N18 Gort to Crusheen Road Scheme

Site Name: Caheraphuca 1

Ministerial Direction No.: 044
Excavation Registration No.: E3654

Burnt Mound

Final Report

On behalf of Galway County Council

Site Director: David Bayley
January 2010

IAC Irish Archaeological Consultancy

PROJECT DETAILS

Project Reference No.	A044
Project	N18 Gort to Crusheen Road Scheme
Ministerial Direction Reference No.	A044
NMS Registration Number	E3654
Excavation Director	David Bayley
Senior Archaeologist	Shane Delaney
Consultant	Irish Archaeological Consultancy Ltd, 120b Greenpark Road, Bray, Co. Wicklow
Client	Galway County Council
Site Name	Caheraphuca 1
Site Type	Burnt Mound
Townland	Caheraphuca
Parish	Inchicronan
County	Clare
NGR (Easting)	139206
NGR (Northing)	188029
Chainage	18,360
Height m OD	34 m OD
RMP No.	N/A
Excavation Dates	15 October – 13 November 2007
Excavation Duration	22 Days
Report Type	Final
Report Date	19 January 2010
Report By	IAC Ltd

ACKNOWLEDGEMENTS

The excavation was carried out in accordance with the Directions issued to Galway 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 Galway County Council and Irish Archaeological Consultancy Ltd.

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NRDO GALWAY COUNTY COUNCIL

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ABSTRACT

Irish Archaeological Consultancy Ltd (IAC), funded by Galway County Council and the National Roads Authority (NRA), undertook the excavation of a burnt mound under Ministerial Directions at the site of Caheraphuca 1 along the N18 Gort to Crusheen road scheme (Figure 1). The following report describes the results of archaeological fieldwork at that site. The area was fully excavated by Dave Bayley under Ministerial Directions A044 and Registration Number E3654 issued by the Department of Environment, Heritage and Local Government (DEHLG) in consultation with the National Museum of Ireland. The fieldwork took place in October - November 2007.

The site at Caheraphuca 1 was located in the townland of Caheraphuca, Co. Clare, between a peat basin in Caheraphuca and one in Clooneen. The site was located in a slight hollow in a gently undulating landscape at NGR 139206/188029 and 34 m OD. It had recently been used for pasture.

Two areas of potential archaeological interest were stripped of topsoil and investigated at the site. The main area consisted of a burnt spread measuring 16 m (east to west) x 13 m x 0.4 m deep. This mound sealed a thin layer of peat that contained two stone axes. A plano-convex knife, a scraper and some worked chert pieces were recovered from the interface between the peat and the burnt spread. To the north of the burnt spread were three large pits, two of which were intercutting. These pits are thought to be broadly contemporary and may have had a water management function. Three troughs were recorded on site, two of which may have been wood-lined. Four smaller pits were also situated around the burnt spread. The area where the burnt spread was situated had been subject to drainage work, with two large stone-filled sink holes having been constructed in recent times, one of which truncated the north-eastern corner of the burnt spread. In the second area, one pit measuring 1.95 m east-west x 1.02 m x 0.11 m deep was recorded.

The burnt spread (C95) at Caheraphuca 1 returned a 2 Sigma calibrated date of 1877–1620 BC (UBA 12745) while the fill of a trough (C58) at the site returned a 2 Sigma calibrated date of 1373–1073 BC (UBA 12744) indicating activity at the site from the early to middle Bronze Age period.

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1 INTRODUCTION

1.1 General

This report describes the excavation of Caheraphuca 1 (Figures 1–3; Plate 1), in the townland of Caheraphuca, Co. Clare, undertaken by David Bayley of IAC Ltd, on behalf of Galway County Council and the NRA. It was carried out as part of the archaeological mitigation programme of the N18 Gort to Crusheen road scheme. The excavation was undertaken to offset the adverse impact of road construction on known and potential subsoil archaeological remains in order to preserve the site by record.

The site was not a Recorded Monument but was first identified during testing carried out David Bayley in summer 2007 (Ministerial Direction No. A044, NMS Licence No. 07E489). All features identified during the assessment phase were subsequently re-identified and excavated during the full excavation phase of the site which took place between 15 October and 13 November 2007 with a team of one director, two supervisors and sixteen assistant archaeologists.

The site was located approximately 750 m to the west of the village of Crusheen (Clare OS sheet 18).

The site was assigned the following identification data:

Site Name: Caheraphuca 1; Ministerial Direction No.: A044; NMS Registration No.: E3654; Route Chainage (Ch): 18,360; NGR: 139206/188029.

1.2 The Development

The N18 Gort to Crusheen scheme involves the construction of a total of 44 km of road to include mainline roadworks (22 km), associated side roads (10 km) and access tracks (12 km). The road will have twin 7 m carriageways, 2.5 m hard shoulders adjacent to the verges and a median with a minimum width of 2.6 m which includes two 1 m hard strips. The selected route bypasses the town of Gort to the east and the village of Crusheen to the west.

1.3 Archaeological Requirements

The archaeological requirements for the N18 Gort to Crusheen road scheme were defined in the Ministerial Directions issued to Galway 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 Galway County Council and Irish Archaeological Consultancy Ltd. These instructions formed the basis of all archaeological works undertaken for this development. The archaeological excavation works under this contract were located between the townlands of Glenbrack, Co. Galway, and Carrowdotia, Co. Clare.

The proposed N18 was subjected to an Environmental Impact Assessment, the archaeology and cultural history section of which was carried out by Babtie Pettit Ltd in 2006. The Record of Monuments and Places, the Sites and Monuments Record, Topographical files of the National Museum of Ireland, aerial photography, and documentary sources were all consulted. Two phases of geophysical survey were conducted. The main phase was by RSKENSR (Bartlett 2004) during the preparation of the EIA (Babtie Pettit Ltd 2006). A supplementary survey was carried out in Ballyboy by Target Geophysics Ltd (Target Geophysics Ltd 2007). As a result of the paper survey, field inspections, geophysical survey, archaeological testing and archaeological monitoring, a total of 22 fully recorded manual excavations were carried out on this section of the overall route alignment. In some cases where a

number of sites of similar type were located together in a single townland, the sites were excavated under one excavation number.

Phase 1 archaeological testing was completed by IAC Ltd and Phase 2 excavation of the sites identified during testing was conducted by IAC Ltd on behalf of Galway County Council and the NRA.

1.4 Methodology

The presence of archaeological remains beneath the topsoil layer was confirmed by machine-cut test trenches. Following testing, the topsoil was reduced to the interface between topsoil and natural subsoil 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 10 m intervals and was subsequently calibrated to the national grid using GPS survey equipment.

All features were subsequently fully excavated by hand and recorded using the single context recording system with plans and sections being produced 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 excavations. Features exhibiting large amounts of carbonised material were targeted. Animal bone, unburnt wood and stone samples were all retrieved through both hand and bulk collection and retained for specialist analysis wherever they were encountered during the excavations.

In the instances where artefacts were uncovered on site they were dealt with in accordance with guidelines issued by the National Museum of Ireland (NMI) and where warranted in consultation with the relevant specialists. All artefacts, ecofacts and paper archive are currently stored in IAC offices, Lismore, Co Waterford and will ultimately be deposited with the National Museum of Ireland.

Radiocarbon dating of the site was carried out by means of AMS (Accelerator Mass Spectrometry) dating of identified and recommended charcoal samples. All calibrated AMS dates in this report are quoted to a 2 Sigma degree of probability.

All excavation and post-excavation works were carried out in consultation and agreement with the Project Archaeologist, the National Monuments Section of the DEHLG and the National Museum of Ireland.

2 EXCAVATION RESULTS

The archaeological activity recorded at Caheraphuca 1 was an early to middle Bronze Age burnt mound.

Detailed descriptions of all excavated features and deposits are listed in Appendix 1.

2.1 Phase 1: Natural Drift Geology

Most of the low-lying areas along the route are associated with poorly drained bog and wet marshland areas glacially formed depressions or seasonal lakes known as turloughs. The higher ground generally comprises well-drained, gently undulating pastureland with some uneven hummocky ridges, formed either of limestone epikarst or glacial features such as drumlins. The two dominant rock types of the region are Carboniferous Limestone, which underlies the entire length of the N18 Gort to Crusheen scheme, and the Devonian Old Red Sandstone, which forms the Slieve Aughty Mountains to the east of the proposed route. The road alignment is predominantly underlain by either limestone derived till and sandy till deposited during the last glaciation or organic peat which has generally formed in the low-lying, poorly drained areas where standing water and slow percolation causes thin layers of peaty soil to accumulate.

The natural subsoil varied across the site at Caheraphuca 1. It was generally compact sandy clay with moderate small to medium stone inclusions. It varied in colour from medium orange in the higher areas of the site to light yellowish-grey in the lower areas where the site had a tendency to flood, resulting in local leaching.

2.2 Phase 2: Prehistoric Activity

The earliest activity on site appeared to be the deposition of Neolithic period axes in a peat deposit.

2.2.1 Peat Deposit

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C113	N/A	2.6	1.28	Undetermined	Dark, brown/black, peat spread	Peat spread

Finds

Context	Find No	Material	Period	Description
C113	E3654:113:1	Mudstone	Prehistoric	Broken adze/axehead
C113	E3654:113:2	Shale	Prehistoric	Axehead

Interpretation

This context was a peat deposit at the base of a natural hollow beneath the burnt deposit, C124 (Figure 4; Plate 3). This was the location of a former seasonal pond. It is possible that the two axeheads (O'Keeffe, Appendix 2.6) were deliberately placed or dumped in the peat (Figure 8, Plate 9 and 10). This was the earliest activity at Caheraphuca 1 and pre-dated the burnt spread activity.

2.3 Phase 3: Bronze Age Burnt Spread and Associated Activity

Bronze Age activity on site consisted of the remains of a burnt mound (Figures 3 and 7; Plate 8).

Area A

2.3.1 Pit

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C7	N/A	1.97	1.91	0.62	Sub-circular pit, irregular, concave base	Pit
C8	C7	1.9	1.84	0.3	Loose, black sand, 50% stone and charcoal	Top fill of pit C7
C17	C7	1.04		0.22	Dark brown sand 50% stones and charcoal	Second fill of pit C7
C18	C7	0.26		0.2	Grey sand with small and 10% charcoal	Third fill of pit C7
C35	C7	0.14		0.14	Light grey sand with ash and charcoal	Primary fill of C7

Finds: None

Interpretation
The contexts above represent a sub-circular pit that contained four fills. Charcoal flecks were present in the fills as well as a small amount of ash and small stones. This feature may have been a trough or industrial pit and the fills represent final use material and material that had been dumped in after it fell out of use. This was the only possible archaeological feature in Area A.

Area B

2.3.2 Large Pits at Centre of Site

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C100	N/A	2.75		0.38	Sub-oval, steep sides, flat base	Cut of large pit
C101	N/A	3.5		0.74	Sub-circular, steep sides, irregular base	Cut of large pit
C29	C100, C101	5.1	1.67	0.37	Black silty clay with stones and charcoal	Fill of two pits
C30	C100, C101	4.76	1.48	0.2	Dark brown silty clay stone inclusions	Top fill of two pits
C31	C101	2.5	2.2	0.38	Light grey, clay-sand, stones, charcoal	Basal fill of C101
C102	N/A	3.35		0.8	Sub-circular, convex sides, flat base	Cut of large pit
C110	C102	0.35		0.2	Sterile brown, silty clay of tight compaction.	Basal fill of pit C102
C106	C102		0.35	0.62	Light brown/yellow, clay sand	Second fill of pit C102
C107	C102	3.00	2.3	0.38	Brown/grey, sandy silt charcoal, boulders	Third fill of pit C102
C108	C102	2.9	2.8	0.27	Brown/grey, sandy silt charcoal, boulders	Fifth fill of pit C102
C109	C102	3.15	2.5	0.23	Dark grey/brown, sandy silt, stones charcoal	Sixth fill of pit C102
C111	C102	0.5	0.1	0.15	Sterile dark grey, sandy clay	Fourth fill of pit C102
C105	C102	5.5	4.25	0.24	Mid-brown, sandy clay with pebbles	Fill of pit within C102

Finds: None

Interpretation
The contexts above represent three large pits that were located at the centre of the site (Figure 4 and 6; Plate 2). They appear to have been filled with water when in use. Pits C100 and C101 are thought to have been broadly contemporary as they were inter-cutting and shared charcoal-rich fill C29 and silty fill C30. Pit C102 was adjacent to pit C101 but contained different fills from the other two and may have been cut at a later date. All fills of pit C102 can be attributed to natural silting. These pits are likely to have been the focus of the burnt spread activity and may possibly have had a water management function, perhaps acting as silt traps. Pit C102 was cut into the water table and may have functioned as a deep well to fill the other troughs around the site.

A sample of the heat-shattered stone from C29, the fill of two of the pits, has been analysed as limestone and chert, which are not typically used in burnt mounds (Mandal, Appendix 2.3). This context also produced evidence for animal bones but unfortunately of indeterminate species (Geber, Appendix 2.4). Charcoal identified from the pit C100 included hazel, oak, ash, cf hawthorn, and poplar/willow (Cobain, Appendix 2.2) which was representative of the other samples analysed from across the site.

2.3.3 Trough, Pit and Stakeholes

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C57	N/A	2.6	2.4	0.24	Sub-rectangular concave sides and base	Cut of trough
C58	C57	2.6	2.4	0.24	Black, silty clay stone and charcoal	Fill of trough
C59	C57	3.62	1.7	0.06	Loose, mid-grey, silty sand	Top fill of C57, C74
C62	C74	1.46	1.2	0.24	Loose, mid-brown, silty clay	Fill of pit
C74	N/A	1.46	1.2	0.24	Irregular cut with base slopes from N-S.	Cut of pit
C75	N/A	0.14	0.13	0.21	Circular cut, vertical sides, concave base	Cut of stakehole
C76	C75	0.14	0.13	0.21	Loose, black, silty sand with small stones	Fill of stakehole C75
C77	N/A		0.39	0.23	Oval cut gradual sides, concave base	Cut of posthole
C78	C77		0.39	0.23	Loose, grey/black, silty clay with charcoal	Fill of posthole
C79	N/A		0.1	0.14	Oval cut, vertical sides, concave base	Cut of stakehole
C80	C79		0.1	0.14	Loose, black, silty sand with small stones	Fill of stakehole C79
C81	N/A	0.1	0.1	0.11	Circular cut, vertical sides, concave base	Cut of stakehole
C82	C81	0.1	0.1	0.11	Loose, black, silty sand with small stones	Fill of stakehole C81
C83	N/A	0.14	0.12	0.17	Sub-circular, vertical sides, concave base	Cut of stakehole
C84	C83	0.14	0.12	0.17	Loose, black, silty sand material	Fill of stakehole C83
C85	N/A	0.11	0.1	0.25	Circular cut, vertical sides, concave base	Cut of stakehole
C86	C85	0.11	0.1	0.25	Loose, black, silty sand with small stone	Fill of stakehole C85
C87	N/A	0.1	0.08	0.2	Circular cut vertical sides, concave base	Cut of stakehole
C88	C87	0.1	0.08	0.2	Loose, mid-grey, silty sand	Fill of stakehole C87

Finds: None

Interpretation

The contexts above represent a trough, pit, one posthole and six stakeholes (Figure 4 and 5; Plate 6). C74 was the cut of an irregular pit that contained a single silty clay fill, C62, and was later cut by trough C57. Two stakeholes, C81 and C83, were recorded at the north and south end of the trough with posthole C77 cut into its west side. Two stakeholes, C85 and C87, were located at the west edge of the trough and two, C75 and C79, were recorded to the southwest and northwest respectively. The presence of the stakeholes and postholes indicate that the trough was wood lined. The trough was filled with charcoal-rich material and burnt stone and was likely to be contemporary with the burnt spread activity to the southwest. The trough would originally have been used to heat water and the charcoal-rich material within it probably represents residual material from when it was last used.

One AMS date was obtained from the trough fill C58. A fragment (1.70 g) of alder/hazel (*Alnus glutinosa/corylus avellana*) charcoal was identified (Cobain, Appendix 2.2). This charcoal returned an AMS result of 2979±39 BP (UBA 12744). The 2 Sigma calibrated result for this was 1373–1073 BC (Appendix 2.1).

2.3.4 Trough and Associated Stakeholes

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C70	N/A	1.8	1.05	0.15	Sub-circular cut, gentle sides flat base	Cut of a trough
C71	C70	1.7	0.88	0.12	Loose, black material with stone, charcoal	Basal fill of trough C70
C72	C70	1.8	1	0.1	Dark brown/grey sand with stone charcoal	Top fill of trough C70
C115	N/A	0.15	0.15	0.24	Circular cut, vertical sides, concave base	Cut of a stakehole
C117	N/A	0.13	0.12	0.22	Circular cut, vertical sides, concave base	Cut of a stakehole
C118	C117	0.13	0.12	0.1	Black, silty clay with frequent charcoal	Top fill of stakehole
C119	C117	0.13	0.12	0.12	Light grey, silt with occasional charcoal	Basal fill of stakehole
C120	N/A	0.1	0.09	0.19	Circular cut , vertical sides, concave base	Cut of a stakehole
C121	C120	0.1	0.09	0.19	Loose, dark grey, sand with charcoal flecks	Single fill of stakehole
C122	C115	0.15	0.15	0.24	Dark grey, sand, charcoal and stones	Single fill of stakehole
C130	N/A	0.13	0.12	0.18	Circular cut, vertical sides, concave base	Cut of a stakehole
C131	C130	0.13	0.12	0.18	Dark grey, sand, charcoal and stones	Single fill of stakehole

Finds

Context	Find No	Material	Period	Description
C72	E3654:72:1	Sandstone	Prehistoric	Rubbing stone

Interpretation:
The contexts above represent a trough C70 which had stakeholes in each of its corners (Figure 4; Plate 5). The trough contained two fills, a charcoal-rich basal fill C71 and an upper fill C72 with moderate small stones and occasional charcoal flecks. The presence of the stakeholes around the interior of the trough indicates that it was timber lined. The trough was probably used in association with the burnt mound activity and was later cut by modern drain C91. The trough would originally have been used to heat water and the charcoal-rich material within it probably represents residual material from when it was last used.

Artefact E3654:72:1 was recovered from the trough and may relate to the activity carried out there. It is a rubbing stone fragment (Sternke, Appendix 2.5).

2.3.5 Pit

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C19	N/A	1.33	1.2	0.12	Sub-circular, concave sides and base	Cut of pit
C20	C19	1.33	1.2	0.12	Brown, silty clay, burnt stone, charcoal	Single fill of pit C19

Finds: None

Interpretation
The contexts above represent a shallow pit C19, which was filled with heat shattered stone and charcoal (C20). Considering the charcoal-rich fill, the function of the pit was likely to have been related to the burnt spread activity. It was cut by modern agricultural furrow C22.

2.3.6 Pit

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C11	N/A	0.94	0.85	0.15	Sub-circular, concave sides, flat base	Cut of pit
C12	C11	0.94	0.85	0.15	Dark brown clay silt, 30% stones, charcoal	Stony fill of pit C11

Finds: None

Interpretation
The contexts above represent a pit C11, and its single stony fill C12. There was little to indicate a date or function but it may have been related to the burnt spread activity.

2.3.7 Pit

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C25	N/A	1.45	1.2	0.2	Large oval pit, concave sides, flat base	Cut of large pit
C26	C25	1.45	0.94	0.17	Dark brown silty sand, stone, charcoal	Basal fill of pit C25
C27	C25	0.95	0.91	0.1	Brown/grey, silty sand, stone, charcoal	Top fill of pit C25

Finds: None

Interpretation:
Pit C25 was an oval pit that contained two fills. Fills, C26 and C27, contained medium and large stones and charcoal inclusions.

2.3.8 Pit

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C40	C41	0.9	0.84	0.33	Dark grey, sandy silt, stone and charcoal	Single fill of C41
C41	N/A	0.9	0.84	0.33	Sub-rectangular cut , flat base	Pit

Finds: None

Interpretation
Pit C41 was located to the north of the three central pits on site (section 2.3.2). Its fill C40 contained moderate inclusions of stone and charcoal. The pits function is likely to have been associated with the central pits and burnt spread activity.

2.3.9 Trough

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C37	C42	1.4	0.84	0.2	Grey/black, sandy clay, decayed stone	Upper fill of trough C42
C38	C42, 49	1.7	0.17	0.2	Dark grey, gravelly sand with burnt stone	Fill of C42 and C49
C42	N/A	1.7	1.61	0.22	Sub-circular cut, gradual sides, flat base	Cut of trough
C49	N/A	0.9	1.38	0.41	Oval cut, vertical sides, concave base	Cut of trough
C50	C49	0.49	0.32	0.12	Loose light grey/yellow silty sand	Fill of C49
C53	C42	1.68	0.7	0.18	Grey/black, sandy clay with burnt stone	Upper fill of C42

Finds: None

Interpretation
The above contexts represent a stepped trough, C42 and C49 (Plan 4 and 5; Plate 7). The main cut was C42, with C49 cut into the northeast of its base. This step could have been used to regulate the amount of water that was required in the trough. If only a small quantity of water was required C49 may have been used, while the whole pit (C42 and C49) may have been used when larger quantities of water were required. The basal fill of C49, C50, was re-deposited natural subsoil. Fill C50 was sealed by a dark gravelly sand, C38, that contained heat-affected stones and charcoal. The trough would originally have been used to heat water and the charcoal-rich material within it probably represents residual material from when it was last used.

Two deposits of heat-affected stone material, C37 and C53, were the upper fills of C42 and were located at either end of the cut.

2.3.10 Pit

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C43	C51/52	0.68	0.68	0.28	Mid brown sandy clay	Single fill of C51
C51	N/A	0.68	0.68	0.28	Cut of shallow pit	Cut of shallow pit
C52	N/A	1.7	1.2	0.02	Irregular deposit. Grey sandy silt and charcoal	Deposit material

Finds: None

Interpretation
Pit C51 was a shallow pit located to the east of the site and contained a single sandy fill C43. It was cut into a deposit of mottled grey silty material, C52 that extended to the north of the feature. It may have been a hearth.

2.3.11 Pit

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C44	C45	0.83	0.57	0.15	Loose black, gritty sand, burnt stone	Top fill of C45
C45	N/A	1.55	0.61	0.28	Oval cut, gradual sides, flat base	Cut of a pit
C46	C45	0.95	0.4	0.22	Grey/black, sandy clay with pebbles	Fill of C45
C54	C45	0.6	0.37	0.2	Yellow/grey, gravelly sand with pebbles	Secondary fill of C45
C55	C45	1.20	0.58	0.15	Grey/black, gravelly sand, charcoal flecks	Basal fill of C45

Finds: None

Interpretation
Pit C45 was an oval pit with a flat base and contained four fills. Three of the four fills contained moderate charcoal. This pit was related to the burnt spread activity (section 2.3.14) and/or activity in the central pits (section 2.3.2).

2.3.12 Pit

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C66	C67	1.5	0.85	0.12	Loose, black, silty sand, pebble and charcoal	Single fill of C67
C67	N/A	1.5	0.85	0.12	Oval cut, irregular sides slight concave base	Cut of possible pit

Finds: None

Interpretation
The above contexts represent the cut of an oval pit C67, which contained a silty fill (C66) with moderate charcoal and stone. Although its exact function is unclear, it was related to the burnt spread activity (section 2.3.14) and/or activity in the central pits (section 2.3.2).

2.3.13 Pit

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C116	N/A	2.5	1.6	0.7	Mottled grey/orange, silty sand, charcoal	Natural subsoil redeposit
C125	C126	0.84		0.19	Mid-grey, silty clay, small stone, charcoal	Basal fill of pit C126
C126	N/A	2.2		0.38	Sub-circular cut, steep sides, flat base	Cut of pit
C127	C126	1.22		0.23	Grey/brown, silty clay small stones charcoal	Top fill of pit C126
C129	C126	0.6		0.22	Black, silty clay, charcoal-rich with stones	Middle fill of pit C126

Finds: None

Interpretation
C126 was a sub-circular pit that contained three fills. The pit was cut into a re-deposit of the natural subsoil C116. All the fills contained charcoal and small stone inclusions. Although the exact function of the pit is unknown, it is likely to be related to the burnt spread activity (section 2.3.14) and/or activity in the central pits (section 2.3.2).

2.3.14 Burnt Spread

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C95	N/A	16.15	10.35	0.34	Irregular, dark brown silty clay, charcoal	Burnt spread material
C96	N/A	7.35	6.34	0.25	Irregular grey silty clay, stone and charcoal	Burnt spread material
C124	N/A	12.15	8.05	0.52	Dark brown silty, charcoal burnt stone	Burnt spread material
C99	N/A	0.84	0.7	0.08	Oval shaped black silty clay with charcoal	Deposit

Finds

Context	Find No	Material	Period	Description
C95	E3654:95:1	Chert	Prehistoric	Flake
C95	E3654:95:2	Chert	Prehistoric	Plano convex knife
C95	E3654:95:3	Chert	Prehistoric	Flake
C95	E3654:95:4	Animal tooth	Prehistoric	Animal tooth
C96	E3654:96:1	Ceramic	Post-medieval	ceramic sherd
C96	E3654:96:2	Ceramic	Post-medieval	ceramic sherd
C97=C95	E3654:97:1	Ceramic	Post-medieval	Clay pipe

Interpretation
These three contexts represent the burnt spread that was recorded in the southwest of the site. The main spread of burnt material, C124, was comprised of dark brown silty clay with charcoal and burnt stone inclusions. Two similar deposits, C95 and C96, sealed C124. Both of these deposits contained medium sized stones and charcoal. Three chert finds and an animal tooth were recovered from the burnt material C95. Two sherds of modern ceramic were recovered from C96. These were intrusive and indicate disturbance of the spread. The heat-shattered material is related to the central pits (section 2.3.2) as well as the troughs/pits across site.

The material had been deliberately dumped into a natural hollow and there were indications in the form of the modern ceramics that it had been disturbed quite recently. This deposit may represent a mound of burnt stones that had been conveniently used as a deposit to fill the hollow. The deposit C99 was located close to the burnt deposit C95 and was probably the same context.

One AMS date was obtained from the spread of heat-shattered stone and charcoal C95. A fragment (1.30 g) of alder/hazel (*Alnus glutinosa/corylus avellana*) charcoal was identified (Cobain, Appendix 2.2). This charcoal returned an AMS result of 3418±40 BP (UBA 12745). The 2 Sigma calibrated result for this was 1877–1620 BC (Appendix 2.1).

The retouched lithic artefact, E3654:95:2, is a plano-convex knife (Figure 8, Plate 10). They are normally dated to the late Neolithic and early Bronze Age periods (Sternke, Appendix 2.5). The two flakes (E3654:95:1 and E3654:95:3) are late Neolithic and were produced with platform core technology.

2.3.15 Miscellaneous Deposits

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C56	N/A	0.9	0.85	0.07	Sub-circular spread, Grey silty clay charcoal	Deposit
C89	N/A	22	10.65	0.11	Grey, gravelly clay, charcoal burnt stones	Spread
C90	N/A	4.45	4	0.08	Sub-circular spread, Grey silty clay charcoal	Stony spread
C94	N/A	1.5	1.1	0.06	Irregular deposit. Dark grey, silty clay stone	Deposit silty clay
C114	N/A	1.45	0.9	0.18	Loose, black, charcoal-rich, burnt stone	Deposit

Finds

Context	Find No	Material	Period	Description
C89	E3654:89:1	Stone	Not applicable	Natural chunk

Interpretation

The contexts above represent two spreads of charcoal-rich and heat-shattered stone material and two smaller deposits. A large spread of gravelly clay with stone and occasional charcoal inclusions, C89, was located on the southern part of the site to the south of the burnt spread (section 2.3.14). This spread of material overlay a smaller sub-circular deposit, C90, which was located to the east of the drainage feature, C128. The spread of material C89 also sealed deposits C56 and C94.

A charcoal-rich deposit with heat-affected stones, C114, overlay the southern extremity of spread C89 and the north side of pit C70. This spread was very similar to fill C71, of pit C70 and may be the same material. These deposits are all dump deposits.

A large assemblage of unburnt bone was recovered from the spread of material C89. The largest number came from cattle (*Bos taurus*) and consisted mainly of bones from the meat rich areas of the body such as the ribs, scapulae, humerus, ulna and vertebrae. Other bones identified were from caprovine (sheep/goat), a red deer antler (*Cervus elaphus*) and horse (*Equus caballus*). Butcher marks were identified on the caprovine scapula where the humerus was separated from the joint (Geber Appendix 2.4).

2.4 Phase 4: Post-medieval Activity

2.4.1 Drain and Drainage Sump

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C24	C128	5.5	4.4		Loose, mid-brown, sandy/stony clay	Fill of sink hole
C91	N/A	4.30	0.51	0.18	Linear cut, sloping sides, concave base	Cut of linear drain
C92	C91	2.45	0.51	0.15	Light grey, sand with small stone inclusions	Fill of south drain
C93	C91		0.51	0.18	Light grey, sand, small stone inclusions	Fill of north drain
C123	C91	0.55	0.43	0.06	Light grey, sand, small stones and charcoal	Fill of linear drain
C128	N/A	5.5	4.4		Sub-circular Not fully excavated	Cut sink hole
C98	N/A	6.55	4		Sub-circular, sandy clay, stone/rocks	Deposit
C48		1.25	0.7	0.21	Mid-grey, sand with grit and charcoal	Modern spread

Finds

Context	Find No	Material	Period	Description
C24	E3654:24:1	Metal	Post-medieval	Fragment of metal
C24	E3654:24:2	Ceramic	Post-medieval	Pearlware jug sherd
C98	E3654:98:1	Ceramic	Post medieval	Blackware rimsherd
C48	E3654:48:1	Animal tooth	Unknown	Tooth

Interpretation
The contexts above represent a modern linear drain C91 and a drainage pit located in the southwest of the site. Together these were likely to have functioned as modern field drainage. The drainage pit was cut into the west side of burnt spread material, C95, and was backfilled with a loose stony fill that contained modern metal and ceramic sherds. The linear drain cut trough C70 and contained three silty fills, one of which was similar to the burnt spread material (section 2.3.14). This context contained modern finds including a sherd of Pearlware jug (McCutcheon, Appendix 2.7).

2.4.2 Two Possible Agricultural Furrows

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C21	C22	0.77	0.34	0.3	Loose, light brown, sandy silt, stones	Fill of furrow
C22	N/A	0.77	0.34	0.3	Oval cut, vertical sides, sloped base	Cut of furrow
C68	C69	0.56	0.32	0.18	Loose, brown, silty sand, pebbles	Single fill of C69
C69	N/A	0.56	0.32	0.18	Oval/linear cut, steep sides, flat base	Cut of modern furrow

Finds: None

Interpretation
The contexts above appear to represent the very limited remains of two furrows or possibly wheel ruts that contained single fills of silty sand. Furrow C22 cut pit C19 and furrow C69 cut pit C67.

2.5 Phase 5: Topsoil

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C1	N/A	Site	Site	0.4	Dark brown, silty clay pebble/small stones	Topsoil

Finds

Context	Find No	Material	Period	Description
C1	E3654:1:1	Chert	Prehistoric	Flake
C1	E3654:1:2	Chert	Prehistoric	Debitage
C1	E3654:1:3	Chert	Prehistoric	Flake
C1	E3654:1:4	Chert	Not applicable	Natural chunk

Interpretation
The topsoil comprised dark brown silty clay with a depth of approximately 0.4 m. Two pieces of chert flakes and a fragment of debitage were recovered from the topsoil layer. The flakes were produced on platform cores and are probably associated with the finds from C95. The debitage fragment indicates that there was tool working or resharpening taking place at the site.

3 SYNTHESIS AND DISCUSSION

3.1 Landscape Setting

Most of the low-lying areas along the route were associated with poorly drained bog and wet marshland which have developed within glacially formed depressions and seasonal lakes known as turloughs. The higher ground generally comprised well-drained, gently undulating pastureland with some uneven hummocky ridges, formed either of limestone epikarst or glacial features such as drumlins. The two dominant rock types of the region are Carboniferous Limestone, which underlies the entire length of the N18 Gort to Crusheen scheme, and the Devonian Old Red Sandstone, which forms the Slieve Aughty Mountains to the east of the project. The road alignment is predominantly underlain by either limestone and sand-derived till deposited during the last glaciation or organic peat which has generally formed since then in the low-lying, poorly drained areas where standing water and slow percolation caused thin layers of peaty soil to accumulate.

A charcoal-rich spread with heat-shattered stone was discovered during test excavations in a slight hollow between two peat basins in Caheraphuca townland, north Co. Clare. It was found in a gently undulating landscape at NGR 139206/188029 and 34 m OD and was previously used for pasture. The Ruan Road ran east to west to the north of it. There is one possible enclosure (CL018-085) located c. 230 m northeast of Caheraphuca 1 (Figure 2). Further nearby recorded monuments include a burial ground (CL018-042) and a burnt mound (CL018-083) located c. 350 m northeast and 250 m west of the site respectively.

3.2 Bronze Age Archaeological Landscape

Following the test excavation phase of the project it was apparent that most of the archaeological sites identified were located to the south of the scheme in County Clare. This trend appears to have resulted from landscape management in the recent past where the better drained lands to the north have been improved and the fields enlarged which would have had a negative effect on any buried archaeological sites. However, the area to the south, which coincides with crossing the county border, was of more marginal land prone to flooding and in this area the route of the new road tended to follow wet valley floors and steep valley slopes. The landscape encountered in County Clare was much the same as it was depicted on the first edition Ordnance Survey maps (1842).

As with the transition from the Mesolithic to Neolithic periods, the transition to the early Bronze Age period brought with it many changes to society. In County Clare and particularly in the northwest of the county in the Burren where there is a highly visible prehistoric landscape due to the exposed bare rock nature of the terrain the large number of prehistoric sites including c. 80 wedge tombs (Jones 2004, 65) indicates a well organised late Neolithic/early Bronze Age landscape. The transition from the Neolithic to the Bronze Age reflects a continued and somewhat intensified population in north and east Clare. It is during this period that megalithic monuments were abandoned in favour of individual cist or pit burials, either located in isolation or in small cemeteries. Different forms of barrow monuments were also being constructed during the period, as well as ceremonial monuments such as circular henges, standing stones, stone rows and stone circles. A current research project in the Burren has also recorded middle and late Bronze Age ritual funerary deposition in Glencurran Cave, Co. Clare (Dowd 2007).

In recent years Bronze Age habitation sites have come more to the fore as they have been uncovered as part of development-led or infrastructural projects. They are well documented elsewhere but two interesting, recently excavated sites include Bronze

Age roundhouses at Tober 1, County Offaly (Walsh 2009) and Barnhill, Dromoland, Co. Clare (Moore Group 2009). An important academic study of the spatial organisation of Bronze Age society and landscape has been undertaken of the north Munster area and in county Clare this is defined by the work undertaken by Grogan on the Bronze Age trivallate hillfort at Mooghaun (Grogan 2005). This study identified and mapped a Bronze Age landscape dominated by the hillfort which may have influenced a catchment area of up to 450 km sq (Grogan 2005, 95). Identified within the area of influence were ceremonial monuments, house sites, burnt mound sites and other more mundane features such as fish traps and trackways in the Fergus estuary (O'Sullivan and Dillon 2005). The Mooghaun study area is outside the sphere of influence of sites identified on the Gort to Crusheen scheme but indicates nonetheless that a similar societal organisation of the landscape may have existed for them too. A hoard of gold objects discovered at Mooghaun during the construction of the Limerick – Ennis railway in 1854 is one of the largest single discoveries of Bronze Age gold in Europe (Grogan 2005, 70). Another significant gold find from the north of the county was the Gleninsheen gorget, a large collar of hammered gold discovered by a farmer in 1932 (Jones 2004, 74).

The most widespread sites from the Bronze Age are burnt mounds (also known as *fulachta fiadh*). They survive as low mounds of charcoal-rich soil mixed with heat-shattered stones. They are usually horseshoe-shaped, located in low-lying areas near a water source and are often found in clusters. While it is generally thought that they were probably used as cooking places (Ó Drisceóil 1988), finds from excavated examples where there is a noteworthy absence of animal bone does not easily support this theory. Lucas (1965) suggested that burnt mounds might have been used for processes such as bulk washing, dying and leather working while Barfield and Hodder (1987) have suggested that such sites were covered by light structures and used as sweat houses. Radiocarbon dates for this monument type have generally placed them in the Bronze Age (Brindley et al. 1990, 55) though evidence from early Irish texts (Ó Drisceóil 1988) suggest use of this type of site up until the 16th century AD.

Burnt mounds make up a significant number of the Recorded Monuments within the immediate vicinity of the Gort to Crusheen road scheme and following examination of a one kilometre wide corridor, using the road as the centreline, of the scheme, these classic elements of the Bronze Age landscape became apparent. Within this defined corridor there were no recorded burnt mounds in south County Galway, whereas north County Clare was rich in the monument-type: RMP sites CL018-069, CL018-071, CL018-072, CL018-077, CL018-084, CL018-082, CL018-083, CL018-086, CL026-143, CL026-130, CL026-131, CL026-136, CL026-138, CL026-137, CL026-134, CL026-135, 02E1284 partly excavated as part of the Bord Gáis Éireann's pipeline to the west at Bearnafunshin (Dennehy 2002a), 02E0342 excavated as part of the Bord Gáis Éireann's pipeline to the west at Bearnafunshin (Halpin 2002)., CL026-149, CL026-150, CL026-151, CL026-156, CL026-157, CL026-158, CL026-165, CL026-164, and Site AR25 Carrowdotia (Taylor 2006a). There appeared to be a tendency in the sites identified for clustering, often within 100 m or less of each other.

Single upright standing stones are a common feature of the Irish landscape and, though they may date to different periods and serve different functions, excavation has shown that some may mark prehistoric burials, while some may signify a route-way, a boundary, or serve a commemorative role. Generally speaking, it is likely that a large number date to the Bronze Age. The orientation of a stone may have had significance, with their long axes aligned to another stone or toward a cairn on a

mountain top, although the latter is difficult to prove. A standing stone (RMP CL026-035) has been identified c. 150 m southeast of the southern end of the route.

Ring barrows consist of a low, usually circular mound or level area enclosed by a fosse and external bank. The diameter of the earthwork usually ranging between 4 m and 12 m and rarely exceeding 1 m in height or depth. Excavation has demonstrated that they usually sealed a burial deposit, often a cremation. Such forms of burial have a long tradition and individual examples have been assigned to the Neolithic, Bronze and Iron Ages. A ring barrow (Dennehy 2002b) was identified in during monitoring of Bord Gáis Éireann's pipeline at Cloonagowan, Co. Clare. The archaeological remains represented a cremation pit with a ring ditch. Pits, stakeholes and a slot trench were identified within the ring ditch, with some pits indicating a probable domestic function. A second cremation pit was identified c. 75 m to the northeast, with an isolated posthole, which may have acted as a marker for the cremation pits, located further to the northeast. A single thumbnail scraper was recovered from the site, enabling the rough dating to the late Neolithic/Early Bronze Age period (Dennehy 2002c). A single cremation pit and industrial pits were identified during the monitoring of Bord Gáis Éireann's pipeline in Gortaficka (Dennehy and Sutton 2002). A wedge tomb (CL026-015) is located less than 500 m from a complex of burnt spreads in Caheraphuca townland which surround and area of peat bog. The wedge tomb is also likely to date to the late Neolithic or early Bronze Age.

Our appreciation of the wider Bronze Age landscape in Counties Clare and Galway is continuously being expanded as more sites are being uncovered during research, development-led and infrastructure projects such as the N18 road scheme. Excavations connected with construction of the N18 to the north (Gort to Oranmore) which is entirely within County Galway has also recently produced evidence for the Bronze Age in the form of eight burnt mounds, one at Ballyglass West, a cluster in Caherweelder townland and further examples in Moyveela and Coldwood (Eachtra 2009).

Excavations undertaken by TVAS (Ireland) Ltd in 2003 in advance of construction of the N18 Ennis Bypass and N85 Western Relief Road, which terminated at the southern end of the N18 Gort to Crusheen road scheme revealed similar archaeological sites. This area was generally better drained and the variety of Bronze Age sites encountered during that project reflects the change in terrain. The marginal lands and areas closest to wetlands, rivers and streams produced evidence for burnt mounds such as the four burnt mound sites identified at Clare Abbey (Hull 2006a and b, Taylor 2006c and d) close to the Ardsollus river (a tributary of the Fergus). TVAS also excavated burnt mound sites at Killow (Taylor 2006b), Cahircalla More (Taylor 2006e) and Carrowdotia (Taylor 2006a) just to the very south of the Gort to Crusheen project. Apart from the burnt mound sites a number of funerary sites were also identified on the N18 Ennis Bypass and N85 Western Relief Road. Two cremation cemetery sites were identified in Manusmore townland (Hull 2006c and 2006d) both were located on slightly elevated free draining gravel ridges. A third site with cremation pits was identified at Killow (Taylor 2006b) in close proximity to a burnt mound; it was located on a low but well-drained gravel drumlin.

The landscape of County Clare is rich in sites dating to the Bronze Age, indicating that the area was widely inhabited during that period. Burnt mounds are the most frequent site of Bronze Age date encountered in this area of Clare, with twenty seven identified within the immediate area of the road scheme. There are no burnt mounds recorded within the tight constraints of the study area for Co. Galway but there are examples in the wider surrounding area and they were also located in the excavations on the N18 contract further to the north. The archaeological evidence to

date indicates that the route of the N18 Gort to Crusheen scheme and indeed its wider landscape was inhabited throughout the entire Bronze Age period.

Bronze Age Caheraphuca 1

The site at Caheraphuca 1 consisted of a burnt spread that sealed three troughs, two of which may have been wood-lined. Four smaller pits were also situated around the burnt spread. To the north of the burnt spread were three large pits, two of which were intercutting. These pits are thought to be broadly contemporary and may have had a water management function, perhaps operating as silt traps. This site returned a suite of radiocarbon dates with 2 Sigma calibrated ranges spanning 1877–1620 BC to 1373–1073 BC (Appendix 2.1).

Parallels in terms of morphology and dating were identified and excavated across the project. The sites excavated across the scheme were generally identified as simple spreads or mounds of burnt and heat-shattered stone, while some of these like the one at Drumminacloghaun 1 (McNamara 2009a) had evidence for a simple earth-cut trough, other sites such as those at Gortavoher 1 (Delaney 2009b) and Caheraphuca 10 (Bayley 2009b) were represented simply by spreads of heat-shattered stone.

Isolated burnt mound sites identified along the project were Rathwilladoon 4 (Lyne 2009), Drumminacloghaun 1 (McNamara 2009a) and Clooneen 1 (Bayley 2009a). As the route travelled further south it tended to follow marginal wetland and stream valleys and the burnt mounds appeared to become more clustered. This clustering of sites was identified at Curtaun 1 and 2 (Delaney 2009a), Gortavoher/Monreagh (Delaney 2009b and McNamara 2009b), Derrygarriff (Nunan 2009a and 2009b), Sranagalloon/Gortaficka (Nunan 2009c and 2009d and 2009e), Caheraphuca (Bayley 2009b) and Ballyline (McNamara 2009c). A similar pattern of clustered burnt mounds to the south in County Clare and a paucity of examples of burnt mounds in county Galway was also encountered during the construction of Bord Gáis Éireann pipeline (Grogan et al. 2007). The AMS dating indicates however that the sites were not necessarily contemporary but rather spanned the entire Bronze Age period and extended into the Iron Age illustrating how the process of this pyrolithic technology remained the same across thousands of years.

More elaborate examples of troughs and pits from across the project (though serving the same function) displayed evidence for timber lining through the identification of stakeholes for upright supports at Curtaun (Delaney 2009a), Caheraphuca 1 and Gortaficka 1 and 2, and in some cases the actual remains of timber lining as at Clooneen 1 (Bayley 2009a), Caheraphuca 4 (Bayley 2009b), Sranagalloon 1 (Nunan 2009c) and Sranagalloon 3 (Nunan 2009d). Although the primary function of these sites was to heat water through the use of hot stones the actual purpose remains unknown. The sites at Caheraphuca 1 and Gortaficka 2 both displayed evidence for numerous troughs, drains, hearths and possibly preparation areas, with stake-lined pits suggesting that they may have been used for some more formal industrial function than the other sites.

Caheraphuca 1 was located approximately 250 m south of the burnt mound at Clooneen 1 (Bayley 2009a) with burnt mounds also located approximately 1 km to the northwest in Clooneen (CL018–76), 250 m to the west in Caheraphuca (CL018–83) and another approximately 1 km to the east at Drummanneen (CL018–88). The Caheraphuca cluster focused on a former wetland. Caheraphuca Lough was situated approximately 900 m to the south. Excluding the sites excavated as part of the project there are also burnt mounds identified surrounding the Caheraphuca cluster to the south. These are located to the southeast in Carrahil townland (CL026–137

and CL026–138) and to the southwest in Caheraphuca (CL026–143, 128, 134 and 136) and Ballyline (CL026–133).

A review of the RMP records and the sites excavated as part of the N18 Gort to Crusheen road scheme indicate that the number of known or suspected burnt mounds increases towards the south of the project. In relation to Caheraphuca 1 there is a cluster of burnt mound sites around the lakes on the eastern slopes of Mullaghmore in the Burren (approximately 9 km to the northwest). A cluster of megalithic tombs and standing stones located on the northern slopes of Maghera hill approximately 12 km to the northeast. A wedge tomb and two unclassified megalithic tombs are located approximately 3.5 km to the northeast in Knockmael East (CL016–026, CL016–027) and a wedge tomb is located in Caheraphuca (CL26–015) approximately 400 m to the south. Clusters of burnt mounds were excavated on the project to the north in Monreagh and Derrygarriff and to the south at Caheraphuca and Ballyline townlands.

3.3 Typology of Burnt Mounds

Burnt mound sites (also commonly referred to as *fulachta 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 preserve 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 troughs 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; Ó Drisceóil 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 specialist environmentalists due to the absence of cereal remains from most burnt mound sites (McClatchie et al. 2007).

3.4 Discussion

3.4.1 Phase 1: Natural Geology

This phase represents the natural subsoil, which was cut or sealed by all subsequent archaeological features. The natural subsoil at the site was generally compact sandy clay. The site was located in a gently undulating landscape and in Caheraphuca townland. It was located on the west-facing slope of a low hill. A large north/south orientated ridge was located to the south. An area of reclaimed bog was located to the north in Clooneen townland and a large reclaimed wetland was located to the south in Caheraphuca townland. The location was typical of those conditions noted on other burnt mound sites and nine were identified in the former Caheraphuca wetland to the south as part of the N18 Gort to Crusheen road scheme.

3.4.2 Phase 2: Prehistoric Activity

The earliest activity identified at the site was represented by stone tools. To the south of the site was a natural hollow that appeared to have been infilled both in the Bronze Age and more recently in the post-medieval period. This backfill material sealed a shallow peat deposit. Two stone axes, one broken and one complete, were recovered from this sealed peat deposit (ISAP, Appendix 2.6).

3.4.3 Phase 3: Bronze Age Burnt Spread and Associated Activity

The Bronze Age activity identified on site was concentrated on three large central troughs in the middle of the site. Immediately to the south of this was a large natural hollow or pond. This hollow appears to have been used for the deliberate dumping of the discarded heat-shattered stone that had been removed from the troughs. A number of troughs and pits and a probable hearth were also identified surrounding the hollow, which was presumably the main source of water for whatever industrial or food-processing activities were practised at the site.

Analysis of the stone used indicates that it was primarily limestone, which is not typical for burnt mounds (Mandal, Appendix 2.3). However, limestone has been identified throughout the scheme at other burnt mound sites. This may be because it was easily gathered in the area, occurring naturally as bedrock or alternatively, it may have been used specifically for an industrial purpose, perhaps in the curing and tanning of animal hides. The artefacts recovered from the site have not helped to identify a specific function. A rubbing stone from one of the troughs may have been used for grinding in either domestic or industrial contexts. Lithic debitage and artefacts were also identified. The most significant, a plano-convex knife, dates to the late Neolithic or early Bronze Age periods and the platform core technology employed on the two flakes also indicates a late Neolithic to early Bronze Age date (Sternke, Appendix 2.5).

A large assemblage of unburnt animal bone was recovered from one of the dump deposits in the pond/hollow. The main species represented was cattle and the bones appeared to represent the meat-rich areas of the body (ribs, scapulae, humerus, ulna and vertebrae). Other species identified were sheep/goat, red deer and horse and butcher marks were identified on the sheep/goat scapula (Geber, Appendix 2.4).

The environmental analysis of the charcoal samples has identified that the site was located close to mixed deciduous woodland with oak, ash, hazel, Maloideae (hawthorn/rowan/crab apple) and elm. The identification of alder, poplar and willow also indicates that these were growing along the edge of a wetland and were gathered in the immediate area, probably from the peat- land to the immediate north (Cobain, Appendix 2.2).

Charcoal from a burnt deposit at Caheraphuca 1 returned a 2 Sigma calibrated date of 1877–1620 BC (UBA 12745) while the fill of a trough at the site returned a 2 Sigma calibrated date of 1373–1073 BC (UBA 12744) indicating activity at the site from the early to middle Bronze Age period.

Lab code	Context / sample	Sample material	Years BP	1 sigma	2 sigma
UBA 12744	C58 / S18	Charcoal Alder/ Hazel	2979±39	Cal 1287–1129 BC	Cal 1373–1073 BC
UBA 12745	C95 / S30	Charcoal Alder/ Hazel	3418±40	Cal 1769–1643 BC	Cal 1877–1620 BC

3.4.4 Phase 4: Post-medieval Activity

The post-medieval activity identified on the site included land drainage features and dump deposits in the pond/hollow feature. Some scant evidence for two agricultural furrows or possibly wheel ruts was also identified.

3.4.5 Phase 5: Topsoil

The topsoil was uniform across the site and was dark brown silty clay up to 0.40 m in depth. Residual Neolithic flakes and debitage were recovered from the topsoil.

4 CONCLUSIONS

The earliest activity on site consisted of a peaty layer sealed beneath the main concentration of heat-shattered stone. It appears to be the base of a small seasonal pond into which two axeheads (one broken and one complete) were deposited. It is possible that these axes were discarded or placed there after use. Three other chert finds (a blade, point and scraper) were recorded at the interface between the peat layer and the overlying burnt spread and may represent similar discarded material.

The main phase of activity consisted of a burnt spread focused on a number of pits, troughs and ancillary spreads. Six troughs were recorded on site, two of which contained stakeholes, indicating that they had been wood-lined. Three large troughs were recorded at the centre of the site and appear to have been a focus of activity. The majority of pits recorded across the site contained some level of charcoal-rich material and were likely to be contemporary with the burnt spread activity. Animal bones representative of the meat-rich elements of the carcass, with some limited evidence for butchery, were identified on the site. Evidently the site was used to process and cook meat. However the main stone type that was used to heat the water-filled troughs at the site was limestone and this is not typical and may indicate a more industrial function, such as tanning or hide production. The dating evidence from the site indicates that it was used over a long period during the early to mid Bronze Age period.

The post-medieval activity on site consisted of a linear drain, a drainage pit with dump deposits and two agricultural furrows. Four lithic finds were recovered from the topsoil including flakes and debitage indicating a Neolithic presence. The artefacts were unrelated to the Bronze Age activity at the site.

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PLATES

Plate 1: Mid-excavation view of site, facing southwest (AirShots Ltd.)

Plate 2: Mid-excavation/working view of central pits C100, C101, C102, facing southeast

Plate 3: Mid-excavation view of burnt spread and underlying peat deposit C113, facing northwest

Plate 4: Mid-excavation view of burnt spread C95, C96 and C124, facing northwest

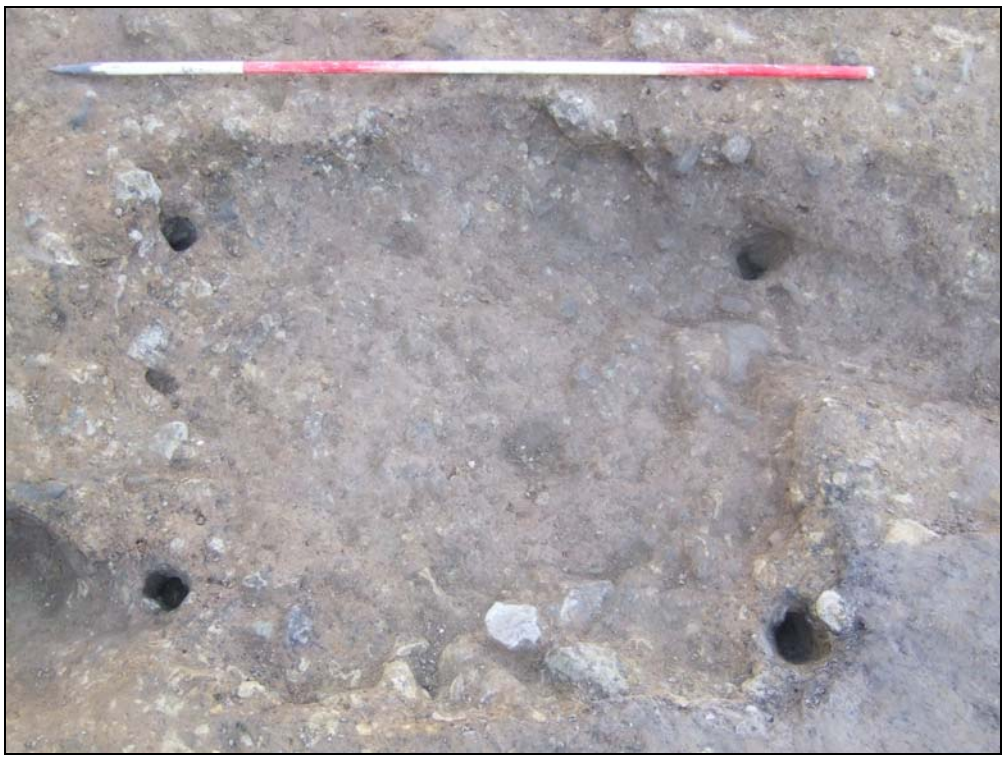

Plate 5: Post-excavation view of possible trough C70 and associated stakeholes, facing southwest

Plate 6: South-facing section of possible trough C57 and C74, facing north

Plate 7: Southeast-facing section of possible trough C42 and C49

Plate 8: East-facing section of large pit C7 (Area A), facing west

Plate 9: Polished shale axehead E3654:113:2

Plate 10: Butt of mudstone axehead (E3654:113:1) and chert retouched artefact (E3654:95:2)

APPENDIX 1 CATALOGUE OF PRIMARY DATA

Appendix 1.1 Context Register

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Finds	Context Above	Context Below
1				average depth 0.4	Topsoil	Dark brown, silty clay with an average depth of approx. 0.4m occasional pebble/small stone inclusions	2 x debitage, 1 x flake, 1 x chunk		
2					Natural subsoil	Varies across site. Compact sandy clay with moderate small-medium stone inclusions. Occasional large stone inclusions. Varies in colour from a medium orange in the higher areas to a light yellow/grey in the lower areas where the site has a tendency to flood			
3					VOID	VOID			
4					VOID	VOID			
5					VOID	VOID			
6					VOID	VOID			
7		1.97	1.91	0.62	Possible fire / waste pit	Sub-circular pit with a generally gradual break of slope at top except for SW side where it is sharp. Sides are irregular with a number of changes of slope. These break gradually to an irregular / concave base		C2	C35
8	C7	1.9	1.84	0.3	Top fill of pit	Loose, black, friable sand with approx. 50% small stone inclusions and moderate charcoal		C1	C35
9		VOID	VOID	VOID	VOID	VOID		C1	C2
10					VOID	VOID			
11		0.94	0.85	0.15	Cut of circular pit	Sub-circular cut with sharp break of slope at top to concave sides which break sharply to a flat base		C12	C2
12	C11	0.94	0.85	0.15	Stoney fill of circular pit	Loose, dark brown / grey clay silt with approx. 30% small stones and occasional charcoal		C12	C11
13					VOID	VOID			
14					VOID	VOID			
15					VOID	VOID			

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Finds	Context Above	Context Below
16					VOID	VOID			
17	C7	1.04	recorded in section	0.22	Second fill of pit C7.	Loose, dark brown sand with approx. 50% medium-sized stones and moderate charcoal		C8	C35
18	C7	0.26	recorded in section	0.2	Fill adjacent to C17 of pit C7	Loose, grey, friable sand with occasional small stone inclusions and approx. 10% charcoal inclusions		C8	C38
19		1.33	1.2	0.12	Cut of sub-circular pit	Sub-circular pit with a gradual break of slope at top to concave sides which break gradually to a concave base		C2	C20
20	C19	1.33	1.2	0.12	Fill of pit	Loose, dark brown, silty clay with frequent heat-affected stone inclusions and occasional charcoal flecks		C19	C2
21	C22	0.77	0.34	0.3	Fill of furrow C22	Loose, light brown, sandy silt with occasional small stone inclusions		C1	C22
22		0.77	0.34	0.3	Cut of furrow	Oval cut. Generally sharp break of slope at top (more gradual to W). Vertical sides which break sharply to base which slopes from W-E		C21	C2
23					VOID	VOID			
24	C128	5.5	4.4	undetermined	Fill of drainage sump	Loose, mid-brown, sandy/stony clay with small-medium rocks	1 modern metal fragment, 1 modern ceramic fragment	C1	C128
25		1.45	1.2	0.2	Cut of sub-rectangular pit	Sub-rectangular pit with a sharp break of slope at top to concave sides which break sharply to a flat base		C26	C2
26	C25	1.45	0.94	0.17	Basal fill of large pit C25	Loose, dark brown / black silty sand with medium-large stone inclusions and approx. 50% charcoal inclusions		C27	C25
27	C25	0.95	0.91	0.1	Top fill of large pit C25	Loose, brown / grey, silty sand with medium and large stone inclusions and rare charcoal		C1	C26
28					VOID	VOID			
29	C100, C101	5.1	1.67	0.37	Fill of two pits C100, C101	Black silty clay of moderate compaction with moderate / frequent inclusions of medium-sized stones and frequent charcoal		C30	C31

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Finds	Context Above	Context Below
30	C100, C101	4.76	1.48	0.2	Top fill of two pits C100, C101	Dark grey / brown, silty clay of moderate compaction with occasional medium-sized stone inclusions		C1	C29
31	C101	2.5	2.2	0.38	Basal fill of C101	Loose, light grey, clayey-sand with occasional small-medium sized stones and occasional charcoal flecks		C29	C101
32						VOID			
33						VOID			
34						VOID			
35	C7	0.14	recorded in section	0.14	First fill of C7	Light grey sand of tight compaction with some ash and moderate charcoal inclusions		C17	C35
36						VOID			
37	C42	1.4	0.84	0.2	Fill of pit/possible trough C42	Grey/black, compact sandy clay with occasional inclusions of decayed stone		C1	C38
38	C42	1.73	recorded in section	0.17	Fill of pit/possible trough C42	Loose, dark grey/black, gravely sand with frequent inclusions of heat affected stone and charcoal		C37, C53	C50, C42
39		VOID	VOID	VOID	VOID	VOID			
40	C41	0.9	0.84	0.33	Single fill of C41	Dark grey, sandy silt of moderate compaction. Moderate inclusions of stone and charcoal		C1	C41
41		0.9	0.84	0.33	Possible waste pit	Oval cut with gradual break of slope at top to gentle sides on E and S. Steep sides on W and N. These break gradually to a flat base		C40	C2
42		1.7	1.61	0.22	Possible trough/ pit associated with the burnt spread activity	Sub-circular cut with gradual break of slope at top (imperceptible at S) to gradual sides which break sharply to a flat base		C38	C2
43	C51	0.68	0.68	0.28	Single fill of C51	Circular spread of mid brown sandy clay		C1	C51
44	C45	0.83	0.57	0.15	Top fill of C45	Loose/moderately compact, black, gritty sand with occasional heat affected stone inclusions		C1	C54
45		1.55	0.61	0.28	Cut of a pit	oval cut with sharp break of slope at top to gradual sides which break gradually to a flat base		C55	C2
46	C45	0.95	0.4	0.22	3rd fill of C45. Possible waste from nearby C95	Loose, grey/black, sandy clay with frequent inclusions of stones and pebbles		C46	C54

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Finds	Context Above	Context Below
47					VOID	VOID			
48	128	1.25	0.7	0.21	Modern deposit	Mid-grey, sand of moderate compaction with frequent inclusions of grit and occasional flecks of charcoal	1 animal tooth		
49		0.9	1.38	0.41	Possible trough/ pit associated with the burnt spread activity C94	Oval cut with a sharp break of slope at top to almost vertical sides which break more gradually to a concave base		C50	C2
50	C49	0.49	0.32	0.12	Fill of small pit C50- formed by natural silting	Loose/moderately compacted, light grey/yellow silty sand.			
51		0.68	0.68	0.28	Possible pit unsure use, possible tree bole	Cut of shallow circular possible pit		C43	C52
52		1.7	1.2	0.02	Deposit of mottled material	Irregular-shaped deposit. Loose, mid grey/black, sandy silt with moderate charcoal and small stone inclusions		C51	C2
53	C42	1.68	0.7	0.18	Top fill of C42	Grey/black, compact sandy clay with frequent inclusions of heat affected stone. Very similar / possibly the same as C37		C1	C38
54	C45	0.6	0.37	0.20	2nd Fill of C45 - possible re-deposited natural	Yellow/grey, gravelly sand of moderate compaction with frequent pebble inclusions		C46	C55
55	C45	1.2	0.58	0.15	Basal fill of C45	Layer of grey/black, gravelly sand at base of C45 which was moderately compacted and contained occasional charcoal flecks		C54	C45
56		0.9	0.85	0.07	Deposit (same as C90)	Sub-circular spread. Grey/brown, silty clay of medium compaction with frequent medium stone inclusions and occasional charcoal inclusions		C89	C95
57		2.6	2.4	0.24	Cut of a possible pit	Sub-rectangular/irregular cut with a generally gradual break of slope at top (sharp on E side), concave sides which break gradually to a concave base		C58	C62
58	C57	2.6	2.4	0.24	Fill of possible pit C57	Loose, black, silty clay with frequent medium-sized stone inclusions and occasional charcoal		C77	C57
59	C57, C74	3.62	1.7	0.0	Top fill of C57, C74	Loose, mid-grey, silty sand with no stone or charcoal inclusions		C1	C58
60					VOID	VOID			

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Finds	Context Above	Context Below
61		0.9	0.57	0.08	Deposit (similar to fill C26 filling pit C25)	Dark brown/black silty clay of moderate compaction with frequent medium stone inclusions and moderate charcoal inclusions			
62	C74	1.46	1.2	0.24	Fill of C74	Loose, mid-brown, silty clay with occasional pebble inclusions		C57	C74
63					VOID	VOID			
64					VOID	VOID			
65					VOID	VOID			
66	C67	1.5	0.85	0.12	Single fill of C67	Loose, black/grey, silty sand with occasional pebble inclusions and occasional flecks of charcoal		C69	C67
67		1.5	0.85	0.12	Cut of possible pit	Oval cut with an imperceptible break of slope at top to irregular sides (gently sloping on E and S; N side cut by C69 and W side is imperceptible). These break gradually on E and S sides and are imperceptible on N and W. Base is slightly concave		C66	C2
68		0.56	0.32	0.18	Single fill of C69	Loose, brown, silty sand with occasional inclusions of pebbles and small angular stones		C1	C69
69		0.56	0.32	0.18	Cut of modern furrow	Oval/linear cut with a generally sharp break of slope at top (gradual at W side). Steep sides which generally break gradually to a flat base (sides break sharply on E side)		C68	C66
70		1.8	1.05	0.15	Cut of a possible trough/pit	Sub-circular cut with a gradual break of slope at top to gently sloping sides which break gradually to a flat/irregular base		C70	C2
71	C70	1.7	0.88	0.12	Basal fill of C70	Loose, black material with moderate small stone inclusions and frequent charcoal		C72	C70
72	C70	1.8	1	0.10	Top fill of C70	Loose, dark brown/grey sand with moderate small stone inclusions and occasional charcoal flecks	1 rubbing stone	C1	C71
73					VOID	VOID			
74		1.46	1.2	0.24	Cut of pit	Irregular cut with a gradual break of slope at top to N and E and a sharp break of slope to S. Sides are irregular / concave. Break of slope at base is imperceptible and the base slopes from N-S.		C62	C2

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Finds	Context Above	Context Below
75		0.14	0.13	0.21	Cut of stakehole	Circular cut with a sharp break of slope at top to vertical sides which break sharply to a concave base		C76	C2
76	C75	0.14	0.13	0.21	Fill of stakehole C75	Loose, black, silty sand with occasional small stone inclusions		C1	C75
77			0.39	0.2	Cut of possible posthole	Oval cut with sharp break of slope at top to a steep sides to S and more gradual sides to N. Sides break gently to a concave base		C78	C58
78	C77		0.39	0.23	Fill of possible posthole C77	Loose, dark grey/black, silty clay with moderate pebble inclusions and occasional charcoal flecks		C85	C77
79			0.1	0.14	Cut of possible stakehole	Oval cut with a sharp break of slope at top to vertical sides which break gradually to a concave base		C80	C2
80	C79		0.1	0.14	Fill of possible stakehole C79	Loose, black, silty sand with occasional small stone inclusions		C1	C79
81		0.1	0.1	0.11	Cut of stakehole	Circular cut with a sharp break of slope at top to vertical sides which break sharply to a concave base		C82	C62
82	C81	0.1	0.1	0.11	Fill of stakehole C81	Loose, black, silty sand with occasional small stone inclusions		C1	C81
83		0.14	0.12	0.17	Cut of possible stakehole	Sub-circular cut with sharp break of slope at top to vertical sides which break gradually to a concave base		C84	C62
84	C83	0.14	0.12	0.17	Fill of C83	Loose, black, silty sand material		C1	C83
85		0.11	0.1	0.25	Cut of stakehole	Circular cut with sharp break of slope at top to vertical sides which break sharply to a concave base		C86	C78
86	C85	0.11	0.1	0.25	Fill of stakehole C85	Loose, black, silty sand with occasional small stone inclusions		C1	C85
87		0.1	0.08	0.2	Cut of possible stakehole	Circular cut with sharp break of slope at top to vertical sides which break gradually to a concave base		C88	C58
88	C87	0.1	0.08	0.2	Fill of possible stakehole C87	Loose, mid-grey, silty sand with no stone or charcoal inclusions		C1	C87

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Finds	Context Above	Context Below
89		22	10.65	0.11	Spread of heavy, gravely material	Mid-grey, silty/gravely clay of tight compaction. Contains: occasional charcoal flecks; moderate medium stone inclusions; occasional burnt stones; moderate animal bone, antler and teeth found	Natural chunk	C1	C90
90		4.45	4	0.08	Stoney grey/brown spread	Sub-circular/irregular spread. Grey/brown, silty clay of medium compaction with frequent medium stone inclusions and occasional charcoal flecks		C89	C95
91		4.30	0.51	0.18	Cut of linear modern drain	Linear cut with gradual break of slope at top to steeply sloping sides which break gradually to a concave base		C123	C2
92	C91	2.45	0.51	0.15	Upper fill of south part of linear drain C91	Light grey, sand of firm compaction with occasional small stone inclusions		C1	C91
93	C91	undetermined	0.51	0.18	Upper fill of north part of linear drain C91	Dark brown/black silty clay of moderate compaction with frequent medium stone inclusions and moderate charcoal inclusions		C1	C91
94		1.5	1.	0.06	Deposit of dark grey/brown silty clay	Irregular deposit. Dark grey/brown, silty clay of medium compaction with occasional small stone inclusions		C89	C95
95		16.15	10.35	0.34	Burnt spread material	Sub-circular/irregular spread. Dark brown/black silty clay of medium compaction with approx. 60% medium stone inclusions and moderate charcoal	2 x chert flakes, 1 x plano convex knife, 1 x tooth	C94	C124
96		7.35	6.34	0.25	Burnt spread material	Sub-circular/irregular spread. Mid grey silty clay of medium compaction with approx. 60% medium stone inclusions and moderate charcoal	2 sherds of modern ceramic	C90	C95
97=95		1	0.6	0.1	Deposit of burnt spread material	Oval-shaped deposit. Loose, black/grey, silty sand with occasional small sub-angular stone inclusions	1 clay pipe bowl fragment	C1	C2
98	128	6.55	4	undetermined	Fill of modern sink hole	Sub-circular spread. Loose, brown, sandy clay with approx. 50% large stone/rock inclusions	1 sherd of modern ceramic	C2	C1
99=95		0.84	0.7	0.08	Deposit of charcoal rich material			C2	C1
100		2.75	recorded in section	0.38	Cut of large pit at centre of site	Sub-oval cut. Sharp break of slope at top to steep sides which taper in towards the base. Sides break gradually to a flat base		C29	C2
101		3.5	recorded in section	0.74	Cut of large pit at centre of site	Sub-circular/irregular in plan. Sharp break of slope at top to irregular/steep sides which break sharply to an irregular base		C31	C2

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Finds	Context Above	Context Below
102		3.35	recorded in section	0.8	Cut of large pit at centre of site	Sub-circular in plan. Gradual break of slope at top on E side / steeper elsewhere. Sides are generally steeply sloping (slightly convex on N side). Sides break gradually to a flat base		C110	C2
103					VOID	VOID			
104					VOID	VOID			
105	C102	5.5	4.25	0.24	Fill of large pit within and west of C102	Mid-brown, sandy clay of moderate compaction with moderate inclusions of pebbles and occasional small stones		C1	C107
106	C102	recorded in section	0.35	0.62	Second fill of large pit C102	Light brown/yellow, clayey sand of firm compaction		C107	C102
107	C102	3	2.3	0.38	Third fill of large pit C102	Mid brown/grey, sandy silt of moderate compaction. Moderate inclusions of charcoal, frequent large stones/boulders		C111	C106
108	C102	2.9	2.8	0.27	Fifth fill of large pit C102	Light brown/grey, sandy silt of tight compaction with moderate charcoal inclusions and frequent large stones/boulders		C109	C111
109	C102	3.15	2.5	0.23	Sixth fill of large pit C102	Loose, dark grey/brown, sandy silt with occasional small stones and charcoal		C1	C108
110	C102	0.35	recorded in section	0.2	Basal fill of large pit C102	Brown, silty clay of tight compaction. Very sterile		C106	C102
111	C102	0.5	0.1	0.15	Fourth fill of large pit C102	Dark grey, sandy clay of moderate compaction. Very sterile		C108	C107
112					VOID	VOID			
113		2.6	1.28	un-determined	Peat spread (possible location of former pond/small seasonal lake)	Dark, brown/black, peat spread	1 axe head & 1 broken axe head	C124	C2
114		1.45	0.90	0.18	Deposit of burnt material	Loose, black, charcoal-rich deposit with moderate inclusions of heat-affected stone		C1	C89
115		0.15	0.15	0.24	Cut of stakehole	Circular cut. Sharp break of slope at top to vertical sides which break sharply to a concave base		C122	C89
116		2.5	1.6	0.7	Re-deposited natural	Mottled dark grey/orange, silty sand of moderate compaction with moderate stone inclusions and occasional charcoal flecks		C126	C2

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Finds	Context Above	Context Below
117		0.13	0.12	0.22	Cut of stakehole	Circular cut with sharp break of slope at top to almost vertical sides which break sharply to a concave base		C119	C70
118	C117	0.13	0.12	0.1	Top fill of stakehole C117	Black, silty clay of tight compaction with frequent charcoal		C70	C119
119	C117	0.13	0.12	0.12	Basal fill of stakehole C117	Light grey, silt of tight compaction with occasional charcoal inclusions		C118	C117
120		0.1	0.09	0.19	Cut of stakehole	Circular cut with sharp break of slope at top to NE and gradual break to SW. Vertical sides (concave to NE). Sides break sharply to a concave base		C121	C2
121	C120	0.1	0.09	0.19	Single fill of stakehole C120	Loose, dark grey, sand with frequent charcoal flecks		C71	C121
122	C115	0.15	0.15	0.24	Fill of stakehole C115	Loose, dark grey, sand with frequent charcoal flecks and occasional small stones		C71	C115
123	C91	0.55	0.43	0.06	Basal fill of linear drain C91	Light grey, sand of moderate compaction with small stones and moderate charcoal inclusions		C92	C91
124		12.15	8.05	max 0.52	Burnt spread material	Loose, dark brown silty clay with moderate charcoal inclusions and frequent heat-affected stone inclusions		C126, C96, C95	
125	C126	0.84	recorded in section	max. 0.19	Basal fill of pit C126	Mid-grey, silty clay of moderate compaction. Occasional small stone inclusions and occasional flecks of charcoal		C126	C116
126		2.2	recorded in section	0.38	Cut of pit	Sub-circular cut with sharp break of slope at top to steep sides which break gradually to a flat base		C125	C116
127	C126	1.22	recorded in section	0.23	Top fill of pit C126	Mid- grey/brown, silty clay of moderate compaction with moderate inclusions of small stones and occasional flecks of charcoal			C129
128		5.5	4.4	undetermined	Cut of modern drainage sump	Sub-circular cut. Not fully excavated so details of cut not determined		C95	C24
129	C126	0.6	recorded section	0.22	Middle fill of pit C126	Black, silty clay fill of moderate compaction. Charcoal rich, occasional small stone inclusions		C127	C125
130	N/A	0.13	0.12	0.18	Cut of a stakehole	Circular cut. Sharp break of slope at top to vertical sides which break sharply to a concave base		C70	C131
131	C130	0.13	0.12	0.18	Fill of a stakehole	Loose, dark grey, sand with frequent charcoal flecks and occasional small stones		C130	C71

Appendix 1.2 Catalogue of Artefacts

Registration Number	Context	Item No.	Simple Name	Full Name	Material	No. of Parts	Description
E3654:1:1	1	1	Chert	Chert Flake	Chert	1	Flake
E3654:1:2		2	Chert	Chert Debitage	Chert	1	Debitage
E3654:1:3	1	3	Chert	Chert Flake	Chert	1	Flake
E3654:1:4	1	4	Chert	Chert Natural chunk	Chert	1	Natural chunk
E3654:24:1	24	1	Metal	Metal object	Metal	1	Modern fragment of metal
E3654:24:2	24	2	Pottery	Pearlware	Ceramic	1	Modern pearlware fragment
E3654:48:1	48	1	Bone	Animal tooth	Animal tooth	1	Tooth
E3654:72:1	72	1	Sandstone	Rubbing stone	Sandstone	1	Rubbing stone
E3654:89:1	89	1	Stone	Natural chunk	Stone	1	Natural chunk
E3654:95:1	95	1	Chert	Chert Flake	Chert	1	Flake
E3654:95:2	95	2	Chert	Chert Plano convex knife	Chert	1	Plano convex knife
E3654:95:3	95	3	Chert	Chert Flake	Chert	1	Flake
E3654:95:4	95	4	Bone	Animal tooth	Animal tooth	1	Tooth
E3654:96:1	96	1	Pottery	Modern ceramic	Ceramic	1	Fragment of modern ceramic
E3654:96:2	96	2	Pottery	Modern ceramic	Ceramic	1	Fragment of modern ceramic
E3654:97:1	97	1	Clay pipe	Clay pipe bowl	Clay	1	Fragment of clay pipe bowl
E3654:98:1	98	1	Pottery	Black-glazed ware	Ceramic	1	Rim sherd of black glazed vessel
E3654:113:1	113	1	Mudstone	Broken axe head	Mudstone	1	Broken axe head
E3654:113:2	113	2	Shale	Axe head	Shale	1	Axe head

Appendix 1.3 Catalogue of Ecofacts

These results relate to the processed samples taken at the excavation. A full list of these samples was supplied with the preliminary reports lodged with Galway County Council NRDO. Bulk soil samples were taken during the course of excavation at this site. Of these five were processed by means of flotation and sieving through a 250/300µm mesh. The resulting retrieved samples of this process are listed below.

1.3.1 Animal bone/burnt bone

Context number	Sample number	Feature	Sample weight (g)
C89	54	Spread	956.72 g

1.3.2 Charcoal

Context number	Sample number	Feature	Sample weight (g)
C29	15	Linear feature/pits	144.5g
C58	18	Pit	1.5g
C95	30	Burnt spread material	5.5g
C107	35	Pit	1.1g
C106	39	Pit	0.8g

1.3.3 Burnt Bone

Context number	Sample number	Feature	Sample weight (g)
C29	15	Linear feature/pits	1.25 g
C95	30	Burnt spread material	0.1 g
C95	30	Burnt spread material	0.3 g

Appendix 1.4 Archive Checklist

Project:	**N18 Gort to Crusheen**	**Irish Archaeological Consultancy Ltd**
Site Name:	**Caheraphuca 1**	
NMS Number:	**E3654**	
Site director:	**Dave Bayley**	
Date:	**15-03-2008**	
Field Records		**Items (quantity)**	**Comments**
Site drawings (plans)	8	
Site sections, profiles, elevations	50	
Other plans, sketches, etc.	0	
Timber drawings	0	
Stone structural drawings	0	
Site diary/note books	1	
Site registers (folders)	1	
Survey/levels data (origin information)	242	
Context sheets	131	
Wood Sheets	0	
Skeleton Sheets	0	
Worked stone sheets	0	
Digital photographs		
Photographs (print)	0	
Photographs (slide)	0	
Finds and Environ. Archive		
Flint/chert	8 chert	2 axeheads, a plano convex knife, 3 flakes, 3 chunks
Stone artefacts	3	1 rubbing stone
Pottery (specify periods/typology)	4	4 post-medieval/modern sherds
Ceramic Building Material (specify types eg daub, tile)	0	
Metal artefacts (specify types – bronze, iron)	0	1 modern fragment of metal
Glass	0	
Other find types or special finds (specify)		1 clay pipe fragment
Timber and trough material	2	
Human bone (specify type eg cremated, skeleton, disarticulated)	0	
Animal bone	3	
Metallurgical waste	0	
Enviro bulk soil (specify no. of samples)	52	All processed
Enviro monolith (specify number of samples and number of tins per sample)	0	
Security copy of archive	Yes	IAC Digital

APPENDIX 2 SPECIALIST REPORTS

RADIOCARBON DATING RESULTS
CAHERAPHUCA 1, CO. CLARE, E3654

CHRONO LABORATORY, QUEENS UNIVERSITY BELFAST

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14CHRONO Centre
Queens University
Belfast
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Northern Ireland

Radiocarbon Date Certificate

Laboratory Identification:	UBA-12744
Date of Measurement:	2009-10-20
Site:	E3654 Caheraphuca 1
Sample ID:	C58S18
Material Dated:	charcoal
Pretreatment:	AAA
Submitted by:	IAC

^{14}C Date:	2979±39
AMS δ^{13}C:	-24.8

Information about radiocarbon calibration

```
                RADIOCARBON CALIBRATION PROGRAM*
                          CALIB REV5.0.2
              Copyright 1986-2005 M Stuiver and PJ Reimer
        *To be used in conjunction with:
        Stuiver, M., and Reimer, P.J., 1993, Radiocarbon, 35, 215-230.
                  Annotated results (text) - -
                  Export file - cl4res.csv

C58S18
UBA-12744
Radiocarbon Age BP   2979 +/-   39
Calibration data set: intcal04.14c                # Reimer et al. 2004
  % area enclosed       cal AD age ranges             relative area under
                                                    probability distribution
  68.3 (1 sigma)     cal BC 1287- 1284                      0.017
                            1268- 1152                      0.851
                            1149- 1129                      0.132
  95.4 (2 sigma)     cal BC 1373- 1341                      0.044
                            1318- 1110                      0.912
                            1103- 1073                      0.033
 References for calibration datasets:
PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell,
  CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich,
  TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey,
  RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor,
  J van der Plicht, and CE Weyhenmeyer (2004), Radiocarbon 46:1029-1058.

Comments:
* This standard deviation (error) includes a lab error multiplier.
** 1 sigma = square root of (sample std. dev.^2 + curve std. dev.^2)
** 2 sigma = 2 x square root of (sample std. dev.^2 + curve std. dev.^2)
where ^2 = quantity squared.
[ ] = calibrated range impinges on end of calibration data set
0* represents a "negative" age BP
1955* or 1960* denote influence of nuclear testing C-14

NOTE:  Cal ages and ranges are rounded to the nearest year which
       may be too precise in many instances.  Users are advised to
       round results to the nearest 10 yr for samples with standard
       deviation in the radiocarbon age greater than 50 yr.
```

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Northern Ireland

Radiocarbon Date Certificate

Laboratory Identification:	UBA-12745
Date of Measurement:	2009-10-20
Site:	E3654 Caheraphuca 1
Sample ID:	C95S30
Material Dated:	charcoal
Pretreatment:	AAA
Submitted by:	IAC

^{14}C Date:	3418±40
AMS δ^{13}C:	-23.8

Information about radiocarbon calibration

RADIOCARBON CALIBRATION PROGRAM*
CALIB REV5.0.2
Copyright 1986-2005 M Stuiver and PJ Reimer
*To be used in conjunction with:
Stuiver, M., and Reimer, P.J., 1993, Radiocarbon, 35, 215-230.
Annotated results (text) - -
Export file - cl4res.csv

C95S30
UBA-12745
Radiocarbon Age BP 3418 +/- 40
Calibration data set: intcal04.14c # Reimer et al. 2004

% area enclosed	cal AD age ranges	relative area under probability distribution
68.3 (1 sigma)	cal BC 1769- 1664	0.967
	1649- 1643	0.033
95.4 (2 sigma)	cal BC 1877- 1840	0.095
	1827- 1794	0.055
	1783- 1620	0.850

References for calibration datasets:
PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer (2004), Radiocarbon 46:1029-1058.

Comments:
* This standard deviation (error) includes a lab error multiplier.
** 1 sigma = square root of (sample std. dev.^2 + curve std. dev.^2)
** 2 sigma = 2 x square root of (sample std. dev.^2 + curve std. dev.^2)
where ^2 = quantity squared.
[ ] = calibrated range impinges on end of calibration data set
0* represents a "negative" age BP
1955* or 1960* denote influence of nuclear testing C-14

NOTE: Cal ages and ranges are rounded to the nearest year which may be too precise in many instances. Users are advised to round results to the nearest 10 yr for samples with standard deviation in the radiocarbon age greater than 50 yr.

THE CHARCOAL REMAINS

CAHERAPHUCA 1, CO. CLARE, E3654

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Introduction

The survival of seed and charcoal macrofossils from dryland archaeology sites is dependent upon the water table being high enough to keep the archaeological features in damp/wet and anoxic conditions. This does not usually occur on archaeological sites in Ireland, unless they are located on riverine flood plains or close to lakes. Seeds and charcoal are however preserved abundantly in the form of charcoal and carbonised plant remains as a result of burning activities in features such as hearths, kilns, furnaces, burnt structures and as waste material disposed in ditches and pits.

There were 24 burnt mound sites spanning from the early to late Bronze Age period in date on the N18 Gort to Crusheen road scheme. The burnt mound activity from Caheraphuca 5, 8, 9, 10, 11, Ballyline 3, Drumminacloghaun, Clooneen and Gortavoher dated from the early Bronze Age. Ballyline 1 and 2 and Gortaficka 1 and 2 were from the early to mid Bronze Age and Sranagalloon 1, 3 Caheraphuca 1, 3, 4, 6, 7, 12, Rathwilladoon 4, Monreagh, Monreagh 3 and Derrygarriff 3 were dated to the mid to late Bronze Age. These sites consisted of archaeological features associated with burnt mound activity and included burnt mounds, spread, troughs, pits and gullies. Plant macrofossil and charcoal remains provide valuable information to determine socio-economic activity on archaeology sites. It is the aim of this report to identify the seed and charcoal species recovered from all these sites and to use this information to:

1) provide additional information regarding the function of features sampled
2) interpret the diet and living conditions of the occupants of the site
3) interpret industrial activities on the site
4) infer the composition of the local flora and woodland

Methodology

There were 5 samples to be analysed for charcoal remains. The following methodology was used to identify the plant macrofossil and charcoal fragments.

Charcoal

The number of charcoal fragments to be identified is dependent on the diversity of the flora. A study by Keepax (1988:120–124) has indicated that depending on the location of the archaeology site, 100–400 fragments of charcoal would need to be identified in order to obtain a full range of species diversity. As Britain and Ireland have a narrow flora diversity in comparison to that of mainland Europe, an identification limit of 100 fragments has been deemed sufficient for samples from either of these two countries (Keepax 1988; cited in Austin 2005:1). As the majority of the samples contained more than 100 fragments, in accordance with Keepax (1988), a maximum of 100 fragments were identified. Of the samples which contained greater than 100 fragments these were sieved through a 10 mm, 4 mm and 2 mm sieve and an equal proportion of each sieve were identified. This is to prevent any bias that may occur if only larger pieces are identified (thereby ensuring any potential smaller species are equally represented).

Each charcoal fragment was fractured by hand to reveal the wood anatomy on radial, tangential and transverse planes. The pieces were then supported in a sand bath and identified under an epi-illuminating microscope (Brunel SP400) at magnifications from x40 to x400. The sand bath allowed the charcoal pieces to be manipulated into the flattest possible position to aid identification. As fragments less than 2 mm in size cannot be accurately identified (it is not possible to get a wide enough field of vision to encompass the necessary anatomical features for identification) only fragments

above this size were examined. During identification, any notable growth-ring characteristics, evidence of thermal and biological degradation and any other unusual microscopic features were recorded. Identifications were carried out with reference to images and descriptions by Cutler and Gale (2000) and Heller et al. (2004) and Wheeler et al. (1989). Nomenclature of species follows Stace (1997).

Plant macrofossils
Plant macrofossil remains were retrieved by standard flotation procedures by IAC Ltd using 1 mm and 250 micron sieves. The floated material was sorted and seeds identified using a low-power stereo-microscope (Brunel MX1) at magnifications of x4 to x40. Identifications were made with reference to Cappers et al. (2006), Berggren (1981) and Anderberg (1994). Nomenclature follows Stace (1997).

Results
The plant macrofossil and charcoal results are fully tabulated in Table 8 in the Appendix at the end of the report.

Charcoal identification notes
The anatomical similarities between (a) the Maloideae species (hawthorn, rowan, crab apple); (b) alder/hazel; (c) sessile/pedunculate oak; (d) wild/bird cherry and (e) poplar/willow mean that it was not possible to identify these taxa to species level (Cutler and Gale 2000).

E3653 Caheraphuca 1
There were five samples retrieved from Caheraphuca 1. Sample 15 (C29) was recovered from pit C100, C101 and contained hazel, oak, ash, cf hawthorn, and poplar/willow charcoal inclusions. The fill (C58-sample 18) of pit/trough, C57 contained alder/hazel and Maloideae species (hawthorn/rowan/crab apple) charcoal fragments. Burnt spread material C95 (sample 30) contained alder/hazel, birch, ash, Maloideae species (hawthorn/rowan/crab apple) and elm charcoal inclusions. Two samples were retrieved from pit C102. Secondary fill C106 (sample 39) contained alder/hazel charcoal fragments and tertiary fill C107 (sample 35) contained alder/hazel, oak, Maloideae species (hawthorn/rowan/crab apple), poplar/willow and elm charcoal inclusions.

E3653 Caheraphuca 3
Five samples were analysed from Caheraphuca 3. Burnt spread C327 contained no charcoal inclusions and pit/tree hole pit C332 (sample 21-C333, samples 20 and 32-C334 and sample 38 C344) contained hazel, alder/hazel oak and ash charcoal inclusions. Sample 20 (fill C334) also contained a single carbonised hazelnut shell.

E3653 Caheraphuca 4
Burnt spreads C404 and C405 were retrieved as samples 2 and 3, respectively. C405 contained hazel, alder/hazel, oak, ash, cf hawthorn, blackthorn/sloe, poplar/willow and elm charcoal inclusions. Burnt spread C405 contained alder, hazel, alder/hazel, birch, oak, ash, cf hawthorn, cf crab apple and blackthorn/sloe charcoal inclusions.

E3653 Caheraphuca 5
A single sample (sample 1) was retrieved from the burnt spread C504 at Caheraphuca 5. This sample contained hazel, alder/hazel, birch, oak, ash, Maloideae species (hawthorn/rowan/crab apple), poplar/willow and yew charcoal inclusions.

E3653 Caheraphuca 6

Three samples were retrieved from burnt mound material at Caheraphuca 6. Deposit C604 (sample 3) contained alder and hazel charcoal inclusions, deposit C605 (sample 1) contained alder/hazel, oak, cf hawthorn, blackthorn/sloe and elm charcoal fragments and deposit C608 (sample 12) contained hazel, birch, oak, ash, Maloideae species (hawthorn/rowan/crab apple) and wild/bird cherry charcoal inclusions. Sample 7 was retrieved from fill C617, which was a packing fill supporting timber C612. This fill contained alder, hazel, oak and ash charcoal inclusions.

E3653 Caheraphuca 7
Samples 2 and 7 were retrieved from burnt spread deposits C708 and C709 (respectively). Sample 2 (C708) contained hazel, alder/hazel, birch, oak, Maloideae species (hawthorn/rowan/crab apple) and wild/bird cherry charcoal fragments. Deposit C709 contained alder/hazel, ash, Maloideae species (hawthorn/rowan/crab apple) and elm charcoal inclusions. Trough C715 contained fill C713 (sample 8), which contained alder/hazel, birch, oak and ash charcoal inclusions. Sample 5 was retrieved from the fill (C710) of pit C711. This pit contained alder/hazel, oak, Maloideae species (hawthorn/rowan/crab apple), wild/bird cherry and blackthorn/sloe charcoal inclusions. Pit C712 contained fill C704 (sample 3), which included alder/hazel, oak, ash, Maloideae species (hawthorn/rowan/crab apple), wild/bird cherry and blackthorn/sloe charcoal inclusions.

E3653 Caheraphuca 8
Five samples were analysed from burnt mound activity at Caheraphuca 8. Sample 10, 39, 48 and 54 were retrieved from burnt mound spreads C810, C827, C829 and C835 respectively. Sample 10 (C810) contained alder and oak charcoal inclusions and a single carbonised hazelnut shell fragment. Burnt mound spread C827 (sample 48) included alder/hazel and ash charcoal fragments. Alder, hazel, alder/hazel, birch, oak, ash, Maloideae species (hawthorn/rowan/crab apple), cf hawthorn and poplar/willow were recovered from burnt mound spread C829 (sample 54). Sample 88 (C835) contained alder/hazel, oak, ash, Maloideae species (hawthorn/rowan/crab apple), cf hawthorn, cf crab apple and yew charcoal fragments. One additional sample (sample 39) was retrieved as a packing fill (C825) located under timber plank C814. This packing fill (C825) contained hazel, alder/hazel, oak, ash and Maloideae species (hawthorn/rowan/crab apple) charcoal inclusions.

E3653 Caheraphuca 9
Sample 2 was retrieved from the fill (C906) of pit C904 and contained alder and ash charcoal inclusions.

E3653 Caheraphuca 10
Two samples were retrieved from burnt mound activity at Caheraphuca 10. Burnt mound spread C1008 was retrieved as sample 4 and contained alder/hazel and oak charcoal fragments. The spread of unburnt stones C1005 (sample 1) contained alder/hazel, ash and Maloideae species (hawthorn/rowan/crab apple) charcoal inclusions.

E3653 Caheraphuca 11
Trough C1109 contained the fill C1118 (sample 5) which included alder/hazel, oak and elm charcoal fragments.

E3653 Caheraphuca 12
Two samples were retrieved from Caheraphuca 12. Sample 1 was taken from burnt mound spread C1203 and contained alder, hazel, oak, ash, Maloideae species (hawthorn/rowan/crab apple), wild/bird cherry, yew and elm charcoal fragments.

Sample 2 was retrieved from the fill (C1204) of trough C1204. This fill contained elder, alder, hazel, alder/hazel, oak, ash and wild/bird cherry charcoal inclusions.

E3655 Rathwilladoon 4
The burnt mound spread (C3 – sample 1) at Rathwilladoon 4 contained hazel, alder/hazel, oak, ash, Maloideae species (hawthorn/rowan/crab apple) and elm charcoal inclusions and a single carbonised hazelnut shell inclusion. The fill (C6) of boundary ditch, C5 contained hazel, alder/hazel, oak and ash charcoal inclusions.

E3712 Monreagh 1 and 2
Four samples were retrieved from Monreagh 1 and 2. Sample 13 was recovered from the fill (C25) of trough C24 and contained alder, hazel, alder/hazel, birch, oak, ash, Maloideae species (hawthorn/rowan/crab apple), blackthorn/sloe and yew charcoal fragments. Fill C36 (sample 18) from trough C35 contained alder/hazel, ash and Maloideae species (hawthorn/rowan/crab apple) charcoal fragments. Sample 21 was retrieved from fill C41 within pit C40. This fill contained ash and Maloideae species (hawthorn/rowan/crab apple) charcoal inclusions. Sample 14 was retrieved from fill C27 within well C26. This sample contained elder, hazel, oak, cf hawthorn and wild/bird cherry.

E3713 Sranagalloon 1
Sample 2 was retrieved from burnt mound spread C5 and contained alder/hazel, oak, ash, Maloideae species (hawthorn/rowan/crab apple), poplar/willow and elm charcoal inclusions. Trough C8 contained fills C11, C12, C9 which were retrieved as sample 22. This sample contained hazel, alder/hazel, birch, oak, ash, traveller's joy and Maloideae species (hawthorn/rowan/crab apple) charcoal fragments.

E3715 Ballyline 3
Sample 1 (C4) was retrieved from pit C3. This pit contained hazel, alder/hazel, birch, oak, ash and Maloideae species (hawthorn/rowan/crab apple) charcoal fragments. The sample (sample 2) retrieved from burnt mound material, C5, contained hazel, alder/hazel, oak, ash, cf hawthorn and elm charcoal inclusions.

E3716 Derrygarriff 3
Three samples were retrieved from burnt mound activity at Derrygarriff 3. Sample 8 was recovered from burnt mound material (C3) and contained alder/hazel, ash, Maloideae species (hawthorn/rowan/crab apple), cf hawthorn and poplar/willow charcoal fragments. Hazel, alder/hazel, birch, ash, Maloideae species (hawthorn/rowan/crab apple), wild/bird cherry, poplar/willow and elm charcoal inclusions were obtained from fill C5 (sample 1) within trough C4. Sample 6 was retrieved from the fill (C8) of trough C6 and contained alder/hazel, oak, ash, Maloideae species (hawthorn/rowan/crab apple) and wild/bird cherry charcoal fragments.

E3717 Ballyline 1 and 2
Troughs C22 and C6 were analysed for charcoal remains from burnt mound activity at Ballyline 1 and 2. The fill (C25-sample 1) of trough C22 contained alder/hazel, ash and Maloideae species (hawthorn/rowan/crab apple) charcoal fragments. Sample 9 was recovered from fill C7 within trough C6. This fill contained alder, hazel, alder/hazel, oak, ash, Maloideae species (hawthorn/rowan/crab apple) and poplar/willow charcoal inclusions.

E3720 Drumminacloghaun 1
Burnt spread material C3 (sample 2) from Drumminacloghaun 1 contained alder/hazel, oak, ash, yew and elm charcoal fragments and a single carbonised

yellow water lily seed. The fill (C6-sample 5) from trough C4 only contained three ash charcoal fragments.

E3722 Clooneen 1
There were three samples retrieved from burnt mound activity at Clooneen 1. Sample 6 was recovered from burnt spread material C3 and contained alder, hazel, alder/hazel, ash and poplar/willow charcoal inclusions. A packing fill layer (C15 – sample 10) which was located under the wooden base of trough C8 contained alder and ash charcoal inclusions. The fill C7 (sample 3) from pit C7 contained alder, hazel, alder/hazel and ash charcoal inclusions.

E3897 Sranagalloon 3
There were eight samples recovered from burnt mound activity at Sranagalloon 3. The spread (C34-sample 40) from possible up cast material contained birch, ash and Maloideae species (hawthorn/rowan/crab apple) charcoal inclusions. Burnt spread material C3 (sample 38) contained hazel, alder/hazel, cf hawthorn, cf crab apple, blackthorn/sloe and elm charcoal inclusions. Two fills (C30 and C35 –samples 28 and 27 respectively) were recovered from trough C28. Fill C30 contained alder, hazel, alder/hazel, cf hawthorn, cf crab apple, blackthorn/sloe and elm charcoal inclusions and a single carbonised hazelnut shell. Fill C35 contained hazel, alder/hazel, oak, ash, Maloideae species (hawthorn/rowan/crab apple) and poplar/willow charcoal fragments and a single carbonised hazelnut shell. Trough C50 contained fill C8 (sample 41). This fill included alder, hazel, alder/hazel, ash and cf hawthorn charcoal fragments. Two fills were sampled from pit C19. Sample 10 was taken from fill C22 and contained hazel, ash, wild/bird cherry and poplar/willow charcoal inclusions. Sample 12 (C27) contained alder/hazel and poplar/willow charcoal fragments.

E3898 Gortaficka 1 and 2
A single sample (sample 1) was recovered from burnt spread material C3 at Gortaficka 1. This sample contained hazel, alder/hazel, ash and wild/bird cherry charcoal inclusions. Two samples were taken from burnt mound material at Gortaficka 2. Sample 5 was retrieved from deposit C10 and contained alder, hazel, alder/hazel, birch, oak, ash, Maloideae species (hawthorn/rowan/crab apple), poplar/willow and yew charcoal inclusions. Deposit C20 (sample 8) contained hazel, alder/hazel, oak, ash and yew charcoal fragments. Fill C41 (sample 35) from within trough C39 and contained wayfaring tree, alder/hazel, traveller's joy and Maloideae species (hawthorn/rowan/crab apple) charcoal fragments. Sample 20 was retrieved from fill 29 within pit C21. This sample contained hazel, alder/hazel, oak, ash, Maloideae species (hawthorn/rowan/crab apple), poplar/willow, yew and elm charcoal inclusions. Drainage gully C53 contained fill C55. The sample from this fill (sample 37) contained two fragments of wayfaring tree charcoal.

E3984 Gortavoher 1
There were two samples recovered from burnt mound material deposits from Gortavoher 1. Sample 1 was recovered from deposit C3 and contained wayfaring tree, hazel, birch, oak, ash, Maloideae species (hawthorn/rowan/crab apple), cf crab apple, blackthorn/sloe, poplar/willow, yew and elm charcoal fragments and carbonised mustard/cabbage, tufted vetch and water pepper seeds. Deposit C6 (sample 2) contained hazel, alder/hazel, birch, oak, Maloideae species (hawthorn/rowan/crab apple), poplar/willow, yew and elm charcoal inclusions.

E4037 Monreagh 3
Three samples were retrieved from burnt mound activity at Monreagh 3. Sample 2 was recovered from burnt mound material C3 and contained alder, hazel,

alder/hazel, oak, ash and elm charcoal inclusions and two carbonised hazelnut shell inclusions. The fill C11 (sample 3) from trough C10 contained alder/hazel, oak, ash and Maloideae species (hawthorn/rowan/crab apple) charcoal fragments and uncharred blackberry and stone bramble seeds. The fill from pit C8 contained alder/hazel, birch, oak, ash and Maloideae species (hawthorn/rowan/crab apple) charcoal inclusions.

Discussion

Burnt mound/spreads

Table 1: Burnt mounds, spreads and deposits excavated on the N18 road scheme (exclusively those analysed for plant macrofossils and charcoal)

Site Name	Details	Context Number
E3653 Caheraphuca 1	Burnt spread material	C95
E3653 Caheraphuca 3 *	Burnt spread material	C327
E3653 Caheraphuca 4	Burnt mound material	C404, C405
E3653 Caheraphuca 5	Burnt spread material	C504
E3653 Caheraphuca 6	Burnt mound material	C604, C605, C608
E3653 Caheraphuca 7	Burnt deposit	C708, C709
E3653 Caheraphuca 8*	Burnt spread	C810
E3653 Caheraphuca 8	Shallow burnt spread	C827, C835
E3653 Caheraphuca 8	Burnt spread material	C829
E3653 Caheraphuca 10	Burnt mound material	C1008
E3653 Caheraphuca 10	Spread of unburnt stones	C1005
E3653 Caheraphuca 12	Burnt mound material	C1203
E3655 Rathwilladoon 4*	Burnt mound material	C3
E3713 Sranagalloon 1	Burnt spread material	C5
E3715 Ballyline 3	Burnt spread material	C5
E3716 Derrygarriff 3	Burnt spread material	C3
E3720 Drumminacloghaun 1 *	Burnt spread material	C3
E3722 Clooneen 1	Burnt mound material	C3
E3897 Sranagalloon 3	Spread – up cast from trough	C34
E3897 Sranagalloon 3	Burnt spread material	C3=C12
E3898 Gortaficka 1	Burnt spread material	C3
E3898 Gortaficka 2	Burnt mound material	C10, C20
E3984 Gortavoher 1 *	Burnt mound material	C3, C6
E4037 Monreagh 3 *	Burnt mound material	C3

* - also contained plant macrofossils

Table 1 shows context numbers of the burnt mound deposits/burnt spreads from each site sampled on the N18. This activity involved heating stones on a hearth and then placing these into troughs filled with water, thereby heating or boiling the water. The stones were then raked out of the trough and ultimately piled as waste material into a horseshoe-shaped mound around the working area. The mounds usually contain burnt stones along with charcoal inclusions which represent the remains of the firing debris used within the hearth/s to heat the stones. All of the burnt spreads/mounds along the N18 route (with the exception of C317 Caheraphuca 3) contained moderate to charcoal inclusions which would represent the firing debris from fuel used within the hearths. The burnt spread samples from Caheraphuca 3 (C327), Caheraphuca 8 (C810), Rathwilladoon 4 (C3), Gortavoher 1 (C3) and Monreagh 3 (C3) also contained carbonised hazelnut shells which may represent

either remains of food consumed during burnt mound activities or hazelnuts still attached to the hazel branches which used as fuel.

The spread of unburnt stones (C1005) at Caheraphuca 10 and spread of upcast material (C34) at Sranagalloon 3 both contained only occasional charcoal inclusions as a result no further information about the use/function of these two spreads can be deduced from palaeoenvironmental activity.

Troughs

Table 2: Troughs excavated on the N18 road scheme (exclusively those analysed for plant macrofossils and charcoal)

Site Name	Details	Context Number
E3653 Caheraphuca 1	Fill of pit/trough C57	C58
E3653 Caheraphuca 6	Fill of trough – fill supporting timber C612	C617
E3653 Caheraphuca 7	Fill of trough, C715	C713
E3653 Caheraphuca 11	Top fill of waste pit/trough, C1109	C1118
E3653 Caheraphuca 12	Fill of trough C1205	C1204
E3712 Monreagh 1 and 2	Fill of trough C24	C25
E3712 Monreagh 1 and 2	Fill of trough C35	C36
E3713 Sranagalloon 1	Fill of trough, C8	C9, C11, C12
E3716 Derrygarriff 3	Fill of trough C4	C5
E3716 Derrygarriff 3	Fill of trough, C6	C8
E3717 Ballyline 1 and 2	Fill of trough, C22	C25
E3717 Ballyline 1 and 2	Fill of trough, C6	C7
E3720 Drumminacloghaun 1	Fill of trough, C4	C6
E3722 Clooneen 1	Layer under wooden base of trough, C8	C15
E3897 Sranagalloon 3 *	Fill of trough C28	C30, C35
E3897 Sranagalloon 3	Fill of trough, C50	C8
E3898 Gortaficka 2	Fill of trough, C39	C41
E4037 Monreagh 3 *	Fill of trough C10	C11

* - also contained plant macrofossils

The troughs outlined in Table 2 from Sranagalloon 1, Caheraphuca 1, 7, 11, 12, Monreagh, 1 and 2, Derrygarriff 3, Ballyline 1 and 2 and Drumminacloghaun 1 all contained a mixture of silty material, burnt stones and charcoal indicating that they were backfilled with burnt mound material soon after use, either deliberately or through collapse or animal treading whereas the troughs from Sranagalloon 3 Gortaficka 2 and Monreagh 3 contained less charcoal and burnt stones which suggests they silted in naturally. Fill C15 was located under the wooden base of trough C8 at Clooneen 1 and C617 was located under timber plank C612 at Caheraphuca 6. These fills have been interpreted as deliberately placed packing fills for their respective trough structures. The charcoal within these fills is most likely intrusive and was derived from the charcoal/stones being deposited into the trough above.

The hazelnut shells recovered from fills C30 and C35 within trough C28 at Sranagalloon 3 were most likely deposited through disposal of hazelnut shells into the fire after consumption on the site, or through hazelnuts attached to branches used as fuel in the fires. The blackberry and stone bramble seeds were uncharred

and most likely silted into or deposited by birds/ small mammals into trough C10 at Monreagh after it went out of use.

Pits

Table 3: Pits excavated on the N18 road scheme (exclusively those analysed for plant macrofossils and charcoal)

Site Name	Details	Context Number
E3653 Caheraphuca 1	Fill of pits C100 and C101	C29
E3653 Caheraphuca 1	Secondary (C106) and tertiary (C107) fill of pit C102	C106 and C107
E3653 Caheraphuca 3	Fills of pit/tree root C332	C333, C334, C344
E3653 Caheraphuca 7	Fills of pits C711 and C712	C710 and C704
E3653 Caheraphuca 9	Secondary fill of pit C904	C906
E3712 Monreagh 1 and 2	Fill of pit, C40	C41
E3715 Ballyline 3	Fill of pit, C3	C4
E3722 Clooneen 1	Fill of pit C12	C7
E3897 Sranagalloon 3	Fill of pit, C19	C22, C27
E3898 Gortaficka 2	Fill of pit, C21	C22, C29
E4037 Monreagh 3	Fill of pit	C8

The pits at Caheraphuca 1 (pit C29), Ballyline 3, Clooneen 1, Caheraphuca 3 Caheraphuca 7 Caheraphuca 9, Monreagh 3 and Monreagh 1 and 2 as outlined in Table 3 were all deliberately backfilled with burnt mound material and contained frequent charcoal inclusions. This charcoal can be attributed to residual firing debris from hearths used to heat stones. The pits at Sranagalloon 3, Gortaficka 2, Caheraphuca 1 (C102) and Caheraphuca 3 silted up naturally and the charcoal within these features was most likely residual from firing debris.

Well

Table 4: Well excavated on the N18 road scheme (exclusively those analysed for plant macrofossils and charcoal)

Site Name	Details	Context Number
E3712 Monreagh 1 and 2	Fill of a well C26	C27

The fill (C27) from well C26 at Monreagh sites 1 and 2 contained frequent charcoal inclusions. There was no burning *in situ* recorded around the edges of this cut and this, together with the burnt stone inclusions, indicates that the well was deliberately backfilled after its final use with charcoal-rich burnt mound material.

Linear features

Table 5: Linear feature excavated on the N18 road scheme (exclusively those analysed for plant macrofossils and charcoal)

Site Name	Details	Context Number
E3898 Gortaficka 2	Fill of drainage gully C53	C55

The fill (C55) from drainage gully C53 at Gortaficka 2 contained only two fragments of charcoal. It is most likely this residual charcoal accumulated from nearby through natural silting into the drainage gully after the gully went out of use.

Platform/Timber features

Table 6: Timber features excavated on the N18 road scheme (exclusively those analysed for plant macrofossils and charcoal).

Site Name	Details	Context Number
E3653 Caheraphuca 8	Burnt material under timber plank, C814	C825

The fill (C825) from under timber plank C814 at Caheraphuca 8 contained only occasional fragments of charcoal. It is most likely this residual charcoal accumulated from nearby burnt mound activity and silted under the timber plank during the use of the structure.

Economic and Industrial Activities

Burnt Mound Activity

The plant macrofossil evidence from the samples recovered from burnt mound activity from sites Gortavoher 1, Monreagh 3, Sranagalloon 1, 3, Rathwilladoon 4, Caheraphuca 3, 8, 12 not provide any definitive explanation for the use of these features. The hazelnut shells recovered are indicative of a food source being consumed, perhaps as a snack during burnt mound use or they could have been attached to hazel branches which were subsequently burnt. The vetch, mustard/pepper, yellow water lily, blackberry and water pepper can all be consumed (discussed below), although they were recovered in very small quantities from these sites suggesting they were accidental inclusions (accidental losses during harvesting, the burning of weeds or they were dropped by animals/birds) rather than an indication of food production.

Fuel use

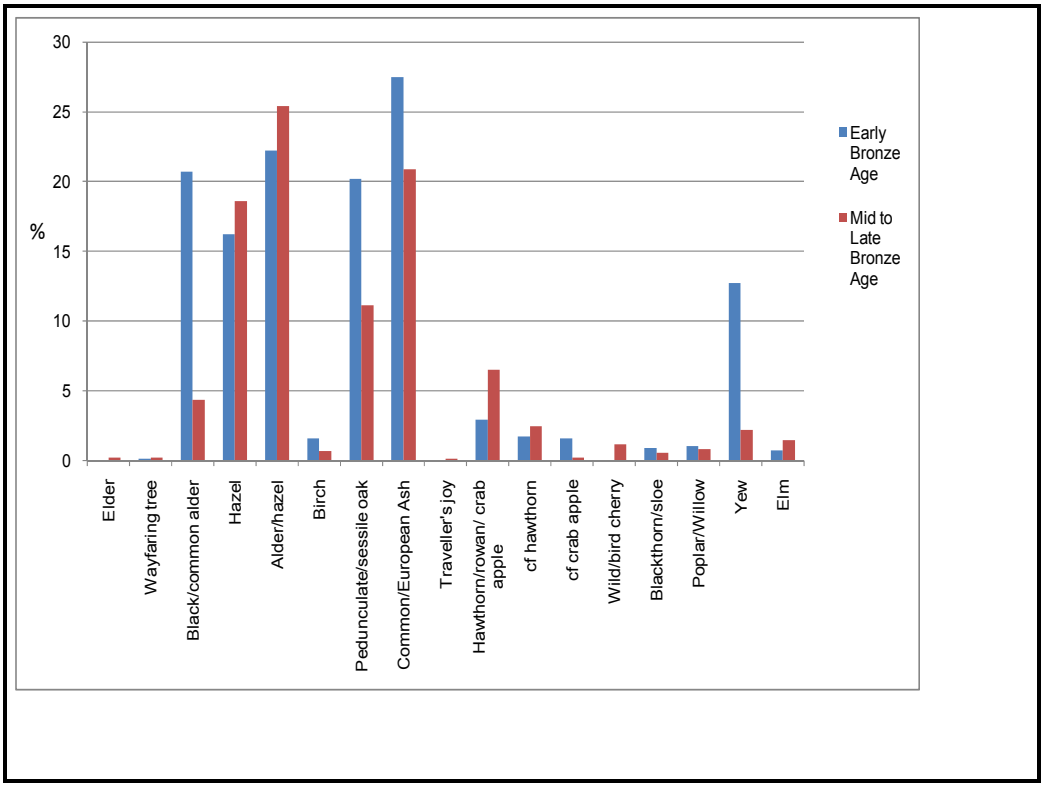
The woodland species exploited for fuel for burnt mound activities was similar throughout the Bronze Age period. The main fuels used as firing material for burnt mound activity on the N18 were ash, oak and elm. There was a high proportion of oak, ash and elm charcoal fragments which did not show obvious curved growth rings: therefore it is likely the wood was derived from larger branches or stem (trunk) wood which would have been deliberately cut with the intention of burning (rather than opportunistic gathering of brushwood). There was also a proportion of the oak and ash charcoal which did exhibit curved growth rings, which is likely to represent smaller branches. Ash, oak and elm would have been chosen as they have dense heartwood and with good ventilation, and burn slowly, maintaining an even temperature (Cutler and Gale 2000:120, 205; Stuijts 2005:145). This is essential for a fire being used to heat up stones as it would require constant heat for relatively long periods of time; and as collection of wood is a labour intensive activity, selection of species according to their burning properties would have been commonplace. There was also a high percentage of hazel and alder/hazel charcoal from all the N18 sites. Hazel is recorded as a reasonable fuel wood and was widely available within oak woodlands, particularly on the fringes of cleared areas (Grogan et al. 2007:30). It is possible that the hazel was used as a dominant fuel wood where oak and ash were not available.

The remaining charcoal recorded from the N18 sites consisted of elder, wayfaring tree, alder, hazel, birch, traveller's joy, hawthorn, rowan, crab apple, wild/bird cherry, blackthorn/sloe, poplar/willow and yew. The majority of the charcoal from these species exhibited curved growth rings, which suggests they derived from round wood lateral branches rather than stem/trunk wood. It is therefore likely that these branches were collected as deadwood and used within brushwood bundles as kindling for the fire. Alder, elder, birch, poplar/willow are species that are ideal to use for kindling. They are all anatomically less dense than for example, oak and ash, and burn quickly at relatively high temperatures (Cutler and Gale 2000:34, 50, 236; Grogan et al. 2007:29, 31). This property makes them good to use as kindling, as the high temperatures produced would encourage the oak and ash to ignite and start to burn.

Hawthorn, rowan, crab apple, yew, wild/bird cherry and blackthorn/sloe have a closer grain anatomical structure, and as a result make reasonable firewood (Grogan et al. 2007:30-31; Cutler and Gale, 2000:196; Stuijts, 2005:144); however, the majority of charcoal from these species originated from small twigs, which indicates that rather than being the dominant fuels, these were kindling used to ignite the oak, ash and elm. Wild/bird cherry and blackthorn/sloe can be slow to ignite and therefore they need assistance from other species such as alder or birch, which burn at high temperatures. Traveller's joy and wayfaring tree have both been recorded as good fuel woods, however as these species are both small shrub species, and because of their small representation within the charcoal assemblage, it is most likely they were collected inadvertently while gathering other twigs/roundwood for brushwood bundles (Stuijts, 2005:145, Cutler and Gale, 2000:80).

There were several slight percentage changes in species used in the early compared to mid to late Bronze Age as indicated by Figure 1. While these trends have been observed, they must be interpreted with caution because the percentage fragment count cannot be used to deduce the actual abundance of these species within the woodland (see composition of local woodlands section below for a more detailed discussion). Therefore the percentages outlined below can only realistically be used to indicate a 'presence'/'absence' variable for each species within the environment.

Figure 1: Percentage change (fragment count) in species used as fuel in the early to late Bronze Age period.



The most noticeable percentage change was the decrease in the presence of oak and ash from the early to late Bronze Age period. This can be attributed to the increase in deforestation throughout the Bronze Age period to make way for settlement, agriculture and industrial activities, which resulted in oak and ash becoming less widely available. This trend is mirrored in the pollen core results obtained from Sheeauns Lough in Connemara. Research by Molloy and O'Connell (1991:79) demonstrated a similar trend with a decrease in oak and ash pollen occurring during the late Bronze Age period. The other large percentage change to occur was the drop in yew between the early and late Bronze Age period. Yew was one of the dominant trees along with oak during the late Neolithic period; however the increase in forest clearance led to a sharp decrease in its presence within oak woodlands. This is again observed in Molloy and O'Connell's (1991:102) research which shows an increase in yew tree pollen until the early Bronze Age, when its abundance starts to decrease. In tandem with the N18 Gort to Crusheen scheme an environmental study has been carried out in the vicinity of the burnt mound sites at Caheraphuca townland. Unfortunately the analysis was not complete by the time that the final excavation reports were compiled.

Management of the local environment

Fuel wood has been a valuable commodity throughout history and has been systematically cleared for settlement, agricultural and industrial activities from the Neolithic period onwards. There are at least 7000 known examples of burnt mounds in Ireland (Power et al. 1997 cited in Grogan et al. 2007, 81) which indicates that their use was widespread throughout the Bronze Age period and subsequently this would have had a huge impact on woodland. Bronze Age communities would have been aware of the impact of deforestation, and coppicing would have been introduced to

manage and retain this valuable resource. The high volume of hazel and alder roundwood within the charcoal is indicative of woodland management by coppicing. This type of woodland management would have been undertaken by cutting the tree to a stump every five to seven years and allowing it to re-generate. The new stems produced were harvested and used for fuel and construction of other wooden structures. This management ensured that the woodland resource was maintained for future generations (Van der Verf 1991, 97; Rackham 1980, 103).

Herbaceous taxa and diet

Herbaceous plants were often exploited to be used as herbs in cooking, vegetables or eaten raw in salads, all of which would have helped add flavour to food and to provide vitamins, minerals and additional fibre. Cabbage/mustard has been recorded as being eaten raw as salad, boiled down and used as pottage in stews and soups and as a vegetable similar to spinach (Behre 2008:67-8). Vetches were also retrieved on the site and are recorded to have been used to thicken stews. Water pepper is also present. It has a very acrid taste and for this reason, its seeds have been used for spices in food (Timson 1966:817). There is also evidence of fruit seeds and nuts – stone bramble and blackberries. These berries would have provided additional vitamin C and were possibly eaten raw or added into tarts/cakes (Pearson 1997: 14). Hazelnut shells were also recovered from various sites. The consumption of hazelnuts would have provided a valuable source of vitamins and minerals and would be eaten raw or could be crushed and added to stews (Pearson 1997:13).

All these species have been recorded as food in documentary sources, analysis of archaeological ecofacts and foods we eat today. Macrofossil analysis of the stomach contents of bog bodies from Kayhausen (Oldenburg, Germany), Grauballe man (Jutland, Denmark), Tollund man (Jutland, Denmark) and Lindow man (Lindow Moss, Cheshire, Britain) have indicated the presence of species such as cabbage/mustard and various fruits and nuts. As these taxa were all found in Ireland during the prehistoric period, it can be assumed that they would have been selected and consumed (or processed to use in/or with cooking food) in Ireland. Their inclusion within the plant macrofossil record from the N18 may also be indicative of weed species establishing in disturbed areas of the site, however it cannot be disregarded that some of these species were being exploited and consumed.

Composition of local woodlands and flora

All the archaeological sites within this report were located in areas of wetland, peat or areas that were prone to flooding as described in Table 7 below.

Table 7: Location of Burnt mound sites on the N18 Gort to Crusheen road scheme.

Site Name/Code	Description of present day ecological setting
E3653 Caheraphuca 1	A hollow between two peat basins
E3653 Caheraphuca 3-12	Located around a peat basin formed on the site of the now drained Caheraphuca Lough
E3655 Rathwilladoon 4	Located on the edge of a wetland area
E3712 Monreagh 1 and 2	Undulating peat covered land
E3713 Sranagalloon 1	Located on an area of flat pasture land, prone to flooding
E3715 Ballyline 3	
E 3716 Derrygarriff 3	Raised ground in a wetland area
E3717 Ballyline 1 and 2	Low lying flat land, close to the base of a hill
E3720 Drumminacloghaun 1	Raised area of pasture land with a natural spring and wetland

	area to the north
E3722 Clooneen 1	Located in a peat basin on drained bog land
E3897 Sranagalloon 3	Located between pasture and peat covered area along the base of a steeply sloping N-S orientated stream valley
E3898 Gortaficka 1 and 2	Marginal land between a pasture and peat covered area, adjacent to a N-S orientated stream
E3984 Gortavoher 1	Located at the base of a slope, positioned where the slope ended and an area of peat land began, close to the Scarriff stream
E4037 Monreagh 3	Located on the edge of a wetland area.

Local flora - Evidence from plant macrofossils

Submerged water plants
There were no submerged water plants retrieved from the N18 burnt mound sites.

Marsh/fen species
Water-pepper and yellow water lily are both species which grow in marshy, waterlogged areas and were found at Gortavoher 1 and Drumminacloghaun 1 (respectively) Water-pepper may possibly have been hand selected to use in foods (as discussed above), however it is most likely that both these species were transported by birds or other small animals and dropped/disposed of on the site.

Opportunistic/ruderal species
Cabbage/mustard, blackberry and stone bramble are all opportunistic species which grow well on cleared/waste ground. These species all could have grown easily within the N18 burnt mound sites (Gortavoher 1 and Monreagh 3 respectively) taking advantage of drier cleared areas and waste ground around the site and adjacent to tracks leading the site. While these are all considered 'weed' species, it cannot be disregarded that these were also food sources during this time, so their inclusion within the archaeological features could indicate their consumption. However as so few were recovered, it most likely signifies their accidental collection with brushwood fuel or was an indication of local flora growing in and around the site.

Dryland species
Vetch was the only dryland species recovered from the burnt mound sites (Gortavoher 1) (Holland 1919:9–10). As the seeds were recovered in small quantities it is most likely they were either dropped by birds or small animals or were inadvertently collected with brushwood and burnt in the fires.

Local woodlands – Evidence from charcoal remains
As asserted by Scholtz (1986), cited in Prins and Shackleton (1992:632), the 'Principle of Least Effort' suggests that communities of the past collected firewood from the closest possible available wooded area. This suggests that the woodland surrounding the site consisted of oak-ash woodland in dryland areas (usually away from the sites) and alder-carr fen in areas close to the sites. While this can be used as the basic theory, other variables affecting wood collection must be taken into account (Prins and Shackleton 1992:632). These include:

1) Selection of particular species in favour of others within the woodland
Oak, ash and elm were likely to have been deliberately selected as fuel as they are considered long lasting and effective fuels (Stuijts 2005:141 and 143) so it is likely they were preferentially searched for and harvested and would therefore have a higher percentage representation within the charcoal assemblage.

2) Deliberately cultivated species

The evidence of hazel and alder coppicing during the Bronze Age is another variable, which by altering and managing the environment, would have increased the amount of available hazel/alder wood therefore its representation within the charcoal assemblages.

3) Differential preservation of charcoal/non-uniform survival of charcoal over time
Preservation rates of charcoal can be affected by a number of variables
a) Mechanical abrasion on a site with stony subsoil may cause the charcoal fragments to be broken into smaller unidentifiable fragments.
b) Two identical pieces of wood may fragment into different numbers of charcoal fragments when burnt. Some, all or none of these may be recovered from the archaeological record which would affect possible woodland reconstructions.
c) The overall heat of the fire may cause the wood to turn to ash and not be represented at all in the archaeological record (Asouti and Austin, 2005:1–5).

As a result of these variables it is not possible to infer from the fragment counts obtained the percentages/numbers of each of these species within the local environment. However, based on the assumption that communities will collect wood from the closest possible source (Scholtz 1986) and, in particular, the collection of economically less important kindling fuel wood (which was most likely obtained from the area close to the site), the charcoal assemblage does suggest that the local vegetation throughout the Bronze Age would have consisted of alder-carr fen in the immediate vicinity of the sites due to their wetland location. There was, however, a large assemblage of charcoal from dryland species which indicate the presence of oak-ash woodland on raised areas/slopes close to the sites.

Alder-carr woodland
The evidence of alder-carr fen woodland indicates a damp to waterlogged environment close to the burnt mound sites. This type of woodland would have consisted of alder, willow and poplar. These are all trees which thrive in waterlogged and damp soils, particularly in areas close to streams or with a high water table (McVean 1953:451; Stuijts 2005:143; Cutler and Gale 2000:190). Viburnum and elder are both understory shrubby plants/small trees which grow in damp, waterlogged soils again adjacent to streams, lakes and in areas with a high water table (Stuijts 2005:145; Aitkinson and Aitkinson 2002:897). Birch is a tree which can tolerate both dry and damp soils and would most likely be located in marginal areas between the damp, waterlogged soil and drier areas, upslope from the burnt mound sites (Stuijts 2005:140).

Oak-Ash woodland
The large assemblage of dryland wood species indicates the presence of an oak-ash woodland, close to the burnt mound sites. This would have consisted of oak, ash and elm trees which would be the dominant large tree species (Cutler and Gale 2000:120, 205; Stuijts 2005:145). On the marginal areas of oak-ash woodlands or in clearings, yew, rowan, hazel, hawthorn, crab apple, wild/bird cherry and blackthorn all thrive. These species are all lower-level woodland species and will grow in shaded conditions; however, they are usually located where there is a higher light availability to allow flowers and fruits to develop (Stuijts 2005:142, 144; Cutler and Gale 2000:88, 183, 196). Traveller's joy is an understory shrub plant which clings to trees within oak woodlands to grow (Cutler and Gale 2000:80).

Conclusion
The archaeological features excavated from the N18 burnt mound sites have provided a rich assemblage of charcoal which allows an insight into the industrial activities of a Bronze Age community. The charcoal remains identified from all burnt

mound features (troughs, burnt mounds, burnt spreads, pits, gullies, wooden structures) represented firing debris from the fuel used in hearths to heat stones. These stones would then have been used to heat water within troughs on site.

The fuel used to heat the stones appears to have been exploited from alder-carr fen woodland consisting of alder, willow, poplar, viburnum and birch, and oak-ash woodland consisting of oak, ash, elm, hazel, yew, rowan, hawthorn, crab apple, wild/bird cherry, blackthorn and traveller's joy. The oak, ash and elm would most likely have provided the main fuels for the fire as they provide long-lasting heat at relatively high temperatures. The remaining species were likely to have been used as kindling material for the fire.

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Appendix

Table 8 Charcoal species identified from E3653 Caheraphuca 1, Co Clare.

Sample Number			15	18	30	35	39
Fill Number			C29	C58	C95	C107	C106
Cut Number			C100, C101	C57	N/A	C102	C102
Family	**Species**	**Common Name**					
Betulaceae	*Corylus avellana*	Hazel	60				
	Alnus glutinosa /Corylus avellana	Alder/hazel		19	18	5	8
Fagaceae	*Betula* spp	Birch			3		
	Quercus robur/ petraea	Pedunculate/sessile oak	12			3	
Oleaceae	*Fraxinus excelsior*	Common/European Ash	21		23		
Roseaceae	*Maloideae* spp *(Crateagus monogyna/Sorbus* spp/*Malus sylvestris)*	Hawthorn/rowan/ crab apple		6	1	2	
	cf *Crateagus monogyna*	cf hawthorn	6				
Salicaceae	*Populus* spp/*Salix* spp	Poplar/Willow	1			2	
Ulmaceae	*Ulmus glabra*	Elm			1	1	
		Indeterminate	1	4	6	0	0
		Total fragments identified:	100	25	46	13	8

NB – All plant macrofossil material is carbonised unless otherwise stated.

PETROGRAPHICAL REPORT ON STONE SAMPLES TAKEN DURING ARCHAEOLOGICAL EXCAVATIONS AT CAHERAPHUCA 1, CO. CLARE, E3654

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Introduction
This report is based on the macroscopic (hand specimen) examination of a stone sample taken during archaeological excavations in advance of the N18 Gort to Crusheen road scheme. The purpose of the study was to identify the rock types from which the stone objects were made, to highlight potential sources for them, and to comment on their possible function. It is important to note that macroscopic petrographical studies have been considered of limited value in comparison to microscopic (thin section and geochemical analysis) studies. On the other hand, macroscopic studies provide an excellent preliminary assessment tool and have proven to be of considerable value in petrographical studies (e.g. see Mandal 1997; Cooney and Mandal 1998).

Solid Geology and Soils of the Site (see Figure 1)
The bedrock under the site consists of Lower Carboniferous Waulsortian Limestone (see below).

The geology of the area is predominantly made up of Lower Carboniferous Age rocks. However, older rocks make up the west and southwest of the area; the oldest rocks in the area occur as inliers (areas of older rocks surrounded by younger rocks) of Ordovician age tuff, lavas and clastic sediments, known as the Caher Hill Formation (shown as CH on Figure 1). Silurian Age rocks also occur as inliers in the area, in the form of the Derryfadda Formation (DF), consisting of greywackes, siltstones and mudstones. These are stratigraphically overlain unconformably by the Upper Devonian to Lower Carboniferous Ayle River Formation (AR) of mudstones, siltsones and conglomerates. This formation marks the start of a conformable sequence making up much of the study area, comprising: the Lower Limestone Shale (LLS), sandstone, siltstone and thin limestone; the Ballysteen Formation (BA), fossiliferous dark-grey muddy limestone which includes in this area the Ballynash Member (BAbn), wavy-bedded cherty limestone and this shale; and the Waulsortian Limestones (WA), massive bedded lime-mudstone.

There is a minor gap in the sequence in this area, the next youngest rocks belonging to the Tubber Formation (TU), consisting of crinoidal and cherty limestone and dolomite and the Burren Formation (BU), consisting of pale grey clean skeletal limestone. Both of these formations contain numerous distinct members, all represented in the area. Each of the members consist of a distinctive type of limestone, for example, the Aillwee Member (lower) (BUal) of bedded and massive fossiliferous limestones.

These Lower Carboniferous rocks, which 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.

Bedrock is not generally exposed in the area; instead it is covered by boulder clay, which is the result of glacial action during the last glaciation. Drumlins are common in the area. The soils of the area consist of shallow brown earths (Aalen et al. 1997).

Results

Site	Sample	Context	Notes		
Caheraphuca 1B	15	29	Altered/decayed	Angular blocks	Limestone; chert

Potential Sources
It is likely that the source of the sample is local. There are abundant sources for limestone of all varieties in the Carboniferous succession. It is, however, important to note that these rock types were not necessarily sourced from bedrock, but could also have come from secondary sources, such as in the glacial tills / sub-soils at the site.

Discussion
While it is not possible to determine a definitive source for this sample based on macroscopic examination alone, it can be stated that the rock types are available locally in outcrop and within the glacial tills / sub-soils. It is therefore highly probable that the material in the sample was sourced in the immediate vicinity of the site.

A total of 38 samples were examined from sites across the N18 Gort to Crusheen scheme (see Appendix 1). Of these 30 are clearly decayed; only 13 are clearly burnt. A total of 33 contain angular to sub-angular blocks of stone; 28 contain rounded to sub-rounded cobbles / pebbles. It is not possible to determine with a degree of certainty whether the material was used in its broken state, or if large blocks were deliberately broken. A total of 24 samples contain limestone and / or cherty limestone as their principal stone type. Of these, one (from Caheraphuca 3; E3653 sample 12) also contains quartzite and sandstone; eight others contain quartzite and three others contain sandstone. A total of 11 samples contain quartzite as their primary stone source; of these three contain limestone, one sandstone, and three both. Finally, three samples contain sandstone as the primary stone type, one (Gortaficka 1; E3898 sample 1) containing chert and one (Gortaficka 2; E3898 sample 8) containing limestone. Coarse grained sandstone and quartzite of these types are typical of burnt mound material. Limestone is however atypical of burnt mound type material – fine grained rock types such as limestone do not absorb heat in the same manner as coarse rock types such as sandstone and dolerite (e.g. see Mandal 2004).

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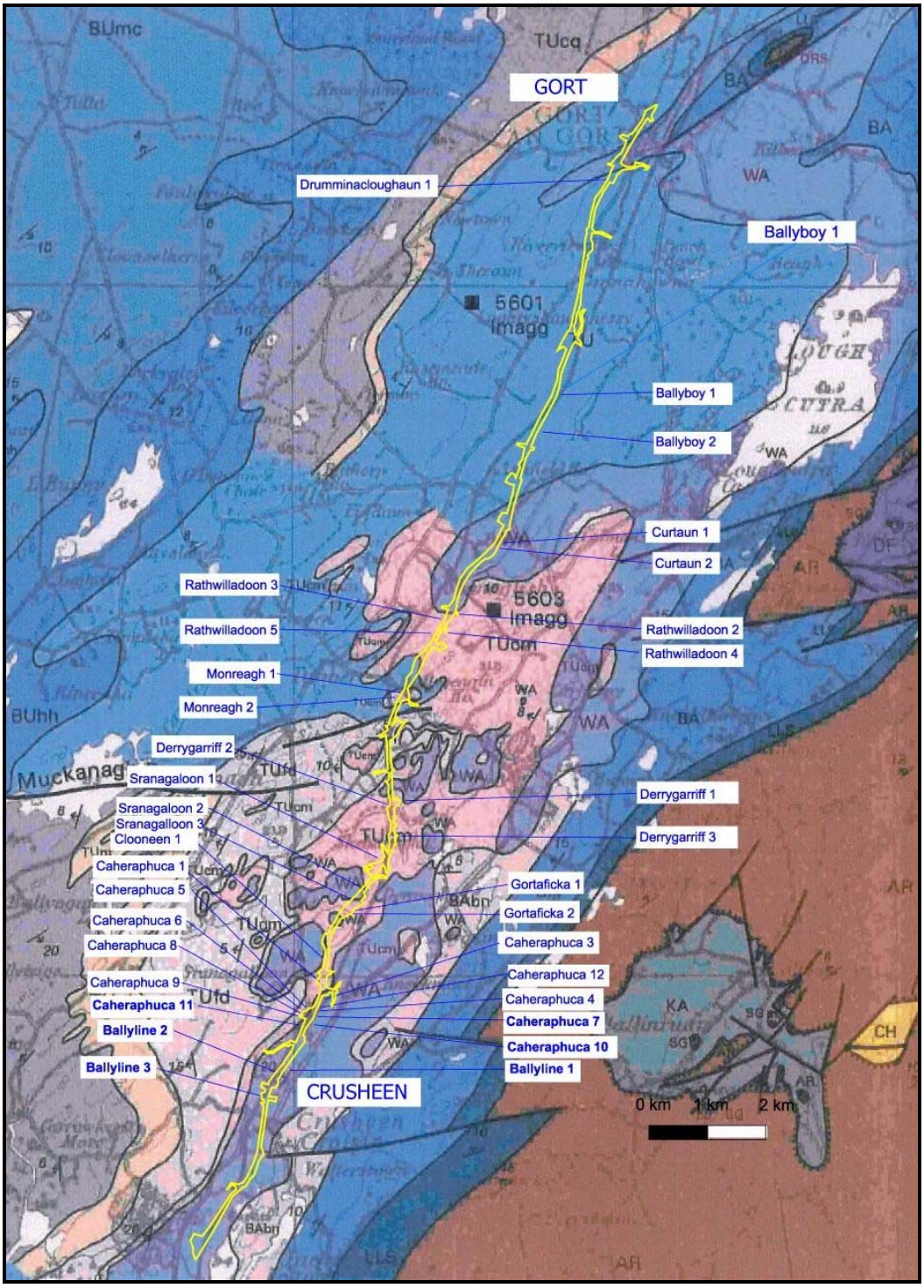

Figure 1 Geology of the area from Gort to Crusheen (after McConnell et al. 2004)

Table 1 Results of the Assessment of Samples for the Scheme

Site	License	Sample	Context	Notes		
Caheraphuca 10	E3653	1	1005	Not altered	Angular blocks	Limestone; chert
Caheraphuca 10	E3653	4	1008	Altered	Angular (cherty limestone) to sub-angular (limestone) blocks	Limestone, cherty; limestone; some sandstone, coarse grained red quartz rich
Caheraphuca 10	E3653	5	1009	Not altered (limestone) altered (quartzite)	Angular (limestone) to sub-rounded (quartzite)	Limestone; chert; some quartzite, yellow
Caheraphuca 12	E3653	2	1204	Not altered / not burnt	Shattered blocks and rounded cobbles	Quartzite, very coarse
Caheraphuca 3	E3653	12	327	Altered / burnt soil	Rounded to angular pebbles	Limestone; quartzite; chert; sandstone
Caheraphuca 4	E3653	2	4	Heat altered	Angular blocks and broken rounded cobbles	Quartzite / sandstone; red-yellow-grey, coarse grained
Caheraphuca 4	E3653	3	5	Not altered / not burnt	Rounded to sub-rounded cobbles	Limestone; some quartzite
Caheraphuca 5	E3653	1	504	Altered / burnt	Sub-angular blocks	Quartzite, very coarse grained yellow
Caheraphuca 6	E3653	1	605	Heat altered	Rounded / fractured cobbles	Limestone; some quartzite, coarse
Caheraphuca 6	E3653	3	604	Not altered / not burnt	Rounded to sub-rounded cobbles	Limestone; some quartzite
Caheraphuca 6	E3653	7	617	Heat altered	Rounded to sub-rounded cobbles	Limestone; some quartzite
Caheraphuca 6	E3653	12	608	Heat altered	Angular to rounded cobbles	Quartzite, very coarse; sandstone, red quartz rich; minor amounts of limestone, calcite and chert
Caheraphuca 7	E3653	2	708	Decayed / burnt	Angular to sub-rounded blocks	Limestone; sandstone, coarse grained red
Caheraphuca 7	E3653	7	709	Not altered / not burnt	Angular blocks	Limestone, cherty; sandstone, coarse grained red quartz rich
Caheraphuca 8	E3653	48	827	Heat altered	Angular to rounded pebbles	Sandstone, coarse grained yellow
Caheraphuca 8	E3653	54	829	Altered / decayed	Angular (limestone) & sub-rounded (sandstone	Limestone, cherty; sandstone, coarse grained red quartz rich
Caheraphuca 8	E3653	88	835	Altered / decayed	Angular	Quartzite, coarse grained yellow; limestone; chert
Caheraphuca 1B	E3654	15	29	Altered / decayed	Angular blocks	Limestone; chert
Rathwilladoon 4	E3655	1	3	Heat altered	Sub-angular to sub-rounded blocks	Limestone
Rathwilladoon 4	E3655	4	6	Decayed (angular blocks)	Angular blocks to rounded pebbles	Limestone; chert; quartzite, very coarse grained; vein quartz; sandstone
Monreagh 2	E3712	13	25	Not altered / not burnt	Rounded to sub-rounded cobbles	Limestone; some quartzite
Monreagh 2	E3712	14	27	Not altered / not burnt	Rounded cobbles	Limestone; some quartzite
Sranagalloon 1	E3713	2	5	Altered / decayed	Angular to sub-rounded cobbles	Limestone

Site	License	Sample	Context	Notes		
Ballyline 3	E3715	1	4	Altered	Rounded to sub-angular blocks and fractured cobbles	Quartzite, coarse grained red-yellow-grey
Ballyline 3	E3715	2	5	Altered	Rounded to sub-angular blocks and fractured cobbles	Quartzite, coarse grained red-yellow-grey
Ballyline 1	E3717	9	7	Not altered / not burnt	Angular to sub-rounded cobbles	Quartzite; sandstone, yellow red quartz rich; limestone; chert; vein quartz
Ballyline 2	E3717	1	25	Altered	Angular to sub-angular blocks	Quartzite, coarse grained yellow; minor amounts of limestone, cherty
Drumminacloghaun	E3720	2	3	Altered / decayed	Sub-rounded cobbles	Limestone
Clooneen 1	E3722	10	15	Heat altered / shattered	Angular cobbles	Quartzite, very coarse grained white; some limestone, cherty
Sranagalloon 3	E3897	1	3	Altered / decayed	Sub-rounded cobbles	Limestone
Sranagalloon 3	E3897	6	9	Decayed	Sub-angular blocks	Limestone
Sranagalloon 3	E3897	38	3	Heat altered	Sub-angular to sub-rounded blocks	Limestone
Sranagalloon 3	E3897	40	34	Altered / decayed	Sub-rounded cobbles	Limestone; some chert
Sranagalloon 3	E3897	41	8	Heat altered	Sub-angular to sub-rounded blocks	Limestone
Gortaficka 1	E3898	1	3	Altered / burnt	Angular to sub-rounded cobbles	Sandstone, coarse grained yellow-red quartz rich; some chert
Gortaficka 2	E3898	8	20	Altered / decayed	Sub-angular to sub-rounded blocks	Sandstone, coarse grained yellow quartz rich; some limestone; chert
Gortaficka 2	E3898	9	8	Altered / decayed	Angular blocks	Quartzite, very coarse grained; sandstone, yellow quartz rich; limestone, cherty
Derrygarriff 3	E3710	8	3	Altered	Sub-rounded to sub-angular cobbles	Limestone

OSTEOLOGICAL REPORT ON FAUNAL REMAINS CAHERAPHUCA 1, CO. CLARE, E3654

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1 Introduction

1.1 The archaeological excavations along the N18 Gort to Crusheen road scheme discovered animal bone on ten sites; Rathwilladoon 2 in Co. Galway, and Caheraphuca 1, Caheraphuca 4, Caheraphuca 6, Gortaficka 1, Gortaficka 2, Sranagalloon 2, Sranagalloon 3, Monreagh 2 and Curtaun 1 and 2 in Co. Clare. The majority of these sites are of Bronze Age date, and were burnt mounds or *fulacht fiadh* sites. A settlement site with Neolithic, Bronze Age and Iron Age period dates is represented by Rathwilladoon 2 and 3, an early medieval and medieval kiln features were identified at Curtaun 1 and 2 and the early modern enclosure at Sranagalloon 2 has also produced a Bronze Age date.

1.2 The total animal bone assemblage from all sites consisted of only 1847 fragments, at a weight of about 4 kg. The osteological analysis will therefore only reveal the variety of species identified and the anatomical distribution of the bones on these sites. Not enough data are available for any assessment of husbandry economy or age-at-slaughter strategies. The largest bone quantities by weight were found at Caheraphuca 4, Caheraphuca 1, and Curtaun 1 and 2 (Table 1).

Table 1 *The quantity of the animal bone samples from the archaeological excavations of the N18 Gort to Crusheen road scheme by site. Abbreviation: NISP = Number of Identified Specimens*

Site	Type	NISP	Weight (g)
Rathwilladoon 2, Co. Galway	Multi period settlement	1216	383.95
Caheraphuca 1, Co. Clare	Burnt mound	27	956.72
Caheraphuca 4, Co. Clare	Burnt mound	126	1533.90
Caheraphuca 6, Co. Clare	Burnt mound	13	121.37
Gortaficka 1, Co. Clare	Burnt mound	1	25.80
Gortaficka 2, Co. Clare	Burnt mound	10	60.47
Monreagh 2, Co. Clare	Burnt mound	32	9.64
Sranagalloon 3, Co. Clare	Burnt mounds	1	8.32
Curtaun 1 and 2, Co. Galway	Kilns	418	619.18
Sranagalloon 2, Co. Clare	Enclosure	3	9.49
Total		*1847*	*3728.84*

2 Osteological methodology

2.1 The bone and shell fragments were identified to species, element, and body side with the aid of an osteological reference collection (Margaret Gowen & Co. Ltd. and the Natural History Museum of Ireland), and reference atlases (Iregren 2002; Răduleț 2007 and 2008; Schmid 1972). Traces of slaughter, butchery and food preparation were also examined, as well as post-depositional taphonomic changes on bones such as erosion and animal gnawing.

2.2 Mammal bone fragments not identifiable to species were assigned to a category of animal based on the size of the fragment if possible. These categories were large mammal (LM), which primarily would include bones from cattle and horses; medium mammal (MM), which includes for example caprovines (sheep/goat), pigs and large dogs; and small mammal (SM), which would include small dogs, cats, hares and rabbits. These categories were however not considered in the interpretative analysis of the data.

2.3 The bones were counted and weighed on a digital weight scale with an

accuracy of 0.01g (OHAUS Scout Pro SPU402). Only fragments that could be identified to species are regarded as identified in this analysis (NISP = Number of Identified Species). In addition to fragment count and weight, the assemblage was also quantified by MNI (Minimum Number of Individuals). Size, side and sex characteristics were taken into considering when the total MNI was estimated (see Chaplin 1971), and a zone recording system (Serjeantson 1996) was employed when identifying the fragments.

2.4 Measurements were taken following the metric standards by von den Driesch (1976) using an osteometric boards and a measuring tape with 0.50 mm accuracy, as well as a digital calliper with 0.01 mm accuracy (BILTEMA 16-105). The most important post-cranial measurements are available in Appendix 2. A complete and comprehensive register of all the measurements, including the cranial metrics, is available with the author. Shoulder height of horse was calculated using the equations by May (1985).

The descriptions given by Boessneck et al. (1964) and Prummel and Frisch (1986) were consulted when attempting to distinguish between sheep and goat bones in caprovine remains. The estimation of age-at-slaughter and death was conducted by assessing the degree of mandibular dental wear (Grant 1982; Payne 1973; 1987), and by examining the stage of fusion of the epiphyseal ends of the long bones (Habermehl 1961 and 1975; Silver 1969).

Acknowledgments
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3 *Bronze Age; burnt mounds (fulacht fiadh) sites*

3.1 *Caheraphuca 1, Co. Clare*

The archaeological excavation at Caheraphuca 1 revealed an area of burnt spread and several pits and troughs dating to the Bronze Age period, which are interpreted as a *fulacht fiadh.* These features are usually interpreted as cooking sites, although other uses of these features such as for brewing, saunas and textile industry have also been suggested. (see appendix 1 to this report).

Animal bones were found in two features. Three fragments of burnt bone (1.25 g) of indeterminable mammal specie were found in C29, which was the fill of either pits C100 or C101. These two large features were located at the centre of the site, just north of the burnt spread area.

The majority of the bones (27 fragments; 956.72 g) were found in C89, which was a spread consisting of charcoal and burnt stones, located just south of the burnt spread area. None of the bone fragments found within this fill were burnt.

Thirteen bones were identified as cattle *(Bos taurus),* consisting mainly of meat-rich body regions such as the vertebrae, ribs, scapulae, humerus and ulna. One scapula fragment of sheep or goat *(Ovis aries/Capra hircus),* a complete right metacarpal from horse *(Equus caballus)* and an antler fragment from red deer *(Cervus elaphus)* were also identified (Table 2).

Butcher marks were noted on the caprovine scapula fragment, where three parallel knife cut marks were noted on the inferior margin of the neck portion of the bone, this from when the humerus was separated from the joint.

Shoulder height could be estimated from the horse metacarpal, which gave a stature of 152 cm (14.3hh).

Table 2 *Identified mammal species and skeletal elements in C89 at Caheraphuca 1*

Element	**Cattle**	**S/G**	**Horse**	**Red deer**	LM
Antler	-	-	-	**1**	-
Mandible	**1**	-	-	-	-
Teeth	**1**	-	-	-	-
Vertebrae	**3**	-	-	-	-
Ribs	**1**	-	-	-	-
Scapula	**3**	**1**	-	-	-
Humerus	**2**	-	-	-	-
Ulna	**1**	-	-	-	-
Metacarpal	-	-	**1**	-	-
Metatarsal	**1**	-	-	-	-
Indet.	-	-	-	-	11
Total:	*13*	*1*	*1*	*1*	*11*
%NISP:	*48.15*	*3.70*	*3.70*	*3.70*	*40.74*
Weight (g)	*505.64*	*9.28*	*237.65*	*102.15*	*102.00*

3.2 *Caheraphuca 4, Co Clare*

Two large burnt mounds (*fulacht fiadh*) and a timber trough was discovered during the archaeological excavations at Caheraphuca 4. Animal bones were found in three features; in C403 which was deposit of natural peat and in C404 and C405 which were the two burnt mound features.

The bones in C403 (104 fragments; 950.50 g) were identified as cattle *(Bos taurus),* and all derived from the same infant animal. What remained of the skeleton was the right maxilla and zygomatic, the right mandible, fragments of a cervical vertebra, six thoracic vertebrae fragments, eleven left and ten right ribs, the scapulae, the right humerus, the ulnae, the right metacarpal, fragments of the coxa, the femora, the tibiae, the right metatarsal and a second phalanx. Age-at-death was determined from dental eruption to have been 5-6 months.

This animal is likely to have died prematurely, and the carcass was disposed of on the site at Caheraphuca 4. Considering the context and the nature of the bones, they are possibly not archaeological.

Context C404 contained a virtually complete right metatarsal from cattle *(Bos taurus).* No evidence of slaughter or butchery was noted on the bone.

Context C405 contained seven adult cattle *(Bos taurus)* bones (393.94 g); a molar tooth, one rib fragment, one scapula fragment, a virtually complete left radius, the diaphyses of a left and right femur, and the diaphysis of a right tibia. One virtually complete adult caprovine *(Ovis aries/Capra hircus)* metacarpal was also identified

3.3 *Caheraphuca 6, Co. Clare*

One burnt mound, two burnt spreads and a timber trough were identified on this site. Animal bones were identified in a layer of re-deposited peat (C618) found underneath the timber trough.

The sample consisted of 13 fragments (121.37 g), of which eight (121.23 g) could be identified as sheep skull bones (Ovis aries), probably the same animal. The remaining five unidentified fragments were burnt and white in colour (0.14 g).

The sheep skull bones consisted of the occipital, the sphenoid, the left maxilla, fragment of a horn core, a styloid process of the hyoid and a complete mandible. Age estimation based on dental eruption of the mandible suggested an age-at-slaughter of 27-36 months. No traces of slaughter, butchery or skinning were noted on any of the fragments.

3.4 *Gortaficka 1, Co. Clare*

A small burnt spread area was discovered at this site, located at the base of a hill. Only one pig boar canine tooth (tusk) (25.80 g) was identified in a black peat deposit (C7) directly overlaying the mineral subsoil layer. The large size of the tooth would suggest that it derives from wild boar *(Sus scrofa).*

3.5 *Gortaficka 2, Co. Clare*

This site consisted of a burnt spread, a shallow pit/trough, a pit and a stake hole. Animal bones were found in the top fill (C24) of pit C23. These were all identified as cattle *(Bos taurus),* comprising of one rib fragment (30.27 g) and nine cranial bone fragments (30.20 g). No evidence of slaughter, butchery or burning was noted on any of the fragments.

3.6 *Monreagh 2, Co. Clare*

This site revealed burnt mounds, possible troughs, two wells, one pit and a linear feature of a Bronze Age date. Only three minor samples of animal bones were found, in C25 which was the fill of a trough (C24), C27 which was the fill of a well (C26) and C41 which was the fill of a pit (C40).

Context C25 contained 29 fragments of unidentifiable mammal bones (9.34 g), of which two fragments (0.11 g) were burnt. Context C27 contained 2 burnt bone fragments (0.18 g) of unknown mammal species. Finally, a crown fragment of an incisor tooth of sheep or goat *(Ovis aries/Capra hircus)* was identified in C41.

3.7 *Sranagalloon 3, Co. Clare*

The archaeological excavations at Sranagalloon 3 revealed a burnt mound, troughs and pit features. One animal bone, a fragment of the acetabulum of a right coxae of a mature cattle *(Bos taurus)* (8.32 g) was identified in the fill (C29) of trough C28. No traces of slaughter, butchery or burning were noted on the fragment.

4 Summary and discussion

4.1 Fulachtaí fia are traditionally interpreted as cooking sites, but the relatively minor occurrences of animal bones from around these features could potentially indicate a different use of these sites. One alternative interpretation is that they were used for tannery and processing of animal skins, which would explain the scarcity of certain skeletal elements (see Tourunen 2007).

4.2 When looking at the taxa and anatomical distribution in the animal bones found at *fulachtaí fia* sites along the N18 road scheme, it is clear that cattle dominates the taxa identified in association with these species. The skeletal elements in cattle are both from meat-rich and meat-poor body regions, while the bones from sheep/goat, pig, horse and red deer are all meat poor (Table 3).

4.3 The overall anatomical distribution is suggests that hides from at least caprovines, horse and red deer - with the skull and feet still attached to the fell - had been brought to the sites to be processed within a tannery industry. This is consistent with other animal bone finds from *fulachtaí fia* sites (see Tourunen 2007).

Table 3 *The identified taxa and skeletal elements of all burnt mound sites (Bronze Age)*

Element	Cattle	S/G	Pig	Horse	Red deer	LM	MM	Indet.
Antler/Horn core	-	**1**	-	-	**1**	-	-	-
Cranial	**1**	5	-	-	-	-	-	-
Mandible	**1**	2	-	-	-	-	-	-
Teeth	**2**	**1**	**1**	-	-	-	-	-
Vertebrae	**3**	-	-	-	-	-	-	-
Ribs	**3**	-	-	-	-	-	-	-
Scapula	4	**1**	-	-	-	-	-	-
Humerus	2	-	-	-	-	-	-	-
Radius	**1**	-	-	-	-	-	-	-
Ulna	**1**	-	-	-	-	-	-	-
Metacarpal	-	1	-	**1**	-	-	-	-
Coxae	**1**	-	-	-	-	-	-	-
Femur	**2**	-	-	-	-	-	-	-
Tibia	**1**	-	-	-	-	-	-	-
Metatarsal	**1**	-	-	-	-	-	-	-
Indet.	-	-	-	-	-	**22**	**2**	**36**
NISP	**23**	11	1	**1**	**1**	**22**	**2**	**36**
%NISP	**23.71**	11.34	1.03	**1.03**	**1.03**	**22.68**	**2.06**	**37.11**
Weight (g):	**968.37**	142.51	25.80	**237.65**	**102.15**	**190.67**	**4.79**	**9.66**

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Appendices

Table A1 Identified species from Caheraphuca 1

Sample	*Cattle*	*S/G*	*Horse*	*Red deer*	*Indet*	*Weight (g)*	*Comments*
15	-	-	-	-	*i*	1.25	Burnt
54	13	1	1	1	11	956.72	

Metrics

Table A2.1. *Caheraphuca 1 - Cattle bone measurements (mm). Abbreviations: see von den Driesch 1976*

Site	*Period*	*Sample*	*Element*	*Side*	*Bp*	*BFp*	*SD*	*CD*	*SLC*	*LG*	*BG*	*BPC*	*DPA*	*SDO*
E3654	BA	54	Humerus	L	-	-	26.19	-	-	-	-	-	-	-
E3654	BA	54	Metatarsal	R	-	-	21.07	-	-	-	-	-	-	-
E3654	BA	54	Scapula	R	-	-	-	-	-	62.57	57.20	-	-	-
E3654	BA	54	Scapula	R	-	-	-	-	44.24	-	-	-	-	-
E3654	BA	16	Femur	L	-	-	24.27	85.00	-	-	-	-	-	-
E3654	BA	16	Femur	R	-	-	-	-	-	-	-	-	-	-
E3654	BA	16	Radius	L	65.45	60.29	31.19	91.00	-	-	-	-	-	-
E3654	BA	16	Scapula	?	-	-	-	-	-	-	-	-	-	-
E3654	BA	16	Tibia	R	-	-	30.89	82.00	-	-	-	-	-	-
E3654	BA	17	Mt	R	36.97	-	21.52	-	-	-	-	-	-	-

Table A2.2 *Caheraphuca 1 - Caprovine bone measurements (mm). Abbreviations: see von den Driesch 1976*

Site	*Period*	*Sample*	*Species*	*Element*	*Side*	*Bp*	*SD*	*GLl*	*SLC*	*LG*	*BG*	*GB*	*Bd*
E3654	BA	54	S/G	Scapula	R	-	-	-	20.54	31.30	22.06	-	-
E3654	BA	16	G	Metacarpal	L	22.68	15.69	-	-	-	-	-	-

Table A2.3 *Caheraphuca 1 - Horse bone measurements (mm). Abbreviations: see von den Driesch1976*

Site	*Period*	*Sample*	*Element*	*Side*	*Bp*	*GL*	*GLl*	*Ll*	*SD*	*Bd*
E3654	BA	54	Metacarpal	R	53.70	248.50	246.00	241.00	36.80	53.00

Epiphyseal bone fusion and mandibular dental wear data

Table A3.1 *Cattle bone epiphyseal fusion data for all sites on N18 road scheme. Abbreviations: UF = unfused; IF = infusion; F = fused.*

Fusion period	Period	UF	IF	F	%UF
Early fusion (< 1 *I/A* years)	Neolithic	0	0	0	-
	Bronze Age	0	0	1	*0.00%*
	Early medieval	1	0	0	*100.00%*
	Total:	*1*	*0*	*1*	*50.00%*
Mid fusion (2-2 *I/A* years)	Neolithic	0	0	1	*0.00%*
	Bronze Age	0	0	0	-
	Early medieval	1	0	0	*100.00%*
	Total:	*1*	*0*	*1*	*50.00%*
Late fusion (> 3 years)	Neolithic	0	0	0	-
	Bronze Age	0	0	1	*0.00%*
	Early medieval	0	0	0	-
	Total:	*0*	*0*	*1*	*0.00%*

Table A3.2 *Caprovine bone epiphyseal fusion data for all sites on N18 road scheme. Abbreviations: UF = unfused; IF = infusion; F = fused*

Fusion period	Period	UF	IF	F	%UF
Early fusion (< 1 years)	Neolithic	0	0	2	*0.00%*
	Bronze Age	0	0	1	*0.00%*
	Early medieval	1	0	1	*50.00%*
	Total:	1	0	4	*25.00%*
Mid fusion (1 - 2 *Vi* years)	Neolithic	0	0	0	-
	Bronze Age	0	0	0	-
	Early medieval	2	0	0	*100.00%*
	Total:	*2*	*0*	*0*	*100.00%*
Late fusion (> 3 years)	Neolithic	0	0	0	-
	Bronze Age	0	0	0	-
	Early medieval	0	0	1	*0.00%*
	Total:	*0*	*0*	*1*	*0.00%*

Table A3.3 *Pig bone epiphyseal fusion data for all sites on N18 road scheme. Abbreviations: UF = unfused; IF = infusion; F = fused*

Fusion period	Period	UF	IF	F	%UF
Early fusion (< 1 years)	Neolithic	0	0	0	-
	Bronze Age	0	0	0	-
	Early medieval	0	0	0	-
	Total:	*0*	*0*	*0*	-
Mid fusion (1 - 2 *I/A* years)	Neolithic	0	0	0	-
	Bronze Age	0	0	0	-
	Early medieval	0	0	0	-
	Total:	*0*	*0*	*0*	-
Late fusion (> 3 years)	Neolithic	1	0	0	*100.00%*
	Bronze Age	0	0	0	*0*
	Early medieval	0	0	0	*0*
	Total:	*1*	*0*	*0*	*100.00%*

LITHIC FINDS REPORT
CAHERAPHUCA 1, CO. CLARE, E3654

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Introduction

Eleven lithic finds from the archaeological excavation of a prehistoric site at Caheraphuca 1, Co. Clare, were presented for analysis (Table 1). The finds are associated with the remains of a burnt mound with associated troughs and pits.

Find Number	Context	Material	Type	Condition	Cortex	Length (mm)	Width (mm)	Thickness (mm)	Complete	Retouch
E3654:1:1	1	Chert	Flake	Lustred	Yes	21	15	3	No	No
E3654:1:2	1	Chert	Debitage							
E3654:1:3	1	Chert	Flake	Lustred	No	40	24	6	No	No
E3654:1:4	1	Chert	Natural Chunk							
E3654:72:1	72	Sandstone	Rubbing Stone	Weathered	n/a	123	77	45	No	No
E3654:89:1	89	Chert	Natural chunk							
E3654:95:1	95	Chert	Flake	Lustred	Yes	43	22	6	Yes	No
E3654:95:2	95	Chert	Retouched artefact	Lustred	Yes	43	12	7	No	Left edge direct abrupt, right edge Direct semi-abrupt
E3654:95:3	95	Chert	Flake	Reasonably fresh	Yes	27	24	9	Yes	No
E3654:113:1	113	Chert	Polished stone axe	Burnt	No	44	39	15	No	No
E3654:113:1	113	Chert	Polished stone axe	Burnt	No	84	68	23	No	No

Table 1: Composition of the Lithic Assemblage from Caheraphuca 1b (E3654)

Methodology

All lithic artefacts are examined visually and catalogued using Microsoft Excel. The following details are recorded for each artefact which measures at least 20 mm 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 20 mm are classed as debitage and not analysed further. The same is done with natural chunks.

Quantification

The lithics are eight flaked/worked pieces of chert, a used piece of sandstone and two natural chunks of chert (Table 1). Eight artefacts are larger than 20 mm in length and width and were therefore recorded in detail.

Provenance

The lithics were recovered from the topsoil, the fill of a trough or pit and three spreads (Table 2).

Find No.	Context No.	Description	Artefact Type
E3654:1:1	C1	Topsoil	Flake
E3654:1:2	C1	Topsoil	Debitage
E3654:1:3	C1	Topsoil	Flake
E3654:1:4	C1	Topsoil	Natural Chunk
E3654:72:1	C72	Fill of trough/pit	Rubbing Stone
E3654:89:1	C89	Spread of heavy, gravely material	Natural Chunk
E3654:95:1	C95	Burnt spread material	Flake
E3654:95:2	C95	Burnt spread material	Retouched Artefact
E3654:95:3	C95	Burnt spread material	Flake
E3654:113:1	C113	Peat spread	Polished Stone Axe
E3654:113:2	C113	Peat spread	Polished Stone Axe

Table 2: Context Information for the Assemblage from Caheraphuca 1b (E3654)

Condition

The lithics survive in variable condition (Table 3). Six artefacts are incomplete and four chert artefacts (E3654:1:1, E3654:95:1-3) bear the remnants of cortex (Table 1). The lustre observed on four artefacts (E3654:1:1, E3654:1:3, E3654:95:1-2) is a direct result of their exposure to heat, i.e. they did not directly come into contact with fire, but where perhaps strewn around a hearth.

CONDITION	AMOUNT
Reasonably Fresh	1
Weathered	1
Burnt	2
Lustred	4
Total	**8**

Table 3: Assemblage Condition from Caheraphuca 1b (E3654)

Technology/Morphology

The assemblage comprises three types of flaking products including one retouched artefact (Table 4). In addition, three macro tools were identified.

TYPE	AMOUNT
Flake	4
Debitage	1
Retouched Artefact	1
Macro Tool	3
Total	**9**

Table 4: Assemblage Composition from Caheraphuca 1b (E3654)

The four flakes derive from the topsoil (E3654:1:1 and E3654:1:3) and the spread of burnt material (E3654:95:1 and E3654:95:3). All were produced on platform cores. Flake E3654:95:1 shows use-wear on its left edge. The flakes measure between 21 mm and 43 mm in length (Fig. 1). They date the Neolithic period, most likely to the second half of that period, based on their technology and morphology.

The presence of one piece of debitage suggests that a limited amount of knapping/tool re-sharpening took place at the site.

Retouched Artefacts
The retouched artefact (E3654:20:1) is a classic slug knife which was produced on a bipolar blade or flake. It is an elongated, symmetrical and domed example and measures 43 mm long, 12 mm wide and 7 mm thick. The slug knife dates to the late Neolithic/early Bronze Age period based on its morphology (O'Hare 2005; Woodman et al. 2006).

Macro Tools
The assemblage contains one sandstone rubbing stone (E3654:72:1) and two polished stone axehead fragments (E3654:113:1-2). Artefact E3654:72:1 was recovered from the fill of a trough/pit and is a possible quern or rubbing stone fragment. The stone measures 123 mm long, 77 mm wide and 45 mm thick. It probably dates to the Neolithic or Bronze Age period and may be directly associated with the activities that took place at the burnt mound.

The polished stone axes were found in a layer of peat which was sealed by the spread of burnt mound material. Axe E3654:113:1 survives in the form of the butt portion of small axe. It measures 44 mm in length, 39 mm in width and 15 mm in thickness. The second axe (E3654:113:2) is an unfinished, reworked axe that is missing its butt. It is a rather small example and measures 84 mm long, 68 mm, wide and 23 mm thick.

The polished stone axes from Caheraphuca 1b are typologically and technologically diagnostic and most likely date to the late Mesolithic period, based on the presence of flat facets on the broad sides of the axe (Woodman pers. comm.).

Figure 1: Dimensions (mm) of the Assemblage Components from Caheraphuca 1b (E3654)

Dating
The lithic assemblage from Caheraphuca 1b is typologically and technologically diagnostic. The flakes most likely date to the second half of the Neolithic period and the classic slug knife dates to the late Neolithic/early Bronze Age.

There is very little indication that knapping took place at this site in the Bronze Age. The polished stone axes appear to date the final Mesolithic period / early Neolithic period and are clearly associated with earlier activities that may have taken place at this site during that period.

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

Discussion
The size and composition of the flaked assemblage is typical for Irish burnt mounds. Recent excavations in the south-east of Ireland revealed a similar pattern of very small assemblages found with burnt mounds, e.g. the N25 Waterford By-Pass (Woodman 2006), a pattern that is replicated elsewhere in Ireland. In fact, many burnt mounds are devoid of lithic artefacts.

Summary
The lithic finds from the archaeological excavation at Caheraphuca 1b, Co. Galway are eight flaked/worked pieces of chert and one used piece of sandstone. In addition, two natural chunks of chert were contained in the assemblage. The flaked assemblage comprises four platform flakes, one piece of debitage and a classic elongated slug knife.

The flaked component is typologically and technologically diagnostic and probably dates to the second half of the Neolithic period. The slug knife dates to the late Neolithic/early Bronze Age. The two polished stone axes probably date to the final part of the Mesolithic period / early Neolithic period and thus, are residual components at this site.

There is limited evidence that *in situ* flint knapping/tool resharpening took place at this site. The artefacts recovered are most likely associated with domestic tasks carried out in and around the environs of the burnt mound.

This site makes a minor contribution to the evidence for prehistoric sites in Co. Clare.

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STONE AXEHEAD FRAGMENTS

CAHERAPHUCA 1, CO. CLARE, E3654

EMMETT O'KEEFFE

Irish Stone Axe Project,
University College Dublin

Caheraphuca, Co. Clare
ISAP: 21624
(E3654:113:002)

Petrology: Shale

Adze/Axe: Polished shale axe. Left side heavily flaked, some scars leading to face 1 could be re-working, left side well ground & polished in areas, mostly near edge. Clear junctions between left side and both edge and butt, clear junction between left side and both faces, especially near edge. Right side flaked, some possible re-flaking. Highly ground in places, especially near blade area and edge. Clear junction between right side and edge and between right side and both faces near the edge. Edge sharp, slightly sinuous in cross section. Blade area face 1 polished, visible striae especially prevalent in blade area related to sharpening.

Weathering has caused some of the surface of the blade area, face 1 to be removed. Clear junction between blade area and central portion face 1. Face 1 polished except for flake scars leading from sides. Blade area face 2 polished, similar weathering to blade area face 1. Clear junction with face 2, face 2 polished centrally with extensive unpolished areas. Flaked and unpolished areas could relate to hafting. Butt appears relatively smooth but unground, sloped in both plan and cross section. EOK

L. 8.4cm W. 6.8cm T. 2.3cm

Caheraphuca, Co. Clare
ISAP: 21625
(E3654:113:001)

Petrology: Mudstone

Axe/Adze: Butt of mudstone axe/adze. Both sides pointed. Slight facet on left, face 2, slight facet on right, face 1. Slight damage to right side. Damage to face 2, possibly weathering. Faces polished, visible striae. Butt removed by flaking, may be related to damage on right side. EOK

L. 4.4 cm W. 3.9 cm T. 1.5 cm

A NOTE ON THE MODERN POTTERY

CAHERAPHUCA 1, CO. CLARE, E3654

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Introduction
Two sherds of modern pottery were presented for study. The first of these (C24:2) is the later sherd, the base of a pearlware jug. The second sherd (C98:1) is a fragment of rim sherd of a black glazed vessel, probably a pancheon or large shallow bowl.

Black glazed ware
The addition of iron to the lead glaze gives the distinctive black colouring. Many of the vessels were produced in Lancashire and Staffordshire and exported in large quantities to Ireland in the 17th and 18th centuries. The clay can be intermixed with white clay giving a marbled effect, similar to stoneware in dark red/brown, or soft red earthenware. It appears that soft red earthenwares were also made in Ireland in the 18th and 19th centuries (Meenan 1997, 349).

Pearlware
Wedgwood's development of creamware was further refined as pearlware, with a harder-fired clay and a blue rather than a green tinge in the collected glaze (Savage & Newman 2000, 216). This formed the basis for many decorative forms of the later 18th and 19th centuries such as shell-edged, mochaware and transfer printed ware.

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CATALOGUE OF CLAY PIPE
CAHERAPHUCA 1, CO. CLARE, E3654

MAEVE TOBIN MA

Irish Archaeological Consultancy Ltd
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Find number	Object Type	Material	Description	Dimensions
E3654:97:1	Clay pipe bowl	Ceramic	A fragment of a cream coloured clay pipe bowl, which curves and would have formed part of a cylinder. Stained brown. Date and provenance unknown.	L 26 mm, min. W 20.5 mm, min D 4.5 mm

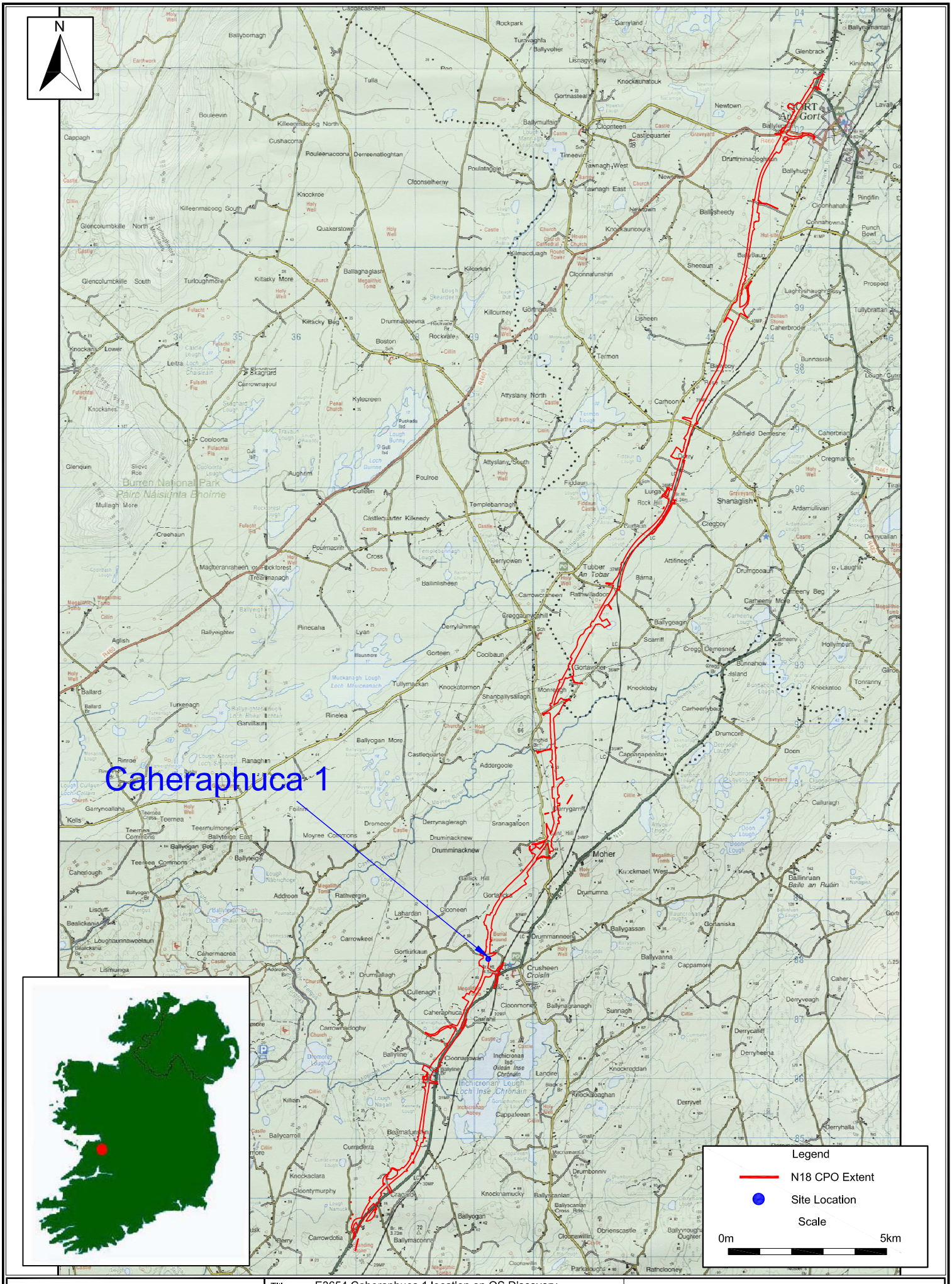
APPENDIX 3 LIST OF RMP SITES IN AREA

RMP No	Description
CL018-041	Ringfort Cashel
CL018-042	Burial Ground
CL018-083	*Fulacht Fiadh*
CL018-085	Enclosure possible
CL026-013001	Ringfort Cashel
CL026-013002	House
CL026-015	Megalithic Tomb
CL026-130	*Fulacht Fiadh*
CL026-136	*Fulacht Fiadh*
CL026-137	*Fulacht Fiadh*
CL026-138	*Fulacht Fiadh*
CL026-143	*Fulacht Fiadh* possible

See Figure 2 for location.

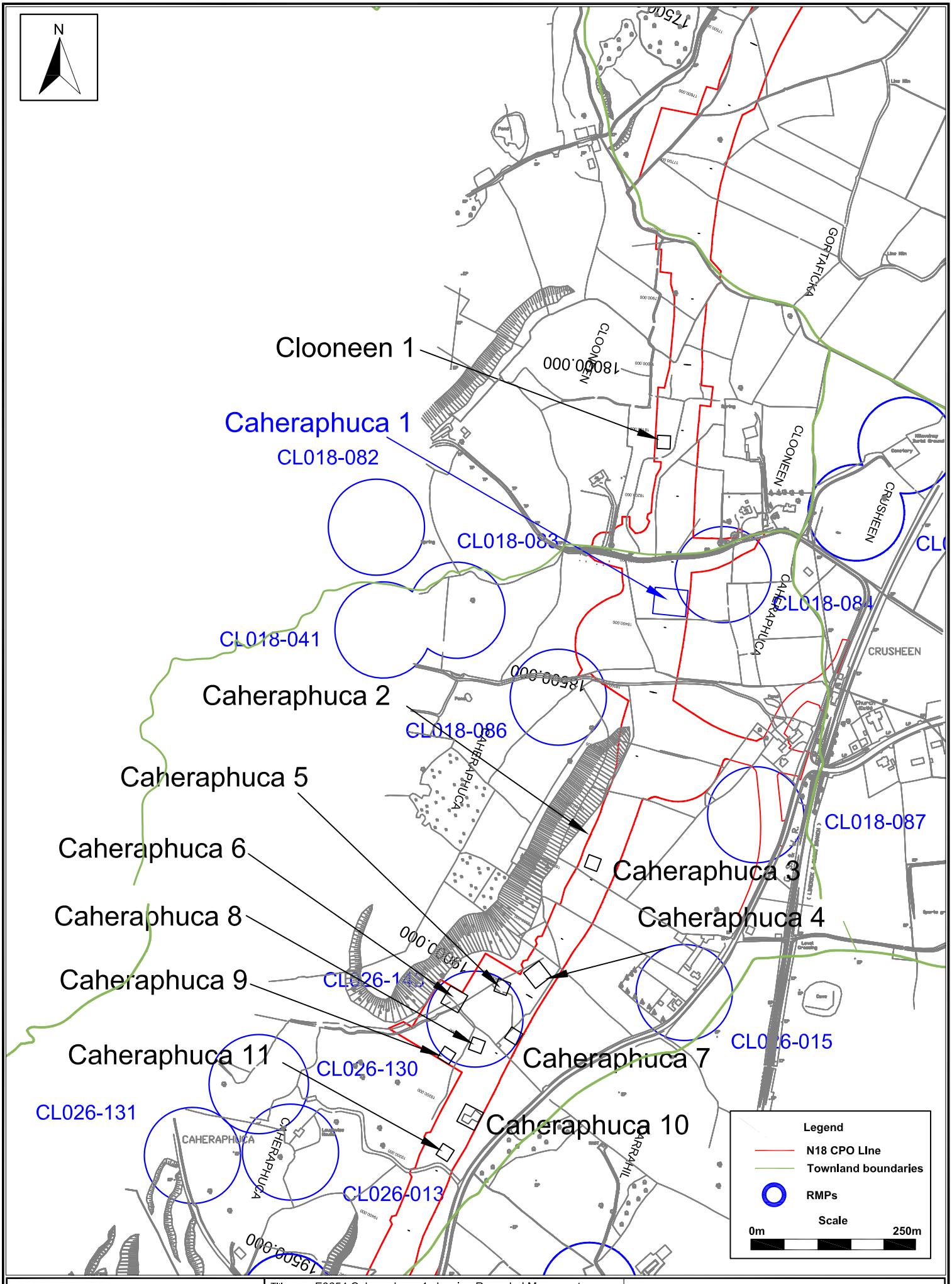
APPENDIX 4 LIST OF N18 GORT TO CRUSHEEN SCHEME SITE NAMES

Site Name	Ministerial Direction No.	NMS Registration Number	Site Type
Drumminacloghaun 1	A044	E3720	Burnt mound
Ballyboy 1	A044	E3719	Ringditch
Ballyboy 2	A044	E3718	Ringditch
Curtaun	A044	E3721	Burnt mounds and early medieval cereal kilns
Rathwilladoon 2 & 3	A044	E3656	Prehistoric settlement
Rathwilladoon 4	A044	E3655	Burnt mound
Rathwilladoon 5	A044	E3657	Charcoal production kiln
Gortavoher 1	A044	E3904	Burnt mound
Monreagh 1 & 2	A044	E3712	Burnt mound
Monreagh 3	A044	E4037	Burnt mounds
Derrygarriff 1	A044	E3716	Burnt mound
Derrygarriff 2	A044	E3711	Metal production site
Derrygarriff 3	A044	E3710	Burnt mound
Sranagalloon 1	A044	E3713	Burnt mound
Sranagalloon 2/Site 146	A044	E3714	Enclosure
Sranagalloon 3	A044	E3897	Burnt mound
Gortaficka 1 & 2	A044	E3898	Burnt mounds
Clooneen 1	A044	E3722	Burnt mound
Caheraphuca 1	A044	E3654	Burnt mound
Caheraphuca 3 - 12	A044	E3653	Burnt mounds
Ballyline 1 & 2	A044	E3717	Burnt mounds
Ballyline 3	A044	E3715	Prehistoric pit



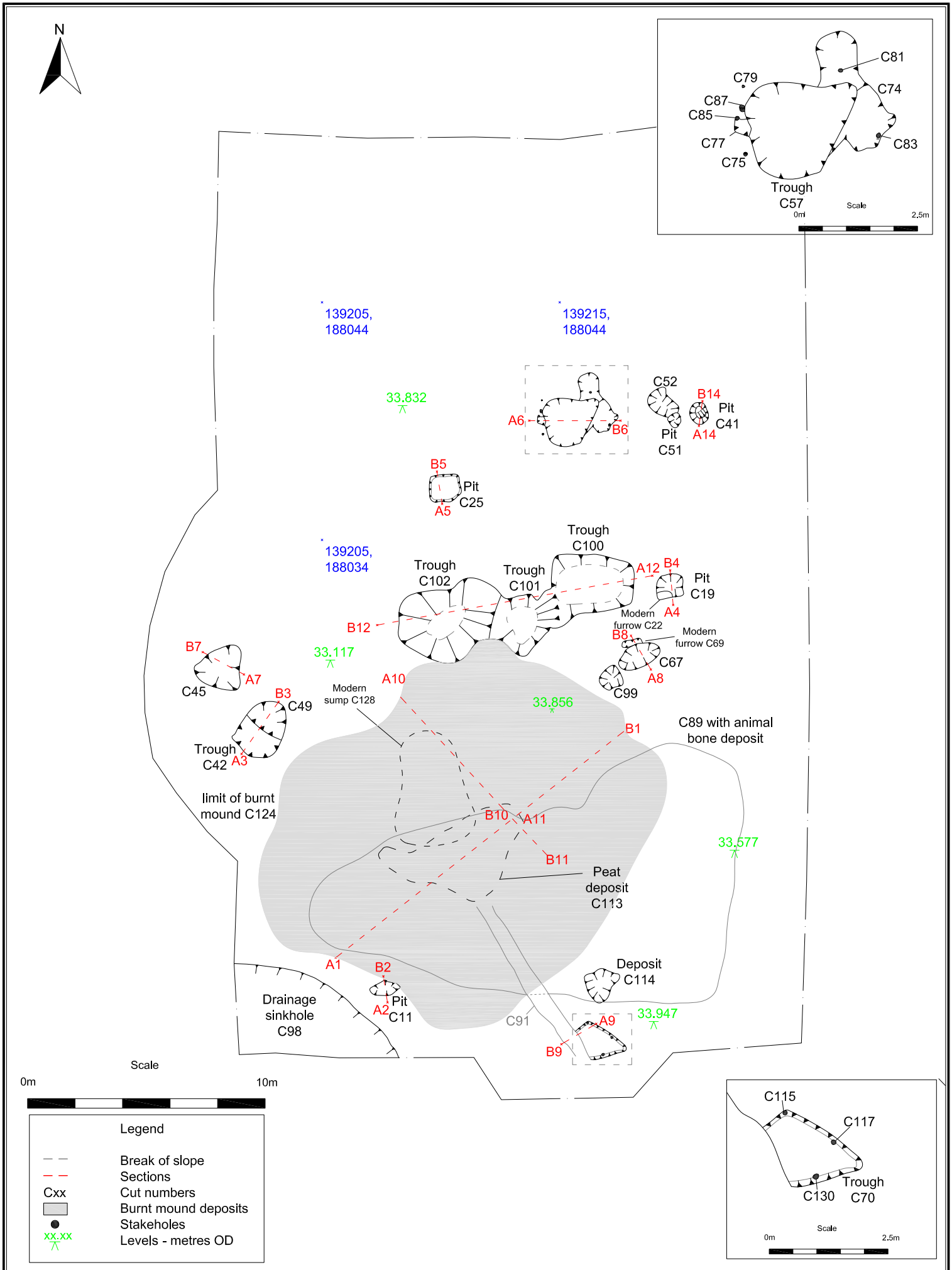
IAC Irish Archaeological Consultancy

Title:	E3654 Caheraphuca 1 location on OS Discovery Series background	Scale:	1:80,000 @A4
Project:	N18 Gort to Crusheen	Date:	17/11/09
Client:	Galway County Council	Produced by:	G Kearney
		Job No:	J2440
		Figure No:	1



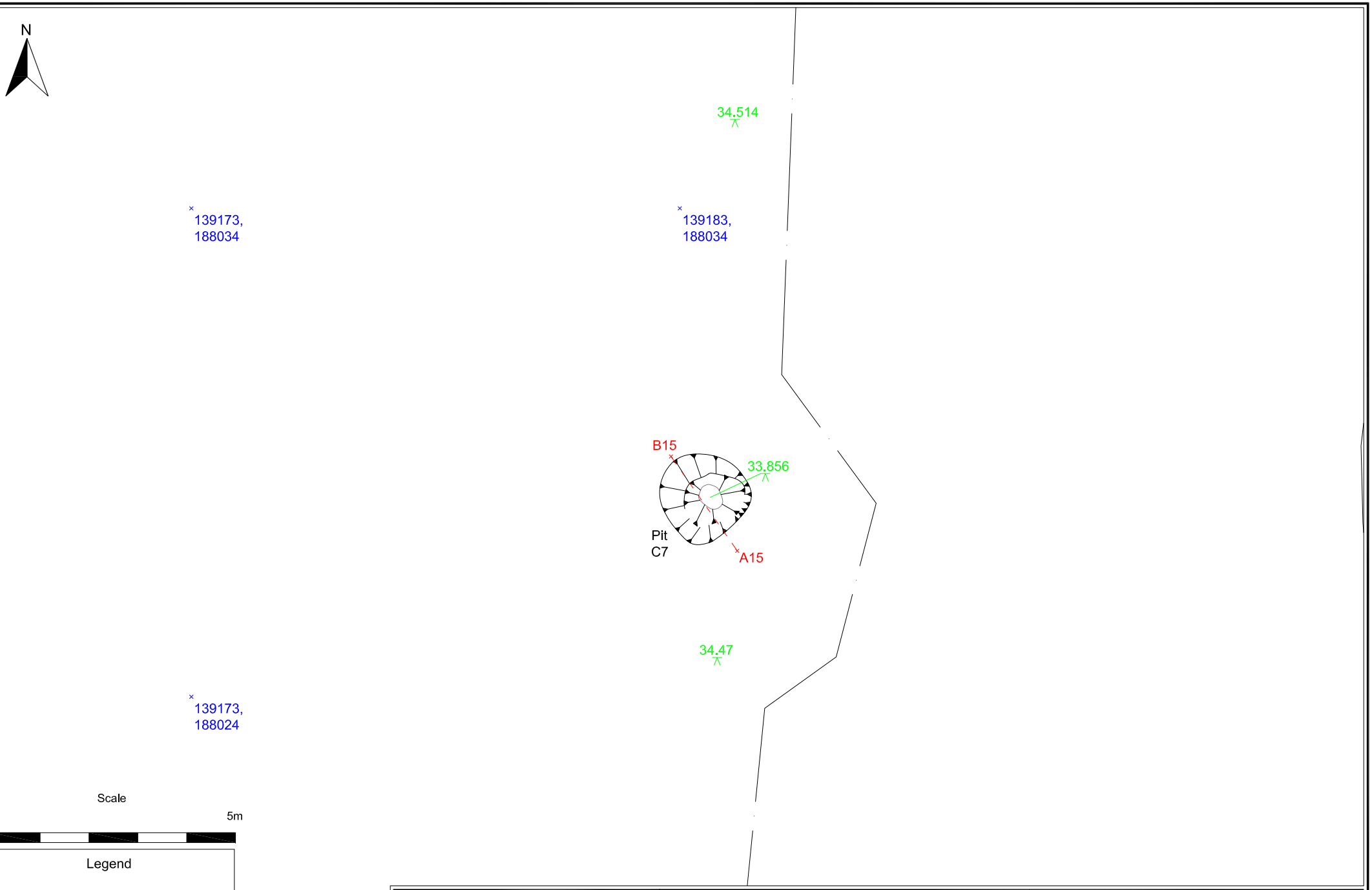
IAC Irish Archaeological Consultancy

Title:	E3654 Caheraphuca 1 showing Recorded Monuments with OSI background	Scale:	1:10,000 @ A4
Project:	N18 Gort to Crusheen	Date:	18/11/09
Client:	Galway County Council	Produced by:	G Kearney
		Job No:	J2440
		Figure No:	2



IAC Irish Archaeological Consultancy

Title:	Caheraphuca 1 post-excavation plan Area B
Project:	N18 Gort to Crusheen
Client:	Galway County Council
Scale:	1:200 @ A4
Date:	14/01/10
Produced by:	G Kearney
Job No:	J2440
Figure No:	3

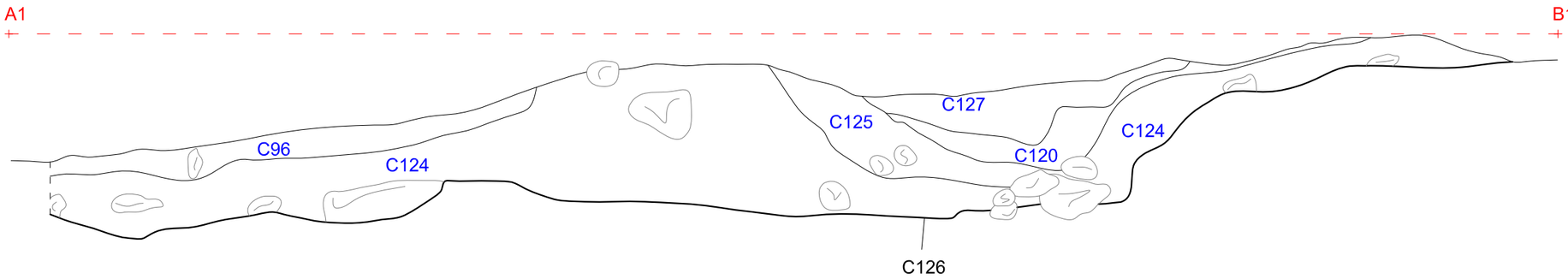


IAC Irish Archaeological Consultancy

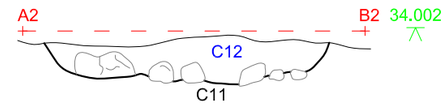
Title:	Caheraphuca 1 post-excavation plan area A
Project:	N18 Gort to Crusheen
Client:	Galway County Council

Scale:	1:100 @ A4
Date:	20/01/10
Produced by:	G Kearney
Job No:	J2440
Figure No:	4

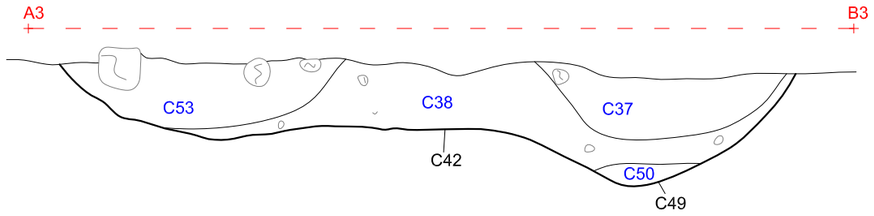
Southeast facing section of C126



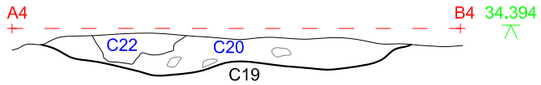
East facing section of C11



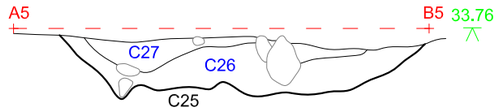
Southeast facing section of possible trough C42, C49



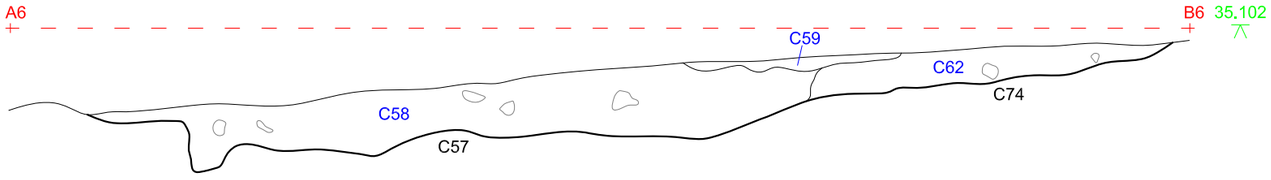
East facing section of C22 and C19



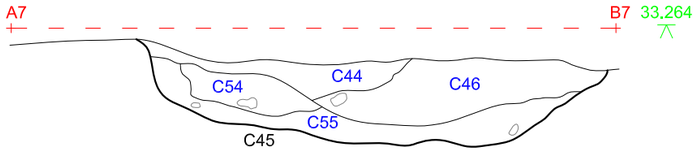
East facing section of C25



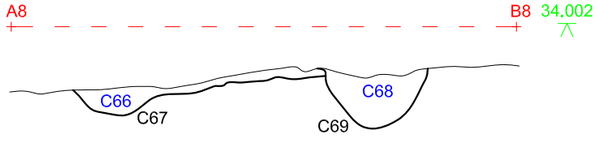
South facing section of C57 and C74



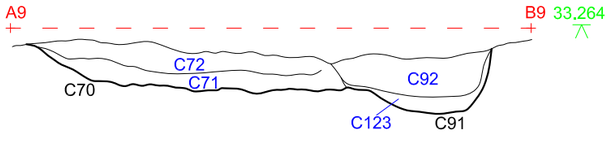
Northeast facing section of C67 and C69



Northeast facing section of C67 and C69



Northwest facing section of C70 and C91



Scale

0m 1m

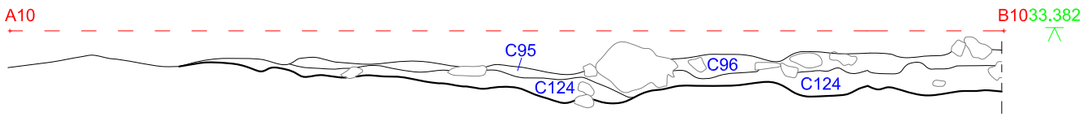
Legend

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

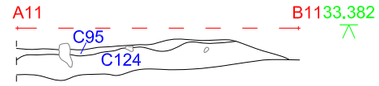
Title:	Caheraphuca 1 sections		
Project:	N18 Gort to Crusheen		
Client:	Galway County Council		
Scale:	1:20 @A3	Job No:	J2440
Date:	18/01/10	Figure No:	5
Produced by:	G Kearney		

IAC Irish Archaeological Consultancy

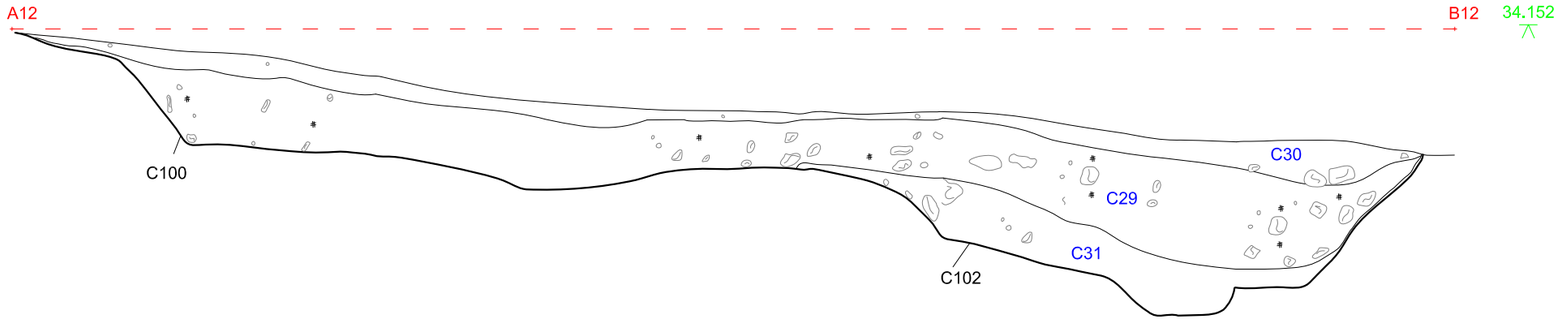
Southwest facing section of C96 and C124



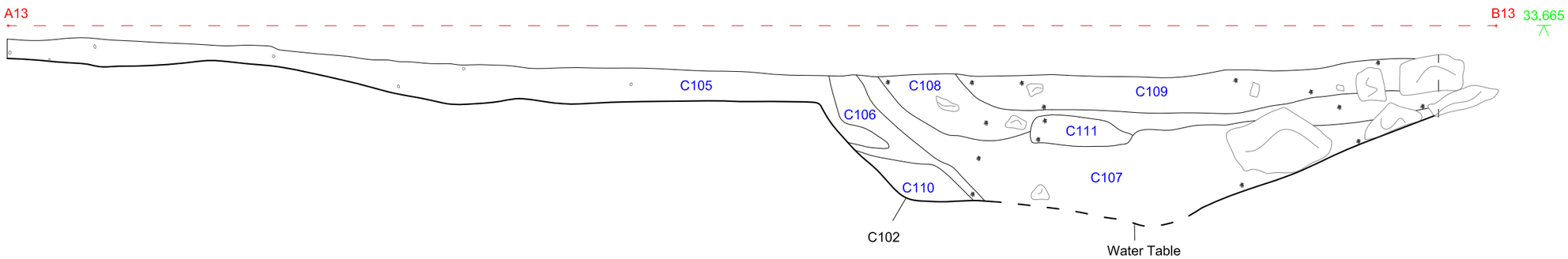
Southwest facing section of C96 and C124



North facing section of C100 and C101



South facing section of C102



Scale

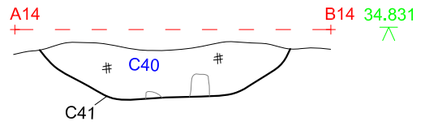
0m 2.5m

Legend

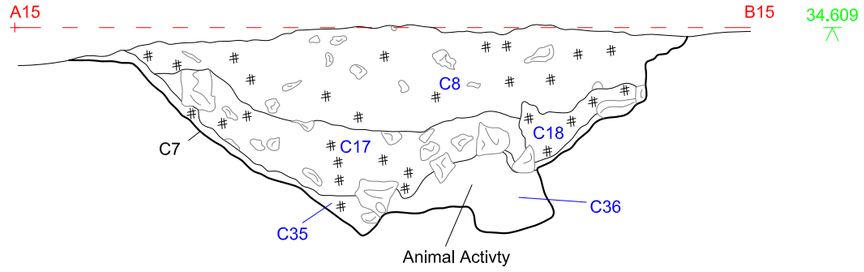
Cxx	Cut numbers
Cxx	Fill numbers
	Stone
#	Charcoal
xx.xx	Levels - metres OD

Title:	Caheraphuca 1 sections	
Project:	N18 Gort to Crusheen	
Client:	Galway County Council	
Scale: 1:50 @A3	Job No: J2440	IAC Irish Archaeological Consultancy
Date: 18/01/09	Figure No: 6	
Produced by: G Kearney		

East facing section of C41



East facing section of C7, C8, C17, C18, C35, C36



Scale

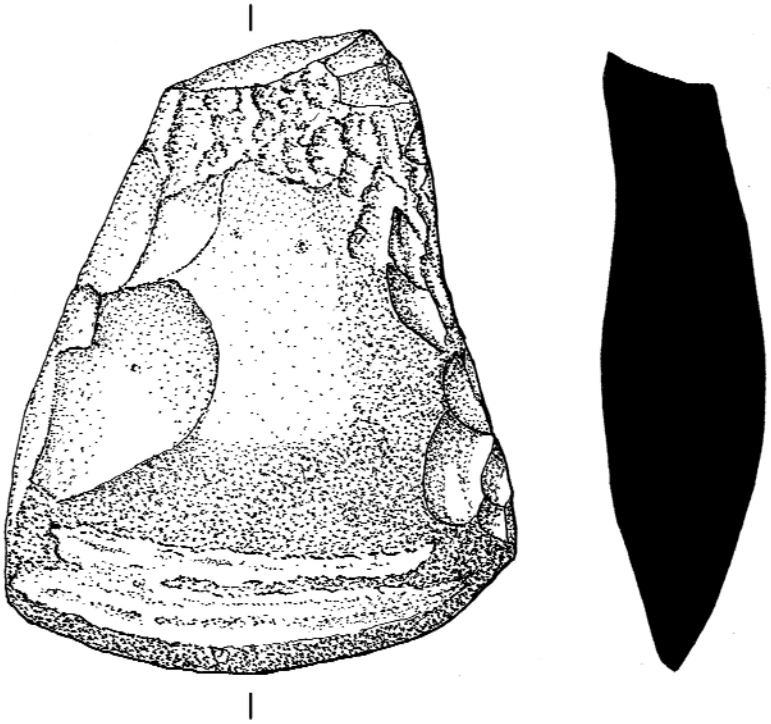
0m 1m

Legend

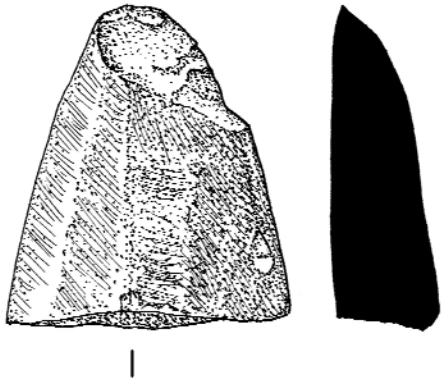
Cxx	Cut numbers
Cxx	Fill numbers
	Stone
#	Charcoal
xx.xx	Levels - metres OD

Title:	Caheraphuca 1 sections	
Project:	N18 Gort to Crusheen	
Client:	Galway County Council	
Scale: as shown	Job No: J2440	IAC Irish Archaeological Consultancy
Date: 23/02/09	Figure No: 7	
Produced by: G Kearney		

E3654:113:1



E3654:113:2



E3654:95:2

Scale

0cm 5cm

IAC Irish Archaeological Consultancy	Title: Caheraphuca 1 Lithics, E3654:95:2, E3654:113:1 and E3654:113:2 (by Alva Mac Gowan)	Scale:	1:1 @ A4
		Date:	12/01/10
	Project: N18 Gort to Crusheen	Produced by:	G Kearney
	Client: Galway County Council	Job No:	J2440
		Figure No:	8