National Roads Authority
An tÚdarás um Bóithre Náisiúnta

NDP
NATIONAL DEVELOPMENT PLAN

Department of Transport
An Roinn Iompair

LAOIS
COUNTY COUNCIL

ARCHAEOLOGICAL
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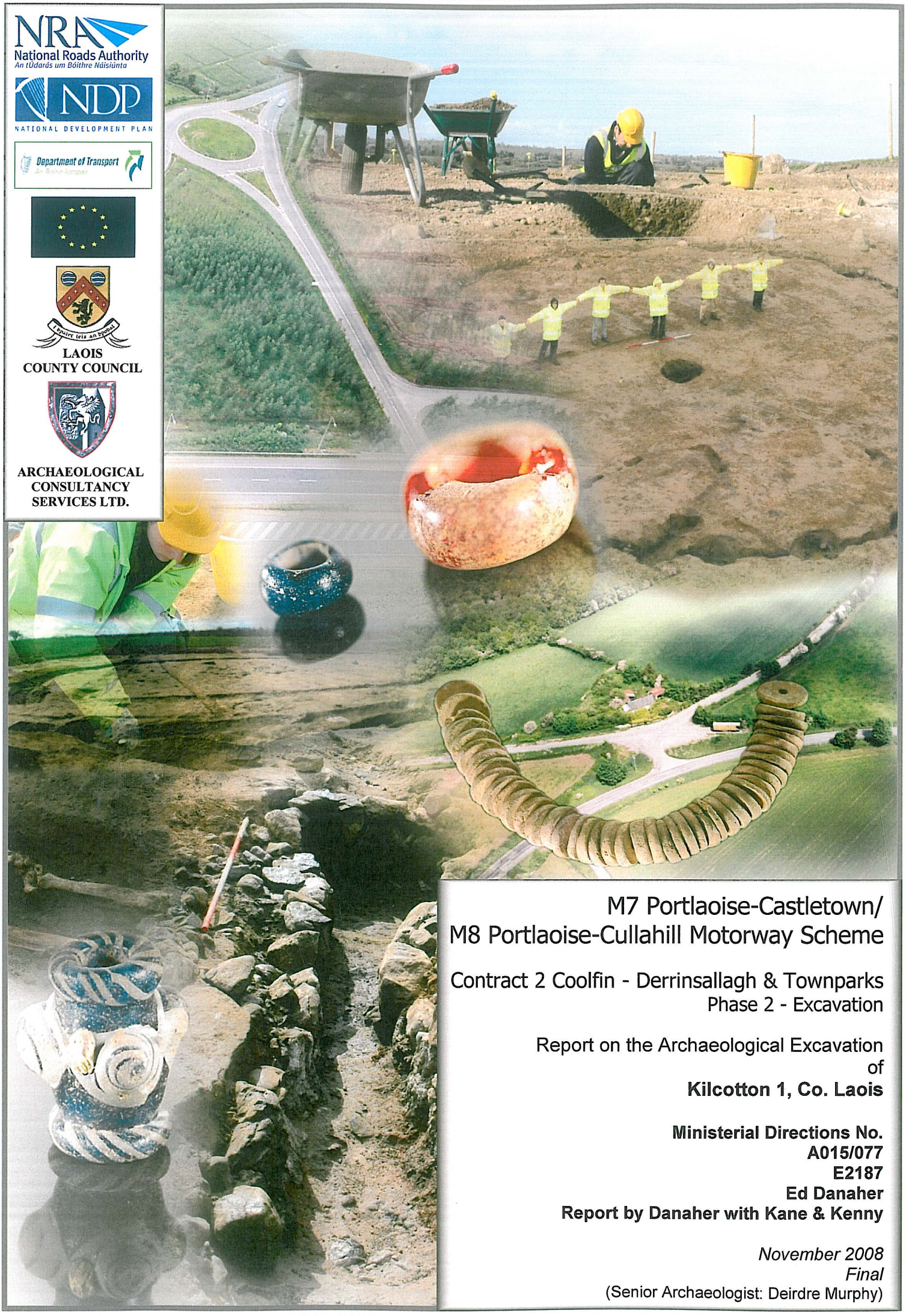

# M7 Portlaoise-Castletown/ M8 Portlaoise-Cullahill Motorway Scheme

## Contract 2 Coolfin - Derrinsallagh & Townparks
Phase 2 - Excavation

Report on the Archaeological Excavation
of
**Kilcotton 1, Co. Laois**

**Ministerial Directions No.**
**A015/077**
**E2187**
**Ed Danaher**
**Report by Danaher with Kane & Kenny**

*November 2008*
*Final*
(Senior Archaeologist: Deirdre Murphy)

## PROJECT DETAILS

| | |
|---|---|
| **Project** | M7 Portlaoise to Castletown/<br>M8 Portlaoise to Cullahill Motorway Scheme |
| **Client** | Laois County Council, County Hall, Portlaoise,<br>County Laois |
| **Contract** | Contract 2 |
| **Site Name** | Kilcotton 1 |
| **Townland** | Kilcotton |
| **Nat. Grid Ref.** | 230117, 185382 |
| **OS Map Ref.** | OS 6 inch sheet 22 |
| **Chainage** | 14800-15100 |
| **Ministerial Direction No.** | A015/077 |
| **Record No.** | E2187 |
| **Archaeologist** | Ed Danaher |
| **Senior Archaeologist** | Deirdre Murphy |
| **Report Type** | Final |
| **Report Status** | Final |
| **Report by** | Danaher with Kane and Kenny |
| **Date of Submission** | November 2008 |
| **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.

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## 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 Kilcotton, 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 during archaeological testing carried out by Lydia Cagney of Archaeological Consultancy Services Ltd in March-April 2005 under ministerial direction (A015/032) 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. 43 trenches were excavated within this field and a number of charcoal rich pits containing in-situ burning were identified. The site was designated Kilcotton 1.

Archaeological resolution of Kilcotton 1 (A015/077) commenced on 6th February 2006 by Ed Danaher of Archaeological Consultancy Services Ltd. For recording purposes, the site was designated the scheme no. A015/077 and record no. E2187. Topsoil stripping revealed the remains of 49 charcoal production pits spread out over an area extending two hundred metres. Four radiocarbon dates were returned for this site, placing it in the Medieval period ranging between the High and Late period. No artefacts were recovered.

**CONTENTS**

**List of Figures**



**List of Plates**

# 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 Kilcotton 1, Contract 2, County Laois (Ordnance Survey six-inch sheet 22, National Grid Co-ordinates 230117, 185382; Figures 1–7). The site at Kilcotton 1 was situated *c.*1.5km to the southeast of Aghaboe monastic complex, *c.*10km to the west of Abbeyleix and *c.*9km to the east of Borris-in-Ossory. It was located at Chainage 14800-15100 of the proposed scheme, in the townland of Kilcotton and within the Parish of Aghaboe. Much of the activity within Kilcotton 1 and 2 was both similar and contemporary, with a field boundary separating the two sites. Both were sited in relatively flat land that rose gradually in height as you travelled from east to west. A ringfort was situated to the north in the adjacent townland of Bushfield or Maghernaskeagh while an area of wetland was situated within the site designated Kilcotton 2. Close to this wet area was a *fulacht fiadh* dating to the Early Bronze Age.

## 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 time-scale 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 Lydia Cagney. The site was identified during archaeological testing carried out by Lydia Cagney of Archaeological Consultancy Services Ltd in March – April 2005 under ministerial direction number A015/032. 43 trenches were excavated within this field and some potential archaeology was identified. The site was designated Kilcotton 1.

### 1.4 Date and Duration of Excavation Works

Topsoil stripping of the site began on 27th January 2006 while the initial clean back started on 6th February. All site works were completed by 2nd March 2006.

### 1.5 Size and Composition of the Excavation Team

The excavation team was composed of:

One site director
One supervisor
Twelve archaeological assistants
Nine general operatives

# 2. RECEIVING ENVIRONMENT

## 2.1 Detailed Overview of the receiving environment

### 2.1.1 Topographic

Kilcotton 1 was located *c.*2km to the west-northwest of Corraun 1 in low lying undulating landscape. The nearest modern water source appears to be a small stream *c.*700m to the north of the site. There is a small hill to the northwest of Kilcotton at Knockaroe. Located in an area of carboniferous limestone, southwest Laois enjoys some of the best soils in Co. Laois. With grey brown podzolics, which are medium textured and moderately deep (Feehan 1983, 93), these well drained soils have a wide range of use. Capable of high levels of production including farm, fruit and vegetable crops over a long grazing season, they are also excellent grassland soils suitable for animal grazing. Kilcotton townland itself however, was situated in a low-lying area more suited to burnt mound or industrial-type activity than agriculture. The area of lower lying ground encompasses a small tributary of the River Gully, located *c.*6km to the east of Kilcotton.

### 2.1.2 Archaeological

Prior to the M7 Portlaoise to Castletown/M8 Portlaoise to Culahill 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 was 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 Kilcotton.

*Fulachta fiadh*/burnt mound sites were a more common Bronze Age archaeological feature recorded in Co. Laois (although they also date 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 southwest of Kilcotton. 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 (1986; 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 Scheme). 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. Sites excavated at Shanboe 6 and in the townlands of Derrinsallagh and Derryvorrigan will further our understanding of this period in the county.

There are several recorded monuments in the townlands of Bushfield or Maghernaskeagh and Lismore, adjacent to the townland of Kilcotton. In Lismore, the remains of a medieval church were recorded. It has been suggested that this church was a later edition to a possibly earlier ecclesiastical site. This church was dedicated to St. Canice and was known as 'Cill Cainneach Beg' or 'Kilkennybeg' meaning 'the little church of Canice', obviously in relation to the saints more important churches at Aghaboe and Kilkenny. The name Kilkennybeg is still attached to the field adjoining the church on the south and is separated from it by a modern fence. The field in which the church is located is called 'the lawn' or sometimes 'the church field'. The only inscribed monuments are two or three engraved grave stones from the 18$^{th}$ century (Carrigan, 1905, 131-2). A tower house is indicated in Lismore on the down survey parish maps (1654-6). The two structures indicated on the equivalent barony maps most likely represent the tower house and the church (Courtney, 2005, 107).

In Grangemore townland, close to Kilcotton is a 17$^{th}$ century castle (Inventory No. 1028), once owned by the Phelans. According to Carrigan, the walls are 3ft thick, the doors are defended by port-holes, the chimney stacks are lozenge-shaped (1905, 132). Also in this townland are the remains of a rectangular stone built house (Inventory No. 1035). There is also a rectangular earthwork, or possible moated site, in this townland, which may represent an Anglo-Norman presence in the area (Inventory No. 927). There are two circular enclosures (Inventory No. 423, 424) in this townland (Sweetman et al 1995, 127, 60, 47). It is impossible to speculate the origin of these enclosures, as they may represent prehistoric or early medieval enclosures. At Knockseera, close to Kilcotton, are the remains of a church and graveyard (Inventory No. 722). These remains are associated with St. Kiernan of Ossory (Sweetman et al 1995, 85).

### 2.1.3 Historic

The famous 6th century foundation of St. Canice at Aghaboe is located *c.*1.5km to the northeast of Kilcotton, which became the most important monastery in the kingdom of Ossory. St. Canice also founded the ecclesiastical centre at Kilkenny ('The church of Canice') during this period. In Cross townland, a cross shaped depression in a field is recorded in the Archaeological Inventory. An altercation reputedly occurred between St. Canice's followers at Aghaboe and those at Kilkenny as they argued over which group would receive his remains for burial. While they argued, a stranger appeared with two coffins, so each group could take some of his remains. The cross in this townland supposedly marks the spot where this happened (Sweetman et al 1995, 92). Aghaboe was linked to the island retreat of Monahincha by a pilgrim road (Kennedy 2003, 9). The road reputedly passed though Lismore and Bushfield, where recent excavations have revealed a large early medieval enclosure with a cemetery and metalworking area. The monastery at Aghaboe was raided in 845 and 913 AD by Vikings, after which it was restored until 1116 AD, when it was almost burned to the ground. Becoming the Episcopal See of the Diocese of Ossory in the early 12th century, Aghaboe enjoyed power until the Normans took control at the end of the century in which Strongbow granted the monastic lands to Thomas de Hereford, one of his Norman Knights. A motte and bailey dating to the time of the Anglo-Norman occupation here has been recorded (Sweetman et al 1995, 101). In 1234, the monastery was rebuilt as a priory church for the canons regular of St. Augustine. The church was attacked again in the 14th century by the MacGillapatricks during the Irish resurgence which saw the shrines, bones and reliquaries of St. Canice destroyed (O'Hanlon and O'Leary, vol I, 1907, 167). They took control of the area and in 1382 a Dominican Friary was established there by Florence MacGillapatrick, Lord of Ossory (Kennedy 2003, 12). The friary was suppressed in 1540 and was subject to unrest during the suppression of religious houses in the 16th and 17th centuries. In 1556, Laois and Offaly were renamed the Queen's County and the King's County respectively and the area was targeted for plantation. About one third of the marginal land in Laois was granted back to the O'Connors and the O'Moores on the condition that they were loyal to the crown and they abandoned their Gaelic ways. The rest of the county was colonised by English settlers and plantation towns were established (Kennedy 2003, 13). Several sites dating to the Post-Medieval period have been excavated recently in advance of the M7 Portlaoise to Castletown/M8 Portlaoise to Culahill Motorway Scheme. These include a smithy/forge at Cuffsborough 5, an industrial site at Gortnagroagh 1, a possible Post-Medieval well at Cuffsborough 3 and a Post-Medieval trackway with wheel ruts at Cuffsborough 4. A protestant parish church was also built there in 1818 (Kennedy 2003, 14).

# 3. RESEARCH FRAMEWORK

The research framework for Kilcotton 1 will address the following topics:

(i) The construction date or date of initial site occupation/use
(ii) The date of site abandonment
(iii) The extent of the archaeological site/activity
(iv) The extent of the viable (local/regional) economic catchment area, i.e. the nearest viable contemporary sources of water, food, raw materials, centres of trade, transportation routes, etc.
(v) What cultural group/unit would have occupied the site
(vi) Why the site location would have been chosen
(vii) How the site would have been constructed and what activities would have taken place at and within the site
(viii) The likely social status of the builders/occupiers of the site
(xvi) 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 on 6th February 2006 under Ministerial Direction Number A015/077. 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. E2187:3:1 represents find number 1 within feature number 3 in Kilcotton 1, which was excavated under record number E2187. 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** Fill of F004

**F004** Cut of charcoal production pit filled with F003 (Area A)

**F005** Tertiary fill of F006

**F006** Cut of charcoal production pit filled with F137, F138, F005 (Area A)

**F007** Fill of F008

**F008** Cut of probable charcoal production pit filled with F007 (Area A)

**F009** Fill of F010

**F010** Cut of charcoal production pit filled with F009 (Area A)

**F011** Fill of F012

**F012** Cut of possible charcoal production pit filled with F011 (Area A)

**F013** Fill of F014

**F014** Cut of probable charcoal production pit filled with F013 (Area A)

**F015** Fill of F016

**F016** Cut of probable charcoal production pit filled with F015 (Area A)

**F017** Fill of F018

**F018** Cut of charcoal production pit filled with F017 (Area A)

**F019** Fill of F020

**F020** Cut of probable charcoal production pit filled with F019 (Area A)

**F021** Fill of F022

**F022** Cut of cultivation furrow filled with F021 (Area A)

**F023** Fill of F024

**F024** Cut of cultivation furrow filled with F023 (Area A)

**F025** Fill of F026

**F026** Cut of probable charcoal production pit filled with F025 (Area A)

**F027** Fill of F028

**F028** Cut of possible charcoal production pit filled with F027 (Area A)

**F029** Fill of F030

**F030** Cut of cultivation furrow filled with F029 (Area A)

**F031** Non archaeological

**F032** Non archaeological

**F033** Fill of F034

**F034** Cut of cultivation furrow filled with F033 (Area A)

**F035** Fill of F036

**F036** Cut of probable charcoal production pit filled with F035 (Area B)

**F037** Fill of F038

**F038** Cut of probable charcoal production pit filled with F037 (Area B)

**F039** Fill of F040

**F040** Cut of charcoal production pit filled with F039 (Area B)

**F041** Fill of F042

**F042** Cut of possible charcoal production pit filled with F041 (Area B)

**F043** Fill of F044

**F044** Cut of probable charcoal production pit filled with F043 (Area B)

**F045** Secondary fill of F046

**F046** Cut of large charcoal production pit filled with F131, F045 (Area B)

**F047** Fill of F048

**F048** Cut of possible charcoal production pit filled with F047 (Area B)

**F049** Fill of F050

**F050** Cut of pit filled with F049 (Area B)

**F051** Fill of F052

**F052** Cut of possible charcoal production pit filled with F051 (Area B)

**F053** Fill of F054

**F054** Cut of charcoal production pit filled with F053 (Area B)

**F055** Fill of F056

**F056** Cut of posthole filled with F055 (Area B)

**F057** Fill of F058

**F058** Cut of charcoal production pit filled with F057 (Area B)

**F059** Fill of F060

**F060** Cut of possible charcoal production pit filled with F059 (Area B)

**F061** Fill of F062

**F062** Cut of charcoal production pit filled with F061 (Area C)

**F063** Fill of F065

**F064** Fill of F066

**F065** Cut of stakehole at base of F062 filled with F063 (Area C)

**F066** Cut of stakehole at base of F062 filled with F064 (Area C)

**F067** Secondary fill of F068

**F068** Cut of charcoal production pit filled with F120, F067 (Area B)

**F069** Fill of F070

**F070** Cut of cultivation furrow filled with F069 (Area B)

**F071** Fill of F072

**F072** Cut of probable charcoal production pit filled with F071 (Area A)

**F073** Fill of F074

**F074** Cut of large charcoal production pit filled with F073 (Area C)

**F075** Fill of F076

**F076** Cut of probable charcoal production pit filled with F075 (Area C)

**F077** Fill of F078

**F078** Cut of possible charcoal production pit filled with F077 (Area D)

**F079** Secondary fill of F080

**F080** Cut of large charcoal production pit filled with F085, F079 (Area D)

**F081** Fill of F082

**F082** Cut of charcoal production pit filled with F081 (Area D)

**F083** Fill of F084

**F084** Cut of pit/spread filled with F083 (Area D)

**F085** Primary fill of F080

**F086** Fill of F087

**F087** Cut of probable charcoal production pit filled with F086 (Area D)

**F088** Fill of F089

**F089** Cut of probable charcoal production pit filled with F088 (Area D)

**F090** Secondary fill of F091

**F091** Cut of large charcoal production pit filled with F104, F090 (Area D)

**F092** Fill of F093

**F093** Cut of large charcoal production pit filled with F092 (Area D)

**F094** Fill of F095

**F095** Cut of possible charcoal production pit filled with F094 (Area D)

**F096** Secondary fill of F097

**F097** Cut of charcoal production pit filled with F098, F096 (Area D)

**F098** Primary fill of F097 (charcoal lens)

**F099** Secondary fill of F101

**F100** Primary fill of F101 (charcoal layer)

**F101** Cut of charcoal production pit filled with F100, F099 (Area D)

**F102** Fill of F103

**F103** Cut of probable charcoal production pit filled with F102 (Area D)

**F104** Primary fill of F091 (charcoal layer)

**F105** Secondary fill of F106

**F106** Cut of charcoal production pit filled with F136, F105 (Area D)

**F107** Fill of F108

**F108** Cut of probable charcoal production pit filled with F107 (Area D)

**F109** Secondary fill of F110

**F110** Cut of charcoal production pit filled with F111, F109 (Area D)

**F111** Primary fill of F110 (charcoal layer)

**F112** Fill of F113

**F113** Cut of probable charcoal production pit filled with F112 (Area D)

**F114** Fill of F115

**F115** Cut of probable charcoal production pit filled with F114 (Area D)

**F116** Secondary fill of F117

**F117** Cut of charcoal production pit filled with F121, F116 (Area D)

**F118** Fill of F119

**F119** Cut of possible charcoal production pit filled with F118 (Area D)

**F120** Primary fill of F068 (charcoal layer)

**F121** Primary fill of F117 (charcoal layer)

**F122** Fill of F123

**F123** Cut of cultivation furrow filled with F122 (Area A)

**F124** Fill of F125

**F125** Cut of possible charcoal production pit filled with F124 (Area A)

**F126** Tertiary fill of F127

**F127** Cut of large charcoal production pit filled with F129, F128, F126 (Area A)

**F128** Secondary fill of F127 (lens within F126)

**F129** Primary fill of F127 (charcoal layer)

**F130** Same as F126

**F131** Primary fill of F046 (Thin basal layer)

**F132** Main fill of F133

**F133** Cut of possible charcoal production pit filled with F140, F132 (Area B)

**F134** Secondary fill of F135

**F135** Cut of charcoal production pit filled with F139, F134 (Area D)

**F136** Primary fill of F106 (charcoal-rich layer)

**F137** Primary fill of F006 (charcoal-rich layer)

**F138** Secondary fill of F006 (lens deposit of charcoal)

**F139** Primary fill of F135 (charcoal-rich layer)

**F140** Lens fill of F133 (charcoal-rich layer)

### 4.2.2 Stratigraphical Matrix

**Natural Deposit**

| | |
|---|---|
| **F001** | Topsoil: Consisted of soft, grey-brown, silty clay (0.30m depth). No artefacts recorded. |
| **F002** | Natural subsoil: Consisted of light grey, silty clay. |

**Area A (Late Medieval period; Figures 8-10, Plate 2)**

**Charcoal production pit 1 (Area A)**

| | |
|---|---|
| **F004** | Cut of shallow sub-circular pit, with rounded corners. Measured 0.80m x 0.60m x 0.10m. Orientated east-west. Had a gradual break of slope, concave sides, and an imperceptible break of slope leading to a flat-slightly rounded base. Filled with F003. Burning *in-situ* evident, oxidisation recorded at base and sides. Truncated by furrow. Situated northwest in Area A. Above F002, below F003. |
| **F003** | Fill of F004, with loose, dark black-mid brown (reddish hue), silty clay. Frequent charcoal flecking, and small pebbles included. Measured 0.80m x 0.60m x 0.10m. No artefacts or samples taken. Above F004, below furrow. |

**Charcoal production pit 2 (Area A)**

| | |
|---|---|
| **F006** | Cut of large sub-circular pit, with rounded corners. Measured 1.80m x 1.40m x 0.24m. Orientated northeast-southwest. Had a sharp break of slope, concave sides, and a gradual break of slope leading to a rounded-uneven base. Filled with F137, F138, F005. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated towards the south in Area A, adjacent to F125. Truncated by furrow. Above F002, below F137. |
| **F137** | Primary fill of F006, with compact, dark black, silty clay (25%). Frequent charcoal flecking (75%) and occasional small pebbles included. Measured 0.60m x 0.06m (width x depth). No artefacts or samples taken. Above F006, below F138. |
| **F138** | Secondary fill of F006 (lens within F005), with compact, dark black, charcoal (95%). Measured 1m x 0.05m (width x depth). No artefacts or samples taken. Above F137, below F005. |

| | |
|---|---|
| **F005** | Tertiary fill of F138, with loose, mid brown, silty clay. Frequent charcoal flecking, and occasional small pebbles included. Measured 1.80m x 0.24m. No artefacts or samples taken. Above F138, below furrow. |

**Probable charcoal production pit 3 (Area A)**

| | |
|---|---|
| **F008** | Cut of shallow sub-circular pit/spread, with rounded corners (possibly a natural depression). Measured 0.80m x 0.75m x 0.02m. Had an imperceptible break of slope, shallow sloping sides, and an imperceptible break of slope leading to a rounded base. Filled with F007. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated southwest in Area A, adjacent to F010. Above F002, below F007. |
| **F007** | Fill of F008, with loose, light-mid brown (reddish hue), silty clay. Frequent charcoal (80%) included. Measured 0.80m x 0.75m x 0.02m. No artefacts or samples taken. Above F008, below F001. |

**Charcoal production pit 4 (Area A)**

| | |
|---|---|
| **F010** | Cut of large circular pit, with rounded corners. Measured 1.60m x 1.40m x 0.09-0.20m. Had a sharp break of slope, steep-concave sides, and a gradual break of slope leading to a rounded base. Filled with F009. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated southwest in Area A, adjacent to F008. Above F002, below F009. |
| **F009** | Fill of F010, with loose, mid brown (reddish hue), silty clay. Frequent charcoal and occasional stones included. Measured 1.60m x 1.40m x 0.09-0.20m. No artefacts or samples taken. Above F010, below F001. |

**Possible charcoal production pit 5 (Area A)**

| | |
|---|---|
| **F012** | Cut of shallow sub-oval pit/spread. Measured 0.45m x 0.30m x 0.02-0.04m. Orientated north-south. Had an imperceptible break of slope, shallow sloping sides, and an imperceptible break of slope leading to a flat base. Filled with F011. Situated southeast in Area A. Above F002, below F011. |
| **F011** | Fill of F012, with loose, brown-black, charcoal-rich silty clay. Frequent charcoal (60%) and occasional small stones included. Measured 0.45m x 0.30m x 0.02-0.04m. No artefacts or samples taken. Above F012, below F001. |

**Probable charcoal production pit 6 (Area A)**

| | |
|---|---|
| **F014** | Cut of circular pit/spread. Measured 1.40m x 1.30m x 0.07m. Had a gradual break of slope, shallow sloping sides, and a gradual break of slope leading to a flat base. Filled with F013. Burning *in-situ* evident, oxidisation recorded at base and sides. Truncated by F022. Situated east in Area A. Above F002, below F013. |
| **F013** | Fill of F014, with loose, black, silty clay. Frequent charcoal (80-90%) and occasional small stones included. Measured 1.40m x 1.30m x 0.07m. No artefacts recorded. One charcoal/soil sample taken. Above F014, below F022. |

**Probable charcoal production pit 7 (Area A)**

| | |
|---|---|
| **F016** | Cut of sub-circular pit/spread, with rounded corners. Measured 0.90m x 0.75 x 0.08m. Had an imperceptible break of slope, shallow sloping sides, and an imperceptible break of slope leading to a flat base. Filled with F015. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated east in Area A. Above F002, below F015. |
| **F015** | Fill of F016, with loose, black, silty clay. Frequent charcoal (90%) and occasional small stones included. Measured 0.90m x 0.75m x 0.08m. No artefacts or samples taken. Above F016, below F001. |

**Charcoal production pit 8 (Area A)**

| | |
|---|---|
| **F018** | Cut of circular pit. Measured 0.72m x 0.72m x 0.11m. Had a gradual break of slope, concave sides, and a gradual break of slope leading to a rounded base. Filled with F017. Burning *in-situ* evident, oxidisation recorded at base and sides. Truncated by furrow. Situated northeast in Area A. Above F002, below F017. |
| **F017** | Fill of F018, with compact, black, silty clay (5%). Frequent charcoal (95%) (Oak) (See Appendix 10.1) and occasional small stones included. Measured 0.72m x 0.72m x 0.11m. No artefacts recorded. One charcoal sample taken. A radiocarbon date of Cal AD 1460-1640 (See Appendix 10. 2). Above F018, below furrow. |

**Probable charcoal production pit 9 (Area A)**

| | |
|---|---|
| **F020** | Cut of sub-rectangular pit/spread, with rounded corners. Measured 1.10m x 0.80m x 0.05m. Orientated north-south. Had a gradual break of slope, shallow sloping sides, |

| | |
|---|---|
| | and an imperceptible break of slope leading to a flat base. Filled with F019. Burning *in-situ* evident, oxidisation recorded at base and sides. Truncated by F024. Situated southeast in Area A. Above F002, below F019. |
| **F019** | Fill of F020, with compact, black, silty clay. Frequent charcoal (90%) and occasional small stones included. Measured 1.10m x 0.80m x 0.05m. No artefacts recorded. One charcoal/soil sample taken. Above F020, below F024. |

**Probable charcoal production pit 10 (Area A)**

| | |
|---|---|
| **F026** | Cut of shallow sub-circular pit/spread. Measured 0.80m x 0.70m x 0.06m. Had an imperceptible break of slope, shallow sloping sides, and an imperceptible break of slope leading to a flat base. Filled with F025. Burning *in-situ* evident, oxidisation recorded at base and sides. Truncated by F024. No discernible cut, possible natural depression. Situated southeast in Area A. Above F002, below F025. |
| **F025** | Fill of F026, with loose, mid brown-black, silty clay. Frequent charcoal and occasional small stones included. Measured 0.80m x 0.70m x 0.06m. No artefacts or samples taken. Above F026, below F024. |

**Possible charcoal production pit 11 (Area A)**

| | |
|---|---|
| **F028** | Cut of shallow circular pit/spread. Measured 0.50m x 0.50m x 0.05m. Had a sharp break of slope, concave sides, and a gradual break of slope leading to a rounded base. Filled with F027. Situated southeast in Area A. Above F002, below F027. |
| **F027** | Fill of F028, with loose, mid brown, silty clay. Frequent charcoal (70%) and occasional small stones included. Measured 0.50m x 0.50m x 0.05m. No artefacts or samples taken. Above F028, below F001. |

**Probable charcoal production pit 12 (Area A)**

| | |
|---|---|
| **F072** | Cut of shallow sub-oval pit/spread. Measured 0.81m x 0.70m x 0.04m. Orientated northwest-southeast. Had a gradual break of slope, shallow sloping sides, and an imperceptible break of slope leading to a rounded base. Oxidised clay was present. Filled with F071. Situated north in Area A. Above F002, below F071. |
| **F071** | Fill of F072, with loose, brown-black, silty clay. Frequent charcoal and occasional |

| | |
|---|---|
| | oxidised clay included. Measured 0.81m x 0.70m x 0.04m. No artefacts or samples taken. Above F072, below F001. |

**Possible charcoal production pit 13 (Area A)**

| | |
|---|---|
| **F125** | Cut of sub-circular conical pit. Measured *c.*1m x 0.89m x 0.45m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed-rounded base. Filled with F124. Adjacent to F006, F127. Situated towards the south in Area A. Above F002, below F124. |
| **F124** | Fill of F125, with loose, dark black-brown, silty clay. Frequent charcoal and stones included. Measured *c.*1m x 0.89m x 0.45m. No artefacts or samples taken. Above F125, below F001. |

**Large charcoal production pit 14 (Area A)**

| | |
|---|---|
| **F127** | Cut of sub-circular pit. Measured 1.70m x 1.40m x 0.69m. Orientated northeast-southwest. Had a sharp break of slope, vertical-stepped sides, and a sharp break of slope leading to an uneven-flattened base. Filled with F129, F128, F126. Burning *in-situ* evident, oxidisation recorded at base and sides. Adjacent to F125. Truncated by F034. Situated towards the south in Area A. Above F002, below F129. |
| **F129** | Primary fill of F127, with compact, dark black, charcoal layer. No other inclusions. Measured 0.85m x 0.06m (width x depth). No artefacts or samples taken. Above F127, below F0128. |
| **F128** | Secondary fill of F127, with compact, black, silty charcoal (lens within F126). Occasional stones included. Measured 1.70m x 0.08m (length x depth). No artefacts or samples taken. Above F129, below F126. |
| **F126** | Tertiary fill of F127, with loose, mid brown, silty clay. Occasional charcoal included. Measured 1.65m x 1.40m x 0.55m. No artefacts or samples taken. Above F128, below F034. |

## Area B (Late Medieval period) (Figures 11-12; Plates 1, 3-5)

### Probable charcoal production pit 15 (Area B)

| | |
|---|---|
| **F036** | Cut of shallow sub-circular pit/spread. Measured 1.20m x 0.91m x 0.04m. Orientated northwest-southeast. Had an imperceptible break of slope, shallow sloping sides, and an imperceptible break of slope leading to a flat base. Filled with F035. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated northwest in Area B. Above F002, below F035. |
| **F035** | Fill of F036, with soft-loose, mid brown, silty clay. Frequent charcoal (60%) included (Oak) (See Appendix 10.1). Measured 1.20m x 0.91m x 0.04m. No artefacts recorded. One charcoal sample taken. A radiocarbon date of Cal AD 1490-1670 (See Appendix 10. 2). Above F036, below F001. |

### Probable charcoal production pit 16 (Area B)

| | |
|---|---|
| **F038** | Cut of shallow oval pit/spread. Measured 1.16m x 0.76m x 0.03-0.05m. Orientated north-south. Had an imperceptible break of slope, shallow sloping sides, and an imperceptible break of slope leading to an uneven base. Filled with F037. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated west in Area B. Above F002, below F037. |
| **F037** | Fill of F038, with loose, mid brown, silty clay. Frequent charcoal (70%) included. Measured 1.16m x 0.76m x 0.03-0.05m. No artefacts or samples taken. Above F038, below F001. |

### Charcoal production pit 17 (Area B)

| | |
|---|---|
| **F040** | Cut of sub-circular pit. Measured 2.28m x 1.61m x 0.05-0.23m. Had an imperceptible break of slope, concave sides, and an imperceptible break of slope leading to an uneven base. Filled with F039. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated west in Area B. Above F002, below F039. |
| **F039** | Fill of F040, with firm, light brown, silty clay. Occasional charcoal (15%) and small stones included. Measured 2.28m x 1.61m x 0.05-0.23m. No artefacts recorded. One charcoal/soil sample taken. Above F040, below F001. |

**Possible charcoal production pit 18 (Area B)**

| | |
|---|---|
| **F042** | Cut of large circular pit. Measured 1.49m x 1.05m x 0.18-0.22m. Had a gradual break of slope, concave sides, and a gradual break of slope leading to a flat base. Filled with F041. Situated west in Area B. Above F002, below F041. |
| **F041** | Fill of F042, with firm, light brown, silty clay. Frequent charcoal and occasional small stones included. Measured 1.49m x 1.05m x 0.18-0.22m. No artefacts or samples taken. Above F042, below F001. |

**Probable charcoal production pit 19 (Area B)**

| | |
|---|---|
| **F044** | Cut of shallow sub-circular pit/spread. Measured 1.10m x 0.80m x 0.03-0.09m. Orientated northeast-southwest. Had a gradual break of slope, concave sides, and a gradual break of slope leading to a flat base. Filled with F043. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated south in Area B. Above F002, below F043. |
| **F043** | Fill of F044, with loose, mid brown, silty clay. Frequent charcoal (60%) and occasional small stones included. Measured 1.10m x 0.80m x 0.03-0.09m. No artefacts or samples taken. Above F044, below F001. |

**Large charcoal production pit 20 (Area B)**

| | |
|---|---|
| **F046** | Cut of large sub-circular pit. Measured 1.73m x 1.30m x 0.17-0.39m. Orientated northeast-southwest. Had a gradual break of slope, concave-vertical sides, and a gradual break of slope leading to an uneven base. Filled with F131, F045. Burning *in-situ* evident, oxidisation recorded at base and sides. Truncated by furrow. Situated southwest in Area B, adjacent to F133. Above F002, below F131. |
| **F131** | Primary fill of F046, with compact, black, charcoal (thin basal layer). Occasional small stones and silty clay included. Measured 0.04m (depth). No artefacts or samples taken. Above F046, below F045. |
| **F045** | Secondary fill of F046, with firm, light black, charcoal. Occasional small stones included. Measured 1.73m x 1.30m x 0.17-0.39m. No artefacts or samples taken. Above F131, below furrow. |

**Possible charcoal production pit 21 (Area B)**

| | |
|---|---|
| **F048** | Cut of oval pit. Measured 1.57m x 1.01m x 0.06-0.16m. Orientated northeast-southwest. Had a gradual break of slope, concave sides, and a gradual break of slope leading to an uneven base. Filled with F047. Situated southeast in Area B. Above F002, below F047. |
| **F047** | Fill of F048, with soft-loose, dark brown, silty clay. Frequent charcoal (60%) included. Measured 1.57m x 1.01m x 0.06-0.16m. No artefacts or samples taken. Above F048, below F001. |

**Pit (Area B)**

| | |
|---|---|
| **F050** | Cut of circular pit. Measured 1.24m x 1.10m x 0.19m. Had a sharp break of slope, concave sides, and a gradual break of slope leading to a flat base. Filled with F049. Situated north of Area B, adjacent to F052. Above F002, below F049. |
| **F049** | Fill of F050, with firm, light greyish-brown, silty clay. Very occasional charcoal and small stones included. Measured 1.24m x 1.10m x 0.19m. No artefacts or samples taken. Above F050, below F001. |

**Possible charcoal production pit 22 (Area B)**

| | |
|---|---|
| **F052** | Cut of large sub-circular pit, with rounded corners. Measured 1.60m x 1.38m x 0.12-0.20m. Had a gradual break of slope, concave sides, and a gradual break of slope leading to an uneven base. Filled with F051. Situated north of Area B, adjacent to F050, F056, F058. Above F002, below F051. |
| **F051** | Fill of F052 with loose, dark brown, silty clay. Frequent charcoal (70%) and occasional small stones included. Measured 1.60m x 1.38m x 0.12-0.20m. No artefacts recorded. One charcoal sample taken. Above F052, below F001. |

**Charcoal production pit 23 (Area B)**

| | |
|---|---|
| **F054** | Cut of circular pit. Measured 1.44m x 1.37m x 0.24m. Had a gradual break of slope, concave sides, and a gradual break of slope leading to an uneven base. Filled with F053. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated east in Area B. Above F002, below F053. |

| | |
|---|---|
| **F053** | Fill of F054, with firm, mid brown, silty clay. Frequent charcoal and stones included. Measured 1.44m x 1.37m x 0.24m. No artefacts or samples taken. Above F054, below F001. |

**Posthole (Area B)**

| | |
|---|---|
| **F056** | Cut of sub-oval posthole, with rounded corners. Measured 0.46m x 0.31m x 0.25m. Had a sharp break of slope, concave sides, and a gradual break of slope leading to a rounded base. Filled with F055. Situated north of Area B, adjacent to F058, F052. Above F002, below F055. |
| **F055** | Fill of F056, with soft-loose, light greyish-brown, silty clay. Occasional charcoal and one large stone included. Measured 0.46m x 0.31m x 0.25m. No artefacts or samples taken. Above F056, below F001. |

**Charcoal production pit 24 (Area B)**

| | |
|---|---|
| **F058** | Cut of oval pit. Measured 1.60m x 0.94m x 0.06-0.28m. Orientated north-south. Had a sharp break of slope, concave sides, and a gradual break of slope leading to an uneven base. Filled with F057. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated north of Area B, adjacent to F056, F052. Above F002, below F057. |
| **F057** | Fill of F058, with soft-loose, mid brown, silty clay. Occasional charcoal (30%) and large stones included. Measured 1.60m x 0.94m x 0.06-0.28m. No artefacts or samples taken. Above F058, below F001. |

**Possible charcoal production pit 25 (Area B)**

| | |
|---|---|
| **F060** | Cut of oval pit, with rounded corners. Measured 0.80m x 0.45m x 0.19m. Orientated north-south. Had a sharp break of slope, vertical sides, and a gradual break of slope leading to an uneven base. Filled with F059. Situated north in Area B. Above F002, below F059. |
| **F059** | Fill of F060, with firm, mid greyish-brown, silty clay. Occasional charcoal (30%) and occasional large stones included. Measured 0.80m x 0.45m x 0.19m. No artefacts or samples taken. Above F060, below F001. |

### Charcoal production pit 26 (Area B)

| | |
|---|---|
| **F068** | Cut of circular pit. Measured 1.60m x 1.50m x 0.23m. Had a gradual break of slope, concave sides, and a gradual break of slope leading to an uneven base. Filled with F120, F067. Burning *in-situ* evident, oxidisation recorded at base and sides. Truncated by F070. Situated northeast in Area B. Above F002, below F120. |
| **F120** | Primary fill of F068, with dark black, charcoal (charcoal layer). Mixed with brownish-grey silty clay. Measured 0.02-0.04m (depth). No artefacts or samples taken. Located to the west of the base. Above F068, below F067. |
| **F067** | Secondary fill of F068, with firm, mid brownish-grey, silty clay. Frequent charcoal and small stones included. Measured 1.60m x 1.50m x 0.23m. No artefacts recorded. One charcoal sample taken. Above F068, below F070. |

### Possible charcoal production pit 27 (Area B)

| | |
|---|---|
| **F133** | Cut of sub-circular pit. Measured 1.80m x 1.60m x 0.28m. Had a sharp break of slope, concave sides, and a gradual break of slope leading to a rounded-pointed base. Filled with F140, F132. Situated southwest in Area B, adjacent F046. Truncated by furrow. Above F002, below F140. |
| **F140** | Lens fill of F133, with soft, black, charcoal. Occasional small stones included. Measured 0.45m x 0.04m. No artefacts or samples taken. Above F133, below F132. |
| **F132** | Main fill of F133, with loose, mid brown, silty clay. Occasional charcoal and decayed stones included. Measured 1.80m x 1.60m x 0.28m. No artefacts or samples taken. Above F140, below furrow. |

## Area C (Late Medieval period) (Figure 13, Plate 6)

### Charcoal production pit 28 (Area C)

| | |
|---|---|
| **F062** | Cut of circular pit, with rounded corners. Measured 1.85m x 1.65m x 0.18m. Orientated northeast-southwest. Had a gradual break of slope, concave sides, and a gradual break of slope leading to a rounded base. Filled with F061. Two stakeholes (F065, F066) recorded at the base. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated south in Area C. Above F002, below F065, F066. |

| | |
|---|---|
| **F061** | Fill of F062, with firm, dark grey, charcoal (charcoal layer) (Oak) (See Appendix 10.1). Occasional small stones included. Measured 1.85m x 1.65m x 0.18m. No artefacts recorded. One charcoal/soil sample taken. A radiocarbon date of Cal AD 1430-1530 (See Appendix 10. 2). Above F063, F064, below F001. |

**Stakehole 1 (Area C)**

| | |
|---|---|
| **F065** | Cut of circular stakehole. Measured 0.12m x 0.10m (length x width). Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base. Filled with F063. Situated at the base of F062. Above F062, below F063. |
| **F063** | Fill of F065, with loose, dark black-brown, silty clay. Frequent charcoal and small stones included. Measured 0.12m x 0.10m (length x width). No artefacts or samples taken. Above F065, below F061. |

**Stakehole 2 (Area C)**

| | |
|---|---|
| **F066** | Cut of circular stakehole. Measured 0.09m x 0.08m (length x width). Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base. Filled with F064. Situated at the base of F062. Above F062, below F064. |
| **F064** | Fill of F066, with loose, dark black-brown, silty clay. Frequent charcoal and small stones included. Measured 0.09m x 0.08m (length x width). No artefacts or samples taken. Above F066, below F061. |

**Large charcoal production pit 29 (Area C)**

| | |
|---|---|
| **F074** | Cut of large sub-circular pit. Measured 1.80m x <1.16m x 0.20m. Orientated north-south. Had a gradual break of slope, concave sides, and a gradual break of slope leading to a rounded base. Filled with F073. Burning *in-situ* evident, oxidisation recorded at base and sides. Ran under baulk, not fully excavated. Situated south in Area C. Above F002, below F073. |
| **F073** | Fill of F074, with loose, dark grey-black, charcoal (charcoal layer). Occasional small stones included. Measured 1.80m x <1.16m x 0.20m. No artefacts recorded. One soil sample taken. Above F074, below F001. |

### Probable charcoal production pit 30 (Area C)

| | |
|---|---|
| **F076** | Cut of oval pit/spread, with rounded corners. Measured 0.52m x 0.40m x 0.08m. Orientated northwest-southeast. Had an imperceptible break of slope, shallow sloping sides, and an imperceptible break of slope leading to an uneven base. Filled with F075. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated north in Area C. Above F002, below F075. |
| **F075** | Fill of F076, with firm, grey, silty clay. Occasional charcoal and medium-sized stones included. Measured 0.52m x 0.40m x 0.08m. No artefacts or samples taken. Above F076, below F001. |

## Area D (High-Late Medieval period) (Figure 14)

### Possible charcoal production pit 31 (Area D)

| | |
|---|---|
| **F078** | Cut of circular pit/spread. Measured 1.32m x 1.19m x 0.09m. Orientated north-south. Had a gradual break of slope, concave sides, and a gradual break of slope leading to an uneven base. Filled with F077. Above F002, below F077. |
| **F077** | Fill of F078, with firm, dark brown, silty clay. Frequent charcoal and occasional stones included. Measured 1.32m x 1.19m x 0.09m. No artefacts or samples taken. Above F078, below F001. |

### Large charcoal production pit 32 (Area D)

| | |
|---|---|
| **F080** | Cut of circular pit, with rounded corners. Measured 1.78-2.35m x 2.09m x 0.37m. Had a sharp break of slope, concave sides, and a gradual break of slope leading to an uneven base. Filled with F085, F079. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated west in Area D, adjacent to F082. Above F002, below F085. |
| **F085** | Primary fill of F080, with soft-loose, black, sandy silt. Frequent charcoal included. Measured 1.78-2.35m x 2.09m x 0.16m. No artefacts or samples taken. Above F080, below F079. |
| **F079** | Secondary fill of F080, with firm, mid brownish-grey, silty clay. Occasional charcoal and small stones included. Measured 1.78-2.35m x 2.09m x 0.21m. No artefacts or samples taken. Above F085, below F001. |

**Charcoal production pit 33 (Area D)**

| | |
|---|---|
| **F082** | Cut of sub-circular pit. Measured 1.12m x 1.01m x 0.13m. Had a gradual break of slope, concave sides, and a gradual break of slope leading to a rounded base. Filled with F081. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated west in Area D, adjacent to F080. Above F002, below F081. |
| **F081** | Fill of F082, with firm, brown, clayey silt. Frequent charcoal and occasional small stones included. Measured 1.12m x 1.01m x 0.13m. No artefacts or samples taken. Above F082, below F001. |

**Pit/spread (Area D)**

| | |
|---|---|
| **F084** | Cut of irregular pit/spread, with rounded corners. Measured *c.*3m x 1.45m x 0.13m. Orientated north-south. Had a gradual break of slope, concave sides, and an imperceptible break of slope leading to an uneven base. Filled with F083. Situated north in Area D. Above F002, below F083. |
| **F083** | Fill of F084, with firm, light brown, silty clay. Frequent small stones, a moderate amount of charcoal and occasional large stones included. Measured *c.*3m x 1.45m x 0.13m. No artefacts or samples taken. Above F084, below F001. |

**Probable charcoal production pit 34 (Area D)**

| | |
|---|---|
| **F087** | Cut of shallow sub-circular pit/spread. Measured 0.93m x 0.80m x 0.05m. Had a gradual break of slope, shallow sloping sides, and an imperceptible break of slope leading to an uneven base. Filled with F086. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated west in Area D. Above F002, below F086. |
| **F086** | Fill of F087, with soft-loose, mid brown, silty clay. Frequent charcoal and occasional small stones included. Measured 0.93m x 0.80m x 0.05m. No artefacts or samples taken. Above F087, below F001. |

**Probable charcoal production pit 35 (Area D)**

| | |
|---|---|
| **F089** | Cut of shallow circular pit/spread. Measured 1m x 1m x 0.03m. Orientated north-south. Had an imperceptible break of slope, shallow sloping sides, and an imperceptible break of slope leading to an uneven base. Filled with F088. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated west in Area D, adjacent |

| | |
|---|---|
| | to F091. Above F002, below F088. |
| **F088** | Fill of F089, with soft-loose, mid brown, silty clay. Frequent charcoal and occasional small stones included. Measured 1m x 1m x 0.03m. No artefacts or samples taken. Above F089, below F001. |

**Large charcoal production pit 36 (Area D)**

| | |
|---|---|
| **F091** | Cut of sub-circular pit. Measured 2.08m x 1.73m x 0.22m. Orientated northeast-southwest. Had a sharp break of slope, concave sides, and a gradual break of slope leading to an uneven base. Filled with F104, F090. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated west in Area D, adjacent to F089. Above F002, below F104. |
| **F104** | Primary fill of F091 (thin charcoal layer), with soft-loose, black, sandy silt. Frequent charcoal included. Measured 2.08m x 1.73m x 0.03m. No artefacts recorded. One charcoal sample taken. A BETA radiocarbon date of Cal AD 1320-1350 and Cal AD 1390-1440 (See Appendix 10. 2). Above F091, below F090. |
| **F090** | Secondary fill of F091, with firm, light greyish-brown, silty clay. Frequent charcoal and occasional small stones included. Measured 2.08m x 1.73m x 0.19m. No artefacts or samples taken. Above F104, below F001. |

**Large charcoal production pit 37 (Area D)**

| | |
|---|---|
| **F093** | Cut of sub-rectangular pit, with rounded corners. Measured 2.04m x 1.31-1.44m x 0.15m. Orientated northeast-southwest. Had a gradual break of slope, concave sides, and a gradual break of slope leading to an uneven base. Filled with F092. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated south in Area D. Above F002, below F092. |
| **F092** | Fill of F093, with firm, dark brown-grey, silty clay. Frequent charcoal and occasional small stones included. Measured 2.04m x 1.31-1.44m x 0.15m. No artefacts or samples taken. Above F093, below F001. |

**Possible charcoal production pit 38 (Area D)**

| | |
|---|---|
| **F095** | Cut of shallow circular pit/spread. Measured 0.85m x 0.85m x 0.03m. Had an imperceptible break of slope, shallow sloping sides, and an imperceptible break of slope leading to an uneven base. Filled with F094. Above F002, below F094. |
| **F094** | Fill of F095, with firm, mid brown, silty clay. Frequent charcoal included. Measured 0.85m x 0.85m x 0.03m. No artefacts or samples taken. Above F095, below F001. |

**Charcoal production pit 39 (Area D)**

| | |
|---|---|
| **F097** | Cut of shallow circular pit. Measured 1.37m x 1.25m x 0.08-0.12m. Had a gradual break of slope, shallow sloping sides, and a gradual break of slope leading to an uneven base. Filled with F098, F096. Burning *in-situ* evident, oxidisation recorded at base and sides. Above F002, below F098. |
| **F098** | Primary fill of F097 (charcoal lens), with soft-loose, black, silty clay. Frequent charcoal included. Measured 0.95m x 0.03m (length x depth). No artefacts or samples taken. Above F097, below F096. |
| **F096** | Secondary fill of F097, with firm, light greyish-brown, silty clay. A moderate amount of charcoal and occasional small stones included. Measured 1.37m x 1.25m x 0.08-0.12m. No artefacts or samples taken. Above F098, below F001. |

**Charcoal production pit 40 (Area D)**

| | |
|---|---|
| **F101** | Cut of sub-circular pit. Measured 1.74m x 1.34m x 0.20m. Had a gradual break of slope, concave sides, and a gradual break of slope leading to an uneven base. Filled with F100, F099. Burning *in-situ* evident, oxidisation recorded at base and sides. Above F002, below F100. |
| **F100** | Primary fill of F101, with soft-loose, black, sandy silt (charcoal layer). Frequent charcoal included. Measured 1.74m x 1.34m x 0.04m. No artefacts or samples taken. Above F101, below F099. |
| **F099** | Secondary fill of F101, with firm, mid brown, silty clay. Frequent charcoal and occasional small stones included. Measured 1.74m x 1.34m x 0.16m. No artefacts or samples taken. Above F100, below F001. |

**Probable charcoal production pit 41 (Area D)**

| | |
|---|---|
| **F103** | Cut of shallow circular pit/spread. Measured 1.53m x 1.40m x 0.07m. Had an imperceptible break of slope, shallow sloping sides, and an imperceptible break of slope leading to an uneven base. Filled with F102. Burning *in-situ* evident, oxidisation recorded at base and sides. Above F002, below F102. |
| **F102** | Fill of F103, with soft-loose, mid brown, silty clay. A moderate amount of charcoal and small stones included. Measured 1.53m x 1.40m x 0.07m. No artefacts or samples taken. Above F103, below F001. |

**Charcoal production pit 42 (Area D)**

| | |
|---|---|
| **F106** | Cut of sub-circular pit. Measured 1.68m x 1.68m x 0.24m. Had a gradual break of slope, concave sides, and a gradual break of slope leading to an uneven base. Filled with F136, F105. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated east in Area D. Above F002, below F136. |
| **F136** | Primary fill of F106, with firm, black, sandy silt (charcoal layer). Frequent charcoal included. Measured 1.68m x 0.40m x 0.04m. No artefacts recorded. One charcoal sample taken. Above F106, below F105. |
| **F105** | Secondary fill of F106, with firm, mid greyish-brown, silty clay. Frequent charcoal included. Measured 1.68m x 1.68m x 0.20m. No artefacts or samples taken. Above F136, below F001. |

**Probable charcoal production pit 43 (Area D)**

| | |
|---|---|
| **F108** | Cut of shallow oval pit/spread, with rounded corners. Measured 0.94m x 0.66m x 0.04m. Orientated north-south. Had a gradual break of slope, shallow sloping sides, and a gradual break of slope leading to an uneven base. Filled with F107. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated east in Area D. Above F002, below F107. |
| **F107** | Fill of F108, with soft-loose, brownish-black, sandy silt. Frequent charcoal included. Measured 0.94m x 0.66m x 0.04m. No artefacts recorded. One charcoal sample taken. Above F108, below F001. |

**Charcoal production pit 44 (Area D)**

| | |
|---|---|
| **F110** | Cut of sub-oval pit, with rounded corners. Measured 2.70m x 1.20-1.35m x 0.28m. Orientated northwest-southeast. Had a sharp break of slope, vertical sides, and a gradual break of slope leading to an uneven base. Filled with F111, F109. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated east in Area D. Above F002, below F111. |
| **F111** | Primary fill of F110, with soft-loose, black, sandy silt (charcoal layer). Frequent charcoal included. Measured 2.70m x 1.20-1.35m x 0.10m. No artefacts or samples taken. Above F110, below F109. |
| **F109** | Secondary fill of F110, with firm, light yellowish-brown, clayey silt. A moderate amount of charcoal and occasional large stones included. Measured 2.70m x 1.20-1.35m x 0.18m. No artefacts or samples taken. Above F111, below F001. |

**Probable charcoal production pit 45 (Area D)**

| | |
|---|---|
| **F113** | Cut of shallow circular pit/spread. Measured 0.46m x 0.46m x 0.02-0.04m. Had an imperceptible break of slope, imperceptible sides, and an imperceptible break of slope leading to an uneven base. Filled with F112. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated north in Area D. Above F002, below F112. |
| **F112** | Fill of F113, with loose, light brown, silty clay. Frequent charcoal included. Measured 0.46m x 0.46m x 0.02-0.04m. No artefacts or samples taken. Above F113, below F001. |

**Probable charcoal production pit 46 (Area D)**

| | |
|---|---|
| **F115** | Cut of shallow circular pit/spread. Measured 2.12m x 2.12m x 0.02m. Had an imperceptible break of slope, imperceptible sides, and an imperceptible break of slope leading to an uneven base. Filled with F114. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated north in Area D. Above F002, below F114. |
| **F114** | Fill of F115, with firm, mid-dark brown, silty clay. Frequent charcoal, and a moderate amount of stones included. Measured 2.12m x 2.12m x 0.02m. No artefacts or samples taken. Above F115, below F001. |

**Charcoal production pit 47 (Area D)**

| | |
|---|---|
| **F117** | Cut of rectangular pit, with rounded corners. Measured 1.97m x 1.20m x 0.18m. Orientated northeast-southwest. Had a gradual break of slope, stepped sides, and a gradual break of slope leading to an uneven base. Filled with F121, F116. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated at centre of Area D. Above F002, below F121. |
| **F121** | Primary fill of F117, with soft-loose, black, sandy silt (charcoal layer). Frequent charcoal included. Measured 1.97m x 1.20m x 0.02-0.06m. No artefacts or samples taken. Above F117, below F116. |
| **F116** | Secondary fill of F117, with soft, mid brown, sandy clay. A moderate amount of charcoal and occasional small stones included. Measured 1.97m x 1.20m x 0.12-0.16m. No artefacts or samples taken. Above F121, below F001. |

**Possible charcoal production pit 48 (Area D)**

| | |
|---|---|
| **F119** | Cut of sub-oval pit, with rounded corners. Measured 1.60m x 1.30m x 0.05-0.15m. Orientated north-south. Had a gradual break of slope, concave sides, and a gradual break of slope leading to an uneven base. Filled with F118. Above F002, below F118. |
| **F118** | Fill of F119, with firm, dark brownish-black, silty clay. Frequent charcoal included. Measured 1.60m x 1.30m x 0.05-0.15m. No artefacts or samples taken. Above F119, below F001. |

**Charcoal production pit 49 (Area D)**

| | |
|---|---|
| **F135** | Cut of sub-oval pit, with rounded corners. Measured 3m x 2.04m x 0.23m. Orientated northeast-southwest. Had a sharp break of slope, concave sides, and a gradual break of slope leading to an uneven base. Filled with F139, F134. Burning *in-situ* evident, oxidisation recorded at base and sides. Situated southeast in Area D. Above F002, below F139. |
| **F139** | Primary fill of F135, with firm, brownish-grey, sandy silt. A moderate amount of charcoal included. Measured 3m x 2.04m x 0.13m. No artefacts or samples taken. Above F135, below F134. |
| **F134** | Secondary fill of F135, with firm, light yellowish brown, clayey silt. A moderate |

| | |
|---|---|
| | amount of small stones and occasional charcoal included. Measured 3m x 2.04m x 0.10m. No artefacts or samples taken. Above F139, below F001. |

## Modern features Area A-D (Figures 10–12)

### Cultivation furrow 1 (Area A)

| | |
|---|---|
| **F022** | Cut of linear furrow. Measured 0.80m x 0.23m (width x depth). Orientated northeast-southwest. Had a sharp break of slope, concave sides, and a gradual break of slope leading to a rounded base. Filled with F021. Truncated F014. Situated east in Area A. Above F013, below F021. |
| **F021** | Fill of F022, with loose, mid brown, silty clay. Occasional small stones included. Measured 0.80m x 0.23m (width x depth). No artefacts or samples taken. Above F022, below F001. |

### Cultivation furrow 2 (Area A)

| | |
|---|---|
| **F024** | Cut of linear furrow. Measured 0.20m x 0.08m (width x depth). Orientated northeast-southwest. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base. Filled with F023. Truncated F020, F026. Situated southeast in Area A. Above F019, F025, below F023. |
| **F023** | Fill of F024, with loose, mid brown, silty clay. Occasional charcoal and small stones included. Measured 0.20m x 0.08m (width x depth). No artefacts or samples taken. Above F024, below F001. |

### Cultivation furrow 3 (Area A)

| | |
|---|---|
| **F030** | Cut of linear feature. Measured 0.48m x 0.05m (width x depth). Orientated northeast-southwest. Had a gradual break of slope, concave sides, and an imperceptible break of slope leading to a rounded base. Filled with F029. Situated towards the south in Area A, adjacent to F006. Above F002, below F029. |
| **F029** | Fill of F030, with loose, light-mid brown, silty clay. Occasional stones and pebbles included. Measured 0.48m x 0.05m (width x depth). No artefacts or samples taken. Above F030, below F001. |

**Cultivation furrow 4 (Area A)**

| | |
|---|---|
| **F034** | Cut of linear feature. Measured 0.40m x 0.03-0.05m (width x depth). Orientated northeast-southwest. Had a gradual break of slope, concave sides, and an imperceptible break of slope leading to a slightly flattened base. Filled with F033. Truncated F127. Situated towards the south in Area A. Above F126, below F033. |
| **F033** | Fill of F034, with loose, light brown, silty clay. Occasional charcoal included. Measured 0.40m x 0.03-0.05m (width x depth). No artefacts or samples taken. Above F034, below F001. |

**Cultivation furrow 5 (Area B) (Plate 5)**

| | |
|---|---|
| **F070** | Cut of linear furrow. Measured 0.55-0.65m x 0.05m (width x depth). Orientated northeast-southwest. Had a gradual break of slope, shallow sloping sides, and a gradual break of slope leading to a flat base. Filled with F069. Truncated F068. Situated northeast in Area B. Above F067, below F069. |
| **F069** | Fill of F070, with firm, yellowish-brown, clayey silt. No inclusions. Measured 0.55-0.65m x 0.05m (width x depth). No artefacts or samples taken. Above F070, below F001. |

**Cultivation furrow 6 (Area A)**

| | |
|---|---|
| **F123** | Cut of linear furrow. Measured 0.44m x 0.05m (width x depth). Orientated northeast-southwest. Had a gradual break of slope, shallow concave sides, and an imperceptible break of slope leading to a rounded base. Filled with F122. Adjacent to F006, F125. Situated towards the south in Area A. Above F002, below F122. |
| **F122** | Fill of F123, with loose, mid brown, silty clay. Occasional charcoal and small stones included. Measured 0.44m x 0.05m (width x depth). No artefacts or samples taken. Above F123, below F001. |

### 4.2.3 Stratigraphic Sequencing

| **Table … Stratigraphic Groups** | | |
|---|---|---|
| **Site Name: Kilcotton 1** | | **Record No.: E2187 – Scheme No.: A015/077** |
| **Period** | **Phase** | **Composition** |
| I | 1 | Formation of subsoil |
| II | 1 | High-Late Medieval Period: Initial clearance of site |
| | 2 | Cutting of charcoal pits/other pits/posthole/stakeholes |
| III | 1 | Modern period: Cutting of cultivation furrows |

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

#### Period 2 High-Late Medieval period

#### Phase 2

Fifty-one pit-like features were revealed at Kilcotton 1, dispersed across four areas of the site identified as A, B, C and D (Figure 7, Plates 1-6). Of these, forty-nine were likely to be charcoal production pits. Each was categorized according to a type for ease of reference only. Although all contained charcoal (which derived from Oak, See Appendix 10.1), they varied significantly in size and were identified separately as a result. Together, they formed an extensive area of charcoal production. This activity involved the gentle smouldering of wood within a pit covered by straw and clay or other organic materials designed to roast but not burn the wood. Oxygen would be controlled and introduced when necessary. This charcoal was a necessary component in the smelting process of iron production.

#### Charcoal production pits

#### Type 1:

Twenty-two large oval-circular pits (F004, F006, F010, F018, F040, F046, F054, F058, F062, F068, F074, F080, F082, F091, F093, F097, F101, F106, F110, F117, F127, F135: 0.72-3m x 0.60-2.09m x 0.05-0.69m) were noted. They comprised mainly gradual-sharp breaks of slope, sloping-concave sides, and rounded-uneven bases.

#### Type 2:

Sixteen shallow oval-circular pits/spreads (F008, F014, F016, F020, F026, F036, F038, F044, F072, F076, F087, F089, F103, F108, F113, F115: 0.46-2.12m x 0.46-2.12m x 0.02-0.09m) were noted. Due to their shallow nature, they have been identified as probable charcoal production pits. They comprised mainly imperceptible breaks of slope, shallow sloping sides, and flat-uneven bases.

Both type 1 and 2 pits were filled with black-brown, silty clay, charcoal, and small stones. Evidence of oxidisation was recorded at the base and sides of each pit indicating *in-situ* burning. No artefacts were recovered.

**Type 3:**

Eleven further oval-circular pits (F012, F028, F042, F048, F052, F060, F078, F095, F119, F125, F133: 0.45-1.80m x 0.30-1.60m x 0.02-0.28m) were noted. Despite containing varying quantities of charcoal, they each lacked evidence of oxidisation. As a result, they have been identified only as possible charcoal production pits. They comprised mainly gradual breaks of slope, and concave sides, but varied between flat, uneven and rounded bases. Filled with black-brown, silty clay, they also contained charcoal, and occasional stones. No artefacts were recovered.

**Area A (Figures 8–10, 15–20; Plate 2)**

Fourteen pits were noted, scattered in random clusters mainly to the southeast of this area. Included were five type 1 pits (F004, F006, F010, F018, F127), interspersed with six type 2 pits (F008, F014, F016, F020, F026, F072) and a further three type 3 pits (F012, F028, F125). No discernible pattern of pit arrangement could be ascertained. A radiocarbon date of Cal AD 1460-1640 was returned for F017, which was the fill of F018 (Late Medieval period) (See Appendix 10. 2).

**Area B (Figures 11–12, 15–20, Plates 3, 4 & 5)**

Eleven pits were noted, scattered to the south and east of this area. Included were four type 1 pits (F040, F046, F054, F068), interspersed with three type 2 pits (F036, F038, F044) and a further four type 3 pits (F042, F048, F060, F133). A number of these pits contained primary or lens deposits of charcoal.

Three pits (two related to charcoal production) were noted, situated north of Area B. Type 1 pit F058 and type 3 pit F052 lay nearby to one another. Further southwest, pit F050 (1.24m x 1.10m x 0.19m) comprised sharp breaks of slope, concave sides, and a flat base. Filled with greyish-brown silty clay, it contained very little charcoal. Adjacent to F058, sub-oval posthole (F056: 0.46m x 0.31m x 0.25m) comprised gradual-sharp breaks of slope, concave sides, and a rounded base. Filled with greyish-brown, silty clay, charcoal, a large (possibly structural) stone was recorded at the base. A radiocarbon date of Cal AD 1490-1670 was returned for F035, which was the fill of F036 (Late Medieval period) (See Appendix 10. 2). No artefacts were recovered.

### Area C (Figure 13, 15–20, Plate 6)

Three pits were noted, dispersed across this area. Included were two type 1 pits (F062, F074), interspersed with one type 2 pit (F076). Located within the base of F062 were two circular stakeholes (F065, F066: 0.09-0.12m x 0.08-0.10m (length x width). Comprising sharp breaks of slope, vertical sides, and a pointed base, each contained loose, dark black-brown, silty clay, charcoal and small stones. A radiocarbon date of Cal AD 1430-1530 was returned for F061, which was the fill of F062 (Late Medieval period) (See Appendix 10. 2). No artefacts were recovered.

### Area D (Figure 14; 15–20)

Nineteen pits were noted, scattered mainly to the south of this area. Included were ten type 1 pits (F080, F082, F091, F093, F097, F101, F103, F106, F110, F117, F135), interspersed with six type 2 pits (F087, F089, F103, F108, F113, F115) and a further three type 3 pits (F078, F095, F119). Also recorded in this area, pit/spread F084 (*c.*3m x 1.45m x 0.13m) comprised gradual breaks of slope, concave sides, and an uneven base. Filled with brown, silty clay, small stones, it also contained charcoal and occasional large stones. A BETA radiocarbon date of Cal AD 1320-1350 and Cal AD 1390-1440 was returned for F104, which was the fill of F091 (High Medieval period) (See Appendix 10. 2). No artefacts were recovered.

### Period 3 Modern period

### Phase 1

Prior to excavation of the site, this field was used for tillage. Truncating a number of the abovementioned pits, six northeast-southwest cultivation furrows (F022, F024, F030, F034, F070, F123: 0.20-0.80m x 0.03-0.23m (width x depth)) were noted (Figures 8, 10–12). Comprising gradual-sharp breaks of slope, concave-vertical sides, and rounded bases, each contained loose, mid brown, silty clay, charcoal and small stones.

## 4.2.4 Stratigraphic Discussion

The excavations at Kilcotton 1 exposed the presence of a large number of charcoal production pits highlighting at least two phases of occupation, from the High-Late Medieval period (See Appendices 10.2 & 10.3, Table 4), while the six cultivation furrows attest to a later phase of activity (Plates 1-6). Other pits peripheral to the main features revealed on site will not be discussed in detail below due to their isolated nature. A technical description of each can be found in the matrix and sequencing above.

Charcoal production involved the gentle smouldering of wood within a pit covered by straw and clay or other organic materials. The fire within this pit would be carefully supervised with the controlled introduction of oxygen to create temperatures of *c.*600°C, designed to roast and not burn the wood (Carlin et al, 2007). Such a task would take a number of days to complete. A large number of trees were required for the relatively small amount of charcoal produced. This charcoal was a necessary component for the smelting process of ironworking. Along with charcoal, oxidised clay was a common by-product of such activity. This type of pit ranges widely in date from the Late Bronze age to the Post-Medieval period (Carlin et al, 2007).

Fifty-one pits were revealed across four main areas of Kilcotton 1 (labelled A-D), following the removal of topsoil (See Figure 7, Plates 1-6). As both charcoal-rich soil (Oak species, See Appendix 10.1) and oxidised clay were recorded in the fills, thirty-eight of these were identified as definite or probable charcoal production pits. The reddish hue noted at the base and sides of each pit was created by oxidisation. This process suggests *in-situ* burning occurred. Twenty-two pits had mainly gradual-sharp breaks of slope, sloping-concave sides, and rounded-uneven bases and depths of 0.05-0.29m. A further sixteen had an average depth of 0.06m with mainly imperceptible breaks of slope, shallow sloping sides, and flat-uneven bases. Heavy truncation by cultivation and other activities may account for their shallow nature. As a result, the latter have been described as probable charcoal production pits. As the remaining eleven pits were devoid of oxidisation, they have been classified as possible charcoal production pits. The occurrence of black silty clay throughout the majority of pit types however suggests most were used in a similar manner.

At the base of pit F062, were two stakeholes (F065, F066) consisting of similar material to that deposited in the main cut. Indicating a contemporary structure, the stakeholes may have supported vertically-placed wooden timbers prior to roasting or have aided the smouldering of such wood (Carlin et al, 2007). A radiocarbon date of Cal AD 1430-1530 was returned for F062 dating the pit to the Late Medieval period (See Appendix 10. 2). A further example was recorded in Area B. Situated adjacent to charcoal production pit F058, posthole F056 (the only recorded posthole on site) contained charcoal and a large stone at its base, possibly supportive in nature. The lack of metal artefacts or slag recorded helps distinguish this type of pit from that of ferrous-related pits such as bowl furnaces, other smelting furnaces and bloom-smithing hearths (Carlin et al, 2007). The absence of features directly associated with iron production (for example, bowl furnaces) suggests that this activity took place elsewhere, perhaps nearby. No diagnostic artefacts were recorded, a common feature of charcoal producing sites. Seventeen similar pits dating to a similar period were recorded east of this

site at Kilcotton 2, indicating that the area of charcoal production went beyond the boundaries of the excavated Kilcotton 1.

### 4.2.5 Stratigraphic Conclusion

Through the various stages of archaeological investigation a large number of charcoal producing pits and other pits/spreads were revealed highlighting intensive activity (See Figure 7). This activity involved producing vital material for one of the various processes of ironworking suggesting the site was industrial in nature. The marked scarcity of artefacts solidifies the argument that Kilcotton 1 was a charcoal production site, a site which tends not to produce such finds. When comparing this site with neighbouring archaeological sites (Kilcotton 2), a pattern of industrial-related activity across the townland emerges.

## 4.3 Artefactual evidence

No artefacts were recovered.

## 4.4 Environmental Evidence

### 4.4.1 Wood ID analysis

See Appendix 10.1

| Site | E number | Feature type | Context | Sample no | Date | Identification | Comment |
|---|---|---|---|---|---|---|---|
| **Kilcotton 1** | E2187 | Charcoal pit | F017 | 3 | 1460-1640AD Late Medieval | Oak (608g, 100f) | Coppiced wood |
| **Kilcotton 1** | E2187 | Charcoal pit | F036 | 9 | 1784 - 1800AD Late Medieval | Oak (140g, 100) | |
| **Kilcotton 1** | E2187 | Charcoal pit | F061 | 8 | 1550-1640AD Late Medieval | Oak (188g, 100f) | |

### 4.5 Dating Evidence

Radiocarbon dates were retrieved for four of these pits placing the site into the Medieval period. Charcoal from F017, the fill of pit F018, produced a date of Cal AD 1460 to 1640AD from a sample of oak (Late Medieval period). Oak from pit F036, produced a date of Cal AD 1490 to 1670 (Late Medieval period) while similarly, oak from F061, the fill of pit F062, produced a date of Cal AD 1430 to 1640 (Late Medieval period). Further oak from F104, the fill of pit F091, produced a date of Cal AD 1320 to 1440 (High Medieval period) (See Appendices 10.1, 10.2 & 10.3, Table 4).

## 5. DISCUSSION

**Authors: Niall Kenny, Jonathan Kinsella, Neil Carlin, Emily Kane and Ed Danaher.**

***Much of the discussion which follows (including appendix 1) has been directly taken from a research report prepared by Niall Kenny for Archaeological Consultancy Services entitled Charcoal Production and Ironworking: a selection of sites from the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme.***

The production of charcoal and ironworking are closely related, with quantities of charcoal required in the smelting process. This charcoal was produced by carbonising smouldering wood in an oxygen-limited environment; the amount of air was carefully controlled so that the wood was roasted but not burnt. The residual product of this process only comprised ten per cent of the raw material used, and a large number of trees would have been felled during the iron manufacture process. Pits were filled with timber that was placed against a vertical post, to a height of *c*. 1m and then covered with straw or bracken, followed by a layer of earth or turf. Well-placed gaps were created within this top layer in order to aid airflow within the kiln. The vertical post was removed, and the resultant hole filled with charcoal, which would then be ignited. The fire would be carefully controlled to create temperatures of *c.* 600°C, thus evaporating the water and other impurities in the wood, without allowing the wood to actually burn. The wood was effectively roasted and, as it turned to charcoal, the timber shrank greatly thereby causing cracks to appear on the outer earthen case of the kiln. Such cracks had to be repaired immediately, as an uncontrolled ingress of air could cause the whole kiln to explode into flames. This process of turning timber into charcoal would take several days, and had to be monitored continually, and carefully. Eventually, the kiln was sealed and the fire was allowed to die. After a suitable period of cooling, the kiln would be dismantled and the charcoal removed.

## Classifying and defining charcoal production features

In recent years ample evidence for charcoal production has been excavated throughout the country. This evidence will be discussed in detail below, but prior to this the various names used to describe these features will be outlined. Unfortunately, there has been no universal attempt to classify these features in the past. This can partly be explained by the fact that their discovery in large numbers is a more recent phenomenon and by the fact that there has been no composite study or discussion of these charcoal production features.

A study of the few published sources, numerous excavation reports and stratigraphic reports as well as a composite analysis of the excavations database has revealed that archaeologists have struggled somewhat to classify charcoal production features. In fact, archaeologists have inconsistently applied many different descriptive names and labels to these features. In the past they have been referred to as 'charring hearths', 'charring pits' and 'pit-steads' (Tylecote 1986, 225). Hull and Taylor (2006, 32) refer to these features (particularly the ones excavated at Kilmaniheen West, Co. Kerry) as 'charcoal production pits' while Carlin, Ginn and Kinsella (Forthcoming) refer to them (particularly those excavated on the KEK road-scheme) as 'charcoal producing kilns'. The oxford dictionary of archaeology refers to these features as 'clamp kilns' (Darvill 2002), however, they are often more informally referred to as 'heaps' and 'clamps'. On the excavations database such features have been classified as 'fire-pits', 'charcoal pits', 'charcoal-manufacturing kilns', 'charcoal-production pits', 'pits' and so on. The evidence for charcoal production tends to come in the form of pits cut into the subsoil; these pits tend to be circular, oval and rectangular shaped and they normally exhibit evidence for in situ burning on their bases and sides. Furthermore they tend to contain frequent to large amounts of charcoal in their primary and secondary fills. It would probably be best to avoid the use of the term 'manufacturing' in the classification of these features as this can be misleading – implying large-scale and more industrial charcoal production.

In Britain right up until the first half of the 20th century charcoal was produced in what was called 'traditional earth pit kilns' and 'traditional mound kilns' (ILO 1985; Aaron 1980). The 'traditional earth pit kilns' are very similar to the charcoal production features which have been excavated on archaeological sites throughout the country. The term 'charcoal production kiln' seems to best describe the process/ activity (i.e. of drying/ incomplete wood combustion) which occurred in these charcoal production features. However, the term 'charcoal production pit' seems to best describe the archaeological remains (i.e. the ubiquitous pit) for charcoal production in Ireland. Therefore this term shall be used throughout the paper when referring to pits which were used to for wood carbonisation (charcoal production) in the past.

## Charcoal production: an analysis of the archaeological remains

A complete analysis of all the archaeological remains for charcoal production in late prehistoric, early medieval and later medieval Ireland is simply too large a study to undertake for the purposes of this research report – especially in light of the large number of recent discoveries on development-led excavations (such as road-schemes, gas pipe-lines etc.). The most common charcoal production feature excavated in Ireland appears to be the charcoal production pit. Therefore a sample corpus of 100 excavated charcoal production pits were selected and analysed (see Table 1 Appendix 1). The 100 charcoal production pits chosen were excavated on a variety of different projects right across the country; in counties such as Louth, Meath, Westmeath, Kildare, Wicklow, Clare, Cork and Kerry, but most notably in Co. Laois and on the current M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme. In fact 49 out of the 100 charcoal production pits were excavated on the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme. This accounts for just less than 50% of the entire corpus under study. The reason for picking such a large number of charcoal production pits excavated in Co. Laois for the study was because the basis for this study is the ongoing research on the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme. The selection of charcoal production pits for the study was not entirely random – it was driven by a number of different factors - the most important being the availability of information on the various charcoal pits. Published/forthcoming excavations provided more information on the pits (such as radiocarbon dates/dimensions etc.) and so these and ACS excavations were preferentially chosen. The selection process was random in terms of the type of charcoal production pits chosen i.e. their shape and size etc. If the pit was definitely or most likely a charcoal production pit then it was chosen for the corpus of 100. However, if there was a question mark over the pit functioning as a charcoal production pit then it was excluded from the corpus. Information on the 100 charcoal pits came from a variety of different published and unpublished sources including Hull and Taylor (2006), Grogan, E., O' Donnell, L. and Johnston, P. (2007), Carlin, Ginn and Kinsella (Forthcoming), the excavations database (www.excavations.ie), Danaher and Kane (2008a; 2008b) and various other unpublished ACS excavation reports, particularly for the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme and K-E-K excavations.

## Dating

17 of the 100 charcoal production pits (10%) have been dated (see Table 1 and Table 4 Appendix 1). However, detailed radiocarbon dating information is only available for 15 of the 17 dated charcoal production pits (see Table 4). Furthermore, outside of the 17 dated charcoal production pits, 2 more 'possible charcoal production pits' have been radiocarbon dated (Table 4). Three sub-rectangular shaped charcoal production pits (Kilmaniheen West, Co.

Kerry, Newcastle 2, Co. Meath and Rossan 3, Co. Meath) were all found to date to the early medieval period – particularly the later part of the early medieval period (see Table 4; Hull and Taylor 2006; O'Hara 2003; Murphy 2003). Furthermore, three rectangular shaped charcoal production pits (Hardwood 3, Co. Meath and Ardnamullan, C108 and C118 Co. Westmeath) were dated to the later part of the early medieval period and earlier part of the late medieval period (see Table 4; Murphy 2004a; Linnane 2004a). A sub-rectangular/ oval shaped charcoal production pit (Pit 12) at Kilmaniheen West, Co. Kerry and a rectangular shaped charcoal production pit excavated at Barefield, Co. Clare were also dated to the later part of the early medieval period (Hull and Taylor 2006). It seems then that the rectangular/ sub-rectangular shaped charcoal production pit was chronologically diagnostic to the early medieval period (particularly the later part) and the earlier part of the late medieval period. Indeed, Carlin, Ginn and Kinsella (Forthcoming) suggest that this was the case from their analysis of the K-E-K excavations.

While the rectangular/ sub-rectangular shaped charcoal production pits appear to date to the later part of the early medieval period and earlier part of the late medieval period, it seems that other types of charcoal production pit were also in use during this period. A circular shaped charcoal production pit excavated at Mondaniel 2, Co. Cork was dated to 1280-1420 Cal. AD, while a possible charcoal production pit (circular in shape) excavated at Mondaniel 1 was dated to 1420-1640 Cal. AD (Cotter 2005a; 2005b). One sub-circular and four charcoal production pits excavated at Kilcotton (1 and 2; Table 4) dated to between 1430-1670 Cal AD but mainly between 1460-1640 Cal AD. A second sub-circular pit excavated at Kilcotton 1 was dated to 1320-1440 Cal AD while interestingly two sub-oval pits, one from Kilcotton 2 and the other from Delligabaun 1, returned dates of 980-1160 Cal AD and 860-1020 Cal AD respectively. Furthermore, an irregular shaped charcoal production pit excavated at Curryhills 1, Co. Kildare was dated to the 11th and 12th centuries (O' Sullivan and Harney 2007, 198). Interestingly, on quite a number of sites with more than one charcoal production pit, pits of different size and shape occur alongside each other (e.g. Kilmaniheen West, Co. Kerry, Kilcotton 1 and 2, Co. Laois, Stonehousefarm 3, Co. Westmeath, Derrinsallagh 4, Co. Laois etc; Table 1). From the available data it is not possible to clearly determine whether these pits are contemporary with one another or not, however, it is suggested here that there was not a simple progression from one type of charcoal production pit to another throughout time. Instead it is likely that different types of charcoal production pits and different methods of charcoal production were employed by the same people in the past. It may be the case that certain types of pits (i.e. methods of charcoal production) were more prevalent in certain areas, or on particular sites or even in one particular time period (e.g. rectangular/ sub-rectangular type – later early medieval/ early late medieval). The earliest dated charcoal

production pit appears to the one excavated at Hardwood 3, Co. Meath (see Table 4). This feature returned radiocarbon dates of 770-970 Cal. AD and 720-960 Cal. AD (Carlin, Ginn and Kinsella Forthcoming). Very few charcoal production pits have so far been radiocarbon dated – and fewer dates still have been published. This seriously limits any discussion of the chronological typologies of charcoal production pits in Ireland. Many more charcoal production pits (of different shape and form) need to be securely radiocarbon dated in order for a more sound chronology of these features to be realised. As of yet no charcoal production pits have been dated to the very early historic or prehistoric periods. However, we do know that charcoal was the dominant fuel for the early iron smelter (Tylecote 1986, 131). In fact the 8th century law tract Críth Gablach outlines a list of possessions that one grade of farmer (the Mruigfher) was expected to have, and this included ...'a sack of charcoal for irons' (Scott 1990, 100). We know that charcoal production was integral to early iron smelting and smithing processes. The roots of charcoal production most likely lie in the Bronze Age period – with the advent of metallurgy. Charcoal production went hand in hand with metalworking – particularly ironworking – therefore it should only be a matter of time before earlier charcoal production features are discovered.

Iron production and ironworking processes altered little in Ireland until the introduction of the blast furnace in the early 17th century. The bloomery process of ironworking seems to have remained virtually unchanged from the Iron Age until the late medieval period and so many features associated with iron smelting and smithing activities are chronologically indistinguishable. It is quite likely too that the charcoal production process altered little from the late prehistoric period until the late medieval period. This highlights the importance of scientific dating in furthering our knowledge of charcoal production in Ireland. It is argued here that more circular and oval shaped charcoal production pits need to be scientifically dated along with more rectangular and sub-rectangular charcoal production pits occurring on sites with prehistoric activity. It is also suggested that charcoal production pits of different shape - occurring on the same site - be scientifically dated to identify whether the different pits were contemporary with one another or not. While the sub-rectangular/ rectangular shaped charcoal production pits appear to date to the later part of the early medieval period and earlier part of the late medieval period, this will remain to be upheld with the dating of many more charcoal production pits in the future. However it must be remembered that as oak is the predominant wood specie associated with these features and subsequently used for C-14 dating purposes the old-wood effect needs to be considered when discussing these dates.

## Archaeological and landscape context

Charcoal production pits can occur in a range of different contexts. Quite often they tend to occur as single isolated pits associated with no other contemporary archaeological features. Examples of this include the excavated sites of Barnasallagh 1 and 3, Delligabaun 1 and Trumra 1 and 3 – all excavated in Co. Laois on the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme. Other examples of excavated isolated charcoal production pits include the sites of Kilquane and Kilbreckan, Co. Clare (O' Donovan 2002, Hull 2002). Charcoal production pits can also occur in small isolated clusters of 2-4. Examples of this include the excavated sites of Ballynabarny, Co. Wicklow and Mondaniel 2, Co. Cork where four isolated charcoal production pits were excavated on each site (Frazer 2002, Cotter 2005a). Large clusters of charcoal production pits were excavated on other sites such as Kilcotton 1, Co. Laois (49 examples), Kilcotton 2 Co. Laois (17 examples) and Kilmaniheen West, Co. Kerry (16 examples) (Danaher and Kane 2008a; 2008b; Hull and Taylor 2006).

There was no distinctly organised or uniform layout to the charcoal production pits excavated at Kilcotton 1 and Kilcotton 2. The pits excavated at Kilcotton 1 occurred in four distinct clusters or areas while the pits at Kilcotton 2 occurred in three distinct clusters or areas (Danaher & Kane 2008a; 2008b). At both sites there were numerous other features (areas of burning, postholes, stake-holes, pits etc.) which seem to be related to the charcoal production activities which were being undertaken on site. Similarly the 16 charcoal production pits excavated at Kilmaniheen West, Co. Kerry did not appear to form a recognisable pattern in their layout, however some did appear to respect each other and occur close together (Hull and Taylor 2006). The lack of domestic structures and finds at these three sites, and the large-scale evidence for charcoal production indicates that these sites were locales which were primarily utilised for industrial activities – most likely associated with the early stages of the ironworking process. It is probable that many more charcoal production pits lie outside of the road-take at Kilcotton 1 and 2. It seems likely that all three of these sites (Kilcotton 1 and 2 and Kilmaniheen West) were revisited and re-used at different stages for charcoal production purposes and not just on one occasion – this would explain the scattered nature of the charcoal production features on all three sites. It is likely that these sites were situated quite close to abundant and suitable woodland resources. Indeed the place-name evidence seems to indicate the presence of oak woodland of some antiquity in the vicinity of charcoal production activity excavated at Barnasallagh 1 and 3, Kilcotton 1 and 2, Derrinsallagh 4 and Delligabaun 1. No evidence for on-site smelting or smithing activities was uncovered on any of the three sites (Kilmaniheen West, Kilcotton 1 and 2); however, it is likely that these charcoal production sites were located within the vicinity of an ironworking site.

Interestingly, five bowl furnaces were recorded and excavated at the early medieval enclosure site of Lismore/ Bushfield 1 just 1.5km to the west of the sites of Kilcotton 1 and Kilcotton 2.

Further evidence for ironworking in the area was excavated at Derryvorrigan 1 (6 possible furnaces) c. 3.75km to the west of Kilcotton 1 and Kilcotton 2. An extensive Iron Age iron smelting site was excavated at Derrinsallagh 4 c.5km to the west, while evidence for small-scale early medieval ironworking was excavated at the ring-fort site of Derrinsallagh 3 c.4.5km to the west. Small-scale ironworking activity, radiocarbon dated to the late medieval period was excavated at Derrinsallagh 1, while undated small-scale ironworking activity was excavated at Doon 1 and Derrinsallagh 5 c. 6km to the west of Kilcotton 1 and 2. The isolated charcoal production pits excavated at Barnasallagh 1 and 3 were located between the Kilcotton charcoal production sites and the ironworking sites in the Derrinsallagh/ Derryvorrigan area and it is possible that these sites along with the charcoal production pits actually excavated on the site of Derrinsallagh 4 were used to produced charcoal fuel for the important ironworking activities which were being undertaken in the area throughout the centuries. As indicated in the case of the charcoal production pits excavated on the Iron Age ironworking site of Derrinsallagh 4, charcoal pits were also found to be located on iron smelting sites.

On the K-E-K excavations a number of charcoal production pits were excavated on ironworking sites - for example at Griffinstown 3, Hardwood 2 and 3 and Newcastle 2 (Linnane 2004b; Murphy 2004b; Murphy 2004a; O' Hara 2003). A rectangular charcoal production pit was excavated on the multi-period ironworking site of Hardwood 3. Evidence for smithing and smelting activities from different periods in prehistory and history was uncovered on the site (Murphy 2004a). The large sub-rectangular charcoal production pit excavated at Newcastle 2, Co. Meath was excavated on an iron smelting site. A bowl furnace and a slag pit amongst other features were excavated on the site (O' Hara 2003). Three sub-rectangular shaped charcoal production pits were excavated on an ironworking site at Aghamore, Co. Westmeath (Grogan, O' Donnell & Johnston 2007, 333-4). Nine pits interpreted as 'ore-extraction' pits and a series of eight small bowl furnaces were excavated on the ironworking site at Aghamore and two radiocarbon dates date activity at the site to the early medieval period (7th century) and the later part of the early medieval and earlier part of the late medieval period (12th and 13th centuries; Grogan, O' Donnell & Johnston 2007, 333-4). A sub-rectangular shaped charcoal production pit was excavated on the late Iron Age/ Early Christian iron smelting site of Shallon 1 (Russell & Corcoran 2001). The evidence for iron smelting at this site came in the form of a bowl furnace which was radiocarbon dated to the late Iron Age/Early Christian period and it was located only a few metres from the

charcoal producing pit (Russell & Corcoran 2001). As we can see then charcoal production pits can occur as single isolated pits, in small clusters of isolated pits, in large clusters of pits and on small or large (single and multi-period) ironworking sites.

The sixteen charcoal pits excavated at Kilmaniheen West, Co. Kerry were situated in dry rough pasture on a gently sloping riverside terrace adjacent to the River Feale (Hull and Taylor 2006, 25). The isolated charcoal production pit excavated at Ballycorrick, Co. Clare was situated on an east-facing slope of a steep valley while the isolated charcoal pit excavated at Cahernalough, Co. Clare was also located on an east-facing slope, but in this case it was gently sloping (Grogan, O' Donnell & Johnston 2007, 173, 183). The isolated charcoal pit excavated at Cappanavaroge, Co. Clare was sited, once again, on sloping ground; on a north-east-facing slope of a hill (Grogan, O' Donnell, & Johnston 2007). The two pits excavated at Stonehousefarm, Co. Westmeath and the four pits excavated at Ballynabarny, Co. Wicklow were once again sited on sloping ground (McDermott 2004, Frazer 2002). In the case of the two charcoal pits excavated at Stonehousefarm, they were located halfway up a steep north-facing slope overlooking an area of low-lying boggy land (McDermott 2004). The charcoal pits excavated at Mondaniel 2 (four) and Kilbrien 2 (one), Co. Cork were all located on the lower south-eastern slopes of a ridge which overlooked the Bride valley (Cotter 2005a; Cotter 2003). Quite a number of the excavated charcoal production pits seem to have been siting on sloping ground. This was most likely a deliberate choice because sloping ground would have drained more easily, allowing rain and surface water to run off - thus not hampering or interfering with the charcoal production process in the pit. Pits were most likely not located on agriculturally productive land (tillage land etc) but in rougher and less fertile forest-land. If the charcoal or the pit became too wet the entire labour intensive process would have been spoiled. While there was an obvious preference for the topographical siting of charcoal production pits, it is clear that other factors would have influenced their location. These may include factors such as proximity to woodland as well as proximity to smelting sites, smithing sites and settlement sites. It also likely that there were other (more social) factors and significances which may have governed the siting of charcoal production pits (e.g. not located on somebody else's property/ territory, not located in or near a revered grove or forest etc.).

### Different types of charcoal being produced

Any species of wood can be carbonised however the properties of the charcoal differs with the type of timber used (Aaron 1980, 9). Interestingly, many different types of wood were procured for charcoal production in the past. Tree species such as oak, willow, ash, Pomoideae, alder and hazel were all procured for charcoal production in Ireland in the past. Specialist analysis of the charcoal samples from charcoal production pits, bowl furnaces and

smithing hearths will give us a much more complete list of the various types of wood species which were being used for charcoal production and the ironworking process. Analysis of charcoal remains in a number of bowl furnaces excavated in 'structure D' at Reask, Co. Kerry revealed that charcoal fuel was produced from oak, hazel, alder, birch and holly while further analysis in 'structure G' revealed charcoal derived from oak, birch, willow, holly, ivy and hawthorn (Fanning 1981, 164-5). A peat dump excavated in close proximity to the iron smelting/ smithing activity at Reask, Co. Kerry indicates that perhaps peat was also being carbonised and used as a charcoal in Ireland in the past (Scott 1990, 167). Tylecote (1986, 140) informs us that the dominant fuel used at a smelting site excavated at Wiltrow in Shetland (Scotland) was in fact peat charcoal.

As noted above, any species of wood can be carbonised, however it seems that hardwoods prove to be much more suitable for charcoal production (Aaron 1980, 9; Pleiner 2000, 115-130). Tylecote (1986, 225) notes that a very important property required of metallurgical charcoal is that is must be strong enough to avoid crumbling under pressure. It is also important that during transport (cartage) the charcoal must not crumble – and this is one of the main reasons why hardwoods are preferred for charcoal production (Tylecote 1986, 225). Hardwoods such as oak and ash do not crumble as easy as softwoods and quite importantly they also tend to burn for longer and at a higher temperature – making them ideal for producing charcoal which is to be used as a fuel in metalworking activities. Quite notably, analysis of the charcoal from many metallurgical features discovered on the K-E-K M4 excavations revealed that oak was the most dominant wood species used for charcoal production (Carlin, Ginn and Kinsella Forthcoming). Likewise, oak was the predominant specie used for charcoal production at both Kilcotton 1 and 2 (Danaher and Kane 2008). Furthermore, the excavation of sixteen charcoal production pits at Kilmaniheen West, Co. Kerry also revealed the prevalent use of oak wood (Hull and Taylor 2006).

We know from a c.1563 AD Elizabethan map of Laois that vast areas of Laois were heavily wooded in the 16th century (Hore 1863; Andrews & Loeber 1998). Furthermore, 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 quite prominently (Feehan 1999, 8; Feehan 1983). The place-name evidence also seems to indicate that the county was heavily wooded in the past; particularly with oak woodland. In fact it seems that oak woodland once prevailed in the wider Kilcotton, Barnasallagh and Delligabaun area of contract 2 on the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme. Oak was the most dominant tree in Ireland's native forests and this was also the case in Co. Laois (Feehan 1983, 137). Other trees native to Co. Laois which would have been ideal for carbonisation include alder, common birch, silver

birch, elm and ash (Feehan 1983, 137). Pleiner (2000, 116) notes that the procurement of wood for charcoal burning was always dependent upon the range of trees available to the charcoal producer in the immediate surroundings. Apart from oak, willow was also being procured for charcoal production at Kilcotton while Pomoideae was utilised at Delligabaun 1.

There is great potential for palaeo-environmental research in the study of charcoal production in the past. If we can scientifically establish the range of wood-species available in the surrounding area to charcoal producers at a particular charcoal production site, then this can be studied against the actual wood-species which were selected for charcoal production on the site. Therefore we can see which wood-species were preferred and which were not – thus providing us with an insight into the decision making process and wood-species selection process of early charcoal producers. Scott (1990, 167) has suggested that there was 'a strong possibility that different charcoals were being used for different purposes – hardwood charcoal for smelting, peat charcoal for bloomsmithing and forging'. It was noted above that different charcoals have different properties; therefore Scott's suggestion is quite plausible. The smokier charcoals might have not have been favoured for certain tasks, while specific types of charcoal may have been used for cooking and more domestic purposes. Furthermore hardwood charcoals might have been used for more industrial activities such as iron smelting. Interestingly, hazel charcoal was discovered in the base of a smelting furnace excavated at Newcastle 2, Co. Meath on the K-E-K road-scheme and this was interpreted as kindling fuel used to light the main fuel within the furnace (Carlin, Ginn and Kinsella Forthcoming). It is also possible that the hazel charcoal was used to dry out the furnace bowl prior to the main smelting activity. However, this 'different charcoal – different function' theory has yet to be scientifically investigated and substantiated. It may be worthwhile taking a small number of sites (ironworking and domestic) and sampling domestic hearths, smelting furnaces, smithing hearths and forging hearths to see if different types of charcoal was favoured for domestic or industrial purposes or whether different types of charcoal was favoured for different stages in the ironworking process (e.g. smelting, bloomsmithing, secondary smithing/ forging).

It is likely that there are other 'non-practical' factors that may have influenced which types of wood species were procured for charcoal production and which types of charcoal were used for certain tasks in the past. Certain tribes or groups of people may have had an affinity with a particular type of wood or tree in the past or with trees or wood from a specific area - and so that wood species may have been used primarily for charcoal production over other types of trees, or the opposite could have been the case - it may not have been felled for charcoal production at all. It is likely that certain social and cultural taboos were associated with different types of trees in the past – indeed in many cultures throughout the world there seems

to be myths, stories, lore associated with trees, forests and groves (Laird 2004). A more detailed look at the ethnographical evidence would provide many examples of this. We only have to look as far as rural Irish folk customs surrounding holy bushes and trees. Indeed we know from the law-texts (Bretha Comaithchesa) that trees and woodland were very important to early Irish economy and that they were listed or graded according to their economic importance (Kelly 1997, 379-80). While the law-texts highlight the economic importance of the various types of trees it is clear that some trees, particular oak and ash were revered in the past as they were referred to as 'nobles of the wood' (Kelly 1997, 379-80). Furthermore, it is well known that oak trees and groves were once revered in Celtic and pagan mythology (Green 1986; 1995). In fact oak is revered in many cultures as a strong, proud, durable and long-living entity. It is not hard to see why past peoples preferred the use of oak wood for charcoal production. It is clear then that there were probably many different factors (practical and 'less practical') which influenced the procurement and use of different wood species for charcoal production in the past (and indeed regarding the uses of different types of charcoal in different tasks).

## The importance of charcoal in early times

The earliest most efficient and effective metallurgical fuel was charcoal (Tylecote 1986, 225; Pleiner 2000, 115-130). Charcoal was especially integral in the iron smelting process where very high temperatures were needed to reduce the iron ore, but it would also have been essential in the bloomsmithing and forging stages of the ironworking process (Scott 1990, 167; Pleiner 2000, 115-130). There is no doubt that charcoal would also have been integral in the smelting and working of non-ferrous metals and indeed other materials such as glass and enamel (Scott 1990, 217). As noted above, not much has been written on charcoal production in general but especially on charcoal production in Ireland – and where it is discussed or referred to it is almost entirely and unequivocally seen as a process associated with industrial activities (mainly ironworking) (Scott 1990, 167; Tylecote, 225). It is likely while charcoal was integral to the iron smelting and smithing process and indeed other industrial processes that it was also used widely for more domestic purposes (as it was a 'clean' and virtually smokeless fuel).

We know from the ethnographic evidence that a significant amount of charcoal being produced in the third world and less-developed countries (e.g. Tanzania) is actually consumed in the domestic arena (Kimaryo & Ngereza). There is only one very brief reference to charcoal (Gúal) in the historical sources – in the 8th century law tract Críth Gablach – where among a list of household possessions for one grade of farmer (the mruigfher) is '...a sack of charcoal for irons...' is listed (Scott 1990, 100). We know from this reference that a store of

charcoal was especially needed for the production of iron. In the case of this reference Scott (1990, 100) suggests that this is likely to refer to fuel for the forge hearth or for smelting. Why not for both ironworking activities? It is generally accepted that in the early medieval times small-scale ironworking activities (as evidenced on many excavations) were undertaken by less skilled members of society at their occupation site (Edwards 1990, 86). It is therefore likely that charcoal was also produced on small-scale levels as well as large-scale levels to meet more small-scale ironworking needs as well as more domestic household needs. It is likely that the different grades of farmers produced their own charcoal for small-scale smelting and smithing activities but also for use in the domestic arena – and this may account for many of the isolated charcoal production pits that are being excavated throughout Ireland.

## Charcoal as a commodity

As a result of carbonisation the volume of wood diminishes by approximately 50% (ILO 1985, 48). Furthermore, the weight of the wood also decreases: the carbonised wood (charcoal) tends to weigh only about 20% of the air-dry weight of the wood used (ILO 1985, 48). Charcoal is therefore much easier to move and transport than bulkier and heavier fuel woods – it is lighter, more compact and very easy to bag and cart (ILO 1985, 48). Compared with fuel wood, charcoal is also easier to store, it requires little or no breaking down in size prior to its use and it burns smokeless at a much higher temperature (ILO 1985, 48). The energy content of one kg of charcoal is twice as high as the energy content of one kg of fuel wood (and far less bulky) (ILO 1985, 48). We know that charcoal was essential to the ironworking process – and so it would have been valuable commodity in early medieval times – but it also seems that charcoal would have been quite a useful and desirable fuel for domestic consumption as well as industrial consumption in early times. It seems that charcoal would have been a valuable multi-purpose commodity and, quite notably, there is evidence for the trading of charcoal in the archaeological record. Evidence for ironworking was discovered on the island of Sceilig Mhiceal, c.7km off the coast of Kerry (Scott 1990, 100). However, a complete abscence of iron ore and timber on Sceilig Mhiceal indicates that charcoal and either iron ore or iron was transported and traded across the sea to the island community (Scott 1990, 100).

Furthermore, evidence for iron smelting was discovered in an Early Christian context on Church Island, near Valencia Co. Kerry (Tylecote 1986, 187). This island, like Sceilig Mhiceal, had no iron ore or charcoal resources and these would also have been transported to the island from the mainland (Tylecote 1986, 187). Charcoal was traded to these two islands for ironworking activities, but it is also likely that charcoal was traded to the islands to be used for other industrial and domestic purposes as there was a complete lack of fuel on the

islands. It is probable that charcoal was being traded to most of the inhabited islands along the Irish seaboard in past times. In early medieval times charcoal was most likely produced by the majority of farmers/ households at a local level for small-scale ironworking activities and domestic use. However, it is probable that charcoal was also being traded locally and regionally on the main land of Ireland. Oak or ash charcoal may have been imported or traded into areas where bogland was prevalent and where peat was probably the dominant resource for charcoal production and fuel. Furthermore, in areas where coniferous forests prevailed charcoal derived from hardwoods may also have been traded and imported into these areas for smelting activities – where high temperatures were needed. However, this has yet to be substantiated in the archaeological record.

### The impact of charcoal production on the landscape

Charcoal production often involved the felling of large tracts of woodland. Indeed, charcoal production activities such as those at Kilcotton 1, Kilcotton 2 and Kilmaniheen West would have involved the felling of substantial areas of woodland and these would certainly have drastically altered the physical landscape over a long period of time. Furthermore, this would also have altered the way people engaged with that landscape. For example; land that was previously forested, once cleared, may then have been used for agricultural purposes; as woodland resources in one particular area became diminished it is likely that charcoal production activities would have shifted to new areas. Charcoal production has had and continues to have a drastic impact on many landscapes across the world today – particularly in many third world countries and less developed countries (Mercer & Soussan; Van der Plas 1995). Large-scale deforestation in places such as sub-Saharan Africa and the Amazon remains a growing and topical concern (Mercer & Soussan; Van der Plas 1995). For example, in the early 1990s when selling trees for fuel was one of the only options for cash for farmers almost all the trees/ woodland cover on the Caribbean Island of Haiti was cut down and sold for charcoal production (Swartley and Toussaint 2006). This drastically altered the island landscape of Haiti and had a serious impact on the ecology and economy of the island (Swartley and Toussaint 2006).

Furthermore, charcoal production for iron smelting in the Carajas region of Brazil has been identified as a threat to the forests of eastern Amazonia while it has also been noted that woodlands of the Bay region of Somalia are being devastated for charcoal production for Mogadishu's markets (Fearnside 1989; Bird & Shepherd 1988). These examples are anecdotal however they do illustrate the impact rural, agriculturally-based societies - engaged in charcoal production - can have on their own landscapes and environments. Quite interestingly, palaeo-botanical studies were carried out in northern Wales in connection with

ironworking activities carried out on the hillfort site of Bryn y Castell and they indicated that there was a certain decline of trees during the period of iron production at the site and that this may have been a result of charcoal production (Mighall & Chambers 1989; Pleiner 2000, 127). In this case the ironworking was quite small-scale and the impact on the local environment was therefore not too drastic (Pleiner 2000, 127). Pleiner (2000, 128) states that in earlier times concentrations of charcoal production activity must have had a devastating effect on the natural environment – and in particular on its vegetation. In late medieval times strict statutory regulation and control of woodland clearance was introduced in order to stop such devastation (Pleiner 2000, 127). Historical sources inform us that as early as the 13th century such measures were introduced in England - as this was found to be the case in the Forest of Dean in south-western England (Pleiner 2000, 127). We can imagine then that in early Ireland concentrated charcoal production activities would certainly have impacted upon and altered the surrounding landscape; altering physical environments and landscapes but also importantly changing the very way people interacted with their landscapes

## 6. INTERPRETATION AND RECONSTRUCTION

The site designated Kilcotton 1 contains the remnants of relatively large scale charcoal production with 49 likely charcoal production pits being identified at this location, a further 17 were discovered at Kilcotton 2 to the east of this site. The presence of these charcoal production pits at Kilcotton suggests that charcoal was being produced at this location in large quantities possibly by local farmers, for small-scale smelting and smithing activities as well as for use in the domestic arena.

## 7. ASSESSMENT OF ARCHAEOLOGICAL POTENTIAL AND SIGNIFICANCE

As discussed above, it is generally accepted that in Early Medieval (and Medieval) times, small-scale ironworking activities were undertaken by less skilled members of society at their occupation site (Edwards 1990, 86). It is therefore likely that charcoal was also produced on small-scale levels to meet more small-scale ironworking needs as well as more domestic household needs. However, when discussing this site it is important that it is considered with the 17 charcoal production pits discovered at Kilcotton 2 and also the one discovered at Delligabaun 1 further to the east. When viewed in this context we can conclude that this area was not only an important location for charcoal production but also had a long tradition of

such spanning centuries. It is likely that many more charcoal production pits are present outside of the road take in this area. The dates for Kilcotton 1 and 2 would suggest that much of the charcoal production that took place at these locations did so between 1400 and 1650 AD.

## 8. CONCLUSION

The excavated pits at Kilcotton 1 have been interpreted as the remains of charcoal production pits dating to the High-Late medieval period. These pits together with the others excavated in the Kilcotton and Delligabaun townlands implies that there was a tradition of charcoal production within this area that spanned the Early – Post medieval periods. Interestingly, no evidence for iron smelting or working was unearthed in either townland and while it is possible that this activity occurred close by it is also feasible that it never took place at this location and that this area may have been specifically designated for charcoal production only. This would suggest woodland management and organisation of resources with the produced charcoal possibly being transported to iron production centres outside of this area. However, with only 66 pits spanning hundreds of years being discovered over a large area, it is a matter of debate whether they represent small-scale local charcoal production, within an area that had a tradition of charcoal production, or whether these pits are in fact a small sample of what is really present within the area, implying that many more charcoal production pits lay outside the roadtake. If so, this would suggest that charcoal was being produced at a large scale at this location. However, the random nature of the pits at Kilcotton surely precludes the interpretation of this site as a planned industrial site and what we are possibly witnessing is the remains of a cottage industry rather than a large-scale industrial complex. 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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## 9.3 Cartographic Sources


1839 1st edition Ordnance Survey Map

1891 2nd edition Ordnance Survey Map

1909 Ordnance Survey Revision edition RMP map


Signed:

Ed Danaher
Licensed Archaeologist
November 2008

# 10. APPENDICES

## 10.1 Appendix 1: Wood Identification analysis report

**Kilcotton 1, M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, Co Laois, Ireland**

***Species identification of charcoal samples***

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# Contents

## 1. Introduction

Three thousand eight hundred and ninety seven charcoal fragments from one hundred and four contexts relating to twenty seven archaeological sites were analyzed from excavations along the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill road scheme, contract 2. Thirty four wood samples from Middle and Late Bronze Age *fulacht* sites and wooden troughs were also analyzed within the framework of these studies. Contract 2 covers a length of approx 13 km and includes numerous *fulacht fiadh* sites, charcoal production pits, bowl furnaces, cremation pit, linear feature, hearths, burnt spread, wells, kilns, pits, postholes and one ring gully.

In recent years, a considerable amount of structural as well as non-structural wood and charcoal has been recovered from archaeological deposits in Ireland. Wood was a vital and widely used raw material from prehistoric to medieval times although its importance is rarely reflected in the analysis of archaeological assemblages mainly due to its perishable nature. It is important to note that people in prehistoric, Early Christian and medieval communities were mainly dependant on woodland resources for the construction of buildings, for the manufacture of most implements and for fuel for wood-burning activities. The woods in a surrounding catchment area were exploited and often managed to provide an essential raw material for the community. A study of the range of species on an archaeological site offers an indication of the composition of local woodland in its period of use and any selection policies for particular species at any given time and place.

Large assemblages of wood and charcoal from the numerous road schemes currently under excavation, and subsequent analysis of the sampled wood and charcoal is currently on-going in Ireland. Although relatively little of the charcoal and wood analysis carried out from these analyses has been published, one recent publication includes the gas-pipe line to the west which is used for comparative purposed in this report (Grogan *et al*. 2007).

Analysis of timbers can provide information on two different levels. These can be seen as the structural and constructional aspects gained from studying the timbers as ‘timber’ and also the environmental and dendrochronological aspects gained from a study of the timber as ‘wood’. From preliminary analysis of some of the work in progress on the wood assemblages it is clear that oak was the most common species used for wall-posts and planks, hazel was preferred for wattle structures and species such as pomoideae, ash, willow, alder, birch and holly were utilised for a variety of other structural requirements. Alder, ash and oak are the

most frequent species used in the construction of plank-lined troughs while hazel and ash are selected for wattle posts also used in the construction of wattle troughs.

The analysis completed from the wood and charcoal excavated along the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme will add important information to the rapidly expanding database of environmental indicators particularly in relation to the Neolithic, Bronze Age and Medieval periods in the area. This area of work is especially important in Ireland where there are no written records up to the 18th century relating to the amount and type of woodland in Ireland (McCracken 1971, 15).

The analysis of charcoal can also provide information on two different levels. Charcoal analysis is an important component of any post-excavation environmental work as it can help in re-constructing an environment hitherto lost, although this must be done with caution as sufficient sample numbers and fragments counts are required for a complete and full understanding of the immediate environment. Keepax suggests 50 samples in a European temperate climate. Charcoal is also analyzed and identified to determine what species are used and selected for particular functions on site i.e. post-holes, wall posts, burnt remains of wattle and so forth. In summary, charcoals are excellent indicators of exploited environments and the vegetation that developed within them.

Results from the hundreds of *fulacht fiadh* which have been analyzed throughout Ireland with regard to species selection for fuel have shown that a wide variety of taxa are identified from these assemblages, which may suggest that the inhabitants were selecting firewood from whatever trees and branches were closest to hand. Alder charcoal does sometimes dominate the *fulacht* assemblages but this is generally confined to the wetter areas of Ireland such as Mayo (O'Carroll, N5, 2007) and the midlands area of Ireland (O'Carroll, N6 KTK, 2008) highlighting the wetter environments in these particular areas of Ireland particularly during the Bronze Age. Oak and hazel was shown to be more frequently used at *fulacht* sites in Tipperary possibly highlighting the different terrain of more dryland areas and scrubland in the south of Ireland in the Bronze Age (O'Donnell, N8 2008).

The wood and charcoal assemblage analysed in this report covers both the Prehistoric and Medieval periods. Charcoal was analysed from a Neolithic pit at Derrinsallagh 3, numerous Bronze Age *fulacht* sites, early and Late Medieval charcoal production pits, a Late Bronze Age cremation pit from Derrinsallagh 3, the fill of an Iron Age well excavated at Bushfield 4,

a Bronze Age fire hearth from Boherard 2, early medieval and high medieval kilns from Derrinsallagh 3, several un-diagnostic pits dating to the Bronze Age, Iron Age and Medieval periods, Middle and Late Bronze Age postholes and an early Medieval ring gully from Lismore/Bushfield 1.

The analysis presented here concentrates on species identification, species selection and the composition of the local woodland during the Neolithic, Bronze Age, Iron Age and Medieval periods along the route of Contract 2, M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill. Woodworking analysis was completed on timbers that contained evidence of tooling, which includes recording facets and jam curves and is sometimes a useful indicator of tool types being used on a given site at a given period. Split timber types, preserved point types, annual tree-ring counts and average growth rates of the trees that the wood was felled from was also noted and recorded. Each piece of wood was also examined for blade signatures.

**2. Methods**

The process for identifying wood, whether it is charred, dried or waterlogged is carried out by comparing the anatomical structure of wood samples with known comparative material or keys (Schweingruber 1990). A wood reference collection from the Botanical Gardens in Glasnevin, Dublin was also used.

**Wood**

Thin slices were taken from the transversal, tangential and longitudinal sections of each piece of wood and sampled using a razor blade. These slices were then mounted on a slide and glycerine was painted onto the wood to aid identification and stop the wood section from drying out. Each slide was then examined under an E200 Nikon microscope at magnifications of 10x to 500x. By close examination of the microanatomical features of the samples the species were determined. The diagnostic features used for the identification of wood are micro-structural characteristics such as the vessels and their arrangement, the size and arrangement of rays, vessel pit arrangement and also the type of perforation plates.

All of the wood excavated on each site was sampled for identification and further analysis. The wood samples were firstly washed and recorded on wood working sheets and were then identified as to species. Where appropriate, the samples were measured and described in

terms of their function and wood technology. This included point types, split types and individual toolmarks such as facets and tool signatures.

The annual tree rings were counted partially under a microscope and partially by eye therefore it is only an approximate age. The annual tree ring counts for the split timbers do not give a real estimate of the age of the parent tree when it was cut down as splitting implies division and therefore only partial remains of the parent tree will survive. Average growth rates were also established. A fast growth rate is around 4mm per year. As different factors (weather and soil conditions) determine growth rates of trees and growth rates vary across each sample average growth rates were calculated for each sample.

**Charcoal**

The soil samples were processed on-site. The flots were sieved through a 250 micron or a 1mm sieve, while the retent was put through a 2mm or 4mm sieve. All of the charcoal remains from the soil samples were then bagged and labeled.

The identification of charcoal material involves breaking the charcoal piece along its three sections (transverse, tangential and radial) so clean sections of the wood pieces can be obtained. This charcoal is then identified to species under a universal compound microscope reflected and transmitted light sources at magnifications x 10 - 400. By close examination of the microanatomical features of the samples the charcoal species are determined.

The purpose of the charcoal identifications was two-fold. In some cases the identifications were carried out prior to C14 dating in order to select specific species for dating and in other cases the charcoal was analyzed for fuel selection policies and selection of wood types for structural use. Each species was identified, bagged together and then weighed. Insect channels were noted on the charcoal fragments identified as this may indicate the use of dead or rotting wood used for fuel or other such functions. The distinction can sometimes be made between trunks, branches and twigs if the charcoal samples are large enough. This was noted where possible. When charcoal samples showed indications of fast or slow growth this was also recorded. The samples identified for environmental reconstruction and wood usage were counted per fragment and then weighed. The smaller sample amounts with less than 50 fragments were all identified while 50 fragments were identified from the larger samples.

There are inherent problems in re-constructing the environment at the time of use of the site due to the low quantity of samples and charcoal fragments identified from the assemblages. Keepax concludes that, when working in a temperate climate, at least fifty samples should be identified from an archaeological site, to make it a viable charcoal study, with a minimum of 25 samples (Keepax 1988). Notwithstanding the charcoal sample numbers, it is clear that the charcoal results coupled with the wood analysis throw up some interesting results and trends in relation to wood selection and use and woodland cover in the Neolithic, Bronze, Iron and Medieval periods in Co. Laois.

A number of wood taxa cannot be identified to species or sub-species level anatomically. Sessile oak *(Quercus petraea)* and pedunculate oak *(Quercus robur)* are both native and common in Ireland and the wood of these species cannot be differentiated on the basis of their anatomic characteristics. English elm *(Ulmus procera)* and wych elm *(Ulmus glabra)* cannot be separated by their wood structure and identifications of elm are shown as *Ulmus* spp. There are also two species of birch (*Betula pendula* and *Betula pubescens*) and several species of willow therefore the identifications are given as *Betula* spp and *Salix* spp respectively. Within the family of Pomoideae it is impossible to distinguish between crab apple (*Malus sylvestris*), pear (*Pyrus communis*), hawthorn (*Crataegus* spp.) and mountain ash/rowan (*Sorbus aucuparia*).

## 3. Definitions of Element Types and woodworking terminology

***Dates and timeframes***

| | |
|---|---|
| *Neolithic* | *4000-2500BC* |
| *Early Bronze Age (EBA)* | *c. 2500-1800BC* |
| *Middle Bronze Age (MBA)* | *1800-1000BC* |
| *Late Bronze Age (LBA)* | *1000-500BC* |
| *Iron Age* | *500BC-400AD* |
| *Early Medieval* | *400AD-1200AD* |
| *High Medieval* | *1200AD-1400AD* |
| *Late Medieval* | *1400AD-1600AD* |
| *Post Medieval* | *1600AD – 1900AD* |

***Constructional Elements***

*Brushwood*: Stems or rods measuring 6 cm or less in diameter.

*Roundwood:* A piece of worked or unworked wood in the round and over 6 cm in diameter.

*Vertical Stake/Post:* Upright brushwood or roundwood driven vertically or at an angle into the ground. Sometimes but not always used for stabilization.

*Horizontal*: Brushwood, plank or roundwood laid flat on the ground.

*Twigs*: Small shoots or branches measuring around 1 cm in diameter.

*Split timber*: Wood converted from the round including planks, half splits and split pegs.

***Woodworking terms and definitions***

*Chisel point:* The end of a piece of wood cut to a point on one single face.

*Conversion:* The way in which the primary trunk has been split into smaller elements.

*Facet:* The cut surface produced on a piece of wood by a tool blow. The blow can leave behind a particular signature if the cutting edge of the tool is flawed.

*Facet junction:* The nature of the junctions between each facet was also assessed as to whether they were clean, ragged or stepped

*Jam curves:* A complete toolmark on wood retaining the impression of the complete width of the blade used

*Pencil point:* The end of a piece of wood cut to a point on multiple faces.

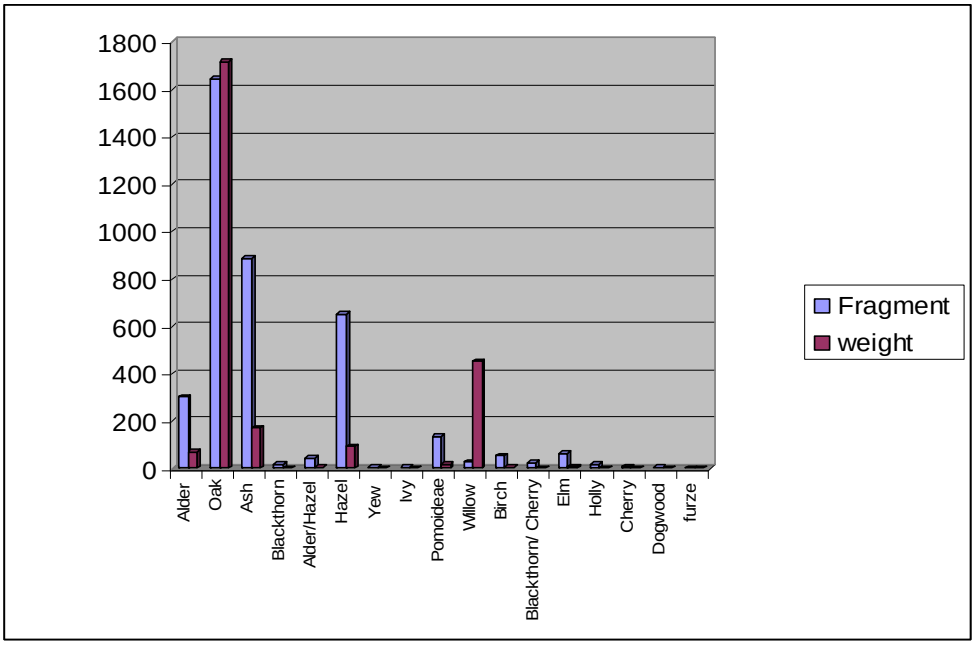
*Signature:* A signature is an imperfection in a woodcutter's blade which is transferred onto the timber when the wood is cut. A negative impression or a groove is created where a flange of metal extends beyond the axe blade where as a positive or raised signature is created by a gap in the blade edge.

*Wedge point:* The end of a piece of wood cut to a point on two faces.

## 4. Results & Analysis

**Charcoal assemblage, all sites**

**Figure 1:** All taxa identified from sites analyzed. Weight in grams




**Kilcotton 1, Late Medieval charcoal production pits**

**Table 1:** Wood taxa identified from Kilcotton 1

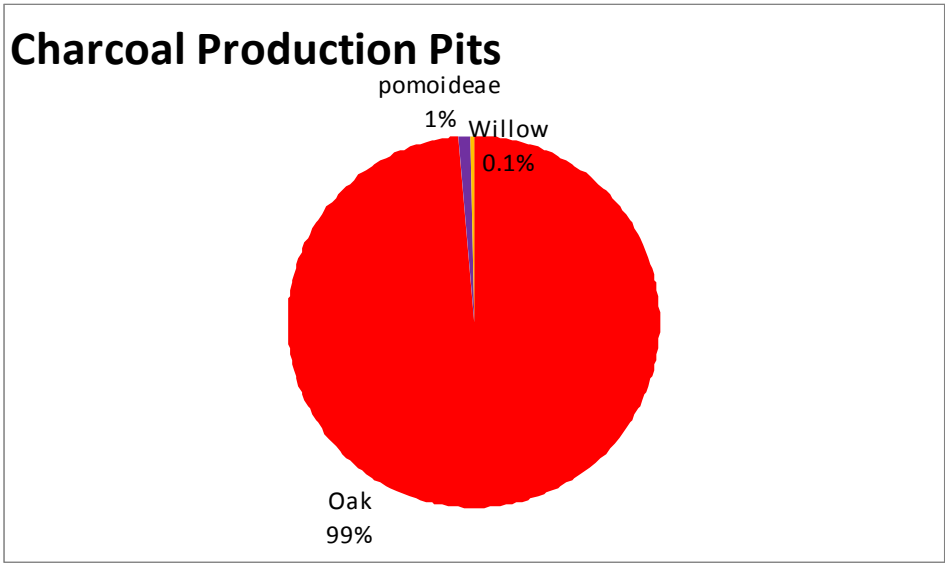
| Site | E number | Feature type | Context | Sample no | Date | Identification | Comment |
|---|---|---|---|---|---|---|---|
| **Kilcotton 1** | E2187 | Charcoal pit | F017 | 3 | 1460-1640AD Late Medieval | Oak (608g, 100f) | Coppiced wood |
| **Kilcotton 1** | E2187 | Charcoal pit | F036 | 9 | 1784 - 1800AD Late Medieval | Oak (140g, 100) | |
| **Kilcotton 1** | E2187 | Charcoal pit | F061 | 8 | 1550-1640AD Late Medieval | Oak (188g, 100f) | |

Oak was the only taxon identified from the charcoal production pits. The oak wood identified from F017 had some of the characteristics of wood extracted from coppiced oak woods. The

oak wood was fast growing and of brushwood type. Oak coppiced trees would have been used to supply the wood burners and the metal workers with a quick renewable supply of oak wood and charcoal.

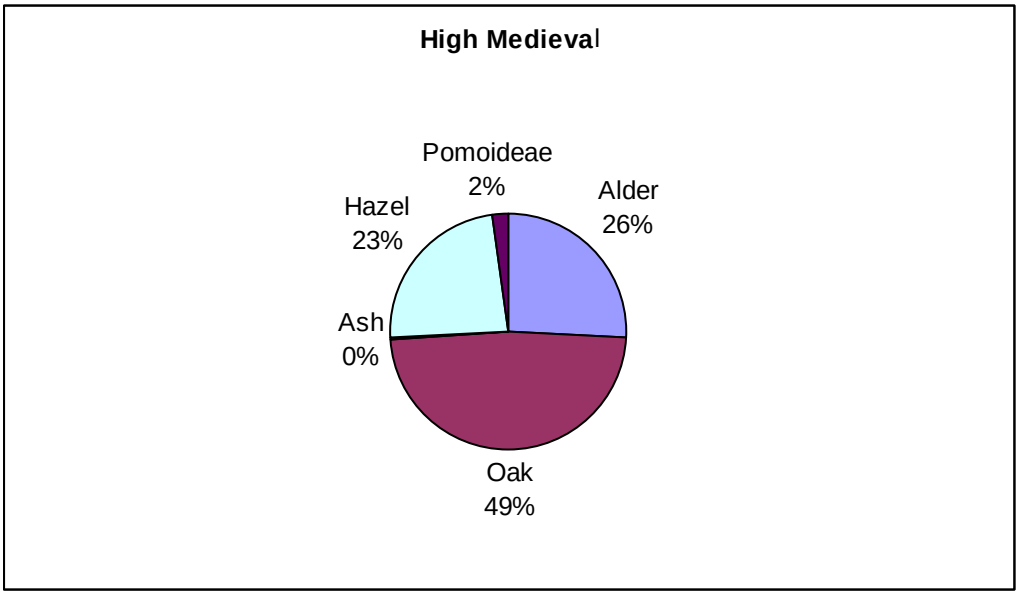
**Results by feature/site types**

**Figure 2:** Wood taxa identified from Charcoal production pits



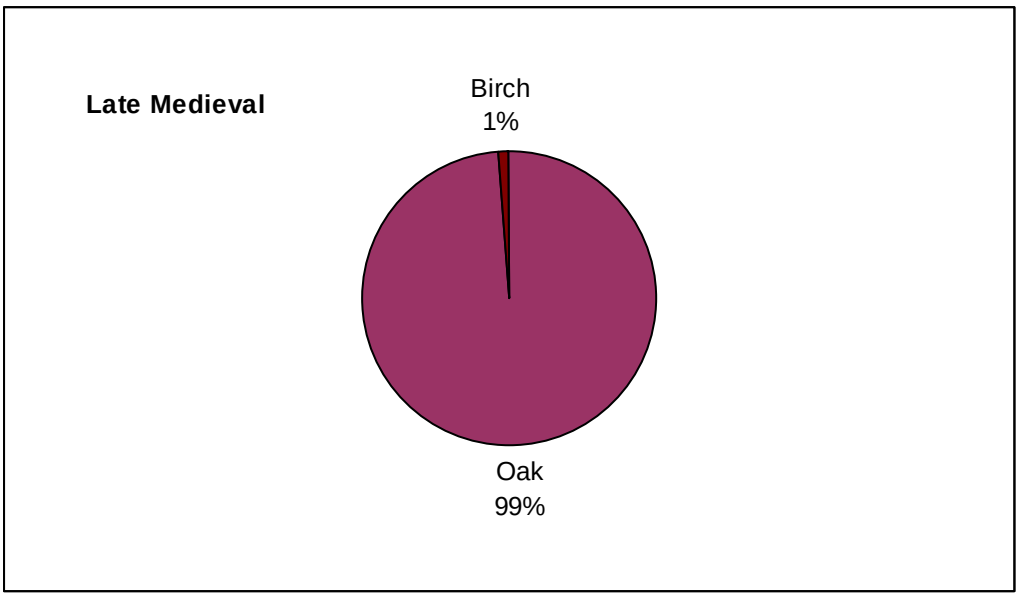

Oak was the preferred taxa for use within the charcoal pits at Barnasallagh 3, Delligabaun 1, Derrinsallagh 2, Kilcotton 1 & 2. Other taxa present were pomoideae and willow. Oak is a dense wood and is very suitable for charcoal production and by inference metal working activities as seen at excavated bowl furnace sites at Derrinsallagh 5, Derryvorrigan 1, and Bushfield/Lismore 1 as well as charcoal production sites at Barnasallagh 3, Kilcotton 1 & 2 and Delligabaun 1 . Oak also makes good firewood when dried and will grow in wetter areas when other conditions such as climate are favourable. Oak has unique properties of great durability and strength. The oak identified suggests that there was a supply of oak in the surrounding environment during the medieval periods. The oak was possibly selected from a coppiced area. A coppice tree is where the tree is cut down at its base and as a consequence several new shoots or straight growing trees will grow out of this one stump. The use of quickly renewable oak coppiced trees would have been the most efficient method of sustaining a continuous supply of fuel for use in these charcoal production pits.

**Figure 3:** Wood taxa identified from the High Medieval periods



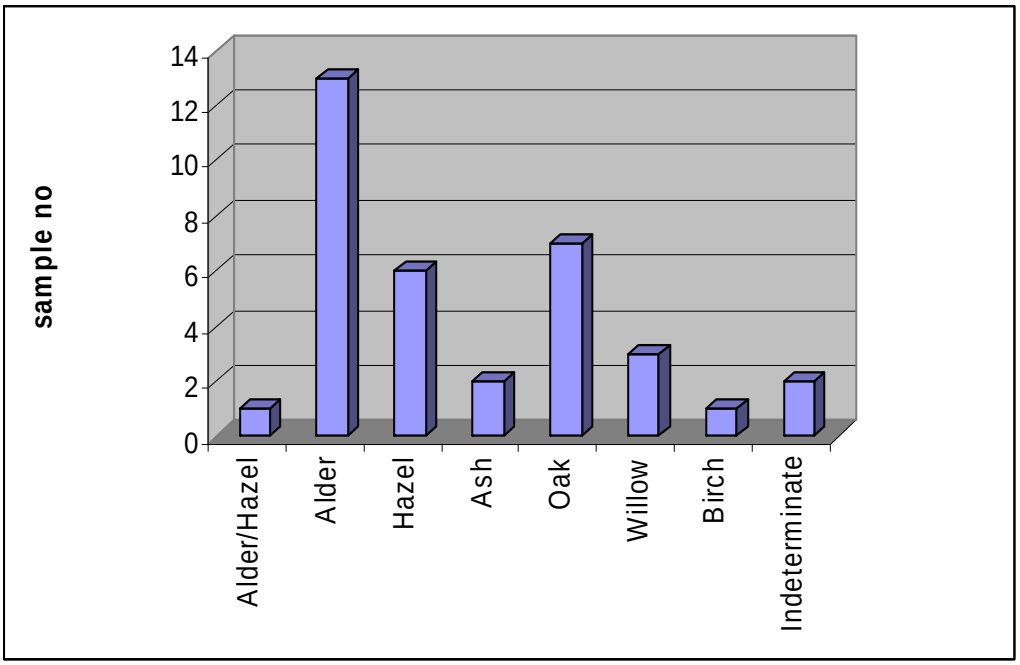

Four samples from Derrinsallagh 1 (pit), Derrinsallagh 3 (kiln) and Kilcotton 1 (charcoal production pit) were identified from the assemblage relating to the High medieval period. Oak is most prevalent from these features with alder and hazel also present in considerable quantities. Other taxa present in lesser quantities are pomoideae and ash.

**Figure 4:** Wood taxa identified from the Late Medieval periods



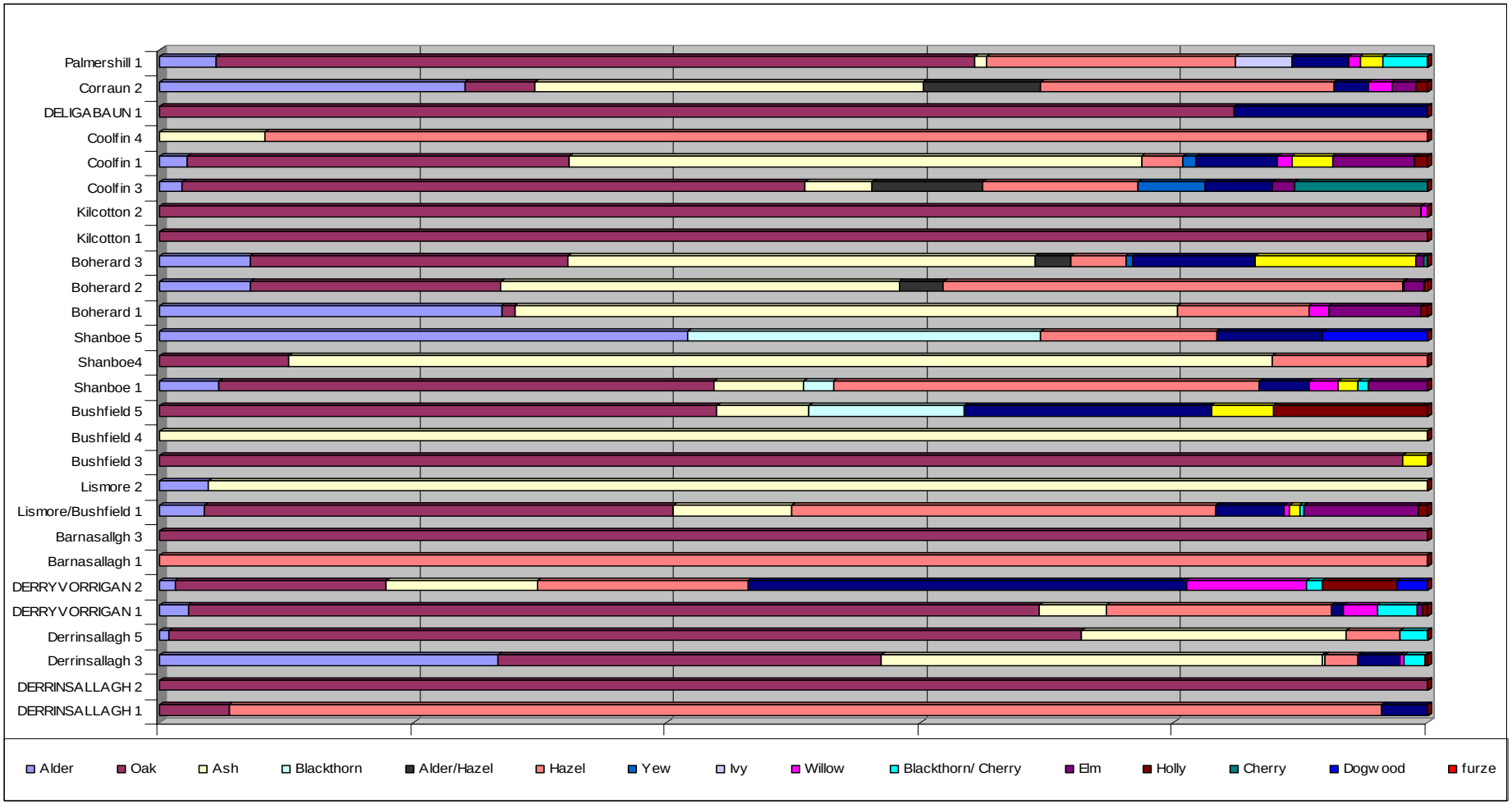
Four samples from two sites associated with charcoal production at Kilcotton 1 and a charcoal rich pit at Bushfield 3 were identified from the assemblage. Not surprisingly oak was the most dominant taxa in the assemblage. Birch was the only other taxon present on the assemblage dated to the Late Medieval periods.

**Figure 5:** All wood taxa identified from sites that produced wood along Contract 2



## 5. Discussion of Charcoal and wood assemblage

**Table 2:** Wood taxa identified from each site excavated along Contract 2, M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme



**Aims of the study**

1. To determine the types of wood selected for use either as fuel or as structural wood.
2. To re-construct the environment that the charcoal and wood was selected from and the possible changes and differences in different time periods between woodland present in the areas during the Neolithic, Early, Middle and Late Bronze Age, Iron Age and Medieval periods.
3. To determine use and function of particular features and their associated charcoal through the identification of taxa types

**Wood types identified from charcoal and wood assemblages**

**Table 3:** Taxa types identified from the charcoal and wood assemblage along Contract 2

| **Botanical name** | **Species** |
|---|---|
| *Corylus avellana* | Hazel |
| *Prunus spinosa* | Blackthorn |
| *Prunus avium/padus* | Bird/Wild Cherry |
| *Ulmus sp.* | Elm |
| *Pomoideae* | Apple type |
| *Quercus spp* | Oak |
| *Alnus glutinosa* | Alder |
| *Salix sp* | Willow |
| *Fraxinus excelsior* | Ash |
| *Cornus sanguinea* | Dogwood |
| *Betula sp* | Birch |
| *Taxus Baccata* | Yew |
| *Ulex europeas* | Furze |
| *Ilex acquilofium* | Holly |
| *Hedera helix* | Ivy |

Three thousand eight hundred and ninety seven charcoal fragments from one hundred and four contexts relating to twenty seven archaeological sites were analyzed from excavations along the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill road scheme, contract 2. Thirty four wood samples from a Middle Bronze Age walkway and Late Bronze Age *fulacht* sites were also analyzed within the framework of these studies. Contract 2 covers a length of approx 13 km and includes numerous *fulacht fiadh* sites, charcoal production pits, cremation pit, a well, kilns, bowl furnaces, a linear feature, pits, postholes and one ring gully. Charcoal

analyzed from charcoal production pits dated mainly to the Medieval periods and bowl furnaces dating to the Iron Age and related to metalworking activities were identified from Derrinsallagh 5, Derryvorrigan 1, Bushfield/Lismore 1, Barnasallagh 1, Kilcotton 1 and Delligabaun 1.

There were fifteen taxa present in the charcoal and wood remains. Taxa identified from the assemblage were oak (*Quercus* sp), hazel (*Corylus avellana*), ash (*Fraxinus excelsior),* alder (*Alnus glutinosa),* Pomoideae (apple type), elm (*Ulmus* sp), birch (*Betula* sp), blackthorn/cherry (*Prunus* spp), holly *(Ilex acquilofium*), willow *(Salix* spp), yew (*Taxus baccata*), ivy *(Hedera helix),* dogwood *(Cornus sanguinea)* and *Ulex europeas* (Furze) in order of representation. The range of taxa identified from the features analysed includes large trees (elm, ash, yew and oak), medium sized trees (alder and birch) and smaller scrub or hedgerow trees like blackthorn, blackthorn/cherry, willow, dogwood, hazel, holly, furze, and pomoideae. Ivy is classed as a woody stem creeper and was very abundant on trees, walls and rocks (Webb 1953, 73).

Not surprisingly oak was also more prevalent at the medieval dated charcoal production sites as well as the bowl furnaces used for metalworking activities. The pattern of oak use at these sites is repeated elsewhere across the country where oak was exclusively collected for charcoal production. Oak is a dense wood and is very suitable for charcoal production and associated metalworking activities. It also makes good firewood when dried and will grow in wetland areas when conditions are dry. The oak identified suggests that there was a supply of oak in the surrounding environment. The oak was possibly selected from a coppiced wood. A coppice tree is where the tree is cut down at its base and as a consequence several new shots or straight growing trees will grow out of this one stump. The use of quickly renewable oak coppiced trees would have been the most efficient method of sustaining a continuous supply of fuel for use in these charcoal production pits.

The existence of these charcoal production pits conjures up many scenarios of an organized well-structured society which places our ancestors away from obvious settlement centres and refocuses attention into the broader landscape, in which so much of the medieval day would have been spent. The charcoal burner would have roamed around from place to place in order to access new areas of coppiced woodlands as previously coppiced areas regenerated. The area around Kilcotton may have been particularly rich in oak coppiced trees throughout the Medieval period.

Oak dominates the charcoal assemblage from the Iron Age and Medieval periods. The high quantities of oak in these periods are mainly due to the features analysed which included numerous charcoal production pits and metal working bowl furnaces. The kilns from Derrinsallagh 3 produce a wider array of taxa from this period with alder being the main taxa selected for use in the kiln.

**6. Conclusions on Wood and charcoal Assemblage**

Three thousand eight hundred and ninety seven charcoal fragments from one hundred and four contexts relating to twenty seven archaeological sites were analyzed from excavations along the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill road scheme, contract 2. Thirty four wood samples from a Middle Bronze Age walkway and Late Bronze Age *fulacht* sites were also analyzed within the framework of these studies. Contract 2 covers a length of approx 13 km and includes numerous *fulacht fiadh* sites, charcoal production pits, cremation pit, wells, kilns, bowl furnaces, a linear feature, pits, postholes/stakeholes and one ring gully.

There were fifteen taxa present in the charcoal and wood remains. Taxa identified from the assemblage were oak (*Quercus* sp), hazel (*Corylus avellana*), ash (*Fraxinus excelsior),* alder (*Alnus glutinosa),* pomoideae (apple type), elm (*Ulmus* sp), birch (*Betula* sp), blackthorn/cherry (*Prunus* spp), holly *(Ilex acquilofium*), willow *(Salix* spp), yew (*Taxus baccata*), ivy *(Hedera helix),* dogwood *(Cornus sanguinea)* and *Ulex europeas* (Furze) in order of representation. The range of taxa identified from the features analysed includes large trees (elm, ash, yew and oak), medium sized trees (alder and birch) and smaller scrub or hedgerow trees like blackthorn, blackthorn/cherry, willow, dogwood, hazel, holly, furze, and pomoideae. Ivy is classed as a woody stem creeper and was very abundant on trees, walls and rocks (Webb 1953, 73).

Oak along with ash, hazel and alder dominate the charcoal assemblage while alder, oak, hazel, willow and ash in that order are present in the wood assemblage. Oak may have been used as post material at Derrinsallagh 3 and was the preferred taxon for use at metalworking activities including Medieval charcoal production pits and Iron age dated bowl furnaces.

In contrast to the analysis carried out along the route of Contract 1 and 3 hazel, ash, alder and oak are the dominant taxa identified from the *fulacht* sites. Alder was identified in higher quantities along this stretch of the road scheme which may indicate that the surrounding environment of these *fulacht* sites were wetter than other stretches of the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme. Hazel wattle lined the trough at

Shanboe 1. Oak planks were also identified from Shanboe 1. All of the wood taxa identified from the excavations were of native origin. The inhabitants of the sites along the route of Contract 2 had access to a mosaic of environment types which included oak in the Medieval periods. Alder plays a more significant role in the sites analyzed along this stretch of the routeway.

It would be of great benefit to the project if the results were compared and contrasted with local and regional pollen cores from the areas that underwent excavation.

# Appendix 1:

## Description of wood types

*Alnus glutinosa* (Alder)

Alder is a widespread native tree and occupies wet habitats along stream and river banks. It is an easily worked and split timber and therefore quite commonly manufactured into planks.

*Betula* sp (Birch)

Hairy birch (*Betula pubescens Ehrh*) and silver birch (*Betula pendula Roth*) cannot be distinguished microscopically. Silver birch requires light and dry soil while hairy birch grows on wet-marginal areas. Birch more often occurs on wet marginal areas and is one of the first trees to establish itself on raised bogs. The wood from birch trees is strong but it rots quickly when exposed to outdoor conditions.

*Corylus avellana* (Hazel)

Hazel is a native species and was very common up to the end of the 17th century. McCracken (1971, 19) points out that "it was once widespread to a degree that is hard to imagine today". With the introduction of brick, steel and slate the crafts associated with hazel became obsolete, and today the woods that supplied hazel have diminished rapidly.

Hazel is normally about 3-5m in height and is often found as an understory tree in broadleaf woods dominated by oak. It also occurs as pure copses on shallow soils over limestone as seen today in The Burren in Co. Clare and survives for 30 to 50 years. Its main advantage is seen in the production of long flexible straight rods through the process known as coppicing. Hazel also makes good fuel.

*Fraxinus excelsior* (Ash)

Ash is a native species to Ireland preferring lime rich freely draining soils. It is not a very durable timber in waterlogged conditions but has a strong elastic nature and is easily worked. Ash appears to have colonised the open land after the first farmers removed much of the native woodland therefore it is frequently used as structural timber in the Later Bronze Age periods as seen at Clonfinlough in Co. Offaly. Ash is also abundant in native hedgerows and was quite common in the later historic period.

*Ilex aquifolium* (Holly),

Holly is a shrub found quite commonly in hedgerows alongside blackthorn and furze and in the understory of oak woods. The *Bretha Comaithchesa* (Laws of neighbourhood) which are listed in the ancient Irish law tracts records holly as one of the five nobles of the wood namely for its use in the construction of cart-shafts and its leaves were valuable as cattle fodder during the winter months (Nelson 1993, 43).

*Pomoideae,* (Apple type)

Pomoideae includes apple, pear, hawthorn and mountain ash. It is impossible to distinguish these wood species anatomically but as wild pear is not native and crab apple is a rare native species in Ireland it is likely that the species identified from the site along the N5 are hawthorn or mountain ash (rowan) (Nelson 194-200, 1993). Hawthorn (*Crataegus monogyna*) is a native species, and is found in many hedgerows throughout Ireland. Mountain ash (*Sorbus aucuparia*) is also a common tree in Ireland growing particularly well in rocky and hilly mountainous places.

*Prunus spinosa* (Blackthorn)

It is difficult to differentiate between cherry and blackthorn particularly in relation to charcoal therefore the identified charcoal has been classified as *Prunus* spp which could be either blackthorn or cherry.

The sloe bush, as blackthorn is commonly referred to, is a very durable wood and is as strong as oak. It is a thorny shrub found in woods and scrubs on all soil types. In a woodland situation it is more likely to occur in clearings and at the woodland edges.

*Prunus padus/Prunus avium* (Bird /Wild cherry)

The genus *Prunus spp.* includes *Prunus spinosa* (Blackthorn), *Prunus avium* (Wild cherry) and *Prunus padus* (Bird cherry). Wood of the genus *Prunus* can be difficult to differentiate microscopically. Wild cherry and blackthorn are more common in Ireland than bird cherry. There is very little archaeological evidence for the use of cherry wood in Ireland although the wild cherry tree is commonly found in many hedgerows (Nelson 1993, 167). It is a very durable wood and is as strong as oak.

*Quercus* spp (Oak)

Sessile oak *(Quercus petraea)* and pedunculate oak *(Quercus robur)* are both native and common in Ireland and the wood of these species can not be differentiated on the basis of their anatomic characteristics. Pedunculate oak is found growing in areas of heavy clays and loams, particularly where the soil is alkaline. Sessile oak is found on acid soils and often in pure stands. Unlike pedunculate oak, it thrives on well-drained soils but is tolerant of flooding (Beckett 1979, 40-41). Both species of oak grow to be very large trees (30-40m high).

Oak was one of the most prevalent trees growing in Ireland throughout the medieval period. The anglicised form of the Irish name for oak (derry) is included in many townland names today. Out of 62,000 townlands in Ireland about 1,600 contain the word “derry” in one form or another, either as a prefix or suffix (McCracken 1971, 23).

Oak is a dense wood and is very suitable for charcoal production. It also makes good firewood when dried and will grow in wetland areas when conditions are dry. Charcoal was important in pre-historic and Medieval Ireland as it burned hotter and cleaner than wood and was considered superior to wood in that respect. We know from historical sources that the charcoal maker, or collier, was an important figure in Early Medieval Ireland.

Oak also has unique properties of great durability and strength and was frequently used in the manufacture of posts and wooden plank.

*Salix* sp (Willow),

Willow is a very strong wood in tree form and is excellent for the use as posts. It is also a very flexible wood and was commonly used for the construction and weaving of baskets. It is a native species in Ireland and can be found in a tree and shrub form. According to Webb (1971, 160-2) thirteen species of willow are found growing wild in Ireland, of which eight are certainly native. The wood of *salix* trees and shrubs cannot be differentiated to species on the basis of anatomical features.

*Taxus Bacatta* (Yew)

The yew *(Taxus bacatta L.)* is a slow-growing conifer, living as long as 1000 years and reaching 65 feet, they are known for their strength and resistance to the cold. *Taxus bacatta* has a preference for well-drained lime rich soils. It is much less common in recent times because of over harvesting (its hard, springy wood was the source of English longbows). The evergreen needles are very broad, and the seeds are produced in red, berry-like cones. Yews

are toxic; one of the toxic compounds, taxol, is an effective treatment for some cancers. Yew is used for the manufacture of wooden bows, spears and many staves were constructed from yew in the Early Medieval periods.

*Ulmus* spp (Elm)
A few fragments of elm charcoal were identified from the trough fill, the early burnt spreads and the early Neolithic hut sites.

English elm *(Ulmus procera)* and wych elm *(Ulmus glabra)* cannot be separated by their wood structure. As suggested by Mitchell (1986) elm declined (although would not have completely died out) with the advent of farming and possibly elm disease epidemic around 3700BC. It generally prefers damp woods particularly on limestone.

*Cornus Sanguinea* (Dogwood)
A medium sized shrub with reddish twigs. It is found in thickets and rocky places and is more commonly found along the western seaboards and parts of central Ireland.

*Ulex europeas* (Furze, Gorse or Whin)
A bushy shrub with green thorny branchlets. The furze shrub reaches a height of 2-5 feet and contains bright yellow flowers. Furze or gorse is commonly found on heaths, pastures and stony places.

*Hedera Ilex* (Ivy)
Ivy is a woody creeper and climbs by clinging roots. It is a native taxa and is abundantly found on trees, walls and rocks.

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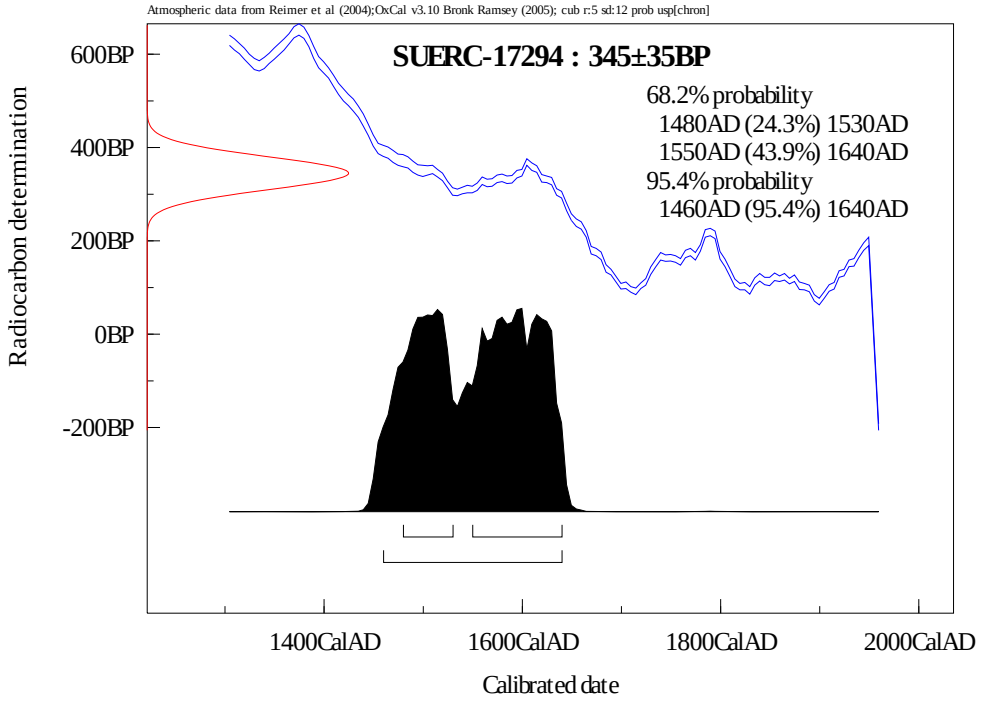
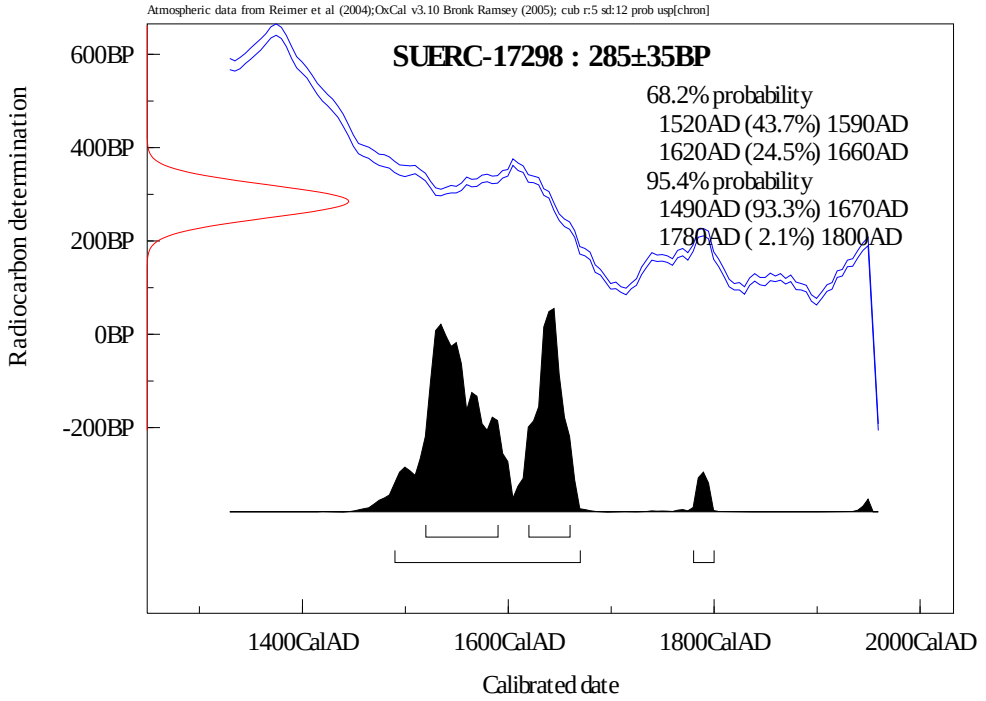
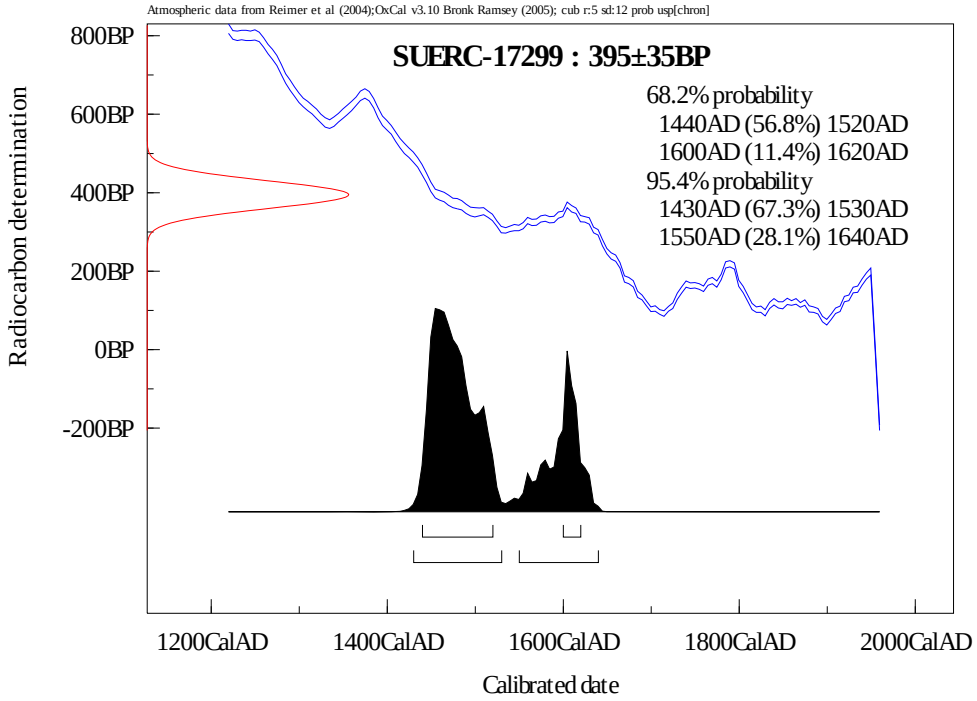
## 10.2 Appendix 2: Radiocarbon dating analysis




| GU No. | Reporting Number | Sample Type | Site | Sample Id | Species Dated | d13C | Age % Modern | Ageerror 1 sigma |
|---|---|---|---|---|---|---|---|---|
| 16152 | SUERC-17294 | Charcoal | Kilcotton 1 | Kilcotton 1:E2187:F17:S3 | Oak | -23.9 | 345 | 35 |




| GU No. | Reporting Number | Sample Type | Site | Sample Id | Species Dated | d13C | Age % Modern | Ageerror 1 sigma |
|---|---|---|---|---|---|---|---|---|
| 16153 | SUERC-17298 | Charcoal | Kilcotton 1 | Kilcotton 1:E2187:F36:S9 | Oak | -23.9 | 285 | 35 |




| GU No. | Reporting Number | Sample Type | Site | Sample Id | Species Dated | d13C | Age % Modern | Ageerror 1 sigma |
|---|---|---|---|---|---|---|---|---|
| 16154 | SUERC-17299 | Charcoal | Kilcotton 1 | Kilcotton 1:E2187:F61:S8 | Oak | -26.0 | 395 | 35 |

Ms. Rachel Sloane Report Date: 8/17/2006

| Sample Data | Measured Radiocarbon Age | 13C/12C Ratio | Conventional Radiocarbon Age(*) |
|---|---|---|---|
| Beta - 218639 | 490 +/- 40 BP | -23.0 o/oo | 530 +/- 40 BP |

SAMPLE: A015/077:F104:S10
ANALYSIS: Radiometric-Standard delivery (with extended counting)
MATERIAL/PRETREATMENT: (charred material): acid/alkali/acid
2 SIGMA CALIBRATIONS : Cal AD 1320 to 1350 (Cal BP 630 to 600) AND Cal AD 1390 to 1440 (Cal BP 560 to 510)

# CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-23:lab. mult=1)

**Laboratory number:** **Beta-218639**

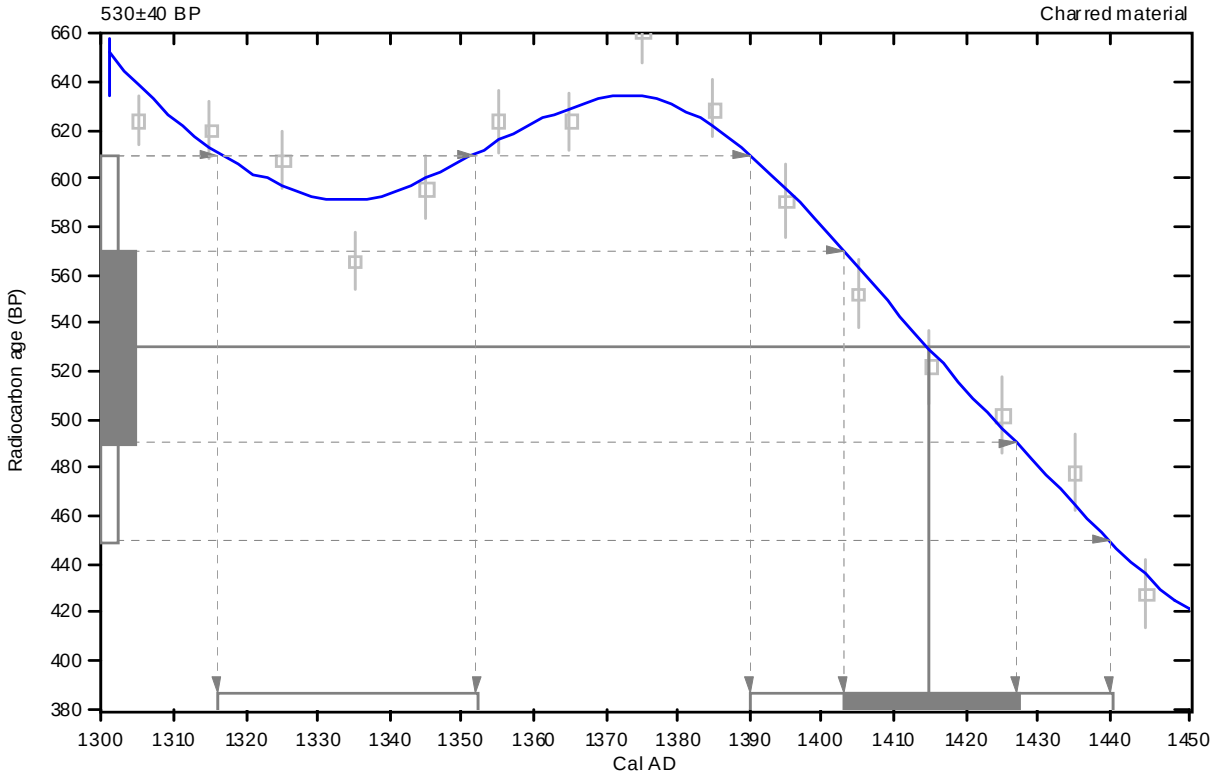
**Conventional radiocarbon age:** **530±40 BP**

**2 Sigma calibrated results: (95% probability)** **Cal AD 1320 to 1350 (Cal BP 630 to 600) and Cal AD 1390 to 1440 (Cal BP 560 to 510)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 1420 (Cal BP 540)

1 Sigma calibrated result: (68% probability) Cal AD 1400 to 1430 (Cal BP 550 to 520)




References:

***Database used***
*INTCAL98*
***Calibration Database***
***Editorial Comment***
*Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii*
***INTCAL98 Radiocarbon Age Calibration***
*Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083*
***Mathematics***
***A Simplified Approach to Calibrating C14 Dates***
*Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322*

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## 10.3 Appendix 3: Tables

**Table 1** List and details of 100 excavated charcoal production pits[1]

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date[2] | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| **1.** | Aghamore | Westmeath | 02E0869 | Emmet Byrnes | Yes | Rectangular | ? | ? | ? | One of three charcoal production pits found on this iron-working site. |
| **2.** | Aghamore | Westmeath | 02E0869 | Emmet Byrnes | Yes | Rectangular | ? | ? | ? | One of three charcoal production pits found on this iron-working site. |
| **3.** | Aghamore | Westmeath | 02E0869 | Emmet Byrnes | Yes | Rectangular | ? | ? | ? | One of three charcoal production pits found on this iron-working site. |
| **4.** | Ardnamullan 1 (C108) (KEK) | Westmeath | 02E1147 | Steve Linnane | Yes | Rectangular | 2.5m x 1.5m x 0.25m | Yes | Cal AD 1020 to 1250[3] | Pit had charcoal rich fills. Wood identification: oak and willow. |
| **5.** | Ardnamullan 1 (C118) (KEK) | Westmeath | 02E1147 | Steve Linnane | Yes | Rectangular | 1.6m x 0.9m x 0.1m | Yes | Cal AD 1030 to 1250[4] | This rectangular pit was not much more than a depression as it had been severely |

[1] Information on these charcoal pits was derived from a variety of sources. This included the excavations database – www.excavations.ie; Hull and Taylor 2006; Grogan, O' Donnell and Johnston (2007); O' Sullivan and Harney 2007; Danaher and Kane 2008a; 2008b and various other ACS preliminary and stratigraphic reports for the M7/ M8 pits. Carlin, Ginn and Kinsella (Forthcoming) along with various excavation reports for the listed KEK sites were also consulted and these were the source of the KEK RC dates and information.

[2] Entries highlighted in blue are charcoal production pits which have been securely dated.

[3] RC date came from the secondary fill of the pit. Sample material: Oak & willow/ *Quercus spp & Salix spp*, Lab code: Beta 177449, (900+-50 BP, Cal AD 1020-1250), 2 sigma.

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date[2] | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | truncated by ploughing activities. Wood identification: oak. |
| **6.** | Ballycorick | Clare | 02E1011 | Graham Hull | Yes | Rectangular | 4.2m x 1.4m x 0.2m | Yes | - | Pit contained a 100% charcoal rich fill. Very large, branch-sized, pieces of charcoal were included. Oak wood. (Grogan et al. 2007) |
| **7.** | Ballynabarny | Wicklow | 02E1304 | William Frazer | Yes | Oval | 1.52m x 1.2m x 0.13m | Yes | - | Altogether four isolated charcoal rich pits exhibiting evidence for *in situ* burning occurred at this site |
| **8.** | Ballynabarny | Wicklow | 02E1304 | William Frazer | Yes | Oval | 0.84m diam. x 0.09m | Yes | - | Altogether four isolated charcoal rich pits exhibiting evidence for *in situ* burning occurred at this site |
| **9.** | Ballynabarny | Wicklow | 02E1304 | William Frazer | Yes | Oval | 1.08m x 1.2m x 0.24m | Yes | - | Altogether four isolated charcoal rich pits exhibiting evidence for *in situ* burning occurred at this site |
| **10.** | Ballynabarny | Wicklow | 02E1304 | William Frazer | Yes | Oval | 2.4m x 1.5x 0.2m | Yes | - | Altogether four isolated charcoal rich pits exhibiting evidence for *in situ* burning occurred at this site |
| **11.** | Barefield | Clare | 04E0052 | M. Casey | Yes | Rectangular | 4m x 1.6m x | Yes | 11th to 12th | Pit contained charcoal rich fills. |

[4] RC date came from the single fill of the pit. Sample material: Oak/ *Quercus spp*, Lab code: Beta 177450 (880+-40 BP, Cal AD 1030-1250), 2 sigma.

[5] I have no detailed information relating to this dated pit, information obtained from Hull and Taylor 2006, 32.

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date[2] | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 0.28m | | centuries [5] | |
| **12.** | Barnasallagh 1 | Laois | M7/ M8 | Anne-Marie Lennon | Yes | Sub-circular | 0.9m x 0.88m x 0.1m | ? | - | Single isolated pit containing high charcoal content, particularly in its primary fill. |
| **13.** | Barnasallagh 3 | Laois | M7/ M8 | Anne-Marie Lennon | Yes | Sub-rectangular | 1.6m x 0.9m x 0.09m | ? | - | Isolated pit - It contained a single fill of charcoal rich soil |
| **14.** | Cahernalough | Clare | 02E1477 | Graham Hull | Yes | Oval | 1.9m x 1.4m x 0.28m | Yes | - | None (isolated). The upper fill of this pit was fine silt which darkened from the surface down. The basal fill was almost pure charcoal. (Grogan et al. 2007) |
| **15.** | Cappakeel 2 | Laois | 03E1048 | Jonathan Dempsey | Yes | Sub-rectangular | 1.27m x 0.97m x 0.9m | Yes | - | A possible hearth base was located 20m to the SSE of the charcoal producing kiln. The kiln had two charcoal rich fills. |
| **16.** | Cappakeel 3 | Laois | 03E1724 | Jonathan Dempsey | Yes | Sub-rectangular | 1.6m x 1.1m x 0.26m | Yes | - | This charcoal manufacturing pit was found along with two other pits and an irregular shaped pit with a slag rich fill (iron-working evidence). |
| **17.** | Cappakeel 4 | Laois | 03E1913 | Tara O' Neill | Yes | Sub-circular | 1.2m x 0.95m x 0.26m | Yes | - | This charcoal pit contained occasional patches of oxidised clay and 10% charcoal. A disturbed kiln (cereal?) was located 17.5m to the SW of the pit. |
| **18.** | Cappanavarnoge | Clare | 02E1156 | Graham Hull | Yes | Oval | 1.7m x 0.7m x | Yes | - | Pit contained silty clay with considerable charcoal and fire- |

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date[2] | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 0.19m | | | reddened clay. (Grogan et al. 2007) |
| **19.** | Charleville | Louth | 97E0475 | Cóilín Ó Drisceoil | Yes | Sub-rectangular | 2.7m x 0.85m x 0.5m | Yes | - | None (isolated). Frequent charcoal inclusions in the pit. |
| **20.** | Curryhills 1 | Kildare | 99E0569 | | Yes | Irregular | 1.74m x 1.14m x 0.13 | Yes – irregularly spread | AD 1005-1185[6] | None (Isolated). Pit was found to contain charred material consisting of ash and charred/ burnt wood fragments |
| **21.** | Delligabaun 1 | Laois | M7/ M8 | Ed Danaher | Yes | Sub-oval | 1.93m x 1.36m x 0.2m | Yes | - | Single isolated pit containing high charcoal content, particularly in its primary fill. This feature is cut by a later linear furrow. Charcoal sent for RC dates. |
| **22.** | Derrinsallagh 4 (C123) | Laois | M7/ M8 | Anne-Marie Lennon | Yes | Oval | 1.3m x 1m x 0.3m | Yes | - | This pit had frequent charcoal inclusions and was located on an extensive Iron Age iron production site. Five charcoal pits in total were found on the site. |
| **23.** | Derrinsallagh 4 (C238) | Laois | M7/ M8 | Anne-Marie Lennon | Yes | Sub-rectangular | 0.7m x 0.4m x 0.2m | Yes | - | Occasional charcoal inclusions. This pit was located on an extensive Iron Age iron production site. Five charcoal pits in total were found on the site. |
| **24.** | Derrinsallagh 4 (C419) | Laois | M7/ M8 | Anne-Marie | Yes | Oval | 1.2m x 0.9m x | Yes (Very | - | Compact charcoal rich fill. This pit was located on an |

[6] I have no detailed information relating to this radiocarbon date, information obtained from O' Sullivan & Harney 2007(EMAP).

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date[2] | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lennon | | | 0.3m | small) | | extensive Iron Age iron production site. Five charcoal pits in total were found on the site. |
| **25.** | Derrinsallagh 4 (C424) | Laois | M7/ M8 | Anne-Marie Lennon | Yes | Sub-rectangular | 2.6m x 2.2m x 0.3m | Yes | - | Moderate to frequent charcoal inclusions. This pit was located on an extensive Iron Age iron production site. Five charcoal pits in total were found on the site. |
| **26.** | Derrinsallagh 4 (C426) | Laois | M7/ M8 | Anne-Marie Lennon | Yes | Oval | 1.24m x 1.1m x 0.36m | Yes | - | Occasional charcoal inclusions. This pit was located on an extensive Iron Age iron production site. Five charcoal pits in total were found on the site. |
| **27.** | Griffinstown 3 (KEK) | Westmeath | 02E1144 | Steven Linnane | Yes | Rectangular | 1.3m x 0.95m x 0.12m | ? | - | Other features associated with metalworking found on the site. |
| **28.** | Hardwood 2 (C010) (KEK) | Meath | 02E1140 | Deirdre Murphy | Yes | Rectangular | 2.2m x 1.2m | Yes | - | This pit had rounded corners. Three other charcoal pits were excavated on this site along with a possible bowl furnace. |
| **29.** | Hardwood 2 (C029) (KEK) | Meath | 02E1140 | Deirdre Murphy | Yes | Rectangular | 2.4m x 1.4m x 0.25m | Yes | - | Three other charcoal pits were excavated on this site along with a possible bowl furnace. Possible furnace dated to Cal AD 1020 to 1210. |
| **30.** | Hardwood 3 (KEK) | Meath | 02E1141 | Deirdre Murphy | Yes | Rectangular | 2.8m x 1.15m | Yes | Cal AD 770 to | This rectangular pit had rounded corners and contained |

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date[2] | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | x 0.27m | | 970/ 720 to 960[7] | carbonised lengths of wood running along the axis of the pit. The wood came from tree branches which had not been worked and almost accounted for 100% of the deposit within the pit. This charcoal pit occurred on a site with multi-period metalworking activity. |
| **31.** | Kilbreckan | Clare | 02E1060 | Graham Hull | Yes | Oval | 3.3m x 1.4m x 0.15m | Yes | - | None (Isolated). (Grogan et al 2007) |
| **32.** | Kilbrien 2 | Cork | 03E1089 | Eamonn Cotter | Yes | Circular | 1m x 0.1m | Yes | - | This pit was found to contain layers of charcoal. A cluster of three stake-holes occurred nearby to the pit. |
| **33.** | Kilcotton 1 (F006) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-circular | 1.8m x 1.4m x 0.24m | Yes | - | Primary fill 75% charcoal. |
| **34.** | Kilcotton 1 (F010) | Laois | M7/ M8 | Ed Danaher | Yes | Circular | 1.6m x 1.4m x 0.09-0.2m | Yes | - | Frequent charcoal inclusions. |
| **35.** | Kilcotton 1 (F014) | Laois | M7/ M8 | Ed Danaher | Yes | Circular | 1.4m x 1.3m x 0.07m | Yes | - | Primary fill 80-90% charcoal. |
| **36.** | Kilcotton 1 | Laois | M7/ M8 | Ed | Yes | Sub-circular | 0.90m | Yes | - | Primary fill 90% charcoal. |

[7] RC dates came from the primary and secondary fills of the pit- these appear to both represent 1 use of the pit. Sample material: Alder/ alnus glutinosa, Lab code: Beta 177446, (1190+-40 BP, Cal AD 720 to 1160/ 770 to 970), 2 sigma.

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date[2] | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| | (F016) | | | Danaher | | | x 0.75m x 0.08m | | | |
| **37.** | Kilcotton 1 (F018) | Laois | M7/ M8 | Ed Danaher | Yes | Circular | 0.72m x 0.72m x 0.11m | Yes | - | Primary fill 95% charcoal. Feature is cut by a furrow. |
| **38.** | Kilcotton 1 (F020) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-rectangular | 1.1m x 0.8m x 0.05m | Yes | - | Primary fill 90% charcoal. |
| **39.** | Kilcotton 1 (F040) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-circular | 2.28m x 1.61m x 0.05-0.23m | Yes | - | 15% charcoal in pit fill |
| **40.** | Kilcotton 1 (F044) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-circular | 1.1m x 0.8m x 0.03-0.09m | Yes | - | Very shallow pit. It contained 60% charcoal. |
| **41.** | Kilcotton 1 (F046) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-circular | 1.73m x 1.3m x 0.17-0.39m | Yes | - | Pit contained a thin charcoal basal layer. Feature truncated by a furrow |
| **42.** | Kilcotton 1 (F054) | Laois | M7/ M8 | Ed Danaher | Yes | Circular | 1.44m x 1.37m x 0.24m | Yes | - | Fill contained frequent charcoal |
| **43.** | Kilcotton 1 (F058) | Laois | M7/ M8 | Ed Danaher | Yes | Oval | 1.6m x 0.94m | Yes | - | Primary context 30% charcoal |

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date[2] | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | x 0.06-0.28m | | | |
| **44.** | Kilcotton 1 (F062) | Laois | M7/ M8 | Ed Danaher | Yes | Circular | 1.85m x 1.65m x 0.18m | Yes | - | Frequent dark firm charcoal inclusions. Two stake-holes recorded in the pit base. |
| **45.** | Kilcotton 1 (F068) | Laois | M7/ M8 | Ed Danaher | Yes | Circular | 1.6m x 1.5m x 0.23m | Yes | - | Frequent charcoal inclusions in fills |
| **46.** | Kilcotton 1 (F074) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-circular | 1.8m x 1.16m x 0.2m | Yes | | Charcoal filled fill. Pit not fully excavated – ran under baulk. |
| **47.** | Kilcotton 1 (F076) | Laois | M7/ M8 | Ed Danaher | Yes | Oval | 0.52m x 0.4m x 0.08m | Yes | | Shallow pit feature with occasional charcoal |
| **48.** | Kilcotton 1 (F080) | Laois | M7/ M8 | Ed Danaher | Yes | Circular | 1.78-2.35m x 2.09m x 0.37m | Yes | - | Frequent charcoal inclusions |
| **49.** | Kilcotton 1 (F082) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-circular | 1.12m x 1.01m x 0.13m | Yes | - | Frequent charcoal inclusions |
| **50.** | Kilcotton 1 (F087) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-circular | 0.93m x 0.8m x 0.05m | Yes | - | Very shallow pit feature. Frequent charcoal inclusions |

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date[2] | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| **51.** | Kilcotton 1 (F089) | Laois | M7/ M8 | Ed Danaher | Yes | Circular | 1m x 1m x 0.03m | Yes | - | Very shallow pit feature. Frequent charcoal inclusions |
| **52.** | Kilcotton 1 (F091) | Laois | M7/ M8 | Ed Danaher | Yes | Circular | 2.08m x 1.73m x 0.22m | Yes | - | Frequent charcoal inclusions |
| **53.** | Kilcotton 1 (F093) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-rectangular | 2.04m x 1.31-1.44m | Yes | - | Frequent charcoal inclusions |
| **54.** | Kilcotton 1 (F097) | Laois | M7/ M8 | Ed Danaher | Yes | Circular | 1.37m x 1.25m 0.08-0.12m | Yes | - | Shallow pit feature. Primary fill charcoal lens |
| **55.** | Kilcotton 1 (F101) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-circular | 1.74m x 1.34m x 0.2m | Yes | - | Primary fill charcoal layer with frequent charcoal throughout the secondary layer |
| **56.** | Kilcotton 1 (F103) | Laois | M7/ M8 | Ed Danaher | Yes | Circular | 1.53m x 1.40m x 0.07m | Yes | - | Shallow pit feature. Moderate charcoal inclusions |
| **57.** | Kilcotton 1 (F106) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-circular | 1.68m x 1.68m x 0.24m | Yes | - | Primary fill – firm charcoal layer. Charcoal inclusions throughout the secondary layer |
| **58.** | Kilcotton 1 (F108) | Laois | M7/ M8 | Ed Danaher | Yes | Oval | 0.94m x | Yes | - | Very shallow feature. Frequent charcoal inclusions |

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date[2] | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 0.66m x 0.04m | | | |
| **59.** | Kilcotton 1 (F110) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-rectangular | 2.7m x 1.2-1.35m x 0.28m | Yes | - | Rounded corners. Primary fill charcoal layer. |
| **60.** | Kilcotton 1 (F117) | Laois | M7/ M8 | Ed Danaher | Yes | Rectangular | 1.97m x 1.2m x 0.18m | Yes | - | Primary fill charcoal layer. |
| **61.** | Kilcotton 1 (F127) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-circular | 1.7m x 1.4m x 0.69m | Yes | - | Primary fill charcoal layer |
| **62.** | Kilcotton 1 (F135) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-oval | 3m x 2.04m x 0.23m | Yes | - | Moderate charcoal inclusions |
| **63.** | Kilcotton 2 (F009) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-oval | 2.3m x 1.22m x 0.09m | Yes | - | Frequent charcoal inclusions. |
| **64.** | Kilcotton 2 (F010) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-oval | 1.51m x 1.36m x 0.05m | Yes | - | Occasional charcoal inclusions (charcoal layer) |
| **65.** | Kilcotton 2 (F011) | Laois | M7/ M8 | Ed Danaher | Yes | Oval | 1.64m x 1.02m x | Yes | - | Basal layer – charcoal filled layer. |

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date[2] | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 0.19m | | | |
| **66.** | Kilcotton 2 (F015) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-oval | 1.50m x 0.80m x 0.13m | Yes | - | Frequent charcoal – basal layer |
| **67.** | Kilcotton 2 (F017) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-circular | 0.82m x 0.70m x 0.16m | Yes | - | Frequent charcoal in basal layer |
| **68.** | Kilcotton 2 (F040) | Laois | M7/ M8 | Ed Danaher | Yes | Circular | 1.04m x 1.04m x 0.04m | Yes | - | Frequent charcoal in basal layer |
| **69.** | Kilcotton 2 (F056) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-oval | 1.15m x 0.91m x 0.10m | Yes | - | Frequent charcoal in the basal charcoal layer |
| **70.** | Kilcotton 2 (F060) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-oval | 1.23m x 1.10m x 0.11m | Yes | - | Frequent charcoal in the basal charcoal layer. Surrounded by six stake-holes. |
| **71.** | Kilcotton 2 (F073) | Laois | M7/ M8 | Ed Danaher | Yes | Sub-circular | 1.68m x 1.6m x 0.22m | Yes | - | Secondary fill – charcoal layer. |
| **72.** | Kilmacredock Upper | Kildare | 01E0306 | Fiona Reilly | Yes | Circular | ? | Yes | - | This pit was filled with a charcoal deposit |

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date[2] | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| **73.** | Kilmaniheen West (Pit 1) | Kerry | 04E0964 | Hull and Taylor (2006) | Yes | Sub-rectangular | 1.8m x 0.8m x 0.28m | Yes | Cal AD 810 to 840/ Cal AD 860 to 1030[8] | The primary fill of this pit had a deposit of 80% charcoal (This pit occurred on a site containing at least 16 identifiable charcoal production pits). |
| **74.** | Kilmaniheen West (Pit 10) | Kerry | 04E0964 | Hull and Taylor (2006) | Yes | Sub-rectangular | 3.8m x 1.25m x 0.24m | Yes | - | Primary deposit contained 80% charcoal with some very large chunks. Feature had rounded corners (This pit occurred on a site containing at least 16 identifiable charcoal production pits). |
| **75.** | Kilmaniheen West (Pit 11) | Kerry | 04E0964 | Hull and Taylor (2006) | Yes | Sub-rectangular | 3.88m x 1.18m x 0.2m | Yes | - | Primary deposit contained 60% charcoal (This pit occurred on a site containing at least 16 identifiable charcoal production pits). |
| **76.** | Kilmaniheen West (Pit 12) | Kerry | 04E0964 | Hull and Taylor (2006) | Yes | Sub-rectangular/ Oval | 1.9m x 1.2m x 0.21m | Yes | Cal AD 990 to 1160[9] | Primary deposit contained 60% charcoal, with some large chunks (This pit occurred on a site containing at least 16 identifiable charcoal production pits). |

[8] RC date came from the primary fill of the pit. Sample material: Quercus, Lab code: Beta-194572, (1080+-60 BP, Cal AD 810 to 840/ Cal AD 860 to 1030), 2 sigma (95%).

[9] RC date came from the primary fill of the pit. Sample material: Alnus/ Corylus, Lab code: Beta-207373, (980+-40 BP, Cal AD 990 to 1160), 2 sigma (95%).

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date[2] | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| **77.** | Kilmaniheen West (Pit 13) | Kerry | 04E0964 | Hull and Taylor (2006) | Yes | Sub-rectangular | 2.8m x 1.32m x 0.12m | Yes | - | Primary deposit contained 60% charcoal (This pit occurred on a site containing at least 16 identifiable charcoal production pits). Traces of *in situ* burning inside and outside the pit. |
| **78.** | Kilmaniheen West (Pit 14) | Kerry | 04E0964 | Hull and Taylor (2006) | Yes | Sub-rectangular | 2.72m x 1.4m x 0.22m | Yes | - | Primary deposit contained 60% charcoal (This pit occurred on a site containing at least 16 identifiable charcoal production pits). |
| **79.** | Kilmaniheen West (Pit 15) | Kerry | 04E0964 | Hull and Taylor (2006) | Yes | Oval | 1.94m x 0.94m x 0.2m | Yes | - | Primary deposit contained 60% charcoal (This pit occurred on a site containing at least 16 identifiable charcoal production pits). |
| **80.** | Kilmaniheen West (Pit 16) | Kerry | 04E0964 | Hull and Taylor (2006) | Yes | Sub-rectangular | 2.6m x 0.85 x 0.45m | Yes | - | Very thin primary deposit contained 80% charcoal (This pit occurred on a site containing at least 16 identifiable charcoal production pits). |
| **81.** | Kilmaniheen West (Pit 2) | Kerry | 04E0964 | Hull and Taylor (2006) | Yes | Oval | 2.1m x 1.4m x 0.12m | Yes | - | This feature was truncated by machine work (This pit occurred on a site containing at least 16 identifiable charcoal production pits). |
| **82.** | Kilmaniheen West (Pit 3) | Kerry | 04E0964 | Hull and Taylor (2006) | Yes | Sub-circular | 0.98m x 0.8m x 0.12m | Yes | - | This pit had a single fill containing at least 80% charcoal (This pit occurred on a site containing at least 16 |

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date[2] | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | identifiable charcoal production pits). |
| **83.** | Kilmaniheen West (Pit 4) | Kerry | 04E0964 | Hull and Taylor (2006) | Yes | Sub-rectangular (elongated) | 3.8m x 1m x 0.1m | Yes | - | The secondary fill of this feature contained 60% charcoal (This pit occurred on a site containing at least 16 identifiable charcoal production pits). |
| **84.** | Kilmaniheen West (Pit 7) | Kerry | 04E0964 | Hull and Taylor (2006) | Yes | Oval (elongated) | 2.3m x 0.95m x 0.08m | Yes | - | Charcoal deposit in the primary context (This pit occurred on a site containing at least 16 identifiable charcoal production pits). |
| **85.** | Kilmaniheen West (Pit 8) | Kerry | 04E0964 | Hull and Taylor (2006) | Yes | Oval | 1.3m x 0.9m x 0.15m | Yes | - | (This pit occurred on a site containing at least 16 identifiable charcoal production pits). |
| **86.** | Kilmaniheen West (Pit 9) | Kerry | 04E0964 | Hull and Taylor (2006) | Yes | Sub-rectangular | 3.75 x 1.32m x 0.3m | Yes | - | Primary fill contained 60% charcoal and chunks of burnt clay. Feature had rounded corners (This pit occurred on a site containing at least 16 identifiable charcoal production pits). |
| **87.** | Kilquane | Clare | 02E1176 | Edmond O'Donovan | Yes | Rectangular | 1.22m x 0.8m x 0.12m | Yes | - | This was an isolated pit. The base and sides of this pit were lined with a thin layer of fire-reddened clay. A deposit of brown sandy silt (30%) containing a very large quantity of charcoal (70%) lay above the fire-reddened clay. |

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date[2] | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| **88.** | Kinnegad 2 (KEK) | Westmeath | 02E0926 | Deirdre Murphy | Yes | Circular | 1.3m x 0.2 | Yes | - | Only a very thin layer of charcoal was excavated in this pit. A series of features, some dated to the later prehistoric era, were uncovered across the site. |
| **89.** | Lisheen | Clare | 02E1063 | Graham Hull | Yes | Oval | 1.4m x 1.05m x 0.05m | Yes | - | Pit was truncated by the topsoil stripping and was prob. 0.1m deep. |
| **90.** | Mondaniel 2 (C008) | Cork | 03E0985 | Eamonn Cotter | Yes | Circular | 1.2m (diam.) x 0.15m | Yes | Cal AD 1280 to 1420[10] | The primary context contained a layer of dense charcoal. Oak wood sampled. (Four charcoal production pits were uncovered at this site in total). |
| **91.** | Mondaniel 2 (C047) | Cork | 03E0985 | Eamonn Cotter | Yes | Circular | 0.45m (diam.) x 0.07m | Yes | - | Its single fill had a high charcoal content. It was much smaller than the 3 other charcoal prod. Pits found on the site, but it was quite similar. |
| **92.** | Mondaniel 2 (C057) | Cork | 03E0985 | Eamonn Cotter | Yes | Oval | 1.74m x 0.57m x 0.21m | Yes | - | This pit contained a frequent charcoal content. Its shallowness is most likely due to agricultural activities having truncated it (Four charcoal production pits were uncovered at this site in total). |

[10] RC date came from the lower fill of the pit. Sample material: Oak/ *Quercus spp*, Lab code: Beta 201038 (630+-50 BP, Cal AD 1280-1420), 2 sigma.

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date[2] | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| **93.** | Mondaniel 2 (C107) | Cork | 03E0985 | Eamonn Cotter | Yes | Sub-circular | 1.2m x 0.88m x 0.05m | Yes | - | This pit contained a very high charcoal content (Four charcoal production pits were uncovered at this site in total). |
| **94.** | Newcastle 2 (KEK) | Meath | 02E1093 | Rob O' Hara | Yes | Sub-rectangular | 3.7m x 1.6m x 0.26m | Yes | Cal AD 1050 to 1270[11] | Four small stake-holes were cut into the base of the pit and these were positioned in a rough diamond shape in the centre of the pit. Dense layers of pure charcoal were found in the pit, along with some intact pieces of wood resembling planking. A bowl furnace and other features associated with metalworking were found on site and these were dated contemporary to the charcoal pit. |
| **95.** | Rossan 3 (KEK) | Meath | 02E1065 | Deirdre Murphy | Yes | Sub-rectangular | 2m x 1.2m x 0.15m | Yes | Cal AD 1030 to 1280[12] | The primary fill of this pit contained frequent inclusions of charcoal. Prehistoric activity on site. |
| **96.** | Shallon 1 | Meath | 01E0195 | Ian Russell | Yes | Sub-rectangular | 1.02m x 0.7m | Yes | - | The charcoal pit was located close to a possible bowl |

[11] RC date came from a primary fill of the pit. Sample material: Oak/ *Quercus spp*, Lab code: Beta 177441 (850+-40 BP, Cal AD 1050-1270), 2 sigma.

[12] RC date came from the primary fill of the pit. Sample material: Oak/ *Quercus spp*, Lab code: Beta 177430 (840+-60 BP, Cal AD 1030-1280), 2 sigma.

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date[2] | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | x 0.18m | | | furnace which was radiocarbon dated to Cal. AD 240–540 (1660 ± 60 BP) – the Late Iron Age/ Early Christian period. |
| **97.** | Stonehousefarm 3 | Westmeath | ? | Conor McDermott (IAWU) | Yes | Oval | 1.9m x 1m x 0.14m | Yes | - | Single fill of loose black charcoal. 2 charcoal pits were found at this site. |
| **98.** | Stonehousefarm 3 | Westmeath | ? | Conor McDermott (IAWU) | Yes | Sub-rectangular | 2.4m x 1.33m x 0.39m | Yes | | Single fill of loose black charcoal. **A single large piece of charcoal retained a tool mark.** 2 charcoal pits were found at this site. |
| **99.** | Trumra 1 | Laois | M7/ M8 | Aidan O' Connell | Yes | Sub-circular | 1.5m x 1.4m x 0.15m | Unknown | - | This pit was isolated and its primary fill consisted of charcoal rich inclusions |
| **100.** | Trumra 3 | Laois | M7/ M8 | Tara O' Neill | Yes | Sub-rectangular | 2.4m x 1.36m x 0.28m | Unknown | - | This pit was isolated. Its primary fill consisted of well compacted black fibrous charcoal – this was sealed by a grey silty ash. |

**Table 2** Breakdown of the different types/ shapes of charcoal production pits

| | |
|---|---|
| Oval | 21 |
| Sub-oval | 7 |
| **Total Oval/ Sub-oval** | **28** |
| Circular | 17 |
| Sub-circular | 18 |
| **Total Circular/ Sub-circular** | **35** |
| Rectangular | 13 |
| Sub-rectangular | 22 |
| **Total rectangular/ sub-rectangular** | **35** |
| Other | 2 |
| **Total number of charcoal production pits** | **100** |

**Table 3** Average size of different shaped charcoal production kilns

| | |
|---|---|
| Rectangular/ Sub-rectangular | 2.42 x 1.17 x 0.24 |
| Oval/ sub-oval | 1.70 x 1.13 x 0.16 |
| Circular/ Sub-circular | 1.39 x 1.22 x 0.33 |

**Table 4** List of dated charcoal production pits[13]

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. | Kilmaniheen West (Pit 12) | Kerry | 04E0964 | Hull and Taylor (2006) | Yes | Sub-rectangular/ Oval | 19m x 1.2m x 0.21m | Yes | Cal AD 990 to 1160[14] | Primary deposit contained 60% charcoal, with some large chunks (This pit occurred on a site containing at least 16 identifiable charcoal production pits). |
| 2. | Kilmaniheen West (Pit 1) | Kerry | 04E0964 | Hull and Taylor (2006) | Yes | Sub-rectangular | 1.8m x 0.8m x 0.28m | Yes | Cal AD 810 to 840/ Cal AD 860 to 1030[15] | The primary fill of this pit had a deposit of 80% charcoal (This pit occurred on a site containing at least 16 identifiable charcoal production pits). |
| 3. | Hardwood 3 (KEK) | Meath | 02E1141 | Deirdre Murphy | Yes | Rectangular | 2.8m x 1.15m x | Yes | Cal AD 770 to | This rectangular pit had rounded corners and |

[13] Entries highlighted in red are from possible (not definite) charcoal production pits. Information regarding *in situ* burning was absent for these features- casting doubt over their interpretation as charcoal production pits. See Table 1 footnote regarding source of information in this table.

[14] RC date came from the primary fill of the pit. Sample material: Alnus/ Corylus, Lab code: Beta-207373, (980+-40 BP, Cal AD 990 to 1160), 2 sigma (95%).

[15] RC date came from the primary fill of the pit. Sample material: Quercus, Lab code: Beta-194572, (1080+-60 BP, Cal AD 810 to 840/ Cal AD 860 to 1030), 2 sigma (95%).

[16] RC dates came from the primary and secondary fills of the pit- these appear to both represent 1 use of the pit. Sample material: Alder/ alnus glutinosa, Lab code: Beta 177446, (1190+-40 BP, Cal AD 720 to 1160/ 770 to 970), 2 sigma.

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 0.27m | | 970/ 720 to 960[16] | contained carbonised lengths of wood running along the axis of the pit. The wood came from tree branches which had not been worked and almost accounted for 100% of the deposit within the pit. This charcoal pit occurred on a site with multi-period metalworking activity. |
| 4. | Mondaniel 1 (C005) | Cork | 03E0981 | Eamonn Cotter | Possible | Circular | 1m x 0.9m x 0.1m | No | Cal AD 1420 to 1640[17] | The primary layer in this pit consisted of a layer of dense charcoal. Oak wood. Two possible charcoal pits were uncovered at this site. |
| 5. | Mondaniel 2 (C008) | Cork | 03E0985 | Eamonn Cotter | Yes | Circular | 1.2m (diam.) x 0.15m | Yes | Cal AD 1280 to 1420[18] | The primary context contained a layer of dense charcoal. Oak wood sampled. (Four charcoal production pits were uncovered at this site in total). |
| 6. | Newcastle 2 | Meath | 02E1093 | Rob O' | Yes | Sub- | 3.7m x | Yes | Cal AD | Four small stake-holes were |

[17] RC date came from the secondary fill of the pit. Sample material: Oak/ *Quercus spp*, Lab code: Beta 201037 (400+-60 BP, Cal AD 1420-1640), 2 sigma.

[18] RC date came from the lower fill of the pit. Sample material: Oak/ *Quercus spp*, Lab code: Beta 201038 (630+-50 BP, Cal AD 1280-1420), 2 sigma.

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| | (KEK) | | | Hara | | rectangular | 1.6m x 0.26m | | 1050 to 1270[19] | cut into the base of the pit and these were positioned in a rough diamond shape in the centre of the pit. Dense layers of pure charcoal were found in the pit, along with some intact pieces of wood resembling planking. A bowl furnace and other features associated with metalworking were found on site and these were dated contemporary to the charcoal pit. |
| 7. | Rossan 3 (KEK) | Meath | 02E1065 | Deirdre Murphy | Yes | Sub-Rectangular | 2m x 1.2m x 0.15m | Yes | Cal AD 1030 to 1280[20] | The primary fill of this pit contained frequent inclusions of charcoal. Prehistoric activity on site. |
| 8. | Ardnamullan 1 (C118) (KEK) | Westmeath | 02E1147 | Steve Linnane | Yes | Rectangular | 1.6m x 0.9m x 0.1m | Yes | Cal AD 1030 to 1250[21] | This rectangular pit was not much more than a depression as it had been |

[19] RC date came from a primary fill of the pit. Sample material: Oak/ *Quercus spp*, Lab code: Beta 177441 (850+-40 BP, Cal AD 1050-1270), 2 sigma.

[20] RC date came from the primary fill of the pit. Sample material: Oak/ *Quercus spp*, Lab code: Beta 177430 (840+-60 BP, Cal AD 1030-1280), 2 sigma.

[21] RC date came from the single fill of the pit. Sample material: Oak/ *Quercus spp*, Lab code: Beta 177450 (880+-40 BP, Cal AD 1030-1250), 2 sigma.

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | severely truncated by ploughing activities. Wood identification: oak. |
| 9. | Ardnamullan 1 (C108) (KEK) | Westmeath | 02E1147 | Steve Linnane | Yes | Rectangular | 2.5m x 1.5m x 0.25m | Yes | Cal AD 1020 to 1250[22] | Pit had charcoal rich fills. Wood identification: oak and willow. |
| 10. | Curryhills 1 | Kildare | 99E0569 | | Yes | Irregular | 1.74m x 1.14m x 0.13 | Yes – irregularly spread | AD 1005-1185[23] | None (Isolated). Pit was found to contain charred material consisting of ash and charred/ burnt wood fragments |
| 11. | Barrees | Cork | 02E0914 | William O' Brien | Possible | Oval | 4.4m x 3.3m x 0.55m | ? | 585±20 BP (GrN-28305) | This pit contained a waterlogged peaty fill with preserved branches and twigs This layer overlay a compact layer of charcoal. The charcoal layer was radiocarbon dated to 585±20 BP suggesting a later medieval context. This charcoal production pit may be a large roasting pit. |

[22] RC date came from the secondary fill of the pit. Sample material: Oak & willow/ *Quercus spp & Salix spp*, Lab code: Beta 177449, (900+-50 BP, Cal AD 1020-1250), 2 sigma.

[23] Have no detailed information relating to this radiocarbon date, information obtained from O' Sullivan & Harney 2007(EMAP).

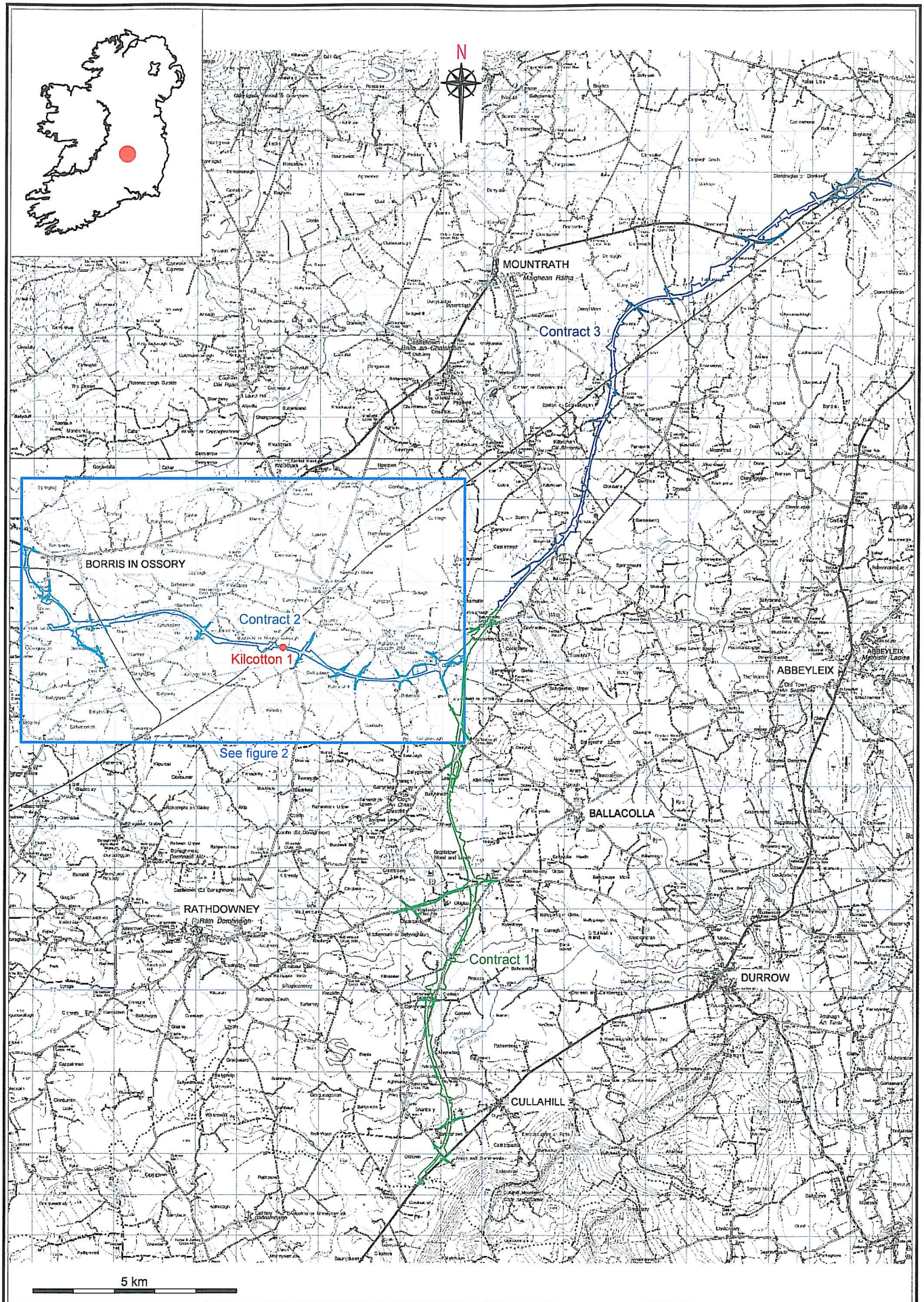
| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| 12. | Barefield | Clare | 04E0052 | M. Casey | Yes | Rectangular | 4m x 1.6m x 0.28m | Yes | 11th to 12th centuries [24] | Pit contained charcoal rich fills. |
| 13. | Delligabaun 1 | Laois | E2232 | E. Danaher | Yes | Sub-oval | 1.93m x 1.36m x 0.20m | Yes | Cal AD 860 to 1020 | Frequent charcoal and occasional large stone inclusions. Wood identification: Pomoideae (apple). |
| 14. | Kilcotton 1 (F36:S9) | Laois | E2187 | E. Danaher | Yes | Sub-circular | 1.20m x 0.91m x 0.04m | Yes | Cal AD 1490 to 1670 | Frequent charcoal inclusions. Wood identification: Quercus (oak) |
| 15. | Kilcotton 1 (F61:S8) | Laois | E2187 | E. Danaher | Yes | Circular pit | 1.85m x 1.65m x 0.18m | Yes | Cal AD 1430 to 1640AD | Frequent charcoal and occasional small stone inclusions. Wood identification: Quercus (oak). |
| 16. | Kilcotton 1 (C104:S10) | Laois | E2187 | E. Danaher | Yes | Sub-circular | 2.08m x 1.73m x 0.22m | Yes | Cal AD 1320 to 1350 & Cal AD 1390 to 1440 | Frequent charcoal and occasional small stone inclusions. Wood identification: Quercus (oak). |
| 17. | Kilcotton 1 (F17:S3) | Laois | E2187 | E. Danaher | Yes | Circular | 0.72m x 0.72m x 0.11m | Yes | Cal AD 1460 to 1640 | Frequent charcoal and occasional small stone inclusions. Wood |

[24] Have no detailed information relating to this dated pit, information obtained from Hull and Taylor 2006, 32.

| No. | Site name/ Townland | County | Excavation No. | Director | Charcoal production pit | Pit shape | Dims | *In situ* burning | Date | Associated features/ site type. Comments on fill. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | identification: Quercus (oak). |
| 18. | Kilcotton 2 (F39:S5) | Laois | E2188 | E. Danaher | Yes | Sub-oval | 1.50m x 0.80m x 0.13m | Yes | Cal AD 980 to 1160 | Frequent charcoal and occasional small stone inclusions. Wood identification: Quercus (oak). |
| 19. | Kilcotton 2 (F48:S7) | Laois | E2188 | E. Danaher | Yes | Circular | 0.70-0.75m x 0.70-0.75m x 0.04m | Yes | Cal AD 1460 to 1640 | Frequent charcoal inclusions. Wood identification: Quercus (oak) |
| 20. | Kilcotton 2 | Laois | E2188 | E. Danaher | Yes | Circular | 1.94m x 1.94m x 0.22m | Yes | Cal AD 1470 to 1650 | Frequent charcoal and occasional small stone inclusions. Wood identification: Willow. |

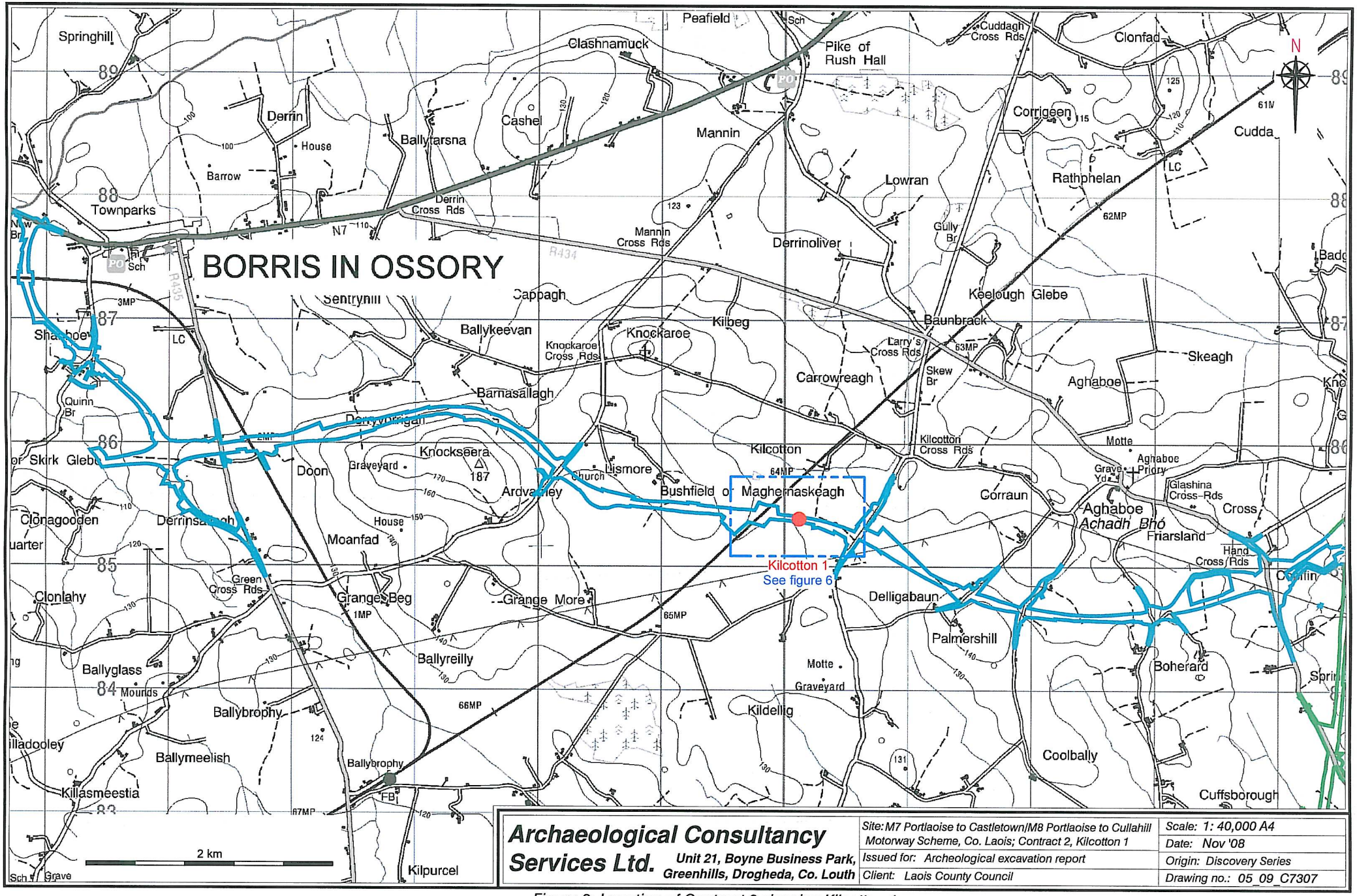
## 10.4 Appendix 4: Archive Contents

| Table …. Site Archive (Basic) Summary | | | |
|---|---|---|---|
| Site Name: Kilcotton 1 | | Record No.: E2187 – Scheme No.: A015/077 | |
| Type | Description | Quantity | Notes |
| Contexts | Validated contexts from excavation | 140 | All contexts sheets have been checked and cross-referenced. |
| Plans | 'A2' 1:50 (no. of sheets) | 4 | Post-ex plan. |
| Sections | 'A2' 1:10 (no. of sheets) | 57 | |
| Photographs | | 23 | Colour Print |
| Registers | Plan Register<br>Photographic Register<br>Finds Register<br>Sample Register | 1<br>1<br>1<br>1 | All Registers have been checked and cross-referenced. |
| Diaries | Director's Diary | 1 | All Diaries have been checked and cross-referenced. |




| | | |
|---|---|---|
| **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, Kilcotton 1 | Scale: 1: 125,000 A4 |
| | | Date: Nov '08 |
| | Issued for: Archaeological excavation report | Origin: ACS Ltd |
| | Client: Laois County Council | Drawing no.: 05_09_C7306 |

*Figure 1: Location of M7/M8 Motorway Scheme showing location of Kilcotton 1*




| | | |
|---|---|---|
| **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, Kilcotton 1 | Scale: 1: 40,000 A4 |
| | Issued for: Archeological excavation report | Date: Nov '08 |
| | Client: Laois County Council | Origin: Discovery Series |
| | | Drawing no.: 05_09_C7307 |

*Figure 2: Location of Contract 2 showing Kilcotton 1*

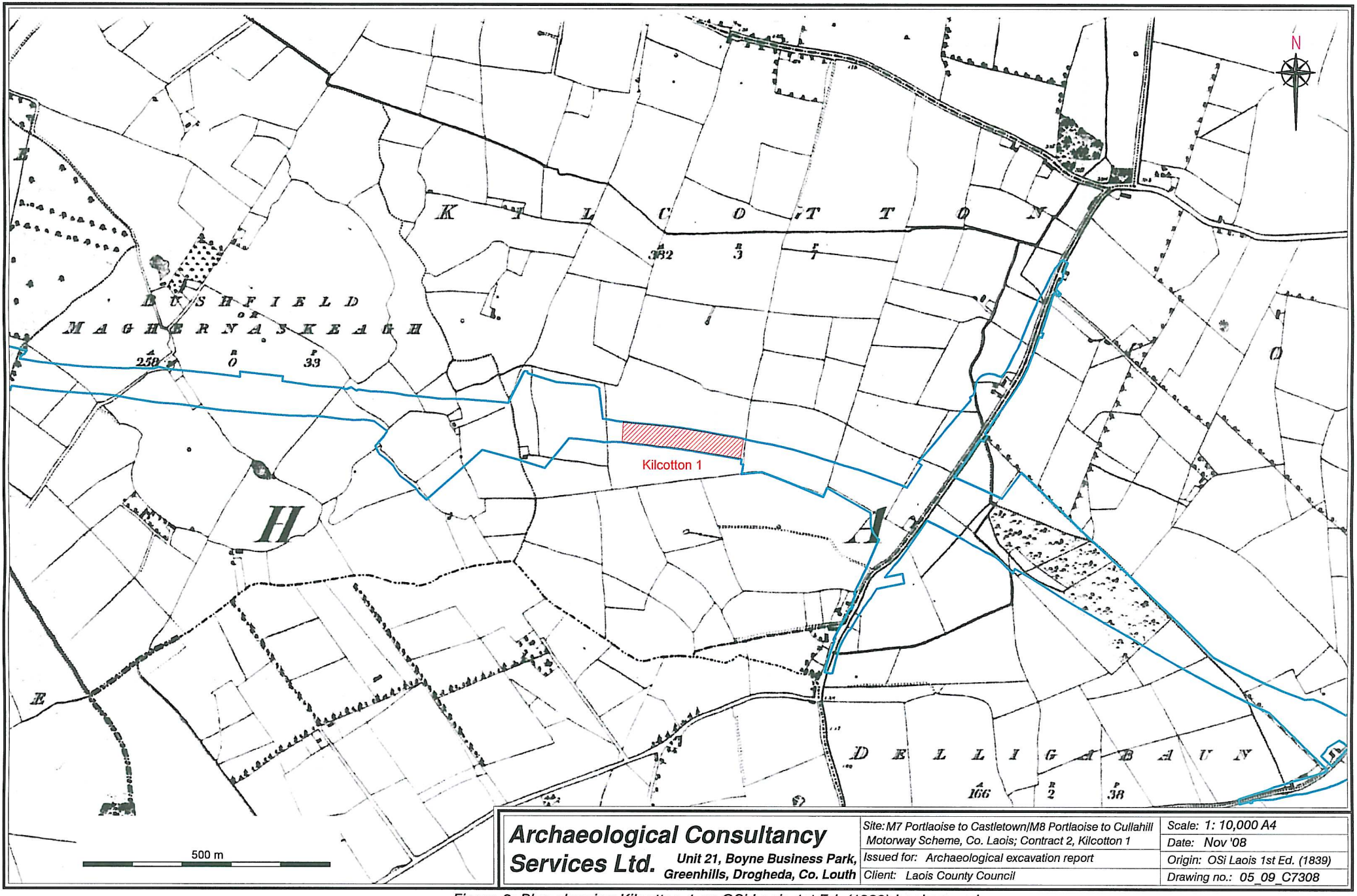



*Figure 3: Plan showing Kilcotton 1 on OSi Laois 1st Ed. (1839) background*

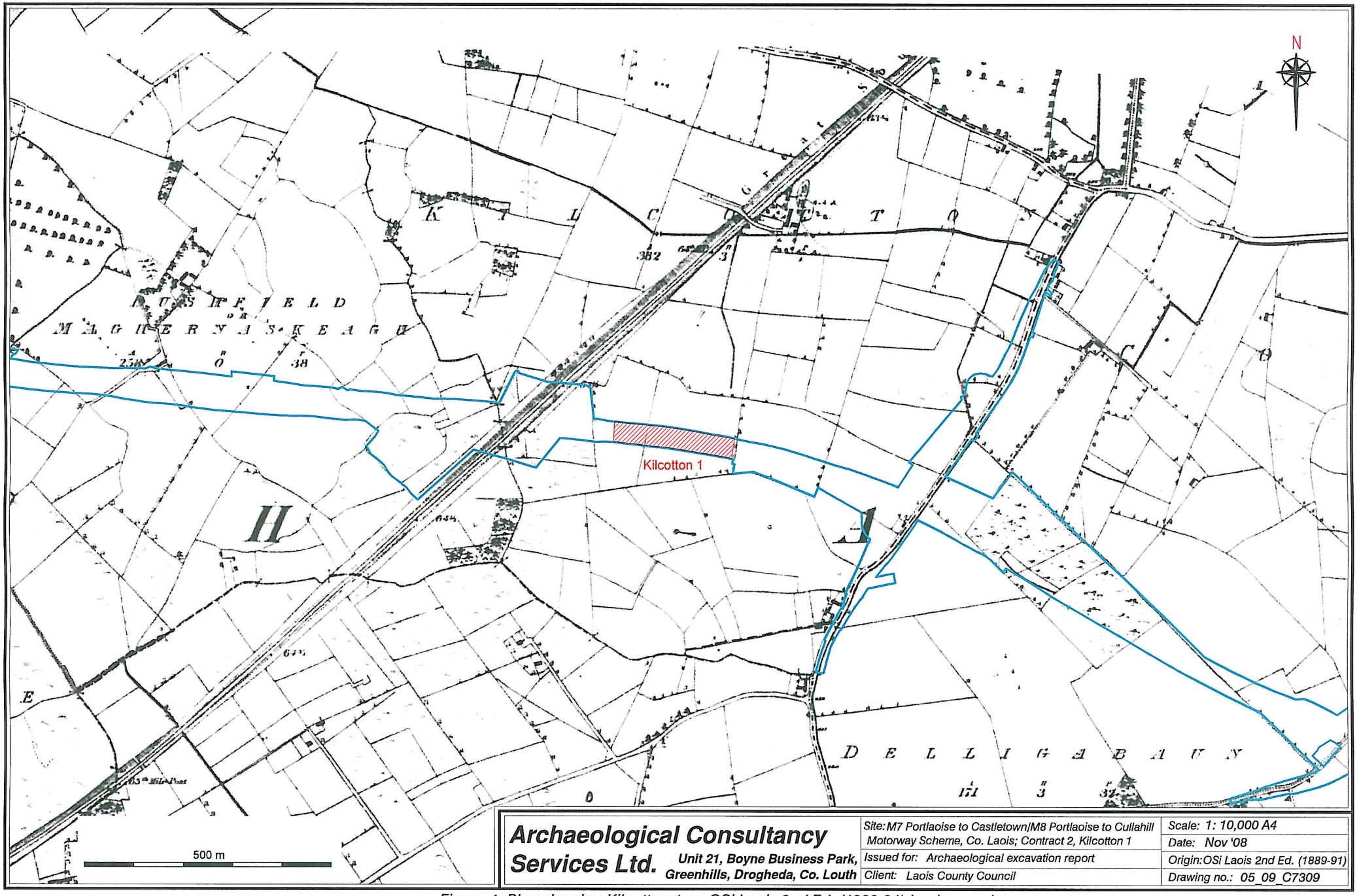
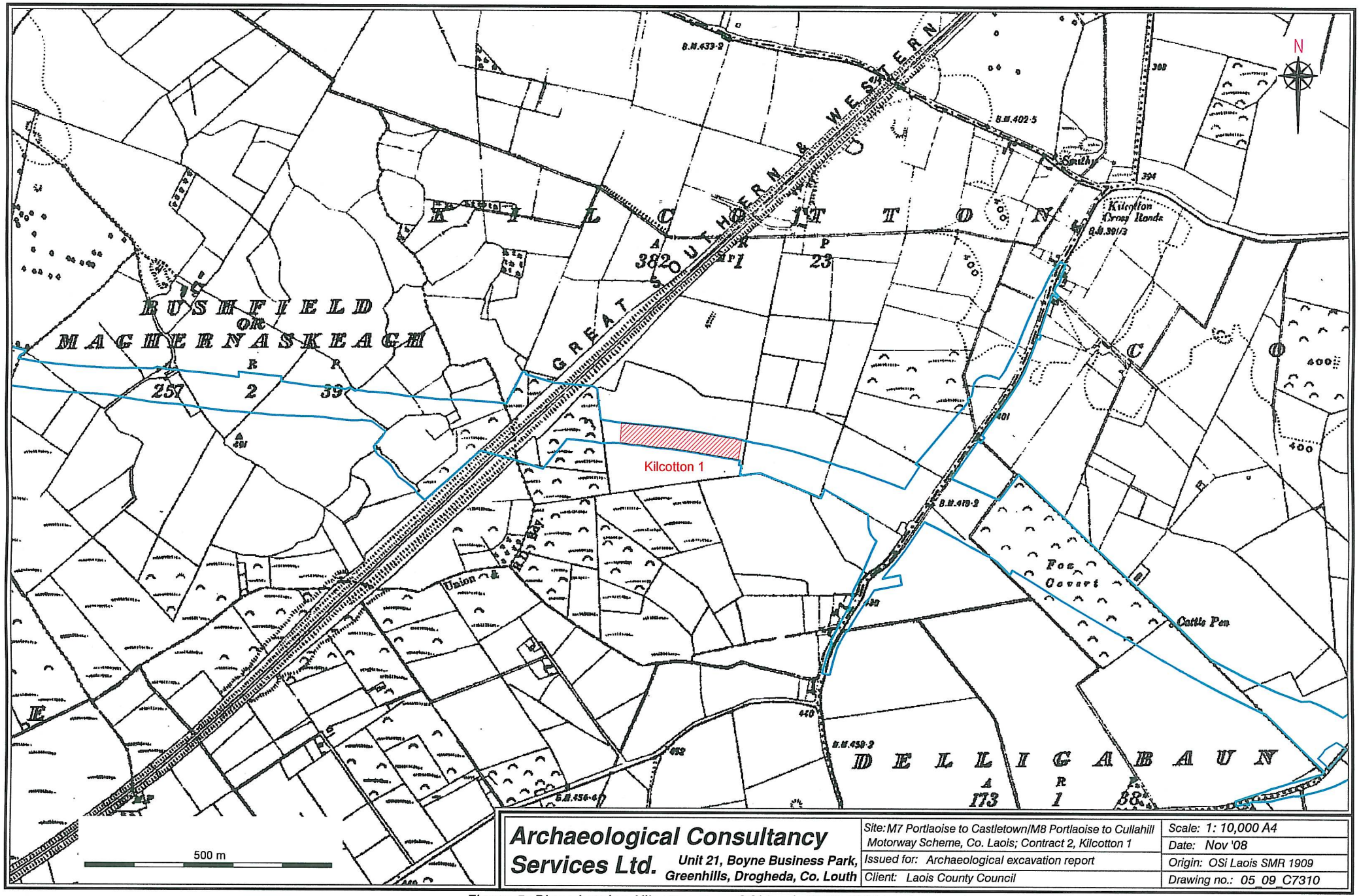



*Figure 4: Plan showing Kilcotton 1 on OSi Laois 2nd Ed. (1889-91) background*




| | | |
|---|---|---|
| **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, Kilcotton 1 | Scale: 1: 10,000 A4 |
| | | Date: Nov '08 |
| | Issued for: Archaeological excavation report | Origin: OSi Laois SMR 1909 |
| | Client: Laois County Council | Drawing no.: 05_09_C7310 |

*Figure 5: Plan showing Kilcotton 1 on OSi Laois SMR 1909 background*

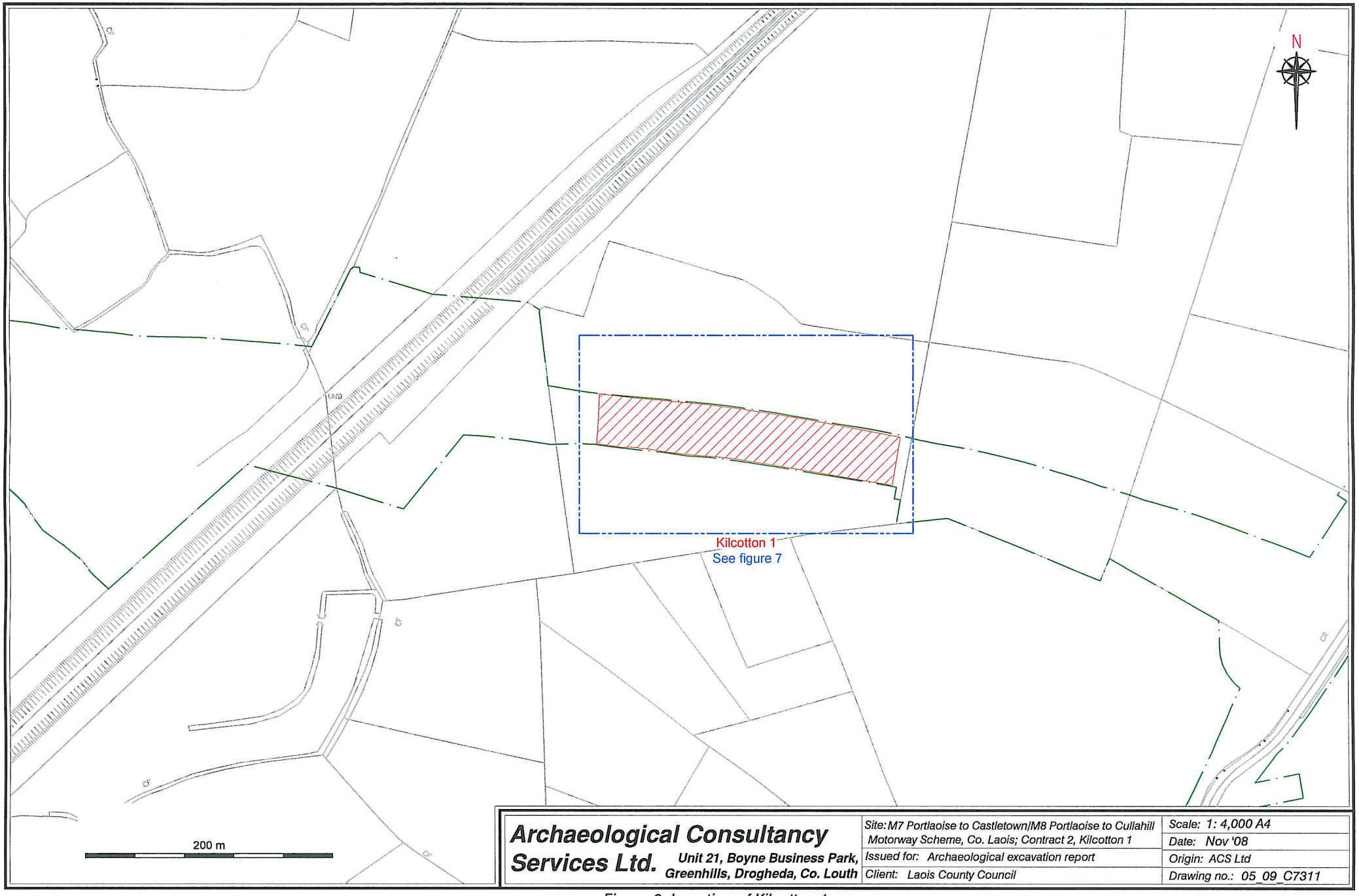



*Figure 6: Location of Kilcotton 1*

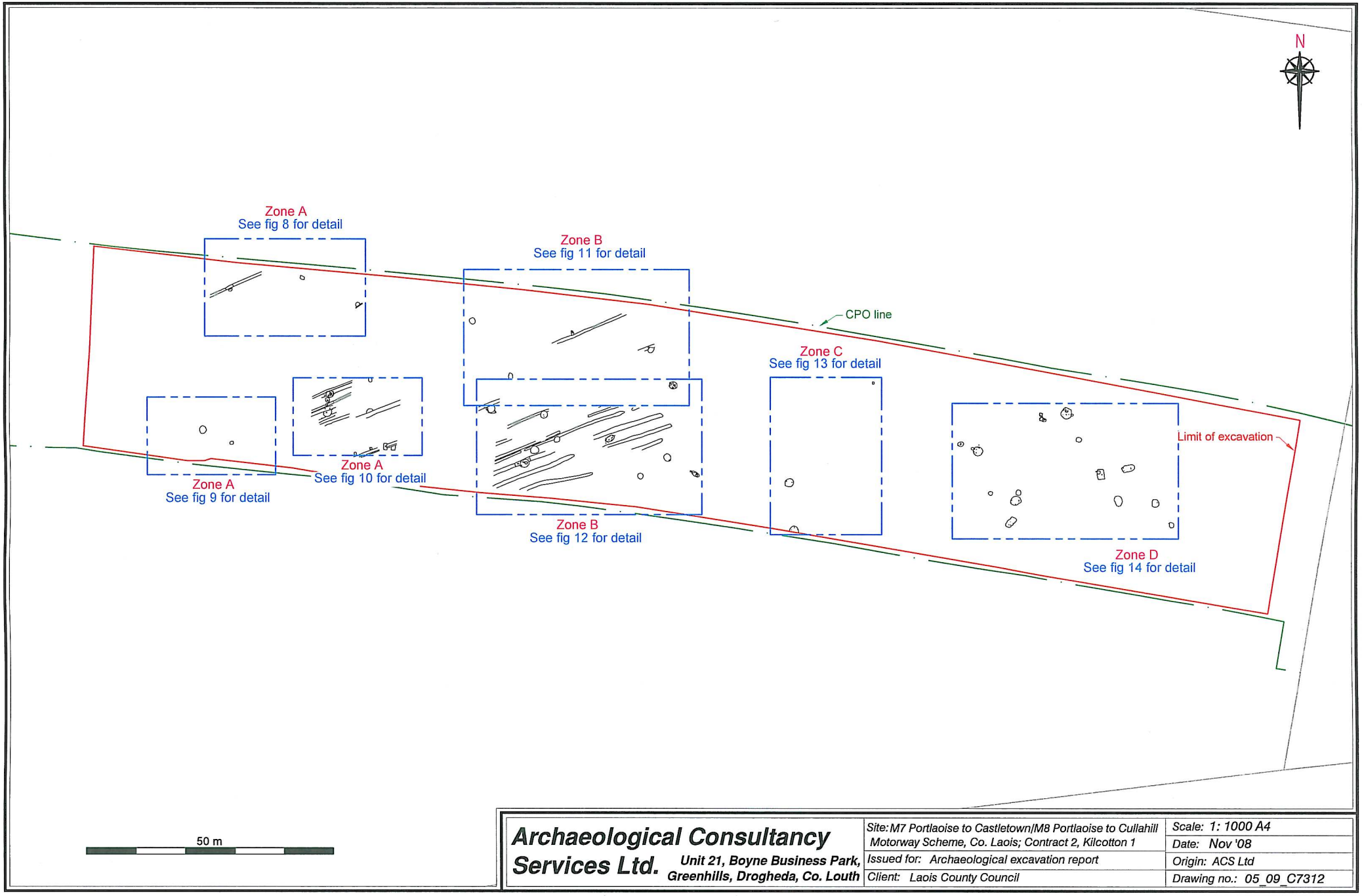
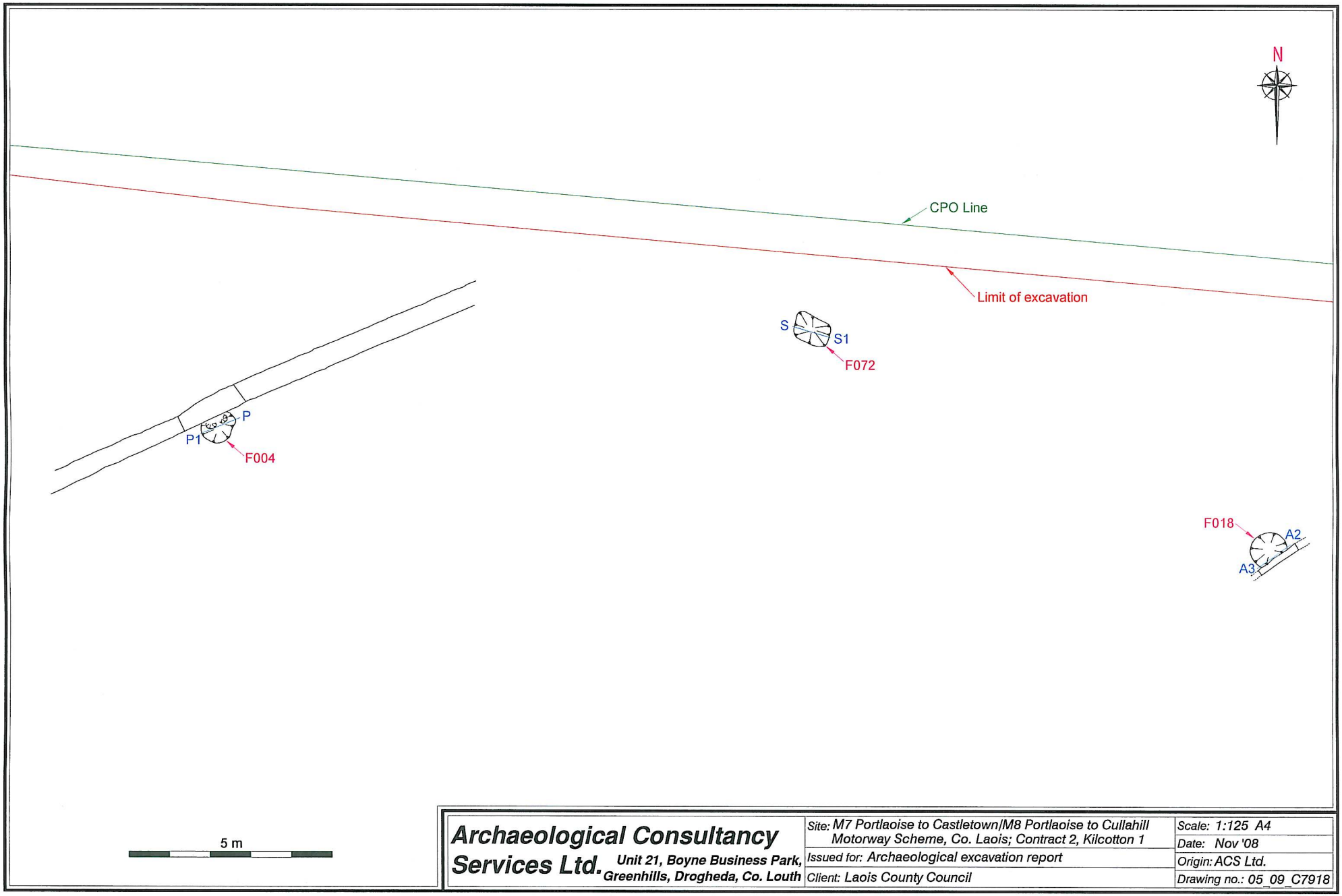



*Figure 7: Plan showing extent of site*




| | | |
|---|---|---|
| **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, Kilcotton 1 | Scale: 1:125 A4 |
| | | Date: Nov '08 |
| | Issued for: Archaeological excavation report | Origin: ACS Ltd. |
| | Client: Laois County Council | Drawing no.: 05_09_C7918 |

*Figure 8: Post-excavation detail of Area A*

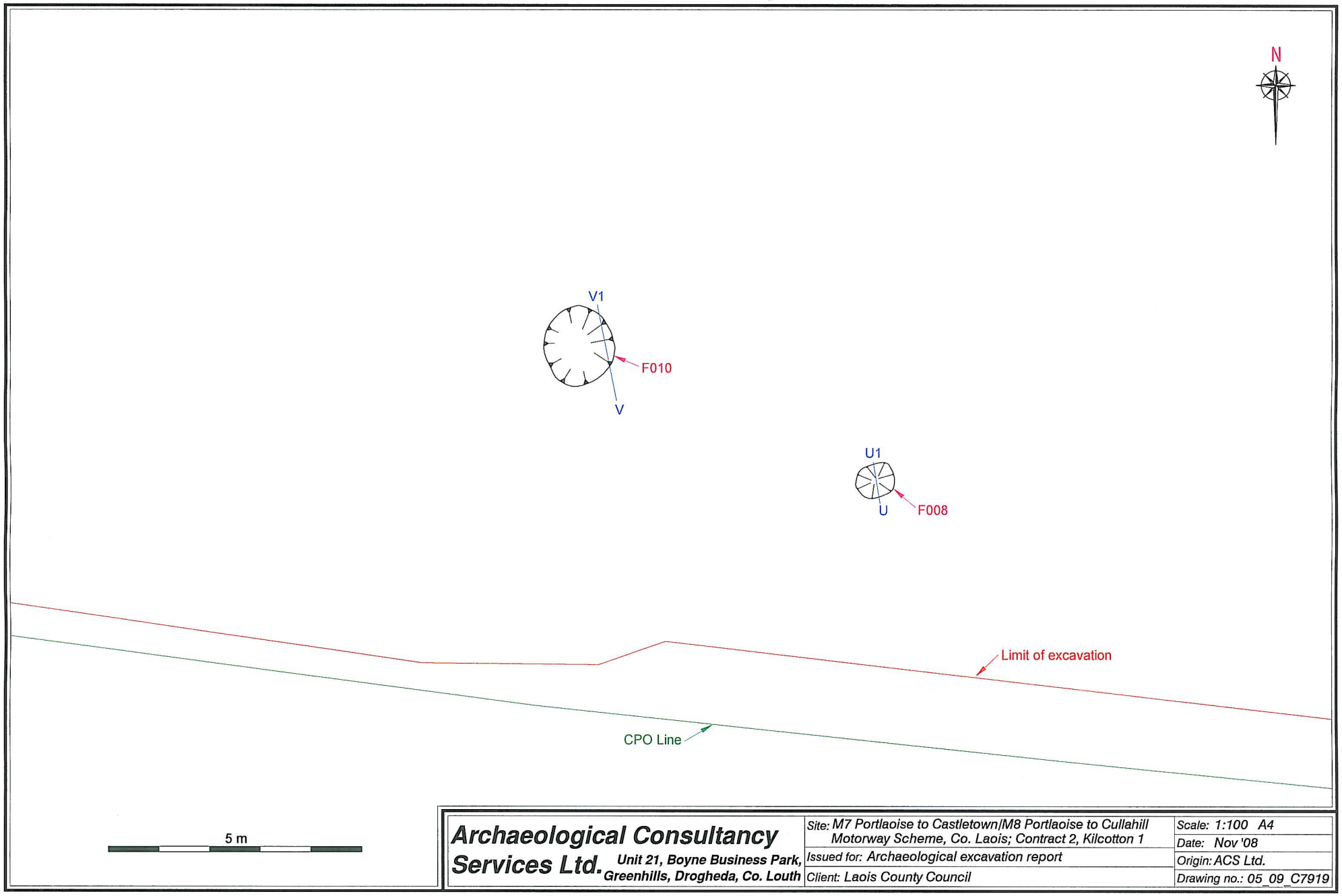



*Figure 9: Post-excavation of Area A*

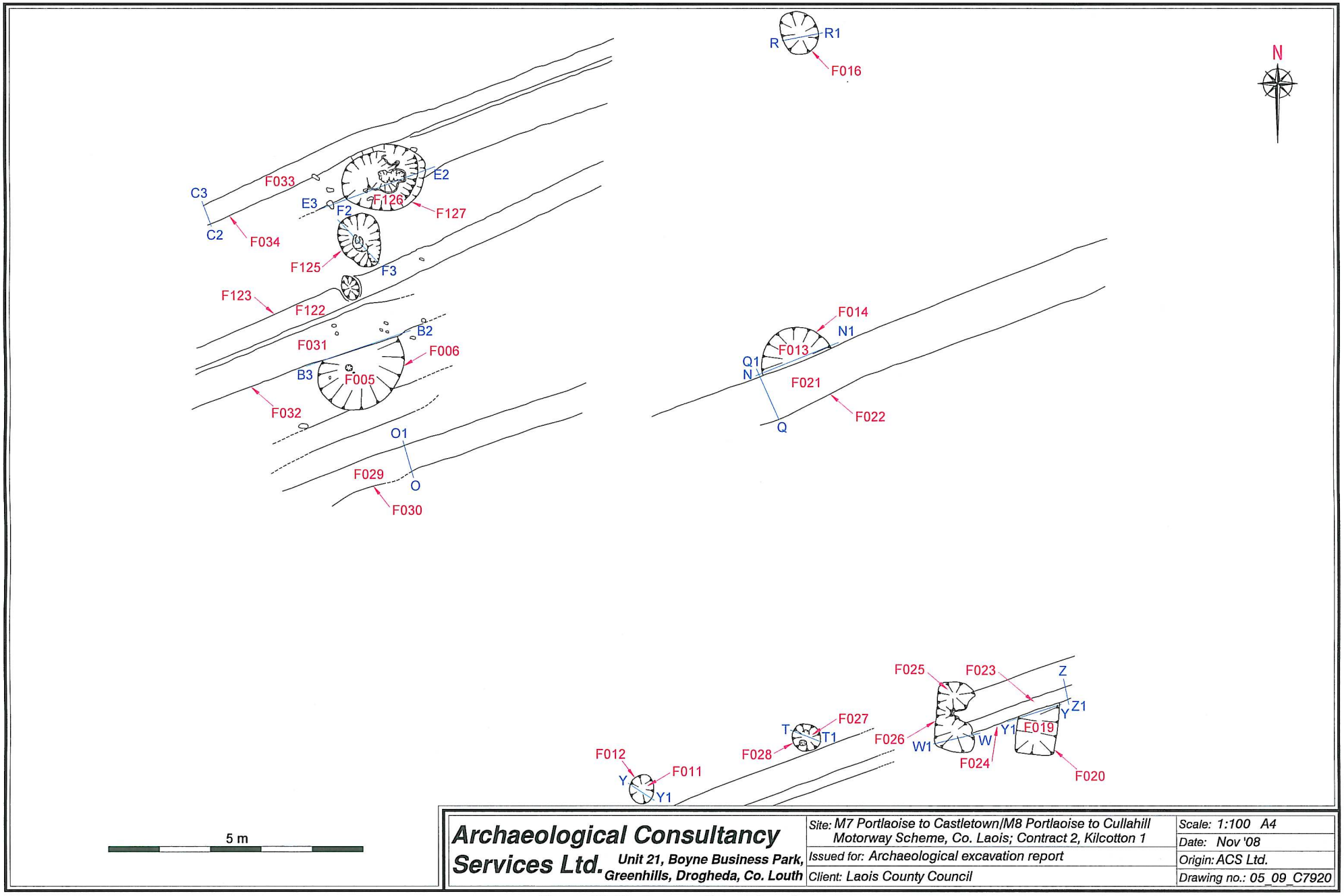



*Figure 10: Post-excavation of Area A*

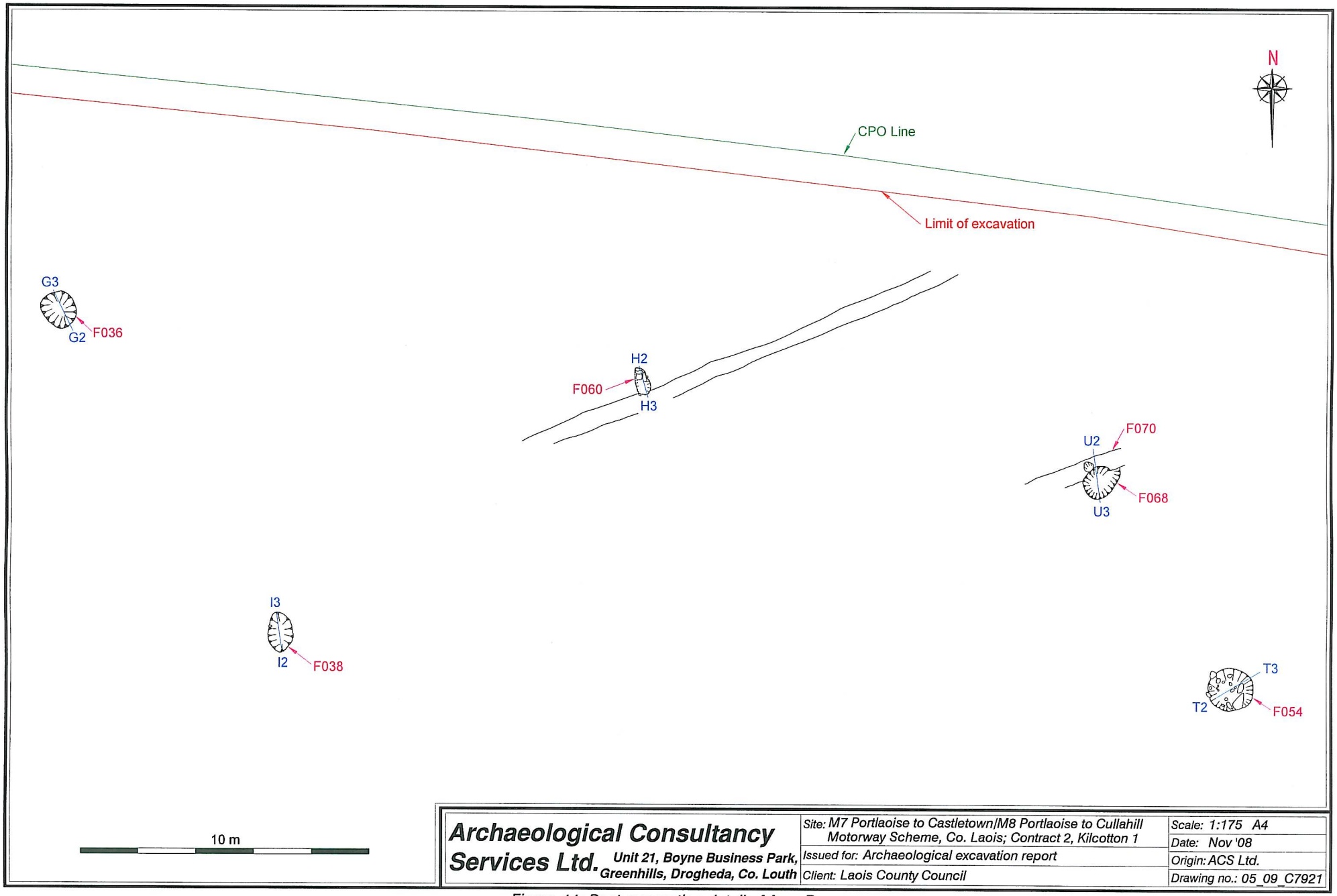



*Figure 11: Post-excavation detail of Area B*

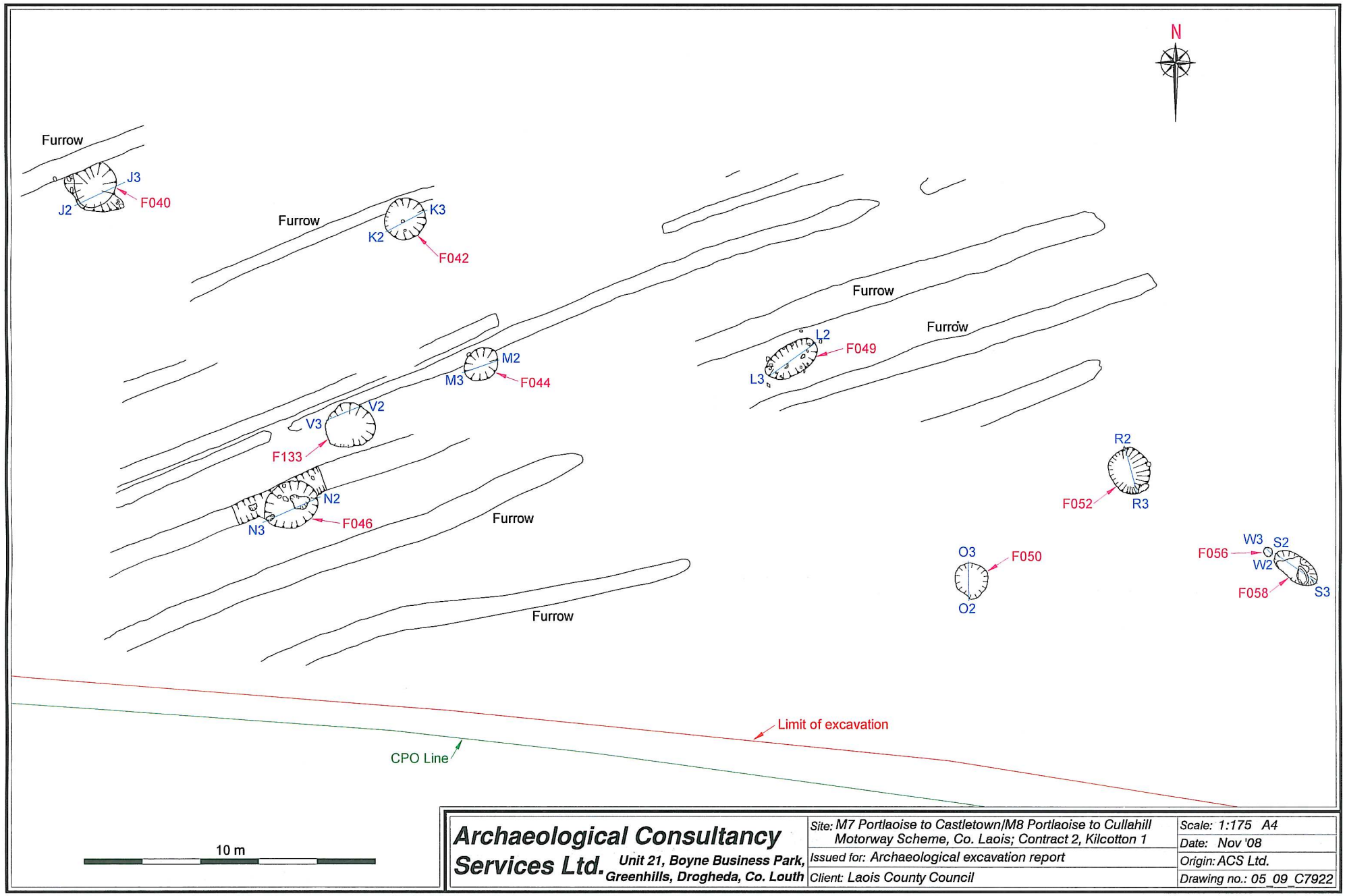
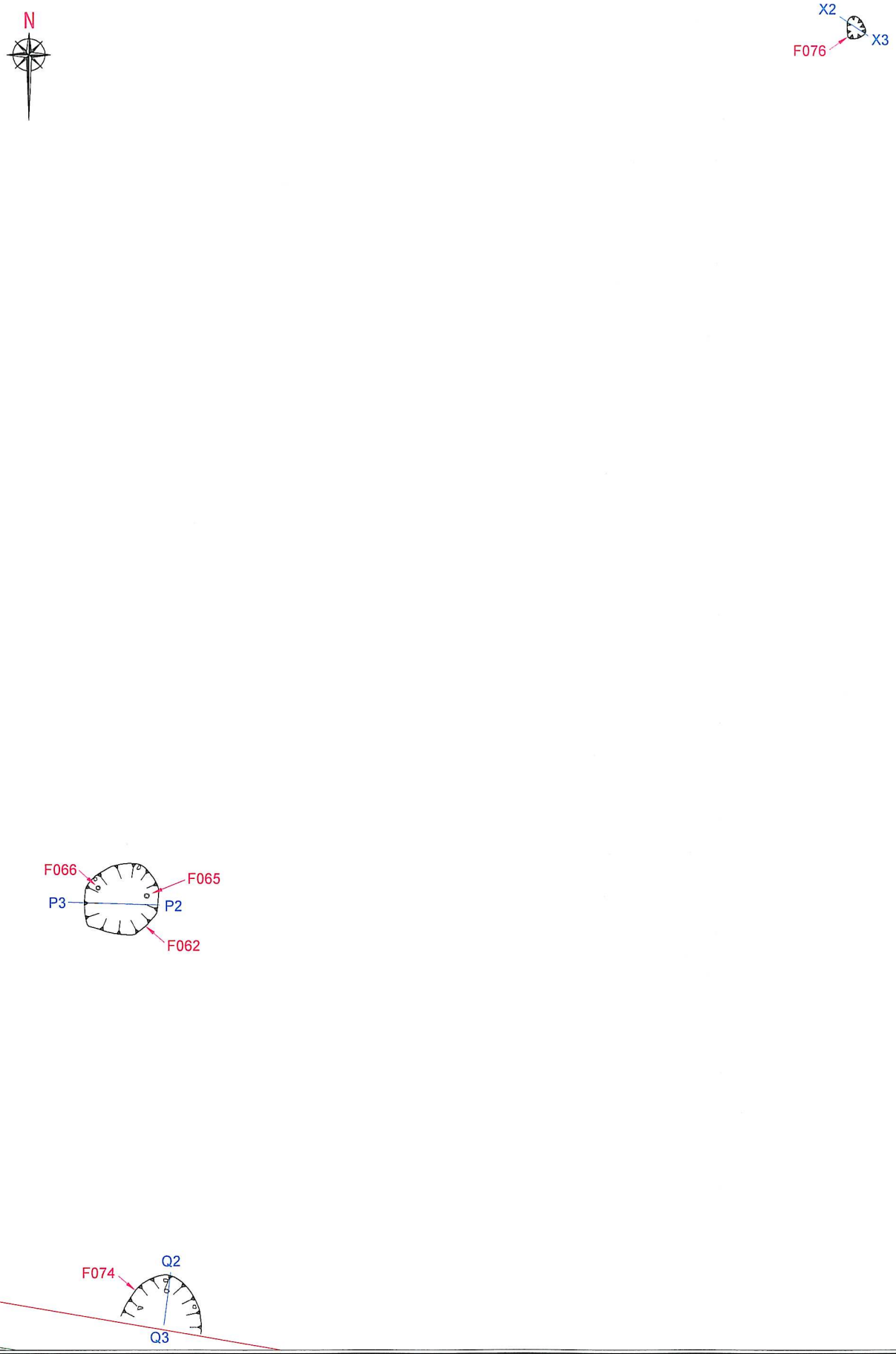
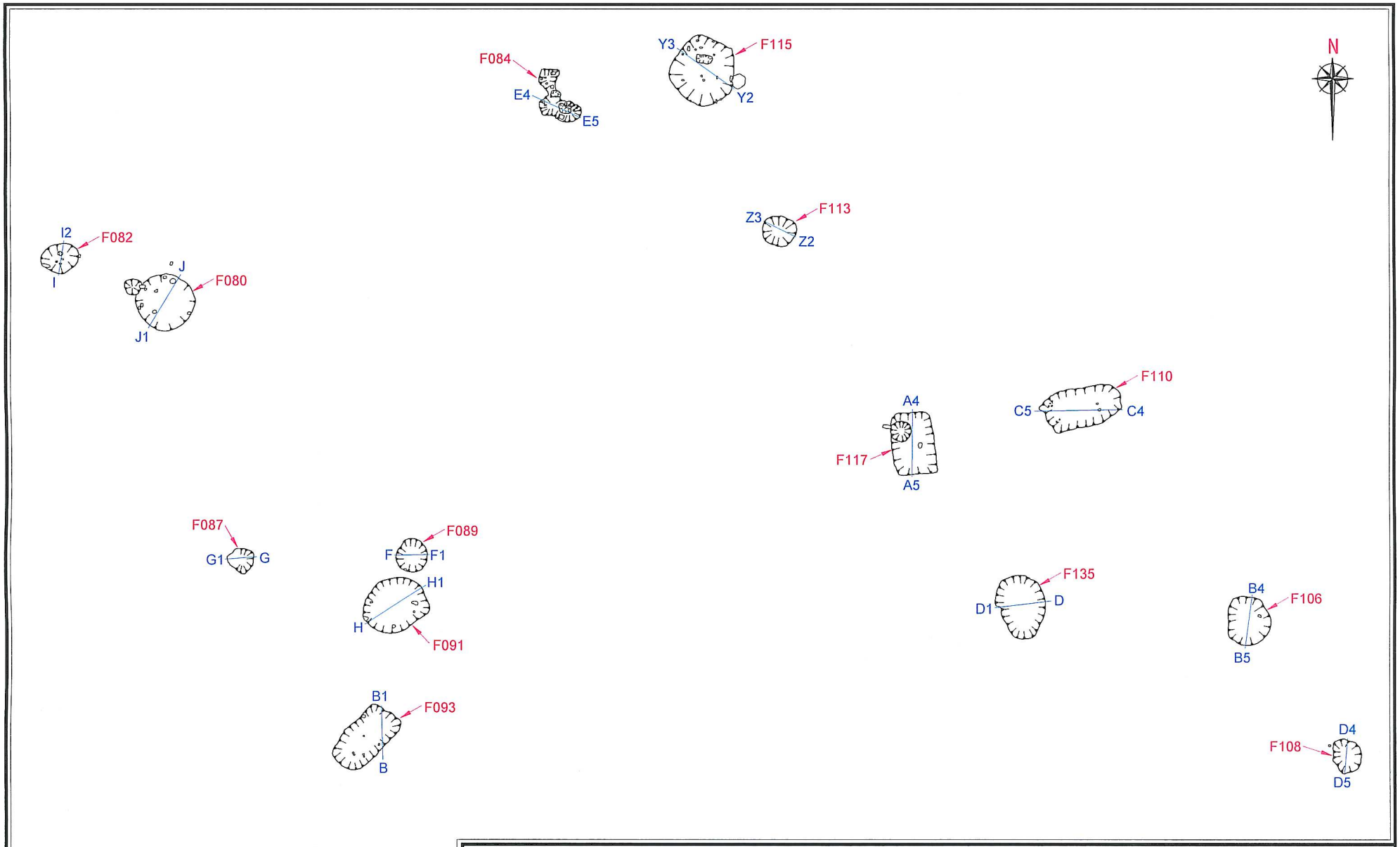



*Figure 12: Post-excavation detail of Area B*



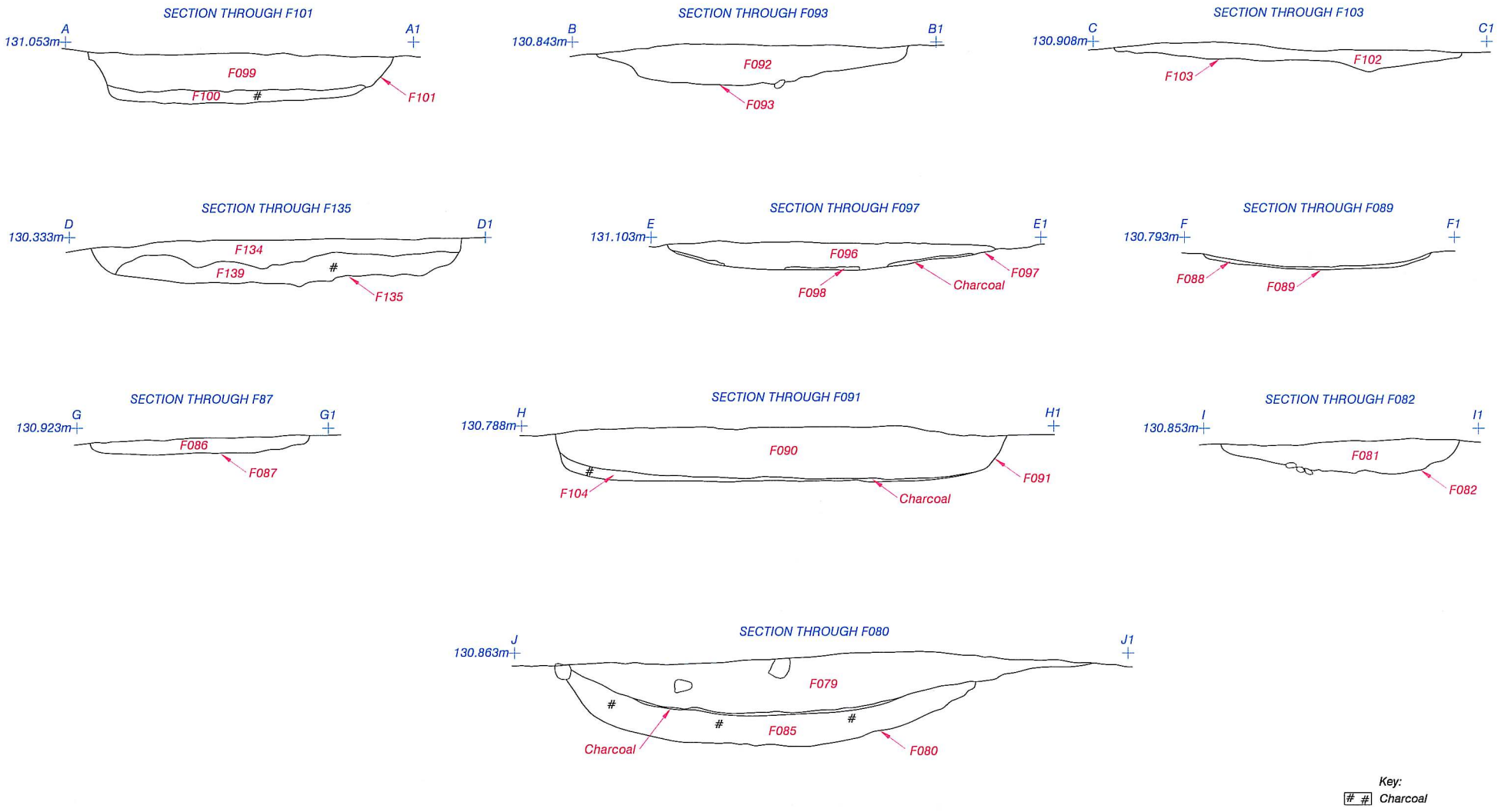

| | | |
|---|---|---|
| **Archaeological Consultancy Services Ltd.** Unit 21, Boyne Business Park, Greenhills, Drogheda, Co. Louth | Site: M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, Co. Laois; Contract 2, Kilcotton 1 | Scale: 1:130 A4 |
| | Issued for: Archaeological Excavation Report | Date: Nov '08 |
| | Client: Laois County Council | Origin: ACS Ltd. |
| | | Drawing no.: 05_09_C7923 |

*Figure 13: Post-excavation detail of Area C*




| | | |
|---|---|---|
| **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, Kilcotton 1 | Scale: 1:175 A4 |
| | | Date: Nov '08 |
| | Issued for: Archaeological excavation report | Origin: ACS Ltd. |
| | Client: Laois County Council | Drawing no.: 05_09_C7924 |

*Figure 14: Post-excavation detail of Area D*

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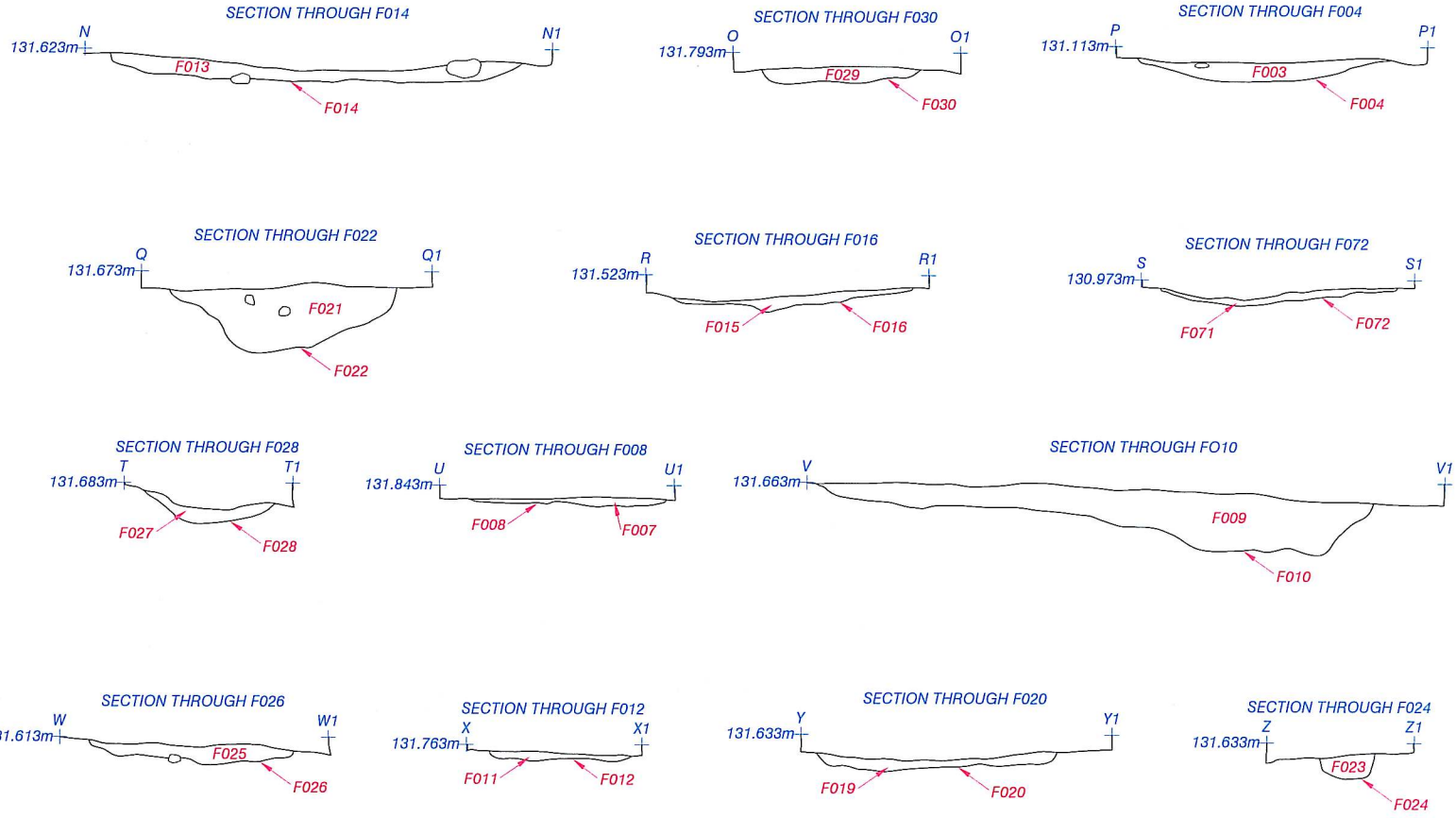
|---|---|---|
| **Archaeological Consultancy Services Ltd.** Unit 21, Boyne Business Park, Greenhills, Drogheda, Co. Louth | Site: M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, Co. Laois; Contract 2, Kilcotton 1 | Scale: 1:25 A4 |
| | | Date: Nov '08 |
| | Issued for: Archaeological excavation report | Origin: ACS Ltd. |
| | Client: Laois County Council | Drawing no.: 05_09_C7925 |

Figure 15: Sections

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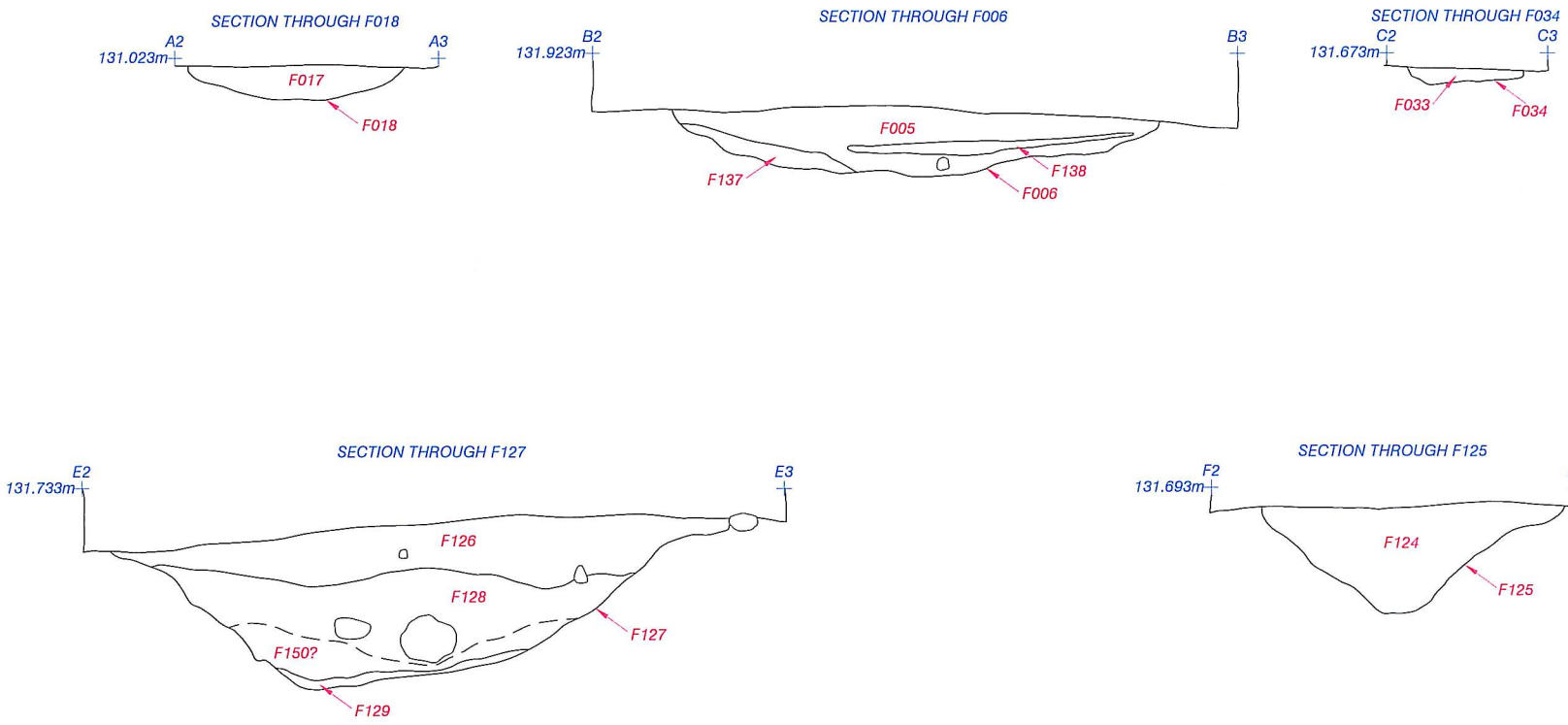
|---|---|---|
| **Archaeological Consultancy Services Ltd.** Unit 21, Boyne Business Park, Greenhills, Drogheda, Co. Louth | Site: M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, Co. Laois; Contract 2, Kilcotton 1 | Scale: 1:25 A4 |
| | | Date: Nov '08 |
| | Issued for: Archaeological excavation report | Origin: ACS Ltd. |
| | Client: Laois County Council | Drawing no.: 05_09_C7926 |

Figure 16: Sections

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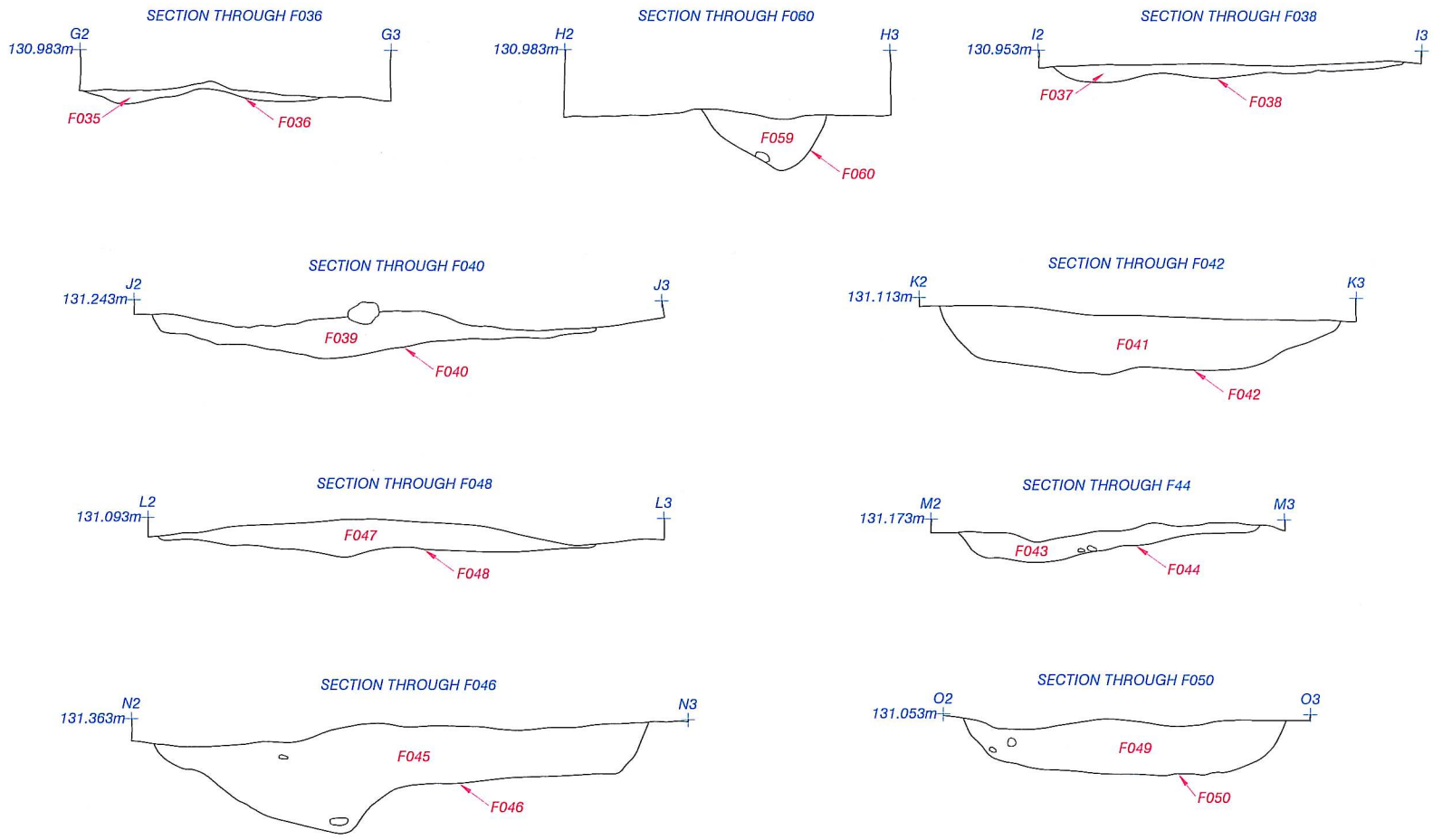
|---|---|---|
| **Archaeological Consultancy Services Ltd.** Unit 21, Boyne Business Park, Greenhills, Drogheda, Co. Louth | Site: M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, Co. Laois; Contract 2, Kilcotton 1 | Scale: 1:25 A4 |
| | | Date: Nov '08 |
| | Issued for: Archaeological excavation report | Origin: ACS Ltd. |
| | Client: Laois County Council | Drawing no.: 05_09_C7927 |

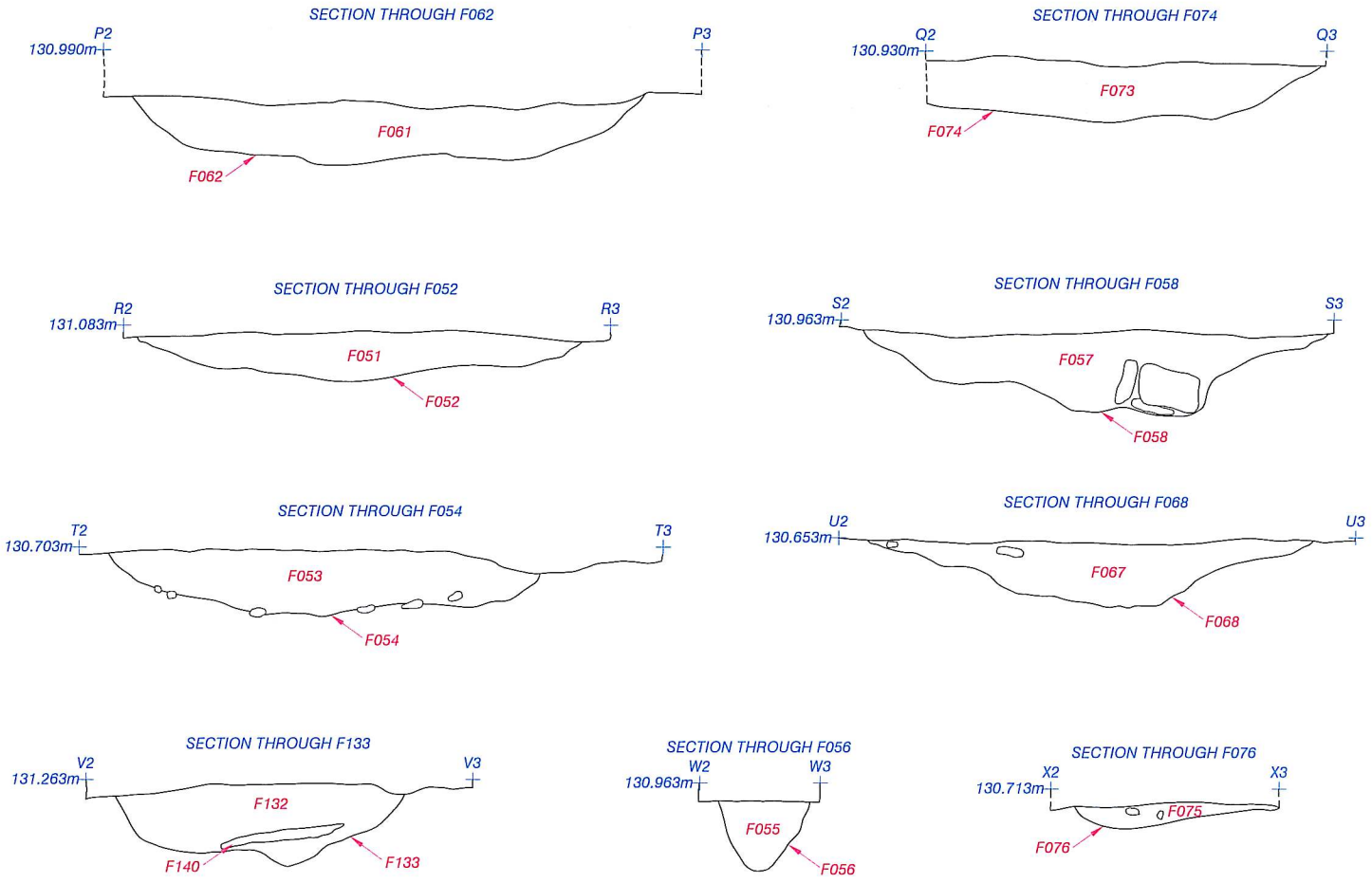
Figure 17: Sections




**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, Kilcotton 1 | Scale: 1:25 A4 |
| | Date: Nov '08 |
| Issued for: Archaeological excavation report | Origin: ACS Ltd. |
| Client: Laois County Council | Drawing no.: 05_09_C7928 |

Figure 18: Sections

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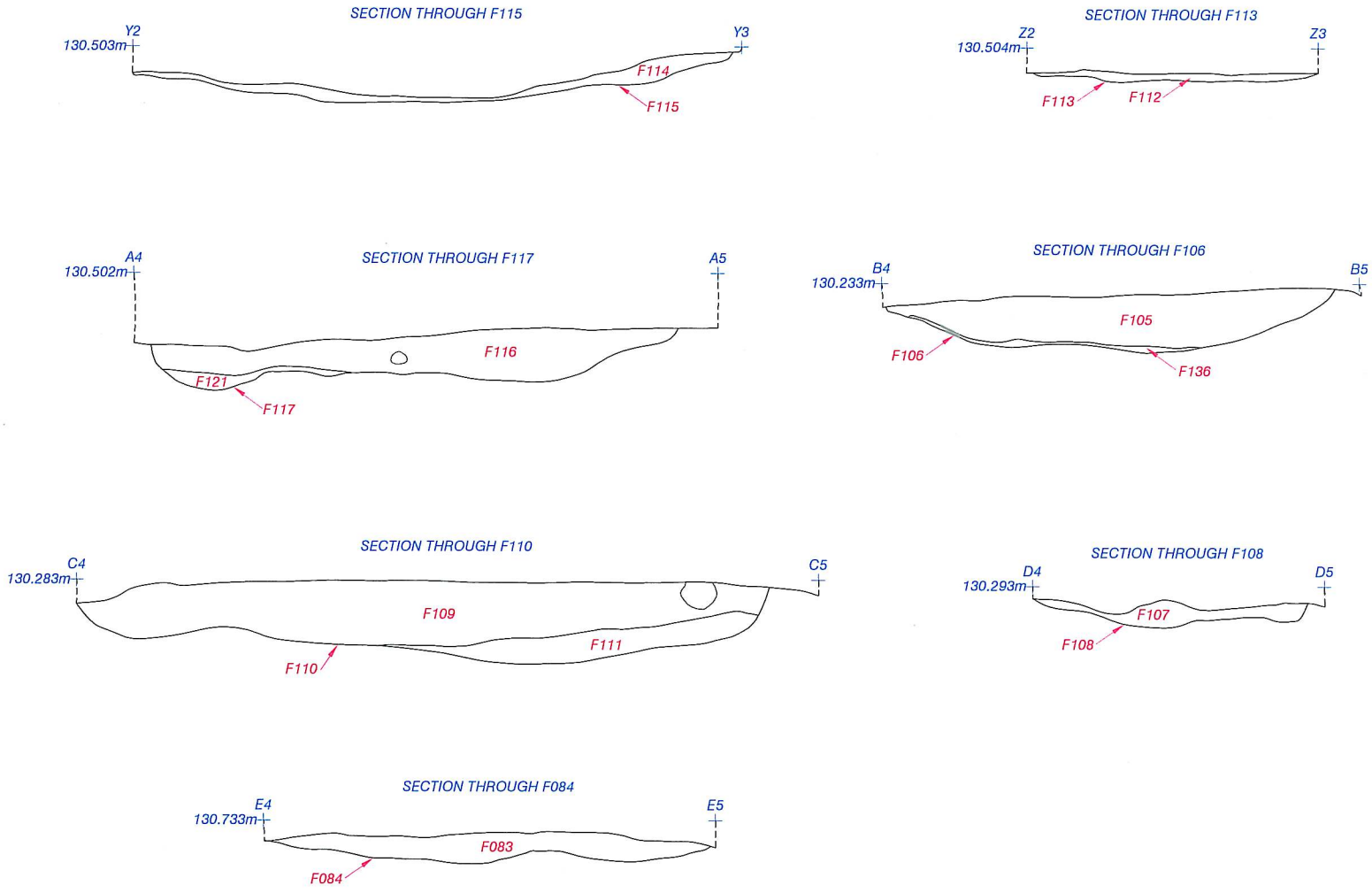
|---|---|---|---|
| **Archaeological Consultancy Services Ltd.** Unit 21, Boyne Business Park, Greenhills, Drogheda, Co. Louth | Site: M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, Co. Laois; Contract 2, Kilcotton 1 | Scale: 1:25 A4 |
| | | Date: Nov '08 |
| | Issued for: Archaeological excavation report | Origin: ACS Ltd. |
| | Client: Laois County Council | Drawing no.: 05_09_C7929 |

Figure 19: Sections

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|---|---|---|
| **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, Kilcotton 1 | Scale: 1:25 A4 |
| | | Date: Nov '08 |
| | Issued for: Archaeological excavation report | Origin: ACS Ltd. |
| | Client: Laois County Council | Drawing no.: 05_09_C7930 |

*Figure 20: Sections*

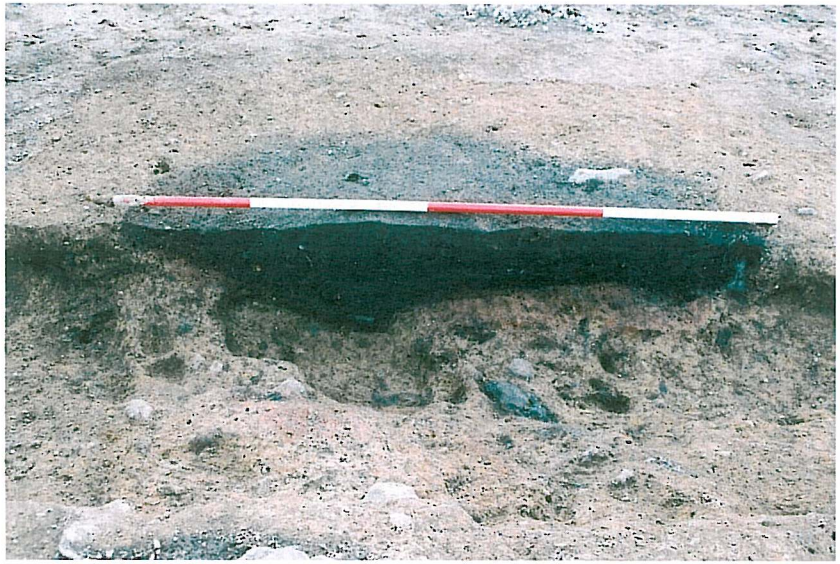

*Plate 1: Mid-excavation view of F046 showing a north-facing section (Area B) (05_09_CP305_04)*

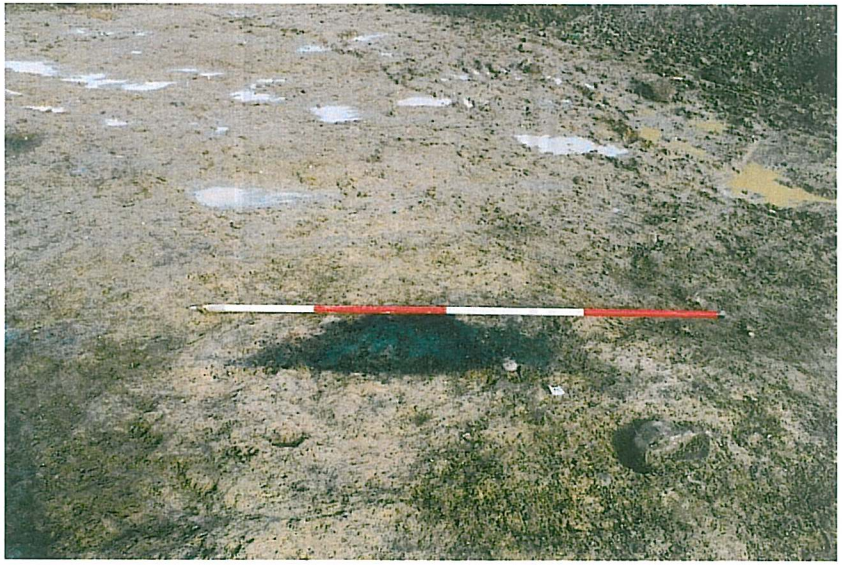

*Plate 2: Mid-excavation view of F012 showing section from the northeast (Area A) (05_09_CP304_21)*

*Plate 3: Mid-excavation view of F038 showing section from the east (Area B) (05_09_CP305_16)*

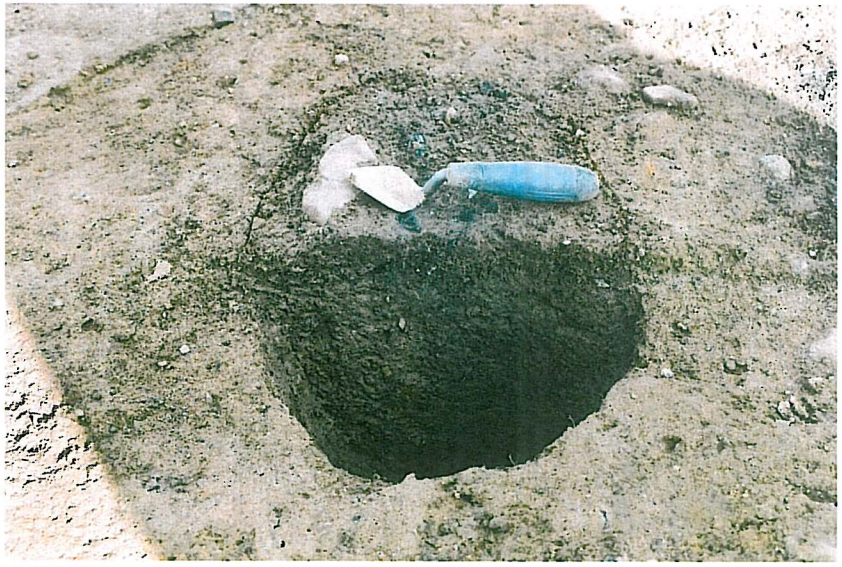

*Plate 4: Mid-excavation view of F056 showing a west-facing section (Area B) (05_09_CP305_08)*

*Plate 5: Mid-excavation view of F068 & F070 showing a west-facing section (Area B) (05_09_CP305_03)*

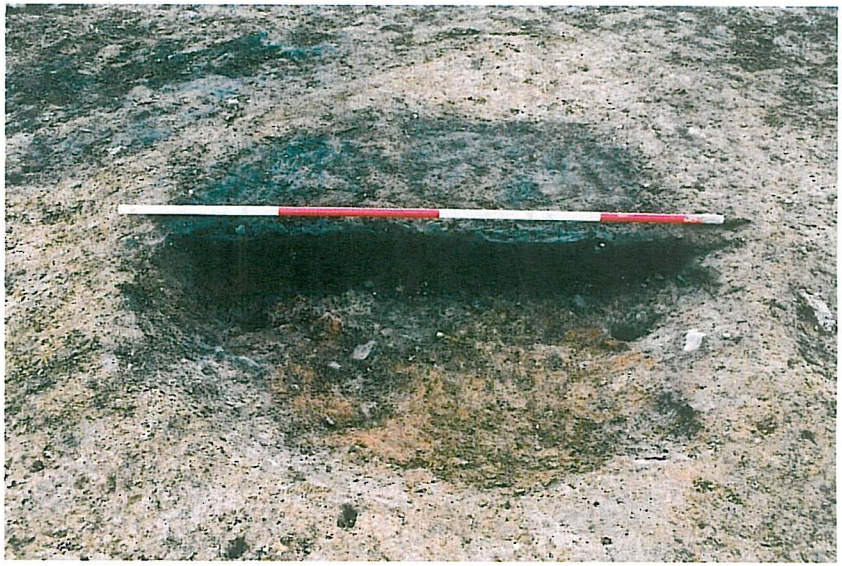

*Plate 6: Mid-excavation view of F062, F065 & F066 showing a north-facing section (Area C) (05_09_CP305_02)*