



ARCHAEOLOGICAL CONSULTANCY SERVICES LTD.

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

> > Contract 1 Gortnaclea – Oldtown Phase 2 - Excavation

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

> Ministerial Directions No. A015/104 E2213 John Lynch Report by Lynch with Kane

> > August 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 1 |
| Site Name | Addergoole 2 |
| Townland | Addergoole, Co. Laois |
| Nat. Grid Ref. | 233752, 175571 |
| OS Map Ref. | OS 6 inch sheet 28 |
| | |
| Chainage | 13320-13400 |
| Ministerial Direction No. | A015/104 |
| Record No. | E2213 |
| Archaeologist | John Lynch |
| Senior Archaeologist | Deirdre Murphy |
| Report Type | Final |
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| Report by | Lynch with Kane |
| | |
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The excavation was carried out in accordance with the Directions of the Minister for the Environment, Heritage and Local Government (DOEHLG), in consultation with the National Museum of Ireland (NMI) issued under Section 14 of the National Monuments Acts 1930–2004.

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NON TECHNICAL SUMMARY

The proposed M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme consists of approximately 41km of motorway and 11km of single dual carriageway commencing to the southwest of the existing Portlaoise Bypass and running in a southern direction tying into the existing N8 at Oldtown. A portion of the scheme runs to the west tying into the existing N7 near Borris-in-Ossory. The Archaeological Works contract is subdivided into three separate contracts. The following report describes the results of archaeological excavation along one section of the planned M8 Portlaoise to Cullahill Motorway Scheme, at Addergoole, County Laois, Contract 1.

Contract 1 extends from the townland of Gortnaclea to Oldtown and consists of approximately 14km of motorway, which extends from Aghaboe to south of Cullahill through the townlands from Gortnaclea to Oldtown. The site was identified during archaeological testing (A015/023) carried out by Ed Danaher of Archaeological Consultancy Services Ltd between March and April 2005. Five trenches were excavated within this field (Field 47, Plot 313) and a number of potential archaeological features were identified. The site was designated Addergoole 2.

Archaeological resolution of Addergoole 2 was carried out between 11th April and 9th June 2006 by John Lynch of Archaeological Consultancy Services Ltd. For recording purposes, the site was designated the scheme no A015/104 and record no E2213. Topsoil stripping on 10th October revealed several burnt mound spreads, two troughs, three paleochannels and some modern features. No artefacts were recovered.

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1. INTRODUCTION

1.1 Site Location

This report details the results of the archaeological excavation of a site on the M7 Portlaoise – Castletown / M8 Portlaoise-Cullahill Motorway Scheme at Addergoole 2, Contract 1, County Laois (Ordnance Survey six-inch sheet 28; National Grid Co-ordinates 233752, 175571; Figures 1–7). The site at Addergoole 2 was situated southwest of Cullahill village and was located c.1.2km south of Cannonswood Cross and c.2km northwest of Cullahill. It was located between Chainage 12100-13300 of the proposed scheme, in the townland of Addergoole and within the Parish of Aghmacart.

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-three 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 2008 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 John Lynch. The site was identified during archaeological testing (A015/023) carried out by Ed Danaher of Archaeological Consultancy Services Ltd between March and April 2005. Five trenches were excavated within this field (Field 47, Plot 313) and a number of potential archaeological features were identified. The site was designated Addergoole 2.

1.4 Date and Duration of Excavation Works

Topsoil stripping occurred on 10th October 2006. Excavation was carried out between 11th April and 9th June 2006.

1.5 Size and Composition of the Excavation Team

The excavation team was composed of:

One director Two supervisors Six archaeological assistants

2. RECEIVING ENVIRONMENT

2.1 Detailed Overview of the receiving environment (Information provided by Amy McQuillan on behalf of John Lynch)

2.1.1 Topographic

The *fulachta fiadh* or burnt mounds excavated at Addergoole and Aghmacart were clustered on the eastern and western banks of a stream c.4.5km to the west of Cullahill village. The stream appears to be a tributary of the River Erkina. Aghmacart 1 & 2 both occurred on the western side of this stream while Addergoole 1 & 2 occurred on the eastern side. The River Erkina flows to the north of Addergoole and Aghmacart in an east-west direction. The tributary breaks from the river and flows in a north-south direction between the sites before it forks to the south of these sites, tapering out to the west and joining the River Goul to the east. The sites were located in low-lying land. The River Goul is located c. 1km to the east of this cluster of *fulachta fiadh*. There is a hill to

the south-southeast near Mayne-bog Bridge and higher ground to the southwest of Addergoole. Addergoole is located on the eastern edge of an area of carboniferous limestone, which covers most of southwest Laois. To the east of this begins the southern extent of the Cullahill Limestone area (Feehan 1983, 28). Addergoole is located in an area of grey-brown podzolics of the Patrickswell series. There is a small area of gleys (Mylerstown imperfectly drained phase) in the eastern area of the townland although Addergoole 1-2 appear to be located in the area of podzolics (Conry 1987- map 1). The Patrickswell series, along with the Stradbally series, form the most important tillage soils in Co. Laois (Conry 1987, 35). They are excellent tillage and grassland soils and are capable of yielding farm, fruit and vegetable crops. These soils usually cover landscapes with hills, knolls and often occurrences of rock outcrop (Feehan 1983, 91). The imperfectly drained podzolic gleys located to the east of the townland have a wide use range although there are some limitations to its use in unfavourable seasons (Conry 1987, 43). There are dispersed pockets of Banagher series peat soil in the area around Addergoole. These soils have a variable use range but can be improved substantially where there is sufficient drainage. If the soils cannot be drained sufficiently, they will only be useful for rough summer grazing and forestry (Conry 1987, 59-60).

2.1.2 Archaeological

There is, as yet, no definite recorded Mesolithic activity in Co. Laois, although some possible Neolithic activity was detected prior to the relevant project. A total of eight megalithic tombs have been recorded so far in Co. Laois (Sweetman et al 1995). There is a possible cairn at Aghaboe (Sweetman et al 1995, 7) although this may actually be a leacht where O'Hanlon and O'Leary (1907, vol I, 159) state that locals lay St. Canice's body here prior to internment. Two sites excavated on the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway scheme have been provisionally dated to the Neolithic based on artefactual evidence, Derrinsallagh 3 and Derryvorrigan 2. If dated accurately to the Neolithic, they will represent the only excavated Neolithic sites in Co. Laois and the structural evidence at Derryvorrigan 2 may represent the only excavated Neolithic house sites in the county. There is no known Neolithic activity in the vicinity of Addergoole. Nineteen *fulacht fiadh* or burnt mound sites (including one possible site) were noted in Co. Laois (Sweetman et al 1995, 12-3). A brief examination of the online excavation bulletin (www.excavations.ie) revealed a further six examples excavated in Co. Laois before 2002. Excavations along the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway scheme have revealed a minimum number of 40 sites that have been classified as *fulachta fiadh*. There is little direct evidence for Bronze Age settlement in the townlands surrounding Addergoole. Although the presence of *fulachta fiadh* can often be used as an indicator of settlement patterns in an area, they do not represent the actual settlement sites of Bronze Age

people. Bronze Age structures were since excavated during the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway scheme at: Cuffsborough 4; Coolfin 1, Killeany 1 & 2 and at Clonadacasey 2. Other more ephemeral evidence was occupation was uncovered at Cuffsborough 2 and Lismore 2.

There is evidence of funerary and ceremonial activity with a recorded possible megalithic tomb and a crouched inhumation cist burial with a food vessel near the settlement complex excavated at Cuffsborough during the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway scheme (Sweetman et al 1995, 1, 5). Rivers and lakes provided an important vista for ceremonial activity in the Bronze Age. Addergoole is located near the River Goul, which would have been a significant landscape feature in the Bronze Age, in terms of transport, deposition and a water source. A socketed bronze knife and an iron spearhead were found in the River Gully (provenance unknown, see Environmental Impact Statement, vol 3b, P. 127-128). It is unknown if these were found together or exactly where they came from and although the iron spearhead does not date to the Bronze Age, there is a possible tradition here of depositing artefacts in rivers and lakes. Spearheads were found in the River Nore and also in the River Erkina in Co Laois. Iron Age excavations at Ballydavis, Co. Laois (Keeley 1999) revealed an extensive Iron Age metalworking site in association with ring-ditches and funerary activity. Barrows, although many date to the Bronze Age, were often used as funerary monuments in the Iron Age. Twenty-four sites were recorded in the Archaeology Inventory of Co. Laois as barrows (Sweetman et al 1995, 7-10) and a further four ring-ditches were excavated by Keeley (1999) in Ballydavis, Co. Laois, which revealed an Iron Age date.

The ecclesiastical remains at the Priory of Aghmacart now consist of a restored Protestant Church, a bell tower, church ruins and the fragments of a complex of other buildings (Kennedy 2003, 15). A monastery is said to have been founded here in 550 AD by St Tigernach but there are no remains visible today. In 1156 or 1157, Aghmacart was burned during the course of a raid on Ossory by Muircheartach macNeill Ua Lochlainn. A priory for the Canons Regular of the Order of St. Augustine was established here for the Blessed Mary in 1168 (Kennedy 2003, 15). This became the burial place of the MacGillapatricks, who were later known as the Fitzpatrick's (Kennedy 2003, 15). A few hundred meters of to the east of the priory the massive tower of the Fitzpatrick's castle (Inventory no. 938) can be seen (O'Hanlon and O'Leary 1907, 176). Aghmacart was given the status of the parish of Ossory diocese, administered by the Augustinian canons. It was suppressed in 1540 and the parish lands, mainly Aghmacart and Cannonswood, were leased by the crown to the Fitzpatrick's. By 1601, they were the property of Florence Fitzpatrick, Lord of Upper Ossory and the church fell into ruin until the 18th century when it was remodelled and used as a parish church for the Church of Ireland (Kennedy 2003, 16- appendix

1). A nunnery is said to have been located in 'Kiln Field' beside the road to Aghmacart. The foundations of the Nunnery are no longer visible although the tradition in the area remains. This land and other surrounding areas were given to the Nunnery of Kilkilliheen (Ferrybank) by David Fitz Milo, Baron of Overke around 1240 AD. In this grant the name appears as Gortedro-Godelli. In 1540 the Abbess of Kilkilliheen surrendered lands in 'Adrygowle'. In 1557 the possession of Kilkilliheen Nunnery was handed over to the Corporation of Waterford (Carrigan 1905, vol II, 234- appendix 1).

Cullahill Castle is located to the southeast of Addergoole. Cullh-achill appears in Keating's pedigree of the Lords of Upper Ossory, where Finghin MacGillapatrick is entered as 'Finghin na Cul-choille' or Finghin of Cullahill. This was the principal residence and stronghold of the Mac Gillapatricks of Upper Ossory. It had a massive keep, built on solid rock (Carrigan 1905, 230). The date of the erection of the castle was probably sometime around 1425. The castle is said to have been cannonaded by the Cromwellians in the middle of the 17th century. In 1517 the Kilkenny men took the castle of 'Coolkill in Ossory' by force and took with them one of its gates that they would use as a trophy of their victory (Carrigan 1905, 232). According to the Down Survey Books Cullahill Castle was 'out of repair', ruined and uninhabited by 1657. The castle chapel, or church, stands in ruins about 100 yards to the west of the castle. It was the private chapel of the catholic Lord of Upper Ossory (Carrigan 1905, 233-appendix 1).

2.1.3 Historic

The famous 6th century foundation of St. Canice at Aghaboe is located to the north of Addergoole, 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.

From the Anglo-Norman period on, Domhnall MacGillapatrick was the King of central Ossory, with Richard de Clare (Strongbow) as his overlord. The family, as kings of Ossory, controlled much of the land in Laois and Kilkenny. They remained in power until the early 17th century after the English conquest under Elizabeth I. 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 Addergoole 2 will address the following topics:

- (i) The construction date or date of initial site occupation/use
- (ii) The absolute/ relative chronology of site use in terms of periods, levels, phases, sequences and events.
- (iii) The extent of the archaeological site/activity.
- (iv) The location and distribution of known cotemporary sites in the local, regional and national (and international, if appropriate) context.
- (v) 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.

- (vi) The nature and composition of the archaeological finds, features, layers and deposits on site.
- (vii) The phases of activity on site.
- (viii) What cultural group/unit would have occupied the site.
- (ix) What their material culture would have been
- (x) Why the site location would have been chosen
- (xi) Are there any morphologically similar sites used for similar purposes.
- (xii) The function of the site and its likely interrelationships with the contemporary social, economic, cultural and natural environment.

4. EXCAVATION RESULTS

4.1 Excavation Methodology

Excavation was carried out between 11th April and 9th June 2006 under ministerial direction number A015/104. Topsoil (F001) stripping on this site was carried out by means of a twenty tonne mechanical excavator equipped with a grading bucket. Spoil was managed by a dumper and was stored on archaeologically sterile areas within the limits of the site. The recording techniques employed were based on a recording system that best suits a rural environment. All potential archaeological features exposed were cleaned, recorded (by plan, photographs, levels, feature sheets etc.) and excavated accordingly by hand using the single context method. Each feature was assigned a context number. 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. E2213:3:1 represents find number 1 within feature number 3 in Addergoole 2, which was excavated under record number E2213. 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 Burnt mound spread
- F004 Burnt mound spread

- F005 Burnt mound spread
- **F006** Fill of F025
- F007 Burnt mound spread
- F008 Cut of paleochannel filled with F029, F019, F027, F009, F010
- F009 Fourth fill of F008
- F010 Upper/Fifth fill of F008
- F011 Cut and fill of paleochannel
- F012 Cut and fill of furrow
- F013 Cut and fill of furrow
- F014 Cut and fill of furrow
- F015 Cut and fill of furrow
- F016 Large limestone deposit
- F017 Large limestone deposit
- F018 Cut and fill of stone-lined culvert/drain
- F019 Secondary fill of F008
- F020 Fill of F024
- F021 Cut of trough filled with F023, F022, F028
- F022 Secondary/Upper fill of F021
- F023 Lower/Primary fill of F021
- F024 Cut of pit filled with F020, F026
- F025 Cut of trough filled with F006
- F026 Cow skeleton/Fill of F024
- F027 Tertiary fill of F008
- F028 Tertiary fill of F021
- F029 Lower/Primary fill of F008
- F030 Collective fill of stakeholes F049
- F031 Deposit east of F021
- F032 Burnt mound on west bank of F036, north of F033
- F033 Burnt mound spread on west bank of F036, south of F032
- **F034** Secondary fill of F045
- F035 Burnt mound spread on the eastern bank of F036
- **F036** Cut of paleochannel filled with F043, F037, F040, F038, F039, F041, (F046, F047) (F035, F033, F032)
- **F037** Secondary/Upper fill of F036
- F038 Organic fill of F036
- F039 Organic fill of F036
- F040 Organic fill of F036

- F041 Organic fill of F036
- **F042** Cut and fill of furrow
- F043 Lower/Primary fill of F036
- F044 Upper/Tertiary fill of F045
- F045 Cut of trough filled with F048, F034, F044
- F046 Charcoal deposit/Fill of F036
- F047 Deposit above F046
- F048 Lower/Primary fill of F045
- F049 Cut of stakeholes filled with F030
- F050 Collective fill of stakeholes F051
- F051 Cut of stakeholes filled with F050

4.2.2 Stratigraphic Matrix

Natural Deposits

| F002 | Natural subsoil: Consisted of compact, yellow, sand which blended into grey-brown, |
|------|---|
| | sandy clay closer to paleochannel F008. The site lay beside a stream at the base of |
| | the eastern valley slope. |
| F001 | Topsoil: Consisted of brown, sandy clay. Measured 0.30m in depth. One iron object |
| | (possibly horse shoe) recorded (E2213:001:1). |

Trench 1 (See Figs. 7 & 8, Plates 1 & 2)

Paleochannel 1 (See Figs. 7, 8 & 11, Plate 4)

| F008 | Cut of large linear paleochannel. Orientated north-south, parallel to the modern river |
|------|--|
| | course. Measured 25.80m x 9.90m x 1m. Had a gradual break of slope, concave |
| | sides, and a gradual break of slope leading to a flat base. Filled with F029, F019, |
| | F027, F009, F010. Some of F007 subsided into F008. Located west in the Trench 1. |
| | Above F002, below F029. |
| F029 | Lower/Primary fill of F008, with coarse, orange-white, silty sand (largest deposit |
| | within F008). Occasional natural wood included. Measured 13.30m x 5.57m (length |
| | x width). No artefacts recorded. One timber sample taken (#33). Located mainly on |
| | the eastern side of F008. Above F008, below F019. |
| F019 | Secondary fill of F008, with fine, grey, silty sand. No other inclusions noted. |
| | Measured 25.80m x 2m x 0.10m. No artefacts or samples taken. Above F029, below |
| | F027. |
| F027 | Tertiary fill of F008, with loose, brown, clayey sand. Occasional pieces of burnt |

| | wood and red deer bone included. Measured 7.53m x 1.66m (length x width). No |
|------|--|
| | artefacts recorded. One soil, bone and wood sample taken (#11, 12 & 34). Located |
| | mainly on the eastern edge of F008. Above F019, below F009 (F007). |
| F009 | Alluvial deposit: Fourth fill of F008, with soft, white, silty sand. No other inclusions |
| | noted. Measured 25.80m x 7.64m x 0.10m. No artefacts or samples taken. Located |
| | mainly on the eastern slope of F008. Above F027 (F007), below F010. |
| F010 | Alluvial deposit: Upper/Fifth fill of F008, with firm, orange-brown, peat. No other |
| | inclusions noted. Measured 18.75m x 9.90m x 0.40m. No artefacts recorded. One |
| | soil sample taken (#3). Located mainly on the eastern edge of F008. Above F009, |
| | below F016, F017. |

Paleochannel 2 (See Figs. 7 & 8)

| Deposit of soft, white, silty sand that filled a shallow paleochannel. No other |
|---|
| inclusions noted. Similar deposit to F009 that ran down the hill toward F008. |
| Orientated northeast-southwest. Measured 19.25m x 2.25m (length x width). No |
| artefacts or samples taken. Located to the east in Trench 1. Truncated by F013, |
| F014, F015. Above F002, below F013, F014, F015. |
| |

Burnt mound activity

Trough 1 (See Figs. 7, 8, 9 & 11, Plates 3, 4 & 5)

| F021 | Cut of sub-rectangular trough, with rounded corners. Orientated east-west. Measured |
|--------------|---|
| | 2m x 1.30m x 0.85m. Had a sharp break of slope, sloping-slightly convex sides, and |
| | a sharp break of slope leading to a flat base. Its western edge (which lay within |
| | F008) was formed by deposit F028. Filled with F023, F022, F028. Associated with |
| | F003, F004, F005, F007. Truncated edge of F008, lay beneath its upper fills (F009). |
| | Located within Trench 1, to the west of F049 and F051. Above F002, below F023. |
| F023 | Lower/Primary fill of F021, with loose, black, charcoal-rich sandy clay. Frequent |
| | heat shattered limestone and charcoal included. Measured 2m x 1.30m x 0.08m. No |
| | |
| | artefacts recorded. Three soil samples taken (#2). Above F021, below F022. |
| F022 | artefacts recorded. Three soil samples taken (#2). Above F021, below F022.Alluvial deposit: Upper/Secondary fill of F021, with firm, grey-brown, clay |
| F022 | artefacts recorded. Three soil samples taken (#2). Above F021, below F022. Alluvial deposit: Upper/Secondary fill of F021, with firm, grey-brown, clay (deposited by F008). Occasional sand included. Measured 1.50m x 0.35m (width x |
| F022 | artefacts recorded. Three soil samples taken (#2). Above F021, below F022. Alluvial deposit: Upper/Secondary fill of F021, with firm, grey-brown, clay (deposited by F008). Occasional sand included. Measured 1.50m x 0.35m (width x depth). No artefacts recorded. One soil sample taken (#4). Above F023, below F009, |
| F022 | artefacts recorded. Three soil samples taken (#2). Above F021, below F022. Alluvial deposit: Upper/Secondary fill of F021, with firm, grey-brown, clay (deposited by F008). Occasional sand included. Measured 1.50m x 0.35m (width x depth). No artefacts recorded. One soil sample taken (#4). Above F023, below F009, F010 (F028). |
| F022 F028 | artefacts recorded. Three soil samples taken (#2). Above F021, below F022. Alluvial deposit: Upper/Secondary fill of F021, with firm, grey-brown, clay (deposited by F008). Occasional sand included. Measured 1.50m x 0.35m (width x depth). No artefacts recorded. One soil sample taken (#4). Above F023, below F009, F010 (F028). Deposit of mottled grey-yellow, sandy clay that formed the western edge of F021. |
| F022 | artefacts recorded. Three soil samples taken (#2). Above F021, below F022. Alluvial deposit: Upper/Secondary fill of F021, with firm, grey-brown, clay (deposited by F008). Occasional sand included. Measured 1.50m x 0.35m (width x depth). No artefacts recorded. One soil sample taken (#4). Above F023, below F009, F010 (F028). Deposit of mottled grey-yellow, sandy clay that formed the western edge of F021. Measured 1.90m x 1.30m x 0.30m. No artefacts or samples taken. Above F022, |

Elongated oval structure associated with F021

Stakehole series 1 (See Figs. 8 & 9, Plates 7 & 8)

| F049 | Series of stakeholes located to the east of F021. Mainly circular in plan, each had a |
|------|---|
| | very sharp break of slope, vertical sides and a gradual break of slope leading to a |
| | tapered-rounded-pointed base. Filled with F030. Adjacent to F051. Above F002, |
| | below F030. |
| F030 | Collective fill of F049, with soft, black, silty sand. Occasional heat shattered stones |
| | included (fulacht fiadh/burnt mound type fill). No artefacts recorded. Three soil |
| | samples taken (#15, 21-22). Above F049, below F004. |

Stakehole series 2 (See Figs. 8 & 9, Plates 7 & 8)

| F051 | Series of stakeholes located to the east of F021. Mainly circular in plan, each had a |
|------|--|
| | sharp break of slope, slightly concave sides and a gradual-sharp break of slope leading |
| | to a mainly rounded base. Some had flat or pointed bases. Filled with F050. Adjacent to |
| | F049. Above F002, below F050. |
| F050 | Collective fill of F051, with soft, grey-brown, fine sand. No other inclusions noted. No |
| | artefacts or samples taken. Above F051, below F004. |

Trough 2 (See Figs. 7, 8 & 11, Plate 6)

| F025 | Cut of trough consisting of 2 bowl-shaped depressions; taken together measured 4.51m |
|------|---|
| | x 2.32m (length x width). Northern depression: circular, shallow and 1.54m in diameter. |
| | Southern depression: sub-circular and measured 2.32m x 2.10m x 0.30m. A shallow |
| | depression of 0.66m in length lay between the depressions and may have connected |
| | them. Filled with F006. Located northeast of F021 in Trench 1. Above F002, below |
| | F006. |
| F006 | Main fill of F025, with firm, black, charcoal-rich material. Frequent heat shattered |
| | limestone and sandstone included. Measured 4.51m x 2.32m x 0.30m. No artefacts |
| | recorded. One soil sample taken (#6). Above F025, below F001. |
| 1 | |

Burnt mound spread 1 (See Fig. 8)

| F003 | Burnt mound deposit consisting of loose-firm, brown-black, charcoal-rich material. |
|------|--|
| | Frequent heat shattered limestone and sandstone included. Measured 2.50m x 2.25m |
| | x 0.08m. Located to the east of F008 in Trench 1. No artefacts recorded. One soil |
| | sample taken (#7). Associated with F021. Above F002, below F001. |

Burnt mound spread 2 (See Fig. 8)

| F004 | Burnt mound deposit consisting of firm, brown-black, charcoal-rich material. |
|------|--|
| | Frequent heat shattered stones included. Measured 1.50m x 1m x 0.12m. Located to |
| | the east of trough F021, in Trench 1 and above F049 and F051. No artefacts |
| | recorded. One soil sample taken (#8). Associated with F021. Above F030, F050, |
| | below F001. |

Burnt mound spread 3 (See Fig. 8)

| F005 | Burnt mound deposit consisting of loose, brown-black, charcoal-rich material. Frequent |
|------|--|
| | heat shattered limestone and sandstone included. Measured 4.50m x 2m x 0.15m. |
| | Truncated by F014 and F015. Located to the southwest of F025, in Trench 1. No |
| | artefacts recorded. One soil sample taken (#9). Associated with F021. Above F002, |
| | below F014, F015. |

Burnt mound deposit 4 (See Figs. 7 & 8)

| F007 | Burnt mound deposit that subsided into F008. Consisted of black, heat shattered |
|------|---|
| | stones and charcoal. Measured 8.50m x 2m x 0.05m. No artefacts recorded. One soil |
| | and charcoal sample taken (#13). Associated with F021, located west of it. Above |
| | F028, F027, below F009. |
| | |

Deposit east of F021

| F031 | Deposit of dark grey, silty clay. No other inclusions noted. Measurements not |
|------|---|
| | recorded. No artefacts or samples taken. Above F002, below F001. |

Trench 2 (See Figs. 7 & 10, Plate 10)

Paleochannel 3 (See Figs. 7, 10 & 12, Plate 15)

| F036 | Cut of linear paleochannel. Orientated north-south. Measured 21m x 8m x 0.60m. |
|------|--|
| | Had a sharp break of slope, irregular-concave sides and an irregular-flat base. Filled |
| | with F043, F037, F040, F038, F039, F041 (F046, F047) (F035, F033, F032). See |
| | below for the latter deposits. Located in Trench 2. F035 returned a date of Cal BC |
| | 2480-2280. F037 returned a date of Cal AD 1660-1890. Above F002, below F043. |
| F043 | Lower/Primary fill of F036, with soft-coarse, white, sandy silt. No other inclusions |
| | noted. Measured 12m x 5.80m x 0.40m. No artefacts recorded. One soil sample |
| | (#24). Above F036, below F037 (F035). |
| F037 | Secondary/Upper fill of F036, with soft, grey, sand. Pig bones included. Measured |

| | 5.50m x 3m x 0.13m. No artefacts recorded. Two bone and one soil sample taken |
|------|--|
| | (#23, 27, 30). F037 returned a date of Cal AD 1660-1890. Above F043, below F033, |
| | F032. |
| F040 | Alluvial deposit: Organic fill of F036, with firm, brown, organic clay. It contained |
| | deer bone. Measured 6.35m x 4m x 0.09m. No artefacts recorded. Two bone samples |
| | taken (#31, 32). Above F032, below F038. |
| F038 | Alluvial deposit: Organic fill of F036, with loose, white, sand. No other inclusions |
| | noted. Measured 15.95m x 4.95m x 0.60m. No artefacts recorded. One soil sample |
| | taken (#25). Above F040, F035, below F039, F041. |
| F039 | Alluvial deposit: Organic fill of F036, with hard, brown, sandy clay. No other |
| | inclusions noted. Measured 12.60m x 2.40m x 0.35m. No artefacts recorded. One |
| | soil sample taken (#28). Above F038 (F033), below F001. |
| F041 | Alluvial deposit: Organic fill of F036, with grey-brown, clayey silt. Occasional |
| | charcoal included. Measured 5.10m x 2m x 0.30m. No artefacts or samples taken. |
| | Located to the west of F036. Above F038, F035, below F001. |

Burnt mound activity

Trough 3 (See Figs. 7, 10 & 11, Plate 11)

| F045 | Cut of oval trough. Orientated northeast-southwest. Measured 1.02m x 0.99m x |
|------|---|
| | 0.28m. Had a sharp break of slope, vertical sides, and a sharp break of slope leading |
| | to a flat base. Filled with F048, F034, F044. Located to the west in Trench 2. Above |
| | F002, below F048. |
| F048 | Lower/Primary fill of F045, with soft, light grey-orange, silty sand. Occasional |
| | charcoal included. Measured 0.89m x 0.12m x 0.25m. No artefacts or samples taken. |
| | Above F045, below F034. |
| F034 | Secondary fill of F045, with compact, brown, charcoal-rich, sandy clay. Frequent |
| | small heat shattered stones included. Measured 2.50m x 1m x 0.28m. No artefacts |
| | recorded. One soil sample taken (#19). Above F048, below F044. |
| F044 | Upper/Tertiary fill of F045, with soft, brown, silty sand. Occasional stones and |
| | charcoal included. Measured 0.99m x 0.50m x 0.23m. No artefacts or samples taken. |
| | Above F048, below F044. |

Burnt mound spread 5 (See Figs. 7, 10 & 12, Plate 12)

| F033 | Burnt mound deposit on the western bank of F036. Consisted of a compact, black- |
|------|---|
| | grey, charcoal deposit. Frequent heat shattered limestone and sandstone included. |

Measured 1.95m x 0.80m x 0.15m. No artefacts recorded. One soil sample taken (#17). Possibly associated with F045 as it lay 1.50m to its west. Located south of F032 in Trench 2. Above F037, below F039.

Burnt mound spread 6 (See Figs. 7 & 10, Plate 13)

| F032 | Burnt mound deposit on the western bank of F036. Consisted of a compact, black, |
|------|---|
| | finely comminuted charcoal. Frequent small heat shattered limestone and sandstone |
| | included (mainly limestone, very angular and less than 0.05m in length). Measured |
| | 7.50m x 2.80m x 0.20m. No artefacts recorded. Two soil samples taken (#16). |
| | Located north of F033 in Trench 2. Above F037, below F040 (F047). |

Burnt mound spread 7 (See Figs. 7, 10 & 12, Plates 14 & 15)

| T025 | |
|------|---|
| F035 | Burnt mound deposit on the eastern bank of F036 in Trench 2. Consisted of a |
| | |
| | compact, black charcoal rich deposit. Frequent heat shattered stones included. |
| | |
| | Measured 2.80m x 2.24m x 0.24m. No artefacts recorded. One soil sample taken |
| | |
| | (#18). F035 returned a date of Cal BC 2480-2280. Above F043, below F041 (F038). |
| | |

Charcoal deposit

1

| F046 | Charcoal deposit/Fill of F036, with soft, grey-black, charcoal. Occasional stones |
|------|---|
| | included. Measured 0.98m x 0.54m x 0.08m. No artefacts recorded. One charcoal |
| | sample taken (#20). Located on the western bank of F036. Above F002, below F047. |
| F047 | Deposit of loose, grey, sand lying above F046. Frequent charcoal and small stones |
| | included. Measured 2.60m x 2.50m x 0.20m (within the area of excavation). No |
| | artefacts recorded. One soil sample taken (#29). Lay beneath F032. Above F046, |
| | below F032. |

Modern agricultural features (Trenches 1 & 2)

Pit 1 (See Figs. 7 & 8, Plate 9)

| F024 | Cut of rectangular pit, with square corners. Measured 1.93m x 1.19m x 0.39m. | | | | | | | | |
|------|--|--|--|--|--|--|--|--|--|
| | Contained a cow burial. Had a sharp break of slope, vertical sides and a sharp break | | | | | | | | |
| | of slope leading to a flat base. Truncated F013. Located to the south in Trench 1. | | | | | | | | |
| | Above F013, below F026. | | | | | | | | |
| F026 | Fill of F024/Burial of semi-disarticulated cow skeleton. No artefacts recorded. Two | | | | | | | | |
| | bone and one soil samples taken (#1, 10, 14). Above F024, below F020. | | | | | | | | |
| F020 | Main fill of F024, with mottled white-brown, sandy clay. No other inclusions noted. | | | | | | | | |

Measured 1.93m x 1.19m x 0.39m. No artefacts recorded. One soil sample taken (#5). Above F026, below F001.

Limestone deposits (See Figs. 7 & 8)

| F016 | Large deposit of limestone. Measured 5.50m x 5.30m (length x width: within the | | | | | | | |
|------|---|--|--|--|--|--|--|--|
| | area of excavation). Located to the northwest in Trench 1. Connected to F017 | | | | | | | |
| | through F018. No artefacts or samples taken. Above F010, below F001. | | | | | | | |
| F017 | Large deposit of limestone. Measured 5m x 3.75m (length x width: within the area of | | | | | | | |
| | excavation). Located in the southwest in Trench 1. Connected to F016 through F018. | | | | | | | |
| | No artefacts or samples taken. Above F010, below F001. | | | | | | | |

Culvert/Drain 1 (See Fig. 8)

| F018 | Cut of stone-filled linear culvert/drain. Orientated north-south, between F016 and |
|------|--|
| | F017. Measured 16.50m x 0.05m (length x width). No artefacts or samples taken. |
| | Located in Trench 1. Above F010, below F001. |

Furrow 1 (See Fig. 8)

| F012 | Cut of linear furrow. Orientated northeast-southwest. Measured 2.70m x 1m (length | | | | | | | |
|------|---|--|--|--|--|--|--|--|
| | x width). Filled with loose, brown, sandy clay. No artefacts or samples taken. | | | | | | | |
| | Located in Trench 1. Above F002, below F001. | | | | | | | |

Furrow 2 (See Fig. 8)

| F013 | Cut of linear furrow. Orientated northeast-southwest. Measured 20.5m x 0.75m |
|------|---|
| | (length x width). Filled with loose, white-brown, sandy clay. No artefacts or samples |
| | taken. Located in Trench 1. Truncated F011, F005. Above F011, below F001. |

Furrow 3 (See Fig. 8)

| F014 | Cut of linear furrow. Orientated northeast-southwest. Measured 12.25m x 0.75m |
|------|---|
| | (length x width). Filled with loose, brown sandy clay. No artefacts or samples taken. |
| | Located in Trench 1. Truncated F011, F005. Above F011 (F005), below F001. |

Furrow 4 (See Fig. 8)

| F015 | Cut of linear furrow. Orientated northeast-southwest. Measured 12.5m x 0.75m |
|------|---|
| | (length x width). Filled with loose, brown sandy clay. No artefacts or samples taken. |
| | Located in Trench 1. Truncated F011, F005. Above F011 (F005), below F001. |

Furrow 5 (See Fig. 10)

| F042 | Cut of linear furrow. Orientated northeast-southwest. Measured 12.50m x 0.40m x |
|------|--|
| | 0.08m. No artefacts or samples taken. Located in Trench 2. Truncated F036. Above |
| | F038, below F001. |

4.2.3 Stratigraphic Sequencing

| Site Name: | Addergoole 2 | Record No.: E2213 | | | | | |
|------------|--------------|---|--|--|--|--|--|
| Period | Phase | Composition | | | | | |
| I | 1 | Natural subsoil (post-glacial geological depositions) | | | | | |
| II | 1 | Paleochannels F008, F011 and F036 | | | | | |
| | 1 | Late Neolithic Period/Early Bronze Age: Burnt mound/Fulacht fiadh activity. | | | | | |
| | 2 | Abandonment of site | | | | | |
| IV | 1 | Topsoil formation | | | | | |
| | 2 | Modern Agriculture | | | | | |

This section represents stratigraphic detail, with all periods represented, starting at the earliest.

Period 1

Phase 1 Soil Formation

Addergoole 2 Trench 1 lay at the base of a west facing slope on the eastern side of a tributary of the river Goul that ran from north-south. The natural subsoil F002 consisted of yellow, sand that blended into grey-brown sandy clay nearer paleochannel F008.

Addergoole 2 Trench 2 lay flat 35m to the north of Trench 1 and beside the same stream at the base of the same west facing slope. The natural subsoil F002 consisted of compact, yellow, sand, which blended into grey-brown, sandy clay closer to paleochannel F008. In Trench 2, the skeleton of a young pig was found at least partially embedded in F002. Despite being recorded within F037, an upper fill of F036, this pig skeleton may in fact pre-date the site. The alluvial nature of the deposits makes this difficult to determine with certainty.

Period 2

Phase 1

Paleochannel F008, F011, F036 (See Figs. 7, 8, 10, 11 & 12, Plates 1, 2, 4, 10 & 15)

North-south F008 (25.80m x 9.90m x 1m) was a large paleochannel that ran parallel to the modern stream and was filled with F029, F019, F027, F009, F010 (See Figs. 7, 8 & 11, Plate 4). Located in Trench 1, its western bank lay outside the limit of excavation and may have merged

with the modern stream. Its most substantial fill, F029 consisted of coarse, orange-white, silty sand and lay mainly on the eastern side of the paleochannel. Above this, F019 had fine, grey, silty sand and could also be found on the eastern slope of F008. It ran the full length of F008 within the area of excavation. F027 consisted of loose, brown, clayey sand with occasional pieces of burnt wood and red deer bone (See Appendix 10.4). It also was recorded mainly on the eastern edge of F008. Two alluvial deposits were recorded above the main fills of F008. Both F009 and F010 were laid down following the abandonment of the site and will be discussed further below.

East in Trench 1, a small, shallower paleochannel (F011: 19.25m x 2.25m length x width) was filled with soft, white, silty sand (See Figs. 7 & 8). It appeared to slope down towards the valley northeast-southwest and may have merged with F008 south of the limit of excavation. Its only deposit was very similar to F009, the upper fill of F008, indicating that it was also deposited following abandonment of the site.

Within Trench 2, a large north-south paleochannel (F036: 21m x 8m x 0.60m) was filled with F043, F037, F040, F038, F039, F041 (See Figs. 7, 10 & 12, Plate 15). It was also partly filled with burnt mound deposits F035, F033, F032 and charcoal deposits F046, F047. The basal/primary fill, F043 comprised soft-coarse, white-grey, sandy silt. The coarse, grey, gravel at the base may indicate that it originally held a fast flowing current. This deposit lay beneath F035, the latter of which returned a date of Cal BC 2480-2280 (See Appendix 10.5.1). The second main deposit, F037 lay on the western bank of the paleochannel beneath burnt mound F033. Containing soft, grey, sand, F037 also included pig bones, one of which returned a date of Cal BC 1660 to 1890 (See Appendices 10.4 & 10.5.3). This date must be considered as erroneous as the bone must have originated from an upper deposit of the paleochannel. It does not make stratigraphical sense otherwise. F032, F033, F046, F047, also recorded within F036, may have subsided into the paleochannel following subsequent activities and will be discussed further below. The four other upper deposits within the paleochannel (F038-F041) were alluvial deposits following abandonment of the site, similar to that recorded in F009 and F010.

Period 3

Phase 1 Late Neolithic Period/Early Bronze Age

Burnt mound activity: Troughs F021, F025, F045 (See Figs. 7-11 Plates 1-6, 10-11)

The large trough F021 remains undated but has a very strong similarity to a feature recorded at Cannonswood 2 in the neighbouring townland during the same project, which dated to Cal BC 2030-1870. Burnt mound F035, which was recorded at this site and will be discussed below, was

dated to Cal BC 2480-2280 (See Appendix 10.5.1). Thus for the purposes of this discussion the *fulacht fiadh/*burnt mound activity will be considered as Late Neolithic Period/Early Bronze Age.

To the west in Trench 1, F021 (2m x 1.30m x 0.85m) was a large sub-rectangular trough cut into the eastern bank of paleochannel F008 (See Figs. 7, 8, 9 & 11, Plates 3, 4 & 5). Consisting of sharp breaks of slope, sloping-slightly convex sides and a flat base, it was filled mainly with two deposits F023 and F028 and sealed with F022, F009 and F010. The western edge of F021 (which lay within F008) was formed by deposit F028, which comprised grey-yellow, sandy clay and was up to 0.30m in depth. It may have been up cast material from the cutting of F021, but it appeared to have been used to form the western side of F021. The basal/primary deposit, F023 contained loose, black, charcoal-rich material with frequent inclusions of burnt limestone (See Appendix 10.3). It may have originally merged with burnt mound deposit F007, which lay adjacent to F021. F007 will be discussed further below. Charcoal from F023 was identified as pomoideae and oak (See Appendix 10.2). Each of the sealing deposits including F022 were alluvial deposits which sealed F021 after the trough was abandoned. To the east of this trough, a series of stakeholes forming two groups were recorded (F049/F051). These will be discussed further below.

To the north of F049/F051 and northeast of F021, a trough (F025: $4.51 \text{m} \times 2.32 \text{m}$ length x width) comprising two bowl-shaped depressions was recorded with a single *fulacht fiadh*/burnt mound deposit F006 (See Figs. 7, 8 & 11, Plate 6). The northern depression (1.54m in diameter) was circular and shallow. While the northern feature was not substantial, the larger southern depression (2.32m x 2.10m x 0.30m) was definitely a feature. A shallow depression of 0.66m in length lay between the depressions and may have connected them. F006 consisted of firm, black, charcoal-rich material and heat shattered limestone and sandstone (See Appendix 10.3).

To the west in Trench 2, a small oval trough (F045: 1.02m x 0.99m x 0.28m) was filled with three deposits F048, F034, F044 (See Figs. 7, 10 & 11, Plate 11). Located to the west of paleochannel F036, it had sharp breaks of slope, vertical sides and a flat base. The basal/primary fill, F048 consisted of soft, light grey-orange, silty sand and occasional inclusions of charcoal. F034 had typical *fulacht fiadh*/burnt mound material; compact, brown, charcoal-rich sandy clay and heat shattered stones. The upper fill, F044 had soft, brown, silty sand and occasional inclusions of stone. It sealed F045. As the trough lay only 1.50m from burnt mound deposit F033, it appears that they were associated with one another (See below for further detail on F033).

Stakehole structure F049/F051 (See Figs. 8 & 9, Plates 7 & 8)

A series of stakeholes (F049/F051) which formed a structure lay directly to the east of F021. The structure was clearly associated with the trough. Two different types of fill were noted dividing

the structure into two elements, F049 (the western section) and F051 (the eastern section). F030 was the *fulacht fiadh*/burnt mound deposit which filled F049. It consisted of soft, black, silty sand and occasional inclusions of heat shattered stones. F050, the fill of F051 contained soft, greybrown, fine sand. Both sets of stakeholes were very similar, circular and with very sharp breaks of slope, vertical-irregular sides and bases which were generally gradual and tapered to a rounded point while occasionally flat. No stakeholes were recorded at the eastern end, which was likely to be the entrance to the structure. F049/F051 may have been a small hut adjoining F021, a superstructure to accommodate activities undertaken within F021 or a possible processional avenue or formal entrance into the trough.

Burnt mounds F003, F004, F005, F007, F032, F033 and F035 (See Figs. 7, 8, 10 & 12, Plates 12-15)

Located between paleochannels F008 and F011 in Trench 1, F003 ($2.50m \times 2.25m \times 0.08m$) was a burnt mound deposit, which consisted of charcoal and heat shattered limestone and sandstone (See Appendix 10.3). Situated *c*.3.50m to the south of F021, it appears to be associated with this trough (See Fig. 8). Further north in the same trench, F004 ($1.50m \times 1m \times 0.12m$) consisted of finely comminuted charcoal and heat shattered stones. Lying above stakehole structure F049/F051 (See Fig. 8), it may also have been burnt mound material upcast from trough F021. East of the stakehole structure, F005 ($4.50m \times 2m \times 0.15m$) was the third burnt mound deposit in this group located east of F021 (See Fig. 8). It consisted of charcoal-rich material and heat shattered limestone and sandstone (See Appendix 10.3). Truncated by furrows F014 and F015, it may also have been associated with the large trough. Surrounding much of F021 to the west, a large burnt mound deposit, F007 ($8.50m \times 2m \times 0.05m$) lay above the eastern bank of paleochannel F008 (See Fig. 8). Consisting of black, heat shattered stones and charcoal, it was situated partly below the alluvial deposit F009, a sealing deposit of F008. As it was adjacent to F021, it too was associated with it.

In Trench 2, a large burnt mound deposit (F033: $1.95m \ge 0.80m \ge 0.15m$) was recorded to the west of paleochannel F036 (See Figs. 7, 10 & 12, Plate 12). It contained compact, black-grey, charcoal material with heat shattered limestone and sandstone (See Appendix 10.3). As it was located only 1.50m east of trough F045, it appears to be associated with it. North of F033, a similar burnt mound deposit F032 (7.50m $\ge 2.80m \ge 0.20m$) was noted (See Figs. 7 & 10, Plate 13). Lying above the western bank of F036, it consisted of black, finely comminuted charcoal and small heat shattered limestone and sandstone. The majority of the stones were limestone, very angular and less than 0.05m in length (See Appendix 10.3). On the eastern bank of F036, burnt mound deposit F035 (2.80m $\ge 2.24m \ge 0.24m$) consisted of compact, black, charcoal-rich soil

with frequent inclusions of heat shattered stones (See Figs. 7, 10 & 12, Plates 14 & 15). Charcoal from ash within F035 was dated to Cal BC 2480-2280 (See Appendix 10.5.1).

Two charcoal deposits were noted to the west of F036. F046 (0.98m x 0.54m x 0.08m) contained soft, grey-black, charcoal. Above this, F047 (2.60m x 2.50m x 0.20m) consisted of loose, grey, sand. It lay beneath burnt mound deposit F032 and sealed charcoal deposit F046. F046 is thus likely to be related to burnt mound deposit F032 and may have been an earlier phase buried by alluvial deposit F047.

Phase 2

Abandonment of site: F009, F010, F022, F038, F039, F040, F041 (See Figs. 11 & 12)

Abandonment of the site was visible through various alluvial deposits, which sealed the abovementioned archaeological deposits. Both F009 and F010 sealed the large paleochannel F008 and also trough F021, which was located to its east (See Fig. 8). F009 comprised soft, white, silty sand while F010, which lay above it, contained orange-brown, peat. F009 lay above F007 at the eastern edge of F008. The large trough F021 to the east of F008 was sealed by F009, F010 and F022. The latter deposit consisted of firm, grey-brown, clay. It was deposited by paleochannel F008 and was similar to F009.

Several pieces of natural oak were retrieved from paleochannel F008, the most interesting of which was recorded as Timber 1 (4.20m x 0.40m: length x width). It lay perpendicular to trough F021 in an east-west orientation and had a V–shaped groove on the top which was originally though to be a sluice. However, upon further examination it was considered natural (See Appendix 10.6).

Four alluvial deposits mentioned above were recorded in paleochannel F036. F040 contained firm, brown, organic clay and sealed burnt mound deposit F032 to the north of Trench 2. Deer bone was recovered from this fill (See Appendix 10.4). Above this, F038 had loose, white, sand and sealed burnt mound deposit F035. F039 and F041 were the uppermost fills of F036. F039 contained hard, brown, sandy clay and lay above burnt mound F033. F041 had grey-brown, clay silt with occasional charcoal.

Period 4

Phase 1

Topsoil formation: F001

The topsoil (F001) comprised brown, sandy clay and measured 0.30m in depth. One iron object (possibly horse shoe) recorded (E2213:001:1).

Phase 2 Modern period

Agricultural activity: F024, F016-F017, F012-F015, F042 (See Figs. 7, 8 & 10, Plate 9)

A pit (F024: 1.93m x 1.19m x 0.39m) containing a cow burial F026 was recorded to the south of Trench 1 (See Figs. 7 & 8, Plate 9). Rectangular in plan and with square corners, it comprised sharp breaks of slope, vertical sides and a flat base. F026 was a semi disarticulated cow burial (See Appendix 10.4). The main fill of the pit, F020 contained loose, mottled white-brown, sandy clay. The pit truncated furrow F013, indicating its modern date.

Two large limestone deposits, F016 (5.50m x 5.30m: length x width) and F017 (5m x 3.75m (length x width) were recorded above the alluvial deposit F010 in F008 in Trench 1 (See Fig. 7 & 8). Their purpose was possibly to solidify the marshy ground, as they both lay within the soft paleochannel deposits. Situated 16.50m apart, they were connected by a stone-filled culvert/drain F018 that was oriented north-south (See Fig. 8).

A series of parallel furrows (F012, F013, F014, F015 and F042) oriented northeast-southwest was recorded. Measuring between 0.75-1m in width and an average of 0.08m in depth, they contained mainly brown, sandy clay. F013-F015 truncated F011 and F005 while F042 truncated F036.

4.2.4 Stratigraphic Discussion

The excavations at Addergoole 2 revealed the remains of burnt mound/*fulacht fiadh* activity in two separate trenches, dated to the Late Neolithic Period/Early Bronze Age (See Figs. 7-12, Plates 1-15). A technical description can be found in the matrix and sequencing above. Three paleochannels (F008, F011, F036) were recorded at Addergoole 2. Due to their size and similarity, it is possible that F008 (Trench 1) and F036 (Trench 2) were in fact the same paleochannel. However as Trenches 1 and 2 were situated 35m apart, this is difficult to determine. The topsoil in between the two trenches was not stripped. Paleochannel F011 was quite different from F008 and F036 as it was small and shallow. Its fill was similar to the upper fills of F008 and F036, but quite unlike the lower, coarse, gravel fills.

The same basic sequence of deposits within these paleochannels was noted at three other *fulacht fiadh*/burnt mound sites, which lay in the same valley beside the same stream. These sites include

Addergoole 1, Aghmacart 1 and Aghmacart 2. The general sequence is coarse sand or gravel at the base of the paleochannel, which gradually becomes less sandy and siltier the further up it goes. The final phase is the growth of brown, organic peat.

Three troughs were also noted at Addergoole 2, all of which were different to one another. Within Trench 1, F021 was an unusual trough as it truncated the eastern side of paleochannel F008. F028 was the connecting deposit between these two features. It was an upcast from the cutting of F021 used to form the western side of the trough. The main fill of F021, F023 was very similar to four burnt mound deposits (F003, F004, F005, F007) that surrounded the trough, all of which appear to be related to F021. To the east of F021, a series of stakeholes (F049/F051) indicating a superstructure were noted. The oval or linear structure of stakeholes, F049/F051 measured 4.50m in length and 2m in width. It appeared to have been reconstructed several times and may have had an opening at its eastern end as no postholes were recorded there. With this linear arrangement, the structure may have been a sweat lodge, a processional avenue or formal entrance leading into trough F021. In this case, F021 may have been a bath. Bathing may have had spiritual as well as practical benefits. Access to baths and sweathouses may have been dictated by social ranking and may even have been associated with rites of passage (See Eogan 2007).

Northeast of F021, F025 appeared to be a pair of bowl-shaped troughs or pits. The southern pit was more substantial and thus identified as a trough. At a depth of 0.30m, the northerly depression may have been a *fulacht* pit. Quite shallow, these pits have a more specific function to the average trough, including pot boiling or dry roasting. Within Trench 2, F045 was a small trough with sharp breaks of slope, vertical sides and a flat base. It contained very little burnt mound material, though the nearby mound F033 would indicate more substantial use. All of the troughs appeared to contain limestone. Limestone is not a commonly used stone in *fulachta fiadh*/burnt mounds as it produces calcium hydroxide (See Appendix 10.3). Calcium hydroxide can be used in the tanning industry for neutralizing excess acid. However, calcium hydroxide, or slakelime, would be hazardous to health if mixed with food. Calcium hydroxide is also corrosive to the skin. In its dry form, calcium hydroxide is a white powder. See section 5 for further discussion on this.

It was not clear which troughs were associated with which burnt mounds. However, it can be surmised that F033 was associated with trough F045. Burnt mound deposit F032 however lay south of the northern baulk of Trench 2 with no trough recorded nearby. Though the mound did not appear to extend into the northern baulk, a trough may have been situated to the north. Likewise, burnt mound deposit F035 extended into the eastern baulk. No trough was located though it may have been sited to the east beyond the limit of excavation. As ash tree charcoal

from this deposit returned a date of Cal BC 2480-2280, the site has been placed in the Late Neolithic Period/Early Bronze Age (See Appendix 10.5.1).

No hearths were located and no trough appeared to be sealed with clay.

4.2.5 Stratigraphic Conclusion

The different shapes, sizes and profiles of the three troughs do not necessarily indicate a similar purpose for the features. They do however have the use of limestone in common. Trough F021 was actually cut into the side of paleochannel F008. Some of the upcast clay was then used to form the sides of the trough. A stakehole structure to the east of the trough may have served as a processional avenue/formal entrance or less likely as a sweat lodge. It is not clear however that bathing is possible in limestone. It may have been dangerous due to the calcium hydroxide produced. Thus the structure may have had a practical purpose. This structure has a striking similarity to a feature found in the neighbouring townland of Cannonswood during the same M7-M8 project, which was dated to Cal BC 2030-1870.

To the north of F021, F025 appeared to be a pair of bowl-shaped pits. They may possibly have been *fulacht* pits which used dry hot stones for dry roasting or pot boiling with water. Later they were covered by a mound. F025 was similar to a very large trough in the neighbouring field at Addergoole 1, which also had two compartments. However, the difference in size and depth between the features makes comparison difficult. As F045 was a small trough, it may have had an industrial use.

There was a marked scarcity of associated pits or structures and it is possible that these may have been removed by agricultural activity over time. Burnt mounds F003, F004, F005 and F033 only survived in patches. It is likely that south of F025 and west of F021, a burnt mound was ploughed out. F033 was certainly truncated by ploughing and survived mainly in paleochannel F036 only. The mounds F007, F032 and F035 survived intact within the paleochannels which were far too deep to be affected by ploughing. However, it may be added that very little other archaeology was found at similar sites along the same stream even where it did not seem that ploughing had removed any features.

4.3 Artefactual Material

| Metal objects | | | | | | | |
|------------------|--------|--------------|---------------|-----------|---------------------------|--|--|
| Report: Context: | Period | Completeness | Artefact type | Condition | Comments (decoration etc) | | |
| Find number | | | | | | | |
| E2213:001:1 | Modern | fragment | Iron object | - | Possibly horse shoe | | |

4.4 Environmental Evidence

4.4.1 Plant Macrofossil Analysis Report

See Appendix 10.1

| Table: Flotation results of General Environmental samples | | | | | | | |
|---|------------------|----------------------------------|-------------------|-------------|--|--|--|
| Site Name | e: Addergoo | ole 2 | Record No.: E2213 | | | | |
| Context number | Sample number | Feature type | Sample vol (g) | Sample type | Analysis results | | |
| F023 | 2 | Fill of <i>fulacht</i> trough | N/A | Env. | N/A | | |
| F006 | 6 | Fill of <i>fulacht</i> trough | 400g | Env. | Charcoal, fat-hen, modern roots and twigs, sow-thistle. | | |
| F032 | 16 | Burnt mound | 2750g | Env. | Charcoal, lime, mollusca shell (terrestrial) modern roots, hazel, fat-hen, sun spurge, fumitory. | | |
| F035 | 18 | Burnt mound | N/A | Env. | N/A | | |
| F030 | 21 | Fill of stakehole | 2g | Env. | Charcoal and modern roots. | | |

4.4.2 Charcoal Samples sent for Analysis

See Appendix 10.2

| Table: Charcoal samples sent for analysis | | | | | | |
|---|-----------|-------------------------------|-------------------|-------------|-------------------|--|
| Site Nam | e: Adderg | oole 2 | Record No.: E2213 | | | |
| Context | Sample | Feature type | Sample vol | Sample type | Analysis results | |
| number | number | reature type | (litres) | Sample type | Anarysis results | |
| F023 | 2 | Fill of <i>fulacht</i> trough | | Charcoal | Pomoideae and oak | |
| F035 | 18 | Burnt mound | | Charcoal | Ash and Hazel. | |

4.4.3 Petrographical Analysis

See Appendix 10.3

| Table: Sto | one Residue | Samples sent for An | alysis | | |
|-------------------------|------------------|---------------------|------------------------|-------------------|---|
| Site Name: Addergoole 2 | | | | Record No.: E2213 | |
| Context number | Sample number | Feature type | Sample vol (litres) | Sample type | Analysis results |
| F003 | 7 | Burnt mound | | Stone Residue | 50:50 coarse quartzite and coarse limestone (decayed) |
| F005 | 9 | Burnt mound | | Stone Residue | 50:50 coarse quartzite and coarse limestone (decayed) |
| F035 | 18 | Burnt mound | | Stone Residue | 50:50 coarse quartzite and coarse limestone (decayed) |
| F032 | 16 | Burnt mound | | Stone Residue | 50:50 coarse quartzite and coarse limestone (decayed) |

4.4.4 Bone Samples sent for Analysis

See Appendix 10.4

| Table: Bone Samples sent for Analysis | | | | | |
|---------------------------------------|--------|-------------------|------------|-------------------|---------------------------|
| Site Name: Addergoole 2 | | | | Record No.: E2213 | |
| Context | Sample | Feature type | Sample vol | Sample type | Analysis results |
| number | number | | (litres) | | |
| F026 | 10 | Cattle burial. | | Bone | Cattle. |
| F027 | 12 | From paleochannel | | Bone | Red deer (Cervus elaphus) |
| F037 | 23 | From paleochannel | | Bone | Pig Ulna. |
| F037 | 30 | From paleochannel | | Bone | Pig Ulna. |

| F040 | 31 | From paleochannel | Bone | Deer. |
|------|----|-------------------|------|-------|
| F040 | 32 | From paleochannel | Bone | Deer. |

4.5 Dating Evidence

See Appendix 10.5

| Table: Charcoal Samples sent for Radiocarbon dating | | | | | | |
|---|------------------|--------------|------------------------|-------------------|------------------|--|
| Site Name: Addergoole 2 | | | | Record No.: E2213 | | |
| Context number | Sample number | Feature type | Sample vol (litres) | Sample type | Analysis results | |
| F037 | | Paleochannel | | Bone | Cal AD 1660-1890 | |
| F035 | 18 | Burnt mound | | Charcoal | Cal BC 2480-2280 | |

5. DISCUSSION (Information provided by Amy McQuillan on behalf of John Lynch)

This section will provide a brief synopsis of what is currently known about burnt mounds (*fulachta fiadh*) in Ireland to date. This will include an analysis of their form, function, dating and distribution.

Form

When identified in the field, burnt mounds survive as grass covered mounds of burnt and broken stone, ash and charcoal. The mounds, as they exist in the field, vary in size from only a few metres in diameter to over 20 metres in diameter. The heights can vary greatly but most seem to range between 1 and 2 metres. The classic burnt mound is horse-shoe shaped in plan, with the two horns of the mound almost completely enclosing a shallow area or depression, but they can also be oval or D-shaped in plan (O' Drisceoil 1991, 3). Although these sites are generally subject to some level of degradation through ploughing and agricultural activity, many have been so badly disturbed by agricultural activity that they have been levelled and are then only discovered through excavation. In these cases they usually survive as spreads of charcoal blackened soil with a large number of heat shattered stones. These most often cover troughs, hearths and pits, but can often exist as a simple burnt spread. In some cases, the burnt spread no longer survives or was never built up at the site and the only remains are troughs or pits containing burnt stone material. The general features excavated at these sites include; burnt spreads; troughs; pits; hearths; wells and sometimes postholes or evidence for a structure. The remains of burnt mounds can differ significantly from site to site, for example some lack troughs or hearths and some are simple burnt spreads with no associated features.

Troughs are usually rectangular, circular or oval in shape and were often lined with wooden planks, stone slabs, wattle, clay or occasionally the remains of a dugout canoe. The average trough tends to measure up to 2m in length, 1m in width and 1m in depth. Hearths or simple bonfires would have been used at these sites to heat the stones before they were lowered into the trough of water. Hearths or fire reddened areas are commonly, although not always, discovered at these sites during excavation. An arrangement of postholes on the site is not uncommon and may represent the remains of huts or shelters (O'Sullivan and Downey 2004, 36).

Distribution

At the macro scale, burnt mounds are known from every county in Ireland and are the most numerous prehistoric site excavated in Ireland. The largest concentration is in Co. Cork, although there are high concentrations in Clare, Kilkenny, Mayo and Waterford, which may be partly due to biases in surveyed areas (O'Sullivan and Downey 2004, 37). Large numbers of
burnt mound sites have also been recorded in England, Scotland and Wales (Hodder 1990; Halliday 1990; Williams 1990). At the micro scale, burnt mounds are usually located in wet, marshy areas adjacent to a water source such as a river or stream. Some of the troughs would have been manually filled with water while others would have filled naturally. Groups of between 2 and 6 burnt mounds have been noted in relatively small areas, all of which would be inter-visible and within a few metres of each other (Ò'Drisceoil 1991, 3). Burnt mounds are also very often located near areas of settlement and have been excavated in the vicinity of many Irish Bronze Age roundhouses such as at Caltragh Co. Sligo; Ballyhenry, Co. Down; Kilmurray, Co. Wicklow; Cloghlucas South, Co. Cork (McDonagh 2005; MacManus 1998; O'Neill 2001; Gowen 1988). This has been noted on the M7-M8 scheme at Cuffsborough, located *c*.2.5km to the south of Cross 1, where a series of Bronze Age houses were excavated at Coolfin 2, 3 and 4. These were located within the vicinity of the roundhouse at Coolfin 1, which was excavated *c*.200m to the south of Cross 1.

Dating

An examination of radiocarbon dates from burnt mounds sites has revealed that the majority of these sites date to the Bronze Age and most of these cluster around 1500 – 500BC (Brindley et al 1989/90; Brindley and Lanting 1990). The earliest sites appear to date from the early 3rd millennium BC while the latest sites date to the Iron Age and later (O' Neill 2000). Generally, although not exclusively, earlier sites have circular troughs, while rectangular troughs are more common from around 2000 BC and can be lined with planks, wicker, logs or flagstones. By the 2nd millennium BC, elongated single piece troughs were also used, which were deliberately carved from dugout canoes (O'Neill 2000, 19).

Function

There is an ongoing debate within Irish archaeology regarding the function and purpose of burnt mounds. It is generally agreed that these sites were used for heating or boiling water. Water from a nearby source would have been used to fill the trough, which may or may not have been lined. Stones were heated on the fire and thrown into the water to heat it. The hot stone cracked after being submersed in cold water, leaving the characteristic heat shattered stones. After use, the stones that could no longer be used were discarded around the trough until a mound of heatshattered stones built up, leaving a gap at one side for access.

Cooking places

One of the foremost arguments regarding the function of burnt mounds is that they were used for boiling meat. This argument has traditionally been based on the association of these sites with historical references to cooking places, which lead to the use of the term '*fulacht fiadh*' (the former name used for a burnt mound) for these sites. This interpretation has been consolidated by experiments investigating the legitimacy of cooking at these sites (see below). O' Drisceoil (1988, 673) noted that the word '*fulacht*' originally meant 'recess' or 'cavity' and became known as meaning 'a pit used for cooking' or 'cooking place'. 'Fiadh' means 'of the deer' or 'of the wild' and 'Fian' means 'of a roving band of hunters or warriors' and occasionally 'of the Fianna or Fionn Mac Cumhail'. The Fianna was a mythical or pseudo historical army of hunters led by Fionn Mac Cumhail (ibid). There are many historical references to cooking places located near water that have been interpreted as burnt mounds (O'Drisceoil 1991, 4). A review of the early medieval documentary sources regarding burnt mounds has indicated that these sources specifically refer to cooking on a spit and that this does not seem to be connected to the burnt mounds excavated today (O'Neill 2003-4).

It has since been realized that most burnt mound sites belong to the Bronze Age and that the historical texts do not refer to these sites. The interpretation of these as cooking sites, however, has continued to be one of the forerunning arguments among scholars (O'Drisceoil 1988; O' Kelly 1954). O'Kelly (1954) conducted experiments at a reconstructed burnt mound site in order to demonstrate that food could indeed be cooked in a trough of water heated with burnt stones. In this experiment 454 litres of water were brought to the boil within 35 minutes. It was discovered that the addition of stones in particular places can keep the water boiling for over two hours, enough to fully cook an edible joint of meat. In these experiments, all of the features on the site and the debris produced from the experiment were fully accounted for. Others have conducted experiments in an attempt to consolidate the cooking theory (Lawless 1990; Allen 1994) and demonstrated that it is fully possible to cook meat in this fashion using all the features commonly found at burnt mound sites.

Baths and saunas

Another prominent argument for the function of these sites has been that they were ancient bathing places (Barfield and Hodder 1987; Barfield 1991). This is also partly based on historical references to bathing at these sites and the lack of settlement evidence and debris found during excavations. It was suggested that they may have been either bathing places or, where evidence for postholes or an enclosure was noted, even saunas using steam from water placed on hot stones (Barfield and Hodder 1987). There have been arguments against this theory also, mainly by O'Drisceoil (1988); based partially on the lack of enclosing features or structural elements at most burnt mound sites and also the general build up of stones around the troughs, which would

rule out the presence of an enclosure/structure for use as a sauna. Some sites have been excavated with what appears to be structural evidence around pits or troughs, possibly indicating the presence of a covering which would allow the possibility that the site was used as a sauna or sweathouse. At Shanboe 1, on the M7-M8, a pit was excavated which was surrounded by a ring of stakeholes and could have functioned as a covering for a sauna or sweathouse. This was located beside a large pit which may have functioned as a plunge pool for use after the sauna (Wiggins forthcoming). A posthole structure was also noted at the nearby site Shanboe 5, and appeared there to have been the focus of burnt mound related activity (Wiggins forthcoming).

Other suggestions

A range of other functions for these sites has been suggested. These include a range of industrial activities relating to the manufacture and treatment of fabrics such as fulling, textile production, dying and laundering (Jeffery 1991). Barfield (1991) offered a series of alternative suggestions including grease rendering and salt production. Monk (2007) suggested that obtaining the by-product of boiling meat, animal fat, may have been an important function of these sites, as fat was used for leather making, for waterproofing woollen garments, preservation of meat, rush candles and soaps. Leather, oxhide and sheepskin clothing would have required animal fats rubbed on them to make them waterproof. There is also a reference in Homer's Illiad to the use of fat to seal cremations (Monk 2007, 22-23). One other recent suggestion is that burnt mounds may have been used to brew beer. This has been supported by experiments where archaeologists proved that a large amount of enjoyable ale could be produced relatively quickly in a reconstructed burnt mound trough (Moore and Quinn 2007). Other suggestions for functions of hot stone technology include boat-building, butter production, brine evaporation, pottery filler, leather working and metallurgy (Barfield and Hodder 1987, 371).

Finds from *fulachta fiadh*/burnt mounds

The finds from these sites are few, generally not indicative of a function and are usually not chronologically distinctive, although occasionally flint, metal objects (including gold dress ornaments and bronze axes) and quernstones are found at burnt mounds (Cherry 1990). There is a general lack of animal bone from sites in Ireland, which can only occasionally be attributed to acidic soils. This fact has been used to discredit the cooking interpretation (Leahy, 2002, 28). It has also been used to support the theory that they were bathing places or saunas (Barfield and Hodder 1987, 376).

Discussion

It appears that each suggestion put forward regarding the function of these sites has an argument to dispute it and that there is no single explanation that fits the archaeological evidence precisely. These sites may be multi-functional activity areas and many of these sites may have had different functions. If the same function could be proposed for every burnt mound site, then we would expect the archaeological evidence from each site to be somewhat uniform. It is quite possible that the sites were used initially for cooking. The fat would be removed from the water and used to preserve the leftover meat, while the left over fat and hot water was used to cleanse people, as animal fat would have been an essential ingredient in soap before the industrial revolution. The site may have intermittently been used for a variety of activities outlined above.

The implications of heating limestone

Fire cracked limestone was discovered at Aghmacart 2 in trough F004, where heat shattered limestone and quartzite were found in the trough and the burnt mound. Limestone may have been unsuitable for use at burnt mound sites if the function of the site was cooking. When limestone is heated and submersed in water it formed a corrosive substance called calcium hydroxide, or slakelime, which would be hazardous to health if mixed with food.

Stone selection and suitability

In Feehan's examination of extant burnt mounds in Counties Laois, Offaly and North Tipperary, he noted that there was a definite preference for the use of sandstone, although fractured limestone was usually present in the mound also (Feehan 1983, 203). The selection of stone was quite important, as many rocks will simply shatter when heated to a high temperature or when they are suddenly quenched, i.e. by immersing in water. Hard sandstones are among the most resilient in this respect, whereas most limestone shatters easily and some limestone will explode dangerously when heated by fire (Feehan 1983, 203). In experiments investigating the effects of heating and cooling of rock types at burnt mound sites Buckley (1990) noted that limestone fractured and became waste after only 6 heating and cooling episodes. Sandstone became waste after 5 episodes. This is little compared to other rock types such as Gabbro (<25 episodes) and Basaltic (20 episodes). This would indicate that burnt mounds where sandstone was in use as the primary stone would have a larger mound of stone debris than another site utilising other, more durable, rock type for the same duration of time. Buckley (1990) noted in his examinations of the rock types commonly used at burnt mound that drift derived material was most commonly used although sedimentary rocks were preferred. He also noted that igneous and some metamorphosed rocks are highly reusable for such a purpose (Buckley 1990).

Another important factor is the convenience of size and shape of the stone. Water worn cobbles and small boulders from streams would have been ideal (Feehan 1983, 203). The nearby River Goul and its tributaries would have provided a source of stone for Cannonswood 2. The local stone sources would have been a strong influencing factor in the location of burnt mounds. The location of these sites next to rivers and streams may have been dictated just as much by the need for suitable stone as the need for water.

As carboniferous limestone forms the underlying bedrock in most of Co. Laois, limestone would have been easily sourced. O'Kelly (1954, 144-5) noted that the absence of burnt mounds in counties Clare, Galway and Limerick was due to the limestone sub-strata, because when limestone is heated and subsequently submersed in water it would produce calcium hydroxide. His reasoning for the paucity of burnt mound in the midland limestone belt was that they existed only where small patches of drift allowed a supply of sedimentary rocks. Although since the publication of O'Kelly's paper in 1954, examples have been found in every county in Ireland, many of which are located in limestone areas (Buckley 1990, 170). So it is clear that burnt mounds were in use in limestone areas, a statement that is supported by the number of sites excavated in Laois on the M7-M8.

Heating limestone and its implications

Once limestone is heated to a certain temperature and then submersed in water, it is capable of produced calcium hydroxide, also known as slake lime or hydrated lime. Calcium hydroxide has characteristic alkaline properties and has for many years in Ireland been used as a soil fertiliser and for the hardening of mortar for building purposes (O'Sullivan and Downey 2004, 21). If limestone was heated and submersed in water at burnt mounds, it may have been capable of producing calcium hydroxide. It seems that such a corrosive mixture would not have been an ideal solution in which to boil food.

While Darina Allen's experiment (1994) demonstrated that food could be safely cooked and consumed when cooked in troughs heated with red hot pieces of limestone and sandstone, an experiment conducted at Turlough, Castlebar, Co. Mayo, demonstrated that limestone was not suitable due to its capability of turning to lime if exposed to prolonged high temperatures and mixed with water. During this experiment, when heated limestone was placed in the trough full of water, a black oily scum formed on the surface of the water, while the water itself turned a milky colour (Lawless 1990). It is unclear why limestone was safely used in the experiment (Lawless 1990, 8). The reaction of the limestone undoubtedly depends on the temperature of the fire and the duration of its exposure to high temperatures. Limestone also has varying chemical and geological components depending on the source, so some limestones would react differently to others. The unreliable and reactive nature of limestone as demonstrated by the Turlough experiment would indicate that this stone was probably not used to cook at burnt mounds in the Bronze Age. Lime is an alkaline substance with a high PH and would undoubtedly be hazardous to health if mixed with food.

Grogan et al (2007, 98) have noted that the occurrence of limestone as the primary heat affected stone at many burnt mound sites and the averse chemical reaction produced from heating this stone and submersing it in water has been used as an argument against the use of some sites for cooking. The counter argument provided by Grogan (2007, 88) was that the amount of calcium hydroxide produced in the trough would not have been harmful, particularly if the food was wrapped in straw, which seems to be the method adopted in experimental cooking (Grogan et al 2007, 98). This may have been why the food was safely cooked and eaten using limestone at the experiment conducted by Darina Allen (1994). As the temperate of the fire upon which the stones were heated would vary depending on fuel, it seems that the reaction of the limestone to the heat and water could vary depending on external factors.

The unstable nature of limestone would indicate that it would not have been chosen for cooking purposes at the risk of health damage. This is supported by the number of burnt mounds excavated on the M7-M8 in Laois (an area where limestone was the most readily available stone source) at which limestone was not used in troughs. If people seemed to deliberately avoid limestone at some sites in favour of sandstone pebbles from rivers, such as at Cross 1 and Ballycuddahy 1 (contract 1), then it seems reasonable to assume that there was a deliberate reason for avoiding the use of this substance. Perhaps limestone was used because the main purpose at some sites was to create hydrated lime for industrial or agricultural uses. Alternatively it may have been adopted for use because the activities associated with the trough were not affected by hydrated lime. Our knowledge of the implications of limestone use at burnt mounds is at present deficient and perhaps more research in this area could clarify the possible motivations for doing so.

6. INTERPRETATION AND RECONSTRUCTION

Addergoole 2 was a Late Neolithic/Early Bronze Age *fulacht fiadh*/burnt mound site situated amid a series of paleochannels. Due to the use of limestone and the shallow nature of troughs F045 and F025, bathing and cooking seem an unlikely function. F021 was a trough cut into paleochannel F008 and had a linear or oval stakehole structure to its east. This structure may have been a processional avenue or formal entrance leading into a bathing area. However, bathing in a limestone *fulacht fiadh*/burnt mound trough may have been dangerous due to the production of calcium hydroxide and thus an industrial use for the troughs is quite possible.

Plant macrofossil analysis suggests that hazel was growing near the site and hazel nuts may have provided a supplementary food source (See Appendix 10.1).

The semi-disarticulated cow specimen from F026 could have been between 2.5 and 3 years of age and likely male (See Appendix 10.4). F026 was considered a modern burial based on its appearance and because it truncated a modern furrow. Given the date of the site, the possibility of a Neolithic cow burial should not be completely discounted, though it seems very unlikely.

F037/F002 contained a whole pig specimen carcass (See Appendix 10.4). Some small skeletal elements are missing, which could be a consequence of post-depositional processes. It was male and probably died before its first year of age, between 8 and 9 months old. The pig had not reached its optimum age to be used as a meat source and it was too old to be considered as a piglet or suckling pig slaughtered for feasting.

"Therefore, this specimen could have been bred on site and died of natural causes or perhaps its meat and lard were consumed, although the absence of butchery marks does not allow confirmation of this hypothesis. Finally, the possibility of this specimen been killed for stock control should not be discounted, even if it is difficult to validate this idea with only one specimen as evidence." (See Appendix 10.4). This pig appeared to pre-date the archaeological activity and actually lay within the natural subsoil F002.

7. ASSESSMENT OF ARCHAEOLOGICAL POTENTIAL AND SIGNIFICANCE

Various elements within Addergoole 2 are potentially significant. Particularly as four sites Addergoole 1 and 2 and Aghmacart 1 and 2 lay along the same stream. The significance of the individual sites will be greatly expanded on by a collective study. The use of limestone in Addergoole 2 and the position of trough F021 within a paleochannel and its possible processional avenue are worthy of research. Furthermore, Neolithic sites were considered rare in County Laois prior to this project and excavations on the M7-M8 project may indicate substantial Neolithic activity in the area.

8. CONCLUSION

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

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Signed:

hynch

John Lynch Licensed Archaeologist August 2008

10. APPENDICES

10.1. Appendix 1: Plant Macrofossil Analysis Report

Addergoole 2, M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Project, Co Laois, Ireland

Plant macrofossil analysis

Report 1902

<u>April 2008</u>

Archaeological Services Durham University on behalf of Archaeological Consultancy Services Ltd

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| 1. | Summary | • | • | • | • | • |
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1. Summary

The project

1.1 An excavation was undertaken by Archaeological Consultancy Services Ltd at Addergoole 2, Co Laois, Ireland. This report presents the results of plant macrofossil analysis of 10 bulk samples taken at the site.

Results

1.2 The analysis provides limited information about the contexts and the site due to the low number of charred plant macrofossils. The few remains suggest that hazel was growing near the site, and hazel nuts may have provided a supplementary food source. The charcoal present is likely to be from fires associated with the burnt mound.

2. Project background

Location and background

A burnt mound was excavated Archaeological Consultancy Services Ltd at Addergoole 2, Co Laois, Ireland. This report presents the results of plant macrofossil analysis of 10 contexts including burnt mound material (3, 7, 9, 32, and 33), fulacht troughs (6 and 34), and stake holes, context (30), samples (15, 21 and 22).

Objective

2.2 The objective was to further our understanding of Bronze Age settlements in Co Laois and the use of burnt mounds.

Dates

2.3 Samples were received by Archaeological Services Durham University in October 2007.Analysis and report preparation was conducted between October 2007 and April 2008.

Personnel

2.4 Sample processing was undertaken by Archaeological Consultancy Services Ltd. The plant macrofossil analysis and report preparation was carried out by Dr Helen Ranner and Mr Lorne Elliott.

Archive

2.5 The record number is A015/104 (E2213). The flots are currently at the Environmental Laboratory at Archaeological Services Durham University awaiting collection or return.

3. Methods

3.1 The flots were examined at up to ×60 magnification using a Leica MZ6 stereomicroscope, and seeds were identified by comparison with modern reference material held in the Environmental Laboratory at Archaeological Services Durham University. Plant taxonomic nomenclature follows Stace (1997).

4. **Results**

4.1 The flots were dominated by charcoal with occasional insect remains, modern roots and terrestrial snail shells. Lime was recorded in context (34), fossilised crinoid stem fragments in context (9), and charred twigs in context (30). Charred plant remains were only present in context (32), and consisted of a hazel nutshell fragment. A few uncharred seeds were recorded but the non-waterlogged nature of the deposits suggests that these are later intrusive material. The results are presented in Table 1.

Table 1: Plant macrofossils from Addergoole 2

| Context | | | 6 | 7 | 9 | 30 | 30 | 30 | 32 | 33 | 34 |
|---|-------|--------------|--------------|--------------|--------------|------------|------------|--------------|--------------|--------------|--------------|
| Sample | | | 6 | 13 | 9 | 15 | 21 | 22 | 16 | 17 | 19 |
| Material available for radiocarbon dating | | \checkmark | \checkmark | \checkmark | \checkmark | - | - | \checkmark | \checkmark | \checkmark | \checkmark |
| Feature description | | | trough | burnt mound | burnt mound | stake hole | stake hole | stake hole | burnt mound | burnt mound | trough |
| Flot weight (g) | | 57 | 138 | 53 | 53 | 3 | 2 | 22 | 1178 | 50 | 7 |
| Flot volume (ml) | | 160 | 400 | 170 | 170 | 2 | 2 | 30 | 2750 | 100 | 35 |
| Flot matrix (relative abundance) | | | | | | | | | | | |
| Charcoal / charcoal dust | | 3 | 3 | 3 | 3 | 1 | 1 | 2 | 5 | 2 | 2 |
| Fossilised crinoid stems (pre-Quaternary) | frag. | - | - | - | 1 | - | - | - | - | - | - |
| Insecta | | - | - | - | 1 | - | - | - | 1 | 1 | 1 |
| Lime | | - | - | - | - | - | - | - | - | - | 1 |
| Modern roots | | - | 1 | - | 2 | - | 1 | 1 | 1 | 1 | 2 |
| Mollusca shell (terrestrial) | | 2 | 1 | 1 | 1 | - | - | - | 2 | 1 | 1 |
| Twigs (charred) | | | - | - | - | - | - | 1 | - | - | - |
| Charred remains (total number) | | | | | | | | | | | |
| (t) Corylus avellana (Hazel) Nutshell frag. | | | - | - | - | - | - | - | 1 | - | - |
| Uncharred remains (relative abundance) | | | | | | | | | | | |
| (a) Chenopodium album (Fat-hen) | seed | - | 1 | - | - | - | - | - | 2 | - | - |
| (a) Euphorbia helioscopia (Sun Spurge) seed | | - | - | - | - | - | - | - | 1 | - | - |
| (a) <i>Fumaria</i> spp (Fumitory) seed | | - | - | - | 1 | - | - | - | 1 | - | - |
| (a) Sonchus sp (Sow-thistle) achene | | - | 1 | - | - | - | - | - | - | - | - |
| (r) Lamium spp (Dead-nettle) seed | | - | - | - | 1 | - | - | - | - | - | - |
| (x) Caryophyllaceae undifferentiated (Pink family) seed | | - | - | - | 1 | - | - | - | - | - | - |
| (x) Chenopodium spp (Goosefoot) seed | | - | - | - | 1 | - | - | - | - | - | - |
| (x) Cirsium / Carduus spp (Thistles) achene | | | - | - | - | - | - | - | 1 | - | - |
| (x) <i>Taraxacum</i> spp (Dandelion) achene | | | - | - | - | - | - | - | 2 | 1 | - |

(a: arable weed; r: ruderal; t: woodland; x: wide niche)

Relative abundance is based on a scale from 1 (lowest) to 5 (highest)

5. Discussion

5.1 The analysis provides limited information about the contexts and the site due to the low number of charred plant macrofossils. The few remains suggest that hazel was growing near the site, and hazel nuts may have provided a supplementary food source. The charcoal present is likely to be from fires associated with the burnt mound, and the fossilized crinoid stem fragments are pre-Quaternary fossils derived from local limestone.

6. Sources

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10.2 Appendix 2: Charcoal Analysis Results

<u>Addergoole 2, Contract 1, M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill</u> <u>Motorway Project, Co Laois, Ireland</u>

Species identification of charcoal samples

July 2008

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- 1. Introduction
- 2. Methods
- 3. Definitions of time period, element types and woodworking terminology
- 4. Results and Analysis
- 5. Summary and Conclusions on Wood and Charcoal Assemblage
- 6. References

1. Introduction

Two thousand seven hundred and ten charcoal fragments from sixty two contexts relating to twenty seven archaeological sites were analysed from excavations along the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill road scheme, contract 1. Contract 1 covers a length of approx 31 km and includes numerous *fulacht fiadh* sites, iron working sites, enclosures, ditches, house and palisade structures, barrows, pits, postholes and one possible cow-horn processing site.

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 ongoing 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 purposes in this report (Grogan *et al.* 2007). Analysis of timbers can also 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 Cullahill to Cashel will add important information to the rapidly expanding database of environmental indicators particularly in relation to the 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 are required for a complete and full understanding of the immediate environment. Keepax suggest 50 samples in a European temperate climate. Charcoal is also analysed 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 on. 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 analysed 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 fuel 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 KEK, 2008) highlighting the wetter environments in the particular areas of Ireland. 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 analysis presented here concentrates on species identification, species selection and the composition of the local woodland during the Bronze Age, at Aghmacart 1. 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 drawn from was also noted and recorded. Each piece of wood was also examined for blade signatures.

In general the charcoal analysed was quite fragmented and iron stained with few large brushwoods or roundwoods with pith to bark charcoal samples were encountered. As a consequence determining ring width growths and ring counts on the charcoal samples was not completed for the majority of the samples.

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. The growth rates for some samples varied significantly therefore these samples were classified as slow to moderate, moderate to fast and so on.

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 analysed 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 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

| 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 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 Addergoole 2

Addergoole 2, Early Bronze Age, Fulacht fiadh

Table 2: Wood taxa present at Addergoole 2

| Site | E number | Feature type | Context | Sample no | Date | Identification | Comment |
|------------|----------|--------------|---------|-----------|---------|-------------------|-----------|
| | | FF | | | 2480BC- | Oak (3.5g-31 f), | Oak |
| Addergoole | | FF | | | 2280BC | Ash $(0./g-11 f)$ | brushwood |
| 2 | E2213 | spread | F035 | 18 | EBA | Hazel (0.6g-8 f) | 16yrs |
| | | | | | | Oak (12.8g, 26 | |
| | | | | | | f), Ash (0.1g, | |
| | | | | | | 2f) | |
| | | | | | | Hazel (7.5g, | |
| | | | | | | 25f) | |
| Addergoole | | Trough | | | | Pomoideae | |
| 2 | E2213 | fill | F023 | 2 | EBA | (1.5g, 2 f) | |

Two samples were analyzed from Addergoole 2. The samples were extracted from a *Fulacht* spread and the *Fulacht* trough. The spread and the trough produced a similar array of taxa which indicates that the features are most likely associated with each other. Large fragments counts of oak were identified. The oak wood used at the trough may have been collected from the oak trees which grew close to the site. Well preserved ancient oak trees were recorded beside the excavated site within a paleochannel and they may have grown close to the site during the sites life span. Other taxa present were ash, hazel and pomoideae, all dryland taxa. There were no wetland taxa identified from the assemblage, which may indicate that the area was quite dry and there was access to primary woodlands such as oak trees at the time of use of the site.

Results by feature/site types

Fulacht fiadh sites

Twenty seven samples from features associated with *fulacht* sites were analyzed from Contract 1. These samples were retrieved from Addergoole 1 & 2, Aghmacart 1, Ballycuddahy 1, Cannonswood 2, Cuffsborough 1, 2 & 3, Curragh 1 & 2, Leap 2, Oldglass 2 & 3, Oldtown 1, Parknahown 5 and Tintore 1. Eleven taxa were identified and these were mainly represented by oak (*Quercus* spp), ash (*Fraxinus excelsior*) and hazel (*Corylus avellana*), dryland taxa. Smaller amounts of alder (*Alnus glutinosa*), pomoideae (apple type), holly (*Ilex aquifolium*), willow (*Salix* sp), birch (*Betula* sp), elm (*Ulmus* sp), blackthorn (*Prunus spinosa*) and cherry (*Prunus padus/avium*) were also identified.

When all the taxa are graphed in relation to feature types it is clear that there is very little difference in wood selection between different feature types excavated at these ubiquitous *fulacht* sites. Does this indicate that similar functions were being carried out at the pits and troughs and the burnt spreads are related to all burning activities at the site? Oak is more prevalent in the identifications from the postholes which may suggest that oak was being used as post material at these sites.



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





A total of thirteen sites were analysed which dated to the Early Bronze Age. These were Addergoole 1 and 2, Aghmacart 1. Ballycuddahy 1, Cannonswood 2, Cuffsborough 2 and 4, Curragh 1 and 2, Leap 2, Oldglass 2 and 3 and Tintore 1. These excavated sites were all related to *Fulacht* activity except **F169** from Cuffsborough 4 which is associated with a slot trench.

A total of ten taxa were identified from the Early Bronze Age sites. Oak, hazel and ash trees were present in most quantities from the samples analysed while lesser quantities of alder, pomoideae, elm, blackthorn/cherry, holly and willow were also present. The information indicates access to primary woodland areas which contained oak, ash and possible hazel scrub. The environment surrounding the sites in the Early Bronze Age appeared to be relatively dry as the main taxa identified are symptomatic of dryland conditions. Willow and alder, wetland taxa, were present in low quantities.

5. Summary and Conclusions on Wood and charcoal Assemblage

Two thousand seven hundred and ten charcoal fragments from sixty two contexts related to twenty seven archaeological sites were analysed from excavations along the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill, contract 1. Thirteen wood samples including a hazel wooden artifact was also analyzed from the assemblage. Fourteen taxa were identified from the charcoal and wood assemblage retrieved from the sites and features excavated along the routeway. These were oak (*Quercus* sp), hazel (*Corylus avellana*), ash (*Fraxinus excelsior*), alder (*Alnus glutinosa*), Pomoideae (apple type), blackthorn/cherry (*Prunus* spp), yew (*Taxus baccata*), willow (*Salix* spp), birch (*Betula* sp), holly (*Ilex aquilofium*), elm (*Ulmus* sp) and alder buckthorn (*Frangula alnus*) and pine (*Pinus sylvestris*) in order of representation. The charcoal is mainly representative of fuel collection policies at the Bronze Age *fulacht* sites.

Oak along with ash and hazel dominate the charcoal assemblage while oak, hazel, alder, pine and yew in that order are present in the wood assemblage.

A variety of taxa were also identified from the kilns although dryland taxa were more frequently identified such as hazel, oak and ash.

Oak, hazel and ash are the dominant taxa identified from the *fulacht* sites. These are all dryland type taxa. These results are in contrast to wood analysis carried out at Charlesland and the N11 in Co. Wicklow, the gas pipeline to the west the N6 KEK in the midlands and Charlestown in Co. Mayo where alder and oak appear to be more dominant. However recent results from the N8 Cashel to Mitchelstown have produced a similar array of taxa where oak, hazel and ash are more common than wetland taxa such as alder. With regard to other functions for the charcoal we can conclude that the activities carried out within the troughs were similar to that which was being carried out at the pits as the taxon identified from the *fulacht* pits mirrors those present in the troughs.

All of the wood taxa identified from the excavations were of native origin. The wood and charcoal assemblage analyzed here is indicative of a more dryland environment. Wetland species identified in lower quantities were alder, birch and willow which are symptomatic of local wet condition along river banks or peat bogs.

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10.3 Appendix 3: Petrographical Report

Petrographical Report on Stone Samples from Addergoole 2, Co. Laois

Ministerial Direction No. A015/104

Geology of the Site

(see Figure 1; Archer et al. 1996; Gatley et al. 2005)

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 Durrow Formation of shaly fossiliferous and oolitic limestone.

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 |
|--------------|----------|--------|---|
| Addergoole 2 | A015/104 | 07 | 50:50 coarse quartzite and coarse limestone (decayed) |
| Addergoole 2 | A015/104 | 09 | 50:50 coarse quartzite and coarse limestone (decayed) |
| Addergoole 2 | A015/104 | 16 | 50:50 coarse quartzite and coarse limestone (decayed) |
| Addergoole 2 | A015/104 | 18 | 50:50 coarse quartzite and coarse limestone (decayed) |

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 occur in the glacial tills, the importing of quartzite from other areas, or the preferential extraction of quartzite from the tills cannot be ruled out.

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10.4 Appendix 4: Animal Bone Analysis Report

05_09

M7 Portlaoise to Castletown / M8 Portlaoise to Cullahill Motorway Scheme Project

Animal Bone Analysis Report from Addergoole 2, Co. Laois

(A015/104, E2213)

June 2008

By Claudia Tommasino

05-09 Addergoole 2 (A015/104, E2213) Animal Bone Analysis Report

Claudia Tommasino June 2008

1. Introduction

Addergoole 2, excavated as part of the M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme Project, is a fulacht fiadh where several burnt mound spreads were identified, possibly dating from the Bronze Age. Its soil stripping allowed the recognition of pits, linear features and paleochannels. The excavation of the site, which took place between April and June 2006, produced the identification of burnt mounds, 3 troughs, 3 paleochannels, stakeholes and timbers and modern agricultural features.

Four of the features contained animal bones in them:

- F26: possible modern burial of a semi-unarticulated animal specimen found in F24, a rectangular pit with square corners.
- F27: loose brown clayey sand with some presence of burnt wood, which was part of the fill of paleochannel F8.
- F37: grey sandy deposit, filling paleochannel F36.
- F40: brown organic fill of paleochannel F36.

The mammal assemblage incorporates cattle (*Bos Taurus*), pig (*Sus sp.*), deer (*Cervus/Dama*) and red deer (*Cervus elaphus*).

Radiocarbon dating was done using ash from F35, obtaining the prehistoric date of 2480-2280 BC (Oxcal Calibrated Dates. Suerc Laboratory. Glasgow, Scotland). This feature kept no relation with any of the features from where animal bones were recovered.

2. Methodology and analyses

2.1 Identification and quantification

The general methodology applied for the recording and analysis of this assemblage is similar to the one described by McCormick and Murray (2007). Due to the nature and size of this assemblage, no NISP (Number of Identifiable Specimen) or MNI (Minimum Number of Individuals) were calculated. Instead, the animal bones were quantified by TNF (Total Number of Fragments). Furthermore, TNF were divided into three categories: 'countable', 'low grade' and 'non-countable'. Fragments where at least 50% of the diagnostic area is present would be countable. The criteria for countable fragments are as follows:

- Long bones and metapodials with one or both epiphyses or metaphyses present in at least 50%.
- Mandible if at least one of the teeth or alveolus of the dp4-P4/M3 row is present.
- Scapula whenever the glenoid articulation is present.
- Ulna if the olecranon process is present.
- Astragalus if the distal end is present.
- Calcaneum whenever the sustentaculum is present.
- Pelvis whenever the ischial or illial section of the acetablulum are present.
- Cranium only if the zygomatic arch or three or more teeth or alveolus of the dp4-P4/M3 row are present.
- Every loose tooth if occlussal surface is present.
- Axial carcass only axis and atlas (whenever more than 50% is present).
- Horn cores and antler if a complete transverse section is present.

On the other hand, 'non countable' elements are those which could provide some kind of important information relating pathology, taphonomy or bone work (like pig fibula) but less than 50% of the diagnostic zone is present. Ribs, vertebrae and carpal/tarsals were recorded as non countable, to keep track of the usage or waste patterns in the site, but were not included in the TNF or analyses.

Finally, fragments that did not fit into the aforementioned criteria were considered as 'low grade'.

'Countable' and 'non-countable' fragments were recorded in two different forms in one electronic database (in Microsoft Office Access 2003) including information such as: context, species, skeletal element, side, condition, state of fusion, taphonomy, pathology, measurements, ageing, dental wear and observations. The 'non-countable' form emphasised aspects of taphonomy, pathology and observations.

Skeletal element, species and laterality were assessed for 'countable' and 'non-countable' fragments according to the criteria reported by Schmidt (1972), Cornwall (1974), Hillson (1995), and Davis (1987). Skeletal elements are expressed in tables and figures by their abbreviation or codes, shown in Appendix table 1.

2.2 Ageing

The age of the individuals were established by the epiphysial fusion and the dental development or wear stage.

The eruption and tooth wear were recorded using the method described by Grant (1982) for cattle and pigs. Consequently, Higham wear stages were assigned only for mandibles and mandibular loose M3 (except when in eruption or not in wear) (Higham, 1967).

The epiphysial fusion assessment was done using the categories of fused, unfused or fusing for metaphyses, epiphyses or metaphyses and epiphyses. Later on, Silver (1969) and Reitz and Wing (1999) provided the information for assigning chronological age for cattle, pig and deer.

2.3 Sex determination

Two methods for assessing sex were applied for two species. The measurement of the distal breath of metacarpals was used for cattle following the criteria explained by McCormick (1997). Root morphology of canines was evaluated for pig sexing, according to Schmidt (1972) and McCormick (1997).

2.4 Taphonomy

The recognition of any taphonomic factors such as gnawing, burning and butchery marks in the bones was dealt mostly according to Lyman (1994).

2.5 Pathology

Pathological modifications were recorded in detail and assessed by their effects on the bones, using the criteria of Fox (1939), Baker (1970), Baker and Brothwell (1980) and Siegel (1976).

2.6 Measurements and osteometry

Whenever possible, fused specimens were measured following Von Den Driesch (1976), Payne and Bull (1988) and Davis (1992).

3. Analyses and results

3.1 Summary of findings: Assemblage Overview

3.1.1 Identification and quantification

The animal bone assemblage from Addergoole 2 encompasses 102 countable fragments. Only 1 fragment (0.9%) of all countable and non-countable fragments could not be associated to any of the 3 semi-unarticulated or semi-articulated specimens.

Most of the countable fragments were found in good or excellent condition (see Figure 1). Only 3% were poorly preserved due to severe effects of wear.



3.1.2 Taphonomy

No taphonomic modifications were f in any fragments from Addergoole 2.

3.2 Animal bones from F26

F26 was encompassed by a complete semi-unarticulated cattle specimen. Table 1 details the skeletal elements and laterality recovered for this specimen. This specimen is reported as a modern feature and showed no relation with any archaeological feature.

| Species | Element | Side | Total |
|---------|------------------------|------|-------|
| Cattle | Astragalus | L | 1 |
| | | R | 1 |
| | Calcaneus | L | 1 |
| | | R | 1 |
| | Cranium | L | 2 |
| | | R | 1 |
| | Femur | L | 1 |
| | | R | 1 |
| | Humerus | L | 1 |
| | | R | 1 |
| | Loose Mandibular Teeth | R | 2 |
| | Loose Maxillary Teeth | R | 6 |
| | Metacarpal 1 | L | 1 |
| | | R | 1 |
| | Mandible | L | 1 |
| | | R | 1 |
| | Metatarsal 1 | L | 1 |
| | | R | 1 |
| | Patella | L | 1 |
| | | R | 1 |
| | Pelvis | L | 1 |
| | | R | 1 |
| | Phalange 1 | L | 4 |
| | R | 4 |
|--------------------------------------|---|----|
| Phalange 2 | L | 4 |
| | R | 4 |
| Phalange 3 | L | 3 |
| | R | 4 |
| Radius | L | 1 |
| | R | 1 |
| Scapula | L | 1 |
| | R | 1 |
| Scubocafoid | L | 1 |
| | R | 1 |
| Tibia | L | 1 |
| | R | 1 |
| Ulna | L | 1 |
| | R | 1 |
| Atlas | U | 1 |
| Axis | U | 1 |
| Vertebrae, ribs, carpals and tarsals | U | NC |
| Cattle Total | | 64 |

Table 1. Total of skeletal elements for cattle specimen from F26 (including non-countable fragments).

This specimen was aged by two different methods. According to the method of tooth wear stages (Grant, 1982) and Higham's (1967) mandible wear stages this specimen's age was estimated at 31-32 months of age (Table 2). The epiphyseal fusion of postcranial elements following Reitz and Wing (1999) corresponds to a specimen aged close to 36 months of age, as seen in Table 3. Therefore, the cattle specimen from F26 could be aged between 2 ½ to 3 years of age.

| Element and laterality | dp4 | M1 | M2 | M3 | Higham MWS | Estimated age in months |
|---------------------------|-----|----|----|----|------------|-------------------------|
| MN (R and L) | k | j | f | b | 16 | 31-32 |

Table 2. Tooth Wear Stages (Grant, 1982) and Mandible Wear Stages for M3 (Higham, 1967) for cattle specimen from F26.

| Skeletal Elements/Zones | Age in months | Epiphyses of | Specimen F26 |
|-------------------------|---------------|--------------|--------------|
| | | No. Unfused | No. Fused |
| Metacarpal 1 prox | before birth | 0 | 2 |
| Metatarsal 1 prox | before birth | 0 | 2 |
| Phalange 1 prox | before birth | 0 | 8 |
| Phalange 2 prox | before birth | 0 | 8 |
| Pelvis prox | 6-10 months | 0 | 2 |
| Scapula prox | 7-10 months | 0 | 2 |
| Humerus dist | 12-18 months | 0 | 2 |
| Radius prox | 12-18 months | 0 | 2 |
| Total Early Fusing | | 0 | 28 |
| Metacarpal 1 dist | 24-30 months | 0 | 2 |
| Tibia dist | 24-30 months | 0 | 2 |

| Metatarsal 1 dist | 33-36 months | 0 | 2 |
|---------------------------|--------------|----|---|
| Calcaneus | 36-42 months | 0 | 2 |
| Total Early Fusing | | 0 | 8 |
| Humerus prox | 42-48 months | 2 | 0 |
| Radius dist | 42 months | 2 | 0 |
| Ulna ole | 42-48 months | 2 | 0 |
| Femur prox | 42-48 months | 2 | 0 |
| Femur dist | 42-48 months | 1 | 1 |
| Tibia prox | 42-48 months | 2 | 0 |
| Total Early Fusing | | 11 | 1 |

Table 3. Epiphyseal fusion for postcranial elements from cattle specimen from F26, classified under early, middle or late-fusing stages following Reitz and Wing (1999).

Even though most of the post-cranial elements from this specimen were unfused, metacarpal distal breadth size is by far larger than expected in a female specimen, and therefore it could be assessed as a male (Bd = 63.7 mm). Nevertheless, it is important to remember that this method of sexing cattle is based on medieval archaeological assemblages and could not be fully dependable when employed in modern specimens.

No taphonomic or pathological modifications were observable in this specimen.

Regarding measurements, table 4 shows measurements taken for this specimen. Nevertheless, due to the important number of unfused epiphyses these measurements should not be considered for further analyses.

| Species | Element | NISP | Bd | GL | Вр |
|---------|---------|------|------|------|------|
| Cattle | MC1 | 1 | 63.7 | - | - |
| | MC1 | 1 | 63.8 | - | - |
| | PH2 | 1 | 24.4 | 47.6 | 33.5 |
| | PH2 | 1 | 25.8 | 46.7 | 33.4 |
| | PH2 | 1 | 33.6 | 46.1 | 26.4 |
| | PH2 | 1 | 33.7 | 43.4 | 27 |

Table 4. Details of measurements (in mm.) by skeletal elements for the cattle specimen following Von

 Den Driesch (1976), Payne and Bull (1988) and Davis (1992).

3.3 Animal bones from F27

The only skeletal element found in this feature is an antler of red deer (*Cervus elaphus*). This fragment did not present any taphonomic modification and it seems to be a shed antler, instead of one obtained by hunting.

The presence of this antler in the site, although not butchered or worked, may suggest the use of antler as raw material for tools or other types of objects.

3.4 Animal bones from F37

F37 contained a whole pig specimen's carcass. The skeletal elements that encompassed this specimen are specified in table 5. Some small skeletal elements are missing, which could be a consequence of post-depositional processes.

| Species | Element | Side | Total |
|---------|--------------------------------------|------|-------|
| Pig | Astragalus | L, R | 2 |
| | Calcaneus | R | 1 |
| | Cranium | L, R | 4 |
| | Femur | L, R | 2 |
| | Humerus | L, R | 2 |
| | Metacarpal 3 | L, R | 2 |
| | Metacarpal 4 | L, R | 2 |
| | Mandible | L, R | 2 |
| | Metatarsal 4 | R | 1 |
| | Patella | U | 1 |
| | Pelvis | L | 1 |
| | Phalange 1 | L, R | 2 |
| | Phalange 2 | L, R | 2 |
| | Radius | L, R | 2 |
| | Scapula | L, R | 2 |
| | Ulna | L, R | 2 |
| | Atlas | U | 1 |
| | Axis | U | 1 |
| | Vertebrae, ribs, carpals and tarsals | U | NC |
| | 34 | | |

Table 5. Total of skeletal elements for pig specimen from F37 (including non-countable fragments).

Tables 6 and 7 detail the tooth wear stages (Grant, 1982) and Higham's (1967) mandible wear stages and the epiphyseal fusion of postcranial elements following Reitz and Wing (1999). Both these methods allowed the age assessment for this specimen, which died before its first year of age, between 8 and 9 months old.

| Skeletal Elements/Zones | Age in months | Epiphyses of S | pecimen F37 |
|-------------------------|---------------|----------------|-------------|
| | | No. Unfused | No. Fused |
| Metacarpal prox | before birth | 0 | 3 |
| Metatarsal prox | before birth | 0 | 1 |
| Phalange 2 prox | 12 months | 2 | 0 |
| Pelvis prox | 12 months | 1 | 0 |
| Scapula prox | 12 months | 2 | 0 |
| Humerus dist | 12-18 months | 2 | 0 |
| Radius prox | 12 months | 2 | 0 |
| Phalange 1 prox | 24 months | 2 | 0 |

| Total Early Fusing | | 11 | 4 |
|---------------------------|--------------|----|---|
| Metacarpal dist | 24-27 months | 4 | 0 |
| Tibia dist | 24 months | 2 | 0 |
| Metatarsal dist | 24-27 months | 1 | 0 |
| Calcaneus | 24-30 months | 1 | 0 |
| Total Middle Fusing | | 8 | 0 |
| Humerus prox | 42 months | 2 | 0 |
| Radius dist | 42 months | 2 | 0 |
| Ulna ole | 36-42 months | 2 | 0 |
| Femur prox | 42 months | 2 | 0 |
| Femur dist | 42 months | 2 | 0 |
| Tibia prox | 42 months | 2 | 0 |
| Total Late Fusing | | 12 | 0 |

Table 6. Epiphyseal fusion for postcranial elements from pig specimen from F37, classified under early, middle or late-fusing stages following Reitz and Wing (1999).

| Element and laterality | dp4 | M1 | M2 | M3 | Higham MWS | Estimated age in months |
|---------------------------|-----|----|----|----|------------|-------------------------|
| MN | i | с | 0 | 0 | 10 | 8 - 9 |

| Table 7. | Tooth | Wear | Stages | (Grant, | 1982) | and | Mandible | Wear | Stages | (Higham, | 1967) | for | pig |
|----------|--------|------|--------|---------|-------|-----|----------|------|--------|----------|-------|-----|-----|
| specimen | from F | 37. | | | | | | | | | | | |

The morphological characteristics of canines allowed the assessment of its sex. This specimen was clearly a male pig.

No taphonomic or pathological modifications were observable in the bones that encompassed this specimen.

No measurements were taken from this specimen due to the extremely high number of unfused epiphyses.

The age for this specimen does not represent an animal killed at its optimum age to be used as a meat source. Furthermore, it is too old to be considered as a piglet or suckling pig slaughtered for feasting. Therefore, this specimen could have been bred on site and died of natural causes or perhaps its meat and lard were consumed, although the absence of butchery marks does not allow confirming this hypothesis. Finally, the possibility of this specimen being killed for stock control should not be discounted, even if it is difficult to validate this idea with only one specimen as evidence.

3.5 Animal bones from F40

All three skeletal elements found in F40, detailed in table 8, seem to have belonged to the same specimen of deer. They all represent meaty bones from fore and hind limbs, and no butchery marks were observable in any of these bones.

| Species | Element | Side | Total |
|---------|---------|------|-------|
| Deer | Humerus | L | 1 |
| | Radius | L | 1 |
| | Tibia | L | 1 |
| Deer | 3 | | |

Table 8. Total of skeletal elements for deer specimen from F40.

The epiphyseal fusion of the three skeletal elements suggests that this deer specimen was at least 23 months of age at the moment of death (Reitz and Wing, 1999). Table 9 specifies this data.

| Skeletal Elements/Zones | Age in months | Epiphyses of S | pecimen F40 |
|---------------------------|---------------|----------------|-------------|
| | | No. Unfused | No. Fused |
| Radius prox | 5-8 months | 1 | 0 |
| Humerus dist | 12-20 months | 1 | 0 |
| Total Early Fusing | | 2 | 0 |
| Tibia dist | 20-23 months | 1 | 0 |
| Total Middle Fusing | | 1 | 0 |

Table 9. Epiphyseal fusion for postcranial elements from deer specimen from F40, classified under early, middle or late-fusing stages following Reitz and Wing (1999).

The poor preservation of these bones did not allow for measurement of any zone of the skeletal elements, besides one skeletal zone of humerus (table 10).

| Deer HU 1 56 25.9 50.6 38.9 | Species | Element | NISP | Bd | GL | Bp | SD | BT | HTC |
|-----------------------------|---------|---------|------|----|----|----|------|------|------|
| | Deer | HU | 1 | 56 | - | - | 25.9 | 50.6 | 38.9 |

Table 10. Details of measurements (in mm.) by skeletal elements for the deer specimen following Von Den Driesch (1976), Payne and Bull (1988) and Davis (1992).

The occurrence of these postcranial skeletal elements allows complementing the idea stated previously regarding the presence of antler (F27). Deer could have been exploited mainly as a raw material supplier. Antler could have been acquired from collecting those naturally shed from adult deer or by hunting. In the latter cases, whole or partial carcasses of deer could have been transported to the site and the venison consumed, producing an incidental presence of postcranial elements (especially meaty bones) in the site.

4. Comparisons

Due to the lack of information regarding the phasing of the site and specifically the features where animal bones were found, no comparisons with other Irish archaeological sites were carried out. Furthermore, the small size of the assemblage does not allow the establishment

of any husbandry pattern to be contrasted with recurrent activities identified in Neolithic, Bronze Age, Iron Age or Medieval sites. In spite of this, it could be mentioned that the idea of deer to be exploited as a raw material and occasionally as venison source has been observed in sites from the Bronze Age and the Medieval Period of Ireland (McCormick and Murray, 2007).

5. Conclusions

As mentioned before, the small size of the assemblage did not allow for identification of a definite husbandry practices from the site. Furthermore, the lack of phasing for the four features analysed did not allow any comparisons with other archaeological sites from Ireland.

The only species represented in archaeological features for this site are pig and deer. Pigs seem to have been bred on site and used as a meat source, while deer were mainly exploited for their antler and possibly their meat.

6. Recommendations

Further archaeological studies with contextual approaches and a defined phasing of the site could be useful to expand the few interpretations drawn from the animal bone assemblage from Addergoole 2.

Therefore, the author as the bone specialist suggests that countable and non-countable animal bones should be kept in case more contextual information is obtained for the site, allowing further analyses. The assemblage should be stored under methods approved by National Museum of Ireland that would guarantee low-acid conditions to ensure its preservation. The 'low grade' fragments could be discarded. Finally, if the modern origin of the cattle specimen is confirmed, it could be kept as part of a comparative collection; otherwise it should be kept together with the rest of the assemblage.

Nevertheless, the final decision should be made by the National Museum of Ireland in agreement with the licence holder.

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Appendix

| Abbreviation | Element | |
|--------------|-------------------------|--|
| AN | Antler | |
| AS | Astragalus | |
| CA | Calcaneus | |
| CR | Cranium | |
| FE | Femur | |
| HC | Horn Core | |
| HU | Humerus | |
| LMT | Loose Mandibular Tooth | |
| LT | Loose tooth | |
| LXT | Loose Maxillary Tooth | |
| MC1 | Metacarpal 1 | |
| MC2 | Metacarpal 2 | |
| MC3 | Metacarpal 3 | |
| MC4 | Metacarpal 4 | |
| MC5 | Metacarpal 5 | |
| MCU | Metacarpal Unidentified | |
| MN | Mandible | |
| MPU | Metapodial Unidentified | |
| MT1 | Metatarsal 1 | |
| MT2 | Metatarsal 2 | |
| MT3 | Metatarsal 3 | |
| MT4 | Metatarsal 4 | |
| MT5 | Metatarsal 5 | |
| MTU | Metatarsal Unidentified | |
| NC | Coracoid | |
| PA | Patella | |
| PE | Pelvis | |
| PH1 | Phalange 1 | |
| PH2 | Phalange 2 | |
| PH3 | Phalange 3 | |
| RA | Radius | |
| SC | Scapula | |
| SCU | Scafocuboid | |
| TI | Tibia | |
| UL | Ulna | |
| VC1 | Atlas | |
| VC2 | Axis | |

Table 1. Skeletal elements and their abbreviation

10.5.1 Appendix 5: Radiocarbon Analysis Report

| GU | Reporting | o . | 0.1 | | | 1400 | Age % | Ageerror |
|-------|-----------|----------------|--------------|-----------------------------|---------------|-------|--------|----------|
| No. | Number | Sample Type | Site | Sample Id | Species Dated | d13C | Modern | 1 sigma |
| 16190 | 17990 | Charcoal | Addergoole 2 | Addergoole 2:E2213:F035:S18 | Ash | -25.2 | 3890 | 35 |



10.5.2 Appendix 5: Radiocarbon Analysis Report



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| Fax: | 01355 229898 |

RADIOCARBON DATING CERTIFICATE

| Laboratory Code | SUERC-15850 (GU-15781) |
|----------------------------------|------------------------|
| Submitter | Joanne O Meadhra |
| | ACS Ltd. |
| | 21 Boyne Business Park |
| | Greenhills, Drogheda |
| | Co. Louth, Ireland |
| Site Reference | Addergoole 2 |
| Sample Reference | E2213 : F037 : Bag 2 |
| Material | Bone : Pig Ulna |
| δ^{13} C relative to VPDB | -20.9 ‰ |
| Radiocarbon Age BP | 160 ± 40 |

- **N.B.** 1. The above ¹⁴C age is quoted in conventional years BP (before 1950 AD). The error, which is expressed at the one sigma level of confidence, includes components from the counting statistics on the sample, modern reference standard and blank and the random machine error.
 - 2. The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal3).
 - 3. Samples with a SUERC coding are measured at the Scottish Universities Environmental Research Centre AMS Facility and should be quoted as such in any reports within the scientific literature. Any questions directed to the Radiocarbon Laboratory should also quote the GU coding given in parentheses after the SUERC code.

10.5.3 Appendix 5: Radiocarbon Analysis Report



10.6 Appendix 6: Timber Identification

Addergoole 2 was one of a series of fulacht fiadhs sites situated amid a series of paleochannels. Timber 1 (sample 33) was a large rotted natural oak. It lay on F029 a fill of paleochannel F008. F008 was likely the ancient extent of the modern river course. F029 was a white gravely silt deposit which represented a later phase of the paleochannel, when it was silting up. Timber 1 was lay horizontally and was oriented roughly east-west. It was round in section, with a natural Vshaped groove. It was 4.20m in length and in 0.40m in diameter. It was flat at the top in the west but became more rounded and natural in the east. A natural V-shaped groove runs from west to east and becomes deeper and more V-shaped in the east where timber 1 splits into two pieces, like a fork. The eastern (split) end was splayed and may have been the lower part of the tree. Note that before timber 1 was fully exposed it appeared to be a timber or a sluice and possibly

even a footbridge.

Timber 2 (sample 34,) lay associated with and possibly on, some burnt mound deposits F007, which were deposited into the paleochannel. Timber 2 lay beside F007 and on F027. F007 was burnt mound deposit from the nearby trough F021. F027 in paleochannel F008 was loose brown clayey sand with occasional charcoal and animal bone. It was an upper fill of F008 the paleochannel. Timber 2 was oriented north south was in 1.50m length, 0.15m in width and 0.06m in depth. It narrows at both ends and was natural.

10.7 Appendix 7: Summary of Fulachta Fiadh on M7-M8

| 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 <i>fulacht</i> /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 <i>fulacht/</i> burnt spreads. | Bronze Age |
| Clonadacasey 4 | 3 | Burnt mound | A small number of archaeological features including a number of <i>fulacht</i> /burnt spreads, stakeholes and troughs. | Bronze Age |
| Clonboyne 2 | 3 | Burnt mound | Remains of a ploughed out <i>fulacht fiadh</i> . 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 | <i>Fulacht</i> /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 <i>fulacht fiadh</i> /burnt mound | Late Bronze Age |
| Shanboe 5 | 2 | Burnt Mound | Ploughed out remains of a <i>fulacht</i> /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 |

| Table Site Archive (Basic) Summary | | | | | | |
|------------------------------------|---------------------------|-------------------|--|--|--|--|
| Site Name: Add | lergoole 2 | Record No.: E2213 | | | | |
| Туре | Description | Quantity | Notes | | | |
| Contexts | Validated contexts | 51 | All contexts sheets have been checked | | | |
| | from excavation | | and cross-referenced. | | | |
| Plans | 'A2' 1:50 (no. of sheets) | 7 | Pre-ex plan, post-ex plan. | | | |
| Sections | 'A2' 1:10 (no. of sheets) | 12 | | | | |
| Matrices | | 1 | Paper and digital records. | | | |
| Photographs | | 163 | Digital Version only. | | | |
| Registers | Plan Register | 1 | All Registers have been checked and | | | |
| | Photographic Register | 1 | cross-referenced. | | | |
| | Finds Register, | 1 | | | | |
| | Sample Register | 1 | | | | |
| Diaries | Director's Diary | 1 | All Diaries have been checked and cross- | | | |
| | | | referenced. | | | |

10.8 Appendix 8: Archive Contents



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



Figure 2: Location of Contract 1 showing Addergoole 2



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



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



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





Figure 7: Location of trenches



Figure 8: Post-excavation plan of Addergoole 2 Trench 1





Figure 10: Post-excavation plan of Addergoole 2 Trench 2







Plate 1: General overview of Trench 1 from the south (05_09_Addergoole 2_CP622_05)



Plate 2: General overview of Trench 1 from the west (05_09_Addergoole 2_CP622_08)



Plate 3: Mid-excavation of trough F021 from the east (05_09_Addergoole 2_CP624_17)



Plate 4: Timber 1 which lay in paleochannel F008 from the east. Trough F021 is visible in the background (05_09_Addergoole 2_CP625_17)



Plate 5: Post-excavation of trough F021 from the west (05_09_Addergoole 2_CP626_14)



Plate 6: Post-excavation of trough F025 from the south (05_09_Addergoole 2_CP627_03)



Plate 7: Stakeholes F049 and F051 from the east (05_09_Addergoole 2_CP633_26)



Plate 8: Stakeholes F049 and F051 (05_09_Addergoole 2_CP633-26)



Plate 9: Pit F024 and cattle burial F026 (05_09_Addergoole 2_CP624_06)



Plate 10: General overview of Trench 2 from the west (05_09_Addergoole 2_CP629_04)



Plate 11: Trough F045 from the south (05_09_Addergoole 2_CP632_04)



Plate 12: Burnt mound F033 from the east (05_09_Addergoole 2_CP630_19)


Plate 13: Burnt mound F032 from the east (05_09_Addergoole 2_CP630_24)



Plate 14: Burnt mound F035 from the west (05_09_Addergoole 2_CP630_17)



Plate 15: Post-excavation of burnt mound F035 from the west. F035 is visible in the white section through paleochannel F036 and in the west facing baulk (05_09_Addergoole 2_CP631_08)