

**N18 Ennis Bypass
and N85 Western Relief Road**

Site AR126, Cahircalla Beg, Co. Clare

**Final Archaeological Excavation Report
for Clare County Council**

Licence No: 04E0024

by Graham Hull

Job J04/02

(NGR 132803 175465)

14th August 2006

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Summary

Site name: N18 Ennis Bypass and N85 Western Relief Road, Site AR126, Cahircalla Beg, Co. Clare

Townland: Cahircalla Beg

Parish: Drumcliff

Barony: Islands

County: Clare

SMR/RMP Number: N/A

Planning Ref. No: N/A

Client: Clare County Council, New Road, Ennis, Co. Clare

Landowner: Clare County Council, New Road, Ennis, Co. Clare

Grid reference: 132803 175465 (OSI Discovery Series, 1:50,000, Sheet 58. OS 6" Clare Sheet 33)

Naturally occurring geology: Limestone bedrock overlain by riverine peat

TVAS Ireland Job No: J04/02

Licence No: 04E0024

Licence Holder: Graham Hull

Report author: Graham Hull

Site activity: Excavation

Site area: 950m²

Sample percentage: 100%

Date of fieldwork: 29th January to 25th February 2004

Date of report: 14th August 2006

Summary of results: A *fulacht fiadh* with a stone-lined trough was excavated. The mound was composed of laminated deposits of burnt stone. Charcoal and animal bone was recovered from the monument. Radiocarbon dating shows that the *fulacht fiadh* had its origin in two burnt stone spreads deposited in the late Neolithic/early Bronze Age. After a hiatus of c. 1000 years, the body of the mound developed in the 12th to 9th centuries BC.

Monuments identified: Bronze Age *fulacht fiadh*

Location and reference of archive: The primary records (written, drawn and photographic) are currently held at TVAS Ireland Ltd, Ahish, Ballinruan, Crusheen, Co. Clare.

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**N18 Ennis Bypass and N85 Western Relief Road, Site AR126, Cahircalla Beg, Co. Clare
Final Archaeological Excavation Report**

By Graham Hull

Report J04/02s

Introduction

This report documents the final results of an archaeological excavation of a Bronze Age *fulacht fiadh* (Site AR126) on the route of the N18 Ennis Bypass and N85 Western Relief Road at Cahircalla Beg, Co. Clare (NGR 132803 175465) (Fig. 1). The excavation forms part of the Ennis Bypass Archaeological Contract 7.

A preliminary archaeological report for this site was produced in May 2004 (Hull 2004).

The National Monuments Act 1930 (as amended) provides the legislative framework within which archaeological excavation can take place and the following government publications set out many of the procedures relating to planning/development and archaeology:

Framework and Principles for the Protection of the Archaeological Heritage (DAHGI 1999a)

Policy and Guidelines on Archaeological Excavation (DAHGI 1999b)

Code of Practice between the National Roads Authority and the Minister for Arts, Heritage, Gaeltacht and the Islands (NRA/MAHGI 2001)

Project background

As part of the National Roads Authority scheme for upgrading the N18 Limerick to Galway Road, Clare County Council, in consultation with NRA Project Archaeologist Sébastien Joubert, requested a series of archaeological investigations along the route of the proposed Ennis Bypass and a Western Relief Road. The proposed scheme has an overall length of 21km and involves the construction of a 13.8km eastern bypass of Ennis from Latoon, north of Newmarket-on-Fergus, to Cragard, north of Barefield. The Western Relief Road is 7.1km long and is to link Killow and Claureen (Fig. 1).

A number of sites of archaeological interest were known to lie on the route of the new roads and the mitigation strategy agreed by the Project Archaeologist and the national licensing authorities for these sites was preservation by record, i.e. full archaeological excavation. Further sites, without surface expression, were located as the result of intensive test trenching along the course of the road (03E1291 Hull 2003 and 03E1293 Roger 2004). As preservation *in situ* was not a reasonable option, the resolution strategy for these new sites was also preservation by record.

The archaeological excavation and post excavation work were funded by Clare County Council through the National Roads Authority and part-financed by the European Union under the National Development Plan 2000-2006.

Location, topography and geology

The site was located in the townland of Cahircalla Beg, in the parish of Drumcliff, barony of Islands, approximately 2km south-west of Ennis town centre (the O'Connell Monument) and was centred on NGR 132803 175465 (Figs 1 and 2).

The site was east of the N68 Kilrush Road in an open boggy field and the *fulacht fiadh* was found near the base of a steep incline that dropped down from higher ground at the east to wet ground at the west (Plate 1). The hillside was densely wooded, mostly with hazel scrub, and little or no topsoil was present over outcropping limestone. A small unrectified stream ran parallel to the road and west of the monument.

The *fulacht fiadh* was built directly onto outcropping limestone bedrock that sloped gently down from south-east to north-west. The monument was positioned at the transition between dry land and boggy ground and was adjacent to riverine peat that deepened towards the small stream to the west.

The *fulacht fiadh* lay at approximately 10m above Ordnance Datum.

Expansive views to the west were given from the mound but the view to the east was obscured in greater part by the hillside above.

Archaeological background

As part of the environmental assessment process for the road scheme, Clare County Council commissioned desk-based and walkover surveys that formed part of an Environmental Statement (Babtie Pettit 2000) and an archaeological study for the Environmental Impact Statement (Doyle 1999). A total of 36 sites of known or potential cultural heritage significance were identified along the entire route of the proposed Ennis Bypass and Western Relief Road.

Earthwork and geophysical survey were undertaken on potential archaeological sites and invasive testing and excavation took place in 2002 and 2003 on some of the above ground sites affected by the proposed road (Aegis 2002, IAC 2003, Geoquest 2002, Earthsound 2003).

A systematic programme of testing, along the new road route, involving the mechanical excavation of a central linear trench with offsets, took place in Summer/Autumn 2003. Twenty-two previously unknown sites, including cremation cemeteries, burnt stone spreads, enclosures and brick clamps were found (03E1291 Hull 2003 and 03E1293 Roger 2004). Monuments dating from the Bronze Age to the modern period were found.

Earlier phases of archaeological intervention on newly constructed stretches of the N18 (Dromoland to Carrigoran), to the immediate south of this road project, have demonstrated that the locality has a rich range of prehistoric and later monuments (99E0350 Hull and Tarbett-Buckley 2001).

A previously unrecorded, above-ground *fulacht fiadh* was found during testing (03E1291 Hull 2003). The *fulacht fiadh* was a characteristic ‘croissant’ shape and the two ‘horns’ closed at the west (Plate 2). Mature hazel trees grew on the body of the mound and a small test trench was hand dug to establish the construction of the feature. The test trench measured 1.2m by 1.2m, was 0.25m deep and demonstrated that beneath 0.1m of leaf mould, burnt limestone and charcoal were present. The *fulacht fiadh* (AR126) is the subject of this excavation report.

Seven small and discrete burnt stone spreads were investigated as part of this road project (AR127 04E0028, Taylor 2006a) at the edge of, and close to the surface of, a peat bog on the opposite side of the stream. Six of these burnt stone spreads have been radiocarbon dated to the late Neolithic/ early Bronze Age and the seventh was dated to the late Bronze Age.

Excavation aims and methodology

A licence to excavate was granted to Graham Hull by the National Monuments Section of the Department of the Environment, Heritage and Local Government, in consultation with the National

Museum of Ireland, on behalf of the Minister for the Environment, Heritage and Local Government. The licence number is 04E0024.

The aims of the excavation were to:

- 1) Preserve by record all archaeological deposits and features within the excavation area
- 2) Produce a high quality report of the findings

The fieldwork took place between 29th January and 25th February 2004 and was directed by Graham Hull, supervised by Lee Roy Krakowicz and assisted by Tim Dean, Lewis Goodman, Callum Hillary, Mike Parks, Alan Smart and Kate Taylor.

The excavation area was rectangular, centred on the *fulacht fiadh* seen during testing, and examined 950m².

Mature hazel tree cover on the monument was cut down and removed (Plates 3 and 4). The mossy topsoil was then removed by hand and a detailed contour plan of the monument using GPS data was made (Figs 3 and 4).

The location of a trough was identified during hand-cleaning. It was decided, in consultation with the Project Archaeologist, that a half-section of the entire monument would give a meaningful insight into construction techniques. The body of the monument was half-sectioned using a 13 tonne, 360°, tracked machine, operated under direct and continuous archaeological supervision (Plates 5 and 6). Spits no greater than 0.05m were removed and the spoil was visually scanned for artefacts. The trough and immediately surrounding area were fully excavated by hand.

After recording of the half-sectioned monument the remaining half was removed mechanically under archaeological control.

A full written, drawn and photographic record was made following procedures outlined in the TVAS Ireland Field Recording Manual (First Edition 2003).

Excavation Results (Figs 2 to 6 and Plates 2 to 9)

A complete context list is given as Appendix 1.

A large, above-ground *fulacht fiadh* was examined and was morphologically typical of the monument type. In plan, the *fulacht fiadh* was crescent or croissant shaped with the horns closing to the wetter west side (Fig. 5). The monument measured 13.5m from north-west to south-east and 17.5m from north-east to south-west. The *fulacht fiadh* had a maximum height of 1.6m (Fig. 6). It is estimated that the *fulacht fiadh* was composed of 400 tonnes of burnt stone.

The following descriptions should be read in conjunction with Table 1: Context descriptions (below).

A centrally located, rectangular trough (4), edged with six large limestone slabs, measured 1.8m by 0.9m and was 0.45m deep (Plates 7-9). The volume of the trough was approximately 0.75m³. The slabs were typically in the size range of 0.5m to 0.6m long by 0.45m to 0.55m wide and 0.1m to 0.2m thick. The slabs were mostly placed on the underlying bedrock but in places it could be demonstrated that the slabs were stratigraphically later than the burnt stone material 19.

The stratigraphic sequence of the build-up and construction of the *fulacht fiadh* is shown in Figure 6 and descriptions of the *fulacht fiadh* contexts are given below in Table 1.

Seven distinguishable deposits of burnt stone were recorded in the *fulacht fiadh* (22, 21, 19, 20, 17 and 16). These deposits were clearly structured dumps of burnt stone, sequentially becoming part of a growing mound, associated with a water-filled trough (Plates 5 and 6).

It was noted that the recorded trough cut deposit 19 and it is therefore possible that the trough was a reiteration of an earlier structure.

At some stage after the deposition of layer 19, a line of four limestone pieces (2) was inserted into the mound behind the trough and served as a revetment to stop slippage.

Table 1: *Fulacht fiadh* context descriptions

Context No.	Description
22	Initial <i>fulacht</i> deposit. A black coloured, smooth textured organic/peaty silt with 5-10% inclusion of sandstone fragments (typically 0.05m diameter) Occasional charcoal flecks present. No limestone present.
21	Second <i>fulacht</i> deposit. A loose mixture of 80% limestone pieces (0.02m to 0.1m diameter) and 20% black sooty soil. Very occasional pieces of fire reddened sandstone.
19	Third <i>fulacht</i> deposit. A loose mixture of 95%limestone pieces (0.05 to 0.25m diameter) and 5%black silty soil. The soil may have derived from upper layers of <i>fulacht</i> . Some charcoal flecking. Only 1% sandstone present.
20	Fourth <i>fulacht</i> deposit. Discrete dump of stones within deposit 19. These stones differ from 19 in that they have been subject to intense heat (oxidisation reddening) but have not been shattered through thermal shock (i.e. not put hot into water). The limestone pieces are typically 0.05m to 0.25m in diameter. Sandstone is a very rare constituent. The voids between the stones and on stone surfaces are flecks of charcoal and white deposit (?powdered lime). Possibly deposit 20 represents a fire lit on the body of the mound. These stones were not put in water.
18	Fifth <i>fulacht</i> deposit. Loose mixture of 80% limestone pieces (0.01m to 0.15m diameter) and black and sooty silt with charcoal flecking. Only limestone observed.
2	Four limestone slabs placed into 19 as revetment to prevent slippage into trough. Deposit 17 probably built up behind revetment. Stones are unworked and in the size range of 0.3m by 0.6m across and 0.15m wide.
17	Sixth <i>fulacht</i> deposit. Loose mixture of 80% limestone pieces (0.01m to 0.15m diameter) and black and sooty silt with charcoal flecking. Some sandstone present.
25	Deposit in front of revetment 2. Loose mixture of 40% limestone pieces (less than 0.1m diameter) and 60% black silty soil. Tree root disturbance.
16	Final <i>fulacht</i> deposit. Loose mixture of 70% limestone pieces (0.01m to 0.1m diameter) and 30% dark grey to black silty soil. Some sandstone present. Charcoal flecking evident. Root disturbed.
24	Concretion. Found only at beneath and behind SE-most trough slab. Hard concretion of limestone and charcoal pieces. Colour is grey to yellow to orange. Perhaps formed by limestone particles from deposit 19, mixing with fine natural sand 12 in the presence of moisture, charcoal and heat.
4	Stone lined trough. Composed of six large upright slabs that were braced/propped by smaller stones. The larger of the trough stones measured 1.1m by 0.65m by 0.12m and 0.95m by 0.6m by 0.1m. Limestone solution holes in some of the stones. Fossil marine shells densely covered many of the 6 large stones and it is not unreasonable to suspect that this 'decoration' influenced selection. The trough would need to be lined unless the water table was higher in the past.
23	Singular infill of trough. Loose mixture of 40% limestone pieces (0.05m to 0.35m diameter) and 60% black peaty/organic soil. No organic material, such as moss, that might have been used to retain water in the trough was found.

Finds

A catalogue of finds is given as Appendix 2.

Three contexts yielded small quantities of bone (deposits 16, 19 and 23). Deposits 16 and 23, both close to the surface, have the greatest potential for intrusion, perhaps by burrowing animals and tree root action. The bone from deposit 19 is, however, very secure.

The finds have been cleaned, numbered, labelled, properly packed and will be deposited with the National Museum of Ireland in accordance with *Advice Notes for Excavators* (NMI 1997).

The six large limestone slabs used to construct the trough were removed from site and, following discussion with the National Museum, the stones have been deposited with the County Clare Museum, Ennis. The Clare Museum intends to erect the stones outside the museum with an interpretative panel.

The trough stones have not been allocated finds numbers.

Animal bone by Sian Anthony

Methodology

Bone from three contexts was examined from Site AR126 (Table 2). The bones were recovered from a series of burnt stone deposits forming a large burnt mound. Some of the bone was recovered during excavation, other material came from soil samples wet-sieved to a 2mm fraction. All small pieces of bone were scanned rapidly as in many cases deposits only produced fragments under 1 or 2mm in size. The bones were not separated into size, so percentage fragmentation could not be calculated however the majority of fragments were under 2mm leaving a lack of recognisable pieces throughout the assemblage.

Human osteological analysis followed recommendations from McKinley (1994, 2000) and Brickley and McKinley (2004). Mammalian bones were identified using standard texts (Hillson 1992 and Getty 1975), all were rapidly scanned and bones damaged on excavation were rejoined and counted as one bone. Small amounts of material were identified as mammalian only, this does not preclude the possibility that some may be human but could not be readily identified as such. Where they are recognised as animal this is noted.

Results

Fifteen pieces of animal bone were recovered from this site, weighing 79g. All the bones were in an excellent state of preservation with two sawn edges, one around the base of a horn on an ovicaprid skull, this is a commonly observed mark occurring when removing the horn for working. A second saw mark was observed on a large ungulate skull piece. All the pieces that showed cut marks were recovered from the upper layer of the burnt mound (deposit 16) and may not be related to the original function of the site.

Table 2: Bone from AR126

Find Number	Cut	Deposit	Sample Number	Species	Pres	Total	Weight (g)	Maximum fragment size (mm)	Comments
04E0024:1	-	16		Mixed animal	E	4	69		2 sawn edges, large pig MC and various pieces
04E0024:2	-	19	8	Mammal	E	10	<1	<2	Fragments
04E0024:3	-	23		Cow	E	1	9		Rib

Samples

A catalogue of samples and results is given as Appendix 3.

Bulk soil samples were taken from nine contexts. These samples were floated and then wet sieved through a 300micron and then 2mm sieves in order to recover charred plant remains and small finds. Large quantities of charcoal were recovered from each of the nine sampled contexts. The charcoal included many large pieces that should be suitable for radiocarbon dating.

In addition to the sampling for charred plant material, representative samples of the burnt stone from the *fulacht fiadh* have been collected.

Identification of stone samples by Dr Martin Feely

Introduction

TVAS delivered nine plastic bags containing between two and thirteen stone samples taken from three deposits from AR126. A total of 42 stone samples were identified using a Nikon incident light binocular microscope. Each stone sample in each sample bag has been given a letter and the description of each stone is matched below to that letter.

Results

Table 3: Rock types

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Cut	Deposit	Sample	Identification
-	16	1	4 stones: a-d) Fossiliferous carboniferous limestone
-	17	3	a) Medium grained sandstone b-c) Fossiliferous carboniferous limestone
-	18	5	3 stones: a-c) Fossiliferous carboniferous limestone
-	19	7	4 stones: a-d) Fossiliferous carboniferous limestone
-	20	9	3 stones: a-c) Fossiliferous carboniferous limestone
-	21	11	2 stones: a-b) Fossiliferous carboniferous limestone
-	22	13	8 stones: a) Medium grained micaceous sandstone b) Medium grained sandstone c) Medium grained sandstone d) Medium grained micaceous sandstone e) Pebbly sandstone f) Medium grained sandstone g) Medium grained micaceous sandstone h) Medium grained micaceous sandstone
-	23	15	13 stones: a) fragment of finely crystalline calcite – probably a fragment from a vein of calcite in limestone b) Fossiliferous carboniferous limestone c) Fossiliferous carboniferous limestone d) Fossiliferous carboniferous limestone e) fragment of calcite (probably part of stone a) f) Fossiliferous carboniferous limestone g) Fine grained sandstone h) Fossiliferous carboniferous limestone

			i) Fine grained sandstone j) Fossiliferous carboniferous limestone k) Fossiliferous carboniferous limestone l) Fossiliferous carboniferous limestone m) Fossiliferous carboniferous limestone
-	24	16	2 pieces: a) Very weathered sample. It contains thin coatings of chalcedony (cryptocrystalline quartz) on porous calcareous brecciated material. Full of tiny wood/charcoal fragments cemented together by botryoidal (bunch of grapes in form) calcite (maybe some silica also). b) Also very porous and similar to a). Both samples may be igneous in origin

Fragmentation of stones

I see nothing exceptional about the stone samples and the average size of each stone is quite small <100mm to pebble size. They represent material I would expect to encounter in glacial debris. I cannot say that they are smaller fragments of larger heated stones dropped into cold water.

Discussion

In general the stone samples from the Ennis Bypass are either sandstone or limestone. The sandstones are of three main types: a common sandstone, a micaceous variety which has visible “shiny” flakes mica and finally a pebbly variety like a fine conglomerate. The limestone samples all have visible fossiliferous material similar to that found in the Lower Carboniferous limestones of Ireland.

Additional “stone” varieties include fragments of the mineral calcite, quartz and fine grained igneous rocks. The sandstone samples most likely represent Devonian sandstones while there is little doubt that the limestone is Lower Carboniferous in age. This is not surprising as both geological periods are represented by rock exposures in the west and southwest of the country. Glacial debris commonly contains disaggregated blocks of both rock types. The fragments of calcite and quartz probably formed part of geological structures termed veins, which transect existing rocks. The igneous varieties may represent samples of Carboniferous volcanic rocks but this is speculative.

Charred plant macrofossils and other remains by Val Fryer

Introduction

A series of eight samples for the extraction of the plant macrofossil assemblages were taken from successive layers within the mound, and a further sample was taken from the fill of the trough.

Methods

The samples were floated and wet sieved by TVAS Ireland Ltd, and the flots were collected in a 300 micron mesh sieve. The dried flots were scanned under a binocular microscope at magnifications up to x 16, and the plant macrofossils and other remains noted are listed below on Table 4. All plant remains were charred. The density of material within each assemblage is expressed in the table as follows: x = 1 – 10 specimens, xx = 10 – 100 specimens and xxx = 100+ specimens.

Modern contaminants including mollusc shells, roots, seeds and arthropods were present throughout.

Results

Plant macrofossils

Charcoal fragments formed the principal component of all nine assemblages, with the only other plant macrofossils recorded being a few small pieces of charred root/stem in sample 4.

Other remains

Small fragments of burnt stone were noted in the assemblages from samples 2, 8 and 17. Mineralised soil concretions were common or abundant in the trough fill (sample 15) and the primary layer within the mound (sample 17). The rare fragments of black porous ‘cokey’ material present within sample 10 are possible residues of the combustion of organic remains at extremely high temperatures.

Conclusions

The charcoal rich assemblages from this site are typical of material recovered from other *fulachta fiadh* across County Clare and elsewhere within Ireland (Penny Johnston, pers. comm.). It is assumed that the charcoal is solely derived from fuel used for the heating of the stones prior to their immersion in water.

Table 4: Charred plant macrofossils and other remains

Sample No.	2	4	6	8	10	12	14	15	17
Deposit No.	16	17	18	19	20	21	22	23	22
Charcoal <2mm	xxx	xxx	xxx	xx	xxx	xxx	xx	xx	xx
Charcoal >2mm	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xx	xx
Charred root/stem		x							
Black porous ‘cokey’ material					x				
Burnt stone	x			x					x
Mineralised soil concretions								xxx	xx
Sample volume (litres)	10	10	10	10	10	10	10	10	10
Volume of flot (litres)	0.1	0.1	0.3	0.4	0.3	0.1	0.4	0.3	<0.1
% flot sorted	100%	100%	50%	25%	50%	100%	25%	50%	100%

Charcoal by Simon Gannon

Introduction

Eight samples of charcoal fragments were retrieved from seven contexts from the site, consisting of a *fulacht fiadh*. Identification of taxa of the retrieved charcoal may assist in the reconstruction of the local, contemporary woodland-environment and the use of the woodland resources by the people responsible for the archaeological features.

Methods

In sorting fragments suitable for identification a guide size of at least 2mm in radial cross-section was used. In this sort some samples were found to contain an unusually large number of fragments and sub-samples were taken, as detailed in Analysis Results.

Initially the grain direction of the fragments was identified before fracturing across their transverse plains. Identifications were made under microscopic examination, in most cases. Further fractures were made to reveal radial and/or tangential plains in cases where identification was more difficult. Magnification of between x10 (hand lens) to x400 was used. Structural elements of the fragments were examined to allow for identification of roundwood, heartwood, and sapwood features.

Reference material comprised a reference collection of charred samples of taxa and reference publications, *Microscopic Wood Anatomy* (Schweingruber 1990) and *The Identification of the Northern European Woods* (Hather 2000).

Analysis Results

The results are summarized in Table 5. Classification follows that of *Flora Europae* (Tutin *et al* 1964-1980). Certain related taxa cannot be securely differentiated on the basis of their anatomical characteristics and are assigned to their respective family groups as with the genera *Salix* and *Populus*, and the genera *Craetaegus*, *Malus* and *Sorbus*. Provisional identifications have been given in cases where the condition of the charcoal was degraded.

The various identifications of wood taxa were consistent with taxa from the following groups:

Broadleaf taxa

Betulaceae. *Alnus* sp., alder.

Corylaceae. *Corylus* sp., hazel.

Fagaceae. *Quercus* sp., oak.

Oleaceae. *Fraxinus* sp., ash.

Rosaceae.

Subfamily Pomoideae. *Craetagus* sp., hawthorn; *Malus* sp., apple; *Sorbus* spp., *Sorbus aucuparia*, rowan; *S. aria*, whitebeam; *S. hibernica*, Irish whitebeam, and other *Sorbus* species.

Prunus sp., *Prunus avium*, wild cherry; *P. spinosa*, blackthorn; *P. padus*, bird cherry.

Rosa sp., rose.

Salicaceae. *Salix* sp., willow; *Populus* sp. poplar.

Ulmaceae. *Ulmus* sp., elm.

Coniferous taxa

Cupressaceae. *Taxus* sp. yew.

Discussion

Anatomical characteristics from charcoal fragments do not allow for identification of individual species in every case. Several species belong to groups of species, species of genera, of sub-families and of families that cannot be separated anatomically (Schweingruber 1990, Hather 2000). It is possible that a narrow range of species and, occasionally, one or two species can be indicated with a degree of confidence due to established factors, principally their native status and history of introduction by people (Huntley and Birks 1983, Peterken 1996 and Scannell and Synott 1987). The following section places the given charcoal based taxa identifications in the context of defined tree species allowing for implications related to their environmental characteristics and possible use by ancient peoples to be drawn. Consulted reference works pertaining to environmental factors included Goldstein *et al* 1984, Hather 2000, Huntley and Birks 1983, Mitchell 1978, Scannell and Synott 1987 and Tutin *et al* 1964-1980. Kelly 1998, O'Sullivan 1996, Rackham 1976-1990 and Raftery 1996, were consulted in relation to the uses different tree species may have served in antiquity.

Taxa descriptions

Alder

The sole native species is *Alnus glutinosa*, Common Alder, Irish fearnóg (family – Betulaceae).

Environment indications. Tolerant of nearly all soil types including relatively infertile soils, such as ironpan and peaty soils. Particularly tolerant of water logged conditions and is often a streamside tree. Has the ability to 'pioneer' into previously disturbed land. Native distribution throughout Ireland.

Uses in antiquity. A hardwood suitable for a variety of artefacts and smaller structural timber. Tends to harden when in contact with water and therefore suitable for making piles etcetera. It burns quickly when used for firewood but has been found suitable for charcoal production.

Hazel

There is a single native species, *Corylus avellana*, hazel, coll (family - Corylaceae).

Environmental indications. Botanically a shrub, but does not flower and fruit without sunlight, so is really a canopy tree preferring woodland edges and clearings though it bears moderate shade and is also found as understorey, typically in oak woodlands. Fairly tolerant of poor soils but does not grow on acid soils and preferring chalky, fertile, deep soil. Growing throughout Ireland.

Uses in antiquity. A tough and flexible wood, useful for small implements and small structural elements. Also grows easily in coppice-like form producing rods suitable for wattle and basketry type structures. Makes useful firewood.

Ash

There is a single native species, *Fraxinus excelsior*, ash, fuinseog (family - Oleaceae).

Environmental indications. Requiring deep, fertile, moist but well drained, soils. Grows well in mixed stands when not shaded. Widespread throughout Ireland.

Uses in antiquity. A strong but elastic wood suitable for many purposes including structural timber (not where in prolonged contact with water or soil). Coppices readily. Burns well even when green, partly due to low water content.

Hawthorn/ Sorbus

The represented species is probably one or more of the following native members of the sub-family Pomoideae that includes several *Sorbus* species. (Family - Rosaceae).

Crab Apple, *Malus sylvestris*, cran fia-úll; hawthorn, *Crataegus monogyna*, sceach geal.

Environmental indications. Both species. Very rugged and adaptable to almost any climate and most soil types, requiring moist soil and can grow in semi-shade or no shade. Natural distribution throughout Ireland.

Uses in antiquity. Both species produce a very hard close grained wood, suitable for small implements such as mallets and splitting wedges. Both species make excellent fuel; *C. monogyna* can also make livestock barriers and is noted for being the hottest firewood.

Sorbus. One or more of the native group of at least six species that includes, the most widespread rowan, *Sorbus aucuparia*, caorthann, as well as whitebeam, *Sorbus aria*, fionncholl coiteann; and Irish whitebeam, *Sorbus hibernica*, fionncholl ghaelach.

Environmental indications. General. Very tolerant of soil quality generally, though requiring moist soil. Tolerating light shade, though fruiting better in a sunny position. Effective pioneer, Rowan natural to all of Ireland. Other *Sorbus* species native to Ireland have a much more restricted range within Ireland and elsewhere, with Irish whitebeam found only in Ireland.

Uses in antiquity. Heavy, close grained hard wood suitable for carving and useful for making bows, tool handles, mallet heads and, if sizable, beams etcetera. Coppices well.

Oak

There are two native species, pedunculate oak, *Quercus robur*, dair ghallda and sessile oak, *Quercus petraea*, dair ghaelach. (Family - Fagaceae).

Environmental indications. Broadly soil tolerant. *Q. robur* preferring alkaline or neutral soils rich in minerals, particularly damp clay soils and usually found in mixed woodland. *Q. petraea* preferring acid and lighter well drained soils, often in pure stands. Both species are naturally distributed throughout Ireland.

Uses in antiquity. Both species produce a hard wood resistant to abrasion and water degradation, particularly useful for structural timber and implements, poles and fencing. Woodland trees can be coppiced to produce stakes, straight poles etcetera. The density of oak wood makes for an optimum long lasting fire fuel (Rossen and Olson 1985).

Willow /poplar

The Salicaceae family provides various possible individual species, native to Ireland, including ten or more from the genera of willows and one from the genera of poplars.

Willow

There are ten or more willow species native to Ireland, though some having restricted range. Examples of the more widespread species being eared willow (*Salix aurita*), crann sníofa; goat willow (*Salix caprea*), sailchearnach; and grey willow (*Salix cinerea*), saileach liath.

Environmental indications. Extremely hardy and tolerant of a wide range of soils and habitats, often growing in, though not restricted to, wet places. Not tolerant of drought. *S. cinerea* and *S. purpurea* are not particularly shade tolerant, *S. caprea* is reputedly more tolerant of shade. These are 'pioneer' species and can move into areas where the soil has been disturbed such as cleared woodland.

Uses in antiquity. Very tough and flexible wood useful for woven structures. Brittle branchwood not suitable as timber breaks violently when burnt. The stems are very flexible. Coppiceable, it can produce stout poles.

Poplar

Aspen, *Populus tremula*, crann creathach.

Environmental indications. Tolerant of poor soils growing on scrub, frequent on damp sites on hillsides, in rocky valley bottoms. A woodland tree where not under canopy. Moderately tolerant of drought as mature tree, not at all as a seedling. A short-lived pioneer tree. Native to Ireland.

Uses in antiquity. Wood is very soft with limited usefulness, of low flammability but making good charcoal.

Yew

The native species is yew, *Taxus baccata*, iúr (family - Taxaceae).

Environmental indications. Growing on limestone and chalk in woods and scrub, often occurring in dense shade of oak woods. Also can form pure stands in sheltered sites. Natural distribution throughout Ireland.

Uses in antiquity. A heavy, hard, durable, and elastic wood, resistant to water. Useful for structures, bows, tool handles etc. Makes good firewood.

Elm

The sole native species is *Ulmus glabra*, wych elm, leamhán sléibhe (family-Ulmaceae).

Environmental indications. Generally requiring non-calcareous top soil, can grow in heavy clay soil, needing moist but not waterlogged ground. Distribution throughout Ireland. Moderately shade tolerant.

Uses in antiquity. A hard, elastic, wood which is durable under water. Useful as structural timber, implements etcetera. Responds well to coppicing. The inner bark fibre can be used for ropes, mats etc.

The total range of taxa from AR126, Cahircalla More, comprises alder (*Alnus*), hazel (*Corylus*), ash (*Fraxinus*), hawthorn/apple/*Sorbus*-group (Pomoideae), cherry/blackthorn (*Prunus*), oak (*Quercus*), possibly willow/poplar (Salicaceae), yew (*Taxus*) and elm (*Ulmus*). The represented taxa belong to the groups of species represented in the native Irish flora and, conversely, non-native tree species such as lime (*Tilia*) and beech (*Fagus*) are not represented.

Generally, there are various, largely unquantifiable, factors that effect the representation of species in charcoal samples including bias in contemporary collection, inclusive of social and economic factors, and various factors of taphonomy and conservation (Schweingruber 1990). On account of these

considerations the identified taxa are not considered to be proportionately representative of the availability of wood resources in the environment in a definitive sense and are possibly reflective of particular choice of fire making fuel from those resources.

There is a strong level of consistency in taxa representation between the samples, especially in Samples 2 to 14 which may suggest contemporaneity of action. Sample 4, Deposit 17 also has a consistent small roundwood component that may indicate a particular circumstance of wood use/ fire processing, given that such small wood is likely to burn out completely in a typical fire.

Hawthorn/apple/*Sorbus*-group (Pomoideae), oak (*Quercus*), ash (*Fraxinus*), yew (*Taxus*) and hazel (*Corylus*) are all well represented as charcoal and all except yew (*Taxus*) are typically common fire fuels from the Ennis Bypass sites. Yew (*Taxus*) is present in relatively high numbers here and at the Cahircalla More sites AR127 and AR128 which suggests that there was good access to the species locally.

Conclusion

A varied woodland environment local to the site of AR126 is indicated by the range of taxa present in the samples. The identified taxa are broadly consistent with the picture of wood use from the other Ennis Bypass sites. The charcoal of the site has probably derived from fire fuel debris, and a particularly ready access to, and possible preference for ash (*Fraxinus*) is indicated.

Table 5: Number of identified fragments per sample

Sample	Deposit	Context type	<i>Alnus</i>	<i>Betula</i>	<i>Corylus</i>	<i>Corylus / Alnus</i>	<i>Fraxinus</i>	<i>Pomoideae</i>	<i>Prunus</i>	<i>Quercus</i>	<i>Salicaceae</i>	<i>Taxus</i>	<i>Ulmus</i>
2	16	Layer	-	-	2 (1r)	-	8	13	2	5	-	7	1
4	17	Layer	-	-	17 (9r)	-	7(2r)	18 (10r)	11(7r)	2	-	1	-
6	18	Layer	-	-	7	-	4	16 (1r)	5	25	-	6	-
8	19	Layer	2	-	2	5	5	16	8	9	?1	6	-
10	20	Deposit	-	-	6	-	9	14	6	18	-	2	-
12	21	Layer	-	-	4	-	3	7	-	1	-	-	-
14	22	Layer	-	-	3	-	12	-	1	13	-	36	-
15	23	Trough fill	-	-	2	-	10	2	-	-	-	-	-
17	22	Layer	-	-	10	-	2	3	4	-	-	-	-

(r: roundwood)

Radiocarbon dates

Seven radiocarbon determinations from charcoal from deposits within the *fulacht fiadh* were made by Beta Analytic Inc, Miami, Florida (Table 6).

Table 6: Radiocarbon determinations

Sample material	Cut	Deposit	Sample	Lab code	Radiometric age	Calendrical calibrations
Charcoal Fraxinus	-	22	14	Beta-207728	3930±40 BP	2 sigma (95%) Cal BC 2550 to 2540 and Cal BC 2490 to 2300 1 sigma (68%) Cal BC 2470 to 2400 and Cal BC 2380 to 2360
Charcoal Fraxinus	-	16	2	Beta-207729	2770±40 BP	2 sigma (95%) Cal BC 1000 to 820 1 sigma (68%) Cal BC 940 to 850
Charcoal Corylus	-	17	4	Beta-211561	2770±40 BP	2 sigma (95%) Cal BC 1000 to 820 1 sigma (68%) Cal BC 940 to 850
Charcoal Corylus	-	18	6	Beta-211562	2870±40 BP	2 sigma (95%) Cal BC 1140 to 920 1 sigma (68%) Cal BC 1100 to 990
Charcoal Corylus	-	20	10	Beta-211563	2860±40 BP	2 sigma (95%) Cal BC 1130 to 920 1 sigma (68%) Cal BC 1060 to 970
Charcoal Corylus	-	21	12	Beta-211564	3100±40 BP	2 sigma (95%) Cal BC 1440 to 1280 1 sigma (68%) Cal BC 1410 to 1360 and Cal BC 1360 to 1320
Charcoal Corylus	-	19	8	Beta-211565	2880±40 BP	2 sigma (95%) Cal BC 1190 to 930 1 sigma (68%) Cal BC 1110 to 1000

The charcoal was from relatively short-lived tree species and therefore the radiocarbon determinations are reasonably indicative of the dates of deposition of the layers that made the mound. The radiocarbon information is shown on Figure 6, and shows that the mound was begun in the late Neolithic/early Bronze Age and continued into the late Bronze Age. Radiocarbon dating was not sought from the trough fill (23) as this deposit was thought to be likely to have derived from later slippage from deposits 16 and 25.

Discussion

The excavation of Site AR126, Cahircalla Beg, Co. Clare has examined a well preserved, ‘classic’ crescentic-shaped *fulacht fiadh* with an associated trough. However, the monument has seemingly undergone if not a change in use, a change in status.

Three phases of deposition of burnt stone, separated by two periods of inactivity are apparent. There was no evidence for troughs in Phase I and II.

Phase I

At the very end of the Neolithic period, between 2550 and 2300 BC, a layer of burnt stone (22), 0.15m thick, approximately 4m across and composed exclusively of sandstone, was deposited onto the surface of the natural geology.

This burnt stone deposit was identical to the seven burnt stone spreads, recorded within 220m to the north and west on the other side of the stream flood plain (Site AR127, Taylor 2006a). Six of these spreads were dated to the period between 2470 and 1700 BC and all were made of sandstone. Four other burnt stone sites were excavated as part of this road project, 2km to the east on the flood plain of the River Fergus (AR121 04E0031 Taylor 2006b, AR122 04E0032 Taylor 2006c, AR124 04E0022

Hull 2006a, AR125, 04E0023, Hull 2006b). Three of these sites have been radiocarbon dated to the later Bronze Age (AR121 2 sigma Cal BC 1000 to 820), the late Neolithic and early Bronze Age (AR122 2 sigma Cal BC 2430 to 2140 and Cal BC 1870 to 1630) and the early Bronze Age (AR124 2 sigma Cal BC 2200 to 1960).

The almost exclusive use of sandstone at the thirteen burnt stone spreads is significant, as the later deposits that became the AR126 *fulacht fiadh* were predominantly limestone. It is very likely then, that sandstone was gathered from the glacial debris in the late Neolithic/early Bronze Age and that this resource was exhausted by the later Bronze Age, at least locally, and substituted as a heating medium by more commonly occurring limestone. Another explanation for the change from sandstone to limestone implies a change in use - sandstone might be a better rock-type if food preparation was the function of the earlier burnt stone sites.

At AR126, the radiocarbon evidence demonstrates that there was a hiatus in the deposition of burnt stone, of at least 860 years and at most 1270 years.

Phase II

After this gap of at least 35 generations, burnt stone (21) was again deposited at this location between the years 1440 to 1280 BC. The deposit was 0.3m thick, extended across approximately 4m and was mostly of limestone with some sandstone. There was then a gap of at least 90 years and as much as 250 years, before more stone was again laid.

This second phase was seemingly similar to the first phase, in that a single episode of heating stone took place.

Phase III

The radiocarbon dates for the upper deposits of the mound (16-20) overlap in the 370 year period from 1190 to 820 BC. The minimum time period that these upper deposits could have been laid was the 70 years between 1000 and 930 BC. Stratigraphically discrete deposits were apparent within the mound and it was in this period that the large crescent shaped *fulacht fiadh* with its stone-lined trough was constructed.

The line of retaining stones (2) suggests it was important to the makers to continue piling up stone to make a yet bigger mound at this location. This engineering indicates that the mound was seen as a special place, as it would have been quite possible to start another nearby.

It has been argued that *fulachta fiadh* seem to occur in the proximity of habitation enclosures (Cooney and Grogan 1994) and that these monuments may have formed part of a social 'round', in which individual family groups hosted reciprocal ceremonial activities for the local community (Grogan 2005). The burnt stone spreads from the Ennis Bypass road scheme were found at characteristically wet locations and these ill-defined spreads of stone ranged in size from a metre or two to 15m across and were typically less than 0.1m thick. It is not clear what specific activity the spreads represent; but it is likely that the stone was used to heat water in a similar manner to *fulachta fiadh* with the lack of a trough perhaps indicating that the water was held in a portable container. The shallow burnt stone spreads may perhaps be thought of, in some cases, as precursors to *fulachta fiadh* at which the process of repeated deposition of burnt stone across many years was not continued long enough for the full-blown mound to develop. It is possible that the burnt stone spread of one of these family groups at AR126 was 'promoted' to become a much more ostentatious monument, perhaps reflecting the centralisation of authority that it is thought took place during the Bronze Age. There are, however, problems with the notion of continuity of site across many centuries. The two early phases of burnt stone spread at AR126 were shallow and amorphous and may represent single burning episodes. How would people know where they were after a few generations? Perhaps the relatively short period of

between 70 and 370 years separating Phases II and III would have been a more realistic period to be held in memory.

Research in the Mooghaun area of Co. Clare indicates that *fulachta fiadh* may have served as gathering places for local community feasting (Grogan and Condit 2000, 25). Prehistoric settlement was not found in the immediate vicinity as part of this road project but a number of these sites have been identified within the wider landscape (Grogan 2005). This said, *fulachta fiadh* may not have had single functions and the debate of cooking place, bathing place, sauna or textile manufacturing will probably not be solved by this example. The small quantity of animal bone found in the upper deposit of AR126 does however hint at prehistoric animal butchery. The cut marks on one of the bones indicates horn removal from a sheep or goat, but it cannot be said if the animal was used for consumption or if it was the hide that was being processed. It is worth noting that excavated medieval tanneries are often characterised by, among other things, a preponderance of horns or horn cores.

The stone-lined trough at Site AR126 does not seem to have parallels in County Clare. Other excavated *fulachta fiadh* sites in the county (see for example those excavated as part of the Gas Pipeline to the West – Grogan forthcoming) have been shown to have unlined pits for the presumed heating of water. If the Cahircalla Beg trough was to hold water (and there is no reason to suppose that this was not the case) then there must have been an impermeable lining that did not survive. No evidence for a moss or clay lining was found in the trough.

As development-led excavation increases the number of *fulachta fiadh* dug in a scientific manner, more of these monuments are seen to be not just mundane domestic sites. One only has to consider a recently excavated *fulacht fiadh* from Co. Limerick that was associated with a human skull deposited in a spring (Taylor 2004) or the find of Early Bronze Age musical pipes from a *fulacht fiadh* trough in Co. Wicklow (website and BA 2004). Even such a significant find as the Mooghaun gold from Co. Clare (only 9km to the south-west) was likely to have derived from a *fulacht fiadh* (Condit 1996).

Discussions of how long each monument was in use have tended to rely on statistical analysis of the volume of the mound and trough (eg Masterton 1999). The Cahircalla Beg *fulacht fiadh* is special in that although it did not produce significant artefacts, it has a relatively unusual identifiable stratigraphic sequence of deposits that provides an absolute chronology for the site.

Archaeological potential off the road CPO

The *fulacht fiadh* was excavated in its entirety within the road CPO, and taking into account the very shallow soil overlying bedrock, associated features are not likely to be present immediately off the CPO.

Publication plan

A summary of the findings of the excavation has been submitted to *Excavations 2004*.

Copies of this final excavation report will be deposited with the Clare County Museum and the Local Studies Library, Ennis, Co. Clare

A summary article, describing the findings of this road project has been published in the local journal *The Other Clare* (Hull and Taylor 2005).

An illustrated information brochure describing the findings of this road project has been published by Clare County Council.

The six stones from the *fulacht fiadh* trough will be reconstructed, as found, and displayed outside the County Clare Museum, Ennis with an interpretative panel.

The stated aim of the National Roads Authority with regard to archaeological publication is clear, (O'Sullivan 2003) and it is anticipated that the results of this excavation will be disseminated as a component of a monograph dedicated to the archaeology of the Ennis Bypass. Publication is expected to take place in 2006/7 at the latest.

The radiocarbon dated *fulachta fiadh* and burnt stone spreads excavated as part of this road project and a number of other dated burnt stone sites, excavated by the author and others on the BGE Gas Pipeline to the West (Grogan forthcoming), on the west bank of the upper Fergus estuary would make an informative article in a national journal and would provide valuable comparative data to supplement the Discovery Programme research programme. It is proposed to discuss this thematic and regional publication with the Project Archaeologist Sébastien Joubert and with Eoin Grogan.

Graham Hull MIFA MIAI
TVAS Ireland Ltd
14th August 2006

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Website: www.mglarcc.com/projects/musical_instrument.htm

Appendix 1: Catalogue of features and deposits

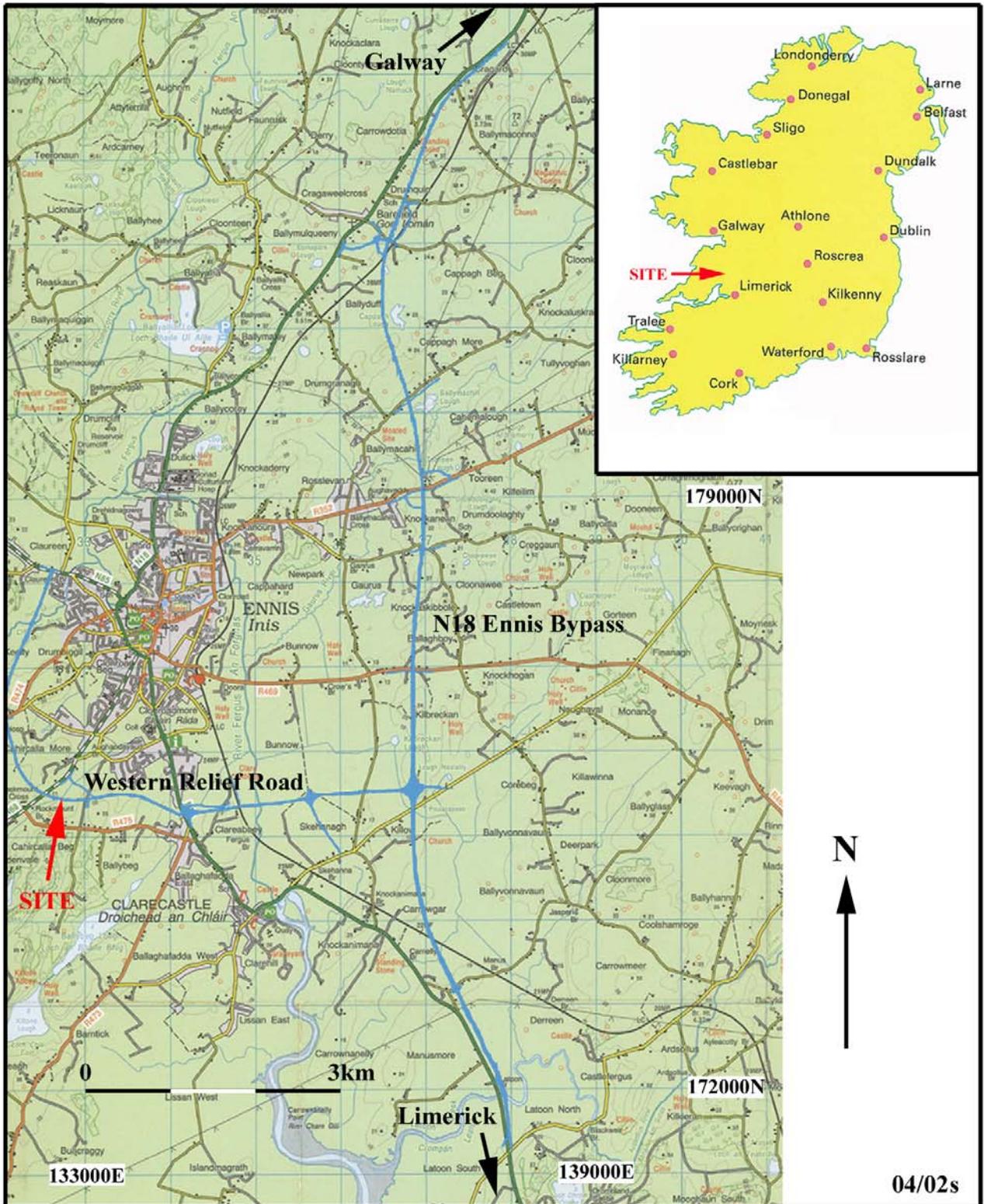
Context No	Description	Find No.	Sample No.
1	Cut for stones 2		
2	Line of stones in <i>fulacht fiadh</i>		
3	Cut for trough 4		
4	<i>Fulacht fiadh</i> trough		
5	Bracing stones for 4		
6	Not used		
7	Not used		
8	Not used		
9	Not used		
10	Not used		
11	Topsoil		
12	Natural sand layer		
13	Limestone bedrock		
14	Limestone wall		
15	Subsoil associated with 14		
16	Layer in <i>fulacht fiadh</i>	1	1, 2
17	Layer in <i>fulacht fiadh</i>		3, 4
18	Layer in <i>fulacht fiadh</i>		5, 6
19	Layer in <i>fulacht fiadh</i>	2	7, 8
20	Heat affected stones in <i>fulacht fiadh</i>		9, 10
21	Layer in <i>fulacht fiadh</i>		11, 12
22	Layer in <i>fulacht fiadh</i>		13, 14, 17
23	Infill of trough	3	15
24	Concretion at base of trough		16
25	Layer in <i>fulacht fiadh</i>		

Appendix 2: Catalogue of finds

Find No	Deposit	Sample No	Category	Description	No pieces	Weight (g)
1	16		Bone	Animal bones- inc 2 cut pieces	4	69
2	19	8	Bone	Small burnt fragments	10	<1
3	23		Bone	Cow bone- Rib fragment	1	9

Appendix 3: Catalogue of samples

Sample No.	Deposit	Volume sieved (L)	Volume floated (L)	Finds?	Stone sample?	Charred plant remains?
1	16	-	-	N	Y	N
2	16	10	10	N	N	Y
3	17	-	-	N	Y	N
4	17	10	10	N	N	Y
5	18	-	-	N	Y	N
6	18	10	10	N	N	Y
7	19	-	-	N	Y	N
8	19	10	10	Bone	N	Y
9	20	-	-	N	Y	N
10	20	10	10	N	N	Y
11	21	-	-	N	Y	N
12	21	10	10	N	N	Y
13	22	-	-	N	Y	N
14	22	10	10	N	N	Y
15	23	10	10	N	Y	Y
16	24	-	-	-	Y	Y
17	22	-	-	N	N	Y



**N18 Ennis Bypass, Site AR126,
Cahircalla Beg, Co. Clare
04E0024**

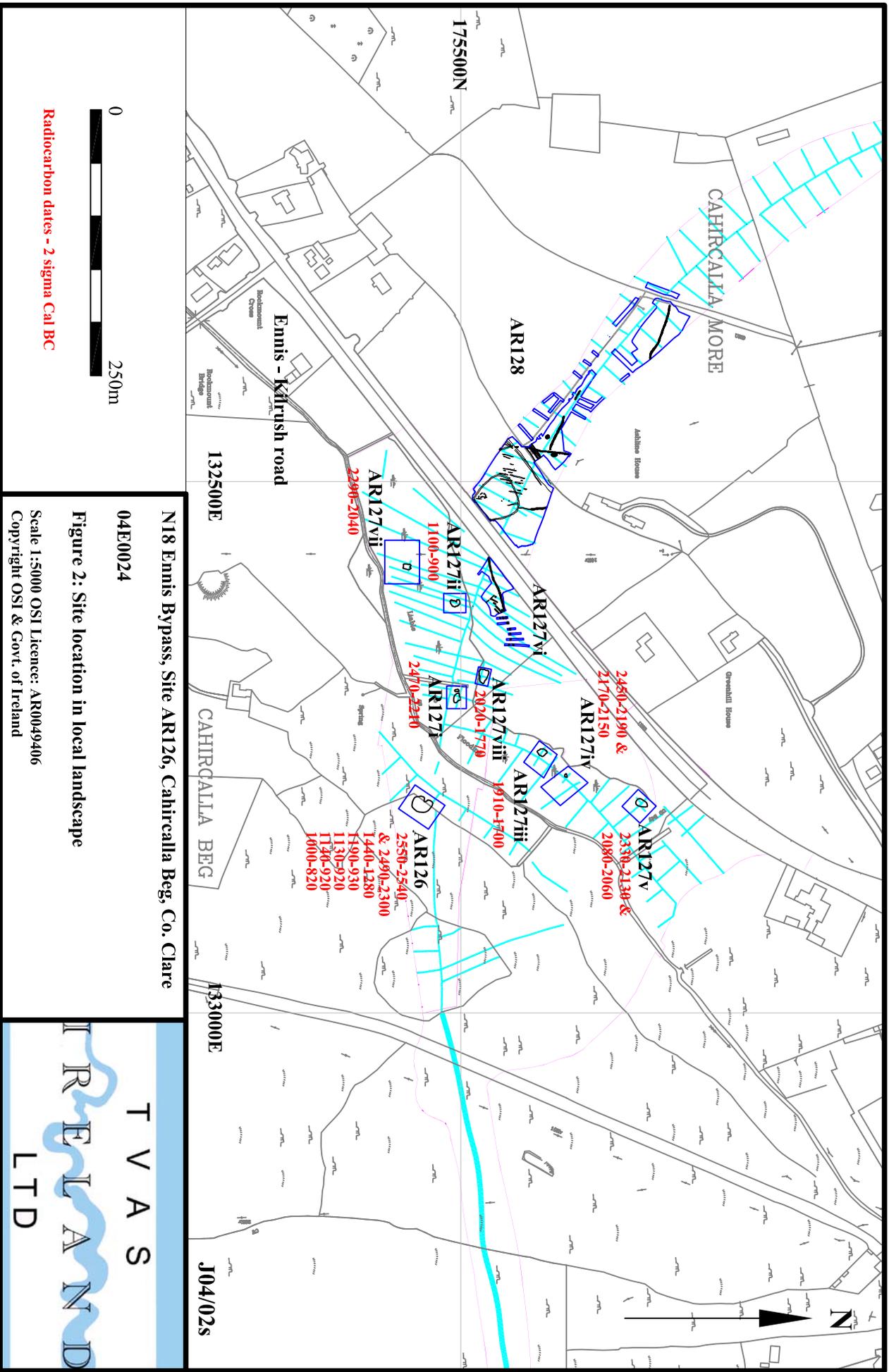
Figure 1: Site location

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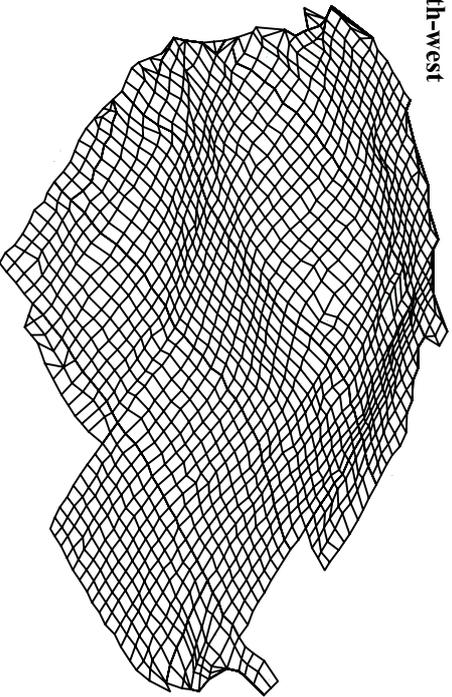
04/02s



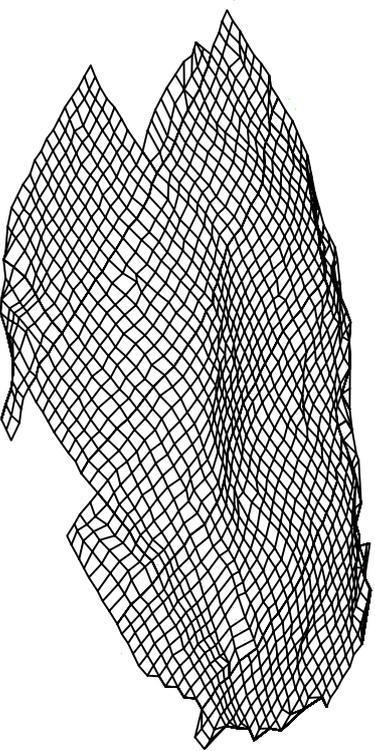
Radiocarbon dates - 2 sigma Cal BC



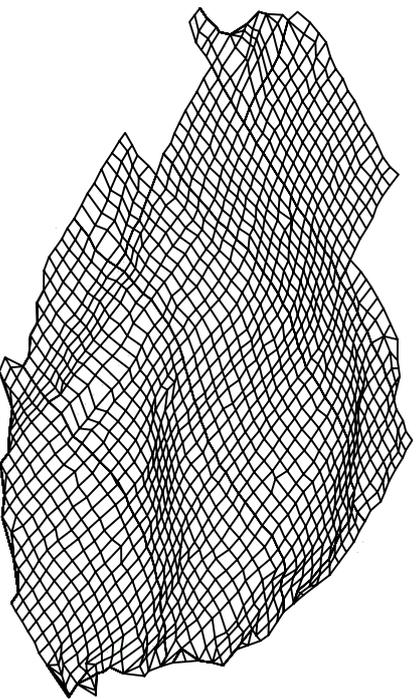
From south-west



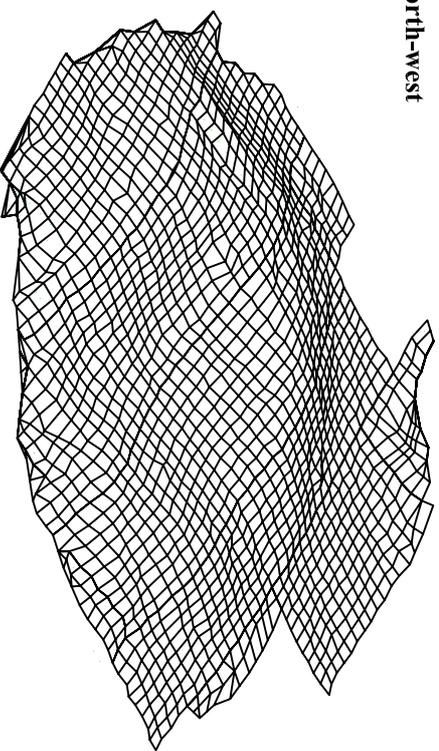
From south-east



From north-east



From north-west



J04/02s

N18 Ennis Bypass, Site AR126, Cahircalla Beg, Co. Clare

04E0024

Figure 3: Isometric views of *fulacht fiadh*

Scale 1:250 Compiled from GPS survey data



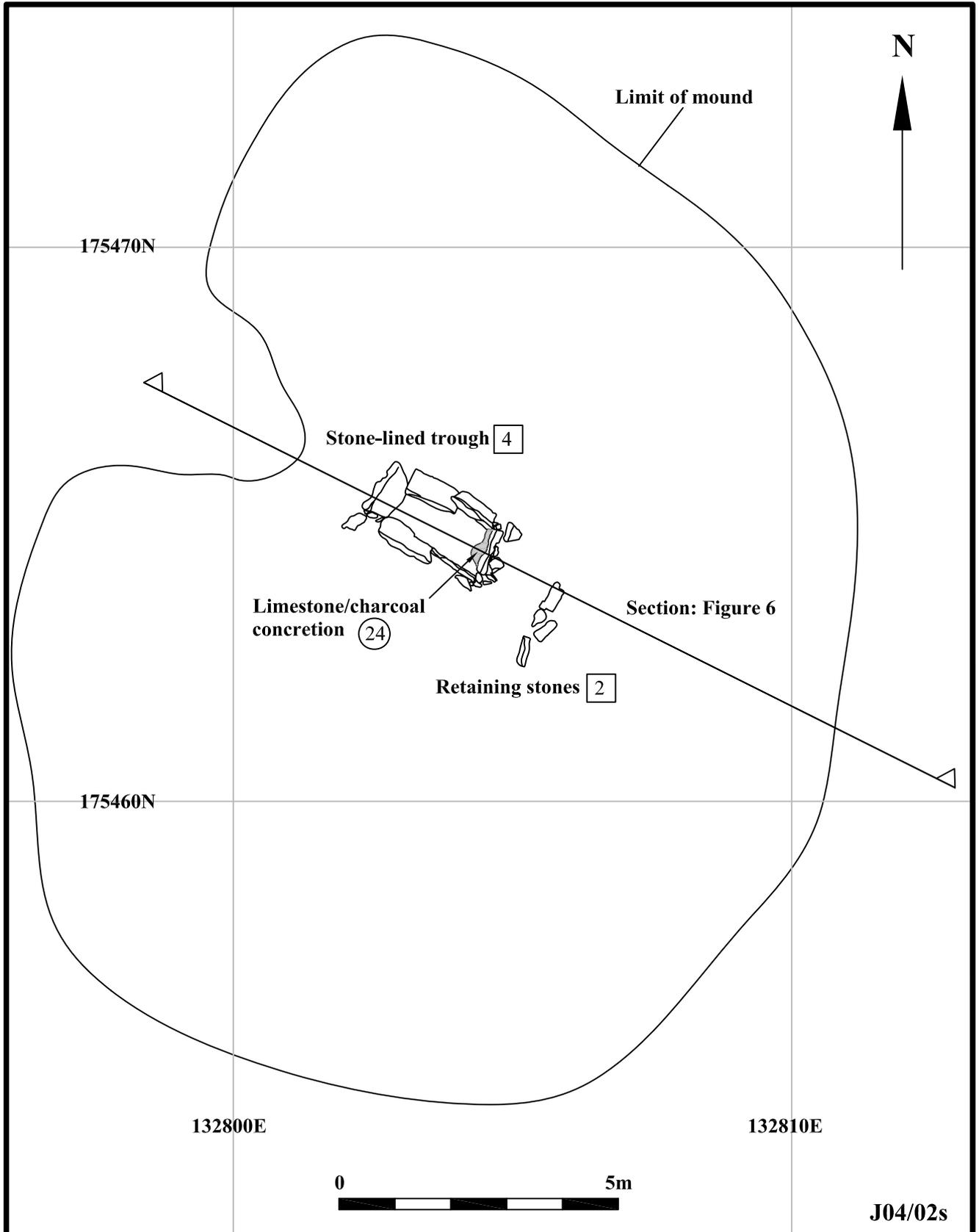


J04/02s



N18 Ennis Bypass, Site AR126, Cahircalla Beg, Co. Clare
04E0024

Figure 4: View of *fulacht fiadh* from west
Scale 1:100 Compiled from GPS survey data



J04/02s

N18 Ennis Bypass, Site AR126, Cahircalla Beg, Co. Clare

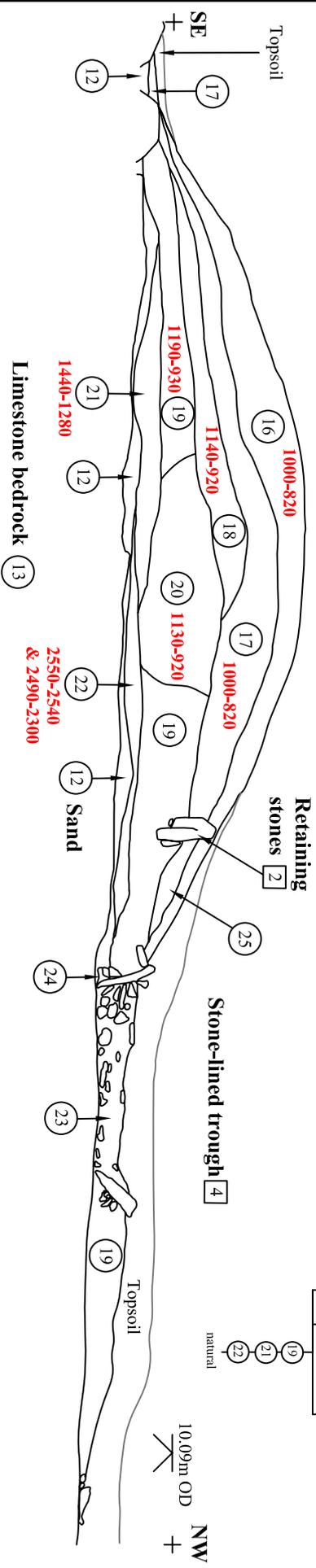
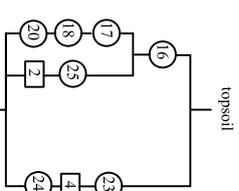
04E0024

Figure 5: Plan of *fulacht fiadh*

Scale 1:100



Stratigraphic matrix



Radiocarbon dates - 2 sigma Cal BC



N18 Ennis Bypass, Site AR126, Cahircalla Beg, Co. Clare

04E0024

Figure 6: Section through *fulacht fiadh*

Scale 1:60

J04/02s



Plate 1. Site AR126 in local landscape. Looking south-west



Plate 2. Fulacht fiadh as found. Looking south-west



Plate 3. Fulacht fiadh stripped of hazel scrub. Looking south-east



**Plate 4. Fulacht fiadh cleared of all vegetation. Looking north-west.
Scales 1m and 0.5m**

04E0024



Plate 5. Fulacht fiadh half-sectioned. Looking west. Scales 1m and 0.5m



Plate 6. Fulacht fiadh half-sectioned. Detail. Looking west. Scales 1m and 0.5m



Plate 7. Stone trough fully excavated. Looking east. Scales 1m and 0.5m