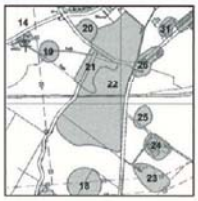






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NDP National Development Plan 2007 - 2013

Department of Transport An Roinn Iompair

NRA An tÚdarás um Bóithre Náisiúnta National Roads Authority Archaeology

Date: June 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 E2870, in the townland of Blackrath, Co. Kildare.

By: John Twomey
National Monuments Section Registration Number: E2870
Director: Gillian McCarthy
NGR: 281160/200057

Report Status: Final

Meanma agus Mianach

HEADLAND ARCHAEOLOGY Ltd

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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, E2870, was allocated by the Department for the excavation of the present site in Blackrath townland under the directorship of Gillian McCarthy 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 IAC Ltd under N9/N10 Kilcullen to Waterford Scheme: Kilcullen to Powerstown. Archaeological Services Contract No. 1 – Test Excavations, Kilcullen to Mullamast under Ministerial Direction Number A021/083 on this site between 10 October and 19 November 2005 identified a possible isolated cremation pit, 0.3m x in diameter x 0.05m depth, with a charcoal-rich fill and exposed burnt bone .

Full archaeological resolution was conducted on this site between 30 April and 4 May 2007**.** The feature identified during testing was re-identified along with a further cremation pit, three pits and a number of modern furrows. Artefacts recovered during the excavation consisted of flint debitage forming a naturally backed flake (E2870:035:001-013; Appendix 10), and finds from the topsoil of iron and modern pottery. A Preliminary Report of works on the site was completed by Headland Archaeology (Ireland) Ltd in February 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 E2870.

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 E2870 was situated in the townland of Blackrath, parish of Narraghmore, barony of Narragh and Reban East, and was located 10.25 km southwest of Kilcullen, Co. Kildare at National Grid Reference 281160/200057 (Figure 1). The site was located in pastureland at the south-eastern edge of Narraghmore bog c.350 m east of the existing N9.

The known archaeological sites in the vicinity of E2870 (Figure 2) in advance of the current road development included; a church site and graveyard (RMP KD032-031) and a ringfort (RMP KD032-032) which were situated 200 m and 800 m to the northeast respectively, a towerhouse (RMP KD032-033) was situated 500 m to the east, an enclosure site (RMP KD032-034) was situated around 500 m to the southwest and over 500 m to the south was a ringfort (Rath/Cashel) (RMP KD032-035) and an enclosure site (RMP KD032-036).

Archaeological investigations undertaken as part of Archaeological Services Contract No. 5 on the road scheme identified areas of prehistoric activity locally including: a burnt mound, metalled surface and well at Inchaquire, Site E2869, 700 m to the south (Hanbidge 2009c); a burnt mound, townland boundary, and post-medieval structure at Blackrath, Site E2871, 850 m to the north (Hanbidge 2009d); a burnt mound at Ballymount, Site E2872 ,930 m to the north (Twomey 2009a); a burnt mound and prehistoric occupation site at Ballymount, E2873, 1050 m to the north (Hanbidge 2009e); and a burnt mound at Ballymount, E2874, 1100 m to the north (Hanbidge 2009f). These sites all returned radiocarbon dates from the Bronze Age and point to intense prehistoric activity having taken place in this landscape.

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 625 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 and sections were drawn at scales of 1:20 and 1:50, and 1:10 respectively. 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 charcoal 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, fills from the cremation pits 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.

Full archaeological resolution was conducted on this site between 30 April and 4 May 2007. The crew on site E2870 consisted of 1 director, 1 supervisor and 7 site assistants.

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

4 Excavation results

Following topsoil removal, two cremation pits, three circular pits, and a number of modern agricultural furrows were revealed.

Phase 1
Cremations: Situated in the centre of the site was cremation pit (006) (Figure 4, Plates 1-3). This pit had circular shape in plan and measured 0.34 m long, 0.28 m wide and 0.29 m deep. In profile it had vertical sides and a flat base. It contained three fills: (013), (012), and (011). The basal fill (013) consisted of yellowish grey/brown silty sand. This layer did not contain any burnt bone and measured 0.01 m in depth. Over this was a middle fill (012) of light yellowish brown silty sand, which contained inclusions of charcoal and occasional burnt bone (0.4 g) and measured 0.06 m in depth. The upper fill (011) consisted of dark brown silt and measured 0.22 m in depth. It contained frequent inclusions of burnt bone (195.7 g) and charcoal. A sample of cremated bone from this fill was radiocarbon dated to 1120-840 cal BC (2σ) (SUERC-25366) (Appendix 9). Also during post-excavation environmental analysis, remains of charred hazelnut shell (*Corylus avellana*) were also recovered from this feature (Appendix 7).

Located 9.4 m northwest of cremation pit (006) was a second cremation pit (033) (Figure 5, Plates 4-5). This pit had a circular shape in plan with a diameter of 0.35 m and a depth of 0.23 m. In profile, it had vertical sides and a flat base. It contained two fills: (035) and (037). The basal fill (037) consisted of loose dark brown silty clay and measured 0.08 m in depth. It contained inclusions of stone, charcoal, and burnt bone (1.7 g). The upper fill (035) consisted of soft, black sandy silt and measured 0.15 m in depth. It contained frequent inclusions of burnt bone (22 g) and charcoal, and occasional inclusions of stones. Thirteen fragments of heat shattered flint debitage (E2870:035:001-013, Plate 11, Appendices 2 and 10) were recovered from this fill (035). All of these pieces showed signs of thermal alteration and could be refitted to single naturally backed flake (E2870:035:001) (Plate 12, Appendix 10). Environmental sampling of this deposit saw the recovery of charred grains of naked barley (*Hordeum vulgare* var. *nudum*) along with charred hazelnut shell (*Corylus avellana*) (Sample E2870:002, Appendix 7)). Cremated bone from this fill was radiocarbon dated to 1050-810 cal BC (2σ) (SUERC-25367) (Appendix 9).

Phase 2
Pits: In the north-western corner of the site, 5.3 m to the north of cremation pit (033) was pit (014), (Figure 6, Plate 6). It had a circular shape in plan with concave sides and an irregular base. It had a diameter of 1.5 m with a depth of 0.27 m and contained a single sterile fill (032) which consisted of light greyish brown silty sand.

Located approximately 6 m to the west of cremation pit (006) was pit (026) (Figure 7, Plates 7-8). It had a diameter of 1.65 m and measured 0.33 m deep. In profile it had concave sides and an irregular base. It contained two fills: (027) and (028). The basal fill (027) consisted of mid-orangey brown clay with moderate inclusions of charcoal flecks and occasional fragments of unburnt animal bone, and measured 0.17 m in depth (Samples E2870:005, E2870:026). The upper fill (028) consisted of compact, dark-brown grey silty clay with frequent small burnt stones and moderate charcoal and unburnt animal bone inclusions and measured 0.28 m in depth (Samples E2870:006, E2870:025).

A circular shaped pit (029) was located in the centre of the site, 4.1 m to the southwest of cremation pit (006) (Figure 7, Plates 9-10). It had concave sides and an irregular base. It had a diameter of 1.51 m and a depth of 0.45 m. It contained two fills: (030) and (031). The basal fill (030) consisted of compact, orangey grey clay with occasional burnt stones and charcoal inclusions (Sample E2870:008). This fill

measured 0.13 m in depth. The upper fill (031) measured 0.15 m in depth and consisted of dark greyish brown silty clay with charcoal and burnt stone inclusions (Sample E2870:009).

Phase 3
Furrows: A number of modern agricultural furrows: (003)/(016), (007)/(015), (017), (018)/(034), (019)/(042), and (065) cut through the site. These measured 0.5 m in width and ranged in depth between 0.05 m and 0.14 m. They ran for a distance of *c*. 25 m in length across the site in a WNW-ESE direction and were on average 2 m apart. All contained a similar heavily compacted silty clay fill (see Appendix 1).

5 Discussion

The results of the excavation at Blackrath 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.

Although the site was small three distinct phases of activity were noted. Phase I relates two the two cremations (006) and (033) both of which have been dated to the Late Bronze Age. Phase II relates to the unstratified pits (014), (026) and (029), while phase III consists of the post medieval agricultural features uncovered.

Phase I
The cremation pit (006) contained the remains of a single adult female. (Appendix 7). Around 10% of the total bone from an adult cremation was present. The condition of the surviving bones suggests the cremation was a primary rite, undertaken while the body was still fleshed, and was an efficient process with temperatures reaching in excess of 800°C. The vast majority of the surviving bone was from the cranium. This may reflect the larger size of this skull, or alternatively may indicate a deliberate selection and deposition of the cranium. This is mirrored in many cremation burials from this period, where the skull, perhaps as the most striking and symbolic body part, is chosen to represent the individual in the burial rite (Appendix 7). Similar deposits of cremation burials with skull fragments have been excavated at Ballybar Lower, Co. Carlow (E2622; Hackett and Hanbidge, 2009), Burtown Little, Co. Kildare (E2989; Moloney, 2009b) and Mullamast, Co Kildare, (E2973; Hackett, 2009). A fragment of the occipital bone was also recovered from a ritual Iron Age context in a nearby site at Ballymount, Co. Kildare (E2876; Twomey 2009b). A radiocarbon date retrieved from the burnt bone places the cremation in the Late Bronze Age, at a date of 1120-840 Cal BC (2σ) (Appendix 9).

The cremation burial retrieved from cremation pit (033) was not substantial enough to contain any diagnostic elements. However, a radiocarbon date of 1050-810 cal BC (2σ) (Appendix 9) was obtained indicating that it was contemporary with the cremation in pit (006).

Small cemeteries of two or three cremations are common through the Middle and Late Bronze Age, marking a change from more the elaborate earlier practices of the Neolithic and Early Bronze Age. By the Late Bronze Age, token cremations were being deposited and mark the waning of an earlier tradition of interring most, if not all, of the burnt remains of an individual in a less visible manner (Waddell 2005, 161). The evidence from this site fits with this evolution of the burial rite. In addition a number of other contemporary cremations were discovered on this road scheme: Moone (E2977) a cremation cemetery with seven pits, 6 km southwest (Lenihan *et al* 2009); Burtown Little (E2988) two

cremations, 7.3 km southwest (Moloney 2009a Woodlands West (E2966) cremations associated with a ring ditch (Long, *et al* 2009).

This is also one of a number of Bronze Age sites in the surrounding landscape to produce evidence for the cultivation and consumption of naked barley grains (*Hordeum vulgare* var. *nudum*). This crop was cultivated in Ireland from the Neolithic period, but grew in popularity during the Bronze Age. At Inchaquire (E2868)(Hanbidge 2009b) 750 m to the southwest, a single grain was retrieved from a waste pit and appears to be intrusive, probably wind blown, highlighting the growing and processing of the crop in the surrounding landscape. This was contemporary with the cremations here (E2870), returning a radiocarbon date of 100-800 cal BC (2 σ) (SUERC-25905). Larger quantities were recovered at Inchaquire (E2867) (Hanbidge 2009a) 1.5 km to the southwest in association with a Middle Bronze Age burnt mound, showing the ongoing cultivation of this cereal crop in the locality.

The charred nature of the grains from deposit (035) suggests they may have been burnt within the pyre for the cremation. Similarly the charred hazelnut shell fragments recovered from both cremations may be from the pyre. Hazelnut shells are usually seen as waste fragments from consumption, but it is possible that hazel wood may have been used as fuel for the conflagration, resulting in the charring and subsequent deposition of these fragments (Appendix 7). Thermal damage to the lithics recovered from this deposit may stem from the same process resulting in the twelve small fragments (E2870:035:002-013) splitting from a single naturally backed flake (E2870:035:001); this points to the deposition of these lithics along with the grains and hazelnuts as grave goods (Appendix 10).

Phase II
Due to the unsuitability of the samples retrieved, and the lack of any artefacts uncovered from the features, no further information can be extrapolated from the pits (014) and (026). No evidence exists to suggest these pits belong to the same phase of activity as the two cremation pits (006) and (033), while the layout of the pits offers no explanation of their purpose. The burnt bone from pit (026) could not be identified as human, and may have entered this pit through natural processes rather than by way of a deliberate deposit. The unburnt animal bone recovered from pit (029) is from a large mammal, possibly cattle, and suggest that this pit was used as a waste pit.

Phase III
The five furrows uncovered all post-date the other features on site. The shallow nature of the features and the uniformity of their shape and orientation reinforce the validity of their interpretation as post-medieval agricultural furrows.

Conclusions
The location of four recorded RMP sites within the townland of Blackrath alone, along with the cluster of site uncovered during excavations in advance of the N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow, points to a concentration of prehistoric activity in this general area of Co. Kildare.

Seven other sites were excavated within 1.5 km of the cremation pits at E2870: Inchquire (E2867) a burnt mound (Hanbidge 2009a); Inchaquire (E2868) Bronze Age pits (Hanbidge 2009b); Inchaquire (E2869) a burnt mound (Hanbidge 2009c); Blackrath (E2871) a burnt mound and settlement (Hanbidge 2009d); Ballymount (E2873) a burnt mound (Hanbidge 2009e); Ballymount (E2874) a burnt mound (Hanbidge 2009f).Four of these returned radiocarbon dates placing then within the Bronze Age. Of these four, the site at Ballymount E2874, situated 1.1 km to the north, was broadly contemporary with these cremation pits returning radiocarbon dates of 1130-920 cal BC (2σ) (SUERC – 25287) and 970-810 cal BC (2σ) (SUERC – 25286) .As yet not radiocarbon date has been returned for

the burnt mound at E2872 (Twomey 2009a), however, it is highly likely that this site will also prove to be Bronze Age in date.

The evidence from the other sites in its vicinity support the notion that site E2870 should not be viewed in isolation but rather as part of a greater archaeological landscape. These sites show a continuation of human activity in this locality throughout the Bronze Age, and also reflect the wide range of activities being undertaken by these people.

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	65
Plans	9
Sections	24
Photographs	70
Registers	5
Notebooks	-

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.
- Jessica Djohari, Site Supervisor, Headland Archaeology (Ireland) Ltd.
- The excavation team.

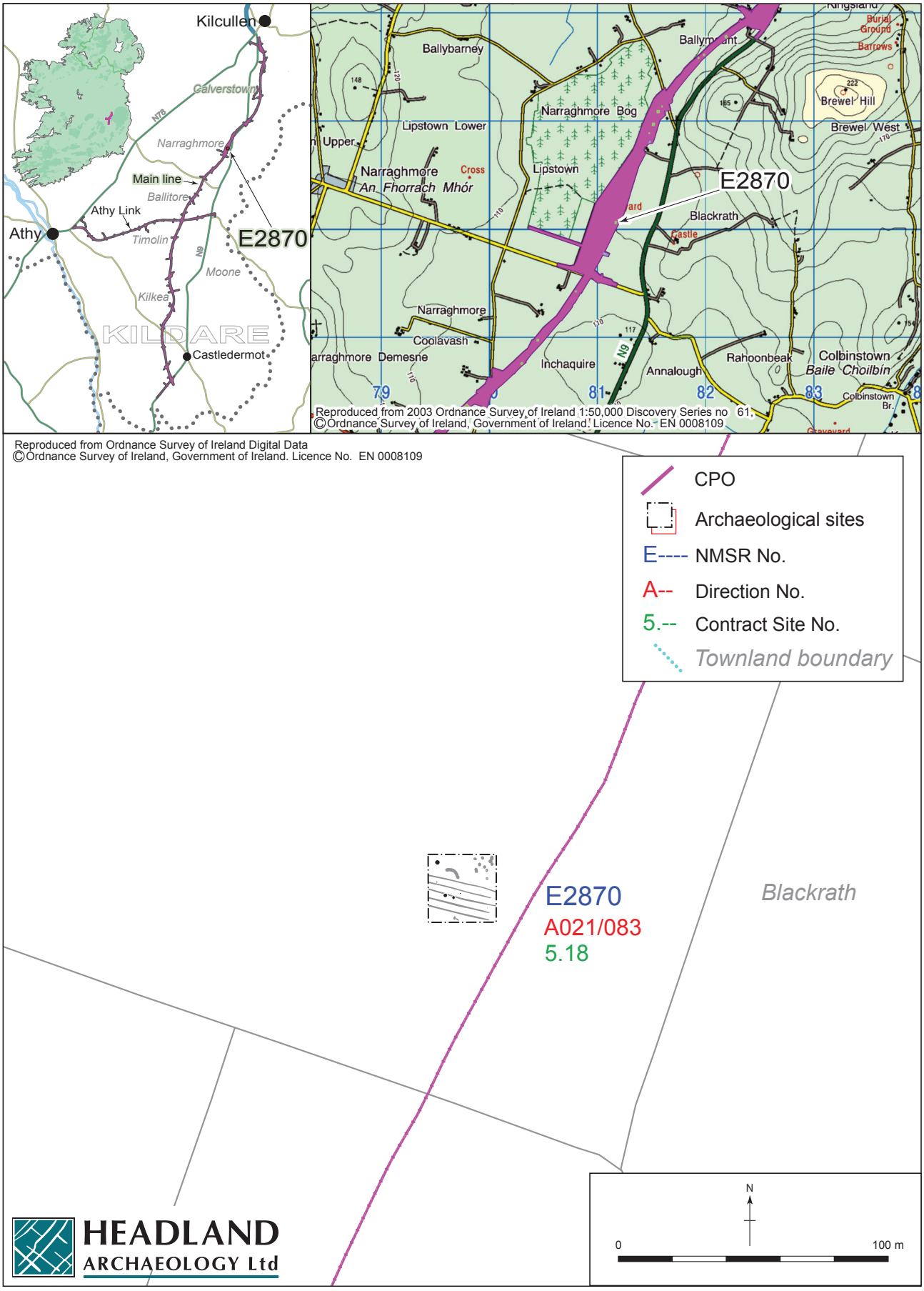


Figure 1 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road. E2870 Site location.

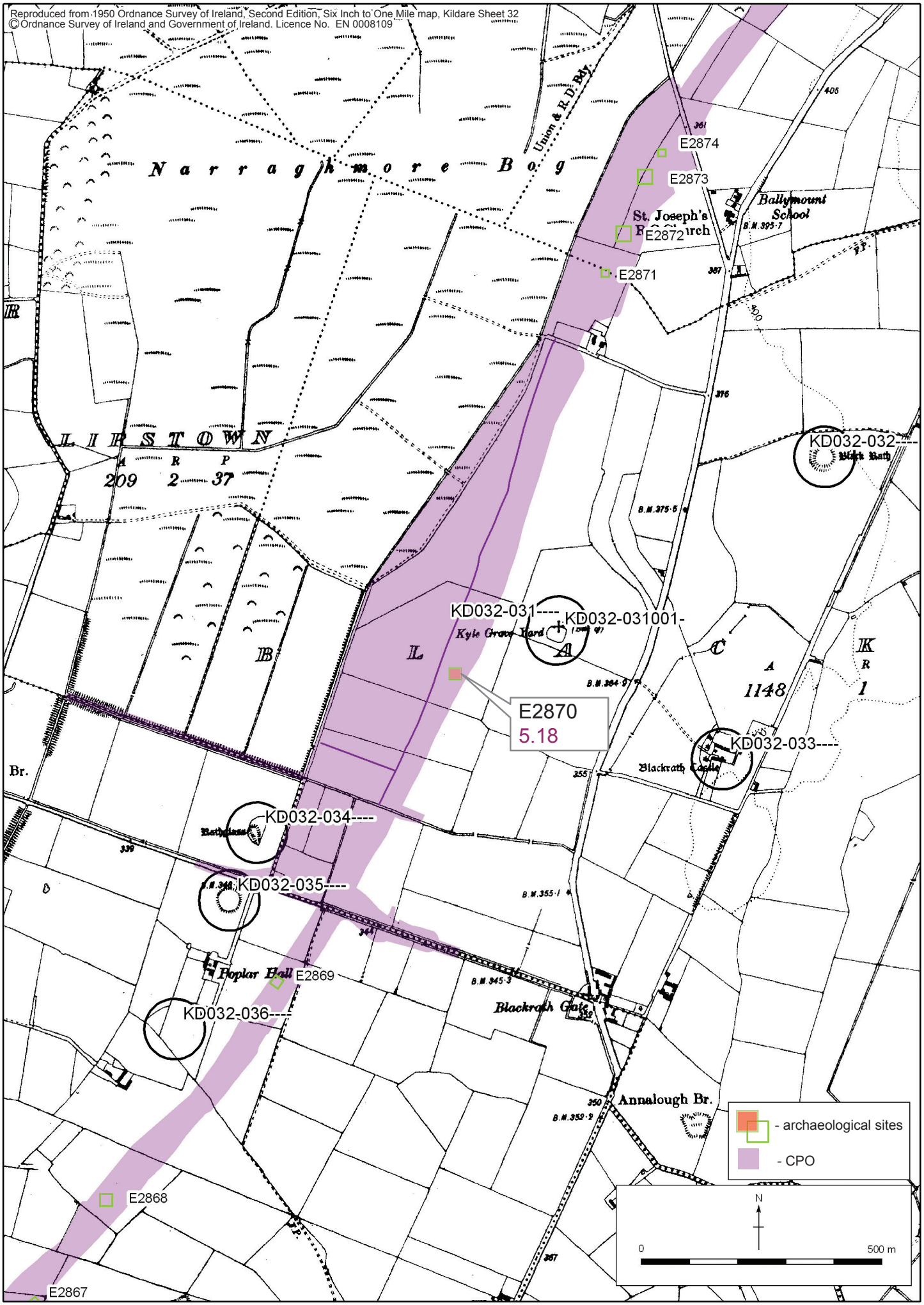


Figure 2 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road: E2870, extract from RMP.

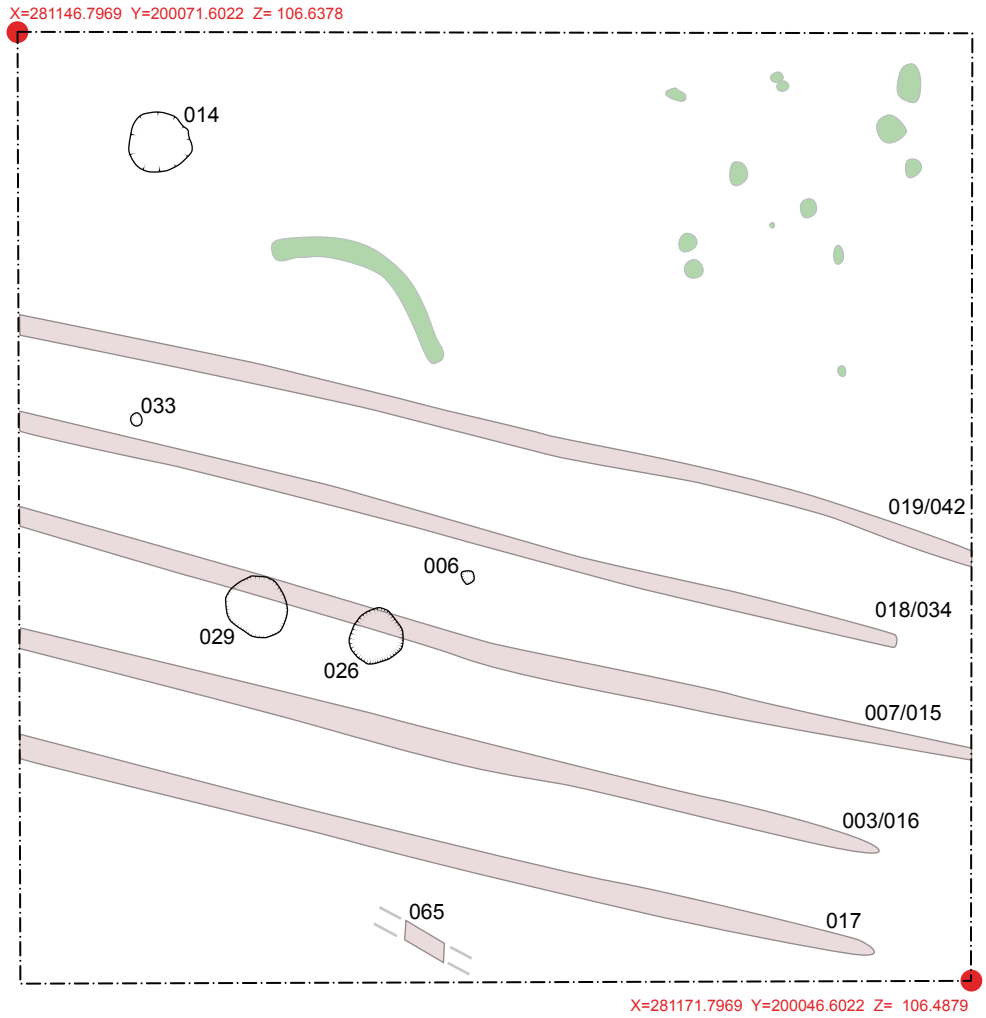


Figure 3 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road. E2870, Site layout.

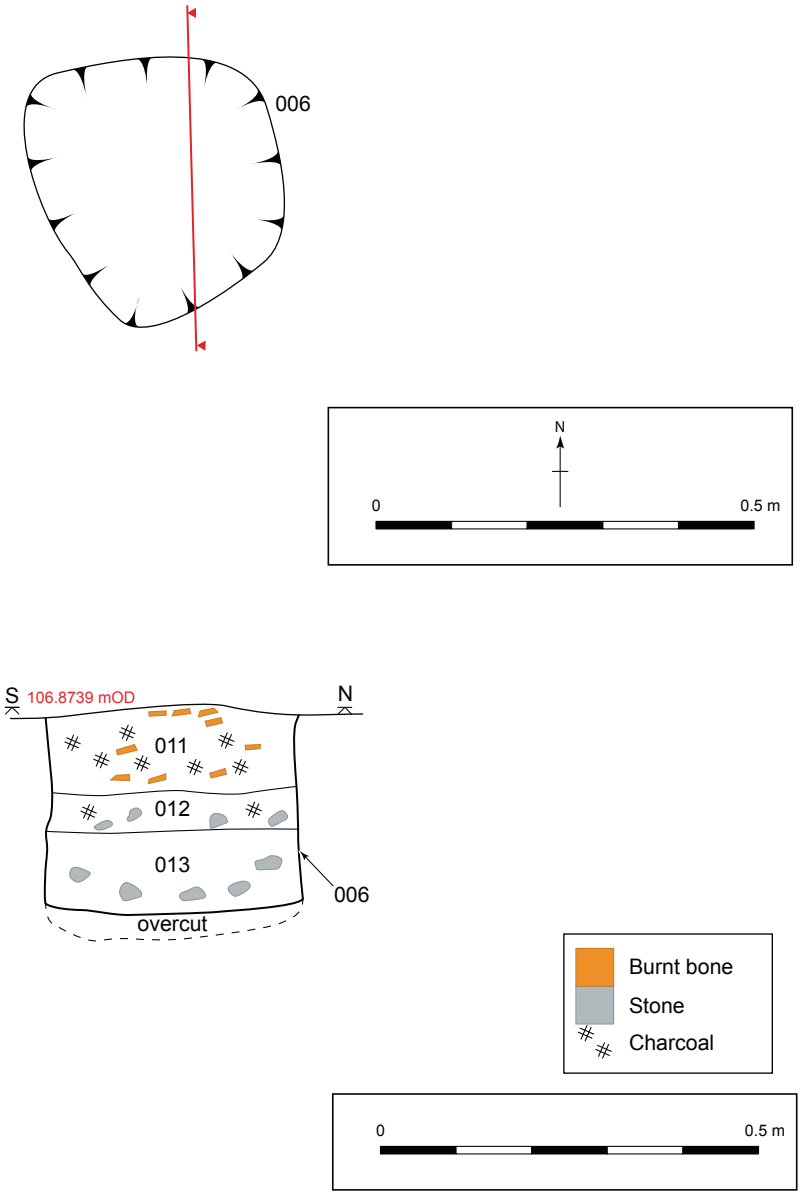


Figure 4 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road. E2870, Plan of and east-facing section through Cremation Burial Pit (006).

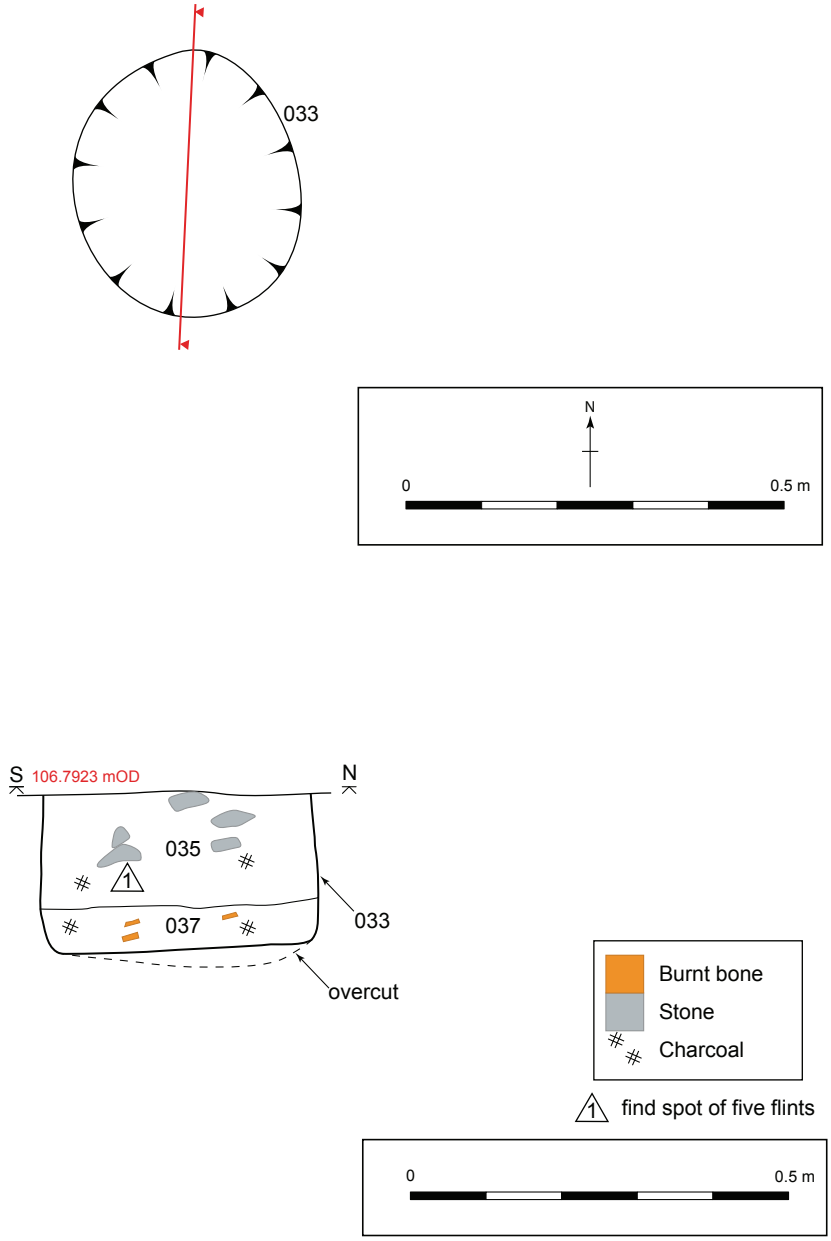


Figure 5 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road. E2870, Plan of and east-facing section through Cremation Burial Pit (033).

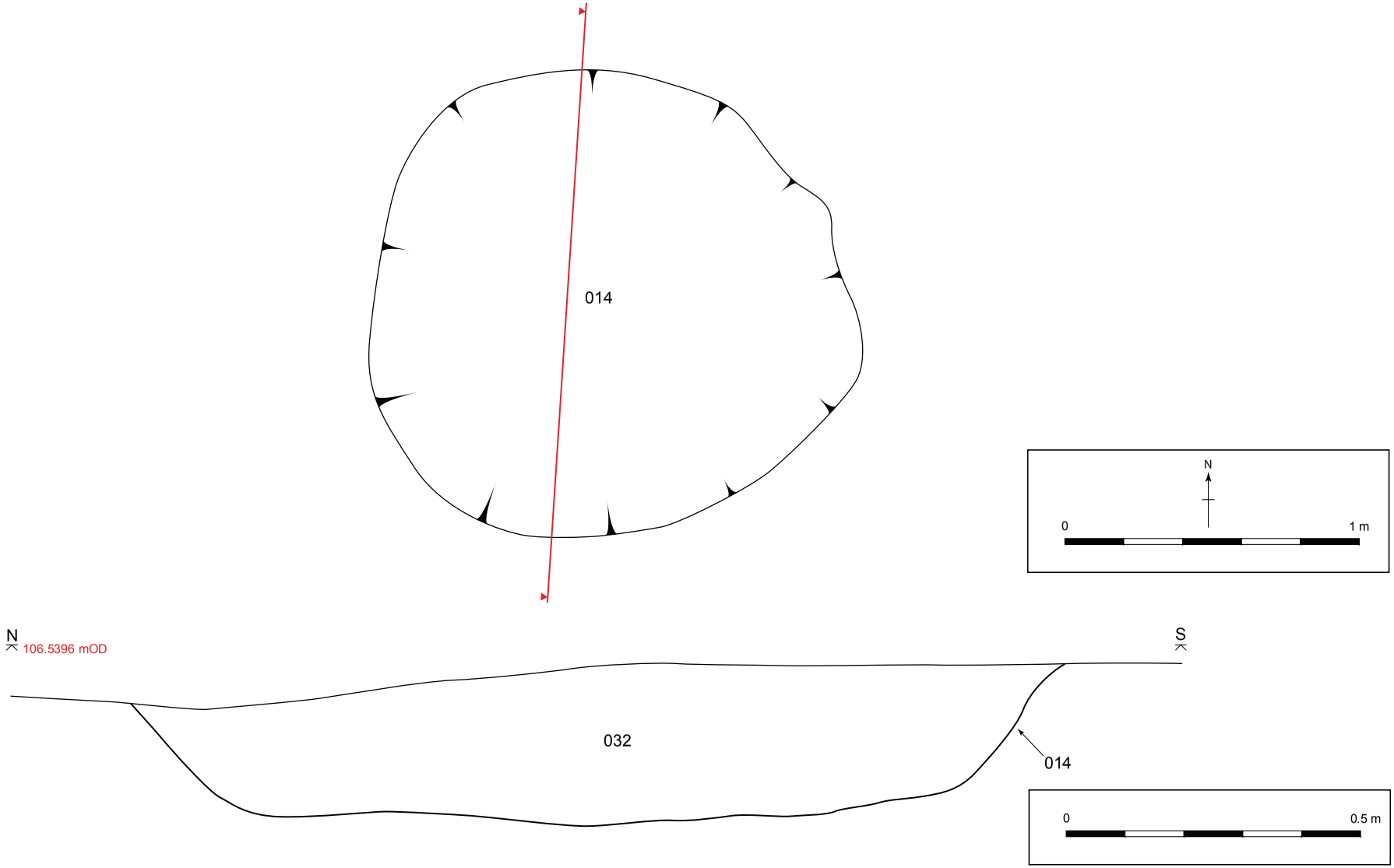


Figure 6 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow.
Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road.
E2870, Plan of and west-facing section through Pit (014).

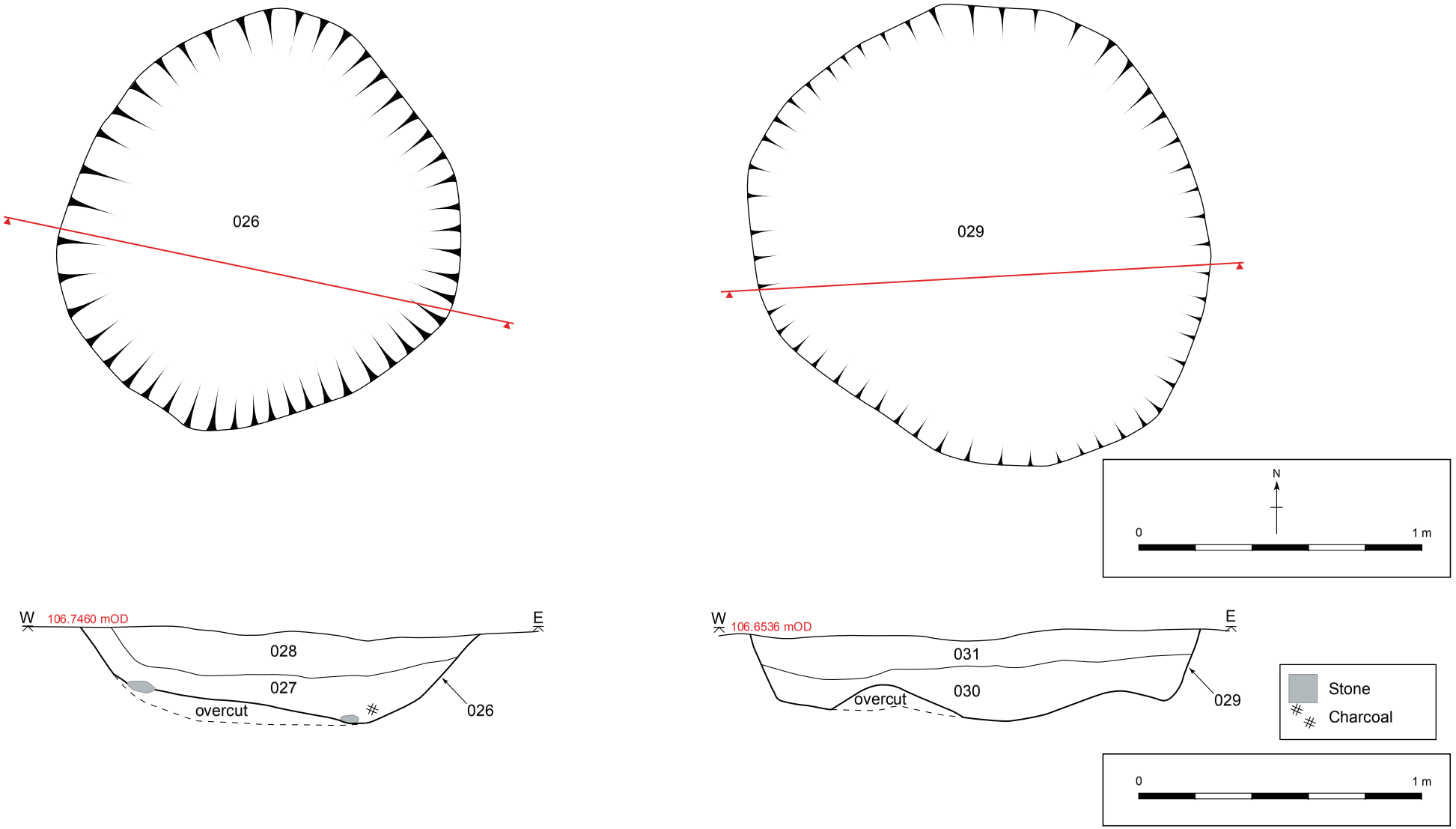


Figure 7 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow.
Archaeological Services Contract No. 5 - Resolution, Kilcullen to Moone and Athy Link Road.
E2870, Plans of- and south-facing sections through Pits (026) and (029).

Plate 1 - Pre-excavation view of cremation burial pit (006), facing east.

Plate 2 - Mid-excavation view of cremation burial pit (006), facing east.

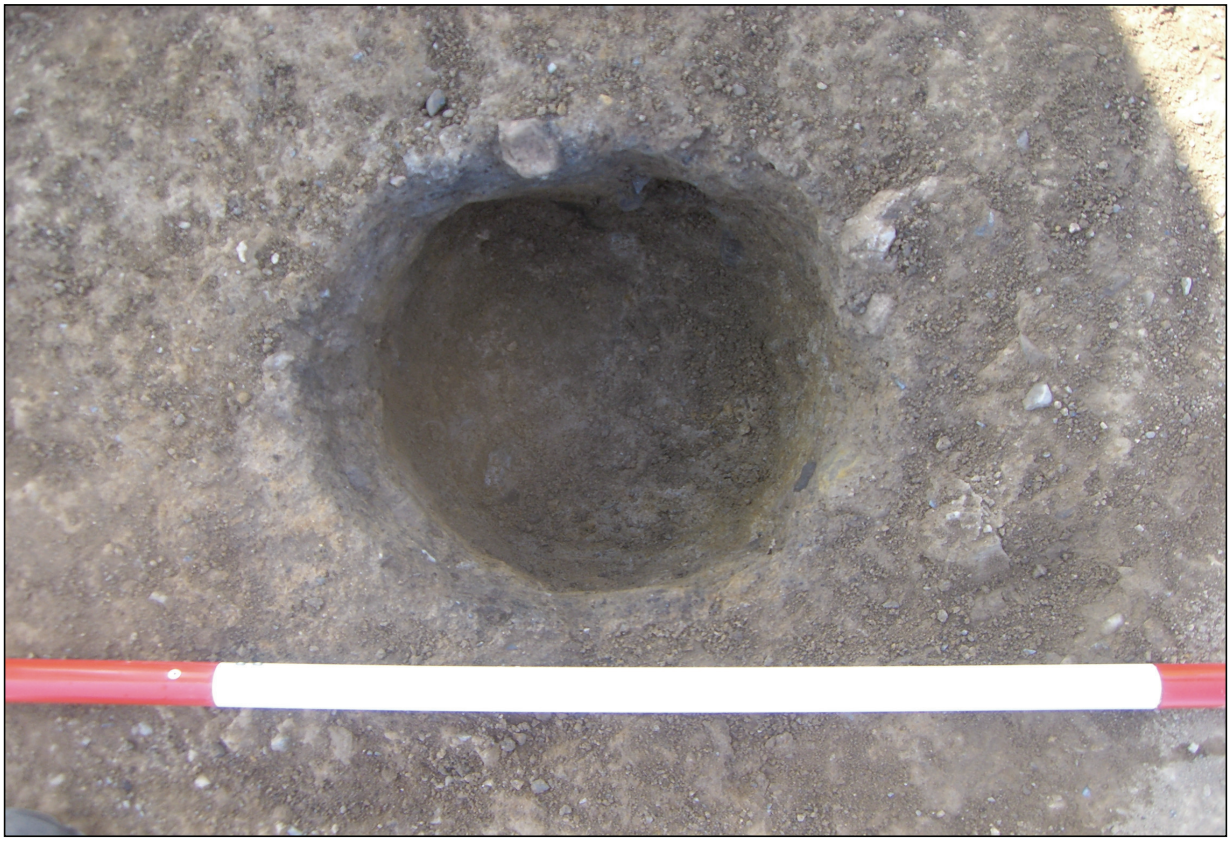


Plate 3 - Post-excavation view of cremation burial pit (006), facing east.

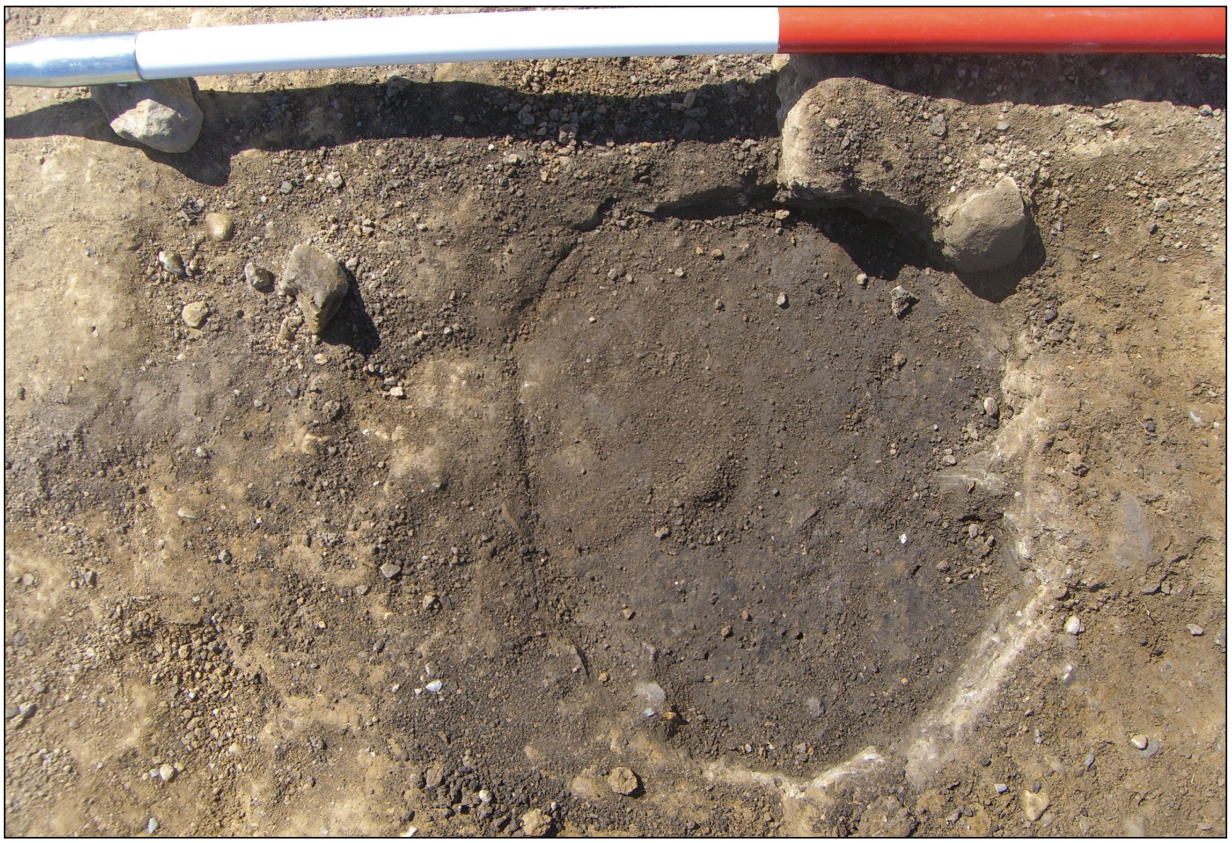


Plate 4 - Mid-excavation view of cremation burial pit (033), facing west.

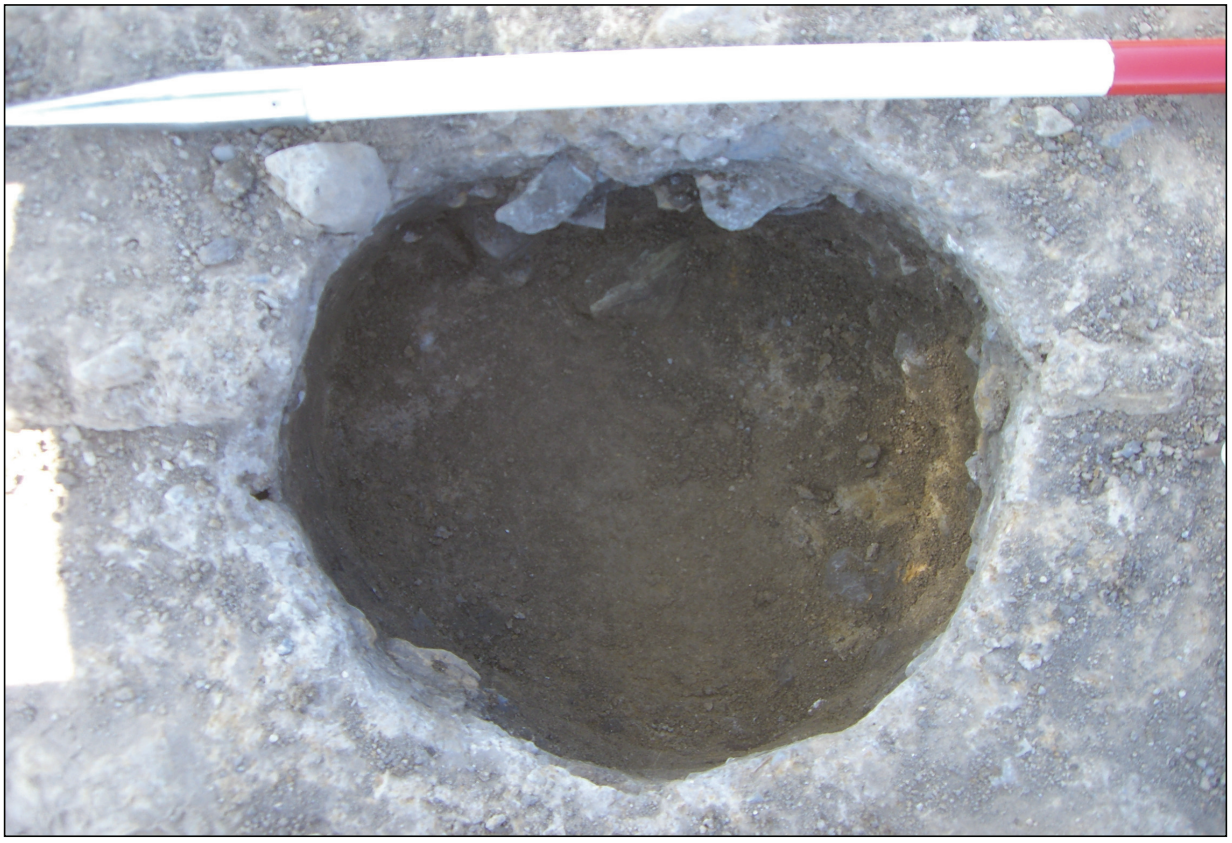


Plate 5 - Post-excavation view of cremation burial pit (033), facing west.

Plate 6 - Post-excavation view of pit (014), facing north.

Plate 7 - Mid-excavation view of pit (026), facing north.

Plate 8 - Post-excavation view of pit (026), facing south.

Plate 9 - Mid-excavation view of pit (029), facing north.

Plate 10 - Post-excavation view of pit (029), facing north.

Plate 11 - Flint debitage E2870:035:001-013.

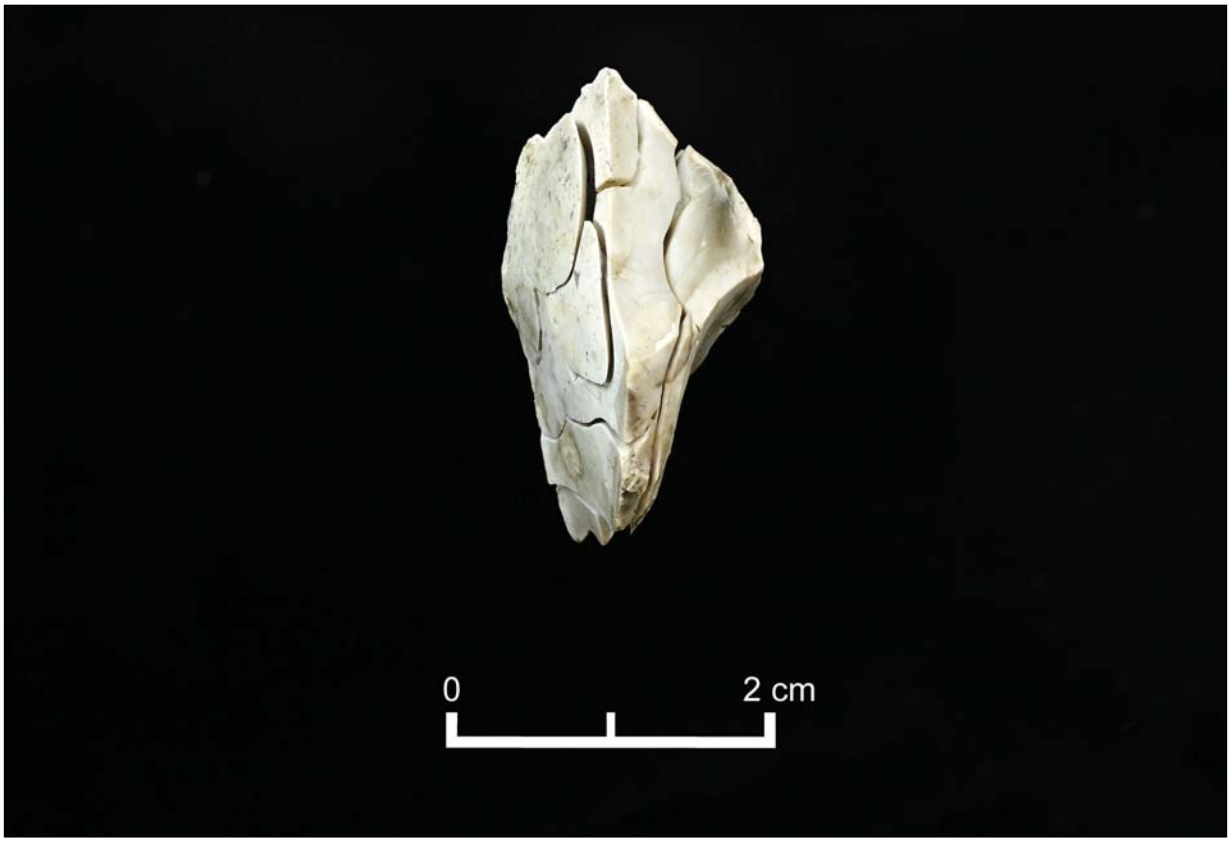


Plate 12 - Refit of flint debitage E2870:035:001-013.

Appendix 1 – Context Register for Site E2870

Context no.	Type	Fill of:	Filled by:	Depth (m)	Width (m)	Length (m)	Description	Interpretation
(001)	Deposit	n/a	n/a		n/a	n/a		Topsoil
(002)	Deposit	n/a	n/a		n/a	n/a		Natural
(003)	Cut	n/a	(004) (005)	0.22	0.64	0.35	Linear feature orientated NW/SE with concave sides and rounded base	Cut of furrow, same as (016)
(004)	Fill	(003)	n/a	0.13	0.51	0.35	Light brownish orange silty clay with frequent stones (1-2 cm)	Base fill of furrow (003) same as (021)
(005)	Fill	(003)	n/a	0.08	0.48	0.35	Light orange yellow silty clay with frequent stone inclusions (0.5-1 cm)	Top fill of furrow (003)
(006)	Cut	n/a	(011) (012) (013)	0.26 - 0.29	0.28	0,34	Round in plan with vertical sides and flat base	Cremation pit
(007)	Cut	n/a	(008) (009) (010)	0.3	0.9	0.4	Linear feature orientated NW/SE with concave sides and rounded base	Cut of furrow, same as (015)
(008)	Fill	(007)	n/a	0.19	0.9	0.4	Mid-orange-brown silty clay with cobbles (15%) and medium pebbles (20%)	Fill of furrow
(009)	Fill	(007)	n/a	0,10	0.64	0,40	Mid-yellowish brown silt	Fill of furrow
(010)	Fill	(007)	n/a	0.5	0.08	0.4	Light orange-brown sandy clay with inclusions :gobbles and medium pebbles	Base fill of furrow (007) same as (020)
(011)	Fill	(006)	n/a		0.34	ca. 0.11, 0.34 (N/S)	Dark brown burnt silt	First fill of (006)
(012)	Fill	(006)	n/a	0.06	0.28	0.34	Light yellowish brown silty sand	Second fill in cut (006)
(013)	Fill	(006)	n/a	0.01	0.28	0.34	Yellowish grey-brown clay silty sand	Third fill of cut (006)
(014)	Cut	n/a	(032)	0.27	1.50	1.50	Circular in plan with concave sides and irregular base	Cut of oval pit

Context no.	Type	Fill of:	Filled by:	Depth (m)	Width (m)	Length (m)	Description	Interpretation
(015)	Cut	n/a	(020)	0.23	0.27	0.61	Linear feature with concave sides and rounded base, running NW/SE	Cut of furrow
(016)	Cut	n/a	(021)	0.19	0.33	0.62	Linear feature with concave sides and tapered rounded base, running NW/SE	Cut of feature, same as (003) just numbered twice
(017)	Cut	n/a	(022)	0.08	0.26	0.41	Linear feature with concave sides and tapered rounded base, running NW/SE	Cut of feature
(018)	Cut	n/a	(023) (024)	0.18	0.24	0.64	Linear feature with concave sides and tapered rounded base, running NW/SE	Cut of furrow same as (034)
(019)	Cut	n/a	(025)	0.08	0.27	0.59	Linear feature with concave sides and tapered pointed base, running NW/SE	Cut of feature, same as (042)
(020)	Fill	(015)	n/a	0.23	0.27	0.6	Mid-orange-brown silty clay with medium pebbles (1%), pebbles (5%), cobbles (1%)	Fill of furrow (015) same as (010)
(021)	Fill	(016)	n/a	0.19	0.33	0.62	Mid-orange-brown silty clay with medium pebbles (1%) and pebbles (5%)	Fill of furrow (016), same as (004)
(022)	Fill	(017)	n/a	0.08	0.26	0.41	Mid-orange-brown silty clay with medium pebbles (5%), pebbles (5%)	Fill of furrow
(023)	Fill	(018)	n/a	0.13	0.24	0.64	Mid-orange-brown silty clay with medium pebbles (5%) and pebbles (10%)	Fill of furrow, same as (036)
(024)	Fill	(018)	n/a	0.06	0.23	0.33	Light orange brown silty clay with medium pebbles (5%) and pebbles (10%)	Fill of furrow
(025)	Fill	(019)	n/a	0.26	0.08	0.59	Mid-orange-brown silty clay with gobbles (1%) and medium pebbles (5%)	Fill of furrow (019) same as (043)
(026)	Cut	n/a	(027) (028)	0.45	1.51	1.51	Bowl shaped with flat base and 80-60 grades sloping sides	Cut of bowl shaped pit
(027)	Fill	(026)	n/a	0.17	1.31	1.31	Mid-brown mottled orange clay with lots of charcoal	Fill of pit (poss. natural redeposit)
(028)	Fill	(026)	n/a	0.15	1.31	1.31	Mid-brown / dark brown grey silty clay with lots of small burnt stones, frequent charcoal and stones	Fill of pit

Context no.	Type	Fill of:	Filled by:	Depth (m)	Width (m)	Length (m)	Description	Interpretation
(029)	Cut	n/a	(030) (031)	0.33	1.65	1.65	Bowl shaped, rounded with concave sides and irregular base	Cut of bowl shaped pit
(030)	Fill	(029)	n/a	0.33	1.65	1.65	Orange and grey clay with burnt stones and medium size stones and charcoal	Fill of pit
(031)	Fill	(029)	n/a	0.15	1.65	1.65	Dark brown and grey silty clay with charcoal, burnt stones and middle size stones	Fill of pit
(032)	Fill	(014)	n/a	0.27	1.51	1.51	Light greyish brown silty sand with medium pebbles	Fill of pit
(033)	Cut	n/a	(035) (037)	0.23	0.35	0.35	Circle, rounded with vertical sides and flat base	Cut of cremation pit
(034)	Cut	n/a	(036)	0.23	0.55	0.78	Linear, running NW/SE with convex sides and flat base	Cut of furrow
(035)	Fill	(033)	n/a	0.15	0.34	0.35	Blackish burned sandy silt with charcoal, burnt bones, stones and flakes of flint	Fill of pit (cremation layer)
(036)	Fill	(034)	n/a	0.21	0.53	0.78	Loose mid-brown sandy silt with stones and small roots	Fill of furrow (034) same as (018)
(037)	Fill	(033)	n/a	0.08	0.34	0.35	Loose dark brown sandy silty clay with stones, charcoal and burnt bones	Fill of cremation pit
(038)	Cut	n/a	(039)	0.22	0.4	0.55	Slightly curved linear with concave sides and tapered blunt point base Slots were used to examine further and find the rest but it showed it is more likely to be natural	Non-archaeological
(039)	Fill	(038)	n/a	0.22	0.4	0.55	Light brownish yellow silty clay	Fill of (038) natural, Non-archaeological
(040)	Cut	n/a	(041)	0.07	0.08	0.08	Circular in plan, no corners with sharp sides and tapered blunt point	Natural feature
(041)	Fill	(040)	n/a	0.07	0.08	0.08	Mid-orange-brown silt	Natural feature
(042)	Cut	n/a	(043)	0.2	0.67	0.26	Linear feature running NW/SE with vertical sides, concave almost flat base, same as (019)	Cut of furrow, same as (019)

Context no.	Type	Fill of:	Filled by:	Depth (m)	Width (m)	Length (m)	Description	Interpretation
(043)	Fill	(042)	n/a	0.08	0.25	0.38	Fine, loose mid-brown sandy silt with small stones and roots	Fill of furrow (042) same as (025)
(044)	Cut	n/a	(045)	0.07	0.25	0.34	Semi-circular very shallow with concave sides and tapered rounded point base	Non-archaeological
(045)	Fill	(044)	n/a	0.07	0.25	0.34	Yellow brown silty clay	Non-archaeological
(046)	Fill	(047)	n/a	0.15	0.14	0.15	Firm mid-orange brown sandy (40%) silt (60%)	Non-archaeological
(047)	Cut	n/a	(046)	0.15	0.14	0.15	Oval in plan with concave side from W, S, N and convex form E, Tapered rounded base	Non-archaeological
(048)	Cut	n/a	(049)	0.06	0.13	0.11	Oval in plan with concave sides and moderate tapered blunt point	Non-archaeological
(049)	Fill	(048)	n/a	0.06	0.13	0.11	Dark brown sandy silt	Non-archaeological
(050)	Cut	n/a	(051)	0.05	0.12	0.11	Round in plan with concave sides and tapered pointed base	Non-archaeological
(051)	Fill	(050)	n/a	0.05	0.12	0.11	Dark brown sandy silty clay with one small stone	Non-archaeological
(052)	Cut	n/a	(053)	0.12	0.22	0.17	Oval / rounded in plan with concave sides and tapered point base	Non-archaeological
(053)	Fill	(052)	n/a	0.12	0.22	0.17	Light yellowish brown sandy silt	Non-archaeological
(054)	Cut	n/a	(055)	0.31	0.25	0.28	Circular in plan with vertical sides and rounded base	Non-archaeological
(055)	Fill	(054)	n/a	0.31	0.25	0.28	From moderate to loose mid-orangey brown sandy silt	Non-archaeological
(056)	Fill	(065)	n/a	0.06	0.45	E - W	Soft light greyish brown sandy silt	Fill of furrow
(057)	Cut	n/a		0.04	0.11	0.08	Round with concave sides and round flat base	Non-archaeological
(058)	Fill	(057)	n/a	0.04	0.11	0.08	Firm light yellowish brown sandy silt	Non-archaeological
(059)	Cut	n/a	(060)	0.15	0.15	0.31	Irregular oval with sides sharp / vertical at N and slightly gradual in S , tapered point base	Non-archaeological

Context no.	Type	Fill of:	Filled by:	Depth (m)	Width (m)	Length (m)	Description	Interpretation
(060)	Fill	(059)	n/a	0.15	0.15 (S), 0.13 (N)	0.31	Fine and loose mid-yellowish brown sandy silt with small stones, small roots and pebbles	Non-archaeological
(061)	Cut	n/a	(062)	0.21	0.62	0.62	Slightly curved linear with concave sides and tapered blunt point base	Non-archaeological
(062)	Fill	(061)	n/a	0.21	0.62	0.62	Light yellow silty clay with pebbles (5%), medium pebbles (10%) and gobbles (1%)	Non-archaeological
(063)	Cut	n/a	(064)	0.12	0.38	0.44	Slightly curved linear with concave sides and tapered blunt point base	Non-archaeological
(064)	Fill	(063)	n/a	0.12	0.058	0.44	Light brownish yellow sandy silt	Non-archaeological
(065)	Cut	n/a	(056)	0.06	0.45	W-E	Linear feature running through the site with gradual sides and flat base	Cut of furrow

Appendix 2 – Finds Register for Site E2870

Find no.	Material	Type	Identification	Description
E2870:001:001	Metal	Iron object	Post-medieval	Possible knife blade or nail shaft
E2870:001:002	Ceramic	Ceramic	Post-medieval	Modern Pottery
E2870:035:001	Stone	Flint	Prehistoric	Flint flake-cortex backed
E2870:035:002	Stone	Flint	Prehistoric	Flint flake
E2870:035:003	Stone	Flint fragments	Prehistoric	Flint spall
E2870:035:004	Stone	Flint	Prehistoric	Flint spall
E2870:035:005	Stone	Flint	Prehistoric	Flint spall
E2870:035:006	Stone	Flint	Prehistoric	Flint spall
E2870:035:007	Stone	Flint	Prehistoric	Flint potlid spall
E2870:035:008	Stone	Flint	Prehistoric	Flint potlid spall
E2870:035:009	Stone	Flint	Prehistoric	Flint potlid spall
E2870:035:010	Stone	Flint	Prehistoric	Flint potlid spall
E2870:035:011	Stone	Flint	Prehistoric	Flint potlid spall
E2870:035:012	Stone	Flint	Prehistoric	Flint spall
E2870:035:013	Stone	Flint	Prehistoric	Flint indet

Appendix 3 – Sample Register for Site E2870

Sample no.	Context no.	Description
E2870:001	(004)	Fill of (003) furrow
E2870:002	(006)	Fill of (006) (011), (012), (013) cremation
E2870:003	(010)	Fill of (007) furrow
E2870:004	(024)	Fill of (018) furrow
E2870:005	(027)	Fill of (026) base pit
E2870:006	(028)	Fill of (026) top pit
E2870:007	(035)	Fill of (034) in slot 8, furrow 4
E2870:008	(030)	Fill of (029) in pit 2
E2870:009	(031)	Fill of (029) in pit 2
E2970:010	(041)	Fill of (040) stake-hole
E2870:011	(035)	Fill of (033) spit 1,2,3 cremation
E2870:012	(043)	Fill of (042) in slot 10, furrow 5
E2870:013	(032)	Fill of (014), light greyish brown silty sand
E2870:014	(046)	Fill of stake-hole (047) mid orangey brown
E2870:015	(053)	Fill of posthole (052)
E2870:016	(055)	Fill of posthole (054)
E2870:017	(049)	Fill of stake-hole (048)
E2870:018	(058)	Fill of poss. stake-hole (057)
E2870:019	(045)	Void Non Archaeological
E2870:020	(060)	Fill of posthole (059)
E2870:021	(045)	Void Non Archaeological
E2870:022	(039)	Void Non Archaeological
E2870:023	(051)	Fill of stake-hole (050)
E2870:024	(062)	Void Non Archaeological
E2870:025	(028)	Bones of Animals, (027) (026), pit
E2870:026	(027)	Bones of Animals (026), pit
E2870:027	-	Void Animal fossil, not animal bone
E2870:028	(037)	Fill of (033) spit 4 cremation
E2870:029	(001)	Slag from topsoil

Appendix 4 – Photo Register for Site E2870

Photo Number	Direction facing	Description
E2870:001	NW	Post-ex of (042) slot 10 furrow
E2870:002	E	Working Shot
E2870:003	E	Working Shot
E2870:004	E	Pits (026), (029) and Furrow (007)
E2870:005	S	Site photo
E2870:006	N	Post-ex stake-hole (047)
E2870:007	N	Mid-ex stake-hole (048)
E2870:008	S	Mid-ex stake-hole (050)
E2870:009	S	Mid-ex stake-hole (052)
E2870:0010	N	Post-ex (048)
E2870:0011	S	Post-ex (050)
E2870:0012	E	Post-ex (057)
E2870:0013	W	Post-ex (054)
E2870:0014	W	Post-ex (059)
E2870:0015	N	Post-ex (038)
E2870:0016		Post-ex posthole (050)
E2870:0017	N	Post-ex (014)
E2870:0018	W	Slot 1Furrow 6 (065)
E2870:0019	W	Post-ex of entrance (061)
E2870:0020	E	Pre-ex possible cremation
E2870:0021	E	Cremation (006)
E2870:0022	N	Cremation (006)
E2870:0023	N	Cremation (006)
E2870:0024	S	Cremation (006)
E2870:0025	E	Post-ex furrow (003)
E2870:0026	E	Cremation (006)
E2870:0027	S	Cremation (006)
E2870:0028	E	Cremation (006)
E2870:0029	S	Cremation (006)
E2870:0030	E	Cremation (006)
E2870:0031	S	Cremation (006)
E2870:0032	E	Cremation (006)
E2870:0033	S	Cremation (006)
E2870:0034	S	Cremation (006)
E2870:0035	W	Post-ex furrow (007)
E2870:0036	W	Post-ex furrow (007)
E2870:0037	W	Post-ex (006)
E2870:0038	W	Post-ex (006)
E2870:0039	N	Pre-ex (014)
E2870:0040	E	W facing section (014)(032)
E2870:0041	W	Pre-ex (033)
E2870:0042	W	Pre-ex (033)
E2870:0043	W	Post-ex furrow (015)
E2870:0044	W	Post-ex furrow (016)
E2870:0045	W	Post-ex furrow (017)

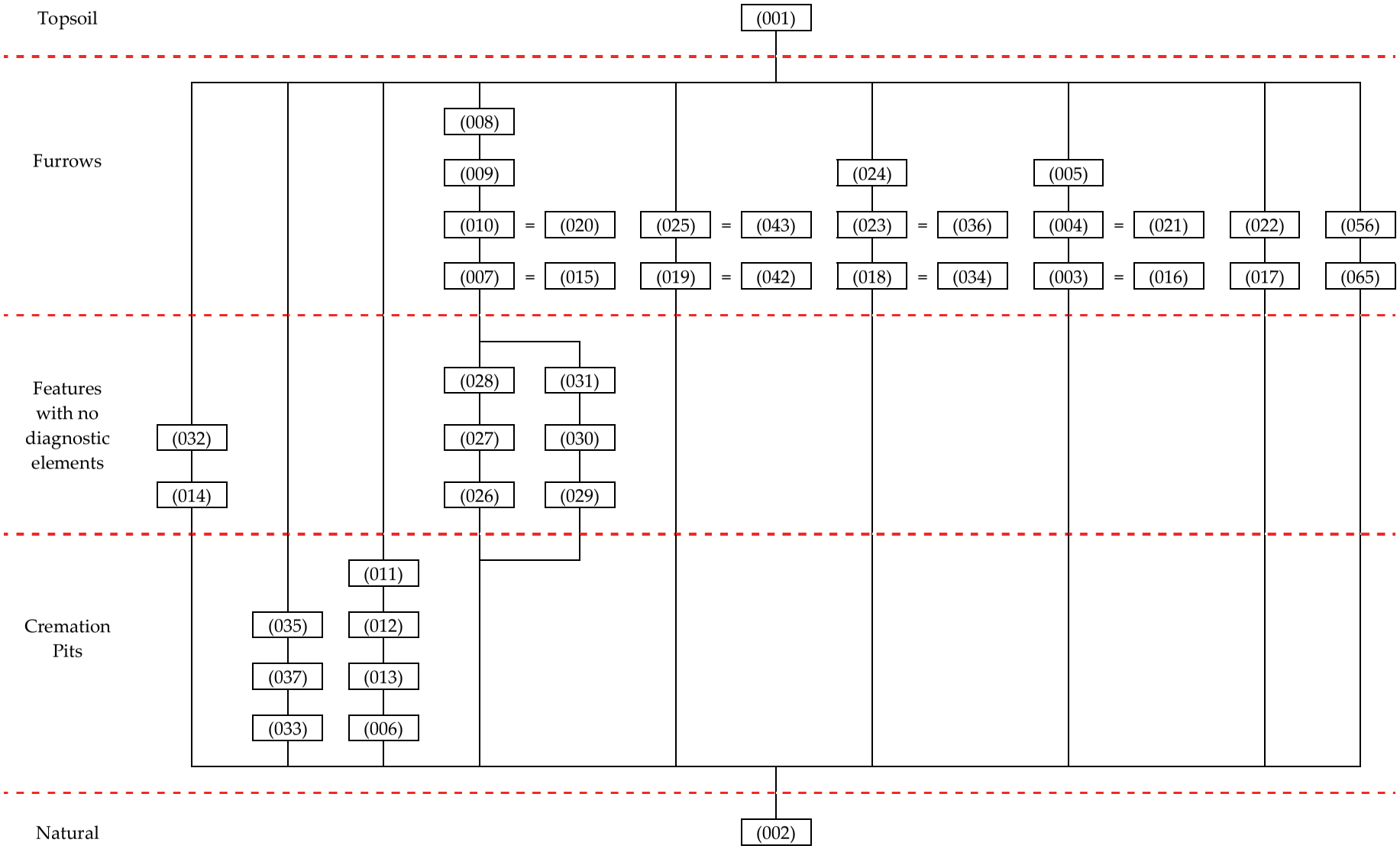
Photo Number	Direction facing	Description
E2870:0046	W	Post-ex furrow (018)
E2870:0047	W	Post-ex furrow (019)
E2870:0048	S	Mid-ex (029)
E2870:0049	S	Mid-ex (029)
E2870:0050	S	Mid-ex (026)
E2870:0051	S	Mid-ex (026)
E2870:0052	W	Post-ex (034)
E2870:0053	W	Post-ex (034)
E2870:0054	E	Mid-ex (033)
E2870:0055	S	Mid-ex (033)
E2870:0056	S	Post-ex (029)
E2870:0057	S	Post-ex (029)
E2870:0058	S	Post-ex (026)
E2870:0059	E	Mid-ex (033)(035)
E2870:0060	N	Mid-ex (033)(035)
E2870:0061		Flint flakes from (033)
E2870:0062		Flint flakes from (033)
E2870:0063	W	Mid-ex (033) (037)
E2870:0064	S	Mid-ex (033) (037)
E2870:0065	N	Post-ex (033)
E2870:0066	W	Post-ex (033)
E2870:0067	N	Post-ex stake-hole (038)
E2870:0068	E	Post-ex stake-hole (040)
E2870:0069	W	Mid-ex posthole (055)
E2870:0070	W	Post-ex posthole (050) Photo missing!

Appendix 5 – Drawing Register for Site E2870

Drawing No.	Type	Scale	Description
001	Plan	1:20	Pre-ex in plan of (006) cremation
002	Section	1:10	Mid-ex of pit 1 (026) (section)
003	Section	1:10	Mid-ex of pit 2 (029) (section)
004	Section	1:10	Mid-ex of pit 3 (014) (section)
005	Plan	1:10	Post-ex of pit 1 (026)
006	Plan	1:10	Post-ex of pit 2 (029)
007	Section	1:10	Post-ex of slot 3 (015) furrow
008	Section	1:10	Post-ex of slot 1 (003) furrow
009	Section	1:10	Post-ex of slot 2 (007) furrow
010	Section	1:10	Post-ex of slot 6 (018) furrow
011	Section	1:10	Post-ex of slot 5 (017) furrow
012	Section	1:10	Post-ex of slot 7 (019) furrow
013	Section	1:10	Post-ex of slot 4 (016) furrow
014	Section	1:10	Post-ex of slot 9 (038) Non Archaeological
015	Section	1:10	Post-ex of slot 8 (034) furrow
016	Plan	1:50	Pre-ex plan of site, 4 parts
017	Plan	1:10	Post-ex of (014) pit
018	Section	1:10	Post-ex profile of stake-hole (047) S-facing
019	Section	1:10	Mid-ex section of stake-hole (048)
020	Section	1:10	Mid-ex profile of posthole (054)
021	Plan	1:10	Post-ex plan of cut (posthole) (054)
022	Section	1:10	Mid-ex of stake-hole (050)
023	Section	1:10	Mid-ex of posthole (052)
024	Section	1:10	Post-ex of posthole (059)
025	Section	1:10	Post-ex of posthole (059)
026	Section	1:10	Mid-ex of slot 1 (065) furrow
027	Plan	1:50	Pre-ex plan
028	Section	1:10	Post-ex of cut (061) Non Archaeological
029	Plan	1:50	Pre-ex plan
030	Plan	1:50	Pre-ex plan
031	Section	1:10	West facing section of furrow (042)

Drawing No.	Type	Scale	Description
032	Section	1:10	Section through cremation (006)
033	Section	1:10	Section through cremation (033)

Appendix 6 – E2870 Site Matrix



Appendix 7 – Palaeoenvironmental samples report for Blackrath, Co. Kildare, E2870
By: Karen Stewart MSc

Introduction

Twenty-seven environmental samples were taken during the excavation at Blackrath, Co. Kildare, E2870, a site comprising two Late Bronze Age cremation pits, three pits and a number of modern furrows.

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 summarised below in Tables 2 (Composition of flots) and 3 (Composition of retents). All plant material was preserved by charring. Not all samples produced both a flot and a retent. Samples 004, 006, 007, 008, 009, 010, 012, 013, 014, 015, 016, 017, 018, 019, 020, 023 and 024 were all found to contain no material of archaeological significance and have thus been recorded as 'archaeologically sterile'.

Wood charcoal
Wood charcoal was recovered from all those features not found to be archaeologically sterile. The concentrations recovered varied from rare (+) to common (+++). The highest concentrations were recovered from samples 002 and 011, taken from (011) and (035), fills of cremation pits (006) and (033) respectively.

Other charred plant remains
Charred hazelnut (*Corylus avellana*) shell was recovered from samples 002 and 011, both fills of cremation pits, (006) and (033) respectively.

Charred naked barley (*Hordeum vulgare* var. *nudum*) grains were recovered from sample 011, taken from (035), a fill of cremation pit (033).

Other material
Burnt bone was recovered from all samples taken from cremation pits (samples 002, 011, and 028), as well as sample (005), from a fill of pit (026) This is analysed in the osteological remains report in Appendix 8.

Radiocarbon dates results
Two samples were radiocarbon dated from this site. Sample 2 from the fill of a cremation pit (011), was dated to 1120-840 cal BC (2 σ) (SUERC- 25366) and Sample 11, also from the fill of a cremation pit (035) was dated to 1050-810 cal BC (2 σ) (SUERC- 25367).

Radiocarbon dating was undertaken by Gordon Cooke at Scottish Universities Environmental Research Centre (SUERC), after Reimer *et al* (2004). Calibrated age ranges were calculated using radiocarbon calibration program CALIB REV5.0.2. The results are presented in Table 1.

Discussion

Many of the samples were taken from features which have subsequently been interpreted as non-archaeological features (McCarthy 2009), and most of these were found to contain no material of archaeological significance, which would support these interpretations. However two of the samples taken from non-archaeological features were found to contain charcoal – Sample 021, taken from (045), a fill of (044) and Sample 022, taken from (039), a fill of (038). However, the concentrations of charcoal recovered from these features were very low, with the exception of samples 002 and 011m, and may have been deposited by natural action such as rainwash, and thus does not necessarily preclude a non-archaeological interpretation of these features.

The presence of wood charcoal implies that anthropogenic conflagration events were occurring in the vicinity, and that wood was being used as a fuel source. The fact that charcoal was found in association with cremation deposits, as in samples 002, 011 and 028, also indicates some knowledge of local woodlands and the properties of different woods, as not all woods will burn well or long enough to produce the temperatures required for cremation of a human body, which must usually exceed 800˚C (Walker and Miller 2005), and large volumes of wood are required in order to fully cremate a body (Holck 1986). Sample 005 also contained bone but this could not be identified to animal or human (Appendix 8) and so the charcoal deposited here may have had a different origin than that in the cremation deposits.

The charred grain recovered from Sample 011, a fill of cremation pit (033), is particularly interesting. Naked barley has been cultivated in Ireland since the Neolithic but grew in popularity as a crop in the Bronze Age, to which the cremation is dated (See Table 1). Five flint flakes were also recovered from this sample, and they have been interpreted as having been burnt in the pyre alongside the body (Appendix 10). The grain is likely to have a similar origin, and more grain may originally have been deposited on the pyre, with only a small percentage surviving, as very specific conditions are required for the preservation of cereals by charring (Boardman and Jones 1990). These conditions include reduced oxygen supply and high temperatures. The high temperatures could obviously have been supplied by the pyre itself; the lack of oxygen was probably caused by the grains being buried beneath ash or other particles.

The recovery of cultivated plant remains from cremation contexts is relatively rare, and so the significant volume of grain recovered from (035) is interesting. Two contexts, basal fill (1081) of pit (1080) and fill (1016) of pit (1015) excavated on site E2570 in Burtonhall Demesne, Co. Kildare were found to contain cremated bone and various types of cereal grain (club wheat, hulled barley, cereal indeterminate, *Avena sp*., *Hordeum Vulgarae*, *Triticum aestivo compactum* and Avena sp., hulled barley, cereal indeterminate, respectively (Stewart 2009, Stephenson 2009). A single charred barley (*Hordeum* sp.) grain was recovered from a cremation deposit at Barnagore, Co. Cork, excavation number (02E0400) (Hall 2003), from which flax (*Linum usitatissimum*) was also recovered.

Hazelnuts occur frequently on prehistoric sites (McComb and Simpson 1999); those preserved by charring likely represent a small fraction of what might have been consumed on the site (*ibid*.). Ordinarily charred hazelnut shells are seen as waste fragments of hazelnut consumption. As the nutshell on this site was recovered from the two cremation pits, (006) and (033), it may be the case

that they represent the surviving fragments of a pyre deposit. However, in the case of hazelnut shell, where it occurs alongside charcoal, it remains a possibility that hazelnuts were included in the conflagration if hazel wood was being used as a fuel source.

Conclusion

Two cremation deposits were found to contain significant volumes of charcoal, with one also containing significant concentrations of charred grain. The charred grain, and possibly hazelnut shell fragments, may represent a 'grave good'.

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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
E2870	SUERC-25366		cremated human bone	-23.6	2815 +/- 50	1040 - 900 cal BC	1	1120 - 840 cal BC	1
E2870	SUERC-25367		cremated human bone	-25.6	2775 +/- 50	980 - 890 cal BC	51	1050 - 810 cal BC	1
						880 - 840 cal BC	17		

Table 1 - Results of radiocarbon dating

Context number	Sample number	Total flot vol. (ml)	Charcoal			Comments
			Quantity	Max size (cm^3)	AMS	
004	001	10	+	0.1		
024	004	5				Archaeologically sterile
027	005	5				Archaeologically sterile
028	006	1				Archaeologically sterile
036	007	10				Archaeologically sterile
030	008	5				Archaeologically sterile
031	009	2				Archaeologically sterile
041	010	5				Archaeologically sterile
043	012	5				Archaeologically sterile
032	013	5				Archaeologically sterile
046	014	1				Archaeologically sterile
053	015	5				Archaeologically sterile
055	016	5				Archaeologically sterile
049	017	2				Archaeologically sterile
058	018	2				Archaeologically sterile
045	019	10				Archaeologically sterile
060	020	10				Archaeologically sterile
045	021	5				Archaeologically sterile
039	022	5				Archaeologically sterile
051	023	1				Archaeologically sterile
062	024	1				Archaeologically sterile

Table 2 – Composition of flots
Key: + = rare, ++ = occasional, +++ = common and ++++ = abundant
* = sufficient sized charcoal for identification and AMS dating

Context number	Sample number	Retent vol. (L)	Context/ Sample description	Wood charcoal		Mammal bone		Nutshell	charred seed	Worked Stone	Comments
				Qty	AMS	Burnt	Unburnt				
004	001	1	Fill of furrow (003)	+							
011	002	18	Fill of cremation (006)	+++	*	+++		+			Cremation spits 1-6
024	004	1.5	Fill of furrow (018)								Archaeologically sterile
027	005	1.5	Basal fill of pit (026)	++		+					
028	006	1	Top fill of pit (026)								Archaeologically sterile
036	007	2	Fill of furrow (034)								Archaeologically sterile
030	008	1	Basal fill of pit (029)								Archaeologically sterile
031	009	0.25	Upper fill of pit (029)								Archaeologically sterile
041	010	0.1	Fill of non-archaeological feature (040)								Archaeologically sterile

Context number	Sample number	Retent vol. (L)	Context/ Sample description	Wood charcoal		Mammal bone		Nutshell	charred seed	Worked Stone	Comments
				Qty	AMS	Burnt	Unburnt				
035	011	5	Fill of cremation pit (033)	+++	*	++		+	++ *Hordeum vulgare var. nudum*	+ Flint (5 burnt flakes)	Cremation spits 1-3
043	012	1.5	Fill of furrow (042)								Archaeologically sterile
032	013	1	Fill of pit (014)								Archaeologically sterile
046	014	0.2	Fill of non-archaeological feature (047)								Archaeologically sterile
053	015	1	Fill of non-archaeological feature (052)								Archaeologically sterile
055	016	0.5	Fill of non-archaeological feature (054)								Archaeologically sterile

Context number	Sample number	Retent vol. (L)	Context/ Sample description	Wood charcoal		Mammal bone		Nutshell	charred seed	Worked Stone	Comments
				Qty	AMS	Burnt	Unburnt				
049	017	0.1	Fill of non-archaeological feature (048)								Archaeologically sterile
058	018	0.1	Fill of non-archaeological feature (057)								Archaeologically sterile
045	019	1	Fill of non-archaeological feature (044)								Archaeologically sterile
060	020	1	Fill of non-archaeological feature (059)								Archaeologically sterile
045	021	1	Fill of non-archaeological feature (044)	+	*						
039	022	1	Fill of non-archaeological feature (038)	+	*						

Context number	Sample number	Retent vol. (L)	Context/ Sample description	Wood charcoal		Mammal bone		Nutshell	charred seed	Worked Stone	Comments
				Qty	AMS	Burnt	Unburnt				
051	023	0.1	Fill of non-archaeological feature (050)								Archaeologically sterile
062	024	1	Fill of non-archaeological feature (061)								Archaeologically sterile
037	028	1	Fill of cremation pit (033)	+	*	++					Cremation spit 4

Table 3 – Composition of retents
Key: + = rare, ++ = occasional, +++ = common and ++++ = abundant
* = sufficient sized charcoal for identification and AMS datin

Appendix 8 – The osteological remains from Blackrath, Co. Kildare (E2870)
By: Carmelita Troy MA, Auli Tourunen PhD and Albína Hulda Pálsdóttir MA

Summary

This document is submitted as a report on the post-excavation treatment and analysis of cremated human remains retrieved from the site at Blackrath, Co. Kildare E2870, which was excavated under the direction of Gillian McCarthy, Headland Archaeology (Ireland) Ltd. This document details the processing and analytical protocols which were undertaken, to complete the report.

Resolution on this site revealed two cremation pits, three pits and a number of modern furrows. The cremation and 'token' burial contained in two pits were recovered from Blackrath, comprised bone weighing a total of 219.8 g. The minimum number of individuals (MNI) represented is one adult, possibly female. Approximately 11.5 % of both cremations could be positively identified to element. The cremation was highly efficient, with evidence for pyre temperatures of over 800°C, to allow for the full oxidisation of over 90% of the bone present in the assemblage. The animal bone specimens were recovered by hand-picking and they derive from fills (027) and (028) of pit (026), which is undated. This pit (026) also contained 0.2 g of burnt bone unidentified to source, either human or animal.

Introduction

This document is submitted as a report on the osteological analysis of cremated human remains recovered during archaeological excavation at Blackrath E2870, under the direction of Gillian McCarthy of Headland Archaeology (Ireland) Ltd. The cremation burial from this site consists of a moderate quantity of bone from pit (006). The token burial from pit (033) contained a small amount of bone. The animal bone specimens were recovered by hand-picking and they derive from fills (027) and (028) of pit (026), which is unphased. This pit (026) also contained burnt bone unidentifiable to source, either human or animal.

Methodology

Human remains
Processing: All contexts containing human bone were 100% sampled and carefully wet-sieved through a sieve bank of 10 mm, 5 mm and 2 mm mesh sizes, under the supervision of a qualified osteologist. Any grave goods, pyre debris and charcoal recovered during this process were retained for examination by the appropriate specialist. The cleaned bone was dried and bagged according to mesh size, and packed in museum standard boxes prior to analysis.

Analysis: Following procedure laid down by McKinley (1994b; 2004), and Gejvall (1969), the remains from each burial were assessed for:

- Weight
- Degree of fragmentation
- Skeletal elements
- Demographic data - sex, age, minimum number of individuals
- Pathology data
- Efficiency of cremation

Animal bone

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 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).

Results

Human remains

In total, two cremations were fully excavated for human osteological analysis, see Table 1 below.

Context	Sample No.	Spit No.	Description
011	002	-	Primary fill of cremation pit (006)
012	002	-	Secondary fill of cremation pit (006)
035	011	1-3	Fill of cremation pit (033)
037	028	4	Fill of cremation pit (033)

Table 1 – Samples processed for cremation analysis

Cremation fill (011) from pit (006) contained common charcoal and burnt bone. It is also important to note that this feature was excavated in spits 0.05 m deep in an attempt to ascertain, whether the bone was distributed in a deliberate order, or whether it had been placed into the pit with no regard for skeletal element. A lower fill (012) in the cremation pit (006) included frequent charcoal and occasional burnt bone. The quantity of burnt bone from lower fill (012) amounted to 0.4 g. It is possible, due to the minute quantity of bone within this sample that the bone had filtered down from the upper fill (011) and does not represent an additional burial. Cremation pit (006) measured 0.34 m (north/south) by 0.28 m and 0.29 m deep.

Token deposit (035) of pit (033) contained common charcoal and occasional burnt bone. This pit was also excavated in a total of three spits. There were 13 flakes of burnt flint located in Spit 2. A lower fill (037) in the cremation pit (033) also contained occasional burnt bone and rare charcoal. The 1.7 g of bone from fill (037) is perhaps a primary token deposit. However, the quantity of bone is so small, compared to the 22 g of bone from fill (035), that it is impossible to say for certain whether it represents a deliberate deposition. Pit (033) measured 0.36 m by 0.35 m and 0.23 m in depth.

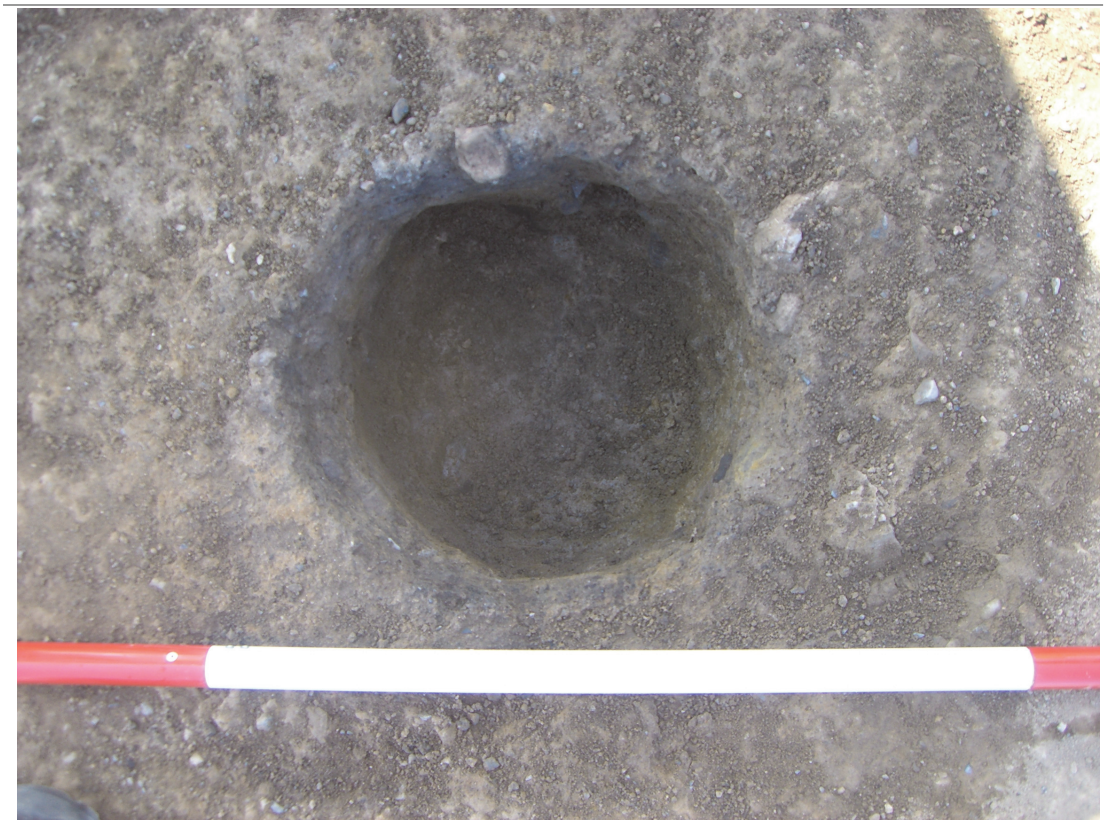

Plate 1 – Post-excavation of cremation pit (006), facing west

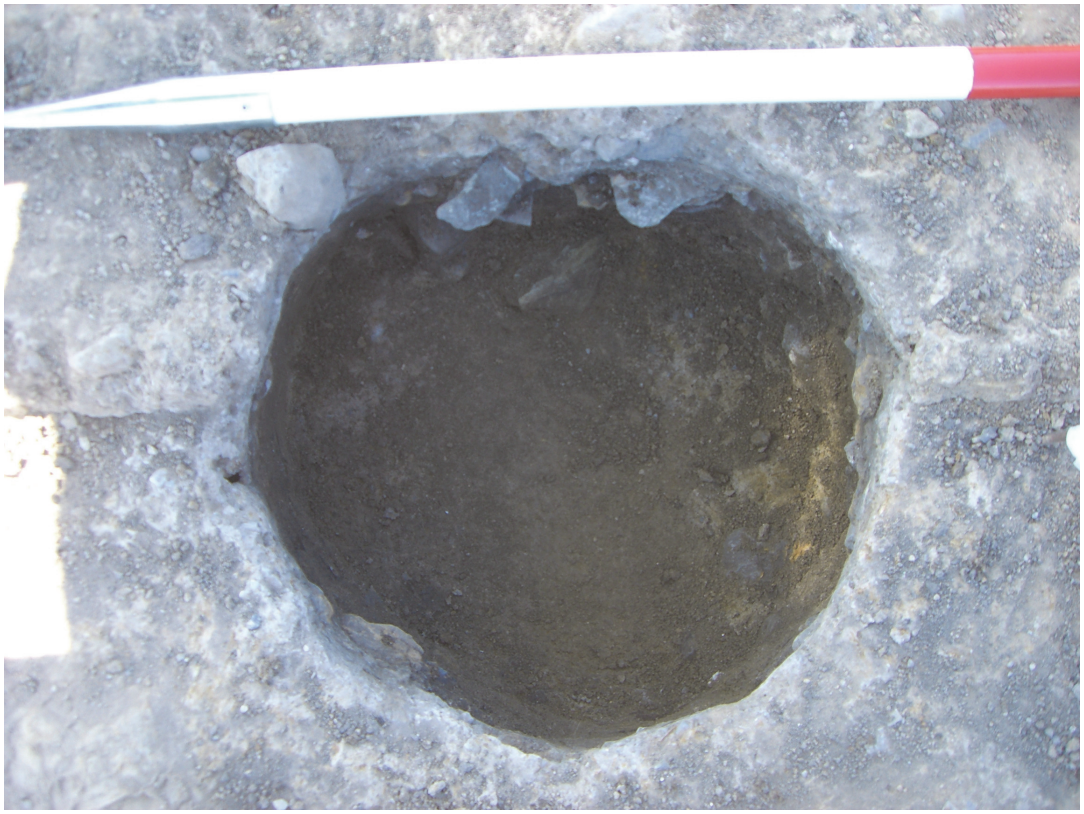

Plate 2 – Post-excavation of pit (033), containing token deposit (035)

Identification and quantification of cremated bone

In order to validate the presence of human material, identification of particular elements of the human body is important. Certain elements may have been purposefully selected following cremation. The absence of some elements, especially those that are smaller, may be due to the lack of their survival as a result of fragmentation during the cremation process, utilisation for different purposes or post-depositional preservation conditions.

Table 2 below summarises the results of the quantification analysis:

Context	Total Weight of Cremated Bone (g)	Total Weight of Identifiable Human Fragments (g)	MNI
035	22	-	0
037	1.7	-	0
011	195.7	22.5	1
012	0.4	-	0
Total	**219.8**	**22.5**	**1**

Table 2 – Summary of the quantification analysis

McKinley (1993) found that modern cremation processes resulted in the production of between 1227.4 g and 3001.3 g of bone. From this she inferred that the cremation of a whole body and deposition of the remains in an archaeological context would realistically produce between 57 g to 2200 g (McKinley 1997, 139) of cremated human bone. The amount of bone from cremation burial (011 and 012) was well within the amount that would be expected, had the cremated bone of a whole adult body been deposited in antiquity. Table 2 shows that the MNI for the site in Blackrath (E2870) is one.

Only context (011) produced bone fragments that had identifiable human elements. Figure 1 below shows the weight distribution of identified fragments from this context:

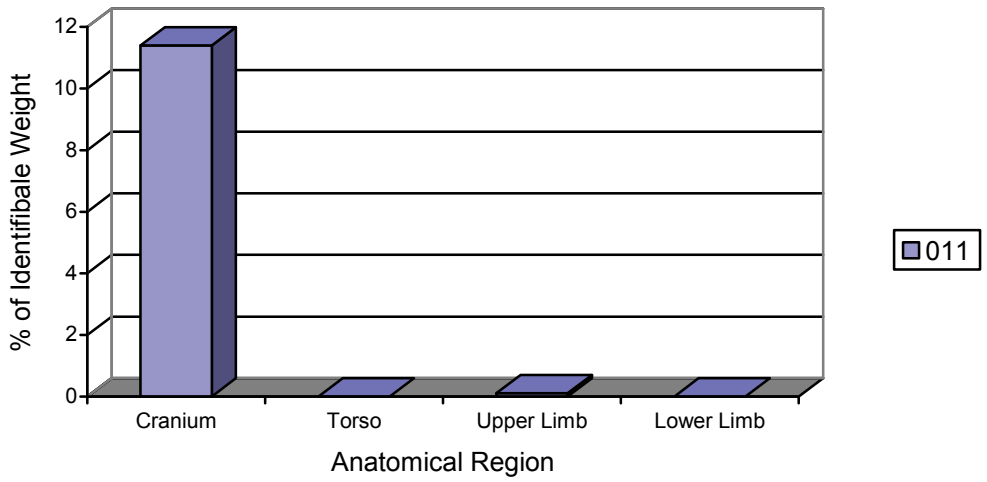

Figure 1 – Distribution of identifiable elements from (011), as percentage of all identifiable fragments in grams. Note only elements which could be identified to anatomical region have been included.

Demographic Data

Age: The individual from cremation burial (011) could not be assigned a biological age at death, beyond the attribution of adult.

Sex: Amongst the remains there were no sexually dimorphic cranial and pelvic elements to be used in the determination of sex. However, for cremation burial (011) the cortical measurement of the maximum parietal thickness fell within the probable female range.

No elements were present in the remaining contexts that could be assessed for indications of the sex of the individual.

Bone fragmentation

The assessment of bone fragmentation is necessary to indicate whether deliberate post-cremation processes were being utilised and give a better understanding into the pyre technology. The quality of the overall analysis is determined on the degree of fragmentation of the cremated bone. After the cremation deposit is wet-sieved through a flotation tank, bone fragmentation is assessed by processing the cremation deposit into three sieve fractions (10 mm, 5 mm, 2 mm) and comparing the proportion of bone in each fraction (McKinley 2004). Measurement of the maximum bone fragment was also recorded from each context.

Figure 2 below, summarises the results of the quantification of cremated bone present by sieve fraction weight and percentage of total weight:

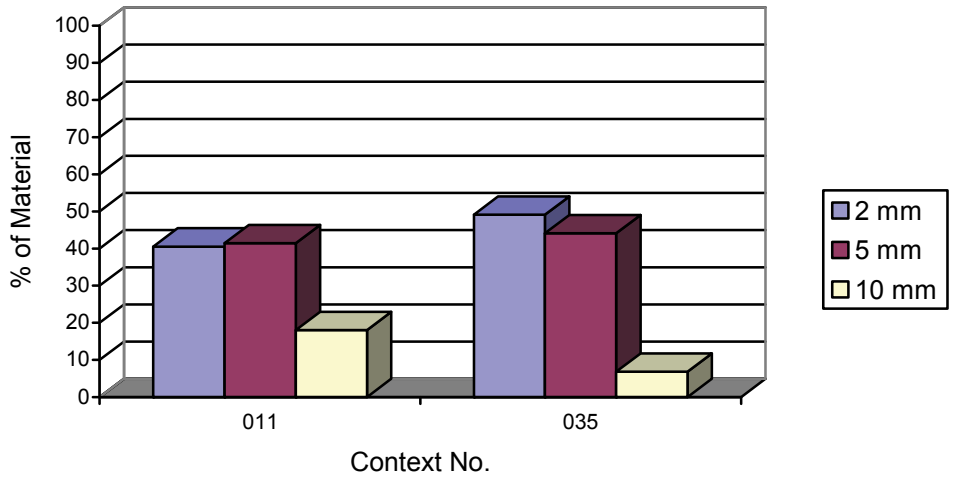

Figure 2 – Levels of fragmentation in the burials

These results indicate that 83.1% of the burnt bone recovered from the two cremation deposits was less than 10 mm in size. The average maximum fragment size was 22.97 mm (41.39 mm being the maximum) but only a small percentage of the bone present was of this size.

Efficiency of the cremation

Levels of oxidation indicate pyre efficiency. This is understood chiefly through the colouration of the bone, on a scale from charred (black) to completely burnt (white). Pyre temperatures of 400°C or less are believed to only be enough to blacken the bone, as the temperature increases to 600°C more of the organic component of bone burns away leaving the bone a grey-blue colour. At 700 to 800°C the bone becomes white and forms a disordered chalky structure, and burns totally at 1000°C, although the mineral component has a melting

point of 1645°C (Walker and Miller 2005). The average temperature of cremations ranges from 1000 to 1100°C (McKinley 2006). The extent of the burning or oxidisation of the bone represents the relative success of the cremation processed applied and contemporary knowledge of pyre technology.

Walker and Miller (2005) report that generally, the range of colours (black, blue, grey and white – Plate 3) seen in burnt bone relates to the temperature to which the bone was exposed as seen in Table 3 below:

Colour	**Temperature**
Brown/Orange	Unburnt
Black	Charred (*c*.400°C)
Blue/Grey	Incompletely Oxidised (*c*.500-700°C)
White	Completely Oxidised (>800°C)

Table 3 – Range of colours in burnt bone related to the temperature

Plate 3 – Range of colours of cremated bone – black, blue, grey and white

Patterns of warping and cracking on cremated remains provide information on the state of bone at the time of cremation. Dry or defleshed bones form a 'check' pattern of horizontal and vertical cracks. Bones which have been burned while fleshed, however, form a characteristic pattern of disorganized cracking and warping (Buikstra and Ubelaker, 1994, 96). The patterns of warping present in the assemblage indicate that the bone was fleshed when it was cremated; suggesting that the cremations were a primary burial rite and were not employed secondary to exposure or excarnation of the remains.

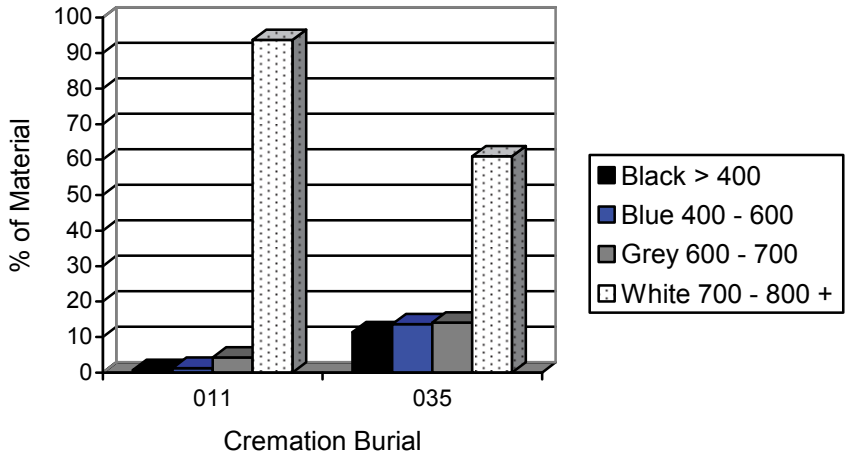

Figure 3 – Levels of oxidisation of the cremation burials

Figure 3 displays the percentage of colour of cremated bone in each cremation deposit and indicates that all of the deposits contained bone that had been fully oxidised which was achieved by being exposed to a adequate temperature (i.e. above 800°C), with an sufficient amount of oxidisation for a sustained amount of time to completely burn the bone. There was a small amount of bone (9.6%) that was not completely oxidised (>800°C) (Figure 3). The presence of blue/grey bone amongst completely oxidised bone was also found in the Blackrath burials. This was usually present along the internal surface (cancellous bone) of long bones. This may indicate that this bone was exposed to high enough temperatures to oxidise the outside of the bone (or cortical bone) but not for long enough for the internal surface of the bone to oxidise (Murray and Rose 1993). Figure 5 implies that the majority of the regions of the skeleton were completely burnt while a small portion did not quite reach the optimal temperature.

Grave goods

Possible grave goods were found during excavation. These are listed in Table 5.

Context	Burial Weight (g)	Feature Type	Find No.	Find Description
035	22.0	Token Burial	E2870:035:001-013	13 flakes of burnt flint

Table 5 – Grave goods found in association with the assemblage

Animal bone

A total of 19 unburnt animal bone specimens were analysed from the site (Table 6).

Context	Sample	Species	Element	NISP	Notes	Recovery
027	026	Unidentified	Teeth	14	possibly cattle	Hand collected
028	025	Cattle	Teeth	5	all possibly from the same tooth	Hand collected
			Total	**19**		

Table 6 – Species representation of sample (NISP)

Unidentified bone

One unidentified burnt bone sample was found from a context that included unburnt animal tooth fragments (Table 6). It is possible that this burnt bone sample might derive either from human (representing token deposit) or animal (bone waste).

Context	Sample No.	Spit No.	Description	Weight of Bone (g)
027	005	-	Fill of bowl shaped pit (026)	0.2

Table 7 – Unidentified burnt bone

Dating

A sample of cremated bone, weighing 2g, was taken from each burial. The results in Table 8 indicate that the burials from Blackrath date to the Late Bronze Age.

Lab Code	Context ID	Material	δ13C	Radiocarbon age BP	Calibrated Age Ranges (95.4%)	Relative probability
SUERC-25366	c.011 s.002	Cremated bone	-23.6	2815 +/- 50	1120-840 cal. BC	95.4%
SUERC-25367	c.035 s.011	Cremated bone	-25.6	2775 +/- 50	1050-810 cal. BC	95.4%

Table 8 – Radiocarbon dates

Discussion

Two Late Bronze Age cremation burials and three pits located at Blackrath E2870. The funerary practices represented a possible female cremation burial (011 and 012) and a possible 'token' or partial interment (035 and 037). Burial rites in the Late Bronze Age continued, as in the Middle Bronze Age, to be largely undifferentiated; also a formal burial site appears to have become less common and in most cases, regardless of status, people were buried in a simple manner (Cooney and Grogan 1999, 144). The known formal burials are predominantly cremations, often only representing a token burial deposit, which were placed in simple pits (Cooney and Grogan 1999, 145). During the Middle and Late Bronze Age both isolated individual grave-pits and clusters of two or more burials form components of the funerary landscape (Grogan 1988, 2004). Of 150 Bronze Age cemetery sites identified during the 1970s, 58% contained two or three burials (Waddell 1981, 166). An adjacent site containing human remains is Ballymount (E2873) which yielded an Early Bronze Age (1940-1750 cal. BC (2δ) (SUERC-24992)) crouched inhumation. A comparative site includes Rathcrogue, Co. Carlow (E2596) where there were two Late Bronze Age (1254-934 cal. BC (2δ) (UBA-8054, 8053)) cremation burials which contained an average of 344.5 g of bone.

Little is really known of methods used to recover cremated bone from a pyre site for burial only that rarely, if ever, was all the bone included. Ethnographic sources record how bone may be 'scraped' together into a pit or covered by a mound (McKinley 1994a). Many fragments had clearly broken along fracture lines during the burning process and subsequently during the depositional period. Bone in pyre cremations will obviously fissure as it is rendered brittle, especially whilst hot. Bone may break as the pyre structure collapses in the later stages of the cremation or if the pyre was tended to any degree, e.g. reinstating bones which had fallen out of the main body of the pyre or slight stirring late in the process to

re-oxygenate the pyre. McKinley (1994a) notes that fragment sizes observed in cremation reports can only be taken to represent the post-excavation size, not necessarily the size of deposited fragments. Fragment sizes are affected both by mode of burial and post-depositional disturbances. McKinley (1994a) states that the additional post-depositional protection offered to the bone by placing it in an urn resulted in larger recorded fragment sizes compared to those from an undisturbed un-urned cremation.

Characteristic dehydration such as horizontal, longitudinal and 'U'-shaped fissuring was demonstrated on the bone. This indicates a number of factors. Firstly it seems likely that when the body was burnt there was still flesh and particularly fat attached to the bone, as opposed to the burning of defleshed (excarnated) bones. In a modern crematorium, when the body reaches a temperature of 800°C the fat in the body ignites and, essentially, the body then burns so fiercely that the gas jets may be switched off (Mays 1998; McKinley 1994b). The splitting on the bones from Blackrath indicates intense burning such as this and over two thirds of the sample was fully oxidised (white colouration) indicating the individual/s was/were very well cremated. The bones from the cremation had been subjected to a fairly marked degree of cracking, twisting and warping. In addition, many cranial fragments had warped, causing the inner and outer tables to separate. These occurrences again indicate that a high temperature was achieved during firing (McSweeney 2005). Ubelaker (1978) suggests that marked warping can be indicative of bone being burnt while still 'fresh', i.e. soon after death. This suggestion, however, is difficult to support in an archaeological context.

Cremation deposits (035 and 037) probably represent token internments. Token burials are cremations that have been described as consisting of small, minute or token quantities. According to Cooney and Grogan (1999, 136) the token and comminute nature of the cremations is a representation of the individual in burial. These characteristics of the burial itself also suggest that other portions of the cremated bone may have been used at different stages in an extended mortuary ritual where much of the ceremonial emphasis may have been placed on the cremation, funeral and burial rather than on just what was placed in the grave. Token burials make their first appearance in the Middle Bronze Age (Cooney and Grogan 1999, 129). The change-over which occurred in the Middle Bronze involved the abandonment of high-status burial offerings and the widespread adoption of token cremation burial which was continued into the Late Bronze Age (Cooney and Grogan 1999, 126-127). There were four Late Bronze Age cremation deposits from Moone, Co. Carlow (E2977) that yielded a low quantity of bone, ranging from 8 to 34.4 g and would suggest that these were also token burials.

According to Figure 1, there is a clear preference for skull fragments. Although there are a number of possible reasons for this apparent preference, it should be treated with caution as such bones have a better chance of surviving in the archaeological record. Perhaps some bones were lost while the secondary burial rites were taking place, but it could also be suggested that they were in social circulation. It could be argued that skulls were the largest and therefore most visually striking of the human bones. The skull could also have been viewed as carrying the essence of an individual and may therefore have warranted special care after death to ensure general good fortune, such as fertility of people and crops.

The presence of 13 flakes of burnt flint (E2870:035:001-013) in token burial (035) indicated that these objects were probably present in the pyre with the individual during the cremation process. It must have taken particular care to retrieve these flakes prior to depositing them with the token amount of cremated bone. It is thought that objects found with cremated bone usually relates to the status of the person. The recovery of a retouched chert flake from

another Late Bronze Age cremation burial from Moone, Co. Kildare (E2977) is worth noting; utilised lithics has been recovered from a number of cremation burials in Ireland (e.g. Ballybar Lower, Co. Carlow (E2622)). The deposition of lithics, either formal retouched artefacts or unretouched lithics within cremation burials needs to be explored further (M. Mallia-Guest pers. comm.).

The animal bone material from Blackrath, Co. Kildare is too small for conclusive comparison against other assemblages. Due to the fact that the pit from which the tooth fragments were retrieved is undated and cannot be linked to the cremation activity, no conclusions can be drawn from the animal bone material from Blackrath.

Conclusions

The prehistoric funerary activity from Blackrath E2870 is represented by an unenclosed flat cremation cemetery containing one cremation pit burials and a possible 'token' burial dating from the Late Bronze Age. Finds were also recovered in the form of pyre goods from one burial which consisted of 13 flakes of burnt flint. The animal bone specimens were recovered from one undated pit, which also contained burnt bone unidentified to source, either human or animal.

The human body, which was certainly fresh at the time of cremation, appears to have been expertly cremated. There is also evidence of meticulous collection of the bones. In addition, the under-representation of both a number of skeletal elements and of general skeletal weights indicates that portions of the body and/or cremated remains were specially selected for utilisation in some other manner. The cremation recovered from this site indicate that although general osteological analysis is limited on these types of human skeletal remains, the validity of their study is unquestionable because of their invaluable information the bones may yield.

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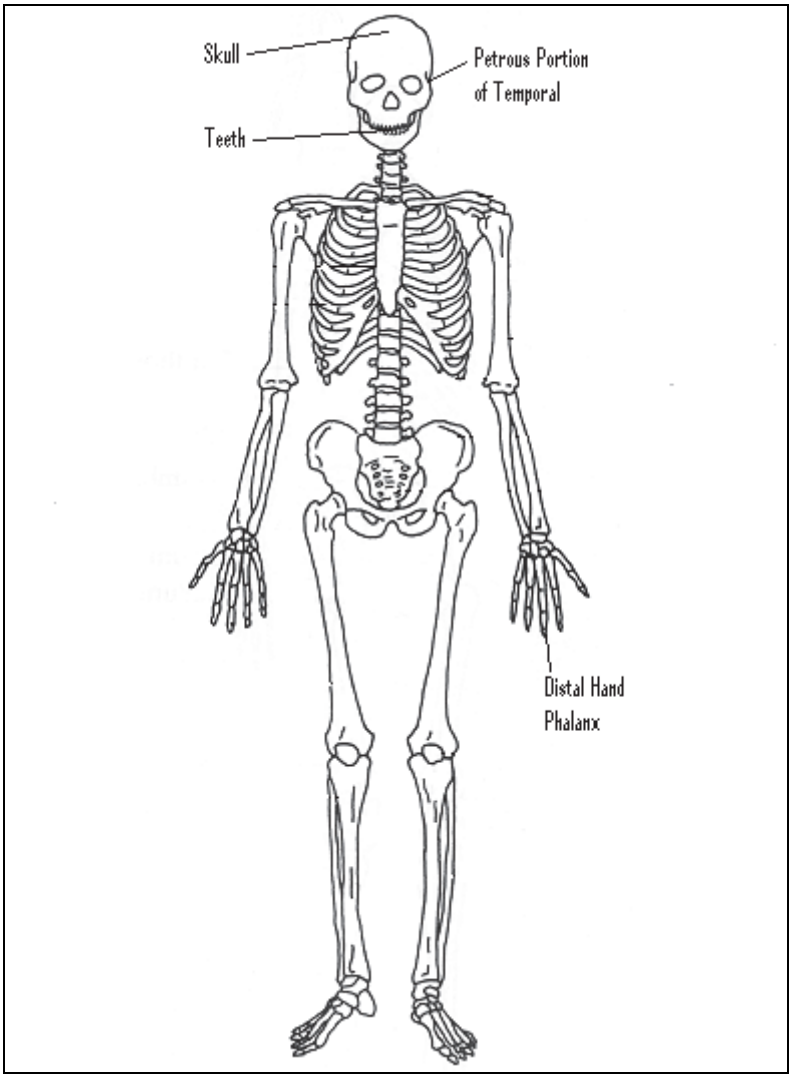
Catalogue of human bone

Cremation burial (011)
Age category: Adult
Sex: Possible Female
Total weight of bone: 195.7 g
Total weight of identifiable bone: 22.5 g
Maximum fragment size: 41.39 mm
MNI: 1
Radiocarbon date: 1120-840 cal. BC (2δ) Late Bronze Age
Recognisable elements: Skull fragments (17.7 g); teeth (1.5 g) - incisors present; petrous portion of the left temporal (3.2 g): distal hand phalanx (0.1 g).



Efficiency of cremation:

Cut	Fill	Spit	Sample No.	Total Weight (g)	Black (%)	Blue-Grey (%)	White (%)
006	011	1	002	128.5	0.6	4.9	94.5
006	011	2	002	67.2	0.9	6.8	92.3
			Total	**195.7**	**0.7**	**5.6**	**93.7**

Fragmentation of bone:

Cut	Fill	Spit	Sample No.	Total Weight (g)	10mm Fraction (g)	5mm Fraction (g)	2mm Fraction (g)
006	011	1	002	128.5	20.4	52.4	55.7
006	011	2	002	67.2	14.9	28.7	23.6
			Total	**195.7**	35.3	81.1	79.3

Comments: Fill (012) of cremation pit (006) was located below cremation deposit (011) and contained 0.4 g of burnt bone. Perhaps this sample of bone filtered down from the upper fill and is not an additional burial as the quantity is minute.

Token burial (035)
Total weight of bone: 22 g
Maximum fragment size: 17.97 mm
Radiocarbon date: 1050-810 cal. BC (2δ) Late Bronze Age

Efficiency of cremation:

Cut	Fill	Spit	Sample No.	Total Weight (g)	Black (%)	Blue-Grey (%)	White (%)
033	035	1	011	1.4	-	50	50
033	035	2	011	6.6	16.7	22.7	62.1
033	035	3	011	14	10.7	27.9	61.4
			Total	**22**	**11.4**	**27.7**	**60.9**

Fragmentation of bone:

Cut	Fill	Spit	Sample No.	Total Weight (g)	10mm Fraction (g)	5mm Fraction (g)	2mm Fraction (g)
033	035	1	011	1.4	-	0.3	1.1
033	035	2	011	6.6	0.3	1.6	4.7
033	035	3	011	14	1.2	7.8	5
			Total	**22**	**1.5**	**9.7**	**10.8**

Comments: Fill (037) of pit (033) was located below token deposit (035) and contained 1.7 g of burnt bone. Perhaps this sample is a primary token deposit but the quantity of bone is so small it is impossible to say for certain whether it was a deliberate deposition.

Unidentified burnt bone – fill (027), basal fill of pit (026)
Total weight of bone: 0.2 g
Maximum fragment size: 11.05 mm
Colour: White (100%)
Bone fragmentation: 5 mm – 0.1 g; 2 mm – 0.1 g
Comments: Due to the minute quantity of burnt bone it is unlikely that the sample was deliberately deposited and it is more probable that it found its way into the pit by natural processes.

Appendix 9 – 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	Period
E2870	SUERC-25366	Context 011 Sample 002	Cremated human bone	-23.6	2815 +/- 50	1040-900 cal. BC	68.2%	1120-840 cal. BC	95.4%	Late Bronze Age
E2870	SUERC-25367	Context 035 Sample 011	Cremated human bone	-25.6	2775 +/- 50	980-890 cal. BC 880-840 cal. BC	51.0% 17.2%	1050-810 cal. BC	95.4%	Late Bronze Age

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RADIOCARBON DATING CERTIFICATE

2 October 2009

Laboratory Code	SUERC-25366 (GU-19209)
Submitter	Carmelita Troy Headland Archaeology (Ireland) Ltd Unit 1 Wallinstown Business Park Little Island, Co. Cork Ireland
Site Reference	Blackrath E2870
Context Reference	011
Sample Reference	002
Material	Cremated bone : Human
$\delta^{13}C$ relative to VPDB	-23.6 ‰
Radiocarbon Age BP	2815 ± 50

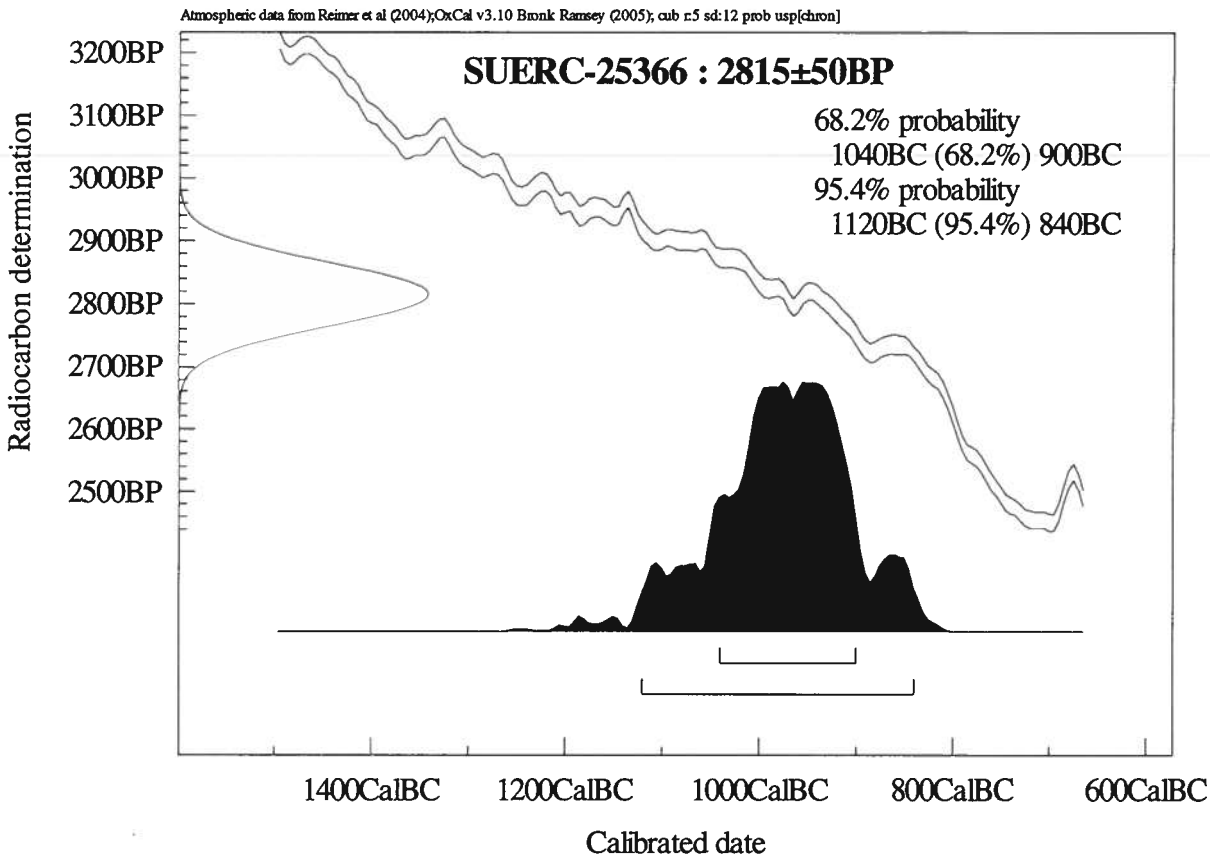
N.B.

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-25367 (GU-19210)
Submitter	Carmelita Troy Headland Archaeology (Ireland) Ltd Unit 1 Wallinstown Business Park Little Island, Co. Cork Ireland
Site Reference	Blackrath E2870
Context Reference	035
Sample Reference	011
Material	Cremated bone : Human
$\delta^{13}C$ relative to VPDB	-25.6 ‰
Radiocarbon Age BP	2775 ± 50

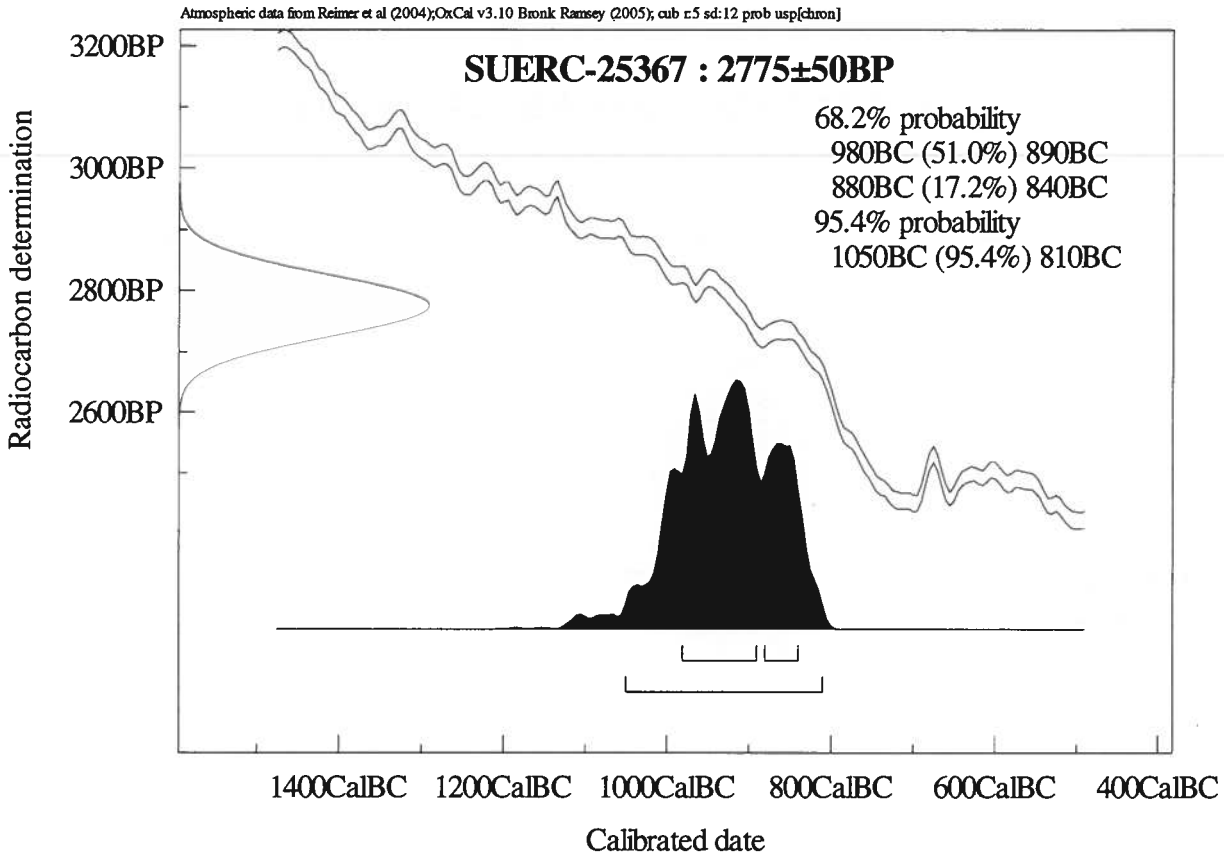
N.B.

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



Appendix 10 – The lithic assemblage from Blackrath, Co. Kildare (E2870)

By: Maria Soledad Mallia-Guest

Introduction

A total of five lithic finds were retrieved during archaeological resolution at site E2870 (Blackrath, Co Kildare) in advance of the N9/N10 Kilcullen to Waterford Scheme Phase 3 roadworks. Eight additional pieces of flint were identified during post-excavation following the environmental processing of the soil samples. The site comprised a limited number of archaeological features including pits and cremation burials as well as agricultural furrows. In addition to these stratified finds, the remaining artefacts were only surface finds consisting of post-medieval pottery, a metal artefact as well as a piece of metallurgical waste (McCarthy 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 Assemblage

All the lithic finds were recovered from the same upper blackish burnt sandy silt charcoal rich deposit (035) from an unurned cremation pit (033) (Table 1). Five finds were retrieved during excavation as well as eight additional shattered flint pieces which were identified upon environmental processing of the soil sample. All the finds are fractured and in very poor condition due to thermal alteration. They are also small in size measuring less than 25 mm in length. All the pieces (E2870:035:002-013) have been detached from the same artefact E2870:035:001 and can be classified either as a refitting indeterminate flake (E2870:035:002) and shatter or potlid spalls (E2870:035:003-013) which are the result of thermal shock and therefore non-technological in origin.

Artefact E2870:035:001 is a heavily heat-affected naturally backed flake measuring less than 25 mm in length. The flake, which appears to be bipolar in origin, exhibits intense discolouration due to calcination, surface crazing and potlidding. The latter consists of sub-circular/lenticular or sometimes tabular depressions resulting from the expansion and contraction of the flint when exposed to heat. It displays approximately 10% of cortex remnant and possibly a plain platform. The distal end of the artefact is missing exhibiting a thermal irregular fracture and the lateral edge opposing the cortex

back appears to show micro-retouch when refitting its split flake E2870:035:002. However, given the overall condition of the artefact it is difficult to confidently determine if such macroscopic damage is the result of use-wear associated with a functional working edge.

Finds E2870:035:003 and E2870:035:004 are also the product of thermal damage presenting discoloured and patinated surfaces as well as some cortex remnant measuring less than 20 mm in length. Potlid spalls and shatter (E2870:035:005-012) of rather sub-circular to sub-rectangular outline were also readily identified within the same size range (Table 1). Four of these small non-technological pieces (E2870:035:006-009) have been identified as having been detached from the surface of artefact E2870:035:001 and 002. These are less than 15 mm in length and also present a very low percentage of cortex remnant however, they are clear refits of flake E2870:035:001 and its split flake E2870:035:002. The remaining potlid spalls (E2870:035:010-012) show intense distortion on their surfaces and lack of any cortex remnant suggesting these are internal shatter which do not readily refit with artefact E2870:035:001.

Finally, one single piece of debitage (E2870:035:013) has been classified as indeterminate shatter as it is difficult to specify if it is a thermal shock by-product or resulting from knapping. It is also in very poor condition and shows intense crazing - surface cracking - as well as differential colouration and texture to that observed, indicating that it could have been exposed for a prolonged period of time.

Discussion

The flint finds retrieved on site E2870 in the townland of Blackrath Co. Kildare can be classified as a single naturally backed flake, which has been subject to intense thermal damage. This factor increased the artefacts brittleness causing its heavy fragmentation. Given the overall artefact condition, the presence of use-damage is rather circumstantial therefore the piece has been classed as debitage, this is, an unretouched knapping by-product.

It would appear that the artefact was obtained by bipolar technique as indicated by the bashed ends, however this is difficult to determine given the overall condition. The bipolar technique requires the use of an anvil or stationary surface to open the core (Whittaker 1994, Inizan 1999) and it is particularly effective when reducing small-sized pebbles such as those found on Irish coastal localities. This technique was particularly important in late prehistoric contexts, since the Middle/Late Neolithic towards the Late Bronze Age (O'Hare 2005, Woodman et al. 2006).

Heat-treatment of siliceous raw material of poor quality can facilitate their knapping particularly in the case of those artefacts demanding fine controlled pressure flaking in their final manufacture stages (Crabtree and Butler 1964, Whittaker 1994)

Changes in colour, generally towards darker shades, a decrease in translucency and increased waxy luster are among the modifications taking place without compromising the workability of the raw material (Ahler 1983)

However, experimental work has demonstrated that significant detrimental alterations are expected on fine-grained flints when heated above 250ºC. Particularly within the 300-400ºC ranges the raw material becomes weaker and more brittle with a high occurrence of thermoclastic fractures (*ibid.*), such as those observed in this case.

Both spalling /potlidding and splitting have been identified within this assemblage. The spalling here recorded, in the form of tabular or sub-circular fragments is most likely to indicate rapid temperature

increase and cooling. The granular fractures, distortion and the intense crazing observed in this specimen, suggest exposure to temperatures over 500°C (Purdy 1975, Ahler 1983, Patterson 1995)

All in all, the internal damage present on this artefact is not consistent with intentional heat-treatment and only points to the fact that the find was certainly integrated if not placed directly onto the pyre. This deposition, however, cannot be confidently considered as a deliberate or accidental incorporation.

As Cooney and Grogan (1999) highlight, the nature of artefacts and their deposition in funerary contexts are certainly linked to people in metaphorical way. In particular, when discussing the Bronze Age burial practices, the status of the individual seems to have been emphasised. Lithic grave offerings usually consist of exceptional finished artefacts such as flint convex scrapers or plano-convex knives and axes and have been commonly found in several Bronze Age urned graves (O'Riordain and Waddell 1994). However, this is not particularly noticeable within the Carlow/Kildare area. Previously investigated nearby cremation cemeteries, in the townlands of Strawhill (Co. Carlow) or Graneywest and Brownstown (Co. Kildare), showed minimal lithic evidence and only a single plano-convex knife was found in Brownstown (Co. Kildare) in association with an urned cremation (Mount 1998).

Offerings within cremations have recently been recorded along the N9/N10 road stretch under Contract 4 resolution works. Such is the case of sites E2622 in the townland of Ballybar Lower, Co. Carlow where ritual deposition of miniature arrowheads in a male adult cremation burial was identified (Sternke 2008, Hackett and Hanbidge 2009, Mallia-Guest 2009a). Site E2588 in the townland of Ballybar Upper (Co. Carlow), yielded a cremation burial from which only a small debitage piece was recovered upon post-excavation processing (O'Connell and Breen 2009, Mallia-Guest 2009b).

Further Recommendations

It is envisaged that a photograph of the heat-fractured flint debitage piece E2870:035:001-002 and detached external potlid spalls E2870:035:006 will be required as a complement to this report.

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NMI Number	Raw Material	Type	Category	Length (mm)	Width (mm)	Thickness (mm)	State	Condition	others	Cortex	Type of Platform	Ripples	Comments	Colour
E2870:035:001	Flint	Cortex-backed flake	Debitage	23.5	25.1	18.2	Very poor	F	B/Potl/ D/L/ Crz	<10 %	Plain?	Diff.	Heavily heat affected cortex backed flake possible bipolar in origin, with intense discolouration, surface crazing and potlidding. Indeterminate fragment and potlid spalls E2870:035:002-006 are non-technological refits. Distal end of the artefact is missing and lateral edge opposing cortex exhibits what appears to be scattered micro-retouch Unclear if it was functioning as a working edge.	Light grey-white /red cortex
E2870:035:002	Flint	Split flake	Debitage	19.3	20.2	5.7	Very poor	F	B/Potl/ L D/Crz	<10 %	N/A	N/A	Heavily fractured and heat affected indeterminate shatter, refitting cortex backed flake E2870:035:001-potlidding on both surfaces	Light grey
E2870:035:003	Flint	Spall	Non-tech. (thermal)	16.6	6.1	2.9	Very poor	F	B/D/ Potl/Pt	5%			Non -technological irregular thermal shatter refits in between the split flakes	Light grey
E2870:035:004	Flint	Spall	Non-tech. (thermal)	17.5	5.1	1.8	Very poor	F	B/D/ Potl/Pt	5%			Non -technological sub-rectangular/tabular thermal shatter refits in between the split flakes sub-rectangular	Light grey
E2870:035:005	Flint	Spall	Non-tech. (thermal)	17.5	9.1	1.4	Very poor	C	B/Potl/ L	No			Non-technological potlid spall, prsenting intense luster, although it does not obviously refit with	Light grey

NMI Number	Raw Material	Type	Category	Length (mm)	Width (mm)	Thickness (mm)	State	Condition	others	Cortex	Type of Platform	Ripples	Comments	Colour
													E2870:035:001 it derives from the same artefact possible an internal shatter given the nested potlid pattern and the slight thickness.	
E2870:035:006	Flint	Spall	Non-tech. (thermal)	13.6	5.9	1.4	Very poor	C	B/Pt/D	<5 %			Non-technological tabular/rectangular spall retrieved from retent and refitting on the surface of E2870:035:002	Light grey
E2870:035:007	Flint	Potlid spall	Non-tech. (thermal)	10.7	9.4	1.3	Poor	C	B/Pt/L/ Ct	100 %			Sub-circular/potlid spall retrieved from retent and refitting surface of E2870:035:002	Light whitish grey
E2870:035:008	Flint	Potlid spall	Non-tech. (thermal)	7.3	6.7	0.6	Poor	F	B/Pt/L/ Ct	90 %			Sub-circular/potlid spall retrieved from retent and refitting surface E2870:035:002	Light whitish grey
E2870:035:009	Flint	Spall	Non-tech. (thermal)	6.8	6.1	1.2	Poor	F	B/Pt/L/ Ct	90 %			Sub-rectangular spall retrieved from retent and refitting surface E2870:035:002	Light whitish grey
E2870:035:010	Flint	Potlid spall	Non-tech. (thermal)	9.8	6.2	0.9	Very poor	F	B/Potl/ L	No			Non-technological sub-circular potlid spall and shatter with no cortex remnant, so internal shatter likely to refit with Artefact E2870:035:001. Retrieved from retent	Light grey
E2870:035:011	Flint	Potlid spall	Non-tech. (thermal)	6.3	4.4	0.2	Very poor	F	B/L	No			Non-technological sub-circular potlid spall and shatter with no cortex remnant, so internal shatter	Light grey

NMI Number	Raw Material	Type	Category	Length (mm)	Width (mm)	Thickness (mm)	State	Condition	others	Cortex	Type of Platform	Ripples	Comments	Colour
													likely to refit with Artefact E2870:035:001. Retrieved from retent	
E2870:035:012	Flint	Spall	Non-tech. (thermal)	7.2	3.5	0.9	Very poor	F	B/L	No			Non-technological with granulated surface irregular spall and with no cortex remnant, so internal shatter likely to refit with Artefact E2870:035:001. Retrieved from retent	Light grey
E2870:035:013	Flint	Indet.	Indet.	10.6	5.4	2.7	Very poor	F	B/D/ Crz	<10 %			Indeterminate shatter, exhibiting intense reddening and discolouration/patination as well as surface crazing and some cortex remnant, with a longitudinal fracture. Retrieved from retent, possible cortex remant from artefact E2870:035:001.	Mid reddish whitish mottled grey

Key: Indet: Indeterminate; Non-tech: non-technological; C: complete; F: fractured; B: burnt; D: discoloured; Crz: crazing; Potl: potlidding; L: lustered; Pt: patinated; Ct: corticated; Diff: diffuse.

Table 1 Lithic Assemblage from Blackrath, Co. Kildare (E2870)

Appendix 11 – Assessment of metallurgical remains from E2870 based on visual examination
By: Barry Cosham

A single fragment of slag weighing 22 grams was recovered from the topsoil during excavation. Upon examination it was determined to be slag relating to iron metallurgy, but was otherwise undiagnostic, i.e. the specific process responsible for its creation could not be ascertained. It is likely that the slag originated off site as no evidence for metal working was recorded. The slag may have been transported to the site accidentally or as a result of agricultural activity i.e. manuring. As such it has no relevance to the interpretation of the site.

Sample no.	Context no.	Weight (g)	Description	Interpretation
029	001	22	Single fragment, c. 3-4cm in diameter, purple/black in colour, high density, slightly vesicular, some iron corrosion, no diagnostic morphological characteristics	Undiagnostic