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Department of Transport An Roinn Iompair

NRA An tÚdarás um Bóithre Náisiúnta National Roads Authority Archaeology

Date: March 2010
Client: Kildare County Council
Project code: KCK06

N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 5 – Resolution, Kilcullen to Moone and Athy Link Road.
Final Report on archaeological investigations at Site E2972, in the townland of Mullamast, Co. Kildare.

By: Liam Hackett and John Twomey
National Monuments Section Registration Number: E2972
Director: Liam Hackett
NGR: 278878/194949

Report Status: Final

Meanma agus Misneach

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Executive Summary

This final report presents the results of the archaeological resolution works carried out on behalf of Kildare County Council and the National Roads Authority as part of the Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road. The works were undertaken prior to the commencement of construction of the N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. The Minister of the Environment, Heritage & Local Government, following consultation with the National Museum of Ireland, issued Directions to Kildare County Council on 8 March 2007 for archaeological resolution works relating to the road development. The registration number, E2972, was allocated by the Department for the excavation of the present site in Mullamast townland under the directorship of Liam Hackett of Headland Archaeology (Ireland) Ltd.

An Environmental Impact Assessment was published in 2003 for the Kilcullen to Powerstown Scheme, with Valerie J Keeley Ltd preparing the Archaeological, Architectural and Cultural Heritage Assessment. This formed Chapter 10 of the EIS produced by the Roughan and O'Donovan - Faber Maunsell Alliance. Geophysical prospection was carried out on certain areas of high archaeological potential by Bartlett-Clark Consultancy as part of the Environmental Impact Assessment, on behalf of Valerie J. Keeley Ltd/Kildare County Council.

Aerial photography was undertaken along the entire route selection as part of the non-invasive assessment after the EIA stage. This work was carried out in April 2004 by Markus Casey.

Archaeological testing carried out by CRDS Ltd for the N9/N10 Kilcullen to Waterford Scheme: Archaeological Services Contract No. 2 – Test Excavations, Mullamast to Prumplestown and Athy Link Road under Ministerial Direction Number A021/167 on this site between 29 June and 5 July 2006 identified a series of pits containing animal bone (Animal Bone Sample: A021/167:010) and one pit yielding a struck chert flake (A021/167:008:001) within the arc of a curvilinear feature, along with associated possible post pits, a field ditch and a series of linear agricultural furrows.

Full archaeological resolution was conducted on this site between 2 May and 1 June 2007. This revealed several pits that can be broadly dated to the prehistoric period through the recovery of lithic artefacts, a crouched inhumation burial, a possible cremation pit and a possible bowl furnace, burnt pits, medieval cereal-drying kilns, animal bone refuse pits, a number of curvilinear features and gullies, a series of linear agricultural furrows and post-medieval field systems all within the excavation area.

A Preliminary Report of works on the site was completed by Headland Archaeology (Ireland) Ltd on April 2009.

1 Introduction

The N9/N10 Kilcullen to Waterford Road Scheme, of which the Kilcullen to Powerstown Scheme forms part, was proposed as a High Quality Dual Carriageway/Motorway, forming the Major Inter Urban route between Dublin and Waterford. The Kilcullen to Powerstown Scheme was advanced as a single entity up to the Compulsory Purchase Order/Environmental Impact Statement and was subsequently divided into two separate construction contracts: the Carlow By-pass (Phase 1) and the Kilcullen to Carlow Scheme (Phase 3). Kildare County Council, National Roads Design Office, has responsibility for overseeing the project management of these two schemes. The entire road scheme from Kilcullen to Waterford has now been designated as Motorway.

An Environmental Impact Assessment was published in 2003 for the Kilcullen to Powerstown Scheme, with Valerie J Keeley Ltd preparing the Archaeological, Architectural and Cultural Heritage Assessment. This formed Chapter 10 of the EIS produced by the Roughan and O'Donovan - Faber Maunsell Alliance. Geophysical prospection was carried out on certain areas of high archaeological potential by Bartlett-Clark Consultancy as part of the Environmental Impact Assessment, on behalf of Valerie J. Keeley Ltd/Kildare County Council.

Aerial photography was undertaken along the entire route selection as part of the non-invasive assessment after the EIA stage. This work was carried out in April 2004 by Markus Casey.

Construction commenced on Phase 1, the Carlow By-pass, in January 2006 and the road was completed and opened in May 2008. Construction of Phase 3, the Kilcullen to Carlow Scheme, which also includes a new single carriage link road to Athy town, commenced in January 2008.

Archaeological test-trenching was undertaken in advance of Phase 1, the Carlow By-pass, by Headland Archaeology (Ireland) Ltd between June and August 2005 (Archaeological Services Contract No. 3). This work identified 64 archaeological sites, which required archaeological excavation in advance of road construction. The resolution works for these sites were undertaken by Headland Archaeology (Ireland) Ltd between January and August 2006 (Archaeological Services Contract No. 4).

Archaeological test-trenching was undertaken in advance of the construction of Phase 3, the Kilcullen to Carlow Scheme, by IAC Ltd and CRDS Ltd, between October to November 2005 and May to August 2006 (Archaeological Services Contracts No. 1 and No. 2, respectively). This work resulted in the identification of 102 archaeological sites, which required resolution in advance of construction. The resolution works for these sites were undertaken by Headland Archaeology (Ireland) Ltd between March and December 2007 (Archaeological Services Contracts No. 5 and No. 6). This report details the results of one of those excavations, undertaken under NMSR Number E2972.

The project was funded by the Irish Government and the European Union through Kildare County Council/National Roads Authority, under the National Development Plan 2000-2006 and 2007-2013.

Construction Phases 2 and 4 relate to the section of road between Powerstown, Co. Carlow and the Waterford city By-pass and are project managed by Waterford County Council, National Roads Design Office.

2 Site description and location

Site E2972 was situated in the townland of Mullamast, parish of Narraghmore, barony of Kilkea and Moone, Co. Kildare. It was located 1.1 km southwest of Ballitore village and directly west of an existing tertiary road that leads northwards to Peelhall Crossroads. At this point the adjoining tertiary road ran along the townland boundary, separating Mullamast from the adjacent townland of Moone. The site was located at National Grid Reference 278878/194949 (Figure 1).

Two monuments were identified in the Record of Monuments and Places (Figure 2) within 850 m of the site. These are an enclosure site (RMP KD036-044) 825 m to the northwest, and a nineteenth century landscaping feature (RMP KD036-045) 360 m to the northwest, both situated in Mullamast townland. Depicted on both the 1st Edition 6" Ordnance Survey map of 1839 (sheet no. KE036) and the 2nd Edition Ordnance Survey map of 1909 (sheet no. KE036-06/10) was Willowbrook House, located approximately 200 m to the northeast of the site (Figure 2). There are no visible physical remains of this building today. The site was situated in a grass field on the lower eastern slope of Mullamast hill with a height of 110 m OD overlooking lowlands to the east with views of the foothills of the Wicklow Mountains.

A number of archaeological sites were excavated as part of the same road scheme in the vicinity of site E2972. Approximately 200 m to the east Site E2973 revealed an Iron Age ring-ditch site and an Iron Age/early medieval cereal-drying kiln (Twomey 2009), while directly west of the adjacent existing road Site E2980 revealed the remains of an early Bronze Age flat cemetery with 2 cremations (one urned), 13 pit burials, 1 cist burial with associated grave goods of pottery, copper jewellery and flint artefacts, enclosed by a 70 metre (projected) diameter Iron Age penannular ditch with a substantial animal bone assemblage and worked bone, antler and metal artefacts, a prehistoric ring-ditch, cereal-drying kilns, pits and agricultural features (Hackett 2009). Both were excavated as part of the same road scheme.

3 Aims and methodology

The objective of the work was the preservation by record of any archaeological features that would be impacted by the proposed development, in advance of the road construction programme.

Topsoil stripping of the site was conducted using a 360° tracked machine fitted with a 1.9 m wide ditching (toothless) bucket under constant archaeological supervision. A total area of 2680 m² was exposed. The resulting surface was cleaned and all potential features investigated by hand. Archaeological contexts were recorded by photograph and on *pro forma* record sheets. Plans were drawn at scales of 1:50 and 1:20 and sections at 1:10. Registers are provided in the appendices (Appendices 1-5). Ordnance Datum levels and feature locations were recorded using Penmap and a total station theodolite.

Environmental samples, including charred wood and animal bone samples, were taken of any deposits suitable for analysis or dating as per Headland Archaeology (Ireland) Ltd environmental guidelines and following consultation with environmental archaeologist and archaeobotanist Karen Stewart and zooarchaeologist Dr. Auli Tourunen. In addition, cremations/inhumations were recovered as per Headland Archaeology (Ireland) Ltd treatment of human remains guidelines and following consultation with osteoarchaeologist Carmelita Troy. Artefacts recovered during the excavation were assigned unique numbers and treated in accordance with National Museum of Ireland guidelines. A total of 52% of the soil samples taken during the excavation were selected for processing and environmental analysis (Appendix 8).

Full archaeological resolution was conducted on this site between 2 May and 1 June 2007. The crew on site E2972 consisted of 1 director, 1 deputy site manager and 40 site assistants.

Following excavation, artefacts and environmental samples were analysed by the appropriate specialists and reports produced on the findings for incorporation into this report (see appendices).

4 Excavation results

Following the removal of topsoil at Site E2972, the remains of a crouched inhumation burial, a possible cremation pit, a possible bowl furnace, several medieval cereal-drying kilns and numerous pits, curvilinear features and gullies were identified. In addition to these features a series of linear agricultural furrows and post-medieval field systems were also noted (Figures 3 and 4).

Unstratified artefacts
Site stripping yielded a number of metal objects including an iron horseshoe, a large iron hook, and a metal ring, part of a possible horse bit (E2972:001:001-003) (Appendix 14) and three sherds of post-medieval pottery (E2972:001:004-006), a honestone (E2972:001:007) (Plates 21 and 22; Appendix 15)and animal bone (Sample E2972:015) were recovered from surface cleaning. Excavation revealed prehistoric, medieval and post-medieval activity on this site (Figures 3 and 4).

Phase I – General Prehistoric Activity
Four oval pits in the southwest quadrant of the site were subject to similar depositional processes with a lower brown clay deposit below an upper yellow sand or silt. Prehistoric artefacts were identified and retrieved from the fills of two of them.

The most southerly pit (237) was located *c.* 9 m from the southern edge of the road corridor and 15 m from the west edge of site (Figure 3). It measured 0.62 m north/south by 0.6 m and 0.19 m deep and had sharply sloping sides with a slightly concave shaped base. Its basal fill (241) comprised of moderately compact brown clay with occasional small stone inclusions and yielded a symmetrical flint leaf-shaped flint arrowhead (E2972:241:001; Figure 11; Appendix 15). The upper fill was moderately compact yellow orange fine sand (236). This feature's western edge was truncated by a furrow (153).

The next pit (244) was located 2.2 m west of pit (237). It measured 1.4 m northwest/southeast by 1.17 m and 0.45 m deep, had sharply sloping sides and an uneven base. It was filled by compact greyish brown gravelly silty sand with occasional stone inclusions (246), situated below compact greyish yellow sandy clay with occasional small stone inclusions (245).

A third oval pit (260) was located 0.34 m north of pit (237). It measured 0.52 m east/west by 0.38 m with a maximum depth of 0.14 m. It had sharply sloping sides and a base that sloped down from the west to the east. Compact brown clay with pebbles and stones (259) filling its base yielded natural chert pebbles (E2972:259:001). This was below moderately compact yellow orange sandy silt (258).

The last pit of this group (240) was *c* 5 m northwest of pit (260). It measured 1.2 m east/west by 0.5 m and 0.24 m deep with sharply sloping sides and an uneven base. It was filled by moderately compact dark brown clay with occasional small stone and charcoal fleck inclusions (239). This overlay moderately compact yellow orange fine sand with stone and pebbles (238).

Six pits that formed a sub-rectangular shape in plan, and a seventh pit to their east, were *c* 7.2 m to the east of the grouping described above, in the southeast quadrant of the site (Figure 3).

Oval pit (235) was *c.* 7.2 m east of pit (260). It measured 1.16 m east/west by 0.55 m and 0.24 m deep with sharply sloping sides and a concave shaped base. It was filled by moderately compact dark brown fine clay with some small stones (234) located below moderately compact yellowish orange sand (233).

Situated *c.* 3.3 m to the south was oval pit (227). It measured 1.3 m northwest/southeast by 0.8 m and 0.5 m deep and had sharply sloping sides, except on the southeast where they were more gradually sloped.

A possible posthole (249) truncated the base of (227). This was circular in plan with a diameter of 0.2 m and a depth of 0.12 m. It had sharply sloping sides and a concave shaped base. Sterile loose mid-brown clayey sand (250) filled this possible posthole. Overlying this within the base of the pit was loose brown black silty sand with gravel and frequent stone inclusions (229). The tertiary fill was compact orange brown sandy clay (228).

Just over *c.* 7m to the south was an oval pit (247). It measured 1.2 m east/west by 0.8 m and 0.28 m deep with gradually sloping sides and a concave shaped base. Its primary fill was loose dark brown silty sand with large stone inclusions (257). Its upper fill was compact brown clay with small stones (248).

An oval feature (266) was *c.* 2.2 m east of pit (247). It measured 2.1 m northwest/southeast by 1.2 m and 0.64 m deep with stepped sides and an irregular shaped base that formed two individual depressions. Its basal fill (269), comprising of loose mid-brown silty clay with occasional pebbles, yielded a chert convex scraper (E2972:269:001; Appendix 15). The secondary fill was compact dark grey sandy clay mixed with gravel and moderate pebbles (268). The tertiary fill was compact light brown sandy clay (267).

Pit (220) was 4.1 m north of pit (227). It had a rectangular shape measuring 2.4 m north/south by 1.5 m and 0.42 m deep with stepped sides on the east, more gradual to the west and an uneven base that like pit (227) was truncated by a possible posthole (231). This was 0.32 m in diameter and 0.18 m deep with sharply sloping sides except on the east where it was stepped. It was filled by loose dark brown silty sand (232). The base of the feature contained loose grey brown silty sand with gravel and small stones (230). A single arris flint blade (E2972:221:001; Figure 11) and flint debitage (E2972:221:002-004) (Appendix 15) was recovered from the upper fill, which was compact orangey brown sandy clay with occasional charcoal fleck inclusions (221). Three flint debitage flakes were also recovered from the retent of the sample taken from this deposit (E2972:221: 002, 003, 004)

The final pit (194) of the grouping was situated 3.95 m north of pit (220). It measured 1.7 m northwest/southeast by 0.95 m and was 0.31 m deep, with gradually sloping sides and a flat base (Figure 9; Plates 3 and 4)) that was cut by stake-hole (222). This measured 0.18 m in diameter and was 0.16 m deep with sharply sloping sides and a tapered rounded base. Loose mid-brown silty clay with occasional pebbles (222) filled it. Compact dark grey silty clay mixed with gravel and pebbles (196) that produced a chert small convex end/side scraper (E2972:196:001; Figure 11; Appendix 15) filled the base of the pit. The pits upper fill was compact light brown silty clay with pebbles (195).

An isolated sub-rectangular pit (056) was 14 m north of the pit (235) (Figure 3). It measured 1.3 m east/west by 0.9 m and 0.47 m deep with sharply sloping sides and a flat base (Plate 20). Its basal fill was mid-brown silty sand with occasional small and medium sized stones (059). The secondary fill

was moderately compact mid-grey stony gravel (058). Overlying this was (057), a moderately compact yellowish grey sandy gravel with occasional small to medium sized stones and fourteen unburnt animal bones and a single burnt bone which is more likely human than animal (Sample E2972:008; Appendix 9). This context also yielded a piece of burnt flint debitage (E2972:057:001).

An irregular shaped pit (183) was 5.65 m east of pit (172) and was truncated along its central portion by the ditch (003). It measured 3.19 m east/west by 0.42 m and 0.31 m deep with sharp to gradually sloping sides and a concave shaped base. Its fill consisted of compact brown sandy silt with occasional charcoal fleck inclusions (184) and a single fragment of flint debitage (E2972:184:001) (Appendix 15).

Phase II – Late Bronze Age/Early Iron Age Activity

A shallow grave (272) containing a single crouched inhumation ((278); Skeleton 1) aligned west/east (Figure 5; Plate 1) was located near the centre of the site. It was oval in plan measuring 1.1 m east/west by 0.75 m and 0.2 m deep with gradually sloping sides and a concave shaped base. The skull was to the west; and was resting on its right side, facing south. Its feet were missing and the hands were clasped. No associated grave goods were present. Overlying the skeleton and filling the grave pit was loose mid-brown gravelly sandy clay with small stones (273) and animal bone inclusions (Sample E2972:130). A radiocarbon date of 760–410 cal BC (2σ) (SUERC-24971) was obtained from the skeletal remains, placing this burial in the Late Bronze Age/ early Iron Age transitional period (Appendices 10 and 11).

Phase III – Iron Age Activity

A waste pit (016) was located in the northeast quadrant of the site and *c.* 5.5 m from the northern edge of the road corridor (Figure 3). Oval in plan, it measured 0.37 m east/west by 0.31 m and 0.1 m deep with gradually sloping sides and a flat base. It contained loose dark black brown sandy silt with moderate charcoal fleck inclusions and burnt and unburnt bone fragments (017) (Sample E2972:002). A total of thirty-three burnt bones were recovered, none of which were identifiable to species or element. Unburnt bones were identified belonging to pig, sheep/goats, large mammals and medium mammals (Appendix 9). Radiocarbon dating gave an Iron Age date range of cal AD 0-240 (2σ) (SUERC-25478) for this material (Appendix 11). Initially interpreted as a possible cremation pit, upon analysis no human bone could be identified due to the fragmentary nature of the bone (Carmelita Troy, pers. comm.).

An isolated oval pit (251) was *c.* 3.9 m from the west edge of site (Figure 3). It measured 1.3 m east/west by 0.95 m and 0.28 m deep with sharply sloping sides and a flat base that were heavily oxidised (Figure 9; Plates 15 and 16). Its lower fill was compact greyish orange clay with frequent charcoal and ash inclusions (256). This was below a loose grey layer of ash and charcoal (255). Overlying this was scorched loose orange silty clay (254) which represented a later burning episode with a resulting deposit of loose black silty charcoal (253) with inclusions of charred barley and indeterminate cereal grains overlying it. A radiocarbon date of 210 cal BC - cal AD 60 (2σ) (SUERC - 25480) was returned from one of these cereal grains (Appendix 11). The feature was backfilled after its final use with compact sandy clay that contained occasional small stone inclusions (252).

Phase IV – Medieval Activity

Kilns: Six kilns and one possible kiln were excavated. Most of them were located near the eastern edge of site.

Kiln (116) was located *c.* 6 m from the north edge of the road corridor and 0.5 m from the east edge of site. It was figure-of-eight-shaped in plan measuring 2.3 m along a northwest/southeast axis (Figure 6). A circular fire-pit, situated at the northwestern end had a 0.8 m diameter and was 0.9 m deep with sharply sloping sides and concave shaped base that was heavily oxidised. A linear flue measuring 0.8 m long, 0.7 m wide and 0.7 m deep with vertical sides had a base that sloped upwards towards the drying chamber. This drying chamber was circular in plan and had a 0.7 m diameter, was 0.43 m deep with gradually sloping sides and a slightly concave shaped base. The fire-pit base was overlain by loose grey ash with occasional charcoal fleck inclusions and sand (217). This was below a mixed layer of loose grey oxidised silty sand and charcoal lenses (215) representing usage of the kiln with *in situ* burning. The tertiary fill of the kiln, filling the fire-pit and flue, was loose brownish grey silty sand with frequent stone inclusions (214). The upper portion of the entire feature was filled with a backfill of loose dark brown sandy silt with occasional charcoal fleck inclusions (117). Animal bones consisting of cattle, pig, sheep/goat, large mammal, medium mammal, and unidentified bones (Sample E2972:129; Appendix 9) along with an incomplete point of a pin or needle (E2972:117:001) (Figure 12; Appendix 13) were recovered from this deposit. A curvilinear feature (218) cut this kiln.

A second kiln (176) was located *c.* 4.5 m to the south. It was partly located beyond the east edge of the site and appeared to have been disturbed by later cutting (073) associated with the adjacent road. Within the site the surviving fire-pit and flue component measured 2.34 m along an east/west axis (Figure 6). The fire-pit was sub-oval in plan measuring 2.13 m east/west by 1.05 m and 0.33 m deep with gradually sloping sides and concave shaped base that was moderately oxidised. The linear flue measured 0.11 m long with gradually sloping sides and a base that sloped upwards to where it was disturbed with a depth of 0.12 m at this location. A layer of loose, blackish brown clay with frequent charcoal fleck inclusions (175) overlay the base of the fire-pit. The remainder of the kiln contained loose dark brown gravelly clay with charcoal fleck inclusions (174) that yielded animal bone (Sample E2972:086) and a sherd of post-medieval pottery (E2970:174:001) (Figure 12).

In the northwest quadrant kiln (088) was *c.* 5 m from the north edge of site. It was keyhole-shaped in plan and measured 2.12 m along a north/south axis (Figure 6; Plates 7 and 8). Its oval fire-pit, located on the north measured 1.4 m east/west by 1.1 m and 0.25 m deep with gradually sloping sides and an uneven base that was oxidised. The irregular-shaped drying chamber measured 0.72 m north/south by 0.7 m and 0.1 m deep. It had gradually sloping sides and an uneven base. There was no flue component. The fire-pit basal fill was loose blackish grey silty clay with occasional charcoal fleck inclusions (090). This deposit contained a single bone belonging to a large mammal and five bones unidentified to species (Appendix 9) along with oat and barley grains (Appendix 8) and numerous small fragments of slag (Appendix 16). This was below a loose orange and white ash layer with occasional small stones and charcoal fleck inclusions (091). The tertiary fill of the fire-pit was loose grey sandy clay with occasional charcoal fleck inclusions (092). Next in sequence was loose orange sandy clay with frequent small stones and occasional charcoal fleck inclusions (093). The upper fill of the fire-pit was loose dark grey sandy clay with frequent small stones and occasional charcoal fleck inclusions (094). The drying chamber contained a backfill of loose dark grey sandy clay with frequent small stones and occasional charcoal fleck inclusions (089).

Kiln (070), *c.* 2 m south of kiln (088), was figure-of-eight-shaped in plan measuring 2.9 m along a northeast/southwest axis (Figure 6; Plates 11 and 12). Its fire-pit, to the north, was circular in plan with a 1.2 m diameter and was 0.6 m deep with sharply sloping sides and a flat base that was heavily oxidised. A 0.5 m long linear flue with sharply sloping sides and a concave-shaped base sloped

upwards towards the drying chamber which was circular in plan, measuring 1.2 m in diameter and 0.2 m deep, had gradually sloping sides and concave shaped base. The base of the fire-pit contained compact orange/brown silty sand with moderate charcoal fleck inclusions (072). Filling the rest of the kiln was a backfill of compact dark brown sandy silt with occasional charcoal fleck inclusions (071). Animal bone (Sample E2972:037) was identified and retrieved from this deposit comprising cattle, horse, pig, sheep and large mammal bones as well as unidentified bones. The kiln was disturbed by a portion of a curvilinear feature (081).

Kiln (133) was located *c.* 16 m southeast of kiln (070), in the central area of the site. It had a very slight figure-of-eight shape in plan measuring 2.6 m in length along a north-northeast/south-southwest axis (Figure 6; Plate 9). The fire-pit, located to the north was sub-circular in plan measuring 1.47 m in diameter and 0.48 m deep with gradually sloping sides and concave shaped base that was slightly oxidised. The base sloped upwards to the drying chamber. It was sub-oval in plan measuring 1.1 m north/south by 1 m and 0.29 m deep with gradually sloping sides and concave shaped base. The basal fill of the fire-pit was loose black silty sand with occasional charcoal fleck inclusions (140). Three bones from a medium sized mammal and four unidentified bones were retrieved from this deposit along with a high number of charred barley, oat and indeterminate cereal grains (Appendix 8). A radiocarbon date of cal AD 540-680 (2σ) (SUERC-25851) was attained from charcoal recovered from this deposit (Appendix 11). A loose yellow silty ash layer (139) was next in sequence. The tertiary fill of the fire-pit was loose orange silty sand (138) which was overlain by loose yellowish grey silty ash (137) and loose greyish silty ash (136). Loose black silty sand with occasional charcoal fleck inclusions (135) was above these ash deposits. The upper portion of the kiln contained a backfill of loose dark brown silty clay (134).

Kiln (103) was *c.* 14 m southeast of kiln (133) and 3 m from the eastern edge of the site. It was figure-of-eight-shaped in plan measuring 2.3 m along a north/south axis (Figure 6; Plate 13). The fire-pit, located to the north was circular in plan with a 1.15 m diameter and 0.97 m deep with vertical sides and concave-shaped base. A poorly defined linear flue measured 0.15 m long, 0.9 m wide and 0.55 m deep with sharply sloping sides and an oxidised base that sloped upwards towards a sub-circular drying chamber. This measured 1.2 m east/west by 1 m and 0.55 m deep with sharply sloping sides and a flat base. The first three fills of the kiln were located in the fire-pit. Loose light grey sandy ash with occasional charcoal fleck inclusions (130) filled the base. The secondary fill was loose grey brown silty sand with ash and charcoal inclusions (129). The tertiary fill was loose light grey with occasional charcoal fleck inclusions (128). This contained seven mouse bones and a number of unidentified animal bones along with a small number of charred barley, oat and indeterminate cereal grains (Appendix 8) and small fragments of slag (Appendix 16). Next in sequence and overlying the base of the drying chamber was loose brown grey silty sand with occasional charcoal fleck inclusions (126). This was below loose light yellow brown silty sand and ash with occasional charcoal fleck inclusions (127) that was primarily located in the fire-pit portion and possibly represented the final usage of the kiln. The upper portion of the kiln was backfilled with two deposits. The first was loose light brown silty sand with moderate charcoal fleck inclusions (125) from which animal bone including four partial cow skulls were retrieved (Sample E2972:067). This was below loose dark brown silt with small stones (124) also with animal bone content including a partial cow skull, horse, sheep/goat and unidentified bone (Sample E2972:066) (Appendix 9).

A sub-rectangular shaped kiln (187) was located *c.* 8 m south of kiln (103) and *c.* 4 m from the eastern edge of site. It was disturbed along its central portion by a field ditch (006) so its original shape in plan could not be determined. It measured a maximum 3.5 m along a north/south axis (Figure 6; Plate 14). Its surviving sub-oval fire-pit, located to the north measured 1.89 m east/west by 1.7 m and 0.61 m deep with sharp to gradually sloping sides and a flat base. The drying chamber appeared sub-square in plan with surviving dimensions of 1.8 m east/west by 1 m and 0.61 m deep with sharply sloping

sides and a flat base. The basal fill of the bowl consisted of loose greyish black silty clay with charcoal, ash and scorched sand lenses (190) with a small quantity of charred barley, oat, and indeterminate cereal grains (Appendix 8). This deposit represented successive firing of the kiln. Next in the sequence within the fire-pit was loose mid-grey silty sand with charcoal fleck inclusions (189). Animal bone (Sample E2972:107) was identified and retrieved from this deposit. The drying chamber basal fill was loose black silty clay with frequent charcoal fleck inclusions (192) and six unidentified animal bones (Sample E2972:132; Appendix 9). A large quantity of charred cereal grains identified as barley oats and indeterminate were retrieved from this fill, one grain returning a radiocarbon date of cal AD 560-770 (2σ) (SUERC-25479) (Appendix 11). Also present within this deposit was numerous fragments of probable fuel ash slag (Sample E2972:115; Appendix 16). Overlying this and located against the south edge of the feature was loose orangish brown coarse sand (193). This was below loose dark black brown sandy silt with occasional charcoal fleck inclusions (191) from which two cattle bones (Sample E2972:102; Appendix 9) and a single small fragment of slag (Sample E2972:104; Appendix 16) was recovered. The upper portion of the kiln was backfilled with loose mid-orangish brown silty sand with occasional charcoal fleck inclusions (188) and animal bone comprising cattle, pig, sheep/goat, large mammal and unidentified species (Sample E2972:084; Appendix 9).

A sub-rectangular pit with slightly bulbous ends (055), possibly representing an unused kiln due to the lack of oxidisation or firing phases, was located 0.5 m northwest of kiln (088). It measured 3.3 m northwest/southeast by 1.3 m and 0.38 m deep with gradually sloping sides and a concave-shaped base. It was filled by loose dark brown silty clay with gravel (054) from which animal bone (Sample E2972:010) was recovered.

Furnace: A slag pit or shaft furnace (108) adjacent to two possibly related pits (109) and (243) and a patch of oxidised natural soil was just inside the east edge of the site in the northeast quadrant. It was sub-circular in plan, orientated northeast/southwest and measured 0.53 m long by 0.46 m wide and 0.25 m deep. It had gradually sloping sides and a concave shaped base (Figure 8; Plate 2). Compact yellow fine sand (112) filled the base. Oxidised red fine sand (111), the result of *in situ* burning within the pit was over the basal fill. Slag (Sample E2972:046) was identified and retrieved from this deposit as it was from the upper fill of the feature, which consisted of compact dark black grey ash with occasional charcoal fleck inclusions (110) (Sample E2972:047). The slag recovered included spheres and hammerscale and the heavy oxidisation suggests this feature functioned as a small bowl furnace, albeit a small inefficient one due to its construction (Appendix 16). Hazel charcoal from this feature was radiocarbon dated and returned a date of cal AD 400-610 (2 σ) (SUERC - 25850) (Appendix 11).

Phase V - Undated

Adjacent to the possible bowl furnace (108) on its southeast was sub-circular pit (109). It measured 0.81 m long by 0.76 m wide and 0.4 m deep with sharply sloping sides and a flat base (Figure 8; Plate 2). It was filled by loose dark brown sand (113) from which animal bone was collected (Sample E2972:048).

An elongated pit (243) was located 0.8 m to the northeast of pit (109). A linear ditch (005) and a later cutting for the existing road (073) truncated it. It measured 1.34 m northwest/southeast by 0.59 m and had a surviving depth of 0.23m. Animal bone (Sample E2972:098) and a single fragment of slag (Sample E2972:133; Appendix 16) were identified and retrieved from its fill, which comprised of loose dark brown clay with gravel (242).

The oxidised natural (274) was 2.3 m south of the possible furnace. It formed an irregular shape and extended for 2 m north/south by 1.2 m.

Stone-lined pit: A shallow sub-circular pit (104) located south of (274) and *c.* 3 m from the east edge of site measured 2 m east/west by 1.75 m and 0.13 m deep (Figure 7; Plates 5 and 6). Its gradually sloping sides and uneven base was overlain by compacted small stones and pebbles (163), 0.03 m deep. Six medium to large sized flat stones (162) overlay the stone lining and a deposit of moderately compact black sandy silt with occasional charcoal fleck inclusions (105) that filled the rest of the pit. A shattered sheep's skull along with other animal bones (Sample E2972:045) were identified and retrieved from the deposit. A furrow (106) truncated this feature.

Burnt Pits: In the site's northeast quadrant was a burnt pit (011), which may have been a hearth. It was located *c.* 9 m from the northern edge of the road corridor and adjacent to a curvilinear ditch (096). It was oval in plan, measured 0.96 m east/west by 0.82 m and 0.05 m deep with gradually sloping sides and flat base that were heavily oxidised. It was filled with compact greyish black clayish silt with frequent charcoal fleck inclusions (012); this deposit was the result of *in situ* burning.

A burnt pit (075), also a possible hearth was located in the southwest corner of the site. It was oval in plan measuring 1.2 m northeast/southwest by 0.8 m and 0.2 m deep with gradually sloping sides and concave shaped base. Its base was filled with compact dark red oxidised silty clay with moderate charcoal fleck inclusions (078). This was below compact brown sandy clay with occasional charcoal and burnt clay flecks (076) and compact dark brown sandy clay (077).

A third possible hearth (118) was located in the northeast corner of the site truncating the kiln (116). It had an irregular shape in plan measuring 0.50 m north/south by 0.20 m and 0.15 m deep. It contained a single fill (119) of loose yellow silty clay with inclusions of charcoal and charred barley and indeterminate cereal grain (Sample E2972:053; Appendix 8).

Pits: Numerous pits with relatively shallow depths were distributed throughout the site. A grouping of fourteen was in the southeast quadrant (Figure 4), in close proximity to the prehistoric pits and near the east edge of the site. Animal bone was retrieved from the fills of seven of these.

The most southerly of these features was sub-circular pit (151). It measured 0.54 m north/south by 0.45 m and 0.19 m deep with gradually sloping sides and a flat base. It contained loose dark brown silty clay with occasional charcoal fleck inclusions (152) and animal bone (Sample E2972:058).

A sub-oval pit (179), located 4 m to the north was truncated by a ditch (006) on its south edge. Its surviving measurements were 0.37 m east/west by 0.25 m and 0.15 m deep with sharply sloping sides and a flat base. It was filled by compact dark brown silty sand with occasional charcoal fleck inclusions and charred barley and indeterminate cereal grains most likely wind blown intrusions (180) (Appendix 8).

Located 0.95 m northwards of the disturbed pit (179) was a sub-circular pit (159) with a diameter of 0.5 m and a depth of 0.3 m with sharply sloping sides except on the west where they were more gradual and a concave shaped base. It was filled by loose dark brown silty sand with occasional charcoal fleck inclusions (160) below compact brown sandy clay (161).

Directly to the northwest, oval pit (120) measured 0.95 m northwest/southeast by 0.6 m and 0.3 m deep with gradually sloping sides and a concave shaped base (Plate 10). It was filled by compact dark brown silty sand with moderate charcoal fleck inclusions (121) and some animal bones (Sample E2972:040).

Sub-circular pit (145) was 1.2 m to the northwest of pit (120). It measured 0.25 m northwest/southeast by 0.2 m and 0.1 m deep with gradually sloping sides and a concave shaped base. Loose dark brown silty sand with gravel (146) and animal bone (Sample E2972:050) filled the feature.

Circular pit (122) was 0.7 m to the east of pit (145). It had a 0.4 m diameter and was 0.13 m deep with gradually sloping sides and an uneven base. It was filled by loose dark brown silty sand (123) with animal bone inclusions (Sample E2972:042).

The next shallow pit in the grouping was oval pit (165) situated 1.1 m northeast of pit (122). It measured 0.7 m by 0.4 m and was 0.13 m deep with gradually sloping sides and an uneven base. It was filled by loose dark brown silty sand (164).

Oval pit (170) was the most northerly feature of the cluster. It was situated 5.2 m from pit (165) and measured 0.42 m north/south by 0.36 m and 0.1m deep with gradually sloping sides and a flat base. It was filled by loose dark grey sandy clay with pebbles (171).

Oval pit (167) was 0.25 m further northeast of pit (165). It measured 0.93 m east/west by 0.5 m and had a maximum depth of 0.16 m. Its sides were gradual and its base was flat. It was filled by loose dark brown silty sand with occasional charcoal fleck inclusions (166) from which animal bone was retrieved (Sample E2972:077).

Circular pit (199) was adjacent to and directly northeast of pit (167). It was disturbed by a linear feature (141) on its east side. Its surviving portion suggested it had an original of 0.5 m diameter. It was 0.14 m deep. Its sides were gradual and the base was flat. It was filled by compact brown silty sand (200).

Oval pit (114), located 1.1 m to the south of pit (199), was disturbed on its east side by the linear feature (141). It measured 0.71 m east/west by 0.62 m and 0.17 m deep with gradually sloping sides and a flat base. Loose brown silty sand (115) with animal bone (Sample E2972:043) filled the pit.

Circular pit (172) was located 1.9 m southeast of circular pit (199). It was truncated by ditch (003) on its eastern side. It had a 0.52 m diameter and was 0.12 m deep with gradually sloping sides and a concave shaped base. It was filled by loose black sandy silt with frequent charcoal fleck inclusions (173).

A sub-circular pit (149) measuring 0.9 m north/south by 0.85 m and 0.2 m deep with gradually sloping sides and a concave shaped base was located 0.72 m southeast of pit (172). It was filled by moderately compact dark brown silty clay (150).

A number of pits distributed in the northeast quadrant of the site were filled with sand deposits; sometimes with charcoal fleck inclusions and animal bone inclusions.

The most northerly was sub-circular pit (156) located 0.4 m from curvilinear feature (098). It had a diameter of 0.3 m and a depth of 0.05 m with gradually sloping sides and a concave-shaped base. Its fill was compact yellow sand (158).

Oval pit (155) was 0.3 m south of pit (156). It measured 0.6 m east/west by 0.3 m and was 0.25 m deep with gradually sloping sides and a concave shaped base. It contained a deposit of loose dark brown sand (157).

Located 4 m to the west circular pit (181) had a diameter of 0.5 m and was 0.2 m deep with gradually sloping sides and a concave-shaped base. It was filled by loose dark brown sand (182) from which animal bone (Sample E2972:079) was identified and retrieved along with a single small fragment of slag.

Circular pit (101) was 3.8 m southeast of pit (181) and 4 m from the east edge of site. It had a diameter of 0.6 m and was 0.15 m deep with gradually sloping sides and a concave-shaped base. Its single fill was loose dark brown sand (102) with animal bones (Sample E2972:031).

An irregular shaped feature (223) was 1.8 m southwest of pit (101) and truncated by ditch (003). It measured 2.7 m east/west by 1.41 m and 0.27 m deep with sharp to gradually sloping sides and a slightly concave-shaped base. Frequent animal bone (Sample E2972:101) was contained in its fill; loose dark brown black silty sand with occasional charcoal fleck inclusions (224).

An irregular pit (020) was *c.* 4 m northwest of pit (101). It measured 0.94 m east/west by 0.62 m and 0.12 m deep with sharp to gradually sloping sides and a flat base. It contained loose brown sand (021).

Oval pit (022) was 3.24 m west of pit (020). It measured 0.65 m east/west by 0.5 m and 0.1 m deep with gradually sloping sides and a flat base. It was filled by loose mid-brown sand with occasional charcoal fleck inclusions (023) which produced animal bones (Sample E2972:003).

A third oval pit (033) was located *c.* 7 m southeast of pit (022) and *c* 7 m from the eastern edge of the site. It measured 0.7 m east/west by 0.6 m and 0.14 m deep with sharply sloping sides and uneven base. Its fill was loose dark brown sand (034).

Another oval pit (024) was 2.1 m to the southwest of pit (033). It measured 0.77 m northeast/southwest by 0.67 m and 0.23 m deep with gradually sloping sides and a concave shaped base. It was filled by loose brown sand (025).

A fifth oval pit (026), *c.* 1.55 m southwest of pit (024) measured 0.75 m northeast/southwest by 0.7 m and 0.19 m deep. It had gradually sloping sides and a concave shaped base. It was filled by loose brown medium sand (027).

Phase VI - Post-medieval and Possible Post-medieval
Curvilinear Features: A number of curvilinear features were excavated, most situated along the east edge of the site, adjacent to the existing road.

Curvilinear ditches (050) and (081) in the northwest quadrant of the site appeared to act as two portions of a circular feature that, if continuous, would have had an overall internal diameter of *c* 8.5 m (Figure 3). Ditch (050) formed the north segment. It was disturbed along its north edge by ditch (005). It survived as a curvilinear feature measuring *c.* 13.74 m long, 0.7 m wide and with a maximum depth of 0.26 m, with gradually sloping sides and a flat to concave shaped base. Animal bone comprising cattle, sheep/goat, and unidentified species (Sample E2972:006; Appendix 9) were retrieved from its fill which consisted of loose dark brown silty sand with occasional charcoal fleck inclusions (051). Charred cereal remains of 2-row barley, oat, and indeterminate grains were also present in this deposit (Sample E2972:006; Appendix 8). The southern ditch segment (081) truncated kiln (070) and was 4.7 m long, 0.5 m wide and 0.22 m deep with gradually sloping sides and concave shaped base. It contained loose dark brown sandy gravel (082).

Curvilinear gully (066) was located *c* 16 m east of the curvilinear feature. (050, 081) It had an overall north/south alignment. Ditches (096) and (079) appeared to terminate at the north terminus and

southwest edge of the gully (066) which measured 5.5 m long, 0.55 m wide and 0.21 m deep with gradually sloping sides and a flat base. Its fill, loose brown clayey sand with occasional charcoal fleck inclusions (067), had animal bone content comprising cattle, horse, sheep/goat, large and medium mammals, and unidentified species (Sample E2972:011; Appendix 9). It could not be determined during the excavation phase if the two ditches, (079) and (096), were earlier or later than the ditch (066). It is possible they are contemporary and part of the same phase of activity of the curvilinear gullies given the fact that both terminate near the two ends of the curvilinear gully (066).

A 3 m long portion of a curvilinear feature (098) was partly exposed inside the northeast corner of the site. It measured 0.47 m wide and 0.27 m deep with gradually sloping sides and a concave shaped base (Plate 19). It was filled by grey brown silty sand with frequent stones (099) and animal bone from large and medium mammals and unidentified species (Sample E2972:036; Appendix 9).

Located 4.3 m south of (098), and partly extending beyond the east edge of the site was a curvilinear feature (218). Within the site it displayed a maximum 3.9 m internal diameter, was 0.55 m wide and 0.2 m deep with gradually sloping sides and concave shaped base. It contained dark brown sandy clay (219). This feature truncated kiln (116) and was itself slightly truncated by later cutting (073).

A 4 m long surviving portion of a curvilinear gully (169) was located *c.* 17.2 m south of gully (218). Ditch (003) cut its west side with a furrow (204) and the road cutting (073) disturbing its east end. It was 0.4 m wide and 0.25 m deep, its sides were sharp and base flat. It contained a single fill of brown grey clayey sand with frequent small stones (168).

A third curvilinear feature (095), also disturbed on its east side by the road cutting (073), was *c.* 16 m south of gully (169). It survived as a semicircular shaped feature in plan with the length between its surviving arcs giving a diameter of 4.9 m (Figure 9; Plates 17 and 18). The gully's maximum width was 0.7 m and it had a depth of 0.23 m with gradually sloping sides and a concave shaped base. Its single fill was loose greyish brown stony silt (100) from which animal bone was collected comprising cattle, a large mammal, and unidentified species (Sample E2972:030) (Appendix 9).

Curvilinear gully (177) was truncated by ditch (006) on its north side and by the road cutting (073) on its south. It survived to an approximate length of 4 m. It had a maximum width of 0.6 m and a depth of 0.22 m. It had sharply sloping sides, a flat base and contained loose dark brown sandy silt (178).

A curvilinear feature (201), located 5 m from the south edge of the road corridor was only partly inside the east edge of the site where it was truncated by the road cutting (073). Its surviving dimensions suggested it had an original 4.2 m internal diameter. It was 0.5 m wide and 0.25 m deep with gradually sloping sides and a concave shaped base. It was filled by loose dark brown silty sand with occasional sub-angular stones and charcoal inclusions (202).

A curvilinear gully (197) was 1.4 m west of and partially enclosed curving gully (201). It had a general northeast/southwest orientation extending for 6.3 m and was truncated on the east by the road cutting (073). It was 0.5 m wide and 0.15 m deep with gradually sloping sides and a concave shaped base. It was filled by loose dark brown silty clay with occasional charcoal fleck inclusions (198) and animal bone content comprising cattle, a medium sized mammal, and unidentified species (Sample E2972:091) (Appendix 9).

Curvilinear Ditches: Two ditches (079) and (096) entered the site from the northern edge of the road corridor.

Curvilinear ditch (079) was the most westerly. It continued in a southeast direction for 25.1 m where it terminated along the west edge of curvilinear feature (066). It had a maximum width and depth of 1.3 m and 0.6 m respectively with gradually sloping sides and a concave shaped base. It was filled by loose brown silty sand with frequent stones (080). Burnt and unburnt bones from cattle, pig, sheep/goat, large and medium mammals and unidentified species (Sample E2972:021-022; Appendix 9), a sherd of blackware (E2970:080:001) and a worked bone (E2970:080:002) were recovered from this fill. This ditch was truncated by ditch (005).

A slightly curved linear ditch (096) entered the site *c.* 10 m east of curvilinear ditch (079). It ran for *c.* 15.8 m in a southeast direction and like ditch (079) it appeared to terminate where it met curvilinear gully (066), this time on its north terminus. It measured 0.65 m wide and 0.3 m deep. Its fill was similar to the fill (067) of the curvilinear feature and comprised of loose dark brown clayey sand with occasional charcoal fleck inclusions (097) and animal bone inclusions comprising cattle, pig, sheep/goat, large and medium mammals and unidentified species (Sample E2972:026; Appendix 9).

It could not be determined during the excavation phase if the two ditches, (079) and (096), were earlier or later than the ditch (066). It is possible they are contemporary and part of the same phase of activity of the curvilinear gullies given the fact that both terminate near the two ends of the curvilinear gully (066).

Field Enclosure and Agricultural Activity: Four field boundary ditches (Figure 10) and a number of agricultural furrows were located within the site.

A north/south running field ditch (003) ran the full width of the road corridor (*c.* 53.5 m) parallel to and approximately 6 m from the eastern edge of the site. It measured 1.01 m wide and had a maximum depth of 0.49 m with gradual to steep sloping sides and a concave shaped base (Figure 10). It was filled by loose to moderately compact dark orangish brown silty sand with small stone inclusions (060). Animal bone comprising large and medium mammals, an articulated dog skeleton, and unidentified species (Sample E2972:009; Appendix 9), four post-medieval pottery sherds (E2972:060:001-004), a chert artefact possibly with a fractured retouched working edge (E2972:060:005; Appendix 15), a pair of scissors (E2972:060:007) and a corroded iron bar of unknown function (E2972:060:006) (Appendix 14) were identified and retrieved from this fill.

An east/west running field ditch (006) running the full width (*c* 29 m) of the south end of the site truncated ditch (003) and was cut by road cutting (073) at the eastern edge of the site. It disturbed kiln (187) along its central portion. It had a maximum width and depth of 1.26 m and 0.4 m respectively with gradual to sharply sloping sides and a flat base (Figure 10). Its single fill was loose light brown clayey sand with pebble inclusions (061).

Two parallel running field ditches, (004) and (005), sharing a similar orientation with ditch (006), were partially located inside the northern edge of the site. These field ditches cut ditch (003).

Within the site ditch (004) was *c.* 28.5 m long, terminating approximately 3 m from the east edge of site. It had a maximum width of 1.3 m, was 0.35 m deep with gradually sloping sides and a concave shaped base (Figure 10). It was filled by loose dark brown silty clay with frequent pebbles (065) from which a glass bottle spout (E2972:065:001; Plates 23 and 24) and two sherds of post-medieval pottery (E2972:065:002-003) were recovered (Figure 12).

Ditch (005) was *c.* 3 m to the south. It ran the full width of the site with its east end truncated by the road cutting (073). It had a maximum width of 1.2 m and depth of 0.29 m (Figure 10). It was filled by

loose dark brown silty sand (062) and contained a single sheep/goat bone and two bones unidentifiable to species (Sample E2972:013; Appendix 9).

A small linear feature (036), possibly a lazy bed, cut the field ditch (005) approximately 4 m from the north edge of the site. It measured 5.6 m northeast/southwest by 0.9 m and was 0.35 m deep with gradually sloping sides and a concave shaped base. Animal bones comprising sheep/goat, dog, medium sized mammals and unidentified species (Sample E2972:004; Appendix 9) were recovered from its fill, which consisted of moderately compact dark brown silty sand with frequent small stone inclusions (037).

A number of north/south running agricultural furrows, (048), (052), (063), (068), (106), (131), (141), (153), (204), (206), (208), and (209), were located mainly near the east edge of, and in the northwest quadrant of, the site. Some extended beyond the north edge of the road corridor. They were between 4.7 m and 16 m long and 0.44 m to 0.66 m wide with depths of between 0.08 m and 0.19 m. All had gradually sloping sides and flat or concave shaped bases. Their fills ranged between grey to brown silty sands, sandy clays or silty clays (053), (064), (069), (107), (132), (142), (154), (203), (205), (207), and (210). Two of the furrows contained animal bones. Fill (107) of (106) contained bones of cattle, pig, sheep/goat, large and medium mammal and unidentified species, while fill (142) of (141) contained bone from sheep/goat, a medium sized mammal, and unidentified species (Samples E2972:012 and E2972:074; Appendix 9). An undiagnostic corroded metal strip (E2972:053:001) was recovered from the fill (053) of one of these furrows (052) (Appendix 14).

A number of stone sockets and shallow features (009), (225), (018), (038), (041), (046), (083), (185) with their respective fills (010), (226), (019), (039), (040), (084), (085), (086), (087), (042), (047), (186) were recorded. They are likely to date to post-medieval field clearance. The fill (226) of circular stone socket (225) yielded an undiagnostic clay pipe stem fragment (E2972:226:001) was probably dates to the 19th century (Appendix 12).

Partly inside, and running along the east edge of the site, was a modern cutting (073) that is likely to relate to the construction of the road that ran adjacent to the site. Within the site it was 53.5 m long north/south and was visible for a width of 1.5 m and to a depth of 0.55 m. It truncated a number of archaeological features already described. The cutting was filled by brown silty clay (074) which contained a number of animal bones from cattle, horse, pig, sheep/goat, crows and other birds, large and medium mammals and unidentified species (Sample E2972:032; Appendix 9). The road was substantially lower than the real ground surface. Waste spoil from its excavation thrown up along the east edge of the site resulted in the formation of overburden along this edge of the site.

5 Discussion

The results of the excavation at Mullamast are discussed here following stratigraphic, environmental, dating and artefactual analysis. The site is then discussed on a local level and related to other sites known in the vicinity (including those discovered on the current scheme). Finally the site is discussed on a national level in an attempt to place it in context and assess how it contributes to the archaeological record in general.

Development of the site

The results of the excavation point to multiple, and quite different, phases of activity at the site. The earliest activity appears to centre around two groupings of pits, and a single isolated feature. This activity has not been precisely dated, however the lithic assemblage retrieved ranged chronologically across the prehistoric period from the late Mesolithic/early Neolithic to the late Neolithic/Early

Bronze based on their morphological and technological aspects (Appendix 15). On this basis a date no later than the Bronze Age appears to be indicated. The presence of finished objects along with debitage as a by-product of knapping suggests a variety of activities were undertaken at Mullamast.

By the Late Bronze Age/Iron Age transition, there was a change in the character of activity at the site with the insertion of a single crouched inhumation. However, this transition to funerary activity appears to have been short-lived as subsequent activity in the Iron Age, characterised by two pits – one waste, one storage – indicative of a more domestic-type activity. This phase of activity appears to be broadly contemporary with recorded Iron Age activity in the wider scheme as represented by contemporary activities at the ring-ditch on Site E2973 200 m to the west and with the construction of the enclosing ditch around the Bronze Age cemetery less than 50 m to the northeast on Site E2980. Further extensive Iron Age activity was revealed at Site E2982 in Moone townland where two domestic structures with associated features including two iron smelting pits, and a 'cillín' containing the burials of eight juveniles were excavated.

This domestic character continued into the early medieval period; activity during this period appears to be ancillary to a main settlement. The key features identified were a series of cereal-drying kilns and at least one metalworking furnace. In addition to the early medieval features a series of undated features, primarily comprising two groupings of small pits (one in the northeast corner of the site, the other towards the southeast immediately east of the grouping of prehistoric pits) were recorded.

The grouping of pits in the northeast corner of the site may represent waste pits. Many of the features contained animal bone and usually held some fragments of charcoal. This differentiates them from the adjacent grouping of prehistoric pits, many of which were sterile. A small number of charred barley and indeterminate cereal grains were also retrieved from one of these pits. While likely to be an accidental wind blown rather than deliberate deposit, it does raise the possibility that these features may be contemporary with the main phase of cereal processing on site as represented by the early medieval cereal drying kilns.

Three further pits remain undated. All showed evidence for in situ burning and may have functioned as hearths. One of the three (118), truncated the upper fill of the cereal drying kiln (116) implying this feature at least may date to the medieval or post-medieval period.

The latest activity at the site was characterised by post-medieval agricultural and landscaping features. Some of these features clearly predate the road shown on Noble and Keenan's Map of Kildare (1752), suggesting a 17th or early 18th century date.

Inhumation burial

The single crouched inhumation in the centre of the site appears to be an isolated event. The age of the male interred and the lack of any signs of trauma (Appendix 10), suggest this individual died of natural causes, and that this burial may reflect a deliberate choice of this spot overlooking the River Greese and the Wicklow mountains beyond.

The late Bronze Age/Iron Age transitional date obtained (760–410 cal BC (2σ) (SUERC-24971)) shows the burial to be unrelated to the adjacent Bronze Age cemetery at Moone E2980 (Hackett 2010), though the construction of an enclosing ditch there in the Late Iron Age/early medieval period implies that the cemetery was either still visible upon the landscape, or that a knowledge of their presence remained in the consciousness of the local people. The ring-ditch site (E2973) (Hackett and O' Connell 2009) approximately 200 m to the west with cremated human bone in its ditch fill further underlines this location as a being the focus for prehistoric funerary activity, as does a number of recorded sites within the townland of Mullamast; three barrows (RMP KD036-009; RMP KD036-011;

RMP KD036-014), and two barrow sites (RMP KD036-012; RMP KD036-013), one of which contained a cist burial (RMP KD036-01201).

During the Bronze Age, there is an increasing tendency towards single burial, a trend that began in the later Neolithic. Although no grave goods were found with the burial, its crouched position is common of prehistoric burials. However, the known formal burials of the Late Bronze Age are predominantly cremations, often representing only token burial deposits (Appendix 10), inhumation such as this are rare, with the inhumation rite only returning to dominance in the Late Iron Age, with under the influence of Romano-British funerary rites. Two other isolated crouched inhumations have been identified during investigations associate with this road scheme. These were at Site E2873 in Ballymount townland 6.5 km to the northeast (McCarthy 2009), and 2.2 km to the west in Mullamast townland where archaeological excavation at the site of a temporary compound for use during the construction of this road scheme, under licence number (08E0100), revealed a Bronze Age burial site (Hackett 2009). Both dated from the Early Bronze Age, substantially earlier than the E2972 burial, and probably reflecting continuity from Late Neolithic funerary rites; the burial from Ballymount was radiocarbon dated to 1940-1750 cal BC (2σ) (SUERC-24992), and the Mullamast burial was radiocarbon dated to 1878-1688 cal BC (2σ) (UBA-12023).

Further afield, a Late Bronze Age (1260-1020 BC) crouched inhumation burial was recovered from Leshemstown, Co. Meath 05E0398 (McGowan 2005). The burial record for the Late Bronze Age is fairly sparse and indicates that it is not an area where social differences can easily be interpreted (Cooney and Grogan 1999, 144). In this it both continues the trends of the Middle Bronze Age and forms the background to the burial tradition of the Iron Age.

Medieval Activity – Cereal Processing
Seven kilns, and one possible kiln, were recorded on site, their figure-of-eight and keyhole shapes in plan corresponding to an established morphology for medieval cereal-drying kilns. Cereal drying kilns are classified according to their shape in plan with the five main categories being; keyhole-shaped, L-shaped, figure-of-eight-shaped, dumb-bell-shaped and irregular (Monk and Kelleher 2005, 79). Figure-of-eight and dumb-bell-shaped kilns are seen as the forerunners to later keyhole shaped kilns. Radiocarbon dates were attained for two of the kilns on site placing there use within the early medieval period. The similar morphology of the remaining kilns would suggest they are broadly contemporary with these dates.

These kilns would have played a crucial role in the processing of cereal grains, avoiding the possible rotting of the cereal crop in the damp Irish climate and ensuring the survival of grain seed for the following year. The drying process would have been carried out throughout the year as required, with a concentration of activity in late summer/early autumn in preparation for winter storage or immediate use after harvesting.

Four of the kilns shared a similar north/south orientation, two were aligned northwest/southeast, one was northwest/southeast and one had an east/west axis. The fire-pit was always located on the northern end except in one (116) where this component was situated on the west. All were earth cut and most had a lower scorched fire pit connected by a flue to a higher drying chamber. A fire lit in the fire bowl would provide the necessary heat required for the drying process. Often a stone slab (baffle stone) would be placed on edge to stop fire spreading into the kiln and sparks from this subsequently igniting the straw. No evidence for a baffle stone was recovered from any of these kilns. Recently harvested cereals would have been placed on a wooden rack or straw bed and the heat from the fire would travel through the flue to the drying chamber which would have been covered by a roof of clay or thatch. Evidence for such a thatching was discovered in association with a kiln at site E2996 in Ballyvaas Co. Kildare (Doyle 2009). However no structural evidence associated with the kilns, such as

drying platforms or wind breaks, were detected on site E2972. Both the stratigrahic evidence and the high proportion of unidentifiable charred cereal remains in a number of the kilns points to their being used for more than one episode of drying.

Radiocarbon dates were obtained from two of the kilns (Table 1), which suggest a late 6th to 8th century AD date range for the cereal processing activity. Though cereal processing was identified on two adjacent sites (E2973 and E2980), this activity appears to be Late Iron Age in date (Table 1). There was, however, an enclosure site (RMP KD036-044) located *c.*825 m to the northwest that may have been associated with the activities at E2972.

Site	Context Nr	Orientation	Radiocarbon Date (2 σ)	SUERC-Number
E2973	(004)	North/south	Cal AD 250 - 550	SUERC - 25484
E2972	(070)	North/south	-	-
E2972	(088)	North/south	-	-
E2972	(103)	North/south	-	-
E2972	(116)	Northwest/southeast	-	-
E2972	(133)	Northeast/ southwest	Cal AD 540 - 680	SUERC - 25851
E2972	(176)	East/west	-	-
E2972	(187)	North/south	Cal AD 560 - 770	SUERC - 25479
E2980	(123)	East/west	-	-
E2980	(155)	North/south	cal AD 340 - 580	SUERC - 25456
E2980	(188)	Northeast/ southwest	cal AD 130 - 380	SUERC - 25313

Table 1 – Cereal-drying kilns on Site E2972 and nearby sites

Barley and oats comprised the majority of cereal grains recovered from the kiln, barley being most frequent in all bar one, kiln (088). This corresponds with the charred plant remains from a later medieval stone built, keyhole shaped kiln excavated at Site E2970 (Hackett and Twomey 2009) located 1.3 km to the west.

Historical texts attest to a variety of grain being grown in early medieval Ireland and with each type having its own value, a legal text *Bretha Déin Chécht* describes that a grain of wheat is associated with a supreme king, bishop and a master poet while a grain of oats is associated with the *bóaire* or strong farmer. Generally cereals were prepared in the form of bread, porridge and animal feeds, but barley was also used as the main ingredient for making beer (Edwards 1990, 60). Climatic conditions favoured the cultivation of barley and oat above that of wheat. Barley, used in ale production, was also a bread grain with monastic and penitential connotations. Oat, a low-status grain, was probably the chief cereal crop, most commonly used for oaten porridge and bread.

The high numbers of charred cereal remains found in situ in kilns (088), (133) and (187) may point to these features being damaged or destroyed, and subsequently abandoned (Appendix 8). Animal bone, including cow skulls, was retrieved from the upper fills of four kilns (Appendix 9). A number of similar cereal-drying kilns were excavated along the west edge of the adjacent site (E2980) (Hackett 2009), on the other side of the existing road which is situated in the townland of Moone. This location of a cluster of cereal-drying kilns along the townland boundary is perhaps significant. It has a parallel at Abbeyland, Blackcastle Demesne, Co. Meath (98E0590), where a kiln straddled a townland boundary. There are other recorded examples of cereal-drying kilns being set into, or associated with, various forms of boundaries such as ditches or field fences (Monk and Kelleher 2005). One kiln was recorded on the ring-ditch site (E2973) (Hackett and Twomey 2009) 200 m uphill to the west. The stone-lined pit (104) is possibly associated with the cereal-drying kilns. Its function is unclear.

The majority of farms or small group of farms would have had its own grain drying kiln with virtually every townland having one up to the mid-1800s (O'Sullivan and Downey, 2005). When compiled with the results from the nearby sites the results show the continued undertaking of cereal grain drying in this locality over a number of centuries in the late Iron Age/early medieval period the central role of cereal crops in the economy and diet of the time.

Early medieval activity – metalworking

The morphology of pit (108) suggests it represented the remains of a furnace which has been radiocarbon dated to the beginning of the early medieval period. It represents the lower section of a feature which would have had a clay structure above ground. This element of these features rarely survives as it would have been dismantled to remove the iron bloom and slag (Edwards 1999, 87). The method of smelting iron ore within such a furnace was known as the bloomery process. Charcoal would have been placed in the furnace and preheated with bellows used to pump air into the base of the furnace. Roasted ore and charcoal would have been added and once the temperature had reached between 1100 and 1200°C the ore would reduce to form iron metal while the impurities reacted to form slag. Evidence for the operation of this feature is provided with the presence of oxidised red sand and a quantity of slag. Jones (2001) has suggested that the presence of slag within a feature may indicate a failed smelting attempt which led to the abandonment of the furnace.

The shallow nature of the furnace implies it may have been a slag pit furnace or a shaft furnace. This feature would have produced a small quantity of metal, possibly in a single episode, rather than being evidence of widescale metal working at Mullamast. Iron ore for this process may have been sourced from Narraghmore Bog located 5.5 km to the northeast, with further evidence for metalworking in the surrounding landscape coming from Site E2876 in Ballymount adjacent to this bog (Twomey 2009). Here a medieval slag pit furnace was uncovered, which would post-date this feature, but again would likely represent a single episode of smelting. Such evidence suggests other similar features may occur in isolation across this landscape.

Post-medieval/possible post-medieval activity

A series of curvilinear gullies, which may be related to ornamental garden features of Willowbrook House which was located approximately 200 m to the northeast of the site are associated with this phase of activity. Their function is unclear. The road cutting along the east edge of the site disturbed some of these features. This road is depicted on the Noble and Keenan Map of Kildare giving a pre-1752 date for these features (Stephenson 2009, illus. 8). Gardens have been a feature of the Irish landscape for centuries, the temperate climate being particularly favourable to their development and maintenance. They would have been developed in association with a country house and demesne for the owners use and pleasure. While an element of demesnes from Anglo Norman times, it was from the 16th century on that ornamental gardens became an important feature in the environs of an Irish country house. The ephemeral nature of gardens lent itself to changing styles and fashions over the centuries; many of the symmetrical ornamental gardens of the earlier centuries being replaced in favour of a more natural landscaped form during the eighteenth century reflecting a desire to make the garden a part of the wider landscape. The later half of the nineteenth century saw many of these gardens developed into landscaped parks, some of which still survive today as at Fota Co. Cork and Powerscourt Co. Wicklow. Many others reverted to agricultural land with the demise of the Irish landed gentry and the 'big house' in the late nineteenth/early twentieth century.

The circular ditch excavated may represent the border of a flower bed, the stone-lined base providing drainage for the feature, or a tree ring: a feature used to define or enclose an ornamental tree. The partial truncation of the majority of these features by the existing roadway suggests they may have been set out along the route of an earlier road or pathway which was subsequently widened to its

current alignment. A possible post-medieval ornamental garden feature consisting of a circular ditch was excavated on a site (E2978) (Hackett 2008b) located approximately 110 m to the southeast of Willowbrook House and *c.* 250 m to the east of site E2972 (Figure 2).

Other post-medieval activity on site includes land division and enclosure reflecting changing agricultural practices on the land, as represented by a number of field boundary ditches and furrows. These followed two orientations. The field boundary (003) and the furrows followed a north-northeast/south-southwest line running parallel to the road cutting (073). The proximity of the field boundary and to roadway to each other indicates that they are unlikely to have been contemporary given the inefficient nature of farming and ploughing the narrow stretch of land between these features. Therefore it would appear likely that the boundary and furrows precede the construction of the present roadway.

Alternatively the east/west orientated field boundaries (004), (005) and (006) appear to respect this road cutting at their eastern termini suggesting they post date the construction of the roadway. However none of these features are represented on either the 1st Edition 6" Ordnance Survey map no. KE036 of 1839 or the 2nd Edition 6" Ordnance Survey map no. KE036-10 of 1909, suggesting that they date no later than the early 19th century.

Conclusion

The archaeological investigations undertaken at Site E2972 highlight the continuing presence and activities of people upon the surrounding landscape across several millennia. Agricultural practices and evidence for the processing of agricultural produce provided the most extensive remains, though evidence of burial, small-scale industrial activity and post-medieval landscape gardening were also identified.

The artefactual evidence recovered is representative of this multi-period activity ranging from late Mesolithic/Early Neolithic lithics to post-medieval pottery. Environmental remains, primarily in the form of charred cereal seeds highlight the crops cultivated in the medieval area and give evidence for the diet of that period. Animal bone was identified and retrieved from the fill of the inhumation burial as well as from numerous pits and features throughout the site. In the adjoining prehistoric inhumation cemetery Site E2980, the fill of a later, Iron Age enclosing ditch yielded a large quantity of animal bone. This may suggest a possible Iron Age date for animal bone deposition on site. It may be the case however, that animal bone deposition was occurring at different phases of the sites use.

All the archaeology related to this site within the CPO has been resolved.

6 Archive quantities

The site archive is comprised of the following materials:

Item	Quantity
Context Sheets	252
Plans	71
Sections	104
Photographs	123
Registers	5
Notebooks	1

The archive material is contained within 1 box.

Storage of the archive in a suitable format and location is required in order to provide for any future archaeological research. It is proposed that in addition to the paper archive a digital copy is prepared. The archive is currently stored in the offices of Headland Archaeology (Ireland) Ltd., Unit 1, Wallingstown Business Park, Little Island, Co. Cork. It is proposed that following completion of post-excavation analysis, the archive is appropriately deposited in consultation with the National Museum of Ireland.

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- Graphics department, Headland Archaeology (Ireland) Ltd.
- T.J O'Connell, Site Supervisor, Headland Archaeology (Ireland) Ltd.
- The excavation team.

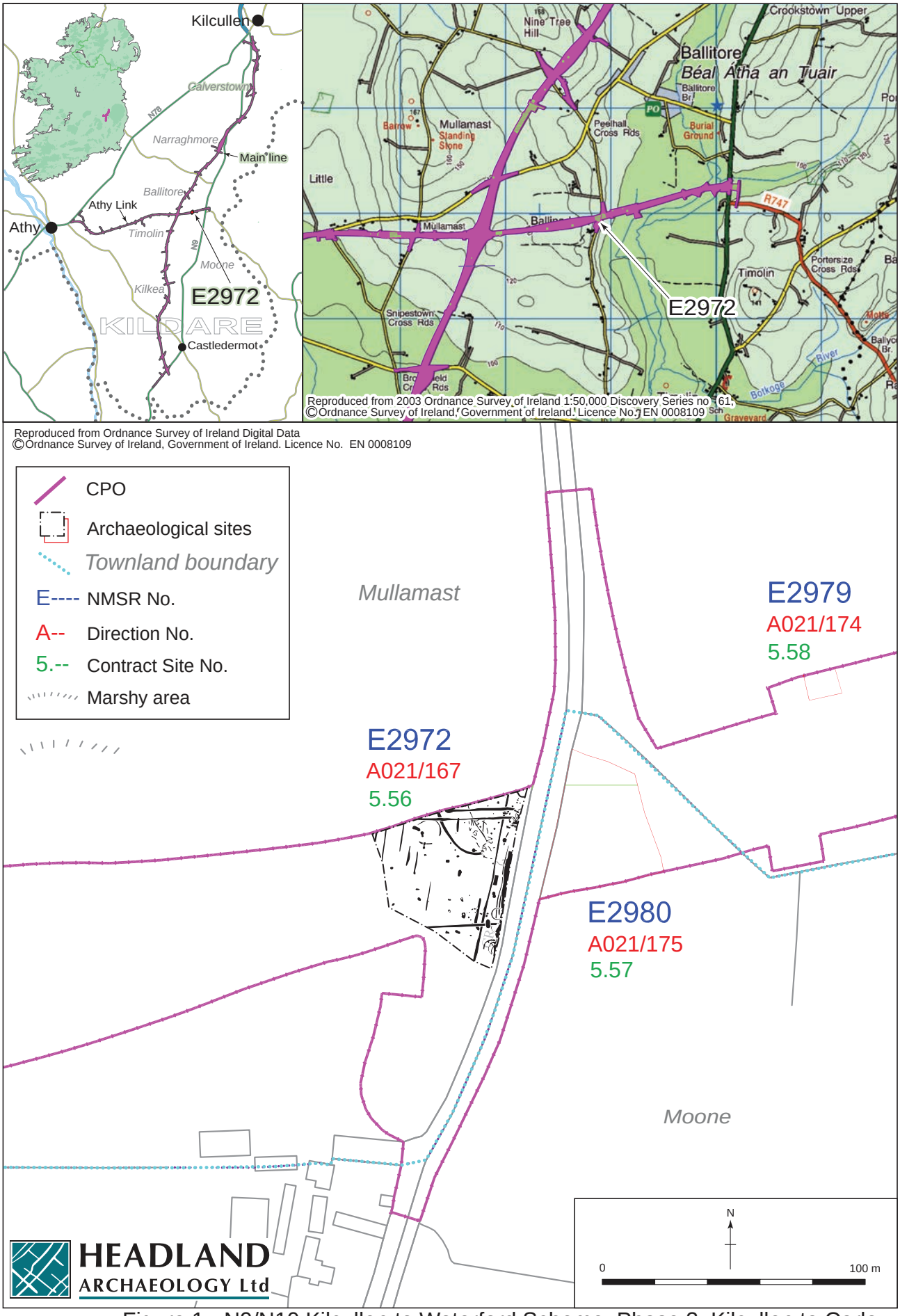


Figure 1 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road: E2972, Site location.

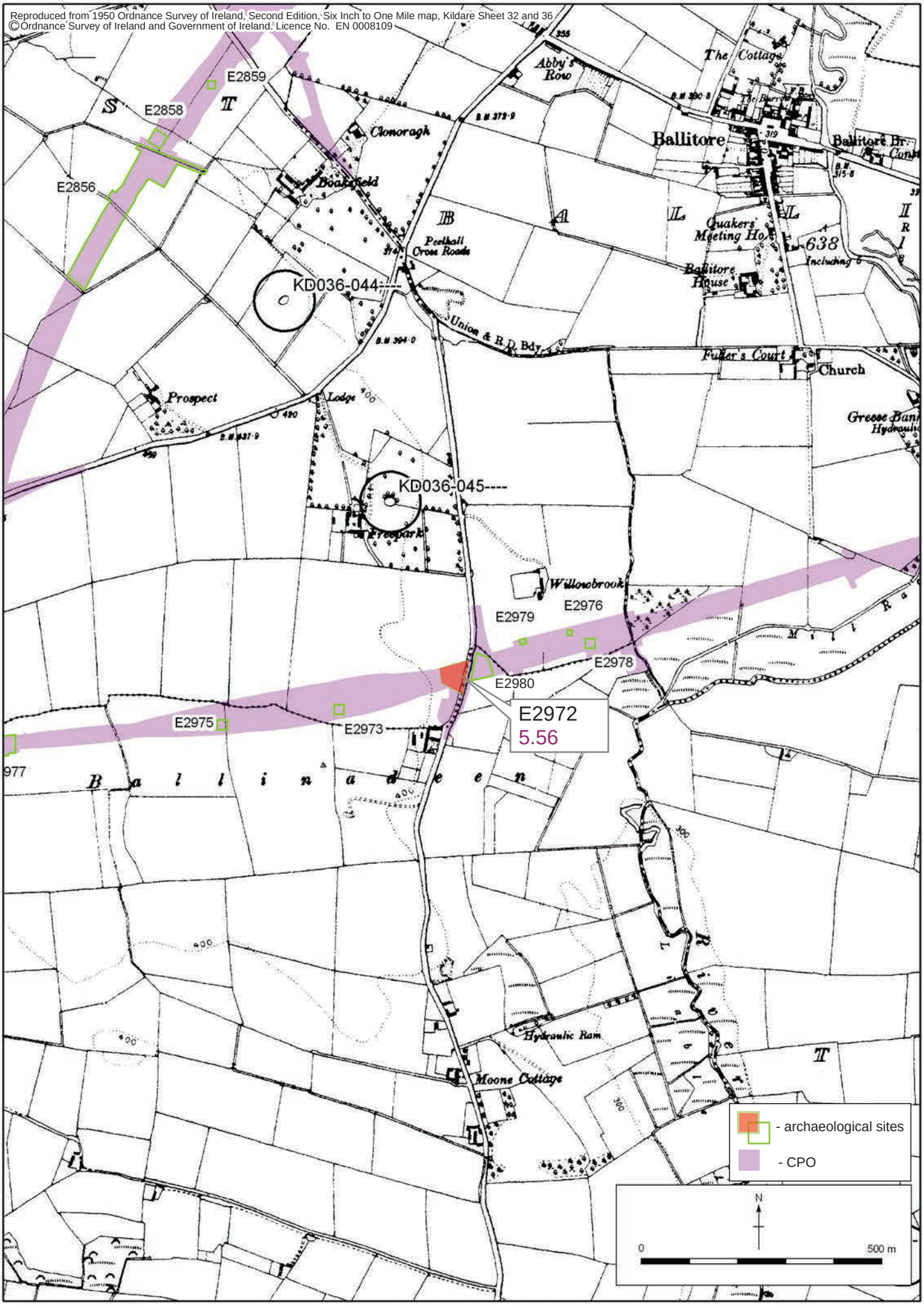


Figure 2 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road: E2972, Extract from RMP.

Figure 3 - N9/N10 Kilcullen to Waterford Scheme; Phase 3: Kilcullen to Carlow, Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road: E2972, Site layout.

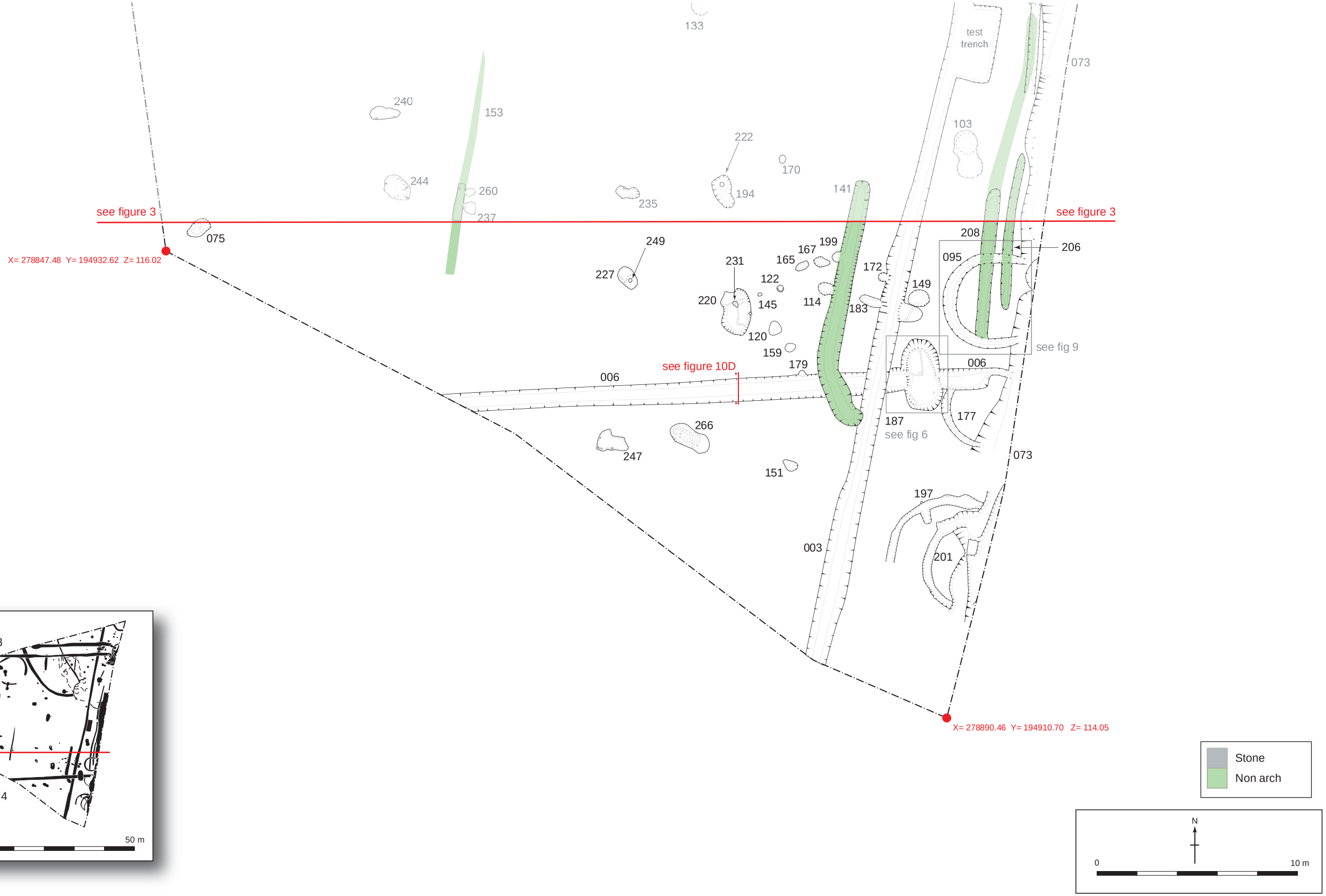


Figure 4 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road: E2972, Site layout.

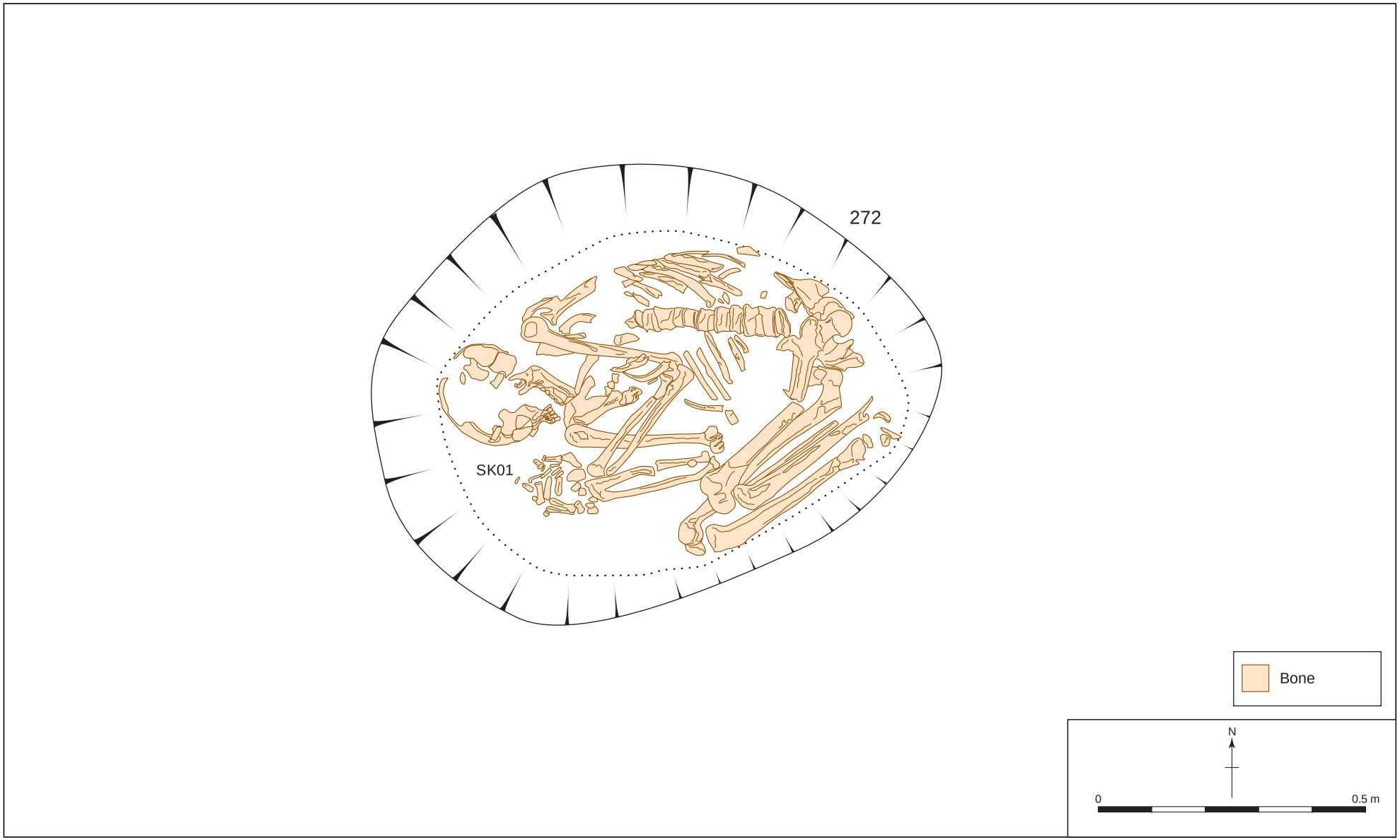
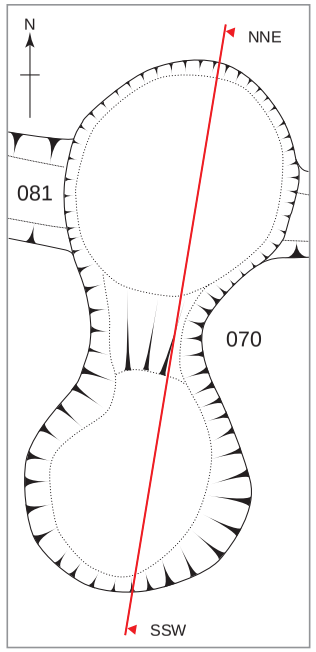
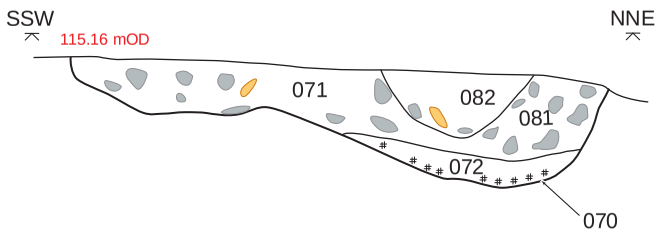
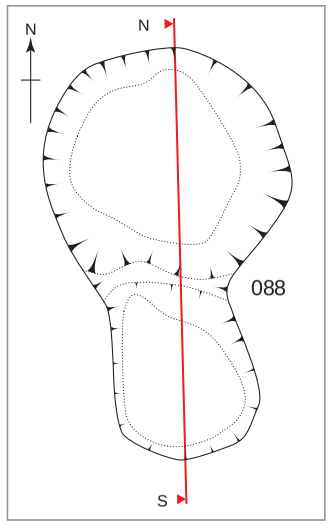
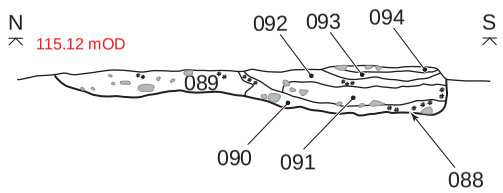


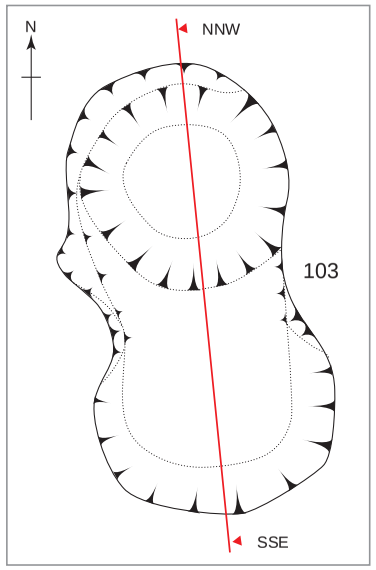
Figure 5 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow.
Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road:
E2972, Mid-excavation plan of crouched inhumation burial (272), SK01.

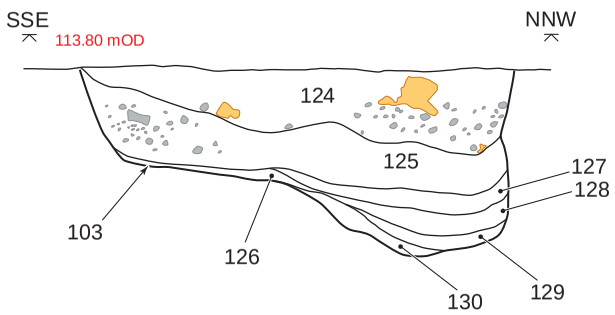


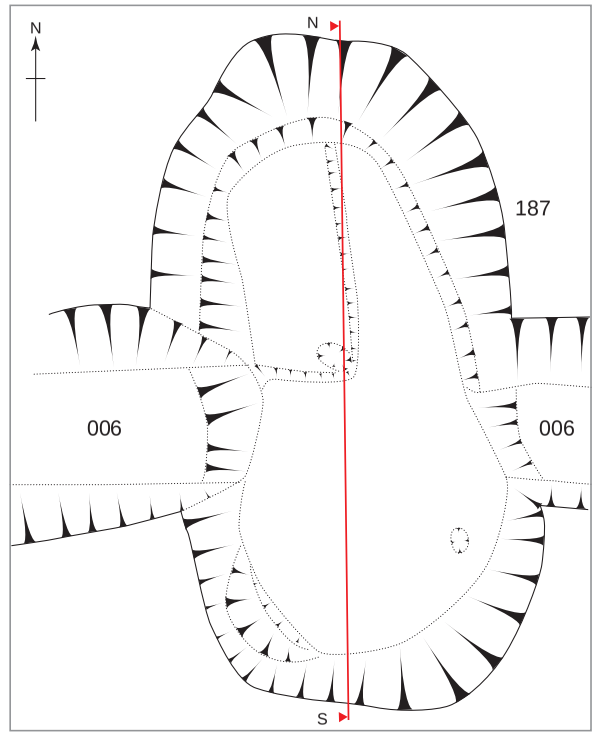


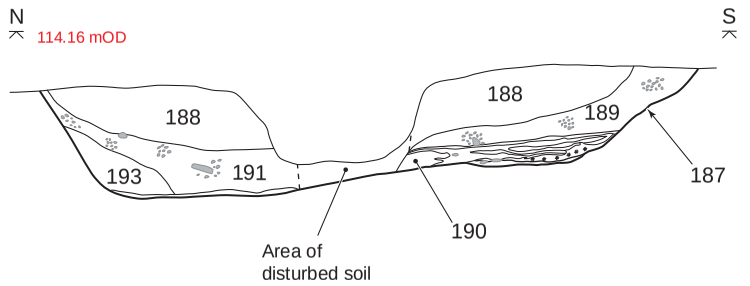


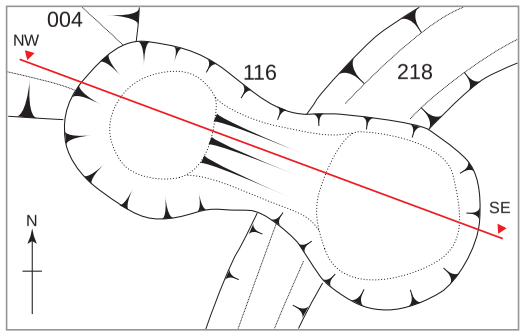


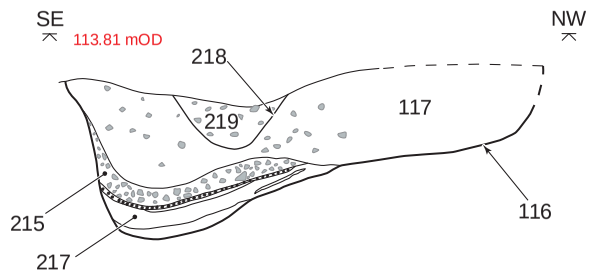


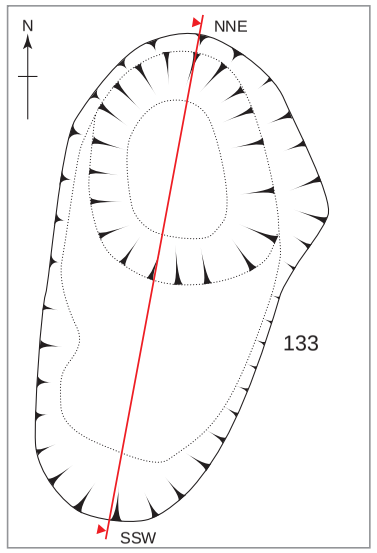


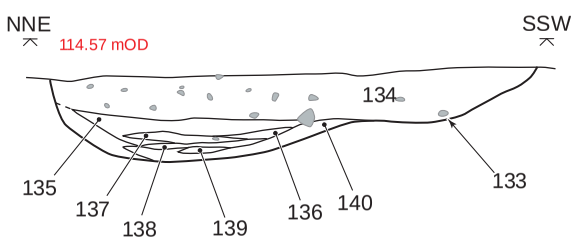


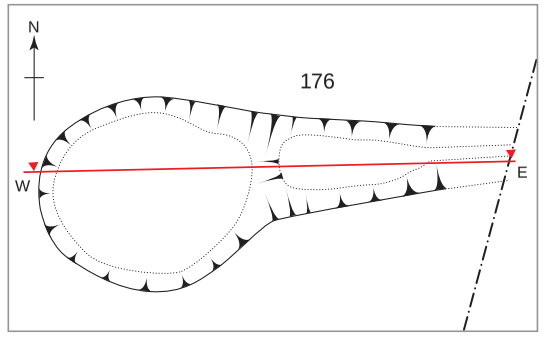


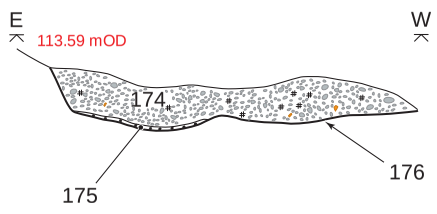












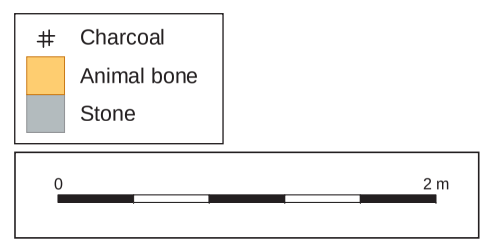


Figure 6 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road: E2972, Plans and sections of kilns (070), (088), (103), (116), (133), (176) and (187).

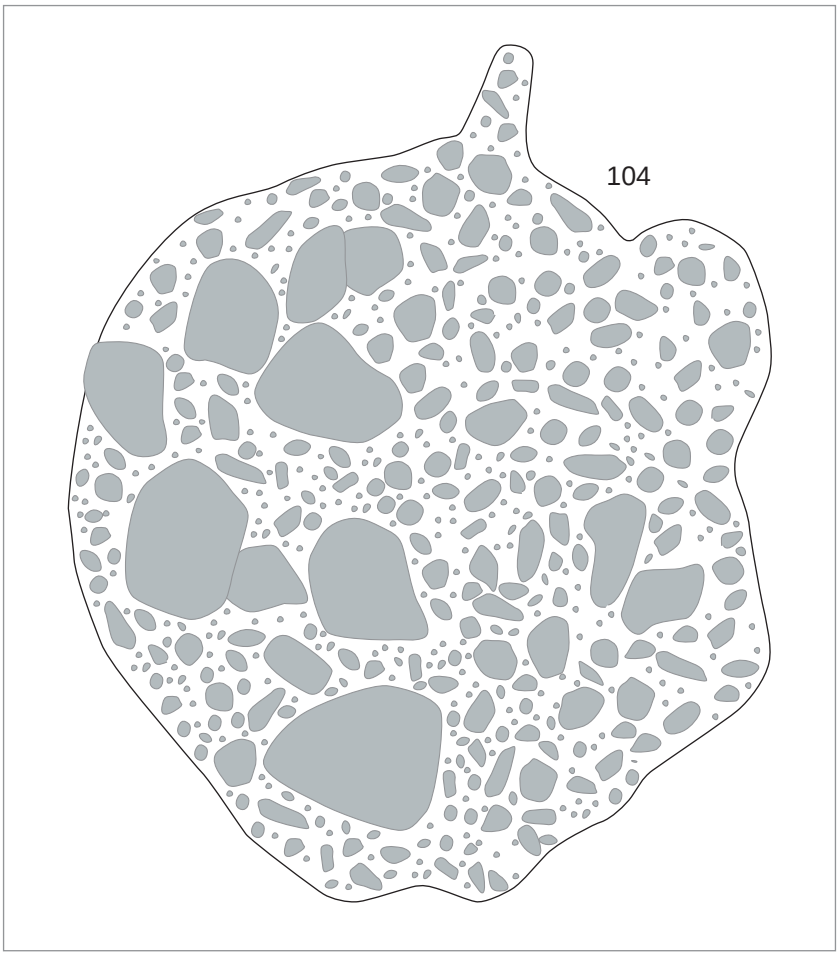
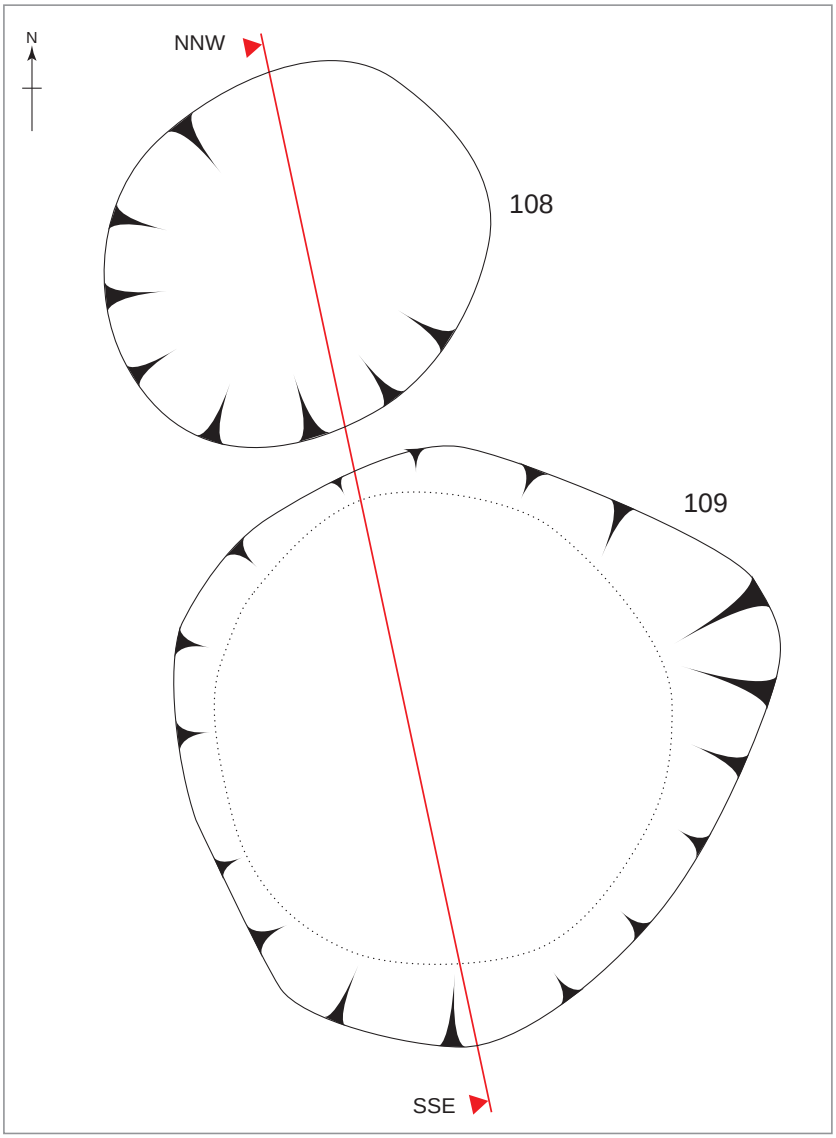


Figure 7 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road: E2972, Detailed plan of stone lined pit (104).



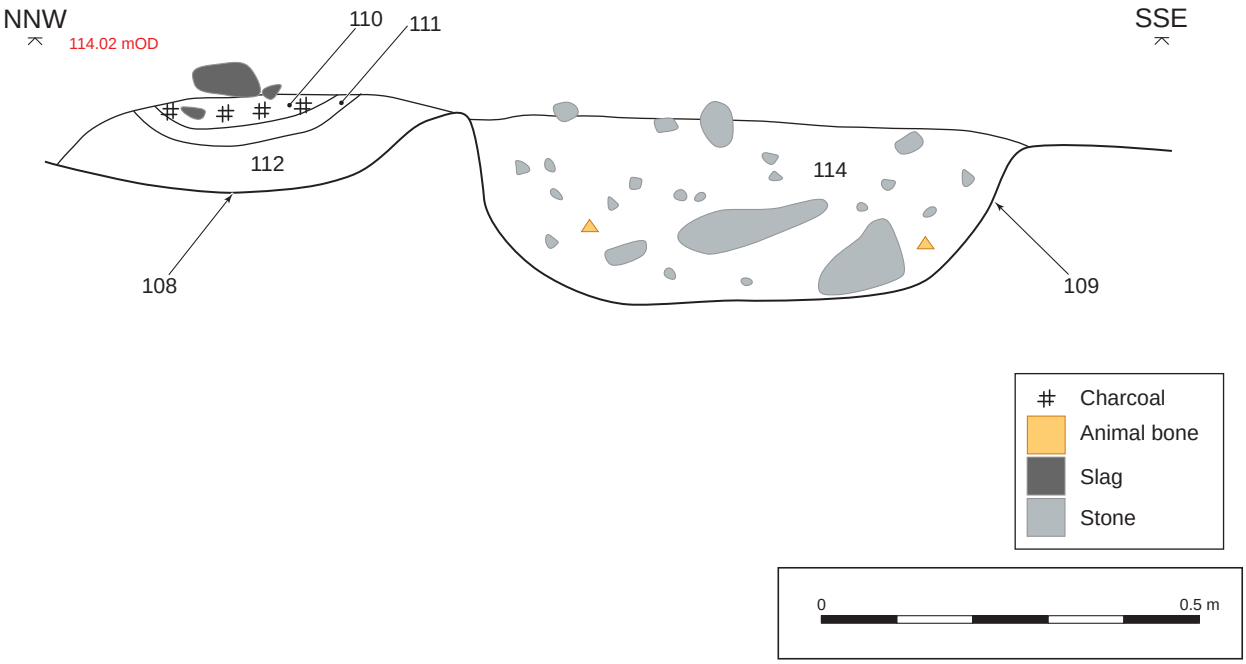


Figure 8 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road: E2972, Detail plan and east-facing section of bowl furnace (108) and adjacent pit (109).

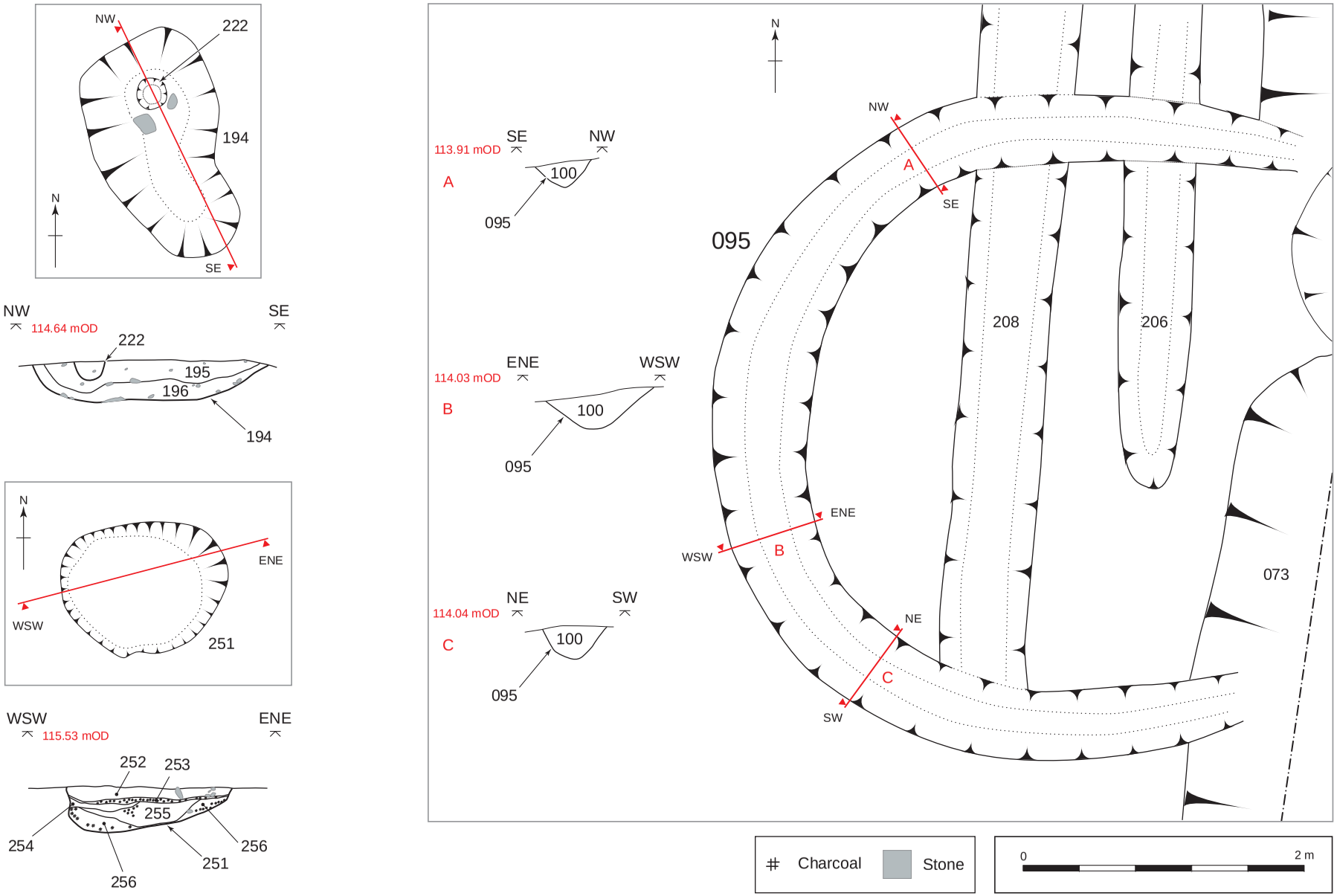


Figure 9 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road: E2972, Plans and sections of pit (194), hearth (251) and ring gully (095).

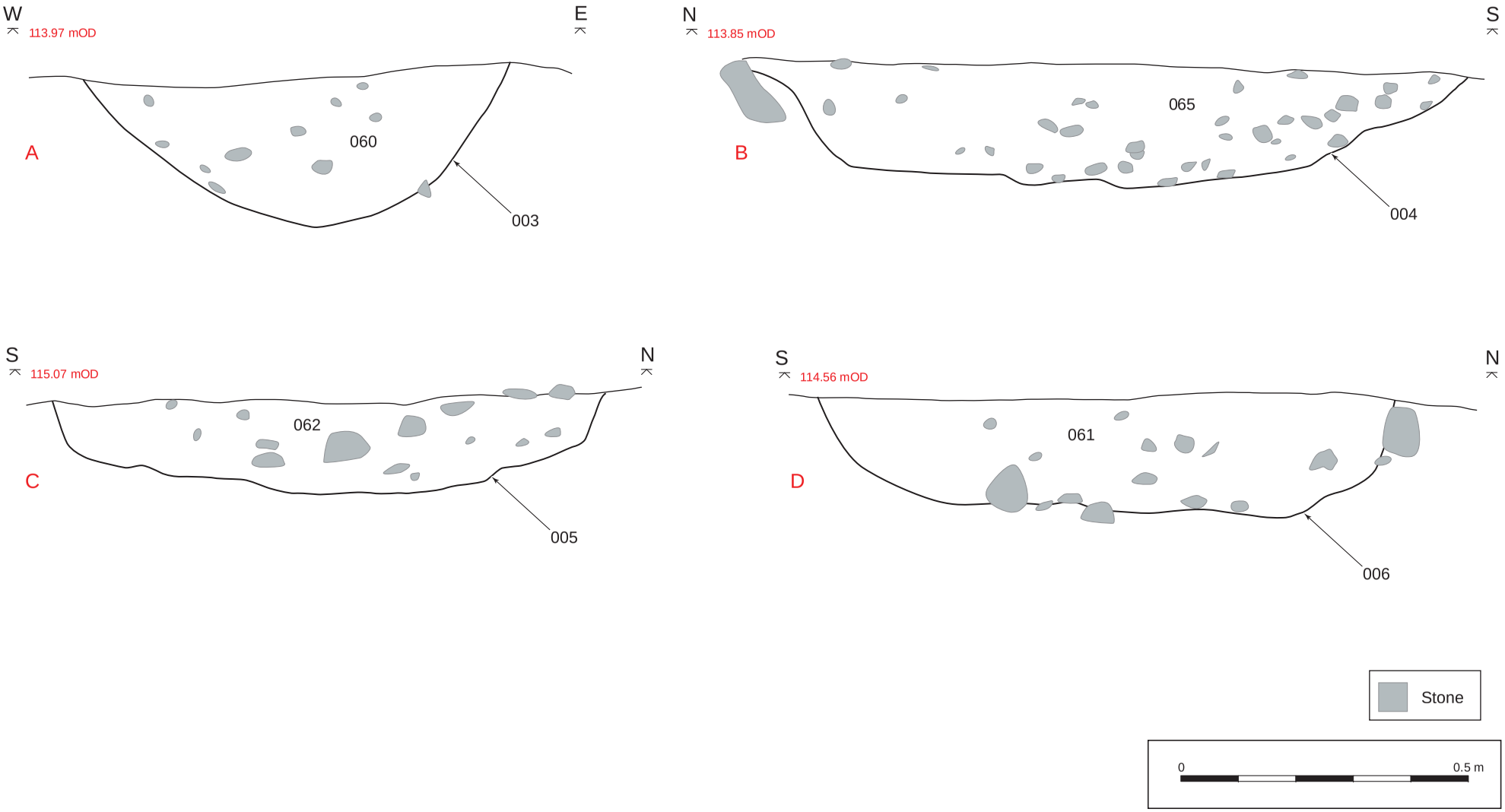
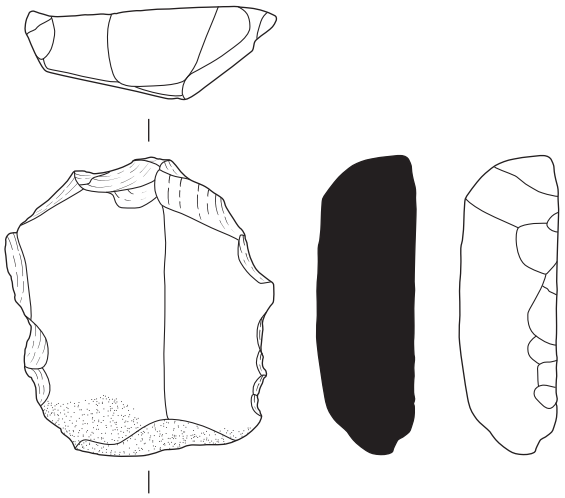
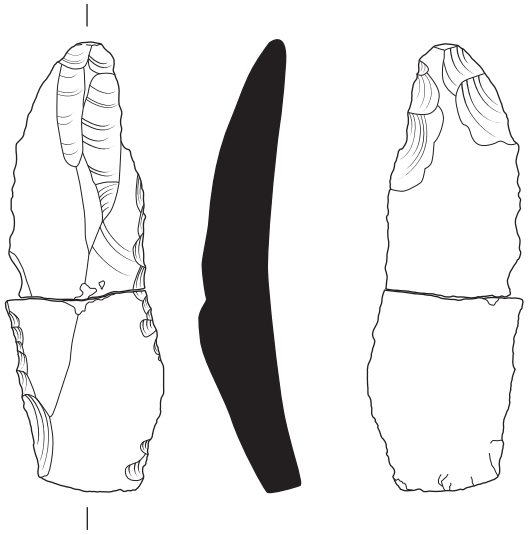


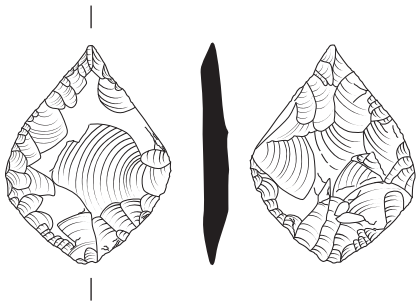
Figure 10 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road: E2972, Sections of ditches (003), (004), (005) and (006).



E2972:196:001
Chert Scraper



E2972:221:001
Flint Blade



E2972:241:001
Flint Arrowhead

0 3 cm

Drawn by: Hannah Sims

Figure 11 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road: E2972, Illustrations of chert scraper (E2972:196:001), flint blade (E2972:221:001) and flint arrowhead (E2972:241:001)

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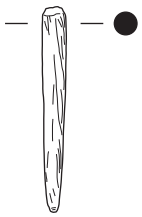
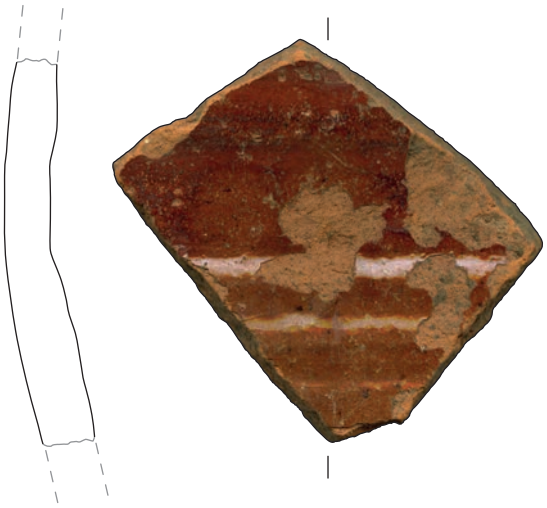


E2972:117:001
Bone Point
(Possible needle or pin)



E2972:065:003
Post-Medieval Pottery

E2972:174:001
Coarseware

0 3 cm

Drawn by: Hannah Sims

Figure 12 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road: E2972, Illustrations of bone object (E2972:117:001), post-medieval pottery sherd (E2972:065:003) and coarseware sherd (E2972:174:001)

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Plate 1 - Mid-excavation view of inhumation burial (272), facing west.

Plate 2 - Mid-excavation view of bowl furnace (108) and adjacent pit (109), facing north.

Plate 3 - Mid-excavation view of prehistoric pit (194), facing northeast.

Plate 4 - Post-excavation view of prehistoric pit (194), facing southwest.

Plate 5 - Pre-excavation view of stone-lined pit (104), facing north.

Plate 6 - Mid-excavation view of stone-lined pit (104), facing south.

Plate 7 - Mid-excavation view of kiln (088), facing west.

Plate 8 - Post-excavation view of kiln (088), facing west.

Plate 9 - Mid-excavation view of kiln (133), facing west.

Plate 10 - Mid-excavation view of pit (120), facing southwest.

Plate 11 - Mid-excavation view of kiln (070), facing northeast.

Plate 12 - Post-excavation view of (070), facing north.

Plate 13 - Post-excavation view of kiln (103), facing southeast.

Plate 14 - Mid-excavation view of kiln (187), facing west.

Plate 15 - Mid-excavation view of burnt pit (251), facing south.

Plate 16 - Post-excavation view of burnt pit (251), facing north.

Plate 17 - Pre-excavation view of ring gully (095), facing east.

Plate 18 - Post-excavation view of ring gully (095), facing east.

Plate 19 - Post-excavation view of ring gully (098), facing northwest.

Plate 20 - Post-excavation view of pit (056), facing east.

Plate 21 - Hone stone (E2972:001:007), front view.

Plate 22 - Hone stone (E2972:001:007), side view.

Plate 23 - Glass bottle spout (E2972:065:001), front view.

Plate 24 - Glass bottle spout (E2972:065:001), side view

Appendix 1 – Context Register for Site E2972

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
(001)	Deposit					0.3	Mid-brown silty clay	Topsoil.
(002)	Deposit						Yellowish grey sandy gravel mixed with yellow clay.	Subsoil.
(003)	Cut		(060), (061)	53.5 (within site)	1.01	0.49	Linear ditch (aligned N/S) with gradually sloping sides and concave shaped base.	Field boundary.
(004)	Cut		(065)	28.5 (within site)	1.3 (max)	0.35 (max)	Linear ditch (aligned E/W) with gradually sloping sides and concave shaped base.	Field boundary.
(005)	Cut		(062)	37 (within site)	1.2 (max)	0.29 (max)	Linear ditch (aligned E/W) with gradually sloping sides and concave shaped base.	Field boundary.
(006)	Cut		(061)	29 (within site)	1.26 (max)	0.4 (max)	Linear ditch (aligned E/W) with gradually sloping sides and flat base.	Field boundary.
(007)								Void
(008)								Void
(009)	Cut		(010)	0.3	0.26	0.12	Oval shape in plan with sharply sloping sides and concave shaped base.	Stone socket.
(010)	Fill	(009)		0.3	0.26	0.12	Dark brown silty sand with occasional charcoal fleck inclusions.	Fill of stone socket.
(011)	Cut		(012)	0.96	0.82	0.05	Oval shape in plan with gradually sloping sides and flat base that were heavily oxidised.	Possible hearth feature.
(012)	Fill	(011)		0.96	0.82	0.05	Compact grey black clayish silt with frequent charcoal fleck inclusions.	Fill of possible hearth feature.
(013)								Void
(014)								Void
(015)								Void

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
(016)	Cut		(017)	0.37	0.31	0.1	Oval pit with gradually sloping sides and flat base.	Possible cremation pit.
(017)	Fill	(016)		0.37	0.31	0.1	Loose dark black brown sandy silt with moderate charcoal fleck inclusions and occasional burnt and unburnt bone fragments.	Fill of possible cremation pit.
(018)	Cut		(019)	0.5	0.4	0.14	Irregular shaped pit with sharply sloping sides and an irregular base.	Stone socket.
(019)	Fill	(018)		0.5	0.4	0.14	Brown sandy gravel.	Fill of stone socket.
(020)	Cut		(021)	0.94	0.62	0.12	Irregular shaped pit with sharp to gradually sloping sides and flat base.	Pit.
(021)	Fill	(020)		0.94	0.62	0.12	Loose brown fine sand.	Fill of pit.
(022)	Cut		(023)	0.65	0.5	0.1	Oval shaped pit with gradually sloping sides and a flat base.	Pit.
(023)	Fill	(022)		0.65	0.5	0.1	Loose Mid-brown fine sand with occasional charcoal fleck inclusions and animal bones.	Pit.
(024)	Cut		(025)	0.77	0.67	0.23	Oval shape in plan with gradually sloping sides and concave shaped base.	Pit.
(025)	Fill	(024)		0.77	0.67	0.23	Brown sand.	Fill of pit
(026)	Cut		(027)	0.75	0.7	0.19	Oval shape in plan with gradually sloping sides and concave shaped base.	Pit.
(027)	Fill	(026)		0.75	0.7	0.19	Loose brown sand.	Fill of pit (natural redeposit).
(028)								Void.
(029)								Void.
(030)								Void.
(031)								Void.

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
(032)								Void.
(033)	Cut		(034)	0.7	0.6	0.14	Oval shape in plan with sharply sloping sides and concave shaped base.	Pit.
(034)	Fill	(033)		0.7	0.6	0.14	Loose dark brown sand.	Fill of pit.
(035)								Void.
(036)	Cut		(037)	5.6	0.9	0.35	Linear shaped feature with gradually sloping sides and concave shaped base.	Modern linear feature.
(037)	Fill	(036)		5.6	0.9	0.35	Compact dark brown silty sand with frequent small stones and animal bones.	Fill of modern linear feature.
(038)	Cut		(039), (040)	3.05	1.35	0.55	Irregular shape in plan with stepped sides and flat base.	Stone socket.
(039)	Fill	(038)		3.05	1.35	0.3	Yellow sand.	Fill of stone socket.
(040)	Fill	(039)		3.05	1.35	0.25	Dark yellow fine sand.	Fill of stone socket.
(041)	Cut		(042)	0.61	0.56	0.22	Circular shape in plan with gradually sloping sides and concave shaped base.	Stone socket.
(042)	Fill	(041)		0.61	0.56	0.22	Mid brown sand	Fill of stone socket.
(043)								Void
(044)								Void
(045)								Void
(046)	Cut		(047)	0.28	0.26	0.26	Circular shape in plan with vertical sides and flat base.	Stone socket.
(047)	Fill	(046)		0.28	0.26	0.26	Yellow brown sandy gravel	Fill of stone socket (natural redeposit).
(048)	Cut		(049)	3 (within site)	0.7	0.27	Cut of NE/SW running linear feature with gradually sloping sides and concave shaped base.	Furrow.

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
(049)	Fill	(048)		3 (within site)	0.7	0.27	Light brown sandy silt.	Fill of furrow.
(050)	Cut		(051)	13.74	0.7(max)	0.26	Curvilinear feature with gradually sloping sides and concave shaped base.	Curvilinear gully.
(051)	Fill	(050)		13.74	0.7 (max)	0.26	Loose dark brown silty sand with occasional charcoal fleck inclusions and occasional animal bone inclusions.	Fill of curvilinear gully.
(052)	Cut	(0	(053)	5.5	0.44 (max)	0.11	Linear feature (N/S) with gradually sloping sides and concave shaped base.	Furrow.
(053)	Fill	(052)		5.5	0.44 (max)	0.11	Mid-brown silty sand.	Fill of furrow.
(054)	Fill	(055)		3.3	1.3	0.38	Loose dark brown silty clay with gravel and animal bones.	Fill of pit.
(055)	Cut		(054)	3.3	1.3	0.38	Sub oval shape in plan with gradually sloping sides and concave shaped base.	Pit.
(056)	Cut		(059)	1.3	0.9	0.47	Sub rectangular shape in plan with sharply sloping sides and flat base.	Pit.
(057)	Fill	(056)		0.72	0.9	0.32	Moderately compact yellow grey sandy gravel with occasional stones and animal bones.	Fill of pit (natural redeposit).
(058)	Fill	(056)		0.48	0.9	0.32	Moderately compact mid- grey stony gravel.	Fill of pit.
(059)	Fill	(056)		1.32	0.9	0.15	Mid-brown silty sand with occasional stones and burnt animal bones.	Fill of pit.
(060)	Fill	(003)		53.5	1.01	0.49 (max)	Dark orange brown silty sand with small stone inclusions and animal bones.	Fill of field boundary ditch.
(061)	Fill	(003)		29 (within site)	1.26	0.40 (max)	Loose light brown clayey sand with pebble inclusions.	Fill of field boundary ditch.
(062)	Fill	(005)		37	1.2	0.29	Dark brown silty sand with animal bone fragments.	Fill of field boundary ditch.
(063)	Cut		(064)	9.5	0.98	0.1	Linear feature (N/S) with gradually	Furrow.

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
				(within site)			sloping sides and concave shaped base.	
(064)	Fill	(063)		9.5 (within site)	0.98	0.1	Mid-brown sandy clay.	Fill of furrow.
(065)	Fill	(004)		28.5 (within site)	1.3 (max)	0.35 (max)	Dark brown silty clay with frequent pebbles and occasional animal bones.	Fill of field boundary ditch (natural redeposit).
(066)	Cut		(067)	5.5	0.55 (max)	0.21 (max)	Curvilinear feature with gradually sloping sides and flat base.	Curvilinear gully.
(067)	Fill	(066)		5.5	0.55	0.21	Loose brown clayey sand with occasional charcoal fleck inclusions and animal bone.	Fill of curvilinear gully.
(068)	Cut		(069)	7.9 (within site)	0.5	0.1	Linear feature (NS) with gradually sloping sides and concave shaped base.	Furrow.
(069)	Fill	(068)		7.9 (within site)	0.5	0.1	Mid- grey brown sandy clay.	Fill of furrow.
(070)	Cut		(072), (071)	2.9 (max)	1.2 (max)	0.6 (max)	Figure of eight shape in plan aligned NE/SW with the circular fire bowl to the north with gradually sloping sides and flat base, a linear flue with sharply sloping sides and concave shaped base and a circular drying chamber with gradually sloping sides and flat base.	Cereal drying kiln.
(071)	Fill	(070)		2.9	1.2	0.6	Compact dark brown sandy silt with occasional charcoal fleck inclusions and animal bones.	Fill of cereal drying kiln.
(072)	Fill	(070)		1.28	1	0.5	Compact orange brown silty sand with	Fill of cereal

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
							moderate charcoal fleck inclusions.	drying kiln.
(073)	Cut		(074)	53.5 (within site)	1.5	0.55	Linear cutting (aligned N/S) for roadway along east edge of site.	Road cutting.
(074)	Fill	(073)		53.5	1.5	0.55	Brown silty clay with occasional animal bones.	Fill of road cutting.
(075)	Cut		(076), (077), (078).	1.2	0.8	0.2	Oval shape in plan with gradually sloping sides and concave shaped base.	Hearth feature.
(076)	Fill	(075)		1.04	0.36	0.1	Brown sandy clay with occasional charcoal inclusions and burnt clay flecks.	Fill of hearth feature.
(077)	Fill	(075)		0.4	0.29	0.04	Dark brown sandy clay.	Fill of hearth feature.
(078)	Fill	(075)		1.24	0.55	0.11	Dark red oxidised silty clay with moderate charcoal fleck inclusions.	Fill of hearth feature.
(079)	Cut		(080)	25.1	1.3 (max)	0.6 (max)	Curvilinear ditch with gradually sloping sides and concave shaped base	Curvilinear ditch.
(080)	Fill	(079)		25.1	1.3 (max)	0.6 (max)	Loose brown silty sand with burnt and unburnt animal bones and frequent stones.	Fill of curvilinear ditch.
(081)	Cut		(082)	4.7	0.5	0.22	Curvilinear feature with gradually sloping sides and concave shaped base. Appears as portion of curvilinear ditch (050).	Curvilinear gully portion.
(082)	Fill	(081)		4.7	0.5	0.22	Loose dark brown sandy gravel.	Fill of curvilinear gully.
(083)	Cut		(086),085),(084), (087)	1.34	0.76	0.38	Irregular shaped feature with gradually sloping sides and concave shaped base.	Feature.
(084)	Fill	(083)		4.7	0.5	0.12	Light grey brown silty sand.	Fill of feature.
(085)	Fill	(083)		1.34	0.76	0.13	Dark brown sandy clay.	Fill of feature.
(086)	Fill	(083)		0.73	0.34	0.3	Light brown silty clay.	Fill of feature.

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
(087)	Fill	(083)		0.23	0.14	0.02	Mid-brown silty clay	Fill of feature.
(088)	Cut		(090), (089), (091), (092), (093), (094)	2.12	1.1	0.25 (max)	Key-hole shape in plan aligned N/S with an oval fire bowl to the north with sharp to gradually sloping sides and uneven base and an irregular shaped drying chamber with gradually sloping sides and a shallow uneven base. No flue component.	Cereal drying kiln.
(089)	Fill	(088)		1.05		0.12	Loose dark grey sandy clay with occasional charcoal fleck inclusions.	Fill of cereal drying kiln.
(090)	Fill	(088)		0.72	0.7	0.1	Loose black grey silty clay with occasional charcoal fleck inclusions.	Fill of cereal drying kiln.
(091)	Fill	(088)		1.05	Unknown	0.1	Loose orange and white ash with occasional charcoal fleck inclusions.	Fill of cereal drying kiln.
(092)	Fill	(088)		1.1	Unknown	0.1	Loose grey sandy clay with occasional charcoal fleck inclusions.	Fill of cereal drying kiln.
(093)	Fill	(088)		0.65	Unknown	0.05	Loose orange sandy clay with frequent small stones and occasional charcoal fleck inclusions.	Fill of cereal drying kiln.
(094)	Fill	(088)		0.55	Unknown	0.04	Loose dark grey sandy clay with frequent small stones and occasional charcoal fleck inclusions.	Fill of cereal drying kiln.
(095)	Cut		(100)	4.9 (diameter)	0.7 (max)	0.23	Circular gully with gradually sloping sides and concave shaped base, disturbed by road cutting.	Curvilinear gully.
(096)	Cut		(097)	15.8 (within site)	0.65 (max)	0.3 (max)	Curvilinear ditch with a NE/SW orientation and gradually sloping sides and concave shaped base.	Slightly curved linear ditch.
(097)	Fill	(096)		15.8	0.65	0.3	Loose dark brown clayey sand with occasional charcoal fleck inclusions and	Fill of ditch.

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
							animal bone content.	
(098)	Cut		(099)	Unknown	0.47	0.27	Portion of curvilinear gully partially located within the site. Gradually sloping sides and concave shaped base.	Curvilinear gully.
(099)	Fill	(098)		Unknown	0.47	0.27	Grey brown silty sand with frequent stones and animal bone.	Fill of curvilinear gully.
(100)	Fill	(095)		4.9 (diameter)	0.7	0.23	Loose grey brown stony silt with animal bones.	Fill of curvilinear gully.
(101)	Cut		(102)	0.6	0.6	0.15	Circular shape in plan with gradually sloping sides and concave shaped base.	Pit.
(102)	Fill	(101)		0.6	0.6	0.15	Loose dark brown sand with animal bones.	Fill of pit.
(103)	Cut		(130), (129), (128), 126), (127), (125), (124)	2.3	1.2 (max)	0.97 (max)	Figure of eight shape in plan aligned N/S with a circular fire bowl to the north with sharply sloping sides and concave shaped base, a poorly defined flue with sharply sloping sides and sloping base and a circular drying chamber with sharply sloping sides and flat base.	Cereal drying kiln.
(104)	Cut		(163), (162), (105)	2	1.75	0.13	Sub circular shape in plan with very gradually sloping sides and uneven base.	Pit.
(105)	Fill	(104)		2.15	1.75	0.1	Compact black sandy silt with occasional charcoal fleck inclusions and animal bones including sheep's skull.	Fill of pit.
(106)	Cut		(107)	4.7	0.45	0.08	Linear feature (NE/SW) with gradually sloping sides and concave shaped base.	Furrow.
(107)	Fill	(106)		4.7	0.45	0.08	Mid-brown silty clay with animal bones.	Fill of furrow.
(108)	Cut		(112), (111), (110)	0.53	0.46	0.25	Circular shape in plan with gradually sloping sides and concave shaped base.	Possible bowl furnace.
(109)	Cut		(113)	0.81	0.76	0.4	Circular shape in plan with gradually	Pit.

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
							sloping sides and a flat base.	
(110)	Fill	(108)		0.25	0.25	0.1	Compact dark black grey ash with occasional charcoal fleck inclusions and slag.	Fill of possible bowl furnace.
(111)	Fill	(108)		0.35	0.35	0.1	Oxidised red fine sand with slag content.	Fill of possible bowl furnace.
(112)	Fill	(108)		0.53	0.46	0.2	Compact yellow fine sand.	Fill of possible bowl furnace.
(113)	Fill	(109)		0.81	0.76	0.4	Loose dark brown sand with animal bone.	Fill of pit.
(114)	Cut		(115)	0.71	0.62	0.17	Oval shape in plan with gradually sloping sides and a flat base.	Pit.
(115)	Fill	(114)		0.71	0.62	0.17	Loose brown silty sand with animal bones.	Fill of pit.
(116)	Cut		(217), (117), (214), (215), (217)	2.3	0.8 (max)	0.9 (max)	Figure-of-eight shape in plan aligned NW/SE with the circular fire bowl to the south with sharply sloping sides and concave shaped base, a linear flue with sharply sloping sides and sloping base and a circular drying chamber with gradually sloping sides and slightly concave shaped base.	Cereal drying kiln.
(117)	Fill	(116)		2.3	0.8	0.1	Loose dark brown sandy silt with charcoal fleck inclusions and animal bones.	Fill of kiln.
(118)	Cut		(119)	0.5	0.1	0.15	Irregular shape in plan with gradually sloping sides and flat base.	Pit.
(119)	Fill	(118)		0.5	0.1	0.15	Yellow clay with a lens of charcoal and burnt animal bones.	Fill of pit.
(120)	Cut	(121)		0.95	0.6	0.3	Oval pit with gradually sloping sides and	Pit.

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
							concave shaped base.	
(121)	Fill		(120)	0.95	0.6	0.3	Compact dark brown silty sand with moderate charcoal fleck inclusions, frequent stones and animal bone.	Fill of pit.
(122)	Cut		(123)	0.4	0.4	0.13	Circular shape in plan with gradually sloping sides and uneven base.	Pit.
(123)	Fill	(122)		0.4	0.4	0.13	Loose dark brown silty sand with animal bones.	Fill of pit.
(124)	Fill	(103)		2.3	1.2	0.45	Loose dark brown silt with small stones and animal bone including one cow skull.	Fill of kiln.
(125)	Fill	(103)		2.05	0.95	0.35	Loose light brown silty sand with moderate charcoal fleck inclusions and animal bone content including four cow skulls.	Fill of kiln.
(126)	Fill	(103)		1.07	Unknown	0.05	Loose brown grey silty sand with occasional charcoal fleck inclusions.	Fill of kiln.
(127)	Fill	(103)		1.25	Unknown	0.11	Loose light yellow brown silty sand and ash with occasional charcoal fleck inclusions.	Fill of kiln.
(128)	Fill	(103)		1	0.9	0.12	Loose light grey ash with occasional charcoal fleck inclusions.	Fill of kiln.
(129)	Fill	(103)		0.9	0.9	0.07	Loose grey brown silty sand with ash and charcoal inclusions.	Fill of kiln.
(130)	Fill	(103)		0.9	0.7	0.12	Loose light grey sandy ash with occasional charcoal fleck inclusions.	Fill of kiln.
(131)	Cut		(132)	8.6	0.6	0.1	Linear feature with gradually sloping sides and concave shaped base.	Furrow.
(132)	Fill	(131)		8.6	0.6	0.1	Brown silty clay.	Fill of furrow.
(133)	Cut		(140), (139), (138), (137),	2.6 (max)	1.47 (max)	0.48 (max)	Sub rectangular shape in plan aligned N/S with a sub circular fire bowl to the	Cereal drying kiln.

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
			(136), (135), (134)				north with gradually sloping sides and concave shaped base, no flue component and an oval drying chamber with sides and concave shaped base.	
(134)	Fill	(133)		2.6	1.45	0.45	Loose dark brown silty clay.	Fill of kiln.
(135)	Fill	(133)		1.33	1.21	0.16	Loose black silty sand with occasional charcoal fleck inclusions.	Fill of kiln.
(136)	Fill	(133)		0.38	0.33	0.06	Loose grey silty ash.	Fill of kiln.
(137)	Fill	(133)		0.8	0.72	0.06	Loose yellow grey silty ash.	Fill of kiln.
(138)	Fill	(133)		0.71	0.68	0.03	Loose orange silty sand.	Fill of kiln.
(139)	Fill	(133)		0.38	0.29	0.04	Loose yellow silty ash.	Fill of kiln.
(140)	Fill	(133)		1.36	0.64	0.08	Loose black silty sand with occasional charcoal fleck inclusions.	Fill of kiln.
(141)	Cut		(142)	12.4	1.25 (max)	0.21	Linear feature (aligned N/S) with gradually sloping sides and concave shaped base.	Furrow.
(142)	Fill	(141)		12.4	1.25 (max)	0.21	Light brown sandy silt with occasional charcoal fleck inclusions and animal bones.	Fill of furrow.
(143)								Void
(144)								Void
(145)	Cut		(146)	0.25	0.2	0.1	Sub circular shape in plan with gradually sloping sides and concave shaped base.	Pit.
(146)	Fill	(145)		0.24	0.19	0.1	Loose dark brown silty sand with gravel and animal bone.	Fill of pit.
(147)								Void
(148)								Void
(149)	Cut		(150)	0.9	0.85	0.2	Sub circular shape in plan with gradually sloping sides and concave shaped base.	Pit.
(150)	Fill	(149)		0.9	0.85	0.2	Moderately compact dark brown silty	Fill of pit.

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
							clay.	
(151)	Cut		(152)	0.54	0.45	0.19	Sub circular shape in plan with gradually sloping sides and flat base.	Pit.
(152)	Fill	(151)		0.54	0.45	0.19	Dark brown silty clay with occasional charcoal fleck inclusions and animal bones.	Fill of pit.
(153)	Cut		(154)	10.96	0.47	0.1	Linear feature with gradually sloping sides and concave shaped base.	Furrow.
(154)	Fill	(153)		10.96	0.47	0.1	Grey brown sandy clay.	Fill of furrow.
(155)	Cut		(157)	0.6	0.3	0.25	Oval pit with gradually sloping sides and concave shaped base.	Pit.
(156)	Cut		(158)	0.3	0.3	0.05	Sub circular shape in plan with gradually sloping sides and concave shaped base.	Pit.
(157)	Fill	(155)		0.6	0.3	0.25	Loose dark brown sand.	Fill of pit.
(158)	Fill	(156)		0.3	0.3	0.05	Compact yellow sand.	Fill of pit.
(159)	Cut		(160), (161)	0.5	0.5	0.3	Sub circular shape in plan with sharply sloping sides and concave shaped base.	Pit.
(160)	Fill	(159)		0.5	0.48	0.23	Loose dark brown silty sand with occasional charcoal.	Fill of pit.
(161)	Fill	(160)		0.5	0.3	0.15	Brown orange sandy clay.	Fill of pit.
(162)	Fill	(104)		–	–	–	Stone deposit overlying stone lining surface in base of pit.	Fill of pit.
(163)	Fill	(104)		2.15	1.75	0.2	Stone lining composed of compacted small stones, lining base of pit.	Fill of pit.
(164)	Fill	(165)		0.7	0.4	0.13	Dark brown silty sand.	Fill of pit.
(165)	Cut		(164)	0.7	0.4	0.13	Oval shape in plan with gradually sloping sides and flat base.	Pit.
(166)	Fill	(167)		0.93	0.5	0.16	Dark brown silty sand with occasional charcoal fleck inclusions and animal bone.	Fill of pit.

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
(167)	Cut		(166)	0.93	0.5	0.16	Sub rectangular shape in plan with gradually sloping sides and flat base.	Pit.
(168)	Fill	(169)		4	0.4	0.25	Loose brown grey clayey sand with frequent animal bones.	Fill of curvilinear gully.
(169)	Cut		(168)	4	0.4	0.25	Curvilinear feature with sharply sloping sides and flat base.	Curvilinear gully.
(170)	Cut		(171)	0.42	0.36	0.1	Oval shape in plan with gradually sloping sides and flat base.	Pit.
(171)	Fill	(170)		0.42	0.36	0.1	Dark grey sandy clay.	Fill of pit.
(172)	Cut		(173)	0.52	0.52	0.12	Circular shape in plan with gradually sloping sides and concave shaped base.	Pit.
(173)	Fill	(172)		0.52	0.52	0.12	Loose black sandy silty with frequent charcoal fleck inclusions.	Fill of pit.
(174)	Fill	(176)		2.13	0.98	0.28	Loose dark brown gravelly clay with charcoal fleck inclusions and animal bone.	Fill of kiln.
(175)	Fill	(176)		0.91	0.77	0.4	Loose brown black clay with frequent charcoal fleck inclusions.	Fill of kiln.
(176)	Cut		(175), (174)	2.34	1.05	0.33	Kiln aligned E/W with a westward oval fire bowl with gradually sloping sides and concave shaped base, a linear flue with sharply sloping sides and sloping base and a drying chamber located beyond the east edge of site.	Kiln.
(177)	Cut		(178)	4	0.6	0.22	Curvilinear feature with sharply sloping sides and a flat base.	Curvilinear gully.
(178)	Fill	(177)		3.7	0.6	0.22	Loose dark brown sandy silt.	Fill of curvilinear gully.
(179)	Cut		(180)	0.37	0.25	0.15	Sub circular shape in plan with vertical sides and a flat base.	Pit.

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
(180)	Fill	(179)		0.37	0.25	0.15	Compact dark brown silty sand with occasional charcoal fleck inclusions.	Fill of pit.
(181)	Cut		(182)	0.5	0.5	0.2	Circular shape in plan with gradually sloping sides and concave shaped base.	Pit.
(182)	Fill	(181)		0.5	0.5	0.2	Loose dark brown sand with animal bone content.	Fill of pit.
(183)	Cut		(184)	3.19	0.42	0.31	Irregular shape in plan with gradually sloping sides and concave shaped base.	Pit.
(184)	Fill	(183)		3.19	0.42	0.31	Compact brown sandy silt with charcoal fleck inclusions and animal bones.	Fill of pit.
(185)	Cut		(186)	0.36	0.3	0.16	Circular feature with gradually sloping sides and concave shaped base.	Stone socket.
(186)	Fill	(185)		0.36	0.3	0.16	Dark brown sandy clay	Fill of stone socket.
(187)	Cut		(188), (189), (190), (191), (192), (193)	3.5	1.89 (max)	0.61 (max)	Sub rectangular shape in plan aligned N/S with an oval fire bowl to the north with sharply sloping sides and concave shaped base, flue component destroyed by a later truncation (006) and sub rectangular shaped drying chamber with sharply sloping sides and uneven base.	Kiln.
(188)	Fill	(187)		3.09	1.38	0.32	Loose mid- orange brown silty sand with occasional charcoal fleck inclusions and animal bones.	Fill of kiln.
(189)	Fill	(187)		1.46	1.77	0.28	Loose mid- grey silty sand with occasional charcoal fleck inclusions, animal bone and metal ore.	Fill of kiln.
(190)	Fill	(187)		1.18	1.09	1.15	Loose grey black silty clay with charcoal, ash and scorched sand lenses and animal bones.	Fill of kiln.

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
(191)	Fill	(187)		1.33	1.2	0.24	Loose dark black brown sandy silt with occasional charcoal fleck inclusions, animal bones and slag.	Fill of kiln.
(192)	Fill	(187)		1.12	0.95	0.06	Loose black silty clay with frequent charcoal fleck inclusions and ash.	Fill of kiln.
(193)	Fill	(187)		0.94	0.3	0.32	Loose orange brown coarse sand.	Fill of kiln.
(194)	Cut		(196), (195)	1.7	0.95	0.31	Oval shape in plan with gradually sloping sides and flat base.	Pit.
(195)	Fill	(194)		1.7	0.95	0.24	Compact light brown silty clay with pebbles.	Fill of pit.
(196)	Fill	(194)		1.7	0.95	0.16	Compact dark grey silty clay mixed with gravel.	Fill of pit.
(197)	Cut		(198)	6.3	0.5	0.15	Curvilinear feature with gradually sloping sides and concave shaped base.	Curvilinear gully.
(198)	Fill	(197)		6.3	0.5	0.15	Loose dark brown silty clay with occasional charcoal fleck inclusions and animal bone content.	Fill of curvilinear gully.
(199)	Cut		(200)	0.5	0.4	0.14	Circular shape in plan with gradually sloping sides and flat base.	Pit.
(200)	Fill	(199)		0.5	0.4	0.14	Compact brown silty sand.	Fill of pit.
(201)	Cut		(202)	4.2 (diameter)	0.5	0.25	Curvilinear feature with gradually sloping sides and concave shaped base.	Curvilinear gully.
(202)	Fill	(201)		4.2 (diameter)	0.5	0.25	Loose dark brown silty sand with occasional sub angular stone and charcoal inclusions.	Fill of curvilinear gully.
(203)	Fill	(204)		16	0.66	0.19	Mid-brown silty sand.	Fill of furrow.
(204)	Cut		(203)	16	0.66	0.19	Linear feature (N/S) with gradually sloping sides and flat base	Furrow.
(205)	Fill	(206)		5.3	0.42	0.11	Mid-brown silty sand.	Fill of furrow.
(206)	Cut		(205)	5.3	0.42	0.11	Linear feature (N/S) with gradually	Furrow.

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
							sloping sides and flat base.	
(207)	Fill	(208)		12	0.63	0.08	Mid-brown silty sand.	Fill of furrow.
(208)	Cut		(207)	12	0.63	0.08	Linear (N/S) feature with gradually sloping sides and flat base.	Furrow.
(209)	Cut		(210)	7	0.6	0.08	Linear (N/S) feature with gradually sloping sides and concave shaped base.	Furrow.
(210)	Fill	(209)		7	0.6	0.08	Light brown yellow sandy clay.	Fill of furrow.
(211)								Void
(212)								Void
(213)								Void
(214)	Fill	(116)		1.3	Unknown	0.1	Loose brown grey silty sand with frequent stone inclusions.	Fill of kiln.
(215)	Fill	(116)		1.15	Unknown	0.04	Loose grey oxidised silty sand and charcoal lenses.	Fill of kiln.
(216)								Void
(217)	Fill	(116)		0.88	Unknown	0.1	Loose grey ash with occasional charcoal fleck inclusions and sand.	Fill of kiln.
(218)	Cut		(219)	3.9 (diameter)	0.55	0.2	Curvilinear feature with gradually sloping sides and concave shaped base.	Curvilinear gully.
(220)	Cut		(221), (230)	2.4	1.5	0.42	Rectangular shape in plan with gradually sloping sides and uneven base.	Pit.
(221)	Fill	(220)		2.4	1.5	0.42	Compact orange brown sandy clay with occasional charcoal fleck inclusions.	Fill of pit.
(222)	Cut/fill			0.18	0.18	0.16	Circular stake-hole with vertical sides and tapered rounded base. Filled by loose Mid-brown silty clay with occasional pebbles.	Stake-hole
(223)	Cut		(224)	2.7	1.41	0.27	Irregular shape in plan with gradually sloping sides and a slightly concave shaped base.	Pit.

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
(224)	Fill	(223)		2.68	1.41	0.27	Loose dark brown black silty sand with occasional charcoal and frequent animal bones.	Fill of pit.
(225)	Cut		(226)	0.41 (diameter)	0.41 (diameter)	0.19	Circular shape in plan with gradually sloping sides and concave shaped base.	Stone socket.
(226)	Fill	(225)		0.41 (diameter)	0.41 (diameter)	0.19	Grey brown sandy silt with frequent charcoal and animal bones.	Fill of pit.
(227)	Cut		(229), (228)	1.3	0.8	0.5	Oval shape in plan with vertical sides on the east, gradual elsewhere and a concave shaped base.	Pit.
(228)	Fill	(227)		1	0.8	0.3	Compact orange brown sandy clay.	Fill of pit
(229)	Fill	(227)		1.3	0.8	0.2	Loose brown black silty sand with gravel and frequent stone inclusions.	Fill of pit
(230)	Fill	(220)		Unknown	c.1.4	0.11	Loose brown grey silty sand with gravel and small stone.	Fill of pit.
(231)	Cut		(232)	0.32 (diam)	0.32 (diam)	0.18	Circular post with sharp to stepped sides and concave shaped base.	Possible posthole.
(232)	Fill	(232)		0.32 (diam)	0.32 (diam)	0.18	Loose dark brown silty sand.	Fill of possible posthole.
(233)	Fill	(235)		0.6	0.6	0.15	Moderately compact yellow orange sand.	Fill of pit.
(234)	Fill	(235)		1.16	0.55	0.2	Moderately compact dark brown fine clay with occasional stones.	Fill of pit.
(235)	Cut		(234),(233)	1.16	0.55	0.24	Oval shape in plan with sharply sloping sides and concave shaped base.	Pit.
(236)	Fill	(237)		0.48	0.46	0.1	Compact yellow orange fine sand.	Fill of pit.
(237)	Cut		(241), (236)	0.62	0.6	0.19	Oval shape in plan with sharply sloping sides and slightly concave shaped base.	Pit.
(238)	Fill	(240)		0.76	0.6	0.12	Moderately compact yellow orange fine sand with stone and pebbles.	Fill of possible feature.
(239)	Fill	(240)		0.5	1.2	0.18	Moderately compact dark brown clay	Fill of pit.

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
							with occasional charcoal fleck inclusions and stones.	
(240)	Cut		(238),(239)	1.2	0.5	0.24	Oval shape in plan with sharply sloping sides and uneven base.	Pit.
(241)	Fill	(237)		0.62	0.6	0.15	Moderately compact brown clay with occasional small stone inclusions.	Fill of pit.
(242)	Fill	(243)		1.28	0.59	0.21	Dark brown clay with gravel, animal bone and slag.	Fill of pit.
(243)	Cut		(242),	1.28	0.59	0.23	Elongated shape in plan with gradually sloping sides and uneven base.	Pit.
(244)	Cut		(245), (246)	1.4	1.17	0.45	Oval shape in plan with sharply sloping sides and uneven base.	Pit.
(245)	Fill	(244)		0.6	0.5	0.11	Compact grey yellow sandy clay with occasional small stone inclusions.	Fill of pit.
(246)	Fill	(244)		1	0.52	0.43	Compact grey brown gravelly silty sand with occasional stone inclusions.	Fill of pit.
(247)	Cut	(248), (257)		1.2	0.8	0.28	Oval shape in plan with gradually sloping sides and concave shaped base.	Pit.
(248)	Fill	(247)		1.2	0.8	0.14	Compact brown clay with small stones.	Fill of pit.
(249)	Cut		(250)	0.2	0.2	0.12	Circular shape in plan with sharply sloping sides and concave shaped base.	Possible posthole.
(250)	Fill	(249)		0.2	0.2	0.12	Loose Mid-brown clayey sand.	Fill of possible posthole.
(251)	Cut		(256), (255), (254), (253), (252)	1.3	0.95	0.28	Oval shape in plan with sharply sloping sides on the west, gradual elsewhere and a flat base that were heavily oxidised.	Burnt pit.
(252)	Fill	(251)		1.3	0.95	0.1	Compact yellow grey sandy clay.	Fill of burnt pit.
(253)	Fill	(251)		1.1	0.8	0.05	Loose black silty charcoal.	Fill of burnt pit.
(254)	Fill	(251)		0.36	–	0.08	Loose, oxidised orange silty clay	Fill of burnt pit.
(255)	Fill	(251)		0.77	–	0.15	Loose grey ash and charcoal.	Fill of burnt pit.

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
(256)	Fill	(251)		1.05	–	0.15	Compact grey orange clay with charcoal and ash content.	Fill of burnt pit.
(257)	Fill	(247)		1.2	0.8	0.14	Loose dark brown silty sand with large stone inclusions.	Fill of pit.
(258)	Fill	(260)		0.38	0.32	0.8	Moderately compact yellow orange sandy silt.	Fill of pit.
(259)	Fill	(260)		0.52	0.38	0.14	Moderately compact brown clay with pebbles and stones.	Fill of pit.
(260)	Cut		(258), (259)	0.52	0.38	0.14	Oval shape in plan with sharply sloping sides and an irregular shaped base.	Pit.
(261)								Void
(262)								Void
(263)								Void
(264)								Void
(265)								Void
(266)	Cut		(269), (268), (267)	2.1	1.2	0.64	Oval shape in plan with stepped sides and irregular base.	Feature.
(267)	Fill	(266)		1.12	0.76	0.15	Compact light brown sandy clay.	Fill of feature.
(268)	Fill	(266)		2.1	1.2	0.15	Compact dark grey sandy clay with gravel.	Fill of feature.
(269)	Fill	(266)		1.3	0.52	0.4	Loose Mid-brown silty clay with occasional pebbles.	Fill of feature.
(270)								Void
(271)								Void
(272)	Cut		(273), (278)	1.1	0.75	0.2	Oval shape in plan with gradually sloping sides and concave shaped base.	Grave pit.
(273)	Fill	(272)		1.1	0.75	0.2	Loose Mid-brown gravelly sandy clay with small stones and animal bones.	Fill of grave pit.
(274)	Oxidisation			2	1.2	–	Patch of red oxidised natural.	Possible hearth.
(275)								Void

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
(276)								Void
(277)								Void
(278)	Skeleton						SK1	Crouched Inhumation Burial.

Appendix 2: Skeleton Register for Site E2972

Context No.	Skeleton No.	Description
(278)	1	Crouched inhumation (aligned W/E) with skull on west, facing south and resting on its right side, feet missing and hands clasped.

Appendix 3 – Finds Register for Site E2972

Find no.	Material	Type	Identification	Description
E2972:001:001	Metal	Iron	Post-medieval	Horseshoe
E2972:001:002	Metal	Iron	Post-medieval	Hook, domestic or agricultural
E2972:001:003	Metal	Iron	Post-medieval	Metal ring - possible horse bit
E2972:001:004	Ceramic	Pottery	Post-medieval	Post-medieval pottery
E2972:001:005	Ceramic	Pottery	Post-medieval	Post-medieval pottery
E2972:001:006	Ceramic	Pottery	Post-medieval	Post-medieval pottery
E2972:001:007	Stone	Stone	-	Hone stone
E2972:053:001	Metal	Iron	Post-medieval	Possible iron blade
E2972:057:001	Stone	Flint	Prehistoric	Burnt flint debitage
E2972:060:001	Ceramic	Pottery	Post-medieval	Post-medieval pottery
E2972:060:002	Ceramic	Pottery	Post-medieval	Post-medieval pottery
E2972:060:003	Ceramic	Pottery	Post-medieval	Post-medieval pottery
E2972:060:004	Ceramic	Pottery	Post-medieval	Post-medieval pottery
E2972:060:005	Stone	Chert	Prehistoric	Chert debitage
E2972:060:006	Metal	Iron	-	Iron object
E2972:060:007	Metal	Iron	Post-medieval	Iron scissors
E2972:062:001	Stone	Quartz	Prehistoric	Retouched quartz artefact
E2972:065:001	Glass	Glass	Post-medieval	Glass bottle spout
E2972:065:002	Ceramic	Pottery	Post-medieval	Post medieval pottery
E2972:065:003	Ceramic	Pottery	Post-medieval	Post medieval pottery
E2972:080:001	Ceramic	Pottery	Post-medieval	Blackware
E2972:080:002	-----	------	------	Void
E2972:117:001	Bone	Animal	-	Worked bone point
E2972:174:001	Ceramic	Pottery	Post-medieval	Coarseware
E2972:184:001	Stone	Chert	Prehistoric	Chert convex end/side scraper
E2972:196:001	Stone	Chert	Prehistoric	Possible chert scraper
E2972:221:001	Stone	Flint	Prehistoric	Single arris flint blade
E2972:221:002	Stone	Flint	Prehistoric	Flint debitage
E2972:221:003	Stone	Flint	Prehistoric	Flint debitage
E2972:221:004	Stone	Flint	Prehistoric	Flint debitage
E2972:226:001	Ceramic	Tobacco pipe	Post-medieval	Clay tobacco pipe stem
E2972:241:001	Stone	Flint	Prehistoric	Flint leaf-shaped arrowhead
E2972:259:001	Stone	Chert	Prehistoric	Natural chert pebbles
E2972:269:001	Stone	Chert	Prehistoric	Chert scraper

Appendix 4 – Sample Register for Site E2972

Sample No.	Context No.	Description
E2972:001	(012)	Compact grey black clayish silt with frequent charcoal fleck inclusions.
E2972:002	(017)	Loose dark blackish brown sandy silt with moderate charcoal and occasional burnt and unburnt bone fragments, possible cremation.
E2972:003	(023)	Loose Mid-brown fine sand with occasional charcoal fleck inclusions and animal bones.
E2972:004	(037)	Compact dark brown silty sand with frequent small stones and animal bones.
E2972:005		*Non-archaeological*
E2972:006	(051)	Loose dark brown silty sand with occasional charcoal fleck inclusions and occasional animal bone inclusions.
E2972:007	(072)	Compact orange brown silty sand with moderate charcoal fleck inclusions.
E2972:008	(057)	Moderately compact yellow grey sandy gravel with occasional stones and animal bones.
E2972:009	(060)	Dark orange brown silty sand with small stone inclusions and animal bones.
E2972:010	(054)	Loose dark brown silty clay with gravel and animal bones.
E2972:011	(067)	Loose brown clayey sand with occasional charcoal fleck inclusions and animal bone.
E2972:012	(107)	Animal bone.
E2972:013	(062)	Dark brown silty sand with animal bone fragments.
E2972:014	(078)	Dark reddish brown sandy clay with occ. small stones, occ. charcoal and oxidised clay.
E2972:015	(001)	Animal bone.
E2972:016	(065)	Dark brown silty clay with frequent pebbles and occasional animal bones.
E2972:017	(059)	Mid-brown silty sand with occasional stones and burnt animal bones.
E2972:018	(080)	Loose brown silty sand with burnt and unburnt animal bones and frequent stones.
E2972:019	(105)	Compact black sandy silt with occasional charcoal fleck inclusions.
E2972:020	(078)	Dark reddish brown sandy clay, occasional small stones, charcoal and oxidised clay
E2972:021	(080)	Burnt animal bones
E2972:022	(080)	Animal bone.
E2972:023	(094)	Loose dark grey sandy clay with frequent small stones and occasional charcoal fleck inclusions.
E2972:024	(093)	Loose orange sandy clay with frequent small stones and occasional charcoal fleck inclusions.
E2972:025	(092)	Loose grey sandy clay with occasional charcoal fleck inclusions.
E2972:026	(097)	Loose dark brown clayey sand with occasional charcoal fleck inclusions and animal bone content.
E2972:027	(071)	Compact dark brown sandy silt with occasional charcoal fleck inclusions.
E2972:028	(082)	Loose dark brown sandy gravel.
E2972:029	(072)	Compact orange brown silty sand with moderate charcoal fleck inclusions.
E2972:030	(100)	Loose grey brown stony silt with animal bones.
E2972:031	(102)	Loose dark brown sand with animal bones.

Sample No.	Context No.	Description
E2972:032	(074)	Brown silty clay with occasional animal bones.
E2972:033	(091)	Loose orange and white ash with occasional charcoal fleck inclusions.
E2972:034	(090)	Loose black grey silty clay with occasional charcoal fleck inclusions.
E2972:035	(089)	Loose dark grey sandy clay with occasional charcoal fleck inclusions.
E2972:036	(099)	Grey brown silty sand with frequent stones and animal bone.
E2972:037	(071)	Compact dark brown sandy silt with occasional charcoal fleck inclusions and animal bone.
E2972:038	(107)	Mid-brown silty clay.
E2972:039	(121)	Compact dark brown silty sand with moderate charcoal fleck inclusions, frequent stones.
E2972:040	(121)	Animal bone.
E2972:041	(123)	Loose dark brown silty sand.
E2972:042	(123)	Animal bone.
E2972:043	(115)	Loose brown silty sand with animal bones.
E2972:044	(142)	Void.
E2972:045	(105)	Animal bone.
E2972:046	(111)	Oxidised red fine sand and slag.
E2972:047	(110)	Compact dark black grey ash with occasional charcoal fleck inclusions and slag.
E2972:048	(113)	Loose dark brown sand with animal bone.
E2972:049	(146)	Dark brown silty sand.
E2972:050	(146)	Animal bone.
E2972:051	(117)	Loose dark brown sandy silt with charcoal fleck inclusions and animal bones.
E2972:052	(117)	Charcoal.
E2972:053	(119)	Yellow clay with a lens of charcoal and burnt animal bones.
E2972:054	(119)	Burnt bone.
E2972:055	(119)	Charcoal.
E2972:056	(173)	Loose brown black clay with frequent charcoal fleck inclusions.
E2972:057	(168)	Loose brown grey clayey sand with frequent animal bones.
E2972:058	(152)	Dark brown silty clay with occasional charcoal fleck inclusions and animal bones.
E2972:059	(164)	Dark brown silty sand.
E2972:060		Bone.
E2972:061	(137)	Loose yellow grey silty ash.
E2972:062	(140)	Loose black silty sand with occasional charcoal fleck inclusions.
E2972:063	(139)	Yellow grey silty ash.
E2972:064	(160)	Loose dark brown silty sand with occasional charcoal.
E2972:065	(161)	Brown orange sandy clay.
E2972:066	(124)	Loose dark brown silt with small stones and animal bone including one cow skull.
E2972:067	(125)	Loose light brown silty sand with moderate charcoal fleck inclusions and animal bone including cow skulls.
E2972:068	(126)	Loose brown grey silty sand with occasional charcoal fleck inclusions.
E2972:069	(127)	Loose light yellow brown silty sand and ash with occasional charcoal fleck inclusions.
E2972:070	(128)	Loose light grey ash with occasional charcoal fleck inclusions.

Sample No.	Context No.	Description
E2972:071	(129)	Loose grey brown silty sand with ash and charcoal inclusions.
E2972:072	(130)	Loose light grey sandy ash with occasional charcoal fleck inclusions.
E2972:073	(171)	Dark grey sandy clay.
E2972:074	(142)	Light brown sandy silt with occasional charcoal fleck inclusions and animal bones.
E2972:075	(180)	Compact dark brown silty sand with occasional charcoal fleck inclusions.
E2972:076	(166)	Dark brown silty sand with occasional charcoal fleck inclusions.
E2972:077	(166)	Animal bone.
E2972:078	(166)	Charcoal
E2972:079	(182)	Loose dark brown sand with animal bone content.
E2972:080	(178)	Loose dark brown sandy silt.
E2972:081	(184)	Compact brown sandy silt with occasional charcoal fleck inclusions and animal bones.
E2972:082	(200)	Compact brown silty sand.
E2972:083	(188)	Loose mid- orange brown silty sand with occasional charcoal fleck inclusions.
E2972:084	(188)	Animal bone.
E2972:085	(191)	Loose dark black brown sandy silt with occasional charcoal fleck inclusions.
E2972:086	(174)	Loose dark brown gravelly clay with charcoal fleck inclusions and animal bone.
E2972:087	(175)	Charcoal.
E2972:088	(195)	Compact light brown silty clay with pebbles.
E2972:089	(196)	Compact dark grey silty clay mixed with gravel.
E2972:090	(202)	Loose dark brown silty sand with occasional sub angular stone and charcoal inclusions.
E2972:091	(198)	Loose dark brown silty clay with occasional charcoal fleck inclusions and animal bone content.
E2972:092	(221)	Compact orange brown sandy clay with occasional charcoal fleck inclusions.
E2972:093	(232)	Loose dark brown silty sand.
E2972:094	(222)	Loose Mid-brown silty clay with occasional pebbles.
E2972:095	(230)	Loose brown grey silty sand with gravel and small stone.
E2972:096	(228)	Compact orange brown sandy clay.
E2972:097	(229)	Loose brown black silty sand with gravel and frequent stone inclusions.
E2972:098	(242)	Dark brown clay with gravel, animal bone.
E2972:099	(226)	Grey brown sandy silt with frequent charcoal.
E2972:100	(224)	Loose dark brown black silty sand with occasional charcoal.
E2972:101	(224)	Loose dark brown black silty sand with occasional charcoal and frequent animal bones.
E2972:102	(191)	Animal bone.
E2972:103	(190)	Loose grey black silty clay with charcoal, ash and scorched sand lenses.
E2972:104	(191)	Slag
E2972:105	(189)	Loose mid- grey silty sand with occasional charcoal fleck inclusions.
E2972:106	(189)	Metal ore
E2972:107	(189)	Animal bone.
E2972:108	(236)	Compact yellow orange fine sand.

Sample No.	Context No.	Description
E2972:109	(241)	Moderately compact brown clay with occasional small stone inclusions.
E2972:110	(245)	Compact grey yellow sandy clay with occasional small stone inclusions.
E2972:111	(246)	Compact grey brown gravelly silty sand with occasional stone inclusions.
E2972:112	(193)	Loose orange brown coarse sand.
E2972:113	(190)	Charcoal
E2972:114	(190)	Loose grey black silty clay with charcoal, ash and scorched sand lenses.
E2972:115	(192)	Loose black silty clay with frequent charcoal fleck inclusions and ash.
E2972:116	(252)	Compact yellow grey sandy clay.
E2972:117	(253)	Charcoal.
E2972:118	(254)	Loose, oxidised orange silty clay
E2972:119	(255)	Loose grey ash and charcoal.
E2972:120	(256)	Compact grey orange clay with charcoal and ash content.
E2972:121	(219)	Dark brown sandy clay with animal bone content.
E2972:122	(117)	Loose dark brown sandy silt with charcoal fleck inclusions.
E2972:123	(214)	Loose brown grey silty sand with frequent stone inclusions.
E2972:124	(215)	Loose grey oxidised silty sand and charcoal lenses.
E2972:125	(217)	Loose grey ash with occasional charcoal fleck inclusions and sand.
E2972:126	(267)	Compact light brown sandy clay.
E2972:127	(268)	Compact dark grey sandy clay with gravel.
E2972:128	(269)	Loose Mid-brown silty clay with occasional pebbles.
E2972:129	-	Void.
E2972:130	-	Void
E2972:131	(273)	Loose Mid-brown gravelly sandy clay with small stones.
E2972:132	(192)	Animal bone.
E2972:133	(242)	Slag.

Appendix 5 – Photo Register for Site E2972

Shot No.	Direction Facing	Description
E2972:001	West	Pre-ex view of northern portion of site.
E2972:002	East	Pre-ex view of northern portion of site.
E2972:003	East	Pre-ex view of northern portion of site.
E2972:004	East	Pre-ex view of (066).
E2972:005	Southeast	Pre-ex view of (066).
E2972:006	Southeast	Pre-ex view of NE portion of site.
E2972:007	Northwest	Pre-ex view of NW portion of site.
E2972:008	Northwest	Pre-ex view of NW portion of site.
E2972:009	Northwest	Pre-ex view of northern area of site.
E2972:010	Southwest	Pre-ex view of northern area of site.
E2972:011	Southwest	Pre-ex view of west area of site.
E2972:012	West	Pre-ex view of northern area of site.
E2972:013	Southwest	Pre-ex view of northern area of site.
E2972:014	South	Pre-ex view of east edge of site.
E2972:015	Northwest	Pre-ex view of east edge of site.
E2972:016	Northwest	Pre-ex view of (108), (109).
E2972:017	Northeast	Pre-ex view of kiln (103).
E2972:018	West	Pre-ex view of kiln (075).
E2972:019	Southwest	Pre-ex view of (167).
E2972:020	Southeast	Pre-ex view of (165).
E2972:021	South	Pre-ex view of (114).
E2972:022	North	Pre-ex view of (122).
E2972:023	Southwest	Pre-ex view of (159).
E2972:024	North	Pre-ex view of (120).
E2972:025	North	Pre-ex view of (105) cut by (107).
E2972:026	East	Pre-ex view of (095).
E2972:027	West	Mid-ex view of east area of site.
E2972:028	North	Pre-ex view of (088).
E2972:029	North	Mid-ex view of (108), (109).
E2972:030	Southeast	Mid-ex view of curvilinear gully (098).
E2972:031	East	Mid-ex view of ditches (004), (005).
E2972:032	Northeast	Mid-ex view of (056).
E2972:033	Northwest	Mid-ex view of (095).
E2972:034	Northwest	Mid-ex view of (098).
E2972:035	East	Mid-ex view of (063).
E2972:036	North-northeast	Mid-ex view of (043).
E2972:037	North	Mid-ex view of road cutting (073).
E2972:038	South	Mid-ex view of (050).
E2972:039	West	Mid-ex view of (170).
E2972:040	Southwest	Mid-ex view of (159).
E2972:041	Southwest	Mid-ex view of ditch (153).
E2972:042	West	Mid-ex view of (149).
E2972:043	West	Mid ex view of kiln (133).
E2972:044	West	Mid-ex view of kiln (133).

Shot No.	Direction Facing	Description
E2972:045	North	Mid-ex view of (133).
E2972:046	North	Mid-ex view of (108), (110).
E2972:047	East	Mid-ex view of (096).
E2972:048	West	Mid-ex view of (088).
E2972:049	West	Mid-ex view of (088).
E2972:050	Southwest	Mid-ex view of (083).
E2972:051	North	Mid-ex view of (079).
E2972:052	East	Mid-ex view of (079).
E2972:053	East	Mid-ex view of (066), slot 2.
E2972:054	East	Mid-ex view of (066), slot 3.
E2972:055	South	Mid-ex view of (052).
E2972:056	East	Mid-ex view of (048).
E2972:057	South	Mid-ex view of (041).
E2972:058	South	Mid-ex view of kiln (176).
E2972:059	West	Mid-ex view of (133).
E2972:060	West	Mid-ex view of (038).
E2972:061	Southwest	Mid-ex view of (120).
E2972:062	Northeast	Mid-ex view of kiln (070).
E2972:063	Northeast	Mid-ex view of kiln (070).
E2972:064	North	Mid-ex view of (114).
E2972:065	East	Mid-ex view of (079).
E2972:066	West	Mid-ex view of curvilinear gully (098).
E2972:067	North	Mid-ex view of curvilinear gully (098).
E2972:068	South	Mid-ex view of (164).
E2972:069	West	Mid-ex view of kiln (187).
E2972:070	South	Mid-ex view of kiln (116).
E2972:071	Northeast	Mid-ex view of (194).
E2972:072	East	Mid-ex view of (197).
E2972:073	West	Mid-ex view of kiln (187).
E2972:074	Northwest	Mid-ex view of (220).
E2972:075	Southwest	Mid-ex view of (197).
E2972:076	West	Mid-ex view of kiln (187).
E2972:077	South	Mid-ex view of kiln (176).
E2972:078	East	Mid-ex view of (201).
E2972:079	North	Mid-ex view of (225).
E2972:080	Northeast	Mid-ex view of (242).
E2972:081	South	Mid-ex view of burnt pit (251).
E2972:082	West	Mid-ex view of Skeleton 1, (272).
E2972:083	West	Mid-ex view of Skeleton 1, (272).
E2972:084	West	Mid-ex view of Skeleton 1, (272).
E2972:085	West	Mid-ex view of Skeleton 1, (272).
E2972:086	West	Mid-ex view of Skeleton 1, (272).
E2972:087	West	Mid-ex view of Skeleton 1, (272).
E2972:088	West	Cow skull from kiln (070).
E2972:089	East	Post-ex view of kiln (103).
E2972:090	Southwest	Post-ex view of (194).
E2972:091	West	Post-ex view of (199).

Shot No.	Direction Facing	Description
E2972:092	North	Site view.
E2972:093	North	Post-ex view of curvilinear gully (177).
E2972:094	South	Post-ex view of (183).
E2972:095	North	Post-ex view of (103)
E2972:096	Southwest	Post-ex view of (159).
E2972:097	West	Post-ex view of kiln (070).
E2972:098	South	Post-ex view of (183).
E2972:099	Southwest	Post-ex view of (083).
E2972:100	North	Post-ex view of (050).
E2972:101	Southeast	Post-ex view of (050).
E2972:102	West	Post-ex view of (050).
E2972:103	South	Post-ex view of (050).
E2972:104	North	Post-ex view of (070).
E2972:105	North	Post-ex view of (075).
E2972:106	Southwest	Post-ex view of curvilinear gully (098).
E2972:107	Northwest	Post-ex view of curvilinear gully (098).
E2972:108	South	Post-ex view of (101).
E2972:109	North	Post-ex view of (066), (079).
E2972:110	East	Post-ex view of (066), (079).
E2972:111	West	Post-ex view of kiln (088).
E2972:112	East	Post-ex view of (108).
E2972:113	South	Post-ex view of (141).
E2972:114	Northeast	Post-ex view of (056).
E2972:115	West	Post-ex view of (006).
E2972:116	West	Post-ex view of (038).
E2972:117	South	Post-ex view of (041).
E2972:118	East	Post-ex view of curvilinear gully (095).
E2972:119	West	Post-ex view of (120).
E2972:120	North	Post-ex view of (251).
E2972:121	Southeast	Post-ex view of NE corner of site.
E2972:122	West	Post-ex view of kiln (176).
E2972:123	North	Post-ex view of (033).

Appendix 6 – Drawing Register for Site E2972

Drawing no.	Type	Scale	Description
E2972:001	Section	01:10	East facing section of feature (007), (008).
E2972:002	Section	01:10	Northwest facing section of pit (009), (010).
E2972:003	Section	01:10	East facing section of pit (020), (021).
E2972:004	Section	01:10	North northwest facing section of possible hearth (011), (012).
E2972:005	Section	01:10	West facing section of pit (022), (023).
E2972:006	Section	01:10	South facing section of feature (013), (014), (015).
E2972:007	Section	01:10	South facing section of pit (018), (019).
E2972:008	Section	01:10	South facing section of possible cremation pit (016), (017).
E2972:009	Section	01:10	Northwest facing section of pit (024), (025).
E2972:010	Section	01:10	Northeast facing section of pit (026), (027).
E2972:011	Section	01:10	Southeast facing section of (028), (029), (030).
E2972:012	Section	01:10	South facing section of pit (034), (035).
E2972:013	Section	01:10	East facing section of (031), (032), (036).
E2972:014	Section	01:10	Southwest facing section of linear feature (036), (037).
E2972:015	Section	01:10	Northeast facing section of linear feature (036), (037)
E2972:016	Section	01:10	West facing section of pit (040), (039).
E2972:017	Section	01:10	North facing section of pit (041), (042).
E2972:018	Section	01:10	Northeast facing section of linear feature (036), (037).
E2972:019	Section	01:10	Southwest facing section of linear feature (036), (037).
E2972:020	Section	01:10	South facing section of stone socket (046), (047).
E2972:021	Section	01:10	North northwest facing section of possible hearth feature (011), (012).
E2972:022	Section	01:10	Southwest facing section of pit (055), (054).
E2972:023	Section	01:10	Northeast facing section of pit (056), (057), (058), (059).
E2972:024	Section	01:10	North facing section of gully (050), (051).
E2972:025	Section	01:10	South facing section of furrow (063), (064).
E2972:026	Section	01:10	North facing section of furrow (052), (053).
E2972:027	Section	01:10	West facing section of ditch (003), (060).
E2972:028	Section	01:10	West facing section of ditch (004), (065).
E2972:029	Section	01:10	West facing section of gully (050), (051), 005), (062).
E2972:030	Section	01:10	North facing section of ditch (096), (097).
E2972:031	Section	01:10	West facing section of ditch (096), (097).
E2972:032	Section	01:10	North facing section of ditch (096), (097).
E2972:033	Section	01:10	West facing section of ditch (096), (097).
E2972:034	Section	01:10	South facing section of road cutting (073), (074).
E2972:035	Section	01:10	North facing section of road cutting (073), (074).
E2972:036	Section	01:20	East facing section of kiln (070), (072), (071), (081), (082).
E2972:037	Section	01:10	South facing section of hearth feature (075), (076), (078).
E2972:038	Section	01:10	East facing section of ditch (005), (062).
E2972:039	Section	01:10	East facing section of ditch (006), (061).
E2972:040	Section	01:10	

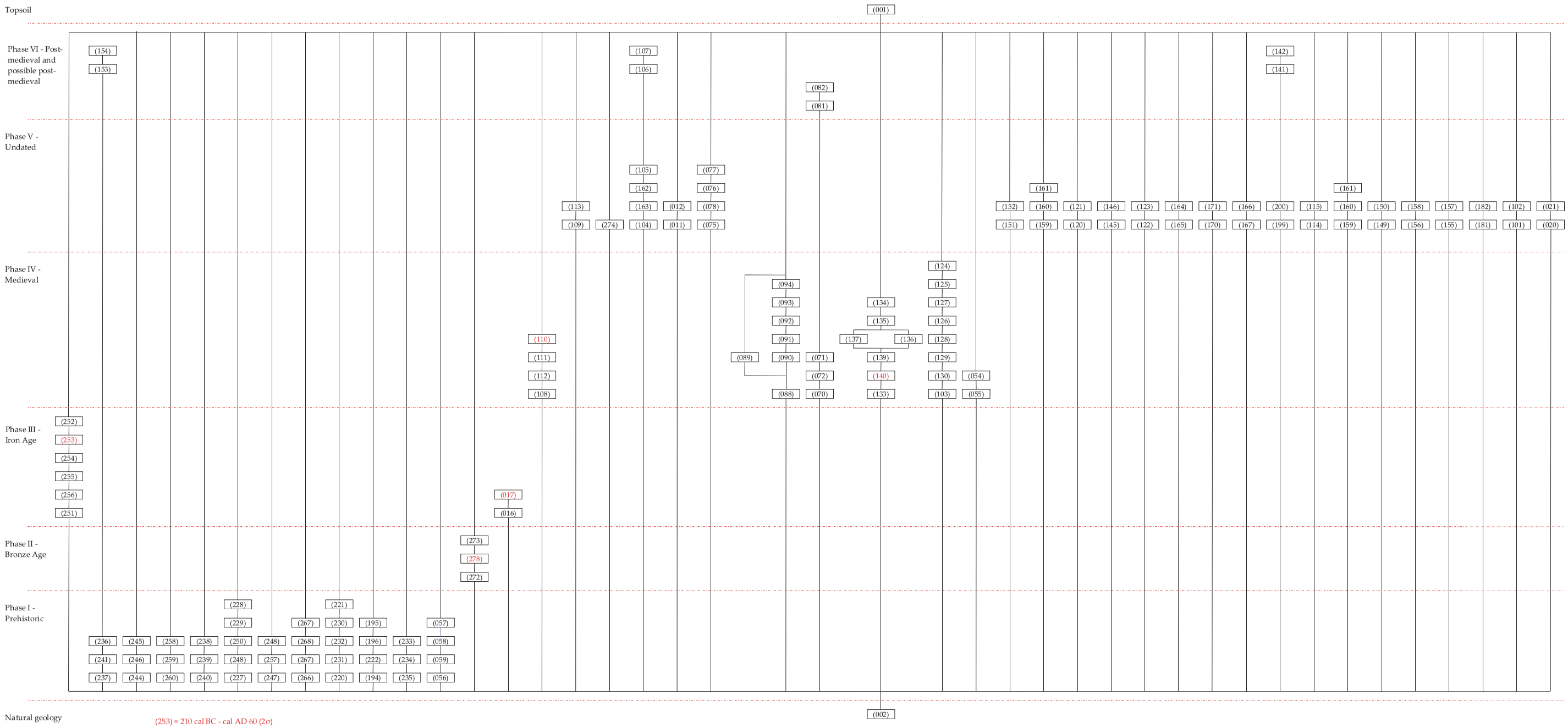
Drawing no.	Type	Scale	Description
E2972:041	Section	01:10	
E2972:042	Section	01:10	North facing section of furrow (068), (069).
E2972:043	Section	01:10	Northeast facing section of furrow (052), (096).
E2972:044	Section	01:10	North facing section of curvilinear ditch (079), (080).
E2972:045	Section	01:10	West facing section of kiln (088), (089), (090), (091), (092), (093), (094).
E2972:046	Section	01:10	South facing section of curvilinear ditch (079), (080).
E2972:047	Section	01:10	Northeast facing section of pit (083), (086), (085), (084), (087).
E2972:048	Section	01:10	Northwest facing section of curvilinear ditch (079), (080).
E2972:049	Section	01:10	Southeast facing section of curvilinear ditch (079), (080).
E2972:050	Section	01:10	Southeast facing section of curvilinear ditch (079), (080).
E2972:051	Section	01:10	North facing section of gully (095), (100).
E2972:052	Section	01:10	Northwest facing section of gully (098), (099).
E2972:053	Section	01:10	Northeast facing section of gully (095), (100).
E2972:054	Section	01:10	North facing section of pit (101), (102).
E2972:055	Section	01:10	West facing section of bowl furnace (108), (109).
E2972:056	Section	01:10	West facing section of pit (104), (105), (106), (107).
E2972:057	Section	01:10	South facing section of furrow (131), (132).
E2972:058	Section	01:10	South facing section of pit (114), (115), (141), (142).
E2972:059	Section	01:10	West facing section of (143), (144).
E2972:060	Section	01:10	Northeast facing section of pit (120), (121).
E2972:061	Section	01:10	Southwest facing section of pit (122), (123).
E2972:062	Section	01:10	Northwest facing section of kiln (116), (117), (118), (119).
E2972:063	Section	01:10	West facing section of possible posthole (145), (146).
E2972:064	Section	01:10	West facing section of kiln (133), (140), (139), (138), (137), (136), (135), (134).
E2972:065	Section	01:10	East facing section of kiln (103), (129), (128), (126), (127), (125), (124).
E2972:066	Section	01:10	East facing section of (147), (148).
E2972:067	Section	01:10	North northeast facing section of pit (151).
E2972:068	Section	01:10	Northeast facing section of pit (153), (154).
E2972:069	Section	01:10	Northeast facing section of pit (159), (160), (161).
E2972:070	Section	01:10	East facing section of gully (169), (168).
E2972:071	Section	01:10	Northwest facing section of pit (165), (166).
E2972:072	Section	01:10	North facing section of pit (171), (172), (141), (142).
E2972:073	Section	01:20	East facing section of pit (171), (171).
E2972:075	Section	01:10	North facing section of kiln (176), (174), (175).
E2972:076	Section	01:10	North facing section of gully (177), (178).
E2972:077	Section	01:10	North facing section of pit (167), (166).
E2972:078	Section	01:10	East facing section of pit (179), (180).
E2972:079	Section	01:10	South facing section of pit (181), (182), (003), (060).
E2972:080	Section	01:10	North facing section of feature (183), (184), (003), (060).

Drawing no.	Type	Scale	Description
E2972:081	Section	01:10	East facing section of ditch (006), (187).
E2972:082	Section	01:10	Northeast facing section of pit (199), (100).
E2972:083	Section	01:10	Northeast facing section of gully (201), (202).
E2972:084	Section	01:10	Northwest facing section of gully (201), (202).
E2972:085	Section	01:10	East facing section of pit (185), (186).
E2972:086	Section	01:10	North facing section of kiln (116), (217), (215), (214), (117), (218), (219).
E2972:087	Section	01:10	West facing section of gully (197), (198).
E2972:088	Plan	01:20	Post-ex plan of (031).
E2972:089	Plan	01:20	Post-ex plan of (007).
E2972:090	Plan	01:20	Post-ex plan of possible hearth feature (012).
E2972:091	Plan	01:20	Post-ex plan of pit (038).
E2972:092	Plan	01:20	Post-ex plan of pit kiln (009).
E2972:093	Plan	01:20	Post-ex plan of kiln (070), (081).
E2972:094	Plan	01:20	Post-ex plan of pit (041).
E2972:095	Plan	01:20	Post-ex plan of pit (170).
E2972:096	Plan	01:20	Post-ex plan of furrow (083).
E2972:097	Plan	01:20	Post-ex plan of pit (056).
E2972:098	Plan	01:20	Post-ex plan of bowl furnace bowl furnace (108), (109).
E2972:099	Plan	01:20	Post-ex plan of pit (020).
E2972:100	Plan	01:20	Post-ex plan of pit (024).
E2972:101	Plan	01:20	Post-ex plan of (143).
E2972:102	Plan	01:20	Post-ex plan of pit (018).
E2972:103	Plan	01:20	Post-ex plan of pit (101).
E2972:104	Plan	01:20	Post-ex plan of pit (022).
E2972:105	Plan	01:20	Post-ex plan of pit (026).
E2972:106	Plan	01:20	Post-ex plan of (013).
E2972:107	Plan	01:20	Post-ex plan of pit (083).
E2972:108	Plan	01:20	Post-ex plan of ditch (003), (181).
E2972:109	Plan	01:20	Post-ex plan of pit (033).
E2972:110	Plan	01:20	Post-ex plan of pit (185).
E2972:111	Plan	01:20	Post-ex plan of pit (088).
E2972:112	Plan	01:20	Post-ex plan of pit (055).
E2972:113	Plan	01:20	Post-ex plan of kiln (103).
E2972:114	Plan	01:20	Post-ex plan of kiln (133).
E2972:115	Section	01:10	North facing section of furrow (209), (210).
E2972:116	Section	01:10	West facing section of pit (220), (221), (230).
E2972:117	Plan	01:20	Post-ex plan of pit (104), (106).
E2972:118	Plan	01:20	Post-ex plan of ditch (003), (183).
E2972:119	Section	01:10	West facing section of possible posthole (231), (232).
E2972:120	Section	01:10	Southwest facing section of pit (194), (222), (196), (195).
E2972:121	Plan	01:20	Post-ex plan of pit (199).
E2972:122	Plan	01:20	Post-ex plan of pit (167).

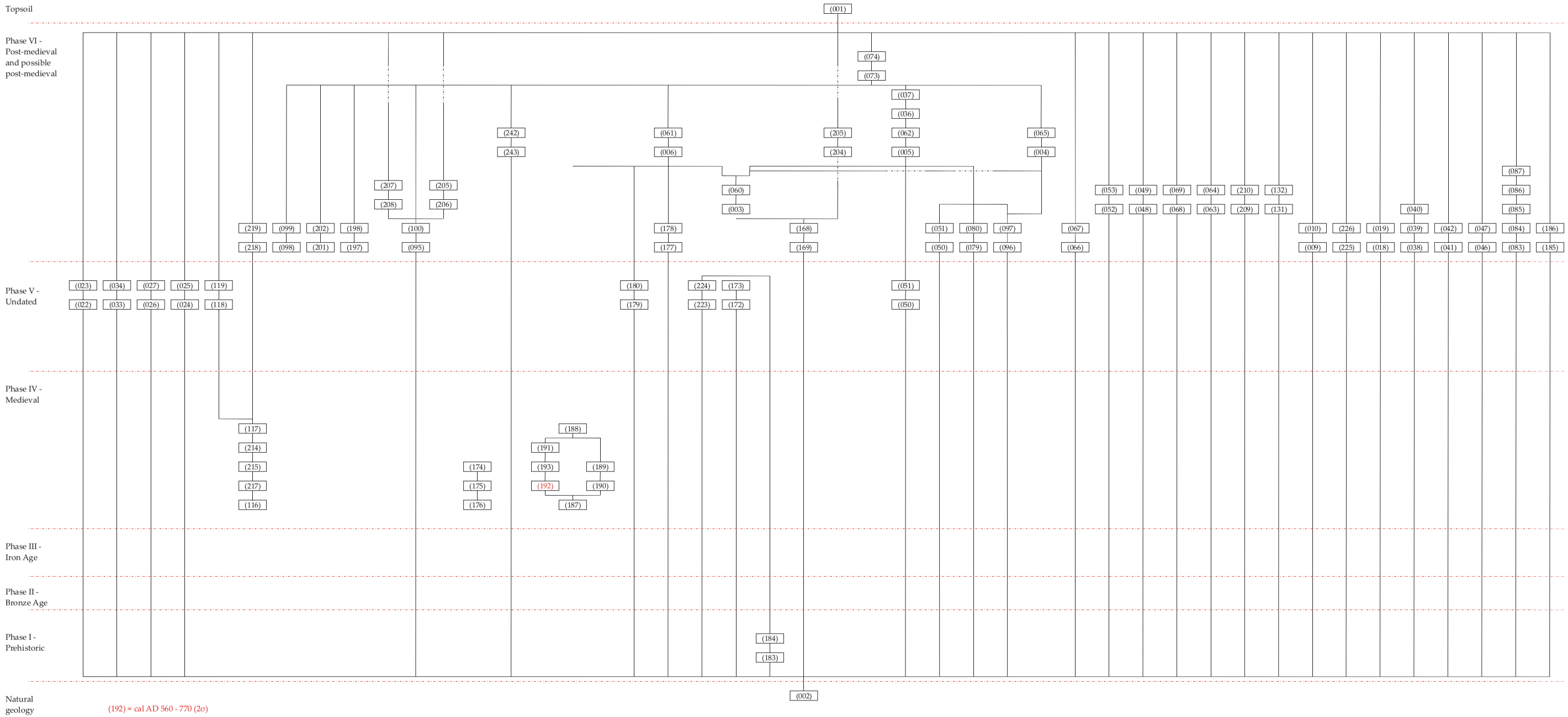
Drawing no.	Type	Scale	Description
E2972:123	Plan	01:20	Post-ex plan of pit (165).
E2972:124	Plan	01:20	Post-ex plan of pit (122).
E2972:125	Plan	01:20	Post-ex plan of pit (114), (141).
E2972:126	Plan	01:20	Post-ex plan of pit (194).
E2972:127	Plan	01:20	Post-ex plan of pit (151).
E2972:128	Plan	01:20	Post-ex plan of pit (149).
E2972:129	Plan	01:20	Post-ex plan of ditch (003), (172).
E2972:130	Plan	01:20	Post-ex plan of pit (179).
E2972:131	Plan	01:20	Post-ex plan of pit (159).
E2972:132	Plan	01:20	Post-ex plan of pit (120).
E2972:133	Plan	01:20	Post-ex plan of possible posthole (145).
E2972:134	Plan	01:20	Post-ex plan of hearth feature (075)
E2972:135	Section	01:10	Southwest facing section of possible feature (227), (228), (229).
E2972:136	Section	01:10	Northeast facing section of pit (243), (242).
E2972:137	Section	01:10	Northeast facing section of pit (244), (245), 246).
E2972:138	Section	01:10	South facing section of burnt pit (251), (256), (255), (254), (253), (252).
E2972:139	Section	01:10	South facing section of possible posthole (249), (250), (227), (229), (228).
E2972:140	Profile	01:10	Profile of pit (225), (228).
E2972:141	Section	01:10	South facing section of possible feature (227), (228), (229).
E2972:142	Profile	01:10	Profile of pit (223), (224).
E2972:143	Section	01:10	South facing section of possible feature (236), (241), (237).
E2972:144	Plan	01:20	Post-ex plan of gully (197), (201).
E2972:145	Section	01:10	West facing section of (247), (248), (257).
E2972:146	Plan	01:50	Post-ex plan of east edge of site showing (006), (073), (095), (117), (206), (208).
E2972:147	Plan	01:50	Post-ex plan of east edge of site showing (073), (169), (204).
E2972:148	Plan	01:20	Post-ex plan of kiln (176).
E2972:149	Plan	01:20	Post-ex plan of pit (220), (231).
E2972:150	Plan	01:20	Post-ex plan of features (227), (249).
E2972:151	Plan	01:20	Post-ex plan of features (153), (237), (260).
E2972:152	Plan	01:20	Post-ex plan of possible feature (235).
E2972:153	Section	01:20	North northeast facing section of (262), (263).
E2972:154	Section	01:10	Northeast facing section of (264), (265).
E2972:155	Section	01:10	Northeast facing section of feature (266), (267), (268), (269).
E2972:156	Plan	01:50	Post-ex plan of east edge of site showing (003), (004), (005), (073), (098), (116), (156), (157), 218), (233), (225).
E2972:157	Plan	01:20	Post-ex plan of (213).
E2972:158	Plan	01:20	Post-ex plan of feature (240).
E2972:159	Plan	01:20	Post-ex plan of (247).

Drawing no.	Type	Scale	Description
E2972:160	Plan	01:20	Post-ex plan of (262).
E2972:161	Plan	01:20	Post-ex plan of (265).
E2972:162	Plan	01:20	Post-ex plan of burnt pit (251).
E2972:163	Plan	01:20	Post-ex plan of pit (244).
E2972:164	Plan	01:20	Post-ex plan of east edge of site showing (187), (177), (006).
E2972:165	Plan	01:20	Post-ex plan of oxidised natural (274).
E2972:166	Section	01:10	North facing section of (277), (276).
E2972:167	Plan	01:20	Post-ex plan of feature (266).
E2972:168	Plan	01:20	Post-ex plan of (277).
E2972:169	Plan	01:20	Post-ex plan of feature (266).
E2972:170	Plan	01:50	Post-ex plan of group of features showing (004), (005), (050), (079).
E2972:171	Plan	01:20	Post-ex plan of possible posthole (043).
E2972:172	Plan	01:20	Post-ex plan of possible cremation pit (016).
E2972:173	Plan	01:20	Post-ex plan of grave pit (272).
E2972:174	Plan	01:20	Profile of grave pit (272).
E2972:175	Plan	01:20	Post-ex plan of (270)
E2972:176	Plan	01:20	Post-ex plan of (050).

Appendix 7 – Site matrix



Appendix 7 – Site matrix



Appendix 8 – Palaeoenvironmental sample analysis for E2972
By: Abby Mynett and Scott Timpany

Introduction

Thirty-four environmental samples were taken during the excavation of Mullamast, Co. Kildare E2972, a site consisting of a large variety of pits, kilns and a crouched inhumation burial. All of the samples were processed to retrieve any palaeoenvironmental material that may aid in the interpretation of the site and function of the pits, only nine of the samples produced grain and were analysed.

Methodology

Samples of approximately 10 L were taken on site under the direction of an environmental archaeologist. Samples were processed in laboratory conditions using a standard flotation method (cf. Kenward *et al.*, 1980). This was then sorted by eye and any material of archaeological significance removed. All plant macrofossil samples were analysed using a stereomicroscope at magnifications of x10 and up to x100 where necessary to aid identification. Identifications were confirmed using modern reference material and seed atlases including Cappers *et al.* (2006).

Results

The results are presented in Tables 1 and 2. All plant material was preserved by charring.

Charred plant remains
All of the samples from E2972 contained cereal grains, samples (034), (062) and (115) had a particularly high frequency of charred remains. The preservation and condition of the remains was found to be generally good. Species identified included oat (*Avena* sp.), probable oat (cf. *Avena)*, straight and twisted hulled barley (*Hordeum vulgare*), which may relate to 2-row and 6-row varieties, together with hulled barley where due to poor preservation it was not possible to differentiate between the two varieties. A high proportion of grains could not be identified to a family or species due to poor preservation and abrasion and as a result were classified as *Cerealia* indet. Together with the charred grain wild taxa were also found in the form of sedge nutlets (*Carex* sp.).

Discussion

The samples collected were taken from the fills of a number of different features in order to gain a representation of the site as a whole. These samples are predominantly from medieval deposits, however one of the samples has a date of 210 cal BC - cal AD 60 at (2σ) (SUERC - 25480; 2065±50 BP) placing it in the prehistoric period and some samples (053 and 075) have yet to be phased. The frequency and species of charred cereal grains found should enable a large amount of interpretation to be attained for the site at Mullamast. A large proportion of cereal grains were identified as indeterminate grain this is probably resulting from either the carbonisation process or subsequent depositional factors. Although their species cannot be established it is still viable to use them in interpretation to affirm the presence of agricultural and cultivation practices. The interpretation of features relating to the samples consists of pits, kilns and a curvilinear gully and will be discussed as such (O'Connell and Hackett 2009).

Curvilinear gully

The curvilinear gully (050) is one of the latest deposits on site dating to the post-medieval period. It is likely one of two ditches (081) that originally formed a larger circular feature and is located in the northwest quadrant of the site. The charred remains from sample (006) are relatively few when compared to the kiln and pit features, with only fifteen grains recorded. However of the fifteen grains recorded seven were identified to 2-row barley, one to oat and seven unidentifiable. It is likely the occurrence of grains in this gully is the result of secondary deposition in the form of groundwater runoff. Also present in fill (051) was unburnt mammal bone; this together with the grain recovered could be interpreted as waste disposal into the ditch. The preservation condition of remains was moderate which could be resultant from their deposition method.

Burnt pit

The burnt pit feature (251) was located to the west of the site with steep sloped edges and flat base. This feature has a date of 210 cal BC to cal AD 60 at (2σ) (SUERC-25480; 2065±50 BP) from emmer wheat grains. The pit was heavily oxidised indicating frequent or prolonged burning had occurred (O'Connell and Hackett 2009). Sample (117) was taken from the penultimate fill (253) of the pit and was composed of loose black silty charcoal. Cereals recovered from this sample were few (29), but included predominantly barley species (86%). The preservation of the charred remains was good, with only two grains unable to be species identified. The amount of grain present in this pit indicates that it could have been used as a storage pit that has perhaps later been cleansed.

Pits

Two of the environmental samples, (053) and (075), came from pits (118) and (179). The latter, sub-oval in shape, was composed of compact dark brown silty sand and occasional charcoal fleck inclusions. It was identified in the southeast quadrant, where the majority of excavated pits were found (O'Connell and Hackett 2009). Grains recovered from this area were again few, with only five recorded; one barley and four of indeterminable species. The grain's deposition is not likely to be the direct result of human agency due to the preservation and size of sample, rather wind blown from another part of the site where domestic food preparation and cooking was taking place.

Pit (118) had the remains of only five cereal grains, one oat, two barley and two indeterminate grains in context (119), sample (053). The interpretation of these remains is similar to pit (179); accidental deposition by natural agencies, owing to their low frequencies.

Cereal-drying kiln

This feature was identified in the northwest excavation area; Sample 034 was taken from kiln (088). Its shape is described as key-hole, with sloping sides and an uneven base and is of a type, which generally date to the medieval period (O'Connell and Hackett 2009). The bottom of the kiln had oxidisation present; however there was no evidence for a flue partition. Sample 034 was taken from the lower fill of the feature and produced abundant charred plant remains with over seven hundred grains recovered. Also of note is that this sample (034) was the only one found to contain more oat grains than barley, accounting for 44% of the samples total. The high amount of grain recovered could be due to the destruction or damage of the kiln, resulting in its abandonment and thus leaving a large charred grain assemblage.

Kilns

Four of the environmental samples (070), (114), (115) and (062) were taken from the fills of kiln remains on site. Charred remains from all the kilns on site were more abundant than those recovered from samples taken from pit or ditch deposits. This is to be expected on sites that are agriculturally proficient.

Kiln (133) a roughly hour-glass shaped feature filled by (140) in its base, was composed of loose black silty sand with charcoal fleck inclusions. This was the earliest fill of the fire-pit with Sample 062 taken for analysis. Alder charcoal from this sample has given a date of cal AD 540-680 at (2σ) (SUERC-25851; 1420±50 BP). The charred remains identified from the sample were in a moderate to good state of preservation condition. The total number of charred remains recorded for this sample is over 1500 (see Table 1). The prominent cereal present was barley, which accounted for just over 48% of the samples cereal grains. Oat was the next highest grain recorded at 26% and indeterminate cereal grain accounted for 25%. The large number of unidentifiable grain could be interpreted as material that has been charred a number of times. This would imply waste from previous cooking occasions was not thoroughly removed before the next and could elucidate the high percentage of indeterminate charred cereal grains.

Sample 070 was recovered from the basal fill (128) of kiln (103). It was located to the east of the site. The feature, a slight figure-of-eight–shaped feature, produced very few charred cereal grains, totalling twenty (see Table 1). Of these the majority were barley with some oat and the remaining grains were indeterminate. The few cereals that were present were recorded as being in a good state of preservation. The kilns grains may represent the remnants of drying grain prior to storage.

Located to the south of kiln (103) was a sub-rectangular shaped kiln (187). Two samples were taken from this feature, one of which contained abundant charred grain. Sample 114 was taken from the basal fill (190) of the kiln, producing charcoal and animal bone (O'Connell and Hackett, 2009). Charred grain was present in a relatively low quantity, totalling just under fifty (see Table 1), but their preservation state was good with only five of the charred remains recorded as indeterminate. Again the dominant species identified was barley with a number of oat grains present. The deposit (190) is cited as having evidence for the repeated firing of the kiln (*ibid*). The continual firing could explain the lack of charred remains found in this sample or that the kiln was regularly cleaned out after use.

The drying chamber of kiln (187) was filled by context (192), which has been radiocarbon dated to cal AD 560-770 at (2σ) (SUERC-25479; 1380±50 BP) from emmer grain present in the deposit. No traces of emmer grain were identified in the nine samples analysed, thus this may have been a misidentification during radiocarbon dating. Sample (115) contained the largest number of charred plant remains of all the nine samples analysed with 2447 grains recorded. At 38% a large number of the charred sample was too abraded and fragmentary to be species identified. Although the indeterminate grain count is high the results correlate with the previous samples analysed from site in that barley is the predominant species (40%) and oat having a high representation of 22%. The frequency of charred cereal recovered from this sample implies crop cultivation and domestic activities occurring on or near the feature. In addition to cereal grains sample (115) also contained wild taxa in the form of sedge nutlets, these could have been mixed in with the grain during processing.

In relation to other excavations in the region the results from the excavation of Mullamast, Co. Kildare E2972 are comparable to a number of other Irish sites containing kiln remains. Trends are particularly evident with large hulled barley and oat cereal grain assemblages recovered from site. Sites of comparable datasets taken from cereal-drying kiln deposits include excavations at the M3 in County Meath (Kinsella 2008, 106) and Taylor's Grange, Brehon's Chair in county Dublin. Similar evidence taken from kiln features is seen at Mullamast, County Kildare E2973, Kilnacranna, Co. Tipperary E3266 which is of a similar medieval date to this site (MacLeod and Cosham 2009) and in the townland of Moone, Co. E2980 (Hackett 2009).

Conclusion

- The charred cereal remains from the excavation of Site E2972 in Mullamast, Co. Kildare has revealed a large amount of environmental evidence to support that the society was practicing agricultural activities.
- The presence of numerous kiln remains coinciding with the charred plant suggests that domestic activities in the form of baking and cooking were commonplace from the medieval period onwards.
- The charred remains were dominated by barley grains in particular the hulled-straight type suggesting the 2-row variety was preferred, with a large amount of oat also present in the sample.

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E-Number	Lab code	Sample ID	Material	δ13C	Radiocarbon age BP	Calibrated Age Ranges (1 σ)	Relative probability	Calibrated Age Ranges (2 σ)	Relative probability
E2972	SUERC-25851	sample #062, context 140	alder charcoal	-25.7	1420 +/- 50	cal AD 590 - 660	68.2	cal AD 540 - 680	95.4
E2972	SUERC-25850	sample #047, context 110	hazel charcoal	-26.4	1560 +/- 50	cal AD 430 - 550	68.2	cal AD 400 - 610	95.4
E2972	SUERC - 25480	sample #117, context 253	charred emmer grain	-22.3	2065 +/- 50	170 – 20 cal BC	65.7	210 cal BC – cal AD 60	95.4
						10 cal BC – cal AD 0	2.5		
E2972	SUERC - 25479	sample #115, context 192	charred emmer grain	-23.4	1380 +/- 50	cal AD 605 - 680	68.2	cal AD 560 - 720	89.4
								cal AD 740 – 770	6.0
E2972	SUERC - 25478	sample #002 context 017	charred grain: emmer	-24.4	1895 +/- 50	cal AD 50 - 170	61.8	cal AD 0-240	95.4

Table 1 – Results of radiocarbon dates

Feature	Curvilinear Gully (050)	Cereal-drying kiln (088)	Kilns				Pits		Burnt Pit (251)
			(103)	(133)	(187)	(187)	(118)	(179)	
Context No	51	90	128	140	190	192	119	180	253
Sample No	6	34	70	62	114	115	53	75	117
Orig. vol (litres)	5	5	2	6	3	2	2	5	1
% of sample analyzed	100	100	100	100	100	100	100	100	100
Common Name									
sedge	-	-	-	5	-	43	-	-	-
oat	1	227	-	313	4	238	1	-	2
oat	-	112	-	79	3	293	-	-	-
hulled barley	-	117	1	207	6	236	-	-	8
hulled barley	7	191	13	513	30	725	2	1	17
hulled barley	-	1	-	5	-	4	-	-	-
cereal indet.	7	126	6	382	5	908	2	4	2
	-	-	-	-	-	1	-	-	-
Cereals (%)	100	100	100	99.6	100	98.2	100	100	100
Wild taxa (%)	0	0	0	0.33	0	1.76	0	0	0
Chaff fragments (%)	0	0	0	0	0	0.04	0	0	0
Barley (%)	46.6	39.9	65	48.3	75	40.1	40	100	86.2
Oat (%)	6.6	43.8	5	26.2	14.6	22.1	20	0	6.9
Indet (%)	46.6	16.3	30	25.5	10.4	37.8	40	0	6.9
Total no.of cereals per litre	3	154.8	10	250	16	1224	2.5	1	29

Table 2 – Composition of flots

Appendix 9 – Final report on the faunal remains from Mullamast (E2972), Co. Kildare
By: Albína Hulda Pálsdóttir MA

Introduction

This report discusses the results of the animal bone analysis from Mullamast, Co. Kildare (E2972). The resolution of the site revealed prehistoric pits, a crouched inhumation burial, a possible cremation pit and a possible bowl furnace, burnt pits, medieval cereal-drying kilns, animal bone refuse pits, a number of curvilinear features and gullies, a series of linear agricultural furrows and post-medieval field systems all within the excavation area. The Mullamast (E2972) site is located close to two other sites, Mullamast (E2973) and Moone (E2980) (O'Connell and Hackett 2009, 2-3).

The animal bone specimens were recovered by hand-picking and from soil sample retent. The animal bones analysed for this report derive from fill (017) of pit (016), fill (023) of pit (022), fill (037) of modern linear feature (036), fill (051) of curvilinear gully (050), fill (057) of pit (natural redeposit) (056), fill (060) of field boundary ditch (003), fill (062) of field boundary ditch (005), fill (067) of curvilinear gully (066), fill (071) of cereal-drying kiln (070), fill (074) of road cutting (073), fill (080) of curvilinear ditch (079), fill (090) of cereal-drying kiln (088), fill (097) of ditch (096), fill (099) of curvilinear gully (098), fill (100) of curvilinear gully (095), fill (102) of pit (101), fill (105) of pit (104), fill (107) of furrow (106), fill (117) of kiln (116), fill (119) of pit (118), fill (121) of pit (120), fill (123) of pit (122), fills (124) and (128) of kiln (103), fill (140) of kiln (133), fill (142) of furrow (141), fill (146) of pit (145), fill (166) of pit (167), fill (182) of pit (181), fill (184) of pit (183), fills (188), (191) and(192) of kiln (187), fill (198) of curvilinear gully (197), fill (224) of pit (223) and fill (253) of burnt pit (251).

Methodology

During the analysis each specimen was identified and recorded according to species, skeletal element, age and sex where possible. The animal bone reference collection located in Headland Archaeology (Ireland) Ltd, Unit 1 Wallingstown Business Park, Little Island, Co. Cork was utilised. The bird bones were identified by using the bone collection in the Natural History section of the National Museum of Ireland. The York System bone database program was used for recording (Harland *et al*. 2003). The material was quantified by using the number of identified specimens (NISP). Distinctions made between sheep and goat follow Boessneck (1969) and Prummel and Frisch (1986). In addition, Payne (1975) was used for the identification of sheep and goat milk teeth.

The categories "large mammal" (lm) and "medium mammal" (mm) were used for specimens (mainly ribs and vertebrae) which could not be assigned to a species. The specimens categorised as large mammal are likely to belong to either cattle or horse; red deer was absent in the assemblage. Medium mammal specimens are most likely to consist of sheep or pig bones: however the presence of goat is possible. Tooth eruption and wear were recorded according to Grant (1982). Mandibles were further divided into age groups presented by O'Connor (2003, 160). For ages of tooth eruption and epiphyseal fusion, Silver's (1969) figures were followed. Cattle horn cores were aged using Armitage and Clutton-Brock (1976). Measurements were taken following von den Driesch (1976). In addition, the medial edge of the pelvis was measured according to Vretemark (1997). In addition, during the analysis pathological changes, carnivore and rodent gnawing, signs of burning and butchery marks were recorded. All data is stored in digital and written form in Headland Archaeology (Ireland) Ltd, Unit 1 Wallingstown Business Park, Little Island, Co. Cork.

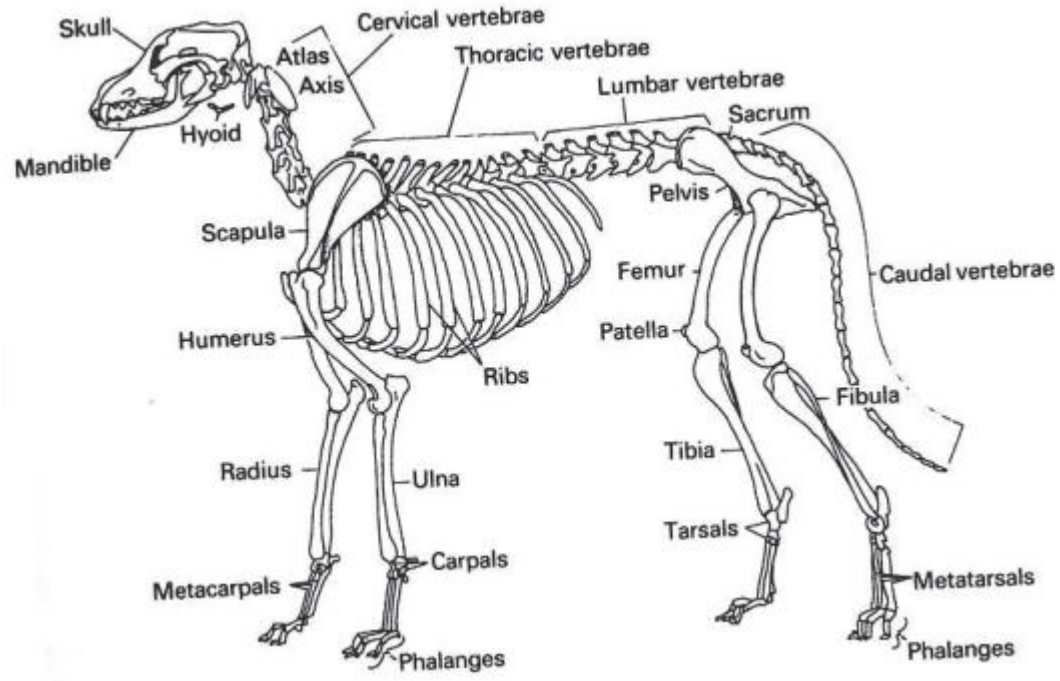

Figure 1 – Location on animal skeleton of terms referred to in text (Davis 1987, 54, in Reitz and Wing 1999)

Results

A total 3180 of bone specimens were analysed from Mullamast (Table 1). The bones come from an undated prehistoric phase, an Iron Age phase, an early medieval phase, post-medieval and possible post-medieval as well as a number of unphased pits and subsoil. Each phase of the site will be discussed in turn below. In general the preservation of the material from Mullamast ranged from excellent to poor. Many of the bones were fragmented and fragile. Some of the fragmentation had occurred during the burial process, but post-mortem breaks were common. A sample could include a high number of specimens within a few anatomical elements, because of the high fragmentation rate.

Context	*Cattle*	*Horse*	*Pig*	*Sheep*	*Sh/g*	*Dog*	*Mouse*	*Crs*	*Bird*	*Canid*	*Lm*	*Mm1*	*Mm2*	*Unid*	***NISP***
017			1		4						3	4		87	99
023					1						1	1		42	45
037					1					2		2		12	17
051	1				6									32	39
057												1		14	15
060						*214**					4	9	*4**	529	760
062					1									2	3
067	2	9			5						4	5		89	114
071	8	1	1	1							29			145	185
074	15	1	12	2	9			1	10		32	11		258	351
080	2		2		4						14	4		32	58
090											1			5	6
097	6		3	1	4						26	12		393	445

Context	*Cattle*	*Horse*	*Pig*	*Sheep*	*Sh/g*	*Dog*	*Mouse*	*Crs*	*Bird*	*Canid*	*Lm*	*Mm1*	*Mm2*	*Unid*	***NISP***
099					1						2	3		24	30
100	1										1			2	4
102	1											1		32	34
105	4	1		2	10						2	6		93	118
107	3		1		6						4	2		13	29
117	15		2		1						9	20		154	201
119												1		66	67
121	1			1	2	1					1	3		5	14
123											1				1
124	8	1			3						11	1		23	47
128							7							13	20
140												3		4	7
142					1							1		20	22
146												1			1
166	1													2	3
182	4	2					1				2	5		28	42
184	8										1			32	41
188	2		1	1	2						2			6	14
191	2														2
192														6	6
198	1											1		18	20
224	4		1								13	1		296	315
253														5	5
Total	89	15	24	8	61	215	8	1	10	2	163	98	4	2482	**3180**

Table 1 – Species representation of sample (NISP). Sh/g = sheep/goat, Canid = canid family, Lm = large mammal, Mm1 = medium mammal (sheep, goat, pig), Mm2 = medium mammal (carnivore), Unid = unidentified. * Articulated dog skeleton

Prehistoric activity A total of 15 bones were recovered from undated prehistoric fill (057) of pit (natural redeposit) (056) (Table 2). None of the bones from the undated prehistoric phase showed signs of gnawing, butchery or pathology. Fourteen of the bones recovered were burnt, the single unburnt fragment was a medium mammal shaft fragment which is more likely animal than human judging from morphology.

Context	*Species*	*Element*	*Burning*	***NISP***
057	Unidentified	Unidentified	Calcined	13
057	Unidentified	Unidentified	Charred	1
057	Medium mammal	Shaft	Unburnt	1
Total				**15**

Table 2 – Species and element distribution for undated prehistoric fill (057) of pit (056) (NISP)

Iron Age Only one feature was securely dated to the Iron Age, fill (017) of pit (016), which contained animal bone (Table 3). A total of 99 bone fragments were recovered from a soil sample. None of the bones showed signs of pathology, butchery or gnawing and the preservation was poor. Sheep/goat bones are most common, followed by pig but the sample size is very small. A pig femur fragment, sheep/goat skull base, two tibia and femur fragments, three large mammal ribs, two medium mammal shaft fragments and radius/ulna fragments, as well as unidentified fragments were recovered. None of the bones from fill (017) of pit (016) were identifiable as human (Carmelita Troy pers. comm.). Due to the small size of the assemblage the element distribution reveals little about its nature but head and limb bones are represented. This material most likely reflects the dumping of domestic waste.

Element	*Pig*	*Sheep/goat*	*Large mammal*	*Medium mammal*	*Unidentified*	***NISP***
Skull		1				1
Rib			3	1		4
Radius/ulna				1		1
Shaft				2		2
Tibia		2				2
Femur	1	1				2
Unidentified					87	87
Total	1	4	3	4	87	**99**

Table 3 – Species and elements from the Iron Age faunal assemblage (NISP)

A total of 33 burnt bones were recovered from fill (017) of pit (016) (Table 4). None of the burnt bones were identifiable to either species or element.

Context	*Calcined*	*Charred*	*Unburnt*	***NISP***
017	28	5	66	99
Total	28	5	66	**99**

Table 4 – Burning in the Iron Age material from fill (017) of pit (016)

Medieval activity A total of 606 bones were recovered from the early medieval phase at Mullamast (Table 5). The majority of the bones from the early medieval phase come from fills of the various kilns that were excavated and will be dealt with below; the bones from fill (105) of pit (104) will be dealt with separately.

Context	*Cattle*	*Horse*	*Pig*	*Sheep*	*Sheep/goat*	*Mouse*	*Lm*	*Mm*	*Unid.*	***NISP***
071	8	1	1	1			29		145	185
090							1		5	6
105	4	1		2	10		2	6	93	118
117	15		2		1		9	20	154	201
124	8	1			3		11	1	23	47
128						7			13	20
140								3	4	7
188	2		1	1	2		2		6	14
191	2									2
192									6	6
Total	39	3	4	4	16	7	54	30	449	**606**

Table 5 – Species distribution for the early medieval phase at Mullamast (NISP). Lm = large mammal, Mm = medium mammal, Unid = unidentifed

Isolated pit A total of 118 bones were recovered from fill (105) of pit (104) (Table 6). One proximal cattle metacarpal fragment, probably from a juvenile, had been gnawed, most likely by a dog. None of the bones from fill (105) of pit (104) were burnt or showed signs of pathology or butchery. Sheep/goat bones are most common on the material followed by cattle. No bones from wild animals were recovered from fill (105) of pit (104). A shattered sheep/goat skull was recovered from the pit and two matching mandible fragments from the same individual indicating a primary deposit. The element distribution for sheep/goat shows that elements from the head, trunk and limbs are present indicating both primary and secondary butchery but given the small size of the assemblage no firm conclusions can be drawn from this although the assemblage seems most likely to be derived from domestic refuse.

Element	*Cattle*	*Horse*	*Sheep*	*Sheep/goat*	*Lm*	*Mm*	*Unid*	***NISP***
Horn core				1				1
Skull				1				1
Mandible			1					1
Teeth	3			3				6
Thoracic vertebra						2		2
Rib						2		2
Metacarpal	1		1					2
Pelvis				3		1		4
Tibia		1		2				3
Shaft					2	1		3
Unidentified							93	93
Total	4	1	2	10	2	6	93	**118**

Table 6 – Species and element distribution for fill (105) of pit (104) (NISP). Lm = large mammal, Mm = medium mammal, Unid = unidentified

Only one mandible with teeth was found in contexts from the early medieval phase of Mullamast (Table 7). The mandible was from an immature sheep and came from fill (105) of pit (104). Due to the small number of mandibles that could be aged no conclusions can be drawn from the age category division.

Context	*Species*	*Dp4*	*M1*	*M2*	*M3*	*Age class*
105	Sheep	m	g	f	Erupting through bone	Sub-adult 1

Table 7 – Tooth wear (Dp4-M3) according to Grant (1982). Division of mandibles into age categories, (O'Connor 2003, 160)

Kilns A total of 488 bones were recovered from kiln fills at Mullamast (Table 8). In fill (071) of cereal-drying kiln (070) a cattle axis fragment, cattle teeth, pelvis fragments, a nearly complete but broken adult cattle skull, a horse maxillary molar, a deciduous pig incisor, a complete sheep metatarsal with carnivore gnawing, various large mammal and unidentified unburnt fragments were found. From fill (090) of cereal-drying kiln (088) an unburnt large mammal shaft fragment and five burnt unidentifiable fragments were recovered. A cattle astragalus, gnawed calcaneus, humerus and pelvis fragments, teeth, a nearly complete cattle right hind leg from a juvenile individual, pig fifth metatarsal and radius fragments, sheep/goat mandibular molar, an unidentified carnivore canine,

various large and medium mammal bones, including a medium mammal scapula with carnivore gnaw marks and burnt and unburnt unidentifiable fragments were found in fill (117) of kiln (116). In fill (124) of kiln (103) a cattle axis, second phalanx, a distally unfused radius, a cattle ulna fragment, four nearly complete cattle skulls, a horse tibia fragment, sheep/goat maxillary premolar, two sheep/goat metatarsal fragments, one of which had signs of carnivore gnawing, various large and medium mammal fragments were found. A nearly complete mouse skeleton which is possibly intrusive, an unidentified tooth fragment and burnt unidentifiable fragments came from fill (128) of kiln (103). From fill (140) of kiln (133) two medium mammal rib fragments, a medium mammal shaft fragment and unburnt unidentifiable fragments were recovered. Fill (188) of kiln (187) contained a cattle mandibular incisor, a cattle tibia fragment, a pig mandible fragment, a sheep pelvis, a sheep/goat metacarpal and medapodial fragment a large mammal humerus and shaft fragment and unburnt unidentified fragments. From fill (191) of kiln (187) two cattle maxillary molars were recovered. Only burnt unidentifiable fragments were recovered from fill (192) of kiln (187).

Context	*Cattle*	*Horse*	*Pig*	*Sheep*	*Sheep/goat*	*Mouse*	*Lm*	*Mm*	*Unid*	***NISP***
071	8	1	1	1			29		145	185
090							1		5	6
117	15		2		1		9	20	154	201
124	8	1			3		11	1	23	47
128						7			13	20
140								3	4	7
188	2		1	1	2		2		6	14
191	2									2
192									6	6
Total	35	2	4	2	6	7	52	24	356	**488**

Table 8 – NISP in kiln contexts from the early medieval phase at Mullamast. Sh/goat = sheep/goat, Lm = large mammal, Mm = medium mammal, Unid = unidentified

The majority of identifiable specimens from the kiln fills came from cattle (Figure 2)

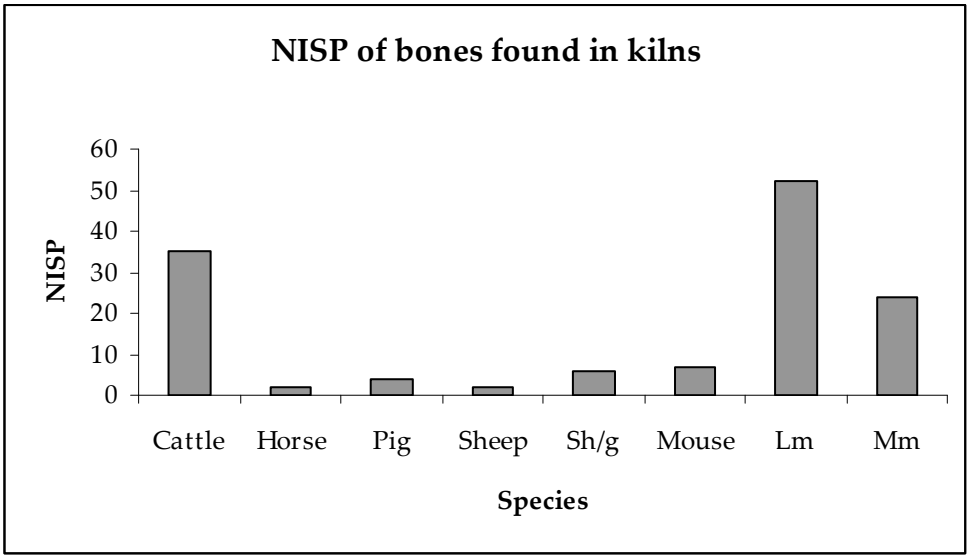

Figure 2 – Number of identified specimens from the early medieval kilns at Mullamast, excluding unidentified fragments. Sh/goat = sheep/goat, Lm = large mammal, Mm = medium mammal

When the element distribution is examined the high ratio of cattle and large mammal skull fragments is apparent (Table 9). Otherwise the element distribution shows that the cattle bones come from all stages of the butchery process, representing whole carcasses. For the other species present the specimens are too few to show any clear distribution.

Element	*Cattle*	*Horse*	*Pig*	*Sheep*	*Sh/g*	*Mouse*	*Lm*	*Mm*	*Unid.*	***NISP***
Skull	7						26		5	38
Mandible			1				2			3
Teeth	8	1	1		2		1		2	15
Atlas	1									1
Axis	1									1
Thoracic vertebra							1			1
Lumbar vertebra							1			1
Rib							10	3	23	36
Scapula	1					1		1		3
Humerus	2						1			3
Radius	1		1							2
Ulna	1						1			2
Metacarpal					1					1
Pelvis	3			1						4
Femur						1				1
Tibia	1	1				3	1			6
Calcaneus	1									1
Astragalus	1									1
Tarsals	1									1
Central tarsal	1									1
Metatarsal	1		1	1	2					5
Metapodial					1	2				3
Phalanx 1	2									2
Phalanx 2	2									2
Shaft							6	20	1	27
Unidentified							2		325	327
Total	35	2	4	2	6	7	52	24	356	**488**

Table 9 – Element distribution for bones from the early medieval kilns at Mullamast. Sh/goat = sheep/goat, Lm = large mammal, Mm = medium mammal, Unid = unidentified

Three partial cattle skulls with measurable horn cores were recovered from kiln fills at Mullamast (Table 10). In fill (124) of kiln (103) there were fragments of two more skulls but they did not have horn cores and could not be measured.

Context	*Age class*	*GD (45)*	*LD (46)*	*BC (44)*	*Notes*
071	4	72.7	44.36	194	
124	5	41.55	32.99	115	Size of left and right horn core uneven, the right one is more gracile and shorter.
124	4	49.47	45.4	163	

Table 10 – Cattle horn core measurements following von den Driesch (1976). Age class was decided using Armitage and Clutton-Brock (1976). GD = greatest diameter of the horn core base, LD = least diameter of the horn core base, BC = basal circumference

Cattle horn core basal circumference exhibits a dual size distribution between sexes. Horn cores with smaller basal circumference are females, the larger ones males; the threshold between females and males was set to 150 mm basal circumference with the references to other studies (Prillof 2000, 30-34; Vretemark 1997, 106; Wigh 2001, 65). By these criteria, one of the horn cores recovered from (124) derived from a female and one from a male. In context (071) one male cattle skull was found. The morphological criteria also supported the sexing of the skulls. From fill (124) of kiln (103) a total of four partial cattle skulls were recovered. One from a probable adult male, one from a probably adult female, one from unsexed adult and another of a juvenile cattle, giving a MNI (minimum number of individuals) of four individuals. All of the skulls and skull fragments were unburnt.

A total of 70, or 14%, burnt bone specimens were recovered in contexts associated with kilns (Table 11). A high number of burnt bones is not uncommon in kilns but this is most likely due to sampling bias since kiln contexts tend to be heavily sampled for environmental data and the majority of the bone from the kiln fills derives from soil samples.

Context	*Calcined*	*Charred*	*Unburnt*	***NISP***
071			185	185
090	5		1	6
117	45	2	154	201
124			47	47
128	12		8	20
140			7	7
188			14	14
191			2	2
192	1	5		6
Total	63	7	418	**488**

Table 11 – Burnt bones from the various kiln contexts at Mullamast

Three measurable bones were found in the kilns from early medieval phase of the site (Table 12). The medial edge of the cattle pelvis was measured for sex assessment, and it is likely to derive from a female as the value was under the 9.8 mm threshold (Wigh 2001, 66; Vretemark 1997, 103). One sheep pelvis could be measured for sex estimation. The value was lower than 4.7 mm, and thus it likely comes from a female (Wigh 2001, 66; Vretemark 1997, 103).

Context	*Species*	*Element*	*Bd*	*GLl*	*Dl*	*GLm*	*Dm*	*Me*
071	Cattle	Pelvis						7.95
117	Cattle	Astragalus	37	58	32.5	52.5	31	
188	Sheep	Pelvis						4.4

Table 12 – Measurements following von den Driesch (1976). Bd = distal breadth, GL = greatest length, GLl = greatest length lateral, Dl = greatest dept of lateral, GLm = greatest length medial, Dm = greatest depth of medial half. Following Vretemark (1997) Me = medial edge

Two bones from the early medieval kilns Mullamast showed signs of butchery (Table 13). From fill (071) of cereal-drying kiln (070) a chopped cattle pelvis was recovered and from fill (140) of kiln (133) a medium mammal rib with multiple knife marks. These butchery marks are indicative of both primary and secondary butchery.

Context	*Species*	*Element*	*Butchery*
071	Cattle	Pelvis	Chop
140	Medium mammal	Rib	>1 knife marks

Table 13 – Butchery marks at Mullamast

A total of four bones, or 0.8%, from the kiln fills showed signs of carnivore gnawing (Table 14).

Context	*Carnivore gnawing*	*No gnawing*	***NISP***
071	1	184	185
090		6	6
117	2	199	201
124	1	46	47
128		20	20
140		7	7
188		14	14
191		2	2
192		6	6
Total	4	484	**488**

Table 14 – Gnawing at Mullamast

Three bones in the early medieval material showed pathological changes (Table 15). The pathological elements are most likely all from the same juvenile cattle. Osteoperiostitis develops due to inflammation caused by infection (Baker and Brothwell 1980).

Context	*Species*	*Element*	*Zone*	*Pathology notes*
117	Cattle	Phalanx 1	2	Osteoperiostitis
117	Cattle	Phalanx 1	2	Osteoperiostitis
117	Cattle	Phalanx 2	2	Osteoperiostitis

Table 15 – Pathologies observed in the early medieval material

Post-medieval and possible post-medieval material A total of 1959 bones were recovered from the post-medieval and possible post-medieval contexts at Mullamast (Table 16). The bones have been divided into three groups according to association each discussed in turn below. Fill (051) of curvilinear gully (050), fill (067) of curvilinear gully (066), fill (099) of curvilinear gully (098), fill (100) of curvilinear gully (095) and fill (198) of curvilinear gully (197) are all from the curvilinear gullies connected to the post-medieval garden. Fill (080) of curvilinear ditch (079) and fill (097) of ditch (096) are grouped together and are possibly connected to the curvilinear gullies that relate to the post-medieval garden. The bones from fill (074) of road cutting (073) are discussed separately as they do not directly relate to any of the other features as are the bones from isolated pit (118) which was filled by (119). Sheep/goat bones are most common in the material followed by cattle and pig excluding the complete dog skeleton recovered. The preservation of the post-medieval and possible post-medieval faunal assemblage ranged from good to poor.

Context	*Cattle*	*Horse*	*Pig*	*Sheep*	*Sh/g*	*Dog*	*Canid*	*Crows*	*Bird*	*Lm*	*Mm1*	*Mm2*	*Unid*	***NISP***
037					1		2				2		12	17
051	1				6								32	39
060						214				4	9	4	529	760
062					1								2	3
067	2	9			5					4	5		89	114
074	15	1	12	2	9			1	10	32	11		258	351
080	2		2		4					14	4		32	58
097	6		3	1	4					26	12		393	445
099					1					2	3		24	30
100	1									1			2	4
107	3		1		6					4	2		13	29
119											1		66	67
142					1						1		20	22
198	1										1		18	20
Total	31	10	18	3	38	214	2	1	10	87	51	4	1490	**1959**

Table 16 – The species distribution in the post-medieval and possible post-medieval material from Mullamast (NISP). Sh/g = sheep/goat, Canid = canid (dog) family, Lm = large mammal, Mm = medium mammal, Unid = unidentifed

When the ratio of the major domesticates for the post-medieval and possibly post-medieval material is examined the dominance of sheep/goat bones in the collection seems very strong but given the relatively small number of identified bones no conclusions can be drawn from this (Table 17).

Species	*NISP*	*%NISP*
Cattle	31	34.44%
Sheep/goat	41	45.56%
Pig	18	20.00%
Total	**90**	100.00%

Table 17 – The species ratios for the main domestic species from the post-medieval and possibly post-medieval material

Curvilinear gullies A total of 207 bones were recovered from fill (051) of curvilinear gully (050), fill (067) of curvilinear gully (066), fill (099) of curvilinear gully (098), fill (100) of curvilinear gully (095) and fill (198) of curvilinear gully (197) all of which were probably associated with the ornamental garden (Table 18). None of the bones were burnt or showed signs of pathology or butchery. Sheep/goat bones are most common in the gullies followed by horse and then cattle. No wild animal bones were recovered from the gully fills.

Context	*Cattle*	*Horse*	*Sh/g*	*Lm*	*Mm*	*Unid*	***NISP***
051	1		6			32	39
067	2	9	5	4	5	89	114
099			1	2	3	24	30
100	1			1		2	4
198	1				1	18	20
Total	5	9	12	7	9	165	**207**

Table 18 – The species present in the gullies from Mullamast (NISP)

The element distribution from the gullies shows that for cattle and sheep/goat both head, limb and trunk elements are represented indicating both primary and secondary butchery (Table 19). Fill (051) of curvilinear gully (050) contained a cattle pelvis fragment, sheep/goat teeth and carpals as well as unidentifiable fragments. From fill (067) of curvilinear gully (066) a cattle mandible and femur fragment, horse mandible fragment and teeth, sheep/goat teeth metapodials and pelvis and femur fragments were recovered along with various elements from large and medium mammals and unidentified fragments. In fill (099) of curvilinear gully (098) a single sheep/goat humerus fragment was found, two large mammal shaft fragments, three medium mammal scapula fragments which are possibly all from the same bone and probably sheep/goat and unidentified fragments. Fill (100) of curvilinear gully (095) contained a worn cattle premolar, a large mammal tibia fragment and two unidentified fragments. A cattle mandible fragment and medium mammal shaft fragment as well as unidentified fragments came from fill (198) of curvilinear gully (197).

Context	*Element*	*Cattle*	*Horse*	*Sh/g*	*Lm*	*Mm*	*Unid*	***NISP***
051	Teeth			4				4
051	Carpals			2				2
051	Pelvis	1						1
051	Unidentified						32	32
	051 Total	*1*		*6*			*32*	*39*
067	Mandible	1	3		1			5
067	Teeth		6	1				7
067	Lumbar vertebra				1			1
067	Vertebra					2		2
067	Rib					2		2
067	Metacarpal			1				1
067	Pelvis			1				1
067	Femur	1		1				2
067	Metatarsal			1				1
067	Shaft				1	1		2
067	Unidentified				1		89	90
	067 Total	*2*	*9*	*5*	*4*	*5*	*89*	*114*

Context	*Element*	*Cattle*	*Horse*	*Sh/g*	*Lm*	*Mm*	*Unid*	***NISP***
099	Scapula					3		3
099	Humerus			1				1
099	Shaft				2			2
099	Unidentified						24	24
	099 Total			*1*	*2*	*3*	*24*	*30*
100	Teeth	1						1
100	Tibia				1			1
100	Unidentified						2	2
	100 Total	*1*			*1*		*2*	*4*
198	Mandible	1						1
198	Shaft					1		1
198	Unidentified						18	18
	198 Total	*1*				*1*	*18*	*20*
		5	9	12	7	9	165	**207**

Table 19 – Element distribution for the material from the gullies

Two bones from the gullies had been gnawed, most likely by dogs (Table 19). A gnawed cattle pelvis fragment was found in fill (051) of curvilinear gully (050) and a gnawed sheep/goat distal metatarsal was recovered from fill (067) of curvilinear gully (066). This could indicate either that the material might was been left uncovered for some time or that the gnawing took place before it was deposited in the gullies.

Context	*Element*	*Cattle*	*Sheep/goat*	***NISP***
051	Pelvis	1		1
067	Metatarsal		1	1
Total		1	2	**3**

Table 20 – Gnawing in the gully material

Ditches Two fills of ditches which are possibly related to the ornamental garden at Willowbrook House contained animal bone (O'Connell and Hackett 2009, 16). A total of 503 animal bones were recovered from the ditches (Table 21). None of the bones from the ditches were burnt or showed signs of gnawing, pathology or butchery. Sheep/goat and cattle bones were most common in these contexts followed by pig. No wild animals were found in the assemblage. Fill (080) of curvilinear ditch (079) contained a fragment of a cattle radius and tibia, a juvenile pig skull fragment and scapula fragment, sheep/goat teeth and atlas as well as large mammal vertebra and shaft fragments, medium mammal skull fragments which are probably from a juvenile pig and unidentified fragments. From fill (097) of ditch (096) a cattle mandible, femur, metatarsal and metapodial fragment were recovered, a complete cattle radius and phalanx 1, pig mandible fragment and tooth and femur fragment, sheep/goat metacarpals and teeth as well as various large and medium mammal elements and unidentified fragments.

Context	*Cattle*	*Pig*	*Sheep*	*Sh/g*	*Lm*	*Mm*	*Unid*	***NISP***
080	2	2		4	14	4	32	58
097	6	3	1	4	26	12	393	445
Total	8	5	1	8	40	16	425	**503**

Table 21 – Species present in the ditch fills. Sh/g = sheep/goat, Lm = large mammal, Mm = medium mammal, Unid = unidentified

The element distribution for fill (080) of curvilinear ditch (079) shows trunk and limb elements are represented for cattle (when large mammal bones are included). For pig head and forelimb are represented but for sheep only head and neck elements are represented. This element distribution indicates both primary and secondary butchery elements but the assemblage is very small so no concrete conclusions can be drawn. For the cattle, pig and sheep/goat bone from fill (097) of ditch (096) head, trunk and limb bones represented also indicating both primary and secondary butchery (Table 22).

Context	*Element*	*Cattle*	*Pig*	*Sheep*	*Sh/g*	*Lm*	*Mm*	*Unid*	***NISP***
080	Skull		1				4	10	15
080	Teeth				3				3
080	Atlas				1				1
080	Thoracic vertebra					2			2
080	Scapula		1						1
080	Radius	1							1
080	Tibia	1							1
080	Shaft					10		1	11
080	Unidentified					2		21	23
	080 Total	*2*	*2*		*4*	*14*	*4*	*32*	*58*
097	Mandible	1	1			1			3
097	Teeth		1		2				3
097	Atlas					2			2
097	Thoracic vertebra					1			1
097	Lumbar vertebra					8			8
097	Vertebra					9	1		10
097	Rib					1	6		7
097	Scapula						3		3
097	Radius	1			1				2
097	Metacarpal			1	1				2
097	Femur	1	1						2
097	Metatarsal	1							1
097	Metapodial	1							1
097	Phalanx 1	1							1
097	Shaft					4	2	1	7
097	Unidentified							392	392
	097 Total	*6*	*3*	*1*	*4*	*26*	*12*	*393*	*445*
Total		8	5	1	8	40	16	425	**503**

Table 22 – The element distribution for the material from the ditches. Sh/g = sheep/goat, Lm = large mammal, Mm = medium mammal, Unid = unidentifed

One measurable bone was found in material from the post-medieval and possible post-medieval ditches at Mullamast (Table 23). The cattle radius from fill (097) of ditch (096), gave a withers height

of 110 cm (Matolcsi 1970). This withers height is similar to that found on medieval sites in Ireland indicating that the animal not of a modern improved breed (Denham 2007, 216).

Context	*Species*	*Element*	*GL*
097	Cattle	Radius	256.5

Table 23 – Measurements following von den Driesch (1976). GL = greatest length

Road cutting A total of 351 bones were recovered from fill (074) of road cutting (073) which dates to before the 1830s (O'Connell and Hackett 2009, 16). The context mostly had bones from domestic species such as cattle, horse, pig and sheep/goat but a crow family tarsometatarsus was also recovered along with a bird wing phalanx which was unidentifiable to family or species (Table 24). The element distribution shows that for cattle (when large mammal vertebra are included) most elements of the skeleton are represented. A single horse tooth was recovered. For pig and sheep/goat there seems to be a bias towards head and limb elements with elements of the trunk largely absent presenting a different pattern from the cattle bone. This could however be due to recovery bias since bones from medium mammals are less likely to be collected trough hand picking than the corresponding elements coming from large mammals.

Element	*Cattle*	*Horse*	*Pig*	*Sheep*	*Sh/g*	*Crows*	*Bird*	*Lm*	*Mm*	*Unid*	***NISP***
Skull								1			1
Mandible					1						1
Teeth	7	1	6		5					13	32
Cervical vertebra								1			1
Thoracic vertebra								2			2
Lumbar vertebra								2	1		3
Vertebra										2	2
Rib								5			5
Scapula			2								2
Humerus			1	1	1						3
Radius/ulna	1										1
Radius	1										1
Ulna	2										2
Pelvis	1		1								2
Tibia	1				2			2			5
Astragalus			1								1
Metatarsal	1			1							2
Tarsometatarsus						1					1
Phalanx 1			1								1
Phalanx 2	1										1
First wing digit							1				1
Shaft							2	18	10	5	35
Unidentified							7	1		228	236
Total	15	1	12	2	9	1	10	32	11	258	**351**

Table 24 – Element distribution from fill (074) of road cutting (073). Sh/g = sheep/goat, Lm = large mammals, Mm = medium mammals

One bone from fill (074) of road cutting (073), a pig astragalus, could be measured (Table 25). From the greatest length lateral of the pig astragalus from fill (074) of road cutting (073) the withers height can be calculated to be 66.7 cm (Teichert 1969). This withers height is one the smaller side even for the medieval period so it indicates that the animal not of a modern improved breed (Denham 2007, 258). It is also possible that the small withers height stems from the fact that the individual was not fully mature or was female.

Context	*Species*	*Element*	*Bd*	*GLl*	*GLm*
074	Pig	Astragalus	21.79	37.3	34.96

Table 25 – Measurements according to von den Driesch (1976). Bd = distal breadth, GLl = greatest length lateral, GLm = greatest length medial

Tooth wear was recorded for one mandible from fill (074) of road cutting (073) (Table 26). The sheep/goat mandible came from a fully mature adult animal. Due to the fact that only one mandible for which tooth wear could be recorded was recovered no conclusions can be drawn from the age category division.

Context	*Species*	*P4*	*M1*	*M2*	*M3*	*Age class*
074	Sheep/goat	g	h	g	f	Adult 3

Table 26 – Tooth wear (Dp4-M3) according to Grant (1982). Division of mandibles into age categories, (O'Connor 2003, 160)

Butchery One bone from fill (074) of road cutting (073) showed signs of butchery, a single knife mark was observed on a medium mammal shaft (Table 27). This butchery mark is more reflective of secondary butchery but due to the fact that only one bone with butchery marks was recovered no clear assumptions can be made.

Context	*Species*	*Element*	*Butchery*
074	Medium mammal	Shaft	Knife mark

Table 28 – Butchery in fill (074) of road cutting (073)

Agricultural features A number of the post-medieval and possible post-medieval agricultural features at Mullamast contained animal bone (Table 29). A total of 898 bones were recovered a long with a nearly complete dog skeleton from fill (060) of field boundary ditch (003) which is discussed in detail below. Excluding the bones belonging to the dog skeleton from fill (060) of field boundary ditch (003), sheep/goat is the most common species found in the agricultural features followed by cattle, canid (dog) family and pig. From fill (037) of modern linear feature (036) a canid femur and tibia from a juvenile individual, probably dog, a sheep/goat metacarpal fragment, a medium mammal pelvis and shaft fragment and unburnt unidentified fragments were recovered. In fill (060) of field boundary ditch (003) a nearly complete dog skeleton discussed in detail below, large mammal rib, sacrum and scapula fragments, medium mammal rib fragments and unidentified unburnt fragments probably mostly from the dog skeleton and unidentified burnt fragments were found. Fill (062) of field boundary ditch (005) contained a sheep/goat tibia fragment and an unidentified ulna fragment. Cattle teeth, a pig maxillary incisor, sheep/goat teeth, femur, metacarpal, mandible and pelvis fragment, a large mammal shaft fragment, a medium mammal rig and cervical vertebra fragment and unburnt unidentifiable bones were found in fill (107) of furrow (106). From fill (119) of pit (118) a charred medium mammal thoracic vertebra fragment and burnt and unburnt unidentifiable fragments were recovered. In fill (142) of furrow (141) a sheep/goat radius fragment with carnivore gnawing, a medium mammal shaft fragment and burnt and unburnt unidentifiable fragment were found.

Context	*Cattle*	*Pig*	*Sheep/goat*	*Dog*	*Canid*	*Lm*	*Mm1*	*Mm2*	*Unid*	***NISP***
037			1		2		2		12	17
060				*214**		4	9	*4**	529	760
062			1						2	3
107	3	1	6			4	2		13	29
119							1		66	67
142			1				1		20	22
Total	3	1	9	214	2	8	15	4	642	**898**

Table 29 – Species represented in the agricultural features from Mullamast (NISP). Canid = canid (dog) family, Lm = large mammal, Mm = medium mammal, Unid = unidentified. * Articulated dog skeleton

One bone from the agricultural features had been gnawed (Table 30). A gnawed sheep/goat radius shaft with gnaw marks came from fill (142) of furrow (141).

Context	*Element*	*Cattle*	*Sheep/goat*	***NISP***
142	Radius		1	1

Table 30 – Gnawing in the post-medieval and possible post-medieval material

One bone from the agricultural features at Mullamast had butchery marks (Table 31). A large mammal rib with chop marks was recovered from fill (060) of field boundary ditch (003) (Table). Chop marks are more commonly found in large mammal bones due to the larger size of the carcass. Most of the chop marks have resulted while cutting up the carcass into smaller pieces for consumption – the most common elements being treated this way were the high utility skeletal elements like vertebrae and ribs. The butchery marks observed in the material from the agricultural features are more likely to be connected to secondary butchery but due to the fact that only one element had butchery marks no clear assumptions can be made.

Context	*Species*	*Element*	*Butchery*
060	Large mammal	Rib	Chops

Table 31 – Butchery in the material from the agricultural features

Articulated dog skeleton One nearly complete dog skeleton was recovered from fill (060) of field boundary ditch (003). The skeleton was close to being complete although the majority of the skull, one cervical vertebrae, one thoracic vertebrae, and other assorted elements are missing (Table 32). The dog was male as the baculum, or penis bone, was present.

Element	*Dog*	*Medium mammal*	***Total***
Skull	3		3
Mandible	2		2
Teeth	3		3
Atlas	1		1
Axis	1		1
Cervical vertebra	8		8
Thoracic vertebra	17		17
Lumbar vertebra	7		7
Caudal vertebra	8		8

Element	*Dog*	*Medium mammal*	***Total***
Vertebra	6	4	10
Rib	106	9	115
Scapula	2		2
Humerus	1		1
Radius	1		1
Ulna	2		2
Carpals	3		3
Carpals/tarsals	3		3
Baculum	1		1
Pelvis	4		4
Femur	2		2
Patella	1		1
Astragalus	1		1
Tibia	2		2
Fibula	1		1
Calcaneus	1		1
Metapodial	13		13
Phalanx 1	8		8
Phalanx 2	4		4
Phalanx 3	1		1
Sesamoid	1		1
Unidentified			479
Total	214	13	706

Table 32 – Elements present from articulated dog skeleton

The dog skeleton had six measurable elements (Table 33). The wither height of the dog can be calculated from the greatest length of the femur, radius and tibia and is between 44 and 46 cm (Harcourt 1974). This wither height indicates that the dog was of medium size (McCormick 1991).

Element	*GL*	*GB*	*Bp*	*Dp*	*SD*	*Bd*	*DC*
Calcaneus	37	15.67					
Femur	147		34.55			28.19	16.43
Humerus				34.3	12.29	29.65	
Radius	138		16.12		12.38	20.53	
Tibia	148.5		28.88		12.09	20.21	
Tibia	148		29.38		11.75	20.49	

Table 33 – Measurements. GL = greatest length, GB = greatest breath, Bp = proximal breath, Dp = depth of proximal end, SD = smallest breath of diaphysis, Bd = distal breadth, Dc = greatest depth of caput femoris

The dog skeleton showed a number of pathologies (Table 34). The pathologies probably caused severe discomfort for the animal and had been ongoing for some time and had not reached a point of stabilization. All long bones were fused indicating a fully grown individual but the teeth were relatively unworn indicating that the dog was not elderly.

Context	*Element*	*ZONE*	*Pathology notes*
060	Femur	123	Looks like an unhealed dislocation, excess bone growth around the acetabulum, does not look like a long- term condition, the new bone mass is not dense or polished.
060	Teeth		Possible dental crowding and malformation of front of maxilla and alveoli
060	Mandible	1	Dental crowding of the P1, P2, P3, M1. Teeth are not worn, probably a rather young adult animal.
060	Mandible	1	Dental crowding of the P1, P2, P3, M1. Teeth are not worn, probably a rather young adult animal.
060	Pelvis	1	Looks like an unhealed dislocation, excess bone growth around the acetabulum, does not look like a long term condition, the new bone mass is not dense or polished
060	Skull		Possible dental crowding and malformation of front of maxilla and alveoli

Table 34 – Pathologies observed in the dog skeleton from fill (060) of field boundary ditch (003)

Isolated pit A total of 67 bones were recovered from single fill (119) of pit (118) which belongs to the post-medieval and possible post-medieval phase at Mullamast (Table 35). The pit contained a charred medium mammal thoracic vertebra fragment along with both burnt and unburnt unidentifiable fragments. None of the bones from fill (119) of pit (118) showed signs of gnawing, pathology or butchery. Given the date of the material and species and elements represented in the assemblage it most likely reflects domestic waste.

Species	*Element*	*Burning*	***NISP***
Medium mammal	Thoracic vertebra	Charred	1
Unidentified	Unidentified	Unburnt	10
Unidentified	Unidentified	Calcined	55
Unidentified	Unidentified	Charred	1
Total			**67**

Table 35 – The material from fill (119) of pit (118)

Unphased material A total of 591 bones came from the various unphased pits and topsoil (001) at Mullamast (Table 36). None of the bones from the unphased assemblage were gnawed or showed signs of pathology or butchery. A sheep/goat tooth along with both a large and medium mammal shaft fragment and unidentified fragments were recovered from fill (023) of pit (022). From fill (102) of pit (101) a single cow tooth was found as well as a medium mammal shaft and unidentified fragments. A cattle calcaneus unfused proximally, a dog maxillary incisor, a sheep humerus, sheep/goat, femur, and humerus fragments, a large mammal rib, medium mammal rib and shaft fragments and unburnt unidentified fragments came from fill (121) of pit (120). From fill (123) of pit (122) a large mammal cervical vertebra fragment was recovered. In fill (146) of pit (145) a medium mammal shaft fragment was found. A cattle metatarsal and burnt unidentified fragments were recovered from fill (166) of pit (167). From fill (182) of pit (181) cattle teeth and mandible fragments, horse mandibular molars, a proximally unfused mouse humerus, possibly intrusive, large and medium mammal bone fragments and unburnt unidentifiable fragments were found. Fill (184) of pit (183) contained cattle teeth, a large mammal shaft fragment and burnt and unburnt unidentifiable

fragments. From fill (224) of pit (223) cattle teeth, cattle mandible and skull fragments, a pig tibia fragment and various large and medium mammal fragments along with burnt and unburnt unidentified fragments were recovered. Fill (224) of pit (223) also contained some human bone (Troy 2010, Appendix 10). In fill (253) of burnt pit (251) only burnt unidentifiable fragments were found.

Context	*Cattle*	*Horse*	*Pig*	*Sheep*	*Sh/g*	*Dog*	*Mouse*	*Lm*	*Mm*	*Unid*	***NISP***
001	13		8		5			20	13	31	90
023					1			1	1	42	45
102	1								1	32	34
121	1			1	2	1		1	3	5	14
123								1			1
146									1		1
166	1									2	3
182	4	2					1	2	5	28	42
184	8							1		32	41
224	4		1					13	1	296	315
253										5	5
Total	32	2	9	1	8	1	1	39	25	473	**591**

Table 36 – Species distribution for the unphased material from Mullamast (NISP). Lm = large mammal, Mm = medium mammal, Unid = unidentified

A total of 54 burnt bones were recovered from the unphased material (Table 37). The burnt material was all recovered from fills of pits. All of the burnt bones were unidentifiable to species and the only ones identifiable to element were a tooth root and skull fragment from fill (224) of pit (223).

Context	*Calcined*	*Charred*	*Unburnt*	***NISP***
023	15		30	45
102	11		23	34
121			14	14
123			1	1
146			1	1
166	2		1	3
182			42	42
184	2	1	38	41
224	11	7	297	315
253	3	2		5
Total	44	10	447	501

Table 37 – Burning for the unphased assemblage

One of the unphased contexts, fill (253) of burnt pit (251), contained only bones that were unidentifiable to species or element and could be either human or animal (Table 38).

Context	*Element*	*Species*	***NISP***
253	Unidentified	Unidentified	5
Total			5

Table 38 – The unidentified material from fill (253) of burnt pit (251)

Discussion

The bone material from Mullamast, Co Kildare comes from three dated phases, Iron Age, early medieval and post-medieval, as well as there being material from undated prehistoric contexts and unphased contexts.

The Iron Age material comes from a single fill (017) of pit (018). Four sheep/goat bones and one pig bone were recovered along with burnt and unburnt unidentified fragments. The Iron Age faunal assemblage from Mullamast is too small for conclusive comparison to other sites. However, some general statements can be made. Of the small number of Iron Age animal bones assemblages analyzed and published in Ireland, most derive from high-status ceremonial sites (McCormick and Murray 2007, 31). For example, in Dún Ailinne Co. Kildare, cattle, pig, sheep/goat and horse bones were identified, interpreted to relate to ritual activities (Crabtree 2002). Recent excavations in the Carlow/Kildare area have revealed a number of Iron Age sites some of which yielded faunal assemblages. A large number of animal bones dating to the Late Iron Age were recovered from the fills of an enclosure ditch Moone, Co. Kildare (E2980). Cattle dominate the sample, followed by pig, sheep or goat and horse. The assemblage also included horse, dog, red deer, wood mouse and a whale bone. In addition, the material included a few bones of small songbirds (Passeriformes) and (unidentified) fish bones. Some pig bones derive from very large and robust individuals, either from wild boar or very large domestic animals (Tourunen and Pálsdóttir 2010a). Faunal remains dating to the Late Iron Age have been found at Prumplestown Lower, Co. Kildare (E2967) where a number of cattle, sheep/goat, pig and horse bones were recovered from a context that also contained cremated human bone (Tourunen and Pálsdóttir 2010b). From Mullamast, Co. Kildare (E2860) burnt cattle and sheep/goat bones were recovered from a hearth fill as well as unidentified bone coming from both the hearth and associated pits all dating to the Late Iron Age to early medieval period (Tourunen and Pálsdóttir 2009). At Hallahoise, Co. Kildare (E2948) burnt bone unidentifiable as either human or animal was recovered from a pit dated to the Late Iron Age (Pálsdóttir 2010). From Ballybannon, Co. Carlow (E2612) a small faunal assemblage dating to the Early Iron Age was recovered from a fill of a re-cut of an enclosure ditch. Most of the identified bones derive from cattle and red deer, with dog also being represented in the sample. The cattle bones derived mainly from head and limb bones but the red deer bones in the sample consisted solely of pieces of antler (Tourunen 2009). At Knockgraffen, Co. Tipperary (09E0123) a small assemblage dating to the Early Iron Age with cattle and pig bones and a skeleton of a large dog were found associated with a ring-ditch. Like the Mullamast collection no sheep/goat bones were recovered at Knockgraffen (Tourunen and Pálsdóttir 2010c)

The early medieval material at Mullamast seems to reflect both primary and secondary butchery and apart from the mouse bones which are possibly intrusive only common domestic species are present. The early medieval assemblage is dominated by cattle, followed by sheep/goat with pig and horse bones also present. This cattle-dominated pattern is very familiar from Irish early medieval sites (McCormick and Murray 2007, 35, 41). The many partial cattle skulls found in kiln fills at Mullamast

are quite unusual, most likely they were deposited in the kilns after they fell out of use. The skulls came from both bulls and cows. Given the early medieval dates of the kilns it is possible that the skulls reflect some sort of ritual activity but without more comparable sites and dating of the cattle skulls themselves no firm conclusion can be drawn. The skulls might also reflect deposition of slaughter waste. The early medieval material from Mullamast is both relatively small in size and unusual in its nature so no direct comparisons can be made. However, a number of other sites in the region have had kilns with animal bone. At Mullamast (E2973), Co. Kildare the only identifiable bone from the kiln was a cattle pelvis fragment but a large mammal shaft fragment was also recovered along with unidentifiable fragments. The ratio of burnt bones in the kiln material was rather low and most likely the bones were deposited in the kiln after it fell out of use (Pálsdóttir 2010). Animal bone is occasionally recovered from the fills of kilns such as in Ballybar Lower, Co. Carlow (E2622), Gorteen, Co. Limerick (08E0174) and Narraghmore, Co. Kildare (E2854) (Tourunen 2009a, b and c), and it is likely to relate to other activities practiced on the vicinity of the kiln than to the kiln use itself.

The post-medieval and possible post-medieval faunal assemblage consisted mostly of bones from common domestic species such as cattle, sheep/goat, pig and horse. It also included some disarticulated dog and canid bones and a complete dog skeleton. The element distribution and butchery marks reflect both primary and secondary butchery indicating that the complete carcasses were consumed at the site and there was no evidence of specialized activity. The material most likely represents domestic waste and discard of animals that are not were generally not eaten in the post-medieval period, such as horse and dog. The crow bones found in fill (074) of road cutting (073) are most likely not related to human activity.

Since the date of the bones from the unphased material is not known no conclusions can be drawn from them. Both human and animal bone was recovered from some of the unphased contexts. One pit contained only burnt bone unidentifiable as either human or animal and it could represent either a token burial or domestic waste. Token burials are cremations that have been described as consisting of small, minute or token quantities. The Middle Bronze Age in Ireland includes the burial traditions of token cremation burials within isolated pit cremations, enclosed and unenclosed pit cemeteries, barrows, ring-ditches and mounds (Cooney and Grogan 1999, 126). The token cremation burial and ring-ditches first make their appearance in the Middle Bronze Age and ring-ditches formed the principal markers of formal burial in this period (Cooney and Grogan 1999, 129).

Context	*Sample*	*Species*	*Element*	*NISP*	*Side*	*Gt50*	*Proxfus*	*Distfus*	*Age*	*Modifications*	*Admin*	*Notes*	*Percent*	*Texture*	*Burning*	*Recovery*
001	015	pig	isoteeth	1							fb	Male canine. Mandible.	70			hc
001	015	cow	phal1	1		123	f	f						3		hc
001	015	cow	phal3	1		12	f							2		hc
001	015	cow	isoteeth	3								M1/2. Maxilla.	90			hc
001	015	cow	isoteeth	1								Deciduous m1/2. Maxilla.	90			hc
001	015	cow	isoteeth	1								Pm. Maxilla.	90			hc
001	015	cow	isoteeth	1								M3. Mandible.	90			hc
001	015	cow	isoteeth	1								M1/2. Mandible.	90			hc
001	015	sh/g	isoteeth	3								M1/2. Maxilla.	90			hc
001	015	mm1	rib	2												hc
001	015	lm	rib	5							fb					hc
001	015	sh/g	m/c	1	r	125678	f							3		hc
001	015	cow	m/t	1	l	3478		f						3		hc
001	015	mm1	lumb	1			f				fb		30	3		hc
001	015	mm1	lumb	1							fb		10			hc
001	015	pig	isoteeth	1							fb	M1. Broken in 3.	90			hc
001	015	pig	isoteeth	1							fb	M2.	90			hc
001	015	unid	isoteeth	1							fb	Fragment of root.	10			hc
001	015	pig	isoteeth	1								Pm.	90			hc
001	015	cow	ax	1							fb		30			hc
001	015	pig	mand	2							fb	Possibly fragments from same mandible and connected with the loose pig teeth.	10	2		hc
001	015	mm1	skull	2							fb	Possibly fragments of pig mandible.	10	2		hc
001	015	mm1	skull	2							fb	Possibly from pig mandible.		2		hc
001	015	unid	ui	5							fb			2		hc
001	015	pig	ulna	1	l	C								1		hc
001	015	cow	isoteeth	1							fb	Tooth fragment.	30			hc
001	015	unid	fem	1									10	3		hc
001	015	pig	tib	1	l	789								2		hc
001	015	sh/g	m/t	1			f							2		hc
001	015	mm1	sha	2										1		hc
001	015	mm1	sha	3										3		hc
001	015	lm	sha	11										3		hc
001	015	cow	m/c	1									10	3		hc
001	015	lm	sha	1										3		hc
001	015	unid	ui	20										3		hc
001	015	unid	rib	1							fb			3		hc
001	015	lm	sha	1										3		hc
001	015	lm	ui	1							fb			3		hc
001	015	lm	cerv	1									30	3		hc
001	015	unid	ui	3							fb			3		hc
017	002	unid	ui	1											char	1
017	002	mm1	sha	1										2		1

Context	*Sample*	*Species*	*Element*	*NISP*	*Side*	*Gt50*	*Proxfus*	*Distfus*	*Age*	*Modifications*	*Admin*	*Notes*	*Percent*	*Texture*	*Burning*	*Recovery*
017	002	unid	ui	7							fb			3		1
017	002	unid	ui	4											char	1
017	002	unid	ui	28											cal	1
017	002	unid	ui	47										3		1
017	002	mm1	rad/uln	1										3		1
017	002	lm	rib	3							fb			3		1
017	002	sh/g	fem	1	r	6								3		1
017	002	sh/g	tib	1	l	9					fb			3		1
017	002	mm1	sha	1										3		1
017	002	pig	fem	1	l						fb	Broken in 2.		4		1
017	002	sh/g	tib	1										3		1
017	002	mm1	rib	1										3		1
017	002	sh/g	skull	1								Base of skull	10	3		1
023	003	unid	ui	14											cal	1
023	003	unid	isoteeth	1									10			1
023	003	unid	isoteeth	1									10			1
023	003	unid	ui	24										3		1
023	003	unid	ui	1											cal	1
023	003	mm1	sha	1										3		1
023	003	lm	sha	1										3		1
023	003	unid	ui	1										3		1
023	003	sh/g	isoteeth	1								m1/2 maxilla				1
037	004	sh/g	m/c	1	l	1256	f							3		hc
037	004	mm1	sha	1							fb			3		hc
037	004	mm1	pel	1	r	2					fb	Fused.		3		hc
037	004	unid	ui	12										3		hc
037	004	canid	fem	1	r	34	u		j		fb	Probably dog. Probably same individual as juvenile proximal tibia.		1		hc
037	004	canid	tib	1	r	123	u		j		fb	Probably dog. Broken in 2. Probably same individual as juvenile proximal femur.		1		hc
051	006	unid	ui	32										3		1
051	006	sh/g	isoteeth	1							fb	Broken in 2. Probably m1/2 maxilla	50			1
051	006	sh/g	isoteeth	1							fb		10			1
051	006	sh/g	isoteeth	2							fb	Possibly fragments from sh/g teeth but could not be fitted.				1
051	006	cow	pel	1	r	5				c		Probably dog gnawing.		2		1
051	006	sh/g	carp	1	r							Cu. Fused.	90	2		1
051	006	sh/g	carp	1								Ci. Fused.	90	2		1
057	008	unid	ui	13											cal	1
057	008	unid	ui	1											char	1
057	008	mm1	sha	1										4		1
060	136	dog	pel	1	r	12					fb	Fused. Pathology, looks like an unhealed dislocation. Part of articulated dog skeleton.		1		hc
060	136	dog	ax	1	b		f	f				Part of articulated dog skeleton.	90	1		hc

Context	*Sample*	*Species*	*Element*	*NISP*	*Side*	*Gt50*	*Proxfus*	*Distfus*	*Age*	*Modifications*	*Admin*	*Notes*	*Percent*	*Texture*	*Burning*	*Recovery*
060	136	dog	at	1	b		f	f				Part of articulated dog skeleton.	90	1		hc
060	136	dog	skull	1	r							Fragment of maxilla with i1 and i2. Possibly matches with maxillary incisor but if that is the case there is no space for the i3. Part of articulated dog skeleton.	10	2		hc
060	136	dog	isoteeth	1	r							Possibly matches with the maxilla fragment but if that is the case there is no space for the i3. Possible pathology. Part of articulated dog skeleton.	90			hc
060	136	dog	isoteeth	1	l							i2 maxilla. Part of articulated dog skeleton.	90			hc
060	136	dog	isoteeth	1	l							i3 maxilla. Part of articulated dog skeleton.	90			hc
060	136	dog	pel	1	l							Fused. Broken in 3. Zones present didn't fit diagram. Part of articulated dog skeleton.	50	2		hc
060	136	dog	scap	1	r	12						Fused. Broken in 4. Part of articulated dog skeleton.		2		hc
060	136	dog	scap	1	l						fb	Probably part of articulated dog skeleton.	10	2		hc
060	136	dog	skull	1	r						fb	Fragment of occipital. Part of articulated dog skeleton.	10	2		hc
060	136	dog	skull	1	r							Fragment of zygomaticus. Part of articulated dog skeleton.	10	2		hc
060	136	dog	thor	8	b		f	f			fb	Part of articulated dog skeleton.	90	2		hc
060	136	dog	thor	4	b		f	f			fb	Centras. Part of articulated dog skeleton.	70			hc
060	136	dog	thor	5	b							Other thoracic vertebra fragments	30	2		hc
060	136	dog	vert	6							fb	Probably part of articulated dog skeleton.	10	2		hc
060	136	dog	cerv	5	b		f	f				Part of articulated dog skeleton.	90	1		hc
060	136	dog	cerv	3							fb	Fragments of at least one more cervical vertebra. Part of articulated dog skeleton.	30	2		hc
060	136	dog	lumb	7	b		f	f			fb	Part of articulated dog skeleton.	90	2		hc
060	136	dog	lumb	7	b		f	f			fb	Part of articulated dog skeleton.	90	2		hc
060	136	dog	caud	7	b		f	f				Part of articulated dog skeleton.	90	3		hc
060	136	dog	caud	1	b		f	f			fb	Part of articulated dog skeleton.	50	2		hc
060	136	dog	rib	20			f				fb	Proximal fragments of rib. Part of articulated dog skeleton.	30	2		hc
060	136	dog	rib	86							fb	Rib fragments other than proximal end. Part of articulated dog skeleton.	30	2		hc
060	136	dog	phal3	1			f					Part of articulated dog skeleton.	90	1		hc
060	136	unid	ui	479								Probably fragments of the bones of the articulated dog skeleton.		2		hc
060	136	lm	scap	2							fb		10	3		hc
060	136	unid	ui	10							fb			3		hc
060	136	mm1	rib	9								Caustal cartilage. Possibly part of articulated dog skeleton.		2		hc
060	136	dog	phal2	4			f	f				Part of articulated dog skeleton.	90	1		hc
060	136	dog	phal1	7			f	f				Part of articulated dog skeleton.	90	1		hc
060	136	dog	phal1	1			f				fb	Part of articulated dog skeleton.	50	1		hc
060	136	lm	rib	1										3		hc
060	136	lm	sac	1	b						fb	Broken in 2		3		hc
060	136	dog	calc	1	l		f	f				Part of articulated dog skeleton.	90	1		hc
060	136	dog	hum	1	r	1234	f	f				Part of articulated dog skeleton.		1		hc
060	136	dog	tib	1	r	123456	f	f			fb	Broken in 2. Part of articulated dog skeleton.		1		hc
060	136	dog	tib	1	l	123456	f	f			fb	Broken in 2. Part of articulated dog skeleton.		1		hc

Context	*Sample*	*Species*	*Element*	*NISP*	*Side*	*Gt50*	*Proxfus*	*Distfus*	*Age*	*Modifications*	*Admin*	*Notes*	*Percent*	*Texture*	*Burning*	*Recovery*
060	136	dog	fem	1	l	123456	f	f			fb	Broken in 2. Part of articulated dog skeleton. GL=147=GLC Bp=34.55 Dc=16.43 SD= Bd=28.19		1		hc
060	136	dog	fem	1	r	123456	f	f			fb	Broken in 3. Part of articulated dog skeleton. GL= not measurable Bp=Not measureable due to pathology		1		hc
060	136	dog	rad	1	r	1234	f	f			fb	Broken in 2. Part of articulated dog skeleton.		1		hc
060	136	dog	astr	1	r		f	f				Part of articulated dog skeleton.	90	1		hc
060	136	dog	ulna	1	l	4					fb	Broken in 2. Probably same as dog ulna zone 12. Part of articulated dog skeleton.		2		hc
060	136	dog	ulna	1	l	12	f				fb	Probably same as dog ulna zone 4 but could not be matched. Part of articulated dog skeleton.		1		hc
060	136	dog	pat	1								Part of articulated dog skeleton.	90	1		hc
060	136	dog	m/p	13		123	f	f			fb	Three m/p are broken in 2. Part of articulated dog skeleton.		1		hc
060	136	dog	carp/tars	3								Part of articulated dog skeleton.	90	1		hc
060	136	dog	carp	1	l							Cr + C1. Fused. Part of articulated dog skeleton.	90			hc
060	136	dog	carp	1	r							Cr+ C1. Fused. Part of articulated dog skeleton.		1		hc
060	136	dog	mand	1	l	123						Fused. Broken in 2 and canine loose. Part of articulated dog skeleton.		1		hc
060	136	dog	mand	1	r	123					fb	Fused. Part of articulated dog skeleton.		1		hc
060	136	dog	bac	1	b						fb	Broken in 4. Rather large. Part of articulated dog skeleton.	90	1		hc
060	136	dog	fib	1							fb	Fused. Part of articulated dog skeleton.	10	1		hc
060	136	dog	pel	2							fb	Fused. Part of articulated dog skeleton.	10	1		hc
060	136	unid	ui	33							fb	Possibly fragments of bones from the articulated dog skeleton.		2		hc
060	136	mm2	vert	4							fb	Probably fragments of vertebra from the articulated dog skeleton.	10	1		hc
060	136	dog	carp	1								Fused. Part of articulated dog skeleton.	90	1		hc
060	136	dog	ses	1								Fused. Part of articulated dog skeleton.	90	1		hc
060	009	unid	ui	7											cal	1
062	013	unid	ulna	2										2		1
062	013	sh/g	tib	1		A								4		1
067	137	horse	isoteeth	1								M1/2. Mandible.				hc
067	137	lm	lumb	1							fb		30	2		hc
067	137	horse	mand	2							fb		10	3		hc
067	137	sh/g	m/t	1	r	5678				c		Probably dog gnawing.		2		hc
067	137	lm	mand	1							fb		10	3		hc
067	137	sh/g	isoteeth	1								Pm. Maxilla.	90			hc
067	137	mm1	rib	2							fb			3		hc
067	137	unid	ui	88										3		hc
067	137	sh/g	fem	1	l	678					fb	Broken in 2.		2		hc
067	137	cow	fem	1	l	236					fb	Broken in 3.		2		hc
067	137	horse	mand	1	b	7					fb	Probably related to the horse incisors.		2		hc
067	137	horse	isoteeth	3							fb	Incisors. Probably from the horse mandible but could not				hc

Context	*Sample*	*Species*	*Element*	*NISP*	*Side*	*Gt50*	*Proxfus*	*Distfus*	*Age*	*Modifications*	*Admin*	*Notes*	*Percent*	*Texture*	*Burning*	*Recovery*
												be fitted.				
067	137	horse	isoteeth	2							fb	Canines. Probably maxillary, possibly male.	90			hc
067	137	sh/g	m/c	1									30	3		hc
067	137	lm	sha	1							fb			3		hc
067	137	mm1	vert	2							fb			2		hc
067	137	mm1	sha	1										3		hc
067	137	sh/g	pel	1	l	8					fb	Fused.		2		hc
067	137	unid	ui	1										3		hc
067	137	lm	ui	1							fb			3		hc
067	137	cow	mand	1	l	4								2		hc
071	037	unid	sha	1							fb	Broken in 3.		2		hc
071	037	cow	skull	1	b				a		fb	Frontal, horncores, temporal, occipital and zygomatic. Numerous skull fragments associated with it. Age class 4. Measurements: left horn core 45: 72.70 46: 44.36 BC: 19,4	50	1		hc
071	037	horse	isoteeth	1								M1/2. Maxilla.	90			hc
071	037	sheep	m/t	1	l	125678	f			c				2		hc
071	037	cow	isoteeth	2								Pm. Maxilla.				hc
071	037	lm	skull	24							fb	Probably part of cow skull.	10	2		hc
071	037	cow	skull	1	r						fb	Broken in 2, permanent molar loose. Deciduous m1 and m2 present. Probably same animal as maxillare fragment.	30	2		hc
071	037	cow	skull	1	r						fb	Maxillare. Probably part of cow maxilla with teeth.	10	1		hc
071	037	lm	isoteeth	1							fb	Tooth fragment. Probably cow.	10			hc
071	037	lm	sha	1							fb			3		hc
071	037	lm	ui	1							fb			2		hc
071	037	lm	thor	1							fb		30	2		hc
071	037	pig	isoteeth	1								Deciduous, incisor. Mandible.	90			hc
071	037	cow	ax	1	l		f				fb		30	2		hc
071	037	cow	pel	1	l	123456						Fused. Medial edge = 7.95.		2		hc
071	037	cow	pel	1	l	5								3		hc
071	037	unid	ui	140										3		hc
071	037	unid	ui	4							fb			2		hc
071	037	lm	mand	1							fb	Broken in 3.	10	2		hc
074	135	bird	w1	1			f	f					90	1		hc
074	135	crows	tarso	1		1		f			fb	Corvidae tarsometatarsus (e.g. Corvus corvix).	10	2		hc
074	135	bird	sha	2							fb			2		hc
074	135	sh/g	mand	1	l	1BCDE					fb	Broken in 16 and teeth loose.		2		hc
074	135	sh/g	isoteeth	1								M3. Mandible	90			hc
074	135	sh/g	isoteeth	1							fb	Molar, maxilla.	30			hc
074	135	sh/g	isoteeth	3							fb	Tooth fragments				hc
074	135	horse	isoteeth	1								Molar. Maxilla.				hc
074	135	cow	isoteeth	2								M1/2. Mandible.				hc
074	135	cow	isoteeth	1								Premolars. Mandible.				hc
074	135	cow	isoteeth	1							fb	Molar. Maxilla.	50			hc

Context	*Sample*	*Species*	*Element*	*NISP*	*Side*	*Gt50*	*Proxfus*	*Distfus*	*Age*	*Modifications*	*Admin*	*Notes*	*Percent*	*Texture*	*Burning*	*Recovery*
074	135	cow	isoteeth	1								Premolar. Maxilla.	90			hc
074	135	lm	rib	2										2		hc
074	135	cow	phal2	1		123	f	f						1		hc
074	135	sh/g	tib	1	l	5689A		f			fb	Broken in 2.		3		hc
074	135	cow	m/t	1	r	5678								3		hc
074	135	lm	skull	1								Pars petrosa. Possibly cow.	10	2		hc
074	135	pig	phal1	1		123	f	f				II/V		3		hc
074	135	pig	hum	1	r	78					fb	Broken in 2.		3		hc
074	135	sh/g	hum	1	l	789A					fb			2		hc
074	135	sheep	hum	1	r	345678		f			fb			2		hc
074	135	pig	astr	1	l	1234						Fused.		2		hc
074	135	cow	rad	1	r	349K		f						1		hc
074	135	cow	rad/uln	1	l	125E	f				fb			2		hc
074	135	cow	pel	1	r	126					fb	Fused. Broken in 3.		2		hc
074	135	pig	scap	1	l	123					fb	Fused.		3		hc
074	135	sheep	m/t	1	l	5678								3		hc
074	135	pig	pel	1	r	26			j		fb	Acetabulum unfused. Broken in 3.	30	2		hc
074	135	cow	isoteeth	2							fb	Molar fragments.	30			hc
074	135	unid	isoteeth	5							fb	Tooth fragments.	10			hc
074	135	pig	isoteeth	1							fb	Tooth fragment.	10			hc
074	135	unid	isoteeth	1							fb		10			hc
074	135	pig	isoteeth	1							fb	Incisor. Mandible. Broken in 2.	90			hc
074	135	pig	isoteeth	1								Deciduous incisor. Mandible.	90			hc
074	135	pig	isoteeth	1							fb	Canine.	10			hc
074	135	lm	rib	2							fb			2		hc
074	135	mm1	sha	8												hc
074	135	lm	sha	12										3		hc
074	135	unid	vert	2							fb		10	2		hc
074	135	lm	thor	1			f	f					50	3		hc
074	135	lm	lumb	1							fb		30	2		hc
074	135	lm	cerv	1							fb		10	2		hc
074	135	mm1	lumb	1			u	u			fb		50	2		hc
074	135	lm	thor	1			u	u			fb		30	3		hc
074	135	lm	rib	1										2		hc
074	135	unid	ui	224										3		hc
074	135	bird	ui	7							fb					hc
074	135	unid	skull	10							fb	Possibly fragments of sh/g mandible with teeth.				hc
074	135	unid	isoteeth	7							fb		10			hc
074	135	pig	isoteeth	2							fb		10			hc
074	135	unid	ui	4										3		hc
074	135	lm	sha	5										3		hc
074	135	cow	ulna	1	r	H								3		hc
074	135	sh/g	tib	1	l								10			hc

Context	*Sample*	*Species*	*Element*	*NISP*	*Side*	*Gt50*	*Proxfus*	*Distfus*	*Age*	*Modifications*	*Admin*	*Notes*	*Percent*	*Texture*	*Burning*	*Recovery*
074	135	pig	scap	1							fb	Broken in 2.	10	2		hc
074	135	lm	tib	1							fb		10	3		hc
074	135	unid	sha	1							fb	Broken in 2.		2		hc
074	135	mm1	sha	1										2		hc
074	135	mm1	sha	1										2		hc
074	135	lm	ui	1							fb			2		hc
074	135	cow	tib	1	l						fb			2		hc
074	135	lm	sha	1							fb	Broken in 2.		2		hc
074	135	lm	tib	1							fb		10	3		hc
074	135	cow	ulna	1	r	C					fb			2		hc
074	135	lm	lumb	1							fb		10	2		hc
074	135	unid	sha	4										3		hc
080	022	lm	thor	1									30			hc
080	022	sh/g	isoteeth	1								M3. Mandible.				hc
080	022	sh/g	isoteeth	1								M1/2. Mandible.				hc
080	022	sh/g	isoteeth	1								Pm. Mandible.				hc
080	022	mm1	skull	4					j		fb	Unfused. Probably fragments of juvenile pig skull.	10	2		hc
080	022	pig	skull	1	r				j		fb	Temporal. Unfused. Probably same as fragments of juvenile mm skull and uni skull fragments.	30	2		hc
080	022	unid	skull	10							fb	Probably same as fragments of juvenile lm skull and cow temporal skull fragment.		2		hc
080	022	unid	ui	6							fb			3		hc
080	022	unid	sha	1							fb	Broken in 2.		2		hc
080	022	sh/g	at	1			f	f			fb		30	2		hc
080	021	lm	sha	7							fb			3		hc
080	021	unid	ui	15							ci,r			3		hc
080	021	lm	thor	1							fb		30			hc
080	021	cow	tib	1	r	5		f			fb	Broken in 3.		4		hc
080	021	pig	scap	1	l	57					fb	Broken in 2.		4		hc
080	021	cow	rad	1	l	678			neo		fb	Broken in 2.		2		hc
080	021	lm	sha	1							fb	Broken in 3.		3		hc
080	021	lm	ui	2							fb			4		hc
080	021	lm	sha	1							fb			4		hc
080	021	lm	sha	1							fb	Broken in 2.		4		hc
090	034	lm	sha	1									10	2		1
090	034	unid	ui	5											cal	1
097	134	lm	sha	2							fb			2		hc
097	134	cow	m/t	1	l	125678	f	u			fb	Broken in 2.		2		hc
097	134	cow	phal1	1		23		f			fb		50	3		hc
097	134	lm	sha	1										2		hc
097	134	sh/g	isoteeth	2								M1/. Maxilla.	90			hc
097	134	mm1	rib	1							fb	Broken in 2.		3		hc
097	134	lm	rib	1							fb	Broken in 2.		3		hc
097	134	mm1	rib	2										3		hc

Context	*Sample*	*Species*	*Element*	*NISP*	*Side*	*Gt50*	*Proxfus*	*Distfus*	*Age*	*Modifications*	*Admin*	*Notes*	*Percent*	*Texture*	*Burning*	*Recovery*
097	134	sheep	m/c	1	r	1256	f							3		hc
097	134	sh/g	rad	1	r	5678					fb			2		hc
097	134	sh/g	m/c	1	l	5678					fb			2		hc
097	134	cow	rad	1	r	123456789K	f	f			fb	Broken in 2. GL = 256.5		2		hc
097	134	pig	mand	1	r	1B					fb	Broken in 2.		2		hc
097	134	pig	isoteeth	1								Deciduous incisor. Mandible.				hc
097	134	lm	sha	1							fb			2		hc
097	134	mm1	scap	3							fb			3		hc
097	134	unid	sha	1							fb			3		hc
097	134	cow	mand	1	r	4					fb			2		hc
097	134	lm	mand	1		6					fb		10	3		hc
097	134	cow	fem	1	l	78					fb			2		hc
097	134	lm	thor	1							fb			2		hc
097	134	lm	lumb	7			f	f			fb		50	3		hc
097	134	lm	vert	7							fb		30	3		hc
097	134	unid	ui	390										3		hc
097	134	mm1	sha	2										3		hc
097	134	lm	vert	2							fb			3		hc
097	134	cow	m/p	1				f					10	2		hc
097	134	pig	fem	1	l									3		hc
097	134	mm1	vert	1							fb		10	2		hc
097	134	unid	ui	2							fb			3		hc
097	134	mm1	rib	3							fb			2		hc
097	134	lm	at	2							fb			3		hc
097	134	mm1	rib	3							fb			2		hc
097	134	lm	at	2							fb			3		hc
097	134	lm	lumb	1							fb	Abnormally big foramena.	30	3		hc
099	036	unid	ui	23										3		1
099	036	mm1	scap	3							fb	Probably all from the same scapula but could not be fitted. Possibly sh/g.		3		1
099	036	sh/g	hum	1	r	78								3		1
099	036	lm	sha	1								Broken in 3.		3		1
099	036	lm	sha	1										3		1
099	036	unid	ui	1							fb			3		1
100	030	lm	tib	1							fb		10	4		1
100	030	unid	ui	2										4		1
100	030	cow	isoteeth	1								Pm. Mandible, very worn.				1
102	031	unid	ui	4										3		1
102	031	unid	ui	11											cal	1
102	031	unid	ui	16										3		1
102	031	unid	isoteeth	1									10			1
102	031	cow	isoteeth	1								m1/2 maxilla				1
102	031	mm1	sha	1										3		1
105	045	horse	tib	1	l	789					fb	Broken in 3.		2		hc
105	045	cow	m/c	1	l	5678				c		Probably juvenile.		2		hc
105	045	cow	isoteeth	1								M1/2. Maxilla.	90			hc

Context	*Sample*	*Species*	*Element*	*NISP*	*Side*	*Gt50*	*Proxfus*	*Distfus*	*Age*	*Modifications*	*Admin*	*Notes*	*Percent*	*Texture*	*Burning*	*Recovery*
105	045	cow	isoteeth	1								Deciduous. M1/2. Maxilla.	90			hc
105	045	cow	isoteeth	1								M1/2. Mandible.	70			hc
105	045	sheep	m/c	1	l	125678	f							2		hc
105	045	sh/g	tib	1	r	5689A		f			fb	Broken in 2.		1		hc
105	045	sh/g	tib	1	l	569A		f			fb			2		hc
105	045	mm1	rib	1							fb	Broken in 2.		3		hc
105	045	sh/g	isoteeth	3								Incisors. Mandible. Probably from sheep, mandibles.	90			hc
105	045	sheep	mand	1	b	1234567ACDE					fb	Both mandibles from same animal. Tooth wear done on left side.	90	1		hc
105	045	sh/g	skull	1	b						fb	Nearly complete shattered sheep skull with teeth, both permanent and deciduous, probably same animal as sheep manible pair. 15 teeth, 84 skull fragments.	70	2		hc
105	045	lm	sha	1							fb	Broken in 2.		2		hc
105	045	sh/g	hco	1							fb	Broken in 5.	50	3		hc
105	045	unid	ui	90										3		hc
105	045	mm1	thor	2							fb		10	2		hc
105	045	mm1	rib	1							fb			2		hc
105	045	lm	sha	1							fb			2		hc
105	045	mm1	sha	1							fb			2		hc
105	045	unid	ui	1										3		hc
105	045	unid	ui	1		1					fb			2		hc
105	045	sh/g	pel	1	r	5					fb			2		hc
105	045	sh/g	pel	1	r	38					fb	Fused. Proably same animal as other sh/g pelvis fragment.				hc
105	045	sh/g	pel	1	r	26					fb	Fused. Proably same animal as other sh/g pelvis fragment.		2		hc
105	045	mm1	pel	1									10	2		hc
105	045	unid	ui	1							fb			2		hc
107	012	cow	isoteeth	2							fb	M1/2. Mandible.	90			hc
107	012	cow	isoteeth	1							fb	M1/2. Maxilla.	90			hc
107	012	sh/g	isoteeth	1							fb	M1/2. Maxilla.	70			hc
107	012	sh/g	m/c	1									30	3		hc
107	012	mm1	rib	1							fb			3		hc
107	012	lm	sha	4										2		hc
107	012	sh/g	mand	1	r	45					fb	Broken in 2. Probably same as other sh/g man fragment but could not be fitted.		2		hc
107	012	sh/g	mand	1	r	3					fb	Broken in 3. Probably same as other sh/g man fragment but could not be fitted.		3		hc
107	012	unid	ui	13							fb			3		hc
107	012	pig	isoteeth	1								Incisors. Maxilla. No wear.	90			hc
107	012	mm1	cerv	1			u	u			fb		30	3		hc
107	012	sh/g	pel	1	l	1					fb	Fused.	10	3		hc
107	012	sh/g	fem	1	r	78		u						2		hc
117	052	mm1	sha	1											cal	1
117	052	unid	ui	9											cal	1

Context	*Sample*	*Species*	*Element*	*NISP*	*Side*	*Gt50*	*Proxfus*	*Distfus*	*Age*	*Modifications*	*Admin*	*Notes*	*Percent*	*Texture*	*Burning*	*Recovery*
117	052	unid	ui	1										2		1
117	051	unid	ui	35											cal	1
117	051	unid	ui	2											char	1
117	129	cow	m/t	1	r	12345678	f	u				Distal epihysis loose. Possibly from same juvenile cow right, hind leg as phalanxes and tcen.		1		hc
117	129	cow	phal2	1		123	fg	f				Possibly from same juvenile cow right, hind leg as m/t and tcen.		1		hc
117	129	cow	phal1	1		123	u	f				Possibly from same juvenile cow right, hind leg as m/t and tcen.		1		hc
117	129	cow	phal1	1		123	u	f				Possibly from same juvenile cow right, hind leg as m/t and tcen.		1		hc
117	129	cow	calc	1	l	235		f		c				2		hc
117	129	lm	lumb	1			u						70	3		hc
117	129	cow	isoteeth	1								M1/2. Mandible.	90			hc
117	129	cow	isoteeth	1								Pm. Maxilla.	90			hc
117	129	sh/g	isoteeth	1								M1/2. Mandible.	90			hc
117	129	pig	rad	1	l	125678	f				fb			2		hc
117	129	cow	scap	1	l	123		f			fb			2		hc
117	129	cow	hum	1	r	78					fb			2		hc
117	129	cow	isoteeth	1							fb	Deciduous M1/2. Maxilla.	70			hc
117	129	cow	astr	1	l	1234	f	f						2		hc
117	129	unid	ui	98										3		hc
117	129	mm1	rib	1										3		hc
117	129	lm	sha	1										3		hc
117	129	mm1	sha	17										3		hc
117	129	lm	rib	1										2		hc
117	129	cow	hum	1	l	B					fb	Broken in 5.		2		hc
117	129	lm	sha	2							fb			2		hc
117	129	lm	ui	1										3		hc
117	129	lm	skull	1							fb		10	3		hc
117	129	unid	skull	4							fb		10			hc
117	129	lm	mand	1		6								4		hc
117	129	unid	ui	3							fb			2		hc
117	129	cow	tcen	1	r		f	f				Articulates with cow T2+T3. Possibly from same juvenile cow right, hind leg as m/t and phalanxes with pathology.	90	1		hc
117	129	cow	tar	1	r		f	f				Articulates with cow tcen. Possibly from same juvenile cow right, hind leg as m/t and phalanxes with pathology.	90	1		hc
117	129	cow	pel	1	r	6					fb	Broken in 7.	10	2		hc
117	129	mm1	scap	1						c			10	1		hc
117	129	lm	skull	1									10	2		hc
117	129	unid	ui	1										1		hc
117	129	pig	m/t	1	l	13	f					Mt IV		2		hc
117	129	unid	isoteeth	1								Carnivoir canine. Possibly juvenile dog but could not be fitted with anything in reference collection.	90	1		hc
119	053	unid	ui	9										3		1

Context	*Sample*	*Species*	*Element*	*NISP*	*Side*	*Gt50*	*Proxfus*	*Distfus*	*Age*	*Modifications*	*Admin*	*Notes*	*Percent*	*Texture*	*Burning*	*Recovery*
119	053	unid	ui	1											cal	1
119	053	unid	ui	54											cal	1
119	053	unid	ui	1										3		1
119	053	unid	ui	1											char	1
119	054	mm1	thor	1									10		char	hc
121	040	lm	rib	1							fb			3		hc
121	040	mm1	rib	1							fb			3		hc
121	040	mm1	rib	1							fb	Broken in 2.		3		hc
121	040	unid	ui	5										3		hc
121	040	mm1	sha	1							fb	Broken in 2.		3		hc
121	040	sheep	hum	1	r	3456789AB		f						2		hc
121	040	sh/g	hum	1	l	789AB						Probably juvenile.		2		hc
121	040	sh/g	fem	1	l	678					fb	Broken in 2.		2		hc
121	040	cow	calc	1		2	u				fb		10	3		hc
121	040	dog	isoteeth	1	l							Incisor, left, maxilla.	90			hc
123	042	lm	cerv	1									10	3		hc
124	066	cow	at	1	b		f	f					90	1		hc
124	066	cow	phal2	1		123	f	f						3		hc
124	066	cow	ulna	1	r	CE					fb	Broken in 2.		3		hc
124	066	cow	rad	1	l	1256789K	f	u						1		hc
124	066	sh/g	m/t	1	l	5678				c				3		hc
124	066	sh/g	m/t	1							fb			2		hc
124	066	lm	tib	1		A					fb	Broken in 4.		2		hc
124	066	lm	rib	9							fb			2		hc
124	066	unid	rib	23							fb			2		hc
124	066	lm	ulna	1							fb	Broken in 2.		4		hc
124	066	horse	tib	1	r						fb		30	2		hc
124	066	cow	skull	1	b						fb	Horncore, frontal, occipital, parietal, some temporal. 5mm hole on right side of frontal, betweem eyes, possible butchery? A large number of various skull fragments belonging to one of the four skulls were also found. Measurements: Left horncore 45 = 41.55, 46 = 32.99 BC = 11.5 Right horncore 45 = 39.82, 46 = 32.00, BC = 12. Size of left and right horncore uneven, the right one is more gracile and shorter. Age category 5.	50	1		hc
124	066	cow	skull	1	b						fb	Horncores, frontal, occipital, parietal, part of temporal. A large number of various skull fragments belonging to one of the four skulls were also found.	50	1		hc
124	066	cow	skull	1	b				j		fb	Frontal. Sutures not fused, broken in 2. A large number of various skull fragments belonging to one of the four skulls were also found.	30	1		hc
124	066	sh/g	isoteeth	1								Pm. Maxilla	90			hc
124	066	mm1	sha	1							fb			2		hc
124	066	cow	skull	1	r						fb	Fragment of frontal, overlaps the other three skulls. A large number of various skull fragments belonging to one of the four skulls were also found. Measurements: Left	10	1		hc

Context	*Sample*	*Species*	*Element*	*NISP*	*Side*	*Gt50*	*Proxfus*	*Distfus*	*Age*	*Modifications*	*Admin*	*Notes*	*Percent*	*Texture*	*Burning*	*Recovery*
												horncore 45 = 49.47, 46 = 45.40, BC = 16.3. Age class 4.				
128	070	unid	ui	12											cal	1
128	070	unid	isoteeth	1									10			1
128	070	mouse	tib	1	l		u				fb	Possibly all one individual. Possible intrusion.	70	1		1
128	070	mouse	tib	1	r						ci,r	Possibly all one individual. Possible intrusion.	50	1		1
128	070	mouse	fem	1				u				Unfused distal epiphesis. Possibly all one individual. Possible intrusion.	10	1		1
128	070	mouse	tib	1				f			fb	Possibly all one individual. Possible intrusion.	50	1		1
128	070	mouse	scap	1							fb	Fused. Possibly all one individual. Possible intrusion.	30	1		1
128	070	mouse	m/p	1			f	f				Possibly all one individual. Possible intrusion.	90	1		1
128	070	mouse	m/p	1							fb	Broken in 2. Possibly all one individual. Possible intrusion.	90			1
140	062	mm1	rib	1										3		1
140	062	mm1	rib	1							fb			2		1
140	062	mm1	sha	1										2		1
140	062	unid	ui	4										3		1
142	074	unid	ui	10											cal	1
142	074	mm1	sha	1										3		1
142	074	unid	skull	2										3		1
142	074	unid	ui	8										3		1
142	074	sh/g	rad	1	l	67				c		Probably dog gnawing.		3		1
146	050	mm1	sha	1										3		hc
166	078	unid	ui	2											cal	1
166	077	cow	m/t	1	r	125678	f							2		hc
182	138	cow	mand	1	l	5								3		hc
182	138	cow	isoteeth	1								m1/2 Maxilla				hc
182	138	cow	isoteeth	1								M3, mandible				hc
182	138	horse	isoteeth	2								Molars, mandible.				hc
182	138	unid	ui	27										3		hc
182	138	lm	rib	1										3		hc
182	138	mm1	sha	1										3		hc
182	138	unid	rib	1										3		hc
182	138	mm1	rib	1								Broken in 3.		3		hc
182	138	mm1	rib	3										3		hc
182	138	cow	isoteeth	1								Incisor. Mandible.				hc
182	138	lm	scap	1	l								10	2		hc
182	138	mouse	hum	1			u						90	1		hc
184	081	unid	ui	2											cal	1
184	081	lm	sha	1											char	1
184	081	unid	ui	21										3		1
184	081	unid	isoteeth	6												1
184	081	unid	skull	2										3		1
184	081	cow	mand	1	r	4					fb			3		1
184	081	cow	mand	1							fb	Broken in 2.	10			1

Context	*Sample*	*Species*	*Element*	*NISP*	*Side*	*Gt50*	*Proxfus*	*Distfus*	*Age*	*Modifications*	*Admin*	*Notes*	*Percent*	*Texture*	*Burning*	*Recovery*
184	081	cow	isoteeth	2								Incisors mandible				1
184	081	cow	isoteeth	1								Pm. Mandible				1
184	081	cow	isoteeth	1							fb	Pm. Mandible. Broken in .				1
184	081	cow	isoteeth	1							fb	Fragment, mostly root.	50			1
184	081	cow	skull	1	l				j		fb	Temporal fragment.	10	3		1
184	081	unid	ui	1							fb			3		1
188	084	cow	isoteeth	1								Incisor. Mandible.				hc
188	084	lm	sha	1							fb			3		hc
188	084	sheep	pel	1	r	123468						Fused. Vretemark. Medial edge 4,4.		2		hc
188	084	unid	ui	5										3		hc
188	084	pig	mand	1							fb		10	2		hc
188	084	lm	hum	1									30	3		hc
188	084	sh/g	m/p	1		56					fb			3		hc
188	084	cow	tib	1	r	8								4		hc
188	084	sh/g	m/c	1	l	5								3		hc
188	084	unid	skull	1							fb	Broken in 2.	10	3		hc
191	102	cow	isoteeth	2								m1/2 Maxilla.				hc
192	115	unid	ui	3											char	1
192	115	unid	ui	1											cal	1
192	115	unid	ui	2											char	1
198	091	cow	mand	1							fb		10	3		1
198	091	mm1	sha	1										2		1
198	091	unid	ui	17												1
198	091	unid	ui	1								Broken in 2.		4		1
224	100	unid	ui	8											cal	1
224	100	unid	ui	6											char	1
224	100	unid	isoteeth	1							fb	Root.			char	1
224	100	unid	skull	1								Pars petrosa	10		cal	1
224	100	cow	isoteeth	2								Pm. Mandible.				1
224	100	cow	mand	1							fb		10	3		1
224	100	lm	skull	6							fb		10			1
224	100	unid	skull	2							fb		10	3		1
224	100	lm	sha	4							fb			3		1
224	100	unid	ui	266										3		1
224	100	unid	skull	7										3		1
224	100	lm	skull	2							fb			3		1
224	100	unid	ui	2											cal	1
224	100	unid	isoteeth	1							fb		10			1
224	100	pig	tib	1	r	789					fb	Broken in 2.		3		1
224	100	cow	skull	1	l						fb		10	3		1
224	100	unid	skull	1										3		1
224	100	unid	sha	1										3		1
224	100	mm1	carp	1	l							Cr. Fused.	90	3		1

Context	*Sample*	*Species*	*Element*	*NISP*	*Side*	*Gt50*	*Proxfus*	*Distfus*	*Age*	*Modifications*	*Admin*	*Notes*	*Percent*	*Texture*	*Burning*	*Recovery*
224	100	lm	thor	1										3		1
253	117	unid	ui	1							fb	Broken in 2			cal	1
253	117	unid	ui	2											char	1
253	117	unid	ui	2											cal	1

Table 40 – Complete list of animal bones from Mullamast (E2972)

Key to complete list of animal bones:

Species
canid = canid family
cow = cattle
lm = large mammal
mm1 = medium mammal (sheep, goat, pig)
mm2 = medium mammal (carnivore)
sh/g = sheep/goat
unid = unidentified

Elements
Mammals:
astr = astragalus
at = atlas
ax = axis
bac = baculum
calc = calcaneum
carp = carpal
carp / tars = carpals/tarsals
caud = caudal vertebrae
cerv = cervical vertebrae
fem = femur
fib = fibula
hco = horncore
hum = humerus
isoteeth = isolated teeth
lumb = lumbar vertebrae
mand = mandible
m/c = metacarpal
m/p = metapodial
m/t = metatarsal
pat = patella
pel = pelvis
phal1 = phalanx 1
phal2= phalanx 2
phal3 = phalanx 3
rad = radius
rad/uln = radioulna
sac = sacrum
scap = scapula
ses = sesamoid
sha = shaft
tar = tarsal
tcen = central tarsal
thor = thoracic vertebrae
tib = tibia
ui = unidentified mammal
vert = vertebra

Bird:
sha = shaft
tarso = tarsometatarsus
ui = unidentifed bird
w1 = wing digit i

Side
r = right
l = left
b = both

GT50
For mammal and bird diagnostic zones, the York System (Harland et al. 2003) follows the Environmental Archaeology Unit's (EAU) recording protocol (Dobney, Jaques and Johnstone 1999) with minor re-coding.

Fusing proximal and distal
f = fused
u = unfused
fs = fusing

Age
neo = neonatal
j = juvenile

Modification
c = carnivore gnawing

Admin
fb = fresh brekage

Texture
1 = excellent
2 = good
3 = fair
4 = poor

Burning
cal = calcified
char = charred

Recovery
hc = hand-picked
1 = sieved with 1 mm sieve

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Appendix 10: The osteological remains from Mullamast, Co. Kildare (E2972)
By: Carmelita Troy MA

Summary

This document is submitted as a report of the post-excavation treatment and analysis of human remains retrieved from Mullamast, Co. Kildare E2972. The resolution of the site revealed prehistoric pits, a crouched inhumation burial, a possible bowl furnace, burnt pits, medieval cereal-drying kilns, animal bone refuse pits, a number of curvilinear features and gullies, a series of linear agricultural furrows and post-medieval field systems all within the excavation area (O'Connell and Hackett 2009).

The Late Bronze/Iron Age human remains at Mullamast E2972 was an isolated west/east crouched inhumation, identified within a simple shallow grave. The burial represents an older middle adult male, estimated to be 35 to 45 years at death. Over 75% of the expected remains were present, and they were in good condition. Levels of oral hygiene were shown to be fair. Signs of degenerative joint disease throughout the vertebrae that were present for analysis indicate that this individual probably led an active life. Early stage osteoarthritis in the left clavicle may indicate a preference for working of the left hand. This combination of pathological indicators may suggest that this individual was involved in heavy lifting in his occupation. Finally there is also evidence of a cholesterol gallstone.

Introduction

This document is submitted as a report on the osteological analysis of human remains recovered during archaeological excavations at Mullamast E2972, Co. Kildare. A single west/east orientated crouched inhumation was identified in a shallow grave during excavations. Approximately 75% of the inhumation was present, in good condition. No diagnostic dating evidence was found in direct association with this burial.

Methodology

The articulated burial was assessed using a range of morphological and metrical analyses, according to internationally agreed standards.

- A visual and written inventory was created for all surviving bone (Brickley 2004). Preservation levels were recorded following McKinley (2004).
- The dentition was recorded using Buikstra and Ubelaker (1994) to record presence/absence, attrition and dental pathology. Methods devised by Swärdstedt (1966) were used for estimating chronological age at Dental Enamel Hypoplasia on anterior teeth.
- Cranial and post-cranial metrics were taken at a standard 36 landmarks, (where possible), as described by Buikstra and Ubelaker (1994); post-cranial metrics were also employed in the assessment of sex and stature (Trotter and Gleiser 1952, 1958).
- Sex was assessed using diagnostic criteria of the cranium and pelvis (Buikstra and Ubelaker 1994).
- Age at death was assessed using morphological changes in the pelvis (Lovejoy *et al*. 1985) and dental attrition (Brothwell 1981; Miles 1962).
- Cranial and post-cranial non-metric traits as described by Berry and Berry (1967), and Finnegan (1978) were recorded.

- Pathology was recorded using guidelines set down by Roberts and Connell (2004). Assessments of joint disease followed Rogers *et al*. (1987).

Results

There was one inhumation recovered from Mullamast E2972 (Table 1).

Skeleton No.	Context No.	Grave Fill	Grave Cut
1	278	273	272

Table 1 – Contextual information for inhumation

Retent bone
Human bone was retrieved from an animal bone and a soil sample during the post-excavation stage of processing (Table 2). The human bone corresponds to Skeleton 1 and was incorporated into the analysis of the inhumation.

Context No.	Sample No.	Description
001	015	Animal bone sample from topsoil
224	100	Fill of pit (223)

Table 2 – Retent bone

Skeleton 1
Age range: 35 – 45 years at death
Age category: Older middle adult
Sex: Male
Stature: 166.68 cm (5′5″)
Completeness: >75%
Preservation: Good

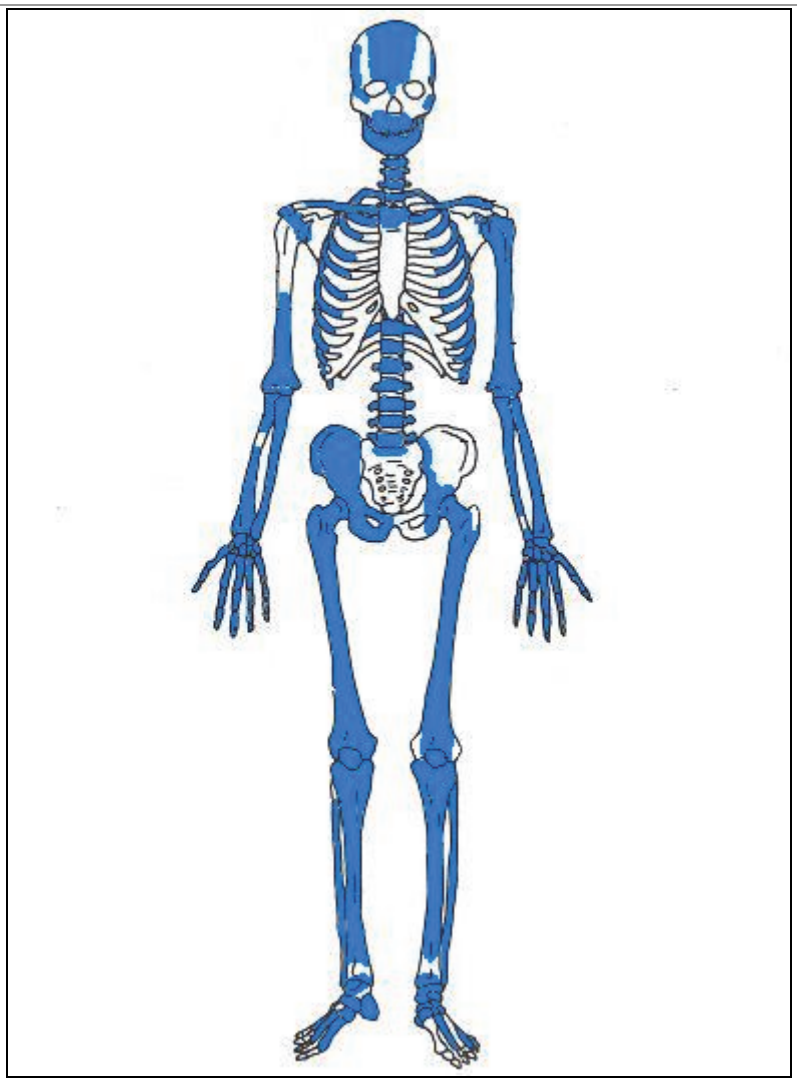

Figure 1 – Elements present in Skeleton 1

Dental inventory:

P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P

P – tooth present
21 socket absent
AM – tooth lost ante-mortem
PM – tooth lost post-mortem

Dental pathology: Severe calculus on 18, 28, 41, 42, 48, moderate on 16, 17, 24-27, 31-35, 37, 38, and slight on 11-15, 21-23, 36, 44, 45, 47; Severe periodontal disease at 17, 18, 26-28, 36, 41, 42, moderate at 11, 13, 16, 24, 25, 35, 37, 47, slight at 12, 14, 21, 23, 38, 44-46.

Skeletal pathology: Degenerative joint disease (osteophytic lipping and porosity) of cervical (C2 – C7), thoracic (T3, T5-T12) and lumbar (L1-L5) and sacrum (S1); Schmorl's nodes evident on T3, T5-T12 and L1-L4. Severe porosity on the left lateral aspect of the clavicle. Non-specific periostitis near the sternal end of a left rib. Porotic hyperstosis on the left and right parietals and the occipital. One cholesterol gallstone.

Non-Metric Traits: Ossicles in lambdoid, vastus notch on the left patella, left medial and bilateral lateral tibial squatting facets

Metrics: *Right* – Femoral head diameter 46.23 mm

Left – Glenoid cavity width 26.74 mm; Humeral head diameter 45.04 mm; radial head diameter 24.30 mm (indicating male); Femoral head diameter 46.23 mm.

Demographic data
Sex: Sex was estimated using sexually dimorphic features of the pelvis and cranium, as well as metrical analysis. Results showed the individual to be male, with well-developed muscle attachments throughout the body.

Age: Age was established from the pubic symphysis and auricular surface of the pelvis which provided an estimate of 35 to 45 years. This places Skeleton 1 in the older middle adult age category.

Stature
Stature was calculated using femoral length, which suggested a living height of 166.7 cm (5'5"). Attainted living stature is the combination of genetics and nutrition. Without sufficient nutrition, it is not possible for an individual to achieve full genetic potential, which will limit their stature. Skeleton 1 appears to be relatively shorter than the average stature for males from Early Bronze Age cemeteries.

Site	**Male Mean (cm)**
Graney West, Co. Kildare	170
Ploopluck, Co. Kildare	171
Keenoge, Co. Meath	168.5
Edmondstown, Co. Dublin	182
Straid, Co. Derry	179
Hempstown Commons, Co. Kildare	168
Sliguff, Co. Carlow	180
Moone, Co. Kildare E2980	*186.5*
Mullamast, Co. Kildare E2972	*166.7*
Total Average	**174.6**

Table 3 – Male stature in Early Bronze Age Ireland

Dental analysis
Calculus: If plaque is not removed from the tooth surface, it can mineralize into calculus (tartar), either sub- or supra-gingival. Sub-gingival calculus is associated with the development of periodontal disease. Calculus is considered to be extremely common in almost all archaeological populations (Roberts and Manchester 1997).

All of the teeth were affected to some degree with calculus. Five of the teeth were severely affected. The location of calculus within the dental arcade is also of interest. It is often noted in archaeological populations that the anterior teeth show lower levels of calculus, indicating that individual attempted some form of dental cleaning for the teeth which would be most visible. Calculus is also higher in the upper posterior regions, near the saliva glands which play a part in its formation. Skeleton 1 displayed severe incidences of calculus in the third molars and the lower incisors. These results would suggest that this individual did not take much care in his oral hygiene.

Periodontal disease: Periodontal disease is connected to poor oral hygiene, where a build up of plaque and subsequently calculus causes inflammation of the gums leading to gingivitis and gradual recession of the alveolar bone. Eventually this condition leads to tooth loss. Contributing factors are a soft, carbohydrate diet, dental anomalies such as crowding and malocclusion, and nutritional deficiencies such as scurvy which cause general problems with epithelial tissues (Hillson 1986). There were severe levels of periodontal disease in the upper teeth (Plate 1) and there was a true prevalence rate of 96% (24 out of 25) affected.

Plate 1 – Severe alveolar resorption of maxillary bone of Skeleton 1 due to periodontal disease

Pathological conditions

Joint disease: Joint disease (often referred to as degenerative joint disease, 'DJD', or arthropathies) is one of the most commonly observed pathological processes on the human skeleton. The onset of the disease tends to be age related, as it appears to primarily occur as a result of repeated 'wear and tear' on the joints with degeneration of the articular cartilage (Ortner and Putschar 1981). The disease can be accelerated by occupational activities and may also be brought on by trauma. The evidence of joint degeneration is manifested in the form of porosity or pitting of the joint surface and/or additional bone growths known as osteophytes. In more advanced cases, eburnation or polishing of the bone can occur as the bones of the joint rub off each other. The presence of eburnation is pathogonomic of osteoarthritis (Rogers and Waldron 1995).

Very little evidence for activity-related change was found in the main joints of the skeleton, except for severe porosity of the left acromial end of the clavicle. Also the hypertrophic development of the deltoid muscle on the left arm may suggest that this individual was left-handed, or was using his left more often than his right for strenuous activity. Contributing activities include lifting of heavy rocks and other items and throwing objects over one shoulder (Capasso *et al*. 1999, 57).

Spinal joint disease: Skeleton 1 shows signs of degenerative joint change in the majority of the observable vertebrae (Table 4). There is evidence of moderate to severe osteophytic lipping and porosity on the inferior and superior centra (bodies). It is difficult to attribute a cause for this degeneration however it seems that there was no underlying pathological process; rather this abnormality was a result of activity and ageing.

Vertebrae	No. Present	No. Affected	Prevalence %
Cervical	7	6	86
Thoracic	12	9	75
Lumbar	5	5	100
Sacrum	1	1	100
Totals	**25**	**21**	**84**

Table 4 – Prevalence rates of spinal joint disease in Skeleton 1

Degeneration of the cervical vertebrae is probably due to the strenuous work that the male was active in which involved the neck and shoulders. However, Wells (1982) found among the Romano-British at Cirencester that females frequently displayed affected cervical vertebrae and suggested that the women there may have been in the habit of carrying loads on their heads. However, having the majority of the vertebral column affected indicates that this male was probably quite active in manual labour throughout his lifetime.

Disease of the viscera - Gallstones (Cholelithiasis): The gallbladder stores bile created by the liver and helps in digestion. Bile contains water, cholesterol, salts, fats, proteins and such and works to break down fat in the intestine as digestion occurs. When food is ingested the gallbladder contracts, and releases bile through the cystic duct and into the common bile duct (Figure 4). This duct then carries bile to the small intestine, where it begins to break down the fat in the food. If bile within the gallbladder becomes chemically unbalanced, it can form into particles that eventually grow into stones.

Gallstones fall into two categories, cholesterol or pigment (bilirubin) stones. Cholesterol stones are often yellow in colour and are composed mainly of undissolved cholesterol. About 80% of modern day incidences are cholesterol stones. Pigment gallstones are small dark brown or black stones and form when the bile contains too much bilirubin. It is not always clear what causes them. They tend to form in people with conditions – such as cirrhosis, biliary tract infection and sickle cell anaemia – that result in excess bilirubin forming.

Many factors, some of which are not fully understood, contribute to the formation of gallstones and too much cholesterol is among them. Normally the bile contains enough bile salts and lecithin – a fatty compound – to dissolve the cholesterol excreted by the liver, but if the contains more cholesterol than can be dissolved, the cholesterol may form into crystals and eventually into stones. Incomplete or infrequent gallbladder emptying is another contributor to gallstones. Bile may become too concentrated and contribute to the formation of gallstones. Eating too little fat or going long periods without eating can decrease gallbladder contractions. Fewer contractions can keep the gallbladder from emptying completely or infrequently (MFMER 1998-2007).

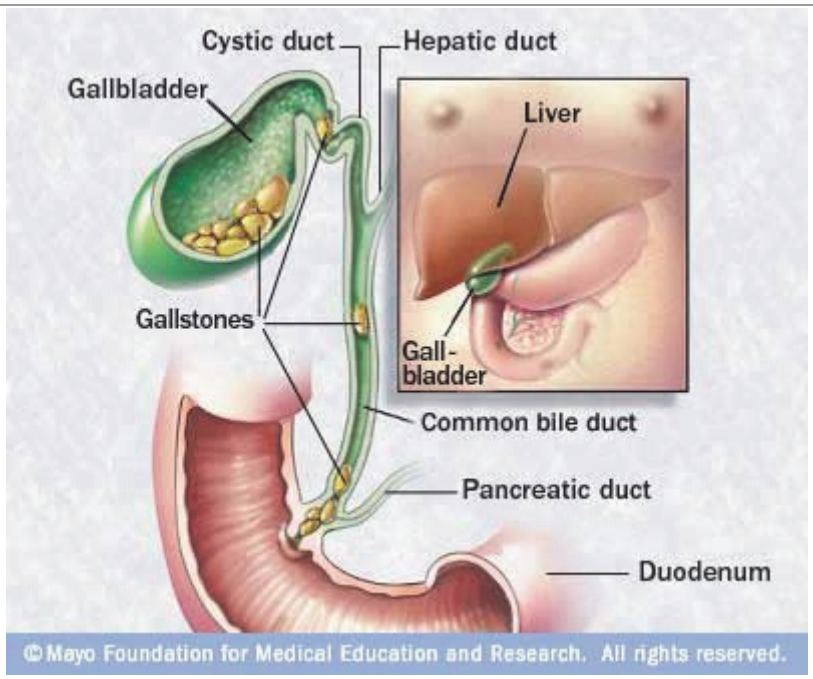

Figure 2 – Detailed image of the digestive system and gallstone formation (MFMER 2007)

The majority of gallstones within the gallbladder are silent, producing no symptoms. Although, if there are complications or if left untreated there are a number of adverse effects. If a stone blocks the cystic duct, bacteria may reach the gallbladder and initiate a violent, acute infection, turning the gallbladder into a puss-filled bag (empyema) that may perforate, initiating a lethal acute periotonitis. Alternatively, erosion of the gallbladder mucosa by stones may generate chronic inflammation (cholecystitis) that may be symptomatic intermittently. If an unexpelled calculus in the common bile duct continues to expand by further crystal deposition and eventually moves to block the main flow of bile, the bile pressure rises and a hepatic duct ruptures. The spilled bile is absorbed by the blood where the increase in reabsorbed bilirubin pigment imparts a yellowish-orange colour to all tissues including the skin (jaundice). Intestinal bacteria commonly also make their way into the common bile duct causing acute ascending cholangitis (Aufderheide and Rodríguez-Martín 1998, 272).

Skeleton 1 had one light brown coloured gallstone (Plate 2) (measuring 12.94 mm maximum diameter) and based on the information described above, it indicates that it is a cholesterol gallstone and due to him being in the older middle adult category it probably developed over his lifetime. Even though there was only one stone recovered it is quite possibly that there had been more. There was no skeletal evidence of any complications with the gallstones but as some would have been acute episodes they would not have had an opportunity to mark the bone. It is highly unlikely that the gallstones had any part in the cause of death of Skeleton 1 from Mullamast.

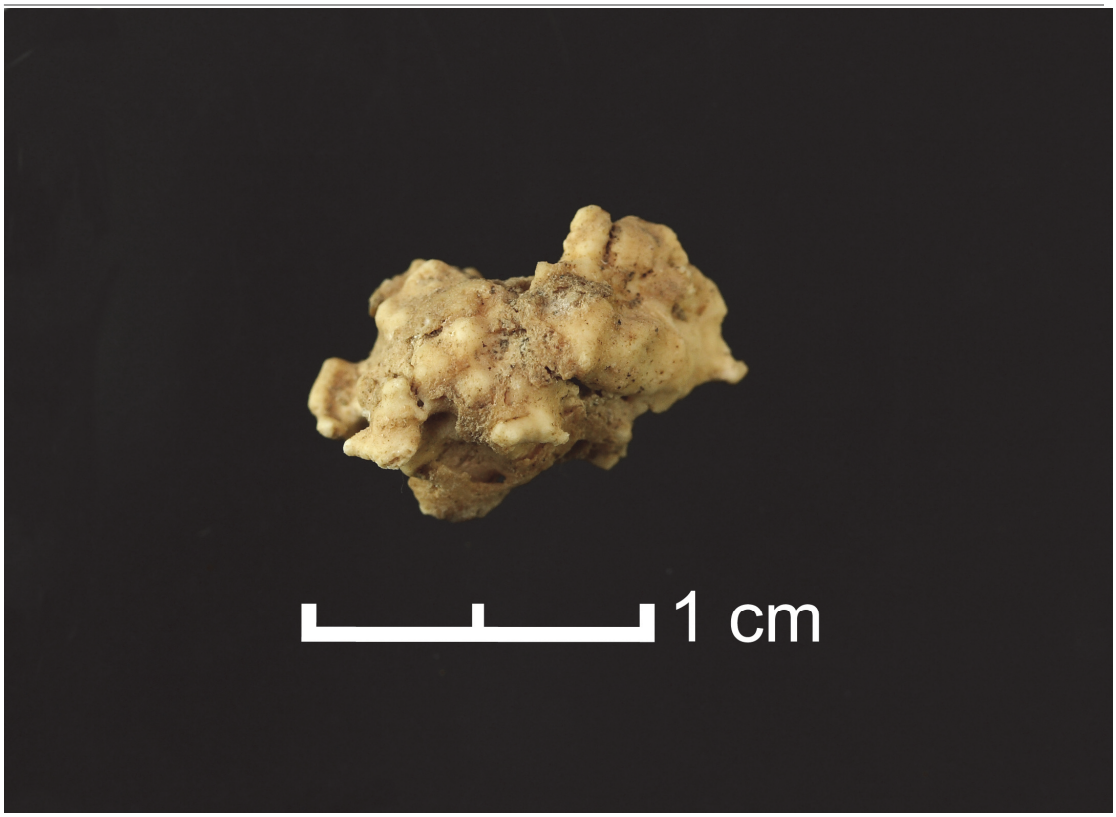

Plate 2 – Gallstone recovered from Skeleton 1

Infectious disease: There was no evidence in the assemblage for specific infectious diseases such as tuberculosis, leprosy or syphilis. There was only one incident of non-specific infection. This is presented in detail below.

Periostitis was noted on the visceral (interior) sternal end of two left ribs (Plate 3). The ribs presented pale grey deposits of bone and the location is generally suggestive of some type of pulmonary infection but probably not pulmonary tuberculosis as this mainly affects the vertebral end of the ribs (Santos and Roberts 2006, 47).

Plate 3 – Periostitis evident on left ribs (indicated by the red arrows) of Skeleton 1

Non-metric traits

Non-metric, or discontinuous, traits are classed as non-pathological variants in bone morphology, such as the presence of an extra foramen on the anterior mandible, ossicles within cranial sutures or the presence of a third trochanter on the femur. There is some argument in the literature as to the cause and significance of these traits, and several studies have used them as a marker of biodistance between populations and within samples (Bondioli *et al*. 1986, Ossenberg 1976).

Skeleton 1 displayed bilateral lateral and left medial tibial squatting facet, left vastus notch of the patellae and ossicles in lambdoid of the cranium. Unfortunately, as this skeleton is an isolated burial, no useful inferences can be made from the appearance of these traits.

Dating

A sample of human bone, weighing 1 g, was radiocarbon dated by Scottish Universities Environmental Research Centre, Glasgow, Scotland. The radiocarbon results (Table 5) indicates that the inhumation burial (Skeleton 1) dates from the Late Bronze Age/Iron Age.

Lab Code	Sample ID	Material	δ13C	Radiocarbon age BP	Calibrated Age Ranges (95.4%)	Relative probability
SUERC-24971	c.278 Skeleton 1	Human bone	-21.3	2455 +/- 30	760-680 cal. BC 670-410 cal. BC	25.8% 69.6%

Table 5 – Radiocarbon dating results

Discussion

Skeleton 1 from Mullamast was interred within a simple shallow grave, in a crouched position, orientated west/east (Plate 4). Although no grave goods were found with the burial, its crouched position is common of prehistoric burials. Radiocarbon dates places this skeleton into the Late Bronze age or the early part of the Iron Age. Two other isolated crouched inhumations were located at Site E2873 in Ballymount, Co. Kildare (McCarthy 2009) and at Site 08E0100 Mullamast, Co. Kildare

(Hackett 2009), both dating from the Early Bronze Age (SUERC-24992, 1940-1750 cal. BC (2σ) and UBA-12023, 1878-1688 cal BC (2σ) respectively) and located in deep pit burials. A Late Bronze Age (1260-1020 BC) crouched inhumation burial was recovered from Leshemstown, Co. Meath 05E0398 (McGowan 2005). The burial record for the Late Bronze Age is fairly sparse and indicates that it is not an area where social differences can easily be interpreted (Cooney and Grogan 1999, 144). It both continues the trends of the Middle Bronze Age and forms the background to the burial tradition of the Iron Age. The known formal burials of the Late Bronze Age are predominantly cremations, often representing only token burial deposits.

Many elements similar to those in the latter part of the Bronze Age occur in the burials of the Iron Age. These include ring-ditches; the dominance of cremation and the presence of token burials occasionally in peripheral contexts (Cooney and Grogan 1999, 199), and the frequent reuse of individual sites. Few formal burial sites are known from this transitional phase and it has been suggested that burial ritual took on a less formal tradition. There were three crouched and two indeterminate Iron Age infant burials located at Site E2982 in Moone, Co. Kildare (Dennehy 2009) which were radiocarbon dated to 200 cal. BC – cal. AD 120 (2σ) (SUERC-24995, 25241-3, 25245).

During the Bronze Age, there is an increasing tendency towards single burial, a trend that began in the later Neolithic.

Plate 4 – West facing photo of Skeleton 1 *in situ*

Conclusion

Skeleton 1 represents an older adult male, estimated to be 35 to 45 years at death, interred within a shallow grave in a crouched position. Approximately 75% of the expected remains were present they were in moderate condition. Levels of oral hygiene were shown to be relatively fair, with 100% of teeth present showing signs of calculus deposition. However, periodontal disease evident in the upper and lower dental arcades shows that this individual suffered from gum disease. He also had a high rate of attrition on his teeth.

Signs of degenerative joint disease throughout the vertebrae indicate that this individual probably led an active life, and early stage osteoarthritis in the left clavicle may indicate a preference for working with the left arm. This combination of pathological indicators may suggest that this individual was involved in heavy lifting in his occupation.

The presence of a cholesterol gallstone suggests that this individual had an excess amount of fat in his diet. Finally, the evidence of periostitis on a rib indicates that this man suffered from some type of pulmonary infection.

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Radiocarbon dates

Lab Code	Skeleton ID	Material	δ13C	Radiocarbon Age BP	Calibrated Age Ranges (1δ)	Relative probability	Calibrated Age Ranges (2δ)	Relative probability	Period
SUERC-24971	c.278 SK 1	Human bone	-21.3	2455 ± 30	750-680 cal. BC 670-640 cal. BC 590-570 cal. BC 560-480 cal. BC 470-410 cal. BC	23.4% 7.9% 2.8% 23.7% 10.5%	760-680 cal. BC 670-410 cal. BC	25.8% 69.6%	Late Bronze Age/Iron Age

Appendix 11 - Radiocarbon Dates and Certificates

E-Number	Lab code	Sample ID	Material	δ13C	Radiocarbon age BP	Calibrated Age Ranges (1 σ)	Relative probability	Calibrated Age Ranges (2 σ)	Relative probability
E2972	SUERC-25851	sample #062, context 140	alder charcoal	-25.7	1420 +/- 50	cal AD 590 - 660	68.2	cal AD 540 - 680	95.4
E2972	SUERC-25850	sample #047, context 110	hazel charcoal	-26.4	1560 +/- 50	cal AD 430 - 550	68.2	cal AD 400 - 610	95.4
E2972	SUERC - 24971	SK 1, context 278	human bone	-21.3	2455 +/- 30	750 – 680 cal BC	23.4	760 – 680 cal BC	25.8
						670 – 640 cal BC	7.9		
						590 – 570 cal BC	2.8	670 – 410 cal BC	69.6
						590 – 570 cal BC	23.7		
						470 – 410 cal BC	10.5		
E2972	SUERC - 25480	sample #117, context 253	charred emmer grain	-22.3	2065 +/- 50	170 – 20 cal BC	65.7	210 cal BC – cal AD 60	95.4
						10 cal BC – cal AD 0	2.5		
E2972	SUERC - 25479	sample #115, context 192	charred emmer grain	-23.4	1380 +/- 50	cal AD 605 - 680	68.2	cal AD 560 - 720	89.4
								cal AD 740 – 770	6.0
E2972	SUERC - 25478	sample #002 context 017	charred grain: emmer	-24.4	1895 +/- 50	cal AD 50 - 170	61.8	cal AD 0-240	95.4

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RADIOCARBON DATING CERTIFICATE

20 October 2009

Laboratory Code	SUERC-25851 (GU-19519)
Submitter	Karen Stewart Headland Archaeology (Ireland) Ltd. Unit 1 Wallingstown Business Park Little Island Co. Cork, Ireland.
Site Reference	KCK07 E2972 (sample KCK06.C6)
Context Reference	140
Sample Reference	62
Material	charcoal : alder
$\delta^{13}C$ relative to VPDB	-25.7 ‰
Radiocarbon Age BP	1420 ± 50

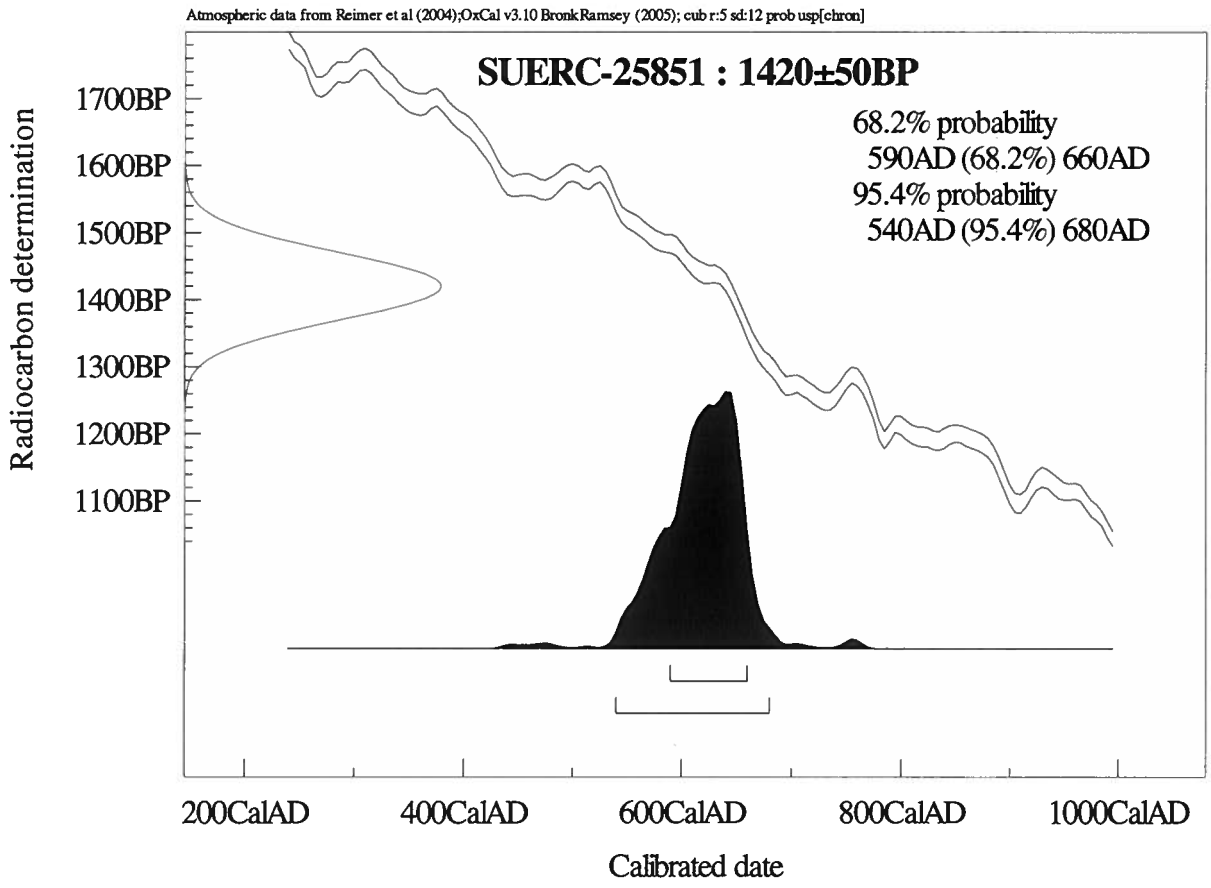
N.B.

1. 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.
2. The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal3).
3. 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 g.cook@suerc.gla.ac.uk or Telephone 01355 270136 direct line.

Conventional age and calibration age ranges calculated by :- R. Anderson Date :- 20-10-09

Checked and signed off by :- E. Dunbar Date :- 20/10/09

Calibration Plot



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RADIOCARBON DATING CERTIFICATE

20 October 2009

Laboratory Code	SUERC-25850 (GU-19518)
Submitter	Karen Stewart Headland Archaeology (Ireland) Ltd. Unit 1 Wallingstown Business Park Little Island Co. Cork, Ireland.
Site Reference	KCK06 E2972
Context Reference	110
Sample Reference	47
Material	charcoal : hazel
$\delta^{13}C$ relative to VPDB	-26.4 ‰
Radiocarbon Age BP	1560 ± 50

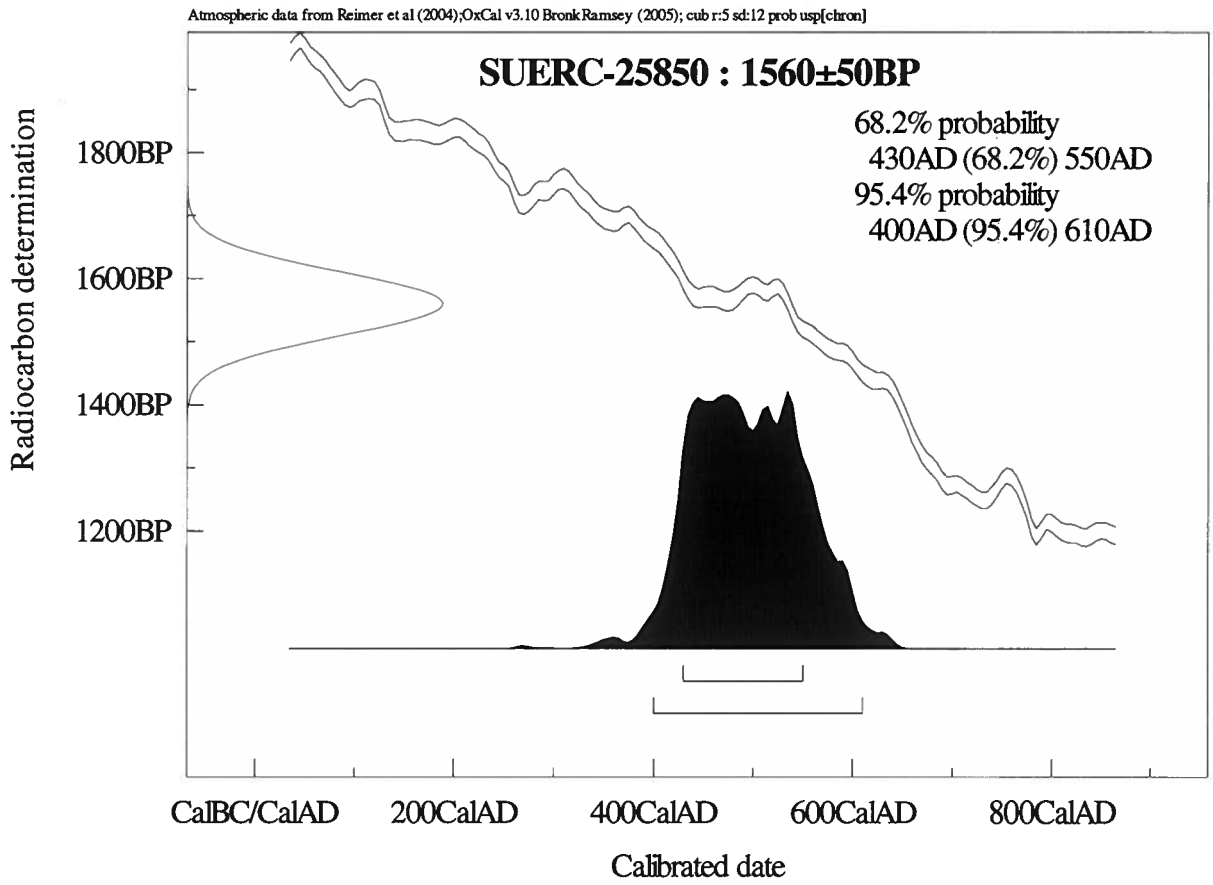
N.B.

1. 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.
2. The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal3).
3. 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 g.cook@suerc.gla.ac.uk or Telephone 01355 270136 direct line.

Conventional age and calibration age ranges calculated by :- R. Anderson Date :- 20-10-09

Checked and signed off by :- E. Dunbar Date :- 20/10/09

Calibration Plot



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RADIOCARBON DATING CERTIFICATE

16 September 2009

Laboratory Code	SUERC-24971 (GU-19192)
Submitter	Carmelita Troy Headland Archaeology (Ireland) Ltd Unit 1 Wallinstown Business Park Little Island, Co. Cork Ireland
Site Reference	Mullamast E2972
Context Reference	278
Sample Reference	SK 1
Material	Human bone : Human
$\delta^{13}C$ relative to VPDB	-21.3 ‰
Radiocarbon Age BP	2455 ± 30

N.B.

1. 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.

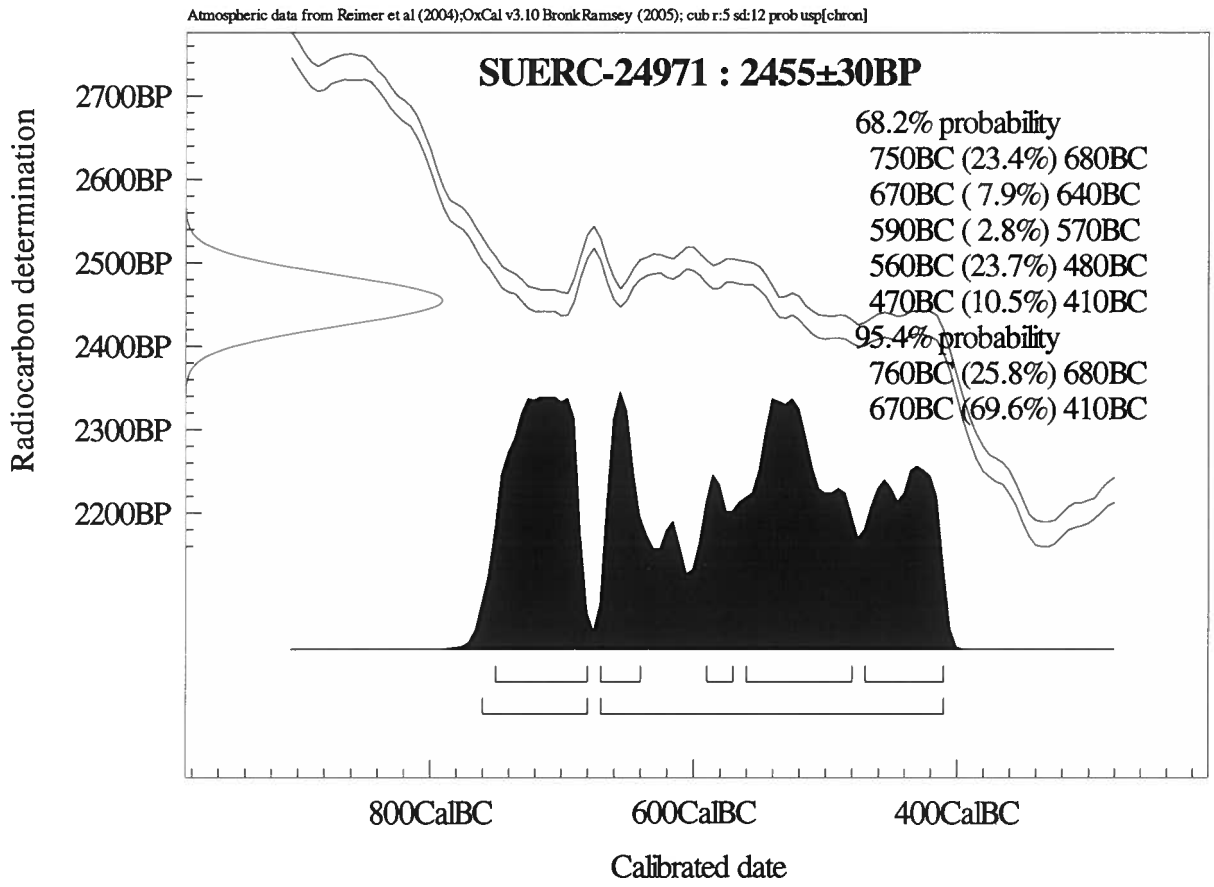
2. The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal3).

3. 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 g.cook@suerc.gla.ac.uk or Telephone 01355 270136 direct line.

Conventional age and calibration age ranges calculated by :- R. Anderson Date :- 16-9-09

Checked and signed off by :- P. Naysmith Date :- 16.9.09

Calibration Plot



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RADIOCARBON DATING CERTIFICATE

2 October 2009

Laboratory Code	SUERC-25480 (GU-19469)
Submitter	Karen Stewart Headland Archaeology (Ireland) Ltd. Unit 1 Wallingstown Business Park Little Island Co. Cork, Ireland.
Site Reference	KCK06 E2972
Context Reference	253
Sample Reference	117
Material	charred grain : emmer
$\delta^{13}C$ relative to VPDB	-22.3 ‰
Radiocarbon Age BP	2065 ± 50

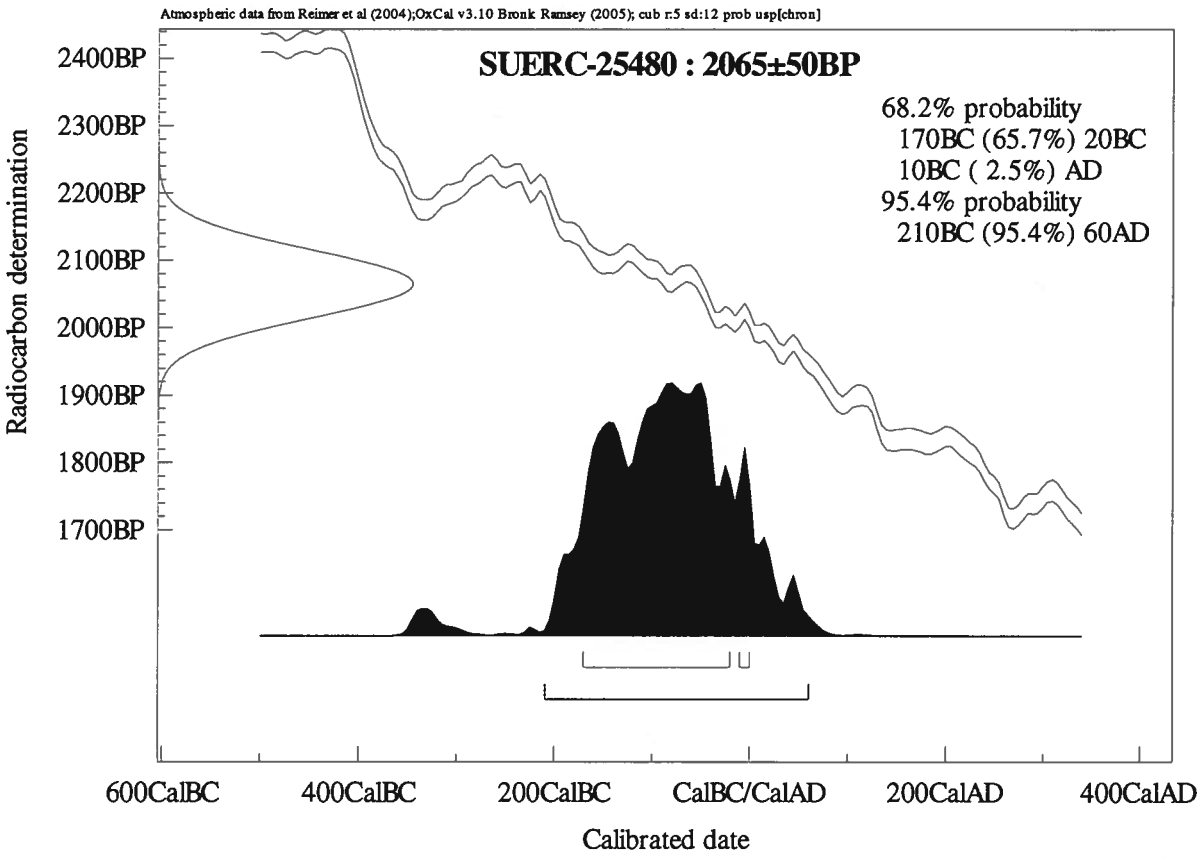
N.B.

1. 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.
2. The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal3).
3. 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 g.cook@suerc.gla.ac.uk or Telephone 01355 270136 direct line.

Conventional age and calibration age ranges calculated by :- P. Naysmith Date :- 02/10/09

Checked and signed off by :- E. Dunbar Date :- 02/10/09

Calibration Plot



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RADIOCARBON DATING CERTIFICATE

2 October 2009

Laboratory Code	SUERC-25479 (GU-19468)
Submitter	Karen Stewart Headland Archaeology (Ireland) Ltd. Unit 1 Wallingstown Business Park Little Island Co. Cork, Ireland.
Site Reference	KCK06 E2972
Context Reference	192
Sample Reference	115
Material	charred grain : emmer
$\delta^{13}C$ relative to VPDB	-23.4 ‰
Radiocarbon Age BP	1380 ± 50

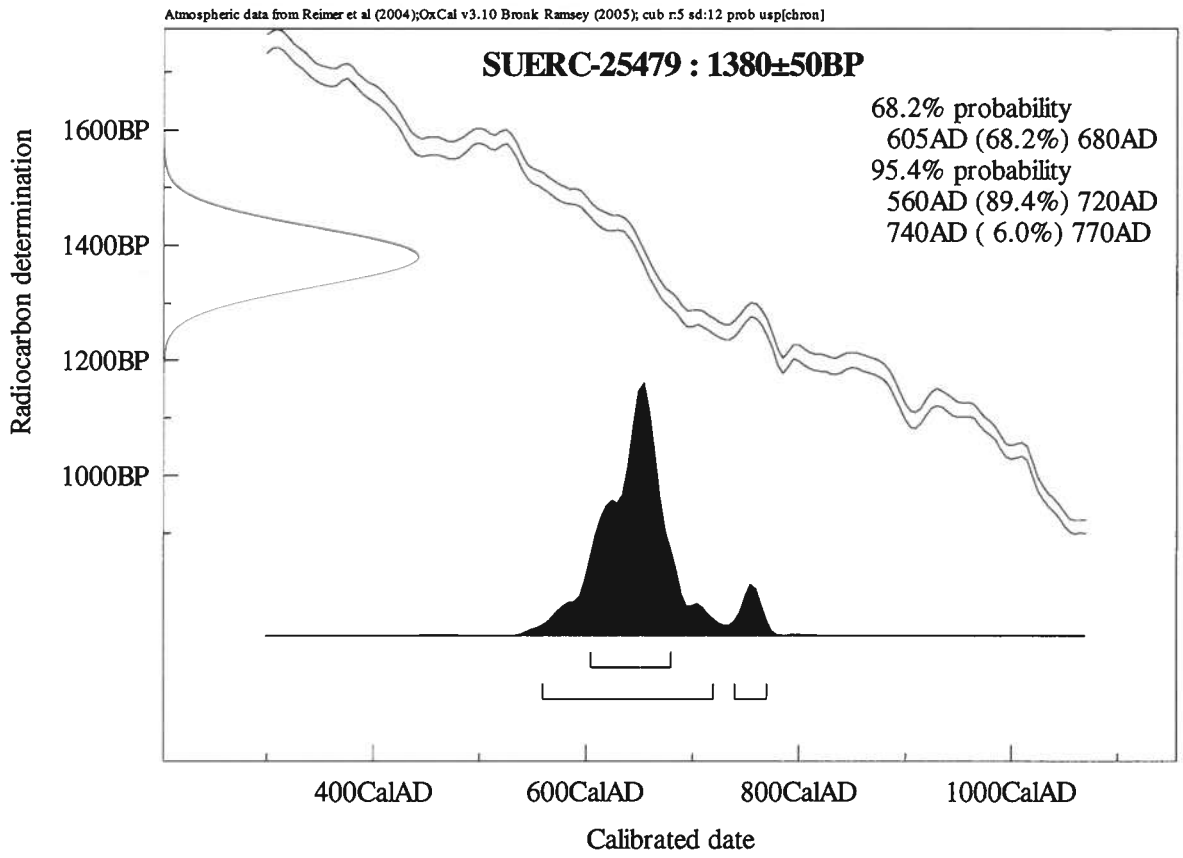
N.B.

1. 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.
2. The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal3).
3. 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 g.cook@suerc.gla.ac.uk or Telephone 01355 270136 direct line.

Conventional age and calibration age ranges calculated by :- P. Naysmith Date :- 2/10/09

Checked and signed off by :- E. Dunbar Date :- 02/10/09.

Calibration Plot



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RADIOCARBON DATING CERTIFICATE

2 October 2009

Laboratory Code SUERC-25478 (GU-19467)

Submitter Karen Stewart
Headland Archaeology (Ireland) Ltd.
Unit 1 Wallingstown Business Park
Little Island
Co. Cork, Ireland.

Site Reference KCK06 E2972
Context Reference 17
Sample Reference 2

Material charred grain : emmer

$\delta^{13}C$ relative to VPDB -24.4 ‰

Radiocarbon Age BP 1895 ± 50

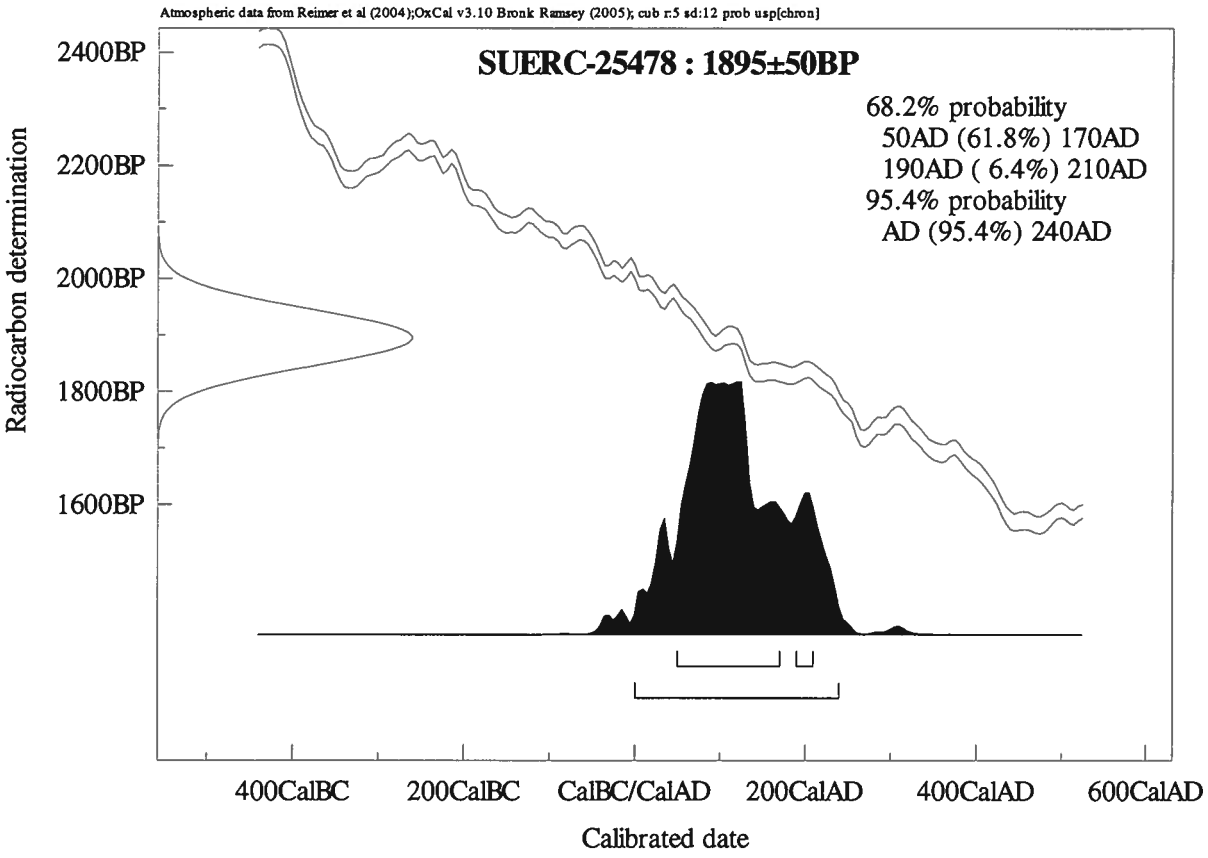
N.B.

1. 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.
2. The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal3).
3. 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 g.cook@suerc.gla.ac.uk or Telephone 01355 270136 direct line.

Conventional age and calibration age ranges calculated by :- P. Naysmith Date :- 02/10/09

Checked and signed off by :- G. Dunbar Date :- 02/10/09

Calibration Plot



Appendix 12 – The clay pipe stem from Mullamast townland, Co. Kildare (E2972) N9/N10 Kilcullen to Moone and Athy Link Road
By: Clare McCutcheon MA MIAI

Discussion

A single undecorated stem fragment was recovered from (226). This is an undiagnostic piece, probably dating to the 19th century.

Appendix 13 – Report on Bone Artefacts from Site E2972 at Mullamast, Co. Kildare
By: Miriam Carroll and Annette Quinn, Tobar Archaeological Services

Introduction

One bone artefact (E2972:117:001) was recovered from the excavations at Mullamast townland, Co. Kildare (Figure 12). The object consists of a worked bone point which is incomplete. It was recovered from the fill of a kiln (116). The object is discussed below and is followed by a catalogue.

Bone Point

The bone point (E2972:117:001) recovered from the excavations at Mullamast is incomplete and is likely to be the pointed end of a larger object. It is not possible to say with any great certainty what the object originally comprised or what its precise function was (Figure 12). Given the size of the surviving portion and its diameter it is possible that it represents the point of a bone needle or pin. Such items are relatively common in the archaeological record from the early medieval through to the later medieval period. The tip of the bone point displays some evidence for wear therefore it is possible that it was part of an object which had frequent use. Further classification and discussion of the point is not possible, however, due to its incomplete state.

Bone Point. E2972:117:001. *Bone*. L. 26.9 mm, D. (shank) 3.1 mm. Wt. 0.2 g Incomplete. Lower portion of shank and point of worked bone object. Tapers to a slightly rounded, possibly worn tip. Shank circular in section.

Appendix 14 – Report on Ferrous Artefacts from Site E2972 at Mullamast Townland, Co. Kildare
By: Miriam Carroll and Annette Quinn, Tobar Archaeological Services

Introduction

Six ferrous artefacts were recovered from the excavations at site E2972, Mullamast townland, Co. Kildare. The finds came from a variety of contexts, all of which would appear to be post-medieval in date. The assemblage is comprised of a scissors (E2972:060:007), horseshoe (E2972:001:001), hook (E2972:001:002), ring (E2972:001:003) and two items which are listed under miscellaneous due to their fragmentary nature. The artefacts recovered are discussed below according to type and general function, where possible, and each section is followed by a catalogue.

Tools

An iron scissors (E2972:060:007) came from the fill of a field boundary ditch (003). Although highly corroded the scissors retains its distinctive form with two finger loops, handles and tapering blades apparent. The blades are now fused but would originally have pivoted on a rivet, although this detail is obscured by corrosion. Scissors have a relatively long history of use in Britain and Ireland where the earliest examples have been recovered from thirteenth century contexts. Such scissors do not differ significantly in form from post-medieval types being comprised of the same elements outlined above. In the thirteenth and fourteenth centuries scissors came into use along side the well established shears. Scissors do not, however, seem to have replaced the shears as the latter continued in use well into the fifteenth century and beyond (Carroll and Quinn 2003, 268-9). Medieval scissors occasionally feature in scenes of sheep shearing however the finger loops and long blades allowed their use with one hand and it is possible that this tool was preferred by tradesmen such as tailors, hatters and barbers (de Neergaard 2000, 60). According to Hume (1969, 267) the blades of seventeenth century scissors had become wider and thicker while in the later half of the eighteenth century the blades again became narrower. The scissors from Mullamast came from a post-medieval context and is likely to date to the nineteenth century.

A large iron hook (E2972:001:002) was recovered from the subsoil overlying site E2972. The hook shank is rectangular in cross section and tapers to a blunt point. The opposing end is broken but may originally have been looped. Hooks had a variety of uses throughout the medieval and post-medieval period and generally were sized according to function. The hook from Mullamast is likely to be post-medieval in date and may have been used in a domestic or agricultural context.

Scissors. E2972:060:007. *Fe*. L. 121.4 mm, Wt. 26.2 g. Complete. Scissors with oval finger loops and narrow blades, now fused. Handles slightly bowed. Corroded.

Hook. E2972:001:002. *Fe*. L. (shank) 176.8 mm, L. (hook) 55 mm, W. 8.4 mm, Th. 7.3 mm, Wt. 73.5 g. Incomplete. Large iron hook with rectangular sectioned shank. Tapers to a u-shaped hook with a blunt point. Corroded.

Horse Equipment

One horseshoe (E2972:001:001) came from the topsoil (001) covering the site. The shoe is a very small example and is mis-shaped. Corrosion obscures some of the detail of the shoe therefore it is not possible to say if it was ever used. The shoe displays a calkin at each heel. Calkins consist of projections formed by turning down the heels of the horseshoe whose function was apparently to provide a better foothold on soft ground. The calkins on this shoe, although somewhat obscured by corrosion, would appear to represent what is referred to as a 'thickened' heel (Clark 2004, 81). Calkins are also a feature of medieval horseshoes, however they continued in use albeit less frequently in the post-medieval period. For example, Clark (*ibid*.) cites a seventeenth century work in which the benefits of calkins were being disputed:

> 'though they may be intended to keep the Horse from sliding, yet they do him more harm than good, in that he cannot tread evenly upon the ground, whereby he many times wrencheth his Foot…..and especially upon stony ways where the Stones will not suffer the Calkins to enter…..'.

The shoe from Mullamast is post-medieval in appearance and is likely to be nineteenth/twentieth century in date.

Horseshoe. E2972:001:001. *Fe*. L. 88.6 mm, W. 55.8 mm, Th. 7.7 mm, Wt. 103.5 g. Incomplete. Small horseshoe with calkin at both heels. Nail holes not apparent. Corroded.

Miscellaneous

Three ferrous objects (E2972:001:003, E2972:060:006 and E2972:053:001) are listed under miscellaneous due to their fragmentary or undiagnostic nature. The metal ring (E2972:001:003) which was recovered from the topsoil covering the site may have been used in association with a horse bit or in a domestic context. A corroded iron bar (E2972:060:006) which came from the fill of a field boundary ditch (061) is incomplete and of unknown function. Similarly, a broken and corroded metal strip (E2972:053:001) recovered from the fill of a furrow (052) is undiagnostic.

Miscellaneous. E2972:001:003. *Fe*. D. (ext.) 40 mm (int.) 30 mm, Th. 4.9 mm, Wt. 11 g. Complete. Corroded metal ring with rectangular cross section.

Miscellaneous. E2972:060:006. *Fe*. L. 77.3 mm, W. 5.4 mm, Th. 3.5 mm, Wt. 3.7 g. Incomplete. Corroded iron bar, rectangular in section. Bent at one end to form hook-like appearance, broken.

Miscellaneous. E2972:053:001. *Fe*. L. 80 mm, W. 17 mm, Th. 5.1 mm, Wt. 16.3 g. Incomplete. Flat metal strip. Splayed, slightly rounded terminal, tapers towards other end. Fragmented and corroded.

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Appendix 15 – The knapped and ground stone assemblage from Mullamast, Co. Kildare (E2972)
By: Maria Soledad Mallia-Guest

Introduction

A total of 12 lithic finds were recovered during archaeological testing, resolution and post-excavation processing of the samples recovered at site E2972 (Mullamast, Co Kildare), with an additional ground stone artefact also recovered during resolution of the site. The site consisted of a number of possible prehistoric pits as well as a possible later phase of activity which could be represented buy several kilns and isolated evidence of metalworking. A number of curvilinear ditches as well as agricultural features were also excavated. The overall artefactual assemblage includes several sherds of post-medieval pottery, clay pipe fragments and iron finds. (O'Connell and Hackett 2009)

Methodology

A macroscopic analysis of the components was carried out based upon a techno-typological approach following categories developed by Inizan *et al.* (1999). Further contextual background is provided by Woodman *et al*. (2006).

The artefacts were visually examined with the aid of an 8x hand lens, recorded and catalogued using Microsoft Excel 2003. No minimum size criterion was applied for artefact discard; therefore, any other lithic material that may have been retrieved during sample processing was incorporated to contribute to the assemblage integrity. The variables recorded include overall metric attributes (length, width and thickness), type of raw material, fragmentation, and artefact condition to determine if post-depositional, manufacture or use-damage was present.

In addition, when macroscopic evidence of use-wear was present, subsequent basic high-power micro-wear analysis was carried out using a reflective microscope at 200x magnification. The presence/absence of use traces such as micro-polish, motion striation and edge-scarring/rounding were also recorded.

The ground stone finds were also visually examined with the aid of a stereomicroscope at 40x magnification. In addition to the metric attributes and weight, raw material, artefact condition and any evidence of manufacture through abrasion, polish or impact present was also recorded and discussed along with any signs of wearing and use motion. Categorisation and overall function is discussed following basic parameters presented by Adams (2002) and Moore (1978).

The knapped assemblage

A total of 12 lithic finds (Table 1, Figure 1 and 2) were recovered from deposits within two field boundaries, (003) and (005), deposits (060) and (062), and from a grouping of pits of variable morphology and size including the irregular feature (183) and (194), the rectangular pits (220) and (237) and the oval pits (260) and (266). These grouping yielded the majority of the artefacts here discussed and were provisionally interpreted in association with nearby burial activity (O'Connell and Hackett 2009). Lastly, an additional chert find was recovered during testing phase from a soft silty clay deposit with frequent gravel content, identified within a large pit (*ibid.*). Unfortunately, the context of recovery for this artefact could not be confidently assigned to any feature resolved during

the excavation, nevertheless, it is plausible that the artefact would have been retrieved from contexts identified in resolution as features (038) or (104) (L. Hackett pers. comm.).

Both chert and flint finds are equally represented within the assemblage with a single quartz artefact recovered from the fill of field boundary ditch (005). All in all, the assemblage is in rather poor condition, with substantially lustered and patinated surfaces equally incorporating fragmented and complete specimens. The finds measure less than 60 mm in length and can be further classified in three categories; retouched artefacts and fragments, debitage pieces and natural chunks of no archaeological significance (Table 1, Figure 2)

Retouched artefacts and fragments
This category comprises a total of four artefacts presenting evidence of formal retouching along the edges. These were recovered in their majority from the fills of a cluster of pits with the exception of the possible quartz artefact fragment (E2972:062:001) which was recovered from the silty sand deposit (062) of field ditch (005) (Figure 3). Besides the quartz artefact, two additional flint retouched artefacts (E2972:221:001 and E2972:241:001) and two chert examples (E2972:196:001 and E2972:269:001) were also identified. The latter were further classified as convex scraper varieties presenting series of unifacial direct retouch and abrupt working edges. The flint artefacts are, on the other hand, more diverse, being further classified as an unifacially and marginally retouched blade (E2972:221:001) and a fine bifacially retouched leaf-shaped projectile head (E2972:241:001)

A possible fragment of a retouched quartz artefact (E2972:062:001) has been identified exhibiting at least two negative flake scars in distal position along with some incipient abrasion defining an asymmetrical unifacial edge. Given its regular profile in median view, the fragment could well represent a fractured working edge.

Chert find E2972:196:001 is a small convex end/side scraper measuring less than 40 mm in length recovered from the basal dark grey silty clay gravel deposit (196) of pit (194). The artefact is manufactured on a dark greyish black chert blank with darker banding, resembling silicified limestone varieties from the Midlands. The artefact, which is weathered and corticated at its distal end, exhibits a series of direct unifacial abrupt retouch partially extending over the artefact's surface at its proximal end. Blunting is also present, which along with the straight and regular profile suggest that this end was the active working edge. A rather regular series of retouch, also exhibiting a minor degree of blunting and half-moon fractures, are also present on its side, which may indicate a passive edge to facilitate gripping. Given the overall rolled and weathered condition of the artefact, no use-wear was readily identifiable.

The additional chert artefact E2972:269:001 is also a fragmented convex scraper measuring less than 35 mm in length and manufactured on what appears to be the proximal end of an inner angular flake of local chert. The find was recovered from the basal silty clay deposit of an oval feature (266). The find presents a rather abrupt edge angled at 75° exhibiting a short marginally extending series of retouching along an irregular in outline convex edge. The artefact is heavily lustered and rolled with transversal lateral fracture.

A retouched single arris flint blade (E2972:221:001) was recovered from the orangish brown sandy clay upper fill of a rectangular pit (220). The artefact, which measures over 55 mm in length, is in very poor condition and transversally fractured at its median point. It exhibits an obvious intense white patination of its original grey translucent appearance as well as iron staining. The blade, which shows a plain platform prepared by retouch, also displays a short marginal series of direct abrupt retouch (angled at 70°) located on the distal end, with a brief series of inverse retouch at its proximal or butt

end. Both lateral edges exhibit some kind of blunting including half-moon fractures and rounding which can be attributed to use-wear damage, indicating that both edges were the working active ones and eventually patinated. Both lateral edges are straight in outline with asymmetrical bevels with the left edge presenting a slightly concave outline in plan view. The artefact is most likely detached by direct and possibly hard-hammer percussion.

The presence of later, rather fresh flaking scars overriding the white patination, particularly at the proximal end, is suggestive of a possible later recycling of the artefact, however the absence of any relatively fresh macroscopic use-damage and the rather discontinuous pattern of the flaking does not seem to support such trajectory. On the other hand, a small number of debitage pieces were also recovered from this fill (221) suggesting that this artefact may have been manufactured and discarded in this context.

The additional flint artefact (E2972:241:001) is an exceptionally symmetrically shaped leaf-shaped projectile head measuring less than 30 mm in length exhibiting white mottled patination as well as minor iron-staining on its surfaces. The find was recovered from the basal deposit (241) within pit (237) situated in proximity to other artefact-bearing pits. The artefact is complete and bears a slight thickness of 2.8 mm with no remnant jagged thick plateau present on any of the surfaces. It is manufactured on a very well bifacially thinned blank, possibly an inner angular flake. It is shaped to a sharp, finely retouched tip exhibiting a projecting angle of 74°; its base it is also shaped to a rounded end. It displays at least two retouch series, with the original surface thinning as well as an invasive later one. Only one portion of the blank appears to have been left unretouched, corresponding with the natural hinge termination of the original flake situated on the lateral left side. The opposing end is however exceptionally retouched and so is its proximal/base end which appears to show at least more than two retouch series.

Microscopic abrasion and striae are present at its median section exactly at the rounded junctions derived from bifacial thinning by pressure flaking. Lustre is particularly obvious on the tip and relatively less so on the surface. At its broadest point, which coincides roughly with the median section of the artefact, it measures 21.6 mm, while it only 2.5 mm in breadth at its base. The projectile appears to be perfectly functional with no evidence of impact fractures.

Debitage

A total of six finds E2972:060:005 E2972:184:001, E2972:221:002-004, and the testing find A021/167:080:001 (Table 1, Figure 2) can be classified as unretouched knapping by-products derived from the reduction of flint and local chert nodules. With the exception of the debitage recovered from the field boundary (003), all the other pieces can be classified as inner angular flakes exhibiting at least one extraction scar on their dorsal surfaces.

The majority of the finds were recovered from the upper fill (221) of a rectangular pit (220) with a single find identified within the single brown sandy silt fill (184) from the irregular pit (183). All the flakes measure less than 35 mm in length falling within the very small-small category, presenting plain and non-differentiated striking platforms, mostly unprepared. All the pieces are weathered and patinated and can be considered mostly undiagnostic knapping by-products, with the exception of the flakes recovered from deposit (221). These pieces exhibit slightly curved profiles and slight thickness, associated mostly with non-differentiated platforms. These attributes are suggestive of blank thinning and trimming and therefore they can be classified as possible secondary technology by-products indicating that the finishing of formal artefacts took place *in situ*. The pieces are also lustered and patinated and resemble the material from the retouched blade E2972:221:001. None of these finds were however suitable blanks for further modification. On the other hand, the chert flakes

recovered from contexts (060) as well as the testing find A021/167:080:001 retrieved from a silty clay deposit (008) would have been potential small blanks however of rather poor knapping quality.

Natural Chunks
Two small sub-angular mid-grey chert pieces which were identified as find E2972:259:001 (Table 1) were classified as natural pebbles, heavily patinated and rolled, exhibiting no evidence of intentional modification and were therefore deemed as of non-archaeological significance.

The ground stone assemblage

A single ground stone artefact, E2972:001:007 (Table 2), was recovered from the topsoil (001) along with iron finds as well as post-medieval pottery sherds.

The find, which appears to be a moderately modified by use, is a fine-grained sandstone cobble exhibiting natural welts and markings, measuring 220.1 mm in length by 80.1 mm in width, with a thickness of 49.06 mm and a weight of 1.2 kg. The artefact is sub-oval in shape with straight end at its upper portion and a fractured lower portion. It shows an asymmetrical biconvex cross-section with flat and smoothed sides.

Abrasive striations, which are fainted and shallow, are partially present on both the central portion of a broad surface as well as the smoothened flattened sides. No grooves are visible, nevertheless the level of wearing of the sides is considerable. Scattered pecking extends over one of the faces, which could indicate some level of reworking to reactivate the abrasive capacity of the raw material before the surface becomes exhausted.

Moreover, the intensity of the wearing on one of the flat sides or plane suggests this was some sort of sharpening or abrader stone, such as a honestone. In this regard, it is plausible that this finer cemented sandstone specimen may not have accommodated the abrasive function effectively but in turn serving as a complement to other set of sharpening stones of variable coarseness (Moore 1978). With regards to size, Peacock (1998) has pointed out the possible associations between the size of the honestone and the size of the artefacts to be shaped, with larger examples, as the one here presented, having been particularly suitable for agricultural blades as opposed to small domestic items.

On the sole basis of morphology and use wear pattern no chronology can be drawn for this artefact.

Discussion

Although, the knapped lithic assemblage recovered at site E2972 (Mullamast, Co. Kildare) includes a small number of debitage and retouched artefacts, the majority of which are in poor condition, it is possible to derive general trends regarding lithic manufacture and use on site. All the formal artefacts but one are clearly associated with a number of pits situated in close proximity to each other, with the rectangular pit (220) incorporating both finished products as well as by-products derived from secondary modification. This association could well indicate that these are primary contexts of use as well as discard of artefacts, with both activities taking place *in situ*

Regarding technological variables, this assemblage does not seem to include any clearly diagnostic debitage derived from the application of bipolar technique, which is usually interpreted as a dominant reduction technique within later prehistoric assemblages, particularly those associated with

Bronze Age occupations. (O'Hare 2005). Furthermore, an emphasis on platform technology – which is believed to have been more important in earlier prehistoric times – is suggested by the attributes recorded in the assemblage retrieved at site E2972. It is also important to highlight the absence of potential blanks that could be further modified, as well as the lack of utilized, unretouched, flakes. This could also reflect an emphasis on secondary modification, including pressure flaking as possibly suggested by the flakes from context (221) as well as use and discard of artefacts rather than the primary reduction of nodules. Given the overall condition of the assemblage as well as the presence of relatively blunted and exhausted edges, it is possible that these pits represent contexts of use and discard.

When both morphological and technological aspects are combined, it is possible to tentatively place the activities on site on a timeline spanning throughout the Neolithic. In particular, the presence of an earlier component on site is tentatively suggested through the presence of a leaf-shaped projectile head. Such projectiles have been traditionally found within Early Neolithic contexts (Woodman *et al*. 2006) with an emphasis on the investment on the artefact's symmetry apparently reinforced during the Middle Neolithic in association with burials (Nelis 2004).

A number of excavated sites along the N9/N10 road scheme have yielded examples of leaf-shaped arrowheads found both in residual and secure contexts, in particular the specimen associated with a series of multi-purpose, cooking and rubbish pits identified at site E2882 in the townland of Baronsland (Co. Kildare) (Dennehy *et al* 2009) which were radiocarbon dated to the first half of the 4th millennium BC. Similarly, these artefacts have been recovered in association with the rectangular houses at Corbally, Co. Kildare (Purcell 2002) also spanning through the same period and where secondary working of the objects was carried out in the house and the immediate surrounding area.

Moreover, convex-end scrapers as those recovered on this site are also associated with both Neolithic and Early Bronze Age assemblages, from then on the sub-circular and disc-shaped varieties appear to become more frequent and standardized but thicker (O'Hare 2005, Woodman *et al* 2006).

The same chronology can roughly be presented for the retouched single arris blade. Blade technology is frequent during Late Mesolithic times from which laterally retouched pieces, similar to the one recovered on site E2972 are produced. However, fine large examples also occur in Early Neolithic contexts, while backed blades utilized as knives either with blunted backs or fine lateral retouch are also a Late Neolithic/Early Bronze Age occurrence (i.e. Newgrange) (Lehane 1982).

The debitage recovered along with the blade from deposit (221) does not appear to be the result of its secondary modification but likely from possibly pressure flaking of another piece which would tentatively place the deposition within a Neolithic/Bronze Age timespan. Furthermore, the presence of relatively fresh flaking at the end of blade E2972:221:001 may indicate potential reworking or reclamation of an earlier artefact at a later time.

As regards to raw material, it is apparent that both chert and flint are being reduced in the same frequency. It is worth noting, however, the relative poor investment observed in obtaining relatively well defined and regular working edges, particularly among the chert artefacts in relation to the flint counterparts.

This could reflect the nature of the knapping materials, with local chert varieties available within the widespread limestone deposits of Carboniferous date and the more restricted distribution of good quality flint (Geological Survey of Ireland 2007). Flint nodules are available as beach pebbles in coastal localities and locally as part of glacial till (Woodman *et al.* 2006). It would therefore indicate a

more extensive reduction of chert versus the more intensively reduced good quality flint which would only be available through a careful selection of beach/remanié pebbles or through exchange mechanisms as those in place for the earlier part of the Neolithic (Cooney 2000; Cooney and Mandal 1998).

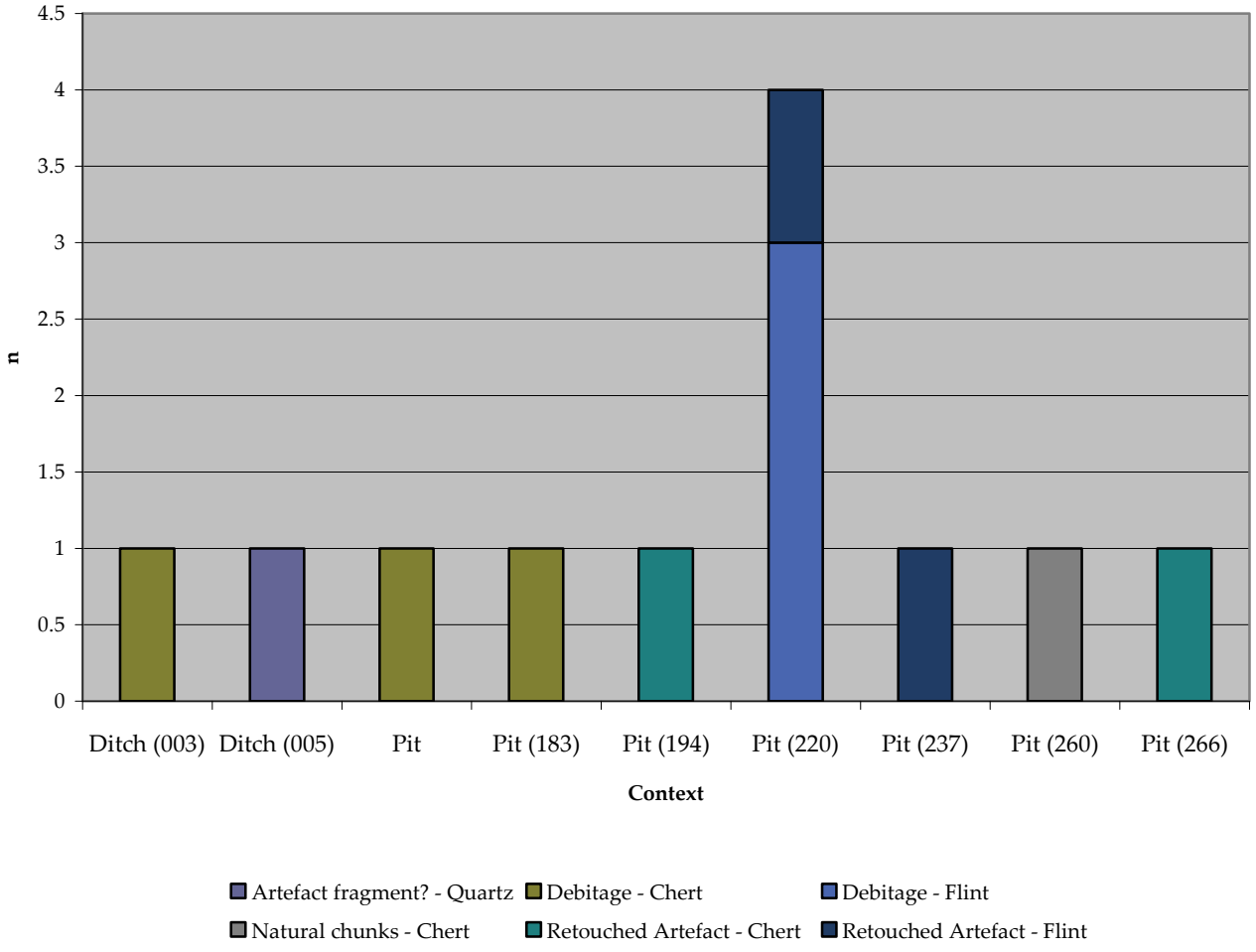

Figure 1 – Distribution by context of the knapped lithic assemblage from Mullamast (E2972)

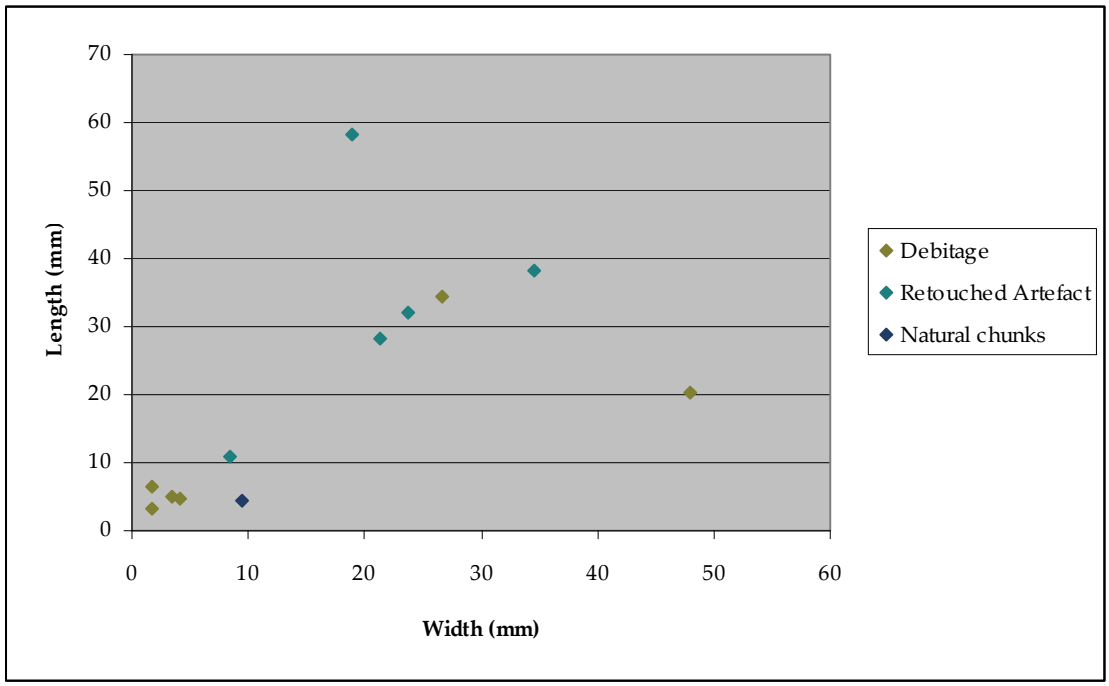

Figure 2 – Length/width ratios of the knapped lithic assemblage from Mullamast (E2972)

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NMI Number/ Testing find number	Raw Material	Type	Category	Length (mm)	Width (mm)	Thickness (mm)	State	Condition	others	Retouch	Blank	Position of Retouch	Type of Retouch	Extension of Retouch	Type of use damage	Type of Platform	Colour
E2972:060:005	Chert	Inner indet. flake	Debitage	20.4	47.9	20.3	F	Very Poor	Rolled, blunted and lustred	No	Yes?					Plain	Dark greyish black
E2972:062:001	Quartz	Retouched edge fragment	Artefact fragment?	10.8	8.4	4.5	F	Fair		Yes?	Indet. flake	Unifacial Indet.	Abrupt 70º	Short-distal with only 2 clear negative scars however some abrasion	Abrasion	N/A	Milky quartz
E2972:184:002	Chert	Inner angular flake	Debitage	5	3.4	0.1	C	Fair	Lustered burnt? And slightly distally fractured	No	No					Plain	Mid-grey
E2972:196:001	Chert	Convex end-side scraper	Retouched Artefact	38.1	34.5	11.6	C	Very Poor	Lustered and rolled, heavily weathered	Yes	Inner single arris flake	Direct Unifacial	68-72° Abrupt	Semi-invasive, partially extending over the blank, covering 90%of the perimeter, series is very uneven	Blunting, particularly on distal left side and half moon fractures	ND	Dark greyish black
E2972:221:001	Flint	Retouched single arris blade	Retouched Artefact	58.3	18.9	7.7	F	Very Poor	Heavily patinated, transversal fracture	Yes	Single arris blade	Direct Unifacial	70° Abrupt	Short marginal series on distal end, inverse at proximal butt end	Blunting and half moon fractures on lateral edges	Plain	white patination, grey core
E2972:221:002	Flint	Inner angular flake	Debitage	4.6	4.2	0.2	C	Poor	White patination and slightly fractured	No	No					ND	White
E2972:221:003	Flint	Inner angular flake	Debitage	6.6	1.8	0.3	C	Poor	White patination	No	No					ND	White
E2972:221:004	Flint	Inner angular flake	Debitage	3.1	1.7	0.4	C	Poor	White patination and slightly fractured	No	No					Plain	White
E2972:241:001	Flint	Leaf-shaped projectile head	Retouched Artefact	28.1	21.3	2.8	C	Fair	Patinated-iron stained	Yes	Indet.	Bifacial	Low-angle	Invasive, not completely extending over the areas	blunting and microscopic abrasion	N/A	Light whitish grey
E2972:259:001	Chert	Natural chunks	Natural chunks	4.4	9.5	2.4	F	Very Poor	Weathered								Mid grey
E2972:269:001	Chert	Fragmented convex scraper	Retouched Artefact	32.1	23.7	7.3	F	Very Poor	Lustered and rolled, lateral fracture	Yes	Inner angular flake	Direct Unifacial	75° Abrupt	Short marginal series, abrupt	Blunting	N/A	Dark greyish black

A021/167:008:001	Chert	Inner angular flake	Debitage	34.4	26.6	7.2	C	Poor	Weathered, patinated	No	Yes					Plain	Dark grey

Key: C: complete; F: fractured; Indet: indeterminate; ND: non-differentiated

Table 1 – The knapped lithic assemblage from Mullamast, Co. Kildare (E2972)

NMI Number/ Testing find number	Raw Material	Type	Length (mm)	Width (mm)	Thickness (mm)	State	Condition	Weight	Cross-section	others	Blank	Colour
E2972:001:007	Sandstone	?Honestone	220.1	80.1	49.06	F	Poor	1.2 Kg	Biconvex-assymetrical-(oval)	Sub-rectangular in shape with flat sides and convex broad surfaces, abrasive shallow striations, smoothened and flattened sides, scattered pecking on broad surface, Possible abrader? Raw material with markings -depositional - (welt/ridges), an asymmetrical (oval) biconvex cross-section.	Cobble	Dark brownish grey

Table 2 – Ground stone assemblage from Mullamast, Co. Kildare (E2972)

Appendix 16 – Assessment of metallurgical remains from Mullamast, E2972 based on visual examination
By: Barry Cosham BSc

Introduction

The excavation at E2972 revealed prehistoric pits, a crouched inhumation burial, a possible cremation pit and a possible bowl furnace, burnt pits, medieval cereal-drying kilns, animal bone refuse pits, a number of curvilinear features and gullies, a series of linear agricultural furrows and post-medieval field systems (Hackett 2009). A quantity of possible metallurgical waste residues were recovered from environmental samples during post-excavation work. The aim of this report is to determine the nature and quantity of these residues and recommend what, if any, further analyses should be undertaken.

Methods

Eight samples totalling 1018 grams were recovered during the processing of environmental samples. The remains were quantified and a detailed description compiled, allowing categorisation and identification with reference to Bachmann (1982) and Bayley *et al* (2001). The results and discussion are presented below.

Results

The following table presents the results of the visual assessment.

Sample no.	Context no.	Weight (g)	Description	Interpretation
034	090	<1	Many tiny fragments, *c*. 5 mm in diameter, dark red/black colour, magnetic, recovered during environmental processing	Geological
047	110	804	Many slag fragments, ranging in diameter from *c*. 10 mm to *c*. 80 mm, mostly grey/black in colour, generally very vesicular, one fragment appears to be part of a furnace base or smithing hearth base, some slag spheres present with average diameters of *c*. 4-5 mm, also a small quantity of flake hammerscale, recovered during environmental processing	Iron smelting/smithing
070	128	<1	Few tiny fragments, *c*. 5 mm in diameter, dark red/black colour, recovered during environmental processing	Geological
079	182	1	Single fragment, *c*. 10-20 mm in diameter, brown/orange colour, some iron corrosion/concretion, recovered during environmental processing	Geological
104	191	95	Single fragment, *c*. 70 mm diameter, grey - purplish red colour, abraded with slightly	Geological

Sample no.	Context no.	Weight (g)	Description	Interpretation
			rounded edges, stone not slag, recovered during environmental processing	
106	189	59	Single small fragment, c. 40 mm diameter, black colour, angular edges, 'shiny' crystals visible, stone not slag	Geological
115	192	<1	Many tiny fragments, *c*. 5 mm in diameter, pale grey/white colour, probable fuel ash slag, recovered during environmental processing	Undiagnostic
133	242	59	Single slag fragment broken in two, *c*. 30-70 mm in diameter, purple/black in colour, highly vesicular, charcoal imprints on 'lower' surface, upper surface has occasional charcoal imprints but is highly abraded, small amount of iron corrosion visible on lower surface, recovered during environmental processing	Undiagnostic

Total: 1018

Approximately 79% of the assemblage (by weight) came from a single sample (047) which contained a mix of both iron smithing and iron smelting residues. The remainder of the assemblage was comprised of geological material (15%) and undiagnostic slag (6%).

Discussion

As mentioned above, approximately 79% of the assemblage (by weight) came from a single sample (047). This material came from the upper fill (110) of what was identified on site as 'a possible bowl furnace' (Hackett 2009). 'A possible bowl furnace (108) adjacent to two possibly related pits and a patch of oxidised natural soil was just inside the east edge of the site in the northeast quadrant. It was circular in plan measuring 0.4 m in diameter and 0.25 m deep with gradually sloping sides and a concave shaped base. Compact yellow fine sand (112) filled the base. Oxidised red fine sand (111), the result of *in situ* burning within the pit was over the basal fill. Slag (Sample E2972:046) was identified and retrieved from this deposit as it was from the upper fill of the feature, which consisted of compact dark black grey ash with occasional charcoal fleck inclusions (110) (Sample E2972:047). The slag recovered and the heavy oxidisation suggests this feature functioned as a small bowl furnace. Adjacent to the possible bowl furnace on its southeast was circular pit (109). It had a 0.6 m diameter and was 0.4 m deep with sharply sloping sides and a flat base. It was filled by loose dark brown sand (113) from which animal bone was collected (Sample E2972:048)' (Hackett 2009).

The slag evidence from (110) taken together with the information recorded during excavation clearly indicates that the feature functioned as an iron smelting furnace. It is not clear which furnace technology was used, although some possibilities are more likely than others. The dimensions and physical characteristics almost immediately rule out the possibility that the feature was a bowl furnace. Technically a true bowl furnace should have a depth to width ratio of 1:1 (Tylecote 1986, 133) which is not apparent with (108). Experimental work has shown that bowl furnaces are inefficient at the best of times (Tylecote 1986:133); if (180) had functioned as a bowl furnace it would probably not have been large enough to produce a worthwhile amount of iron. The slag evidence also suggests that

a bowl furnace was unlikely to have been the specific furnace technology used. The presence of slag spheres suggests that the furnace had some kind of superstructure as slag spheres form from molten drops of slag freezing as they fall into the base of the furnace. In a bowl furnace there would probably not be enough depth or space for this to occur. This suggests that the furnace was either a slag pit furnace or a shaft furnace. With the current evidence it is not possible to say which of these it might be, although it appears that the furnace was of the non-tapping variety as there was no tap slag present within the assemblage.

Something that should be considered is where the raw materials (ore and charcoal) for the smelting on this site came from, as this can have implications for woodland management and the environment in general. Charcoal and ore are required in a ratio of approximately 10 charcoal to 1 ore for smelting (Tylecote 2001), which means that any potential smelter is likely to look for an area with a good supply of timber suitable for charcoal making over an area that has rich ore. This is particularly true in Ireland where 'bog ore', which is formed by the precipitation of iron minerals in bogs and other poorly drained places, is abundant. No evidence for charcoal production was noted on the site although as the smelting activity was confined to the southwest end of the site near the limit of excavation it is still possible that charcoal was manufactured nearby.

None of the other features on the site appeared to have a metalworking function based on the examined assemblage. An elongated pit (243) which was located in the vicinity of (108) contained a single fragment of slag (Sample 133). This fragment almost certainly originated from (108) and does not add to the interpretation of pit (243). An area of oxidised natural (274) was also located in the area and could represent an area where ore was roasted in an open fire, although there is no direct evidence to support this.

In summary it is clear that iron smelting activity was taking place on the site in furnace (108). No other metallurgical activity was represented within the assemblage although this does not necessarily preclude the possibility that other activities were undertaken on the site. The source of ore and charcoal remain unknown although they were most likely obtained in the immediate area, particularly in the case of the charcoal. The furnace dates to the Late Iron Age/early medieval period.

Recommendations

Further analysis of the assemblage is possible. XRF and other chemical techniques would be able to show the elemental composition of the slag and microstructural examination could show the different phases within the slag indicating what the furnace conditions may have been like, however these techniques are unlikely to provide any useful information towards the interpretation of the site. It is therefore recommended that no further analysis be undertaken on the material from this site at this time.

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