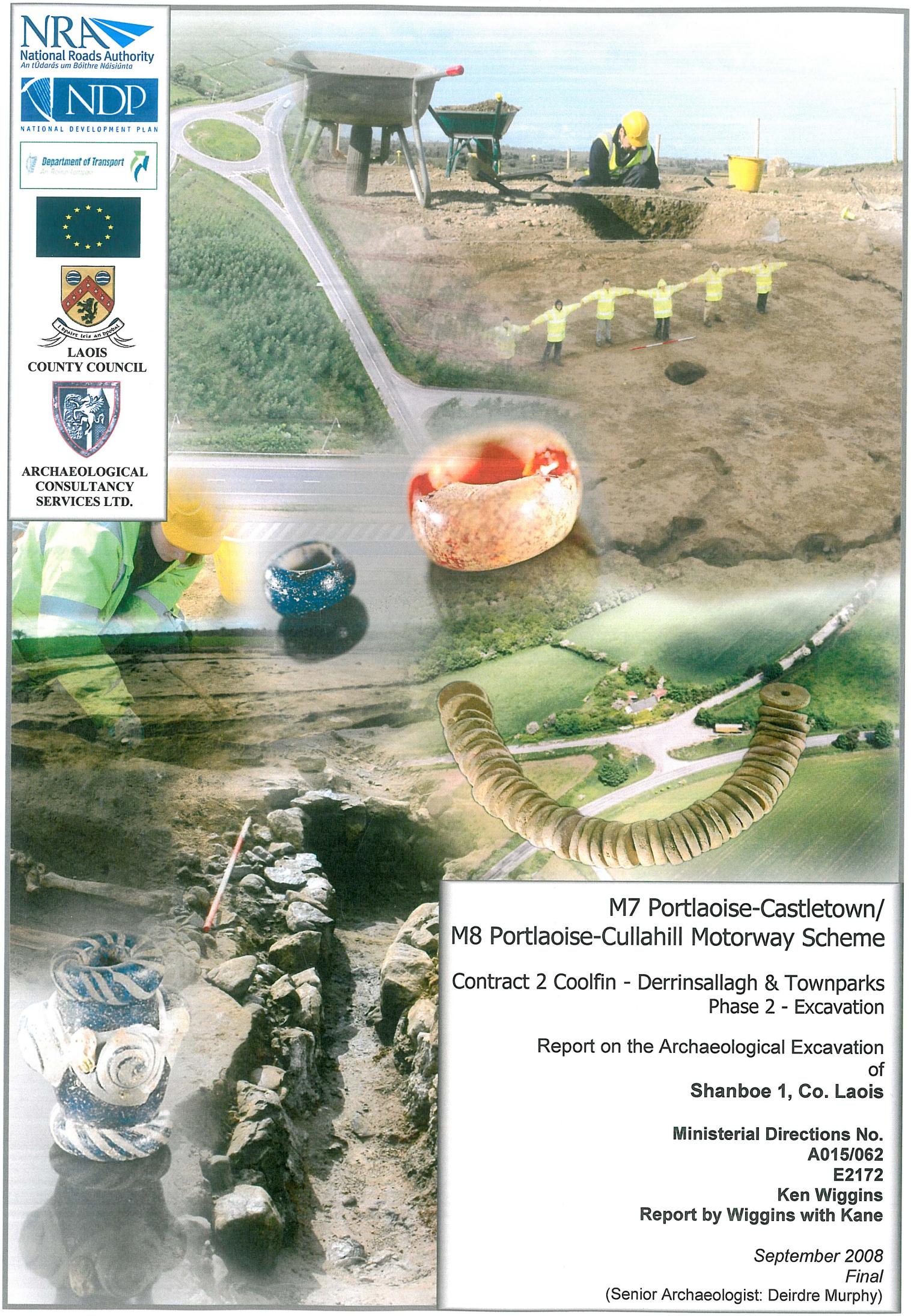


National Roads Authority
An tÚdarás um Bóithre Náisiúnta

NDP
NATIONAL DEVELOPMENT PLAN

Department of Transport

LAOIS
COUNTY COUNCIL

ARCHAEOLOGICAL
CONSULTANCY
SERVICES LTD.

M7 Portlaoise-Castletown/ M8 Portlaoise-Cullahill Motorway Scheme

Contract 2 Coolfin - Derrinsallagh & Townparks Phase 2 - Excavation

Report on the Archaeological Excavation
of
Shanboe 1, Co. Laois

Ministerial Directions No.
A015/062
E2172
Ken Wiggins
Report by Wiggins with Kane

September 2008
Final
(Senior Archaeologist: Deirdre Murphy)

PROJECT DETAILS

Project	M7 Portlaoise to Castletown/ M8 Portlaoise to Cullahill Motorway Scheme
Client	Laois County Council, County Hall, Portlaoise, County Laois
Contract	Contract 2
Site Name	Shanboe 1
Townland	Shanboe
Nat. Grid Ref.	223879, 187154
OS Map Ref.	OS 6 inch sheet 22
Chainage	600
Ministerial Direction No.	A015/062
Record No.	E2172
Archaeologist	Ken Wiggins
Senior Archaeologist	Deirdre Murphy
Report Type	Final
Report Status	Final
Report by	Wiggins with Kane
Date of Submission	September 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.

Consulting Engineers – ARUP Consulting Engineers

Project Engineer – Mike Evans
Engineer – Gráinne Wolfe

Kildare County Council, National Roads Design Office

Senior Executive Engineer – Adrian King
Project Archaeologist – Sylvia Desmond
Engineer – Damian McGinnity

Laois County Council

Executive Engineer – Brenda Cuddy
Liaison – Sarah Dunne

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

Chief Archaeologist – Brian Duffy
Archaeologist – Martin Reid

Irish Antiquities Division, National Museum Of Ireland

Keeper – Nessa O Connor
Assistant Keeper – Isabella Mulhall

NON TECHNICAL SUMMARY

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

Contract 2 consists of 11 km of motorway, which extends east west from Aghaboe to west of Borris in Ossory through the townlands from Coolfin to Townsparks and Derrinsallagh. The site was identified during archaeological testing carried out by Linda Clarke of Archaeological Consultancy Services Ltd in March-April 2005 under ministerial direction (A015/041) 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. A total of 15 trenches were excavated within one field and the remains of a *fulacht fiadh/*burnt mound were identified. The site was designated Shanboe 1.

Archaeological resolution of Shanboe 1 (A015/062) commenced on the 10th August 2005 and was carried out by Ken Wiggins of Archaeological Consultancy Services Ltd. For recording purposes, the site was designated the scheme no. A015/062 and record number E2172. Topsoil stripping exposed a large *fulacht*/burnt mound spread, which covered a number of troughs and pits. One chert arrowhead was recorded (E2172:003:1).

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 Shanboe 1, Contract 2, County Laois (Ordnance Survey six-inch sheet 22, National Grid Co-ordinates 223879, 187154; Figures 1–6). The site at Shanboe 1 was situated northwest of the townland of Derrinsallagh, and of Aghaboe and was located to the east of the River Quinn. It was located at Chainage 600 of the proposed scheme, in the townland of Shanboe and within the Parish of Aghaboe.

1.2 Scope of the Project

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

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

Following completion of fieldwork a programme of post-excavation analysis was necessary as reports on the archaeological findings must be published. A dissemination strategy also forms a crucial part of this phase of the project. It is proposed that all final reports will be submitted to the relevant authorities by the end of 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 Linda Clarke. The site was identified during archaeological testing carried out by Linda Clarke of Archaeological Consultancy Services Ltd in March-April 2005 under ministerial direction number A015/041. A total of 15 trenches were excavated within this field and some potential archaeology was identified. The site was designated Shanboe 1.

1.4 Date and Duration of Excavation Works

The excavation commenced on 10th August 2005 and was completed on 9th September 2005.

1.5 Size and Composition of the Excavation Team

The excavation team was composed of:

One director
One supervisor
Three archaeological assistants
Two general operatives

2. RECEIVING ENVIRONMENT

2.1 Detailed Overview of the receiving environment (Information provided by Niall Kenny and Emily Kane on behalf of Ken Wiggins)

2.1.1 Topographic

Shanboe 1 is situated on a gentle north-facing slope in the heart of the River Quinn flood plain. It is located at the western end of a low-lying east-west running ridge known as the Timoney ridge. Higher lying and more fertile land occurs to the south and east of this plain on the ridges and hills of Ballyquaid, Knockseera and Sentryhill. The Slieve Bloom mountain range is visible stretching across the northern horizon. The Timoney ridge seems to extend westwards from the lower slopes of the hill of Knockseera running through the townlands of

Doon, Derrinsallagh and Shanboe and levelling out in the Clonagooden and 'Erris or Skirk Glebe' areas.

The underlying geology of the area is mainly that of carboniferous limestone (Feehan 1983, 28). This basic underlying rock formation is overlain by a mantle of glacial drift material which is mostly composed of limestone with variable amounts of shale and sandstone. However, throughout this limestone rich area a range of other rock types occur including chert. The chert occurs right throughout the limestone region in nodules at specific places in the landscape. In fact, right across the midlands chert appears to have been a widely used and widely available resource in prehistoric times. This part of County Laois is located in an area where grey-brown podzolic (medium textured, moderately deep) soils are prevalent (Feehan 1983, 90-3). These soils are among the best soils in Ireland. They are medium textured, well-drained, friable podzolics and are especially good for tillage farming, although these soils are also highly suitable for grass production and grazing (Feehan 1983, 92). Despite this, there are pockets of rough and unproductive gley soils in the areas around Shanboe particularly. These less fertile soils are much wetter and are not good for tillage and crop husbandry and at best are only suitable for rough summer grazing (Feehan 1983, 93-4). It can be noted that wet and marshy lower lying flood plains were utilised for burnt mound activity while the higher lying areas were used for domestic settlement activity. It therefore could be stated that places such as Shanboe and the lower lying parts of Newtown or Skirk effectively became burnt mound landscapes.

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 is currently unrecorded in Laois, but it is unlikely that early hunter-gatherers didn't utilise the rich post-glacial environment as they did at Lough Boora, County Offaly. As the transition from a subsistence economy to cereal cultivation and livestock rearing was made during the fourth millennium BC, large tracts of forest cover were cleared, permanent settlements were established, pottery was first used, and elaborate burial rites were developed.

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

Fulachta fiadh/burnt mound sites were a more common Bronze Age archaeological feature recorded in Co. Laois (although could 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 southeast of Shanboe. 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

development). The fact that there are no visible surface traces or remains at most of the recorded *fulachta fiadh* sites in the county informs us that a significant amount of other sites (which were never recorded) may have been completely levelled and destroyed. The recent excavations on this motorway scheme are a veritable cross section of the landscape of Laois and they seem to indicate a more real and widespread distribution of *fulachta fiadh* sites (i.e. not just sporadic distribution in the southern part of the county). Many of the recently discovered sites have been badly truncated and ploughed out just like the previously recorded examples.

Stray finds can also provide an indicator of Bronze Age activity where an absence of archaeological monuments occurs. This can be seen at Aghaboe with the recovery of two bronze axeheads, one broad flat and one flanged, indicating such activity existed, prior to the motorway scheme. Very little archaeology in Laois was dated to the Iron Age prior to this motorway scheme. Sites excavated at Shanboe 6 and in the townland of Derrinsallagh will further our understanding of this period in the county.

2.1.3 Historic

The famous 6th century foundation of St. Canice at Aghaboe is located to the southeast of Shanboe, 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 Shanboe 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 10th August 2005 under Ministerial Direction Number A015/062. 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. The site was divided into four quadrants by the placement of two baulks, which met in the centre. 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. E2172:3:1 represents find number 1 within feature number 3 in Shanboe 1, which was excavated under record number E2172. 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 *Fulacht*/Burnt mound deposit above F004 (NW, SW quadrants)

F004 *Fulacht*/Burnt mound spread (All quadrants)

F005 Cut of modern field boundary ditch filled with F006 (SW, SE quadrants)

F006 Fill of F005

F007 Cut of modern field boundary ditch filled with F008 (SW, SE quadrants)

F008 Fill of F007

F009 Non archaeological

F010 Cut of trough/well filled with F031, F032, F011 (NE quadrant)

F011 Tertiary/Upper fill of F010

F012 Cut of *fulacht*/roasting pit filled with F013, F014 (SE quadrant)

F013 Fill of F012

F014 Redeposited fill of F012

F015 Cut of *fulacht* pit filled with F016 (SE, SW quadrants)

F016 Fill of F015

F017 Cut of trough filled with F018, F049, F045 (SE, SW quadrants)

F018 Primary/Lower fill of F017

F019 Redeposited material (SW quadrant)

F020 *Fulacht*/burnt mound deposit beneath F021 (All quadrants)

F021 *Fulacht*/burnt mound deposit above F020 (All quadrants)

F022 *Fulacht*/burnt mound deposit beneath F020 (SE, NE quadrants)

F023 *Fulacht*/burnt mound deposit beneath F020 (NW quadrant)

F024 *Fulacht*/burnt mound deposit beneath F025, F033 (All quadrants)

F025 Peat deposit beneath F023 (NE, NW quadrant)

F026 Cut of trough filled with F043, F027 (NW quadrant)

F027 Secondary/Upper fill of F026

F028 Cut of trough filled with F042, F030, F041, F029 (NE quadrant)

F029 Fourth/Upper fill of F028

F030 Secondary/Middle fill of F028

F031 Primary/Lower fill of F010

F032 Secondary/Middle fill of F010

F033 *Fulacht*/burnt mound spread beneath F020 (NW quadrant)

F034 Fill of F037

F035 Cut of *fulacht* pit filled with F038, F036 (SW quadrant)

F036 Secondary/Upper fill of F035

F037 Cut of curvilinear feature filled with F034 (SW quadrant)

F038 Primary/Lower fill of F035

F039 Cut of *fulacht* pit filled with F040 (SE, NE quadrants)

F040 Fill of F039

F041 Tertiary/Middle fill of F028

F042 Primary/Lower fill of F028

F043 Primary/Lower fill of F026

F044 Same as F017

F045 Tertiary/Upper fill of F017

F046 Main fill of F048

F047 Timbers within F048

F048 Cut of pit filled with F047, F046 (NE quadrant)

F049 Secondary/Redeposited fill of F017

F050 *Fulacht*/Burnt mound deposit (NW quadrant)

F051 *Fulacht*/Burnt mound spread/pit (NW quadrant)

F052 *Fulacht*/Burnt mound spread/pit (NW quadrant)

4.2.2 Stratigraphic Matrix

Natural Deposits:

F001	Topsoil: Consisted of soft, light brown silty clay. Frequent sand and stones included. Measured 0.04-0.28m (in depth). No artefacts recorded.
F002	Natural subsoil: Consisted of compact, yellow, sand. Occasional large boulders/stones included.

Trough 1 (Figures 8 & 11, Plate 4) (SE, SW Quadrants)

F017	Cut of large sub-rectangular trough, with rounded corners. Orientated north-south. Measured 2.73m x 2.10m x 0.40m. Had a gradual-sharp break of slope, convex-vertical sides, and a sharp break of slope leading to a flat base. Filled with F018, F049, F045. Contained 16 stakeholes, randomly placed. Abutted F015. Same as F044. Lay beneath F020. Above F002, below F018.
F018	Primary/Lower fill of F017, with moderately compact, light grey, silty sand. Frequent heat shattered stones (quartzite, quartz, sandstone, limestone and greywacke) and occasional charcoal (Alder, Hazel, Pomoideae, Blackthorn/Cherry, Elm and Oak) included. A radiocarbon date of Cal BC 1510-1380 was returned for this fill (See Appendix 10.4). Measured 2.73m x 2.10m x 0.32m. No artefacts recorded. One sample taken (heat shattered stones) (#15). Above F017, below F049.
F049	Secondary/Redeposited fill of F017, with compact, mottled yellow-brown-grey, silty sand. Occasional charcoal and heat shattered stones included. Measured 2m x 0.55m x 0.20m. No artefacts or samples taken. Above F018, below F045.
F045	Tertiary/Upper fill of F017, with soft, dark grey-black, silty sand. Frequent heat shattered stones (limestone) and charcoal (Oak, Ash, Hazel, Pomoideae, Birch and Elm) included. Measured 1.50m x 3.60m x 0.29m (spread beyond the main cut). No artefacts recorded. One sample taken (heat shattered stones) (#16). Above F049, below F020.

Stakeholes A-P (1-16) within F017 (Figure 8)

Main fill	Each stakehole consisted of soft, mottled dark grey-black, silty sand. Frequent

	charcoal and heat shattered stones (sandstone) included. No artefacts or samples taken.
F017A	Cut of stakehole. Measured 0.08m x 0.08m x 0.09m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F017B	Cut of stakehole. Measured 0.08m x 0.07m x 0.10m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F017C	Cut of stakehole. Measured 0.04m x 0.05m x 0.05m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F017D	Cut of stakehole. Measured 0.08m x 0.07m x 0.13m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a tapered flat base. Inclined to the southeast.
F017E	Cut of stakehole. Measured 0.11m x 0.09m x 0.32m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to the base which was not recorded (probably over-cut).
F017F	Cut of double stakehole. Measured 0.16m x 0.10m x 0.20-0.30m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F017G	Cut of stakehole. Measured 0.07m x 0.06m x 0.19m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F017H	Cut of stakehole. Measured 0.03m x 0.03m x 0.14m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F017I	Cut of stakehole. Measured 0.05m x 0.04m x 0.11m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a tapered pointed base.
F017J	Cut of stakehole. Measured 0.08m x 0.07m x 0.16m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base. Inclined to the south.
F017K	Cut of stakehole. Measured 0.05m x 0.05m x 0.20m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base. Inclined to the east.
F017L	Cut of stakehole. Measured 0.07m x 0.06m x 0.18m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F017M	Cut of stakehole. Measured 0.09m x 0.08m x 0.20m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F017N	Cut of stakehole. Measured 0.10m x 0.05m x 0.11m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base. A stone was

	recorded at the western edge.
F017O	Cut of stakehole. Measured 0.06m x 0.05m x 0.10m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a tapered base.
F017P	Cut of stakehole. Measured 0.09m x 0.08m x 0.30m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to an unrecorded base.

Trough/Well 2 (Figures 8 & 11, Plate 2) (NE quadrant)

F010	Cut of oval trough/well. Orientated east-west. Measured 3.75m x 3.35m x 1.02m. Had a sharp break of slope, mainly concave sides, and a sharp break leading to an uneven base. A series of flat sandstone slabs to give the appearance of steps into the trough were recorded. Filled with F031, F032, F011. A wooden lining was recorded (brushwood sallies with bark, cut flat and interwoven). Contained 35 stakeholes, randomly placed. Located west of F028, north of F039. Above F002, below F031.
F031	Primary/Lower fill of F010, with soft sticky, yellow-grey, sandy clay. Frequent stones (limestone), marl and wood bark/pieces (in poor condition) included. Measured 2.60m x 2m x 0.30m. No artefacts recorded. One wood sample taken (#17). A BETA radiocarbon date of Cal BC 1380 to 1100 was returned for this fill (See Appendix 10.4). Above F010, below F032.
F032	Secondary/Middle fill of F010, with soft, dark brown-grey, peat. Frequent wood debris and occasional stones (quartzite, coarse quartz, sandstone, limestone and greywacke) included. Measured 1.60m x 1.50m x 0.30m. No artefacts recorded. Six samples taken (charcoal, soil and wood) (#7, 11). Situated mainly to the west of the pit. Above F031, below F011.
F011	Tertiary/Upper fill of F010, with friable, dark brown-black, sandy clay. Frequent heat shattered stones (limestone and sandstone) and wood debris included. A single plank was also recorded. Measured 3.60m x 2.90m x 0.42m. No artefacts recorded. One soil sample taken (#14). Above F032, below F004.

Stakeholes A-I2 (1-35) within F010 (Figure 8)

Main fill	Each stakehole consisted of soft, mottled dark grey-black, silty sand. Frequent charcoal and heat shattered stones (sandstone) included. No artefacts or samples taken.
F010: A	Cut of stakehole. Measured 0.04m x 0.03m (length x width). Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base.
F010: B	Cut of stakehole. Measured 0.10m x 0.10m x 0.11m. Had a sharp break of slope,

	vertical sides, and a sharp break of slope leading to a tapered flat base.
F010: C	Cut of stakehole. Measured 0.04m x 0.04m x 0.29m. Had a sharp break of slope, vertical sides, and a sharp break of a slope leading to a flat base.
F010: D	Cut of stakehole. Measured 0.16m x 0.10m x 0.16m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a tapered flat base. Inclined to the west.
F010: E	Cut of double stakehole. Measured 0.17m x 0.12m x 0.15m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a tapered flat base.
F010: F	Cut of stakehole. Measured 0.12m x 0.10m x 0.15m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to tapered flat base.
F010: G	Cut of stakehole. Measured 0.05m x 0.05m x 0.06m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a tapered flat base. Inclined to the north.
F010: H	Cut of stakehole. Measured 0.06m x 0.06m x 0.07m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F010: I	Cut of stakehole. Measured 0.10m x 0.09m x 0.09m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a tapered flat base.
F010: J	Cut of stakehole. Measured 0.12m x 0.08m x 0.14m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base.
F010: K	Cut of stakehole. Measured 0.03m x 0.02m x 0.05m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F010: L	Cut of stakehole. Measured 0.12m x 0.10m x 0.11m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base with stones.
F010: M	Cut of stakehole. Measured 0.09m x 0.08m x 0.09m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F010: N	Cut of stakehole. Measured 0.09m x 0.09m x 0.12m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base.
F010: O	Cut of stakehole. Measured 0.07m x 0.06m x 0.10m Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F010: P	Cut of stakehole. Measured 0.12m x 0.10m x 0.23m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base. Inclined to the south.
F010: Q	Cut of stakehole. Measured 0.09m x 0.09m x 0.23m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F010: R	Cut of double stakehole. Measured 0.10m x 0.10m x 0.21m. Had a sharp break

	of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F010: S	Cut of stakehole. Measured 0.07m x 0.06m x 0.12m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F010: T	Cut of stakehole. Measured 0.10m x 0.10m x 0.10m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base.
F010: U	Cut of stakehole. Measured 0.07m x 0.05m x 0.06m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base. Inclined to the north.
F010: V	Cut of stakehole. Measured 0.07m x 0.06m x 0.10m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F010: W	Cut of stakehole. Measured 0.03m x 0.02m x 0.05m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F010: X	Cut of stakehole. Measured 0.10m x 0.09m x 0.12m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base.
F010: Y	Cut of stakehole. Measured 0.15m x 0.13m x 0.19m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base.
F010: Z	Cut of stakehole. Measured 0.08m x 0.05m x0.14m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F010: A2	Cut of stakehole. Measured 0.08m x 0.08m x 0.11m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F010: B2	Cut of stakehole. Measured 0.08m x 0.08m x 0.12m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base.
F010: C2	Cut of stakehole. Measured 0.08m x 0.08m x 0.10m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base.
F010: D2	Cut of stakehole. Measured 0.14m x 0.10m x 0.11m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a tapered flat base.
F010: E2	Cut of stakehole. Measured 0.07m x 0.07m x 0.09m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F010: F2	Cut of stakehole. Measured 0.08m x 0.07m x 0.07m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a tapered pointed base.
F010: G2	Cut of stakehole. Measured 0.07m x 0.06m x 0.07m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a tapered pointed base.
F010: H2	Cut of stakehole. Measured 0.08m x 0.07m x 0.09m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F010: I2	Cut of stakehole. Measured 0.11m x 0.11m x 0.11m. Had a sharp break of slope,

	vertical sides, and a sharp break of slope leading to a tapered flat base.

Fulacht/roasting pit 1 (Figures 8 & 12, Plate 3) (SE quadrant)

F012	Cut of rectangular pit, with rounded corners. Orientated northwest-southeast. Measured 2.30m x 1.35m x 0.14m. Had a sharp break of slope, concave sides, and a gradual break of slope leading to an uneven-flat base. Filled with F013, F014 (F014 was redeposited east of pit with a stone lying between the fills). Lay beneath F020. Possible roasting pit. Above F002, below F013.
F013	Main fill of F012, with soft, black, sand. Frequent heat shattered stones (sandstone) and charcoal included. Measured 2.30m x 1.35m x 0.10m. No artefacts recorded. One charcoal/soil sample taken (#8). Above F012, below F014.
F014	Redeposited fill of F012, with friable, brown-orange, silty sand. Frequent heat shattered stones included. Measured 1.50m x 1.15m x 0.07m. No artefacts or samples taken. Above F013, below F020.

Fulacht pit 2 (Figure 8, Plate 4) (SE, SW quadrants)

F015	Cut of small circular pit. Measured 0.90m x 0.70m x 0.10m. Had a gradual break of slope, concave sides, and a gradual break of slope leading to a rounded base. Probable natural depression. Filled with F016. Abutted F017. Above F002, below F016.
F016	Fill of F015, with soft, dark grey-black, silty sand. Frequent charcoal flecks and heat shattered stones (limestone and sandstone) included. Measured 0.90m x 0.70m x 0.10m. No artefacts or samples taken. Above F015, below F004.

Trough 3 (Figures 8 & 12, Plate 5) (NW quadrant)

F026	Cut of circular trough. Measured 1.65m x 1.63m x 0.65m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base. Filled with F043, F027. Sandstone slabs recorded on top of pit. Situated west of the main activity. Above F002, below F043.
F043	Primary/Lower fill of F026, with compact, grey-brown-orange, silty sand. Frequent small sub angular stones and large limestone's included. Measured 0.99m x 0.99m x 0.22m. No artefacts or samples taken. Above F026, below F027.
F027	Secondary/Upper fill of F026, with friable, black, sandy silt. Frequent charcoal and heat shattered stones (sandstone, limestone, quartz, quartzite, greywacke and chert) included. Measured 1.63m x 1.45m x 0.50m. No artefacts recorded. One soil sample

	taken (#13). Above F043, below F024.

Trough 4 (Figures 8 & 11, Plate 6) (NE quadrant)

F028	Cut of sub-oval trough. Orientated northwest-southeast. Measured 2.20m x 1.20m x 0.50m. Had a sharp break of slope, concave sides, and a gradual break of slope leading to a flat base. Filled with F042, F030, F041, F029. Truncated F048. Located east of F010. Above F046, below F042.
F042	Primary/Lower fill of F028, with compact, grey-brown, silty clay. Frequent decayed stone and organic clay included. Measured 0.60m x 0.20m x 0.12m. No artefacts or samples taken. Above F028, below F030.
F030	Secondary/Middle fill of F028, with mid brown-grey, silty clay. Frequent organic material, sand, decayed stone and charcoal included. Measurements unrecorded. No artefacts or samples taken. Above F042, below F041.
F041	Tertiary/Middle fill of F028, with hard, grey, silty sand. Frequent clay and yellow decayed stone included. Measured 0.17m x 0.15m x 0.04m. No artefacts or samples taken. Above F030, below F029.
F029	Fourth/Upper fill of F028, with compact, silty sand. Frequent yellow decayed stone, heat shattered stones (sandstone) and charcoal included. Measured 2.20m x 1.20m x 0.12m. No artefacts or samples taken. Above F041, below F004.

***Fulacht* pit 3 (Figures 8 & 10, Plate 7) (SW quadrant)**

F035	Cut of oval pit. Orientated east-west. Measured 1.65m x 1m x 0.20m. Had a sharp break of slope, concave sides, and a gradual break of slope leading to a rounded base. Filled with F038, F036. Truncated by F007. Above F002, below F038.
F038	Primary/Lower fill of F035, with soft, black charcoal rich (Oak, Hazel and Willow) deposit. Frequent heat shattered stones (sandstone, limestone and chert) included. Measured 0.60m x 0.60m x 0.03m. No artefacts recorded. One charcoal/soil sample taken (#9). Above F035, below F036.
F036	Secondary/Upper fill of F035, with compact, light brown-grey silty sand. Frequent yellow and red sandstones included. Measured 1.65m x 1m x 0.17m. No artefacts or samples taken. Above F038, below F007.

Curvilinear feature 1 (Figure 8) (SW quadrant)

F037	Cut of curvilinear feature. Orientated east-west. Measured 5.10m x 4.20m (length x width). Had a gradual-sharp break of slope, irregular sides, and a gradual break of slope leading to a rounded base. Filled with F034. Surrounded F019, within the southwest quadrant. Truncated by F005, F007. Above F002, below F034.
F034	Fill of F037, with compact, brown-grey, silty sand. Frequent heat shattered stones included. Measured 5.10m x 4.20m (length x width). No artefacts or samples taken. Above F037, below F005, F007.

Redeposited material (Figure 8) (SW quadrant)

F019	Deposit of compact, orange, sandy silt. Frequent irregular stones included. Measured 4.30m x 1.20m (length x width). Surrounded by F037, within the southwest quadrant. Above F024, below F020.

***Fulacht* pit/Trough 4 (Figures 8 & 11, Plate 8) (SE, NE quadrants)**

F039	Cut of small sub-rectangular pit/trough. Orientated northwest-southeast. Measured 1.60m x 1.25m x 0.15m. Had a gradual break of slope, gently sloping sides, and an imperceptible break of slope leading to a flat base. Filled with F040. Contained 10 stakeholes, randomly placed. Lay beneath F020. Located south of F010. Not fully excavated as some lay beneath baulk. Above F002, below F040.
F040	Fill of F039, with friable, black, silty sand. Frequent charcoal (Alder, Oak, Ash, Blackthorn, Hazel and Elm) and heat shattered stones (quartz and quartzite) included. Measured 1.60m x 1.25m x 0.15m. No artefacts recorded. One charcoal/soil sample taken (#12). Above F039, below F020.

Stakeholes A-J (1-10) within F039 (Figure 8)

Main fill	Each stakehole consisted of loose-soft, mottled dark grey-black, silty sand. Frequent charcoal and heat shattered stones (sandstone) included. No artefacts or samples taken.
F039A	Cut of stakehole. Measured 0.06m x 0.05m x 0.18m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a tapered flat base.
F039B	Cut of 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 tapered flat base.
F039C	Cut of stakehole. Measured 0.12m x 0.08m x 0.13m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base. Inclined to

	the south.
F039D	Cut of double stakehole. Measured 0.10m x 0.09m x 0.21-0.40m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F039E	Cut of stakehole. Measured 0.08m x 0.09m x 0.14m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F039F	Cut of stakehole. Measured 0.07m x 0.06m x 0.06m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base with stones.
F039G	Cut of stakehole. Measured 0.06m x 0.06m x 0.05m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a tapered pointed base.
F039H	Cut of stakehole. Measured 0.08m x 0.06m x 0.11m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F039I	Cut of stakehole. Measured 0.07m x 0.06m x 0.16m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F039J	Cut of stakehole. Measured 0.09m x 0.07m x 0.18m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.

Pit 5 (Figure 8) (NE quadrant)

F048	Cut of sub-oval pit. Orientated southwest-northeast. Measured 1.70m x 1.40m x 0.35m. Had a gradual break of slope, gently sloping sides and a gradual break of slope leading to an uneven base. Filled with F047, F046. Truncated by F028. Located east of F010. Above F002, below F047.
F047	Timber element in F048. Recorded in poor condition and un-worked. Above F048, below F046.
F046	Fill of F048, with mottled brownish-yellow, silty sand. Frequent decayed stone included. Measured 1.70m x 1.40m x 0.35m. No artefacts or samples taken. Above F047, below F028.

Fulacht/Burnt mound deposit (Figure 10) (NW quadrant)

F050	Natural depression consisting of compact, light-dark grey, silty sand. Frequent heat shattered stones, decayed sandstone and occasional charcoal included. Measured 0.70m x 0.30m (length x depth). No artefacts or samples taken. Above F002, below F024.

Fulacht/Burnt mound spread/pit 1 (Figures 8 & 12) (NW quadrant)

F051	Rectangular spread/pit containing dark grey, silty sand. Occasional peat and charcoal included. Measured 1.30m x 0.70m x 0.08m. No artefacts or samples taken. Contained 11 stakeholes, randomly placed. Located west of F052. Above F002, below F001.

Stakeholes A-K (1-11) within F051 (Figure 8)

Main fill	Each stakehole consisted of loose-soft, mottled dark grey-black, silty sand. Frequent charcoal and heat shattered stones (sandstone) included. No artefacts or samples taken.
F051A	Cut of stakehole. Measured 0.07m x 0.06m x 0.12m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a tapered flat base.
F051B	Cut of stakehole. Measured 0.03m x 0.03m x 0.20m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base. Inclined to the north.
F051C	Cut of stakehole. Measured 0.04m x 0.04m x 0.20m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base. Inclined to the south.
F51D	Cut of stakehole. Measured 0.06m x 0.05m x 0.13m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base. Inclined to the southwest.
F051E	Cut of stakehole. Measured 0.03m x 0.03m x 0.30m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base. Inclined to the west.
F051F	Cut of stakehole. Measured 0.05m x 0.05m x 0.06m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F051G	Cut of stakehole. Measured 0.05m x 0.04m x 0.04m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F051GH	Cut of stakehole. Measured 0.04m x 0.04m x 0.23m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F051I	Cut of stakehole. Measured 0.03m x 0.03m (length x width). Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base.
F051J	Cut of stakehole. Measured 0.06m x 0.05m x 0.22m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F051K	Cut of stakehole. Measured 0.05m x 0.04m x 0.22m. Had a sharp break of slope,

	vertical sides, and a sharp break of slope leading to a pointed base. Inclined to the north-west.

Fulacht/Burnt mound spread/pit 2 (Figures 8 & 12) (NW quadrant)

F052	Curvilinear spread/pit containing compact, light-dark grey, silty sand. Occasional tiny pebbles included. Measured 4.90m x 0.95m x 0.11m. Contained 24 stakeholes, randomly placed. Located east of F051. Truncated by a modern drainage pipe. No artefacts or samples taken. Above F002, below F025.

Postholes L-I2 (1-24) within F052 (Figure 8) (NW quadrant)

Main fill	Each stakehole consisted of loose-soft, mottled dark grey-black, silty sand. Frequent charcoal and heat shattered stones (sandstone) included. No artefacts or samples taken.
F052L	Cut of stakehole. Measured 0.06m x 0.05m x 0.20m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base.
F052M	Cut of stakehole. Measured 0.06m x 0.06m x0.08m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F052N	Cut of stakehole. Measured 0.06m x 0.06m x 0.23m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F052O	Cut of stakehole. Measured 0.07m x 0.05m x 0.07m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F052P	Cut of stakehole. Measured 0.03m x 0.03m x 0.06m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base. Inclined to the west.
F052Q	Cut of stakehole. Measured 0.05m x 0.05m x 0.06m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base. Inclined to the west.
F052R	Cut of stakehole. Measured 0.05m x 0.05m x 0.06m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F052S	Cut of stakehole. Measured 0.04m x 0.04m x 0.22m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base. Inclined to the west
F052T	Cut of stakehole. Measured 0.05m x 0.05m x 0.23m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.

F052U	Cut of stakehole. Measured 0.06m x 0.06m x 0.10m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F052V	Cut of stakehole. Measured 0.06m x 0.04m x 0.13m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base. Inclined to the south.
F052W	Cut of stakehole. Measured 0.06m x 0.05m x 0.16m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base.
F052X	Cut of stakehole. Measured 0.07m x 0.06m x 0.15m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base.
F052Y	Cut of stakehole. Measured 0.07m x 0.07m x 0.15m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base.
F052Z	Cut of stakehole. Measured 0.04m x 0.03m x 0.09m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F052A2	Cut of stakehole. Measured 0.08m x 0.08m x 0.17m. Had a sharp break of slope, concave sides, and a sharp break of slope leading to a pointed base.
F052B2	Cut of stakehole. Measured 0.05m x 0.04m x 0.19m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F052C2	Cut of stakehole. Measured 0.06m x 0.05m x 0.10m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F052D2	Cut of stakehole. Measured 0.04m x 0.03m x 0.09m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F052E2	Cut of stakehole. Measured 0.04m x 0.03m x 0.14m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F052F2	Cut of stakehole. Measured 0.05m x 0.04m x 0.13m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F052G2	Cut of stakehole. Measured 0.04m x 0.04m x 0.09m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F052H2	Cut of stakehole. Measured 0.02m x 0.02m x 0.06m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a pointed base.
F052I2	Cut of stakehole. Measured 0.05m x 0.05m x 0.30m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading to a flat base.

Fulacht/Burnt mound spreads

Fulacht/Burnt mound spreads (Figures 9 & 10) (All quadrants)

F024	All quadrants: Redeposited material with compact, light grey, silty sand. Occasional heat shattered stones (sandstone) and charcoal included. Measured 5m x 4m x 0.06m. No artefacts or samples taken. Associated with F015. Above F027, F050, below F019, F025, F033.
F033	NW quadrant: Deposit of moderately compact, dark grey, silty sand. Frequent charcoal and a moderate amount of heat shattered stones (quartzite, coarse quartz, sandstone, limestone and greywacke) included. Measured 5.80m x 0.10m (length x depth). No artefacts recorded. One sample taken (heat shattered stones) (#5). Above F024, below F020.
F025	NE, NW quadrants: Deposit of moderately compact, dark brown-grey, peat. Occasional heat shattered stones and charcoal included. Measured 5.60m x 10m x 0.18m. No artefacts or samples taken. Above F024, F052, below F023.
F023	NW quadrant: Redeposited material with compact, yellow, silty sand. Frequent small stones and pebbles included. Measured 0.67m x 0.30m x 0.10m. Associated with a small gully between F010 and F015. No artefacts or samples taken. Above F025, below F020.
F022	SE, NE quadrants: Deposit of compact, mottled brown-grey, clay. Occasional charcoal and heat shattered stones included. Measured 2.70m x 0.55m x 0.24m. No artefacts or samples taken. Associated F010, F020, F039. Above F002, below F020.
F020	All quadrants: Deposit of soft-friable, dark grey-black, peaty-sandy silt. Frequent heat shattered stones (quartzite, coarse quartz, sandstone, limestone and greywacke) and a moderate amount of charcoal flecks included. Measured 17.20m x 12.60m x 0.32m. No artefacts recorded. Four samples taken (heat shattered stones) (#1-4). Associated with F010 and F015. Lay above F012, F017, F019, F039. Above F014, F019, F022, F023, F033, F040, F045, below F021.
F021	All quadrants: Deposit of moderately compact, mid grey, silty sand. Frequent heat shattered stones and occasional charcoal (Oak and Hazel) included. Measured 4.90m x 2.80m x 0.20m. No artefacts recorded. One sample taken (heat shattered stones) (#6). Above F020, below F004.
F004	All quadrants: Irregular deposit of friable-moderately compact, grey silty sand. A moderate amount of heat shattered stones and occasional charcoal flecks included. Measured 24m x 19m x 0.06-0.40m. Covered almost the entire *fulacht*/burnt mound and F010. No artefacts or samples taken. Truncated by F005. Above F021 (F011,

	F016), below F003 (F005).
F003	NW, SW quadrants: Deposit of moderately compact, grey-brown, silty sand. Occasional stones pebbles and heat shattered stones included. Measured 7.15m x 4.40m x 0.30m. One chert arrowhead (Neolithic) recorded (E2172:3:1; Figure 13; Plate 9; See Appendices 10.3 & 10.6). No samples taken. Located west of site. Above F004, below F001.

Modern features

Field boundary ditch 1 (Figures 8 & 10)

F005	Cut of linear field boundary ditch. Orientated east-west. Measured 41m x 1.60m x 0.28m. Had a sharp break of slope, concave sides, and a gradual break of slope leading to a rounded base. Filled with F006. Truncated F004, F012, F037. Located north of F007. Above F004, F013, F034, below F006.
F006	Fill of F005, with a mixture of topsoil and redeposited *fulacht*/burnt mound material. Measured 41m x 1.60m x 0.28m. No artefacts or samples taken. Above F005, below F001.

Field boundary ditch 2 (Figures 8 & 10)

F007	Cut of linear field boundary ditch. Orientated east-west. Measured 41m x 1.20m x 0.40m. Had a sharp break of slope, concave sides, and a gradual break of slope leading to a rounded base. Filled with F008. Truncated F035, F037. Located south of F005. Above F036, F034, below F008.
F008	Fill of F007, with a mixture of topsoil and redeposited *fulacht*/burnt mound material. Measured 41m x 1.20m x 0.40m. No artefacts or samples taken. Above F007, below F001.

4.2.3 Stratigraphic Sequencing

Table … Stratigraphic Groups		
Site Name: Shanboe 1		**Record No.: E2172**
Period	**Phase**	**Composition**
I	1	Formation of subsoil
II	1	Middle-Late Bronze Age: Initial clearance of site
	2	Cutting of *fulacht*/burnt mound-related features
	3	Final deposition of *fulacht* spreads
III	1	Modern period: Cutting of cultivation furrows

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

Period 2 Middle-Late Bronze Age period

Phase 2

Pits containing *fulacht*/burnt mound material (Figures 8, 10, 11 & 12; Plates 1-8)

A number of pits and troughs were recorded across four quadrants of the site following the removal of the main *fulacht*/burnt mound. They were filled with varying amounts of *fulacht*/burnt mound material that included heat shattered stones (quartzite, coarse quartz, limestone, sandstone, chert and greywacke) (Appendix 10.2) and charcoal flecks.

Of these, a concentration could be seen in the northeast quadrant. At least two troughs (Sub-rectangular F017, Sub-oval F028: 2.20–2.73m x 1.20–2.10m x 0.40–0.50m) and a third trough/well (Oval F010: 3.75m x 3.35m x 1.02m) were identified. To the west of the main concentration, a fourth trough (Circular F026: 1.65m x 1.63m x 0.65m) was noted. Each consisted of mainly sharp breaks of slope, vertical sides and flat bases, with varying deposits of brown-black, silty clay and silty sand. Charcoal sampled from the primary fill of F026 (F043) was identified as Oak, Ash, Hazel, Pomoideae, Birch and Elm (Appendix 10.1).

F010 was the largest pit on site and appears to be the focal point of activity in this area. With its relatively large size, it may have been utilised as a well/primary trough for the surrounding features. Filled with three deposits (F031, F032, F011), it consisted mainly of sandy clay, peat and other organic material. To its southwest, a series of flat sandstone slabs were recorded going into the trough giving the appearance of steps. Fragments of wood were noted cut flat and interwoven at the base, indicating the remains of an artificial waterproof lining. Alternatively, the feature could have acted as a trough or bath-like feature. Associated with F010 were 35 stakeholes recorded both within the trough and surrounding it in an apparently random pattern (possibly indicating re-cuts and re-use of the feature). Filled with mottled dark grey-black, silty sand, it has been suggested by the excavator that they were used to support a superstructure or sweathouse-type feature (See Fig. 8). A radiocarbon date was returned for the primary fill of F010 (F031) dating it to the Late Bronze Age, Cal BC 1380-1100 (See Appendix 10.4).

Located to its southwest, F026 had a number of sandstone slabs above its upper fill (F027) while F028, to the northeast of F010, contained a layer of organic material at its base (F042)

(Figure 8). An artificial lining of compact, silty clay may have been recorded at the base of both troughs. No such lining was recorded in the remaining two troughs/pits. Both F017 and F039 contained charcoal (which was identified as Alder, Hazel, Pomoideae, Blackthorn/Cherry, Elm and Oak) and heat shattered stones (Appendices 10.1 & 10.2). Charcoal from the primary fill of F017 (F018) returned a Late Bronze date of Cal BC 1510-1380 (Appendix 10.4). This indicates that F010 and F017, however contiguous, were not contemporary features and that F017 pre-dated F010. A further 16 stakeholes were recorded randomly placed within and surrounding F017 (indicating re-cuts and re-use). Also filled with mottled dark grey-black, silty sand, they have been identified by the excavator as possible structural supports for a sweathouse-type feature (Figure 8).

A possible fifth trough was recorded *c.*1m to the south of F010 (Sub-rectangular F039: 1.60m x 1.25m x 0.15m), although this shallow pit consisted of more gradual breaks of slope and gently sloping sides. It has subsequently been identified as a *fulacht* pit. This feature also contained 10 stakeholes with mottled dark grey-black, silty sand, mainly within the pit itself indicating a superstructure used in a similar manner to those mentioned above. As the pattern was less random and fewer stakeholes were recorded, the possibility of re-cut and re-use becomes more diminished.

Surrounding these, two features (circular *fulacht* pit F015 and sub-oval pit F048: 0.90-1.70m x 0.70-1.40m x 0.10-0.35m) were noted, the latter of which was truncated by F028 indicating a separate phase of use. Organic material recorded in the primary fill of F028 was similar to the ‘timber element’ uncovered in F048. This timber had similar characteristics to that found in trough F010. Abutting trough F017, F015 comprised gradual breaks of slope, concave sides, and a rounded base. It is possible that it was a natural depression filled with material dispersed from F017 (both were filled with dark grey-black, silty sand).

Further south, three other pits (Rectangular F012, Oval F035, Curvilinear F037: 1.65-5.10m x 1-4.20m x 0.14–0.20m) were uncovered. Described as a ‘roasting pit’, F012 consisted of gradual-sharp breaks of slope, concave sides, an uneven-flat base and silty sand. It was truncated to the south by the northern twin of a double field ditch (F005), spreading its upper fill F014 to the east of the pit. Abutting one another, *fulacht* pit F035 and curvilinear feature F037 comprised gradual-sharp breaks of slope, irregular-concave sides, rounded bases and brown-grey, silty sand (F035 also contained charcoal identified as Oak, Hazel and Willow: Appendix 10.1). Truncated to the south by F005 and F007 in the southwest quadrant, F037 surrounded deposit F019.

Deposits and other spreads (See Figures 8, 10 & 12)

Curvilinear spread F019 (4.30m x 1.20m (length x width)) was noted surrounded by pit F037. Containing compact, orange, sandy silt, it also included irregular-sized stones. A further deposit, F050 (0.70m x 0.30m (length x depth) had no visible cut and lay beneath spread F024. Filling a natural depression in the northwest quadrant, it contained grey, silty sand. Also situated in the northwest quadrant and abutting F010, rectangular spread F051 (1.30m x 0.70m x 0.08m) and curvilinear spread F052 (4.90m x 0.95m x 0.11m) lay adjacent to one another. Containing dark grey, silty sand, peat and charcoal, they were both very shallow features that included between 11 and 24 stakeholes (F051: 11, F052: 24). These stakeholes were similar to those found in the three larger pits/troughs located in the northeast quadrant. They were filled with mottled dark grey-black, silty sand and included charcoal and heat shattered stones. Both of the stakehole groups were placed mainly to one side of each depression/spread, indicating a possible windbreaker or cooking frame.

Phase 3

Fulacht/burnt mound spreads (Figures 9 & 10)

Covering the entire site were a number of deposits forming the main *fulacht*/burnt mound that had become dispersed following cultivation activities. This mound was the largest feature on site and covered all other features including pits and troughs. Consisting of grey silty sand with heat shattered stones (quartzite, coarse quartz, sandstone, limestone and greywacke) (See Appendix 10.2) and charcoal flecks, one of the main deposits F004 (24m x 19m x 0.06-0.40m) was recorded in all quadrants. Noted as the main upper layer of the *fulacht*/burnt mound, it covered all of the other main features on site with the exception of F003. Situated to the west of F004 and truncating it, F003 (7.15m x 4.40m x 0.30m) consisted of grey-brown, silty sand with stones pebbles and heat shattered stones. A chert arrowhead was recorded (E2172:003:1) diagnostically dated to the Neolithic period (See Appendices 10.3 & 10.6). Both F020 and F021 were noted below F004 and were located in all quadrants. F021 (4.90m x 2.80m x 0.20m) comprised mid grey, silty sand with heat shattered stones and charcoal flecks (Oak and Hazel) (See Appendix 10.1). Below this, F020 (17.20m x 12.60m x 0.32m) consisted of dark grey-black, peaty-sandy silt with heat shattered stones (sandstone) and charcoal flecks (See Appendix 10.2). Below F020, F022 (2.70m x 0.55m x 0.24m) was noted in both the southeast and northeast quadrants. It consisted of mottled brown-grey clay, charcoal and heat shattered stones. In the northwest quadrant and also below F020, F023

(0.67m x 0.30m x 0.10m) contained redeposited yellow, silty sand with small stones and pebbles. Below this, F025 (5.60m x 10m x 0.18m) was found in both the northeast and northwest quadrants. Containing a thin layer of peat, it included heat shattered stones and charcoal flecks. Found only in the northwest quadrant and below F020, F033 (5.80m x 0.10m (length x depth)) consisted of dark grey, charcoal-rich, silty sand with heat shattered stones (quartzite, coarse quartz, sandstone, limestone and greywacke) (See Appendix 10.2). Below this and above pit F026 and spread F050, F024 (5m x 4m x 0.06m) contained light grey, silty sand with heat shattered sandstones and charcoal.

Period 3 Modern period

Phase 1

Field boundary ditches (Figures 8 & 10)

Two field boundary ditches were recorded to the south of the site. Linear F005 and F007 (41m x 1.20-1.60m x 0.28-0.40m) ran parallel to one another from east to west. Comprising a mixture of topsoil and redeposited *fulacht*/burnt mound material, they truncated a number of pits on site including F012, F035 and F037. A modern drain pipe cut through the site in a northeast-southwest direction, truncating spread/pit F052 and abutting F010 and F051.

4.2.4 Stratigraphic Discussion

Excavation of Shanboe 1 revealed the remains of *fulacht*/burnt mound activity, situated on a gentle north facing slope above a boggy plain, dated to the Middle-Late Bronze Age (See Appendix 10.4) (See Figs. 1-12, Plates 1-8). Comprising a number of deposits, it measured *c.*25m (east-west) x *c.*15-19m (north-south) x 0.50m in depth. Once removed, a number of pits were noted. A technical description can be found in the matrix and sequencing above. The largest pit (F010), located to the northeast of the site, was a possible well utilised for the surrounding features (See Figs. 8 & 11). It may also have been a large trough, used for more industrial-type activities or a bathing area with a series of flat sandstones slabs used as steps to access it. Oval in plan, it contained three deposits of sandy clay and peat, indicating some waterlogging activity. The lower fill (F031) comprised the remains of wooden timbers interwoven into what can be determined as a waterproof lining. This fill returned a radiocarbon date of Cal BC 1380-1100 indicating a Late Bronze Age date (See Appendix 10.4). Containing a large amount of *fulacht* material, the feature included *c.*35 stakeholes recorded randomly around its edge. Along with the wood debris found in the upper fill of the pit (F011), these stakeholes provide evidence of a possible superstructure such as an aid to

retrieve water, a windbreaker, a cooking frame or a sweathouse-type feature. The random nature of their position may indicate recurrent phases of use. Adjacent to three other similar pits/troughs (F017, F028, F039), F010 appears to be the focal point of activity on site. F017 however, provided a radiocarbon date from a charcoal sample of Cal BC 1510-1380 dating it to the Middle-Late Bronze Age (See Appendix 10.4). This therefore highlights that F010 and F017, however contiguous, were not contemporary. Both F017 and F039 also contained a large number of stakeholes (16 and 10, respectively) used for similar purposes (See Fig. 8). F039 however only had a depth of 0.15m. Similar to F010 and F017, it may originally have been a trough truncated to its present depth. It may also have acted as a *fulacht* pit (See below). A further trough (F026) was situated in a more isolated location to the west of the site (See Figs. 8 & 12).

Other pits surrounded the larger pits/troughs and were probably associated with them. Adjacent to F010 and truncated by F028, F048 contained a 'timber element' similar to that found in the primary fill of both larger pits (See Fig. 8). Further south, pit F012 contained two deposits of *fulacht* material suggesting it was a *fulacht* or 'roasting' pit (See Figs. 8 & 12). Similar to the average trough, *fulacht* pits generally had a depth of less than 0.25m. They are considered to have a more specific role (such as pot boiling) and may sometimes negate the need for water at all, i.e. dry roasting. There were a number of similar possible *fulacht* pits (F015, F035) scattered across the site beneath the main mound. Two deposits of silty sand, peat and charcoal (F051, F052) were noted to the northwest of the site containing a number of stakeholes each (See Figs. 8 & 12). Similar to the abovementioned troughs, they may have been heavily truncated. Only one artefact was recorded on site. A probable Neolithic chert arrowhead (E2172:003:1) was uncovered in the small spread F003 on the western margin of the burnt mound (See Appendices 10.3 & 10.6). The archaeological material found at Shanboe 1 represents the levelled remains of *fulacht fiadh* or burnt mound activity. This activity involved heating water (supplied by a well/stream) through 'hot stone technology' within a trough or pit provided, in the aim of implementing domestic and other activities. *Fulacht* material comprising heat shattered stones and charcoal was a by-product of such technology (Grogan, *forthcoming*). See Main discussion in section 5 for further information.

4.2.5 Stratigraphic Conclusion

Through the various stages of archaeological investigation *fulacht*/burnt mound activity was recorded indicating a degree of domesticity. A small number of troughs and *fulacht*-related pits were noted. This complex arrangement of features provides good evidence of occupation

Shanboe 1. Besides the chert arrowhead recovered from this site, there was a marked scarcity of finds preventing further diagnostic analysis being carried out. This however is a common trait of *fulacht fiadh*/burnt mound sites. When comparing Shanboe 1 with neighbouring archaeological sites, a pattern of occupation across the local landscape emerges.

4.3 Artefactual Material

4.3.1 Lithic analysis

See Appendices 10.3 & 10.6

Table: Lithic samples sent for analysis					
Site Name: Shanboe 1				Record No.: E2172	
Report: Context: Find number	Period	Completeness	Artefact type	Condition	Comments (decoration etc)
E2172:003:1	Probable Neolithic period	Full	Chert arrowhead	Good	Dimensions: 32.7x16.6x3.6mm

4.4 Environmental Evidence

4.4.1 Wood identification/Charcoal analysis See Appendix 10.1

Table: Charcoal samples sent for analysis					
Site Name: Shanboe 1				Record No.: E2172	
Context number	Sample number	Feature type	Date obtained	Sample type	Analysis results
F018	15	Fill of *fulacht* trough	1340BC-1320BC LBA	Charcoal	Alder, Hazel, Pomoideae, Blackthorn/Cherry, Elm and Oak
F021	6	Burnt mound spread	LBA	Charcoal	Oak and Hazel
F038	9	*Fulacht* pit	LBA	Charcoal	Oak, Hazel and Willow
F040	12	*Fulacht* pit	LBA	Charcoal	Alder, Oak, Ash, Blackthorn, Hazel and Elm
F045	16	Trough	LBA	Charcoal	Oak, Ash, Hazel, Pomoideae, Birch and Elm

4.4.2 Petrographical analysis

See Appendix 10.2

Table: Stone Residue Samples sent for Analysis				
Site Name: Shanboe 1			Record No.: E2172	
Context number	Sample number	Feature type	Sample type	Analysis results
F011	14	Trough	Stone Residue	Quartzite, coarse quartz, sandstone, limestone and greywacke
F018	15	Trough fill	Stone Residue	Quartzite, coarse quartz, sandstone, limestone and greywacke
F020	1-4	Burnt mound spread	Stone Residue	Quartzite, coarse quartz, sandstone, limestone and greywacke
F027	13	Trough	Stone Residue	Quartzite, coarse quartz, sandstone, limestone and greywacke
F032	7	Trough	Stone Residue	Quartzite, coarse quartz, sandstone, limestone and greywacke
F032	11	Trough	Stone Residue	Sandstone, Limestone and Chert
F033	5	Burnt mound spread	Stone Residue	Quartzite, coarse quartz, sandstone, limestone and greywacke
F038	9	*Fulacht* pit	Stone Residue	Sandstone, Limestone and Chert
F040	12	*Fulacht* pit	Stone Residue	Quartz and quartzite
F045	16	Trough fill	Stone Residue	Limestone

4.5 Dating Evidence

See Appendix 10.4

Table: Charcoal Samples sent for Radiocarbon dating				
Site Name: Shanboe 1			Record No.: E2172	
Context number	Sample number	Feature type	Sample type	Date obtained
F018	15	Fill of trough F017	Charcoal	Cal BC 1510-1380
F031	17	Primary fill of trough F010	Charcoal	Cal BC 1380-1100

5. DISCUSSION (Information provided by Niall Kenny on behalf of Ken Wiggins)

Fulachta fiadh or burnt mounds tend to survive as low grass covered mounds, usually horseshoe/crescent shaped, consisting of large accumulations of heat shattered stones mixed with black soil and charcoal (Brindley *et al* 1989/90, 25; Power *et al* 1997, 75). When levelled, these monuments are often visible as black spreads of heat shattered stone in ploughed fields. *Fulachta fiadh* normally consist of a hearth, trough and the associated mound of material (Brindley *et al* 1989/90, 25). However, not all sites consisting of quantities of charcoal and heat shattered stone may be classified as a *fulacht fiadh* as they may lack the all important associated trough and hearth features. A number of different factors can contribute to the absence of a trough/hearth and these include: the trough/hearth may have been destroyed by agricultural activity such as ploughing, the trough/hearth may lie outside the limits of the excavation or portable or wooden containers may have been used as water receptacles and were removed when the site went out of use. We do know that by the mid-second millennium BC elongated, single-piece wooden troughs fashioned and carved from dugout boats were in use (O' Neill 2000, 19: O' Kelly 1954, 132) and so the use of these could account for some (not all) of the sites lacking troughs. Furthermore, if the stones were heated on simple bonfires and not in cut or lined hearth places then traces of this may not be visible in the archaeological record (due to deep ploughing etc). Therefore, the absence of a trough/ hearth at such sites does not automatically imply that these sites were not *fulachta fiadh*.

The accumulation of the mound of burnt stone around the trough occurs through prolonged use of hot stone technology. Simply, this involved the heating of stones, probably on a nearby hearth, and placing them in the water filled trough. The immersion of hot stones in the trough

boils the water for some desired purpose and the stones subsequently shatter and break. The accumulation of heat shattered stone and charcoal around the trough in a crescent shape mound is the result of continued use and emptying of the trough.

The majority of *fulachta fiadh* and burnt mound sites have been firmly placed in the second millennium BC and the earlier part of the first millennium BC (1500 – 500BC) (Brindley *et al* 1989/90; Brindley & Lanting 1990; Waddell 1998, 177). However, through development led excavations it is becoming increasingly clear that their use may have a much earlier antiquity. The earliest sites appear to date from the early 3rd millennium BC while the latest sites possibly survive into the Iron Age and even beyond into the early and later Medieval periods (O' Neill 2000; O' Neill 2003-4, 83). The site at Shanboe 1 returned a Late Bronze Age date of Cal BC 1510-1380 (See Appendix 10.4).

However, generally (although not always) unlined oval and circular shaped troughs tend to occur on early Bronze Age sites while rectangular shaped troughs are more common in the middle Bronze Age and these tend to be lined with wood (wicker/ planks/ logs) and flagstones (O' Neill 2000, 19). Also by the mid-second millennium BC wooden troughs fashioned from dugout boats are known (i.e. as at Killeens site II, O' Kelly 1954, 132-134). These general trends may help to indicate a tenuous and rough date for the certain *fulacht* sites. However, observations relating to trough morphology and dating must not be taken as a given and should be treated very cautiously.

Fulachta fiadh are undeniably the most common type of prehistoric site in Ireland (Power *et al* 1997, 75; Waddell 1998, 174). There are over 4,500 known examples throughout Ireland and over 3,000 of these occur in Co. Cork (Power *et al* 2000). The known distribution of these sites occurs right throughout the island of Ireland (with large concentrations in Munster) and notably, examples have been recorded on islands such as Valentia, off the coast of Co. Kerry (Mitchell 1990; Sheehan 1990). It is probable that thousands of more *fulacht* sites exist, unrecorded and undetected, throughout Irish landscape. Large numbers of burnt mound sites have also been recorded in England, Scotland and Wales (Hodder 1990; Halliday 1990; Williams 1990).

Fulachta fiadh and burnt mound sites are normally situated close to a water source, such as a river, stream or in wet marshy areas (Power *et al* 1997, 75). In spite of the obvious biases which previous surveys and fieldwork have on *fulachta fiadh* distribution maps, regional studies show that in Cork particular concentrations occur along streams and sandstone ridges

and tend to occur below the 800ft contour (Power 1990). Particular concentrations and clusters of *fulachta fiadh* sites have also been identified in Co. Kilkenny (again despite the biases of previous fieldwork/ surveys in the area) and these occur throughout the county near streams and streamlets in limestone and sandstone rich areas (Condit 1990).

The exact function of *fulachta fiadh* is rather ambiguous and despite the vast number of these monuments occurring throughout Britain and Ireland, they still remain somewhat enigmatic. There are many different theories as to the function of *fulachta fiadh* and briefly these include: cooking places (O' Kelly 1954; O' Drisceoil 1988), prehistoric bathing places/ saunas (Barfield & Hodder 1987) as well as semi-industrial functions such as leather working/ production, fulling cloth, soap production, garment waterproofing, processing cremations, brewing, boat building, brine evaporation and so on (as listed by Barfield & Hodder 1987, 371; Waddell 1998, 177 and O' Neill 2000, 19; Monk 2007, 24). While there has been much debate and discussion over the possible function of these monuments, it is generally accepted that they were used to bring troughs of water to a boil through a form of hot stone technology (Waddell 1998, 177). It is also accepted that some of these sites were used continuously over long periods of time which accounts for the resultant accumulation of quite large mounds of heat-shattered stone at these sites (e.g. at Shanboe 1) (Waddell 1998). It has been suggested that 'if a single function could be proposed (for *fulachta fiadh*) it would be expected that all of these sites would have a similar form' (O'Connor 2007, 9). It is also stressed that it is futile searching for one single function when it is clear that so many of the *fulachta fiadh* sites are different in form. Most academics are agreed on the fact that these sites were used to boil water through the use of hot stones, it is probable then that this hot water was used in the undertaking of a variety of different tasks and functions. Research studies carried out by ACS Ltd on the M3 excavations of the size and arrangement of pits, troughs, hearths and other features associated with *fulachta fiadh* sites indicates that perhaps the variation in the form of these features and sites may be to do with the fact that these sites served different multiple functions (O'Connor, 2007).

O' Kelly (1954) and others (such as Lawless 1990 and even the chef Darina Allen 1994) have adequately demonstrated that *fulachta fiadh* could at least theoretically have functioned as ancient cooking sites. This theory has dominated academic discourse since the 1950s, however it appears that there are inherent problems with it; the general absence of animal bones from many *fulacht fiadh* sites severely undermines this theory and high acidic levels and bad preservation cannot always explain their wide-scale absence. O' Kelly (1954) has suggested that the lack of bone on some sites may be due to the fact that the meat was not

consumed on site (but instead at settlement sites) or that scavenging animals and dogs may have retrieved the bones. The 'cooking site theory' cannot be applied universally to all *fulacht fiadh* sites, however it is certain that some sites did function as cooking places amongst other things. While it is quite possible that Shanboe 1 and 5 did function as cooking sites in the past, quite significantly, there is a complete lack of animal bone evidence from both sites to suggest that this was so. Quantities of animal bone have been recorded on other *fulachta fiadh* sites excavated on the same road scheme i.e. at Cuffsborough 1 and Cuffsborough 3. A large number of bovine bone fragments (25 in total) were recorded at the late Bronze Age *fulacht fiadh* site excavated ten years ago in Cloonaddadoran Co. Laois and these were actually found in the basal fill of the trough (Crumlish 1997). The animal bone recovered from Cuffsborough 1 and 3 and Cloonaddadoran in Laois could very well be the vestiges of ancient cooking practices and so these sites could very well have functioned as cooking sites (both ritual and functional) for nearby settlement sites such as Cuffsborough 4 and possibly even Cuffsborough 2. However, as noted above, the complete absence of animal bone on the sites of Shanboe 1 and 5 indicates that perhaps other activities were possibly being carried out at these sites.

A sub-rectangular posthole/stake-hole structure was excavated in the centre of the burnt mound site at Shanboe 5. Furthermore, the remains of what appears to be a stake-hole lined pit were excavated adjacent to the large pit at Shanboe 1. These two features represent the remains of two structures on two distinct burnt mound sites. It has been suggested in the past that *fulachta fiadh* sites may have functioned as saunas/sweat baths/sweat-houses (Barfield and Hodder 1987). Ó Drisceoil (1988) has further suggested that *fulacht* sites were primarily used as cooking places but also, on a more secondary level, as bathing sites. Ó Drisceoil (1988) has noted that steam bathing or sweating with dry heat requires an enclosed space. Therefore the structural remains for such above ground covered areas/shelters at Shanboe 1, but especially Shanboe 5, could be the remnants of such prehistoric saunas and sweat-houses. There was no sufficient evidence to suggest that any pits or troughs at Shanboe 1 or 5 were covered over, therefore it is unlikely that such sites functioned as covered bathing sites. This is not to say that open air bathing did not take place, however this would be very difficult to identify in the archaeological record. The archaeological evidence seems to indicate possible steam bathing and sweating with dry heat at Shanboe 1 and 5.

A hearth place was excavated on the northwest side of the hut site at Shanboe 5 while a pit filled with burnt mound material was excavated directly to the west of the hut, at the possible entranceway. In the past Barfield and Hodder (1987) have suggested that on some *fulacht*

sites stones may have been heated outside on a fire and were then carried into the covered hut/tent structure on site with wooden tongs or possibly they were rolled into the hut structures. It is conceivable that stones were heated in the hearth place adjacent to the hut at Shanboe 5 and were then subsequently transported into the hut where they were used for steam bathing or dry heat sweating. The pit located directly to the west of the hut could then have functioned as a dump for the heat shattered stones subsequent to their use in the sweating/bathing processes within the hut. Ó Drisceoil (1988) highlights the difficulties in Barfield and Hodder's (1987) bathing and sauna/sweating hypothesis for *fulachta fiadh* and argues that wide scale structural evidence for these activities (especially sweat houses and saunas) has yet to be identified in the archaeological record. The structural remains on the sites of Shanboe 1 and 5 could very well be the remains of such activities. Hut structures have been excavated on a few other *fulachta fiadh* sites in the country e.g. at Ballyvourney I and II (O' Kelly 1954) and on the earliest phase at Drombeg (Fahy 1960). O' Kelly (1954) interpreted the hut structure at Ballyvourney as a meat storage hut. These enclosed hut spaces could have acted as stores or even as huts for smoking/curing meat while it is also possible that such huts may have simply provided people with temporary shelter. Evidence for associated huts and covered structures has only been found on a small minority of sites and so while this is not sufficient evidence to interpret all *fulachta fiadh* as bathing/ sweat and sauna sites it is grounds to suggest that this may have been one of the multiple functions such sites were used for in the past, and this is evident at Shanboe 1 and 5.

While the evidence seems to tentatively suggest some sort of bathing/sauna function for the sites at Shanboe 1 and 5 this hypothesis is further propelled by the lack of any faunal/cooking remains. We do know for certain however that the *fulachta fiadh* sites in the townland of Shanboe were used to bring water to a boil through hot stone technology and that it is likely, even though little evidence remains today, that a variety of different domestic, industrial, recreational and perhaps even ritual (feasting or bathing) activities were carried out at these places.

A chert arrowhead was found within an archaeological spread/deposit on the western margin of the burnt mound at Shanboe 1. The arrowhead is a hollow-based (also termed 'concave-based') type which diagnostically dates to the later Neolithic period (See Appendix 10.3). Typically, the hollow-based arrowhead consists of a roughly triangular shaped arrowhead with a hollow or concave base. The arrowhead found at Shanboe 1 is an example of a typical hollow-based arrowhead; exhibiting both the distinctive triangular shape and finely fashioned concave end. This type of arrowhead is not as common as other types of arrowhead i.e. the

leaf shaped and lozenge shaped arrowheads, however examples have been found at sites such as Newgrange, Co. Meath, Lyles Hill, Co. Antrim and in a late 3rd millennium Beaker context at Ross Island, Killarney, Co. Kerry (Waddell 1998, 50). The recovery of a find which diagnostically dates to the late Neolithic in a secure context would indicate a late Neolithic date for the *fulacht fiadh* site at Shanboe 1. However, the site itself has been dated from the primary/basal fill of one of a group of troughs to the Late Bronze Age (Cal BC 1510-1380) (See Appendix 10.4). Finds, such the chert arrowhead from Shanboe 1 are quite rare on *fulacht fiadh* sites. No debitage, cores, or knapping related artefacts such as hammer stones of any description were found on the site of Shanboe 1, indicating that no actual stone tool manufacturing was being carried out on site. Instead such activities may have been carried out at nearby settlement sites, source/quarry sites or at other locales in the surrounding landscape. One such hammerstone was recovered at Shanboe 5 (E2176:004:1) (See Appendix 10.2) although the site appears to date to the Early Medieval period (Cal AD 760-900: See Appendix 10.3), which is significantly different to the Late Bronze Age date of Shanboe 1. Despite this, the site may have originated in the Bronze Age as only one context was sampled for dating. A leaf shaped flint arrowhead with part of its birch shaft still attached was found at a depth of about 3m in a bog, south of Portlaoise in the townland of Cloonaddadoran, Co. Laois. Interestingly, burnt mound/*fulacht fiadh* activity dating to the late Bronze Age has been noted and investigated in this townland.

As mentioned in section 2, the area around Shanboe is predominantly a carboniferous limestone rich area (Feehan 1983, 28). Despite this, chert can be found in nodules at specific places in the landscape and was a widely used and widely available resource in prehistoric times. Indeed, in this part of Laois chert would most likely have been a widely available resource which could have been quarried at specific sites or procured as river rolled pebbles and stones. An impressive Neolithic chert javelin head exhibiting a high quality of knapping skill was retrieved from a blanket bog between Glenkitt and Glenall, high up on the Slieve Bloom Mountains (Feehan 1983, 265). A number of flint blades and flakes were discovered at the possible Neolithic sub-circular structure c. 2km to the south-east of Shanboe at Derrinsallagh 3 (on the same road scheme). This indicates two very important things. One, that two different types of stone material were being used to make stones tools in this area in the past (Chert and flint). Two, as pointed out above, it seems that higher lying ridge and hill locations in the region were locales of possible domestic settlement and activity (at the sites of Derrinsallagh 3 and Derryvorrigan 2 with the excavation of 2 posthole structures and associated pottery and flint finds) in the Neolithic, while the lower lying locales (Shanboe) were places of concentrated burnt mound activity.

The fact that two types of stone were being exploited in the region is quite interesting. It poses a series of questions such as: was one particular type of stone more abundant than the other? Was the choice of a specific stone material resource to do with its availability, quality or other unidentifiable less functional reasons? Was any exotic or high quality stone being imported into the area for the production of stone tools? Answers to these questions would require a more in-depth study of the geology of the area and the petrology of the arrowhead and possible chert and flint sources; however, these questions are still worth considering. The chert that the arrowhead is made from appears to be of good quality. Chert in the area would have been quite abundant and so there was probably a variety of good and bad sources to choose from. Flint on the other hand was probably only available in glacial tills and in riverine locations as small rolled pebbles (not always the highest quality). Most academics would argue that flint would be of a superior quality to that of chert. Indeed, Antrim flint and flint from the north-east and coastal regions would probably be of a superior quality to locally available chert in Laois. However, in the midlands it must be considered that the only available flint sources were small riverine/glacial till pebbles which may have been inferior to the often good quality and abundant sources of chert which were more widely available in the locality. It could then be suggested that chert may have been the superior stone material in use by prehistoric peoples in the area.

6. INTERPRETATION AND RECONSTRUCTION

Shanboe 1 was a Late Bronze Age *fulacht fiadh*/burnt mound site situated in a landscape rich with similar, relatively contemporary activities. Two dates placing it in this period were returned from two of a number of troughs (F017 & F010) located adjacent to one another (Cal BC 1510-1380 & Cal BC 1380-1100 respectively) (See Appendix 10.4). A number of possible hut structures were recorded adjacent to two of the main troughs on site (F010, F017), a *fulacht* pit (F039) associated with these troughs and two further *fulacht*/burnt mound deposits/pits (F051, F052). This suggests that similar, relatively large scale activities were being carried out over a period of time on the site. The possible re-cutting of a hut structure between F010 and F017 suggests re-current use of these features. The manufacture of these elaborate features would have required skill and time suggesting the site was carefully selected to perform its function and was intended for re-use. The apparent lack of any major structural evidence suggests that the site was not intended for habitation and was utilised for a task. This task was most likely either cooking of foodstuffs or for bathing/saunas/sweathouses. What is certain is that water was boiled extensively at this site

using hot stone technology, evidence of which was found in the majority of site features (See Section 4, Appendix 10.2).

7. ASSESSMENT OF ARCHAEOLOGICAL POTENTIAL AND SIGNIFICANCE

Various elements within Shanboe 1 are potentially significant, particularly as three similar sites were located within the same townland. The significance of the individual sites will be greatly expanded on by a collective study. It highlights that across this particular landscape, burnt mound activity was prevalent. As the townland itself lies within a marshy area and does not contain very productive soil (See Section 2), it would not have benefited farming (See Section 5). The relatively large scale use at the site of hut structures located beside *fulacht*/burnt mound features indicates that a specific function related to bathing (that may negate the cooking site theory) may have existed. As this particular feature is not recorded at all *fulacht*/burnt mound sites, it is a significant archaeological find and requires further investigation. Artefacts are also not usually recorded at these sites. However, at Shanboe 1 a fully intact chert arrowhead (E2172:003:1) was recovered (See Appendix 10.3). No knapping or associated artefact was found with this suggesting the possibility that it was a 'rogue' artefact not necessarily associated with the site's activities. Alternatively, as mentioned in Section 5, it may have been brought to Shanboe 1 from a related site nearby for specific use. It was recorded within the upper deposit of the main *fulacht*/burnt mound spread of the site (F003) suggesting it has been disturbed along with the burnt mound over time by agricultural practices. Therefore, stratigraphical placement cannot be fully determined.

8. CONCLUSION

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

9. BIBLIOGRAPHY

Allen, D. (1994) 'Hot water and plenty of it', *Archaeology Ireland*, **27**, 8-9

Barfield, L. and M. Hodder (1987), 'Burnt mounds as saunas, and the prehistory of bathing', *Antiquity*, 61, 370-379

Brindley, A. L., et al. (1989-90), 'Radiocarbon dates from Irish fulachta fiadh and other burnt mounds', *JIA*, 5, 25-33

Brindley, A.L. & Lanting, J.N. (1990) 'The Dating of Fulacht fiadh', in Buckley, V. (Ed.) *Burnt Offerings, International Contributions to Burnt Mound Archaeology*, 55-58, Wordwell: Dublin

Clarke, L. (2005), *Testing Report for Area 14 Contract 2 M7/ M8 (Shanboe & Townparks), Co. Laois*, unpublished testing report prepared by ACS Ltd

Condit, T. (1990) 'Preliminary observations on the distribution of fulachta fiadh in County Kilkenny', in Buckley, V. (Ed.) *Burnt Offerings, international contributions to Burnt Mound Archaeology*, 18-23, Wordwell: Dublin

Corlett, C. (1997), 'A fulacht fiadh site at Moynagh Lough, County Meath', *Ríocht na Mídhe*, **9(3),** 46-49

Crumlish, R. (1997) *Cloonaddadoran Co. Laois*. Excavations.ie- database of Irish excavation reports

Fahy, E.M. (1960) 'A hut and cooking places at Drombeg, Co. Cork', *Journal of the Cork Historical and Archaeological Society*, **65** (201), 1-17

Feehan, J. (1983), *Laois: an environmental history*, Ballykilcavan Press: Stradbally

Grogan, E. O'Donnell, L. & Johnston, P. (2007), *The Bronze Age Landscapes of the Pipeline to the West, an integrated archaeological and environmental assessment*, Margaret Gowen and Co. Ltd. Wordwell: Bray

Joyce, P.W. (1995), *The History and Origins of Irish Names of Places*. De Burca. Dublin (facsimile reprint of original edition)

Halliday, S.P. (1990) 'Patterns of fieldwork and the distribution of burnt mounds in Scotland', in Buckley, V. (Ed.) *Burnt Offerings, international contributions to Burnt Mound Archaeology*, 60-61, Wordwell: Dublin

Hodder, M.A. (1990) 'Burnt mounds in the English West Midlands', in Buckley, V. (Ed.) *Burnt Offerings, international contributions to Burnt Mound Archaeology*, 106-111, Wordwell: Dublin

Kennedy, J. (2003). *The Monastic Heritage & Folklore of County Laois*, Roscrea: Lisheen

Kenny, N. (2007). On recent archaeological discoveries in the townland of Shanboe, unpublished research report for ACS Ltd

Lawless, C. (1990) 'A Fulacht Fiadh Bronze Age cooking experiment at Turlough, Castlebar', *Cathair na Mart* **10,** 1-10

Mitchell, F. (1990), 'Early Bronze Age fulachts on Valencia Island', in Buckley, V. (Ed.) *Burnt Offerings, international contributions to Burnt Mound Archaeology*, 24-26, Wordwell: Dublin

Monk, M. (2007) 'A greasy subject', *Archaeology Ireland*, **21 No. 1**, 22-24

O'Connor, Eimear (2007), *Fulachta Fiadh, Burnt Mounds and Hot Stone Technology on the M3*, unpublished report for ACS Ltd

O' Drisceoil, D.A. (1988) 'Burnt mounds: cooking or bathing?', *Antiquity*, **62**, 671-80

O' Drisceoil, D. (1991), 'Fulachta Fiadh: a general statement', *North Munster Antiquarian Journal*, **33,** 3-6

O' Hanlon, J. & O' Leary, E. (1907) (Reprint 1981) *History of the Queen's county*, Vol. 1, Kilkenny: Roberts Books

O' Kelly, M. J. (1954) 'Excavations and experiments in ancient Irish cooking-places', *Journal of the Royal Society of Antiquaries Ireland* **84,** 105-155

O' Neill, J. (2000) 'Just another fulachta fiadh story', *Archaeology Ireland*, **Vol. 14 No. 2**, 19

O'Neill, J. (2003-4) '*Lapidibus in igne calefactis coquebatur*: The Historical burnt mound 'tradition'', *Journal of Irish Archaeology* **12 & 13**, 79-85

Power, D. (1990) 'Fulachta fiadh in County Cork', in Buckley, V. (Ed.) *Burnt Offerings, international contributions to Burnt Mound Archaeology*, 13-17, Wordwell: Dublin

Power, D. *et al*. (1997) *Archaeological Inventory of County Cork* (Vol. III Mid Cork), Stationery house: Dublin

Power, D. *et al*. (2000) *Archaeological Inventory of County Cork* (Vol. IV North Cork), Stationery house: Dublin

Sheehan, J. (1990) 'The excavation of a fulacht fiadh at Coarhamore, Valentia Island, Co. Kerry', in Buckley, V. (Ed.) *Burnt Offerings, international contributions to Burnt Mound Archaeology*, 27-37, Wordwell: Dublin

Sweetman, D. e*t al.* (1995) *Archaeological Inventory of County Laois*, Stationary Office: Dublin

Waddell, J. (1998), *The Prehistoric Archaeology of Ireland*, Wordwell, Bray

Wiggins, K. (2006), *Preliminary report of Shanboe 1, Contract 2, M7/M8*, unpublished report prepared by ACS Ltd

Williams, G. (1990) 'Burnt mounds in south-west Wales', in Buckley, V. (Ed.) *Burnt Offerings, international contributions to Burnt Mound Archaeology*, 129-141, Wordwell: Dublin

9.2 Other Sources

Environmental Impact Statement, M7 Portlaoise-Castletown & M8 Portlaoise-Cullahill Road Scheme, Volume 7, Appendix 3.5.1, Archaeology, Architecture and Cultural Heritage Report. Prepared by Margaret Gowen & Co

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

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

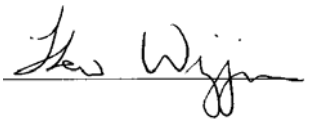
9.3 Cartographic Sources

1839 1st edition Ordnance Survey Map

1891 2nd edition Ordnance Survey Map

1909 Ordnance Survey Revision edition RMP map

Signed:



Ken Wiggins
Licensed Archaeologist

September 2008

10. APPENDICES

10.1 Appendix 1: Wood Identification/Charcoal analysis report

Shanboe 1, M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Project, Co Laois, Ireland

Species identification of charcoal samples

September 2008

Ellen OCarroll MA DIP. EIA MGT

Archaeological Consultancy & Wood Specialist

8 Cumberland Street, Dun Laoghaire, Co. Dublin

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/M8 Portlaoise to Cullahill/Castletown 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

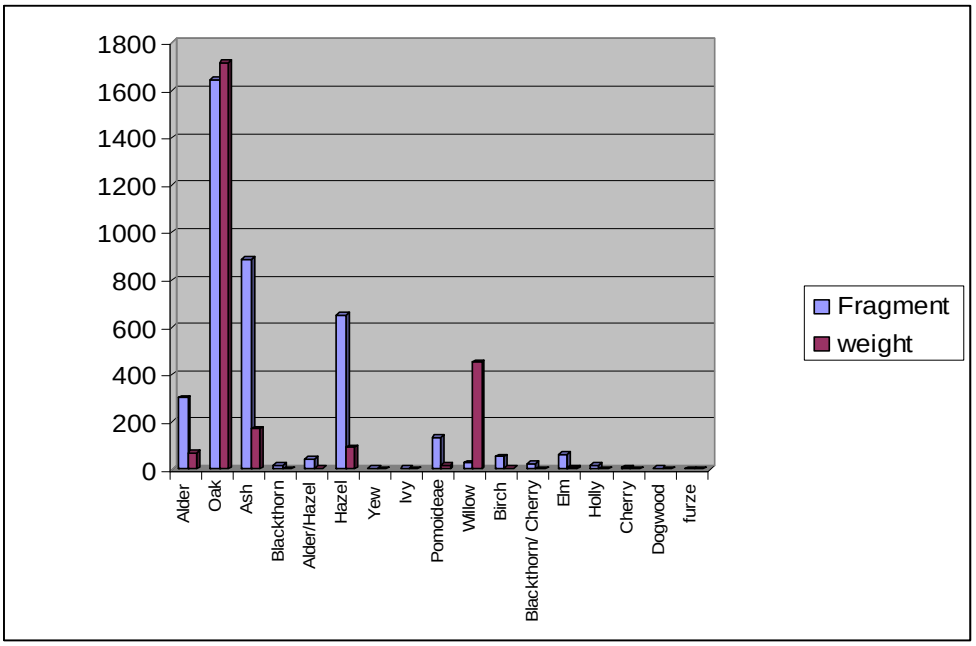
Chisel point:	The end of a piece of wood cut to a point on one single face.
Conversion:	The way in which the primary trunk has been split into smaller elements.
Facet:	The cut surface produced on a piece of wood by a tool blow. The blow can leave behind a particular signature if the cutting edge of the 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



Charcoal assemblage results at Shanboe 1

Shanboe 1, Late Bronze Age fulacht activity

Table 1: Taxa present at Late Bronze Age *fulacht* site

Site	E number	Feature type	Context	Sample no	Date	Identification	Comment
Shanboe 1	E2172	Trough	F18	15	1340BC-1320BC LBA	Alder (0.1g, 2f) Oak (0.2g, 5f) Hazel (0.1g, 2f) Pomoideae (0.1g, 4f) Blackthorn/ cherry (0.05g, 1f) Elm (0.2g, 3f)	Tiny fragments Hard to id
Shanboe 1	E2172	FF spread	F21	5	LBA	Oak (0.1g, 4f) Hazel (0.5g, 10f)	Tiny fragments Hard to id
Shanboe 1	E2172	FF Pit	F38	9	LBA	Oak (5g, 26f) Hazel (6.1g, 21f) Willow (0.1g, 3f)	Iron stained. Hazel brushwood
Shanboe 1	E2172	FF Pit	F40	12	LBA	Alder (0.1g, 4f) Oak (0.1g, 5f) Ash (0.05g, 4f) Blackthorn (0.1g, 3f) Hazel (0.05g, 1f) elm (1g, 2f)	
Shanboe 1	E2172	FF trough	F43	16	LBA	Oak (0.8g, 10f) Ash (0.2g, 5f) Hazel (0.5g, 9f) Pomoideae (0.05g, 1f) Birch (0.1g, 2f) Elm (0.01g, 1f)	Clay and tiny fragments

Oak and hazel were the dominant taxa types identified from Shanboe 1. Other taxa present and used as fuel at the site were ash, alder, elm, pomoideae, willow, blackthorn, birch and blackthorn/cherry in order of priority. Primary woodland trees

are represented at the site by oak, ash and elm while hazel, blackthorn/cherry, pomoideae are scrubland type trees and wetland taxa present are birch, alder and willow.

Results by feature/site types

***Fulacht* fiadh sites**

Sixty six samples from features associated with *fulacht* sites were analyzed from Contract 2. These samples were retrieved from hearths at Boherard 2 and Coolfin 1, pits associated with Shanboe 1, Boherard 1, 2 & 3, Coolfin 1, 3, Corraun 2, posthole/stakeholes excavated at Coolfin 1 & Corraun 2, spreads at Shanboe 1, 4, Boherard 1, 2 & 3 and Coolfin 4. Charcoal from troughs was analyzed from Bushfield/Lismore 1 and Boherard 1, 2 & 3. Fourteen taxa were identified and these were mainly represented by ash (*Fraxinus excelsior*), hazel (*Corylus avellana),* oak (*Quercus* spp) and alder (*Alnus glutinosa*) mainly dryland taxa although alder is mostly associated with wetland areas. Smaller amounts of pomoideae (apple type), holly (*Ilex aquifolium*), willow (*Salix* sp), birch (*Betula* sp), elm (*Ulmus* sp), yew (*Taxus baccata*), ivy (*Hedera helix*), furze (*Ulex europeas*), blackthorn (*Prunus spinosa*) and cherry (*Prunus padus/avium)* were also identified. Ash charcoal is seen to dominate at the hearths and pits features while hazel is more frequent at the spreads and trough features. Oak and ash is more prevalent in the identifications from the postholes and stakeholes which may suggest that oak or ash may have been used as post/stake material at these sites.

Figure 2: Wood taxa identified from features associated with *fulacht* sites

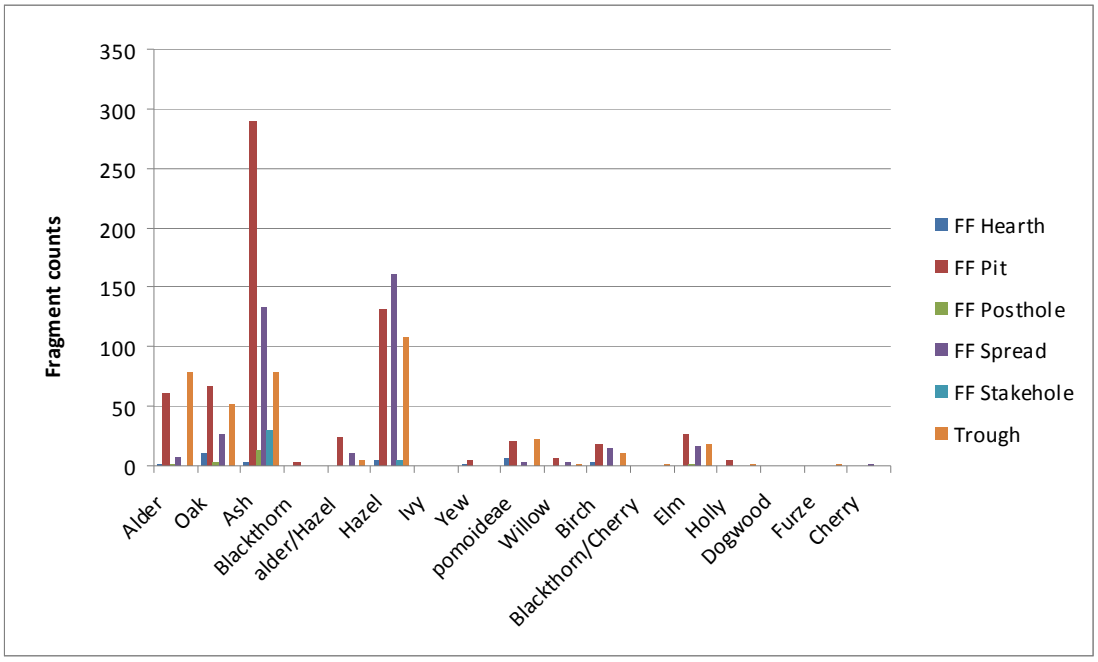
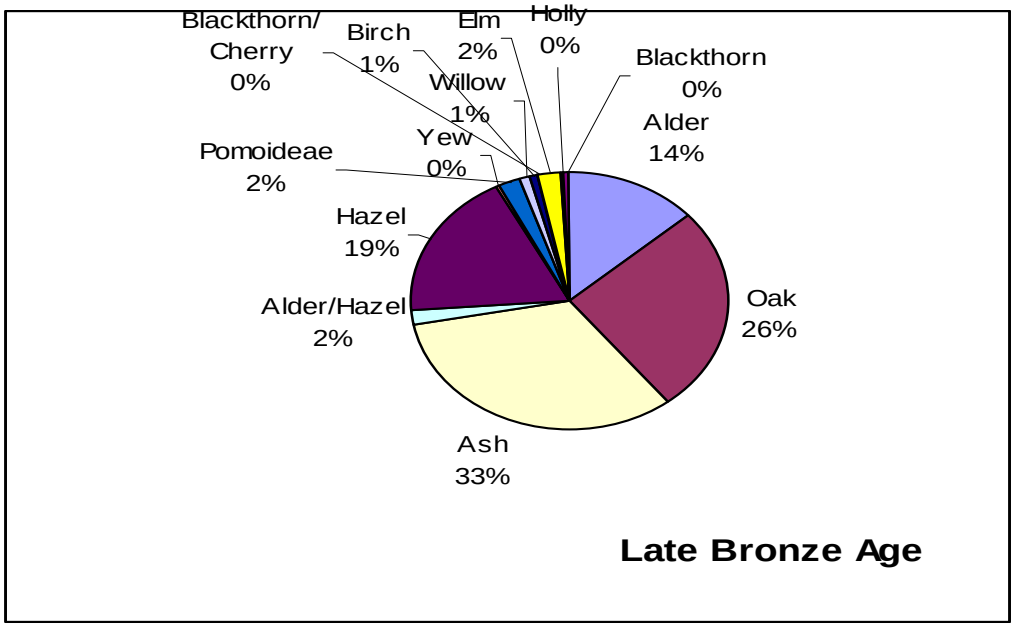


Figure 3: Wood taxa present at the Late Bronze Age sites excavated

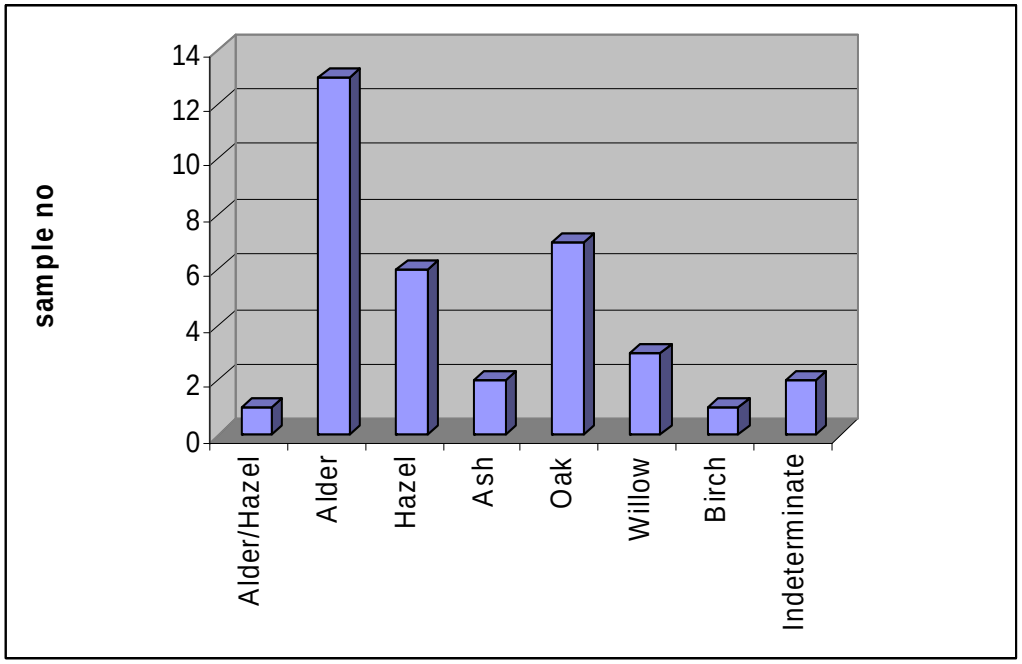


Nineteen samples from eight sites were analysed from the Later Bronze Age period. A total of thirteen features were analysed from the Late Bronze Age. These were from Derrinsallagh 3 (postholes and cremation pit), Derryvorrigan 1 (pit), Lismore 2 (Stakehole), Lismore 2 (stakehole), Shanboe 1 (*Fulacht* activity) Shanboe 4 (*Fulacht* activity), Coolfin 1 & 4 (*fulacht* activity) and Corraun 2 (*fulacht* activity). Twelve taxa were identified from these features. These were oak, ash, alder, pomoideae, hazel, blackthorn/cherry, yew, willow, birch, holly and elm. Oak and ash are present in near equal quantities and alder is represented in much higher quantities than any other period. Is this an indication of the deterioration in the climate as attested from various other paleo-environmental records? It is thought the Ireland saw a dramatic change in climatic weather conditions whereby the Ireland became much wetter and colder in the Later Bronze Age. The inhabitants of the Late Bronze Age moved down from the upland areas to the rivers and coastal areas to exploit the natural food sources of the rivers and lakes and as a consequence we have a larger number of Crannog sites or lake side settlements dating the Later Bronze Age.

Table 2: Identifications from wood assemblage

Site	Site type	Sample type	Sample number	Context	Date	Identifications	Comment	Length	Width x Depth/ Diameter	Age	Woodworking evidence	Recommendations
E2184 Shanboe 1	Fulacht /trough	Post and wattle	III		LBA	*Corylus avellana*	Desiccated	15cm	4cm	15yrs	No	Discard
E2184 Shanboe 1	Fulacht /trough	Post and wattle	V		LBA	*Corylus avellana*	Mushy and desiccated. Eaten by ants				No	Discard
E2184 Shanboe 1	Fulacht /trough	Horizontal/Plank		F32	LBA	*Quercus spp*	Gnarly wood	71cm	17cm x 5cm	20yrs	Tangentially split	Discard
E2184 Shanboe 1	Fulacht /trough	Horizontal/Plank		F32	LBA	*Quercus spp*		31cm	12 x 4.5cm	40yrs	Radial split	Discard
E2184 Shanboe 1	Fulacht /trough	Indt.	VII		LBA	*Root?*					No	Discard
E2184 Shanboe 1	Fulacht /trough	Post and wattle	XII		LBA	*Indt.*	Root?				No	Discard

Figure 4: All wood taxa identified from sites that produced wood along Contract 2



Wood from Shanboe 1, which was excavated from a trough, F010, measured 4.5m by 3.5m by 1.06m deep and contained remnants of post-and wattle lining (F032). There was also a larger plank-like timber from this trough. Shanboe 1 dated to the Later Bronze Age. The wood varied in preservation qualities where some displayed evidence of tooling and other samples contained much degraded wood which was mushy and very difficult to identify or analyze. Shanboe 1 produced hazel mushy and desiccated wood which has been interpreted as wattle surrounding the trough. One tangentially and one radial split oak planks were also analysed from the assemblage (Figure 6).

Figure 5: Wood taxa identified from individual sites analyzed

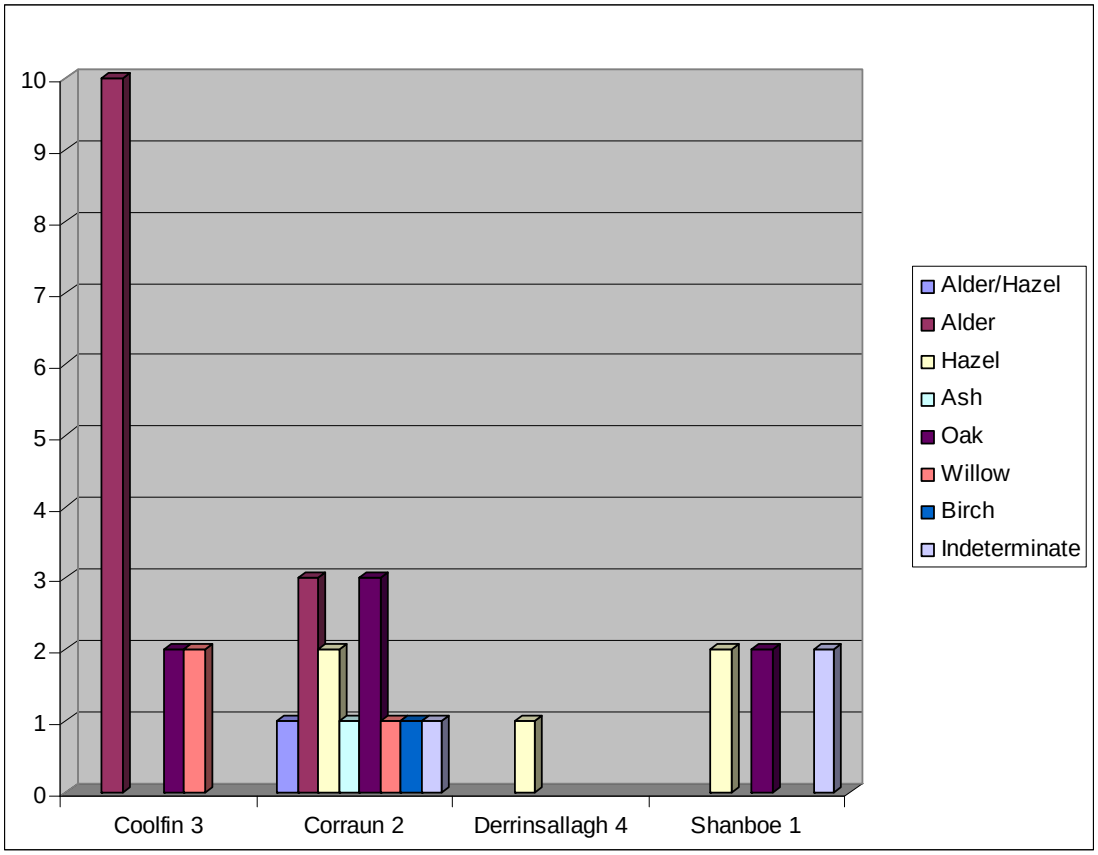
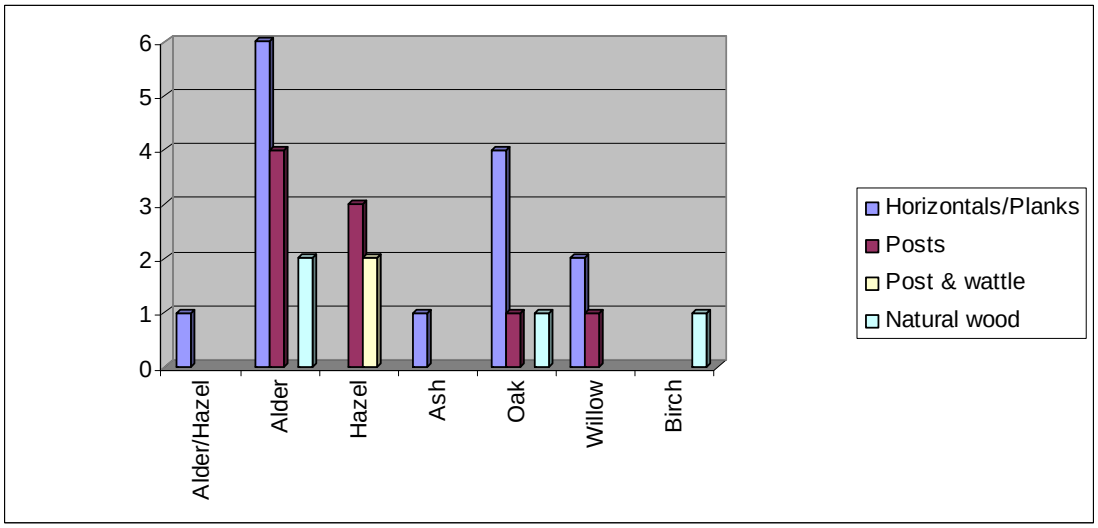
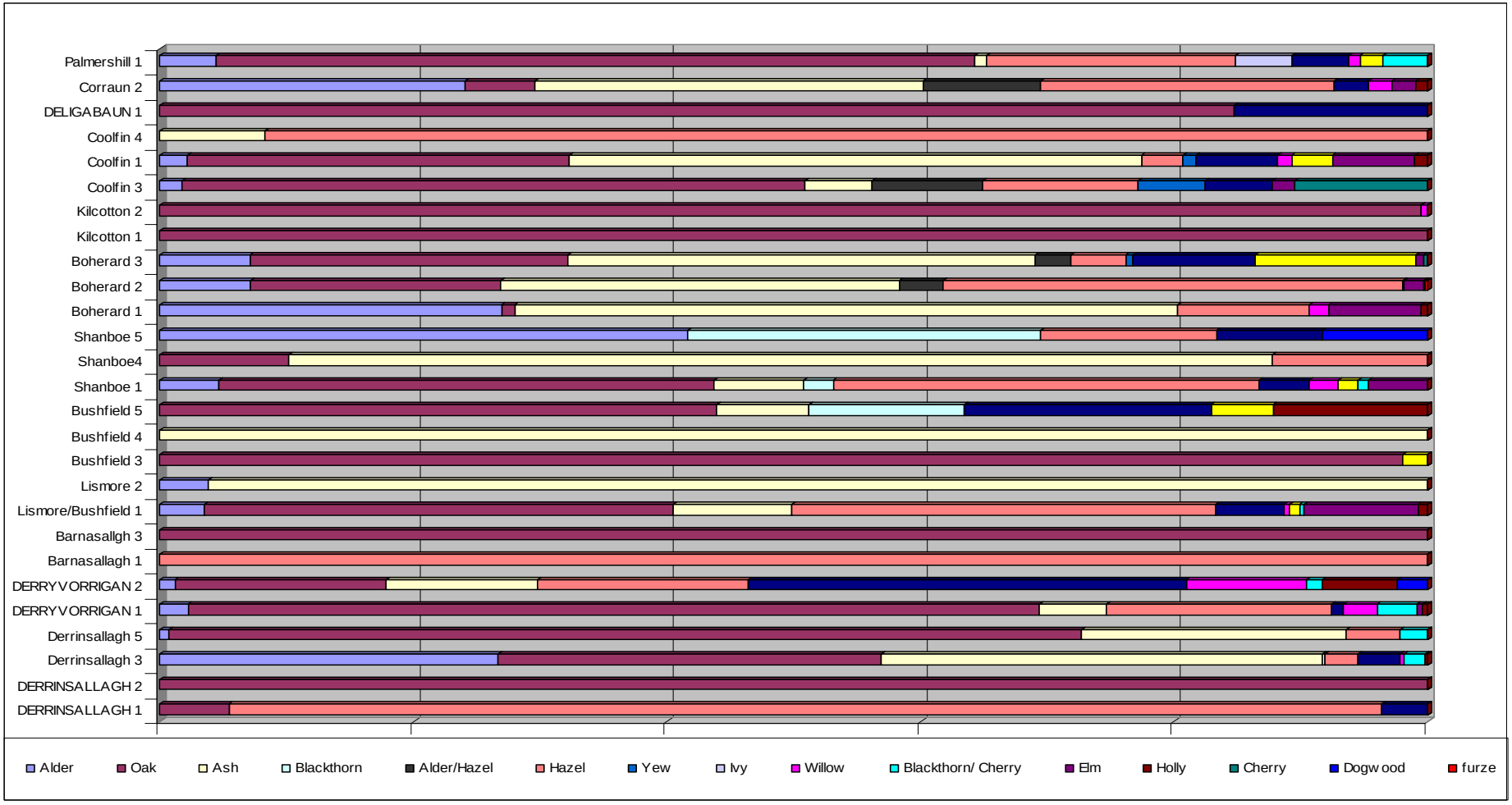


Figure 6: Wood types used for different structural requirements at the sites analyzed



5. Discussion of Charcoal and wood assemblage

Table 3: Wood taxa identified from each site excavated along Contract 2, M7/M8



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 4: 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 was identified from the fill of various troughs, the fill of pits, from burnt mound spreads and hearths associated with excavated *fulachta fiadh*. These were from Boherard 1, 2 and 3, Coolfin 1, 3 and 4, Shanboe 1 and 4, Corraun 2 and Bushfield/Lismore 1. Wood timbers were identified from the remains of a wooden trough at Shanboe 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).

The results from the wood analysis reflect to a certain extent surrounding tree land cover and selection of such trees for use at the Bronze Age sites. The identifications show that alder and oak wood were the main taxa used for planks and horizontals at these sites. Natural birch wood was identified from Shanboe 1 F009. The oak and ash may have been selected from woodlands within the area of Coolfin and Corraun while hazel coppice of a particular size may have been draw felled from areas of hazel coppice for the construction of the wattle lined trough at Shanboe 1. Any further analysis on the hazel wattle was impossible due to the degraded state of the wood. Wetland species identified were alder, birch and willow which are symptomatic of local wet condition along river banks or peat bogs. These wetland taxa may have been growing in close proximity to the *fulacht* sites as these site types are generally found in wetter areas.

Alder is more frequently identified along this stretch of the scheme as opposed to the analysis completed along the route of Contract 1 and 3. This may be related to the fact there were more *fulacht fiadh* samples analyzed from this stretch of the roadway and also the environment may have been wetter along the areas under discussion during the Pre-historic periods. The main fuel used and collected at the *fulacht* sites consisted of ash, hazel, alder and oak in that order. This is in contrast to the findings along the route of Contract 1 and 3 where dryland taxa are more

dominant and alder plays a less significant role in the identifications. The higher percentages of alder along this stretch of the road particularly in relation to the *fulacht* sites may suggest that the environment of the Bronze Age peoples was wetter and access to primary woodland areas such as oak was more difficult along this stretch of the road. Due to the nature of *fulacht* sites there location is normally accessible to a water source and as such within easy reach of alder trees. Alder trees are normally associated with riversides, lake shores and damp woods (Webb, 1953, 151).

The use of higher quantities of alder at the *fulacht* sites along this stretch of the M7/M8 compares favourably to analysis carried out in Mayo (Charlestown by-pass) and the midlands area of Ireland (N6-KEK) by the author where alder was more apparent at these sites. The presence of similar taxa within the pits and the trough suggest that similar functions were being carried out at these sites. Another observation from the analysis is that there was a lot more hazel and ash identified from the *fulacht* spreads as opposed to any other tax and alder was not as significant when compares with the troughs and pit fills. This trend should be studied further at other sites that are examined in such detail to determine if it is of any significance in the dynamics and uses of the ubiquitous *fulacht* sites.

Comparative work carried out in other areas includes Charlesland in Co. Wicklow where charcoal and wood were analysed from four *fulachta fiadh* by O' Donnell, dating from the Early to the Late Bronze Age. Troughs, hearths, mounds, and a burnt spread were analysed from these sites. The charcoal assemblage was dominated by ash, alder, willow and hazel. The wood from two of the *fulacht* sites was mainly alder along with some hazel. The absence of oak and the greater quantities of alder in this area compared favourably to analysis carried out along the N11 in Co. Wicklow (O Carroll, 2007, unpublished post excavation reports, NRA). This is in contrast to results obtained from Contract 1 and 3 along the M7/M8 and the M8 Mitchelstown to Fermoy where hazel, oak and ash dominate over any other taxa. Work carried out along the gas pipeline to the west show that the main woods used for firewood at 44 analysed *fulacht fiadh* were alder, ash, oak and hazel (O' Donnell, 2007, 32).

Ash also occurs more frequently around the areas of Boherard, Corraun and Coolfin, Lismore/Bushfield and Shanboe 1. Ash and yew are sometimes associated with land clearance so could it be possible from these small sample numbers and identifications to infer that the areas surrounding Derrinsallagh/Derryvorrigan and Boherard/Corraun and Coolfin as well as Lismore/Bushfield and Shanboe 4 were

more populated particularly in the Bronze Age. It is difficult to attribute a function to the charcoal identified from the pits as the function of them, for the most part, is unknown. The other taxa identified from the pits include hazel, ash and oak which the most frequently identified species. The alder, willow and birch are wetland type trees while the ash, elm, yew and oak are normally associated with primary woodlands and the scrub material identified include pomoideae, holly, dogwood, hazel and blackthorn/cherry. The charcoal is reminiscent of hearth/firewood material where a variety of taxa are collected from twigs and branches from near to the site.

When the charcoal is plotted against time periods we see similar data sets for oak, hazel and ash in the early and middle Bronze Age and late Bronze Age with a notable increase in alder taxon in the Later Bronze Age. Other patterns emerging from the analysis is that elm appears to occur more frequently in the Early Bronze Age sites as seen in similar analysis carried out along the route of Contract 1 and 3. Elm is thought to have extensively died out with the occurrence of an elm disease epidemic in the Neolithic period. From the very small sample set from the Neolithic period we see oak dominating along with smaller fragments of hazel and holly. This is similar to what is seen in pollen diagrams for the Neolithic periods of Ireland where oak woodlands are seen to dominate in the early pre-historic periods to be replaced by ash in the woodland clearings created by the earlier inhabitants.

6. Woodworking evidence

Analysis of wood was carried out from 4 wooden troughs excavated at Shanboe 1, Derrinsallagh 4 and Corraun 2 all dated to the Late Bronze Age. There was no tooling recognised on the timbers from Corraun 2, Derrinsallagh 4 and Shanboe 1.

7. 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.

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/M8 Portlaoise to Cullahill/Castletown. 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 Neolithic periods, primary woodland trees and many varieties of smaller and scrubland trees in the Bronze Age and Iron Age. 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.

8. References

Beckett, J.K., 1979, *Planting Native Trees and Shrubs*. Jarrold and Sons Ltd; Norwich.

Eogan, G., 1983, *Hoards of the Irish Later Bronze Age*. University College Dublin

Edlin, HL, 1956. *Trees, wood and man*. Collins, London

Grogan, E, O Donnell, L, Johnston, P. 2007. *The Bronze Age Landscapes of the pipeline to the west.* Wordwell, Wicklow

Grogan, E., O'Donnell, L. & Johnston, P. (2007) *The Bronze Age landscapes of the Pipeline to the West: an integrated archaeological and environmental assessment*. Wordwell Ltd., Dublin.

Grogan, E. (2005) *The North Munster Project*. 2 Volumes. Wordwell Ltd., Dublin.

Heery, A. (1998) *The vegetation history of the Irish midlands: Palaeoecological reconstructions of two lake sites adjacent to eskers* PhD thesis, University of Dublin (Trinity College).

The Heritage Council (2007) *A review of research needs in Irish archaeology*. The Heritage Council of Ireland Series, Kilkenny.

Hall V & J Piltcher, 2001, *Flora Hibernica*, The Collins Press

Hall, V., 1995, "Woodland Depletion in Ireland over the last Millennium" in J.R. Pilcher and S. Mac An tSaoir (eds), *Wood, Trees and Forests in Ireland, 23-35.*

Hurley, M.F., 1982, "Wooden artefacts from the excavation of the medieval City of Cork" in S. McGrail, *Woodworking Techniques before A.D 1500,* B A R **129**, 301-311.

Hurley, M.F., 1986, *A study of Skeletal and Wooden Artefacts from Medieval Cork.* Unpublished M.A. Thesis, University College Cork.

Hurley, M. & Scully, O., 1997, *Late Viking Age and Medieval Waterford Excavations 1986-1992.* Waterford Corporation.

Kelly, F., 1988, *A Guide to Early Irish Law.* Institute for Advanced Studies, Dublin.

Keepax, C. A. (1988) *Charcoal analysis with particular reference to archaeological sites in Britain*. Ph.D. Dissertation, University of London.

McCracken, E., 1971, *The Irish Woods Since Tudor Times.* Institute of Irish Studies, Belfast.

Morgan, R., 1975, "The Selection and Sampling of Timber from Archaeological Sites for Identification and Tree-ring analysis", *Journal of Archaeological Science,* 2, 221-230.

Nelson E.C., 1993, *Trees of Ireland*. The Lilliput Press, Dublin.

Moloney et al, 1994) Excavations at Clonfinlough, Co. Offaly, Crannog Publications.

MacCoitir, N., 2003, *Irish Trees, Myths, legends and Folklore*. The Collins Press

O Carroll, E., 1996, *The analysis of two wooden assemblages from Corlea Bog, Co. Longford and King John's Castle, Co. Limerick.* Unpublished M.A. Thesis, University College Cork.

O Carroll, E., 2004, The analysis of wood and charcoal from Monanny, Co. Monaghan, Unpublished report for IAC.

O Carroll, E., 2007, The analysis of wood and charcoal from Cashelduff, Co. Mayo, Unpublished report for Mayo County Council.

O Carroll, E., 2007, The analysis of wood and charcoal from the N11, Arklow to Rathnew, Co. Wicklow, Unpublished report for the NRA/Wicklow County Council.

O'Carroll, E. 2004. *The analysis of charcoal remains from Ballybrowney Lower 1, Co. Cork*. Unpublished specialist report for ACS Ltd

O'Carroll, E. 2000. *The analysis of charcoal remains from Bettystown, Co. Meath*. Unpublished specialist report for ADS Ltd.

O'Carroll, E. 2002. *The analysis of charcoal remains from Hermitage, Co. Limerick*. Unpublished specialist report for Aegis.

O Carroll, E, 2007, Wood and Charcoal identifications from the N5, Charlestown by-pass, Mayo Co. Co. /NRA

O Carroll, E, 2008, Wood and Charcoal identifications from the N6 KEK, VJ Keeley Ltd/NRA

O Carroll, E, 2008, Wood and Charcoal identifications from the M7/M8 Portlaoise to Cullahill/Castletown, Contract 1, post excavation report for ACS & NRA

O Carroll, E, 2008, Wood and Charcoal identifications from the M7/M8 Portlaoise to Cullahill/Castletown, Contract 3, post excavation report for ACS & NRA

O Donnell, L. 2005, *Wood and charcoal identifications from Charlesland, Co. Wicklow*, Unpublished specialist report for Margaret Gowen and Co.

O Donnell, L. 2005, *Wood and charcoal identifications from Ballynagran, Co. Wicklow*, Unpublished specialist report for Margaret Gowen and Co.

O Donnell, 2008, *Wood and charcoal identified from the N8 Cashel to Mitchelstown,* unpublished post excavation report for NRA/Margaret Gowen & Company

O' Sullivan, A., 1987, "Wood in Archaeology", *Archaeology Ireland 4***,** 69-73.

O' Sullivan, A., 1994, "The use of Trees and Woodland in early medieval Ireland", *Irish Forestry* **51,** 80-94.

Rackham, O., 1976, *Trees and Woodlands in the British Landscape.* Weidenfeld & Nicholson, London.

Rackham, O., 1980, *Ancient Woodland: its history, vegetation and uses in England.* Edward Arnold, London.

Schweingruber, F.H., 1990, (3rd edition) *Microscopic Wood Anatomy*. Birmensdorf: Swiss Federal Institute for Forest, Snow and Landscape Research.

Sands, R. 1997, *Pre-historic woodworking. The Analysis and Interpretation of Bronze and Iron Age toolmarks.* Institute of Archaeology, University of London

Webb, D.A., 1977, *An Irish Flora*. Dundalgan Press Ltd., Dundalk.

Western, C. A., 1970, "Wood and Charcoal in Archaeology", *Science in Archaeology,* 178-187.

10.2 Appendix 2: Petrographical analysis report

Petrographical Report on Stone Samples

from Shanboe 1, Co. Offaly

(Ministerial Direction No. A015/062)

Geology of the Site (see Figure 1; Archer *et al*. 1996; Gatley *et al*. 2005)

EurGeol Dr Stephen Mandal MIAI PGeo

The geology of the area is dominated by Carboniferous sediments, predominantly limestone, which form a stratigraphical succession generally younging to the southeast.

However, the oldest rocks in the area occur in the northwest of the area and are of Devonian Age, comprising the Cadamstown Formation (CW) of pale and red sandstone, grit and claystone and include the Clonaslee Member (CWcl), which consists of thick flaggy sandstone and thin siltstone.

The oldest rocks of the Carboniferous Period in the area belong to the Lower Limestone Shale (LLS), consisting of sandstone, limestone and mudstone. These unconformably overlie the Ballysteen Formation (BA); Courceyan Age fossiliferous dark grey muddy limestones which make up the majority of the area. Included in the Ballysteen Formation is the Lisduff Oolite Member (BAld) of oolitic limestone. Overlying this is the Waulsortion Limestones, massive bedded limestones of Upper Courceyan Age.

Another unconformity separates the Waulsortion Limestones from the conformable Urlingford Succession of the Crosspatrick Formation (CS), pale-grey cherty crinoidal limestone; the Aghmacart Formation (AG), dark shaly micrite / peloidal limestone; the Durrow Formation (DW), shaly fossiliferous and oolitic limestone; and the Clogrenan Formation (CL), cherty bluish crinoidal limestone.

A further substantial unconformity separates this succession from the Killeshin Siltstone Formation (KN), Upper Namurian muddy siltstone and silty mudstone, in turn unconformably overlain by the Moyadd Coal Formation (MC), Lower Westphalian shale, siltstone and minor sandstone.

The bedrock at the site consists of the Ballysteen Formation of fossiliferous dark grey muddy limestones.

The geology of the area represents the period from the Devonian (*c*. 410 – 355 million years ago), when this part of Ireland was on the edge of a huge continent called Laurussia, formed by the collision of Laurentia and Avalonia – South America at the end of the Silurian. The rocks were derived from the Caledonian mountain uplift which occurred at e start of the Devonian, representing the final erosion of the mountain range prior to the inundation of the early Carboniferous sea. The Carboniferous sequence of rocks in the area is a result of

shallow (sandstones and limestones) and deeper (shales and mudstones) period of deposition on the sea floor.

Results of Assessment

Site	MD #	Sample	Description
Shanboe 1	A015/062	01	Predominantly yellow / red / grey quartzite, coarse quartz, sandstone plus limestone and greywacke
Shanboe 1	A015/062	02	Predominantly yellow / grey quartzite, coarse quartz, sandstone plus limestone and greywacke
Shanboe 1	A015/062	03	Predominantly yellow / red / grey quartzite, coarse quartz, sandstone plus limestone and greywacke
Shanboe 1	A015/062	04	Predominantly yellow / grey quartzite, coarse quartz, sandstone plus limestone and greywacke
Shanboe 1	A015/062	05	Predominantly yellow / red / grey quartzite, coarse quartz, sandstone plus limestone and greywacke
Shanboe 1	A015/062	07	Predominantly yellow / red / grey quartzite, coarse quartz, sandstone plus limestone and greywacke
Shanboe 1	A015/062	09	Finer sandstone, limestoe, grey / yellow chert
Shanboe 1	A015/062	11	Finer sandstone, limestoe, grey / yellow chert
Shanboe 1	A015/062	12	Quartz and quartzite
Shanboe 1	A015/062	13	Predominantly yellow / red / grey quartzite, coarse quartz, sandstone plus limestone and greywacke
Shanboe 1	A015/062	13	Finer sandstone, limestoe, grey / yellow chert
Shanboe 1	A015/062	14	Predominantly yellow / grey quartzite, coarse quartz, sandstone plus limestone and greywacke
Shanboe 1	A015/062	15	Predominantly yellow / red / grey quartzite, coarse quartz, sandstone plus limestone and greywacke
Shanboe 1	A015/062	16	Large blocks of angular limestone

Potential Sources

All of the materials identified within the samples are readily available at the site, in bedrock and in the overlying glacial tills.

However, the closest bedrock source for quartzite occurs in the Clay Gill Sandstone Formation which occurs in the upland areas *c*. 3k east of Durrow. Whilst it is possible that quartzite occurs in the glacial tills, the importing of quartzite from other areas, or the preferential extraction of quartzite from the tills cannot be ruled out.

References

Archer, J.B., Sleeman, A.G. and Smith, D.C., 1996. *The Geology of Tipperary: to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 18*. Geological Survey of Ireland Publications. Westprint Ltd: Sligo.

Gatley, S., Somerville, I.D., Morris, J.H., Sleeman, A.G. and Emo, G., 2005. *Geology of Galway-Offaly: to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 15*. Geological Survey of Ireland Publications. Westprint Ltd: Sligo.

10.3 Appendix 3: Lithic analysis report

Preliminary analysis of the lithic piece from

Shanboe 1, Co. Laois

Archaeological Record No: E2172

Ministerial Direction/Scheme No: A015/062

By Dr. MARIA B. O'HARE

Statement of Significance

Although this is a single artefact recovered as part of excavations from Shanboe 1, Co. Laois, it is significant as it a hollow based arrowhead and is a relatively time-sensitive lithic diagnostic. For instance, until a recent study by the present writer assessing arrowheads along with other lithic technology within the context of the Irish Bronze Age, the hollow based arrowheads were believed to have Neolithic origins; this may not actually be the case. Instead, on the weight of evidence for their unconvincing association within any Neolithic context and their virtually synonymous association twirh Irish Beaker and earlier Bronze Age contexts, these are now beginning to be accepted as a lithic projectile point introduced around the same time as metalwork into Ireland (O' Hare 2005 and O' Hare forthcoming).

Therefore, the hollow based arrowhead recovered from the excavation at Shanboe 1, Co. Laois may be an archaeological marker for prehistoric activity dating from the Beaker period until at least the beginning of the Middle Irish Bronze Age. Furthermore, the quality of the chert employed is of interest as chert material from this region is fairly rare; perhaps this indicates an imported piece as it is a very well produced arrowhead and made from a fairly exotic material. Interestingly, there was slight tip damage, which is consistent with it having been deployed as a weapon.

Introduction

A single lithic was derived from the Portlaoise to Castletown/Culahill, contract 2 of the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme at Shanboe 1, Co. Laois. Excavation licence number E2172, scheme A015/62. This lithic piece has an individual entry and is listed within the database (Microsoft excel) for Contract 2, report number seven and is accompanied by a glossary of terms corresponding to this database.

Description of artefact

A chert hollow based arrowhead (E2172:003:001) was recovered from feature (F3). It has length, breadth and thickness dimensions of 32.7x16.6x3.6mm and the measurement from the centre of the base of the arc to the barbs is 3.7mm. The arrowhead would appear to be made on good quality black chert derived from carboniferous limestone deposits. It has slight distal damage and the nature of the break would appear to indicate damage as a result of impact with a hard object.

Hollow based arrowheads and their cultural affinities

The hollow based arrowhead is a relatively common type found in Ireland and very rarely found in Britain as noted by Green (1980, 141), although direct parallels are found in Belgium museums as observed by Green (1980, 147). He suggests that the mechanism by

which the hollow based arrowhead could have come to Britain may have been in conjunction with imported 'Irish metalwork' (1980, 147), thereby indicating that these may belong to the metalworking era. Furthermore, Green illustrates both the barbed and tanged and hollow based arrowhead types as sharing a similar spatial and temporal distribution within Ireland (1980, fig. 55).

This is further indicated by Case, who notes that the hollow based arrowhead may be an 'eastern' derived arrowhead type in association with Beakers and the barbed and tangs may represent a 'western' Beaker association (1995, 24). The hollow based arrowheads appear to have continued along-side many of the barbed and tanged types as indicated generally by Green (1980) and indeed, Raftery comments upon the arrowhead from a Early Bronze Age context at Freestone Hill, Co. Kilkenny, the 'hollow-based flint arrowhead, is an elegant example of its class and completely at home in a Food Vessel context' (1969, 21).

Prompted by the studies highlighted above, pre-Bronze Age contexts were sought as part of a detailed study undertaken by the present writer in order to establish the validity of the hollow based arrowhead as an essentially new lithic type-fossil of the earliest Bronze Age in Ireland. The study found no convincing Neolithic origins within Ireland for the hollow based arrowhead; indeed, this arrowhead is fully synonymous with cultural material of the Beaker and Early Bronze Age period within Ireland.

Beaker and Bronze Age arrowheads

The hollow based arrowhead appears to have been manufactured from the Beaker period onwards and although the barbed and tanged arrowheads would appear to be synonymous with this cultural époque; the hollow based arrowhead is also part of the Beaker cultural package at this time. In fact, in the survey undertaken by the writer (O' Hare 2005), hollow based arrowheads were just as frequently found with Beaker material as the barbed and tanged arrowhead and some cases, the hollow based arrowhead was more frequent than the barbed and tanged variety.

Therefore the hollow based arrowhead is synonymous with the earliest Beaker period almost exclusively within domestic contexts which is again evident from c. 2000 to 1700 BC and the hollow based arrowhead would appear to have been introduced within the Beaker period *c*. 2400 BC. It has a relatively short currency until the end of the Vase Tradition commencing at around 2000 BC. Furthermore, these are typically from domestic contexts rather than funerary contexts where other arrowhead types are fairly common.

Parallels for the Shanboe 1 arrowhead

Interestingly, as is the case with other flint or chert arrowheads, the tip damage may be indicative of actual use as a weapon either for hunting or warfare and is itself very significant. Although there is much variation between the arrowheads that are described as hollow based type, and several comparisons could be drawn between the Shanboe specimen and others particularly of chert from a wide range regions from all over Ireland, the closest parallel, dimensionally, morphologically and in terms of the same material is to be found from Carrowjames II, Co. Mayo (Raftery 1938-1939 and 1940-1941) from within a tumulus spread that had a range of material from various prehistoric periods, although essentially the main ceramic deposit was that of Cordoned Urns which date to 1800/1700 to the Middle Bronze Age period and this specimen may therefore be an heirloom deposit in this context.

Discussion

On the weight of evidence, the hollow based arrowhead from Shanboe, 1, Co. Laois would appear to belong to the period 2400 to 1800 BC. It is most likely to have originated from within a domestic context and is an archaeological marker for prehistoric activity dating around this period. Furthermore, it is also a possible import of an exotic type implement within the Shanboe area and is also significant as it shows evidence of having been deployed as a weapon possibly for hunting or even warfare and that it is made of a relatively exotic material within this region, i.e. chert.

Bibliography

Case, H. 1995. Irish Beakers in their European Context, in J. Waddell and E, Shee Twohig (eds.), *Ireland in the Bronze Age: Proceedings of the Dublin Conference, April 1995*, 14-29. Dublin.

Green, S. 1980. *The Flint Arrowheads of the British Isles, British Archaeological Reports* 75. Vols. 1 and 2. Oxford.

O' Hare, M. 2005. *The Bronze Age Lithics of Ireland*, Unpublished phD thesis, Queen's University, Belfast.

O' Hare, M. Forthcoming publication for *B.A.R. British Archaeological Reports*.

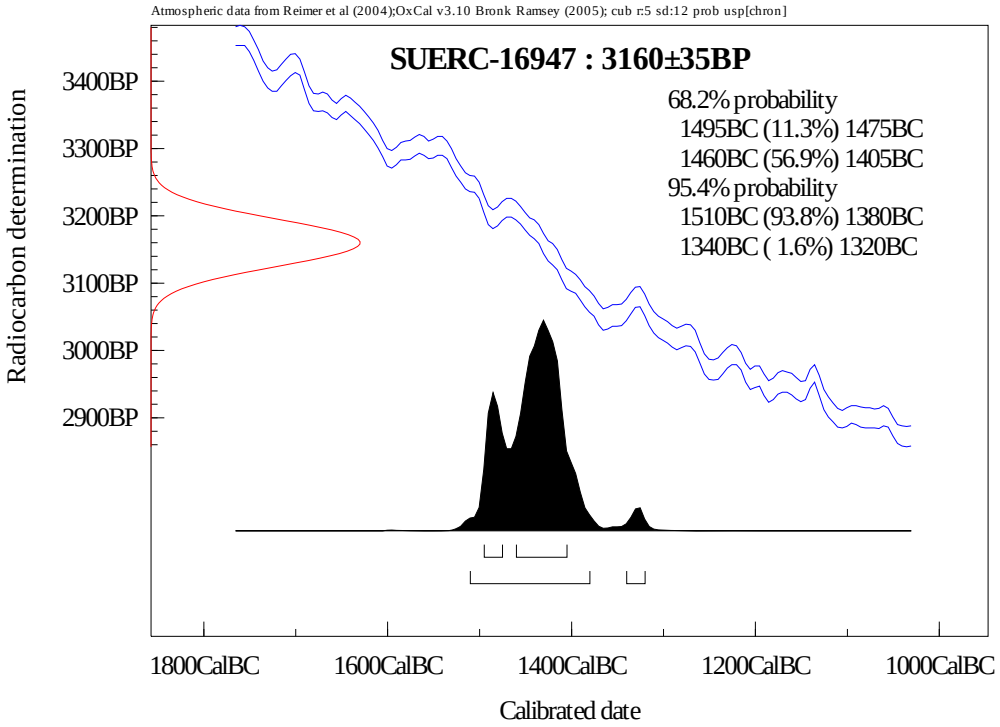
Raftery, B. 1969. Freestone Hill, Co. Kilkenny: An Iron Age Hillfort and Bronze Age Cairn, *Proceedings of the Royal Irish Academy* 68C, 1-108.

Raftery, J. 1938-1939. The Tumulous Cemetery of Carrowjames Part I, *Journal of the Galway Archaeological and Historical Society* XVIII, nos. iii-iv, 157-167.

Raftery, J. 1940-1941. The Tumulous Cemetery of Carrowjames Part II, *Journal of the Galway Archaeological and Historical Society* XIX, nos. i-ii, 16-88.

Above: Chert Arrowhead from Shanboe 1 (ACS Archive)

10.4 Appendix 4: Radiocarbon dating analysis report



GU No.	Reporting Number	Sample Type	Site	Sample Id	Species Dated	d13C	Age % Modern	Ageerror 1 sigma
16106	SUERC-16947	Charcoal	Shanboe 1	Shanboe 1:E2172 :F18:S15	Elm	-25.7	3160	35

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 218630	3000 +/- 40 BP	-25.6 o/oo	2990 +/- 40 BP

SAMPLE : A015/062:C31:S17
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (wood): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 1380 to 1100 (Cal BP 3320 to 3050)

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.6:lab. mult=1)

Laboratory number: **Beta-218630**

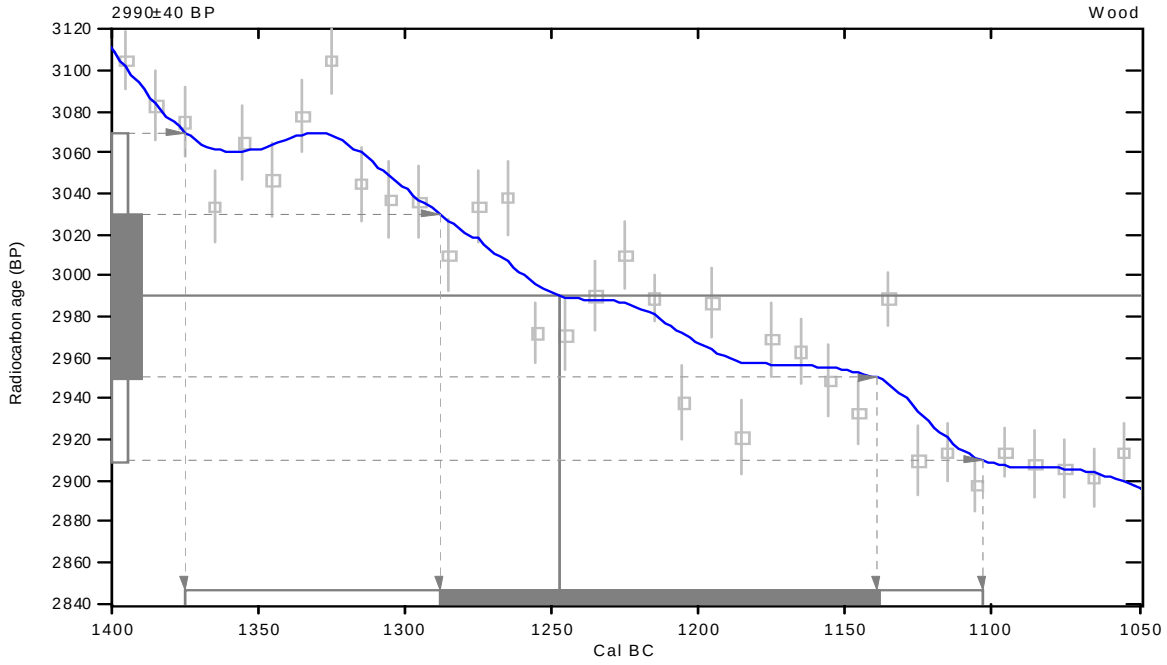
Conventional radiocarbon age: **2990±40 BP**

2 Sigma calibrated result: (95% probability) **Cal BC 1380 to 1100 (Cal BP 3320 to 3050)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 1250 (Cal BP 3200)

1 Sigma calibrated result: (68% probability) Cal BC 1290 to 1140 (Cal BP 3240 to 3090)



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

Beta Analytic Radiocarbon Dating Laboratory
4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • E-Mail: beta@radiocarbon.com

10.5 Appendix 5: Burnt Mounds on the M7 Portlaoise toCastletown/M8 Portlaoise to Cullahill Motorway Scheme

Townland	Contract No.	Site Type	Description	Provisional Date
Addergoole 1	1	Burnt mound	2 burnt spreads and several paleochannels.	Late Bronze Age
Addergoole 2	1	Burnt mound	Several burnt spreads, 2 troughs and other features	Late Bronze Age
Aghmacart 1	1	Burnt mound	3 burnt spreads	Early Bronze Age
Aghmacart 2	1	Burnt mound	1 burnt spread and 1 trough	Early Bronze Age
Ballycuddahy 1	1	Burnt Mound(s)	2 small burnt spreads, 2 troughs (1 oval and 1 rectangular) and 1 pit	Bronze Age
Ballyhinode 1	1	Burnt Mound	Remains of fulacht/burnt mound	-
Ballyhinode 2	1	Burnt Mound	Remains of fulacht/burnt mound	-
Boherard 1	2	Burnt Mound	Burnt Spread	Bronze Age
Boherard 2	2	Burnt Mound	Burnt Spread and associated pits	Bronze Age
Boherard 3	2	Burnt Mound	Burnt Spread and pit furnace	Bronze Age
Bushfield 1	2	Burnt Mound	Several burnt spreads and troughs	Bronze Age
Bushfield 4	2	Burnt Mound	Several burnt spreads and troughs	Bronze Age
Bushfield 5	2	Burnt Mound	Several burnt spreads and troughs	Bronze Age
Cannonswood 2	1	Burnt Mound	Several burnt spreads and troughs	Bronze Age

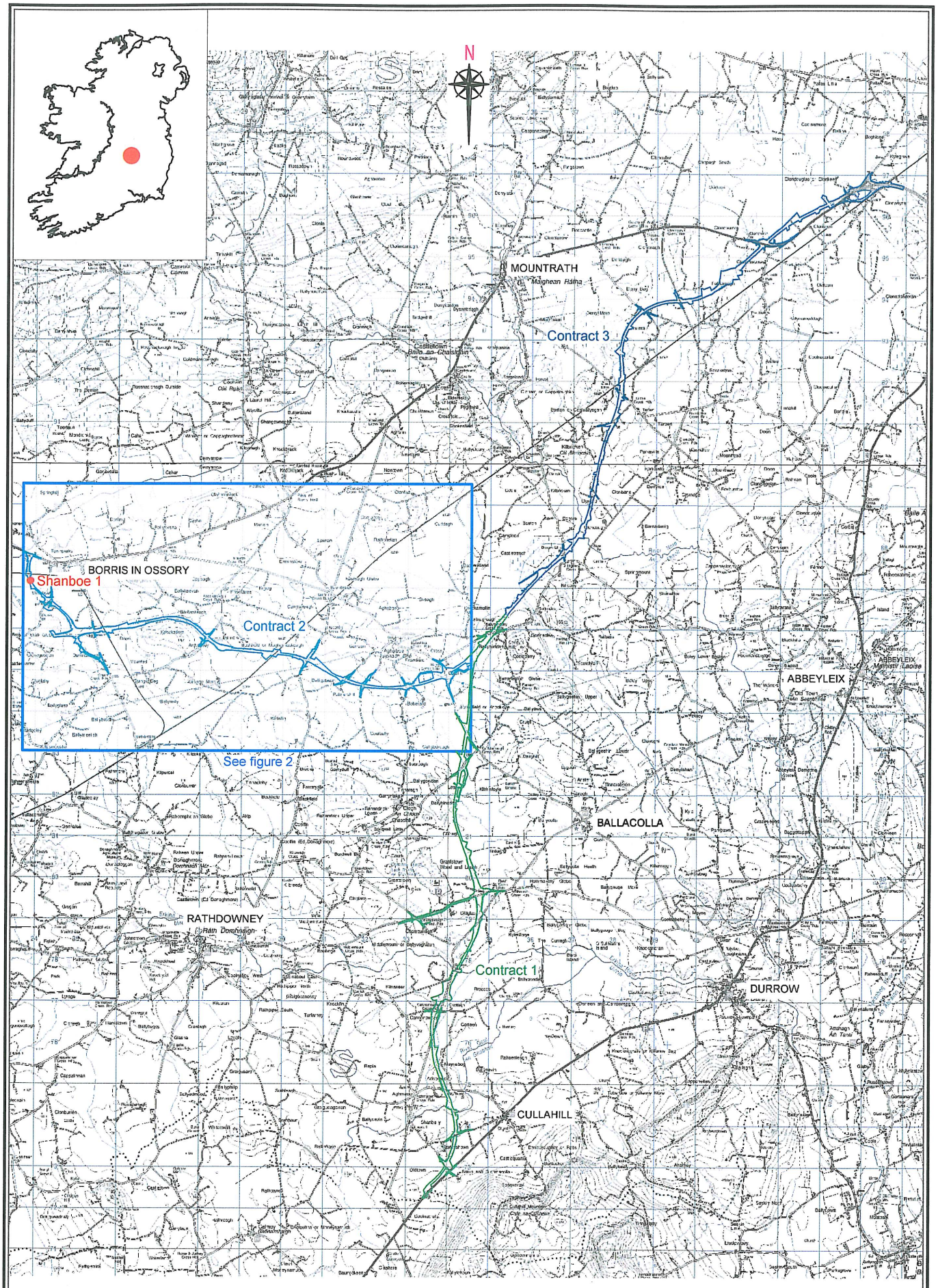
Cappaloughlin 5	3	Burnt mound	Remains of three *fulacht*/burnt spreads and two pit-like troughs	Bronze Age
Cappaloughlin 6	3	Burnt mound	Remains of fulachta fiadh activity: 8 troughs and associated spreads	Bronze Age
Clonadacasey 3	3	Burnt mound	A small number of archaeological features including a trough and two *fulacht*/burnt spreads.	Bronze Age
Clonadacasey 4	3	Burnt mound	A small number of archaeological features including a number of *fulacht*/burnt spreads, stakeholes and troughs.	Bronze Age
Clonboyne 2	3	Burnt mound	Remains of a ploughed out *fulacht fiadh.* A possible flint plough pebble and hone stone were recorded	Bronze Age
Coolfin 2	2	Burnt Mound Activity	Four small pits containing heat shattered stone. The pits ranged from circular to sub-oval in shape and had an average diameter of less than a meter and depth of 200mm.	Bronze Age
Coolfin 3	2	Burnt Mound	Burnt spread (c.12m in length). A large sub-rectangular pit situated to the north of this feature was interpreted as a well (over 3m in length, 2m in width and a metre deep) and contained a timber walkway leading from outside the northern edge to its centre. The cut for this 'U' – shaped well was while a single timber plank supported by uprights provided access into it. A stream apparently truncated the spread in the past.	Bronze Age
Coolfin 4	2	Burnt Mound	Rectangular pit measuring 1.6m E-W and 1.05m N-S and a depth of 0.15m. The burnt mound material and the four corner postholes suggest that this feature probably held a trough. A north-south orientated stream was situated 8m to the west.	Bronze Age
Corraun 1	2	Burnt Mound	Burnt mound activity	Bronze Age

Corraun 2	2	Burnt Mound	Substantial burnt mound & associated pits, hearths & 3 troughs	Bronze Age
Corraun 3	2	Burnt Mound	Extensive burnt mound activity	Bronze Age
Cross 1	1	Burnt Mound	Burnt stone spread and an associated trough	Bronze Age
Cuffsbororugh 1	1	Burnt Mound Site	Burnt stone spread, 3 sub-rectangular troughs, 1 sub-circular trough & 2 large pits. Linear ditches. Finds included pottery & deer antler.	Bronze Age
Cuffsborough 3	1	Burnt Mound Site Possible well	2 large deep pit features & 2 large shallow pit features (containing burnt stone), associated pits & ditches. Post-Medieval well?	Bronze Age Post-Medieval?
Curragh 1	1	Burnt mound	2 distinct fulachta fiadh	Early Bronze Age
Curragh 2	1	Burnt mound	1 fulacht fiadh and other post medieval features	Late Bronze Age/ Late Medieval period
Friarsland 1	2	Burnt Mound	Burnt spread (15 x 10m). This site very small and was completed during the testing phase.	Bronze Age
Friarsland 2	2	Burnt Mound	Burnt spread (5 x 2m)	Bronze Age
Gortnagroagh 1	1	Burnt Mound/ Industrial Activity	Drains, a large oval pit & a smaller rectangular pit all containing post-Medieval pottery while both pits contained heat shattered sandstone and dated to the Bronze Age. A number of cow-horns were also found on site	Bronze Age/Post-Medieval
Leap 2	1	Burnt Mound	Ploughed out remains of fulacht/burnt mound or spread	-

Oldglass 1	1	Burnt Mound	Remains of fulacht/burnt mound and a circular structure.	Iron Age
Oldglass 2	1	Burnt Mound	Remains of fulacht/burnt mound and associated pits	-
Oldglass 3	1	Burnt Mound	Remains of fulacht/burnt mound	Bronze Age
Shanboe 1	2	Burnt Mound	*Fulacht*/burnt mound spread, which covered a number of troughs and pits. One chert arrowhead was recovered.	Bronze Age
Shanboe 4	2	Burnt Mound	Ploughed out remains of a *fulacht fiadh*/burnt mound	Late Bronze Age
Shanboe 5	2	Burnt Mound	Ploughed out remains of a *fulacht*/burnt mound spread and associated pits	Early Medieval
Springfield 2	1	Burnt Mound	Troughs, pits, postholes and associated burnt mound activity	Bronze Age
Springfield 3	1	Burnt Mound	Burnt stone spread and a metalled surface	Bronze Age
Tintore 1	1	Burnt mound	2 fulachta fiadh and troughs	Bronze Age
Tintore 2	1	Burnt mound	Several fulachta fiadh spreads and associated pits	Late Bronze Age

10.6 Appendix 6: Archive Contents

Table …. Site Archive (Basic) Summary			
Site Name: Shanboe 1		Record No.: E2172	
Type	Description	Quantity	Notes
Contexts	Validated contexts from excavation	52	All contexts sheets have been checked and cross-referenced.
Plans	'A2' 1:50 (no. of sheets)	7	Pre-ex plan, post-ex plan.
Sections	'A2' 1:10 (no. of sheets)	17	
Photographs		126	Digital Version only.
Registers	Plan Register Photographic Register Finds Register, Sample Register	1 1 1 1	All Registers have been checked and cross-referenced.
Diaries	Director's Diary	1	All Diaries have been checked and cross-referenced.



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, Shanboe 1	Scale: 1: 125,000 A4
		Date: Sept '08
	Issued for: Archaeological excavation report	Origin: ACS Ltd
	Client: Laois County Council	Drawing no.: 05_09_C7356

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

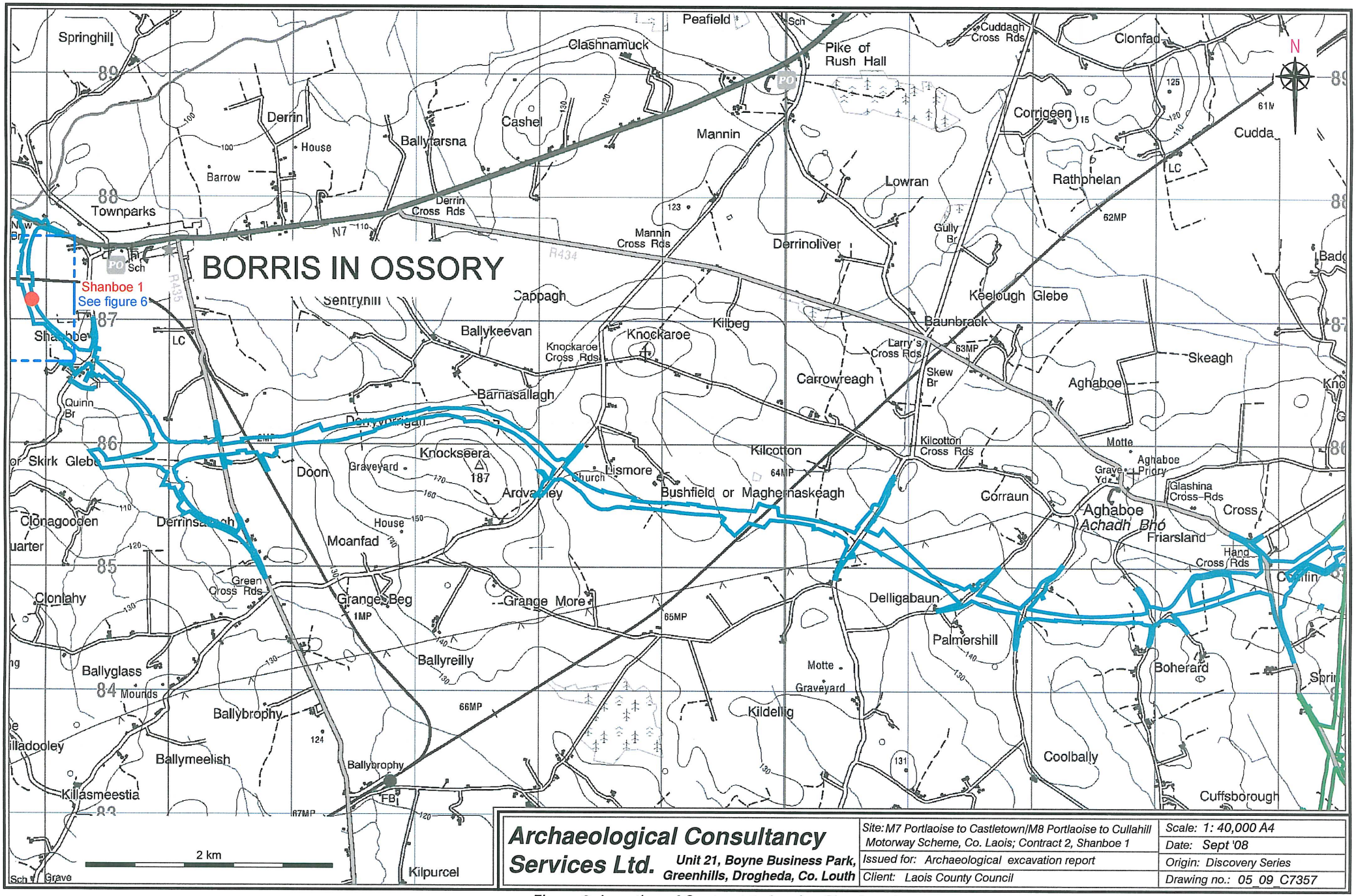
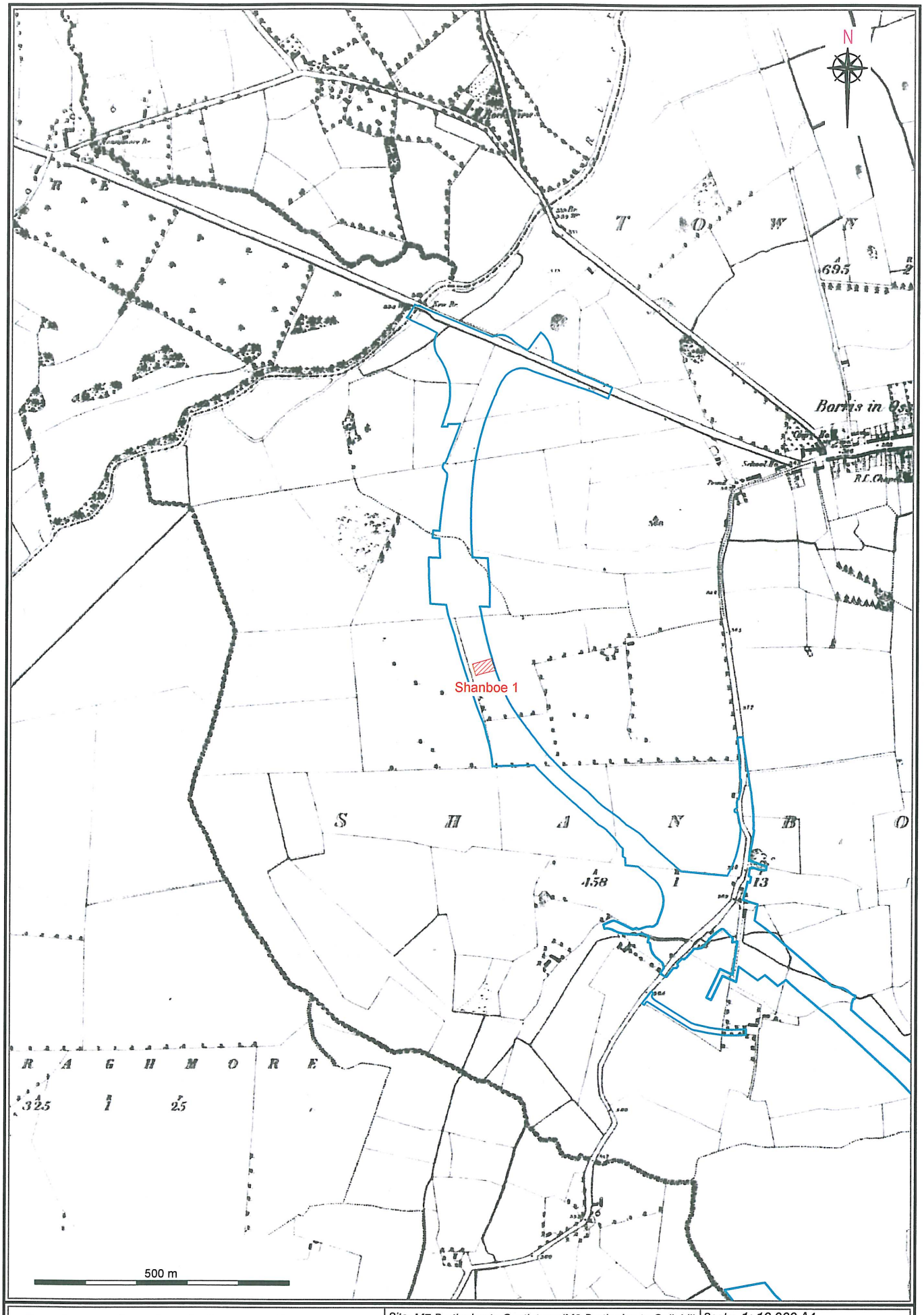
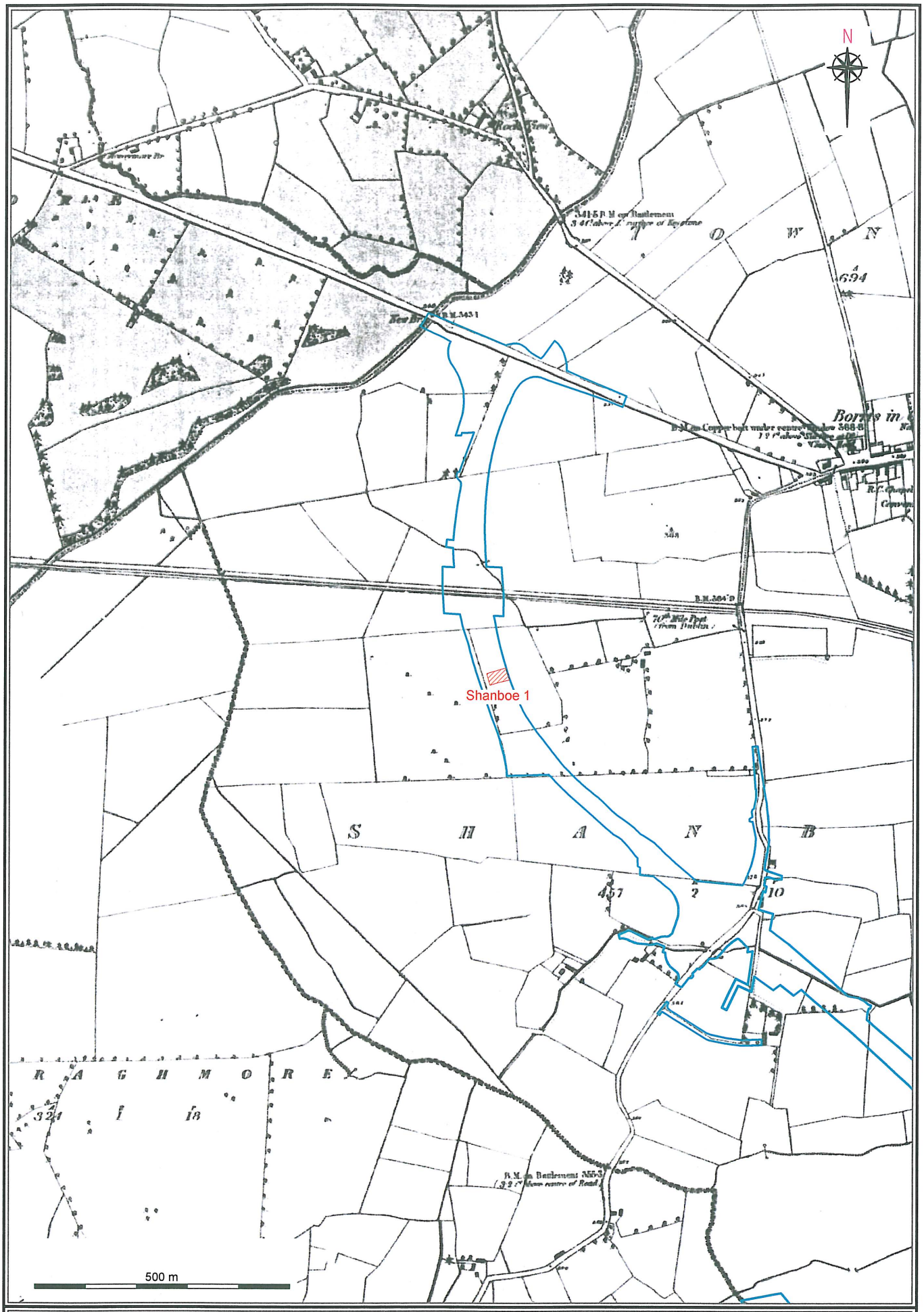


Figure 2: Location of Contract 2 showing Shanboe 1



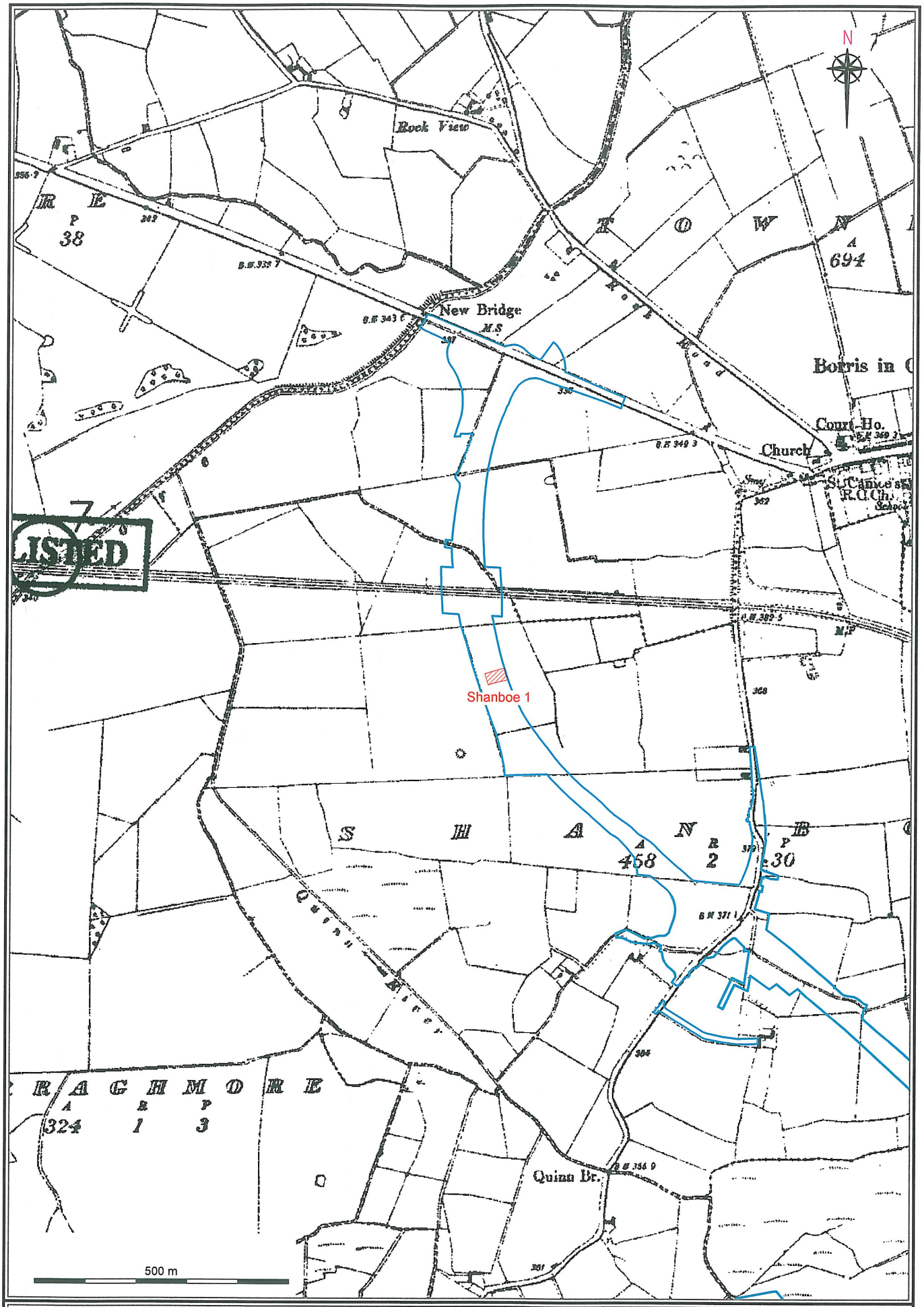
Archaeological Consultancy Services Ltd. Unit 21, Boyne Business Park, Greenhills, Drogheda, Co. Louth	Site: M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, Co. Laois; Contract 2, Shanboe 1	Scale: 1: 10,000 A4
		Date: Sept '08
	Issued for: Archaeological excavation report	Origin: OSi Laois 1st Ed. (1839)
	Client: Laois County Council	Drawing no.: 05_09_C7358

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



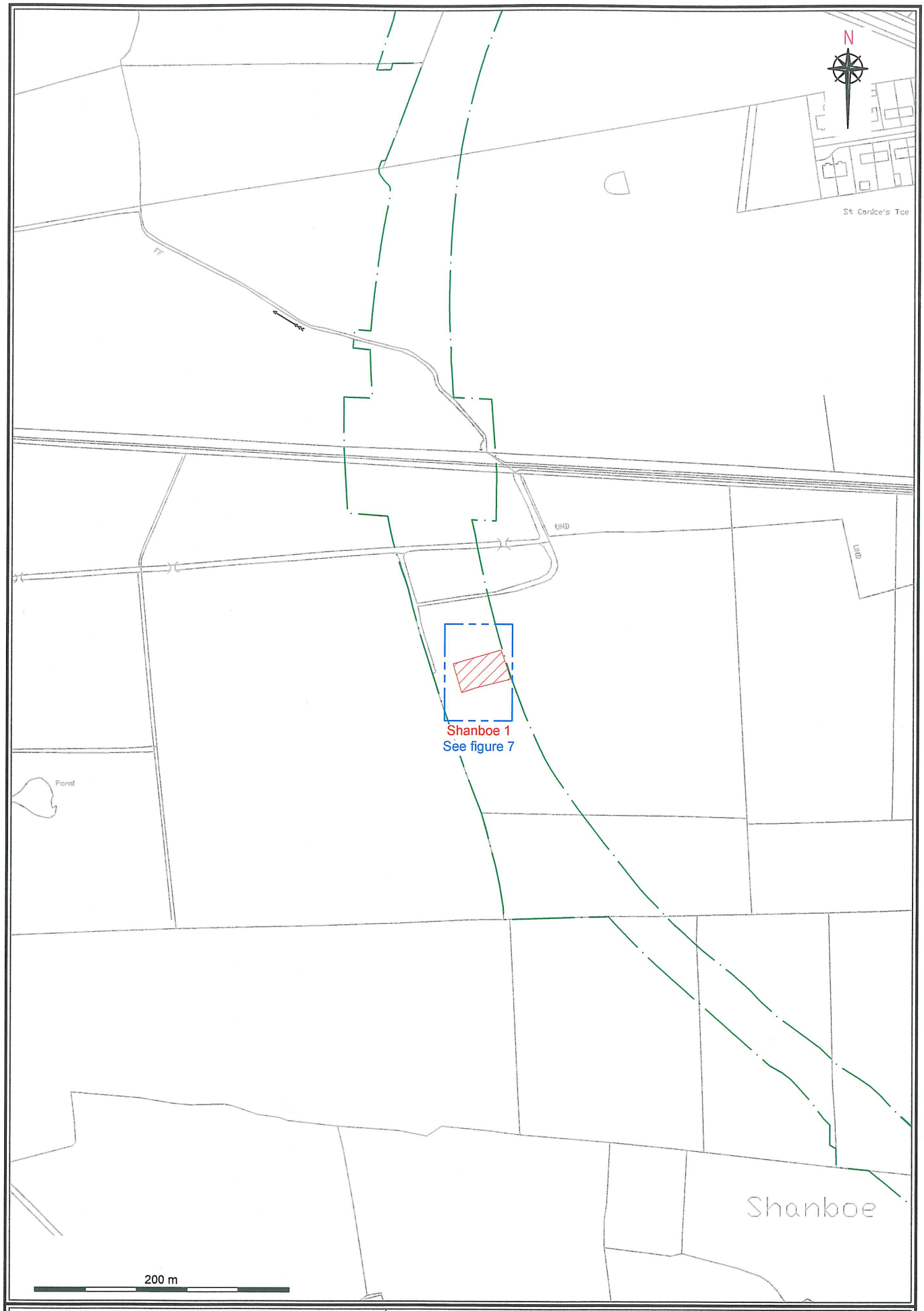
Archaeological Consultancy Services Ltd. Unit 21, Boyne Business Park, Greenhills, Drogheda, Co. Louth	Site: M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, Co. Laois; Contract 2, Shanboe 1	Scale: 1: 10,000 A4
		Date: Sept '08
	Issued for: Archaeological excavation report	Origin: OSi Laois 2nd Ed. (1889-91)
	Client: Laois County Council	Drawing no.: 05_09_C7359

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



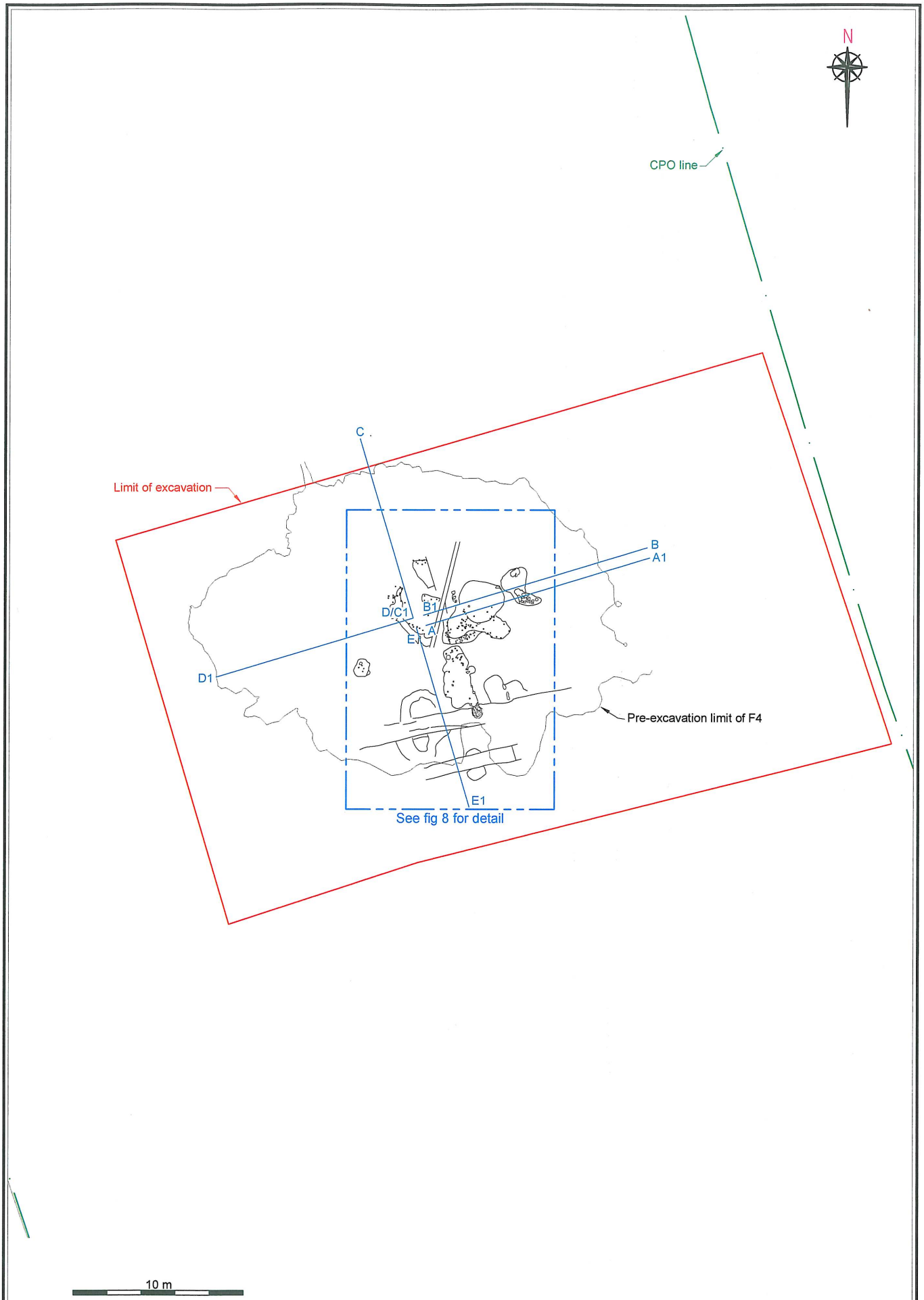
Archaeological Consultancy Services Ltd. *Unit 21, Boyne Business Park, Greenhills, Drogheda, Co. Louth*	Site: M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, Co. Laois; Contract 2, Shanboe 1	Scale: 1: 10,000 A4
		Date: Sept '08
	Issued for: Archaeological excavation report	Origin: OSi Laois SMR 1909
	Client: Laois County Council	Drawing no.: 05_09_C7361

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



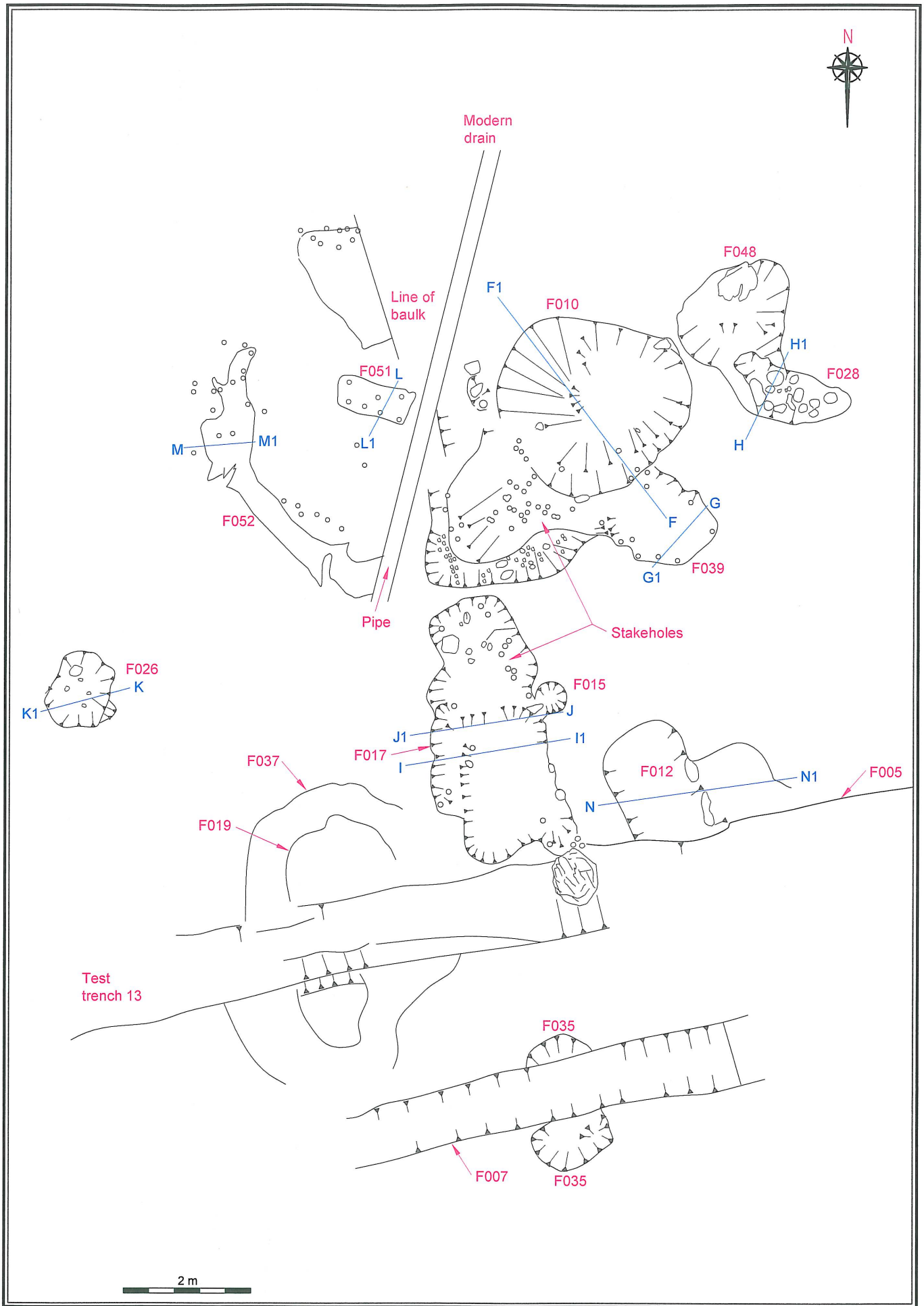
Archaeological Consultancy Services Ltd. Unit 21, Boyne Business Park, Greenhills, Drogheda, Co. Louth	Site: M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, Co. Laois; Contract 2, Shanboe 1	Scale: 1: 4,000 A4
		Date: Sept '08
	Issued for: Archaeological excavation report	Origin: ACS Ltd
	Client: Laois County Council	Drawing no.: 05_09_C7361

Figure 6: Location of Shanboe 1



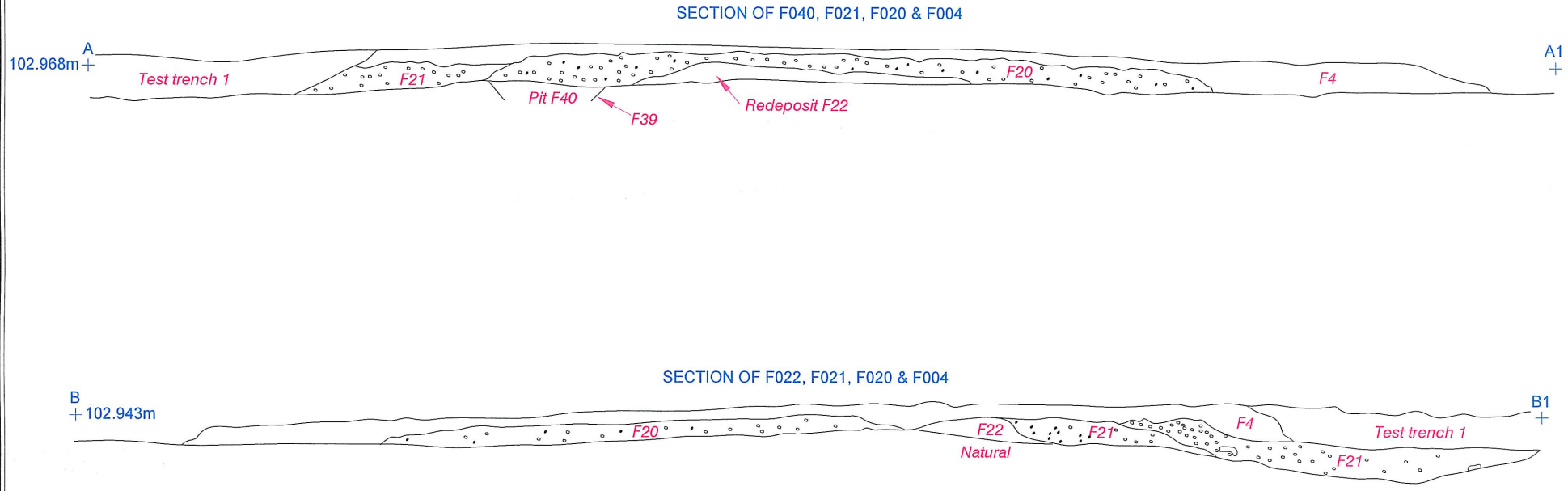
Archaeological Consultancy Services Ltd. Unit 21, Boyne Business Park, Greenhills, Drogheda, Co. Louth	Site: M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme, Co. Laois; Contract 2, Shanboe 1	Scale: 1: 300 A4
		Date: Sept '08
	Issued for: Archaeological excavation report	Origin: ACS Ltd
	Client: Laois County Council	Drawing no.: 05_09_C7362

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, Shanboe 1	Scale: 1: 70 A4
		Date: Sept '08
	Issued for: Archaeological excavation report	Origin: ACS Ltd
	Client: Laois County Council	Drawing no.: 05_09_C7363

Figure 8: Post-excavation plan of Shanboe 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, Shanboe 1	Scale: 1:50 A4
		Date: Sept '08
	Issued for: Archaeological Excavation Report	Origin: ACS Ltd.
	Client: Laois County Council	Drawing no.: 05_09_C7364

Figure 9: Sections

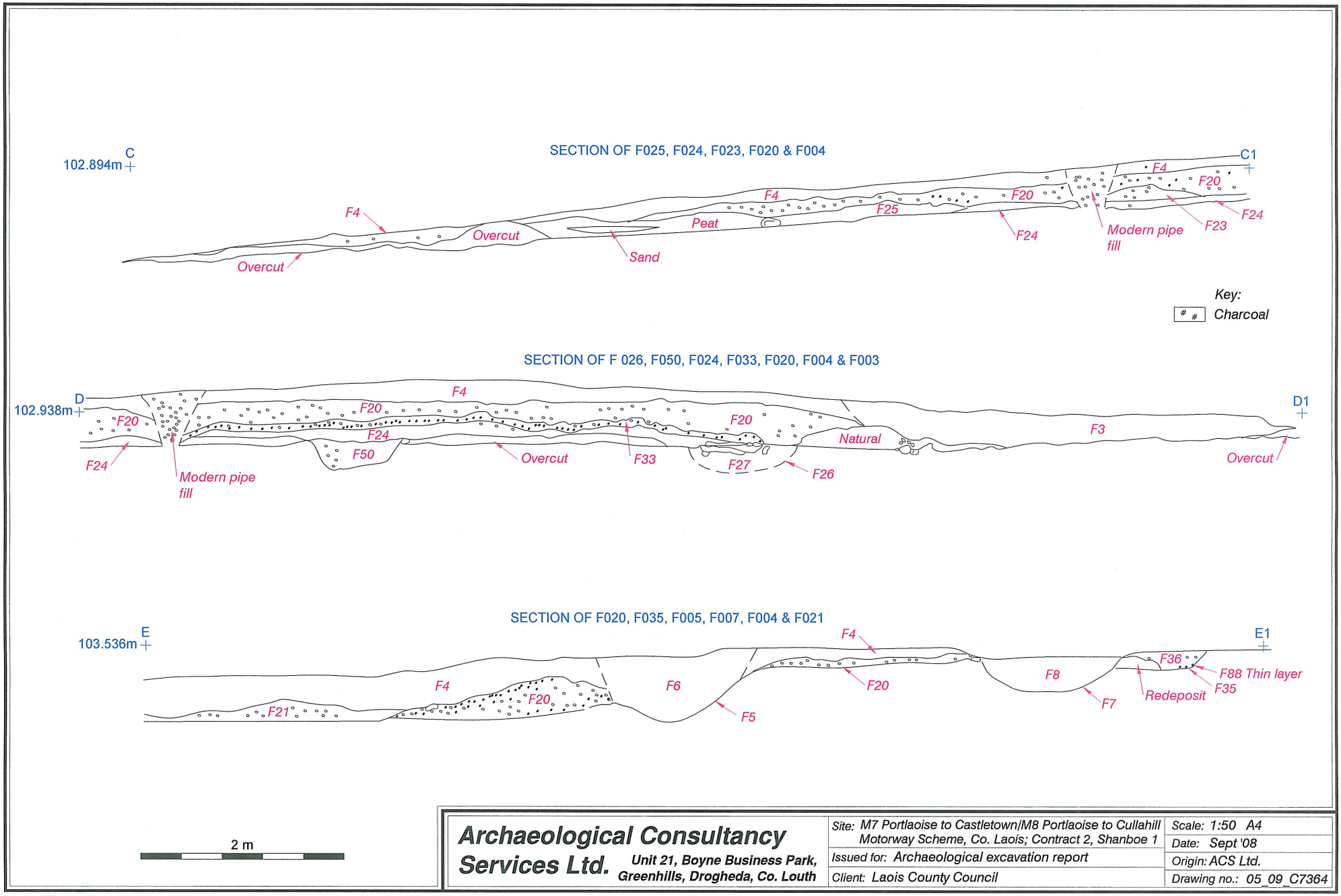
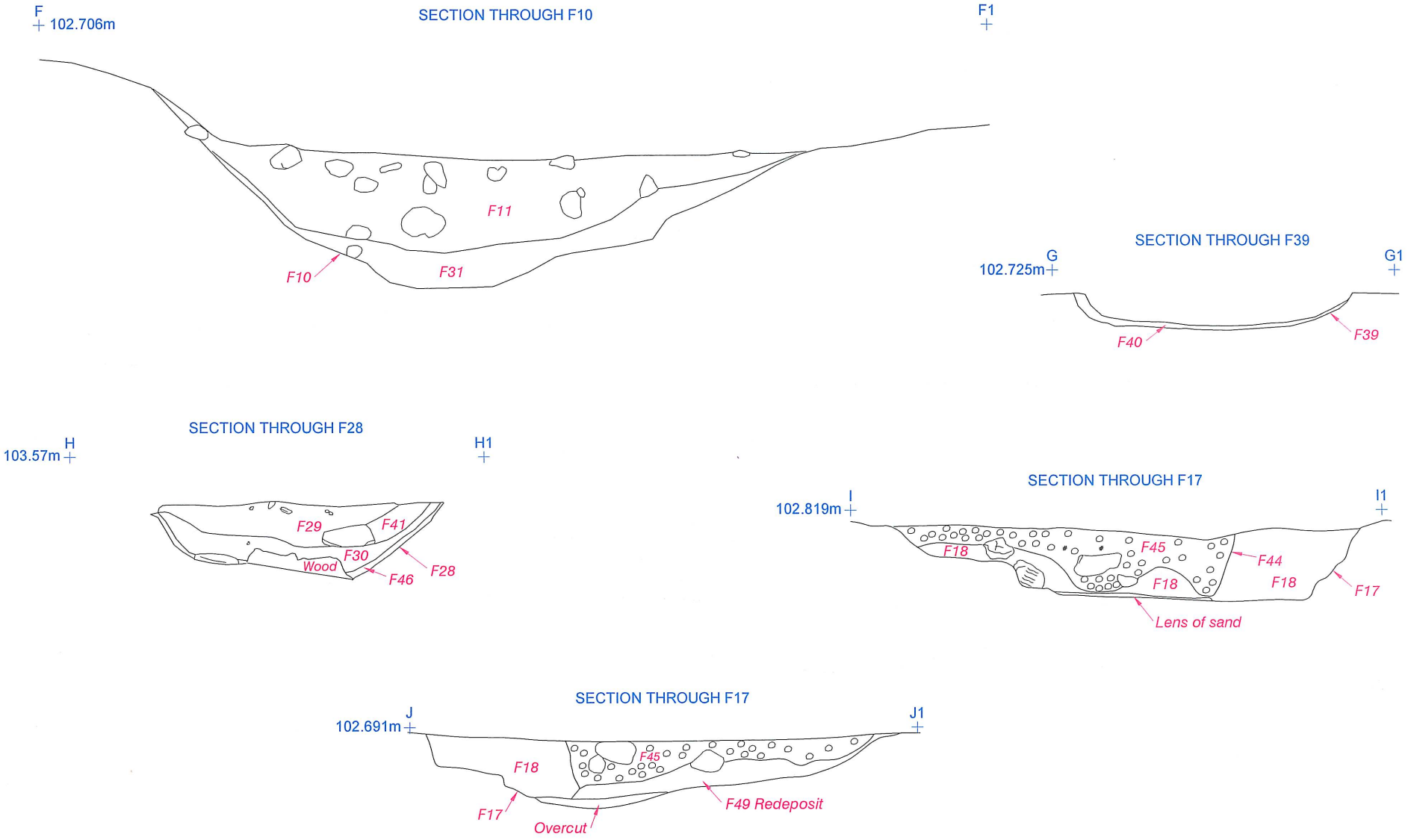
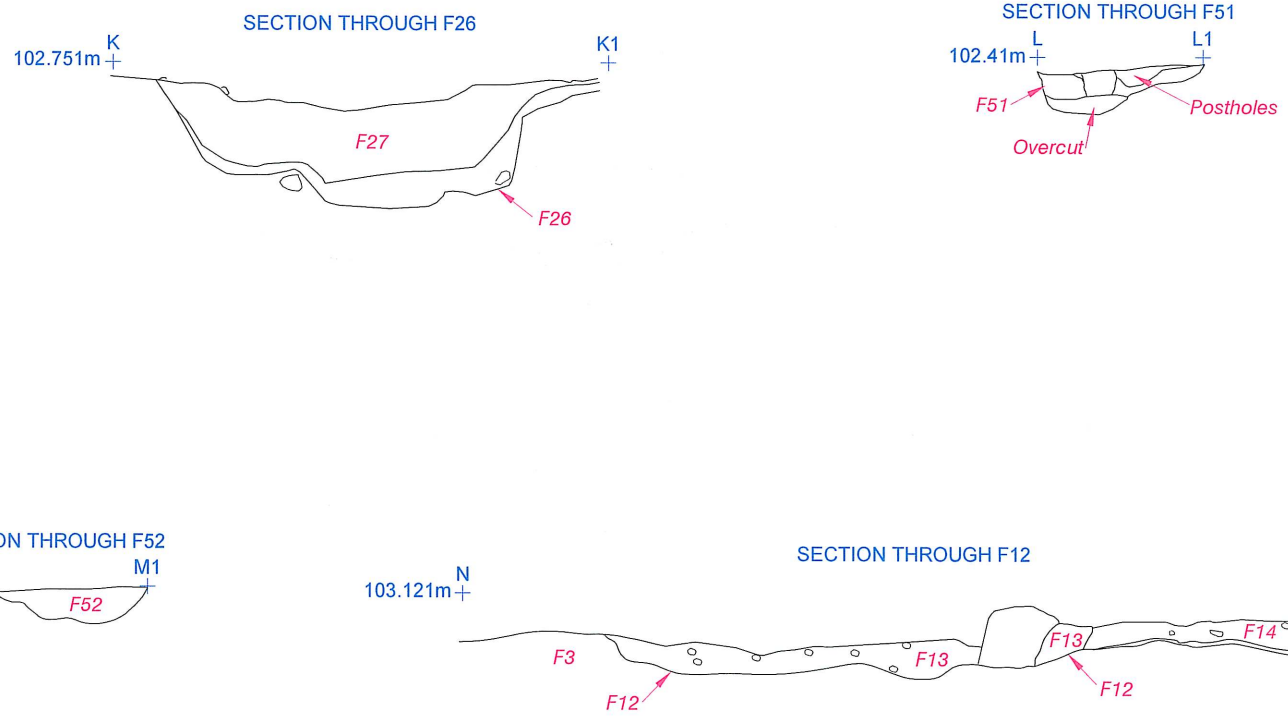


Figure 10: Sections



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, Shanboe 1	Scale: 1:25 A4
		Date: Sept '08
	Issued for: Archaeological excavation report	Origin: ACS Ltd.
	Client: Laois County Council	Drawing no.: 05_09_C7366

Figure 11: 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, Shanboe 1	Scale: 1:25 A4
		Date: Sept '08
	Issued for: Archaeological excavation report	Origin: ACS Ltd.
	Client: Laois County Council	Drawing no.: 05_09_C7367

Figure 12: Sections

Plate 1: General view of the site from the west (05_09_CP01_01)

Plate 2: Post-excavation view of F010 (05_09_CP05_06)

Plate 3: Mid-excavation view of F012 showing F013 & F014 from the south (05_09_CP02_03)

Plate 4: View of F017 & F015 below baulk from the northwest (05_09_CP02_18)

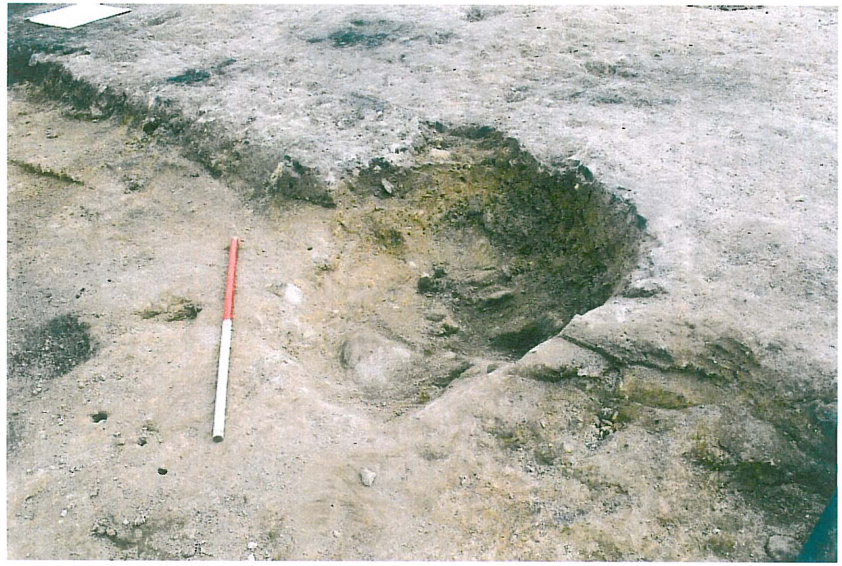


Plate 5: Post-excavation view of F026 from the northwest (05_09_CP04_13)

Plate 6: Mid-excavation view of F028 showing timbers from the southeast (05_09_CP03_22)

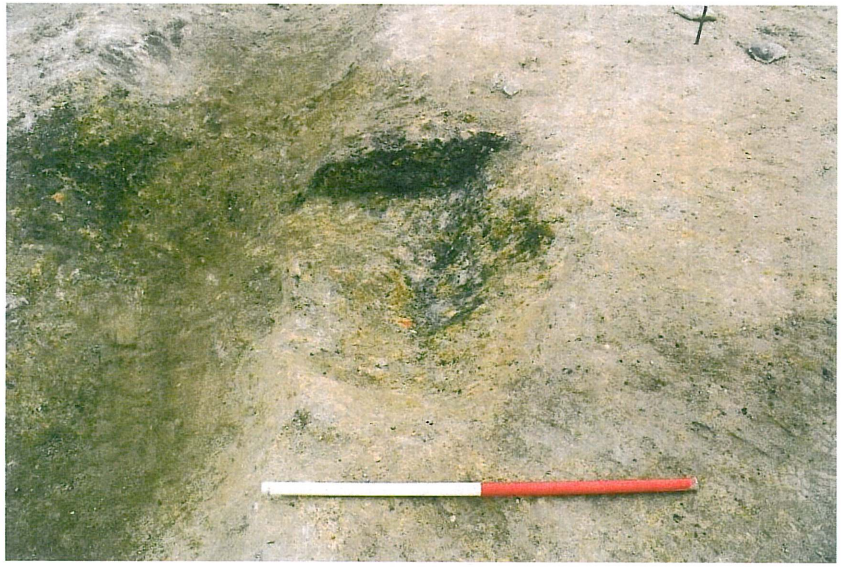


Plate 7: Mid-excavation view of F035 truncated by F009 from the west (05_09_CP03_10)

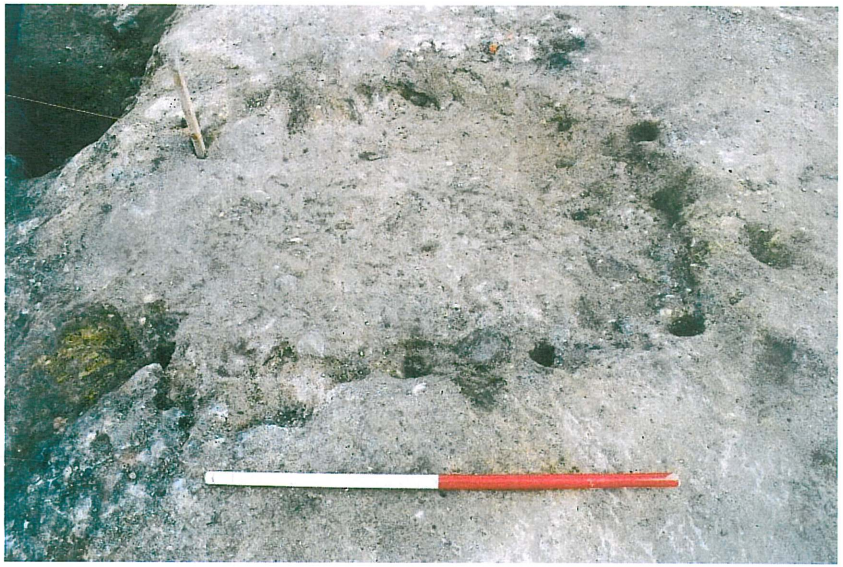


Plate 8: Post-excavation view of F039 with stakeholes from the southwest (05_09_CP03_01)

Plate 9: Chert Arrowhead (05_09_Artefact photos_Shanboe 1_E2172:3:1_002)