N6 KINNEGAD – ATHLONE SCHEME PHASE 2: KILBEGGAN TO ATHLONE DUAL CARRIAGEWAY

SITE A016/040; E2668: CREGGANMACAR 3

FINAL REPORT

ON BEHALF OF WESTMEATH COUNTY COUNCIL

23 JUNE 2009

IAC Irish Archaeological Consultancy

PROJECT DETAILS

Project Reference No.	WH/00/112
Project	N6 Kinnegad – Athlone Road Scheme: Phase 2, Kilbeggan – Athlone Dual Carriageway
Ministerial Direction Reference No.	A016/040
NMS Registration Number	E2668
Excavation Director	Patricia Lynch
Senior Archaeologist	Shane Delaney
Consultant	Irish Archaeological Consultancy Ltd, 120b Greenpark Road, Bray, Co. Wicklow
Client	Westmeath County Council
Site Name	Cregganmacar 3
Site Type	Burnt Mound and Associated Features
Townland	Cregganmacar
Parish	Kilcleagh
County	Westmeath
NGR (Easting)	E217310 (Area A) E217356 (Area B)
NGR (Northing)	N237450 (Area A) N237512 (Area B)
Chainage	12250–90
Height m OD	Area A 70m OD, Area B 67m OD
RMP No.	N/A
Excavation Start Date	8 February 2006
Excavation Duration	14 days
Report Type	Final
Report Date	23 June 2009
Report By	Patricia Lynch

ACKNOWLEDGMENTS

This report has been prepared by Irish Archaeological Consultancy Ltd on behalf of Westmeath County Council and the National Roads Authority in advance of the construction of the N6 Phase 2: Kilbeggan to Athlone Dual Carriageway Scheme.

The excavation was carried out in accordance with the Directions of the Minister for the Environment, Heritage and Local Government (DOEHLG), in consultation with the National Museum of Ireland (NMI) issued under Section 14 of the National Monuments Acts 1930–2004.

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ABSTRACT

Irish Archaeological Consultancy Ltd (IAC), funded by Westmeath County Council (WCC) and the National Roads Authority (NRA), undertook an excavation in the townland of Cregganmacar at the site of Cregganmacar 3 in advance of the proposed N6 Phase 2: Kilbeggan to Athlone Dual Carriageway Scheme (Figure 1). The following report describes the final results of archaeological fieldwork at that site. The area was fully excavated by Patricia Lynch under Ministerial Direction (A016/040) and NMS Registration Number E2668 issued by the DOEHLG in consultation with the National Museum of Ireland. The fieldwork took place between 8 and 27 February 2006.

Cregganmacar 3 consisted of two separate areas of archaeology (Area A and B). The remains of a Bronze Age burnt mound site and associated isolated features were excavated within Area B. An isolated Iron Age pit was uncovered in Area A.

From the excavated evidence the site may have been in use periodically over an extended period of time. Three broad phases of archaeological activity were identified on-site based upon radiocarbon dating results, the proximity of features, the similarity of fills and in some cases the direct stratigraphical association between features. The primary phase of archaeological activity identified consisted of the remains of a burnt mound feature evident in the presence of three stratigraphically linked deposits of levelled material one of which dated to the middle Bronze Age period (2 Sigma Cal 1431–1313 BC) (QUB, Appendix 2.6). In terms of later Bronze Age archaeological activity a total of 10 features were identified consisting of a trough dating to the later Bronze Age (2 Sigma Cal 928–825 BC) (QUB, Appendix 2.6) and eight associated stakeholes and an isolated posthole. In Area A an isolated triangular shaped pit dating to the Iron Age (2 Sigma Cal 372–203 BC) (QUB, Appendix 2.6) was excavated with an associated posthole and an isolated deposit.

A post-medieval to modern phase of activity was also identified on-site consisting of a northwest to southeast aligned field boundary ditch, seven southwest to northeast aligned furrows in Area A and three east to west aligned furrows in Area B. Whilst these features are non archaeological in nature they do help to assist in the overall chronological interpretation of a site and for this reason were included in the discussion of this site.

Whilst there were no artefacts recovered from features within either of the identified phases of archaeological activity, a total of 22 objects were recovered from the non-secured context C1, topsoil and two objects from the upper fill (C36) of the post-medieval to modern field boundary C35. The assemblage in total consisted of three natural flint flakes, a fossil stone, 11 post-medieval pottery sherds, two metal fragments and five green glass modern bottle sherds.

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1 INTRODUCTION

1.1 General

This final archaeological report describes the results of the excavation carried out at the site of Cregganmacar 3 in the townland of Cregganmacar, Co. Westmeath (Figures 1 and 2) as part of an archaeological mitigation program associated with the N6 Phase 2: Kilbeggan to Athlone Dual Carriageway Scheme. Archaeological fieldwork was carried out under ministerial direction by Patricia Lynch of Irish Archaeological Consultancy Ltd (IAC Ltd) and was funded by WCC & NRA under the National Development Plan 2000–2006, 2007–2013 and the EU Structural fund.

Cregganmacar 3 was identified as a result of archaeological assessment undertaken by IAC Ltd. in August 2005 (Ministerial Direction No. A016/029; NMS Reg. No. E3273). All features identified during the assessment phase (burnt spread and probable furrow) were subsequently re-identified and the site was fully excavated during the full resolution phase of the project which took place between 8 and 27 February 2006 with a team of 1 director, 1 supervisor and 7 site assistants.

The site was located in pastureland at a height of between 67–70m OD to the south of the existing N6, c. 1km south of Moate (Westmeath OS sheet 036). Cregganmacar 3 had not been previously identified and was not a recorded monument.

The site was assigned the following identification data:

Site Name: Cregganmacar 3; Ministerial Direction No.: A016/040; NMS Registration No.: E2668; Route Chainage (Ch): 12250–90; NGR: 217310/237450 (Area A) and 217356/237512 (Area B).

1.2 Proposed Development

The proposed N6 Kinnegad–Athlone Scheme is to be constructed in two phases. The Phase 2 Kilbeggan–Athlone scheme will consist of a dual carriageway that will run for a distance of approximately 29km. The location of the route is predominantly to the south of the existing N6 and there will be access to the local road network through the seven grade separated junctions located at Athlone, Farnagh, Moate and Kilbeggan. The cross-section of the mainline consists of 2m wide verges, 2.5m wide hard shoulders, 7m wide two-lane carriageways and a 3m wide central reserve. This central reserve will accommodate 1m hard strips and a safety barrier. In addition to the mainline dual carriageway there is a further 0.3km of standard dual carriageway to the south of Athlone Interchange to connect to the existing N6 and 1.2km to the south of Kilbeggan Interchange to connect to the existing N52.

1.3 Archaeological Requirements

The archaeological requirements for the N6 Kilbeggan to Athlone Dual Carriageway Scheme, are outlined in the Ministerial Directions issued to Westmeath 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 Westmeath County Council and Irish Archaeological Consultancy Ltd. These instructions form the basis of all archaeological works undertaken for this development. The archaeological excavation works under this contract are located between the townlands of Kilbeggan South, Co. Westmeath and Creggan Lower, Co. Westmeath.

The proposed N6 was subjected to an Environmental Impact Assessment, the archaeology and cultural history section of which was carried out by Sheila Lane and Associates and presented in 2003. The Record of Monuments and Places, the Sites

and Monuments Record, Topographical files, aerial photography, the Westmeath Archaeological Urban Survey and literary sources were all consulted. One phase of geophysical survey was also conducted at selected sites along the proposed route by Target Archaeological Geophysics. As a result of the paper survey, field inspections and geophysical survey, a number of potential sites were recorded in proximity to this section of the overall route alignment.

Advance archaeological testing was completed by IAC Ltd and excavation of the sites identified during testing was conducted by IAC Ltd on behalf of Westmeath County Council.

1.4 Methodology

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

All 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 excavation. Where relevant features exhibiting large amounts of carbonised material were the primary targets.

In the instances where artefacts were uncovered on site they were dealt with in accordance with the guidelines as issued by the 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 2 Sigma.

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

2 EXCAVATION RESULTS

Detailed descriptions of contexts are listed in Appendix 1. The site matrix is detailed in Figure 7.

2.1 Phase 1: Natural Drift Geology

The dominant bedrock geology identified along the corridor of the proposed route are Lower Carboniferous rocks, mainly limestone lithologies, which overlay Devonian Old Red Sandstone rocks. Carboniferous volcanic rocks were also identified as being present locally in the form of sills passing through the bedrock sequences (Riada Consult, 2003). The underlying geology of the area is overlain by occasional moraines and small glacial hillocks covered by grey brown podzolic soils.

Two different types of subsoil were discovered above bedrock at Cregganmacar 3 (Figure 7). The subsoil C2 was encountered in Area A and consisted of loose orange/yellow sand/silt. The subsoil C58 was encountered in Area B and consisted of medium grey silty clay.

2.2 Phase 2: Middle Bronze Age Archaeological Activity (Area B)

2.2.1 Burnt Mound Material

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
6	N/A	8.5	7.5	0.24	Charcoal rich soil, heat shattered stones	Burnt mound deposit.
9	N/A	6.0	6.0	0.11	Peat, charcoal enriched soil, burnt stones	Burnt mound deposit.
34	N/A	4.2	3.0	0.15	Black/dark brown soil, charcoal	Re-deposited material

Finds: None

Interpretation:
This group of contexts represent the remains of individual layers of burnt mound material (heat fractured stone and charcoal rich clay). A total of three different deposits (C9, C6 and C34) were identified (Figures 5 and 7). Deposit C9 consisted of a mix of peat and burnt mound material, was identified as the earliest deposit having been sealed by C6 (Figure 6). This peaty layer probably formed as a result of the marshy conditions on the site and later became mixed with C6 consisting of the main bulk of the burnt mound material. The deposit C34 which overlay C6 was re-deposited material produced as a result of modern disturbance. Radiocarbon dating of a charcoal sample, identified as hazel (*Corylus* sp.) (O'Carroll, Appendix 2.5), from the deposit C6 produced a result of 3103+/-24 (UBA 9147) which was calibrated to a 2 Sigma date range of 1431–1313 BC dating it to the middle Bronze Age (QUB, Appendix 2.6).

Whilst originally these deposits would most likely have formed a mound type feature it was eventually spread flat as a result of later post-medieval to modern phases of agricultural activity on the site.

2.3 Phase 3: Late Bronze Age Archaeological Activity

A second phase of burnt mound activity was tentatively identified. This was defined by a possible re-use of the site in the late Bronze Age defined by the cutting of a trough (C38) through the burnt mound deposits described above.

2.3.1 Trough C38 and Associated Stakeholes

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
38	N/A	2.43	1.86	0.25	Sub-rectangular cut, flat base	Cut of trough
39	C38	2.43	1.86	0.25	Loose to moderate black soil, burnt stones	Fill of trough
40	N/A	0.2	0.25	0.4	Round feature with circular base	Cut of stakehole
41	C40	0.2	0.2	0.28	Grey/black silty clay, charcoal	Fill of stakehole
42	N/A	0.11	0.1	0.08	Circular cut, U-shaped base	Cut of stakehole
43	C40	0.12	0.1	0.13	Grey silty clay, charcoal and 10% pebbles	Basal fill of stakehole
44	N/A	0.08	0.07	0.12	Sub-oval cut, rounded base	Cut of stakehole
45	C44	0.08	0.07	0.12	Black/dark brown silty clay, burnt stone	Fill of stakehole
46	N/A	0.09	0.07	0.08	Circular cut, V-shaped base	Cut of stakehole
47	C46	0.09	0.07	0.08	Black/dark brown silty clay, burnt stone	Fill of stakehole
48	N/A	0.08	0.08	0.09	Circular cut, U-shaped base	Cut of stakehole
49	C48	0.08	0.08	0.09	Black/dark brown silty clay, burnt stone	Fill of stakehole
50	N/A	0.27	0.09	0.26	Rectangular cut, straight sides and flat base	Cut of plank slot
51	C50	0.27	0.09	0.26	Black soil with heat shattered stones	Fill of plank slot
54	N/A	0.06	0.06	0.09	Circular cut, steep sides, U-shaped base	Cut of stakehole
55	C54	0.06	0.06	0.09	Black/grey soil with heat shattered stones	Fill of stakehole
56	N/A	0.06	0.05	0.07	Circular cut, U-shaped base	Cut of stakehole
57	C56	0.06	0.05	0.07	Black/grey soil with heat shattered stones	Fill of stakehole
59	C42	0.11	0.1	0.08	Black/dark brown silty clay, burnt stone	Fill of stakehole

Finds: None

Interpretation:
This group of contexts represent the remains of a potential trough and associated stakeholes (Figures 5 and 7). The trough was cut through the burnt mound material detailed above in Section 2.2.1. The stakeholes (C40, C42, C44, C46, C48, C54 and C56) internally cut the base of C38 and may be evidence that the feature was lined, though no evidence of any actual lining was recovered (Plates 1–4). These stakeholes all contained similar fills comprising burnt mound-type material. Cut C50, located in the southwest corner, was different to the other stakeholes in that it was rectangular in shape and may have represented a partial plank slot rather than a stakehole. The trough structure itself was sub-rectangular with a flat base (Plate 4) and contained a single fill (C39), consisting of burnt mound type material containing significant amounts of fire-cracked stones (Figure 6; Plate 1). It is likely that this fill represents the latest phase of archaeological activity, or last 'use' of the trough. Radiocarbon dating of a charcoal sample, identified as alder (*Alnus* sp.) (O'Carroll, appendix 2.5), from this deposit produced a result of 2740+/-23 (UBA 9148) which was calibrated to a 2 Sigma date range of 928–825 BC placing it within the late Bronze Age (QUB, Appendix 2.6). A single fragment of un-identifiable burnt bone was recovered from C39 (total weight <0/1g) (Coughlan, Appendix 2.8).

2.3.2 Posthole C52

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
52	N/A	0.18	0.18	0.22	Circular feature with steep sides	Cut of posthole
53	C52	0.18	0.18	0.22	Firm black soil with heat shattered stones	Fill of posthole

Finds: None

Interpretation:
These contexts represent the remains of a posthole located to the southwest of trough C38. Its fill (C53) comprised burnt mound-type material, similar to the

stakeholes identified within C38. The function of this feature is unknown as there do not seem to be any further postholes in the immediate vicinity of it. However, due to its proximity to the possible trough C38 (Figure 5) and the similar nature of their fills, it is assumed that they are directly associated.

2.4 Phase 4: Iron Age Archaeological Activity (Area A)

2.4.1 Pit C3 with posthole C8 at base

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
3	N/A	0.9	1.0	0.18	Sub triangular cut	Cut of pit
4	C3	0.9	0.9	0.18	Light grey silty clay, decayed stone	Fill of pit
5	C3	0.1	0.12	0.15	Dark grey silty soil, charcoal	Fill of pit
7	C8	0.22	0.08	0.08	Loose brown/grey grit and sand mix	Fill of posthole
8	N/A	0.22	0.08	0.08	Straight-sided posthole with a flat base	Cut of posthole

Finds:

Context	Find Number	Material	Period	Description
C4	E2668: 4:1	Stone	Prehistoric	Fossil stone-non archaeological

Interpretation:
This group of contexts represent the remains of a sub-triangular pit and a centrally positioned, truncating posthole feature, located in Area A of the site (Figure 4; Plate 8). The pit contained two fills (C4 and C5) and whilst both fills were similar in composition C5 differed marginally in that it was rich in charcoal (Figure 6). A sample from C4, from charcoal identified as oak (*Quercus* sp.) (O'Carroll, appendix 2.5), produced a radiocarbon date of 2214+/-22 (UBA 9146) which gives a calibrated 2 Sigma date range of 372–203 BC dating it to the Iron Age (QUB, Appendix 2.6).

A large stone was identified as having been deliberately placed at the interface between C3 and C8 possibly acting as a pad stone. C8 itself was a circular feature containing a single fill (C7). Fill C7 differed markedly from the pit fills in that it was predominantly a mixture of sand and grit rather than a silty clay. The function of this pit and posthole feature is unknown as it occurs in almost complete isolation.

2.4.2 Deposit C19

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
19	N/A	0.7	0.68	0.05	Black silty sand, charcoal	Charcoal deposit

Finds: None

Interpretation:
This feature consisted of a charcoal deposit identified on the subsoil to the south of Pit C3 (Figure 4). It may be related to an episode of burning, though no evidence of *in situ* burning was identified during the excavation. This deposit and the charcoal rich fill of C3 (C5) may be associated. C5 appears to have formed while pit C3 was still open and may have originated with this deposit C19.

2.5 Phase 5: Post-Medieval to Modern Agricultural Activity

2.5.1 NW–SE Field Boundary C35

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
35	N/A	4.3	3.05	0.3	Linear cut, sharp sides and flat base	Cut of ditch/boundary
36	C35	4.3	3.05	0.25	Mid brown soil	Fill of ditch/boundary
37	C35	0.86	0.73	0.08	Mid-brown soil, modern inclusions	Basal fill of C35

Finds:

Context	Find Number	Material	Period	Description
C36	E2668:36:3	Stone	-	Fossil stone
C36	E2668:36:4	Metal	Modern	Nail stem: iron, bent, nail shank, square
C36	E2668:36:5	Flint	-	Water rolled pebble-non archaeological

Interpretation:
This group of contexts represent the remains of a modern, linear, northwest to southeast-aligned field boundary ditch containing a fills C36 and C37 (Figures 5 and 7; Plate 5). Both fills, consisting of mid-brown clay contained modern finds such as china pottery fragments. This boundary is of no archaeological significance but it does identify the latest phase of activity on site.

2.5.2 Area A Features-SW–NE Aligned Furrows

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
20	N/A	2.9	0.37	0.6	Linear cut, gradual sides and rounded base	Cut of furrow
21	C20	2.9	0.37	0.6	Mid/dark brown soil occasional pebbles	Fill of furrow
22	N/A	2.9	0.37	0.6	Linear cut, gradual sides and rounded base	Cut of furrow
23	C22	2.9	0.37	0.6	Orange/brown sandy silt, small stones	Fill of furrow
24	N/A	2.9	0.78	0.6	NE–SW orientated shallow cut	Cut of furrow
25	C24	2.9	0.78	0.6	Brown soil, pebble inclusion	Fill of furrow
26	N/A	7.9	0.55	0.11	Shallow linear cut with rounded base	Cut of furrow
27	C26	7.9	0.55	0.11	Mid/dark brown silty clay, pebbles	Fill of furrow
28	N/A	5.15	1.32	0.1	Shallow linear cut with rounded base	Cut of furrow
29	C28	5.15	1.32	0.1	Mid/dark brown silty clay, pebbles	Fill of furrow
30	N/A	6.42	0.97	0.9	Shallow linear cut with rounded base	Cut of furrow
31	C30	6.42	0.97	0.9	Mid/dark brown silty clay, pebbles	Fill of furrow
32	N/A	3.11	0.59	0.5	Shallow linear cut with rounded base	Cut of furrow
33	C32	3.11	0.59	0.5	Mid/dark brown silty clay, pebbles	Fill of furrow

Finds: None

Interpretation:
This group of contexts represent the remains of a collection of modern agricultural plough furrows identified in Area A (Figure 4). These furrows did not appear to truncate any of the known archaeological features on the site and as such are not of any particular archaeological significance. They represent the latest activity associated with this site.

2.5.3 Area B Features-EW Aligned Field Boundary and Furrows

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
10	N/A	17	0.5	0.2	'U' shaped cut of an agricultural furrow	Cut of Furrow
11	C10	17	0.5	0.2	Brown mix of burnt mound and topsoil	Fill of furrow

12	N/A	17	0.5	0.2	Linear cut concave base	Cut of furrow
13	C12	17	0.5	0.2	Loosely compacted brown/black soil	Fill of furrow
14	N/A	17	0.5	0.2	U-shaped cut concave base	Cut of furrow
15	C14	17	0.5	0.2	Brown silty clay and peat mix	Fill of furrow
16	N/A	17	1.8	0.48	Rectangular, steep sides and flat base	Cut of field boundary
17	C16	3.5	1.8	0.3	Loosely compacted brown clay/peat mix	Fill of field boundary
18	C16	3.5	1.5	0.28	Loosely compact medium brown silty clay	Fill of field boundary

Finds: None

Interpretation:
This group of contexts represent the remains of a collection of modern agricultural plough furrows and a field boundary ditch identified in Area B of the site (Figure 4). The furrows, aligned east to west, spanned the width of Area B. All of the fills were similar consisting of a mix of topsoil and burnt mound type material however this is to be expected as these furrows truncated the archaeological features in this area including the trough C38. The furrows and field boundary C16 (Figure 6) are of no archaeological significance but do represent the latest phase of activity associated with the site in general.

2.6 Phase 6: Topsoil

2.6.1 Topsoil

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
1	N/A	Site	Site	Site	Firmly compacted dark - mid brown topsoil	Topsoil

Finds:

Context	Find Number	Material	Period	Description
C1	E2668:1:1	Pottery	18thC	Transfer printed ware sherd
C1	E2668:1:2	Pottery	18thC	Transfer printed ware sherd
C1	E2668:1:3	Pottery	18thC	Mottled ware sherd
C1	E2668:1:4	Pottery	17thC to 18thC	Glazed red earthenware sherd
C1	E2668:1:5	Pottery	18thC to 19thC	Black glazed ware sherd
C1	E2668:1:6	Pottery	18thC	Pearlware sherd
C1	E2668:1:7	Pottery	18thC	Transfer printed ware sherd
C1	E2668:1:8	Pottery	18thC	Pearlware sherd
C1	E2668:1:9	Flint	N/A	Natural flake-non archaeological
C1	E2668:1:10	Flint	N/A	Natural flake-non archaeological
C1	E2668:1:11	Flint	N/A	Natural chunk-non archaeological
C1	E2668:1:12	Pottery	17thC to 18thC	Glazed red earthenware sherd
C1	E2668:1:13	Pottery	17thC to 18thC	Glazed red earthenware sherd
C1	E2668:1:14	Pottery	17thC to 18thC	Glazed red earthenware sherd
C1	E2668:1:16	Bone		
C1	E2668:1:17	Glass	Post-Medieval	Green glass bottle body sherd
C1	E2668:1:18	Glass	Post-Medieval	Green glass bottle body sherd
C1	E2668:1:19	Glass	Post-Medieval	Green glass bottle body sherd
C1	E2668:1:20	Glass	Post-Medieval	Green glass bottle body sherd
C1	E2668:1:21	Glass	Post-Medieval	Green glass bottle body sherd
C1	E2668:1:22	Metal	Post-Medieval	18thC fragment of cast iron vessel

Interpretation:
This group represents the topsoil that sealed all of the archaeological deposits and features at Cregganmacar 3 (Figure 7).

Animal bone, a single sample of possible cremated bone and a single sample of shell were all recovered from the topsoil. The animal bone sample consisted of five fragments from a single mandible of a species identified as sheep or goat. It was estimated that the animal had reached an age of six years plus before it died however any further conclusions about the assemblage were not possible due to the limited size of the sample (Lofqvist, Appendix 2.4).

The samples of possible cremated bone and shell were deemed insignificant in terms of their overall value in relation to the interpretation of the site due to their limited size and the fact they came from the latest, heavily disturbed, context (C1).

3 SYNTHESIS AND DISCUSSION

3.1 Landscape Setting

The new route of the N6 runs from south of Kilbeggan town to east of Athlone Co. Westmeath, crossing through the northern part of Co. Offaly for approximately 7.5km of its entire length. The landscape of this area is comprised of generally flat to undulating terrain. The underlying geology of the area is dominated by carboniferous limestone and is overlain by occasional glacial features such as moraines and eskers. The eskers dominate to the north and south of most of the route, with moraines featuring along parts of the western section toward Athlone. The soil cover varies considerably across the scheme, passing through soil complexes, grey brown podzols, boglands and alluvial deposits. The area is drained by the River Shannon through its tributaries, the Brosna, Boor, Cloghatanny and Gageborough rivers.

The site at Cregganmacar 3 was located 1.5km southwest of the town of Moate. Area A was located on the crest of a gently north sloping hill (70m OD), while the burnt activity in Area B was located at the base of the gently sloping hill (67m OD). The underlying geology of the area is carboniferous limestone, which is overlain by small glacial hillocks to the north. The site was located on the boarder between the Patrickswell/Baggotstown soil complexes and peat soils to the south. A small bog was situated 300m to the southeast of the site in Gorteen/Curries/Ballynamuddagh (6"OS map 1834–1842). Baltrasna Lough lies 550m northeast of the site. A small river 80m northeast would have provided the necessary water source for the functioning of the site.

3.2 Archaeological Landscape (Bronze Age and Iron Age)

Apart from the publication of archaeological inventories in some midland counties such as Offaly (O'Brien and Sweetman 1997), and peatland surveys by the Irish Archaeological Wetland Unit (Moloney *et al*. 1993) our knowledge of the prehistoric archaeology of the midlands is limited. There is no archaeological inventory for Co. Westmeath. We are reliant on data stored at the RMP (see Appendix 3) and information from a limited number of excavations within Westmeath and Offaly. This road scheme joins a number of recent large-scale commercially-driven archaeological excavations, most notably the gas pipeline to the west (Grogan *et al*. 2007) which runs mostly parallel a short distance to the north of the N6. While evidence for Iron Age settlement and activity remains relatively minor in this region the gas pipeline has been extremely informative for revealing a range of Bronze Age sites in south Westmeath, a county that has traditionally witnessed only minor scholarly research. These sites have proved to be similar to, although in smaller quantities, those in landscapes that have received more extensive attention, (Grogan *et al*. 2007, 24). Both the gas pipeline and excavations along the N6 have identified a wealth of domestic and burial evidence covering the early, middle and late parts of the Bronze Age period.

The Bronze Age

This area had been subject to a limited number of excavations of Bronze Age sites. The most important of these is Hencken's (1942) investigation at Ballinderry crannog II in the barony of Kilcoursey, Co. Offaly, which revealed a late Bronze Age settlement phase (see also Newman 1997 for a reappraisal of the archaeological evidence). However, this picture is quickly changing as a result of commercially-driven archaeology such as the gas pipeline to the west (Grogan *et al*. 2007) and excavations in advance of this road scheme.

The area immediately surrounding Kilbeggan contains direct evidence for a range of Bronze Age sites including barrows, cists and an early Bronze Age pit burial (Grogan

et al. 2007, 138, Figure. 6.6). The cists at Ardballymore (WM037-009) and Kilgaroan (WM037-010) are located in close proximity to a number of sites impacted by the N6 including those in the townlands of (moving east to west) Kilbeggan South, Tonaphort, Ballinderry Big, Kilgaroan, Ardballymore, Ballinderry Little, Correagh and Kilbeg. This is significant because sites within the majority of these townlands (except Ballinderry Little 1 which was not dated) have produced early to late Bronze Age evidence almost exclusively represented by burnt mounds or components of these.

Prior to the gas pipeline, a small number of excavations had occurred to the north and the northeast of the N6 including the cemetery sites at Knockast (Hencken and Movius 1934; Grogan 2004), Edmondstown (Mount and Hartnett 1993) and Ballybrennan, Barrettstown and Redmondstown (see Waddell 1990). Added to this is the crannog at Coolure, on Lough Derravaragh within the barony of Moycashel, which was the focus of archaeological survey, environmental investigation and artefactual and landscape research (O'Sullivan *et al*. 2007). The island was first occupied in c. 850 BC, during the late Bronze Age, and several late Bronze Age weapons and ornaments have been recovered nearby in the small bay (*ibid*.). The gas pipeline excavations have added considerably to our knowledge of the Bronze Age in this region and Grogan *et al*. (2007, 139) have identified three principal Bronze Age focal zones in –

- The valleys of the Brosna and Clodiagh rivers to the south and east of Kilbeggan.
- The hilly terrain around the Hill of Uisneach.
- The slightly elevated area around Edmondstown to the west of Killucan.

Before the gas pipeline and N6 excavations south Westmeath was considered a 'quiet' zone but a much more intensive Bronze Age landscape has emerged possibly related to the major Bronze Age centre at Knockast (*ibid*. 161). The pipeline revealed a dominance of Bronze Age archaeology mainly dating to the middle and late parts of the period. Settlement, for example, is indicated by the middle Bronze Age house at Knockdomny 3km northwest of Moate town (Hull 2006), and by a number of burnt mounds such as Ballynagarbry, directly to the west of Moate, and at Williamstown (Grogan *et al*. 2007, 139). The N6 traversed the latter townland and revealed a burnt spread dating to the late Bronze Age.

Important late Bronze Age settlements were uncovered in advance of the N6 including the possible house at Creggan Lower 1 and the house, boundary fences and pits at Tober. When added to the large rectangular late Bronze Age house at Ballinderry crannog II (Newman 1997 has since argued for the presence of a second rectangular Bronze Age structure) – identified as a thin black deposit which contained occupational debris and fragments of timbers and brushwoods and which produced many finds, mostly from the house, including pottery, knives, flesh-hooks, awls, rings, pins, beads and a variety of stone objects (Hencken 1942, 6–8) – it demonstrates how this was a well-settled and established region notably in the later part of the period. This interpretation is further reinforced by the large number of burnt mounds that were discovered along the N6 and some notable clusters within certain townlands, for example, at Cregganmacar, Burrow or Glennanummer and Kilbeg.

In Athlone, at the western edge of the scheme and close to Creggan Lower, an assortment of high-status Bronze Age artefacts – mainly dating to the middle and late periods – are well represented including, for example, a gold lunula, bronze flat axes and rapiers and later gold items such as bar torcs, penannular bracelets, dress

fasteners and ring money (Murtagh 2000, 9). The distribution of further high-status artefacts including the hoards from Ballinderry, Killulagh, Brockagh and Enniscoffey provide further evidence of a well settled Bronze Age landscape in this region (Eogan 1983; Grogan *et al.* 2007, 161). Both the pipeline and N6 excavations have demonstrated how quickly perceptions and knowledge of archaeological landscapes can change as new sites are revealed in areas previously thought to be mostly devoid of such

The Iron Age

Excavations along the gas pipeline produced a small number of Iron Age sites (Grogan *et al*. 2007, 6), but none within the midland counties. The Iron Age was better represented by a number of ironworking sites and the settlement/cemetery site of Johnstown 1, Co. Meath, discovered in advance of the M4 which traverses counties Westmeath, Meath and Kildare (Carlin, Clarke and Walsh 2008). The site of Kinnegad 2, within the barony of Farbill, Co. Westmeath, revealed ironworking features dating to the early, middle and later parts of the period (Carlin 2008, 2; table 1.1), while a small number of sites – mainly industrial-type features – in neighbouring County Meath were also dated to the Iron Age (*ibid*.). Survey and excavation of the midland bogs – mainly in Offaly but also Westmeath – have also revealed snippets of Iron Age activity. An Iron Age vessel, dating to 197 BC–AD 68, was recovered from Toar Bog, Co. Westmeath (Murray 2000), after initial survey (Irish Archaeological Wetland Unit 2000). The northern parts of Daingean Bog, within counties Offaly and Westmeath, revealed small deposits of brushwood and some roundwoods – one site was classified as a trackway – dating from the Iron Age onwards (McDermott 2001). To the south of Daingean, at Clonad Bog, a number of sites were discovered including three substantial trackways dating from the late Bronze Age/Iron Age (Moore *et al.* 2003). Finally, four Iron Age 'Y'-shaped pendants were uncovered in the same region at Ballykean Bog, as part of the peatland survey in Offaly, as well as an early medieval palisaded habitation site and 12 trackways (Moore *et al*. 2003). The most significant recently discovered Iron Age site in the region is at Coolure crannog on Lough Derravaragh in the barony of Moycashel (O'Sullivan et al. 2007). A substantial plank palisade was dendrochronologically dated to AD 402±9 years placing a secondary construction phase of the crannog at the end of the Iron Age, 1200 years after it was originally built. This is a rare example of a crannog dating to the late Iron Age/early medieval transitional phase as most lake dwellings have been dated to the late Bronze Age/early Iron Age – for example Ballinderry crannog No. II, Co. Offaly (Hencken 1942; Newman 2002), – or securely to the late sixth and early seventh centuries (*ibid*.).

The N6 has produced a small number of sites that can be dated to the late Bronze Age/early Iron Age transitional phase such as the burnt mound sites at Williamstown 2, Seeoge and Aghafin 1, some pits and postholes at Moyally 6 and a possible hearth at Ballinderry Big 2. A burnt spread at nearby Cregganmacar 1 was dated to 399–235 BC similar to the date that came from pit C3 at Cregganmacar 3. A figure-of-eight-shaped ironworking furnace was dated to the middle Iron Age at Moyally 2 and, finally, a ringditch was also dated to the same period at Cappydonnell Big. The N6 findings mirror the results from other excavations within the region, such as the M4 and gas pipeline, and throughout Ireland generally where only a small number of sites dating to the Iron Age were revealed.

The Bronze Age and Iron Age at Cregganmacar 3

Cregganmacar 3 (Area B) consisted of a layer of burnt and heat shattered stone that sealed a trough, which produced evidence for stakeholes in its base. The mound was dated to the middle Bronze Age. Parallels in terms of morphology and dating were apparent across the scheme. Located within the same townland, at Cregganmacar 1,

a burnt mound sealed a single pit and four postholes and produced a 2 Sigma calibrated date of 399–235 BC (Lynch 2009a). At Cregganmacar 2, a burnt spread sealed one trough while another trough, to the northeast of the site had four postholes (Lynch 2009b). A pit, directly north of the burnt spread and with a similar fill, returned a 2 Sigma date range of 912–822 BC (UBA 9160) placing it in the late Bronze Age. A burnt spread was also excavated in this townland at Cregganmacar 4 although no trough was located. It was dated to the early Bronze Age (Lynch 2009c).

Four sites were uncovered in Cregganmacar that were similar in form; they were comprised of burnt mounds or spreads, mostly sealing trough-like features which occasionally contained postholes. Evidence from the AMS dating indicates that none were contemporary and it illustrates how elements of this pyrolithic technology remained the same across thousands of years.

Apart from the Cregganmacar examples, a number of other burnt mound sites were identified along the route of the N6 between Athlone and Kinnegad with troughs associated with postholes or stakeholes indicating that they were lined in some fashion. Approximately 10km to the west at Williamstown 2, for example, stakeholes were associated with both troughs located beneath the burnt mound and both features returned late Bronze Age dates (Lyne 2009a). At Aghafin 1, approximately 7km to the west, two stakeholes were identified in the base of one trough and the burnt mound was dated to the late Bronze Age/early Iron Age transitional period (Lynch 2009d).

The presence of stake or postholes within troughs is relatively common and indicates that a lining (probably timber or even leather) was present. More complete examples with timber lining were excavated along the gas pipeline to the west, where seven troughs had stakeholes or *in-situ* pegs present while a further five contained *in-situ* timber lining (Grogan *et al* 2007, 85).

The vast majority of dated burnt mound sites appear to be from the middle to late Bronze Age period (Brindley *et al* 1989−90; Corlett 1997). However, dates ranging from the, late Neolithic (Grogan *et al* 2007, 87) to the medieval periods (Walsh 1990, 47), are known so the Iron Age date at Cregganmacar 1 is not unusual. Indeed a small number of other burnt mound sites on the N6 have been dated to the transitional Bronze Age/early Iron Age including Seeoge (Lyne 2009b) and Aghafin 1 (Lynch 2009d).

The burnt mound site at Cregganmacar 1 is paralleled by a number of similar sites that were revealed along the N6 between Kilbeggan and Athlone. Apart from Cregganmacar other notable clusters of burnt mound sites occurred also at Williamstown, Seeoge, Burrow or Glennanummer and Kilbeg. This clustering of sites has also been identified at excavations elsewhere in Westmeath including Newtown (Stevens 2004a, 2004b, 2004c) and Enniscoffey/Caran (Molloy 2007a, 2007b, 2007c 341–2). Archaeological investigation on the section of the N6 to the east of Kilbeggan has also uncovered a range of burnt mound sites, including Stonehousefarm 6.1 and 6.2 (McDermott 2004).

3.3 Archaeological Typology Background (Burnt Mounds)

Burnt mound sites 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 7000 burnt mound sites and in excess of 1000 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 being forthcoming.

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

Ó Néill (2003–2004, 82) has aptly identified these sites as the apparatus and by-product of pyrolithic technology. This technology involved the heating or boiling of water by placing fire-heated stones into troughs of water. Small shallow round-bottomed pits, generally referred to as pot boiler pits or roasting pits, are often associated with burnt mound sites. The purpose of these pits remains unclear. Occasionally large pits are also identified and may have acted as wells or cisterns. Linear gullies may extend across the site, often linked to troughs and pits, and demonstrate a concern with onsite water management. Post and stakeholes are often found on burnt mound sites and these may represent the remains of small structures or wind breakers.

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

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

3.4 Discussion

Three main phases of archaeological activity were identified at Cregganmacar 3, a middle Bronze Age burnt mound, a later trough insertion dating to the late Bronze Age and an isolated Iron Age posthole. The specific archaeological context of the site and its phases are described in detail below.

3.4.1 Phase 1: Natural Deposits

This phase represents the natural subsoil, which was cut or sealed by all subsequent archaeological features (Figure 7). For the purposes of recording on-site this phase of activity was allocated the context numbers C2 and C58. The subsoil (C2) was encountered in Area A and consisted of loose orange to yellow sandy silt. The subsoil (C58) was encountered in Area B and consisted of predominantly of medium

grey silty clay.

3.4.2 Phase 2: Middle Bronze Age Archaeological Activity

Phase 2 represents the remains of features uncovered that are associated with the primary phase of activity on-site. A single burnt mound feature consisting of three deposits (C9, C6 and C34) was identified as belonging to this phase (Figure 6).

Deposit C9, consisting of a mix of peat and burnt mound material was identified as the earliest deposit and was sealed by C6. This peaty layer probably formed as a result of the marshy conditions on the site and later became mixed with C6 consisting of the main bulk of the burnt mound material. The deposit C34 which overlay C6 was re-deposited material produced as a result of modern disturbances.

Radiocarbon dating of a charcoal sample, identified as hazel (*Corylus avellana*) (O'Carroll, Appendix 2.5), from the deposit C6 produced a result of 3103+/-24 (UBA 9147) which was calibrated to a 2 Sigma date range of 1431–1313 BC placing it within the middle Bronze Age (QUB, Appendix 2.6). Other woods identified in this charcoal sample were alder (*Alnus glutinosa*.), oak (*Quercus* sp.), ash (*Fraxinus excelsior*), blackthorn (*Prunus* sp.), willow (*Salix* sp.) and holly (*Ilex* sp.) (O'Carroll, Appendix 2.5). This dating evidence places this feature in a phase of activity c. 400 years earlier than the main trough C38 (Cf. Section 3.4.3, Figure 6). This would suggest that the building up of the burnt mound material associated with this deposit happened in correlation with a different, un-identified, trough which may exist outside the limit of excavation.

3.4.3 Phase 3: Late Bronze Age Archaeological Activity

Phase 3 represents the remains of features uncovered that are associated with the secondary phase of activity on-site (Figure 7). A total of 10 features were identified consisting of a trough dating to the later Bronze Age and eight associated stakeholes and an isolated posthole.

The trough structure (C38) was sub-rectangular in plan with a flat base and contained a single fill (C39) consisting of burnt mound material containing significant amounts of fire-cracked stones (Figures 5 and 6). It is likely that this fill represents the latest phase of archaeological activity in relation to this feature associated with the abandonment of the site. Radiocarbon dating of a charcoal sample, identified as alder (*Alnus glutinosa*) (O'Carroll, Appendix 2.5), from deposit C39 produced a result of 2740+/-23 (UBA 9148) which was calibrated to a 2 Sigma date range of 928–825 BC placing it within the late Bronze Age (QUB, Appendix 2.6). Other wood types identified in this sample were oak (*Quercus* sp), ash (*Fraxinus excelsior*), blackthorn (*Prunus* sp.), hazel (*Corylus avellana*), willow (*Salix* sp.) and pomoideae (O'Carroll, Appendix 2.5).

The eight associated stakeholes (C40, C42, C44, C46, C48, C54 and C56) cut the base of trough C38 and may be evidence that the feature was lined, though no evidence of any actual lining was recovered (Figure 5). These stakeholes all contained similar fills comprising burnt mound material. Feature C50, located in the southwest corner, was different to the other stakeholes in that it was rectangular in shape and may have represented a partial plank slot rather than a stakehole.

The isolated posthole (C52) located to the south of trough C38 contained a single fill (C53) consisting of burnt mound material, similar to the stakeholes identified within C38. The function of this feature is unknown, as there do not seem to be any further postholes in the immediate vicinity of it. However, due to its proximity to the possible

trough C38 and the similar nature of their fills, it is assumed that they are directly associated in some way.

A small sample of stone form the burnt mound was analysed by Stephen Mandal (Mandal, Appendix 2.7). The stone form this burnt mound was decayed limestone which would have been sourced locally as it was abundant within the local geological landscape.

The environmental evidence from the charcoal identifications (O'Carroll, Appendix 2.5) suggests that alder was the dominant species of tree in the area during the Bronze Age perhaps with an oak-hazel woodland surrounding the sites during the late Bronze Age period. Ash, *Prunus* sp. (blackthorn/cherry), pomoideae, holly and large fragment counts of alder as well as the presence of willow and birch indicates an area of wetland close by to the site during the late Bronze Age.

3.4.4 Phase 4: Iron Age Archaeological Activity

In Area A of the site the remains of a sub-triangular pit (C3) was identified with a centrally positioned posthole feature (C8). The pit contained two fills (C4 and C5) and whilst both fills were similar in composition C5 differed marginally in that it was rich in charcoal. A sample from C4, from charcoal identified as oak (*Quercu*s sp.) (O'Carroll, Appendix 2.5), produced a date of 2214+/-22 (UBA 9146) which gives a calibrated 2 Sigma date range of 372–203 BC placing it within an Iron Age context (QUB, Appendix 2.6). A large stone was identified as having been deliberately placed at the interface between C3 and C8 possibly acting as a pad stone. C8 itself was a circular feature containing a single fill (C7). C7 differed markedly from the pit fills, in that it was predominantly a mixture of sand and grit rather than silty clay. The function of this pit and posthole feature is unknown as it occurs in almost complete isolation, however it may have supported a single upright post c. 0.2m diameter. This could tentatively be interpreted as a posthole cut for a free-standing pole such as a totem.

A singular charcoal deposit (C19) was identified on the subsoil to the south of Pit C3. It may be related to an episode of burning, though no evidence of *in situ* burning was identified during the excavation. This deposit and the charcoal rich fill of C3 (C5) may be associated. C5 appears to have formed while pit C3 was still open and may have originated with deposit C19.

3.4.5 Phase 5: Post-Medieval and Modern Agricultural Activity

Phase 5 represents the remains of features interpreted as being related to modern agricultural activity on the site consisting of a linear field boundary ditch, seven northwest to southeast aligned plough furrows in Area A and three east to west aligned plough furrows in Area B (Figures 4, 5 and 7). These features are not archaeological in nature but are useful in helping to determine the sequencing of archaeological events on-site. This is evident in how the plough furrows identified in Area B truncated the archaeological features in this area including the trough C38.

Three artefacts were recovered from deposit C36 in field boundary ditch C35. These were a fossil, a piece of metal believed to be the shaft of a nail (Johnson, Appendix 2.3) and an unworked flint pebble (Sternke, Appendix 2.1).

3.4.6 Phase 6: Topsoil

This phase represents the topsoil that sealed all of the archaeological deposits and features on site (Figure 7).

Whilst there were no artefacts recovered from features within either of the identified phases of archaeological activity, a total of 22 objects were recovered from the non-

secured context (C1), topsoil. The assemblage in total consisted of three possible flints, 11 post-medieval pottery sherds, a metal fragments and five glass sherds. The three flint objects, originally thought to be worked, were identified as naturally occurring heavily water-rolled flakes derived from flint pebbles and as such were non archaeological in nature (Sternke, Appendix 2.1). Upon specialist examination it was identified that the 11 post-medieval sherds of pottery consisted of four glazed red earthenware sherds datable broadly to the 17th and 18th centuries, one sherd of mottled ware, two sherds of transfer printed ware and two sherds of pearlware datable to the 18th century and a single sherd of black glazed ware datable broadly to the 18th and 19th centuries (McCutcheon, Appendix 2.2). The metal object was a fragment of iron vessel. This was not considered to be archaeological significant. The five glass sherds were identified as being green glass bottle sherds broadly datable to the post-medieval phase and are of no archaeological significance (Johnson, Appendix 2.3).

In terms of ecofacts the excavations produced animal bone, and a single sample of shell all from the non-secured context C1, topsoil. The animal bone consisted of five fragments from a single mandible of a species identified as sheep or goat. It was estimated that the animal had reached an age of 6 years plus before it died however any further conclusions about the assemblage were not possible due to the limited amount of bone found (Lofqvist, Appendix 2.4). The samples of possible cremated bone and shell were deemed insignificant in terms of their overall value in relation to the interpretation of the site due to their limited size and the fact they came from the latest, heavily disturbed, context C1.

4 CONCLUSIONS

Three main phases of archaeological activity were identified at Cregganmacar 3 (middle, late Bronze Age and Iron Age) within two distinct excavation areas (Area A and B).

Area B of Cregganmacar 3 consisted of the remains of a site type classically known as a burnt mound site. The majority of burnt mound sites are datable to the Bronze Age (c. 2500–c. 700 BC). In its simplest form evidence for this site type usually consists of a trough and burnt mound although sometimes one exists without the other and often there are associated miscellaneous features such as postholes or isolated pits. Area A consisted of a pit, posthole and charcoal rich deposit. The posthole dated to the Iron Age.

From the excavated evidence at Cregganmacar the site may have been in use periodically over an extended period of time. Three broad phases of archaeological activity, a middle Bronze Age phase and a late Bronze Age phase associated with a burnt mound in Area B, and an Iron Age phase in Area A.

Whilst the first two phases of this site were dated to the Bronze Age it should be noted that there was a difference of at least 385 years between the returned calibrated dates. As the samples dated were of species considered to be very reliable in terms of accuracy for radiocarbon dating this would seem to be suggesting that this site was in use over a significant period of time. It is possible that this was a seasonal site.

In Area A an Iron Age phase was identified by a triangular shaped pit, with a calibrated 2 Sigma date range of 372–203 BC in addition to this an associated posthole and an isolated deposit were also identified. The date returned from this is similar to that returned from a burnt spread at nearby Cregganmacar 1 which was dated to 399–235 BC (Lynch 2009a). This is strong evidence of Iron Age activity in the area.

In terms of charcoal from the Bronze Age phases of the site alder was the dominant taxon identified from the assemblage. The results also suggest that there may have been oak-hazel woodlands surrounding the sites during the late Bronze Age period at Cregganmacar 3. Other dryland taxa present in the area in lesser quantities were ash, *Prunus* sp (blackthorn/cherry), pomoideae and holly. Large fragment counts of alder as well as the presence of willow and birch indicates an area of wetland close by to the site during the late Bronze Age (O'Carroll, Appendix 2.5).

Oak (*Quercus* sp.) was the only charcoal found in C4 and C5 the fills of Iron Age pit C3.

A post-medieval to modern phase of activity was also identified consisting of a northwest to southeast aligned field boundary ditch, seven southwest to northeast aligned furrows in Area A and three east to west aligned furrows in Area B.

5 BIBLIOGRAPHY

5.1 References

Barfield, L and Hodder, M 1987 Burnt mounds as saunas, and the prehistory of bathing, *Antiquity* **61**, 370–379.

Brindley, A L Lanting, J N & Mook, W G 1989−90 Radiocarbon dates from Irish fulachta fiadh and other burnt mounds. *Journal of Irish Archaeology* **5**, 25−33.

Carlin, N 2008 The landscape of the M4. In N. Carlin, L Clarke and F Walsh, *The Archaeology of Life and Death on the Boyne Floodplain: The Linear Landscape of the M4*, 1–10, Dublin, National Roads Authority, Wordwell.

Carlin, N Clarke, L and Walsh, F 2008 *The Archaeology of Life and Death on the Boyne Floodplain: The Linear Landscape of the M4*. Dublin, National Roads Authority, Wordwell.

Corlett, C 1997 A fulacht fiadh site at Moynagh Lough, County Meath, *Ríocht na Mídhe* **9** (3), 46−49.

DAHGI (1999a) *Framework & Principles for the Protection of Archaeological Heritage*. Department of Arts, Heritage, Gaeltacht and the Islands.

Eogan, G 1983 *Hoards of the Irish Late Bronze Age*. University College, Dublin.

Grogan, E 2004 Middle Bronze Age burial traditions in Ireland. In H Roche, E Grogan, J Bradley, J Coles and B Raftery (eds), *From Megaliths to Metals: Essays in Honour of George Eogan*, 61–71. Oxford, Oxbow.

Grogan, E O' Donnell, L and Johnstown, P 2007 *The Bronze Age Landscapes of the Pipeline to the West*. Wordwell, Bray.

Hencken, H 1942 Ballinderry crannóg no. 2, *Proceedings of the Royal Irish Academy* **47**C, 1–76.

Hencken, H and Movius, H L 1934 The cemetery cairn at Knockast, *Proceedings of the Royal Irish Academy* **41**C, 232–84.

Hull, G 2006 Excavation of a Bronze Age round-house at Knockdomny, Co. Westmeath, *Journal of Irish Archaeology* **15**, 1–14.

IAC Ltd 2005 *N6 Kinnegad-Athlone Scheme Phase 2: Kilbeggan to Athlone Dual Carriageway: Archaeological Assessment.* Unpublished report.

Jeffrey, S 1991 Burnt mounds, fulling and early textiles? In M. Hodder and L. Barfield (eds), *Burnt mounds and hot stone technology*. Sandwell Metropolitan Borough Council, 97–102.

Lawless, C 1990 A Fulact Fiadh Bronze Age cooking experiment at Turlough, Castlebar, *Cathair na Mart* **10**, 1–10.

Lucas, A T 1965 Washing and bathing in ancient Ireland, *JRSAI* **96**, 65–114.

Lynch, P 2009a *Site A016/038 Cregganmacar 1. Final Report*. Unpublished report prepared for Irish Archaeological Consultancy Ltd.

Lynch, P 2009b *Site A016/039 Cregganmacar 2. Final Report*. Unpublished report prepared for Irish Archaeological Consultancy Ltd.

Lynch, P 2009c *Site A016/085 Cregganmacar 4. Final Report*. Unpublished report prepared for Irish Archaeological Consultancy Ltd.

Lynch, P 2009d *Site A016/037 Aghafin 1. Final Report.* Unpublished report prepared for Irish Archaeological Consultancy Ltd.

Lyne, E 2009a *Site A016/086 Williamstown 2. Final Report*. Unpublished report prepared for Irish Archaeological Consultancy Ltd.

Lyne, E 2009b *Site A016/007 Seeoge 2. Final Report*. Unpublished report prepared for Irish Archaeological Consultancy Ltd.

McClatchie, M Brewer, A Dillon, M Johnston, P Lyons, S Monk, M Stewart, K and S Timpany 2007 Brewing and *fulachta fiadh*. *Archaeology Ireland* **21** (4), 46.

Molloy, B 2007a Enniscoffey/Caran, Co. Westmeath, burnt mound, E Grogan, L O'Donnell and P Johnston *The Bronze Age Landscapes of the Pipeline to the West*, 341. Bray. Margaret Gowen and Co. Ltd. and Wordwell.

Molloy, B 2007b Enniscoffey/Caran, Co. Westmeath, *fulacht fiadh*, E Grogan, L O'Donnell and P. Johnston *The Bronze Age Landscapes of the Pipeline to the West*, 341. Bray. Margaret Gowen and Co. Ltd. and Wordwell.

Molloy, B 2007c Enniscoffey/Caran, Co. Westmeath, *fulacht fiadh*, E Grogan, L O'Donnell and P. Johnston *The Bronze Age Landscapes of the Pipeline to the West*, 342. Bray. Margaret Gowen and Co. Ltd. and Wordwell.

Moloney, A Jennings, D Keane, M and McDermott, C 1993 *Excavations at Clonfinlough, Co. Offaly.* Irish Archaeological Wetland Unit Transactions 2. Dublin, Irish Archaeological Wetland Unit.

Moore, C Murray, C Stanley, M & McDermott, C 2003 'Bogland surveys in Ireland: forty shades of brown' In: J. Fenwick (eds). *Lost and Found: discovering Ireland's past*. Bray: Wordwell.

Mount, C and Hartnett, P J 1993 Early Bronze Age cemetery at Edmondstown, Co. Dublin, *Proceedings of the Royal Irish Academy* **93**C, 21–79.

Murtagh, H 2000 *Athlone History and Settlement to 1800*. Athlone, Old Athlone Society.

Newman, C 1997 Ballinderry crannóg No. 2, Co. Offaly: the later Bronze Age, *Journal of Irish Archaeology* **8**, 91–100.

Newman, C 2002 'Ballinderry crannog No. 2, Co. Offaly: Pre-crannog early medieval horizon', *Journal of Irish Archaeology* **11**, 99–123.

NRA (2003) *Archaeological Guidelines for Reporting on Constraint, Route Selection, Environmental Impact Assessment on Archaeological Aspects of NRA Road Schemes*. Draft Consultation Document. National Roads Authority.

O'Brien, C and Sweetman, D 1997 *Archaeological Inventory of Co. Offaly*. Dublin, The Stationary Office.

O' Drisceoil, D A 1988 Burnt mounds: cooking or bathing, *Antiquity* **62**, 671–680.

O' Kelly, M J 1954 Excavations and experiments in ancient Irish cooking-places, *JRSAI* **84**, 105–155.

Ó Néill, J 2003−2004 Lapidibus in igne calefactis coquebatur: The historical burnt mound tradition, *The Journal of Irish Archaeology* 12–13, 79−85.

O'Sullivan, A Sands, R and Kelly, E P 2007 *Coolure Demesne Crannog, Lough Derravaragh: An Introduction to its Archaeology and Landscapes*. Bray, Wordwell.

Power, D *et al*. 1997 *Archaeological inventory of County Cork. Volume 3: Mid Cork,* The Office of Public Works, Dublin.

Quinn, B and Moore, D 2007 Ale, brewing and *fulachta fiadh*, *Archaeology Ireland* **21** (3) 8–10.

Riada Consult, Westmeath County Council 2003 *N6 Kinnegad to Athlone Dual Carriageway Environmental Impact Statement.*

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

Walsh, C 1990 A Medieval Cooking Trough from Peter Street, Waterford *in* Buckley, V (ed.), *Burnt Offerings: International Contributions to Burnt Mound Archaeology*, 47–48. Dublin, Wordwell.

5.2 Other Sources

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

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

Cartographic References

Ordnance Survey Map, scale 1:10560, 1842

Electronic Resources

Irish Archaeological Wetland Unit 2000 Irish Archaeological Wetland Unit fieldwork 2000, counties Westmeath and Offaly (Licence Ref.: Various).
http://excavations.ie/Pages/Details.php?Year=&County=Westmeath&id=5381

McDermott, C 2004 Stonehousefarm 6.1 and 6.2, Co. Westmeath: *Fulachta fiadh*.
http://excavations.ie/Pages/Details.php?Year=&County=Westmeath&id=12708

McDermott, C 2001 Daingean Bog (Ballylennon/Barnaboy/Rathdrum), Peatland survey, Co. Offaly.
http://excavations.ie/Pages/Details.php?Year=&County=Offaly&id=7040

Murray, C 2000 Pallasboy, Co. Westmeath, Iron Age wooden vessel. (Licence Ref.: 00E0536).
http://excavations.ie/Pages/Details.php?Year=&County=Westmeath&id=5309

Stevens, P 2004a Newtown 1, Co. Westmeath, *fulacht fiadh*. (Licence Ref.: 04E0689)
http://excavations.ie/Pages/Details.php?Year=&County=Westmeath&id=12694

Stevens, P 2004b Newtown 2, Co. Westmeath, *fulacht fiadh*. (Licence Ref.: 04E0690)
http://excavations.ie/Pages/Details.php?Year=&County=Westmeath&id=12693

Stevens, P 2004c Newtown 3, Co. Westmeath, *fulacht fiadh*. (Licence Ref.: 04E0691)
http://excavations.ie/Pages/Details.php?Year=&County=Westmeath&id=12695

PLATES

Plate 1: E2668: Possible trough/structure C38 (Area B), mid-excavation, facing northwest

Plate 2: E2668: Postholes C40 and C42 (Area B), post-excavation, facing northwest

Plate 3: E2668: Postholes C42, C44, C46 and C48 (Area B), post-excavation, facing northwest

Plate 4: E2668: Possible trough/structure C38 (Area B), post-excavation, facing southeast

Plate 5: E2668: Possible field boundary C35 (Area B), mid-excavation, facing north

Plate 6: E2668: Field boundary C16 (Area B), mid-excavation, facing west

Plate 7: E2668: Post-excavation of Area B, facing northwest

Plate 8: E2668: C3 (Area A), post-excavation, facing south

Plate 9: E2668: Post-excavation of Area A, facing west

APPENDIX 1 CATALOGUE OF PRIMARY DATA

Appendix 1.1 Context Register

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Finds
1	N/A	N/A	N/A	N/A	Topsoil	Firmly compacted dark-mid brown topsoil.	Modern pottery, flint, bone, glass, iron object.
2	N/A	N/A	N/A	N/A	Subsoil	Loose orange/yellow sand/silt.	N/A
3	N/A	0.9	1.0	0.18	Pit with posthole at base.	Sub triangular pit with posthole at the base.	N/A
4	C3	0.9	0.9	0.18	Fill of pit.	Very compact light grey silty clay that contained occasional inclusions of decayed stone.	Stone with fossils
5	C3	0.1	0.12	0.15	Fill of pit.	Small deposit abutting C4. Consisted of a dark grey silty soil that contains 50% charcoal inclusions.	N/A
6	N/A	8.5	7.5	0.02 - 0.24	Burnt mound.	Irregular sub crescent spread of burnt mound material consisting of charcoal enriched soil, containing 10% heat shattered stones.	N/A
7	C8	0.22	0.08	0.08	Fill of posthole.	Loose brown/grey grit and sand mix that contained 10% pebbles.	N/A
8	N/A	0.22	0.08	0.08	Cut of posthole.	Straight sided posthole with a flat base. This was cut into the base of C3. A large stone was placed in the interface of C3 & C8.	N/A
9	N/A	6.0	6.0	0.01 - 0.11	Mix of burnt mound material and peat underlying C6.	Irregular sub crescent spread of burnt mound material consisting of a mix of peat and charcoal enriched soil, containing 50% heat shattered stones.	N/A
10	N/A	17.0	0.5	0.2	Furrow cut.	'U' shaped cut of an agricultural furrow.	N/A
11	C10	17.0	0.5	0.2	Fill of furrow.	Fill of furrow consisting of a loose brown/back mix of burnt mound material and topsoil.	N/A
12	C13	17.0	0.5	0.2	Cut of furrow.	Linear feature with graduated sides and concave base.	N/A
13	C12	17.0	0.5	0.2	Fill of furrow.	Loosely compacted brown/black soil.	N/A
14	N/A	17.0	0.5	0.2	Cut of furrow.	U-shaped feature with gradual sides and concave base.	N/A
15	C14	17.0	0.5	0.2	Fill of furrow.	Loosely compacted brown/black silty clay and peat mix.	N/A
16	N/A	17.0	1.8	0.48	Cut of modern field boundary.	Rectangular feature with steep sides and flat base.	N/A
17	C16	3.5	1.8	0.3	Fill of field boundary.	Loosely compacted clay and peat mix. Dark to medium brown. Less then 20% stone inclusion.	N/A
18	C16	3.5	1.5	0.28	Backfill from when the field boundary was removed.	Loosely compacted medium brown silty clay. Less than 20% stone inclusions.	N/A

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Finds
19	N/A	0.7	0.68	0.05	Charcoal deposit on subsoil.	Round feature with loose black silty sand, frequent charcoal, and occasional small stone inclusions.	N/A
20	N/A	2.9	0.37	0.6	Cut of possible furrow.	Linear feature with graduated sides and rounded base.	N/A
21	C20	2.9	0.37	0.6	Fill of furrow.	Moderate to loose mid/dark brown soil with occasional pebble inclusion.	N/A
22	N/A	2.9	0.37	0.6	Cut of furrow.	Linear feature with graduated sides and rounded base.	N/A
23	C22	2.9	0.37	0.6	Fill of furrow.	Lightly compacted orange/brown sandy silt with small stone inclusions.	N/A
24	N/A	2.9	0.15-0.78	0.6	Cut of furrow.	NE–SW orientated shallow cut.	N/A
25	C24	2.9	0.78	0.6	Fill of furrow.	Loose light brown soil with 10% pebble inclusions.	N/A
26	N/A	7.9	0.55	0.11	Cut of furrow.	Shallow linear feature with rounded base.	N/A
27	C26	7.9	0.55	0.11	Fill of furrow.	Loose to moderately compacted mid/dark brown silty clay with 10% pebble inclusion.	N/A
28	N/A	5.15	1.32	0.1	Cut of furrow.	Shallow linear feature with rounded base.	N/A
29	C28	5.15	1.32	0.1	Fill of furrow.	Loosely compacted mid/dark brown soil with moderate pebbles.	N/A
30	N/A	6.42	0.97	0.9	Cut of furrow.	Shallow linear feature with rounded base.	N/A
31	C30	6.42	0.97	0.9	Fill of furrow.	Moderately compacted mid/dark brown soil with 10% pebble inclusions.	N/A
32	N/A	3.11	0.59	0.5	Cut of furrow.	Shallow linear feature with rounded base.	N/A
33	C32	3.11	0.59	0.5	Fill of furrow.	Loosely compacted dark brown/grey soil with 1% burnt stone inclusions.	N/A
34	N/A	4.2	3.0	0.15	Re-deposited burnt mound material.	Loosely compacted black to dark brown soil. Inclusions: charcoal 50%, stones <20%.	N/A
35	N/A	4.3	3.05	0.3	Cut of ditch/boundary.	Linear feature with sharp sides and flat base.	N/A
36	C35	4.3	3.05	0.25	Upper fill of modern feature. Mix of topsoil and subsoil. Unknown function. Area prone to flooding.	Moderate compaction, mid brown soil. 5% pebble inclusion. Modern china.	Modern pottery Brick Iron nail
37	C35	0.86	0.73	0.08	Lower fill of ditch/boundary. Feature of unknown function, possibly a dump.	Moderately compacted, mid-brown soil with some modern inclusions.	N/A
38	N/A	2.43	1.86	1.25	Possible trough/structure associated with the burnt mound? There are a number of postholes within.	Sub-rectangular feature with sharp sides and flat base.	N/A

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Finds
39	C38	2.43	1.86	0.25	Fill of C38.	Loose to moderate black soil with 50% inclusions of fire cracked stones.	N/A
40	N/A	0.2	0.25	0.4	Posthole within C38.	Round feature with circular base.	N/A
41	C40	0.20	0.2	0.28	Fill of posthole.	Loose to medium compacted grey/black silty clay. Inclusions: charcoal 10%, pebbles 10%	N/A
42	C39	0.11	0.1	0.08	Posthole cutting into C38.	Circular feature with steep sides and U-shaped base.	N/A
43	C40	0.12	0.1	0.13	Fill of the lower part of C40.	Loose to moderately compacted grey silty clay. Inclusions of 10% charcoal and 10% pebbles.	N/A
44	N/A	0.08	0.07	0.12	Posthole within C38.	Sub-oval feature with steep sides and a rounded base.	N/A
45	C44	0.08	0.07	0.12	Fill of posthole.	Loosely compacted black/dark brown silty clay with <20% inclusion of heat affected stones.	N/A
46	N/A	0.09	0.07	0.08	Stake hole within C38.	Circular feature with steep sides and a V-shaped base.	N/A
47	C46	0.09	0.07	0.08	Fill of stakehole.	Loosely compacted black/dark brown silty clay with <20% inclusion of heat affected stones.	N/A
48	N/A	0.08	0.08	0.09	Stake hole within C38.	Circular feature with steep sides and a U-shaped base.	N/A
49	C48	0.08	0.08	0.09	Fill of stake hole.	Loosely compacted black/dark brown silty clay with <20% inclusion of heat affected stones.	N/A
50	N/A	0.27	0.09	0.26	Rectangular posthole/slot associated with other postholes.	Rectangular feature with straight sides and flat base.	N/A
51	C50	0.27	0.09	0.26	Fill of posthole.	Loosely compacted black soil with heat shattered stones.	N/A
52	N/A	0.18	0.18	0.22	Cut of posthole.	Circular feature with steep sides.	N/A
53	C52	0.18	0.18	0.22	Fill of posthole.	Compact black soil with heat shattered stones.	N/A
54	N/A	0.06	0.06	0.09	Cut of posthole.	Circular feature with steep sides and a U-shaped base.	N/A
55	C54	0.06	0.06	0.09	Circular posthole filled with burnt mound material. Part of possible structure surrounding the trough?	Loosely compacted black/grey soil with heat shattered stones.	N/A
56	N/A	0.06	0.05	0.07	Cut of possible post/stake hole. Part of possible structure surrounding the trough?	Circular feature with graduated sides and U-shaped base.	N/A
57	C56	0.06	0.05	0.07	Fill of possible stakehole. Part of possible structure surrounding the trough?	Loose to moderately compacted black/grey silty clay with <15% heat shattered stone inclusions.	N/A
58	N/A	N/A	N/A	N/A	Subsoil.	Medium grey silty clay.	N/A
59	C42	0.11	0.1	0.08	Black/dark brown silty clay, burnt stone	Fill of stakehole	N/A

Appendix 1.2 Catalogue of Artefacts

Find Registration No.	Context	Item No.	Simple Name	Full Name	Material	No. of parts	Description
E2668:1:1	1	1	Pottery	18thC pottery sherd	Pottery	1	Transfer printed ware sherd
E2668:1:2	1	2	Pottery	18thC pottery sherd	Pottery	1	Transfer printed ware sherd
E2668:1:3	1	3	Pottery	18thC pottery sherd	Pottery	1	Mottled ware sherd
E2668:1:4	1	4	Pottery	17thC to 18thC pottery sherd	Pottery	1	Glazed red earthenware sherd
E2668:1:5	1	5	Pottery	18thC to 19thC pottery sherd	Pottery	1	Black glazed ware sherd
E2668:1:6	1	6	Pottery	18thC pottery sherd	Pottery	1	Pearlware sherd
E2668:1:7	1	7	Pottery	18thC pottery sherd	Pottery	1	Transfer printed ware sherd
E2668:1:8	1	8	Pottery	18thC pottery sherd	Pottery	1	Pearlware sherd
E2668:1:9	1	9	Flake	Natural flint flake	Flint	1	Natural flake-non archaeological
E2668:1:10	1	10	Flake	Natural flint flake	Flint	1	Natural flake-non archaeological
E2668:1:11	1	11	Chunk	Natural flint chunk	Flint	1	Natural chunk-non archaeological
E2668:1:12	1	12	Pottery	17thC to 18thC pottery sherd	Pottery	1	Glazed red earthenware sherd
E2668:1:13	1	13	Pottery	17thC to 18thC pottery sherd	Pottery	1	Glazed red earthenware sherd
E2668:1:14	1	14	Pottery	17thC to 18thC pottery sherd	Pottery	1	Glazed red earthenware sherd
E2668:1:16	1	16	Bone Sample	Sample of sheep/goat mandible	Bone	5	Mandible fragments of sheep/goat
E2668:1:17	1	17	Bottle	19th C Green glass body sherd of bottle	Glass	1	Green glass bottle body sherd-non archaeological
E2668:1:18	1	18	Bottle	19th C Green glass body sherd of bottle	Glass	1	Green glass bottle body sherd-non archaeological
E2668:1:19	1	19	Bottle	19th C Green glass body sherd of bottle	Glass	1	Green glass bottle body sherd-non archaeological
E2668:1:20	1	20	Bottle	19th C Green glass body sherd of bottle	Glass	1	Green glass bottle body sherd-non archaeological
E2668:1:21	1	21	Bottle	19th C Green glass body sherd of bottle	Glass	1	Green glass bottle body sherd-non archaeological
E2668:1:22	1	22	Vessel	Fragment of iron vessel of unknown date	Metal	1	Fragment of cast iron vessel of unknown date
E2668:36:1	36	1	Pottery	18thC pottery sherd	Pottery	1	Painted Pearlware
E2668:36:2	36	2	Pottery	18thC pottery sherd	Pottery	1	Painted Pearlware
E2668:36:3	36	3	Fossil Stone	Fossil stone	Stone	1	Fossil stone
E2668:36:4	36	4	Nail	Bent shaft of nail	Iron	1	Iron nail shaft, bent with square section
E2668:36:5	36	5	Stone	Natural flint pebble	Flint	1	Natural pebble-non archaeological
E2668:36:6	36	6	Pottery	18thC pottery sherd	Pottery	1	Transfer printed ware
E2668:36:7	36	7	Pottery	18thC pottery sherd	Pottery	1	Transfer printed ware
E2668:36:8	36	8	Pottery	18thC pottery sherd	Pottery	1	Transfer printed ware
E2668:36:9	36	9	Pottery	18thC pottery sherd	Pottery	1	Transfer printed ware

Appendix 1.3 Catalogue of Ecofacts

A total of eleven bulk soil samples were taken during the course of excavation at this site. All were processed by means of floatation and sieving through a 250µm mesh. The resulting retrieved samples of this process are listed below. In addition to this a group of animal bones was retrieved on site. Details of these finds and samples can also be found listed below.

1.3.1 Animal Bone

Minimal animal bone was recovered during the excavation. This was allocated a find number during excavation.

Context number	Find number	Feature	Sample weight (g)
C1	16	Topsoil	65g

1.3.2 Burnt Bone

Two samples of cremated bone were recovered during the excavation from the un-secured context of topsoil and from trough C38

Context number	Sample number	Feature	Sample weight (g)
C1	17	Topsoil	<0.1g
C39	9	Trough C38	<0.1g

1.3.3 Charcoal

Context number	Sample number	Feature	Sample weight (g)
C4	1	Fill of C3 large pit	8.8g
C5	2	Fill of C3 large pit	2.6g
C6	3	Burnt spread	3.7g
C7	4	Fill of C8 posthole at base of C3	1.2g
C9	5	Peat/burnt mound mix under burnt mound	0.1g
C39	9	Fill of C38 trough	9.3g
C41	11	Fill of structural posthole C40	1.3g
C43	12	Fill of structural posthole C40	0.4g
C49	13	Fill of structural posthole C40	3.3g
C51	14	Fill of structural posthole C40	0.4g
C53	15	Fill of C52 posthole	0.3g

1.3.4 Shell

A single sample of shell was recovered during the excavation from the un-secured context of topsoil.

Context number	Sample number	Feature	Sample weight (g)
C1	18	Topsoil	N/A

1.3.5 Petrographical samples

A single sample of heat fractured stone was recovered from the burnt mound in Area B.

Context number	Sample number	Feature	Sample weight (g)
C6/C9	N/A	Burnt mound spread	Minimal

Appendix 1.4 Archive Checklist

Project: N6 Kilbeggan – Athlone	**Irish Archaeological Consultancy Ltd**	
Site Name: Cregganmacar 3		
NMS Number: E2668		
Ministerial Direction Number: A016/040		
Site director: Patricia Lynch		
Date: 5 November 2008		
Field Records	**Items (quantity)**	**Comments**
Site drawings (plans)	4	Digitised
Site sections, profiles, elevations	17	Digitised
Other plans, sketches, etc.	0	
Timber drawings	0	
Stone structural drawings	0	
Site diary/note books	1	
Site registers (folders)	6	Digitised
Survey/levels data (origin information)	82	
Context sheets	59	Digitised
Wood Sheets	0	
Skeleton Sheets	0	
Worked stone sheets	0	
Digital photographs	54	On IAC server
Photographs (print)	0	
Photographs (slide)	0	
Finds and Environ. Archive		
Flint/chert	3	
Stone artefacts	1	
Pottery (specify periods/typology)	17 PM sherds	
Ceramic Building Material (specify types e.g. daub, tile)	0	
Metal artefacts (specify types - bronze, iron)	2 fe	
Glass	5 PM frags	
Other find types or special finds (specify)	0	
Human bone (specify type e.g. cremated, skeleton, disarticulated)	0	
Animal bone	5 pieces	
Metallurgical waste	0	
Enviro bulk soil (specify no. of samples)	14	
Enviro monolith (specify number of samples and number of tins per sample)	0	
Security copy of archive	1	On IAC Server

Appendix 1.5 Copy of Registration No Document from. DoEHLG

National Monuments
Acts (1930-2004)
Ministerial Directions
Record Number for
archaeological activity

AN ROINN COMHSHAOIL, OIDHREACHTA AGUS RIALTAIS AITIÚIL
DEPARTMENT OF THE ENVIRONMENT, HERITAGE
AND LOCAL GOVERNMENT

File: Direction No. A16

Registration Number: E2668

Directions have been issued to Murty Hanly on behalf of Westmeath County Council in order to regulate archaeological activities carried out on N6 Kilbeggan to Athlone (Phase 2).

Application having been duly made to me by Ms. Patricia Lynch of c/o ADS Ltd,, Windsor House,, 11 Fairview Strand,, Fairview, Co. Dublin.

For a registration number to record excavation at the site of Creaganmacar 040 being part of the townland of in the County of Westmeath.

This registration is not an archaeological licence or consent but it is issued solely for archive purposes and to allow for the material from the activity to be registered with the National Monuments Service and the National Museum.

Signed ..... 31 October 2006

Appendix 1.6 Copy of Ministerial Direction Document

Section 14A(2) National Monuments Acts 1930-2004

Directions to Westmeath County Council for the carrying out of archaeological works on the N6 Kinnegad to Athlone dual carriageway road scheme (Phase 2 * Kilbeggan to Athlone).

1. Introduction

The project is an approved road development, having been approved by An Bórd Pleanála on 26th March 2004.

The development will consist of a dual carriageway that will run for a distance of approximately 57.5km.

In line with recommendations in the Environmental Impact Assessment for the scheme, archaeological investigations included site specific testing followed by a centreline test trench with staggered offsets. The request for directions has an attached strategy document that covers the proposed resolution works

These directions relate to Phase 2 works and are issued following the receipt by the Minister of reports on the testing work carried out in Phase 1.

2. Directions

All aspects of the archaeological works should be conducted in accordance with provisions of the policy and advice notes on archaeological excavations issued by the Department and in line with the provisions of the Code of Practice agreed with the National Roads Authority. Archaeological works shall be carried out in accordance with the Strategy for Proposed Works submitted with the application seeking Directions.

3. Project Archaeologist

The Project Archaeologist appointed for the road development should ensure that the archaeological works are carried out in accordance with the terms of the directions.
· Any changes to the agreed method statement for the excavations should be submitted to the National Monuments Section for approval.
· Any proposal to change any named director of a specific excavation should firstly be notified to the National Monuments Section for approval.

4. Conduct of Archaeological Excavations:

a) The archaeological excavations should be carried out in accordance with the specifications set out in the strategy document submitted to the Minister.
b) The National Monuments Section should be notified of the commencement date of the works on site.
c) The names of the archaeological consultants, including site directors should be submitted to the National Monuments Section in advance of the works commencing.

d) Where necessary the layout of the archaeological trenches should be adjusted to include additional archaeological features and deposits or areas of archaeological potential.
e) All archaeological objects recovered in the course of the test excavations should be treated and conserved in line with the advice notes and guidelines issued by the National Museum of Ireland.
f) A report on the progress of the archaeological works shall be submitted to the National Monuments Section every 4 weeks.

5. Record Number for the scheme:

The record number for the recording of archaeological works is A016/000. Sub-numbers may be allocated by the Project Archaeologist to the additonal works. These numbers should be notified to the National Monuments Section for agreement with full details of the archaeological works involved.

6. Detection Device:

Detection devices may be used as appropriate in the course of archaeological works to recover archaeological objects. Details of proposed methodologies should be notified to the National Monuments Section.

7. Reports:

1. A report on the results of the archaeological excavations should be submitted to the National Monuments Section within 4 weeks of the completion of the works on site. Should additional time be required to complete the report the National Monuments Section should be notified before the expiration of the 4-weeks period. A copy of the report should be sent to the National Museum of Ireland.
2. A summary of the excavation results for the site should be published in the Excavations Bulletin for the year when works are undertaken.

8. National Monuments (Subsection 14A(4)):

If during the carrying out of the archaeological excavations a site should prove to be a National Monument within the meaning of the National Monuments Acts (1930-2004) all works should stop and the National Monuments Section should be informed immediately.

9. Inspection of Works

Officers, servants or agents of the Minister may inspect the archaeological works at any time and full co-operation should be given to them in carrying out the inspections.

APPENDIX 2 SPECIALIST REPORTS

N6 KILBEGGAN - ATHLONE ROAD PROJECT

LITHICS FINDS REPORT FOR A016/040 CREGGANMACAR 3

DR. FARINA STERNKE MA, PHD

DEPARTMENT OF ARCHAEOLOGY
UNIVERSITY COLLEGE CORK

Introduction

Four lithic finds (E2668:1:9–11 & E2668:36:5) from archaeological investigations along the route of the N6 Kilbeggan - Athlone Road at Cregganmacar 3, were presented for analysis. The lithics were associated with a burnt mound and later post-medieval agricultural activity.

Find No.	Context	Area	Material	Type	Cortex	Cond.	Length (mm)	Width (mm)	Thickness (mm)	Complete	Retouch
E2668:1:9	1	B	Flint	Flake	Yes	waterrolled	17	11	6	Yes	No
E2668:1:10	1	A	Flint	Flake	Yes	waterrolled	17	24	18	Yes	No
E2668:1:11	1	A	Flint	Chunk	Yes	waterrolled	13	11	6	Yes	No
E2668:36:5	36	B	Quartz	Pebble	Yes	slightly weathered	28	21	18	Yes	No

Table 1 Composition of the lithic assemblage from Cregganmacar 3 (A016/040)

Methodology

All lithic artefacts were examined visually and catalogued using Microsoft Excel. The following details were recorded for each artefact: 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.

Quantification

The lithics are three flints and one quartz pebble (Table 1).

Provenance

The three flint artefacts were recovered from the topsoil and the quartz pebble was found in context 36, which is the upper fill of a modern field ditch.

Condition:

The three flints (E2668:1:9–11) survive in heavily water rolled, weathered and patinated condition and the quartz pebble is slightly weathered (Table 1). All finds are complete.

Technology/Morphology:

Lithics E2668:1:9 and E2668:1:10 are heavily rolled flakes which derive from beach pebbles. They might be natural flakes, i.e. produced by wave action etc. Artefact E2668:1:11 is a small chunk from a beach pebble, which equally appears to be a natural product.

The quartz pebble is unmodified.

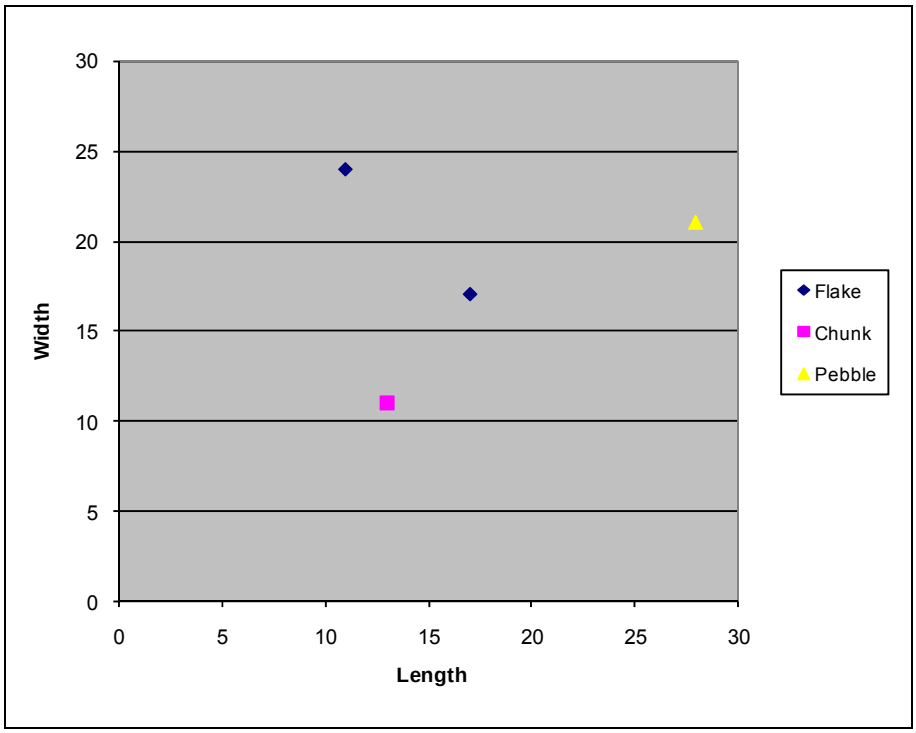

Figure 1 Dimensions (mm) of the Assemblage Components from Cregganmacar 3 (A016/040)

Conservation

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

Discussion

The four lithic finds from archaeological investigations along the route of the N6 Kilbeggan - Athlone Road at Cregganmacar 3 are three natural flints and one unmodified quartz pebble which have no archaeological significance.

Bibliography

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

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

THE POST-MEDIEVAL AND MODERN POTTERY FROM CREGANMACAR 3, CO. WESTMEATH (A016/040)

CLARE MCCUTCHEON MA MIAI

Seventeen sherds of pottery were presented for study, reduced to sixteen following reassembly. The site is described as having evidence of burnt mound with later post-medieval agricultural activity. Eleven of the sherds were recovered from the topsoil C1 with six found in C36.

Area	Context	Context description	Fabric type	Finds number
A	1	Topsoil	Glazed red earthenware	12+13, 14
B	1	Topsoil	Glazed red earthenware Black glazed ware Mottled ware Pearlware Transfer printed ware	4 5® 3 6(B), 8(H) 1®, 2, 7(B)
B	36		Transfer printed ware Painted pearlware	6–9 1®, 2®

Table 1: Pottery identifications by context, Cregganmacar 3 (E2668).

A piece of black glazed ware dating to the 18th/19th centuries was recovered from Area B. These vessels were widely available in Ireland and some may also have been made here. The principal source of black glazed ware, however, is Lancashire and North Wales, often termed Buckley ware. The clay can be intermixed with white clay giving a marbled effect, or near stoneware in dark red/brown, or soft red earthenware. The black glaze results from the addition of iron to the overall lead glaze.

Three pieces of glazed red earthenware, the commonly used dairy and kitchen ware of the time, were recovered from the topsoil. The fabric is generally sandy earthenware, usually oxidised buff to light orange through to brown. The clear lead glaze takes its colour from the fabric with variations due to firing conditions (Jennings 1981, 157). These are also known as brownwares and were made widely in England and Ireland in the later 17th and 18th centuries (Dunlevy 1988, 24–5). A typical kiln was excavated at Tuam, Co. Galway with milk pans and dishes comprising the majority of the vessels (Carey & Meenan 2004).

Seven of the sherds are of transfer printed ware. This is a technique developed in the mid-18th century, consisting of inking engraved copper plate, transferring the design to paper and then pressing it onto the vessel when still wet (Savage & Newman 1985, 296).

The final four sherds are of pearlware, two of which were decorated with overpainting.

References:

Carey, A & Meenan, R 2004 'Excavation of a post-medieval pottery kiln, Tuam, Co. Galway', *Journal of the Galway Archaeological & Historical Society* **56**, 37–45.

Dunlevy, M 1988 *Ceramics in Ireland.* Ard-Mhúsaem na hÉireann/National Museum of Ireland, Dublin.

Jennings, S 1981 *Eighteen centuries of pottery in Norwich.* East Anglian Archaeology Report no.13, Norwich.

Savage, G & Newman, H 1985 *An illustrated dictionary of ceramics.* Thames and Hudson London.

THE N6 KILBEGGAN-ATHLONE ROAD PROJECT

THE SMALL FINDS FROM A016-040 CREGGANMACAR 3

CATHERINE JOHNSON

This is one of a number of sites excavated as part of the N6 Kilbeggan–Athlone road project, to which different license numbers have been given.

Cregganmacar 3 produced evidence of burnt mound material and of later post medieval agricultural activity. The few finds consist of green glass bottle sherds of post-medieval date, a probable nail shank, part of an iron vessel and a piece of fired earth.

Fired earth
E2668:36:3 small fragment of fired earth, with one flat surface. Lightweight, soft red fabric. L.29 mm W.24mm T.22mm.

Metal
The two iron objects from this site are both incomplete. One is probably a nail shank and the other appears to be a base fragment from a thick iron vessel, such as a cast-iron pot, with a flat base and sloping sides. Iron cooking pots and cauldrons were made over a long period of time and cannot be closely dated. They continued to be produced throughout the 19th century (Noel Hume 1991, 175–6).

Fragment of iron vessel
E2668:1:22 is a small fragment from an iron vessel, consisting of part of the base and side. The surface is coated with soil and corrosion products. L. 120 mm W. 41 mm T. 5 mm.

Stem
E2668:36:4 is a slightly bent iron stem, with a square section, broken at both ends. The surface is coated with soil and corrosion products. L. 78 mm W. 6 mm T. 6 mm.

Glass
The glass assemblage consists of a five green bottle sherds, dating to the post-medieval period.

E2668:1:17 is a small body sherd from a green glass bottle. L.35 mm W. 20 mm T. 7.5mm.

E2668:1:18 is a body sherd from a green glass bottle. L.62mm W. 65 mm T. 7 mm

E2668:1:19 is a small body sherd from a green glass bottle. L.31 mm W. 8 mm T. 7.5mm.

E2668:1:20 is a small sliver of pale green bottle glass. L. 22 mm W. 15 mm T. 2 mm.

E2668:1:21 is a small body sherd from a green glass bottle. L.55 mm W. 18 mm T. 8 mm.

Stone
E2668:4:1 is a D-shaped piece of stone, with fossils on the surface. L. 125 mm W. 120 mm T. 77 mm.

Bibliography
Noel Hume, I 1991 *A guide to artifacts of colonial America,* Alfred. A Knopf*,* New York.

OSTEOARCHAEOLOGICAL REPORT OF ANIMAL BONES FROM A016/040 CREGGANMACAR 3, N6 ATHLONE TO KILBEGGAN ROAD SCHEME COUNTY WESTMEATH

MOORE GROUP
ANIMAL BONE REPORT PREPARED FOR IAC LTD
AUTHOR: CAMILLA LOFQVIST,
OSTEOARCHAEOLOGICAL SERVICES SECTION
DATE: SEPTEMBER 2007

Non technical summary

This report describes the results of the osteoarchaeological analysis of animal bones retrieved during archaeological work carried out at A016/040 Cregganmacar 3, along the N6 Athlone to Kilbeggan Road Scheme, Co. Westmeath. The author undertook the bone analysis for Moore Group (MOORE) on behalf of the client, IAC Ltd.

The bone analysis was commissioned in order to get an osteoarchaeological aspect of the development site and to see if the bone material could provide additional information on the interpretation of the site. The purpose is also to broaden the understanding of animal consumption and animal husbandry at the site, through the osteological study of the animal remains.

A total of five fragments from one mandible were retrieved. They had a total weight of 65g. The sample only contained one anatomical unit from one animal species. The animal identified was sheep/goat. Due to difficulties in differentiation, sheep and goat bones are usually analysed as one group (caprinae).

Introduction

The Osteoarchaeological Services Section of Moore Group was commissioned to undertake an osteoarchaeological analysis of disarticulated animal bones retrieved during archaeological work at A016/040 Cregganmacar 3, N6 Athlone to Kilbeggan Road Scheme, Co. Westmeath. The osteoarchaeological analysis was carried out on behalf of IAC Ltd.

The purpose of this report is to broaden the understanding of animal consumption and animal husbandry at the site, through the osteological study of the animal remains. The aim is to use the bones as a means of archaeological interpretation of the site, either to support suggested theories or to point to other possible interpretations of the cultural heritage. As the osteological materials contain a large quantity of information; it is important from the start, to define the type of information that is going to be collected. The data gathered from this report was based on five different variables:

- Species distribution
- Anatomical distribution
- Age distribution
- Sex ratios and size variations
- Cut-/gnaw-marks and disease distribution.

In order to enable comparisons between the different materials it is important to be consistent in the use of analysis methods. If this is not fulfilled, the results would be impossible to compare. The osteological methods used in this report are presented in the section below.

Methodology

Identification of the bones was made by reference to Sisson and Grossman *The anatomy of the Domestic Animals* (Getty 1975), Schmid *Atlas of Animal bones* (1972), Hillson *Teeth* (1996), During´s *Bildkompendium i Animalosteologi* (unpubl) and a comparative collection of bones belonging to the author. A systematic bird bone identification was made by reference to Cohen & Serjeantson *A Manual for the Identification of Bird bone from Archaeological Sites* and where possible, the bones were identified to family level.

During analysis of the material, all fragments were counted and identified to species,

anatomical unit, part of anatomical unit, side and fusion stage. Pathology and cut/gnaw marks were also examined. Quantification was based on three methods:

NISP: Number of Identified Specimens. Indicates the total number of fragments found. The NISP is decided by different factors like the age of the animal, the size of the animal and how well the preservation was at the place where the bones were deposited.

MNI: Minimum Number of Individuals. Indicates the minimum number of individuals from every species that were present in the material. The MNI is calculated on the specimen of the most abundant skeletal element present, taking left and right side in consideration, as well as looking at the age of the animal. However, it is important to point out that MNI is only an estimate.

MNE: Minimum Numbers of Elements. Indicates the minimum number of anatomical units that are present and what side they are from. MNE is used to calculate MNI and is used in the Fusion data tables. To allow for a young individual to grow the bones from a juvenile at birth are made up of several different parts. When the individual gets older the different parts grow together and form one bone. The parts of the bone grow together at different age-stages and this makes it possible to estimate the age of an animal. This means that three bone fragments can be part of the same bone element. For example: Proximal and distal epiphyses fused with the diaphysis. To avoid getting a higher MNE all loose epiphyses have to be paired with all unfused diaphysis.

Age is based on fusion data and tooth eruption. Habermehl (1961) and Silver (1969) have been used to determine stages of fusion while Schmid (1972) and Hillson (1996) have been used to determine tooth eruption data. It should be noted that bone elements from juveniles are often under-represented in bone materials, because they are very fragile and very easy to break.

Different formula are used to calculate Estimated Shoulder Heights (ESH) for the different species. Matolsci (1970) and Fock (1966) are used to estimate height of withers for cattle while Teichert (1975) is used for sheep.

The average height of withers and average weight of the meat-producing animals has increased from Bronze Age to Modern time. For example, cattle during medieval times had an average height of 1.05m but by the late 18th century had this increased to an average height of 1.35m (Davis, 1987:178; tab 8:7). Along with size, the average weight of the animals had increased. The dressing-out weight for cattle and caprinae is 50% of the animal's total, live weight. The dressing-out weight for pig is 80% of the animal's total weight (McCormick, 1997:200). The size figures of cattle are based on Davis (1987:178; tab 8:7).

The genders of the animals are estimated from measurements of the horncore and the coxae. For cattle, Armitage & Clutton Brock (1976) is used for the estimation based on the horncore and Vretemark (1997) for the estimation based on the coxae. For caprinae Vretemark (1997) is used for the coxae. For pig and horse, the upper and lower Canine teeth are used to determine the sex.

The bones were searched for traces of gnawing, cut marks and pathology. The gnaw marks give information about how exposed the bones were after being discarded. A high percentage of bones with traces of gnawing indicates that the bones were left exposed so animals like dogs, rats and other scavengers had access to the bones. The cut marks can give valuable information about how the carcasses were

butchered. These marks can also give information about if the animals were kept for their milk, as a source of meat, or if they played an important part in industrial production of for example hide or bone objects.

Results

Five bone fragments from C1 (topsoil) were submitted for examination. These were examined and all fragments were identified to species. The animal species identified in the material was: *Ovis aries/Capra hircus* (sheep/goat) (Table 2, Appendix 1). Sheep (Ovis) and goat (Capra) are difficult to distinguish from each other. For this reason these two species have been analysed together as one group (Caprinae).

Showing the total number of fragments (NISP), total number of anatomical elements (MNE), total number of individuals (MNI) and total weight for all species present.

Species	NISP	NISP in %	MNE	MNE in %	MNI*	MNI in %	Weight	Weight %
Sheep/goat	5	100.0%	1	100.0%	1	100.0%	65.0	100.0%
Grand Total:	5	100%	1	100%	1	100%	65.0	100%

Table 1. NISP, MNE, MNI and weight for all species. (*MNI=Minimum Number of Individuals)

Sheep/Goat; Ovis/Capra

Five fragments from one mandible, identified as sheep/goat, were retrieved from Cregganmacar 3. The mandible held two worn teeth indicating this was an old adult of c. six^{+} years. This jaw bone displayed areas of bone growth further highlighting the advancing age of this individual. The total weight of these bones was 65g.

Sheep (Ovis) and goat (Capra) are difficult to distinguish from each other. However, it is indicated in old Irish law-texts that the goat was never common and that the animal never played an important roll in the animal husbandry during early Irish farming (Kelly, 1998, 78). Bones of goat are rarely found on rural Early Christian sites but seem to have been more common in urban environments, the explanation being that the goat could be kept in the towns and thereby supply the inhabitants with fresh milk while cow's milk was not readily available (McCormick, 1997, 202f). Sheep were appreciated for their meat, wool and milk. The sheep's horn was sometimes used for comb making and the sheep skin could be used to make leather. Further, untanned sheep skin was occasionally used to produce parchment, a material prepared for writing on. Sheep are very adaptable to different kind of food and climate.

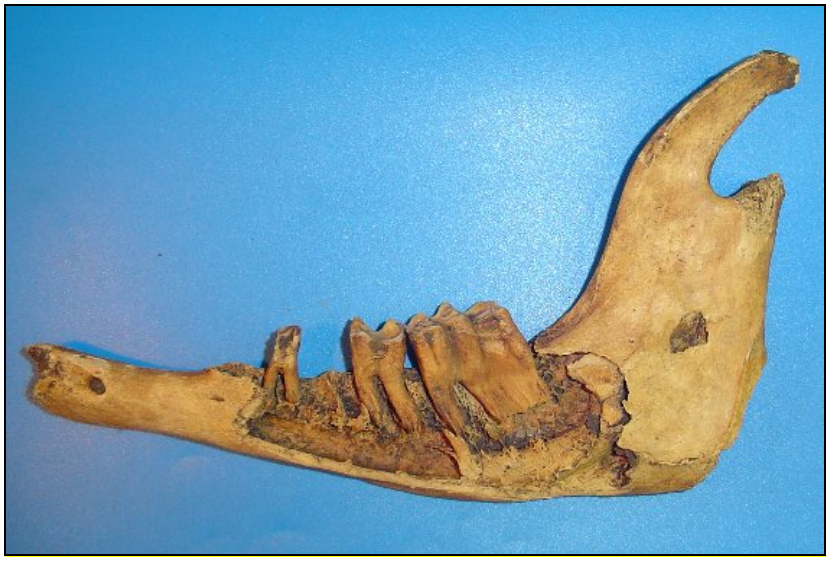

Plate 1. Mandible from sheep/goat.

Summary

Five bone fragments (5) with a total weight of 65g from topsoil (C1) were submitted for examination. The bone sample was assessed and identified to species. The animal identified in the material was: Sheep (Ovis)/ goat (Capra). However, these two species are difficult to distinguish from each other and are therefore analysed together as one group (Caprinae). The five fragments retrieved from Cregganmacar 3 were all from the same mandible. Examination of the tooth wear revealed that this individual was a mature adult of c. six^{+} years.

No definite conclusions could be retrieved from the Cregganmacar 3 bone assemblage due to the limited size of the bone sample.

Bibliography

Armitage, PL & Clutton-Brock, J 1976 A system for classification and description of the horncores of cattle from archaeological sites. *Journal of Archaeological Science*, Academic Press.

Cohen, A & Serjeantson, D 1996 *A Manual for the Identification of Bird bone from Archaeological Sites.* Archetype Press London.

Davis, S J M 1987 *The archaeology of animals.* Yale University Press, London.

Driesch, A von den 1976 *A guide to measurement of animal bones from archaeological sites.* Peabody Museum., Harvard University, Cambridge.

During, E 1997 *Bildkompendium i animalosteologi* . Arkeosteologiska Forsknings Laboratoriet. Ulriksdal. Stockholm.

Foch, J 1966 *Metrische Untersuchungen an Metapodien einiger europäischer Rinderrassen.* Unpublished dissertation, University of Munich.

Getty, R 1975 *Sisson and Grossman's The Anatomy of the Domestic Animals. Vol 1+2.* W.B. Saunders Company. Philadelphia. London.

Habermehl, K H 1961 *Die Altersbestimmung bei Haustieren, Pelztieren und beim jagdbaren Wild* . Parey, Hamburg – Berlin.

Hillson, S 1996 *Teeth*. Cambridge University Press. Cambridge.

Kelly, F 1998 *Early Irish Farming, a study based mainly on the law-texts of the 7th and 8th centuries AD.* Early Irish Law Series Volume IV. Dublin.

Lisle, L 1957 *Observations on Husbandry.* (2 vols) London.

Luff, R M 1984 *Animal Remains in Archaeology.* Shire Publications, Aylesbury.

Matolsci, J 1970 Historische Erforschung der Körpergröße der Rindes auf Grund von ungarischem Knochenmaterial. *Zeitschrift für Tierzüchtung und Züchtungsbiologie* **87**, 89–137.

McCormick, F & Murphy, E 1997 In Walsh, C (ed). *Archaeological excavations at Patrick, Nicholas and Winetavern Streets, Dublin.* Brandon, Dublin.

O'Connor, T 2000 *The archaeology of animal bones*. Sutton Publishing Ltd, Gloucestershire.

Peabody Museum Bulletin 1 Peabody museum of archaeology and Ethnology. Harvard University. Peabody Museum., Harvard University, Cambridge.

Schmid, E 1972 *Atlas of Animal Bones*. For Prehistorians, Archaeologists and Quaternary Geologists. Elsevier, Amsterdam.

Silver, I A 1969 *The aging of domestic Animals*. Science in Archaeology. (283–309). London.

Sten, S 1992 *Borgar fran forntid och medeltid I Vastsverige*. Arkeologi i Vastsverige 5. Goteborgs arkeologiska museum. Goteborg.

Teichert, M 1966/69 *Osteometrische Untersuchungen zur Berechnung derWiederisthöhe bei vorund frühgechichtlichen Schweinen.* (Habil.-Schr. Univ. Halle 1966 oder Ethnogr.-Arch. Zeitschr. **10**, 1969, 517–525).

Troy-Smith, R 1957 *A history of British livestock husbandry to 1700.* Routledge, London.

Vretemark, M 1997 *Fran ben till boskap. Kosthall och djur hallning medutgangspunkt I medeltida benmateral fran Skara. Del 1*. Skrifter franSkaraborgs Lansmuseum, Nr 25.

Wiseman, J 2000 *The pig. A British History*. Gerald Duckworth & Co Ltd, London.

Appendix 1 Animal Bone Database

Table 2

Sample No	Context	Animal	Element	Part of Element	NISP	MNE	Side	Pr epi	P 1/3	M 1/3	D 1/3	Di epi	J	M / F	C	G	P	Burnt	Description	Meas	Comment	weight
16	1	O/C	Mandible	Fairly complete+P4-frag+M2+M3	5	1	Sin	-	-	-	-	-	-	-	-	-	1	-	Bone growth assoc with high age	-	m,g=46=6+years	65

CHARCOAL IDENTIFICATIONS

N6 KINNEGAD – ATHLONE SCHEME
PHASE 2: KILBEGGAN TO ATHLONE
DUAL CARRIAGEWAY

MINISTERIAL DIRECTION NUMBER: A016/040
NMS REGISTRATION NUMBER: E2668
CREGEANMACAR 3

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1. Introduction

Eleven charcoal samples were identified and analysed from excavations from a burnt mound dated to the mid to late Bronze Age and nearby Iron Age features. Cregganmacar 3 is located in Cregganmacar townland, to the S of the existing N6, c. 1km south of Moate (Westmeath OS sheet 036). The archaeological excavation was carried out by Irish Archaeological Consultancy Ltd on behalf of Westmeath County Council and the National Roads Authority in advance of the construction of the N6 Phase 2: Kilbeggan to Athlone Dual Carriageway Scheme.

The analysis of charcoal and wood can provide information on two different levels. The analysis is an important component of any post-excavation environmental work as it can help in re-constructing an environment hitherto lost to us, although this must be done with caution as sufficient sample numbers are required for a complete and full understanding of the immediate environment. Keepax suggest 50 charcoal samples in a European temperate climate. Charcoal and wood are also analysed and identified to determine what species are used and selected for particular functions on site i.e. postholes, wall posts, burnt remains of wattle and so on.

2. Methods

The process for identifying wood, whether it is charred, dried or waterlogged is carried out by comparing the anatomical structure of wood samples with known comparative material or keys (Schweingruber 1990). A wood reference collection from the Botanical Gardens in Glasnevin, Dublin was also used.

Charcoal

The soil samples were processed on-site. The flots were sieved through a 250 micron or a 1mm sieve, while the retent was put through a 2mm or 4mm sieve. All of the charcoal remains from the soil samples were then bagged and labeled.

The identification of charcoal material involves breaking the charcoal piece along its three sections (transverse, tangential and radial) so clean sections of the wood pieces can be obtained. This charcoal is then identified to species under a universal compound microscope reflected and transmitted light sources at magnifications x 10 - 400. By close examination of the microanatomical features of the samples the charcoal species are determined.

The purpose of the charcoal identifications was two-fold. In some cases the identifications were carried out prior to C14 dating in order to select specific species for dating and in other cases the charcoal was analysed for fuel selection policies and selection of wood types for structural use. Each species was identified, bagged together and then weighed. Insect channels were noted on the charcoal fragments identified as this may indicate the use of dead or rotting wood used for fuel or other such functions. The distinction can sometimes be made between trunks, branches and twigs if the charcoal samples are large enough. This was noted where possible. When charcoal samples showed indications of fast or slow growth this was also recorded. The samples identified for environmental reconstruction and wood usage were counted per fragment and then weighed. The smaller sample amounts with less than 50 fragments were all identified while 50 fragments were identified from the larger samples. In general the fragment count for charcoal was low from these features.

There are inherent problems in re-constructing the environment at the time of use of the site due to the low quantity of samples and charcoal fragments identified from the assemblages. Keepax concludes that, when working in a temperate climate, at least fifty samples should be identified from an archaeological site, to make it a viable

charcoal study, with a minimum of 25 samples (Keepax 1988). Notwithstanding the charcoal sample numbers, it is clear that the charcoal results coupled with the wood analysis throw up some interesting results and trends in relation to wood selection and use and woodland cover in the Bronze and Iron Age periods in Co. Westmeath.

A number of wood taxa cannot be identified to species or sub-species level anatomically. Sessile oak *(Quercus petraea)* and pedunculate oak *(Quercus robur)* are both native and common in Ireland and the wood of these species cannot be differentiated on the basis of their anatomic characteristics. English elm *(Ulmus procera)* and wych elm *(Ulmus glabra)* cannot be separated by their wood structure and identifications of elm are shown as *Ulmus* sp. There are also two species of birch (*Betula pendula* and *Betula pubescens*) and several species of willow therefore the identifications are given as *Betula* sp and *Salix* sp respectively. *Prunus* includes blackthorn (*Prunus spinosa*) and cherry (*Prunus padus/avium*) and sometimes it is difficult to differentiate between the different species of *Prunus* sp.

3. Description of the feature types and landscape

Cregganmacar 3 (A016-040) produced evidence of burnt mound material and of later post medieval agricultural activity. The burnt mound C6 measured 0.24m deep by 4m long and 3m wide and consisted of charcoal enriched soil and heat shattered stones. A potential trough with evidence of postholes/stakeholes in its base was also identified during the excavation. The site is not particularly important as a discrete site - but may be important collectively.

4. Results

Two hundred and thirty seven fragments of charcoal were identified from eleven samples submitted for dating and environmental re-construction and woodland use. The fragment count was low for some of the samples and furthermore certain samples contained very tiny iron stained charcoal fragments and these were hard to identify. The charcoal is related to the burnt mound activity and some possible structural remains dating to the late Bronze Age and Iron Age period in Co. Westmeath. The fragment count of each taxon represented in the samples is given below in Figure 1 and Table 1.

Figure 1: All taxa identified from the charcoal samples analyzed

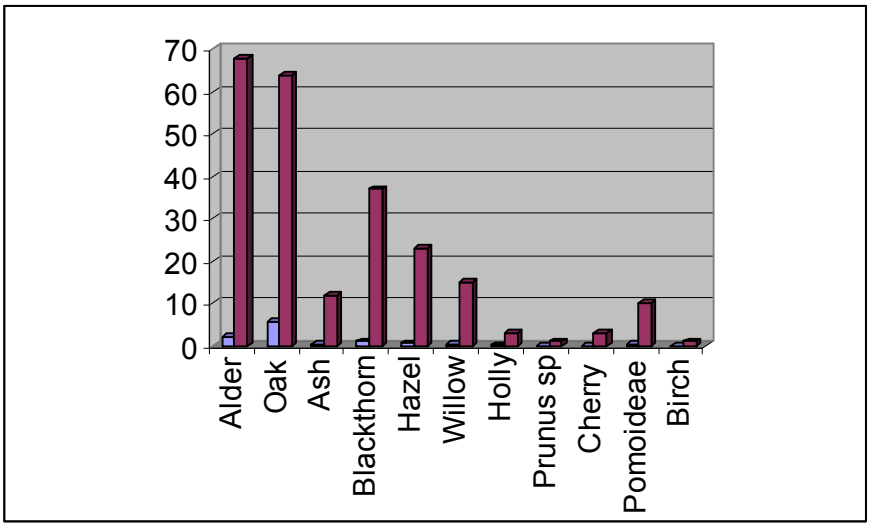

Table 1: Identifications from charcoal from Cregganmacar 3

Site no.	Context no.	Context type	Sample no.	Species	Comment
A016-040	C39	Trough	9	Alder (1.3g*, 25f*), Oak (0.2g, 4f), Ash (0.2g, 3f), Blackthorn (0.3g, 6f), Hazel (0.1g, 2f), Willow (0.3g, 6f), Pomoideae (0.1g, 1f)	928–825BC
A016-040	C6	Burnt mound	3	Alder (0.1g, 3f), Oak (0.5g, 11f), Ash (0.1g, 4f), Blackthorn (0.3g, 20f), Hazel (0.1g, 5f), Willow (0.1g, 2f), Holly (0.1g, 2f)	1431–1313BC
A016-040	C4	Pit	1	Oak (5g, 13f)	Iron stained charcoal. 372 – 203BC
A016-040	C5	Pit	2	All oak (3.5g, 25f)	All identified
A016-040	C9	Burnt spread	5	Willow brushwood (0.01g, 1f). 4yrs, Hazel (0.01g, 1f)	All identified
A016-040	C7	Posthole	4	Oak (1g, 15f), Hazel (0.1g, 1f)	All identified
A016-040	C43	Posthole	12	Oak (0.2g, 5f), Alder (0.01g, 2f), Willow (0.01g, 1f), Prunus sp (0.01g, 1f)	All identified
A016-040	C53	Stakehole	15	Hazel (0.01g, 1f), Oak (0.01g, 1f), Alder (0.01g, 1f)	All identified
A016-040	C51	Stakehole	14	Alder (0.1g, 6f), Birch (0.01g, 1f), Pomoideae (0.1g, 5f), Holly (0.01g, 1f)	All identified
A016-040	C49	Posthole	13	Alder (0.5g, 20f), Ash (0.2g, 3f), Blackthorn (0.1g, 6f), Hazel (0.1g, 3f), Willow (0.1g, 5f), Cherry (0.1g, 3f), Pomoideae (0.1g, 3f)	Very small fragments
A016-040	C41	Posthole	11	Alder (0.2g, 10f), Oak (0.2g, 5f), Ash (0.01g, 2f), Blackthorn (0.3g, 5f), Hazel (0.2g, 8f), Pomoideae (0.01g, 1f)	

*g = grammes
* f = fragment count

5. Discussion and Conclusions of Charcoal assemblage

Wood types identified the assemblages
There were ten taxa types present in the charcoal remains.

The range of taxa identified from the features analysed includes large trees such as oak and ash, medium sized trees (alder & birch) and smaller scrub or hedgerow trees (willow, hazel, blackthorn/cherry, pomoideae & holly). Alder, willow and birch are generally found growing near wetland areas and are symptomatic of a wetter environment. The charcoal is related to wood selection in relation to firewood used at the site (C9, C6, C4, C5) as well as possibly structural wood from the posthole and stakehole fills (C7, C43, C53, C51, C49, C41).

Alder was the dominant taxon identified from the Bronze Age assemblage. The results also suggest that there may have been oak-hazel woodlands surrounding the sites during the late Bronze Age period at Cregganmacar 3. Other dryland taxa present in the area in lesser quantities were ash, *Prunus* sp. (blackthorn/cherry), pomoideae and holly. Large fragment counts of alder as well as the presence of willow and birch indicates an area of wetland close by to the site during the late Bronze Age.

It is difficult to discern from the charcoal identifications if any of the taxa present in the posthole and stakehole fills are related to the posts that were once present in the structural features. This is due to the fact that there are several taxa present in the identifications from these features (Table 1). The charcoal may have fallen into the post holes post depositional use. It is possible that oak was used as post material in C7 as Oak dominates the charcoal identifications within this feature. It is also interesting to note that oak was the main taxon present in C4 & C5 in the Iron Age pit.

Further analysis, discussions and comparisons of results will form part of a final integrated charcoal and pollen study of the sites and the surrounding environment on this scheme which is being undertaken as part of the authors PHD thesis. These results will be published accordingly.

6. References

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

Grogan, E O Donnell, L Johnston, P 2007 *The Bronze Age Landscapes of the pipeline to the west.* Wordwell, Wicklow.

Hall, V 1995 “Woodland Depletion in Ireland over the last Millennium” in J.R. Pilcher and S. Mac An tSaoir (eds), *Wood, Trees and Forests in Ireland, 23–35.*

Hurley, M F 1982 "Wooden artefacts from the excavation of the medieval City of Cork" in S. McGrail *Woodworking Techniques before A.D 1500,* BAR **129**, 301–311.

Hurley, M F 1986 *A study of Skeletal and Wooden Artefacts from Medieval Cork.* Unpublished M.A. Thesis, University College Cork.

Hurley, M & Scully, O 1997 *Late Viking Age and Medieval Waterford Excavations 1986–1992.* Waterford Corporation.

Keepax, C A 1988 Charcoal analysis with particular reference to archaeological sites in Britain. Ph.D. Dissertation, University of London.

Kelly, F 1988 *A Guide to Early Irish Law.* Institute for Advanced Studies, Dublin.
McCracken, E 1971 *The Irish Woods Since Tudor Times.* Institute of Irish Studies, Belfast.

Moloney *et al*, 1994) Excavations at Clonfinlough, Co. Offaly, Crannog Publications.

Morgan, R 1975 "The Selection and Sampling of Timber from Archaeological Sites for Identification and Tree-ring analysis", *Journal of Archaeological Science* **2**, 221–230.

Nelson E C 1993 *Trees of Ireland.* The Lilliput Press, Dublin.

O'Carroll, E 1996 *The analysis of two wooden assemblages from Corlea Bog, Co. Longford and King John's Castle, Co. Limerick.* Unpublished M.A. Thesis, University College Cork.

O'Carroll, E 2004 The analysis of wood and charcoal from Monanny, Co. Monaghan, Unpublished report for IAC.

O'Carroll, E 2007 The analysis of wood and charcoal from Cashelduff, Co. Mayo, Unpublished report for Mayo County Council.

O'Carroll, E 2007 The analysis of wood and charcoal from the N11, Arklow to Rathnew, Co. Wicklow, Unpublished report for the NRA/Wicklow County Council.

O'Carroll, E 2007 The wood and charcoal analysis from the Charlestown By-pass, Unpublished report for the NRA /Mayo County Council.

O'Donnell, L 2005 *Wood and charcoal identifications from Charlesland, Co. Wicklow*, Unpublished specialist report for Margaret Gowen and Co.

O'Donnell, L 2005 *Wood and charcoal identifications from Ballynagran, Co. Wicklow*, Unpublished specialist report for Margaret Gowen and Co.

O'Sullivan, A 1987 "Wood in Archaeology", *Archaeology Ireland* **4**, 69–73.

O'Sullivan, A 1994 "The use of Trees and Woodland in early medieval Ireland", *Irish Forestry* **51**, 80–94.

Rackham, O 1976 *Trees and Woodlands in the British Landscape.* Weidenfeld & Nicholson, London.

Rackham, O 1980 *Ancient Woodland: its history, vegetation and uses in England.* Edward Arnold, London.

Sands, R 1997 *Pre-historic woodworking. The Analysis and Interpretation of Bronze and Iron Age tool marks.* Institute of Archaeology, University of London.

Schweingruber, F H 1990 (3rd edition) *Microscopic Wood Anatomy*. Birmensdorf: Swiss Federal Institute for Forest, Snow and Landscape Research.

Webb, D A 1977 *An Irish Flora*. Dundalgan Press Ltd., Dundalk.

Western, C A 1970 "Wood and Charcoal in Archaeology", *Science in Archaeology,* 178–187.

RADIOCARBON DATING RESULTS
CREGGANMACAR 3

CHRONO LABORATORY, QUEENS UNIVERSITY BELFAST

Colette Rynhart
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^{14}CHRONO Centre
Queens University Belfast
42 Fitzwilliam Street
Belfast BT9 6AX
Northern Ireland

Radiocarbon Date Certificate

Laboratory Identification: UBA-9146
Date of Measurement: 2008-05-13
Site: A016/040 Creggeanmacar Co. Westm
Sample ID: S1 C4
Material Dated: Oak
Pretreatment: AAA
Submitted by: IAC

^{14}C Date: 2214±22
AMS δ^{13}C: -27.9

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 - c14res.csv
```

```
S1 C4
UBA-9146
Radiocarbon Age BP   2214 +/-   22
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 359- 349                        0.104
                            313- 275                        0.373
                            259- 208                        0.524
  95.4 (2 sigma)     cal BC 372- 336                        0.171
                            331- 203                        0.829

 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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Belfast BT9 6AX
Northern Ireland

Radiocarbon Date Certificate

Laboratory Identification: UBA-9147
Date of Measurement: 2008-05-19
Site: A016/040 Creggeanmacar Co.Westme
Sample ID: S3 C6
Material Dated: Hazel
Pretreatment: AAA
Submitted by: IAC

^{14}C Date: 3103±24
AMS δ^{13}C: -28.6

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 - c14res.csv

S3 C6
UBA-9147
Radiocarbon Age BP    3103 +/-    24
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 1417- 1378                     0.772
                             1336- 1321                     0.228
  95.4 (2 sigma)      cal BC 1431- 1313                     1.000
```

```
 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-9148
Date of Measurement: 2008-05-19
Site: A016/040 Creggeanmacar Co.Westme
Sample ID: S9 C39
Material Dated: Alder
Pretreatment: AAA
Submitted by: IAC

^{14}C Date: 2740±23
AMS δ^{13}C: -28.0

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 - c14res.csv
```

```
S9 C39
UBA-9148
Radiocarbon Age BP   2740 +/-   23
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 904- 888                         0.291
                             882- 842                         0.709
  95.4 (2 sigma)      cal BC 928- 825                         1.000
```

```
 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.
```

PETROGRAPHICAL REPORT ON STONE SAMPLES TAKEN DURING ARCHAEOLOGICAL EXCAVATIONS AT CREGGANMACAR 3, CO. WESTMEATH.

(E2668)

EURGEOL DR STEPHEN MANDAL MIAI PGEO

1. Introduction

This report is based on the macroscopic (hand specimen) examination of stone samples taken during archaeological excavations at Cregganmacar 3, Co. Westmeath (Licence Number E2668). The purpose of the study was to identify the rock types from which the stone objects were made, to highlight potential sources for them, and to comment on their possible function. It is important to note that macroscopic petrographical studies have been considered of limited value in comparison to microscopic (thin section and geochemical analysis) studies. On the other hand, macroscopic studies provide an excellent preliminary assessment tool and have proven to be of considerable value in petrographical studies (e.g. see Mandal 1997; Cooney and Mandal 1998).

2. Results

Site	Ministerial Direction	Sample	Notes
Cregganmacar 3	A016/040	Sample 3	Decayed and burnt, angular blocks, sandstone, coarse yellow red quartz rich

3. Solid Geology and Soils of the Site

The bedrock under the site consists of Lower Carboniferous Age Waulsortian Limestone, at the geological boundary with the Ballysteen formation of fossiliferous limestone (see below).

The geology of the area is predominantly made up of Carboniferous Age rocks. The oldest rocks in the area occur as inliers (areas of older rocks surrounded by younger rocks) of Devonian age Old Red Sandstone (shown as ORS on Figure 1); red conglomerates, sandstones and mudstones. These are stratigraphically overlain unconformably by the Upper Carboniferous (basal Courceyan) Navan Group (NAV), consisting of limestones, sandstones and mudstones. The Old Red Sandstone (a coarse to very coarse quartz iron rich sandstone very common in the southwest of Ireland) represents the erosion and (mainly riverine) deposition of the mountains uplifted during the Caledonian Orogeny. The Upper Carboniferous rocks represent periods of shallower and deeper water deposition respectively.

Overlying these rocks stratigraphically are the Upper Courceyan age Ballysteen Formation (BA) consisting of fossiliferous dark grey muddy limestone, in turn overlain by the Waulsortian Limestones (WA) of massive unbedded lime-mudstones. These are overlain comformably by the Chadian-Asbian age Allenwood Formation (AW); thick bedded limestone which is locally peloidal, and the Lucan Formation (LU); dark limestones and shales (known as Calp). These 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 (see Morris *et al*. 2003; Gatley *et al*. 2005).

Bedrock is not generally exposed in the area, instead it is covered by boulder clay, which are the result of glacial action during the last glaciation. Eskers - elongated ridges of stratified gravel, probably formed by streams flowing beneath or on a glacier - are common in the area. The soils of the area consist of grey/brown podzols (luvisols), and are generally very fertile (Aalen *et al.* 1997).

4. Potential Sources

It is likely that the sources for all of the samples are local. There are abundant sources for limestone, sandstone, quartz sandstone and quartzite. It is, however, important to note that these rock types were probably not sourced from bedrock, but from secondary sources, such as in the glacial tills / sub-soils at the site.

5. Discussion

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

Fifteen samples were examined from sites across the N6 Kilbeggan to Athlone scheme. All are decayed; all but the sample from Moyally 3 (A016/047: Sample 7) and that from Kilbeggan South (A016/082: Sample 10) are clearly burnt. All bar one are composed of angular pieces; crushed and broken stone. 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. The exception is that from Burrow – Glennanummer (A016/054: Sample 25) which consists of sub-rounded blocks, possibly indicative of the selective crushing of cobbles. Nine of the samples, including that from this site consist of coarse grained quartz sandstone; the samples from Burrow – Glennanummer (A016/054: Sample 25) and Ballinderry Big 1 (A016/076: Sample 23) also contain limestone. Coarse grained sandstone of this type is typical of fulacht fiadh material. The remaining six samples consist of limestone, which is atypical of fulacht material – fine grained rock types such as limestone do not absorb heat in the manner that coarse rock types such as sandstone and dolerite (e.g. see Mandal 2004).

6. Bibliography

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

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

Gatley, S Somerville, I D Morris, J H Sleeman, A G and Emo, G 2005 *Geology of Galway-Offaly: to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 15*. Geological Survey of Ireland Publications. Westprint Ltd: Sligo.

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

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

Morris, J H Somerville, I D and MacDermot, C V 2003 *Geology of Longford and Roscommon: to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 12*. Geological Survey of Ireland Publications. Westprint Ltd: Sligo.

ASSESSMENT OF THE BURNT BONE FROM CREGGANMACAR 3 A016/040 E2668

JENNIE COUGHLAN MA

Assessment of the burnt bone form soil flotation
Cregganmacar 3

context	sample		10mm	5mm	2mm	<2mm		total weight		max. length		colour		feature type		notes
39	9				<0.1			<0.1		negligible		white		Trough C38		unidentifiable

APPENDIX 3 LIST OF RMP SITES IN AREA

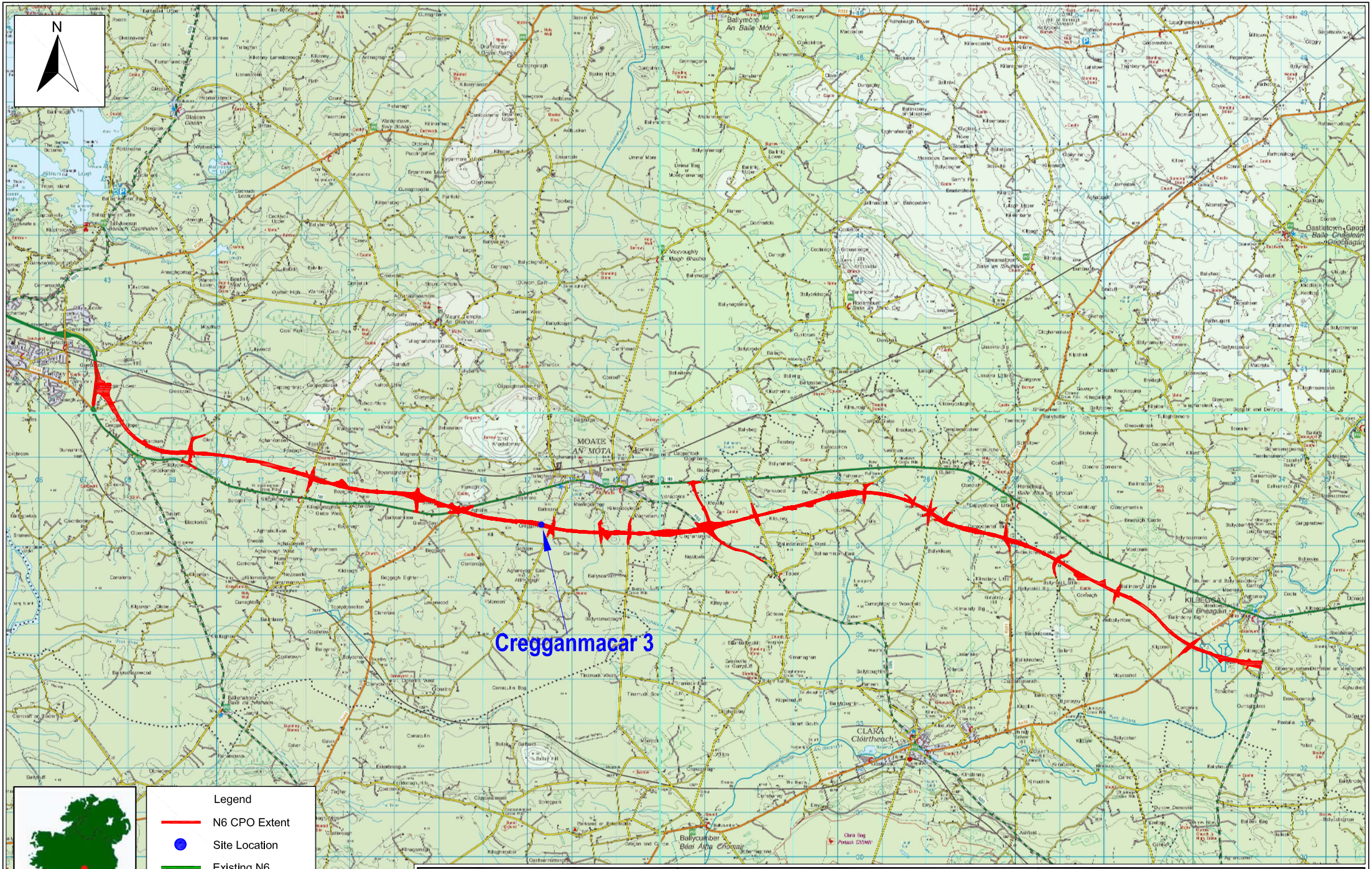
RMP No	Description
WM030-102	Earthwork
WM030-103	Castle
WM030-107	Ringfort (Rath/Cashel)
WM030-108	Ringfort (Rath/Cashel)
WM030-109	Castle site
WM030-111	Motte and Bailey
WM030-112	Castle
WM030-11201	Sheela-na-gig
WM030-11202	Architectural fragment
WM030-113	Cemetery
WM030-117	Bullaun Stone
WM036-015	Ringfort (Rath/Cashel)
WM036-016	Ringfort (Rath/Cashel)
WM036-018	Castle
WM036-019	Bullaun Stone
WM036-020	Mill Site
WM036-021	Ringfort (Rath/Cashel)
WM036-043	Earthwork site

See Figure 2 for location.

APPENDIX 4 LIST OF N6 SCHEME SITE NAMES

Site Name	*Ministerial Direction No.*	*NMS Registration Number*
Seeoge 2	A016/007	E2635
Moyally 7	A016/015	E2643
Kilcurley 1	A016/019	E2647
Cappydonnell Big 1	A016/025	E2653
Ardballymore 2	A016/028	E2656
Creggan lower 1	A016/030	E2658
Creggan lower 2	A016/031	E2659
Williamstown 1	A016/032	E2660
Williamstown 3	A016/033	E2661
Williamstown 4	A016/034	E2662
Boyanaghcalry 1	A016/035	E2663
Seeoge 1	A016/036	E2664
Aghafin 1	A016/037	E2665
Cregganmacar 1	A016/038	E2666
Cregganmacar 2	A016/039	E2667
Cregganmacar 3	A016/040	E2668
Curries 1	A016/041	E2669
Curries 2	A016/042	E2670
Culleenagower 1	A016/043	E2671
Moyally 2	A016/044	E2672
Moyally 1	A016/046	E3274
Moyally 3	A016/047	E2674
Moyally 5	A016/048	E2675
Moyally 6	A016/049	E2676
Tober 1	A016/051	E2677
Burrow or Glennanummer 1	A016/052	E2678
Burrow or Glennanummer 2	A016/053	E2679
Burrow or Glennanummer 3	A016/054	E2680
Russagh 4	A016/055	E2681
Russagh 1	A016/056	E2682
Russagh 2	A016/057	E2683
Russagh 3	A016/058	E2684
Kilbeg 1	A016/059	E2688
Kilbeg 2	A016/060	E2689
Kilbeg 4	A016/062	E2691
Kilbeg 5	A016/063	E2692
Kilbeg 6	A016/064	E2693
Kilbeg 7	A016/065	E2694
Correagh 1	A016/066	E3374
Ballinderry Little 1	A016/067	E2695
Ardballymore 1	A016/068	E2696
Kilgaroan 1	A016/069	E2697
Kilgaroan 2	A016/070	E2698
Kilgaroan 3	A016/071	E2699
Kilgaroan 4	A016/072	E2700
Kilgaroan 6	A016/074	E2702
Ballinderry Big 1	A016/076	E3275
Ballinderry Big 2	A016/077	E3276
Ballinderry Big 3	A016/078	E3277
Tonaphort 1	A016/079	E3278
Tonaphort 2	A016/080	E3279
Tonaphort 3	A016/081	E3280

Site Name	***Ministerial Direction No.***	***NMS Registration Number***
Kilbeggan South 1	A016/082	E3281
Kilbeggan South 2	A016/083	E3282
Kilbeggan South 3	A016/084	E3283
Cregganmacar 4	A016/085	E2703
Williamstown 2	A016/086	E2704
Kilbeg 8	A016/087	E3966



IAC Irish Archaeological Consultancy

Title:	E2668 Cregganmacar 3 site location on OS Discovery Series background
Project:	N6 Kinnegad to Athlone Phase 2: Kilbeggan - Athlone Dual Carriageway
Client:	Westmeath County Council

Scale:	As Shown
Date:	30/03/09
Produced by:	P Higgins
Job No:	J2291
Figure No:	1

N

WM030-107

WM030-108

WM030-113

WM030-117

WM030-112

WM030-111

WM030-109

WM030-103

WM030-102

WM036-016

WM036-015

WM036-019

WM036-018

WM036-020

WM036-021

WM036-043

Seeoge 2

Aghafin 1

Cregganmacar 1

Cregganmacar 2

Cregganmacar 3

Cregganmacar 4

Curries 2

Curries 1

FARNAGH

TULLAGHNAGEERAGH

AGHANARGIT

BALTRASNA

AGHAFIN

KILLEENBOYLEGAN

KILL

BOGGAGH
CONRAD

GORTEEN

CREGGANMACAR

CURRIES

MEATEGRANDGE

AGHAREVAGH EAST

ATTIMURTAGH

Legend

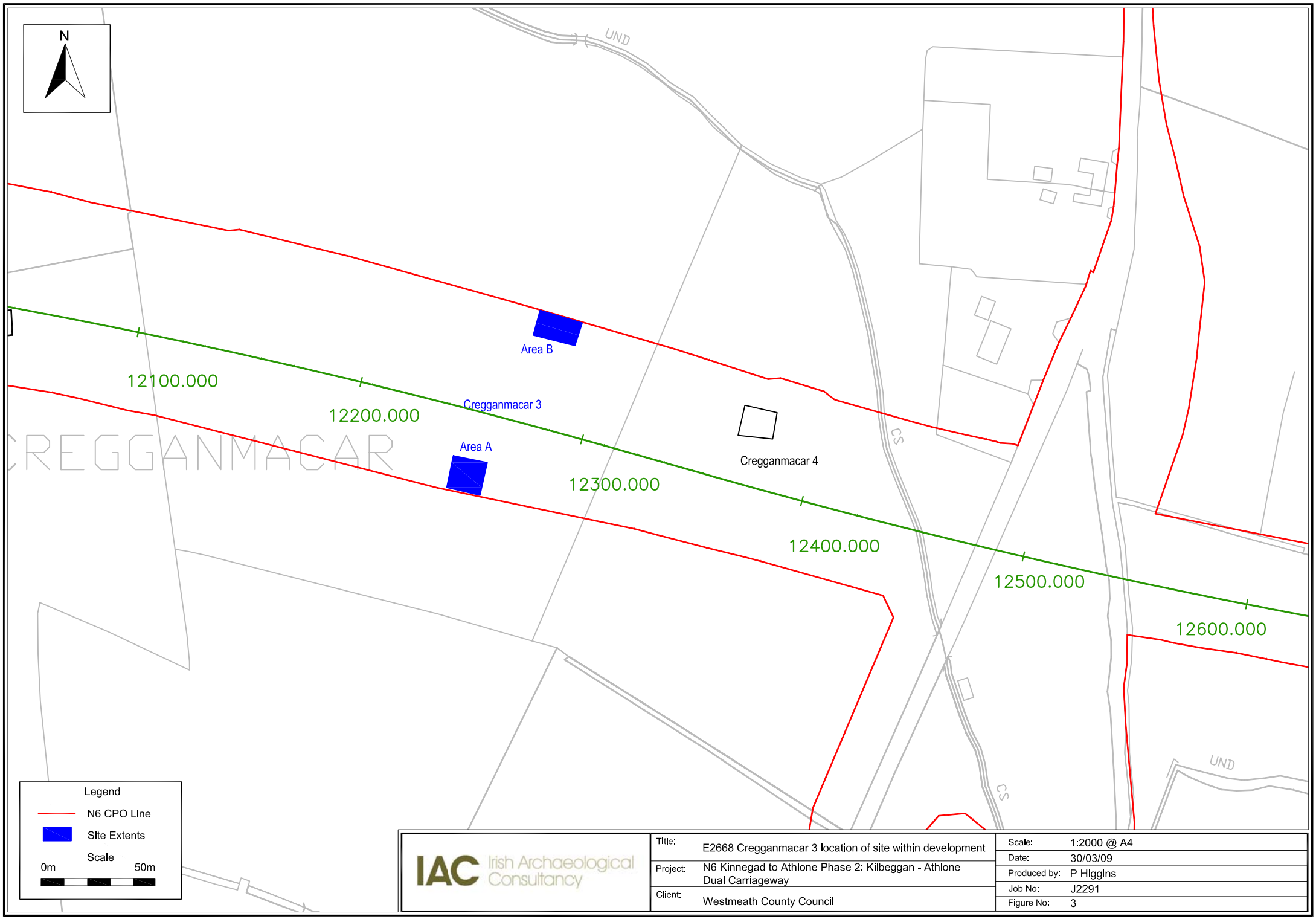
N6 CPO Line

RMPs

Scale

0m 250m

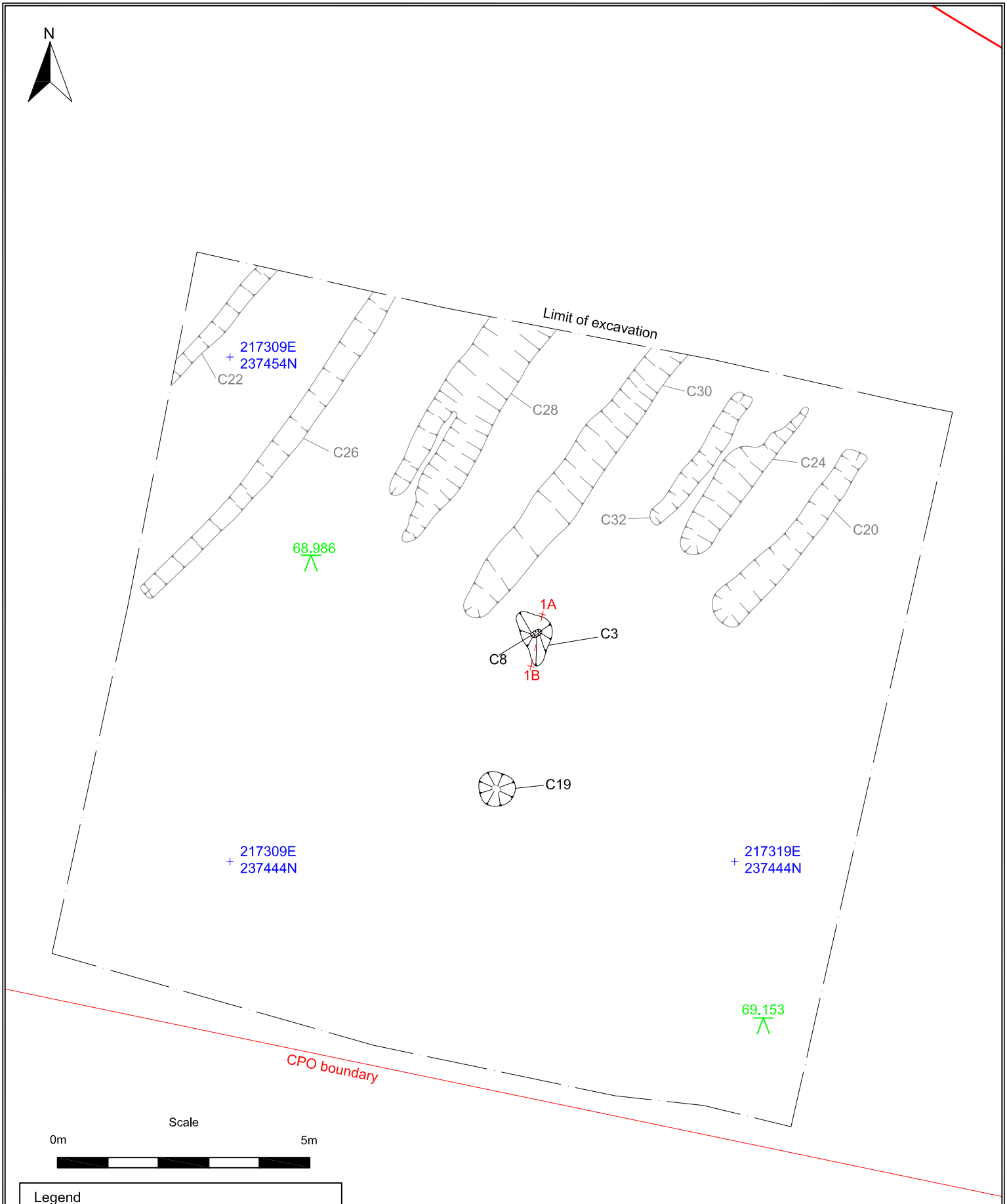
Title:	E2668 Cregganmacar 3 showing RMPs with OS background		
Project:	N6 Kinnegad to Athlone Phase 2: Kilbeggan - Athlone Dual Carriageway		
Client:	Westmeath County Council		
Scale:	1:10000 @ A3	Job No: J2291	IAC Irish Archaeological Consultancy
Date:	30/03/09	Figure No: 2	
Produced by:	P Higgins		



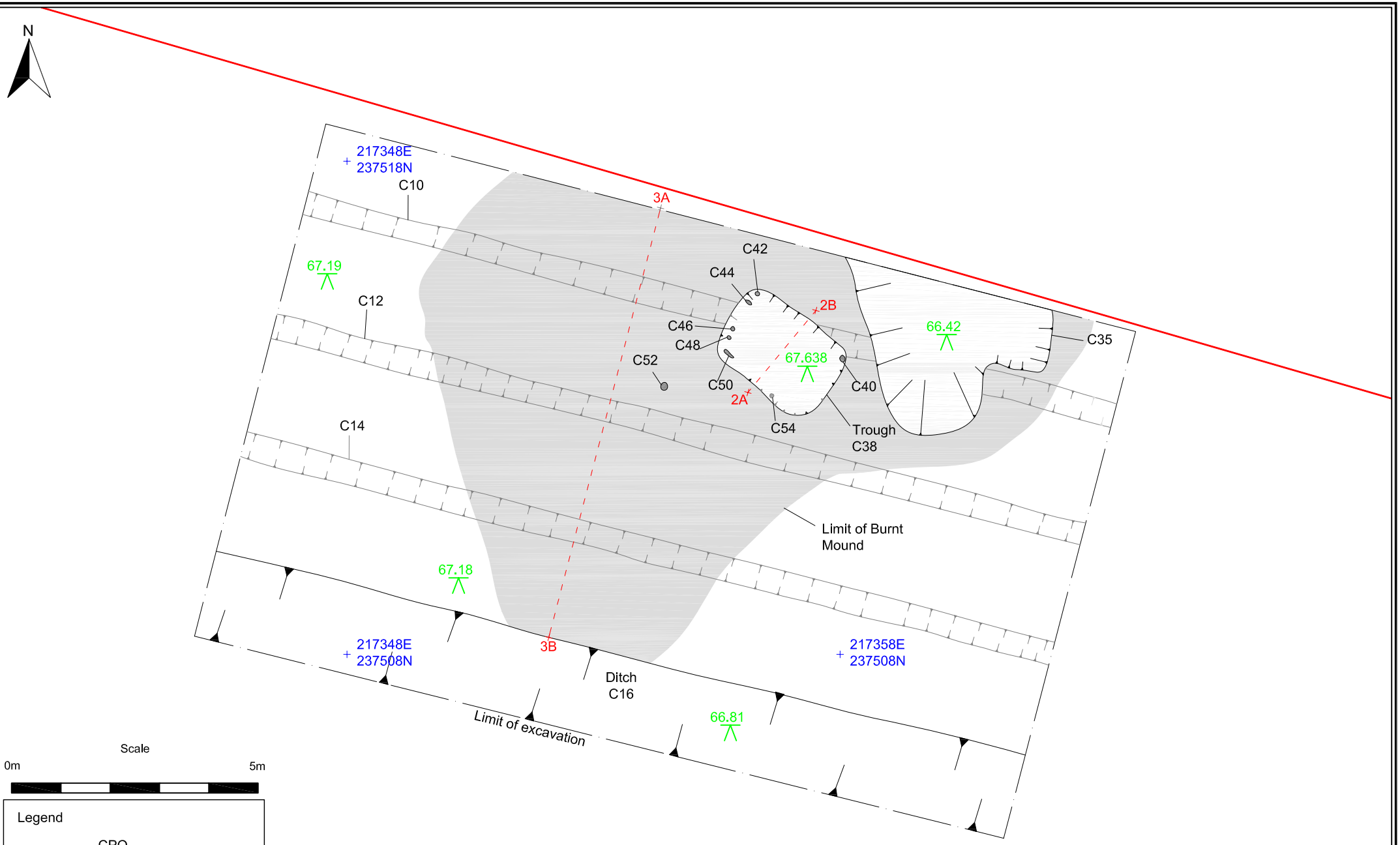
IAC Irish Archaeological Consultancy

Title:	E2668 Cregganmacar 3 location of site within development
Project:	N6 Kinnegad to Athlone Phase 2: Kilbeggan - Athlone Dual Carriageway
Client:	Westmeath County Council

Scale:	1:2000 @ A4
Date:	30/03/09
Produced by:	P Higgins
Job No:	J2291
Figure No:	3



IAC Irish Archaeological Consultancy	Title: E2668 Cregganmacar 3 post-excavation plan area A	Scale: 1:100 @ A4
	Project: N6 Kinnegad to Athlone Phase 2: Kilbeggan - Athlone Dual Carriageway	Date: 30/03/09
		Produced by: G Kearney
	Client: Westmeath County Council	Job No: J2291
		Figure No: 4

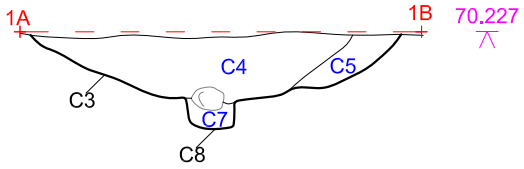


IAC Irish Archaeological Consultancy

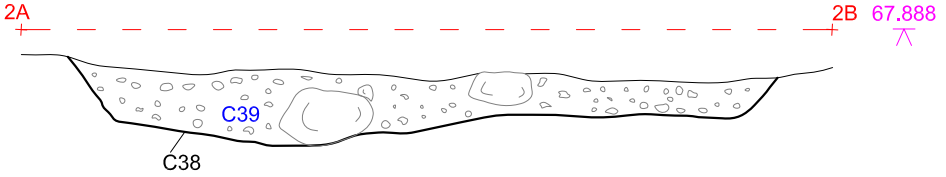
Title:	E2668 Cregganmacar 3 site plan area B
Project:	N6 Kinnegad to Athlone Phase 2: Kilbeggan - Athlone Dual Carriageway
Client:	Westmeath County Council
Scale:	1:100 @ A4
Date:	30/03/09
Produced by:	G Kearney
Job No:	J2291
Figure No:	5

Scale: 1:20

Cregeanmacar 3
West facing section of C3



Cregeanmacar 3
Southeast facing section of C38



Scale

0m 1m

Scale: 1:50

Cregeanmacar 3
West Facing Section

Scale

0m 2.5m

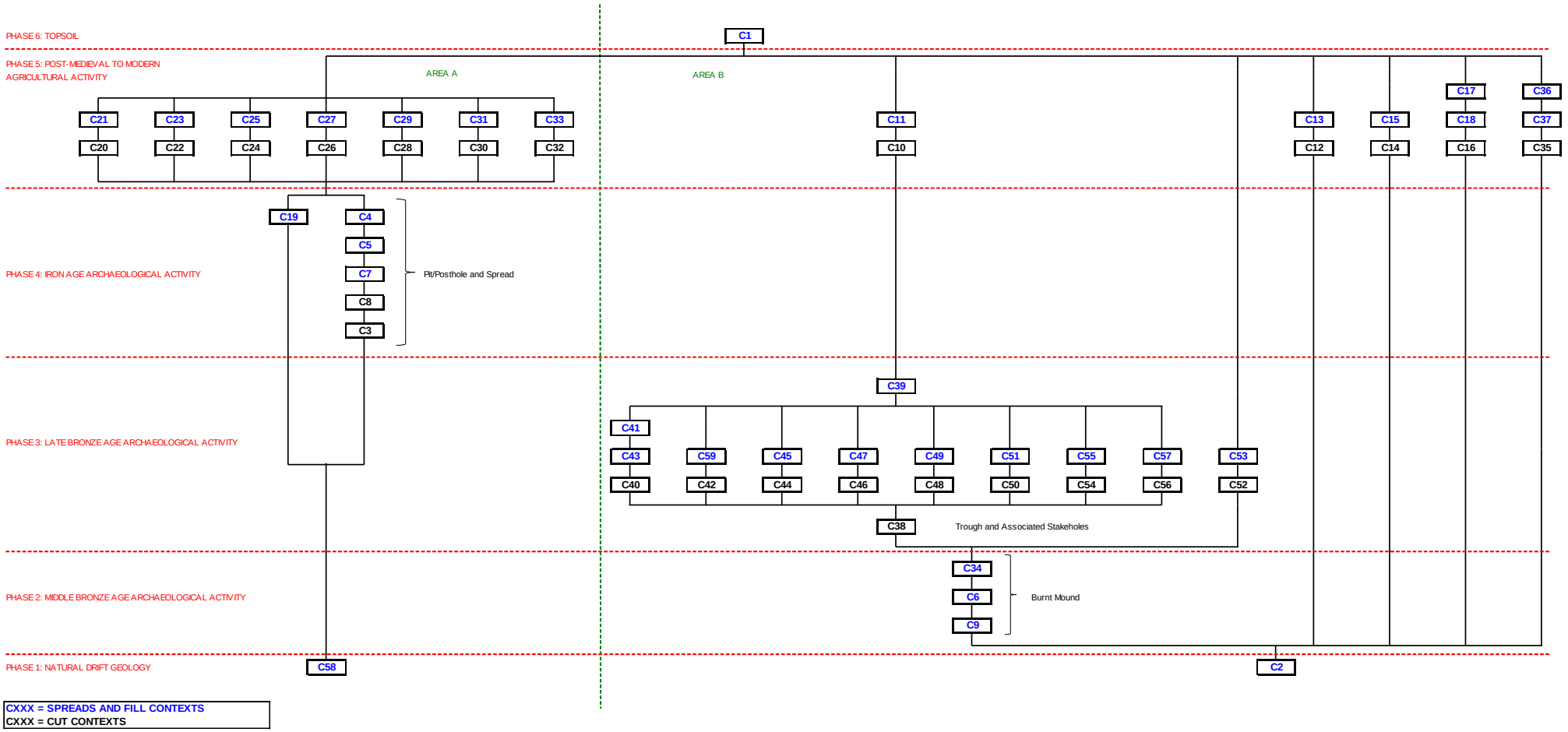
Legend

C##	Cut numbers
C##	Fill Numbers
	Stone
###.##	Reduced Levels

IAC Irish Archaeological Consultancy

Title:	E2668 Cregganmacar 3 sections 1 - 3
Project:	N6 Kinnegad to Athlone Phase 2: Kilbeggan - Athlone Dual Carriageway
Client:	Westmeath County Council

Scale:	As shown
Date:	30/03/09
Produced by:	G Kearney
Job No:	J2291
Figure No:	6



IAC Irish Archaeological Consultancy

Title:	E2668 Cregganmacar 3 matrix
Project:	N6 Kinnegad to Athlone Phase 2: Kilbeggan - Athlone Dual Carriageway
Client:	Westmeath County Council

Scale:	N/A
Date:	25/03/09
Produced by:	G Kearney
Job No:	J2291
Figure No:	7