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

Ministerial Direction Scheme Reference No.	A032
Registration No.	E3727
Site Name	AR090, Rathclogh 2
Townland	Rathclogh
County	Kilkenny
Excavation Director	Patricia Lynch
NGR	253650 148848
Chainage	37700

FINAL REPORT

ON BEHALF OF KILKENNY COUNTY COUNCIL

APRIL 2012

IAC Irish Archaeological Consultancy

PROJECT DETAILS

Project	N9/N10 Kilcullen to Waterford Scheme, Phase 4 – Knocktopher to Powerstown
Ministerial Direction Reference No.	A032
Excavation Registration Number	E3727
Excavation Director	Patricia Lynch
Senior Archaeologist	Tim Coughlan
Consultant	Irish Archaeological Consultancy Ltd, 120b Greenpark Road, Bray, Co. Wicklow
Client	Kilkenny County Council
Site Name	AR090, Rathclogh 2
Site Type	Dispersed pits
Townland(s)	Rathclogh
Parish	Danesfort
County	Kilkenny
NGR (easting)	253650
NGR (northing)	148848
Chainage	37700
Height OD (m)	71.009
RMP No.	N/A
Excavation Dates	27 August–17 September 2007
Project Duration	20 March 2007–18 April 2008
Report Type	Final
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Report By	Tim Coughlan and Patricia Lynch
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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 AR090, Rathclogh 2 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 Patricia Walsh under Ministerial Direction A032 and Excavation Registration Number E3727 issued by the DOEHLG in consultation with the National Museum of Ireland for IAC. The fieldwork took place between the 27 August 2007 and 15 September 2007.

This site was locatedin the centre of an undulating rectangular pasture field with general views of the surrounding areas. The area of excavation measured 33.8m x 19.6m and contained several pits of archaeological potential that seemed to be in two separate groups. The pits, which probably served as waste pits, contained charcoal, flint and chert debitage, charred hazelnuts and seeds in their fills.. A single stakehole was also excavated.

The lithic finds comprise three bipolar chert cores, 13 blades, 18 flakes, 83 pieces of debitage and seven retouched artefacts, including two small convex end scrapers. The presence of a number of cores and debitage suggests that lithic production took place at or near the site during the middle-late Neolithic.

A total of two samples were sent for AMS radiocarbon dating. A sample of ash charcoal from the waste pit fill C16 was radiocarbon dated. The 2 sigma calibrated result was 2848–2493BC (UBA 13097). A sample of ash charcoal from the waste pit fill C11 was also radiocarbon dated. The 2 sigma calibrated result was 2852–2501BC (UBA 13098).

Rathclogh 2 is an important site locally—although the archaeological remains are small they are significant in assisting our understanding of a developing landscape from the Neolithic to the Bronze Age. This is particularly relevant given the presence of middle and late Neolithic, Beaker, middle and late Bronze Age, and Iron Age evidence in the vicinity of the site. The Danesfort and Kilree townlands are also rich in early medieval and medieval settlement and the Neolithic activity at Danesfort 9 and 7 and Rathclogh 2 thus represents the foundation for all later activity.

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1 INTRODUCTION

1.1 General

This report presents the results of the archaeological excavation of Rathclogh 2, AR090 (Figure 1), in the townland of Rathclogh undertaken by Patricia Lynch 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 660m^2 and was first identified during testing carried out in 2007 by Rob Lynch (E3360) of IAC Ltd on behalf of the National Roads Authority. Rathclogh 2 was excavated between 27 August and 15 September 2007 with a team of one director, one supervisor, three assistant archaeologists and six general operatives.

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.

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 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 sits on a south-westerly slope in a large, sub-rectangular field, with the terrain inclining towards the north-east. The surrounding landscape is rolling pasture with views to the west, south and east. The incline obscures the view to the north and north-east. There are no significant features visible on the horizon. To the south the Bennettsbridge-Danesfort road runs on an east-west axis. Rathclogh 1 is located *c.* 500m to the south-west and Kilree 1 is located *c.* 800m to the north-east. Two enclosures are located within close proximity of the site; KK023-063 is located *c.* 50m to the east and KK023-049002 is located *c.* 300m to the north. The River Nore is located *c.* 2.2km to the east.

2.1 PHASE 1 Natural Drift Geology

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C2	N/A				Light yellowish brown silty clay	Subsoil

The subsoil comprised a silty clay.

2.2 PHASE 2 Late Neolithic Activity

The prehistoric activity consisted of eight pits and a stakehole that seemed to be divided into two clusters, in the east and west halves of the site (Figure 5).

2.2.1 East Cluster

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C3	N/A	0.74	0.42	0.16	Oval cut	Cut of waste Pit
C4	C3	0.74	0.42	0.11	Dark blackish brown clay	Basal Fill of Pit
C25	C3	0.4	0.24	0.05	Mid-Yellowish brown silty clay	Upper Fill of Waste Pit
C5	C6	0.78	0.74	0.17	Dark brownish grey silty clay	Mid Fill of Waste Pit
C6	N/A	0.78	0.74	0.22	Sub-Circular cut	Waste Pit
C7	C6	0.5	0.07	0.05	Mid-Yellowish grey silty clay	Basal Slump Fill of Pit
C26	C6	0.31	0.25	0.09	Mid-Yellowish greyish brown silty clay	Upper Fill of Pit
C10	N/A	0.64	0.54	0.12	Oval cut	Waste Pit
C11	C10	0.64	0.54	0.12	Mid-greyish black silty clay	Fill of Pit
C17	N/A	0.08	0.07	0.07	Circular cut	Stakehole
C18	C17	0.08	0.07	0.07	Dark greyish brown silty clay	Fill of Stakehole

Finds

Context	Find Number	Material	Period	Description
C4	E3727:4:1-2	Chert	Middle Neolithic	Chert flakes
C4	E3727:4:3-5	Chert	Neolithic	Chert debitage
C4	E3727:4:6	Chert	Middle Neo	Chert blade
C4	E3727:4:7-8	Chert	Neolithic	Chert debitage
C4	E3727:4:9-11	Flint	Neolithic	Flint debitage
C5	E3727:005:1	Flint	Middle Neolithic	Flint blade
C5	E3727:005:2	Chert	Middle Neolithic	Chert flake
C11	E3727:011:1	Chert	Middle Neolithic	Chert blade
C11	E3727:011:2	Chert	Middle Neolithic	Chert core
C11	E3727:011:3	Chert	Middle Neolithic	Chert flake
C11	E3727:011:4	Chert	Neolithic	Retouched artefact
C11	E3727:011:5	Chert	Middle Neolithic	Chert flake
C11	E3727:011:6	Chert	Middle Neolithic	Chert blade
C11	E3727:011:7.1-7.7	Flint	Neolithic	Flint debitage

Pit C3 contained charcoal-enriched soil and fragments of chert and flint debitage. Charred hazelnuts were also recovered from one of its fills, C4 (Figures 4–5). Pit C6, also contained charcoal-enriched soil as well as a fragment of chert, and a fragment of flint. Charred hazelnuts and burnt bone were also recovered from one of its fills,

C5 (Figures 4–5; Plate 1). The third pit, C10, had similar fills, with charcoal-enriched soil and six fragments of chert and fragments of flint debitage (Figures 4–5). Charred hazelnuts, seeds and a mollusc shell were also recovered from its fill, C11. A stakehole, C17, was also present in this area, adjacent Pit 6 (Figure 4; Plate 1). There was no evidence for *in situ* burning within any of these features; therefore these pits may represent waste pits.

Three lithics, five pieces of chert debitage and three pieces of flint debitage were retrieved from C4 (fill of pit C3). The lithics have been identified as two chert flakes and one chert blade. Two lithics were retrieved from C5 (fill of pit C6), identified as a flint blade and a chert flake. Six lithics and seven pieces of flint debitage were retrieved from C11 (fill of pit C10), and consisted of two chert blades, one chert core, two chert flakes and one retouched chert artefact. Following analysis of the assemblage it has been suggested that it can be dated by typology to the Neolithic period (Sternke, Appendix 2.1).

Charcoal analysis of fill C4 (basal fill of pit C3) indicated a predominance of oak (*Quercus sp.*) and ash (*Fraxinus excelsior*), and analysis of fill C11 (fill of pit C10) indicated a predominance of ash (*Fraxinus excelsior*). The lack of *in situ* burning from these features and the presence of charred hazelnut shell and flint/chert debitage suggests that the charcoal assemblage was likely dumped or discarded into these features from nearby firing events (Lyons, Appendix 2.2).

Soil samples retrieved from pit fills C4, C5 and C11 were sent for plant remains analysis. All were found to contain hazelnut shell fragments (*Corylus avellana* L.). These nut 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 (Johnston, Appendix 2.3).

Animal bone was retrieved from waste pit fill C5. Three calcined fragments of trabecular bone were identified. Due to the size and fragmented nature of the individual bone pieces it was not possible to identify any fragments to species or bone element (McCarthy, Appendix 2.4).

A small fragment (0.54g) of ash was chosen for AMS dating from C11 and returned a result of 4086±24 (UBA 13098). The 2 Sigma calibrated result for this was 2852–2501BC (QUB, Appendix 2.5) dating this feature to the late Neolithic period.

2.2.2 West Cluster

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C8	N/A	0.64	0.5	0.16	Sub-Circular cut	Cut of pit
C9	C8	0.64	0.5	0.16	Mid-Blackish brown silty clay	Fill of pit
C12	N/A	0.78	0.7	0.15	Oval cut	Cut of pit
C13	C12	0.78	0.7	0.15	Dark greyish brown silty clay	Fill of pit
C14	N/A	0.76	0.7	0.29	Sub-Circular cut	Cut of waste pit
C15	14	0.4	0.35	0.08	Mid-Yellowish brown clay	Fill of waste pit
C16	14	0.72	0.7	0.21	Mid-greyish brownish black silty clay	Fill of waste pit
C19	N/A	0.8	0.7	0.27	Sub-Circular cut	Waste Pit
C20	C19	0.8	0.7	0.27	Mid-Yellowish greyish brown silty clay	Fill of Pit
C21	N/A	0.42	0.3	0.18	Irregular/Sub-Rectangular cut	Waste Pit
C22	C21	0.42	0.3	0.18	Dark blackish grey silty clay	Fill of Pit

Finds

Context	Find Number	Material	Period	Description
C9	E3727:009:1	Chert	Middle Neolithic	Chert blade

Context	Find Number	Material	Period	Description
C9	E3727:009:2	Chert	Middle Neolithic	Chert core
C9	E3727:009:3-4	Chert	Middle Neolithic	Chert blade
C9	E3727:009:5-8	Chert	Neolithic	Chert debitage
C9	E3727:009:9	Flint	Middle Neolithic	Flint blade
C9	E3727:009:10.1–10.20	Flint	Neolithic	Flint debitage
C13	E3727:013:1	Chert	Late Neo/EBA	Convex end scraper
C13	E3727:013:2	Chert	Late Neo/EBA	Convex end scraper
C13	E3727:013:3	Chert	Middle Neolithic	Chert core
C13	E3727:013:4	Chert	Middle Neolithic	Chert blade
C13	E3727:013:5	Chert	Middle Neolithic	Chert flake
C13	E3727:013:6-7	Chert	Neolithic	Chert debitage
C13	E3727:013:8	Chert	Middle Neolithic	Chert blade
C13	E3727:013:9.1-9.9	Chert	Neolithic	Chert debitage
C13	E3727:013:10	Flint	Middle Neolithic	Flint blade
C13	E3727:013:11	Flint	Neolithic	Flint flake
C13	E3727:013:12	Flint	Middle Neolithic	Flint blade
C13	E3727:013:13-14	Flint	Neolithic	Flint debitage
C13	E3727:013:15.1–15.9	Flint	Neolithic	Flint debitage
C16	E3727:016:1	Chert	Neolithic	Retouched artefact
C16	E3727:016:2	Chert	Neolithic	Chert debitage
C16	E3727:016:3	Flint	Neolithic	Retouched artefact
C16	E3727:016:4	Flint	Middle Neolithic	Flint flake
C16	E3727:016:5	Flint	Neolithic	Flint debitage
C16	E3727:016:6	Flint	Middle Neolithic	Flint flake
C20	E3727:020:1-2	Chert	Middle Neolithic	Chert flake
C20	E3727:020:3	Chert	Late Neo/EBA	Convex end scraper
C20	E3727:020:4	Chert	Middle Neolithic	Chert flake
C20	E3727:020:5	Chert	Middle Neolithic	Chert blade
C20	E3727:020:6	Chert	Neolithic	Chert debitage
C20	E3727:020:7-10	Chert	Middle Neolithic	Chert flakes
C20	E3727:020:11-12	Flint	Middle Neolithic	Flint flakes
C20	E3727:020:13.1–13.6	Flint	Neolithic	Flint debitage
C22	E3727:022:1	chert	Neolithic	Retouched artefact
C22	E3727:022:2.1-2.8	Chert	Neolithic	Chert debitage
C22	E3727:022:3.1-3.5	Flint	Neolithic	Flint debitage

Each of these five small pits, C8, C12, C14, C19, and C21, contained charcoal-rich soil and fragments of chert and flint debitage (Figures 4–5; Plates 2–3). Their function remains unknown. There was no evidence for *in situ* burning; therefore these pits may represent waste pits.

Thirty lithics, twenty-one pieces of chert debitage, and forty-three pieces of flint debitage were recovered from the fills of the pits within this western cluster. Of note within the assemblage were 3 convex end scrapers (C16 and C20) (Figure 5), chert and flint blades, cores, and chert and flint flakes. The convex end scrapers are likely to date from the late Neolithic/early Bronze Age period. The flint flakes have been identified as being middle Neolithic in date, and the retouched artefacts are also likely to date to this period. The remaining pieces of chert and flint debitage have been dated to the early/middle Neolithic period (Sternke, Appendix 2.1).

Charcoal analysis of fill C9 (fill of pit C8), fill C13 (fill of pit C12), fill C16 (fill of pit C14), and fill C22 (fill of pit C21) indicated a range of species. There was a predominance of ash (*Fraxinus excelsior*), oak (*Quercus sp.*) and alder (*Alnus glutinosa*) with a small amount of willow (*Salix* sp.). The lack of *in situ* burning from these features and the presence of charred hazelnut shell and flint/chert debitage

suggests that the charcoal assemblage was likely dumped or discarded into this features from nearby firing events (Lyons, Appendix 2.2).

Soil samples retrieved from pit fills C9, C13, C16, C20 and C22 were sent for plant remains analysis. All samples contained hazelnut shell fragments (*Corylus avellana* L.) which are commonly found in Irish archaeological deposits (Johnson, Appendix 2.3).

A small fragment (0.38g) of pomaceous fruitwood was chosen for AMS dating from C16 and returned a result of 4072±24 (UBA 13097). The 2 Sigma calibrated result for this was 2848–2493BC (QUB, Appendix 2.5) dating this feature to the late Neolithic period.

2.3 PHASE 3 Topsoil

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C1	N/A				Dark yellowish brown clayey silt	Topsoil

Finds: None

The topsoil was a clayey silt with no finds.

A single small piece of slag was recovered from C1 and it consisted of a small grey-black irregular shaped nodule with a weight of 2.5g that measured 15mm in length and 12mm in width (Wallace, Appendix 2.5). The surface was irregular and there was extensive vitrification evident and some porosity evident on one side (*ibid.*). It is possible this piece may be vitrified clay formed in a hearth and may not have any metallurgical links (*ibid.*). The quantity of material is very small and cannot be seen as evidence of metal-working on the site; it may represent a single episode of artefact repair on or near the site or there is the possibility that an iron-working area or dump of residues was located nearby, outside the area of the road take (*ibid.*).

3 SYNTHESIS

The synthesis presents the combined results of all of the archaeological analysis carried out at Rathclogh 2. 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 140 kilometres long and drains a total catchment of 1572 square kilometers and runs through the central and southern sections of the route. In the south of the route three main tributaries of the River Nore are evident. The Kings River flows east through Callan and Kells. It is joined by the River Glory which meanders on a north-south axis towards the western margins of the route landscape and the Little Arrigle River flows along the southern fringes. These rivers are flanked by low-lying valleys that are characterised by wet, marshy land. The condition of the soil improves further north beyond the King's River where the influence of these waterways declines. In the northern area of the route the River Dinin is a tributary of the River Nore flowing south-west from Brennan's Hill through the Castlecomer Plateau. The Plateau is the tableland that is the watershed between the Rivers Nore and Barrow (Lyng 1984). The River Barrow is the second longest river (193 kilometres) in Ireland after the River Shannon. It rises in the Slieve Bloom Mountains in Co Laois and flows east across bogs and lowlands and then turns south into the lowland immediately east of the Castlecomer Plateau. It passes through

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

The physical landscape through which the N9/N10 Phase 4 passes can be divided into three principal areas defined by the main rivers and their catchments. The southern area is located in the undulating landscape on the western flanks of the Nore Valley. The central area is dominated by the fertile watershed between the Barrow and Nore systems in the hinterland of Kilkenny City. The northern area is located on the western flanks of the Barrow Valley overlooked by uplands to the north and west. Rathclogh 2 is located in the central landscape area.

3.1.2 The Central Landscape

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

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

3.1.3 Site Specific Landscape

The site sits on a south-westerly slope in a large sub-rectangular field, with the terrain inclining towards the north-east. The surrounding landscape is rolling pasture with views to the west, south and east. The incline obscures the view to the north and north-east. There are no significant features visible on the horizon. To the south, the Bennettsbridge-Danesfort road runs on an east-west axis. Rathclogh 1 is located *c*. 500m to the south-west and Kilree 1 is located *c*. 800m to the north-east. Two enclosures are located within close proximity of the site; KK023-063 is located *c*. 50m to the east and KK023-049002 is located *c*. 300m to the north. The River Nore is located *c*. 2.2km 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 Rathclogh 2, 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 Rathclogh 2 has been identified as being Neolithic in date.

3.2.1 The General Neolithic Landscape of the Scheme

The Neolithic period in Ireland is generally understood to have occurred between 4000BC–2500BC. Archaeological evidence directly associated with settlement during this period had - prior to the upsurge in development-led excavations - been rather sparse in Kilkenny and Carlow as the soils in these areas may have been too heavy for Neolithic farming technology (Grogan 2004). However, recent excavations on the Waterford to Knocktopher portion of the N9/N10 Kilcullen to Waterford Road Scheme in south Kilkenny, as well as the rectangular houses discovered on the Kilcullen to Powerstown portion of the same road scheme in Co. Carlow, have added further insight into the Neolithic settlement of the region. Prior to the N9/N10 excavations archaeological activity in the Kilkenny/Carlow region was predominantly represented by a limited number of burials or tombs, most of which are Neolithic in date, such as the middle Neolithic megalithic tombs at the eponymous site of Linkardstown and at Baunogenasraid, Co. Carlow and Jerpoint West, Co. Kilkenny (Raftery, 1944; Raftery, 1972; 1974; Ryan 1974;).

The Central Neolithic Landscape

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

The N9/N10 excavations within this central landscape revealed direct evidence for settlement although this is represented mainly by artefacts. A possible temporary shelter was recorded at Danesfort 12 however, while a second possible structure was identified at Danesfort 9. At Danesfort 12, six postholes and two stakeholes formed a semi-circular shape, arced around a central posthole, which perhaps

supported an internal post. The Danesfort 9 structure comprised a curvilinear slot-trench in which four depressions were noted that may have served as footings for wooden posts and three possible postholes; it has been dated to the late Neolithic period. Neolithic domestic settlement activity was also noted at Holdenstown 2, in the form of a series of isolated pits, postholes, hearths and a circular series of pits which contained flint and a broken polished stone axe. One of the postholes excavated has been dated to 3791–3656BC (UBA 13112). The multi-period site of Danesfort 5 also yielded evidence of early prehistoric activity in the form of an isolated pit containing a single piece of Neolithic pottery. The lithic assemblage from Rathclogh 2, while containing small early and final Neolithic elements, dates predominantly to the middle Neolithic. Contemporary activity, probably associated with a domestic site, is represented at Danesfort 7, Danesfort 12 and Danesfort 13 by small quantities of globular bowls. Two pits from Templemartin 5 contained cremated remains encased in pottery vessels. Both vessels from the cremation pits are thought to date to the late Neolithic. These are plain Grooved Ware pots and represent some of the first evidence for funerary contexts of this period in Ireland (Grogan and Roche 2009h). Evidence of the late Neolithic/Beaker period was recorded in this landscape in the form of pottery sherds. Beaker pottery was recovered from a domestic context at Danesfort 8 which is typical of this material, and the evidence at Danesfort, consisting of pits and postholes without any indication of a structural plan, is consistent with the record elsewhere in the country.

Conclusion

The broad regional pattern in the Neolithic in all three of the scheme 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 Site Specific Archaeological Landscape of Rathclogh 2

There are a number of recorded monuments located in close proximity to Rathclogh 2. An enclosure site (KK023-063) is located *c*. 50m to the east and three further enclosure sites (KK023-049001–3) are recorded *c*. 200m to the north. Additionally, enclosure sites are also located *c*. 900m to the ENE (KK024-032) and *c*. 800m to the ESE (KK024-058) of Rathclogh 2. To the SWS of Rathclogh 2, an enclosure site and a possible ridge and furrow site (KK023-062001–2) are located *c*. 300m away, and located *c*. 700m to the south-west, another enclosure site (KK023-063) is recorded. To the north-west, an enclosure and hut site are also recorded at Kilree (KK023-048001–2).

At Rathclogh 2 a number of pits and a single stakehole dating to the middle/late Neolithic period were excavated. There were a number of sites excavated in the immediate vicinity of Rathclogh 2, as part of the N9/N10 Phase 4: Knocktopher to Powerstown works. At Kilree 1, located *c*. 600m to the north-east, a large sub-rectangular trough containing four stakeholes and a single posthole, C22, were identified. A hearth and a second possible hearth were also excavated and these

have been dated to the late Bronze Age. Further to the north-east, located *c*. 900m away, post medieval activity in the form of a field boundary, field drains and pits were excavated at Kilree 2. At Kilree 3, located *c*. 1.05km to the north-east of Rathclogh 2, an early medieval, multi-ditch enclosure with one timber-lined possible souterrain and one subterranean passage-way, also a probable souterrain were excavated.

A number of sites were also excavated to the south of Rathclogh 2, as part of the N9/N10 Phase 4: Knocktopher to Powerstown works. At Rathclogh 1, located *c*. 400m to the south-west of Rathclogh 2, post medieval activity in the form of field drains and a field boundary were excavated. At Danesfort 11, located *c*. 550m to the south-west, features associated with burnt mound activity were excavated although no burnt mound spread was uncovered. At Danesfort 10, located *c*. 600m to the south-west of Rathclogh 1, prehistoric hearths and pits were excavated and at Danesfort 9, located *c*. 750m to the south-west, a late Neolithic temporary shelter or the ephemeral remains of a domestic dwelling and a single pit were excavated. At Danesfort 8, located *c*. 850m to the south-west, two ditch alignments of an ancient field system were excavated, as well as a number of pits (some containing Beaker pottery), postholes and stakeholes. At Danesfort 7, located *c*. 1.05km to the south-west of Rathclogh 2, Neolithic activity in the form of eight scattered circular pits, two stakeholes and one post pit were recorded. Middle Neolithic pottery sherds were also recovered at this site.

3.3 Typological Background of Isolated Pits

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

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

It is possible that some isolated pits/postholes represent simple refuse pits associated with temporary settlement but may also have been excavated and backfilled as part of a ritual associated with the transient nature of people at the time. Edmonds suggests that pits were dug and filled as people left a place for a season, like the planting of crops, offering "the hope of renewal and return" (Edmonds 1999). Pollard also suggests that abandoning a settlement and moving on was an act of social transition, and a potential threat to social order. The digging and filling of pits may have been a way to counter this threat (Pollard 2001, 22–23).

3.4 Summary of the Excavation Results

The site comprised eight pits and a stakehole that appeared to be divided into two clusters, in the east and west halves of the site. Both sets of pits contained flint and chert artefacts and debitage as well as charcoal and charred hazelnut fragments.

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. Radiocarbon dating from a sample from both clusters returned almost identical dates, indicating that both areas of activity were broadly contemporary and dated to the later Neolithic period.

Lithics analysis

The lithic finds from the archaeological excavation at Rathclogh 2, Co. Kilkenny are 63 flaked pieces of flint and 61 flaked pieces of chert. The assemblage contains three bipolar chert cores, 13 blades, 18 flakes, 83 pieces of debitage and seven retouched artefacts including two small convex end scrapers.

The assemblage is dominated by a middle Neolithic lithic component represented by the cores and bipolar-on-an-anvil flakes and blades. A residual early Neolithic component is made up of two single-platform blades and one single-platform flake. The two convex end scrapers may be indicative of a short-term use of the site in the Beaker period.

The presence of a number of cores and debitage suggests that lithic production took place at the site during the middle Neolithic occupation of the site. Together with the discarded retouched tools, the recovered cores, flakes, blades and debitage and represent waste from lithic production and the immediate use and re-sharpening of lithic tools, possibly in domestic activities. The waste and tools were subsequently discarded in the various pits.

Charcoal and Wood Species identification

The charcoal samples from C4 (fill of pit C3), C9 (fill of pit C8), C11 (fill of pit C10), C13 (fill of pit C12), C16 (fill of pit C14) and C22 (fill of pit C21) recorded at Rathclogh 2 were selected for charcoal analysis.

Despite two distinct groupings of pits identified at the site, ash, oak and alder were all recorded in varying concentrations. Pit C12 (C13) contained the only evidence for willow. The lack of *in situ* burning from these features coupled with the presence of charred hazelnut shell, charred grain and flint/chert debitage suggests that the charcoal assemblage was likely dumped or discarded into these features from nearby firing events.

Analysis of Plant Remains

A total of eight samples were examined from this site; C4 (S2), C5 (S3), C9 (S4), C16 (S5), C11 (S6), C13 (S7), C20 (S8) and C22 (S9). All of the samples contained hazelnut shell fragments. This was the only type of archaeobotanical material recovered from the site. Hazelnut shells are ubiquitous finds and various taphonomic factors mean that they are more likely to be preserved in Irish archaeological deposits than most other types of plant material. Although the quantity of hazelnut shell fragments from Rathclogh 2 is quite large, the interpretative value of this assemblage is limited.

Animal Bone Analysis

Three calcined fragments of trabecular bone were recovered from archaeological contexts C5 on Rathclogh 2 were submitted for examination. Due to the size and fragmented nature of the individual bone pieces it was not possible to identify any fragments to species or bone element. No definite or statistically detailed conclusions could be drawn from the burnt bone assemblage retrieved from Rathclogh 2 due to its limited size and poor degree of bone preservation.

Metallurgical waste analysis

A single small piece of slag was recovered from the topsoil layer on this site. As there was only a single small fragment of slag from this site its presence is most likely indicative of high temperature activity in a hearth or small-scale iron smithing or artefact repair in the general vicinity. As this fragment cannot be linked to any single chronological feature or event on the site further analysis is not considered worthwhile in this case.

Radiocarbon Dating

Two samples were sent for AMS radiocarbon dating.

A sample of ash charcoal from the waste pit fill C16 was radiocarbon dated. The 2 sigma calibrated result was 2848–2493BC (UBA 13097).

A sample of ash charcoal from the waste pit fill C11 was radiocarbon dated. The 2 sigma calibrated result was 2852–2501BC (UBA 13098).

4 DISCUSSION AND CONCLUSIONS

4.1 Discussion

Rathclogh 2 was located in well drained flat land that is currently extensively used for tillage and pasture. The nature of the physical landscape was obviously attractive to settlers in this area given the large number of archaeological sites excavated as part of the N9/N10 Phase 4: Knocktopher to Powerstown, particularly in the neighbouring townlands of Danesfort to the southwest and Kilree to the northeast.

The site at Rathclogh 2 comprised a series of pits in two separate clusters that have been dated to the late Neolithic period, but this is not the first evidence of human activity in the area. The nearby site of Danesfort 7 produced a middle Neolithic date and sherds of pottery from a series of pits, although no definitive structure was identified. Late Neolithic evidence was identified at Danesfort 9 which produced radiocarbon dates indicating that it is broadly contemporary with the activity at Rathclogh 2. Danesfort 9 consisted of a possible temporary shelter or hut. Rathclogh 2 had evidence of pits with lithics, possibly deliberately deposited, but as with the pits on the earlier Danesfort 7 site, no definitive structure or plan could be identified.

The area was subsequently more intensively settled in the Bronze Age and into the early medieval and medieval periods. This follows a general pattern identified across the country. It is possible that there are more definitive settlements dating to the Neolithic that have yet to be discovered in the area of Danesfort, Rathclogh and Kilree and that the excavated evidence represents activity ephemeral to this. It is also possible that as suggested by Grogan the soils in these areas may have been too heavy for Neolithic farming technology (2004). In this instance the Neolithic activity would have been transient and temporary with the area being used by hunters in the Neolithic rather than settled and farmed. This interpretation compliments the archaeological results from the N9/N10 Phase 4 scheme.

It has been identified in Section 3.3 that it is difficult to understand the precise function of isolated pits or groups of pits within the wider landscape in the absence of definitive domestic settlement or burial sites in the vicinity. The interpretation of the Rathclogh 2 results is equally difficult, given the lack of evidence. It is suggested by Sternke in her analysis of the lithics that the lithic assemblage could date to the middle Neolithic, although the radiocarbon dating suggests a later Neolithic date. The lithic assemblage largely consists of cores, flakes, blades and debitage which Sternke suggests represents waste material from flint and chert working that has been discarded. Two convex end scrapers may be indicative of short term use of the site in the Beaker period. It should be noted that the nearby site of Danesfort 8 produced a sizeable assemblage of Beaker pottery, so there is evidence in the area contemporary with Beaker activity. The hazelnut shell fragments identified within some samples could represent domestic waste. It is possible therefore that Rathclogh 2 represents a small dumping area associated with a nearby late Neolithic domestic settlement that may survive outside the limits of the N9/N10: Phase 4 alignment.

4.2 Conclusions

Rathclogh 2 is an important site locally, and although the archaeological remains are small they are significant in assisting our understanding of a developing landscape from the Neolithic to the Bronze Age. This is particularly relevant given the presence of middle and late Neolithic, Beaker, middle and late Bronze Age, and Iron Age evidence in the vicinity of the site. The Danesfort and Kilree townlands are also rich in early medieval and medieval settlement and the Neolithic activity at Danesfort 9

and 7 and Rathclogh 2 thus represents the foundation for all later activity. It is likely that the area was not intensively settled or farmed in the Neolithic and the temporary structure at Danesfort 9 is evidence of this.

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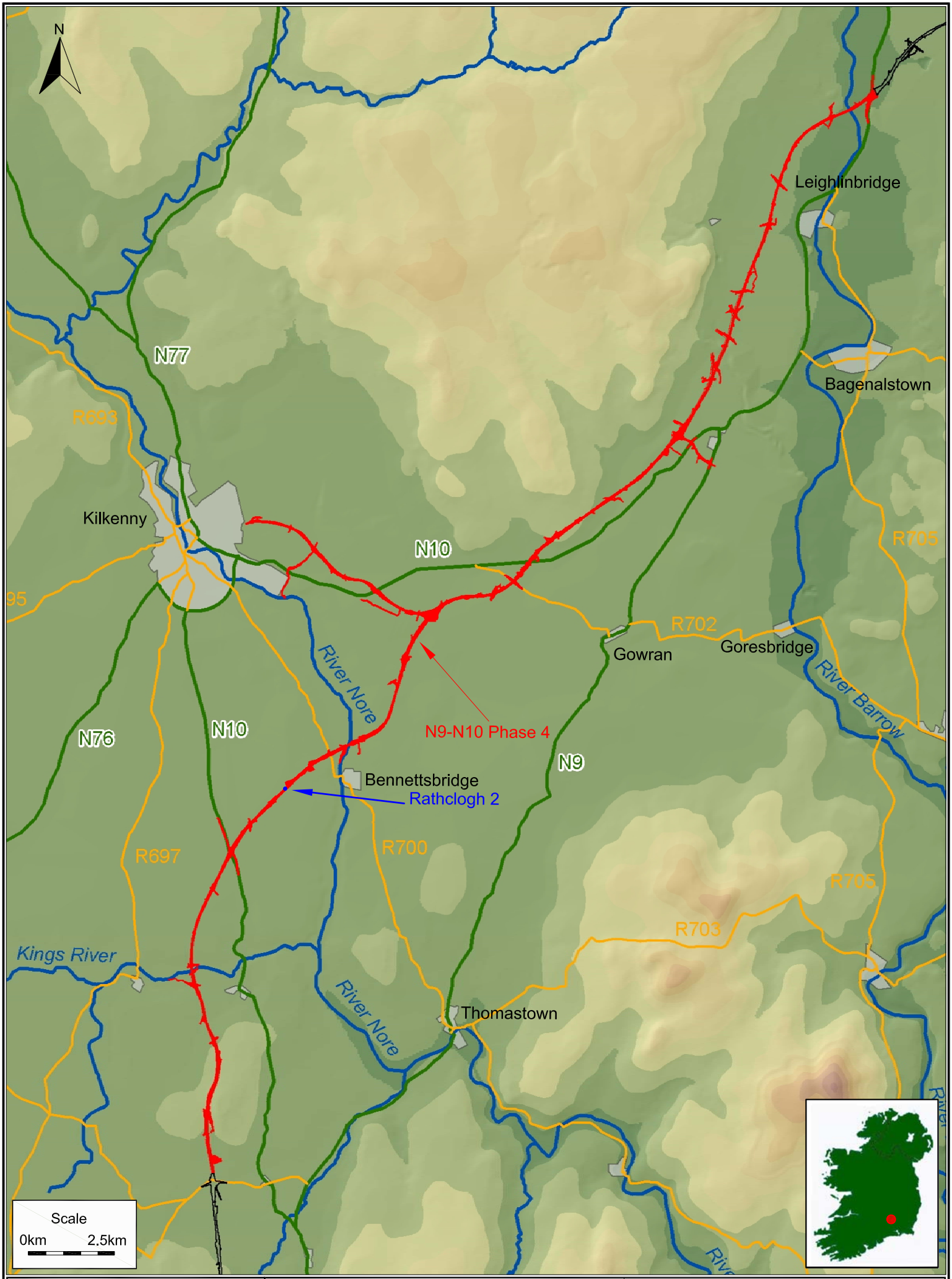

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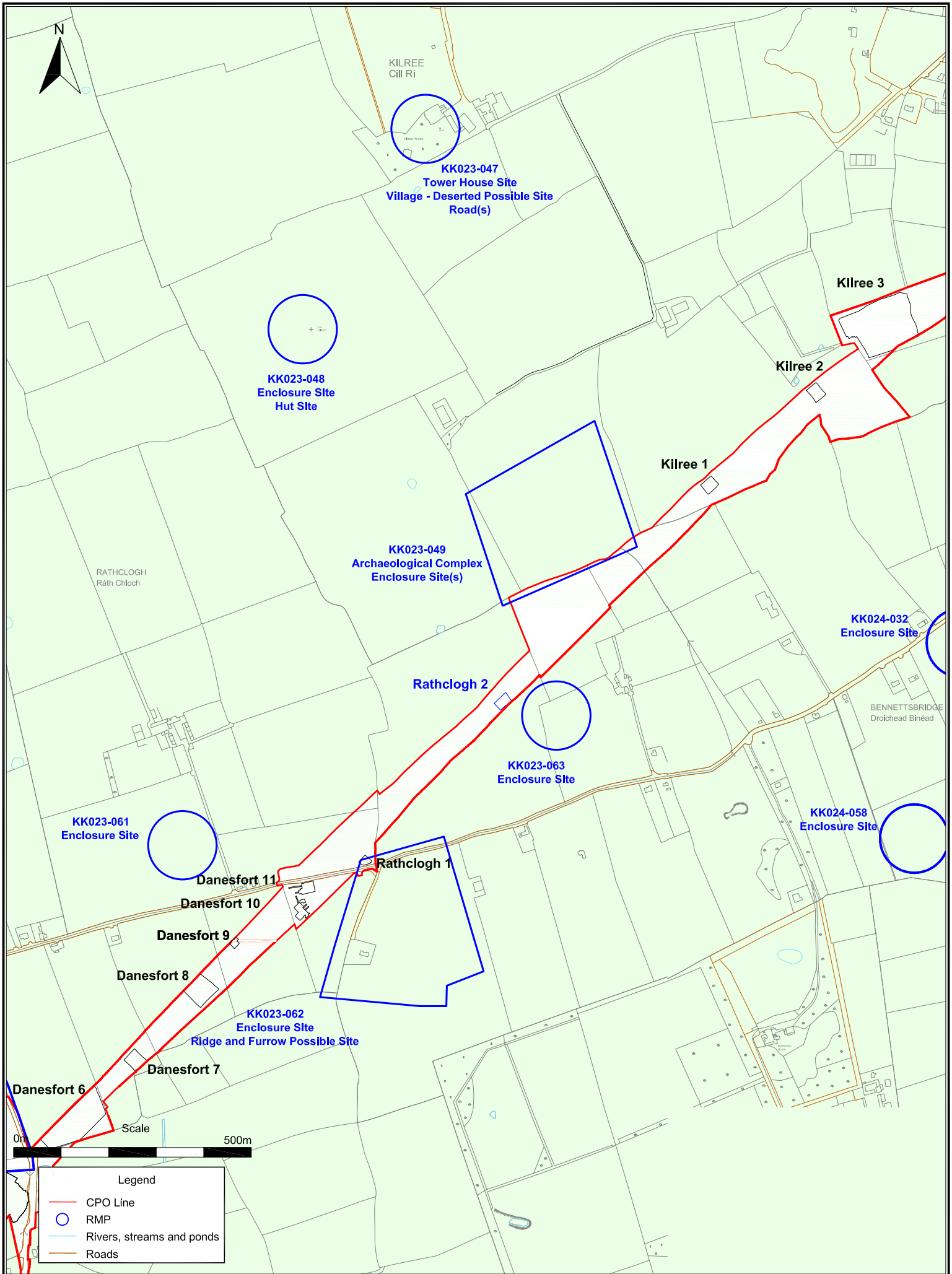

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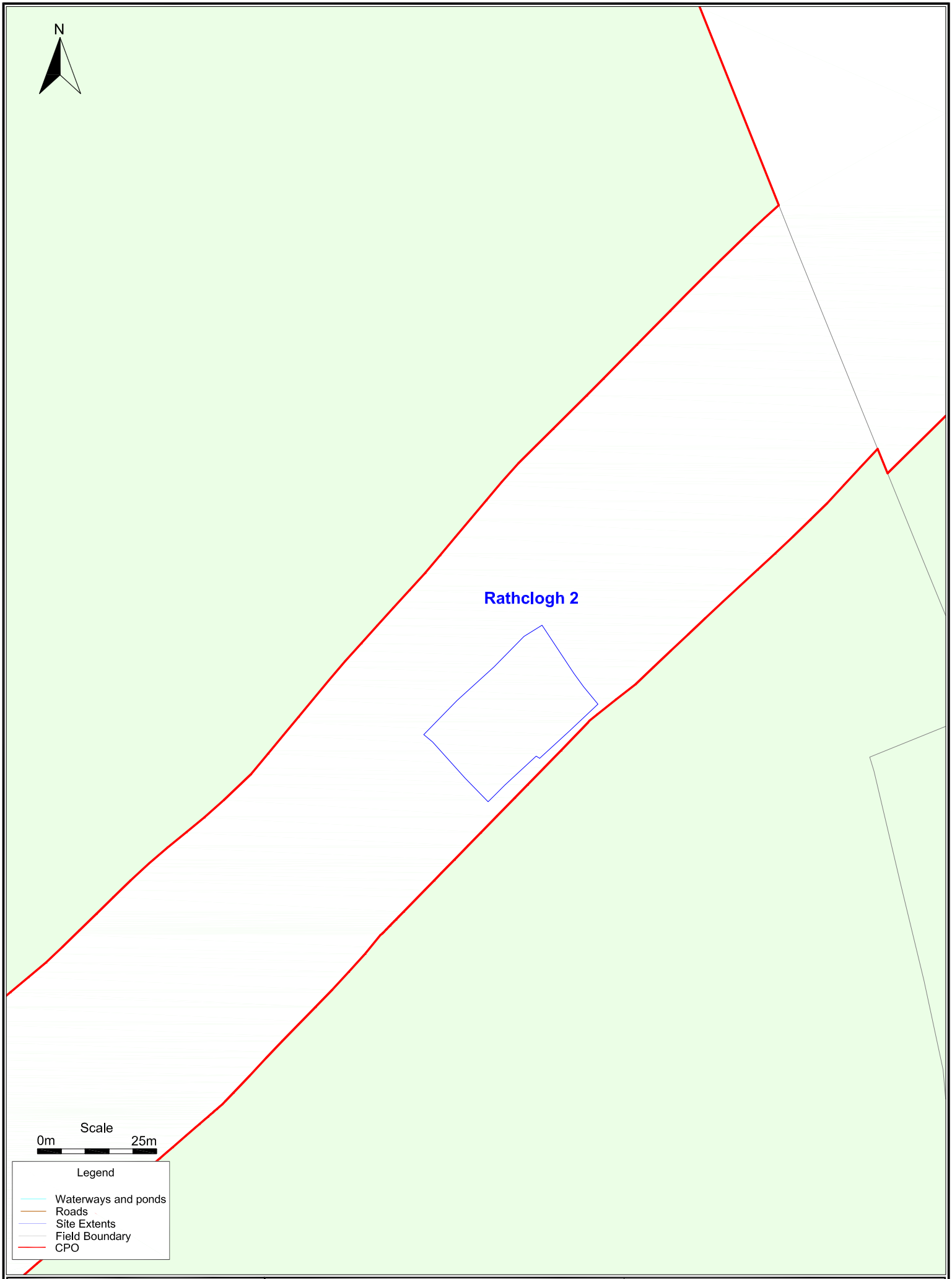

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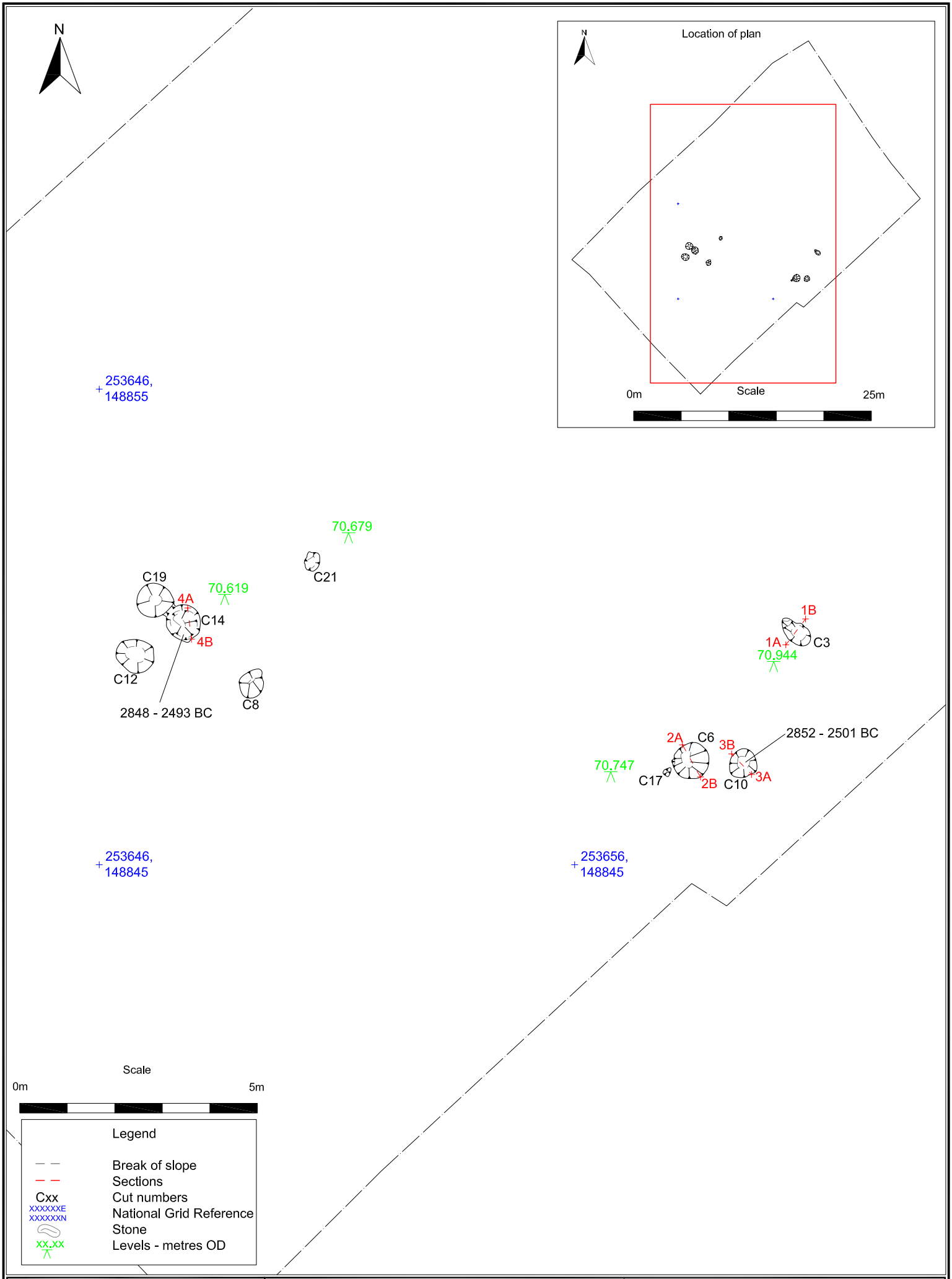

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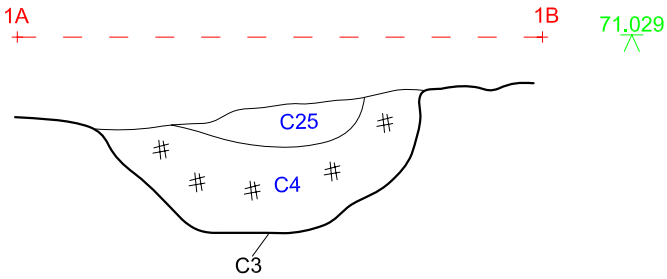
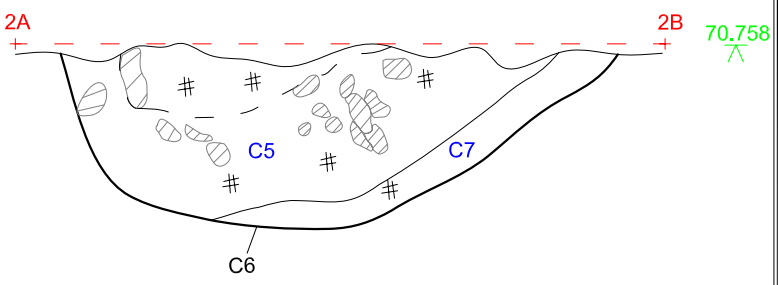
Southeast facing section of C3



Southwest facing section of C6



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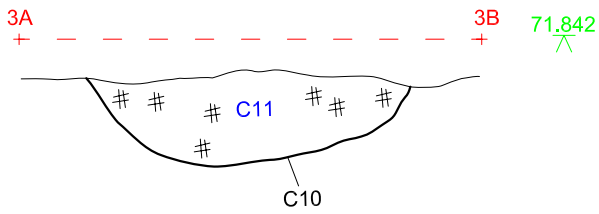
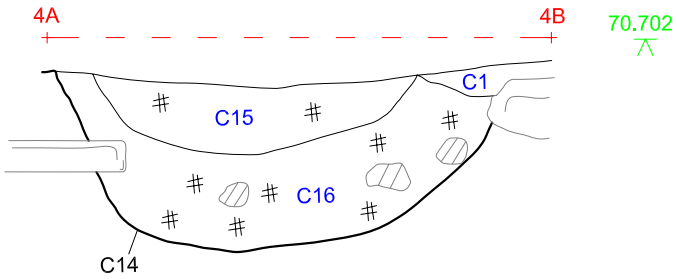


West facing section of C14



Scale 1:10

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Legend

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

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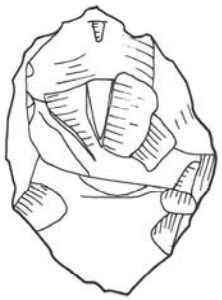

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	Client:	Kilkenny County Council	Produced by: G Kearney
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			Figure No: 5

PLATES

Plate 1: Stakehole C17 and pit C6, mid-excavation and post-excavation (respectively), facing north-east

Plate 2: Pits C14 and C19, post-excavation, facing south-west

Plate 3: Pit C8, mid-excavation, facing north-east

APPENDIX 1 CATALOGUE OF PRIMARY DATA

Appendix 1.1 Context Register

Context	Fill of	L(m)	W(m)	D(w)	Interpretation	Description	Context Above	Context Below
C1	NA	NA	NA	0.4	Topsoil	Loosely Compacted, Dark Yellowish-Brown Clayey-Silt with frequent small, medium and large stones	NA	ALL
C2	NA	NA	NA	NA	Subsoil	Firmly Compacted, Light Yellowish/Orangish-Brown Silty-Clay with moderate small and medium stones and occasional large stone	ALL	NA
C3	NA	0.74	0.42	0.16	Waste Pit	Oval, NW-SE orientated Pit. Sharp break of slope at top, with moderately sloping sides, slightly steeper on the E side of the cut and a gradual break of slope at the base. Base is concave.	C4	C2
C4	C3	0.74	0.42	0.11	Basal Fill of Pit	Oval, NW-SE orientated, Friable Compacted Dark Blackish-Brown Clay with frequent charcoal flecks, moderate medium stones (frequently burnt) and occasional fragments flint and chert. Basal fill of waste pit	C25	C3
C5	C6	0.78	0.74	0.17	Middle Fill of Waste Pit	Sub-Circular, NE-SW orientated, Loosely Compacted Mid-Brownish-Grey Silty-Clay with moderate charcoal, small and medium stones, medium heat affected stones and one piece of flint.	C26	C7
C6	NA	0.78	0.74	0.22	Waste Pit	Sub-Circular Cut, slightly NE-SW orientated, Sharp break of slope at top with moderately sloping sides and an imperceptible break of slope. Base is concave	C7	C2
C7	C6	0.5	0.07	0.05	Basal Slump Fill of Pit	Oval, NE-SW orientated. Firm but Friable Compacted Mid-Yellowish-Grey Silty-Clay with occasional charcoal flecks. Possibly redeposited natural slump in base of cut	C5	C6
C8	NA	0.64	0.5	0.16	Waste Pit	Sub-Circular Cut, slightly NE-SW orientated, Sharp break of slope at top with moderately sloping sides and an imperceptible break of slope. Base is concave	C9	C2
C9	C8	0.64	0.5	0.16	Fill of Pit	Sub-Circular, slightly NE-SW orientated, Friable Compacted Mid-Blackish-Brown Silty-Clay with frequent small stones, moderate medium heat affected stones, moderate charcoal flecks and occasional fragments of chert	C1	C8
C10	NA	0.64	0.54	0.12	Waste Pit	Oval Cut, NE-SW orientated, Sharp break of slope at top, steep moderately sloping sides, and an imperceptible break of slope at base. Base is concave	C11	C2

Context	Fill of	L(m)	W(m)	D(w)	Interpretation	Description	Context Above	Context Below
C11	C10	0.64	0.54	0.12	Fill of Pit	Oval, NE-SW orientated. Friable Compacted Mid-Greyish-Black Silty-Clay with moderate small and medium stones, moderate medium heat affected stones, moderate charcoal flecks and occasional fragments of chert	C1	C10
C12	NA	0.78	0.7	0.15	Waste Pit	Oval Cut, NW-SE orientated, Sharp break of slope at top, moderately sloping sides, and an imperceptible break of slope at base. Base is concave	C13	C2
C13	C12	0.78	0.7	0.15	Fill of Pit	Oval, NW-SE orientated, Friable Compacted Dark-Greyish-Brown Silty-Clay with moderate small and medium stones, moderate medium heat affected stones, moderate charcoal flecks and occasional fragments of flint and chert	C1	C12
C14	NA	0.76	0.7	0.29	Waste Pit	Sub-Circular cut. Sharp break of slope at the top, steeply sloping sides and an imperceptible break of slope at the base. Base is concave	C16	C2
C15	C14	0.4	0.35	0.08	Fill of Pit	Sub-Circular, Friable Compacted Mid-Yellowish-Brown Clay with occasional small stones and charcoal flecks	C19	C16
C16	C14	0.72	0.7	0.21	Fill of Pit	Sub-Circular, Friable Compacted Mid-Yellowish-Brown Clay with frequent charcoal flecks, moderate medium stones, occasional large stones and fragments of flint, and v. occasional hazelnut fragments	C15	C14
C17	NA	0.08	0.07	0.07	Stakehole	Circular Cut, Sharp break of slope at top, steeply sloping sides and a sharp break of slope at base. Base is concave	C18	C2
C18	C17	0.08	0.07	0.07	Fill of Stakehole	Circular, Friable Compacted Dark-Greyish-Brown Silty-Clay	C1	C17
C19	NA	0.8	0.7	0.27	Waste Pit	Sub-Circular, NW-SE orientated, Sharp break of slope at top, steeply sloping sides and an imperceptible break of slope. Base is concave	C20	C15
C20	C19	0.8	0.7	0.27	Fill of Pit	Sub-Circular, Friable Compacted NW-SE orientated, Mid-Yellowish-Greyish-Brown Silty-Clay with moderate medium stones, occasional medium heat affected stones, occasional charcoal flecks and fragments of flint and chert	C1	C19
C21	NA	0.42	0.3	0.18	Waste Pit	Sub-Rectangular, NW-SE orientated, with rounded corners, Sharp break of slope, moderately sloping sides and an imperceptible break of slope at base. Base is flat	C22	C2
C22	C21	0.42	0.3	0.18	Fill of Pit	Sub-Rectangular, NW-SE orientated, Friable	C1	C21

Context	Fill of	L(m)	W(m)	D(w)	Interpretation	Description	Context Above	Context Below
						Compacted Dark Blackish-Grey Silty-Clay with moderate medium heat affected stones and moderate charcoal flecks		
C23	NAS							
C24	NAS							
C25	C3	0.4	0.24	0.05	Upper Fill of Waste Pit	Sub-Oval, NW-SE orientated, Firm-Moderate Mid-Yellowish-Brown Silty-Clay	C1	C4
C26	C6	0.31	0.25	0.09	Upper Fill of Waste Pit	Sub-Circular, NW-SE orientated, Firm-Moderate Mid-Yellowish-Brown Silty-Clay	C1	C5

Appendix 1.2 Catalogue of Artefacts

Registration Number	Context	Item No.	Simple Name	Full Name	Material	Description	No. of Parts
E3727:004:1	4	1	Flake	Chert flake	Chert	A chert flake produced using the controlled bipolar-on-an-anvil method	N/A
E3727:004:2	4	2	Flake	Chert flake	Chert	A chert flake which was produced on a single-platform core	N/A
E3727:004:3-5	4	3-5	Debitage	Chert debitage	Chert	Chert debitage	N/A
E3727:004:6	4	6	Blade	Chert blade	Chert	A chert blade which is a controlled bipolar-on-an-anvil example	N/A
E3727:004:7-8	4	7-8	Debitage	Chert debitage	Chert	Chert debitage	N/A
E3727:004:9-11	4	9-11	Debitage	Flint debitage	Flint	Flint debitage	N/A
E3727:005:1	5	1	Blade	Flint blade	Flint	A flint blade which is a controlled bipolar-on-an-anvil example. Shows use-wear traces on its left and right edge	N/A
E3727:005:2	5	2	Flake	Chert flake	Chert	A chert flake produced using the controlled bipolar-on-an-anvil method	N/A
E3727:009:1	9	1	Blade	Chert blade	Chert	A chert blade which is a controlled bipolar-on-an-anvil example	N/A
E3727:009:2	9	2	Core	Chert core	Chert	A chert core. A bipolar-on-an-anvil example which was produced on a flake using a controlled method	N/A
E3727:009:3	9	3	Blade	Chert blade	Chert	A chert blade which is a controlled bipolar-on-an-anvil example	N/A
E3727:009:4	9	4	Blade	Chert blade	Chert	A chert blade which is heavily weathered and was produced on a single platform blade core	N/A
E3727:009:5-8	9	5-8	Debitage	Chert debitage	Chert	Chert debitage	N/A
E3727:009:9	9	9	Blade	Flint blade	Flint	A flint blade which is a controlled bipolar-on-an-anvil example	N/A
E3727:009:10.1 - 10.20	9	10.1 - 10.20	Debitage	Flint debitage	Flint	Flint debitage	N/A
E3727:011:1	11	1	Blade	Chert blade	Chert	A chert blade which is a controlled bipolar-on-an-anvil example	N/A
E3727:011:2	11	2	Core	Chert core	Chert	A chert core. A bipolar-on-an-anvil example which was produced on a flake using a controlled method. This core started its use-life as a single-platform core which was reduced using the bipolar method in its final stages	N/A

Registration Number	Context	Item No.	Simple Name	Full Name	Material	Description	No. of Parts
E3727:011:3	11	3	Flake	Chert flake	Chert	A chert flake produced using the controlled bipolar-on-an-anvil method	N/A
E3727:011:4	11	4	Artefact	Chert retouched artefact	Chert	A chert retouched artefact	N/A
E3727:011:5	11	5	Flake	Chert flake	Chert	A chert flake produced using the controlled bipolar-on-an-anvil method	N/A
E3727:011:6	11	6	Blade	Chert blade	Chert	A chert blade which is a controlled bipolar-on-an-anvil example	N/A
E3727:011:7.1 - 7.7	11	7.1 - 7.7	Debitage	Flint debitage	Flint	Flint debitage	N/A
E3727:013:1	13	1	Artefact	Chert retouched artefact	Chert	A chert retouched artefact	N/A
E3727:013:2	13	2	Scraper	Chert convex end scraper	Chert	A chert convex end scraper produced on a bipolar flake	N/A
E3727:013:3	13	3	Core	Chert core	Chert	A chert core. A bipolar-on-an-anvil example which was produced on a flake using a controlled method	N/A
E3727:013:4	13	4	Blade	Chert blade	Chert	A chert blade which is a controlled bipolar-on-an-anvil example	N/A
E3727:013:5	13	5	Flake	Chert flake	Chert	A chert flake produced using the controlled bipolar-on-an-anvil method	N/A
E3727:013:6-7	13	6-7	Debitage	Chert debitage	Chert	Chert debitage	N/A
E3727:013:8	13	8	Blade	Chert blade	Chert	A chert blade which is a controlled bipolar-on-an-anvil example	N/A
E3727:013:9.1 - 9.9	13	9.1 - 9.9	Debitage	Chert debitage	Chert	Chert debitage	N/A
E3727:013:10	13	10	Blade	Flint blade	Flint	A flint blade which is a controlled bipolar-on-an-anvil example. Shows use-wear traces on its left edge	N/A
E3727:013:11	13	11	Flake	Flint flake	Flint	A flint flake which was produced on a single-platform core	N/A
E3727:013:12	13	12	Blade	Flint blade	Flint	A flint blade which is a controlled bipolar-on-an-anvil example	N/A
E3727:013:13-14	13	13-14	Debitage	Flint debitage	Flint	Flint debitage	N/A
E3727:013:15.1 - 15.9	13	15.1 - 15.9	Debitage	Flint debitage	Flint	Flint debitage	N/A
E3727:016:1	16	1	Artefact	Chert retouched artefact	Chert	A chert retouched artefact	N/A
E3727:016:2	16	2	Debitage	Chert debitage	Chert	Chert debitage	N/A
E3727:016:3	16	3	Scraper	Flint convex end scraper	Flint	A flint convex end scraper	N/A
E3727:016:4	16	4	Flake	Flint flake	Flint	A flint flake which was produced on a single-platform core	N/A

Registration Number	Context	Item No.	Simple Name	Full Name	Material	Description	No. of Parts
E3727:016:5	16	5	Debitage	Flint debitage	Flint	Flint debitage	N/A
E3727:016:6	16	6	Flake	Flint flake	Flint	A flint flake produced using the controlled bipolar-on-an-anvil method	N/A
E3727:020:1	20	1	Flake	Chert flake	Chert	A chert flake which was produced on a single-platform core	N/A
E3727:020:2	20	2	Flake	Chert flake	Chert	A chert flake produced using the controlled bipolar-on-an-anvil method	N/A
E3727:020:3	20	3	Scraper	Chert scraper	Chert	A chert convex end scraper produced on a bipolar flake	N/A
E3727:020:4	20	4	Flake	Chert flake	Chert	A burnt chert flake produced using the controlled bipolar-on-an-anvil method	N/A
E3727:020:5	20	5	Blade	Chert blade	Chert	A chert blade which is heavily weathered and was produced on a single platform blade core	N/A
E3727:020:6	20	6	Debitage	Chert debitage	Chert	Chert debitage	N/A
E3727:020:7	20	7	Flake	Chert flake	Chert	A chert flake produced using the controlled bipolar-on-an-anvil method. Shows use wear and polish on its right edge	N/A
E3727:020:8	20	8	Flake	Chert flake	Chert	A chert flake produced using the controlled bipolar-on-an-anvil method	N/A
E3727:020:9	20	9	Flake	Chert flake	Chert	A chert flake produced using the controlled bipolar-on-an-anvil method	N/A
E3727:020:10	20	10	Flake	Chert flake	Chert	A chert flake produced using the controlled bipolar-on-an-anvil method	N/A
E3727:020:11	20	11	Flake	Flint flake	Flint	A flint flake produced using the controlled bipolar-on-an-anvil method	N/A
E3727:020:12	20	12	Flake	Flint flake	Flint	A flint flake produced using the controlled bipolar-on-an-anvil method	N/A
E3727:020:13.1 -13.6	20	13.1 - 13.6	Debitage	Flint debitage	Flint	Flint debitage	N/A
E3727:022:1	22	1	Artefact	Chert retouched artefact	Chert	A chert retouched artefact	N/A
E3727:022:2.1 - 2.8	22	2.1 - 2.8	Debitage	Chert debitage	Chert	Chert debitage	N/A
E3727:022:3.1 - 3.5	22	3.1 - 3.5	Debitage	Flint debitage	Flint	Flint debitage	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 9 soil samples were taken from features at Rathclogh 2 and all samples were processed by flotation and sieving through a 250µm mesh. The following are the ecofacts recovered from these samples:

Context #	Sample #	Feature type i.e. Structure A, hearth C45	charcoal	Seeds and charcoal	Burnt animal bone	animal bone	human bone	metallurgical waste	Other
C1	1	Topsoil						2.5g	
C4	2	Waste Pit	23.1g	0.2g					
C5	3	Waste Pit	4.3g	0.8g	<0.1g				
C9	4	Waste Pit	19.1g	1.0g					
C11	6	Waste Pit	36.9g	2.7g					<0.1g (Shell)
C13	7	Waste Pit	18.6g	0.4g					
C16	5	Waste Pit	45.9g	0.6g					
C20	8	Waste Pit	7.5g	0.6g					
C22	9	Waste Pit	5.7g	0.3g					

Appendix 1.4 Archive Index

Project: N9/N10 Phase 4: Knocktopher to Powerstown		
Site Name: Rathlogh 2 AR090		
Excavation Reg Number: E3727		
Site director: P. Lynch		
Date: April 2011		
Field Records	**Items (quantity)**	**Comments**
Site drawings (plans)	5 sheets	
Site sections, profiles, elevations	1 sheet	
Other plans, sketches, etc.	-	
Timber drawings	-	
Stone structural drawings	-	
Site diary/note books	-	
Site registers (folders)	1	
Survey/levels data (origin information)	85	
Context sheets	26	
Wood Sheets	1	
Skeleton Sheets	1	
Worked stone sheets	1	
Digital photographs	30	
Photographs (print)	-	
Photographs (slide)	-	
Security copy of archive	yes	digital

APPENDIX 2 SPECIALIST REPORTS

Appendix 2.1 Lithics Report – Farina Sternke

Appendix 2.2 Charcoal and Wood Report – Susan Lyons

Appendix 2.3 Plant Remains Analysis Report – Penny Johnston

Appendix 2.4 Burnt Bone Report – Aoife McCarthy

Appendix 2.5 Metallurgical Waste Analysis Report – Angela Wallace

Appendix 2.6 Radiocarbon Dating Results – QUB Laboratory

Appendix 2.1 Lithics Report – Farina Sternke

Lithics Finds Report for E3727 Rathclogh 2 (A032/106), Co. Kilkenny
N9/N10 Road Scheme– Phase 4B
Farina Sternke MA, PHD

Introduction
A total of 124 lithic finds from the archaeological investigations of a prehistoric site at Rathclogh 2, Co. Kilkenny were presented for analysis (Table 1). The finds are associated with a stakehole and a series of pits.

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

Quantification
The lithics are 63 flaked pieces of flint and 61 flaked pieces of chert (Table 1). A total of 41 artefacts are larger than 20mm in length and width or are of typological and technological significance and were therefore recorded in detail.

Provenance
The lithic artefacts were recovered from two groups of pit fills (C4, C5 and C11; and C9, C13, C16, C20 and C22).

Table 1 Composition of the Lithic Assemblage from Rathclogh 2 (E3727)

Find Number	Context	Material	Type	Condition	Cortex	Length (mm)	Width (mm)	Thickness (mm)	Complete	Retouch
E3727:004:1	4	Chert	Flake	Reasonably fresh	No	22	21	7	Yes	No
E3727:004:2	4	Chert	Flake	Reasonably fresh	No	17	23	3	Yes	No
E3727:004:3	4	Chert	Debitage							
E3727:004:4	4	Chert	Debitage							
E3727:004:5	4	Chert	Debitage							
E3727:004:6	4	Chert	Blade	Reasonably fresh	Yes	28	14	3	Yes	No
E3727:004:7	4	Chert	Debitage							
E3727:004:8	4	Chert	Debitage							
E3727:004:9	4	Flint	Debitage							
E3727:004:10	4	Flint	Debitage							
E3727:004:11	4	Flint	Debitage							
E3727:005:1	5	Flint	Blade	Slightly Patinated	No	39	18	5	No	No
E3727:005:2	5	Chert	Flake	Reasonably fresh	No	13	20	2	Yes	No
E3727:009:1	9	Chert	Blade	Reasonably fresh	Yes	28	16	9	Yes	No
E3727:009:2	9	Chert	Core	Reasonably fresh	Yes	23	22	8	Yes	
E3727:009:3	9	Chert	Blade	Reasonably fresh	Yes	37	15	6	Yes	No
E3727:009:4	9	Chert	Blade	Heavily weathered	Yes	38	18	4	Yes	No
E3727:009:5	9	Chert	Debitage							
E3727:009:6	9	Chert	Debitage							
E3727:009:7	9	Chert	Debitage							
E3727:009:8	9	Chert	Debitage							
E3727:009:9	9	Flint	Blade	Patinated	Yes	23	9	5	No	No
E3727:009:10.1	9	Flint	Debitage							
E3727:009:10.2	9	Flint	Debitage							
E3727:009:10.3	9	Flint	Debitage							
E3727:009:10.4	9	Flint	Debitage							
E3727:009:10.5	9	Flint	Debitage							
E3727:009:10.6	9	Flint	Debitage							

Find Number	Context	Material	Type	Condition	Cortex	Length (mm)	Width (mm)	Thickness (mm)	Complete	Retouch
E3727:009:10.7	9	Flint	Debitage							
E3727:009:10.8	9	Flint	Debitage							
E3727:009:10.9	9	Flint	Debitage							
E3727:009:10.10	9	Flint	Debitage							
E3727:009:10.11	9	Flint	Debitage							
E3727:009:10.12	9	Flint	Debitage							
E3727:009:10.13	9	Flint	Debitage							
E3727:009:10.14	9	Flint	Debitage							
E3727:009:10.15	9	Flint	Debitage							
E3727:009:10.16	9	Flint	Debitage							
E3727:009:10.17	9	Flint	Debitage							
E3727:009:10.18	9	Flint	Debitage							
E3727:009:10.19	9	Flint	Debitage							
E3727:009:10.20	9	Flint	Debitage							
E3727:011:1	11	Chert	Blade	Reasonably fresh	Yes	53	20	14	Yes	No
E3727:011:2	11	Chert	Core	Reasonably fresh	Yes	30	38	18	Yes	No
E3727:011:3	11	Chert	Flake	Reasonably fresh	Yes	26	15	9	Yes	No
E3727:011:4	11	Chert	Retouched Artefact	Reasonably fresh	Yes	24	13	9	Yes	Right edge inverse low angle
E3727:011:5	11	Chert	Flake	Reasonably fresh	Yes	26	15	9	Yes	No
E3727:011:6	11	Chert	Blade	Reasonably fresh	Yes	24	7	4	Yes	No
E3727:011:7.1	11	Flint	Debitage							
E3727:011:7.2	11	Flint	Debitage							
E3727:011:7.3	11	Flint	Debitage							
E3727:011:7.4	11	Flint	Debitage							
E3727:011:7.5	11	Flint	Debitage							
E3727:011:7.6	11	Flint	Debitage							
E3727:011:7.7	11	Flint	Debitage							
E3727:013:1	13	Chert	Retouched Artefact	Reasonably fresh	Yes	40	24	11	Yes	Distal right edge direct abrupt
E3727:013:2	13	Chert	Retouched Artefact	Reasonably fresh	No	26	24	15	Yes	Distal direct abrupt
E3727:013:3	13	Chert	Core	Reasonably fresh	Yes	25	21	12	Yes	No
E3727:013:4	13	Chert	Blade	Reasonably fresh	Yes	31	12	11	No	No

Find Number	Context	Material	Type	Condition	Cortex	Length (mm)	Width (mm)	Thickness (mm)	Complete	Retouch
E3727:013:5	13	Chert	Flake	Reasonably fresh	No	23	18	5	No	No
E3727:013:6	13	Chert	Debitage							
E3727:013:7	13	Chert	Debitage							
E3727:013:8	13	Chert	Blade	Reasonably fresh	No	33	14	5	No	No
E3727:013:9.1	13	Chert	Debitage							
E3727:013:9.2	13	Chert	Debitage							
E3727:013:9.3	13	Chert	Debitage							
E3727:013:9.4	13	Chert	Debitage							
E3727:013:9.5	13	Chert	Debitage							
E3727:013:9.6	13	Chert	Debitage							
E3727:013:9.7	13	Chert	Debitage							
E3727:013:9.8	13	Chert	Debitage							
E3727:013:9.9	13	Chert	Debitage							
E3727:013:10	13	Flint	Blade	Patinated	No	29	12	7	Yes	No
E3727:013:11	13	Flint	Flake	Reasonably fresh	Yes	25	23	5	Yes	No
E3727:013:12	13	Flint	Blade	Patinated	No	23	9	9	Yes	No
E3727:013:13	13	Flint	Debitage							
E3727:013:14	13	Flint	Debitage							
E3727:013:15.1	13	Flint	Debitage							
E3727:013:15.2	13	Flint	Debitage							
E3727:013:15.3	13	Flint	Debitage							
E3727:013:15.4	13	Flint	Debitage							
E3727:013:15.5	13	Flint	Debitage							
E3727:013:15.6	13	Flint	Debitage							
E3727:013:15.7	13	Flint	Debitage							
E3727:013:15.8	13	Flint	Debitage							
E3727:013:15.9	13	Flint	Debitage							
E3727:016:1	16	Chert	Retouched Artefact	Reasonably Fresh	Yes	24	25	9	Yes	Distal direct semiabrupt
E3727:016:2	16	Chert	Debitage							
E3727:016:3	16	Flint	Retouched Artefact	Slightly Patinated	Yes	22	15	8	No	Right edge direct abrupt
E3727:016:4	16	Flint	Flake	Slightly Patinated	Yes	25	20	7	Yes	No

Find Number	Context	Material	Type	Condition	Cortex	Length (mm)	Width (mm)	Thickness (mm)	Complete	Retouch
E3727:016:5	16	Flint	Debitage							
E3727:016:6	16	Flint	Flake	Slightly Patinated	Yes	29	19	9	Yes	No
E3727:20:1	20	Chert	Flake	Weathered	Yes	33	29	11	Yes	No
E3727:20:2	20	Chert	Flake	Reasonably fresh	No	35	20	10	Yes	No
E3727:20:3	20	Chert	Retouched Artefact	Reasonably Fresh	Yes	34	12	8	Yes	Proximal direct abrupt
E3727:20:4	20	Chert	Flake	Burnt	Yes	21	20	4	No	No
E3727:20:5	20	Chert	Blade	Heavily weathered	Yes	34	11	5	No	No
E3727:20:6	20	Chert	Debitage							
E3727:20:7	20	Chert	Flake	Reasonably Fresh	Yes	37	20	8	Yes	No
E3727:20:8	20	Chert	Flake	Reasonably Fresh	No	20	25	5	Yes	No
E3727:20:9	20	Chert	Flake	Reasonably Fresh	Yes	29	20	8	Yes	No
E3727:20:10	20	Chert	Flake	Reasonably Fresh	Yes	23	23	9	Yes	No
E3727:20:11	20	Flint	Flake	Patinated	Yes	30	22	5	Yes	No
E3727:20:12	20	Flint	Flake	Patinated	Yes	22	16	5	Yes	No
E3727:20:13.1	20	Flint	Debitage							
E3727:20:13.2	20	Flint	Debitage							
E3727:20:13.3	20	Flint	Debitage							
E3727:20:13.4	20	Flint	Debitage							
E3727:20:13.5	20	Flint	Debitage							
E3727:20:13.6	20	Flint	Debitage							
E3727:022:1	22	Chert	Retouched Artefact	Reasonably fresh	No	23	16	5	Yes	Left edge inverse semiabrupt
E3727:022:2.1	22	Chert	Debitage							
E3727:022:2.2	22	Chert	Debitage							
E3727:022:2.3	22	Chert	Debitage							
E3727:022:2.4	22	Chert	Debitage							
E3727:022:2.5	22	Chert	Debitage							
E3727:022:2.6	22	Chert	Debitage							
E3727:022:2.7	22	Chert	Debitage							
E3727:022:2.8	22	Chert	Debitage							
E3727:022:3.1	22	Flint	Debitage							
E3727:022:3.2	22	Flint	Debitage							

Find Number	Context	Material	Type	Condition	Cortex	Length (mm)	Width (mm)	Thickness (mm)	Complete	Retouch
E3727:022:3.3	22	Flint	Debitage							
E3727:022:3.4	22	Flint	Debitage							
E3727:022:3.5	22	Flint	Debitage							

Condition:
The lithics survive in variable condition (Table 2). The majority of lithics are reasonably fresh, only one artefact is burnt and eight artefacts are incomplete. This suggests that the artefacts were deposited in the pits relatively swiftly following there production. Approximately 75% (n=30) of the recorded (non-debitage) artefacts bear the remnants of cortex.

CONDITION	AMOUNT
Reasonably Fresh	28
Slightly Patinated	4
Patinated	5
Weathered	1
Heavily Weathered	2
Burnt	1
Total	**41**

Table 2 Assemblage Condition from Rathclogh 2 (E3727)

Technology/Morphology:
The worked and utilised artefacts represent five types of flaking products including seven retouched artefacts (Table 3).

TYPE	AMOUNT
Core	3
Blade	13
Flake	18
Debitage	83
Retouched Artefact	7
Total	**124**

Table 3 Assemblage Composition from Rathclogh 2 (E3727)

CORES
The three cores (E3727:009:2, E3727:011:2 and E3727:013:3) identified in the assemblage are all made of chert. They are all bipolar-on-an-anvil examples which were produced on flakes using a controlled method. Core E3727:011:2 started its use-life as a single-platform core which was reduced using the bipolar method in its final stages.

The cores measure between 23mm to 30mm long (Fig. 1) and date to the first half of the Neolithic period, possibly the middle Neolithic, based on their technology.

BLADES
With the exception of four blades, all of the thirteen blades in the assemblage are made of chert. Blades E3727:005:1, E3727:009:9, E3727:013:10 and E3727:013:12 are made of flint. Blades E3727:009:4 and E3727:020:5 are heavily weathered and were produced on single platform blade cores. They appear to represent a residual early Neolithic component on the site. The remaining blades are all controlled bipolar-on-an-anvil examples which most likely date the middle Neolithic.

Two blades shows use-wear traces on their left and right edge (E3727:005:1) and left edge (E3727:013:10).

The majority of the blades measures between 25mm to 40mm long (Fig. 1).

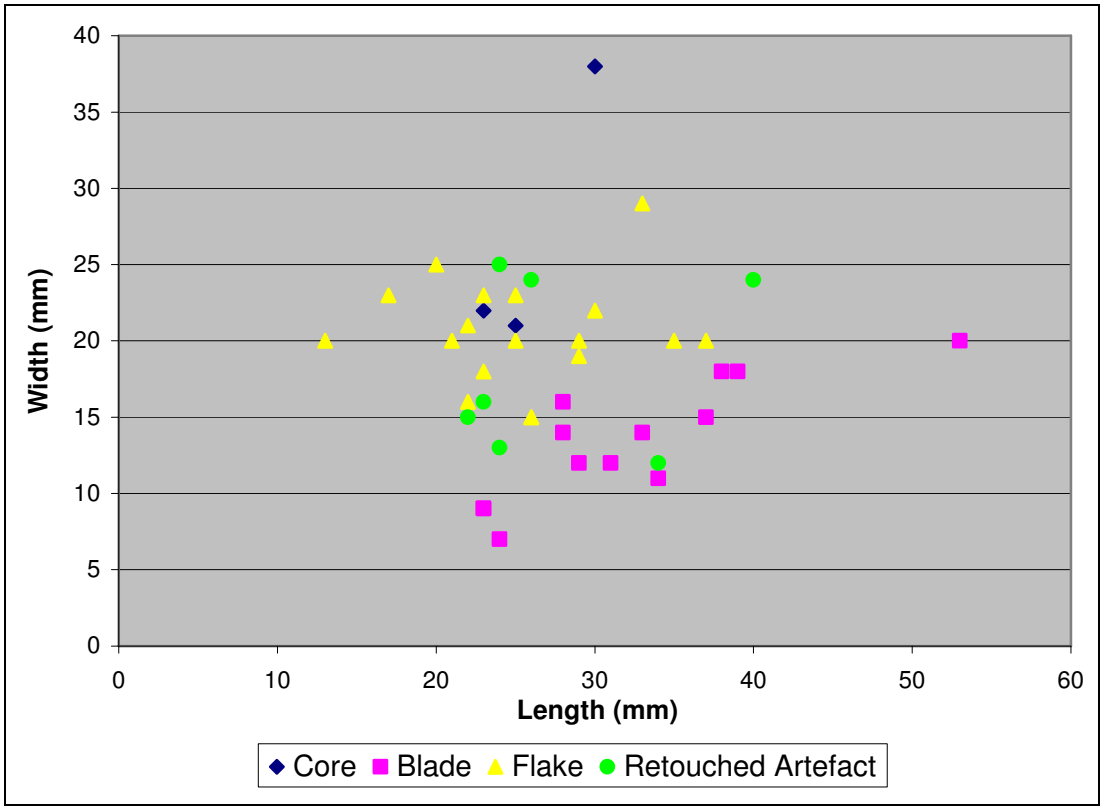

Figure 1 Dimensions (mm) of the Cores, Blades, Flakes and Retouched Artefacts from Rathclogh 2 (E3727)

FLAKES

A total of 13 of the 18 flakes are made of chert. The remaining five flakes are made of flint (Table 1). One flake (E3727:020:1) and two further possible examples (E3727:004:2 and E3727:016:4) were produced on single-platform cores. Flake E3727:020:1 is a weathered early Neolithic example. The remaining 15 flakes were produced using the controlled bipolar-on-an-anvil method.

One flake (E3727:020:7) shows use wear and polish on its right edge.

The flake population in this assemblage appears to date to the first half of the Neolithic period, more precisely the middle Neolithic, based on its technology.

The flakes rarely exceed 30mm in length (Fig. 1), the majority measuring between 20–30mm long.

DEBITAGE

The presence of 83 pieces of debitage (53 flints and 30 cherts) together with the presence of three cores, blades and flakes confirms that knapping/tool re-sharpening took place at the site.

Retouched Artefacts:

With the exception of one, the seven retouched artefacts identified in the assemblage are all made of chert. Artefact E3727:016:3 is made of flint.

The retouched artefacts were all produced on bipolar flakes and are two small convex end scrapers (E3727:013:2 and E3727:020:3) and five miscellaneous

retouched artefacts (E3727:011:4, E3727:013:1, E3727:016:1, E3727:016:3 and E3727:022:1).

The convex end scrapers measure 26mm and 22mm long, 24mm and 15mm wide and 15mm and 8mm thick, respectively. They most likely date to the late Neolithic/early Bronze Age (Beaker period).

Two of the five miscellaneous artefacts were most likely used as convex end scrapers (E3727:013:1 and E3727:016:3). The purpose of the remaining three artefacts remains unknown.

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

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

It can be divided into three groups: (1) two single-platform blades and a flake associated with the early Neolithic (Woodman *et al.* 2006), which represent a residual component; (2) the three bipolar cores and the controlled bipolar-on-an-anvil blades and flakes form the main body of the assemblage and date to the middle Neolithic; and (3) two small convex end scrapers are associated with a Beaker presence at the site.

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.

Comparative Material
This assemblage is similar in character to those recovered at Holdenstown 3 (E3854) and Moanduff 2 (E3735) on the same stretch of road. These sites may all be part of an extensive network of Neolithic and early Bronze Age sites.

Discussion
Flint is available in smaller nodules along the Wicklow, Wexford and Waterford coast or in the glacial tills in Co. Kilkenny in the form of remanié pebbles. The use of a limited single platform and dominant bipolar technology on small to medium sized pebbles is in parts the result of this availability. The flint used at Rathclogh 2 is beach pebble flint which almost certainly derives from the Wicklow, Wexford or Waterford coast. The majority of these flint nodules are rather small pebbles with an average dimension of 30–50mm and often only permit the use of a bipolar technology to efficiently reduce the nodule achieving a maximum outcome, i.e. the largest possible amount of suitable and usable blanks. The result is the regionally dominant split pebble bipolar (Neolithic and Bronze Age) character of the south-eastern flint assemblages (O'Hare 2005). However, the assemblage of Rathclogh 2 also contains three single platform flakes and blades. Particularly, during the Neolithic period, flint was also introduced in the form of larger blanks, i.e. selected single platform flakes and blades. These were produced on the coast, where flint was abundant and subsequently carried onto the inland settlement sites (Woodman pers. comm.).

Approximately 50% of the Rathclogh 2 assemblage was produced on local chert and chert which may have been imported from North Tipperary and the Midlands.

Given the technological composition of the middle Neolithic component of the Rathclogh 2 assemblage, i.e. predominantly production debris, it is safe to assume that it was produced and used *in situ.* It is almost certain that the Beaker elements were introduced to the site rather than produced *in situ.*

Summary

The lithic finds from the archaeological excavation at Rathclogh 2, Co. Kilkenny are 63 flaked pieces of flint and 61 flaked pieces of chert. The assemblage contains three bipolar chert cores, 13 blades, 18 flakes, 83 pieces of debitage and seven retouched artefacts including two small convex end scrapers.

The assemblage is dominated by a middle Neolithic lithic component represented by the cores and bipolar-on-an-anvil flakes and blades. A residual early Neolithic component is made up of two single-platform blades and one single-platform flake. The two convex end scrapers may be indicative of a short-term use of the site in the Beaker period.

The presence of a number of cores and debitage suggests that lithic production took place at the site during the middle Neolithic occupation of the site. Together with the discarded retouched tools, the recovered cores, flakes, blades and debitage and represent waste from lithic production and the immediate use and re-sharpening of lithic tools, possibly in domestic activities. The waste and tools were subsequently discarded in the various pits.

This site makes a significant contribution to the evidence for middle Neolithic settlement and land use in Co. Kilkenny.

Recommendations for Illustration

- Core (E3727:011:2)
- Convex End Scraper (E3727:013:2)
- Convex End Scraper (E3727:016:3)

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Appendix 2.2 Charcoal and Wood Report – Susan Lyons

Client – Irish Archaeological Consultancy Ltd
Site Name- Rathclogh 2
Excavation number –E3727 AR090
County – Kilkenny
Author- Susan Lyons
Date –23/10/09

Charcoal Identification Summary Report

Illustrations

Figures

Tables

Introduction

Six charcoal samples were identified and analysed from excavations associated with features excavated at Rathclogh 2 Co. Kilkenny as part of the resolution of the N9/N10 Kilcullen to Waterford Scheme, Phase 4B – Rathclogh to Powerstown. The archaeological excavations revealed several pits of archaeological potential that seemed to be in two separate groups. The pits contained charcoal, flint and chert debitage, charred hazelnuts and seeds in their fills. It is probable that they represent waste pits and potentially date to the prehistoric period. A single stakehole was also excavated (Lynch, 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 report serves as a summary report only for Rathclogh 2 and will later form part of an overall scheme-wide charcoal study for the N9/N10 (Lyons, *et al, forthcoming).*

Methodology (After IAC Ltd)

Processing

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

Charcoal identifications

Six charcoal samples from C4 (fill of pit C3), C9 (fill of pit C8), C11 (fill of pit C10), C13 (fill of pit C12), C16 (fill of pit C14) and C22 (fill of pit C21) 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. Where possible the age and growth pattern of the wood fragments is also recorded by studying the transverse section at a magnification of up to 40x.

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

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

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

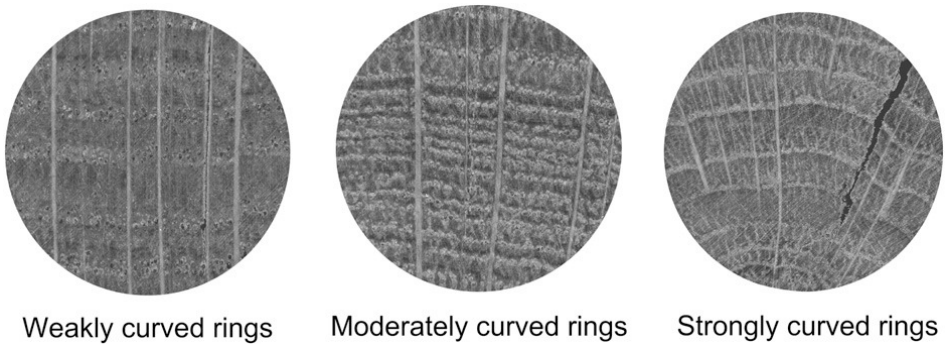

Fig. 1. Ring curvature (after Marguerie and Hunot 2007 1421, Fig. 3)

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

Four wood species totaling 300 identifications were recorded from the samples associated with Rathclogh 2. *Fraxinus excelsior* (ash) was the dominant species

recorded, followed by lesser incidences of *Quercus* sp. (oak), *Alnus glutinous* (alder) and *Corylus avellana* (hazel) **(Fig. 2)**.

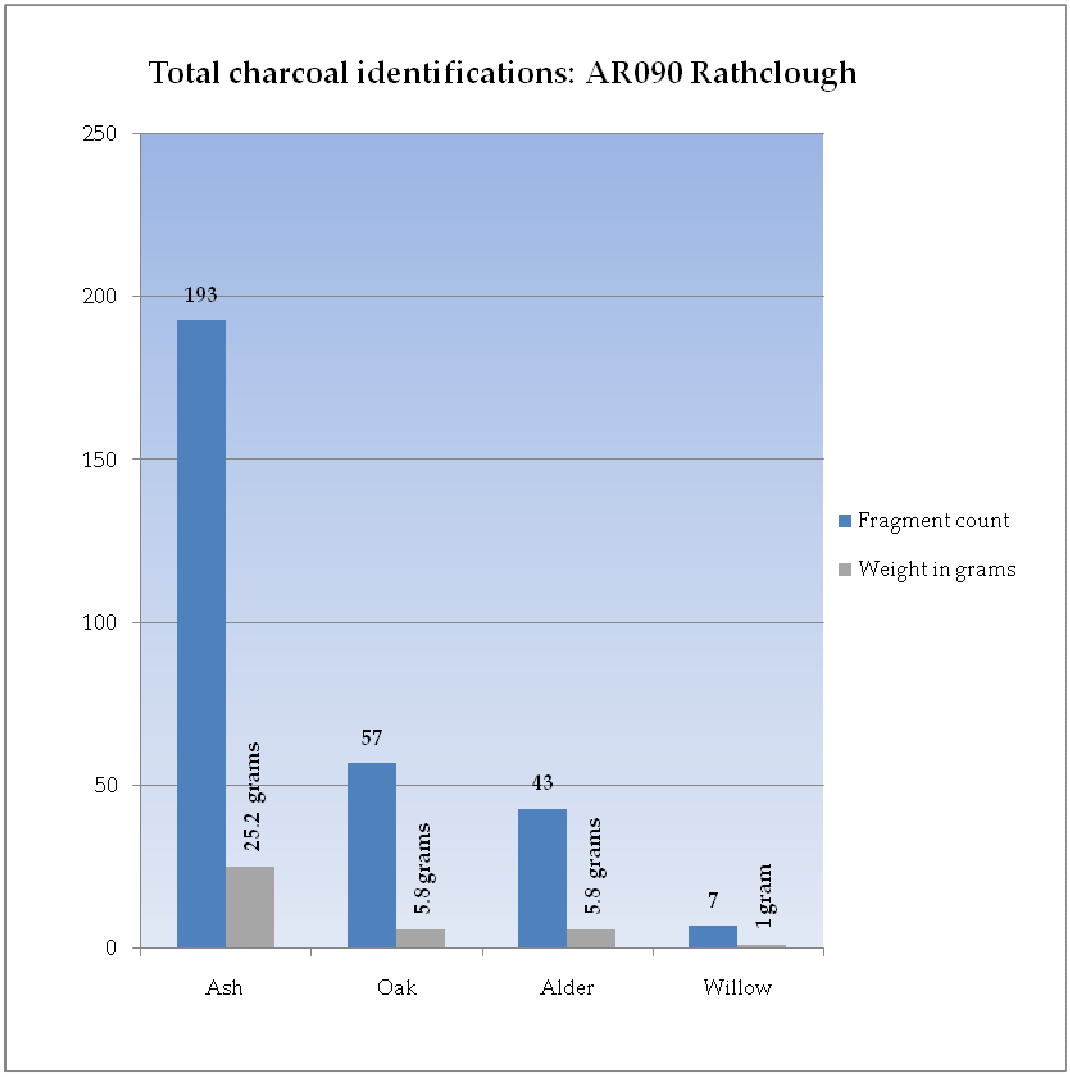

Fig. 2

Ash was the dominant species recorded from pit C10 (C11), pit C14 (C16) and pit C21 (C22). Alder dominated within pit C12 (C13), while oak was the dominant species from pit C3 (C4). C13 contained the only evidence for willow.

Discussion

Background and origin of wood species

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

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

Alnus glutinous L. Gärtner (alder or black alder)
Alder is usually found growing close to running water, rivers or in damp woodland, in the latter often with oak (Orme and Coles, 1985; Rackham, 1995). In marshland alder grows as a shrub frequently mixed with willow and alder buckthorn to form alder carr (Cutler and Gale, 2000). It can also grow well in and on fen peat. Germination and early growth of alders requires a constant supply of water, however once the tree reaches maturity its root system makes the tree less dependent on high water levels (Stuijts, 2005). Alders commonly produce root nodules which contain nitrogen-fixing bacteria, known as *Schinzia alni* which enables alder to enrich soils through its fallen leaves hence allowing the tree to survive in poorer soil conditions (Milner cited in Culter and Gale, 2000; van der Meiden cited in Stuijts, 2005). In suitable conditions alder growth is fast, usually reaching a height of 25m with a maximum girth of 1m and can grow to an age of sixty to one hundred years (Strotelder cited in Stuijts, 2005). While alder makes for poor fuel, it produces good quality charcoal (Edlin, 1951). Once in a waterlogged state, alder is very durable and is often used in the construction of underwater bridge piles, houses and scaffolding (Culter and Gale, 2000).

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

Distribution of charcoal from Rathclogh 2
The number of identifiable charcoal fragments recovered from Rathclogh 2 were localised to just six pit features; C4 (fill of pit C3), C9 (fill of pit C8), C11 (fill of pit C10), C13 (fill of pit C12), C16 (fill of pit C14) and C22 (fill of pit C21).

The samples selected for charcoal analysis represent two groups of pit features recorded from the excavations at Rathclogh 2. Pit C3 and C10 define Group 1, while

pits C8, C12, C14 and C21 define Group 2. The composition of wood species was relatively similar from each pit. While ash was recorded from all six pits, oak and alder was also recorded from C4, C9, C13 and C16, with willow identified from C13. Based on this composition and distribution, it is likely that all six pits were contemporary or contained charred debris from contemporary firing activities. Since C11 and C22 contained exclusively ash charcoal, this may reflect a single dumping episode or the remains of fuel debris from a specialized activity. The absence of *in situ* burning from all features also suggests that the charcoal recorded was re-deposited or dumped from another source. The presence of flint/chert debitage, charred hazelnut shell and charred grain (Lynch, 2009) from some of these features would also imply that these functioned as refuse pits, as suggested (Lynch, 2009, 5).

Summary
The charcoal samples from C4 (fill of pit C3), C9 (fill of pit C8), C11 (fill of pit C10), C13 (fill of pit C12), C16 (fill of pit C14) and C22 (fill of pit C21) recorded at Rathclogh 2 were selected for charcoal analysis.

Despite two distinct groupings of pits identified at the site, ash, oak and alder were all recorded in varying concentrations. Pit C12 (C13) contained the only evidence for willow. The lack of *in situ* burning from these features coupled with the presence of charred hazelnut shell, charred grain and flint/chert debitage suggests that the charcoal assemblage was likely dumped or discarded into these features from nearby firing events.

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Table 1 Charcoal identification results from AR090 Rathclogh 2 (E3727)

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
4	2	23.1 grams	Basal fill of pit C3	Quercus sp. (oak)	28	2.7 grams	3mm - 11mm	2 - 5 rings	weak
				Fraxinus excelsior (ash)	22	2.5 grams	4mm - 10mm	3 - 6 rings	weak
9	4	19.1 grams	Fill of pit C8	Fraxinus excelsior (ash)	18	2.2 grams	4mm - 7mm	4 - 6 rings	weak
				Quercus sp. (oak)	18	1.4 grams	3mm - 6mm	3 - 5 rings	weak
				Alnus glutinous (alder)	14	1.8 grams	5mm - 9mm	4 - 6 rings	weak
11	6	36.9 grams	Fill of pit C10	Fraxinus excelsior (ash)	50	7 grams	4mm - 25mm	3 - 8 rings	weak
13	7	18.6 grams	Fill of pit C12	Alnus glutinous (alder)	20	3.1 grams	3mm - 9mm	4 - 7 rings	weak
				Fraxinus excelsior (ash)	17	2.2 grams	4mm - 15mm	3 - 6 rings	weak
				Salix sp. (willow)	7	1 grams	6mm	2 - 5 rings	
				Quercus sp. (oak)	6	0.9 grams	5mm	3 rings	
16	5	45.9 grams	Fill of pit C14	Fraxinus excelsior (ash)	36	7.2 grams	4mm - 15 mm	3 - 7 rings	weak
				Alnus glutinous (alder)	9	0.9 grams	5mm - 7mm	4 rings	
				Quercus sp. (oak)	5	0.8 grams	5mm	3 rings	
22	9	5.7 grams	Fill of pit C21	Fraxinus excelsior (ash)	50	4.1 grams	4mm - 11mm	4 - 8 rings	weak

Appendix 2.3 Plant Remains Analysis Report – Penny Johnston

Client – Irish Archaeological Consultancy Ltd
Site Name- Rathclogh 2
Excavation number – E3727 AR090
County – Kilkenny
Author- Penny Johnston
Date – June 2009

1 Introduction

This report details the analysis of plant remains recovered from the excavation at Rathclogh 2, E3727 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

The site at Rathclogh 2 comprised a series of pits with fills of waste material, probably waste from a hearth or hearths. The radiocarbon dates indicated late Neolithic and Early Bronze Age activity. A total of eight samples were examined from this site; C4 (S2), C5 (S3), C9 (S4), C16 (S5), C11 (S6), C13 (S7), C20 (S8) and C22 (S9). All of the samples contained hazelnut shell fragments (Table 1). This was the only type of archaebotanical material recovered from the site. Hazelnut shells are ubiquitous finds and various taphonomic factors mean that they are more likely to be preserved in Irish archaeological deposits than most other types of plant material (see Monk 2000). Although the quantity of hazelnut shell fragments from Rathclogh 2 is quite large, the interpretative value of this assemblage is limited.

Table 1: Identified plant remains from Rathclogh 2

Context	**4**	**5**	**9**	**16**	**11**	**13**	**20**	**22**
Sample	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Hazelnut shell fragments (*Corylus avellana* L.)	9	38	37	12	121	4	24	14

References

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Appendix 2.4 Burnt Bone Report – Aoife McCarthy

Osteoarchaeological Report of Burnt Bone from
E3727 A032/: Rathclogh 2 AR090
Co. Kilkenny
N9/N10 Kilcullen to Waterford Scheme
Phase 4b: Knocktopher to Powerstown

Author: Aoife McCarthy MA BA
Date: March 2010

Table f Contents

1. Introduction

Introduction

This report details the osteological analysis of burnt bone samples recovered during excavations at Site E3727 AR090 Rathclogh 2 in the townland of Rathclogh, 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 (Lynch, P. 2009) and from consulting the original site register documents.

General Osteological Information

The osteological analysis of burnt bone fragments recovered during sieving of bulk soil samples from Rathclogh 2 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 3 fragments from 3 possible skeletal elements and weighing 0.01g were recorded within the assemblage. The degree of preservation of the bone assemblage was poor.

All 3 burnt bone fragments recovered at Rathclogh 2 originated from C5 the middle fill of waste pit feature C6. Two charcoal samples retrieved from archaeological contexts C16 and C11 were classified to species and issued for AMS dating. A sample of ash charcoal from waste pit fill C16 returned a two sigma calibrated date of Cal. 2848–2493BC; whilst ash charcoal identified within waste pit fill C11 returned a two sigma calibrated radiocarbon date of Cal. 2852–2501BC, placing activity within the late Neolithic.

Due to fragmentation combined with poor preservation and small size of the individual bone pieces it was not possible to identify any of the 3 bone fragments, these were classed as indeterminate vertebrate.

2. Methodology

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

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

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

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

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

AGEING: Two main methods are used to determine the age of faunal remains; tooth eruption and degree of Epiphysial fusion (a less reliable method). Tooth eruption and wear stages were recorded for the following teeth where possible; dP4 (deciduous fourth premolar), P4 (fourth premolar), M1 (first molar), M2 (second molar) and M3 (third molar) of cattle, sheep/goat and pig (Grant 1982). The analysis of tooth wear patterns refers to the alteration of the enamel surface and exposure of inner dentine through use.

BIOMETRICAL DATA: Due to a high degree of fragmentation and small size of the remains measurements and biometrical analysis were 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 degree of fragmentation and the nature of the burnt bone material recovered from Rathclogh 2.

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

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

3. Results

Context 5 Sample 3

A total of 3 burnt bone fragments (0.01g) of indeterminate vertebrate were recovered within C5 the middle fill of waste pit feature C6. Calcination of the trabecular bone fragments was recognised by an alteration of the bone texture combined with colour change to grey/white. 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. Such distortion to the bone structure reduces its size and as detailed alters bone colour (Luff R. & Pearce J. 1994). Also as Devlin J.P. & Herrmann N. P (2008, 109) state *"increasing exposure to heat bone progresses through a sequence of colours from unburned tan, to shades of dark brown to black, progressing to blue and grey and finally to white*."

4. Summary

Three calcined fragments of trabecular bone were recovered from archaeological contexts C5 on Rathclogh 2 were submitted for examination. Due to the size and fragmented nature of the individual bone pieces it was not possible to identify any fragments to species or bone element. No definite or statistically detailed conclusions could be drawn from the burnt bone assemblage retrieved from Rathclogh 2 due to its limited size and poor degree of bone preservation.

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	C5	3	Unid	Unid													W		3	0.01	Series of miniscule fragments of calcined trabecular bone.

Key:

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

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GLOSSARY OF TERMS:

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

Appendix 2.5 Metallurgical Waste Analysis Report – Angela Wallace

Metallurgical Waste Analysis Report from
E3727 A032/: Rathclogh 2 AR090
Co. Kilkenny
N9/N10 Kilcullen to Waterford Scheme
Phase 4b: Knocktopher to Powerstown
Report by: Angela Wallace Msc, MIAI
August 2010

Introduction
The site at Rathclogh 2 consisted of eight small pits and a single stakehole. The pits appeared to be grouped in two distinct groups. Group 1 consisted of four features, three pits, C3, C6, C10 and a single stakehole C17. These pits contained chert and flint debitage, as well as charred hazelnuts. Group 2 was located 8.75m to the north-west of Group 1 and contained five pits C8, C12, C14, C19 and C21. These pits contained chert and flint debitage, as well as charred hazelnuts and some seeds, in a charcoal-rich matrix. Radiocarbon dates confirmed the pits were late Neolithic in date.

Possible Metallurgical Material
A single small piece of slag was recovered from the topsoil layer on this site. Piece of slag consists of a small grey-black irregular shaped nodule with a weight of 2.5g, piece measures 15mm in length and 12mm in width. Surface is irregular and there is extensive vitrification evident on the surface and some porosity evident on one side. It is possible this piece may be vitrified clay formed in a hearth and may not have any metallurgical links.

Quantity of material is very small and cannot be seen as evidence of metal-working on the site. The material may represent a single episode of artefact repair on or near the site or there is the possibility an iron-working area or dump of residues was located nearby outside the area of the road take.

Conclusions & Recommendations
As there was only a single small fragment of slag from this site its presence is most likely indicative of high temperature activity in a hearth or small-scale iron smithing or artefact repair in the general vicinity. As this fragment cannot be linked to any single chronological feature or event on the site further analysis is not considered worthwhile in this case. Chemical and microscopic analysis would help determine whether or not piece is fired clay or metallurgical in nature.

Appendix 1: Catalogue of Material

Sample #	Context #	Material	Number of Bags	Weight (g)
1	C1	Slag	1	2.50g

Appendix 2.6 Radiocarbon Dating Results – QUB Laboratory

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

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

Calibration data set: intcal04.14c

Context	Sample No	Material	Species id/ Weight	Lab	Lab Code	Date Type	Calibrated date ranges	Measured radiocarbon age (BP)	13C/12C Ratio ‰
C16, Fill of a waste pit	5	Charcoal	*Fraxinus excelsior* / 0.38g	QUB	UBA 13097	AMS (Std)	2831–2504BC(1 sigma), 2848–2493BC (2 sigma)	4072±24	-26.3
C11, Fill of a waste pit	6	Charcoal	*Fraxinus excelsior* / 0.54g	QUB	UBA 13098	AMS (Std)	2834–2577BC(1 sigma), 2852–2501BC (2 sigma)	4086±24	-24.5

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

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

APPENDIX 3 LIST OF RMP IN AREA

RMP No	Description
KK023-047001	Castle – Tower House
KK023-047001	Settlement – deserted – possible medieval
KK023-047003	Road / trackway
KK023-048001	Enclosure
KK023-048002	Hut site
KK023-049001	Enclosure
KK023-049002	Enclosure
KK023-049003	Enclosure
KK023-060001	Field system
KK023-060002	Linear earthwork
KK023-061	Enclosure
KK023-062001	Enclosure
KK023-062002	Cultivation ridges
KK023-063	Enclosure

See Figure 2 for location.

APPENDIX 4 LIST OF SITE NAMES

Site Name	Site Code	E Number	Director	NGR
Baysrath 2	AR055	E3627	Fintan Walsh	251593/137855
Baysrath 3	AR056	E3628	Fintan Walsh	251672/138000
Baysrath 4	AR057	E3629	Fintan Walsh	251515/138280
Danganbeg 1	AR058	E3606	Emma Devine	251462/138754
Danganbeg 2	AR059	E3607	Emma Devine	251397/138939
Danganbeg 3	AR060	E3671	Emma Devine	251430/139245
Danganbeg 4	AR061	E3676	Emma Devine	251401/139372
Knockadrina 1	AR062	E3677	Ed Lyne	251422/139420
Tinvaun 1	AR063	E3678	Ed Lyne	251482/139625
Tinvaun 2	AR064	E3680	James Kyle	251445/139736
Tinvaun 3	AR065	E3608	James Kyle	251501/139832
Tinvaun 4	AR066	E3609	James Kyle	251508/139917
Stonecarthy West 1	AR067	E3610	James Kyle	251538/140023
Knockadrina 2	AR068	E3611	James Kyle	251647/140237
Rathduff 1	AR069	E3612	Ed Lyne	251286/142167
Rathduff Upper 1	AR070	E3613	Ed Lyne	251280/142559
Kellsgrange 1	AR071	E3575	James Kyle	250911/143732
Kellsgrange 2	AR072	E3577	James Kyle	250967/143861
Kellsgrange 3	AR073	E3576	James Kyle	250948/144003
Ennisnag 1	AR074	E3614	Richard Jennings	251416/145690
Ennisnag 2	AR075	E3615	Richard Jennings	251638/146068
Danesfort 12	AR076	E3616	Richard Jennings	251669/146186
Danesfort 13	AR077	E3617	Richard Jennings	251765/146384
Danesfort 2	AR078	E3540	Richard Jennings	251953/146745
Danesfort 4	AR079	E3539	Richard Jennings	251880/147579
Danesfort 3	AR080A	E3542	Richard Jennings	252221/146845
Danesfort 1	AR080B	E3541	Richard Jennings	252267/146707
Croan 1	AR081	E3543	Emma Devine	252280/147332
Danesfort 5	AR082	E3456	Emma Devine	252567/147767
Danesfort 6	AR083	E3538	Emma Devine	252764/147995
Danesfort 7	AR084	E3537	Emma Devine	252878/148099
Danesfort 8	AR085	E3461	Richard Jennings	253020/148246
Danesfort 9	AR086	E3458	Richard Jennings	253089/148345
Danesfort 10	AR087	E3459	Richard Jennings	253229/148414
Danesfort 11	AR088	E3460	Richard Jennings	253245/148462
Rathclogh 1	AR089	E3726	Patricia Lynch	253365/145515
Rathclogh 2	AR090	E3727	Patricia Lynch	253650/148848
Kilree 1	AR091	E3728	Patricia Lynch	254088/149310
Kilree 2	AR092	E3729	Patricia Lynch	254320/149500
Kilree 3	AR093	E3643	Patricia Lynch	254449, 149639
Kilree 4	AR094	E3730	Patricia Lynch	255330/150084
Dunbell Big 2	AR095	E3853	Yvonne Whitty	256684/151066
Holdenstown 1	AR096	E3681	Yvonne Whitty	256737/151253
Holdenstown 2	AR097/98	E3630	Yvonne Whitty	256891/151781
Holdenstown 3	AR099	E3854	Yvonne Whitty	256990/152085
Holdenstown 4	AR100	E3682	Yvonne Whitty	256828/152048
Dunbell Big 1	AR101	E3855	Yvonne Whitty	257034/152315
Rathcash 1	AR102	E3859	Tim Coughlan	258178/154199
Rathcash 2	AR103	E3860	Tim Coughlan	258294/154293
Rathcash East 1	AR104	E3892	Tim Coughlan	259419/154546
Rathcash East 2	AR105	E3893	Tim Coughlan	259555/154566
Rathcash East 3	AR106	E3861	Tim Coughlan	259821/154653
Blanchvillespark 1	AR107	E3894	Richard Jennings	260535/155212
Blanchvillespark 2	AR108	E3895	Tim Coughlan	260637/155449
Blanchvillespark 3	AR109	E3913	Tim Coughlan	260785/155653

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