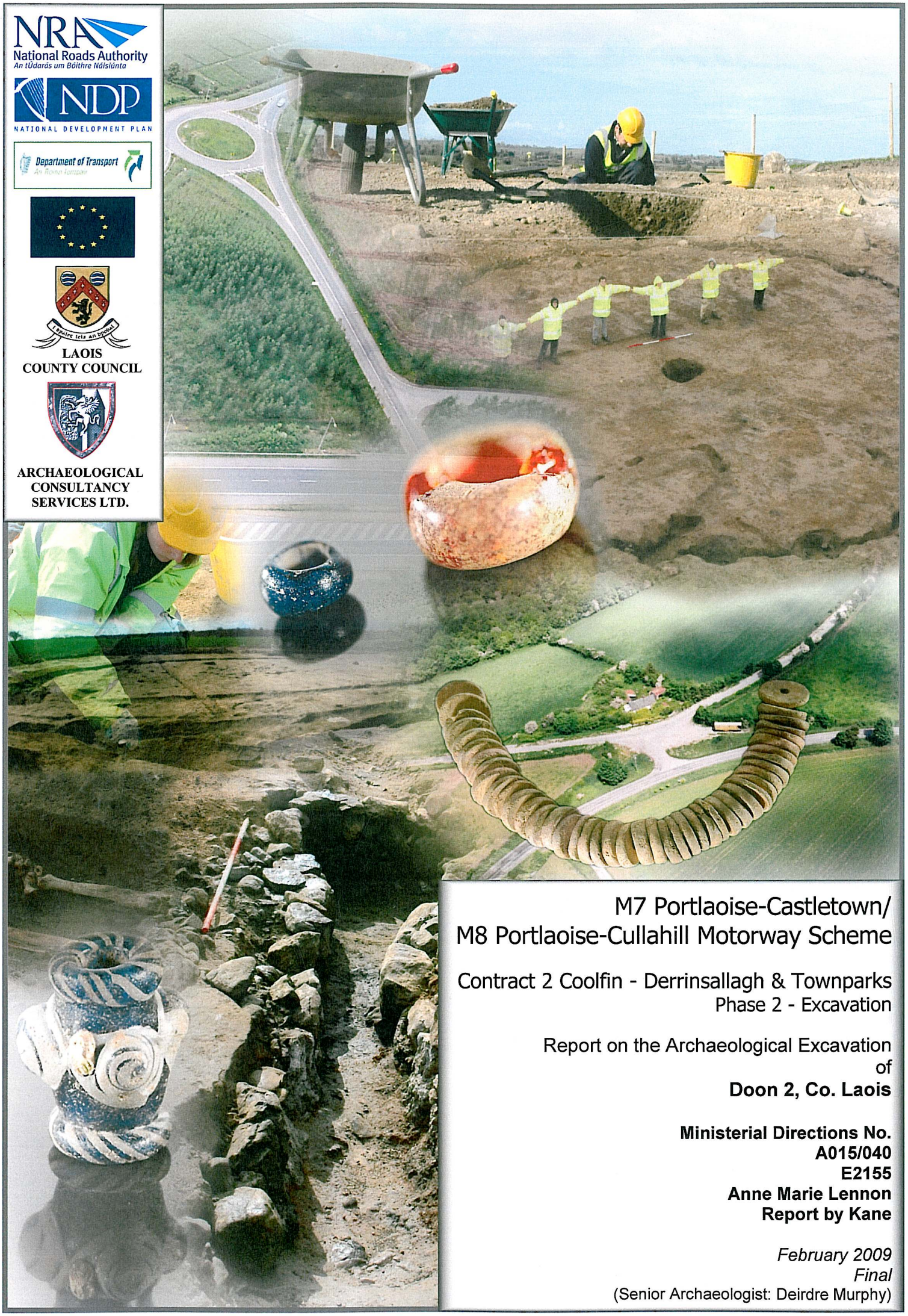

National Roads Authority
An tÚdarás um Bóithre Náisiúnta

NDP
NATIONAL DEVELOPMENT PLAN

Department of Transport

LAOIS
COUNTY COUNCIL

ARCHAEOLOGICAL
CONSULTANCY
SERVICES LTD.

M7 Portlaoise-Castletown/ M8 Portlaoise-Cullahill Motorway Scheme

Contract 2 Coolfin - Derrinsallagh & Townparks
Phase 2 - Excavation

Report on the Archaeological Excavation
of
Doon 2, Co. Laois

Ministerial Directions No.
A015/040
E2155
Anne Marie Lennon
Report by Kane

February 2009
Final
(Senior Archaeologist: Deirdre Murphy)

PROJECT DETAILS

Project	M7 Portlaoise to Castletown/ M8 Portlaoise to Cullahill Motorway Scheme
Client	Laois County Council, County Hall, Portlaoise, County Laois
Contract	Contract 2
Site Name	Doon 2
Townland	Doon, Co. Laois
Nat. Grid Ref.	225757, 184993
OS Map Ref.	OS 6 inch sheet 21
OD Height	127.16m
Chainage	3500-3600
Ministerial Direction No.	A015/040
Record No.	E2155
Archaeologist	Anne Marie Lennon
Senior Archaeologist	Deirdre Murphy
Report Type	Final
Report Status	Final
Report by	Kane
Date of Submission	February 2009
Distribution	Elspeth Logan & Mary Deevy

ACKNOWLEDGEMENTS

This report has been prepared by Archaeological Consultancy Services Ltd on behalf of Laois County Council, Kildare National Roads Design Office (NRDO), and the National Roads Authority (NRA).

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

Consulting Engineers – ARUP Consulting Engineers

Project Engineer – Mike Evans

Engineer – Gráinne Wolfe

Kildare County Council, National Roads Design Office

Senior Executive Engineer – Adrian King

Project Archaeologist – Sylvia Desmond

Engineer – Damian McGinnity

Laois County Council

Executive Engineer-Brenda Cuddy

Liaison – Sarah Dunne

National Monuments, Department of the Environment, Heritage and Local Government

Chief Archaeologist – Brian Duffy

Archaeologist – Martin Reid

Irish Antiquities Division, National Museum Of Ireland

Keeper - Nessa O Connor

Assistant Keeper – Isabella Mulhall

NON TECHNICAL SUMMARY

The proposed M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme consists of approximately 41km of motorway and 11km of single dual carriageway commencing to the southwest of the existing Portlaoise Bypass and running in a southern direction tying into the existing N8 at Oldtown. A portion of the scheme runs to the west tying into the existing N7 near Borris-in-Ossory. The Archaeological Works contract is subdivided into three separate contracts. The following report describes the results of archaeological excavation along one section of the planned M8 Portlaoise to Cullahill Motorway Scheme, at Shanboe, County Laois, Contract 2.

Contract 2 consists of 11 km of motorway, which extends east west from Aghaboe to west of Borris in Ossory through the townlands from Coolfin to Townsparks and Derrinsallagh. The site was identified and resolved during additional archaeological testing of Testing Area 13, by Anne Marie Lennon of Archaeological Consultancy Services Ltd in July 2006 under ministerial direction (A015/040) from The Minister of the Environment, Heritage and Local Government, issued in consultation with the National Museum of Ireland (NMI) issued under Section 14 of the National Monuments (Amendment) Act 2004. For recording purposes, the site was designated the scheme number A015/040 and record number E2155. The site was identified as Doon 2. 2 trenches were excavated within Field 506 (Plot 136) and a small isolated bowl/slagpit furnace or smithing hearth containing charcoal and slag (smithing hearth cake fragments) from blacksmithing was identified north of the enclosure at Derrinsallagh 4 (See Appendix 10.1). It was radiocarbon dated to the Early Medieval period (650–780 AD). No artefacts were recorded.

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1. INTRODUCTION

1.1 Site Location

This report details the results of the archaeological excavation of a site on the M7 Portlaoise–Castletown/M8 Portlaoise–Cullahill Motorway Scheme at Doon 2, Contract 2, County Laois (Ordnance Survey six-inch sheet 21; National Grid Co-ordinates 225757, 184993; Figures 1–2). The site at Doon 2 was situated south of Borris in Ossory village. It was located at Chainage 3500-3600 of the proposed scheme, in the townland of Doon and within the Parish of Aghaboe.

1.2 Scope of the Project

The purpose of the Archaeological Services Project was to conduct Archaeological Site Investigations within the lands made available for the scheme and to assess the nature and extent of any new potential archaeological sites uncovered (Phase 1). This phase of the project was carried out in March-June 2005 and throughout 2006 when access to land became available. The principal aim of this phase of the project was to test the known sites, including sites of potential identified in the EIS and through aerial photography. It sought to test for any previously unknown sites that may by virtue of their size or complexity lead to significant delays and costs if revealed during construction works. This phase of the project also tried to assess the archaeological risk across the scheme by examining the volume, range, complexity and distribution of archaeology identified during testing.

The second phase of the project involved the resolution of all archaeological sites identified within the proposed road corridor prior to commencement of the construction of the motorway (Phase 2). The aim of this phase of works was to clear the entire route of archaeology in order to avoid delays and costs during construction works. This phase of the project was carried out from July 2005-October 2006 and excavations were conducted by seven licensed directors under the management of a Senior Archaeologist, Deirdre Murphy. In total ninety-two sites were excavated during this phase of works and all excavations were given separate record numbers issued by The Department of the Environment, Heritage and Local Government.

Following completion of fieldwork a programme of post-excavation analysis was necessary as reports on the archaeological findings must be published. A dissemination strategy also forms a crucial part of this phase of the project. It is proposed that all final reports will be submitted to the relevant authorities by February 2009 and that publication and public lectures/seminars will follow thereafter. Both the format and timescale for publication and seminars will be decided in consultation with the Project Archaeologist.

1.3 Circumstances of Discovery

An archaeological assessment of this site was carried out in advance of the construction of the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, on behalf of Laois County Council by Anne Marie Lennon. The site was identified during additional archaeological testing of Testing Area 13, by Anne Marie Lennon of Archaeological Consultancy Services Ltd in July 2006 under ministerial direction number A015/040. 2 trenches were excavated within Field 506 (Plot 136) and some potential archaeology was identified north of the enclosure at Derrinsallagh 4. The site was designated Doon 2.

1.4 Date and Duration of Excavation Works

Excavation of this site was carried out in July 2006 during additional archaeological testing.

1.5 Size and Composition of the Excavation Team

The excavation team was composed of:

One director

One supervisor

2. RECEIVING ENVIRONMENT

2.1 Detailed Overview of the receiving environment (Information provided by Niall Kenny on behalf of Deirdre Murphy)

2.1.1 Topographic

A low natural ridge seems to extend westwards from the lower slopes of the hill of Knockseera running through the townlands of Doon and Derrinsallagh and levelling out in the Clonagooden and 'Erris or Skirk Glebe' areas.

It is likely that the surrounding landscape would have been much more heavily wooded in early medieval times. We know from the c.1563 AD Elizabethan map of Laois that vast areas to the east of Derrinsallagh were heavily wooded in the 16th century (The Derrinsallagh area was not surveyed) and that in Sir George Carew's list of Irish forests compiled at the end of the 16th century the forests of the Queen's County featured prominently (Feehan 1999, 8; Feehan 1983). The place-name evidence also seems to indicate this.

The underlying geology of the area the sites in question are located in is mainly that of carboniferous limestone (Feehan 1983, 28). This basic underlying rock formation is overlain by a mantle of glacial drift material which is mostly composed of limestone with variable amounts of shale and sandstone. The sites at Doon (1-3) and Derrinsallagh (1-5) are located in an area in Co. Laois where grey-brown podzolic (medium textured, moderately deep) soils are prevalent (Feehan 1983, 90-3). The grey-brown podzolic soils are among the best soils in Ireland. The soils in this area are medium textured, well-drained, friable podzolics and are especially good for tillage farming, although these soils are also highly suitable for grass production and grazing (Feehan 1983, 92). There are pockets of rough and unproductive gley soils in the areas around Doon. These less fertile soils are much wetter and are not good for tillage and crop husbandry and at best are only suitable for rough summer grazing (Feehan 1983, 93-4). Westropp (1897, 680) first noted that ringforts tended to be noted on well drained slopes, while subsequent research has quantified the relationship between ringfort distribution and favourable environmental factors (e.g. Bennett 1989; Proudfoot 1961; Stout, G. 1984, 29-32; Stout 1991; 1997).

2.1.2 Archaeological

On the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, the prehistoric period was generally under-represented in relation to the later medieval periods, perhaps a

reflection on the problems inherent in identifying prehistoric sites in the modern landscape than an actual archaeological truth. It is also an expression of how the physical geography of the region since the last glacial period has affected human settlement within the county when later communities settled and developed sites that may have previously been settled by prehistoric groups with the earlier archaeological sites being effectively removed by later domestic, industrial or agricultural activity, from the medieval period to the present. The Mesolithic period is currently unrecorded in Laois, but it is unlikely that early hunter-gatherers didn't utilise the rich post-glacial environment as they did at Lough Boora, County Offaly. As the transition from a subsistence economy to cereal cultivation and livestock rearing was made during the fourth millennium BC, large tracts of forest cover were cleared, permanent settlements were established, pottery was first used, and elaborate burial rites were developed.

The numerous eskers, which cross the county provided well drained, easily worked soils for agricultural purposes. However, the widespread clearance of the woodland cover coupled with a climatic deterioration, led to a prolonged period of bog growth that covered much of Slieve Bloom. Neolithic ritual sites in the form of megalithic tombs and artefacts are known from the county (Sweetman *et al* 1995) however, settlement sites had yet to be identified prior to the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme. A similar situation exists for the Bronze Age whereby certain types of sites are known but actual settlement evidence is less common. A number of prehistoric sites including two standings stones, a megalithic structure, an urn burial and a henge monument were recorded in the townland of Newtown or Skirk, south of the river Quinn flood plain and close to Doon.

Fulachta fiadh/burnt mound sites were a more common Bronze Age archaeological feature recorded in Co. Laois (although some were dated to the Medieval period). Nineteen (including one possible site) were noted in the county (Sweetman et al 1995, 12-3), prior to the M7 Portlaoise to Castletown/M8 Portlaoise to Culahill Motorway Scheme. Of these, 13 (68%) have been completely ploughed out and levelled; through various agricultural practices such as ploughing and land reclamation. One of the remaining recorded sites was fully excavated; another was revealed through ploughing and is still reasonably intact, while four still survive as upstanding mounds (Sweetman *et al* 1995). Four were recorded by Candon in his 1986 Archaeological Survey of the barony of Clandonagh to the southeast of Doon. No surface remains or traces of these monuments exist today (Sweetman *et al* 1995, 12), indicating the high destruction rate in the locality. All of these recorded sites occur in the southern parts of the county and eight of the 19 *fulachta fiadh* sites in Laois were recorded by Candon (1987) in separate archaeological surveys of the baronies of Clandonagh and Clarmallagh. The excavations on the

M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme uncovered in excess of 40 *fulachta fiadh*/burnt mound/spread sites and so these discoveries have great potential to add to our very limited knowledge and understanding of hot stone technology and associated *fulachta fiadh*/burnt mound activity in Bronze Age Laois.

The distribution and number of *fulachta fiadh* and associated sites in Co. Laois is certainly not representative of what was the original picture. Our current distribution and known corpus of *fulachta fiadh* sites in Laois has been obtained (mainly) through sporadic recording; two intensive archaeological surveys in two distinct geographical areas in the southwest of the county; and also through development led archaeology in more recent years (most notably the current M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway development). The fact that there are no visible surface traces or remains at most of the recorded *fulachta fiadh* sites in the county informs us that a significant amount of other sites (which were never recorded) may have been completely levelled and destroyed. The recent excavations on this motorway scheme are a veritable cross section of the landscape of Laois and they seem to indicate a more real and widespread distribution of *fulachta fiadh* sites (i.e. not just sporadic distribution in the southern part of the county). Many of the recently discovered sites have been badly truncated and ploughed out just like the previously recorded examples.

Stray finds can also provide an indicator of Bronze Age activity where an absence of archaeological monuments occurs. This can be seen at Aghaboe with the recovery of two bronze axeheads, one broad flat and one flanged, indicating such activity existed, prior to the motorway scheme. Very little archaeology in Laois was dated to the Iron Age prior to this motorway scheme.

The following discussion is based on a spatial analysis of the known and recently discovered archaeological sites occurring within a distance of approximately 3km of Derrinsallagh 2 and 3, adjacent to the townland of Doon. While all the known archaeological monuments in the surrounding area were taken into account, this discussion shall primarily deal with monuments that may have been contemporary with Derrinsallagh 2 & 3 and Doon 1-2, i.e. the archaeology of the medieval landscape.

There is not a very high density of ringforts or enclosures in the immediate area around Derrinsallagh and Doon and quite notably not one ringfort/ enclosure or circular earthwork occurs within 2.3km of the Derrinsallagh 3 complex. Within the c.3km study area taken around Derrinsallagh 3, there were three monuments that have been classified as ‘ringforts’ and five monuments that have been classified as ‘enclosures’. Three of the five enclosure sites could quite possibly be ringforts. The three enclosure sites of interest (LA021-022----; LA021-025----;

LA022-015----) and the three ringfort sites are all very similar in nature; they are circular or sub-circular in shape and tend to be defined by banks with external fosses. The average diameter of these monuments is between 35-40m with some variation. One ringfort (LA021-024----) has evidence of an original entrance at the SE while another ringfort (LA021-030001-) has evidence for a possible original entrance at the E. This is reminiscent of the entrance way occurring in the E at the site of Derrinsallagh 3. Including the recently uncovered site of Derrinsallagh 3 and the possible ringfort in the townland of Clonagooden, there is a total of eight ringforts within the 3km study area taken around the site of Derrinsallagh 3.

The different classification of these monuments (Enclosure/ ringfort) is probably more to do with human interpretation and human bias than the actual occurrence of different site types in the area. Nevertheless these eight 'enclosure-like' circular and sub-circular sites c.40m in diameter seem to represent what was the secular early medieval settlement of the surrounding landscape. These sites primarily functioned as domestic settlements and farms and so tend to be located in more fertile and arable land (Edwards 1990, 19), perhaps this can possibly explain their distribution in the surrounding areas around Derrinsallagh. The secular settlement in the surrounding areas appears to be scattered although more densely concentrated c.2km to the south-west of Derrinsallagh and Doon in the Killasmeestia, Clonlahy and Newtown or Skirk areas. However, we do know that there is a history of a ringfort in the townland to the west of Derrinsallagh and Doon and also that according to the folklore evidence there is a history of local interference and removals of ringfort bushes and features in the area. This raises the question of whether the current distribution pattern is anything like what the original picture would have been. The hills in other parts of Co. Laois have numbers of ringforts scattered on their lower slopes (i.e. in the Ballyquaid Glebe/ Newtown or Skirk area to the west of Derrinsallagh). Perhaps the absence of any surviving ringforts on the lower slopes of Knockseera and Sentryhill can be explained by the fact that these areas were likely to have been more intensively farmed over the years owing to the soils being better drained and that the destruction of monuments was more widespread in this area. Another factor which may help explains the more slightly concentrated distribution of ringforts to the south-west of the Derrinsallagh and Doon area is that the hill of Knockseera was the site of a possible early ecclesiastical foundation. This foundation spread across parts of Knockseera hill and consisted of a church, graveyard, holy well, holy bush and altar site. The foundation was associated with St. Kieran and may also have been associated with the pilgrims' route which traversed the landscape and ran eastwards to the sites of Lismore and Aghaboe. Therefore it is possible that the absence of any ringfort settlement on the lower slopes of Knockseera hill and Sentryhill and the sparse and scattered presence of ringforts in the surrounding area is a result of early ecclesiastical activity in the area and not as a result of intensive agricultural activities in these areas. However, it is possible that a combination of both factors have left us with our current distribution pattern.

The uncovering of the early medieval sites of Derrinsallagh 2 and 3 significantly adds to what is known about early medieval activity and settlement distribution in the area. We can begin to imagine that such enclosure and ringfort sites were centres of life and activity such as the corn-drying and cereal processing activity at Derrinsallagh 3 (see below). It is clear that the activity at Derrinsallagh 2 and 3 involved large-scale crop husbandry and land management across the local landscape; it involved an intimate relationship and interaction with the surrounding landscape and fields or vegetation. We can imagine the lower lying ridges and slopes being populated by early medieval peoples who tended to their livestock and processed their cereals in and around enclosed and defended settlements. These people had an in-depth knowledge of the local soils, topography, water sources as well as the track-ways and route-ways that traversed the region. They engaged in daily, seasonal and annual activities such as ploughing, sowing, tending to livestock and crops, reaping and harvesting of the local fields around their settlement and so on. The excavation of the ringfort site at Derrinsallagh 3 and the associated field ditches radiating from it to the north-west and south helps us to realise that these ringfort sites were not isolated sites and islands of settlement activity. Instead we can envisage that these ringfort sites (such as Derrinsallagh 3) existed contemporaneously with each other and that they were apart of and very much active within the wider early medieval landscape.

2.1.3 Historic

The place-name elements *Dún* and *Lios* (Doon/ Lismore Tds.) would seem to indicate that a fort or fortified settlement once existed in both of these areas.

The prehistoric period is generally under-represented in relation to the later medieval periods, perhaps a reflection on the problems inherent in identifying prehistoric sites in the modern landscape than an actual archaeological truth. It is also an expression of how the physical geography of the region since the last glacial period has affected human settlement within the county when later communities settled and developed sites that may have previously been settled by prehistoric groups with the earlier archaeological sites being effectively removed by later domestic, industrial or agricultural activity, from the medieval period to the present. The Mesolithic period is currently unrecorded in Laois, but it is unlikely that early hunter-gatherers didn't utilise the rich post-glacial environment as they did at Lough Boora, County Offaly. As the transition from a subsistence economy to cereal cultivation and livestock rearing was made during the fourth millennium BC, large tracts of forest cover were cleared, permanent settlements were established, pottery was first used, and elaborate burial rites were developed. The numerous eskers, which cross the county, provided well drained, easily worked soils for agricultural

purposes. The widespread clearance however, of the woodland cover, coupled with a climatic deterioration, led to a prolonged period of bog growth that covered much of Slieve Bloom. Neolithic ritual sites and artefacts are known from the county; however settlement sites have yet to be identified. A similar situation exists for the Bronze Age and Iron Age, whereby certain types of sites are known but actual settlement evidence is non-existent or uncommon.

Early medieval Ireland was divided into five provinces known as *cóiceda* or fifths. In the early medieval period, Laois essentially marked the boundary between the Laigin and the Osraige, in essence the boundary between Leinster and Munster. It was in this region that the greater political manoeuvrings of the seventh and eighth centuries played out, as the opposing dynasties of the Uí Neill and Eóganachta vied for supremacy with terrible consequences for the Laigin. Although they remained locally important, their territory was reduced to a fraction of their former kingdom, comprising a small section of the current county. Archaeologically, this was the period in which ringforts and monasteries were first constructed. Monasteries, such as those at Timahoe and Aghaboe among others, would become important centres of trade and learning taking on the appearance, and performing many of the functions, of towns.

In AD1169, Laois was settled by the Anglo-Normans, led by Maurice de Prendergast, acting in association with the Osraige. During the subsequent colonisation, ringworks, motte and baileys, moated sites and stone castles were constructed; perhaps the most important fortification being the castle atop the Rock of Dunamase. The Anglo-Normans founded at least three boroughs but were rather unsuccessful and never fully developed as urban centres. Indeed, it wasn't until the plantations of the fifteenth century that any attempts at town planning succeeded with the establishment of Portlaoise and Ballinakill. The remaining towns and villages of the county date mainly to the eighteenth century and include Mountrath, Portarlington, Rathdowney, Mountmellick, Abbeyleix and Stradbally.

3. RESEARCH FRAMEWORK

The research framework for Doon 2 will address the following topics:

(i) The absolute/relative chronology of site use in terms of periods, levels, phases, sequences and events
(ii) The extent of the archaeological site/activity
(iii) The location and distribution of known contemporary sites in the local, regional

and national (and international, if appropriate) context.

(iv) The nature and composition of the archaeological finds, features, layers and deposits on site.

(v) The phases of activity on site

(vi) The nature and phases of construction, use, repair and abandonment of the site.

(vii) Why the site location would have been chosen

(viii) The function of the site and its likely interrelationships with the contemporary social, economic, cultural and natural environment.

(ix) The longevity of the site, its success (or otherwise) and the reasons for the site being abandoned.

4. EXCAVATION RESULTS

4.1 Excavation Methodology

Excavation began in July 2006 under Ministerial Direction Number A015/040. Topsoil stripping on this site was carried out by means of a twenty tonne mechanical excavator equipped with a grading bucket. Spoil was managed by a dumper and was stored on archaeologically sterile areas within the limits of the site. The recording techniques employed were based on a recording system that best suits a rural environment. All potential archaeological features exposed were cleaned, recorded (by plan, photographs, levels, feature sheets etc.) and removed by hand excavation. The site was recorded using multi-context planning of all features exposed. An appropriate sampling strategy was employed. Any finds were washed (where appropriate), treated and catalogued on site and left ready for any further post excavation analysis deemed necessary. They were numbered according to the requirements of the National Museum of Ireland from 1 to 99 according to record number and feature number, i.e. E2155:3:1 represents find number 1 within feature number 3 in Doon 2, which was excavated under record number E2155. Unless otherwise stated, the features have been measured length-width-depth. All measurements are in metres. Upon completion of excavation all cuttings were surveyed using GPS equipment and only areas within the CPO were resolved.

4.2 Full Stratigraphic Report

4.2.1 List of features

F001 Topsoil

F002 Natural subsoil

F003 Cut of bowl/slagpit furnace or smithing hearth filled with F006, F005, F004

F004 Main/Tertiary fill of F003

F005 Slag deposit within F003

F006 Oxidised clay within F003

4.2.2 Stratigraphical matrix

Natural deposits

F001	Topsoil: Consisted of mid-brown, silty clay. Measured 0.40m (depth). No artefacts recorded.
F002	Natural subsoil: Consisted of compact, orange-brown, clay. Occasional stones included.

Bowl/Slag pit furnace or Smithing hearth (See Fig. 6, Plates 3-4)

F003	Cut of oval bowl/slag pit furnace or smithing hearth. Measured 0.38m x 0.30m x 0.30m. Had a gradual break of slope, sloping sides and a gradual break of slope leading to a rounded base. Filled with F006, F005, F004. Above F002, below F006.
F006	Oxidised clay mixed with charcoal was recorded at the base and sides of F003. Above F003, below F005. Charcoal from this deposit was radiocarbon dated to the Early Medieval period (650–780 AD).
F005	Slag deposit located at the base of F003. One sample taken. Identified at three smithing hearth cake fragments (See Appendix 10.1). Above F006, below F004.
F004	Main/Tertiary fill of F003, with loosely compacted, dark black-brown, silty clay. Frequent iron slag fragments and charcoal included. Measured 0.38m x 0.30m x 0.30m. No artefacts recorded. One soil sample taken. Above F005, below F001.

4.2.3 Stratigraphic Sequencing

Table … Stratigraphic Groups		
Site Name: Doon 2		**Record No.: E2155 – Scheme no.: A015/040**
Period	**Phase**	**Composition**
I	1	Formation of subsoil
II	1	Initial clearance of site
	2	Early Medieval Period: Cutting of pit F003

This report details each unit in the stratigraphic sequence, starting with the earliest.

Period 2

Phase 2 Early Medieval Period

Bowl furnace/Slag pit smelting furnace or Smithing furnace (See Fig. 6, Plates 3-4)

A single oval bowl/slag pit smelting furnace or smithing furnace (F003: 0.38m x 0.30m x 0.30m) was recorded following the removal of topsoil. It consisted of gradual breaks of slope, sloping sides and a rounded base. Filled with one deposit only, it contained loosely compacted, dark black-brown, silty clay and a large quantity of charcoal. Oxidised clay was also recorded at the base and sides of the pit, indicating *in situ* burning. A number of slag fragments were noted at the base of the pit, which were identified by Young as three smithing hearth cake fragments, the result of blacksmithing (See Appendix 10.1). This material may have been deposited in an abandoned smelting furnace. The pit may also have been an 'unusually deep' smithing hearth (a pit used for blacksmithing and not for the production of iron) though this cannot be confirmed (See Tim Young's report in Appendix 10.1). An area measuring 18m x 4m was excavated and no other features were uncovered. This feature was radiocarbon dated to the Early Medieval period (650–780 AD; Appendix 3). No artefacts were recovered.

4.2.4 Stratigraphic Discussion

The excavations at Doon 2 exposed a small-scale ironworking process, dating to the Early Medieval period (See Fig. 6, Plates 3 & 4). One oval pit (F003) was recorded north of the supposed line of the Derrinsallagh 4 enclosure, following the removal of topsoil during additional testing of the area. A trench measuring 18m x 4m was stripped and surveyed but no further features were noted. The isolated furnace or hearth comprised material consistent with blacksmithing (smithing hearth cake fragments), although the pit was 'unusually deep' and not generally consistent with smithing hearths (See Young's report in Appendix 10.1). According to Young, the blacksmithing material may have been discarded in an abandoned smelting furnace (which itself contained burnt/oxidised clay and charcoal). This oxidised clay at the base and sides is indicative of *in situ* burning while the charcoal was an essential part of iron smelting, used to create optimum temperatures to melt iron ore (Carlin, et al *forthcoming*, 3). Therefore, what may be present at this site is the use and re-use of a pit for different processes of the same industry (See Section 5 for further discussion).

4.2.5 Stratigraphic Conclusion

Through the testing phase of archaeological investigation small scale ironworking/blacksmithing was revealed, dating to the Early Medieval period. No artefacts were recovered, hindering further analysis of the site. When comparing Doon 2 with neighbouring archaeological sites (particularly those within the townland of Derrinsallagh), a pattern of large-scale ironworking-related activity across the locale emerges.

4.3 Artefactual evidence

No artefacts were recovered.

4.4 Environmental Evidence

4.4.1 Metallurgical analysis

See Appendix 10.1

F	*find*	*sample*	*context wt*	*wt*	*no*	*Notes*
005			594	74	1	small SHC crust fragment
005				186	1	dense and slightly folded SHC fragment
005				330	1	major part of small dense SHC
						(all quite strongly rusted, with charcoal in rust)

4.5 Dating Evidence

Radiocarbon analysis of charcoal from this site revealed that it dated to the Early Medieval period (650–780 AD). The charcoal was identified as Pomoideae by Ellen O Carroll (pers. com).

5. DISCUSSION (Information provided by Niall Kenny on behalf of Deirdre Murphy)

As a single bowl/slagpit smelting furnace or smithing hearth was recorded at Doon 2, a discussion of this type of feature will be presented below.

The iron production/working process; an outline from the archaeological evidence

In order to understand the nature and complexities of an iron production/working-related site such as Doon 2 and Derrinsallagh 4 and indeed the other iron production/working activities in the surrounding Derrinsallagh/Derryvorrigan/Doon area, we must first analyse and outline the whole iron production process and the iron-working process based on the archaeological evidence. It is important to consider what kind of imprints or archaeological remains such smelting and smithing processes left behind in order to understand the archaeological discoveries at Doon 2 and other sites more fully. This section will briefly outline the iron production and iron working processes that would have been undertaken by early ironworkers.

The iron production and iron-working process altered little in Ireland until the introduction of the blast furnace in the early 17th century. Prior to the introduction of the blast furnace iron was produced through a method known as the 'bloomery process' or 'direct process'. This bloomery process virtually remained unchanged from the Iron Age until the late Medieval period and so without proper dating evidence (radiocarbon, dendrochronology or through diagnostic finds) it may be quite difficult to identify a date for a metal-working site or even to identify different chronological sequences or periods of use for the site or whether the site was a multi-period site or not. However, through thorough excavation, specialist metal-working residue analysis and a composite dating programme, multi-period metal-working sites such as Hardwood 3, Kinnegad 2 and Johnstown 1 have been uncovered and identified on the K-E-K M4 excavations (Carlin Forthcoming). Iron Age and Early Medieval metal-working activities may leave similar archaeological residues, remains and features as later medieval metal-working activities. It is therefore quite possible that different periods of metal production/ working took place at Derrinsallagh 4 over many centuries, especially considering the evidence for small scale metal-working at the nearby Early Medieval site of Derrinsallagh 3 and the possible much later Medieval metal production activities uncovered at Derrinsallagh 1 in the same townland. The recovery of Bronze Age pottery from the site would seem to indicate earlier occupation at the site.

The use of charcoal

Iron has a melting point of 1540°C which would have been too high for ancient smelting furnaces to achieve (Henderson 2000, 211). While iron could not be brought to a molten state in the abscence of the required technology (blast furnace), it could be smelted through the use of charcoal at a temperature of c.1200° C. Charcoal is the material produced as a result of the incomplete combustion of wood. Large quantities of charcoal were needed to reach the high temperatures required for the smelting process. The process of charcoal production reduces the volume of the wood by c. 30% and its weight by c. 25% (Henderson 2000, 229); therefore quite a significant amount of trees would have been felled in order to supply fuel for the smelting and

smithing processes. The use of charcoal was integral to the iron production process. It is no surprise then that on many of the recently uncovered Iron Age iron production sites charcoal production kilns were found in close proximity to the smelting furnaces (i.e. at Derrinsallagh 4 and at Hardwood 3 on the K-E-K M4 excavations- Carlin Forthcoming). For smelting the ores oak charcoal was probably preferred because it is denser and longer burning than other softer woods (Photos-Jones 2003a, 22; Raftery 1994, 148; Tylecote 1962). Moreover, an analysis of the charcoal from many of the charcoal production kilns discovered on the K-E-K M4 excavations revealed that oak was the predominant species of tree/ wood used as fuel for the iron production (smelting) and working activities (smithing) carried out on many of the sites (Carlin Forthcoming). It is likely too that other woods such as hazel would have been used to preheat and dry out the clay lined smelting furnaces (Photos-Jones 2003a, 22).

Iron Ore

The raw material required for producing iron is iron ore. While large quantities of charcoal must be produced to be used in the smelting process, so too must large quantities of iron ore be procured. Iron ore was quarried in the past, as seems to be the case at Garryduff 1, where local iron ore outcrops were exploited to produce iron on the ringfort site (O'Kelly 1962, 103). However, processing and indeed quarrying such ores was far more labour intensive than exploiting and smelting bog iron ore (Mytum 1992, 230). It is becoming increasingly clear that the more widespread and easily accessible resource of bog iron ore was exploited by iron producers in the Iron Age, Early Medieval and Medieval periods (Mytum 1992, 230; Raftery 1994, 147). This is supported by the fact that geochemical analysis revealed that local bogs were a source of the iron ore that was being smelted at the multi-period iron production sites of Rossan 3, Kinnegad 2 and Hardwood 3 uncovered on the K-E-K M4 excavations (Carlin Forthcoming; Photos-Jones 2003b, 22). The finding of bog iron ore at the ecclesiastical settlement site of Reask Co. Kerry and the discovery of bog ore at Ballyvourney Co. Cork further strengthens this assertion (Fanning 1981; Scott 1991, 154). Iron production/ smelting sites were most likely and logically located in close proximity to the ore outcrop or bog iron source. These sites would also have been located close to a large source of wood (i.e. a forest), preferably oak, so that vast quantities of wood could be procured for charcoal production.

Ore roasting

Prior to smelting the procured ore was roasted to break it up into smaller and more manageable or even transportable pieces. The roasting process importantly breaks down compounds and causes micro-cracking in the ore lumps- this aids the smelting process and can drive off Co2/ H2o and sulphur (Crew 1996; Mytum 1992, 230). This was an important process as it appears from an analysis of some of the slag at Lagore crannog Co. Meath that the ore was not effectively roasted

because the slag still contained ferrous sulphides from sulphur in the ore, and so the smelt was much less productive (Mytum 1992, 231). Evidence for ore roasting was also uncovered on the Early Medieval ringfort site of Garryduff (Scott 1991, 154). The roasting of ore would have taken place in a simple bon-fire onto which the ore was heaped (Fairburn 2004). The roasting of the ore would probably have taken place close to the iron ore source and/ or close to the smelting furnace.

Smelting; bowl/slagpit and low shaft furnaces

The smelting usually took place in either a bowl furnace/slagpit iron smelting furnace (See Appendix 10.1) or larger low shaft furnace. The presence and use of the low shaft furnace in early Irish metal-working has been disputed by eminent scholars such as Scott (1991, 213), Raftery (1994, 148) and Pleiner (2000). However, it is becoming increasingly clear through development-led excavations in recent years that the low shaft furnace was in use in early Irish ironworking i.e. at sites such as Cappakeel 3 Co. Laois, Lisnagar Demesne 1 Co. Cork and at Ballydowney and Farrananstack Co. Kerry (Fairburn 2004; Fairburn 2005; Fairburn 2003a; 2003b).

The bowl furnace/slagpit iron smelting furnace consisted of a small pit in which the charcoal and ore were placed. Sometimes this pit was clay-lined and covered over with a low dome-shaped clay roof while other times it simply consisted of an unlined pit in the ground with no provision for the removal or tapping of slag (Scott 1991, 159). These furnaces tend not to be well preserved and it has been suggested by Tylecote (1986) that they could represent the remains of very poorly preserved low shaft furnaces. The low shaft furnace usually consisted of a hemi-spherical shaped bowl cut into the ground (bowl or pit shapes can vary though). This bowl was clay-lined and quite importantly clay sides were built up above ground into the shape of a conical or cylindrical shaped clay chimney (Fairburn 2004). In the case of the low shaft furnace the charcoal and iron ore were mixed or placed in alternating layers while in the case of the bowl furnace the charcoal was placed close to the air hole and tuyere where a bellows was attached (Mytum 1992, 231). Tuyeres and accompanying bellows also functioned with the shaft furnace and these provided a continuous flow of oxygen throughout the furnace (Mytum 1992, 231). The tuyere was basically a hardened clay nodule which the bellows fitted into and these came in a variety of shapes and forms (Mytum 1992, 231). Slag (a by-product of the smelting process) formed in the base of the bowl furnace and solidified with the charcoal into a furnace bottom. The iron bloom formed on the upper surface of these slag and ash deposits. The bloom ‘is a rough, often spongy mass, containing metallic iron flakes and nodules that have sintered together, mixed with pieces of slag, partially reduced ore, charcoal and pieces of furnace clay’ (Fairburn 2004).

Shaft furnaces achieved a higher temperature than the bowl furnace, increasing the carbon content of the iron and overall iron output (Fairburn 2004). The slag residues from the shaft furnace could

be tapped or untapped, and tap slag (as identified at Cappakeel 3 Co. Laois and Lisnagar Demesne 1 Fairburn 2004; 2005) as well as large remains of vitrified clay fragments and above surface lining, is often an indirect indicator for the presence of the low shaft furnace. The identification of low shaft furnaces in the archaeological record is quite difficult as the above surface clay superstructure was often deliberately broken to retrieve the bloom after the smelt, or was destroyed through many centuries of destructive agricultural practices such as ploughing.

O' Kelly's (1961) experimental work with bowl furnaces highlighted their basic inefficiency and inconsistency. While this may have been a result of O' Kelly's lack of expertise in metal working, the assertion that the bowl furnace was less practical and efficient than the low shaft furnace has been further substantiated by scholars such as Wynne and Tylecote (1958), Tylecote (1986), Tholander (1987) Crew (1991) and Crew and Rehren (2002, 96). It would appear to Young (See Appendix 10.1) that the majority of the ironworking pits recorded at Derrinsallagh 4 were either slagpit smelting furnaces or smithing hearths and not 'bowl furnaces' which was the initial identification.

Primary and secondary smithing

Iron smelting sites can be identified by the presence of furnace bottoms, tuyere fragments, blooms (very rare), vitrified clay fragments, and of course by the slag and charcoal-rich pits in which the smelting took place. The end product of the smelting process was the iron bloom, and it is the production of this bloom of iron which gives the 'bloomery process' its name. Blooms are very rarely found on smelting or smithing sites, however consolidated blooms have been found at Lough Faughan crannog Co. Down and at Carrigmuirish and the Brothers' Cave, both in Co. Waterford (Collins 1955; Tylecote 1986). Some more fragments of unrefined bloom were found at Hardwood 3 on the K-E-K M4 excavations (Photos-Jones 2003a, 22). The bloom is retrieved by breaking the clay superstructure and is further refined through a process known as 'bloomsmithing' where it is heated and hammered to remove the impurities and slag residues from it. The bloomsmithing process also known as primary smithing, results in the production of a block of iron known as a billet of iron. This primary smithing may have been conducted at the smelting site and the actual smelting furnace pit could have been used as a hearth to undertake the task. This process could equally have been undertaken at a smithing hearth at a different site perhaps within the vicinity of the local settlement or at a local smithing site closer to the settlement than the smelting site which would more likely to have been located near the natural resources (bogland and woodland).

The slag from the primary smithing action would have collected in the base of the pit, (of either the reused smelting furnace or smithing hearth), and would have formed into a distinctive lump of

waste known as a smithing cake or smithing hearth bottom. These smithing cakes or hearth bottoms are also termed plano convex bases or PCB's (Fairburn 2004).

Secondary smithing is the process which turns a refined billet of iron into a finished artefact and it is carried out in the same way as the primary smithing process; through a series of heating and hammering. The primary smithing of the bloom and secondary smithing of the billet produces further by products such as hammer scale; small flat and thin pieces of magnetic metal or impurities that are hammered out of the iron piece. Hammer scale is usually a prime indicator of smithing and can be used to locate where the process took place (Fairburn 2004). However, hammer scale can be produced through refining the bloom and the billet so it is often hard to distinguish whether the presence of hammer scale is the result of primary smithing or secondary smithing. If a continuous and large amount of smithing has taken place in one spot over a long period of time, the residues from this process can become trampled into the floor around the smithing area and form a cemented smithing pan (Fairburn 2004). The pan is made up of highly magnetic by product material, dust, hammer scale, slag residues and other by product materials. Secondary smithing however, would likely to have been conducted under a covered shelter or within some sort of structure, so as to provide the smith with shelter from the elements and also with a low light so that the smith could judge the temperature of the iron and hearth. Two such possible structures have been identified at two high status Iron Age iron-smithing/ working sites; one at the royal site of Tara Co. Meath and another one at a contemporary site at Ballydavis Co. Laois (Roche 2002, 71; Crew and Rehren 2002, 95-6). The iron-working activity at Ballydavis was initially interpreted as possible smelting activity by the director (Keeley 1999, 29), but owing to the difficulty in interpreting the difference between smithing and smelting residues and the apparent lack of specialist analysis and lack of focus on such activity at the site in the published findings, it is quite possibly that such activity was that of smithing. The occurrence of high status metal finds and crucible fragments on site also indicates that the site was a smithing site (metal working) of some importance. The presence of iron billets and various smithing tools and implements including anvils (wooden or stone), such as the small stone one used for finer metalworking from the early medieval ringfort site of Garryduff, are also indicators of smithing and forging activity.

Scott (1991, 99) aptly states that 'one serious bar to interpretation of the evidence (metallurgical by product residues) is the difficulty of distinguishing between smelting slags, those resulting from bloomsmithing and those from forging'. According to Young (See Appendix 10.1), the material recorded at Doon 2 was the result of blacksmithing as the slag found in F003 was identified as smithing hearth cake fragments. The pit in which it was found however would appear

to be 'unusually deep' for blacksmithing and therefore may have been a smelting pit re-used for depositing such waste material.

6. INTERPRETATION AND RECONSTRUCTION

The site at Doon 2 represents small scale ironworking activity. It comprised a single pit that contained material consistent with the blacksmithing process (smithing hearth cake fragments) (See Appendix 10.1). The pit itself however, was 'unusually deep' for a blacksmithing pit and along with the charcoal and oxidised clay recorded around the edges, it is possible the pit was originally a bowl/slagpit furnace used for smelting. This may indicate that the slag material recovered was deposited after the smelting pit was abandoned. Similar pits dated to the Iron Age/Medieval period lay adjacent to the townland of Doon indicating an extensive complex involving ironworking existed.

7. ASSESSMENT OF ARCHAEOLOGICAL POTENTIAL AND SIGNIFICANCE

As only a single ironworking pit was recorded and no artefactual material was recovered, little significant archaeological evidence can be attributed to the site. If however, it is discussed in relation to the surrounding townland of Derrinsallagh, a broader picture of ironworking emerges. Large scale activity during the Iron Age/Medieval period is evident in this part of Co. Laois, which adds greatly to the archaeological record.

8. CONCLUSION

This site has been adequately archaeologically assessed and resolved. There are no other archaeological features within the limits of the roadtake. Consequently no further work is required prior to the construction phase of the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme.

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9.2 Other Sources

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Prepared by Margaret Gowen & Co

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

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

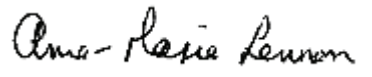
9.3 Cartographic Sources

1839 1st edition Ordnance Survey Map

1891 2nd edition Ordnance Survey Map

1909 Ordnance Survey Revision edition RMP map

Signed:



Anne Marie Lennon
Licensed Archaeologist

February 2009

10. APPENDICES

10.1 Appendix 1: Metallurgical analysis report

GeoArch Report 2008/25

Evaluation of Archaeo-metallurgical residues from Doon 2, Contract 2, M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme

Record no: E2155

Dr Tim Young

12th December 2008

Abstract

Archaeometallurgical residues from Doon 2 comprised three smithing hearth cake fragments from fill F005 of pit F003.The pit may itself have been a smithing hearth of unusually deep morphology, or may have been an abandoned basal pit from a slagpit iron smelting furnace. The pieces suggest blacksmithing, but are not indicative of age.

Contents

Methods

All investigated materials were examined visually, using a low-powered binocular microscope where necessary. All significant materials were summarily described and recorded to a database (Table 1). As an evaluation, the materials were not subjected to any high-magnification optical inspection, nor to any other form of instrumental analysis. The identifications of materials in this report are therefore necessarily limited and must be regarded as provisional.

Results

Material

The material from Doon 2 comprised 3 fragments of smithing hearth cakes (SHCs). All of the material had a rusty, concretion adhering to outside, which contained charcoal fragments. A single SHC appeared to be complete, and weighed 330g, placing it in the typical range for slag cakes from blacksmithing, but which is not indicative of age.

Distribution

All the fragments came from F005, a fill of what was described as a “bowl furnace”, cut F003, 0.38m in diameter and 0.30m deep. The slag appears to have been present at the very bottom of the cut.

Interpretation

The assemblage is clearly from iron smithing, but the feature containing the slag is not a typical smithing hearth. It is possible that this is the basal pit of a slag pit iron smelting furnace, for it is of a typical size of such a pit, but contains no slag indicative of smelting. The assemblage must be considered therefore either to have been dumped into an abandoned smelting furnace, or this was an unusually deep smithing hearth.

Evaluation of potential

This assemblage has little potential for benefit from additional analysis. It is possible that the soil sample (stated to have been taken in the stratigraphic report, might yield micro-residues capable of clarifying the origin of the pit itself.

There is no especial need for retention of this material.

F	*find*	*sample*	*context wt*	*wt*	*no*	*Notes*
005			594	74	1	small SHC crust fragment
005				186	1	dense and slightly folded SHC fragment
005				330	1	major part of small dense SHC
						(all quite strongly rusted, with charcoal in rust)

Table 1: Summary catalogue

10.2 Appendix 2: Archive contents

Table …. Site Archive (Basic) Summary			
Site Name: Doon 2		Record No.: E2155 – Scheme no.: A015/040	
Type	Description	Quantity	Notes
Contexts	Validated contexts from excavation	6	All contexts sheets have been checked and cross-referenced.
Plans	'A2' 1:50 (no. of sheets)		
Sections	'A2' 1:10 (no. of sheets)	1	Section
Photographs		3	Colour print
Registers	Plan Register Photographic Register Finds Register Sample Register	1 1 1 1	All Registers have been checked and cross-referenced.
Diaries	Director's Diary	1	All Diaries have been checked and cross-referenced.

Appendix 3 Radiocarbon Results

Scottish Universities Environmental Research Centre
Director: Professor A B MacKenzie Director of Research: Professor R M Ellam
Rankine Avenue, Scottish Enterprise Technology Park,
East Kilbride, Glasgow G75 0QF, Scotland, UK
Tel: +44 (0)1355 223332 Fax: +44 (0)1355 229898 www.glasgow.ac.uk/suerc

RADIOCARBON DATING CERTIFICATE

3 February 2009

Laboratory Code	SUERC-22073 (GU-17999)
Submitter	Maria Lear ACS Ltd Unit 21 Boyne Business Park Greenhills, Drogheda Co. Louth, Ireland
Site Reference	Doon 2
Sample Reference	E2155 : C6 : S1
Material	Charcoal : Pomoideae
$\delta^{13}C$ relative to VPDB	-25.3 ‰
Radiocarbon Age BP	1320 ± 30

N.B.

1. The above ^{14}C age is quoted in conventional years BP (before 1950 AD). The error, which is expressed at the one sigma level of confidence, includes components from the counting statistics on the sample, modern reference standard and blank and the random machine error.

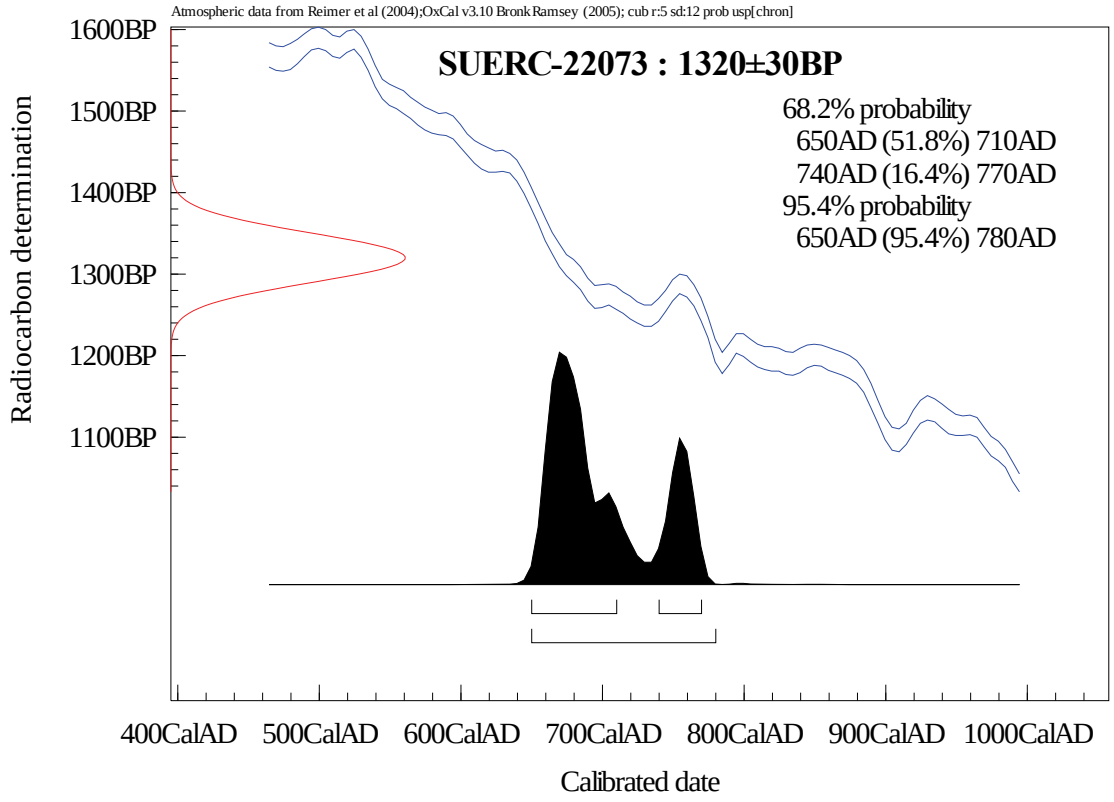
2. The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal3).

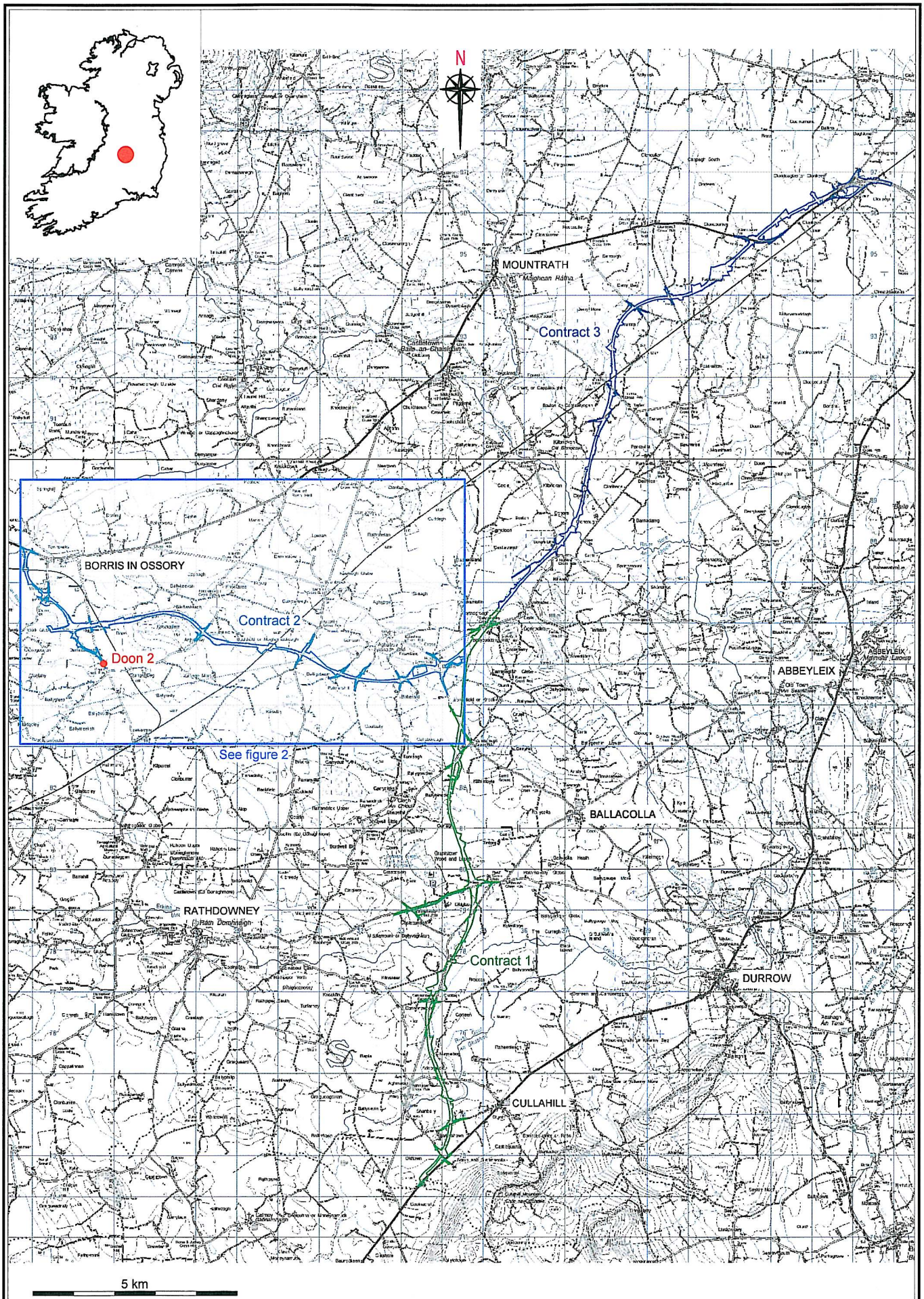
3. Samples with a SUERC coding are measured at the Scottish Universities Environmental Research Centre AMS Facility and should be quoted as such in any reports within the scientific literature. Any questions directed to the Radiocarbon Laboratory should also quote the GU coding given in parentheses after the SUERC code. The contact details for the laboratory are email g.cook@suerc.gla.ac.uk or Telephone 01355 270136 direct line.

Conventional age and calibration age ranges calculated by :- Date :-

Checked and signed off by :- Date :-

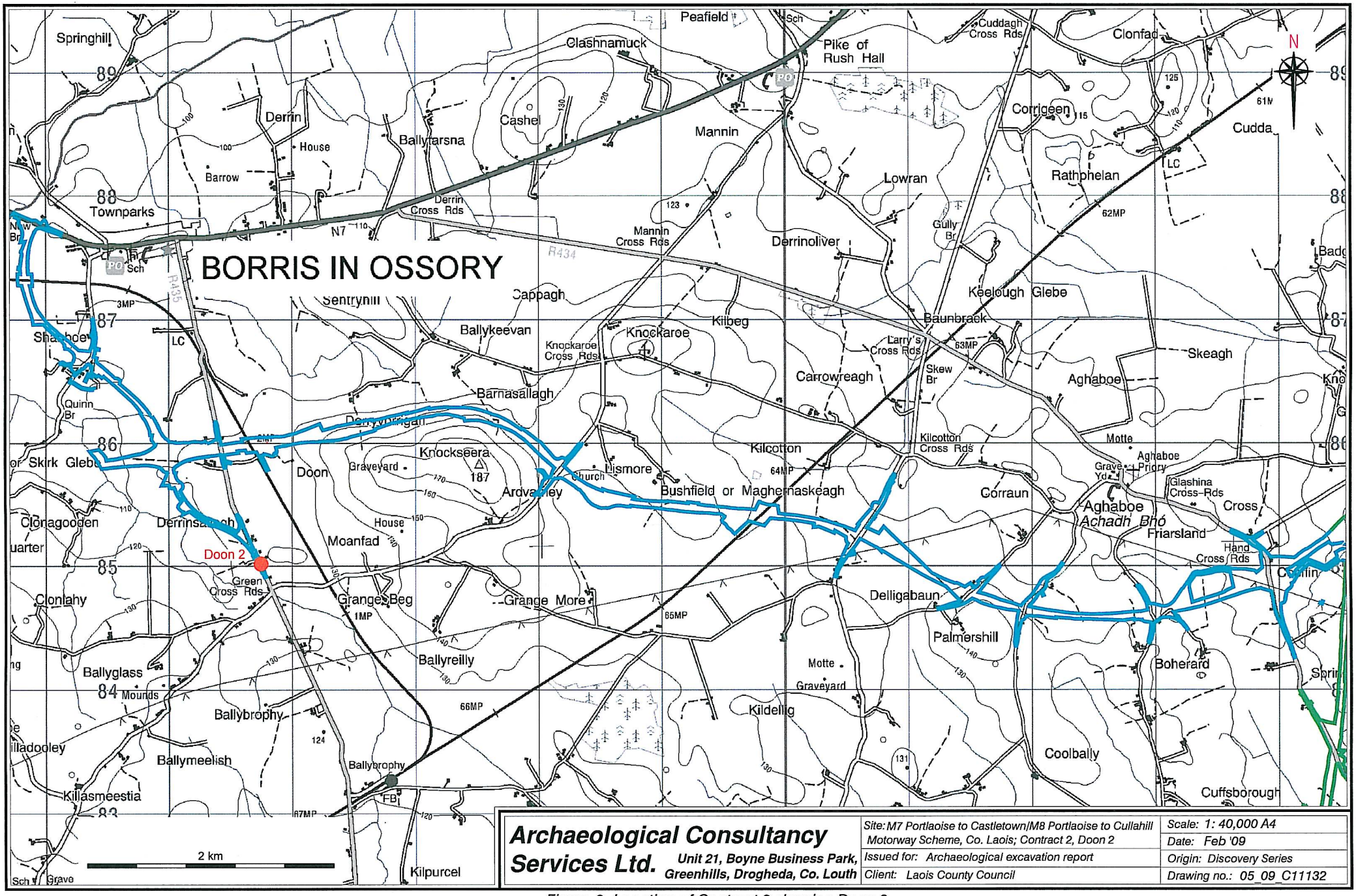
Calibration Plot





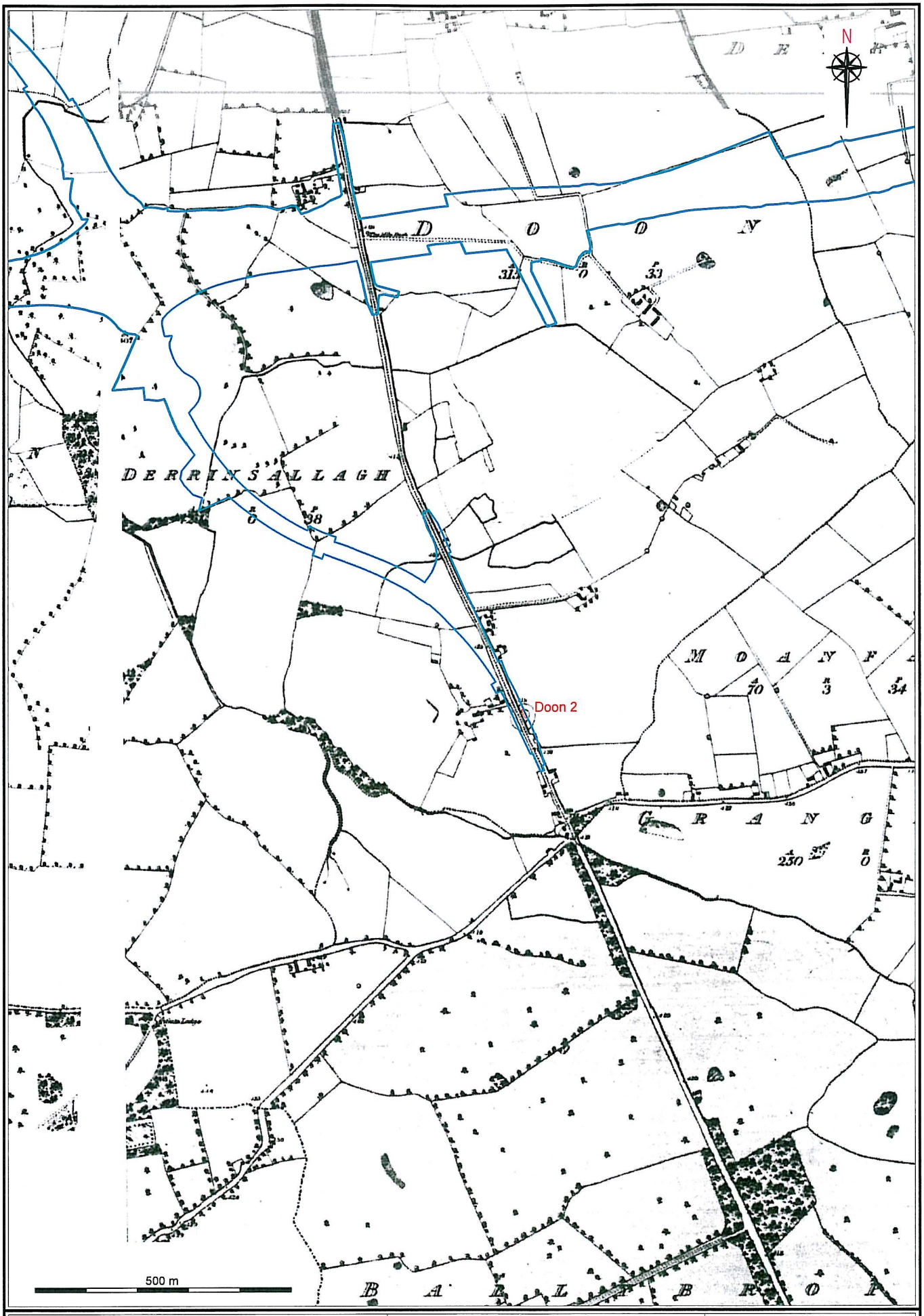
Archaeological Consultancy Services Ltd. Unit 21, Boyne Business Park, Greenhills, Drogheda, Co. Louth	Site: M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, Co. Laois; Contract 2, Doon 2	Scale: 1: 125,000 A4
		Date: Feb '09
	Issued for: Archaeological excavation report	Origin: ACS Ltd
	Client: Laois County Council	Drawing no.: 05_09_C11131

Figure 1: Location of M7/M8 Motorway Scheme showing location of Doon 2



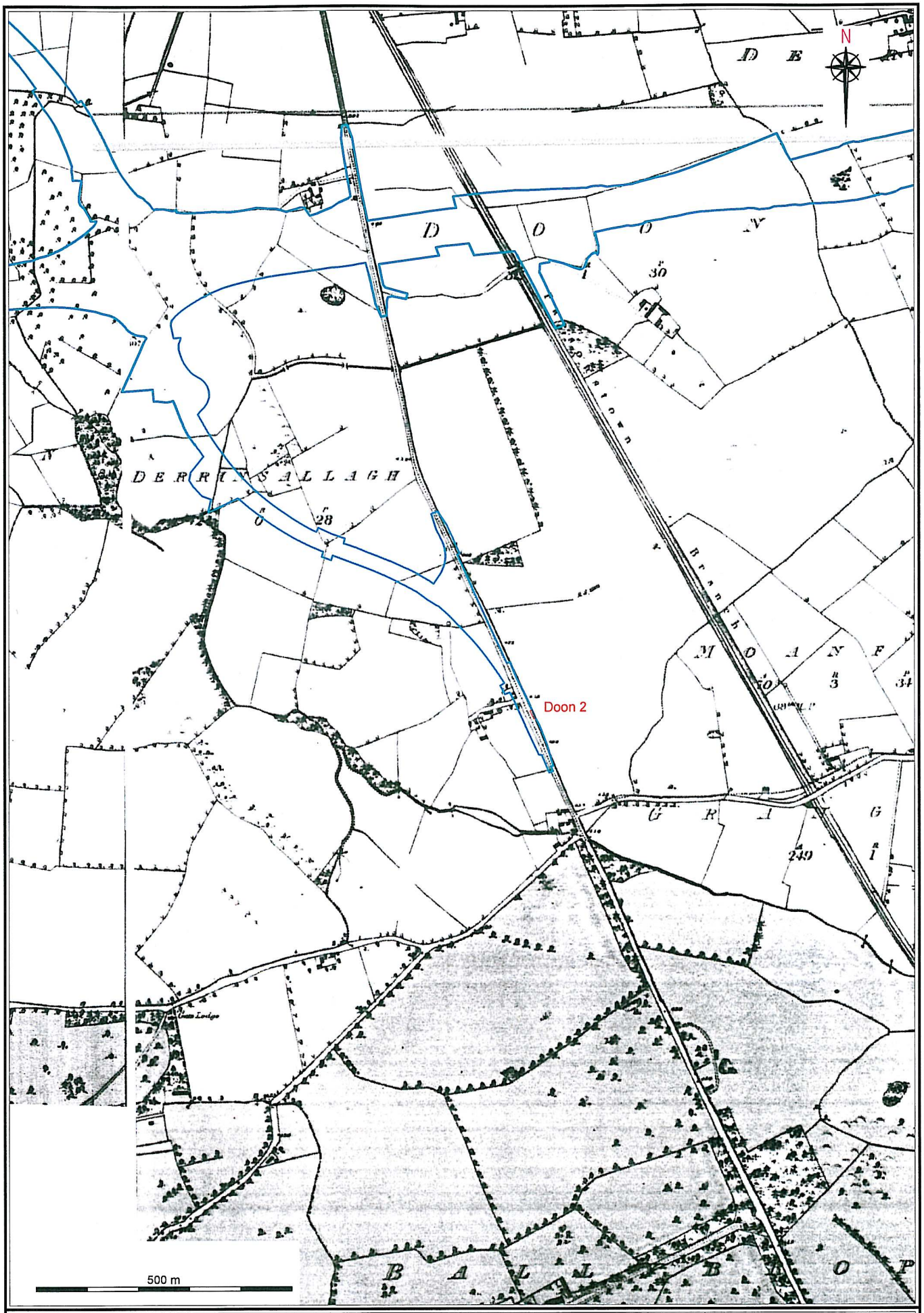
Archaeological Consultancy Services Ltd. *Unit 21, Boyne Business Park, Greenhills, Drogheda, Co. Louth*	Site: M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, Co. Laois; Contract 2, Doon 2	Scale: 1: 40,000 A4
	Issued for: Archaeological excavation report	Date: Feb '09
	Client: Laois County Council	Origin: Discovery Series
		Drawing no.: 05_09_C11132

Figure 2: Location of Contract 2 showing Doon 2



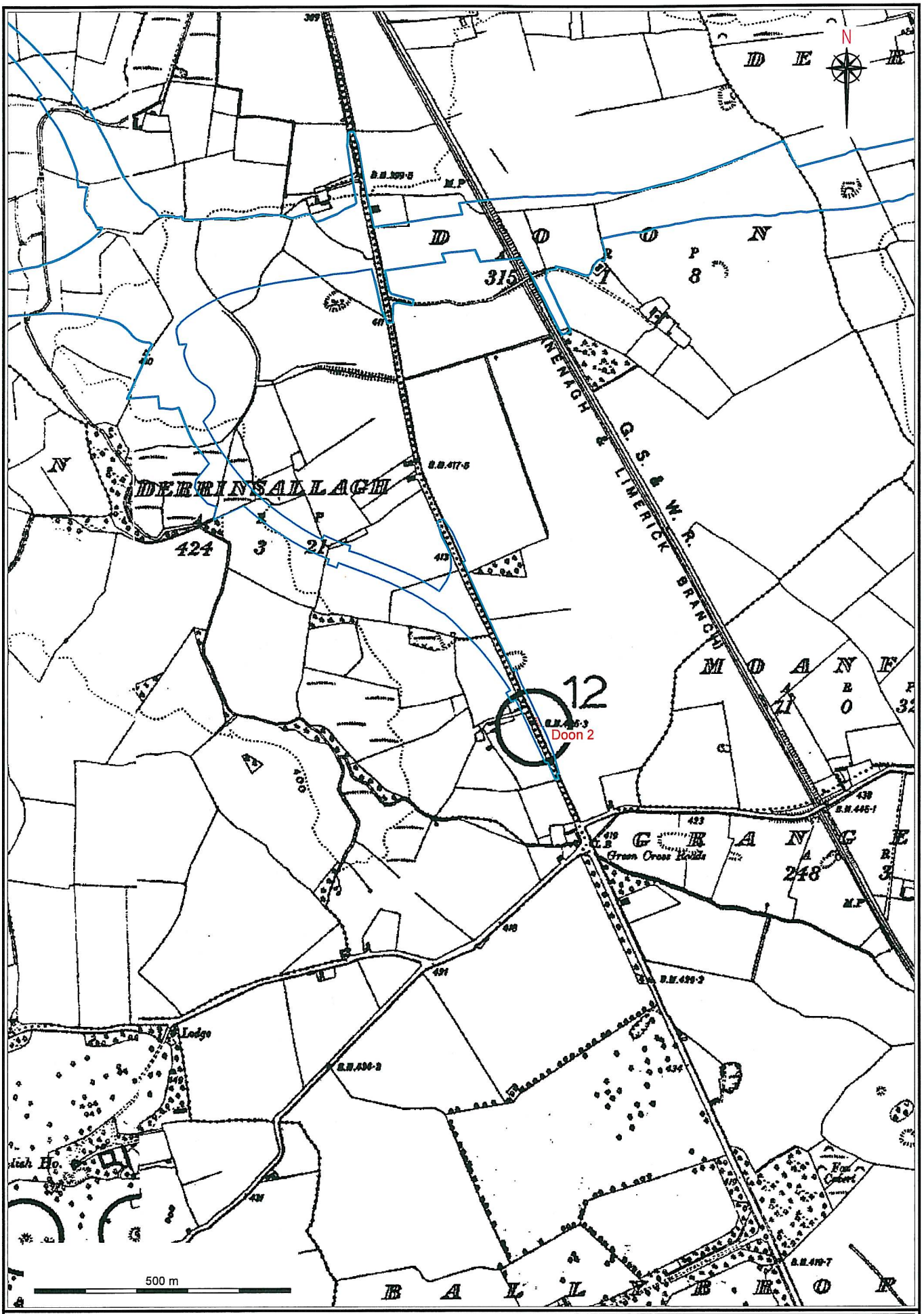
Archaeological Consultancy Services Ltd. Unit 21, Boyne Business Park, Greenhills, Drogheda, Co. Louth	Site: M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, Co. Laois; Contract 2, Doon 2	Scale: 1: 10,000 A4
		Date: Feb '09
	Issued for: Archaeological excavation report	Origin: OSi Laois 1st Ed. (1839)
	Client: Laois County Council	Drawing no.: 05_09_C11133

Figure 3: Plan showing Doon 2 on OSi Laois 1st Ed (1839) background



Archaeological Consultancy Services Ltd. Unit 21, Boyne Business Park, Greenhills, Drogheda, Co. Louth	Site: M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, Co. Laois; Contract 2, Doon 2	Scale: 1: 10,000 A4
		Date: Feb '09
	Issued for: Archaeological excavation report	Origin: OSi Laois 2nd Ed. (1889-91)
	Client: Laois County Council	Drawing no.: 05_09_C11134

Figure 4: Plan showing Doon 2 on OSi Laois 2nd Ed (1889-91) background



Archaeological Consultancy Services Ltd. Unit 21, Boyne Business Park, Greenhills, Drogheda, Co. Louth	Site: M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, Co. Laois; Contract 2, Doon 2	Scale: 1: 10,000 A4
		Date: Feb '09
	Issued for: Archaeological excavation report	Origin: OSi Laois SMR 1909
	Client: Laois County Council	Drawing no.: 05_09_C11135

Figure 5: Plan showing Doon 2 on OSi Laois SMR 1909 background

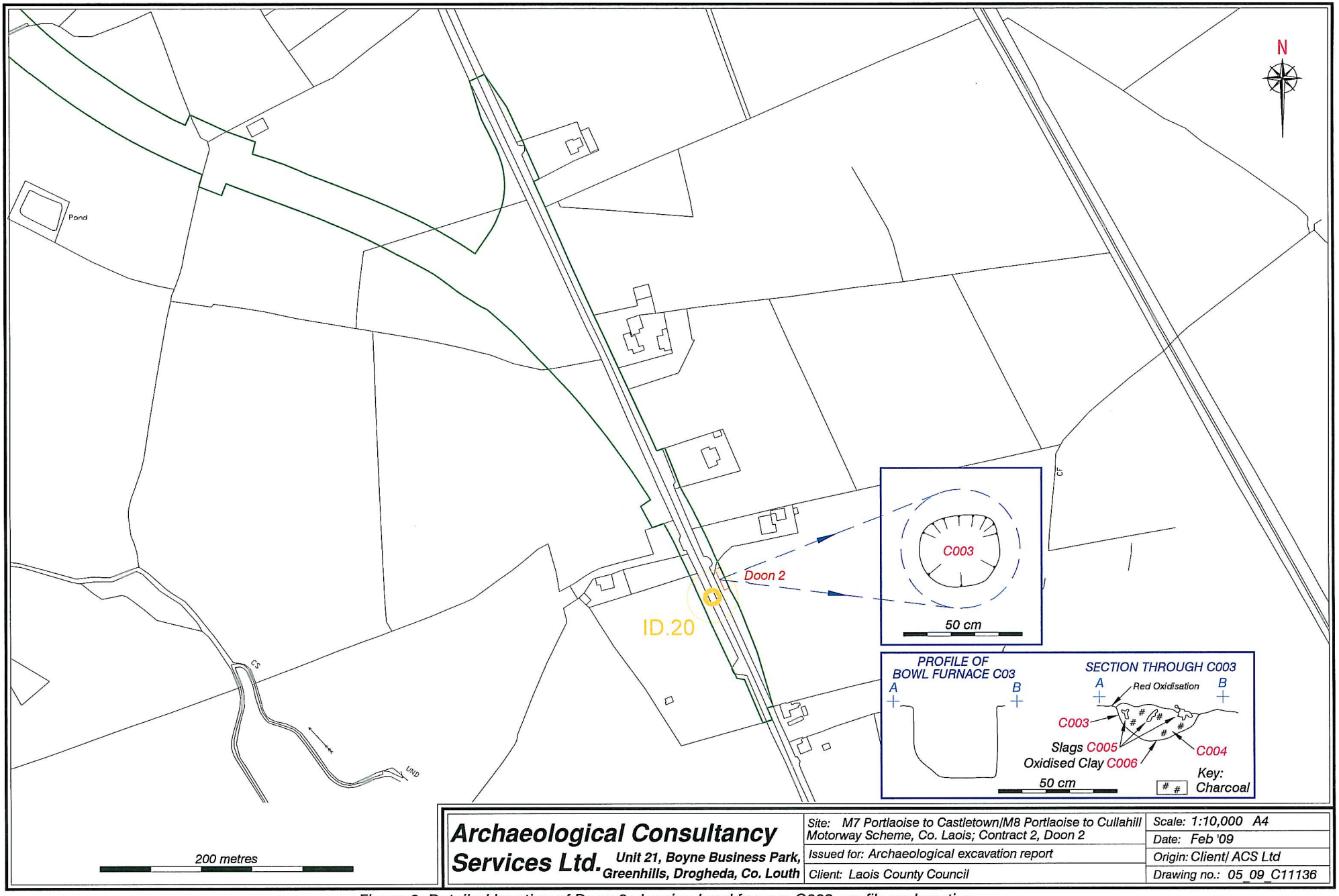


Figure 6: Detailed location of Doon 2 showing bowl furnace C003, profile and section

Plate 1: Stripping in progress at LA022:012 along public road R435 (05_09_CP869_25)

Plate 2: Stripping in progress at LA022:012 along eastern side of public road R435 (05_09_CP869_13)

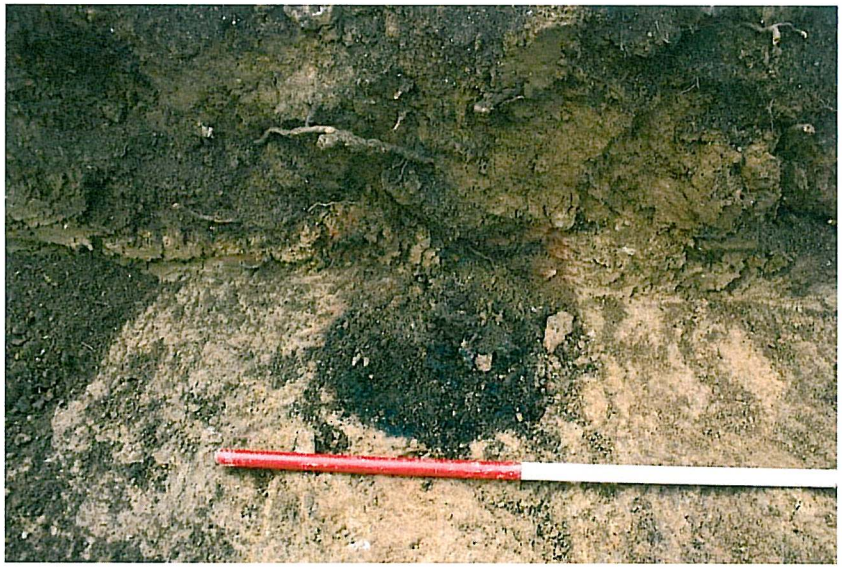


Plate 3: Pre-excavation of bowl furnace along east side of road R435 (05_09_CP869_08)

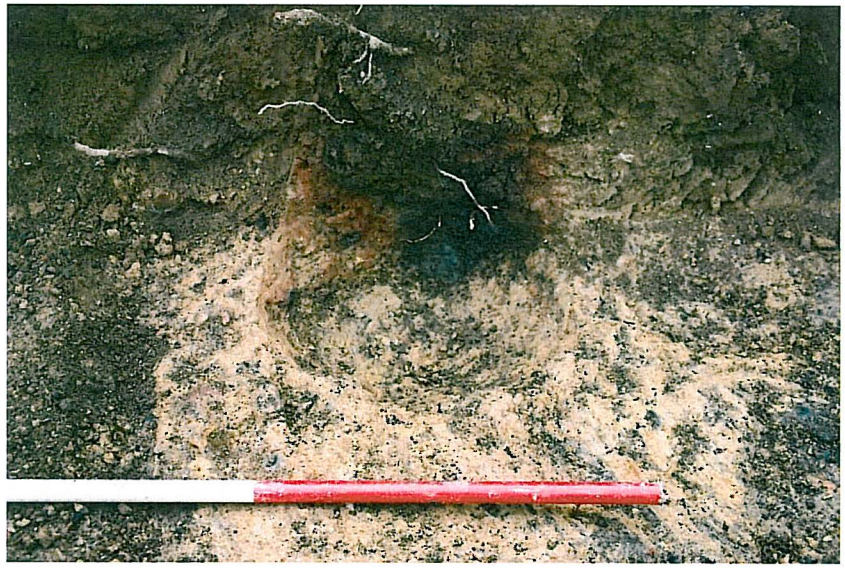


Plate 4: Mid-excavation of bowl furnace along east side of road R435 (05_09_CP869_17)