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

Ministerial Direction Scheme Reference No.	A032
Registration No.	E3617
Site Name	AR077, Danesfort 13
Townland	Danesfort
County	Kilkenny
Excavation Director	Richard Jennings
NGR	271765 146384
Chainage	34512–34545

FINAL REPORT

ON BEHALF OF KILKENNY COUNTY COUNCIL

JUNE 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	E3617
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	AR077, Danesfort 13
Site Type	Bronze Age ringditch / Early Medieval metalworking area
Townland(s)	Danesfort
Parish	Danesfort
County	Kilkenny
NGR (easting)	271765
NGR (northing)	146384
Chainage	34512–34545
Height OD (m)	53.620
RMP No.	N/A
Excavation Dates	26 July–28 August 2007
Project Duration	20 March 2007–18 April 2008
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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 AR077, Danesfort 13 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 E3617 issued by the DOEHLG in consultation with the National Museum of Ireland for IAC. The fieldwork took place between the 26 July and 28 August 2007.

The excavation at Danesfort 13 identified a variety of different features from a number of different periods. Lithics from two small pits have been recovered typologically dated to the early Mesolithic. Another pit was cut by an Iron Age ringditch and this stratigraphic relationship could mean that it was contemporary with the early prehistoric pits.

One of the most notable features on the site was an early/middle Iron Age ringditch. It enclosed an area of 5.80m and no internal features were identified. There was no evidence of a surviving mound or bank. The lower fill contained hazelnuts shells which may have been deliberately deposited. The upper fill contained small fragments of cremated bone that could not be identified to species. These may represent a deliberate ritual deposit but may also be residual from a nearby disturbed feature/deposit. A small pit to the east of the ringditch represented the location of a cremation deposit, which contained a large number of calcinated and fragmented bone. Most of the fragments were un-diagnostic and not identified to species but some were identified a pig with less identified as possible human. It is likely that the cremation pit was deliberately placed in proximity to the ringditch.

In the middle Iron Age there is evidence that the site was the focus of primary metallurgical activity through the presence of a smelting furnace and associated possible bloom smithing hearth. A linear boundary ditch is thought to have been open at the time of the metal working on site as slag and metallurgical waste material was identified within its basal fills. This ditch was possibly constructed as a territorial division. A small area of metalled surface adjacent to the ditch may be a working platform and four pits located along the line of the boundary ditch all contained metallurgical waste. It is not clear whether the pits originally functioned as post-pits delineating the boundary which were subsequently used as waste pits or whether their sole function was as waste pits. Other features scattered across the site consisted of pits containing metallurgical debris that may represent further waste pits and a possible charcoal production pit. The charcoal was potentially for use in the furnace or the bloom smithing hearth.

The excavation at Danesfort 13 yielded five pottery sherds (plus 10 fragments) representing a middle Neolithic globular bowl. The pottery was in a disturbed position possibly derived from an earlier pit. The pottery appears to have been exposed to intense heat after breakage resulting in the vessel shattering further which suggests that the pottery was accidentally incorporated into the iron working process.

The lithic assemblage from the site is dominated by an early Mesolithic component represented by blade cores, flakes and blades. Three flakes and miscellaneous retouched artefacts are associated with a possible use of the site in the middle Neolithic.

A small blue glass bead was also recovered from the site. Glass beads have been found in association with cremated human remains from a number of Iron Age sites in Ireland.

Two samples were sent for AMS radiocarbon dating. A sample of charred hazelnut from ringditch fill C108 yielded a 2 sigma calibrated result of 503–384BC (UBA 10999). A sample of hazelnut from the bottom fill of furnace C51 was also radiocarbon dated. The 2 sigma calibrated result was AD7–125 (UBA 15552).

Danesfort 13 was a multi-period site with Mesolithic, and early and middle Iron Age activity. The activity was also varied consisting of isolated pits, a ringditch and associated cremation pit, metallurgical furnaces and a linear boundary ditch. The evidence from Danesfort 13, in association with that of the nearby sites of Danesfort 6 and 8, adds significantly to the pattern of Mesolithic activity in the region and the identification of Neolithic globular bowl sherds is important in terms of the regional distribution of this pottery type. The Iron Age activity on the site is also of regional significance as there was previously limited evidence for such activity within these environs. In conjunction with the other excavated sites from the scheme, particularly in the Danesfort area, it forms part of a complex archaeological landscape displaying strong continuity of settlement throughout prehistory which is complimented by the early medieval and medieval recorded monuments in the surrounding landscape.

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1 INTRODUCTION

1.1 General

This report presents the results of the archaeological excavation of Danesfort 13, AR077 (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 measured 2326m^2 and was first identified during testing carried out betweem 30 January and 3 March 2006 by Melanie McQuade (E3882) for Margaret Gowen & Co. Ltd. on behalf of the National Roads Authority. Danesfort 13 was excavated between 26 July and 28 August 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 charred plant remains samples. All calibrated radiocarbon dates in this report are quoted to two Sigma. Dating of the site also involved pottery analysis through typological study.

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 13 was located in a valley adjacent to a tributary that joins the King's River at the village of Ennisnag. The valley runs from east to west and is U-shaped with gentle sides. The site was found on the valley's southern side near the base where the terrain was quite open and flat (Plate 1). Its position at only 54m OD meant that views from the site were fairly restricted in all directions. Conversely, this meant that the site was clearly visible from high points on both sides of the valley. The location of four ringforts (KK023-076–9) on higher positions within 1km of the site indicates that this area was an important part of the early medieval landscape.

2.1 PHASE 1 Natural Drift Geology

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C2					Medium grey, sandy, gravelly clay	Subsoil

The subsoil comprised a mid grey sandy gravelly clay.

2.2 PHASE 2 Early Prehistoric Activity

This phase of activity consisted of three pits. Two of these pits contained lithics that have been identified as early Mesolithic. The other pit, which was truncated by a later ringditch, has been included on the basis of stratigraphy.. (Figures 4 and 5).

2.2.1

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C79	N/A	1.86	0.90	0.22	Oval shaped cut	Cut of pit
C80	C79	1.80	0.90	0.16	Brown silty sand	Fill of pit
C81	C79	1.06	0.90	0.12	Light yellowish brown silty sand	Top fill of pit
C104	N/A	1.20	1.16	0.34	Sub-circular in shape	Cut of pit
C105	C104	1.20	1.16	0.34	Reddish brown silty sand	Fill of pit
C106	C104	1.20	1.16	0.34	Mid greyish brown silty sand	Fill of pit
C125	N/A	0.43	0.17	0.08	Linear cut	Cut of pit
C126	C125	0.43	0.17	0.08	Mid greyish brown silty sand	Fill of pit

Finds

Context	Find Number	Material	Period	Description
C80	E3617:080:001	Flint	Early Mesolithic	Piece of debitage
C80	E3617:080:002	Flint	Early Mesolithic	Flint flake
C80	E3617:080:003	Flint	Early Mesolithic	Blade Core
C80	E3617:080:004	Flint	Early Mesolithic	Flint flake
C80	E3617:080:005	Flint	Early Mesolithic	Flint blade
C80	E3617:080:006	Flint	Early Mesolithic	Flint flake
C80	E3617:080:007	Flint	Early Mesolithic	Piece of debitage
C80	E3617:080:008	Flint	Early Mesolithic	Broken flint blade
C80	E3617:080:009	Flint	Early Mesolithic	Flint blade
C80	E3617:080:010–15	Flint	Early Mesolithic	6 pieces of flint debitage
C80	E3617:080:016	Flint	Early Mesolithic	Flint blade
C81	E3617:081:001	Flint	Early Mesolithic	Piece of debitage
C81	E3617:081:002	Flint	Early Mesolithic	Flint blade
C81	E3617:081:003	Flint	Early Mesolithic	Flint blade core
C81	E3617:081:004	Flint	Early Mesolithic	Piece of debitage
C81	E3617:081:005	Flint	Early Mesolithic	Flint flake
C81	E3617:081:006	Chert	Early Mesolithic	Chert blade
C105	E3617:105:001	Flint	Early Mesolithic	Flint debitage

Pit C79, which was found in the north-eastern part of the site, contained various flint objects including cores, blades, flakes, and debitage. It appeared that these were intentionally deposited, given that there were no adjacent features with similar archaeological evidence. This suggests ritual activity. The pit was cut through by a later pit C82, which was probably early medieval (Plate 3). In the south of the site C104, a small sub-circular pit, contained a single piece of flint debitage that has been identified as diagnostically Mesolithic in date. Given the presence of a single piece of debitage it is possible that this artefact is intrusive. A third small pit C125, located along the western extents of the site, was truncated by a later ring-ditch (C101) and as such could be related to this early phase of activity on the site on the basis of stratigraphy.

One piece of flint debitage was retrieved from C105, the fill of pit C104, and most likely dates to the early Mesolithic period (Sternke, Appendix 2.2). Eight flint lithics and eight pieces of flint debitage were retrieved from C80 (fill of C79). The lithics have been identified as three flint flakes, one flint blade core and four flint blades. Based on the morphology and technology of these artefacts and debitage, they have all been dated to the early Mesolithic (*ibid.*). Four flint lithics and two pieces of flint debitage were retrieved from C81. The lithics have been identified as one flint blade core, one flint blade, one chert blade and one flint flake. Based on the morphology and technology of these artefacts and debitage, they have all been dated to the early Mesolithic (*ibid.*).

Charcoal analysis of fill C105 (fill of pit C104) indicated a predominance of hazel (*Corylus avellana*), ash (*Fraxinus excelsior*), pomaceous fruitwood (*Maloideae* spp.), wild/bird cherry (*Prunus avium/padus* sp.) and oak (*Quercus* sp.). The samples examined suggest that throughout the different time periods, oak was the dominant species growing close to the site. Oak is an excellent fuel, and is capable of reaching the high temperatures required for cremation in Bronze Age Ireland and metal production in Iron Age/early Medieval Ireland (O'Donnell, Appendix 2.4).

A sample taken from the fill of pit C104, C105, produced evidence for plant remains. The sample contained charred hazelnut shell fragments (*Corylus avellana* L.). These are ubiquitous finds in Irish archaeobotanical assemblages (Johnston, Appendix 2.5).

2.3 PHASE 3 Early Iron Age Funerary Activity

This phase consisted of a ringditch and a cremation pit burial (Figures 4 and 5)

2.3.1 Ringditch

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C101	N/A	8.10	7.90	0.68	Circular-shaped cut	Cut of ringditch
C107	C101	8.10	0.50	0.51	Stones	Secondary fill of ringditch
C108	C101	8.10	1.87	0.45	Yellowish grey clayey sand	Basal fill of ringditch
C109	C101	8.10	1.30	0.22	Dark brown silt	Secondary fill of ringditch
C110	C101	8.10	1.17	0.07	Dark brown to black silt	Upper fill of ringditch

Finds

Context	Find Number	Material	Period	Description
C108	E3617:108:001	Flint	Middle Neolithic	Flint flake
C109	E3617:109:001	Flint	Middle/late Neolithic	Retouched tool

The ringditch was annular with a diameter of approximately 8m (Figures 4–5; Plates 1–2). Its south-east and north-west sides were slightly straighter than its north-east and south-west sides. The area it enclosed measured 5.8m in diameter and the ditch

was 2.2m wide. There were no features in its interior space, with the exception of pit C125, which the ringditch truncated (see 2.2.1). The ditch was U-shaped and contained four fills (Plate 6). Fragments of cremated bone in the upper fill may be intrusive although hazelnut shells in the basal fill C108 may be associated with deliberate deposition.

There was no evidence of a surviving mound or bank associated with the ringditch, although the basal fill had a sandy rather than a silty component and was banked up against the internal side of the ditch which could perhaps be interpreted as evidence for an internal mound/bank that slipped back into the ditch. However, the basal deposit was quite small and would have only formed a very small mound/bank.

One lithic was retrieved from basal fill C108. The lithic has been identified as a flint flake and most likely dates to the middle Neolithic period. A further lithic was retrieved from C109. The lithic has been identified as a retouched artefact, most likely a convex end scraper and most likely dates to the middle/late Neolithic period (Sternke, Appendix 2.2). As C108 was subsequently dated to the Iron Age by radiocarbon dating, and the ringditch is typologically dated to this period, the possible Neolithic artefacts must be residual, although no features associated with the Neolithic period were recorded on the site.

Charcoal analysis of fill C110 (fill of ringditch C101) indicated a predominance of hazel (*Corylus avellana*), ash (*Fraxinus excelsior*), oak (*Quercus* sp.) and willow (*Salix* sp.). The samples examined suggest that throughout the different time periods, oak was the dominant species growing close to the site (O'Donnell, Appendix 2.4).

A sample taken from the fill C108 produced evidence for plant remains. The sample contained charred hazelnut shell fragments (*Corylus avellana* L.), ubiquitous finds in Irish archaeobotanical assemblages (Johnston, Appendix 2.5). As the assemblage was large it may be indicative of the site diet (*ibid.*), or the hazelnut shells may have been deliberately deposited as they were recovered from the basal fill of ringditch C101.

Five tiny, poorly preserved calcined fragments of bone that weighed 0.17g were recovered from C110, the loosely compacted upper silt fill of the ringditch. All 5 fragments displayed evidence of exposure to a high level of heat and were of undetermined element (McCarthy, Appendix 2.6). Their recovery from the upper and final fill of the ditch and the absence of deposits of cremated bone either within the earlier fills of the ditch, or within pits internal to the ringditch, suggests that these fragments are residual from a nearby disturbed deposit rather than deliberately placed within the fill.

A small quantity of metallurgical residue was recovered from C101. The presence of this material in the vicinity is probably due to material being spread or dumped across the site over time (Wallace, Appendix 2.7).

A fragment (6.9g) of charred hazelnut was chosen for AMS dating from C108 and returned a result of 2350±21 BP. The 2 Sigma calibrated result for this was 503–384BC (QUB, Appendix 2.8) dating this feature to the early/middle Iron Age.

2.3.2 Cremation pit

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C66	N/A	0.25	0.21	0.07	Oval shaped cut	Cut of cremation pit
C78	C66	0.25	0.21	0.07	Mid brown sandy silt	Fill of cremation pit

Finds: None

This small, shallow pit was located 5.00m to the east of the ringditch. It was possibly truncated by modern agricultural activity due to its shallow depth (Plate 7).

A total of 484 moderate to very poorly preserved calcined bone fragments (18.79g) representing a possible 442 skeletal elements were recovered within C78 the fill of possible cremation pit C66. This bone represented 98.9% of the total burnt bone recovered from the site. Forty three calcined fragments of parietal skull, proximal phalanx and rib corpus recovered from the fill were identified as pig/sus, and a further 10 burnt fragments of premolar root and skull were identified as possible human. Due to poor preservation combined with fragmentation a series of 436 un-diagnostic calcined fragments were not identified to species (McCarthy, Appendix 2.7).

2.4 PHASE 4 Middle Iron Age Industrial Activity

A number of pits on the site contained slag and one has been identified as a probable smelting furnace with another a possible smithing hearth. The furnace and hearth were located at the centre of the site. One of these was dated to the middle Iron Age. Other features have been interpreted as being contemporary on the basis of type or location and consisted of waste pits and occupation debris. These features were generally to the east of boundary ditch C13, outlined in section 2.4.3, which ran northwest–southeast across the site. The only exception to this was pit C98, which was located to the south of ringditch C101 (Figure 6).

2.4.1 Smelting furnace (C49)

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C49	N/A	0.95	0.38	0.25	Irregular shaped cut	Cut of furnace
C50	C43	0.58	0.05	0.25	Reddened natural	Fill of furnace
C51	C43	0.68	0.43	0.05	Black silty sand	Bottom fill of furnace
C52	C43	0.50	0.30	0.11	Dark grey silty sand	Middle fill of furnace
C53	C43	0.68	0.34	0.19	Grey silty clay	Top layer of furnace

Finds: None

A total of 1.37kg of metallurgical residues were recovered from the fills of furnace C49. A hazelnut shell from the basal fill (C51) of this feature was dated to Cal AD7–125 (UBA 15552) and this gives a reliable date for iron-working activity at this site. The majority of the metallurgical residues from this feature consisted of relatively small drippy slags characteristic of smelting; the quantity suggests a very small-scale smelting operation. The presence of burnt clay in the upper layer may point to a collapsed clay shaft. The metallurgical residues from fills C16, C17 and C70 in ditch C13, and from pits C35 and C93 (Figure 4) may have originated from this furnace (Wallace, Appendix 2.7). A channel running off this feature to the north-east may be the remains of a flue.

2.4.2 Smithing Hearth (C73)

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C73	N/A	1.20	0.75	0.12	Oval shaped cut	Cut of smelting pit
C74	C73	1.20	0.75	0.05	Dark brown silty clay	Basal fill of kiln
C75	C73	1.08	0.69	0.08	Yellowish brown clayey silt	Upper fill of kiln
C76	C73	0.49	0.61	0.07	Yellow clayey silt	Upper fill of kiln
C77	C73	0.71	0.53	0.01	Red clay	Scorching of kiln
C88	N/A	0.51	0.20	0.07	Linear shaped cut	Cut of vent channel

Finds: None

Smithing hearth C73 was located 1.1m to the north-east of furnace C49. It was probably used as a hearth for charcoal production for use in the furnace C49. The base of the feature was scorched and the fills contained a quantity of charcoal. Substantial quantities of charcoal would have been required to carry out the smelting of the iron ore. It may also have been used as a smithing hearth for refining of iron bloom from the smelting operation (Wallace, Appendix 2.7).

2.4.3 Boundary Ditch

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C13	N/A	44.0	1.65	0.55	Linear cut	Cut of linear ditch
C16	C13	44.0	1.65	1.00	Light brown grey silty clay	Fill of linear ditch
C17	C13	44.0	1.65	0.35	Light grey brown silt	Fill of linear ditch
C69	C13	2.50	0.62	0.04	Greyish yellow clayey sand	Fill of linear ditch
C70	C13	2.50	0.64	0.20	Light brown grey silty clay	Fill of linear ditch
C102	N/A	13.5	0.41	0.30	Linear cut	Cut of linear feature
C103	C102	13.2	0.41	0.23	Mid brown silty clay	Fill of linear feature
C123	N/A	3.50	0.53	0.30	Linear cut	Cut of linear feature
C124	C102	3.50	0.53	0.30	Black/ dark brown silty soil	Fill of linear feature

Finds

Context	Find Number	Material	Period	Description
C16	E3617:016:001	Copper Alloy		Copper Alloy waste
C16	E3617:016:002	Chert	Later Mesolithic	Chert blade
C17	E3617:017:001	Flint	Middle Neolithic	Flint flake
C103	E3617:103:001	Flint	Middle Neolithic	Flint flake

Boundary ditch C13 crossed the site from northwest–southeast (Figures 4–6). The alignment of the ditch suggested that it might have been part of a field boundary that extended from ploughed-out ringfort KK023-079, which was located 0.35km to the south-east, down towards the Ennisnag River tributary. A total of 1200g of metallurgical waste was found throughout fill C16 as well as 179.5g from C17 and 314.7g from C70. This is believed to be related to the metal working features outlined in section 2.4.1 and 2.4.2. Ditch C13 appeared to truncate an earlier silted-up channel of which two segments, C102 and C123, survived (Figures 4–5; Plate 8). A lack of metallurgical waste in these latter segments suggests that this earlier channel may have silted up prior to onset of metalworking on the site.

The ditch was probably constructed as a more permanent territorial division to the one provided by the channel. The effort gone into its construction reflected an intensification of activity on the site and possibly a change in land use of the area. Given the presence of metallurgical waste in its basal fills adjacent to the metalworking area (C69 and C70) it is probable that the metalworking activity occurred soon after the ditch was in place. The waste included pieces of iron slag, charcoal and fired clay. It is clear however that the ditch was open contemporary with the furnace and smithing hearth activity.

One lithic was retrieved from ditch fill C16. The lithic has been identified as a chert blade and dates to the later Mesolithic period. A further lithic was retrieved from ditch fill C17. The lithic has been identified as a flint flake and most likely dates to the middle Neolithic period. One lithic was retrieved from C103. The lithic has been identified as a flint flake and most likely dates to the middle Neolithic period (Sternke, Appendix 2.2).

A small piece of copper alloy waste was recovered from fill C16, a fill of ditch C13,. It is roughly oval in shape and narrows at one end (Scully, Appendix 2.3).

Metallurgical residues were recovered from a number of features. All of these features were located to the east of ditch C13 except form pit C98 which was located to the south of ringditch C101 (Figure 4). The greatest quantity of residues from the site (1.52kg) was linked with the fills C70 and C16 of the linear north-west/south-east oriented ditch C13, and a small quantity of metallurgical residue was also recovered from linear ditch fill C17. Those recovered from the basal fill C70 were small amorphous non-diagnostic fragments, 20-65mm across and over 15 small-medium irregular shaped lumps, including some blocky pieces measuring 30-110mm were recovered from fill C16. It would seem residues recovered within ditch C13 may have originated in nearby furnace C49 or associated pit C73, both of which show evidence for high temperature activity having taken place. The presence of this material in the vicinity is probably due to material being spread or dumped across the site over time (Wallace, Appendix 2.7).

2.4.4 Metalled surface

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C92	N/A	11.2	1.70	0.06	Grey soil with stones	Deposit of stones beside ditch
C46	N/A	11.2	1.70	0.3	Light grey brown silty clay	Occupation deposit

Finds: None

A deposit of stones set into the natural subsoil was identified at one location adjacent to the north-east side of the ditch and this has been interpreted as a deliberately laid surface. The stones overlay earlier gully C102. They was on the opposite side of the ditch to the furnace and smithing hearth so is likely not to be directly associated with this activity. Its location adjacent the boundary ditch suggests it is contemporary. The stones, which were generally sub-angular limestone pieces, were sealed with a deposit of silty clay which may represent an occupation deposit that built up during the use of the surface rather than a deliberately dumped layer.

A small quantity of metallurgical residue was recovered from C46, the presence of this material in the vicinity is probably due to material being spread or dumped across the site over time (Wallace, Appendix 2.7).

2.4.5 Pits containing metallurgical waste

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C14	N/A	0.61	0.53	0.10	Oval shaped cut	Cut of possible pit
C15	C14	0.61	0.53	0.10	Mid brown sandy silt	Fill of possible pit
C35	N/A	0.90	0.70	0.27	Oval shaped cut	Cut of pit
C36	C35	0.80	0.70	0.05	Dark blackish brown sandy clay	Bottom fill of pit
C37	C35	0.90	0.77	0.23	Dark blackish brown clayey silt	Fill of pit
C38	C35	0.50	0.45	0.19	Mid brownish grey clayey sand	Upper fill of pit
C86	N/A	0.86	0.63	0.32	Irregular oval shaped cut	Cut of pit
C87	C86	0.87	0.51	0.13	Light brown silty sand	Fill of pit
C91	C86	0.87	0.49	0.27	Greyish brown sandy silt	Fill of pit
C93	N/A	0.93	0.59	0.30	Oval shaped cut	Cut of pit
C94	C93	0.91	0.51	0.29	Brownish yellow silty clay	Fill of pit
C95	C93	0.92	0.45	0.28	Dark brown sandy clay	Fill of pit

Finds: None

Four pits were identified along the north-east side of the boundary ditch C13, laid over the fills of earlier feature C102. All of these pits contained residues from

metallurgical waste. It is unclear whether the pits were deliberately dug as waste pits or whether they originally functioned as post-pits, possibly delineating the boundary, which were subsequently filled with dumped waste material.

Charcoal analysis of fill C38 (fill of pit C35) indicated a predominance of hazel (*Corylus avellana*) and oak (*Quercus* sp.). The samples examined suggest that throughout the different time periods, oak was the dominant species growing close to the site (O'Donnell, Appendix 2.4).

Metallurgical residues weighing 0.75kg were recovered from pit C35 and they consisted of non-diagnostic amorphous lumps and nodules (Wallace, Appendix 2.7). Two samples from upper fill C38 were analysed and consisted of very small irregular nodules of slag, some spherical pieces, measuring 3–30mm (*ibid*.). Amorphous lumps, including four pieces ranging from 50–70mm in diameter and 7 small fragments measuring 15–30mm across were contained within the sample analysed from fill C37. Metallurgical residues weighing 1.20kg were also recovered from pit C93 and they consisted mainly of non-diagnostic amorphous lumps and nodules (Wallace, Appendix 2.7). One possible fragment of a smithing hearth cake was identified which indicates some smithing activity (*ibid*.). There is no evidence for any *in situ* scorched soil, charcoal deposits or baked clay and it would seem residues recovered within C35 and C93 may have originated in nearby furnace C49 or associated pit C73, both of which show evidence for high temperature activity having taken place (*ibid*.).

A small quantity of metallurgical residue was recovered from pit C14, the presence of this material in the vicinity is probably due to material being spread or dumped across the site over time (Wallace, Appendix 2.7).

2.4.6 Features Possibly Contemporary with Metalworking Area

There was a scatter of other features on the site which may or may not have been associated with the metalworking area (Figure 4). The presence of the occasional piece of iron slag in some of them makes it probable that they were at least contemporary features. The remainder of the features, which yielded no iron slag or finds, could conceivably belong to the prehistoric rather than the Iron Age or early medieval period.

2.4.6.1 Irregular Kiln C24

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C24	N/A	2.90	1.30	0.64	Keyhole shaped cut	Cut of irregular pit
C25	C24	2.85	1.30	0.31	Brown silty sand	Top fill of irregular pit
C26	C24	2.43	1.26	0.17	Light brown sandy silt	Middle fill of irregular pit
C27	C24	0.11	0.23	0.04	Dark brown silty soil	Charcoal lens in irregular pit
C44	C24	2.20	1.24	0.24	Light brown sandy clay	Fill of irregular pit
C45	C24	0.32	0.27	0.59	Orange brown soil	Fill of irregular pit

Finds

Context	Find Number	Material	Period	Description
C25	E3617:025:001	Chert	Prehistoric	Natural chunk
C44	E3617:044:1	Glass	Iron Age	Blueglass bead

This irregular-shaped pit (C24; Figure 4) probably belonged to the Iron Age, owing to the discovery of a glass bead dating from *c.* 200BC–AD200 (Eoin Grogan, pers. comm.) and the presence of iron slag in three of its fills. The pit was only 5m north-west of the metalworking area in a fairly isolated position. Its purpose was somewhat difficult to ascertain. Its shape resembled that of a kiln but there was no evidence

from it to suggest that it ever functioned as one. The two primary fills resembled the natural boulder clay and were perhaps deliberately redeposited. The upper three fills could have silted-in naturally. There was minimal charcoal and no indication of *in situ* burning.

One natural chunk of chert was recovered from C25 (Sternke, Appendix 2.2).

A tiny blue glass bead was recovered from fill C44 of pit C24. It is annular with a straight perforation. The pit in which the bead was found may be contemporary with the ringditch and cremation burial pit also excavated on site. Glass beads have been found in association with cremated human remains from a number of Iron Age sites in Ireland (Scully, Appendix 2.3).

A small quantity of metallurgical residues were recovered from kiln C24, the presence of this material in the vicinity is probably due to material being spread or dumped across the site over time (Wallace, Appendix 2.7).

2.4.6.2 Possible Charcoal Production Pit C117

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C117	N/A	2.70	2.10	0.21	Irregular shaped cut	Cut of hearth
C118	C117	0.90	0.74	0.03	Red clay	Fill of hearth
C119	C117	0.92	0.80	0.06	Black silty clay	Fill of hearth
C120	C117	2.45	2.10	0.17	Dark brown silty clay	Deposit

Finds: None

The remains of a possible charcoal production pit (C117) were found 17m from the metalworking area in the northernmost part of the site (Figure 4; Plate 13). The pit was semi-bowl shaped but open on its northern side. The sides and base of the bowl were scorched red and its silty clay basal fill (C118) contained charcoal pieces and lumps of oxidised clay. The middle layer of the pit, C119, was rich in charcoal and contained some charred seeds while its upper layer, which also filled the northern area of the pit, appeared to have silted in naturally after the pit had gone out of use. Given its distance from the metalworking area and the lack of any finds or slag it is difficult to confirm that it was a contemporary feature. However, it was possibly a charcoal-producing pit or a roasting pit.

Charcoal analysis of fill C119 (fill of pit C117) indicated a predominance of hazel (*Corylus avellana*) and oak (*Quercus* sp.) (O'Donnell, Appendix 2.4).

A sample taken from the fill of hearth C117, C119 produced evidence for plant remains. The sample contained a small amount of indeterminate cereal grains (Johnston, Appendix 2.5).

2.4.6.3 Pits and posthole with iron slag

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C33	N/A	0.50	0.34	0.37	Oval shaped cut	Cut of posthole
C34	C33	0.50	0.34	0.37	Medium brown silty sand	Fill of posthole
C82	N/A	1.10	1.00	0.48	Oval shaped cut	Cut of pit
C83	C82	1.10	0.72	0.19	Brown silty sand	Fill of pit
C84	C82	0.90	0.30	0.28	Brownish grey silty sand	Fill of pit
C85	C82	1.10	0.87	0.35	Light brown sandy silt	Fill of pit
C98	N/A	1.06	0.80	0.35	Irregular oval shaped cut	Cut of pit
C99	C98	0.45	0.62	0.28	Grey silty clay	Fill of pit
C100	C98	0.45	0.74	0.15	Brownish grey silty clay	Fill of pit

Finds

Context	Find Number	Material	Period	Description
C85	E3617:085:1	Pottery	Middle Neolithic	Rim sherd of globular bowl
C85	E3617:085:2–3	Pottery	Middle Neolithic	Body sherds of a globular bowl
C85	E3617:085:4–7	Pottery	Middle Neolithic	Pottery fragments
C85	E3617:085:8	Pottery	Middle Neolithic	Body sherd of a globular bowl
C85	E3617:085:9–11	Pottery	Middle Neolithic	Pottery fragments
C85	E3617:085:12	Pottery	Middle Neolithic	Rim sherd of a globular bowl

Two small pits and a posthole that contained evidence for metallurgical residues within their fills were identified outside the main area of industrial activity. It is possible that they are directly related or that the metallurgical material is intrusive in their fills.

Posthole C33 was located 18m north-east of the metalled surface C92 (Figure 4). The feature was possibly contemporary with the metalworking area as it contained charcoal, burnt clay and slag within its fill. This material was probably occupational debris which ended up in the posthole after its post was removed from the ground. It resembled the debris overlaying the metalled surface. This was the only structural feature in this area and its purpose is unclear.

Prehistoric pit C79 was truncated by pit C82. The latter pit was probably contemporary with the Iron Age activity to its south-west, as one of its secondary fills, C84, contained a good quantity of iron slag. Its upper fill, C85, contained a few very small sherds of middle Neolithic pottery. The most plausible explanation for their presence is that they washed into the pit as it naturally silted up.

Pit C98 was found 20m south-west of the pit furnace C49 (Figure 4). It would probably have been classified as a prehistoric feature were it not for the fact that it contained iron slag and, in contrast to the fills of the nearby prehistoric pits, its matrix was a silty clay rather than a silty sand. As pit C98 was found on the western edge of the excavation it is possible that it was part of another activity area that existed beyond the excavation area in the direction of the river tributary.

Five sherds and ten fragments of prehistoric pottery were recovered from fill C85 of pit C82. The fabric is compact and well-fired and the external surface was finished with a fine slurry; the pottery appears to have been exposed to further intense heat after breakage resulting in the vessel shattering along the joint lines of the coil construction. This suggests that the pottery was accidentally incorporated into the iron working process. The pottery comes from a globular bowl with a pointed rim and the limited dating evidence suggests that these vessels date to the middle Neolithic period (Grogan and Roche, Appendix 2.1).

Charcoal analysis of fill C99 (fill of pit C98) indicated a predominance of hazel (*Corylus avellana*), ash (*Fraxinus excelsior*), pomaceous fruitwood (*Maloideae* spp.) and oak (*Quercus* sp.) (O'Donnell, Appendix 2.4).

A sample taken from the fill of posthole C33, C34 produced evidence for plant remains. The sample contained charred hazelnut shell fragments (*Corylus avellana* L.). These are ubiquitous finds in Irish archaeobotanical assemblages (Johnston, Appendix 2.5).

A small quantity of metallurgical residue was recovered from posthole C33 and pit C82, the presence of this material in the vicinity is probably due to material being spread or dumped across the site over time (Wallace, Appendix 2.7).

2.5 PHASE 5 Undated Features

2.5.1 Pits/postholes of uncertain phase

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C3	N/A	0.44	0.29	0.25	Oval shaped cut	Cut of posthole/pit
C4	C3	0.44	0.29	0.25	Orange brown silty sand	Fill of posthole/pit
C5	N/A	0.40	0.26	0.39	Oval, gradual sloping sides, tapered rounded point	Cut of posthole
C6	C5	0.4	0.26	0.39	Loose dark grey brown sand silt	Fill of posthole
C9	N/A	0.82	0.36	0.12	Oval shaped cut	Cut of pit
C10	C9	0.82	0.36	0.12	Brown silty clay	Fill of pit
C18	N/A	0.54	0.30	0.16	Oval shaped cut	Cut of posthole/pit
C19	C18	0.54	0.30	0.11	Brownish red silty sand	Fill of posthole/pit
C20	N/A	0.37	0.34	0.26	Circular shaped cut	Cut of posthole
C21	C20	0.37	0.20	0.18	Brown silty clay	Fill of posthole
C22	C20	034	0.32	0.06	Dark brown silty clay	Top fill of posthole
C28	N/A	2.35	1.10	0.50	Irregular oval shaped cut	Cut of pit
C29	C28	0.76	0.35	0.15	Light brown yellow silty clay	Fill of pit
C30	C28	2.00	1.10	0.50	Dark brown silty clay	Fill of pit
C31	N/A	0.58	0.35	0.13	Oval shaped cut	Cut of posthole/pit
C32	C31	0.58	0.35	0.13	Brown silty sand	Fill of posthole/pit
C40	N/A	1.88	1.00	0.39	Oval shaped cut	Cut of pit
C41	C40	0.98	0.48	0.11	Dark brown silty clay	Bottom fill of pit
C42	C40	1.88	1.00	0.30	Reddish brown silty clay	Fill of pit
C43	C40	1.05	0.99	0.18	Light brown yellow sandy silt	Upper fill of pit
C47	N/A	0.40	0.38	0.22	Circular shaped cut	Cut of posthole
C48	C47	0.40	0.38	0.22	Reddish brown silty clay	Fill of posthole
C54	N/A	0.44	0.42	0.14	Oval shaped cut	Cut of pit/posthole
C55	C54	0.44	0.42	0.14	Light brown grey silty sand	Fill of pit/posthole
C56	N/A	0.51	0.29	0.15	Oval shaped cut	Cut of pit
C57	C56	0.51	0.29	0.15	Medium brown silty clay	Fill of pit
C58	N/A	0.50	0.40	0.07	Oval shaped cut	Cut of pit
C59	C58	0.50	0.40	0.04	Yellowish brown sandy silt	Bottom fill of poss. pit
C60	C58	0.30	0.40	0.25	Yellowish brown silty clay	Top fill of poss. pit
C61	N/A	0.82	0.30	0.30	Oval shaped cut	Cut of pit
C62	C61	0.82	0.30	0.30	Light brown silty clay	Fill of pit
C63	N/A	0.45	0.22	0.21	Oval shaped cut	Cut of pit
C64	C63	0.45	0.22	0.21	Brown silty clay	Fill of pit
C65	C61	1.10	0.26	0.11	Greyish brown sandy clay	Deposit -fill of pit
C67	C68	0.50	0.43	0.15	Greyish brown silty sand	Fill of pit
C68	N/A	0.50	0.43	0.15	Oval shaped cut	Cut of pit
C71	N/A	0.83	0.64	0.25	Irregular shaped cut	Cut of pit
C72	C71	0.83	0.64	0.25	Dark greyish brown silty clay	Fill of pit
C96	N/A	1.14	1.00	0.20	Oval shaped cut	Cut of pit
C97	C96	1.14	1.00	0.20	Greyish brown silty sand	Fill of pit

Finds: None

It was not possible to determine to which period the 17 pits/postholes widely dispersed across the site belonged (Figure 4). Posthole/pits C3, C18 and C31 formed a rough line running northeast–southwest to the north of ditch C13 at the east of the site, however they were very widely spaced and did not represent a structure. However, the likelihood is that they were contemporary with the metalworking activity, given that such a scatter of anonymous pits was more probable in this context than in

a funerary landscape. Also, the majority of them were filled with the same silty or sandy clay deposits that filled the majority of the features of the metalworking area, whereas the Bronze Age pits contained silty sands.

2.5.2 Deposits of uncertain phase

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C23	N/A	0.58	0.44	0.04	Brown sandy silt	Shallow deposit
C39	N/A	0.40	0.38	0.07	Light greyish brown silty sand	Deposit

Finds: None

Two small shallow deposits of uncertain phase were found on the excavation. It is thought that they are of a similar antiquity to the metalworking due to their proximity. Deposit C39 is located to the north-east of metalled surface C92 and to the west of C28. Deposit C23 is located south of linear C13 and north of pits C40 and C47.

2.6 PHASE 6 Topsoil and Plough Soil

2.6.1 Furrows

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C7	N/A	2.73	0.40	0.12	Linear cut	Cut of linear feature
C8	C7	2.73	0.40	0.12	Yellowish brown sandy silt	Fill of linear feature
C11	N/A	2.32	0.32	0.13	Linear cut	Plough furrow
C12	C11	2.32	0.32	0.13	Yellowish brown sandy silt	Fill of plough furrow

Finds: None

These two furrows ran parallel in the eastern extent of the site.

2.6.2 Topsoil

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C1	N/A				Medium grey sandy, gravelly clay	Topsoil

Finds

Context	Find Number	Material	Period	Description
C1	E3617:001:001	Flint	Early Mesolithic	Piece of flint debitage
C1	E3617:001:002	Flint	Early Mesolithic	Blade

The topsoil comprised a sandy, gravelly clay from which two prehistoric flint artefacts were derived.

One lithic and one piece of flint debitage were retrieved from topsoil C1. The lithic has been identified as a patinated flint blade. Based on the morphology and technology these artefacts both have been dated to the early Mesolithic (Sternke, Appendix 2.2).

3 SYNTHESIS

The synthesis presents the combined results of all of the archaeological analysis carried out at Danesfort 13. 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 140 kilometres 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 (193 kilometres) 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 Banagagole. 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. Damesfort 13 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 13 was located in a valley adjacent to a tributary that joins the King's River at the village of Ennisnag. The valley runs from west to east and is U-shaped with gentle sides. The site was found on the valley's southern side near the base where the terrain was quite open and flat (Plate 1). Its position at only 54m OD meant that views from the site were fairly restricted in all directions. Conversely, this meant that the site was clearly visible from high points on both sides of the valley. The location of four ringforts (KK023-076–9) on such high positions within 1km of the site indicates that this area was an important part of the early medieval landscape.

The site was also well-situated within an archaeologically rich prehistoric landscape (Ch. 33740-37100, Ennisnag, Danesfort and Croan townlands). Evidence of funerary and domestic activity was discovered 0.2km to the south-west at Danesfort 12, AR076, where two ringditches, a pit circle and three cremation pits were found in low-lying land beside the tributary. Another ringditch was found 0.6km to the east at Danesfort 1, AR080b, while Graves (1860–1) reported the discovery in 1838 of an intact Bronze Age urn in a sand pit next to a post-medieval turret (KK023-080) which is visible 0.35km to the east (Plate 2). A burnt mound was located 0.4km to the west further up the valley. Two prehistoric shelters on higher ground were recorded 0.8km to the south-west and 1.1km to the north-east (Ennisnag 1 and Croan 1 respectively). Bronze Age sites were also excavated 1.4–2.2km to the north and north-east at Danesfort 5–7 including a settlement and cremation pits with late Bronze Age pottery. The next closest recorded Bronze Age activity was recorded in a shallow basin at Danesfort 11 *c.* 2.7km to the north-west.

3.2 The Archaeological Landscape

As part of the general research relating to sites along the scheme and the specific research relating to Danesfort 13, 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 13 has been identified as being Mesolithic, Neolithic, Bronze Age and Iron Age in date.

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

Evidence of hunter-gatherers in the Kilkenny Carlow region is limited. The most abundant evidence of their presence comes from flint scatters discovered primarily along river basins in both counties. The Ballylough Project centred in the Waterford Harbour region and the lower reaches of the Barrow River has identified large numbers of later Mesolithic and Neolithic settlements in the estuarine area, consisting almost entirely of lithic scatters (Zvelebil et al 1996; Gibbons 1990, 2). It is quite possible that hunter-gatherer groups operating from base camps in the Waterford Harbour area or from the central midlands would have exploited the rich faunal and fish resources which Kilkenny's major rivers undoubtedly had (Gibbons 1990, 2). Since the completion of the Ballylough Project, further research has been carried out and the mid reaches of the River Barrow have also been investigated. The research has highlighted a lithic collection dominated by non-flint artefacts indicating a widespread use of local, non-flint materials in the late Mesolithic and Neolithic in the region; the presence of imported flint suggests that the valley also served as a corridor for communications and exchange (Zvelebil *et al.*1996, 13). Eight of the lithic scatters were assigned to the Mesolithic period, by virtue of producing characteristic retouched flake or blade artefacts (Ramsden 1991, 20). Since these discoveries, archaeological excavations in both counties Kilkenny and Carlow have further

contributed to our knowledge of Mesolithic settlement in the region. In 2002 river gravels recovered from the River Nore in Co. Kilkenny presented a small quantity of Mesolithic flint (Doyle 2004). Additionally, the construction of the N25 Waterford Bypass led to excavations in south Kilkenny that revealed ephemeral traces of lakeside huts dating to the Mesolithic period, as well as the discovery of associated flint artefacts including two Bann Flakes (Wilkins 2007). These discoveries are extremely significant as they demonstrate the first domestic structural evidence of the Mesolithic population in Co. Kilkenny. A late Mesolithic Bann Flake was also recovered close to burnt mound activity excavated at site 17, Rathpatrick, in Co. Kilkenny, also part of the N25 Waterford Bypass (Wren 2007). Further to these discoveries eight of the sites excavated by Headland Archaeology, to the east of Carlow town as part of the Carlow to Kilcullen portion of the N9/N10 Road Scheme, have produced considerable stone tool assemblages also dating to the late Mesolithic period (Dunne and Moloney 2008).

The excavations along Phase 4 of the N9/N10 Kilcullen to Waterford Scheme: Knocktopher to Powerstown produced very little evidence of Mesolithic occupation. Early Mesolithic finds were recovered from five sites along the scheme, namely at Knockadrina 2, Danesfort 6, Danesfort 8, Danesfort 13 and Danganbeg 1 and late Mesolithic finds were retrieved from two sites, Danesfort 13 and Kilree 4. All of the sites that yielded early Mesolithic finds are located in the south of the route and they consisted mostly of blades that were recovered from secondary contexts on predominantly Bronze Age and early medieval sites, thus representing a residual component. A radiocarbon date also indicates early Mesolithic activity at Holdenstown 2; this came from a single pit/posthole (6199–6005BC; UBA 13110). The main focus of activity on this site was an early medieval cemetery but localised Bronze Age and Iron Age activity was also excavated. No diagnostic artefacts dating to the early Mesolithic period were recovered from Holdenstown 2 however, so the significance of the radiocarbon date is unclear. The material recovered from Danesfort 13 included two blade cores, blades, flakes and debitage. Excavators also recovered a very large late Mesolithic chert blade. Two late Mesolithic butt-trimmed ‘Bann’ flakes were also recovered during the excavation of Kilree 4, which was located on the edge of the Nore floodplain. These artefacts are not from a secure context but the riverine location, possibly at a natural crossing point on the river, is typical of late Mesolithic settlement patterns. Danesfort and Kilree are very significant additions to the pattern of Mesolithic activity in the region. The proximity of the two sites, two kilometres apart, suggests that this area may have been extensively exploited during this period. Also of note in the locale is a midden (KK023-041) recorded at Kilmog or Racecourse, situated two kilometres west of Kilree and two and a half kilometres north-west of Danesfort, further attesting the probability of a Mesolithic community in the region.

3.2.2 The General Neolithic Landscape of the Scheme

The Neolithic period in Ireland is generally understood to have occurred between 4000–2500BC. Archaeological evidence directly associated with settlement during this period had - prior to the upsurge in development-led excavations - been rather sparse in Kilkenny and Carlow as the soils in these areas may have been too heavy for Neolithic farming technology (Grogan 2004). However, recent excavations on the Waterford to Knocktopher portion of the N9/N10 Kilcullen to Waterford Road Scheme in south Kilkenny, as well as the rectangular houses discovered on the Kilcullen to Powerstown portion of the same road scheme in Co. Carlow, have added further insight into the Neolithic settlement of the region. Prior to the N9/N10 excavations archaeological activity in the Kilkenny/Carlow region was predominantly represented by a limited number of burials or tombs, most of which are Neolithic in date, such as the middle Neolithic megalithic tombs at the eponymous site of Linkardstown and at

Baunogenasraid, Co. Carlow and Jerpoint West, Co. Kilkenny (Raftery, 1944; Raftery, 1972; 1974; Ryan 1974;).

The Central Neolithic Landscape

In contrast there is a relative absence of Neolithic monument types in the flatter fertile plains of central Kilkenny. Here the soils consist of grey brown podzols interwoven with smaller areas of gley which would have been less amenable to early farmers. A possible late Neolithic embanked enclosure (or henge) is located in Carran (Gibbons 1990, 6), to the east of the present region, and further east close to the Carlow border there is an unclassified megalithic tomb in Barrowmount (KK021-029). A similar enclosure occurred in Annamult (Gibbons 1990, 6; Prendergast 1954) to the south. Henges are one indication of increased ceremonial activity from the late Neolithic period onwards (Gibbons 1990) and further evidence of the late Neolithic is apparent to the north-east, beyond this region in Rathbeagh, where an enclosure is located on the banks of the Nore (Condit and Simpson 1998, 50–51).

The N9/N10 excavations within this central landscape revealed direct evidence for settlement although this is represented mainly by artefacts, although one possible temporary shelter was recorded at Danesfort 12, while a second possible structure was identified at Danesfort 9. At Danesfort 12, six postholes and two stakeholes formed a semi-circular shape, arced around a central posthole, which perhaps supported an internal post. The Danesfort 9 structure comprised a curvilinear slot-trench in which four depressions were noted that may have served as footings for wooden posts and three possible postholes; it has been dated to the late Neolithic period. Neolithic domestic settlement activity was also noted at Holdenstown 2, in the form of a series of isolated pits, postholes, hearths and a circular series of pits which contained flint and a broken polished stone axe. One of the postholes excavated has returned a date of 3791–3656BC (UBA 13112).The multi-period site of Danesfort 5 also uncovered evidence of early prehistoric activity in the form of an isolated pit containing a single piece of Neolithic pottery. The lithic assemblage from Rathclogh 2, while containing small early and final Neolithic elements, dates predominantly to the middle Neolithic. Contemporary activity, probably associated with a domestic site, is represented at Danesfort 7, Danesfort 12 and Danesfort 13 by small quantities of globular bowls. Two pits from Templemartin 5 contained cremated remains encased in pottery vessels. Both vessels from the cremation pits are thought to date to the late Neolithic. These are plain Grooved Ware pots and represent some of the first evidence for funerary contexts of this period in Ireland. Evidence of the late Neolithic/Beaker period was recovered in this landscape in the form of pottery sherds. Beaker pottery was recovered from a domestic context at Danesfort 8 which is typical of this material, and the evidence at Danesfort, consisting of pits and postholes without any indication of a structural plan, is consistent with the record elsewhere in the country.

Conclusion

The broad regional pattern in the Neolithic in all three of the landscapes in Phase 4 indicates two core areas of settlement. In the north-east there is a concentration of activity along the upper Barrow Valley extending from the Goresbridge area northwards along the Barrow and the valley of the Burren River. This continued to be an important area into the middle and late Neolithic and the activity at Ballynolan 1 is on the southern edge of this landscape. To the south-west, on the upland fringes between the Nore and Suir Valleys, a second settlement concentration may reflect route-ways along the lower Nore/Barrow and Suir extending southwards towards the coast at Waterford. The central areas within the current scheme, consisting of lower lying terrain, appear not to have been attractive in this early period possibly a reflection of the heavier, and perhaps more thickly afforested, soils. Expansion into

this landscape is, however, indicated by the Grooved Ware and Beaker contexts at Templemartin 5, Paulstown 2 and Danesfort and this heralds more intensive settlement in the Bronze Age.

3.2.3 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.

Two 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 returned a radiocarbon date of 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.

In 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 produced 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 returned a date of 382–206BC (UBA 12233) and a pit at the multiperiod site of Moanduff 2 retrieved a date of 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.

3.2.4 The Site Specific Archaeological Landscape of Danesfort 13

There are a number of recorded monuments located in the vicinity of Danesfort 13. A ringfort (KK023-079) is recorded *c*. 220m to the south of the site and *c*. 350m to the south-west, another ringfort (KK023-078) is recorded. Located 650m to the WNW, a holy well (KK023-075) is recorded and two further ringforts (KK027-076–77) are recorded 120–260m to the west of Danesfort 13. Additionally, a ringwork (KK023-080) and a designed landscape (KK023-080001) are located *c*. 250m to the north-east of the site.

Iron Age activity was recorded at Danesfort 13. The early Iron Age archaeology primarily consisted of a ringditch and a cremation pit. The middle Iron Age phase consisted of a field boundary ditch and a metalworking area that included a charcoal-producing kiln, a furnace and a possible forging area. There were a number of archaeological excavations to the immediate south of Danesfort 13, as part of the N9/N10 Phase 4: Knocktopher to Powerstown works. At Danesfort 12, located *c*. 150m to the south-west of Danesfort 13, multiple periods of activity were excavated. These consisted of a possible late Neolithic temporary structure, an early Bronze Age pit circle, a middle Bronze Age industrial complex and two late Bronze/Iron Age ringditches and cremation pits. Also excavated was an iron working furnace probably dating to the early medieval period and a rectangular ditch enclosure. At Ennisnag 2, , located *c*. 300mto the south-west, no features of archaeological significance were excavated, however at Ennisnag 1, *c*. 750m to the south-west of Danesfort 13, a prehistoric temporary shelter and two small groups of pits were excavated. Prehistoric pottery recovered from the site represented two early Neolithic Carinated bowls, assigning an early Neolithic date to the activity at Ennisnag 1.

To the north of Danesfort 13, a number of sites were excavated as part of the N9/N10 Phase 4: Knocktopher to Powerstown works. At Danesfort 2, located *c*. 350m to the north-east, burnt mound activity and associated activity dating to the early Bronze Age and early/middle Iron Age periods was excavated. At Danesfort 1, located *c.* 550m to the north-east of Danesfort 13, a ringditch containing cremated bone within its fills has been dated to the middle Iron Age. Danesfort 3 was located *c.* 600m to the north-east of Danesfort 13, however no features of archaeological significance were excavated at this site.

3.3 Typological Backgrounds

3.3.1 Typological Background of Isolated Pits – compiled by Michelle Brick

It can be difficult to get in to the prehistoric 'mind set' when interpreting archaeological remains none more so than in the case of apparently isolated pits and postholes, sometimes containing 'ritually' deposited items.

Usually large postholes/pits are interpreted as load bearing or structural elements of a building however when these features are identified in relatively isolated contexts away from obvious structures that explanation is not plausible. What then was their function? Were they excavated purely as rubbish pits to deposit pottery or finds or did they have more significance? Were they a 'closing deposit' when a structure was being abandoned/dismantled? Even if the deposition was attributable to such actions what was the posthole/pit excavated for, what did it support? Totem poles or marker posts have been suggested for such anomalies in the past indeed it has been noted that all a totem pole would leave behind in the archaeological record is a seemingly unremarkable large posthole (Barker1993, 25).

It is possible that some isolated pits/postholes represent simple refuse pits associated with temporary settlement but may also have been excavated and backfilled as part of a ritual associated with the transient nature of people at the time. Edmonds suggests that pits were dug and filled as people left a place for a season, like the planting of crops, offering "the hope of renewal and return" (Edmonds 1999). Pollard also suggests that abandoning a settlement and moving on was an act of social transition, and a potential threat to social order. The digging and filling of pits may have been a way to counter this threat (Pollard 2001).

Cremation pits are a common form of burial in the Bronze Age in which the dead would have been burnt on a wooden pyre and the ashes placed in a small pit. Burials can be found in isolation, or grouped together in cemeteries. Recent excavations along the many linear infrastructure projects have revealed hundreds of these pit burials and analysis indicates that these pits may indeed not be 'isolated' features as such and may be part of the wider landscape of Bronze Age burial rites in Ireland (Grogan, O Donnell & Johnston 2007, 115). In the middle and later Bronze Age the quantity of cremated bone deposited was represented by small token deposits rather than the full cremated body.

3.3.2 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 ring-ditches 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 ring-ditches.

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. Ringditches appear to have continued to be built or 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).

3.3.3 Typological Background of Metallurgical Features – compiled by Michelle Brick

The ironworking processes in Ireland remained largely static until the 17th century with the introduction of the blast furnace, so the features that survive archaeologically today appear similar in form even though they span the centuries between late prehistory and the later middle-ages. Diagnostic artefacts are also mainly absent so radiocarbon dating is vital for determining the age of various metallurgical features, including smelting furnaces. Radiocarbon-dated examples of furnaces from the M4 show that, despite their morphological similarities, they were in use from the beginnings of the fifth century BC until the late medieval period with the majority dating to the early middle ages (Carlin *et al* 2008, 104). A number of possible furnaces along the M7/M8 (specialist metallurgical reports are awaited) have also produced dates spanning the middle Iron Age through to the later medieval period (Kenny 2007).

The two basic raw materials required for iron working are wood (charcoal) and iron ore. Ironworking and the production of charcoal are closely related, as quantities of charcoal are required in the smelting process. It was produced by carbonising smouldering wood in a controlled oxygen-limited environment, resulting in the wood being roasted and not burnt. The archaeological evidence for this process can be seen in charcoal production kilns/pits – shallow circular or rectangular pits with evidence of heat-scorching at the base and deposits that have a very high charcoal content. The iron ore was sometimes extracted by mining, as at Garryduff 1, Co. Cork, where surface outcrops of yellow sandstone or lower limestone shale containing limonite were available (O'Kelly, 1962, 103). Haemetite and Siderite were also exploited as at Ballyhenry, Co. Antrim (Lynn 1983) and Nendrum, Co, Down (Lawlor, 1925) respectively. Such resources were not as widespread as bog iron ore (Mytum 1992, 230) which is formed by the leaching of iron from the underlying geology and exists around the margins of bogs and wetlands. It has a high manganese and phosphorous content and low potassium and calcium content (Hall and Photos-Jones, 1998). The manganese acts as a flux that lowers the melting point of the slag (Carlin, 2008). The ore is also a renewable resource and these characteristics would have made it particularly suitable for use in early bloomery technology (Photos-Jones *et al.* 1998).

Much of the technology associated with the primary stages of iron production such as charcoal production kilns, furnaces and smithing hearths, during the bloom smithing process, were located close to natural resources such as wood and bogland. This is not surprising because oak was the preferred fuel for charcoal production as it is denser and burns for longer than softer woods (Raftery 1994, 148; Tylecote 1962), while bog ore was more readily available and required less work to extract compared to mining and was also a regularly renewable resource (Mytum 1992, 230). The primary stages of ironworking generally took place away from dwellings due to the dangers associated with the production, such as the risk of fire and the toxic nature of the process. The results from recent excavations, such as along the M4 (Carlin *et al* 2008) and the M7/M8 (Kenny 2007) testify to this as the majority of furnaces were located in marginal places, availing of the limited drier and sloping ground, close to bog and woodland and away from settlements. However, furnaces do occur within enclosed early medieval settlements in some instances, such as Killickaweeny, Co.

Kildare (Walsh 2008), and it appears that iron smelting was practised sometimes within enclosures, possibly in controlled safe environments away from the dwellings.

The primary process in the production of iron was through smelting, a practice whereby iron minerals or ores are reduced and broken up by reactions with burning charcoal in a furnace (bloomery), leading to the production of an iron bloom and liquid slag (Carlin, 2008). This bloom retained numerous impurities as the temperatures did not exceed 1250˚C, well below the melting point of iron. The second stage in the production process bloomsmithing, where the bloom is re-heated in a hearth and hammered to remove excess slag and other impurities (Crew, 1991). This primary smithing may have been conducted at the smelting site and the original furnace pit could have been re-used as the hearth. Some smithing hearths would have had a low clay superstructure to increase efficiency and would have had bellows connected. The slag from this process accumulated in the base of the hearth pit and is known as a smithing hearth bottom or cake (plano-convex base). The purer iron billet produced from the primary smithing then underwent secondary smithing (blacksmithing) or forging to make or repair metal objects. This took place in a sheltered hearth which created suitably dim lighting for the smith, who used the colour of the iron as an indicator of its temperature (Carlin, 2008). The metal was heated in the hearth before being shaped into the desired form using hand tools and an anvil.

Furnaces, used for the smelting of ores into an iron bloom prior to the smithing stages, survive in the archaeological record as small shallow heat-scorched pits, usually oval or hemispherical in shape, containing fills of iron slag, charcoal and, in many cases, oxidised clay. Dense blocks of slag commonly form at the bottom of the furnace which have been termed plano-convex or 'furnace-bottoms' (Scott 1990, 155–6). A total of 30 furnaces – with approximate diameters of between 0.4m and 0.7m and depths not exceeding 0.2m – were identified in advance of the M4 road scheme and survived as bowl-shaped pits, with heat-reddened sides and bases, which contained slag and, in many examples, vitrified clay fragments (Carlin *et al* 2008, 94). A recent summary of furnaces associated with raths has revealed similar morphological characteristics and deposits whereby they were all heat-scorched small pits containing charcoal, slag and burnt clay in many instances (Comber 2008, 115–7).

Slag is a by-product of smelting as well as smithing, and this vitreous waste is one of the most common archaeological indicators of iron metallurgy. Microscopic analysis of the slag is very informative about the processes that led to its production. This is the key to deciphering the activities that occurred on a site and is of particular importance in detecting whether smelting or smithing, or both, occurred in a particular context (Carlin, 2008)

Debates have recently focused on the arguments for (Carlin *et al* 2008; Crew and Rehren 2002, 96; Mytum 1992, 231) and against (Pleiner 2000; Scott 1990; Raftery 1994, 148) the existence of the low-shaft furnace in Ireland with the former mainly arguing that the low-shaft furnace, in contemporary use in Britain, was more efficient than the bowl furnace. This view was based, to a large extent, on the experimental work on bowl furnaces by O'Kelly (1961) and later by Tylecote (1986). Bowl furnaces consisted of pits containing charcoal, positioned close to the air hole, and ore that were sometimes clay-lined and may have had a low dome-shaped clay roof (Scott 1990, 159). Low-shaft furnaces differed in that they were clay-lined and clay sides were constructed above ground into the shape of a conical- or a cylindrical-shaped chimney (Carlin *et al* 2008, 92). They also differed to the bowl furnace because the charcoal and ore were placed in alternating layers (Mytum 1992, 231). Archaeologically, however, it is difficult to distinguish between the two because both

survive as heat-scorched pits containing charcoal and slag deposits and, in many cases, vitrified clay fragments. The presence of the latter cannot be used as evidence for the existence of the low-shaft furnace because bowl furnaces may also have been clay-lined or roofed by a clay dome. Regardless of the existence, or not, of the low-shaft furnace, the large number of furnaces found in excavations across the country demonstrate that iron smelting was an integral part of the iron production process and it usually occurred in marginal places, in proximity to raw materials, and away from settlements where the final process – iron forging – was frequently practised.

3.4 Summary of the Excavation Results

The excavation at Danesfort 13 identified a variety of different features from a number of different periods. Lithics from two small pits have been typologically dated to the early Mesolithic. Another pit was cut by an Iron Age ringditch and this stratigraphic relationship could mean that it was contemporary with the early prehistoric pits.

One of the most notable features on the site was an early/middle Iron Age ringditch. It enclosed an area of 5.80m and no internal features were identified. There was no evidence of a surviving mound or bank. The lower fill contained hazelnuts shells which may have been deliberately deposited. The upper fill contained small fragments of cremated bone that could not be identified to species. These may represent a deliberate ritual deposit but may also be residual from a nearby disturbed feature/deposit. A small pit to the east of the ringditch represented the location of a cremation deposit, which contained a large number of calcinated and fragmented bone. Most of the fragments were un-diagnostic and not identified to species but some were identified a pig with less identified as possible human. It is likely that the cremation pit was deliberately placed in proximity to the ringditch.

In the middle Iron Age there is evidence that the site was the focus of primary metallurgical activity through the presence of a smelting furnace and associated possible bloom smithing hearth. A linear boundary ditch is thought to have been open at the time of the metal working on site as slag and metallurgical waste material was identified within its basal fills. This ditch was possibly constructed as a territorial division. A small area of metalled surface adjacent to the ditch may be a working platform and four pits located along the line of the boundary ditch all contained metallurgical waste. It is not clear whether the pits originally functioned as post-pits delineating the boundary which were subsequently used as waste pits or whether their sole function was as waste pits. Other features scattered across the site consisted of pits containing metallurgical debris that may represent further waste pits and a possible charcoal production pit. The charcoal was potentially for use in the furnace or the bloom smithing hearth.

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.

Prehistoric pottery analysis

Excavations at Danesfort 13 yielded five pottery sherds (plus 10 fragments) representing a middle Neolithic globular bowl with a pointed rim. This pottery type has rarely been identified in this region. All of the pottery came from the fill C85 of pit C82. The pottery is clearly in a disturbed position possibly derived from the earlier pit. The pottery appears to have been exposed to further intense heat after breakage resulting in the vessel shattering along the joint lines of the coil construction. This suggests that the pottery was accidentally incorporated into the iron working process.

Lithics analysis
The lithic finds are 28 flaked pieces of flint, two flaked pieces of chert and a natural chunk of chert. The assemblage contains two dual opposed platform blade cores, eight blades, seven flakes, 12 pieces of debitage and one miscellaneous retouched artefact. The assemblage is dominated by an early Mesolithic component represented by the blade cores and most of the flakes and blades. One large later Mesolithic chert blade represents a residual component at the site. Three flakes and the miscellaneous retouched artefact are associated with a possible use of the site in the middle Neolithic. The discarded cores, flakes, blades and debitage represent waste from lithic production and the immediate use and re-sharpening of lithic tools in the early Mesolithic period. Evidence for this occupation as well as that of the possible middle Neolithic use of the site was disturbed and artefacts were re-deposited during the subsequent periods.

Small finds analysis
A glass bead and a piece of copper alloy waste were submitted for analysis. The tiny blue glass bead was annular with a straight perforation. Glass beads have been found in association with cremated human remains from a number of Iron Age sites in Ireland. A small piece of copper alloy waste was found in the fill of the smelting furnace pit C73. It was roughly oval but narrowed at one end.

Charcoal and Wood Species identification
Charcoal was examined from five contexts at Danesfort 13. Hazel, ash, pomaceous fruitwood, cherry, blackthorn, oak and willow were identified. The samples examined suggest that throughout the different time periods, oak was the dominant species growing close to the site. Oak is an excellent fuel, and is capable of reaching the high temperatures required for cremation in Bronze Age Ireland and metal production in Iron Age/early Medieval Ireland. Charcoal identifications from the Danesfort sites 2, 7, 11 and 9 were all dominated by oak, in comparison to Danesfort 13 (Lyons *et al* forthcoming). In contrast, Danesfort 10 is dominated by pomaceous fruitwood.

Analysis of Plant Remains
A total of 9 samples were examined from this site. Of these, there were no charred seeds in 5 samples; four of which were from C110 and the other from C103. The plant remains from the other four samples were primarily charred fragments of hazelnut shell fragments.

Animal Bone Analysis
A total of 489 burnt bone fragments were submitted for examination of which 484 were from C78, the fill of possible cremation pit C66 and the remaining five were from C110, a fill of ringditch C101. The bone samples were assessed and identified to species where possible. 10.8% of the fragments were identified and divided into species. The burnt bone remains assemblage contained bones from two species pig and human. No definite or statistically detailed conclusions could be drawn from the bone assemblage.

Metallurgical waste analysis
A total of 5.87kg of metallurgical material was recovered from this site. The greatest quantities of residues from the site (1.52kg) were linked with the fills of a linear north-west/south-east oriented ditch C13. A total of 1.37kg of residues was recovered from the fills of an oval furnace C49. A hazelnut shell from the basal fill (C51) of this feature was dated to Cal AD7–125. This gives a reliable date for iron-working activity at this site. Morphology and quantity of residues suggests small-scale iron smelting was the most likely activity being carried out. The vast majority of the material is

typical of iron-working residues and consists of small-medium non diagnostic irregular nodules. There is a small percentage of distinctive drippy type slags, this morphology can be linked with iron smelting or primary smithing (i.e. reheating and hammering of the spongy bloom of iron to remove slag remaining within), morphology of the material can be indicative of both processes. The absence of smithing hearth cakes would suggest that small-scale smelting may be the most likely activity carried out at this site.

Radiocarbon Dating

Two samples were sent for AMS radiocarbon dating.

A sample of charred hazelnut from ringditch fill C108 was radiocarbon dated. The 2 sigma calibrated result was 503–384BC (UBA 10999).

A sample of hazelnut from bottom fill of furnace C51 was radiocarbon dated. The 2 sigma calibrated result was AD7–125 (UBA 15552).

4 DISCUSSION AND CONCLUSIONS

4.1 Discussion

The excavation at Danesfort 13 identified a variety of different features from a number of different periods. Artefacts in the form of lithics and pottery suggest that the site was occupied in the Mesolithic and Neolithic periods, although pottery in particular was from a disturbed context and was not *in situ*. Two phases of occupation in the Iron Age were identified, represented by an early/middle Iron Age ringditch and associated cremation pit and later middle Iron Age metal working and linear boundary ditch. The site was situated on near-flat ground within a gently sloping valley in proximity of a tributary of the King's River and was relatively well drained. The physical location of the site would have been attractive for occupation and settlement in prehistory. The identification of archaeological features within this physical setting is not unusual although there were no particularly dominating physical features that would have indicated the nature of activity that was identified during the excavation.

The surrounding archaeological landscape shows no previously recorded monuments in the immediate vicinity that would date to the prehistoric period. The monuments in the vicinity consist of ringforts and a holy well which would all date to the early medieval period or later. In this regard the identification of a prehistoric site was unexpected. The site was also well-situated within an archaeologically rich prehistoric landscape as evidenced from the N9/N10 excavations within Ennisnag and Danesfort. Evidence of funerary and domestic activity was discovered 0.2km to the south-west at Danesfort 12 where two ringditches, a pit circle and three cremation pits were found in low-lying land beside the tributary. Another ringditch was found 0.6km to the east at Danesfort 1 while Graves (1860–1) reported the discovery in 1838 of an intact Bronze Age urn in a sand pit next to a post-medieval turret (KK023-080) which is visible 0.35km to the east (Plate 2). A burnt mound was located 0.4km to the west further up the valley at Danesfort 2. A temporary Neolithic structure was recorded on higher ground 0.8km to the south-west at Ennisnag 1. Bronze Age sites were also excavated 1.4–2.2km to the north and north-east at Danesfort 5–7 including a settlement and cremation pits with late Bronze Age pottery.

Mesolithic Activity

The identification of Mesolithic activity was not expected at the site prior to excavation, indeed identification of Mesolithic activity from any of the sites on the scheme would not have been anticipated. As has been outlined (Section 3.2.1) the excavations along the N9/N10 Phase 4 produced very little evidence of Mesolithic occupation. Early Mesolithic finds were recovered from five sites along the scheme, and of interest is the cluster in Danesfort (at Danesfort 6, Danesfort 8 and Danesfort 13) with late Mesolithic finds identified from two sites, Danesfort 13 and Kilree 4. In general the early Mesolithic finds consisted mostly of blades that were recovered from secondary contexts on predominantly Bronze Age and early medieval sites, perhaps representing a residual component, or in the case of Danesfort 13 from an isolated pit. The material recovered from Danesfort 13 included two blade cores, blades, flakes and debitage. The site also produced a very large late Mesolithic chert blade. Two late Mesolithic butt-trimmed 'Bann' flakes were recovered during the excavation of Kilree 4, which was located to the east of Danesfort on the edge of the Nore floodplain. These artefacts are not from secure contexts but the riverine location at Kilree is typical of late Mesolithic settlement patterns. The proximity of the two sites, two kilometres apart, suggests that this area may have been extensively exploited during this period. Also of significance is a midden (KK023-041) recorded at Kilmog or Racecourse, situated two and a half kilometres north-west of Danesfort, further attesting the possibility of a Mesolithic community in the region.

Neolithic Activity

No features from Danesfort 13 can be definitively dated to the middle Neolithic period but the presence of sherds of a middle Neolithic globular bowl within a pit fill attest to Neolithic activity in the vicinity of the site. Analysis of the pottery has confirmed that the pottery became included in the later Iron Age furnace activity and is therefore residual within that feature - Grogan and Roche (Appendix 2.1). There is evidence for localised activity throughout the Neolithic period from other excavations on the N9/N10 in the wider area. In this context isolated Neolithic activity at Danesfort 13 is not unusual, although the presence of sherds of a globular bowl is significant given the rarity of the pottery type from the region.

Early Iron Age Ringditch and Cremation Pit

The presence of a ringditch and cremation pit in a lowland valley basin is unusual as normally such monuments are located on higher ground. A similar location aspect was applicable at Danesfort 12, which was located 0.2km to the south-west and which contained two ringditches, three cremation pits and a possible pit circle. These sites, including Danesfort 1 to the east, were potentially part of a larger funerary landscape that dated from the Bronze Age through to the Iron Age.

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 a roughly circular enclosing ditch, which can be of varying width, depth, and diameter. In this regard Danesfort 13 can be interpreted as a fairly typical ringditch site in terms of its basic form. 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. The small amount of unidentified cremated bone from the upper fill may represent material disturbed from a nearby pit rather than a deliberate deposit. A pit near the ringditch contained a quantity of cremated bone and it seems likely that this was deliberately placed in proximity of the ringditch. Cremated animal bone (pig) was recorded from the pit as well as some possible human bone which could indicate a specific ceremonial or ritual activity. It should be noted that while only a small amount of possible human remains were identified it is possible that some of the unidentifiable fragments, which made up most of the assemblage may also 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. Johnston, in her analysis of the plant remains from the site, identified hazelnut shell fragments from the base of the ringditch which may also represent a deliberate ceremonial deposit. It seems likely therefore that Danesfort 13 was the site of ritual and probably burial activity in the early/middle Iron Age.

Middle Iron Age Metalworking

Metalworking features dated to the middle Iron Age were excavated at Danesfort 13. The metalworking features have been identified as relating to a smelting furnace and possible bloom smithing hearth following analysis of the slags recovered from the fills. It is probable that the charcoal production pit on the site was directly related to the metalworking activity. There is no evidence of any contemporary settlement evidence associated with the metallurgical activity however, the primary stages of ironworking generally took place away from dwellings due to the dangers associated with the production, such as the risk of fire and the toxic nature of the process. There was no definitive evidence on the site for the earliest stages of metalworking, that is, iron ore

procurement and the roasting of iron ore nodules in pits to facilitate the smelting process.

The smelting furnace (C49) was sub-circular and had a small channel extending from the northern side of the pit. This may have contained a tuyère or pipe, through which air was either naturally drawn into the furnace or was artificially pumped in using bellows. The possible bloom smithing hearth (C73) was oval shaped and was reddened and scorched due to the high firing temperatures. It was located only 1.1m north-east of the smelting furnace. A small outlet channel on its eastern side was probably an air vent or access point for a set of bellows, which could have been used to oxygenate the fire.

It is difficult to classify the smelting furnace as they were neither completely bowl shaped and nor do they precisely fit the profile of a slag pit furnace, which tended to have steep sides all the way around and a flat base (Young, 2003). Their shape appeared to be a variant of the two. In terms of function, however, they more closely resembled a slag pit furnace, which is described by Young as one where molten slag sunk to near the bottom of the pit and was retained. This contrasted with a bowl furnace, where typically the accumulated molten slag was drained away through a hole in the base of the furnace to ensure that the tuyère did not become blocked with slag. This process is known as slag tapping (*ibid.*).

The fills in furnace C49 conform to Young's description of a slag pit furnace. High temperatures caused the base and sides of the pit to become oxidised and reddened. A silty sand deposit rich in charcoal (C51) was the basal fill. Above this was a silty sand layer with some iron and a large quantity of slag (C52). This was the waste product near the bottom of furnace which would have been retained until the end of the smelt. An upper layer of burnt clay (C53) suggested that some form of clay superstructure was built over the furnace pit to keep in the heat, unless the clay derived from a disintegrated tuyère (Edwards, 1990).

On the east side of the linear boundary ditch, the metalled surface (C92) and oval pits with metallurgical waste (C35, C86, and C93) were part of a different phase of the metalworking process. The proximity of the pits to the ditch and the lack of burning in them suggested that their function may have been to cool down metal after it had been smelted or forged. The ditch comfortably retained water after episodes of rainfall during the excavation. The pits were almost certainly open at the time the metalled surface was in place. The purpose of the metalled surface, which consisted of a series of pebbles impacted into the natural clay, must have been to provide a solid working platform. Perhaps the platform once supported an anvil for forging. Another activity that may have taken place here was the removal of the remaining slag from the iron bloom prior to forging (Edwards, 1990). This is supported by the scatter of iron slag and lumps of burnt clay over the metalled surface and within the three pits. Pit C86 contained such material even though it was situated 5m north-west of the metalled surface and the debris layer.

The Linear Boundary

The linear boundary ditch was undated but stratigraphic relationships and the presence of iron slags within its lower fills indicate that it dates to the middle Iron Age. A similarly dated boundary ditch was identified at another site that contained earlier Iron Age ringditches excavated along the route of the N9/N10 Phase 4. Holdenstown 1 was located to the north-east approximately 5km away on the other side of the River Nore. At Holdenstown the significance of the linear boundary was emphasised by the location of an early medieval *ferta* burial ground alongside the ditch. These types of burial grounds were often located near to territorial boundaries and it is

possible that the Danesfort 13 ditch also represents a territorial boundary, although the metallurgical evidence suggests that both sides of the boundary may have been used for metal processing so perhaps its function was not territorial.

4.2 Conclusions

Danesfort 13 was a multi-period site with Mesolithic, and early and middle Iron Age activity. The activity was also varied consisting of isolated pits, a ringditch and associated cremation pit, metallurgical furnaces and a linear boundary ditch. Danesfort 13, in association with nearby sites of Danesfort 6 and 8 are very significant additions to the pattern of Mesolithic activity in the region and the identification of Neolithic globular bowl sherds is important in terms of the regional distribution of this pottery type. The Iron Age activity on the site is also of regional significance as there was previously limited evidence for Iron Age activity. In conjunction with the other excavated sites from the scheme, particularly in the Danesfort area, it forms part of a complex archaeological landscape displaying strong continuity of settlement throughout prehistory which is complimented by the early medieval and medieval recorded monuments in the surrounding landscape.

5 BIBLIOGRAPHY

5.1 References

Barker, P. 1993 *Techniques of Archaeological Excavation*. Third Edition, Batsford.

Bradley, J. 1990 The early development of the medieval town of Kilkenny. In W. Nolan and K. Whelan (eds), *Kilkenny: History and Society*, 63–74. Geography Publications Dublin.

Bradley, J. 2000 *Irish Historic Towns Atlas No. 10: Kilkenny*. Royal Irish Academy, Dublin.

Bradley, R 2007 *The Prehistory of Britain and Ireland*. Cambridge University Press, Cambridge.

Carlin, N. 2008 Iron working and Production. In N. Carlin, L. Clarke & F. Walsh, *The Archaeology of Life and Death in the Boyne Floodplain: The Linear Landscape of the M4 Kinnegad-Enfield-Kilcock Motorway.* NRA Scheme Monographs 2.

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.

Cassidy, B 1991a Digging at Dunbell. *Archaeology Ireland,* **16**, 18–20.

Cassidy, B. 1991b Dunbell Ringfort No 5, Dunbell Big, Co. Kilkenny. In I. Bennett (ed.) *Excavations 1990: summary accounts of archaeological excavation in Ireland.* Wordwell. Bray

Channing, J. 2007 A post excavation report on site AR053 and AR054, Baysrath and Knocktopher Commons, Co Kilkenny. Unpublished report to Kilkenny County council on behalf of Valerie J Keely Ltd.

Clarke, L. & Carlin, N. 2008 E3088 Ardsallagh 1 Final Report. Unpublished Final Report. National Monuments Service, Department of the Environment, Heritage and Local Government, Dublin.

Clarke, L. & Carlin, N. 2006 Life and death in County Meath: prehistoric remains at Ardsallagh. *Archaeology Ireland,* **20** (4), 22–25.

Comber, M. 2008 *The Economy of the Ringfort and Contemporary Settlement in Early Medieval Ireland*. BAR International Series 1773. Oxford. Archaeopress.

Condit, T. & Gibbons, M. 1988 Two Little-Known Hillforts in Co. Kilkenny. *Decies,* **37**, 47–53.

Cooney, G. & Grogan, E. 1999 *Irish Prehistory a Social Perspective.* Bray; Wordwell.

Crew, P. 1991 the experimental production of prehistoric bar iron. *Historical Metallurgy,* **25**, 21–36.

Crew, P. & Rehren, T. 2002 Appendix 1: High-temperature workshop residues from Tara: iron, bronze and glass. In H. Roche *Excavations at Raith na Rig, Tara Co. Meath 1997.* Discovery Programme Reports **6**, 83–102. Dublin, Royal Irish Academy/Discovery Programme.

Daly, A and Grogan, E 1993 Excavations of four barrows in Mitchelstowndown West, Knocklong, County Limerick. *Final Report, Discovery Programme Reports 1*, 44–60. Royal Irish Academy. Dublin.

Dennehy, Frazer, McQuade, Molloy, & Slater 2006 *N9/N10 Kilcullen to Waterford Scheme: Waterford to Powerstown Investigations, Contract 2: Knockmoylan to Danesfort townlands, Co. Kilkenny Archaeological Assessment Report, A032/05–08*. Unpublished Report for MGL Ltd.

Doyle, I. 2004 River Nore, Co. Kilkenny. In I. Bennett (ed.) 2004 *Excavations 2002: Summary Accounts of Archaeological Excavations in Ireland*. Bray: Wordwell.

Dunne, N. & Moloney, C. 2008 Finding a hidden people- the archaeology of a current road project. N9/N10 Kilcullen to Waterford Road Scheme; Kilcullen to Carlow. Headland Archaeology Ltd.

Edmonds, M. 1999 *Ancestral geographies: Landscape Monuments and Memory.* London. Routledge.

Edwards, N. 1990 *The Archaeology of Early Medieval Ireland.* London.

Farrelly, J. and Keane, M. 2002 New barrow types identified in County Sligo. In M.A. Timoney (ed.), *A Celebration of Sligo*, 97–101. Sligo Field Club, Sligo.

Foley, C. 1974 Pressé of excavation results, 1973, *National Monuments Files F94/1781/1.*

Foley, C. 2006 Excavation of a ringfort at Dunbell Big, Co. Kilkenny, *Journal of the Royal Society of Antiquaries of Ireland,* **136**, 5–22.

Gibbons, M. 1990 The Archaeology of Early Settlement in County Kilkenny. In W. Nolan & K. Whelan (eds.) *Kilkenny: History and Society* Geography Publications, 1–32.

Gowen, M. and Tarbett, C. 1988 A third season at Tankardstown. *Archaeology Ireland,* **8**, 156.

Graves, J. 1860, Three urns from Danesfort. *Journal of Kilkenny and South-East Ireland Archaeology. Soc.,* **3**, 168–169.

Grogan, E. 2004 The implications of Irish Neolithic houses. In I. Shepherd *Scotland in Ancient Europe,* 103–114. Edinburgh: Society of Antiquaries of Scotland,

Grogan, E. O'Donnell, L. and Johnston, P. 2007 *The Bronze Age Landscapes of the Pipeline to the West*. Bray, Margaret Gowen and Co. Ltd and Wordwell.

Graves, J. 1860–1 Sepulchral Urns at Danesfort, Co. Kilkenny. *Journal of the Royal Society of Antiquaries of Ireland,* **III**,169.

GSB Prospection Ltd 2003 *Geophysical Survey Report 2003/39, N9/N10 Kilcullen to Waterford – South: Powerstown to Waterford*.

Hall, A and Photos-Jones, E. 1998 The bloomery mounds of the Scottish Highlands: Part II – a review of iron mineralization in relation to the Scottish Highlands bloomeries. *Journal of the Historical Metallurgy Society,* **32** (2), 54–66.

Hogan, J. 1861 Topographical and Historical Illustrations of the Suburbs of Kilkenny. *JRSAI*, **III**, 355–387.

Keeley, V.J. Ltd 2005 *N9/N10 Kilcullen to Waterford Scheme: Waterford to Powerstown. Environmental Impact Statement. Chapter 17: Archaeology and Cultural Heritage, Chapter 18: Architectural Heritage.*

Kenny, N. 2007 *On the Recent Archaeological Discoveries in the Townlands of Derryvorrigan and Derrinsallagh: Iron Production and Ironworking in the Iron Age and Beyond*. Unpublished report prepared for Archaeological Consultancy Services Ltd.

Kinsella, J. 2007 *Cereal Drying and Metallurgy at Lismullin, Co.Meath: A Preliminary Analysis.* Unpublished Report Prepared for Archaeological Consultancy Services Ltd.

Lawlor, H.C. 1925 *The Monastery of Saint Mochai of Nendrum*. Belfast Natural History and Philosophical Society.

Lyng, T. 1984 *Castlecomer Connections: Exploring History, Geography and Social Evolution in North Kilkenny* Environs 217, 387, 410–413

Lynn, C. 1983 Two raths at Ballyhenry, Co. Antrim. *Ulster Journal of Archaeology,* **46**, 67–91.

Monk, M. and Kelleher, E. 2005 An assessment of the archaeological evidence for Irish corn-drying kilns in the light of results of archaeological experiments and archaebotanical studies. *The Journal of Irish Archaeology* **14**, 77–144.

Mytum, H. 1992 *The Origins of Early Christian Ireland*. London, Routledge.

Newman, C. 1997 *Tara: An Archaeological Survey*. Royal Irish Academy. Dublin.

O' Connor, E. 2006 *A double ringditch at Raynestown, Co. Meath*. Unpublished paper compiled for Archaeological Consultancy Services Ltd.

Ó Drisceoil, C. 2008 *Archaeological Excavation at Talbot's Tower, Kilkenny City*. Unpublished report prepared for Kilkenny Archaeology.

Ó Drisceoil, C., Bradley, J., Jennings, R., McCullough, L., and Healy J. 2009 *The Kilkenny Archaeological Project (KKAP)* Report for the Irish National Strategic Archaeological Research (INSTAR). Accessed online 2009: http://www.kkap.ie/assets/kkap_final_report_161208.pdf

O'Kelly, M. J. 1961 The ancient method of smelting iron. *Internat. Kongress fuer Von u. Fruegeschichte*, 459–91. Hamburg, Universitatsbibliothek Basel.

O' Kelly, M. J. 1962 Two ringforts at Garryduff, Co. Cork. *Proceedings of the Royal Irish Academy,* **63**C, 17–25.

O'Neill, J. 1999 Cherrywood Science and Technology Park, Co. Dublin. (Licence Refs.: 98E0526, 99E0517, 99E0518, 99E0523). In I. Bennett (ed.), *Excavations 1999*, *Summary account of archaeological excavations in Ireland*. Wordwell. Bray.

O'Neill, J 2006 Excavation of pre-Norman structures on the site of an enclosed Early Christian cemetery at Cherrywood, Co. Dublin. In S. Duffy (ed.), *Medieval Dublin VII*. Four Courts Press. Dublin.

O'Sullivan, A., McCormick, F., Kerr, T. & Harney, L. 2008 Early Medieval Ireland: Archaeological Excavations 1930–2004 *EMAP Report 2.1* INSTAR Programme 2008.

O'Sullivan, M. and Downey, L. 2005 Corn Drying Kilns. *Archaeology Ireland,* **19**, 32–35.

Photos-Jones, E., Atkinson, J., Hall, A. and Banks, I. 1998 The bloomery mounds of the Scottish Highlands: Part I – the archaeological background. *Journal of the Historical Metallurgy Society,* **32** (1), 15–32.

Pleiner, R. 2000 *Iron in Archaeology: The European Bloomery Smelters*. Prague, Archaeologicky USTAV AV CR.

Pollard, J 2001 The Nature of Archaeological Deposits and Finds Assemblages. In A Woodward & J D Hill (eds), *Prehistoric Britain: The Ceramic Basis*, 22-33. Oxbow Books, Oxford.

Prendergast 1954 National Museum of Ireland correspondence files. NMI.

Raftery, J. 1944 A Neolithic Burial in Co. Carlow, *Journal of the Royal Society of Antiquaries of Ireland,* **74**, 61–2.

Raftery, B. 1969 Freestone Hill, Co. Kilkenny: An Iron Age Hillfort and Bronze Age Cairn. *PRIA,* **68**C, 1–108.

Raftery, B. 1972 A Burial Mound at Baunogenasráid, Co. Carlow. *Carloviana*, **21**, 12–14

Raftery, B. 1974 A prehistoric burial mound at Baunogenasraid, Co. Carlow, *Proceedings of the Royal Irish Academy,* 74.

Raftery, B. 1994 *Pagan Celtic Ireland: The Enigma of the Irish Iron Age*. London, Thames and Hudson.

Ramsden, P. G. 1991 Prehistoric Archaeology in the Burrin River Valley Carlow, Ireland. *Carloviana,* **39**, 18–27.

Roseveare, M. and Roseveare, A. (ArchaeoPhysica Ltd) 2005 *N9/N10 Kilcullen to Waterford Scheme: Waterford to Powerstown Geophysical Survey Report*.

Ryan, M. 1974. Cist-burial with food vessel from Slyguff townland, Nr. Bagenalstown, Co. Carlow. *Carloviana,* **23**, 21–4.

Scott, B. G. 1990 *Early Irish Ironworking*. Belfast, The Ulster Museum.

Stout, M 1997 *The Early Irish Ringfort*. Four Courts Press, Dublin.

Tietzsch-Tyler, D. 1994 *Building stones of St. Canice's Cathedral, Kilkenny*. Dublin.

Tylecote, R. F. 1962 *Metallurgy in Archaeology*. London: Edward Arnold.

Tylecote, R. F. 1986 *The Prehistory of Metallurgy in the British Isles* London, Institute of Metals.

Waddell, J. 1990 *The Bronze Age Burials of Ireland*. Galway University Press, Galway.

Waddell, J 1998 *The Prehistoric Archaeology of Ireland*, Wordwell. Bray.

Walsh, F. 2008 Killickaweeny 1: high-class early medieval living. In N Carlin, L Clarke and F Walsh, *The Archaeology of Life and Death on the Boyne Floodplain: The Linear Landscape of the M4*, 27–54, Dublin, National Roads Authority, Wordwell.

Whitty, Y. and Tobin, M. 2009 Rites in transition: the story told by Holdenstown 1 and 2. *Seanda,* **4**, 19–21.

Wilkins, B. 2007 Newrath, Co. Kilkenny. In I. Bennett (ed.) 2007 *Excavations 2004: Summary Accounts of Archaeological Excavations in Ireland*. Bray: Wordwell.

Wren, J. 2007 Site 17, Rathpatrick, Co. Kilkenny. In I. Bennett (ed.) 2007 *Excavations 2004: Summary Accounts of Archaeological Excavations in Ireland*. Bray: Wordwell.

Young, T. P. 2003. Is the Irish iron-smelting bowl furnace a myth? A discussion of new evidence for Irish bloomery iron making. *Geoarch Report 2003/09*.

Zvelebil, M., Macklin, M.G., Passmore, D.G. and Ramsden, P. 1996 Alluvial Archaeology in the Barrow Valley, Southeast Ireland: The “Riverford Culture” re-visited. *The Journal of Irish Archaeology,* **7**, 13–40.

5.2 Other Sources

Record of Monuments and Places (RMP), The Department of the Environment, Heritage and Local Government, 7 Ely Place Upper, Dublin 2.

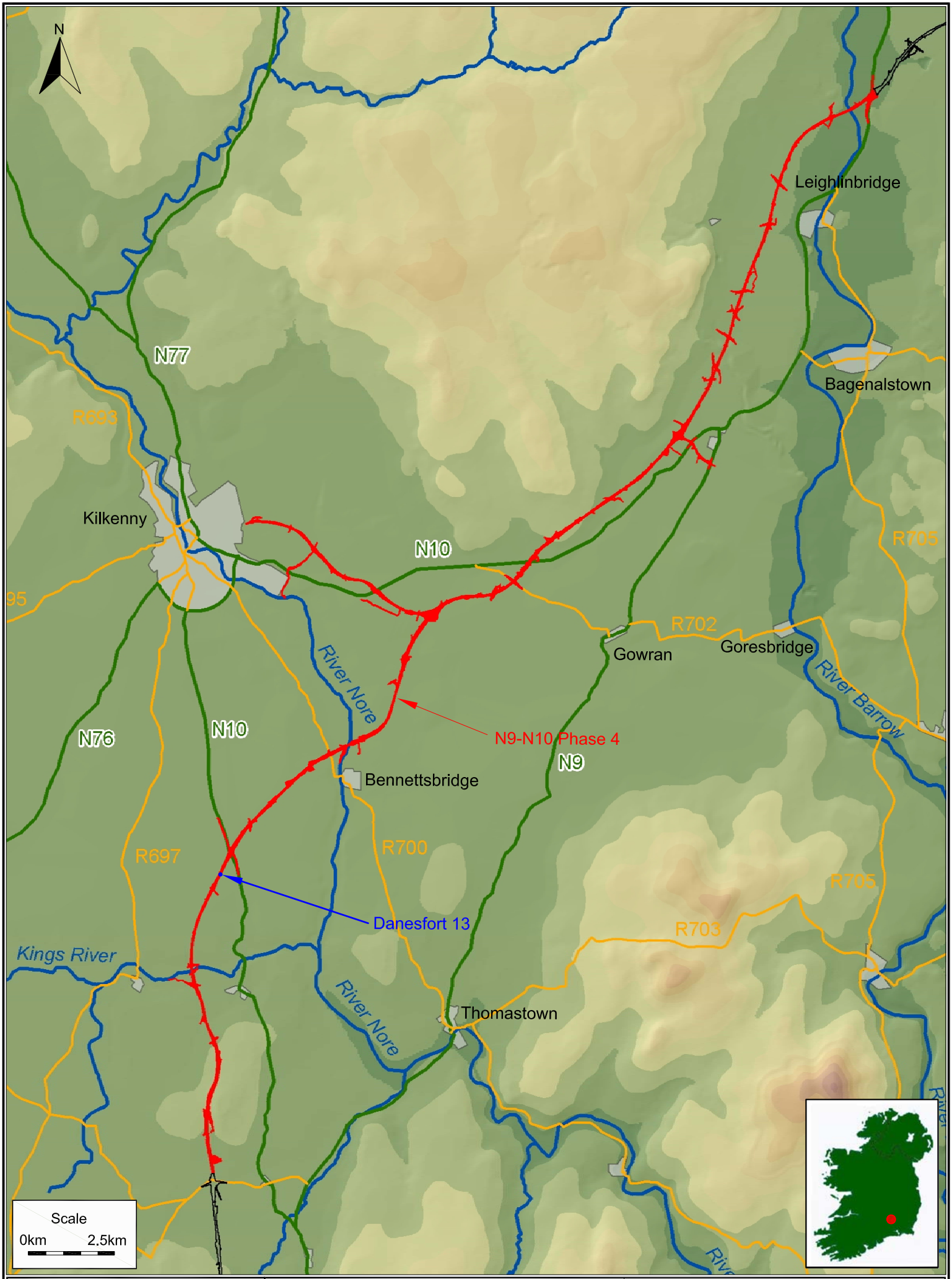
Topographical Files of the National Museum of Ireland, Kildare Street, Dublin 2.

First Edition Ordnance Survey Map

Second Edition OS map

Electronic references

ENVision; *Environmental Protection Agency* Soil maps of Ireland http://www.epa.ie/InternetMapViewer/mapviewer.aspx



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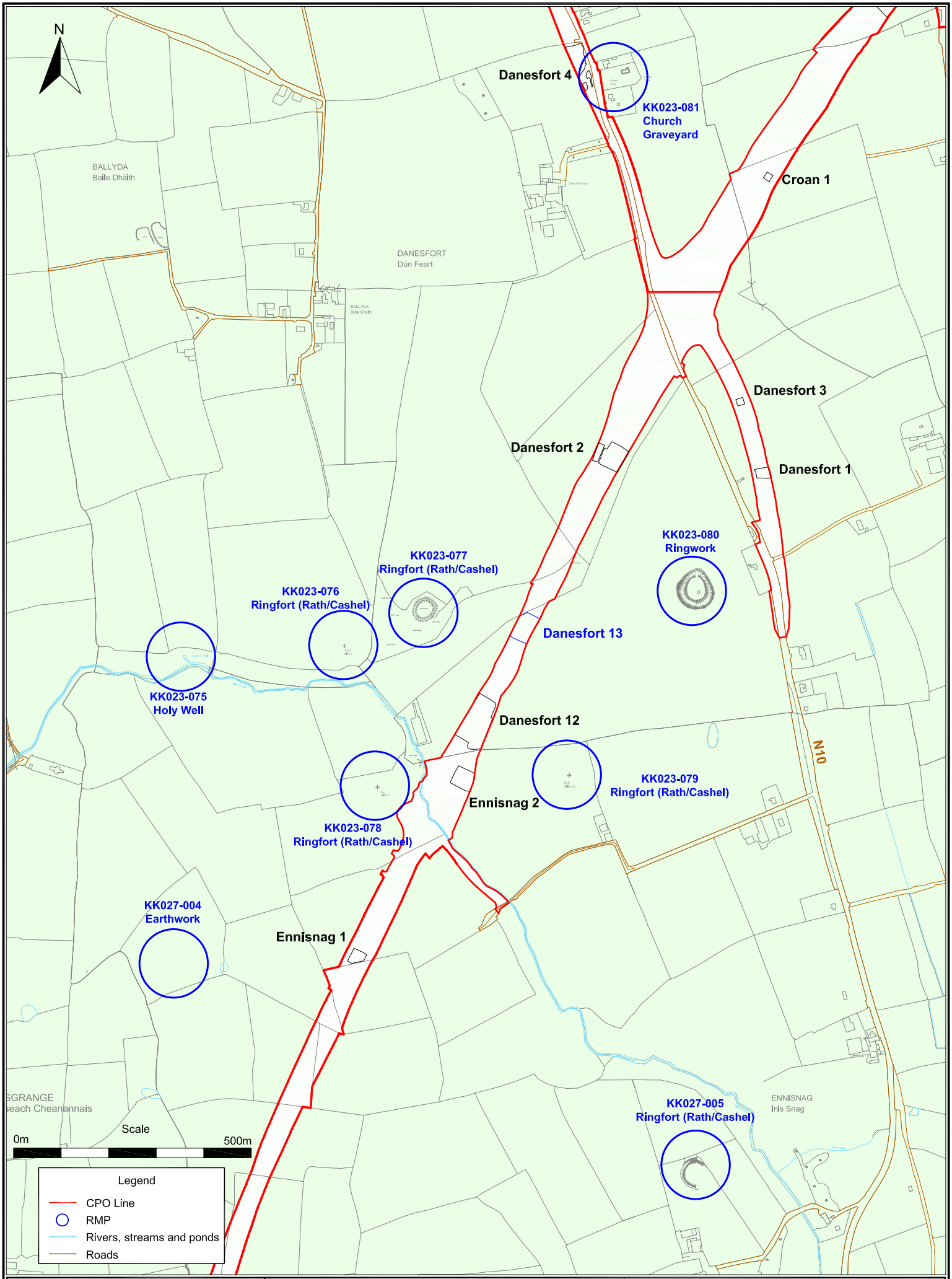

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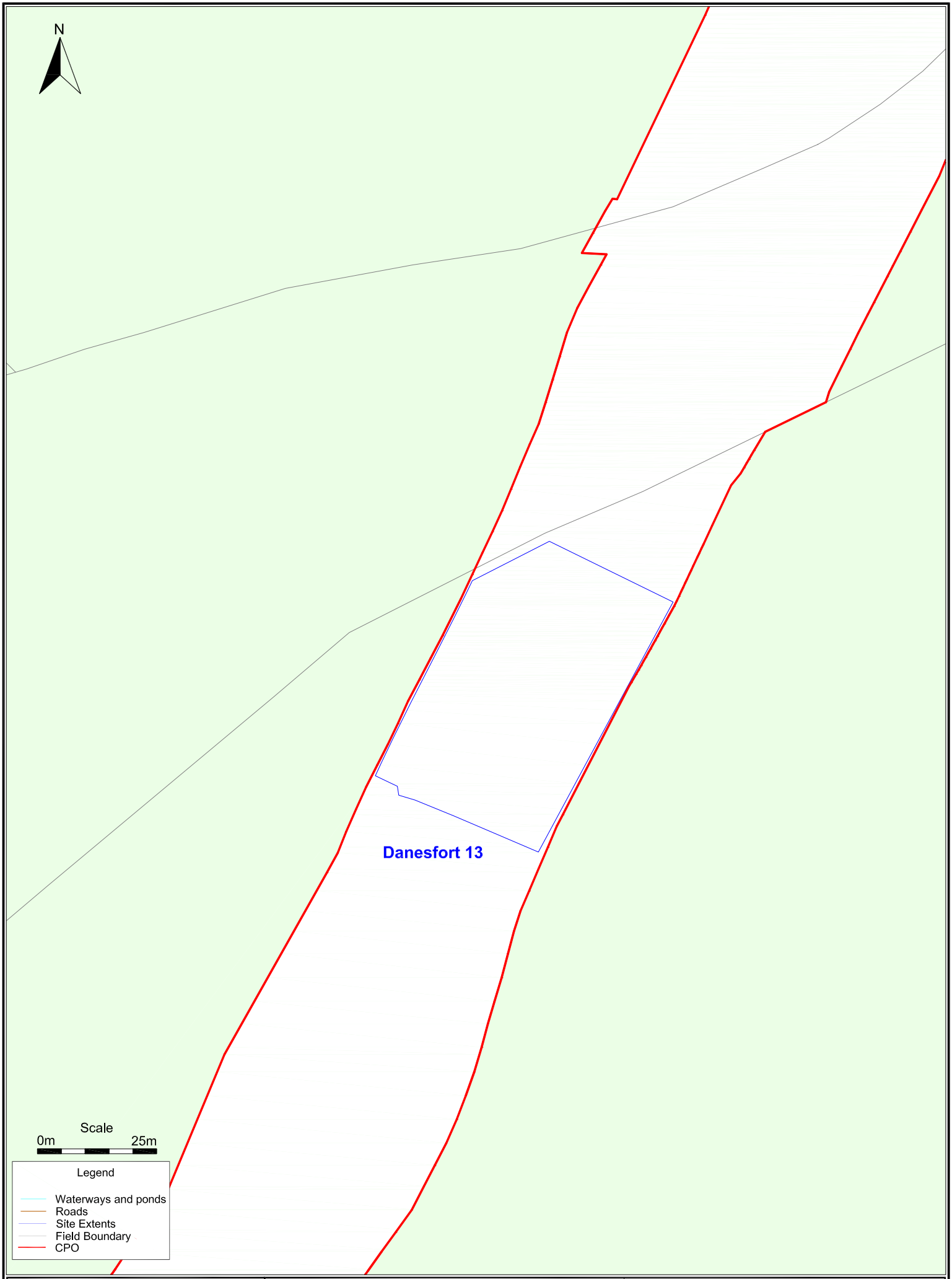

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Client:	Kilkenny County Council

Scale:	1:1000 @ A4
Date:	10/05/10
Produced by:	P Higgins
Job No:	J2432.1
Figure No:	3

N

Charcoal production pit C117

C123

C13

C61

53.404

Kiln C24

2B

C82

C79

2A

C33

251756, 146397

Limit of Excavation

C86

C28

C102

1A

C13

C39

Ring ditch C101

503 - 384 BC

1B

C35

Metalled surface (C92)

Smithing hearth C88/C73

C66

C93

C9

53.965

C125

3B

AD 7 - 125

Furnace C49

C5

C31

C104

3A

C18

C56

C54

C3

C14

251776, 146377

251756, 146377

C98

C96

53.850

C68

C20

C13

C23

C47

C40

C71

53.745

C58

Scale

0m 10m

Legend

- Phase 2 - Early Prehistory
- Phase 3 - Early Iron Age Funerary Activity
- Phase 4 - Middle Iron Age Industrial Activity
- Phase 5 - Undated Activity
- Sections
- CXX Cut numbers
- CXX Fill numbers
- Stone
- XXXXXXE XXXXXXN National Grid Reference
- XX.XXX Levels - metres OD

Title:	Danesfort 13 - Plan of site		
Project:	N9-N10 Phase 4: Knocktopher to Powerstown		
Client:	Kilkenny County Council		
Scale:	1:200 @A3	Job No:	J2432
Date:	01/07/10	Figure No:	4
Produced by:	P Higgins		

IAC Irish Archaeological Consultancy

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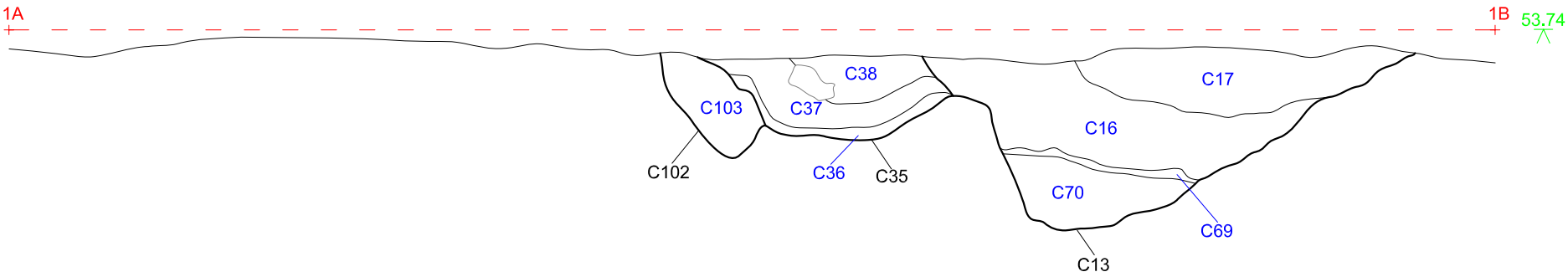
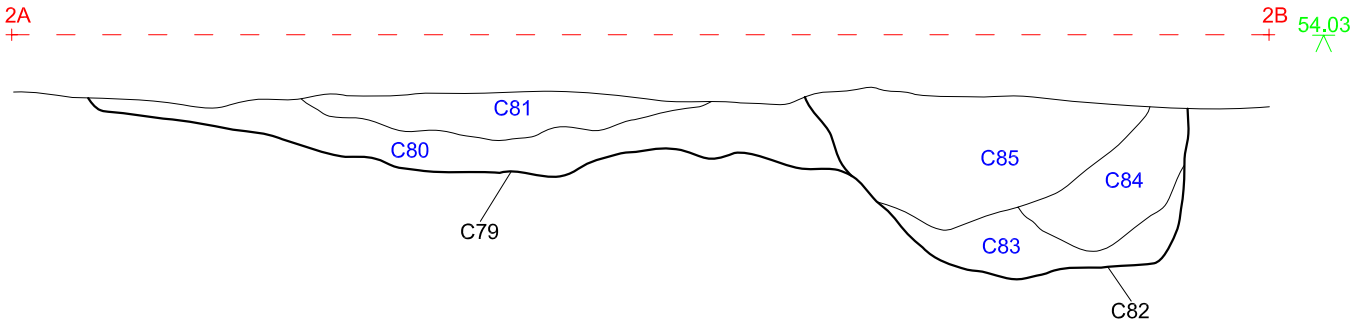
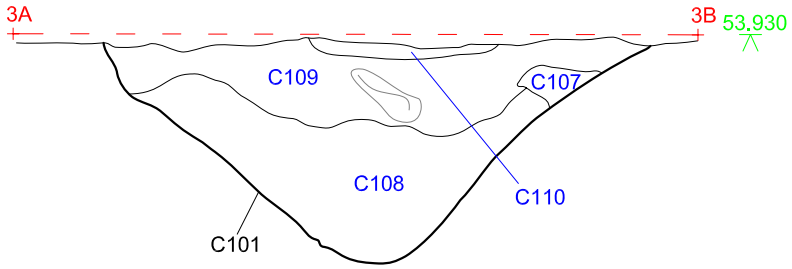


Southeast facing section of C79, C82,



ENE facing section of C101



Scale

0m 1m

Legend

CXX	Cut Numbers
CXX	Fill Numbers
	Stone
#	Charcoal
XX.XXX	Levels - metres OD

IAC Irish Archaeological Consultancy

Title:	Danesfort 13 - Section drawings of ringditch C101, pit C82 cutting pit C69, and field boundary ditch C13 with related features
Project:	N9-N10 Phase 4: Knocktopher to Powerstown
Client:	Kilkenny County Council

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Date:	01/07/10
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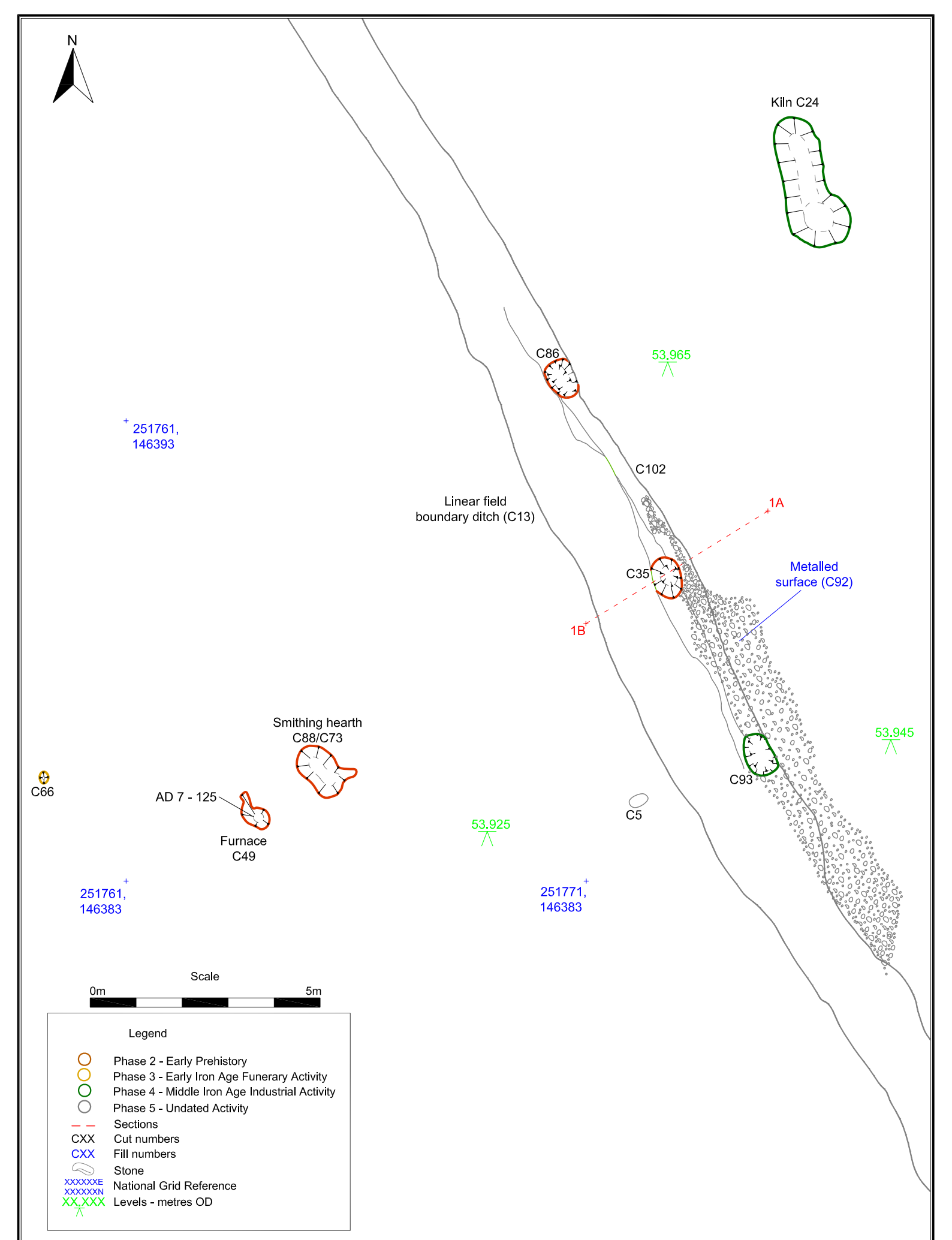

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Project:	N9/N10 Phase 4
Client:	Kilkenny County Council
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Date:	01/07/10
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Job No:	J2432
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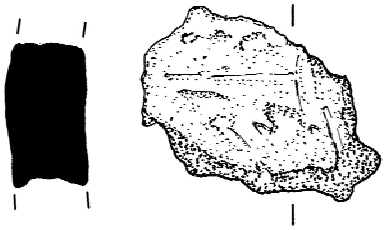

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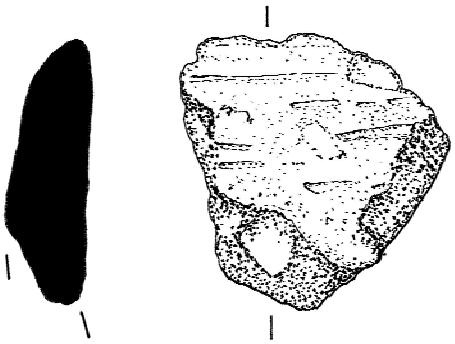

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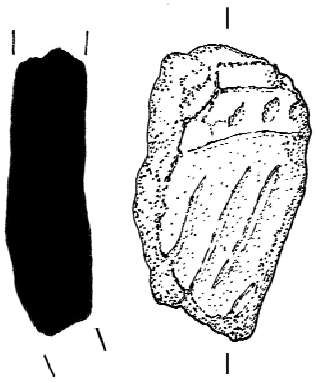

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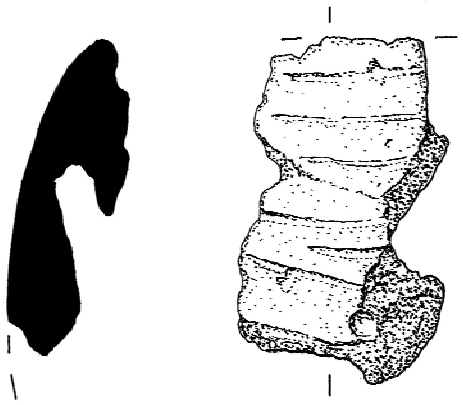

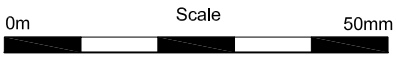

Illustration by Alva Mac Gowan

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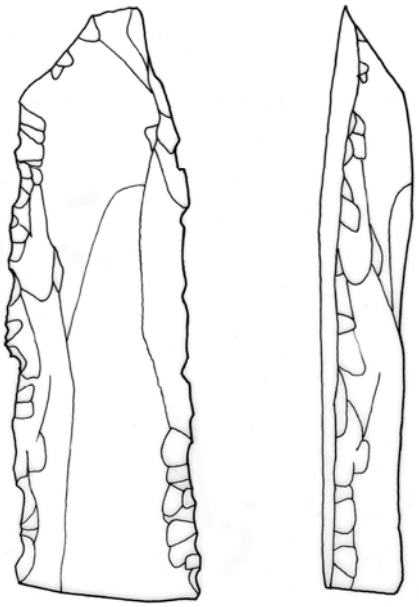

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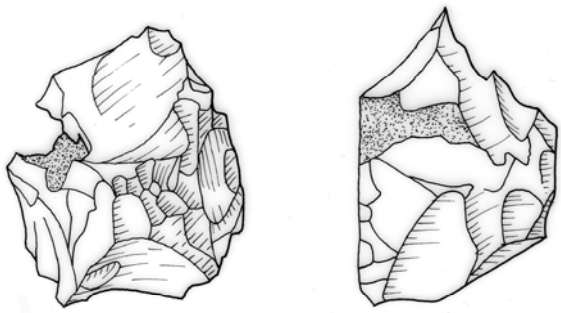

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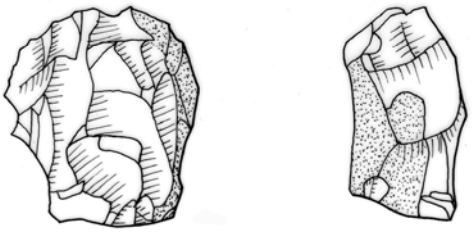

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Scale

0m 50mm

Illustration by Johnny Ryan

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	Project: N9-N10 Phase 4: Knocktopher to Powerstown	Produced by:	P Higgins
		Job No:	J2432.1
	Client: Kilkenny County Council	Figure No:	8

PLATES

Plate 1: Danesfort 13, post-excavation, facing NNW

Plate 2: Danesfort 13, post-excavation, facing north-east towards turret KK023-080

Plate 3: Pit C79 cut by pit C82, mid-excavation, facing north-west

Plate 4: Ringditch showing C110, mid-excavation, facing south-west

Plate 5: Ringditch and stone deposit C107, mid-excavation, facing north-west

Plate 6: Ringditch and asymmetrical deposition of basal fill C108, mid-excavation, facing south.

Plate 7: Cremation pit C66, pre-excavation, facing north

Plate 8: Field boundary ditch C13 and linear C123, post-excavation, facing north-west

Plate 9: Smithing hearth/charcoal production pit C73, mid-excavation, facing south-west

Plate 10: Slag furnace pit C49, mid-excavation, facing south-west

Plate 11: Furnace C49 (left) and slag furnace pit C73 (right), post-excavation, facing north-west

Plate 12: Linear ditch C13 and oval pits C35, post-excavation, metalled surface C92, pre-excavation, facing NNW

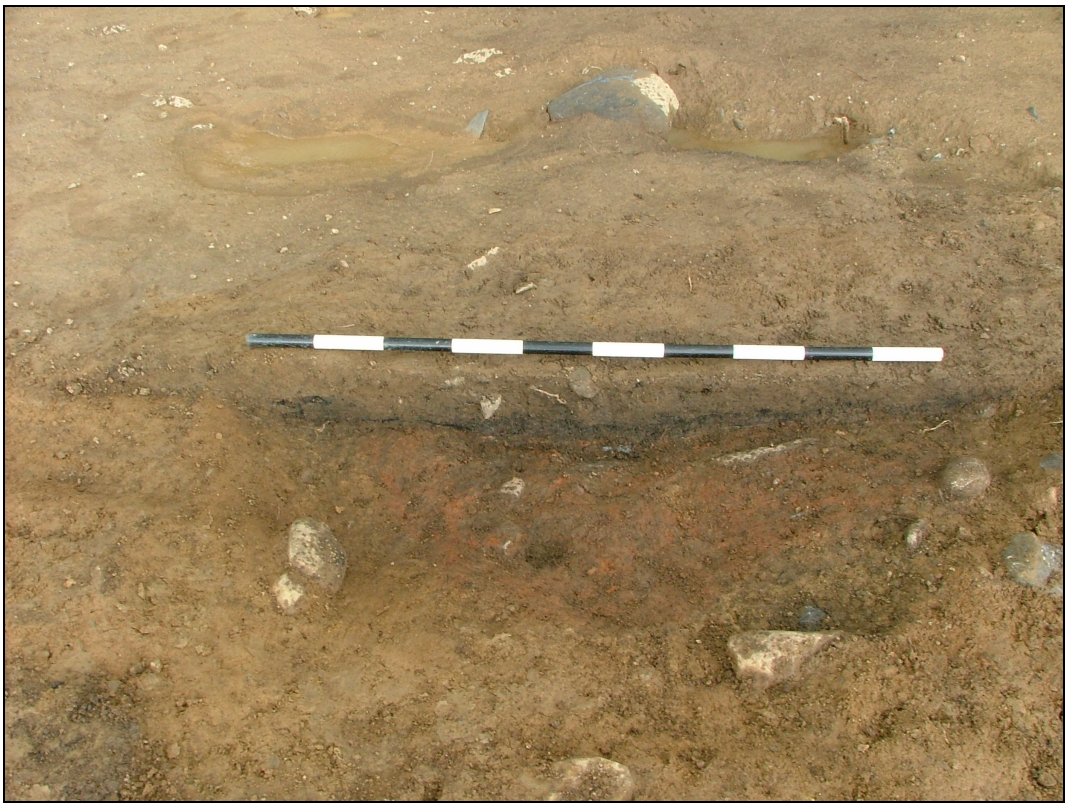

Plate 13: Possible charcoal production pit C117, mid-excavation, facing north-west

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				Topsoil	Dark brown sandy silty clay.		
2	N/A				Subsoil	Medium grey sandy gravelly clay.		
3	N/A	0.44	0.29	0.25	Cut of posthole	Oval in plan, sharp break of slope with steep sides leading to a concave base.	C4	C2
4	C3	0.44	0.29	0.25	Fill of posthole	Firmly compacted orange brown silty but fine sand with 1% charcoal and 2% pebbles.	C1	C3
5	N/A	0.40	0.26	0.39	Cut of posthole	Oval in shape e-w, straight break of slope on east side while gradual on the west side, gradual basal break of slope with a tapered round point.	C6	C2
6	C5	0.4	0.26	0.39	Fill of posthole	Loosely compacted dark greyish brown sandy silt with 10% charcoal.	C1	C5
7	N/A	2.73	0.40	0.12	Cut of linear feature	Linear, gradual break of slope with concave sides and a flat base.	C8	C2
8	C7	2.73	0.40	0.12	Fill of linear feature	Loosely compacted yellowish brown sandy silt with no inclusions.	C1	C7
9	N/A	0.82	0.36	0.12	Cut of pit	Oval in shape, sharp break of slope with vertical sides on the north side and gradual on the south side, sharp basal break of slope leading to a flat base.	C10	C2
10	C9	0.82	0.36	0.12	Fill of pit+G34	Firmly compacted brown silty clay with 10% charcoal.	C1	C9
11	N/A	2.32	0.32	0,13	Plough furrow	Linear feature. Gradual break of slope n top with concave sides leading to a gradual basal break of slope and a flat base.	C12	C2
12	C11	2.32	0.32	0,13	Fill of plough furrow	Loosely compacted yellowish brown sandy silt with no inclusions.	C1	C11
13	N/A	44.0	1.65	0.55	Linear ditch	Linear feature. Gradual break of slope with sloping sides leading to a gradual basal break of slope and a concave base.	C70	C38
14	N/A	0.61	0.53	0.10	Cut of poss.pit	Oval in shape, sharp break of slope with concave sides leading to a gradual basal break of base and a flat base.	C15	C2
15	C14	0.61	0.53	0.10	Fill of possible pit	Tightly compacted mid brown sandy silt with 20% charcoal and 3% stones.	C1	C14
16	C13	4.40	1.65	1.00	Fill of ditch	Tightly compacted light brown grey silty clay with occasional slag, grit pebbles, charcoal and tiny lumps of burnt/sun dried clay.	C17	C69
17	N/A	44.0	1.65	0.35	Siltage	Tightly compacted light grey brown silt with 7% grit, <1% charcoal and very occasional slag.	C1	C16

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
18	N/A	0.54	0.30	0.16	Cut of posthole	Oval in shape, sharp break of slope with straight sides leading to a gradual basal break of slope on the north-east side while sharp on the other side. Leads to an oval base.	C19	C2
19	C18	0.54	0.30	0.11	Fill of posthole	Loosely compacted brownish red silty sand with 10% small stones and occasional charcoal.	C1	C18
20	N/A	0.37	0.34	0.26	Cut of posthole	Circular shape. Sharp break of slope with steep sides, gradual basal break of slope leading to a concave base.	C21	C2
21	C20	0.37	0.20	0.18	Fill of posthole	Loosely compacted brown silty clay with occasional charcoal and small stones.	C22	C2
22	C20	0.34	0.32	0.06	Top fill of posthole	Loosely compacted dark brown silty clay with occasional charcoal and 10% small stones.	C1	C21
23	N/A	0.58	0.44	0.04	Shallow deposit	Loosely compacted brown sandy silt with 15% small stones and occasional charcoal.	C1	C2
24	N/A	2.90	1.30	0.64	Cut of irregular pit	Key hole shaped. Sharp break of slope with steep sides leading to a gradual basal break of slope and an uneven base.	C45	C2
25	C24	2.85	1.30	0.31	Top fill of irregular pit	Moderately to tightly compacted brown silty sand with stones within.	C27	C25
26	C24	2.43	1.26	0.17	Middle fill of irregular pit	Moderately compacted light brown sandy silt with some grey clay and orange flecks throughout.	C25	C44
27	C24	0.11	0.23	0.04	Charcoal lens in irregular pit	Tightly compacted black dark brown silty soil with 70% charcoal.	C1	C25
28	N/A	2.35	1.10	0.50	Cut of pit	Irregularly oval in shape. Gradual break of slope in south and west while sharp in north-east and west, concave sides leading to a gradual basal break in slope and an uneven base.	C29	C2
29	C28	0.76	0.35	0.15	Fill of pit	Loosely compacted light brown yellow silty clay with 10% small stones.	C30	C28
30	C28	2.00	1.10	0.50	Fill of pit	Loosely compacted dark brown silty clay with 10% small stones.	C1	C29
31	N/A	0.58	0.35	0.13	Cut of posthole	Oval in shape. Gradual break of slope with vertical sides leading to a gradual basal break of slope and a flat base.	C32	C2
32	C31	0.58	0.35	0.13	Fill of posthole	Loosely compacted brown silty sand with less than 1% charcoal and 5% medium pebbles.	C1	C31
33	N/A	0.50	0.34	0.37	Cut of posthole	Oval in shape. Sharp break of slope with sloping sides. Basal break of slope is gradual with a concave base.	C34	C2
34	C33	0.50	0.34	0.37	Fill of posthole	Loosely compacted medium brown silty sand with 2% charcoal, 5% burnt clay and 1% slag.	C1	C33
35	N/A	0.90	0.70	0.27	Cut of pit	Oval in shape. Sharp break of slope with concave sides leading to a gradual basal break of slope and a flat base.	C36	C2

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
36	C35	0.80	0.70	0.05	Bottom fill of pit	Loosely compacted dark blackish brown with reddish lumps of burnt soil sandy clay. Also 5% charcoal.	C37	C35
37	C35	0.90	0.77	0.23	Fill of pit	Loosely compacted dark blackish brown clayey silt with 90% charcoal and some slag.	C38	C36
38	C35	0.50	0.45	0.19	Upper fill of pit	Tightly compacted mid brownish grey clayey sand with 20% charcoal and 10% small stones.	C13	C37
39	N/A	0.40	0.38	0.07	Deposit	Circular in shape, loosely compacted light greyish brown silty sand with 1–5% charcoal.	C1	2
40	N/A	1.88	1.00	0.39	Cut of pit	Oval shaped. Gradual break of slope in north and east while sharp in west and south. Sloping sides leading to a concave base.	C41	C2
41	C40	0.98	0.48	0.11	Bottom fill of pit	Loosely compacted dark brown silty clay with occasional charcoal and small stones.	C42	C40
42	C40	1.88	1.00	0.30	Fill of pit	Tightly compacted reddish brown silty clay with occasional charcoal and small stones.	C43	C41
43	C40	1.05	0.99	0.18	Upper fill of pit	Light brown yellow sandy silt with 10% big stones and occasional charcoal.	C1	C42
44	C24	2.20	1.24	0.24	Fill of irregular pit	Tightly compacted light brown sandy clay with stones throughout.	C26	C45
45	C24	0.32	0.27	0.59	Fill of irregular pit	Tightly compacted orange brown soil with clay and stones throughout.	C44	C24
46	N/A	11.20	1.70	0.03	Occupation deposit	Loosely compacted light grey brown silty clay with 3% charcoal , 3% burnt clay and 3% slag.	C1	C92
47	N/A	0.40	0.38	0.22	Cut of posthole	Circular in shape, gradual break of slope on north and east side, sharp on other side, straight sides leading to a round base.	C48	C2
48	C47	0.40	0.38	0.22	Fill of posthole	Firmly compacted reddish brown silty clay with small stones and occasional charcoal.	C43	C2
49	N/A	0.95	0.38	0.25	Cut of furnace	Oval in shape, sharp break of slope with vertical sides leading to a gradual basal break and an irregular base.	C51	C2
50	C49	0.58	0.05	0.25	Fill of furnace	Tightly compacted reddened natural.	C51	C49
51	C49	0.68	0.43	0.05	Bottom fill of furnace	Loosely compacted black silty sand, rich in charcoal.	C52	C49
52	C49	0.50	0.30	0.11	Middle fill of furnace	Loosely compacted dark grey silty sand with a large amount of iron within.	C53	C51
53	C49	0.68	0.34	0.19	Top layer of furnace	Loosely compacted mottled grey silty clay with very light brown clay throughout.	C1	C52
54	N/A	0.44	0.42	0.14	Cut of posthole	Oval in shape, sharp break of slope with straight sides, sharp basal break of slope leading to a concave base.	C55	C2

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
55	C54	0.44	0.42	0.14	Fill of posthole	Loosely compacted light brown grey silty sand with small and large stones throughout.	C1	C54
56	N/A	0.51	0.29	0.15	Cut of pit	Oval in shape, sharp break of slope with steep sides leading to a sharp basal break of slope and a flat base.	C57	C55
57	C56	0.51	0.29	0.15	Fill of pit	Loosely compacted medium brown silty clay with small stones and roots throughout.	C1	C56
58	N/A	0.50	0.40	0.07	Cut of pit	Oval in shape, gradual break of slope with gradual sides, basal break of slope is imperceptible with a concave base.	C60	C2
59	C58	0.50	0.40	0.04	Bottom fill of poss. pit	Loosely compacted yellowish brown sandy silt with occasional charcoal.	C60	C58
60	C58	0.30	0.40	0.25	Top fill of poss.pit	Loosely compacted brown yellowish silty clay with 5% charcoal.	C1	59
61	N/A	0.82	0.30	0.30	Cut of pit	Oval in shape, gradual break of slope with sloping sides, gradual basal break of slope with a concave base.	C62	C2
62	C61	0.82	0.30	0.30	Fill of pit	Loosely compacted light brown silty clay with 5% fine pebbles.	C63	C61
63	N/A	0.45	0.22	0.21	Cut of pit	Oval in shape, gradual break of slope with sloping sides, gradual basal break of slope with a concave base.	C64	C62
64	C63	0.45	0.22	0.21	Fill of pit	Loosely compacted brown silty clay with 15% fine pebbles.	C65	C63
65	C61	1.10	0.26	0.11	Deposit -fill of pit	Loosely compacted greyish brown sandy clay with moderate charcoal and infrequent stones.	C1	C64
66	N/A	0.25	0.21	0.07	Cut of cremation pit	Oval in shape, gradual break of slope with sloping sides, gradual basal break of slope with a concave base.	C78	C2
67	C68	0.50	0.43	0.15	Fill of pit	Firmly compacted greyish brown silty sand with stones and infrequent charcoal.	C1	C68
68	N/A	0.50	0.43	0.15	Cut of pit	Oval in shape, gradual break of base with steep sides, gradual basal break of slope leading to a flat base.	C67	C2
69	C13	2.50	0.62	0.04	Fill of ditch	Firmly compacted greyish yellow clayey sand with no inclusions.	C13	C70
70	C13	2.50	0.64	0.20	Bottom fill of ditch	Firmly compacted light brown grey silty clay with 1% slag, 5% grit pebbles, 2% charcoal and 1% tiny lumps of sun burnt dried clay.	C69	C13
71	N/A	0.83	0.64	0.25	Cut of pit	Irregular in shape, gradual break of slope with sloping sides and an uneven base.	C72	C2
72	C71	0.83	0.64	0.25	Fill of pit	Firmly compacted dark greyish brown silty clay with 7% charcoal and 5% stones.	C1	C71
73	N/A	1.20	0.75	0.12	Cut of kiln	Oval in shape, gradual break of base with sloping sides, gradual basal break of slope with a flat base.	C77	C2
74	C73	1.20	0.72	0.05	Fill of kiln	Loosely compacted dark brown silty clay with 30% charcoal and	C75	C77

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
						some small stones.		
75	C73	1.08	0.69	0.08	Fill of kiln	Firmly compacted yellowish brown clayey silt with 4–6 large stones, charcoal and 10% small stones.	C76	C74
76	C73	0.49	0.61	0.07	Fill of kiln	Tightly compacted yellow clayey silt with charcoal and small stones.	C1	C75
77	C73	0.71	0.53	0.01	Scorched base of charcoal producing kiln	Tightly compacted red clay with 10% stones and some charcoal.	C74	C73
78	C66	0.25	0.21	0.07	Fill of cremation pit	Tightly compacted mid brown sandy silt with 20% burnt bone.	C1	C66
79	N/A	1.86	0.90	0.22	Cut of pit	Oval in shape, break of slope is imperceptible with convex sides leading to an uneven base.	C80	C2
80	C79	1.80	0.90	0.16	Fill of pit	Firmly compacted brown silty sand with occasional charcoal.	C81	C2
81	C79	1.06	0.90	0.12	Top fill of pit	Firmly compacted light yellowish brown silty sand with occasional charcoal.	C82	C80
82	N/A	1.10	1.00	0.48	Cut of pit	Oval in shape, sharp break of slope in Eastern side while vertical on western side with gradual sides leading to a gradual basal break of slope and a concave base.	C83	C80
83	C82	1.10	0.72	0.19	Fill of pit	Firmly compacted brown silty sand with 30% charcoal and 1–3% gravel.	C84	C80
84	C82	0.90	0.30	0.28	Fill of pit	Firmly compacted brownish grey silty sand with frequent charcoal.	C85	C83
85	C82	1.10	0.87	0.35	Fill of pit	Loosely compacted light brown sandy silt with frequent charcoal and angular mid sized stones.	C1	C84
86	N/A	0.86	0.63	0.32	Cut of pit	Irregular oval shape, gradual break of slope with sloping sides, gradual basal break of slope leading to a flat base.	C91	C102
87	C86	0.87	0.51	0.13	Fill of pit	Tightly compacted light brown silty sand with stones, slag and charcoal.	C17	C91
88	N/A	0.51	0.20	0.07	Cut of linear feature	Linear, gradual break of slope with gradual sides leading to a gradual basal break of base and a concave base.	C89	C2
89	C88	0.51	0.20	0.07	Fill of linear feature	Loosely compacted dark brown silty clay with 30% charcoal.	C1	C88
90	C49	0.23	0.10	0.05	Fill of pit	Loosely compacted light brown sandy silt with small amount of charcoal and some small stones.	C1	C53
91	C86	0.87	0.49	0.27	Fill of pit	Firmly compacted greyish brown sandy silt with stones, charcoal and slag within.	C87	C86
92	N/A	11.20	1.70	0.06	Deposit of stones beside ditch	Tightly compacted grey soil with sub angular and sub-rounded stones within.	C46	C2
93	N/A	0.93	0.59	0.30	Cut of pit	Oval in shape, sharp break of slope with vertical sides leading to a	C94	C103

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
						sharp basal break of slope and a flat base.		
94	C93	0.91	0.51	0.29	Fill of pit	Firmly compacted brownish yellow silty clay with 15% small and big stones and some charcoal.	C95	C93
95	C93	0.92	0.45	0.28	Fill of pit	Loosely compacted dark brown sandy clay with 15% big stones, charcoal and slag.	C46	C94
96	N/A	1.14	1.00	0.20	Cut of pit	Oval in shape, sharp break of slope with sloping corners, gradual basal break of slope leading to an oval base.	C97	C2
97	C96	1.14	1.00	0.20	Fill of pit	Loosely compacted greyish brown silty sand with stones and charcoal within.	C1	C96
98	N/A	1.06	0.80	0.35	Cut of pit	Irregular oval shape, sloping break of slope with gradual sides and a concave base.	C99	C2
99	C98	0.45	0.62	0.28	Fill of pit	Loosely compacted grey silty clay with 10% small stones and infrequent charcoal.	C100	C98
100	C98	0.45	0.74	0.15	Fill of pit	Loosely compacted brownish grey silty clay with 10% small stones.	C1	C99
101	N/A	8.10	7.90	0.68	Cut of ringditch	Circular shape in plan, sharp break of slope with sloping sides leading to gradual basal break of slope a concave base.	C108	C126
102	N/A	13.50	0.41	0.30	Cut of linear feature	Linear, gradual break of slope with concave sides leading to an imperceptible basal break of slope and a concave base.	C103	C2
103	C102	13.20	0.41	0.23	Fill of linear feature	Loosely compacted mid brown silty clay with occasional charcoal and moderate stones and pebbles.	C1	C102
104	N/A	1.20	1.16	0.34	Cut of pit	Sub-circular in shape, gradual break of slope with sloping sides leading to a gradual basal break of base and a concave base.	C105	C2
105	C105	1.20	1.16	0.34	Fill of pit	Loosely compacted reddish brown silty sand with <3% charcoal and 15% stones.	C106	C104
106	C106	1.20	1.16	0.34	Fill of pit	Very loosely compacted mid greyish brown silty sand with >10% charcoal and <15% stones.	C1	C105
107	C101	8.10	0.50	0.51	Fill of ringditch	Loosely compacted stony fill.	C109	C108
108	C101	8.10	1.87	0.45	Bottom fill of ringditch	Firmly compacted yellowish grey clayey sand with 1–2% charcoal, 3% grit/gravel and 2% small stones.	C107	C101
109	C101	8.10	1.30	0.22	Upper fill of ringditch	Softly to firmly compacted dark brown silt with occasional charcoal.	C110	C107
110	C101	8.10	1.17	0.07	Fill of ringditch	Loosely compacted dark brown to black silt with 10% charcoal flecks and cremated bone.	C1	C109
111	N/A	0.52	0.48	0.17	Natural hollow?	Oval in shape, gradual break of slope with concave sides, gradual basal break of slope leading to a concave base.	C112	C2

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
112	C111	0.52	0.48	0.17	Non-archaeological hollow	Loosely compacted brown decayed peat/silt with small pebbles throughout.	C1	C111
113	N/A	0.52	0.41	0.28	Natural hollow	Oval in shape, gradual break of base with concave sides, gradual basal break of base with a concave base.	C114	C2
114	C113	0.52	0.41	0.28	Fill of non-archaeological hollow	Loosely compacted brown decayed peat/silt with small pebbles throughout.	C1	C113
115	N/A	0.60	0.38	0.26	Natural hollow	Oval in shape, gradual break of slope with concave sides, gradual basal break of slope leading to a concave base.	C116	C2
116	C115	0.60	0.38	0.26	Non-archaeological hollow	Loosely compacted brown peat, no inclusions.	C1	C115
117	N/A	2.70	2.10	0.21	Cut of hearth	Irregular shape, break of slope is imperceptible on south side, gradual on the west and sharp on the east and north side, sloping sides leading to an imperceptible basal break of base and an irregular base.	C118	C2
118	C117	0.90	0.74	0.03	Fill of hearth	Tightly compacted red clay with charcoal.	C119	C2
119	C117	0.92	0.80	0.06	Fill of hearth	Loosely compacted black silty clay with >70% charcoal and some stones.	C120	C118
120	C117	2.45	2.10	0.17	Deposit	Firmly compacted dark brown silty clay with stone and charcoal inclusions.	C1	C119
121	N/A	0.59	0.54	0.26	Geological formation	Oval in shape, gradual break of slope with sloping sides, gradual basal break of slope with a concave base.	C122	C2
122	C121	0.59	0.54	0.26	Fill of geological formation	Loosely compacted dark brown sandy clay with 5% small stones.	C1	C121
123	N/A	3.50	0.53	0.30	Cut of linear feature	U shaped, sharp break of slope with sloping sides leading to a gradual basal break of slope and a concave base.	C124	C2
124	C123	3.50	0.53	0.30	Fill of linear feature	Moderately compacted black/dark brown silty soil with 5% charcoal, 10% stones and 70% soil.	C1	C123
125	N/A	0.43	0.17	0.08	Cut of poss. furrow	Linear, sharp break of slope with stepped sides, basal break of slope is gradual while base is concave.	C126	C2
126	C125	0.43	0.17	0.08	Fill of furrow	Tightly compacted mid greyish brown silty sand with occasional charcoal >10%.	C1	C125

Appendix 1.2 Catalogue of Artefacts

Registration Number	Context	Item No.	Simple Name	Full Name	Material	Description	No. of Parts
E3617:001:001	1	1	Debitage	Flint debitage	Flint	Flint debitage	N/A
E3617:001:002	1	2	Blade	Flint blade	Flint	A flint blade produced on a single-platform or dual opposed platform core	N/A
E3617:016:001	16	1	Waste	Copper alloy waste	Copper alloy	A small piece of copper alloy waste which is roughly oval in shape and narrows at one end	N/A
E3617:016:002	16	2	Blade	Chert blade	Chert	A very large chert blade produced on a single-platform or dual opposed platform core. It is missing its proximal end.	N/A
E3617:017:001	17	1	Flake	Flint flake	Flint	A burnt flint flake produced on a single-platform core	N/A
E3617:025:001	25	1	Chunk	Natural chunk of chert	Chert	Natural chunk of chert	N/A
E3617:044:001	44	1	Bead	Blue glass bead	Glass	A very small blue glass bead. Semi-translucent, annular with a straight perforation	N/A
E3617:080:001	80	1	Debitage	Flint debitage	Flint	Flint debitage	N/A
E3617:080:002	80	2	Flake	Flint flake	Flint	A burnt flint flake produced on a single-platform core	N/A
E3617:080:003	80	3	Core	Flint core	Flint	A burnt, flint, dual opposed, platform blade core which was produced on a beach pebble	N/A
E3617:080:004	80	4	Flake	Flint flake	Flint	A burnt flint flake produced on a single-platform core	N/A
E3617:080:005	80	5	Blade	Flint blade	Flint	A burnt flint blade produced on a single-platform or dual opposed platform core and displays use-wear on its right edge	N/A
E3617:080:006	80	6	Flake	Flint flake	Flint	A burnt flint flake produced on a single-platform core	N/A
E3617:080:007	80	7	Debitage	Flint debitage	Flint	Flint debitage	N/A
E3617:080:008	80	8	Blade	Flint blade	Flint	A burnt flint blade produced on a single-platform or dual opposed platform core and displays use-wear on its right edge	N/A
E3617:080:009	80	9	Blade	Flint blade	Flint	A burnt flint blade produced on a single-platform or dual opposed platform core. It shows the remnants of a one-sided crest on its dorsal surface	N/A
E3617:080:010-15	80	10–15	Debitage	Flint debitage	Flint	Flint debitage	N/A
E3617:080:016	80	16	Blade	Flint blade	Flint	A burnt flint blade produced on a single-platform or dual opposed platform core	N/A
E3617:081:001	81	1	Debitage	Flint debitage	Flint	Flint debitage	N/A
E3617:081:002	81	2	Blade	Flint blade	Flint	A burnt flint blade produced on a single-platform or dual opposed platform core	N/A

Registration Number	Context	Item No.	Simple Name	Full Name	Material	Description	No. of Parts
E3617:081:003	81	3	Core	Flint core	Flint	A burnt, flint, dual opposed, platform blade core which was produced on a beach pebble	N/A
E3617:081:004	81	4	Debitage	Flint debitage	Flint	Flint debitage	N/A
E3617:081:005	81	5	Flake	Flint flake	Flint	A burnt flint flake produced on a single-platform core. This is a core rejuvenation flake.	N/A
E3617:081:006	81	6	Blade	Chert blade	Chert	A chert blade produced on a single-platform or dual opposed platform core and displays use-wear on its right edge	N/A
E3617:085:1	85	1	Bowl	Rimsherd of middle Neolithic pottery	Ceramic	A rimsherd of a simple middle Neolithic globular bowl, vessel is decorated with horizontal lines, fingernail impressions and stab marks	N/A
E3617:085:2	85	2	Bowl	Bodysherd of middle Neolithic pottery	Ceramic	A bodysherd of a simple middle Neolithic globular bowl, vessel is decorated with horizontal lines, fingernail impressions and stab marks	N/A
E3617:085:3	85	3	Bowl	Bodysherd of middle Neolithic pottery	Ceramic	A bodysherd of a simple middle Neolithic globular bowl, vessel is decorated with horizontal lines, fingernail impressions and stab marks	N/A
E3617:085:4	85	4	Bowl	Fragment of middle Neolithic pottery	Ceramic	A fragment of a simple middle Neolithic globular bowl, vessel is decorated with horizontal lines, fingernail impressions and stab marks	N/A
E3617:085:5	85	5	Bowl	Fragment of middle Neolithic pottery	Ceramic	A fragment of a simple middle Neolithic globular bowl, vessel is decorated with horizontal lines, fingernail impressions and stab marks	N/A
E3617:085:6	85	6	Bowl	Fragment of middle Neolithic pottery	Ceramic	A fragment of a simple middle Neolithic globular bowl, vessel is decorated with horizontal lines, fingernail impressions and stab marks	N/A
E3617:085:7	85	7	Bowl	Fragment of middle Neolithic pottery	Ceramic	A fragment of a simple middle Neolithic globular bowl, vessel is decorated with horizontal lines, fingernail impressions and stab marks	N/A
E3617:085:8	85	8	Bowl	Bodysherd of middle Neolithic pottery	Ceramic	A bodysherd of a simple middle Neolithic globular bowl, vessel is decorated with horizontal lines, fingernail impressions and stab marks	N/A
E3617:085:9	85	9	Bowl	Fragment of middle Neolithic pottery	Ceramic	A fragment of a simple middle Neolithic globular bowl, vessel is decorated with horizontal lines, fingernail impressions and stab marks	N/A
E3617:085:10	85	10	Bowl	Fragment of middle Neolithic pottery	Ceramic	A fragment of a simple middle Neolithic globular bowl, vessel is decorated with horizontal lines, fingernail impressions and stab marks	N/A

Registration Number	Context	Item No.	Simple Name	Full Name	Material	Description	No. of Parts
E3617:085:11	85	11	Bowl	Fragment of middle Neolithic pottery	Ceramic	A fragment of a simple middle Neolithic globular bowl, vessel is decorated with horizontal lines, fingernail impressions and stab marks	N/A
E3617:085:12	85	12	Bowl	Rimsherd of middle Neolithic pottery	Ceramic	A rimsherd of a simple middle Neolithic globular bowl, vessel is decorated with horizontal lines, fingernail impressions and stab marks	N/A
E3617:085:13	85	13	Bowl	Fragment of middle Neolithic pottery	Ceramic	A fragment of a simple middle Neolithic globular bowl,vessel is decorated with horizontal lines, fingernail impressions and stab marks	N/A
E3617:085:14	85	14	Bowl	Fragment of middle Neolithic pottery	Ceramic	A fragment of a simple middle Neolithic globular bowl, vessel is decorated with horizontal lines, fingernail impressions and stab marks	N/A
E3617:085:15	85	15	Bowl	Fragment of middle Neolithic pottery	Ceramic	A fragment of a simple middle Neolithic globular bowl, vessel is decorated with horizontal lines, fingernail impressions and stab marks	N/A
E3617:103:001	103	1	Flake	Flint flake	Flint	A bipolar flint flake	N/A
E3617:105:001	105	1	Debitage	Flint debitage	Flint	Flint debitage	N/A
E3617:108:001	108	1	Flake	Flint flake	Flint	A burnt, bipolar flint flake. An attempt was made to use this as a bipolar core	N/A
E3617:109:001	109	1	Scraper	Flint convex end scraper	Flint	A possible flint convex end scraper which is missing its proximal end	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 45 soil samples were taken from features at Danesfort 13 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 bone	animal bone	human bone	metallurgical waste	Other
C1	60	Topsoil						17.1g	
C15	2	Possible pit	0.2g					25.7g	
C16	10	Linear ditch						1200g	
C17	11	Linear ditch						179.5g	
C25	5	Pit/tree bole						1.2g	
C26	6	Pit/tree bole						1.5g	
C34	3	Posthole	0.8g	1.4g				25.4g	
C34	4	Posthole						12.6g	
C37	13	Pit						6000g soil	
C37	16	Pit						510.8g	
C38	12	Pit	2.4g					74.9g	
C38	22	Pit						168g	
C41	8	Possible pit	0.7g						
C44	7	Pit/tree bole	0.4g					0.1g	
C46	19	Deposit							
C46	48	Deposit						225.4g	
C46	50	Deposit						384.1g	
C51	27	Furnace						226.4g	
C51	30	Furnace	24.4g	0.1g				104.4g	
C52	26	Furnace						447.3g	
C53	29	Furnace						595.8g	
C70	9	Linear ditch						314.7g	
C72	20	Possible pit	0.6g						
C78	23	Cremation pit			50.5g				
C78	24	Cremation pit			132.1g				

Context #	Sample #	Feature type i.e. Structure A, hearth C45	charcoal	Seeds and charcoal	Burnt bone	animal bone	human bone	metallurgical waste	Other
C84	39	Pit						24.2g	
C85	40	Pit						206.9g	
C94	35	Pit						405.3g	
C95	44	Pit						6000g	
C95	45	Pit						800g	
C99	36	Pit	1.8g						
C103	38	Curvilinear	3.7g						
C105	46	Pit	1.4g	0.2g					
C106	47	Pit	12.2g						
C108	65	Ringditch	3.5g	6.9g					
C108	66	Ringditch	0.3g						
C108	68	Ringditch	0.6g						
C109	63	Ringditch	0.6g	<0.1g					
C110	52	Ringditch	38.0g	<0.1g	0.2g				? insects
C110	54	Ringditch	13.5g	0.1g					
C110	55	Ringditch	34.8g	<0.1g					
C110	56	Ringditch	0.7g	<0.1g					
C110	59	Ringditch						24g	
C119	51	Hearth	29.0g	0.2g					
C124	57	Curvilinear	0.4g						

Appendix 1.4 Archive Checklist

Project: N9/N10 Phase 4 Knocktopher to Powerstown		
Site Name: Danesfort 13		
Excavation Registration Number: E3617		
Site director: Richard Jennings		
Date: January 2011		
Field Records	**Items (quantity)**	**Comments**
Site drawings (plans)	19	8 pre-ex, 1 mid-ex, 13 post-ex 10 section sheets
Site sections, profiles, elevations	13	
Other plans, sketches, etc.	0	
Timber drawings	0	
Stone structural drawings	0	
Site diary/note books		
Site registers (folders)	1	
Survey/levels data (origin information)		
Context sheets	126	
Wood Sheets	0	
Skeleton Sheets	0	
Worked stone sheets	0	
Digital photographs	187	
Photographs (print)	0	
Photographs (slide)	0	

APPENDIX 2 SPECIALIST REPORTS

Appendix 2.1 Prehistoric Pottery Report – Eoin Grogan & Helen Roche

Appendix 2.2 Lithics Report – Farina Sternke

Appendix 2.3 Small Finds Report – Siobhán Scully

Appendix 2.4 Charcoal and Wood Report – Lorna O'Donnell

Appendix 2.5 Plant Remains Analysis Report – Penny Johnston

Appendix 2.6 Animal Bone Report – Aoife McCarthy

Appendix 2.7 Metallurgical Waste Analysis Report – Angela Wallace

Appendix 2.8 Radiocarbon Dating Results – QUB Laboratory

Appendix 2.1 Prehistoric Pottery Report – Eoin Grogan & Helen Roche

N9/N10 Knocktopher to Powerstown
The Prehistoric Pottery Assemblage from Danesfort 13, Co. Kilkenny
(AR077, E3617)
Eoin Grogan and Helen Roche

Summary
The site at Danesfort 13 produced five sherds (plus 10 fragments, weight: 66g) representing a middle Neolithic globular bowl. This pottery type has only rarely been identified in this region.

Context
All of the pottery came from the fill **85**[1] of pit **82** (Jennings 2008a). This cut through an earlier, probably prehistoric pit, and a lower fill (**84**) produced iron slag. The pottery is clearly in a disturbed position possibly derived from the earlier pit.

Middle Neolithic globular bowl
There are five sherds (plus 10 fragments, weight: 66g) from a simple globular bowl with a pointed rim. The fabric is compact and well-fired and the external surface was finished with a fine slurry; the pottery appears to have been exposed to further intense heat after breakage resulting in the vessel shattering along the joint lines of the coil construction. This suggests that the pottery was accidentally incorporated into the iron working process.

The distribution of vessels of this type (Case 1961: 'Sandhills Ware: Goodland bowls'; Herity 1982: 'Globular bowls') is concentrated in east Ulster and especially in counties Antrim, Tyrone and Derry but extends into north Leinster. This type has only rarely been recorded in the south of Ireland but there are vessels from burials at Rockbarton ('Caherguillamore'), Co. Limerick (Hunt 1967; Herity 1982, 299–300, fig. 25: 2–3), and Rath, Co. Wicklow (Prendergast 1959; Brindley 2004), as well from a domestic context at Ballynacarriga, Co. Tipperary (Roche and Grogan 2009), while small numbers of sherds have come from Danesfort sites 7 and 12, Co. Kilkenny (Devine and Zimny 2008; Jennings 2008b; Grogan and Roche 2009a; 2009b). Globular bowls have a wide range of associations with other decorated pottery types (see Eogan and Roche 1997; Grogan and Roche 2005). The limited dating evidence suggests that these vessels date to *c.* 3500–3000 BC.

References
Brindley, A L 2004 The Neolithic Pottery and the Bronze Age Cist at Rath, County Wicklow. In A Gibson and A Sheridan (eds), From Sickles to Circles. Britain and Ireland at the Time of Stonehenge*, 194–200. Tempus, Stroud.*

Case, H 1961 Irish Neolithic Pottery: Distribution and Sequence, *Proceedings of the Prehistoric Society* **9**, 174–233.

Devine, E and Zimny, P 2008 AR084 Danesfort 7 (E3537), Archaeological Resolution Report, N9/N10 Kilcullen to Waterford Scheme. Phase 4: Knocktopher to Powerstown. Unpublished Interim report on behalf of Kilkenny County Council, Irish Archaeological Consultancy Ltd.

Eogan, G and Roche, H 1997 *Excavations at Knowth* **2**. Royal Irish Academy Monographs in Archaeology, Dublin.

Grogan, E and Roche, H 2005 The prehistoric pottery from Balregan 1, Co. Louth (03E0157). Unpublished Report for Irish Archaeological Consultancy Ltd.

Grogan, E and Roche, H 2009 The prehistoric pottery assemblage from Danesfort 7, Co. Kilkenny (AR084, E3537). N9/N10 Knocktopher to Powerstown. Unpublished Report for Irish Archaeological Consultancy Ltd.

[1] Throughout this report context numbers are in **bold**.

Grogan, E and Roche, H 2009 The prehistoric pottery assemblage from Danesfort 12, Co. Kilkenny (AR076, E3616). N9/N10 Knocktopher to Powerstown. Unpublished Report for Irish Archaeological Consultancy Ltd.

Herity, M 1982 Irish Decorated Neolithic Pottery, Proceedings of the Royal Irish Academy ***82****C, 247–404.*

Hunt, J 1967 Prehistoric Burials at Caherguillamore, Co. Limerick. In E Rynne (ed.), *North Munster Studies: Essays in commemoration of Monsignor Micheal Moloney*, 20–42. Thomond Archaeological Society, Limerick.

Jennings, R. 2008a E3617 Danesfort 13 Stratigraphic Report. Unpublished Stratigraphic Report. National Monument Service. Department of the Environment, Heritage and Local Government, Dublin.

Jennings, R 2008b AR 076 Danesfort 12 (E3616), Archaeological Resolution Report, N9/N10 Kilcullen to Waterford Scheme. Phase 4: Knocktopher to Powerstown. Unpublished Interim report on behalf of Kilkenny County Council, Irish Archaeological Consultancy Ltd.

Prendergast, E 1959 Prehistoric burial at Rath, Co. Wicklow, *Journal of the Royal Society of Antiquaries of Ireland* **89**, 17–29.

Roche, H and Grogan, E 2009 The prehistoric pottery from Ballynacarriga 3, Co. Tipperary (E2412). M8 Fermoy to Mitchelstown Bypass. Unpublished Report for Eachtra Archaeological Projects.

CATALOGUE

The excavation number E3617 is omitted throughout: only the context number, in **bold**, followed by the find number is included (e.g. **22**:1). The thickness refers to an average dimension; where relevant a thickness range is indicated. Vessel numbers have been allocated to pottery where some estimation of the form of the pot is possible, or where the detailed evidence of featured sherds (e.g. rims, shoulders), decoration or fabric indicates separate pots. Group numbers (Roman numerals) refer to sherds from a vessel where the overall form is not identifiable principally due to the absence of sufficient feature (rim/ neck/ shoulder) sherds. While this generally indicates separate pots due to the nature of the material is it possible that some Vessel Groups may represent portions of vessels otherwise identified by Vessel Numbers. Individual sherds that could not be definitely ascribed to either category are described separately; these may come from further pots that are not, however, included in the calculations of minimum and maximum numbers of vessels. Fragments are very small pieces, generally measuring less than 10 x 10mm, or where only one surface is preserved. The inclusions were examined using simple magnification and in some cases attribution reflects probable, rather than certain, identification.

Middle Neolithic globular bowl
*Pits and postholes with iron slag, fill **85** of pit **82***
Vessel 1. This is represented by 5 sherds (2 rimsherds: **85**:1, 12; 3 bodysherds: **85**:2–3, 8; 10 fragments: **85**:4–7, 9–11, 13–15) from a simple globular bowl with a pointed, slightly in-turned, rim. The buff to grey-buff fabric has a dark grey core and inner surface. The surfaces are smooth and the exterior had been finished with a fine slurry. A patchy blackened accretion occurs on the inner surface. The vessel was coil-built and has shattered along this joints. The fragmentation of the pottery and the

condition of the fabric indicate that the pottery had been subjected to very high temperatures after initial breakage; this is consistent with the incorporation of the pottery into an iron working context. There is a medium to high content of dolerite and quartzite inclusions (up to 10.15 x 6.56mm). Body thickness: 10.15–12.16mm; weight: 66g.

Decoration The upper part of the vessel has a band of irregularly applied horizontal lines. Below this are intermittent horizontal fingernail impressions. Elsewhere on the body bands of horizontal lines are interspersed with oblique panels defined by scored lines and filled with fingernail impressions and stab marks.

Comment Pit **82** was cut through an earlier pit (**79**); both fills (**80**, **81**) of the earlier feature produced flint artefacts (including scrapers and blades) and debitage. The secondary fill **84** of pit **82** produced iron slag. The fire-damage to the pottery suggests that it became mixed in with iron working activity and had been fortuitously incorporated into the later fill.

Vessel No.	Context/feature	Number of sherds	Rimsherds	Necksherds	Shouldersherds	Base-anglesherds	Bellysherds	Bodysherds	Fragments	Inclusions	Vessel size (mm)	Weight (g)	Pottery type	Decorated
1	85	5	2	0	0	0	0	3	10	D Q	-	66	MNGB	■

Q quartziteD dolerite MNGB middle Neolithic globular bowl

Table 1. Details of pottery including individual vessels from Danesfort 13, Co. Kilkenny.

Vessel	Context	Sherds to draw	Section only	Photograph
1	85	R. **85**:1, 12, B. 2–3, 8		

R. rim N neck S. shoulder

Table 2. Suggestions for illustration

Appendix 2.2 Lithics Report – Farina Sternke

Lithics Finds Report for E3617 Danesfort 13 (A032/086), Co. Kilkenny
N9/N10 Road Scheme – Phase 4
Farina Sternke MA, PhD

Contents

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Introduction

A total of 31 lithic finds from the archaeological investigations of a multi-period site at Danesfort 13, Co. Kilkenny were presented for analysis (Table 1). The finds are associated with a cremation pit, two oval pits and a ring ditch.

Find Number	Context	Material	Type	Condition	Cortex	Length (mm)	Width (mm)	Thickness (mm)	Complete	Retouch
E3617:001:1	1	Flint	Debitage							
E3617:001:2	1	Flint	Blade	Patinated	Yes	37	12	4	No	No
E3617:016:2	16	Chert	Blade	Weathered	No	77	24	10	No	No
E3617:017:1	17	Flint	Flake	Burnt	Yes	30	23	9	Yes	No
E3617:025:1	25	Chert	Natural chunk							
E3617:080:1	80	Flint	Debitage							
E3617:080:2	80	Flint	Flake	Burnt	No	25	14	3	No	No
E3617:080:3	80	Flint	Core	Burnt	Yes	28	24	16	No	No
E3617:080:4	80	Flint	Flake	Burnt	Yes	25	16	6	No	No
E3617:080:5	80	Flint	Blade	Burnt	No	49	16	7	No	No
E3617:080:6	80	Flint	Flake	Burnt	Yes	31	25	8	Yes	No
E3617:080:7	80	Flint	Debitage							
E3617:080:8	80	Flint	Blade	Burnt	No	28	15	4	No	No
E3617:080:9	80	Flint	Blade	Burnt	Yes	44	17	8	No	No
E3617:080:10	80	Flint	Debitage							
E3617:080:11	80	Flint	Debitage							
E3617:080:12	80	Flint	Debitage							
E3617:080:13	80	Flint	Debitage							
E3617:080:14	80	Flint	Debitage							
E3617:080:15	80	Flint	Debitage							
E3617:080:16	80	Flint	Blade	Burnt	No	30	12	5	Yes	No
E3617:081:1	81	Flint	Debitage							
E3617:081:2	81	Flint	Blade	Burnt	No	33	14	14	Yes	No
E3617:081:3	81	Flint	Core	Burnt	Yes	33	32	28	No	No
E3617:081:4	81	Flint	Debitage							
E3617:081:5	81	Flint	Flake	Burnt	Yes	26	16	5	No	No
E3617:081:6	81	Chert	Blade	Burnt	No	36	11	4	No	No
E3617:103:1	103	Filnt	Flake	Lustred	Yes	27	14	7	Yes	No
E3617:105:1	105	Flint	Debitage							
E3617:108:1	108	Flint	Flake	Burnt	No	29	21	9	Yes	No
E3617:109:1	109	Flint	Retouched Artefact	Patinated	No	9	21	3	No	Distal direct semiabrupt

Table 1 Composition of the Lithic Assemblage from Danesfort 13 (E3617)

Methodology

All lithic artefacts are examined visually and catalogued using Microsoft Excel. The following details are recorded for each artefact which measures at least 20mm in length or width: context information, raw material type, artefact type, the presence of cortex, artefact condition, length, with and thickness measurements, fragmentation and the type of retouch (where applicable). The technological criteria recorded are based on the terminology and technology presented in Inizan *et al.* 1999. The general typological and morphological classifications are based on Woodman *et al.* 2006. Struck lithics smaller than 20mm are classed as debitage and not analysed further,

unless they represent pieces of technological or typological significance, e.g. cores etc. The same is done with natural chunks.

Quantification
The lithics are 28 flaked pieces of flint and two flaked pieces of chert (Table 1). In addition, one natural chunk of chert was presented for analysis.
Sixteen artefacts are larger than 20mm in length and width or are of typological and technological significance and were therefore recorded in detail.

Provenance
The lithic artefacts were recovered from the fills of an oval pit and the ring ditch.

Condition:
The lithics survive in variable condition (Table 2). The majority of lithics are burnt and twelve artefacts are incomplete. The lustre observed on one artefact (E3617:103:1) is a direct result of its exposure to heat, i.e. it did not directly come into contact with fire, but was perhaps strewn around a hearth/fire. Nine artefacts bear the remnants of cortex.

CONDITION	AMOUNT
Patinated	2
Weathered	1
Burnt	14
Lustred	1
Total	**18**

Table 2 Assemblage Condition from Danesfort 13 (E3617)

Technology/Morphology:
The artefacts represent five types of flaking products including one retouched artefact (Table 3).

TYPE	AMOUNT
Core	2
Blade	8
Flake	7
Debitage	12
Retouched Artefact	1
Total	**30**

Table 3 Assemblage Composition from Danesfort 13 (E3617)

CORES
The two cores (E3617:080:3 and E3617:081:3) identified in the assemblage are both made of flint. They are dual opposed platform blade cores which were produced on

beach pebbles. Both cores are rest cores and measure 28mm and 33mm long, 24mm and 32mm wide and 16mm and 28mm thick. They are classic early Mesolithic blade cores (Woodman *et al.* 2006).

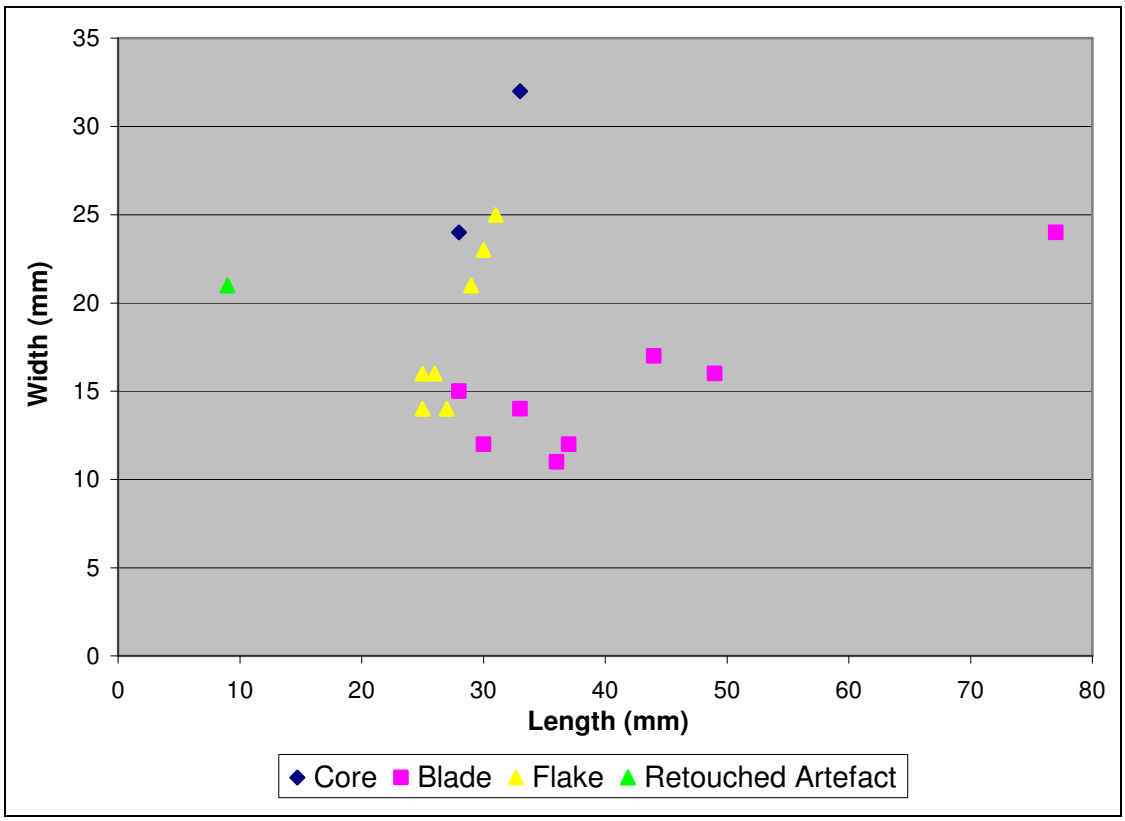

Figure 1 Dimensions (mm) of the Artefacts from Danesfort 13 (E3617)

BLADES

Two of the eight blades recovered at the site are made of chert (E3617:016:2 and E3617:081:6), the remaining six blades are made of flint. All blades were produced on single-platform or dual opposed platform cores. Three blades (E3617:080:5, E3617:080:8 and E3617:081:6) displays use-wear on their right edges.

Two blades are of particular interest. Blade E3617:016:2 is a very large chert blade. It is missing its proximal end and measures 77mm long, 24mm wide and 10mm thick. It is a classic later Mesolithic blade.

Blade E3617:080:9 shows the remnants of a one-sided crest on its dorsal surface. This feature is relatively rare in Irish lithic technology and is predominantly associated with early Mesolithic blade production. The remaining six blades also date to the early Mesolithic based on their morphology and technology (Woodman *et al.* 2006).

With the exception of the large later Mesolithic example, the blades rarely exceed 40mm in length (Fig. 1), the majority measuring between 25–40mm long.

FLAKES

The assemblage contains seven flakes, all of which are made of flint. Five flakes (E3617:017:1, E3617:080:2, E3617:080:4, E3617:080:6 and E3617:081:5) were produced on single-platform cores, in fact flake E3617:081:5 is a core rejuvenation

flake. With the exception of flake E3617:017:1,these flakes certainly date to the early Mesolithic period.
The remaining two flakes (E3617:103:1 and E3617:108:1) are bipolar examples. An attempt was also made to use the latter flake as a bipolar core. These two flakes and flake E3617:017:1 most likely date to the middle Neolithic period.

The flakes rarely exceed 30mm in length (Fig. 1), the majority measuring between 25–30mm long.

DEBITAGE
The presence of 12 pieces of flint debitage together with the presence of the cores, blades and flakes confirms that knapping/tool re-sharpening took place at the site during the early Mesolithic period.

Retouched Artefacts:
The only retouched artefact (E3617:109:1) identified in the assemblage is made of flint. It is a miscellaneous retouched tool which may have been used as a convex end scraper. The artefact is missing its proximal end and most likely dates to the second half of the Neolithic (middle-late Neolithic).

As can be expected, the size of the retouched artefact generally corresponds to the measured blade and flake sizes in the assemblage (Fig. 1).

Dating:
The assemblage has to be regarded typologically and technologically as a palimpsest including early Mesolithic, later Mesolithic and Neolithic diagnostic elements.

It can be divided into three groups: (1) the majority of artefacts are clearly associated with the early Mesolithic such as the single-platform flakes and blades and the dual opposed platform cores (Woodman *et al.* 2006); (2) a single later Mesolithic which represents a residual component at the site; and (3) three flakes and a miscellaneous retouched tools is probably associated with the use of the site in the middle Neolithic.

Conservation
Lithics do not require specific conversation, but should be stored in a dry, stable environment. Preferably, each lithic should be bagged separately and contact with other lithics should be avoided, so as to prevent damage and breakage, in particular edge damage which could later be misinterpreted as retouch. Larger and heavier items are best kept in individual boxes to avoid crushing of smaller assemblage pieces.

Comparative Material
The early Mesolithic component of the assemblage is similar in character to that recovered at Mount Sandel, Co. Derry (Woodman 1985) and Eleven Ballyboes, Co. Donegal (Costa *et al.* 2001).

Discussion
Flint is available in smaller nodules along the Wicklow, Wexford and Waterford coast or in the glacial tills in Co. Kilkenny in the form of remanié pebbles. The use of a limited single platform and dominant bipolar technology on small to medium sized pebbles is in parts the result of this availability. The flint used at Danesfort 13 is beach pebble flint which almost certainly derives from the Wicklow, Wexford or Waterford coast. The majority of these flint nodules are rather small pebbles with an average dimension of 30–50mm which are very suitable for the early Mesolithic

single-platform blade technology, but as a result the regionally dominant split pebble bipolar is widely used in the Neolithic and Bronze Age (O'Hare 2005).
The two chert blades in the Danesfort 13 assemblage were almost certainly imported from the Midlands.

Given the technological composition of the early Mesolithic component of the Danesfort 13 assemblage, i.e. predominantly production debris, it is safe to assume that it was produced, used and subsequently deposited *in situ.*

Summary
The lithic finds from the archaeological excavation at Danesfort 13, Co. Kilkenny are 28 flaked pieces of flint, two flaked pieces of chert and a natural chunk of chert.
The assemblage contains two dual opposed platform blade cores, eight blades, seven flakes, 12 pieces of debitage and one miscellaneous retouched artefact.

The assemblage is dominated by an early Mesolithic component represented by the blade cores and most of the flakes and blades. One large later Mesolithic chert blade represents a residual component at the site. Three flakes and the miscellaneous retouched artefact are associated with a possible use of the site in the middle Neolithic.

The discarded cores, flakes, blades and debitage represent waste from lithic production and the immediate use and re-sharpening of lithic tools in the early Mesolithic period. Evidence for this occupation as well as that of the possible middle Neolithic use of the site was disturbed and artefact were re-deposited during the subsequent periods, particularly during the Bronze Age and early medieval period.

This site makes a major contribution to the evidence for Mesolithic and Bronze Age settlement and land use in Co. Kilkenny.

Recommendations for Illustration
- Later Mesolithic Blade (E3617:016:2)
- Core (E3617:080:3)
- Core (E3617:081:3)

References
Costa, L-J, Sternke, F. and Woodman, P. C. 2001 (2003) The Analysis of a Lithic Assemblage from Eleven Ballyboes, County Donegal. *Ulster Journal of Archaeology* **60**, 1–8.
Inizan, M-L, Reduron-Ballinger, M., Roche, H. and Tixier, J. 1999 *Technology and Terminology of Knapped Stone* **5**. CREP, Nanterre.
O'Hare, M. B. 2005 The Bronze Age Lithics of Ireland. Unpublished PhD Thesis. Queen's University of Belfast.
Woodman, P. C. 1985 *Excavations at Mount Sandel 1973–77: County Londonderry*. H.M.S.O. Belfast.
Woodman, P. C., Finlay, N. and Anderson, E. 2006 *The Archaeology of a Collection: The Keiller-Knowles Collection of the National Museum of Ireland*. National Museum of Ireland Monograph Series 2. Wordwell, Bray.

Appendix 2.3 Small Finds Report – Siobhán Scully

N9/N10 Knocktopher to Powerstown
Danesfort 13, E3617 A032/086 AR077
Small Finds Report
Siobhán Scully, Margaret Gowen & Co. Ltd
December 2009

Introduction
This report details two artefacts, a glass bead and a piece of copper alloy waste, recovered from the excavations at Danesfort 13 (E3617) as part of the N9/N10 Knocktopher to Powerstown road scheme.

Glass Bead
A tiny blue glass bead (044:1) was found in the fill of a pit at Danesfort 13. It is annular with a straight perforation. The pit (C24) in which the bead was found may be contemporary with the ringditch and cremation burial pit also excavated at Danesfort 13. Glass beads have been found in association with cremated human remains from a number of Iron Age sites in Ireland. A single blue glass bead was found in association with the central burial within the ring-barrow at Mullaghmore, Co. Down (Mogey 1949, 86); multi-coloured glass beads and cremated human bone were found in the fosse of the small ring-barrow at Grannagh, Co. Galway (Rynne 1969, 9) and 80 small glass beds were recovered from the fosse of a small ring-barrow at Oran Beg, Co. Galway (Rynne 1970, 10). A similar large number of glass beads were found with the cremated human remains at the centre of a ringditch at Ballydavis, Co. Laois (Keeley 1996, 51–2) and at least 50 glass beads were associated with cremated remains at Ferns, Co. Wexford (Ryan 2000, 302).

Catalogue
E3617:044:1 Very small blue glass bead. Semi-translucent. Annular. Straight perforation. H 0.7mm Diam 1.8mm Diam of perforation 0.9mm.

Metal
A small piece of copper alloy waste (E3617:016:1) was found in the fill of the smelting furnace pit C73. It is roughly oval in shape and narrows at one end.

Catalogue
E3617:016:1 Copper alloy waste. Roughly oval in shape, narrower at one end. L 17mm Wth 5.5–11mm T 1.5mm.

References
Keeley, V.J. 1996 Ballydavis. In I. Bennet (ed.), *Excavations 1995: Summary accounts of archaeological excavations in Ireland*. Wordwell, Bray.

Mogey, J. M. 1949 Preliminary Report of Excavations in Mullaghmore td., Co. Down. *Ulster Journal of Archaeology,* **12**, 82–88.

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

Rynne, E. 1969 Grannagh, near Ardrahan, Co. Galway. In T.G. Delaney (ed.), *Excavations 1969*. Archaeological Bulletin published by Irish Young Archaeologists Association. Belfast.

Rynne, E 1970 Oran Beg Ring Barrow. In T.G. Delaney (ed.), *Excavation 1970*, 10. Irish Young Archaeologists Association. Belfast.

Appendix 2.4 Charcoal and Wood Report – Lorna O'Donnell

Site Name- Danesfort 13
Excavation number –E3617 AR077
County – Kilkenny
Author- Lorna O'Donnell
Date –16/10/09

Summary Charcoal Report

Illustrations

Figures

Tables

Introduction

This report describes the charcoal analysis of samples from Danesfort 13 excavated by Richard Jennings. It was excavated as part of the N9/N10 Kilcullen to Waterford Scheme, Phase 4 – Knocktopher to Powerstown (Jennings 2008). The site consisted of a possible Bronze/Iron Age ring ditch, as well as Iron Age/Early Medieval metalworking evidence. -384 BC was received from C108. The aim of the work is to identify enough suitable material for radiocarbon dating, and to provide a floristic background to the site. It can also identify any species selection patterns at Danesfort 13. This report is summary in nature only, further analysis, discussions and comparisons of results will be incorporated into a final integrated charcoal and wood report for all sites along 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 a high clay content will be soaked in water for 1–2 days to aid the sieving process.

Charcoal identification

Each piece of charcoal was examined and orientated first under low magnification (10x-40x). They were then broken to reveal their transverse, tangential and longitudinal surfaces. Pieces were mounted in plasticine, and examined under a binocular microscope with dark ground light and magnifications generally of 200x and 400x. Each taxon or species will have anatomical characteristics that are particular to them, and these are identified by comparing their relevant characteristics to keys (Schweingruber 1978; Hather 2000 and Wheeler *et al* 1989) and a reference collection supplied by the National Botanical Gardens of Ireland, Glasnevin. It was aimed to identify fifty fragments per sample.

Details of charcoal recording

The general age group of each taxa per sample was recorded, and the growth rates were 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 were 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 was considered to be approximately 0.4mm per annum, medium approximately 1mm per annum and fast approximately 2.2mm per annum.

The ring curvature of the pieces was also noted – for example weakly curved annual rings suggest the use of trunks or larger branches, while strongly curved annual rings indicate the burning of smaller branches or trees (Fig. 1). Tyloses in vessels in species such as oak can denote the presence of heartwood. These occur when adjacent parenchyma cells penetrate the vessel walls (via the pitting) effectively blocking the vessels (Gale 2003, 37). Insect infestation is usually recognised by round holes, and is considered to be caused by burrowing insects. Their presence normally suggests the use of decayed degraded wood, which may have been gathered from the woodland floor or may have been stockpiled.

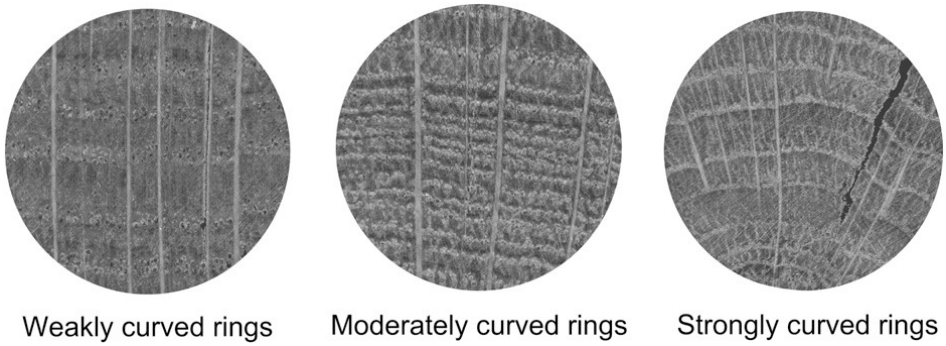

Fig. 1 Ring curvature. Weakly curved rings indicate the use of trunks or large branches. (After Marguerie and Hunot 2007 1421, Fig. 3).

Results

Charcoal was examined from five contexts at Danesfort 13. Seven wood types were identified from the site, including hazel (*Corylus avellana*), ash (*Fraxinus* sp.), pomaceous fruitwood (Maloideae), wild/bird cherry (*Prunus avium/padus*), blackthorn (*Prunus spinosa*), oak (*Quercus* sp.) and willow (*Salix* sp.). The results are dominated by oak (Fig. 2).

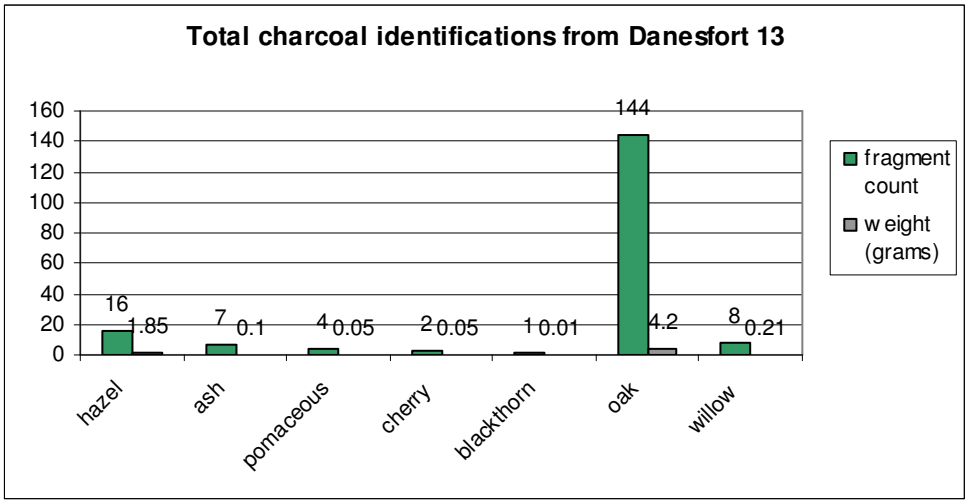

Fig. 2

Charcoal was examined from the earliest prehistoric phase on site, a pit (Cut 105 Fill 104). Hazel, oak, pomaceous fruitwood, cherry and ash were identified from here. One sample was identified from a Bronze/Iron Age context, this is a cremation deposit (C110) in a ringditch (C101). This contains a variety of trees, but was

dominated by oak. Three samples were identified from Iron Age/early Medieval deposits. A pit (Cut 35 Fill 38) with metalworking waste contains low levels of oak and hazel. Another pit (Cut 98 Fill 99) with iron slag remains contained hazel, ash, pomaceous fruitwood, blackthorn and oak in similar quantities. A hearth (Cut 119 Fill 117) is dominated by oak with some hazel.

Discussion
It is presumed that while people may have managed trees during prehistory in Ireland, that they did not plant them, and therefore that the trees would grow in optimum soil conditions. A consideration of the preferred growth conditions of the trees from Danesfort 13 should provide a background to the type of soil conditions close to the site.

The charcoal results from Danesfort 13 indicate that the people were gathering fuel from a mosaic of different wood types. Overall, the results are dominated by oak. This wood is frequently identified from Irish archaeological sites. It is a strong, robust timber, which burns well at high temperatures. The oak present could be either our native sessile oak (*Quercus petraea*) or our native pedunculate (*Quercus robur*) which prefers more wet, heavier clays than the sessile oak. (Beckett 1979, 40–41). Another large canopy trees probably growing close to the site was ash, which prefers moist, well drained and fertile soils. It is very intolerant of shade (Lipscombe and Stokes 2008, 188).

A shrub or scrub element is indicated by the presence of hazel, cherry, blackthorn and pomaceous fruitwood. Hazel is a very tolerant tree; it can grow from wet to dry conditions (but not waterlogged ones) (Orme and Coles 1985, 9). It was once very common in Ireland, Mc Cracken writes that it was once widespread to an extent that is hard to imagine today (1971, 19). It can grow as a tree or can form hazel scrub. Wild/bird cherry can grow well in light conditions such as near woodland margins (Orme and Coles 1985, 11). Blackthorn can often be found on woodland edges and occurs on a wide range of soils (Lipscombe and Stokes 2008, 64).

The Maloideae group (pomaceous fruitwood), a sub family of the Rosaceae includes crab apple, wild pear, rowan/whitebeam and hawthorn. Crab apple (*Malus sylvestris*) is a tree of hedges, copses and oak woodland, thriving in fertile and heavy soils. It often grows singly, with large distances between individual trees (Lipscombe and Stokes 200, 78). Wild pear (*Pyrus pyraster*) can grow on woodland edges (Lipscombe and Stokes 2008, 114). Rowan (*Sorbus aucuparia*) is a tough colonizer which can tolerate peaty soils and exposed conditions. It needs plenty of light to thrive (Hickie 2002, 65). It is a tree of mountains, woodlands and valleys, growing on a wide range of soils, including chalks, acid soils and even peat (Lipscombe and Stokes 2008, 120). Whitebeam (*Sorbus aria*) grows up to 20m high and has a preference for limestone soils (Orme and Coles 1985, 11). Hawthorn (*Crataegus monogyna)* can thrive in all but the most acid of soils (Gale and Cutler 2000). As wild pear is not a native Irish species, it is likely that the charcoal represents other types encompassed in the Maloideae group.

A wetland element is indicated by the identification of willow which will grow in wetland areas, beside streams or rivers.

Summary
Charcoal was examined from five contexts at Danesfort 13. Hazel, ash, pomaceous fruitwood, cherry, blackthorn, oak and willow were identified. The samples examined suggest that throughout the different time periods, oak was the dominant species growing close to the site. Oak is an excellent fuel, and is capable of reaching the high

temperatures required for cremation in Bronze Age Ireland and metal production in Iron Age/early Medieval Ireland. Charcoal identifications from the Danesfort sites 2, 7, 11 and 9 were all dominated by oak, in comparison to Danesfort 13 (Lyons *et al* forthcoming). In contrast, Danesfort 10 is dominated by pomaceous fruitwood.

References

Beckett, J.K. 1979 *Planting Native Trees and Shrubs*. Norwich: Jarrold and Sons Ltd.

Gale, R. 2003 Wood based industrial fuels and their environmental impact in lowland Britain. In P. Murphy and P.E.J. Wiltshire (eds), *The Environmental Archaeology of Industry*. Oxbow books: Oxford 30–47.

Gale, R. & Cutler, D. 2000. *Plants in Archaeology. Identification of vegetative plant materials used in Europe and the southern Mediterranean to c. 1500*. West Yorkshire: Westbury Publishing.

Hather, J.G. 2000. *The Identification of the Northern European Woods. A guide for archaeologists and conservators*. London: Archetype Publications Ltd.

Hickie, D. 2002 *Native trees and forests of Ireland*. Dublin: Gill & Macmillan Ltd.

Jennings, R. 2008 E3617 Danesfort 13 Stratigraphic Report. Unpublished Stratigraphic Report. National Monument Service. Department of the Environment, Heritage and Local Government, Dublin.

Lipscombe, M. and Stokes, J. 2008 *Trees and how to grow them.* London*:* Think books.

Lyons, S., O'Carroll, E. and O'Donnell, L. forthcoming. Charcoal analysis from the N9 N10- overall integrated report. Unpublished report for Irish Archaeological Consultancy Ltd.

Marguerie, D. and Hunot, J.Y. 2007 Charcoal analysis and dendrology: data from archaeological sites in north-western France. *Journal of Archaeological Science,* **34** 1417–1433.

Mc Cracken, E. 1971 *The Irish Woods since Tudor Times. Distribution and exploitation.* Devon : David & Charles Newton Abbot.

Orme, B.J. and Coles, J.M., 1985 Prehistoric woodworking from the Somerset levels: 2 : Species selection and prehistoric woodlands. *Somerset Levels papers,* 11, 7–24

Schweingruber, F.H. 1978 *Microscopic wood anatomy*. Birmensdorf: Swiss Federal Institute for Forest, Snow and Landscape Research.

Wheeler, E.A, Bass, P. & Gasson, P.E. 1989 *IAWA list of microscopic features for hardwood identification*. IAWA Bulletin nos. **10** (3): 219–332.: Leiden: Rijksherbarium

Table 1 Charcoal identification details from Danesfort 13

Time period	Context number	Cut number	Sample number	Flot weight (g)	Context description	Wood taxon	No. of fragments	Charcoal weight (grams)	Size of fragments (mm)	No. of growth rings	Growth	Weakly or strongly curved rings	Insect holes	Tyloses	Comment
Iron Age/Early Medieval	38	35	12	2.4	pit with metallurgical waste	*Corylus avellana* (hazel)	8	0.4	2–8	2–6					
						Quercus sp. (oak)	11	0.21	2–8	2–6	medium				
Iron Age/Early Medieval	99	98	36	1.8	pit with iron slag	*Corylus avellana* (hazel)	5	1.22	5–10	2–8	medium				
						Fraxinus sp. (ash)	1	0.02	2–8	2–6					
						Maloideae spp. (pomaceous)	2	0.03	2–8	2–6					
						Prunus sp.	1	0.01	2–8	2–6					
						Quercus sp. (oak)	5	0.13	2–8	2–6	medium				
Prehistoric	105	104	46	1.4	pit	*Corylus avellana* (hazel)	1	0.01	5–10	2–6					
						Fraxinus sp. (ash)	3	0.04	5–10	2–6					
						Maloideae spp. (pomaceous)	2	0.02	2–8	2–6					
						Prunus avium/padus sp. (wild/bird cherry)	2	0.05	2–8	2–6					
						Quercus sp. (oak)	41	0.51	2–8	2–10	medium				
Bronze/Iron Age	110	101	52	38	cremation deposit in ring ditch	*Corylus avellana* (hazel)	1	0.04	2–8	2–6					
						Fraxinus sp.	3	0.04	2–8	2–6	medium				

						(ash)									
						Quercus sp. (oak)	38	0.49	2–8	2–10	medium	strongly curved			
						Salix sp. (willow)	8	0.21	2–8	2–6	medium				
Iron Age/Early Medieval	119	117	51	29	hearth	*Corylus avellana* (hazel)	1	0.18	2–8	2–6					
						Quercus sp. (oak)	49	2.86	2–8	2–10					

Appendix 2.5 Plant Remains Analysis Report – Penny Johnston

Plant Remains Analysis Report for
E3617 Danesfort 13 (A032/086), 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 (E3617).

The excavated remains included evidence early Iron Age burial and middle/late Iron Age industrial 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 13 E3617 AR077

This was a multi-period site. There was evidence for a middle Bronze Age ringditch, a cremation pit and two other pits. There was also evidence for early medieval metalworking at the site, including two bowl furnaces and a hearth.

A total of 9 samples were examined from this site. Of these, there were no charred seeds in 5 samples; C110 (S56), C110 (S52), C110 (S54), C110 (S55) and C103 (S63). The plant remains from the other four samples were primarily charred fragments of hazelnut shell fragments. Please see the results from Baysrath 2 E3627 and Knockadrina 1 E3611 for further discussion of the relevance of hazelnut shell fragments from archaeological sites.

Table 1Identified charred plant remains from Danesfort 13 E3617

Context	**34**	**105**	**119**	**108**
Sample	**3**	**46**	**51**	**65**
Hazelnut shell fragments (*Corylus avellana* L.)	51	2		234
Indeterminate cereal grains			2	

Appendix 2.6 Burnt Bone Report – Aoife McCarthy

Osteoarchaeological Report of Burnt Bone from
E3617 A032/: Danesfort 13 AR077
Co. Kilkenny
N9/N10 Kilcullen to Waterford Scheme
Phase 4: Knocktopher to Powerstown
Author: Aoife McCarthy MA BA
Date: July 2010

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1. Introduction

1.1 Introduction

This report details the osteological analysis of burnt bone samples recovered during excavations at Site E3617 AR077 Danesfort 13 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. Site AR077 had two main archaeological phases; Bronze/Iron Age and early medieval. The Bronze Age activity consisted primarily of a ringditch and cremation pit. Early medieval activity consisted of a field boundary ditch and metalworking area which included a charcoal producing kiln, furnace and a possible forging area. 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 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 489 fragments from 447 possible skeletal elements weighing 180.96g were recorded within the assemblage. The degree of preservation of the burnt bone material recovered varied from moderate to very poor preservation. A high rate of fragmentation was also noted within the assemblage.

The majority of the burnt remains assemblage recovered at Danesfort 13 originated from C78 the fill of possible cremation pit feature C66 which accounted for 484 bone fragments or 98.9% of the total. A single charred hazelnut sample retrieved from archaeological context ditch fill C108 was issued for AMS dating and returned a two sigma calibrated date of Cal. 503–384BC placing activity within the Iron Age period.

A total of 53 burnt bone fragments (10.8%) of the faunal remains assemblage were classified to species. Due to fragmentation combined with poor preservation and small size of individual bone fragments it was not possible to identify 436 fragments (89.2%) 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 burnt bone assemblage recovered from Danesfort 13 contained bones from a possible 2 different species including; pig and human.

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 meant dental ageing was not possible.

Biometrical Data: Due to the nature, type and condition of burnt bone recovered 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 burnt material recovered from Danesfort 13.

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

Context 110 Sample 52

A series of 5 tiny, poorly preserved calcined fragments of bone were recovered from C110 the loosely compacted silt fill of ringditch feature C101.

Indeterminate Vertebrate

Five poorly preserved and cracked fragments of calcined bone that weighed 0.17g were recovered from ringditch fill C101. All 5 fragments of undetermined element displayed evidence of exposure to a high level of heat. Transverse and longitudinal cracking combined with colour change to white indicated exposure to high temperatures and resulting calcination. White or pale grey colour indicates exposure of bone to temperatures in excess of *c.* 600°C combined with a ready oxygen supply (McKinley, 2004).

Context 78 Samples 23 & 24
A total of 484 moderate to very poorly preserved calcined bone fragments (18.79g) representing a possible 442 skeletal elements were recovered within C78 the fill of possible cremation pit C66. Forty three calcined fragments of parietal skull, proximal phalanx and rib corpus recovered from pit fill C78 were identified as pig/sus. A further 10 burnt fragments of premolar root and skull were identified as possible human. Due to poor preservation combined with fragmentation a series of 436 un-diagnostic calcined fragments were not identified to species.

Pig/*Sus*
Pig was one of two identifiable species retrieved from C78 at Danesfort 13; a series of forty three calcined fragments of parietal skull, proximal phalanx and rib corpus were identified. The total weight of recovered pig bone was 31.92g. Pig MNI was calculated at 1 based on recovered proximal phalanx and rib corpus fragments. All 43 pig bone fragments recovered from C78 exhibited evidence of exposure to a high level of heat and resulting calcination. Calcination was manifested by colour change to grey/white combined with frequent transverse and longitudinal cracking of the 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 (DeHann, J. D, 2008, 37).

Homo Sapiens Sapiens/Human
A series of 10 moderately preserved calcined fragments of premolar root and skull identified to human were recovered within possible cremation pit fill C78. The total weight of recovered human bone was 3.88g. All 10 bone and teeth fragments displayed extensive cracking as well as colour change to grey/white indicating calcination. 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).

Indeterminate Vertebrate
Due to fragmentation combined with poor preservation a sum of 436 calcined fragments of indeterminate vertebrate recovered from C78 at were not identified to species. A total of 65 burnt long bone diaphysis and rib corpus fragments (14.9%) were categorised as medium sized vertebrate. A further 40 calcined fragments of skull and vertebrae bone (9.2%) were classed as small sized vertebrate. The remaining 331 thoroughly calcined fragments of long bone diaphysis, skull and undetermined element were deemed un-sized indeterminate vertebrate. A high proportion of the unidentifiable bone fragments comprised cortical, trabecular and tiny un-diagnostic fragments of bone. All 436 fragments showed evidence of calcination resulting from exposure of the bone to a high temperature. 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.”

4. Summary
A total of 489 burnt bone fragments recovered from two archaeological contexts on Danesfort 13 were submitted for examination. The bone samples were assessed and identified to species where possible. From these a total of 441 fragments (90.2%) were not possible to identify to species due to the size and fragmented nature of the pieces. The remaining 53 fragments (10.8%) were identified and divided into species. The burnt bone remains assemblage contained bones from two species pig and human. No definite or statistically detailed conclusions could be drawn from the bone assemblage retrieved from Danesfort 13 due to its small size and the poor degree of

bone preservation. However, as detailed all of the bone assemblage across all contexts displayed evidence of exposure of the bones to a high level of heat resulting in calcination. Unfortunately a large portion of the burnt bone was too small and un-diagnostic for identification and therefore it could not be determined whether the bone was human or animal.

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	C110	52	Unid	Unid													W		5	0.17	Series of tiny fragments of calcined bone
2	C78	23	Unid	Unid													G W		17	1.75	Series of tiny fragments of calcined cortical bone
3	C78	23	Unid Small Size	Skull													G W		24	5.90	Series of poorly preserved calcined fragments of skull, cracking of bone surface. Degree of trabecular bone exposed.
4	C78	23	Unid Small Size	Skull													G W		13	2.14	Series of poorly preserved small size skull fragments. Bone surface of fragments shows cracking
5	C78	23	Unid Small Size	Vertebrae		uf		1	1								G		1	0.11	Calcined poorly preserved fragment, trabecular bone exposed.
6	C78	23	Unid Small Size	Vertebrae					1								G W		2	0.19	Small poorly preserved calcined fragments
7	C78	23	Unid Med Size	Long Bone													G W		5	4.18	Series of calcined moderately preserved fragments of diaphysis. Bone surface shows transverse cracking. Largest fragment Length 17mm, Width 14mm, Thickness 7mm. Cortical bone exposed
8	C78	23	Unid Med Size	Long Bone													G W		12	6.30	Series of calcined moderately preserved fragments of diaphysis. Bone surface shows transverse & longitudinal cracking. Degree of cortical bone exposed on all. Largest fragment. Length 11mm, Width 9mm, Thickness 5mm
9	C78	23	Unid	Unid													G W		67	16.87	Series of small-tiny calcined, poorly preserved fragments of bone & cortical bone.
10	C78	23	Unid Med Size	Long Bone							1	1					G W		13	6.10	Series of poorly preserved calcined fragments of diaphysis. All fragments show cracking of bone surface. Cortical bone exposed.
11	C78	23	Unid	Unid													G W		18	5.91	Series of calcined poorly preserved fragments of bone & cortical bone. Un-diagnostic.

12	C78	24	Poss Human	premolar Root													G W		1	0.23	Cracked moderately preserved premolar root, exposed to heat
13	C78	24	PossHuman	Premolar Root													G W		1	0.07	Cracked moderately preserved premolar root, exposed to heat
14	C78	24	Poss. Human	Skull													G W		8	3.58	Series of calcined moderately preserved fragments of skull. Bone surface of all shows cracking.
15	C78	24	Pig Size	Parietal Skull													G W		3	5.81	Series of moderately preserved calcined fragments of skull. Cracking visible on surface of all fragments.
16	C78	24	Unid	Unid													G W		24	2.20	Series of calcined tiny poorly preserved fragments of cortical bone
17	C78	24	Unid Med Size	Long Bone													G W		6	5.93	Series of moderately preserved partially re-constructed fragments of diaphysis. Transverse & longitude cracking visible. Degree of cortical bone exposed. Largest fragment Length 22mm, Width 12mm, Thickness 7mm
18	C78	24	Pig Size	proximal phalanx						1	1						G W		4	5.51	Series of moderately preserved partially re-constructible diaphysis fragments. Bone surface of all fragments show transverse cracking.
19	C78	24	Pig Size	Rib						1							G W		6	3.25	Series of moderately preserved fragments of corpus. Bone surface of all fragments shows cracking. Calcined.
20	C78	24	Unid Med Size	Long Bone													G W		5	5.13	Moderately preserved partially re-constructible diaphysis fragments. All surfaces show longitude cracking.
21	C78	24	Unid Med Size	Long Bone													G W		10	6.96	Series of moderately preserved calcined fragments of diaphysis. Bone surface of each fragment shows transverse cracking due to heat.
22	C78	24	Pig Size	Skull													W		14	7.60	Series of moderately preserved calcined fragments of skull. Surface of all fragments shows cracking.
23	C78	24	Pig Size	Proximal Phalanx			fsd						1		1		W G		1	1.64	Poorly preserved distal fragment, v little bone surface remains. Bone is calcined & large degree of cortical bone exposed.
24	C78	24	Pig Size	Proximal Phalanx										1	1		W G		6	2.57	Partially re-constructible poorly preserved distal articular surface fragments. Cortical bone exposed. Calcined & cracked.

25	C78	24	Pig Size	Rib					1	1							G		4	2.36	Series of calcined, poorly preserved fragments of corpus. Bone surfaces show cracking. Smooth surface
26	C78	24	Pig Size	Rib						1	1						G W		5	3.18	Series of poorly preserved cracked fragments of rib corpus. All fragments show cracking of surface due to heat.
27	C78	24	Unid	Unid													G W		60	20.20	Series of small-tiny calcined, poorly preserved fragments of bone & cortical bone. Un-diagnostic. From 2mm sieve
28	C78	24	Unid Med Size	Long Bone													G W		5	3.96	Moderately preserved partially re-constructible diaphysis fragments. All surfaces show longitude cracking, and sandwich burning affect
29	C78	24	Unid	Long Bone													G W		18	9.44	Series of moderately preserved fragments of long bone diaphysis. Bone surface shows cracking & splitting on all. Degree of cortical bone exposed.
30	C78	24	Unid	Skull													G W		26	7.86	Series of moderately preserved fragments of skull, bone surfaces show cracking. 5mm sieve
31	C78	24	Unid	Unid													G W		21	2.60	Series of poorly preserved calcined fragments of cortical & trabecular bone. 2mm sieve
32	C78	24	Unid Med Size	Rib					1	1							G W		9	2.28	Series of calcined moderately preserved fragments of rib corpus. Bone surface of all shows cracking. 5mm sieve
33	C78	24	Unid	Long Bone													G W		17	9.37	Series of moderately preserved diaphysis fragments. Bone surface of fragments shows cracking. Degree of cortical bone exposed. Largest fragment Length 12mm, Width 9mm, Thickness 5mm
34	C78	24	Unid	Unid													G W		58	19.61	Series of small-tiny poorly preserved & cracked fragments of bone & cortical bone. Un-diagnostic as too small.

Key:

C= Context
Bu=Burnt
G=Gnaw
Q=Quantity of Pieces
But=Butchery
Unid=Unidentifiable
Taxa=Taxon
B=Black
N=No
R=Rodent
Cn=Carnivore
Dist=Distal
W=White
Anat=Anatomical Element
Prox=Proximal
G=Grey
S=Sample

5. References:

Binford, L & Howell, F.C. 1981 *Bones, Ancient Men and Modern Myths*. Florida Academic Press Inc.

Boessneck, J. 1969 Osteological Differences between Sheep and Goat. In D. Brothwell and E. Higgs (eds), Science in Archaeology, 331–358. Thames & Hudson, London.

Chapman, E.N., Gipson, D.R., Piper, A.L., Rainwater, C. W. and Symes, S.A. 2008 Patterned Thermal Destruction of Human Remains in a Forensic Setting. In C.W. Schmidt and S.A. Symes (eds), The Analysis of Burned Human Remains. Academic Press, London.

Davis, S.J. 1987 The Archaeology of Animals. New Haven & London: Yale University Press.

DeHann, J.D. 2008 Fire and Bodies. In C.W. Schmidt and S.A. Symes (eds), The Analysis of Burned Human Remains. Academic Press, London.

Fisher J.W. 1995 Bone Surface Modifications in Zooarcheology. *Journal of Archaeological Method and Theory,* **2**(1).

Grant, A. 1982 The use of tooth wear as a guide to the age of domestic ungulates. In B. Wilson, C. Grigson and S. Payne (eds), Ageing and sexing animal bones from Archaeological Sites, 91–108. BAR 109, Oxford.

Haynes G. 1978 Morphological Damage and Alteration to Bone: Laboratory experiments, field studies and zoo studies. *American Quaternary Association* 210, Edmonton Alberta.

Hillson, S. 1992 Mammal Bones and Teeth: An Introductory Guide to Methods and Identification. London Institute of Archaeology: UCL, London.

Jennings, R. 2009 Archaeological Resolution Report N9/N10 Kilcullen to Waterford Scheme Phase 4: Knocktopher to Powerstown E3617 Site AR077 Danesfort 13, IAC Ltd. Forthcoming.

Luff R. & Pearce J. 1994 The Taphonomy of Cooked Bone. In Whither Environmental Archaeology, Oxbow Books Ltd, Oxford.

Lyman R.L 1994 Vertebrae Taphonomy, Cambridge University Press

McCormick, F. 1992 Early Faunal Evidence for Dairying. *Oxford Journal of Archaeology*, **11** (2), 201–209.

McKinley, J.I. 2004 Compiling a Skeletal Inventory: Cremated Human Bone. In M. Brickley & J.I. McKinley (eds), Guidelines to the Standards for Recording Human Remains, 9–13. Southampton.

O'Connor T.P. 2000 *The Archaeology of Animal Bones*. Sutton.

Olsen P.S. 1988 Surface Modification on Bone: Trampling versus Butchery. *Journal of Archaeological Science,* **15**, 535–559.

Reitz, E.J and Wing, E.S. 2008 *Zooarchaeolgoy Second Edition*. Cambridge Manuals in Archaeology, Cambridge University Press.

Schmidt, C. W. 2008 The Recovery and Study of Burned Human Teeth. In C.W. Schmidt and S.A. Symes (eds), The Analysis of Burned Human Remains. Academic Press, London.

Schmid, E. 1972 *Atlas of Animal Bones for Prehistorians, Archaeologists and Quaternary Geologists.* Amerstadam, London, New York, Elsevier Publishing.

Serjeanston, D. 2000 Good to Eat and Good to Think With: Classifying Animals from Complex Sites. In P. Rowley-Conwy (ed.), *Animal Bones, Human Societies*, 179–89. Oxford: Oxbow Books.

Silver, I.A. 1969 The Ageing of Domestic Animals. In D.R. Brothwell and E. Higgs (eds), *Science in Archaeology*, 283–302. London.

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 2.7 Metallurgical Waste Analysis Report – Angela Wallace

Report on Archaeometallurgical Residues From
Danesfort 13, E3617 A032/086 AR077
N9/N10 Kilcullen to Waterford Scheme
Phase Rathclogh 4, Knocktopher to Powerstown

Angela Wallace MSc, MIAI
August 2010

Introduction
A total of 5.87kg of metallurgical material was recovered from this site. The greatest quantities of residues from the site (1.52kg) were linked with the fills of a linear north-west/south-east oriented ditch C13. A total of 1.37kg of residues was recovered from the fills of an oval furnace C49. A hazelnut shell from the basal fill (C51) of this feature was dated to Cal AD7–125. This gives a reliable date for iron-working activity at this site. Morphology and quantity of residues suggests small-scale iron smelting was the most likely activity being carried out.

Metallurgical Material
The vast majority of the material is typical of iron-working residues and consists of small-medium non diagnostic irregular nodules.

There is a small percentage of distinctive drippy type slags, this morphology can be linked with iron smelting or primary smithing (i.e. reheating and hammering of the spongy bloom of iron to remove slag remaining within), morphology of the material can be indicative of both processes. The absence of smithing hearth cakes would suggest that small-scale smelting may be the most likely activity carried out at this site. Further analysis of residues, especially those linked with furnace C49 is recommended in order to elucidate which process material is coming from and also efficiency of processes.

Archaeological Features with Associated Metallurgical Residues

Features with no evidence for high temperature activity

Linear Ditch C13: The greatest quantity of residues from the site (1.52kg) was linked with the fills of a linear north-west/south-east oriented ditch C13.

Pit C35 contained 0.75kg of residues consisting of non-diagnostic amorphous lumps and nodules. This pit measured 0.90m in length, 0.70m in width and 0.27m in depth and had two fills C36 a dark blackish brown sandy clay and C37 a dark blackish brown clayey silt.

Pit C93 contained 1.20kg of residues, mainly non-diagnostic amorphous lumps and nodules. Pit had an oval shaped cut and measured 0.93m in length, 0.59m in width and 0.30m in depth. It had two fills C94 a brownish yellow silty clay and C95 a dark brown sandy clay. One possible fragment of a smithing hearth cake was identified which indicates some smithing activity. Pit C93 was located *c.* 10m north-east of furnace C49. This pit was located along the edge of linear ditch C13 and was linked with a metalled surface and also with two other nearby pits C35 (0.75kg) and C86 to the north-west.

There is no evidence for any *in situ* scorched soil, charcoal deposits or baked clay in association with any of these features. It would seem residues recovered within ditch C13 and pits C35 and C93 may have originated in nearby furnace C49 or associated pit C73, both of which show evidence for high temperature activity having taken place.

Features with evidence for high temperature activity

Furnace C49
A total of 1.37kg of residues was recovered from the fills of furnace C49. A hazelnut shell from the basal fill (C51) of this feature was dated to Cal AD7–125. This gives a reliable date for iron-working activity at this site. This feature was oval in shape

measuring 0.85m in length, 0.38m in width and 0.25m in depth. A small channel extended from the northern side of the pit which may have been used as a channel for a bellows (see Plate 2). 'High temperatures caused the base and sides of the pit to become oxidised and reddened. A silty sand deposit rich in charcoal (C51) was the basal fill. Above this was a silty sand layer with some iron and a large quantity of slag (C52). An upper layer of burnt clay (C53) suggested that some form of clay superstructure was built over the furnace pit' (Jennings :08).

Plate 1: Mid-excavation of C13, linear ditch, C35 and C93, oval pits and pre-excavation of metalled surface C92, facing NNW

Plate 2: Post-excavation of furnace C49 (left) and C73 (right), facing north-west

The majority of the metallurgical residues from this feature consisted of relatively small drippy slags characteristic of smelting, the quantity suggests a very small-scale smelting operation. The presence of burnt clay in the upper layer may point to a collapsed clay shaft. The residues from ditch C13 and pits C35 and C93 may have originated from this furnace.

Oval Pit C73

This feature was oval shaped and measured 1.2m in length, 0.75m in width and 0.12m in depth. This feature shows scorching around the base and sides, there is a small channel on the eastern side probably used for bellows, to oxygenate the fire. The basal fill of the pit (C74) consisted of a dark-brown, silty clay layer with large amounts of charcoal, some of which were relatively big pieces. The upper fills (C75 and C76), consisted of clayey silts with only minimum amounts of charcoal. There were no slag samples submitted from this feature. Furnace C49 was located only 1.1m to the south-west from pit C73. This pit was probably used as a hearth for charcoal for the furnace C49, substantial quantities of charcoal would have been required to carry out smelting of the iron ore. It may also have been used as a smithing hearth for refining of iron bloom from the smelting operation.

Hearth C117

The remains of a hearth (C117) was found 17m from furnace C49 in the northernmost part of the site. The sides and base of the hearth were scorched red and its silty clay basal fill contained charcoal pieces and lumps of oxidised clay. There are no metallurgical residues linked to this feature it cannot be definitively linked to the metal-working process. It may have functioned as an ore roasting pit or smithing hearth which was subsequently cleaned out. It is not possible to confirm whether or not it was contemporary with metallurgical features.

Small quantities of metallurgical residues were recovered from other scattered features around the site, the presence of this material in postholes and kiln C24 in the vicinity is probably due to material being spread or dumped across the site over time.

Discussion & Conclusions

Brief Background for Irish Smelting Furnaces

There has been some debate about the morphology of Irish furnaces, some believe them to be bowl-shaped (Scott 1990: 159) based on the common findings on archaeological sites of slag associated with shallow hemi-spherical pits. The evidence would also support the possibility that low clay shaft furnaces with slag pits may have been used as described by Pleiner (2000:150). Some supporting discussion for the Irish evidence for low clay shaft slag pit furnaces has been presented by Young (2003) and there is a good discussion of the contributions to this debate by Carlin (2008: 91–2).

Experimental work on bowl furnaces and low clay shaft furnaces has indicated the low clay shaft types are more suitable for smelting (Crew 1991), the bowl furnaces do work but not as efficiently (Tylecote 1986), it seems likely that several different types of furnace may have been used simultaneously amongst different communities as there is considerable variation in the record. Morphology of furnaces used may also be linked to the types of raw materials and ores locally available, further synthesis of recent discoveries and carefully documented experimental work based on Irish archaeological evidence will hopefully shed more light on this.

It is usually only possible to guess at furnace morphologies as frequently all that remains is a scorched bowl-shaped depression in the ground and some slag and fired clay fragments. Where there are large quantities of baked clay fragments associated with slag pits there is reasonable evidence to assume they formed part of a clay superstructure or shaft. Fired clay fragments are easily eroded over time and we can't assume the absence of clay shafts or low bowl furnaces when such evidence is missing.

Chronological Significance of Danesfort 13 Furnace
The main focus of high temperature activity with associated metalworking evidence on the site is centered on the small possible smelting furnace C49. This is the most significant feature in terms of metal-working evidence on the site. This feature was dated to Cal AD7–125 which places ironworking on this site firmly within the Iron Age. The study of furnaces and metalworking from this period is particularly significant in understanding how the technology was developed or introduced into Ireland.

The combined evidence from recently excavated sites such as Tonybaun (Nolan 2006) Rossan 6 (Photos-Jones 2008a), Kinnegad 2 (Photos-Jones 2008b) and Johnstown 3 (Photos-Jones 2008c) suggests that the first iron-working in Ireland is likely to have developed towards the late fifth or early fourth century BC (Wallace & Anguilano: 2010). There is huge variety in volumes of metallurgical residues and types of associated hearths and furnace features on all of these sites. The features and further analysis of directly associated residues is therefore highly important in terms of developing an understanding of adoption and spread of this complex technological development.

Four other sites on the N9/N10 scheme also produced evidence for possible Iron Age iron smelting. An in depth comparative study of evidence and residues from all four sites would provide a useful overview of new archaeological evidence of metal-working activity from the scheme.

The site of Rathcash East 3 had evidence for an oval shaped furnace with associated pits, this site produced 16.22kg of iron-working waste and was dated to Cal 160BC–AD0. At the site of Tinvaun 2 the furnace C43 was dated to 39BC–AD64 using young oak, a total of 8.75kg of slag was recovered from this site. The site of Danesfort 5 had evidence for 8.8kg of slag associated with a furnace, a nearby feature which contained a small quantity of slag (227g) was dated to Cal 786–543BC, indicating Danesfort 5 may also be an Iron Age smelting site**.**

A total of 10.9kg of possible smelting slags were also identified at the site of Danesfort 12. Furnace on this site consists of a circular pit with an extended oval area, it is likely there would have been a clay shaft over the pit during smelting and that slags would have been raked out from an opening at the base of this shaft. Unfortunately there is no date from iron-working activity at this site but it is also possibly Iron Age in date.

There were no metal artefacts recovered from this site so it is difficult to determine what, if any artefacts were being manufactured. A single glass bead and a possible piece of bronze waste were recovered suggesting glass and non-ferrous working may have taken place in the vicinity. The volume of metallurgical material from Danesfort 13 is relatively small (5.87kg) and the bulk of the material is scattered around the site, much of it appears to be dumped within features that have no link to any high temperature activity. The most important residues from this site are those directly linked with the possible furnace C49 and it is recommended these are prioritised for

further analysis. Data from analysis can be used to compile a comparative study on efficiency of processes in relation to other smelting furnaces in the vicinity.

References:

Carlin, N. 2008 Iron working and Production. In N. Carlin, L. Clarke & F. Walsh, *The Archaeology of Life and Death in the Boyne Floodplain: The Linear Landscape of the M4 Kinnegad-Enfield-Kilcock Motorway.* NRA Scheme Monographs 2.

Crew, P. 1991 The Experimental Production of Prehistoric Bar Iron. *Historical Metallurgy*, **25**, 1–36.

Hall, R.*et.al.* 2006 Excavations at Priors Hall, Corby, Northamptonshire. An Iron Age & Romano-British Iron working complex. Archaeological Project Services Report No. 4/08.

Nolan, J. 2006 Excavation of a children's burial ground at Tonybaun, Ballina, County Mayo. In J. O'Sullivan & M. Stanley (eds), *Settlement, Industry and Ritual*, 89–101.

Photos-Jones, E. 2008a Analysis of Metallurgical Waste from Rossan VI, SASAA 9. In N. Carlin, L. Clarke & F. Walsh, *The Archaeology of Life and Death in the Boyne Floodplain: the linear landscape of the M4* (on CD-ROM). NRA Scheme Monographs 2. National Roads Authority, Dublin.

Photos-Jones, E. 2008b Analysis of Metallurgical Waste from Kinnegad II, SASAA 93. In N. Carlin, L. Clarke & F. Walsh, *The Archaeology of Life and Death in the Boyne Floodplain: the linear landscape of the M4* (on CD-ROM). NRA Scheme Monographs 2. National Roads Authority, Dublin.

Photos-Jones, E. 2008c Slag Analysis for Johnstown 3, Appendix 2. In N. Carlin, L. Clarke & F. Walsh, *The Archaeology of Life and Death in the Boyne floodplain: the linear landscape of the M4* (on CD-ROM). NRA Scheme Monographs 2. National Roads Authority, Dublin.

Pleiner, R. 2000 *Iron in Archaeology: The European Bloomery Smelters*, Prague.

Scott, B.G. 1990 *Early Irish Ironworking*. Ulster Museum Publication 266. Belfast.

Tylecote R. 1986 *The Prehistory of Metallurgy in the British Isles*. London. The Institute of Metals.

Wallace, A. & Anguilano, L. 2010 Iron-smelting and smithing: new evidence emerging on Irish road schemes in *Creative Minds: production, manufacturing and invention in ancient Ireland.* Archaeology and the National roads Authority, Monograph Series No. **7**, 69–84.

Young T.P. 2003 Is the Irish iron-smelting bowl furnace a myth? A discussion of new evidence for Irish bloomery iron making. GeoArch Report 2003/09

Appendix 1: Catalogue of Samples

Sample #	Context #	Weight (g)	
2	C015 Fill of pit C14	25.70g	1 irregular flattish nodule 45mm across.
3	C034 Fill of posthole C33	25.40g	V small irregular nodules 3-10mm across.
4	C034 Fill of posthole C33	12.60g	4 small irregular nodules 5-25mm across.
5	C025 top fill of poss kiln C24	1.20g	3 small irregular frags 3-8mm across.
6	2C06 Fill of posthole C5	1.50g	3 tiny irregular non-diagnostic pces 3-10mm across.
7	C044 fill of poss kiln C24	0.10g	One small slag sphere 5mm diameter.
9	C070 Basal fill of ditch C13	314.70g	Small amorphous non-diagnostic frags 20-65mm across.
10	C016 fill of ditch C13	1200g	*c.*15+ small-med irregular shaped lumps, some blocky pces 30-110mm.
11	C017 Siltage	179.50g	2 small dense amorphous lumps 55-70mm across, poss Fe rich slags
12	C038 upper fill of pit C35	74.90g	V small irregular nodules slag, some spherical pces, 3-30mm.
16	C037 fill of pit C35	510.80g	Amorphous lumps, 4 pces ranging from 50-70mm across & *c.*7 small frags 15-30mm across.
22	C038 upper fill of pit C35	168g	Several small irregular nodules, 25-50mm across, non-diagnostic.
26	C052 mid fill furnace C49	447.30g	Small drippy frags 10-60mm across.
27	C051 Basal fill furnace C49	226.40g	Several distinctive grey drippy pces 20-60mm across.
29	C053 upper fill furnace C49	595.80g	Small-med frags blocky & drippy frags ranging from 20-80mm.
30	C51 Basal fill furnace C49	104g	V small drippy frags 5-20mm across.
35	C094 Fill of pit C93	405.30g	Small amorphous nodules 10-50mm across, non-diagnostic pces.
39	C084 Fill of pit C82	24.20g	1 small irregular nodule 40mm across.
40	C085 Fill of pit C82	206.90g	Small frags oxidised baked clay lining.
45	C095 Fill of pit C93	800g	1 poss SHC frag, 2 medium slags 90-120mm across & *c.*10 small irregular pces 10-60mm across.
48	C046 Occupation deposit	225.40g	Small amorphous frags 20-50mm across.
50	C046 Occupation deposit	384.10g	Small-med frags oxidised baked clay lining , some vitrified pces.
59	C110 Fill of ringditch C101	24g	1 small blocky pce slag 40mm across.
60	C001 Topsoil	17.10g	1 small nodule poss ore or slag with reddish hue.

Appendix 2.8 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: intcal04.14c (UBA 10999)

Calibration data set: intcal09.14c (UBA 15552)

Context	Sample No	Material	Species id/ Weight	Lab	Lab Code	Date Type	Calibrated date ranges	Measured radiocarbon age (BP)	13C/12C Ratio ‰
C108, Fill of a ring ditch	65	Seed	*Corylus avellana* / 6.9g	QUB	UBA 10999	AMS (Std)	406–394 BC (1 sigma), 503–384 BC (2 sigma)	2350±21	-26.7
C51, bottom fill of furnace	30	Seed	*Corylus avellana* / 0.1g	QUB	UBA 15552	AMS (Std)	AD26–84 (1 sigma), AD7–125 (2 sigma)	1939±24	-25.5

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
KK023-080	Castle Ringwork
KK023-080001	Designed Landscape, folly
KK023-077	Ringfort, Unclassified
KK023-078	Ringfort, Unclassified
KK023-076	Ringfort, Unclassified
KK023-075	Ritual Site, Holy Well
KK023-079	Ringfort, Unclassified
KK023-005	Enclosure
KK023-004	Enclosure

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