N9/N10 KILCULLEN TO WATERFORD SCHEME, PHASE 4 – KNOCKTOPHER TO POWERSTOWN

Ministerial Direction Scheme Reference No.	A032
Registration No.	E3541
Site Name	AR080B, Danesfort 1
Townland	Danesfort
County	Kilkenny
Excavation Director	Richard Jennings
NGR	252267 146707
Chainage	35000

FINAL REPORT

ON BEHALF OF KILKENNY COUNTY COUNCIL

APRIL 2012

IAC Irish Archaeological Consultancy

PROJECT DETAILS

Project	N9/N10 Kilcullen to Waterford Scheme, Phase 4: Knocktopher to Powerstown
Ministerial Direction Reference No.	A032
Excavation Registration Number	E3541
Excavation Director	Richard Jennings
Senior Archaeologist	Tim Coughlan
Consultant	Irish Archaeological Consultancy Ltd, 120b Greenpark Road, Bray, Co. Wicklow
Client	Kilkenny County Council
Site Name	AR080B, Danesfort 1
Site Type	Ringditch
Townland(s)	Danesfort
Parish	Danesfort
County	Kilkenny
NGR (easting)	252267
NGR (northing)	146707
Chainage	35000
Height OD (m)	61.935
RMP No.	N/A
Excavation Dates	25 June–13 July 2007
Project Duration	20 March 2007–18 April 2008
Report Type	Final
Report Date	April 2012
Report By	Richard Jennings and Tim Coughlan
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ACKNOWLEDGEMENTS

This final report has been prepared by Irish Archaeological Consultancy Ltd in compliance with the directions issued to Kilkenny County Council by the Minister for Environment, Heritage and Local Government under Section 14A (2) of the National Monuments Acts 1930–2004 and the terms of the Contract between Kilkenny County Council and Irish Archaeological Consultancy Ltd.

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ABSTRACT

Irish Archaeological Consultancy Ltd (IAC), funded by the National Roads Authority (NRA) through Kilkenny County Council, undertook an excavation at the site of AR080B, Danesfort 1 along the proposed N9/N10 Kilcullen to Waterford Scheme, Phase 4 – Knocktopher to Powerstown (Figure 1). The following report describes the results of archaeological excavation at that site. The area was fully excavated by Richard Jennings under Ministerial Direction A032 and Excavation Registration Number E3541 issued by the DOEHLG in consultation with the National Museum of Ireland for IAC. The fieldwork took place from 25 June to 11 July 2007.

A circular geophysical anomaly recorded by ArchaeoPhysica Ltd (2005) was re-examined in the fieldwork phase and was shown to be a ringditch. It had a total diameter of 11.8m and an internal diameter of 7.8m. The ditch was U-shaped and no deeper than 0.75m.

The ringditch was almost perfectly circular apart from a kink in its south-east side, the reason for which is unknown. The ditch was filled with a stony basal layer, a charcoal-rich middle layer and an upper layer of silting. Three deposits of cremated animal bone and some animal teeth were found within the charcoal-rich layer. No cremated material or features were found in the interior of the ringditch. No conclusive evidence survived to indicate whether there was originally an associated bank or mound. Three small postholes were identified a short distance away from the ringditch. Their function is unknown and it is unclear what their relationship to the ringditch is, if any.

A sample of charred hazelnut shell from ringditch fill C4 was radiocarbon dated. The 2 sigma calibrated result was AD28–215 (UBA 15556).

The site at Danesfort has identified the remains of a ringditch that was probably used in the middle Iron Age for ritual and burial purposes. Token depositions of cremated bone, despite the absence of confirmed human bone, show that careful and considered deposition took place at the site. The presence of a possible personal ornament in the form of fused glass, possibly a bead that had been subject to high temperature, is further evidence of token deposition at the site. The site is of local importance as it widens our understanding of Iron Age activity in this area, together with complimentary evidence from other sites excavated in the area as part of the N9/N10 Phase 4. The significance of the site in terms of the further study of ringditches from the wider region cannot be underestimated.

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1 INTRODUCTION

1.1 General

This report presents the results of the archaeological excavation of Danesfort 1, AR080B (Figure 1), in the townland of Danesfort undertaken by Richard Jennings of IAC, on behalf of Kilkenny County Council and the NRA, in accordance with the Code of Practice between the NRA and the Minister for Arts, Heritage, Gaeltacht and the Islands. It was carried out as part of the archaeological mitigation programme of the N9/N10 Kilcullen to Waterford Road Scheme, Phase 4, which extends between Knocktopher in Co. Kilkenny to Powerstown in Co. Carlow. The excavation was undertaken to offset the adverse impact of road construction on known and potential subsoil archaeological remains in order to preserve the site by record.

The site was identified during a geophysical survey by ArchaeoPhysica Ltd (2005) and was re-examined during testing carried out between 30 January and 3 March 2006 by Melanie McQuade (E3882) for Margaret Gowen Ltd. on behalf of the National Roads Authority. Danesfort 1 excavated between 25 June and 11 July 2007 with a team of one director, one supervisor and 10 assistant archaeologists.

1.2 The Development

For the purposes of construction, the N9/N10 Kilcullen to Waterford Road Scheme has been divided into separate sections, known as Phases 1–4. Phase 2 of the scheme extends from the tie-in to the Waterford City Bypass at Dunkitt, to Knocktopher in Co. Kilkenny (Ch. 2+000–Ch. 25+400). Phase 4 continues from Knocktopher to Powerstown in Co. Carlow (Ch. 25+400–Ch. 76+000) and includes the Kilkenny Link Road.

The roadway of the entire scheme includes approximately 64km of mainline high quality dual carriageway and 6.2km of the Kilkenny Link Road, which will connect the road development to the Kilkenny Ring Road Extension. The road development requires the realignment and modification of existing national, regional and local roads where the mainline intersects them. It requires the acquisition of 305 hectares of land for its construction. A further link road will connect the scheme to Paulstown in County Kilkenny, while six new grade separated junctions and three roundabouts are part of the road development.

1.3 Archaeological Requirements

The archaeological requirements for the N9/N10 Kilcullen to Waterford Road Scheme, Phase 4: Knocktopher to Powerstown, are outlined in the Archaeological Directions issued to Kilkenny County Council by the Minister for Environment, Heritage and Local Government under Section 14A (2) of the National Monuments Acts 1930–2004 and in the terms of the contract between Kilkenny County Council and Irish Archaeological Consultancy Ltd. These instructions form the basis of all archaeological works undertaken for this development. The archaeological excavation works under this contract are located between the townlands of Knocktopher, Co. Kilkenny, and Powerstown, Co. Carlow.

The proposed N9/N10 was subjected to an Environmental Impact Assessment, the archaeology and cultural history section of which was carried out by Valerie J. Keeley Ltd and published in February 2005. The Record of Monuments and Places, the Site Monument Record, Topographical files, aerial photography, the Kilkenny and Carlow County Archaeological Urban Survey, and literary sources were all consulted. Two phases of geophysical survey were also conducted by Target (post-EIS geophysics carried out by ArchaeoPhysica) and an aerial survey was carried out by Margaret Gowen & Co. Ltd. As a result of the paper survey, field inspections and geophysical

survey, 35 sites were recorded in proximity to this section of the overall route alignment.

A previous archaeological assessment of Phase 2 of the scheme (test trenching conducted by Margaret Gowen & Co. Ltd. in 2006) extended into the lands acquired for Phase 4 to a point at Ch. 37+100 in the townland of Rathclogh, Co. Kilkenny. Thirty-four archaeological sites were identified within this area between Knocktopher and Rathclogh and subsequently excavated by Irish Archaeological Consultancy Ltd. as part of this archaeological contract.

Advance archaeological testing of the area between Rathclogh (Ch. 37+100) and Powerstown (Ch. 76+000) was completed by IAC during March–May 2007 and excavation of the sites identified during this process was also conducted by IAC between August 2007 and April 2008.

1.4 Methodology

The methodology adopted was in accordance with the approved Method Statement. The topsoil was removed to the interface between natural and topsoil using a 20 tonne mechanical excavator equipped with a flat toothless bucket under strict archaeological supervision. The remaining topsoil was removed by the archaeological team with the use of shovels, hoes and trowels in order to expose and identify the archaeological remains. A site grid was set up at 10m intervals and was subsequently calibrated to the national grid using GPS survey equipment.

All archaeological features were fully excavated by hand and recorded on *pro forma* record sheets using a single context recording system best suited to rural environment, with multi context plans and sections being recorded at a scale of 1:50, 1:20 or 1:10 as appropriate.

A complete photographic record was maintained throughout the excavation. Digital photographs were taken of all features and of work in progress. These photographs were supplemented by specialist aerial photography.

An environmental strategy was devised at the beginning of the excavation based on IAC in-house post-excavation and site methodologies and guidelines. Features exhibiting large amounts of carbonised material were the primary targets. Features containing metallurgical waste were fully sampled for analysis.

All artefacts uncovered on site were dealt with in accordance with the guidelines as issued by the NMI and where warranted in consultation with the relevant specialists. All archive is currently stored in IAC's facility in Lismore, Co Waterford and will ultimately be deposited with the National Museum of Ireland.

All dating of samples from the site was carried out by means of AMS (Accelerator Mass Spectrometry) Radiocarbon Dating of identified and recommended wood charcoal, charred plant remains, bone (burnt and unburnt) samples. All calibrated radiocarbon dates in this report are quoted to two Sigma.

All excavation and post excavation works were carried out in accordance with the relevant approvals and in consultation and agreement with the National Roads Authority (NRA) Project Archaeologist, the National Monuments Section of the DoEHLG and the National Museum of Ireland. Where necessary licences to alter and export archaeological objects were sought from the National Museum of Ireland.

References to other sites excavated as part of the N9/N10 Phase 4: Knocktopher to Powerstown are referenced throughout this report only by their site name e.g. Paulstown 1. A list of these sites and details including director's name and National Monuments Excavation Reference Number can be referenced in Appendix 4.

Final Report Date Ranges

The following date ranges for Irish prehistory and medieval periods are used for all final reports for the N9/N10 Phase 4: Knocktopher to Powerstown excavations.

Mesolithic: 7000–4000BC
Neolithic: 4000–2500BC
Early Bronze Age: 2500–1700BC
Middle Bronze Age: 1700–1200BC
Late Bronze Age: 1200–800BC
Iron Age: 800BC–AD500
Early medieval period: AD500–1100
Medieval period: AD1100–1600
Post-medieval: AD1600–1800

Source:
Carlin, N., Clarke, L. & Walsh, F. 2008 *The M4 Kinnegad-Enfield-Kilcock Motorway: The Archaeology of Life and Death on the Boyne Floodplain*. NRA Monograph Series No. 2, Wordwell, Bray.

2 EXCAVATION RESULTS

Danesfort 1, a ringditch, was located in an open area of gently undulating terrain that stretches east for 2km to the River Nore, south for 3km to the King's River and south-west for less than 1km to the Ennisnag tributary of the King's River. The low-lying land (50–70m above sea level) meant that the north Kilkenny Hills could just be seen 18km to the north, the Slieveardagh Hills 20km to the west and north-west, the top of Slievenamon 28km to the south-west, the Booley Hills 20km to the south, Coppanagh and Brandon Hills 15–20km to the south-east, and the Blackstairs Mountains 32km to the east.

2.1 Phase 1 Natural Drift Geology

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C2	N/A				Brownish to orange loose gritty sand, gravel	Subsoil

2.2 Phase 2 Iron Age Activity

2.2.1 Ringditch

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C3	N/A	37.5	2.80	0.75	Circular cut	Cut of ringditch
C4	C3	37.5	2.35	0.31	Dark brown, grey hue clayey silt	Fill of ringditch
C5	C3	37.5	1.80	0.30	Light brown, orange hue, sandy clay	Fill of ringditch
C7	C3	37.5	3.73	0.37	Dark brown, orange hue, clayey silt	Fill of ringditch
C38	C3	0.30	0.30	0.15	Cremated bone	Deposit within C4
C39	C3	0.25	0.25	0.15	Cremated bone	Deposit within C4
C40	C3	0.30	0.30	0.15	Cremated bone	Deposit within C4

Finds

Context	Find No	Material	Period	Description
C4	E3541:004:1	Glass	Prehistoric	Fragment of blue glass bead

The ringditch was annular and had a total external diameter of 11.8m and an internal diameter of 7.8m. Its ditch was U-shaped, up to 2.8m wide and up to 0.75m deep. It was almost perfectly circular in plan but a kink in its alignment was apparent in its southern section, the reason for which is unclear (Plate 3). No entrance was identified. A portion of the eastern side of the ringditch remained unexcavated due to the alignment of the C.P.O. The ditch was filled with a stony basal layer (C7, also recorded as C13, C17 and C29), a charcoal-rich middle layer (C4, also recorded as C6, C12 and C15) and an upper layer of silting (C5, also recorded as C11, C14 and C16) (Plate 4; Figures 4–5). Three cremated bone deposits and some animal teeth were found within the charcoal layer. No cremations were found in the interior of the ringditch. No conclusive evidence survived to indicate whether a bank or mound were once part of this funerary monument.

The sterile nature of the basal fill, C7, is curious – only one small piece of animal bone and two charcoal samples were identified from a dozen soil samples that were processed. Its stony composition resembled the natural subsoil but its matrix was more silty than sandy so it is possible that the material naturally silted into the ringditch. However the cremated bone and organic material in C4 was deposited *after* C7 had accumulated. If C7 does represent a natural accumulation then it suggests that the two phases of this funerary monument – the construction of the ringditch and the deposition of the concentrations of cremated bone and charcoal rich material – took place at different times.

An alternative explanation for C7 is that the material was deliberately redeposited soon after the construction of the ringditch as part of a single event with the subsequent deposit of C4 following immediately. The idea that a feature was excavated and then intentionally refilled is not uncommon in the prehistoric period – it is thought to have been a trait of pit circle monuments.

It is clear that the cremated bone concentrations were found in three locations within the C4 deposit. Two of them (C39 and C40) were in the southern area beside the kink in the ditch and the third (C38) was on the opposite side. Perhaps the kink was deliberate in order to mark the position of the cremated material within the otherwise circular ringditch. The specialist analysis of the cremated bone has identified animal bone and no human remains. It is possible therefore that they represent token or ceremonial depositions within the ditch.

The upper fill of the ringditch, C5, was considerably less stony and silty and had a higher clay and sand content than the basal fill C7. It is possible that the deposit was intentionally placed to seal the cremated remains, but the material may represent the remnants of a bank which, either through erosion or deliberate destruction, had filled the ditch. It would be expected that a bank constructed of natural subsoil would have a higher stone content.

In addition to the cremated bone, a small piece of fused glass was recovered from fill C4 of the ringditch. The fused glass is blue in colour and may originally have been a bead but has been subjected to high temperatures, possibly from a funeral pyre associated with a cremated burial (Scully, Appendix 2.1).

Charcoal analysis of fill C4 indicated a predominance of oak (*Quercus* sp.), willow (*Salix* sp.), hazel (*Corylus avellana*) and ash (*Fraxinus excelsior*). Charcoal analysis of fill C7 (fill of ringditch C3) indicated a predominance of willow (*Salix* sp.). These assemblages are likely to represent dumped or re-deposited charcoal debris (Lyons, Appendix 2.2).

Two samples taken from the fill C4 produced evidence for plant remains. The samples contained small amounts of hazelnut shell fragments (*Corylus avellana* L.), indeterminate cereal grains and tuber fragments. Tuber fragments are often found in association with cremated bone deposits and it is possible that these are accidental inclusions, but the fact that they are generally found with cremation deposits may be indicative of special selection (Johnson, Appendix 2.3).

Burnt animal bone fragments (114.61g) were recovered from fill C4. The bone recovered represented cow (25.4g), horse (69g), rodent (0.78g), domestic fowl (0.25g) and 19.18g of bone were unidentifiable. Burnt animal bone fragments (62.86g) were also recovered from fill C39. The bone recovered represented pig (4.4g), sheep/goat (3.29g) and 55.17g of bone were unidentifiable. Burnt animal bone fragments (32.38g) were recovered from fill C40. The bone recovered represented pig (1.93g), sheep/goat (1.41g) and 29.04g of bone were unidentifiable (McCarthy, Appendix 2.5). All of the fragments displayed evidence of exposure to heat in the form of colour change and surface texture modifications such as cracking, consistent with calcinations (McCarthy, Appendix 2.4).

Three small fragments of possible metallurgical material from C4 were submitted for examination and all three fragments are magnetic and have a combined weight of 0.90g. One larger fragment measures 10mm across and the two smaller fragments are 2.5 and 4mm across; all three fragments are dark grey in colour and irregular in shape. It is not possible to visually assign these pieces to any metallurgical process

as there are no diagnostic features. Fragments could be small naturally occurring nodules high in iron or could be by-products of the iron smithing process, the association with a blue glass bead within the same context could also indicate fragments may be linked to glass making (Wallace, Appendix 2.5).

A small fragment (0.1g) of hazelnut shell was chosen for AMS dating from C4 and returned a result of 1900±31 (UBA 15556). The 2 Sigma calibrated result for this was AD28–215 (QUB, Appendix 2.6) dating this feature to the Iron Age period.

2.2.2 Postholes

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C20	N/A	0.41	0.38	0.38	Circular cut	Cut of posthole
C21	C20	0.41	0.38	0.38	Dark brown (greyish hue) clayey silt	Fill of posthole
C22	N/A	0.42	0.38	0.44	Circular cut	Cut of posthole
C23	C22	0.42	0.38	0.26	Dark brown(greyish hue) clayey sand	Top fill of posthole
C24	C22	0.25	0.25	0.28	Dark brown clayey silt	Bottom fill of posthole
C25	C20	0.28	0.24	0.10	Dark brown clayey silt	Fill of deposit
C26	N/A	0.42	0.38	0.24	Oval cut	Cut of posthole
C27	C26	0.30	0.30	0.24	Mid brown grey silty sand	Fill of posthole
C28	C26	0.20	0.18	0.15	Greyish black clayey silt	Fill of posthole

Elsewhere on the site, three postholes or small pits were clustered together 5m to the north-west of the ringditch. None of them contained evidence of funerary activity – charred seeds were the only significant finds in C21, the only fill of posthole C20. Postholes C22 and C24 contained slumped-in sandy packing fills which were sealed by silt deposits.

Charcoal analysis of fill C21 indicated a predominance of oak (*Quercus* sp.). This may be representative of the remains of a burnt structure; it is also likely to reflect the remains of charred post ends, a method used in construction works (Lyons, Appendix 2.2)

A soil sample from C21 contained un-charred plant material, probably modern contaminants of the archaeological deposits. These seeds were identified as un-charred seeds from the Goosefoot (Chenopodiaceae), Knotgrass (Polygonaceae) and Daisy (Asteraceae) families (Johnston, Appendix 2.3).

2.3 Phase 3 Post-medieval Activity

2.3.1 Modern linear ditch and drains

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C8	N/A	15.0	2.00	0.54	Linear cut	Cut of linear feature
C9	C8	15.0	1.50	0.20	Brown silty clay	Fill of linear feature
C10	C8	15.0	1.63	0.55	Brown silty sand	Fill of linear feature
C30	C8	2.00	1.10	0.54	Light yellowish brown sandy clay	Fill of ditch
C31	N/A	29.1	0.52	0.08	Linear cut	Cut of drain
C32	C31	29.1	0.52	0.08	Mid brown sandy silt	Fill of drain
C33	N/A	22.8	0.50	0.12	Linear cut	Cut of drain
C34	C33	22.8	0.50	0.12	Mid brown sandy silt	Fill of drain

The linear ditches and drains were clearly recent because the main ditch C8, which ran northeast–southwest at the north of the site, matched the line of a field boundary on the RMP map. Modern drains C31 and C33 ran parallel to one another at the north of the site also running northeast–southwest.

2.4 Phase 4 Topsoil and Ploughsoil

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C01				0.45	Dark brown clayey silt	Topsoil

Finds: None

The topsoil sealed all of the archaeological features identified on the site.

3 SYNTHESIS

The synthesis presents the combined results of all of the archaeological analysis carried out at Danesfort 1. This includes the analysis of the physical and archaeological landscape, the compilation of information gathered during research into the site type, date, and function, and the results of the excavation and specialist analysis of samples taken during the course of on-site works.

3.1 Landscape Setting

3.1.1 The General Landscape – compiled by Michelle Brick

The topography of the region through which the route passes is generally flat with an average height of 70m O.D. The southern periphery of the route is bordered by Kilmacoliver (261m) and Carricktriss Gorse (314m), with Slievenamon (721m) further west. The Slieveardagh hills (340m) are visible on the western horizon in the south of the route and with the exception of Knockadrina Hill (140m); the enclosed landscape is made up of minor undulations. In the centre of the route Freestone Hill (130m) and Knocknagappoge (334m) further north are the significant uplands. A number of hills and mountains are visible in the distance to the east and west of this area of the landscape but the topography remains generally flat. To the north the Castlecomer Plateau influences a rise in the overall topography of the region. This expanse of terrain stretches along the north-east margins of Kilkenny, crosses the county border into Carlow and stretches northwards into Laois. This plateau consists of a variety of hills and peaks including Mountnugent Upper (334m), Baunreagh (310m), Knockbaun (296m), Brennan's Hill (326m) and Fossy Mountain (330m). These hills contain seams of anthracite coal as a result of millions of years of compression, and consequently Shales and Sandstones were formed which are evident throughout the plateau. Mining in the region began in the 17th century, continued for over 300 years and it is for what Castlecomer is best known. According to the Environmental Protection Agency soil maps of Ireland, the underlying bedrock of the entire region primarily consists of Carboniferous Limestone. However there is also a small amount of surface bedrock, sands, gravels, shales and sandstone Tills present along the route. The soil cover of the region is primarily composed of Grey Brown Podzolics, Renzinas and Lithosols. Additional soil types also present along the route include Brown Earths, surface Water Gleys and Ground Water Gleys.

The prevailing water courses within the landscape of the N9/N10 Phase 4 are the Rivers Nore and Barrow. The River Nore rises on the east slopes of the Devil's Bit in Co. Tipperary and flows eastwards through Borris-in-Ossory and then south through Co. Kilkenny, passing through the towns of Durrow (Laois), Ballyragget, Kilkenny, Bennettsbridge and Thomastown to join the River Barrow upstream of New Ross, Co. Wexford. It is 140km long and drains a total catchment of 1572 square kilometers and runs through the central and southern sections of the route. In the south of the route three main tributaries of the River Nore are evident. The Kings River flows east through Callan and Kells. It is joined by the River Glory which meanders on a north-south axis towards the western margins of the route landscape and the Little Arrigle River flows along the southern fringes. These rivers are flanked by low-lying valleys that are characterised by wet, marshy land. The condition of the soil improves further north beyond the King's River where the influence of these waterways declines. In the northern area of the route the River Dinin is a tributary of the River Nore flowing south-west from Brennan's Hill through the Castlecomer Plateau. The Plateau is the tableland that is the watershed between the Rivers Nore and Barrow (Lyng 1984). The River Barrow is the second longest river (193km) in Ireland after the River Shannon. It rises in the Slieve Bloom Mountains in Co Laois and flows east across bogs and lowlands and then turns south into the lowland immediately east of the Castlecomer Plateau. It passes through Portarlington, Athy, Carlow, and

Graiguenamanagh and runs through northern section of the route. It is joined by the River Nore at New Ross. The Maudlin River is the notable tributary of the River Barrow within the landscape of the route and flows east from Old Leighlin, with minor tributaries of it flowing through Bannagagole. There are also streams and minor watercourses present throughout the entire landscape and these waterways would have been a valuable resource to past communities and would also have had a major influence on settlement and the surrounding land use.

The physical landscape through which the N9/N10 Phase 4 passes can be divided into three principal areas defined by the main rivers and their catchments. The southern area is located in the undulating landscape on the western flanks of the Nore Valley. The central area is dominated by the fertile watershed between the Barrow and Nore systems in the hinterland of Kilkenny City. The northern area is located on the western flanks of the Barrow Valley overlooked by uplands to the north and west. Danesfort 1 is located in the central landscape area.

3.1.2 The Central Landscape

The central landscape of the route encompasses the environs of the Nore Valley and the hinterland of Kilkenny City. It includes 35 sites discovered during the Phase 4 excavations stretching from Danesfort 1 north-east to Dunbell Big 1 and along the Kilkenny Link Road from Rathgarvan or Clifden 1 west to Leggetsrath East 1. The underlying bedrock of the region is made up of Carboniferous Limestone sands and gravels, Carboniferous Limestone Tills, Shale's and Sandstone Tills. According to the EPA the natural soils of the region consist of Renzinas and Lithosols in areas dominated by underlying bedrock of Carboniferous Limestone sands and gravels. Soil cover consisting of Grey Brown Podzolics and Brown Earths is present in areas of underlying Carboniferous Limestone Tills and Surface Water Gleys and Ground Water Gleys are the soils present where the underlying bedrock is made up of Shale's and Sandstone Tills. This landscape is underlain not only by the Butlersgrove geological formation but also by the Ballyadams formation (thick-bedded calcarenitic wackestone on erosional surfaces). A large number of quarries in the area, some of which produced the distinctive blue 'Kilkenny limestone' that was used to construct the medieval and later city, occur around the city itself and extend southward into the dolomite formations along the Nore around Dunbell (Tietzsch-Tyler, 1994).

The glacial drift around the Kilkenny City hinterland, along the Kilkenny Link Road, comprises sandy (50–60%), gravely clay with a noticeably higher sand content than along the southern plain of the River Nore. As this section crosses existing watercourses, areas of granular deposits and several isolated sand and gravel lenses were noted. The floodplain of the Nore extends *c.* 80m on the western side and *c.* 50m on the eastern side, creating marsh and wet grassland within the immediate area. The nature of the glacial drift and geology, combined with the water sources and floodplains in the area, has resulted in the high quality of the local pastoral and arable agricultural landscape. The topography in this section remains between 50m and 80m OD creating open and expansive views over the confluence of the Nore and Kings Rivers. Mountains are visible on the horizon to the north, east and south-east. Freestone Hill (130m) is located directly to the North and Knocknaguppoge beyond this rises to 334m. Outside the parameters of this landscape lies Brandon Hill (513m) to the south-east and further to the east are the Blackstairs Mountains (735m) and Mount Leinster (795m). The River Nore is the prevailing water course of the region and the River Barrow flows along the margins to the east. The Kings River is located to the south and would have influenced activity in and around this area.

3.1.3 Site Specific Landscape

Danesfort 1, a ringditch, was located in an open area of gently undulating terrain that stretches east for 2km to the River Nore, south for 3km to the King's River and south-west for less than 1km to the Ennisnag tributary of the King's River. The low-lying land (50–70m above sea level) meant that the north Kilkenny Hills could just be seen 18km to the north, the Slieveardagh Hills 20km to the west and north-west, the top of Slievenamon 28km to the south-west, the Booley Hills 20km to the south, Coppanagh and Brandon Hills 15–20km to the south-east, and the Blackstairs Mountains 32km to the east. Their relatively low elevation and distance from Danesfort 1 meant that none of these hills appeared especially prominent in the landscape. Outstanding views of the wider landscape were available 250m to the south-west on a small mound that was capped by a post-medieval turret (KK023-080) and was possibly the site of a 13th-century castle (Plate 2).

3.2 The Archaeological Landscape

As part of the general research relating to sites along the scheme and the specific research relating to Danesfort 1, the known archaeology within the surrounding landscape was assessed in order to establish the level and type of activity in the surrounding area in the past. This included a review of information from the Record of Monuments and Places, previous excavations and other relevant documentary sources including mapping and other sites excavated as part of the N9/N10 Phase 4 scheme. The excavated archaeology at Danesfort 1 has been identified as being Iron Age in date.

3.2.1 The General Iron Age Landscape of the Scheme – compiled by Michelle Brick

As with wider settlement patterns in Ireland, direct evidence for Iron Age (800BC–AD500) domestic habitation was not identified, although several furnaces, kilns and ringditches date to this period and attest to an Iron Age presence in the area. It is possible that some smaller Iron Age ringditches were in fact structural, rather than funerary. Evidence for Iron Age domestic settlement activity remains indirect and peripheral in Kilkenny and Carlow, and in Ireland as a whole.

The Southern Landscape

Direct evidence of Iron Age activity in the southern landscape of the N9/N10 Phase 4 is limited. There is a marked absence of hillforts from south Kilkenny but this does not necessarily infer absence of settlement (Gibbons 1990, 20). A small number of features produced Iron Age dates in this landscape as a result of the N9/N10 Phase 4 excavations. A posthole dating to this period (165BC–AD16; UBA 10984) was excavated at Baysrath 2, and belongs to a possible structure indicating potential domestic settlement in the region. At Tinvaun 2 a possible hut structure was identified which consisted of four truncated slot-trench-like pits, a posthole and a shallow, roughly central pit in the interior of the area. Dates returned for this possible structure have indicated that it was in use during the Iron Age period (AD5–124; UBA 12169). There was also some metalworking activity on site and this structure may have been associated with it. Further to this, a posthole and a hearth excavated at Danganbeg 1 also dated to the Iron Age (762–416BC and 41BC–AD55; UBA 14025 and UBA 14024 respectively). No funerary features belonging to the Iron Age were excavated as part of the present Phase 4 in the southern landscape. However, some metal working activity in the form of slag pits/furnaces and funerary activity in the form of a ringditch has been excavated at Baysrath directly to the south of the present excavations and have been dated to the Iron Age period (Channing 2007). Three circular structures excavated at this site have also been dated to this period (AD60–131, AD25–128 and 88BC–AD53; UBA 10684, UBA 10685 and UBA 10691 respectively) indicating a strong Iron Age presence in this area (*ibid.).* A ditch dating

to the Iron Age (39BC–AD74; UBA 10993) was excavated at Tinvaun 1; burnt mound activity associated with the Bronze Age was also excavated at this site and this ditch relates to a later phase of activity at the site. At Knockadrina 2 (51BC–AD78; UBA 12178) an Iron Age furnace was excavated and at Stonecarthy West 1 a possible trough also yielded an Iron Age date (771–539BC; UBA 12174), however other features associated with a burnt mound on the site returned Bronze Age dates.

The Central Landscape

As with the southern landscape there is no direct evidence for Iron Age settlement although there are many early medieval RMP sites in this area, the majority of which are ringforts and enclosure sites, such as the ringforts recorded at Woolengrange (KK024-079 and KK024-082) and the enclosures at Carran (KK024-021001, 2) . Iron Age activity in the county is represented by the Hillfort at Freestone Hill where a defensive hillfort and inner enclosure (KK020-018002) was built encircling the hill-top (Gibbons 1990, 18), re-using the site of an earlier burial cairn (KK020-018001). The site was then re-occupied *c.* AD300 (Raftery 1969). Another possible Iron Age hillfort is located at Cotterallsrath located to the west of the southern end of this central landscape. Directly to the north-east of this site and located four miles south of Kilkenny City are the remains of a linear earthwork at Grevine West (Gibbons 1990, 20), also indicating an Iron Age presence in the region. Additionally, excavations were carried out at two ringforts in the townland of Dunbell; Dunbell 6 in 1972 and Dunbell 5 (KK024-010) in 1990 (Foley 1974; 2006; Cassidy 1991). The ringfort settlement at Dunbell 5 in particular produced dates from the Bronze Age to the eighth–10th centuries AD including evidence of Iron Age occupation.

Three clusters of Iron Age activity were noted from the N9/N10 excavations within the central landscape, at Danesfort and at Kilree and Holdenstown. These sites exhibited evidence for funerary activity and no evidence for domestic settlement was uncovered within this central landscape. At Danesfort 13 the primary fill of a ringditch was radiocarbon dated to 503–384BC (UBA 10999) and was considered to be associated with two similar ringditches excavated at the neighbouring site of Danesfort 12. A fine glass bead found within a pit at Danesfort 13 also indicated that Iron Age activity continued in the Danesfort area, confirming the longevity of Danesfort as a focus for prehistoric funerary activity, and, although the area continued to be occupied in the early medieval period the focus then shifted towards settlement. Iron Age activity was excavated at Kilree 4, a site which contained a probable token cremation burial within a double ringditch (171BC–AD4, UBA 15563), which was located on flat, gravely ground that overlooked the River Nore and its floodplain. At Holdenstown 1, three ringditches of Iron Age date were excavated. The largest was penannular in plan and had an undug, east-facing causeway. The two best preserved ringditches had evidence of re-cutting which may have been a symbolic act of redefining the burial monument. The primary phase has been interpreted as representing funerary feasting while the secondary phase consisted of burial possibly dating to the late Iron Age. Both ringditches were subsequently re-cut and were backfilled with material which included burnt bone, charcoal, seeds, and animal bone. The quantity of cremated bone is indicative of token cremation mixed with pyre debris. Although Ringditch 3 was heavily truncated, it also contained evidence of token cremation. The evidence thus far is indicative of burial potentially in the Iron Age and the site was later re-used as an inhumation cemetery known as a ferta, during the early medieval period. A shallow, northeast–southwest linear ditch spanned the entire width of the site at Holdenstown 1. The precise function of this ditch is unknown; however, its length and the fact that no return was identified suggest that it may have been a boundary ditch. It is possible that it is broadly contemporary with the burials within Ringditch 2, as these burials followed the same alignment of this ditch and there was no truncation. The ditch has been dated to the

Iron Age period (168–3BC; UBA 13108). It is then possible that the burials associated with Ringditch 2 and with this ditch were placed either inside or outside the boundary; both of which suggests a significant symbolism.

At Danesfort 12 a furnace had evidence of reddened sides and a burnt and blackened rim but the base was not scorched. The fills contained large quantities of charcoal and slag. It is possible that this activity was contemporary with the Iron Age funerary activity recorded on site. Metallurgical activity was also recorded at Danesfort 13 and included two smelting furnace pits, a metalled surface, three waste pits, and an occupation deposit. This activity may also have been contemporary with Iron Age funerary activity also recorded on site. At the multi-period site of Danesfort 5 a metalworking area was identified and included several pits and deposits. Of these pits one returned an Iron Age date of 786–543BC (UBA 12192). A kiln excavated at Danesfort 5 also produced Iron Age dates ranging between 169BC and AD50, (UBA 12189–91). Other features at this site were dated to the late Bronze Age period and the Iron Age activity may indicate a continuity of settlement at the site. At Holdenstown 2 a total of five kilns were identified with one dating to AD21–203 (UBA 13111). Both Danesfort 2 and Holdenstown 4 returned Iron Age dates from features associated with burnt mound activity (744–407BC UBA 11000; 765–420 BC; UBA 13114).

The Northern Landscape

The northern landscape of the N9/N10 Phase 4 also contained Iron Age evidence. The aforementioned Freestone Hill (KK020-018) is located directly to the south of this landscape and two additional hillforts can also be located in the north of the county. Clomantagh (KK008-124002) overlooks Johnstown in north-west Kilkenny and similar to Freestone Hill, the site was originally used in the Bronze Age as a funerary complex (Gibbons 1990, 18). A linear earthwork has also been recorded at Woodsgift (Gibbons 1990, 20) and is located directly to the south of this site. The other possible hillfort in the region is recorded at Tooremore or Carndubh to the east (*ibid*.). This hillfort, which is not shown on the Ordnance Survey maps, is situated on Corrandhu Hill, two miles east of Ballyragget, straddling the townland boundary between Toore More and Donaghmore (Condit and Gibbons 1988, 49). Further to these, located along the Kilkenny-Carlow border is a linear earthwork known as the Rathduff Trench (KK026-006). It ran for over three miles from the River Barrow at Duninga, in a north westerly direction to the foothills of the Castlecomer plateau above Shankill (Gibbons 1990, 20). A portion of this linear earthwork was excavated at Shankill 1 and consisted of a U shaped bank with a ditch.

Excavations in the northern landscape of the N9/N10 revealed a small amount of domestic settlement evidence. The fill of a stakehole associated with a possible structure at Moanduff 1 produced an Iron Age date of AD215–376 (UBA 13124); the site also had evidence of occupation in the Bronze Age which implies that the site may have been used throughout both periods. Radiocarbon dating for Rathcash East 1 also indicates use of the site during the Iron Age period. The excavated features included a possible structure that may be inferred as a ringditch as a result of the middle Iron Age date retrieved from its fill (38BC–AD73; UBA 12221) and an associated rubbish pit (37BC–AD123; UBA 12220). Excavations in the northern landscape of the N9/N10 did not produce any evidence for Iron Age funerary activity. However ephemeral Iron Age activity was discovered at a number of sites in the form of metal working and burnt mound activity. At Rathcash East 3 a large keyhole-shaped furnace that dated to the Iron Age (160BC–AD0; UBA 14032), aligned northeast–southwest was excavated along with six post-pits that may have supported a shelter around the west side of the furnace. The post – pits had a rectangular arrangement, being open on the east (furnace) side. The furnace had 18 fills, with the

majority containing significant amounts of charcoal and frequent slag. Some of the post-pits contained charcoal, burnt clay and slag. One of the post-pits has been dated to 362–200BC (UBA 14033). A kiln and pit excavated at Cranavonane 3 have been dated to 104BC–AD50 (UBA 12251) and 341–54BC (UBA 12252) respectively. In addition to these features a pit excavated at Jordanstown 1 was dated to 382–206BC (UBA 12233) and a pit at the multi-period site of Moanduff 2 was dated to AD140–385 (UBA 12260). Features associated with burnt mound activity dating to this period were excavated at Rathcash 2 where the fill of a trough dated to 344–55BC (UBA 12219) and at Kellymount 2, where a waterhole has been dated to AD236–380 (UBA 14041). The fill of a trough at Kellymount 3 also returned a date of 751–409BC (UBA 14043).

Conclusion
The presence of the Iron Age ringditches along the N9/N10 Phase 4 and the number of sites displaying industrial activity dating to this period confirm the presence of an Iron Age community in the region. The possible structure at Rathcash East 1 may also be indicative of an Iron Age settlement site, further demonstrating Iron Age activity in the locality. The presence of three hillforts in north Kilkenny suggests that it was an area of considerable importance during this period (Condit and Gibbons 1988, 52). The lack of excavated domestic settlements along the route is not indicative of a sparse population at the time rather they were not located along the corridor of the N9/N10 route-way and have yet to be discovered.

3.2.2 The Site Specific Archaeological Landscape of site Danesfort 1

There are two recorded monuments located *c.* 200m to the SSW of Danesfort 1. These consist of a castle ringwork (KK023-080) and a designed landscape (folly) (KK023-080001). Additionally, *c.* 630m to the SSW, a ringfort (unclassified) (KK023-079) is recorded and to the south-west, *c.* 950m away, there is another ringfort (unclassified) recorded) (KK023-078). To the ESE, two further ringforts (unclassified) are recorded (KK023-076 & 077), these are located *c.* 820m and *c.* 650m away, respectively. To the north, *c.* 850m away from Danesfort 1, a church (KK023-081001), graveyard (KK023-081002) and church slab (KK023-081002) are also located.

A ringditch containing cremated bone was excavated at Danesfort 1. The ringditch was situated within an archaeologically rich Bronze Age landscape (Ch. 33740-37100, Danesfort and Croan townlands). Evidence of funerary and domestic activity was discovered 0.6–0.8km to the south-west at sites Danesfort 12 and 13 where three ringditches, a pit circle and three cremations were found in low-lying land beside the Ennisnag tributary. Graves (1860–1) reported the discovery in 1838 of an intact Bronze Age urn in a sand pit next to the afore-mentioned post-medieval turret (KK023-080) which is visible 0.2km to the SSW of Danesfort 1. A prehistoric shelter on higher ground was recorded 0.6km to the north (Croan 1). Bronze Age sites were also excavated 1.2–1.5km to the NNE at Danesfort 5–7 including a settlement and cremation pits with late Bronze Age pottery.

3.3 Typological Background of Ringditches – compiled by Michelle Brick

Ringditches are one of the monument types classified under the general barrow label. Newman (1997) has identified five main types in the Tara area based mainly on morphological differences between monuments. They include the ringditch, the embanked ringditch, the ring barrow, the bowl barrow and the bowl barrow lacking an external bank. Two additional barrow types, the stepped barrow and the enclosure barrow have been identified by Farrelly and Keane (2002). Ringditches generally consist of a single ditch enclosing an area, however, examples with two and even three enclosing ditches have been noted, such as at Tankardstown, Co. Limerick

(Gowen and Tarbett 1988), Raynestown , Co. Meath (O'Connor 2006) and Creevy, Co. Donegal (Waddell, 1988, 366). The incorporation of an entrance into the enclosed area, generally a simple undug causeway, appears to be more common to later monuments.

Ringditches and barrows became common burial monuments in the middle to late Bronze Age. These could contain central cremation pits or cremated bone/funeral pyre debris in or beneath a mound or in the ringditch fill. Sometimes there is no direct funerary evidence although often the monuments were located within a prehistoric cemetery complex (Daly and Grogan 1993). It can be difficult to be certain whether ringditches formed standalone funerary monuments or the remnants of flattened barrows or were in the case of those with no associated burials, cemetery markers or even non-funerary structures.

The manner of the deposition of human remains in the ringditch varies from site to site. Burial depositions consist of inhumations and cremations, the latter being the most dominant rite. The burials generally being interred in cists, stone lined pits and more commonly in simple unlined pits. The ringditch usually encloses the burial area, although in some case burials can be found outside this enclosed area. It is also common to find cremated deposits in simple spreads within the enclosure or within the enclosing ditch. In many cases a variety of burial forms may be found in one ringditch. In general the burials only represent a small proportion of the population; therefore they may represent the burials of high ranking individuals. A trend which is becoming increasingly common, as more ringditch sites are being excavated, is the complete absence of burials in ringditches.

Ringditches are generally located on higher ground and are often found in proximity to streams or rivers. Sites may cluster, along with other barrow types, to form barrow cemeteries. Ringditch appear to have continued to be built or earlier monuments re-used, during the Iron Age and early medieval period, such as Ardsallagh 1, Co. Meath (Clarke and Carlin 2008) and Cherrywood, Area A, Site 4, Co. Dublin (O'Neill 2001)

3.4 Summary of the Excavation Results

The dominant feature of the excavation was a sub-circular ringditch. It was almost perfectly circular apart from a kink in its south-east side, the reason for which is unknown. The ditch was filled with a stony basal layer, a charcoal-rich middle layer and an upper layer of silting. Three deposits of cremated animal bone and some animal teeth were found within the charcoal-rich layer. No cremated material or features were found in the interior of the ringditch. No conclusive evidence survived to indicate whether there was originally an associated bank or mound. Three small postholes were identified a short distance away from the ringditch. Their function is unknown and it is unclear what their relationship to the ringditch is, if any.

3.5 Summary of the Specialist Analysis

A number of specialists provided analysis of samples and artefacts recovered from the site as part of the post-excavation works. This work in part formed the basis for the dating evidence for the site. The detailed reports on the results of all analysis are in Appendix 2.

Small finds analysis

A small piece of fused glass (4:1) was recovered from the fill (C4) of the ringditch. This fill also contained cremated bone. The fused glass is blue in colour and may originally have been a bead but has been subjected to high temperatures, possibly from a funeral pyre associated with the cremated bone.

Charcoal and wood species identification
A mixed wood assemblage of oak, willow, ash and hazel was recorded from ditch C4 and is likely to represent dumped or re-deposited charcoal debris. While the oak charcoal recorded in posthole C20 (fill C21) may be the remains of a burnt structure, it is also likely to reflect the remains of charred post ends, a method used in construction works.

Analysis of plant remains
Fifteen soil samples from this site were examined. Charred plant remains were found in only two samples; C4 (S13) and C4 (S15). These included hazelnut shell fragments, indeterminate cereal grains and tuber fragments. Tuber fragments are often found in association with cremated bone deposits. For example, they were found in burials at Ballyveelish, Co. Tipperary. They are also known from other cremation deposits; for example at Rathgall, Co. Wicklow and at other sites in Dublin County. It is possible that these are accidental inclusions, but the fact that they are generally found with cremation deposits may be indicative of special selection.

Animal bone analysis
A total of 441 samples of faunal remains and burnt bone fragments were submitted for examination. It was not possible to identify 82.5% of the fragments to species. The remaining 17.5% of the assemblage contained bones from species of cow, pig, sheep, goat, domestic fowl, horse and rodent. The faunal remains of rodent, horse and deer were recovered from archaeological contexts which also contained domestic and indeterminate species. A single fragment of medium sized vertebrate long bone diaphysis showed evidence of butchery in the form of a single cut mark. 97.3% of the assemblage displayed evidence of exposure to heat.

Although the deposits of cremated bone within ringditch C3 had been tentatively interpreted as funerary activity no human remains were positively identified with the assemblage.

Metallurgical waste analysis
Three small fragments of possible metallurgical material from C4 were submitted for examination. It was not possible to visually assign these pieces to any metallurgical process as there were no diagnostic features. The fragments could be small, naturally occurring nodules high in iron or could be by-products of the iron smithing process, the association with a blue glass bead within the same context could also indicate fragments may be linked to glass making.

Radiocarbon Dating
A single sample was sent for AMS radiocarbon dating.

A sample of charred hazelnut shell from ringditch fill C4 was radiocarbon dated. The 2 sigma calibrated result was AD28–215(UBA 15556).

4 DISCUSSION AND CONCLUSIONS

4.1 Discussion

The excavation at Danesfort 1 has produced evidence of a ringditch which has been dated to the middle Iron Age. The site is located in a gently undulating landscape with generally good views of the surrounding terrain. The setting of Danesfort 1 was not a prominent one, yet its location certainly proved attractive throughout prehistory as testified to by the range of sites excavated across the townland as part of the current scheme. It is unclear why this might be.

The range of activity from the surrounding sites is as varied as the dates which have been outlined above. Probable transient early Neolithic domestic settlement can be seen in a temporary shelter at Danesfort 7, with more substantial domestic evidence in the form of houses and associated enclosures from the middle Bronze Age at Danesfort 5. A burnt mound demonstrating at least two phases of activity from the early Bronze Age and the early Iron Age has been identified at Danesfort 2. Evidence of ritual/burial activity can be seen from ringditches at Danesfort 12 and 13. At Danesfort 12 one ringditch is broadly contemporary with that identified at Danesfort 1 (88BC–AD54, 2 sigma, UB 15550) while another ringditch that is dated to the early Bronze Age had a later middle Iron Age hearth located almost centrally within it. This hearth was slightly earlier in date than the Danesfort 1 ringditch. At Danesfort 13, to the west of Danesfort 1, a broadly contemporary furnace (AD7–125, 2 sigma, UB 15552) along with a slightly earlier middle Iron Age ringditch were recorded. Charcoal production pits that again slightly predate the Danesfort 1 site were identified over a kilometre to the north-east at Danesfort 10, showing further variation to the nature of the archaeological evidence from the immediate area. In the context of the surrounding archaeological environment the identification of the Danesfort site is not unexpected in either form or date.

It has been identified that ringditches may or may not contain evidence for cremated human remains and that these may often represent token deposits (Section 3.3). In terms of our understanding of the function and form of ringditches there would appear to be only one defining attribute – that these sites will consist of an annular enclosing ditch, which can be of varying width, depth, and diameter. In this regard Danesfort 1 can be interpreted as a typical ringditch site as well as an unusual one. Its basic form is fairly typical and the lack of evidence of a human burial, cremated or otherwise, is not unusual, indeed many ringditches contain no evidence other than the ditch itself. However, cremated animal bone was recorded from three discrete depositions within the ditch, which could indicate a specific ceremonial or ritual activity. The concentrations of bone deposited within the ditch were analysed and the presence of sheep and pig within the assemblage was confirmed. It should be noted that while human remains were not positively identified it is possible that some of the smaller unidentifiable fragments may be of human origin. The animal bone fragments may be the remains of feasting associated with the burial ceremony and may not have been subject to the same degree of processing as the human remains which may have been crushed into fine particles, a practice that was not uncommon in later prehistory. It is also interesting that a fragment of fused glass was recovered within the middle fill. This may be the remnants of a small bead or personal ornament that had been subjected to high temperature, possibly from a pyre. Johnston, in her analysis of the plant remains from the site, identified tuber fragments which are often found in association with cremated bone deposits and may be indicative of special selection. It seems likely therefore that Danesfort 1 was the site of ritual and probably burial activity in the middle Iron Age.

4.2 Conclusions

The excavation at Danesfort has identified the remains of a ringditch that was probably used in the middle Iron Age for ritual and burial purposes. Token deposits of cremated bone, despite the absence of confirmed human bone, show that careful and considered deposition took place at the site. The presence of a possible personal ornament in the form of fused glass, possibly a bead that had been subjected to high temperature, is further evidence of token deposition at the site. The ringditch was not fully excavated due to the alignment of the area acquired under the C.P.O. and further evidence for the use of this ditch may lie outside of this area to the east. The site is of local importance as it widens our understanding of Iron Age activity in this area, together with complimentary evidence from other sites excavated in the locale as part of the N9/N10 Phase 4 scheme. The further significance of the site in terms of the wider study of ringditches from the region cannot be underestimated.

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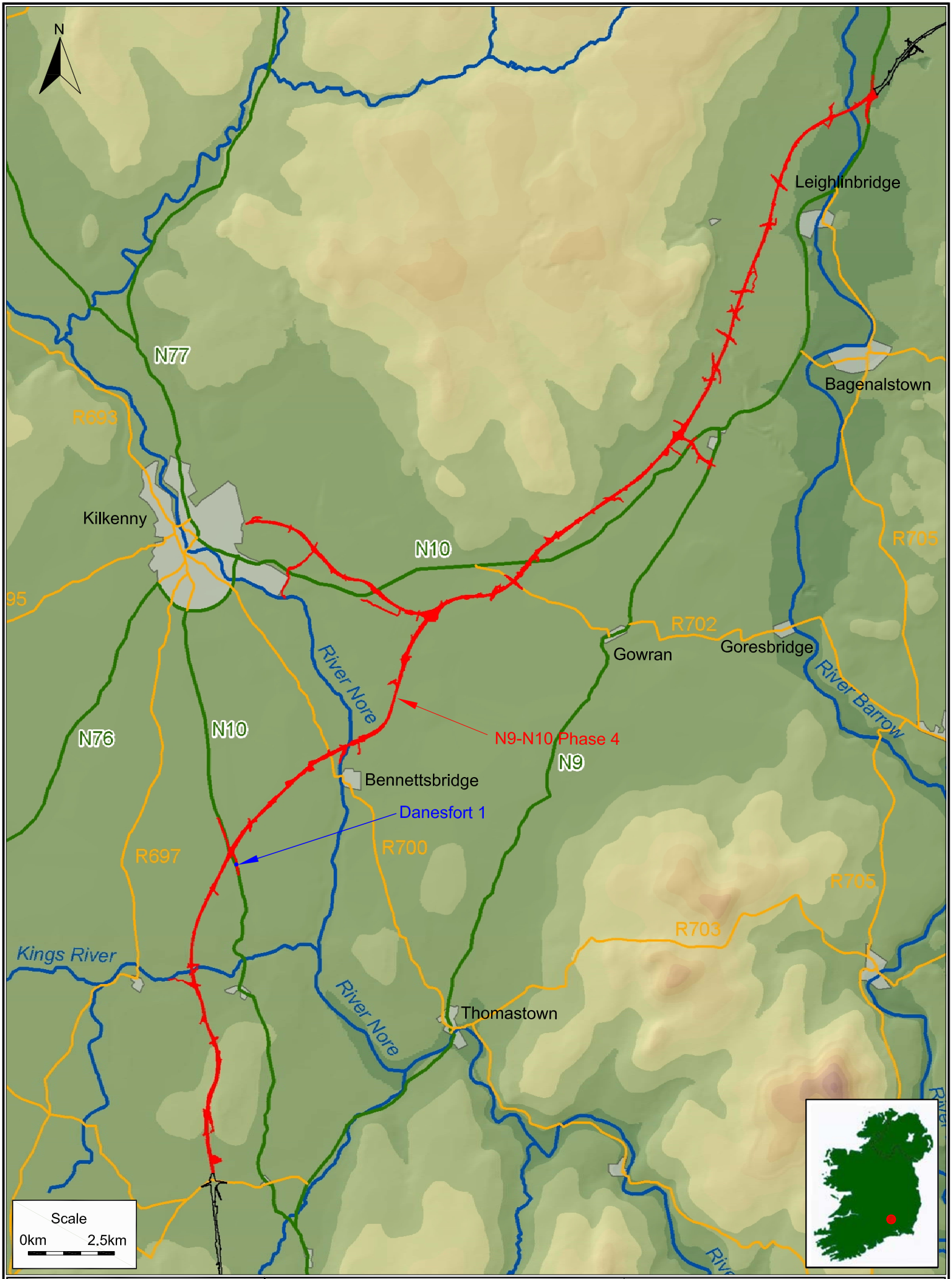

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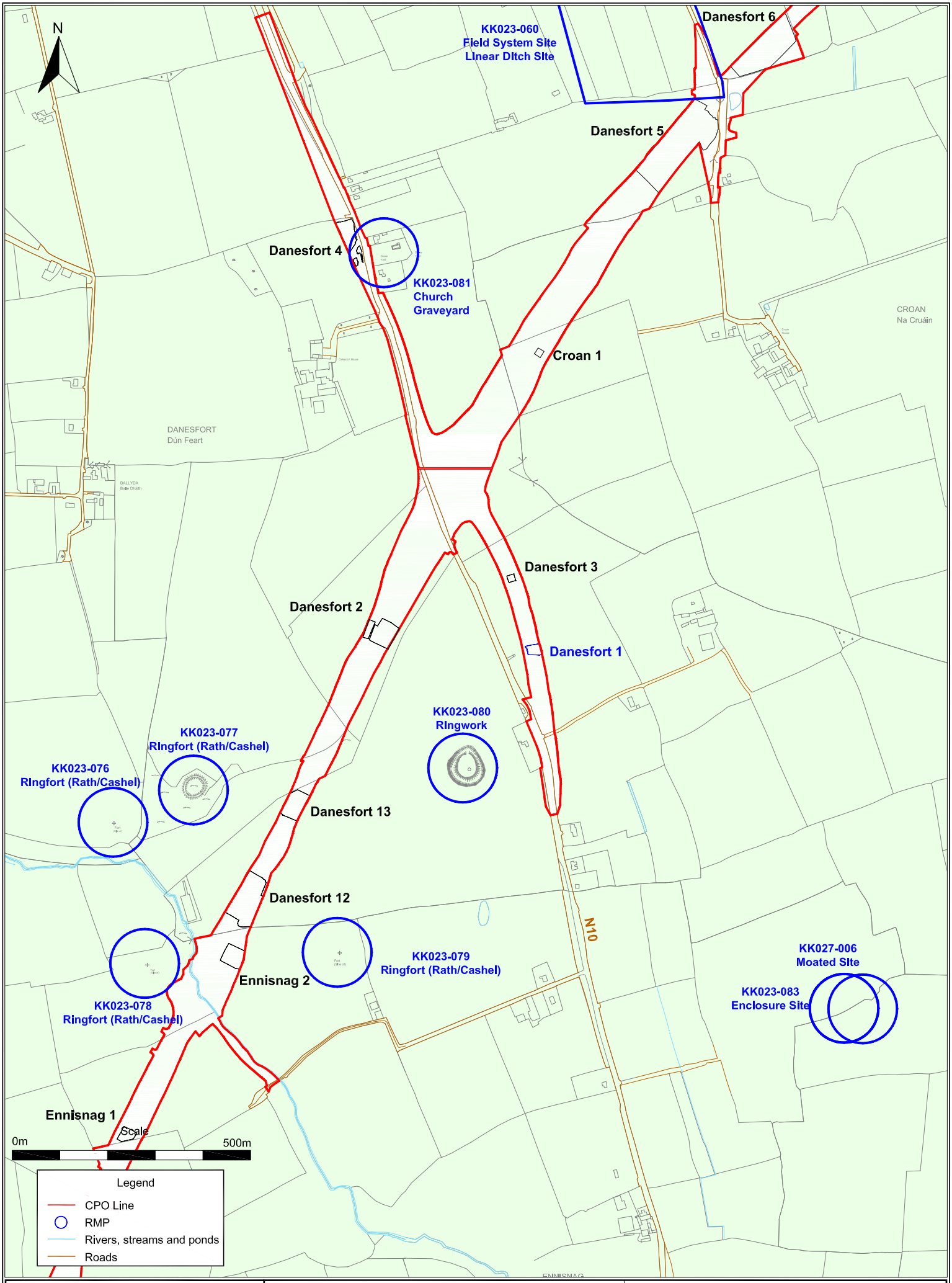

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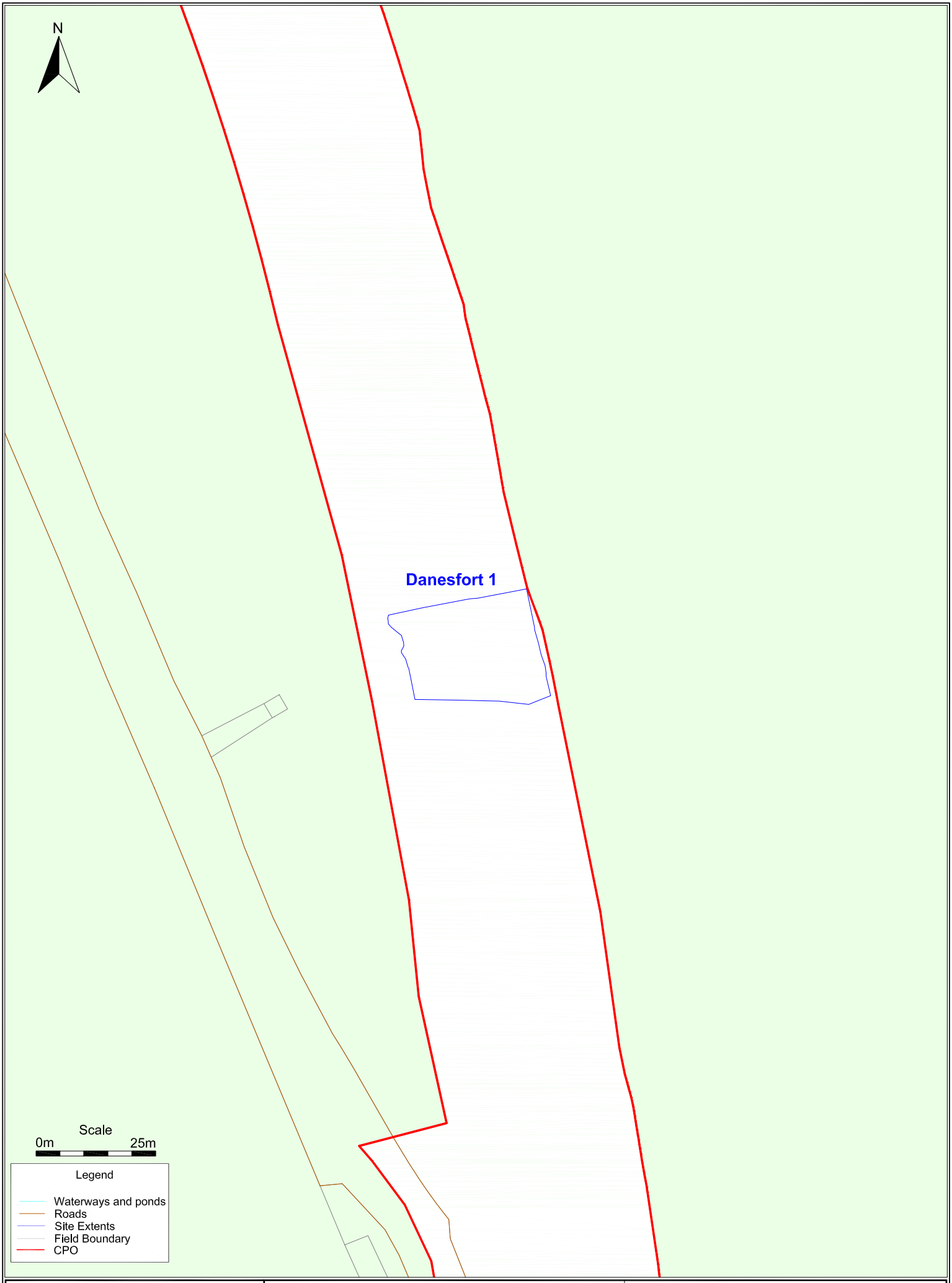

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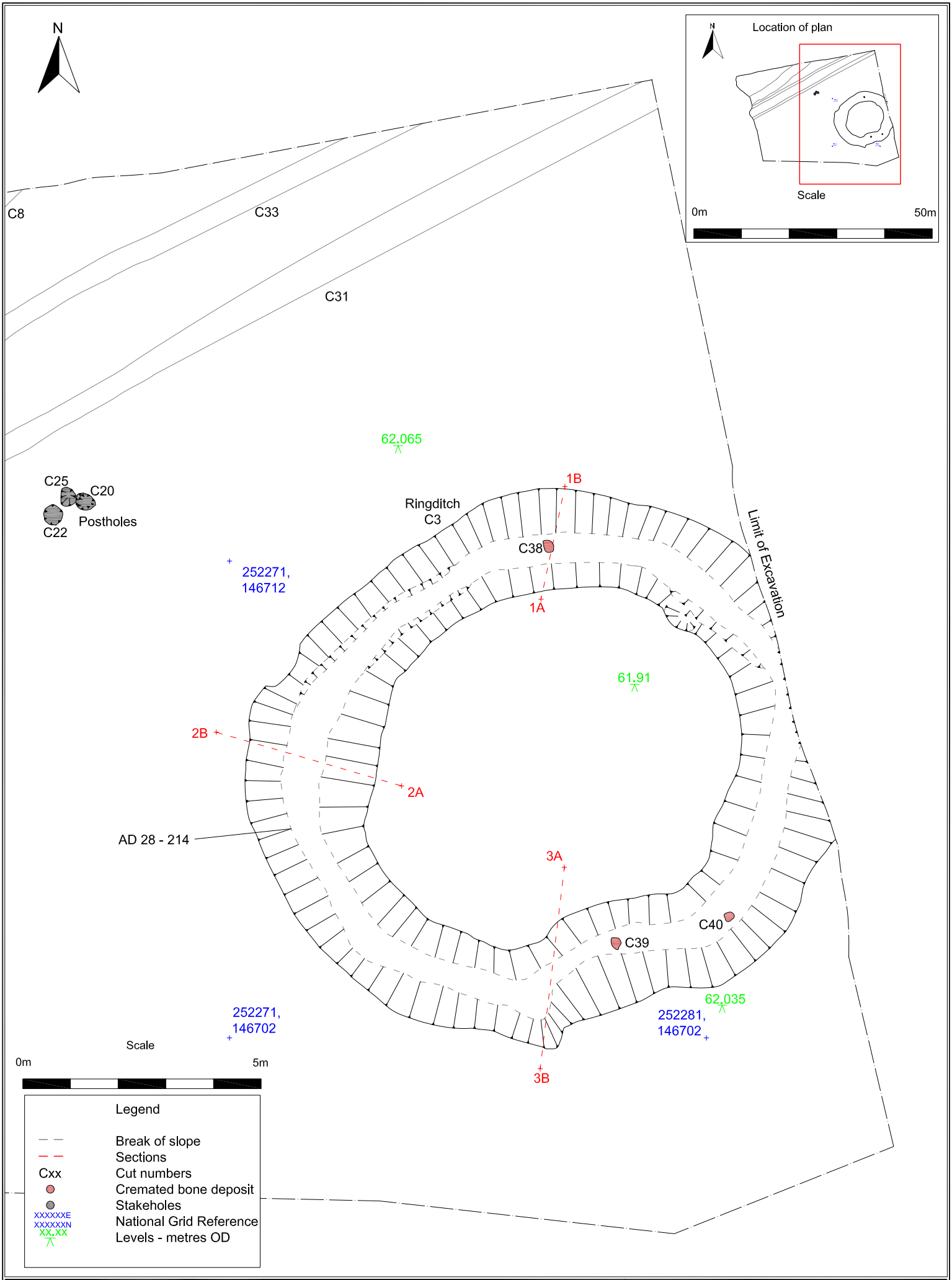

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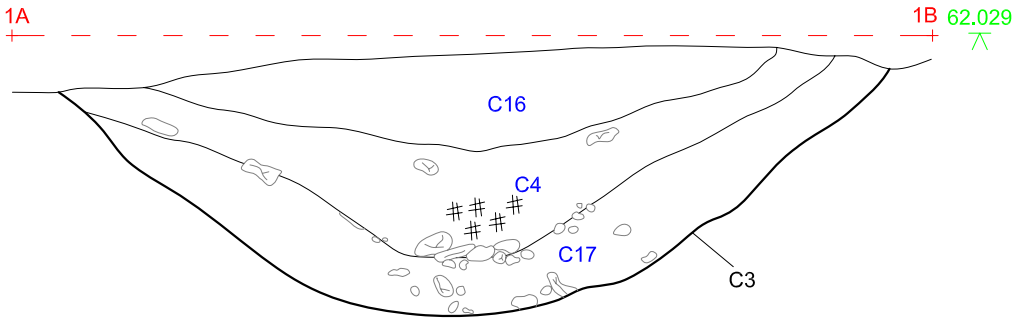
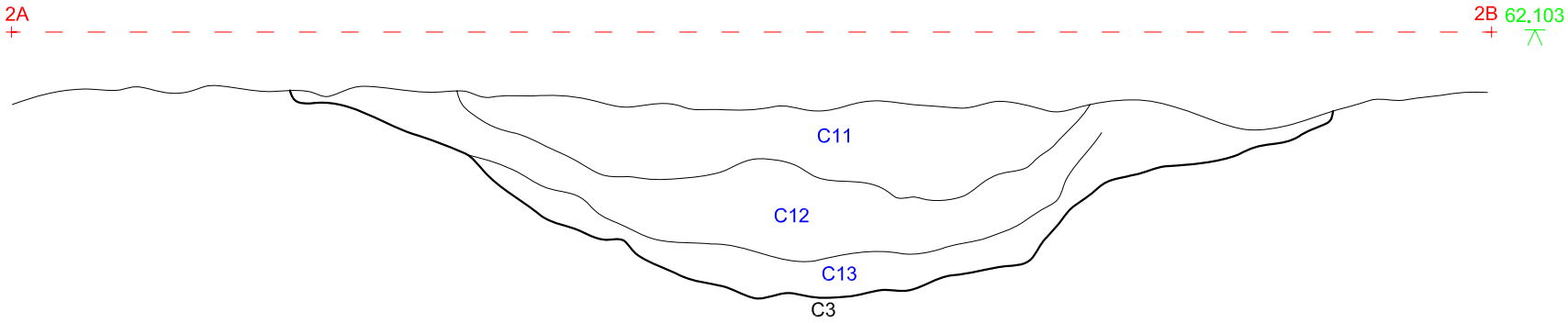
		Job No:	J2432.1
	Client: Kilkenny County Council	Figure No:	4

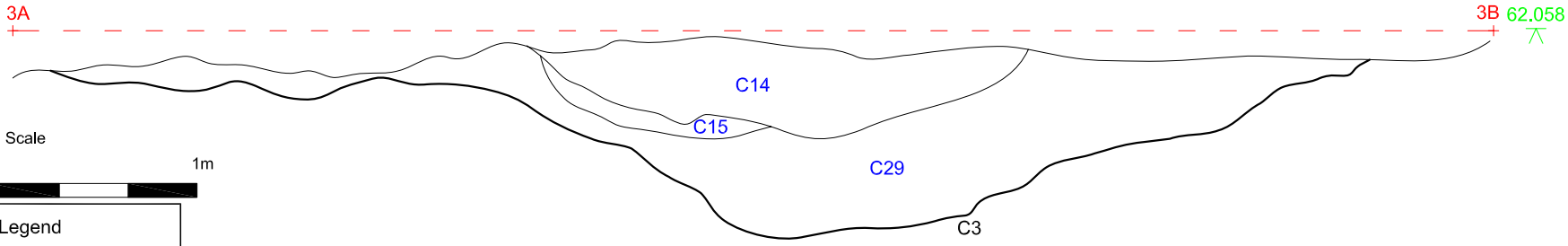
East facing section of C3



NNE facing section of C3



West facing section of C3



Scale

0m 1m

Legend

Cxx	Cut numbers
Cxx	Fill numbers
	Stone
#	Charcoal
xx.xx	Levels - metres OD

IAC Irish Archaeological Consultancy

Title:	Danesfort 1 - Sections 1-3
Project:	N9/N10 Phase 4: Knocktopher to Powerstown
Client:	Kilkenny County Council

Scale:	1:20 @ A4
Date:	18/06/10
Produced by:	G Kearney
Job No:	J2432.1
Figure No:	5

PLATES

Plate 1: Ringditch C3, pre-excavation, facing north-west

Plate 2: Ringditch C3, post-excavation, facing south-west (Turret KK023-080 in background)

Plate 3: Ringditch C3 – visible kink in alignment, post-excavation, facing west

Plate 4: Ringditch fill C4 containing cremated bone, mid-excavation, facing east

APPENDIX 1 CATALOGUE OF PRIMARY DATA

Appendix 1.1 Context Register

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
1	N/A	N/A	N/A	0.45m	Topsoil	Dark brown clayey silt		
2	N/A	N/A	N/A	N/A	Subsoil	Brownish yellow to orange loose gritty sand and gravel		
3	N/A	37.5	2.80	0.75	Cut of ringditch	Circular in plan, gradual break of slope, sides gradual, not perceptible to the south and base - flat to concave	C1	C2
4	C3	37.5	2.35	0.31	Fill of ringditch	Moderately compacted dark brown with grey hue clayey silt with large flecks of charcoal and pebbles.	C16	C17
5	C3	37.5	1.80	0.30	Fill of ringditch	Moderately compacted light brown with orange hue sandy clay with irregular shaped stones and flecks of charcoal.	C1	C6
6	C3	37.5	2.35	0.31	Fill of ringditch	Same as C4, C12, C15	C5	C7
7	C3	37.5	3.73	0.37	Fill of ringditch	U shaped fill in ringditch, loosely compacted dark brown with orange hue clayey silt with pebbles and occasional flecks of charcoal.	C6	C2
8	N/A	15.00	2.00	0.54	Cut of linear feature	Linear slightly curving ne-sw, sharp break of slope-top, gradual break of slope-base with sloping sides and a concave base.	C30	C2
9	C8	15.00	1.50	0.20	Fill of linear feature	Firmly compacted brown silty clay with occasional small stones and charcoal.	C1	C10
10	C8	15.00	1.63	0.55	Fill of linear feature	Loosely compacted brown silty sand with occasional stones.	C9	C30
11	C3	37.5	1.80	0.30		same as C5, C14, C16		
12	C3	37.5	2.35	0.31		same as C4, C6, C15		
13	C3	37.5	3.73	0.37		same as C7, C17, C29		
14	C3	1.80	0.30	0.30		same as C5, C11, C16		
15	C3	2.35	0.31	0.31		same as C4, C6, C12		
16	C3	1.80	0.30	0.30	Fill of ringditch	Same as C5	C1	C4
17	C3	2.11	0.37	0.25	Fill of ringditch	Same as C7	C4	C2
18-19				N/A				
20	N/A	0.38	0.38	0.41	Cut of posthole	Circular on plan, steep break of slope-top with vertical sides, gradual base break of slope- base with a concave base.	C21	C2
21	C20	0.38	0.38	0.41	Fill of posthole	Loosely compacted dark brown clayey silt with charcoal flecks and large angular stones and pebbles.	C1	C20

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
22	N/A	0.38	0.44	0.42	Cut of posthole	Circular in shape, sharp break of slope-top with vertical sides, gradual break of slope-base with concave base.	C24	C2
23	C22	0.38	0.26	0.42	Top fill of posthole	U shaped bottom fill of posthole, very loosely compacted dark brown clayey sand with some silt with greyish hue, flecks of charcoal and occasional pebbles within.	C1	C24
24	C22	0.25	0.25	0.28	Bottom fill of posthole	U shaped fill of posthole, fairly loosely compacted dark brown clayey silt with pebble inclusions.	C23	C22
25	N/A	0.28	0.24	0.1	Fill of deposit	Oval in shape, loosely compacted dark brown clayey silt with greyish black hue, occasional flecks of charcoal and some irregular stones.	C1	C2
26	N/A	0.42	0.38	0.24	Cut of posthole	Oval in shape, sharp break of slope-top and gradual break of slope-base with sloping sides leading to concave base.	C27	C2
27	C26	0.30	0.30	0.24	Fill of posthole	Firmly compacted mid brown grey silty sand with irregular small stone inclusions.	C28	C26
28	C26	0.20	0.18	0.15	Fill of posthole	Softly compacted greyish black clayey silt with occasional charcoal and small stones.	C1	C27
29	C3				Fill of ringditch	Same as c7, c13 & c21		
30	C8	2.00	1.10	0.54	Fill of ditch	Softly compacted light yellowish brown sandy clay with occasional small stones.	C10	C8
31	N/A	29.1	0.52	0.08	Cut of drain	Linear feature, gradual break of slope with concave sides, leading to a flat base.	C32	C2
32	C31	29.1	0.52	0.08	Fill of drain	Loosely compacted mid brown sandy silt with stone inclusions.	C1	C31
33	N/A	22.80	0.50	0.12	Cut of drain	Linear feature running NE-SW, gradual break of slope-top with concave sides and a flat base.	C34	C2
34	C33	22.8	0.50	0.12	Fill of drain	Loosely compacted medium brown sandy silt with stone inclusions.	C35	C2
35-37	N/A						C37	C2
38	C3	0.30	0.30	0.15	Deposit	Deposit of cremated bone within fill 4 north of the ringditch.	C4	C4
39	C3	0.25	0.25	0.15	Deposit	Deposit of cremated bone within charcoal rich fill concentrated to a small area to the south of the ringditch.	C4	C4
40	C3	0.30	0.30	0.15	Deposit	Cremated bone within fill 4 which is rich in charcoal. Located at the south-eastern end of ringditch.	C4	C4

Appendix 1.2 Catalogue of Artefacts

Registration Number	Context	Item No.	Simple Name	Full Name	Material	Description	No. of Parts
E3541:004:1	4	1	Glass	Fused glass	Glass	Fused glass. Roughly sub-rectangular in shape with rounded corners. Dark blue in colour. Opaque. Slightly vesicular in texture	N/A

Appendix 1.3 Catalogue of Ecofacts

During post excavation works specific samples were processed with a view to further analysis. A total of 25 soil samples were taken from features at Danesfort 1 and all samples were processed by flotation and sieving through a 250µm mesh. The following are the ecofacts recovered from these samples:

Context #	Sample #	Feature type i.e. Structure A, hearth C45	charcoal	Seeds and charcoal	Burnt animal bone	animal bone	human bone	metallurgical waste	Other
C4	1	Ringditch	0.8g	0.1g					
C4	8	Ringditch	66.5g	0.3g	15.6g				
C4	9	Ringditch	0.5g	0.2g					
C4	10	Ringditch	0.3g	0.1g					
C4	11	Ringditch	3.1g						
C4	12	Ringditch	6.2g	0.1g				0.9g	
C4	13	Ringditch	5.5g	0.2g					
C4	14	Ringditch	1.0g	0.1g					
C4	15	Ringditch	1.8g	<0.1g					
C4	16	Ringditch	0.1g	<0.1g					
C4	17	Ringditch	4.8g	<0.1g					
C4	19	Ringditch	6.9g			14.5g			
C4	22	Ringditch	2.4g						
C4	23	Ringditch	22.5g	<0.1g					
C4	24	Ringditch	0.7g			81.0g			
C4	25	Ringditch	<0.1g			4.1g			

Context #	Sample #	Feature type i.e. Structure A, hearth C45	charcoal	Seeds and charcoal	Burnt animal bone	animal bone	human bone	metallurgical waste	Other
C4	26	Ringditch	<0.1g			1.2g			
C6	2	Ringditch	37.5g	0.1g					
C7	32	Ringditch	<0.1g						
C21	3	Posthole	2.9g	0.1g					
C25	4	Deposit	0.1g	0.1g					
C23	5	Posthole	0.5g	0.1g					
C24	6	Posthole	0.1g						
C39	20	Concentration of bones	1.0g		62.5g				
C40	21	Concentration of bones	20.5g		34.6g				

Appendix 1.4 Archive Checklist

Project: N9/N10 Phase 4 Knocktopher to Powerstown		
Site Name: AR080b Danesfort 1		
Excavation Registration Number: E3541		
Site director: Richard Jennings		
Date: August 2011		
Field Records	**Items (quantity)**	**Comments**
Site drawings (plans)	9 plans	1 pre-ex, 6 sections, 4 mid-ex and 4 post-ex
Site sections, profiles, elevations	6 sections	
Other plans, sketches, etc.	0	
Timber drawings	0	
Stone structural drawings	0	
Site diary/note books	1	
Site registers (folders)		
Survey/levels data (origin information)	514	
Context sheets	40	
Wood Sheets	0	
Skeleton Sheets	0	
Worked stone sheets	0	
Digital photographs	78	
Photographs (print)	0	
Photographs (slide)	0	

APPENDIX 2 SPECIALIST REPORTS

Appendix 2.1 Small Finds Report – Siobhán Scully

N9/N10 Knocktopher to Powerstown
Danesfort 1 E3541 A032/068 AR080B
Siobhán Scully, Margaret Gowen & Co. Ltd
December 2009

Small Finds Report

Introduction

This report details a single piece of fused glass retrieved from the excavations at Danesfort 1 (E3541) as part of the N9/N10 Knocktopher to Powerstown road scheme.

Fused Glass

A small piece of fused glass (004:1) was recovered from the fill (C4) of the ringditch at Danesfort 1. This fill also contained cremated bone. The fused glass is blue in colour and may originally have been a bead but has been subjected to high temperatures, possibly from the funeral pyre in which burial was cremated. Heat-affected glass beads/fused glass have been found associated with Cremations 8, 11 and 18 at Carrowjames, Co. Mayo (Raftery 1941, 30–1, 22), a number of the glass beads from the ringditch at Ferns Co. Wexford had fused together (Ryan 2000, 302) and four pieces of fused blue glass were also associated with cremated bone from the upper fills of the ring-barrow at Marlhill, Co. Tipperary (Scully 2009, 331).

Catalogue

E3541:004:1 Fused glass. Roughly sub-rectangular in shape with rounded corners. Dark blue in colour. Opaque. Slightly vesicular in texture. L 10mm Wth 7mm T 6mm.

Reference

Raftery, J. 1941 The Tumulus-Cemetery of Carrowjames, Co. Mayo. *Journal of the Galway Archaeological and Historical Society,* **19**, 16–85.

Ryan, F. 2000 Ferns Lower, Ferns. In I. Bennet (ed.), *Excavations 1999: Summary accounts of archaeological excavations in Ireland*. Wordwell, Bray.

Scully, S. 2009 Glass Beads. In M. McQuade, B. Molloy & C. Moriarty, *In the Shadow of the Galtees: archaeological excavations along the N8 Cashel to Mitchelstown road scheme*, 331–5. Wordwell/National Roads Authority, Bray.

Appendix 2.2 Charcoal and Wood Report – Susan Lyons

Client – Irish Archaeological Consultancy Ltd
Site Name- Danesfort 1
Excavation number –E3541 AR080b
County – Kilkenny
Author- Susan Lyons
Date –16/09/09

Charcoal Identification Summary Report

Introduction

Three charcoal samples were identified and analysed from excavations associated with features of potentially prehistoric date at Danesfort 1, Co. Kilkenny as part of the resolution of the N9/N10 Kilcullen to Waterford Scheme, Phase 4B – Rathclogh to Powerstown. The site contained a ringditch (diameter of 11.8m). It contained in its middle fill cremated bone, animal bone, charred seeds and hazelnuts, charcoal and a fragment of a blue glass bead. A cluster of postholes was also identified to the north-west of the ringditch (Jennings, 2009).

It is generally considered that the principle reason for charcoal analysis is the hypothesis that wood used as firewood will be collected from as close to a site as possible and as such can help to reflect the local wooded environment in the area. It is also likely that abandoned structural timbers or wood brought to the site for uses in construction works or other activities are also reused as firewood. The charcoal identified can also go some way to interpreting the local woodland that grew in the vicinity of the site and possible changes to that woodland over time. This charcoal report serves as a summary report only for Danesfort 1 and will later form part of an overall scheme-wide charcoal study for the N9/N10 (Lyons, *et al, forthcoming).*

Methodology (After IAC Ltd)

Processing

- A mechanical flotation tank using a pump and water recycling system is used for soil flotation.
- The soil is washed using a 1mm mesh in the flotation tank and a 300 micron and 1mm sieve is used to catch floated material.
- The volume of all soil samples are recorded in litres using a measuring jug.
- The sample is then placed into the 1mm mesh in the flotation tank, the tank is then filled with water and the sample washed. Any large lumps of soil can be carefully broken down by hand, but the jets of water in the flotation tank gently clean the rest of the sample.
- Once the sample is clean (just stones, charcoal, artefacts remaining in the mesh) the tank is fill up with water and at this stage any floating material (charcoal, seeds etc) should flow over the spout and into the sieves.
- The retent is then gently poured into a labelled tray (containing site code, site name, sample number and context number) and place on a shelf to dry.
- The flots are securely packaged in tissue, labelled and hung up to dry. This prevents any loss of light material (seeds) which could result once the flots are dry and being moved (if they are dried on trays).
- Before washing a new sample all equipment used (measuring jugs, 1mm mesh, sieves etc) are thoroughly washed using clean water.
- The large black settling tanks (and water) are cleaned between every site, or if a large site is being processed, every 1–2 weeks.
- Any samples containing high clay content will be soaked in water for 1–2 days to aid the sieving process.

Charcoal identifications

Three charcoal samples from C4 and C7 (fill of ringditch C3) and C21 (fill of posthole C20) were selected for charcoal analysis.

The larger sized charcoal fragments (>3mm in width) are fractured to view the three planes [transverse, radial and tangential sections] necessary for microscopic wood identification. The wood species identifications are conducted under a binocular microscope using a trancident light and viewed at magnifications of 100x, 200x and 400x where applicable.

Wood species identifications are made using wood reference slides and wood keys devised by Franklin and Brazier (1961), Schweingruber (1978), Hather (2000) and the International Association of Wood Anatomists (IAWA) wood identification manuals and (www.lib.ncsu/edu/insidewood) by Wheeler, Bass and Gasson (1989).

Quantifying charcoal samples can be difficult as many wood species can be affected by heat is different ways and hence become fragmented into an arbitrary number of fragments. Due to the potential for a very high number of charcoal fragments from the samples, a representative sample of 50 charcoal fragments (Keepax, 1988) are randomly chosen from larger samples for identification and analysis. In the case of smaller samples all charcoal fragments within are identified. The charcoal fragments of each species identified are counted, weighted (grams) and bagged according to species.

Details of charcoal recording
The general age group of each taxa per sample is recorded, and the growth rates are classified as slow, medium, fast or mixed. It was not within the scope of this project to measure all the ring widths from the charcoal, however, some measurements are taken with a graticule in the microscope in order to make the scale of slow, medium and fast growth less subjective. Slow growth within the charcoal from this site is considered to be approximately 0.4mm per annum, medium approximately 1mm per annum and fast approximately 2.2mm per annum.
The ring curvature is also noted where applicable from each charcoal fragment. Weakly curved annual rings suggest the use of trunks or larger branches, while strongly curved annual rings indicate the burning of smaller branches or twigs **Fig. 1.** Tyloses within the vessels of species such as oak can denote the presence of heartwood. These are balloon–like outgrowths of adjacent parenchyma cells of xylem vessels (vascular tissue used to transport water and minerals). When the plant is subjected to stressful conditions, tyloses will develop and block the vascular tissue to prevent further damage to the plant.

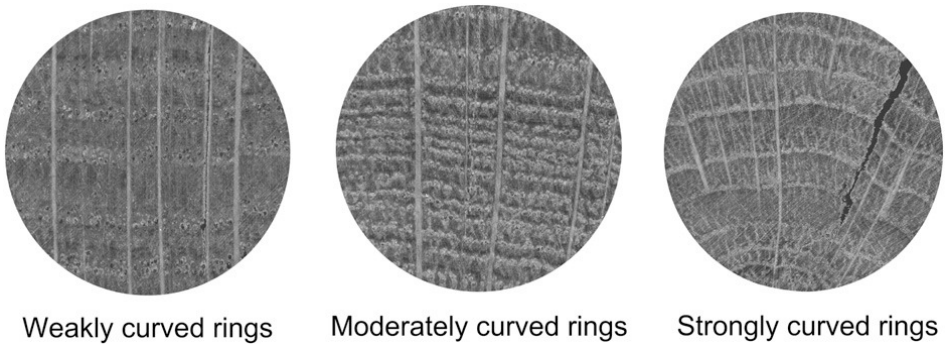


Fig. 1. Ring curvature (after Marguerie and Hunot 2007 1421, Fig. 3)

Results
The results of the charcoal identifications are summarized in **Table 1**

Four wood species totaling 101 identifications were recorded from the samples associated with Danesfort 1. *Quercus* sp. (oak), was the dominant species identified, followed by much lesser incidences of *Salix* sp. (willow), *Corylus avellana* (hazel) and *Fraxinus excelsior* (ash) (Fig. 2).

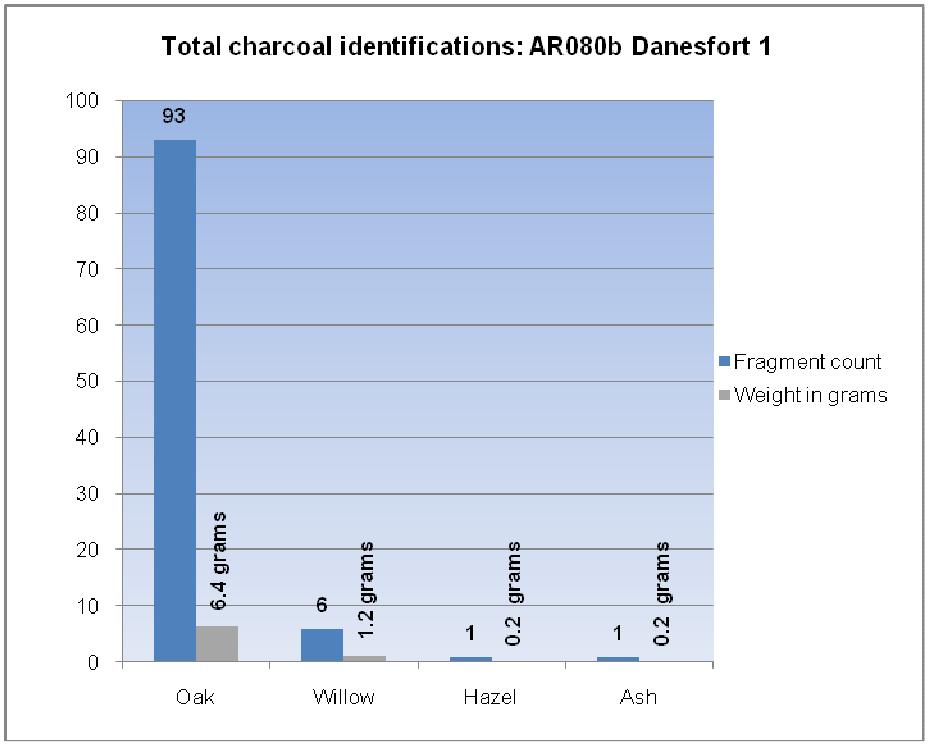


Fig. 2

Oak was the dominant species recorded from C4 (C3) and C21 (C20). Hazel, ash and willow was also recorded from C4, while just one willow charcoal fragment was identified from C7.

Discussion

Background and origin of wood species

Quercus sp. (oak)
Oak is a tall deciduous woodland tree, often growing in association with hazel and ash. Most species prefer damp, non–calcareous soils on lowland or montane sites. Of the 27 European species, pedunculate oak (*Quercus robur)* and sessile oak (*Quercus petraea)* are native to Ireland. Pedunculate oak is common on heavy clay lowland soils whereas sessile oak thrives on the lighter loams characteristic of higher ground (Culter & Gale, 2000). The wood is easy to cleave both radially and tangentially and has provided one of the most important building materials since the prehistoric period (Gale & Culter, 2000). The heartwood timber is renowned for its durability but the paler sapwood is susceptible to beetle and fungal attack. The strength of the timber depends on the species and is influenced by climatic and edaphic factors (Edlin, 1951). When burnt, oak charcoal, particularly the dense heartwood, has higher calorific values than most European woods and this can make for good long–lasting fuel (Culter & Gale, 2000).

Salix spp. (willows).
There are a number of different species of willow which cannot be differentiated through wood anatomy. They grow rapidly, and can be easily propagated from cuttings. General comments only about the genus can be made, as there are different varieties of it. They are not naturally a woodland species, although shrubby growth

may occur under light woodland cover. All willows appear to favour wet conditions, and it may be a pioneer species on wet soils. The use of willow depends on the species concerned, for some grow as shrubs and others as trees, and a species may be particularly suited to some purpose. In general, the flexibility of willow shoots has led to coppicing or pollarding to produce the raw materials for baskets, frames, hurdling etc. (Orme & Coles, 1985). The main Irish native willows are grey willow (*Salix cinera*), goat willow (*Salix caprea*) and eared willow (*Salix aurita*).

Corylus avellana L. (hazel)
Hazel woodlands replaced birch in the early post–glacial forests and remains on some shallow limestone soils to the present day (Pilcher & Hall, 2001). The species can tolerate most soil types, but not waterlogged conditions and forms a small deciduous tree or shrub. It commonly occurs in understorey of oak and/or ash woodlands, where it may grow to a height of 10m or more. In open areas or woodland glades hazel grows as a shrub. Hazel is a common species recorded from Irish archaeological sites and its widespread presence is highlighted in pollen diagrams from the Neolithic to the medieval period (Caseldine, 1996). It produces good firewood and is a suitable wood for kindling. The wood is soft enough to be split yet flexible and strong enough to be used in rope making and basketry. It has also proved a useful resource in the construction of hurdles, wattling, palisades and trackways from prehistoric times (Pilcher & Hall, 2001).

Fraxinus excelsior (ash)
Ash thrives well on nutrient–rich soils but is also a common woodland species and grows in mixed woodland with oak on damp, slightly acidic soils (Gale & Culter, 2000). Pollen analysis indicates that ash became more common in the pollen record from the Neolithic period onwards (Mitchell, 1953/4). This could be as a result of more clearance due to agricultural practices at the time, where ash was able to germinate and grow more vigorously as secondary woodland and in marginal areas and hedges (Kelly, 1976). Ash is also abundant in native hedgerows and was quite common in the later historic period.

Distribution of charcoal from Danesfort 1
The number of identifiable charcoal fragments recovered from Danesfort 1 were localised to just three contexts; C4 and C7 (fills of ringditch C3) and C21 (fill of posthole C20).

The mixed composition of wood species from C4 (oak, hazel, willow and ash) coupled with the lack of any *in situ* burning suggests that this charcoal assemblage is re-deposited or dumped charred debris from one or more firing events. The low charcoal content from C7 makes it difficult to interpret the wood species from here and as such no further discussions will be made.

The presence of just oak from posthole fill C21 may reflect the remains of a burnt structure or part of a burnt post. Charcoal is often recorded from postholes and while is it difficult to ascertain if it represents a structure that had burnt down, it is also interpreted as the result of construction methods, such as a) the charring of post bases to prevent the timbers from rotting b) a way of re-sizing posts of c) the method by which the timbers were felled.

Summary
A mixed wood assemblage of oak, willow, ash and hazel was recorded from ditch C4 is likely to represent dumped or re-deposited charcoal debris. While the oak charcoal recorded posthole C20 (C21) may be the remains of a burnt structure, it is also likely to reflect the remains of charred post ends, a method used in construction works.

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Table 1 Charcoal identification results from Danesfort 1 (E3541)

Context number	Sample number	Flot volume (grams)	Context description	Wood Species Identifications	No. of fragments	Charcoal weights (grams)	Size of fragments (mm)	No. of growth rings	Growth ring curvature	Comments
004	008	66.5 grams	Fill of ringditch C3	Quercus sp. (oak)	43	4.2 grams	3mm - 15mm	3 - 7 rings	weak	wide growth rings (1mm - 2.5mm
				Salix sp. (willow)	5	1.2 grams	4mm - 7mm	3 - 6 rings		
				Corylus avellana (hazel)	1	0.2 grams	4mm	3 rings		
				Fraxinus excelsior (ash)	1	0.2 grams	5mm	3 rings		
007	003	<0.1 grams	Fill of ringditch C3	Salix sp. (willow)	1	<0.1 grams	3mm	2 rings		
021	003	2.9 grams	Fill of posthole C20	Quercus sp. (oak)	50	2.2 grams	3mm - 8mm	3 - 6 rings	weak	

Appendix 2.3 Plant Remains Analysis Report – Penny Johnston

Plant Remains Analysis Report for
E3541 Danesfort 1 (A032/068), Co. Kilkenny
N9/N10 Road Scheme – Phase 4

Penny Johnston, Eachtra

Introduction

This report details the analysis of plant remains recovered from excavations in advance of the construction of the N9/N10 Knocktopher to Powerstown Road (Phase 4). The excavation was directed by Richard Jennings on behalf of Irish Archaeological Consultancy Ltd. The archaeological site was located in the townland of Danesfort (E3541).

The excavated remains included evidence for middle Iron Age funerary activity.

Methodology

The samples were processed by the client, who also carried out a preliminary sorting of the samples. This pre-selection of the plant remains may bias the final plant records from these sites, as it is possible that many small items, such as weed seeds and chaff, were not picked out.

The selected material was sent to Eachtra Archaeological Projects where it was examined under a low-powered binocular microscope (X6–X45). Suitable plant material was identified and the results of analysis are presented.

Danesfort 1 E3541 AR080B

This site comprised a ringditch with three deposits of cremated bone. A total of 15 samples from this site were examined: C4 (S1), C4 (S8), C4 (S9), C4 (S10), C4 (S12), C4 (S13), C4 (S14), C4 (S15), C4 (S16), C4 (S17), C4 (S23), C6 (S2), C21 (S3), C23 (S5) and C25 (S4). Many of the samples contained un-charred plant material, probably modern contaminants of the archaeological deposits. These seeds were identified as un-charred seeds from the Goosefoot (*Chenopodiaceae*), Knotgrass (*Polygonaceae*) and Daisy (*Asteraceae*) families.

Charred plant remains were found in only two samples; C4 (S13) and C4 (S15). These included hazelnut shell fragments, indeterminate cereal grains and tuber fragments. Tuber fragments are often found in association with cremated bone deposits. For example, they were found in burials at Ballyveelish, Co. Tipperary (Monk 1987b). They are also known from other cremation deposits; for example at Rathgall, Co. Wicklow (Johnston et al. 2003) and at other sites in Dublin County (e.g. Johnston 2002; Johnston 2003). It is possible that these are accidental inclusions, but the fact that they are generally found with cremation deposits may be indicative of special selection.

Identified plant remains from Danesfort 1 E3541

Context	**4**	**4**
Sample	**15**	**13**
Hazelnut shell fragments (*Corylus avellana* L.)		4
Indeterminate cereal grains	1	
Indeterminate tuber fragments		1

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Appendix 2.4 Burnt Bone Report – Aoife McCarthy

Osteoarchaeological Report of Faunal Remains and Burnt Bone from
E3541 A032/: Danesfort 1 AR080b
Co. Kilkenny
N9/N10 Kilcullen to Waterford Scheme
Phase 4: Knocktopher to Powerstown
Author: Aoife McCarthy MA BA
Date: July 2010

Table of Contents

1. Introduction

1.1 Introduction
This report details the osteological analysis of faunal remains and burnt bone samples recovered during excavations at Site E3541 AR080B Danesfort 1 in the townland of Danesfort, Co. Kilkenny as part of the archaeological mitigation programme of the N9/N10 Kilcullen to Waterford Road Scheme. Aoife McCarthy MA (Osteoarchaeology University of Southampton 2006) undertook the analysis on behalf of Irish Archaeological Consultancy Ltd in July 2010. A previously recorded circular geophysical anomaly (ArchaeoPhysica Ltd 2005) was re-examined during archaeological fieldwork at AR080B. The anomaly was shown to be a ringditch with a total diameter of 11.8m and internal diameter of 7.8m. The ditch was U-shaped and no deeper than 0.75m. Cremated bone was recovered from the middle of its three main fills at opposite sides of the ditch. No cremations were found in the interior of the ringditch. At the time of writing this report, background archaeological information was obtained from a draft interim excavation report (Jennings, R. 2009) and from consulting the original site register documents.

1.2 General Osteological Information
The osteological analysis of both hand retrieved faunal remains and burnt bone fragments was undertaken to provide an overview of the osteoarchaeological aspect of the site and determine if the material could provide further interpretation of site activity.

A total of 441 fragments from 411 possible skeletal elements weighing 211.97g were recorded within the assemblage. The degree of preservation of the bone assemblage recovered varied from moderate to very poor preservation. A high rate of fragmentation was also noted within the combined assemblage.

A large portion of the faunal and burnt remains assemblage recovered at Danesfort 1 originated from C39 a deposit of charcoal and bone within ringditch feature C3 which accounted for 203 bone fragments or 46% of the total. At the time of report production a single sample of hazelnut shell from ringditch fill C4 had been issued for AMS dating. However, a radiocarbon date was yet to be returned. A single small piece of fused glass which may originally have been a bead that was subjected to high temperatures was recovered from ringditch fill C4 (Scully, S, 2009, 1). The blue glass bead has been interpreted as prehistoric in date.

A total of 77 bone fragments (17.5%) of the faunal remains assemblage were classified to species. Due to fragmentation combined with poor preservation and small size of the individual bone fragments it was not possible to identify 364 fragments (82.5%) these were classed as indeterminate vertebrate of small, medium or large size. In an Irish context the classification ‘large mammal’ includes cattle and horse, ‘medium mammal’ comprises pig, sheep and larger dogs whilst ‘small mammal’ includes species such as hares, foxes, cats and small dogs. Bone elements were identified where possible. The faunal and burnt remains assemblage recovered from Danesfort 1 contained bones from a possible 7 different species including; cow, pig, sheep, goat, domestic fowl, horse and rodent.

2. Methodology

Species Identification: Identification of the bones involved reference to Schmid (1972) and Hillson (1992) as well as comparison with the author’s own reference material. The closely related taxa of sheep and goat are difficult to distinguish and where grouped under the term ‘caprinae’

- NISP: Number of Identified Specimens Indicates the total number of fragments found.

- MNI: Minimum Number of Individuals. Indicates the minimum number of individuals from every species that were present in the material. Estimating MNI is calculated on the specimen of the most abundant skeletal element present; whilst taking age, sex, size and archaeological context into account.

- In order to calculate accurate MNI and MNE figures for each species, bird as well as mammal, a method of zoning was implemented when recording (Serjeantson, 2000). This method was used so as to compensate for any possible biases due to fragmentation; siding was also taken into account at this point.

- MNE: Minimum Number of Elements. Indicates the minimum number of anatomical units that are present and what side they are from. To avoid getting a higher MNE all loose epiphyses have to be paired with all un-fused diaphysis.

Ageing: Two main methods are used to determine the age of faunal remains; tooth eruption and degree of Epiphysial fusion (a less reliable method). Tooth eruption and wear stages were recorded for the following teeth where possible; dP4 (deciduous fourth premolar), P4 (fourth premolar), M1 (first molar), M2 (second molar) and M3 (third molar) of cattle, sheep/goat and pig (Grant 1982). The analysis of tooth wear patterns refers to the alteration of the enamel surface and exposure of inner dentine through use. The nature and type of material recovered at Site AR080B meant dental ageing was not possible.

Biometrical Data: Due to the nature, type and condition of animal bone recovered at Site AR080B biometrical analysis was not possible.

Sex Determination: Sex determination of animal remains is possible by analysis of certain sexually dimorphic elements. For example goat horncores may be classified as male or female based on their morphology and cattle metacarpals can be defined as male or female through calculation of the slenderness index (McCormick 1992). Sexual determination of species was not possible due to the nature, condition and type of faunal material recovered from Danesfort 1.

Butchery/Gnawing/Burning: Evidence for butchery was recorded under the categories of cut, chopped, chopped and cut. All specimens were analysed for evidence of rodent or carnivorous gnawing as well as evidence of burning. Burnt bones were recorded in accordance with colour changes resulting from differing heat levels e.g. calcined bones acquire a bluish-whitish hue through exposure to high temperatures.

Pathology: The discovery of any injury and/or pathology was recorded for all specimens, where present.

3. Results

Cow/*Bos*

Cattle was well represented at Danesfort 1, a total of 18 fragments, which formed 23.4% of the identified faunal remains assemblage were recovered (Appendix 1). The total weight of recovered cattle bone was 25.4g. Cattle MNI was calculated at 1

based on recovered molar crown fragments. Due to poor preservation and cracking of the molar crown fragments it was not possible to calculate an estimated age at slaughter for the domestic species. The skeletal element of cow present within the assemblage was permanent molar crown. Due to a lack of measurable pig bone fragments retrieved at biometric data analysis was not possible for the domestic species. All 18 molar crown teeth fragments showed evidence of exposure to heat in the form of colour change and surface texture alteration. Calcination was visible as colour change to white and grey combined with cracking of the enamel surface (Appendix 2). As temperature increases teeth turn blue-grey then starch and chalky white in colour with fracture types similar to bone (Schmidt, C.W, 2008, 58).

Sus/Pig

Pig was represented at Danesfort 1 by a total of 16 fragments, which formed 20.8% of the identified animal bone assemblage recovered (Appendix 1). The total weight of recovered pig bone was 6.52g. Pig MNI was calculated at 1 based on recovered rib corpus and metapodial bone fragments. The skeletal elements of pig present within the assemblage were rib and metapodial. Due to a lack of measurable pig bone fragments biometric data analysis was not possible for the domestic species. It was also not possible to estimate an age at slaughter for pig.

None of the recovered pig bone fragments exhibited evidence of butchery or rodent and scavenger gnawing. All 16 pig bone fragments displayed evidence of exposure to heat in the form of colour change and surface texture modifications such as cracking, consistent with calcination. Bone structure changes through exposure to heat with a white or pale grey colour indicating exposure to temperatures in excess of *c*. 600°C combined with a ready oxygen supply (McKinley, 2004). As detailed by Luff & Pearce in 1994 contact of bone with heat diminishes its moisture content and results in the combustion of the organic or collagen component; the remaining structure of the bone after this process is mineral.

Sheep/Goat (*Caprinae*)

Caprinae formed 20.8% of the identified animal and burnt bone assemblage at Danesfort 1; with a total of 16 bone fragments recovered (Appendix 1). The total weight of retrieved caprinae bone was 4.7g. Sheep/Goat MNI was calculated at 1 based on recovered rib corpus fragments. The only skeletal element of sheep/goat present within the assemblage was rib corpus. Due to a lack of measurable sheep/goat bone fragments biometric data analysis was not possible for the domestic species. It was also not possible to estimate an age at slaughter for *caprinae*.

None of the 16 fragments of caprinae bone showed evidence of butchery and/or rodent and scavenger gnawing. However, all 16 fragments displayed evidence of exposure to high temperatures and resulting calcination. All 16 fragments exhibited colour change to chalky white combined with transverse and longitudinal cracking of surviving bone surface. During the process of calcination the bone itself dehydrates, calcinates, shrinks, delaminates and fractures. Dehydration is the first step to occur followed by charring and burning of the organic components (DeHann, J. D, 2008, 9). The calcined bone that remains when the process is complete is thermally altered bone which has lost all organic material and moisture.

Equus/Horse

Eight fragments of horse permanent molar crown weighing 69g were recovered from Danesfort 1; and constituted 10.4% of the identified bone assemblage. All 10 fragments of molar crown exhibited evidence of exposure of the tooth to a high level of heat. This was manifested as a chalky white colour and extensive cracking or surviving enamel. As previously stated when temperature increases teeth turn blue-

grey then starch and chalky white in colour with and show fracture types similar to bone (Schmidt, C.W, 2008, 58).

Rodent

A series of 18 small and poorly preserved fragments of rib corpus and tooth root fragments, weighing 0.78g were recovered within bone material. Rodent bone and teeth fragments formed 23.4% of the recovered assemblage. All 13 fragments of tooth root and enamel displayed evidence of exposure to low temperatures visible as charring and blackening of the surface. The remaining 5 fragments of rodent size rib corpus exhibited evidence of exposure to a higher level of heat resulting in calcination of the fragments. This was manifested as colour change to white combined with surface cracking.

Domestic Fowl

A single calcined moderately preserved fragment of domestic fowl sized rib corpus weighing 0.25g was identified at Danesfort 1. The bone fragment was glossy and smooth in texture and bright white in colour indicating exposure to high temperatures.

Indeterminate Vertebrate

Due to fragmentation, poor preservation and small un-diagnostic fragment size a series of 364 unidentifiable bone fragments of indeterminate vertebrate (82.5%), weighing 105.32g were recovered from Danesfort 1 (Appendix 1). A total of 64 fragments (17.6%) of unidentifiable bone were classed as small size vertebrate; whilst 67 bone fragments (18.4%) were categorised as medium sized vertebrate. The remaining 233 bone fragments (64%) were deemed un-sized indeterminate vertebrate with bone elements identified where possible.

All 364 fragments of molar crown, skull, rib corpus and unidentifiable element of indeterminate vertebrate recovered at displayed evidence of exposure to a high level of heat, resulting in the calcination of the bone. This was recognised by an alteration of the bone texture to glossy smooth and surface cracking combined with colour change to grey/white. The structure of bone changes through exposure to heat. Contact of bone with heat diminishes its moisture content and results in the combustion of the organic or collagen component; the remaining structure of the bone after this process is mineral. As Devlin J.P. & Herrmann N. P (2008, 109) state “increasing exposure to heat bone progresses through a sequence of colours from unburned tan, to shades of dark brown to black, progressing to blue and grey and finally to white.” None of the bone fragments of indeterminate vertebrate showed evidence of butchery and/or rodent and scavenger gnawing.

4. Summary

A total of 441 hand retrieved faunal remains and burnt bone fragments recovered from multiple archaeological contexts on Danesfort 1 were submitted for examination. Similar to un-burnt faunal remains bone surface shape and morphology was analysed to identify burnt remains as human or animal. Although such methods are reliable positive identification of very small-tiny sized cremated bone fragments is only achievable with histological analysis. A total of 364 fragments (82.5%) were not possible to identify to species due to small fragment size, poor preservation and fragmentation of the bone. The remaining 77 fragments (17.5%) were identified and divided into species. The faunal remains assemblage contained bones from 7 recognisable species of cow, pig, sheep, goat, domestic fowl, horse and rodent (Appendix 1). The faunal remains of rodent, horse and deer were recovered from archaeological contexts which also contained domestic and indeterminate species.

Taphonomic alterations noted on the faunal and remains give us an insight into the process that the assemblage went through before recovery. As illustrated a single fragment of medium sized vertebrate long bone diaphysis showed evidence of butchery in the form of a single cut mark. None of the recovered bone fragments displayed indicators of rodent or scavenger gnawing. No examples of pathological alterations were recorded within the faunal remains. A total of 429 bone fragments (97.3% of the entire assemblage) including identified and indeterminate species displayed evidence of exposure to heat. The majority of the 429 burnt bone fragments showed surface warping, exposure of trabecular bone and colour change to grey/white or white indicating contact with a high point of heat and an acceleration of the mineralisation process (Luff R. & Pearce J. 1994). Due to its higher density over human bone prolonged high temperatures are necessary to achieve the uniform appearance of calcination in animal bone.

No definite or statistically detailed conclusions could be drawn from the bone assemblage retrieved from Danesfort 1 due to its small size and poor degree of bone preservation. Although the deposits of cremated bone within ringditch C3 have been interpreted as funerary activity no positively human remains were identified with the assemblage. As detailed a large portion of the bone material was un-diagnostic, intentional crushing as well combined with pre-and post-depositional handling of the remains may be possible explanations for the high quantity of small unidentifiable fragments present.

Bone Database:

SPEC	C	S	TAXA	ANAT	SIDE	PROX	DIST	1	2	3	4	5	6	7	8	BUT	BU	G	Q	W (G)	COMMENTS
1	C4	25	Cow	Molar Crown													G		4	3.7	Molar crown & small fragments, cracked & v poorly preserved. Dental notes not possible as v little enamel & dentine surface survives
2	C4	24	Horse	Molar Crown													G, W		1	17.8	V poorly preserved & fragmented incomplete molar crown. Dental notes not possible as no dentine surface survives enamel cracking. Exposed to heat
3	C4	24	Horse	Molar Crown													G, W		1	18.1	V poorly preserved & fragmented incomplete molar crown. Dental notes not possible as no dentine surface survives enamel cracking. Exposed to heat
4	C4	24	Horse	Molar Crown													G, W		1	14.9	V poorly preserved & fragmented incomplete molar crown. Dental notes not possible as no dentine surface survives enamel cracking. Exposed to heat
5	C4	24	Cow	Molar Crown													G, W		1	10.8	V poorly preserved & fragmented incomplete molar crown. Dental notes not possible as no dentine surface survives, enamel cracking. Exposed to heat
6	C4	24	Horse	Molar Crown													G, W		1	12.2	V poorly preserved & fragmented incomplete molar crown. Dental notes not possible as no dentine surface survives, enamel cracking. Exposed to heat
7	C4	24	Horse	Molar Crown													G, W		4	6	
8	C4	24	Unid	Tooth															12	1.1	Series of small-minuscule fragments of tooth enamel.
9	C4	19	Cow	Molar Crown													W		2	6	V poorly preserved & fragmented incomplete molar crown. Dental notes not possible as no dentine surface survives, enamel cracking. Exposed to heat
10	C4	19	Cow	Molar Crown													W		5	3.1	Series of small poorly preserved fragments of molar crown.
11	C4	19	Cow	Molar Crown													W		6	1.8	Series of small poorly preserved fragments of molar crown.
12	C4	19	Unid	Molar Crown													G		33	2.8	Series of small-tiny poorly preserved fragments of molar crown
13	C4	26	Rodent	Tooth Root													B G		1	0.2	Poorly preserved fragment of tooth root. Dis-coloured to black, possible exposure to

SPEC	C	S	TAXA	ANAT	SIDE	PROX	DIST	1	2	3	4	5	6	7	8	BUT	BU	G	Q	W (G)	COMMENTS
																					heat
14	C4	26	Rodent	Tooth Root													B G		1	0.1	Poorly preserved fragment of tooth root. Dis-coloured to black, possible exposure to heat
15	C4	26	Rodent	Tooth Root													B G		1	0.1	Poorly preserved fragment of tooth root. Dis-coloured to black, possible exposure to heat
16	C4	26	Rodent	Enamel													B G		11	0.1	Series of small-tiny poorly preserved fragments of enamel
17	C4	26	Unid	Unid													G		1	0.4	
18	C40	21	Unid Med Size	Long Bone													W		8	5.37	Series of partially re-constructible poorly preserved chalky white burnt bone fragments. Surface powdery and shows signs of extensive longitudinal cracking. Largest fragment Length 33mm, Width 10mm, Thickness 5mm
19	C40	21	Unid	Skull													W		8	1.4	Series of cracked poorly preserved fragments of skull. Bone surface chalky.
20	C40	21	Pig Size	MP						1							W G		6	2.12	Poorly preserved fragments of diaphysis. Bone surface shows longitudinal cracking. Chalky white in texture & colour
21	C40	21	Unid Sm so	Rib						1							W G		7	1.93	Poorly preserved calcined fragments of rib corpus. Trabecular bone exposed on all fragments. Bone surface shows cracking.
22	C40	21	Shp/Gt Size	Rib						1							W		4	1.41	Partially re-constructible poorly preserved fragments of corpus. Trabecular bone exposed on all. Bone surface shows cracking due to heat.
23	C40	21	Unid	Unid													G W		31	12.99	Series of small-tiny un-diagnostic fragments of bone & cortical bone. Calcined & poorly preserved. Highly fragmented
24	C40	21	Unid Med Size	Rib													G W		15	3.18	Series of moderately preserved calcined fragments of corpus. Trabecular bone exposed. Largest fragment Length 16mm, Width 4mm, Thickness 3mm
25	C40	21	Unid	Unid													G W		17	6.1	Series of poorly preserved & highly fragmented calcined bone. Bone surface shows cracking from heat.
26	C4	8	Unid Sm so	Skull													W		18	2.49	Series of moderately preserved but calcined fragments of skull. Bone surface shows cracking due to heat. Surface chalky white & powdery

SPEC	C	S	TAXA	ANAT	SIDE	PROX	DIST	1	2	3	4	5	6	7	8	BUT	BU	G	Q	W (G)	COMMENTS
27	C4	8	Rodent Size	Rib						1							W		4	0.28	Partially re-constructible moderately preserved small fragments of rib corpus. Degree of trabecular bone exposed.
28	C4	8	DF Size	Rib							1						W		1	0.25	Calcined, glossy surfaced corpus fragment.
29	C4	8	Unid Med Size	Rib												Cut=1	G W		5	1.42	Series of poorly preserved, fragmented & calcined rib corpus. Bone surface of all shows cracking
30	C4	8	Unid	Unid													G W		24	8.98	Series of small-tiny poorly preserved fragments of calcined bone & cortical bone. Un-diagnostic as too small.
31	C4	8	Unid Med Size	Long Bone													G W		4	1.99	Series of moderately preserved calcined fragments of diaphysis. Bone surface shows cracking.
32	C39	20	Unid Sm Size	Skull													G W		10	3.54	Series of calcined (chalky texture) fragments of skull bone. Surface shows evidence of cracking & splitting
33	C39	20	Pig Size	Rib							1						W G		3	2.54	Calcined, mineralised corpus fragments. Bone surface shows cracking & chalky white colour.
34	C39	20	Unid Med Size	Long Bone													W G		2	3.68	Moderately preserved calcined fragments of diaphysis, degree of cortical bone exposed. Largest fragment Length 27mm, Width 8mm, Thickness 6mm
35	C39	20	Unid Med Size	Long Bone													W G		2	2.66	Poorly preserved calcined fragments of diaphysis. Degree of cortical bone exposed. Bone surface shows evidence of cracking due to heat
36	C39	20	Unid Small Size	Rib							1						W G		4	1.96	Moderately preserved corpus fragments, bone surface shows evidence of transverse cracking. Largest fragment Length 34mm, Width 6mm, Thickness 4mm
37	C39	20	Pig Size	Rib						1							W		7	1.86	Series of moderately preserved, calcined fragments of rib corpus. Degree of trabecular bone exposed. Bone surface of each fragment shows evidence of cracking
38	C39	20	Unid Small Size	Skull													W		5	0.71	Moderately preserved calcined fragments of skull. Bone surface shows evidence of cracking.
39	C39	20	Shp/Gt Size	Rib						1	1						W		12	3.29	Moderately preserved calcined fragments of rib corpus. Bone surface shows evidence of cracking. Colour chalky white. Mineralised
40	C39	20	Unid	Unid													G W		26	1.62	Series of calcined fragments of cortical &

SPEC	C	S	TAXA	ANAT	SIDE	PROX	DIST	1	2	3	4	5	6	7	8	BUT	BU	G	Q	W (G)	COMMENTS
																					trabecular bone
41	C39	20	Unid Small Size	Skull													G W		20	3.37	Series of calcined moderately preserved fragments of bone. Surface is cracked. Bone colour chalky white
42	C39	20	Unid	Unid													W		42	18.99	Series of small-tiny calcined fragments of bone & cortical bone. Too small & un-diagnostic
43	C39	20	Unid Med Size	Long Bone													W		3	1.92	Series of moderately preserved fragments of diaphysis. Bone surface shows cracking. Chalky white
44	C39	20	Unid Med Size	Rib													W G		28	3.67	Series of poorly preserved fragments of rib corpus. Bone surface of all fragments show surface cracking & exposure of trabecular bone.
45	C39	20	Unid	Unid													W G		26	6.79	Series of small-tiny calcined fragments of bone & cortical bone. Too small & un-diagnostic
46	C39	20	Unid	Rib													W G		13	6.26	Series of calcined moderately preserved fragments of rib corpus. Trabecular bone exposed & all fragments show cracking

Key:

C= Context
S=Sample
Anat=Anatomical Element
Prox=Proximal
Dist=Distal

But=Butchery
Bu=Burnt
G=Gnaw
Q=Quantity of Pieces
G=Grey

N=No
Unid=Unidentifiable
Taxa=Taxon
B=Black

W=White
R=Rodent
Cn=Carnivore

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GLOSSARY OF TERMS:

BOS: Latin term for Cow
SUS: Latin term for Pig
CERVUS: Latin term for Deer
EQUUS: Latin term for Horse
OVIS: Latin term for Sheep
CAPRINAE: Latin term for Sheep/Goat
CANIS: Latin term for Dog
LEPUS: Latin term for Hare
AVES: Latin term for Bird
TAPHONOMY: The study of the processes affecting an organism after death from the time of burial until collection.
TRABECULAR BONE: Osseous tissues that fill the interior cavity of bones and resemble a sponge or honeycomb.
DIAPHYSIS: Bone shaft
CORPUS COSTAE: Body of Rib Bone

Appendix 1: % MNI

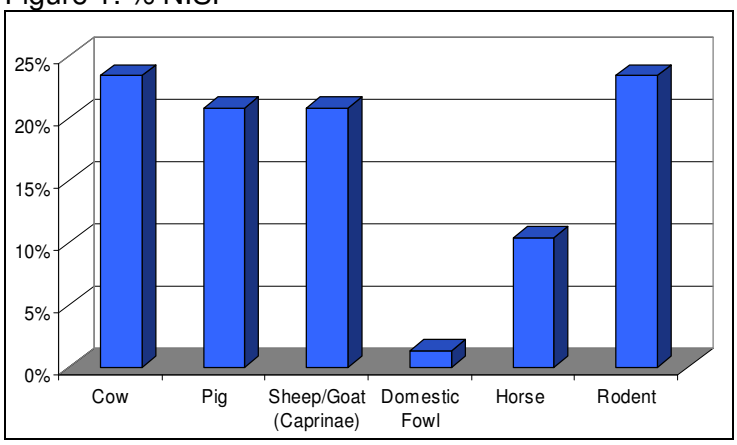
Table 1: Identifiable Fragments

SUM OF QUANTITY	
TAXA	TOTAL
Cow	18
Pig Size	16
Sheep/Goat (*Caprinae*) Size	16
Horse	8
Domestic Fowl	1
Rodent	14
Rodent Size	4
TOTAL	77

Table 2: % NISP

% NISP	
Cow	23.4%
Pig	20.8%
Sheep/Goat (*Caprinae*)	20.8%
Domestic Fowl	1.30%
Horse	10.40%
Rodent	23.4%

Figure 1: % NISP



Appendix 2: Butchery & Taphonomy

Table 3: Burning/Colour Change Cow

COUNT OF QUANTITY		ANATOMICAL ELEMENT	
TAXA	BURNING/COLOUR CHANGE	MOLAR CROWN	GRAND TOTAL
COW	White	13	13
	Grey	4	4
	Grey/White	1	1
Cow Total		18	18

Table 4: Burning/Colour Change Pig

COUNT OF QUANTITY		ANATOMICAL ELEMENT		
TAXA	BURNING/COLOUR CHANGE	RIB	METAPODIAL	GRAND TOTAL
PIG	White/Grey	3	6	9
	White	7		7
Pig Total		10	6	16

Table 5: Burning/Colour Change Sheep/Goat (*Caprinae*)

COUNT OF QUANTITY		ANATOMICAL ELEMENT	
TAXA	BURNING/COLOUR CHANGE	RIB	GRAND TOTAL
CAPRINAE	White	16	16
Caprinae Total		16	16

Table 6: Burning/Colour Change Horse

COUNT OF QUANTITY		ANATOMICAL ELEMENT	
TAXA	BURNING/COLOUR CHANGE	MOLAR CROWN	GRAND TOTAL
HORSE	Grey/White	8	8
Horse Total		8	8

Appendix 2.5 Metallurgical Waste Analysis Report – Angela Wallace

Report on Archaeometallurgical Residues
From Danesfort 1 E3541 AR080B Co. Kilkenny
N9/N10 Knocktopher to Powerstown
Road Scheme

Angela Wallace MSc, MIAI
August 2010

AR080B Danesfort 1

Introduction

This site consisted of a ringditch with a total diameter of 11.8m. The ditch was filled with a stony basal layer, a charcoal-rich middle layer and an upper layer of silting. Three cremated bone deposits and some animal teeth were found within the charcoal layer. No cremations were found in the interior of the ringditch. No conclusive evidence survived to indicate whether a bank or mound were once part of this funerary monument.

It contained cremated bone, animal bone, charred seeds and hazelnuts, charcoal and a fragment of a blue glass bead in its middle fill. Evidence is inconclusive as to whether a bank or mound accompanied the ditch. A hazelnut shell from mid-fill C4 was dated to CAL AD28–215.

Possible Metallurgical Material

Three small fragments of possible metallurgical material from C4 were submitted for examination. All three fragments are magnetic and have a combined weight of 0.90g. One larger fragment measures 10mm across and the two smaller fragments are 2.5 and 4mm across. All three fragments are dark grey in colour and irregular in shape.

Conclusions & Recommendations

It is not possible to visually assign these pieces to any metallurgical process as there are no diagnostic features. Fragments could be small naturally occurring nodules high in iron or could be by-products of the iron smithing process, the association with a blue glass bead within the same context could also indicate fragments may be linked to glass making. Further analysis is necessary to determine whether these pieces are naturally occurring or linked to a metallurgical process.

Appendix 2.6 Radiocarbon Dating Results – QUB Laboratory

The "Measured radiocarbon age" is quoted in conventional years BP (before AD 1950). The error is expressed at the one-sigma level of confidence.

The "Calibrated date range" is equivalent to the probable calendrical age of the sample material and is expressed at the two-sigma (95.4% probability) level of confidence

Calibration data set: intcal09.14c

Context	Sample No	Material	Species id/ Weight	Lab	Lab Code	Date Type	Calibrated date ranges	Measured radiocarbon age (BP)	13C/12C Ratio ‰
C4, Fill of ringditch C3	13	Charred hazelnut	*Corylus avellana* L., / 0.1g	QUB	UBA 15556	AMS (Std)	AD68–130 (1 sigma), AD28–215 (2 sigma)	1900±31	-21.8

References for calibration datasets:
PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, PG Blackwell, C Bronk Ramsey, CE Buck, GS Burr, RL Edwards, M Friedrich, PM Grootes, TP Guilderson, I Hajdas, TJ Heaton, AG Hogg, KA Hughen, KF Kaiser, B Kromer, FG McCormac, SW Manning, RW Reimer, DA Richards, JR Southon, S Talamo, CSM Turney, J van der Plicht, CE Weyhenmeyer (2009) Radiocarbon 51:1111–1150.

Comments:
* This standard deviation (error) includes a lab error multiplier.
** 1 sigma = square root of (sample std. dev.^2 + curve std. dev.^2)
** 2 sigma = 2 x square root of (sample std. dev.^2 + curve std. dev.^2)
where ^2 = quantity squared.
[ ] = calibrated range impinges on end of calibration data set
0* represents a "negative" age BP
1955* or 1960* denote influence of nuclear testing C-14
NOTE: Cal ages and ranges are rounded to the nearest year which may be too precise in many instances. Users are advised to round results to the nearest 10 yr for samples with standard deviation in the radiocarbon age greater than 50 yr.

APPENDIX 3 LIST OF RMP IN AREA

RMP No	Description
KK023-081001	Church
KK023-081002	Graveyard
KK023-081003	Grave slab
KK023-077	Ringfort (Unclassified)
KK023-076	Ringfort (Unclassified)
KK023-080	Castle Ringwork
KK023-080001	Designed Landscape (Folly)
KK023-083	Not in RMP
KK023-078	Ringfort (Unclassified)
KK023-079	Ringfort (Unclassified)

See Figure 2 for location.

APPENDIX 4 LIST OF SITE NAMES

Site Name	Site Code	E Number	Director	NGR
Baysrath 2	AR055	E3627	Fintan Walsh	251593/137855
Baysrath 3	AR056	E3628	Fintan Walsh	251672/138000
Baysrath 4	AR057	E3629	Fintan Walsh	251515/138280
Danganbeg 1	AR058	E3606	Emma Devine	251462/138754
Danganbeg 2	AR059	E3607	Emma Devine	251397/138939
Danganbeg 3	AR060	E3671	Emma Devine	251430/139245
Danganbeg 4	AR061	E3676	Emma Devine	251401/139372
Knockadrina 1	AR062	E3677	Ed Lyne	251422/139420
Tinvaun 1	AR063	E3678	Ed Lyne	251482/139625
Tinvaun 2	AR064	E3680	James Kyle	251445/139736
Tinvaun 3	AR065	E3608	James Kyle	251501/139832
Tinvaun 4	AR066	E3609	James Kyle	251508/139917
Stonecarthy West 1	AR067	E3610	James Kyle	251538/140023
Knockadrina 2	AR068	E3611	James Kyle	251647/140237
Rathduff 1	AR069	E3612	Ed Lyne	251286/142167
Rathduff Upper 1	AR070	E3613	Ed Lyne	251280/142559
Kellsgrange 1	AR071	E3575	James Kyle	250911/143732
Kellsgrange 2	AR072	E3577	James Kyle	250967/143861
Kellsgrange 3	AR073	E3576	James Kyle	250948/144003
Ennisnag 1	AR074	E3614	Richard Jennings	251416/145690
Ennisnag 2	AR075	E3615	Richard Jennings	251638/146068
Danesfort 12	AR076	E3616	Richard Jennings	251669/146186
Danesfort 13	AR077	E3617	Richard Jennings	251765/146384
Danesfort 2	AR078	E3540	Richard Jennings	251953/146745
Danesfort 4	AR079	E3539	Richard Jennings	251880/147579
Danesfort 3	AR080A	E3542	Richard Jennings	252221/146845
Danesfort 1	AR080B	E3541	Richard Jennings	252267/146707
Croan 1	AR081	E3543	Emma Devine	252280/147332
Danesfort 5	AR082	E3456	Emma Devine	252567/147767
Danesfort 6	AR083	E3538	Emma Devine	252764/147995
Danesfort 7	AR084	E3537	Emma Devine	252878/148099
Danesfort 8	AR085	E3461	Richard Jennings	253020/148246
Danesfort 9	AR086	E3458	Richard Jennings	253089/148345
Danesfort 10	AR087	E3459	Richard Jennings	253229/148414
Danesfort 11	AR088	E3460	Richard Jennings	253245/148462
Rathclogh 1	AR089	E3726	Patricia Lynch	253365/145515
Rathclogh 2	AR090	E3727	Patricia Lynch	253650/148848
Kilree 1	AR091	E3728	Patricia Lynch	254088/149310
Kilree 2	AR092	E3729	Patricia Lynch	254320/149500
Kilree 3	AR093	E3643	Patricia Lynch	254449, 149639
Kilree 4	AR094	E3730	Patricia Lynch	255330/150084
Dunbell Big 2	AR095	E3853	Yvonne Whitty	256684/151066
Holdenstown 1	AR096	E3681	Yvonne Whitty	256737/151253
Holdenstown 2	AR097/98	E3630	Yvonne Whitty	256891/151781
Holdenstown 3	AR099	E3854	Yvonne Whitty	256990/152085
Holdenstown 4	AR100	E3682	Yvonne Whitty	256828/152048
Dunbell Big 1	AR101	E3855	Yvonne Whitty	257034/152315
Rathcash 1	AR102	E3859	Tim Coughlan	258178/154199
Rathcash 2	AR103	E3860	Tim Coughlan	258294/154293
Rathcash East 1	AR104	E3892	Tim Coughlan	259419/154546
Rathcash East 2	AR105	E3893	Tim Coughlan	259555/154566
Rathcash East 3	AR106	E3861	Tim Coughlan	259821/154653
Blanchvillespark 1	AR107	E3894	Richard Jennings	260535/155212
Blanchvillespark 2	AR108	E3895	Tim Coughlan	260637/155449

Site Name	***Site Code***	***E Number***	***Director***	***NGR***
Blanchvillespark 3	AR109	E3913	Tim Coughlan	260785/155653
Blanchvillespark 4	AR110	E3914	Tim Coughlan	261442/156269
Blanchvillespark / Ballyquirk 1	AR111	E3862	Ruth Elliott	261531/156323
Ballyquirk 1	AR112	E3863	Ruth Elliott	261531/156323
Ballyquirk 2	AR113	E3864	Ruth Elliott	261811/156508
Ballyquirk 3	AR114	E3865	Ruth Elliott	261875/156559
Ballinvally 1	AR115	E3836	Emma Devine	263258/157521
Garryduff 1	AR116	E3852	Emma Devine	263933/157991
Kilmacahill 1	AR117	E3915	Tim Coughlan	264267/158369
Kilmacahill 2	AR118	E3833	Tim Coughlan	264380/158453
Jordanstown 1	AR119	E3834	James Kyle	264546/158643
Jordanstown 2	AR120	E3851	James Kyle	264893/159038
Kellymount 6	AR121	E3758	Przemaslaw Wierbicki	265130,159277
Jordanstown 3	AR122	E3916	Przemaslaw Wierbicki	265103/159227
Kellymount 1	AR123	E3756	Przemaslaw Wierbicki	265250/159397
Kellymount 2	AR124	E3757	Przemaslaw Wierbicki	265164/159463
Kellymount 3	AR125	E3856	Przemaslaw Wierbicki	265338/159597
Kellymount 4	AR126	E3857	Przemaslaw Wierbicki	265412/159803
Kellymount 5	AR127	E3858	Przemaslaw Wierbicki	265530,159977
Shankill 2	AR128	E3738	Richard Jennings	265924/160651.
Shankill 3	AR129	E3737	Richard Jennings	266052/161141
Shankill 4	AR130	E3838	Richard Jennings	266286/161526
Shankill 5	AR131	E3850	Richard Jennings	266374/161730
Shankill 6	AR132	E3840	Richard Jennings	266403/161836
Moanmore 1	AR133	E3835	Richard Jennings	266476/162016
Moanmore 2	AR134	E3843	Sinead Phelan	266756/162866
Moanmore 3	AR135	E3837	Sinead Phelan	266856/163259
Bannagagole 1	AR136	E3844	Sinead Phelan	266942/163569
Moanduff 1	AR137	E3839	Robert Lynch	267261/164397
Coneykeare 1	AR138	E3683	Sinead Phelan	267836/166209
Coolnakisha 1	AR139	E3768	Ellen O'Carroll	268175/167274
Coolnakisha 2	AR140	E3767	Ellen O'Carroll	268306/167559
Cranavonane 1	AR141	E3842	Tim Coughlan	268554/167895
Cranavonane 2	AR142	E3732	Ellen O'Carroll	268830/168154
Cranavonane 3	AR143	E3731	Ellen O'Carroll	269123/168362
Tomard Lower 1	AR144	E3733	Ellen O'Carroll	269349/168496
Paulstown 1	AR145	E3642	Ruth Elliot	265889/158499
Paulstown 2	AR146	E3632	Ruth Elliot	265664/158651
Rathgarvan or Clifden 1	AR147	E3760	Przemaslaw Wierbicki	257026/154123
Maddockstown 1	AR148	E3759	Przemaslaw Wierbicki	256886/154199
Templemartin 3	AR149	E3845	Emma Devine	255095/155200
Templemartin 4	AR150	E3841	Emma Devine	254920/155427
Templemartin 5	AR151	E3846	Emma Devine	254706/155636
Templemartin 1	AR152	E3849	Emma Devine	254504/155826
Templemartin 2	AR153	E3847	Emma Devine	254173/156236
Leggetsrath East 1	AR154	E3734	Emma Devine	253793/156484
Moanduff 2	AR155	E3735	Sinead Phelan	267470/164887
Moanduff 3	AR156	E3736	Sinead Phelan	267515/164979
Ballyquirk 4	AR157	E3848	Richard Jennings	262596/157025
Shankill 1	AR158	E3766	Przemaslaw Wierbicki	265707/160269
Rathgarvan or Clifden 2	AR159	E3921	Tim Coughlan	257095/154119
Ballynolan 1	AR160	E3755	Sinead Phelan	267714/165597
Rathduff Upper 3	UA2	E3974	Tim Coughlan	250991/143565
Rathduff Bayley	UA4	E4011	Tim Coughlan	251005/143564