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

Ministerial Direction Scheme Reference No.	A032
Registration No.	E3852
Site Name	AR116, Garryduff 1
Townland	Garryduff
County	Kilkenny
Excavation Director	Emma Devine
NGR	263933 157991
Chainage	62800

FINAL REPORT

ON BEHALF OF KILKENNY COUNTY COUNCIL

JANUARY 2014

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	E3852
Excavation Director	Emma Devine
Senior Archaeologist	Tim Coughlan
Consultant	Irish Archaeological Consultancy Ltd, 120b Greenpark Road, Bray, Co. Wicklow
Client	Kilkenny County Council
Site Name	AR116, Garryduff 1
Site Type	Prehistoric
Townland(s)	Garryduff
Parish	Kilmacahill
County	Kilkenny
NGR (easting)	263933
NGR (northing)	157991
Chainage	62800
Height OD (m)	67.851
RMP No.	N/A
Excavation Dates	15 January–11 February 2008
Project Duration	20 March 2007–18 April 2008
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Report By	Emma Devine and Tim Coughlan
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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 AR116, Garryduff 1 along the proposed N9/N10 Kilcullen to Waterford Scheme, Phase 4 – Knocktopher to Powerstown (Figure 1). The following report describes the results of archaeological excavation at that site. The area was fully excavated by Emma Devine under Ministerial Direction A032 and Excavation Registration Number E3852 issued by the DoEHLG in consultation with the National Museum of Ireland for IAC. The fieldwork took place between the 15 January and 11 February 2008.

The site was situated on a gentle north-east facing slope of glacial till that leads down to the Monefelim River *c.* 50m from the main concentration of archaeological features. The river ran northwest-southeast past the site.

Multi-phased activity, predominantly relating to the early-middle Bronze Age and the late Bronze Age, was identified on the site. The earliest dated activity was centred on two small cremation pits located in the north-west. The adjacent pits contained quantities of cremated human bone, with both pits potentially containing one adult individual (a possible male in the southern of the two pits, C49, and a possible female in the northern pit, C118). A deposit from one of the pits was radiocarbon dated to the early-middle Bronze Age.

The late Bronze Age activity was focussed on two structures. Structure 1 possibly represents a roundhouse defined by a curvilinear arrangement of postholes and stakeholes, some of which were contained within a slot trench. Only evidence for the southern half of the structure was extant and indicated that it was approximately 11m in diameter. A possible concentric internal line of postholes, 8m in diameter, was also recorded. A range of dates from the late Bronze Age and the early and middle Iron Age were recorded from features associated with the structure. It is interpreted that the Iron Age dates possibly relate to some later intrusive activity, particularly as the second structure was also dated as nearly contemporary late Bronze Age.

Structure 2 was identified in the south-east of the site and like Structure 1 comprised a curvilinear line of postholes, some within a small slot-trench. It seems that only a quarter of the structure lay within the roadtake so its full dimensions are unclear. On the basis of the excavated section however, it is possible that this structure may have been twice the size of Structure 1 – approximately 22m in diameter. This size would appear too large to be a house or other roofed building so the precise nature and function of Structure 2 is unknown and it may represent a fence or boundary division.

Other features were identified across the site, with some being isolated pits or deposits and some being in clusters. A cluster of activity was recorded in the area between the two structure which would seem to be related consisting of a pit, postholes and small deposits. A possible cooking pit was recorded to the north-east of the structures in a somewhat isolated position. Domestic waste in the form of charred hazelnut shells, and small quantities of charred cereals and cremated animal bone were recorded from some of the deposits.

Artefacts from the site consisted of two poorly preserved pottery sherds and six fragments that possibly represent vessels of early, middle and final Neolithic date, and a single flint blade also possibly Neolithic in date. These may be derived from disturbed Neolithic contexts, although no definitive Neolithic features were identified on the site. Environmental evidence indicates that the landscape was surrounded by

mixed woodlands. Cremated animal bone and some charred seed and hazelnut shell fragments may relate to a domestic activity associated with the structures.

A total of five samples were sent for AMS radiocarbon dating. The results of the analysis dated a fragment of cremated human bone from the fill of a cremation pit to 1738–1518BC (UBA 15414). Ash charcoal from the fill of a pit associated with Structure 1 produced a 2 sigma calibrated date of 1258–1024BC (UBA 15412). Willow charcoal from the fill a posthole associated with Structure 2 was dated to 1253–1018BC (UBA 15415). The two remaining dates may relate to intrusive activity and their significance is unclear. Ash charcoal from a pit fill had a 2 sigma calibrated date of 746–400BC (UBA 15416) and hazel charcoal from the fill of a post/stakeholes returned a date of 392–209BC (UBA 15413).

The excavation has unearthed evidence of funerary activity in the form of two cremation pits dated to the early-middle Bronze Age and two possible roundhouses dated to the late Bronze Age. Other activity possibly dating to the Neolithic was evident from pottery remains recovered from the site. Two features also yielded Iron Age radiocarbon dates, although it is not clear what the significance of these dates is. Both phases of activity are very important locally as they represent the first prehistoric evidence in Garryduff townland. They have a wider significance as they expand our previously know distribution of Bronze Age sites in north Kilkenny. The two possible roundhouses are of regional significance as there is a relative paucity of excavations relating to roundhouses in the wider area.

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1 INTRODUCTION

1.1 General

This report presents the results of the archaeological excavation of Garryduff 1, AR116 (Figures 1-3), in the townland of Garryduff undertaken by Emma Devine 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 925m^2 and was first identified during testing carried out between 27 March and 6 April 2007 by Richard Jennings for IAC Ltd. on behalf of the National Roads Authority. Garryduff 1 was excavated between 15 January and 11 February 2008 with a team of one director, two supervisors and 17 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.

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

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

All dating of samples from the site was carried out by means of AMS (Accelerator Mass Spectrometry) Radiocarbon Dating of identified and recommended wood charcoal and burnt bone 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

The site is situated on a gentle northeast-facing slope of glacial till that leads down to the Monefelim River *c*. 50m from the main concentration of archaeological features. The river ran northwest-southeast–past the site. The surrounding topography is generally flat and of pasture. Ballinvally 1 is located *c*. 800m to the south-west and Kilmacahill 1 is located *c*. 500m to the north-east. There is a church (KK021-001001), graveyard (KK021-01002) and ecclesiastical enclosure (KK021-001003) situated *c*. 450m to the east.

Additional archaeological testing was undertaken at the end of the excavation in the field located immediately west of the site in an effort to establish if any other archaeological features related to the site were apparent but nothing additional was found.

2.1 PHASE 1 Natural Drift Geology

Context	Fill of	L (m)	W (m)	D (m)	Basic Description	Interpretation
C2	N/A	All	All	-	Grey to yellow sandy, gravelly glacial till	Subsoil

Finds: None

The subsoil was a gravelly glacial till which was prone to collapse where voids had formed, possibly by ice wedges. It may have subsided over time to create hollow C63 (ref. section 2.4). It was particularly stony and smaller discrete features may not have left any clearly identifiable evidence in this type of subsoil.

2.2 PHASE 2 Early-Middle Bronze Age Cremation Activity

2.2.1 Cremation Burials

Context	Fill of	L (m)	W (m)	D (m)	Basic Description	Interpretation
C3	C49	0.5	0.32	0.06	Mid-brown silty clay	Upper fill of C49
C48	C49	0.4	0.3	0.04	Brownish black, silty sand, charcoal	Fill of cremation pit
C49	N/A	0.4	0.32	0.1	Circular feature	Cut of cremation pit
C117	C118	0.52	0.42	0.15	Dark greyish brown silty sand	Fill of cremation pit
C118	N/A	0.52	0.42	0.15	Oval feature	Cut of cremation pit

Finds: None

Two small pits containing quite large chunks of cremated human bone were located towards the northwestern corner of the site. Cremation Pit 1 (Plate 1), C49, contained two deposits; the first of these, C48, was a charcoal-rich layer of burnt bone and possible pyre material (in the form of frequent charcoal inclusions). The secondary deposit C3 was the main cremation deposit and was composed almost entirely of burnt bone.

Cremation Pit 2 (Plate 2), C118, contained the single cremation deposit C117, in which the main concentration of bone was located centrally (Figures 4-5).

Charcoal analysis of fills C3 and C48 of possible cremation pit C49, and fill C117 of cremation pit C118 all indicated the presence of oak (*Quercus* sp.). When burnt, oak charcoal, particularly the dense heartwood, has higher calorific values than most European woods and this can make for good, long-lasting fuel (Cutler and Gale, 2000) (Lyons, Appendix 2.5).

Stone retrieved from C118 was analysed and was found to be coarse greywacke sandstone. Course grained sandstone is typical of *fulacht fiadh* material. The sample

is clearly a shattered cobble, indicating a secondary source, such as in glacial tills / river cobbles. It is therefore possible that these rocks were sourced locally (Mandal, Appendix 2.8).

Both of the identified cremation pits at Garryduff 1 contained roughly equal quantities of burnt bone, with 1126.2g recorded from pit C118. The cremated bone weight from both of the identified cremation pits was comparable to the expected weight of a single adult individual. Survival of the bone fragments from both burials was considered moderate with a total of 24.6% of the total bone weight comprising elements greater than 10mm in diameter. The maximum surviving fragment length was 66.8mm (Pit C49) and in both pits the greatest percentage of bone weight fell between 5mm and 10mm in diameter. This suggests that the post-cremation treatment of the remains did not include deliberate 'crushing' of the bone. The majority of identifiable elements comprised non-specific long bone fragments and skull fragments with additional fragments identifiable as elements of upper and lower limbs and axial skeleton. The range of skeletal elements from both the axial and appendicular skeleton, including a number of the small hand bones, strongly suggests that there was no deliberate selection of specific skeletal elements for deposition (Coughlan, Appendix 2.10).

The robusticity and cortical thickness of the identifiable long bone and cranial fragments suggest that the elements in Pit C49 derived from an adult individual(s). The C49 assemblage also contained a partial left orbital margin and it is suggested that this individual was a male. A single partial pubic bone identified in the assemblage from pit C118, although incomplete, did appear relatively gracile which may indicate that this individual was a female (*ibid.*). A single fragment of a partial pubic symphysis identified in the assemblage from pit [C118] provided some indication of age, suggestive of Stage 2–3 in the Suchey-Brooks scheme, giving a mean age estimation of 25–30.7years.

A small fragment (1.7g) of human bone was chosen for AMS dating from C48 and returned a result of 3339±43 (UBA 15414). The 2 Sigma calibrated result for this was 1738–1518BC (QUB, Appendix 2.11) dating this feature to the early-middle Bronze Age period.

2.3 PHASE 3 Late Bronze Age Settlement Activity

The late Bronze Age activity on the site was focussed on two circular structures and some associated pits and postholes.

2.3.1 Structure 1

2.3.1.1 Enclosing Postholes and Slot-trench C42

Context	Fill of	L (m)	W (m)	D (m)	Basic Description	Interpretation
C5	C52	0.32	0.26	0.36	Dark grey silty sand	Fill of posthole
C7	C53	0.25	0.24	0.12	Blackish silty sand	Fill of posthole
C14	C56	0.3	0.16	0.23	Brownish grey silty organic	Fill of posthole
C15	C50	0.39	0.24	0.14	Brownish black silty organic	Fill of posthole
C17	C42	8	0.4	0.14	Blackish grey charcoal silty clay	Fill of slot-trench
C20	N/A	0.55	0.34	0.1	Greyish black, coarse sand	Deposit
C22	C102	0.57	0.36	0.18	Darkish grey silty sand	Fill of posthole
C27	C71	0.13	0.12	0.17	Brownish grey silty clay	Fill of stakehole
C28	C159	2.3	1.7	0.1	Dark brownish black clay	Fill of stakehole/slot-trench
C42	N/A	8	0.4	0.14	Curvilinear	Cut of slot-trench
C50	N/A	0.15	0.18	0.14	Sub-rectangular feature	Cut of posthole
C51	C50	0.15	0.18	0.14	Mid-brownish grey sandy silt	Fill of posthole

Context	Fill of	L (m)	W (m)	D (m)	Basic Description	Interpretation
C52	N/A	0.32	0.26	0.36	Circular feature	Cut of posthole
C53	N/A	0.25	0.24	0.12	Circular feature	Cut of posthole
C56	N/A	0.39	0.26	0.19	Sub-rectangular feature	Cut of posthole
C71	N/A	0.13	0.12	0.17	Circular feature	Cut of stakehole
C73	C74	0.14	0.12	0.11	Dark grey silty sand	Fill of stakehole
C74	N/A	0.14	0.12	0.11	Circular feature	Cut of stakehole
C79	C80	0.42	0.28	0.22	Darkish grey silty sand	Fill of posthole
C80	N/A	0.42	0.28	0.22	Oval feature	Cut of posthole
C83	N/A	0.19	0.12	0.18	Oval feature	Cut of stakehole
C85	Multiple – see description	0.35	3	0.2	Black silty burnt material Filling C148, C88, C101, C146, C106, C100, C143, C109, C110, C111, C120, C87, C86	Fill of post and stakeholes
C86	N/A	0.17	0.12	0.2	Oval feature	Cut of posthole
C87	N/A	0.13	0.1	0.1	Sub-circular feature	Cut of stakehole
C88	N/A	0.37	0.32	0.19	Circular feature	Cut of posthole
C89	C88	0.3	0.27	0.12	Brownish yellow grey sandy gravel	Fill of posthole
C92	N/A	0.15	0.14	0.15	Sub-circular feature	Cut of stakehole
C100	N/A	0.46	0.32	0.18	Circular feature	Cut of posthole
C101	N/A	0.44	0.41	0.31	Circular feature	Cut of posthole
C102	N/A	0.57	0.36	0.18	Oval feature	Cut of posthole
C104	C105	0.68	0.36	0.23	Dark brown silty sand	Fill of posthole
C105	N/A	0.68	0.36	0.23	Circular feature	Cut of posthole
C106	N/A	0.21	0.19	0.21	Sub-circular feature	Cut of posthole
C109	N/A	0.5	0.3	0.22	Oval feature	Cut of posthole
C110	N/A	0.38	0.3	0.2	Oval feature	Cut of posthole
C111	N/A	0.32	0.25	0.16	Oval feature	Cut of posthole
C114	C115	0.43	0.38	0.24	Blackish grey silty clay	Fill of posthole
C115	N/A	0.43	0.38	0.3	Oval feature	Cut of posthole
C120	N/A	0.16	0.12	0.22	Sub-circular feature	Cut of posthole
C143	N/A	0.38	0.36	0.24	Sub-circular feature	Cut of posthole
C146	N/A	0.3	0.28	0.26	Sub-oval feature	Cut of posthole
C148	N/A	0.15	0.14	0.14	Sub-circular feature	Cut of posthole
C156	C164	0.4	0.3	0.2	Dark brown silty sand	Fill of posthole
C159	N/A	0.15	0.12	0.2	Sub-circular feature	Cut of stakehole
C160	N/A	0.1	0.08	0.09	Circular feature	Cut of stakehole
C161	N/A	0.11	0.09	0.23	Circular feature	Cut of stakehole
C162	N/A	0.09	0.08	0.17	Circular feature	Cut of stakehole
C164	N/A	0.4	0.3	0.2	Oval feature	Cut of posthole
C165	N/A	0.15	0.14	0.1	Sub-circular feature	Cut of posthole
C168	N/A	0.13	0.13	0.08	Circular feature	Cut of stakehole
C171	N/A	0.07	0.07	0.13	Circular feature	Cut of stakehole
C172	N/A	0.1	0.08	0.08	Oval feature	Cut of stakehole
C173	N/A	0.07	0.06	0.14	Circular feature	Cut of stakehole
C178	C179	0.05	0.04	0.05	Mid-brownish grey silty gravel	Fill of stakehole
C179	N/A	0.05	0.04	0.05	Circular feature	Cut of stakehole
C180	C181	0.05	0.05	0.06	Dark grey silty sand	Fill of stakehole
C181	N/A	0.05	0.04	0.06	Circular feature	Cut of stakehole
C182	C183	0.05	0.06	0.09	Mid-dark grey silty sand	Fill of stakehole
C183	N/A	0.05	0.06	0.09	Circular feature	Cut of stakehole
C184	C185	0.08	0.06	0.12	Dark grey sandy silt	Fill of stakehole
C185	N/A	0.08	0.06	0.12	Circular feature	Cut of stakehole
C186	C160	0.1	0.08	0.09	Grey silty sand	Fill of stakehole
C187	C161	0.11	0.09	0.23	Dark brown grey sandy silt	Fill of stakehole
C188	C162	0.09	0.08	0.17	Grey black sandy silt	Fill of stakehole
C189	C168	0.13	0.13	0.08	Darkish brown silty sand	Fill of stakehole
C190	C165	0.15	0.14	0.1	Darkish brown silty sand	Fill of stakehole

Context	Fill of	L (m)	W (m)	D (m)	Basic Description	Interpretation
C191	C148	0.15	0.14	0.14	Packing stones	Packing fill
C192	C83	0.44	0.29	0.22	Dark greyish brown silty sand	Fill of stakehole
C193	C171	0.07	0.07	0.13	Greyish sand	Fill of stakehole
C194	C172	0.1	0.08	0.08	Mid-brown clayey sand	Fill of stakehole
C195	C173	0.07	0.06	0.14	Black, silty sand	Fill of stakehole

Finds

Context	Find No.	Material	Period	Description
C85	E3852:85:1–3	Pottery	Neo/EBA	Three fragments of Beaker pottery
C104	E3852:104:1	Pottery	Neo/BA	One fragment of Beaker pottery
C114	E3852:114:1	Pottery	Early Neolithic	Bodysherd

The main enclosing element of Structure 1 was defined by a semi-circular alignment of postholes and stakeholes, some of which appeared to be within an associated slot trench. A total of 39 postholes and stakeholes were recorded. It is suggested that the stakeholes represented the truncated remains of postholes; some of which were more prominent in the south-east. The post- and stakeholes defined the southern extent of the structure but no comparable evidence was recorded for its northern extents. A single relatively isolated posthole and a deposit possibly marked the location of a second posthole in the north-west area (C102 and C20 respectively). This suggests that this area may have been truncated. The potential that elements of the structure were truncated is supported by the remains of smaller stakeholes on the south-east side. The features collectively enclosed an area measuring 11m in diameter.

A number of the postholes in the south-west of the structure were located within an associated small curving slot-trench, C42 (Figure 4; Plates 3–4). It contained 14 postholes (C86, C88, C92, C100, C101, C105, C106, C109–C111, C115, C120, C143, and C146) and stakehole C87, and almost all were filled with burnt charcoal-rich deposit C85. It appeared that the posts contained in the slot had been burnt out, thus creating the charcoal rich deposit C85, and the structure was then abandoned. A sherd of prehistoric pottery and some charred seeds and hazelnuts were recovered from C85 during sieving. A charcoal-rich silt layer C17 then washed in to the slot sealing everything else beneath. Two postholes, C148 and C88, contained evidence for *in situ* packing material, C89 and C191, respectively. Two other postholes were filled by deposits other than the charcoal rich C85: C105 contained C104 and C115 contained C114. Both of these deposits were contemporary with fill C85 but were slightly lighter in colour, both were burnt charcoal-rich deposits, and a sherd of late Neolithic pottery was recovered from each. All of the posts were circular and positioned with a gap of 10–15cm between them. A total of seven of postholes and one stakehole occurred outside the slot trench to the north. One of these, C56 was sub-rectangular in shape and may have originally supported a plank rather than a post. A rectangular post, C50, contained packing material, C51, that had slumped inwards when the post was removed and then silted up with fill C15.

In the south-east of the structure stakeholes C71, C83, C168 and C179 appeared to have had their stakes removed and the holes subsequently silted up. Stakehole C71 had evidence for *in situ* stone packing while C181, C183 and C185 appeared to have rotted *in situ*, and perhaps the bases of the stakes snapped off when they were being removed and were left in the ground. The remaining two postholes, C164 and C165, and the remaining seven stakeholes, C159–C162, and C171–C173, were all sealed beneath a silty deposit, C28. This deposit had formed in a slight depression that surrounded these stakes and posts and which may have been the remains of another slot-trench. Six of these stakeholes were filled with natural silt deposits and some

contained burnt bone (unidentifiable and animal bone). Stakehole C159 appeared to have been filled with the surrounding C28 deposit. Posthole C164 may have been backfilled with burnt material and posthole C165 had been filled with a natural silty sand.

One small sherd of prehistoric pottery was recovered from fill C114 of posthole C115 located in slot trench C42. This bodysherd has been identified as an early Neolithic vessel fragment. The condition of the pottery suggests that it derived from a domestic context although the considerable wear it displays may indicate that it was disturbed from earlier contexts. Three fragments of prehistoric pottery were recovered from C85 of slot trench C42 and one fragment of prehistoric pottery was recovered from C104 of posthole C105 within slot trench C42. The fabric and firing suggest these are final Neolithic/ early Bronze Age pottery fragments and the condition of the pottery suggests that it derived from a domestic context although the considerable wear may indicate that it is disturbed from earlier contexts (Grogan and Roche, Appendix 2.1).

Charcoal analysis of C85 of posthole C100 within slot trench C42 indicated a presence of willow (*Salix* sp.), ash (*Fraxinus excelsior*), hazel (*Corylus avellana*), oak (*Quercus* sp.), pomaceous fruitwoods (*Maloideae* spp.) and elm (*Ulmus* sp.). Charcoal analysis of C156, fill of posthole C164 indicated a presence of willow (*Salix* sp.), pomaceous fruitwoods (*Maloideae* spp.), ash (*Fraxinus excelsior*) and oak (*Quercus* sp.). Fills C5, C7, C28, and C190, from postholes and stakeholes were also sent for charcoal analysis and indicated a presence of hazel (*Corylus avellana*), ash (*Fraxinus excelsior*), willow (*Salix* sp.), oak (*Quercus* sp), elm (*Ulmus* sp.) and cherry type (*Prunus* sp.). The use of willow depends on the species concerned, for some grow as shrubs and others as trees, and a species may be particularly suited to some purpose. Ash thrives well on nutrient-rich soils but is also a common woodland species and grows in mixed woodland with oak on damp, slightly acidic soils (Cutler and Gale, 2000). Hazel produces good firewood and is a suitable wood for kindling. Oak is a tall deciduous woodland tree, often growing in association with hazel and ash. It is easy to cleave both radially and tangentially and has provided one of the most important building materials since the prehistoric period (ibid.). Pomaceous fruitwoods burn slow and steady and provide excellent heat with minimal smoke (ibid.). Elm species flourishes on rich, alluvial soils particularly in riverine habitats. The cherry species can be difficult to distinguish in the absence of bark, buds and leaves, wild cherry produces inferior firewood (Lyons, Appendix 2.5).

Samples retrieved from slot trench fill C28, post and stakehole fills C85, and posthole fill C156 were sent for plant remains analysis. These samples contained hazelnut shell fragments (*Corylus avellana* L.). C85 also contained a single fragment of indeterminate tubers. Slot trench fill C28 also contained indeterminate cereal grains and probably hulled barley grains (*Hordeum vulgare* L.). Hazelnut shell fragments are commonly found in Irish archaeological deposits, and they usually represent waste, since the shell fragments were cast aside after the nut kernel was consumed (Monk 2000, 75). The quantity of cereal grains present was so small that it was impossible to establish the importance of each grain type (Johnston, Appendix 2.6).

Burnt animal bone fragments were recovered from the post and stakehole fill C85, posthole fill C156, and stakehole fill C27 but they were too small and in too poor a condition to identify to species. Fragments of burnt animal bone were recovered from the stakehole fill C186, a pig (*Sus)* rib fragment and other unidentifiable burnt animal bone fragments were identified in the burnt bone analysis. Fragments of burnt animal bone were also recovered from the slot trench fill C28; a fragment of rodent sized burnt bone was identified but the other burnt bone fragments were too small to identify to species. Fragments of burnt animal bone were recovered from the

posthole fill C5, pig (*Sus)* sized bone fragments and fragments of rodent sized burnt bone were identified but the other burnt bone fragments were too small to identify to species. The burnt bone fragments recovered from the posthole fill C7 were also too small and badly preserved to identify to species (McCarthy, Appendix 2.7)

A small fragment (0.6g) of hazel from charred deposit C85 was chosen for AMS dating and returned a result of 2251±26 (UBA 15413). The 2 Sigma calibrated result for this was 392–209BC (QUB, Appendix 2.11) dating this feature to the middle Iron Age period. This date may not necessarily represent the date of the structure and may relate to some later intrusive activity. A pit (C108) located in the south of the enclosing elements was dated to the late Bronze Age and is discussed below. Another similar structure was identified in part to the south-east (see Structure 2 below) which returned a contemporary late Bronze Age date to pit C108 so it is interpreted that Structure 1 is also a late Bronze Age construction.

2.3.1.2 Pits C108 and C78

Context	Fill of	L (m)	W (m)	D (m)	Basic Description	Interpretation
C16	C78	1.4	1.1	0.22	Dark black silty sand	Fill of pit
C26	C108	0.3	1.28	0.56	Mid-brown black silty clay	Fill of pit
C55	C78	0.36	0.26	0.2	Brownish silty clay	Fill of pit
C78	N/A	1.5	1.25	0.22	Oval feature	Cut of shallow pit
C107	C108	1.28	0.66	0.46	Greyish brown, silty clay	Fill of pit
C108	N/A	1.28	1.05	0.76	Oval feature	Cut of pit
C157	C108	1.28	0.98	0.18	Mid-brown silty sand	Redeposit
C158	C108	0.85	0.8	0.02	Mid-brown silty sand	Fill of pit

Finds

Context	Find No.	Material	Period	Description
C26	E3852:26:1	Pottery	Middle Neolithic	Necksherd
C26	E3852:26:2	Limestone	Early Neolithic	Natural chunk

Two pits were identified along the line of the enclosing postholes and stakeholes of Structure 1. One, C78, lay to the north-west and the other, C108, to the south (Figures 4–5). Pit C78 was quite shallow and was in the same location as postholes C52 and C53 and stakehole C74 which were cut through its base. This pit may have supported a large post which could have provided additional structural support. As it was located at the end of the western arc of postholes the pit C78 may have defined an entranceway or terminus to the enclosing elements. It may also represent clearance of a rock or similar to facilitate the placing of the postholes. The postholes C52, C53 and stakehole C74 had contained posts that were removed and filled with charcoal-rich deposits, and all were sealed beneath fills C16 and C55 which overlaid them.

Pit C108 was much deeper than any of the other features on site and contained a number of deposits (Figure 5). The size of the pit and its location on the line of the other enclosing elements suggest that it may have been directly related to the enclosure and possibly had a structural function. Basal fill C158 had formed by silting and contained charcoal flecks and small stones washed into the pit after it was dug, and some burnt bone fragments were recovered from it. It is suggested that large slump layer C157 then fell in, as the surrounding subsoil was very gravelly and unstable and the sides of the pit tended to collapse inwards even during excavation. A charcoal-rich stony deposit C26 overlay C157 and had been dumped in from the south side of the feature. Burnt bone fragments and charred seeds and hazelnuts were recovered from it. Secondary stony dump layer C107 overlaid both C157 and C26. It also contained burnt bone and charred hazelnut shells. A single piece of

metallurgical waste was retrieved from fill C26 which consists of a tiny spherical piece of slag *c*. 3mm in diameter and 0.1g in weight. This piece is most likely a by-product of iron smithing, possibly formed during primary smithing where the bloom is being refined (Wallace, Appendix 2.9).

One small sherd of prehistoric pottery was recovered from C26 of pit C108. This necksherd has been identified as a middle Neolithic vessel fragment (Grogan and Roche, Appendix 2.1).

One lithic was retrieved from C26. The lithic has been identified as a natural chunk of limestone and most likely dates to the early Neolithic period (Sternke, Appendix 2.3).

Samples of charcoal were analysed from C26, C107 and C158, fills of pit C108 and the results indicated a presence of hazel (*Corylus avellana*), willow (*Salix* sp.), ash (*Fraxinus excelsior*), cherry type (*Prunus* sp.), oak (*Quercus* sp) and pomaceous fruitwoods (*Maloideae* spp.). Hazel produces good firewood and is a suitable wood for kindling. Ash thrives well on nutrient-rich soils but is also a common woodland species and grows in mixed woodland with oak on damp, slightly acidic soils (Cutler and Gale, 2000). The use of willow depends on the species concerned, for some grow as shrubs and others as trees, and a species may be particularly suited to some purpose. Oak is a tall deciduous woodland tree, often growing in association with hazel and ash. It is easy to cleave both radially and tangentially and has provided one of the most important building materials since the prehistoric period (ibid.). The cherry species can be difficult to distinguish in the absence of bark, buds and leaves, wild cherry produces inferior firewood. Elm species flourishes on rich, alluvial soils particularly in riverine habitats. Pomaceous fruitwoods burn slow and steady and provide excellent heat with minimal smoke (*ibid.*) (Lyons, Appendix 2.5).

Samples taken from pit fills C26 and C107 were sent for plant remains analysis. The samples were found to contain a large number of hazelnut shell fragments (*Corylus avellana* L.) and a small number of probable hulled barley grains (*Hordeum vulgare* L.). Hazelnut shell fragments are commonly found in Irish archaeological deposits (Johnston, Appendix 2.6).

Fragments of burnt animal bone were recovered from the pit fills C107 and C158 but were too small and badly preserved to identify to species. Fragments of burnt animal bone were recovered from the pit fill C26, pig (*Sus)* bone fragments and other unidentifiable burnt animal bone fragments were identified in the burnt bone analysis. The possible exposure of a bone fragment to metal resulting in green discolouration was noted on a single fragment of pig rib corpus (McCarthy, Appendix 2.7).

Stone retrieved from C5, C26 and C107 was analysed and was found to be coarse greywacke/ very coarse grained quartz red sandstone. Course grained sandstone is typical of *fulacht fiadh* material. The sample is clearly a shattered cobble, indicating a secondary source, such as in the glacial tills / river cobbles. It is therefore possible that these rocks were sourced locally (Mandal, Appendix 2.8).

A small fragment (0.3g) of ash was chosen for AMS dating from C158 and returned a result of 2929±29 (UBA 15412). The 2 Sigma calibrated result for this was 1258–1024BC (QUB, Appendix 2.11) dating this feature to the late Bronze Age period.

2.3.1.3 Internal Pit C66

Context	Fill of	L (m)	W (m)	D (m)	Basic Description	Interpretation
C18	C66	2	1.3	0.16	Brownish black sandy silt	Hearth waste, fill of pit
C66	N/A	2	1.3	0.16	Oval feature	Cut of pit

Finds: None

Pit C66 (Plate 5) was the largest internal feature. It was a shallow sub-oval pit and was orientated northwest–southeast. Charcoal-rich deposit C18 had been dumped in and contained burnt bone, heat-cracked stones, and charred hazelnuts. The material collectively may represent waste from a hearth. The pit has been dated to the early Iron Age and as such may not be contemporary with the structure. The pit is truncated by three postholes, C68, C70 to the north and C91 to the south, suggesting it pre-dates them although they could be broadly contemporary. These postholes (see next section) were associated with other pits and postholes that may represent an internal ring associated with the structure. The date therefore from the pit must be viewed with some scepticism, (as with the middle Iron Age date from the enclosing gully [Section 2.2.1.1]) and may relate to a sample contaminated with later intrusive material.

Charcoal analysis of C18 fill of pit C66 indicated the presence of hazel (*Corylus avellana),* ash (*Fraxinus excelsior*), cherry type (*Prunus* sp.), elm (*Ulmus* sp.) and oak (*Quercus* sp.) (Lyons, Appendix 2.5).

A sample taken from pit fill C18 was sent for plant remains analysis and contained hazelnut shell fragments (*Corylus avellana* L.). Hazelnut shell fragments are commonly found in Irish archaeological deposits (Johnston, Appendix 2.6).

Fragments of burnt animal bone were recovered from the pit fill C18 and were too fragmented and cracked to identify to species (McCarthy, Appendix 2.7).

A small fragment (1g) of ash was chosen for AMS dating from C18 and returned a result of 2416±30 (UBA 15416). The 2 Sigma calibrated result for this was 746–400BC (QUB, Appendix 2.11) dating this feature to the early Iron Age period.

2.3.1.4 Internal Pit/Posthole ring

Context	Fill of	L (m)	W (m)	D (m)	Basic Description	Interpretation
C19	N/A	0.3	0.3	0.1	Dark brown clay	Deposit
C21	N/A	0.42	0.36	-	Dark brownish black sandy	Deposit
C23	C149	0.58	0.5	0.07	Loose, dark brown, sandy silt	Fill of pit
C25	C72	0.4	0.4	0.2	Mid-black silty sand	Fill of posthole
C29	C75	0.7	0.26	0.14	Mid-brownish black silty clay	Fill of pit
C30	C37	0.6	0.52	0.15	Greyish silty sand	Fill of pit
C37	N/A	0.6	0.52	0.13	Circular feature	Cut of pit
C67	C68	0.4	0.4	0.31	Black silty clay	Fill of posthole
C68	N/A	0.4	0.4	0.31	Circular feature	Cut of posthole
C69	C70	0.42	0.42	0.2	Dark brown to black, silty clay	Fill of posthole
C70	N/A	0.42	0.42	0.2	Circular feature	Cut of posthole
C72	N/A	0.4	0.4	0.2	Oval feature	Cut of posthole
C75	N/A	0.7	0.26	0.14	Oval feature	Cut of shallow pit
C90	C91	0.38	0.25	0.08	Black silty clay	Fill of posthole
C91	N/A	0.38	0.25	0.08	Circular feature	Cut of posthole
C149	N/A	0.58	0.5	0.07	Circular feature	Cut of small pit

Finds

Context	Find No.	Material	Period	Description
C30	E3852:30:1	Pottery	Modern	1 pottery sherd

A number of features were identified internally within the area enclosed by Structure 1, and appeared to form a smaller, internal concentric curvilinear alignment in the south of the structure (Figure 4; Plate 3). These were formed by four postholes, and three small shallow pits that may also represent the remains of postholes. These were generally located between 1.00-1.50m inside the outer line of postholes defining the structure and this regularity could support their interpretation as having a structural function. In the north-west of the structure two deposits, C19 and C21, may represent the remnants of features associated with this internal alignment. It has been identified above (Section 2.3.1.3) that three of these 'inner' postholes cut through pit C66, the fill of which has been dated to the Iron Age, and suggests it is later than Structure 1. However, as outlined, the validity of this date is in question and it is interpreted that the internal ring is contemporary with the main enclosing elements.

Analysis of C67, the fill of posthole C68, cutting through pit C66, indicated the presence of hazel (*Corylus avellana*), pomaceous fruitwoods (*Maloideae* spp.), ash (*Fraxinus excelsior*) and oak (*Quercus* sp.). Fill C90 of posthole C91 indicated a presence of hazel (*Corylus avellana*), willow (*Salix* sp.), ash (*Fraxinus excelsior*) and oak (*Quercus* sp). Analysis of fill C69 of posthole C70 indicated a presence of ash (*Fraxinus excelsior*), hazel (*Corylus avellana*), pomaceous fruitwoods (*Maloideae* spp.), willow (*Salix* sp.) and oak (*Quercus* sp.) (Lyons, Appendix 2.5).

Fragments of burnt animal bone were recovered from the posthole fills C69 and C90 but were too fragmented and cracked to identify to species. Fragments of burnt animal bone were also recovered from the posthole C67, one fragment was identified as a pig (*Sus*) sized fragment and the rest of the burnt bone fragments were too small and badly preserved to identify to species (McCarthy, Appendix 2.7).

A single fragment of modern pottery (E3852:30:1) indicates intrusive activity in pit C37.

2.3.1.5 Other Internal Features

Context	Fill of	L (m)	W (m)	D (m)	Basic Description	Interpretation
C11	N/A	12	9.5	-	Occupation deposit, hard compaction	Deposit
C24	N/A	0.66	0.6	0.04	Dark greyish black, silty sand	Deposit
C31	N/A	0.4	0.36	0.1	Greyish, silty sand	Deposit
C32	C82	0.52	0.28	0.3	Grey silty sand	Fill of posthole
C82	N/A	0.62	0.28	0.3	Oval feature	Cut of posthole
C84	N/A	0.2	0.19	0.05	Mid-brownish black silty clay	Deposit
C95	C96	0.74	0.32	0.21	Grey silty sand	Fill of posthole
C96	N/A	0.74	0.32	0.21	Circular feature	Cut of posthole
C112	C113	0.32	0.31	0.15	Dark blackish sandy silt	Fill of stakehole
C113	N/A	0.32	0.31	0.15	Sub-circular feature	Cut of stakehole
C196	C82	0.2	0.15	0.1	Greyish brown silty sand	Fill of posthole

Finds

Context	Find No.	Material	Period	Description
C11	E3852:11:1-2	Pottery	Neolithic/EBA	2 fragments (Beaker pottery)

A number of other features and deposits were recorded in the area enclosed by Structure 1 (Figure 4; Plate 3). These consisted of two postholes C82 and C96 in the

south-east of the structure that may be related to the internal ring, as discussed above. as they were in close proximity to it. Stakehole C113 may also be related to this internal ring but its relative isolation in the north of the structure means that this cannot be stated with any certainty.

A number of deposits were identified within the enclosure that may represent the remains of an occupation surface enclosed by the arc of the slot trench (C42) which was only extant in patches or hollows, the rest having been truncated by machine-stripping prior to excavation or by agricultural activity in the intervening years. The largest of these was C11 with C24, C31 and C84 representing more localised variations or possibly the remnants of shallow postholes or pits. Two sherds of Neolithic pottery were recovered from C11 and charred seeds from C24. The heavily compacted deposit C11 may represent a trample layer. It extends around all of the post- and stakeholes.

One of the postholes, C82, contained *in situ* packing stones and packing material C32, and it is suggested that the post or posts had been removed and silt deposit C196 then formed in the voids. The other posthole, C96, was oval in shape and contained deposit C95, from which some burnt bone and charcoal was recovered. C113 was probably a stakehole and contained C112, a dark organic deposit that was probably the remains of the stake rotted *in situ*.

Two fragments of prehistoric pottery were recovered from the possible occupation deposit, C11. The fabric and firing indicate that this is final Neolithic/ early Bronze Age pottery and the condition of the pottery suggests that it is derived from a domestic context although the considerable wear may indicate that it is disturbed from earlier contexts (Grogan and Roche, Appendix 2.1).

Charcoal analysis of the possible occupation deposit C24, within arc 1 of Structure 1 showed the presence of hazel (*Corylus avellana*). Charcoal analysis of C32, fill of posthole C82 indicated a presence of ash (*Fraxinus excelsior*), oak (*Quercus* sp.), willow (*Salix* sp.) and hazel (*Corylus avellana*). Similarly, charcoal analysis of C95, fill of posthole C96, indicated a presence of oak (*Quercus* sp.), ash (*Fraxinus excelsior*), hazel (*Corylus avellana*) and willow (*Salix* sp.) (Lyons, Appendix 2.5).

Fragments of burnt animal bone were recovered from the posthole fills C32 and C95 and were too fragmented and cracked to identify to species (McCarthy, Appendix 2.7).

2.3.2 Structure 2

2.3.2.1 Slot Trench C136 and Associated Postholes

Context	Fill of	L (m)	W (m)	D (m)	Basic Description	Interpretation
C121	C122	0.3	0.24	0.14	Dark grey sandy clay	Deposit
C122	N/A	0.3	0.24	0.14	Circular feature	Cut of posthole
C123	C124	0.24	0.24	0.1	Dark greyish brown sandy clay	Deposit
C124	N/A	0.24	0.24	0.1	Circular feature	Cut of posthole
C125	C126	0.19	0.2	0.2	Mid-brown silty clay	Deposit
C126	N/A	0.2	0.2	0.19	Circular feature	Cut of posthole
C127	C128	0.38	0.3	0.15	Mid-greyish brown sandy clay	Deposit
C128	N/A	0.15	0.38	0.3	Circular feature	Cut of posthole
C129	C130	0.4	0.38	0.17	Light grey sandy gravelly clay	Deposit
C130	N/A	0.4	0.38	0.17	Sub-circular feature	Cut of posthole
C131	C132	0.32	0.2	0.18	Dark blackish gravelly clay	Deposit
C132	N/A	0.32	0.2	0.18	Oval feature	Cut of posthole
C133	C134	0.3	0.2	0.26	Dark grey sandy silt	Deposit

Context	Fill of	L (m)	W (m)	D (m)	Basic Description	Interpretation
C134	N/A	0.3	0.2	0.26	Oval feature	Cut of posthole
C135	C136	5.1	0.6	0.11	Light greyish brown gritty silt	Deposit
C136	N/A	5.1	0.6	0.11	Curvilinear	Cut of slot-trench
C139	C140	0.2	0.08	0.09	Dark grey silty clay	Fill of posthole
C140	N/A	0.3	0.26	0.18	Oval feature	Cut of posthole
C141	C142	0.24	0.24	0.25	Dark brown sandy silt	Deposit
C142	N/A	0.24	0.24	0.25	Circular feature	Cut of posthole
C144	C145	0.5	0.32	0.12	Mid-brown clayey gravel	Fill of posthole
C145	N/A	0.5	0.32	0.12	Circular feature	Cut of posthole
C147	C140	0.3	0.26	0.18	Light brown silty gravel	Packing fill
C150	C151	0.26	0.24	0.16	Mid-dark brown sandy gravelly silt	Fill of posthole
C151	N/A	0.26	0.24	0.16	Oval feature	Cut of posthole
C152	C153	0.3	0.26	0.14	Dark brownish grey sandy silt	Fill of posthole
C153	N/A	0.3	0.26	0.14	Oval feature	Cut of posthole
C154	C155	0.3	0.23	0.16	Mid-grey clayey silt	Fill of posthole
C155	N/A	0.3	0.23	0.16	Circular feature	Cut of posthole
C163	N/A	0.09	0.08	0.1	Circular feature	Cut of stakehole
C166	C167	0.22	0.2	0.15	Mid-dark grey sandy gravelly silt	Fill of posthole
C167	N/A	0.22	0.2	0.15	Circular feature	Cut of posthole
C169	C170	0.24	0.17	0.26	Mid-greygritty silt	Fill of posthole
C170	N/A	0.24	0.17	0.26	Circular feature	Cut of posthole
C174	C175	0.16	0.15	0.1	Mid-brown silty clay	Fill of stakehole
C175	N/A	0.16	0.15	0.1	Circular feature	Cut of stakehole
C176	C177	0.11	0.1	0.1	Mid-brown, silty clay	Fill of stakehole
C177	N/A	0.11	0.1	0.1	Circular feature	Cut of stakehole

Finds: None

Structure 2 was located in the south-east corner of the site, 14m SSE of Structure 1 (Figures 4 and 5; Plates 6 and 7). It consisted of numerous tightly packed post-holes some of which were within a slot-trench C136. The features were arranged in curvilinear plan although only the northern extent of the structure was within the roadtake. The portion of the structure within the limits of the excavation possibly represented only 25% of its total area, based on the span and curve of the curvilinear alignment. If this was the case it would potentially have been twice as big as Structure 1, measuring approximately 22m in diameter.

The slot-trench was located at the east end of the excavated portion of the alignment and was orientated east–west and continued beneath the roadtake to the east. It contained six postholes (C134, C145, C151, C153, C155, and C170) and stakehole C163 which was angled towards posthole C151 and probably helped support it. Posthole C134 had *in situ* packing stones that appeared heat affected, and contained a lot of charcoal, suggesting that the post may have burnt *in situ*. The rest of the posts had been removed from their holes and had silted up naturally. C155 and C170 (Figure 5) contained *in situ* packing stones around their top edges.

A line of nine postholes (C122, C124, C126, C128, C130, C132, C140, C142, and C167) and two stakeholes (C175 and C177) continued the enclosing element to the south-west of the slot-trench although no further evidence of a definitive slot trench was recorded. The alignment of postholes petered out approximately 2m from the south-western limit of excavation but its seems likely that they would have continued further west beyond the roadtake. All of the posts had been removed and the postholes had silted up with charcoal-rich organic soils afterwards. C128, C130, C142 all had packing stones *in situ* around their edges, and the packing stones from C122 had collapsed inwards on removal of the post. C140 had clear evidence of soil

packing, fill C147. Stakehole C177 had also silted up naturally with charcoal-rich organic soil after the removal of its stake.

Charcoal analysis of C129, fill of posthole 130 indicated a presence of hazel (*Corylus avellana*), ash (*Fraxinus excelsior*), and oak (*Quercus* sp.) (Lyons, Appendix 2.5). Analysis of C131, fill of C132 indicated the presence of oak (*Quercus* sp.) and charcoal analysis of C150, fill of posthole C151 indicated the presence of hazel (*Corylus avellana*), ash (*Fraxinus excelsior*), cherry type (*Prunus* sp.) and oak (*Quercus* sp.) (Lyons, Appendix 2.5).

A small fragment (0.5g) of willow was chosen for AMS dating from C139, fill of posthole C140 and returned a result of 2921±28 (UBA 15415). The 2 Sigma calibrated result for this was 1253–1018BC (QUB, Appendix 2.11) dating this feature to the late Bronze Age period.

2.3.3 Other Features possibly related to Structures 1 and 2

2.3.3.1 Cooking Pit C116

Context	Fill of	L (m)	W (m)	D (m)	Basic Description	Interpretation
C44	C103	0.8	0.5	0.3	Blackish clayey gravel	Fill of pit
C45	C116	0.96	0.9	0.05	Dark brownish black clayey silt	Fill of pit
C103	N/A	0.8	0.5	0.3	Oval feature	Cut of pit
C116	N/A	1.36	0.96	0.23	Sub-circular feature	Cut of cooking pit
C119	C116	0.8	0.56	0.18	Firm, dark black silty clay	Fill of cooking pit
C137	C116	0.96	0.9	0.05	Black stony silt	Fill of pit
C138	C116	1.12	0.78	0.23	Mid-brown black silty clay	Fill of pit

Finds:

Context	Find No.	Material	Period	Description
C44	E3852:44:1	Flint	Early Neolithic	Flint flake, worked

Pit C116 was situated 15m east of Structure 1 (Figures 4 and 5) and has been interpreted as a cooking pit. It contained a primary charcoal-rich deposit C138, which was confined to the edges of the pit and probably comprised of residual material from a previous episode of use. Deposit C119 comprised burnt waste (charcoal, burnt bone and charred seed) and appeared to have been the result of a burning episode. A layer of flattish heat-affected stones that looked as if they had been deliberately placed overlaid it. The stones could have been used to create a surface for, perhaps, some type of rudimentary oven. Layer C137 overlaid the stones and comprised heat-shattered stones and charcoal. It was sealed by silt layer C45 that formed after the pit was abandoned.

Another small pit was located nearby, away from the main clusters of activity (Figure 4). Pit C103 was located 3m south of C116 and contained dumped deposit C44 that contained burnt bone, charcoal and a piece of worked flint.

One lithic was retrieved from C44. The lithic has been identified as worked flint flake and most likely dates to the early Neolithic period (Sternke, Appendix 2.3).

Charcoal analysis of C119 fill of pit C116 indicated a presence of ash (*Fraxinus excelsior*), hazel (*Corylus avellana*) and cherry type (*Prunus* sp.) (Lyons, Appendix 2.5). Hazel produces good firewood and is a suitable wood for kindling (*ibid.*). Ash thrives well on nutrient-rich soils but is also a common woodland species and grows in mixed woodland with oak on damp, slightly acidic soils (Cutler and Gale, 2000).

The cherry species can be difficult to distinguish in the absence of bark, buds and leaves, wild cherry produces inferior firewood (Lyons, Appendix 2.5).

A sample taken from cooking pit fill C119 was sent for plant remains analysis. The sample contained hazelnut shell fragments (*Corylus avellana* L.) and a single oat grain *(Avena* L. species). Hazelnut shell fragments are commonly found in Irish archaeological deposits (Johnston, Appendix 2.6).

Fragments of burnt animal bone were recovered from the cooking pit fill C119 and were too fragmented and cracked to identify to species (McCarthy, Appendix 2.7).

2.3.3.2 Other Features

Context	Fill of	L (m)	W (m)	D (m)	Basic Description	Interpretation
C33	C62	0.26	0.18	0.13	Dark grey clayey sand	Fill of posthole
C34	N/A	0.43	0.28	0.09	Brownish grey clayey sand	Deposit
C35	C64	0.38	0.32	0.27	Dark greyish black, sandy silt	Fill of posthole
C36	N/A	0.33	0.3	0.07	Dark greyish brown	Deposit
C38	C65	0.42	0.3	0.19	Mid-grey sandy silt	Fill of posthole
C39	N/A	0.7	0.4	0.07	Blackish, silty sand	Deposit
C40	C99	0.46	0.4	0.16	Dark greyish gravelly sand	Fill of posthole
C41	C94	0.45	0.3	0.1	Blackish silty sand	Fill of oval pit
C43	N/A	0.88	0.5	0.1	Dark greyish brown silty sand	Deposit
C61	C62	0.4	0.33	0.21	Dark brown clayey sand	Fill of posthole
C62	N/A	0.4	0.33	0.37	Oval feature	Cut of posthole
C64	N/A	0.38	0.32	0.27	Oval feature	Cut of posthole
C65	N/A	0.42	0.3	0.19	Oval feature	Cut of posthole
C76	C81	0.33	0.27	0.15	Dark brownish grey sandy silt	Fill of posthole
C77	N/A	0.47	0.32	0.14	Blackish brown silty sand	Deposit
C81	N/A	0.33	0.37	0.15	Sub-circular feature	Cut of posthole
C93	C94	1.94	1.78	0.4	Brown silty sand	Fill of oval pit
C94	N/A	1.94	1.78	0.4	Oval feature	Fill of oval pit
C97	C98	0.29	0.22	0.2	Mid-grey sandy silt	Fill of small pit
C98	N/A	0.29	0.22	0.2	Oval feature	Cut of shallow pit
C99	N/A	0.46	0.4	0.16	Circular feature	Cut of posthole

Finds: None

A number of features were located between the two structures in the centre of the site but it could not be established if they were directly related (Figure 4). This cluster was located 1.25m south-east of pit C108 and extended south-east from it. It comprised one large pit, four postholes, two stakeholes and several deposits. Large pit C94 was located 7.5m from Structure 1 and 5.5m from Structure 2. It contained two deposits: primary dumped stony layer C93, and C41, a secondary dump of charcoal-rich soil. One of the postholes, C81, was located immediately north-east of the large pit, and had silted up naturally after removal of the stake. Three of the four postholes, C62, C64 and C65, were located midway between pit C94 and Structure 1. C64 contained single silted deposit C35 with inclusions of charcoal and burnt bone and a stone that may have been used to pack a post in position originally (Figures 4 and 5). C62 contained *in situ* packing deposit C61 and secondary silted fill C33. C65 was irregular in shape and contained single silted deposit C38. Posthole C99 was located 1m north-east of pit C94 and contained single silted fill C40. A shallow pit, C98, was located 2.5m north of posthole C99 and had filled naturally with silt after the removal of its stake.

Three of the deposits, C34, C36, and C43, were located near to postholes C62 and C64 and may represent the truncated remains of other postholes that contained

silted deposits (Figure 4). The rest of the deposits, C12, C39 and C77, were scattered and appeared to be the result of the silting up of natural hollows (see section 2.3.3.3).

Charcoal analysis of C33, fill of posthole C62 indicated a presence of hazel (*Corylus avellana*) and oak (*Quercus* sp.). Hazel produces good firewood and is a suitable wood for kindling. Oak is a tall deciduous woodland tree, often growing in association with hazel and ash (Lyons, Appendix 2.5).

A sample taken from posthole fill C33 was sent for plant remains analysis. The sample contained a small number of hazelnut shell fragments (*Corylus avellana* L.). These shell fragments are commonly found in Irish archaeological deposits (Johnston, Appendix 2.6).

2.3.3.3 Cluster of Features south of Structure 1

Context	Fill of	L (m)	W (m)	D (m)	Basic Description	Interpretation
C6	N/A	0.2	0.19	0.11	Greyish brown sandy silt	Deposit
C8	C59	0.23	0.1	0.02	Dark greyish brown, sandy silt	Fill of pit
C9	N/A	0.62	0.42	0.16	Greyish brown, sandy silt	Deposit
C10	C54	0.87	1	0.23	Brownish grey silty sand	Fill of pit
C12	N/A	0.3	0.25	0.05	Light to mid-grey silty sand	Deposit
C54	N/A	1	0.87	0.23	Sub-circular feature	Cut of large pit
C58	C59	0.37	0.3	0.33	Mid-brown sandy silt	Fill of pit
C59	N/A	0.37	0.2	0.33	Sub-oval feature	Cut of pit

Finds: None

A number of features were located 2.5m south/south-west of Structure 1 and comprised pits C54, C59 and deposits C6 and C9. Pit C54 was irregularly shaped and may have been the result of root activity; it contained silted fill C10. Smaller pit C59 was located 0.75m east of C54 and contained silted deposits C58 and C8. The two deposits C6 and C9 were located north-west of C54 and had washed into natural hollows from the surrounding activity. A further small isolated deposit C12 was located to the west of Structure 1. The function or significance of these features is not known.

2.4 PHASE 4 Post-medieval Activity

Context	Fill of	L (m)	W (m)	D (m)	Basic Description	Interpretation
C4	C197	0.3	0.6	0.08	Soft grey brown sandy silt	Fill of furrow
C13	C57	0.78	0.3	0.08	Dark grey silty sand	Deposit
C46	C198	9.8	0.46	0.1	Mid-brown clayey silt	Fill of furrow
C47	C63	11.4	6.2	0.46	Dark brownish, silty sand	Fill of pit
C57	N/A	0.14	0.7	0.14	Linear	Cut of furrow
C60	C63	4.3	0.1	0.5	Brown silty sand	Fill of pit
C63	N/A	11.4	6.6	0.9	Oval feature	Cut of large pit
C197	N/A	28–30	0.6	0.08	Linear	Cut of furrow
C198	N/A	9.8	0.46	0.1	Linear	Cut of furrow

Finds

Context	Find No.	Material	Period	Description
C47	E3852:47:1	Pottery	Modern	Body sherd of shell-edged ware
C47	E3852:47:2	Ceramic	Modern	3 pieces of clay pipe
C47	E3852:47:3	Clay	Modern	Burnt clay

A large pit C63 was located immediately north-west of Structure 1 (Figures 4 and 6; Plate 8). It had been filled with a dumped deposit C47 and silted layer C60. It had

obviously been infilled during the 19th century, due to the presence of pottery and clay pipe fragments dating to this period. This probably occurred during the habitation period of a now-ruined cottage on the roadside east of the site. The sherd of pottery recovered from C47 was identified as a bodysherd of shell-edged ware plate and dates to the later 18th and 19th centuries (McCutcheon, Appendix 2.2). A small quantity of fragmented dog bone was recovered from pit fill C60, They consisted of unburnt dog skull bones and teeth fragments (McCarthy, Appendix 2.7).

The other post-medieval features consisted of plough furrows, oriented southwest-northeast (C57 and C198) and southeast-northwest (C197), which are undated but may be post-medieval or modern in origin. There was no evidence to suggest they were related to any of the other phases of activity on the site.

A single metallurgical sample was taken from furrow fill C46. It consisted of a dense, roughly oval shaped piece of slag weighing 386.6g. The piece was non-diagnostic but is most likely a *Smithing Slag Lump (SSL*). The evidence from Garryduff 1 suggests perhaps a single episode of smithing activity took place at or near this site. The amount of material recovered is quite small and no distinctive iron-working features were identified on the site, it is likely this sample is stray material from a currently unidentified nearby smithing workshop (Wallace, Appendix 2.9).

2.5 PHASE 5 Topsoil

Context	Fill of	L (m)	W (m)	D (m)	Basic Description	Interpretation
C1	N/A			0.8	Mid-brown clayey sand	Topsoil

Finds

Context	Find No	Material	Period	Description
C1	E3852:1:1	Pottery	Modern	Bodysherd black glazed ware
C1	E3852:1:2-3	Pottery	Modern	2 body sherds glazed red earthenware
C1	E3852:1:4	Pottery	Modern	Rimsherd of shell-edged ware
C1	E3852:1:5-9	Pottery	Modern	5 pieces of clay pipe
C1	E3852:1:10	Glass	Modern	Blue glass fragment
C1	E3852:1:11	Limestone	EM	Decorated Stone

The topsoil on site consisted of a moderately compacted mid-grey brown clay sand with moderately occurring inclusions of medium and small stones. No finds of archaeological significance were recovered from the topsoil.

Four sherds of pottery were recovered from topsoil C1. One has been identified as a bodysherd of a black glazed ware bowl and dates to the 18th and 19th centuries. Two sherds have been identified as bodysherds of glazed red earthenware bowls and also date to the 18th and 19th centuries. The remaining sherd has been identified as a rimsherd of shell-edged ware plate and dates to the later 18th and 19th centuries (McCutcheon, Appendix 2.2).

One lithic was retrieved from topsoil C1 (Figure 7) which as been identified as a decorated piece of limestone and most likely dates to the early medieval period (Sternke, Appendix 2.3). This may be related to the church (KK021-001001), graveyard (KK021-01002) and ecclesiastical enclosure (KK021-001003) situated *c.* 450m to the east.

One very small body sherd of blue glass was recovered from the topsoil C1 and has been identified as 19th century in date (Scully, Appendix 2.4).

3 SYNTHESIS

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

3.1 Landscape Setting

3.1.1 The General Landscape

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

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

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

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

3.1.2 The Northern Landscape

The northern landscape of the N9/N10 crosses the border from Kilkenny into Carlow and traverses the western side of the River Barrow; the Blackstairs Mountains, which are of granite formation, are located to the east of the Barrow. It includes 50 sites discovered during the Phase 4 excavations stretching from Rathcash 1 northwards to Tomard Lower 1. This northern landscape is overlooked to the west by the Castlecomer Plateau, and the excavated sites are all situated on contours of 50–100m OD. From the south-west of the Barrow, and encroaching into the northern landscape, the underlying limestone is dolomitized and consequently the permeability has been increased. The glacial drift comprises slightly sandy (20–60%) slightly gravely clays with a moisture content of 10–20%. There is therefore significantly less sand but higher moisture content than in the southern and central landscapes. This moisture occurs in the wetter deposits in the top 1–2m before ground level in localised areas with silty sand and gravel lenses indicating a high water table. To the east of the River Barrow, localised silty, laminated clays and peat occur. Soft ground was noted in the river's floodplain. The area is also classified as a minor aquifer in the Kilkenny Groundwater Protection Scheme (Buckley & Fitzsimmons, 2002) due to these thick sand and gravel deposits. Progressing northwards, the views become more expansive, and the rising high ground of the Castlecomer Plateau (50–300m OD) bounds the distant landscape. This plateau consists of a variety of hills and peaks, which contain seams of anthracite, the focus of coal mining in the region from the 17th century. The Blackstairs Mountains (735m) are visible on the horizon to the south-east, and most obvious of these is the peak of Mount Leinster (795m). There are impressive views from these plateaus and hills especially to the south, east and west over the Barrow and Nore Valleys.

The prevailing watercourse of this region is the River Barrow which travels north–south through the landscape. The Maudlin River is a tributary of the River Barrow and flows from the west through Old Leighlin; minor tributaries of this river flow through Bannagagole, directly north of Moanmore, and the River Dinin is a tributary of the River Nore which travels south-west from Brennan's Hill through the Castlecomer Plateau. The suffix 'comer' signifies a meeting of the rivers; it also signifies any deep gripe, such, for instance, as the channel formed by a mountain stream (Carrigan, 1905). From the hinterland of Kilkenny and the confluence of the Nore and Barrow the Monefelim River contributes to the occurrence of wet grassland and broadleaf woodland. The narrow tributaries of the River Barrow, including the Monefelim River, as well as the Maudlin River, flow from the higher, steep, escarpment located to the west. Subsoils in this area consist of undifferentiated

alluvium and soils of mineral alluvium. The route crosses into County Carlow where at Moanmore (meaning 'great bog') a variety of archaeological features have been recorded. At the most northerly point of the N9/N10 the land is again characterised by its views; here they include the Barrow Valley, Mount Leinster, Brandon Hill, and the Blackstairs Mountains.

3.1.3 Site Specific Landscape

The site is situated on a gentle northeast-facing slope of glacial till that leads down to the Monefelim River *c*. 50m from the main concentration of archaeological features. The river ran northwest–southeast past the site. The surrounding topography is generally flat and of pasture. Ballinvally 1 is located *c*. 800m to the south-west and Kilmacahill 1 is located *c*. 500m to the north-east. There is a church (KK021-001001), graveyard (KK021-01002) and ecclesiastical enclosure (KK021-001003) situated *c*. 450m to the east.

3.2 The Archaeological Landscape

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

3.2.1 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 Sheepstown 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 Northern Neolithic Landscape

The most notable features of the Neolithic within the northern landscape are the funerary monuments on the Castlecomer Plateau and in the Carlow region. There are only a few examples of these structures in north Kilkenny which may be of Neolithic date. These include the megalithic structures at Ballyspellan (KK008-136) and Swiftsheath (KK010-114) and further to the north-west is the passage tomb of Clonmantagh (KK008-12400) and the portal tomb of Borrismore (KK012-062). There are also two megalithic structures located in Ballynaslee (KK004-005001, KK004-005002) close to the Kilkenny–Carlow border. These two structures are close to Russelltown, situated directly east across the county border in Carlow where recent archaeological excavations yielded a rectangular Neolithic structure (Dunne 2007; Logan 2007). An additional Neolithic structure was also discovered close-by in Busherstown (Dunne 2007, 67) and both structures have been associated with domestic activity dating to the early–middle Neolithic. It is of particular interest that

these sites are situated close to Brown's Hill in the townland of Kernanstown, the location of a portal tomb (CW007-010) which also dates to this period. Additional potential Neolithic activity can be found throughout Co. Carlow. Three megalithic structures are located to the east and north-east of the county in Donore (CW016-075), Knockmore (CW022-007) and Clonygoose (CW022-007). There are also some portal tombs in this area, specifically Ballygraney (CW019-090), Ballynasilloge (CW022-010001) and Kilgraney (CW019-041). A further portal tomb occurs at Haroldstown (CW009-008) and a cluster of three megalithic structures are located in Kernanstown (CW007-010, CW007-011, CW007-012), one of which is the abovementioned portal tomb at Brown's Hill. A Middle Neolithic Linkardstown tomb occurs to the north-east in Baunogenasraid (CW012-017) and this cist is surrounded by a megalithic structure (Raftery, 1972). The Linkardstown tombs at Linkardstown itself and Baunogenasraid indicate continuation of activity in to the middle and later Neolithic. Further evidence to the east in County Wicklow, from a possible occupation site at Rathgall (Raftery, 1976; Roche, forthcoming) associated with broad-rimmed bowls and the related but later burial at Rath (Prendergast 1959; Brindley and Lanting 1989/90), are part of the extensive, if dispersed, settlement pattern within the Barrow, Suir and Slaney catchments. An element of continuity in the region is further indicated by the discovery of sherds from middle Neolithic bowls at Moanduff 2, Garryduff 1 and Paulstown 2.

Neolithic evidence was identified at four sites in the northern landscape of the N9/N10 Road Scheme, again mainly in the form of artefacts. Three of the sites were located close to where the Kilkenny/Carlow border. Middle Neolithic pottery, representing both globular and broad rimmed bowls, came from domestic activity at Paulstown 2. A large multi-period settlement was excavated at Moanduff 2, where evidence of middle and final Neolithic settlement was also discovered. Early Neolithic domestic activity is represented by a significant lithic assemblage that includes arrowheads, convex end scrapers, platform cores, blades and flakes. Three pits and several other dispersed features were assigned to the middle Neolithic period and produced a globular bowl pottery sherd and three flint hollow scrapers. Final Neolithic/ early Bronze Age Beaker pottery came from domestic activity and amongst the lithic material were distinctive Beaker scrapers. As this structure does not conform to the early Neolithic settlement morphology, it is more likely to date to the later Neolithic periods, or perhaps the Bronze Age. Residual Neolithic material in the form of three flint scrapers also came from Coolnakisha 1. Further evidence of the late Neolithic/Beaker period in the northern landscape came from Paulstown 2 in the form of beaker pottery. Smaller quantities also came from Garryduff 1, Blanchvillespark/Ballyquirk 1, Kilmacahill 2, Shankill 5 and Moanduff 2. At Paulstown 2 the Beaker pottery may have been associated with three post circles. These appear to be free-standing posts forming small ceremonial enclosures with internal rectangular settings of four upright posts. However, it is possible that the Paulstown 2 posts represent the truncated foundations of small circular houses.

Conclusion

The broad regional pattern in the Neolithic in all three of the Phases 4 landscapes 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.

3.2.2 The General Bronze Age Landscape of the Scheme

The archaeological record implies that the Irish Bronze Age (2500–800BC) population dramatically increased from that of the Neolithic and the evidence for permanent settlements with considerable longevity becomes much more substantial. In addition, a wide range of ritual and funerary activity associated with this settlement is apparent. The overall environmental record for Ireland suggests that there was a general climatic deterioration in the Bronze Age, bringing wetter, colder conditions; during this period there was also accelerated forest clearance with more intensive habitation in the drier lowlands. As a result of extensive development-led projects across the country, understanding of settlement and burial patterns from the early Bronze Age has greatly developed. The distribution of the prehistoric evidence shows that the Rivers Nore and Barrow provided a focus for settlement. In the central part of the current portion of the N9/N10 Phase 4 the fertile Kilkenny lowlands have produced some Bronze Age archaeology, particularly in Danesfort and Ennisnag townlands. In the northern part of the scheme intense settlement is indicated by both burnt mounds and barrows existing on the uplands of the Castlecomer Plateau and the flanking valleys of the Nore and Suir. Hillforts appear to be positioned to overlook the settlement activity, as well as the route of the Nore, the lower saddle to the north of the Slieveardagh Hills, and to the south of the spur surmounted by Clonmantagh. A considerable number of ringditches, cremation and inhumation burials (single and grouped), burnt mound sites, structures and domestic settlement evidence, have been recorded as part of the Bronze Age on the N9/N10 Phase 4.

In the southern landscape the exposure of domestic Bronze Age settlement was less forthcoming than that of the northern landscape. There was little direct evidence for structures in the southern and central landscapes with the exception of a cluster of structures in the Danesfort area. Instead most of the settlement activity that fell within the roadtake was noted in the northern landscape, further to the north of Kilkenny and in Carlow. Ritual and burial is a dominant feature of the Bronze Age in Kilkenny and Carlow as indicated by the presence of flat cemeteries, burial cairns, ringditches, mounds, barrows and hillforts throughout these counties. Freestone Hill situated in Coolgrange, Co. Kilkenny, in the centre of the present landscape is just one example of these sites. Along the lower part of the Nore Valley, and concentrated in the Foulksrath and Jenkinstown areas, the landscape is dominated by barrows (in this case more specifically ringditches). The contrasting locations of these site types most probably relate to differential landscape exploitation by the same communities with some activities, possibly associated with the seasonal use of upland pasture, confined to higher terrain and settlement and funerary activity taking place in the more sheltered lowlands.

The significant number of burnt mound sites discovered due to the N9/N10 excavations, combined with the previously known examples in the RMP reinforces the concept that Bronze Age activity in Kilkenny and Carlow was considerable. A total of 36 sites with evidence for burnt mound activity were uncovered during the N9/N10 excavations, with an additional example discovered, and preserved outside, the roadtake. The burnt mounds are focussed in the upland area, especially along the river and stream valleys, such as at Clashduff, Coan West and Muckalee on the Dinin and Douglas Rivers, and in the upland hinterland of Freestone Hill.

The distribution of the prehistoric evidence shows that the Rivers Nore and Barrow provided a focus for Bronze Age settlement. The patterning of human activity in the region indicates that these were also the principal route-ways in prehistory; both were navigable by small craft but they, and the major tributaries of the Nore– the Dinin and King's Rivers – were also conspicuous landscape features that facilitated accurate navigation through this landscape. The Barrow and Nore also provided access to wider networks beyond the region.

The Northern Landscape: Domestic Settlement

The domestic settlement evidence from the landscape along the northern sections of Kilkenny and the border with Carlow can be characterised by multi-period sites, such as at Moanduff 2–3, and by clusters of activity represented by multiple burnt mound sites and several, possibly associated, structures. This part of the Barrow is overlooked by the hillforts at Freestone Hill (KK020-018002) (Coolgrange), Ballinkillin (CW019-027) and Killoughternane (CW019-065). However, the distinct clustering of the Paulstown area sites suggests the existence of a community separate to that in the immediate vicinity of Freestone Hill although it is probable that the hillforts reflect a wider landscape control system involving co-operation or alliance between a number of communities in the Kilkenny region. In addition to the indirect evidence in the form of burnt mounds and cultural deposits in pits, several structures, of typical Bronze Age morphology, were recovered. At Garryduff 1, the site concerned in this report, an external ring of 37 postholes and stakeholes was positioned in a shallow, curving slot-trench and enclosed an area 11m in diameter with an inner ring of 10 larger postholes (7m diameter). This structure was located on the edge of a break of slope, which led down to an adjacent river. It was suggested that other features on site may represent a possible grain stand and pits for food storage/rubbish. In the south-western corner of the site a curving arc (12m long) of 18 postholes and stakeholes was identified which may continue beyond the site. Six kilometres to the north of Garryduff 1 was an oval-shaped structure at Shankill 4. This was most likely a hut (4m x 3m) and consisted of postholes, stakeholes, an internal hearth, and outlying pits. An arc of stakeholes measuring 3m by 2.5m on its north side might have formed an entrance porch. Sherds from at least one domestic cordoned urn came from the site. A roundhouse at Moanmore 2 consisted of 14 postholes, a central hearth, and up to 50 associated stakeholes and postholes.

As well as two rectangular Neolithic structures at Moanduff 2–3 there were four, or possibly five, separate areas of Bronze Age activity identified. As the features representing this activity were heavily truncated it is impossible to identify their exact function however some may represent Bronze Age structures. A middle–late Bronze Age enclosure (180m x 160m) and late Bronze Age activity in the form of troughs with burnt clay and stone were also excavated on site. At Coneykeare 1 two very tentative structures were identified by the director and a fifth concentration of activity, incorporating burnt mounds and settlement activity; was noted at Coolnakisha 1. A five post, L-shaped possible temporary structure at Coolnakisha 1 was identified along with two pits containing burnt bone and a moderate amount of charcoal and flint. A spread, also containing a moderate amount of charcoal, burnt bone, flint and heat-shattered stones was located to the north-west of the possible structure. It is most likely that the burnt bone deposits within the features on this site are domestic in nature.

The Northern Landscape; Funerary and Ritual activity

Funerary evidence is represented by ringditches at Kellymount 5 and Paulstown 1 and simple pit cremations also at Paulstown 1. Evidence of the Bronze Age is present at Croan (Aghaviller Parish); where a food vessel was discovered, and also at Cruttenclough; where artefacts of amber, gold and bronze were found; there were

14 gold beads discovered with varying decoration together with graduated amber beads (Lyng 1984). The find circumstances of these artefacts is unknown however similar artefacts in the form of a necklace were discovered at Tara, around the neck of an adolescent male, buried in a pit (Herity and Eogan 1977) and it is likely that the Cruttenclough finds came from a similar burial context. They indicate trading links with Europe and a bronze sunflower pin was also discovered in this townland, which is of late Bronze Age type (Lyng 1984; Eogan 1974a, 87) and originally had a gold foil covering. Other material demonstrating a late Bronze Age presence in the area includes the large hoard from Ballytegan, Co. Laois (Eogan 1983); this contained three sunflower (two covered in gold foil) and one disc-headed pin, two socketed axes, a bracelet of twisted strands and a variety of both solid and hollow bronze rings. These are characteristic of Eogan's (1974b; 1993) midland province type and this hoard demonstrates ritual activity in the region. Early Bronze Age activity is also evident in the adjacent area of Co. Carlow on the east side of the River Barrow. A cist burial at Killinane contained cremated bone and an upright tripartite bowl food vessel (Moore 1984). Similar discoveries were also found close by in Sliguff and Wells; both townlands are located in west Carlow along the Kilkenny border close to the landscape of the present scheme. The Sliguff cist contained a crouched inhumation that was accompanied by a bowl while the pit cemetery at Baunogenasraid was inserted into the mound of the earlier Linkardstown tomb (Raftery 1974). A large cemetery mound at Ballon Hill was discovered in the 19th century, which revealed a large assemblage of vases and collared urns in both pit and cist burials (Waddell 1990, 51–53).

Six of the sites in this northern landscape of the N9/N10 Phase 4 had evidence for prehistoric funerary activity which was represented by barrows, ringditches, cists and cremation deposits at Rathcash East 1, Garryduff 1, Paulstown 1–2, Kellymount 5, and Coolnakisha 1–2. This evidence broadens the funerary landscape of the Bronze Age in this region. A possible ringditch was recorded at Rathcash East 1. It was formed by two very shallow curvilinear cuts creating a circle with a diameter of 6m and potential openings or entrances (1.45m wide) mirroring one another on the south-east and north-west sides. Nearby activity included a hearth and possible refuse pit. It is possible that this domestic activity was related to funerary practices associated with the ringditch; however, it is perhaps more plausible that, given the lack of associated burial activity (although the enclosed area had been truncated) and the occurrence of two entrances, the ringditch in fact represents a domestic structure.

The cemetery complex at Paulstown 1 consisted of both pit and cist burials. Three small cists (averaging 0.6m by 0.32m by 0.16m internally) were made expediently with slabs and blocks of local stone. Three other pits were less formally lined with stone. Each contained cremations but one cist produced two discrete deposits. Three other grave pits formed part of the cemetery. In one of these pits an unburnt human skull was placed on top of a washed cremation deposit. Several burials were accompanied by ceramic gravegoods. These gravegoods included burnt sherds from bipartite vases, a miniature cordoned urn and a miniature vase; a burnt flint scraper as well as charred seeds and hazelnuts also came from one of the cists. The largest grave at Paulstown consisted of a large pit or pits. This contained a complex sequence of deposition which appears to have begun with a circular pit which contained an inverted vase; this was disturbed by the insertion of Vessel 1, another inverted vase which survived intact. A miniature vase (No. 6) may have accompanied one of these burials. Subsequently, a second larger pit extended the grave to the south. The fragmentary remains of three pots (No.s 3–5) were deposited on the base of this pit and a large cremation deposit was placed over them. This deposit contained sherds from Vessels 5 and 6 as did a final silty fill. The evidence suggests

that the grave was extended to accommodate burials disturbed from other graves. A large circular pit occurred on the edge of the cemetery (1.55m by 1.48m by 0.80m deep). This had originally been maintained as an open feature that filled naturally with water. Subsequently, a complex sequence of layers containing charcoal, burnt and unburnt bone, charred hazelnut shells and seeds, antler and flint (including flakes, blades and debitage), developed or was deposited in the pit. The proximity of this feature, which appears to have been a well, suggests that it was associated with the funerary activity on the site.

A double ringditch was identified at Kellymount 5. The external ringditch (12m diameter x 1.04m deep) was lined with a spread of burnt mound material, possibly relating to the earlier use of the site as a burnt mound complex. The only artefacts in this external ringditch consisted of three Bronze Age pottery sherds. The internal ringditch (5.6m diameter x 0.2m deep) was situated centrally within the external ringditch and also contained heat-shattered stones in its fills. A central pit had burnt bone inclusions. A further two pits were located to the south of the ringditches and both contained burnt bone inclusions. A substantial part of a vase urn came from one of the troughs associated with the burnt mound complex; while this may be derived from the funerary activity it is evident that the vessel had been used in a domestic context and may have been a deliberate deposit in the base of the trough.

Evidence for funerary activity was also excavated at Coolnakisha 2, where one pit (0.33m x 0.26m x 0.13m) contained 25.5g of charcoal, 0.1g of charred seeds and 390.3g of burnt bone. Other pits and possible pits and spreads also contained burnt bone inclusions, although in much smaller quantities. Both sites produced small quantities of probably middle Bronze Age while residual Neolithic material in the form of three flint scrapers came from Coolnakisha 1.

It is therefore apparent that the central, northern part of Kilkenny contained the most varied evidence for burial and funerary activity. As the N9/N10 progresses northwards, sites with a probable continuity of function and chronology emerge: from the Danesfort complex near the King's River to the varied ringditches and cremations at Templemartin 5 and the amalgamation of ritual and burial at Paulstown 1–2.

The Northern Landscape; Burnt Mound Activity

The evidence from the northern landscape was dominated by clusters of burnt mounds and reinforces the patterning already indicated by the previously known archaeological record. Several previously identified burnt mounds were recorded in Cloghoge (KK020-039, KK020-075–076), Rathcash West (KK020-077–078), Shankill (KK016-003, KK016-010) and at Moanmore (meaning 'great bog') (CW015-007, CW015-014). Twenty seven sites with evidence of burnt mound activity were uncovered as part of the N9/N10 Phase 4 excavations within the northern landscape. The underlying limestone geology/glacial drift consisted of sandy/gravel-clays which have a higher moisture content than the southern and central landscapes resulting in a high water table in localised areas. This helps explain the presence of the considerably sized waterholes at these burnt mound sites, notably within the Jordanstown and Kellymount cluster (Jordanstown 2&3 and Kellymount 1-3, 5&6). Other clusters of burnt mound activity in the northern landscape occurred at Ballyquirk 1,2&4, Moanmore 1&3, Moanduff 1,2&3, Rathcash 1&2, Blanchvillespark 2,3&4 and Cranavonane 1&2. Other sites exhibiting burnt mound activity include Shankill 6, Bannagagole 1, Rathcash East 2, Tomard Lower 1 and Ballinvally 1. Due to the poor on-site conditions the sites at Cranavonane 2 and Blanchvillespark 2 were not fully resolved but were identified as burnt mounds. Burnt mounds were not excavated at Kellymount 1, Moanduff 2&3, Ballyquirk 1 and Ballinvally 1; however

features associated with burnt mound activity were recovered and excavated at these sites indicating a clear association with this type of activity.

The Northern Landscape; Route-ways and communications
While it is clear that the rivers and streams are a major feature of the settlement networks the distribution of prehistoric activity, for example on the lowland fringes to the south of the Castlecomer Plateau, shows that other route-ways were functioning at both a local and regional scale. Within these network systems it is possible to identify particular concentrations of human activity. Some of these were already important in the early Neolithic while others became prominent only in the Bronze Age. Among the most significant of these are those in the area around Carlow, on the upper Barrow and its tributary the Burren River, which the archaeological work on the Carlow Bypass has highlighted (Dunne 2007). To the south of this, the eastern side of the Barrow in the Goresbridge area formed the core of a settlement zone that in the Bronze Age extended westwards across the river into the Paulstown area of Co. Kilkenny. The immediate environs of Kilkenny City also appear in the Bronze Age as a settlement focus, underlined as a result of the N9/N10 excavations, while the southern end of the Castlecomer Plateau, with the major focal site on Freestone Hill, has been highlighted by the discovery of new sites on the lowlands immediately to the south around Rathcash. The Monefelim River ran northwest–southeast *c*. 50m from the main concentration of archaeological features at Garryduff 1.

The Northern Landscape; Conclusions
In the northern part of the region, focussed on the uplands of the Castlecomer Plateau and the flanking valleys of the Nore and Suir, intense settlement is indicated by both burnt mounds and barrows. The burnt mounds are focussed in the upland area and especially along the river and stream valleys, such as at Clashduff, Coan West and Muckalee on the Dinin and Douglas Rivers, and in the upland hinterland of Freestone Hill. Along the lower part of the Nore Valley, and concentrated in the Foulksrath and Jenkinstown areas, the landscape is dominated by barrows (in this case more specifically ringditches). The contrasting locations of these site types most probably relate to differential landscape exploitation by the same communities with some activities, possibly associated with the seasonal use of upland pasture, confined to higher terrain and settlement and funerary activity taking place in the more sheltered lowlands. The large number of burnt mounds discovered on the lowland fringe to the east of the plateau, along the Barrow Valley, shows the development of intensive settlement throughout the northern part of the region. In this area the hillforts appear to be positioned to overlook the settlement landscape.

3.2.3 The Site Specific Archaeological Landscape of Garryduff 1

There are no recorded monuments in the immediate vicinity of Garryduff 1. An enclosure site (KK021-002) is located *c*. 600m to the north-east. Ecclesiastical remains (KK021-001) are recorded *c*. 450m to the east and further to the east and enclosure site (KK021-003) is recorded *c*. 1.2km away. A *fulachta fiadh* site (KK020-026) is also recorded *c*. 1.3km to the south.

At Garryduff 1, two structures with associated features and two cremation pits were excavated. Samples of ecofacts from the structures have returned dates associated with the middle Bronze Age period. A middle Bronze Age date was also returned for a sample of bone from one of the cremation pits. However a pit containing hearth waste excavated within Structure 1 was dated to the early Iron Age and a fill associated with posts and stakeholes also from Structure 1 was dated to the middle Iron Age date. This suggests the structure and possibly the settlement site, was reused through prehistory. This is further emphasised by the presence of Neolithic pottery. A number of sites were excavated to the north-east of Garryduff 1, as part of

the N9/N10 Phase 4: Knocktopher to Powerstown works. At Kilmacahill 1, located *c.* 450m to the north-east of Garryduff 1, undated isolated activity in the form of a pit with a possible internal stakehole was excavated. At Kilmacahill 2, located *c.* 500m away, several groups of postholes and stakeholes, that may represent temporary prehistoric structures were excavated. A further pit was identified at the centre of the site, which contained a significant amount of early Bronze Age pottery sherds. Dates returned from the site indicate early Neolithic activity, as well as early, middle and late Bronze Age activity at the site suggesting the site had a continuity of use in prehistory.

A number of sites were also excavated to the south-west of Garryduff 1, as part of the N9/N10 Phase 4: Knocktopher to Powerstown works. At Ballinvally 1, located *c.* 750m away, two deposits and a pit dating to the early Bronze Age were excavated as well as a possible cremation pit which has returned a middle Iron Age date. At Ballyquirk 4, located *c.* 1.6km away, a complex of up to five burnt mounds and associated features were excavated and dates returned from the site indicate it was in use during the middle Bronze Age period. At Ballyquirk 3, located *c.* 2.5km to the south-west of Garryduff 1, a sub-rectangular- or oval-shaped stakehole structure was excavated. A post-built structure which replaced its earlier stakehole counterpart was also excavated and dated to the middle Bronze Age. A number of pits and associated features were also excavated.

3.3 Typological Backgrounds

3.3.1 Typological Background of Bronze Age Cremations

Early Bronze Age burial is often characterised by cist or pit burials often with decorated vessels and occasionally other grave goods. Both cremation and inhumation of single and multiple individuals occur such as at Keenoge, Co. Meath, Edmondstown, Co. Dublin, and Freestone Hill in Co. Kilkenny. This shows a continuation of some of the Neolithic communal burial practices (Mount 1997, 97, 106; Raftery 1969, 96). Cappydonnell Big is an example of a 'mixed' cemetery, containing both cist and possible pit burial, but also a crouched inhumation (Coughlan 2010). The vessel types associated with these types of burials are of the bowl and vase tradition initially with vase urns, encrusted urns and collared urns becoming more common towards the end of the period (Brindley 2007, 266–274; Grogan 2004, 62; Waddell 2000, 144).

The transition from the early to middle Bronze Age sees some continuity of burial practice but there is a complete abandonment of inhumation and by the late Bronze Age cremation remains the sole burial rite. Simple pits with or without marker posts and soil capping with very few grave goods become the main burial type (Lynch and O'Donnell 2007, 114). The vessels that accompany the burials also change with the cordoned urn becoming the dominant vessel until the later period (*c.* 1400–1300 BC) when simple undecorated flat-bottomed domestic vessels emerge (Grogan 2004, 62; Grogan and Roche forthcoming).

In the later middle to late Bronze Age there is a gradual decline in the quantity of human remains included in formal burial (Grogan et al., 2007). Instead of the deposition of complete individuals it became customary, to include only part of the individual; it appears that token cremation became prevalent. Structured deposition of cremated remains was noted at Mitchelstowndown North, Co. Limerick, where the human bone content was combined in paste and spread along the sides and base of the pit and the central hollow in this case filled in with re-deposited subsoil (Gowen 1988, 98–103). It seems that although less of the body was being formally deposited

it was being treated very particularly with a definite ritual or process for deposition of the remains being carried out.

Clusters of circular pits containing pottery sherds may represent cenotaphs perhaps replacing the need for formal deposition of cremated remains altogether (Grogan 2004, 67; Daly and Grogan 1993). It is possible that this trend towards token cremation or grave goods in the place of full formal burial of the remains was a result of change in the treatment of the body prior to cremation using methods such as excarnation (the prolonged exposure of the body), where there would be less of the body left to cremate. Or it could represent a change in the need for formal burial, the ashes being scattered instead (McGarry, forthcoming a). It has been suggested that portions of the cremated bone were 'distributed to mourners as mementos' as was practised among Australian Aborigines in the 19th century (McKinley 1997, 138)

Cremation burials

Cremation was the preferred funerary practise for much of the Bronze Age but the paucity of pyre sites in Ireland is notable. Experimental firings of pyres on flat ground surfaces using animal corpses undertaken by McKinley (1997, 134) have shown that evidence for pyres tends to be ephemeral at best and difficult to discern. Pyre sites identified in Ireland tend to be locations used repeatedly over a period. However, Swedish excavators of a funerary complex at Gualöv have identified shallow draught pits with dimensions of no more than 0.50m long containing some fire reddening and soot as being the remains of funeral pyres (Arcini 2005, 68). It was also noted that pyre sites were rarely re-used and that the individual cremated on the pyre was usually buried nearby if not on the actual location of the pyre (ibid., 69).

Johnston (2007, 74–6) has noted from studying the environmental remains on the Pipeline to the West that high levels of cereal grains were recovered from ritual/cremation deposits and that it is hardly accidental. Though oak was predominant, cherry and apple were also identified in the remains. These may have been votive offerings placed on the pyre alongside the individual or could have represented scented wood used simply and practically to camouflage the stench of burning flesh and bone (Lynch and O'Donnell 2007, 112).

It has been proven that open air cremation is not a quick, clean, clinical, little-time and energy-consuming activity (Lynch and O'Donnell 2007). The location of the cremation is also important as the collective event must have been visibly observable although the highest and most prominent point in the landscape was not the best location as the wind can carry most of the flames away from the body (Jonuks and Konsa 2005; Williams 2004). In this regard, Cappydonnell Big may not have been a suitable place to carry out the actual cremations. Basic pyre construction appears to have remained fairly constant, consisting of a rectangle of timbers in-filled with brushwood providing both a fuel source and a support for the corpse and gravegoods.

Cremation is a process whereby a body undergoes a process of dehydration and oxidation of the organic components of the body and skeleton. Many modern day experiments have shown that the chemical reaction of fire has four requirements: sufficient oxygen, material that is combustible, sufficient ignition temperature and an environment where all of these conditions can be maintained (Holck, 1986). The weather is also an important factor. The extent to which the fire affects a body depends on how efficiently these requirements are met. A body can be rapidly reduced to calcinated ashes in a well-ventilated and well-fed fire: a partly burnt body with some areas virtually unaffected and others heavily affected occurs as a result of draft and a lack of fuel (Walker et al., 2006). Cremated bone can range in colour from

white (calcinated), through hues of grey and blue to black/brown (slightly charred). All of these can occur within a single cremation resulting from some areas of the body being more covered with denser soft tissue than others and depending on the presence of soft tissue at the time of cremation (Buikstra and Swegle, 1989).

The optimum temperature of the fire should be about 700–1000° C and this needs to be maintained over a number of hours for successful cremation but variations occur as a result of the bulk of soft tissue. The weight of the bone recovered from an adult is 1000–3000g (McKinley 1993). The distortion and shrinkage of the bone fragments occurs as a result of rapid water loss because of the heat and may also be affected by the quantity of soft tissue covering the bone at the time of cremation. Transverse cracking indicates that bone was covered with flesh when burnt (Shipman et al. 1984). Analysis of the remains can attempt to identify the number of individuals, age, sex and pathologies, and whether the bones were washed, sorted or pounded, or if there was a selection process in the extraction of bone from the pyre.

3.3.2 Typological Background of Bronze Age Structures

Interpretation of Irish Bronze Age houses has relied considerably on the British evidence. The re-interpretation in the 1970s of several sites such as Itford Hill and Black Patch, both in Sussex, proved seminal in advancing understanding of how these structures functioned (Musson, 1970; Drewett, 1979). Further excavations in the South Downs facilitated Guilbert to describe a typical Bronze Age roundhouse of post construction, the posts of which were regularly spaced, apart from towards the back of the structure where there was a tendency toward tight spaced posts (Guilbert 1982). The Sussex region is particularly rich in such Bronze Age settlement remains and the interpretations derived from the evidence have since proven enduring and archetypal. It would not be until 2000 that such discussions were taking place within the published domain in Ireland when Doody summarised and categorised the structure features associated with Bronze Age roundhouses and noted their axis of symmetry, as observed by Guilbert in the 1980s, and their similarity in appearance across Ireland (Doody, 2000). Doody identified three basic ground-plans: circular (83%), oval, and rectilinear (ibid.); however, these have been recently expanded upon by Ó Néill (forthcoming). The circular roundhouses are generally between 3m and 15m in diameter, use locally available materials for construction and have a broadly eastern entrance (Doody, 2000). The roof is predominantly supported by at least one ring of posts (often set in a gully or slot-trench) and occasionally a central post. In general, the walls are non-load bearing; the entrance is often emphasised by elaborate door sills or, more commonly, the addition of a porch. Internal features include stakeholes representing divisions, storage pits, waste pits, stone paving, and, more infrequently, hearths; it is therefore particularly interesting that the houses on the N9/N10 do have evidence for internal, off-centre hearths. Interpretations regarding the exact lifespan of a typical roundhouse have been wide-ranging and extend from 15–25 years (e.g. Drewett 1982, 343) to 30–75 years (Brück 1999, 149). A widespread paucity or limitation of chronologically diagnostic artefacts associated with roundhouses further complicates such interpretations. Frequently, roundhouses show signs of repair and rebuild, as was extensively evident at the nucleated site of Corrstown, Co. Londonderry (Ginn & Rathbone, 2012) where 74 roundhouse platforms were excavated. This nucleated site represents the highest concentration of contemporary Bronze Age houses known to date throughout Ireland and Britain. Most excavated examples do occur in isolation or in pairs or small groups of buildings, as along the N9/N10, indicating that the majority of the Irish Bronze Age population lived in small settlement groups.

3.4 Summary of the Excavation Results

The excavation has identified multi-phased activity predominantly relating to the early-middle Bronze Age and the late Bronze Age. The earliest dated activity is centred on two small cremation pits located in the north-west of the site. The adjacent pits both contained quantities of cremated human bone with both pits potentially containing one adult individual, with a possible male identified in Pit C49 and a possible female in pit C118. The fill of one of the pits has been radiocarbon dated indicating the activity is from the early-middle Bronze Age.

The late Bronze Age activity was focussed on two structures. Structure 1 possibly represents a Bronze Age roundhouse and is defined by a curvilinear arrangement of postholes and stakeholes some of which were contained within a slot trench. Only evidence for the southern half of the structure was extant and indicated that it was approximately 11m in diameter. A possible concentric internal line of postholes was also recorded which was approximately 8m in diameter. A range of different dates were recorded from features associated with the structure from late Bronze Age and the early and middle Iron Age. It is interpreted that the Iron Age dates possibly relate to some later intrusive activity particularly as the second structure was also dated as nearly contemporaneous late Bronze Age.

Structure 2 was identified in the south-east of the site and like Structure 1 comprised a curvilinear line of postholes, some within a small slot-trench. Unfortunately it is likely that only 25% of the area of the structure lay within the roadtake so its full dimensions are unclear. On the basis of the excavated section however, it is possible that this structure may have been twice the size of Structure 1 – approximately 22m in diameter. This size would appear too large to be a house or other roofed building so the precise nature and function of Structure 2 is unknown and it may represent a fence or boundary division.

Other features were identified across the site, with some being isolated pits or deposits and some being in clusters. A cluster of activity, comprising a pit, postholes and small deposits, was recorded in the area between the two structures which would seem to be related. A possible cooking pit was recorded to the north-east of the structures in a somewhat isolated position. Domestic waste in the form of charred hazelnut shells, and small quantities of charred cereals and cremated animal bone were recorded from some of the deposits.

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

The excavation yielded two sherds and six fragments of prehistoric pottery. This is poorly preserved but may represent at least four vessels of early, middle and final Neolithic date. All of the pottery is fragmented and worn and no certain identifications were possible. The assemblage highlights the concentration of early prehistoric activity in this part of the Barrow Valley.

Medieval and Post-medieval Pottery Analysis

Five sherds of pottery were presented for study, all but one from surface clearance and all dating to the later 18th to 19th century.

Lithics Analysis
The lithic finds from Garyduff 1 are a flint flake, a possible limestone dressing stone and a natural chunk of limestone. It dates to the early Neolithic period, while the decorated stone may be early medieval in date.

Small finds Analysis
One very small body sherd (E3852:1:10) of blue glass was recovered from the topsoil at Garryduff 1. Blue glass was commonly used for poison bottles during the nineteenth century and this fragment may represent one such bottle.

Charcoal and Wood Species identification
A total of seven wood species were recorded from Garryduff 1. Hazel and oak dominated the assemblage, followed by ash and willow, with lesser occurrences of pomaceous woods, cherry-type and elm. The charcoal assemblage recorded from Garryduff 1 contained wood species which represent the woods selected for construction works, specialized activities, such as cremation pyres and general day-to-day fuel use. Much of the charcoal is also likely to have become incorporated into sealing and infilling deposits over time. The site is likely to have been located in a clearance close to marginal woodland species and scrub (hazel, pomaceous woods, and cherry-type) but with access to drier woodland (oak, hazel, elm and ash) with a river or damper ground nearby (willow and elm).

Analysis of Plant Remains
A total of 15 samples were examined. Most of the plant remains were identified as hazelnut shell fragments. A very small quantity of cereal grains were recovered, including a small amount of oat and barley grain. However the quantity of cereals is so small it is impossible to extrapolate the relative importance of each grain type.

Animal Bone Analysis
A total of 380 animal bone fragments were recovered from Garryduff. It was only possible to identify 18.9% of the assemblage as representing dog, pig and rodent. The assemblage was dominated by the domestic species of dog and pig; which accounted for 10%) of the entire assemblage respectively. A total of 89.7% of the entire assemblage displayed evidence of exposure to a high level of heat. No definite or statistically detailed conclusions could be drawn from the burnt bone material recovered due to its limited size and low level of preservation.

Petrographical analysis
A total of four samples of stone were submitted for analysis. These were all identified as sandstone. Coarse grained sandstone does not occur in bedrock in the immediate vicinity of the site. The dominant rock type in the area is limestone. It is significant that sandstone is the predominant rock type given that, due to the differing underlying bedrock, it would not be the most abundant rock type available, either in outcrop or in the overlying tills. This indicates that sandstones were deliberately being selected for use in preference to the more abundant finer grained rock types in the area.

Metallurgical Waste Analysis
Two samples of metallurgical material were submitted for examination from this site. The evidence from Garryduff 1 suggests perhaps a single episode of smithing activity took place at or near this site. The amount of material recovered is quite small and no distinctive iron-working features were identified on the site, it is likely these two samples are stray material from a nearby smithing workshop.

There is no way of determining a date for the iron-working material unless charcoal can be extracted from the larger piece of slag and dated. Given the small quantity of material and the lack of associated iron-working features this is not considered worthwhile. Based on commonly emerging date ranges for similar material from other archaeological sites it is estimated material can be roughly dated within a range from 400BC–AD800.

Cremated Human Bone Analysis

Both of the identified cremation pits at Garryduff 1 contained roughly equal quantities of burnt bone, ranging from 1008.3g (pit C49) to 1126.2g (pit C118). The cremated bone weight from both of the identified cremation pits was comparable to the expected weight of a single adult individual. Survival of the bone fragments from both burials was considered moderate with a total of 24.6% of the total bone weight comprising of elements greater than 10mm in diameter. This suggests that the post-cremation treatment of the remains did not include deliberate 'crushing' of the bone. Rather, it is suggested that the level of bone fragmentation encountered relates to post-depositional compressive forces. The majority of identifiable elements comprised of skull fragments and unidentified long bone fragments with additional fragments identifiable as elements of upper and lower limbs and axial skeleton. Analysis of the skeletal elements indicates that both burials contained adults with a probable male in Pit C49 and possible female in Pit C118.

Radiocarbon Dating

A total of five samples were sent for AMS radiocarbon dating.

The results of the analysis dated ash charcoal from the fill C158 of a pit. The 2 sigma calibrated date was 1258–1024BC (UBA 15412).

The results of the analysis dated hazel charcoal from the fill C85 of a post and stakeholes. The 2 sigma calibrated date was 392–209BC (UBA 15413).

The results of the analysis dated a fragment of cremated human bone from the fill C48 of a cremation pit. The 2 sigma calibrated date was 1738–1518BC (UBA 15414).

The results of the analysis dated willow charcoal from the fill C139 of a post pit. The 2 sigma calibrated date was 1253–1018BC (UBA 15415).

The results of the analysis dated ash charcoal from the fill C18 of a pit. The 2 sigma calibrated date was 746–400BC (UBA 15416).

4 DISCUSSION AND CONCLUSIONS

4.1 Discussion

4.1.1 Early-middle Bronze Age Cremations

The early-middle Bronze Age activity on the site consisted of two small cremation pits. The site is situated on a gentle northeast-facing slope of glacial till that leads down to the Monefelim River *c*. 50m away. Bronze Age burials are often located on slightly higher ground, often prominent in the surrounding landscape. The site clearly overlooks the Monefelim River and its small valley so could be seen as being in a prominent position. However, the identification of the two pit burials would not have been anticipated in advance solely on the basis of their physical setting.

Evidence from the analysis of the cremated bone from the burials has identified that each pit probably contained the remains of one individual with little or no obvious selection processes being carried out. This would be expected for cremation in the earlier stages of the Bronze Age as it was not until later in the period that deliberate selection of body parts, ritual crushing and token depositions became the common practice. It is also commonplace for the burials of early-middle Bronze Age to consist of simple pits with soil capping and no grave goods, as with the Garryduff 1 examples. In terms of their function, form and date, therefore, the two cremation pits fit in well with our current understanding as outlined in Section 3.1.1.

Analysis of the surrounding archaeological landscape shows that there was no previously recorded prehistoric activity in the vicinity with the nearest site being 1.3km to the south (KK020-026 a *fulachta fiadh*). Excavation as part of the N9-N10 Phase 4 did identify evidence of broadly contemporary activity in the wider environment. To the south an isolated trough at Ballinvally 1 0.70m away was slightly earlier in date than the Garryduff cremations. Contemporary dates were returned from a burnt mound site at Ballyquirk 4 to the south, with more contemporary dates returned from Ballyquirk 3 and 2 activity further south again, with the latter relating to a Bronze Age settlement 2.75km away. To the north the undated site at Kilmacahill 1 450m away revealed 3 sherds from a middle Bronze Age vessel indicating potential contemporary activity. The adjacent site to the north, Kilmacahill 2, consisted of series of postholes and stakeholes that may represent temporary settlements. One of the dates from this site is broadly contemporary with the Garryduff 1 cremations. It is clear therefore from the surrounding excavations as part of the scheme that the area contains scattered evidence for settlement in the early-middle Bronze Age and the Garryduff evidence adds to that pattern.

4.1.2 Late Bronze Age Structures

The late Bronze Age activity was focussed on two probable structures. As outlined above the site is located on a gentle slope overlooking the Monefelim River. Riverine locations are attractive for settlement as they represent natural boundaries as well as providing a water source. The stony and gravelly nature of the subsoil in the area of the site suggests that it was well drained and was located sufficiently upslope from the river that it was unlikely to have been within its floodplain. The site would be seen as attractive for settlement and the location of possible Bronze Age roundhouses in this environment would not be unexpected.

Bronze Age roundhouses are generally between 3m and 15m in diameter, use locally available materials for construction and have a broadly eastern entrance (Doody 2000). The roof is predominantly supported by at least one ring of posts (often set in a gully or slot-trench) and occasionally a central post. Structure 1 from Garryduff 1 has many of these characteristics being 11m in diameter and containing a ring of

posts, some set in a slot-trench. It seems likely therefore that this represents the remains of a roundhouse. There was no definitive evidence of a central roof support, and based on the size of the diameter it could perhaps be expected. However, there was no evidence of any elements of the entire northern section of the structure and much of the eastern side was characterised by very small stakeholes. It is likely however that these stakeholes represented merely the bases of larger post-holes which had been truncated. It is unclear what the precise nature of this truncation was as there was no clearly defined drop or scarp in the ground level. A large pit was recorded to the north of the structure which contained post-medieval finds and it is interpreted that this is likely to have been related to the truncation of the site in some way. Because so much of the structure is missing it is difficult to be entirely accurate in terms of the interpretation of its function as there is no clearly defined entrance or structural elements such as roof supports.

The nature and function of Structure 2 is also not clearly defined as only a small portion of the structure was identified within the lands made available for the construction of the scheme. In its basic form it is broadly similar to Structure 1 as it consists of a curvilinear arrangement of postholes and an associated slot-trench. On this basis it could be considered as a second roundhouse. The excavated portion of the structure suggests that it could be approximately 22m in diameter which would seem too large for a roundhouse. It may represent a boundary or fence and may not relate to a building as such. It is not possible to be definitive with its interpretation based on the portion of the structure that was excavated.

The dating of Structure 1 also provides some debate. Elements from the structure have yielded three separate dates and it is possible that any one of them represents the accurate date for the structure. This could place the structure in the late Bronze Age, early Iron Age or middle Iron Age. On the basis of a broadly contemporary date having been derived from deposits within Structure 2, it is interpreted that the structures are later Bronze Age, however, this does not explain the Iron Age activity. As has been outlined above the site has clearly been the subject of some level of disturbance which can possible be dated to the post-medieval period. It seems likely from the radiocarbon dates that this disturbance may also relate in part to the Iron Age although no features can be definitively identified as being associated with a separate phase of activity from the structures. The dating of the site is further complicated by the identification of pottery sherds dating from the early, middle and final Neolithic, although it should be noted that all of the pottery is fragmented and worn and no certain identifications were possible. It was suggested (Grogan and Roche, Appendix 2.1) that the pottery was likely to have been disturbed from their original contexts. It is clear therefore that there may have been several phases of activity on the site with much of the evidence now intermixed.

Analysis of the environmental evidence from the site gives us some insight into the surrounding landscape and possible late Bronze Age activities. The charcoal assemblage is very mixed indicating the presence of very mixed woodland in the vicinity. This is to be expected given the location of the site adjacent the Monefelim River and it is likely that this woodland provide both fuel and raw materials for construction. The seeds and burnt animal bone, although evident in relatively small quantities may point to a domestic function for the structures.

As outlined above in the discussion on the early-middle Bronze Age cremation pits there were no previously recorded sites dating to the Bronze Age in the vicinity. Surrounding excavations associated with the M9/N10 scheme have provided evidence of broadly contemporary activity in the wider landscape most notably from Ballyquirk 3 to the south and Kilmacahill 2 to the north, but these represented

evidence of temporary transient settlement and it is possible therefore that the Garryduff structures were the focal point of the communities associated with these ephemeral activities.

4.2 Conclusion

The site has produced evidence of funerary activity in the form of two cremation pits dated to the early-middle Bronze Age and two possible roundhouses dated to the late Bronze Age. Other activity possibly dating to the Neolithic was evident from pottery remains recovered from the site and two samples indicaetd Iron Age radiocarbon dates, although it is not clear what the significance of these dates is. Both phases of activity are very important locally as they represent the first prehistoric evidence in the Garryduff townland. They have a wider significance as they expand our previously known distribution of Bronze Age sites in north Kilkenny. The two possible roundhouses are of regional significance as there is a relative paucity of excavations relating to roundhouses in the wider area.

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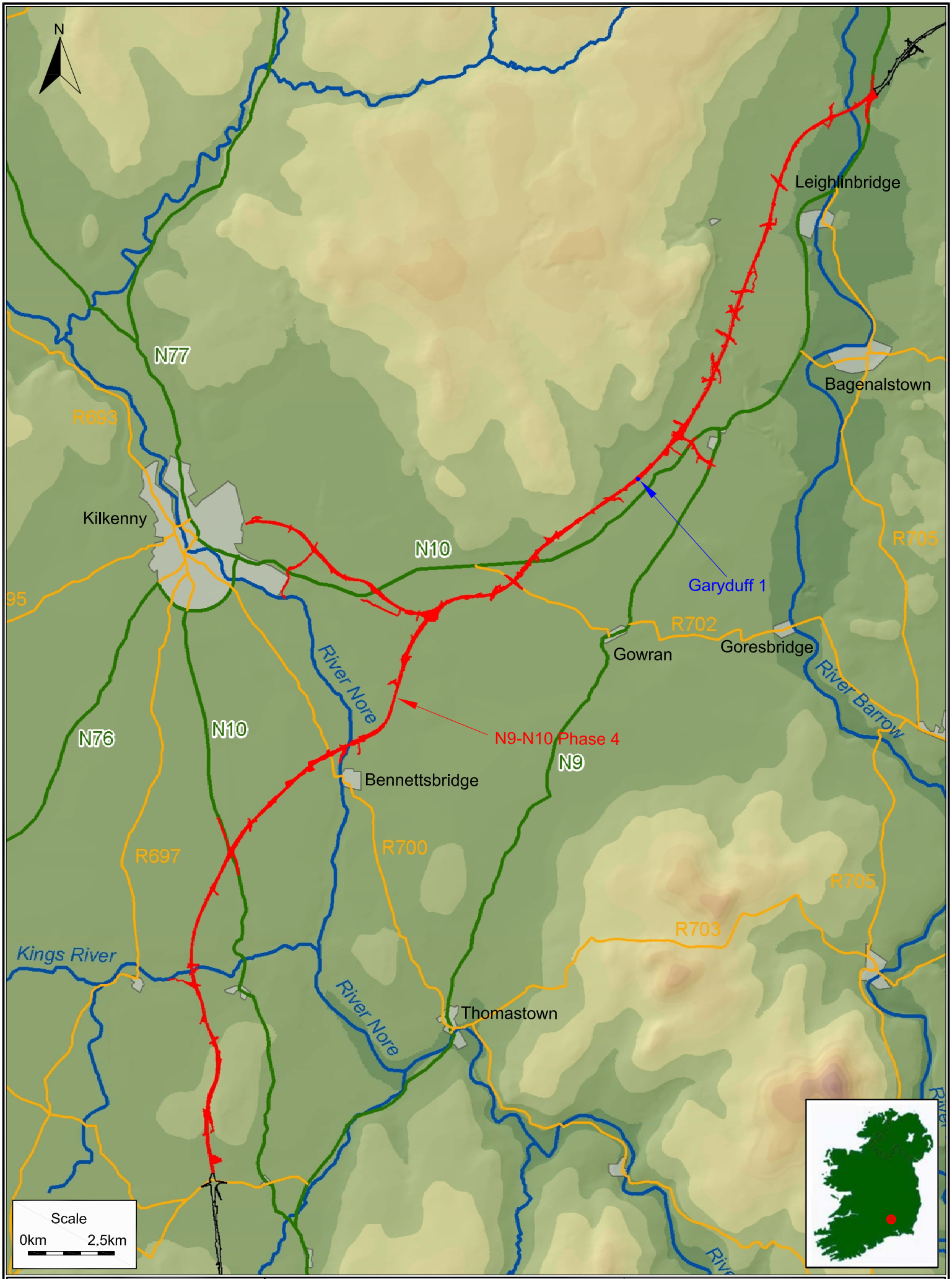

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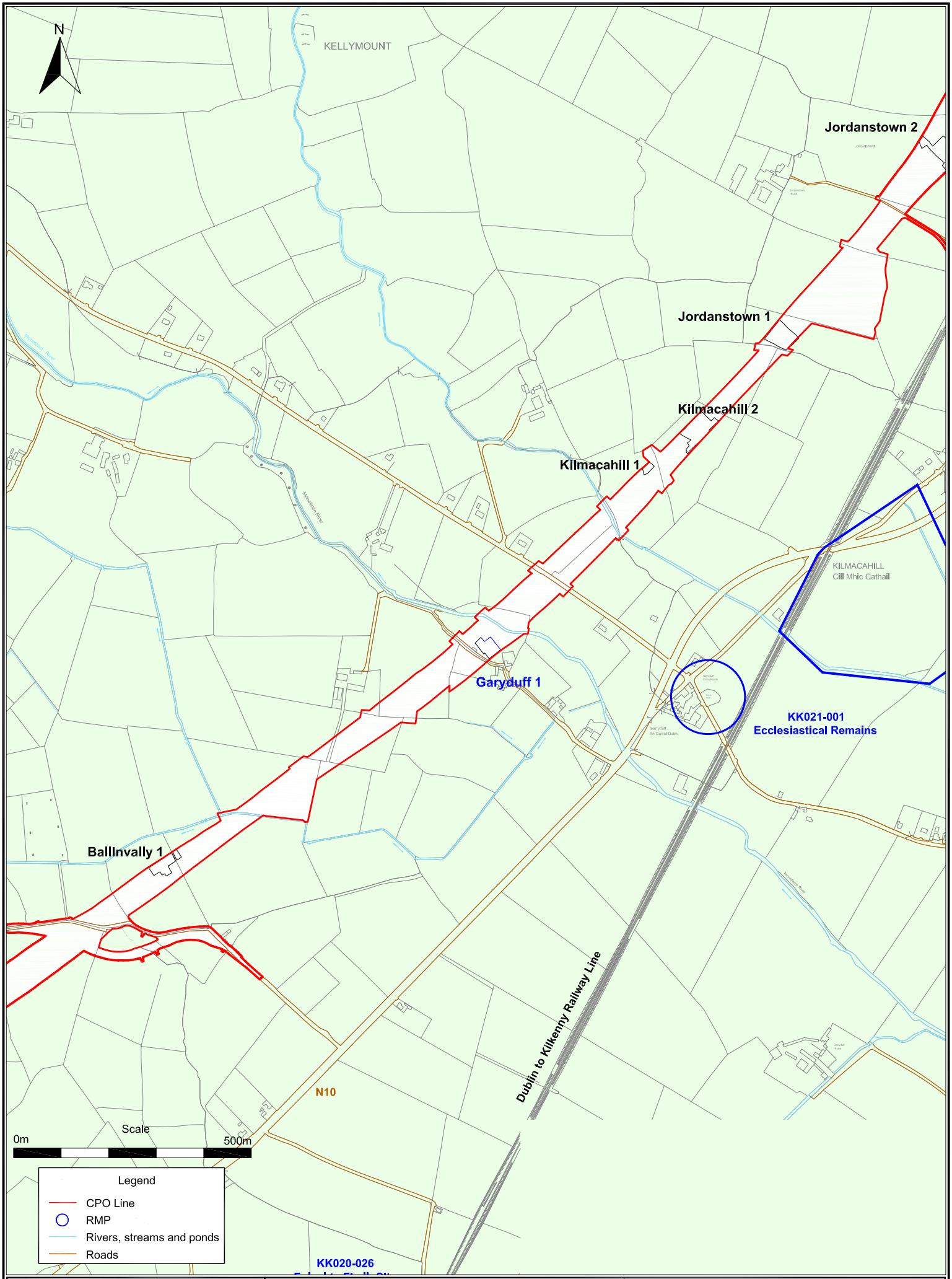

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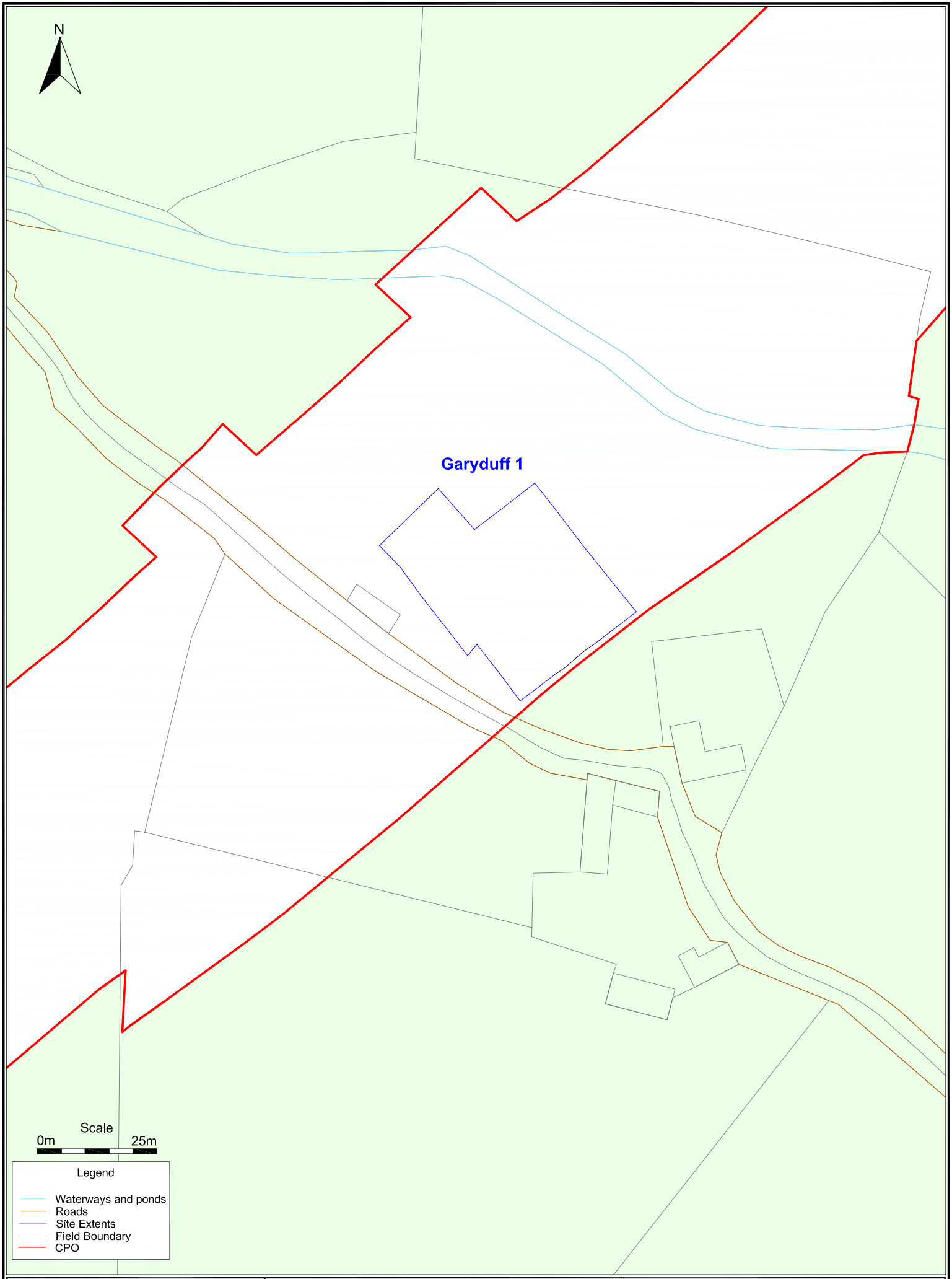

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N

C63

7B

67.123

deposit C47

7A

C102

C20

C21

3A

C118

3B

263918,
157999

C78

C53

C74

C52

C12

Outline of C11

1B

1738-1518 BC

C49

1A

C80

C19

C113

C56

Structure 1

C50

C88

C68

C185

C100

C66

C183

C57

C115

C181

C179

746-400 BC

C101

C82

C96

C146

Slot Trench

C75

C173

C106

C42

C70

C149

C37

C172

C105

C24

C162

C160

C28

C143

C91

C164

C159

C109

C111

C171

6B

C110

C92

C86

C165

C71

C43

C120

C87

C83

C168

6A

C108

392-209 BC

1258-1024 BC

C98

C9

67.43

C34

2B

C36

C62

C64

2A

C65

C6

C77

C39

C54

C59

C99

C81

C94

C197

263944,
157983

1253-1018 BC

C140

C142

C145

C163

C153

C155

C132

C136

C130

C177

C175

C167

C151

5A

C128

C170

C126

C134

5B

C124

C122

Structure 2

67.17

Limit of Excavation

263943,
157996

C116

C46

4A

4B

C198

C103

Scale

0m 5m

Legend

- Break of slope
- Sections
- Cxx Cut numbers
- Cxx Fill numbers
- Postholes
- XXXXXXE XXXXXXN National Grid Reference
- XX.XX Levels - metres OD

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Date:	09/01/14	Figure No:	4
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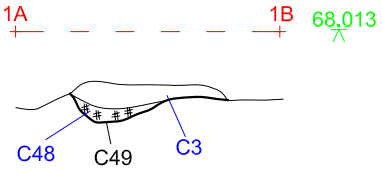

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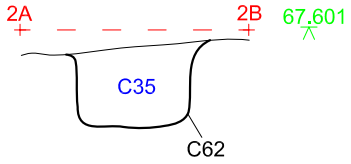

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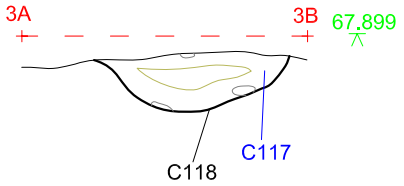

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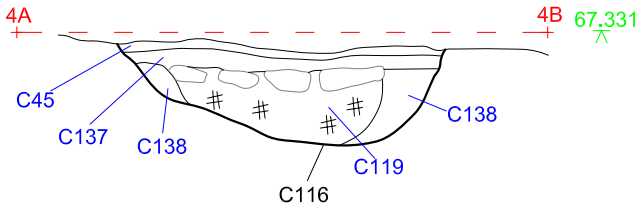

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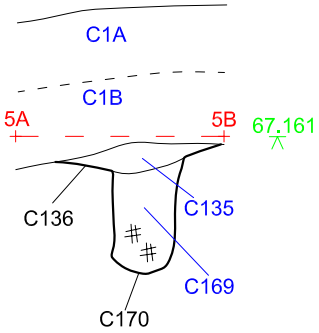

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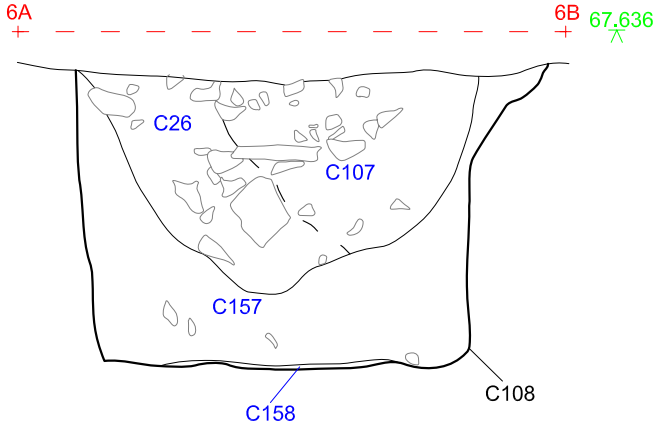

Scale

0m 1m

Legend

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

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Project:	N9/N10 Phase 4: Knocktopher to Powerstown
Client:	Kilkenny County Council

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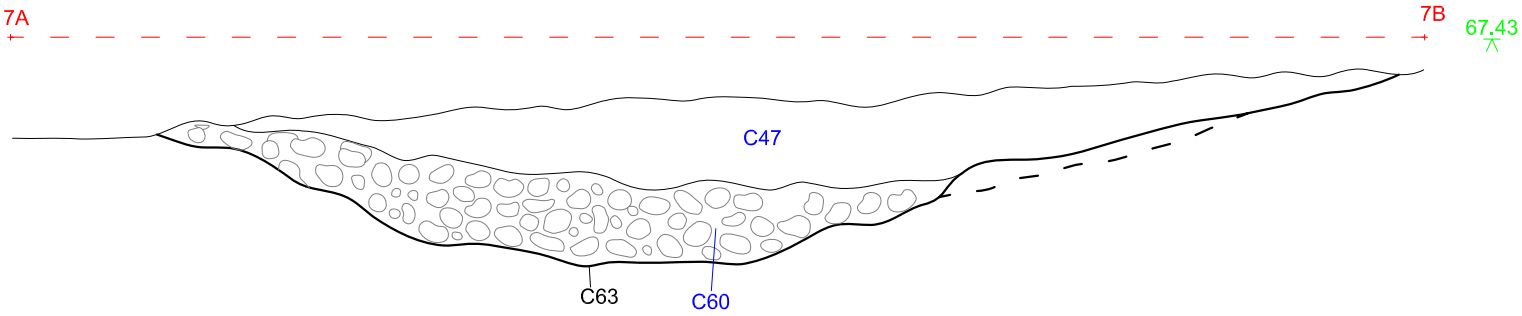
Date:	05/01/12
Produced by:	G Kearney
Job No:	J2432.1
Figure No:	5

West facing section of C63



Scale

0m 2m

Legend

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

IAC Irish Archaeological Consultancy

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Project:	N9/N10 Phase 4: Knocktopher to Powerstown
Client:	Kilkenny County Council

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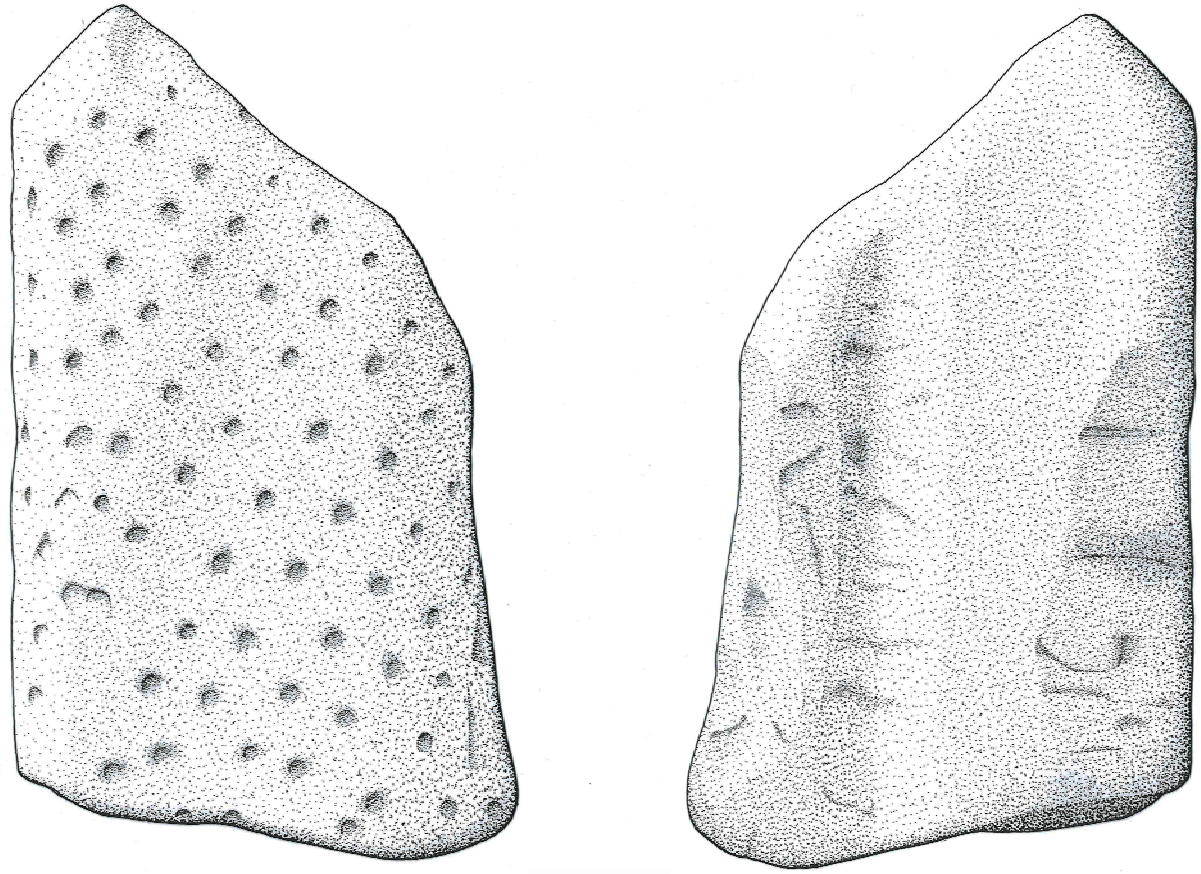
E3852:1:11



Scale

0mm 50mm

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		Job No:	J2432
	Client: Kilkenny County Council	Figure No:	7

PLATES

Plate 1: Cremation pit C49 mid-excavation facing south-west

Plate 2: Cremation pit C118 mid-excavation facing east

Plate 3: Structure 1 and internal features, post-excavation, facing north-east

Plate 4: Structure 1, post-excavation, facing south-east

Plate 5: Pit C66 mid excavation facing south-west

Plate 6: Structure 2, post-excavation, facing south-east

Plate 7: Structure 2 post-excavation facing south-west

Plate 8: Large pit C63, 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
C1	N/A			0.8	Topsoil	Soft, dark to mid-brown, clayey sand, pebble and stones inclusions		
C2	N/A				Subsoil	Loose grey to yellow, sandy clay, sand and stone inclusions		
C3	C49	0.5	0.32	0.06	Upper fill of C49	Soft, mid-brown, silty clay, occasional flecks of charcoal. Abundant with burnt bone	C1	C48
C4	C197	0.3	0.6	0.08	Fill of furrow	Linear, soft, greyish brown, sandy silt, no inclusions. Break of slope at top gradual, sloping sides; break of slope at base gradual, base flat	C1	C197
C5	C52	0.32	0.26	0.36	Fill of posthole	Sub-circular loose dark greyish black, silty sand, occasional stones, frequent charcoal	C55	C52
C6	N/A	0.2	0.19	0.11	Deposit	Irregular, loose, grey brown, sandy silt, charcoal inclusions. Break of slope at top gradual, sharp sides; break of slope at base gradual, base concave	C1	C2
C7	C53	0.26	0.24	0.12	Fill of posthole	Loose, blackish, silty sand, frequent charcoal, occasional stones	C7	C53
C8	C59	0.23	0.1	0.02	Deposit	Loose, darkish grey brown sandy silt, occasional pebbles	C4	C58
C9	N/A	0.62	0.42	0.16	Deposit	Loose, greyish brown, sandy silt, occasional stones	C1	C2
C10	C54	0.87	1	0.23	Fill of pit	Soft, brownish grey, silty sand, charcoal, frequent stones	C1	C54
C11	N/A	12	9.5		Deposit	Sub-circular, hard compaction, could possibly be a layer of trample left behind after habitation of the house	C1	C2
C12	N/A	0.3	0.25	0.05	Deposit	Easily moulded light to mid-grey silty sand with occasional compact areas of oxidized clay	C57	C2
C13	C57	0.78	0.3	0.08	Deposit	Loose, dark grey, silty sand, occasional charcoal flecks, occasional pebbles	C1	C57
C14	C56	0.3	0.16	0.23	Fill of posthole	Oval, loose, brownish grey, silty organic, frequent pebbles and stones	C1	C56
C15	C50	0.39	0.24	0.14	Fill of posthole	Loose, blackish brown, silty organic, frequent pebbles and stones	C1	C51
C16	C78	1.4	1.1	0.22	Fill of pit	Loose, dark black, silty sand, stones, burnt bone and charcoal inclusions	C1	C78
C17	C42	8	0.4	0.14	Fill of slot-trench	Firm - loose, blackish grey , charcoal silty clay, moderate stones	C1	C42
C18	C66	2	1.3	0.16	Hearth waste, fill of pit	Loose, brownish black, sandy silt, burnt bones, charcoal, cobbles and pebbles	C70	C66
C19	N/A	0.3	0.3	0.1	Deposit	Soft, dark brown, clayish, occasional small stones	C1	C2
C20	N/A	0.55	0.34	0.1	Deposit	Loose, greyish black, coarse sand, occasional mica	C1	C2
C21	N/A	0.42	0.36		Deposit	Loose, dark brownish, sandy gravelly, frequent pebbles	C1	C2
C22	C102	0.57	0.36	0.18	Fill of posthole	Soft, dark grey, silty sand, moderate amount of stones	C1	C102
C23	C149	0.58	0.5	0.07	Fill of pit	Loose, dark brown, sandy silt, charcoal, small to medium-sized stones	C1	C149
C24	N/A	0.66	0.6	0.04	Deposit	Loose, dark grey blackish, silty sand, occasional charcoal and stones	C1	C2
C25	C72	0.4	0.4	0.2	Fill of posthole	Loose, mid-black, silty sand, occasional charcoal flecking	C1	C72

Context	Fill of	L (m)	W (m)	D (m)	Interpretation	Description	Context Above	Context Below
C26	C108	0.3	1.28	0.56	Fill of pit	Soft, mid-brown black, silty clay, frequent large to medium-sized stones, occasional burnt bone, and charcoal flecking	C107	C157
C27	C71	0.13	0.12	0.17	Fill of stakehole	Loose, brownish grey, silty clay, burnt bone, occasional charcoal	C1	C71
C28	C159	2.3	1.7	0.1	Fill of slot-trench	Firm, dark greyish black, clayey, infrequent charcoal. Above stakeholes C165 C164 C160 C161 C162 C172 C173	C1	C159
C29	C75	0.7	0.26	0.14	Fill of pit	Loose, mid-brownish black, silty sand, frequent stones. Occasional charcoal	C1	C75
C30	C37	0.6	0.52	0.15	Fill of pit	Loose, grey silty sand, occasional charcoal, occasional stones, modern pottery	C1	C37
C31	N/A	0.4	0.36	0.1	Deposit	Loose, greyish, silty sand, occasional stones	C1	C2
C32	C82	0.52	0.28	0.3	Fill of posthole	Loose grey silty sand, occasional charcoal, burnt bones, packing stones	C196	C82
C33	C62	0.26	0.18	0.13	Fill of posthole	Soft, dark grey clayey sand, occasional charcoal and stones	C1	C61
C34	N/A	0.43	0.28	0.09	Deposit	Soft, brownish grey, clayish sand. Oval, break of slope at top gentle, gently sloping sides; break of slope at base sharp, base concave	C1	C2
C35	C64	0.38	0.32	0.27	Fill of posthole	Loose, dark greyish black, sandy silt, charcoal and brown bone	C1	C64
C36	N/A	0.33	0.3	0.07	Deposit	Loose, dark greyish brown, sandy silt, occasional stones	C1	C2
C37	N/A	0.6	0.52	0.13	Cut of pit	Circular, break of slope at top sharp, concave sides; break of slope base gradual, base irregular	C30	C2
C38	C65	0.42	0.3	0.19	Fill of posthole	Loose, mid-grey, sandy silt, occasional charcoal	C1	C65
C39	N/A	0.7	0.4	0.07	Deposit	Loose, blackish, silty sand, occasional charcoal	C1	C2
C40	C99	0.46	0.4	0.16	Fill of posthole	Soft, dark greyish, gravelly sand	C1	C99
C41	C94	0.45	0.3	0.1	Fill of oval pit	Loose, blackish, silty sand, frequent charcoal	C1	C93
C42	N/A	8	0.4	0.14	Cut of slot-trench	Linear, break of slope at top sharp broken by stones, sides stony but sharp; break of slope at base sharp, irregular base. Cut by C92 C105 C115 C148 C88 C101 C146 C106 C100 C143 C109 C110 C111 C120 C87 C86	C2	C17
C43	N/A	0.88	0.5	0.1	Deposit	Loose, dark greyish brown, silty sand, occasional stones	C1	C2
C44	C103	0.8	0.5	0.3	Fill of pit	Loose, blackish, gravelly clay, charcoal, burnt bone, occasional stones	C1	C43
C45	C116	0.96	0.9	0.05	Fill of pit	Soft, dark brownish black, clayish silt, occasional charcoal and stones	C1	C137
C46	C198	9.8	0.46	0.1	Fill of furrow	Soft, mid-brownish, clayey silt, occasional stones. Break of slope at top gradual, gently sloping sides; break of slope at base gradual, base flat	C1	C198
C47	C63	11.4	6.2	0.46	Fill of pit	Loose, dark brownish, silty sand, occasional charcoal flecking, moderate burnt clay	C1	C60
C48	C49	0.4	0.3	0.04	Fill of cremation pit	Soft, brownish black, silty sand, frequent charcoal, frequent burnt bone, small pebbles	C3	C49
C49	N/A	0.4	0.32	0.1	Cut of cremation pit	Circular, break of slope at top gradual, sides sloping; break of slope at base gradual, base flat but stony	C48	C2
C50	N/A	0.15	0.18	0.14	Cut of posthole	Circular, break of slope at top east–west sharp, north–south broken with packing stones, sides irregular with packing stones; break of slope at base sharp, shape of base gradual, base concave	C51	C2

Context	Fill of	L (m)	W (m)	D (m)	Interpretation	Description	Context Above	Context Below
C51	C50	0.15	0.18	0.14	Fill of posthole	Loose, mid-brownish grey, sandy silt, moderate amount of packing stones	C15	C50
C52	N/A	0.32	0.26	0.36	Cut of posthole	Sub-circular, break of slope at top sharp to right angled, sides vertical; break of slope at base sharp, base concave. Cutting C78	C5	C78
C53	N/A	0.25	0.24	0.12	Cut of posthole	Sub-circular, break of slope at top gradual, gently sloping sides; break of slope at base gradual, base concave. Cutting C78	C7	C78
C54	N/A	1	0.87	0.23	Cut of large pit	Hearth-shaped irregular, corners rounded, break of slope at top gradual, sides sloping; break of slope at base gradual, irregularly shaped base and stony	C10	C2
C55	C78	0.36	0.26	0.2	Fill of pit	Firm, brownish, silty clay, occasional charcoal	C5	C16
C56	N/A	0.39	0.26	0.19	Cut of posthole	Irregular, break of slope at top horizontal, sides sloping, break of slope at base concave, base irregular	C14	C2
C57	N/A	0.14	0.7	0.14	Cut of furrow	Linear, break of slope at top sharp, sides sloping; break of slope at base sharp to gradual, base flat. Cutting C12	C13	C12
C58	C59	0.37	0.2	0.33	Fill of posthole	Loose, mid brown, sandy silt, occasional stones.	C8	C59
C59	N/A	0.37	0.2	0.33	Cut of posthole	Sub-oval, break of slope at top sharp, sides vertical; break of slope at base moderate, base concave	C58	C2
C60	C63	4.3	0.1	0.5	Fill of pit	Loose, brown, silty sand, frequent stones, occasional animal bone	C47	C63
C61	C62	0.4	0.33	0.21	Fill of posthole	Soft, dark brown, clayey sand, occasional stones	C33	C62
C62	N/A	0.4	0.33	0.37	Cut of posthole	Oval, corners rounded, break of slope at top sharp, sides sharp to vertical; break of slope at base sharp, base flat	C61	C2
C63	N/A	11.4	6.6	0.9	Cut of large pit	Oval, break of slope at top gradual, concave sides; break of slope at base gradual, base concave	C60	C2
C64	N/A	0.38	0.32	0.27	Cut of posthole	Oval, break of slope at top sharp, vertical sides; break of slope at base gradual, base concave	C35	C2
C65	N/A	0.42	0.3	0.19	Cut of posthole	Oval, break of slope at top sharp and gentle on south side, sides sharp and sloping; break of slope at base sharp, base concave	C38	C2
C66	N/A	2	1.3	0.16	Cut of pit	Oval, break of slope at top sharp in the south-west and gradual in north-east, vertical sides, gradual break of slope at base, base flat	C18	C2
C67	C68	0.4	0.4	0.31	Fill of posthole	Soft, black, silty clay, charcoal, bones and infrequent stones	C1	C68
C68	N/A	0.4	0.4	0.31	Cut of posthole	Circular, break of slope at top sharp, vertical sides; break of slope at base gradual, base flat	C67	C18
C69	C70	0.42	0.42	0.2	Fill of posthole	Dark brown to black, silty clay, occasional charcoal and bones, occasional stones	C91	C70
C70	N/A	0.42	0.42	0.2	Cut of posthole	Circular, break of slope at top sharp, vertical sides; break of slope at base gradual, base flat	C69	C18
C71	N/A	0.13	0.12	0.17	Cut of stakehole	Circular, break of slope at top sharp, vertical sides; break of slope at base sharp, base tapered	C27	C2
C72	N/A	0.4	0.4	0.2	Cut of posthole	Oval, break of slope at top sharp; break of slope at base gradual, base concave	C25	C2

Context	Fill of	L (m)	W (m)	D (m)	Interpretation	Description	Context Above	Context Below
C73	C74	0.14	0.12	0.11	Fill of stakehole	Loose, dark grey silty sand, frequent charcoal, occasional pebbles and stones	C16	C74
C74	N/A	0.14	0.12	0.11	Cut of stakehole	Oval, break of slope at base gradual, concave sides; break of slope at base gradual, base pointed	C73	C78
C75	N/A	0.7	0.26	0.14	Cut of shallow pit	Irregular oval, corners rounded, break of slope at top sloping, sides gradual at south-west end, sharp at south-east end; break of slope at base steep running southwest–northeast, base concave	C29	C2
C76	C81	0.33	0.27	0.15	Fill of posthole	Loose, dark brownish grey, sandy silt, occasional charcoal flecking	C81	C2
C77	N/A	0.47	0.32	0.14	Deposit	Loose, blackish brown, silty sand, occasional charcoal	C1	C2
C78	N/A	1.5	1.25	0.22	Cut of shallow pit	Oval, break of slope at top gradual, non-perceptible sides; break of slope at base gradual, base flat. Cut by C52 C53 C74	C16	C2
C79	C80	0.42	0.28	0.22	Fill of posthole	Loose, darkish grey silty clay, occasional stones, occasional charcoal	C1	C80
C80	N/A	0.42	0.28	0.22	Cut of posthole	Oval, break of slope at top gradual, concave sides; break of slope at base gradual, base concave	C79	C2
C81	N/A	0.33	0.37	0.15	Cut of posthole	Sub-circular, break of slope at top sharp to south–north, sides steep; break of slope at base sharp to south, imperceptible to north, base concave	C1	C76
C82	N/A	0.62	0.28	0.3	Cut of posthole	Oval semicircular, corners rounded, break of slope at top sharp, sides sharp; break of slope at base	C32	C2
C83	N/A	0.19	0.12	0.18	Cut of stakehole	Oval, break of slope at top sharp, vertical sides; break of slope at base gradual, concave base	C192	C2
C84	N/A	0.2	0.19	0.05	Deposit	Irregular, loose, mid-brownish black, silty clay, occasional stones	C1	C2
C85		0.35	3	0.2	Fill of post and stakeholes	Soft, black, silty burnt material, occasional rounded heat-affected cracked stones, charcoal. Fill of C148 C88 C101 C146 C106 C100 C143 C109 C110 C111 C120 C87 C86	C17	C101-
C86	N/A	0.17	0.12	0.2	Cut of posthole	Sub-circular, break of slope at top sharp, sides vertically sloping; break of at slope base shape, base flat	C85	C42
C87	N/A	0.13	0.1	0.1	Cut of stakehole	Sub-circular, break of slope at top sharp, sharply sloping sides; break of slope at base sharp, base tapered	C85	C42
C88	N/A	0.37	0.32	0.19	Cut of posthole	Circular, break of slope at top south-east edge sharp, rest broken by stones, sides sharp; break of slope at base irregular, base flat	C89	C42
C89	C88	0.3	0.27	0.12	Fill of posthole	Loose, brownish yellow grey sandy gravel, frequent pebbles	C85	C88
C90	C91	0.38	0.25	0.08	Fill of posthole	Soft, black, silty clay, small amount of pebbles, frequent charcoal flecking	C1	C91
C91	N/A	0.38	0.25	0.08	Cut of posthole	Oval, break of slope at top gradual, gradual sides; break of slope at base gradual, base flat	C90	C69
C92	N/A	0.15	0.14	0.15	Cut of stakehole	Sub-circular, break of slope sat top gradual, vertical sides; break of slope at base gradual, base flat	C17	C42
C93	C94	1.94	1.78	0.4	Fill of oval pit	Loose brown silty sand, moderate stone inclusions	C41	C94

Context	Fill of	L (m)	W (m)	D (m)	Interpretation	Description	Context Above	Context Below
C94	N/A	1.94	1.78	0.4	Fill of oval pit	Oval, break of slope at top gradual, sides sloping; break of slope at base gradual, base irregular	C93	C2
C95	C96	0.74	0.32	0.21	Fill of posthole	Loose, grey, silty sand, occasional charcoal, occasional stones	C1	C96
C96	N/A	0.74	0.32	0.21	Fill of posthole	Semi-oval, break of slope at top sharp, concave sides; break of slope at base gradual, base concave	C95	C2
C97	C98	0.29	0.22	0.2	Fill of small pit	Loose, mid-grey sandy silt, occasional charcoal	C1	C98
C98	N/A	0.29	0.22	0.2	Cut of shallow pit	Oval, break of slope at top sharp, steep sides; break of slope at base sharp, base tapered	C97	C2
C99	N/A	0.46	0.4	0.16	Cut of posthole	Circular, corners rounded, break of slope at top gradual to steep, sides vertical; break of slope at base flat, base round	C40	C2
C100	N/A	0.46	0.32	0.18	Cut of posthole	Circular, break of slope at top gradual, gradual sides; break of slope at base gradual, base concave	C85	C42
C101	N/A	0.44	0.41	0.31	Cut of posthole	Circular, break of slope at top sharp, sides sharp; break of slope at base gradual but broken by packing stones, base concave	C85	C42
C102	N/A	0.57	0.36	0.18	Cut of posthole	Oval, break of slope at top sharp, sides sloping; break of slope at base sharp, base concave	C22	C2
C103	N/A	0.8	0.5	0.3	Cut of pit	Oval, break of slope at top gradual, gradual sides; break of slope at base gradual, base concave	C44	C2
C104	C105	0.68	0.36	0.23	Fill of posthole	Loose, dark brown silty sand, occasional charcoal pebbles and stones	C17	C105
C105	N/A	0.68	0.36	0.23	Cut of posthole	Irregular oval, break of slope at top gradual, concave sides; break of slope at base gradual, base concave	C104	C42
C106	N/A	0.21	0.19	0.21	Cut of posthole	Semi circular, break of slope at top gradual, vertical sides; break of slope at base gradual, base flat	C85	C42
C107	C108	1.28	0.66	0.46	Fill of pit	Soft, greyish brown, silty clay, frequent medium-sized stones, infrequent charcoal	C1	C26
C108	N/A	1.28	1.05	0.76	Cut of pit	Oval, break of slope at top steep, vertical sides; break of slope at base U-shaped, base flat sloping westerly	C158	C2
C109	N/A	0.5	0.3	0.22	Cut of posthole	Oval, break of slope at top sharp, vertical sides; break of slope at base sharp irregular, base concave	C85	C42
C110	N/A	0.38	0.3	0.2	Cut of posthole	Oval, break of slope at top sharp, sides sloping; break of slope at base sharp, base flat	C85	C42
C111	N/A	0.32	0.25	0.16	Cut of posthole	Oval, break of slope at base sharp, sharply sloping sides; break of slope at base sharp, base concave	C85	C42
C112	C113	0.32	0.31	0.15	Fill of stakehole	Loose, dark black, sandy silt, frequent charcoal, occasional stones	C1	C113
C113	N/A	0.32	0.31	0.15	Cut of stakehole	Sub-circular, break of slope at top sharp, sharply sloping sides; break of slope at base sharp, base concave	C112	C2
C114	C115	0.43	0.38	0.24	Fill of posthole	Soft, blackish grey, silty clay, frequent charcoal and pebbles, burnt stones. Pottery fragment	C17	C115

Context	Fill of	L (m)	W (m)	D (m)	Interpretation	Description	Context Above	Context Below
C115	N/A	0.43	0.38	0.3	Cut of posthole	Oval, break of slope at top south edge sharp, rest broken by packing stones, sides sharp to gradual; break of slope at base sharp, base V -shaped	C114	C42
C116	N/A	1.36	0.96	0.23	Cut of cooking pit	Sub-circular, break of slope at top sharp, sides concave; break of slope at base gradual, base concave	C138	C2
C117	C118	0.52	0.42	0.15	Fill of cremation pit	Soft, dark greyish brown, silty sand, burnt bones, frequent charcoal, moderate stones	C1	C118
C118	N/A	0.52	0.42	0.15	Cut of cremation pit	Oval/rectangular, break of slope at top gradual, sides sloping; break of slope at base gradual, base concave	C117	C2
C119	C116	0.8	0.56	0.18	Fill of cooking pit	Soft, dark black, silty clay, frequent charcoal, occasional stones	C137	C138
C120	N/A	0.16	0.12	0.22	Cut of posthole	Sub-circular, break of slope at top sharp to vertical, sides vertical; break of slope at base sharp, base flat	C85	C42
C121	C122	0.3	0.24	0.14	Deposit	Circular, loose, dark grey, sandy gravelly clay, occasional charcoal flecking, medium-sized stones	C1	C122
C122	N/A	0.3	0.24	0.14	Cut of posthole	Circular, break of slope at top sharp to gradual, sides straight convex on west side; break of slope at base gradual, base concave	C121	C2
C123	C124	0.24	0.24	0.1	Deposit	Loose, dark greyish brown, sandy clay, occasional small pebbles	C1	C124
C124	N/A	0.24	0.24	0.1	Cut of posthole	Circular, break of slope at top gradual, sides concave; break of slope at base gradual to non-perceptible, base concave	C123	C2
C125	C126	0.19	0.2	0.2	Deposit	Soft, mid-brown, silty clay, occasional small stones	C1	C126
C126	N/A	0.2	0.2	0.19	Cut of posthole	Circular, break of slope at top sharp, straight sides; break of slope at base gradual, base concave	C125	C2
C127	C128	0.38	0.3	0.15	Deposit	Loose, mid-greyish brown, sandy clay, one large stone, occasional medium-sized stones	C1	C128
C128	N/A	0.15	0.38	0.3	Cut of posthole	Circular, break of slope at top gradual, concave sides; break of slope at base gradual, base concave	C127	C2
C129	C130	0.4	0.38	0.17	Deposit	Loose, light grey, sandy gravelly clay, occasional large stones	C1	C130
C130	N/A	0.4	0.38	0.17	Cut of posthole	Sub-oval, break of slope at top sharp, straight sides; break of slope at base sharp, base slightly concave	C129	C2
C131	C132	0.32	0.2	0.18	Deposit	Loose, dark blackish grey, gravelly clay, occasional medium-sized stones, moderate amount of charcoal	C1	C132
C132	N/A	0.32	0.2	0.18	Cut of posthole	Oval, break of slope at top sharp to gradual, sides straight to sloping; break of slope at base gradual, base concave	C131	C2
C133	C134	0.3	0.2	0.26	Deposit	Soft, dark grey, sandy silt, moderate charcoal flecking, occasional packing stones	C135	C134
C134	N/A	0.3	0.2	0.26	Cut of posthole	Oval, break of slope at top sharp, sides straight to sloping; break of slope at base gradual, base flat	C133	C136
C135	C136	5.1	0.6	0.11	Deposit	Moderately compact, light greyish brown, gritty silt, occasional small to medium-sized stones	C1	C136

Context	Fill of	L (m)	W (m)	D (m)	Interpretation	Description	Context Above	Context Below
C136	N/A	5.1	0.6	0.11	Cut of slot-trench	Curvilinear, break of slope at top sharp to gradual, sides concave; break of slope at base gradual, base concave	C135	C2
C137	C116	0.96	0.9	0.05	Fill of pit	Loose, black, stony silt, frequent heat-shattered stones	C45	C119
C138	C116	1.12	0.78	0.23	Fill of pit	Moderately compact, mid-brownish black, silty clay, occasional charcoal, small stones	C119	C116
C139	C140	0.2	0.08	0.09	Fill of posthole	Soft, dark grey, silty clay, occasional charcoal flecks	C1	C147
C140	N/A	0.3	0.26	0.18	Cut of posthole	Oval, break of slope at top gradual, slightly concave sides; break of slope at base gradual, base concave	C147	C2
C141	C142	0.24	0.24	0.25	Deposit	Soft, dark brown, sandy silt, occasional small stones	C1	C142
C142	N/A	0.24	0.24	0.25	Cut of posthole	Circular, break of slope at top sharp, straight sides; break of slope at base sharp to gradual, base slightly concave	C141	COO2
C143	N/A	0.38	0.36	0.24	Cut of posthole	Sub-circular, break of slope at top sharp, sides sloping; break of slope at base gradual, base concave	C85	C42
C144	C145	0.5	0.32	0.12	Fill of posthole	Loose, mid-brown, clayey gravel, moderate small stones, frequent pebbles	C135	C145
C145	N/A	0.5	0.32	0.12	Cut of posthole	Circular, break of slope at top sharp, sides straight; break of slope at base sharp, base flat but undulating, dug down onto stones in subsoil	C144	C136
C146	N/A	0.3	0.28	0.26	Cut of posthole	Sub-oval, break of slope at top sharp, sides vertical to concave on north; break of slope at base sharp, base concave	C85	C42
C147	C140	0.3	0.26	0.18	Packing fill	Loose, light brown, silty gravel, moderately frequent small stones	C139	C140
C148	N/A	0.15	0.14	0.14	Cut of posthole	Sub-circular, break of slope at top sharp, sides sharp to sloping; break of slope at base sharp, base concave	C191	C42
C149	N/A	0.58	0.5	0.07	Cut of small pit	Oval, break of slope at top gradual, gradual sides; break of slope at base gradual, base flat	C23	C2
C150	C151	0.26	0.24	0.16	Fill of post pit	Loose, mid-dark brown, sandy gravelly silt, occasional small stones, occasional large packing stones	C135	C151
C151	N/A	0.26	0.24	0.16	Cut of post pit	Oval, break of slope at top sharp, sides slightly concave to straight; break of slope at base concave, base gradual. Cutting C136	C150	C136
C152	C153	0.3	0.26	0.14	Fill of post pit	Loose to soft, dark brownish grey, sandy silt, moderate amount of charcoal	C135	C153
C153	N/A	0.3	0.26	0.14	Cut of post pit	Oval, break of slope at top sharp, straight sides; break of slope at base sharp, base undulating, flat	C152	C136
C154	C155	0.3	0.23	0.16	Fill of post pit	Soft, mid-grey, clayey silt, moderate amount of charcoal, occasional amount of packing stones	C135	C155
C155	N/A	0.3	0.23	0.16	Cut of post pit	Circular, break of slope at top sharp, straight sides; break of slope at base sharp, base slightly concave	C154	C136
C156	C164	0.4	0.3	0.2	Fill of posthole	Loose, dark brown, silty sand, moderate amount of charcoal, pebbles	C1	C164
C157	C108	1.28	0.98	0.18	Redeposit	Soft, mid-brown, silty sand, frequent small stones	C26	C158

Context	Fill of	L (m)	W (m)	D (m)	Interpretation	Description	Context Above	Context Below
C158	C108	0.85	0.8	0.02	Fill of pit	Hard, mid-brown, silty sand, frequent small stones, moderate charcoal flecking	C157	C108
C159	N/A	0.15	0.12	0.2	Cut of stakehole	Sub-circular, break of slope at top sharp, steep sides; break of slope at base sharp, base tapered	C28	C2
C160	N/A	0.1	0.08	0.09	Cut of stakehole	Circular, break of slope at top gradual, irregular sides; break of slope at base gradual, base tapered	C186	C2
C161	N/A	0.11	0.09	0.23	Cut of stakehole	Circular, break of slope at top sharp, steep sides; break of slope at base sharp, base concave	C187	C2
C162	N/A	0.09	0.08	0.17	Cut of stakehole	Circular, break of slope at top sharp, straight sides; break of slope at base sharp, base concave	C188	C2
C163	N/A	0.09	0.08	0.1	Cut of stakehole	Circular, break of slope at top sharp, straight sides; break of slope at base sharp, base tapered	C150	C136
C164	N/A	0.4	0.3	0.2	Cut of posthole	Oval, break of slope at top sharply sloping, sides vertical; break of slope at base sharp, base flat	C156	C164
C165	N/A	0.15	0.14	0.1	Cut of stakehole	Sub-circular, break of slope at top sharp, sides sloping; break of slope at base gradual, base concave	C190	C2
C166	C167	0.22	0.2	0.15	Fill of post pit	Loose, mid- to dark grey, sandy gravely silt, moderate amount of charcoal	C1	C167
C167	N/A	0.22	0.2	0.15	Cut of post pit	Circular, break of slope at top sharp, sides sloping inwards; break of slope at base gradual, base concave	C166	C2
C168	N/A	0.13	0.13	0.08	Cut of stakehole	Circular, break of slope at top gradual, concave sides; break of slope at base gradual, base U-shaped	C189	C2
C169	C170	0.24	0.17	0.26	Fill of post pit	Soft, mid-greyish brown, gritty silt, moderate amounts of charcoal, occasional small stones	C135	C170
C170	N/A	0.24	0.17	0.26	Cut of post pit	Circular, break of slope at top sharp, sides graduated, stepped on north side; break of slope at base sharp, base flat	C169	C136
C171	N/A	0.07	0.07	0.13	Cut of stakehole	Circular, break of slope at top sharp, vertical sides; break of slope at base sharp, base concave	C193	C2
C172	N/A	0.1	0.08	0.08	Cut of stakehole	Oval, break of slope at top sharp to gentle, sides steep to gradual; break of slope at base sharp, base concave	C194	C2
C173	N/A	0.07	0.06	0.14	Cut of stakehole	Circular, break of slope at top sharp, steep sides; break of slope at base sharp, base concave	C195	C2
C174	C175	0.16	0.15	0.1	Fill of stakehole	Soft, mid-brown, silty clay, frequent small stones, occasional charcoal flecking	C1	C175
C175	N/A	0.16	0.15	0.1	Cut of stakehole	Circular, break of slope at top gradual, vertical sides; break of slope at base gradual, base irregular	C174	C2
C176	C177	0.11	0.1	0.1	Fill of stakehole	Soft, mid-brown, silty clay, occasional flecks of charcoal, frequent small stones	C1	C177
C177	N/A	0.11	0.1	0.1	Cut of stakehole	Circular, break of slope at top gradual, vertical sides; break of slope at base gradual, base irregular	C176	C2

Context	Fill of	L (m)	W (m)	D (m)	Interpretation	Description	Context Above	Context Below
C178	C179	0.05	0.04	0.05	Fill of stakehole	Loose, mid-brownish grey, silty gravel, frequent small stones	C1	C179
C179	N/A	0.05	0.04	0.05	Cut of stakehole	Circular, break of slope at top sharp, vertical sides; base tapered	C178	C2
C180	C181	0.05	0.05	0.06	Fill of stakehole	Loose, dark grey, silty sandy gravel, moderate stones	C1	C181
C181	N/A	0.05	0.04	0.06	Cut of stakehole	Circular, break of slope at top sharp, straight sides, break of slope at base sharp, base tapered	C180	C2
C182	C183	0.05	0.06	0.09	Fill of stakehole	Soft, mid-dark grey, silty, occasional charcoal flecking	C1	C183
C183	N/A	0.05	0.06	0.09	Cut of stakehole	Circular, break of slope at top sharp, straight sides; break of slope at base sharp, base tapered	C182	C2
C184	C185	0.08	0.06	0.12	Fill of stakehole	Soft, dark grey, sandy silt, occasional charcoal flecking	C1	C185
C185	N/A	0.08	0.06	0.12	Cut of stakehole	Circular, break of slope at top sharp, straight sides; break of slope at base sharp, base tapered	C184	C2
C186	C160	0.1	0.08	0.09	Fill of stakehole	Moderately soft, grey, silty sand	C28	C160
C187	C161	0.11	0.09	0.23	Fill of stakehole	Moderately soft, dark brown grey, sandy silt, charcoal, burnt bone both frequent	C28	C161
C188	C162	0.09	0.08	0.17	Fill of stakehole	Soft, greyish black, sandy silt, frequent charcoal and burnt bone	C28	C162
C189	C168	0.13	0.13	0.08	Fill of stakehole	Loose, darkish brown, silty sand, moderate charcoal flecking	C1	C168
C190	C165	0.15	0.14	0.1	Fill of stakehole	Loose, darkish brown, silty sand, moderate charcoal flecking	C1	C165
C191	C148	0.15	0.14	0.14	Packing fill	3 flat angular stones, 1 flat rounded stone. Forms packing for stakehole	C85	C148
C192	C83	0.44	0.29	0.22	Fill of stakehole	Loose, dark grey brown, silty sand. Occasional stones	C1	C83
C193	C171	0.07	0.07	0.13	Fill of stakehole	Soft, grey, sand, small stones possibly heat-shattered	C1	C171
C194	C172	0.1	0.08	0.08	Fill of stakehole	Soft, mid-brown, clayey sand, occasional stones	C28	C172
C195	C173	0.07	0.06	0.14	Fill of stakehole	Soft, black, silty sand, occasional charcoal, occasional burnt stones	C28	C173
C196	C82	0.2	0.15	0.1	Fill of posthole	Soft, greyish brown, silty sand, occasional stones	C1	C32
C197	N/A	28–30	0.6	0.08	Cut of furrow	Linear northwest–southeast, gradual break of slope at top, gradual sides; flat base	C4	C10
C198	N/A	9.8	0.46	0.1	Cut of furrow	Linear northwest–southeast, gradual break of slope at top, gradual sides; flat base	C46	C2

Appendix 1.2 Catalogue of Artefacts

Registration Number	Context	Item No.	Simple Name	Full Name	Material	Description	No. of Parts
E3852:1:1	1	1	Bowl	Bodysherd of black glazed ware	Ceramic	A bodysherd of black glazed ware, part of a bowl dating to the 18th / 19th century	N/A
E3852:1:2	1	2	Bowl	Bodysherd of glazed red earthenware	Ceramic	A bodysherd of glazed red earthenware, part of a bowl dating to the 18th / 19th century	N/A
E3852:1:3	1	3	Bowl	Bodysherd of glazed red earthenware	Ceramic	A bodysherd of glazed red earthenware, part of a bowl dating to the 18th / 19th century	N/A
E3852:1:4	1	4	Plate	Rimsherd of shell-edge ware	Ceramic	A rimsherd of shell-edge ware, part of a plate dating to the late 18th / 19th century	N/A
E3852:1:5	1	5	Pipe	Clay pipe stem	Ceramic	A thin and straight fragment of clay pipe stem, cream in colour. Circular in section with an off centre internal hole	N/A
E3852:1:6	1	6	Pipe	Clay pipe stem	Ceramic	A thin and straight fragment of clay pipe stem, cream in colour. Circular in section with a central internal hole	N/A
E3852:1:7	1	7	Pipe	Clay pipe bowl	Ceramic	A cream fragment of a clay pipe bowl, which curves and would have formed part of a tapering cylinder	N/A
E3852:1:8	1	8	Pipe	Clay pipe bowl	Ceramic	A small fragment of clay pipe bowl, cream in colour, which curves slightly	N/A
E3852:1:9	1	9	Pipe	Clay pipe bowl	Ceramic	A small fragment of clay pipe bowl, cream in colour, which curves slightly	N/A
E3852:1:10	1	10	Bottle	Bodysherd of blue glass	Glass	A very small bodysherd of blue glass, possibly part of a poison bottle used during the 19th century	N/A
E3852:1:11	1	11	Stone	Limestone decorated stone	Limestone	A possible limestone dressing stone. It is rectangular and elongated in shape and has a regular pattern of small holes incised on one of its sides	N/A
E3852:11:1	11	1	Pottery	Fragment of prehistoric pottery	Ceramic	A fragment of final Neolithic / early Bronze Age pottery	N/A
E3852:11:2	11	2	Pottery	Fragment of prehistoric pottery	Ceramic	A fragment of final Neolithic / early Bronze Age pottery	N/A
E3852:26:1	26	1	Pottery	Necksherd of prehistoric pottery	Ceramic	A necksherd of middle Neolithic pottery	N/A

Registration Number	Context	Item No.	Simple Name	Full Name	Material	Description	No. of Parts
E3852:26:2	26	2	Chunk	Natural limestone chunk	Limestone	A natural chunk of limestone	N/A
E3852:30:1	30	1	Pottery	Sherd of modern pottery	Ceramic	A sherd of modern pottery	N/A
E3852:44:1	44	1	Flake	Flint flake	Flint	A flint flake produced on a single platform core and displays use-wear traces on its right and left edge	N/A
E3852:47:1	47	1	Pottery	Bodysherd of pearlware	Ceramic	A single sherd of modern pottery pearlware common to the 18th / 19th century	N/A
E3852:47:2	47	2	Pipe	Clay pipe stem	Ceramic	A straight fragment of clay pipe stem, cream in colour. Circular in section with an off centre internal hole	N/A
E3852:47:3	47	3	Pipe	Clay pipe stem	Ceramic	A straight fragment of clay pipe stem, cream in colour. Circular in section with a central internal hole	N/A
E3852:47:4	47	4	Pipe	Clay pipe stem	Ceramic	A slightly tapering fragment of clay pipe stem, cream in colour. Has been subject to weathering as broken ends are rounded. Circular in section with an off centre internal hole	N/A
E3852:85:1	85	1	Pottery	Fragment of prehistoric pottery	Ceramic	A fragment of final Neolithic / early Bronze Age pottery	N/A
E3852:85:2	85	2	Pottery	Fragment of prehistoric pottery	Ceramic	A fragment of final Neolithic / early Bronze Age pottery	N/A
E3852:85:3	85	3	Pottery	Fragment of prehistoric pottery	Ceramic	A fragment of final Neolithic / early Bronze Age pottery	N/A
E3852:104:1	104	1	Pottery	Fragment of prehistoric pottery	Ceramic	A fragment of final Neolithic / early Bronze Age pottery	N/A
E3852:114:1	114	1	Pottery	Bodysherd of prehistoric pottery	Ceramic	A bodysherd of early Neolithic pottery	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 37 soil samples were taken from features at Garryduff 1 and 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	burnt bone	animal bone	human bone	Heat-affected stone	Other
C3	1	Fill of cremation pit	14.3g		97.8g				
C3	2	Fill of cremation pit	11g		876g				
C5	15	Fill of posthole	3.1g		1.6g			0.1l	
C7	8	Fill of posthole	2.2g		0.9g				
C18	19	Hearth waste, fill of pit	11.6g	0.4g	1.6g				
C24	12	Deposit	1.0g	2.4g					
C26	50	Fill of pit	2.5g	1.1g	6.0g			0.1l	0.1g (Slag)
C26	51	Fill of pit	3.8g	3.2g	3.1g				
C26	65	Fill of pit			0.7g				
C27	16	Fill of stakehole	0.4g		0.2g				
C27	66	Fill of stakehole							14.9g (Burnt clay)
C28	40	Fill of slot-trench	1.6g	0.4g	0.4g				
C32	23	Fill of posthole	12.2g		0.3g				
C33	10	Fill of posthole	0.5g	0.4g					
C46	42	Fill of furrow							386.6g (Slag)
C48	3	Fill of cremation pit	10.3g		64g				
C60	64	Fill of pit				34.0g			
C61	11	Fill of posthole	0.3g						
C67	20	Fill of posthole	6.7g		5.4g				1.3g (Burnt Clay)
C69	25	Fill of posthole	6.0g	0.2g	0.1g				
C85	35	Fill of post and stakeholes	1.7g	0.1g	0.2g				
C85	38	Fill of post and stakeholes	0.5g	0.1g					
C85	39	Fill of post and stakeholes	0.2g	<0.1g	0.2g				

Context #	Sample #	Feature type i.e. Structure A, hearth C45	charcoal	seeds	burnt bone	animal bone	human bone	Heat-affected stone	Other
C85	45	Fill of post and stakeholes	1.5g	0.2g	0.1g				
C90	24	Fill of posthole	5.5g	0.4g	0.2g				
C95	32	Fill of posthole	11.3g		0.9g				
C107	52	Fill of pit	1.1g	<0.1g	0.5g			0.06l	
C117	44	Fill of cremation pit	7g		1152g				
C119	43	Fill of cooking pit	2.0g	0.2g	9.9g			0.25l	
C129	57	Deposit	0.7g						
C131	56	Deposit	0.3g						
C139	55	Fill of post pit	0.2g						
C150	54	Fill of post pit	0.9g						
C156	47	Fill of posthole	1.9g	0.4g	0.8g				
C158	53	Fill of pit	0.4g		0.3g				
C186	46	Fill of stakehole	<0.1g		1.2g				
C190	48	Fill of stakehole	0.3g						

Appendix 1.4 Archive Index

Project: N9/N10 Phase 4 Knocktopher to Powerstown		
Site Name: AR116 Garryduff 1		
Excavation Registration Number: E3852		
Site director: Emma Devine		
Date: 07.05.08		
Field Records	**Items (quantity)**	**Comments**
Site drawings (plans)	7 plans	1 pre-excavation plan, 6 post-excavation plans
Site sections, profiles, elevations	12 section sheet drawings	
Other plans, sketches, etc.	0	
Timber drawings	0	
Stone structural drawings	0	
Site diary/note books	0	
Site registers (folders)	2	
Survey/levels data (origin information)	1	
Context sheets	196	
Wood Sheets	0	
Skeleton Sheets	0	
Worked stone sheets	0	
Digital photographs	368	
Photographs (print)	0	
Photographs (slide)	0	
Security copy of archive	Yes	Digital copy

APPENDIX 2 SPECIALIST REPORTS

Appendix 2.1 Prehistoric Pottery Report – Eoin Grogan and Helen Roche

Appendix 2.2 Medieval/Post Medieval Pottery Report – Clare McCutcheon

Appendix 2.3 Lithics Report – Farina Sternke

Appendix 2.4 Small Finds Report – Siobhán Scully

Appendix 2.5 Charcoal and Wood Report – Susan Lyons

Appendix 2.6 Plant Remains Analysis Report – Penny Johnston

Appendix 2.7 Osteological Report on the Faunal Remains and Burnt Bone – Aoife McCarthy

Appendix 2.8 Petrographical Report – Stephen Mandal

Appendix 2.9 Metallurgical Waste Analysis Report – Angela Wallace

Appendix 2.10 Cremated Human Bone Report – Jennie Coughlan

Appendix 2.11 Radiocarbon Dating Results – QUB Laboratory

Appendix 2.1 Prehistoric Pottery Report –Eoin Grogan and Helen Roche

N9/N10 Knocktopher to Powerstown
The Prehistoric Pottery Assemblage From Garryduff 1, Co. Kilkenny
(AR116, E3852)

Eoin Grogan and Helen Roche

Summary
The site produced two sherds (plus six fragments, weight: 10g) of prehistoric pottery. This is poorly preserved but may represent at least four vessels of early, middle and final Neolithic date. The assemblage highlights the concentration of early prehistoric activity on this part of the Barrow Valley.

The prehistoric pottery
The site produced two sherds (plus six fragments, weight: 10g) of prehistoric pottery. The material came from a small curving slot trench (**42**[1]) and other features forming an arc that defined an area 12m in diameter (Devine and Zimny 2008) as well as a spread within the enclosed area. The condition of the pottery suggests that it is derived from a domestic context although the considerable wear, to Groups I, and III–IV, may indicate that it is disturbed from earlier contexts.

All of the pottery is fragmented and worn and no certain identifications were possible. However, based on fabric, inclusions and firing three phases of material may be represented. A bodysherd (Group I[2]) from fill **114** of posthole **115** in slot trench **42** is probably from an early Neolithic vessel. A small quantity of early Neolithic material was also noted in the lithic assemblage (Sternke 2009). Group II, which consists of a single necksherd, appears, on the basis of fabric and the slurry finish, to be from a middle Neolithic pot, possibly a globular bowl; it must be stressed, however, that this is a tentative identification and this might be a middle Bronze Age domestic vessel. The fabric of Groups III and IV is more distinctive and despite the much worn condition this can, with reasonable certainty, be identified as final Neolithic/ early Bronze Age Beaker.

In this area small quantities of both early and middle Neolithic material have been recorded at Paulstown 2 (Elliot 2008a; Grogan and Roche 2009a). Paulstown also has a large Beaker assemblage while small amounts came from Blanchvillespark/ Ballyquirk 1 and to the north at Moanduff, Co. Carlow (Elliot 2008b; Phelan and Zimny 2009; Grogan and Roche 2009b; 2009c). Despite the small size of the Garryduff assemblage this is a significant addition to the concentration of early prehistoric activity on this part of the Barrow Valley.

References
Devine, E. and Zimny, P. 2008 E3852 Garryduff 1 Stratigraphic Report. Unpublished Stratigraphic Report. National Monuments Service. Department of the Environment, Heritage and Local Government, Dublin.

Elliot, R. 2008a E3632 Paulstown 2 Stratigraphic Report. Unpublished Stratigraphic Report. National Monuments Service. Department of the Environment, Heritage and Local Government, Dublin.

Elliot, R. 2008b E3862 Blanchvillespark/Ballyquirk 1 Stratigraphic Report. Unpublished Stratigraphic Report. National Monuments Service. Department of the Environment, Heritage and Local Government, Dublin.

Grogan, E. and Roche, H. 2009a The prehistoric pottery assemblage from Paulstown 2, Co. Kilkenny (AR146, E3632). N9/N10 Rathclogh to Powerstown. Unpublished Report for Irish Archaeological Consultancy Ltd.

[1] Throughout this report the context numbers are in **bold**.
[2] Group numbers (Roman numerals) refer to sherds from a distinct vessel where the overall form is not identifiable.

Grogan, E. and Roche, H. 2009b The prehistoric pottery assemblage from Blanchvillespark/ Ballyquirk 1, Co. Kilkenny (AR111, E3862). N9/N10 Rathclogh to Powerstown. Unpublished Report for Irish Archaeological Consultancy Ltd.

Grogan, E. and Roche, H. 2009c The prehistoric pottery assemblage from Moanduff 2, Co. Carlow (AR155, E3735). N9/N10 Rathclogh to Powerstown. Unpublished Report for Irish Archaeological Consultancy Ltd.

Phelan, S. and Zimny, P. 2009 E3735 Moanduff 2 Stratigraphic Report. Unpublished Stratigraphic Report. National Monuments Service. Department of the Environment, Heritage and Local Government, Dublin.

Sternke, F. 2009 Lithics Finds Report for E3852 Garyduff 1 (A032/147), Co. Kilkenny. N9/N10 Road Scheme – Phase 4B. Unpublished Report for Irish Archaeological Consultancy Ltd.

CATALOGUE

The excavation number E3852 is omitted throughout: only the context number, in **bold**, followed by the find number is included (e.g. **114**: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 small sherds (generally less than 10mm square) where only one surface has survived while crumbs are very small pieces (≤ 5 x 5mm) generally without surviving surfaces. The inclusions were examined using simple magnification and in some cases attribution reflects probable, rather than certain, identification.
Worn: some wear damage to surfaces and edge breaks much worn: considerable wear damage
N/A thickness can not be determined

Prehistoric pottery

Slot trench 42 and associated postholes

*Fill **114** of posthole **115** in slot trench **42***

Group I. This is represented by a single bodysherd (**114**:1) of buff fabric with a medium content of quartzite inclusions (≤ 1.5 x 1mm) and small mica flecks. Thickness: 6.75mm; weight: 2g.

Comment The fabric and firing suggest this is early Neolithic pottery.

*Charcoal-rich stony fill **26** of pit **108***

Group II. This is represented by a single necksherd (**26**:1) of brown-buff fabric with a grey-brown core. There is a medium to high content of quartzite inclusions (≤ 3.67 x 3.67mm, up to 7.68 x 6.3mm). The external surface may have been finished with fine slurry. Thickness: 8.87mm; weight: 5g.

Comment The fabric and firing suggest this is middle Neolithic pottery.

*Fill **85** of slot trench **42**, fill **104** of posthole **105** in slot trench **42***

Group III. This is represented by 4 fragments (**85**:1–3, **104**:1) of buff to red-buff fabric with a dark grey core. There is a very low content of fine quartzite inclusions (≤ 1mm) and small mica flecks. Thickness: N/A; weight: 2g.

Comment The fabric and firing suggest this is final Neolithic/ early Bronze Age pottery.

Features enclosed by slot trench 42

Group IV. This is represented by 2 fragments (**11**:1–2) of buff fabric with a grey-buff core. There is a very low content of fine quartzite inclusions (≤ 1mm). Thickness: *c.* 6.48mm; weight: 1g.

Comment The fabric and firing indicate that this is final Neolithic/ early Bronze Age pottery.

Vessel No.	Context/feature	Number of sherds	Rimsherds	Necksherds	Base-anglesherds	Bellysherds	Bodysherds	Fragments	Inclusions	Vessel size (cm)	Weight (g)	Pottery type
Group I	114	1	0	0	0	0	1	0	Q M	-	2	ENCB?
Group II	26	1	0	1	0	0	0	0	Q	-	5	MN?
Group III	85/104	0	0	0	0	0	0	4	Q M	-	2	Beaker?
Group IV	11	0	0	0	0	0	0	2	Q	-	1	Beaker
Total		***2***	***0***	***1***	***0***	***0***	***1***	***6***			***10***	

Q quartzite M mica
ENCB early Neolithic carinated bowl MN middle Neolithic
Table 1. Details of pottery including individual vessels from Garryduff 1, Co. Kilkenny.

Appendix 2.2 Medieval/Post Medieval Pottery Report – Clare McCutcheon

A Note on the Pottery
From
Garryduff 1 (E3852)
N9/N10 Knocktopher to Powerstown Co. Kilkenny

Clare McCutcheon MA MIAI

Introduction:
A total of five sherds of pottery were presented for study, all but one from surface clearance and all dating to the later 18th to 19th century.

Methodology:
The material was identified visually and the information is presented in Table 1. The identification of each sherd has been entered on a database (Access format) as per the requirements of the National Museum of Ireland, the body responsible for the material remains from excavations within the state. The database shows the *licence*, *context* and *finds* number; the *links* of reassembled sherds within and between contexts; the *category* and *type* of material i.e. ceramic and pottery; the *identification* of the fabric type and the diagnostic *description* i.e. rim, handle etc. The final two fields contain *habitat* numbers, firstly the box number where each sherd is stored and secondly the location of the box within the storage system of the National Museum of Ireland. The database is easily searchable for particular types of pottery, vessels parts and the links within and between contexts.

The pottery identification is presented in Table 1 showing the quantity of sherds in each fabric type and the minimum number of vessels (MNV), an objective number based on the presence of rim/handle sherds in the assemblage. The more subjective minimum number of vessels represented (MVR) is also listed and is based on the numbers of diagnostic pieces such as differently shaped rims, quantity of handle etc. The most likely form of the vessels represented by the sherds and the known date of distribution of the fabric type are included in the table.

Fabric	Sherds	MNV	MVR	Form	Date
Black glazed ware	1	-	1	Bowl	18th-19th
Glazed red earthenware	2	-	2	Bowls	18th-19th
Shell-edged ware	2	-	1	Plate	L18th-19th
Total post-medieval	**5**	**-**	**4**		

Table 1: Pottery identification, Garryduff 1 (E3852)

Black glazed ware:
These wares were made in North Wales and Lancashire in the 17th and 18th centuries (Davey 1975) and also in parts of Ireland (Meenan 1997). Along with glazed red earthenwares or 'brownwares' these supplied the main dairy and kitchen wares, particularly in 18th and 19th century Ireland. The black colour resulted from the addition of iron to the lead glaze applied to the earthenware vessels. A reassembled sherd from a possible pancheon was recovered.

Glazed red earthenware:
Glazed red earthenware or 'brownwares' were made widely in Britain and Ireland from the later 17th century through to the 19th century (Dunlevy 1988, 24-5). Because of the standardisation of the clay and vessel form it is always difficult to specify a particular production site but a typical kiln was excavated at Tuam, Co. Galway with milk pans and dishes comprising a majority of the vessels (Carey and Meenan 2004). The fabric is generally sandy earthenware, usually oxidised buff to light orange through to brown. The clear lead glaze takes its colour from the fabric with variations due to firing conditions (Jennings 1981, 157).

Shell-edged ware:
Shell-edging as a decorative motif was first used on Bow porcelain and creamware but was principally used on pearlware, popular with Wedgwood and other Staffordshire potters from 1779-1830 (*ibid*., 262). While only one sherd on this site is clearly identified as shell-edged ware, due to the blue-edging, it is most likely that the

sherd of undecorated pearlware was from the central or undecorated portion of the same plate.

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Appendix 2.3 Lithics Report – Farina Sternke

Lithics Finds Report For E3852 Garyduff 1 (A032/147), Co. Kilkenny
N9/N10 Road Scheme – Phase 4B

Farina Sternke MA, PHD

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List of Tables

Introduction

A total of three lithic finds from the archaeological investigations of a prehistoric site at Garyduff 1, Co. Kilkenny were presented for analysis (Table 1). The finds are associated with the remains of circular prehistoric structures with associated pits and postholes.

Find Number	Context	Material	Type	Condition	Cortex	Length (mm)	Width (mm)	Thickness (mm)	Complete	Retouch
E3852:001:11	1	Limestone	Decorated Stone	Rolled		134	85	57	Yes	No
E3852:026:2	26	Limestone	Natural chunk							
E3852:044:1	44	Flint	Flake	Patinated	No	52	37	11	No	No

Table 1 Composition of the Lithic Assemblage from Garyduff 1 (E3852)

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 are retouched or of specific significance, e.g. cores etc. The same is done with natural chunks.

Quantification

The artefacts are a worked flint (E3852:044:1), one modified piece of limestone (E3852:001:11) and one natural chunk of limestone (E3852:026:2). Two artefacts (E3852:044:1 and E3852:001:11) are larger than 20mm in length and width and were therefore recorded in detail.

Provenance

The finds were recovered from the topsoil and context C44.

Condition:

The lithics survive in patinated (E3852:044:1) and rolled (E3852:001:11) condition. Artefact E3852:044:1 is incomplete.

Technology/Morphology:

The lithics are a flake (E3852:044:1) and a macro tool (E3852:001:11).

FLAKES

The flake (E3852:044:1) was produced on a single-platform core. It displays use-wear traces on its right and left edge and measures 52mm in length, 37mm in width and 11mm in thickness. The flake dates to the early Neolithic period based on its technological and morphological characteristics (Woodman *et al.* 2006).

Macro Tools:

The macro tool (E3852:001:11) is a possible limestone dressing stone. It is a rectangular and elongated in shape and has a regular pattern of small holes incised

on one of its sides. This artefact measures 134mm in length, 85mm in width and 57mm in thickness. It may be early medieval in date.

Dating:
The assemblage has to be regarded as technologically and typologically diagnostic and dates to the early Neolithic period (flake). The decorated stone most likely dates to the early medieval period.

Conservation
Lithics do not require specific conservation, 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.

Summary
The lithic finds from the archaeological excavation at Garyduff 1, Co. Kilkenny are a flint flake, a possible limestone dressing stone and a natural chunk of limestone. The blade dates to the early Neolithic period, while the decorated stone may be early medieval in date.
This site makes a minor contribution to the evidence for prehistoric and early medieval settlement in Co. Kilkenny.

Recommendations for Illustration
- Decorated Stone (E3852:001:11)

References
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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 2.4 Small Finds Report – Siobhán Scully

N9/N10 Knocktopher to Powerstown
Phase 4b
Garryduff 1
E3852 A032/147 AR116
By Siobhán Scully, Margaret Gowen & Co. Ltd
For Irish Archaeological Consultancy

December 2009

Introduction

This report details a single piece of post-medieval glass recovered from the excavations at Garryduff 1 (E3852) as part of the N9/N10 Knocktopher to Powerstown road scheme.

Glass

One very small body sherd (001:10) of blue glass was recovered from the topsoil at Garryduff 1. Blue glass was commonly used for poison bottles during the nineteenth century (Fletcher 1975, 58).

Catalogue

E3852:001:10 Poison Bottle? Very small body sherd of blue glass. 19th Century.

Reference

Fletcher, E. 1975 *Bottle Collecting*. Blandford Press, Poole.

Appendix 2.5 Charcoal and Wood Report – Susan Lyons

Client – Irish Archaeological Consultancy Ltd
Site Name- Garryduff 1
Excavation number –E3852 AR116
County – Kilkenny
Job code –100.73
Author- Susan Lyons

Date –15/07/10

CHARCOAL IDENTIFICATION SUMMARY REPORT

Illustrations

Figures

Tables

Introduction

Twenty-seven charcoal samples were identified and analysed from excavations associated with prehistoric activity recorded at Garryduff 1, Co. Kilkenny as part of the resolution of the N9/N10 Kilcullen to Waterford Scheme, Phase 4B – Rathclogh to Powerstown.

The archaeological excavations at the site revealed a Late Neolithic site comprising of a large arc of post and stakeholes (Structure 1) together with internal features reflecting the remains of pyre activity. Cremation pits and a possible cooking pit were also identified outside Structure 1. To the south of Structure 1 further postholes were recorded which defined a second structure (Structure 2) (Devine, 2009).

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

Methodology (After IAC Ltd)

Processing

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

Charcoal identifications

Thirty charcoal samples from a variety of structural deposits (postholes), kilns, ditches and pits were selected for charcoal analysis.

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

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

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

Details of charcoal recording
The general age group of each taxa per sample is recorded, and the growth rates are classified as slow, medium, fast or mixed. It was not within the scope of this project to measure all the ring widths from the charcoal, however, some measurements are taken with a graticule in the microscope in order to make the scale of slow, medium and fast growth less subjective. Slow growth within the charcoal from this site is considered to be approximately 0.4mm per annum, medium approximately 1mm per annum and fast approximately 2.2mm per annum.

The ring curvature is also noted where applicable from each charcoal fragment. Weakly curved annual rings suggest the use of trunks or larger branches, while strongly curved annual rings indicate the burning of smaller branches or twigs **Fig. 1.** Tyloses within the vessels of species such as oak can denote the presence of heartwood. These are balloon-like outgrowths of adjacent parenchyma cells of xylem vessels (vascular tissue used to transport water and minerals). When the plant is subjected to stressful conditions, tyloses will develop and block the vascular tissue to prevent further damage to the plant.

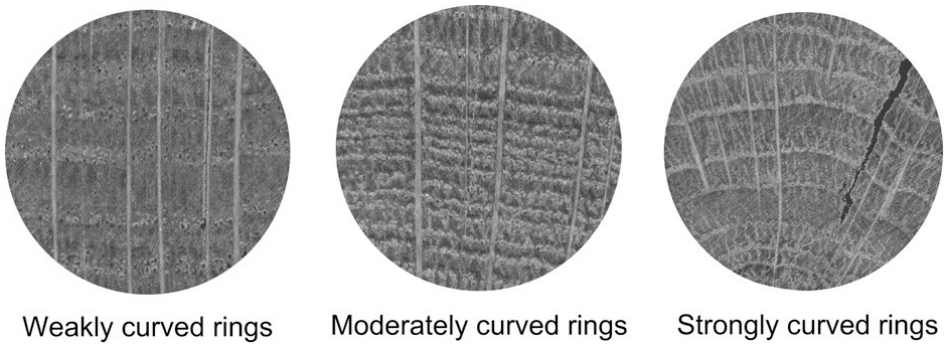

Fig. 1. Ring curvature (after Marguerie and Hunot 2007 1421, Fig. 3)

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

Seven wood species totaling 965 identifications were recorded from the samples associated with Garryduff 1. *Corylus avellana* (hazel) was the dominant wood species recorded. While it was identified from the majority of the samples, it was most notable from Structure 1 (postholes C52 and C91; pit C108 and slot trench C159). *Quercus* sp. (oak) was the second most common species identified, especially from Structure 1 (postholes C96) and cremation pits (C49 and C118). *Fraxinus excelsior* (ash) was also recorded in notable concentrations, especially from Structure 1 (postholes C52, C53 and C82; pit C66) and cooking pit C116). *Salix* sp. (willow) was recorded from many of the features, especially Structure 1 (postholes C100 and C164). Maloideae/Pomoideae spp. (pomaceous woods) was identified from the assemblage, of which the highest concentrations were noted from Structure 1 (posthole C68). Much lower *Prunus* sp. (cherry-type) and *Ulmus* sp. (elm) and were also recorded. **Fig 2**.

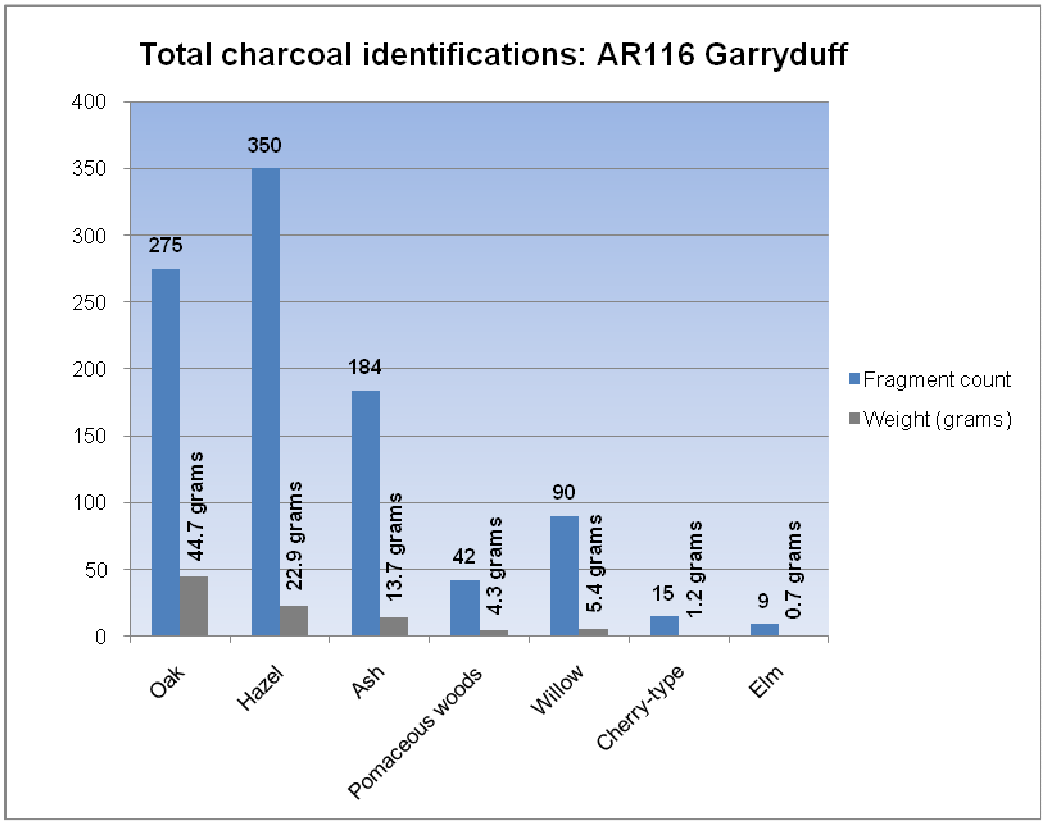

Fig. 2

Discussion

Background and origin of wood species

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

yet flexible and strong enough to be used in rope making and basketry. It has also proved a useful resource in the construction of hurdles, wattling, palisades and trackways from prehistoric times (Pilcher & Hall, 2001).

Quercus sp. (oak)
Oak is a tall deciduous woodland tree, often growing in association with hazel and ash. Most oak species prefer damp non-calcareous soils on lowland or montane sites at altitudes up to 4,000 m (Cutler and Gale, 2000). It is a tall deciduous woodland tree, often growing in association with hazel and ash. Oaks can reach a height of 40 metres and live for 1,000 years or more (Hickie, 2002, 60). Of the 27 European species, pedunculate oak (*Quercus robur)* and sessile oak (*Quercus petraea)* are native to Ireland. Pedunculate oak is common on heavy clay and lowland soils whereas sessile oak thrives on the lighter loams characteristic of higher ground (ibid.). The two native Irish oaks are usually distinguished by their acorns: the sessile oak has acorns with no stalks, while the pedunculate oak has acorns with long stalks (peduncles). The wood is easy to cleave both radially and tangentially and has provided one of the most important building materials since the prehistoric period (ibid.). The heartwood timber is renowned for its durability but the paler sapwood is susceptible to beetle and fungal attack. The strength of the timber depends on the species and is influenced by climatic and edaphic factors (Edlin, 1951). When burnt, oak charcoal, particularly the dense heartwood, has higher calorific values than most European woods and this can make for good long-lasting fuel (Cutler and Gale, 2000).

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

Salix spp. (willows).
There are a number of different species of willow which cannot be differentiated through wood anatomy. They grow rapidly, and can be easily propagated from cuttings. General comments only about the genus can be made, as there are different varieties of it. They are not naturally a woodland species, although shrubby growth may occur under light woodland cover. All willows appear to favour wet conditions, and it may be a pioneer species on wet soils. The use of willow depends on the species concerned, for some grow as shrubs and others as trees, and a species may be particularly suited to some purpose. In general, the flexibility of willow shoots has led to coppicing or pollarding to produce the raw materials for baskets, frames, hurdling etc. (Orme & Coles, 1985). The main Irish native willows are grey willow (*Salix cinera*), goat willow (*Salix caprea*) and eared willow (*Salix aurita*).

Maloideae/Pomoideae spp. (pomaceous fruit woods)
The Pomoideae (Maloideae) woods are pomaceous fruit wood species which includes the genera *Malus* (apple), *Pyrus* (pear), *Sorbus* (rowan or whitebeam) and *Crataegus* (hawthorn). They are anatomically very similar and in the absence of bark, buds and leaves cannot be differentiated between each other very often. The pomaceous wood types are small deciduous trees or shrubs and are common to the scrub margins of woodlands and hedgerows (Cutler and Gale, 2000). The apple

species, often crab apple (*Malus sylvertris*) in woodlands, is a light-demanding tree and is often found in open oak woods. When dry, crab apple makes for good firewood. While its wood is durable and tough, its crooked trunks and small branches make this species unsuitable for most construction works and instead it is used in making small implements, such as tool handles, bodkins and screws.

Pear, grown as wild pear (*Pyrus pyraster*), is good as fuel. The wood is smooth, fine-grained and also suitable for turnery, household utensils, instruments and small decorative woodwork. Rowan/whitebeam (*Sorbus*) grows well in light soils and avoids clays and limestone. It can be found growing close to oak, hornbeam and hazel in Britain (Rackham, 1995). This species produces the hardest wood and was used in Europe to make cogs for machine wheels until the introduction of cast iron (Cutler and Gale, 2000). Coppiced shoots were used as hoops and crates and the bark was commonly used as animal fodder (Cutler and Gale, 2000, 184). Hawthorn is shade-tolerant and forms understorey in ash and hazel woodland and was commonly planted as a hedge or boundary marker. It was also used in the production of small woodworkings, turnery and ideal for carving and engraving. Both hawthorn and apple-type (*Malus* sp.) produce edible fruits which would have been gathered as a foodstuff from the prehistoric period (Greig, 1991). These wood types burn slow and steady and provide excellent heat with minimal smoke (Cutler and Gale, 2000).

Prunus sp. (cherry-type)
The cherry species can be difficult to distinguish in the absence of bark, buds and leaves. Wild cherry (*P. avium)* is a medium to tall tree, common to woodlands and hedges on light, well-drained soils. It produces inferior firewood. The timber is a red colour and although tough and hard is unsuitable for outdoor use as it decayed easily (Cutler and Gale, 2000). Bird cherry (*P. padus)* is a smaller tree and less common than wild cherry. It grows in marginal woodland as a solitary tree and can live for up to eighty years (Rackham, 1980). The wood has no real economical value, although has been used in barrel production (Cutler and Gale, 2000). Both species are used in the production of ornamental or culinary objects (ibid.).

Ulmus sp. (elm)
Elm species flourishes on rich, alluvial soils particularly in riverine habitats. During the Neolithic period, elm began to decline in Ireland and Britain. This was attributed to various causes including climatic changes (Godwin, 1975), persistent use of elm foliage as fodder for livestock (Cutler & Gale, 2000), a shift to arable farming during the Neolithic and the presence of the wood-boring beetle *Scolytus,* which carried the fungus *Ceratocystus ulmi* (a cause of Dutch Elm Disease).

Distribution of charcoal from Garryduff 1 **(Fig. 3)**
The number of identifiable charcoal fragments recovered from Garryduff 1 were localised to features which represented structural deposits and pits associated with prehistoric Structures 1 and 2 and cremation pits (C49 and C118), which were also identified at the site.

The majority of the charcoal recorded from Structure 1 was from structural deposits, such as postholes, pits and slot trench layers. The presence of charcoal from structural deposits is usually interpreted as the remains of a structure, or part of, which had burnt down. It must also be noted that charcoal from such deposits may also be the result of construction methods such as a) the charring of post bases to prevent the timbers from rotting b) a way of re-sizing posts of c) the method by which the timbers were felled. Hazel and ash dominated from these contexts, followed by oak and willow, with lower incidences of pomaceous woods, cherry-type and elm.

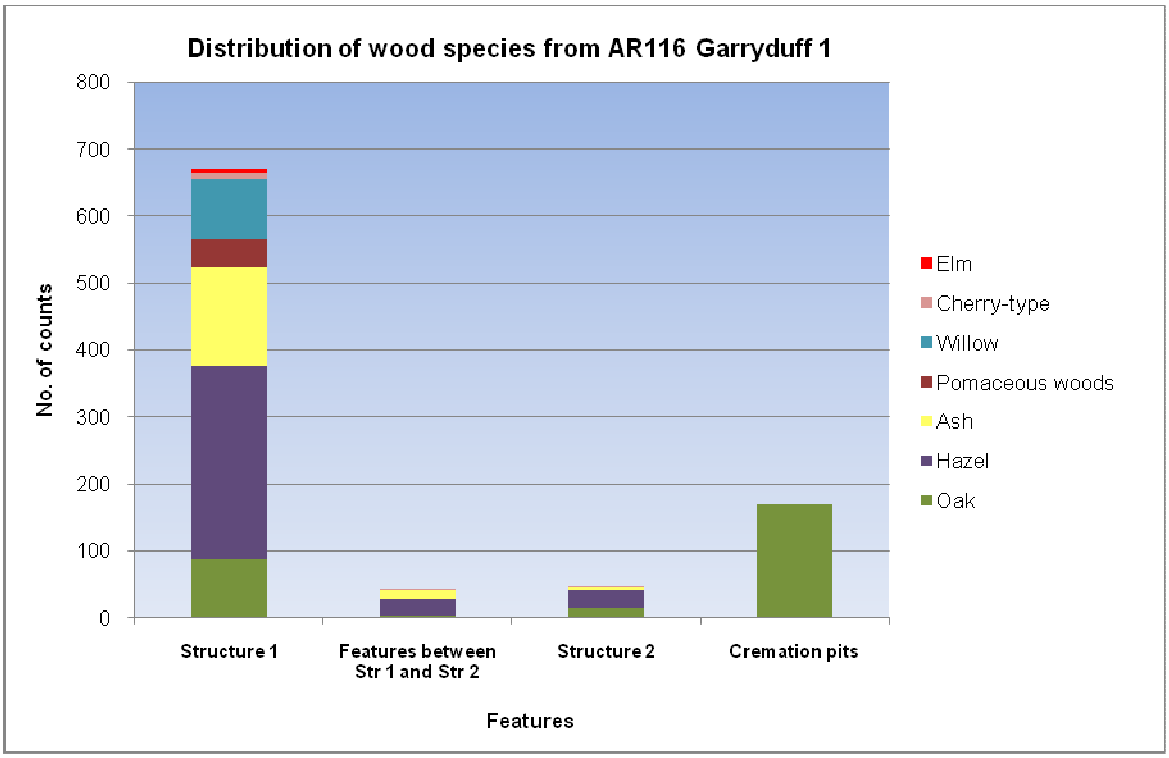

Fig. 3

Ash, oak and possibly elm would have been popular woods used in heavy construction during the prehistoric period (Gale & Cutler, 2000) while hazel and willow were both suitable to lighter structures, such as wind breakers and wattling (ibid.). Ash and hazel were also the most notable species recorded from prehistoric structural deposits at Ennisnag, Co. Kilkenny (Lyons, 2010a), but in lower incidences from Bronze Age deposits at Danesfort 5, Co. Kilkenny (Lyons 2010b). Structure 2 also contained a similar wood composition, where ash, oak and hazel were also recorded from pit deposits within the structure. It is likely that the charcoal remains also represent fuel from local firing activities, such as hearths. As a result of such burning activities it is possible that some of the wood species recorded in lower concentrations were a mix of structural wood and fuel debris. This is also likely to account for the composition of wood species from the pits (C130 and C132) and posthole (C151) identified between Structure 1 and Structure 2.

The cremation pits (C49 and C118) recorded contained exclusively oak charcoal. An environmental study of the charcoal remains from archaeological excavations along the Gas Pipeline to the West (Dublin to Clare) revealed that oak was the primary species recorded from cremation deposits (O'Donnell, 2007, 48). This trend is also noted from cremations recorded at Ballinvally, Co. Kilkenny (Lyons 2009), associated with the N9/N10 scheme. Oak produces good quality charcoal, which reaches the high temperatures suitable for the cremation process (Cutler and Gale, 2000). The absence of other wood species from these deposits therefore indicates that oak was selected specifically for this funerary activity.

Oak, ash, hazel and possibly elm are all common to open woodland, while hazel, pomaceous woods and cherry-type would have grown in marginal woodland or clearances. Willow and possibly elm favour damper soils and may indicate that a river or waterlogged soils were located nearby.

Summary
A total of seven wood species were recorded from Garryduff 1– hazel and oak dominated the assemblage, followed by ash and willow, with lesser occurrences of pomaceous woods, cherry-type and elm.

The charcoal assemblage recorded from Garryduff 1 contained wood species which represent the woods selected for construction works, specialized activities, such as cremation pyres and general day-to-day fuel use. Much of the charcoal is also likely to have become incorporated into sealing and infilling deposits over time.

The site is likely to have been located in a clearance close to marginal woodland species and scrub (hazel, pomaceous woods, and cherry-type) but with access to drier woodland (oak, hazel, elm and ash) with a river or damper ground nearby (willow and elm).

The results from this site will be later merged and discussed with similar sites also excavated along the N9/N10 scheme.

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Table 1 Charcoal identification results from Garryduff 1 (E3852)

Feature	Context number	Sample number	Flot volume (grams)	Context description	Wood Species Identifications	No. of fragments	Charcoal weights (grams)	Size of fragments (mm)	No. of growth rings	Growth ring curvature	Comments
Structure 1	005	015	3.1g	Fill of posthole C52	Corylus avellana (hazel)	28	1.3 grams	2mm-8mm	2-4	weak	
					Fraxinus excelsior (ash)	15	1.1 grams	3mm-9mm	2-4		
					Salix sp. (willow)	5	0.5 grams	3mm-6mm	2-3		
					Quercus sp. (oak)	1	0.1 grams	<3mm			
					Prunus sp. (cherry-type)	1	0.1 grams	<5mm			
	007	008	2.2g	Fill of posthole C53, located within pit C78	Corylus avellana (hazel)	15	0.7 grams	3mm-5mm	<5		
					Fraxinus excelsior (ash)	14	1.2 grams	3mm-6mm	2-4		
					Quercus sp. (oak)	7	0.4 grams	2mm-4mm	<3		
					Prunus sp. (cherry-type)	1	0.1 grams	3mm			
	018	019	11.6 grams	Fill of pit C66	Corylus avellana (hazel)	21	2.2 grams	3mm-12mm	2-5	weak	
					Fraxinus excelsior (ash)	21	1.8 grams	3mm-7mm	2-4	weak	
					Prunus sp. (cherry-type)	4	0.4 grams	3mm-5mm	2-3		
					Ulmus sp. (elm)	3	0.3 grams	3mm			
					Quercus sp. (oak)	1	0.1 grams	3mm			
	024	12	1.0g	Deposit within arc 1	Corylus avellana (hazel)	21	1 gram	2mm-8mm	2-5 rings	weak	
	026	050	2.5g	Fill of pit C108	Corylus avellana (hazel)	36	2 grams	3mm-20mm	2-7	25% strong	
					Salix sp. (willow)	8	0.7 grams	3mm-5mm	<4		
					Fraxinus excelsior (ash)	3	0.3 grams	3mm			
					Prunus sp. (cherry-type)	3	0.3 grams	4mm			
		051	3.8g		Corylus avellana (hazel)	24	1.6 grams	2mm-8mm	2-6		
					Salix sp. (willow)	11	0.7 grams	3mm-5mm	2-3		
					Quercus sp. (oak)	8	0.5 grams	2mm-6mm	<5		
					Fraxinus excelsior (ash)	6	0.4 grams	3mm-5mm	<5		
					Maloideae spp. (pomaceous woods)	1	0.1 grams	3mm			
	107	52	1.1g		Corylus avellana (hazel)	10	0.7 grams	3mm-10mm	2-8	weak	
					Fraxinus excelsior (ash)	6	0.3 grams	<3mm			

Feature	Context number	Sample number	Flot volume (grams)	Context description	Wood Species Identifications	No. of fragments	Charcoal weights (grams)	Size of fragments (mm)	No. of growth rings	Growth ring curvature	Comments
					Quercus sp. (oak)	5	0.3 grams	<3mm			
	158	153	0.4 grams		Fraxinus excelsior (ash)	7	0.2 grams	<3mm			
	028	040	1.6g	Fill of slot trench C159	Corylus avellana (hazel)	27	1.2 grams	2mm-12mm	2-8	20% strong	
					Quercus sp. (oak)	7	0.3 grams	<5mm			
					Fraxinus excelsior (ash)	6	0.3 grams	<3mm			
					Prunus sp. (cherry-type)	2	0.1 grams	<3mm			
	032	23	12.2g	Fill of posthole C82, located inside arc 1	Fraxinus excelsior (ash)	20	3 grams	2mm-20mm	2-11		
					Quercus sp. (oak)	18	2.1 grams	3mm-15mm	2-9		
					Salix sp. (willow)	6	1.3 grams	3mm-25mm	3-10		
					Corylus avellana (hazel)	6	0.4 grams	<3mm			
	067	020	6.7g	Fill of posthole C68 within arc 1	Corylus avellana (hazel)	26	3 grams	4mm-20mm	2-12	30% strong	
					Maloideae spp. (pomaceous woods)	17	1.9 grams	3mm-15mm	3-11	strong	
					Fraxinus excelsior (ash)	6	0.4 grams	<5mm	<3		
					Quercus sp. (oak)	1	0.1 grams	<3mm			
	090	024	5.5g	Fill of posthole C91, located inside arc 1	Corylus avellana (hazel)	36	2.2 grams	3mm-20mm	2-12	weak	
					Salix sp. (willow)	9	0.9 grams	3mm-7mm	2-4		
					Fraxinus excelsior (ash)	3	0.2 grams	<3mm			
					Quercus sp. (oak)	2	0.1 grams	<3mm			
	069	025	6.0g	Fill of posthole C70, located inside arc 1	Fraxinus excelsior (ash)	25	1.3 grams	2mm-15mm	2-9	weak	
					Corylus avellana (hazel)	16	1.1 grams	3mm-14mm	2-7		
					Maloideae spp. (pomaceous woods)	7	0.8 grams	2mm-7mm	2-4		
					Salix sp. (willow)	1	0.1 grams	<3mm			
					Quercus sp. (oak)	1	0.1 grams	<3mm			
	095	032	11.3g	Fill of posthole C96 within arc 1	Quercus sp. (oak)	32	3.3 grams	3mm-28mm	3-16	weak	Narrow ring width
					Fraxinus excelsior (ash)	7	0.7 grams	2mm-6mm	2-4		
					Corylus avellana (hazel)	6	1 gram	3mm-8mm	2-6		
					Salix sp. (willow)	5	0.3 grams	<5mm			
	085	035	1.7g	Fill of posthole C100	Salix sp. (willow)	12	1 gram	3mm-12mm	3-4	weak	

Feature	Context number	Sample number	Flot volume (grams)	Context description	Wood Species Identifications	No. of fragments	Charcoal weights (grams)	Size of fragments (mm)	No. of growth rings	Growth ring curvature	Comments
				within slot trench C42, arc 1	Fraxinus excelsior (ash)	11	0.8 grams	3mm-7mm	2-5		
					Corylus avellana (hazel)	9	0.9 grams	3mm-8mm	2-6		
					Quercus sp. (oak)	2	0.1 grams	<3mm			
	085	45	1.5g	Fill of posthole C100 within slot trench C42, arc 1	Corylus avellana (hazel)	9	0.7 grams	2mm-8mm	2-4		
					Maloideae spp. (pomaceous woods)	8	0.7 grams	3mm-8mm	2-5		
					Ulmus sp. (elm)	5	0.4 grams	2mm-4mm	<3		
					Fraxinus excelsior (ash)	3	0.2 grams	<5mm			
	156	047	1.9g	Fill of posthole C164, sealed by C28	Salix sp. (willow)	34	0.8 grams	<3mm	<3	weak?	
					Maloideae spp. (pomaceos woods)	9	0.6 grams	3mm-9mm	2-5		
					Fraxinus excelsior (ash)	5	0.4 grams	3mm-4mm	2-3		
					Quercus sp. (oak)	2	0.1 grams	<3mm			
	190	48	0.3 grams	Fill of stakehole C165, sealed by C28	Corylus avellana (hazel)	7	0.2 grams	<2mm			
					Ulmus sp. (elm)	1	0.1 grams	<3mm			
					Prunus sp. (cherry-type)	1	0.1 grams	<3mm			
Features between Str. 1 and Str. 2	033	10	0.5g	Fill of posthole C62, located between arc 1 and arc 2	Corylus avellana (hazel)	13	0.9 grams	3mm-10mm	2-6		
					Quercus sp. (oak)	3	0.2 grams	<5mm			
	119	043	2.0g	Fill of possible cooking pit C116	Fraxinus excelsior (ash)	14	1 gram	3mm-12mm	2-5	weak	
					Corylus avellana (hazel)	12	0.8 grams	3mm-10mm	2-5		
					Prunus sp. (cherry-type)	2	0.1 grams	<3mm			
Structure 2	129	57	0.7g	Deposit of possible pit C130	Corylus avellana (hazel)	12	0.5 grams	<5mm	<3		
					Fraxinus excelsior (ash)	3	0.1 gram	<3mm			
					Quercus sp. (oak)	2	0.1 gram	<3mm			
	131	56	0.3 grams	Fill of possible pit C132	Quercus sp. (oak)	11	0.3 grams	<3mm	<3		
	150	54	0.9g	Fill of post/ pit C151	Corylus avellana (hazel)	16	0.5 grams	2mm-6mm	2-4		
					Fraxinus excelsior (ash)	9	0.3 grams	<3mm			
					Prunus sp. (cherry-type)	2	<0.1 grams	2mm			
					Quercus sp. (oak)	1	<0.1 grams	2mm			

Feature	Context number	Sample number	Flot volume (grams)	Context description	Wood Species Identifications	No. of fragments	Charcoal weights (grams)	Size of fragments (mm)	No. of growth rings	Growth ring curvature	Comments
Cremation pits	003	001	14.3g	Fill of possible cremation pit C49	Quercus sp. (oak)	37	14.3 grams	5mm-35mm	4-13	weak	Ring width (>1mm)
		002	11.0g		Quercus sp. (oak)	32	11 grams	8mm-40mm	5-16	weak	Ring width (>1mm)
	048	003	10.3g	Fill of possible cremation pit C49	Quercus sp. (oak)	50	5.1 grams	5mm-18mm	4-12	weak	Ring width (>1mm)
	117	044	7.0g	Fill of cremation pit C118	Quercus sp. (oak)	50	6.1 grams	4mm-22mm	5-15	weak	Ring width (>1mm)

Appendix 2.6 Plant Remains Report – Penny Johnston

Client – Irish Archaeological Consultancy Ltd
Site Name- Garryduff 1
Excavation number – E3852 AR116
County – Kilkenny
Author- Penny Johnston
Date – June 2009

1 Introduction

This report details the analysis of plant remains recovered from the excavation at Garryduff 1, E3852 in advance of the construction of the N9/N10 Knocktopher to Powerstown Road (Phase 4).

2 Methodology

The samples for this phase 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. As a result, only limited interpretation of the plant remains from this site is possible.

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 at the end of this report. Scientific names are mainly confined to the identification table in order to facilitate easy reading of the text. Nomenclature and taxonomic orders generally follows Stace (1997).

3 Results

Excavation at Garryduff 1 revealed a circular structure and a short section of a potential second structure or fence.

A total of 15 samples were examined (see Table 1). Most of the plant remains from this sample were identified as hazelnut shell fragments. A very small quantity of cereal grains were recovered, including a small amount of oat and barley grain. However the quantity of cereals is so small it is impossible to extrapolate the relative importance of each grain type.

Indeterminate tuber fragments from these samples could not be identified to species. It is possible that this find represents roots and tubers that were dug up and used as fuel or kindling. Comparative finds of tubers are known from deposits at Manusmore, Co. Clare (Fryer 2006). Tubers were also found in connection with burnt bone in samples at Rathgall, Co. Tipperary (Johnston et al. 2003), in association with cremation and burial deposits from some sites, such as Ballyveelish, Co. Tipperary (Monk 1987b, 31) and in cremation deposits at Kilmainham, Co. Dublin (Johnston 2002). The role of tubers for food and fuel in Irish archaeobotanical material is the subject of current research funded by the Heritage Council. Tubers have also been noted in cremation sample from Abingdon in Oxfordshire in Britain (Monk 1987b, 31). This suggests the possibility that some tuber types were intentionally included in cremation deposits.

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Table 1: Identified plant remains from Garryduff 1

Context	**33**	**24**	**18**	**90**	**69**	**85**	**85**	**85**	**28**	**119**	**85**	**156**	**26**	**26**	**107**
Sample	**10**	**12**	**19**	**24**	**25**	**35**	**38**	**39**	**40**	**43**	**45**	**47**	**50**	**51**	**52**
Hazelnut shell fragments (*Corylus avellana* L.)	4	127	23	12	10	2	4		30	4	21	25	58	1904	7
Oat grains *(Avena* L. species)										1					
Probably hulled Barley grains (*Hordeum vulgare* L.)									2				2	2	
Indeterminate cereal grains									3						
Fragments of indeterminate tubers								1							

Appendix 2.7 Osteological Report on the Faunal Remains– Aoife McCarthy

Osteoarchaeological Report of Faunal Remains and Burnt Bone from
E3852: Garryduff 1 AR116
Co. Kilkenny
N9/N10 Kilcullen to Waterford Scheme
Phase 4b: Knocktopher to Powerstown
Author: Aoife McCarthy MA BA
Date: February 2010

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1. Introduction

1.1 Introduction

This report details the osteological analysis of faunal remains and burnt bone samples recovered during excavations at Garryduff 1 in the townland of Garryduff, 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 February 2010. At the time of writing this report, background archaeological information was obtained from a draft interim excavation report (Devine, 2009) and from consulting the original site register documents.

1.2 General Osteological Information

The osteological analysis of both hand retrieved faunal remains and burnt bone fragments recovered during sieving of bulk soil samples from Site AR116 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 380 fragments from 339 possible skeletal elements and weighing 67.79g were recorded within the assemblage. The degree of preservation of the animal bone assemblage varied from well preserved for retrieved faunal remains to moderate–poor for burnt bone fragments. A high rate of fragmentation was noted within the combined assemblage.

A large portion of the faunal remains assemblage originated from C26 the silty clay fill of pit C108 which accounted for 98 bone fragments or 25.8% of the total combined assemblage.

A total of 72 bone and burnt bone fragments (18.9%) of the entire assemblage were classified to species. Due to a high rate of fragmentation combined with poor preservation and small size of the individual bone fragments it was not possible to identify 308 fragments (81.1%) these were classed as indeterminate vertebrate of small, medium or large size. Bone elements were identified where possible.

The faunal remains assemblage contained bones from a possible 3 different species including; dog, pig and rodent. The species of pig and dog are moderately represented within the assemblage, accounting for 31 fragments (43.1%) and 38 fragments (52.8%) respectively of identified material.

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.
- 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. Due to the nature of material recovered from Site AR116 Garryduff 1 ageing was not possible.

BIOMETRICAL DATA: Due to the high degree of fragmentation and small size of the remains measurements were taken but biometrical data interpretation 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 of the faunal material and high degree of fragmentation and the nature of the bone material.

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

CANIS/DOG
Dog was the highest represented animal species identified at Garryduff 1; a total of 38 fragments which formed (52.8%) of the categorised animal and burnt bone assemblage were recovered. The total weight of the recovered dog bone was 33.08g. Dog MNI was calculated at 1 based on recovered skull bone fragments. The skeletal elements of canis/dog present within the assemblage were parietal skull, occipital skull, temporal skull, sphenoid, 1st Molar and 2nd Molar. None of the recovered canis/dog bone fragments displayed evidence of butchery, gnawing or exposure to heat.

SUS/PIG
Pig was the second highest animal species represented at Garryduff 1; a total of 31 fragments which formed 43.1% of the identified and categorised bone assemblage were retrieved. The total weight of recovered pig bone was 5.31g. The skeletal elements of pig/sus present within the assemblage were rib, phalanx and metapodial. Measurements were taken for recovered pig bone fragments, however biometric data analysis was not possible for the domestic species. All pig/*sus* bone fragments displayed evidence of exposure to heat in the form of colour change and surface texture modifications. The possible exposure of a bone fragment to metal resulting in green discolouration was noted on a single fragment of pig rib corpus. Thirty

fragments of rib corpus, metapodial and phalanx bone displayed evidence of calcination in the form of surface texture change and cracking combined with colour change to grey/white (Appendix 3). Bone structure changes through exposure to heat with a white or pale grey colour indicating exposure to temperatures in excess of c. 600°C combined with a ready oxygen supply (McKinley, 2004). As detailed by Luff & Pearce in 1994 contact of bone with heat diminishes its moisture content and results in the combustion of the organic or collagen component; the remaining structure of the bone after this process is mineral.

Rodent
Three rodent size rib corpus fragments, weighing 0.31g were recovered within burnt bone material. All three fragments displayed evidence of exposure to heat in the form of calcination. The largest fragment recovered measured 9mm long by 7mm wide and 3mm thick.

Indeterminate Vertebrate
Due to fragmentation, poor preservation and small fragment size a series of 308 unidentifiable bone fragments of indeterminate vertebrate (81.1%), weighing 29.09g were recovered from Garryduff 1. All 308 indeterminate bone fragments displayed evidence of exposure to a high level of heat, resulting in the calcination of the bone. This was recognised by an alteration of the bone texture and surface cracking combined with colour change to grey/white, several with bluish hues. The structure of bone changes through exposure to heat. Contact of bone with heat diminishes its moisture content and results in the combustion of the organic or collagen component; the remaining structure of the bone after this process is mineral. As Devlin J.P. & Herrmann N. P (2008, 109) state “increasing exposure to heat bone progresses through a sequence of colours from unburned tan, to shades of dark brown to black, progressing to blue and grey and finally to white.” Bone elements of rib, skull, long bone diaphysis and possible phalanx were recorded as indeterminate vertebrate.

4. Summary
Three hundred and eighty hand retrieved faunal remains and burnt bone fragments recovered during sieving of bulk soil samples from Garryduff 1 were submitted for examination. From these a total of 308 (81.1%) were not possible to identify to species due to small fragment size, poor preservation and fragmentation of the bone. The remaining 72 fragments (18.9%) were identified and divided into species. The combined faunal and burnt bone assemblage contained bones from three recognisable species of dog, pig and rodent. As illustrated the species identified at Garryduff 1 was characterised by the domestic species of dog and pig; which accounted for 38 bone fragments (10%) and 31 bone fragments (8.2%) of the entire assemblage respectively. Wild animal species were also represented within the Garryduff 1 assemblage by rodent.

As detailed within the bone database a total of 341 recovered bone fragments or 89.7% of the entire assemblage displayed evidence of exposure to a high level of heat. The burnt bone fragments exhibited surface warping, exposure of trabecular bone and colour change to grey/white or white indicating contact with a high point of heat and an acceleration of the mineralisation process (Luff R. & Pearce J. 1994).

As discussed hand recovered faunal remains and burnt bone samples retrieved from bulk soil sieving originated from a series of 18 archaeological contexts comprising; fills of pit features (C107, C158, C26, C60), posthole features (C156, C32, C5, C67, C69, C7, C85, C90 & C95), stakehole features (C186 &C27) as well as cooking and hearth waste (C119 & C18). Two Neolithic pottery sherds were recovered within pit

fills C26 and C85; which contained unidentified and pig bone fragments respectively. No definite or statistically detailed conclusions could be drawn from the burnt bone material recovered from Garryduff 1 due to its limited size and low level of preservation. The dog/*canis* bone fragments originated from a single pit fill C60, which represents post medieval activity.

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	C60	64	Canis/Dog	Parietal Skull															7	6.62	Series of well preserved parietal skull fragments.
2	C60	64	Canis/Dog	Occipital Skull															8	6.18	Series of well preserved occipital skull fragments
3	C60	64	Canis/Dog	Skull/Sphenoid															2	4.52	Well preserved fragments of sphenoid
4	C60	64	Canis/Dog	Temporal Skull															9	11.88	Well preserved fragments, including external auditory miatus
5	C60	64	Canis/Dog	Skull															9	1.55	Series of small moderately preserved fragments of skull bone
6	C60	64	Canis/Dog	M1															1	1.18	Single loose M1 tooth in wear.
7	C60	64	Canis/Dog	M2															1	0.87	Single loose M2 tooth in wear.
8	C60	64	Canis/Dog	Molar															1	0.28	Single loose molar crown, incomplete.
9	C119	43	Unid	Unid													W, G		6	9.90	Series of calcined highly fragmented bone. Surface cracking.
10	C18	19	Unid	Rib						1							W		5	0.68	Calcined fragment of rib corpus, bone surface cracked. Largest fragment Length 11mm, Width 9mm, Thickness 3mm
11	C18	19	Unid	Unid													W, G		1	0.76	Calcined fragment of possible carpal. Bone surface cracked.
12	C28	40	Unid	Rib													G, W		6	0.33	Series of small-tiny fragments of rib corpus, bone surface cracked and trabecular bone exposed. Small size mammal
13	C28	30	Unid	Skull													G, W		3	0.03	Tiny fragments of thin calcined bone, possible skull
14	C28	30	Rod Size	Rib													G, Blu		1	0.01	Tiny fragment of rib corpus, possible rodent size
15	C158	53	Unid	Skull													W, G		2	0.33	2 fragments of possible skull, calcined. Trabecular bone exposed. Small size mammal
16	C158	53	Unid	Unid													W, G		3	0.15	Series of small calcined fragments of bone, possible long bone.
17	C156	47	Unid	Unid													W, G		4	0.04	Series of calcined fragments of trabecular bone
18	C156	47	Unid	Rib													G		5	0.25	Series of small poorly preserved fragments of rib corpus. Small size

Spec	C	S	Taxa	Anat	Side	Prox	Dist	1	2	3	4	5	6	7	8	But	Bu	G	Q	W (g)	Comments
																					mammal. Trabecular bone exposed on all fragments. Largest fragment Length 7mm, Width 6mm, Thickness 3mm. Bone surface cracked
19	C156	47	Unid	Skull													W, G		4	0.43	Series of small poorly preserved fragments of possible skull, trabecular bone exposed. Bone surface cracked.
20	C156	47	Unid	Unid													G		5	0.10	Series of small calcined fragments of unidentifiable bone.
21	C27	16	Unid	Unid													W, G		6	0.05	Series of tiny fragments of calcined trabecular bone
22	C27	16	Unid	Unid													W		4	0.04	Series of tiny fragments of calcined bone, unidentified
23	C85	35	Unid	Unid													G		2	0.03	Two unidentifiable calcined fragments of trabecular bone
24	C85	35	Unid	Rib													W		2	0.16	Two calcined fragments of rib corpus of small size mammal. Trabecular bone exposed. Larger fragment Length 9mm, Width 7mm, Thickness 3mm
25	C26	65	Unid	Skull													G, W		2	0.59	Two fragments of skull, bone surface cracked. Fragments calcined. Small-med size mammal. Larger fragment Length 13mm, Width 9mm, Thickness 3mm
26	C95	32	Unid	Rib													G		3	0.05	Series of 3 fragments of rib corpus, calcined, trabecular bone exposed. Small size mammal.
27	C95	32	Unid	Long Bone													W, G		3	0.65	Calcined long bone diaphysis fragments small size mammal. Largest fragment Length 12mm, Width 7mm, Thickness 4m. Bone surface cracked
28	C95	32	Unid	Skull													W		2	0.25	Calcined fragment of skull bones. Unidentified
29	C95	32	Unid	Unid													W		1	0.01	Calcined fragment
30	C85	39	Unid	Rib													W, G		11	0.21	Series of calcined fragments of rib corpus, trabecular bone exposed on all. Small-tiny size. Largest fragment Length 9mm, Width 4mm, Thickness 3mm
31	C90	24	Unid	Unid													G		2	0.01	Calcined fragment of trabecular bone
32	C90	24	Unid	Phalanx													W, G		3	0.43	3 fragments of calcined phalanx diaphysis of med size mammal. Bone

Spec	C	S	Taxa	Anat	Side	Prox	Dist	1	2	3	4	5	6	7	8	But	Bu	G	Q	W (g)	Comments
																					surface cracked. Largest fragment Length 9mm, Width 7mm, Thickness 4mm
33	C90	24	Unid	Unid													G		4	0.04	Series of calcined tiny fragments of bone, not possible to ID bone or species.
34	C90	24	Unid	Rib													G		4	0.15	Poorly preserved rib corpus fragments, trabecular bone exposed. Calcined.
35	C32	23	Unid	Rib													W		3	0.08	Series of 3 calcined fragments of rib corpus, trabecular bone exposed.
36	C32	23	Unid	Unid													W		1	0.03	Calcined fragment of trabecular bone
37	C32	23	Unid	Long Bone													W		2	0.17	Calcined fragment of long bone, not poss. to ID species. Fragment Length 6mm, Width 5mm, Thickness 3mm
38	C69	25	Unid	Unid													G		3	0.10	Small calcined fragments of unid bone. Bone surface cracked
39	C85	45	Unid	Unid													W		2	0.01	2 fragments of calcined bone, tiny size
40	C85	45	Unid	Skull													W		2	0.10	Calcined fragments of possible skull
41	C85	45	Unid	Rib													W		3	0.08	Calcined fragments of rib corpus, trabecular bone exposed. Poor condition.
42	C26	50	Unid	Unid													G		9	0.30	Series of calcined fragments of trabecular bone
43	C26	50	Unid	Unid													W, G		10	0.29	Series of small-tiny fragments of calcined bone. Bone surface cracked
44	C26	50	Unid	Long Bone													G, W		11	2.44	Series of long bone fragments of med size mammal. Fragments calcined, bone surface cracked. Largest fragment Length 12mm, Width 10mm, Thickness 4mm. Sandwich burning affect visible on bone surface.
45	C26	50	Unid	Skull													G, W		12	0.99	Series of calcined fragments of skull, trabecular bone exposed on some. Small size mammal. Bone surface cracked.
46	C26	50	Pig Size	Rib													G, Green		19	2.02	Series of calcined fragments of rib corpus, trabecular bone exposed on all fragments. One fragment, green discolouration visible on surface. Largest fragment Length 31mm, Width 5mm, Thickness 3mm. Bone surface cracked

Spec	C	S	Taxa	Anat	Side	Prox	Dist	1	2	3	4	5	6	7	8	But	Bu	G	Q	W (g)	Comments
47	C186	46	Unid	Unid													G		3	0.01	Calcined fragments of trabecular bone
48	C186	46	Unid	Long Bone													W		1	0.14	Calcined long bone diaphysis fragment unid species.
49	C186	46	Pig Size	Rib						1							G, W		4	1.15	Moderately preserved calcined rib corpus fragment, bone surface cracked. Largest fragment, Length 19mm, Width 10mm, Thickness 2mm
50	C26	51	Unid	Skull													W		4	1.21	Calcined fragments of skull, bone surface cracked and trabecular bone exposed. Largest fragment Length 13mm, Width 11mm, Thickness 4mm
51	C26	51	Unid	Rib													G		6	0.32	Series of calcined fragments of rib corpus, bone surface cracked and trabecular bone exposed. Tiny size, small size mammal.
52	C26	51	Unid	Unid													G		3	0.10	Calcined fragments of trabecular bone
53	C26	51	Unid	Unid													G, W		10	0.30	Series of small-tiny fragments of calcined bone. Trabecular bone exposed and surface cracked.
54	C26	51	Pig Size	Phalanx										1			G		5	0.66	Poorly preserved distal phalanx fragment, trabecular bone exposed. Length 13mm, Width 6mm, Thickness 5mm
55	C26	51	Unid	Rib													W		7	0.37	Series of calcined fragments of bone, tiny size. Unid. Bone surface cracked & trabecular bone exposed.
56	C7	8	Unid	Unid													G		5	0.11	Series of fragments of calcined trabecular bone
57	C7	8	Unid	Rib													G, W		2	0.19	Poorly preserved rib corpus fragments, small size mammal, trabecular bone exposed & bone surface cracked. Larger fragment Length 11mm, Width 12mm, Thickness 2mm
58	C7	8	Unid	Skull													G		2	0.23	Poor preservation
59	C7	8	Unid	Unid													G, Blu		3	0.03	Poorly preserved, small fragments, trabecular bone exposed. Exposed to heat
60	C7	8	Unid	Unid													G, W		5	0.20	Poorly preserved small-tiny fragments of calcined bone
61	C5	15	Unid	Unid													G		3	0.01	Calcined fragments of trabecular bone
62	C5	15	Pig Size	Phalanx					1								W		1	0.31	Poorly preserved incomplete proximal

Spec	C	S	Taxa	Anat	Side	Prox	Dist	1	2	3	4	5	6	7	8	But	Bu	G	Q	W (g)	Comments
																					phalanx fragment, degree of trabecular bone exposed. Bone surface cracked. Length 6mm, Width 9mm, Thickness 5mm
63	C5	15	Unid	Unid													G, W		19	0.33	Series of small-tiny fragments of calcined bone. Bone surface cracked & trabecular bone exposed
64	C5	15	Rodent Size	Rib						1							G, W		2	0.30	2 moderately preserved fragments of rib corpus. Trabecular bone exposed. Length 9mm, Width 7mm, Thickness 3mm
65	C5	15	Unid	Rib													W		7	0.28	Poorly preserved fragments of rib corpus, trabecular bone exposed. small size mammal
66	C5	15	Unid	Long Bone													G, W		3	0.24	Series of small-tiny calcined fragments of diaphysis, small size mammal. Bone surface cracked & trabecular bone exposed.
67	C5	15	Pig Size	Phalanx											1		G		1	0.10	Small fragment of distal phalanx, pig size, trabecular bone exposed.
68	C107	52	Unid	Long Bone													G, W		2	0.12	2 small fragments of long bone diaphysis of small size mammal. Bone surface cracked. Larger fragment Length 6mm, Width 4mm, Thickness 3mm
69	C107	52	Unid	Rib													W		6	0.10	Series of small-tiny fragments of rib corpus, bone surface cracked & trabecular bone exposed.
70	C107	52	Unid	Unid													W, G		7	0.12	Series of small-tiny fragments of calcined bone, thin pieces, possibly skull. Poor preservation.
71	C107	52	Unid	Rib													W, G		3	0.23	Rib corpus fragments of small size mammal, trabecular bone exposed & surface cracked. Largest fragment Length 10mm, Width 5mm, Thickness 2mm
72	C67	20	Unid	Unid													G		18	0.89	Series of small-tiny fragments of calcined bone. Trabecular bone exposed and surface cracked.
73	C67	20	Unid	Rib									1				W, G		11	0.93	Series of calcined fragments of rib corpus, poor preservation. Degree of trabecular bone exposed on fragments. Largest fragment Length 9mm, Width

Spec	C	S	Taxa	Anat	Side	Prox	Dist	1	2	3	4	5	6	7	8	But	Bu	G	Q	W (g)	Comments
																					7mm, Thickness 3mm. Small size mammal
74	C67	20	Unid	Unid													G		9	0.26	Poorly preserved calcined fragments of trabecular bone.
75	C67	20	Unid	Skull													G,W		8	1.47	Series of moderately-poorly preserved fragments of skull. Degree of trabecular bone exposed. Sm-med size mammal. Largest fragment Length 8mm, Width 11mm, Thickness 4mm. Bone surface cracking
76	C67	20	Pig Size	MP						1							G		1	1.07	Poorly preserved fragment of diaphysis. Degree of trabecular bone exposed. Metrics not possible. Bone surface cracked. Exposed to heat.
77	C67	20	Unid	Long Bone													G, W		10	0.64	Series of calcined fragments of long bone diaphysis. Degree of trabecular bone exposed. Bone surface of fragments also cracked.

Key:

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

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GLOSSARY OF TERMS:

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

Appendix 2.8 Petrographical Report – Stephen Mandal

Petrographical Report on Stone Samples Taken During Archaeological Excavations
at
Garryduff 1 (E3852)
Eurgeol Dr Stephen Mandal MIAI PGEO

Introduction
This report is based on the macroscopic (hand specimen) examination of stone samples taken during archaeological excavations in advance of the N9/N10 Phase 4b Knocktopher to Powerstown Road Scheme. The purpose of the study was to identify the rock types from which the stone objects were made, to highlight potential sources for them, and to comment on their possible function. It is important to note that macroscopic petrographical studies have been considered of limited value in comparison to microscopic (thin section and geochemical analysis) studies. On the other hand, macroscopic studies provide an excellent preliminary assessment tool and have proven to be of considerable value in petrographical studies (e.g. see Mandal 1997; Cooney and Mandal 1998).

Solid Geology and Soils of the Site (see Figure 1; McConnell 1994)
The bedrock under the site consists of crinoidal wackestone/ packstone limestone belonging to the Ballyadams Formation (shown on Figure 1 as BM).

The stratigraphical sequence in the area consists of the following. Gaps in the stratigraphically sequence are represented by line breaks.

Carboniferous (Silesian)
Coolbaun Formation (CQ) – Shale and mudstone with this coals
Moyadd Coal Formation (MC) – Shale, siltstone and minor sandstone
Bregaun Flagstone Formation (BE) – Thick flaggy sandstone and siltstone
Killeshin Siltstone Formation (KN) – Muddy siltstone and silty mudstone
Luggacurren Shale Formation (LS) – Mudstone and shale with chert and limestone

Carboniferous (Dinantian)
Clogrenan Formation (CL) – Cherty, muddy calcarenite limestone
Ballyadams Formation (BM) – Crinoidal wackestone/ packstone limestone
Milford Formation (MI) – Peloidal calcarenite limestone
Butlersgrove Formation (BU) – Very dark grey argillaceous limestones
Ballysteen Formation (BA) – Fossiliferous dark-grey muddy limestone
Ballymartin Formation (BT) – Limestone and dark grey calcareous shales
Quinagh Formation (QU) – Lenticular mudstone and coarse siltstone
Porter's Gate Formation (PG) – Sandstones, shales and thin limestones

Devonian
Kiltorean Formation (KT) – Yellow and red sandstones, green mudstones
Carrigmaclea Formation (CI) – Red, brown conglomerates and sandstones

Ordovician
Oaklands Formation (OA) – Green, red-purple, buff shale, siltstone
Maulin Formation (MN) – Dark blue-grey slate, phyllite, schist

Igneous Intrusions
The Tullow Pluton (Tw) – Fine to coarse granites dating to *c.* 405Ma

The geology of the area is generally dominated by Lower Carboniferous Age rocks, principally limestones. These rocks, which also make up much of the Midlands of Ireland, represent the northward return of the sea at the end of the Devonian, *c.* 360 million years ago, owing to the opening of a new ocean to the south called the Palaeo-Tethys in what is now central Europe.

To the south of the study area occur Ordovician-Devonian Age rocks. The Devonian Age rocks consist of coarse sandstone and conglomerates representing terrestrial sediments resulting from a period of tectonic uplift.

The older, Ordovician Age rocks represent tectonic activity, relating to the closure of the Iaepetus Ocean, a major ocean which at its widest was probably greater than 3000km across. These rocks have been metamorphosed to slates, phyllites and schists by the intrusion of the Tullow granite pluton *c.* 405 million years ago.

Bedrock is not exposed at surface at the site; instead the overburden consists of boulder clay; surface drift from early glaciations. The area is part of a physical region known as the Caledonian province of the south-east. The soils of the area consist of acid brown earths (Aalen et al. 1997).

Results

Site	Ministerial Direction		NMS Reg.	Sample	Context	Notes		
Garryduff 1	A032/147	AR116	E3852	15	5	Not altered;	Angular;	Sandstone, coarse greywacke/ very coarse grained quartz sandstone, red
Garryduff 1	A032/147	AR116	E3852	43	118	Not altered;	Angular;	Sandstone, coarse greywacke
Garryduff 1	A032/147	AR116	E3852	50	26	Not altered;	Angular;	Sandstone, coarse greywacke/ very coarse grained quartz sandstone, red
Garryduff 1	A032/147	AR116	E3852	52	107	Not altered;	Angular;	Sandstone, coarse greywacke/ very coarse grained quartz sandstone, red

Potential Sources

Coarse grained sandstone does not occur in bedrock in the immediate vicinity of the site. The dominant rock type in the area is limestone. Whilst there are minor sandstones within some of the limestone formations, the closest bedrock source for coarse grained yellow / red sandstone is within the Devonian Age Kiltorean Formation (yellow and red sandstones, green mudstones) and Carrigmaclea Formation (red, brown conglomerates and sandstones) (see Figure 1, shown as KT and CI respectively). It is important to note that these rock types were not necessarily sourced from bedrock. The sample is clearly a shattered cobble, indicating a secondary source, such as in the glacial tills / river cobbles. It is therefore possible that these rocks were sourced locally.

Discussion

Whilst it is not possible to determine a definitive source for these stone samples based on macroscopic examination alone, it can be stated that these rock types are available locally in outcrop and within the glacial tills / sub-soils. It is therefore probable that the material in these samples were sourced in the vicinity of the site.

A total of 159 samples were examined from the scheme across 33 sites (see Table 2). The samples showed a remarkable consistency across the scheme in terms of the principal rock type utilised; very coarse to medium grained sandstone, typically red to yellow in colour. All samples contain a variation of this type of rock as their principal component. Just under half (73) of the samples are clearly burnt / altered, but this does not rule out the possibility that the stone from other samples had been burnt. All bar one (a sample from Kellymount 5 (E3858:43:156)) contained angular pieces of stone, and 122 (77%) also contained sub-rounded to rounded pieces. A total of 63 of the samples contained pebbles and / or cobbles, in most cases broken. Five of the samples contained minor amounts of limestone as a secondary rock type to sandstone.

Site	Licence			No.	Burnt	Angular	Rounded	Pebbles	Limestone
Kilree 1	A032/107	AR091	E3728	1	0	1	0	0	0
Dunbell Big 2	A032/130	AR095	E3853	1	1	1	1	0	0
Holdenstown 4	A032/101	AR100	E3682	7	7	7	7	0	0
Rathcash 1	A032/133	AR102	E3859	3	0	3	3	3	0
Rathcash 2	A032/134	AR103	E3860	12	12	12	12	12	0
Rathcash East 2	A032/136	AR105	E3893	3	0	3	3	0	0
Blanchvillespark 3	A032/140	AR109	E3913	3	0	3	3	3	0
Blanchvillespark 4	A032/141	AR110	E3914	3	3	3	0	0	0
Ballyquirk 1	A032/143	AR112	E3863	1	1	1	1	0	0
Ballyquirk 2	A032/144	AR113	E3864	5	5	5	1	0	0
Ballinvally 1	A032/146	AR115	E3836	1	0	1	1	0	0
Garryduff 1	A032/147	AR116	E3852	4	0	4	0	0	0
Jordanstown 2	A032/151	AR120	E3851	4	4	4	0	0	0
Kellymount 6	A032/122	AR121	E3758	3	3	3	3	0	0
Jordanstown 3	A032/152	AR122	E3916	2	2	2	2	2	0
Kellymount 2	A032/111	AR124	E3757	11	4	11	11	9	1
Kellymount 3	A032/112	AR125	E3856	13	2	13	2	0	1
Kellymount 5	A032/114	AR127	E3858	27	10	26	24	21	3
Shankill 4	A032/153	AR130	E3838	5	1	5	4	0	0
Shankill 5	A032/154	AR131	E3850	2	1	2	1	0	0
Moanmore 1	A032/156	AR133	E3835	6	1	6	1	0	0
Moanmore 2	A032/157	AR134	E3843	2	0	2	2	0	0
Bannagagole 1	A032/159	AR136	E3844	3	2	3	3	3	0
Moanduff 1	A032/160	AR137	E3839	7	1	7	7	3	0
Coolnakisha 1	A032/128	AR139	E3768	1	0	1	1	1	0
Cranavonane 1	A032/164	AR141	E3842	2	2	2	2	2	0
Tomard Lower 1	A032/117	AR144	E3733	1	0	1	1	1	0
Paulstown 1	A032/093	AR145	E3642	3	1	3	3	2	0
Rathgarvan or Clifden 1	A032/125	AR147	E3760	1	0	1	1	0	0
Maddockstown 1	A032/126	AR148	E3759	3	3	3	3	0	0
Leggetsrath East 1	A032/118	AR154	E3734	1	1	1	1	0	0
Moanduff 3	A032/120	AR156	E3736	1	0	1	1	1	0
Ballyquirk 4	A032/167	AR157	E3848	17	6	17	17	0	0
Grand Total :				**159**	**73**	**158**	**122**	**63**	**5**

Table 2. Results of petrographical analysis of stone samples from the N9/N10 Phase 4b Road Scheme

Coarse grained sandstone is typical of *fulacht fiadh* material (e.g. see Mandal 2004). The use of angular and rounded pieces is interesting. Rounded pieces and / or the use of pebbles / cobbles is clear evidence of the use of secondary sources. Angular pieces are more indicative of the use of bedrock sources, but it is important to note that they could also represent angular blocks occurring in tills.

It is significant that sandstone is the predominant rock type given that, due to the differing underlying bedrock, it would not be the most abundant rock type available, either in outcrop or in the overlying tills. This indicates that sandstones were deliberately being selected for use in preference to the more abundant finer grained rock types in the area.

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Appendix 2.9 Metallurgical waste Analysis Report – Angela Wallace

Metallurgical Waste Analysis Report from
E3852: Garryduff 1 AR116
Co. Kilkenny
N9/N10 Kilcullen to Waterford Scheme
Phase 4b: Knocktopher to Powerstown
Author: Angela Wallace MSc, MIAI
Date: August 2010

Garryduff 1

Two samples of metallurgical material were submitted for examination from this site. **Sample 42:** This piece came from C46, the fill of furrow C198A . Sample consists of a dense roughly oval shaped piece of slag weighing 386.6g, and measuring 75mm in length, 50mm in width and 60mm in thickness. Piece is non-diagnostic but is most likely a *Smithing Slag Lump (SSL).*

Sample 50: This piece came from C26 fill of pit C108 containing charcoal, burnt bone and Neolithic pottery. Sample consists of a tiny spherical piece of slag *c.*3mm in diameter and 0.1g in weight. This piece is most likely a by-product of iron smithing, possibly formed during primary smithing where the bloom is being refined. Small spheres are known to fly off the bloom when it is brought to welding temperature (Crew 1986).

Conclusion & Interpretation
The evidence from Garryduff 1 suggests perhaps a single episode of smithing activity took place at or near this site. The amount of material recovered is quite small and no distinctive iron-working features were identified on the site, it is likely these two samples are stray material from a nearby smithing workshop. The main focus of archaeological activity on this site was centred on the Neolithic and included habitation evidence and cremation pits.

There is no way of determining dating for iron-working material unless charcoal can be extracted from the larger piece of slag and dated. Given the small quantity of material and the lack of associated iron-working features this is not considered worthwhile. Based on commonly emerging date ranges for similar material from other archaeological sites it is estimated material can be roughly dated within a range from 400 BC to 800 AD.

Glossary
Smithing Slag Lump (SSL): Hearth slags do not always have a distinctive shape and the term SSL, *smithing slag lumps,* has been used. Such material may be slags which have not been incorporated into the slag cake, or a result of the hearth being cleaned when hot, so that the slag shape becomes distorted. It is obviously more difficult to decide whether such amorphous slags are from smithing or smelting.

Iron Bloom: A spongy mass obtained from the smelting of iron ore in a furnace. It consists of a mixture of fine iron particles, unreacted iron oxide (ore), slag and charcoal residue. The bloom was usually re-heated and hammered to squeeze out any impurities in order to obtain a relatively pure lump of iron metal. This may have been further shaped into a rectangular or cake-shaped *billet* in order to make it easier to transport and trade further afield.

References:
Crew P 1996 Bloom Refining & Smithing Slags and Other Residues HMS Datasheet No. 6 http://hist-met.org/datasheets.html.

Starley D 1995 Hammerscale HMS Datasheet No. 6
http://hist-met.org/datasheets.html.

Appendix 2.10 Cremated Human Bone Report – Jennie Coughlan

Osteological Analysis
of the
Burnt Bone
from the

N9/N10 KILCULLEN TO WATERFORD SCHEME
PHASE 4: KNOCKTOPHER TO POWERSTOWN

AR116, GARRYDUFF
E3852

Report by: Jennie Coughlan
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May 2012

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1. Introduction

This report details the results of the osteological analysis of the cremated bone recovered during archaeological investigations in the townland of Garryduff, Co. Kilkenny. Excavations at Garryduff 1, directed by Emma Devine for Irish Archaeological Consultancy Ltd., were undertaken as part of a series of archaeological resolution works along the proposed route of the N9/N10 Kilcullen to Waterford road scheme.

During excavation works at Garryduff 1 a series of Bronze Age features were uncovered within an area enclosed by an arc of post- and stakeholes and two cremation pits, located outside the enclosed area. The following report discusses the results of the osteological analysis undertaken on a quantity of burnt bone retrieved from the fill of these two middle Bronze Age cremation pits. The total weight of bone retrieved from the two pits was 1008.3g [pit C49] and 1126.2g [pit C118]. Osteological analysis of the cremated bone was undertaken to quantify and, where possible, identify the skeletal elements contained within the cremation deposit and to assess the demographic and pathological profile of the individual interred. Additional consideration was given to aspects of bone colouration and fragmentation as evidence for pyre technology.

In addition to the two identified cremations a further two of the excavated features at Garryduff 1 were found to contain small quantities of burnt bone. Pit [C37], located within the arced structure (Structure 1), contained a total of 0.9g of burnt bone, equating to 9 unidentified fragments. The maximum fragment length was 14.2mm. The burnt bone remains may have been human but this could not be confirmed osteologically. It is unknown whether the burnt bone remains were deliberately placed in the pit, possibly as some form of token or ritualistic deposit, or if they had accidentally become mixed into the fill of the pit.

Pit [C116], a cooking pit located between Structure 1 and Structure 2, contained a total of 10.9g of burnt bone including one identifiable animal fragment. As both the archaeological and osteological evidence indicated that this latter pit did not contain human bone it was excluded from further analysis.

2. Reasons for Analysis and Scope of Reporting

The osteological analysis of human remains is undertaken to establish, where possible, demographic information (sex, age and stature) and to identify skeletal changes that can be linked to occupational, pathological or nutritional stresses. The determination of age, sex and stature not only provides basic population data but can also aid in the identification of age-related skeletal changes, gender differences in diet and occupation and the frequency of disease through different population groups. The osteological analysis of cremation burials considers various aspects of the burial deposit including the total weight of bone, identification of individual skeletal elements and minimum number of individuals represented in the deposit. The identification of demographic and pathological details is more difficult in cremated remains as the fragmented and fire-damaged nature of the bone can limit the amount of information retrieved during analysis. In addition to individual details the analysis of cremated remains can also reveal aspects of cremation ritual, including pyre technology and depositional practices.

3. Materials and Process

All cremated bone was separated from the surrounding matrix prior to analysis as part of post-excavation procedures. The bone from each context was examined in accordance with standards recommended by BABAO and the IFA (Guidelines to the Standards for Recording Human Remains, Brickley and McKinley 2004). Each

sample was sieved through laboratory-grade stack sieves of 2mm, 5mm and 10mm diameter mesh and the material from each sieve was weighed to the nearest 0.1gram. All material was examined macroscopically. Once the bone from each sample was sieved, each sieved portion of bone was weighed as a whole and examined for identifiable bone. Identifiable human skeletal elements were divided into five main categories during osteological analysis; namely skull, axial, upper limb, lower limb and unidentified long bone. Identified elements were weighed separately and described in detail.

4. Cremation burials

Pit [C49] describes a circular pit located in the north-west of the site. The pit contained two distinct fills. The lower fill [C48] was a charcoal rich layer with a depth of 0.04m which contained a total of 62.2g of burnt bone. The upper fill [C3], which survived to a depth of 0.06m, contained 946.1g of burnt bone. The total weight of burnt bone retrieved from this burial pit was 1008.3g.

Pit [C118] describes an oval pit feature located in close proximity to pit [C49]. This burial pit measured 0.52m by 0.42m and had a depth of 0.15m. The pit had a single fill [C117] which contained a total of 1126.2g of burnt bone. The main bulk of the bone was located in the centre of the pit.

4.1. Quantification of skeletal material

Both of the identified cremation pits at Garryduff 1 contained roughly equal quantities of burnt bone, ranging from 1008.3g [pit C49] to 1126.2g [pit C118]. Data from modern crematoria suggests that the weight of bone produced by a single adult individual during the cremation process would normally range from approximately 1000.5g to 2422.5g (McKinley 1993). Although it is often found that cremated bone deposits from archaeological contexts contain smaller quantities of burnt bone than modern cremations, at Garryduff 1 the cremated bone weight from both of the identified cremation pits was comparable to the expected weight of a single adult individual.

Survival of the bone fragments from both burials was considered moderate with a total of 24.6% of the total bone weight comprising of elements greater than 10mm in diameter (Tables 4.1 & 4.2). The maximum surviving fragment length was 66.8mm [pit C49]. In both pits the greatest percentage of bone weight fell between 5mm and 10mm in diameter. It is notable that only 1.0% of the total bone weight from C49, and none of the bone from C118, measured less than 2mm in diameter. This suggests that the post-cremation treatment of the remains did not include deliberate 'crushing' of the bone. Rather, it is suggested that the level of bone fragmentation encountered relates to post-depositional compressive forces.

context/ sample	10mm (g)	%	5mm (g)	%	2mm (g)	%	<2mm (g)	%	Total (g)	max. length
C3/Sample 1	19.8	*22.4*	41.5	*47.1*	25.3	*28.7*	1.6	*1.8*	88.2	30.0mm
C3/Sample 2	252.3	*29.4*	400.2	*46.6*	205.4	*23.9*	-	-	857.9	66.8mm
C48/Sample 3	1.2	*1.9*	19.7	*31.7*	32.9	*52.9*	8.4	*13.5*	62.2	16.4mm
Total	273.3	*27.1*	461.4	*45.8*	263.6	*26.1*	10.0	*1.0*	1008.3	

Table 4.1: Summary of bone fragment size; pit C49

context/ sample	10mm (g)	%	5mm (g)	%	2mm (g)	%	<2mm (g)	%	Total (g)	max. length

C117/Sample 44	252.2	*22.4*	599.9	*53.3*	274.1	*24.3*	-	-	1126.2	47.8mm

Table 4.2: Summary of bone fragment size; Pit C118

4.2. Minimum number of individuals and body part representation

There was no duplication of identifiable skeletal elements in the urned burials. This, combined with consistency in the size and robusticity of the surviving skeletal fragments, indicated that each of the burials contained a minimum number of one individual.

4.2.1. Pit C49

Pit [C49] produced a total of 1008.3g of burnt bone of which 281.5g (27.9%) could be identified (Table 4.3). The majority of identifiable elements comprised of skull fragments (104.1g/10.3%) and unidentified long bone fragments (104.6g/10.4%) with additional fragments identifiable as elements of upper and lower limbs and axial skeleton.

Context	**Sample**	Skull (g)	%	Axial (g)	%	Upper limb (g)	%	Lower limb (g)	%	Long bone (g)	%	Total Identifiable (g)	%	Total Weight (g)
3	**1**	1.6	*1.8*	3.0	*3.4*	-	-	6.6	*7.5*	5.9	*6.7*	17.1	*19.4*	88.2
3	**2**	100.5	*11.7*	39.6	*4.6*	1.7	*0.2*	21.8	*2.5*	96.1	*11.2*	259.7	*30.3*	857.9
48	**2**	2.0	*3.2*	-	-	-	-	0.1	*0.2*	2.6	*4.2*	4.7	*7.6*	62.2
	Total	104.1	*10.3*	42.6	*4.2*	1.7	*0.2*	28.5	*2.8*	104.6	*10.4*	281.5	*27.9*	1008.3

Table 4.3: Summery of identifiable elements; pit C49

Identifiable skull fragments most commonly comprised of fragments of the cranial vault and included a number of large pieces of the left and right parietal bones, fragments of the occipital bone, fragments of the frontal bone and various pieces of the temporal bone, including the petrous portion of the mastoid and the external auditory meatus. In total there were 53 fragments of the cranial vault alone. Additional identifiable skull bones included a fragment of the left zygomatic bone, a fragment of the zygomatic arch, a number of basi-cranial fragments, a partial left orbital margin and fragments of the maxilla and mandible, a number of which survived with complete or partial tooth sockets. Although fragmentation and incomplete survival of the socket margins made it difficult to identify sockets related to specific teeth, it was possible to identify sockets for the right mandibular incisors, canine and first premolar and the possible left maxillary second and third molars.

In addition to fragments of the skull, a number of dental fragments were also identified in the assemblage. Fully erupted tooth crowns normally shatter during the cremation process but tooth roots, protected within the jaw, commonly survive. Identified dental remains included a total of 13 partial and unidentified tooth roots from the lower fill of the pit [C48] and 1 incomplete premolar or canine tooth root identified in the main bulk of burnt bone material [C3/Sample 2].

The bones of the axial skeleton are commonly underrepresented in cremated material. This may relate to aspects of the bone composition, with the vertebral, rib and pelvic elements containing a relatively high percentage of cancellous bone,

and/or may relate to aspects of selective collection of skeletal elements for burial. Pit [C49] contained a total of 42.6g of axial bone fragments. These included a range of vertebral elements, rib shaft fragments and pelvic fragments. The vertebral column was represented by an incomplete C1 and C2, a small number of cervical and thoracic vertebral fragments (neural arch and centra) and a small fragment of a lower lumbar or sacral centrum. The rib cage was represented by 5 small fragments of sternal rib shafts while identified fragments of the pelvis included 6 fragments of iliac blade, 2 fragments of the acetabulum and a small fragment of the auricular surface.

Long bone fragments appear as some of the most readily identifiable elements in a cremation burial, largely due to the robust nature of the bones. Despite this, it is not always possible to identify specific long bones due to warping and distortion during the cremation process. In this cremation burial a total of 104.6g (10.4% of total bone weight) of identifiable elements derived from long bones but could not be identified more specifically. It was, however, also possible to identify a range of specific long bones from both the upper and lower limbs. The upper limb was represented by a fragment of the distal humeral epiphysis and a possible fragment of the scapular margin. Identified fragments of the lower limb included a partial femoral trochanter, a fragment of the distal femoral epiphysis, a fragment of the femoral shaft, 2 fragments of tibial condyle and small number of fibular shaft fragments.

Although larger skeletal elements are commonly easier to identify in cremated remains than smaller bone fragments, the small bones of the hands and feet often survive the cremation process in a relatively complete state. In this assemblage it was possible to identify an incomplete hand phalanx (proximal or intermediate), a fragment of proximal foot phalanx and an almost complete distal foot phalanx.

The identification of a range of skeletal elements from both the axial and appendicular skeleton, including a number of the small hand and foot bones, strongly suggests that there was no deliberate selection of specific skeletal elements for deposition. Rather, it would appear that all parts of the body were considered as important as each other and were carefully collected for deposition after the cremation process.

4.2.2. Pit C118

This burial contained the largest quantity of burnt bone with a total of 1126.2g of burnt bone recovered from the single fill. In total, 280.7g, equating to 24.9% of the total weight of bone from pit [C118] could be identified. As with pit C49, the majority of identifiable bone elements were non-specific long bone fragments (10.2%) with a further 5.4% of the total bone weight identifiable as cranial and dental fragments. Both the upper and lower limbs and the axial skeleton were also represented in this assemblage (Table 4.4).

Cranial fragments most commonly consisted of vault elements with fragments of the occipital, parietal and frontal bones all identified within the assemblage. In addition to the identified vault fragments the assemblage also contained a single left mandibular condyle and a fragment of the mastoid. The dentition was represented by 2 incomplete molar roots, a canine/premolar root and 19 unidentified tooth root fragments.

Pit [C118] contained a large number of fragments deriving from the axial skeleton. Identifiable pelvic fragments comprised of a small number of iliac blade and crest fragments, a single fragment of the acetabulum and a fragment of the pubic symphysis. The vertebral column was represented by a number of fragments ranging

from partial vertebral bodies to incomplete neural arch fragments with elements from the cervical, thoracic and lumbar regions identified. Also identified in the assemblage were a total of 30 rib fragments.

Context	Sample	Skull (g)	%	Axial (g)	%	Upper limb (g)	%	Lower limb (g)	%	Long bone (g)	%	Total Identifiable (g)	%	Total Weight (g)
117	**44**	61.0	*5.4*	58.3	*5.2*	19.7	*1.7*	26.5	*2.4*	115.2	*10.2*	280.7	*24.9*	1126.2

Table 4.4: Summery of identifiable elements; pit C118

In this cremation burial a total of 115.2g (10.2%) of identifiable elements derived from long bones but could not be identified more specifically. It was, however, also possible to identify a range of specific long bones from both the upper and lower limbs. These included an incomplete left distal humeral epiphysis, a partial humeral head, a fragment of the humeral shaft, an incomplete radial head, a fragment of distal radial epiphysis, a small fragment of the scapular blade and a possible fragment of the glenoid portion of the scapula. Identified lower limb bones included fragments of the femoral, tibial and fibular shafts and a fragment of the distal femoral epiphysis.

Also contained within the burnt bone assemblage were a small number of bones from the hand including one complete and one incomplete distal hand phalanx, one incomplete proximal/intermediate hand phalanx, one incomplete proximal hand phalanx and four partial metacarpal heads.

As with pit [C49], the range of skeletal elements from both the axial and appendicular skeleton, including a number of the small hand bones, strongly suggests that there was no deliberate selection of specific skeletal elements for deposition.

4.3. Determination of age and sex

4.3.1. Age determination

Age determination relies on the identification of specific developmental and/or degenerative skeletal and dental sequences. Subadult age is assessed using aspects of both dental development (calcification and eruption sequences), and skeletal development (stages of ossification, long bone length and epiphyseal fusion). Although dental development is completed by approximately 18 years with the eruption of the third molar, skeletal development continues into early adulthood with late fusing epiphyses, including the vertebral endplates, the iliac crest and the medial clavicle, continuing to provide information on age. Once these elements have completely fused (by approximately 30 years of age), age assessment is based on processes of degeneration.

Although the specific skeletal and dental elements that provide the most accurate indications of age were not identified in pit [C49], the robusticity and cortical thickness of the identifiable long bone and cranial fragments suggest that these elements derived from an adult individual(s).

A single fragment of a partial pubic symphysis identified in the assemblage from pit [C118] provided some indication of age. In this instance the surface of the pubic symphysis displayed some billowing. Although the bone was considered too

incomplete to provide an accurate indication of age the surface morphology did suggest Stage 2-3 in the Suchey-Brooks scheme, giving a mean age estimation of 25.0years-30.7years.

4.3.2. Sex determination
In general, the pelvis is considered to exhibit the highest degree of sexual dimorphism, as it is adapted in females to allow for childbirth. Essentially a broad pelvic structure in the female skeleton contrasts with a narrow and high pelvis found in the male skeleton. In addition to the pelvis, the skull is also used as a primary indicator of sexual differentiation in skeletal material and it is often found that males display more robust or prominent features than their female counterparts.

Although fragmented and incomplete, a small number of sexually dimorphic skeletal traits were identified in both of the pits. The burnt bone assemblage from pit [C49] contained a partial left orbital margin. Although the bone was too incomplete to assess the glabellar region, the orbital margin appears rounded, suggesting a probable male sex for this individual.

The single partial pubic bone identified in the assemblage from pit [C118], although incomplete, did appear relatively gracile which may indicate that this individual was a female. Unfortunately the bone was too incomplete to ascertain this with certainty.

4.4. Pathology
There are, relatively speaking, only a small number of diseases that visibly affect bone. Most conditions that do affect the skeleton result from periods of longstanding disease and/or nutritional deficiency, as acute episodes of nutritional or pathological stress most commonly resolve themselves or result in death before the bony elements become involved.

The only visible pathological response in the burial from both burials took the form of mild to moderate osteophytes along the margin of single incomplete cervical centra. Osteophytes, bony outgrowths occurring along the margin of a joint surface, develop as a response to loading of the joint, acting to increase the surface area and spread the load through the affected joint. The presence of these bony outgrowths indicated that this individual suffered from spinal joint disease. Joint disease is one of the most commonly encountered pathologies in archaeological populations and can occur as a consequence of ageing, as a response to stresses at the joint through occupational activity, or secondary to trauma. Although the changes identified in this example were mild in form, it is impossible to determine the extent or severity of the disease based on this single affected fragment.

5. Cremation technology

5.1. Bone colour
To achieve effective cremation a combination of high temperatures and continued maintenance of the pyre over a sustained period of time is required. Differences in colour, visible on cremated bone fragments, can be used to indicate variations in pyre performance. Total loss of the organic portion of the bone, producing an overall white colour (complete oxidisation), requires pyre temperatures of greater than 600°C maintained over a number of hours. Lesser temperatures produce variations in bone colour with a blue-grey colour produced when bone is subject to temperatures of approximately 600°C and blackened (charred) elements occurring at approximately 300°C.

All burnt bone fragments were fully oxidised, indicating that they had been subject to temperatures greater than 600°C over a prolonged period of time.

5.2. Fragmentation

Fragmentation of cremated bone can result from a number of different processes. The act of cremation itself causes the bones to warp and crack, leaving bone elements vulnerable to breakage along these weakened lines. In the immediate aftermath of the cremation raking of the remains can further damage the skeletal elements while post-depositional disturbance and erosion can further reduce the size of bone fragments. Commonly the fragment size of cremated bone deposits placed in the protective environment of a pottery vessel and/or cist is greater than that of bone that has been placed unprotected in a pit.

context	10mm (g)	%	5mm (g)	%	2mm (g)	%	<2mm (g)	%	Total (g)	max. length
Pit C49	273.3	*27.1*	461.4	*45.8*	263.6	*26.1*	10.0	*1.0*	1008.3	66.8mm
Pit C118	252.2	*22.4*	599.9	*53.3*	274.1	*24.3*	-	-	1126.2	47.8mm
Total	525.5	*24.6*	1061.3	*49.7*	537.7	*25.2*	10.0	*0.5*	2134.5	

Table 5.1: Summary of bone fragment size

At Garryduff 1 them size of fragments was roughly comparable between the two burials suggesting that they had been subject to the same post-cremation process. The bone from both burials, however, survived in a less intact state than a pair of Early Bronze Age urned burials from Monamintra, Co. Waterford. In both of the urned examples over 50% of the total bone weight measured over 10mm in diameter. This would suggest that the process of placing the cremation burials from Garryduff 1 in a unurned burial environment provided less protection from compressive forces than burials which had been deposited in an urn.

6. Discussion

Excavations at Garryduff 1 (E3852) were undertaken prior to road works along the proposed route of the N9/N10 Kilcullen to Waterford road scheme. During excavations two cremation pits were identified in close proximity to each other and approximately 9m from an arced structure which has been interpreted as a possible pyre site. These pits have been dated to the middle Bronze Age period.

The weight of burnt bone recovered from the two pits ranged from 1008.3g [pit C49] to 1126.2g [pit C118]. Osteological analysis of the cremated bone was undertaken in order to establish, where possible, the demographic and pathological profile of the cremation burials. Additional consideration was given to aspects pyre technology and post-cremation selection activities.

Analysis of the burnt bone assemblages identified a minimum number of one possible male adult interred in pit [C49] and one possible female middle adult interred in pit [C118]. Both of these individuals experienced mild spinal degenerative joint disease as evidence by mild to moderate osteophytes at the margins of single cervical centra. This condition appears commonly in the study of archaeological populations and hints at periods of occupational stress.

The two burials contained quantities of burnt bone comparable to weights derived from modern crematoria. This, combined with the identification of a wide range of

skeletal elements in both of these burials indicates that there was no preferential selection of specific skeletal elements (e.g. skull and long bones) for deposition.

References

Brickley, M. and McKinley, J. 2004 Guidelines to the Standards for Recording Human Remains. British Association for Biologica Anthropology and Osteoarchaeology & Institute Field Archaeologists. Technical Paper No. 7

McKinley, J.I. 1993 Bone fragment size and weights of bone from modern British cremations and the implications for the interpretation of archaeological cremations in International Journal of Osteoarchaeology 3: 283-287.

Appendix 2.11 Radiocarbon Dating Results – QUB Laboratory

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

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

Calibration data set: intcal09.14c

Context	Sample No	Material	Species id/ Weight	Lab	Lab Code	Date Type	Calibrated date ranges	Measured radiocarbon age (BP)	13C/12 C Ratio ‰
C158, Fill of a pit	53	Charcoal	*Fraxinus excelsior*/ 0.3g	QUB	UB 15412	AMS (Std)	1207–1056BC (1 sigma), 1258–1024BC (2 sigma)	2929±29	-26.3
C85, Fill of post& stakeholes	39	Charcoal	*Corylus avellana*/ 0.6g	QUB	UB 15413	AMS (Std)	385–234BC (1 sigma), 392–209BC (2 sigma)	2251±26	-26.2
C48, Fill of a cremation pit	3	Bone	*Human bone*/ 1.7g	QUB	UB 15414	AMS (Std)	1686–1536BC (1 sigma), 1738–1518BC (2 sigma)	3339±43	-24.6
C139, Fill of a post pit	55	Charcoal	*Salix* sp../ 0.5g	QUB	UB 15415	AMS (Std)	1192–1052BC (1 sigma), 1253–1018BC (2 sigma)	2921±28	-24.3
C18, Fill of a pit	19	Charcoal	*Fraxinus excelsior*/ 1g	QUB	UB 15416	AMS (Std)	522–407BC (1 sigma), 746–400BC (2 sigma)	2416±30	-27.5

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 RMPS IN AREA

RMP No	Description
KK020-026001–006	*Fulachta Fiadh*
KK021-001001	Church
KK021-001002	Graveyard
KK021-001003	Ecclesiastical Enclosure
KK021-002001	Enclosure
KK021-002002	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 1	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
Stonecarthy West 2	UA2	E3974	Tim Coughlan	251372/142037
Rathduff Bayley 1	UA4	E4011	Tim Coughlan	251005/143564