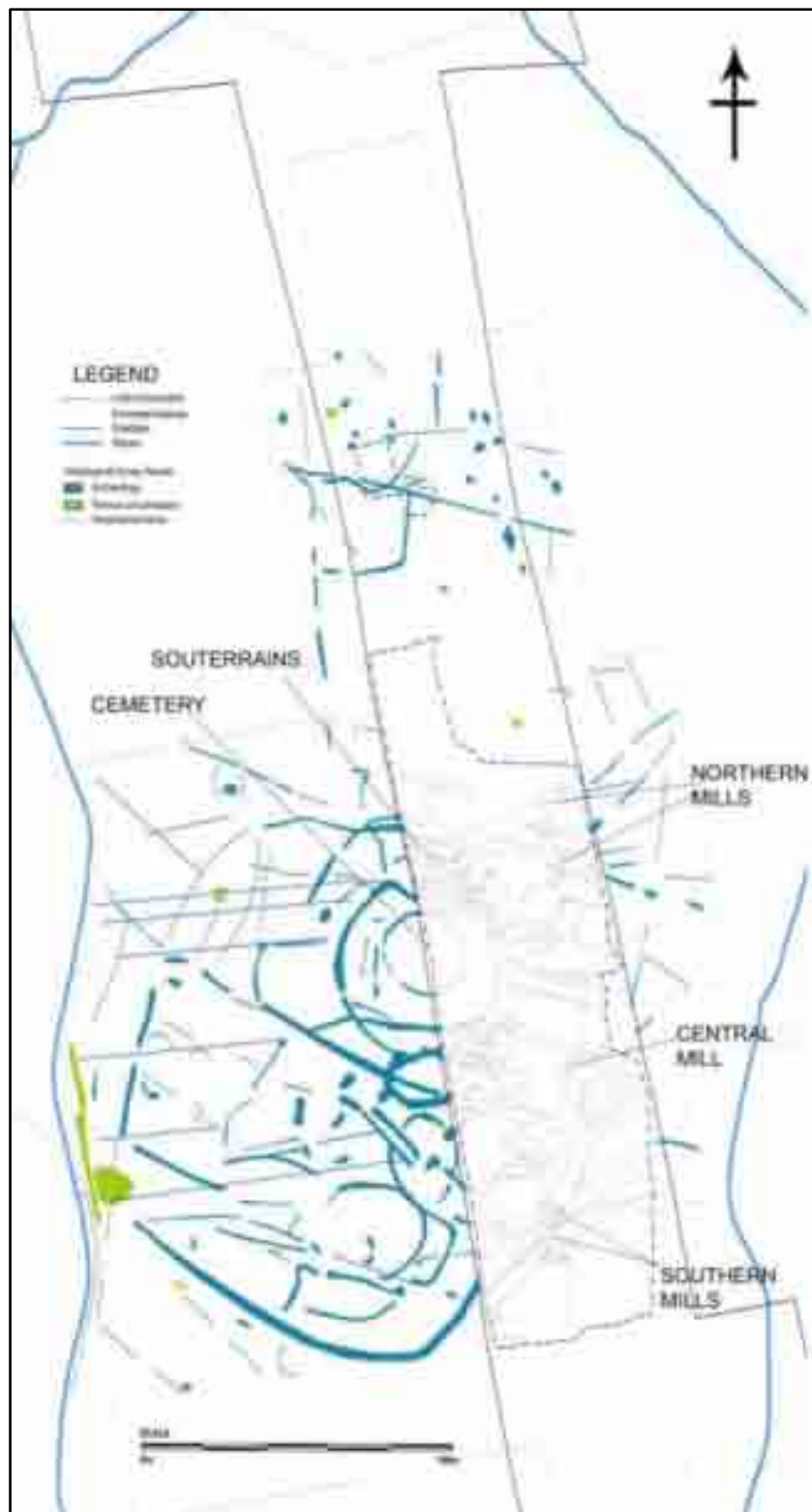
## Animal Bones:

A substantial assemblage of animal bone was recovered totalling nine thousand countable specimens. A relatively high number of horse bones – mainly from ponies – suggest they were utilised for haulage while horses may have pulled ploughs. Bird bones accounted for 2% of the total NISP.

Butchered horse bones were also recorded at Raystown (3% NISP), and these indicate that horse flesh was eaten by the inhabitants and/or their dogs on occasion.

Phase		Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Dog	Cat	Other	Date
I										A.D. 340-600
	NISP	235	142	62	16	P	-	3	-	
	%NISP	51.1	30.9	13.5	3.5	-	-	0.6	-	
	MNI	7	7	3	1	-	-	1	-	
	%MNI	36.8	36.8	15.8	5.3	-	-	5.3	-	
II										A.D. 500-700
	NISP	1656	791	526	162	1	15	53	3	
	%NISP	51.1	24.4	16.2	5.0	<0.1	0.5	1.6	<1.1	
	MNI	50	31	26	7	1	2	4	3	
	%MNI	40.3	25.0	21.0	5.6	0.8	1.6	3.2	0.8	
III										A.D. 600-800
	NISP	998	494	385	122	1	39	3	25	
	%NISP	46.3	22.9	17.9	5.7	-	1.8	0.1	1.2	
	MNI	24	26	14	6	1	3	2	6	
	%MNI	29.3	31.7	17.1	7.3	1.2	3.7	2.4	7.3	
IV										A.D. 700-900
	NISP	242	106	59	52	-	3	2	1	
	%NISP	51.8	22.7	12.6	11.1	-	0.6	0.4	0.2	
	MNI	8	2	2	2	-	1	1	1	
	%MNI	47.1	11.8	11.8	11.8	-	5.9	5.9	5.9	
V										A.D. 900-1150
	NISP	485	190	134	64	1	22	16	1	
	%NISP	52.7	20.6	14.5	6.9	0.1	2.4	1.7	0.1	
	MNI	12	10	6	2	1	2	2	1	
	%MNI	33.3	27.8	16.7	5.6	2.8	5.6	5.6	2.8	

**NISP and MNI of mammalian bone from early medieval phases at Raystown, Co. Meath**



Plan of Raystown, Co. Meath (after Seaver 2006, 77).

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 σ
Wk-17910	Single barley grain from sub-rectangular enclosure	1295±36 BP	<b>A.D. 654-779;</b> A.D. 794-801
Wk-16823	Human bone from articulated burial within ringditch	1647±33 BP	A.D. 263-277; <b>A.D. 329-467;</b> <b>A.D. 480-533</b>
Wk-16306	Human bone from articulated burial within ringditch	1528±33 BP	<b>A.D. 432-602</b>
Wk-16821	Human bone from articulated burial south of ringditch	1425±33 BP	<b>A.D. 573-660</b>
Wk-16307	Human bone from articulated burial within ringditch.	1334±34 BP	<b>A.D. 644-724;</b> <b>A.D. 738-771</b>
Wk-16309	Human bone from articulated burial cutting ringditch with blue glass bead	1130±35 BP	A.D. 782-789; <b>A.D. 809-989</b>
Wk-16310	Human bone from articulated burial outside ringditch	1195±34 BP	A.D. 695-696; A.D. 709-747; <b>A.D. 766-898;</b> A.D. 920-947
Wk-16302	Charcoal from fill of pit cut by souterrain	1249±53 BP	<b>A.D. 665-887</b>
Wk-16294	Charcoal from a circular pit north of the western souterrain	1284±40 BP	<b>A.D. 656-783;</b> A.D. 788-820; A.D. 842-859
UB-6521	Oak timber from Southern Mill 1	1279±32 BP	<b>A.D. 660-782;</b> A.D. 790-809
UB-6522	Oak timber from Southern Mill 4	1315±35 BP	<b>A.D. 653-730;</b> <b>A.D. 735-772</b>
UB-6523	Oak timber from Southern Mill 5	1206±35 BP	<b>A.D. 691-750;</b> <b>A.D. 763-895;</b> A.D. 926-935
Wk-16300	Burnt oak in feature within southern mill complex	1188±37 BP	A.D. 713-745; <b>A.D. 767-901;</b> A.D. 917-966
UB-6524	Oak timber from Northern Mill 2	1096±35 BP	<b>A.D. 887-1017</b>
Wk-16295	Charcoal from backfill of Northern Mill 2	938±32 BP	<b>A.D. 1023-1164</b>
Wk-17907	Oat grain from cereal-drying kiln	1575±30 BP	<b>A.D. 418-551</b>
Wk-17908	Wheat grain from cereal-drying kiln	1428±30 BP	<b>A.D. 576-657</b>
Wk-16296	Blackthorn charcoal from fill of cereal-drying kiln	1151±35 BP	A.D. 779-794; <b>A.D. 799-975</b>
Wk-16303	Blackthorn charcoal from Northern Mill 1	958±32 BP	<b>A.D. 1021-1156</b>

Wk-16304	Willow charcoal from Northern Mill 1	1109±31 BP	<b>A.D. 881-1013</b>
Wk-16308	Human bone from burial cutting ringditch	1412±34 BP	<b>A.D. 579-665.</b>
Wk-16819	Human bone from burial south of ringditch	1574±35 BP	<b>A.D. 414-562.</b>
Wk-16820a	Human bone from burial south of ringditch	1363±36 BP	<b>A.D. 608-709;</b> A.D. 747-766.
Wk-16820b	Human bone from burial within ringditch	1312±38 BP	<b>A.D. 652-774.</b>
Wk-16822	Human bone from burial cutting ringditch	1510±34 BP	A.D. 434-492; A.D. 507-519; A.D. 527-634.
Wk-16825	Human bone from burial within ringditch	1537±34 BP	<b>A.D. 430-596.</b>
Wk-16826a	Human bone from burial within ringditch	1451±35 BP	<b>A.D. 553-652.</b>
Wk-16826b	Human bone from burial within ringditch	1482±35 BP	A.D. 465-482; <b>A.D. 534-649.</b>
Wk-16827	Human bone from burial within ringditch	1491±35 BP	A.D. 441-455; A.D. 460-484; <b>A.D. 533-645.</b>
Wk-16828	Human bone from burial within ringditch	1496±36 BP	A.D. 437-488; <b>A.D. 530-644.</b>
Wk-17906	Cereal grain from ringditch deposit	1576±30 BP	<b>A.D. 417-550.</b>
Wk-17909	Cereal grain from kiln containing burial	1607±37 BP	A.D. 358-363; <b>A.D. 382-547.</b>
Wk-17911	Animal bone from outer burial enclosure	1320±31 BP	A.D. 652-725; A.D. 738-771.
Wk-17912	Animal bone from early gully in northern habitation area	1463±36 BP	<b>A.D. 544-649.</b>
Wk-17913	Animal bone from Northern Mill race 2	1436±32 BP	<b>A.D. 568-656.</b>
Wk-17914	Animal bone from sub-rectangular enclosure	1283±32 BP	<b>A.D. 659-780;</b> A.D. 793-803.
Wk-17915	Animal bone from Northern Mill 2 Headrace	1427±35 BP	<b>A.D. 569-660.</b>
Wk-17916	Animal bone from sub-rectangular enclosure	1352±40 BP	<b>A.D. 612-722;</b> A.D. 740-770.
Wk-17917	Animal bone from outer burial enclosure	1349±31 BP	<b>A.D. 637-715;</b> A.D. 744-768.
Wk-17918	Human bone from Burial B210820	1586±32 BP	<b>A.D. 410-546.</b>
Wk-17919	Human bone from Burial B210944	1531±31 BP	A.D. 432-498; A.D. 501-599.
Wk-17920	Human bone from Burial B210907 cutting ringditch	1524±31 BP	A.D. 432-496; A.D. 502-605.
Wk-17921	Human bone from Burial B210954	1448±35 BP	<b>A.D. 556-654.</b>
Wk-17922	Human bone from Burial B210854	1598±36 BP	<b>A.D. 392-547.</b>
Wk-18197	Barley grain from backfill behind western souterrain wall	1345±29 BP	<b>A.D. 642-712;</b> A.D. 746-767.

Wk-18198	Barley grain from hearths overlying ditch	1096±28 BP	<b>A.D. 890–997;</b> A.D. 1004–1012.
Wk-18199	Oat grain from kiln	1474±33 BP	<b>A.D. 541–646.</b>
Wk-18200	Wheat grain from pit in southern habitation area	1264±32 BP	<b>A.D. 667–783;</b> A.D. 787–824; A.D. 841–861.
Wk-18201	Oat grain from pit in southern habitation area	1253±30 BP	<b>A.D. 674–828;</b> A.D. 838–866.
Wk-18202	Bread wheat grain from post-hole associated with eastern souterrain	1492±30 BP	A.D. 445–445; <b>A.D. 465–482;</b> A.D. 534–644.
Wk-18203	Ash charcoal from junction of boundary and Southern Mill race 4/5	1235±36 BP	<b>A.D. 686–881.</b>

### Animal Bones Appendix:

#### Cattle:

Higham MWS	Age in months	Phase 2	Phase 3	Phase 5
1-4	0-6	-	-	-
5	6-7	1.5	0.5	0.5
6	7-9	2	0.5	0.5
7	8-13	0.5	-	-
8	15-16	1	0.5	0.5
9	16-17	2	1.5	1
10	17-18	1	1	0.5
11	18-24	2	0.5	0.5
12	24	6.5	1.5	0.5
13	24-30	3.5	1	2
14	30	3	1	-
15	30-31	-	-	-
16	31-32	-	-	-
17	32-33	-	1	-
18	36	-	-	-
19	38	1	1	-
20	40	3	3	1
21	40-50	-	-	3
22	50	-	1	2
23	over 50	6	1	-
	<b>Total</b>	<b>33</b>	<b>15</b>	<b>12</b>

**Summary of cattle age-slaughter data (number) for Raystown based on tooth eruption and wear after Grant (1982) and Higham (1967). The 0.5 values represent mandibles where the innermost tooth was either absent or in eruption.**

		Age	Phase II		Phase III		Phase V	
		in months	F	U	F	U	F	U
<b>Early fusing</b>	humerus d., radius p.	12-18	49	15	32	4	16	0
	phalanx 1 & 2 p.	18-24	94	15	50	8	26	6
	<b>TOTAL early fusing</b>		143	30	82	12	42	6
	<b>%</b>		<b>83</b>	<b>17</b>	<b>87</b>	<b>13</b>	<b>88</b>	<b>13</b>
<b>Middle fusing</b>	tibia d., metapodium d.	24-36	77	72	63	33	19	8
	calcaneum p.	36-42	13	9	9	7	4	2
	<b>TOTAL middle fusing</b>		90	81	72	40	23	10
	<b>%</b>		<b>53</b>	<b>47</b>	<b>64</b>	<b>36</b>	<b>70</b>	<b>30</b>
<b>Late fusing</b>	humerus p., radius d., ulna p., femur p., femur d., tibia p.	42-48	91	74	68	18	21	15
	<b>TOTAL late fusing</b>		<b>91</b>	<b>74</b>	<b>68</b>	<b>18</b>	<b>21</b>	<b>15</b>
	<b>%</b>		<b>55</b>	<b>45</b>	<b>79</b>	<b>21</b>	<b>58</b>	<b>42</b>

**Epiphyseal fusion of cattle bone: number of fused (includes 'fusing') and unfused epiphyses grouped into early-, middle- and late-fusing stages after Silver (1969, table A) and Reitz and Wing (1999, table 3.5).**

<b>E.W.H. (cm)</b>	<b>Phase II</b>	<b>Phase III</b>	<b>Phase IV</b>	<b>Phase V</b>
100	-	-	-	-
102	-	-	-	-
104	-	1	-	-
106	1	1	-	-
108	1	1	1	1
110	1	1	-	-
112	4	5	-	-
114	-	3	-	-
116	10	2	1	-
118	-	1	-	3
120	2	1	1	-
122	1	1	-	-
124	1	1	-	-

**Summary of estimated withers heights (EWH) for cattle from Raystown using the multiplication factors of Fock and Matolcsi (quoted in von den Driesch and Boessneck 1974, 336).**

**Sheep/Goat:**

Higham MWS	Age in Months	Phase 2		Phase 3	
		No.	%	No.	%
<b>4</b>	3	0.5	1	0.5	3
<b>5</b>	4	0.5	1	0.5	3
<b>8</b>	7-9	-	-	0.5	3
<b>9</b>	9-10	3	6	1	6
<b>10</b>	10-11	4	8	1	6
<b>11</b>	11-12	1	2	1	6
<b>12</b>	12-21	1.5	3	0.5	3
<b>13</b>	21-24	19.5	38	6	33
<b>14</b>	25-26	6	12	3	17
<b>15</b>	26-28	1.5	3	1	6
<b>16</b>	mature	2.5	5	2	11
<b>17</b>	adult	11	21	1	6
<b>18</b>	old	1	2	-	-
	<b>Total</b>	<b>52</b>		<b>18</b>	

**Sheep/goat age-slaughter data for Raystown based on tooth eruption and wear after Grant (1982), Payne (1973 and 1987) and Higham (1967). The 0.5 values represent mandibles where the innermost tooth was absent or in eruption.**

		Age	Phase 2		Phase 3	
		in months	fused	unfused	fused	unfused
<b>Early fusing</b>	humerus d., radius p.	3-10	54	5	55	0
	phalanx 1 & 2 p.	6-16	22	4	18	2
	<b>TOTAL early fusing</b>		76	9	73	2
	<b>%</b>		89	11	97	3
<b>Middle fusing</b>	tibia d., metapodium d.	15-28	51	29	46	13
	<b>TOTAL middle fusing</b>					
	<b>%</b>		64	36	78	22
<b>Late fusing</b>	calcaneum p.	30-36	6	4	1	1
	femur p.	30-42	5	9	2	1
	humerus p., radius d., ulna p., femur d., tibia p.	36-42	23	31	19	12
	<b>TOTAL late fusing</b>		34	44	22	14
	<b>%</b>		44	56	61	39

**Epiphyseal fusion of sheep/goat bones: number of fused (includes 'fusing') and unfused epiphyses grouped into early-, middle- and late-fusing stages after Silver (1969, table A) and Reitz and Wing (1999, Table 3.5).**

E.W.H. (cm)	Phase II-III
50	-
52	-
54	2
56	6
58	3
60	1
62	-

Estimated withers heights (EWH) of sheep using complete longbone measurements and the multiplication factors of Teichert (quoted in von den Driesch and Boessneck 1974, 339) for Raystown, Lagore, Knowth and Moynagh (after McCormick and Murray 2007).

Pig:

Higham MWS	M3 TWS	Approx age months	Phase 2	Phase 3	Phase 5	Sows (p2-4)	Boars (p2-4)
<b>6</b>		4-5	0	1	0	0	0
<b>7</b>		5-6	0.5	0.5	0	0	0
<b>8</b>		6-7	0.5	0.5	0	0	0
<b>11</b>		9-10	1	0	0	0	0
<b>12</b>		10-11	2	0.5	1	0	0
<b>13</b>		11-12	2	0.5	1	0	0
<b>14-17</b>		12-17	1	2.5	0.5	1	0
<b>18</b>		17-19	5	1	0.5	0.5	1
<b>19</b>		19-21	11.5	3	0.5	1.5	2.5
<b>20</b>	A	21-23	8.5	3.5	1.5	1	1.5
<b>21</b>	B	23-25	2	0	1	1	0
<b>22</b>	C	25-27	0	1.5	0	1	0
<b>23</b>	D	27-29	0.5	0.5	0	0.5	0
<b>24+</b>	E+	30+	0.5	2	0	0.5	0
		Total	35	17	6	7	5

Pig age-slaughter data for Raystown based on tooth eruption and wear after Grant (1982) and Higham (1967). The 0.5 values represent mandibles where the innermost tooth was absent, the mandible could not therefore be confidently assigned to a single stage.

		estimated age in months	PHASE 2		PHASE 3	
			Fused	Unfused	Fused	Unfused
Early fusing	humerus d.	9-18	17	1	13	3
	radius p.	12	24	1	18	2
	phalanx 2 p.	12	4	3	1	2
	Total early fusing		<b>45</b>	<b>5</b>	<b>32</b>	<b>7</b>
	%		<b>90</b>	<b>10</b>	<b>82.1</b>	<b>17.9</b>
Middle fusing	tibia d., phalanx 1 p.	24	19	14	14	10
	metapodium d.	24-27	5	29	0	5
	calcaneum p.	24-30	1	14	1	19
	Total middle fusing		<b>25</b>	<b>57</b>	<b>15</b>	<b>34</b>



		%	<b>30.5</b>	<b>69.5</b>	<b>30.6</b>	<b>69.4</b>
Late fusing	ulna p.	36-42	0	17	0	2
	humerus p., radius d., femur p.& d., tibia p.	42	2	47	1	14
	Total late fusing		<b>2</b>	<b>64</b>	<b>1</b>	<b>16</b>
		%	<b>3</b>	<b>97</b>	<b>5.9</b>	<b>94.1</b>

**Epiphyseal fusion of pig bones: number and percentage of fused (includes 'fusing') and unfused diaphyses grouped into early-, middle- and late-fusing stages after Silver (1969, table A) and Reitz and Wing (1999, Table 3.5).**

**Horse:**

<b>E.W.H (cm)</b>	<b>Phases I-III</b>
116	-
119	1
122	-
125	1
128	1
131	2
134	3
137	1
140	2

**Estimated withers heights (EWH) using greatest length measurements and the multiplication factors of Vitt (1952).**

**Bird:**

		<b>Phase I</b>	<b>Phase II</b>	<b>Phase III</b>	<b>Phase IV</b>	<b>Phase V</b>	<b>Total</b>	<b>%</b>
Duck	<i>Anas sp.</i>	-	2	21	1	-	24	18
Goose	<i>Anser sp.</i>	-	*	12	1	*	13	10
Domestic fowl	<i>Gallus gallus</i>	1	9	5	-	4	19	14
Woodcock	<i>Scolopax rusticola</i>	-	-	1	-	-	1	1
Snipe	<i>Gallinago gallinago</i>	-	-	-	-	1	1	1
Quail	<i>Coturnix coturnix</i>	-	-	2	-	-	2	2
Corncrake	<i>Crex crex</i>	-	7	35	-	2	44	33
Crane	<i>Grus grus</i>	-	*	-	-	-	-	-
Heron	<i>Ardea cinerea</i>	-	-	-	-	-	-	-
Nightjar	<i>Caprimulgus europaeus</i>	-	2	-	-	-	2	2
Goshawk	<i>Accipiter gentilis</i>	-	-	2	-	-	2	2
Raven	<i>Corvus corax</i>	-	-	1	-	1	2	2
Rook/ Crow	<i>Corvus frugilegus/ corone</i>	-	4	-	-	-	4	3
Passerine		1	9	9	-	-	19	14
	<b>Total</b>	<b>2</b>	<b>33</b>	<b>88</b>	<b>2</b>	<b>8</b>	133	

**Frequency of 'countable' bird bones by species and phase. \* = represented by 'non-countable' specimens.**

**Rinnaraw, Co. Donegal**Grid Ref: **C03803680 (20380/43680)**SMR No: **DGO 016-016**Reference: **Comber 2006; Murray & Hamilton-Dyer 2006.**

The early excavations were focused on an area of mounds in the centre of the enclosure and revealed this as a rectangular stone house (7m x 5m internally). A large internal paved area was discovered, as well as possible internal divisions and post holes which may have held the roof. The hearth was located just north of the centre of the house, and occupation deposits from above the paved floor showed fragments of charcoal and burnt bone, as well as iron slag. A stone-lined drain ran out of the house under the wall beside the entrance. This appears to lead from the paved area, and led the excavator to describe the structure as a 'byre-house', with the paved area acting as an animal pen. Such structures were common in the later medieval period and through into the post-medieval period, although similar 'byre houses' have been excavated at Norse sites in the Western Isles.

A shell midden including shellfish (winkles; cockles; and barnacles), as well as iron slag, two iron objects, a pot sherd, and a fragment of tuyère was found in the area of the north wall of the house. The exact relationship of this midden to the wall is not understood, although it has been stated that it carried into the rubble wall core. A second shell midden was found against the outer face of the wall at the entrance. This included shellfish (winkles and limpets) as well as three pot sherds. The dates from shells from these middens suggest that they are substantially later than the occupation of the house, however charcoal from one of the middens is contemporary with the primary occupation (see below). It seems likely therefore that some form of activity continued on site through the medieval period, and into the post-medieval period.

Little was discovered in the 'yard' of the house. Structural remains in the east of the enclosure revealed possible iron-working activity with considerable amounts of iron slag (30kg were recovered from the site) and fragments of furnace bottoms. The largest number of souterrain ware sherds from the site were also recovered from this area.

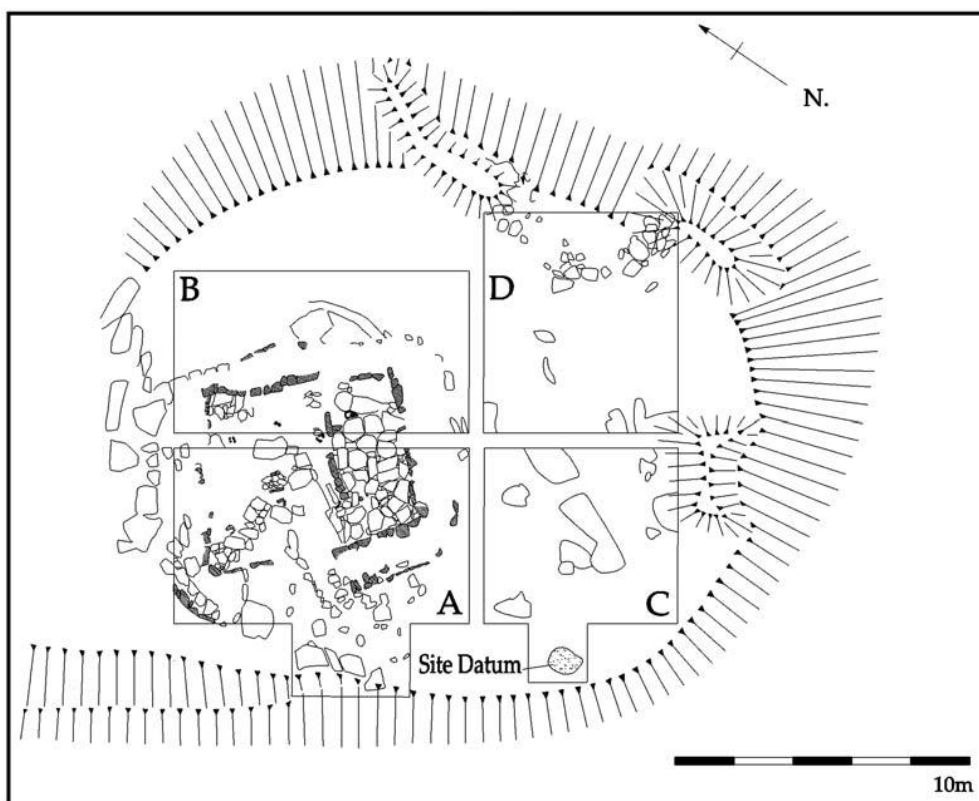
Finds from site included a number of stone artifacts including seven 'burnishers' or polishing stones; five fragments of serpentine rings; a large number of perforated stones (loom weights or net weights); a number of stone discs (interpreted as gaming pieces); and a number of quern fragments. Aside from the iron knife and other object found in the shell midden, a small number of badly corroded iron objects were found – of these, four knife fragments were identified.

**Animal Bones:**

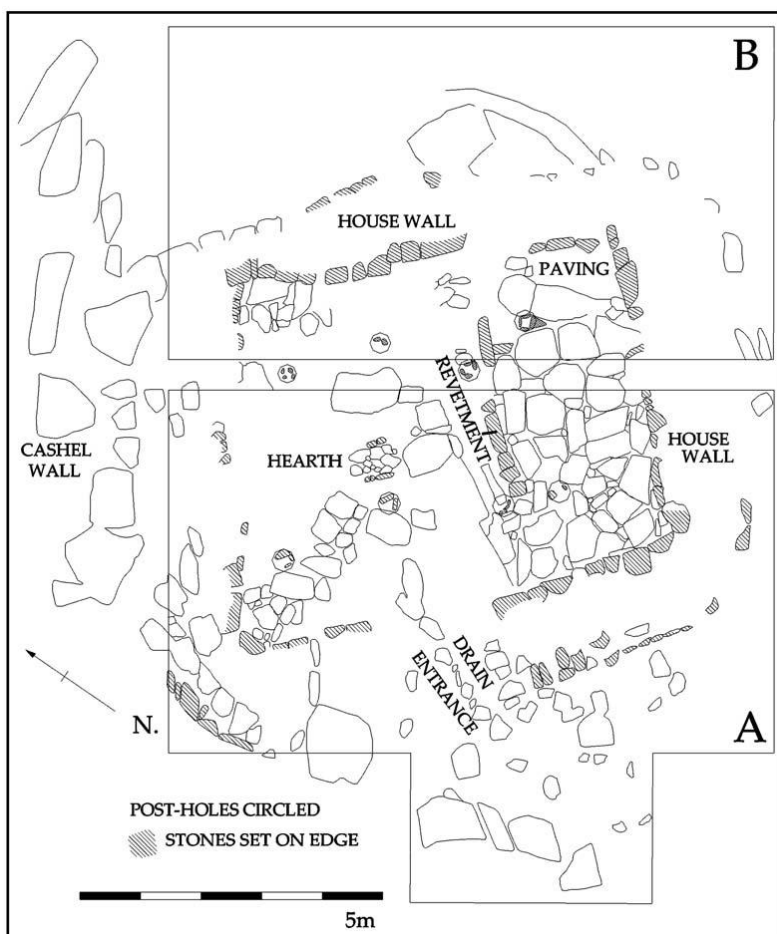
Only 33 identifiable bone fragments were recovered from the excavation.

<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Seal</b>	<b>Bird</b>	<b>Fish</b>
22	2	1	1	1	1	5

**NISP of animal bones from Rinnaraw, Co. Donegal.**



**Rinnaraw Cashel, Co. Donegal (after Comber 2006, 86).**



**House at Rinnaraw, Co. Donegal (after Comber 2006, 81).**

## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

(\* - calibrated with marine reservoir effect: KA Hughen, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, PJ Reimer, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1059-1086.)

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
GrN-18078	Shell from midden	910 $\pm$ 50 BP	<b>A.D. 1344-1624*</b>
GrN-18079	Shell from midden	790 $\pm$ 50 BP	<b>A.D. 1454-1689*</b>
GrN-18080	Charcoal from hearth	1330 $\pm$ 60 BP	<b>A.D. 602-784;</b> A.D. 787-826; A.D. 840-863.
GrN-19755	Charcoal from wall	1085 $\pm$ 25 BP	<b>A.D. 895-927;</b> <b>A.D. 935-1015.</b>
GrN-19756	Charcoal from north midden	1160 $\pm$ 35 BP	<b>A.D. 777-908;</b> <b>A.D. 911-971.</b>
GrN-19757	Charcoal from wall	1070 $\pm$ 35 BP	<b>A.D. 894-928;</b> <b>A.D. 934-1021.</b>
GrN-19758	Charcoal from hearth	1055 $\pm$ 35 BP	<b>A.D. 895-925;</b> <b>A.D. 936-1027.</b>

## **Roestown 2, Co. Meath**

Grid reference: **N95795380 (295792/253807)**

SMR No: **N/A**

Reference: **O'Hara 2007; O'Hara 2009; Sloan 2009.**

Roestown 2 is a large multi-phase enclosed early medieval settlement and associated agricultural complex that was utilised from potentially the mid-sixth century through to the thirteenth century. The site was divided into Area A – an animal enclosure and field systems – and Area B – a settlement and associated field enclosures.

The Phase I enclosure (Area B) was 'D'-shaped (76m x 53m) and was constructed between A.D. 533 and 651. It was subsequently remodelled on two further occasions between the eighth and tenth centuries. The Phase I entrance required a bridge or other form of access as the primary ditch was uninterrupted around the site; in Phase II a causeway was created at the entrance point.

A number of internal ditches were recorded for Phases II and III within Enclosure 1. These were absent during the primary phase. One of the earliest ditches cut a small structure from which E ware was obtained. Cereal-drying kilns and curvilinear gullies – possible small shelters or structures – were located in the southern partition of the enclosure. This area was potentially utilised for cereal processing. A number of radiating ditches were connected to the outer enclosure to the south and it is likely they were fields associated with cereal growing. The western part of the enclosure was also partitioned by a series of ditches but their function is unclear.

A dry-stone-built souterrain was situated at the centre of the 'D'-shaped enclosure and was not stratigraphically related to earlier features. The souterrain contained three beehive chambers that were connected by three short passages. Other aspects of the souterrain included pits within each chamber, a ramped entrance, a boxed cupboard, an air vent and a trapdoor feature.

A large number of personal dress items were associated with the settlement in Area B including glass and stone beads, lignite bracelets, bone pins, copper alloy and iron ringed pins, bone comb fragments and a belt buckle. Non-ferrous metalworking – usually associated with high-status sites – was indicated by the presence of crucible fragments, bone motif pieces, a stone ingot mould and some droplets of copper alloy. Glass working was also practised because some of the crucible fragments contained glazed residues.

A series of small irregular fields were located in Area A, to the east of the 'D'-shaped enclosure. The largest of these, from Phase I, measured 25m x 25m. A number of artefacts were associated with the Phase I fields including bone pins and combs, an iron knife and sherds of E ware. A dog skeleton dating to A.D. 606-717 belonged to this phase and two disturbed human burials – which were associated with one of the enclosures – may also have been associated with Phase I.

The fields were removed to form a much larger 'U'-shaped enclosure – 40m x 30m – that was associated with a number of radiating ditches. The Phase II enclosure and ditches contained large quantities of animal bone and a variety of artefacts including bone pins and comb fragments, iron knives and two stone gaming boards. This phase was dated to the seventh/eighth centuries.

During Phase III, a rectangular enclosure replaced the 'U'-shaped enclosure. Animal bone was still evident in large quantities and artefacts included a strip of decorated bronze, a fragment of silver, a lignite bracelet and a possible bone flute. This phase potentially dates between the eighth and eleventh centuries. The final phase consisted of a small thirteenth/fourteenth-century enclosure that was constructed in the centre of the Phase III enclosure.

## Animal Bones:

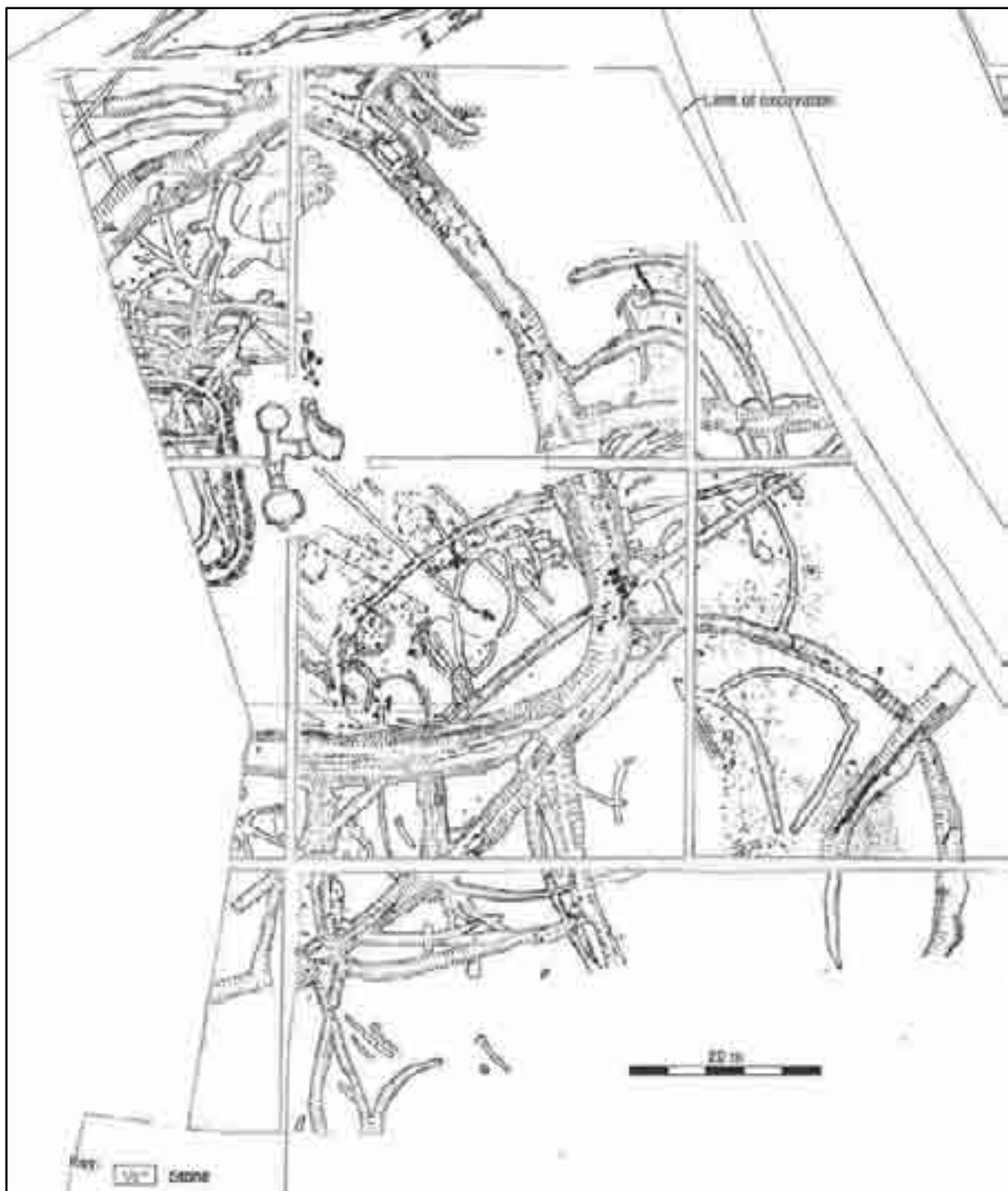
The total NISP for Roestown 2 is 10,238, with a total MNI of 435 animals.

Phase		Cattle	Sheep	Pig	Horse	Dog	Cat	Deer	Rodent	Date
1a										Mid-6 <sup>th</sup> C.
	NISP	747	292	104	40	30	2	-	-	
	%NISP	61.5	24.0	8.6	3.3	2.5	0.2	-	-	
	MNI	23	12	8	2	3	1	-	-	
	%MNI	46.9	24.5	16.3	4.1	6.1	2.0	-	-	
1b										Early 7 <sup>th</sup> C.
	NISP	486.5	174.5	111.5	28	66	-	1	-	
	%NISP	56.1	20.1	12.9	3.2	7.6	-	0.1	-	
	MNI	13	11	10	2	4	-	1	-	
	%MNI	31.7	26.8	24.4	4.9	9.8	-	2.4	-	
2a										Mid-7 <sup>th</sup> C.
	NISP	1257	461.5	450	81	82	2	-	-	
	%NISP	53.9	19.8	19.3	3.5	3.5	0.1	-	-	
	MNI	29	18	23	4	3	1	-	-	
	%MNI	37.2	23.1	29.5	5.1	3.8	1.3	-	-	
2b										8 <sup>th</sup> C.
	NISP	1425.5	489	346	105	17	4	1	-	
	%NISP	59.7	20.5	14.5	4.4	0.7	0.2	0.04	-	
	MNI	36	25	20	4	2	1	1	-	
	%MNI	40.4	28.1	22.5	4.5	2.2	1.1	1.1	-	
3a										Late 8 <sup>th</sup> C.
	NISP	911	251	128.5	113	68	2	2	-	
	%NISP	61.7	17.0	8.7	7.7	4.6	0.1	0.1	-	
	MNI	25	11	9	5	4	1	1	-	
	%MNI	44.6	19.6	16.1	8.9	7.1	1.8	1.8	-	
3b										10 <sup>th</sup> C.
	NISP	76	29	6	8	2	-	-	-	
	%NISP	62.8	24.0	5.0	6.6	1.7	-	-	-	
	MNI	4	3	2	1	1	-	-	-	
	%MNI	36.4	27.3	18.2	9.1	9.1	-	-	-	
4										11 <sup>th</sup> C.
	NISP	191	127	48	26	2	55	-	5	
	%NISP	42.1	28.0	10.6	5.7	0.4	12.1	-	1.1	
	MNI	8	7	6	2	1	3	-	2	
	%MNI	27.6	24.1	20.7	6.9	3.4	10.3	-	6.9	

**NISP and MNI by phase from Roestown, Co. Meath (phasing after O'Hara 2009)**



Phases from Area A, Roestown, Co. Meath (after O'Hara 2007, 145).



Plan of Area B, Roestown, Co. Meath (after O'Hara 2009).



## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
Beta-220115	F427: Animal bone from 'D'-shaped enclosure ditch, Area B	1480 $\pm$ 40 BP	A.D. 441-455; A.D. 460-484; <b>A.D. 533-651</b>
Beta-220116	F484: Animal bone from re-cut of 'D'-shaped enclosure ditch, Area B	1170 $\pm$ 40 BP	A.D. 727-737; <b>A.D. 771-975</b>
Beta-219005	F 144: Animal bone from primary fill of enclosure ditch, Area A.	1380 $\pm$ 40 BP	<b>A.D. 582-694</b> ; A.D. 704-705; A.D. 748-765
Beta-219003	F116: Animal bone from Phase 1 ancillary enclosure, Area A.	1360 $\pm$ 40 BP	<b>A.D. 606-717</b> ; A.D. 743-769
Beta-219002	F108: Animal bone from primary fill of Phase 1 enclosure, Area A	1320 $\pm$ 40 BP	<b>A.D. 648-774</b>

## Animal Bones Appendix:

### Cattle:

Phase	Element	Grant TWS					Higham MWS	Average age (mnts)
		dP4	P4	M1	M2	M3		
3b	LMT					g	20	40
3b	LMT					j	22	50
3b	LMT					k	23	50+
3b	LMT					k	23	50+
4	LMT					b	15	30-31
4	LMT					c	16	31-32
4	LMT					j	22	50
4	LMT					k	23	50+
4	LMT					k	23	50+
4	MN				X	d	17	32-33
4	MN		X	h	g	a	14	30
4	MN	j	-	f	V	O	8	15-16

**Summary of cattle mandible wear for phases where N = < 10. Tooth wear stages after Grant (1982, 92) and mandible wear stages after Higham (1967, 104).**

Higham MWS	Approx Age (months)	1a	1b	2a	2b	3a	3b	4
1	Foetal							
2	Birth/3wks							
3	1-4							
4	5-6							
5	6-7					1		
6	7-9							
7	8-13			1				
8	15-16			1				1
9	16-17	2				1		
10	17-18							
11	18-24		2	1				
12	24	1	1	1		1		
13	24-30	1		1		1		
14	30		1	2		1		1
15	30-31	3		3	2	1		1
16	31-32	2		1		2		1
17	32-33	1		1				1
18	36				1			
18/19	36-38			2				
19	38			1		1		
20	40	6	2	3	8	9	1	
21	40-50				1			
22	50	3		4	6	5	1	1
23	50+		1		5	5	2	2
23+		4	4	3	4	2		
	Total	23	11	26	27	30	4	8

**Summary of mandible wear stages for cattle following Higham (1967, 104) assigned to loose mandibular M3s and mandibles.**

	Element	Age Mnth	Phase 1A		Phase 1B		Phase 2a		Phase 2b		Phase 3a		Phase 3b		Phase 4	
			F	U	F	U	F	U	F	U	F	U	F	U	F	U
Early	M-podium p	Pre-birth	42.5	1	32	-	80.5	-	71.5	1	60	3	3.5	-	5.5	-
	Acetabulum	6-10	11	-	6	3	23	2	13	3	13	4	1	2	2	-
	Scapula d; Humerus d	7-10	29	1	14	-	31	2	29	-	19	1	-	-	4	-
	Radius p	12-18	49	5	28	1	74	6	66	10	52	3	4	-	8	-
	Phalanx (1&2) p	18-24	40	4	25	4	55	13	79	7	49	1	4	-	10	-
	<b>Total</b>		<b>171.5</b>	<b>11</b>	<b>105</b>	<b>8</b>	<b>263.5</b>	<b>23</b>	<b>258.5</b>	<b>21</b>	<b>193</b>	<b>12</b>	<b>12.5</b>	<b>2</b>	<b>29.5</b>	<b>-</b>
	<b>%</b>		<b>94</b>	<b>6</b>	<b>93</b>	<b>7</b>	<b>92</b>	<b>8</b>	<b>92</b>	<b>8</b>	<b>94</b>	<b>6</b>	<b>86</b>	<b>14</b>	<b>100</b>	<b>-</b>
Mid	Tibia d; M-podium d	24-36	52	20.5	26	16	80.5	32.5	74.5	29	57.5	14	2	-	7	3.5
	Calcaneum p	36-42	6	5	6	3	5	6	15	9	5	-	-	-	1	1
	<b>Total</b>		<b>58</b>	<b>25.5</b>	<b>32</b>	<b>19</b>	<b>85.5</b>	<b>38.5</b>	<b>89.5</b>	<b>38</b>	<b>62.5</b>	<b>14</b>	<b>2</b>	<b>-</b>	<b>8</b>	<b>4.5</b>
	<b>%</b>		<b>70</b>	<b>30</b>	<b>62</b>	<b>38</b>	<b>69</b>	<b>31</b>	<b>70</b>	<b>30</b>	<b>82</b>	<b>18</b>	<b>100</b>	<b>-</b>	<b>64</b>	<b>36</b>
Late	Humerus p; radius d; ulna p; femur; tibia p.	42-48	54	20	33	15	91	34	62	38	49	15	5	1	7	4
	<b>Total</b>		<b>54</b>	<b>20</b>	<b>33</b>	<b>15</b>	<b>91</b>	<b>34</b>	<b>62</b>	<b>38</b>	<b>49</b>	<b>15</b>	<b>5</b>	<b>1</b>	<b>7</b>	<b>4</b>
	<b>%</b>		<b>73</b>	<b>27</b>	<b>39</b>	<b>31</b>	<b>73</b>	<b>27</b>	<b>62</b>	<b>38</b>	<b>77</b>	<b>23</b>	<b>83</b>	<b>17</b>	<b>64</b>	<b>36</b>

**Number of fused (fused and fusing) and unfused cattle specimens classified under early, middle or late-fusing stages following Reitz and Wing (1999, 76)**

Phase	Element	No.	Mean	Min.	Max.	StD
	<b>Scapula</b>					
<b>1a, 1b, 2a</b>	GLP	47	63.00	48.2	74.7	5.16
<b>2b, 3a</b>	GLP	31	64.18	58.7	73.1	4.15
<b>1a, 1b, 2a</b>	SLC	27	45.92	31	59.2	7.07
<b>2b, 3a</b>	SLC	16	46.41	28.5	54.2	5.63
	<b>Humerus</b>					
<b>1a, 1b, 2a</b>	SD	6	32.55	28.6	35.3	2.69
<b>1a, 1b, 2a</b>	BT	35	67.37	60.6	72.3	3.09
<b>2b, 3a</b>	BT	22	67.33	60.2	81.4	5.32
<b>1a, 1b, 2a</b>	HTC	60	29.89	25.7	36.2	1.92
<b>2b, 3a</b>	HTC	34	29.49	25.2	36.5	2.86
	<b>Metacarpal</b>					
<b>1a, 1b, 2a</b>	GL	16	185.10	169.8	197.3	6.80
<b>2b, 3a</b>	GL	10	186.32	173.7	195.7	6.22
<b>1a, 1b, 2a</b>	Bp	42	51.66	37.4	61.4	4.63
<b>2b, 3a</b>	Bp	40	51.09	19.6	61.3	7.22
<b>1a, 1b,</b>	Bd	32	54.68	46.8	64.7	4.51

<b>2a</b>						
<b>2b, 3a</b>	Bd	25	54.17	48.6	62.5	3.87
<b>1a, 1b, 2a</b>	SD	22	30.64	27.9	34.8	2.19
<b>2b, 3a</b>	SD	19	28.15	12.1	33.3	4.52
<b>1a, 1b, 2a</b>	B@F	30	50.95	44.1	58.5	3.73
<b>2b, 3a</b>	B@F	24	49.49	44.9	58	3.21
	<b>Pelvis</b>					
<b>1a, 1b, 2a</b>	LA	20	64.56	53	71.9	4.76
<b>2b, 3a</b>	LA	14	64.81	59.1	69.5	3.17
	<b>Tibia</b>					
<b>1a, 1b, 2a</b>	Bd	50	56.05	23.7	67.2	5.63
<b>2b, 3a</b>	BD	30	57.01	52.1	64.2	2.796
	<b>Astragalus</b>					
<b>1a, 1b, 2a</b>	GLI	47	59.66	52	66.2	2.66
<b>2b, 3a</b>	GLI	49	60.26	54.8	66.1	2.42
<b>1a, 1b, 2a</b>	GLm	52	54.40	47.7	59.6	2.46
<b>2b, 3a</b>	GLm	56	54.77	45.6	58.7	2.46
<b>1a, 1b, 2a</b>	Bd	50	38.79	35	45.1	2.18
<b>2b, 3a</b>	Bd	58	38.66	31.4	44.6	2.50
<b>1a, 1b, 2a</b>	Dm	43	33.13	28.3	53.8	3.67
<b>2b, 3a</b>	Dm	41	33.01	27.9	38	2.21
<b>1a, 1b, 2a</b>	DI	48	33.33	30.6	36.4	1.29
<b>2b, 3a</b>	DI	41	33.46	27.6	38.8	1.80
	<b>Calcaneum</b>					
<b>1a, 1b, 2a</b>	GL	8	126.79	118	140	8.48
<b>2b, 3a</b>	GL	11	123.86	115	137	6.54
	<b>Metatarsal</b>					
<b>1a, 1b, 2a</b>	GL	15	209.41	193	225	7.88
<b>2b, 3a</b>	GL	11	205.57	195	215.8	7.23
<b>1a, 1b, 2a</b>	Bp	50	43.54	36.8	53.4	3.35
<b>2b, 3a</b>	Bp	44	43.30	34.5	51.7	3.67
<b>1a, 1b, 2a</b>	Bd	27	51.11	43.4	63	4.61
<b>2b, 3a</b>	Bd	32	50.33	44.8	61.3	3.90
<b>1a, 1b, 2a</b>	SD	34	24.69	21.2	29.9	2.19
<b>2b, 3a</b>	SD	22	24.20	21.7	27.5	1.62

#### Summary of cattle measurements

Phase	REC ID	Element	EWB (cm)
1A	7814	MC1 (F)	111.0
1A	7975	MC1 (F)	112.8
1A	1134	MC1 (M)	113.3
1A	6698	MC1 (M)	119.1
1A	1141	MT1	115.5
1A	1142	MT1	116.2
1A	5412	MT1	122.6
1A	7859	MT1	111.6
1A	7872	MT1	105.2
1A	5448	TI	106.8
1B	3089	MC1 (F)	118.4
1B	1822	MC1 (M)	116.1
1B	8001	MC1 (M)	106.1
1B	7547	MT1	115.5
1B	7329	TI	109.4
2A	778	MC1 (F)	110.7
2A	2108	MC1 (F)	110.9
2A	2652	MC1 (F)	108.0
2A	4987	MC1 (F)	108.7
2A	5861	MC1 (F)	108.0
2A	7396	MC1 (F)	110.4
2A	2198	MC1 (M)	122.3
2A	5518	MC1 (M)	113.1
2A	9559	MC1 (I)	118.2
2A	1105	MT1	112.2
2A	3767	MT1	117.0
2A	3770	MT1	108.9
2A	3772	MT1	114.2
2A	4034	MT1	112.5
2A	4035	MT1	113.0
2A	5611	MT1	112.8
2A	8180	MT1	113.6
2A	9562	MT1	120.9
2A	757	RA	112.7
2A	8176	RA	105.8
2B	4563	MC1 (F)	111.0
2B	7385	MC1 (F)	109.0
2B	7553	MC1 (F)	110.6
2B	940	MC1 (M)	122.3
2B	242	MT1	111.7
2B	260	MT1	117.6
2B	675	MT1	111.9
2B	1504	MT1	115.5
2B	3297	MT1	113.9
2B	4332	MT1	106.3
2B	4427	MT1	108.5
2B	4526	TI	106.5
3A	6813	MC1 (F)	111.5
3A	6814	MC1 (F)	115.1
3A	3534	MC1 (M)	120.5
3A	6103	MC1 (M)	115.9
3A	3535	MC1 (I)	114.5
3A	5887	MC1 (I)	106.4
3A	3531	MT1	109.4

3A	6882	MT1	106.5
3A	7202	MT1	116.1
3A	7224	MT1	115.0
3A	5703	TI	110.4

**All estimated withers heights calculated for cattle after Fock and Matolcsi as outlined in von den Driesch and Boessneck (1974, 336).**

**Sheep:**

Phase	Element	Grant TWS					Higham MWS	Average age (months)
		dP4	P4	M1	M2	M3		
3b	LMT					11G	17	Adult
3b	MN		X	9A	9A	8G	15	26-28
3b	MN		12S	10A	9A	11G	17	Adult
4	LMT					11G	17	Adult
4	LMT					11G	17	Adult
4	LMT					4A	14	25-26
4	MN		14S	15A	10A	11G	17	Adult
4	MN	13L	-	E	0	0	4/5	3-4
4	MN	16L	-	8A	6A	9G	16	Mature
4	MN	16L	-	9A	9A	11G	17	Adult
4	MN	14L	-	5A	C	0	9	9-10
4	MN	16L	-	6A	E	0	0	10-11

**Summary of sheep/goat mandible wear for phases where N = <10. Tooth wear stages after Payne (1973 and 1987) and mandible wear stages after Higham (1967, 106).**

Higham MWS	Approx Age (months)	1a	1b	2a	2b	3a	3b	4
1	Foetal							
2	Birth/6wks							
3	1.5-3							
4	3							½
5	4					1		½
6	5							
7	5-7			1				
8	7-9	1		1				
9	9-10		1					1
10	10-11							1
11	11-12			1				
12	12-21		1	1				
13	21-24			3	1			
14	25-26	8	3	8	6	3		1
15	26-28			2	3	1	1	
16	Mature	6	1	2	1	1		1
17	Adult	9	6	17	17	11	2	4
18	Old					1		
18+				1				
	Total	24	12	37	28	18	3	9

**Summary of mandible wear stages for sheep/goat following Higham (1967, 106) assigned to loose mandibular M3s and mandibles.**

		Age Months	Phase 1A		Phase 1B		Phase 2a		Phase 2b		Phase 3a		Phase 3b		Phase 4	
	Element		F	U	F	U	F	U	F	U	F	U	F	U	F	U
<b>Early</b>	M-podium p	Pre-birth	26.5	-	14	-	31	-	29	-	15	-	1	-	6	-
	Humerus d; radius p	3-10	35	-	20	-	46	-	30	3	24	-	1	-	7	-
	Scapula d	6-8	6	-	6	-	7	-	5	-	6	-	-	-	2	-
	Acetabulum	6-10	3	-	5	-	9	-	10	1	6	2	2	-	1	-
	Phalanx (1&2) p	6-16	5	1	8	1	15	-	17	-	3	1	1	-	3	3
	<b>Total</b>		<b>75.5</b>	<b>1</b>	<b>53</b>	<b>1</b>	<b>108</b>	<b>-</b>	<b>91</b>	<b>4</b>	<b>54</b>	<b>3</b>	<b>5</b>	<b>-</b>	<b>19</b>	<b>3</b>
	<b>%</b>		<b>98.7</b>	<b>1.3</b>	<b>98.1</b>	<b>1.9</b>	<b>100</b>	<b>-</b>	<b>95.8</b>	<b>4.2</b>	<b>94.7</b>	<b>5.3</b>	<b>100</b>	<b>-</b>	<b>86.4</b>	<b>13.6</b>
<b>Mid</b>	Tibia d	15-24	12	2	17	-	17	8	19	5	16	4	1	-	4	1
	M-podium d	18-28	10	4.5	8.5	-	10	3.5	6.5	3.5	3	1	-	-	1	4
	Calcaneum p	30-36	1	1	2	1	2	1	2	-	-	1	-	-	2	1
	<b>Total</b>		<b>23</b>	<b>7.5</b>	<b>27.5</b>	<b>1</b>	<b>29</b>	<b>12.5</b>	<b>27.5</b>	<b>8.5</b>	<b>19</b>	<b>6</b>	<b>1</b>	<b>-</b>	<b>7</b>	<b>6</b>
	<b>%</b>		<b>75.4</b>	<b>24.6</b>	<b>96.5</b>	<b>3.5</b>	<b>69.9</b>	<b>30.1</b>	<b>76.4</b>	<b>23.6</b>	<b>76</b>	<b>24</b>	<b>100</b>	<b>-</b>	<b>53.8</b>	<b>46.2</b>
<b>Late</b>	Humerus p femur p;	30-42	2	3	-	-	1	3	4	7	1	3	2	-	1	-
	Radius d; ulna p; femur d; tibia p.	36-42	15	6	7	5	16	20	14	16	9	8	1	1	1	4
	<b>Total</b>		<b>17</b>	<b>9</b>	<b>7</b>	<b>5</b>	<b>17</b>	<b>23</b>	<b>18</b>	<b>23</b>	<b>10</b>	<b>11</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>4</b>
	<b>%</b>		<b>65.4</b>	<b>34.6</b>	<b>58.3</b>	<b>41.7</b>	<b>42.5</b>	<b>57.5</b>	<b>43.9</b>	<b>56.1</b>	<b>47.6</b>	<b>52.4</b>	<b>75</b>	<b>25</b>	<b>33.3</b>	<b>66.7</b>

**Number of fused (fused and fusing) and unfused sheep specimens classified under early, middle or late-fusing stages following Reitz and Wing 1999, 76).**

Phase	Element	No.	Mean	Min.	Max.	StD
	<b>Scapula</b>					
<b>1a, 1b, 2a</b>	GLP	16	28.37	25.7	31.3	1.42
<b>2b, 3a</b>	GLP	11	28.01	24.6	31.3	1.91
<b>1a, 1b, 2a</b>	SLC	22	16.35	13	21.4	2.00
<b>2b, 3a</b>	SLC	12	16.39	14.5	18.1	1.25
	<b>Humerus</b>					
<b>1a, 1b, 2a</b>	BT	34	25.27	22.9	29.4	1.87
<b>2b, 3a</b>	BT	16	24.82	20.6	29.1	2.07
<b>1a, 1b, 2a</b>	HTC	48	12.63	11.1	14.2	0.80
<b>2b, 3a</b>	HTC	23	12.43	10.4	14	0.89
	<b>Radius</b>					
<b>1a, 1b, 2a</b>	Bp	42	27.15	23.5	30.2	1.63
<b>2b, 3a</b>	Bp	18	27.28	24.3	31	1.77
<b>1a, 1b, 2a</b>	SD	8	15.53	14.2	17	1.01
<b>2b, 3a</b>	SD	6	14.65	12.7	16.4	1.35
	<b>Metacarpal</b>					
<b>1a, 1b, 2a</b>	GL	6	113.92	105.5	123	5.96
<b>1a, 1b, 2a</b>	Bp	32	20.86	18.2	23	1.28
<b>2b, 3a</b>	Bp	16	20.55	17.9	24	1.72

<b>1a, 1b, 2a</b>	Bd	10	23.51	22	27.3	1.54
<b>1a, 1b, 2a</b>	SD	16	12.92	11	15.4	1.32
<b>1a, 1b, 2a</b>	DtM	9	10.09	9.3	11.4	0.70
<b>1a, 1b, 2a</b>	DtL	9	9.32	8.6	9.9	0.43
<b>1a, 1b, 2a</b>	Ddm	8	13.94	13.3	15	0.57
<b>1a, 1b, 2a</b>	Ddl	8	13.29	12.7	13.9	0.36
<b>1a, 1b, 2a</b>	BFdm	10	10.86	10	13	0.86
<b>1a, 1b, 2a</b>	BFdl	9	10.70	9.63	12.8	0.94
	<b>Pelvis</b>					
<b>1a, 1b, 2a</b>	LA	10	26.07	24.2	27.6	1.07
<b>2b, 3a</b>	LA	12	25.48	21.7	28.3	1.81
	<b>Tibia</b>					
<b>1a, 1b, 2a</b>	Bd	39	23.28	20.5	26.4	1.26
<b>2b, 3a</b>	Bd	24	22.91	20.8	26	1.50
<b>1a, 1b, 2a</b>	SD	9	12.61	11.7	14.2	0.76
	<b>Astragalus</b>					
<b>1a, 1b, 2a</b>	GLI	10	25.12	23.8	26.4	0.89
<b>2b, 3a</b>	GLI	8	25.26	22.5	27	1.43
<b>1a, 1b, 2a</b>	GLm	9	23.71	22.4	24.6	0.82
<b>2b, 3a</b>	GLm	9	23.92	21.5	26	1.50
<b>1a, 1b, 2a</b>	Bd	10	16.27	14.5	17.7	0.86
<b>2b, 3a</b>	Bd	24	22.91	20.8	26	1.50
<b>1a, 1b, 2a</b>	Dm	6	14.87	14.4	15.3	0.29
<b>2b, 3a</b>	Dm	8	14.28	12.8	15.5	0.95
<b>1a, 1b, 2a</b>	DI	10	115.14	13.3	24.1	3.20
<b>2b, 3a</b>	DI	8	14.00	12.7	15.6	0.96
	<b>Metatarsal</b>					
<b>1a, 1b, 2a</b>	Bp	25	18.21	14.8	20.5	1.27
<b>2b, 3a</b>	Bp	18	18.79	16.7	28.9	2.62
<b>1a, 1b, 2a</b>	Bd	6	22.53	20.8	24.5	1.59
<b>1a, 1b, 2a</b>	SD	8	11.38	10.4	12.4	0.76
<b>2b, 3a</b>	SD	6	10.97	10.4	11.3	0.34

**Summary of sheep/goat measurements**



Phase	REC ID	Element	EWL (cm)
1A	7732	MC1	52
1A	6092	FE	54
1A	5443	MC1	55
1A	7874	MC1	55
1A	7875	MC1	55
1A	6756	RA	57
1A	5429	RA	58
1B	1892	MT1	55
1B	8066	RA	57
1B	9620	MC1	60
2A	2625	RA	51
2A	2173	MC1	58
2A	4134	MT1	58
2A	3856	MT1	59
2A	3995	MT1	61
2B	985	RA	53
2B	2915	MC1	55
2B	4572	MT1	58
3A	7222	RA	54
4	5241	MT1	60

**All estimated withers heights calculated for sheep after Teichert as specified in von den Driesch and Boessneck were applied (1974, 339).**

**Pigs:**

Phase	Element	Grant TWS					Higham MWS	Average age (months)
		dP4	P4	M1	M2	M3		
1b	LMT					b	20	21-23
1b	MN					d	22	25-27
1b	MN			X	e	b	20	21-23
1b	MN		b	k	c	E	19	19-21
1b	MN (f)		b	f	c	E	19	19-21
1b	MN (m)		b	c	b	H	19	19-21
2b	LMT					c	21	23-25
2b	MN					H	19	19-21
2b	MN			X	A	f	24	30+
2b	MN			X	f	b	20	21-23
2b	MN			X	m	g	25	Adult
4	MN					E	19	19-21
4	MN			X	A	b	20	21-23

**Summary of pig mandible wear for phases where N = < 10. Tooth wear stages after Grant (1982, 94) and mandible wear stages after Higham (1967, 105).**

Higham MWS	Approx Age (months)	1a	1b	2a	2b	3a	4
12	10-11					1M	
18	17-19	1		3+1M		7	
19	19-21	3	3	11+1M	1	1	1
20	21-23	3	1M+1F	4	1	4+2M	1
21	23-25	1+1F		3+1M	1		
22	25-27		1	1			
23	27-29			1			
24	30+				1		
25	Adult	1			1		
	Total	11	6	26	5	15	2

**Summary of mandible wear stages for pig following Higham (1967, 105).**

Phase	Element	Sex	Number
1A	LMT	F	7
	LMT	M	3
	MN	F	4
	MN	M	1
1b	LMT	F	3
	LMT	M	4
	MN	F	1
	MN	M	1
2a	LMT	F	15
	LMT	M	18
	MN	F	1
	MN	M	5
2b	LMT	F	10
	LMT	M	29
	MN	F	1
	MN	M	1
3a	LMT	F	6
	LMT	M	9
	MN	F	-
	MN	M	3
3b	LMT	M	3
4	LMT	F	6
	LMT	M	2
	MN	F	-
	MN	M	1

**Sex determination for pig based on morphology of mandibular canine.**

Phase	Element	Sex	Number
1a	LMT	F	2
1a	LMT	M	1
1b	LMT	F	-
1b	LMT	M	2
2a	LMT	F	2
2a	LMT	M	5
2b	LMT	F	3
2b	LMT	M	6
3a	LMT	F	-
3a	LMT	M	5
4	LMT	F	-
4	LMT	M	1

### Sex determination for pig based on morphology of maxillary canine.

Fusion	Element	Age Months	Phase 1A		Phase 1B		Phase 2a		Phase 2b		Phase 3a		Phase 3b		Phase 4	
			F	U	F	U	F	U	F	U	F	U	F	U	F	U
Early	M-podium p	Pre-birth	3	-	2.5	-	15.5	-	9.5	0.5	4.5	-	-	-	2	-
	Scapula d; radius p; acetabulum; Phalanx 2 p	12	5	-	16	1	46	7	29	3	11	1	-	-	1	1
	Humerus d	12-18	6	-	3	-	11	8	9	1	5	-	-	-	1	-
	<b>Total</b>		<b>14</b>	<b>-</b>	<b>21.5</b>	<b>1</b>	<b>72.5</b>	<b>15</b>	<b>47.5</b>	<b>4.5</b>	<b>20.5</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>4</b>	<b>1</b>
	<b>%</b>		<b>100</b>	<b>-</b>	<b>95.6</b>	<b>4.4</b>	<b>82.9</b>	<b>17.1</b>	<b>91.3</b>	<b>8.7</b>	<b>95.3</b>	<b>4.7</b>	<b>-</b>	<b>-</b>	<b>80</b>	<b>20</b>
Mid	Tibia d; phalanx 1 p	24	3	3	3	3	4	14	12	8	2	4	1	-	-	1
	M-podium d	24-27	1.5	1.5	-	1	4	11	2	4.5	-	2	-	-	-	1
	Calcaneum p	24-30	-	-	-	-	1	9	-	7	-	1	-	-	-	-
	<b>Total</b>		<b>4.5</b>	<b>4.5</b>	<b>3</b>	<b>4</b>	<b>9</b>	<b>25</b>	<b>14</b>	<b>19.5</b>	<b>2</b>	<b>7</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>2</b>
	<b>%</b>		<b>50</b>	<b>50</b>	<b>42.9</b>	<b>57.1</b>	<b>26.5</b>	<b>73.5</b>	<b>41.8</b>	<b>58.2</b>	<b>22.2</b>	<b>77.8</b>	<b>100</b>	<b>-</b>	<b>-</b>	<b>100</b>
Late	Ulna p	36-42	-	-	-	4	-	9	1	2	-	3	-	-	-	-
	Humerus p femur; Radius d; femur d; tibia p.	42	1	6	3	9	5	38	1	13	-	9	-	-	-	3
	<b>Total</b>		<b>1</b>	<b>6</b>	<b>3</b>	<b>13</b>	<b>5</b>	<b>47</b>	<b>2</b>	<b>15</b>	<b>-</b>	<b>12</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3</b>
	<b>%</b>		<b>14.3</b>	<b>85.7</b>	<b>18.8</b>	<b>81.3</b>	<b>9.6</b>	<b>90.4</b>	<b>11.8</b>	<b>88.2</b>	<b>-</b>	<b>100</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>100</b>

Number of fused (fused and fusing) and unfused pig specimens classified under early, middle or late-fusing stages following Reitz and Wing (1999, 76).

Phase	Element	No.	Mean	Min.	Max.	StD
	<b>Scapula</b>					
1a, 1b, 2a	GLP	23	31.85	27.3	37	2.31
2b, 3a	GLP	12	31.48	28.1	37.9	2.68
1a, 1b, 2a	SLC	31	21.30	17.8	24.3	1.71
2b, 3a	SLC	13	19.71	18	21.4	1.07
	<b>Humerus</b>					
1a, 1b, 2a	Bd	15	36.27	31	39.4	2.06
2b, 3a	Bd	6	35.85	34.2	37.7	1.47
1a, 1b, 2a	BT	14	26.65	24.2	28.7	1.38
2b, 3a	BT	8	26.61	23.3	30.1	2.15
1a, 1b, 2a	HTC	18	18.63	16.6	28.6	2.66
2b, 3a	HTC	9	18.20	16.4	19.1	0.99
	<b>Radius</b>					
1a, 1b, 2a	BpP	10	26.76	22.3	29.1	2.00
2b, 3a	BpP	9	25.52	21.4	27.7	1.93
	<b>Pelvis</b>					
1a, 1b, 2a	LA	16	27.22	21.7	29.2	1.78
2b, 3a	LA	8	26.44	25	28.5	1.26
	<b>Tibia</b>					
1a, 1b, 2a	Bd	10	28.94	27.3	30.3	0.99
2b, 3a	Bd	7	27.91	26.3	29.5	1.27
	<b>Astragalus</b>					
1a, 1b, 2a	GLI	8	37.30	34.1	40	2.46

Summary of pig measurements

## **Rosepark, Co. Dublin**

Grid reference: **O20206121 (32020/26121)**

SMR: **DU005-013**

Reference: **Carroll 2008; McCarthy 2008**

Excavations at Rosepark, Balrothery, Co. Dublin revealed a hilltop multi-phase enclosure complex from approximately the late Iron Age until the eighth/ninth century A.D. An unenclosed habitation site, consisting of seven souterrains, succeeded the hilltop settlement but was abandoned prior to the arrival of the Anglo-Normans.

Phase I was marked by the digging of an enclosure ditch (Ditch G) on the summit of the hill. Only 12m of the ditch was excavated, which contained animal bone, charcoal (dated to A.D. 259-411) and iron slag. The remainder of the ditch may have been removed due to the digging of later ditches A and F. Contemporary agricultural activity occurred at the base of the hill as two cereal-drying kilns produced similar radiocarbon dates. The remainder of the kilns were undated but it is likely that many were contemporary. A number of possible huts may also date to this phase as they were truncated by a Phase II ditch (Ditch E). Phase I was largely devoid of artefacts except for a possible iron axehead.

In Phase II, during the fifth/sixth century, an inner (Ditch A) and outer ditch (Ditch B) were excavated on the hilltop. A linear ditch (Ditch E) also extended eastwards from Ditch B while a large house was constructed at this time between the inner and outer enclosures. An entranceway, represented by parallel trenches, was located to the east of the outer enclosure. Ditch A contained large quantities of charcoal and its lower fill was dated to A.D. 431-607. E ware sherds were identified in its upper fill and can be dated between the mid sixth and seventh centuries. It is likely that the outer enclosure was contemporary with the inner enclosing ditch as it related to Ditch E which cut a number of the Phase I features. Only a few finds came from Ditch B, including a possible iron belt buckle and a bone needle, while the only find from Ditch E was an iron escutcheon.

The hilltop enclosure was extensively modified between the sixth and eighth centuries during Phase III. Ditch F was largely a re-cut of Ditch A, the inner enclosure of the Phase II site. A new outer enclosure, Ditch C, was dug but was not as extensive as the previous outer enclosure. However, it showed evidence for an associated stone-revetted bank. Charcoal from Ditch C was dated to A.D. 671-778, while E ware was recovered from both ditches A and C. Other finds from the upper fill of Ditch C included an iron belt buckle, a bronze pin, a knife and a loom weight. Ditch J was likely a continuation of Ditch C and it also probably had a related stone-revetted bank. The ratio of the three main animal domesticates was similar to Phase II.

The disarticulated remains of three adults were found in a shallow pit on top of the hill. One of the individuals was dated to A.D. 582-694. This burial activity may relate to the latter part of Phase II or Phase III

The Phase III outer enclosure enclosed two souterrains while a further five were located further downhill from the hilltop enclosure. The enclosed souterrains may relate to this phase or, alternatively and more likely, they all belong to Phase IV. This phase dated from the ninth century until the arrival of the Anglo-Normans. The souterrains possibly represent a movement from enclosed to open settlement at this point and it appears that the hilltop enclosure was abandoned by the eighth or ninth centuries. Some of the souterrains were used, after their abandonment, as cereal-drying kilns.

### **Animal Bones:**

In total, 4,374 fragments were examined, and 2,146 were able to be identified to species.

<b>Phase</b>	<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Dog</b>	<b>Cat</b>	<b>Red Deer</b>	<b>Whale</b>	<b>LM</b>	<b>MM</b>	<b>Date</b>
I	142	8	11	4	-	-	1	-	83	6	4 <sup>th</sup> /5 <sup>th</sup> C
II	875	270	113	9	2	-	-	3	615	472	5 <sup>th</sup> /6 <sup>th</sup> C
III	605	162	78	19	-	5	1	-	494	368	7 <sup>th</sup> /8 <sup>th</sup> C

**NISP by phase at Rosepark, Balrothery, Co. Dublin.**



**Phase I at Rosepark, Co. Dublin (after Carroll 2008, 24)**



**Phase II at Rosepark, Co. Dublin (after Carroll 2008, 30).**



**Phase III at Rosepark, Co. Dublin (after Carroll 2008, 52).**

#### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Huguen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
UB-4808	Charcoal from fill of Phase I Ditch G	1693±22 BP	<b>A.D. 259-296;</b> <b>A.D. 321-411</b>
UB-4807	Charcoal from cereal drying kiln (Kiln 1)	1689±15 BP	A.D. 262-279; <b>A.D. 326-410</b>
UB-4809	Charred cereal grains from cereal drying kiln (Kiln 2)	1639±21 BP	<b>A.D. 343-440;</b> A.D. 486-531
OxA-11472	Charcoal from lower fill of Phase II Inner Enclosure (Ditch A)	1524±36 BP	<b>A.D. 431-607</b>
UB-4810	Charcoal from Phase III outer enclosure (Ditch C)	1269±23 BP	<b>A.D. 671-778</b>
Beta-236600	Human bone from shallow pit	1380±40 BP	<b>A.D. 582-694;</b> A.D. 704-705; A.D. 748-765

## **Sallymount, Co. Limerick**

Grid Ref: **166527/160525**

SMR No: **N/A**

References: **Clark & Long 2009; Tourunen & Pálsdóttir 2009.**

Extensive early medieval activity was identified at Sallymount, Co. Limerick, represented by a sub-circular enclosure and an attached sub-rectangular enclosure. The sub-circular enclosure would seem to have had a domestic function. A structure consisting of four posts 2m apart arranged in a square (Structure 2) was identified in the interior of the enclosure. A charred hazelnut shell from the fill of one of these holes produced a radiocarbon date of A.D. 671-772 (UBA-12268). No features were identified within the four-post structure; however the ground surface was compacted and slightly stonier than the surrounding area suggesting its use as a floor. A probable hearth was located to the north of this structure and returned a calibrated date range of A.D. 557-644 (UBA-12269).

Seven stakeholes were recorded approximately 1 m to the south of the four-post structure. They were roughly aligned in a north/south direction and arranged in a fashion that could indicate they supported some kind of wattle structure/screen. Another, more substantial fence or screen was located between Structure 2 and the entrance to the enclosure.

The enclosure ditch was re-cut and the entrance causeway remodelled, probably in the seventh century – a charred grain returned a radiocarbon date of A.D. 581-664 (UBA-12265). Three refuse pits were cut into the re-deposited material within the ditch. These contained food refuse as well as tiny un-diagnostic fragments of slag and spheroidal hammerscale from metalworking. A hazelnut from one of these pits was radiocarbon dated to A.D. 653-766 (UBA-12267), while charcoal from another pit produced a radiocarbon date of A.D. 572-646 (UBA-12273). A curvilinear feature truncated the eastern side of the original sub-circular enclosure ditch. Radiocarbon dating of this feature returned a calibrated date of A.D. 677-774 (UBA-12275).

Shortly after the construction of the sub-circular enclosure two additional ditches were excavated to create a sub-rectangular enclosure annexed to the original one. Organic material from the basal layers of these ditches produced dates of A.D. 581-650 (UBA-12280), while the upper fill of the ditches produced dates of A.D. 673-772 (UBA-12271) and A.D. 679-775 (UBA-12272). The sub-rectangular enclosure would appear to have a more industrial focus and deposits in the ditch included evidence of smithing hearths/furnace bottoms, fragments of slag and corroded iron, as well as two fragments of chert debitage, one fragment of flint debitage and two fragments of quartz debitage.

Two postholes located just inside the causeway entrance in the south of the sub-rectangular enclosure were probably related to a gate structure. Three clusters of postholes and pits were located in the interior of this enclosure. These contained fragments of slag and had evidence for hearths, and would appear to have had some industrial function.

Structure 3, approximately 4 m x 2.50 m, was located just outside this enclosure. This structure was defined by a series of postholes, one of which produced a radiocarbon date of A.D. 612-661 (UBA-12281). The fill of these postholes included slag, flake hammerscale, spheroidal hammerscale, and furnace lining. Two features located in the interior of this structure have been interpreted as smithing hearths associated with metalworking.

Structure 4 was also located just south of the sub-rectangular enclosure and consisted of two dumbbell-shaped cereal-drying kilns set inside a structure surrounded by a series of postholes. A central wall separated the structure into two parts, each one containing a kiln. The kiln deposits returned radiocarbon dates of A.D. 653-770 (UBA-9935) and A.D. 688-870 (UBA-9934).

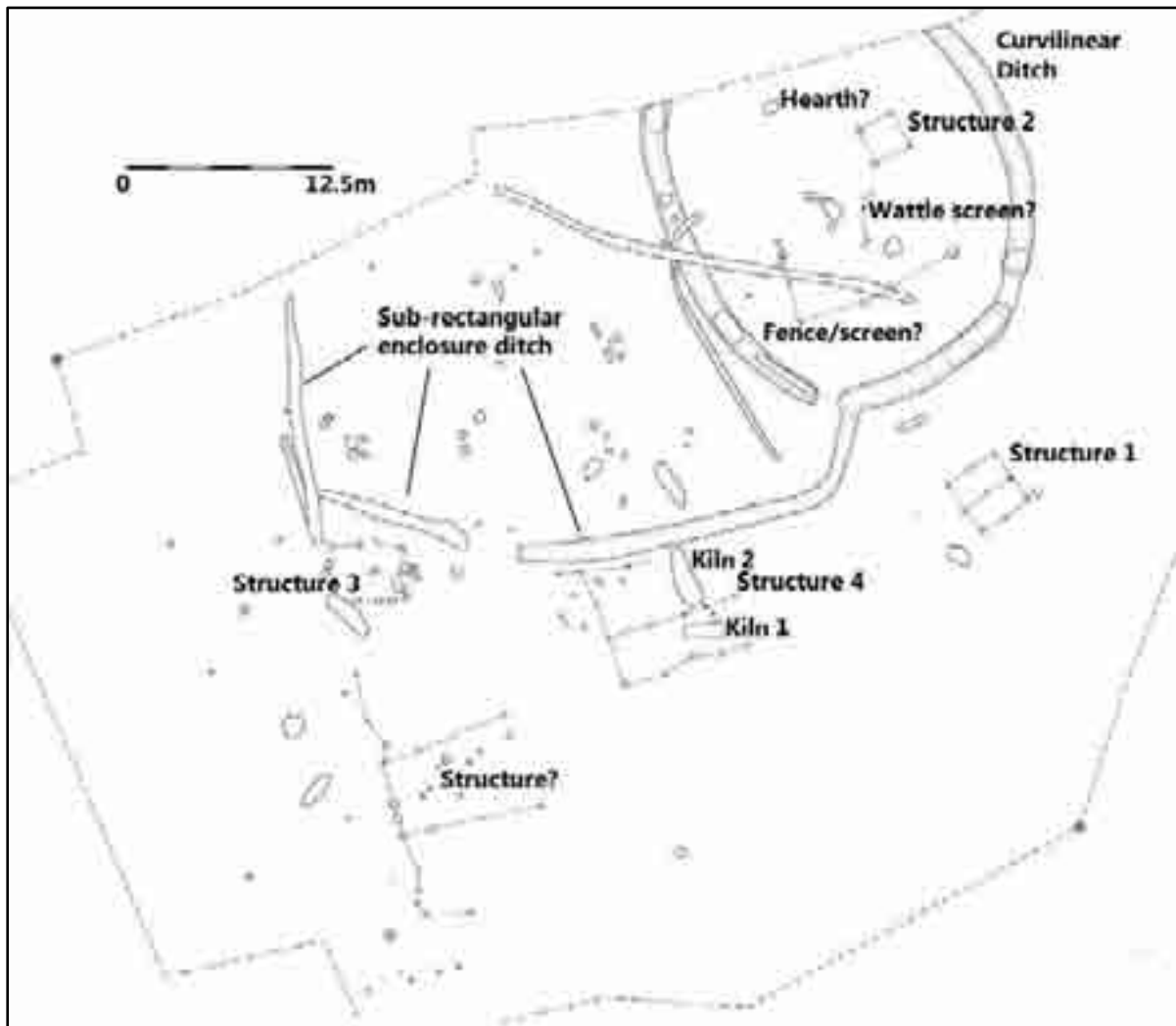
It is tentatively suggested that an alignment of at least 11 postholes and features to the south of Structure 3 may have formed another structure. The shape of the structure represented by the features discussed below is unclear though they seem to reflect one long alignment of postholes with a northwest/southeast orientation combined with several shorter northeast/southwest alignments. The structure measured approximately 11 m long and 6 m wide.

**Animal Bones:**

A total of 1125 specimens were analysed from the site (Tables 1). The bone comes from three phases, Phase 2: Late Bronze Age activity, Phase 3: Iron Age/Early medieval and Phase 4: Early medieval activity. The assemblage from Phase 4 amounted to 842 bones, of which 836 (99.2%) were burnt and unidentifiable to either species or element.

Sheep/Goat	Pig	MM	Unident	Date
1	4	14	823	

**NISP from early medieval phase at Sallymount, Co. Limerick**



**Enclosures at Sallymount, Co. Limerick (after Clarke & Long 2009)**



## Radiocarbon Dates:

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

Sample No.	Context	<sup>14</sup> C Date	Cal. 2 $\sigma$
UBA-9934	Charred hazelnut C592 – basal fill of cereal-drying kiln 1	1239 $\pm$ 24 BP	<b>A.D. 688-870</b>
UBA-9935	Charred barley C123 – basal fill of cereal-drying kiln 2	1320 $\pm$ 26 BP	<b>A.D. 653-721;</b> <b>A.D. 741-770</b>
UBA-12265	Charred cereal C12 – recut of curvilinear ditch	1413 $\pm$ 33 BP	<b>A.D. 581-664</b>
UBA-12266	Charcoal C52 – basal fill of curvilinear ditch	1501 $\pm$ 22 BP	A.D. 470-478; <b>A.D. 535-624</b>
UBA-12267	Hazelnut C54 – upper fill of waste pit	1327 $\pm$ 21 BP	<b>A.D. 653-710;</b> A.D. 747-766
UBA-12268	Hazelnut C211 – fill of posthole Structure 2	1284 $\pm$ 23 BP	<b>A.D. 671-772</b>
UBA-12269	Hazelnut C224 – deposit in hearth	1464 $\pm$ 25 BP	<b>A.D. 557-644</b>
UBA-12270	Charcoal C6 – tertiary fill of curvilinear ditch	1684 $\pm$ 24 BP	A.D. 259-285; A.D. 288-292; <b>A.D. 322-419</b>
UBA-12271	Hazelnut C71 – fill of sub-rectangular enclosure ditch	1282 $\pm$ 20 BP	<b>A.D. 673-730;</b> <b>A.D. 735-772</b>
UBA-12272	Hazelnut C82 – fill of sub-rectangular enclosure ditch	1270 $\pm$ 19 BP	<b>A.D. 679-775</b>
UBA-12273	Charcoal C85 – fill of waste pit	1451 $\pm$ 21 BP	<b>A.D. 572-646</b>
UBA-12274	Charred wheat C317 – fill of posthole	2781 $\pm$ 28 BP	<b>1004-888 B.C.;</b> 883-844 B.C.
UBA-12275	Hazelnut C269 – fill of sub-rectangular enclosure ditch	1275 $\pm$ 20 BP	<b>A.D. 677-774</b>
UBA-12276	Hazelnut C292 – fill of posthole	1279 $\pm$ 21 BP	<b>A.D. 674-773</b>
UBA-12277	Hazelnut C317 – fill of posthole	3262 $\pm$ 23 BP	<b>1612-1493 B.C.;</b> 1475-1461 B.C.
UBA-12278	Charcoal C323 – fill of pit	2735 $\pm$ 32 BP	971-960 B.C.;; <b>934-813 B.C.</b>
UBA-12279	Charcoal C325 – fill of posthole	1649 $\pm$ 21 BP	<b>A.D. 337-434;</b> A.D. 493-506; A.D. 523-526
UBA-12280	Charcoal C121 – fill of sub-rectangular enclosure ditch	1439 $\pm$ 21 BP	<b>A.D. 581-650</b>
UBA-12281	Charcoal C423 – fill of posthole Structure 3	1400 $\pm$ 19 BP	<b>A.D. 612-661</b>
UBA-12282	Emmer C523 – fill of posthole Structure 1	1653 $\pm$ 29 BP	A.D. 261-281; <b>A.D. 325-440;</b> A.D. 486-531
UBA-12283	Charcoal C119 – upper fill of sub-rectangular enclosure ditch	1716 $\pm$ 23 BP	<b>A.D. 255-392</b>
UBA-15462	Charcoal C111 – basal fill of sub-rectangular enclosure ditch	1622 $\pm$ 26 BP	<b>A.D. 387-535</b>

**Seacash, Co. Antrim**Grid Reference: **J15397978 (31539/37978)**SMR No.: **ANT 055:077**Reference: **Lynn 1978; Chaplin & Barnetson 1978.**

The site had been seriously damaged by bull-dozing and all features in the northwest area were truncated to some extent. Access to the enclosure had been gained across an hourglass-shaped causeway, which was broken by a stone-packed drain, possibly a secondary feature of the causeway. An attempt had been made to widen the causeway at sometime late in the enclosure's occupation, or perhaps after its abandonment. A row of eight oak posts ('A' on plan) had been driven in 1.5m from the edge of the causeway and parallel to it. The original entrance was blocked by a gate as two large postholes ('B'), 2m apart and 0.35m deep, were found 2m inside the causeway.

A circular structure was identified to the east of the modern pipe trench, and a rectangular lean-to structure, which may have utilised the exterior bank face as an interior wall, was identified to the east of this. The circular structure was interpreted as a dwelling, while the lean-to may have been an outhouse.

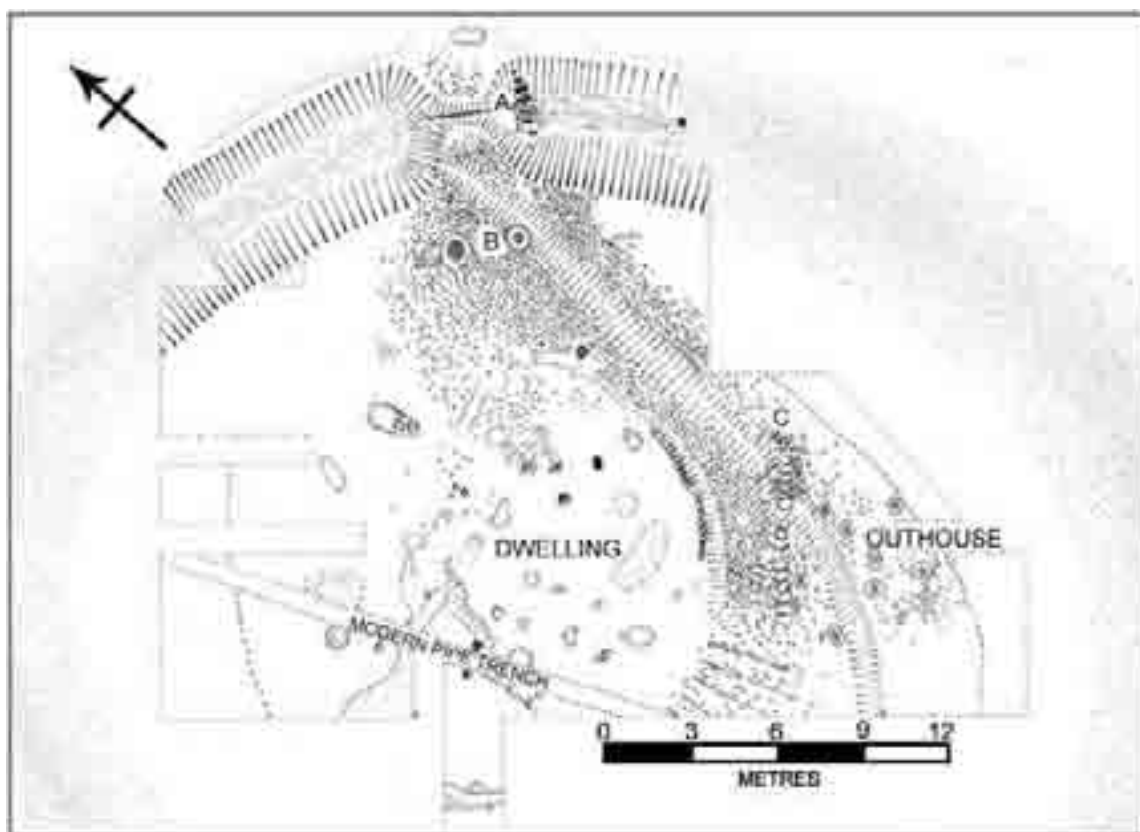
The water-logged conditions immediately to the southeast of the causeway preserved some organic objects – mainly wooden stave-built vessels; and a scrap of possible shoe leather. Almost 3,000 sherds of souterrain ware were found on site, some of which was decorated with cordons or oval impressions. Three glass beads; three bronze pins and an iron spiral ringed pin were also found. Agricultural activity was indicated by the discovery of an iron sickle point and part of a rotary quern-stone; and other industrial activity may have been hinted at by the discovery of pieces of whetstones and hone-stones, as well as stone spindle whorls.

**Animal Bones:**

Comber (2001, 78), has argued that this faunal data represents one of few sites in which the evidence for the transfer of animals between different groups, in particular different levels in society, is visible.

<b>Cattle</b>	<b>Sheep/Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Cat</b>	<b>Date</b>
8	4	5	2	1	<i>c.</i> A.D. 700-1100

**MNI from Seacash, Co. Antrim**



**Plan of Seacash, Co. Antrim (after Lynn 1978, 57)**

### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 σ</b>
UB-671	Gate Post ('B')	1430±70 BP	A.D. 433-494; <b>A.D. 505-695</b> ; A.D. 698-708; A.D. 747-765.
UB-672	Charcoal occupation F16 ('C')	1175±65 BP	A.D. 688-753; <b>A.D. 759-988</b>
UB-673	Causeway Revetment Post ('A')	790±40 BP	<b>A.D. 1174-1281</b>
UB-845 (1973)	71-73 cm above ditch bottom	995±65 BP	A.D. 896-924; <b>A.D. 938-1186</b> ; A.D. 1200-1206
UB-845 (1975)	69-75 cm above ditch bottom	1080±75 BP	<b>A.D. 773-1053</b> ; A.D. 1079-1153
UB-846	19-23 cm above ditch bottom	1140±110 BP	<b>A.D. 661-1049</b> ; A.D. 1085-1123; A.D. 1137-1151
UB-847	0-6 cm above ditch bottom	695±90 BP	<b>A.D. 1162-1424</b>
UB-847F	Retest of 847	1135±100 BP	<b>A.D. 667-1045</b> ; A.D. 1094-1120; A.D. 1141-1147

## Animal Bones Appendix:

### Cattle:

Bone & Epiphysis	Age (months)	# Fused	# Unfused
Scapula d.	7-10	2	-
Innominate	7-10	1	-
Humerus d.	12-18	4	-
Radius p.	12-18	8	-
Tibia d.	24-30	2	-
Metacarpal d.	24-30	3	1
Metatarsal d.	27-36	-	-
Femur p.	36-42	3	2
Calcaneum	36-42	2	1
Radius d.	42-48	2	2
Ulna p.	42-48	3	0
Humerus p.	42-48	1	0
Femur d.	42-48	2	1
Tibia p.	42-48	3	1

### Epiphyseal fusion for cattle bones.

Element	Max. width Glenoid cavity	Max. width distal epiphysis	Max. width prox. epiphysis	Max length
Scapula	54			
	58			
Humerus		65.5		
		67		
Radius			68	
			71	
			72	
			75	
Tibia		51.5		
		57		
Calcaneum				119
				120

### Cattle bone measurements

### Sheep:

Bone	Age	No. of Animals
Scapula	6-8 months	3
Humerus	10 months	1
Innominate	6-10 months	1
Ulna p.	2-2 ½ yrs	1
Tibia p.	3-3 ½ yrs	1

### Slaughter age estimates for sheep

Bone	Age	No. of animals
Scapula	1 yr	4
Innominate	1 yr	1
Femur d.	3 ½ yrs	1

### Slaughter age estimates for pigs

**Sluggary, Co. Limerick**Grid Reference: **R55905355 (155907/153550)**SMR No: **LI013-038**Reference: **Shee-Twohig 2000; McCarty 2000.**

A large trivallate enclosure at Sluggary was polygonal in plan and had a diameter of 40m-48m internally and 70m-80m externally. The inner, middle and outer banks were originally revetted with stone.

Internal features consisted mainly of stakeholes, post-pits and pits. Attempts to identify the ground plans of individual houses were unsuccessful though a number of stakeholes associated with patches of burnt earth and a hearth may represent the remains of a structure. Four furnace bottoms and one piece of slag from the interior of the enclosure suggest on-site iron smelting while one possible clay mould could also indicate metalworking.

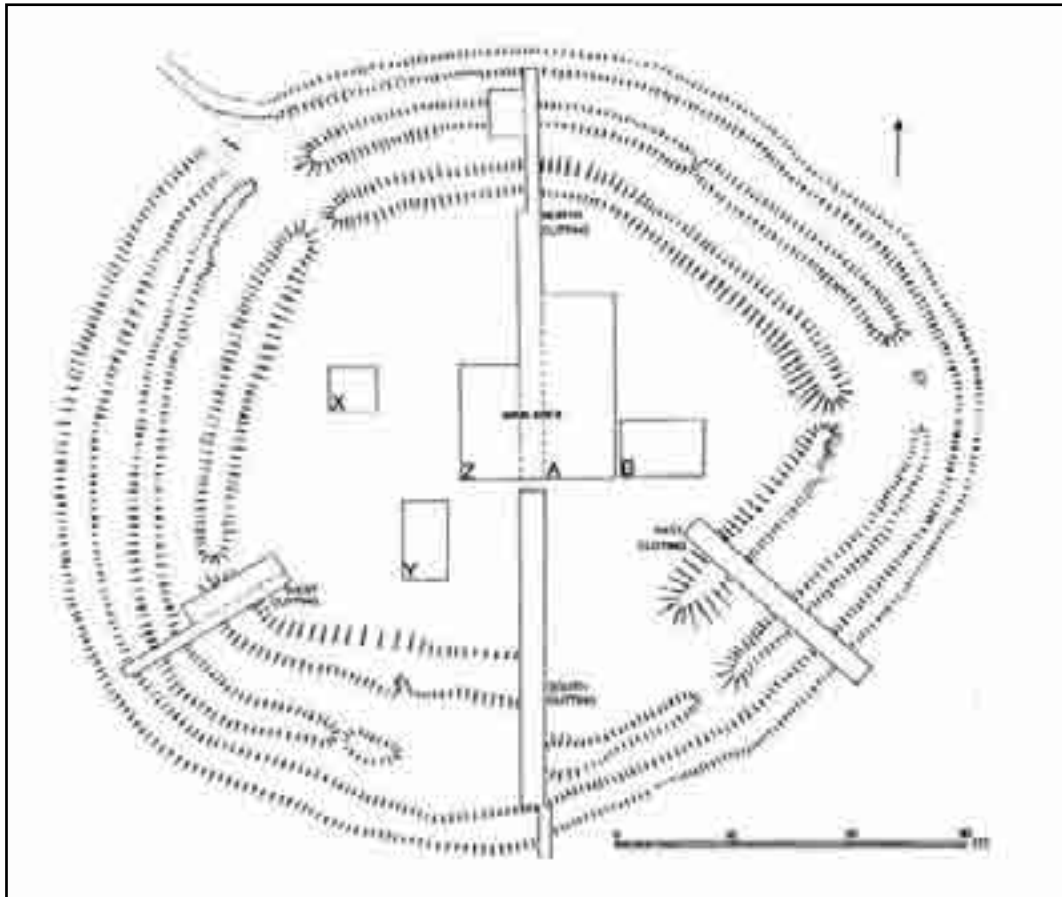
The finds were principally recovered on the surface of the red clay banks or within or associated with the pits cut into it. Finds from the site consisted of ten knives, two needles, one saw, one key and bars, awls and nails. A copper-alloy ringed pin, button/stud and thin strip (from a composite object) and two fragments of fired clay, one a possible mould, were also recovered. A single-edged decorated bone comb and a possible bone handle were recovered inside the fill of the southern perimeter of the inner ditch.

**Animal Bones:**

A total of 398 identifiable bone fragments were recorded. Limited fusion and toothwear data indicated the presence of mature cattle and sheep, while most of the pig bones came from animals that had been killed between their first and second years. The dog bones probably all derived from a single individual, and the red deer was represented by a skull.

<b>Feature</b>	<b>Cattle</b>	<b>Sheep/ Goat</b>	<b>Pig</b>	<b>Horse</b>	<b>Red Deer</b>	<b>Dog</b>	<b>Date</b>
Ditch	186	60	78	2	1	6	
Pit	43	8	14	-	-	-	

**NISP from Sluggary, Co. Limerick**



Plan of site showing areas excavated (after Shee-Twohig 2000, 4)

### Animal Bones Appendix:

There is evidence from the state of fusion of the long bones that many cattle were not slaughtered until they were at least 4 years old. The very worn state of the M3 indicated that some animals were even older.

Species	Element	Min.	Max.	Mean	No.
<b>Cattle</b>	<b>Scapula</b>				
	GLP			58.2	1
	GLG			48.9	1
	BG			42.1	1
	<b>Phalanx 1</b>				
	BP	28.1	28.9	28.5	2
	GL	58.1	59.1	58.6	2
	<b>Metatarsal</b>				
	Bp			52.3	1
	Dp			47.7	1
	<b>Radius</b>				
	Bp			70.1	1
	BFp			64.7	1
	Dp			36.1	1
<b>Sheep</b>	<b>Radius</b>				
	Bd			27.6	1
	BFd			23.6	1
	Dd			17.1	1
	<b>Metacarpus</b>				
	Bp			19.8	1
	Dp			14.4	1
<b>Pig</b>	<b>Astragalus</b>				
	GLI			38.6	1
	GLm			36.1	1

**Bone measurements by species and element from Sluggary, Co. Limerick.**

**Sroove (Lough Gara td.), Co. Sligo**Grid Reference: **M70059999 (170055/299996)**SMR No: **SL046-029**Reference: **Fredengren 2002; Lofquist 2002.**

Sroove crannog was a small, multi-phase crannog, 15m in diameter and 1.2m high, situated on the western shore of Lough Gara. The crannog was originally located in very shallow water (presently exposed as a water meadow due to modern drainage), on top of an earlier stone causeway.

Phase 1 is represented by a stone-built causeway leading out into the lake, 18m in length. The causeway was built over blue lake clays, and a sandy surface produced by trampling lay on its upper surface. There were a few fragments of animal bone (cattle, pig and sheep) from its surface. Its date is unknown.

Phase 2 was an early medieval wooden crannog with a stone causeway, palisade and house. The phase's brushwood floor produced a radiocarbon date of A.D. 776-966. The site was enclosed within a circular palisade, measuring 17m in diameter, of double and single rows of ash-wood posts driven to a depth of 0.40m into the clay. There was a possible rectangular jetty at the north side of the crannog. After the construction of the palisade, an oval to rectangular house with rounded corners was built on the crannog's surface. This house measured 6.5m by 8m internally, and was defined by closely-spaced posts and was protected by stones on the lake side. The house's floor was a thick (0.20m) layer of hazel brushwood, intermixed with clay. The floor produced evidence for blackberries and a small number of oat grains, as well as animal bone. Overall, there were 1511 pieces of bone in Phase 2 deposits (only 8.82% of site total), representing at least four cattle (two adults, two juveniles), four sheep/goat, three pig, one young horse, and one deer. There was a possible entrance (1m wide) at the southwest wall of the house, effectively hidden from view from the probable crannog entrance (at the causeway). A possible hearth was represented by a fire-reddened stone at the centre of the house. Outside the house, the space between it and the palisade was narrow. Finds from Phase 2 included a bone pin (found in stone packing at the house wall), a thumb-scraper of flint (a probable late Neolithic/early Bronze Age type) near a post and a black chert arrowhead found in floor clays. These objects were probably carried onto the site.

Phase 3 was a stony-surfaced crannog, with radiocarbon dates from A.D. 717-1176. The crannog surface was rebuilt with a floor of flagstones and smaller boulders, in two/three layers, with an outer deck of timbers laid around the edges of the site. Although there was no clear structural evidence for a house, palaeoecological and other studies suggest that there was a house on this floor. The hearth was re-used, suggesting a strong symbolic link with the previous phase's house. This phase of the hearth contained a small number of grains from four different types of cereals. Remains of blackberry, raspberry, sloe and elder were also found in Phase 3 deposits. The palisade may have been pulled up towards the end of this phase. There were also large amounts of animal bone found, particularly in front of the door of the house and to the left towards the lake. This comprised a major proportion of the site's bone assemblage (56%), representing the remains of at least sixteen cattle, twelve pig, eight sheep, six horse, one deer, one wild duck, and one hare. Finds from inside the house in this phase are more representative of personal possessions, including a lignite bracelet, a comb fragment from near the fireplace, bone beads, as well as iron nails and a bone pin towards the back of the house. There was also a small bone needle and knife found at the back of the house. There were also finds from outside the house, including iron nails, the head of a ringed pin and bronze studs from a leather strap.

Phase 4 was an open stony platform devoted to iron working, with radiocarbon dates between A.D. 663 and A.D. 969. The site had a uniform floor of stone and bone, and was covered with small, shattered and fire-cracked stones (0.10m thick). The stones were mixed with animal bones, suggesting that this was a deliberate floor deposit. There was no house on the platform, which was probably open to the air. There was no palisade, suggesting a decreasing role of the island's boundary. There was a bowl-shaped depression in the southwest corner of the crannog, possibly in origins a furnace for iron-working, set in a floor of fire-cracked stones. There was some iron slag in this area, although there were not large amounts. A heavy stone may have been used as an anvil.



There were deposits of animal bone all over the site (comprising 30% of the site assemblage), with large amounts comprising a floor at the eastern edge of the crannog. The bone was frequently fragmented, suggesting that it had been walked into the crannog's surface. The Phase 4 burned and unburnt bone included at least 20 cattle, nine pig, seven sheep, four horse, one deer and one dog. Cereal remains were not recorded from this phase of activity, although fruit remains were present. Finds from across the site included an antler ring, smooth white stones (possibly used in crafts), a tracked stone (for sharpening pins) and a lignite bracelet in the sand.

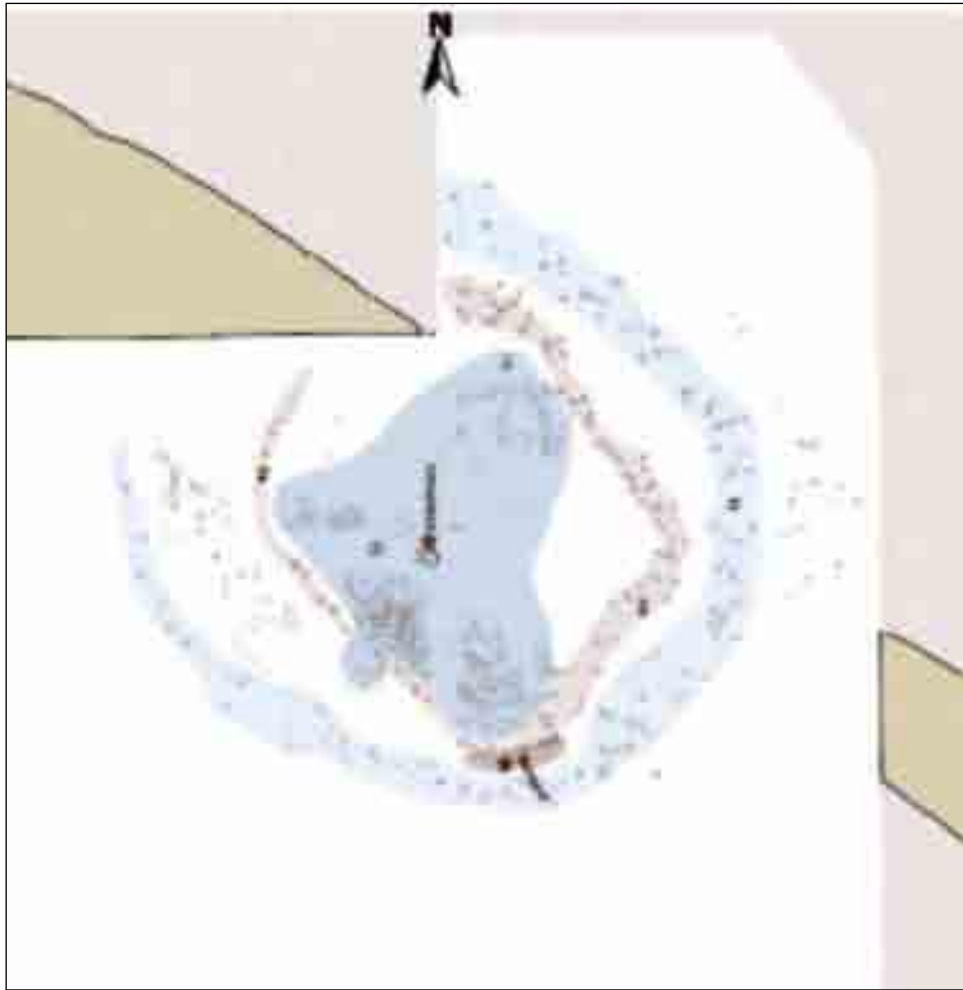
Phase 5 was the final phase of occupation in the early medieval period, possibly no later than A.D. 1000. A stone cairn was constructed across the site, with angular stones and boulders laid on it, with a mid-cairn on the lakeward site. It is possible that it had a superstructure of planks or that it was unfinished.

### Animal Bones:

Over 16,000 animal bone fragments were recovered from the early medieval phases at Sroove. More than 99% of these came from phases 2 (1,511), 3 (9,584) and 4 (5,164).

Phase		Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Dog	Hare	Bird	Fish	Date
<b>1</b>											
	<b>NISP</b>	2	2	1	-	-	-	-	-	-	
	<b>%NISP</b>	40	40	20	-	-	-	-	-	-	
	<b>MNI</b>	1	1	1	-	-	-	-	-	-	
	<b>%MNI</b>	33.3	33.3	33.3	-	-	-	-	-	-	
<b>2</b>											600- 900
	<b>NISP</b>	51	30	25	7	7	1	-	1	-	
	<b>%NISP</b>	41.8	24.6	20.5	0.575	0.575	0.8	-	0.8	-	
	<b>MNI</b>	4	4	3	1	1	1	-	1	-	
	<b>%MNI</b>	26.66	26.66	20.0	6.66	6.66	6.66	-	6.66	-	
<b>3</b>											600- 900
	<b>NISP</b>	577	150	258	110	14	3	2	3	1	
	<b>%NISP</b>	51.6	13.4	23.1	9.8	1.2	0.3	0.2	0.3	0.1	
	<b>MNI</b>	16	8	12	6	1	1	1	1	1	
	<b>%MNI</b>	34	17	25.6	12.9	2.1	2.1	2.1	2.1	2.1	
<b>4</b>										<b>Moose? Mouse?</b>	600- 900
	<b>NISP</b>	671	98	163	40	8	4	-	1	1	
	<b>%NISP</b>	68	10.0	16.5	4.1	0.8	0.4	-	0.1	0.1	
	<b>MNI</b>	20	7	9	3	1	1	-	1	1	
	<b>%MNI</b>	46.5	16.25	20.05	7	2.3	2.3	-	2.3	2.3	
<b>5</b>											c. 10 <sup>th</sup> C
	<b>NISP</b>	18	4	3	4	-	-	-	-	-	
	<b>%NISP</b>	62	14	10	14	-	-	-	-	-	
	<b>MNI</b>	3	1	1	1	-	-	-	-	-	
	<b>%MNI</b>	50	16.66	16.66	16.66	-	-	-	-	-	

**NISP and MNI from phases at Sroove crannog, Co. Sligo.**



**Phase II at Sroove, Co. Sligo (after Fredengren 2002)**

#### **Radiocarbon Dates:**

(PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), *Radiocarbon* 46:1029-1058).

<b>Sample No.</b>	<b>Context</b>	<b><sup>14</sup>C Date</b>	<b>Cal. 2 <math>\sigma</math></b>
Gr-25306	Phase 4: Cattle bone from fire-cracked stone floor (F18)	1290 $\pm$ 30 BP	<b>A.D. 663-775</b>
Gr-25309	Phase 2: Vertical wooden post from southern house wall (F4)	1240 $\pm$ 30 BP	<b>A.D. 686-873</b>
Gr-25267	Phase 3: Wood from timber floor (F13)	1180 $\pm$ 40 BP	<b>A.D. 717-743; A.D. 768-907; A.D. 911-971</b>
Gr-25367	Phase 2: Wood from brushwood floor (F6)	1170 $\pm$ 30 BP	<b>A.D. 776-901; A.D. 917-966</b>
Gr-25308	Phase 3: Wood from timber floor (F13)	1170 $\pm$ 30 BP	<b>A.D. 776-901; A.D. 917-966</b>
Gr-23305	Phase 4: Charcoal from fire-cracked stone floor (F18)	1160 $\pm$ 30 BP	<b>A.D. 778-903; A.D. 914-969</b>

Gr-25266	Phase 2: Wooden vertical peg from western house gable (F4)	1110±25 BP	<b>A.D. 888-988</b>
ST-14697	Phase 2: Vertical wooden post from southern palisade (F3)	1260±120 BP	<b>A.D. 581-1016.</b>
ST-14696	Phase 3: Wood from timber floor (F13)	1035±80 BP	A.D. 781-790; <b>A.D. 808-1176.</b>

## Animal Bones Appendix:

### *Phase 2*

#### **Cattle:**

Only seven bone fragments could be included in the fusion table. Two unfused fragments (28.6%) came from a juvenile and a sub-adult:

- 1) one distal humerus, which fuses at 12-18 months;
- 2) one proximal tibia that fuses at 3.5-4 years.

#### **Sheep/Goat**

The material contained two jaws from two juvenile animals. The first jaw held teeth that showed that the animal was aged *c.* 5 months. The other jaw held teeth that showed that the animal was aged *c.* 12-18 months.

It was possible to put six bone elements into the fusion data table (Appendix 6). Four of these came from juvenile animals. One lumbar vertebrae had both the cranial and caudal epiphyses unfused; these fuse at 4-5 years.

#### **Pig**

The material did not contain any jaws from pig and only two bone fragments could be put into the fusion data table. The two fragments were a distal MC that fuses at 2 years of age and one proximal femur that fuses at 3.5 years. One thoracic vertebra had a corpus epiphyses caudalis that had not yet fused; these fuse at 4-7 years of age.

#### **Horse**

It was only possible to judge age from two mandibles:

- 1) One dp4 shows that the animal was younger than *c.* 3 years.
- 2) One fused PH 3 shows that the animal was older than 1-1.5 years.

#### **Deer**

None of the bone elements could be determined to belong to a juvenile. MT fuses proximal before birth, ulna fuses proximal at 26-42 months, PH 1 fuses proximal at 17-20 months and PH 2 fuses proximal at 11-17 months of age.

### *Phase 3*

#### **Cattle:**

Mandible	dp2	dp3	dp4	PM2	PM3	PM4	M1	M2	M3	Age in months
1	-	-	-	-	P	-	P	-	-	>33
2	-	-	-	-	-	-	-	-	P	>27
3	P	P	P	P	P	P	-	-	-	<24
4	P	P	P	P	P	P	-	-	-	<23

**Presence of teeth in mandibles and approximate death age in months.**

	Unfused		Closing		Fused	
Age of Fusion	#	%	#	%	#	%
7-10 mnths	-	-	-	-	1	100
12-18 mnths	10	42	-	-	14	58
18-24 mnths	2	17	1	8	9	75
2-2 ½ yrs	4	22	-	-	14	78
3-3 ½ yrs	4	80	-	-	1	20
3 ½-4 yrs	14	63.5	1	4.5	7	32
TOTAL	34	41.5	2	2.5	46	56
7-24 months	12	32.5	1	2.5	24	65
2-4 yrs	22	49	1	2	22	49

#### Epiphyseal fusion of cattle bones

Element	Bd	GL	Gender	E.W.H. (cm)
Metacarpal	58.5	175.7	F	105.95

Sexing (Higham & Message 1969) and estimated withers height (Matolski 1970) of cattle bone

Pig:

Mandible	dp2	dp3	dp4	PM2	PM3	PM4	M1	M2	M3	Age in months
1	P	P	-	-	-	-	P	P	-	12
2	-	-	-	-	P	-	-	-	-	>12
3	-	-	-	-	-	-	-	P	P	12
4	-	-	-	-	-	-	-	P	P	>18
5	-	-	P	-	-	-	-	-	-	<15
6	-	-	P	-	-	-	P	-	-	6-15
7	-	-	-	-	P	P	-	-	-	<15
8	-	-	-	-	-	-	P	P	-	<12

Presence of teeth in mandibles and approximate death age in months.

	Unfused		Closing		Fused	
Age of Fusion	#	%	#	%	#	%
1 yr	6	33	-	-	12	67
2 yr	11	58	-	-	8	42
2 ½ yr	3	100	-	-	-	-
3 ½ yr	15	100	-	-	-	-
TOTAL	35	64	-	-	20	36

#### Epiphyseal fusion of pig bones

Sheep/Goat

	Unfused		Closing		Fused	
Age of Fusion	#	%	#	%	#	%
6-10 mnth	2	22	-	-	7	78
13-24 mnth	3	33	2	22	4	45
30-36 mnth	10	91	-	-	1	9
36-42 mnth	2	33	-	-	4	67
TOTAL	17	48	2	6	16	46
0-2 yrs	5	28	2	11	11	61
2-4 yrs	12	71	-	-	5	29

#### Epiphyseal fusion of sheep bones

Phase 3 contained only one mandible from sheep/goat with teeth in place. This jaw came from an animal that was between 12-21 months.

## Horse

Mandible	Inc. 3	P2	P3	P4	Age
1	P	-	-	-	4½ yrs
2	-	P	P	P	<3 yrs

**Presence of teeth in mandibles and approximate death age in months.**

Age of Fusion	Unfused		Closing		Fused	
	#	%	#	%	#	%
9-24 mnths	1	6	-	-	16	94
24-42 mnth	4	67	-	-	2	33
42-60 mnth	2	100	-	-	-	-

**Epiphyseal fusion of horse bones**

*Phase 4*

## Cattle:

Mandible	dp2	dp3	dp4	PM2	PM3	PM4	M1	M2	M3	Age in months
1	P	P	-	P	P	-	-	-	-	<24
2	-	-	-	-	-	P	P	P	-	<33
3	P	P	P	-	-	-	P	-	-	6-24
4	P	P	P	P	-	-	-	-	-	6-24
5	-	-	-	-	-	-	P	P	P	<27
6	-	-	P	P	P	-	-	-	-	27-33
7	-	-	-	-	P	-	-	-	-	<24

**Presence of teeth in mandibles and approximate death age in months.**

Age of Fusion	Unfused		Closing		Fused	
	#	%	#	%	#	%
7-10 mnths	1	17	-	-	5	83
12-18 mnths	7	25	2	7	19	68
18-24 mnths	1	6	-	-	15	94
2-2 ½ yrs	13	52	-	-	12	48
3-3 ½ yrs	1	50	-	-	1	50
3 ½-4 yrs	20	53	2	5	16	42
TOTAL	43	37	4	4	68	59
7-24 months	9	18	2	4	37	78
2-4 yrs	34	52	2	3	29	45

**Epiphyseal fusion of cattle bones**

**Pig:**

Mandible	Inc. 3	dp3	dp4	PM2	PM3	PM4	M1	M2	M3	Age in months
1	-	-	-	-	P	-	P	-	-	6-12
2	-	-	-	-	-	P	-	-	-	<15
3	-	-	-	-	-	P	P	-	-	>15
4	-	-	-	-	-	-	-	P	-	>12
5	-	-	-	-	-	-	P	P	P	18
6	P	-	-	-	-	-	-	-	-	>9
7	-	-	-	-	-	-	P	P	P	>12

**Presence of teeth in mandibles and approximate death age in months.**

Age of Fusion	Unfused		Closing		Fused	
	#	%	#	%	#	%
1 yr	6	46	2	15	5	39
2 yr	4	57	-	-	3	43
2 ½ yr	-	-	-	-	-	-
3 ½ yr	4	57	1	14	2	29
TOTAL	14	52	3	11	10	37
0-2 yrs	10	50	2	10	8	40
2-4 yrs	4	57	1	14	2	29

**Epiphyseal fusion of pig bones**

Element	GLI	E.W.H. (cm)
Astragalus	21.5	61.5

**Estimated withers height (Teichert 1969) of pig bone**

**Sheep/Goat**

Mandible	dp2	dp3	dp4	PM2	PM3	PM4	M1	M2	M3	Age in months
1	-	-	-	-	-	-	P	P	-	>12
2	-	-	-	-	P	P	P	P	-	>24
3	-	-	-	-	P	P	P	-	-	>24

**Presence of teeth in mandibles and approximate death age in months.**

Age of Fusion	Unfused		Closing		Fused	
	#	%	#	%	#	%
6-10 mnth	2	22	-	-	7	78
13-24 mnth	3	33	-	-	6	67
30-36 mnth	10	100	-	-	-	-
36-42 mnth	3	100	-	-	-	-
TOTAL	18	58	-	-	13	42
0-2 yrs	5	28	-	-	13	72
2-4 yrs	13	100	-	-	-	-

**Epiphyseal fusion of sheep bones**

Element	GLI	E.W.H. (cm)
Astragalus	24.1	54.65

**Estimated withers height (Teichert 1975) of sheep bone**

## Horse

Age of Fusion	Unfused		Closing		Fused	
	#	%	#	%	#	%
9-24 mnths	1	25	-	-	3	75
24-42 mnth	-	-	-	-	2	100
42-60 mnth	5	71	-	-	2	29
TOTAL	6	46	-	-	7	54
0-2 yrs	1	25	-	-	3	75
2-4 yrs	5	56	-	-	4	44

### Epiphyseal fusion of horse bones

#### Phase 5

#### Cattle:

Only 3 of the 18 fragments of cattle could be used to define age through fusion data. These 3 bone elements came from animals older than 2 years.

#### Horse:

- 1) One maxilla containing PM2, PM3, PM4. These erupt between 30 and 36 months so the animal is older than 3 years.
- 2) One tooth, an M2. This tooth erupts at 2 years of age.
- 3) One complete PH 2. The proximal diaphysis and epiphysis fuse at 12–15 months.

#### Sheep/Goat

- 1) One tooth, an M1 from maxilla. This tooth erupts at 6 months of age.
- 2) One complete astragalus. This bone fuses at 30–36 months of age.

#### Pig

- 1) One distal diaphysis of a humerus. This bone fuses at 1 year of age.
- 2) One unfused distal diaphysis of a femur. The distal diaphysis and epiphysis fuse at 3.5 years of age so this bone is from an animal that is younger than 3.5 years.
- 3) One unfused distal diaphysis of a metacarpal. This bone fuses at 2 years of age so the bone is from an animal that is younger than 2 years.

## Treanbaun, Co. Galway

Grid Ref: **169136/226170**

SMR No: **N/A**

References: **Pérez 2009; Bermingham 2009.**

Treanbaun is a multi-period site with the Early Bronze Age, Iron Age and early medieval periods producing the majority of the archaeological remains. The Early Bronze Age is represented by two cist burials containing cremation urns. A possible lead, or silver, mining pit also appears to belong to this period.

The highest part of the hill was used as a burial site from the early Iron Age until the end of the early medieval period. This was demarcated by a ditch enclosing an area approximately 80m x 70m on the top of the hill. The early Iron Age burials are represented by a cremation within a probable ring-barrow, whereas the early medieval burials are typical extended inhumations. Radiocarbon dates for these revealed that the cemetery was in use between the 7<sup>th</sup> and 13<sup>th</sup> centuries A.D. It would appear that the early medieval cemetery represents a *féarta*, a kin-based burial ground which was focused on, and re-used, an earlier burial ground, and which was placed on, or near, the boundary of a polity.

It is possible that the early medieval burials at Treanbaun were part of a settlement/cemetery complex, since a souterrain cut into the fill of the enclosure ditch seems to be roughly contemporary with the burials. The domestic finds recovered from both features, ditch and souterrain, such as a green glass bead, a loom weight and a whetstone indicate that they are contemporary with the early medieval burial site.

### Animal Bones:

The full assemblage from Treanbaun weighs around 10 kilos with just under 1800 fragments of bone present, of which 721 belong to the early medieval period. The assemblage is dominated by the remains of cattle, which amount to 55% of fragments counted or 84% of fragments weighed. Dog is the next species best represented (30% of fragments counted and 11% of fragments weighed), but this is the result of the presence of the partial skeletons of two dogs. Age estimates based on epiphyseal fusion data for cattle suggest the presence of young and adult animals but the quantity of bones suitable for ageing is low.

Cattle	Sheep/ Goat	Pig	Horse	Red Deer	Dog	Unident.	Date
136	25	9	2	1	75	473	8 <sup>th</sup> /9 <sup>th</sup> C?

**NISP from early medieval phases at Treanbaun, Co. Galway**





Wk21791	Charcoal (pomoideae) from ring-ditch tertiary fill	634±26	<b>A.D. 1286-1329;</b> <b>A.D. 1340-1396</b>
Wk21792	Charcoal (hazel, pomoideae, alder) from possible mine secondary fill F1020	1245±27	<b>A.D. 683-831;</b> A.D. 836-869
Wk21793	Charcoal (pomidoae and hazel) from possible mine secondary fill F1141	3436±32	1878-1838 B.C.; <b>1830-1791 B.C.;</b> <b>1786-1664 B.C.;</b> 1648-1644 B.C.
Wk21794	Charcoal (hazel) from oval pit secondary deposit F1160 , Area B	2758±31	994-989 B.C.; <b>979-828 B.C.</b>
Wk22559	Cremated human bone from cremation pit fill F47	2418±30	<b>747-688 B.C.;</b> <b>665-646 B.C.;</b> <b>588-580 B.C.;</b> <b>554-400 B.C.</b>
Wk22560	Cremated human bone from cist burial fill F1143	3515±30	<b>1920-1751 B.C.</b>
Wk22711	Charcoal (alder/hazel) (sample 136) from shallow pit secondary fill F63	2052±30	<b>166 B.C. – A.D. 6;</b> A.D. 11-17
Wk22712	Charcoal (birch) from possible mine tertiary fill F1007	2795±30	<b>1016-890 B.C.;</b> 881-848 B.C.
Wk22713	Charcoal from ringditch primary fill F238	1369±30	<b>A.D. 609-688;</b> A.D. 755-756
Wk22714	Charcoal from shallow pit secondary fill F205 (sample 109)	1263±30	<b>A.D. 668-783;</b> A.D. 788-822; A.D. 842-860
Wk22715	Charcoal from fill F1150 of possible mine F1012	3883±75	2568-2517 B.C.; <b>2499-2187 B.C.;</b> 2184-2141 B.C.

#### Animal Bones Appendix:

<b>Skeletal element</b>	<b>Fusion by</b>	<b>Unfused</b>	<b>Fused</b>	<b>Indeterminate</b>
<i>scapula</i>	7-10 mths	1	1	2
<i>pelvis</i>	7-10 mths	1	1	6
<i>humerus d</i>	12-18 mths	1	4	5
<i>tibia d</i>	24-30 mths	1	3	1
<i>metacarpal d</i>	24-30 mths	-	-	2
<i>calcaneus</i>	36-42 mths	1	-	2
<i>radius d</i>	36-42 mths	-	-	2
<i>femur px</i>	42 mths	-	-	1
<i>humerus px</i>	42-48 mths	-	1	-
<i>tibia px</i>	42-48 mths	-	1	3
<i>femur d</i>	42-48 mths	-	1	1
<i>ulna</i>	42-48 mths	-	-	3

#### Epiphyseal fusion of cattle bones at Treanbaun, Co. Galway

### **Waterford - Peter Street**

Grid Ref: **S607123 (26070/11230)**

SMR No: **N/A**

References: **Hurley *et al.* 1997; McCormick 1997.**

### **Waterford - Bakehouse Lane**

Grid Ref: **S608123 (26080/11230)**

SMR No: **N/A**

References: **Hurley *et al.* 1997; McCormick 1997.**

The initial *longphort* of A.D. 914 was probably located at the eastern end of the promontory flanked by the River Suir to the north and St. John's River and marshland to the east and south. Very little archaeological evidence for the tenth and early eleventh century Scandinavian settlement (Stages 1 and 2) has come to light since the excavations along Peter Street, High Street and Lady Lane were to the west of any postulated tenth-century settlement. This Stage 3 area was developed in the eleventh/mid-twelfth century. Settlement rapidly expanded to the west (Stage 4) outside the line of the early/late-twelfth century stone wall constructed along the line of Arundel Square and Bakehouse Lane.

The Stage 3 settlement was defended on its west side by a deep ditch and a large inner (eastern) clay bank, running parallel to Bakehouse Lane. Though post-holes were uncovered at the eastern lip of the ditch, it is likely that the front (west) face of the bank was unrevetted except for woven wattle which protected the clay from slipping back into the ditch. Two drains were uncovered beneath the bank, with timber from the lowest drain producing a dendrochronological date of A.D. 1088±9. Eight timbers from the ditch produced dates between A.D. 1070 and 1090, consistent with the date from below the bank.

A stone-built town wall was constructed in the mid-twelfth century. A metallised surface was laid over the backfilled ditch and extended parallel to the wall for most of its excavated length. Constructional debris such as mortar and chipped stones - apparently derived from dressing the stones used in the wall - overlay the track-way and indicate that it was built shortly before the wall was built. A series of split oak beams were set on this metallised surface, one of which produced a dendrochronological date of A.D. 1132±9. Layers of dumped organic material accumulated rapidly against the outside of the stone wall containing a significant quantity of mid/late twelfth-century pottery sherds (e.g. Ham Green, Minety-type, southeast Wiltshire and coarse cooking wares), as well as butchered bone, horn cores and red deer antler.

Excavations in the centre of the town uncovered a length of the original mid/late-eleventh-century metallised surface at Peter Street. This appears to have been contemporary with the earliest level (mid-eleventh century) of houses, and fourteen contiguous plot boundaries were excavated along an area almost 90m long. Each of these plots contained the superimposed strata of at least twelve levels of houses dating from the mid-eleventh to early fourteenth century. The plots were not all occupied at any one time and the property boundaries changed slightly through the centuries. Where the plot boundaries were excavated, they were usually confined to the vicinity of the backyard houses with rarely any evidence for boundary divisions between street-fronting houses. The Type 2 houses in the backyards of the earlier levels at Peter Street were also found to often transgress the boundary of previous plots indicating that plot boundaries locations were not always strictly adhered to. One rare excavated plot fence at Peter Street was uncovered in Level 1 (mid-eleventh century) and was associated with a log track-way of horizontally-laid oaks. Four east-west plots were also uncovered at the western extent of the twelfth-century town along Bakehouse Lane. Three of the plots to the north were contiguous with each other while a further one was situated at the extreme south of the series of excavated sites.

There is a considerable corpus of excavated Scandinavian and medieval buildings in Waterford city. The earliest and most common type was post-and-wattle structures (64 houses). Also excavated were twelve stone houses, six sunken buildings, five stone-footed buildings, four unidentified structures,

three stone undercrofts, two timber buildings, and one stone and timber building. Forty-six buildings had evidence for re-flooring.

Two thirds (43) of the post-and-wattle buildings belonged to Wallace's Type 1, with the remaining third (21) of Type 2. A feature of the interior of the Waterford Type 1 buildings unique to anywhere else in Ireland was the fireside benches between the central hearth and the side aisles. Unlike the Fishamble examples in Dublin, the Type 2 houses from Waterford were occasionally subdivided into side aisles. They also contained clay floors generally without any coverings of wattle, brushwood and mats though organic bedding material was recovered from a number of the Peter Street structures containing side aisles. Four Type 4 sunken buildings were excavated in Peter Street, Olaf Street and High Street. The sunken building from Peter Street can be securely dated to the late-eleventh century as three primary structural uprights from the structure produced estimated felling dates centring on A.D. 1083±9.

The Waterford Type 1 buildings have been dated to the mid-eleventh/early-thirteenth century (Peter Street: Levels 1-11) though they ceased to be the dominant architectural form by the mid-twelfth century. The Type 2 post-and-wattle buildings have a similar date range to the Type 1 houses. Sunken floored stave-built buildings (Type 4) were first built in the late eleventh century and were in use simultaneously with post-and-wattle structure until just before the mid-twelfth century when ground level sill-beam structures gradually emerged as the dominant architectural form.

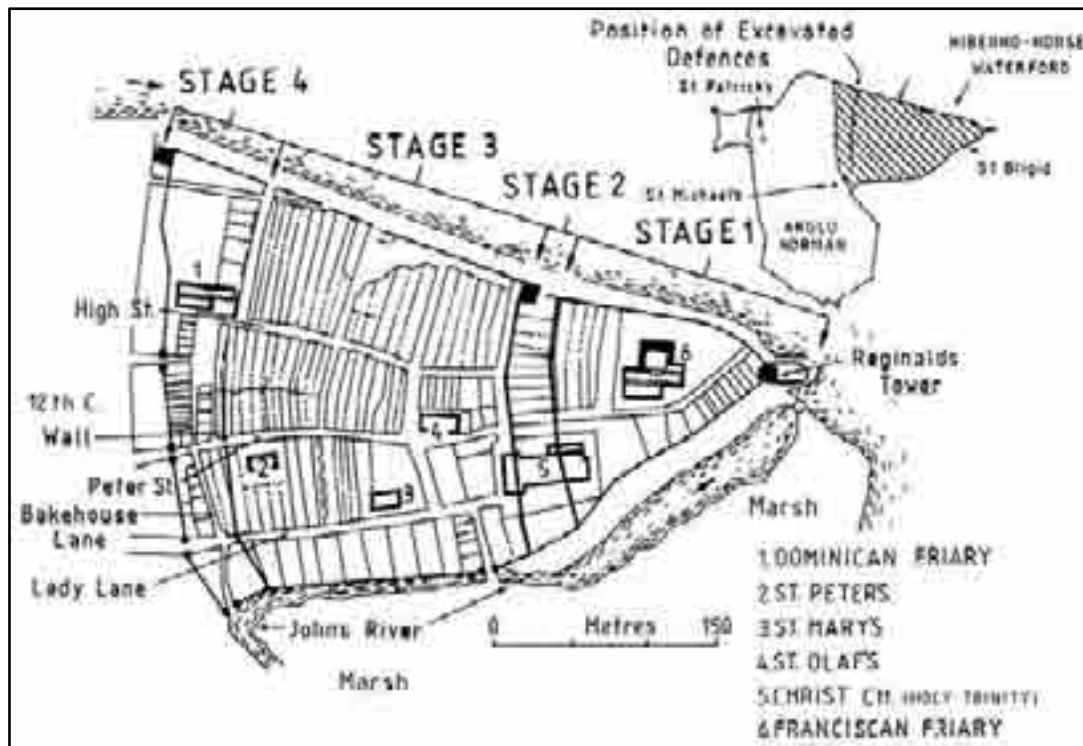
### Animal Bones:

There were large numbers of animal bones produced from the early medieval/pre-Norman phases at Waterford. Domesticates dominated, but there was also a large dump of red deer antlers from outside the twelfth-century wall, suggesting the presence of antler workshops in the town. Hedgehog bones from a thirteenth/fourteenth century pit may represent the earliest known specimen of this animal in Ireland. Giraldus Cambrensis states in 1185 that there were no hedgehogs in Ireland, and the earliest literary reference to a hedgehog in Ireland is *c.* 1603.

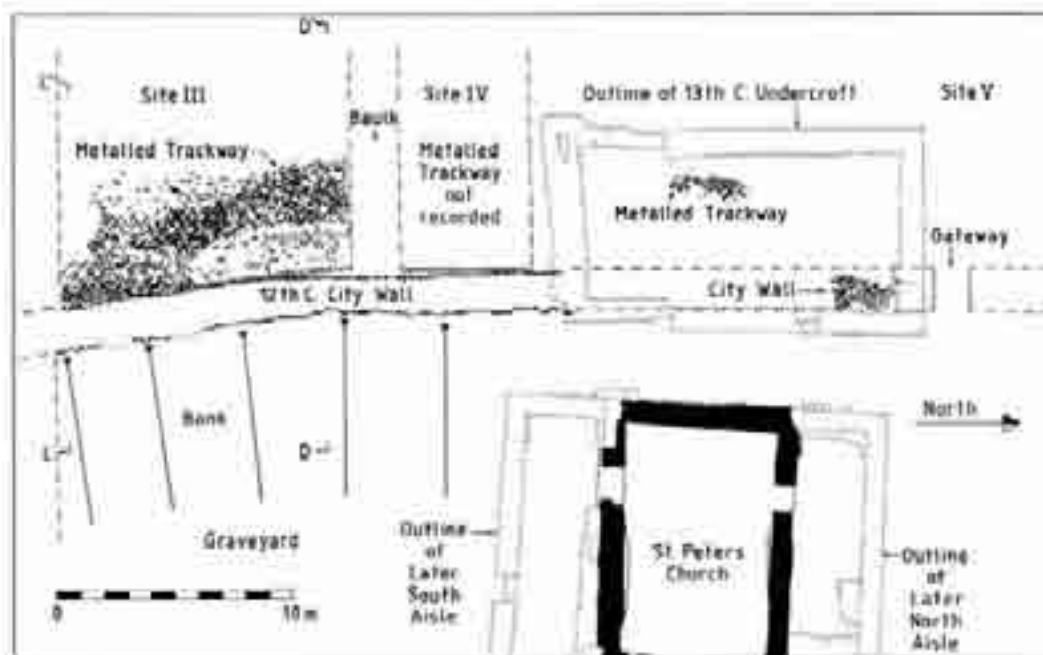
Context		Cattle	Sheep/ Goats	Pig	Horse	Dog	Cat	Red Deer	Fox	Roe Deer	Hare	Seal	Date
1161 – Dump													Mid- 12 <sup>th</sup> C
	NISP	750	209	149	26	5	11	19	-	-	1	-	
	%NISP	64.1	17.9	12.7	2.2	0.4	0.9	1.6	-	-	0.1	-	
	MNI	20	16	12	2	1	4	1	-	-	1	-	
	%MNI	35.1	28.1	21.1	3.5	1.8	7.0	1.8	-	-	1.8	-	
1163- Dump													Mid- 12 <sup>th</sup> C
	NISP	1170	502	143	6	7	25	77	-	1	3	2	
	%NISP	60.4	25.9	7.4	0.3	0.4	1.3	4.0	-	-	0.2	0.1	
	MNI	30	27	12	1	1	6	1	-	1	1	1	
	%MNI	37.0	33.3	14.8	1.2	1.2	7.4	1.2	-	1.2	1.2	1.2	
1170- Dump													Mid- 12 <sup>th</sup> C
	NISP	927	578	111	9	10	9	523	2	-	-	-	
	%NISP	42.6	26.6	5.1	0.4	0.5	0.4	24	0.1	-	-	-	
	MNI	22	22	12	2	2	1	1	1	-	-	-	
	%MNI	34.4	34.4	18.8	3.1	3.1	1.6	1.6	1.6	-	-	-	
Sunken Building													Early 12 <sup>th</sup> C
	NISP	190	36	58	2	6	7	-	-	-	-	-	
	%NISP	63.5	120	19.4	0.7	2.0	2.2	-	-	-	-	-	
	MNI	8	3	7	1	1	2	-	-	-	-	-	
	%MNI												
Peter St – Gp 1													Mid- 11 <sup>th</sup> C
	NISP	1005	375	448	8	17	30	5	-	-	1	-	
	%NISP	53.1	19.8	23.7	0.4	0.9	1.6	0.3	-	-	-	-	
	MNI	39	19	33	1	2	9	1	-	-	1	-	
	%MNI	36.8	17.9	31.1	0.9	1.9	8.5	0.9	-	-	0.9	-	

Peter St - Gp 2														Mid- 11 <sup>th</sup> C
	NISP	1595	442	445	13	19	69	8	-	-	-	-	-	
	%NISP	61.5	17.0	17.2	0.5	0.7	2.7	0.3	-	-	-	-	-	
	MNI	51	23	31	1	2	12	1	-	-	-	-	-	
	%MNI	41.8	18.9	25.4	0.8	1.6	9.8	0.8	-	-	-	-	-	

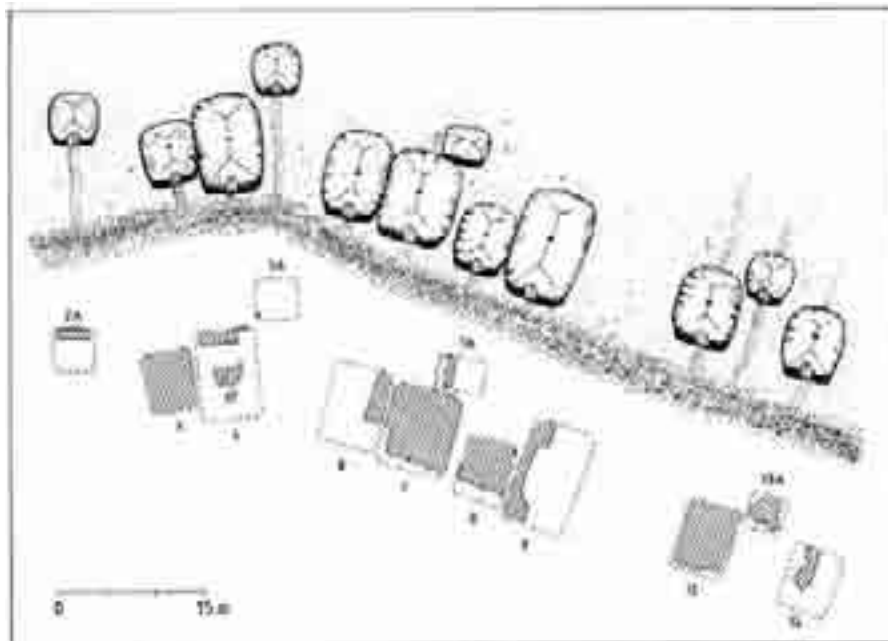
**NISP and MNI from early medieval phases at Waterford.**



**Development of Scandinavian Waterford (after Hurley *et al.* 1997, 7)**



**Plan of excavated defences at Bakehouse Lane (after Hurley *et al.* 1997, 23)**



Level 1 (mid-eleventh century) house plots on Peter Street (after Hurley *et al.* 1997, 55)

## Animal Bones Appendix:

### Cattle:

Higham Stage	Approx. Age (months)	%
1-4	0-6	3
3-7	6-13	7.6
8-10	13-18	4.5
11-12	18-24	4.5
13-14	24-30	7.6
15-18	30-36	9.1
19+	36+	63.6

Summary of cattle age/slaughter from toothwear.

	Peter Street				
	Group 1	Group 2	Dump 1170	Dump 1163	Dump 1161
% Female	65.9	70.4	59	81	72.2
No.	41	27	39	21	18

Percentage of female cattle in early medieval contexts.

Element	Measurement	No.	Min.	Max.	Mean	StD
Scapula						
	GLP	58	53.0	78.2	62.8	4.73
	SLC	56	39.2	58.2	49.1	4.36
Humerus						
	Bt	62	61.9	78.0	68.26	4.19
Radius						
	GL	7	238.0	259.2	252.1	6.65
	Bp	94	61.6	89.1	74.7	4.84
	SD	7	32.6	39.1	34.8	2.16
Metacarpal						
	GL	132	153.	206.6	181.0	9.50
	Bp	211	34.9	63.2	52.6	4.47
	Bd	284	40.7	65.0	54.2	4.29
	SD	132	20.9	36.2	28.8	2.73
Tibia						
	Bp	12	75.9	100.1	86.7	6.24
	Bd	140	49.1	64.1	55.9	3.18
Calcaneum						
	GL	65	106.1	140.1	122.2	5.97
Astragalus						
	GLI	126	50.5	65.0	59.8	2.31
	BD	126	33.0	49.0	38.6	2.57
Metatarsal						
	GL	74	182.4	222.2	206.1	7.51
	Bp	96	35.5	53.7	43.3	3.24
	Bd	137	41.9	64.1	50.1	4.16
	SD	70	20.1	28.5	23.9	1.83

Cattle bone measurements.

No.	Min.	Max.	Mean	StD
63	99.4	121.1	112.5	40.7

Estimated withers height for cattle (cm)

### Sheep:

Element	Measurement	No.	Min.	Max.	Mean	StD
<b>Humerus</b>						
	<b>GL</b>	3	122.3	131.8	125.7	-
	<b>Dp</b>	3	35.7	39.1	37.2	-
	<b>Bd</b>	6	24.9	28.9	26.1	1.34
	<b>Bt</b>	6	22.3	25.1	24.0	0.95
	<b>SD</b>	2	12.0	13.0	12.5	-
<b>Radius</b>						
	<b>GL</b>	20	120.3	148.2	135.8	7.03
	<b>Bp</b>	24	25.1	32.0	28.3	1.76
	<b>Bd</b>	20	23.1	28.5	25.5	1.58
	<b>SD</b>	20	12.4	16.5	14.6	1.12
<b>Metacarpal</b>						
	<b>GL</b>	55	98.9	127.3	114.9	6.28
	<b>Bp</b>	55	18.2	23.5	21.1	1.18
	<b>Bd</b>	54	21.1	28.0	23.5	1.43
	<b>SD</b>	55	10.5	22.9	12.9	1.76
<b>Metatarsal</b>						
	<b>GL</b>	31	110.4	140.9	124.1	6.76
	<b>Bp</b>	29	13.5	19.9	18.1	1.30
	<b>Bd</b>	31	19.9	25.8	21.9	1.35
	<b>SD</b>	31	9.5	13.6	11.2	1.11

Sheep bone measurements.

No.	Min.	Max.	Mean	StD
17	48.4	61.2	54.9	3.1

Estimated withers height for sheep (cm)

### Pigs:

Higham Stage	Approx. Age (months)	%
0-7	0-6	1.9
7-13	6-12	16.8
14-18	12-19	24.1
19-21	19-25	42.6
22-23	25-29	11.2
24+	30+	3.7

Summary of pig age/slaughter from toothwear.

	Female	Male
<b>Peter Street – Group 1</b>	7	11
<b>Peter Street – Group 2</b>	4	5

Sex of pigs from early medieval phases at Peter Street.



Element	Measurement	No.	Min.	Max.	Mean	StD
<b>Scapula</b>						
	<b>GLP</b>	21	30.6	36.1	33.0	1.40
	<b>SLC</b>	21	19.2	30.3	22.2	2.44
<b>Humerus</b>						
	<b>BD</b>	20	26.9	39.5	36.6	2.77
	<b>Bt</b>	83	24.3	36.8	28.5	2.09
<b>Radius</b>						
	<b>GL</b>	3	129.9	133.2	132.0	21.79
	<b>Bp</b>	104	23.6	31.0	26.4	17.49
	<b>Bd</b>	3	28.6	30.9	29.8	1.54
	<b>SD</b>	3	16.1	17.9	17.1	6.41
<b>M/carpal III</b>						
	<b>GL</b>	6	62.1	71.0	78.4	2.90
<b>M/carpal IV</b>						
	<b>GL</b>	9	61.3	85.3	70.5	6.07
<b>Pelvis</b>						
	<b>LAR</b>	91	24.8	33.2	29.0	1.68
<b>Femur</b>						
	<b>Bp</b>	1	-	-	62.9	-
	<b>Bd</b>	2	41.3	43.6	42.6	-
<b>Tibia</b>						
	<b>GL</b>	1	-	-	173.1	-
	<b>Bp</b>	3	39.9	47.5	43.0	3.06
	<b>Bd</b>	44	21.9	29.0	26.5	1.71
<b>Calcaneus</b>						
	<b>GL</b>	1	-	-	72.8	-
<b>M/tarsal III</b>						
	<b>GL</b>	6	70.8	91.5	76.2	7.02
<b>M/Tarsal IV</b>						
	<b>GL</b>	5	78.8	84.9	81.2	2.41

**Pig bone measurements.**

**Horse:**

No.	Min.	Max.	Mean	StD
7	122.4	138.3	129.5	5.6

**Estimated withers height for horse (cm)**



