Project Code: NGTS10
Client: Galway County Council
Date: May 2012

M17 Galway (Rathmorrissy) to Tuam Archaeological Services Contract (2010) forming part of the N17/N18 Gort to Tuam PPP Scheme, Co. Galway. Final Excavation Report for Cloondarone D (E4065) in the townland of Cloondarone, Co. Galway.

Ministerial Directions Number: A049
Excavation Registration Number: E4065
Townland Name: Cloondarone
Civil Parish: Tuam
Barony: Clare
Site Type: Burnt spread and associated trough, two burnt mounds, one with associated trough
National Grid Reference: Cloondarone 10: 142756, 248470; Cloondarone 11: 142749, 248424; Cloondarone 12: 142724, 248412
Chainage: Cloondarone 10: 22410-22420; Cloondarone 11: 22370-22380; Cloondarone 12: 22360-22380
Archaeological Consultant: Headland Archaeology (Ireland) Ltd
Director: Liam McKinstry
Report Author: T.J. O' Connell with Liam McKinstry
Report Status: Approved

Project Code: NGTS10
Client: Galway County Council
Date: May 2012

M17 Galway (Rathmorrissy) to Tuam Archaeological Services Contract (2010) forming part of the N17/N18 Gort to Tuam PPP Scheme, Co. Galway. Final Excavation Report for Cloondarone D (E4065) in the townland of Cloondarone, Co. Galway.

Ministerial Directions Number: A049
Excavation Registration Number: E4065
Townland Name: Cloondarone
Civil Parish: Tuam
Barony: Clare
Site Type: Burnt spread and associated trough, two burnt mounds, one with associated trough
National Grid Reference: Cloondarone 10: 142756, 248470; Cloondarone 11: 142749, 248424; Cloondarone 12: 142724, 248412
Chainage: Cloondarone 10: 22410-22420; Cloondarone 11: 22370-22380; Cloondarone 12: 22360-22380
Archaeological Consultant: Headland Archaeology (Ireland) Ltd
Director: Liam McKinstry
Report Author: T.J. O' Connell with Liam McKinstry
Report Status: Approved

CONTENTS **Page**

EXECUTIVE SUMMARY 4

1 INTRODUCTION 6

2 SITE BACKGROUND AND LOCATION 7

2.1 Site location 7
2.2 General background 7
2.3 Recent excavations 7

3 OBJECTIVES AND METHODOLOGY 9

3.1 Objectives 9
3.2 Methodology 9

4 THE RESULTS 10

4.1 Excavation results: Cloondarone 10 (Figure 3; Plate 1) 10
4.2 Excavation results: Cloondarone 11 (Figure 4; Plate 3) 10
4.3 Excavation results: Cloondarone 12 (Figure 7; Plate 6) 11
4.4 The finds and samples 11

5 DISCUSSION 12

5.1 Phasing and Chronology 12
5.2 Burnt mounds in an Irish context 12
5.2 Siting 13
5.3 Function 14
5.5 Conclusions 15

6 ARCHIVE QUANTITIES 17

ACKNOWLEDGEMENTS 17

REFERENCES 18

FIGURES

Figure 1 E4065 / Cloondarone D, Site location
Figure 2 E4065 / Cloondarone D, Cloondarone 10-12
Figure 3 E4065 / Cloondarone 10, Site layout
Figure 4 E4065 / Cloondarone 11, Site layout
Figure 5 E4065 / Cloondarone 11, East and west facing section of burnt mound (1103)
Figure 6 E4065 / Cloondarone 11, Northeast facing section of trough (1105)
Figure 7 E4065 / Cloondarone 12, Site layout
Figure 8 E4065 / Cloondarone 12, Southwest facing section of spread (1204)
Figure 9 E4065 / Cloondarone 12, Southwest facing section of trough (1203)

PLATES

Plate 1 Cloondarone 10. Pre-excavation view of site showing burnt spread (10003), facing north
Plate 2 Cloondarone 10. Mid-excavation view of burnt spread (10003), facing west
Plate 3 Cloondarone 11. Pre-excavation view of burnt mound (1103), facing north
Plate 4 Cloondarone 11. Mid-excavation view of trough (1105), facing southwest
Plate 5 Cloondarone 11. Post-excavation view of trough (1105), facing north
Plate 6 Cloondarone 12. Pre-excavation view of burnt mound (1204), facing west
Plate 7 Cloondarone 12. Mid-excavation view of burnt spread (1204), facing west
Plate 8 Cloondarone 12. Mid-excavation view of trough (1203), facing northeast
Plate 9 Cloondarone 12. Post-excavation view of trough (1203), facing west

APPENDICES

Appendix 1 Context Register
Appendix 2 Sample Registers
Appendix 3 Drawing Register
Appendix 4 Photo Register
Appendix 5 Site Matrix
Appendix 6 The charred plane remains from Site E4062
Appendix 7 Radiocarbon dates and certificates

EXECUTIVE SUMMARY

This report presents the final results of an archaeological excavation at Cloondarone, Co. Galway, undertaken on behalf of Galway County Council. The excavation works were undertaken as part of an Archaeological Services Contract (2010) prior to the commencement of construction of the M17 Galway (Rathmorrissy) to Tuam section of the N17/18 Gort to Tuam PPP Scheme. The M17 scheme extends from Rathmorrissy townland (at the southern end of the scheme) to Kilmore townland (at the northern end of the scheme) in Co. Galway. The Minister of the Environment, Heritage and Local Government, following consultation with the National Museum of Ireland, issued Directions to Galway County Council for archaeological works associated with the road development (A049). Thirteen areas or sites of archaeological potential were identified in the townland of Cloondarone during Stage (i) testing (carried out under a separate Contract) and were each assigned individual sub numbers; Cloondarone 1-13. For the purposes of excavation these sites were grouped under five registration numbers: E4062 – Cloondarone A (Cloondarone 1-5); E4063 – Cloondarone B (Cloondarone 6-8); E4064 – Cloondarone C (Cloondarone 9); E4065 – Cloondarone D (Cloondarone 10-12); and E4066 – Cloondarone E (Cloondarone 13). The Excavation Registration Number, E4065, was allocated by the Department for archaeological excavations at Cloondarone D under the direction of Liam McKinstry of Headland Archaeology (Ireland) Ltd.

The Archaeological Services Contract (2010) was commissioned by Galway County Council and funded by the National Roads Authority; the contract was managed by Hyder Tobin Engineers on behalf of Galway County Council.

Stage (i) Test Excavation and Survey Services along the scheme were undertaken by CRDS Ltd between August and January 2010 (Bartlett 2009; Shine *et al.* 2009a-d). These test excavations identified a total of 27 archaeological sites which required full archaeological excavation under Stage (iii) of the service requirements. Stage (ii) Pre-Excavation Services were also undertaken by CRDS Ltd.

At that time a number of areas within the scheme were not subject to Stage (i) test excavation. Testing in these areas, comprising 17 specified locations omitted from the previous Contract (2009), were carried out by Headland Archaeology (Ireland) Ltd on behalf of Galway County Council between 11 and 21 May 2010 under Excavation Registration Number E4022. No additional archaeological sites were identified.

Of the thirteen newly discovered sites at Cloondarone the test excavations identified seven burnt mounds of probable Bronze Age date with a further five sites consisting of burnt spreads with associated features such as pits and potential troughs. A possible kiln was also uncovered (Bartlett 2009; Shine *et al.* 2009a). The results of the testing programme in Cloondarone 1-13 can be summarised as follows:

Cloondarone 1	Burnt spread	Cloondarone A
Cloondarone 2	Burnt spread	
Cloondarone 3	Burnt Mound	
Cloondarone 4	Burnt spread	
Cloondarone 5	Burnt spread	
Cloondarone 6	Burnt Mound	Cloondarone B
Cloondarone 7	Burnt Mound	
Cloondarone 8	Burnt Pit	
Cloondarone 9	Possible kiln, pits & spread	Cloondarone C
Cloondarone 10	Burnt Mound	Cloondarone D
Cloondarone 11	Burnt Mound	

Cloondarone 12	Burnt Mound with possible trough	
Cloondarone 13	Burnt Mound	Cloondarone E

Full archaeological excavation was undertaken at site Cloondarone D (E4065) in June 2010. A preliminary report on the results of the excavation was submitted in August 2010.

Cloondarone D was situated in the townland of Cloondarone and was located 3.19 km south-west of Tuam town (Figure 1). The site was situated on flat ground that appeared to be well drained.

The excavation
Cloondarone D comprised the three sites of Cloondarone 10–12.

Cloondarone 10: This area measured c. 6.25 m (north–south) by c. 6 m and excavations revealed an irregular burnt spread consisting of a single deposit of moderate to firmly compact dark greyish black clayey silt containing pockets of mid-orange clayey silt and redeposited natural clay, moderate inclusions of small stones, coarse pebbles and flecks of charcoal which measured 3 m (east–west) by 1.20 m and 0.14 m deep. Though charcoal was present within this deposit, heat-shattered stones were notably absent. No troughs or other cut features were associated with this spread.

Cloondarone 11: This area measured c. 11 m (north–south) by c. 10 m and excavation revealed a trough and a burnt mound.

An oval trough was located in the center of the site. It measured 1.87 m (east–west) by 1.30 m and 0.52 m deep with straight to concave sides and a flat base. A circular burnt mound, composed of moderately compact mid black, grey and orange silty clay, very frequent heat-shattered stone and occasional charcoal flecks, overlay the trough. It measured 7 m (east–west) by 6.7 m and 0.20 m deep.

Cloondarone 12: This area measured c. 21 m (north–south) by c. 9 m and excavation revealed a trough and a burnt mound.

A sub-rectangular trough was located near the western limit of the site. It measured 1.70 m (north-west–south-east) by 0.45 m and 0.22 m deep, with steep vertical sides and a flat base. An irregular burnt spread, consisting of moderately compact, black/dark grey peaty silt, with frequent fire-cracked stone and occasional charcoal fleck inclusions was located directly southeast of the trough. It measured 5.50 m (east–west) by 5 m and 0.10 m deep.

Dating
The activity at Cloondarone 11 was radiocarbon dated to the Final Neolithic/Early Bronze Age and the activity at Cloondarone 12 was radiocarbon dated to the Middle Bronze Age.

Results of specialist analysis
Palaeoenvironmental remains: The only charred plant material recovered from contexts associated with the burnt mound and burnt spread activity at Cloondarone D was charcoal fragments. Visual inspection of the charcoal showed that the charcoal derived from both oak and non-oak species. The species identified included hazel and birch which suggests that wet to marginal woodland was being exploited for fuel during the time of burnt mound activity.

1 INTRODUCTION

The N17/18 Gort to Tuam PPP Scheme is approximately 57 km in length and will connect the N18 Gort to Crusheen Scheme to the existing N17 road immediately north of Tuam. This overall scheme forms part of the Atlantic Corridor designed to connect Letterkenny, County Donegal to Waterford city with a high quality dual carriageway/ motorway link, which will run via Sligo, Galway and Cork. Development of the Atlantic Corridor is an objective of the National Development Plan (NDP) 2007 – 2013. It is also an objective of the Transport 21 framework.

The proposed M17 Galway (Rathmorrissy) to Tuam section of the N17/18 Gort to Tuam PPP Scheme is approximately 26 km long and will connect the existing M6, from Dublin to Galway, at Rathmorrissy with the N17 south of Tuam (Figure 1). An Environmental Impact Statement (EIS) was carried out on the entire length of the proposed road (Galway County Council 2007). The scheme was approved by An Bord Pleanála (Ref. PL07 .HA0005) in March 2009.

The road construction project is being funded as a Public Private Partnership (PPP) scheme. The total archaeological cost is administered by the National Roads Authority through Galway County Council. The current programme of works has been undertaken by Headland Archaeology (Ireland) Ltd following the award of an Archaeological Consultancy Services Contract (2010) by Galway County Council.

A geophysical survey was undertaken within the road corridor by Earthsound Archaeological Geophysics (Bonsall and Gimson 2006). This survey informed the findings of the subsequent EIS (Galway County Council 2007). The EIS included a chapter on Archaeological and Cultural Heritage which was compiled by Sheila Lane & Associates (2007).

Test excavations under Stage (i) of the Archaeological Services Contract (2009) were undertaken by CRDS Ltd between August and January 2010 (Bartlett 2009; Shine *et al*. 2009a-d). These resulted in the identification of 27 archaeological sites within the CPO area. Of these, a high proportion were categorised as burnt mounds or burnt spreads with the remainder taking the form of early modern vernacular building remains, a corn-drying kiln, (likely) prehistoric enclosures and approximately 60% of an upstanding ringfort. Stage (ii) Pre-Excavation Services on the scheme involved the removal and management of topsoil to fully expose the archaeological features and deposits, hand cleaning of exposed surfaces and mapping of features identified at these sites. This was carried out by CRDS Ltd between December 2009 and March 2010.

Further test excavation under Stage (i) of the Archaeological Services Contract (2010) were undertaken by Headland Archaeology (Ireland) Ltd between 11 and 21 May 2010 (Bolger *et al*. 2010), however no additional archaeological sites were identified.

Archaeological excavations were undertaken at each of the 27 identified archaeological sites by Headland Archaeology (Ireland) Ltd between May 2010 and July 2010 under Stage (iii) of the Archaeological Services Contract (2010).

2 SITE BACKGROUND AND LOCATION

2.1 Site location

Cloondarone D (E4065) was situated in the townland of Cloondarone, parish of Tuam, barony of Clare some 3.19 km south west of Tuam town (Figure 1). The component areas (Cloondarone 10-12) were situated on flat ground that appeared to be well drained (Figure 2).

Area	National Grid Reference	Chainage
Cloondarone 10	142756, 248470	22410-22420
Cloondarone 11	142749, 248424	22370-22380
Cloondarone 12	142724, 248412	22360-22380

Table 1 – Locations of sites comprising Cloondarone B

The natural geology of the townland of Cloondarone has been characterised as limestone bedrock, which is overlain by layers of glacial till and/or alluvium and old lake bed sediments. The Clare and Suileen Rivers form the eastern townland boundaries of Cloondarone. The north, west and south of the townland is primarily composed of bog and marshland. A ridge of high land dominates the central area of the townland and is surrounded by low lying bog and marsh which is liable to flood. The sites at Cloondarone are situated within a wetland/dryland interface along the eastern aspect the high ground or ridge. This ridge affords commanding views of the surrounding lowlands. The lowland areas are primarily marginal land drained by the Clare and Suileen Rivers and liable to flood (Shine *et al*. 2009a).

2.2 General background

A possible well site (RMP GA043-050), situated in the townland of Cloondarone, is recorded *c*. 750 m to the northwest of the site, while a ringfort or rath (RMP GA043-045) and a children's burial ground (RMP GA043-045001) are recorded *c*. 575 m northeast of Cloondarone D in the townland of Cloonascragh (Figure 1). All of these recorded sites lay outside the CPO and are unaffected by the scheme.

2.3 Recent excavations

Archaeological investigations undertaken as part of Stage (i) of the Archaeological Services Contract (2010) in advance of the M17 Galway (Rathmorrissy) to Tuam section of the N17/18 Gort to Tuam PPP Scheme identified a number of sites in the vicinity of Cloondarone D.

Cloondarone A (E4062) was located *c*. 650 m to the NNW of Cloondarone D. Excavation there revealed prehistoric burnt mounds and spreads and associated features including troughs (O' Connell and McKinstry 2010a). Cloondarone B (E4063) was located *c*. 300 m to the north of Cloondarone D. Excavation in there revealed a trough and an associated burnt spread, a trough and an associated burnt mound. Radiocarbon dates returned from Cloondarone B indicated activity was occurring there during the Final Neolithic/Early Bronze Age and the Middle Bronze Age (O' Connell and McKinstry 2010b). Cloondarone C (E4064) was located *c*. 80 m to the north of Cloondarone D. Excavation there revealed a late medieval kiln and post-medieval furrows (O' Connell and McKinstry 2010c). Cloondarone E (E4066) was located *c*. 120 m to the south of Cloondarone D. Excavations there revealed two small burnt spreads and a post-medieval field boundary system (O' Connell and

McKinstry 2010d). These sites were fully excavated during Stage (iii) of the current Contract (2010) and are the subject of individual final reports.

3 OBJECTIVES AND METHODOLOGY

3.1 Objectives

The objective of the work was the preservation-by-record through appropriate rescue excavation of any significant archaeological features or deposits, which have been identified within the land take of the proposed development, in advance of the road construction programme, so as to mitigate the impact of the road development on this archaeological material.

3.2 Methodology

Full archaeological excavation was undertaken at Cloondarone D in May and June 2010. The crew for the excavation consisted of 1 director, 1 supervisor and between 8 and 10 site assistants.

Topsoil stripping of the site was conducted using a 360° tracked machine fitted with a 1.9 m wide ditching (toothless) bucket under constant archaeological supervision. The following is a table outlining the total area stripped for each site

Area	**Extent**
Cloondarone 10	36.95 m²
Cloondarone 11	79.06 m²
Cloondarone 12	155.98 m²

Table 2 – Total Areas stripped at Cloondarone 10-12

The resulting surface was cleaned and all potential features investigated by hand at Stage (iii). Archaeological contexts were recorded by photograph and on *pro forma* record sheets. Plans and sections were drawn at scales of 1:50 and 1:20 respectively. Registers are provided in the appendices (Appendices 1-4). Ordnance Datum levels and feature locations were recorded using Penmap and a total station theodolite.

Environmental samples were taken from any deposits suitable for analysis or dating as per the specifications contained in the Archaeological Services Contract (2010), Headland Archaeology (Ireland) Ltd environmental guidelines and in consultation with environmental archaeologist and archaeobotanist Dr. Scott Timpany. No artefacts were recovered during the excavation.

As part of stage (iv) post-excavation works, ten soil samples have been examined by the appropriate specialists and the results are incorporated into this report (see Appendices).

4 THE RESULTS

4.1 Excavation results: Cloondarone 10 (Figure 3; Plate 1)

Cloondarone 10 extended across an area measuring *c*. 6.25 m (north/south) by *c*. 6 m. The topsoil within this area (10001) was an average of 0.20 m in depth and comprised mid brown silty clay. The natural geological stratum (10002) was characterised by compact yellow grey silt.

Potential Prehistoric Activity
Excavation revealed an irregular burnt spread (Figure 3; Plate 2) consisting of a single deposit of moderate to firmly compact dark greyish black clayey silt containing pockets of mid-orange clayey silt and redeposited natural clay, moderate inclusions of small stones, coarse pebbles and flecks of charcoal (10003). It measured 3 m (east/west) by 1.2 m and 0.14 m thick. One sample which was taken from the deposit for processing. Charcoal fragments recovered from the deposit proved to be from non-oak species (Appendix 5).

No troughs or cut features were associated with this spread.

4.2 Excavation results: Cloondarone 11 (Figure 4; Plate 3)

Cloondarone 11 extended across an area measuring *c*. 11 m (north/south) by *c*. 10 m. The topsoil within this area (1101) was an average of 0.20 m in depth and comprised loose to moderately compact slightly grey to mid brown silty clay. The natural geological stratum (1102) was characterised by yellow grey compact silt.

Final Neolithic/Early Bronze Age Activity
Excavation revealed a trough and a burnt mound at Cloondarone 11.

Trough (Figure 6; Plates 4 and 5): An oval trough (1105) was located at the centre of the site. It measured 1.87 m (east/west) by 1.30 m and 0.52 m deep with straight to concave sides and a flat base. The trough contained four fills. The primary fill consisted of compact, grey yellow silty sand, with charcoal flecks (1109). Charcoal was recovered from this deposit during processing of bulk soil samples and was found to be mostly from non-oak species (Appendix 6) A sample of hazel charcoal from this deposit was radiocarbon dated to 2127-1891 cal BC (2σ) (UBA-16996) (Appendices 6 and 7).The secondary fill of the trough consisted of a moderately compact, black to grey-brown sandy clay with frequent heat shattered stone and charcoal flecks (1108). Charcoal recovered from this deposit was determined to be mostly from non-oak species (Appendix 6). The tertiary fill was a deposit of moderately compact, mid-black to grey silty clay with frequent heat shattered stone and moderate charcoal flecks (1107).The final fill of the trough was composed of compact, black brown silty clay (1104).

Burnt mound (Figure 5; Plate 3): A circular burnt mound composed of a single deposit of moderately compact, mixed, mid black, grey and orange silty clay, very frequent heat-shattered stone and occasional charcoal flecks (1103) overlay the trough (1105) described above. The mound measured 7 m (north-south) by 6.70 m and 0.20 m thick. Charcoal recovered from this deposit was determined to be mostly non-oak wood charcoal (Appendix 6).

4.3 Excavation results: Cloondarone 12 (Figure 7; Plate 6)

Cloondarone 12 extended across an area measuring *c*. 21 m (north/south) by *c*. 9 m. The topsoil at the site (1201) was an average of 0.30 m in depth and comprised a moderately compact, mid brown silty clay. The natural geological stratum (1202) was characterised by a compact, yellowy grey gravelly silt, with small to medium sub-angular stones.

Middle Bronze Age Activity
Excavation revealed a trough and a burnt mound at Cloondarone 12.

Trough (Figure 9; Plates 8 and 9): A sub-rectangular trough (1203) was located near the western limit of the site. It measured 1.70 m (northwest/southeast) by 0.45 m and 0.22 m deep with steep vertical sides and a flat base. The trough contained two fills. The primary fill was a firm, dark grey-black clay with decayed stone, charcoal and possible burnt bone or shell fleck inclusions (1205). Charcoal recovered from this deposit was identified as deriving from both oak and non-oak species (Appendix 6). A sample of birch charcoal was radiocarbon dated to 1426-1308 cal BC (2σ) (UBA-16997) (Appendix 6 and 7) dating the activity at Cloondarone 12 to the Middle Bronze Age. The final fill of the trough consisted of firm mid-grey, charcoal-rich clay (1206). Charcoal recovered from this deposit was identified as deriving from both oak and non-oak species (Appendix 6).

Burnt Spread (Figure 8; Plate 7): The burnt spread (1204) was located to the southeast of the trough. It consisted of moderately compact, black/dark grey peaty silt, with frequent fire-cracked stone and occasional charcoal fleck inclusions. It measured 5.50 m by 5 m and 0.10 m deep. Charcoal recovered from this deposit was identified as deriving from both oak and non-oak species (Appendix 6).

4.4 The finds and samples

No finds were retrieved during the investigations at Cloondarone D. A number soil samples were taken.

Analysis of the samples
In consultation with a specialist ten soil samples were selected for processing in order to recover any relevant environmental data. The only charred plant materials recovered from contexts associated with the burnt mound and burnt spread activity at Cloondarone D were charcoal fragments. Visual inspection of this material showed that the charcoal derived from both oak and non-oak species. The species identified included hazel and birch which suggests that wet to marginal woodland was being exploited for fuel during the period of burnt mound activity.

5 DISCUSSION

The principal archaeological features uncovered at this site were a burnt spread in Cloondarone 10, a trough and a burnt mound in Cloondarone 11 and a trough and a burnt spread in Cloondarone 12. The results of the excavation indicate the sites represent the remains of burnt mound activity.

Burnt mounds have been identified in almost every part of the country and are the most common prehistoric monument in Ireland (Waddell 2000, 174). Large infrastructural projects have consistently identified large numbers of these sites; for example burnt mounds and spreads formed the bulk of the recorded archaeology in advance of the gas pipeline to the west (Grogan *et al.* 2007, 81).

Burnt mounds are commonly referred to in the literature as *fulachtaí fiadh*, though it has been suggested by Brindley and Lanting that the use of the term *fulacht fiadh* should be confined to sites with troughs and mounds of burnt stone (1990, 56), the classic site-type of the burnt mound tradition. It is possible that, as no associated troughs were found associated with the burnt spread in Cloondarone 10 and there was an absence of heat-shattered stone, the activity there may represent the remains of some other activity not necessarily associated with the burnt mound tradition. However it would seem likely though given the spreads proximity to the burnt mound activity in Cloondarone 11 and 12, that the spread at Cloondarone 10 does represent the remains of burnt mound activity. Features such as troughs, in this instances, may have been removed due to later agricultural practices or may lie beyond the extent of the current road development.

5.1 Phasing and Chronology

The activity at Cloondarone 11 was radiocarbon dated by hazel charcoal to 2127-1891 cal BC (2σ) (UBA-16996) (Appendices 6 and 7) and the activity at Cloondarone 12 was dated by birch charcoal to1426-1308 cal BC (2σ) (UBA-16997) placing activity at these sites to the Final Neolithic/Early Bronze Age and to the Middle Bronze Age respectively.

Burnt mounds have been found to have a very broad date range with a small number of sites dating from the Late Neolithic and occasional examples producing dates from the Iron Age or later. However, burnt mounds that have been radiocarbon dated show a marked concentration of sites in the Middle Bronze Age, while there is a smaller but significant group indicating use in the Late Bronze Age (Brindley and Lanting 1990). A recent dating program has generally corroborated the findings of Brindley and Lanting; though burnt mounds excavated in advance of the gas pipeline to the west had a high concentration of dates to the 2500-1700 BC period (Grogan et al. 2007, 96), the majority of sites were within the 1700-1000 BC period (*ibid.)*. There were only a small number of sites on this project which returned Late Bronze Age dates. Baillie (1990, 167) has made the suggestion that burnt mounds could have been used for the most part before the eruption of Mount Heckla in 1159 BC, while the environmental changes brought about by the volcano heralded a reduction in their use in the first millennium BC.

The radiocarbon dates returned for the present site are consistent with the trends identified both by Brindley and Lanting (1990) and Grogan (2007).

5.2 Burnt mounds in an Irish context

Classic burnt mounds appear in the landscape as low grassy mounds of crescent or U-shaped plan (Waddell 2000, 174), though excavation has shown that in many cases the mound can be ploughed out

or indeed may never have been on such a scale as to remain identifiable above ground. Excavated burnt mounds usually consist of a mound or spread of burnt stones and firing debris and a trough or troughs. Frequently, associated features such as hearths, pits, stakeholes and postholes are also identified but there is a great deal of variation in the morphology of excavated site types.

The number of identified burnt mounds in the country is constantly increasing and there are at least 7,000 currently known (Grogan *et al.* 2007, 81). Burnt mound sites are commonly referred to as '*fulacht fiadh*' – a phrase composed of two Irish words – in historic and antiquarian sources, and this terminology is commonly used in modern academic literature in reference to such sites. The first word means 'recess' or 'cavity' and by extension came to be associated with pits, pits specifically used for cooking, the act of cooking and sometimes even the food itself (Ó Drisceoil 1988, 673; Ó Drisceoil 1990, 158). The second word has two possible interpretations: *fiadh*, of the deer or of the wild, and *fian*, a roving band of hunters or warriors, occasionally 'of the *Fianna* or Fionn Mac Cumhail' in reference to a mystical army who hunted and lived outdoors (Ó Drisceoil 1988, 673). Whether these early references refer to what we now class as burnt mounds is another matter, although a number of the documentary references from Ireland include explicit descriptions of the process of boiling liquid using heated stones for both cooking and bathing purposes (Ó Neill 2004, 79).

The earliest recorded reference to the term '*fulacht*' occurres in *Cormac's Glossary* from approximately AD 900 (Ó Drisceoil 1988, 673), however many of the sources in which the term is found have their roots in the oral tradition making the term difficult to accurately date (Ó Drisceoil 1990, 157). A text from the 12th century (*Agallamh beg*) describes how a site located on the bank of a stream is regarded as both a cooking place and ancient (Ó Drisceoil 1988, 673).

The association between burnt mounds/*fulachtaí fiadh* and highly mobile groups such as the *fian* has been long debated. The use of burnt mounds for cooking is much more time intensive than roasting meat over a fire, and would point to a more sedentary group, but few settlements have been found in the area immediately surrounding them. Recently the general picture that has been emerging indicates that, while they may not be immediately adjacent to settlement sites, they often clustered in areas where other potentially contemporaneous sites, such as standing stones, habitation enclosures and hilltop enclosures, occur (Grogan 2005, Vol. 1, 41). This would imply that they were part of a wider cultural landscape and could have been used by a largely sedentary society.

Grogan *et al.* (2007, 91) have concluded, from the quantities of heat-shattered stone forming most spreads and mounds, that sites were likely used multiple times on separate occasions and that most sites would have had an extended, if periodic, use. Using digital terrain modelling, they calculated that the average number of uses per site was approximately 250 (*ibid*). They also noted that spoil was occasionally present on top of earlier mounds indicating that troughs had possibly been repositioned (*ibid*).

5.2 Siting

The siting of this monument type generally is noteworthy as they are almost invariably located close to a water source (e.g. Ó Neill 2000). This was well demonstrated during the North Munster Project (Grogan 2005) where the burnt mounds identified were located along the margins of wetland, small lakes, turloughs, bog and marsh as well as the edges of river estuaries and on the banks of rivers and streams. The sites comprising Cloondarone D were situated on flat ground that appeared to be well drained at the time of excavation. The natural geology of the townland of Cloondarone has been characterised as limestone bedrock, which is overlain by layers of glacial till and/or alluvium and old lake bed sediments. The Clare and Suileen Rivers form the eastern townland boundaries of

Cloondarone. The north, west and south of the townland is primarily composed of bog and marshland. A ridge of high ground dominates the central area of the townland and is surrounded by low-lying bog and marsh, which is liable to flood. As such the sites at Cloondarone are generally situated within a wetland/dryland interface along the eastern aspect the high ground or ridge. This ridge affords commanding views of the surrounding lowlands. The lowland areas are primarily marginal land drained by the Clare and Suileen Rivers and liable to flood (Shine *et al.* 2009a).

It has been well documented that burnt mound can be densely concentrated in areas that were suitable for their construction. Ó Drisceoil (1988, 676) describes how they 'are frequently found together in groups of up to ten or more'. This type of clustering of burnt mounds was evident within Cloondarone D and in the surrounding landscape with additional burnt mound sites being excavated at Cloondarone A, B and E. This underlines the desirability of the location of the present site for burnt mounds.

5.3 Function

The technology of burnt mounds is well known. Stones were heated in a nearby fire and placed in a water-filled trough – sometimes lined with timber, stones, clay or reed matting – the heat from the stones would then bring the water to boil. Once cool the stones were removed from the trough and discarded, creating a characteristic mound or spread of heat-shattered stones. How the boiled water was subsequently utilised, however, is more difficult to ascertain. It is most likely that burnt mounds were multifunctional or that different sites were used for different purposes. Determining what each site was used for is difficult, in large part because of the lack of definitive evidence and recovered finds.

The traditional interpretation of these monuments is that they were cooking sites, a view supported both by the early texts, folk memory (Ó Drisceoil 1988; Ó Neill 2004) and experimentation (O'Kelly 1954). The texts frequently give a dual function of cooking and bathing for the sites (Ó Neill 2004, 79). The earliest historical description of burnt stone technology, where a basin of gruel is cooked with fire-heated stones, is from the medieval 'Latin Life of St. Munnu' and dates to before the 15th century (Ó Neill 2004, 79*)*. Chronologically the next account is contained in Geoffrey Keating's early seventeenth century *The History of Ireland* (*Foras Feasa ar Éirinn*) where a lot of detail is given about how the '*Fian*' would cook their quarry over pits of hot stones and in water-filled pits heated by hot stones. In this account the hunters would use a second pit of boiling water to bathe (*ibid.,* 80). The Romance of Mis and Dubh Ruis is another well known account of a deer being boiled in water heated by hot stones and the water subsequently being used for bathing (*ibid*).

The bathing hypothesis is supported by ethnographic work – carried out by Barfield and Hodder (1987), who claim that those who used the burnt mounds may well have covered them in some way and used them for sweating – as well as an increasing corpus of archaeological evidence, as more of burnt mound sites are excavated. Irish sweathouses used medicinally are recorded from the modern period in which a fire would be lit inside a stone hut until the walls were hot, the embers rakes out and the patient sealed inside, sometimes with herbs placed on the hot stones (Barfield and Hodder 1987, 373). Recent excavations have been producing convincing evidence that at least some *fulachtaí fiadh* represent this kind of activity. These include the sites at Rathpatrick (04E0318) on the N25 Waterford Bypass (Gleeson and Breen 2006) and Ballyburn Lower, Co. Kildare (E2566; Hackett 2009).

Experimental work by O'Kelly demonstrated that a joint of meat could be cooked in three to four hours using hot stones to boil water in a trough (O'Kelly 1954). It has been noted that a distinct lack of food refuse such as animal bones is characteristic of scientifically excavated burnt mound sites; however it could be that the cooking of joints of meat was subject to various sorts of ritual or hygiene controls and

that any food remains were carefully disposed of (Waddell 2000, 177). Monk has recently shown, however, that although many bones are likely lost to acidic soil, an increasing number of sites are now producing preserved bone (2007, 22). A recent preliminary study undertaken by Auli Tourunen and Karen Stewart on the pH levels of burnt mounds showed that there was no correlation between the pH value of a site and bone preservation (Tourunen and Stewart 2008). They caution, however, that this information is preliminary and that a wide range of factors may have contributed to bone preservation or the lack of bone and that the use of animal products at sites can not be ruled out (*ibid.*). Additional support is provided for the cooking hypothesis by detailing the importance of meat fat in food preservation (Monk 2007, 23). Without cooking trays, he notes, gathering the fat would have been problematic (*ibid*). One solution, however, is to boil the meat and collect the fat from the surface of the water, an activity for which burnt mounds are ideally suited (*ibid*). The presence of fats in the water of burnt mounds is also supported with the literary evidence in the story of Mis and Dubh Ruis.

Monk (2007, 24) has also hypothesized that burnt mounds may have been associated with soap production as all three primary ingredients are present (wood-ash, water and animal fats). Ó Drisceoil has shown that the bathing in the burnt mounds had possible ritual connections (either with mythical people or with magically curative properties as with Mis and Dubh Ruis), and Barfield and Hodder (1987, 373) show that individual or communal sweating also has frequent ritual associations. Barfield and Hodder do not limit the uses of sweathouses to ritual activity however and they point out that their use is an easy method of bathing.

A newer theory as to the uses of burnt mounds comes from Moore and Quinn (2007) who have suggested brewing as a primary function of the sites. They maintain that the requirement for large quantities of heated water and a lack of suitable material to produce large basins in which to heat the water would have lead to the use of pits or troughs in which hot stones could be dropped to produce the required heat (*ibid.*). They also state that quernstones found in association with burnt mounds indicate grain processing nearby. They provide ethnographic evidence for this type of brewing as well as tracing the practice back 500 years. Although this is considerably later than the date range for burnt mounds, it provides evidence that the practice has been used throughout Europe over a considerable length of time. Their experiment conclusively proved that burnt mounds could easily have been used to produce very drinkable ale (Moore and Quinn 2007). The Irish Archaeobotany Discussion Group, however, has refuted the idea of the primary function of burnt mounds being for brewing in part due to the lack of botanical remains associated with brewing found at the sites and the periodic associated finds of quern stones as possibly ritual depositions near the feature (McClatchie *et al*., 2008).

Evidence from the present site regarding function

There was a distinct lack of plant material recovered from processed soil samples from the site. The only charred plant material recovered from contexts associated with the burnt mound and burnt spread activity at Cloondarone D were charcoal fragments. Visual inspection of the charcoal showed that the material derived from both oak and non-oak species. The species identified included hazel and birch which suggests that wet to marginal woodland was being exploited for fuel during the period of burnt mound activity. The evidence recovered from the site does not provide any conclusive evidence as to the function of the three sites comprising Cloondarone D.

5.5 Conclusions

The burnt mound sites investigated at Cloondarone D represent an increase in the number of such sites recorded from County Galway (National Monuments Service 2007). The main concentration of the known recorded sites is in the south of the County with a distinct clustering of sites to the south and southwest of Athenry (National Monuments Service 2007). Few sites are recorded in the area

north of Athenry and south of Tuam with the result that the burnt mound sites investigated as part of this scheme have expanded upon the distribution of the site-type in the region.

6 ARCHIVE QUANTITIES

The site archive is comprised of the following materials:

Item	Quantity
Context Sheets	20
Plans	3
Sections	8
Photographs	46
Registers	10
Notebooks	1

The archive material is contained within 1 box.

Storage of the archive in a suitable format and location is required in order to provide for any future archaeological research. It is proposed that in addition to the paper archive a digital copy is prepared. The archive is currently stored in the offices of Headland Archaeology (Ireland) Ltd., Unit 1, Wallingstown Business Park, Little Island, Co. Cork. It is proposed that following completion of post-excavation the archive will be deposited with the National Monuments Service, Department of the Environment, Heritage and Local Government, or the National Museum of Ireland, or such other repository as may be directed by the Client's Representative and the Project Archaeologist.

ACKNOWLEDGEMENTS

The director would like to thank the following for their contribution to the excavation and post-excavation phases of this project:

- Martin Jones, NRA Project Archaeologist, Galway County Council, National Roads Design Office.
- Tom Cannon, Senior Engineer Hyder Tobin, Joseph O'Brien, Resident Engineer Hyder Tobin, Tony Collins, Senior Engineer Galway County Council. Laura Heneghan
- Project and post-excavation managers, Colm Moloney, Damian Shiels, Åsa Carlsson and Ross MacLeod, Headland Archaeology (Ireland) Ltd.
- Teresa Bolger, Editor, Headland Archaeology (Ireland) Ltd.
- Graphics department, Headland Archaeology (Ireland) Ltd.
- T.J. O' Connell, Site Supervisor, Headland Archaeology (Ireland) Ltd.
- The excavation team.

REFERENCES

Baillie, M. 1990 Provision of dates for *fulachta fiadh*. In V. Buckley (comp.) *Burnt Offerings: International Contributions to Burnt Mound Archaeology.* Wordwell, Dublin. 165-9.

Barfield, L. and Hodder, M. 1987 Burnt mounds as saunas, and the prehistory of bathing. *Antiquity*, 61, 370-79.

Bartlett, T. 2009 *N17/19 Gort to Tuam PPP Scheme. Archaeological Consultancy Services: Galway (Rathmorrissy) to Tuam Stage (i) Archaeological Services. Rathmorrissy Ringfort GA084:065. E4024.* Unpublished Report by CRDS Ltd for Galway County Council.

Brindley, A. and Lanting J. 1990 The dating of *fulachta fiadh*. In V. Buckley (comp.) *Burnt Offerings: International Contributions to Burnt Mound Archaeology.* Wordwell, Dublin. 55-56

Brindley, A, Lanting, J. and Monk, W. 1990 Radiocarbon dates from Irish *Fulachta Fiadh* and other burnt mounds. *Journal of Irish Archaeology*, 5, 25-33.

Bolger, T., Doyle, L. O'Neill, N., Bartlett, T. and O'Neill, T. 2010 *M17 Galway (Rathmorrissy) to Tuam Archaeological Services Contract (2010) as part of the N17/N18 Gort to Tuam PPP Scheme, Co. Galway. Stage (i) Test Excavations, Addendum Report (E4022)*. Unpublished report by Headland Archaeology (Ireland) Ltd for Galway County Council.

Bonsall, J. and Gimson, H. 2006 *N17 Galway to Tuam National Road Scheme County Galway, Archaeological Geophysical Survey*. Unpublished report by Earthsound Archaeological Geophysics for Galway County Council.

Galway County Council 2007 *Galway (Rathmorrissy) to Tuam Motorway Environmental Impact Statement*. Galway County Council, Galway

Gleeson, C. and Breen, G. 2006 *N25 Waterford Bypass, Contract 3. Final Report on archaeological investigations at Site 40, in the townland of Rathpatrick, Co. Kilkenny.* Unpublished report by Headland Archaeology (Ireland) Ltd for Waterford County Council.

Grogan, E, O' Donnell, E. and Johnston, P. (eds) 2007 *The Bronze Age Landscapes of the Pipeline to the West.* Wordwell, Bray.

Grogan, E. 2005 *The North Munster Project.* 2 vols. Wordwell, Bray.

Hackett, L. 2009 *N9/N10 Kilcullen to Waterford Scheme: Kilcullen to Powerstown. Final Report on archaeological investigations at Site E2566 (A021/008), in the townland of Ballyburn Lower, Co. Kildare.* Unpublished report by Headland Archaeology (Ireland) Ltd for Kildare County Council.

McClatchie, M., Brewer A., Dillon M., Johnston P., Lyons S., Monk M., Stewart K. and Timpany S. (members of the Irish Archaeobotany Discussion Group) 2008 Letter to the Editor 'Brewing and *Fulacht fiadh.' Archaeology Ireland*, 21 (4), 46.

McComb, A. M. G and Simpson D. 1999 The Wild Bunch: Exploitation of the Hazel in Prehistoric Ireland. *Ulster Journal of Archaeology*, 58, 1-16.

Moore, D. and Quinn B. 2007 Ale, brewing and *fulacht fiadh*. *Archaeology Ireland*, 21 (3), 8-11.

Monk, M. 2007 A greasy subject. *Archaeology Ireland*, 21 (1), 22-24.

O' Connell, T.J. and McKinstry, L. 2010a *M17 Galway (Rathmorrissy) to Tuam Archaeological Services Contract (2010) forming part of the N17/N18 Gort to Tuam PPP Scheme, Co. Galway. Preliminary Excavation Report for Cloondarone 1-5, E4062 in the townland of Cloondarone, Co. Galway*. Unpublished report by Headland Archaeology (Ireland) Ltd for Galway County Council.

O' Connell, T.J. and McKinstry, L. 2010b *M17 Galway (Rathmorrissy) to Tuam Archaeological Services Contract (2010) forming part of the N17/N18 Gort to Tuam PPP Scheme, Co. Galway. Preliminary Excavation Report for Cloondarone 6-8, E4063 in the townland of Cloondarone, Co. Galway*. Unpublished report by Headland Archaeology (Ireland) Ltd for Galway County Council.

O' Connell, T.J. and McKinstry, L. 2010c *M17 Galway (Rathmorrissy) to Tuam Archaeological Services Contract (2010) forming part of the N17/N18 Gort to Tuam PPP Scheme, Co. Galway. Preliminary Excavation Report for Cloondarone 9, E4064 in the townland of Cloondarone, Co. Galway*. Unpublished report by Headland Archaeology (Ireland) Ltd for Galway County Council.

O' Connell, T.J. and McKinstry, L. 2010d *M17 Galway (Rathmorrissy) to Tuam Archaeological Services Contract (2010) forming part of the N17/N18 Gort to Tuam PPP Scheme, Co. Galway. Preliminary Excavation Report for Cloondarone 13, E4066 in the townland of Cloondarone, Co. Galway*. Unpublished report by Headland Archaeology (Ireland) Ltd for Galway County Council.

Ó Drisceoil, D. 1988 Burnt mounds: cooking or bathing? *Antiquity,* 62, 671-80.

Ó Drisceoil, D. 1990 *Fulachta fiadh*: the value of early Irish literature. In V. Buckley (comp.) *Burnt Offerings: International Contributions to Burnt Mound Archaeology.* Wordwell, Dublin. 157-164.

O'Kelly, M. J. 1954 Excavations and experiments in ancient Irish cooking places. *Journal of the Royal Society of Antiquities in Ireland* 95, 105-155.

Ó Neill, J. 2000 Just another *fulacht fia* story. *Archaeology Ireland,* 14 (2), 19.

Ó Neill, J. 2004 *Lapidibus in igne calefactis coquebatur:* The historical burnt mound 'tradition'. *Journal of Irish Archaeology,* 12/13, 79-85.

Sheila Lane and Associates 2007 Archaeological and cultural heritage technical report. In Galway County Council *Galway (Rathmorrissy) to Tuam Motorway Environmental Impact Statement*. Volume 3. Galway County Council, Galway

Shine, D., Bartlett, T., Johnson, A. and McKinstry, L. 2009a *N17/18 Gort to Tuam PPP Scheme. Archaeological Consultancy Services: Galway (Rathmorrissy to Tuam) Stage (i) Archaeological Services. Section 1 (Ch 25,400-21,100) E4022*. Unpublished Report by CRDS Ltd for Galway County Council.

Shine, D., Bartlett, T., Johnson, A. and McKinstry, L. 2009b *N17/18 Gort to Tuam PPP Scheme. Archaeological Consultancy Services: Galway (Rathmorrissy) to Tuam Stage (i) Archaeological Services. Section 2 (Ch 21,100-13,050) E4022*. Unpublished Report by CRDS Ltd for Galway County Council.

Shine, D., Bartlett, T., Johnson, A. and McKinstry, L. 2009c *N17/18 Gort to Tuam PPP Scheme. Archaeological Consultancy Services: Galway (Rathmorrissy) to Tuam Stage (i) Archaeological Services. Section 3 (Ch 13,050-4,580) E4022*. Unpublished Report by CRDS Ltd for Galway County Council.

Shine, D., Bartlett, T., Johnson, A. and McKinstry, L. 2009d *N17/18 Gort to Tuam PPP Scheme. Archaeological Consultancy Services: Galway (Rathmorrissy) to Tuam Stage (i) Archaeological Services. Section 4 (Ch 4,580-0) E4022*. Unpublished Report by CRDS Ltd for Galway County Council.

Tourunen A. and Stewart, K. 2008 *pH analysis of burnt mounds: implications for preservation of organic material*. Poster presented at The World Archaeological Congress, Dublin, Ireland 2008.

Waddell, J. 2000 *The prehistoric archaeology of Ireland*. Wordwell, Bray.

Appendix 1 – Context Registers for Cloondarone D, E4065

Context Register for Cloondarone 10

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
10001	Deposit	-	-	-	-	0.2	Mid brown silty clay	Topsoil
10002	Deposit	-	-	-	-	-	Compact yellow grey silt	Natural
10003	Deposit	-	-	3	1.20	0.14	Moderate to firm compaction dark greyish black with pockets of mid-orange clayey silt and redeposited natural clay with moderate small stones, coarse pebbles and flecks of charcoal	Burnt spread

Context Register for Cloondarone 11

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
1101	Deposit	-	-	-	-	-	Mid-brown silty clay	Topsoil
1102	Deposit	-	-	-	-	-	Yellow grey compact silt	Natural
1103	Cut	-	-	7	6.7	0.2	Circular in plan with moderately compact mid black with grey and orange silty clay, very frequent heat shattered stone and occasional charcoal flecks	Burnt mound
1104	Deposit	-	-	6.8	4	0.06	Circular in plan, well cemented dark brown red silty clay	Peat overlying burnt mound
1105	Cut	-	(1106) (1107) (1108) (1109)	1.87	1.3	0.52	Oval in plan with sharp to gradual breaks of slope at the top, straight to concave sides, sharp to gradual break of slope at the base and a sloping flat base	Cut of trough
1106	Deposit	(1105)	-	1.3	1.3	0.06	Compact black brown silty clay, possible the same as (1104)	Peat upper fill of trough (1105)
1107	Deposit	(1105)	-	1.7	1.3	0.15	Moderately compact mid black grey silty clay with frequent heat shattered stone and moderate charcoal flecks, similar to (1103)	Fill of trough

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
1108	Deposit	(1105)	-	1.5	1.1	0.15	Moderately compact black grey brown sandy clay with frequent heat shattered stone and charcoal flecks	Fill of trough
1109	Deposit	(1105)	-	1.7	1.3	0.07	Compact grey yellow silty sand with charcoal flecks	Fill of trough

Context Register for Cloondarone 12

Context no.	Type	Fill of:	Filled by:	Length (m)	Width (m)	Depth (m)	Description	Interpretation
1201	Deposit	-	-	-	-	-	Moderately compact mid brown silty clay	Topsoil
1202	Deposit	-	-	-	-	-	Compact yellowy grey gravelly silt with small to medium sub-angular stones	Natural
1203	Cut	-	(1205) (1206)	1.7	0.45	0.22	Sub-rectangular, orientated NW-SE with rounded corners, sharp breaks of slope at the top and base, steep vertical sides and a flat base	Cut of trough
1204	Deposit	-	-	5.5	5	0.1	Irregular(almost plectrum-shaped) spread of moderately compact black/dark grey peaty silt with frequent fire cracked stone and occasional charcoal	Spread representing possible remains of earlier mound
1205	Deposit	(1203)	-	1.7	0.45	-	Firm dark grey-black clay with decayed stone and charcoal with possible burnt bone or shell fleck	Basal fill of trough (1203)
1206	Deposit	(1203)	-	-	0.45	-	Firm mid grey charcoal-rich clay	Upper fill of trough (1203)
1207	Cut	-	(1208)	3.4	0.65	0.45	Irregular curvilinear in plan with sharp breaks of slope at the top and base, varying sides from vertical to uneven and an irregular base	Tree bole/root activity
1208	Deposit	(1207)	-	3.4	0.44	0.18	Moderately compact mid grey (NE end) to dark grey (SW end) clay with occasional charcoal, frequent small sub-angular stones, occasional medium angular stones and occasional large sub-angular stones	Non-arch. Fill of natural depression/tree bole/root activity

Appendix 2 – Sample Registers for Cloondarone D, E4065

Sample Register for Cloondarone 10

Sample No.	Context No.	Sample size	Description
10001	(10003)	10 L	Moderate to firm compaction dark greyish black with pockets of mid-orange clayey silt and redeposited natural clay with moderate small stones, coarse pebbles and flecks of charcoal

Sample Registers for Cloondarone 11

Soil Samples

Sample No.	Context No.	Description
1101	(1103)	Moderately compact mid black with grey and orange silty clay, very frequent heat shattered stone and occasional charcoal flecks
1102	(1103)	Moderately compact mid black with grey and orange silty clay, very frequent heat shattered stone and occasional charcoal flecks
1103	(1107)	Moderately compact mid black grey silty clay with frequent heat shattered stone and moderate charcoal flecks
1104	(1108)	Moderately compact black grey brown sandy clay with frequent heat shattered stone and charcoal flecks
1105	(1109)	Well compact grey yellow silty sand with charcoal flecks

Sample Registers for Cloondarone 11

Soil Samples

Sample No.	Context No.	Description
1201	(1205)	Firm dark grey-black clay with decayed stone and charcoal
1202	(1206)	Firm mid grey charcoal rich clay with possible burnt bone or shell fleck
1203	(1205)	Firm dark grey-black clay with decayed stone and charcoal with possible burnt bone or shell fleck
1204	(1204)	Moderately compact black/dark grey peaty silt with frequent fire cracked stone and occasional charcoal

Appendix 3 – Drawing Registers for Cloondarone D, E4065

Drawing Register for Cloondarone 10

Drawing No.	Sheet No.	Scale	Type	Description
001	6	1:20	Section	South facing section of spread (10003)

Drawing Register for Cloondarone 11

Drawing No.	Sheet No.	Scale	Type	Description
1101	1	1:50	Plan	Pre-ex plan of burnt mound
1102	2	1:20	Section	East facing section of burnt mound
1103	2	1:20	Section	West facing section of burnt mound
1104	2	1:20	Section	Northeast facing section of (1105)
1105	3	1:20	Plan	Post-ex plan of pit (1105)

Drawing Register for Cloondarone 12

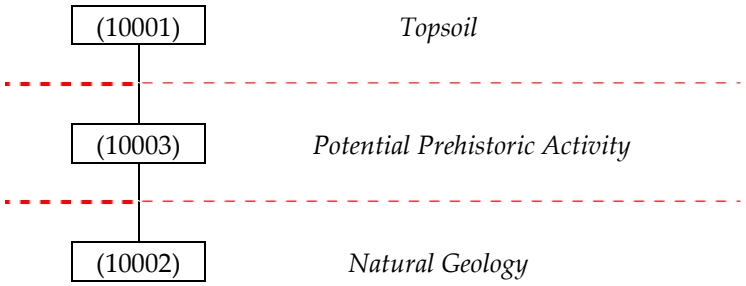
Drawing No.	Sheet No.	Scale	Type	Description
1201	1	1:50	Plan	Pre-ex plan of burnt mound and trough
1202	2	1:20	Section	Southwest facing section of trough (1203)
1203	2	1:20	Section	Southwest facing section of spread (1204)
1204	2	1:20	Section	North facing section of spread (1204)
1205	2	1:20	Section	Northeast facing section of (1207)

Appendix 4 – Photo Registers for Cloondarone D, E4065

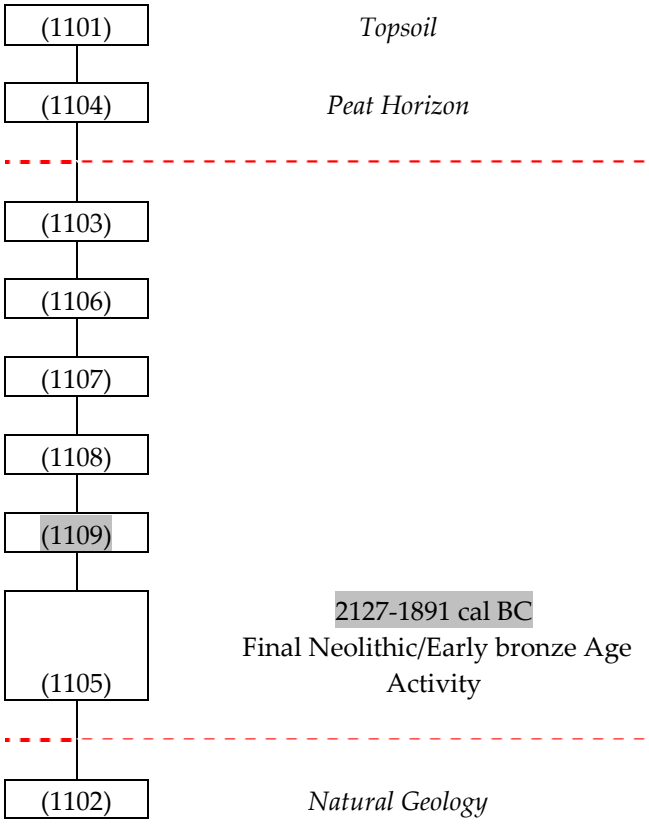
Shot no.	Direction facing	Description
E4065:139	W	Cloondarone 12. Pre-excavation view of burnt mound (1204)
E4065:140	S	Cloondarone 12. Pre-excavation view of burnt mound (1204)
E4065:141	W	Cloondarone 12. Pre-excavation view of trough (1203)
E4065:142	S	Cloondarone 12. Pre-excavation view of trough (1203)
E4065:143	S	Cloondarone 12. Pre-excavation view of site
E4065:144	N	Cloondarone 12. Pre-excavation view of site
E4065:145	S	Cloondarone 11. Pre-excavation view of site
E4065:146	N	Cloondarone 11. Pre-excavation view of site
E4065:147	N	Cloondarone 11. Pre-excavation view of site
E4065:163	NE	Cloondarone 12. Mid-excavation view of trough (1203)
E4065:164	NE	Cloondarone 12. Mid-excavation view of trough (1203)
E4065:165	N	Cloondarone 12. Mid-excavation view of trough (1203)
E4065:166	E	Cloondarone 12. Mid-excavation view of burnt spread (1204)
E4065:167	W	Cloondarone 12. Mid-excavation view of burnt spread (1204)
E4065:168	N	Cloondarone 12. Mid-excavation view of burnt spread (1204)
E4065:169	W	Cloondarone 12. Mid-excavation view of burnt spread (1204)
E4065:170	W	Cloondarone 12. Mid-excavation view of curvi-linear feature (1207)
E4065:171	S	Cloondarone 12. Mid-excavation view of curvi-linear feature (1207)
E4065:177	SW	Cloondarone 12. Mid-excavation view of curvi-linear feature (1207)
E4065:178	SW	Cloondarone 12. Mid-excavation view of curvi-linear feature (1207)
E4065:179	S	Cloondarone 11. Mid-excavation view of burnt mound
E4065:180	NE	Cloondarone 11. Mid-excavation view of burnt mound
E4065:181	NE	Cloondarone 11. Mid-excavation view of burnt mound
E4065:182	NW	Cloondarone 12. Post-excavation view of trough (1203)
E4065:183	W	Cloondarone 12. Post-excavation view of trough (1203)
E4065:184	N	Cloondarone 12. South-facing section of (1207)
E4065:185	N	Cloondarone 10. Pre-excavation of site
E4065:186	N	Cloondarone 10. Pre-excavation of site
E4065:187	E	Cloondarone 11. Pre-excavation of trough (1105)
E4065:188	E	Cloondarone 11. Pre-excavation of trough (1105)
E4065:189	E	Cloondarone 11. Pre-excavation of trough (1105)
E4065:190	E	Cloondarone 11. Pre-excavation of trough (1105)
E4065:191	SE	Cloondarone 11. Pre-excavation of trough (1105)
E4065:192	SE	Cloondarone 11. Pre-excavation of trough (1105)
E4065:193	N	Cloondarone 12. Post-excavation view of site
E4065:194	W	Cloondarone 12. Post-excavation view of site
E4065:195	W	Cloondaronw 10. Mid-excavation view of spread (10003)
E4065:201	SW	Cloondarone 11. Mid-excavation view of trough (1105)
E4065:202	SW	Cloondarone 11. Mid-excavation view of trough (1105)
E4065:203	S	Cloondarone 11. Mid-excavation view of trough (1105)
E4065:204	S	Cloondarone 11. Mid-excavation view of trough (1105)
E4065:223	N	Cloondarone 12. Post-excavation view of site
E4065:224	E	Cloondarone 10. Post-excavation view of site
E4065:225	S	Cloondarone 11. Post-excavation view of trough (1105)
E4065:226	N	Cloondarone 11. Post-excavation view of trough (1105)
E4065:227	W	Cloondarone 11. Post-excavation view of trough (1105)

Appendix 5 – Site Matrices for Cloondarone D, E4065

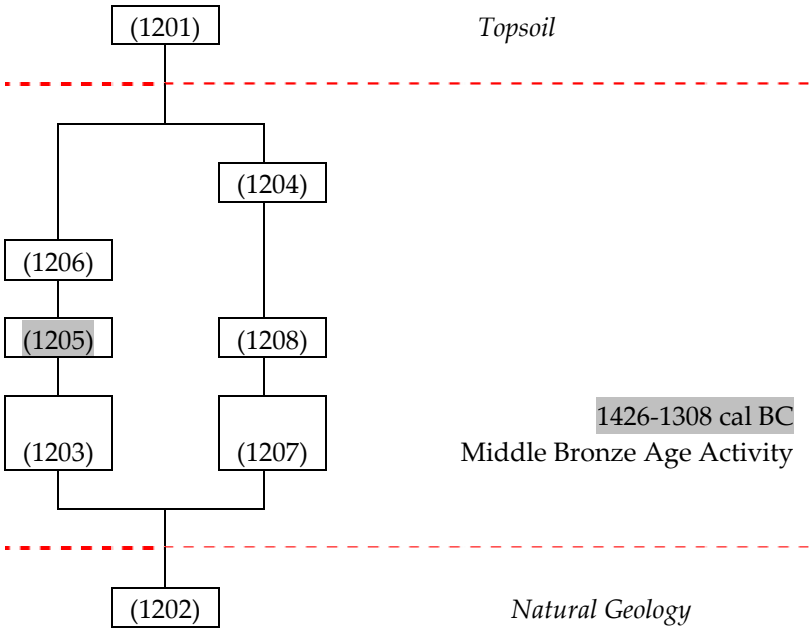
Cloondarone 10



Cloondarone 11



Cloondarone 12



Appendix 6 – The charred plant remains from Cloondarone D (E4065), Co. Galway
By Sarah-Jane Haston, Headland Archaeology Ltd

Introduction

Ten environmental samples were taken during the excavation of Cloondarone D, County Galway (E4065), constituting the three individual sites of a burnt spread (Cloondarone 10), a burnt mound and associated trough (Cloondarone 11) and a trough and burnt spread (Cloondarone 12). All samples were processed in order to retrieve any palaeoenvironmental material that could be used for radiocarbon dating, as well as providing data on the fuels used for burning and evidence of any associated activity around these features.

Methodology

Samples of approximately 10L were taken on site from archaeologically significant features and deposits. Samples were chosen for processing by the Site Director in order to answer research questions set during excavation. Samples were sub-sampled (to 0.3-1 litre) and then processed in laboratory conditions using a standard flotation method (cf. Kenward *et al.*, 1980). The floating debris (flot) was collected in a 250μm sieve and, once dry, scanned using a binocular microscope. Any material remaining in the flotation tank (retent) was wet-sieved through a 1mm mesh and air-dried. This was then sorted by eye and any material of archaeological significance removed. All plant macrofossil samples were analysed using a low power binocular microscope with x10 and x40 magnifications.

Results

The results of the radiocarbon dating are provided in Table 1. The assessment results of the samples are provided in Table 2 (Composition of flots) and Table 3 (Composition of retents). All plant remains were preserved through charring.

Radiocarbon dating
Two radiocarbon dates were returned for Cloondarone D, with dated material being charcoal fragments in both cases (see Table 1). The date range for the site spans the Late Neolithic/Early Bronze Age to the Middle Bronze Age period; from 2127-1891 cal BC (UBA-16996; 3623±35 BP) to 1426-1308 cal BC (UBA-16997; 3094±24 BP).

Wood charcoal
The concentration of charred plant remains was low with all samples found to contain only rare to common amounts of heavily abraded and fragmented charcoal (see Tables 2 and 3). The wood charcoal fragments are present in a range of sizes, from 0.2 to 2.5cm. The larger fragments have been used as radiocarbon dating material for the sites, with hazel (*Corylus avellana*) and birch (*Betula* sp.) identified (see Table 1). The presence of some large fragments within the charcoal assemblage from the sites suggests they represent *in situ* burning associated with the burnt mound activity; subsequently some of this charcoal has spread into the associated features post-use of the mounds. Unfortunately the majority of the charcoal fragments were of a small size with the result that there was no scope for further analysis and identification to species level. Visual inspection of the fragments indicates that they represent mainly non-oak taxa.

Discussion

Cloondarone 10; undated
One sample (10001) was processed from Cloondarone 10. The sample was taken from the burnt spread material (10003) and showed occasional small fragments of non-oak charcoal. The spread did not show any heat-affected stone typically associated with burnt mound activity and no other finds were recovered from this deposit.

Cloondarone 11; 2127-1891 cal BC
Five samples (1101-1105) were processed from Cloondarone 11. Four samples were taken from the fills of the trough (1105) at the site and one sample from the overlying burnt mound material (1103). All samples were found to contain small amounts of mostly non-oak wood charcoal with Samples 1104 and 1105 from the primary (1108) and secondary (1109) fills of the trough showing a small number of large fragments between 2 and 2.5 cm in length. One of the fragments from Sample 1105 has been identified as hazel charcoal and returned a radiocarbon date of 2127-1891 cal BC (UBA-16996; 3623±35 BP) placing this activity in the Late Neolithic/Early Bronze Age. No other finds were recovered from the trough fills and burnt mound deposit.

Cloondarone 12; 1426-1308 cal BC
Four samples were processed from Cloondarone 12. Three samples (1201-1203) were taken from the trough (1203) and one sample (1204) was taken from the adjacent burnt spread (1204). All samples were found to contain small amounts of small fragments of oak and non-oak wood charcoal. Sample 1201, taken from the primary fill (1205) of the trough, did contain larger fragments (up to 1cmin length) and one fragment identified as birch wood returned a radiocarbon date of 1426-1308 cal BC (UBA-16997; 3094±24 BP) placing the activity here in the Middle Bronze Age. As with the other sites, no other finds were recovered from the trough fills and burnt spread deposit.

Burnt mound activity
Only charcoal fragments were recovered from the three burnt mound / spread sites at Cloondarone D. Unfortunately the majority of the charcoal fragments were too small to allow analysis beyond visual identification to oak/non-oak level. Where large charcoal fragments were present they were identified and used for radiocarbon dating. These included hazel from the late Neolithic/Early Bronze Age burnt mound at Cloondarone 11, where some oak charcoal was also noted. The radiocarbon date returned from the Cloondarone 11and charcoal profile present at the site were closely similar to those from the nearby mound at Cloondarone 6 (Cloondarone B, E4063). It may be possible, indeed likely, that the sites are contemporaneous.

Late Bronze Age burnt spread activity is also present at Cloondarone 12 and similar dated (burnt mound) activity has also been found at Cloondarone A (E4062) and Cloondarone B (E4063). Again only small charcoal fragments were present and thus the level of analysis work that could be undertaken was limited. The presence of birch within the charcoal profiles indicates the use of wet or marginal woodland (Stace 1997) for the exploitation of fuel wood. Other marginal woodland taxa have also been identified from charcoal fragments relating to Late Bronze Age burnt mound activity at Cloondarone, including ash and hazel (e.g. Cloondarone A). These identifications provide evidence of local marginal woodland being utilised as a fuel resource for the burnt mound activity.

Conclusion

- The only material recovered from the samples is charcoal fragments. This material is likely to relate to the burnt mound and burnt spread activities but unfortunately provide little interpretative evidence to their function

- Visual inspection of the charcoal showed evidence of oak and non-oak fragments being used as fuel with hazel and birch identified
- The identification of hazel and birch charcoal suggest local marginal woodland was utilised as a fuel resource.

References

Kenward, H.K., Hall A.R. and Jones A.K.J 1980 A tested set of techniques for the extraction of plant and animal macrofossils from archaeological deposits. *Science and Archaeology*, 22, 3-15.

Stace C. 1997 *New flora of the British Isles.* 2nd Edition. Cambridge University Press, Cambridge.

E-Number	Lab code	Sample ID	Material	σ13C	Radiocarbon age BP	Calibrated Age Ranges (1 σ)	Relative probability	Calibrated Age Ranges (2 σ)	Relative probability
E4065	UBA-16996	sample 1105, context 1109	Hazel charcoal	-22.2	3623±35	2030-1939 cal BC	1	2127-2089 cal BC	0.087
								2045-1891 cal BC	0.913
E4065	UBA-16997	Sample 1201, context 1205	Birch charcoal	-28.9	3094±24	1413-1374 cal BC	0.681	1426-1308 cal BC	1
						1426-1308 cal BC	0.319		

Table 1 – Radiocarbon dates from Cloondarone D

Context Number	Sample Number	Feature	Total Flot Vol. (ml)	Charcoal		Material available for AMS	Comments
				Quantity	Max size (cm)		
Cloondarone 10							
10003	10001	Burnt spread	20	++	0.5		
Cloondarone 11							
1103	1101	Burnt mound	<10	+	1		
1103	1102	Burnt mound	<10	+	0.5		
1107	1103	Fill of trough (1105)	<10	+	1.5	Charcoal +	
1108	1104	Fill of trough (1105)	<10				Archaeologically sterile
1109	1105	Fill of trough (1105)	<10	+	0.5		
Cloondarone 12							
1204	1204	Basal fill of trough (1203)	<10	+	0.2		
1205	1201	Upper fill of trough (1203)	<10				Archaeologically sterile
1205	1203	Basal fill of trough (1203)	<10				Archaeologically sterile
1206	1202	Burnt spread	<10				Archaeologically sterile
Key: + = rare, ++ = occasional, +++ = common and ++++ = abundant **NB** charcoal over 1cm is suitable for identification and AMS dating							

Table 2 – E4065 Flotation Sample Results

Context Number	Sample Number	Feature	Sample Vol (l)	Charcoal quantity	Charcoal max size (cm)	Material available for AMS	Comments
Cloondarone 10							
10003	10001	Burnt spread	1	++	0.5		
Cloondarone 11							
1103	1101	Burnt mound	1	+	1	Charcoal +	
1103	1102	Burnt mound	1	++	1	Charcoal +	
1107	1103	Fill of trough (1105)	1	+	0.5		
1108	1104	Fill of trough (1105)	1	++	2.5	Charcoal +	
1109	1105	Fill of trough (1105)	1	++	2	Charcoal +	
Cloondarone 12							
1205	1201	Basal fill of trough (1203)	1	++	1	Charcoal +	
1206	1202	Upper fill of trough (1203)	1	+	0.5		
1205	1203	Basal fill of trough (1203)	0.3	+	0.2		
1204	1204	Burnt spread	1	+	1		
Key: + = rare, ++ = occasional, +++ = common and ++++ = abundant **NB** charcoal over 1cm is suitable for identification and AMS dating							

Table 3 – E4065: Retent Sample Results

Appendix 7 – Radiocarbon dates and certificates

E-Number	Lab code	Sample ID	Material	σ13C	Radiocarbon age BP	Calibrated Age Ranges (1 σ)	Relative probability	Calibrated Age Ranges (2 σ)	Relative probability
E4065	UBA-16996	sample 1105, context 1109	Hazel charcoal	-22.2	3623±35	2030-1939 cal BC	1	2127-2089 cal BC	0.087
								2045-1891 cal BC	0.913
E4065	UBA-16997	Sample 1201, context 1205	Birch charcoal	-28.9	3094±24	1413-1374 cal BC	0.681	1426-1308 cal BC	1
						1426-1308 cal BC	0.319		

Damian shiels_NNL06
E3403
Headland Archaeology Ltd
Unit 1, Wallingstown
Business Pa
Little Island
Co. Cork, - -
Ireland
VAT No. 9952722f

14CHRONO Centre
Queens University
Belfast
42 Fitzwilliam Street
Belfast BT9 6AX
Northern Ireland

Radiocarbon Date Certificate

Laboratory Identification:	UBA-16996
Date of Measurement:	2011-02-22
Site:	Cloondarone E4065
Sample ID:	Hazel C1109 S1105
Material Dated:	charcoal
Pretreatment:	AAA
Submitted by:	Damian Shiels

^{14}C Date:	3623±35 BP
AMS δ^{13}C:	-22.2

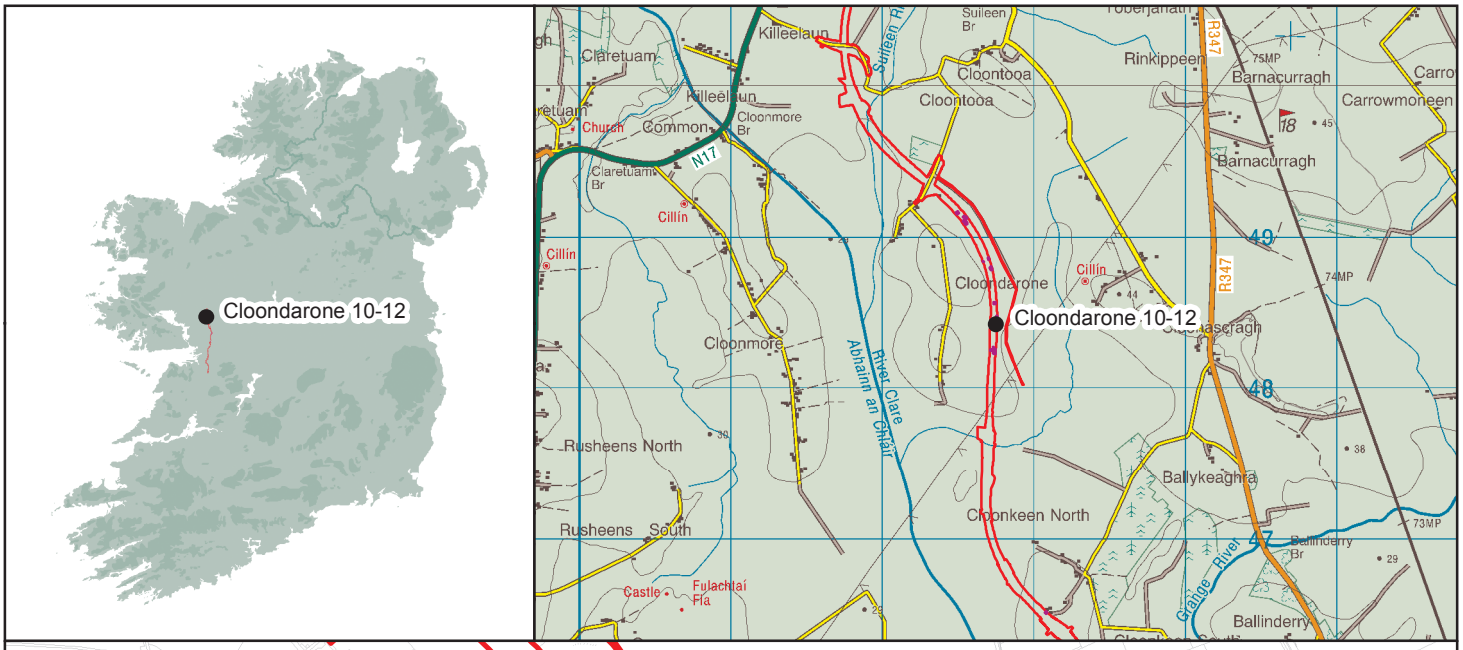
Damian shiels_NNL06
E3403
Headland Archaeology Ltd
Unit 1, Wallingstown
Business Pa
Little Island
Co. Cork, - -
Ireland
VAT No. 9952722f

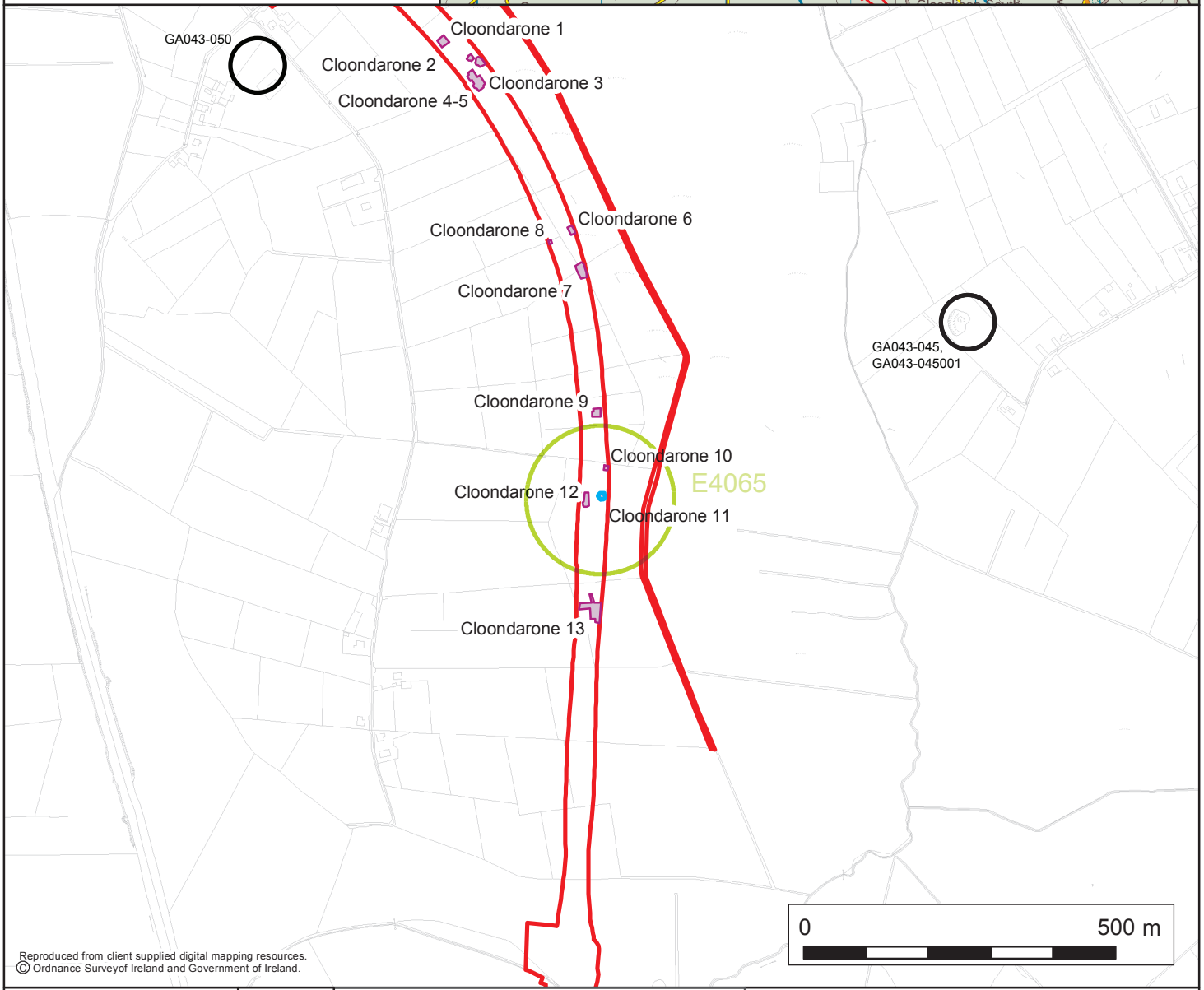
^{14}CHRONO Centre
Queens University
Belfast
42 Fitzwilliam Street
Belfast BT9 6AX
Northern Ireland

Radiocarbon Date Certificate

Laboratory Identification:	UBA-16997
Date of Measurement:	2011-02-25
Site:	Cloondarone E4065
Sample ID:	Birch
Material Dated:	charcoal
Pretreatment:	AAA
Submitted by:	Damian Shiels

^{14}C Date:	3094±24 BP
AMS δ^{13}C:	-28.9





Key

Sites

CPO/LMA

RMP

N

HEADLAND ARCHAEOLOGY

HyderTobin CONSULTANTS

NRA National Roads Authority

NDP National Development Plan 2007 - 2013

transport21 progress in motion

M17 Galway (Rathmorrissy) to Tuam Archaeological Services Contract (2010), forming part of the N17/N18 Gort to Tuam PPP scheme, Co. Galway, Stage (iii).

Figure 1: E4065 / Cloondarone D. Site location.

Drawn by: JMM	1st edit by: SN
2nd edit by:	Signed off:

Cloondarone 10

10003

Cloondarone 11

1103

1105

1203

1207

1204

Cloondarone 12

N

0

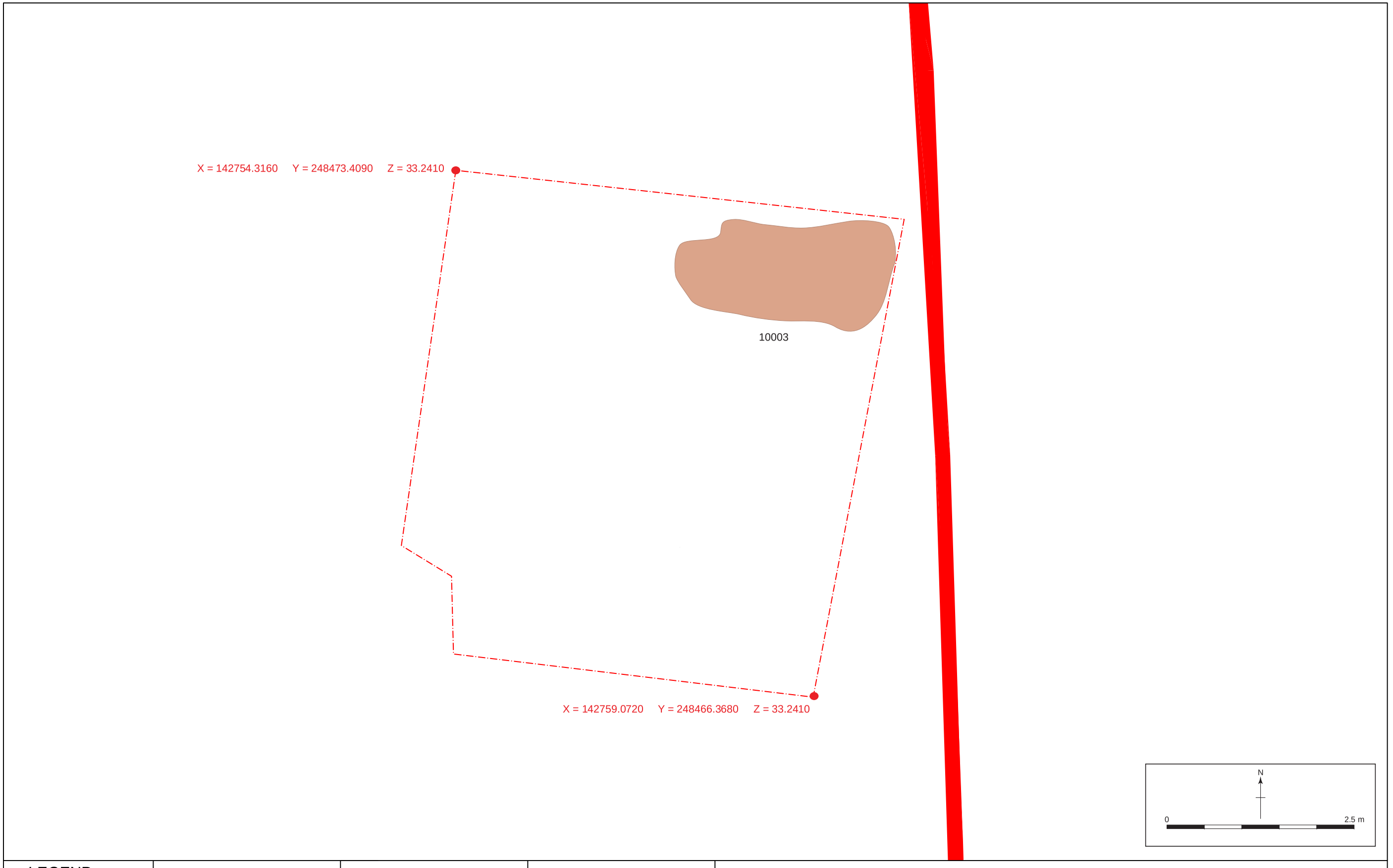
20 m

LEGEND			
North	Scale: 1:400	Archaeology (Top of Slope)	CPO
	Drawn By: DY	Spread / Deposit	Burnt mound
		Site Extents	

HEADLAND ARCHAEOLOGY

M17 Galway (Rathmorrissy) to Tuam Archaeological Services Contract (2010), forming part of the N17/N18 Gort to Tuam PPP scheme,Co. Galway, Stage (iii).

Figure 2: E4065 / Cloondarone D, Cloondarone 10-12.



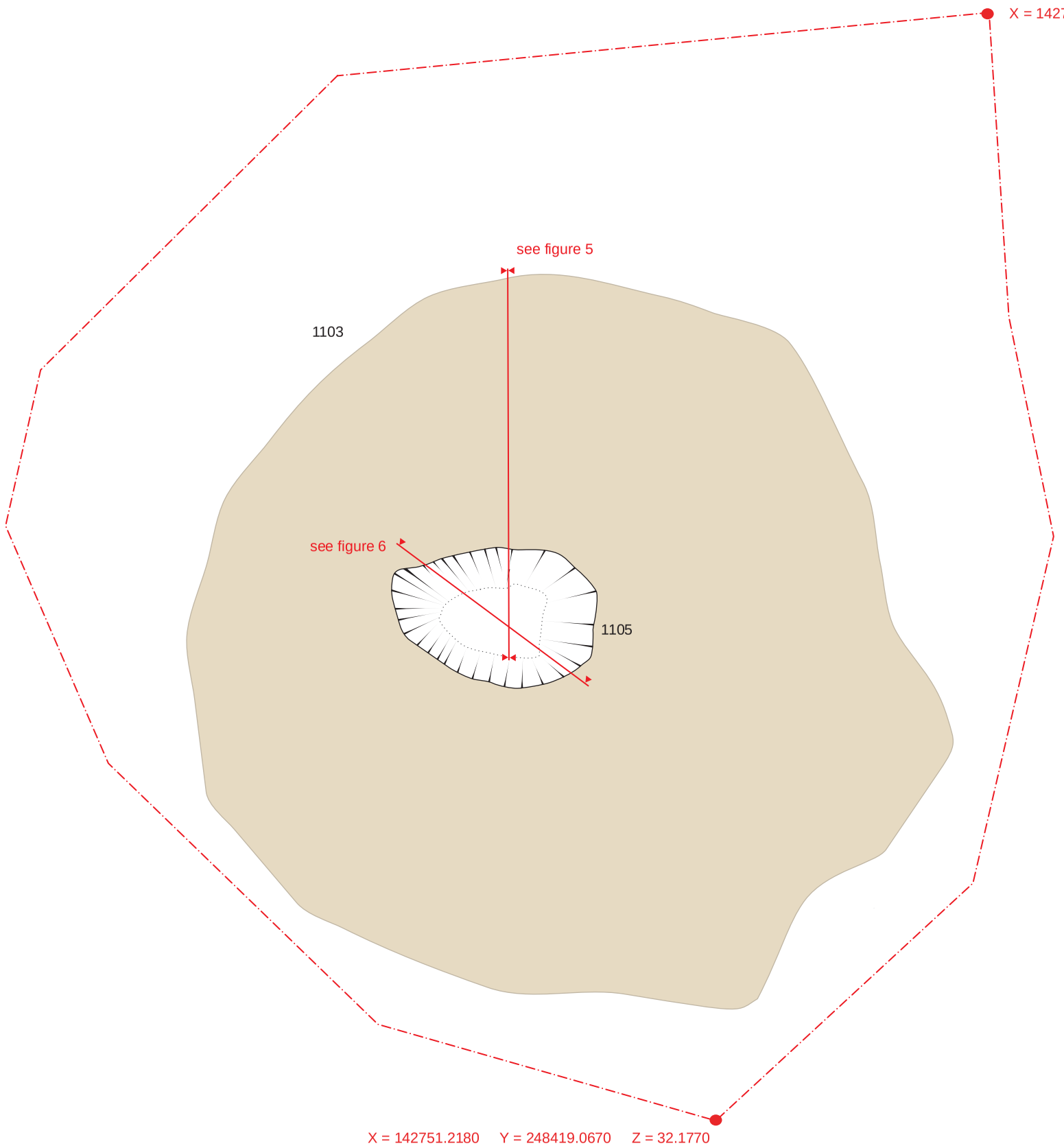
LEGEND		
Scale: 1:50	Spread / Deposit	
Drawn By: DY	Site Extents	

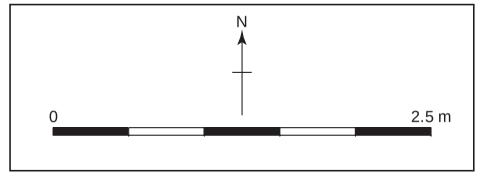
North

HEADLAND ARCHAEOLOGY

M17 Galway (Rathmorrissy) to Tuam Archaeological Services Contract (2010), forming part of the N17/N18 Gort to Tuam PPP scheme, Co. Galway, Stage (iii).

Figure 3: E4065 / Cloondarone 10, Site layout.





LEGEND		
	Archaeology (Top of Slope)	CPO
Scale: 1:50	Burnt mound	
Drawn By: DY	Site Extents	

North

HEADLAND ARCHAEOLOGY

M17 Galway (Rathmorrissy) to Tuam Archaeological Services Contract (2010), forming part of the N17/N18 Gort to Tuam PPP scheme, Co. Galway, Stage (iii).

Figure 4: E4065 / Cloondarone 11, Site layout.

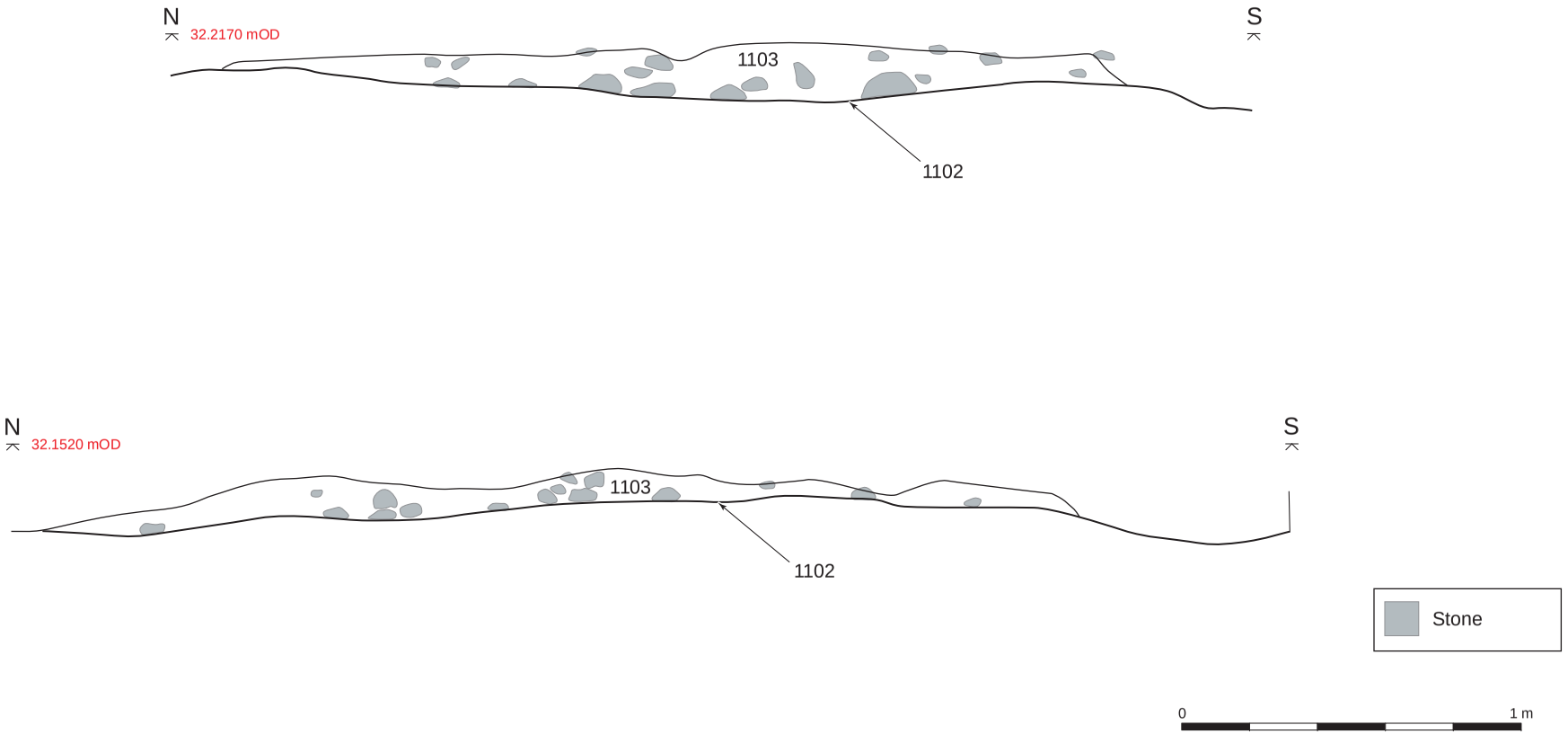


Figure 5 - M17 Galway (Rathmorrissy) to Tuam Archaeology Services Contract (2010), forming part of the N17/N18 Gort to Tuam PPP scheme,Co. Galway, stage (iii): E4065 / Cloondarone 11, East and west facing section of burnt mound (1103).

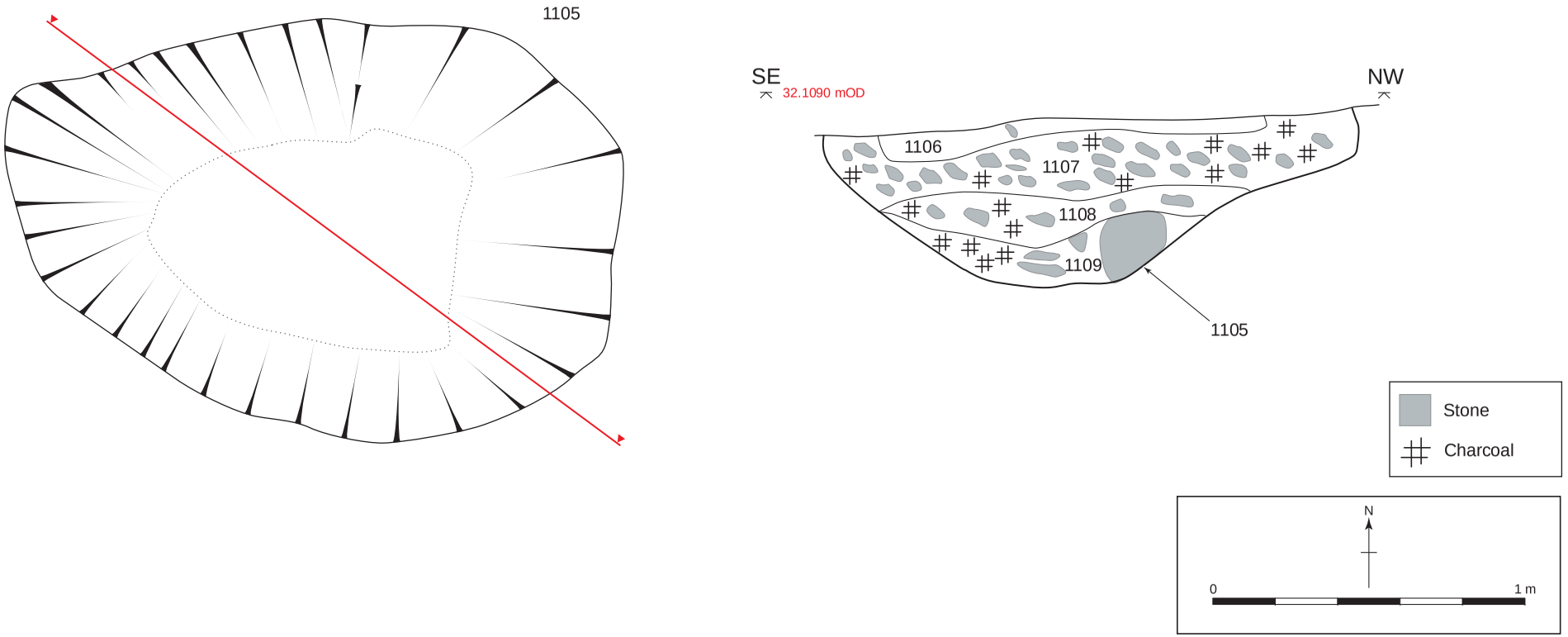
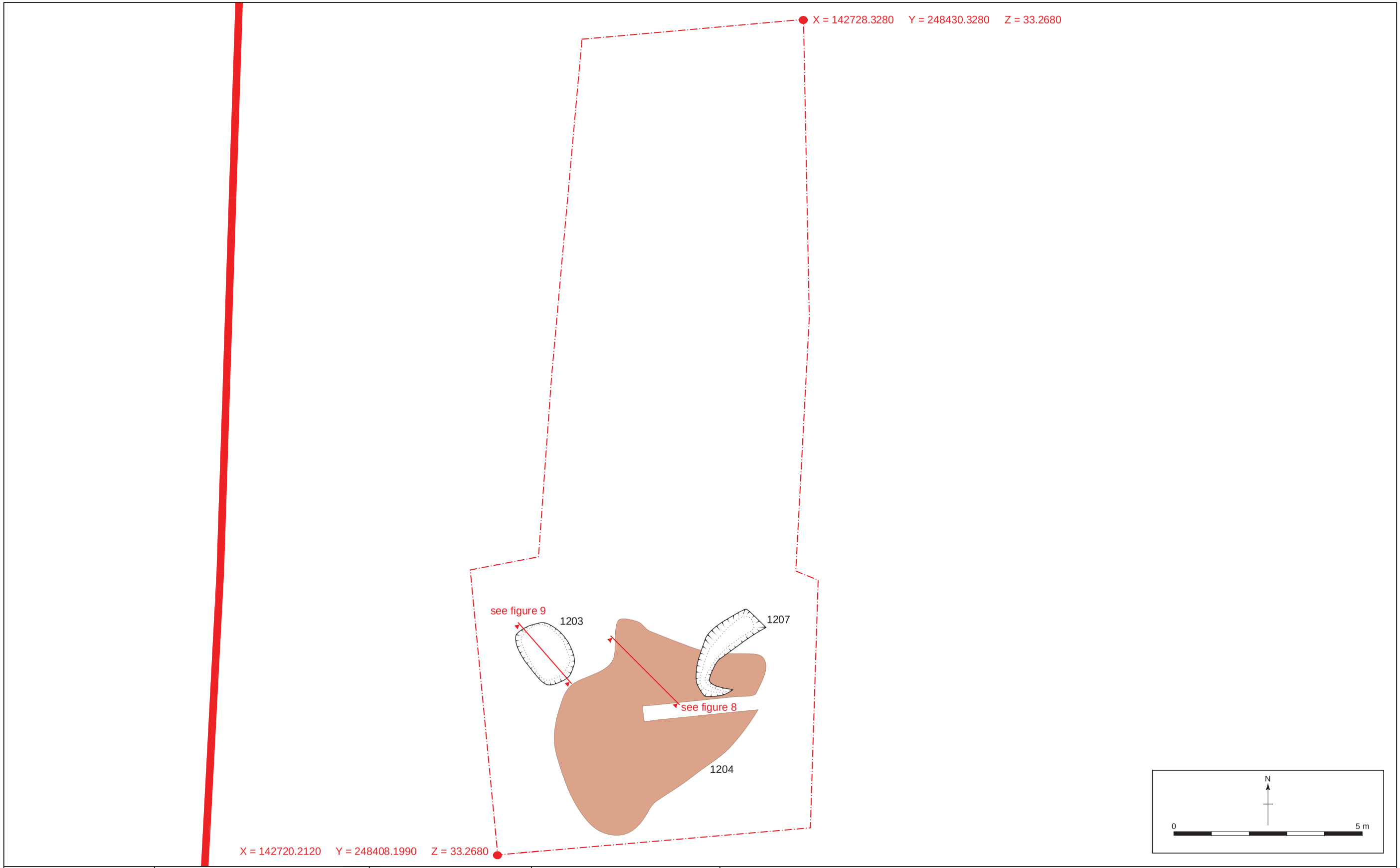


Figure 6 - M17 Galway (Rathmorrissy) to Tuam Archaeology Services Contract (2010), forming part of the N17/N18 Gort to Tuam PPP scheme,Co. Galway, stage (iii): E4065 / Cloondarone 11, Northeast facing section of (1105).



LEGEND		
	Archaeology (Top of Slope)	CPO
Scale: 1:100	Spread	
Drawn By: DY	Site Extents	

North

HEADLAND ARCHAEOLOGY

M17 Galway (Rathmorrissy) to Tuam Archaeological Services Contract (2010), forming part of the N17/N18 Gort to Tuam PPP scheme, Co. Galway, Stage (iii).

Figure 7: E4065 / Cloondarone 12, Site layout.

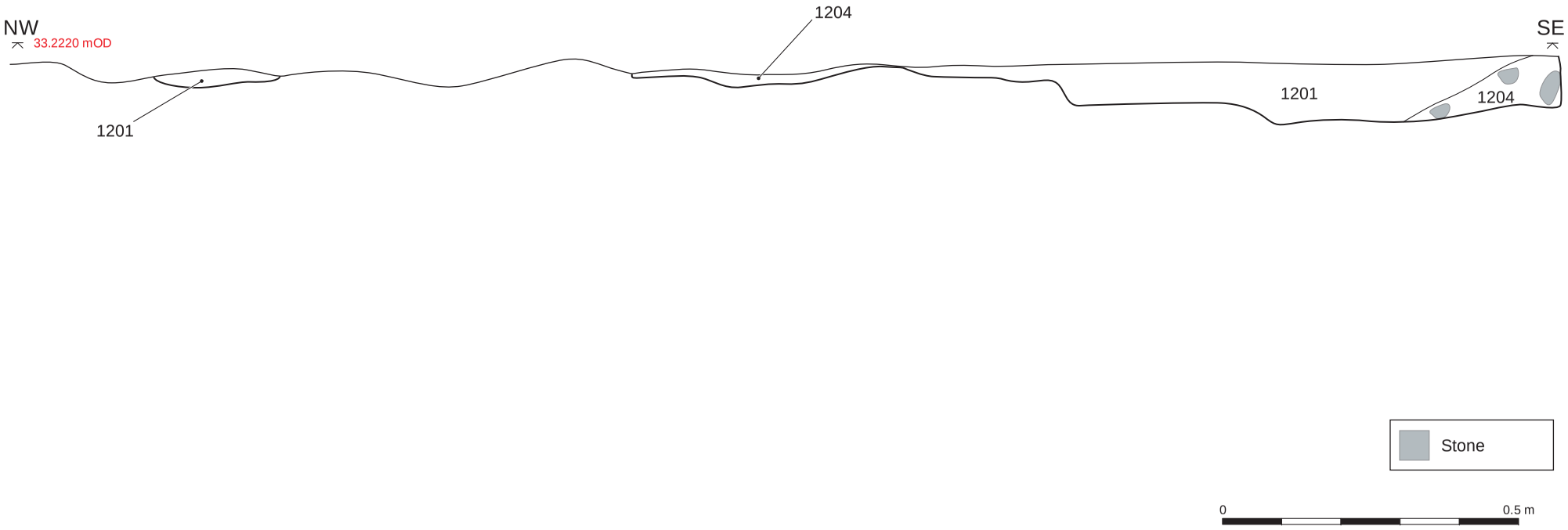


Figure 8 - M17 Galway (Rathmorrissy) to Tuam Archaeology Services Contract (2010), forming part of the N17/N18 Gort to Tuam PPP scheme,Co. Galway, stage (iii): E4065 / Cloondarone 12, Southwest facing section of spread (1204).

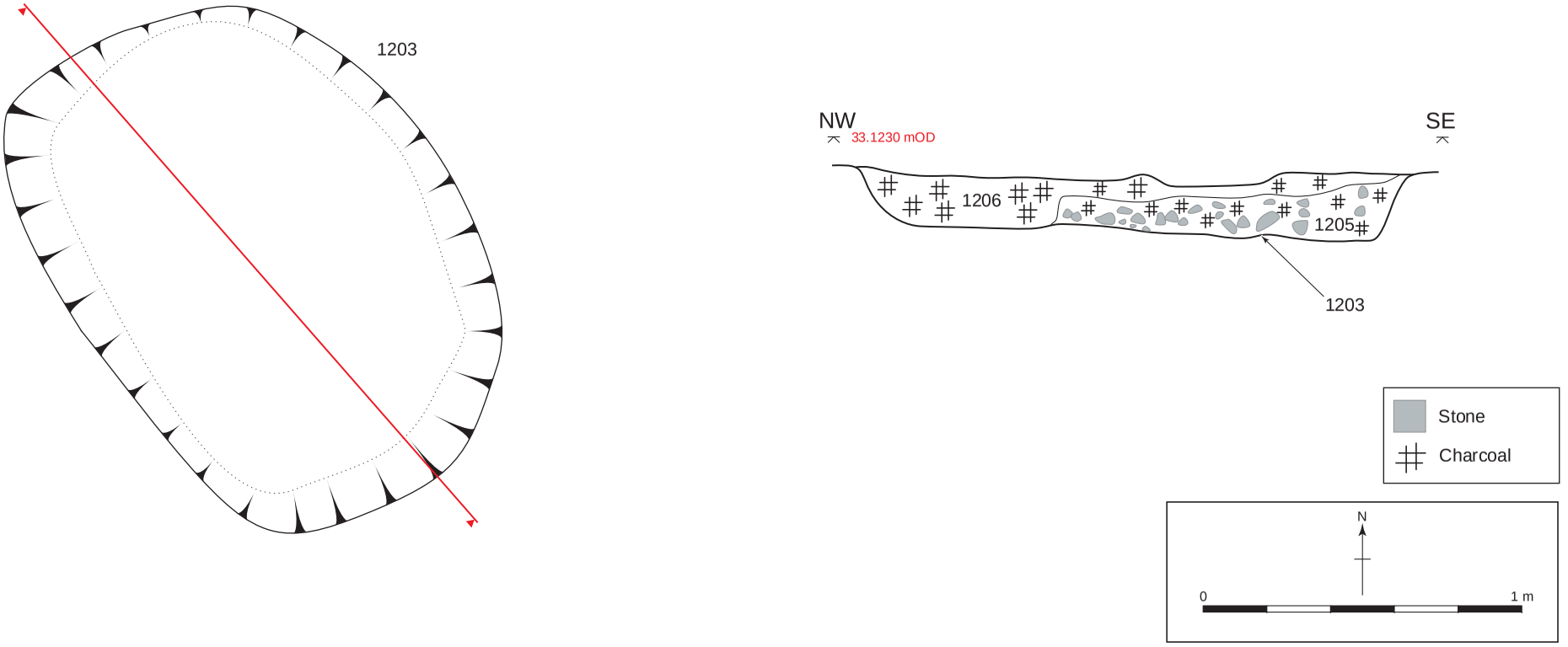


Figure 9 - M17 Galway (Rathmorrissy) to Tuam Archaeology Services Contract (2010), forming part of the N17/N18 Gort to Tuam PPP scheme,Co. Galway, stage (iii): E4065 / Cloondarone 12, Southwest facing section of trough (1203).

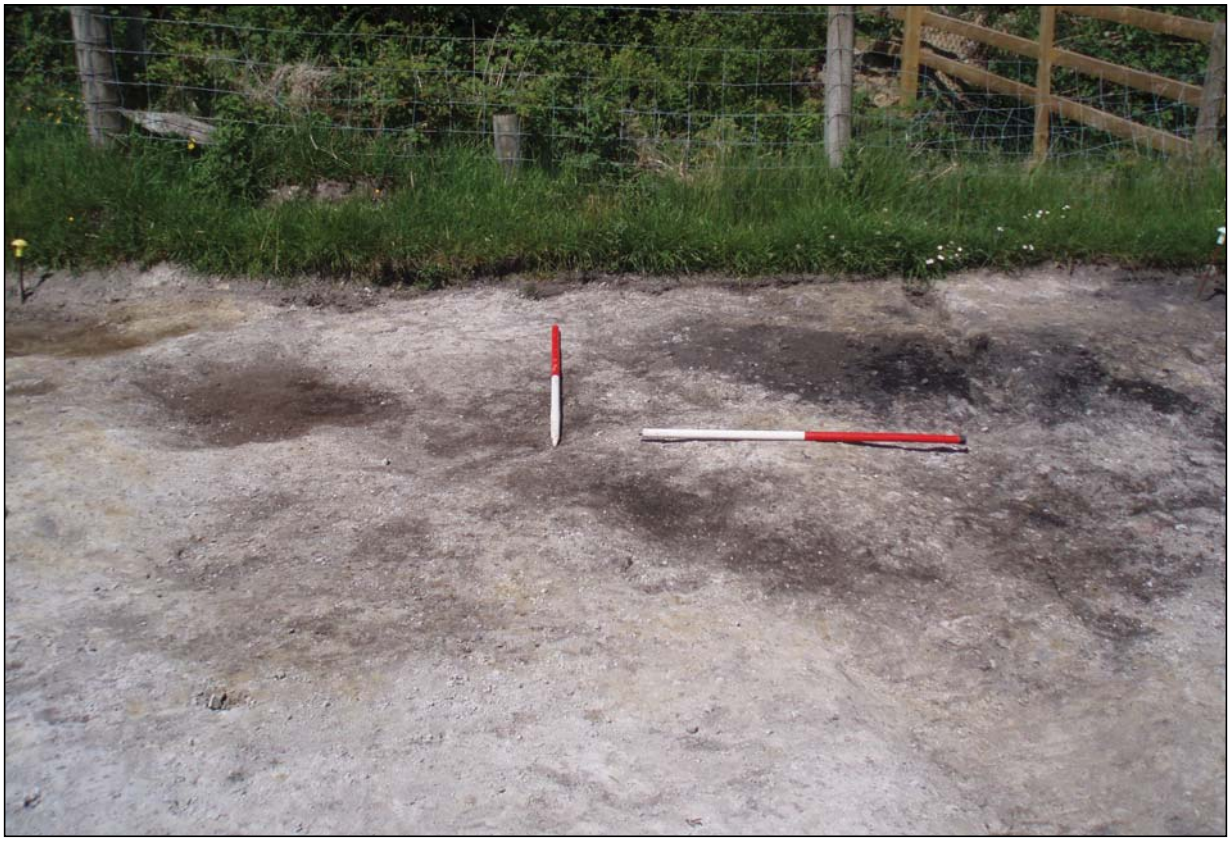


Plate 1 - Cloondarone 10. Pre-excavation view of site showing burnt spread (10003), facing north.

Plate 2 - Cloondarone 10. Mid-excavation view of burnt spread (10003), facing west.

Plate 3 - Cloondarone 11. Pre-excavation view of burnt mound (1103), facing north.

Plate 4 - Cloondarone 11. Mid-excavation view of trough (1105), facing southwest.

Plate 5 - Cloondarone 11. Post-excavation view of trough (1105), facing north.

Plate 6 - Cloondarone 12. Pre-excavation view of burnt mound (1204), facing west.

Plate 7 - Cloondarone 12. Mid-excavation view of burnt spread (1204), facing west.

Plate 8 - Cloondarone 12. Mid-excavation view of trough (1203), facing northeast.

Plate 9 - Cloondarone 12. Post-excavation view of trough (1203), facing west.