Archaeological Excavations at Lanton Quarry, Northumberland

Phase 8, 2016

Four later Neolithic human cremation burial pits, each having held a timber post, arranged in a square, looking towards Yeavering Bell.

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EXECUTIVE SUMMARY

Project Name: Archaeological Excavations at Lanton Quarry, Northumberland
Site Code: LAN16
Planning Authority: Northumberland County Council
Drift Geology: Devensian glacio-fluvial sands and gravels
NGR: NT 95399 31135
Dates of fieldwork: July-August 2016
Dates of report: November 2016

An eighth phase of archaeological excavations following a strip, map and sample methodology was conducted by Archaeological Research Services Ltd at Lanton Quarry near Milfield, Northumberland on behalf of Tarmac. The fieldwork took place over a four week period in July 2016 on an area measuring approximately 1.75 hectares. The investigation took the form of a strip, map and sample in which the topsoil was mechanically removed under archaeological supervision before a sampling strategy was adopted and excavations were undertaken on the features exposed.

The archaeological remains excavated as part of the Phase 8 works included:

- *Two Early Neolithic pits, one of which contained Early Neolithic Carinated Bowl*
- *Four, large later Neolithic human cremation pits, arranged in a diamond configuration, with each pit also having contained an upright timber. Each pit contained at least two human cremations*
- *One isolated Late Neolithic human cremation pit*
- *One isolated probable Neolithic cremation pit*
- *One isolated spread of probable Neolithic human cremation material*
- *Three pits that produced Late Neolithic pottery, including Grooved Ware, and lithics*
- *Two pits that produced probable Neolithic pottery sherds*
- *One possible Neolithic post-built structure consisting of three postholes in an arc*
- *Two post-medieval field boundary ditches*
- *Two modern sheep burials*
- *15 undated pits*
- *15 undated postholes and stakeholes*

The earliest dated remains excavated during Phase 8 at Lanton Quarry were pit F3962 and pit F3964, one of which produced sherds of Early Neolithic Carinated Bowl and an emmer wheat grain that was radiocarbon dated to the Early Neolithic.

The arc of three postholes/post sockets, while undated, possibly represents the truncated remains of an Early Neolithic post-built structure. While the three surviving features alone may not initially appear to be a convincing example of a structure, it must be taken into consideration that additional postholes and sockets probably once existed but have since been truncated beyond recognition. A spread of radiocarbon dates have so far been obtained from other examples of similar post-built structures at Lanton Quarry that place them in the Early Neolithic period, however further dates are needed

from the Phase 8 and other examples that have been found on the site to see if they continued in use throughout the Neolithic, or whether they date to other periods.

A minimum of 16 individuals were represented by the human cremations found on the site during Phase 8. A square or diamond pattern of four later Neolithic human cremation pits, each of which would have contained an upright timber post, are unique to the site and there are no comparable features yet discovered and/or recorded from elsewhere in North East England. A further two, isolated cremation pits were found nearby, one of which would have contained an upright timber and the other of which was radiocarbon dated to the Late Neolithic period. In addition there were also the highly truncated remains of another cremation observed only as a spread of burnt bone on the surface of the exposed gravel. These remains include individuals of all ages ranging from neonates, infants and adolescents to adults. There is the possibility that two of the cremation deposits found within the later Neolithic cremation pit cluster, and that each contained at least two individuals, represent mothers and their babies who died during childbirth. Alternatively they could represent a heavily pregnant woman who died before she could give birth. However, no certain cause of death could be ascertained for any of the individuals and the cremations seem to represent a cross-section of society across all generations. It is probable that more cremations will be discovered during the next phase of excavations, immediately to the south of Phase 8.

Radiocarbon dating of both a primary and a secondary cremation from Cremation Pit 3, within the later Neolithic cluster, demonstrated that only a short amount of time had elapsed between the insertions of the two cremations. In the future, therefore, it will be important to obtain further radiocarbon dates from the cremations in order to ascertain whether they are all roughly contemporary or whether the site was being revisited over a number of years by groups of people using the same rituals to bury their dead.

The assemblage of ceramics and accompanying lithics found during Phase 8 complement the nationally important assemblage that has been collected in previous years and which provides a continuous ceramic sequence through the entire Neolithic. Although not all found during the Phase 8 work at the quarry, previous excavations have yielded sherds of Carinated Bowl, Impressed Ware, Grooved Ware and Beaker and together with the evidence for settlement, farming practices and food consumption and now burial, it is for these reasons that Lanton Quarry remains the best site to answer some of the many unresolved questions surrounding the Neolithic period in North East England.

Palaeoenvironmental analysis of a number of samples from the Phase 8 excavations revealed limited evidence for cereal agriculture with only a single grain of emmer wheat being identified, although importantly this has been radiocarbon dated to the beginning of the Neolithic. In comparison, some of the assemblages of botanical remains recovered from the previous phases of excavation produced greater quantities of cereal grain and chaff with emmer wheat and barley present, together with occasional wild oat and species of fruit and many hazelnut fragments. However, such evidence is always rare for the Neolithic and although the quantities of such material are generally small, their presence is crucial in helping to understand the beginning of farming in Britain and changes in food production over time. The lack of later Neolithic farming and food residues in this part of the site appears to coincide with the discovery of the Neolithic

cremations suggesting that this particular area of the site had been reserved for burial of the dead and was therefore not an area where much in the way of agricultural practices or food production took place.

1. INTRODUCTION

1.1 This report describes Phase 8 of an archaeological strip, map and sample investigation undertaken at Lanton Quarry, Northumberland in July 2016 by Archaeological Research Services Ltd on behalf of Tarmac. Phase 8 of the site was stripped of topsoil revealing heavily truncated archaeological deposits cut into the sand and gravel substratum below. Excavation and sampling of the *c*.1.75 hectare area took place following on immediately from the soil strip.

1.2 Archaeological investigations have been taking place at Lanton Quarry since a programme of fieldwalking in 2003 when finds included a cache of 10 Neolithic large blade and flake tools. A test pit was dug in the location of the cache and a further 48 large flint tools were discovered and part of a Neolithic pit feature below. Excavations began in 2006, when the quarry operation was established, and continued in 2008 prior to the quarry becoming live. Since the quarry opened and began operating a further six phases of strip, map and sample have been carried out as the quarry has been worked. Previous archaeological discoveries include highly significant evidence for multi-period Neolithic settlement remains which have yielded the single largest assemblage of Neolithic pottery yet found in northern England; Bronze Age farming settlements and associated 'granary' structures; a late Iron Age burial ground and what appears to be an associated shrine; and a pioneer phase Anglo-Saxon settlement which has produced important remains from its associated workshops for craft production and includes an important assemblage of pottery as well as loom weights, metal objects, querns, polychrome glass beads and an abundance of cereal remains. The Anglo-Saxon settlement lay immediately over a pre-existing native British roundhouse. More of this settlement survives under the southern bund of the quarry and is yet to be excavated.

1.3 Phase 8 is located in the northeast area of the quarry and was bounded by woodland to the east, ploughed fields to the south, the current haul road to the west and an area of previously extracted quarry to the north.

2. LOCATION, LAND USE AND GEOLOGY

2.1 Lanton Quarry lies in the Milfield Basin to the northeast of the Cheviot massif, approximately 3km north of Wooler (Figure 1). The Milfield plain is an area of low-lying ground butting hard up against areas of upland and which contains a complex sedimentary sequence, with glaciodeltaic and glaciofluvial sand and gravel deposits fanning out from the valley of the River Glen to form a series of terraces (Passmore *et al*. 2002; Passmore and Waddington 2012). Inset below the gravel terraces is an in-filled glacial lake, Lake 'Ewart' or 'Milfield', which forms an extensive alluvial floodplain. Eight hundred metres to the northeast of the site lies the present channel of the River Till, and beyond that the land rises to the Fell Sandstone escarpment that borders the basin on its eastern side. Three kilometres to the south, the igneous rocks of the Cheviot Hills rise abruptly from the plain above the River Glen, where the summits of Humbleton Hill, Harehope Hill and the double peak of Yeavering Bell form prominent landmarks. To the west, the northern foothills of the Cheviots run parallel to the Fell Sandstone ridge, leaving only a 2 km wide corridor at the northern end of the plain through which the

River Till meanders. The archaeology of Lanton Quarry is situated on a terrace of glaciofluvial sand and gravel deposits, situated for the most part at *c*.45 m aOD. The soils covering this part of the glaciofluvial terrace have been characterised as being of argillic brown earth origin (Payton 1992).

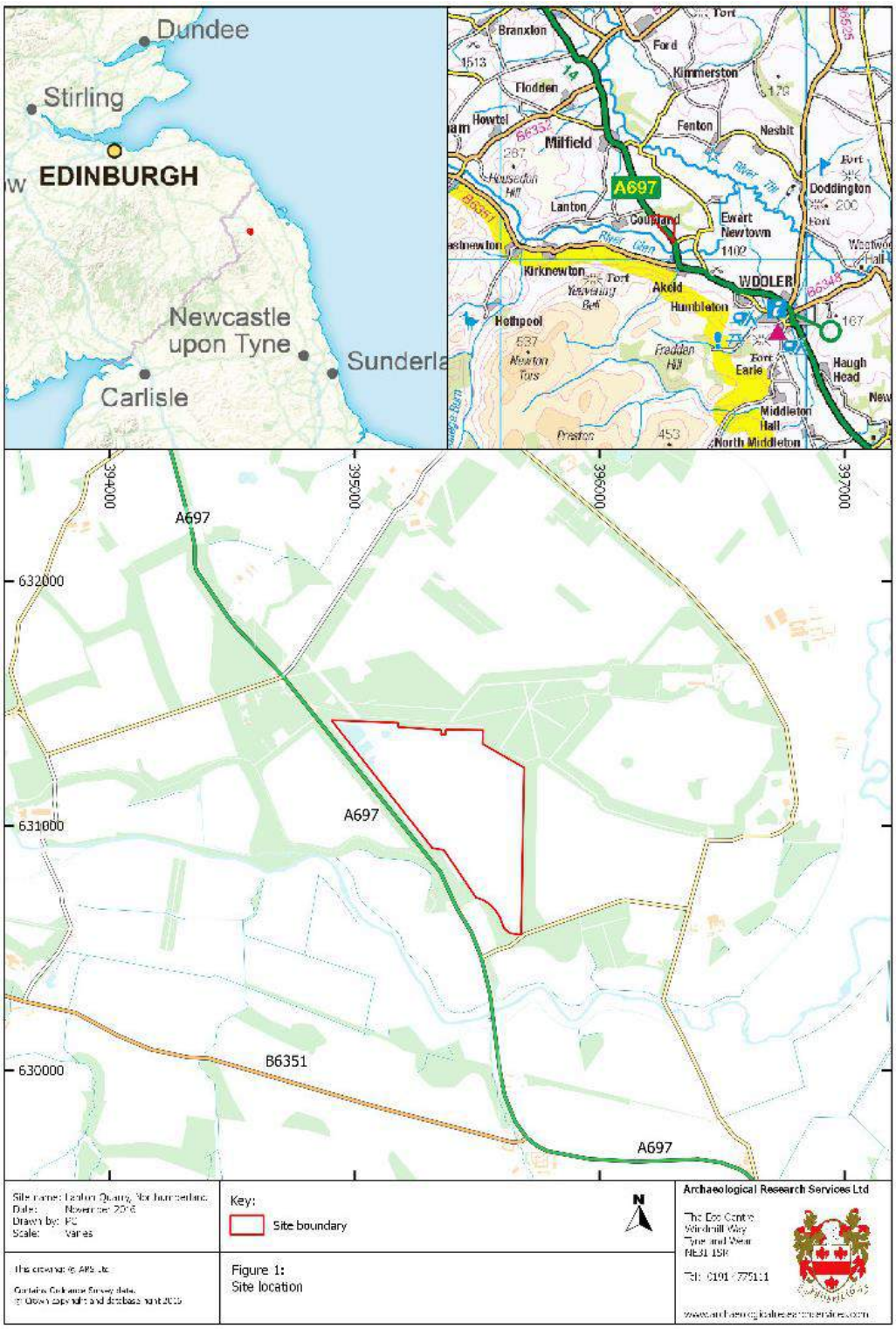

Figure 1: Site location. (Ordnance Survey data copyright OS, reproduced by permission, Licence no. 100045420).

3. METHOD STATEMENT

3.1 The methodology for the strip, map and sample excavations followed the Written Scheme of Investigation contained within the 'Cultural Heritage' chapter for the Environmental Statement that formed part of the planning application for the site (Waddington 2009).

4. RESULTS

4.1 The following section is presented in chronological order with features described in the text and supported by individual context descriptions in the corresponding tables. All accompanying photographs and line drawings are presented in the appendices. It should be noted that the visibility of the archaeological features was often poor due to the high level of truncation across the site, caused by centuries of agricultural activity, and the nature of the sand and gravel geology. In addition, the practice of backfilling some features with the material that came out of them made identification of such subtle differentiation challenging, as has always been the case during excavations across this sand and gravel substrate.

4.2 A total of 51 features were excavated and recorded during Phase 8. These included:

- Two Early Neolithic pits, one of which contained Early Neolithic Carinated Bowl pottery
- Four, large later Neolithic human cremation pits, arranged in a diamond configuration, with each pit also having contained an upright timber post. Each pit contained at least two cremation deposits and some of these contained a minimum of two individuals
- One isolated Late Neolithic human cremation pit
- Three pits that produced Late Neolithic pottery and flint tools including Grooved Ware
- Two pits that produced plain, probable Neolithic, pottery sherds
- One isolated probable Neolithic cremation pit
- One isolated spread of probable Neolithic human cremation material
- One possible Early Neolithic post-built structure consisting of three postholes in an arc
- Two post-medieval field boundary ditches
- Two modern sheep burials
- 15 undated pits
- 15 undated postholes and stakeholes

4.3 Early Neolithic

4.3.1 Pit F3962 and pit F3964 were located adjacent to each other at the northeast extent of the stripped area and were both wide but very shallow (Figure 23). Pit F3964 produced sherds of Carinated Bowl as well as a retouched flint blade (Figure 34) while pit F3962 produced sherds from a prehistoric vessel. A charred emmer wheat grain obtained from the fill of pit F3964 was radiocarbon dated to 3943-3702 cal BC (95.4% probability) (SUERC-69257 (GU41845)). This places the pit and the direct evidence for cereal agriculture as represented by the wheat grain, together with the pottery sherds

within the pit, in the very Early Neolithic period. It is probable that pit F3962 was also Early Neolithic in date based on its proximity to pit F3964 and its similar form.

Feature	Contexts	Description	Average dimensions (m)	Colour of fill	Composition	Finds	C14 date (95.4% probability) cal BC
F3962	3962, 3963	Large, shallow pit	0.95 x 1.23 x 0.08	Pale orange/brown	Sandy silt	Neolithic pottery sherds	
F3964	3964, 3965	Large, shallow pit	2.35 x 1.5 x 0.12	Pale brown/orange	Sandy silt	Carinated bowl sherds, flint blade	3943-3702

Table 1. Early Neolithic pit features.

4.4 Later Neolithic

4.4.1 Four later Neolithic burial post pits with associated human cremations were excavated (Figure 3). These features were arranged in a diamond configuration and are therefore clearly associated. The large pits were located towards the southwest end of the stripped area and ranged in size between 0.95-1.54m wide and 0.29-0.61m deep (Figure 21). It was evident before excavation of the features took place that they all contained at least one cremation burial from the spread of cremated bone that was scattered across the surface of each pit. Each pit had also contained an upright timber so as to form an intentional timber setting marking the position of these graves.

Cremation Pit 1

4.4.2 Cremation Pit 1 was the easternmost of the four pits and it contained a total of four cremations (Figure 5). Half-sectioning of the pit revealed the sequence in which the various fills and deposits had been created. The large pit had been dug with a steep sided cut [4049] while the excavated topsoil and sand and gravel had been piled to one side ready for subsequent backfilling. A deposit of charred material (4046) located at the base of the pit may represent a deposition of pyre material. A large, tapered, possibly charred post had then been inserted into the pit and presumably held in place while the redeposited topsoil, (4047 and 4048), was backfilled around it, followed by the redeposited natural sand and gravel, (4044 and 4045).

4.4.3 Cremation 8 (4054) formed the primary burial having been deposited within the pit amongst the redeposited gravel (4045) before more material was backfilled on top of it. Backfilling had continued presumably until the pit had been completely filled around the post. Osteological analysis of Cremation 8 determined that the remains belonged to an infant (newborn to one year old) (see Section 7 Osteological Analysis of Human Bone).

4.4.4 At a later date a shallow, oval re-cut [4031] had been created in the top of redeposited natural sand and gravel fill (4044) and Cremation 2 (4030) had been inserted on the northeast side of where the post would have been. A small amount of

redeposited natural sand and gravel, (4029), containing small fragments of bone was then backfilled on top of the exposed cremation. Analysis of Cremation 2 determined that the remains belonged to an adult of 17+ years of age (see Section 7 Osteological Analysis of Human Bone).

4.4.5 Cremation material (4050), which was found to contain comingled Cremation 6 and Cremation 7, was also a secondary interment and had been inserted into backfill deposit (4044) within a shallow, irregular cut [4051] to the northwest of where the post would have stood. Over time, as the post decayed, the void it left had become filled with silts and created post pipe deposit (4025). It is not known how much time had elapsed between the erection of the post and the insertion of Cremation 2 and Cremations 6 and 7 but it appears that the post had originally been dug to mark Cremation 8 and then the other cremations inserted into the pit after the timber had been erected. Cremation Pit 1 was 1.2m wide and the post would have been a minimum of 0.51m wide at its widest point. Analysis of cremation material (4050), which contained the comingled remains of Cremation 6 and Cremation 7, has found that Cremation 7 was a possible adult of 17+ years whilst Cremation 6 was a neonate or infant (newborn to one year old) (see Section 7 Osteological Analysis of Human Bone). It is possible that the assemblage from Cremation 6 and Cremation 7 represents a mother and child who both died during childbirth or a heavily pregnant woman who died before she was able to give birth.

Cremation Pit 2

4.4.6 Cremation Pit 2 was located south-southwest of the centre of the pit cluster and was the largest and deepest of the four pits (Figure 6). While the other three Cremation Pits 1, 3 and 4, were spaced evenly apart, Cremation Pit 2 was located slightly further away. Cremation Pit 2 had a similar form and deposition sequence as Cremation Pit 1 whereby the pit cut [4094] had been created before the post was inserted and backfilled around it using redeposited natural sand and gravel (4093). It is probable that the post had been charred before insertion into the pit and created charred deposit (4092) which sat at the base of the pit. This may have been to help preserve the timber and slow down the rotting of the post.

4.4.7 Cremation 9 (4056) had been deposited within the pit on its northern side during this backfilling process amongst deposit (4093). Also deposited during the backfilling process was cremation deposit (4061), which was found to contain comingled Cremations 10, 11 and 12. The deposit had been inserted against the wooden post on the north western side before backfilling was completed. Cremations 10, 11 and 12 (4061) had been deposited along with a flint knife, which had been heat affected and had broken into three pieces, as well as a flint blade, three flakes and two chips. This indicates that the flints were most probably placed on the pyre with the individuals before they were cremated and can be interpreted as grave goods (Figure 34). These are the only cremations excavated during Phase 8 that contained grave goods.

4.4.8 It does not appear that this pit had any cremations inserted at a later date. As the post decayed, the void it left was filled with silts, creating deposits (4091) and (4026). Cremation Pit 2 was 1.8m wide and the post would have been a minimum of

0.65m wide at its widest point. Analysis of the bone assemblage from Cremation 9 determined that it was the remains of a possible adult of 17+ years old. Cremation 10 contained the remains of a possible adolescent or adult of between 13 and 17+ years of age while Cremation 11 and Cremation 12 were both identified as neonate-adolescents of a maximum of 17 years old (see Section 7 Osteological Analysis of Human Bone).

Cremation Pit 3

4.4.9 Cremation Pit 3 was located to the west-northwest of the centre of the pit cluster and was the smallest of the four pits (Figure 7). This pit had been dug with a wide, steep sided cut [4034] and the excavated material had presumably been piled to one side before some topsoil material had been redeposited back into the pit (4037). This pit differed to the other three within the cluster as it had Cremation 5 (4036) deposited within the pit before the post had been inserted. While the post had presumably been held in place the excavated sand and gravel (4043) had been redeposited around it. Analysis of Cremation 5 showed it to be the remains of a possible adult of 17+ years old (see Section 7 Osteological Analysis of Human Bone).

4.4.10 At a later date a circular cut [4033] had been created in the top of the redeposited sand and gravel, on the northwest side of where the post would have stood, and Cremation 1 (4032) had been inserted. Over time when the post rotted, the void where it had been became filled naturally with silts, creating deposit (4027). Cremation Pit 3 was 0.95m wide and the post would have been a minimum of 0.35m diameter at its widest point. Post-excavation analysis of Cremation 1 was unable to determine what age the person had been when they had died.

4.4.11 Both Cremation 1 and Cremation 5 from Cremation Pit 3 were radiocarbon dated in order to ascertain not only what period they belonged to but also roughly how much time had elapsed between the deposition of the primary cremation and the deposition of the secondary cremation. Cremation 1 produced a radiocarbon date of 3085-2897 cal BC (95.4% probability) and probably 3011-2910 cal BC (68.2% probability) (SUERC-69263 (GU41848)). Cremation 5 was radiocarbon dated 3080-2891 cal BC (95.4% probability) and probably 3011-2901 cal BC (68.2% probability) (SUERC-69264 (GU41849)). These dates are statistically identical implying that only a short time elapsed between the burial of each, although their relative stratigraphic positions show Cremation 5 to have been the earlier of the two.

Cremation Pit 4

4.4.12 The fourth cremation pit in the cluster was Cremation Pit 4 which was located north-northeast of the centre of the cluster (Figure 8). A large, wide pit cut [4040] had been created and a large, tapered, charred post had been inserted before backfilled with redeposited topsoil (4038) and sand and gravel (4039).

4.4.13 During this backfilling process Cremation 13 (4075) was inserted amongst the redeposited sand and gravel (4039) on the southwest side of where the post would have stood. Analysis of Cremation 13 showed it to be the remains of a juvenile of 1-12 years old (see Section 7 Osteological Analysis of Human Bone).

4.4.14 A further cremation deposit (4041), which was found to contain comingled

Cremations 3 and 4, had been inserted into the top of the pit at a later date in a cut [4042] up against the southeast side of where the post would have stood. As the post decayed the void would became filled naturally with silts and created deposit (4028). Cremation Pit 4 was 1.3m wide and the post would have been up to 0.59m in diameter at its widest point. Analysis of Cremations 3 and 4 showed them to be the remains of a possible adult of 17+ years old and a neonate-adolescent of newborn to 17 years old respectively. While these are broad age ranges, it is possible that Cremations 3 and 4 represent a mother and child who both died in childbirth, or even a heavily pregnant woman who died before giving birth.

4.4.15 Also discovered and dated to the Late Neolithic period was a human cremation, Cremation 15 (4112), found within pit F4110 which was located on the northwest edge of the stripped area (Figure 11 and Figure 22). This feature measured 0.5 x 0.5m wide and had a maximum depth of 0.2m. Fragments of cremated bone appeared throughout the fill of the pit (4110) however the majority of Cremation 15 (4112) was located at the base, compacted amongst a very dark, organic deposit. There was no evidence that this pit ever held a post. Post-excavation analysis of Cremation 15 determined that it contained the remains of a possible adult of 17+ years old. Radiocarbon dating of a sample of bone from Cremation 11 produced a date of 2620-2467 cal BC (95.4% probability), and probably 2571-2485 cal BC (68.2% probability) (SUERC-69265 (GU41850)), which places it in the Late Neolithic period.

4.4.16 A further probable Neolithic cremation was discovered on the site during Phase 8 of the excavations. It consisted of a spread of topsoil containing cremated human bone, Cremation 14 (4083). The spread was located at the southwest corner of the stripped area and is believed to be the truncated remains of what was probably originally a cremation pit. The spread measured 0.83 x 0.36m. Analysis of Cremation 14 determined that it contained the remains of a neonate to adolescent individual of newborn to 17 years old. No radiocarbon date was obtained for this cremation although it can be assumed to be Neolithic due to its proximity to the remaining Neolithic cremations.

4.4.17 One additional cremation, Cremation 16, was found within a pit feature that would have once held a post. This feature, pit F4120, was not associated with the later Neolithic pit cluster, discussed above, and was located further to the northeast close to pits F4133 and F4140 (Figure 10). Cremation pit F4120 was a pit measuring 0.8 x 0.6m wide with a depth of 0.46m. The deposition sequence of this pit was very similar to that of the pits within the pit cluster in that once the cut [4128] had been created, a tapered post had been inserted into the post and backfilled around with redeposited topsoil (4127) and redeposited sand and gravel (4126). A single cremation burial, Cremation 16 (4125), had been inserted into the pit although it was not clear whether it had been added during the backfilling process or at a later date. There was no evidence that the post had been charred before it had been inserted into the pit. While the post decayed, the void it left had become filled naturally with silts creating deposit (4120). Post-excavation analysis of Cremation 16 provides an age estimation of newborn to 17 years old for this individual. Although a radiocarbon date was not obtained for this cremation, it is assumed that it dates to the Neolithic period due to its form and proximity to the

dated cremations. This feature would benefit from radiocarbon dating to understand if it is directly related to the diamond-shaped cluster of cremation pits and whether the upright posts formed some sort of alignment or were burial marker posts or, indeed, both.

Feature	Contexts	Description	Average dimensions (m)	Colour of fill	Composition	Finds	C14 date (95.4% probability) cal BC
Cremation Pit 1	4025, 4029, 4030, 4031, 4035, 4044, 4045, 4046, 4047, 4048, 4049, 4050, 4051	Large burial pit with post pipe containing human cremations	1.2 x 1.29 x 0.4	Dark brown/grey	Sandy silt		
Cremation Pit 2	4026, 4055, 4056, 4061, 4062, 4092, 4093, 4094	Large burial pit with post pipe containing human cremations	1.8 x 1.7 x 0.48	Dark brown/grey	Sandy silt	Flint	
Cremation Pit 3	4027, 4032, 4033, 4034, 4036, 4037, 4043	Large burial pit with post pipe containing human cremations	0.95 x 1.02 x 0.36	Dark brown/grey	Sandy silt		3080-2891 3085-2897
Cremation Pit 4	4028, 4038, 4039, 4040, 4041, 4042, 4075	Large burial pit with post pipe containing human cremations	1.3 x 1.24 x 0.4	Dark brown/grey	Sandy silt		
F4083	4083	Spread of topsoil containing Cremation 14	0.37 x 0.25 x 0.02	Dark orange brown	Sandy silt		
F4110	4110, 4111, 4112	Small pit containing human Cremation 15	0.5 x 0.5 x 0.2	Dark brown/black	Sandy silt		2620-2467
F4120	4120, 4125, 4126, 4127, 4128	Burial pit with post pipe containing Cremation 16	0.8 x 0.6 x 0.46	Dark brown	Sandy silt		

Table 2. Neolithic cremation pits.

4.4.18 Three features produced pottery dating to the Late Neolithic period (Figure 3). An additional human cremation pit dated to the Late Neolithic was also encountered. The dimensions and compositions of these features are included in the table below

(Table 3).

4.4.19 Pit F3977 was a truncated midden pit located within a cluster along with pit F3979, pit F3974, pit F3981 and pit F3983. Pit F3977 measured 0.75 x 0.95m wide and had a maximum depth of 0.13m. Deposit (4010) was the primary, basal fill of the pit and was a very dark sandy silt containing frequent charred hazelnut shells. This deposit produced sherds of Grooved Ware from two different vessels (Figure 31 and Figure 32) and the upper fill of the pit, (3977), produced a small broken flint chip (Figure 36). It is most probable that deposit (4010) had been created by the secondary deposition of hearth material taken from another feature as there was no evidence of in-situ burning. A charred hazelnut shell recovered from context (4010) produced a radiocarbon date of 2865-2501 cal BC (95.4% probability), and probably 2848-2579 cal BC (68.2% probability) (SUERC-69259 (GU41847)). This places the pit and the pottery found within it in the Late Neolithic period.

4.4.20 Pit F3979 was located to the south-southwest of pit F3977 and consisted of a wide, shallow pit with a rounded base (Figure 12). The primary fill of the feature (3985) was a very dark brown sandy silt which contained frequent hazelnut shells and produced a base sherd from a Grooved Ware vessel (Figure 30). The secondary fill (3979) was redeposited sand and gravel which was presumably removed when the pit was created and then backfilled over secondary hearth deposit (3985). A charred hazelnut shell from context (3985) was radiocarbon dated to 2836-2474 cal BC (95.4% probability), and probably 2622-2491 cal BC (68.2% probability) (SUERC-69258 (GU41846)), which places the feature and the pottery found within it in the Late Neolithic period.

4.4.21 Pit F3987 was located immediately adjacent to pit F3989. Primary fill of pit F3987, (4002), produced a single body sherd from a well-fired Late Neolithic Grooved Ware vessel with raised cordon decoration. Lying above fill (4002) and thereby sealing the pit was a mid grey-brown sandy silt deposit. Fill (4002) was a dark grey/black colour and has been interpreted as a hearth clearance deposit.

Feature	Contexts	Description	Average dimensions (m)	Colour of fill	Composition	Finds	C14 date (95.4% probability) cal BC
F3977	3976, 3977, 3978, 4010	Pit with truncation by animal burrow	0.75 x 0.95 x 0.13	Pale brown	Sandy silt	Sherds of Grooved Ware, flint flake	2865-2501
F3979	3979, 3980, 3985	Wide pit	0.9 x 0.75 x 0.22	Pale brown/orange	Sand	Pot base from Grooved Ware vessel	2836-2474
F3987	3986, 3987, 4002	Waste pit	0.95 x 0.9 x 0.4	Mid grey/brown	Sandy silt	Sherds of Neolithic Grooved Ware	

Table 3. Late Neolithic features.

4.5 Probable Neolithic Remains

4.5.1 Pit F3966 produced a fragment of clay that has been identified as a piece of daub. Wet clay would have been 'daubed' across wattle panels in order to create weatherproof walls. The piece found within pit F3966 displays a cylindrical impression from where it had been pressed against a stick or wattle (Figure 37). Also within pit F3966 was a single small body sherd from a plain, prehistoric, most probably Neolithic, vessel. This feature is worth radiocarbon dating in order to test whether daub walls were being used in the Neolithic to construct their buildings.

4.5.2 Pit F4080 was located towards the southwest extent of the stripped area and contained three fills. The primary fill (4076) was a very dark silt hearth deposit which was overlain by redeposited material (4073). In the top of this feature was a sub-circular deposit of dark grey/brown sandy silt which may represent the location of where a marker such as a post or a stone once stood. Deposit (4073) produced a single, small sherd from a plain vessel which is most probably of Neolithic date.

Feature	Contexts	Description	Average dimensions (m)	Colour of fill	Composition	Finds	C14 date (95.4% probability) cal BC
F3966	3966, 3967	Truncated pit	0.85 x 0.7 x 0.04	Pale brown/orange	Sandy silt	A piece of daub with a wattle impression and a single small pottery sherd	
F4080	4080, 4073, 4074, 4076	Possible hearth clearance pit	0.94 x 0.96 x 0.32	Mid grey/brown	Silty sand	A single sherd of likely Neolithic pottery	

Table 4. Probable Neolithic features.

4.6 Post-medieval

4.6.1 Two Post-Medieval field boundary ditches were identified and excavated during Phase 8 (Figure 3, Figure 14 and Figure 15). One of these, ditch F3968, ran parallel to the modern fence line at the northeast edge of the stripped area and was also seen in the previous phase. The ditch had a 'V' shaped profile and its fill (3968) consisted of a black silty loam which contained frequent modern roots.

4.6.2 The second boundary ditch F4000 had also been recognised in previous phases and could be seen running from north to south across Phase 8 towards the southwest extent of the stripped area. The cut of the ditch had a concave profile with gradually sloping sides and was filled with dark brown sandy loam. The ditch was cut by a modern animal burial F4003, see below. An OS map dated to 1842-1952 shows this ditch running

down the site as part of a larger system of boundaries which separate the current field into a series of farmer's plots.

Feature	Contexts	Description	Average dimensions (m)	Colour of fill	Composition	Finds	C14 date (95.4% probability) cal BC
F3968 (same as F3808 from Phase 7)	3968, 3967	Modern boundary ditch running alongside modern site boundary fence	0.98 x 0.38	Black	Silty loam		
F4000 (same as F3217 from Phase 5 and F3430 from Phase 6)	4000, 4001	Field boundary ditch running from north to south	0.9 x 0.22	Dark brown	Sandy loam	Sheep burial cut into ditch fill	

Table 5. Post-medieval boundary ditches.

4.7 Modern

4.7.1 Three modern sheep burials were excavated during Phase 8 (Figure 16 and Figure 26). These were very similar to animal burials seen in previous phases and are discussed in Section 8 Osteological Analysis of Animal Bone.

Feature	Contexts	Description	Average dimensions (m)	Colour of fill	Composition	Finds	C14 date (95.4% probability) cal BC
F4003	4003, 4004	Modern sheep burial cut through boundary ditch F4000	0.39 x 0.52 x 0.58	Dark brown	Sandy loam	Sheep skeleton	
F4007	4007, 4008, 4009	Modern sheep burial	0.9 x 0.85 x 0.3	Dark grey/brown	Sandy silt	Sheep skeleton	
F4067	4057, 4058, 4067	Modern sheep burial	0.34 x 0.32 x 0.08	Grey/brown	Sandy silt	Sheep skeleton	

Table 6. Modern animal burials.

4.8 Undated features

Undated pits

4.8.1 A total of 15 undated pits were excavated across the stripped area during Phase 8 (Figure 3, Figure 27 and Figure 28). Pit F4011, pit F4081, pit F4086 and pit F4087 were all located quite close to each other not far from the cluster of cremation pits, discussed above. These pits were all around 1m in diameter and had all been truncated but could have probably originally been quite deep. None of the pits produced finds, but they did all contain more than one fill.

4.8.2 Pit F3989 was located immediately adjacent to pit F3987, which produced one body sherd from a Neolithic Grooved Ware vessel, although pit F3989 did not produce any finds. The pits were very similar in form in that they were of similar depth and were both relatively steeply sided with concave bases. It is thought that pit F3987 was a hearth clearance pit due to the deposition of charred material at the base and it is likely that pit F3989 is also a clearance pit, perhaps for midden material such as animal bone which has since decayed.

Feature	Context	Description	Average dimensions (m)	Colour of fill	Composition	Finds	C14 date (95.4% probability) cal BC
F3970	3970, 3971	Truncated pit	0.49 x 0.45 x 0.1	Pale brown	Sandy silt		
F3989	3988, 3989	Waste pit	1 x 1.1 x 0.2	Mid grey/brown	Sandy silt		
F3996	3996, 3997	Small pit	0.5 x 0.5 x 0.07	Mid brown	Sandy silt		
F4011	4011, 4012, 4013, 4014	Pit	1.04 x 1.16 x 0.3	Black	Sandy silt		
F4063	4063, 4064, 4065, 4066	Small pit	0.9 x 0.9 x 0.29	Brown	Sandy silt		
F4068	4068, 4069, 4070, 4071, 4072, 4090	Small pit	0.86 x 1.5 x 0.3	Dark grey/black	Silty sand		
F4081	4081, 4082, 4106	Small pit	0.8 x 0.72 x 0.19	Grey/brown	Silty sand		
F4086	4084, 4085, 4086	Pit	0.95 x 0.95 x 0.2	Black/grey	Silty sand		
F4087	4087, 4088, 4089	Shallow pit	1.12 x 0.28	Brown/grey	Silt		
F4095	4095, 4096, 4103	Pit	0.57 x 0.5 x 0.08	Black	Sandy silt		
F4097	4097, 4098, 4102	Hearth clearance pit	0.8 x 0.65 x 0.19	Pale brown/orange	Sandy silt		
F4099	4099, 4100, 4101	Pit	0.9 x 0.8 x 0.2	Very dark brown	Sandy silt		
F4119	4119, 4121, 4122, 4123, 4124	Large pit	2.01 x 0.48 x 1.52	Mid brown	Gravel and silts		
F4138	4138, 4139	Small pit	0.29 x 0.27 x 0.1	Dark brown	Sandy silt		
F4140	4140, 4141	Shallow pit	0.56 x 0.45 x 0.1	Mid brown	Sandy silt		

Table 7. Undated pits.

Undated postholes and stakeholes

4.8.3 A total of 15 undated postholes and stakeholes were identified and excavated during Phase 8 of the strip, map and sample (Figure 3 and Figure 29).

4.8.4 Posthole F4015 was located very close to field boundary ditch F4000 on the southern side. The remains of wooden post within the posthole and the homogenous fill indicate that this was a modern posthole probably associated with the boundary ditch.

4.8.5 Posthole F4133 was located very close to cremation pit F4120 which contained a single cremation and a post pipe. Posthole F4133 had a circular steep sided cut measuring 0.51 x 0.51 and 0.42m deep. A clear post pipe could be seen within the posthole with redeposited sand and gravel surrounding it. The post pipe deposit (4133) had been created when the post had rotted and the void where it had stood had become filled naturally with silts. It is possible that posthole F4133 was created and was intended to be for the interment of a cremation that never occurred.

4.8.6 Posthole F4019, posthole F4021 and posthole F4023 were three very similarly sized postholes arranged in an arc located not far from the southeast limit of the excavation (Figure 19 and Figure 24). It is possible that these three features represent the remains of a structure. They were all around 0.3m wide and circular and had depths of between 0.07m and 0.15m. Due to the shallow depth of these features, even taking truncation into consideration, it is possible that they were actually post sockets which would have held posts in place with the help of the weight of a structure's roof. It is also probable that these features represent the remains of a structure which may have consisted of more postholes or sockets that have been completely removed by ploughing and truncation. A number of similar triangular, trapezoidal or even circular structures have been excavated during previous phases at Lanton Quarry, Bolam Lake (Waddington 2002) and Thirlings (Miket *et al.* 2008 and Passmore and Waddington 2012) and have been dated to the early Neolithic period through radiocarbon dating and the recovery of Early Neolithic Carinated Bowl pottery. While these posthole/socket features did not produce any dating evidence, it is possible that they represent that truncated remains of a Neolithic post-built structure.

Feature	Contexts	Description	Dimensions (m)	Colour of fill	Composition	Finds	C14 date (95.4% probability) cal BC
F3972	3972, 3973	Isolated posthole	0.37 x 0.43 x 0.21	Pale brown	Sandy silt		
F3974	3974, 3975	Posthole	0.36 x 0.4 x 0.28	Dark brown	Sandy silt		
F3981	3981, 3982	Stakehole	0.34 x 0.2 x 0.1	Very pale brown	Sandy silt		
F3983	3983, 3984	Isolated posthole	0.3 x 0.4 x 0.16	Pale brown	Sandy silt		
F3990	3990, 3991	Heavily truncated posthole	0.41 x 0.9 x 0.38	Mid grey/brown	Sandy silt		
F3992	3992, 3993	Posthole	0.42 x 0.4 x 0.14	Mid grey/brown	Sandy silt		
F3994	3994, 3995	Posthole associated	0.18 x 0.19 x 0.07	Mid grey/brown	Sandy silt		

		with pit F3987 and pit F3989					
F4005	4005, 4006	Isolated posthole	0.3 x 0.38 x 0.3	Dark grey/brown	Sandy silt		
F4015	4015, 4016	Posthole associated with boundary ditch F4000	0.34 x 0.3 x 0.38	Dark brown/grey	Sandy silt		
F4019	4019, 4020	Posthole associated with posthole F4021 and posthole F4023	0.38 x 0.38 x 0.15	Dark brown	Sandy silt		
F4021	4021, 4022	Posthole associated with posthole F4019 and posthole F4023	0.39 x 0.39 x 0.07	Brown	Sandy silt		
F4023	4023, 4024	Posthole associated with posthole F4019 and posthole F4021	0.3 x 0.31 x 0.08	Mid brown	Sandy silt		
F4059	4059, 4060	Posthole	0.42 x 0.43 x 0.22	Grey/brown	Sandy silt		
F4077	4077, 4078, 4079	Pit	0.7 x 1.01 x 0.2	Mid brown/orange	Sand and gravel		
F4104	4104, 4105, 4107	Posthole with possible post pipe	0.46 x 0.56 x 0.18	Mid-dark brown	Sandy silt		
F4131	4131, 4132	Large posthole	0.38 x 0.43 x 0.75	Dark grey/brown	Silty loam		
F4133	4133, 4134, 4135	Posthole with obvious post pipe	0.3 x 0.3 x 0.45	Dark brown	Sandy silt		
F4136	4136, 4137	Shallow posthole/socket	0.25 x 0.22 x 0.09	Dark brown	Sandy silt		

Table 8. Undated postholes and stakeholes.

5. RADIOCARBON DATING

5.1 A total of six radiocarbon dates were obtained from samples excavated during Phase 8, although as with previous phases, several more are required in order to fully understand the highly significant archaeology that has been recovered from this site.

The samples consisted of:

- A charred emmer wheat cereal grain from the fill of a wide, shallow pit (3964)
- A charred hazelnut shell from the primary fill of a midden pit (3985)
- A charred hazelnut shell from the primary fill of a midden pit (4010)
- Bone from Cremation 1
- Bone from Cremation 5
- Bone from Cremation 15

Feature	**Context**	**Sample**	**Lab No.**	**RC Age (BP)**	**$\delta^{13}C$ ($^0/_{00}$)**	**Calibrated date range cal BC (95.4% probability)**	**Calibrated date range cal BC (68.2% probability)**
F3964, a wide shallow pit with Carinated Bowl	3964	Charred emmer wheat grain	SUERC-69257	5004 ± 34	-24.1	3943-3702	3905-3712
Cremation Pit 3	Cremation 1	Human bone	SUERC-69263	4349 ± 34	-23.7	3085-2897	3011-2910
F4027, burial pit with cremations	Cremation 5	Human bone	SUERC-69264	4334 ± 34	-25.0	3080-2891	3011-2901
F3977, primary fill of a midden pit with Grooved Ware	4010	Charred hazelnut shell	SUERC-69259	4101 ± 34	-22.8	2865-2501	2848-2579
F3979, primary fill of a midden pit with Grooved Ware	3985	Charred hazelnut shell	SUERC-69258	4047 ± 34	-22.1	2836-2474	2622-2491
F4110, pit containing a cremation	Cremation 15	Human bone	SUERC-69265	4012 ± 34	-23.3	2620-2467	2571-2485

Table 9. Radiocarbon dating results.

5.2 The samples obtained from the pits containing Carinated Bowl and Grooved Ware produced dates that are consistent with Early and Late Neolithic activity. Furthermore, the dates obtained from the three cremations produced Later Neolithic dates. These six dates, when added to the dates previously obtained from Lanton Quarry, strengthens the evidence for continued occupation of the Milfield Basin

throughout the Neolithic. They have also confirmed the first Neolithic burials in North East England.

6. PALAEOENVIRONMENTAL ASSESSMENT

6.1 Summary

6.1.1 Environmental samples were taken from pit fill contexts which either yielded pottery or other small finds, or had organic-rich fills. The pottery from these contexts indicates they date to the Neolithic period. Material suitable for radiocarbon dating is also highlighted. All the cremations were sampled for environmental material.

6.1.2 Preserved palaeoenvironmental remains in the form of charcoal and botanical macrofossils was common in the sampled pit and midden fills. Environmental material from the cremation burials was less abundant, with only four of the twelve cremations yielding identifiable material. The most common environmental material was charcoal. Identified charcoal contained a range of both long-lived and short-lived tree species indicative of the presence of mixed woodland. Evidence of cereal agriculture was scarce, only a single grain of emmer wheat was identified. Charred hazel nutshell was present in three contexts indicating the use of wild food resources. A fragment of tightly rolled, charred birch bark was recovered from a hearth dump deposit which also contained charred hazel nutshell. This bark fragment resembles fragments which have elsewhere been identified as tapers (Vogt 1949; Hughes 1981). All identified charcoal and plant macrofossils are provided in Appendix III - Palaeoenvironmental Inventory.

6.2 Plant Macrofossils

Method

6.2.1 Environmental samples were floated and allowed to air dry prior to analysis. All flots were scanned using a low power binocular microscope (x40). The soil at the site is free-draining, therefore only carbonized material will have been preserved. All uncharred plant remains were therefore discarded from analysis, although their presence and abundance was noted as an indicator of sediment mixing. In all cases 100% of the flot was scanned. Identification was undertaken using modern reference material held by ARS Ltd in addition to print resources (Cappers et al, 2006). Plant taxonomic nomenclature follows Stace (1997).

Results

6.2.2 Very few plant macrofossils were recovered from this phase of excavations at Lanton Quarry. A single emmer wheat grain was recovered from a context (3964) which also contained Carinated Bowl pottery. Small numbers of hazel nutshell fragments were recovered from three contexts (3985, 3989, 4010). Context (4010) which contained hazel nutshell also contained a small fragment of tightly rolled birch bark. A charred Galium sp seed was identified in context (3979).

6.3 Charcoal analysis

Method

6.3.1 Where available, ten fragments of charcoal per sample were identified to provide a representative sub-sample of the species present. Charcoal was examined using a high power binocular microscope at up to x400 magnification. Charcoal was identified using keys and plates from Shoch *et al*. 2004.

Results

6.3.2 Charcoal was present in most non-cremation samples, and a total of 245 fragments were successfully identified. The most abundant species were oak (39%) and hazel (35%) followed by poplar/willow (9%) and ash (9%). Small amounts of elm, birch, hawthorn/apple and alder were also identified (all <5%).

6.3.3 A small amount of charcoal was identified from four separate cremations. Three cremations had single fragments of apple/hawthorn family, poplar/willow family, and ash charcoal, while the fourth cremation contained six oak fragments.

6.4 Discussion

6.4.1 Charred macrofossils were not abundant in this phase of excavations, and are confined to a small number of contexts. Evidence of cultivation was extremely scarce, as only one emmer wheat cereal grain was identified. Previous seasons of excavation have resulted in larger quantities of emmer what, along with barley and oats (Archaeological Services, 2008). The single charred *Galium* sp. (corn cleaver) seed may represent an agricultural weed.

6.4.2 As in previous excavations of Neolithic material at Lanton Quarry (e.g. Stafford 2006; Cockburn 2012; Strafford 2013), charred hazel nutshell was identified in several contexts indicating the use of hazel nut was a wild food resource. One of these contexts which contained hazel nutshell (4010) was interpreted as a dump of hearth waste material. This context also contained a small, tightly rolled fragment of thin charred birch bark, measuring 28mm x 9mm. These tightly rolled fragments were first identified by Vogt (1949) at Swiss Neolithic sites as tapers used for lighting and to light fires. They have since been identified at several Neolithic sites across Europe (e.g. Hughes 1981). The small fragment identified here (Figure 20) likely represents the stub of a used taper, which was charred and deposited along with other hearth waste including charred hazel nutshell.

6.4.3 The charcoal species identified indicates a mixed deciduous woodland environment. The high proportion of oak (39%) is partially due to large quantities of oak charcoal in a small number on contexts, while hazel (35%) is more generally spread across many contexts, although it was very abundant in context (3989), a midden pit which also yielded charred hazel nutshell. The remaining charcoal consisted of smaller amounts of a variety of long-lived species such as ash and elm, and short-lived species such as poplar/willow, birch, and hawthorn/apple.

6.4.4 A small amount of charcoal was identified from the cremations. Although the sample size was small, only nine fragments were identified in total, it appears that a range of tree species were employed as fuel.

7. OSTEOLOGICAL ANALYSIS OF HUMAN BONE

by Milena Grzybowska

7.1 The following section presents a summary of the osteological and palaeopathological analysis of a total of 16 cremations. Complete analysis of cremated remains is presented in Appendix IV along with the methodology and full osteological inventory.

7.2 Preservation

7.2.1 Overall preservation of the cremated bone was poor.

7.3 Weight

7.3.1 Quantification of the cremated bone has the potential to inform on the cremation process including pyre technology, collection and bone deposition. The weight of the bone recovered from a deposit may be affected by anthropogenic and non-anthropogenic influences. These include the level of protection offered to the cremated remains within the burial environment, the level of post-depositional disturbance and the age and sex of the individual.

7.3.2 In modern crematoria the average weight of the bone after cremation makes up about 3.5% of the total body weight in adults, 2.5% in small children and 1.0% in infants (Warren and Maples, 1997). Although contemporary cremation processes result in the production of between 1227.4g and 3001.3g of bone, it has been suggested that in archaeological contexts whole body deposition should produce weights ranging between 1001.5g and 2422.0g (McKinley 1993).

7.3.3 The weights of the cremated remains varied from 8.5g to 846.8g. These weights did not indicate the presence of more than one individual per burial.

7.4 Skeletal elements quantification

7.4.1 Representation of skeletal elements can inform on the pre-cremation condition of the remains. In order to aid interpretation of funerary behaviour and practice, such as the selective collection of the bone from the pyre, the weights of each skeletal region, expressed as a proportion of the total weight, can be compared to the expected proportion estimated for the modern cremated remains (Gonçalves 2011a).

7.4.2 Bone fragments derived from the skull and limbs were identified within each burial, whereas the axial skeleton elements have been recovered from only four deposits (Cremations 1, 2, 3, 4 and 9). The burials associated with the four large burial pits (Cremations 1-13) produced average proportions of skull weight, axial skeleton weight and limb weight as 37.1%, 0.9% and 61.8%, respectively, whereas the other burials produced slightly lower results for skull weight (21.1%) and higher for limb weight (79.0%) and no evidence for presence of axial skeleton.

7.4.3 In all of the categories, the most substantial deviation from a normal distribution was observed in the axial skeleton (0.0-2.9% vs 21%). This is a common occurrence in archaeological contexts (McKinley 2004) that could be explained by preferential destruction of the trabecular (spongy) bone of the axial elements and

therefore it could not be considered as evidence for their deliberate exclusion during bone collection. A substantial shift in proportion of skull and limb elements was noted between age categories when only burials with one individual were taken into account. Cremated bone of juvenile or younger individuals produced skeletons that consisted of, on average, 48.3% of skull elements and 51.2% of limbs, whereas individuals ascribed to category adult/possible adult produced average respective proportions at the level of 28.1% and 70.5%. This difference results from the dissimilar proportions of the skull to the postcranial area which is approximately 1:4 around the time of birth but is 1:8 in adulthood.

7.4.4 The proportion of skull and limb elements uncovered from three primary burials (Cremations 5, 8 and 13) was 60.5% and 39.3%, respectively, which contrasts with the proportions obtained for the remaining burials (23.9% and 75.0%) and could not be explained exclusively by the higher ratio of sub-adults in these burials as the average proportion of skull of all young individuals was lower (48.3%). The proportional discrepancy might represent a dissimilar burial practice, possibly in the form of a selective collection of the bone from the pyre for burial. However, the skull proportions calculated for the fourth primary burial (31%) (Cremations 10, 11 and 12) nearly mirrors the average proportion obtained for the whole assemblage (34%).

7.5 Demography

7.5.1 Funerary practices may differ according to the age or sex of a deceased individual. Biological sex of an individual can be established by macroscopic examination of the cremated remains as well as via metric analysis, as a heat-related dimensional change of the bone does not have a significant impact on osteometric sexual dimorphism (Gonçalves 2011b).

7.5.2 Age estimation uses different stages of bone and tooth development and degeneration in order to calculate the age of an individual. The most reliable macroscopic methods of age estimation depend on the presence of specific areas of the pelvis (adult individuals) and identifiable teeth (sub-adult individuals).

7.5.3 Due to incompleteness of the skeletons the most reliable ageing methods were applied to only a few individuals (Cremations 6, 7, 8 and 13). The ages of the individuals from Cremations 6, 7, 8 and 13 was assessed on the basis of dental development using an atlas designed by AlQahtani (2008). The approximate age of the remaining individuals was estimated on the basis of epiphyseal fusion (Cremations 3, 4, 9, 10, 11, 12 and 16), robustness of bone (Cremations 1, 2, 3, 4, 5, 14, 15, 16) and age-related pathologies (Cremation 2). It was estimated the cremations contained 1 definite adult (Cremation 2), 1 juvenile (Cremation 13), 1 infant (Cremation 8) and 1 neonate/infant (Cremation 6). The remaining remains comprised of 4 possible subadults (neonate to adolescent; Cremations 4, 11, 12, 14 and 16), 5 possible adults (Cremations 3, 4, 5, 6, 7, 9 and 15) and 2 possible adolescent/adult individuals (Cremations 1 and 10).

7.5.4 It was not possible to establish sex for any of the individuals due to the absence of sexually dimorphic skeletal elements.

7.6 Minimum number of individuals per context

7.6.1 A minimum number of individuals were estimated for each cremation deposit. Nine cremation deposits produced elements that most likely represented a single individual (Cremations 1, 2, 5, 8, 9, 13, 14, 15 and 16), whereas two cremation deposits contained elements of at least two individuals (4041 and 4050) and one cremation deposit contained three (4061) individuals. The minimum number of individuals across all the cremations was 16.

7.7 Metric and non-metric traits

7.7.1 Metric data has a potential to inform on the stature of an individual and ancestry. Non-metric traits are additional sutures, canals, foramina, facets and bony processes, which occur in a minority of skeletons and are attributable to mechanical stress, environment and hereditary affiliation between skeletons.

7.7.2 Due to incompleteness and poor preservation of the bones, no metric data was obtained.

7.8 Pathology

7.8.1 Observation of pathological lesions is a means of assessing health and lifestyle of an individual and population. It also has the potential to inform on the overall success of adaptation to the environment. Pathological analysis requires an exhaustive description of abnormal modifications of a bone, its size and location. Pathological changes are categorized according to their aetiology: congenital, metabolic, infectious, neoplastic, trauma etc.

7.8.2 Osteological material from Cremation 2 produced evidence of marginal osteophytes of the odontoid peg of the cervical vertebra (C2). Osteophytes are growths of new bone at the margins of joints. The prevalence of osteophytes increases with age and their presence around the odontoid peg are associated with older individuals.

7.9 Efficiency of cremation

7.9.1 Cremation efficiency relies on temperature and time of burning. The process of cremation is one of dehydration and oxidation of the organic components of the body.

Oxidation

7.9.2 Complete burning results in complete oxidation of the organic component of bone, leaving only the mineral portion of the skeleton (McKinley, 1994). Experiments have proved that the colour of the bone reflects the temperature it attained during cremation and could therefore act as a proxy for oxidation level (Shipman et al. 1984, Holden et al 1995):

Brown/black bone= charred (c.300°)

Blue/Grey bone= incompletely oxidized (c.600°)

White bone= completely oxidized (>600°)

7.9.3 As the level of the organic content of the bone and the thickness of soft tissue cover influence the degree of oxidation it is not unusual to see a range of colours within one burial or even on a single bone fragment.

7.9.4 The bone of all of the cremation burials was fully oxidised.

Dehydration

7.9.5 Dehydration during cremation results in shrinkage, fissuring, fracturing and warping of the bone.

7.9.6 During cremation various bones within an individual reach different temperatures, depending on intrinsic (e.g. soft tissue cover) and extrinsic (e.g. weather conditions, quality of pyre) factors, therefore shrinkage of the bone varies between individuals and between different skeletal elements of the same individual and may fluctuate between 0-30% (after McKinley 2000). It has been demonstrated that the calcined bones presented a substantially larger degree of shrinkage (-14.5%) than pre-calcined bone (-4.1%) (Gonçalves 2011a). Degree of shrinkage also decreases with age as the progression of the mineralization process within bone becomes increasingly resistant to heat-induced dimensional changes; furthermore, females tended to display more shrinkage than males (Gonçalves 2011a).

7.9.7 Heat-induced warping and fissuring/fracturing patterns can aid determination of the pre-cremation condition of human remains (i.e. fleshed vs de-fleshed) and potentially support identification of secondary (to excarnation) cremations. Warping of the cremated bone has been identified to be an indicator of the preservation of collagen-apatite links within cremated bone (Gonçalves 2011a). Although in modern settings warping and thumbnail fracturing of the bone has been sporadically observed on the cremated 'dry bone' (i.e. de-fleshed prior to cremation) (Gonçalves 2011a), they are much more typical of cremations on fleshed cadavers and green bones. Longitudinal splitting and superficial checking of the external surface and less evidence of warping have been documented for dry bones, while considerable warping, more irregular longitudinal splitting and transverse as well as thumbnail fractures have been found to be characteristic of bone cremated with flesh still attached (after Ubelaker 2009).

7.9.8 All of the cremation deposits contained bone with predominantly U-shaped (thumbnail) and transverse fissuring. A proportion of the bones also exhibited warping. Although in modern settings warping and thumbnail fracturing of the bone has been sporadically observed on the cremated 'dry bone' (i.e. de-fleshed prior to cremation) (Gonçalves 2011a), they are much more typical of cremations on fleshed cadavers and green bones.

Fragmentation

7.9.9 Dehydration increases the liability of bone to fracture. McKinley (1994) after studying over 4000 urned and unurned cremated remains observed that over 50% of bone fragments were in excess of 10mm in size, while the average maximum fragment measured 45.2mm.

7.9.10 Fragmentation of bone is a result of pre- and post-burial activities, which starts with the process of cremation and continues during subsequent collection by means of raking the hot bone from the pyre site, interment, excavation, transportation and post-excavation processing (McKinley 1994). It was demonstrated that fragment sizes should be regarded as post-excavation fragment sizes rather than those of deposited fragments

(McKinley 1992, 1994).

7.9.11 Quantification of bone fragmentation aids assessment of the impact of overall data retrieved from cremated remains and can inform on the pyre technology as well as on cremation practices. The maximum size of the bones was recorded.

7.9.12 McKinley's (1992) study on Romano-British unurned undisturbed cremated remains from St Stephens cemetery in St Albans observed that over 55.2% of bone fragments were in excess of 10mm in size, while the average maximum fragment size was 32.6mm (for skull) and 44.1mm (for long bones).

7.9.13 The investigated assemblage displayed higher levels of fragmentation. The average maximum fragment size was lower than average (30.5mm – skull, 39.9mm – long bone) and a considerably smaller proportion of specimens than average measured over 10mm (37.9%).

7.10 Pyre goods and pyre debris

7.10.1 Pyre goods can be defined as culturally significant items deliberately placed on or inserted into the pyre and subsequently interred with the cremated bone. This may include animal bone, ceramic, glass and other objects that may be considered personal in nature such as jewellery.

7.10.2 Cremations 1, 6-14 and 16 contained small amount of charcoal flecks, and Cremations 1, 3 and 4 included animal bone. A burnt flint knife blade was recovered in association with Cremations 10, 11 and 12.

7.11 Conclusions

7.11.1 The overall appearance of the cremated remains from all the burial contexts provides the evidence of consistently efficient cremation of fleshed cadavers in temperatures exceeding 600°C.

7.11.2 The whole assemblage possibly contained 16 individuals, of which nearly half constituted sub-adults. Nine single and three multiple (double and triple) cremation deposits were identified. Each of the multiple deposits seemed to comprise a sub-adult and an adult or adolescent/adult individual.

7.11.3 Three of the primary cremations (Cremations 7, 8 and 13) contained less than 50g of cremated bone and most likely represented three individuals whose ages varied from an infant (Cremation 8), a juvenile (Cremation 13) to a possible adult (Cremation 7). These deposits manifested higher percentages of skull elements and may represent token burials, where only a small portion of the whole cremation is collected for burial. With regards to the quantity of bone, the minimum number of individuals and elemental quantification patterns, primary cremation deposit (4061) (Cremations 10, 11 and 12) is dissimilar to the other primary burial deposits.

7.11.4 Each of the isolated cremations, Cremations 14, 15 and 16, contained elements that could be attributed to a single individual. Fragmentation of these remains, as well as the results of elemental quantification, approximated that all of the secondary cremation deposits were associated with post-pipes.

7.11.5 Mortuary practice in the Neolithic period was varied and included round

barrows, passage graves, chambered tombs and portal dolmens among others. Whittle (1999) reports an increase in the frequency of single burials from the Middle Neolithic that may be located under mounds, in ditches or pits associated with large monuments such as hinges. The author is not aware of any other examples of Neolithic cremated remain burials in the British Isles associated with post-pipe pits.

7.12 Recommendations for future research

7.12.1 Exposure of the bones to temperatures exceeding 300°C precludes ancient DNA analysis. Frequently present in this material was the petrous part of the temporal bone which may provide an opportunity to conduct strontium stable isotope analysis that could inform on the childhood origin of the individuals (Harvig *et al*. 2014). Due to the paucity of Neolithic cremation remains from North-East England it is recommended that the osteological material be retained for research purposes.

8. Osteological Analysis of Animal Bone

8.1 Material

8.1.1 The animal bone assemblage from Lanton Quarry comprised articulated and disarticulated bone.

8.2 Methods

8.2.1 The analysis follows Animal bones and Archaeology: Guidelines for best practice, Consultation draft developed by English Heritage, now Historic England (Baker and Worley, 2013). Ageing was attempted based on the stage of bone fusion (Zeder 2002). The state of preservation was scored using a four stage system (excellent, good, moderate and poor). Butchery marks, root etching and pathological changes were noted when present and the measurements of skeletally mature specimens followed Von den Driesch (1976).

8.3 Results

8.3.1 Surface preservation was overall good with the exception of context (4003). No butchery marks or gnawing was observed on any of the specimens. A full inventory of the animal bone along with ageing and metric data is presented in Table 27.

8.3.2 Context (4000) contained an incomplete and poorly preserved unfused distal femoral epiphysis of a medium mammal.

8.3.3 Animal bone from context (4003) comprised an incomplete pelvis and hind legs of an immature sheep, including an articulating left tibia, calcaneus and astragalus. The bones represent one individual.

8.3.4 Context (4008) contained the partially preserved torso as well as front and hind limbs of an immature sheep. The elements present included scapulae, right humerus and femur, pelvis, 26 vertebrae, 15 ribs and sternum.

8.3.5 Pit feature F4058 contained a partial skeleton of an immature sheep. The elements present included five right ribs, four thoracic vertebrae and right scapula. No measurements were taken due to the presence of exclusively unfused, skeletally

immature, elements.

8.3.6 For individuals from contexts (4003) and (4008) the measurements were successfully taken.

8.4 Conclusions

8.4.1 Each Animal Bone Group recovered from contexts (4003), (4008) and (4058) contained a single incomplete skeleton of an immature sheep. All of the sheep were less than 4 years old. The age at death of the individual recovered from context (4008) was established to be 2.5-4 years, whereas robustness of the skeleton from context (4058) suggested a considerably younger age. On the basis of the measurements of the elements recovered from contexts (4003) and (4008) it could be concluded that the sheep skeletons represent post-medieval/modern individuals of improved local sheep. No butchery marks or gnawing suggested immediate burial upon death of the diseased animal. No further analysis is recommended.

9. Ceramic Finds Analysis

by Clive Waddington and David Cockcroft

9.1 Introduction

9.1.1 The corpus of ceramic material recovered from the Phase 8 excavation at Lanton Quarry during 2016 comprised an assemblage of Early Neolithic and Late Neolithic pottery numbering approximately 30 sherds (conjoined sherds were counted as a single sherd) in total (excluding crumbs and tiny sherds) and two pieces of daub, with a combined weight of just over 0.98kg. It represents a minimum of three vessels that can be classified as Early Neolithic Carinated Bowl/Plain Ware, and five vessels classified as Late Neolithic Grooved Ware, based upon consideration of profile, fabric and depositional context as well as slightly less reliable indicators such as colour and wall thickness. They were all recovered from pit features scattered across the Phase 8 excavation area.

9.1.2 The assemblage complements the previous assemblages recovered from Lanton Quarry and relates to the evidence for Neolithic occupation across the wider site. It also compares with assemblages recovered from nearby sites such as those from Cheviot Quarry (Johnson and Waddington 2008) and Thirlings (Miket *et al*. 2008). In this respect it forms a significant addition to the local and regional Neolithic pottery sequence.

9.2 Method Statement

9.2.1 The sherds were gently finger-washed in cold water and then left to air dry. Once they had dried the remaining soil was gently brushed off with a sable shaving brush. The sherds were laid out according to context and then by fabric group and individual vessels. The pottery was examined macroscopically with the aid of a x10 hand lens. No microscopic analysis was undertaken. Joining sherds were refitted using HMG adhesive.

9.3 Catalogue

9.3.1 A catalogue describing each identified vessel by ceramic type is presented below.

Carinated Bowl/Plain Wares

Vessel Number	Small Find Number	Context Number	Description	Weight (grams)
121	1834	3964	Two small sherds of an evenly and well-fired vessel with dark brown inner and outer surfaces and slightly lighter brown core. Fabric is hard and contains finely crushed stone. Both surfaces are lightly burnished. Slight curvature on both sherds suggests a rounded vessel. Wall thickness averages 6mm. No decoration. Fabric and shape akin to Carinated Bowl fabrics of the local area.	25.89
122	1834	3964	Two large and three small sherds of an evenly and well-fired plain vessel. Exterior surface is a light buff brown and the interior surface and core dark brown in colour. Hard fabric with crushed stone inclusions up to 7mm across. Outer surface has pitting suggesting dissolved or burnt-out organic inclusions. Curvature of larger sherds suggests a round-bodied vessel. Wall thickness varies from 7 mm – 14 mm. Charred organic residue adhering to the inner surface. No decoration. Fabric and shape akin to Carinated Bowl fabrics of the local area.	143.08
123	1840	3985	One small sherd of an evenly and well-fired plain vessel. Exterior surface is dark brown with a similar internal surface but pale brown core. Hard fabric with small crushed stone inclusions. Exterior surface is burnished and surviving area of interior surface is smooth with charred organic residue adhering to it. Wall thickness averages 8 mm. Curvature suggests a round-bodied vessel. No decoration. Fabric and shape akin to Carinated Bowl fabrics of the local area.	15.67

Table 10. Catalogue of Carinated Bowl/Plain Ware.

Fabric

9.3.2 This small assemblage of Plain Ware has the typical hard and largely well-fired fabric containing angular crushed stone temper which can be of just one stone type or several, the most common being sandstone, limestone and quartz, all of which is available within a few miles radius of the site. The inclusions are generally well sorted and can be up to 7mm across and are fairly evenly distributed throughout the fabric.

The common practice of treating the external and sometimes internal surface by means of burnishing often masks the presence of the inclusions across the surface of the vessels although in some cases surfaces are less well smoothed and inclusions erupt.

9.3.3 Surface colouration can vary considerably, even within a single vessel, as is usual with ceramics fired under a bonfire or pit clamp and repeatedly exposed to smoke discolouration, heat and differential oxygen supply. On the whole they tend to be dark grey, dark brown, grey and occasionally buff brown or a red-brown or with an orangey-brown surface. On the whole, the pottery is well fired and of high quality with a fairly even and uniform colouration throughout indicative of good control of the firing process.

Form

9.3.4 The term Plain Wares covers the ceramics of the same tradition as Carinated Bowls and of the same fabric which includes cups and bowls without shoulders or S-profiles.

9.3.5 The assemblage of Carinated Bowl/Plain Ware material is typical of the Northumberland tradition displaying an absence of decoration and executed in a well-fired fabric with a highly-burnished, or at least well-smoothed, external and sometimes internal surface. Examples of un-shouldered simple bowls or cups are represented. In this regard the corpus aligns well with the material recovered from the previous phases at Lanton Quarry and similar assemblages elsewhere in the Milfield Basin, such as those from Cheviot Quarry (Waddington in Johnson and Waddington 2008), Coupland (Passmore and Waddington 2009) and Thirlings (Miket et al. 2008).

9.3.6 The small size of sherds within this assemblage mean that none of the vessels are adequately represented to allow vessel reconstruction.

Numbers

9.3.7 A total of eight sherds was recovered which represents a minimum of 3 vessels. The most productive context was [3964], a pit fill where two vessels were represented.

Grooved Ware

Vessel Number	Small Find Number	Context Number	Description	Weight (grams)
34	1840	3985	Three conjoining base sherds from an evenly fired decorated vessel. Exterior surface pinkish brown in colour and interior surface is dark brown. External may have applied slip while interior surface appears burnished with evidence for having been grass-wiped. Fabric is hard and stoney with frequent large crushed stone inclusions up to 7.5mm across which can erupt on the external surface. The diameter of the base can be reconstructed at 80 mm. The body of the pot flares out from the base and would have been a vase-shaped vessel. Wall thickness varies between 7 – 9mm excluding the base which is thicker. Decoration consists	88.61

			of parallel diagonal grooves or slashes in groups in alternate directions to produce a herringbone-type effect.	
35	1836	4010	Five conjoining sherds including part of the flat base and three loose body sherds from a decorated vessel. Exterior and interior surfaces are dark brown. The fabric is hard and includes crushed stone inclusions up to 5mm across. The interior and exterior surfaces are smooth, the inner surface being grass-wiped while the outer surface may have a slip applied. The circular base can be reconstructed as being *c*.88mm in diameter. Wall thickness varies from 8-10mm. Decoration comprises parallel diagonal grooves or slashes in groups in alternate directions to produce a herringbone-type effect. The body sherds show examples where a slash has been made across parallel grooves to produce a grid-like effect.	75.01
36	1836	4010	A single small base sherd form a decorated vessel. Exterior surface a pale buff brown colour having been coated in a slip, interior and core a darker brown. Gritty fabric with fine crushed stone inclusions up to 3mm across. The wall of the vessel does not flare out, but is rather more upright with only a slight outward angle indicative of a bucket-shaped vessel. Only a small part of the diameter survives, but an original diameter of around 120mm can be estimated. Wall thickness 6.5mm. Decoration consists of parallel diagonal grooves or slashes in groups in alternate directions to produce a herringbone-type effect.	14.60
37	1838	3976	Two conjoining and one separate body sherd from a hard fabric, evenly fired decorated vessel. Outer surface smooth and red-brown in colour and may have applied slip, internal surface and core mid-brown and grass-wiped. Fabric contains small crushed stone inclusions up to 3mm across. Wall thickness 8-9mm. Decoration consists of parallel diagonal grooves or slashes in groups in alternate directions to produce a herringbone-type effect.	43.47
38	1842	4002	One body sherd from a well-fired vessel with raised cordon decoration. Buff brown smooth external surface with applied slip and dark brown burnished inner surface with mid-brown core. Fabric contains crushed stone inclusions up to 9mm across which occasionally erupt on the inner surface. Wall thickness averages 9mm. Outer surface shows evidence for two straight cordons meeting at an acute angle.	33.68

Table 11. Catalogue of Grooved Ware.

Fabric

9.3.8 The fabrics are typically hard and well-fired with crushed stone inclusions, some of which can be coarse and some of which can be fine and gritty. The stone inclusions are typically sandstone but other stone is also used. The inclusions are evidently well prepared in advance of pot construction. Occasionally the inclusions erupt on the surface, the latter of which typically has a slip applied on both inner, and more frequently, the outer sides. The fabrics have a pale buff-brown or red-brown outer and inner surface and typically a similar or darker core.

Form

9.3.9 All the vessels for which base sherds survive are flat-based. Two of the three vessels for which bases sherds survive belong to vase forms with flaring bodies whilst one is from a less gently flared bucket-shaped vessel. The vessels from this assemblage compare well with the size of Grooved Ware vessels from elsewhere on the site, although other much larger examples have been found as well.

Decoration

9.3.10 Decoration includes the use of applied cordon on Vessel No. 38 suggestive of the 'Durrington Walls' sub-style (Wainwright and Longworth 1971) together with a limited repertoire of grooving (e.g. Fig. 2) which could belong to almost any of the sub-styles. The grooved lines tend to be in groups of parallel diagonal lines, sometimes at different angles to produce a herringbone-like effect, suggesting parallels with Smith's 'Clacton' style (Smith 1956).

9.3.11 This range of Grooved Ware styles is in keeping with the styles recovered elsewhere from the Lanton site, together with those known to be present in the Milfield Basin as, in Gibson's recent review (Gibson 2002), parallels with Durrington Walls and Clacton style vessels have been attested at the nearby sites of Old Yeavering, Ewart 1 pit alignment and Redscar Bridge, and similar Grooved Ware has since been found at Cheviot Quarry (Waddington in Johnson and Waddington 2008) and at the Milfield North Pit (Passmore and Waddington 2009, 196-204).

Numbers

9.3.12 A minimum of five vessels are present within the Grooved Ware assemblage.

Unattributable Material

Unattributable	1835	3966	A single small body sherd which has a plain outer surface and inner surface from a hard fabric prehistoric vessel.	6.00
Unattributable	1843	4073	A single small body sherd which has a plain outer pale brown surface, the inner surface is absent and the core is a gritty dark grey-black.	7.58
Unattributable	1834	3964	A small crumb of indeterminate prehistoric pottery with crushed stone inclusions within fabric.	1.08
Unattributable	1833	3962	Seven small sherds and crumbs of ceramic from a prehistoric vessel with hard fabric and burnished outer surface. Fabric contains crushed stone inclusions typically .2mm across.	32.45

Daub	1848	3966	Two small crumbs of daub, pale brown in colour and well-fired. One shows the curved moulding where it had been curved around a wooden stick/wattle.	10.44

Table 12. Catalogue of unattributable material.

9.3.13 A small amount of unattributable pottery was recovered from four contexts and included small sherds and crumbs, most of which only had part of one, or no surface, surviving. Their small size made them unable to be attributed to any pottery style with certainty, however their fabrics clearly shows them to be of prehistoric, and likely Neolithic, in date.

9.3.14 Two fragments of daub/fired clay are worthy of note as one still retains the impression of where it had been applied around a twig/wattle, suggesting the presence of a prehistoric building on the site.

9.4 Discussion

9.4.1 The Early Neolithic material includes traditional Plain Ware forms typical of other Early Neolithic settlement and pit sites across the sand and gravel terraces of the Milfield Basin. The surfaces tend to have been well burnished and are entirely devoid of decoration. One of the Plain Ware vessels has charred organic residue adhering to its surface indicating its use in the cooking process. These vessels add to the wide range and large number of vessels present across the site and are consistent with the storing, processing, cooking and consumption of food, and perhaps other processing activities, and can therefore be viewed as reflecting domestic occupation during the Early Neolithic across the site. The presence of the daub is important here as this implies the presence of structures on the site. The Carinated Bowl and Plain Ware assemblage from Lanton Quarry is the largest assemblage of Early Neolithic pottery from anywhere in North East England.

9.4.2 Finds of Grooved Ware are relatively rare in North East Britain and their chronology and use is only just beginning to be understood. The sherds from Lanton Quarry show clear evidence for grooved and applied cordon decoration and they form pure Grooved Ware assemblages with no sherds from other traditions identifiable in the same context. The fabric of all the vessels reveals well-made ceramics. The assemblage of Grooved Ware from Phase 8 is significant and complements the overall Grooved Ware assemblage from Lanton Quarry, which currently forms one of the larger assemblages of Grooved Ware from the region.

9.4.3 This Late Neolithic material all comes from pits cut into the sand and gravel terrace providing direct depositional comparanda to the Grooved Ware material recovered elsewhere on the site and from Cheviot Quarry (Johnson and Waddington 2008), the Milfield North pit (Gibson in Passmore and Waddington 2009), Yeavering (Ferrell 1990) and the possible material from Thirlings (Miket *et al*. 2008). As the Grooved Ware corpus for North East England grows the ceramics will be able to be more effectively compared to other regional assemblages. Although not all the vessels can be reconstructed a crude indication of size is afforded by the shape and size of the surviving base fragments which suggest a range of forms from vase to bucket-shaped vessels. All are executed in a fabric with varying quantities of crushed stone, including

quartzitic sandstone, and have been well fired. The surfaces appear to have applied slips.

9.4.4 The opportunity to gain radiocarbon dates for this pottery style is important and forms a priority in the North East archaeological research agenda (Petts and Gerard 2006).

10. LITHICS ASSESSMENT

by Clive Waddington

10.1 Factual Data

Quantity

10.1.1 A total of 11 chipped lithic artefacts were recovered from the excavations at Lanton Quarry in 2016.

Provenance

10.1.2 Table 1 below lists the feature numbers/contexts from which the material was recovered.

Context No	Find No.	Context Type	No. Lithics	Lithic Types Present	Other asstns.	Period
3964	1841	Large shallow pit fill	1	Retouched blade	Early Neolithic pottery	Neo
3977	1837	Upper fill of pit fill	1	Broken chip	Lower fill from same pit produced Grooved Ware and hazelnut shell	Neo
4093	1847	Primary fill of Cremation Pit 2	1	Broken, burnt flake	Cremation	Neo
4061	1846	Cremations 10, 11 and 12 from Cremation Pit 2	8	Knife, blade, three flakes and two chips	Cremation	Neo
Total			11			

Table 13. Lithic counts by context.

Dating

10.1.3 Together the lithics are all part of a parallel-sided blade-based manufacturing tradition that employs consistent blade forms irrespective of what raw material is used. One of the pieces is a long, narrow knife, blunted along one long edge and sharpened along the other and is of typical Neolithic form. None of the features that produced the lithics produced any ceramic material.

Condition

10.1.4 None of the pieces show fresh breaks and therefore the broken pieces have been broken in antiquity prior to discard. All the flints from are heavily burnt and those

from contexts [4093] and [4061] were directly associated with a human cremation. The flint flake from pit [3977] is also burnt, whilst the flint from pit [3964] is fresh and unburnt.

Primary Sources and Documentation

10.1.5 There are no primary sources or documentation that might enhance the study of this collection.

Means of Collecting the Data

10.1.6 The lithics were excavated from the ground using hand tools (trowels and small tools) and from sieves with a 1cm^2 mesh. Each lithic was washed in tap water and gently cleaned with a toothbrush before being left to air dry. Each lithic was placed in an individual plastic bag that was labelled with a unique small find number and the context number.

10.1.7 For the assessment and analysis the lithics were un-bagged and laid out on tables and grouped by context. Lithic counts were recorded and an examination made of all pieces. The lithics were then re-bagged and packed, by context, into a sturdy plastic storage box.

10.2 Statement of Potential

Value of the Data

10.2.1 This assemblage of material is very small on its own but combined with the lithic material from earlier excavations on this site it has the potential to advance the regional research agenda and understand more, specifically, about Neolithic lithic production, use and significance in the region. The flint knife, although burnt, is a fine specimen and adds to some of the other excellent examples of Neolithic flintwork from this site.

Integration of Study with Other Research

10.2.2 The study of this assemblage could be enhanced through acquisition of radiocarbon dates on material from the same context to assist with dating the flint sequence in the region, and by comparison with the dates, styles and circumstances of discard with Neolithic assemblages from previous excavations at Lanton Quarry (see previous Phase reports), the nearby sites of Cheviot Quarry (Johnson and Waddington 2008), Thirlings (Miket et al. 2008), Bolam Lake (Waddington and Davies 2002) and elsewhere (e.g. Harding 1981; Miket 1976; 1981; 1985; Passmore and Waddington 2012).

10.3 Archive Requirements

Storage and Curation

10.3.1 The lithics are currently contained in sealed and labelled plastic bags. Lithics from the same context are all bagged in a context specific bag. These bags are stored in a sturdy plastic storage box with other lithics from Lanton Quarry.

Retention and Discard Policy

10.3.2 It is recommended that all of this collection is kept for future study.

11. Overall Discussion

11.1 The earliest dated remains excavated during Phase 8 at Lanton Quarry were pit F3962 and pit F3964, one of which produced sherds of Early Neolithic Carinated Bowl and an emmer wheat grain that was radiocarbon dated to 3943-3702 cal BC (95.4% probability) (SUERC-69257 (GU41845)) which confirms that the pit was created and used during the Early Neolithic. Early Neolithic Carinated Bowl pottery has been found within features across almost all of the previous phases of excavation at the quarry. Carinated Bowls and other plain vessels are the earliest examples of pottery within the British Isles and represent one of the most significant advances that were made between the Mesolithic and the Neolithic periods, as part of the advent of farming. Excavations at Lanton Quarry have so far added hundreds of sherds of pottery to the Early Neolithic material for Northumberland and have contributed to the chronology of Neolithic pottery across the region and the country.

11.2 Importantly, Carinated Bowl pottery has been found in association with Early Neolithic triangular post-built structures such as those found during the Phase 1 and Phase 2 excavations. These structures are contributing new information to the understanding of Early Neolithic settlement both regionally and nationally. The different types of these structures are illustrated and discussed within Passmore and Waddington (2012) including Buildings 7, 8 and 12 from Lanton Quarry as well as examples from Bolam lake (Waddington and Davies 2002), Thirlings (Miket *et al.* 2008) and Whitton Park (Waddington 2005). The arrangement of three postholes/post sockets discovered during the Phase 8 excavations, while undated, possibly represent the truncated remains of a triangular or even circular, Neolithic post-built structure. While the three surviving features alone do not appear to be a convincing example of a structure, it must be taken it to consideration that additional postholes, sockets and stakeholes probably once existed but have since been truncated beyond recognition. The maximum dimensions of the structure on the ground are 4 x 1m however, as in the other examples mentioned above, the postholes only demonstrate where the weight-bearing posts would have stood and do not relate directly to the shape and size of the covering superstructure. A spread of radiocarbon dates have so far been obtained from other examples of these structures at Lanton Quarry that place them in the Early Neolithic period, however further dates should be obtained both from post-built structures that will undoubtedly be excavated in the future, as well as those that have already been excavated but are as yet undated.

11.3 A total of 16 individuals were represented by the Neolithic cremations that were excavated during the Phase 8 strip, map and sample. The four later Neolithic human cremation burial pits are unique to the site and there are no comparable features yet discovered and/or recorded from elsewhere in North East England. A minimum of 13 individuals were represented by these four later Neolithic pits within the cluster and the remains included individuals of all ages including neonates, infants and adolescents to adults. There is the possibility that two of the comingled cremation deposits (4041 and 4061) that each contained at least two individuals represent mothers and their babies who died during childbirth. Alternatively they could represent a heavily pregnant woman who died before she gave birth. However, no certain cause of death could be

ascertained for any of the individuals and the cremations seem to represent a cross-section of society across all generations. It is highly probable that more cremations will be discovered during the next phase of excavations, immediately to the south of the current phase.

11.4 Radiocarbon dating of both a primary and a secondary cremation (Cremations 1 and 5) from Cremation Pit 3 produced dates of 3085-2897 cal BC (95.4% probability) and probably 3011-2910 cal BC (68.2% probability) (SUERC-69263 (GU41848)), and 3080-2891 cal BC (95.4% probability), and probably 3011-2901 cal BC (68.2% probability) (SUERC-69264 (GU41849)) respectively. This has demonstrated that only a short amount of time had elapsed between the insertions of the two cremations. In the future, therefore, it will be important to obtain further radiocarbon dates from other cremations within the four large pits in order to ascertain whether they are all roughly contemporary or whether the site was being revisited over a number of years by groups of people using the same rituals to bury their dead. If we assume that the three undated burial pits are roughly contemporary with the one from which dates were obtained, the four posts would not have stood for a very long period of time. Studies on Neolithic dry-land settlements suggest that timber buildings could stand for between 50 and 100 years (McIntosh 2009). Therefore, depending on the type of wood used for the posts and taking into consideration that they would have been more exposed to the elements than posts within settlement structures which would have been protected by walls and roofs, it can be estimated that they would not have survived for more than *c*.30 years. There was also no evidence to suggest that they had been replaced. If this is the case it could be presumed that the cemetery represents that of a small family group who did not use the site for more than two generations. Alternatively, if further radiocarbon dating was to prove that longer periods of time had elapsed between the creation of the individual pits and the insertions of the primary and secondary cremation deposits, this would indicate that the site had been revisited by different groups due to its continued status as a place of burial and that perhaps not all four posts were necessarily standing at the same time.

11.5 Only one of the cremation deposits (4061), consisting of comingled Cremations 10, 11 and 12, was deposited with any grave goods. A flint knife, a blade, three flakes and two chips had been placed on the pyre with at least one of the individuals before they had been cremated. It is interesting to note that Cremation Pit 2, which contained Cremations 10, 11 and 12 was recognised as the largest of the four burial pits and had been set slightly apart from the remaining three. Cremation deposit (4061), containing Cremations 10, 11 and 12, was also the primary cremation deposit within the feature. These cremations were estimated to consist of an adolescent/adult and two neonate/adolescents. These factors could indicate that the individuals represented by Cremations 10, 11 and 12 were of particular importance to the group who buried them.

11.6 If future radiocarbon dating of Cremation 16, which was contained within isolated cremation pit F4120, finds that it is is roughly contemporary with the later Neolithic human cremation pit cluster, it is possible that the location for cremation pit F4120 was chosen due not only to its proximity to the cluster but also to take advantage of the aspects that it could provide. Standing at the isolated cremation post pit, F4120,

and looking through the four cremation pit cluster posts would have framed a view of the Cheviot hills beyond and, more specifically, would have led the eye roughly in the direction of Yeavering Bell, the henge and clusters of Neolithic pits that have been found on the gravel terrace at Yeavering (Passmore and Waddington 2009). It is not unreasonable to assume that the siting of cremation pit F4120 was not random and that the post it would have held, together with those held within the later Neolithic cremation pit cluster, were erected to provide significant alignments.

11.7 While the Northumberland landscape contains various Neolithic mortuary monuments such as Early Neolithic long mounds in the valleys of the North Tyne (Passmore and Waddington 2012), and Beaker period henges, the cremation burial pits found during Phase 8 of the excavations at Lanton Quarry are the first dated examples of Neolithic burials within the region.

11.8 Whereas Early Neolithic settlement evidence at Lanton Quarry is reliably represented by the radiocarbon dated triangular post-built structures mentioned previously, settlement evidence for Late Neolithic occupation, and therefore the cremations, does not so far include reliably dated structural remains. It is instead provided by the discovery of Grooved Ware ceramics found within midden pits across the site. Grooved Ware sherds recovered from pit F3977 and pit F3979 during Phase 8 are accompanied by radiocarbon dates which place the pits, and therefore the ceramics, within the mid-3rd millennium BC. While it is unusual for Neolithic communities to place their dead so close to their settlement, it seems that this is what was occurring at Lanton Quarry.

11.9 The assemblage of ceramics and accompanying lithics found during Phase 8 complement the nationally important assemblage that has been collected in previous years and which provides a continuous ceramic sequence through the entire Neolithic. The Carinated Bowl is comparable with similar ceramics from Cheviot Quarry (Johnson and Waddington 2008) and Thirlings (Miket et al. 2008) as well as other important sites such as Bolam Lake, Yeavering and Broomridge (Passmore and Waddington 2012). Later Neolithic Grooved Ware ceramics are not as common in Northumberland as first thought (Passmore and Waddington 2012) although comparable examples to the Lanton material have come from Cheviot Quarry (Johnson and Waddington 2008). In the past Grooved Ware contexts had been poorly represented in the radiocarbon chronology however recent discoveries, including these most recent ones at Lanton Quarry, have provided new dates. Although not all found during the Phase 8 work at the quarry, previous excavations have yielded sherds of Carinated Bowl, Impressed Ware, Grooved Ware and Beaker and together with the evidence for settlement, farming practices and food consumption and now burial, it is for these reasons that Lanton Quarry remains the best site to answer some of the many unresolved questions surrounding the Neolithic period in North East England.

11.10 Palaeoenvironmental analysis of a number of samples from the Phase 8 excavations revealed limited evidence for cereal agriculture with only a single grain of emmer wheat being identified, although importantly this has been radiocarbon dated to the beginning of the Neolithic. In comparison, some of the assemblages of botanical remains recovered from the previous phases of excavation produced greater quantities

of cereal grain and chaff with emmer wheat and barley present, together with occasional wild oat and species of fruit and many hazelnut fragments. However, such evidence is always rare for the Neolithic and although the quantities of such material are generally small, their presence is crucial in helping to understand the beginning of farming in Britain and changes in food production over time. The lack of later Neolithic farming and food residues in this part of the site appears to coincide with the discovery of the Neolithic cremations suggesting that this particular area of the site had been reserved for burial of the dead and was therefore not an area where much in the way of agricultural practices or food production took place.

12. Publicity, Confidentiality and Copyright

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14. Acknowledgements

Archaeological Research Services Ltd would like to thank all those who contributed to the outcome of this project, in particular Gareth Williams of Tarmac Ltd and Nick Best, Northumberland County Council Assistant County Archaeologist.

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APPENDIX I - FIGURES

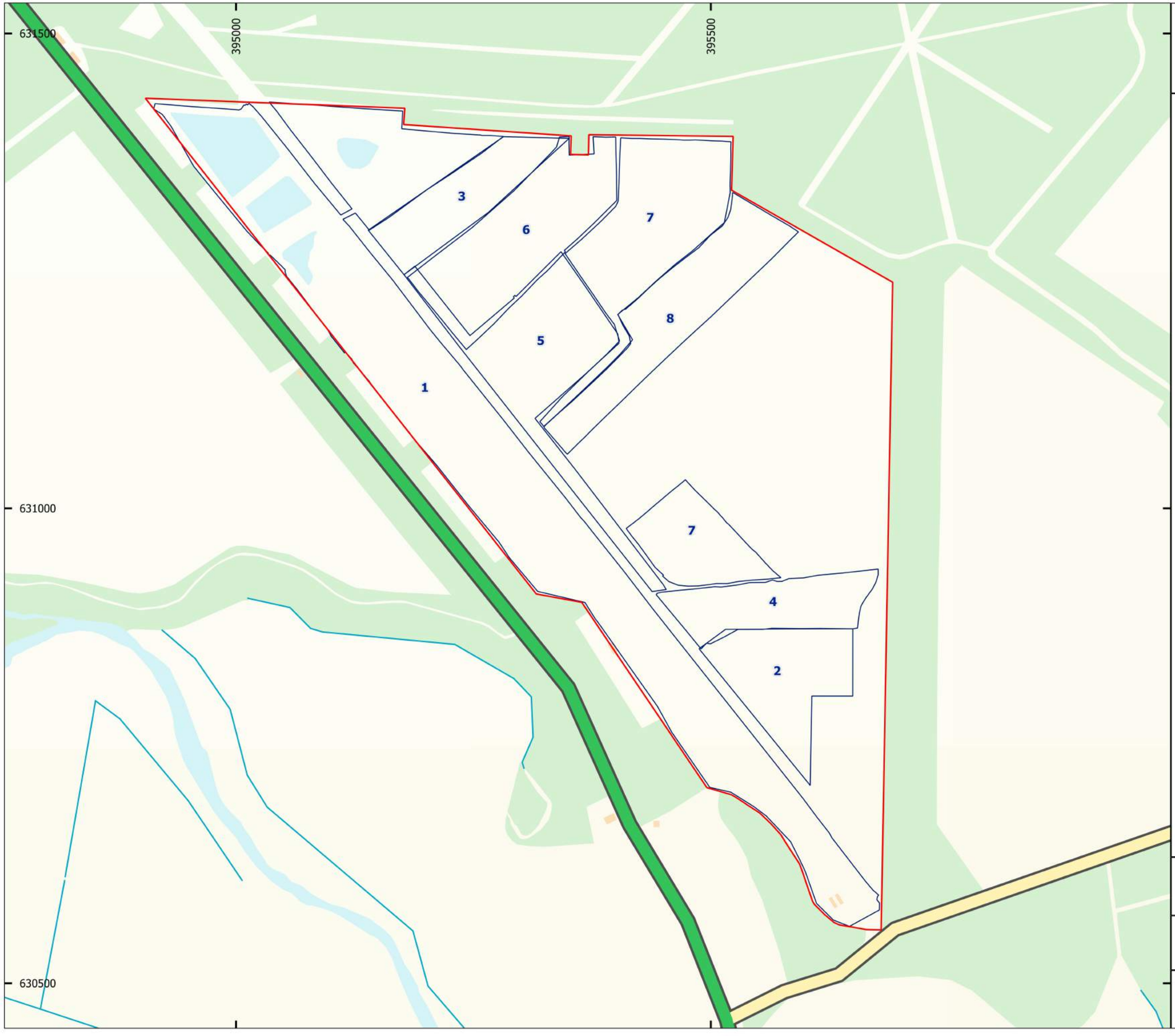

Figure 2:

Lanton Quarry showing numbered excavation phases.

0 100 200 m

N

Site name: Lanton Quarry
Date: November 2016
Drawn by: PC
Scale: 1:4000 at A3

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Four later Neolithic cremation post pits arranged in a diamond configuration.

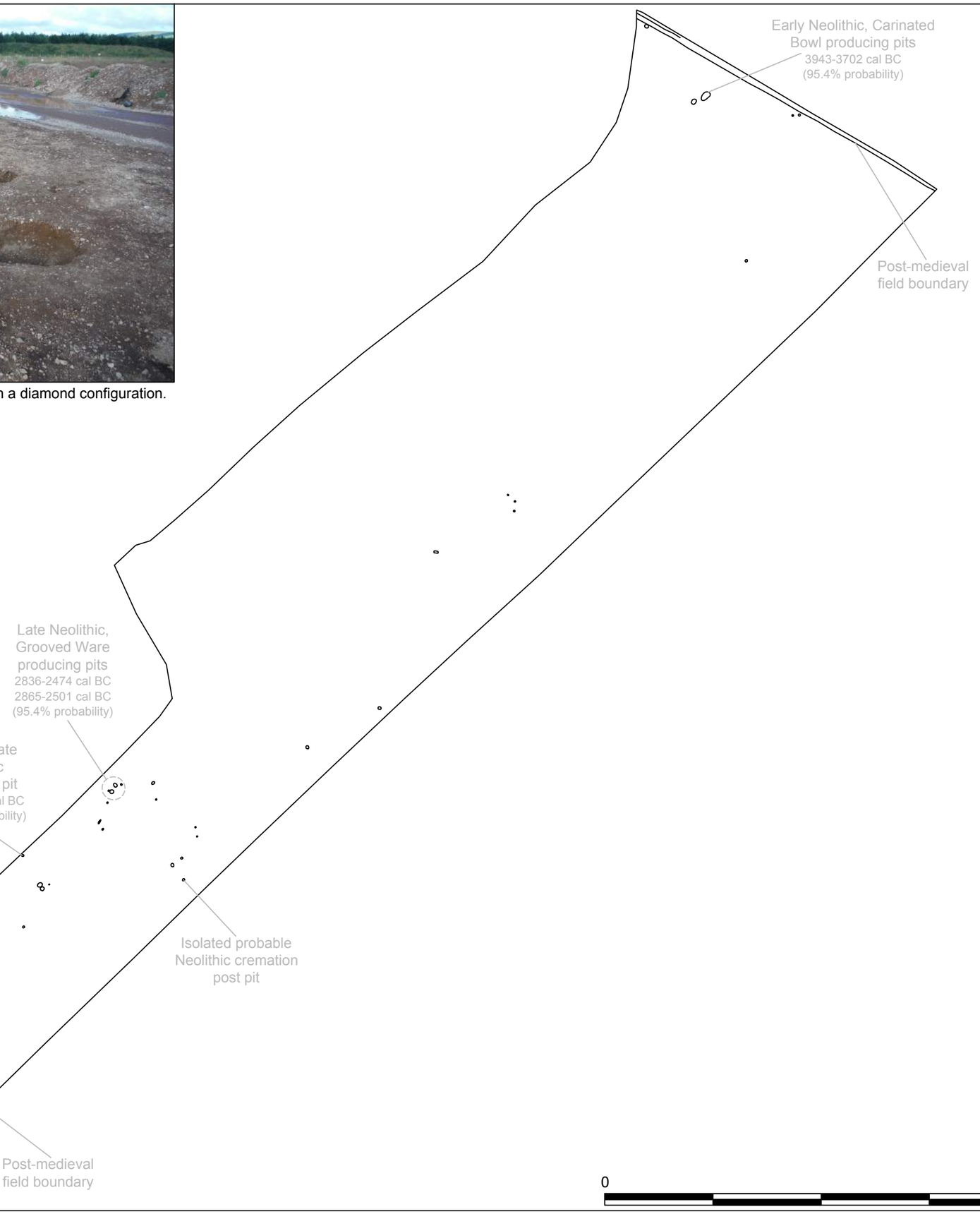


Figure 3:

Plan of archaeological features excavated during Phase 8.

Scale = 1:1000 at A3

Key:

N

Figure 4. Cremation pit cluster after excavation, looking southwest, with Yeavering Bell in the background. Scale = 0.5m graduations.

Figure 5. Cremation Pit 1 after half sectioning. Scale = 0.5m graduations.

Figure 6. Cremation Pit 2 after half sectioning. Scale = 0.5m graduations.

Figure 7. Cremation Pit 3 after half sectioning. Scale = 0.5m graduations.

Figure 8. Cremation Pit 4 after half sectioning. Scale = 0.5m graduations.

Figure 9. Cremation 16, pit F4120 before excavation. Scale = 0.5m graduations.

Figure 10. Cremation 16, pit F4120 after half sectioning. Scale = 0.5m graduations.

Figure 11. Cremation pit F4110 showing Cremation 15 material at the base. Scale = 0.5m graduations.

Figure 12. Pit F3979 and stakehole F3981 after half sectioning. Scale = 0.5m graduations.

Figure 13. Pit F4073 after half sectioning. Scale = 0.5m graduations.

Figure 14. Boundary ditch F4000. Scale = 0.5m graduations.

Figure 15. Boundary ditch F3968. Scale = 0.5m graduations.

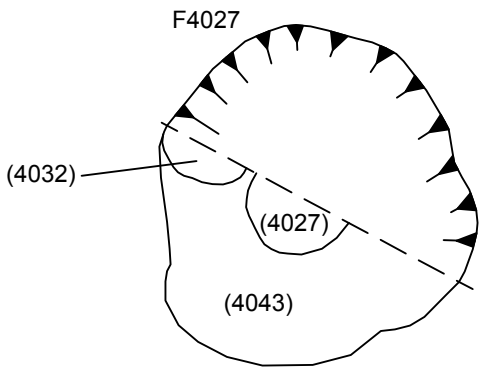
Figure 16. Modern sheep burial F4009. Scale = 0.5m graduations.

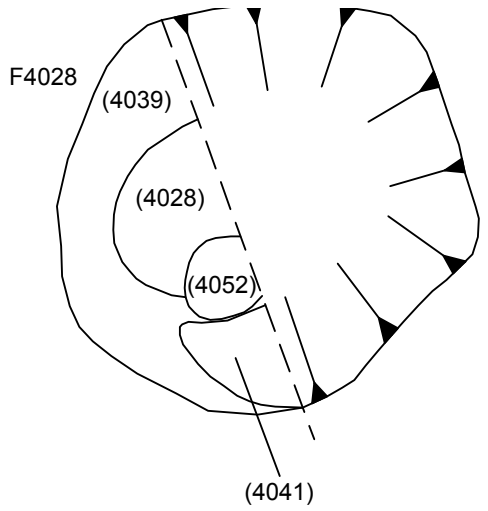
Figure 17. Pit F4011 after half sectioning. Scale = 0.5m graduations.

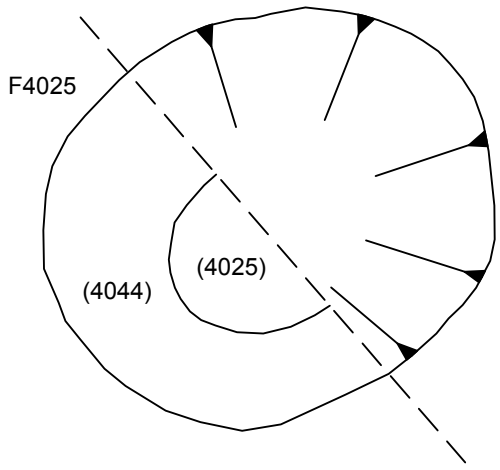
Figure 18. Pit F3987 and pit F3989 after half sectioning. Scale = 0.5m graduations.

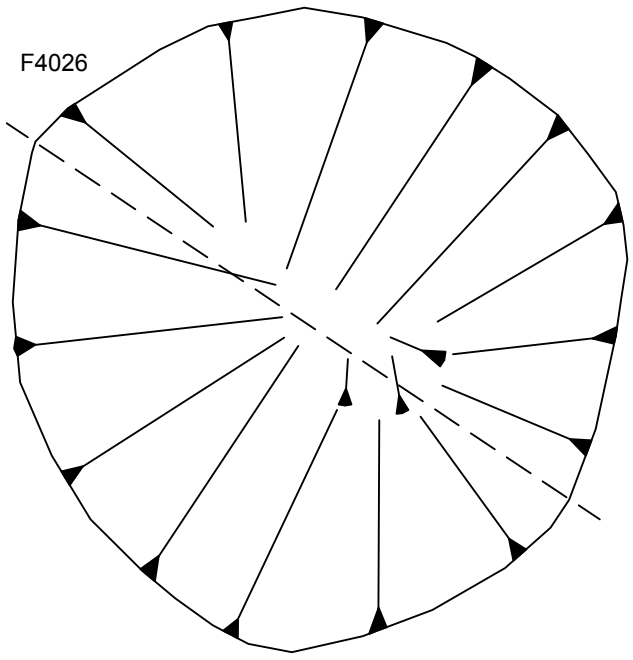
Figure 19. Posthole cluster, including posthole F4019, posthole F4021 and posthole F4023, possibly representing a Neolithic post-built structure. Scale = 0.5m graduations.

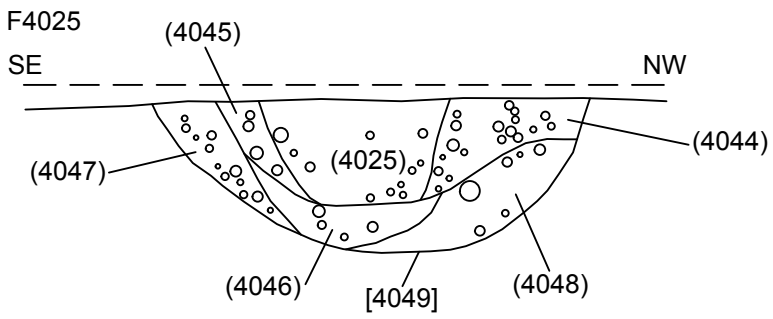
Figure 20. Rolled birch bark and hazel nutshell from context (4010). Scale = 1cm graduations.

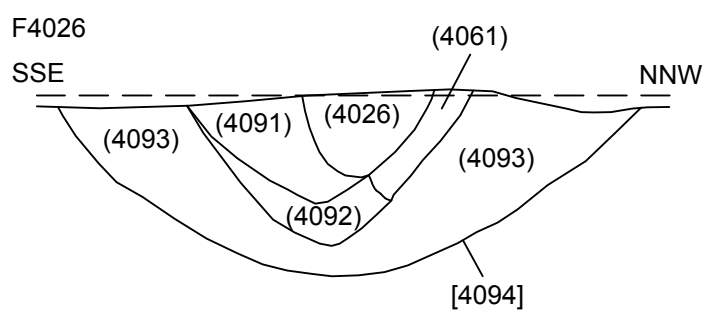


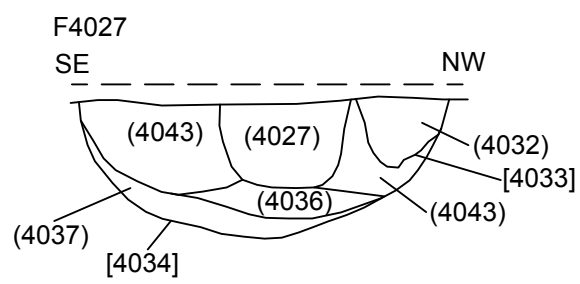












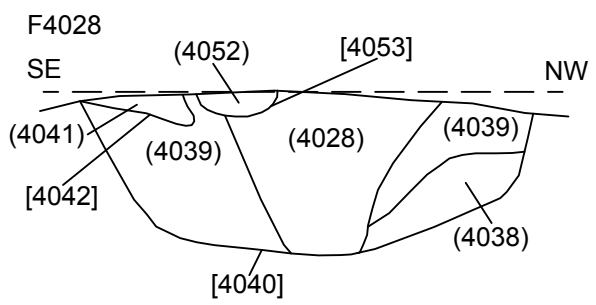


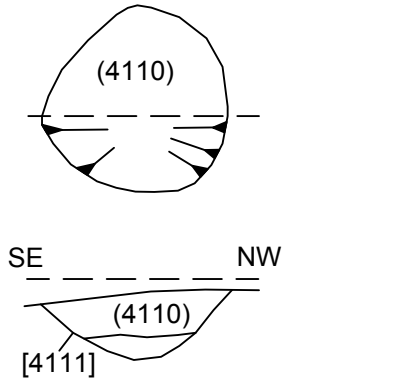
Figure 21:

Cremation pit cluster consisting of F4025, F4026, F4027 and F4028 after half excavation.

Scale = 1:20 at A3

Key:

N



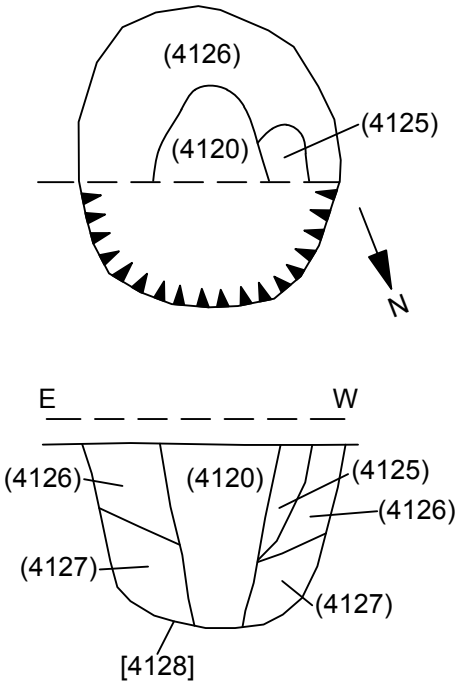
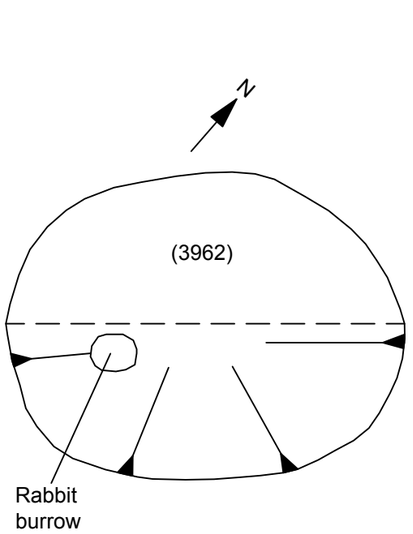


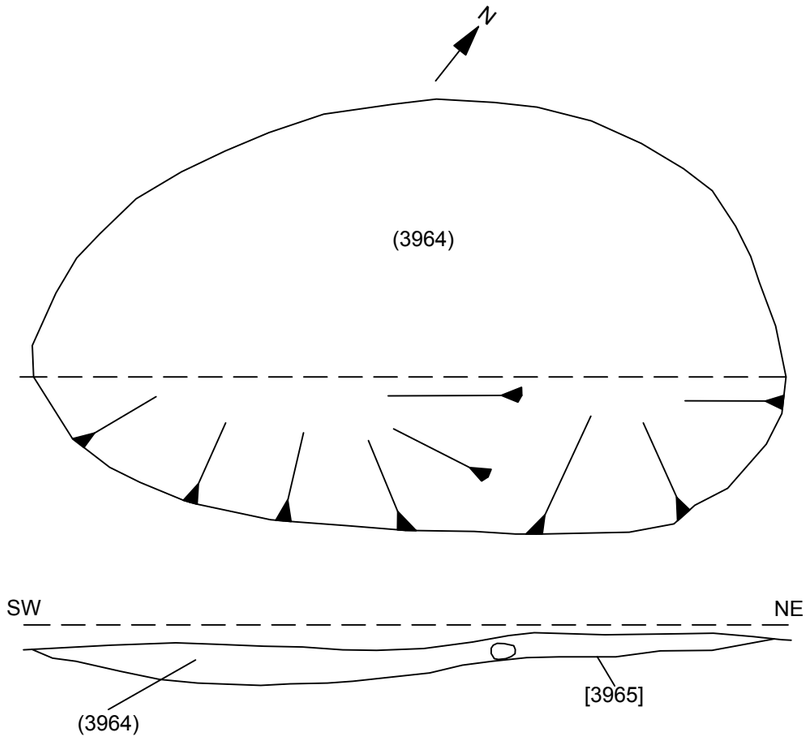
Figure 22:

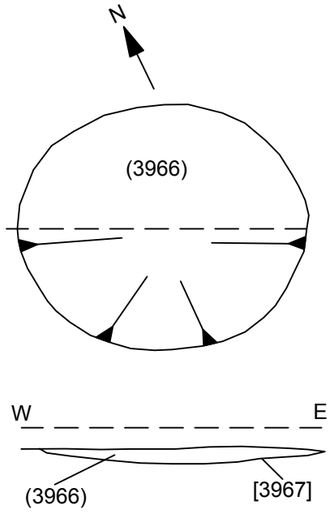
Isolated cremation pits.

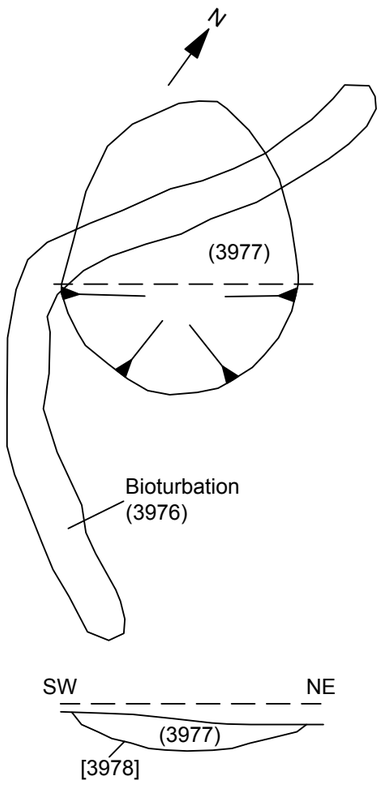
Scale = 1:10 at A4

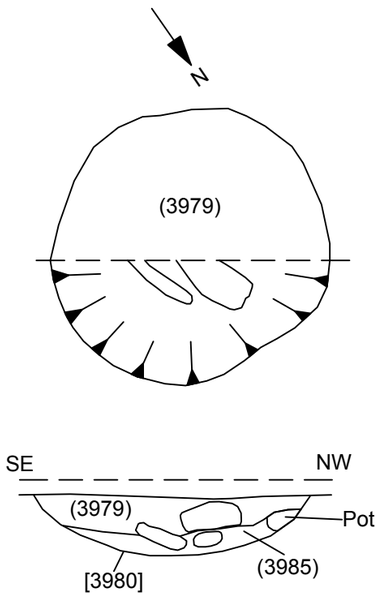
Key:

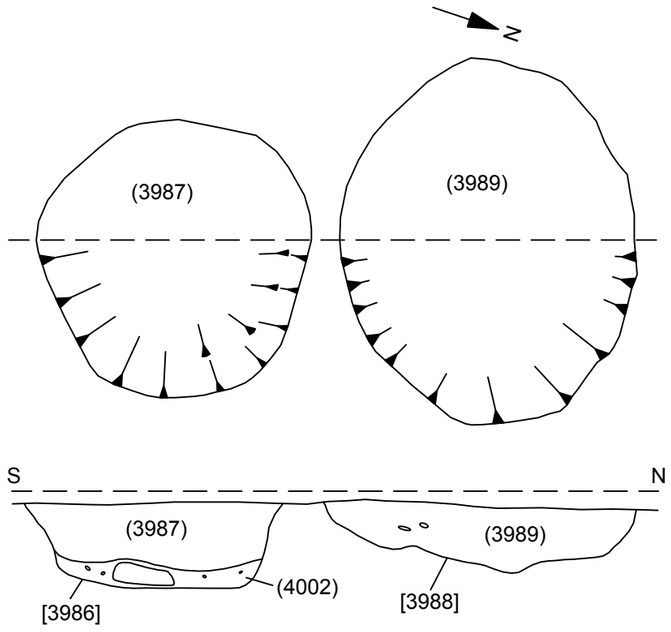












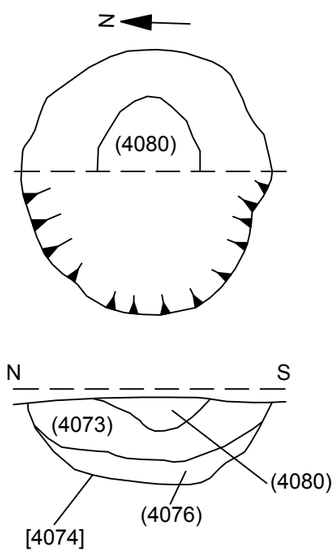
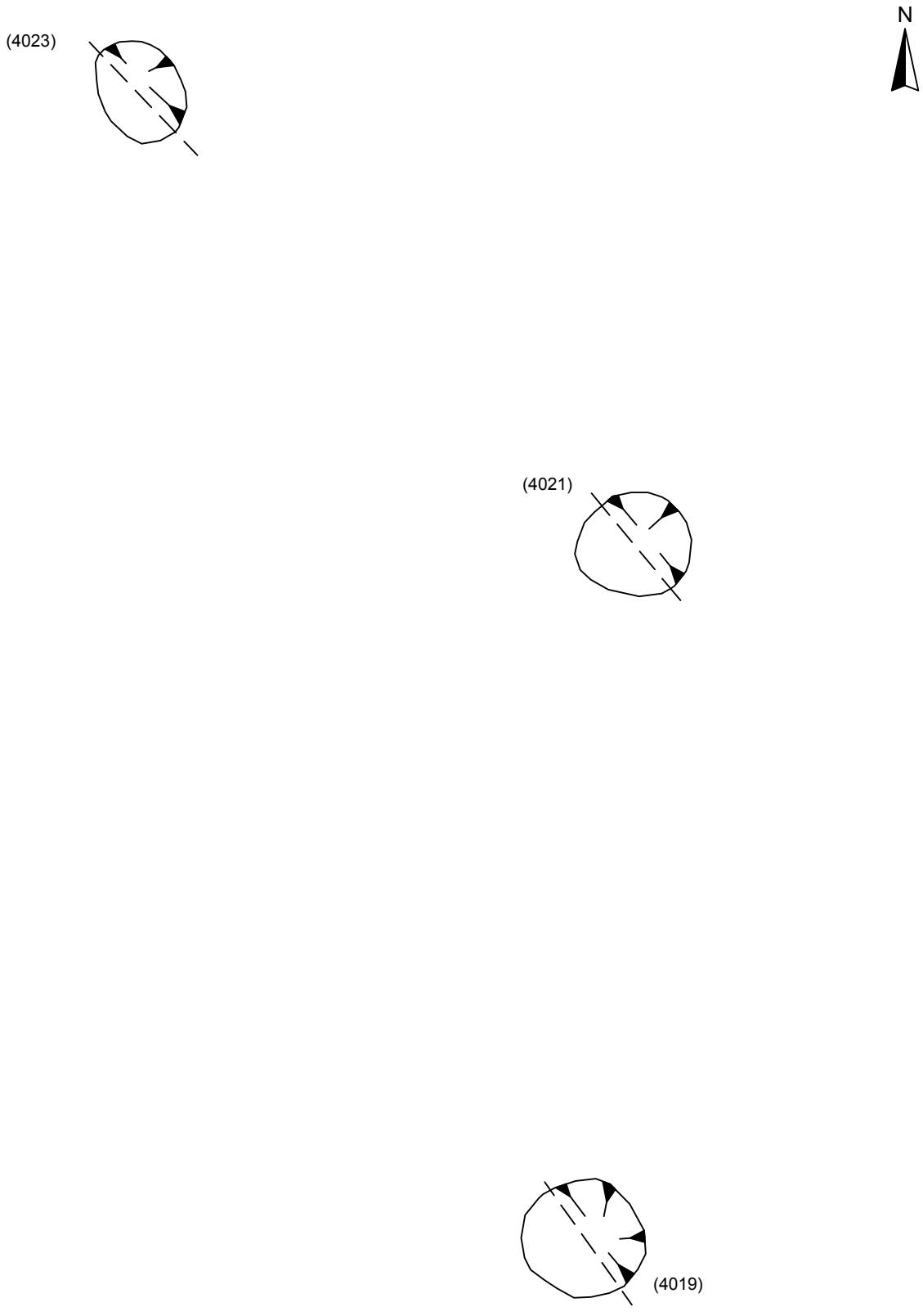


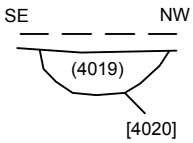
Figure 23:

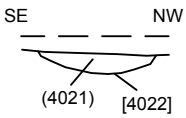
Features that produced prehistoric pottery and/or lithics.

Scale = 1:20 at A3

Key:







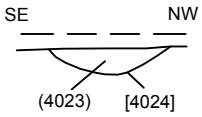


Figure 24:

Possible Early Neolithic post-built structure.

Scale = 1:20 at A4

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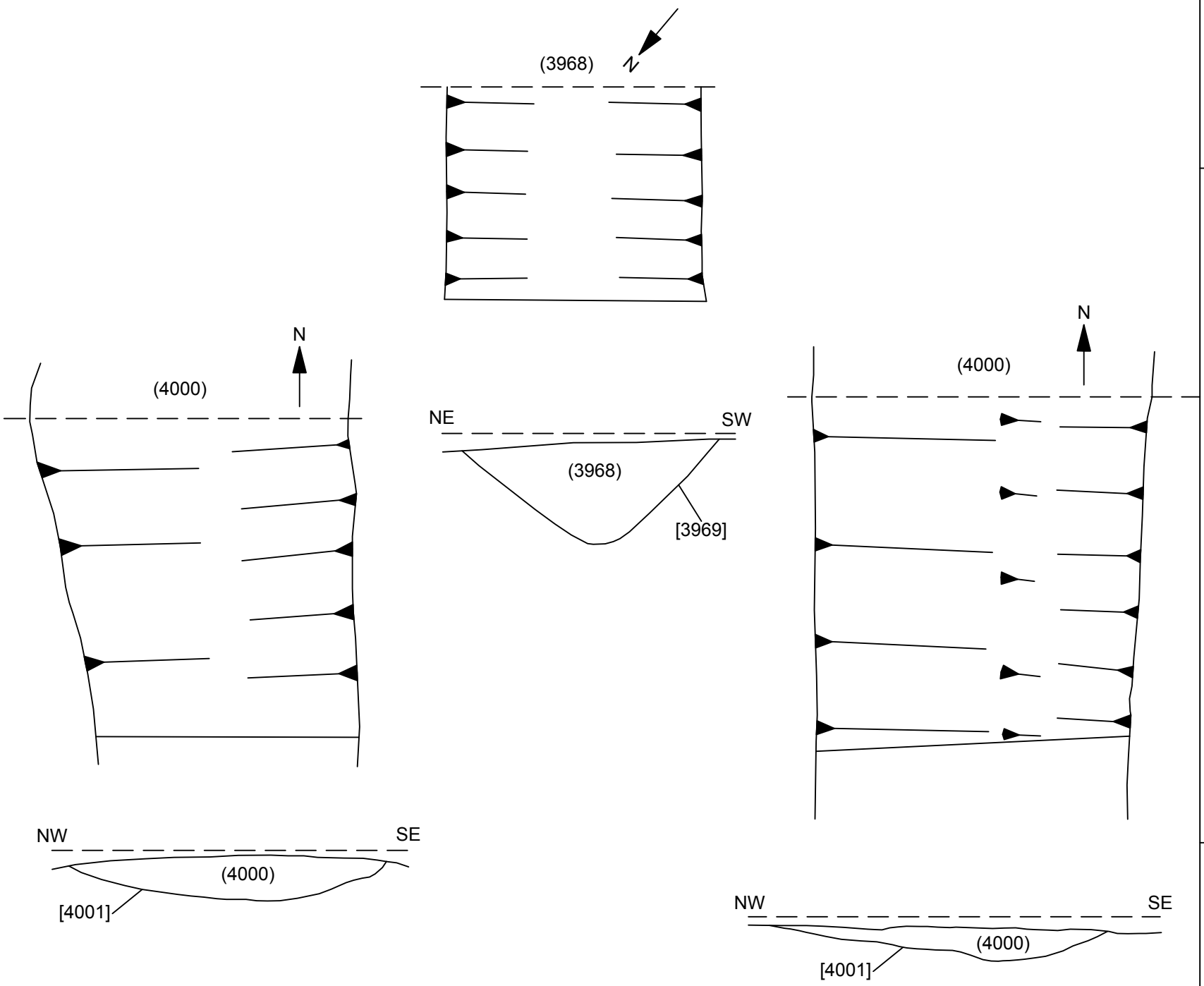

Figure 25:

Post-Medieval boundary ditches.

Scale = 1:20 at A4

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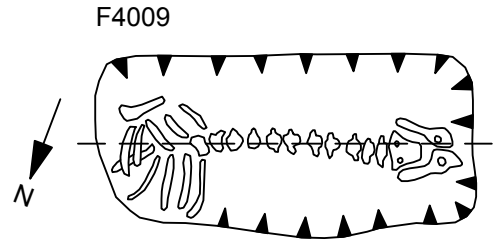
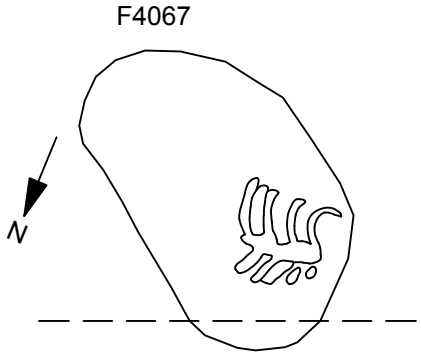
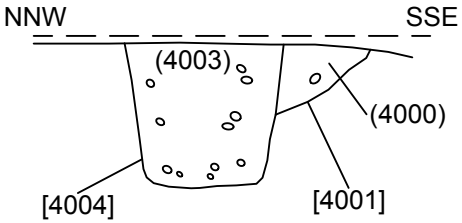
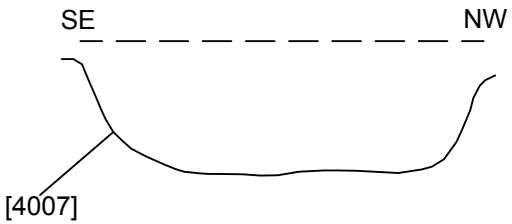








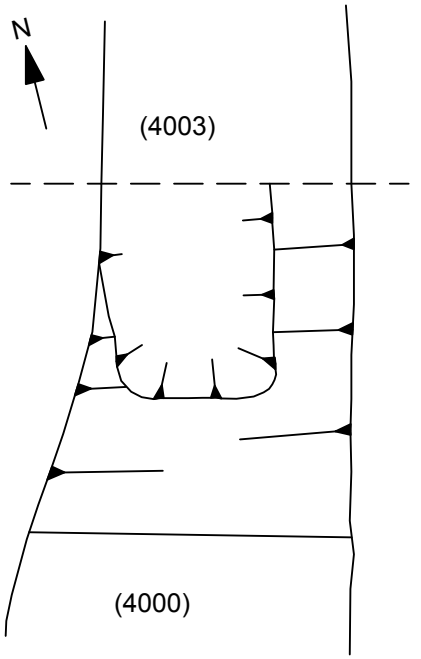


Figure 26:

Modern sheep burials.

Scale = 1:20 at A4

Key:

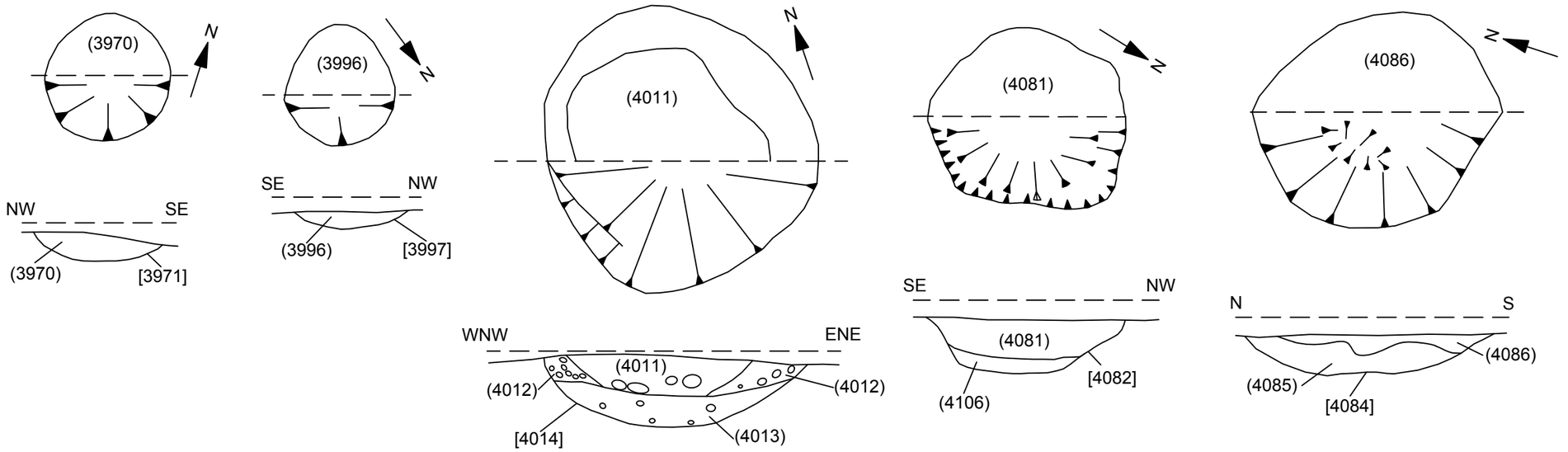
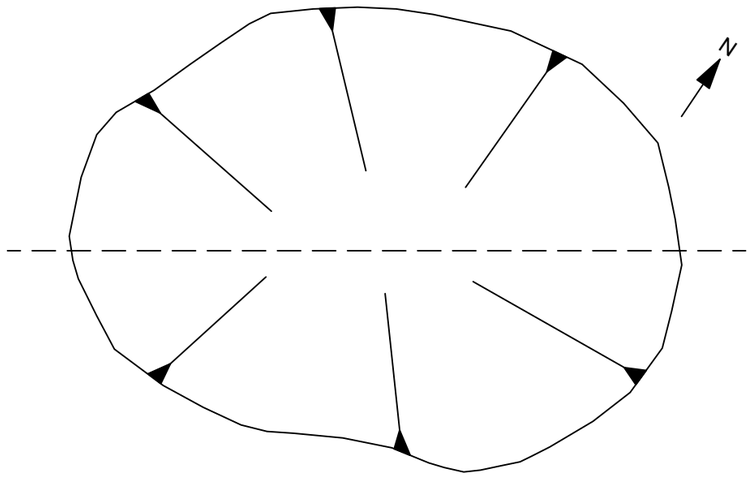


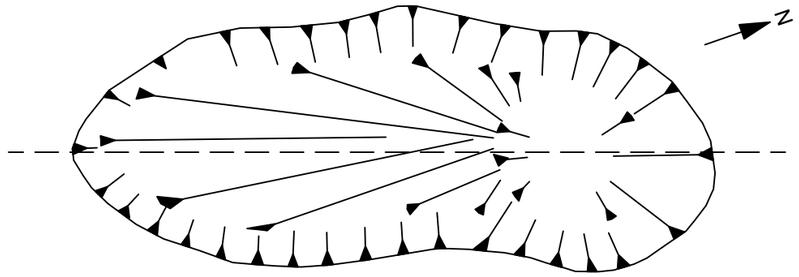
Figure 27:

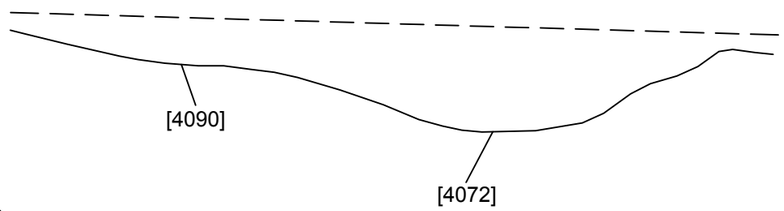
Undated pits.

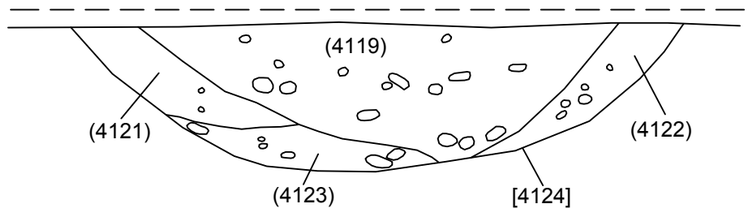
Scale = 1:20 at A3

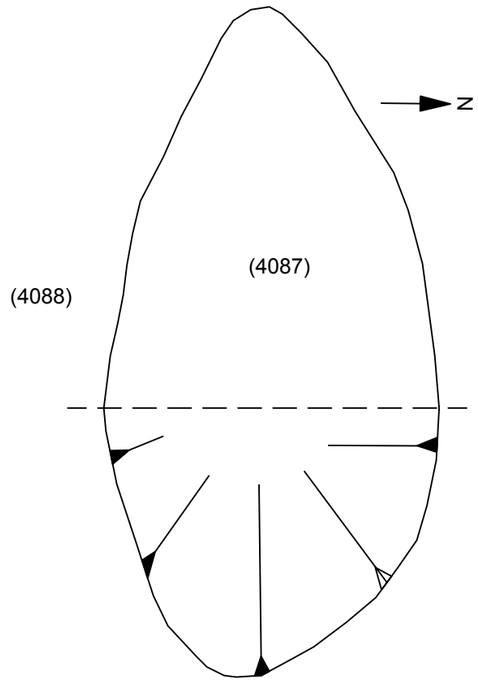
Key:

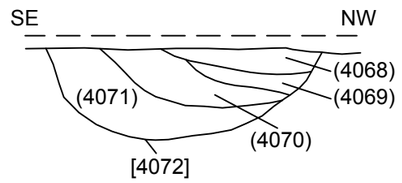


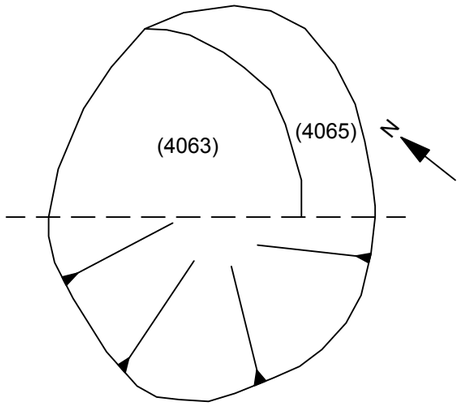


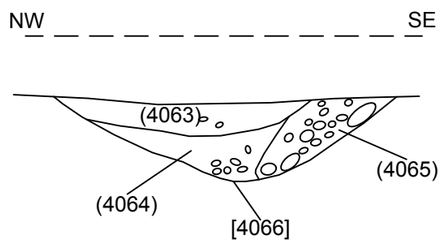












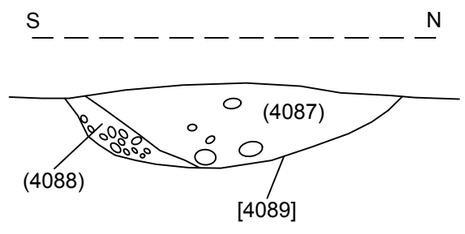


Figure 28:

Large undated pits.

Scale = 1:20 at A3

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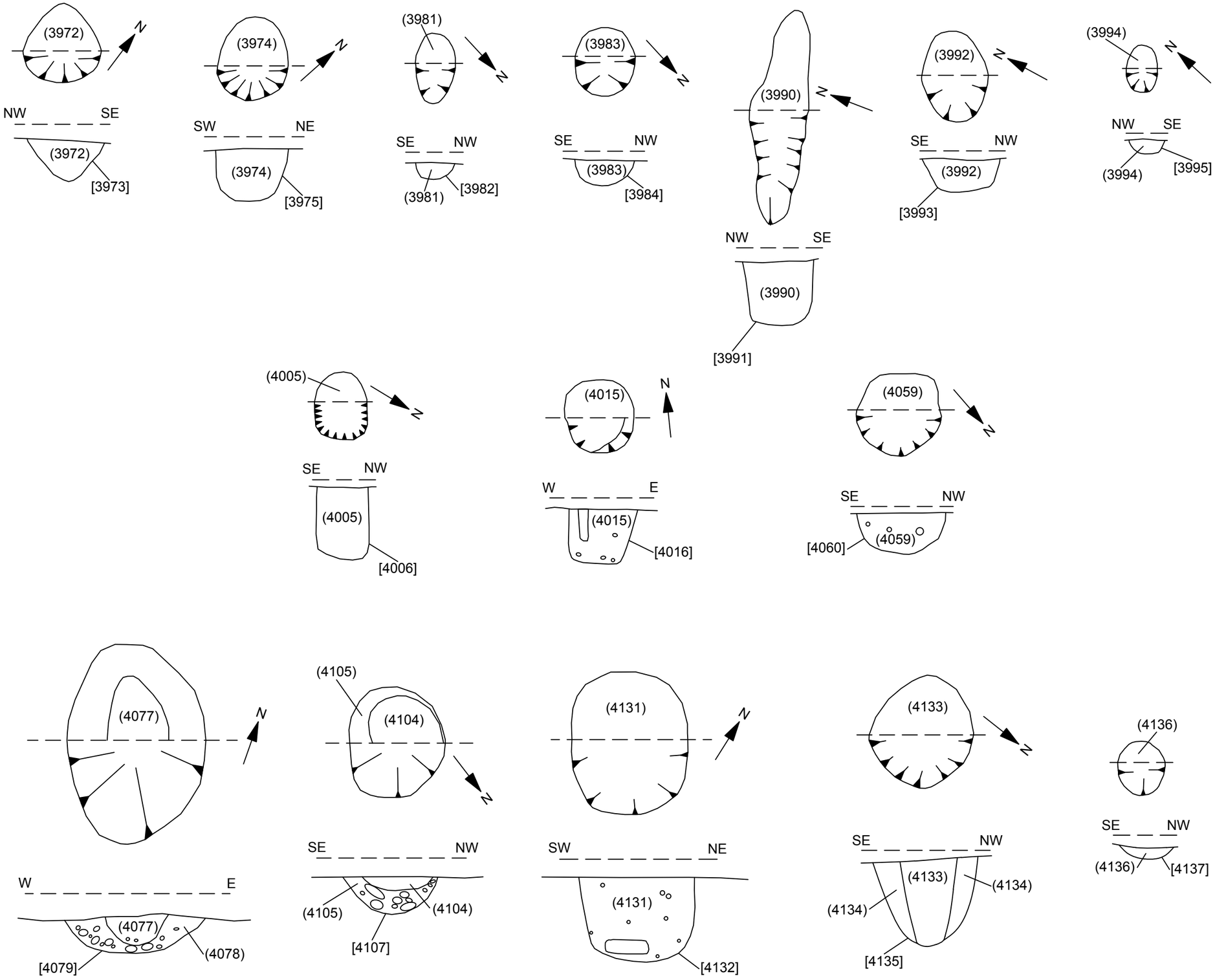


Figure 29:

Plans and sections of undated postholes.

Scale = 1:20 at A3

Key:

Figure 30. Grooved Ware vessel base sherds from context (3985), Vessel 34. Scale = 1cm graduations.

Figure 31. A sherd of Grooved Ware from context (4010), Vessel 36. Scale = 1cm graduations.

Figure 32. Grooved Ware vessel base sherds from context (4010), Vessel 35. Scale = 1cm graduations.

Figure 33. A sherd of Grooved Ware recovered from context (4002), Vessel 38. Scale = 1cm graduations.

Figure 34. Carinated Bowl sherds and a retouched flint blade from context (3964), Vessel 121. Scale = 1cm graduations.

Figure 35. Flint knife recovered from Cremation 8 within Cremation Pit 2. Scale = 1cm graduations.

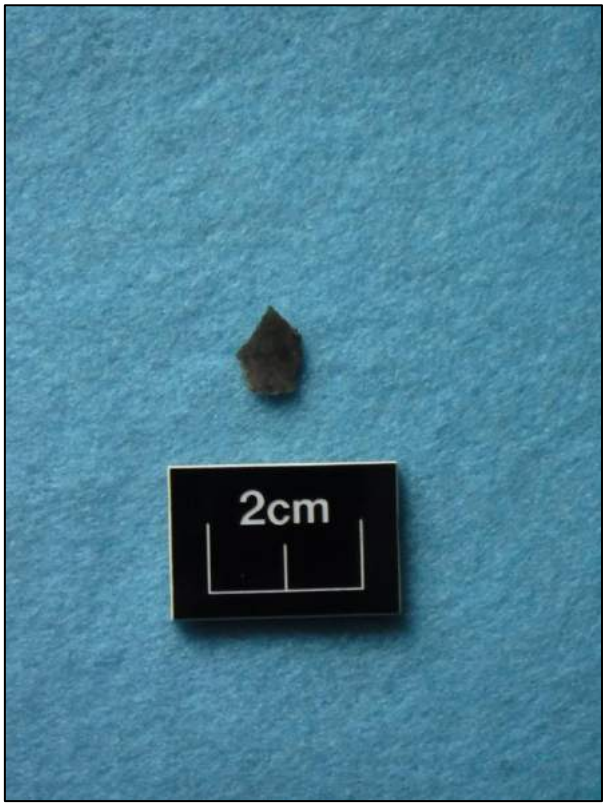
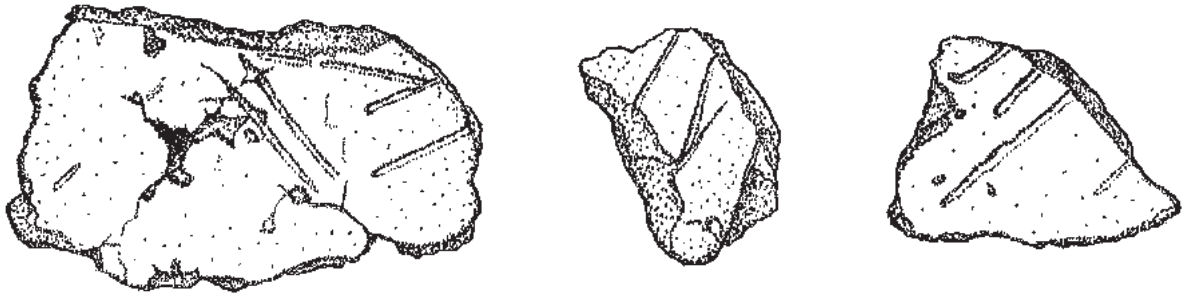


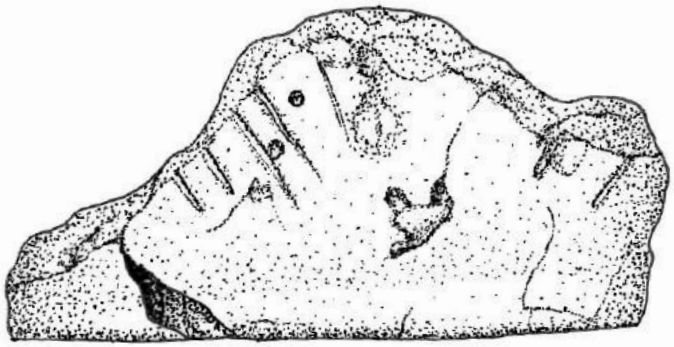
Figure 36. A burnt flint chip from context (3977). Scale = 1cm graduations.

Figure 37. Daub recovered from pit F3966 showing the impression where the clay had been pressed against a stick. Scale = 1cm graduations.

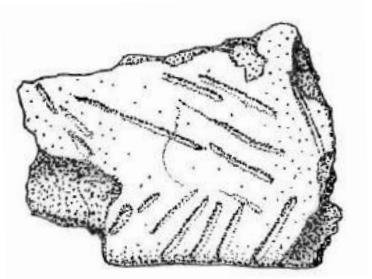
Vessel 37, context (3976), SF No. 1838



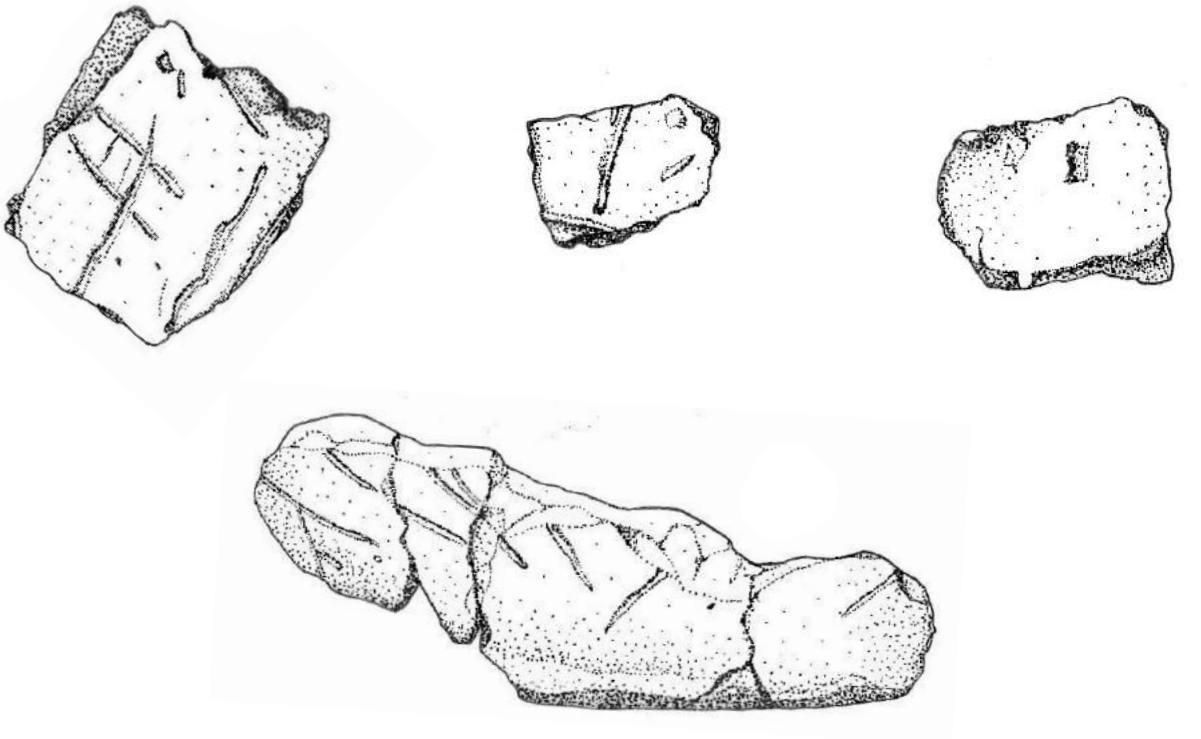
Vessel 34, context (3985), SF No. 1840



Vessel 36, context (4010) SF No. 1836



Vessel 35, context (4010) SF No. 1836



5cm

APPENDIX II - REGISTERS

Context Register

Context No.	Associated Contexts	Description	Date
3962	3962, 3963	Pit	Neo
3964	3964, 3965	Pit	Neo
3966	3966, 3967	Pit	
3970	3970, 3971	Pit	
3972	3972, 3973	Posthole	
3974	3974, 3975	Posthole	
3977	3977, 3978, 4010	Pit	Neo
3979	3979, 3980, 3985	Pit	
3981	3981, 3982	Stakehole	
3983	3983, 3984	Posthole	
3986	3986, 3987, 4002	Pit	
3989	3988, 3989	Pit	
3990	3990, 3991	Posthole	
3992	3992, 3993	Posthole	
3994	3994, 3995	Posthole	
3996	3996, 3997	Pit	
3998	3998, 3999	Natural feature	
4000	4000, 4001	Ditch	Modern
4003	4003, 4004	Sheep burial	Modern
4005	4005, 4006	Posthole	
4007	4007, 4008, 4009	Sheep burial	Modern
4011	4011, 4012, 4013, 4014	Pit	
4015	4015, 4016	Posthole	
4019	4019, 4020	Posthole	
4021	4021, 4022	Posthole	
4023	4023, 4024	Posthole	
4025	4025, 4029, 4030, 4031, 4035, 4044, 4045, 4046, 4047, 4048, 4049, 4050, 4051	Burial pit with associated cremations	Neo
4026	4026, 4055, 4056, 4061, 4062, 4092, 4093, 4094	Burial pit with associated cremations	Neo
4027	4027, 4032, 4033, 4034, 4036, 4037, 4043	Burial pit with associated cremations	Neo
4028	4028, 4038, 4039, 4040, 4041, 4042, 4075	Burial pit with associated cremations	Neo
4052	4052, 4053	Small pit truncating Cremation Pit 4	
4058	4057, 4058, 4067	Animal burrow	
4059	4059, 4060	Posthole	
4063	4063, 4064, 4065, 4066	Pit	
4068	4068, 4069, 4070, 4071, 4072, 4090	Pit	
4080	4073, 4074, 4076, 4080	Hearth clearance pit	
4077	4077, 4078, 4079	Small pit	

4081	4081, 4082, 4106	Pit	
4083	4083	Spread of topsoil containing burnt bone	
4086	4084, 4085, 4086	Pit	
4087	4087, 4088, 4089	Pit	
4088	4088, 4089	Pit	
4095	4095, 4103, 4096	Pit	
4097	4097, 4102, 4098	Pit	
4099	4099, 4100, 4101	Pit	
4104	4104, 4105, 4107	Posthole	
4108	4108, 4109	Natural feature	
4110	4110, 4111, 4112	Cremation pit	Neo
4115	4115, 4116	Badger burrow	
4117	4117, 4118	Pit	
4119	4119, 4121, 4122, 4123, 4124	Pit	
4120	4120, 4125, 4126, 4127, 4128	Burial pit with associated cremation	Neo
4129	4129, 4130	Natural feature	
4131	4131, 4132	Posthole	
4133	4133, 4134, 4135	Posthole with post pipe	
4136	4136, 4137	Posthole/post socket	
4138	4138, 4139	Pit	
4140	4140, 4141	Pit	

Table 14. Context Register.

Environmental Sample Register

Sample No.	Context No.	Description
472	4068	Upper fill of pit F4068
473	4070	Secondary fill of pit F4068
474	4071	Primary fill of pit F4068
475	3962	Fill of shallow scoop which produced probable Carinated Bowl
476	3964	Fill of shallow scoop which produced probable Carinated Bowl
477	3977	Secondary fill of midden pit F3977
478	3979	Secondary fill of pit F3979
479	3985	Primary fill of pit F3979 which produced pot and hazelnut
480	3987	Secondary fill of pit F3987
481	3989	Fill of midden pit
482	4002	Primary fill of pit F3987 which produced pot
483	4010	Primary fill of pit F3977 which produced pot, hazelnut and burnt flint
484	4025	Fill of post pipe within Cremation Pit 1
485	4026	Fill of post pipe within Cremation Pit 2
486	4027	Fill of post pipe within Cremation Pit 3
487	4028	Fill of post pipe within Cremation Pit 4
488	4048	Primary fill of pit Cremation Pit 1

489	4063	Upper fill of pit F4063
490	4064	Primary fill of pit F4063
491	4073	Secondary fill of pit F4080
492	4076	Primary fill of midden pit F4080
493	4081	Upper fill of pit F4081
494	4083	Spread of plough soil associated with Cremation 10
495	4085	Primary fill of pit F4086
496	4086	Secondary fill of pit F4086
497	4104	Upper fill of pit F4104
498	4110	Fill of cremation pit F4110
499	4121	Secondary fill of pit F4119
500	4123	Primary fill of pit F4119
501	4032	Material of Cremation 1
502	4035	Material of Cremation 2
503	4041	Material of Cremation 3 and Cremation 4
504	4012	Secondary fill of pit F4011
505	4000	Fill of boundary ditch F4000
506	4036	Material of Cremation 5
507	4050	Material of Cremation 5
508	4054	Material of Cremation 6
509	4056	Material of Cremation 7
510	4061	Material of Cremation 8
511	4052	Fill of small posthole truncating top of Cremation Pit 4
512	4075	Material of Cremation 9
513	4125	Material of Cremation 12

Table 15. Environmental Sample Register

APPENDIX III - PALAEOENVIRONMENTAL INVENTORY

Context	**3962**	**3964**	**3977**	**3979**	**3985**	**3987**	**3989**	**4002**	**4005**	**4010**	**4012**	**4013**	**4025**	**4026**	**4027**	**4028**	**4048**
Material for Radiocarbon Dating	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Modern seeds																	
Modern roots																	
Charcoal (total no. of fragments)	**12**	**7**	**2**	**3**	**6**	**14**	**30**	**15**	**6**	**2**	**8**	**15**	**7**	**15**	**9**	**9**	**1**
Quercus (oak)	11	1				1			1		8		7	7		5	
Corylus (hazel)	1	4	2		6	6	27	7	3	2		15					
Betula (birch)				2			1		1								
Populus/*Salix* (poplar/aspen/willow)		1				7	1	8	1								
Maloideae (hawthorn/apple)				1												1	1
Ulmus (elm)																	
Fraxinus (ash)														8	9	3	
Alnus (alder)							1										
Charred remains (cultivars and wild food sources)																	
Triticum dicoccum (emmer wheat) grain		1															
Corylus avellana (hazel) nutshell					2		2			1							
Charred remains																	
Galium spp. seed				1													
Charred *Betula* spp. bark										1							

Table 16. Palaeoenvironmental results from pit and posthole fills.

Context	**4052**	**4063**	**4073**	**4076**	**4077**	**4085**	**4092**	**4104**	**4110**	**4121**	**4123**
Material for Radiocarbon Dating	Yes	Yes	No	Yes	Yes	Yes	No	No	No	No	No
Modern seeds											
Modern roots											
Charcoal (total no. of fragments)	**4**	**2**	**2**	**15**	**6**	**9**	**9**	**5**	**15**	**13**	**4**
Quercus (oak)	3	2	1	4	2	5		5	15	13	4
Corylus (hazel)			1	10		1					
Betula (birch)											
Populus/*Salix* (poplar/aspen/willow)					4						
Maloideae (hawthorn/apple)	1			1							
Ulmus (elm)						1	9				
Fraxinus (ash)						1					
Alnus (alder)											
Triticum dicoccum (emmer wheat) grain											
Corylus avellana (hazel) nutshell				2							
Galium spp. seed											
Charred *Betula* spp. bark											

Table 17. Palaeoenvironmental results from pit and posthole fills.

Context	**4032**	**4035**	**4036**	**4041**	**4050**	**4054**	**4056**	**4061**	**4075**	**4083**	**4125**
Material for Radiocarbon Dating	No	No	No	Yes	No	No	No	No	Yes	No	No
Modern seeds											
Modern roots											
Charcoal (total no. of fragments)	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**6**	**1**	**1**	**0**
Quercus (oak)								6			
Corylus (hazel)											
Betula (birch)											
Populus/*Salix* (poplar/aspen/willow)				1							
Maloideae (hawthorn/apple)									1		
Ulmus (elm)											
Fraxinus (ash)										1	
Alnus (alder)											
Triticum dicoccum (emmer wheat) grain											
Corylus avellana (hazel) nutshell											
Galium spp. seed											
Charred *Betula* spp. bark											

Table 18. Palaeoenvironmental results from cremations.

APPENDIX IV - OSTEOLOGICAL METHODS AND INVENTORY

Material and methods

Material

The following osteological analysis focuses on the content of unurned cremated bone deposits excavated from Cremation Pits 1, 2, 3 and 4. These features contained multiple cremation deposits:

Cremation Pit 1

Primary burial – Cremation 8 (4054)

Secondary burials – Cremation 2 (4030) and Cremations 6 and 7 (4050)

Cremation Pit 2

Primary burial – Cremations 10, 11 and 12 (4061)

Secondary burial – Cremation 9 (4056)

Cremation Pit 3

Primary burial – Cremation 5 (4036)

Secondary burials – Cremation 1 (4032)

Cremation Pit 4

Primary burial – Cremation 13 (4075)

Secondary burials – Cremations 3 and 4 (4041)

Further cremation pit features contained single deposits of cremated bone:

- Cremation 14, within a spread of topsoil most likely representing a truncated pit
- Cremation 15, within pit F4110
- Cremation 16, within pit F4120

Methods

The works were undertaken in accordance with the standards laid out by English Heritage (*Human bones from archaeological sites: guidelines for producing assessment documents and analytical reports*, Centre for Archaeology Guidelines, 2004; *Environmental archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation*, 2002), as well as by the Chartered Institute for Archaeologists (*Excavation and Post-Excavation Treatment of Cremated and Inhumed Human Remains*, McKinley and Roberts, 1993) and finally by the British Association of Biological Anthropologists and Osteologists in conjunction with CIfA (*Guidelines to the standards for recording human remains*, Brickley and McKinley, 2004).

Excavation

Excavation of all of the cremations was undertaken on site. The deposits were excavated in 10cm spits where applicable. All of the fills were floated and wet sieved using a series of sieves (2mm, 5mm and 10mm). Bone fragments down to 2mm were collected for examination. Flotation samples were used to recover plant remains and charcoal.

Osteological and palaeopathological analysis

The osteological and palaeopathological analysis were undertaken in accordance with the standards set out by BABAO and CIfA (1993).

The entire material was analysed macroscopically and, when necessary, with the aid of a magnifying glass (x5). The unidentified bone was sorted into three fractions of 10mm, 5mm and 2mm using UKAS accredited calibrated sieves and weighed to one decimal place. A complete inventory of identified specimens was compiled. For each context the total and group weights of bone were recorded, the level of fragmentation was estimated, the maximum bone fragment lengths measured and the average fragment size per feature was noted. The level of oxidation was inferred from the colour of the bone. Dehydration indicators and exogenous staining of the bone was recorded.

An attempt to obtain demographic data was undertaken. Age of the sub-adult individuals was determined using standard ageing techniques, as specified in Scheuer and Black (2000). The age of the skeletally mature individuals is normally established on the basis of the characteristics of the pelvis. Age was categorised as follows: foetus (up to 40 weeks in utero), neonate (around the time of birth), infant (newborn to one year old), juvenile (1-12 years old), adolescent (13-17 years old), young adult (18-25 years old), young middle adult (26-35 years old), old middle adult (36-45 years old), mature adult (46+) and adult (17+).

The minimum number of individuals represents a minimum number of persons that a given cremation deposit contained and was established by combining skeletal element identification, age and sex estimation results.

All pathological changes to the bone and non-metric traits were recorded.

The osteological material was analysed without consideration of associated artefacts so that the assessment could be as objective as possible.

The report was produced in accordance with Human bones from Archaeological Sites: Guidelines for Producing Assessment Documents and Analytical Reports compiled by English Heritage (2004).

Results

Cremation 1 (4032) Cremation Pit 3

TOTAL WEIGHT OF BONE: 217.5g

MINIMUM NUMBER OF INDIVIDUALS: 1

SEX: Unknown

AGE: Unknown (older than juvenile, based on robustness)

GROUP WEIGHTS (SIZE RANGE): GRAMS

Skull (exc. teeth): 38.3g (29-11mm)

Ribs: 2.4g (46-18mm)

Scapula: 1.6g (21mm)

Radius: 5.1g (35-22mm)

Phalanges: 0.1g (12mm)

Long bone shafts (upper and lower): 85.1g (42-10mm)

>10mm: 99.3g / 45.6%

<10>5mm: 99.7g/ 45.8%

<5>1mm: 18.5g/ 8.5%

PROPORTION OF THE TOTAL WEIGHT OF IDENTIFIED FRAGMENTS

Skull: 28.8%

Axial (excluding skull): 1.8%

Appendicular: 69.3%

PATHOLOGY: none

DEGREE OF OXIDATION: completely oxidised (white), very occasionally grey hue within medullary cavity of the long bones and dentine

DEHYDRATION: longitudinal, frequent U-shaped and transverse fissuring on long bones, some warping of skull and long bones (fleshed cremation)

AVERAGE FRAGMENT SIZE: 8mm

LARGEST FRAGMENT SIZE: long bone: 42mm; skull: 29mm

FRAGMENTATION: high, over 50% of fragments measuring less than 10mm

STAINING: none

CHARCOAL: yes

Finds: none

Animal bone: 1.1g (medium mammal: shaft of ulna)

Cremation 2 (4030) Cremation Pit 1

TOTAL WEIGHT OF BONE: 697.3g

MINIMUM NUMBER OF INDIVIDUALS: 1

SEX: Unknown

AGE: Adult (robustness) (?middle adult or older – based on pathological changes)

GROUP: WEIGHT (GRAMS) (SIZE RANGE)

Skull (exc. teeth): 122.6g (45-10mm)

Teeth: 0.1g (9mm)

Vertebrae: 9.6g (29-10mm)

Clavicles: 1.3g (49mm)

Scapulae: 3.7g (39-14mm)

Ribs: 2.7g (29-18mm)

Pelvis: 10.9g (49-19mm)

Femora: 7.8g (60mm)

Fibulae: 3.6g (42mm)

Talus: 1.1g (19mm)

Long bone shafts: 256.5g (53-10mm)

Unid: 277.4g

>10mm: 413.2g/ 59.2%

<10>5mm: 240.0g/ 34.4%

<5>1mm: 44.1g/ 6.3%

PROPORTION OF THE TOTAL WEIGTH OF IDENTIFIED FRAGMENTS

Skull: 29.2%

Axial (excluding skull): 2.9%

Appendicular: 67.8%

PATHOLOGY: C2 – osteophytes on the odontoid peg

DEGREE OF OXIDATION: fully oxidised (white), very occasionally grey hue present

DEHYDRATION: U-shaped and concentric and transverse fissures present, irregular longitudinal fissuring, some warping (fleshed)

AVERAGE FRAGMENT SIZE: 12mm

LARGEST FRAGMENT SIZE: long bone: 53mm; skull: 45mm

FRAGMENTATION: high

STAINING: none

NON-METRIC TRAITS: none observable

CHARCOAL: none

Finds: none

Cremation 3 and Cremation 4 (4041) Cremation Pit 4

TOTAL WEIGHT OF BONE: 846.8g

MINIMUM NUMBER OF INDIVIDUALS: 2

SEX: Unknown

AGE: Cremation 3: ?Adult (>14 years old - fused proximal end of distal phalanges; robustness)

Cremation 4: Unknown (?adolescent; phalangeal robustness)

GROUP: WEIGHT (GRAMS) (SIZE RANGE)

Skull (exc. Teeth): 124.4 (48-4mm)

Teeth: 4.0g (1.4-0.3mm)

Vertebrae: 5.4g (22-10mm)

Ribs: 1.0g (30-13mm)

Scapula: 1.5g (25mm)

Humerus: 11.9g (31-14mm)

Ulna: 1.1g (22mm)

Radius: 6.1g (46-22mm)

Lunate: 1.1g (16-14mm)

Scaphoid: 1.3g (23mm)

Trapezoid 0.3g (12mm)

Distal hand phalanges: 0.2g (9-7mm)

Phalanx: 0.1g (10mm)

Innominates: 6.6g (43-15mm)

Femur: 3.8g (47mm)

Tibia: 12.0g (49-15mm)

Fibula: 3.1g (34-17m)

Talus: 0.6g (14mm)

MTC/MTT: 0.7g (13-9mm)

Long bone shafts (upper and lower unidentified): 206.0g (52-4mm)

>10mm: 333.8g/ 39.4%

<10>5mm: 379.2g/ 44.7%

<5>1mm: 133.8g/ 15.8%

PROPORTION OF THE TOTAL WEIGTH OF IDENTIFIED FRAGMENTS

Skull: 32.8%

Axial (excluding skull): 1.6%

Appendicular: 65.5%

PATHOLOGY: fibrous appearance of occipital endocranial aspect

DEGREE OF OXIDATION: fully oxidised (white)

DEHYDRATION: mostly longitudinal fissures; frequent transverse and very occasional U-shaped fissures also present, occasional warping (?)

AVERAGE FRAGMENT SIZE: 8mm

LARGEST FRAGMENT SIZE: long bone: 52.0mm; skull: 48.0mm

FRAGMENTATION: high

STAINING: none

Animal bone: 0.1g

CHARCOAL: none

Finds: none

Cremation 5 (4036) Cremation Pit 3

TOTAL WEIGHT OF BONE: 48.3g

MINIMUM NUMBER OF INDIVIDUALS: 1

SEX: Unknown

AGE: ?Adult (robustness)

GROUP WEIGHTS (SIZE RANGE): GRAMS

Skull (exc. teeth): 14.7g (29-8mm)

Long bone shafts (upper and lower): 20.0g (46-9mm)

>10mm: 27.3g/ 56.5%

<10>5mm: 18.9g/ 39.1%

<5>1mm: 2.1g/ 4.3%

PROPORTION OF THE TOTAL WEIGTH OF IDENTIFIED FRAGMENTS

Skull: 42.3%

Axial (excluding skull): 0.0%

Appendicular: 57.6%

PATHOLOGY: none

DEGREE OF OXIDATION: completely oxidised

DEHYDRATION: U-shaped and transverse fissuring on long bones, some warping of skull and long bones (fleshed)

AVERAGE FRAGMENT SIZE: 11mm

LARGEST FRAGMENT SIZE: long bone: 46mm; skull: 29mm

FRAGMENTATION: high, over 60% of fragments measuring less than 10mm

STAINING: none

CHARCOAL: none

Finds: none

Cremation 6 and Cremation 7 (4054) Cremation Pit 1

TOTAL WEIGHT OF BONE: 42.0g

MINIMUM NUMBER OF INDIVIDUALS: 2 (dental development – infant, long bones – ?adult)

SEX: Unknown

AGE: Cremation 6: Neonate/Infant (dental development: 1.5 months ± 1.5months: AlQahtani 2009)

Cremation 7: ?Adult (robustness)

GROUP: WEIGHT (GRAMS) (SIZE RANGE)

Skull (exc. teeth): 4.5g (17-5mm)

Teeth: 0.1g (5mm)

Long bone shafts (infant): 0.8g (9-7mm)

Long bone shafts (upper and lower, unidentified): 20.7g (38-10mm)

>10mm: 10.0g/ 23.8%

<10>5mm: 29.5g/ 70.2%

<5>1mm: 2.5g/ 5.9%

PROPORTION OF THE TOTAL WEIGTH OF IDENTIFIED FRAGMENTS

Skull: 15.7%

Axial (excluding skull): 0.0%

Appendicular: 83.8%

INFANT:

Skull: 84%

Long bones: 15%

Proportion of infant bones of the total weight:

12%

PATHOLOGY: none

DEGREE OF OXIDATION: fully oxidised

DEHYDRATION: infant: transverse and longitudinal fissures present, very occasional U-shaped, slight warping (?fleshed); remaining bone: transverse and longitudinal fissures present, very occasional U-shaped, some checking (?)

AVERAGE FRAGMENT SIZE: 9mm

LARGEST FRAGMENT SIZE: long bone: 38mm; skull: 17mm

FRAGMENTATION: high

STAINING: none

CHARCOAL: yes

Finds: none

Cremation 8 (4054) Cremation Pit 1

TOTAL WEIGHT OF BONE: 9.1g

MINIMUM NUMBER OF INDIVIDUALS: 1

SEX: Unknown

AGE: Infant (dental development: 7.5 months ± 1.5 months; AlQahtani 2009)

GROUP: WEIGHT (GRAMS) (SIZE RANGE)

Skull (exc. Teeth): 3.9g (15-1mm)

Teeth: 0.1g (6mm)

Long bone shafts (upper and lower, unidentified): 1.2g (8-4mm)

>10mm: 0.0g/ 0.0%

<10>5mm: 3.7g/ 40.6%

<5>1mm: 5.4g/ 59.3%

PROPORTION OF THE TOTAL WEIGTH OF IDENTIFIED FRAGMENTS

Skull: 76.9%

Axial (excluding skull): 0.0%

Appendicular: 23.0%

PATHOLOGY: none

DEGREE OF OXIDATION: fully oxidised

DEHYDRATION: U-shaped and transverse fissures (?fleshed)

AVERAGE FRAGMENT SIZE: 4mm

LARGEST FRAGMENT SIZE: long bone: 8mm; skull: 15mm

FRAGMENTATION: high

STAINING: none

CHARCOAL: yes

Finds: none

Cremation 9 (4056) Cremation Pit 2

TOTAL WEIGHT OF BONE: 543.7g

MINIMUM NUMBER OF INDIVIDUALS: 1

SEX: Unknown

AGE: ?Adult

GROUP WEIGHTS (SIZE RANGE): GRAMS

Skull (exc. teeth): 38.6g (31-8mm)

Teeth: 1.1g (10-8mm)

Vertebrae: 4.1g (21-7mm)

Ribs: 1.3g (24-11mm)

Scapula: 1.0g (18-11mm)

Radius: 0.6g (11mm)

Hamate: 0.6g (13mm)

MTC/MTT: 0.6g (9-7mm)

Phalanges: 2.9g (19-6mm)

Distal femur: 5.4g (48mm)

Fibula: 3.2g (24-15mm)

Talus: 1.8g (24mm)

Long bone shafts (upper and lower): 216.7g (47-8mm)

>10mm: 189.5g/34.8%

<10>5mm: 310.0g/ 57.0%

<5>1mm: 44.2g/ 8.1%

PROPORTION OF THE TOTAL WEIGHT OF IDENTIFIED FRAGMENTS

Skull: 14.2%

Axial (excluding skull): 1.9%

Appendicular: 83.7%

PATHOLOGY: none

DEGREE OF OXIDATION: completely oxidised (white), very occasionally grey hue

DEHYDRATION: U-shaped and transverse fissuring on long bones, some checking and longitudinal fissuring also present; some warping of skull and long bones (fleshed)

AVERAGE FRAGMENT SIZE: 9mm

LARGEST FRAGMENT SIZE: long bone: 48mm; skull: 31mm

FRAGMENTATION: high

STAINING: none

CHARCOAL: yes

Animal bone: 6.0g (long bone shafts fragments, indeterminate)

Finds: none

Cremation 10, Cremation 11 and Cremation 12 (4061) Cremation Pit 2

TOTAL WEIGHT OF BONE: 655.9g

MINIMUM NUMBER OF INDIVIDUALS: 3

SEX: Unknown

AGE: Cremation 10: Adolescent/Adult (fusion of bones)

Cremation 11: ?Subadult (robustness)

Cremation 12: ?Subadult (robustness)

GROUP: WEIGHT (GRAMS) (SIZE RANGE)

Skull (exc. teeth): 93.1g (37-9mm)

Scapula: 3.4g (31mm)

Carpals: 3.0g (12mm)

Phalanges – hand: 0.4g (15-6mm)

Femur: 3.9g (28mm)

Fibula: 4.0g (47mm)

Long bone shafts (upper and lower, unidentified): 186.7g (59-8mm)

>10mm: 334.7g/ 51.0%

<10>5mm: 271.0g/ 41.3%

<5>2mm: 50.2g/ 7.6%

PROPORTION OF THE TOTAL WEIGTH OF IDENTIFIED FRAGMENTS

Skull: 31.6%

Axial (excluding skull): 0.0%

Appendicular: 68.3%

PATHOLOGY: none

DEGREE OF OXIDATION: fully oxidised

DEHYDRATION: U-shaped and transverse fissures present, longitudinal fissuring, some warping (fleshed)

AVERAGE FRAGMENT SIZE: 12mm

LARGEST FRAGMENT SIZE: long bone: 59mm; skull: 37mm

FRAGMENTATION: high

STAINING: none

NON-METRIC TRAITS: none

CHARCOAL: yes

Finds: burnt lithic knife and blade

Cremation 13 (4075) Cremation Pit 4

TOTAL WEIGHT OF BONE: 8.5g

MINIMUM NUMBER OF INDIVIDUALS: 1

SEX: Unknown

AGE: Juvenile (dental development: 2y±6 months; AlQahtani 2009)

GROUP: WEIGHT (GRAMS) (SIZE RANGE)

Skull (exc. Teeth): 3.4g (19-5mm)

Teeth: 0.1g (7-4mm)

Long bone shafts (upper and lower, unidentified): 2.1g (19-8mm)

>10mm: 3.2g/ 37.6%

<10>5mm: 3.4g/ 40.0%

<5>1mm: 1.9g/ 22.3%

PROPORTION OF THE TOTAL WEIGTH OF IDENTIFIED FRAGMENTS

Skull: 62.5%

Axial (excluding skull): 0.0%

Appendicular: 37.5%

PATHOLOGY: none

DEGREE OF OXIDATION: fully oxidised (white) with very occasionally grey hue (dentine)

DEHYDRATION: U-shaped, transverse fissures, some warping (?fleshed)

AVERAGE FRAGMENT SIZE: 8mm

LARGEST FRAGMENT SIZE: long bone: 19.0mm; skull: 19.0mm

FRAGMENTATION: high

STAINING: none

CHARCOAL: yes

Finds: none

Cremation 14 (4083) spread of topsoil (believed to be a truncated, disturbed cremation)

TOTAL WEIGHT OF BONE: 8.6g

MINIMUM NUMBER OF INDIVIDUALS: 1

SEX: Unknown

AGE: Infant (robustness)

GROUP WEIGHTS (SIZE RANGE): GRAMS

Skull (exc. teeth): 1.2g (18-6mm)

Scapula: 0.3g (20mm)

Long bone shafts (upper and lower): 3.3g (19-7mm)

>10mm: 0.0g/ 0.0%

<10>5mm: 6.1g/ 70.9%

<5>2mm: 2.5g/ 29.0%

PROPORTION OF THE TOTAL WEIGTH OF IDENTIFIED FRAGMENTS

Skull: 25.0%

Axial (excluding skull): 0.0%

Appendicular: 75.0%

PATHOLOGY: none

DEGREE OF OXIDATION: completely oxidised

DEHYDRATION: mostly transverse fissuring on long bones,

AVERAGE FRAGMENT SIZE: 7mm

LARGEST FRAGMENT SIZE: long bone: 19mm; skull: 18mm

FRAGMENTATION: high

STAINING: none

CHARCOAL: yes

Finds: none

Cremation 15 (4112) pit F4110

TOTAL WEIGHT OF BONE: 226.5g

MINIMUM NUMBER OF INDIVIDUALS: 1

SEX: Unknown

AGE: ?A (robustness)

GROUP: WEIGHT (GRAMS) (SIZE RANGE)

Skull (exc. teeth): 32.8g (41-5mm)

Teeth: 0.2g (8mm)

Humerus: 9.7g (43mm)

Radius: 3.0g (37mm)

Talus: 1.4g (17mm)

Long bones shafts: 75.4g (42-7mm)

>10mm: 96.4g/ 42.5%

<10>5mm: 96.3g/ 42.5%

<5>1mm: 33.8g/ 14.9%

PROPORTION OF THE TOTAL WEIGTH OF IDENTIFIED FRAGMENTS

Skull: 26.9%

Axial (excluding skull): 0.0%

Appendicular: 73.0%

PATHOLOGY: none

DEGREE OF OXIDATION: fully oxidised (white)

DEHYDRATION: mostly transverse and longitudinal fractures, with less frequent U-shaped and transverse fissures, occasional slight warping

AVERAGE FRAGMENT SIZE: 16mm

LARGEST FRAGMENT SIZE: long bone: 42mm; skull: 41mm

FRAGMENTATION: high

STAINING: none

NON-METRIC TRAITS: none observable

CHARCOAL: none

Finds: none

Cremation 16 (4125) pit F4120

TOTAL WEIGHT OF BONE: 207.3g

MINIMUM NUMBER OF INDIVIDUALS: 1

SEX: Unknown

AGE: ?Adolescent (robustness coupled with presence of unidentified unfused epiphyses)

GROUP: WEIGHT (GRAMS) (SIZE RANGE)

Skull (exc. Teeth): 15.1g (37-12mm)

Long bone shafts (upper and lower, unidentified): 115.9g (53-11mm)

>10mm: 133.8g/ 64.5%

<10>5mm: 66.2g/ 31.9%

<5>1mm: 7.3g/ 3.5%

PROPORTION OF THE TOTAL WEIGTH OF IDENTIFIED FRAGMENTS

Skull: 26.9%

Axial (excluding skull): 0.0%

Appendicular: 73.0%

PATHOLOGY: none

DEGREE OF OXIDATION: fully oxidised

DEHYDRATION: U-shaped, concentric and transverse fissures, some warping

AVERAGE FRAGMENT SIZE: 12mm

LARGEST FRAGMENT SIZE: long bone: 53.0mm; skull: 37.0mm

FRAGMENTATION: high

STAINING: none

CHARCOAL: yes

Finds: none

Element	Age	Sex	Comment
Sphenoid	-	-	Left greater ala with foramen rotundum
Temporal	-	-	R petrous part, suprameatal crest
Temporal	-	-	L petrous part
Vomer	-	-	-
Phalanx	-	-	Shaft
Ribs	-	-	Angle, shaft
Scapula	-	-	Spine
Radius	-	-	Shaft - 3 fragments

Table 19. Cremation 1.

Element	Age	Sex	Comment
Occipital	-	-	Cruciform eminence
Sphenoid	-	-	Greater ala
Frontal	-	-	Glabella
Temporal	-	-	L – zygomatic arch
Parietal	-	-	L- mastoid angle
Mandible	-	-	R – condyle
Tooth	-	-	Root
Ribs	-	-	8 x shaft fragments
Atlas	-	-	L and R articular facets
Axis	A (marginal osteophytes on dens) suggest older adult (Rogers and Waldron 1995)	-	Dense and superior articular facet
Vertebrae	-	-	9 x apophyseal facets
Sacrum	-	-	1st segments
Scapula	-	-	L spine
Clavicle	-	-	Shaft
Ilium	-	-	R auricular surface

Femur	-	-	Prox end
Fibula	-	-	Dist shaft
Talus	-	-	Trochlea

Table 20. Cremation 2.

Element	Age	Sex	Comment
Occipital	?A	-	Cruciform eminence, fibrous appearance endocranially
Temporal	?A	-	R petrous part
Temporal	-	-	R petrous part
Mandible	-	-	Condyles
Mandible	?A	-	Mental spines
Zygomatic	-	-	R
Frontal	-	-	Frontal crest
Parietal	-	-	R mastoid angle
Scapula	-	-	R spine
Radius	?A	-	Fragments of proximal end and proximal shaft
Ulna	-	-	L proximal end
Humerus	-	-	Trochlea, deltoid
Femur	-	-	Linea aspera
Ischium	Fused ischial tuberosity	-	Tuberosity, acetabulum,
Fibula	-	-	Shaft
Tibia	-	-	Shaft
Scaphoid	?A	-	R
Lunate	-	-	R and unsided
Trapezoid	-	-	-
Distal phalanges	Fused proximal epiphysis	-	2 x proximal end
Distal phalanges	?Ad - robustness	-	2x distal end

MTC/MTT	-	-	4 x heads
Thoracic vertebrae	-	-	2 x apophyseal facets
Vertebrae	-	-	6 x apophyseal facets
Teeth	-	-	15 x roots; 2 x crowns
Premolar	-	-	Upper permanent premolar crown
Molar	-	-	Crown

Table 21. Cremation 3 and Cremation 4.

Element	Age	Sex	Comment
Temporal	-	-	R and L petrous parts
Mandible	-	-	R condyle, angle
Teeth	-	-	4 x roots, 1 upper molar (?M3)
Scapula	-	-	Blade
Vertebrae	-	-	1 x centre, 1 x arch, 8 x apophyseal facets
Radius	-	-	Head
Hamate	-	-	R
MTC/MTT	Fused distally	-	X 2 heads
Proximal hand phalanges	Fused proximally		X 3
Medial hand phalanges	Fused proximally and distally		X 3
Distal hand phalanges	Fused proximally		R and L 1st,
Femur	-	-	Distal shaft
Fibuls	-	-	Shaft
Talus	-	-	R, trochlea

Table 22. Cremation 9.

Element	Age	Sex	Comment
Temporal	?S	-	2 x R petrous part

Temporal	?A	-	R and L petrous part, R sigmoid sulcus
Parietal	Saggital and lambdoid sutures open	-	L, present foramen
Scapula	-	-	Spine
Pisiform	-	-	R
Phalanges	Fused proximally and distally >14y	-	1 x proximal , 1 x distal,
Femur	-	-	Midshaft
Fibula	-	-	Distal shaft

Table 23. Cremation 10, Cremation 11 and Cremation 12.

Element	Age	Sex	Comment
Tooth	-	-	Double root
Humerus	(A)	-	L distal shaft
Radius	(A)	-	Distal shaft
Talus	-	-	Trochlea

Table 24. Cremation 15.

Cremation	Element	Comment
Cremation 5	Occipital – cruciform eminence	
Cremation 6 and Cremation 7	S Pars petrosa R and L (subadult) Upper deciduous canine c. 7.5m (crown1/2)	
Cremation 8	Upper deciduous canine, pars petrosa	Thickness of the skull vault suggests perinatal or foetal
Cremation 13	R M1 permanent Coc (2y ±6 months) R and L pars petrosal, 2 fragments of canines deciduous crowns	
Cremation 14	Scapula R - spine	

Table 25. Cremations 5, 6, 7, 8, 13 and 14.

Burial	Total weight (g)	>10mm	10-5mm	<5mm	MNI	Age category	Skull (%)	Axial (%)	Upper/lower limbs (%)
Cremated remains from pits with posts									
1	271.5	45.6	45.8	8.5	1	?Adolescent/Adult	28.8	1.8	69.3
2	697.3	59.2	34.4	6.3	1	Adult	29.2	2.9	67.8
3	846.8	39.4	44.7	15.8	2	?Adult; ?Adolescent	32.8	1.6	65.5
4	48.3	56.5	39.1	4.3	1	?Adult	42.3	-	57.6

5	42.0	23.8	70.2	5.9	2	Neonate/Infant (1.5 months ± 1.5 months); ?Adult	15.7	-	83.8
5s	5.1	Sub adult only					84.3	-	15.6
6	9.1	0.0	40.6	59.3	1	Infant (7.5 months ± 1.5 months)	76.9	-	23.0
7	543.7	34.8	57.0	8.1	1	?Adult	14.2	1.9	83.7
8	655.9	51.0	41.3	7.6	3	?Adolescent/Adult; ?Subadult; ?Subadult	31.6	-	68.3
9	8.5	37.6	40.0	22.3	1	Juvenile (2 y ± 6 months)	62.5	-	37.5
Av		38.6	45.9	15.3			37.1	0.9	61.8
Cremated remains from pits without posts									
10	8.6	0.0	70.9	29.0	1	?Neonate/Infant	25.0	-	75.0
11	226.5	42.5	42.5	14.9	1	?Adult	26.9	-	73.0
12	207.3	64.5	31.9	3.5	1	?Adolescent	11.6	-	89.1
Av	-	35.6	48.4	15.8	-	-	21.1	-	79.0
							nd:18	nd:21	nd:61

Table 26. Osteological analysis results ('?' – possible, 'Av' – average, 'nd'-normal distribution)

Context	Element	Taxon	Butchery	Gnawing	Age	Metric	Preservation
4000	Femur (dUE), 8 x unidentified fragments	MM	-	-	Immature <48 months	-	Poor
4003	ABG R femur (pUD, dUD), L femur (pUD, dUX), R tibia (pUD), L tibia (pUD; dF), L pelvis, R pelvis, L calcaneus (unfused), L astragalus	O	N	N	Immature 18-48 months	Astrag: GLm:30.8 GLI:37.8	Good
4008	ABG R scapula, L scapula, R humerus (pUD, dS), R femur (pS), R and L: pelvis, 6 x cervical vertebrae (unfused endplates), 9 x thoracic vertebrae (unfused endplates), 9 x lumbar vertebrae (unfused endplates), sacrum (S1/2 unfused, S2/3 – fused), 6 x right ribs, 9 x left ribs, 11 unsided ribs, sternum (unfused)	O	N	N	Immature 30-48 months	Glenoid width: 25.07 Hum dist breadth: 34.30	Good
4058	ABG 5 right ribs, 1 unsided rib, 4 x thoracic vertebrae, 2 x thoracic vertebrae, fragmented right scapula	O	N	N	Immature	-	Good

Table 27. Inventory of animal bone, Lanton Quarry 2016 (p – proximal, d – distal, UD – unfused diaphysis, UE – unfused epiphysis, X – diaphysis and epiphysis, F – fusing, S- fused; O – ovis aries, MM – medium mammal; '-' – not observable).

APPENDIX V - RADIOCARBON DATING CERTIFICATES

Scottish Universities Environmental Research Centre

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Director: Professor R M Ellam Tel: +44 (0)1355 223332 Fax: +44 (0)1355 229898 www.glasgow.ac.uk/suerc

RADIOCARBON DATING CERTIFICATE

05 October 2016

Laboratory Code	SUERC-69257 (GU41845)
Submitter	Elise McLellan Archaeological Research Services Angel House Portland Square Bakewell, Derbyshire DE45 1HB
Site Reference	Lanton Quarry
Context Reference	(3964)
Sample Reference	LAN-5
Material	Charred cereal grain : Triticum dicoccum
δ ^{13}C relative to VPDB	-24.1 ‰
Radiocarbon Age BP	5004 ± 34

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

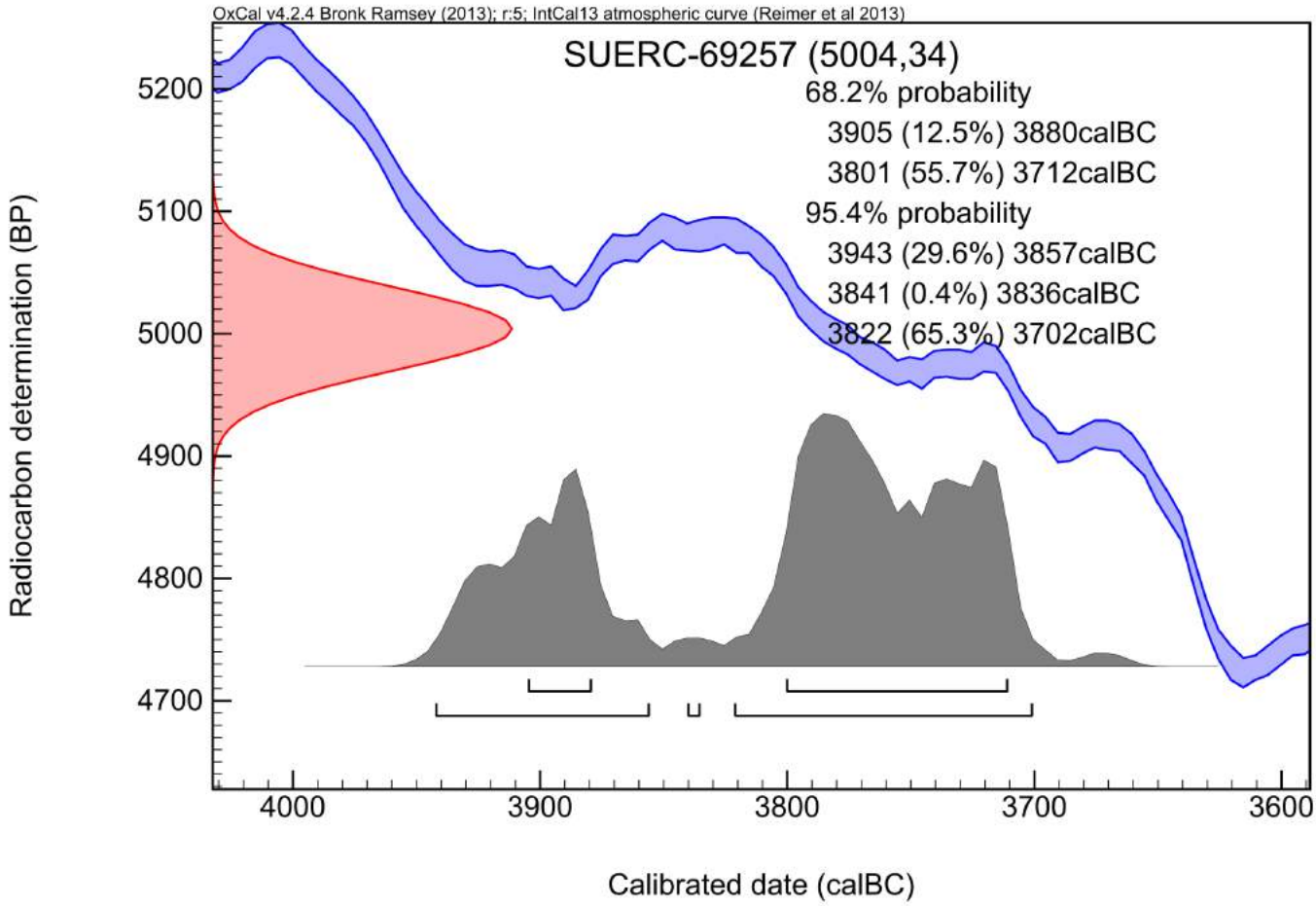
The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal4).

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

Conventional age and calibration age ranges calculated by :- Date :- 05/10/2016

Checked and signed off by :- E. Dunbar Date :- 05/10/2016

Calibration Plot



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RADIOCARBON DATING CERTIFICATE

05 October 2016

Laboratory Code	SUERC-69258 (GU41846)
Submitter	Elise McLellan Archaeological Research Services Angel House Portland Square Bakewell, Derbyshire DE45 1HB
Site Reference	Lanton Quarry
Context Reference	(3985)
Sample Reference	LAN-6
Material	Charred hazel nutshell : Corylus sp.
δ ^{13}C relative to VPDB	-22.1 ‰
Radiocarbon Age BP	4047 ± 34

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

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

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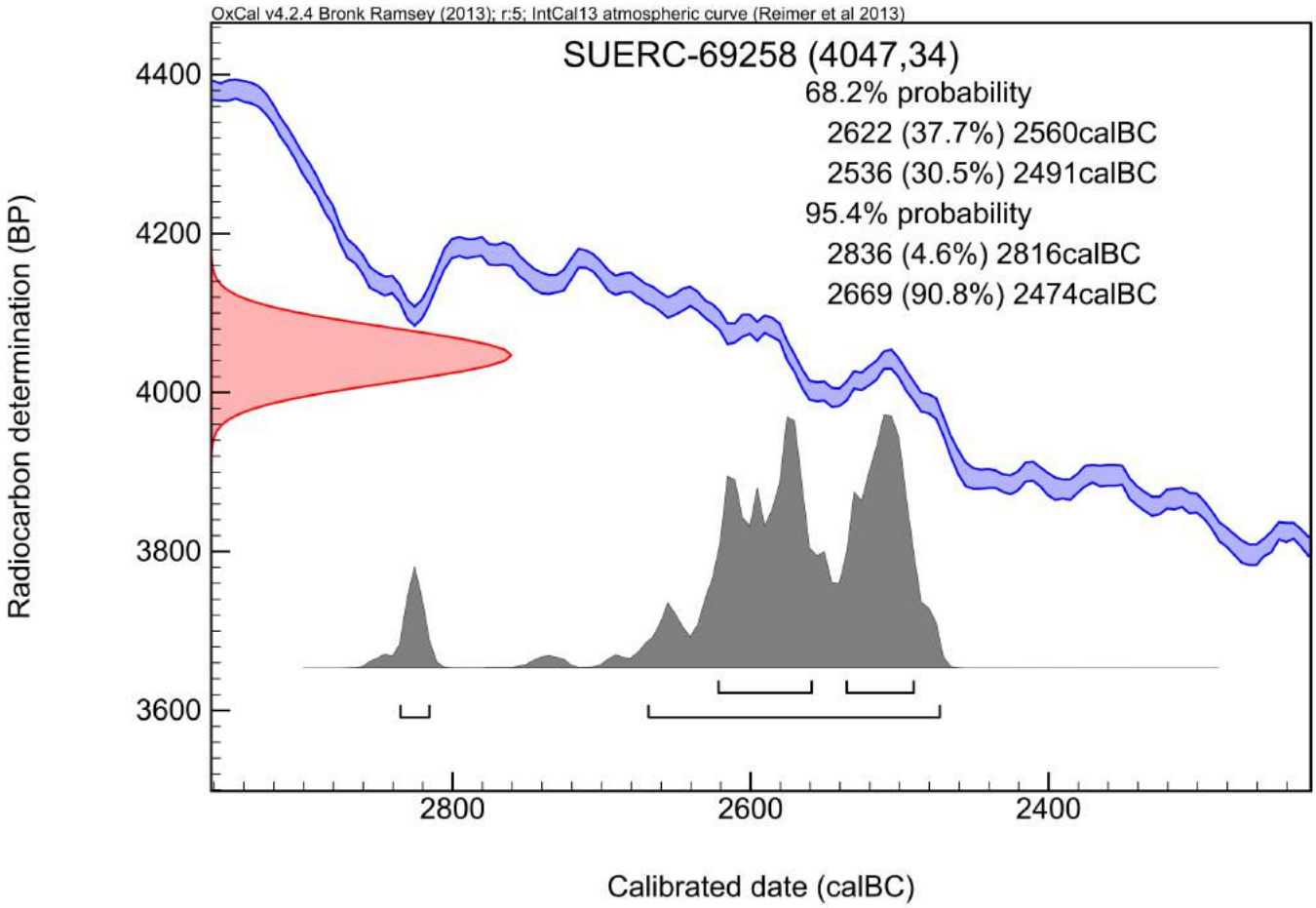
Conventional age and calibration age ranges calculated by :- Date :- 05/10/2016

Checked and signed off by :- E. Dunbar Date :- 05/10/2016

Calibration Plot



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RADIOCARBON DATING CERTIFICATE

05 October 2016

Laboratory Code	SUERC-69259 (GU41847)
Submitter	Elise McLellan Archaeological Research Services Angel House Portland Square Bakewell, Derbyshire DE45 1HB
Site Reference	Lanton Quarry
Context Reference	(4010)
Sample Reference	LAN-7
Material	Charred hazel nutshell : Corylus sp.
δ ^{13}C relative to VPDB	-22.8 ‰
Radiocarbon Age BP	4101 ± 34

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

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

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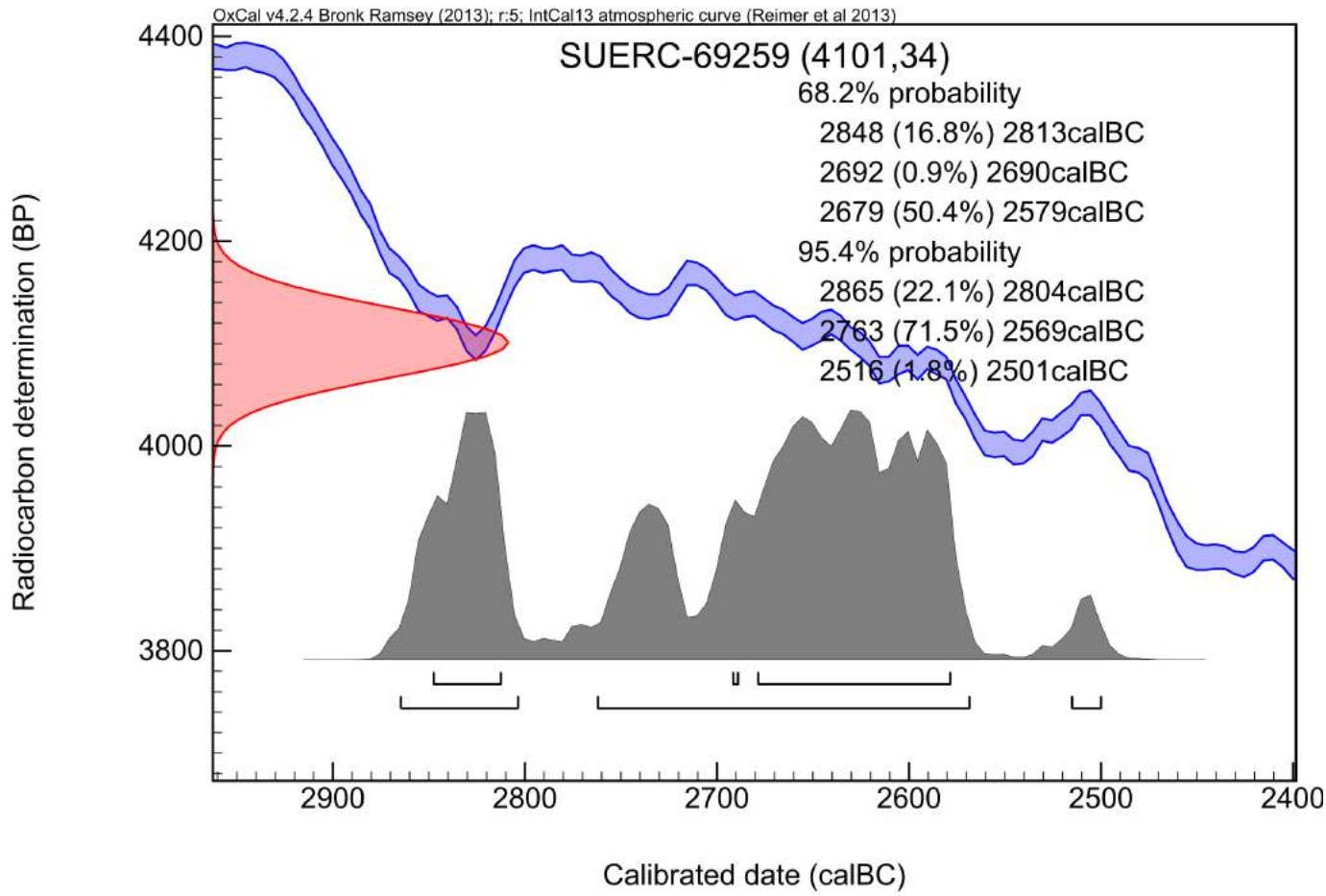
Conventional age and calibration age ranges calculated by :- Date :- 05/10/2016

Checked and signed off by :- E. Dunbar Date :- 05/10/2016

Calibration Plot



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RADIOCARBON DATING CERTIFICATE

05 October 2016

Laboratory Code	SUERC-69263 (GU41848)
Submitter	Elise McLellan Archaeological Research Services Angel House Portland Square Bakewell, Derbyshire DE45 1HB
Site Reference	Lanton Quarry
Context Reference	Crem.1
Sample Reference	LAN-8
Material	Cremated bone : Human
δ ^{13}C relative to VPDB	-23.7 ‰
Radiocarbon Age BP	4349 ± 34

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

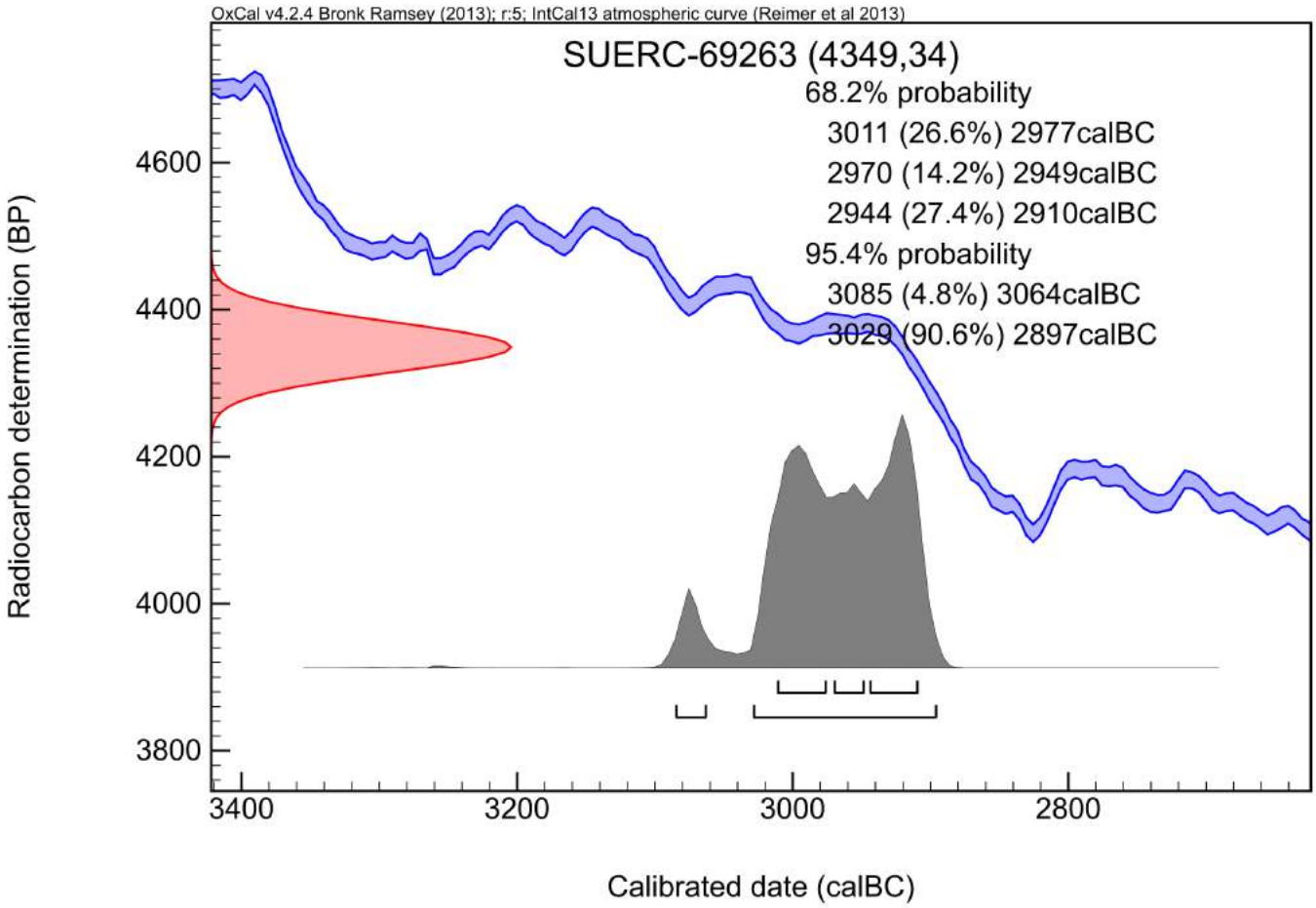
The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal4).

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

Conventional age and calibration age ranges calculated by :- Date :- 05/10/2016

Checked and signed off by :- E. Dunbar Date :- 05/10/2016

Calibration Plot



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RADIOCARBON DATING CERTIFICATE

05 October 2016

Laboratory Code	SUERC-69264 (GU41849)
Submitter	Elise McLellan Archaeological Research Services Angel House Portland Square Bakewell, Derbyshire DE45 1HB
Site Reference	Lanton Quarry
Context Reference	Crem.4
Sample Reference	LAN-9
Material	Cremated bone : Human
δ ^{13}C relative to VPDB	-25.0 ‰ assumed
Radiocarbon Age BP	4334 ± 34

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

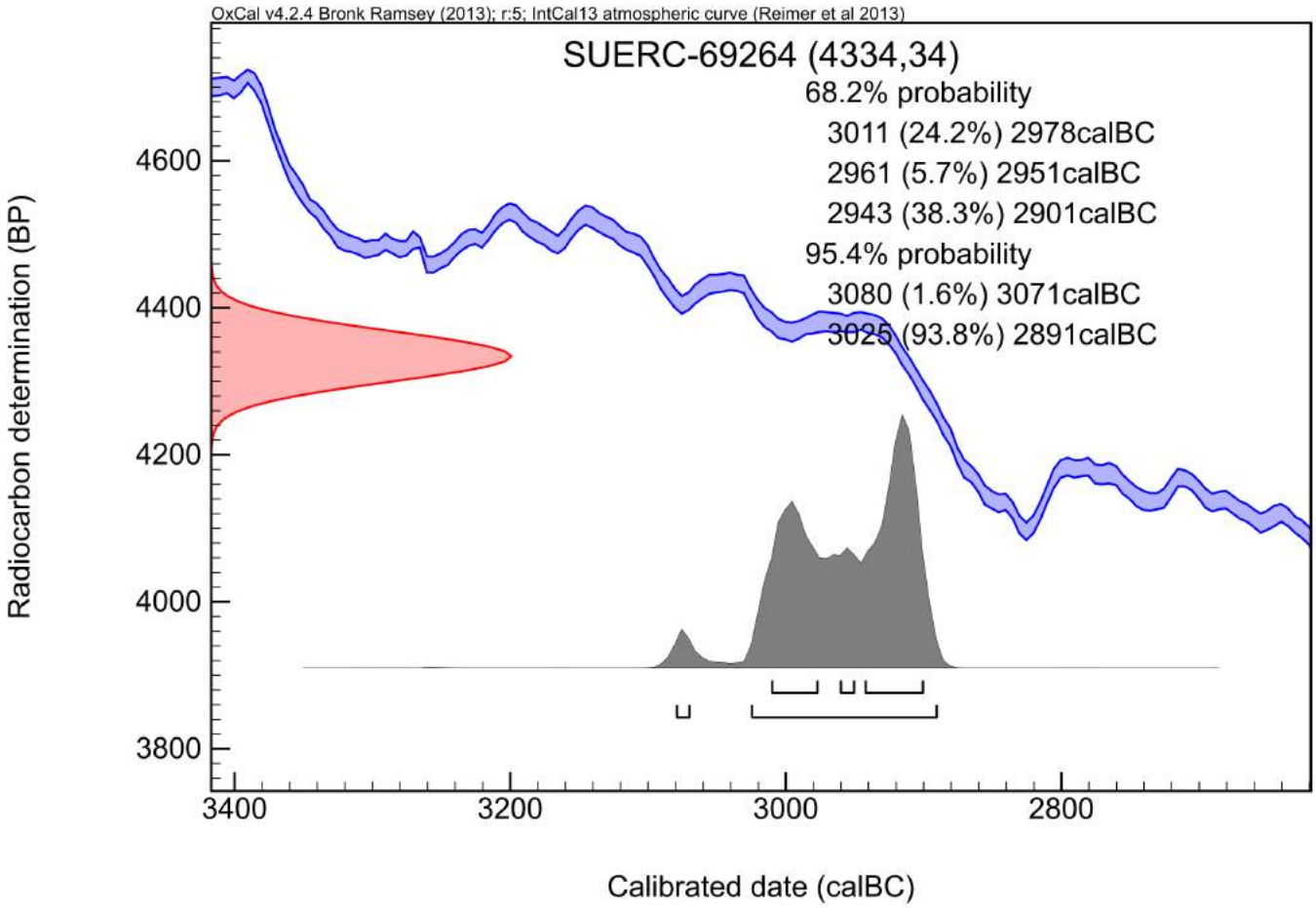
The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal4).

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

Conventional age and calibration age ranges calculated by :- Date :- 05/10/2016

Checked and signed off by :- E. Dunbar Date :- 05/10/2016

Calibration Plot



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RADIOCARBON DATING CERTIFICATE

05 October 2016

Laboratory Code	SUERC-69265 (GU41850)
Submitter	Elise McLellan Archaeological Research Services Angel House Portland Square Bakewell, Derbyshire DE45 1HB
Site Reference	Lanton Quarry
Context Reference	Crem.11
Sample Reference	LAN-10
Material	Cremated bone : Human
δ ^{13}C relative to VPDB	-23.3 ‰
Radiocarbon Age BP	4012 ± 34

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

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

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

Conventional age and calibration age ranges calculated by :- Date :- 05/10/2016

Checked and signed off by :- E. Dunbar Date :- 05/10/2016

Calibration Plot