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The excavation of an Early Neolithic Enclosed Farmstead at Threefords North, Milfield, Northumberland

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SUMMARY

This article reports on the excavation at Threefords, Milfield, Northumberland, of an early fourth millennium Neolithic building and midden, possibly within a ditched enclosure. Associated with these remains were a large deposit of Carinated Bowl pottery, a Group VI axehead of Langdale Tuff, and environmental material that included evidence for cereal cultivation and timber species. Later activity included shallow linear ditches, representing agricultural land division, and rig and furrow ploughing.

LOCATION (FIG. 1)

To the north-west of the small market town of Wooler in north Northumberland lies an extensive tract of low-lying land known as the Milfield Basin. Triangular in shape, it is bounded to the south and west by the northern hills of the Cheviot volcanic massif and to the north and east by long scarped ridges of Fell sandstone. It forms the meeting point of three routeways. That entering from its south-eastern corner gives access southwards to the Northumberland coastal plain and eastwards *via* the Chatton Basin to the coast. From its south-western corner the narrow valley of the River Glen widens into the Bowmont Water, so opening access *via* the middle Tweed Basin and Teviotdale to the western Scottish Lowlands and southwards to the Solway Plain. That to the north leads into the lower Tweed basin some 18km from where it meets the sea.

The floor of the basin is predominantly composed of sand and gravels from glacio-fluvial deposition in the Late Devensian (Passmore & Van der Schriek 2009, 28; Passmore & Waddington 2009). Following the ice's retreat and the downcutting of Etal gorge the lake disappeared, exposing these deposits to shifting distributaries resulting in dissected terrace formations. Today the Basin is drained by the River Till – a southern tributary of the River Tweed, and its tributaries, the rivers Glen and Wooler Water. The village of Milfield occupies a terrace on the west bank of the River Till, set amidst a rich concentration of cropmarks evidencing an intensity of activity relating to ritual, burial and settlement over millennia (Passmore & Waddington 2009; Passmore & Waddington 2012. Adjacent to the village lie Coupland, Milfields South and North (Harding 1981) and Whitton Hill (Miket 1985), part of the densest concentration of Chalcolithic/early Bronze Age hengiform monuments in Britain and Ireland, and two early medieval cemeteries (Scull & Harding 1990). At the eastern side of the village is a Romano-British farmstead, and the extensive early medieval settlement of Maelmin (Passmore & Waddington 2009, 251–265) with its late 7th–early 8th century great hall complex, successor to

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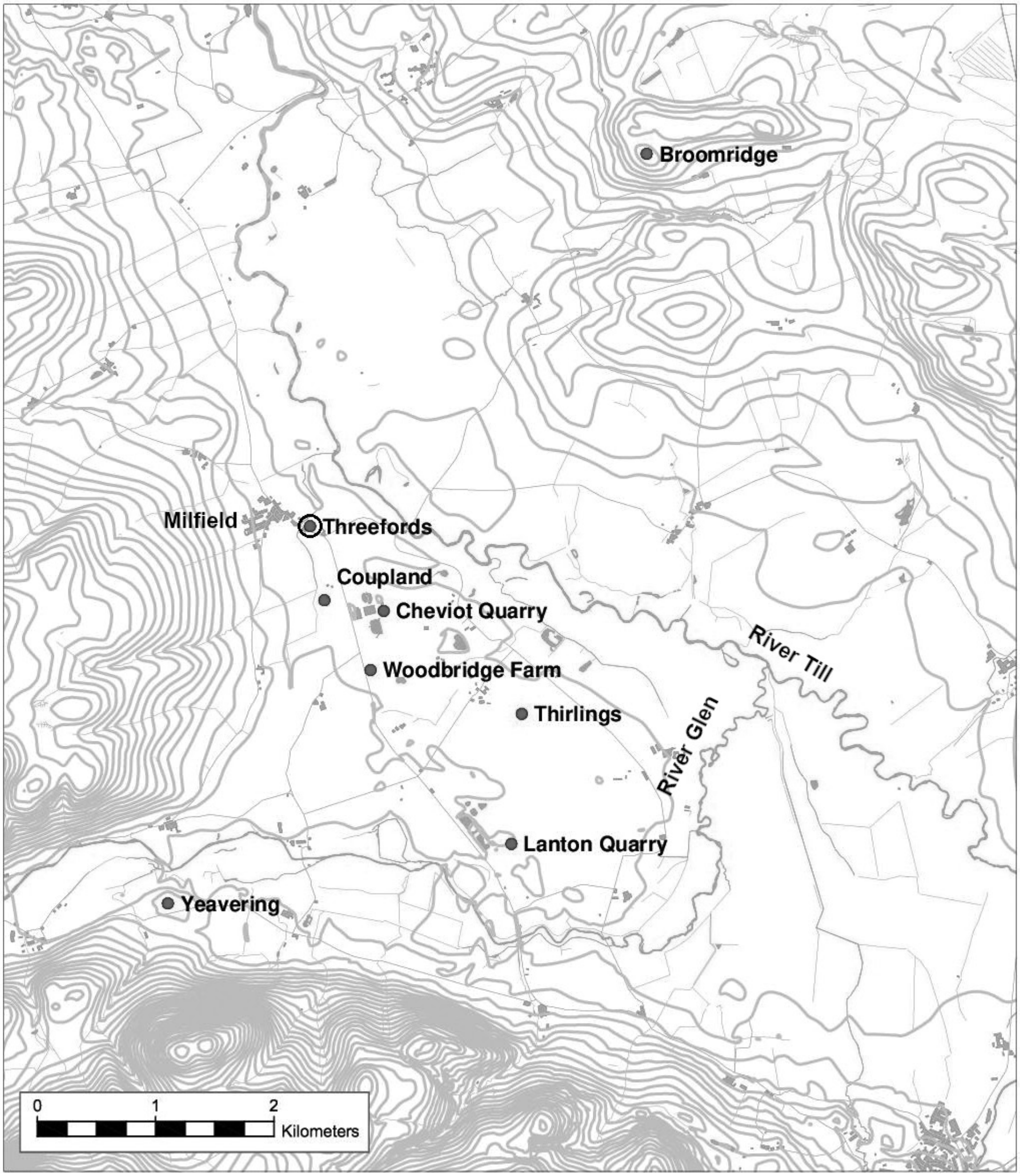

Fig. 1 The location of Threefords and nearby early Neolithic sites. Base mapping: OS OpenMap.

the royal residence of *Ad Gefrin* (Yeavering) (Gates & O'Brien 1988). The village sits at the heart of a concentration of rig and furrow cultivation presumably referencing subsequent medieval occupation otherwise only slightly attested.

THE SITE

The site is visible as the cropmark of a small oval enclosure, with some straighter sections, on the eastern side of the A697 as it enters the village from the south. At an elevation of 42m. O.D. it lies 20m to the south of a small stream now canalised for drainage (fig. 2: NGR NT93765 33738; What 3Words:///funny.enclosing.ribcage). As much as one quarter of its south-western extent is lost to the A697, the remainder shows as a narrow ovoid perimeter enclosing an area of *circa* 0.2ha. The enclosure measures some 64m north-west/south-east and a minimum of 57m north-east/south-west (Gates & O'Brien 1988, fig. 1). Although predominantly curvilinear in form, a full quarter of its north-eastern circuit shows as a series of sharply redirected alignments that give the enclosure here a distinctively angular appearance. There is no uniformity in the lengths of the straighter sections, which appear to range between 10 to 20m in length. Where not obscured by the roadway the only visible interruption in its circuit is in its apparent abrupt termination before meeting the hedge-line and roadway which may be more apparent than real. No structures are visible within, and the only additional features evident are what look to be the course of a modern pipe-line running diagonally across the north-eastern margin, and the light linear indication of a small irregular enclosure pendant upon its northern edge. Extending from north-east to south-west across the interior and beyond lies a broad swathe of

Fig. 2 Polygonal enclosure at Threefords, Milfield, Northumberland from the south (Aerial Photographic Collection, Museum of Antiquities (now Great North Museum), Newcastle Upon Tyne, A/069486).

soil of a slightly lighter hue than that surrounding it. Just 100m to the east are linear features representing additional enclosures. The site has historically been under the plough, and since its scheduled designation there has been a restriction on the depth of ploughing permitted. The enclosure lies within the boundaries of the Scheduled Ancient Monument centred on the early medieval settlement and royal residence of Maelmin (SAM # NT 93 SW 3; NMR # 3831); Northumberland Historic Environment Record # 2001.

THE EXCAVATION

AIMS AND STRATEGY

The site was chosen for excavation in view of the uncertainty surrounding the chronology of enclosures exhibiting polygonality. Excavation took place over two seasons in the summers of 2009 and 2010. The strategy was to investigate the interior of the enclosure as fully as resources allowed and to characterise the enclosure ditch. Area 1 was focused on the interior of the enclosure; Area 2 targeted the ditch; Area 3 was designed to investigate a possible entrance to the enclosure to the north, but this was subsequently discovered to be the result of two

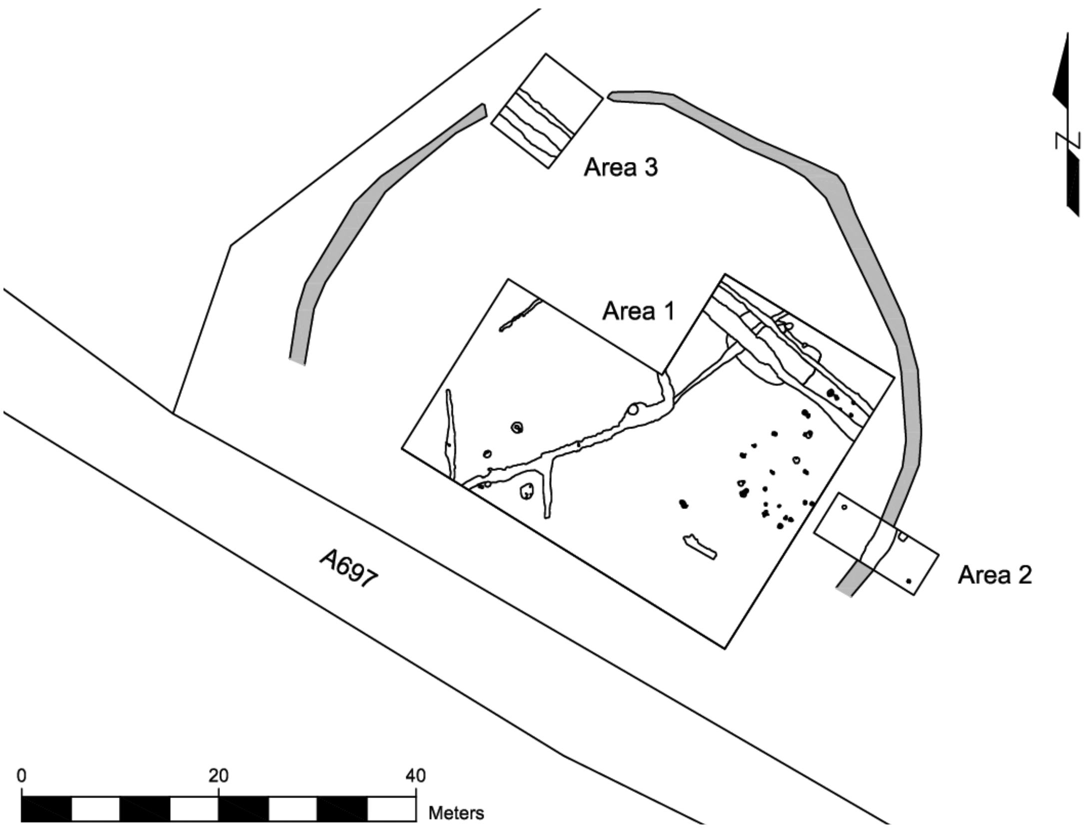

Fig. 3 Trench location, major features, and transcribed enclosure from the aerial photograph (after Gates & O'Brien 1988).

twentieth century pipe trenches removing the archaeological remains at this point. Some 1025 sq. m of the enclosure was excavated, representing 51% of the total internal area. Agricultural topsoil was removed by machine to a depth of 0.4m, at which point the un-truncated tops of the two utility trenches were observed (fig. 3). The remainder of the overburden was removed by hand. All cut features (given hereafter as [F..]), aside from large linears, were fully excavated, with the entirety of their fills (expressed within round-brackets (...)), retained for environmental sampling. All deposits were hand sieved prior to sampling or discard to ensure no artefacts were missed. The site was planned at 1:20 and all sections drawn at 1:10; a black and white print, colour slide, and digital photographic archive was maintained; spatial location was provided by total station geo-referenced to known landmarks.

1. NEOLITHIC ACTIVITY

The evidence for Early Neolithic and probable Early Neolithic activity at Threefords can be divided into four separate, but likely related, categories: 1.1. a building or structure; 1.2. a large *in-situ* area of depositional activity, termed here the 'midden', but see below for a justification for the use of this term; 1.3. a series of depositional pits, some marked with posts, and 1.4. the enclosure ditch. Radiocarbon dating evidence from several depositional pits, the building and the midden indicates likely contemporaneity, and it is argued that the building and midden were in use at the same time (fig. 4). The place of the depositional pits in this scheme is less certain, but it is likely they too are Early Neolithic in date. The enclosure ditch is undated.

1.1. THE STRUCTURE

Within the enclosure and near its eastern edge lay a sub-rectangular structure with rounded ends oriented on a north-east to south-west axis. Notwithstanding some damage at its north-eastern end by utility trenches and a short section of the eastern wall remaining unexcavated, it measured some 15m in length by 8m in width. In plan, the form of the structure was two parallel post-defined long sides, with the short eastern and western ends defined by a semi-circular or apsidal arrangement of posts. No clear evidence of an entrance was observed, though the wide spacing of the postholes would not preclude one at most points on the long edges, or it could have fallen on the short length that lay beyond the area of excavation.

Sixteen of its external postholes containing postpipes were excavated (see fig. 5). All were sub-oval or sub-circular in plan, but varied in size, measuring along the long axis, between 0.25m and 0.7m. The average length of the long-axis was 0.43m, with a standard deviation from this mean of only 0.12m; the average depth was 0.12m. The postpipes within were more regularly sized, though rather small, falling between 0.1m and 0.25m in diameter. Two of the postholes [F26 and F275] contained two contemporary postpipes, whilst only one [F230] showed evidence of different phases of construction, with the original posthole cut first by a sub-oval pit [F226] both of which were then cut by another posthole [F217]. The only artefacts recovered from the postholes were six sherds of pottery of the Carinated Bowl tradition (SF43, 44, 46, 50); a retouched flint flake (SF51) was found on the natural substrate just beyond the edge of posthole [F290]. All of the features were truncated to some degree by later agricultural activity. Six postholes within the building may well have formed part of the structure, for while this is not directly demonstrable, they are similar in form to the postholes that define the structure.

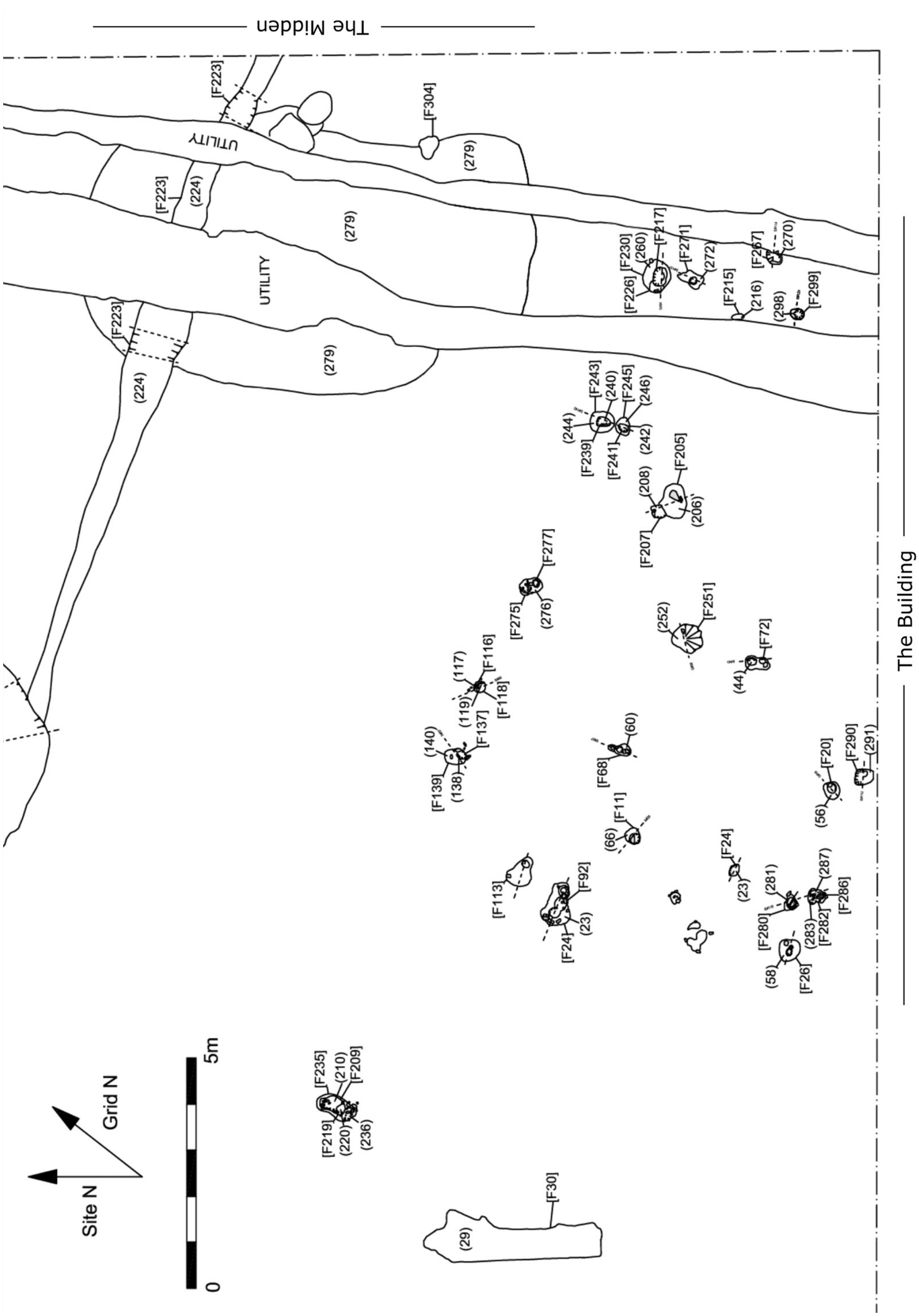

Fig. 4 Plan of the Neolithic Features.

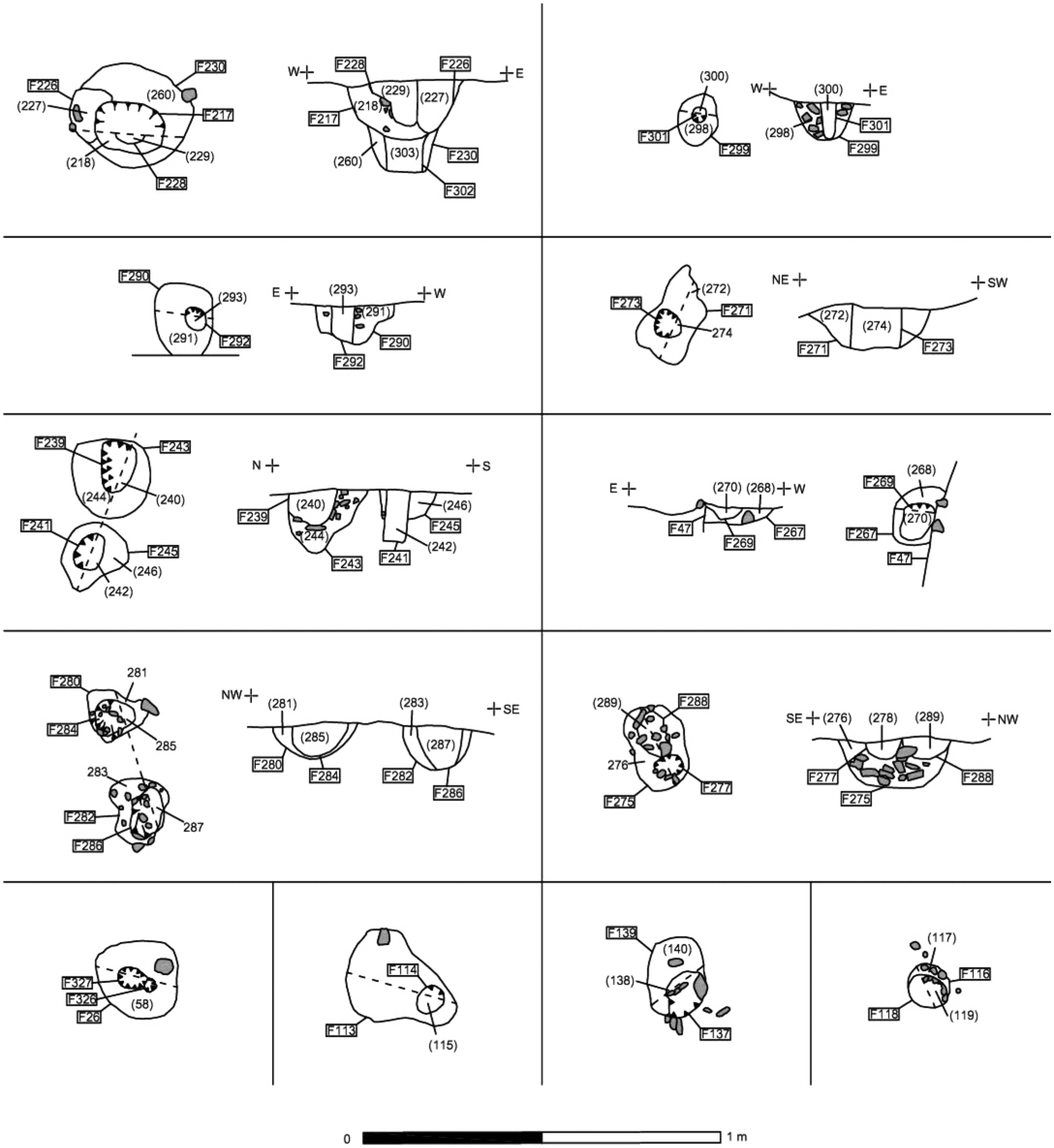

Fig. 5 The postholes comprising the Neolithic building.

Charcoal analysis of samples from ten of the external postholes compare closely with the results from the site as a whole, with oak (*Quercus*) dominating the assemblage and present in every sample. However, Hazel (*Corylus avellana*) is more prevalent in the external posthole fills compared to the features internal to the structure. To a lesser extent birch, alder and apple/pear were present, and may have formed part of the fuel wood or timber on the site. The environmental analysis also reported the presence of wheat grains (not identifiable to species level, see environmental report) and chaff elements from samples taken from the posthole fills.

1.2. THE MIDDEN

The midden lay 2m north of the building. focused in the deepest part of a relict ice-wedge. It was structured as two distinct contexts, the upper layer of which was the greater in extent. The upper deposit (279) measured 9m by 5m, by 0.2m in depth; the lower (295) measured 3m by 2m, by 0.15m in depth; both were continuous spreads of material that appeared to have accumulated through the deposition of material on the ground surface. A series of pits [F304, F313, F315, F318], perhaps the result of extraction of midden material, were cut into both layers, and thus formed part of a complete stratigraphic sequence (see fig. 6).

A total of 269 sherds of Carinated Bowl pottery were recovered from these deposits, a small number of flints (SFs 72; 87; 100; 129; 148; 165; 166; 181; 183) and the butt-end of a Group VI polished stone axehead (SF 134). There were numerous examples of conjoining sherds from the same pots, and 45 vessels were represented, though sherds representing the entirety of a pot were not recovered despite the total excavation of the deposits. This is, however, unsurprising given the levels of horizontal truncation by two utility trenches, and vertical truncation by ploughing of the upper layer (279). Several of the sherds appear to have been broken *in situ* after they were deposited in the midden (fig. 10), though this appeared to be the exception rather than the rule.

Environmental samples taken from the midden indicated a wood charcoal assemblage similar in nature to the other Neolithic features on the site. However, cereal grain and chaff remains were underrepresented compared with the postholes of the building, probably because of unfavourable taphonomic conditions as the result of trampling or disturbance of the deposits.

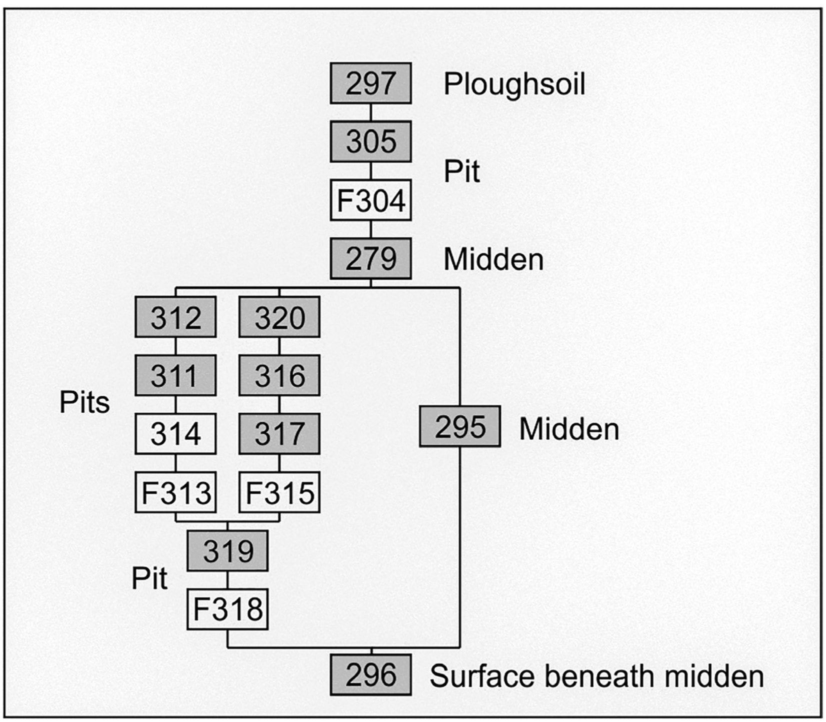

Fig. 6 Stratigraphic matrix of the midden (shaded contexts produced pottery).

1.3. DEPOSITIONAL PITS

There were several pit features on the site, not structurally associated with the building or the midden, which were associated with the deposition of organic material and/or Early Neolithic material culture. The complexity of these features also indicates that the inclusion of material culture was not the accidental result of erosion or residuality. These have been divided into two categories: 'depositional pits' and 'post-marked depositional pits'. These categories were established as statistically significant, based on the nature of deposition at the nearby site of Thirlings (Edwards 2011; Miket *et al.* 2008). Depositional pits are represented by the deposition of material culture without any further structural evidence (such as posts or stakes), whilst post-marked pits are represented by the presence of material culture but were also marked by an upright post or stake. Crucially, these post-marked pits are not classic post-holes, due to their shape or large size (relative to their posts), but rather complex deposits that were marked by the later insertion of a post.

Four of the pits are depositional pits [F51, F53, F147, F207], and three post-marked pits [F54, F72 and F235]. Other pits [F52, F63] are not included in this category because they demonstrably cut boundary features that are later in date. The post-marked pits were very complex features. [F54] was an oval pit (0.95 x 0.87m) with 26 stakeholes driven into its base, and containing two post-pipes with evidence for *in situ* burning of the posts. [F72] was also a large feature (1.1 x 1.25m) that contained two post-pipes and a stakehole. There were two discrete fill deposits, the upper of which produced a rim and a body sherd (SF21, 26), and a radiocarbon determination obtained from hazelnut shell of 3900–3640 cal BC (SUERC-30161; Table 12). [F235] was recut by [F209], which also contained a postpipe [F219], but overall the feature was too large to represent a simple posthole. The fill of [F209] also contained 30 body sherds and a rim sherd of Carinated Bowl pottery.

The depositional pits were all irregular ovals in shape, varying in length between 1.5m and 0.36m, and 0.2m and 0.45m in depth. Only [F51] contained any material culture: a retouched flint blade (SF34); a flint flake (SF35); and a burnt flint flake (SF33). This was the only pit with evidence for a clay lining, green/brown in colour, extending around its sides but not across the base.

1.4. RADIOCARBON RESULTS FROM THE STRUCTURE AND MIDDEN

Radiocarbon dates were produced on environmental samples derived from flotation of deposits from the structure and midden (see fig. 7, and specialist report below). These were subject to Bayesian modelling applied using the program OxCal. From this analysis, we estimate that the start of activity associated with the midden and structure occurred in 3940–3710 cal BC (*95% probable; or 3860–3740 cal BC 68% probable; Start Threefords*). The last Neolithic activity for which we have evidence here occurred in 3750–3590 cal BC *(95% probable; or 3700–3620 cal BC 68% probable; End Threefords*). This Neolithic phase of activity went on for between 1–250 years *(95% probable; Duration Threefords*), most probably between 50–190 years *(68% probable Duration Threefords*).

The midden and the structure were probably contemporary; the first activity associated with the structure occurred in 3900–3710 cal BC (*95% probable*; or *3830–3740 cal BC 68% probable; first_Threefords_structure*), while the midden was first in use in 3880–3700 cal BC (*95% probable*; or *3820–3730 cal BC 68% probable*; *first_Threefords_midden*). The last use of the structure occurred in 3740–3620 cal BC (*95%* probable; or *3700–3630 cal BC 68% probable;*

last_Threefords_strcuture), and the last use of the midden associated with Neolithic activity occurred in 3760–3650 cal BC (*95% probable*; or *3730–3650 cal BC 68% probable; last_Threefords_Neolithic_midden*). In total the Neolithic activity represented by the midden and the structure took place over 1–250 years (*95% probable*; or *50–190 years 68% probable*; *Duration Threefords*; figure not shown). We discuss the chronological context of the structure further below.

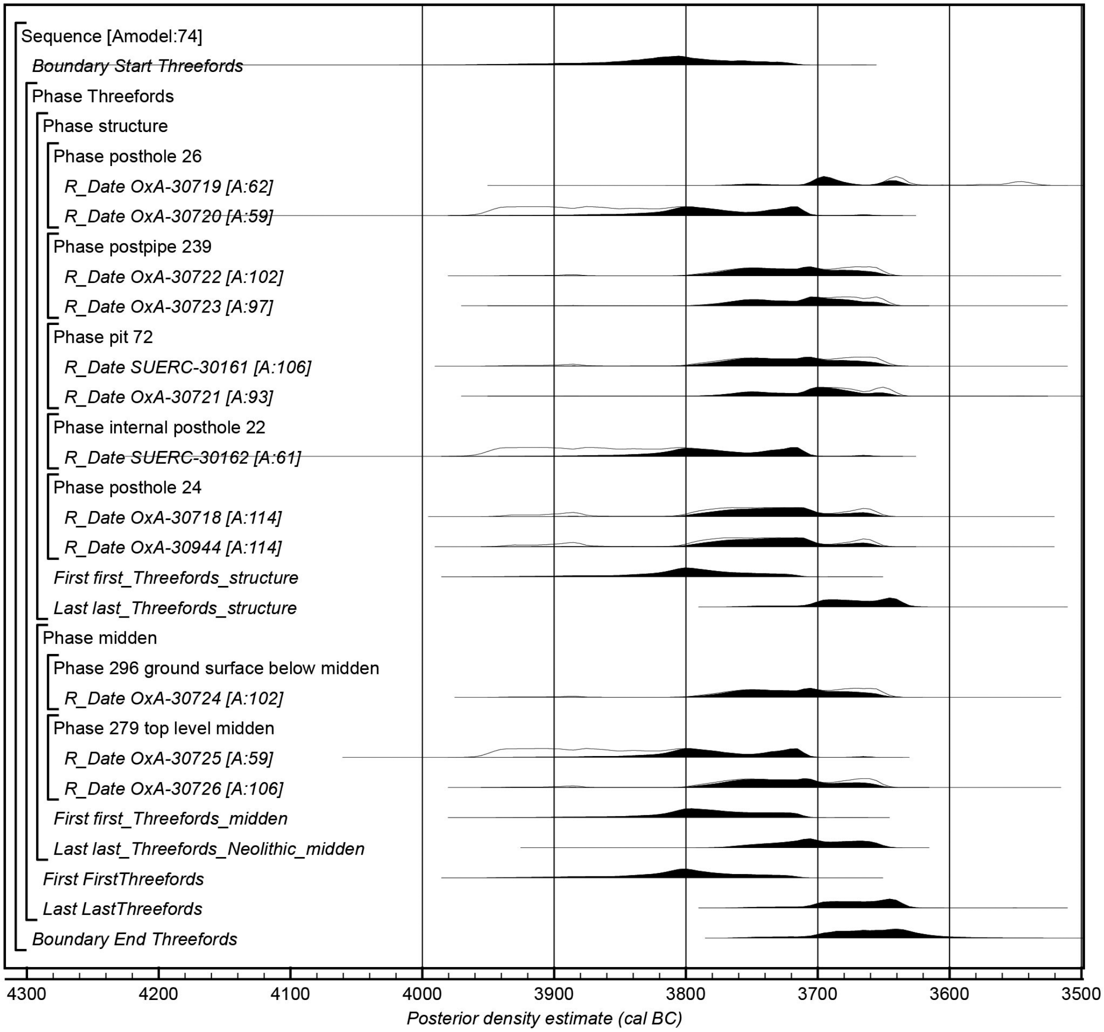

Fig. 7 Site-specific model for results from Threefords. Details of the measurements are given in Table 12. Each distribution represents the relative probability that any event represented by the radiocarbon measurement occurred at a particular time. For each measurement two distributions have been plotted: one in outline, which is a calibrated radiocarbon measurement, and a solid distribution which represents the posterior density estimate produced from the chronological model applied here. Additional solid distributions are shown in the figure in black. These have been calculated in the model; the large square brackets down the left-hand side of the figure, along with the OxCal CQL2 keywords define the model exactly.

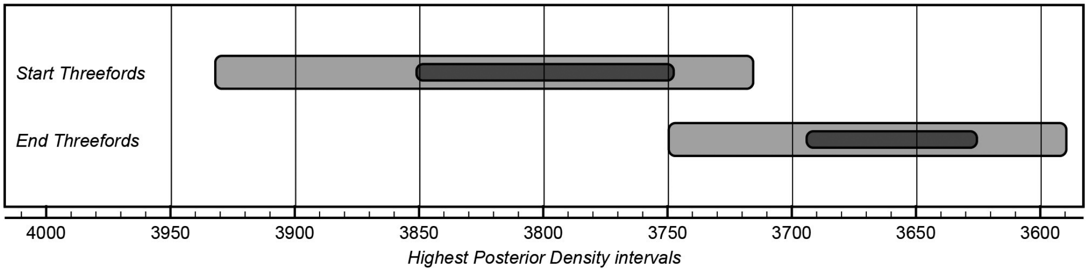

Fig. 8 Highest Posterior Density intervals for key parameters from Threefords. The lighter range represents the 68% probability range, and the darker range represents the 95% probability range. The parameters are calculated from the model shown in Figure 6. The scale along the bottom is in 10 year and 50 year increments (calibrated years BC).

Thinking about a chronology expressed in centuries, it is most probable that the activity at Threefords began in the 39th century BC; it is *72% probable* that the estimate *Start Threefords* – which estimates the probable beginning of settlement here, occurred between 3900 and 3800 BC. It is highly probable that Neolithic activity at this site ended in the 38th century BC; it is *84% probable* that the estimate *End Threefords* occurred between 3800 and 3700 BC (fig. 8).

From the distributions shown in figure 7, we can see that earlier parts of the distributions of several results (OxA-30720, OxA-30725 and SUERC-30162) are being given a tighter resolution by the model applied here. This could simply be an example where the statistical scatter associated with groups of radiocarbon results is constrained by Bayesian chronological modelling (Bronk Ramsey 2009a). However, there is also the potential that the earliest activity associated with the site could be under-sampled (i.e. having been lost, remain unrecovered, or not be preserved in the sampled deposits), and the dates could all, therefore, resolve on the calibration dataset for the first half of the 39th century BC.

1.5. THE ENCLOSURE DITCH

Area 2 lay across the south-eastern circuit of the enclosure ditch [F174] (figs 9 & 10). A three-metre length of the ditch was excavated; it measured 1.8m in width, 0.75m in depth, and was V-shaped in profile with sides sloping at *circa* 45°. It contained an uncomplicated succession of six relatively uniform fills. The lowermost (primary) fill (294) was a silty sand containing numerous stones and few charcoal flecks. There were more stones in the matrix than soil. There was a notable absence of any organic component in this very sterile layer. The second layer (259), was a mid-orange sand, again, a very sterile stony fill and more stones than soil. The third fill (175), was a very sterile and highly compacted creamy/pink silty sand, containing some small stones and very few flecks of charcoal. The fourth fill (173), was a silty sand existing only against the northern side of the ditch. The fifth layer (203), was a dark brown sandy silt containing a few charcoal fragments. This layer, cut by [F262], was the lowest in a series of intercutting pits (*infra*). The sixth and uppermost fill (172), was a dark yellow/brown silty sand that had been truncated by plough activity. The dich contained no material culture, no short-life carbonised material for radiocarbon dating and no identifiable environmental remains.

A series of intercutting pits were identified on the external edge of the ditch. All were shallow and difficult to differentiate from one another during excavation. The lowest in the sequence was [F262], followed by [F264], and then [F263], a posthole containing a post-pipe and packing stones. No dateable environmental remains were recovered from these pits. Pit feature (F264) produced the only diagnostic material: a flint blade (SF84) and a Carinated Bowl rim sherd (SF85) that matched the fabric of a vessel found in the midden.

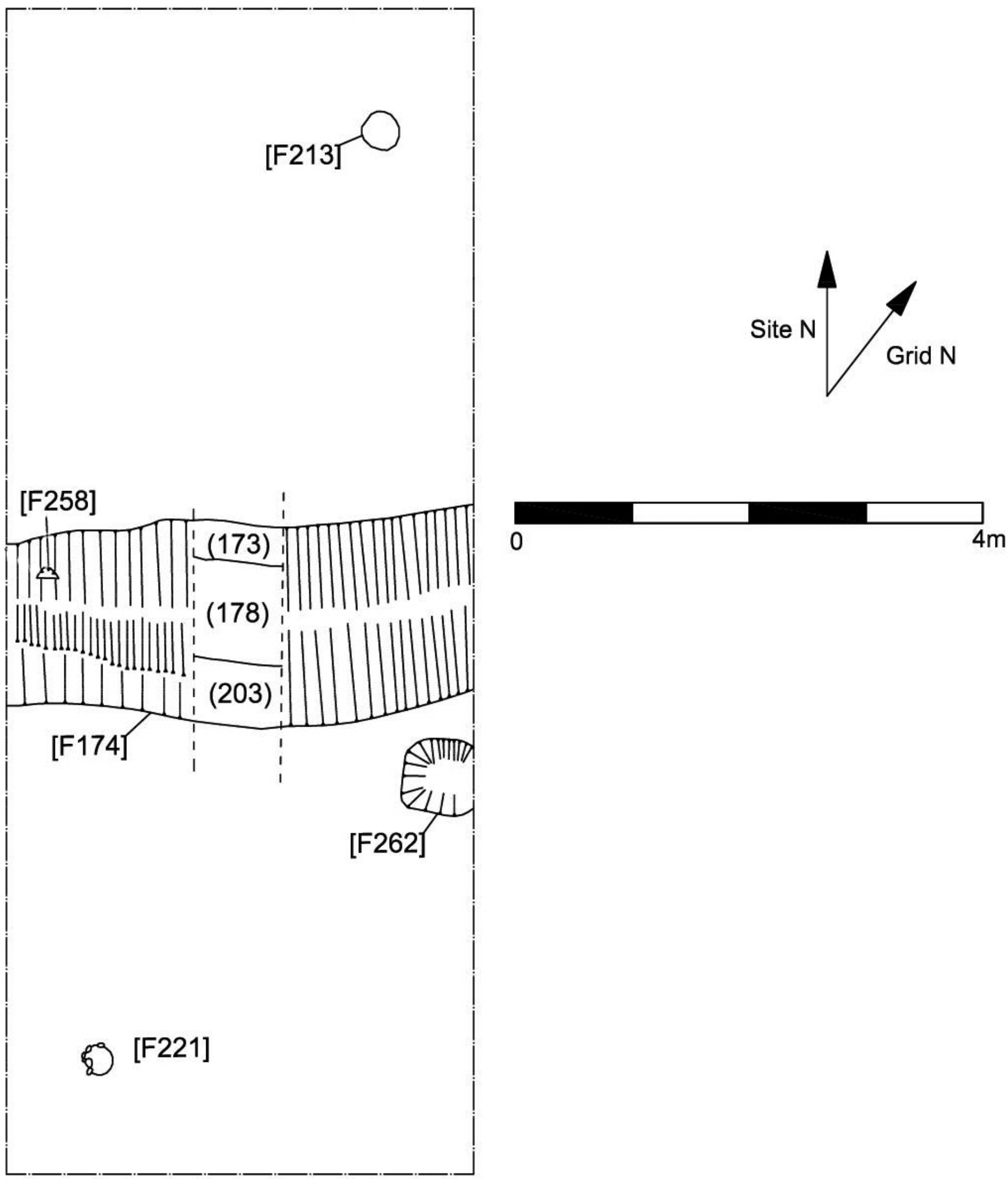

Fig. 9 Plan of the enclosure ditch excavated in Area 2.

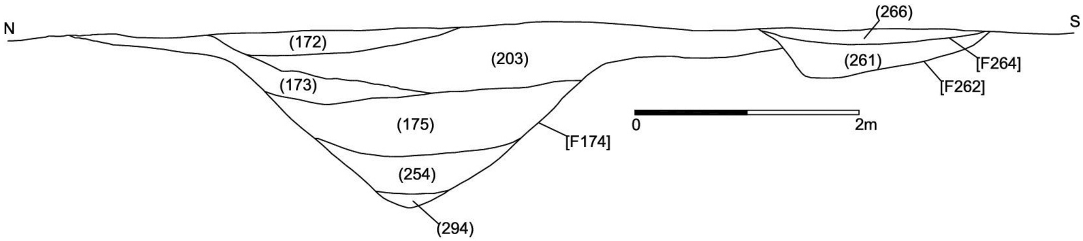

Fig. 10 Section through the enclosure ditch.

2. LATER PREHISTORIC OR EARLY MEDIEVAL ACTIVITY

The following section considers features and contexts that clearly post-date the early Neolithic. These can be divided into the following: 2.1. linear features, and 2.2. relict medieval ridge and furrow agricultural remains that overlay them (fig. 11). These features were mainly concentrated in the northern and western parts of Area 1. The handful of finds recovered from the feature fills were not sufficiently diagnostic to refine dating for any of the features within this broad chronological span.

2.1. THE LINEAR FEATURES

Four linear features were recorded within Area 1: [F61], [F73], [F95] and F223]. The only two with a direct stratigraphic relationship were [F61] and [F223], with the former cutting the latter. Crucially, [F223] also cut the midden material (279), thus demonstrating that these linear features post-dated the midden. [F61] was a complex feature with a perpendicular offshoot and a right angle turn at its south-eastern extent in the trench. Its average width was 0.7m, but its uneven base was relatively shallow at *circa* 0.2m along its entire length of 2m. The finds from [F61] included a large 20cm diameter metalworking hearth bottom (SF45), comprising a solid admixture of burnt earth, stone and iron formed to the hemispherical cast of the hearth base; two fragments of shale loom-weight (SF39 and SF40) found in close proximity to one another; a coarse, undiagnostic potsherd (SF41); a fragment of possible medieval brick (SF42); several fragments of burnt bone; and a 4cm piece of oxidised iron (SF30). Feature [F61] was cut by two pit features, [F52] and [F63], the latter of which contained twelve fragments of burnt bone (SF27), but neither produced any structural evidence.

Feature [F223] was similar in form, though with two distinct fills, at an average of 0.6m in width and 0.2m in depth. It was cut by [F61], truncating its western extent; to the east it extended beyond the edge of the trench, but not before it had cut the midden deposit (279) and in turn been cut by the two utility trenches [F6] and [F47]. It contained no material culture.

Features [F73] and [F95] were of similar character, though it appears that [F95] was far more heavily truncated, shallowing to non-existence as it progressed westward. Neither shared a stratigraphic relationship with any other linear feature on the site. Both varied between 0.3 and 0.5m in width, and though their depth varied to a maximum of 0.5m, they both had steep sides and a flat to slightly rounded base. Feature [F73] appeared to cut [F135], a small posthole in its base. The only material culture from either feature was SF24, a honey-coloured flint blade from [F73], presumably residual as it is the only prehistoric evidence from any of the linear features.

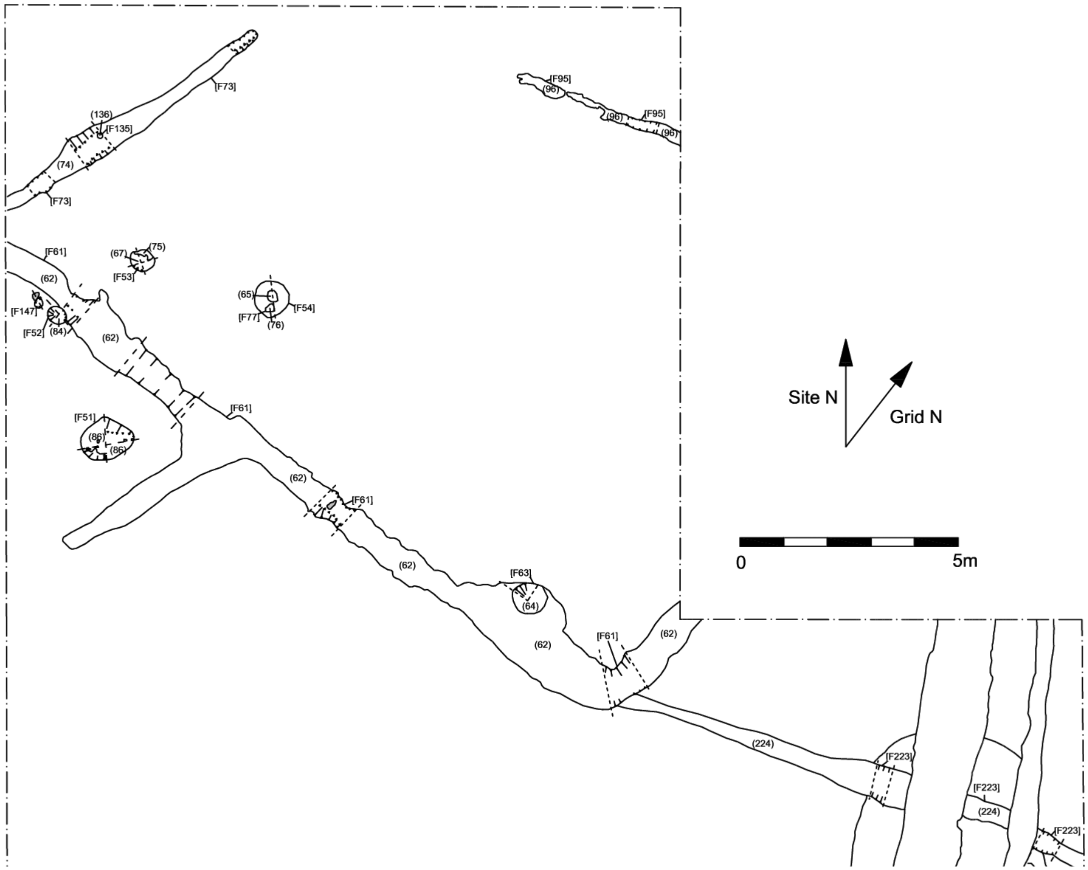

Fig. 11 Plan of the later prehistoric or early Medieval features.

The seed and plant macrofossil analysis of the environmental sample taken from context (62) within [F61] showed the presence of cultivated oat (*Avena Sativa)*, hulled barley (*Hordeum vulgare*) and rye (*Secale cereale*). This is a suite of crop types not cultivated in Britain until after the Iron Age, although hulled barley is known to have been cultivated from the Early Neolithic, and oats from the Late Bronze Age onwards, rye is more likely to have a medieval origin (Bishop *et al.* 2009).

2.2. RIDGE AND FURROW

The linear features were overlain by relict soils from the ridges of ridge and furrow agriculture; there was only limited evidence of shallow truncation of the underlying substrate by the furrows. The relict ridges were not identified in plan during the machine-removal of topsoil, but ghosts of their presence became visible in the trench-edge section of Area 1 after cleaning. It was therefore apparent that the linear features pre-dated the phase of ridge and furrow agriculture, whilst they post-dated the early Neolithic phase of activity, and the presence of a metalworking hearth bottom implies a later prehistoric or medieval date.

DISCUSSION

The early Neolithic material excavated from Threefords is interpreted as the remains of an agricultural settlement, comprising a building, a midden, and several depositional pits; this was possibly enclosed by the encircling ditch. Neolithic buildings are relatively rare in mainland Britain, with notable regional clusters proving the exception rather than the rule. More unusual is the presence of a midden, whilst its association with a structure is unique in northern England.

THE MIDDEN

The identification of middens in the archaeological record has been problematized for some time, particularly because 'middening' is a specific type of practice distinct from the simple disposal of refuse and implies the setting-aside of material for potential re-use. Needham and Spence (1997) argued that, unless middening as a practice could be clearly distinguished, a less loaded term such as 'occupation deposit' is preferable. Indeed, even the canonical midden surrounding the structures at Skara Brae has been reinterpreted, by Alexandra Shepherd, because the original excavators overstated the amount of refuse in its composition and did not appreciate the role of clay in its formation, originating from the structures themselves (Shepherd 2016, 224). As a result, it is essential to justify the identification of the deposits at Threefords as a *bona fide* midden. In this case, we have a defined limit to the extent of the deposits, implying that a specific area of the site was set aside for this purpose. The two deposits are stratified, indicating different phases of use, and a succession of shallow pit-digging events between and from above, these two layers indicates the removal of material for re-use. In each case, the matrix of the layers and the deposits in the pits was far richer in organic material than the surrounding substrate, and the postholes comprising the structure on the site.

It must be admitted that, given the level of agricultural disturbance on the site, and the presence of two utility trenches that cut directly through the midden material, one must confront the possibility of the Neolithic material being redeposited. However, the case for the early Neolithic date of these deposits is compelling. First, the stratified layers contain a far greater concentration of material culture than the cut features on the site, the finds including ceramics, flints and a fragment of a group VI axehead. Second is the complex stratigraphy: pits cut into the midden were refilled with midden material, and this is true of those that cut both the upper and lower layers of the feature. Third is the evidence of *in-situ* breakage of potsherds: these sherds at least remained undisturbed so that they could be broken by pressure from above, rather than broken and scattered by later disturbance (fig. 12). Finally, a series of radiocarbon dates (OxA-30724, OxA-30727, and OxA-30728) from charred plant remains at three locations in the midden indicate earlier fourth millennium activity between 3890–3700 cal BC (*95%probable; first_Threefords_*midden; fig. 7) and 3760–3650 cal BC (*95% probable*; *last_Threefords_Neolithic_midden*; fig. 7).

The midden deposits were the only stratified layers on the site that existed *above* the natural sand and gravel substrate. All others were within cut features associated with the built structure, within the ditch, or within complex pits. This in itself is very unusual, given the lowland location of the site and its history of intensive arable agriculture. The survival of the deposits appears to have been the result of a series of fortunate circumstances coming together in exactly the right way. They were protected beneath a relict ridge from ridge and furrow agriculture, visible in the trench sections and as an undulation in the truncated natural substrate; and they

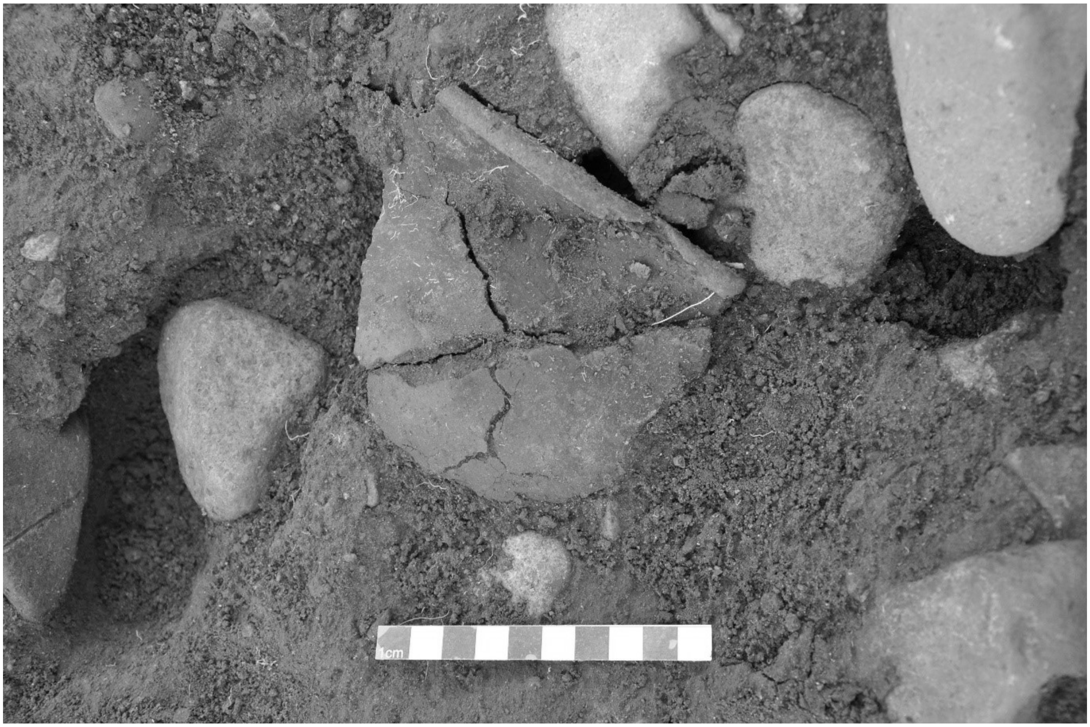

Fig. 12 Carinated Ware sherds broken *in-situ* in the midden.

appear to have been placed on top of a deflated sandy deposit that filled a fossil ice-wedge cast, a periglacial soil feature that formed within the variable sands and gravels of this part of the Milfield Basin, and which are widely attested from aerial photography. This is reminiscent of the survival of the middens at Eton Rowing Lake, which were preserved in the hollows of post-glacial river channels (Allen *et al.* 2013, 489). The Threefords midden was not un-damaged: two service trenches horizontally truncated the deposits to the east, and where unprotected by relict ridge and furrow it was scarred by ploughing.

THE MIDDEN IN CONTEXT

Although rare nationally, Neolithic middens, particularly in southern Britain, have been identified. There was middening of early Neolithic deposits, including large quantities of pottery, at Eton Rowing Course (Allen *et al.* 2013, 490). Middens also appear to have been present prior to the construction of Hazelton North and Ascott-under-Wychwood long cairns in the 39th century cal. BC (Whittle *et al.* 2007, 128); and it would be remiss not to mention the deposits at Skara Brae, Orkney, subject to very detailed analysis as 'anthropic sediments' (Simpson *et al.* 2006), but recently problematised by Shepherd (2016). A similar association between the late Neolithic buildings and middens has been identified at Durrington Walls, with the middens dated to 2535–2475 cal BC, and in use for up to 55 years (Craig *et al.* 2015, 1096).

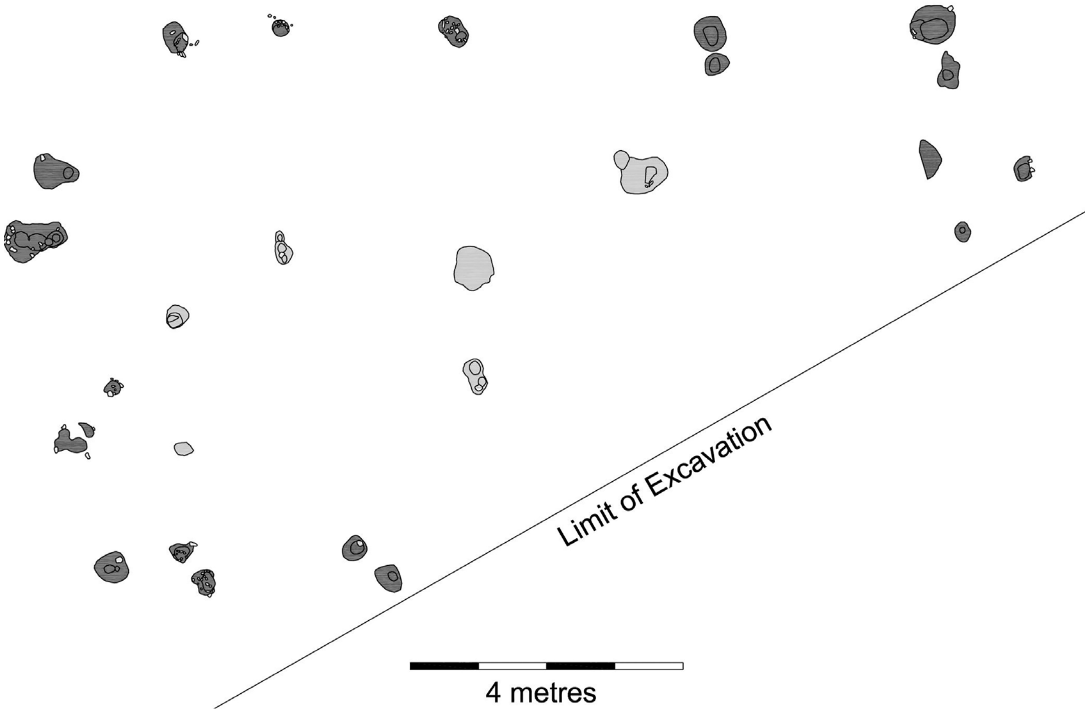

Fig. 13 The Threefords structure in detail (dark grey indicates external postholes; light grey internal).

THE BUILDING

Throughout this paper we have referred to the structure at Threefords as a building. This interpretation requires some discussion, not least in terms of the architectural style of the structure (fig. 13). In recent decades the appearance of recognisable timber structures associated with material characterising what has been called 'the Carinated Bowl Neolithic' (Sheridan 2010) (Carinated Bowl pottery, domesticated animals, cereal cultivation, polished stone axehead fragments, leaf-shaped arrowheads) in Scotland has proved a welcome addition to the evidence for Early Neolithic (i.e. 3800 to 3500 cal BC) settlement from Britain and Ireland (e.g. Darvill 1996; Sheridan 2013; Smyth 2014; Brophy 2015). Generally, it seems that in Britain the appearance of early Neolithic timber structures is earlier in the south with timber structures in England identified at White Horse Stone, Kent in the 41st or 40th centuries cal BC (Whittle *et al.* 2011, 380; see discussion below). Elsewhere they seem a little later, in the 38th or 37th centuries cal BC; whilst the Ireland 'house horizon' appears to occur between 3720 and 3620 cal BC (Smyth 2014). One cannot, however, ignore the very early 4th millennium dates associated with the large 'hall' buildings of Scotland, such as Balbridie, that in terms of structure and cereal strategies demonstrate links to continental practices (Fairweather & Ralston 1993; Sheridan 2013). It is a pattern that may change as the sample size increases and through a more nuanced identification of structural forms, in the same manner as advances in understanding arose from the motorway construction boom in Ireland during the 'Celtic Tiger' years (see TII 2010, and subsequent publications in the series).

Many of these buildings share broadly similar characteristics which suggest common constructional techniques and, perhaps, a common architectural tradition. Such structures are broadly rectangular in plan, with an approximate length to width ratio of 2:1. Brophy characterises these early Neolithic structures as having a length of between 22 and 27m, and a width of 8 to 12m (Brophy 2015, 329). At the upper end of this scale are the Scottish 'halls' or, in Sheridan's terms, 'large houses' (Sheridan 2013) that, by the middle of the fourth millennium are giving way to buildings of lesser size. These structures tend to be constructed from planks and posts in 'plank and slot' construction of postholes and bedding trenches (e.g. Lockerbie Academy, Dumfriesshire: Kirby 2011). Their internal space often appears to be sub-divided in to compartments by postholes, and architectural detailing on the long axes which may represent doors or entrance elaboration. The ends of the structures are often slightly rounded, often with architectural detailing at the corners and postholes outside the footprints of the structures, as at Doon Hill (Lothian), Warren Field, Crathes and Balbridie (both Aberdeenshire), and Claish (Stirlingshire) (Sheridan 2013). Several show evidence of destruction by fire, as at Warren Field, Crathes (Murray *et al.* 2009; Smyth 2014).

Threefords presents characteristics common to some of the early northern Neolithic buildings noted above. The arc of postholes partially truncated at its eastern end but complete at the western echoes the curved gables of the Scottish 'halls'. Although the latter are almost twice the length of Threefords, its size, at *circa* 15m x 8m, is certainly not small; it sits close to the upper limit of Irish examples and of those that Sheridan describes as smaller houses (Garton 1991; Sheridan 2013; Smyth 2014, 27). In other respects, however the differences are more marked, with the structure at Threefords deviating in a number of ways from what we have come to define as the rather limited suite of early Neolithic architectural styles, particularly in the size and distribution of its structural elements. Why then do we regard Threefords as a structure, and how do we suggest this structure might be reconstructed?

Although the oak charcoal recovered from the postpipes comes from logs with diameters of 20cm and upwards (see environmental report, below), the postpipes themselves were not nearly as wide as that, so the structural timber at Threefords was relatively unsubstantial. It is also likely that the over-representation of hazel, compared to the rest of the site, in these postholes indicates that it, not oak, was the structural wood of choice. The postholes that contain these postpipes do not suggest a 'post and slot' construction as seen, for example, at sites such as Lismore Fields, White Horse Stone, Yarnton or Doon Hill Hall A (Garton 1991; Darvill 1996; Brophy 2015; Ralston 2019). Threefords also contrasts with the large Early Neolithic structures at Carnoustie, where the dominance of oak over other wood taxa indicate it was the source of fuel and structural timber (GUARD 2019). It is notable that some of the Threefords postpipes were arranged in pairs or threes within the same postholes. These multi-postpipe features are not palimpsests resulting from the replacement of posts over time; the posts were clearly present at the same time. The building that these posts would produce would not look like 'classic' early Neolithic timber structures as figured in some reconstructions (e.g. Doon Hill, Carnoustie and Lanton Quarry) (Ralston 2019; GUARD 2019; Waddington 2021, 91 fig. 6.4). Neither do the posts of its walls seem sizeable enough to support the plank wall construction, or the thatched or planked gable- or hip-roof forms suggested for most early Neolithic timber houses in Britain and Ireland. While it is valid to question whether the posts evidenced at Threefords had ever carried a substantial roof as envisaged for the larger 'halls', the paired and multiple post arrangement provides substantial weighting towards a roofed interpretation.

EVIDENCE FROM ETHNOGRAPHY

A review of the vernacular architectural traditions of other cultures reveals that structures built from multiple posts in the same postholes are relatively rare (Oliver 1997), in contrast, for example, to post-and-beam or post-and-slot structures, which have global currency over the very long term. The most common occurrence of multi-post structures here is in the creation of different forms of 'tension arch' or 'semi-bent arch' structures, where long, fine, flexible branches are driven into the ground and bent into an arched or domed shape in order to produce a lightly vaulted roof (Cataldi 1997, 653). Various forms of these tension arch or semi-bent arch structures are in use in many parts of the world, but the only examples which we could identify with structures that sometimes include earth-fast double posts as part of their construction were the north American Ojibwa people's birchbark 'wigwam' structures (Oliver 1997, 1867). Similar structures produced by other peoples also achieve tension arch or semi-bent arch buildings, but without the clear evidence for double posts in the same posthole. Ojibwa wigwams were constructed from a tension arch pole frame, with butt-ends cut and forced into the ground in an elliptical or circular plan (Ritzenthaler 1978). To form the roof, a pole and its opposite were bent towards the centre of the space and lashed together. The structure was covered with birchbark panels which were sown together, and the floor covered with cattail (bulrush) mats (Bushnell 1917). Large structures of a size similar to the building at Threefords, would be occupied by several families as domestic dwellings.

We are not seeking a formal ethnographic analogy here, rather, this to identify the existence of a constructional context for double posthole structures associated with tension arch buildings, with comparatively slight posts, incapable of supporting a heavy traditional roof. On this basis, the Threefords structure would qualify as some sort of tension arch or semi-bent arch roofed building. There was no shortage of readily available organic materials at hand for its construction: bark, animal skin, plant matting and so on. Moreover, we have evidence from the charcoal analysis (see below) that hazel and apple and/or pear species were being subject to woodland management regimes, including perhaps pollarding or coppicing. Such strategies – especially in hazel trees – would provide useful raw material for tension arch structures. With the majority of early Neolithic buildings currently identified on the basis of substantial posts or a post-and-slot construction (see Darvill 1996, figs 6.4 & 6.5 for British examples; Smyth 2013, fig. 13.2 for Irish examples and Brophy 2007 for discussion) there are dangers of under-recognising early fourth millennium buildings, to which this (literally) less rigid approach might offer some remedy.

REGIONAL CONTEXT

Such a building as described above is that represented in the primary phase of the site at Stoneyfield, Raigmore (Inverness), a building strikingly similar to that at Threefords (Simpson 1996; Barclay 1996, 70). Measuring 14m x 6m and in a roughly east-west orientation, it is of spaced-post construction (some intercut) with the side walls composed of double-posts in an irregular staggered formation. The ends indicate the same arcuate formation as Threefords, with a central stone-edged hearth and pits within (fig. 14). The stratigraphy at the site was complicated and the position of this building was within a complex sequence that included pits containing Grooved Ware, a cup-marked stone, later platform cairn and cemetery containing Food Vessel and Cordoned Urn (Simpson 1996, 62–4). Recent work by Copper *et al.* (2021) has explored the chronology of the Grooved Ware occupation at the site with new radiocarbon measurements. As a result, despite the similarity to Threefords, it is only most cautiously referenced in the report on structural rather than chronological proximity.

Recent work (Griffiths 2021) has reviewed evidence for early Neolithic activity in the north of England. This highlights a distinct trajectory and pattern of early Neolithic activity in this part of the world, including chronological overlap between latest Mesolithic activity and earliest Neolithic activity in Yorkshire (Griffiths 2014a; 2014b). The Milfield Basin is distinct in the north east of England for the concentration of Neolithic activity, including what now might be regarded as *the* characteristic Neolithic type of site – pit sites (cf. Edwards 2009; Garrow *et al.* 2005) – as exemplified in the Milfield Basin at Thirlings (Miket and Edwards 2008), Whitton Park (Waddington 2006, 13), Coupland (Waddington 2009), Lanton Quarry (Waddington 2021), and somewhat further afield at Bolam Lake (Waddington and Davies 2002). Recent work at Cheviot Quarry 2 (Lanton) (Lotherington 2018) has identified what certainly might be thought a most substantial earlier Neolithic building associated with dates of between 3900 and 3700BC. The nature of the record suggest that Milfield really was a focus of Neolithic activity in the fourth millennium BC, one unusual both in scale and type.

CHRONOLOGICAL CONTEXT

In order to provide a chronological context for the structure at Threefords, the radiocarbon results associated with several early Neolithic timber structures elsewhere in Britain and Ireland are also presented here (fig. 19; Edwards *et al.* in press). These results are taken from Whittle *et al.* (2011), and from the structures excavated at Yarnbury (Gibson *et al.* 2017), Garthdee Road, Aberdeen (Murray and Murray 2015), Lockerbie Academy (Kirby 2011) and Parc Bryn Cegin (Kenny 2008).

As well as creating new modelling approaches for several sites, some differences in the modelling from the approaches undertaken by Whittle *et al.* (2011) have been applied here. We present these results associated with early Neolithic structures in an OxCal Phase model defined by trapezium Boundaries (Bronk Ramsey and Lee 2013). The overall structure of the model is shown in figure 18. The code is available from Edwards *et al.* (in press). Three results from White Horse Stone have not been included in this analysis. These three results (KIA-25383, NZA-21506 and NZA-21504) are from features which also contain Grooved Ware (Hayden 2006). The samples used for these results are probably therefore redeposited, and cannot be considered robustly associated with the early Neolithic timber structure at White Horse Stone.

These results allow us to compare the chronology of the Threefords structure with the currency of other early Neolithic structures in Britain and Ireland. Key parameters from this model are shown in figure 19. If we compare the estimates for the start of use of these structures, we can see that Threefords is relatively early in the sequence, probably for example predating activity at both the Lismore Fields structures (it is *77% probable* that *Start Threefords* predates *Lismore start building I* and *99% probable* that *Start Threefords* predates *first Lismore building I*). Indeed, the start of activity at Threefords probably also predates the structures at Yarnbury, Garthdee Road, Lockerbie Academy, Claish, Crathes, Llandegai and Parc Bryn Cegin (it is *91% probable Start Threefords* predates *first Yarnbury*; it is *70% probable Start Threefords* predates *start Garthdee Road*; it is *81% probable Start Threefords* predates *start Lockerbie Academy*; it is *95% probable Start Threefords* predates *start Claish*; it is *60% probable Start Threefords* predates *start Crathes*; it is *78% probable Start Threefords* predates *Start House B1*; it is *95% probable Start Threefords* predates *start Park Bryn Cegin*).

Indeed, the only estimates for the use of early Neolithic structures that are most probably *older* than Threefords are from the structure at Yarnton and our revised chronology for the structure at White Horse Stone. Our revised estimate for the start of early Neolithic activity at White Horse Stone suggests this took place in the second half of the 39th century cal BC or the first three quarters of the 38th century cal BC. Timeframe – between 3840 and 3710 cal BC (*95% probable; start Yarnton 3871*; fig. 20). This revised chronology differs from Whittle *et al*. (2011) because we have not included earlier fourth millennium results that are residual in later Neolithic features; these cannot be demonstrably associated with early Neolithic activity (see discussion above). Our revised model therefore places the activity at the White Horse Stone early Neolithic timber structure slightly later. Activity at Yarnton also appears to belong to this timeframe. The timber structures and palisade at Doon Hill probably also date to the 39th or 38th centuries, though there is the possibility that an earlier phase of activity is represented (Ralston 2019, 12).

The structure at Threefords therefore appears both to be of unusual architectural style, – *within what we currently understand* as the repertoire of early Neolithic timber architecture, even in comparison to local examples at Cheviot Quarry (Lotherington 2018) – and unusually early, certainly for the north of England and Scotland, with the closest comparanda, again, being the structure at Lanton.

THE ENCLOSURE

The enclosure ditch, with its strange combination of curvilinear and polygonal forms, had, until recently, few comparanda amongst prehistoric, let alone Neolithic, sites in Britain. Despite significant differences, and a recent radical revision in its chronological position, the enclosure on Doon Hill, near Dunbar, Lothian, remains in many respects the closest analogy to Threefords (fig. 14). Indeed, the original British and Anglo-Saxon interpretation of the Doon Hill site by the excavator, Dr Brian Hope-Taylor, was the model that informed the excavation programme at Threefords in 2009. A brief outline of Doon Hill is pertinent as a prelude to what follows.

Between 1964 and 1966 Dr Brian Hope-Taylor excavated the unusual enclosure at Doon Hill discovered by Dr K St. Joseph in 1959. It was interpreted at the time as a palisade, partially curvilinear and partially polygonal in plan, which measured *c*.60m x 40m and encloses *c*.0.23ha. Within its trench side-alternating split logs clasped horizontal timber planking. Within its the southern half were the foundations of two successive rectangular timber buildings. Hall A, the earlier, measured 23m in length and half that in width, with straight side-walls of spaced-post construction and 'open-book' end gables. Its excavator believed that evidence of repeated repair an indicator of considerable age. Following destruction by fire, its successor, Hall B, was built within its foundation trenches. This was a building of slighter construction with doorways in each wall and internal tripartite division. It measured *c*.16m in length x 8m in width. Its excavator interpreted the sequence as a hall and enclosure of 6th C British date, subsequently replaced with a building with its closest parallel amongst mid-7th C royal halls at *Ad Gefrin*, and with its enclosure refurbished.

In a masterclass of forensic re-appraisal, based upon his critical re-examination of the site evidence and underpinned by a substantial number of radiocarbon dates, Professor Ian Ralston has advanced compelling argument for both phases of building and enclosure at Doon Hill to date to the early Neolithic period (Ralston 2019). This reinterpretation confirming early Neolithic settlement activity within a small partially polygonal enclosure has direct implications for the interpretation at Threefords. While a date for the construction of the polygonal ditched

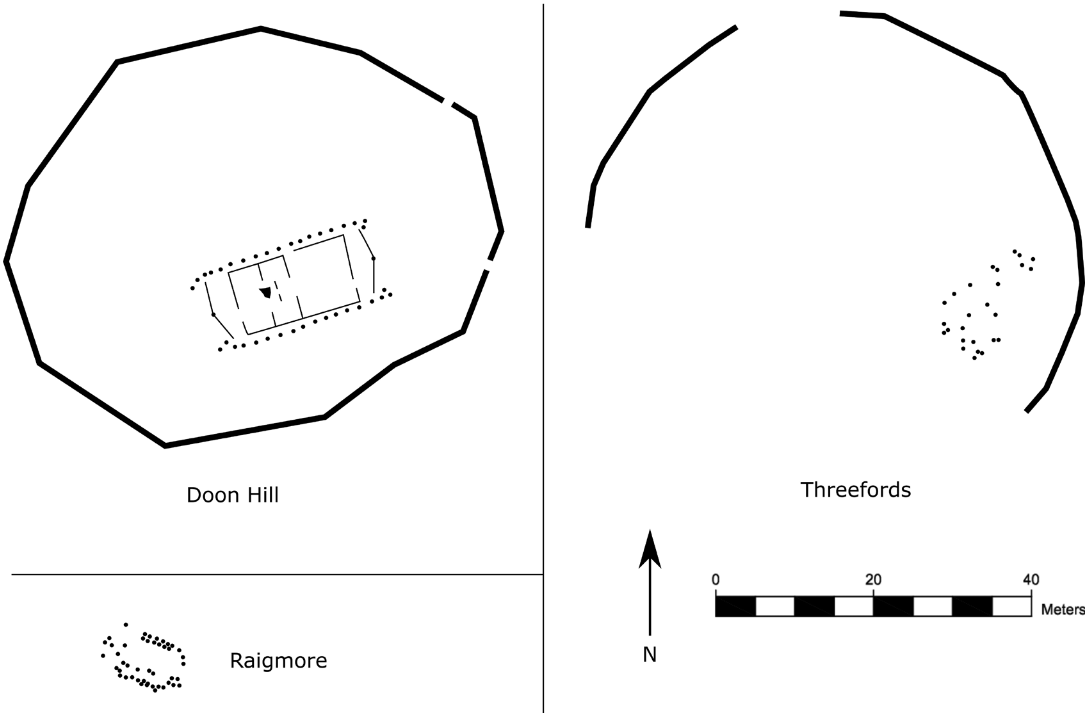

Fig. 14 Comparative schematic plans of Doon Hill (after Ralston 2019), Raigmore (after Barclay 1996) and Threefords (with enclosure transcribed from aerial photograph).

enclosure at Threefords may only be established through future excavation, Doon Hill does establish precedent for that relationship, though significant differences remain, not least in one enclosure being a ditch and the other a palisade, and with significant architectural differences between all three buildings. However, the similarity in size of the enclosures, and the size and orientation of the buildings within, illustrated on fig. 14, are striking.

THE NEOLITHIC PITS

Taken in isolation, the pits themselves add little to the overall interpretation of the site; however, set in their landscape context, they do fit within a pattern familiar at other sites in the Milfield Basin. The extensive pit site at Thirlings is only 2km to the south-east of Threefords North, which saw deposition throughout the Neolithic in 227 features, many of which were markedly similar. A range of unmarked and post-marked pits were identified at the site (Miket *et al.* 2008) and were interpreted as the rule-bound deposition of domestic waste, often in association with Carinated Bowl pottery and Impressed Ware. It is likely that the pits at Threeford North represent the remains of similar practices, and in the case of the dated feature [F72] could well be contemporary with the settlement activity on the site.

The environmental evidence adds to the interpretation of these pits (see environmental report, below). The relative quantities of wood charcoal taxa are very similar to those in the midden, whilst the cereal grain assemblage is very close to that recovered from the postholes of the building. This indicates that the features are likely to be of a similar phase in the use of the site, if not directly contemporary. The midden did not provide as stable a context for the preservation of the cereal remains, in contrast to the postholes, and thus the original assemblage of both may have been more similar. From this perspective it seems likely that the depositional pits were dug and then rapidly filled with midden material (given the absence of primary silting), perhaps even drawn from the pits dug into the midden itself.

However, such depositional activity was not necessarily 'simple'. For example, [F54] contained 26 stakeholes and two postholes with evidence for *in-situ* burning, whilst [F209] contained 30 rim sherds, and [F51] the remains of a clay lining. This behaviour is directly comparable to evidence from Thirlings (Miket *et al.* 2008) where, amongst a wide variety of depositional behaviours, one pit contained a clay lining, and another was marked with a series of stakeholes and a central post, and also contained a large number of pottery sherds, although in this case of later Impressed Ware. A similar range and complexity of pits of a similar likely date have also been identified in the local area at Lanton and Cheviot quarries (Lotherington 2018; Passmore and Waddington 2012), and as such the activity adduced here fits well into the regional pattern.

LATER PREHISTORIC TO EARLY MEDIEVAL REMAINS

The linear features present problems of interpretation, a situation not helped by the relatively undiagnostic nature of the material from within their fills. In date they clearly fall between the Neolithic period, whose deposits they cut, and the medieval period as represented by the rig and furrow cultivation that lies above them. Their profiles indicate two forms. The first is a broad (0.5–1.0m) and often rather shallow (0.2m) gently sloping profile [F61, F223], and the second a trench with steeper sides and a more rounded base [F73, F95). All four appear to represent boundaries marking the subdivision of small agricultural plots. On such well-drained subsoils, drainage alone is an unlikely explanation of their purpose. While the broader features may mark the lines of former boundary hedge divisions, no evidence for root disturbance was identified within their fills. Feature [F61] had clearly lain open as a ditch, and was later considered sufficiently safe and sheltered a location to establish a small iron-smelting hearth. We interpret these as borrow-trenches for soil upcast on one side as the bank to carry a hedge, so creating a doubly effective perimeter, likely to be medieval in date (see the presence of Rye in a related feature, following page), but certainly Iron Age or later The profiles of [F73] and [F95] on the other hand would indicate post trenches and indeed there are indications that [F95] may indeed once have contained posts; there are no good reasons why either, or indeed both of these two features might not also date to this early Neolithic horizon.

Notwithstanding the limitations of the site evidence, the identification of closely analogous features from excavation elsewhere in the region offer contexts against which these ditch features at Threefords might profitably be viewed. While fence-lines appear ubiquitous down to the present, it is from the lowland division of the landscape into small agricultural plots marked by ditch and hedge-banked boundaries – frequently found in close association to, and enclosing, the houses of their settlement, wherein the closest analogies lie. This archaeologically-defined pattern-type is distinctive, and for present purposes it may be considered sufficient to reference two examples from different periods illustrative of the types and their contexts. (An extended consideration of these and other examples may be found in Hodgson *et al.* 2012, 183–222 and Muncaster *et al.* 2014.)

Excavation at Pegswood Moor, Morpeth, Northumberland revealed an extensive network of later Iron Age ditch-marked linear enclosures embracing habitation, storage and processing activities in a mixed arable and pastoral regime dating to between *circa* 200BC and the late 1st century AD (Proctor 2000). Of a later date is the extensive complex of ditch-marked linear enclosures of the second phase of the early medieval settlement at Shotton, Northumberland (Muncaster *et al.* 2014). Dating to between the mid-7th and the 9th centuries AD, this revealed a complex sequence of enclosures defining small areas of cultivation, habitation, processing, storage and some industrial activity. Notwithstanding the many clear differences of material cultural expression between the two sites, an inescapable impression is one of overall general similarities in the daily round between these two mixed farming economies, separateed both in time and by the distinctive patterned distribution of rectilinear farmstead enclosures interposed between them.

To view the Threefords linear features through the prism of the above is not to lay claim to these being the only periods to which they might date, for bank-defined field systems of earlier ages are well recorded in upland contexts (e.g. Burgess 1985) as are earlier dated forms of lowland land division such as pit-alignments (e.g. Mellor 2007). Rather, it is to show from a regional perspective a robustness in the physical survival of this particular form of land enclosure in lowland contexts subjected to intensive cultivation over millennia, and the periods to which they belong. In this respect, reference has already been made to the nearby presence of a rectilinear later Iron Age/Romano- British settlement at Pegswood (Proctor 2000), and the extensive late 6th–8th century settlement at Maelmin amidst which the Threefords enclosure sits, as likely contexts for this linear enclosure phase. Indeed, given that these features produced evidence of hulled barley, cultivated oats and rye, it is likely that they post-date the British Iron Age, and are most likely medieval in date. Although hulled barley is known to have been cultivated from the Early Neolithic, and oats from the Late Bronze Age onwards, rye was unimportant until the medieval periods (Bishop *et al*. 2009).

SPECIALIST REPORTS

ENVIRONMENTAL REPORT

by Ceren Kabuku

Environmental Methodology

Archaeobotanical analysis was carried out on flotation samples taken from the Threefords site located in the Milfield Basin (Northumberland) in order to assess the range and importance of identifiable plant macrofossils. Samples were collected in the field by the excavators based on judgment sampling, aiming to sample the important features and areas of excavation. Recovery of plant remains was achieved using a bucket flotation system with the help of a 250 micron sieve. A total of 59 flotation samples, all from Area 1, were sorted and fully analysed in the archaeobotany laboratory at the University of Liverpool for the retrieval and identification of plant remains. The samples were sorted using a low-power stereomicroscope with a magnification range of 7x to 70x. All specimens identified in this assemblage were preserved by carbonization. The overall aim of this assessment was to provide a detailed account of the plant economy of the Neolithic settlement at the Threefords site, with emphasis placed onto understanding the importance of cereal crops, agro-ecology, use of wild plant resources and woodland management.

All fragments of wood charcoal greater than 2 millimetres in size were sorted for identification. Following wood identification procedures listed in Schweingruber (1990) and

Hather (2000), fragments were examined under a high power reflected light microscope (magnification range 50x-500x) in order to observe the diagnostic wood anatomical features of the specimens. Individual fragments were sectioned using a single-edged razor and identifications were made following the wood anatomy keys in Schweingruber (1990) and Hather (2000) and also in consultation with the wood charcoal reference collection housed in the Archaeobotany laboratory at the University of Liverpool. Every precaution was taken to prevent cross-contamination between samples and petri-dishes were kept contaminant-free with regular cleaning.

A sub-sampling procedure was applied to wood charcoal fragments >2mm in size whereby a random selection from all size classes of fragments were analysed up to 50 fragments per sample or until maximum taxa representation in the sample was reached (following procedure outlined in Théry-Parisot *et al.* 2010). Because higher number of samples can be analysed this way, this sub-sampling strategy allows for a through representation of diversity in the assemblage as a whole while also taking into account the relative proportions of abundant taxa. Wood diameter size classes were recorded for each examined fragment following criteria listed in Marguerie (1992) and Marguerie and Hunot (2007). This technique allows a fast and efficient method of assessing the presence of charcoal fragments that come from twigs, branches or larger sized trunks.

Non-wood plant macrofossils were further examined under a stereomicroscope (magnification range 7x-70x). Published identification manuals, guides and drawings (Nesbitt 2006, Jacomet 2008, Hillman 2001, Hillman *et al*. 1996, Hubbard 1992, Cappers *et al*. 2006, Neef *et al*. 2011) were used in preliminary identifications. These were then checked using the herbaria specimens and the modern reference collection. Of the identified taxa, whole and intact specimens were recorded and counted as one (e.g. whole seeds, nutlets, spikelet forks, and culm nodes). In addition, apical and embryo end fragments of cereal grains were counted and the higher number of the two was added to the number of whole specimens in each sample. Fragment counts of wood charcoal and tubers, rhizomes and rootlet fragments were recorded, yet a definite identification of some of these specimens were not always possible due to preservation conditions.

Results of the Wood Charcoal Analysis (Table 1)

Wood charcoal fragments from 2 midden samples, 6 pit fills, 10 external posthole/post pipe fills and 5 internal posthole/post pipe fills were examined and quantified. Across all context types 356 fragments were identified to species, genus or family level. 11 different taxa were recorded in the Threefords assemblage with deciduous oak (*Quercus*) being the most ubiquitous and abundant taxon in all context types, indicating the importance of this taxon both as a source of fuel and timber. This is followed by hazel (*Corylus avellana*) and apple/pear family wood (*Maloideae*) which are both present mostly in midden and pit fill samples in high abundance, suggesting that these taxa might have been an important part of the fuel economy of the site.

Birch (*Betula*) and alder (*Alnus*) are present sporadically in all context types except internal posthole fills. Elm (*Ulmus*), ash (*Fraxinus*) and willow/poplar (Salicaceae) are present in fewer numbers only in midden or pit fill samples, suggesting that these are most likely to be less frequently used types of fuel wood or timber on site. With regards to preservation conditions and taphonomy of the wood charcoal assemblage as a whole, indeterminate fragments are in low numbers, mostly occurring in midden samples. These fragments display signs of being

Table 1 Summary of identified wood charcoal counts and taxa ubiquity in all contexts examined.

Taxon	**Common name**	**Ubiquity**	**Total fragment number**
Quercus (deciduous)	Oak	100%	133
Corylus avellana	Hazel	65%	87
Maloideae	Apple/pear family	43%	59
Alnus	Alder	21%	14
Betula	Birch	35%	18
Ilex aquifolium	Holly	4%	1
Salicaceae	Willow/poplar	8%	2
Ulmus	Elm	8%	4
Fraxinus	Ash	8%	1
Calluna vulgaris	Heather	17%	5
Indeterminate twig	–	13%	3
Indeterminate	–	25%	20
Total fragments identified			331

exposed to very high temperatures (possibly higher than 650°C) or signs of post-depositional trampling such as radial cracks, partly or completely lignified vessels and fibres.

In internal and external posthole/post pipe fills deciduous oak (*Quercus*) fragments were recorded in every single sample (Table 2). While internal postholes contained a much more limited range of taxa, it appears that external postholes/post pipe fills (those associated with the building in Area 1) contain a more diverse range including hazel (*Corylus avellana*), apple/pear family wood (*Maloideae*), alder (*Alnus*), birch (*Betula*) and holly (*Ilex aquifolium*). This diversity is most likely to be the result of fuel wood remains mixing into posthole fills post-deposition.

The overarching ubiquity oak fragments in posthole and post pipe fills, coupled with the fact that all of these fragments come from relatively larger sized trunks (diameter of ca. 20 cm or larger) strongly suggests that oak was the preferred source of fuel wood on site, the remains of which having eroded into or redeposited in the majority of the cut features. However, given the over-representation of hazel in the postholes and postpipes of the structure, compared with the rest of the site, this would appear to the primary timber for construction. Apple/pear family (*Maloideae*) wood or hazel (*Corylus*) wood of smaller diameter (e.g. branch up to 10–15 cm in diameter) could have been used as supporting elements in construction as they are also found in a number of posthole fills; however there is no *in situ* evidence of this.

The range of taxa and their frequencies are more evenly distributed in samples from pit fills and midden deposits (Tables 3, 4). In samples from middens and pit fills oak (*Quercus*)

Table 2 Summary of wood charcoal fragments identified from posthole and post pipe fills.

	Building posthole and post pipe fills		**Internal posthole and post pipe fills**	
Taxon	**Ubiquity**	**Total fragment number**	**Ubiquity**	**Total fragment number**
Quercus (deciduous)	100%	34	100%	12
Corylus avellana	50%	13	20%	3
Maloideae	20%	4	–	–
Alnus	20%	2	–	–
Betula	20%	2	–	–
Ilex aquifolium	10%	1	–	–
Indeterminate twig	10%	1	–	–
Total fragments identified	57		15	

Table 3 Wood charcoal fragments identified in the midden samples.

Flot Sample No	**122**	**123**		
Context No	**279**	**295**		
Taxon			**Totals**	**Abundance %**
Quercus (deciduous)	18	12	30	29%
Corylus avellana	5	17	22	21%
Maloideae	13	16	29	28%
Alnus	9	–	9	9%
Betula	1	2	3	3%
Ulmus	2	–	2	2%
Calluna vulgaris	1	2	3	3%
Indeterminate twig	1	1	2	2%
Total fragments identified	54	50	104	
Indeterminate	11	4	15	

and hazel (*Corylus*) wood are both present in all samples and along with apple/pear family (*Maloideae*) wood dominate the assemblage in terms of abundance. Birch (*Betula*), alder (*Alnus*), elm (*Ulmus*), heather (*Calluna vulgaris*), ash (*Fraxinus*) and willow/poplar (Salicaceae) are also present in the assemblage, albeit in small numbers.

A majority of the hazel (*Corylus*) and apple/pear family (*Maloideae*) wood charcoal fragments in the midden samples come from small sized branches, twigs and more rarely from small trunks (up to ca. 20 cm in diameter). In a number of hazel fragments and apple/pear family fragments there is evidence of traumatic growth, such as the appearance of callus tissue around wound margins which could be indicative of defoliation or pollarding (Schweingruber 2007). These two taxa are the only taxa in the charcoal assemblage that display such anatomical anomalies and it is highly likely that the evidence of scar and callus tissue formation, especially in small round wood specimens of hazel and apple/pear wood, is the result of woodland management strategies. Further, more detailed examination of some of these specimens could provide further insights into the exact nature of these management strategies. A number of apple/pear family charcoal fragments also contained several false growth rings, which usually comes about in certain taxa as a result of pollarding (Schweingruber 2007).

The distribution of taxa in the midden samples (see Table 3 above), similar to those in the pit fill samples (see Table 4 below), are evenly distributed with oak, hazel and apple/pear family wood as the most prominent components. The fragments in pit fill samples are in a better state of preservation, with far fewer indeterminate fragments, which signals to rapid deposition in these contexts. As will be discussed in the next section, one of these pit fill samples (S126, (311)) contained the majority of fragile cereal processing waste in the assemblage.

Table 4 Wood charcoal fragments identified in pit fill samples.

Flot Sample No	**24**	**59**	**104**	**106**	**126**	**127**		
Context No	**75**	**55**	**312**	**317**	**311**	**305**		
Feature No	**F53**	**F72**	**F313**	**F315**	**F313**	**F230**		
Taxon							**Totals**	**Abundance %**
Quercus (deciduous)	7	14	11	6	9	10	57	37%
Corylus avellana	1	8	7	15	8	10	49	32%
Maloideae	5	2	2	3	8	6	26	17%
Alnus	3	–	–	–	–	–	3	2%
Betula	11	1	–	–	–	1	13	8%
Salicaceae	–	–	–	1	–	1	2	1%
Ulmus	–	–	–	–	–	2	2	1%
Fraxinus	1	–	–	–	–	–	1	1%
Calluna vulgaris	2	–	–	–	–	–	2	1%
Total fragments identified	30		20	25	25	30	115	

This similarity in the composition of wood charcoal fragments between the midden and pit fill samples in addition to the presence of food processing waste in pit fills can be seen as suggesting that these features contain predominantly refuse material as fill. It is not clear from the macrobotanical assemblage whether these features were used predominantly for refuse disposal, or whether they were in-filled rapidly using household waste or re-deposited midden material. However, all pit fill samples examined reveal much better charred plant remain preservation conditions.

Results of the Seed and Other Plant Macrofossil Analysis

Forty-seven flotation samples contained non-wood plant macrofossils in the analysed assemblage. Of these 5 samples were excluded from quantification as it became clear that they contained intrusive material from a later occupation at the site: samples 19 (62) [F61], 50 (132) [F131], 51 (120) [F119], 17 (80) [F79] AND 57 (122) [F121]. These four samples contained a mix of hulled barley (*Hordeum vulgare*), cultivated oat (*Avena sativa*) and rye (*Secale cereale*). It is highly unlikely that they would reflect a variation of the Neolithic crop economy as the other 43 samples do not contain cultivated oat or rye. It is also indicated on the report of the excavation seasons 2009 and 2010 that these contexts and associated features are likely to belong to a later (early medieval) hedge line.

A majority of the cereal assemblage on site consist of glume wheats, smaller number of glume wheat spikelet forks and glume bases and fewer barley remains (Table 5).

Due to preservation limitations a majority of the glume wheats were not identified to species level. These grains and fragments (reflected in the table below as converted to whole grain equivalents) were recorded as glume wheat grains (*Triticum sp.)* since many of these specimens lacked certain features such as surface structure due to weathering or their overall morphology

Table 5 Minimum number of whole grain, spikelet fork, glume base, and rachis elements from all examined samples.

Taxa	**Common name**	**Minimum number of whole items**
Triticum sp. grain	Glume wheat grain (wheat)	106.5
Triticum sp. glume base	Wheat glume base	7
Triticum dicoccum grain	Emmer wheat grain	67
Triticum cf. *dicoccum* spikelet fork	Emmer wheat spikelet fork	11
Triticum cf. *monococcum* grain	Einkorn wheat grain	8
Triticum cf. *nn* spikelet fork	New glume wheat spikelet fork	1
Hordeum vulgare grain	Barley grain	14
Hordeum vulgare cf. var. *nudum*	Naked barley grain	1
Indeterminate cereal grain		92.5

was distorted as a result of charring. The rest of the cereal grains were mostly emmer wheat. Barley grain is also present, and in most cases looked to be of the hulled variety although one specimen contains characteristics of the naked variety. This is followed by a small number of possible einkorn wheat grains. Chaff elements were found in much smaller numbers compared to whole grain finds. As will be discussed, this is possibly linked to preservation conditions as rachis and chaff elements are much more fragile and could be less likely to be exposed to fire. There is also one spikelet fork belonging to a glume wheat that looks like a specimen similar to those described by Jacomet (2008) and Jones *et al*. (2000). The status of this extinct species is unclear in Britain and Ireland; however several examples of these are being reported on a number of earlier agricultural sites across the Old World. No barley rachis fragments were found in the assemblage, perhaps suggesting that the processing of this crop takes place off-site entirely.

An interesting point with regards to taphonomy is that a majority of the cereal grains and chaff elements were not found in the midden samples and instead posthole fills and pit fills produced more numerous remains of both grain and cereal processing waste. This seems to correspond with preservation levels observed in the wood charcoal assemblage as well. Therefore, it is likely that a seemingly low number of cereal grains in the assemblage does not necessarily reflect their absence, but rather this situation seems to reflect a high degree of trampling and post-depositional degradation of the plant macro-remains. In addition, perhaps daily activities and the routine of crop processing and food preparation at Threefords did not involve exposure to fire as often.

Along with a low level representation of chaff elements in the assemblage, wild grasses are also in low numbers and many of these specimens are not preserved well enough to permit identification to species or genus level and were therefore recorded as indeterminate wild grass (Table 6).

Table 6 Summary of wild grass grains and other plant parts from all samples analysed.

Wild grasses (Poaceae)	**Common name**	**Whole specimen equivalents**
Lolium sp. grain	Ryegrass	2
Avena spp. wild grain	Oat, wild	2
Bromus spp.	Brome	1
Danthonia sp.	Oat grass/heath grass	3
Poaceae indeterminate wild grain	Indeterminate wild grass grain	22
Poaceae indeterminate wild culm	Indeterminate wild grass stem	10
Poaceae indeterminate wild pedicel	Indeterminate wild grass flower base	1
Arrhenatherum elatius tuber and rootlet	Onion couch grass tubers and root parts	1

While densities are low, many of the wild grass seeds, along with a sizeable portion of the cereal grain and chaff elements are found in a number of pit fills (e.g. S126, (311) [F313]). While some post pipe fills also contain a high number of the cereal grains (e.g. S113, (270), [F269]) these do not tend to contain as many wild grasses or small seeded weedy taxa. In addition to numerous other rhizome, tuber and rootlet fragments in the assemblage (see Table 7), one specimen was identified from the root system of onion couch grass (see Table 6) (*Arrhenatherum elatius*). The abundance of root, rhizome and grass culm fragments in the assemblage could suggest the presence of burnt residues of early stages of crop processing.

A number of posthole and post pipe fills along with pit fills contain several fragments of hazelnut (Corylus avellana) shell. In addition, pit fill (S126, (311)) contained a fragment of charred fruit flesh that looks to be of apple-type. The remaining wild / weedy specimens in the assemblage include 21 different taxa (Table 7). Most of this part of the assemblage is dominated

Table 7 Summary of the wild and / or weedy taxa in all samples.

Other wild/weedy taxa	**Number of whole specimens**
Linum sp.	3
Malva sp.	3
Veronica hederifolia	57
Plantago lanceolata	1
cf. *Plantago*	1
Rumex sp.	11
Chenopodium spp.	154
Cyperaceae indeterminate	1
Scirpus sp.	1
Cyperus sp.	1
Galium sp.	1
Myosotis sp.	1
Lamiaceae indeterminate	1
Small seeded Fabaceae	11
Brassicaceae indeterminate seed pod	1
Dicotyledonous root and rhizome fragments	7
Monocotyledonous root and rhizome fragments	10
Indeterminate tuber and rootlet	28

by *Chenopodium* sp. (goosefoot) and *Veronica hederifolia* (ivy-leaved speedwell). As mentioned earlier there are also a number of other rhizome and root fragments in several of the samples, although their preservation could be favoured due to the fact that they are much larger in size compared to several of the wild/weedy taxa listed below. Additionally, small seeded wild legume seeds and several members of the sedge (*Cyperaceae*) and rush (*Juncaceae*) families (including *Scirpus* sp., *Cyperus* sp., *Juncus* sp.) and sorrel (*Rumex* sp.) were also found in small numbers.

THE CERAMIC ASSEMBLAGE

by Dana Millson

The Threefords ceramic assemblage consists of 307 sherds of Early Neolithic pottery and related fragments, all of which can be identified as traditional and modified forms of Carinated Bowl (CB) (see Sheridan, 2007: fig. 15). Additional fragments found in the post-pits of the building, excavated in the first season, were too fragmentary to assign a tradition, although one has an orange fabric that is consistent with Anglo-Saxon pottery and one sherd of glazed, medieval Greenware was noted from the linear trench of the same area. The Neolithic pottery consists of body sherds that represent a minimum of 61 vessels. The vessels themselves are fragmentary and remain as sherds that make up 1–5% of the original vessel; however, in a few cases where larger sherds have survived, 25–30% of the original vessel remains. Most of the pottery was found in the midden in Area 1, in contexts (279), (295) and (296), but significant portions were found in pit features [F313], [F315], [F318] and [F304]. Sherds were also uncovered in Area 2 in contexts (202), (265) and (261).

Form

The assemblage appears to be a mixture of traditional CB as well as Early Neolithic 'modified' forms. Where form could be determined, most of the vessels were open bowls, some of them carinated; however, three jars (V23, V34, V43) and a fourth jar (V51) were observed. Coil joins were visible on V4 and V45, which suggests at least one method of construction. Although no bases were found, it would be expected, based on the tradition, that they were round. The rims are mostly everted, and four were rolled over. Rim tops are all simple and most are rounded, but one is pointed and another is squared. The size of the vessels varies from small cups to large bowls and where rim sherds survive, diameters range from 130mm to 360mm, although most fall within the 200mm to 250mm range. In addition, V22 and V58 were decorated with a small lug, or boss, near the shoulder of the vessel.

Fabric

A range of fabrics in varying degrees of fineness of fabrics were observed in the sherds of the Threefords assemblage. Although there are 15 examples of traditional Early Neolithic Carinated Bowl fabric (V1-3, V12, V17, V22, V25, V30, V35, V37, V43, V47-8, V50, V57) with thin, hard walls, fine inclusions and a soapy, black finish on the surfaces, most of the vessels are of a gritty, coarse fabric with larger inclusions and crumbly, red and brown cores. Crushed stone inclusions were noted in all of the sherds and range in size from 0.5mm to 7mm at their greatest length, although most fall between 2mm and 4mm. Rounded stone inclusions and sand were noted in

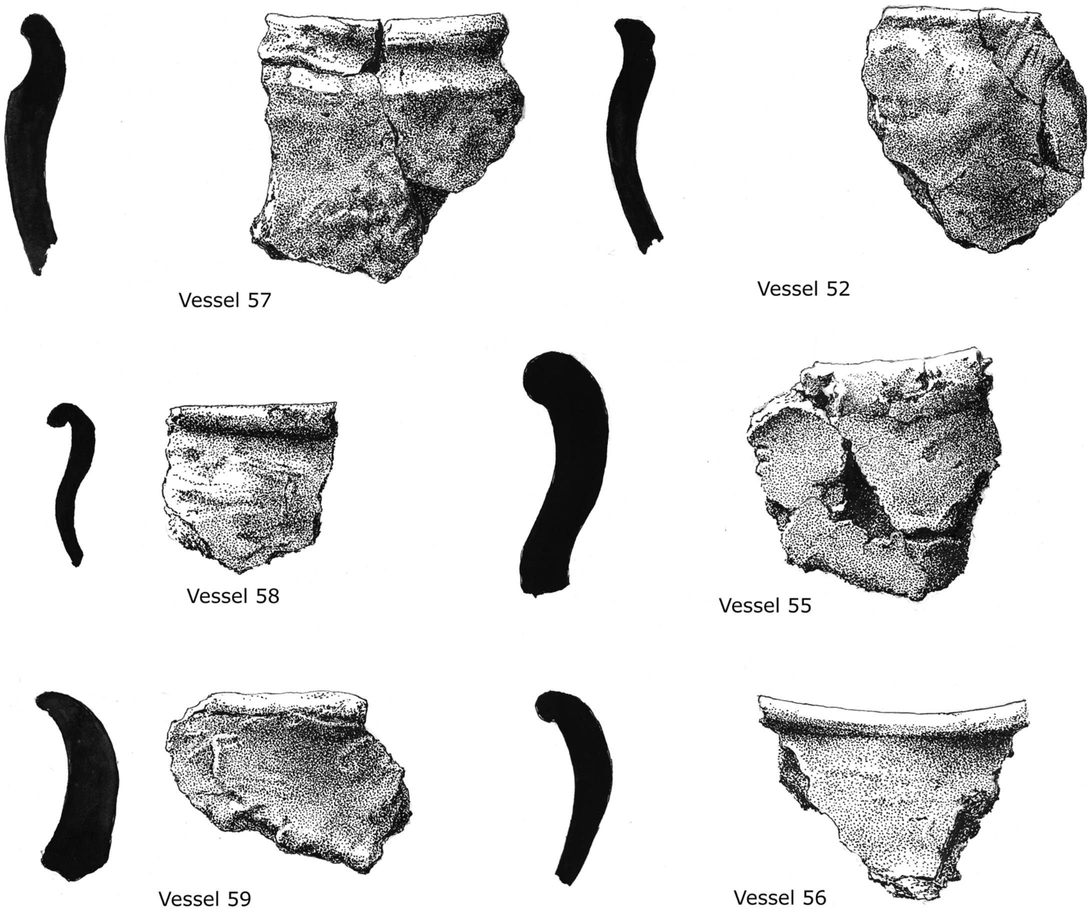

Fig. 15 Selected ceramic vessels.

several examples, but angular lithic pieces that were prepared as temper appear prevalently. The fabrics were analysed using only a 20x hand lens and so the minerals in the clay fabric could not be fully identified; however, natural quartz was noted in V29 and possible quartzite pieces in V34 and V35. The fabric of V24 contained sparkly lithic material, which is likely to be mica, that may have been added for its texture or may have become included accidentally as part of a local stone temper that was added to the clay. The remaining lithic inclusions were simply noted by colour, which included: dark grey, light grey, red, white, orange and brown. The crevices left by burnt-out organics that create a 'corky' texture to the fabric were noted in V2, 3 and V43, and grog was found as an inclusion in four vessels (V1, V2, V15, V26).

Surface Treatment

All of the sherds show some form of surface treatment. In some cases, striations indicate that this amounted only to wiping, but in others, slips were applied (sometimes thickly as in the case of V7). Scraping was visible on the surfaces of three vessels: V6 was scraped on the outer rim, possibly to thin or shape it; V22 was scraped on the shoulder; and V29, a particularly thick-walled vessel, was scraped on its largest body sherd. Burnishing was also observed on vessels of all forms. Three sherds from V51 were also decorated with horizontal grooved lines on a straight neck and grooved chevron and a dashed line of bird-bone motifs on the vessel wall. A possible seed impression was noted on one of the body sherds of V22.

THE FLINT ASSEMBLAGE

by Rob Young

A small assemblage of 49 pieces of lithic material is discussed in this report (fig. 17). Catalogue entries are based on information provided by the excavators. The 49 pieces can be broken down by excavated context as shown in Table 8.

Table 8 Lithic assemblage by context number.

Context No.	No. of finds	% of total assemblage
1	20	41
3	6	12
74 [F73]	1	2
86 [F51]	1	2
169 (Area 3)	1	2
265 [F264]	1	2
279	8	16
295	3	6
305	1	2
312	3	6
316	1	2
317 [F315]	1	2
[F51]	2	4
Total	**49**	**99 (100)**

Raw Material

The raw material used can be broken down as shown in Table 9.

6 pieces exhibit cortex to a greater or lesser degree: 2 pieces retain ochrous grey pebble cortex, two pieces show fawn/white, hard chalk like cortex, 1 piece retains a patch of buff/grey pebble cortex and 1 piece shows grey pebble cortex. One piece exhibits incipient, white re-cortication.

Table 9 Lithic assemblage by context number.

Raw Material	No.	% Total Raw Material
Various shades of Grey Flint	28	57
Black Flint	2	4
Fawn/Honey Brown Flint	2	4
Ochrous Yellow Cherty Flint	1	2
Grey Chert	1	2
Pitchstone	6	12
Calcined Flint	6	12
Quartz	1	2
? Agate	2	4
Total	**49**	**99 (100)**

Typology

The recovered material can be classified as shown in Table 10.

Technology

Twenty three pieces exhibit features relating to initial knapping technology. These can be tabulated as shown in Table 11.

In terms of secondary technological processes (excluding recognisable 'tool' types) only four pieces show evidence for possible retouching or *ad hoc* utilisation and edge damage, possibly through use. The technological data suggest the use of both hard and soft hammer percussive techniques in initial flake removal, as evidenced by surviving bulb and platform types, though the lack of cores and primary flakes suggests that most of the material may have been initially knapped elsewhere and that it arrived on site in its final form. Three pieces exhibit hinge fractures at their distal ends and a piece of pitchstone may have come from core rejuvenation.

The major source of flint utilised on the site, as well as the chert and agate, was probably local and derived from the riverine and glacial gravel deposits of the Till Valley (Waddington 2009a, 110–114). The single scraper (Lithic No. 19), may have been made on higher quality, black, possibly imported, nodular flint. Of particular interest are the 6 pieces of Arran pitchstone (Lithic Nos. 11, 21, 24, 33, 34, and 39, see fig. 18) that were recorded from the site. This is a rare occurrence, and the material must have arrived through some kind of exchange mechanism (Ballin 2015). While pitchstone implements of Mesolithic, Neolithic and Bronze Age type were recorded on Arran itself, Ballin believes that exchange of this raw material, across northern Britain, took place mainly during the early Neolithic, with a later Neolithic expansion of pitchstone use along the western seaboard, and also on Orkney. He points out the occurrence of pitchstone leaf-shaped points and pitchstone micro-blades (c.f. Lithic No. 34 at Threefords)

Table 10 Lithic assemblage by type.

Artefact Type	**No.**	**% Total Assemblage**
Microliths	1	2
Scrapers	1	2
Flake From? Polished Artefact	1	2
Borer/Awl	1	2
? Backed Blades (not seen)	1	2
Broken Primary Flakes	1	2
Secondary Flakes	1	2
Secondary Flakes (Broken)	1	2
Secondary Blades (Broken)	1	2
Inner Flakes	6	12
Inner Flakes (Broken)	3	6
Utilised/Retouched Inner flakes	4	8
Utilised/Retouched Inner flakes (Broken)	1	2
Inner Blade/Flake Segments	4	8
Inner Retouched Blade (Broken)	1	2
Inner Blade (Broken)	1	2
Inner Blade-Like Flake (Broken)	1	2
Inner Flake From Core Trimming	1	2
Detached Distal Ends	7	14
Detached Bulbar Ends	4	8
Chips	3	6
Chunks	4	8
Total	**49**	**98 (100)**

Table 11 Knapping technologies.

Bulb Type	**No.**
Punctiform	1
Pronounced	12
Diffuse	10
Total	**23**

Butt Type	**No.**
Cortical	3
Plain	20
Total	**23**

in deposits dated to the early Neolithic. Radiocarbon dates from a series of Scottish mainland sites confirms these trends and also the close association of pitchstone use with the currency of Carinated Bowl type, early Neolithic, pottery (either 'traditional' or 'modified' forms – see Sheridan 2007) (Ballin 2015). This would seem to mirror the situation at Threefords.

The majority of the lithic finds, with their close association with Carinated Bowl pottery, is also of probable early Neolithic date. The one side and end scraper, exhibits classic, steep, retouch on its working edges, and this, along with the possible borer (Lithic No. 42) and the few pieces exhibiting miscellaneous retouch, or possible evidence for utilisation, would not be out of place in this chronological context. By the same token the shattered flake fragment (Lithic No. 8) exhibits some evidence for seeming polishing on one surface and may be a fragment from a Neolithic polished flint implement, possibly an axehead. All of this material finds ready parallels in lithics recovered from field walking, test pitting, and excavation in other areas of the Till Valley (e.g., Waddington 2009a, 75–125; 2009b, 172–265).

Some of the recorded artefacts might, however, be residual from earlier activity on the site. For example, the fine, obliquely blunted, 'Deepcar' type microlith (Lithic No. 27) from (74) (the fill of linear ditch [F73]) is of Early Mesolithic date, and the blades and blade/flake segments recorded could also be from earlier Mesolithic activity at the site.

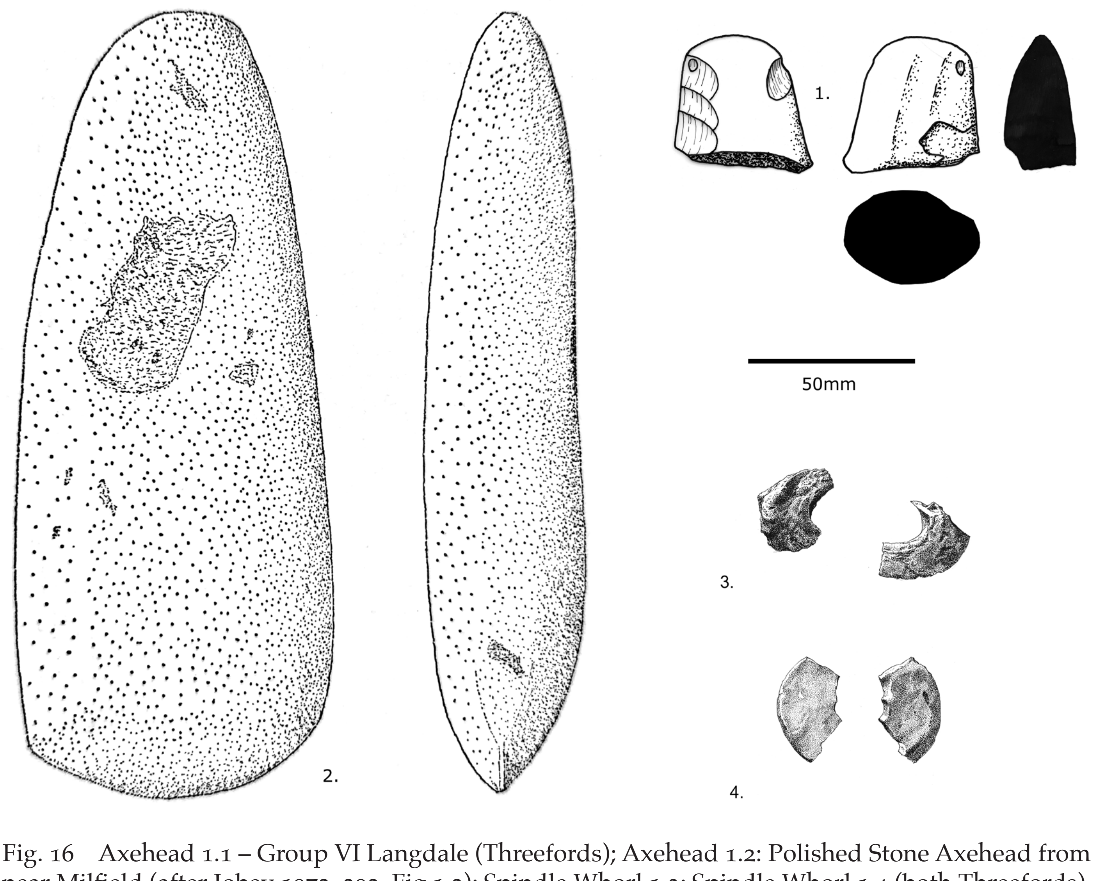

Fig. 16 Axehead 1.1 – Group VI Langdale (Threefords); Axehead 1.2: Polished Stone Axehead from near Milfield (after Jobey 1972, 292, Fig.1.2); Spindle Whorl 1.3; Spindle Whorl 1.4 (both Threefords).

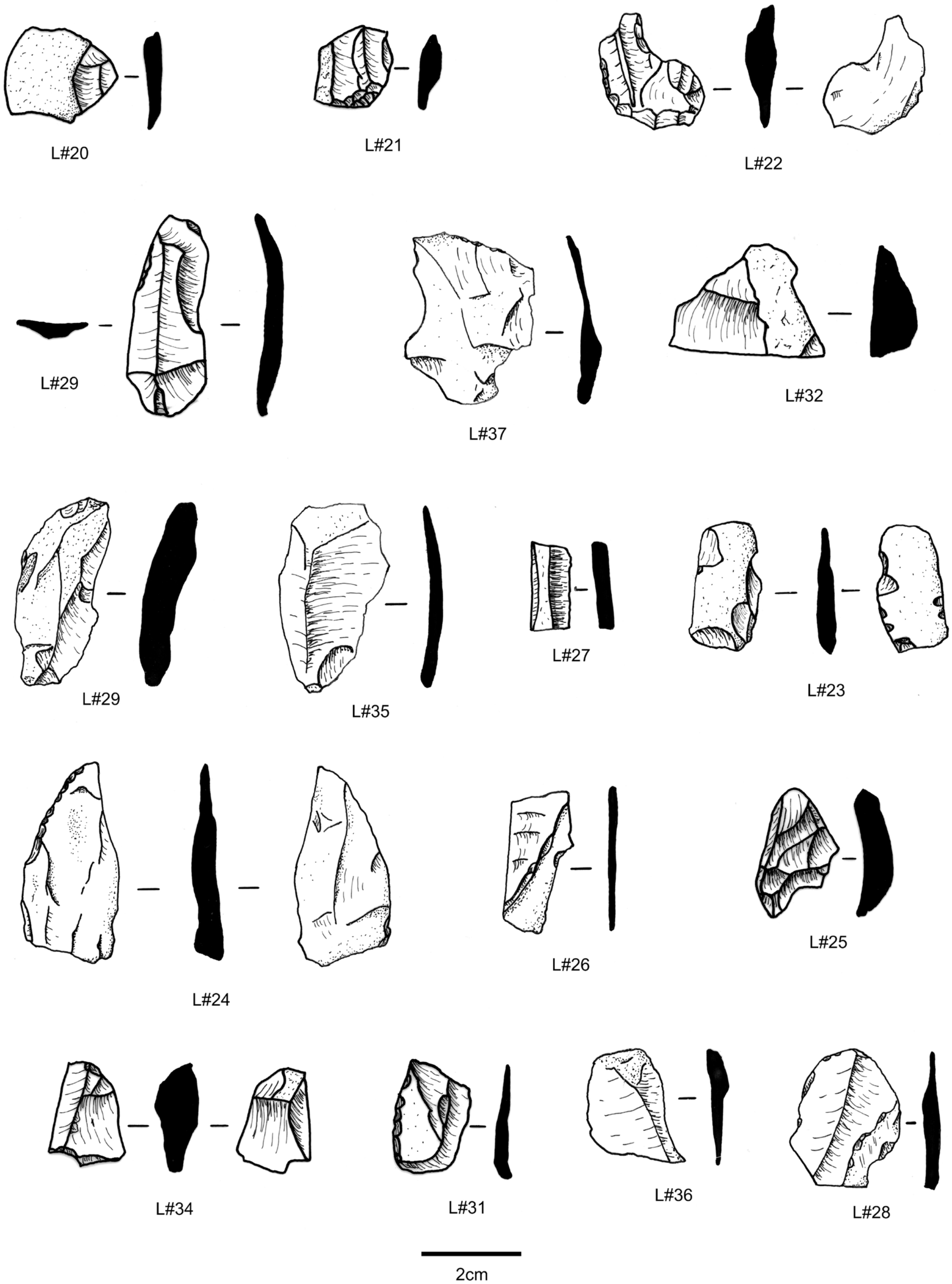

Fig. 17 Selected lithics.

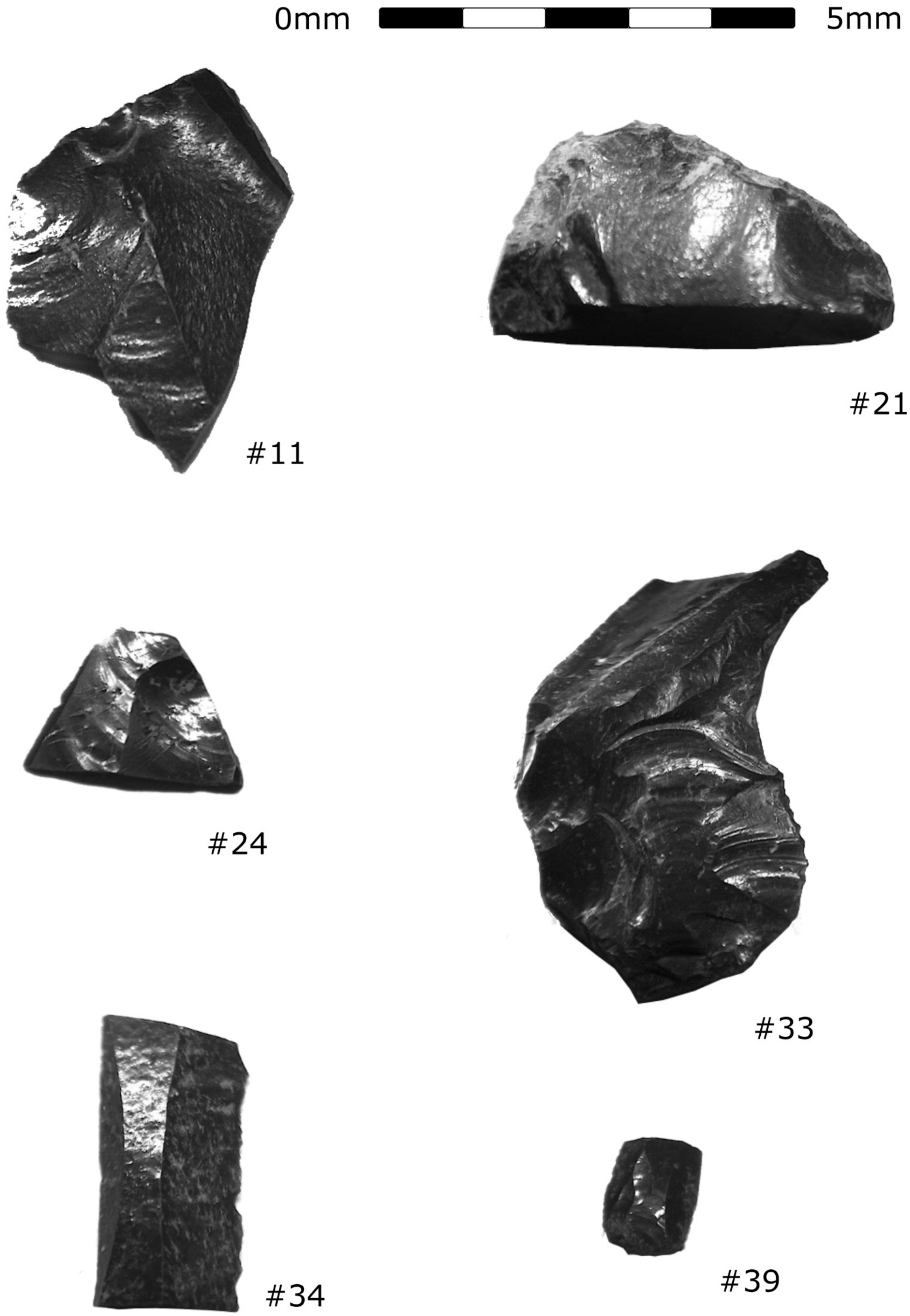

Fig. 18 Pitchstone artefacts.

OTHER STONE ARTEFACTS

by Roger Miket

1. Polished Stone Axehead. Great Langdale, Group VI (fig. 16.1) (SF134) From Context (305), [F304]. Length 46mm., Max. width 41.5mm., max. thickness 25mm. Fragment of the distal or butt-end from a Langdale axehead of epidotised greenstone tuff. All faces show striation from polishing. Chipped in antiquity and abraded.

Group VI axes from Northumberland are well represented amongst museum collections. Invariably the result of serendipitous casual discovery, only two are recorded as from archaeological contexts; that from Bolam Lake, deposited in a wicker or reed-lined pit (Pit 5) associated with flints and Carinated Bowl pottery (Waddington and Davies 2002, 37, fig. 22) and the present example from Threefords. It is noteworthy that both are fragmentary. Recent reconsideration of this axe type and its associated dates have tightened the chronology for production, with the majority of axeheads being produced within the first half of the fourth millennium BC, and diminishing thereafter to around 3330 cal BC (Bradley and Watson 2021; Griffiths 2021; Edinborough *et al.* 2019).

2. Polished Stone Axehead. (fig. 16.2) Length 235mm. Stone type unidentified. Reported as having been, 'picked up some years ago on the east side of the A697 as it approaches Milfield from the south' (Jobey 1972: 292, fig. 1.2). This would suggest it had been found in the same field as, and within or in close proximity to, the Threefords enclosure. Alternatively, it may have been found some distance further south of the village, possibly during the planting of the light woodland that today borders the eastern approach of the A697 in its long approach to Milfield.

3. Shale Spindle Whorl. (fig. 16.3) (SF39) Context 120 from F151 – Fill of boundary ditch. Fragmentary.

4. Stone Spindle Whorl. (fig. 16.4) (SF40). Context 3. Ploughsoil. Ridge material. Approximately one-quarter of a stone spindle whorl; estimated diam. 40mm, with a central hole estimated diam. 10mm. Fragment with flat base and rounded upper edge; decorated.

RADIOCARBON DATING

by Seren Griffiths

Fourteen radiocarbon measurements were produced on samples of charred plant remains and charcoal from Threefords (Table 12). They are conventional radiocarbon measurements (Stuiver and Polach 1977), and were produced using methods outlined in Brock *et al*. (2010), graphitised (Dee and Bronk Ramsey 2000) and dated by AMS (Bronk Ramsey *et al.* 2004) at Oxford Radiocarbon Accelerator Unit (OxA-). Samples measured at Scottish Universities Environmental Research Centre (SUERC-), East Kilbride were pretreated, processed and measured as outlined in Dunbar *et al*. (2016).

Four measurements were produced on ecofacts from structural postholes (OxA-30719, OxA-30720, OxA-30722, OxA-30723). Five measurements were produced from internal features within the structure (SUEC-30161, OxA-30721, SUERC-30162, OxA-30718, OxA-30944). Five measurements were produced from ecofacts recovered from deposits that formed the midden (OxA-30727, OxA-30728, OxA-30724, OxA-30727, OxA-30728).

Table 12 Radiocarbon results from Threefords. Results on different materials from the same context are statistically not significantly different at the 5 percent significance level (Ward & Wilson 1978; T′5% = 3.8, ν = 1) unless stated in the 'context' column below.

Laboratory Number	Radiocarbon sample	Context	$\delta^{13}C$ (‰)	Radio-carbon age (BP)	Calibrated date range (95% confidence; BC unless otherwise stated)
OxA-30718	*Corylus avellana* charcoal	F24, C23, fill of internal posthole	-27.98	4977±37	3940–3640
OxA-30944	*Triticum* sp. seeds		-23.14	4980±35	3940–3650
OxA-30719	*Corylus avellana* nutshell	F26, C25, postpipe fill of structural posthole. Results statistically significantly different (T′=15.6).	-23.10	4853±36	3710–3530
OxA-30720	Maloideae charcoal		-25.99	5054±36	3960–3710
OxA-30722	*Triticum dicoccum* seeds	F239, C240, fill of structural posthole	-26.11	4949±35	3800–3640
OxA-30723	*Corylus avellana* nutshell		-25.27	4934±34	3790–3640
SUERC-30161	*Corylus Avellana* charcoal	F72, C55, upper fill of post-marked pit outside the structure	-24.5	4950±40	3900–3640
OxA-30721	*Triticum monococcum* seeds		-25.23	4910±38	3780–3630
SUERC-30162	*Corylus Avellana* charcoal	F22, C21, fill of internal posthole	-24.3	5055±40	3970–3710
OxA-30724	*Triticum dicoccum* seeds	C296, old ground surface below midden	-25.55	4947±35	3800–3640
OxA-30727	*Hordeum* sp. seeds	C295, lower deposit in midden, evidence for animal burrowing. Results statistically significantly different (T′=20.0).	-24.09	1303±28	Cal AD 650–780
OxA-30728	*Betula* sp. charcoal		-27.69	1480±28	Cal AD 550–650
OxA-30725	*Ulmus* sp. charcoal	C279, topmost deposit in midden	-24.57	5052±35	3960–3710

The Bayesian analysis presented below has been produced using the program OxCal v4.3 (Bronk Ramsey, 2009a; Bronk Ramsey 2017; Bronk Ramsey and Lee, 2013), the calibration data of IntCal20 (Reimer *et al*. 2020), and the probability method (Stuiver and Reimer, 1993). The date ranges quoted below in italics are the Highest Posterior Density intervals derived from these Bayesian models. They are quoted at 95% probability, unless otherwise stated.

The modelling approaches presented here (fig. 7) are defined in the figures by the CQL2 commands and the brackets; the code is presented in the publication monograph (Edwards *et al.* in press). In the text, the highest posterior density intervals that are produced from these modelling approaches are presented in *italics* to differentiate these ranges from calibrated radiocarbon ages.

Two results (OxA-30727 and OxA-30728) are much younger than the rest of the results from the site, providing evidence for activity in the range cal AD 650–780 (OxA-30727; 95% confidence) and cal AD 550–650 (OxA-30728; 95% confidence). The results are not statistically consistent at the 5% significance level (T'5%=3.8; T'=20.0; df=1; Ward and Wilson 1978). These results were produced on charred plant remains from layer C295, the lower deposit in midden, and parts of this deposit showed the effects of animal burrowing, which may indicate how this material became incorporated into the midden. These results have not been included in the model presented below. These results may reflect activity associated with the Anglo-Saxon occupation at Milfield. The result on the barley seed (OxA-30727) may represent cereal exploitation associated with occupation at the Anglo-Saxon palace site that was relocated from

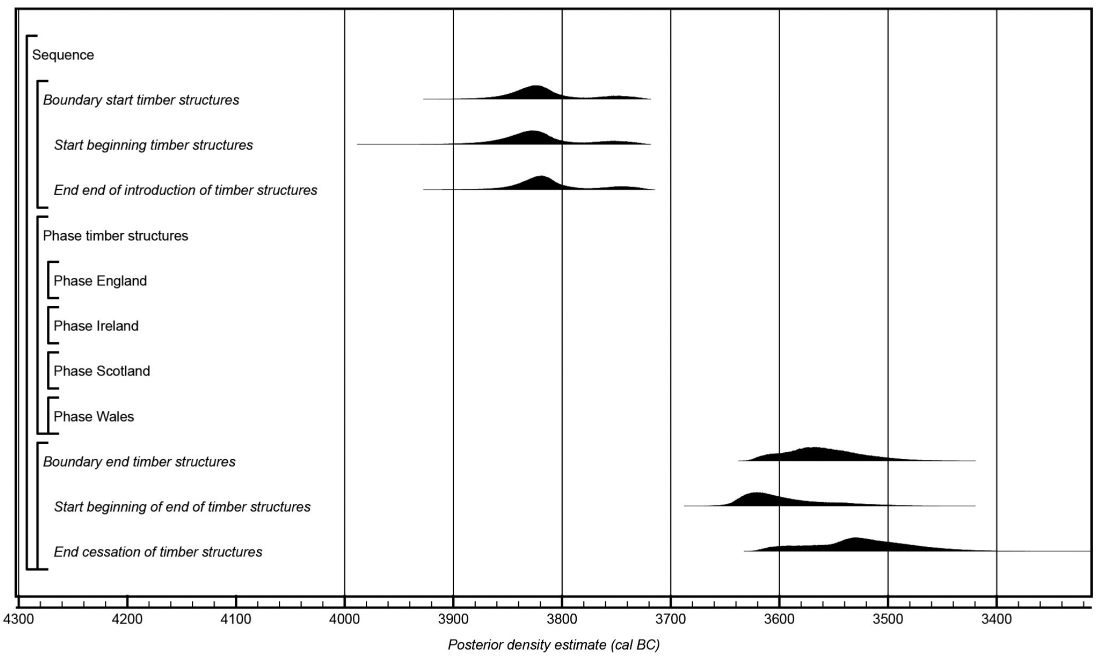

Fig. 19 Overall structure of the chronological currency model for early Neolithic timber structures calculated using trapezium boundary parameters (Lee and Bronk Ramey 2012). The structure of the model is defined by the brackets and the OxCal CQL keywords. The full structure of the model, including the OxCal code is presented in Edwards *et al.* (in press).

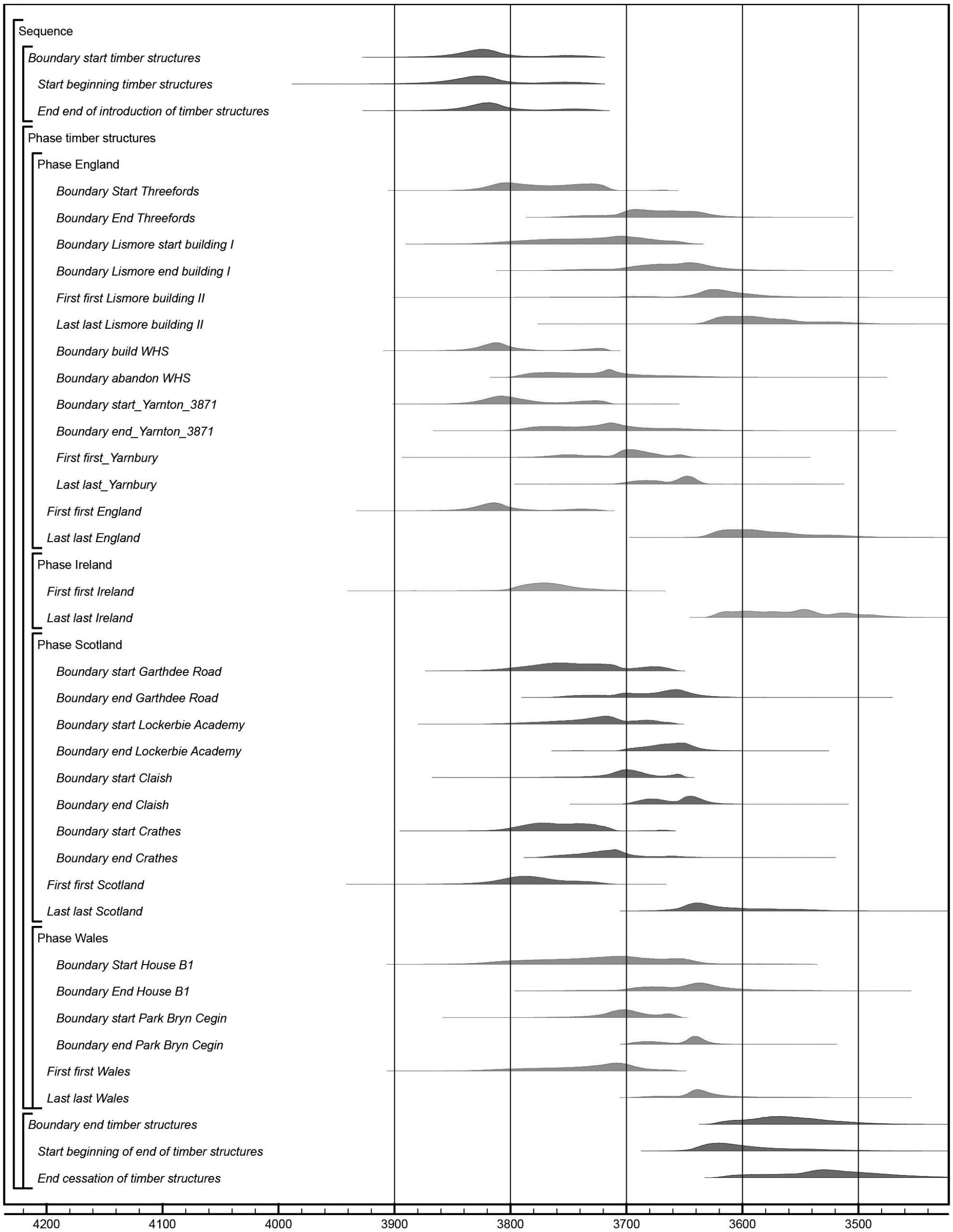

Fig. 20 Key parameters from the model introduced in Figure 17 for early Neolithic timber structures (Edwards *et al.* in press). Estimates for selected timber structures are shown. In red are parameters from sites from England. In green are parameters associated with timber structures from Ireland. In blue are estimates from selected sites in Scotland, and in magenta are selected sites from Wales. The dark grey distributions are estimates for the overall currency of early Neolithic timber structures. Full details of the model are given in Edwards *et al*. (in press).

Yeavering to Milfield in the second half of the 7th century AD (Colgrave and Mynors 1969, 189). These two later results (OxA-30727 and OxA-30728) have not been included in the model for Neolithic occupation at Threefords that is presented below.

The three other results (OxA-30724, OxA-30727, and OxA-30728) produced on charred plant remains from the midden returned earlier third millennium cal BC age estimates. However, these results may also show some evidence for complex taphonomies; the result on the old ground surface beneath the midden (OxA-30724; 3800–3640 cal BC; 95% confidence) is slightly younger than one of the results (OxA-30725; 3960–3710 cal BC; 95% confidence) from the top level of the midden.

Mixing of the midden deposits could have occurred in the fourth millennium as material was incorporated and deposited; all of the material culture from the midden was of early Neolithic types, including Carinated Bowl pottery, Group VI stone axehead, and early domesticated cereals. So, the earlier fourth millennium results from the midden appear to provide estimates for characteristic Neolithic activity. These results (OxA-30724, OxA-30727, and OxA-30728) therefore have been included as active likelihoods in the model presented here, but they are presented as representing an archaeological phase of activity, rather than using the stratigraphic sequence to relate the measurements.

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