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

Ministerial Direction Scheme Reference No.	A032
Registration No.	E3848
Site Name	AR157, Ballyquirk 4
Townland	Ballyquirk
County	Kilkenny
Excavation Director	Richard Jennings
NGR	262596 157025
Chainage	61157

FINAL REPORT

ON BEHALF OF KILKENNY COUNTY COUNCIL

MARCH 2011

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	E3848
Excavation Director	Richard Jennings
Senior Archaeologist	Tim Coughlan
Consultant	Irish Archaeological Consultancy Ltd, 120b Greenpark Road, Bray, Co. Wicklow
Client	Kilkenny County Council
Site Name	AR157, Ballyquirk 4
Site Type	Prehistoric
Townland(s)	Ballyquirk
Parish	Gowran
County	Kilkenny
NGR (easting)	262596
NGR (northing)	157025
Chainage	61157
Height OD (m)	88.138
RMP No.	N/A
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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 AR157, Ballyquirk 4 along the proposed N9/N10 Kilcullen to Waterford Scheme, Phase 4 – Knocktopher to Powerstown (Figure 1). The following report describes the results of archaeological excavation at that site. The area was fully excavated by Richard Jennings under Ministerial Direction A032 and Excavation Registration Number E3848 issued by the DOEHLG in consultation with the National Museum of Ireland for IAC. The fieldwork took place between the 2 and 15 January 2008.

This site consisted of the remains of a complex of up to five burnt mounds and/or associated features alongside a stream over distance of approximately 120m. Burnt mound deposits were identified at three areas with the southern two consisting of troughs and pits with no overlying mound material evident. In essence, Ballyquirk 4 consists of five separate smaller sites, all related to burnt mound type activity, but each individual site differed from the next.

Burnt Mound 1 was located at the north end of the site and consisted of one large trough and three pits that were sealed beneath a sizeable burnt mound spread. The trough contained a partly stoned base in the south-west which appeared deliberately laid as a platform or step, possibly to assist entry and exit. To the west of the spread were two further pits that may or may not have been associated.

To the south of Burnt Mound 1 was Burnt Mound 2. Here a possible trough was dated to the middle Bronze Age and there were four irregular shaped pits to the west of it. To the south of the trough, possibly representing un-associated activity was a hearth, two pits and a small cluster of stakeholes. The stakeholes were adjacent to the hearth and may have supported a light structure, but not a building. All of the features at Burnt Mound 2 were sealed by a burnt mound deposit.

Burnt Mound 3 lay to the south of Burnt Mound 2. A large hearth and a possible temporary structure/shelter consisting of nine stakeholes were recorded. Two other pits, one enclosed by the possible structure, were found. A number of postholes may have represented the remains of a palisade or boundary fence, demarking the area of the burnt spread. All features, with exception of the palisade postholes were sealed by a burnt mound deposit. There was no definitive trough identified at Burnt Mound 3.

Burnt Mounds 4 and 5 were located at the south of the site and neither had any evidence for an overlying deposit of burnt mound material. Burnt Mound 4 consisted of a trough with a flag-stone floor and four corner stakeholes which may have supported lining for the wall of the trough or a small shelter over it. A second possible trough was located to the west. Although it was more likely to be a shallow pit, a rough linear arrangement of three postholes extended between the trough and the pit, but their function is unclear. Burnt Mound 5 was the most southerly and contained an elongated oval trough with a single stakehole at the east edge. It was dated to the middle Bronze Age, but is slightly later than the dated trough at Burnt Mound 2.

The discovery of stone-lined troughs is significant because no other troughs of this type were found on the Road Scheme. It is likely that water for the troughs was sourced from the adjacent stream, although there were a few smaller pits scattered across the site which may have held water.

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1 INTRODUCTION

1.1 General

This report presents the results of the archaeological excavation of Ballyquirk 4, AR157 (Figure 1), in the townland of Ballyquirk undertaken by Richard Jennings of IAC, on behalf of Kilkenny County Council and the NRA, in accordance with the Code of Practice between the NRA and the Minister for Arts, Heritage, Gaeltacht and the Islands. It was carried out as part of the archaeological mitigation programme of the N9/N10 Kilcullen to Waterford Road Scheme, Phase 4, which extends between Knocktopher in Co. Kilkenny to Powerstown in Co. Carlow. The excavation was undertaken to offset the adverse impact of road construction on known and potential subsoil archaeological remains in order to preserve the site by record.

The site measured 2900m^2 and was first identified during testing carried out in 2007 by James Kyle (E3531) for IAC Ltd on behalf of the National Roads Authority. Ballyquirk 4 was excavated between 2 and 15 January 2008 with a team of one director and 12 assistant archaeologists.

1.2 The Development

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

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

1.3 Archaeological Requirements

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

The proposed N9/N10 was subjected to an Environmental Impact Assessment, the archaeology and cultural history section of which was carried out by Valerie J. Keeley Ltd and published in February 2005. The Record of Monuments and Places, the Site Monument Record, Topographical files, aerial photography, the Kilkenny and Carlow County Archaeological Urban Survey, and literary sources were all consulted. Two phases of geophysical survey were also conducted by Target (post-EIS geophysics carried out by ArchaeoPhysica) and an aerial survey was carried out by Margaret Gowen & Co. Ltd. As a result of the paper survey, field inspections and geophysical survey, 35 sites were recorded in proximity to this section of the overall route alignment.

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

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

1.4 Methodology

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

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

A complete photographic record was maintained throughout the excavation. Digital photographs were taken of all features and of work in progress.

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

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.

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 was situated on an undulating landscape. The terrain was well drained pastureland. The Blackstairs Mountains were visible to the east and south-east, Mount Leinster was the most prominent peak of these. Brandon Hill was evident to the south. To the east the River Barrow meanders on a north-south axis. Ballinvally 1 was situated *c*. 1km to the north-east and Ballyquirk 3 was located *c*. 1km to the south-west. There were no recorded monuments in the vicinity of the site.

2.1 PHASE 1 Natural Drift Geology

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C2	N/A				Yellow boulder clay	Subsoil

The subsoil at the site consisted of a clay with infrequent gravel inclusions. Pockets of greyish-white marl indicated that this area was poorly drained and this was proven again during heavy rainfall in January 2008.

2.2 PHASE 2 Prehistoric Activity

The main prehistoric features on the site consisted of up to five burnt mounds and their associated features (Burnt Mounds 1–5). In essence each of the burnt mounds represented an individual site. Some consisted of burnt mound spreads and troughs and pits, some contained just troughs and pits with no mound material. The burnt mounds will be presented from north to south.

2.2.1 Burnt Mound 1

This consisted of a burnt mound that sealed a trough, three pits and some postholes (Figures 4–5).

2.2.1.1 Trough 1

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C243	C303	2.7	2.5	0.2	Black/dark grey silty clay, burnt stones	Fill of trough
C303	N/A	2.7	2.5	0.4	Oval cut	Cut of trough
C306	N/A	0.5	0.5	0.05	Mid grey silty clay, burnt stones	Fill of trough
C345	C303	N/A	N/A	N/A	Stones	Trough platform or step

Finds: None

A large, sub-circular shaped trough (Trough 1: C303) with flat stones positioned on part of its base was located centrally within the area of Burnt mound 1 (Figures 4–5 and 9; Plates 2–4). The trough had a near flat base with steep sloping sides on the west, north and south. The east side, nearest the stream, was considerably shallower and may have been subjected to erosion or may have been deliberate to facilitate natural filling from the stream. There was also an initial gentle slope from the ground surface level down into the trough on the other three sides which may also have been caused by erosion or may have been a feature of the initial construction. The flat stones on the base (C345) were localised in the southern part and there was no evidence to suggest that the entire trough base was once covered by them. The stones were limestone and were irregular to sub-rectangular in shape with maximum dimensions ranging from 0.24–0.50m and thicknesses of 0.05–0.06m. They formed a loose 'L' shape measuring 1m east-west by 0.60m north-south and fitted so well into the southern end of the trough that they must have been deliberately placed. They may have functioned as a platform or a step to enter and exit the trough. The trough was filled with C243, which was identical to C206, the main component of the overlying burnt mound material. The composition of the fill had been altered slightly at the edge of the base of the trough, probably due to water erosion (C306).

2.2.1.2 Pits Sealed by Burnt Mound Material

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C233	C346	2.8	1.3	0.98	Mid grey silty clay, burnt stones	Fill of pit
C271	C272	1.12	0.9	0.13	Mid grey silty sand	Fill of pit
C272	N/A	1.12	0.9	0.13	Circular cut	Cut of pit
C273	C342	1.7	0.94	0.13	dark grey silty clay, burnt stones	Fill of pit
C342	N/A	1.7	0.94	0.13	Oval cut	Cut of pit
C346	N/A	2.8	1.3	0.98	Irregular cut	Cut of pit

Finds: None

Three pits, C346, C342 and C272, were also discovered beneath the burnt mound deposit of Burnt Mound 1 (Figures 5–6). Pit C346 was situated 3m to the north of Trough 1 adjacent to the stream. It was an irregular cut both on its sides and base. Its dimensions indicate that it may have functioned as a trough, as it would have held a reasonable quantity of water, but its irregular shape suggests that it did not represent a trough. Its fill, C233, was a mid-grey deposit with large quantities of burnt stones and only occasional charcoal.

The two other shallow pits were situated to the south-east of Trough 1. The nearest to the trough was C342. It was oval to sub-rectangular in shape and contained burnt mound material. At the base of the pit there was a flat stone measuring 0.68m by 0.30m in its western end. This stone might have been naturally located, although it was similar to the deliberately placed stones within Trough 1. The second pit, C272, was circular but of a similar size and depth to C342, thereby suggesting that they were in some way related. Pit C272 was also filled with charcoal and heat-shattered stones.

2.2.1.3 Pits West of Burnt Mound Material

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C3	C4	1.0	0.75	0.3	Dark greyish black silty clay with burnt stones	Fill of pit
C4	N/A	1.0	0.75	0.3	Oval cut	Cut of pit
C211	C213	0.62	0.50	0.30	Mid yellowish grey silty clay	Fill of pit
C212	C213	0.47	0.2	0.17	Mid greyish brown silty clay	Fill of pit
C213	N/A	1.04	0.65	0.22	Sub-rectangular cut	Cut of pit

Finds: None

Pits C3 and C213 were the only archaeological features in the area to the west of the burnt mound deposit where small amounts of possible burnt mound material had accumulated in natural undulations in the subsoil (Figures 5–6). Pit C3 was located 1.5m to the west of the burnt mound and contained heat-shattered stones in its fill, C4. It was oval shaped with a flat base and may have functioned as a waste pit. Pit C213 was situated in an isolated position 15m to the west of Burnt Mound 1. It was sub-rectangular in shape and was filled with burnt mound material, C211 and C212.

Charcoal was retrieved from pit fill C3 during post-excavation soil flotation. This was subsequently identified to species. Fragments of pomaceous woods (*Pomoideae* spp.), wild / bird cherry charcoal (*Prunus avium/padus*) and birch charcoal (*Betula* sp.) were identified (Lyons, Appendix 2.3). This charcoal is most likely representative of firewood used on site and associated with activities surrounding the *fulacht fiadh*/burnt mound (*ibid*).

2.2.1.4 Burnt Mound Material

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C206	N/A	17	8	0.14	Black/dark grey silty clay	Burnt mound
C357	N/A	>17	> 4	0.05	Mid grey silty clay, burnt stones	burnt mound material

Finds: None

The burnt mound material associated with Burnt Mound 1 was at the northernmost point of the site. It measured 17m north-south by 8m west-east although it continued under the hedgerow on the eastern boundary of the site towards the stream 3m away (Figures 5–6 and 9; Plate 1). Examination of the stream banks revealed no trace of the mound, although the undergrowth was quite thick. The mound was made up of heat-shattered sandstone (angular and 0.02–0.15m in size), frequent amounts of charcoal, and dark grey to black silty clay. Material at the base of the burnt mound was light grey and may have been subjected to water erosion. It extended along the length of the mound but was localised to areas of lower ground, especially to the east of Trough 1 (C303).

As well as the trough, the burnt mound sealed pits C233, C272 and C346 and was cut by a post-medieval ditch (C205) (see Section 2.3). Burnt mound material was also detected within tree roots leading out from the hedgerow. Some of these were initially recorded as possible features (see context register, numbers C314–C320) but were later reinterpreted as non-archaeological.

2.2.2 Burnt Mound 2

Burnt Mound 2 was located 45m to the south of Burnt Mound 1 and beside the same stream (Figure 5).

2.2.2.1 Possible Trough 2

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C297	C301	2.2	1.81	0.52	Black/dark grey silty clay	Middle-upper fill of pit
C301	N/A	2.2	1.81	0.58	Sub-circular cut	Cut of pit
C310	C301	0.77	0.53	0.15	Mid grey sandy silt and burnt stones	Upper fill of pit
C311	C301	1.29	1.2	0.20	Orange brown sand	Middle-lower fill of pit
C312	C301	0.8	0.43	0.1	Stones	Basal fill of pit
C340	C341	0.08	0.08	0.12	Black silty clay	Fill of stakehole
C341	N/A	0.08	0.08	0.12	Circular cut	Cut of stakehole

Finds: None

Possible Trough 2 C301 was sub-circular in shape with moderate to almost vertical sides and a slightly uneven base (Figures 6 and 9; Plate 6). A stakehole, C341, filled with black silty clay, C340, was identified on the base of the pit (Figure 6 and 9). It is unclear what the function of this single stakehole was. The possible trough contained 4 fills. The lower two fills consisted of C311, a compact sand with evidence of iron panning, and C312 which consisted of a dump of stones on the base of the pit. It is possible that these represented the final use of the trough – the stones either as a lining, or the remnants of the final heating of water in the trough. The sand may have accumulated naturally in the abandoned flooded trough, effectively representing wash from the surrounding subsoil. The upper pit fills, C310 and C297, both contained significant quantities of angular heat-shattered stones 0.02–0.10m in size, and probably represented disturbed burnt mound material.

Charcoal was retrieved from trough fill C297 during post-excavation soil flotation. This was subsequently identified to species. Fragments of alder charcoal (*Alnus*

glutinous), ash charcoal (*Fraxinus excelsior*), oak charcoal (*Quercus* sp.), pomaceous woods (*Pomoideae* spp.) and holly charcoal (*Ilex aquilifoilium*) were identified (Lyons, Appendix 2.3). This charcoal is most likely representative of firewood used on site and associated with activities surrounding the *fulacht fiadh*/burnt mound (*ibid*).

Stone retrieved from pit fills C297 and C310 was analysed and was found to be very course grained, quartz rich, red / yellow sandstone which is typical of *fulacht fiadh* type material. The material consisted of sub-rounded to sub-angular stones and included broken pebbles (Mandal, Appendix 2.4). Sandstone does not occur in the underlying bedrock and appears to have been deliberately selected for use in the activity on site (*ibid*).

A small fragment (0.16g) of hazel (*Corylus avellana*) from C297 was chosen for AMS dating and returned a result of 3402±25 (UBA 12264). The 2 Sigma calibrated result for this was 1752–1628BC (QUB, Appendix 2.5) dating this feature to the middle Bronze Age.

2.2.2.2 Pits West of Possible Trough 2

A number of pits, some irregular shaped were recorded to the west of Possible Trough 2.

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C118	C235	4.3	1.7	0.68	Dark brown/dark grey silty clay, stone	Fill of "U" shaped pit
C219	C222	-	-	-	Light grey sandy silt	Fill of pit
C220	C222	-	-	-	Mid grey sandy silt	Fill of pit
C221	C222	4.04	1.84	0.2	Orange / mid grey mottled sandy silt	Basal fill of pit
C222	N/A	4.04	1.84	0.5	Irregular cut	Cut of pit
C226	N/A	N/A	N/A	N/A	Irregular cut	Cut of poss. Pit
C235	N/A	4.3	1.7	0.68	"U" shaped cut	Cut of pit
C238	C226	N/A	N/A	0.3	Dark grey silty clay and burnt stones	Fill of pit
C240	C241	1.68	1.3	0.24	Black/dark grey silty clay	Fill of pit
C241	N/A	1.68	1.3	0.24	Sub-circular cut	Cut of pit
C268	C298	0.1	0.1	0.1	Black silty clay	Fill of stakehole
C298	N/A	0.1	0.1	0.1	Circular cut	Cut of stakehole

Finds: None

Pit C241 was located less than 1m to the west of Possible Trough 2 (Figure 6). It was sub-circular in shape and contained heat-shattered stones in charcoal-rich material, C240 that was very similar to the overlying burnt mound material. It had steep sides and a generally flat base. Its function is unknown.

C298 was an isolated stakehole located 1.5m to the south-west of Possible Trough 2 (Figure 6). Its fill, C268, contained silty clay and frequent charcoal but there was no evidence for a stake having rotted *in situ*.

C235, a large pit that was roughly U-shaped in plan, was 4m to the south-west of Possible trough 2 (Figure 6). Its sides were irregular and while its fill contained heat-shattered stones (C118) it is possible that it had been subject to erosion, perhaps as a result of the pit holding water, although it is not interpreted that its primary function was as a trough. It is possible that this represents two parallel east-west linear pits that have become conjoined at the east end rather than a single u-shaped plan feature.

Pit C226, 2m to the west of pit C241, contained burnt mound material but had been truncated considerably by C222, another very irregularly shaped pit which contained three archaeologically sterile layers (C219, C220, and C221) (Figure 6). Given this sterility and the irregular shape it is possible that the entire feature was a form of tree disturbance and that it was deliberately in-filled with these deposits prior to the formation of the overlying burnt mound. It should be noted that the burnt mound deposit was disturbed and levelled so this does not necessarily mean that C222 pre-dates the actual burnt mound activity, merely pre-dates the disturbance of the mound material.

2.2.2.3 Features to the South of Possible Trough 2

A number of features were identified 7m to the south of Possible Trough 2, including a hearth, two pits and a cluster of stakeholes. They may not be directly associated with the activity surrounding Possible Trough 2, but the overlying mound material seals both sets of features.

Pit C300

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C274	C300	N/A	N/A	0.78	Black silty clay, burnt stones	Fill of pit
C300	N/A	N/a	N/A	N/A	Imperceptible cut	Cut of pit

Finds: None

Pit C300 was situated at the east extent of the group of features and extended beyond the limit of excavation towards the stream (Figure 6). It was filled with burnt, heat-shattered stones and charcoal (C274) which was identical to the overlying main burnt mound.

Hearth C309

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C262	C309	1.24	1.2	0.17	Black silty clay heat shattered stone	Upper hearth fill
C308	C309	1.24	1.2	0.06	Orange red silty clay	Bottom fill of hearth
C309	N/A	1.24	1.2	0.17	Sub-circular cut	Cut of hearth

Finds: None

The hearth C309 was sub-circular in shape and was located immediately south-west of Pit C300 (Figure 6). Its base was uneven and its sides not very perceptible, therefore it may have represented an area of burning, rather than a formal hearth. The base of the feature showed signs of deep scorching (C308), particularly on the sides but less so the base, which indicated high temperatures and *in situ* burning. There was no evidence of hearth waste inside the pit. Instead, it was filled with burnt mound material (C262) which was identical in nature to the main mound, with the exception that there was a high concentration of organic material, probably a result of root disturbance from the nearby hedge and trees.

Charcoal was retrieved from hearth fill C262 during post-excavation soil flotation. This was subsequently identified to species. Fragments of oak (*Quercus* sp.), hazel (*Corylus avellana*), ash (*Fraxinus excelsior*), willow charcoal (*Salix* sp.) were identified (Lyons, Appendix 2.3). As mentioned above, the charcoal present is most likely representative of firewood used in the activity associated with the burnt mound (*ibid*).

Stone retrieved from hearth fill C262 was analysed and was found to be very course grained, quartz rich, red / yellow sandstone which is typical of *fulacht fiadh* type

material. The material consisted of sub-rounded to sub-angular stones and included broken pebbles (Mandal, Appendix 2.4).

Hearth/Pit C164

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C115	C164	0.4	0.38	0.1	Black silty clay	Fill of possible hearth
C164	N/A	0.4	0.38	0.1	Square cut	Cut of possible hearth

Finds: None

The small pit, C164, with steep sides and a gently sloping base, was situated adjacent to the west of the hearth C309 (Figure 6). It contained burnt mound material mixed with reddened clay, C115, and as such may have been a hearth or a pit containing hearth waste. There was, however, no evidence of scorching on its base. Alternatively, it may have been a simple pit the backfill of which contained a concentration of reddened clay from the adjacent hearth.

Stakehole Cluster

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C114	C169	0.1	0.1	0.1	Mid grey silty clay	Fill of posthole
C152	C153	0.16	0.15	0.17	Mid grey silty clay	Fill of posthole
C153	N/A	0.16	0.15	0.17	Circular cut	Cut of posthole
C160	C168	0.07	0.07	0.07	Mid grey silty clay	Fill of stakehole
C162	C170	0.11	0.11	0.11	Mid grey silty clay	Fill of posthole
C163	C171	0.07	0.07	0.07	Mid grey silty clay	Fill of stakehole
C167	C172	0.15	0.15	0.16	Mid grey silty clay	Fill of posthole
C168	N/A	0.07	0.07	0.07	Circular cut	Cut of stakehole
C169	N/A	0.1	0.1	0.1	Circular cut	Cut of stakehole
C170	N/A	0.11	0.11	0.11	Circular cut	Cut of posthole
C171	N/A	0.07	0.07	0.07	Circular cut	Cut of stakehole
C172	N/A	0.15	0.15	0.16	Circular cut	Cut of posthole

Finds:

Context	Find Number	Material	Period	Description
C160	E3848:160:1	Ceramic	Post-medieval	Base sherd from pancheon or large bowl

A group of six postholes and stakeholes was found immediately to the south of shallow pit C164 and may have formed a small associated sub-rectangular structure or platform about 1m by 0.50m in size (Figure 6). Small postholes C153 and C172 were angled towards each other, were almost the same size, and were the largest of the group. At the northern end C169 and C170 were also of the same size but smaller and shallower than the southern pair. The final two, C160 and C168, were smaller and shallower again and as such have been classified as stakeholes. While the stakeholes may be interpreted as having a structural function it is not interpreted that this would have been in the form of a building or shelter, but rather some form of apparatus associated with the hearth - a platform, a table, a rack etc. Stakehole C168 contained a piece of post-medieval pottery which was probably intrusive. It was identified as black glaze ware and represented a base sherd of a pancheon or large bowl (Mc Cutcheon, Appendix 2.1).

2.2.2.4 Burnt mound

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C77	N/A	18	Min. 8	0.3	Black silty clay and burnt stones	Burnt mound material

Finds: None

The burnt mound material, C77, associated with Burnt Mound 2 extended for 18m north-south and was at least 9m wide at its maximum point (Figures 4, 6 and 9; Plate 5). It continued beyond the excavation area beneath the eastern field hedgerow and probably extended as far as the stream situated 3m away. The mound material was deepest in the northern part, where it formed an almost circular shape, while it thinned out into a rectangular-shaped spread alongside the edge of excavation in its southern part. The mound consisted of heat-shattered sandstone which were typically angular and measured between 0.02–0.15m in size. The soil matrix consisted of black silty clay with frequent amounts of charcoal. The upper surface was subjected to significant root disturbance as the bordering hedgerow contained some reasonably mature shrubs. No associated trough was identified.

2.2.3 Pits between Burnt Mound 1 and Burnt Mound 2

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C198	C199	1.6	1.4	0.35	Black silty clay and burnt stones	Fill of pit
C199	N/A	1.6	1.4	0.4	Sub-circular cut	Cut of pit
C200	C201	1.2	0.9	0.3	Dark brown silty clay and burnt stones	Fill of pit
C201	N/A	1.2	0.9	0.3	Sub-circular cut	Cut of pit
C202	C203	1.7	1.6	0.15	Black silty clay and burnt stones	Fill of pit
C203	N/A	1.7	1.6	0.15	Sub-circular cut	Cut of pit

Finds: None

A group of three pits, C199, C201 and C203, was located 15–25m to the south of Burnt Mound 1 and 20–30m to the north of Burnt Mound 2 (Figure 6). The three were in a linear alignment running parallel with the stream to the east. They were spaced over a length of 10m with gaps of 2.5m between them. C199 had moderate to steep sloping sides and a distinctive flat base and may have been used to hold water. C203 was slightly larger but much shallower than C199 and probably had a different purpose. Its base was slightly concave and its sides gently sloping. C201 had an irregular base and variably shaped sides so was different again. The pits were all sub-circular and filled with burnt mound material, despite their distance from either burnt mound. The precise nature of the fills differed for each pit. Fill C198 of pit C199 contained burnt stone pieces typically 0.02m x 0.02m in size along with frequent charcoal (Figure 9). In fill C202, of pit C203, the stones were slightly larger in size, 0.03m by 0.04m, but otherwise in a similar black silty clay matrix. In contrast to both, fill C200 of pit C201 was greyer in colour and contained less charcoal, perhaps signalling that its heat-shattered stones had been deposited from a different burnt mound episode or that the stones had been removed from the trough right after use and thrown into this pit.

Charcoal was retrieved from pit fill C202 during post-excavation soil flotation. This was subsequently identified to species. Fragments of charcoal from pomaceous woods (*Pomoideae* spp.), oak charcoal (*Quercus* sp.), ash charcoal (*Fraxinus excelsior*) and holly charcoal (*Ilex aquilifoilium*) were identified (Lyons, Appendix 2.3). As mentioned in Sections 2.2.1 and 2.2.2, the charcoal present is most likely representative of firewood used in the activity associated with the burnt mound (*ibid*).

Stone retrieved from pit fill C202 was analysed and was found to be very course grained, quartz rich, red / yellow sandstone which is typical of *fulacht fiadh* type material. The material consisted of sub-rounded to sub-angular stones and included broken pebbles (Mandal, Appendix 2.4). As sandstone does not occur in the underlying bedrock it would appear that the stone was deliberately selected for use in the activity on site (*ibid*).

2.2.4 Burnt Mound 3

Burnt Mound 3 was located to the south of Burnt Mound 2 and was the southernmost of the burnt areas associated with a burnt mound deposit - no mound material was identified at Burnt Mounds 4 and 5. It consisted of a hearth, four pits and nine stakeholes.

2.2.4.1 Hearth

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C279	C329	1.2	1.1	0.14	Black organic material, burnt stones	Fill of hearth
C324	329	1.6	1.4	0.01	Orange red silty clay	Thin basal fill hearth
C329	N/A	1.6	1.4	0.2	Sub-circular cut	Cut of hearth

Finds: None

Hearth C329 was under the southern extent of the mound and was at the limit of the excavation area, almost within the hedgerow (Figures 7 and 9). It had gently sloping sides and was shallow. The base of the feature showed signs of scorching (C329) which indicates high temperature and *in situ* burning. Its upper fill (C279) consisted of organic material and frequent amounts of charcoal. The accumulation of organic material within an otherwise typical fill of overlying burnt mound material was probably a result of root disturbance from the nearby hedge and trees.

2.2.4.2 Possible Structure A

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C85	C128	0.68	0.36	0.19	Mid grey silty clay	Fill of shallow pit
C86	C197	0.11	0.1	0.14	Mid grey silty clay	Fill of poss. posthole
C87	C193	0.1	0.1	0.15	Mid grey silty clay	Fill of poss. posthole
C88	C192	0.1	0.1	0.12	Mid grey silty clay	Fill of poss. posthole
C89	C196	0.1	0.1	0.05	Mid grey silty clay	Fill of poss. posthole
C97	C195	0.1	0.09	0.06	Mid grey silty clay	Fill of poss. posthole
C98	C194	0.11	0.11	0.16	Mid grey silty clay	Fill of posthole
C99	C191	0.1	0.1	0.05	Mid grey silty clay	Fill of poss. posthole
C100	C190	0.19	0.17	0.12	Mid grey silty clay	Fill of posthole
C101	C189	0.19	0.12	0.18	Mid grey silty clay	Fill of posthole
C128	N/A	0.68	0.36	0.19	Oval cut	Cut of pit
C189	N/A	0.19	0.12	0.18	Oval cut	Cut of posthole
C190	N/A	0.19	0.17	0.12	Sub-oval cut	Cut of posthole
C191	N/A	0.1	0.1	0.05	Circular cut	Cut of possible posthole
C192	N/A	0.1	0.1	0.12	Circular cut	Cut of posthole
C193	N/A	0.1	0.1	0.15	Circular cut	Cut of posthole
C194	N/A	0.11	0.11	0.16	Circular cut	Cut of posthole
C195	N/A	0.1	0.09	0.06	Circular cut	Cut of poss. posthole
C196	N/A	0.1	0.1	0.05	Circular cut	Cut of poss. posthole
C197	N/A	0.11	0.1	0.14	Circular cut	Cut of posthole

Finds:

Context	Find Number	Material	Period	Description
C87	E3848:087:1	Quartzite	Late Neolithic / Bronze Age	Possible hammer stone (burnt)

Possible Structure A was located 3m to the north-west of hearth C329. It was formed by 9 stakeholes arranged in a square plan measuring 1.9m by 1.9m. Within the enclosed area was a shallow pit C128. The stakeholes may have supported a small light temporary shelter. The function of the internal pit is not known.

One possible hammer stone (E3848:087:1) was retrieved from possible posthole fill C87. It was burnt and appeared to show signs of use in the form of pecked and worn

surfaces on its entire circumference. This may be contemporary with the rubbing / hammer stones retrieved from pit fill C31 and may date to the late Neolithic or Bronze Age. These hammer / rubbing stones may be associated with the use of one or more of the *fulachta fiadh* (Sternke, Appendix 2.1).

Stone retrieved from posthole fills C100 and C101 and pit fill C85 was analysed and was found to be very course grained, quartz-rich, red / yellow sandstone which is typical of *fulacht fiadh* type material. The material consisted of sub-rounded to sub-angular stones and included broken pebbles (Mandal, Appendix 2.4).

2.2.4.3 Pit C149

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C91	C149	0.8	1	0.11	Dark greyish black silty clay	Fill of shallow pit
C149	N/A	0.8	0.7	0.11	Oval cut	Cut of shallow pit

Finds:

Context	Find Number	Material	Period	Description
C91	E3848:091:1	Quartz Crystal	Unknown	Unmodified crystal

The pit contained heat-shattered stones and charcoal which was identical to that of the overlying burnt mound. Its function is unclear although it may have been associated with the possible enclosing palisade (see below)

2.2.4.4 Possible Enclosing Palisade

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C54	C55	0.8	0.74	0.18	Mid greyish brown clayey silt	Fill of shallow pit
C55	N/A	0.8	0.74	0.18	Sub-circular cut	Cut of shallow pit
C66	C67	0.25	0.25	0.08	Dark black sandy silt	Fill of possible posthole
C67	N/A	0.25	0.25	0.08	Circular cut	Cut of possible posthole
C98	C148	0.5	0.5	0.27	Greyish brown silty clay	Fill of pit/posthole
C135	C136	0.33	0.3	0.11	Greyish brown silty clay	Fill of shallow pit/p-hole
C136	N/A	0.33	0.3	0.11	Oval cut	Cut of shallow pit/p-hole
C148	N/A	0.5	0.5	0.27	Circular cut	Cut of pit/posthole
C150	C151	0.2	0.2	0.17	Mid grey silty clay	Fill of posthole
C151	N/A	0.2	0.2	0.17	Circular cut	Cut of posthole

Finds: None

Five postholes may have represented the remains of a palisade or boundary fence around the area of Burnt Mound 3. C148, C136 and C55 formed the western line of this boundary, and formed a perfect 10m long straight line orientated north-south. C136 was almost exactly at the mid-point between C148 and C55 which represented the northern and southern limit respectively. C151 was located to the east of C148 and may have represented part of a northern line the boundary/palisade and it would have been roughly at right angles to the western line. C67 was located to the east of C55 and may have represented a southern line. It was also roughly at right angles

The postholes were filled with grey silty clays which had probably washed in naturally soon after the supporting posts were removed but prior to the accumulation of burnt mound material over the area.

Stone retrieved from fill of possible posthole C66 was analysed and was found to be very course grained, quartz rich, red / yellow sandstone which is typical of *fulacht fiadh* type material. The material consisted of sub-rounded to sub-angular stones and included broken pebbles (Mandal, Appendix 2.4).

2.2.4.5 Burnt Mound Material

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C71	N/A	10	7.5	0.3	Black silty clay and burnt stones	Burnt mound

Finds: None

The spread of burnt mound material (C71) at Burnt Mound 3 was the smallest and southernmost of the three burnt mound spreads identified on the site (Figures 4-7; Plate 7). Its shape was roughly rectangular but its full extent could not be ascertained as it extended beyond the excavation area to the east, beneath the same hedgerow which limited the full excavation of the other two burnt mound spreads.

The mound C71 was made up of heat-shattered stones and frequent amounts of charcoal within a matrix of black silty clay. The stones were limestone, angular and between 0.02m and 0.15m in size. The mound was predictably thickest near its centre (0.3m).

2.2.5 Burnt Mound 4

Burnt Mound 4 consisted of a probable trough, a large pit and three stakeholes. There was no burnt mound deposit evident.

2.2.5.1 Trough 3

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C137	C354	1.1	0.7	0.2	Mid greyish black sandy clay	Upper fill of trough
C138	C354	1.6	1.2	0.2	Mid greyish brown clayey silt	Middle fill of trough
C139	C354	1.05	N/A	0.25	Mid brownish orange sandy clay	Middle fill of trough
C140	C354	1.2	N/A	0.2	Mid greenish grey sandy clay	Middle fill of trough
C141	C354	1.2	2,10	0.1	Dark greyish black silty clay	Basal fill of trough
C142	C354	1.8	N/A	0.05	Flat stones	Stony deposit
C332	C333	0.05	0.05	0.7	Light grey silty clay	Fill of stakehole
C333	N/A	0.05	0.05	0.7	Circular cut	Cut of stakehole
C334	C335	0.13	0.13	0.10	Light grey silty clay	Fill of stakehole
C335	N/A	0.13	0.13	0.10	Circular cut	Cut of stakehole
C336	C337	0.12	0.12	0.13	Dark grey silty clay	Fill of stakehole
C337	N/A	0.12	0.12	0.13	Circular cut	Cut of stakehole
C338	C339	0.1	0.1	0.08	Light grey silty clay	Fill of stakehole
C339	N/A	0.1	0.1	0.08	Circular cut	Cut of stakehole
C354	N/A	2.40	2.10	0.54	Sub-circular cut	Cut of trough

Finds: None

Trough 3 (C354) was located within 1m of the hedgerow that marked the eastern edge of excavation, and was within 5m of the stream that was to the east of the site (Figure 8; Plate 8). The trough was sub-rectangular in plan. Trough 3 was not sealed beneath a burnt mound or spread. The trough (2.4m x 2.1m x 0.54m deep) was sub-circular to irregular shaped and contained a series of flat stones across its base. Its sides were moderate to steep sloping, and its base was reasonably flat. There were eight, possibly nine, *in situ* flat stones at the base of the trough. Two were much larger than the rest including the central stone which measured 0.50m by 0.30m by 0.05m. The remaining stones were on average 0.30m by 0.20m by 0.05m. The stones were angular shaped and in good condition; there was no evidence that they had decayed or been subjected to burning. The trough had five fills. The basal fill (C141) was made up of heat-shattered stones, charcoal and black silty clay - typical burnt mound material. This was covered by three sterile deposits: greenish grey sandy clay (C140), mid-brownish orange sandy clay (C139) and mid-greyish brown

clayey silt (C138) and then topped by another deposit of burnt mound material - a greyish black sandy clay with heat-shattered angular stones (C137). This appeared to have been deliberately dumped into the trough after abandonment.

Four stakeholes (C333, C335, C337, and C339 (Figures 8–9)) were found at the base of Trough 3, roughly positioned in each corner. The stakeholes may have supported a timber lining to the trough or supported a light structure/shelter which may have covered the trough. None of them were completely sealed by the flat stones on the base (C142) and it is therefore likely that the stones and stakes were contemporary. The stakeholes were all filled with grey silty clays (C334, C336, C338, and C340).

Charcoal was retrieved from trough fill C141 during post-excavation soil flotation. This was subsequently identified to species. Fragments of charcoal from alder (*Alnus glutinous*), pomaceous woods (*Pomoideae* spp.), ash (*Fraxinus excelsior*), oak (*Quercus* sp.), holly (*Ilex aquilifoilium*) and wild/bird cherry (*Prunus avium/padus*) were identified (Lyons, Appendix 2.3). As mentioned in Sections 2.2.1, 2.2.2 and 2.2.3, the charcoal present is most likely representative of firewood used in the activity associated with the burnt mound (*ibid*).

Stone retrieved from trough fill C141 was analysed and was found to be very course grained, quartz-rich, red / yellow sandstone which is typical of *fulacht fiadh* type material. The material consisted of sub-rounded to sub-angular stones and included broken pebbles (Mandal, Appendix 2.4).

2.2.5.2 Pit/Possible Trough 4

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C31	C35	1.38	1.12	0.24	Mid grey silty clay	Fill of shallow pit
C32	C35	2.57	2.34	0.13	Mid greyish black silty clay	Fill of shallow pit
C35	N/A	3.07	2.89	0.24	Irregular cut	Cut of shallow pit
C37	C38	0.22	0.2	0.2	Mid yellowish black silty clay	Fill of posthole
C38	N/A	0.22	0.2	0.2	Oval cut	Cut of posthole

Finds:

Context	Find Number	Material	Period	Description
C31	E3848:031:1-3	Quartzite	Late Neolithic / Bronze Age	Rubbing / hammer stone
C32	E3848:032:1	Chert	Neolithic	Flake

A shallow pit (C35) was located 3.5m to the west of Trough 3 (Figure 8). The pit was irregular shaped and measured 3.07m x 2.89m x 0.24m. Its sides were gentle sloping and its base was flat and contained two fills. A mid-grey silty clay (C31) formed on the base and contained occasional heat-shattered sandstone, frequent pieces of limestone and moderate amounts of charcoal chunks. Three possible rubbing stones were found in the deposit. This deposit was partially sealed by a layer of burnt mound material (C32) consisting of occasional small and medium-sized heat-shattered pieces of sandstone, moderate amounts of charcoal chunks and mid-grey to black silty clay. A chert flake was found in this fill.

Three quartzite rubbing/hammer stones were retrieved from pit fill C31. All three rubbing stones show one smoothened/polished side and impact wear around their entire circumference or at a minimum on their opposed pointed ends (Sternke, Appendix 2.2). The rubbing stones measure between 58mm and 76mm long and fit neatly into one hand. These stones are most likely associated with food processing, i.e. manos for querns etc. (Adams 1988, 2002) and may also have been used as hammer stones. These tools most likely date to the late Neolithic or Bronze Age and

may be associated with the use of one or more of the *fulachta fiadh* (Sternke, Appendix 2.2).

A single chert flake was retrieved from pit fill C32. The flake was produced on a single platform core and most likely dated to the first half of the Neolithic period (no later than the middle Neolithic) (Sternke, Appendix 2.2). These lithics may represent an earlier use of the site.

Charcoal was retrieved from pit fills C31, C32 and posthole fill C37 during post-excavation soil flotation. This was subsequently identified to species. Fragments of oak charcoal (*Quercus* sp.), charcoal from pomaceous woods (*Pomoideae* spp.), ash charcoal (*Fraxinus excelsior*) and alder charcoal (*Alnus glutinous*) were identified from pit fill C32 (Lyons, Appendix 2.3). This charcoal was likely to represent firewood used in various activities associated with the burnt mound. Posthole fill C37 only contained oak charcoal (*Quercus* sp.) which could indicate the remains of a burnt structure or the methods used in construction works (*ibid*).

Stone retrieved from pit fills C31 and C32 and posthole fill C37 was analysed and was found to be very course grained, quartz-rich, red / yellow sandstone which is typical of *fulacht fiadh* type material. The material consisted of sub-rounded to sub-angular stones and included broken pebbles (Mandal, Appendix 2.4).

2.2.5.3 Postholes

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C33	C34	0.25	0.25	0.18	Dark brownish black silty clay	Fill of posthole
C34	N/A	0.25	0.25	0.18	Circular cut	Cut of posthole
C37	C38	0.22	0.2	0.2	Mid yellowish black silty clay, heated stones	Fill of posthole
C38	N/A	0.22	0.2	0.2	Oval cut	Cut of posthole
C44	C45	0.25	0.25	0.13	Dark greyish brown silty clay	Fill of posthole
C45	N/A	0.25	0.25	0.13	Circular cut	Cut of posthole

Finds: None

These three postholes, C34, C38 and C45, were of similar shape and formed a roughly north-south orientated line 5.5m in length (Figure 7). They were circular or almost circular in shape and they all had steep to vertical sloping sides and generally flat bases. The distance between C44 and C38 was 2.5m and between C38 and C33 was 3m.

The middle posthole, C38, appeared to cut through the fills of pit C35. It was filled with mid-yellowish grey silty clay, occasional heat-shattered sandstone and frequent amounts of charcoal chunks (C37). The fills of the two other postholes contained no heat-shattered stones and appeared to have silted up naturally (C33 and C34).

The exact function of the postholes is unclear but they may have formed a boundary or fenceline similar to the possible enclosing palisade at Burnt Mound 3.

Charcoal was retrieved from posthole fill C44 during post-excavation soil flotation. This was subsequently identified to species and was found to contain high levels of oak charcoal (*Quercus* sp.) (Lyons, Appendix 2.3). This charcoal may indicate the remains of a burnt structure or the methods used in construction works (*ibid*).

Stone retrieved from posthole fills C33 and C44 was analysed and was found to be very course grained, quartz-rich, red / yellow sandstone which is typical of *fulacht*

fiadh type material. The material consisted of sub-rounded to sub-angular stones and included broken pebbles (Mandal, Appendix 2.4).

2.2.6 Burnt Mound 5

2.2.6.1 Trough 5

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C41	C42	3.2	1.4	0.5	Charcoal, burnt stones, silty clay	Fill of possible Trough
C42	N/A	3.2	1.4	0.5	Oval cut	Cut of possible Trough
C58	C59	0.11	0.09	0.13	Mid reddish grey silty clay with charcoal	Fill of stakehole
C59	N/A	0.11	0.09	0.13	Oval cut	Cut of stakehole

Finds: None

Trough 5 (C42) was the southernmost feature on the site (Figure 8; Plates 9–10). It was located 7m from the southern border of the site and 1.5m from the hedgerow that marked the eastern extent of the excavation area, and 5m from the stream that was adjacent to the east of the site. The trough was sub-oval shaped with an east–west orientation. It had the largest volume capacity of all three troughs on the site. The slopes of its sides were moderate to steep and its base sloped gently into a circular flat depression in the eastern half of the feature. A single stakehole (C59) was found on the east side of the trough cut. It is difficult to interpret the function of a single stakehole. The east side of the trough was partially truncated by a modern drainage or boundary ditch C40.

Although no burnt mound deposit was identified in the area, the trough's single fill, C41, consisted entirely of heat-shattered stones, charcoal and silty clay. A relatively large quantity of charcoal was recovered from the base of the stakehole, suggesting that part of a stake may have rotted *in situ* prior to the stakehole filling up with reddish grey silty clay (C59).

Charcoal was retrieved from fill of possible trough C41 during post-excavation soil flotation. This was subsequently identified to species. Fragments of charcoal from willow (*Salix* sp.), ash (*Fraxinus excelsior*), wild/bird cherry (*Prunus avium/padus*), alder (*Alnus glutinous*) and oak (*Quercus* sp.) were identified (Lyons, Appendix 2.3). As mentioned above the charcoal present is most likely representative of firewood used in the activity associated with the burnt mound (*ibid*).

A small fragment (0.63g) of elm (*Ulmus* sp.) was chosen from C41 for AMS dating and returned a result of 3270±24 (UBA 12263). The 2 Sigma calibrated result for this was 1617–1494BC (QUB, Appendix 2.5) dating this feature to the middle Bronze Age.

Stone retrieved from trough fill C41 was analysed and was found to be very course grained, quartz-rich, red / yellow sandstone which is typical of *fulacht fiadh* type material. The material consisted of sub-rounded to sub-angular stones and included broken pebbles (Mandal, Appendix 2.4).

2.3 PHASE 3 Post-medieval Activity

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C40	C41	10 min	1.0	0.15	Curvilinear cut, U-shaped base	Cut of boundary ditch
C41	N/A	10 min	1.0	0.15	Loose dark brown silty clay	Fill of boundary ditch
C46	C47	N/A	0,67	0,08	Mid greyish brown clayey silt	Fill of furrow
C47	N/A	N/A	0.67	0.08	Linear cut	Cut of furrow
C48	C49	N/A	0.4	0.07	Black silty clay	Fill of furrow

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C49	N/A	N/A	0.4	0.07	Linear cut	Cut of furrow
C205	N/A	45 min	0.9	0.25	Curvilinear cut, U-shaped base	Cut of boundary ditch
C204	C205	45 min	0.9	0.25	Loose dark brown silty clay	Fill of boundary ditch

Finds: None

A drainage ditch or boundary ditch ran up the field, parallel with the eastern field boundary and occasionally slightly truncating some of the prehistoric archaeology (Figures 6–7 and 9). It was apparent for 45m in the northern part of the site (C204), where it partially truncated Burnt Mound 1 and Trough 1, and for 10m in the southern part of the site (C40) where it cut Trough 5. It was not noticeable in the area between Plough marks C46 and C48 ran roughly parallel with the eastern field boundary and were detected intermittently up the site, particularly to the south-west of Burnt Mound 3 (Figure 7).

2.4 PHASE 4 Topsoil and Plough soil

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C1	N/A			0.3	Loose friable brown sandy silt	Topsoil

Finds:

Context	Find Number	Material	Period	Description
C1	E3848:001:1-2	Chert	Unknown	Natural chunk
C1	E3848:001:3	Chert	Neolithic	Flake
C1	E3848:001:4	Flint	Unknown	Debitage

The topsoil (C1) was a loose, friable, brown sandy silt that was on average 0.30m deep. It was particularly organic rich and thin alongside the eastern hedgerow and above the burnt mounds.

One chert flake was retrieved from topsoil. The flake was produced on a single platform core and most likely dated to the first half of the Neolithic period (no later than the middle Neolithic). These may represent an earlier use of the site (Sternke, Appendix 2.2). As the find was unstratified from topsoil it cannot be definitively linked to any feature on site and no conclusive evidence for Neolithic activity was identified from the excavated features on the site, however the possibility of Neolithic activity in the vicinity cannot be ruled out.

The presence of one piece of flint debitage suggests that flint was worked at the site.

3 SYNTHESIS

The synthesis presents the combined results of all of the archaeological analysis carried out at Ballyquirk 4. 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 – compiled by Michelle Brick

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 Slevenamon (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. Ballyquirk 4 is located in the northern landscape area.

3.1.2 The Northern Landscape

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

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

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

3.1.3 Site Specific Landscape

The site was situated on an undulating landscape. The terrain was well drained pastureland. The Blackstairs Mountains were visible to the east and south-east, Mount Leinster was the most prominent peak of these. Brandon Hill was evident to the south. To the east the River Barrow meanders on a north-south axis. Ballinvally 1 was situated *c*. 1km to the north-east and Ballyquirk 3 was located *c*. 1km to the south-west. There were no recorded monuments in the vicinity of the site.

3.2 The Archaeological Landscape

As part of the general research relating to sites along the scheme and the specific research relating to Ballyquirk 4, 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 Ballyquirk 4 has been identified as being Bronze Age in date.

3.3 The General Bronze Age Landscape of the Scheme – compiled by Michelle Brick

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

In the southern landscape the exposure of domestic Bronze Age settlement was less forthcoming than that of the northern landscape. There was little direct evidence for structures in the southern and central landscapes with the exception of a cluster of structures in the Danesfort area. Instead most of the settlement activity that fell within the roadtake was noted in the northern landscape, further to the north of Kilkenny and in Carlow. Ritual and burial is a dominant feature of the Bronze Age in Kilkenny and Carlow as indicated by the presence of flat cemeteries, burial cairns, ringditches, mounds, barrows and hillforts throughout these counties. Freestone Hill situated in

Coolgrange, Co. Kilkenny, in the centre of the present landscape is just one example of these sites. Along the lower part of the Nore Valley, and concentrated in the Foulksrath and Jenkinstown areas, the landscape is dominated by barrows (in this case more specifically ringditches). The contrasting locations of these site types most probably relate to differential landscape exploitation by the same communities with some activities, possibly associated with the seasonal use of upland pasture, confined to higher terrain and settlement and funerary activity taking place in the more sheltered lowlands.

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

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

The Northern Landscape: Domestic Settlement

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

As well as two rectangular Neolithic structures at Moanduff 2–3 there were four, or possibly five, separate areas of Bronze Age activity identified. As the features

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

The Northern Landscape; Funerary and Ritual activity

Funerary evidence is represented by ringditches at Kellymount 5 and Paulstown 1 and simple pit cremations also at Paulstown 1. Evidence of the Bronze Age is present at Croan (Aghaviller Parish); where a food vessel was discovered, and also at Cruttenclough; where artefacts of amber, gold and bronze were found; there were 14 gold beads discovered with varying decoration together with graduated amber beads (Lyng 1984). The find circumstances of these artefacts is unknown however similar artefacts in the form of a necklace were discovered at Tara, around the neck of an adolescent male, buried in a pit (Herity and Eogan 1977) and it is likely that the Cruttenclough finds came from a similar burial context. They indicate trading links with Europe and a bronze sunflower pin was also discovered in this townland, which is of late Bronze Age type (Lyng 1984; Eogan 1974a, 87) and originally had a gold foil covering. Other material demonstrating a late Bronze Age presence in the area includes the large hoard from Ballytegan, Co. Laois (Eogan 1983); this contained three sunflower (two covered in gold foil) and one disc-headed pin, two socketed axes, a bracelet of twisted strands and a variety of both solid and hollow bronze rings. The rings are characteristic of Eogan's (1974b; 1993) midland province and this hoard demonstrates ritual activity in the region. Early Bronze Age activity is also evident in the adjacent area of Co. Carlow on the east side of the River Barrow. A cist burial at Killinane contained cremated bone and an upright tripartite bowl food vessel (Moore 1984). Similar discoveries were also found close by in Sliguff and Wells; both townlands are located in west Carlow along the Kilkenny border close to the landscape of the present scheme. The Sliguff cist contained a crouched inhumation that was accompanied by a bowl while the pit cemetery at Baunogenasraid was inserted into the mound of the earlier Linkardstown tomb (Raftery 1974). A large cemetery mound at Ballon Hill was discovered in the 19th century, which revealed a large assemblage of vases and collared urns in both pit and cist burials (Waddell 1990, 51–53).

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

At Garryduff 1 two unroofed structures, both comprising arcs of post- and stakeholes, may have been associated with a large, northwest–southeast pit (2m x 1.3m x 0.16m) located close to Structure 1. This pit contained a charcoal-rich deposit with burnt bone, heat-cracked stones and charred hazelnuts which had been deliberately deposited. Three postholes also containing similar material in their fills were arranged around the pit and a definite concentration of burnt bone was noted in this area of the site. It is possible that this pit and the adjacent postholes represent the remains of a draught pit for a pyre with the postholes at either side being used to stabilise the pyre structure for the duration of the process. Two cremation pits were located outside the enclosure which contained quite large chunks of human bone and possible pyre material.

The cemetery complex at Paulstown 1 consisted of both pit and cist burials. Three small cists (averaging 0.6m by 0.32m by 0.16m internally) were made expediently with slabs and blocks of local stone. Three other pits were less formally lined with stone. Each contained cremations but one cist produced two discrete deposits. Three other grave pits formed part of the cemetery. In one of these pits an unburnt human skull was placed on top of a washed cremation deposit. Several burials were accompanied by ceramic gravegoods. These gravegoods included burnt sherds from bipartite vases, a miniature cordoned urn and a miniature vase; a burnt flint scraper as well as charred seeds and hazelnuts also came from one of the cists. The largest grave at Paulstown consisted of a large pit or pits. This contained a complex sequence of deposition which appears to have begun with a circular pit which contained an inverted vase; this was disturbed by the insertion of Vessel 1, another inverted vase which survived intact. A miniature vase (No. 6) may have accompanied one of these burials. Subsequently, a second larger pit extended the grave to the south. The fragmentary remains of three pots (No.s 3–5) were deposited on the base of this pit and a large cremation deposit was placed over them. This deposit contained sherds from Vessels 5 and 6 as did a final silty fill. The evidence suggests that the grave was extended to accommodate burials disturbed from other graves. A large circular pit occurred on the edge of the cemetery (1.55m by 1.48m by 0.80m deep). This had originally been maintained as an open feature that filled naturally with water. Subsequently, a complex sequence of layers containing charcoal, burnt and unburnt bone, charred hazelnut shells and seeds, antler and flint (including flakes, blades and debitage), developed or was deposited in the pit. The proximity of this feature, which appears to have been a well, suggests that it was associated with the funerary activity on the site.

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

Evidence for funerary activity was also excavated at Coolnakisha 2, where one pit (0.33m x 0.26m x 0.13m) contained 25.5g of charcoal, 0.1g of charred seeds and 390.3g of burnt bone. Other pits and possible pits and spreads also contained burnt bone inclusions, although in much smaller quantities. Both sites produced small

quantities of probably middle Bronze Age while residual Neolithic material in the form of three flint scrapers came from Coolnakisha 1.

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

The Northern Landscape; Burnt Mound Activity

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

The Northern Landscape; Route-ways and communications

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

The Northern Landscape; Conclusions

In the northern part of the region, focussed on the uplands of the Castlecomer Plateau and the flanking valleys of the Nore and Suir, intense settlement is indicated by both burnt mounds and barrows. The burnt mounds are focussed in the upland area and especially along the river and stream valleys, such as at Clashduff, Coan

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

3.3.1 The Site Specific Archaeological Landscape of Ballyquirk 4

There are no previously recorded monuments in the vicinity of Ballyquirk 4. No sites were excavated in the immediate vicinity as part of the N9/N10 Phase 4: Knocktopher to Powerstown. The nearest sites are over 850m away to the south-west and north-east.

Two adjacent sites are located to the south-west - Ballyquirk 2 and 3. At Ballyquirk 2 an early Bronze Age settlement was identified. A wide range of features including circular arrangements of posts and stakes indicate that this was likely to be the focus of a semi-permanent domestic settlement in the early Bronze Age. At Ballyquirk 3 similar activity was identified although it was not as intensive as at Ballyquirk 2. There was one area of postholes and stakeholes that may represent the remains of a structure as well as random and dispersed pits and postholes. It has been dated to the middle Bronze Age.

To the north-east was Ballinvally 1 where a pit filled with heat-fractured stone and charcoal was identified at the northern edge of the site associated with burnt mound activity. A hearth and three stakeholes were located on the south-western edge of the site. The stakeholes may be the remains of a wind break of shelter associated with the hearth. This site has been dated to the middle Bronze Age.

3.4 Typological Background of Burnt Mounds

Burnt mound sites (also commonly referred to as *fulacht fiadh*) are one of the most common field monuments found in the Irish landscape. The last published survey (Power *et al*. 1997), carried out over a decade ago, recorded over 7,000 burnt mound sites and in excess of 1,000 sites have been excavated in recent years through development led archaeological investigations. In spite of this no clear understanding of the precise function of these sites has been forthcoming.

Burnt mound sites are typically located in areas where there is a readily available water source, often in proximity to a river or stream or in places with a high water table. In the field burnt mounds may be identified as charcoal-rich mounds or spreads of heat shattered stones, however, in many cases the sites have been disturbed by later agricultural activity and are no longer visible on the field surface. Nevertheless even disturbed spreads of burnt mound material often preserves the underlying associated features, such as troughs, pits and gullies, intact.

Ó Néill (2003–2004, 82) has aptly identified these sites as the apparatus and by-product of pyrolithic technology. This technology involved the heating or boiling of water by placing fire-heated stones into troughs of water. Small shallow round-bottomed pits, generally referred to as pot boiler pits or roasting pits, are often associated with burnt mound sites. The purpose of these pits remains unclear. Occasionally large pits are also identified and may have acted as wells or cisterns.

Linear gullies may extend across the site, often linked to troughs and pits, and demonstrate a concern with onsite water management. Post and stakeholes are often found on burnt mound sites and these may represent the remains of small structures or wind breakers.

Burnt mound sites are principally Bronze Age monuments and reach their pinnacle of use in the middle/late Bronze Age (Brindley *et al*. 1989−90; Corlett 1997). Earlier sites, such as Enniscoffey Co. Westmeath (Grogan *et al*. 2007, 96), have been dated to the Neolithic and later sites, such as Peter Street, Co. Waterford (Walsh 1990, 47), have been dated to the medieval period. Thus although burnt mound sites generally form a component of the Bronze Age landscape, the use of pyrolithic technology has a long history in Ireland.

Although there is a general consensus that burnt mound sites are the result of pyrolithic technology for the heating or boiling of water, the precise function of these sites has, to date, not been agreed upon. Several theories have been proposed but no single theory has received unanimous support. The most enduring theory is that burnt mounds sites were used as cooking sites. O'Kelly (1954) and Lawless (1990) have demonstrated how joints of meat could be efficiently cooked in trough of boiling water. The use of burnt mound sites for bathing or as saunas has been suggested as an alternative function (Lucas 1965, Barfield and Hodder 1987, O' Drisceoil 1988). This proposal is largely influenced by references in the early Irish literature to sites of a similar character and is very difficult to prove, or disprove. Others, such as Jeffrey (1991), argue that they may have been centres of textile production for the fulling or dyeing of cloth. More recent demonstrations by Quinn and Moore (2007) have shown that troughs could have been used for brewing, however, this theory has been criticised by leading Irish environmentalists due to the absence of cereal remains from most burnt mound sites (McClatchie *et al*. 2007)

3.5 Summary of the Excavation Results

This site consisted of the remains of a complex of up to five burnt mounds and/or associated features alongside a stream over distance of approximately 120m. Burnt mound deposits were identified at three areas with the southern two consisting of troughs and pits with no overlying mound material evident. In essence, Ballyquirk 4 consists five of five separate smaller sites, all related to burnt mound type activity, but each individual site differed from the next.

Burnt Mound 1 was located at the north end of the site and consisted one large trough and 3 pits that were sealed beneath a sizeable burnt mound spread. The trough contained a partly stoned base in the south-west which appeared deliberately laid as a platform or step, possibly to assist entry and exit. To the west of the spread were two further pits that may or may not have been associated.

To the south of Burnt Mound 1 was Burnt Mound 2. Here a possible trough was dated to the middle Bronze Age and there were four irregular shaped pits to the west of it. To the south of the trough, possibly representing un-associated activity was a hearth, two pits and a small cluster of stakeholes. The stakeholes were adjacent to the hearth and may have supported a light structure, but not a building. All of the features at Burnt Mound 2 were sealed by a burnt mound deposit.

Burnt Mound 3 lay to the south of Burnt Mound 2. A large hearth and a possible temporary structure/shelter consisting of nine stakeholes were recorded. Two other pits, one enclosed by the possible structure, were found. A number of postholes may have represented the remains of a palisade or boundary fence, demarking the area of the burnt spread. All features, with exception of the palisade postholes were

sealed by a burnt mound deposit. There was no definitive trough identified at Burnt Mound 3.

Burnt Mounds 4 and 5 were located at the south of the site and neither had any evidence for an overlying deposit of burnt mound material. Burnt Mound 4 consisted of a trough with a flag-stone floor and four corner stakeholes which may have supported lining for the wall of the trough or a small shelter over it. A second possible trough was located to the west, although it was more likely to be a shallow pit. A roughly linear arrangement of three postholes extended between the trough and the pit, but their function is unclear. Burnt Mound 5 was the most southerly and contained an elongated oval trough with a single stakehole at the east edge. It was dated to the middle Bronze Age, but is slightly later than the dated trough at Burnt Mound 2.

The discovery of stone-lined troughs is significant because no other troughs of this type were found on the Road Scheme. It is likely that water for the troughs was sourced from the adjacent stream, although there were a few smaller pits scattered across the site which may have held water.

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

Post-medieval Pottery Analysis

A single base-sherd of pottery was identified as black glazed ware, from a pancheon or large bowl. These wares were made in North Wales and Lancashire in the 17th and 18th centuries (Davey 1975) and also in parts of Ireland (Meenan 1997).

Lithics analysis

The lithic finds from the archaeological investigations at Ballyquirk 4, Co. Kilkenny are two chert flakes, a piece of flint debitage, three quartzite rubbing/hammer stones and a possible quartzite hammer stone. In addition, an unmodified piece of quartz crystal and two natural chunks of chert were also identified. The flakes appear to date to the first half of the Neolithic period based on their technological characteristics, while the macro tools may date to the late Neolithic or Bronze Age and may be associated with the *fulachta fiadh*.

Charcoal and Wood Species identification

The charcoal fragments identified from C003, C032, C37, C41, C44, C141, C202, C262 and C297 from Ballyquirk 4 were chosen for charcoal identification and analysis. Nine wood species were recorded at the site (oak, pomaceous woods, alder, hazel, ash, willow, holly, wild/bird cherry and birch). The identified charcoal is most likely representative of firewood used on site and associated with activities surrounding the *fulacht fiadh/*burnt mound. The wood assemblage from Trough 3, Trough 5, pit C203 and pit C301 was very similar and likely to be associated with the same phase of events. Trough 1 and Trough 3 contained a different wood composition and based on this could represent a separate phase or burning episodes. The high oak charcoal from postholes C38 and C44 could reflect the remains of a burnt structure or the methods used in construction works.

Petrographical analysis

Samples of stone from the burnt mound material identified course grained red sandstone that was quartz rich. Coarse grained sandstone does not occur in bedrock in the immediate vicinity of the site. The dominant rock type in the area is limestone.

It is important to note that these rock types were not necessarily sourced from bedrock. The sample is clearly a shattered cobble, indicating a secondary source, such as in the glacial tills / river cobbles. It is therefore possible that these rocks were sourced locally.

Coarse grained sandstone is typical of *fulacht fiadh* material (e.g. see Mandal 2004). It is significant that sandstone is the predominant rock type given that, due to the differing underlying bedrock, it would not be the most abundant rock type available, either in outcrop or in the overlying tills. This indicates that sandstones were deliberately being selected for use in preference to the more abundant finer grained rock types in the area.

Radiocarbon Dating

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

A sample of elm charcoal from fill C41 of Trough 5 was sent for analysis and returned a 2 sigma calibrated date of 1617–1494BC (UBA 12263).

A sample of hazel charcoal from fill C39 of possible Trough 2 was sent for analysis and returned a 2 sigma calibrated date of 1752–1628BC (UBA 12264).

4 DISCUSSION AND CONCLUSIONS

4.1 Discussion

Ballyquirk 4 was an interesting site that in essence consisted of up to five separate but related burnt mound sites. All of the sites were located along the western bank of a small stream in a poorly-drained landscape. They stretched for a distance of 120m along the length of the stream.

Ballyquirk 4 was located adjacent to a small stream in a marginal landscape. Physically this type of location is often attractive for burnt mound activity. The proximity of the stream in addition to the wet nature of the immediate landscape provided the water resource for filling troughs. As a result the identification of this type of archaeology in this location is not unexpected.

There are no significant archaeological sites in the immediate vicinity of Ballyquirk 4, including the results of the N9/N10 Phase 4 scheme, so it is difficult to place the site in a wider context. Only two of the possible five burnt mound on the site were dated and both returned middle Bronze Age dates (although not contemporary). However, it is likely that the activities on the site span throughout the Bronze Age period. The sites of Ballyquirk 2 and 3, while in the same townland are *c*. 1km away; so any direct link is tentative. However, these sites produced some evidence for domestic settlement dating to the early Bronze Age (Ballyquirk 2) and the middle Bronze Age (Ballyquirk 3). The dearth of any further archaeological evidence between these sites and the cluster of burnt mounds at Ballyquirk 4 could suggest there may not be any direct association.

The range of burnt mound site types and the nature of the features identified at Ballyquirk 4 was interesting. We have documented a general typological background to burnt mounds (Section 3.3) and indicated that there are many varying elements and possible functions to these sites. The common denominator is the use of hot-stone technology. Ballyquirk 4 displays much of this variety in one location.

The identification of a spread of burnt mound material is often associated with this site type and indeed it was present on Burnt Mounds 1-3. However, no overlying mound material was identified on Burnt Mounds 4 and 5, to the south of the overall site. Perhaps, as both of these burnt mounds are adjacent, there was an external factor at play which has removed the mound material from this area; i.e. washed by excessive flooding or removed by agriculture. But there was no evidence of even residual deposits within natural hollows, so it appeared that these features were never associated with an adjacent burnt spread and it seamed unlikely that the burnt mound material was dumped to the north at one of the other sites. It has been suggested that in some instances small pits with no associated mound may represent roasting pits or pot boilers. The features at Burnt Mound 4 and 5 have been interpreted as troughs, and indeed Trough 3 displays many features characteristic of troughs (i.e. stakeholes in the corners and a lined base). It is more likely therefore that these troughs were used just once, and that the waste material from the heating process was never removed, thus not creating an associated burnt mound deposit.

Two of the troughs showed evidence for a stone lining on the base of the trough. This is unusual and was not identified on any other burnt mound sites on the N9/N10 Phase 4 scheme. The use of this method of basal lining in adjacent burnt mounds suggests that this is a trademark technique to this particular community. The stones in Trough 1 only covered a partial area of the base and may represent a step or a platform for access, but the surviving section was very deliberately laid, as was the

base of Trough 3. Trough 3 also shows evidence of possible lining of the walls of the trough with the presence of a stakehole in each corner, although no actual lining was identified. Trough 3 was the only trough with clear evidence for possible lining as some other troughs had a single stakehole, but the function of a single isolated stakehole cannot be accurately interpreted.

Burnt mound sites are associated with hot-stone technology – usually the heating of stones in a fire which are then placed in a water-filled trough to heat the water. Often while the troughs are identified, there is little evidence of the hearth or the source of the heat. At Ballyquirk 4, two hearths were found, but neither was directly associated with a trough. The hearth at Burnt Mound 2 was a considerable distance to the south of the trough, although it is possible that the adjacent pit C300 may have functioned as a trough. This pit was only partially excavated as it extended beyond the limit of excavation. A sizeable probable hearth was identified at Burnt Mound 3, but no trough or possible trough was identified at this site. Perhaps this evidence indicates that the hearths were not necessarily adjacent to the troughs, possibly because it was too wet. This would require transporting of the hot stones between hearth and trough, but this seems unlikely. It is more plausible that the hearths are raised above the waterlogged ground, and as such leave little or no archaeological record.

Two separate possible structures were identified at the excavation of Ballyquirk 4. At Burnt Mound 2 a small cluster of stakeholes was located adjacent to the hearth. While the small size of the cluster (1.9m by 1.9m) indicates that this is not likely to be a building or shelter, it may represent evidence of a platform, a table, a rack or other temporary fixture. A more convincing possible building/shelter was at Burnt Mound 3 where a roughly square arrangement of nine stakeholes was identified measuring 1.9m x 1.9m. A shallow oblong pit was within the enclosed area. As has been outlined above, there was no definitive trough found at this site, so the presence of a stand alone possible shelter is particularly interesting. Burnt Mound 3 also showed evidence for a possible enclosing fence/palisade with the identification five postholes around the perimeter of main area of activity. Three of these form a perfect straight north-south line immediately to the west of the mound deposit, with the other two postholes at right angles to this line, one at the north the other at the south. This could represent a small but deliberately laid temporary encampment associated with the burnt mound activity

4.2 Conclusions

Ballyquirk 4 produced evidence for burnt mound activity dated to the middle Bronze Age adjacent a small stream. On the surface there appears to be nothing remarkable about the findings in their physical surroundings, even if there is little other archaeological evidence in the surrounding area. However, the site consists of five separate burnt mounds each spaced along the west bank of the stream. Within these sites there are a range of similarities and differences which makes each one uniquely different to the next. There are also elements such as the stone lining of two of the troughs which makes the site unique in terms of the results from the overall N9/N10 Phase 4 scheme. The site is very important locally as it presents the first archaeological evidence from the immediate landscape. It is important regionally as the technology of the stone lined bases may indicate a society with slightly different cultural traditions and methods living in this specific area. The site is also of importance in the wider national study and understanding of burnt mounds and their function and form, particularly given the proximity of the five burnt mounds and the variety of their results.

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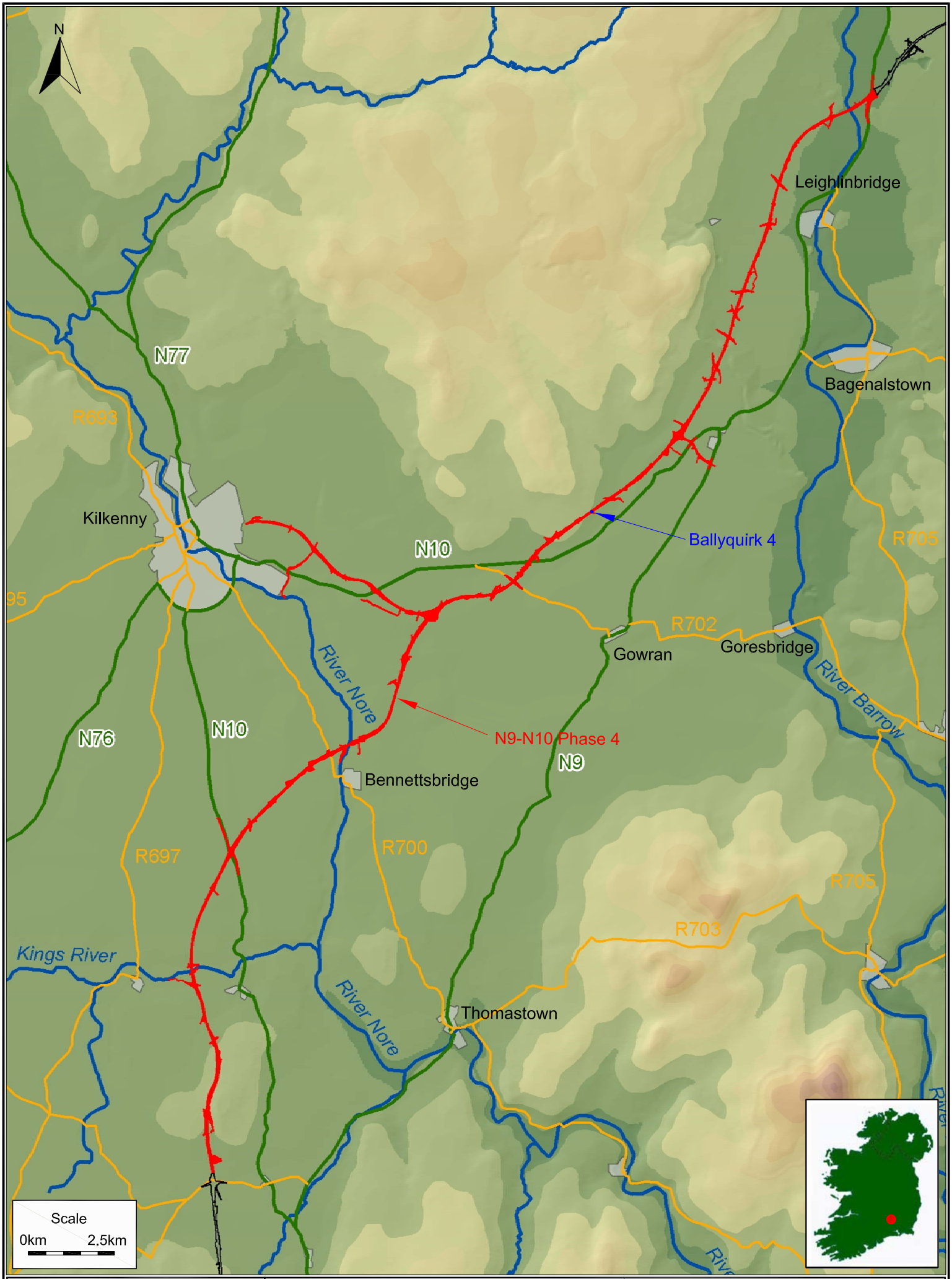

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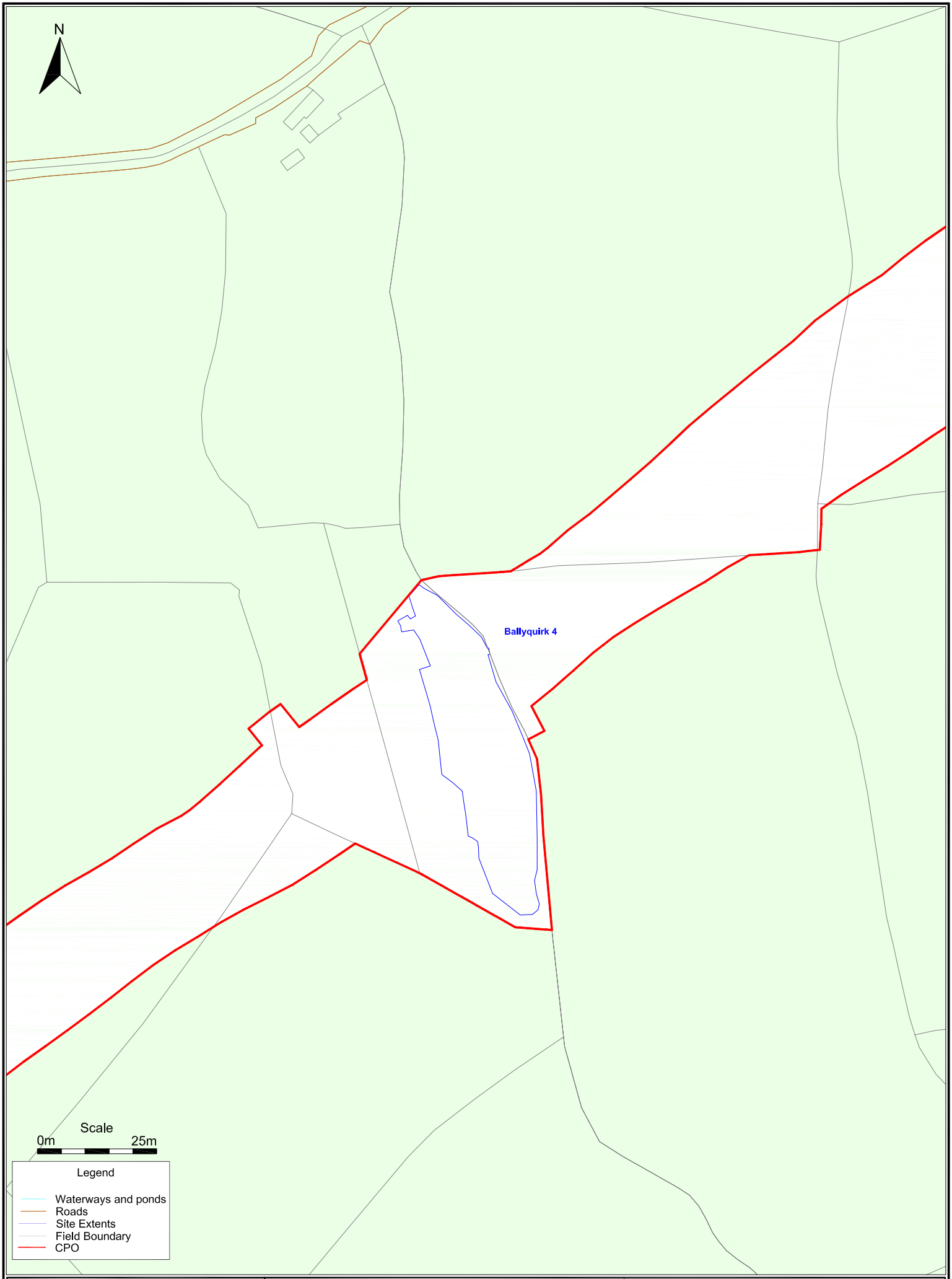

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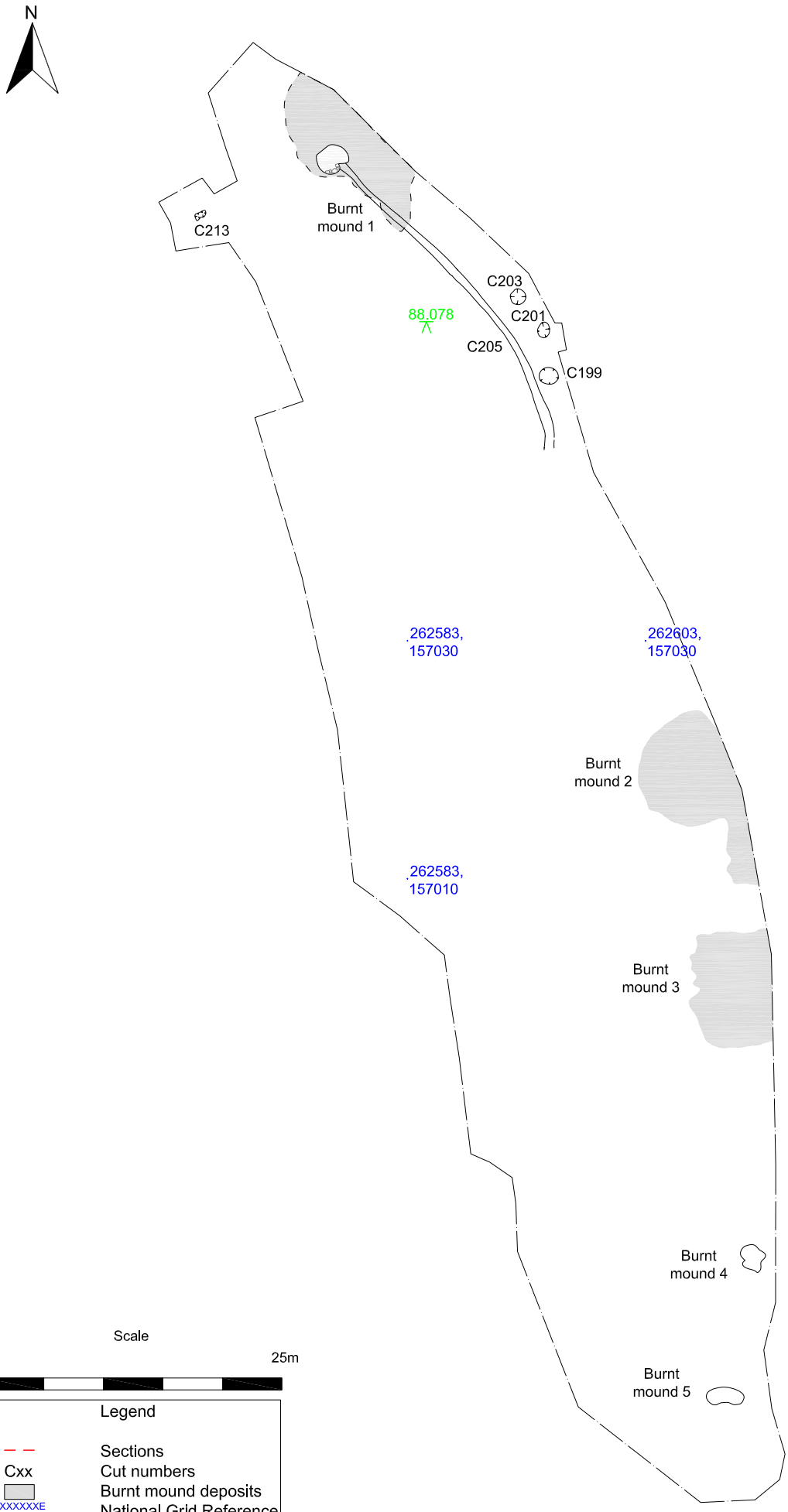

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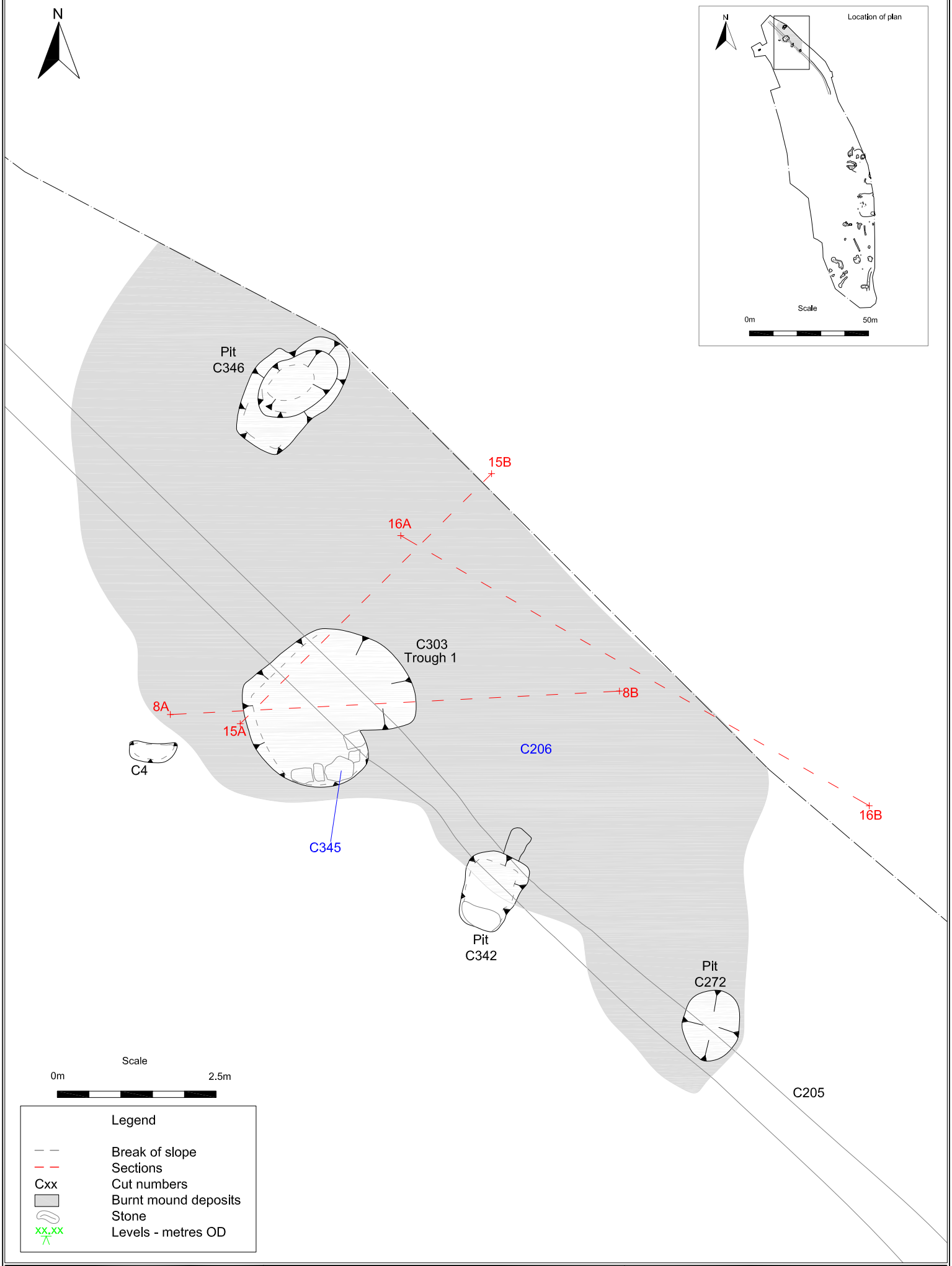

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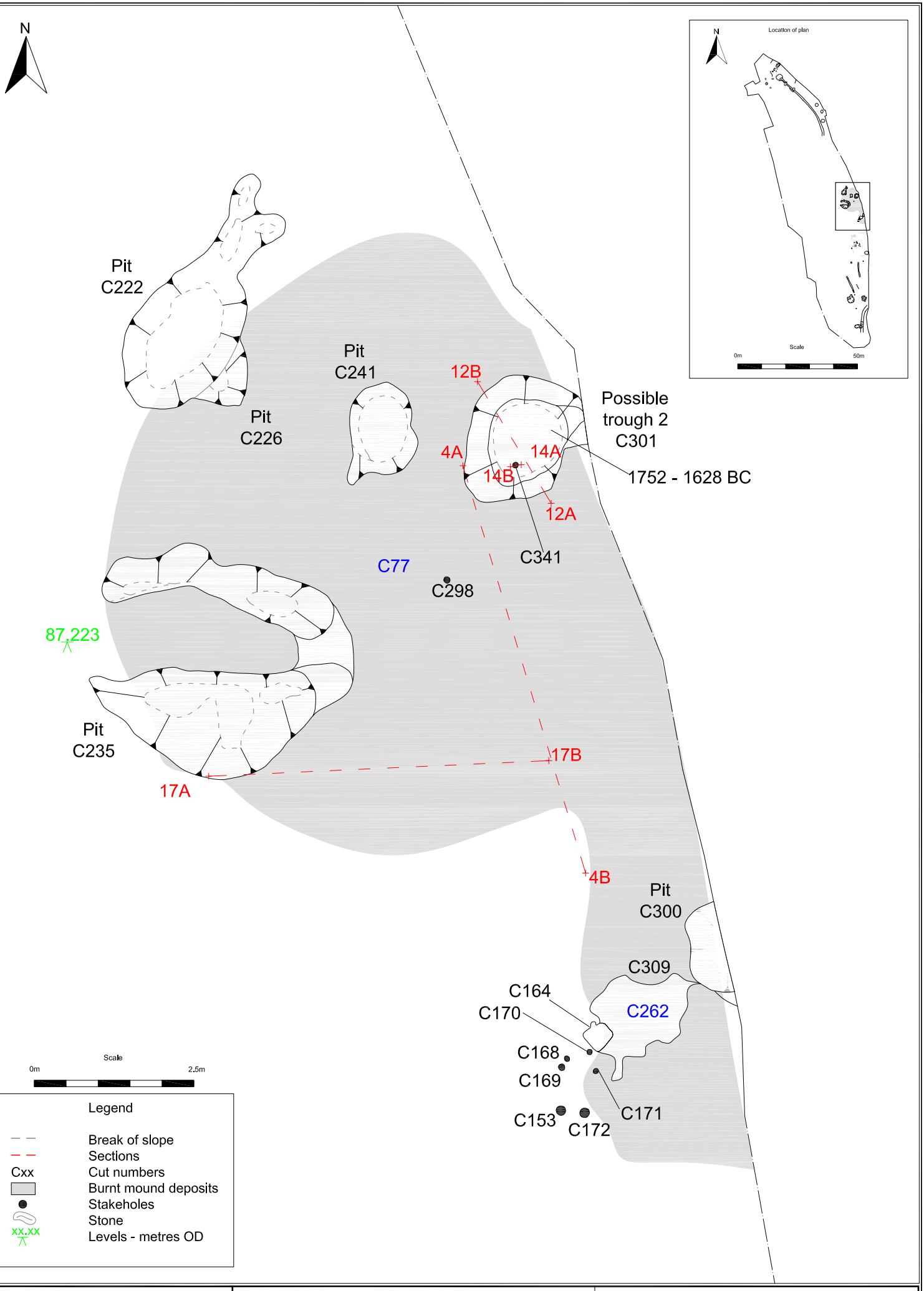

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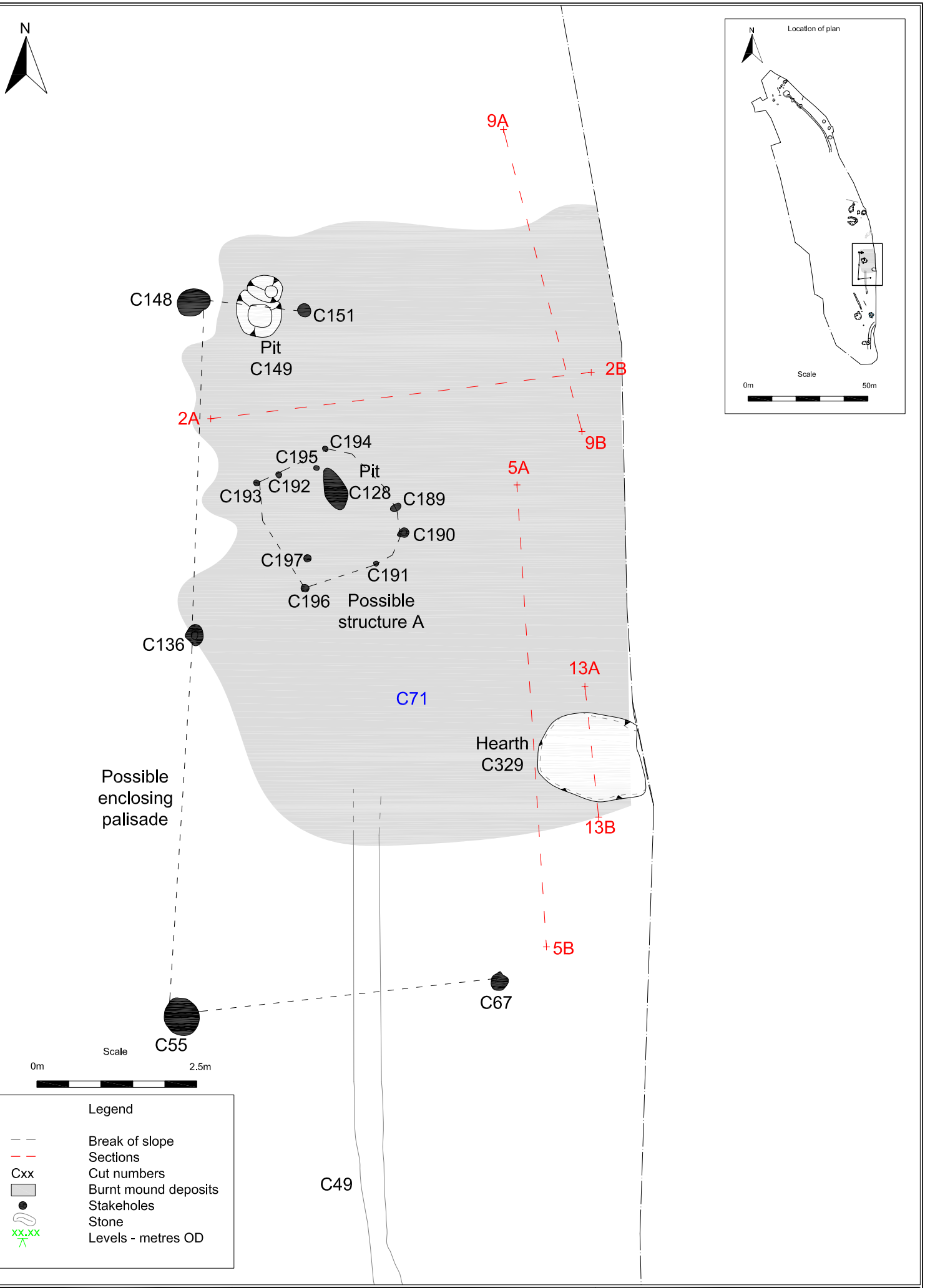

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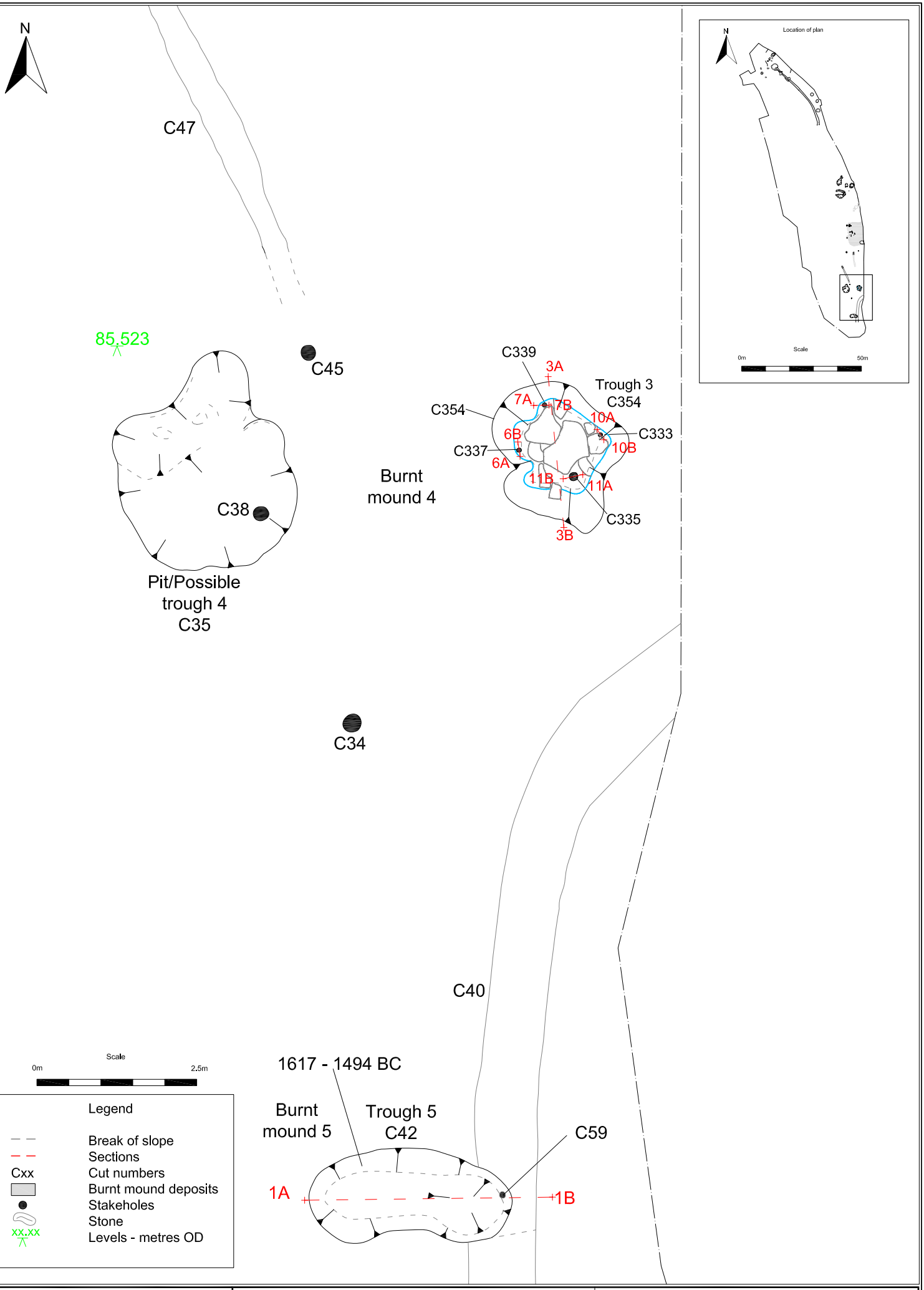

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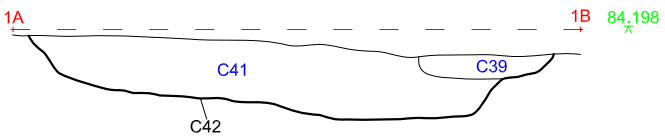

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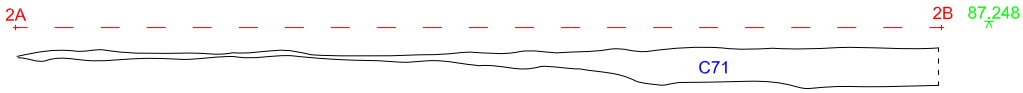

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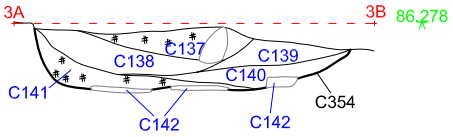

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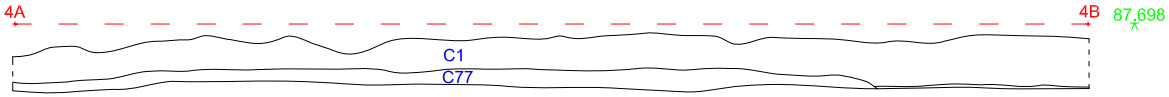

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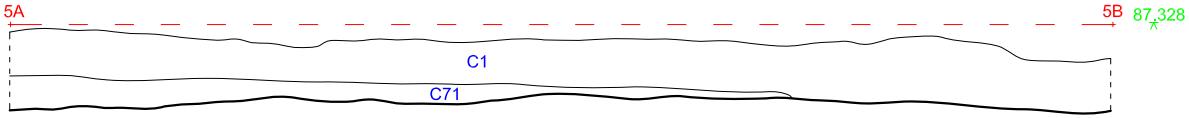

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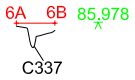

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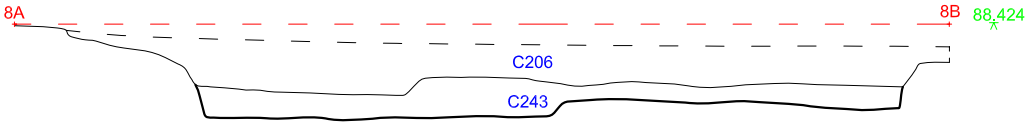

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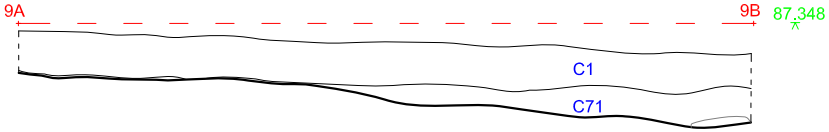

Scale

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Legend

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

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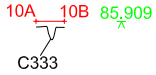

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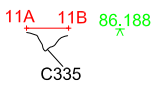

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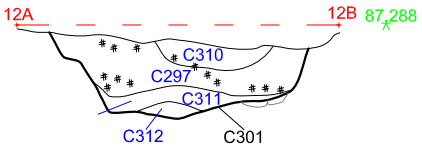

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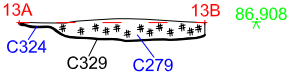

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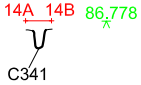

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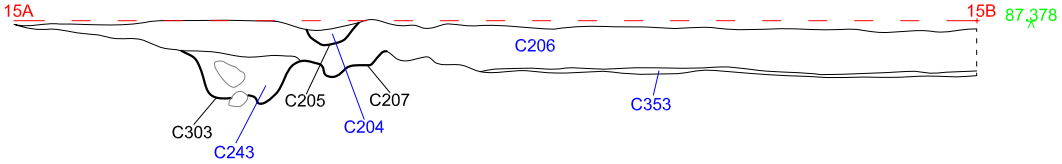

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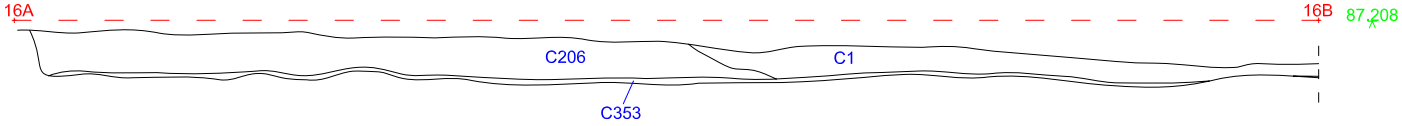
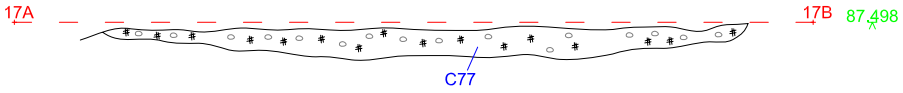


South facing section of C77



Scale

0m 2.5m

Legend

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

IAC Irish Archaeological Consultancy

Title:	Ballyquirk 4 - sections 10 - 17
Project:	N9/N10 Phase 4: Knocktopher to Powerstown
Client:	Kilkenny County Council

Scale:	1:50 @ A4
Date:	25/05/10
Produced by:	G Kearney
Job No:	J2432.1
Figure No:	10

PLATES

Plate 1: Burnt Mound 1, mid-excavation, facing east

Plate 2: Trough 1, pre-excavation, facing east

Plate 3: Trough 1 with flat stones placed on base, post-excavation, facing north

Plate 4: Close-up of stones on base of Trough 1, post-excavation, facing north

Plate 5: Burnt Mound 2, pre-excavation, facing east

Plate 6: Pit C301, mid-excavation, facing west

Plate 7: Burnt Mound 3, pre-excavation, facing east

Plate 8: Trough 3, mid-excavation, facing north-west

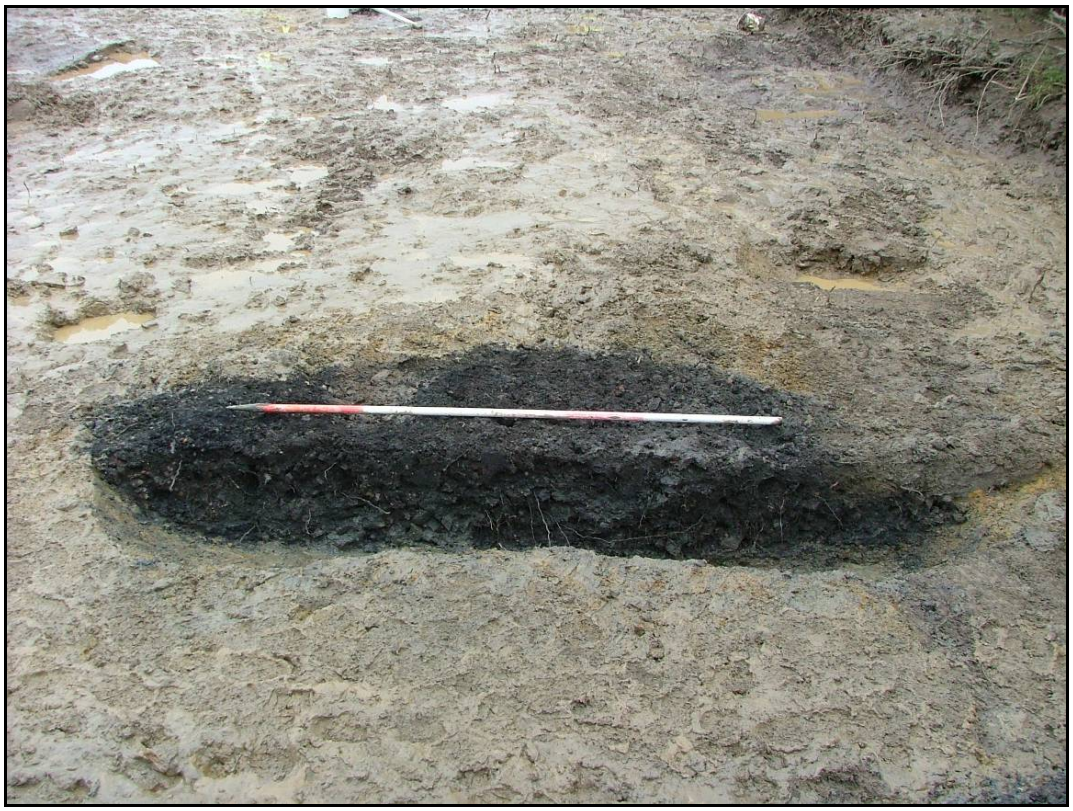


Plate 9: Trough 5, mid-excavation, facing north

Plate 10: Trough 5 showing stakehole C59, post-excavation, facing east

APPENDIX 1CATALOGUE OF PRIMARY DATA

Appendix 1.1 Context Register

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
C1	N/A					Topsoil		
C2	N/A					Subsoil		
C3-C30	N/A					NOT ASSIGNED		
C31	C35	1.38	1.12	0.24	Fill of shallow pit	Irregular shape in plan (N-S). Moderately compacted mid grey silty clay. Contains charcoal flecks - moderate, lime stones - frequent, chert flake - occasional.	C32	C36
C32	C35	2.57	2.34	0.13	Fill of shallow pit	Rectangular shape in plan (N-S), with rounded corners. Moderately compacted mid greyish black silty clay. Contains small and medium sized burnt stones - occasional, charcoal chunks - moderate.	C1	C31
C33	C34	0.25	0.25	0.18	Fill of posthole	Circular shape in plan. Loosely compacted dark brownish black silty clay. Contains charcoal - moderate, stones - occasional.	C1	C34
C34	N/A	0.25	0.25	0.18	Cut of posthole	Circular shape in plan, with sharp break of slope (at top), steep sides, sharp break of slope (at base) and flat shape of base. Associated with two similar postholes - C38, C45.	C33	C2
C35	N/A	3.07	2.89	0.24	Cut of shallow pit	Irregular shape in plan, with imperceptible break of slope (at top), concave sides, gradual break of slope (at base) and flat shape of base.	C36	C2
C36	C35	N/A	N/A	N/A	Stones within C31 originally thought to be structural but now not considered so	Sub-circular shape in plan. Flat stones deposit.	C31	C35
C37	C38	0.22	0.2	0.2	Fill of posthole	Oval shape in plan. Moderately compacted mid yellowish black silty clay. Contains heat shattered stones - occasional, charcoal flecks - moderate.	C1	C38
C38	N/A	0.22	0.2	0.2	Cut of posthole	Oval shape in plan, with sharp break of slope (at top), concave sides, gradual break of slope (at base) and tapered rounded point shape of base.	C37	C2
C39	C40	N/A	1	0.15	Fill of shallow ditch	Linear shape in plan (NE-SW). Loosely compacted mid grey silty clay. Contains seeds - occasional, charcoal flecks - occasional.	C1	C40
C40	N/A	N/A	1	0.15	Cut of shallow ditch	Linear shape in plan (NE-SW), with sharp break of slope (at top), imperceptible sides, imperceptible break of slope (at base) and fairly flat shape of base. Possible field boundary.	C39	C2
C41	C42	3.2	1.4	0.5	Fill of possible trough	Oval shape in plan (E-W). Fairly compacted black (charcoal rich) silty clay. Contains charcoal flecks - frequent, heat shattered stones - frequent.	C40	C42

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
C42	N/A	3.2	1.4	0.5	Cut of possible trough	Oval shape in plan (E-W), with sharp break of slope (at top), concave, imperceptible and gradual sides, mostly sharp break of slope (at base) and fairly flat (sloping towards east) shape of base.	C41	C2
C43	N/A					NOT ASSIGNED		
C44	C44	0.25	0.25	0.13	Fill of posthole	Dark greyish brown silty clay	C1	C44
C45	N/A	0.25	0.25	0.13	Cut of posthole	Circular cut	C43	C2
C46	N/A	N/A	0.67	0.08	Fill of furrow	Linear shape in plan (SE-NW). Loosely compacted black silty clay.	C1	C47
C47	N/A	N/A	0.67	0.08	Cut of furrow	Linear shape in plan, with gradual break of slope (at top), concave sides, gradual break of slope (at base) and flat shape of base. Associated with few others furrows C65, C51, C49	C46	C2
C48	C49	N/A	0.4	0.07	Fill of furrow	Linear shape in plan (SE-NW). Loosely compacted black silty clay.	C1	C49
C49	N/A	N/A	0.4	0.07	Cut of furrow	Linear shape in plan (SE-NW), with gradual break of slope (at top), vertical sides, gradual break of slope (at base) and flat shape of base.	C48	C2
C50	C51	N/A	0.65	0.02	Fill of furrow	Linear shape in plan (SSE-NNW). Loosely compacted dark greyish brown clayey silt. Contains charcoal flecks - occasional, small pebbles - frequent.	C1	C51
C51	N/A	N/A	0.65	0.02	Cut of furrow	Linear shape in plan, with imperceptible break of slope (at top), concave sides, imperceptible break of slope (at base) and concave shape of base.	C50	C2
C52-C53	N/A					NOT ASSIGNED		
C54	C55	0.8	0.74	0.18	Fill of shallow pit	Sub-circular shape in plan. Loosely compacted mid greyish brown clayey silt. Contains stones and cobbles - occasional.	C1	C55
C55	N/A	0.8	0.74	0.18	Cut of shallow pit	Sub-circular shape in plan, with gradual break of slope (at top), vertical sides, gradual break of slope (at base) and flat shape of base.	C54	C2
C56-C57	N/A					NOT ASSIGNED		
C58	C59	0.11	0.09	0.13	Fill of stakehole	Oval shape in plan. Loosely compacted mid reddish grey silty clay. Contains charcoal - frequent.	C1	C59
C59	N/A	0.11	0.09	0.13	Cut of stakehole	Oval shape in plan, with sharp break of slope (at top), steep sides, gradual break of slope (at base) and "U" shaped base.	C58	C2
C60-C65	N/A					NOT ASSIGNED		
C66	C67	0.25	0.25	0.08	Fill of poss. posthole	Circular shape in plan. Loosely compacted dark black sandy silt. Contains charcoal flecks - moderate, small pebbles - moderate.	C1	C67
C67	N/A	0.25	0.25	0.08	Cut of poss. posthole	Circular shape in plan, with sharp break of slope (at top), vertical sides, sharp break of slope (at base) and flat shape of base.	C66	C2
C68-C70	N/A					NOT ASSIGNED		

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
C71	N/A	10	7.5	0.3	*Fulacht* spread	Irregular shape in plan. Moderately compacted black silty clay and heat shattered stones. Contains charcoal flecks - frequent.	C1	
C72-C76	N/A					NOT ASSIGNED		
C77	N/A	18	8	0.3	*Fulacht* spread	Irregular shape in plan. Moderately compacted black silty clay and heat shattered stones. Frequent charcoal inclusions.	C1	
C78-C84	N/A					NOT ASSIGNED		
C85	C128	0.68	0.36	0.19	Fill of shallow pit	Oval shape in plan (NW-SE). Loosely compacted mid grey silty clay. Contains small stones - occasional.	C1	C128
C86	C197	0.11	0.1	0.14	Fill of poss. posthole	Circular shape in plan. Loosely compacted mid grey silty clay. Contains charcoal flecks - occasional.	C1	C197
C87	C193	0.1	0.1	0.15	Fill of poss. posthole	Circular shape in plan. Loosely compacted mid grey silty clay.	C1	C193
C88	C192	0.1	0.1	0.12	Fill of poss. posthole	Circular shape in plan. Loosely compacted mid grey silty clay.	C1	C192
C89	C196	0.1	0.1	0.05	Fill of poss. posthole	Circular shape in plan. Loosely compacted mid grey silty clay.	C1	C196
C90	N/A					NOT ASSIGNED		
C91	C149	0.8	1	0.11	Fill of shallow pit	Oval shape in plan. Loosely compacted dark greyish black silty clay. Contains small stones - occasional.	C1	C149
C92	N/A					NOT ASSIGNED		
C93	C148	0.5	0.5	0.27	Fill of pit	Circular shape in plan. Loosely compacted dark yellowish/grey silty clay. Contained occasional small and medium sized stones.	C1	C148
C94-C96	N/A					NOT ASSIGNED		
C97	C195	0.1	0.09	0.06	Fill of poss. posthole	Circular shape in plan. Loosely compacted mid grey silty clay. Contains charcoal flecks - occasional.	C1	C195
C98	C194	0.11	0.11	0.16	Fill of posthole	Circular shape in plan. Loosely compacted mid grey silty clay.	C1	C194
C99	C191	0.1	0.1	0.05	Fill of poss. posthole	Circular shape in plan. Loosely compacted mid grey silty clay.	C1	C191
C100	C190	0.19	0.17	0.12	Fill of posthole	Sub-circular shape in plan. Loosely compacted mid grey silty clay.	C1	C190
C101	C189	0.19	0.12	0.18	Fill of posthole	Oval shape in plan. Loosely compacted mid grey silty clay.	C1	C189
C102-C113	N/A					NOT ASSIGNED		
C114	C169	0.1	0.1	0.3	Fill of posthole	Circular shape in plan. Loosely compacted mid grey silty clay.	C1	C169
C115	C164	0.4	0.38	0.1	Fill of hearth	Square shape in plan (N-E). Moderately compacted black silty clay. Contains charcoal flecks - frequent.	C1	C164
C116-C117	N/A					NOT ASSIGNED		
C118	C235	4.3	1.7	0.68	Fill of "U" shaped pit	Horse shoe shaped in plan. Fairly compacted dark brown and dark grey silty clay / and heat shattered stones. Contains charcoal flecks - frequent.	C1	C235
C119-C127	N/A					NOT ASSIGNED		

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
C128	N/A	0.68	0.36	0.19	Cut of pit	Oval shape in plan NW-SE, with gradual break of slope – top, gently sloping sides, gradual break of slope – base. U-shaped base.	C85	C2
C129-C134	N/A					NOT ASSIGNED		
C135	C136	0.33	0.3	0.11	Fill of shallow pit	Oval shape in plan. Loosely compacted greyish brown silty clay. Contains small and medium sized stones - occasional.	C1	C136
C136	N/A	0.33	0.3	0.11	Cut of shallow pit	Oval shape in plan, with gradual break of slope (at top), gently sloping sides, gradual break of slope (at base) and "U" shaped base.	C135	C2
C137	C354	1.1	0.7	0.2	Fill of possible trough	Oval shape in plan. Loosely compacted mid greyish black sandy clay. Contains angular stones - frequent, cobbles and pebbles - frequent, charcoal flecks - moderate.	C1	C138
C138	C354	1.6	1.2	0.2	Fill of possible trough	Oval shape in plan. Loosely compacted mid greyish brown clayey silt. Contains angular pebbles - frequent, angular cobbles - frequent.	C137	C139
C139	C354	1.05	N/A	0.25	Fill of possible trough	Sub-circular shape in plan. Loosely compacted mid brownish orange sandy clay. Contains small pebbles - occasional.	C138	C140
C140	C354	1.2	N/A	0.2	Fill of possible trough	Sub-circular shape in plan. Loosely compacted mid greenish grey sandy clay. Contains angular pebbles - occasional.	C139	C141
C141	C354	1.2	2.10	0.1	Basal fill of poss. trough	Oval shape in plan. Loosely compacted dark greyish black silty clay. Contains angular pebbles and sub-angular cobbles - frequent, charcoal flecks - frequent.	C140	C142
C142	C354	1.8	N/A	0.05	Stony deposit	Stony lining base of possible trough.	C141	C354
C143-C147	N/A					NOT ASSIGNED		
C148	N/A	0.5	0.5	0.27	Cut of pit	Circular shape in plan, with gradual break of slope (at top), gently sloping sides, gradual break of slope (at base) and "U" shaped base.		
C149	N/A	0.8	0.7	0.11	Cut of shallow pit	Oval shape in plan (N-S), with sharp break of slope (at top), gently sloping sides, gradual break of slope (at base) and imperceptible shape of base.		
C150	C151	0.2	0.2	0.17	Fill of posthole	Circular shape in plan. Loosely compacted mid grey silty clay.		
C151	N/A	0.2	0.2	0.17	Cut of posthole	Circular shape in plan, with sharp break of slope (at top), vertical sides, gradual break of slope (at base) and "U" shaped base.		
C152	C153	0.16	0.15	0.17	Fill of posthole	Circular shape in plan. Loosely compacted mid grey silty clay.	C93	C2
C153	N/A	0.16	0.15	0.17	Cut of posthole	Circular shape in plan, with sharp break of slope (at top), vertical sides, sharp break of slope (at base) and "V" shaped base.	C91	C2
C154-C159	N/A					NOT ASSIGNED		
C160	C168	0.07	0.07	0.07	Fill of stakehole	Circular shape in plan. Loosely compacted mid grey silty clay.	C1	C168
C161	N/A					NOT ASSIGNED		
C162	C170	0.11	0.11	0.11	Fill of posthole	Circular shape in plan. Loosely compacted mid grey silty clay.	C1	C170

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
C163	C171	0.07	0.07	0.07	Fill of stakehole	Circular shape in plan. Loosely compacted mid grey silty clay.	C1	C171
C164	N/A	0.4	0.38	0.1	Cut of hearth	Square shape in plan (N-E), with sharp break of slope (at top), concave sides, gradual break of slope (at base) and uneven shape of base.	C115	C2
C165-C166	N/A					NOT ASSIGNED		
C167	C172	0.15	0.15	0.16	Fill of posthole	Circular shape in plan. Loosely compacted mid grey silty clay.	C1	C172
C168	N/A	0.07	0.07	0.07	Cut of stakehole	Circular shape in plan, with sharp break of slope (at top), steep sides, sharp break of slope (at base) and "V" shaped base.	C160	C2
C169	N/A	0.1	0.1	0.1	Cut of posthole	Circular shape in plan, with sharp break of slope (at top), vertical sides, sharp break of slope (at base) and "V" shaped base.	C114	C2
C170	N/A	0.11	0.11	0.11	Cut of posthole	Circular shape in plan, with sharp break of slope (at top), steep sides, gradual break of slope (at base) and "U" shaped base.	C162	C2
C171	N/A	0.07	0.07	0.07	Cut of stakehole	Circular shape in plan, with sharp break of slope (at top), steep sides, gradual break of slope (at base) and "U" shaped base.	C163	C2
C172	N/A	0.15	0.15	0.16	Cut of posthole	Circular shape in plan, with sharp break of slope (at top), steep sides, gradual break of slope (at base) and "U" shaped base.	C167	C2
C173-C188	N/A					NOT ASSIGNED		
C189	N/A	0.19	0.12	0.18	Cut of posthole	Oval shape in plan (NE-SW), with sharp break of slope (at top), steep sides, sharp break of slope (at base) and "U" shaped base.		
C190	N/A	0.19	0.17	0.12	Cut of posthole	Sub-oval shape in plan, with gradual break of slope (at top), steep sides, gradual break of slope (at base) and "U" shaped base.		
C191	N/A	0.1	0.1	0.05	Cut of poss. posthole	Circular shape in plan, with gradual break of slope (at top), steep sides, gradual break of slope (at base) and "U" shaped base.		
C192	N/A	0.1	0.1	0.12	Cut of posthole	Circular shape in plan, with sharp break of slope (at top), vertical sides, gradual break of slope (at base) and "U" shaped base.		
C193	N/A	0.1	0.1	0.15	Cut of posthole	Circular shape in plan, with sharp break of slope (at top), vertical sides, gradual break of slope (at base) and "U" shaped base.		
C194	N/A	0.11	0.11	0.16	Cut of posthole	Circular shape in plan, with sharp break of slope (at top), vertical sides, gradual break of slope (at base) and "U" shaped base.		
C195	N/A	0.1	0.09	0.06	Cut of poss. posthole	Circular shape in plan, with gradual break of slope (at top), steep sides, gradual break of slope (at base) and "U" shaped base.		
C196	N/A	0.1	0.1	0.05	Cut of poss. posthole	Circular shape in plan, with sharp break of slope (at top), steep sides, gradual break of slope (at base) and "U" shaped base.		
C197	N/A	0.11	0.1	0.14	Cut of posthole	Circular shape in plan, with sharp break of slope (at top), steep sides, gradual break of slope (at base) and "U" shaped base.		
C198	C199	1.6	1.4	0.35	Fill of pit	Sub-circular shape in plan (N-S). Fairly compacted black silty clay and heat shattered stones. Contains charcoal flecks - frequent.		

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
C199	N/A	1.6	1.4	0.4	Cut of pit	Sub-circular shape in plan (N-S), with sharp break of slope (at top), concave (almost vertical) sides, sharp break of slope (at base) and almost flat shape of base.		
C200	C201	1.2	0.9	0.3	Fill of pit	Sub-circular shape in plan (NE-SW). Loosely compacted dark brown silty clay and heat shattered stones. Contains charcoal flecks - occasional.		
C201	N/A	1.2	0.9	0.3	Cut of pit	Sub-circular shape in plan (NE-SW), with gradual break of slope (at top), concave sides, imperceptible break of slope (at base) and flat shape of base.	C200	C2
C202	C203	1.7	1.6	0.15	Fill of pit	Sub-circular shape in plan. Loosely compacted black silty clay and heat shattered stones. Contains charcoal flecks - frequent.	C1	C203
C203	N/A	1.7	1.6	0.15	Cut of pit	Sub-circular shape in plan, with sharp break of slope (at top), concave sides, imperceptible break of slope (at base) and concave shape of base.	C202	C2
C204	C205	45	0.9	0.25	Fill of field boundary	Curvilinear shape in plan (NW-SE). Loosely compacted dark brown silty clay. Contains organic material - occasional.	C1	C205
C205	N/A	45	0.9	0.25	Cut of field boundary	Curvilinear shape in plan (NW-SE), with sharp break of slope (at top), steep sides, gradual break of slope (at base) and "U" shaped base.	C204	C2
C206	N/A	17	8	0.14	Burnt mound	Irregular shape in plan. Fairly compacted black and dark grey silty clay and heat shattered stones. Contains charcoal flecks - frequent and burnt stones.	C1	site
C207-C210	N/A					NOT ASSIGNED		
C211	C213	0.62	0.5	0.3	Fill of pit	Sub-rectangular shape in plan. Moderately compacted mid yellowish grey silty clay. Contains medium sized burnt stones - occasional, charcoal flecks - occasional.	C212	C213
C212	C213	0.47	0.2	0.17	Fill of pit	Sub-rectangular shape in plan. Moderately compacted mid greyish brown silty clay. Contains burnt stones - frequent, charcoal flecks - occasional.	C1	C211
C213	N/A	1.04	0.65	0.22	Cut of pit	Sub-rectangular shape in plan, with sharp break of slope (at top), stepped sides, gradual break of slope (at base) and uneven shape of base.	C211	C2
C214-C218	N/A					NOT ASSIGNED		
C219	C222	4.04	1.84	0.07	Upper fill of pit	Irregular shape in plan. Fairly compacted light grey sandy silt. Contains pebbles - frequent, stones - frequent.	C223	C220
C220	C222	4.04	1.84	0.25	Mid fill of pit	Irregular shape in plan. Fairly compacted mid grey sandy silt / gritty. Contains pebbles and stones - frequent.	C219	C238
C221	C222	4.04	1.84	0.2	Basal fill of pit	Irregular shape in plan. Fairly compacted orange / mid grey mottled sandy silt. Contains decayed stones - frequent.	C220	C222

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
C222	N/A	4.04	1.84	0.5	Cut of pit	Irregular shape in plan. Possibly big tree root disturbance.	C221	C238
C223	C224			0.12	Fill of furrow	Linear shape in plan (NW-SE). Loosely compacted mid brown silty clay. Contains pebbles and stones - moderate.	C1	C224
C224-C225	N/A				Cut of furrow	Linear shape in plan (NW-SE), with sharp break of slope (at top), concave sides, imperceptible break of slope (at base) and concave shape of base.	C223	C219
C226	N/A	N/A	N/A	N/A	Irregular cut	Irregular shape in plan, with sharp break of slope (at top), convex sides, imperceptible break of slope (at base) and convex shape of base.	C238	C2
C227-C232	N/A					NOT ASSIGNED		
C233	C346	2.8	1.3	0.98	Cut of pit	Irregular (squarish W, rounded E) shape in plan. Fairly compacted mid grey silty clay, mixed with sandy / gritty material and burnt stones. Contains charcoal flecks - occasional.	C1	C346
C234	N/A				Non archaeological	Sub-circular shape in plan. Fairly compacted reddish orange silty clay. Contains charcoal flecks - occasional.	C206	C2
C235	N/A	4.3	1.7	0.68	Cut of pit	"U" shaped in plan, with sharp break of slope (at top). Sides, break of slope (at base) and shape of base different in every part of cut. Width varied between 0,5m-1,7m	C118	C2
C236	C317	0.25	0.2	0.06	Fill of poss. tree bole	Oval shape in plan. Moderately compacted brownish yellow grey silty clay.	C1	C317
C237	N/A					NOT ASSIGNED		
C238	C226	N/A	N/A	0.3	Fill of pit	Imperceptible shape in plan. Fairly compacted dark grey silty clay and burnt stones. Contains charcoal flecks - moderate.	C222	C226
C239	N/A					NOT ASSIGNED		
C240	C241	1.68	1.3	0.24	Fill of pit	Sub-circular shape in plan. Fairly compacted black / dark grey silty clay and burnt stones. Contains charcoal - frequent.	C75	C241
C241	N/A	1.68	1.3	0.24	Cut of pit	Sub-circular shape in plan, with gradual break of slope (at top), concave / stepped sides, gradual break of slope (at base) and fairly flat shape of base.	C240	C2
C242	N/A					NOT ASSIGNED		
C243	C303	2.7	2.5	0.2	Fill of trough	Oval shape in plan. Fairly compacted black silty clay and burnt stones. Contains charcoal - frequent.		
C244-C261	N/A					NOT ASSIGNED		
C262	C309	1.24	1.2	0.17	Fill of poss. hearth	Sub-circular shape in plan. Loosely compacted black silty clay and heat shattered stones. Contains charcoal flecks - frequent.	C1	C308

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
C263	N/A					NOT ASSIGNED		
C264	C302			0.15	Natural depression	Oval shape in plan. Moderately compacted black organic material and burnt stones. Contains charcoal flecks - frequent.		
C265-C267	N/A					NOT ASSIGNED		
C268	C298	0.1	0.1	0.1	Fill of stakehole	Circular shape in plan. Loosely compacted black silty clay. Contains charcoal flecks - frequent.	C1	C298
C269-C270	N/A					NOT ASSIGNED		
C271	C272	1.12	0.9	0.13	Fill of pit	Circular shape in plan. Loosely compacted mid grey silty sand. Contains charcoal flecks - occasional.	C206	C272
C272	N/A	1.12	0.9	0.13	Cut of pit	Circular shape in plan, with sharp break of slope (at top), concave sides, imperceptible break of slope (at base) and uneven shape of base.	C271	C2
C273	C342	1.7	0.94	0.13	Fill of pit	Oval shape in plan. Fairly compacted black and dark grey silty clay and heat shattered stones. Contains charcoal flecks - frequent.	C206	C342
C274	C300	N/A	N/A	0.78	Fill of pit	Not perceptible shape in plan. Fairly compacted black silty clay and heat shattered stones - *fulacht* material. Contains charcoal flecks - frequent.	C1	C300
C275-C278	N/A					NOT ASSIGNED		
C279	C329	1.2	1.1	0.14	Fill of hearth	Sub-circular shape in plan. Loosely compacted black organic material and heat shattered stones. Contains charcoal flecks - frequent.	C1	C324
C280-C296	N/A					NOT ASSIGNED		
C297	C301	2.2	1.81	0.52	Mid fill of pit	Sub-circular shape in plan. Fairly compacted black / dark grey organic material and burnt stones. Contains charcoal flecks - frequent.	C310	C311
C298	N/A	0.1	0.1	0.1	Cut of stakehole	Circular shape in plan, with sharp break of slope (at top), vertical sides, imperceptible break of slope (at base) and tapered rounded point shape of base.	C268	C2
C299	C326	N/A	0.8	0.1	Mid fill of pit	Fairly compacted black organic material and burnt stones. Contains charcoal - frequent. Full extent of the pit can't be seen.	C330	C325
C300	N/A	N/a	N/A	N/A	Cut of pit	Imperceptible shape in plan, with sharp break of slope (at top), concave sides, imperceptible break of slope (at base) and concave shape of base.	C274	C2
C301	N/A	2.2	1.81	0.58	Cut of pit	Sub-circular shape in plan, with sharp break of slope (at top), stepped (S) and vertical (N) sides, sharp (S) and imperceptible (N) break of slope (at base) and flat shape of base.	C312	C2
C302	N/A				Natural depression	Oval shape in plan, with imperceptible break of slope (at top), concave sides, imperceptible break of slope (at base) and concave shape of base.	C264	C2

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
C303	N/A	2.7	2.5		Cut of trough	Oval shape in plan, with imperceptible (NW) and sharp (SE) break of slope (at top), convex (NW) and stepped (SE) sides, sharp break of slope (at base) and flat shape of base.	C345	C2
C304-C305	N/A					NOT ASSIGNED		
C306	C303	N/A	N/A	0.05	Water affected base of burnt mound material in trough. Equivalent to C357	Oval shape in plan. Fairly compacted mid grey silty clay mixed with sandy / gritty material and burnt stones. Contains charcoal flecks - moderate.	C243	C345
C307	N/A					NOT ASSIGNED		
C308	C309	1.24	1.2	0.17	Bottom fill of hearth	Sub-circular shape in plan (E-W). Fairly compacted orange red silty clay. Contains charcoal flecks - occasional.	C262	C309
C309	N/A	1.24	1.2	0.17	Cut of hearth	Sub-circular shape in plan (E-W), with imperceptible break of slope (at top), uneven sides, imperceptible break of slope (at base) and uneven shape of base.	C308	C2
C310	C301	0.77	0.53	0.15	Upper fill of pit	Sub-circular (lens) shape in plan. Fairly compacted mid grey sandy silt and burnt stones. Contains charcoal flecks - occasional.	C1	C297
C311	C301	1.29	1.2	0.20	Mid fill of pit	Sub-circular shape in plan. Moderately compacted orange brown sand. Contains charcoal flecks - moderate.	C297	C311
C312	C301	0.8	0.43	0.1	Basal fill of pit	Stones randomly dumped in to the pit	C311	C301
C313	C314	0.15	0.15	0.07	Fill of poss. tree bole	Oval shape in plan. Moderately compacted brownish grey silty clay. Contains small burnt stones - moderate.	C1	C314
C314	N/A	0.15	0.15	0.07	Cut of poss. tree bole	Oval shape in plan, with sharp break of slope (at top), stepped (N) and steep (NS) sides, sharp break of slope (at base) and "U" shaped base.	C313	C2
C315	N/A	0.1	0.1	0.09	Cut of poss. tree bole	Circular shape in plan, with sharp break of slope (at top), vertical sides, gradual break of slope (at base) and "U" shaped base.	C248	C2
C316	C318	0.27	0.25	0.07	Fill of poss. tree bole	Circular shape in plan. Moderately compacted brownish grey silty clay. Contains small stones - occasional.	C1	C318
C317	N/A	0.25	0.2	0.06	Cut of poss. tree bole	Oval shape in plan, with gradual break of slope (at top), gently sloping sides, gradual break of slope (at base) and flat shape of base.	C236	C2
C318	N/A	0.27	0.25	0.07	Cut of poss. tree bole	Circular shape in plan, with gradual break of slope (at top), gentle sloping sides, gradual break of slope (at base) and flat shape of base.	C316	C2
C319	N/A	0.27	0.27	0.10	Cut of poss. tree bole	Circular shape in plan, with gradual break of slope (at top), gentle sloping sides, gradual break of slope (at base) and "U" shaped base.	C232	C2
C320	N/A	0.26		0.06	Cut of poss. tree bole	Sub-rectangular shape in plan, with sharp break of slope (at top), gentle sloping sides, gradual break of slope (at base) and flat shape of base.	C229	C2
C321	N/A	0.08	0.08	0.12	Cut of tree bole	Circular shape in plan, with sharp break of slope (at top), vertical sides, sharp break of slope (at base) and "U" shaped base.	C253	C2

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
C322-C323	N/A					NOT ASSIGNED		
C324	329	1.6	1.4	0.01	Thin basal fill of hearth	Sub-circular shape in plan. Fairly compacted orange red silty clay. Contains charcoal flecks - occasional.	C279	C329
C325	C326	N/A	0.34	0.09	Mid fill of pit	Fairly compacted black / dark grey sandy silt and burnt stones. Contains charcoal - frequent.	C299	C326
C326	N/A	N/A	0.9	0.35	Cut of pit	Cut of large pit, with sharp break of slope (at top), gentle sloping sides, sharp break of slope (at base) and flat shape of base.	C325	C2
C327-C328	N/A					NOT ASSIGNED		
C329	N/A	1.6	1.4	0.2	Cut of hearth	Sub-circular shape in plan, with imperceptible break of slope (at top), uneven sides, imperceptible break of slope (at base) and uneven shape of base.	C324	C2
C330	C326	N/A	N/A	0.14	Variation of topsoil	Variation of topsoil		
C331	N/A					NOT ASSIGNED		
C332	C333	0.05	0.05	0.7	Fill of stakehole	Circular shape in plan. Loosely compacted light grey silty clay. Contains charcoal - moderate.	C354	C333
C333	N/A	0.05	0.05	0.7	Cut of stakehole	Circular shape in plan, with sharp break of slope (at top), steep sides, tapered point break of slope (at base).	C332	C2
C334	C335	0.13	0.13	0.10	Fill of stakehole	Circular shape in plan. Loosely compacted light grey silty clay. Contains charcoal - moderate.	C354	C335
C335	N/A	0.13	0.13	0.10	Cut of stakehole	Circular shape in plan, with sharp break of slope (at top), uneven and concave sides, tapered rounded point break of slope (at base).	C334	C2
C336	C337	0.12	0.12	0.13	Fill of stakehole	Circular shape in plan. Loosely compacted dark grey silty clay. Contains charcoal - moderate.	C354	C337
C337	N/A	0.12	0.12	0.13	Cut of stakehole	Circular shape in plan, with sharp break of slope (at top), steep sides, tapered rounded point break of slope.	C336	C2
C338	C339	0.1	0.1	0.08	Fill of stakehole	Circular shape in plan. Loosely compacted light grey silty clay. Contains charcoal - moderate.	C354	C339
C339	N/A	0.1	0.1	0.08	Cut of stakehole	Circular shape in plan, with gradual break of slope (at top), concave sides, tapered rounded point break of slope (at base).	C338	C2
C340	C341	0.08	0.08	0.12	Fill of stakehole	Circular shape in plan. Loosely compacted black silty clay. Contains charcoal flecks - frequent.	C301	C341
C341	N/A	0.08	0.08	0.12	Cut of stakehole	Circular shape in plan, with sharp break of slope (at top), vertical sides, tapered blunt point break of slope (at base) and concave shape of base.	C340	C2
C342	N/A	1.7	0.94	0.13	Cut of pit	Oval shape in plan (E-W), with sharp break of slope (at top), vertical sides, sharp break of slope (at base) and uneven shape of base.	C273	C2
C343-C344	N/A					NOT ASSIGNED		

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Context Above	Context Below
C345	C303	N/A	N/A	N/A	Trough platform or step	Part of floor or area for standing or place things within the trough.	C306	C303
C346	N/A	2.8	1.3	0.98	Cut of pit	Squarish (W) and rounded (E) shape in plan, with irregular break of slope (at top and base), sides, and uneven shape of base.	C233	C2
C347-C350	N/A					NOT ASSIGNED		
C351	C199	1.6	1.4	0.05	Bottom fill of pit	Sub-circular shape in plan. Fairly compacted mid grey silty clay. Contains charcoal flecks - moderate.	C198	C199
C352	N/A					NOT ASSIGNED		
C353	N/A	N/A	N/A	0.03	Thin layer beneath C206	Irregular shape in plan. Fairly compacted mid grey sandy / gritty material mixed with burnt stones and lenses of silty clay. Contains charcoal flecks - moderate.	C206	C2
C354	N/A	2.40	2.10	0.54	Cut of pit / trough	Sub-circular shape in plan, with sharp break of slope (at top), smooth sides, gradual and imperceptible break of slope (at base) and fairly even shape of base.	C142	C332, C334, C336, C338
C355	N/A					NOT ASSIGNED		
C356	N/A					NOT ASSIGNED		
C357	N/A	Up to 17	Up to 4	0.05	Water affected basal burnt mound material	Mid grey silty clay, burnt stones	C206	C2

Appendix 1.2 Catalogue of Artefacts

Registration Number	Context	Item No.	Simple Name	Full Name	Material	Description	No. of Parts
E3848:001:1	1	1	Chunk	Natural chert chunk	Chert	Natural chunk of chert	N/A
E3848:001:2	1	2	Chunk	Natural chert chunk	Chert	Natural chunk of chert	N/A
E3848:001:3	1	3	Flake	Chert flake	Chert	A chert flake produced on a single platform core	N/A
E3848:001:4	1	4	Debitage	Flint debitage	Flint	Flint debitage	N/A
E3848:031:1	31	1	Stone	Quartzite rubbing stone	Quartzite	A rubbing stone with one smoothened / polished side and impact wear around the opposed pointed end	N/A
E3848:031:2	31	2	Stone	Quartzite rubbing stone	Quartzite	A rubbing stone with one smoothened / polished side and impact wear around the opposed pointed end	N/A
E3848:031:3	31	3	Stone	Quartzite rubbing stone	Quartzite	A rubbing stone with one smoothened / polished side and impact wear around the opposed pointed end	N/A
E3848:032:1	32	1	Flake	Chert flake	Chert	A chert flake produced on a single platform core	N/A
E3848:087:1	87	1	Stone	Possible quartzite hammer stone	Quartzite	A possible burnt hammer stone which appears to show signs of use in the form of pecked and worn surfaces on its entire circumference	N/A
E3848:091:1	91	1	Crystal	Quartz crystal	Quartz	An unmodified quartz crystal	N/A
E3848:160:1	160	1	Bowl	Sherd of glazed black ware	Ceramic	A base sherd of a glazed black ware pancheon or large bowl	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 26 soil samples were taken from features at Ballyquirk 4 and were processed by flotation and sieving through a 250µm mesh. The following are the ecofacts recovered from these samples.

Context #	Sample #	Feature type i.e. Structure A, hearth C45	charcoal	Seeds & Hazelnut	Animal bone	Burnt animal bone	human bone	Shell	Other
C3	1	n/a	2.5g						
C8	4	n/a	4.0g						
C10	5	n/a	1.0g						
C31	18	Fill of shallow pit	1.1g						0.02l (heat-affected stone)
C32	17	Fill of shallow pit	93.9g						0.5l (heat-affected stone)
C33	9	Fill of posthole	5.5g						0.15l (heat-affected stone)
C37	19	Fill of posthole	46.8g						0.3l (heat-affected stone)
C41	11	Fill of possible trough	73.9g						0.8l (heat-affected stone)
C44	13	Fill of posthole	3.5g						0.02l (heat-affected stone)
C66	16	Fill of poss. posthole							0.1l (heat-affected stone)
C86	68	Fill of poss. posthole	0.2g						
C100	74	Fill of posthole	0.2g						0.04l (heat-affected stone)
C101	75	Fill of posthole	2.2g						0.02l (heat-affected stone)
C131	61		22.9g						0.09l (heat-affected stone)
C137	63	Fill of possible trough	1.7g						
C141	62	Basal fill of poss. trough	31.9g						0.04l (heat-affected stone)
C198	84	posthole	2.9g						0.08l (heat-affected stone)
C202	36	Fill of pit	55.2g						0.05l (heat-affected stone)
C233	48	Pit	4.5g						
C244	60		2.7g						
C262	44	Fill of poss. hearth	1.6g						0.03l (heat-affected stone)
C262	85	Fill of poss. hearth	45.1g						0.4l (heat-affected stone)
C297	39	Mid fill of pit	43.0g						0.5l (heat-affected stone)
C308	42	Bottom fill of hearth	0.2g						
C310	40	Upper fill of pit	11.9g						0.2l (heat-affected stone)
C332	64	Fill of stakehole	0.1g						

Appendix 1.4 Archive Index

Project: N9/N10 Phase 4 Knocktopher to Powerstown		
Site Name: Ballyquirk AR157		
Excavation Registration Number: E3848		
Site director: Richard Jennings		
Date: July 2010		
Field Records	**Items (quantity)**	**Comments**
Site drawings (plans)	30	
Site sections, profiles, elevations	23	
Other plans, sketches, etc.	0	
Timber drawings	0	
Stone structural drawings	0	
Site diary/note books	1	
Site registers (folders)	2	
Survey/levels data (origin information)	4	
Context sheets	355	
Wood Sheets	0	
Skeleton Sheets	0	
Worked stone sheets	0	
Digital photographs	529	
Photographs (print)	0	
Photographs (slide)	0	
Security copy of archive	yes	digital

APPENDIX 2 SPECIALIST REPORTS

Appendix 2.1 Post-Medieval Pottery Report – Clare Mc Cutcheon

Appendix 2.2 Lithics Report – Dr. Farina Sternke

Appendix 2.3 Charcoal and Wood Report – Susan Lyons

Appendix 2.4 Petrographical Report – Dr. Stephen Mandal

Appendix 2.5 Radiocarbon Dating Results – QUB Laboratory

Appendix 2.1 Post-Medieval Pottery Report – Clare Mc Cutcheon

A NOTE ON THE POTTERY FROM BALLYQUIRK 4 (E3848) N9/N10 KNOCKTOPHER TO POWERSTOWN, CO. KILKENNY

CLARE MCCUTCHEON MA MIAI

Introduction:
A single sherd of pottery was presented for study, identified as black glazed ware

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

A base sherd (F160:1) from a pancheon or large bowl was recovered.

References:
Davey, P 1975 *Buckley pottery*. Buckley Clay Industries Research Committee, Shotton.

Meenan, R 1997 Post-medieval pottery. In M F Hurley & O M B Scully, *Late Viking age and medieval Waterford: excavations 1986-1992*, 338–53. Waterford Corporation, Waterford.

Appendix 2.2 Lithics Report – Dr. Farina Sternke

LITHICS FINDS REPORT FOR E3848 BALLYQUIRK 4 (AR157),
CO. KILKENNY
N9/N10 ROAD SCHEME – PHASE 4

FARINA STERNKE MA, PHD

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Introduction

A total of ten lithic finds from the archaeological investigations of a prehistoric site at Ballyquirk 4, Co. Kilkenny were presented for analysis (Table 1). The finds are associated with three *fulachta fiadh* with associated troughs, pits and stakeholes.

Find Number	Context	Material	Type	Condition	Cortex	Length (mm)	Width (mm)	Thickness (mm)	Complete	Retouch
E3848:001:1	1	Chert	Natural Chunk							
E3848:001:2	1	Chert	Natural Chunk							
E3848:001:3	1	Chert	Flake	Reasonably fresh	No	35	29	13	Yes	No
E3848:001:1	1	Flint	Debitage							
E3848:031:1	31	Quartzite	Rubbing/ Hammer stone	Slightly weathered		58	42	34	Yes	No
E3848:031:2	31	Quartzite	Rubbing/ Hammer stone	Slightly weathered					Yes	No
E3848:031:3	31	Quartzite	Rubbing/ Hammer stone	Slightly weathered					Yes	No
E3848:032:1	32	Chert	Flake	Reasonably fresh	No	18	29	5	Yes	No
E3848:087:1	87	Quartzite	Hammer stone?	Burnt		40	36	26	Yes	No
E3848:091:1	91	Quartz crystal	Unmodified crystal						Yes	No

Table 1 Composition of the Lithic Assemblage from Ballyquirk 4 (E3848)

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 artefacts are a flaked piece of flint, two worked cherts and four modified pieces of quartzite. One unmodified piece of quartz crystal, which is a possible manuport, and two natural chunks of chert were also presented for analysis.
Six lithics are larger than 20mm in length and width and were therefore recorded in detail.

Provenance

The lithics were recovered from the topsoil and contexts associated with the *fulachta fiadh*, troughs and pits.

Condition:
The lithics survive in reasonably fresh (E3848:001:3 and E3848:032:1), slightly weathered (E3848:031:1-3) and burnt (E3848:087:1) condition. All finds are complete.

Technology/Morphology:
The artefacts represent two types of flaking products and four macro tools (Table 2).

TYPE	AMOUNT
Flake	2
Debitage	1
Rubbing/Hammer Stone	3
Hammer Stone?	1
Total	**7**

Table 2 Assemblage Composition from Ballyquirk 4 (E384)

FLAKES
The two flakes (E3848:001:3 and E3848:032:1) are made of chert and were both produced on single platform cores. They measure 35mm and 18mm long, 29mm and 29mm wide and 13mm and 5mm thick, respectively.

The flakes most likely date to the first half of the Neolithic period (no later than the middle Neolithic) based on their technology and therefore, may represent an earlier use of the site.

DEBITAGE
The presence of one piece of flint debitage suggests that flint was worked at the site.

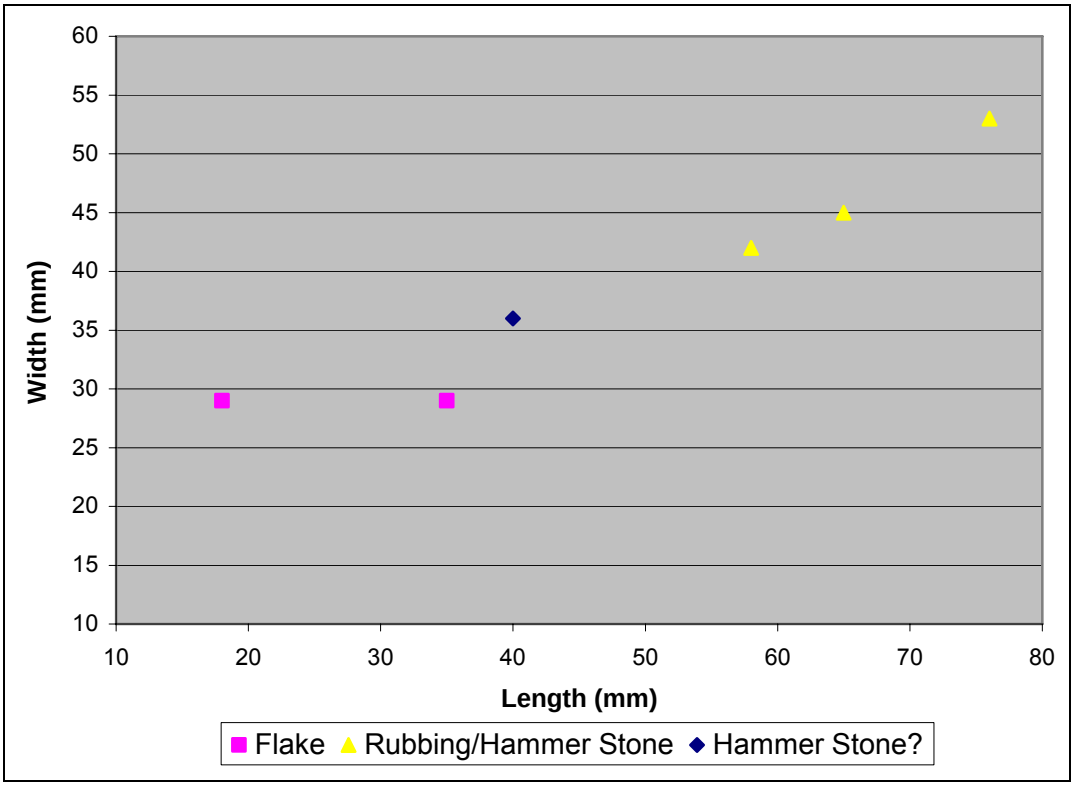

Figure 1 Dimensions (mm) of the Artefacts from Ballyquirk 4 (E3848)

Macro Tools:
A total of four macro tools were recovered during the excavations. All are made of quartzite. They can be divided into three rubbing/hammer stones and one possible hammer stone.

RUBBING/HAMMER STONES
All three rubbing stones (E3848:031:1-3) show one smoothened/polished side and impact wear around their entire circumference or at a minimum on their opposed pointed ends. The rubbing stones measure between 58mm and 76mm long and fit neatly into one hand (Fig. 1). These stones are most likely associated with food processing, i.e. manos for querns etc. (Adams 1988, 2002) and may also have been used as hammer stones.

HAMMER STONES
One possible hammer stone (E3848:087:1) was identified in the assemblage. It is burnt and appears to show signs of use in form of pecked and worn surfaces on its entire circumference. It measures 40mm long, 36mm wide and 26mm thick.

Dating:
The lithic assemblage from Ballyquirk 4 is typologically undiagnostic. However, the two flakes can be dated to the first half of the Neolithic period based on their technology (Woodman *et al.* 2006) and may represent an earlier use of the site. The macro tools may be contemporary, but are more likely to date to the late Neolithic or Bronze Age and may be associated with the use of one or more of the *fulachta fiadh*.

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.

Discussion
The size and composition of the assemblage is typical for Irish burnt mounds. Recent excavations in the south-east of Ireland revealed a similar pattern of very small assemblages found in associated *fulachta fiadh*, e.g. the N25 Waterford By-Pass (Woodman 2006).

Conclusion
The lithic finds from the archaeological investigations at Ballyquirk 4, Co. Kilkenny are two chert flakes, a piece of flint debitage, three quartzite rubbing/hammer stones and a possible quartzite hammer stone. In addition, an unmodified piece of quartz crystal and two natural chunks of chert were also identified. The flakes appear to date to the first half of the Neolithic period based on their technological characteristics, while the macro tools may date to the late Neolithic or Bronze Age and may be associated with the *fulachta fiadh*.

This site makes a minor contribution to the evidence for prehistoric settlement in Co. Kilkenny.

References

Adams, J L 1988 Use-wear Analyses on Manos and Hide-processing Stones. *Journal of Field Archaeology* **15**, 307-315.

Adams, J L 2002 *Ground Stone Analysis - A Technological Approach.* University of Utah Press, Salt Lake City.

Inizan, M-L, M Reduron-Ballinger, H Roche and J Tixier 1999 *Technology and Terminology of Knapped Stone* 5. CREP, Nanterre.

Woodman, P C 2006 *The significance of the lithic assemblages from the archaeological excavations on the Waterford By-Pass.* Unpublished Report for Headland.

Woodman, P C, N Finlay and E Anderson 2006 *The Archaeology of a Collection: The Keiller-Knowles Collection of the National Museum of Ireland*. National Museum of Ireland Monograph Series 2. Wordwell, Bray.

Appendix 2.3 Charcoal and Wood Report – Susan Lyons

Client – Irish Archaeological Consultancy Ltd
Site Name- Ballyquirk 4
Excavation number –E3848 AR157
County – Kilkenny
Author- Susan Lyons

Date –02/09/09

CHARCOAL IDENTIFICATION SUMMARY REPORT

Illustrations

Figures

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1 Introduction

Nine charcoal samples were identified and analysed from excavations associated with the burnt mound activity and Bronze Age structure recorded at Ballyquirk 4, Co. Kilkenny as part of the resolution of the N9/N10 Kilcullen to Waterford Scheme, Phase 4B – Rathclogh to Powerstown. This site consisted of the remains of three burnt mound complexes alongside a stream for a distance of approximately 120m. The mounds were thin and spread-like and were composed of heat-shattered stones and charcoal-rich clays. Other features on the site included two concentrations of stakeholes, which may have been associated with hearth activity, and a concentration of stones which might represent the remnants of a fourth trough (Jennings, 2009).

It is generally considered that the principle reason for charcoal analysis is the hypothesis that wood used as firewood will be collected from as close to a site as possible and as such can help to reflect the local wooded environment in the area. It is also likely that abandoned structural timbers or wood brought to the site for uses in construction works or other activities are also reused as firewood. The charcoal identified can also go some way to interpreting the local woodland that grew in the vicinity of the site and possible changes to that woodland over time. This report serves as a summary report only for Ballyquirk 4 and will later form part of an overall scheme-wide charcoal study for the N9/N10 (Lyons, *et al, forthcoming).*

(Please note that the samples used for C14 dating are not included within this analysis.)

2 Methodology (After IAC Ltd)

2.1 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.

2.2 Charcoal identifications

Nine charcoal samples from C003 (fill of pit under Trough 1), C032 (fill of burnt mound material: Trough 4), C37 (fill of posthole C38), C41 (fill of Trough 5 C42), C44

(fill of posthole), C141 (fill of Trough 3 C354), C202 (fill of pit C203), C262 (fill of hearth C309) and C297 (fill of pit C301) 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.

2.3 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.

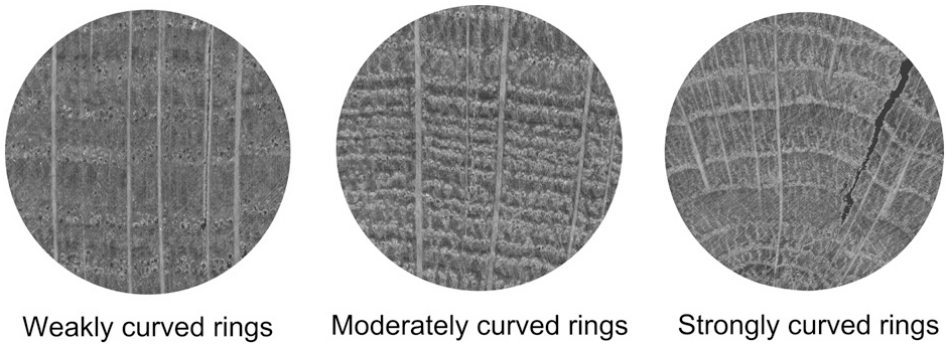

Fig. 1. Ring curvature (after Marguerie and Hunot 2007 1421, Fig. 3)

3 Results

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

Nine wood species totaling 418 identifications were recorded from the samples associated with Ballyquirk 4. The assemblage was dominated by *Quercus* sp. (oak), followed by *Pomoideae* spp. (pomaceous woods), *Fraxinus excelsior* (ash) and *Alnus glutinous* (alder). Lower values of *Corylus avellana* (hazel), *Salix* sp. (willow), *Prunus avium/padus* (wild/bird cherry), *Ilex aquifolium* (holly) and *Betula* sp. (birch) were also recorded (Fig. 2).

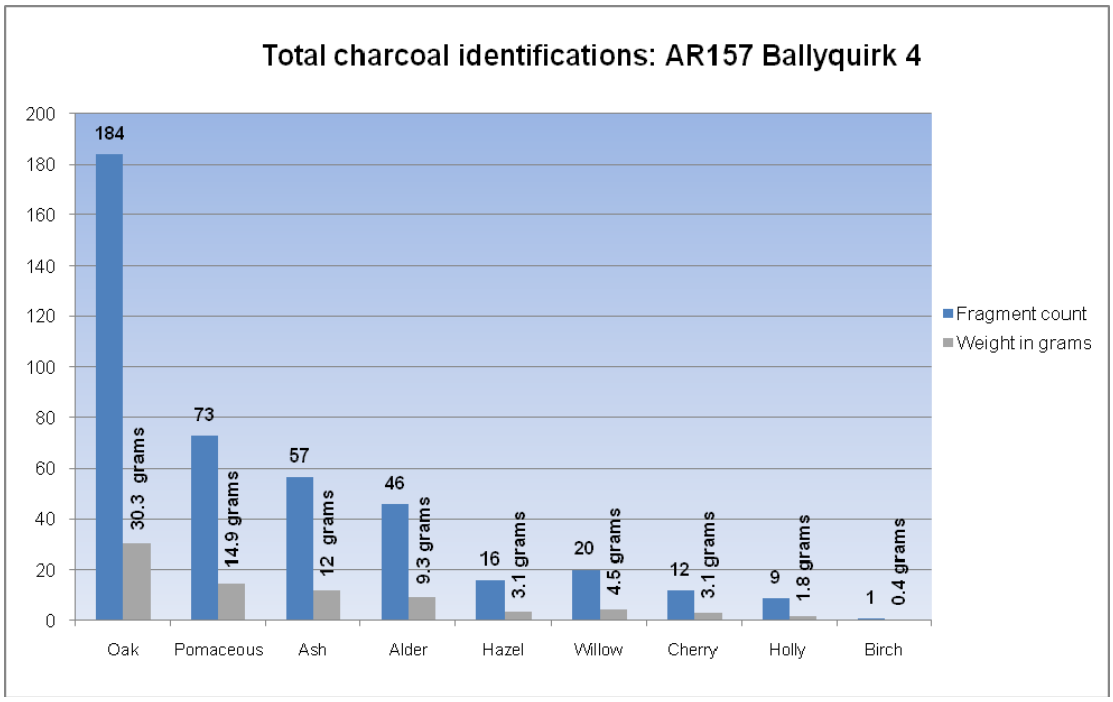

Fig. 2

Postholes C38 and C44 contained exclusively oak charcoal, while all other features contained a mixed wood assemblage. The charcoal assemblage from C003 (associated with Burnt Mound 1) was dominated by pomaceous woods, with lower incidences of birch and cherry. Burnt Mound C032 (Trough 5), C354 (Trough 3), pit C203 and pit C301 all contained varying concentrations of oak, ash, pomaceous woods and alder, with C203, C301 and C354 containing the only values for holly and C354 containing some cherry wood charcoal. Trough 3 C042 contained a slightly different composition of wood species. While oak, ash and alder was also recorded from here, the values for cherry were higher and this feature contained the willow. The only evidence for hazel was recorded from hearth C309, which also contained willow charcoal (Fig. 3).

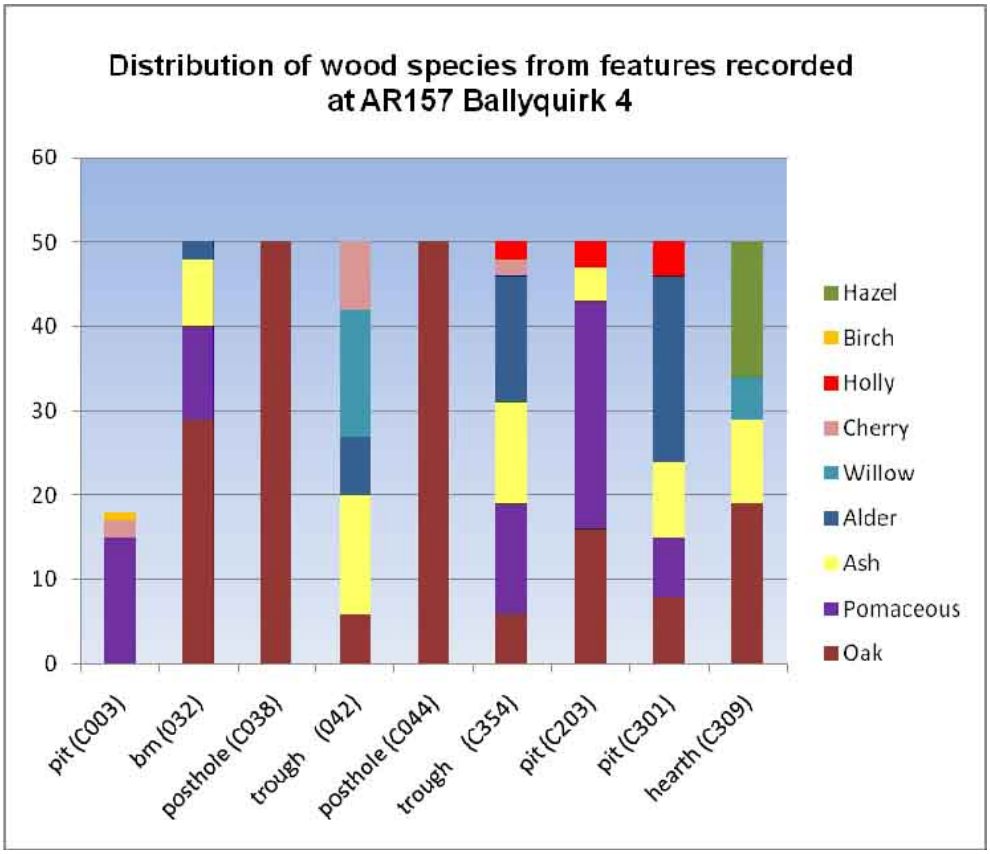

Fig. 3 bm = burnt mound

4 Discussion

4.1 Background and origin of wood species

Quercus sp. (oak)

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

Pomoideae spp. (pomaceous woods)

The pomaceous wood species includes the genera *Malus* (apple), *Pyrus* (pear), *Sorbus* (rowan/mountain ash or whitebeam) and *Crataegus* (hawthorn). They are anatomically very similar and in the absence of bark, buds and leaves cannot be differentiated between each other very often. The pomaceous wood types are small deciduous spiny trees or shrubs and are common to the scrubby margins of woodlands and hedgerows (Gale & Culter, 2000). Hawthorn is shade-tolerant and forms understorey in ash and hazel woodland. Both hawthorn and apple-type (*Malus*

sp.) produced edible fruits which would have been gathered as a foodstuff during the prehistoric period (Greig, 1991). These wood types burn slow and steady and provide excellent heat with minimal smoke (Culter & Gale, 2000). In later prehistoric periods, these wood species are more prevalent in the landscape, perhaps as a result of opening up larger areas of land or the fencing off of certain areas (Stuijts, 2003/4, 20).

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).

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

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

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*).

Ilex aquifolium L. (holly)
Holly is an evergreen tree which grows on almost any soil type and can tolerate heavy shade, sometimes growing as understorey in oak or beech woodlands. It dislikes very wet soils and can thrive well in abandoned agricultural clearings (Cutler and Gale, 2000, 139). Holly produces good firewood. The fine-grained nature of the wood makes it suitable for carving and turning (Orme and Coles, 1985). It can distort when drying and as such is usually used in small pieces and is not suited for outdoor use. It is traditionally used for walking sticks and can be easily coppiced and pollarded (Orme and Coles, 1985). Holly was seen to have held magical and protective powers with some cultures from prehistoric times and was therefore held in high esteem (Culter and Gale, 2000, 139). With many others it is also reputed to bring bad luck (Rackham, 1980). Holly artefacts are generally rare, perhaps reflecting the superstitions attached to the tree or the difficulty with working the wood (Culter and Gale, 2000, 139).

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

Betula spp. (birches)
Birch was one of the first tress to arrive to Ireland after the end of the last glaciation. It grows as trees or shrubs with a preference for light and thrives on non-calcareous soils. It is often associated with heathland and successional oak woods, but can rapidly form secondary woodland in cleared areas and on abandoned peat cuttings. Birch species are generally short-lived, although some examples have known to reach ages of up to 70 and 80 years. Through most of its woodland history, birch played a minor role since its timber was too weak for structural purposes and rots easily outdoors and therefore not greatly valued. Birch wood however, makes a hot but short-lived fuel and produces high quality charcoal (Lines cited in Gale & Culter, 2000). It is best suited in the manufacturing of fine objects, such as furniture, bowls and tool handles. Birch bark has also been used in making shoes and roofs.

4.2 Distribution of charcoal from Ballyquirk 4

The number of identifiable charcoal fragments recovered from Ballyquirk 4 were localised to C003 (fill of pit under Trough 1), C032 (fill of burnt mound material: Trough 4), C37 (fill of posthole C38), C41 (fill of Trough 5 C42), C44 (fill of posthole), C141 (fill of Trough 3 C354), C202 (fill of pit C203), C262 (fill of hearth C309) and C297 (fill of pit C301).

The burnt mound/*fulacht fiadh* activity recorded at Ballyquirk 4 is likely to account for the mixed assemblage recorded from many of these features. This mixed assemblage of wood species recorded in varying concentrations from C003 C032, C41, C141, C202 and C297 makes it is difficult to ascertain the primary source of the material. The periodic dumping of charred remains associated with *fulacht fiadh* activity would inevitably result in the mixing of wood species from different sources representing one or more burning events. It must also be considered that this charred fuel debris would have become distributed across the site to enter open features or become mixed with sealing deposits.

A mixed wood assemblage is not an unusual occurrence from *fulacht fiadh/*burnt mound sites and has also been recorded from a number of similar sites excavated along the routeway of the Gas Pipeline, which ran through Counties Dublin, Meath, Westmeath, Galway and Clare (O'Donnell, 2007). The study of charcoal undertaken from the majority of these sites also contained oak, pomaceous woods, ash, alder, willow, holly, birch and cherry woods (O'Donnell, 2007, 38/39). Similar wood species were also recorded from burnt mound/*fulacht fiadh* sites excavated along the N9/N10, for example AR125, Kellymount 3 (O'Carroll, 2009) AR103 and Rathcash 2 (Lyons, 2009).

Interesting observations are the similar composition and concentration of similar wood species from pits C203, C301 and Trough 3 C354. Since pit C203 was identified close to Trough 3 and pit C301 was underlying Trough 3, the wood species suggests that the burning activities surrounding these features were somewhat contemporary. Deposits associated with Trough 5 (C032) contained a slightly similar wood composition to Trough 3 features, with the exception of holly and cherry wood. The close proximity of Trough 5 to Trough 3 (3.5m) (Jennings, 2009) may account for this similarity, where re-deposited charcoal remains would have entered and become mixed with nearby features. Whether Trough 3 and Trough 5 however are contemporary is difficult to ascertain based on the charcoal remains alone but radiocarbon dating may confirm this.

Trough 5 (C042) deposits contained predominantly ash, willow and cherry, with lesser incidences of oak and alder. This composition suggests that the burning events associated with Trough 5 may not have been contemporary with Trough 3 and Trough 4. Similarly, the presence of pomaceous woods, birch and cherry wood from C003, associated with Trough 1, may also imply a separate burning episode and therefore a separate burnt mound/*fulacht fiadh* phase.

The presence of exclusively oak charcoal from postholes C038 and C044 may be the charred remains of a structure. While it is difficult to ascertain if these postholes reflect structures that had actually burnt down, the occurrence of oak charcoal from these deposits may also be the result of construction methods, such as a) the charring of post bases to prevent the timbers from rotting b) a way of re-sizing posts of c) the method by which the timbers were felled.

The only feature to contain evidence for *in situ* burning was hearth C309. Since this feature contained the only evidence for hazel, it may represent a different phase of events, however this is tentative based on just one sample.

It is expected that species such as alder and willow grew close to *fulacht fiadh* sites as these site types were usually constructed close to wet or marshy ground (Waddell, 1998, 174). The pomaceous woods, cherry woods, holly and birch are common to clearances and marginal woodland or hedgerows, while oak, ash and holly are common to dense woodland areas. Species growing in the immediate vicinity of the

site are likely to have been gathered as the primary fuel resource, while species, such as oak may have brought to the site for other reasons, such as construction purposes and later re-used as fuel. Oak was a valuable wood species for construction due to its durability and strength and its low incidences in the assemblage may signify that it was being used for other purposes rather than fuel.
The results from this site will be later merged and discussed with similar sites also excavated along the N9/N10 scheme.

5. Summary

The charcoal fragments identified from C003, C032, C37, C41, C44, C141, C202, C262 and C297 from Ballyquirk 4 were chosen for charcoal identification and analysis. Nine wood species were recorded at the site (oak, pomaceous woods, alder, hazel, ash, willow, holly, wild/bird cherry and birch). The identified charcoal is most likely representative of firewood used on site and associated with activities surrounding the *fulacht fiadh/*burnt mound. The wood assemblage from Trough 3, Trough 4, pit C203 and pit C301 was very similar and likely to be associated with the same phase of events. Trough 1 and Trough 5 contained a different wood composition and based on this could represent a separate phase or burning episodes. The high oak charcoal from postholes C38 and C44 could reflect the remains of a burnt structure or the methods used in construction works.

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Table 1 Charcoal identification details from AR157 Ballyquirk 4 (E3848)

Context number	Sample number	Flot volume (grams)	Context description	Wood Species Identifications	No. of fragments	Charcoal weights (grams)	Size of fragments (mm)	No. of growth rings	Growth ring curvature	Comments
003	001	2.5g	Fill of pit under Burnt Mound 1	Pomoideae spp. (pomaceous woods)	15	2.2g	3mm - 6mm	3 - 4 rings		
				Prunus avium/padus (wild/bird cherry)	2	0.4g	5mm	3 - 4 rings		
				Betula sp. (birch)	1	0.4g	8mm	6 rings		
032	017	93.9g	Burnt mound material associated with Trough 4	Quercus sp. (oak)	29	6.5g	4mm - 12mm	4 - 8 rings	weak	
				Pomoideae spp. (pomaceous woods)	11	3.8g	4mm - 8mm	3 - 6 rings		
				Fraxinus excelsior (ash)	8	2.3g	5mm - 7mm	3 - 5 rings		
				Alnus glutinous (alder)	2	0.6g	4mm	4 rings		
037	019	46.8g	Fill of posthole C38	Quercus sp. (oak)	50	11.1g	5mm - 75mm	4 - 14 rings	weak	
041	011	73.9g	Fill of Trough 3 (C42)	Salix sp. (willow)	15	3.5g	3mm - 8mm	4 - 8 rings	weak	
				Fraxinus excelsior (ash)	14	3.2g	4mm - 10mm	3 - 9 rings	weak	
				Prunus avium/padus (wild/bird cherry)	8	2.1g	5mm - 8mm	3 - 6 rings		
				Alnus glutinous (alder)	7	2.3g	4mm - 9mm	4 - 5 rings		
				Quercus sp. (oak)	6	1.4g	4mm - 7mm	3 - 5 rings		50% small roundwoods
044	013	3.5g	Fill of posthole	Quercus sp. (oak)	50	3.5g	5mm - 25mm	4 - 15 rings	weak	
141	062	31.9g	Basal fill of Trough 3 (C354)	Alnus glutinous (alder)	15	3.3g	3mm - 6mm	3 - 8rings	weak	
				Pomoideae spp. (pomaceous woods)	13	2.4g	4mm - 8mm	3 - 6 rings	weak	
				Fraxinus excelsior (ash)	12	1.8g	4mm - 7mm	4 - 6 rings		
				Quercus sp. (oak)	6	1.4g	5mm - 8mm	3 - 7 rings		
				Ilex aquilifoilium (holly)	2	0.7g	4mm - 8mm	4 rings		
				Prunus avium/padus (wild/bird cherry)	2	0.6g	6mm - 10mm	3 rings		
202	036	55.2g	Fill of pit C203	Pomoideae spp. (pomaceous woods)	27	5.1g	3mm - 11mm	3 - 6 rings		
				Quercus sp. (oak)	16	3.9g	4mm - 8mm	3 - 6 rings		
				Fraxinus excelsior (ash)	4	1.4g	4mm - 6mm	4 rings		
				Ilex aquilifoilium (holly)	3	0.3g	4mm	3 rings		
262	085	45.1g	Fill of hearth C309	Quercus sp. (oak)	19	2.6g	3mm - 11mm	3 - 9 rings	weak	
				Corylus avellana (hazel)	16	3.4g	4mm - 7mm	3 - 5 rings	weak	
				Fraxinus excelsior (ash)	10	1.9g	3mm - 8mm	3 - 8 rings	weak	
				Salix sp. (willow)	5	1g	5mm - 8mm	4 - 5 rings		
297	039	43g	Fill of pit C301	Alnus glutinous (alder)	22	3.1g	4mm - 11mm	4 - 7 rings	weak	
				Fraxinus excelsior (ash)	9	1.4g	4mm - 6mm	3 - 5 rings		
				Quercus sp. (oak)	8	1.3g	5mm - 6mm	3 - 6 rings		

				Pomoideae spp. (pomaceous woods)	7	1.4g	4mm - 6mm	4 - 5 rings		
				Ilex aquilifoilium (holly)	4	0.8g	3mm - 9mm	3 - 6 rings		

Appendix 2.4 Petrographical Report – Dr. Stephen Mandal

PETROGRAPHICAL REPORT ON STONE SAMPLES TAKEN DURING ARCHAEOLOGICAL EXCAVATIONS AT BALLYQUIRK 4 (E3848)
EURGEOL DR STEPHEN MANDAL MIAI PGEO

1 Introduction

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

2 Solid Geology and Soils of the Site (see Figure 1; McConnell 1994)

The bedrock under the site consists of crinoidal wackestone/ packstone limestone belonging to the Ballyadams Formation (shown on Figure 1 as BM).

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

Carboniferous (Silesian)
Coolbaun Formation (CQ) – Shale and mudstone with this coals

Moyadd Coal Formation (MC) – Shale, siltstone and minor sandstone
Bregaun Flagstone Formation (BE) – Thick flaggy sandstone and siltstone
Killeshin Silstone Formation (KN) – Muddy siltstone and silty mudstone
Luggacurren Shale Formation (LS) – Mudstone and shale with chert and limestone

Carboniferous (Dinantian)
Clogrenan Formation (CL) – Cherty, muddy calcarenite limestone
Ballyadams Formation (BM) – Crinoidal wackestone/ packstone limestone
Milford Formation (MI) – Peloidal calcarenite limestone
Butlersgrove Formation (BU) – Very dark grey argillaceous limestones

Ballysteen Formation (BA) – Fossiliferous dark-grey muddy limestone
Ballymartin Formation (BT) – Limestone and dark grey calcareous shales
Quinagh Formation (QU) – Lenticular mudstone and coarse siltstone

Porter's Gate Formation (PG) – Sandstones, shales and thin limestones

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

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

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

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

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

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

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

3 Results

Site	Ministerial Direction		NMS Reg.	Sample	Context	Notes		
Ballyquirk 4	A032/	AR157	E3848	9	33	Altered;	Sub-angular to sub-rounded	Sandstone, very coarse to medium grained, quartz rich, red/yellow
Ballyquirk 4	A032/	AR157	E3848	11	41	Not altered;	Sub-angular to sub-rounded	Sandstone, very coarse to medium grained, quartz rich, red/yellow
Ballyquirk 4	A032/	AR157	E3848	13	44	Altered;	Sub-angular to sub-rounded	Sandstone, very coarse to medium grained, quartz rich, red/yellow
Ballyquirk 4	A032/	AR157	E3848	16	66	Burnt;	Sub-angular to sub-rounded	Sandstone, very coarse to medium grained, quartz rich, red/yellow
Ballyquirk 4	A032/	AR157	E3848	17	32	Not altered;	Sub-angular to sub-rounded	Sandstone, very coarse to medium grained, quartz rich, red/yellow
Ballyquirk 4	A032/	AR157	E3848	18	31	Altered;	Sub-angular to sub-rounded	Sandstone, very coarse to medium grained, quartz rich, red/yellow
Ballyquirk 4	A032/	AR157	E3848	19	37	Burnt;	Sub-angular to sub-rounded	Sandstone, very coarse to medium grained, quartz rich, red/yellow
Ballyquirk 4	A032/	AR157	E3848	36	202	Not altered;	Sub-angular to sub-rounded	Sandstone, very coarse to medium grained, quartz rich, red/yellow
Ballyquirk 4	A032/	AR157	E3848	39	297	Burnt;	Sub-angular to sub-rounded	Sandstone, very coarse to medium grained, quartz rich, red/yellow
Ballyquirk 4	A032/	AR157	E3848	40	310	Not altered;	Sub-angular to sub-rounded	Sandstone, very coarse to medium grained, quartz rich, red/yellow
Ballyquirk 4	A032/	AR157	E3848	44	262	Not altered;	Angular to sub-rounded	Sandstone, very coarse to medium grained, quartz rich, red/yellow
Ballyquirk 4	A032/	AR157	E3848	61	131	Not altered;	Sub-angular to sub-rounded	Sandstone, very coarse to medium grained, quartz rich, red/yellow
Ballyquirk 4	A032/	AR157	E3848	62	141	Burnt;	Sub-angular to sub-rounded	Sandstone, very coarse to medium grained, quartz rich, red/yellow
Ballyquirk 4	A032/	AR157	E3848	74	100	Altered;	Sub-angular to sub-rounded	Sandstone, very coarse to medium grained, quartz rich, red/yellow
Ballyquirk 4	A032/	AR157	E3848	75	101	Burnt;	Sub-angular to sub-rounded	Sandstone, very coarse to medium grained, quartz rich, red/yellow

Site	Ministerial Direction		NMS Reg.	Sample	Context	Notes		
Ballyquirk 4	A032/	AR157	E3848	84	84	Not altered;	Sub-angular to sub-rounded	Sandstone, very coarse to medium grained, quartz rich, red/yellow
Ballyquirk 4	A032/	AR157	E3848	85	85	Burnt;	Sub-angular to sub-rounded	Sandstone, very coarse to medium grained, quartz rich, red/yellow

4 Potential Sources

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

5 Discussion

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

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

Site	Licence			No.	Burnt	Angular	Rounded	Pebbles	Limestone
Kilree 1	A032/107	AR091	E3728	1	0	1	0	0	0
Dunbell Big 2	A032/130	AR095	E3853	1	1	1	1	0	0
Holdenstown 4	A032/101	AR100	E3682	7	7	7	7	0	0
Rathcash 1	A032/133	AR102	E3859	3	0	3	3	3	0
Rathcash 2	A032/134	AR103	E3860	12	12	12	12	12	0
Rathcash East 2	A032/136	AR105	E3893	3	0	3	3	0	0
Blanchvillespark 3	A032/140	AR109	E3913	3	0	3	3	3	0
Blanchvillespark 4	A032/141	AR110	E3914	3	3	3	0	0	0
Ballyquirk 1	A032/143	AR112	E3863	1	1	1	1	0	0
Ballyquirk 2	A032/144	AR113	E3864	5	5	5	1	0	0
Ballinvally 1	A032/146	AR115	E3836	1	0	1	1	0	0
Garryduff 1	A032/147	AR116	E3852	4	0	4	0	0	0
Jordanstown 2	A032/151	AR120	E3851	4	4	4	0	0	0
Kellymount 6	A032/122	AR121	E3758	3	3	3	3	0	0
Jordanstown 3	A032/152	AR122	E3916	2	2	2	2	2	0
Kellymount 2	A032/111	AR124	E3757	11	4	11	11	9	1

Site	Licence			No.	Burnt	Angular	Rounded	Pebbles	Limestone
Kellymount 3	A032/112	AR125	E3856	13	2	13	2	0	1
Kellymount 5	A032/114	AR127	E3858	27	10	26	24	21	3
Shankill 4	A032/153	AR130	E3838	5	1	5	4	0	0
Shankill 5	A032/154	AR131	E3850	2	1	2	1	0	0
Moanmore 1	A032/156	AR133	E3835	6	1	6	1	0	0
Moanmore 2	A032/157	AR134	E3843	2	0	2	2	0	0
Bannagagole 1	A032/159	AR136	E3844	3	2	3	3	3	0
Moanduff 1	A032/160	AR137	E3839	7	1	7	7	3	0
Coolnakisha 1	A032/128	AR139	E3768	1	0	1	1	1	0
Cranavonane 1	A032/164	AR141	E3842	2	2	2	2	2	0
Tomard Lower 1	A032/117	AR144	E3733	1	0	1	1	1	0
Paulstown 1	A032/093	AR145	E3642	3	1	3	3	2	0
Rathgarvan or Clifden 1	A032/125	AR147	E3760	1	0	1	1	0	0
Maddockstown 1	A032/126	AR148	E3759	3	3	3	3	0	0
Leggetsrath East 1	A032/118	AR154	E3734	1	1	1	1	0	0
Moanduff 3	A032/120	AR156	E3736	1	0	1	1	1	0
Ballyquirk 4	A032/167	AR157	E3848	17	6	17	17	0	0
Grand Total :				**159**	**73**	**158**	**122**	**63**	**5**

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

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

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

6 References

Aalen, F H A, Whelan, K and Stout, M 1997 *Atlas of the Irish Rural Landscape*. Cork University Press: Cork.

Cooney, G and Mandal, S 1998 *The Irish Stone Axe Project: Monograph I*. Wordwell: Wicklow.

Mandal, S 1997 Striking the balance: the roles of petrography and geochemistry in stone axe studies in Ireland. *Archaeometry* **39**(2), 289-308.

Mandal, S 2004 Petrographical Report on Stone Samples found during Archaeological Investigations relating to the Sligo Inner Relief Road (Licence No. 03E0535). *Unpublished report commissioned by ACS Ltd for the NRA.*

McConnell, B (ed.), 1994 *Geology of Carlow-Wexford: A Geological Description to Accompany the Bedrock Geology 1:100,000 Map Series, Sheet 19, Carlow-Wexford*. Geological Survey of Ireland Publications. Westprint: Sligo.

Appendix 2.5 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 ‰
C41, fill of trough	11	Charcoal	*Ulmus* sp/ Elm 0.63g	QUB	UBA 12263	AMS (std)	1606–1502BC (1 sigma), 1617–1494BC (2 sigma)	3270±24	- 24.5
C297, fill of pit	39	Charcoal	*Corylus avellana* / Hazel 0.16g	QUB	UBA 12264	AMS (std)	1742–1670BC (1 sigma), 1752–1628BC (2 sigma)	3402±25	- 25.5

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

Comments:
This standard deviation (error) includes a lab error multiplier.
1 sigma = square root of (sample std. dev.^2 + curve std. dev.^2)
2 sigma = 2 x square root of (sample std. dev.^2 + curve std. dev.^2) where ^2 = quantity squared.

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 3LIST OF RMP IN AREA

RMP No	Description
KK020-026001–006	*Fulachta fiadh*

See Figure 2 for location.

APPENDIX 4LIST OF SITE NAMES

Site Name	Site Code	E Number	Director	NGR
Baysrath 2	AR055	E3627	Fintan Walsh	251593/137855
Baysrath 3	AR056	E3628	Fintan Walsh	251672/138000
Baysrath 4	AR057	E3629	Fintan Walsh	251515/138280
Danganbeg 1	AR058	E3606	Emma Devine	251462/138754
Danganbeg 2	AR059	E3607	Emma Devine	251397/138939
Danganbeg 3	AR060	E3671	Emma Devine	251430/139245
Danganbeg 4	AR061	E3676	Emma Devine	251401/139372
Knockadrina 1	AR062	E3677	Ed Lyne	251422/139420
Tinvaun 1	AR063	E3678	Ed Lyne	251482/139625
Tinvaun 2	AR064	E3680	James Kyle	251445/139736
Tinvaun 3	AR065	E3608	James Kyle	251501/139832
Tinvaun 4	AR066	E3609	James Kyle	251508/139917
Stonecarthy West 1	AR067	E3610	James Kyle	251538/140023
Knockadrina 1	AR068	E3611	James Kyle	251647/140237
Rathduff 1	AR069	E3612	Ed Lyne	251286/142167
Rathduff Upper 1	AR070	E3613	Ed Lyne	251280/142559
Kellsgrange 1	AR071	E3575	James Kyle	250911/143732
Kellsgrange 2	AR072	E3577	James Kyle	250967/143861
Kellsgrange 3	AR073	E3576	James Kyle	250948/144003
Ennisnag 1	AR074	E3614	Richard Jennings	251416/145690
Ennisnag 2	AR075	E3615	Richard Jennings	251638/146068
Danesfort 12	AR076	E3616	Richard Jennings	251669/146186
Danesfort 13	AR077	E3617	Richard Jennings	251765/146384
Danesfort 2	AR078	E3540	Richard Jennings	251953/146745
Danesfort 4	AR079	E3539	Richard Jennings	251880/147579
Danesfort 3	AR080A	E3542	Richard Jennings	252221/146845
Danesfort 1	AR080B	E3541	Richard Jennings	252267/146707
Croan 1	AR081	E3543	Emma Devine	252280/147332
Danesfort 5	AR082	E3546	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	E3468	Richard Jennings	253089/148345
Danesfort 10	AR087	E3459	Richard Jennings	253229/148414
Danesfort 11	AR088	E3460	Richard Jennings	253245/148462
Rathclogh 1	AR089	E3726	Patricia Lynch	253365/145515
Rathclogh 2	AR090	E3727	Patricia Lynch	253650/148848
Kilree 1	AR091	E3728	Patricia Lynch	254088/149310
Kilree 2	AR092	E3729	Patricia Lynch	254320/149500
Kilree 3	AR093	E3643	Patricia Lynch	254449, 149639
Kilree 4	AR094	E3730	Patricia Lynch	255330/150084
Dunbell Big 2	AR095	E3853	Yvonne Whitty	256684/151066
Holdenstown 1	AR096	E3681	Yvonne Whitty	256737/151253
Holdenstown 2	AR097/98	E3630	Yvonne Whitty	256891/151781
Holdenstown 3	AR099	E3854	Yvonne Whitty	256990/152085
Holdenstown 4	AR100	E3682	Yvonne Whitty	256828/152048
Dunbell Big 1	AR101	E3855	Yvonne Whitty	257034/152315
Rathcash 1	AR102	E3859	Tim Coughlan	258178/154199
Rathcash 2	AR103	E3860	Tim Coughlan	258294/154293
Rathcash East 1	AR104	E3892	Tim Coughlan	259419/154546
Rathcash East 2	AR105	E3893	Tim Coughlan	259555/154566
Rathcash East 3	AR106	E3861	Tim Coughlan	259821/154653
Blanchvillespark 1	AR107	E3894	Richard Jennings	260535/155212
Blanchvillespark 2	AR108	E3895	Tim Coughlan	260637/155449

Site Name	Site Code	E Number	Director	NGR
Blanchvillespark 3	AR109	E3913	Tim Coughlan	260785/155653
Blanchvillespark 4	AR110	E3914	Tim Coughlan	261442/156269
Blanchvillespark / Ballyquirk 1	AR111	E3862	Ruth Elliott	261531/156323
Ballyquirk 1	AR112	E3863	Ruth Elliott	261531/156323
Ballyquirk 2	AR113	E3864	Ruth Elliott	261811/156508
Ballyquirk 3	AR114	E3865	Ruth Elliott	261875/156559
Ballinvally 1	AR115	E3836	Emma Devine	263258/157521
Garryduff 1	AR116	E3852	Emma Devine	263933/157991
Kilmacahill 1	AR117	E3915	Tim Coughlan	264267/158369
Kilmacahill 2	AR118	E3833	Tim Coughlan	264380/158453
Jordanstown 1	AR119	E3834	James Kyle	264546/158643
Jordanstown 2	AR120	E3851	James Kyle	264893/159038
Kellymount 6	AR121	E3758	Przemaslaw Wierbicki	265130,159277
Jordanstown 3	AR122	E3916	Przemaslaw Wierbicki	265103/159227
Kellymount 1	AR123	E3756	Przemaslaw Wierbicki	265250/159397
Kellymount 2	AR124	E3757	Przemaslaw Wierbicki	265164/159463
Kellymount 3	AR125	E3856	Przemaslaw Wierbicki	265338/159597
Kellymount 4	AR126	E3857	Przemaslaw Wierbicki	265412/159803
Kellymount 5	AR127	E3858	Przemaslaw Wierbicki	265530,159977
Shankill 2	AR128	E3738	Richard Jennings	265924/160651.
Shankill 3	AR129	E3737	Richard Jennings	266052/161141
Shankill 4	AR130	E3838	Richard Jennings	266286/161526
Shankill 5	AR131	E3850	Richard Jennings	266374/161730
Shankill 6	AR132	E3840	Richard Jennings	266403/161836
Moanmore 1	AR133	E3835	Richard Jennings	266476/162016
Moanmore 2	AR134	E3843	Sinead Phelan	266756/162866
Moanmore 3	AR135	E3837	Sinead Phelan	266856/163259
Bannagagole 1	AR136	E3844	Sinead Phelan	266942/163569
Moanduff 1	AR137	E3839	Robert Lynch	267261/164397
Coneykeare 1	AR138	E3683	Sinead Phelan	267836/166209
Coolnakisha 1	AR139	E3768	Ellen O'Carroll	268175/167274
Coolnakisha 2	AR140	E3767	Ellen O'Carroll	268306/167559
Cranavonane 1	AR141	E3842	Tim Coughlan	268554/167895
Cranavonane 2	AR142	E3732	Ellen O'Carroll	268830/168154
Cranavonane 3	AR143	E3731	Ellen O'Carroll	269123/168362
Tomard Lower 1	AR144	E3733	Ellen O'Carroll	269349/168496
Paulstown 1	AR145	E3642	Ruth Elliot	265889/158499
Paulstown 2	AR146	E3632	Ruth Elliot	265664/158651
Rathgarvan or Clifden 1	AR147	E3760	Przemaslaw Wierbicki	257026/154123
Maddockstown 1	AR148	E3759	Przemaslaw Wierbicki	256886/154199
Templemartin 3	AR149	E3845	Emma Devine	255095/155200
Templemartin 4	AR150	E3841	Emma Devine	254920/155427
Templemartin 5	AR151	E3846	Emma Devine	254706/155636
Templemartin 1	AR152	E3849	Emma Devine	254504/155826
Templemartin 2	AR153	E3847	Emma Devine	254173/156236
Leggetsrath East 1	AR154	E3734	Emma Devine	253793/156484
Moanduff 2	AR155	E3735	Sinead Phelan	267470/164887
Moanduff 3	AR156	E3736	Sinead Phelan	267515/164979
Ballyquirk 4	AR157	E3848	Richard Jennings	262596/157025
Shankill 1	AR158	E3766	Przemaslaw Wierbicki	265707/160269
Rathgarvan or Clifden 2	AR159	E3921	Tim Coughlan	257095/154119
Ballynolan 1	AR160	E3755	Sinead Phelan	267714/165597
Stonecarthy West 2	UA2	E3974	Tim Coughlan	251372/142037
Rathduff Bayley 1	UA4	E4011	Tim Coughlan	251005/143564