N21 Castleisland Bypass Road Improvement Scheme
County Kerry

Archaeological Excavation of
AR020 Clashganniv
Final Report

theArchaeologyCompany

Head Office
Hamilton House
Emmet Street
Birr,
Co. Offaly
Tel: 057-9123552
Fax: 057-9123553

www.thearchaeologycompany.ie  info@thearchaeologycompany.ie
Client: Kerry County Council
Kerry National Road Design Office
The Island Centre
Castleisland
County Kerry

Planning Reg. No: Not applicable

Excavation Licence No: 07E0470

Licensee: Michael Tierney

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

Report by: Michael Tierney
Jennifer Buggie
Hope Leininger
Clare O’Keeffe

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### NRA Database Contents Sheet

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<td><strong>Project archaeologist</strong></td>
<td>Sébastien Joubert, NRA, Kerry National Roads Design Office</td>
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<td><strong>Archaeological consultancy</strong></td>
<td>The Archaeology Company, Hamilton House, Emmet Street, Birr, Co. Offaly</td>
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The excavation of Site AR020 was carried out subsequent to a comprehensive assessment during archaeological testing carried out by TVAS Ireland Ltd. in 2006. The site consisted of a single pit feature and a small linear feature. The pit has been interpreted as a secondary deposit of by-products related to iron smithing and possibly smelting activities. The pit has been radiocarbon dated to cal. AD 776 – 890 (AMS dating technique). The linear feature was a modern agricultural furrow.

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1. Introduction

This report presents the final results of archaeological excavations and analyses of Site AR020 within the townland of Clashganniv, Castleisland, Co. Kerry. This work, conducted under conditions specified within Archaeological Works Contract 2, was undertaken in advance of the N21 Castleisland Bypass Road Improvement Scheme (RIS), Co. Kerry, under Licence No. 07E0470.

The archaeological excavation of AR020 was carried out after the site was found during an archaeological testing programme carried out by TVAS Ireland Ltd. in February and March 2006. This work identified an oval slag filled pit which exploited the natural limestone bedrock and a 3.94m linear feature located 1.5m north of the pit (Taylor and McNamara 2008 7). The archaeological resolution of these features took place from the 15th-19th of June 2007; laboratory work and reporting occurred immediately after and was completed in August 2008.

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 (NRA) 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 which incorporated both desk based studies and field work. The results of this work are reported 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 succeeded in identifying nine sites of archaeological importance along the 5.4km proposed route. Further fieldwork was recommended for eight of the sites, two of which constituted previously known monuments: ringfort AR016 within Mullaghmarky townland and ringfort AR014 in Portduff. Additional archaeological sites
identified consisted of a *fulacht fiadh* AR021 (Clashganniv); pit sites AR025 (Dooneen) and AR024 (Mullaghmarky); and a combination of spreads, pits, linear features, and postholes located at AR022 (Kealgorm) and AR023 (Mullaghmarky) (Taylor & McNamara, 2008).

Site AR020 was identified by TVAS Ireland Ltd. in an area designated Field 3. The test area within Field 3 was just under 250m long. Within this field TVAS Ireland Ltd. recorded:

- a number of linear features interpreted as furrows and drains;
- the AR020 site area comprising a slag filled pit possibly cut into the natural area bedrock (TVAS Ireland Ltd. reference Pit 1) and a linear feature (TVAS Ireland Ltd. reference Linear Feature 2);
- an additional irregularly shaped pit with dimensions of 0.80m x 0.68m x 0.13m deep;
- an additional amorphous feature, interpreted during testing as a possible pit or a tree bole.

During the testing phase, Pit 1, the slag-filled pit at AR020, was sectioned. Iron slag was found on site and collected in the amount of 4.7kg. Hearth bottoms, flake, and sphere hammerscale—all indicative of smithing—were identified during a preliminary review of the assemblage. The second pit mentioned above was completely excavated by TVAS Ltd. during the testing programme. These excavations revealed a single brown sandy silt fill with charcoal and burnt red sandstone inclusions. The cut of the pit had sloping sides and an irregular base. This pit was identified roughly 75m north-west of AR020. Finally, excavations at the above referenced amorphous feature produced a prehistoric chert scraper and two pieces of quartz, suggesting prehistoric activity in the area. Targeted full excavation was recommended for the AR020 Site (Taylor & McNamara, 2008).

The Archaeology Company was then engaged by Kerry County Council to complete the archaeological resolution and preservation by record of eight archaeological sites identified along the proposed route including AR020 Clashganniv. This phase of Archaeological Contract 2 work began in June 2007.
3. Site Location

The 5.4-km long N21 Castleisland Bypass RIS is divided into two distinct elements. 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 the N23 Castleisland-Farranfore Road and measures 1.62km in length.

Site AR020 was situated in the Southern Section of the RIS immediately north of the Farranfore Road intersection at NGR 099150 108960 and 23m OD (figs. 1-2; pl. 1). The site location on Ordnance Survey 6” Series mapping, was close to the west edge of Sheet 40, where it meets Sheet 39. AR020 lay within the townland of Clashganniv, in the Barony of Trughanacmy and Civil Parish of Dysert. It was located in a green field area, consisting of a large level area bounded by mature hedgerows and banks. The underlying geology of the site consisted of limestone, with bedrock outcrops and numerous sinkholes, typical of limestone regions.

4. Archaeological and Historical Background

The Record of Monuments and Places Map for Co. Kerry, Sheets 39 and 40 depict the presence of a number of known archaeological sites in the landscape surrounding AR020. Several sites are within 0.6km of the excavation area. These consist of ringfort sites KE039-056 and -080, feature KE039-08001, potential enclosure KE039-079, enclosure sites KE040-074 and KE040-075 and Kilfinnaun Church KE040-023 located north-east of the site (fig. 3).

Enclosure sites have been constructed in Ireland from the prehistoric period to the modern era and are therefore difficult to date in the absence of archaeological excavation. However, the ringforts in conjunction with the church site are indicative of considerable human activity within the Clashganniv area during the early medieval period and are likely be indicative of further contemporary settlement within the locality.

Two enclosures were partially excavated in the townlands of Portduff (AR014) and Mullaghmarky (AR016) as part of the present N21 road scheme.
During approximately the same time period, prior to the Norman invasion of Ireland in 1169, a church site was established and dedicated to St. Finian within the neighbouring townland of Kealgorm (RPS Group, 183). This revered figure, most famously associated with the monastic foundation on Innisfallen Island built the first church in Castleisland at ‘Caherinard’ which was accessed by a bridge called ‘Droichead Noam Fionnan’ (Ibid, 183). The presence of a church site dating to this period in Kealgorm is indicative of further settlement activity in the area prior to the establishment of the town of Castleisland because ecclesiastical sites often functioned as centres of settlement and economic activity.

The Excavations Database does not record any sites excavated within Clashganniv townland. A search of the database was made in regard to the neighbouring townlands of Kilcow, Farran, Ballygree, Farrannabrack, Kealgorm, Cahereen West, Tonbwee, Killegane, Caheragh, Laharan and Cloonclogh. No previous archaeological investigations were recorded for any of these townlands surrounding Clashganniv (www.excavations.ie). However, a number of features of archaeological significance were uncovered in close proximity to AR020 during works related to the N21 Castleisland Bypass RIS. A small pit feature in the same field as AR020 was fully excavated by TVAS Ireland Ltd during testing phase (Taylor & McNamara 2006, 7). A radiocarbon determination of 2280 to 2250 and 2220 to 2020 cal BC indicated that the pit was backfilled in the Early Bronze Age. An unstratified chert scraper was also found in topsoil in this field during testing at findspot, NGR 990590 109057 (Taylor & McNamara 2006, 7, 41). Also during works on this scheme, a fulacht fiadh site (AR021) was excavated in Clashganniv townland, having been identified during testing by TVAS Ireland Ltd. This fulacht fiadh site was located at NGR 098995 109111, c.50m north-west of the AR020 excavation area. (Taylor & McNamara 2008 8; Tierney et al 2008, Final Report pending).

5. Methodology

The excavation of AR020 was undertaken simultaneously with that of AR024 so as to enable the insertion of ESB ducts in the southern end of the RIS. Topsoil was removed using a 360° mechanical excavator equipped with a toothless grading bucket, until the archaeological features were uncovered (pls. 2-3). Once identified, features were thoroughly cleaned by hand using trowel, shovel, and where appropriate, mattocks.
Archaeological material was then excavated by hand until natural geological layers were attained. During this work a comprehensive site archive was compiled including drawn (to scale), written and photographic records of individual contexts and features. The site registers (context, sample, drawing and finds) are included as Appendix 1 to this report. The excavation area had dimensions of 1452m², with a large area opened around the pit feature to ensure there were no additional subsurface archaeological features. During testing, it had not been possible to fully expose the potential archaeological area due to overhead powerlines (Taylor & McNamara 2008).

Finds were recorded by context individually 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, analyses, processing, etc. Finds will ultimately be deposited with the National Museum of Ireland.

Archaeological resolution took place between the 15th and the 19th of June 2007. The archaeological crew consisted of licensed director Michael Tierney and site assistants Robert McGuire and David Fitzgerald. Weather conditions during excavation were generally warm and dry though with occasional showers.

6. Results of Excavation

The following is a discussion of the nature, stratigraphic relationships and interpretation of archaeological contexts identified during the excavation of AR020. 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, seven contexts were identified at AR020 during archaeological resolution.

6.1 General Site Overview and Voided or Non-Archaeological Contexts

6.1.1 Post-Depositional Disturbance

During archaeological testing the field within which AR020 is located was noted to have contained a number of agricultural features visible within the natural subsoil. This type
of activity is likely to have led to the degradation of potential underlying archaeological material. In addition, the re-stripping of topsoil at AR020, though conducted under close archaeological supervision, led to the partial truncation of previously identified linear feature C[3].

6.1.2 Topsoil and Interface Layer C(6)
Topsoil within the excavation area consisted of a light, slightly orange brown silty clay which varied in depth from 0.10m to 0.25m. No finds were retrieved from the topsoil during stripping or cleaning back of the excavation area.

6.1.3 The Natural Subsoil C(7)
The removal of topsoil at AR020 immediately exposed the underlying natural limestone bedrock in most areas. In locations where a natural subsoil was present, it consisted of a light orange brown sandy clay (pl. 2). During archaeological testing of the AR020 area, a number of sinkholes, phenomena common with limestone geology, were identified by TVAS Ireland Ltd., as was a small limestone quarry in the south-east corner of the field.

6.1.4 Voided Contexts and Contexts of Non-Archaeological Significance
Voided and non-archaeological contexts consist of those identified as agricultural features, features created through bioturbation (plant and animal action), and those resolved as previously identified contexts. Three voided and non-archaeological contexts were identified during AR020 excavations:

C(1) – fill of agricultural furrow,
C(2) – non-archaeological deposit, and

C(1) consisted of a dark brown moderately compacted silty clay fill (pls. 4-5). It contained frequent pieces of sub-angular limestone rock and occasional fragments of burnt bone, (less than 1%). Due to the lack of archaeological significance of this context, the bone was not sent for specialist analysis. C(1) measured 0.60m north-west to south-east, 1.33m north-east to south-west, possessed a maximum depth of 0.11m and constituted the sole fill of agricultural furrow C[3]. A fragmentary stem of a clay pipe (Find # 1) was also retrieved from this context. There were no stamps or markings on the pipe stem fragment but based on its size and style, it is likely to be of 19th date.
C(2) was a greyish brown silty clay containing occasional flecks of charcoal. The deposit measured 0.76m north-south 0.45m east-west and possessed a maximum depth of 0.12m. Prior to excavation this deposit had been ascribed an archaeological origin, however upon excavation was deemed to represent the build up of material within a natural hollow in the bedrock at AR020.

C[3] was a linear cut feature truncated at its north-east end during topsoil stripping and abutting the natural geology at the south-west end (fig. 4, pls. 5-7). The linear cut survived to a length of 1.30m (though identified to 3.94m during archaeological testing), and possessed a width of 0.60m and maximum depth of 0.11m. The break of slope at the top of the cut was sharp with an imperceptible break at the base and concave sides. The base of the cut was linear and concave. The feature was oriented north-east to south-west and contained the single fill, C(1). Upon excavation, C[3] was deemed to represent the remains of an agricultural furrow. No other furrow features were noted within the excavation area, though given the high level of the underlying bedrock and subsequent agricultural activity, it is likely that most furrows would not survive. Although aligned along almost the same orientation as the elongated pit, C[5], located approximately 2m to the south-south-west, this furrow had no apparent relationship with the pit. The differing nature of the two cuts and their fills strongly indicated an agricultural origin for C[3] and an archaeological significance for C[5].

6.2 Excavation of Archaeological Context Pit C[5]

A single archaeological feature was identified at AR020 and associated contexts totalled two: C[5] and C(4). The contexts and feature had originally been identified and investigated by cleaning and sectioning by TVAS Ireland Ltd. during the archaeological testing phase of the project.

Pit feature C[5] was generally oval in plan; the north side being slightly irregular as the boundary was formed by the local natural limestone bedrock (fig. 4, pls. 4-5). The break of slope was sharp at the top of the cut leading to vertical sides to the south (where cut into natural subsoil) with an irregular northern side where abutting the bedrock (figs. 5-6; pls. 8-9). The break of slope was sharp on the south side of the cut and again, irregular to the north. The base was flat and level, orientated north-east to south-west (pls. 7-9). In terms of feature construction, C[5] appears to be deliberately excavated on the south side and to have exploited a natural geological rock formation (rather than
having been deliberately cut) on the north side. There were no indications that the bedrock had been deliberately cut to facilitate this feature.

The pit contained a single fill, C(4). This was a dark black brown moderately compact slightly clayey sandy silt fill (pls. 4-5). It measured 1.20m north-east to south-west, 0.75m north-west to south-east, with a maximum depth of 0.18m-0.20m. It contained a small piece of animal bone, frequent pieces of limestone bedrock with occasional flecks of charcoal and lumps of iron slag. No evidence for in situ burning or a potential furnace feature was identified in association with C[5] despite the presence of charcoal and slag in the fill. The animal bone piece was not sent for specialist analysis as it was in poor condition, crumbling rapidly upon excavation. Enough of the internal fabric of the bone was initially visible, however, to establish that it was definitely not human.

Two soil samples were collected from Pit C[5], fill C(4) during excavations. Samples were subject to flotation, which led to the recovery of a single piece of hazel charcoal (Corylus avellana) weighing 0.03g (Appendix 2). The charcoal exhibited no sign of use or modification beyond burning. The piece was radiocarbon dated, using the AMS (Accelerator Mass Spectrometry) technique, to 1189±21 BP or cal. AD 776-890—the early medieval period. The full AMS report is included as Appendix 3 to this report.

Iron slag was also encountered in the pit fill and subject to further analysis. The associated technical report is included as Appendix 4 to this document. In total, 1.4kg of slag was analysed and results are presented in the table that follows.

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<td>Tiny quantity of flake</td>
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<tr>
<td>Run Slag</td>
<td>40</td>
<td>1</td>
<td>/</td>
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<tr>
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<td>247</td>
<td>1</td>
<td>Bottom; U-shaped</td>
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<tr>
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<td>Undiagnostic</td>
<td>344</td>
<td>1</td>
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<tr>
<td>Undiagnostic</td>
<td>599</td>
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Iron working consists primarily of two activities, smelting and smithing. In the most basic terms, smelting involves extracting metal from its ore; smithing involves
modification of the extracted metal with a hammer. Smelting can result in run slag so some smelting may be associated with Pit C[5] fills. Hammerscale and the possible hearth bottom are indicative of smithing and are a clear indication of this activity. This is consistent with the results of the initial testing programme carried out by TVAS Ltd., during which 4.7kg of iron slag including hearth bottoms, scale and sphere hammerscale were collected (Taylor and McNamara, 2008).

Based on this evidence, it is concluded that C[5] functioned as an iron waste or dump. There is no evidence of in situ burning that would suggest a furnace or hearth function. The lack of any in situ burning or scorching associated with the slag, suggests that the materials appear to be in a secondary context, being dumped or redeposited from the location of manufacture. Associated artefacts are limited to iron slag. The type and amount of slag indicates that a short-lived or small scale industrial activity occurred nearby. This activity may have included smelting and definitely included smithing; possibly associated with domestic scale of tool repair or maintenance. Feature shape, size and position against the natural bedrock also suggest a short term expedience for Feature C[5]. As oak is a preferred material for large scale smelting (Dillon 2008; Appendix 2), the presence of hazel charcoal may also suggest reliance on locally available materials for a single or series of small scale events.

7. Discussion

During the excavation of AR020, a single feature of archaeological significance was identified. This consisted of cut feature Pit C[5], which contained fragments of slag material generated through iron smithing and possibly smelting. No other associated features were identified in the immediate vicinity despite comprehensive topsoil striping of the area (up to 1452m²). The nearest potentially significant archaeological feature—an irregularly shaped sand, burnt sandstone, and charcoal filled pit—was located at a distance of 75m during the TVAS Ireland Ltd. testing programme. As such it may be concluded that an associated furnace may have been either at a distance from C[5] outside the Lands Made Available (LMA), or did not survive. The identification of burnt bone fragments within adjacent agricultural furrow cut C[3] is highly suggestive of potentially-related archaeological features which have not have survived. (The weak, non-archaeologically significant context of these burnt bone fragments and their poor condition meant they were not suitable for post-excavation specialist analysis).
Small scale iron extraction and metal working was conducted in Ireland from the late Iron Age through to the medieval period. The presence of considerable archaeological remains potentially dating to the early medieval period in Clashganniv townland and in neighbouring Kealgorm and Cahereen West, with which further settlement would most likely have been associated, is consistent with the early medieval date for the hazel charcoal found at AR020, cal. AD 776-890.

During archaeological testing in advance of the N21 RIS, two further small scale metal extraction and working sites were identified at AR025 Dooneen and AR024 Mullaghmarky. Dating for AR025 indicated two phases of metallurgical activity in the early Christian/early medieval period and the high medieval period. A smelting furnace produced a date of cal. AD 1220-1272, whilst a smithing hearth was dated to cal. AD 678-773. These archaeological sites, located in the north end of the scheme, in conjunction with AR020 represent the most recent discoveries of a number of such sites along the route of the N21. During previous phases of road improvement north of the current bypass scheme several metal working sites in addition to other archaeological remains were identified. The excavated material included 17 pit features related to metalworking activity in Cloghermore townland, with evidence for the remains of bowl furnaces, forging pits and ore roasting pits. These features were dated to the Iron Age period. (Coyne 1999, Licence No. 99E0130 & 99E0130 (ext.) www.excavations.ie; NRA Archaeological Database). In Knockbrack townland, a pit probably associated with medieval metalworking was excavated at AR01 (Hull 2004, Licence No. 04E0964 www.excavations.ie) and an iron smelting furnace and associated pit features were excavated at AR02 (Hull 2004, Licence No. 04E0965 www.excavations.ie). In Kilmaniheen West at site AR05, charcoal production pits were excavated, which produced radiocarbon dates of AD 810-840 and AD 1010-1030 (Taylor 2004, Licence No. 04E0975 www.excavations.ie; NRA Archaeological Database; Taylor and McNamara 2006, 4).

8. Conclusions

This archaeological investigation involved background research, field excavations, analyses and reporting. Site AR020 is located within an area of potentially high archaeological sensitivity, temporally and culturally affiliated primarily with the early medieval period. Extensive mechanical stripping under archaeological supervision and hand excavation by archaeologists led to the identification and excavation of a single feature of archaeological significance at AR020. This feature appears to be a secondary
deposit of the iron smithing (and possibly smelting) by-product or waste. The pit is small in size, cut into the natural subsoil on the south side; the north feature boundary is unmodified natural limestone bedrock. Its shape, size and contents suggest a small scale, possible single episode of use. Flotation and subsequent floral analyses resulted in the identification of a single piece of hazel charcoal suggesting the presence of such trees in the local area. This charcoal fragment was subject to AMS-technique radiocarbon dating and produced a date range of cal. AD 776 to 890 for the feature. This places the activity at the site in the Early Christian (5th - 9th centuries AD) / early medieval period (5th - 12th centuries AD).

9. References


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[www.brad.ac.uk](http://www.brad.ac.uk) – Department of Archaeological Sciences, Ancient Metallurgy Research Group.

[www.excavations.ie](http://www.excavations.ie) – online database of archaeological excavations throughout Ireland.

[www.nra.ie/Archaeology/NRAArchaeologicalDatabase/](http://www.nra.ie/Archaeology/NRAArchaeologicalDatabase/) - online database of NRA archaeological excavations

www.heritagecouncil.ie
10. Figures

Figure 1. Site Location within N21 Castleisland Bypass RIS (indicated in red). Extract from Kerry County Council Mapping.
Figure 2. Detail of AR020 within the confines of the N21 Castleisland Bypass RIS (indicated in red) and the area of archaeological potential defined by archaeological testing (indicated in green). Extract from Kerry County Council Mapping.
Figure 3. AR020 on the Record of Monuments and Places Map Sheets 39 and 40. Those sites in greatest proximity to the AR020 consist of KE039-056 ringfort, KE039-079 possible enclosure, KE039-080 ringfort, -08001 feature, KE040-075 enclosure, KE040-074 enclosure and KE040-023 Kilfinnaun Church.
Figure 4. Post-excavation plan of AR020 showing agricultural furrow C[3] and pit C[5] (Scale 1:20; Drawings # 1 and 2).
Figure 5. South-west to north-east profile of pit C[5] (Scale 1:20, Drawing # 3).

Figure 6. South-east to north-west profile of pit C[5]. Shows locations where the feature cuts the natural subsoil and exploits the natural bedrock (Scale 1:20, Drawing # 4).
11. Plates

Plate 1: Aerial view of AR020 excavation area, taken after centreline testing.
Plate 2. Overview of trench excavations to relocate AR020.
Plate 3. Detail topsoil stripping to relocate AR020. Note the limestone bedrock directly beneath topsoil layers.

Plate 4. View of site post stripping and clean down.
Plate 5: View of AR020 indicating the locations of C[3] and C[5].
Plate 6: Post-excavation C[3]. Note the cut abuts the natural bedrock in the south-west end. Truncation caused by topsoil stripping is indicated at the north-east end.

Plate 8: Post-excavation view of site indicating the location of C[5].
Plate 9: Post-excavation view of C[5]. Note the natural limestone bedrock to the north and subsoil to the south.
Appendix 1. Site Archive Registers

Context Register

<table>
<thead>
<tr>
<th>Context</th>
<th>Type</th>
<th>Description</th>
<th>Dimensions</th>
<th>Date</th>
<th>Initials</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Fill of C[3]</td>
<td>Dark brown silty clay cont. limestone rocks</td>
<td>0.60m x 1.33m x 0.11m</td>
<td>18/06/2007</td>
<td>DF</td>
</tr>
<tr>
<td>2</td>
<td>Deposit</td>
<td>Greyish brown silty clay cont. flecks of charcoal</td>
<td>0.76m x 0.45m x 0.12m</td>
<td>18/06/2007</td>
<td>RMcG</td>
</tr>
<tr>
<td>3</td>
<td>Cut</td>
<td>Linear cut orientated NE-SW - agricultural furrow</td>
<td>1.30m x 0.60m x 0.11m</td>
<td>18/06/2007</td>
<td>DF</td>
</tr>
<tr>
<td>4</td>
<td>Fill of C[S]</td>
<td>Dark black brown clayey sandy silt cont. slag</td>
<td>1.20m x 0.75m x 0.20m</td>
<td>19/06/2007</td>
<td>RMcG</td>
</tr>
<tr>
<td>5</td>
<td>Cut</td>
<td>Sub-circular cut through subsoil and bedrock - pit</td>
<td>1.20m x 0.75m x 0.20m</td>
<td>19/06/2007</td>
<td>RMcG</td>
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<tr>
<td>6</td>
<td>Topsoil</td>
<td>Light orange brown silty clay</td>
<td>n/a</td>
<td>21/06/2007</td>
<td>JB</td>
</tr>
<tr>
<td>7</td>
<td>Natural</td>
<td>Underlying natural geology of limestone bedrock</td>
<td>n/a</td>
<td>21/06/2007</td>
<td>JB</td>
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Sample Register

<table>
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<th>Context #</th>
<th>Bag #</th>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Soil / charcoal sample</td>
<td>19/06/2007</td>
<td>RMcG DF</td>
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<tr>
<td>2</td>
<td>1</td>
<td>1</td>
<td>Burnt bone sample</td>
<td>19/06/2007</td>
<td>RMcG DF</td>
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<tr>
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<td>2</td>
<td>1</td>
<td>Soil/ charcoal sample</td>
<td>19/06/2007</td>
<td>RMcG DF</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>2</td>
<td>Soil / slag/ charcoal</td>
<td>19/06/2007</td>
<td>RMcG DF</td>
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<tr>
<td>5</td>
<td>4</td>
<td>1</td>
<td>Animal bone</td>
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<td>4</td>
<td>1</td>
<td>Slag</td>
<td>19/06/2007</td>
<td>RMcG DF</td>
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Drawing Register

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<th>Description</th>
<th>Date</th>
<th>Initials</th>
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<tr>
<td>4</td>
<td>5</td>
<td>SE-NW profile of C[S] 1:20</td>
<td>19/06/2007</td>
<td>RMcG DF</td>
</tr>
</tbody>
</table>

Finds Register

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<th>Description</th>
<th>Date</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Stem of clay pipe</td>
<td>18/06/2007</td>
<td>DF</td>
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</table>
Appendix 2. Report on the Analysis of Charcoal from Three Sites on the N21, Co. Kerry (AR020, AR024, and AR025) by Mary Dillon, Archaeological Wood and Charcoal Specialist, employed by Eachtra Ltd.

Analysis of charcoal in advance of AMS dating from three sites on the N21, Co. Kerry (AR020, AR024 and AR025) - 2008

By Mary Dillon

Introduction
In all, 50 samples from three sites from the N21, Co. Kerry (AR020, AR024 and AR025) were submitted for charcoal analysis. Samples were analysed with view to identification of material for dating. Charcoal from trees with a short life-span is suitable for radiocarbon dating while charcoal from trees with a long life-span is not.

Methodology
All charcoal fragments of 2 mm or greater were identified. Each fragment was prepared for microscopic examination by fracturing it by hand and thereby exposing a clean surface along transverse, radial and tangential planes. All three planes were examined at a range of magnifications (x 5 to x 120) under a Nikon stereo microscope. For reference literature the website "wood anatomy" was consulted. The number and weight of fragments were recorded for each wood type.

Results
Only four samples produced suitable charcoal for dating (one from AR024, two from AR025 and one from AR020). All the other samples were 100% oak charcoal. The amount of oak in the samples is suggestive of iron smelting, where oak wood was almost exclusively used. Oak is not suitable for dating because it has a very long life-span. The results are illustrated in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Sample</th>
<th>Context</th>
<th>No. of samples</th>
<th>Identification</th>
<th>Suitable for AMS dating?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
<td>Oak (Quercus spp.)</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>1</td>
<td>Oak (Quercus spp.)</td>
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</tr>
<tr>
<td>3</td>
<td>3</td>
<td>2</td>
<td>Oak (Quercus spp.)</td>
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</tr>
<tr>
<td>5</td>
<td>24</td>
<td>2</td>
<td>Oak (Quercus spp.)</td>
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</tr>
<tr>
<td>6</td>
<td>13</td>
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</tr>
<tr>
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<td>12</td>
<td>2</td>
<td>Oak (Quercus spp.)</td>
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</tr>
<tr>
<td>8</td>
<td>10</td>
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<td>Oak (Quercus spp.)</td>
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</tr>
<tr>
<td>10</td>
<td>15</td>
<td>1</td>
<td>Hazel (Corylus avellana, 0.05g)</td>
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### AR025 Dooneen

<table>
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<tr>
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<th>Suitable for AMS dating?</th>
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<tbody>
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<td>1</td>
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<td>2</td>
<td>Oak (Quercus spp.)</td>
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</tr>
<tr>
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<td>2</td>
<td>Diffuse Porous wood (0.28g)</td>
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</tr>
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</tr>
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<td>Hazel (Corylus avellana, 1.17g)</td>
<td>Yes</td>
</tr>
<tr>
<td>9</td>
<td>21</td>
<td>4</td>
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</tr>
<tr>
<td>14</td>
<td>23</td>
<td>4</td>
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</tr>
<tr>
<td>15</td>
<td>12</td>
<td>3</td>
<td>Oak (Quercus spp.)</td>
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</tr>
<tr>
<td>17</td>
<td>26</td>
<td>1</td>
<td>Oak (Quercus spp.)</td>
<td>No</td>
</tr>
<tr>
<td>19</td>
<td>26</td>
<td>1</td>
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</tr>
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</tr>
<tr>
<td>22</td>
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<td>1</td>
<td>Oak (Quercus spp.)</td>
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</tr>
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<td>23</td>
<td>29</td>
<td>1</td>
<td>Oak (Quercus spp.)</td>
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</tbody>
</table>

### AR020 Clashganniv

<table>
<thead>
<tr>
<th>Sample</th>
<th>Context</th>
<th>No. of samples</th>
<th>Identification</th>
<th>Suitable for AMS dating?</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4</td>
<td>2</td>
<td>Hazel (Corylus avellana, 0.03g)</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Diffuse porous includes all non-conifer trees except oak, ash and elm

**References**

[Wood Anatomy](http://www.woodanatomy.ch)
Appendix 3. Radiocarbon Dating Report

Radiocarbon Date Certificate

Laboratory Identification: UBA-9723
Date of Measurement: 2008-08-05
Site: AR 020
Sample ID: AR020 S04 C[04]
Material Dated: AMS Charcoal
Pretreatment: AAA
Submitted by: The Archaeology

$^{14}C$ Date: 1189±21
AMS $\delta^{13}C$: -27.3
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:
Annotated results (text) —
Export file - ci4res.csv

AR024 S10
UBA-9722
Radiocarbon Age BP 350 +/- 21
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 AD 1485- 1522 0.449
1574- 1626 0.551
95.4 (2 sigma) cal AD 1462- 1529 0.443
1544- 1547 0.006
1551- 1634 0.551

AR020 S04
UBA-9723
Radiocarbon Age BP 1189 +/- 21
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 AD 782- 789 0.108
811- 848 0.511
852- 881 0.381
95.4 (2 sigma) cal AD 776- 890 1.000

References for calibration datasets:
FJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, FG Blackwell,
CE Buck, C Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich,
TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey,
FW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor,

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.

August 2008

theArchaeologyCompany

### IRON SLAG FROM AR020 CLASHGANNIV, N21 CASTLEISLAND BYPASS ROAD IMPROVEMENT SCHEME, CO. KERRY (07E470)

Lynne Keys

Just over 1 kg of slag was examined by eye and categorised on the basis of morphology. Each slag type was weighed and the smithing hearth bottom was individually weighed and measured for statistical purposes. Quantification data are given in the table below in which weight (wt.) is shown in grams; length (len.), breadth (br.) and depth (dep.) in millimetres.

<table>
<thead>
<tr>
<th>AR020 Clashganniv</th>
<th>wt.</th>
<th>len</th>
<th>br.</th>
<th>dep.</th>
<th>pcs.</th>
<th>comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 6 hammerscale</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>tiny quantity of flake</td>
</tr>
<tr>
<td>4 6 run slag</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 6 run slag</td>
<td>247</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>bottom U-shaped</td>
</tr>
<tr>
<td>4 6 undiagnostic</td>
<td>173</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4 6 undiagnostic</td>
<td>344</td>
<td>90</td>
<td>75</td>
<td>45</td>
<td></td>
<td>small smithing hearth bottom?</td>
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<td>4 6 undiagnostic</td>
<td>599</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>smelting slag?</td>
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</table>

Activities involving iron can take two forms:

1) **Smelting** is the manufacture of iron from ore and fuel in a smelting furnace. The resulting products are a spongy mass called an unconsolidated bloom (iron with a considerable amount of slag still trapped inside) and slag (waste). The latter may take various forms depending on the technology used: tap slag, run slag, dense slag, or furnace slag.

2a) **Primary smithing**: hot working (by a smith using a hammer) of the bloom on a string hearth (usually near the smelting furnace) to remove excess slag. The bloom becomes a rough lump of iron ready for use; the slags from this process include smithing hearth bottoms and micro-slags, in particular tiny smithing spheres.

2b) **Secondary smithing**: hot working, using a hammer, of one or more pieces of iron to create or repair an object. As well as bulk slags, including the smithing hearth bottom, this generates micro-slags: hammerscale flakes from ordinary hot working of a piece of iron (making or repairing an object) or tiny spheres from high temperature welding to join or fuse two pieces of iron.

Both smelting and smithing activity produce slag, some diagnostic of the process, others not. Some slag may be described as undiagnostic because it has been broken up during deposition, re-deposition or excavation.

The slag type described as smithing hearth bottom is a plano-convex shaped slag formed as a result of high temperature reactions between the iron, iron-scale and silica from either a clay furnace lining or the silica flux used by the smith. The iron silicate material from this reaction slag dripped down into the hearth base forming slag which, if not cleared out, developed into the smithing hearth bottom. Before it could grow large enough to block the tuyere hole (where the air from a bellows entered the hearth) the smithing hearth bottom was removed and dumped in the nearest pit, ditch or unused area.

Some of the Cashganniv slag may have been generated during smelting but the tiny amount of flake hammerscale present in the soil adhering to the slags indicates that secondary smithing definitely took place. This would lend support to the identification of the small smithing hearth bottom which indicates the activity was short-lived and not intense; it may have been a one-off event. The slag is almost certainly re-deposited as the pit in which the slag was found showed no sign of burning and no vitrified hearth or furnace material was present with the slag.