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Department of Transport An Roinn Iompair

NRA An tÚdarás um Bóithre Náisiúnta National Roads Authority Archaeology

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

N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 6 – Resolution, Moone to Prumplestown.

Final Report on archaeological investigations at Site E2955, in the townland of Woodlands East, Co. Kildare.

By: Liam Hackett
National Monuments Section Registration Number: E2955
Director: Liam Hackett
NGR: 276424N 185155E

Report Status: Final

Meanma agus Misneach

HEADLAND ARCHAEOLOGY Ltd

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CONTENTS **PAGE**

List of Figures

List of Plates

Appendices

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. 6 - Resolution, Moone to Prumplestown. 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 National Monuments Section Registration Number, E2955, was allocated by the Department for the excavation of the present site in Woodlands East townland under the directorship of Liam Hackett of Headland Archaeology (Ireland) Ltd.

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

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

Archaeological testing carried out by CRDS Ltd under N9/N10 Kilcullen to Waterford Scheme: Kilcullen to Powerstown Archaeological Services Contract No. 2, under Ministerial Direction Number A021/150 on this site between 8 May and 28 August, 2006 identified a burnt mound.

Full archaeological resolution was conducted on this site between 19 October and 31 October 2007.
This revealed an oval shaped burnt mound, an oval-shaped trough (021) containing two horizontal timber elements (020) placed at the base, an oval pit (007) and a north/south running linear arrangement of four stake holes (009), (022), (024) and (026). The stakeholes, which were located along the east edge and side of oval pit (007), may have acted as a rack or small fence-line. A radiocarbon date of 2020-1770 cal BC (2σ) (SUERC 25267) from the fill (006) of pit (007), placed the activity of this burnt mound in the Early Bronze Age. A worked flint artefact, identified as a discarded blank (E2955:003:001), and a cattle molar tooth fragment were retrieved from the burnt mound deposit (003) and a whetstone (E2955:001:001) was recovered from the topsoil layer during the stripping. A modern linear field drain (018) truncated both the mound and the trough. Two tree boles (005 and 014) were also recorded on site along with a shallow natural depression (011).

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

1 Introduction

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

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

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

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

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

Archaeological test-trenching was undertaken in advance of the construction of Phase 3, the Kilcullen to Carlow Scheme, by IAC Ltd and CRDS Ltd, between October to November 2005 and May to August 2006 (Archaeological Services Contracts No. 1 and No. 2, respectively). This work resulted in the identification of 102 archaeological sites, which required resolution in advance of construction. The resolution works for these sites were undertaken by Headland Archaeology (Ireland) Ltd between March and December 2007 (Archaeological Services Contracts No. 5 and No. 6). This report details the results of one of those excavations, undertaken under NMSR Number E2955.

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 E2955 was situated in the townland of Woodlands East, barony of Kilkea and Moone, parish of Castledermot *c.* 1.5 km west of Castledermot village and directly south of a tertiary road that led westward from Castledermot to the village of Kilkea (Figure 1). The land in the area of the site was poorly drained, low-lying rough pasture fields.

A number of registered monuments were located within a kilometre of the site (Figure 2). These included a ringfort (KD040/001) located *c.* 250 m to the south, a second ringfort (KD038/042) and an enclosure (KD038/043) located *c.* 500 m to the north-northeast. An earthwork (KD038/044) was located over a kilometre to the north-northeast. A ring-barrow (KD037-051) was located *c.* 1 km to the west-northwest and a cist (KD040-003) *c.* 1 km to the south-southeast. A number of additional sites were excavated in proximity to Site E2955 as part of the same road scheme: a burnt mound dating to the Late Bronze Age at site E2956 (Hackett, 2010) a number of prehistoric charcoal production pits, troughs, pits of varying functions and a burial dating to the late medieval period at site E2954 (Janes 2010); a metalworking and charcoal producing site dating to the medieval period (E2951; Doyle 2010a); a rectangular enclosure with associated structural remains, ditches and pits dating to the early medieval period (E2949; Doyle 2010b); at site E2960, an early medieval kiln, postholes, stakeholes, pits, deposits and skeleton, and a Anglo Norman period enclosure, skeleton with numerous pits, stakeholes and deposits were uncovered in the interior and immediately outside the enclosure (O'Neill 2010); and a quarrying site at E2959 (Twomey 2010).

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 680 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 1:50 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 charred/waterlogged wood were taken on 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. Artefacts recovered during the excavation were assigned unique numbers and treated in accordance with National Museum of Ireland guidelines. A total of 75% of the soil samples taken during the excavation were selected for processing and environmental assessment/analysis (Appendix 7).

Full archaeological resolution was conducted on this site between 19 and 31 October 2007. The crew on site E2955 consisted of 1 director, 1 deputy site manager and 10 site assistants.

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

4 Excavation results

The natural on this site consisted of yellow blue boulder clay (002). The topsoil consisted of loose brown silty clay (001); a whetstone (E2955:001:001) was recovered from this deposit. The whetstone is a modified limestone cobble of local origin and has use wear on its flat side with some evidence of pecking on its sides. The use of soft materials such as mudstones or siltstone has usually been associated with final stages of sharpening (Figure 7, Appendix 10).

On removal of the topsoil, an oval shaped burnt mound (003) was revealed in the centre of the site (Figures 3-4). The features and burnt mound are discussed stratigraphically below.

Natural features
A natural, irregular shaped tree bole (014) was recorded underneath the burnt mound material towards its southern edge. This measured 3.60 m north/south by 1.40 m east/west and 0.60 m in depth. The basal fill (012), measuring maximum 0.60 m in depth, consisted of loose, greyish-brown silty clay with occasional flecks of roots, fragments of wood and charcoal flecks. Above this was a loose clayey fill (013), containing frequent root inclusions and occasional pieces of wood fragments. Covering this layer was burnt mound material (003). A second tree bole (005), was situated to the east of the burnt mound (Figure 3). This measured 2.40 m northwest/southeast by 0.80 m northeast/southwest and 0.50 m in depth. The bole contained a fill of light brown peaty clay (004) with frequent root inclusions, as well as the remains of a tree stump at the base. Unlike tree bole (014), this was stratigraphically separate from the burnt mound (003) and therefore remains un-phased. A shallow and probable natural depression (011), measuring 1.50 m northeast/southwest by 1.24 m northwest/southeast was located underneath and toward the western extent of the burnt mound deposit. This was filled by burnt mound material, consisting of sandy silt, with frequent charcoal and heat-fractured stone (010).

The burnt mound
Trough: An oval-shaped trough (021) (Figure 5) lay under the southwest portion of the mound (Plate 1). It measured 1.8 m northeast/southwest by 0.7 m and 0.16 m deep with gradually sloping sides and a flat base. Lining the base of the trough were two horizontal timber elements (020) (E2599:009-010, Plate 2). The first and northernmost timber measured 0.5 m by 0.12 m wide and 0.03 m thick. The second, to the south, measured 0.6 m by 0.18 m and 0.03 m thick. The two pieces had naturally decomposed into a pointed shape at their north-eastern ends and during the assessment of the two samples, these were found to be too degraded for any species identification or wood working identification to be obtained (Simon Gannon pers. comm.). The trough was filled by loose light black sandy silt (019) with frequent heat-shattered stones and moderate charcoal fleck inclusions. The northern terminus of a later field drain (018) truncated the trough damaging the timber elements on their south western ends (Plate 3).

Pit and stakeholes: An oval pit (007) (Figure 6) was uncovered below the northeast portion of the mound (Plate 4). It measured 1.8 m by 1.1 m and 0.2 m deep with gradually sloping sides and a concave-shaped base. It was filled by loose black clayey silt (006) with frequent heat-shattered stones, charcoal and some organic material/possible wood fragments. A radiocarbon date of 2020-1770 cal BC (2σ) (SUERC 25267) has been returned from pomoidaeae charcoal from the fill (006), placing the activity in the Early Bronze Age (Appendix 9).

A north/south running linear arrangement of four stake holes (009), (022), (024) and (026) was located along the east edge and side of oval pit (007) (Plate 5). They were circular in plan averaging 0.12 m in diameter and between 0.07 m and 0.2 m deep with vertical sides leading to tapered or rounded bases.

Their fills were identical: loose black clayey silt with frequent charcoal inclusions (008), (023), (025) and (027). They may have acted as a rack or small fence-line.

Burnt mound: An oval shaped burnt mound of measuring 11.3 m northwest/southeast by 8.9 m and 0.38 m thick was revealed after topsoil stripping, located roughly in the centre of the site (Figure 3 and 4; Plate 6). A T-shaped cross baulk method of excavation was employed (Plates 7-8). The mound consisted of loose black silty sand (003) with charcoal and fire cracked stone inclusions. A worked flint artefact (E2955:003:001) was recovered during its excavation (Figure 7, Plate 9). It was expertly worked; however it does not conform to a known type and may be a discarded blank. A cattle molar tooth fragment was also identified and retrieved from this deposit (E2955:001, Appendix 8). While little meaningful interpretation can be inferred from such a small assemblage, faunal remains on burnt mound sites are relatively rare, and cattle remains dominate the species in excavations carried out in the Carlow/Kildare area. In a previous study it was found that the animal bones recovered from burnt mound sites have been connected especially with slaughter, primary butchery and meat preparation (Tourunen 2008, 40).

Post-medieval activity
A modern linear field drain (018) truncating both the mound and the trough entered the site from the south and ran in a northeast direction for 11 m before terminating. A total of 8.4 m of the drain were excavated. It was 0.5 m wide and 0.4 m deep with vertical sides and a flat base. Its basal fill consisted of loose light black sandy silt (017) with medium to large stone inclusions. Its secondary fill consisted of loose light black clayey silt (016) with charcoal, roots and occasional small stone inclusions and its upper fill was composed of fairly compact mottled grey yellow and black sandy clay (015) with moderate small stone inclusions.

5 Discussion

The results of the excavation at Woodlands East (E2955) 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.

The site at Woodlands East is a typical example of a burnt mound, situated close to a water source, locally available stone, trough and covering mound. No hearth was discovered on the site, however this is not uncommon. The trough was heavily damaged by the later drainage activity, but a sufficient portion of it remained intact to extrapolate its overall dimensions and form.

The degradation and truncation of the timber lining of the trough (021) means little interpretive information can be assigned to the technology used or the effectiveness of the feature. The pit (007) contained material similar to the mound and may have functioned as a storage pit until the eventual encroachment of the mound made it redundant. The line of stake holes on the eastern edge of the pit may have been contemporaneous with the pit and may have functioned as a rack or small fence line.
The stratigraphy of the mound showed no evidence of seasonal re-use or inundation. This suggests the burnt mound was used actively for a period of time then abandoned once its effective usefulness was reached.

Dating
Fulachtaí fiadh have been found to have a very broad date range with a small number of sites dating from the Late Neolithic and occasional examples producing dates from the Iron Age or later. However, *fulachtaí fiadh* that have been radiocarbon dated show a marked concentration of sites in the Middle Bronze Age, while there is a smaller but significant group indicating use in the Late Bronze Age (Brindley and Lanting 1990).

The radiocarbon date returned from the pit (007) under the mound places this activity in the Early Bronze Age (2020-1770 cal BC (2σ) (SUERC 25267) and when this information is compared with the Late Bronze Age date returned for the burnt mounds excavated at Woodlands East (E2956) approximately 50 m to the south it shows that this environment was used extensively for burnt mound related activities throughout the Bronze Age. The surrounding fields showed several mounds which could also be burnt mounds, indicating that the area was a prime location for such activities.

Environment and setting
The environmental evidence for the site suggests damp/wet conditions with local marginal woodland being used as a fuel source and tormentils, sedges, grasses and brambles all growing in the immediate environment. The adjacent site (E2956), while dated to the Late Bronze Age, showed very similar environmental findings which suggests there was little change in the immediate surroundings and plant life throughout the period of use of the area.

Associated finds
The lithic find (E2955:003:001) recovered from the mound and the cattle molar are significant in that few burnt mounds produce any artefactual evidence, however do not point to any specific function or activity being carried out on the site. The lithic is of interest due to the fact that it shows expert workmanship, but may actually be a discarded blank. It shows minimal use, so may have been used for a specific act then discarded.

The whetstone (E2955:001:001) found in the topsoil layer during the stripping of the site is unlikely to be associated with the burnt mound activity and is possibly medieval or later in date. This type of implement changes very little in shape or from throughout time, but is predominantly associated with metal artefacts, hence the possibly medieval or later date classification.

General morphology and distribution
Burnt mounds or *fulachtaí fiadh* have been identified in almost every part of the country and are the most common prehistoric monument in Ireland (Waddell 2000, 174). Large infrastructural projects have consistently identified large numbers of these sites; for example *fulachtaí fiadh* and related site types such as burnt mounds and spreads formed the bulk of the recorded archaeology in advance of the gas pipeline to the west (Grogan *et al.* 2007, 81).

Classic *fulachtaí fiadh* appear in the landscape as low grassy mounds of crescent or u-shaped plan (Waddell 2000, 174), though excavation has shown that in many cases the mound can be ploughed out or indeed may never have been on such a scale as to remain identifiable above ground. Excavated *Fulachtaí fiadh* usually consist of a mound or spread of burnt stones and firing debris and a trough or troughs. Frequently, associated features such as hearths, pits, stakeholes and postholes are also identified but there is a great deal of variation in the morphology of excavated site types.

The number of identified *fulachtaí fiadh* in the country is constantly increasing and there are at least 7,000 currently known (Grogan *et al.* 2007, 81). A distribution map of known sites in the North Munster Project publication (Grogan 2005, Vol 2, 170) highlights that the majority of known sites are

located in the south of the country and that there are known concentrations in Kerry, West Cork and Mid Clare. There is, however, a much lower density of recorded sites on the south side of the River Shannon and Lough Derg. The discovery of a significant number of previously unknown *fulachtaí fiadh* during archaeological investigations in advance of the N9/10 would suggest that the apparent low density of sites is more likely to be the result of most sites not being recognisable above ground than a genuine sparse distribution in the region.

The siting of this monument type is noteworthy as they are almost invariably located close to a water source (e.g. Ó Neill 2000). This was well demonstrated during the North Munster Project (Grogan 2005) where the *fulachtaí fiadh* identified were located along the margins of wetland, small lakes, turloughs, bog and marsh as well as the edges of river estuaries and on the banks of rivers and streams. The burnt mounds at Woodlands East were located on marshy ground, which even with the introduction of modern drainage systems, was still inundated with water on an almost constant basis.

It has been well documented that *fulachtaí fiadh* can be densely concentrated in areas that were suitable for their construction. Ó Drisceoil (1988, 676) describes how they 'are frequently found together in groups of up to ten or more'. The sites at Woodlands East (E2955 and 2956) show definite evidence for three mounds, with further examples visible in the vicinity of the limits of excavation, clearly demonstrating the validity of this argument.

Historic references and origins of the term fulacht fiadh
The term *fulacht fiadh* itself is composed of two Irish words. The first means 'recess' or 'cavity' and by extension came to be associated with pits, pits specifically used for cooking, the act of cooking and sometimes even the food itself (Ó Drisceoil 1988, 673; Ó Drisceoil 1990, 158). The second word has two possible interpretations: *fiadh*, of the deer or of the wild, and *fian*, a roving band of hunters or warriors, occasionally 'of the *Fianna* or Fionn Mac Cumhail' in reference to a mystical army who hunted and lived outdoors (Ó Drisceoil 1988, 673).

Although references to '*fulacht*' occur as early as the ninth century AD, the consistent use of the term *fulacht fiadh* to refer to the common archaeological field monument does not appear until the nineteenth century (Ó Drisceoil 1990, 158). The earliest recorded reference to the term '*fulacht*' occurred in *Cormac's Glossary* from approximately AD 900 (Ó Drisceoil 1988, 673), however many of the sources in which the term is found have their roots in the oral tradition making the term difficult to accurately date (Ó Drisceoil 1990, 157). A text from the 12th century (*Agallamh beg*) describes how a site located on the bank of a stream is regarded as both a cooking place and ancient (Ó Drisceoil 1988, 673). Geoffrey Keating's early seventeenth century *The History of Ireland* (*Foras Feasa ar Éirinn*) includes the use of the term '*fulacht fian*'.

Besides the use of the term '*fulacht'* a number of documentary references from Ireland include explicit descriptions of the process of boiling liquid using heated stones for both cooking and bathing purposes (O'Neill 2004, 79). The earliest description of burnt stone technology, where a basin of gruel is cooked with fire-heated stones, is from the medieval 'Latin Life of St. Munnu' and dates to before the 15th century (O'Neill 2004, 79*)*. Chronologically the next account is contained in Geoffrey Keating's early seventeenth century *The History of Ireland* (*Foras Feasa ar Éirinn*) where a lot of detail is given about how the '*Fian*' would cook their quarry over pits of hot stones and in water-filled pits heated by hot stones. In this account the hunters would use a second pit of boiling water to bathe (*ibid*., 80). The Romance of Mis and Dubh Ruis is another well known account of a deer being boiled in water heated by hot stones and the water subsequently being used for bathing (*ibid*.).

Function

The technology of *fulachtaí fiadh* is well known. Stones were heated in a nearby fire and placed in a water-filled trough – sometimes lined with timber, stones, clay or reed matting– the heat from the stones would then bring the water to boil. Once cool the stones were removed from the trough and discarded, creating a characteristic burnt mound or spread of heat-shattered stones. How the boiled water was subsequently utilised, however, is more difficult to ascertain.

The association between *fulachtaí fiadh* and highly mobile groups such as the *fian* has been long debated. The use of *fulachtaí fiadh* for cooking is much more time intensive than roasting meat over a fire and would point to a more sedentary group but few settlements are found in the area immediately surrounding them. Recently the general picture that has been emerging indicates that while they may not be immediately adjacent to settlement sites they often clustered in areas where other potentially contemporary sites such as standing stones, habitation enclosures and hilltop enclosures occur (Grogan 2005, Vol. 1, 41). This would imply that they were part of a wider cultural landscape and could have been used by a largely sedentary society.

Grogan *et al.* (2007, 91) have concluded from the quantities of heat-shattered stone forming most spreads and mounds that sites were likely used multiple times on separate occasions and that most sites would have had an extended, if periodic, use history. Using digital terrain modeling, they calculated that the average number of uses per site was approximately 250 (*ibid.*). They also noted that spoil was occasionally present on top of earlier mounds indicating that troughs had possibly been repositioned (*ibid.*).

The traditional interpretation of these monuments is that they were cooking sites, a view supported both by the early texts, folk memory (Ó Drisceoil 1988; Ó Neill 2004) and experimentation (O'Kelly 1954; Allen 1994). The texts frequently give a dual function of cooking and bathing for the sites. However, other theories about their use have also been put forward. These include: fulling, brewing, leather working, and use as sweathouses or as multifunctional sites. It is most likely that *fulachtaí fiadh* were multifunctional or that different sites were used for different purposes. Determining which each site was used for is difficult in large part because of the lack of definitive evidence and recovered finds.

The theory with the most corroborating evidence is the use of the sites for cooking. Experimental work by O'Kelly demonstrated that a joint of meat could be cooked in three to four hours using hot stones to boil water in a trough (O'Kelly 1954), while Allen describes an experiment in which the meat was cooked in two hours (1994, 9). It has been noted that a distinct lack of food refuse such as animal bones is characteristic of scientifically excavated burnt mound sites; however it could be that the cooking of joints of meat was subject to various sorts of ritual or hygiene controls and that any food remains were carefully disposed of (Waddell 2000, 177). Monk has recently shown, however, that although many bones are likely lost to acidic soil, an increasing number of sites are now producing preserved bone (2007, 22). A recent preliminary study undertaken by Auli Tourunen and Karen Stewart on the pH levels of *fulachtaí fiadh* showed that there was no correlation between the pH value of a site and bone preservation (Tourunen and Stewart 2008). They caution, however, that this information is preliminary and that a wide range of factors may have contributed to bone preservation or the lack of bone and that the use of animal products at sites can not be ruled out (*ibid.*). Additional support is provided for the cooking hypothesis by detailing the importance of meat fat in food preservation (Monk 2007, 23). Without cooking trays, he notes, gathering the fat would have been problematic (*ibid.*). One solution, however, is to boil the meat and collect the fat from the surface of the water, an activity for which *fulachtaí fiadh* are ideally suited (*ibid.*). The presence of fats

in the water of *fulachtaí fiadh* is also supported with the literary evidence in the story of Mis and Dubh Ruis.

Monk (2007, 24) has also hypothesized that *fulachtaí fiadh* may have been associated with soap production as all three primary ingredients are present (wood-ash, water and animal fats). Ó Drisceoil (1988; 1990) has shown that the bathing in the *fulachtaí fiadh* had possible ritual connections (either with mythical people or with magically curative properties as with Mis and Dubh Ruis), and Barfield and Hodder (1987, 373) show that individual or communal sweating also has frequent ritual associations. Barfield and Hodder (1987) do not limit the uses of sweathouses to ritual activity however and they point out that their use is an easy method of bathing, largely supporting their argument with ethnographic comparisons. Irish sweathouses used medicinally are recorded from the modern period in which a fire would be lit inside a stone hut until the walls were hot, the embers rakes out and the patient sealed inside, sometimes with herbs placed on the hot stones (Barfield and Hodder 1987, 373). Recent excavations have been producing convincing evidence that at least some *fulachtaí fiadh* represent this kind of activity for example sites at Rathpatrick (04E0318) on the N25 Waterford Bypass (Gleeson and Breen 2006) and Ballyburn Lower, Co. Kildare (E2566) (Hackett 2009b).

A newer theory as to the uses of *fulachtaí fiadh* comes from Moore and Quinn (2007) who have suggested brewing as a primary function of the sites. They maintain that the requirement for large quantities of heated water and a lack of suitable material to produce large basins in which to heat the water would have lead to the use of pits or troughs in which hot stones could be dropped to produce the required heat (*ibid*.). They also state that quernstones found in association with *fulachtaí fiadh* indicate grain processing nearby. They provide ethnographic evidence for this type of brewing as well as tracing the practice back 500 years. Although this is considerably later than the date range for *fulachtaí fiadh*, it provides evidence that the practice has been used throughout Europe over a considerable length of time. Their experiment conclusively proved that *fulachtaí fiadh* could easily have been used to produce very drinkable ale (Moore and Quinn 2007). The Irish Archaeobotany Discussion Group, however, has refuted the idea that the primary function of *fulachtaí fiadh* was brewing, in part due to the lack of botanical remains associated with brewing found at the sites, noting that the occasional associated finds of quern stones at *fulacht fiadh* sites may be the result of ritual depositions close to such sites (McClatchie *et al*., 2008).

Conclusions

The burnt mound/fulacht fiadh identified at Site E2955 appears to form part of a localised cluster of such sites, which also includes the two examples excavated at the nearby Site E2956. Though the burnt mound at Site E2955 has been dated to the Early Bronze Age, the smaller of the two examples at Site E2956 was dated to the Late Bronze Age, suggesting that this cluster of sites is not wholly contemporary, but evolved through the regular use of the area for burnt mound activity. This activity clearly extended throughout the Bronze Age (indicative of Bronze Age settlement in the wider hinterland) and could have commenced earlier (in the Neolithic) or extended later (into the Iron Age or early medieval periods). Further archaeological investigation of the other mounds within the cluster would be required to confirm the overall chronology for the evolution of the cluster

6 Archive quantities

The site archive is comprised of the following materials:

Item	Quantity
Context Sheets	27
Plans	9
Sections	13
Photographs	29
Registers	5
Notebooks	1

The archive material is contained within 1 box.

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

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- The excavation team.

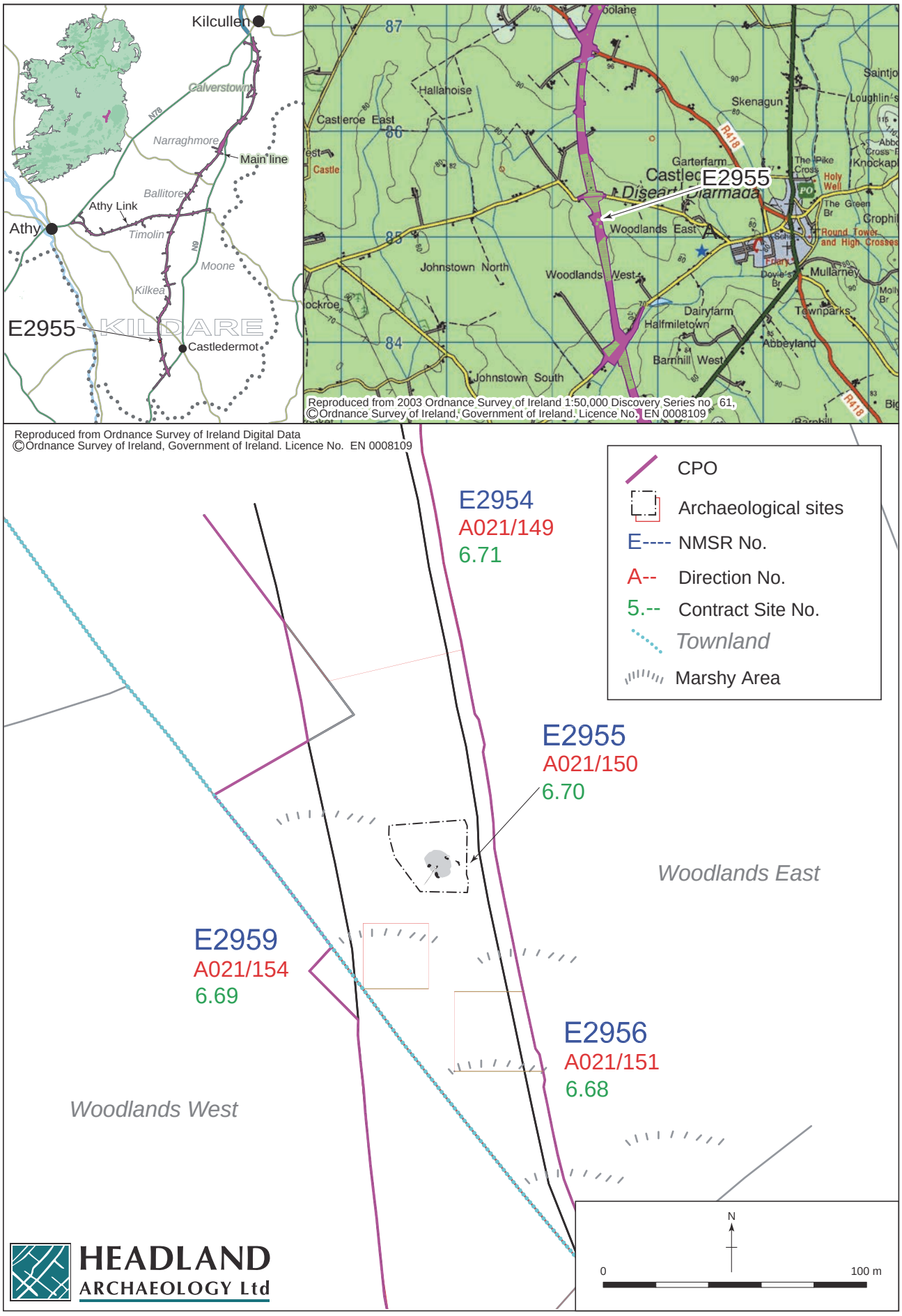


Figure 1 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Killcullen to Carlow. Archaeological Services Contract No. 6 - Resolution, Moone to Prumplestown: E2955, Site location.

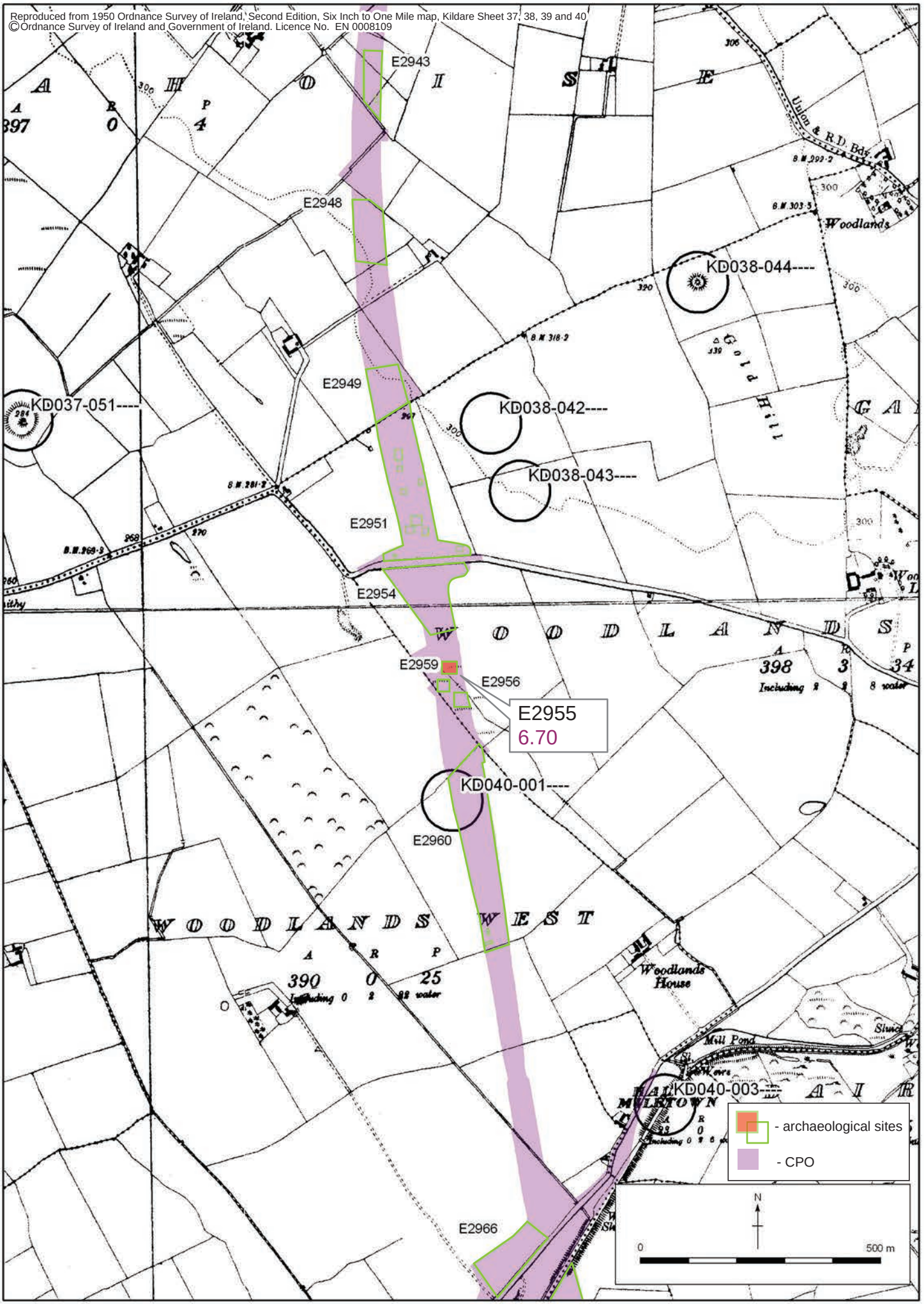


Figure 2 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 6 - Resolution, Moone to Prumplestown: E2955, Extract from RMP.

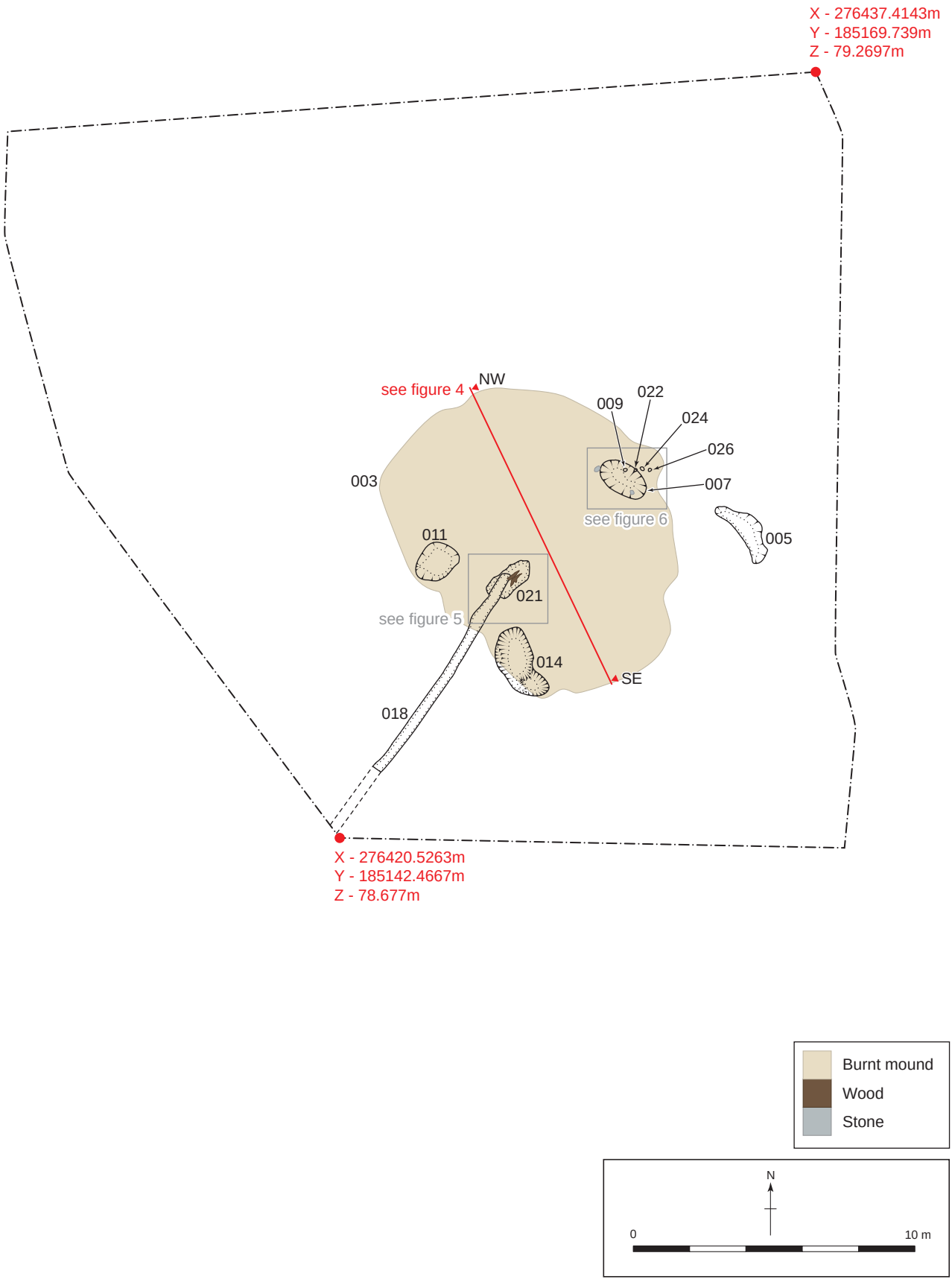
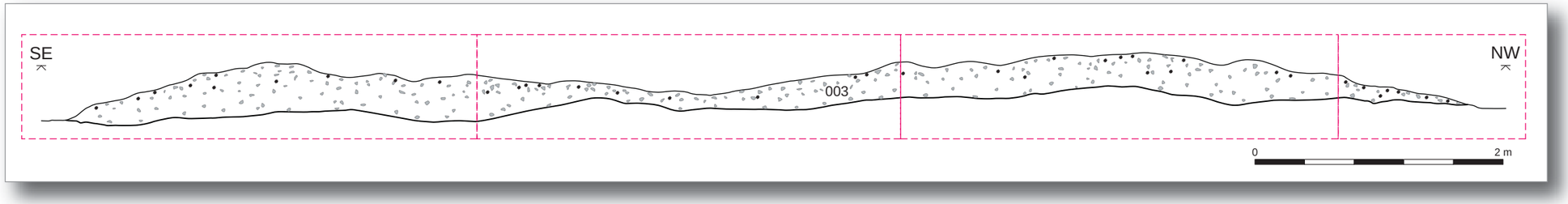


Figure 3 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 6 - Resolution, Moone to Prumplestown: E2955, Site layout.



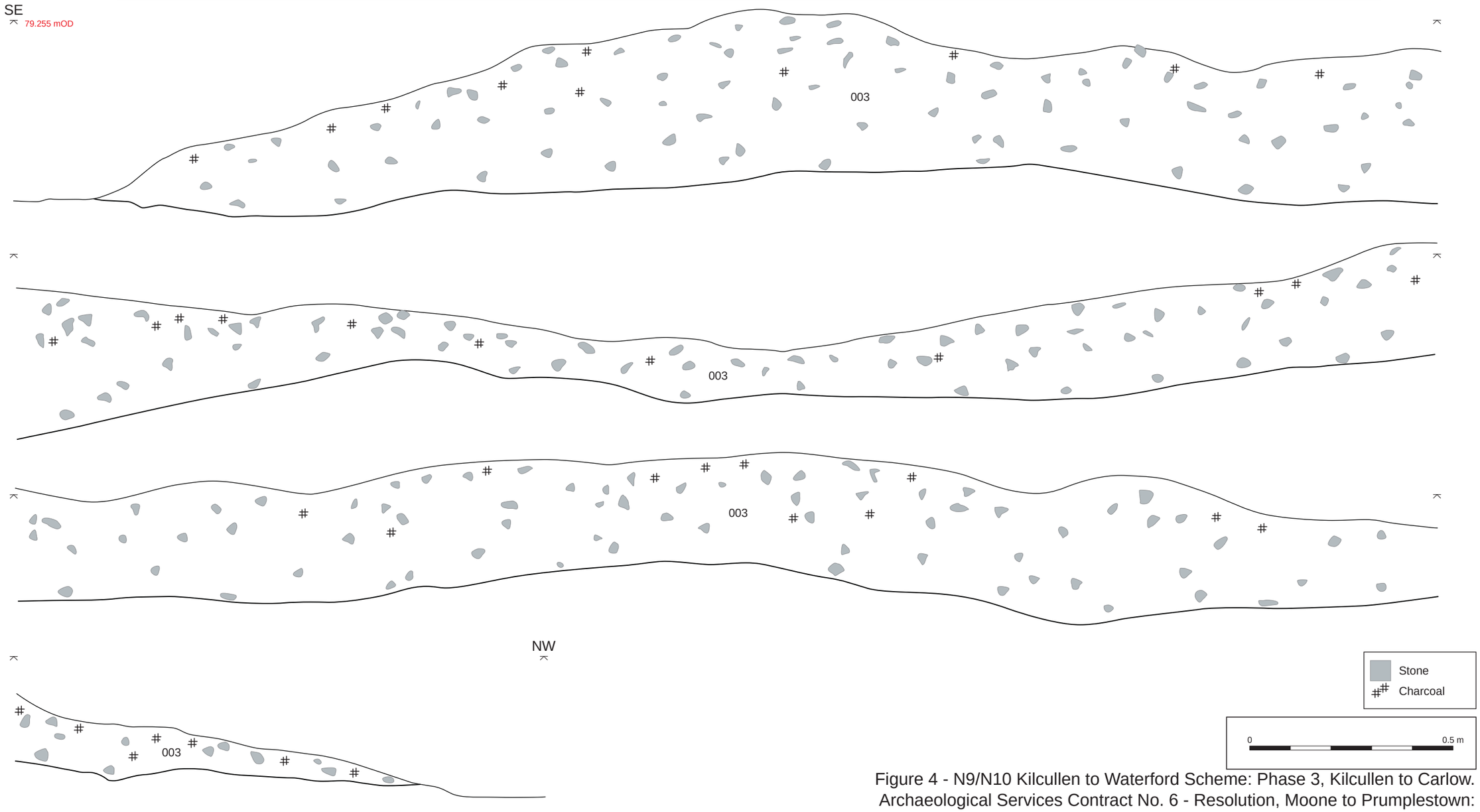
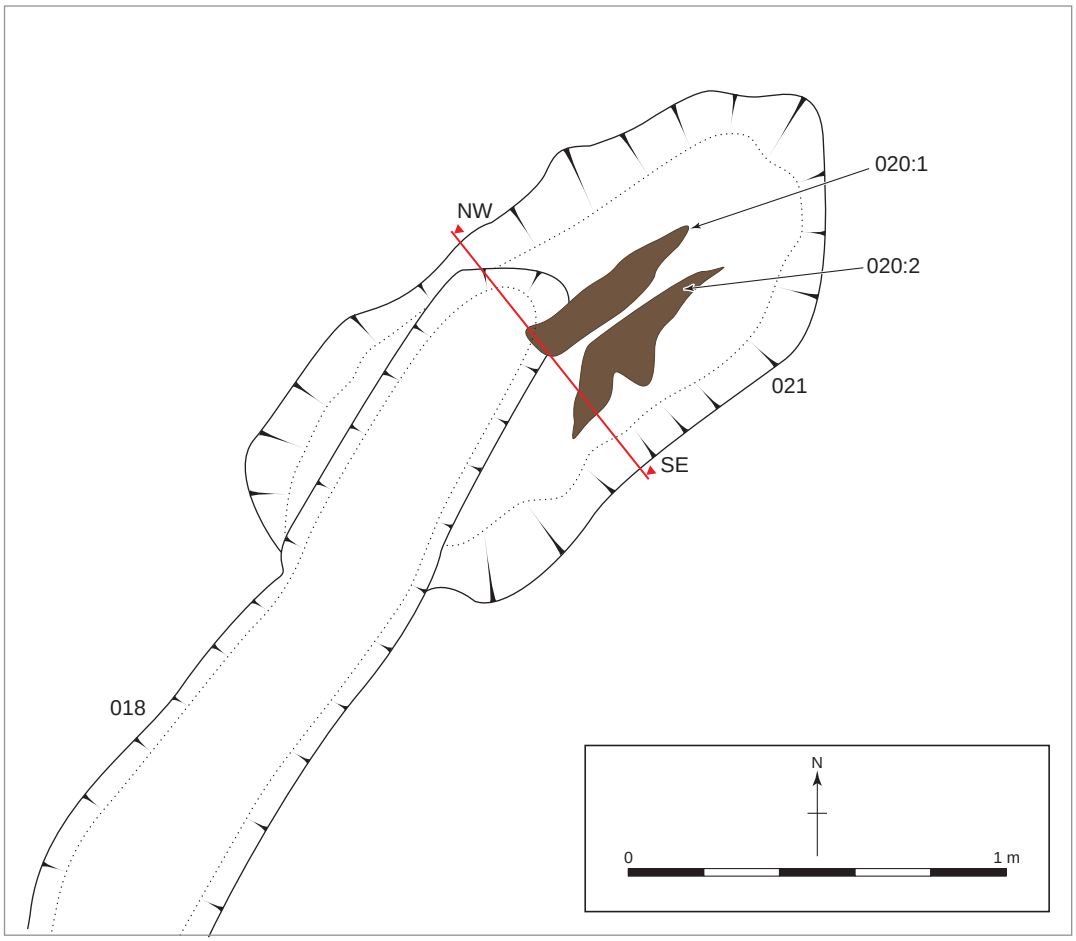


Figure 4 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 6 - Resolution, Moone to Prumplestown: E2955, Northeast facing section of burnt mound (003).



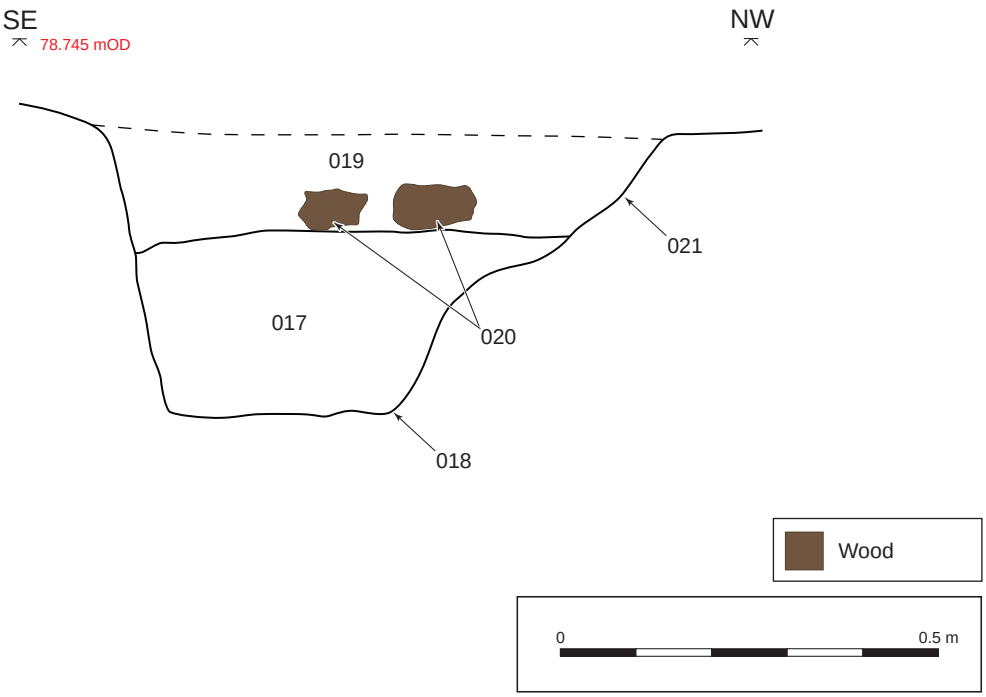
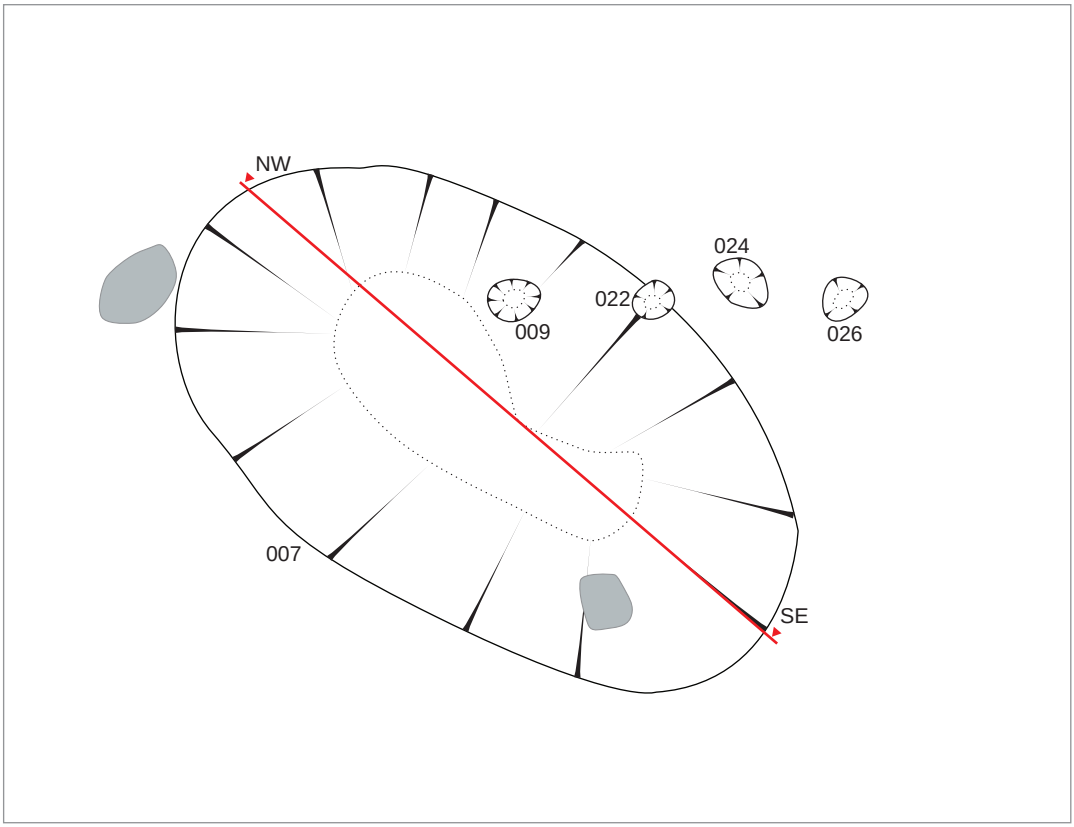
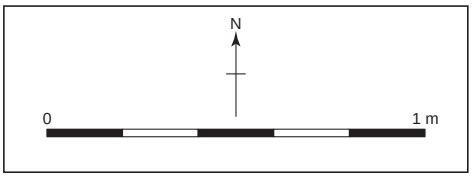


Figure 5 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 6 - Resolution, Moone to Prumplestown: E2955, Plan and section of trough (021).





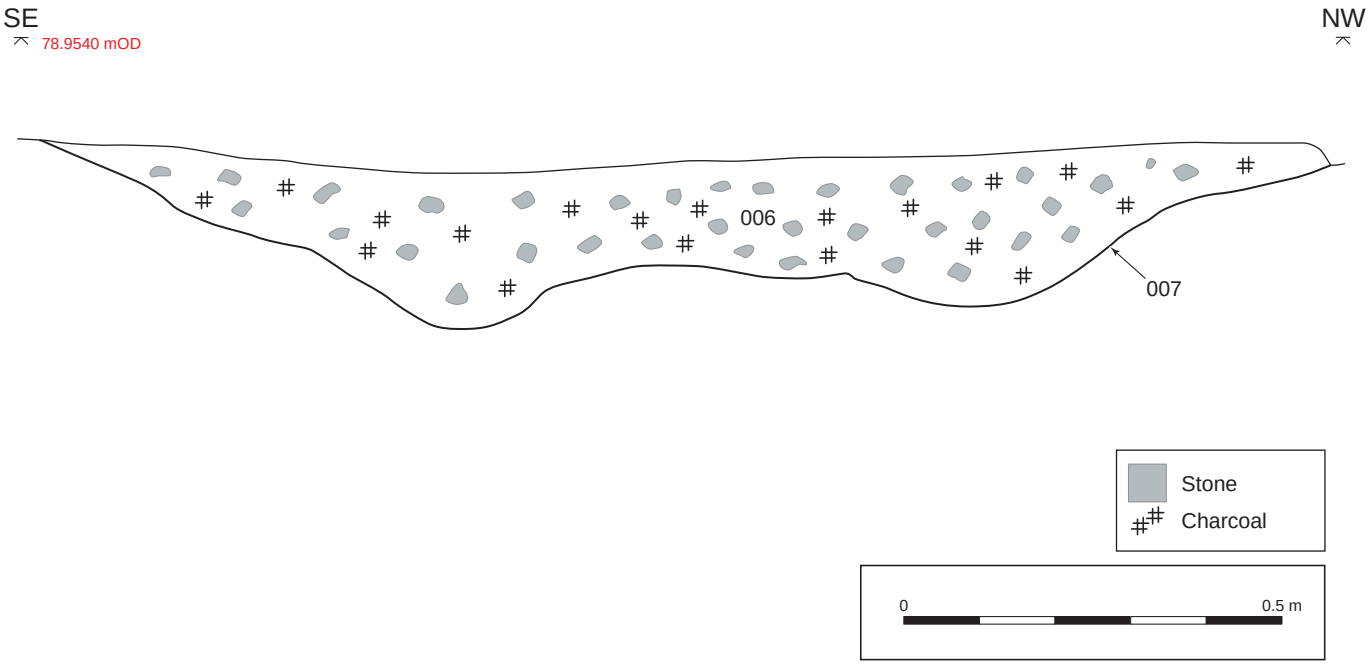


Figure 6 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 6 - Resolution, Moone to Prumplestown: E2955, Plan and section of pit (007) showing stake holes (009), (022), (024), (026).

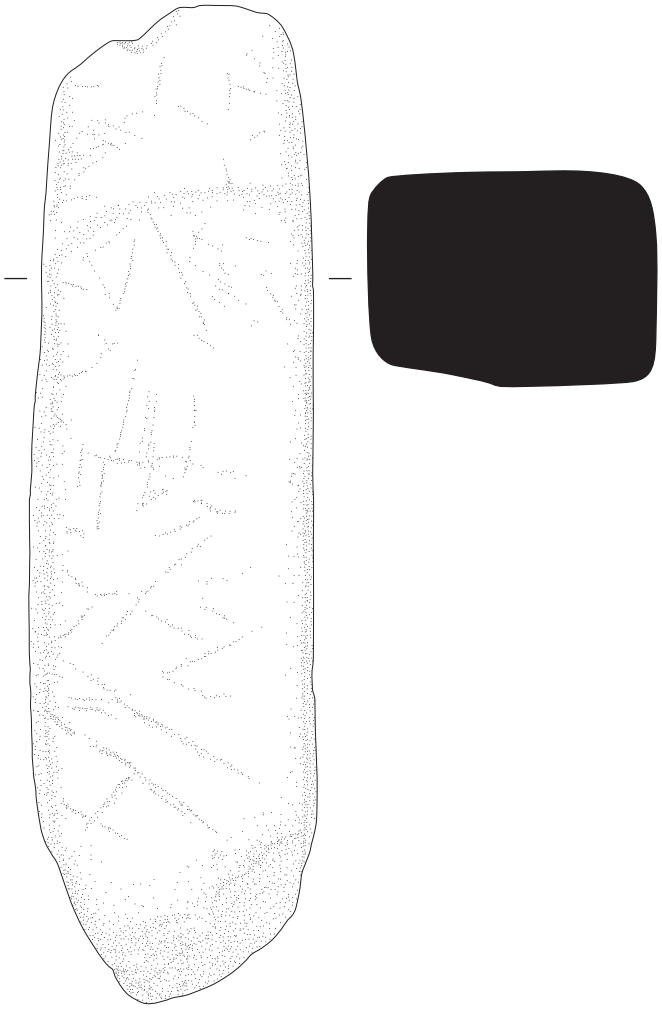


Figure 7 - N9/N10 Kilcullen to Waterford Scheme: Phase 3, Kilcullen to Carlow. Archaeological Services Contract No. 6 - Resolution, Moone to Prumplestown: E2955, Whetstone (E2955:001:001) and Flint Blade (E2995:003:001) illustrations.

Plate 1 - Mid-excavation shot of trough (021), facing southwest.

Plate 2 - Vertical shot of wood (020) in trough (021).

Plate 3 - Mid-excavation shot of drain (018), truncating trough (021), facing southwest.

Plate 4 - Mid-excavation shot of pit (007), facing southwest.

Plate 5 - Post-excavation shot of stakeholes (009, 022, 024, 026), vertical shot.

Plate 6 - Pre-excavation shot of burnt mound (003), facing north.

Plate 7 - Mid-excavation shot of burnt mound (003), facing southeast.

Plate 8 - Mid-excavation shot of site, facing north.

Plate 9 - Worked flint (E2955:003:001) from burnt mound (003).

Appendix 1 – Context Register for Site E2955

Context no.	Type	Fill of:	Filled by:	D (m)	W (m)	L (m)	Description	Interpretation
(001)	Topsoil	-	-	0.25 m	-	-	Loose brown silty clay.	Topsoil
(002)	Natural	-	-	-	-	-	Yellow blue boulder clay.	Natural
(003)	Deposit	-	-	0.38 m	8.9 m	11.3 m	Sub-circular shape in plan. Loose black silty sand with charcoal and fire cracked stone inclusions.	Burnt mound
(004)	Fill	(005)	-	0.5 m	0.8 m	2.4 m	Fairly compact light brown peaty clay and frequent roots.	Fill of tree bowl
(005)	Cut	-	(004)	0.5 m	0.8 m	2.4 m	Crescent shaped in plan with irregularly sloping sides and a concave shaped base.	Tree bowl
(006)	Fill	(007)	-	0.2 m	1.1 m	1.8 m	Loose black clayey silt with frequent heat shattered stones, charcoal and some organic material/possible wood fragment	Fill of pit
(007)	Cut	-	(006)	0.2 m	1.1 m	1.8 m	Oval shape in plan with gradually sloping sides and a concave shaped base.	Cut of pit.
(008	Fill	(009)	-	0.13 m	0.12 m	0.13 m	Loose black clayey silt with frequent charcoal inclusions.	Fill of stake hole.
(009)	Cut	-	(008)	0.20 m	0.12 m	0.13 m	Circular stake hole with vertically sloping sides leading to a tapered point at the base.	Stake hole
(010)	Fill	(011)	-	0.1 m	1.24 m	1.5 m	Loose black sandy silt with charcoal and fire cracked stone inclusions.	Fill of natural depression.
(011)	Cut	-	(010)	0.1 m	1.24 m	1.5 m	Sub-rectangular shape in plan with gradually sloping sides and a flat base.	Natural depression.
(012)	Fill	(014)	-	0.55 m	0.4 m	3.6 m	Loose grey brown silty sand with occasional charcoal fleck inclusions.	Fill of tree bowl.
(013)	Fill	(014)	-	0.35 m	0.4 m	3.6 m	Loose black brown clayey silt with small stones and frequent roots inclusions.	Fill of tree bowl.
(014)	Cut	-	(012) (013)	0.58 m	1.4 m	3.6 m	Irregular shape in plan with convex sides and a concave shaped base.	Tree bowl
(015)	Fill	(018)	-	0.28 m	0.5 m	11 m	Fairly compact mottled grey/ yellow and black sandy clay with moderate small stone inclusions.	Upper fill of drain.
(016)	Fill	(018)	-	0.2 m	0.5 m	11 m	Loose light black clayey silt with charcoal, roots and occasional	Secondary fill of

Context no.	Type	Fill of:	Filled by:	D (m)	W (m)	L (m)	Description	Interpretation
							small stone inclusions.	drain.
(017)	Fill	(018)	-	0.18 m	0.32 m	11 m	Loose light black sandy silt with medium to large stone inclusions.	Basal fill of drain.
(018)	Cut	-	(015)	0.4 m	0.5 m	11 m	Linear in plan with almost vertical sides and a flat base.	Cut of drain.
(019)	Fill	(021)	-	0.35 m	1 m	1.6 m	Loose light black sandy silt with fire cracked stones and charcoal inclusions.	Fill of trough.
(020)	Fill	(021)	-	0.03 m	0.3 m	0.7 m	Two rectangular wood elements orientated east/west located at base of trough.	Timber lining of trough.
(021)	Cut	-	(019) (020)	0.16 m	0.7 m	1.8 m	Sub-rectangular in plan with gradually sloping sides and a flat base.	Cut of trough.
(022)	Cut	-	23	0.07	0.12	0.13	Circular stake-hole with vertically sloping sides leading to a rounded base.	Stake-hole
(023)	Fill	22	-	0.07	0.12	0.13	Loose black clayey silt with frequent charcoal inclusions.	Fill of stake-hole.
(024)	Cut	-	25	0.07	0.11	0.12	Circular stake-hole with vertically sloping sides leading to a tapered point at the base.	Stake-hole
(025)	Fill	24	-	0.07	0.11	0.12	Loose black clayey silt with frequent charcoal inclusions.	Fill of stake-hole.
(026)	Cut	-	27	0.07	0.12	0.12	Circular stake-hole with vertically sloping sides leading to a tapered point at the base.	Stake-hole
(027)	Fill	26	-	0.07	0.12	0.12	Loose black clayey silt with frequent charcoal inclusions.	Fill of stake-hole.

Appendix 2 – Finds Register for Site E2955

Find no.	Material	Description
E2955:001:001	Lithic	Whetstone
E2955:003:001	Lithic	Flint

Appendix 3 – Sample Register for Site E2955

Soil

Sample no.	Context no.	Description
E2955:001	(004)	Fill of pit (005).
E2955:002	(006)	Fill of pit (007).
E2955:003	(006)	Fill of pit some organic material/possible wood fragment (007).
E2955:004	(003)	Burnt mound deposit.
E2955:005	(008)	Fill of stake-hole (009).
E2955:006	(013)	Fill of tree bowl (014).
E2955:007	(012)	Fill of tree bowl (014).
E2955:008	(016)	Fill of drainage ditch (018).
E2955:009	(020)	Timber lining of trough (021).
E2955:010	(020)	Timber lining of trough (021).

Bone

Sample no.	Context no.	Description
E2955:001	(003)	Animal bone from Burnt mound deposit (003).

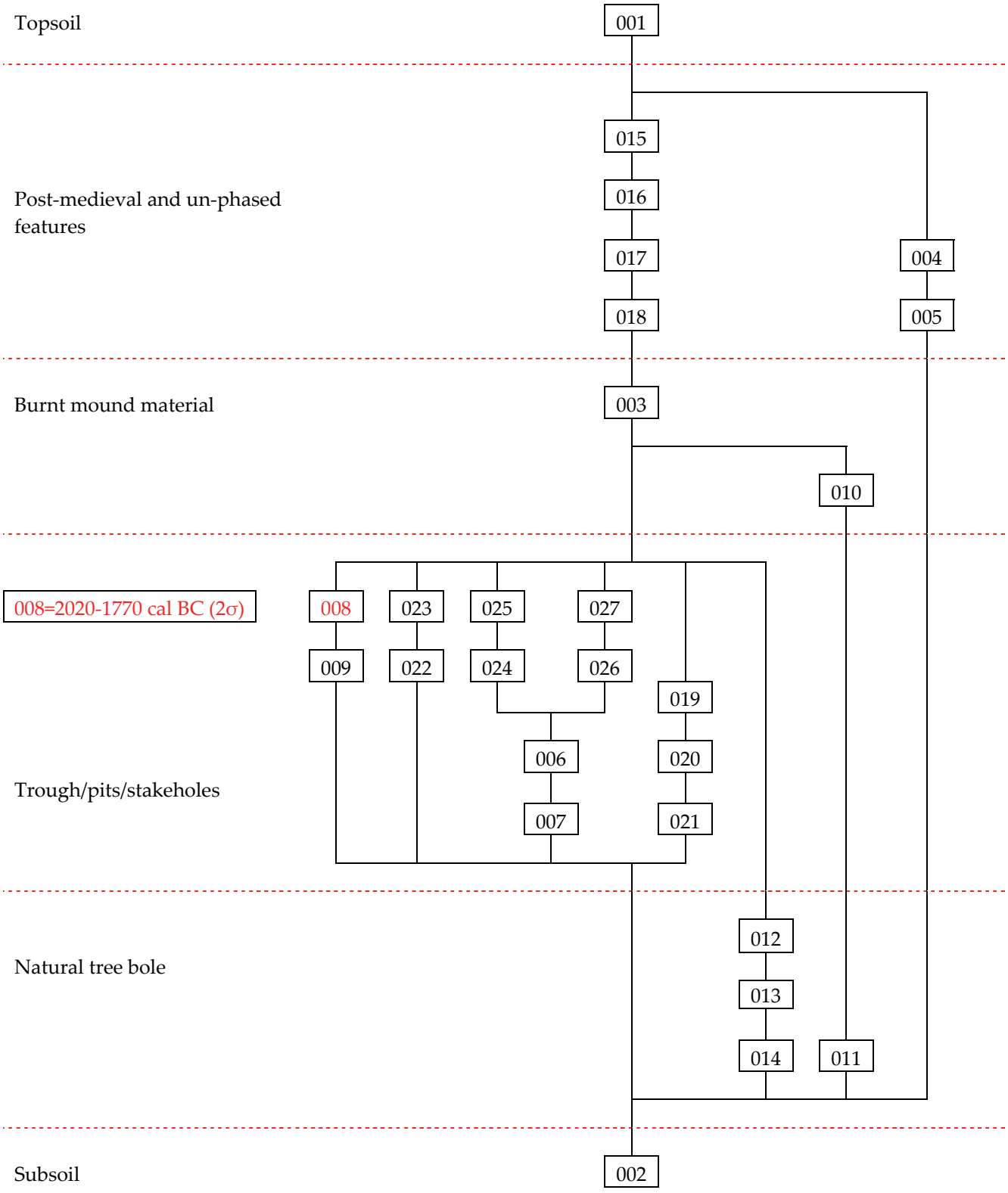
Appendix 4 – Photographic Register for Site E2955

Shot no.	Direction facing	Description
E2955:001	North	Pre-excavation of burnt mound (003).
E2955:002	West	East-facing section of burnt mound (003).
E2955:003	North	South-facing section of burnt mound (003).
E2955:004	South	North-facing section of burnt mound (003).
E2955:005	East	West-facing section of burnt mound (003).
E2955:006	East	West-facing section of burnt mound (003).
E2955:007	North	Mid-excavation view of site.
E2955:008	Southeast	Northwest quadrant under burnt mound (003).
E2955:009	Northeast	Southwest quadrant under burnt mound (003).
E2955:010	Northeast	Pre-excavation of trough (021).
E2955:011	West	Pre-excavation of trough (007).
E2955:012	South	Pre-excavation of pit (011).
E2955:013	East	Pre-excavation of tree bowl (014).
E2955:014	Northeast	Pre-excavation of ditch (018).
E2955:015	Southwest	Mid-excavation of trough (021).
E2955:016	Overhead	Mid-excavation worked wood (020) in trough (021).
E2955:017	Southwest	Mid-excavation of drain (018) truncating trough (021).
E2955:018	Southwest	Northeast-facing section of trough (007).
E2955:019	South	North-facing section of pit (011).
E2955:020	South	North-facing section of tree bowl (014).
E2955:021	North	South-facing section of tree bowl (005).
E2955:022	Southwest	Northeast-facing section of ditch (018).
E2955:023	Northeast	Post-excavation of ditch (018).
E2955:024	Southwest	Timber staining at base of trough (021).
E2955:025	Southwest	Post-excavation of trough (007) and stake-holes (009).
E2955:026	Southwest	Post-excavation of stake-holes (009).
E2955:027	North	Post-excavation of pit (011).
E2955:028	Southeast	Post-excavation of tree bowl (014).
E2955:029	Southwest	Post-excavation of tree bowl (005).

Appendix 5 – Drawing Register for Site E2955

Drawing no.	Type	Scale	Description
1	Section	1.10	East-facing section of burnt mound (003).
2	Section	1.10	North-facing section of burnt mound (003).
3	Section	1.10	West-facing section of burnt mound (003). Part 1
4	Plan	1.20	Pre-excavation plan of tree bowl (005).
5	Section	1.10	Southeast-facing section of tree bowl (005).
6	Plan	1.20	Post-excavation plan of tree bowl (005).
7	Plan	1.10	Pre-excavation plan of trough (007).
8	Section	1.10	Northeast-facing section of trough (007).
9	Plan	1.10	Post-excavation plan trough (007).
10	Section	1.10	South-facing section of burnt mound (003).
11	Plan	1.20	Pre-excavation plan of tree bowl (014).
12	Plan	1.20	Pre-excavation plan of pit (011).
13	Section	1.10	West-facing section of burnt mound (03). Part 2
14	Section	1.10	Northeast-facing section of pit (011).
15	Section	1.10	Northwest-facing section of tree bowl (014).
16	Plan	1.20	Post-excavation plan of pit (011).
17	Plan	1.20	Post-excavation plan of tree bowl (014).
18	Section	1.10	West-facing section of drainage ditch (018).
19	Section	1.10	East-facing section of drainage ditch (018).
20	Section	1.10	East-facing section of drainage ditch (018).
21	Plan	1.20	Post-excavation plan of trough (021) and drainage ditch (018).
22	Section	1.10	East-facing section of trough (021) and drainage ditch (018).

Appendix 6 – Site Matrix



Appendix 7 – Palaeoenvironmental samples assessment for E2955, Woodlands East, Co. Kildare
By: Scott Timpany

Introduction

Ten environmental samples were taken during the excavation of the townland of Woodlands East, Co. Kildare. The site consisted of a burnt mound a trough and a pit, together with four stakeholes and a modern drainage ditch. Four samples (including three waterlogged samples) were processed in order to retrieve any palaeoenvironmental material that may aid in the interpretation of the site.

Methodology

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. Waterlogged samples were sieved through a stack of sieves at sizes of 10mm, 5mm, 2mm, 1mm and 250 μm. All plant macrofossil samples were assessed 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).

Radiocarbon dating was undertaken 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. All results quoted in the text are taken from the 2 σ calibrated age range.

Results

The results are summarised below in Table 1 (radiocarbon dating results), Table 2 (Composition of retents) and Table 3 (Composition of waterlogged samples). Plant material was preserved through a mixture of charring and waterlogging.

Radiocarbon dating
One radiocarbon date was obtained from this site from Pomoideae (hawthorn/apple/pear) charcoal fragments (see Table 1). The Pomoideae charcoal produced an Early Bronze Age date of 2020-1770 cal BC (2 σ) (SUERC-25267; 3560±30 BP) from Sample 002 taken from fill (006) of feature (007).

Wood charcoal
Wood charcoal was the main palaeoenvironmental material recovered from the site and was present in three of the samples (002, 003 and 004). Charcoal fragments were abundant in all three samples; with two samples (003 and 004) containing fragments of a size suitable for AMS dating and identification (see Tables 2 and 3). A charcoal fragment from one sample (002) has been identified and AMS radiocarbon dating (see Tables 1 and 2).

Waterlogged plant remains
The only plant remains recovered, other than charcoal, were from the waterlogged samples (see Table 3). Fruits of tormentils (*Potentilla* sp.) and sedge nutlets (*Carex* sp.) were present in small quantities within Sample 001. Abundant plant monocotyledon fragments, which may represent grasses or sedges, were found in two samples (001 and 003). Wood fragments were present in one sample (003)

also in abundant quantities, although mainly these fragments were of a small size (<0.5 cm). Fungal sclerotia were recovered from two samples (001 and 003).

Discussion

Samples were processed from three features on the site and these are discussed below.

Burnt Mound (003)
One sample (004) was processed from the burnt mound deposit (003). This sample was found to contain only charcoal fragments (see Table 2). Visual assessment of the charcoal fragments from this sample shows that the majority of the charcoal is non-oak suggesting that carr-woodland may have been exploited as a source of timber used for fuel. However, further identification of the charcoal fragments would be needed to confirm this suggestion. The charcoal fragments which make up the mound deposit (together with heat-fractured stone) would have been deliberately discarded there following the burning activity. Unfortunately no other materials were recovered from the sample so the purpose of this burning activity remains unclear.

Pit (007) 2020-1770 cal BC
Two samples (002 and 003) were processed from the fill (006) of pit (007). Both samples were found to contain charcoal fragments, which were observed to contain a mixture of oak and non-oak fragments. The charcoal fragments had similar maximum sizes of approximately 1 cm, with Sample 002 containing the largest quantity of large-sized fragments, whilst those in Sample 003 were mainly small-sized fragments (<0.5 cm). The fill of the pit (006) was also found to contain heat-fractured stones (Hackett 2009) and together with the charcoal fragments this suggests burnt mound material (003) had become incorporated into the infill of the pit. Organic material was also observed in the fill during excavation (Hackett 2009). Assessment of the samples showed the presence of plant monocotyledon fragments, which is likely to relate to sedges and/or grasses, together with wood fragments. Also present were a small number of fungal sclerotia. These plant remains are too fragmentary to be able to identify to species level but are likely to represent plants and fungi growing around the site during the period of burnt mound activity. One charcoal fragment from sample (002) has been identified as fruit tree (hawthorn/apple/pear) and has produced a radiocarbon date of 2020-1770 cal BC (2 σ) (SUERC-25267; 2760±30 BP), indicating this activity took place in the Early Bronze Age. This is an earlier date than the nearby activity at burnt mound Site E2956, which has been dated to the Late Bronze Age.

Tree bowl (005)
One sample (004) was processed from the fill (004) of a tree bowl (005). This sample was the only one of the processed samples not to contain charcoal fragments and suggests this fill may be of a different date to the burnt mound activity. Root fragments were recovered from the samples, which may relate to the tree which had previously grown there. Other plant remains recovered from the sample include fruits of tormentils and nutlets of sedges. Plant monocotyledon fragments were also present in the sample and given the presence of sedge nutlets these may represent sedge remains. Fungal sclerotia were also present in the sample. The assemblage indicates wet conditions in the immediate area of the tree, with both tormentils and sedges growing in damp environments, such as tall-herb communities (Rodwell 1995; Stace 1997).

Conclusions

- The only material recovered from the burnt mound deposit samples was charcoal fragments, which are likely to relate to the burning activities but unfortunately provide little interpretative evidence as to the exact function of the site.
- The absence of charcoal in the tree bowl suggests this may relate to a different period than the burnt mound activity. The waterlogged plant assemblage shows a damp/wet environment existed in the area of the tree.
- The burnt mound activity at this site takes place at an earlier date than that seen at the nearby site E2956.

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E-Number	Lab code	Sample ID	Material	σ13C	Radiocarbon age BP	Calibrated Age Ranges (1 σ)	Relative probability	Calibrated Age Ranges (2 σ)	Relative probability
E2955	SUERC-25267	Sample 002 Context 006	Pomoideae charcoal	-27.7	3560±30	1960-1870 cal BC	67.5	2020-1990 cal BC	3.3
						1840-1830 cal BC	0.7	1980-1860 cal BC	75.4
								1850-1770 cal BC	16.7

Table 1 – Radiocarbon dating results.

Context Number	Sample Number	Retent Vol (l)	Feature	Other plant remains	Charcoal Quantity	Charcoal max size (cm)	Charcoal AMS	Comments
3	4	10	Burnt mound deposit (003)	+++	++++	1.7	*	Other plant remains are root fragments, no flot was produced.

Key: + = rare, ++ = occasional, +++ = common and ++++ = abundant
* = sufficient sized charcoal for identification and AMS dating

Table 2 – Composition of retents

Context Number	Sample Number	Feature	Plant Monocotyledon fragments	Wood Fragments	Seeds	Other Plant remains	Charcoal		Material available for AMS	Comments
							Quantity	Max size (cm)		
004	001	Fill of tree bowl (005)	+++		*Carex* sp. ++, *Potentilla* sp. +	Root fragments ++, Fungal sclerotia +				
006	002	Fill of pit (007)					++++	1	Charcoal ++	
006	003	Fill of pit (007)	++++	++++		Fungal sclerotia +	++++	0.9		

Key: + = rare, ++ = occasional, +++ = common and ++++ = abundant
NB charcoal over 1cm is suitable for identification and AMS dating

Table 3 – Composition of waterlogged materials

Appendix 8 – Final report on the faunal remains from Woodlands East, Co. Kildare (E2955)
By: Auli Tourunen PhD and Albína Hulda Pálsdóttir MA

Introduction

This report discusses the results of the animal bone analysis from Woodlands East, Co. Kildare (E2955). Full archaeological resolution revealed a roughly circular burnt spread of heat shattered stones and charcoal (Hackett 2009, 2). The animal bone specimens were recovered by hand-picking and soil sieving. The animal bone analyzed for this report derives from burnt mound deposit (003).

Methodology

During the analysis each specimen was identified and recorded according to species, skeletal element, age and sex where possible. For mammals the animal bone reference collection located in Headland Archaeology 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). All data is stored in digital and written form in Headland Archaeology Ltd, Unit 1 Wallingstown Business Park, Little Island, Co. Cork. The material was quantified by using the number of identified specimens (NISP).

Results

A total of one cattle molar tooth fragment was recovered from the site (Table 1).

Context	*Sample*	*Species*	*Element*	NISP
003	001	Cattle	Tooth (molar fragment)	1

Table 1 – Species representation of sample (NISP)

Discussion

The faunal assemblage from Woodlands East, Co. Kildare (E2955) is too small to base any conclusions regarding site function on. However, some general observations can be made.

The animal bone samples from burnt mound sites are usually relatively small. In a previous study it was found that the animal bones recovered from burnt mound sites have been connected especially with slaughter, primary butchery and meat preparation (Tourunen 2008, 40). In burnt mounds excavated in the Carlow/Kildare area such as Ballybar Lower (E2618) Co. Carlow, Busherstown (E2584) Co. Calrow and Johnstown (E2586) Co. Carlow, cattle dominate the samples followed by horse, deer, pig and sheep or goat (Tourunen 2008). The material from Ballygawley (Site 1), Co. Tyrone is also dominated by cattle bones, however no horse bones were found in the identifiable portion of the assemblage and the proportion of pig and sheep or goat bones is higher than in the samples from Carlow and Kildare (Tourunen 2009). Possible local variation across Ireland has not been fully investigated. For example, in five burnt mound sites excavated in Co. Tipperary the only identified animal was sheep or goat (Stevens 2005, 326).

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Appendix 9-Radiocarbon Date Certificate

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
E2955	SUERC - 25267	sample # 002, context (006)	pomoideae charcoal	-25.0	3560 +/- 30	1960 - 1870 cal BC	67.5	2020 - 1990 cal BC	3.3
						1840 - 1830 cal BC	0.7	1980 - 1860 cal BC	75.4
								1850 - 1770 cal BC	16.7

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RADIOCARBON DATING CERTIFICATE

18 September 2009

Laboratory Code	SUERC-25267 (GU-19256)
Submitter	Karen Stewart Headland Archaeology (Ireland) Ltd. Unit 1 Wallingstown Business Park Little Island, Co. Cork Ireland
Site Reference	KCK06 E2955
Context Reference	6
Sample Reference	2
Material	charcoal : ash
$\delta^{13}C$ relative to VPDB	-25.0 ‰
Radiocarbon Age BP	3560 ± 30

N.B.

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

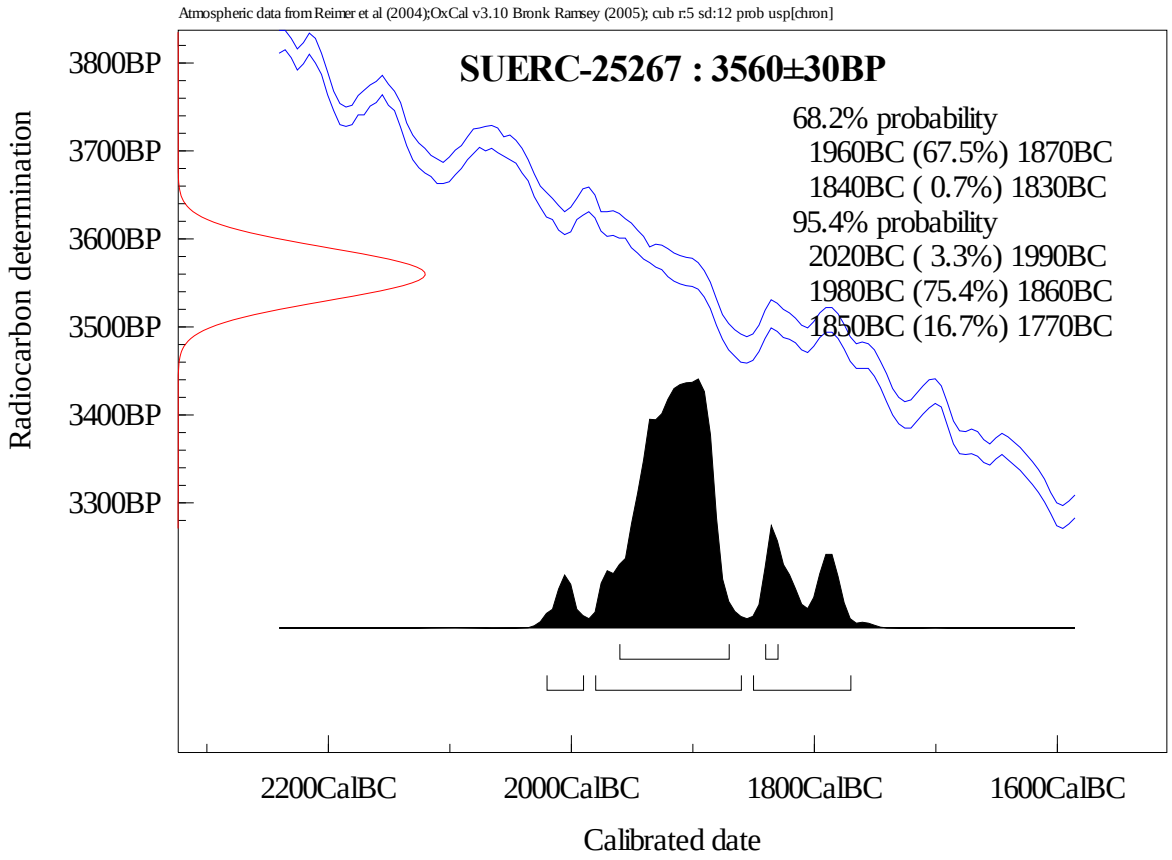
2. The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal3).

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

Conventional age and calibration age ranges calculated by :- Date :-

Checked and signed off by :- Date :-

Calibration Plot



Appendix 10 – The knapped and ground stone assemblage from Woodlands East, Co. Kildare (E2955)
By: Maria Soledad Mallia-Guest

Introduction

A single knapped find and a ground stone artefact were recovered during archaeological resolution of Site E2955 in the townland of Woodlands East (Co. Kildare). The archaeological material identified at the site dated to the Early Bronze Age and comprised a sub-circular in plan burnt mound overlying a trough, a pit and a stakehole arrangement.

Modern disturbance of this spread was recorded as a linear field drain truncating the southwest quadrant (Hackett 2009). No other artefacts were retrieved.

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 based on 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.

The ground stone finds were also visually examined with the aid of stereomicroscope at 40x magnification. In addition to the metric attributes and weight, raw material, artefact condition and any evidence of manufacture through abrasion, polish or impact present was also recorded and discussed along with any signs of wearing and use motion.

Results

A single light yellowish-greyish white flint artefact (E2955:003:001) (Table 1) was recovered from a sub−circular burnt mound spread (003) comprising a black silty sand deposit with charcoal and fire cracked stone inclusions. The find is a medium-sized double arris blade measuring over 50 mm in length presenting a slight orangish discolouration at its distal end and patination at its proximal end, these cannot be conclusively assumed to be the result of heat-exposure. Sides are parallel and straight however widening towards the distal end, where they define a convex sharp edge. Some isolated pseudo-retouch is present on the left mesial upper position with some micro-fractures identified around this convex end. It exhibits a plain prepared by abrasion and lipped platform with a diffuse bulb and ripples of percussion, which become more pronounced towards the distal convex end. This find can be classified as an unretouched knapping by-product, a potential blank for further secondary modification. No clear pattern of macroscopic use-damage was observed, with the exception of some readily visible micro-retouch and rounding situated on the left ventral surface which suggest that this

blank may have been utilised. At its narrow end the artefact shows rather fresh edges with no evidence of use and a slight fracture running parallel to the sides on its left lower mesial portion.

An unstratified ground stone find E2955:001:001 consisting of a rectangular possible whetstone made of grey banded limestone which measures 126.6 mm in length by 38.4 mm in width by 29.1 mm in thickness. The find weighs 291.3 g and shows one fractured end opposing a bevelled one. Both broad surfaces appear to have been in use exhibiting a pattern of parallel striations indicative of abrasive damage, with the sides only presenting pecked patches. The fractured end displays some incipient sheen with a possible whetting groove on the opposing surface suggesting the reuse of this fracture as an active plane. Besides the abrasive damage recorded on the broad surfaces, scattered transversal striae are also visible on the bevel.

Discussion

The knapped find (E2955:003:001) recovered at Site E2955 (Woodlands East, Co. Kildare) can be classified as a finely detached blade blank. Scarce evidence of use appears present on its left upper mesial portion were a convex edge is present, suggesting that this find could have functioned with a longitudinal motion such as those recorded for knives. The broader, squat termination is likely an undesired product resulting from the intensity of the force applied during its detachment. The second arris, running parallel to the main one but truncated, also appears to be have originated during the impact. The morphology of the distal end, which needs to be controlled to facilitate further blade removal, may have compromised this and also its further modification, leaving only the sharp convex distal end and upper section relatively suitable as working edges. Radiocarbon determinations obtained from pomoideae charcoal recovered within deposit (006) returned an Early Bronze Age date range of 2020-1770 cal BC (2σ) (SUERC-25267; 3560±30 BP) (Appendix 9).

Blade technology in Ireland is traditionally assumed to have had a dominant role within early prehistoric lithic assemblages and so is platform technology, and it is particularly known from the Early Mesolithic, but also from small blade-like examples identified in Early Neolithic contexts. The regular Early Mesolithic examples were produced for the manufacture of microliths and backed pieces with a trend towards broader blade-like blanks in the Later Mesolithic, suitable for the manufacture of notched and laterally retouched pieces (Costa *et al* 2001; 2005). Woodman (1977) had originally observed a shift from long blades obtained at the beginning of the Late Mesolithic and the broad flake-like blades frequently found at the end of it. This shift has also been associated with a relative change in the emphasis of soft-hammer percussor use (such as bone, antler, hard wood or soft stones) over blank detachment by hard hammer percussors. The latter produces relatively longer and broader blanks (Costa *et al* 2005). The find here discussed is a likely a direct percussion by-product however. An isolated blade find does not allow for further conclusions regarding the type of percussors used for its detachment and it is not sufficient as a conclusive chronological marker *per se*.

Given its context of recovery, the find may also represent a residual deposition resulting from the reworking of earlier deposits. A number of sites in the area, including E2966 (Woodlands West, Co. Kildare) and E2967 (Prumplestown Lower, Co. Kildare) yielded an important blade-dominated, and in particular chert-dominated, Late Mesolithic component in their lithic assemblages (Mallia-Guest 2009) with a Late Mesolithic butt-trimmed form, also believed to be residual, recovered at a burnt mound in Johnstown, Co. Carlow (E2575) (Sternke 2008).

While chert is locally available as part of limestone deposits of Carboniferous date, flint has a more restricted distribution over the landscape. It can be obtained from secondary sources as beach pebbles in coastal localities or as glacially transported material within till deposits (Woodman *et al*. 2006)

It would appear as well that the possible whetstone (E2955:001:001) is also a modified limestone cobble of local origin. The use of such soft raw materials of poor abrasive quality such as mudstones or siltstone has usually been associated with final stages of sharpening. Also particularly used for finishing more delicate pieces or bringing objects like awls or pins to a point as well as working the end of knives. This would have also resulted in differential wear patterns (*ie*: narrow grooves for pins manufacturing) as different sharpening tasks or tools were being modified (O'Connor 1991, 57)

The petrographical properties of any sharpening stone would ideally require a hard mineral set in a softer matrix such as angular quartz grains generally set in a micaceous or calcite bearing matrix (Moore 1978, 61). As abrasion is the prevailing mechanism altering the contact surface of a whetstone; the petrological nature of the rock in use should ideally sustain its abrasive quality (*e.g.* sandstone) and its capacity to regenerate such abrasive efficiency.

The removal of material from the contact surface during honing takes place through adhesive and abrasive mechanisms, which in turn leave a pattern of striations on the active surfaces (Adams 2002). These surfaces also reflect the intensity of use, through their profiles varying from flat, convex or even dish-shaped. It has also been suggested, in general terms, that smaller (7-15 cm) and fine-grained types, as the example here discussed, were likely part of a craftsman's tools, with larger whetstones involved in the shaping of agricultural rather than domestic blades (Peacock 1998).

Given the nature of the damage, sharpening stones are not suitable for dating purposes as there are no morphological differences among them that can be reliable or chronologically significant (Kars 1984).

Nevertheless, in his examination of Irish whetstones, O' Connor (1991, 60-1) suggested that there is a remarkable continuity from the Early Iron Age through the early medieval period, supplemented rather than broken by the introduction of new types in the Viking Age, in particularly those identified with perforations or tapered ends. None of these attributes were however, identified in the whetstone find here discussed suggesting it could broadly fall within earlier contexts.

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NMI Number	Raw Material	Type	Category	Length (mm)	Width (mm)	Thickness (mm)	State	Condition	Others	Cortex	Blank	Type of Platform	Preparation	Bulb	Ripples	Erailleur scar	Lip	Colour
E2955 :003: 001	Flint	Double arris blade	Debitage	56.3	25.4	5	C	Fair	Slight discolouration and scattered proximal patination	No	Yes	Plain	Yes	D	P	No	Yes	Light yellowish/greyish white

Key: Indet: indeterminate; F: fragmented, Wt: weathered, Lt: lustered; Rd: rolled; Ab: abrupt; S-Ab: semi-abrupt, Bt: Blunted; ND: non-differentiated; D: Diffuse; P: pronounced

Table 1 – The lithic assemblage from Woodlands East, Co. Kildare (E2955)

NMI Number	Raw Material	Type	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)	Shape	Cross-section	State	Condition	Primary Treatment	Active surface	Comments
E2955:001 : 001	Banded Limestone	Sharpening Stone: Whetstone	126.6	38.4	29.1	291.3	Rect.	Rect.	F	Fair	Gd, Pk	Broad surfaces and ends with sheen and striations: indicative of abrasive and adhesive wear.	Banded grey limestone rectangular in shape whetstone on local cobble, presenting one fractured and one bevelled end. Parallel striations on broad surface, fractured end with re-used fracture and incipient polish. Bevelled end displaying localised trasnversal striations. Sides are flat.

Key: Rect: rectangular; F: fragmented; Gd: ground; Pk: pecked

Table 2 – The ground stone assemblage from Woodlands East, Co. Kildare (E2955)