N21 Castleisland Bypass
Road Improvement Scheme
County Kerry

Archaeological Excavation of

AR021 Clashganniv

Final Report

transport21
progress in motion

NRA
National Roads Authority
An tÚdarás um Bóithre Náisiúnta

NDP
National Development Plan 2007 - 2013
Transforming Ireland

Kerry NRDO
National Road Design Office
Oifig Deartha um Bóithre Náisiúnta Chiarraí

Client: Kerry County Council
Kerry National Roads Design Office
The Island Centre
Castleisland
County Kerry

Planning Reg. No: Not applicable

Excavation Licence No: 07E0480

Licensee: Michael Tierney

Project No: N21 Castleisland Bypass (J14) Road Improvement Scheme [KY-00-110]
60/10-859

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NRA Database Contents Sheet

Database entry	**Comment**
Excavation number	07E0480: Excavation of *Fulacht Fiadh*, N21 Castleisland Bypass, Road Improvement Scheme, AR021
Townland	Clashganniv
Site number	AR021
County	Co. Kerry
Project reference	[KY-00-110]
Year of excavation	2007
Grid reference (Easting)	098995
Grid reference (Northing)	109111
OD Height (m)	21
Landscape setting	Located 225 metres (m) north-west of the Farranfore Road intersection and *c.*45m north of Keal Stream
Project archaeologist	Sébastien Joubert, NRA, Kerry National Roads Design Office
Archaeological consultancy	The Archaeology Company, Hamilton House, Emmet Street, Birr, Co. Offaly
Identification technique	Archaeological Testing (TVAS Ireland Ltd)
Site type	*Fulacht Fiadh*
Site activity	Specialized, indeterminate, boiling water by heated stones in a trough
Dating period	Middle Bronze Age
Radiocarbon dates	BP 2904+/-19 BC 1132-1012
Dendro-chronology dates	None

Descriptions	The excavation of AR021 was carried out in November 2007 subsequent to its identification through archaeological testing carried out by TVAS Ireland Ltd. in February 2006. The site consisted of a burnt mound, a wood lined trough, six post or stakeholes, and two additional indeterminate pits.
Artefacts	None
Environmental evidence	None
Additional information	n/a
Publication	To be agreed

1. Introduction

This is the final report on the archaeological excavation of site AR021 within the townland of Clashganniv, Castleisland, Co. Kerry. This work was carried out under Licence No. 07E 0480 and was conducted under conditions specified within Archaeological Works Contract 2. Work was undertaken in advance of the N21 Castleisland Bypass Road Improvement Scheme (RIS), Co. Kerry.

The archaeological excavation of AR021 was carried out subsequent to the site's identification during an archaeological testing programme carried out by TVAS Ireland Ltd. in February and March 2006. This work identified a burnt stone mound site at AR021 (Taylor and McNamara, 7). The archaeological resolution of this site took place in November 2007.

2. Project Background

In February and March 2006 a programme of archaeological testing was carried out along the proposed route of the N21 Castleisland Bypass (J14) Road Improvement Scheme [KY-00-110], Co. Kerry by TVAS Ireland Ltd. under licensed director Kate Taylor (Taylor and McNamara 2008). This work was conducted on behalf of Kerry County Council, in consultation with National Roads Authority Project Archaeologist Sébastien Joubert, as part of the NRA scheme for upgrading the N21 Limerick-Tralee Road. Archaeological testing of the proposed route way in 2006 was preceded by a programme of cultural, archaeological, architectural, and geophysical investigations. The results of these assessments can be found in RPS Group's *Castleisland Bypass Road Improvement Scheme Environmental Report 2005*; CRDS Ltd.'s *Environmental Assessment of Route Corridors (N21 Route Selection Report) 2005;* and Target Archaeological Geophysics' *Geophysical Survey Report: N21 Road Improvement Scheme, Castleisland Bypass, Co. Kerry 2005*.

The testing programme carried out by TVAS Ireland Ltd. succeeded in identifying nine sites of archaeological importance along the 5.4km proposed route. Additional excavation was recommended for eight of the sites. One pit had been excavated by TVAS Ireland Ltd. in February 2006. This included previously known monuments ringfort AR016 (RMP KE039-027) within Mullaghmarky townland and ringfort AR014 (RMP KE039-029) in Portduff; the current site—a burnt stone mound AR021 (Clashganniv); a combination of spreads, pits, linear features and postholes located at AR022 (Kealgorm)

and AR023 (Mullaghmarky); and pit sites AR024 (Mullaghmarky) and AR025 (Dooneen) (Taylor & McNamara, 2008).

The Archaeology Company was then engaged by Kerry County Council to complete the archaeological resolution and preservation by record of nine archaeological sites identified along the proposed route. This phase of Archaeological Contract 2 work began in June 2007.

3. Site Location

The 5.4 km N21 Castleisland Bypass RIS is divided into two distinct sections. The Northern Section will link the N21 north of Castleisland to the N21 Castleisland-Tralee road and measures 3.75km in length. The Southern Section extends from this intersection south-east to link to the N23 Castleisland-Farranfore Road and measures 1.62km in length.

Site AR021 is located in the southern end of the RIS, 225m north-west of the Farranfore Road intersection (figs. 1 & 2). The excavation area covered 2315m². The site location on Ordnance Survey 6" Series mapping, was close to the east edge of Sheet 39, where it meets Sheet 40. The site is within the townland of Clashganniv, in the Barony of Trughanacmy and Civil Parish of Dysert. The etymology of 'Clashganniv' is derived from the Irish '*clais'*, meaning 'trench' or 'furrow' and '*gainimh'*, meaning sand. The placename therefore most directly translates as 'the trench of the sand' or 'sandpit' (Joyce 1913). The site is located in a level field used as pasture. The north boundary of the field is Keal Stream which appears, based on a review of Ordnance Survey maps, to have been redirected between 1841-2 and 1892 (OS 1st edition Sheet KY039-040, surveyed 1841, published 1846; OS 25" edition Sheets KY039-12, surveyed 1892, published 1893 and KY040-09, surveyed 1893, published 1894). The original course of Keal Stream was found at AR022, representing the townland boundary between Kealgorm and Clashganniv townlands. Other field boundaries are marked by hedgerows consisting of bushes and trees. The field is generally flat with a small rise indicated in the central portion, where AR021 is located. Numerous sinkholes were noted across the area during centre-line testing.

4. Archaeological and Historical Background

Prior to archaeological testing undertaken by TVAS Ireland Ltd., no prehistoric sites were known along the proposed route of the N21 Castleisland bypass. Known prehistoric sites in the vicinity were limited to three: NMI # 1978:151, a spot find of a plano-convex stone bearing a figure with a longbow near the entrance of a cave near Castleisland; and two prehistoric *fulachta fiadh* in Ballyinaboul and Glanshearoon (KE040-005 and KE040-006) (fig. 3).

Two additional *fulachta fiadh* sites were excavated along the N21 Castleisland-Abbeyfeale Road Improvement Scheme—AR03 and AR04, both in Kilmaniheen West townland. AR03 consisted of a low burnt stone mound and rectangular wood lined trough that produced a date range from the 9th or 11th centuries B.C. Site AR04 consisted of low burnt stone covering an oval trough and additional circular trough which produced dates ranging from the 10th to 12th centuries B.C. and indications of multiple phases of use (Hull 2005, in Taylor and McNamara 2006). The Excavations Database does not record any previous archaeological investigations in Clashganniv townland.

The TVAS Ireland Ltd. works in Spring 2006 resulted in the identification of new prehistoric sites and materials, including the current site. A light scatter of lithics was also retrieved from one of the seven fields tested in Clashganniv townland. A chert scraper and two pieces of quartz were present in association with the features in AR020, located *c.*175m to the south of AR021 and a struck flint was identified in the topsoil in the same field (Taylor & McNamara 2006, Finds 199:1, 199:2, 199:3, 50:1). Site AR022 is also a prehistoric settlement site dated to earlier in the Bronze Age (Tierney & Leininger 2010a). Excavations conducted at Site AR016 resulted in the identification of a circular house, postholes, and prehistoric finds, including pottery and lithics dated to the Bronze Age (Tierney & Leininger 2010b).

5. Methodology

The excavation of AR021 took place in November 2007. Topsoil was removed using a 360º mechanical excavator equipped with a toothless grading bucket. The limits of the *fulacht fiadh* mound were identified and mapped (fig. 4). Portions of the mound were also removed mechanically under archaeological supervision. Once identified, the trough and other features found on site were cleaned by hand using trowels, shovels and, where appropriate, mattocks. Archaeological features and materials were then

excavated by hand until natural geological layers were reached. During the fieldwork a comprehensive site archive was compiled including drawn (to scale), written, and photographic records of individual contexts and features. Site archive registers are included as Appendices 1-4 of this report.

Finds were recorded by context and individually numbered and all artefacts recovered were retained and removed from site for conservation (when necessary) and specialist examination/analysis. Cleaning took place on site or after removal, as appropriate. Soil and other samples were taken to recover available palaeoenvironmental evidence and materials suitable for scientific dating, *e.g.* charcoal. Short term, secure storage was available on-site during the excavation. Finds and samples were then transported to The Archaeology Company's offices in Birr, County Offaly, for storage, analysis, processing, etc. Finds will ultimately be deposited with the National Museum of Ireland.

The archaeological crew consisted of director, Michael Tierney, supervisor, Michael Rooney and site assistants, David Fitzgerald, Frank Fitzgerald, John Mageean and Robert McGuire. Weather conditions during excavation varied from wet to warm and dry.

Post-excavation proposals were agreed in a Post-excavation Method Statement submitted to the Project Archaeologist based on the results of the excavations. These recommended further work including soil sample screening for archaeobotanical analysis, analysis of charred wood from a number of contexts and of the surviving timbers from the trough that was excavated. The results of this work are integrated into the report and are found in the appendices.

6. Results of Excavation

The following is a discussion of the nature, stratigraphic relationships and final interpretations of archaeological contexts identified during the excavation of AR021 including the results of the post-excavation analysis. Archaeological contexts which are deposits or fills are numbered within curved brackets, *e.*g. C(10), whilst cuts are numbered within square brackets, *e.*g. C[20].

In total 32 contexts were identified during the excavation of Site AR021 including natural strata and voided contexts associated with natural processes; and cultural

contexts associated with the *fulacht*—the mound and trough, post- and stakeholes, and pit features as summarized in the table that follows:

Table 1: Summary of AR021 Natural and Cultural Site Strata and Features

Context Designation	**Context / Feature Type**
C(1), C(2), C(3), C(33)	Natural site strata
C[5], C(6); C(29), C(30)	Voided contexts, natural features and fills
C(4), C(34) C[10], C(11), C(13), C(14), C(15), C(16)	*Fulacht* burnt mound spread/layer *Fulacht* trough cut and fills
C[17], C(22) C[18], C(19) C[20], C(21) C[25], C(26) C[27], C(28) C[31], C(32)	Posthole Posthole Posthole Stakehole Posthole Posthole
C[7], C(8), C(12), C(9) C[23], C(24)	Pit Pit

6.1 Natural Strata and Voided Contexts

6.1.1 Post-Depositional Disturbance

The site was located on an agricultural field used as pasture. Earthmoving to improve drainage including the 19th century straightening of Keal Stream and ploughing had occurred on site. No modern or historic period drain or furrow features directly impacted the subject *fulacht fiadh,* however, it is likely that agricultural activities over time have resulted in a decrease of mound height and the spread of burnt stone and charcoal across the central portion of the field, as seen on site.

6.1.2 Topsoil Layer C(1)

Topsoil was grey brown silty clay and varied from 0.05m to 0.4m thick, with the thinnest layer located directly above AR021 and the thickest located at the south end of the field. Pockets of re-deposited boulder clay were present within the topsoil.

6.1.3 The Natural Subsoil C(2), C(3)

Topsoil was underlain by grey clay with mineral staining and iron panning, C(33). This was quite shallow and had a thickness of 0.1-0.23m. This level was then underlain by natural clays in various colours—yellow, orange, grey, cream, and brown. This wide variation in natural subsoils over a limited geographical area is synonymous with surface drift glaciations resulting from the last ice age. In the local AR021 area, the natural subsoil was a yellow gravely clay. The natural subsoil was designated C(2) on site. An area of subsoil (grey sandy clay) was also locally re-deposited on a corner of the *fulacht fiadh* mound. In this area it was designated C(3). A piece of animal bone was present within C(3), but as this was re-deposited natural, probably representing late contamination rather than comprising part of the *fulacht fiadh*, the bone was not suitable for analysis.

6.1.4 Voided Contexts

Voided contexts associated with this site are limited to four; a sinkhole C[5] and the associated fill C(6); and a natural depression C[29] filled with C(30).

The first set of voided contexts, C[5] and C(6), consisted of a rounded and concave sub-circular basin shaped cut area with an irregular and poorly defined base (designated C[5]). It measured 1.6m (north-west to south-east) by 1.3m with a depth of 0.20m and was located 3.8m to the east north-east of the *fulacht fiadh* trough. The fill (C(6)) was a black silty clay with medium compaction, and containing charcoal and heat shattered stone—virtually the same material as that forming mound of the *fulacht fiadh.* Additional excavations revealed the natural water table at 0.5m below the feature base, and no distinctive or overtly cultural breaks or cuts were noted during excavations. Given the similarity of the fill to C(4), the irregular shape, lack of discernable cut, and the local depth of the water table, this context has been interpreted as a natural sinkhole covered by burnt mound material that has been locally redistributed as a result of agricultural activities.

Contexts C(29) and C(30) comprise a spatially discreet depression or shallow hole which was naturally in filled with brownish grey firmly compact clay—C(29) and decaying root and branch material, C(30). The area measured 4m by 3m in size and was roughly 0.20m deep. There is no indication that this context was deliberately created (that is, there were no discernable vertical side cuts or sharp slope breaks observed during

excavation) or culturally modified in any way. Therefore C(29) and C(30) are considered to be non-cultural and lacking archaeological significance.

6.2 Archaeological Contexts

Archaeological features found at AR021 total nine and include the *fulacht fiadh* (mound and trough), five postholes, a stakehole, and two pits (fig. 6). The total number of contexts was 25 comprising nine cuts and 16 fills.

6.2.1 The Burnt Mound and Wood Lined Trough Cut: C(4) and C[10]

The *fulacht fiadh* excavated at Site AR021 consisted of a burnt stone and charcoal mound, which survived to only a shallow depth and consisted of a single, homogenous deposit (C(4)), wood-lined rectangular trough cut (C[10]), and five associated fills. The burnt stone was limestone, reflecting the readily available local geology.

The mound was roughly sub-circular in plan to horse-shoe shaped and 12m in diameter (fig. 4). The mound ranged in thickness from 0.05m to 0.22m (fig. 5). The overall dimensions may have been impacted by historic and modern farming practices. The main mound deposit was C(4), a black clayey silt with charcoal and burnt stone. A re-deposited layer of the natural subsoil was noted overlying the mound on the western edge (C(3)), with dimensions of 2.7m x 1.2m x 0.12m in depth. The central portion of the mound beneath which the trough was located was lighter in colour (C(34)) than the surrounding soils ((C4); pls. 1-2). Whether this difference was depositional, with the surrounding soils being darker because they represent repeated emptying of the trough or whether it resulted from post-depositional factors, such as greater leaching of charcoal from this area because of the underlying trough is unclear. It is however, almost certain that the difference in this deposit is connected to its stratigraphic relationship to the underlying trough. This is borne out by the fact that C(34) respects the shape of the trough and extends beyond the dimensions of the trough by *c* .0.1m on each side, measuring 3.85m x 1.56m x 0.21m in depth.

The trough cut, C[10], measured 3.6m (north-east to south-west) by 1.3m and was rectangular in plan (figs. 6-8, pls. 3-5). The upper and lower slope breaks were sharply cut with vertical sides on all but the north-east side which was more gradual. The overall depth of the trough cut varied; the northern third was more shallow (0.05m deep) than the southern (0.30m). The trough base was not sloped but rather exhibited

an abrupt step-like break approximate one third from the north-east end. Timber lining was present in the deepest portion (figs. 7 & 8; pl. 5). The step-like break meant that it was quite comfortable to site in leading to speculation that this site may have functioned as a sweatlodge rather than a place for cooking, particularly given the lack of evidence for food processing or cooking in the form of bones or tools. Section 6.2.2 below however shows that the evidence for a superstructure as reflected in the excavation posts and stakeholes is not strong.

Five distinct contexts or fill layers were identified within the cut: C(11), C(13), C(14), C(15), and C(16) (fig. 7).

C(11) was a thin band of dark grey highly compacted clay in the upper northern portion of the cut. It measured 1.6m long by 0.4m wide and was only 0.08m deep. It is interpreted as being intrusive clay particles that originated in the topsoil layer (i.e., they are the result of natural rather than cultural processes). This grey banding was noted elsewhere in the field during the TVAS Ireland Ltd. study.

Located immediately beneath C(11) was the main upper trough fill—C(13). It consisted of black silty soil with charcoal and heat shattered stone and measured 3.6m by 1.3m. It was 0.05m to 0.10m thick. The formation of this context was probably the result of material collapsing into the trough from the overlying burnt mound, in addition to the trough not being cleaned out after final usage.

C(14) underlay C(13) and was roughly 0.03m thick. It was confined to the northern third of the lower part of the trough cut, C[10] and formed the basal layer directly overlying the wood lining, C(16). It consisted of soil, similar to C(11), mottled with natural subsoil. A fragment of charcoal was radioncarbon dated to BC 1132-1021 dating the final use/backfilling of the trough and therefore the site, to the middle to late Bronze Age.

C(15) was a thin black loosely compacted layer of peat in the southern two thirds of the lower part of the trough cut. Like C(14), it sat on top of C(16), the trough's timber lining. C(15) contained shards of burnt wood materials and small stones. It measured 2.2m by 1.0m in plan and was 0.30m thick.

The oak timber lining C(16) was found only in the northern section of the deepest portion of the trough. Three timbers survived, running parallel to each other at the base

of the trough in a north-north-east to south-south-west orientation. These timbers have been allocated the numbers 16A, 16B and 16C. 16A was located at the north-west edge of the trough and had a length of 1.67m and width of 0.21m. 16B in the centre of the base of the trough was 0.88m in length and 0.08-0.33m in width. 16C ran alongside the south-east edge of the trough and measured 2m in length and 0.12-0.29m in width. Each of the three timbers was very thin, varying from *c.*10-40mm thickness along the length. It is likely that the planks were originally of more substantial thickness, but that decay and erosion had worn away much of the material. Apart from being very thin, the wood was moderately well-preserved, with some bark present and could be lifted largely intact (fig. 8; pl. 5). The timbers were analysed by Jean O Dowd of The Archaeology Company and their species confirmed as oak. No toolmarks were evident during the excavation or their subsequent analysis. Their condition had deteriorated during storage in a stable, water-filled box and disintegrated when being investigated so that the primary record remains the drawings, photographs and descriptions outlined above.

The wood lining as identified during excavation was confined solely to the base of the trough. This may reflect differential survival rather than the extent of the lining when constructed. It is possible timber lining had also been present at the sides of the trough and that the base was originally more fully lined. Differential survival may have been due to the utilisation of different species of wood for the lining or timbers may have been removed for re-use or burning prior to final usage but there is no evidence to support these points. In particular there we no negative impressions or any other traces on the trough sides to indicate that they were lined.

6.2.2 Post- and Stakeholes

Six postholes and/or stakeholes were identified in the immediate vicinity of the trough—four on the west side of the long axis (C[17], C[18], C[20], and C[25]) and two on the east-north-east side (C[27] and C[31]) (figs. 6 & 8, pls. 4-6).

Postholes and stakes ranged from 0.13m to 0.31m in diameter and 0.13m to 0.30m in depth. All were generally characterized by sharp upper cut breaks, vertical sides, and tapered, rounded bases. For representative posthole sections and plans, refer to Figure 9 and Plate 6. Additional details are provided below.

C[17] was a possible posthole; sub-circular in plan and measuring 0.30m by 0.26m with a depth of 0.16m. The upper break of the slope was gradual, sides were irregular

and tapering to an uneven, slightly north-south oriented base. The sole fill, C(22), was almost exclusively burnt stone with a small amount of yellow clay and charcoal. The field interpretation is that this may have been dug as a posthole, deemed unsuitable for some reason, and subsequently refilled with stone material from the *fulacht*.

C[18] was a posthole, roughly circular in shape and it measured 0.32m by 0.30m. It was 0.26 m deep. The upper and lower slope cuts were sharp, with vertical sides and a flat, slightly north oriented base. The main fill of this posthole was C(19), it was similar to that of the trough—black moderately compacted sandy peaty silt with heat shattered stones and charcoal. This posthole was located immediately adjacent to C[17], discussed above.

C[20] was a possible post or stakehole, circular in shape and measuring 0.14m in diameter and 0.3m deep. In profile the upper cut was sharp with vertical sides. The base was ill-defined, possibly as a result of water logging. C(21) is the sole fill of possible posthole C[20]. It was mid grey firm clay with some heat-shattered limestone.

C[25] was a possible post or stakehole, sub-circular in plan and measuring 0.15m by 0.11m with a depth of 0.13m. The cut tapered toward a base which was slightly north inclined. The sole fill was designated C(26) and consisted of a dark grey medium compact silty clay with some burnt stone and charcoal.

C[27] was sub-circular in plan and located on the south-east side of the trough. It had dimensions of 0.31m x 0.24m x 0.19m deep. The cut tapered towards the base. The fill was C(28), which consisted of dark grey silty clay with moderate burnt stone and charcoal flecks.

C(31) abutted the trough cut C(10) and was actually partially within the trough on the south-east edge, just where the trough cut steps down. It was sub-circular in shape in plan and measured 0.31m x 0.30m x 0.23m in depth. It tapered towards a fairly flat base and was filled by C(32), which was similar to the burnt mound material, being a dark grey silt, with much burnt stone and charcoal present. It was difficult to distinguish the south-west edge of the cut. The location of this posthole where the trough cut steps down suggests that it may have been a post related to the purpose of the step and overall function of the trough.

The positioning of the post- or stakeholes in a rough arc from south-west to north-east, around the north-west half of the *fulacht* trough may be indicative of the presence of above ground superstructure, perhaps a windbreak or rack was situated over it. This is a very tentative explanation though because they are so spread out.

6.2.3 Pits C[7] and C[23]

Two possible pit features were found in association with *fulachta fiadh* at AR021, one large pit located to the north-west of the trough (C[7]), and another, smaller pit or post located to the west (C[23]) (fig. 6; pls. 7 & 8).

Pit C[7]

C[7] was a pit located beneath the mound material and deposit C(3). A slot was excavated through C[7] to expose two sections. C[7] was circular in shape and measured 2.5m by 2.1m. It was 0.45m deep. The upper slope break was sharp with straight sides leading to an irregular base defined by the presence of wood (figs. 6 & 10, pl. 7).

C(8) was the upper fill of C[7]. It was a mottled transition zone between C(3) and C(12), the main fill of the pit. C(8) was brownish grey charcoal flecked clay mixed with heat affected stone (making up about 30 percent of the context).

C(12) was a brownish grey and black gritty clay with frequent charcoal inclusions and heat affected stone.

C(9) was a charcoal rich layer of fill which occurred beneath the main fill (C(12)) of pit feature C[7]. It was black in colour, with grey and brown flecks and was a firm, charcoal rich clay, measuring 0.8m by 0.7m in size and was 0.03m deep. It was confined to the south-east portion of C[7].

C(29) was a naturally formed peaty deposit present below the cut C[7}. It measured 3m x 2m x 0.2m in depth.

Pit C[23]

C[23] was located 1.8m south-west of the trough (C[10]) and associated cluster of post and stakeholes (C[17], [18], and [20]). In plan it was an oval pit feature measuring

0.67m by 0.56m and oriented north-east to south-west (figs. 6 & 8; pl. 8). The depth was 0.30m. In section there was a gradual upper break followed by sheer vertical side sides. The break of the slope to the base was gradual and the base was irregularly shaped.

C(24) was the main fill of pit C[23]. It was yellow-grey highly compacted clay containing large amounts of heat-shattered limestone and some charcoal. This fill was similar to the mound material.

The function or activity that resulted in Pit C[23] is undefined. In size it is larger than other postholes identified together to support a single structure. More likely the pit served some other purpose. It may have functioned as a small trough.

6.3 Artefacts and Samples

AR021 excavations produced no artefacts except a single piece of bone and the trough wood. The piece of bone was present in C(3), which was re-deposited natural and probably a late deposit. As this context is not secure, there was no benefit in carrying out specialist analysis of the bone. Soil and wood samples were taken from features found on site. Samples were also taken of natural deposits where charcoal flecks were noted as a result of leaching, as there was the potential that these samples may yield information relevant to the archaeological features. A list of finds and samples and the results of flotation are presented in Table 2, below:

Table 2: List of Artefacts and Samples from AR021 Excavations

Sample	Context	Bags	Description	Amount of Charcoal	Other
1	C3	1	Soil sample	Medium to High	None
2	C4	10	Soil sample	High	None
3	C3	1	Bone sample	Not applicable	Bone
4	C(12)	1	Fill of pit	Medium to High	None
5	C(09)	1	Soil sample; charcoal rich layer of C[7]	Medium	None
6	C(11)	1	Soil sample	Low	None
7	C(13)	1	Soil sample	High	None
8	C(14)	1	Soil sample	High	None
9	C(15)	1	Soil sample	High	None
10	C(29)	1	Soil sample, natural peat accumulation	High	Wood

Sample	Context	Bags	Description	Amount of Charcoal	Other
11	C16	1	Trough wood sample	Not applicable	Wood
12	C(29)	1	Roots from C[29] sample	Not applicable	Root

No identifiable archaeobotanical remains were identified during flotation and this was confirmed when they their fine fraction was subsequently scanned.

7. Conclusions

Excavations at AR021 confirmed the presence of and preserved by record a burnt mound, trough with wood lining, six post- or stakeholes and two pits. This is a typical *fulacht fiadh* and may date from the prehistoric to the medieval period, although this site type is most frequently associated with the late Bronze Age (*c.* 1500 BC to 500 BC). The radiocarbon date of BC 1132-1021 places the site firmly within this period. The presence of mound materials in all pits suggests contemporary use and single site general function and occupational period. Another prehistoric site AR022 was excavated only 200 m north of this site and it was thought during the excavation that they may be related. However, the dates from AR022 tend are from earlier in the Bronze Age centring on the date BC 1391-1209 making it two to three hundred years older.

8. Discussion

Fulachta fiadh, or burnt stone mounds, are the most common prehistoric archaeological site type found in Ireland with estimated examples exceeding 7000 (Grogan, O'Donnell, and Johnston, 2007). The NRA database lists *c.*480 *fulacht fiadh* sites being excavated in the Republic of Ireland in the past 13 years alone (www.nra.ie/Archaeology/NRAArchaeologyDatabase). Similar site types have been identified in smaller quantities in England, Scotland, Wales and the Isle of Man, where they are known as Burnt Mounds. The term *fulachta fiadh* originates from 9th century Irish texts (O'Drisceoil 1990, 157-164). '*Fulacht*' refers to an open air pit used for cooking; and '*fiadh*' derived from the early word '*fian*' associated with the young warrior-hunters of the Fianna or Fionn MacCumhail. Variations include *fulacht fian* (singular) and *fulachtaí fia* and *fulachta fiadh* (plural). Analysis shows such sites to have been in use over a prolonged period, from the Bronze Age until the Middle Ages. Although radiocarbon-dating places the vast majority of these site types in the second millennium

BC, *i.e.* the Bronze Age, O'Drisceoil studied early Irish Texts which detailed their use well into the medieval period (O'Drisceoil 1988, 671-80).

These sites are characterized by a mound or spread of heat shattered stone and charcoal, beneath which will be located a roasting pit or trough. A traditional *fulacht fiadh* will consist of a horseshoe shaped mound with a slight central depression indicating the presence and location of a rectangular trough cut into the subsoil and lined with wooden planks, stones, animal hide or clay. Other discreet contexts associated with burnt mounds include fireplaces and/or hearths defined by evidence of *in situ* burning; pot boilers (unlined pits used for cooking or heating in a ceramic vessel); unlined circular or oval shaped pits possibly representing additional troughs or roasting pits; and posts and stakeholes suggesting windbreaks or other above ground structural remains. In terms of artefact recovery, bone is the most common find from *fulachta fiadh* sites. Many *fulachta fiadh* sites have no artefacts at all, though in some rare cases ceremonial materials are found (Grogan, O'Donnell, and Johnston, 2007). AR021 falls neatly within this broad assemblage of features.

The process that results in formation of this kind of archaeological feature is the excavation of the pit, followed by lining such that water can be held. Heated or fired rocks are then added to the water trough which results in the heating of the water for cooking or other purposes which cause the stones to fracture. This spent rock material, along with charcoal from heating, is discarded around the trough, forming the above ground mound or spread.

Water, wood, and rock are integral to the process and the local availability of such resources directly impacts site location. These sites are typically situated in poorly drained locations where the water table will naturally infill the trough. Water sources are almost invariably located nearby, and occasionally *fulachta fiadh* contexts include water management cuts such as drains and channels. Locally procured wood and stone are also hallmarks for *fulachta fiadh*. Once the use of a single *fulacht fiadh* had been exhausted it was common for people to continue to exploit the local environment; and therefore *fulachta fiadh* tend to be found in groups strung out along water courses.

The degree of re-use at a *fulacht fiadh* site is also influenced by the type of stone used. At AR021, limestone was utilised, probably because of local availability, rather than choice. Some academic thought on the matter argues that limestone is not favoured in *fulachta fiadh* sites, as on contact with heat and water it would turn to calcium

hydroxide (O'Kelly 1954, cited in Buckley 1990, 170). The formation of calcium hydroxide may have affected flavour and texture in processes involving cooking or brewing (Moore & Quinn 2007). Therefore industrial or bathing uses may have been preferred at AR021. However, food and drink appreciation is very subjective and influenced by local environment and may not have been much of as much concern as has been hypothesised. Analysis of stone used in other excavated sites suggests that drift-derived and sedimentary rocks are the most common type of stone used in burnt mound sites. This suggests deliberate selection of stones and a preference for one type over another. Experiments conducted indicate that igneous and metamorphosed rock provides much greater longevity, probably reducing the size and therefore visibility of burnt mound sites in areas of such geology, such as the north of the country (Buckley 1990, 171-2). In 1988, experiments were carried out by Victor Buckley under a Royal Irish Academy Research Grant to assess the performance and shatter-rate of different geological rocks in a reconstructed trough (Buckley 1990, 170-172). These experiments suggest that sandstone can be used up to five times and limestone up to six times, before disintegrating into fragments of 50mm in size (Buckley 1990, 171). There are some ethnographic comparisons which suggest that stones may have been sourced from river beds. In a study of *mu-mu,* a cooking pit used in present-day Papua-New Guinea, which functions in a similar manner to *fulachta fiadh*, Hurl found that the people used the nearby stream-bed as a source for stone, not just for portable proximity, but because they had been naturally washed clean already (Hurl 1990, 154-155; Buckley 1990, 170). The burnt stone at AR021 may therefore have been obtained from the adjacent Keal stream.

While hundreds of *fulachta fiadh* have been excavated in Ireland, many research questions remain. Scientific dating of associated materials defines a broad time period for *fulachta fiadh*—examples dating from the late Neolithic to medieval times are known, most of which are affiliated with the middle to late Bronze Age (*c.* 1500 BC to *c.* 500 BC). The purpose is also subject to much debate, theories include cooking places; breweries; bathing, washing, or sweat houses; and industrial activity such as metal working, hide preparation, or dyeing of textiles. Additional research themes surround the duration of use, environmental setting, relationship with habitation and funerary sites, and ritual associations (Grogan, O'Donnell, and Johnston, 2007, Waddell, 1998).

Archaeological remains relocated at AR021 are consistent in context and content with other *fulachta fiadh* excavated in Ireland. The site is located in a poorly drained area adjacent to a stream. A horseshoe-shaped stone and charcoal mound was present on

the surface (although impacted by historic and modern farming); subsurface materials included a trough with plank wood lining. Postholes located in an arc around the south-west to north-eastern portion of the trough suggest the possible presence of a windbreak or superstructure; a not uncommon interpretation of post- and stakeholes found around trough features. Artefact recovery was limited to a single piece of bone which is also typical of burnt mound sites, although the bone from AR021 was not retrieved from a securely stratified context.

The distribution of features across the site area appears to be relativelyrandom or haphazard, perhaps suggesting a lack of activity planning and impromptu feature creation. They are also sparse in contract to the well made trough and substantial mound. The wood planking however takes a certain amount of time and woodcraft skills to prepare, although the labour involved was probably minimal when balanced with the importance of having a well-lined trough that would retain water and be easily cleaned for re-use. The function of this trough is uncertain. The stepped nature of the cut, being shallower at the northern end, may have been designed deliberately to create a comfortable place for a person to sit. If this was the case, it may have been because whatever the activity at AR021 required constant or frequent observation or action, such as stirring or froth skimming, or if there was a superstructure it is not hard to imagine a person tucked into a small sweatlodge or bathhouse.

Burnt mound sites are generally indicative of further associated settlement activity (Waddell 1998, 177). The fact that the vast number of burnt mound sites date to the second millennium BC, supports the suggestion of increasing spread and density of settlement at this time (Cooney and Grogan 1994, 102). Cooney and Grogan in an analysis of the distribution of sites in relation to settlement patterns, write that burnt mounds/*fulachta fiadh* occur primarily '*in zones close to water sources and that their distribution offers insight into what may have been a specialised or seasonal but nevertheless intergrated part of the settlement pattern'* (Cooney & Grogan 1994, 102). They write that whilst '*the nature of activity at fulachta fiadh is well understood, their place in the settlement pattern is less clear*' (Cooney & Grogan 1994, 124). Evidence from an integrated study of an extensive complex in south Limerick suggests that burnt mound sites were located within the main settlement zone (Cooney & Grogan 1994, 124). Based on the evidence from south Limerick, Cooney and Grogan argue that the late second-millennium BC saw the emergence of *'a complex landscape organisation, with extensive cemeteries, domestic sites and* fulachta fiadh *forming an integrated pattern'* (Cooney & Grogan 1994, 141). A study of *fulachta fiadh* in Kilkenny, shows that

such sites in that area, have a complementary distribution to ring-ditches and other Bronze Age monumental sites (Cooney & Grogan 1994, 124). It could therefore be expected that some settlement features may be present in the area surrounding AR021. However, the most likely candidate to be related in this manner AR022, as mentioned above, turned out to have a much earlier date.

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10. Figures

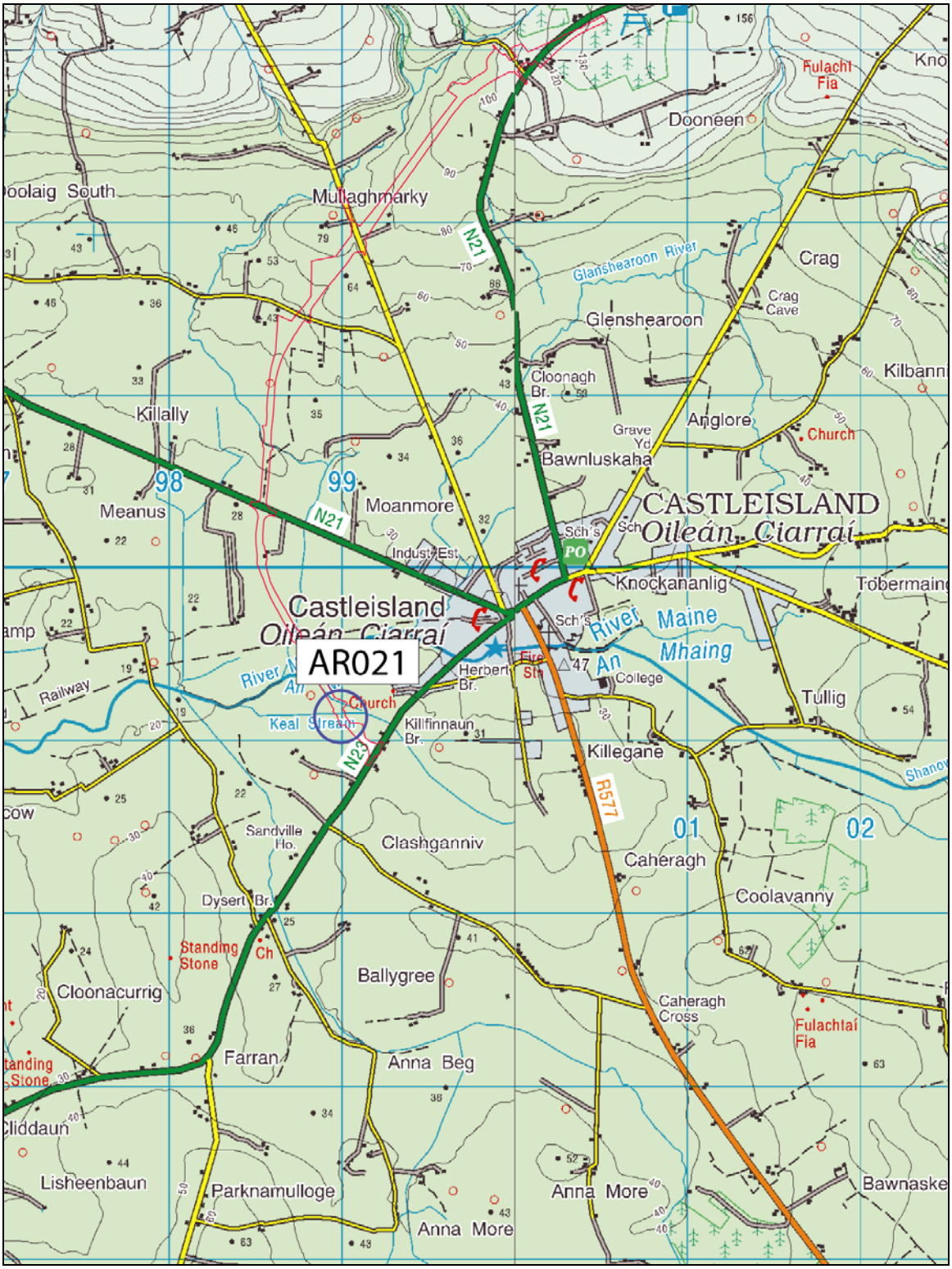

Figure 1. Location of AR021 within the proposed Castleisland RIS.

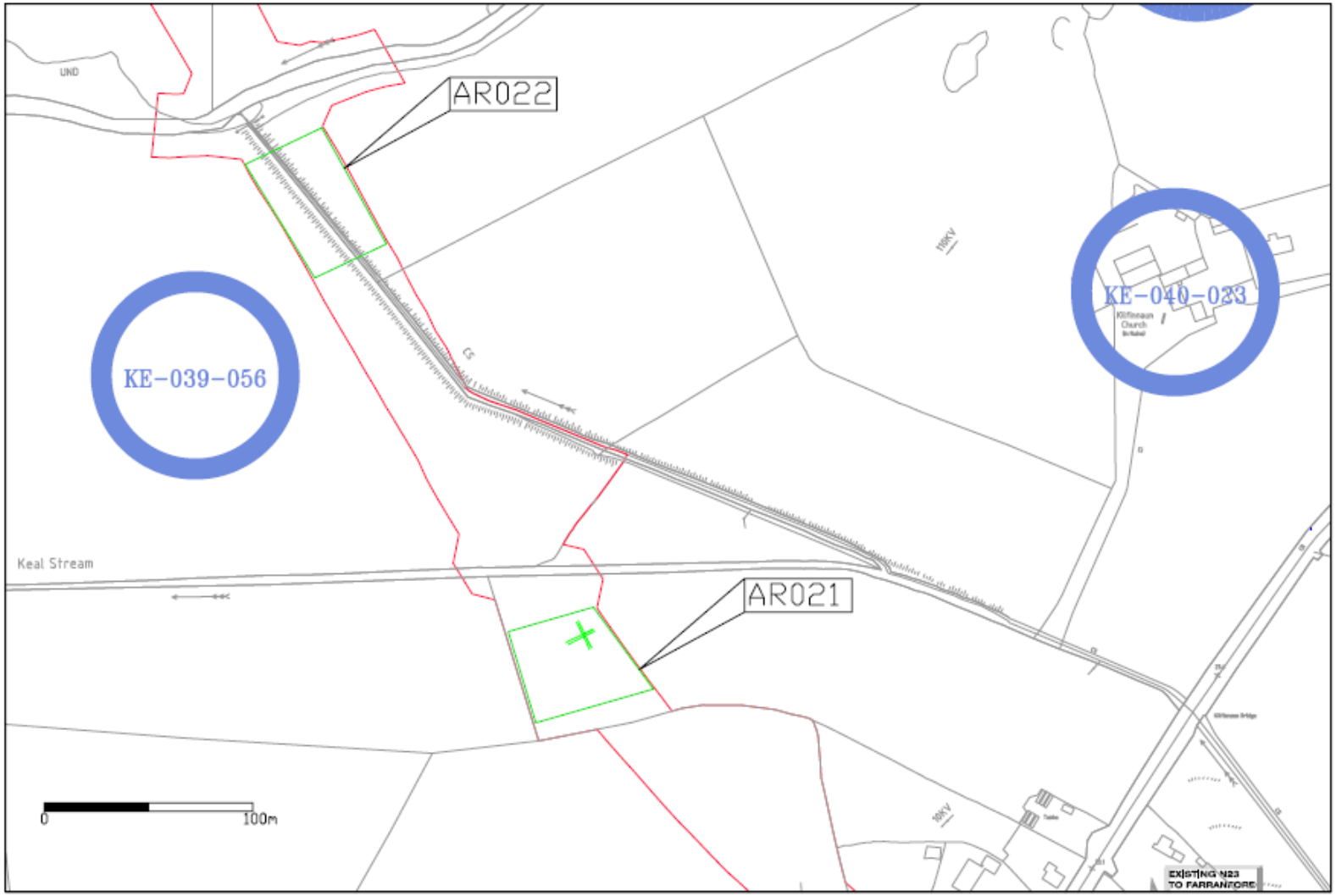

Figure 2. Location of AR021 Excavation Area relative to Keal Stream, AR021 and the limits of the RIS Project Area.

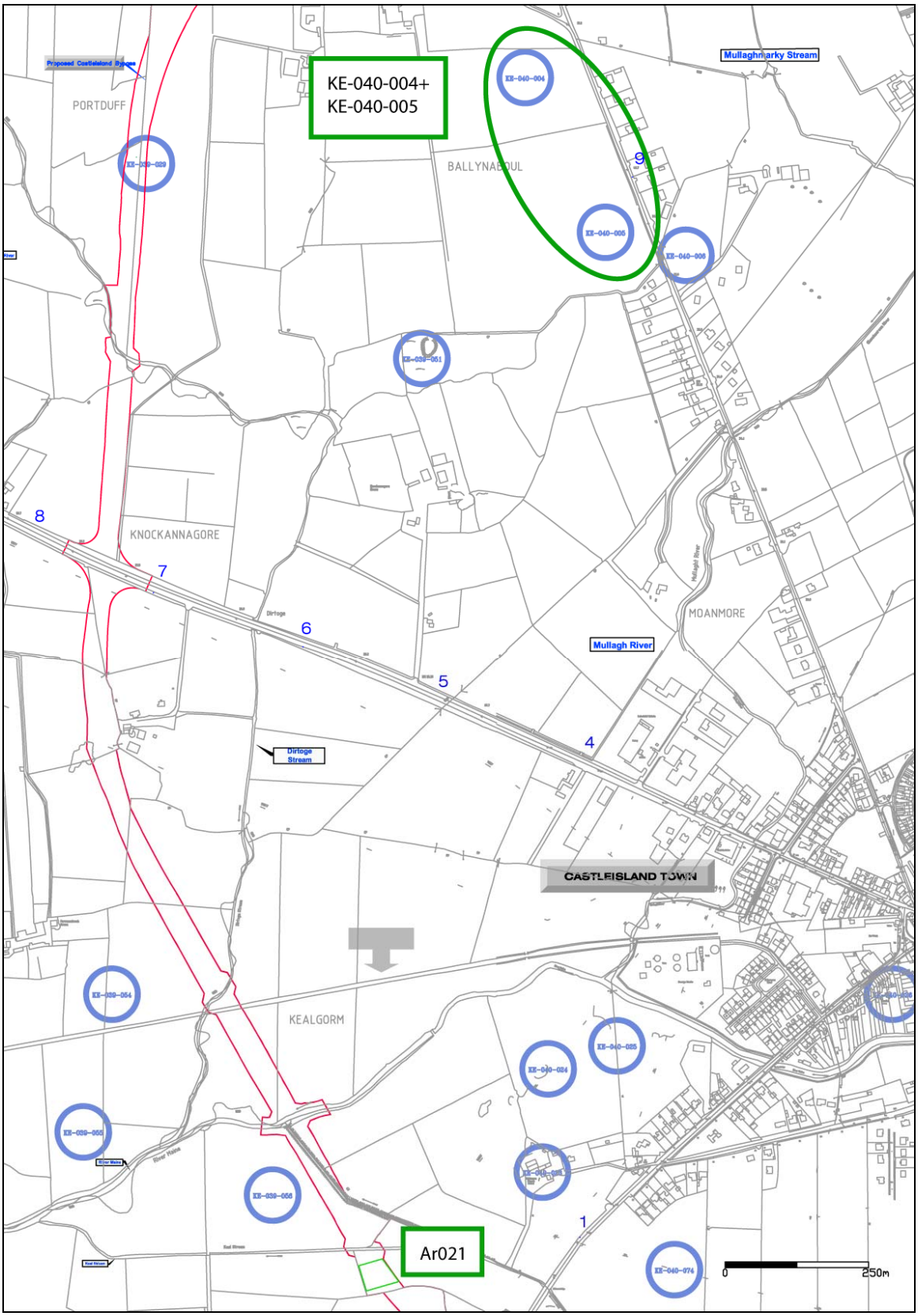

Figure 3. RMP-listed sites near AR021. Sheet Numbers 39 and 40.

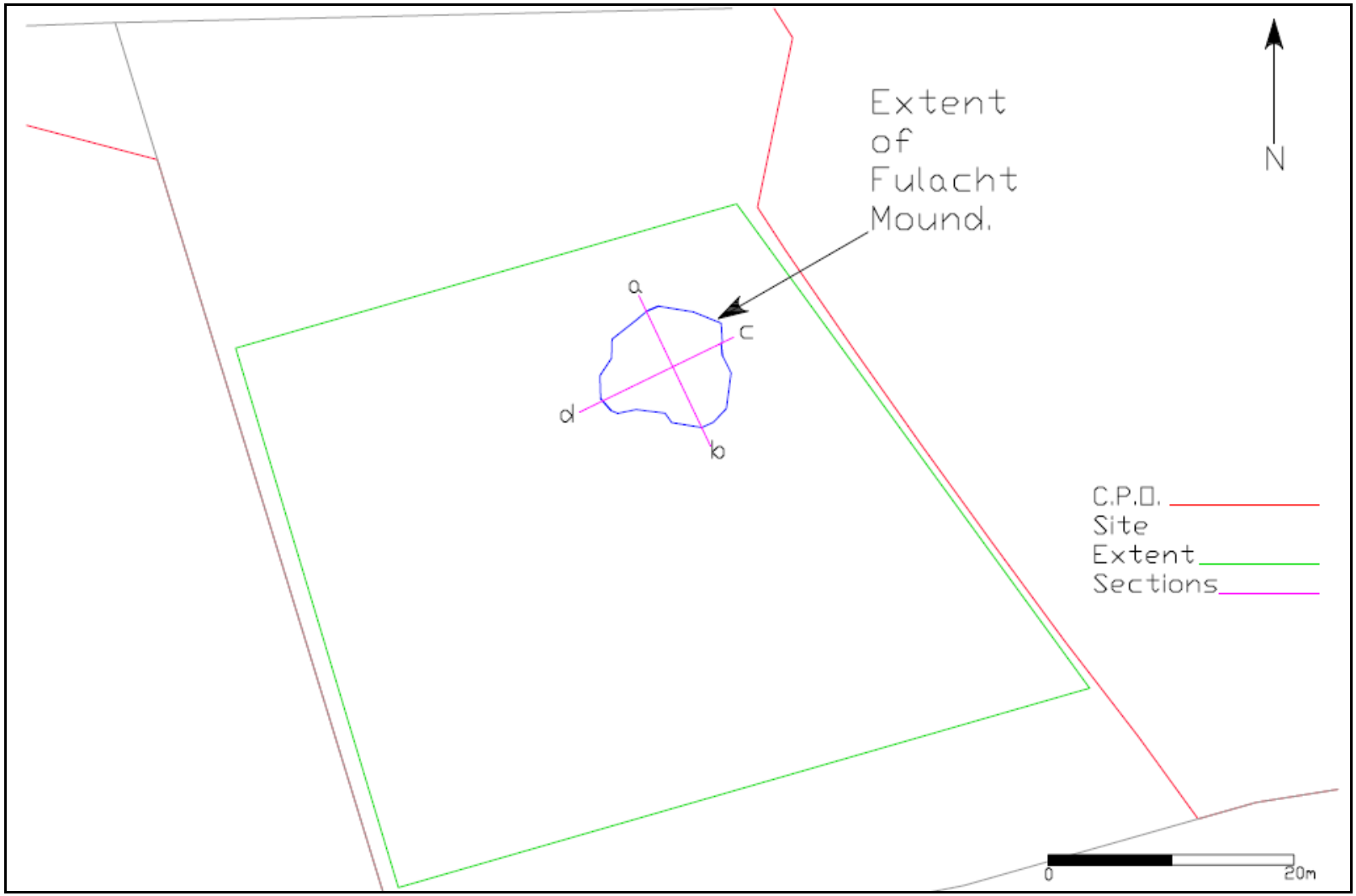

Figure 4: Extent of burnt mound pre-excavation. The location of the cross-section, which divided the mound into quadrants for machine-aided excavation of the mound material is indicated.

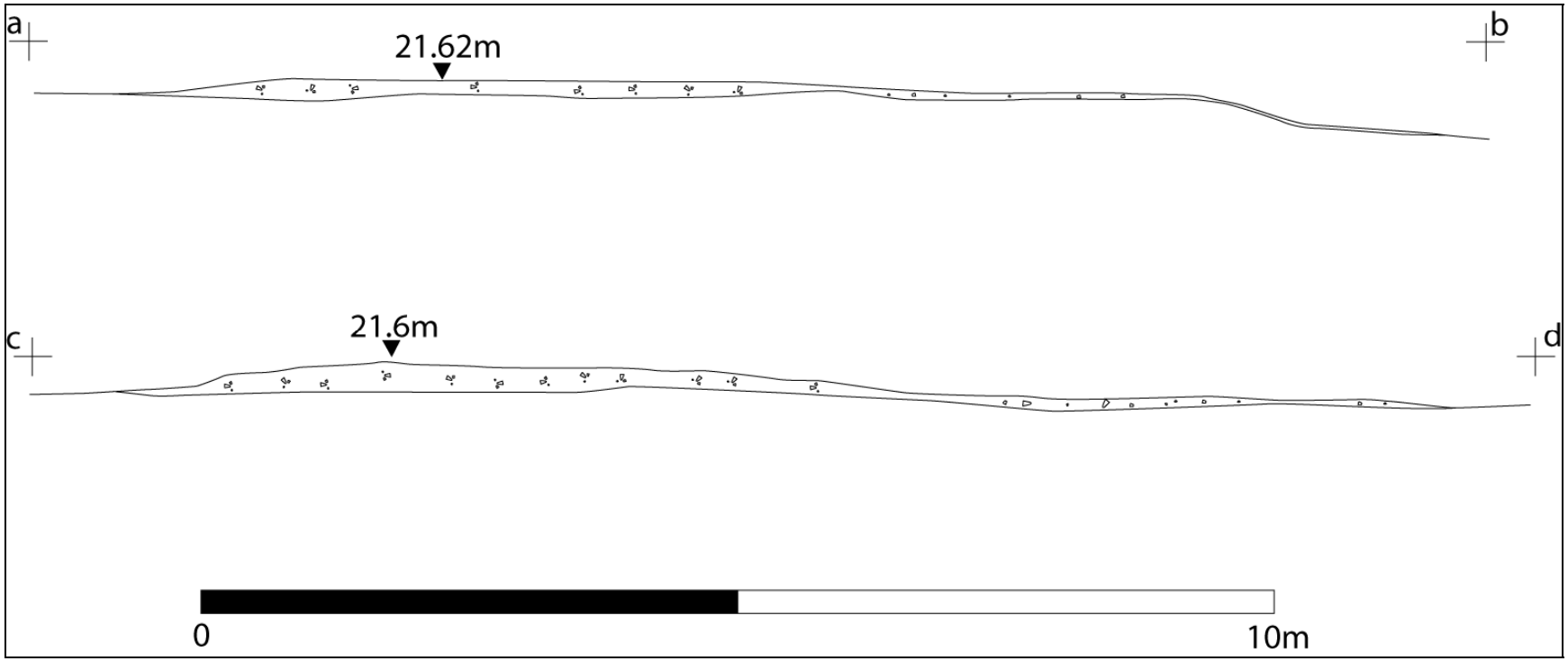

Figure 5: Sections through burnt mound material, C(4). South-west facing section above, north-east facing section below.

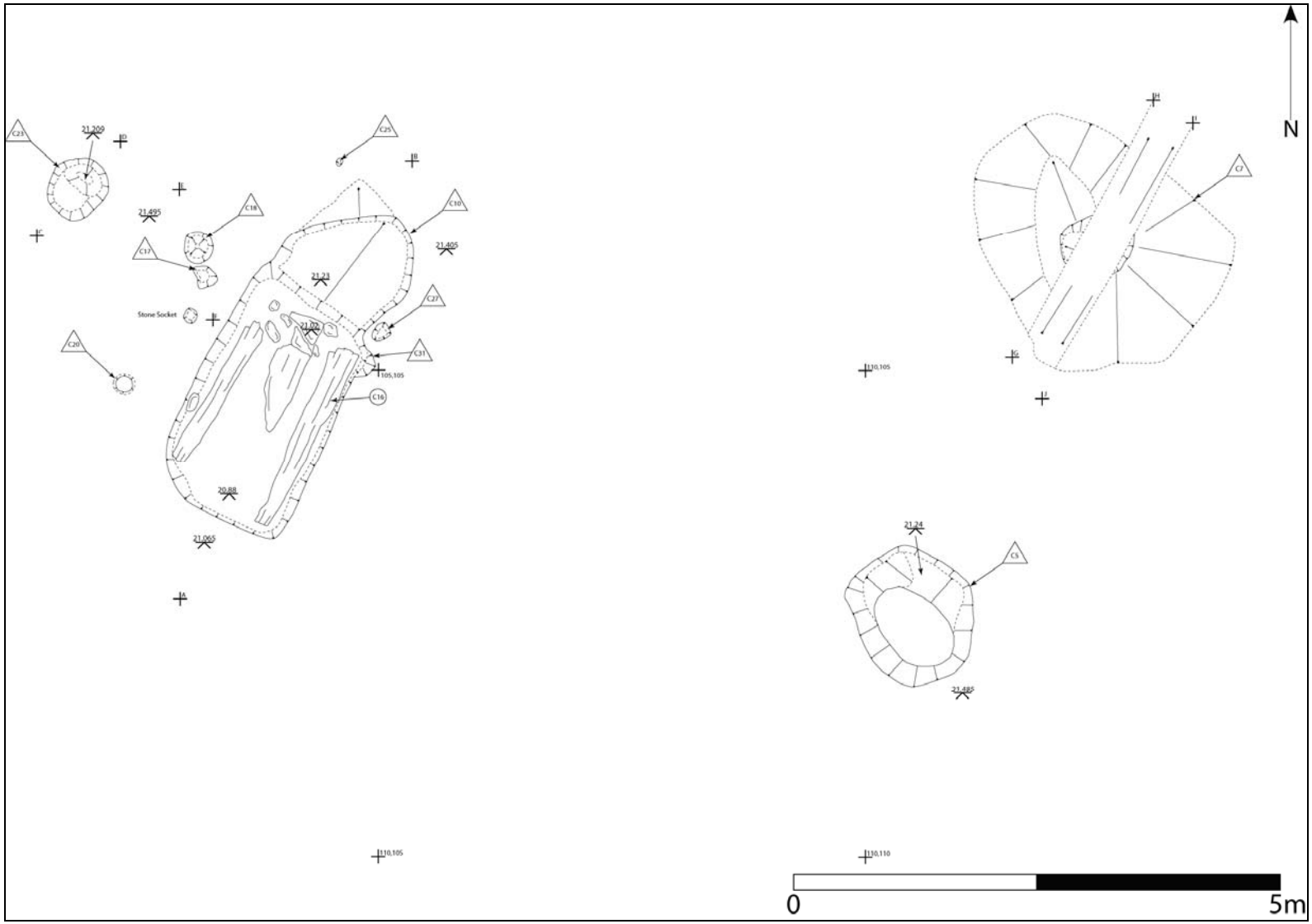

Figure 6. AR021 Site plan, post-excavation.

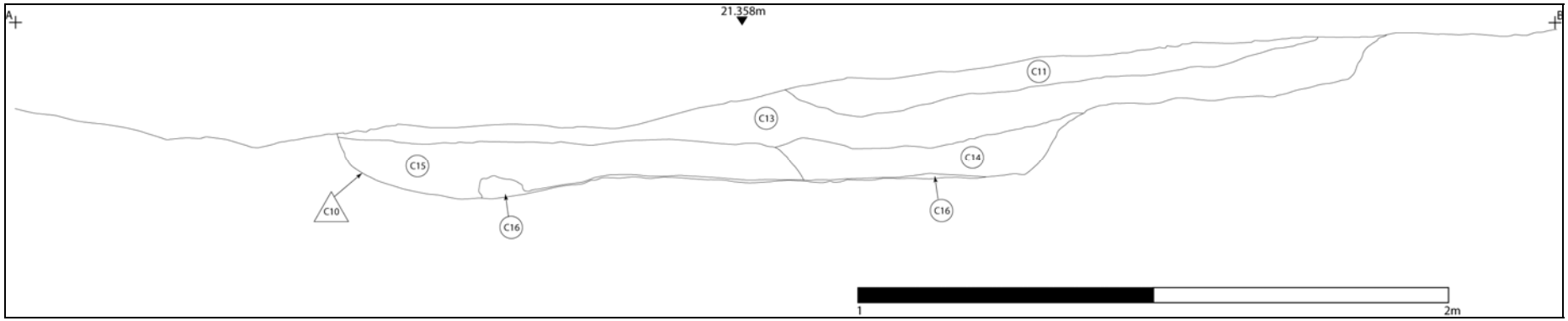

Figure 7. AR021 South-east facing section through trough C[10], showing C(11), C(12), C(13), C(14), C(15) and C(16).

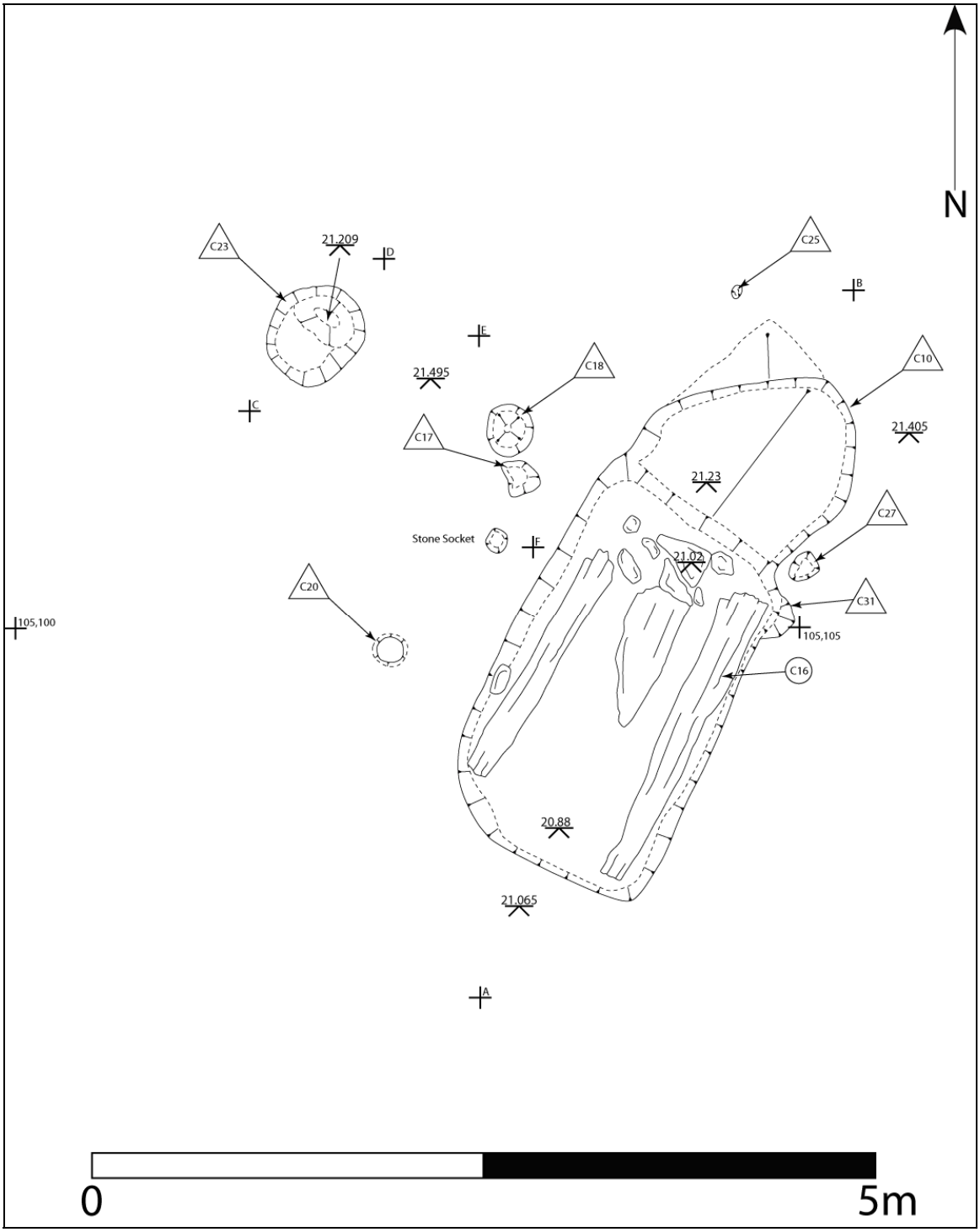

Figure 8: Post-excavation plan of trough, C[10] and associated features, C[16], C[17], C[18], C[20], C[23], C[25], C[27], C[31].

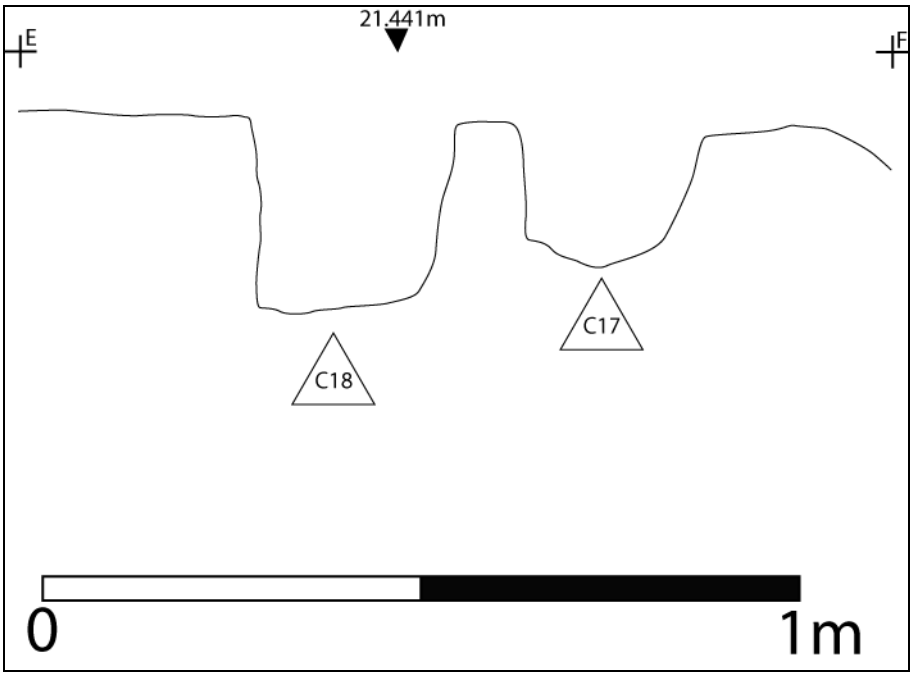

Figure 9. AR021 Cuts C[17] and C[18], representative posthole profiles.

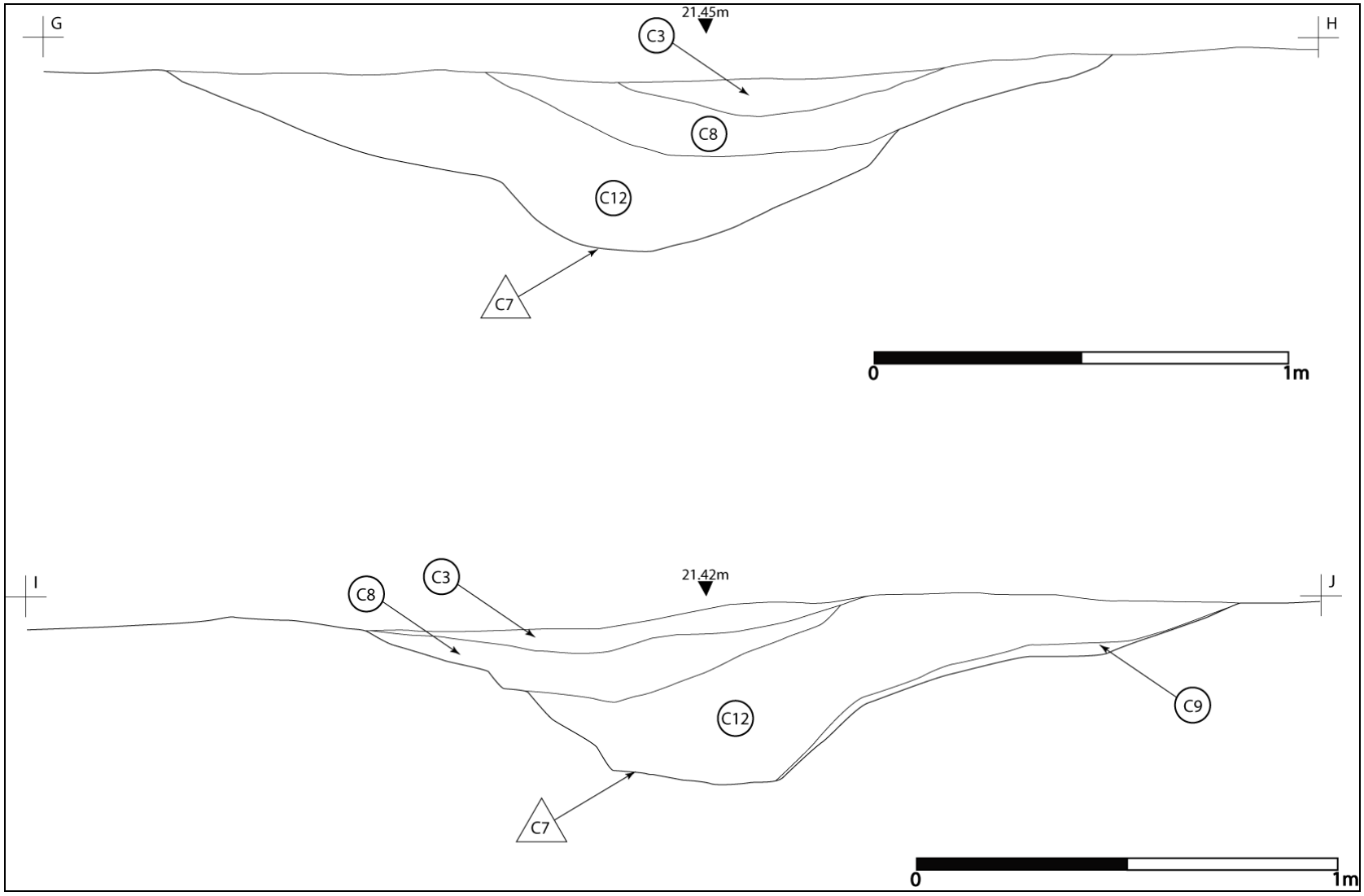

Figure 10. AR021 Sections through C[7], showing fills C(3), C(8), C(9), C(12).

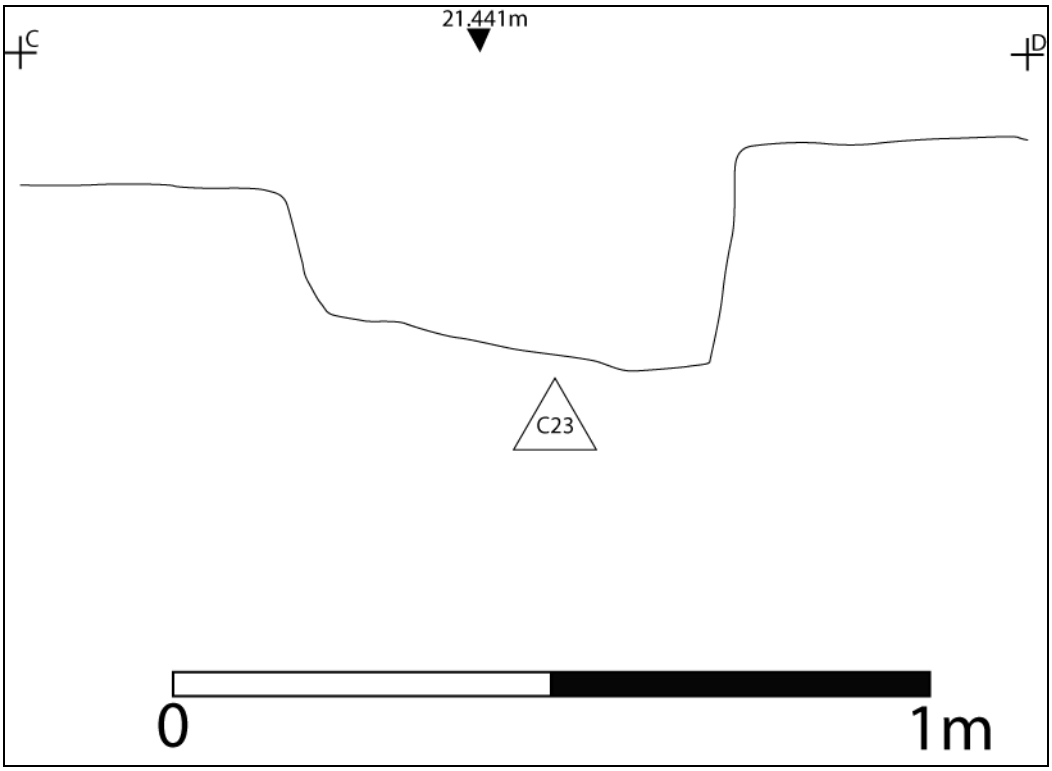

Figure 11. AR021 Profile of C[23].

11. Plates

Plate 1. Detail of mound and trough location, showing differences in soil colour between main burnt mound deposit, C(4) and C(34), the lighter-coloured material overlying the trough, C[10].

Plate 2. Overview of stripped surface, showing the trough cut C[10] and natural subsoils C(2) (orange) and C(3) (grey). Note also the presence of postholes, stakesholes, and pits in the vicinity of C[10].

Plate 3. AR021 Pre-excavation view of trough, C[10].

Plate 4. AR021 Post-excavation view of C[10]. Note additional features to immediate west of C[10].

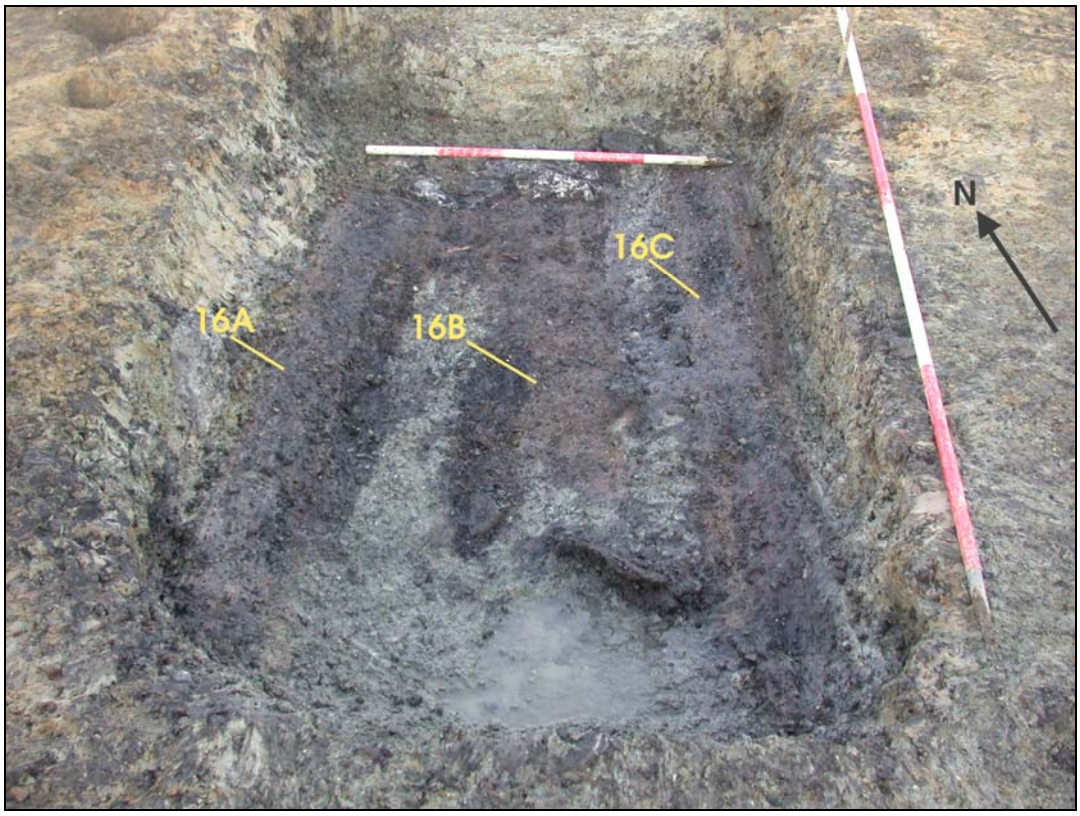

Plate 5. AR021 plank lining, C[16] present in base of trough, C[10]. The three surviving planks are from west to east, 16A, 16B and 16C.

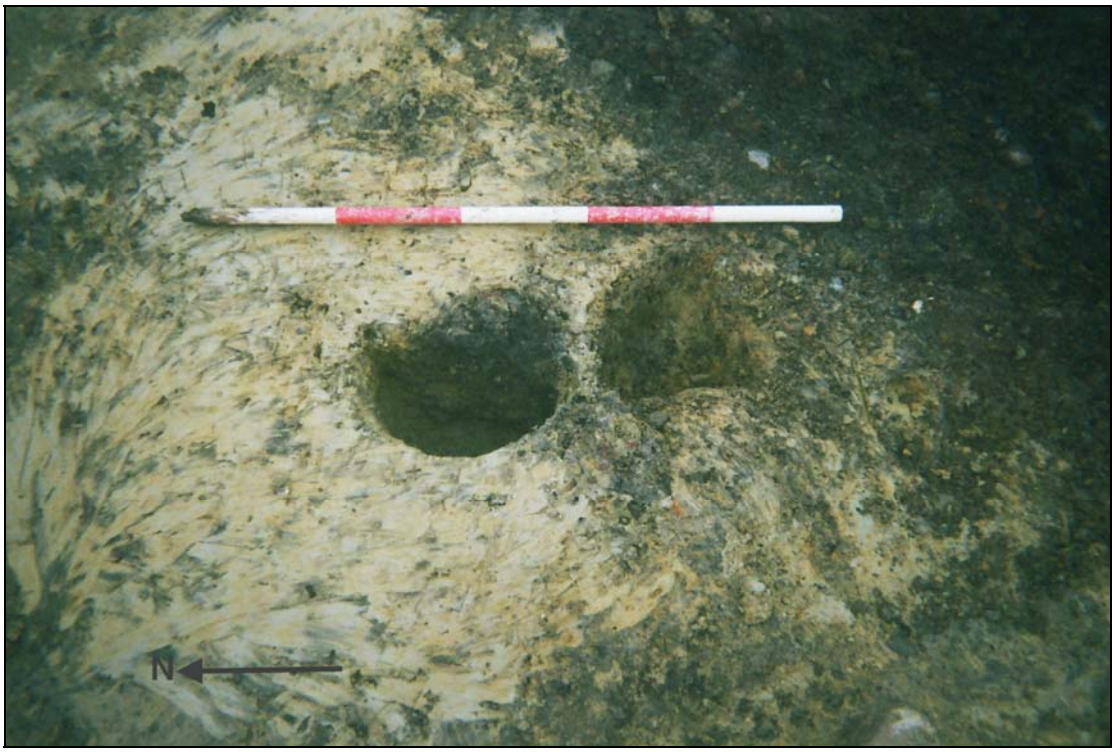

Plate 6. AR021 C[18] and C[17], post-excavation.

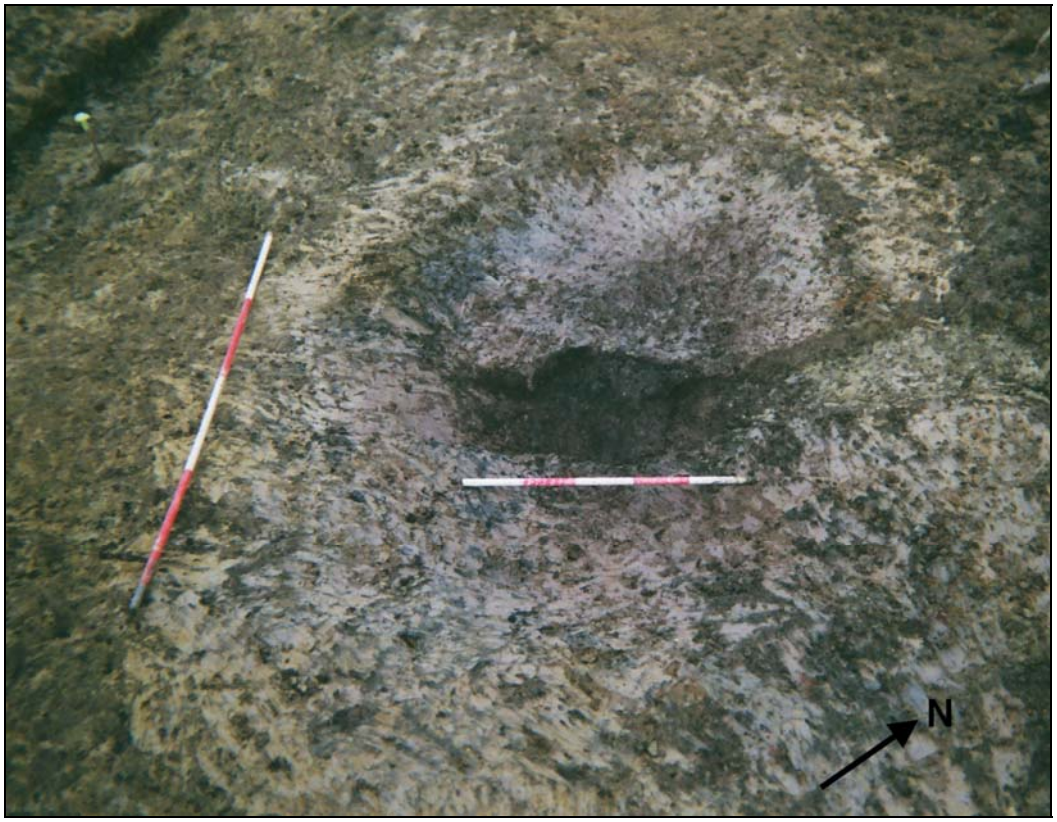

Plate 7. Mid-excavation section through C[7].

Plate 8. Feature C[23] Post-excavation.

Appendix 1: Context Register

Context	Type	Description	Length (m)	Width (m)	Depth (m)	Date	Initials
1	topsoil	Mid brown clayey sand	N/A	N/A	0.05-0.4m	15/11/07	MR
2	subsoil	Yellow clay and gravel	N/A	N/A	N/A	15/11/07	MR
3	deposit	Grey sandy clay	2.7	1.2	0.12	15/11/07	MR
4	deposit	*Fulacht* mound	12m	12m	0.05-0.22	15/11/07	MR
5	cut	Cut of shallow pit/sink hole	1.6	1.3	0.2	15/11/07	JM
6	fill	Fill of [5]	1.6	1.3	2	15/11/07	JM
7	cut	Cut of large circular feature	2.5	2.1	0.45	15/11/07	DF
8	fill	Upper fill of [7]	2.5	1.2	0.15	15/11/07	DF
9	fill	Charcoal layer of [7]	0.8	0.7	0.03	15/11/07	DF
10	cut	Cut of sub-rectangular water trough	3.6	1.3	0.35	15/11/07	RM
11	fill	Upper fill of [10]	1.6	0.4	0.08	15/11/07	JM
12	fill	*Fulacht* fill of [7]	1.8	1.8	0.32	15/11/07	DC
13	fill	*Fulacht* fill of [10]	3.6	1.3	0.5 - 0.10	15/11/07	MR
14	fill	*Fulacht* and redeposited fill of [10]	0.8-0.9	1.3	0.03	15/11/07	MR
15	fill	Black peaty fill of [10]	2.2	1	0.3	15/11/07	JM
16	fill	Timber plank 16A	1.67	0.21	10-40mm	15/11/07	MR
16	fill	Timber plank 16B	0.88	0.08-0.33	10-40mm	15/11/07	MR
16	fill	Timber plank 16C	2.0	0.12-0.29	10-40mm	15/11/07	MR
17	cut	Cut of possible posthole	0.3	0.26	0.16	16/11/07	JM
18	cut	Cut of posthole	0.32	0.3	0.26	16/11/07	FF

Context	Type	Description	Length (m)	Width (m)	Depth (m)	Date	Initials
19	fill	Fill of [18]	0.32	0.3	0.26	16/11/07	FF
20	cut	Cut of possible stakehole	0.14	0.14	0.3	16/11/07	RM
21	fill	Fill of [20]	0.13	0.13	0.3	16/11/07	RM
22	fill	Fill of [17]	0.28	0.26	0.16	16/11/07	JM
23	cut	Cut of small pit	0.67	0.56	0.3	16/11/07	JM
24	fill	Fill of [23]	0.67	0.56	0.3	16/11/07	JM
25	cut	Cut of stakehole	0.15	0.11	0.13	16/11/07	JM
26	fill	Fill of [25]	0.15	0.11	0.13	16/11/07	JM
27	cut	Cut of posthole	0.31	0.24	0.19	16/11/07	MR
28	fill	Fill of [27]	0.31	0.24	0.19	16/11/07	MR
29	deposit	Naturally formed peaty deposit below [7]	3.0	2.0	0.20	16/11/07	DF
30	deposit	Naturally formed clay	4.0	3.0	0.20	16/11/07	DF
31	cut	Cut of possible posthole	0.31	0.30	0.23	16/11/07	MR
32	fill	Fill of [31]	0.31	0.30	0.23	16/11/07	MR
33	topsoil (B)	Grey clay with mineral staining and iron panning which formed an interface between the topsoil C(1) and underlying subsoil.	N/A	N/A	0.05-0.25	15/11/07	MR
34	deposit	Lighter-coloured area of burnt mound material, C(4) where it overlay the trough, C[10]	3.85	1.56	0.21	15/11/07	MR

Appendix 2: Sample Register

Sample	Context	Description	Date	Initials
1	C3	Soil sample	14/11/07	DC
2	C4	Soil sample (10 bags)	14/11/07	DC
3	C3	Bone	15/11/07	DC
4	(12)	Main *fulacht* fill of [7]	16/11/07	DF
5	(09)	Charcoal rich layer of [7]	16/11/07	DC
6	(11)	Soil sample	16/11/07	RM
7	(13)	Soil sample	16/11/07	RM
8	(14)	Soil sample	16/11/07	RM
9	(15)	Soil sample	16/11/07	RM
10	29	Peat natural accumulation	16/11/07	DF
11	C16	East and west timber planks (16A and 16C)	16/11/07	MR
12	C29	Root material from [7]	16/11/07	MR

Appendix 3: Drawing Register

Drawing	Context	Description	Date	Initials
1	(12) [7]	SE Facing Section of P Trough	15/11/07	DF
2	(12) [7]	NW Facing Section of P Trough	15/11/07	DF
3	[10]	Mid Ex (SE Facing Section)	15/11/07	MR
4	[7]	Plan of [7] Recut 110	15/11/07	DF
5	[10]	Post Ex Plan with C16	15/11/07	MR
6	[5]	Post Ex Plan	15/11/07	MR
7	[23]	Mid EX of [23] S Facing Section	15/11/07	DF
8	[18] [17]	Mid Ex of [18] [17] West Facing Section	15/11/07	DF

Appendix 4: Photo Register

Roll	Photo	Description
25	8	*Fulacht Fiadh* Pre-Excavation, from S to N
25	9	*Fulacht Fiadh* Pre-Excavation, from S to N
25	10	*Fulacht Fiadh* Pre-Excavation, from N to S
25	11	*Fulacht Fiadh* Pre-Excavation, from N to S
25	12	*Fulacht Fiadh* Pre-Excavation, from N to S
25	13	*Fulacht Fiadh* Pre-Excavation, from W to E
25	14	*Fulacht Fiadh* Pre-Excavation, from E to W
25	15	*Fulacht Fiadh* Pre-Excavation, from E to W
25	16	*Fulacht Fiadh* Pre-Excavation, from E to W
25	17	*Fulacht Fiadh* Pre-Excavation, from SE to NW
25	18	*Fulacht Fiadh* Pre-Excavation, from SE to NW
25	19	*Fulacht Fiadh* Pre-Excavation
25	20	*Fulacht Fiadh* Pre-Excavation, from Sw to NE
25	21	*Fulacht Fiadh* Pre-Excavation, from W
25	22	*Fulacht Fiadh* Pre-Excavation, from NW to SE
1	26A_00012	*Fulacht Fiadh* Trough Planks, View from SW
1	27A_00011	Detail of Eastern Plank, Upper Portion
1	28A_00010	Detail of Eastern Plank, Middle Portion
1	29A_00009	Detail of Eastern Plank, Lower Portion
1	30A_00008	Detail of Western Plank, Upper Portion
1	31A_00007	Detail of Western Plank, Middle Portion
1	32A_00006	Detail of Western Plank, Lower Portion
1	33A_00005	Detail of Western Plank, Lower Portion
1	34A_00004	Detail of Western Plank, Upper Portion
1	35A_00003	Detail of Western Plank, Middle Portion
2	0A_00049	C[23] Post-Excavation, from SE to NW
2	1A_00048	*Fulacht* Post-Excavation, from NE to SW
2	2A_00047	*Fulacht* Post-Excavation, from SE to NW
2	3A_00046	*Fulacht* Post-Excavation, from SW to NE
2	4A_00045	*Fulacht* Post-Excavation, from SW to NE
2	5A_00044	Overview, Site Flooding
2	6A_00043	Overview, Site Flooding
2	7A_00042	Overview, Site Flooding
2	8A_00041	Overview, Site Flooding
2	9A_00040	Pre-Excavation C[18], C[17], from W to E
2	00A_00050	Sinkhole, View from E

Roll	**Photo**	**Description**
2	10A_00039	
2	11A_00038	C[7]
2	12A_00037	C[7]
2	13A_00036	*Fulacht* Mid-Excavation, from SE to NW
2	14A_00035	*Fulacht* Mid-Excavation Detail Lower Portion, from SE to NW
2	15A_00034	*Fulacht* Mid-Excavation Detail Upper Portion, from SE to NW
2	16A_00033	*Fulacht* Mid-Excavation Detail Upper Portion, from SE to NW
2	17A_00032	*Fulacht* Mid-Excavation Detail Upper Portion, from SE to NW
2	18A_00031	*Fulacht* Mid-Excavation Detail Lower Portion, from SE to NW
2	19A_00030	Post-Excavation C[18], C[17], from W to E
2	21A_00029	
2	22A_00028	
2	23A_00027	
2	24A_00026	
2	25A_00025	*Fulacht* Pre-Excavation, from SE to NW
2	26A_00024	*Fulacht* Pre-Excavation, from SW to NE
2	27A_00023	*Fulacht* Pre-Excavation, from SW to NE
2	28A_00022	
2	29A_00021	C[23]
2	30A_00020	C[23]
2	31A_00019	C[23]
2	32A_00018	Pre-Excavation C[18], C[17] from W to E
2	33A_00017	*Fulacht* Pre-Excavation, from SE to NW
2	34A_00016	*Fulacht* Pre-Excavation, from E to W
2	35A_00015	*Fulacht* Pre-Excavation, from SW to NE
2	36A_00014	*Fulacht* Pre-Excavation, from SW to NE
2	37A_00013	*Fulacht* Pre-Excavation, from SW to NE
2	38A_00012	*Fulacht* Pre-Excavation, from SW to NE

Appendix 5: Radioncarbon Dating Report

The Archaeology
theArchaeologyCompany
Birr Technology Centre
Mill Island
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VAT No. IE 6386745M

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

Radiocarbon Date Certificate

Laboratory Identification:	UBA-10653
Date of Measurement:	2009-01-16
Site:	AR021
Sample ID:	S#8 C#(14)
Material Dated:	Charcoal
Pretreatment:	AAA
Submitted by:	The Archaeology

^{14}C Date:	2904±19
AMS δ^{13}C:	-22.6

Information about radiocarbon calibration

RADIOCARBON CALIBRATION PROGRAM*
CALIB REV5.0.2
Copyright 1986-2005 M Stuiver and PJ Reimer
*To be used in conjunction with:
Stuiver, M., and Reimer, P.J., 1993, Radiocarbon, 35, 215-230.
Annotated results (text) - -
Export file - c14res.csv

S#8 C#(14)
UBA-10653
Radiocarbon Age BP 2904 +/- 19
Calibration data set: intcal04.14c # Reimer et al. 2004

% area enclosed	cal AD age ranges	relative area under probability distribution
68.3 (1 sigma)	cal BC 1124- 1050	1.000
95.4 (2 sigma)	cal BC 1192- 1174	0.044
	1163- 1143	0.051
	1132- 1012	0.905

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

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

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

Report on Identification of Species

Licence no. 07E471

Licence no. 07E472

Licence no. 07E474

Licence no. 07E479

Licence no. 07E480

Castleisland By-Pass

County Kerry

Simon Gannon

Identification of species

The results are summarized in Table 1.

Methodology

Typically, for the identification of species of each sample piece, of approximately 2mm and above across at least one plane, is fractured to reveal transverse, radial longitudinal and/or tangential longitudinal sections. The sections are examined for anatomical characteristics by microscopy of between x10 and x400 magnification. Age related structural elements of the pieces were also considered.

Species identifications were sought for species suitable for radiocarbon dating utilizing AMS. Long lived taxa such as oak, *Quercus* and ash, *Fraxinus* were identified and removed from the sort except where there old growth portions could be eliminated and where there was an absence of other suitable taxa. The maximum weight of suitable identified taxa was sought up to approximately 200mg.

Identifications

Classification follows that of *Flora Europaea* (Tutin *et al* 1964-80). Anatomical characteristics do not allow for identification of individual species in most cases. Several species belong to groups of species, species of genera, of sub-families and of families that cannot be separated anatomically. It is also possible for a narrow range of species and, occasionally, one or two species to be indicated with a degree of confidence due to established factors, such as the native status of certain species and the history of introduction of species by people.

The identifications were consistent with taxa from the following groups.

Broadleaf taxa

Aquifoliaceae. *Ilex aquifolium,* holly. Native species.
Betulaceae. *Alnus glutinosa*, alder; *Betula* sp.*,* birches; *Corylus avellana*, hazel. Native species.
Leguminosae. *Ulex europaeus,* gorse or *Ulex galli,* western gorse. Both species native.
Rosaceae. *Prunus sp. Prunus avium,* wild cherry; *Prunus spinosa,* blackthorn; and *Prunus padus,* bird cherry. These are the three native species. *Prunus spinosa,* blackthorn is the probable indicated species.
Salicacea. *Salix sp.,* willows and *Populus sp.,* poplars. Various species native.

Certain samples were examined and found to be without identifiable charcoal, such as no. 1 from AR014, or with only long lived taxa present such as no. 51 from AR014.

Reference

Tutin, T.G. *et al.* 1964-1980. *Flora Europaea.* Vols.1-5. Cambridge University Press.

TABLE 1. Identification of species. Charcoal analysis for C14

LICENCE No.	SITE No.	SAMPLE No.	Context No.	*Alnus*	*Betula*	*Corylus*	*Corylus/ Alnus*	*Ilex*	*Leguminosae*	*Prunus sp.*	*Salicaceae*
07E471	AR014	12	33	-	7	-	-	-	-	-	-
	AR014	16	20/47	-	-	-	-	-	-	-	-
	AR014	44	64	-	-	1	-	-	-	-	-
	AR014	51	83	-	-	-	-	-	-	-	-
07E474	AR016	6	31	-	-	1	-	-	-	-	-
	AR016	13	68	-	-	-	-	-	2	-	-
	AR016	14	66	-	-	-	-	-	4	-	-
	AR016	28	90	-	-	1	-	-	-	-	-
	AR016	38	64	-	6	-	-	-	-	-	-
	AR016	50	90	1	-	-	-	-	-	-	-
	AR016	66	79	-	-	-	-	-	-	-	-
	AR016	67	79	2	-	-	-	-	-	-	-
	AR016	75	79	-	-	-	-	1	-	-	2
	AR016	81	79	-	-	-	-	-	-	-	-
	AR016	104	70	-	-	-	-	-	-	-	-
	AR016	125	202	-	-	-	2	-	-	-	-
	AR016	128	208	-	-	-	-	-	-	-	-
07E480	AR021	8	14	-	-	4	-	-	-	-	-
07E472	AR022	17	27	-	-	2	-	-	-	-	-
	AR022	41	67	-	-	2	-	-	-	-	-
	AR022	75	102	-	2	1	-	-	-	-	-
	AR022	137	295	-	-	3	-	-	-	-	-
	AR022	229	508	-	-	4	-	-	-	-	-
07E479	AR023	1	5	-	-	-	-	-	-	3	-