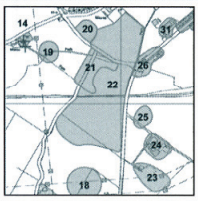
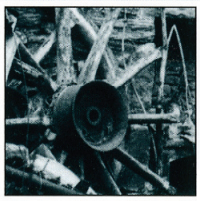


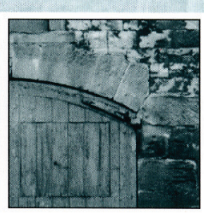

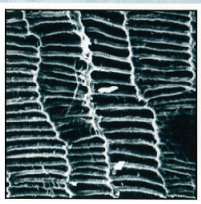


Date: October 2009
Client: Offaly County Council
Project code: NTB06

N52 Tullamore Bypass:
Final Report on archaeological excavations at Ardan 2, E2846, in the townland of Ardan, Co. Offaly

By: Linda Hegarty & John Twomey
Ministerial Direction No: A033
National Monuments Section Registration No: E2846
Director: Linda Hegarty
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HEADLAND
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CONTENTS PAGE

List of Figures

List of Plates

Appendices

1 Summary

This report presents the final results of archaeological investigations carried out on behalf of Offaly County Council as part of the Advance Archaeological Works Contract for the N52 Tullamore Bypass. It was one of eleven sites excavated on this scheme (Appendix 12). The work was undertaken under Ministerial Direction A033 and under National Monuments Section Registration Number E2846 in the townland of Ardan, Co. Offaly. The Minister for the Environment, Heritage & Local Government, following consultation with the National Museum of Ireland, directed that Linda Hegarty of Headland Archaeology Ltd should proceed with archaeological resolution.

Archaeological testing, NMS No. E2493, carried out under Ministerial Direction Number A033 on this site in 2006 identified a deposit of heat shattered stone in a matrix of loosely compacted, mid-dark black-brown sandy silty clay, suggesting the presence of a *fulacht fiadh*.

Full archaeological resolution was conducted on this site in December 2006 and January 2007. This revealed the remains of a burnt mound and associated features consisting of five troughs, two pits, and an area of scorched clay.

2 Introduction

The scheme involves the proposed construction of the N52 Tullamore Bypass, between the townlands of Cloghanbane and Ardan in Co. Offaly. The proposed scheme will consist of the construction of a bypass around the town of Tullamore. It is to consist of 11.5 km of standard single carriageway and 2.5 km of wide single carriageway road. It will also involve the construction of seven at-grade roundabout junctions, priority junctions and seven new major structures, including four river crossings, one canal crossing and one railway crossing. The project is funded by the Irish Government and the European Union, through Offaly County Council/National Roads Authority and under the National Development Plan 2000-2006. Headland Archaeology Ltd. was commissioned by Offaly County Council to undertake the works.

An Environmental Impact Statement was prepared in 2004, with the Cultural Heritage Assessment for the route contained within Section 3.8. The EIS was prepared by Babtie Pettit.

3 Site Description and Historical Background (Figure 1)

Site E2846 was located approximately 0.5 km north of Tullamore town, in the townland of Ardan, at National Grid Reference 34500/26900. Located one kilometre to the north was a section of the prominent Esker Riada running east–west, while the surrounding land was low-lying, gently undulating, farmland. The site was situated on a gentle south-facing slope and under pasture at the time of excavation. It is located towards the western side of a modern field division in the lowest part of the field. Throughout the period of excavation, the eastern side of the site was flooded.

The Ordnance Survey Name Books list the following alternate spellings and names for Ardan: Arden, Ardin, Ardenmore and Raheen, Ardamore and Raheens, Ardamore and Raheers, Ardenbegg, and Ardenmore and Rahin. It lists Ardan as *Ardán* in Irish, translating

it as "a hillock". The townland is described as being located on a crossroad from Tullamore to the parish of Durrow south of the Silver River (which forms the northern boundary) and a small bog (which forms the southern border), which lies beside the road from Tullamore to Tyrelspass. The land use at the time of the survey was chiefly arable and it contained some brushwood and coarse pasture. Gormagh Bridge crosses the Silver River on the boundary with Durrow Parish. The townland is completely within the Parish of Kilbride in the Barony of Ballycowan.

Ardan townland contains one known RMP site (OF017-002), a rath, which is also listed in the Archaeological Inventory of County Offaly (entry 112, OS 17:1:6). The rath is described as situated on a small hillock south of Ardan House in undulating countryside (Archaeological Inventory of Co. Offaly, 24). It is a bivallate rath with a central platform measuring approximately 28 m in diameter on the east-west axis (ibid.). A poorly preserved internal bank, with a width of 1 m and a height of 0.2 m, is visible in the north only (ibid.). A fosse with a width of 3 m and an external bank are visible to the south (ibid.). This monument was about 500m north of the site at Ardan 2.

The first edition Ordnance Survey map shows Ardan to be primarily fields with an area of forest at the northern end. It clearly shows the rath, as well as smaller areas of trees and hedges. A small road runs through the townland in an east-west direction and a larger road runs north-south. Several buildings are depicted on the map, clustered predominantly around the crossroads. Griffith's Valuation of 1848-1864, lists the total area of Ardan as 749 acres 1 R 3 P and a total annual value of £448 18 s.

4 Aims and Methodology

The objective of the work was the preservation by record of archaeological features or deposits in advance of the proposed road's construction.

Topsoil stripping of the site was conducted using a 360° tracked machine fitted with a 1.9 m wide ditching (toothless) bucket under archaeological supervision. A total area of 600 m² was exposed. The resulting surface was cleaned and all potential features investigated and excavated by hand. Archaeological contexts were recorded by photograph and on *pro forma* record sheets. Plans and sections were drawn at an appropriate scale. Registers are provided in the Appendix. Ordnance Datum levels and feature locations were recorded using Penmap and an EDM. Environmental samples were taken on any deposits suitable for analysis or dating.

5 Excavation results

An area measuring 30 m x 20 m (600 m²) of topsoil was stripped in preparation for excavation of features uncovered in testing and any adjacent features. This uncovered a shallow mound of charcoal-rich silt and heat-shattered stone.

Burnt Mound
The burnt mound (3) consisted of a large amount of heat shattered stone within a matrix of loosely compacted, mid-dark black-brown sandy silty clay. This contained frequent inclusions of charcoal flecks and small roots, and was irregular in plan. It had a maximum length of 23.8 m north–south, a width of 9.5 m east–west, and a maximum depth of 0.18 m. Its low lying nature in relation to the high level of the local water table meant that it was

subject to regular flooding. A single large rectangular flint flake was recovered from this context (Appendix 10).

Troughs

Upon excavation a number of features were revealed below the burnt spread (3) (Plate 1). A trough (11) was centrally located beneath the burnt spread (3). This was irregular in plan and orientated northwest-southeast. It had a length of 2.64 m, a width of 2.21 m, a depth of 0.43 m, and contained the fills (23), (24), (25), (26), and (27). The sides of trough (11) were concave and near vertical while its breaks of slope were sharp. It had an irregular base (Plate 2).

Its basal fill (24) was a moderately compacted, light brownish-grey sand, with frequent inclusions of charcoal flecks and heat shattered stones, and occasional inclusions of pebbles, charcoal, chert debris, burnt bone, and a burnt hazelnut fragment. It measured 1.1 m east-west, 0.85 m north-south and had a depth of 0.09 m. A sample suitable for radiocarbon dating was recovered from the environmental sample of fill (24). UB-8276 gave a dating range at two sigma of 2141-1944 cal BC (Appendix 5).

Directly above (24) was (25), a moderately compacted, mid-greyish brown silty sand, with frequent inclusions of charcoal and heat shattered stone. This had a length of 2.15 m east-west, a width of 1.7 m north-south, and a depth of 0.08 m.

Situated between (24) and (25) at their western end was (23) a small deposit of firmly compacted light brown-grey clay, with frequent charcoal inclusions. This measured 0.65 m northwest-southeast, 0.35 m northeast-southwest, and had a depth of 0.04 – 0.06 m.

Above (25) was (26) a moderately compacted, dark brownish-black clay silt with frequent inclusions of heat shattered stone and charcoal, measuring 2.28 m east-west, 1.75 m north-south, and 0.24 m deep.

The uppermost fill of (11) was (27), a firmly compacted dark brownish-grey sandy silty clay, with occasional inclusions of heat shattered stone, charcoal flecks, and large stones. It had a length of 1.82 m, a width of 1.6 m, and a depth of 0.19 m. This extended west from the eastern side of (11) but did not cover the full length of the trough.

Another trough (13) was located 1.5 m southeast of (11). This was rectangular in plan with an east-west length of 2.65 m, a north-south width of 1.56 m, and a depth of 0.21 m. The sides of this trough were near vertical, except to the southeast where they were very gradual. Its breaks of slope were gentle at the top and base, while the base was oval in plan and flat.

The main fill of (13) was identified as being part of the deposit of the burnt mound (3), a loosely compacted, mid-dark black-brown sandy silty clay, containing large amounts of heat shattered stone and frequent inclusions of charcoal flecks. Within the pit this had a length of 2.65 m east-west, a width of 1.56 m north-south, and a depth of 0.06 m. This was located above (28), a firmly compacted mid-grey clay, with moderate inclusions of charcoal flecks and occasional flint debitage. This covered an area of 1.7 m east-west, 1.4 m north-south and 0.06 m deep, and was located over the eastern end of (13).

Located 2.5 m southwest of (13) was a small trough (34). This was oval in plan with a north-south orientation, measuring 1.56 m in length, 1.23 m in width, and with a maximum depth of 0.35 m. Its breaks of slope were sharp at the top and gradual at the base, with vertical

sides between these. It was filled by the material of the burnt mound to a maximum depth of 0.29 m. Below this was (35) a firmly compacted, mottled orange/yellow clay with moderate inclusions of heat shattered stone, and occasional charcoal flecks. This covered the base of (34) to a depth of 0.07 m, extending 1.56 m north-south and 1.23 m east-west (Plate 3).

To the northeast of trough (11) at a distance of 6.6 m was a further trough (5). This was irregular in plan with a length of 1.69 m north-south, a width of 1.40 m east-west, and a maximum depth of 0.66 m. Its corners were rectangular at the northwest, non-extant to the north where it was truncated by pit (9), and rounded elsewhere. The breaks of slope were sharp on top except to the south and east where they were imperceptible, and they were imperceptible at all points of the base. The sides were vertical/near vertical from the west, south and east, undercut to the northwest, and non-extant to the north. The base which was flat, and oval in plan, was orientated to the north of the feature.

Two fills were contained within (5). The top fill was (6) a loosely compacted, dark brownish -black silty clay, with a large amount of heat shattered stones and frequent inclusions of charcoal flecks. This measured 1.51 m north-south, 1.35 m east-west, and had a maximum depth of 0.35 m. Below this was (7) the basal fill of (5), a moderate-firmly compacted, mid-blackish-grey silty clay, with frequent inclusions of heat shattered stone and charcoal flecks. It extended across the base to a depth of 0.06 m, with a length of 1.54 m north-south, and a width of 1.4 m east-west.

A large circular trough (8) with vertical sides was located 0.3 m to the west of trough (5) and pit (9). This had a length of 2.3 m east-west, a width of 2.18 m north-south, and a depth of 0.8 m. Its breaks of slope were imperceptible at all sides on top, and on the base except the north where it was sharp. The base was sub-circular with a slight descent towards the south. This trough contained the fills (29), (30), (31), (32) and (33) (Plates 4 and 5).

The basal fill was (33) a loosely compacted brownish-orange silty sand, containing a large amount of heat shattered stone, moderate inclusions of charcoal, and occasional chert debris. This measured 1.2 m east-west, 1.1 m north-south and had a depth of 0.15 m.

Above this was (32), a loosely compacted, grayish-black silty sand, containing large amounts of heat shattered stone, and frequent inclusions of charcoal and sub-angular stones. This had a length of 1.3 m east-west, 1.1 m north-south, and a depth of 0.13 m. A sample suitable for radiocarbon dating was recovered from the environmental sample of fill (32). UB-8277 gave a dating range at two sigma of 1834-1664 cal BC (Appendix 5).

Over (32) was (31), a firmly compacted mid-greyish-black clay, with frequent inclusions of charcoal flecks, measuring 1.77 m east-west, 1.4 m north-south and 0.12 m in depth. This was below (30), a firmly compacted mid-blackish-grey silty clay, with a length of 1.5 m east-west, a width of 1 m north-south, and a depth of 0.2 m. The top fill of (8) was (29) a firmly compacted mid-brownish-grey clay, with frequent inclusions of an organic material and heat shattered sandstone.

Pits

Trough (5) was truncated at its northern side by a smaller sub-oval pit (9). This had an east-west length of 0.86 m, a north-south width of 0.7 m, and a depth of 0.31 m. The breaks of slope at the top were sharp all around and at the base were gradual/ imperceptible. The sides were vertical/ near vertical to the east and north, undercut to the west, and non extant to the south, while the base was rounded. It was filled by (14) and (16).

The basal fill was (16) a loosely compacted mid-grey silty clay, containing a large amount of heat shattered stone, moderate inclusions of sand, and occasional charcoal flecks. It measured 0.8 m east-west, 0.69 m north-south and 0.24 m deep. Above this was (14, a moderately compacted grayish-brown clay, with frequent inclusions of an organic material and moderate amounts of heat shattered stone. This covered the full extent of the pit, 0.86 m east-west, 0.47 m north-south, and had a depth of 0.15 m.

Located 0.18 m west of trough (34) was a small sub-circular pit (15) with a north-south length of 0.86 m, a width of 0.78 m east-west, and a depth of 0.19 m. Its breaks of slope were sharp at the top and gradual at the base, while the sides were vertical to the west and convex elsewhere. The base was circular with an irregular surface. The pit was entirely filled by a deposit identified as being part of the burnt mound (3), a loosely compacted, mid-dark black-brown sandy silty clay, containing large amounts of heat shattered stone and frequent inclusions of charcoal flecks.

Scorched Clay

An area of scorched clay (18), irregular in plan, was located 0.6 m to the west of the large pit (8). It covered a maximum area of 1.17 m northeast-southwest and 0.93 m northwest-southeast. It appeared to represent the base of a small fire.

6 Discussion

The shallow burnt mound (3) and the presence of five troughs (5), (8), (11), (13) and (34) indicate that this site, E2846, represents the remains of a *fulacht fiadh*. The burnt and heat-shattered stone within a charcoal rich silty matrix is typical of the composition of a burnt mound, or *fulacht fiadh*. Similar sites have returned dates ranging from the Bronze Age to the late medieval period. However the majority of such sites are Bronze Age in date (Waddell 2000).Two dates were retrieved from troughs (11) and (8) at E2846; both single entity AMS two sigma dates of 2141-1944 cal BC and 1834-1664 cal BC, placing this *fulacht fiadh* in the Early Bronze Age (Appendix 5).

The trough (11) was the most centrally located feature on site, and the area to its immediate west, northwest, and north saw the greatest concentration of burnt mound material. This would suggest that it may have been the primary trough on the site. The presence of charcoal in all its fills, as well as burnt bone and hazelnut shell in the basal fill (24), may be evidence for domestic activity taking place in the environs of the site.

Trough (13) is notable for its shallow nature and sub-rectangular shape which differentiates it from the other troughs on site. However the materials recovered through sampling suggest no different activity here compared to the other features on site.

Adjacent to trough (8) was the slightly smaller trough (5). The use of two troughs is attested to in historical texts, where one feature is used for cooking and the other for bathing (O Drisceoil 1988). Such a bathing purpose may explain the substantial depth of trough (8) in comparison to the other troughs on site.

The lack of any environmental remains from the fill of trough (34) inhibits any speculation as to its function beyond that of a location for heating water. The small pits (9) and (15) were too small to have served as troughs. There is no evidence as to the function of these features, but they may have been simple pits for storage.

The scorched clay (18) was the result of burning activity, probably caused in the heating of the stones used to heat water in troughs. Its close proximity to trough (8) would suggest its use primarily in conjunction with this, though the possibility of its use for other troughs cannot be excluded.

The shape of burnt mounds often varies from the 'classic' crescent/kidney shape to completely irregular. Often it depends on the features underneath as the debris from the burning process would initially be dumped away from the features. This would invariably form up as an arc or crescent to one side of the main trough or pit. The size of a mound is often taken as an indicator of the number of uses or length of occupation. Modern farming practises and field clearance often remove all or part of mounds and all that is left is a few burnt stone spreads and a series of pits or troughs. The first site to be scientifically dated was at Ballyvourney in Co. Cork. The site consisted of two burnt stone mounds which were excavated in the 1950s by M.J. O'Kelly. Underneath one of these mounds, Ballyvourney I, was a wood-lined trough, two hearths, a stone lined pit/oven and a number of postholes which were part of a small hut structure. This site became the classic example of a *fulacht fiadh,* but excavations of burnt stone mound sites since Ballyvourney have shown that it was the exception rather than the norm (Ó'Néill 2003-4: 89). Other burnt stone sites from around the country show that these site types were very diverse with the main similarities being the

presence of a mound of burnt stone, a trough or pit feature underneath and a nearby water source.

The term was first used in the 9th century AD in such sources as *The Lives of Saints* and taken to mean the cooking sites which utilised heated stones for cooking. A '*fulacht*' is referred to as a spit in the Yellow Book of Lecan, however, evidence for a spit would be unlikely to survive (O'Sullivan *et al* 2004). The only likely recoverable physical evidence on the sites ('*fulachta fiadh*') would be the by-products of the process, consisting mainly of heat-shattered stone and charcoal and commonly a hole in the natural subsoil for obtaining fresh water (ibid.). As well as ritual functions however *fulachta fiadh* are also associated with settlements.

There are a number of theories with regards to the function of *fulacht fiadh*/burnt mound monuments. Interpretations of *fulachta fiadh* vary from cooking sites, bathing and birthing places, sweathouses, ritual, industrial uses such as dying or fulling or possibly sites for processing leather and textiles. (Grogan *et al* 2007: 99-100). Other uses have also been put forward such as brewing (Moore & Quinn 2007: 8-9). There is even the possibility that these sites were used in the processing of metal ore (O'Brien 1999: 290-1). It is generally accepted that the function of *fulacht fiadh* troughs was to boil water, but how this water was subsequently utilised is notoriously difficult to ascertain. So far no specific evidence has been identified from the troughs to indicate how the hot water was used, and none of the possibilities i.e. cooking, washing, tanning, brewing etc. can be ruled out. A nearby water source would have been required in order to fill the troughs for boiling episodes. At Ardan it may have been available through the high level of the local water table.

In the case of a *fulacht fiadh*, stones were heated on a nearby fire and placed in a water-filled trough – sometimes lined with timber or stones – the heat from the stones would bring the water to boil. Once cool, the stones were removed from the trough and discarded; a characteristic mound or spread of heat-shattered stones was formed. A nearby water source would have been required in order to fill the troughs for boiling episodes. Often this mound forms a horseshoe shape. In this case however the mound consisted of a uniform layer spread out across the site, suggesting it had been partially leveled and spread out, presumably as a result of agricultural activity in the field. This material would have accumulated gradually as a result of dumping. The extent of the mound in relation to the volume of the troughs would point to their being re-used on a number of occasions. However individual tip-lines were not visible within this particular mound.

Troughs were often, though not always, lined with some impervious material such as clay, wood, stone or leather. At the site of Clashroe in Co. Cork, a partially destroyed wood lined trough was uncovered (Hurley, 1987: 97). This trough was constructed utilizing part of a hollowed out tree trunk to form the base and part of the sides of the trough. The remaining end of the trunk had had a groove/slot cut into it so that a plank of wood would be able to be slotted in to the trunk. The other end would presumably have had a similar slot, though that was destroyed by water erosion. Other sites such as Ballyclogh in Co. Cork (Lehane, 1988: 85) had troughs constructed out of flat planks which were set into a large pit. The shape of the wooden part of the trough would have been held in place at the corners by stakes. The space between the wooden part of the trough and the pit cut would then be filled by clay and stone packing material. Often the only trace visible of a trough with wooden lining would be a series of stake or postholes visible at the edges of the trough's base. Unlined troughs are known from such sites as Commons, Co. Limerick (Taylor and Bartlett 2002: 314-15) where a sub-oval trough was found under a burnt mound. The

excavators thought that this trough would have naturally filled with and retained water due to the water table and the natural sub-soil making the lining of it unnecessary.

Radiocarbon dating has shown the activity in trough (8) to post-date that at trough (11) by a minimum of one hundred years. This may reflect a multi-phase use of the site, and emphasises the suitability and attraction of this site for *fulachta fiadh*. 'The sites are frequently found together in groups… along the banks of a stream or in a marshy area within a few metres of each other' (O Drisceoil 1988). The discovery during excavation of another *fulacht fiadh*, E2847, 50 m to the north in an adjoining field highlights this fact. This site returned radiocarbon dates of 1634-1429 cal BC, placing it in at the interface between the early and middle Bronze Age. This again shows the attraction of this area over a relatively long timescale, and would suggest the possibility of further *fulachta fiadh* existing in the surrounding locality.

Other features are often found associated with burnt stone mounds such as pits, postholes, stakeholes, track-ways and platforms. Pits serve a number uses within the context of a burnt stone mound. They can be used as rubbish pits, roasting/cooking pits or wells. At Kilfinning, Co. Limerick (Dennehy 2002: 325-26), a number of 'pot boilers' were identified beneath a burnt stone mound. These features consist of pits containing burnt stone and their function seemed to be cooking 'hobs' on which ceramic vessels could be placed. The difficulty with these pit types would be to tell them apart from roasting pits found in similar sites such as at Roberts town, Co. Limerick (Dennehy 2002: 343-45). Postholes and stakeholes are often present either in the form of simple structures such as wind breaks or huts or associated with pits and troughs where they are part of a lining or racks close by.

There are over 4500 burnt mounds/*fulacht fiadh* to be found in Ireland, with new sites being identified due to the increase in new infrastructure work throughout the country. The majority of known *fulachta fiadh* are located in counties Cork (over 2000), Waterford, Kilkenny and Tipperary. Fourteen such *fulachta fiadh* are noted in the Archaeological Inventory of County Offaly, published in 1997, including a group of five at Garr in the extreme northeast of the county. This number did not include E2846, or E2847 situated 30 m to its south and excavated in tandem with this site. Indeed no similar features had previously recorded within a 15 km radius of this site. This however does not necessarily denote a lack of similar features in the surrounding country side. The period from 1974-2002 saw over 300 *fulachta fiadh* excavations, the only reported one in Offaly being a possible *fulacht fiadh* in Moneygall.

The relatively small number of these features in county Offaly may be a result of "the dominance of limestone in the underlying geology of the county as it can turn to lime when fired or turn to calcium hydroxide when heated stones are placed in the water" (McDermott 1998: 15). The shallow nature of the mounds at Ardan meant they had no recognisable surface features, as is the case with many *fulachta fiadh*, such as many of those uncovered in County Wicklow. None of the other known Offaly examples have been excavated, making any comparative analysis difficult. However the vast majority (10 of 14) of these are located at OD 65-100 m, as are the two at Ardan.

Recent excavation and survey evidence indicates that these burnt mounds occur not as isolated monuments in the landscape but as important indicators of Bronze Age settlement (Brindley, Lanting and Mook, 1989-90). Many contemporaneous sites have been identified and recorded in the archaeological inventory for County Offaly and a number in the landscape surrounding Ardan. Situated 1.5 km north of the *fulacht fiadh* excavated at Ardan,

in the townland of Lug, is a Bronze Age cemetery site 0F009-036. This consisted of an embanked cairn measuring 19.8 m in diameter and with a height of 1.2 m. Excavation in 1935 by Duignan uncovered seven cists and two pits containing a mix of inhumated and cremated burials. Within a central cist a female inhumation was accompanied by an upright food vessel, while another cist contained a second food vessel which had been crushed. Further pottery was found in another cist while the pits contained cremated bone and charcoal. South of this cemetery a disturbed cist OF009-039 was uncovered by a local farmer circa 1950.

Another 1.5 km north of this cemetery site is the standing stone at Ballynamona. Such stones range in date from the Bronze Age up until relatively modern times but were not all necessarily erected for the same purpose. The example at Ballynamona had an adjacent area excavated to its west by Duignan, also in 1935, uncovering a number of disarticulated human bones. 1.5 km west of here, 3 km north west of the *fulachta fiadh* at Ardan, was a ring-barrow in the townland of Balleek Beg. It was recorded by Davies in 1942 as part of an ITA Survey as, a "conical mound (H 0.91 m) enclosed by an inner fosse (Wth 1.82 m) and external bank (H 0.6 m)" (O'Brien *et al*, 1997), no visible remains are extant today.

The only recorded site in the locality of the *fulacht fiadh* at Ardan is a bivallate ringfort OF017-002. This is recorded in the Archaeological Inventory of County Offaly as "comprising a central platform enclosed by a poorly preserved internal bank visible at north only, with a fosse and external bank visible at south", and is situated 500 m northwest of the *fulachta fiadh* sites.

The local evidence for Bronze Age activity in Offaly in general is somewhat minimal, although recorded Bronze Age sites can be found in the vicinity of the site including Bronze Age cremations to the north (O'Brien *et al* 1997). Bronze Age evidence is also visible in the form of earthworks to the southwest and several other *fulachta fiadh* in the area. The area is gently sloping and generally low lying, as would be expected to provide the water necessary for use with the *fulacht fiadh*.

The lithic uncovered from the burnt mound (3) is a large rectangular flake. The flake is unretouched, but shows clear evidence of use in the form of wear along its left and right edges. It was produced using a bipolar percussion technique on beach pebble flint which is commonly associated with Late Neolithic and Bronze Age sites (Appendix 10). This corresponds with the radiocarbon dates retrieved from the troughs (8) and (11).

It is not unusual to recover single finds from Irish burnt mounds. Recent excavations in the southeast of Ireland revealed a similar pattern of very small assemblages found in association with *fulachta fiadh*, e.g. the N25 Waterford By-Pass. These assemblages are dominated by the use of beach pebble flint which is often worked using the bipolar method (Hegarty & Long 2005). The majority of *fulachta fiadh* have not contained artifacts, however, those containing material can usually be placed in the Bronze Age. Others, like E2847 have contained flint flakes and artifacts.

This *fulacht fiadh* displays many of the classic features of such a monument, including several troughs which may have served different functions such as cooking or bathing. The location of the *fulacht fiadh* below the water table provides the water needed for heating and the burnt stones form a flattened mound above them. The radiocarbon dates returned for this site indicate that it was in use for at least 100 years during the early to middle Bronze Age. The lithic material recovered is typical of the Late Neolithic to Bronze Age material,

providing additional support for the radiocarbon dates. Despite the minimal amount of Bronze Age monuments in Offaly, this site and ones nearby are helping to create a clearer picture of activity from that time period.

7 Bibliography

Archaeological Inventory of County Offaly. 1997. Caimin O'Brien and P. David Sweetman (compilers), Stationers Office: Dublin.

Bennett, I. 2003, *Excavations 2003*, Wordwell, Wicklow.

Bennett, I. 2002, *Excavations 2002*, Wordwell, Wicklow.

Bennett, I. 2001, *Excavations 2001*, Wordwell, Wicklow.

Brindley, Lanting and Mook. 1989-90, 'Radiocarbon dates from Irish *fulachta fiadh* and other burnt mounds' in *Journal of Irish Archaeology* No 5

Cherry, Stella. 1990, 'The finds from *fulachta fiadh*' in *Burnt Offerings: International Contributions to Burnt Mound Archaeology*, Dublin

Dennehy E. in Bennett I (Ed). 2002 *Excavations 2002. Summary accounts of archaeological excavations in Ireland.* Wordwell.

Griffiths Valuation, 1848-1864

Grogan E, O'Donnell L & Johnston P. 2007 *The Bronze Age Landscapes of the Pipeline to the West. An integrated archaeological and environmental assessment*. Wordwell.

Hegarty, L and Long, P. 2005, N25 *Waterford Bypass, Contract 3. Final Report on archaeological investigations at Sites 9-11 in the townland of Killaspy, Co Kilkenny*, Headland Archaeology Ltd.

Hurley M. 1987 *A fulacht fiadh at Clashroe, Meelin, Co. Cork*. Cork Historical & Archaeological Society Volume 102.

Manning, C. 1991 *Irish Field Monuments*, The Stationary Office, Dublin

McDermott, C. 1998 'The Prehistory of the Offaly Peatlands' in *Offaly History and Society: interdisciplinary essays on the history of an Irish county*, Geography Publications, Dublin

Mitchell, F and Ryan, M. 2003, *Reading the Irish Landscape*, Town House, Dublin

Moore, D and Quinn, B 2007. Ale, Brewing and *fulachta fiadh*. *Archaeology Ireland*, Vol. 21, No. 3.

National Inventory of Architectural Heritage (accessed at www.buildingsofireland.ie)

O'Brien, C and Sweetman, P.D. 1997, *Archaeological Inventory of County Offaly*, Dublin

O Drisceoil, D.A. 1988 'Burnt mounds: cooking or bathing?' in *Antiquity*, No 62

Ó Néill J. 2003-2004 *Lapidibus in Igne Calefactis Coquebatur: The Historical burnt mound 'tradition'* in The Journal of Irish Archaeology. Volumes XII & XIII.

1840 Ordnance Survey of County Offaly at 1:10,560. Sheet 17. First edition: surveyed 1838

Ordnance Survey Name Books (King's County)

O'Sullivan, M and Downey, L. 2004, "Knowing your Monuments: *Fulachta fiadh*" in *Archaeology Ireland* No.66, Spring 2004.

Record of Monuments and Places (accessed at www.archaeology.ie)

Stewart K, *Palaeoenvironmental Samples Assessment Report: Site E2846 – Ardan* 2. Headland Archaeology Ltd. Unpublished report

Sternke, F. *Lithics Finds Report for E2846 Ardan, Co. Offaly*. Department of Archaeology University College Cork

Waddell, J. 2000, *The Prehistoric Archaeology of Ireland*. Wordwell, London

Wilkins, B. 2007, *Final Report on archaeological investigations at Site E2437, a Bronze Age cremation pyre and burnt mound in the townland of Ballygarraun, South Newford, Co. Galway*, Headland Archaeology Ltd.

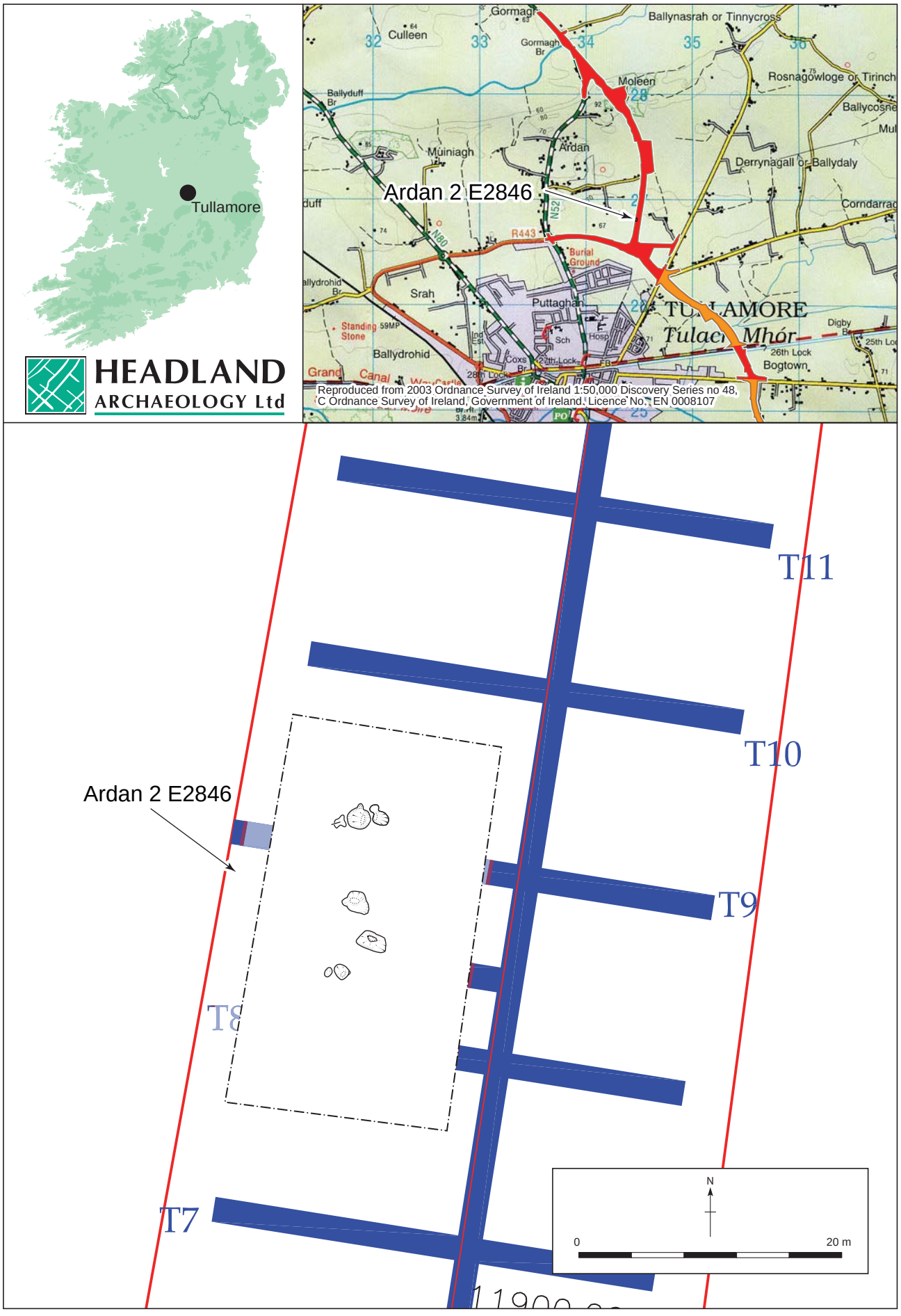

Figure 1 - N52 Tullamore Bypass: E2846 , Ardan 2, Site location

Bypass route is shown broken due to warp of scanned RMP's, this represents a best-fit.

Figure 2 - N52 Tullamore Bypass: E2846, Ardan 2, RMP extract

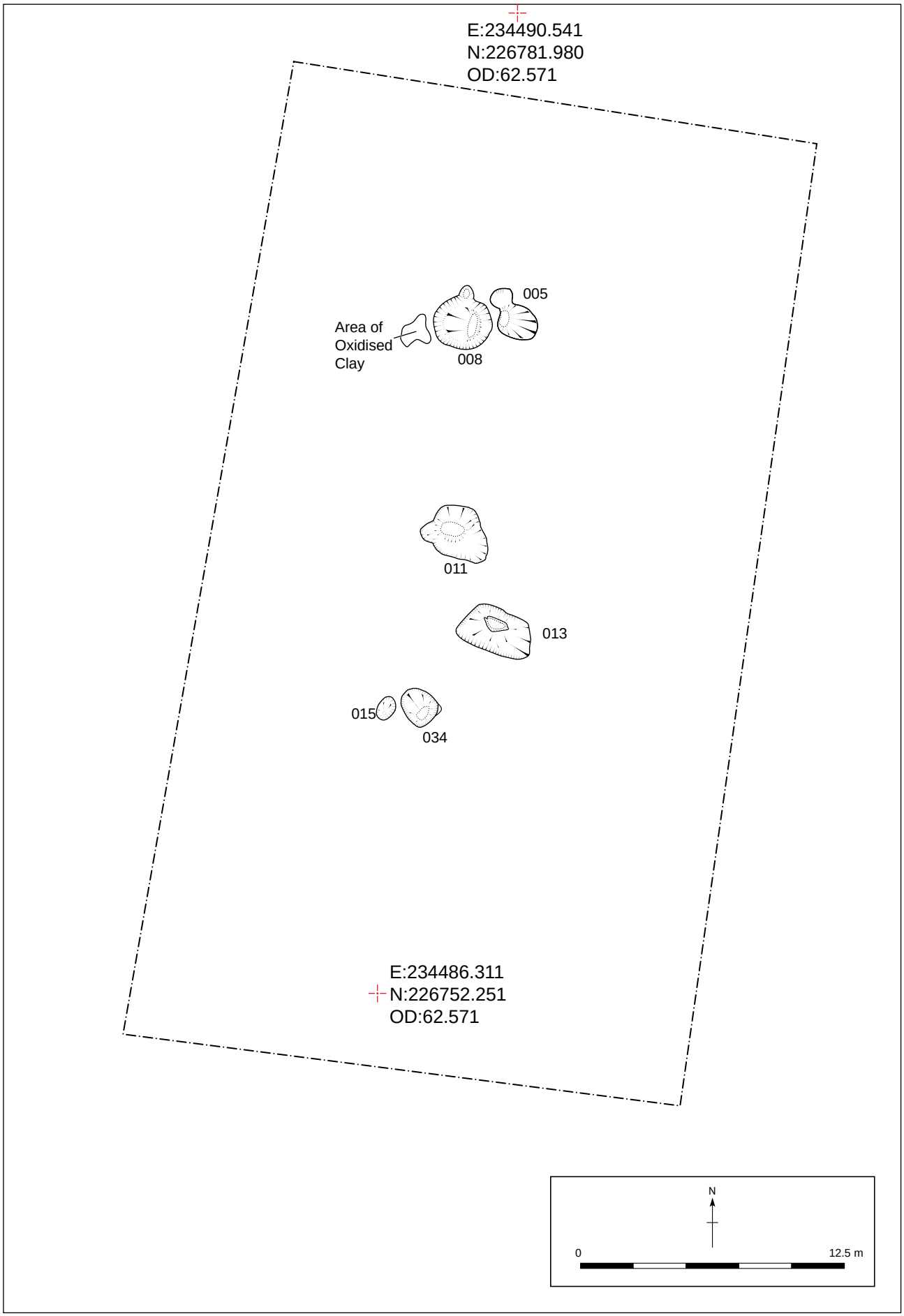

Figure 3 - N52 Tullamore Bypass: E2846 Ardan 2, Site plan

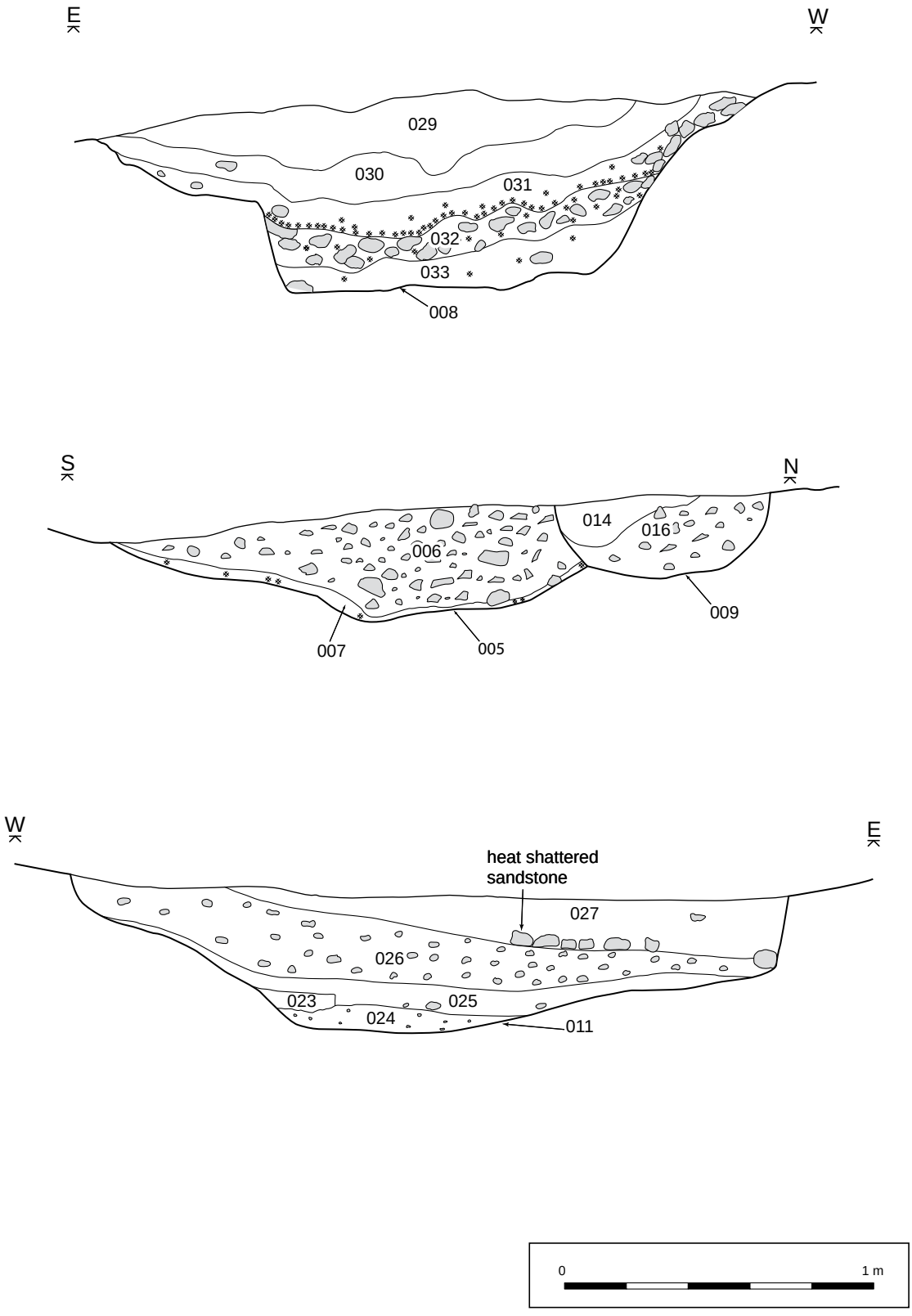

Figure 4 - N52 Tullamore Bypass: Sections of Troughs (5), (8) and (11)

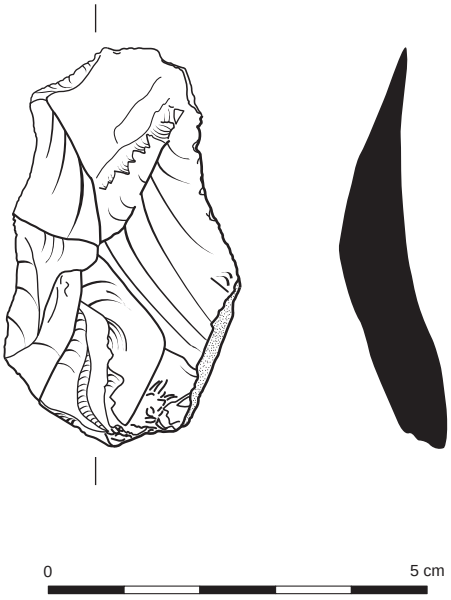

Figure 5 - N52 Tullamore Bypass: Flint flake (E2846:003:001)

Plate 1. Post - excavation of Burnt mound (30)

Plate 2. Post - excavation of Through (11)

Plate 3. Mid - excavation of Through (34)

Plate 4. Mid - excavation of Trough (8)

Plate 5. Post - excavation of Trough (8)

Plate 6. Post - excavation of Trough (5) and Pit (9) with Trough (8) in the background

Appendix 1: Context Register

C	Type	Fill Of	Filled By	D (m)	W (m)	L (m)	Description	Interpretation
1	Deposit	n/a	n/a	0.25-0.40	Site wide	Site wide	Dark brown clay	Topsoil
2	Deposit	n/a	n/a	n/a	Site wide	Site wide	Natural	Natural
3	Deposit	n/a	n/a	0.18	9.5 E-W	23.80 N-S	Irregular shaped loosely compacted mid-dark blackish brown sandy clay, with a large amount of heat shattered stone. Contained frequent inclusions of charcoal flecks and small roots.	Burnt mound
4	Deposit		n/a	n/a	n/a	n/a	Natural depression	
5	Cut	n/a	6, 7	0.15 min 0.66 max	1.40 E-W	1.69 N-S	Sub-oval shaped pit truncated by small pit (9) and 0.3m southeast of larger pit (8). Corners rectangular at northwest, non extant at north where it was truncated by (9), and rounded elsewhere. Breaks of slope were sharp on top except for the south and east where they were imperceptible, and were imperceptible at all points at the base. Sides were vertical/near vertical from west-south-east, and undercut to northwest. The base was flat with an oval shape, and located to the north of the feature. Situated under burnt spread (3).	Large pit/ possible trough

C	Type	Fill Of	Filled By	D (m)	W (m)	L (m)	Description	Interpretation
6	Deposit	5	n/a	0.04 min 0.35 max	1.35 E-W	1.51 N-S	Loosely compacted dark brownish black silty clay, with a large amount of heat shattered stones and frequent inclusions of charcoal flecks. Oval shaped in plan. Fill of (5) located above (7). Truncated by (9) to north. Similar to (3) and fill of troughs (11), (13), and (34)	Top fill of (5)
7	Deposit	5	n/a	0.02 min 0.06 max	1.40 E-W	1.54 N-S	Moderate-firmly compacted mid-blackish grey silty clay, with frequent inclusions of heat shattered stone and charcoal flecks. Oval shaped in plan. Basal fill of (5) located under (6). Truncated by (9) to north. Similar deposits found at the base of troughs (11), (13) and (34).	Basal fill of (5)
8	Cut	n/a	29, 30, 31, 32, 33	0.8	2.18 N-S	2.30 E-W	Circular shaped pit with vertical sides. Breaks of slope were imperceptible at all sides on top, and all sides on base except the north where it was sharp. Base was sub-circular with a slight descent to the south. Situated c.0.60 m east of scorched clay (18) and under burnt spread (3).	Large pit
9	Cut	n/a	14, 16	0.27 min 0.31 max	.70 N-S	0.86 E-W	Oval shaped pit with rounded corners which truncated (5) to its south and was	Small pit

C	Type	Fill Of	Filled By	D (m)	W (m)	L (m)	Description	Interpretation
							0.30m east of (8). Breaks of slope on top were sharp all around and on base were gradual-imperceptible. The sides were vertical/ near vertical to the east and north, undercut to the west, and non extant to the south. Situated under burnt spread (3).	
10	Void	n/a	n/a	n/a	n/a	n/a	n/a	n/a
11	Cut	n/a	23, 24, 25, 26, 27	0.43	2.21 NW-SE	2.64 NE-SW	Irregular shape in plan. Breaks of slope at top were sharp, while sides were near vertical/concave. Base was at two levels, the lower one being located to the west. Situated under burnt spread (3).	Trough
12	Void	n/a	n/a	n/a	n/a	n/a	n/a	n/a
13	Cut	n/a	3, 28	0.21	1.56 N-S	2.65 E-W	Large rectangular shaped pit with rounded corners. Breaks of slope were gentle at top and base, while the base was oval shaped and flat. Partially situated under burnt spread (3).	Trough
14	Deposit	9	n/a	0.03 min 0.15 max	0.47 N-S	0.86 E-W	Moderately compacted greyish brown clay, with frequent inclusions of an organic material and moderate heat shattered stone. Oval shape in plan. Fill of (9) located above (16) and over	Top fill of (9)

C	Type	Fill Of	Filled By	D (m)	W (m)	L (m)	Description	Interpretation
							(6) and (7) of (9).	
15	Cut	n/a	3	0.19	0.78 E-W	0.86 N-S	Sub-circular pit with rounded corners located 0.18m west of possible trough (34). Breaks of slope at top were sharp and at base were gradual, while sides were vertical to the west and convex elsewhere. Base was circular with irregular surface. Situated under burnt spread (3).	Small pit
16	Deposit	9	n/a	0.07 min 0.24 max	0.69 N-S	0.80 E-W	Loosely compacted mid-grey silty clay, with a large amount of heat shattered stone. Moderate inclusions of sand and occasional charcoal flecks. Fill of (9) deposited over the fills (6) and (7) of (5).	Basal fill of (9)
17	Void	n/a	n/a	n/a	n/a	n/a	n/a	n/a
18	Deposit	n/a	n/a	n/a	0.40 NE-SW	0.90 NW-SE	Irregular shaped area of scorched clay located 0.60m west of large pit (8).	Scorched clay from fire activity
19	Void	n/a	n/a	n/a	n/a	n/a	n/a	n/a
20	Void	n/a	n/a	n/a	n/a	n/a	n/a	n/a
21	Cut	n/a	22	0.1	0.39 E-W	0.40 N-S	Small square shaped pit with vertical sides, sharp breaks of slope, and a square shaped base with irregular surface.	Modern square cut feature
22	Deposit	21	n/a	0.1	0.39 E-W	0.40 N-S	Loose-moderately compacted dark brown clay	Fill of (21)

C	Type	Fill Of	Filled By	D (m)	W (m)	L (m)	Description	Interpretation
27	Deposit	11	n/a	0.19	1.6 N-S	1.82 E-W	Firmly compacted dark brownish grey sandy silty clay, with occasional inclusions of heat shattered stone, charcoal flecks and large stones. Situated below (3) and above (23), (24), (25) and (26).	Top fill of (11)
28	Deposit	13	n/a	0.06	1.40 N-S	1.7 E-W	Firmly compacted mid-grey clay, with a rectangular shape in plan located to the eastern side of (13). Moderate inclusions of charcoal flecks.	Basal fill of (13)
29	Deposit	8	n/a	0.23 max	n/a	1.75 E-W	Firmly compacted mid-brownish grey clay, with a sub-oval shape in plan. Frequent inclusions of an organic material and heat shattered sandstone. Situated over (30), (31), (32) and (33).	Top fill of (8)
30	Deposit	8	n/a	0.2	1.00 N-S	1.50 E-W	Firmly compacted mid-blackish grey silty clay, with a sub-oval shape in plan. Situated under (29), and above (31), (32) and (33).	Fill of (8). Possible interface between (29) and (31).
31	Deposit	8	n/a	0.12	1.4 N-S	1.77 E-W	Firmly compacted mid-greyish black clay, with a sub-oval shape in plan. Frequent inclusions of charcoal flecks. Situated under (29) and (30), and below (32) and (33).	Fill of (8)

C	Type	Fill Of	Filled By	D (m)	W (m)	L (m)	Description	Interpretation
32	Deposit	8	n/a	0.13	1.10 N-S	1..30 E-W	Loosely compacted greyish black silty sand, containing large amounts of heat shattered stone, with a sub-circular shape in plan. Frequent inclusions of charcoal and sub-angular stones. Situated under (29), (30) and (31), and above (33).	Fill of (8)
33	Deposit	8	n/a	0.15	1.10 N-S	1.20 E-W	Loosely compacted brownish orange silty sand, containing a large amount of heat shattered stone. Sub-circular shape in plan. Moderate inclusions of charcoal. Situated under (29), (30), (31) and (32).	Basal fill of (8)
34	Cut	n/a	3, 35	0.32min 0.35 max	1.23 E-W	1.56 N-S	Oval shaped pit with rounded corners 0.18m east of small pit (15). Breaks of slope were sharp at top and gradual at base with vertical sides between. Situated under burnt spread (3)	Small trough/ pot boiler
35	Deposit	34	n/a	0.07	1.23 E-W	1.56 N-S	Firmly compacted mottled orange/yellow clay. Oval shape in plan. Moderate inclusions of heat shattered stone and occasional charcoal flecks.	Basal fill of (34)

Appendix 2: Finds Register

Context	3			
Find No.	**Material**	**NMI No.**	**Date**	**Description**
1	Flint	E2846:003:001	Bronze Age	Large rectangular flake

Appendix 3: Sample Register

Sample	Context	Description
1	24	Brownish grey sand fill of trough (11)
2	3	Dark blackish brown sandy clay, with heat shattered stone, basal fill of trough (13)
3	28	Grey clay top fill of trough (13)
4	14	VOID
5	3	VOID
6	32	Greyish black silty sand, fill of trough (8)
7	33	Brownish orange silty sand, basal fill of trough (8)
8	26	Dark brownish black clayey silt, fill of trough (11)
9	3	Material from the burnt spread (3)

Appendix 4: Palaeoenvironmental Samples Assessment Report: Site E2846 – Ardan 2

Karen Stewart, Headland Archaeology

Introduction

Six samples were processed from the site E2486 (Ardan 2) on the NTB06 Tullamore Bypass route. These six samples have been assessed for environmental material, and the suitability of any remains for wood identification and Accelerated Mass Spectrometry (AMS) dating.

Methods

Samples of approximately 10L were taken on site under the direction of environmental archaeologist Susan Lyons. Samples were processed in laboratory conditions using a standard flotation method (cf. Kenward *et al*, 1980). The floating debris (flot) was collected in a 250 μm sieve and, once dry, scanned using a binocular microscope. Any remaining material in the flotation tank (retent) was wet-sieved through a 1 mm mesh and air-dried. This was then sorted by eye and any material of archaeological significance removed. All plant macrofossil samples were analysed using a stereomicroscope at magnifications of x10 and up to x100 where necessary to aid identification. Identifications were confirmed using modern reference material and seed atlases including Cappers *et al* (2006).

Results

The results are summarised below in Tables 1 (retent samples) and 2 (flotation samples).

Table 1: Composition of retents

Sample number	Context number	Retent vol. (L)	Wood charcoal		Carbonised hazelnut shell	Mammal bone		Flint	Chert debris
			Qty	AMS		Burnt	Unburnt		
1	24	2l	++	*	+	+			+
2	3	0.3l	+						+
3	28	0.1l	++					+	
6	32	0.5l	+						
7	33	1.5l	+++	*					+
8	26	1.5l	++						

Table 2: Composition of flots

Sample Number	Context Number	Total flot Vol. (ml)	Charcoal Quantity	AMS	Comments
1	24	10	++++	*	
2	3	5	+		
3	28	2	+++		
6	32	5	+++		Mollusc shell +
7	33	5	+		
8	26	1	+		

Key: + = rare, ++ = occasional, +++ = common and ++++ = abundant
* = sufficient sized charcoal for identification and AMS dating

Plant remains
All of the samples assessed were found to contain charcoal with Sample 1 the most charcoal rich. Samples 1 and 7 were the only samples to contain charcoal fragments of sufficient size and quantity for identification and Accelerated Mass Spectrometry (AMS) dating.

The only plant remain, other than charcoal, to be found was carbonised hazel (*Corylus avellana*) nutshell, in Sample 1.

Other Finds
Lithics were represented in the form of chert debris in Samples 1, 2 and 7, and flint in Sample 3. Burnt bone was also recovered from Sample 1, and mollusc shells were noted in the flotation remains from Sample 6.

Radiocarbon dates
Radiocarbon dating was undertaken by Stephen Hoper at Queens University Belfast, after Stuiver, M. *et al*

Context Number	Lab Number	Description	Radiocarbon Date BP	Calibrated range (2 sigma) calendar yrs
24	UB-8276	*Corylus avellana* charcoal	3668 +/- 36	2141 - 1944 BC
32	UB-8277	*Pomoideaceae* charcoal	3438 +/- 36	1834 - 1664 BC

For full calibration data see Appendix 5.

Discussion
Though charcoal was noted in all of the samples processed, it was abundant in only one sample – Sample 1. The size and quality of the charcoal was suitable in only two samples for Accelerated Mass Spectrometry dating. This may indicate that little charcoal was present in the sampled contexts to begin with, or that the charcoal was significantly abraded before or during deposition.

The carbonised hazel nutshell found in Sample 1 may represent evidence of the exploitation of natural resources for foodstuffs.

Samples 1 and 8 represent two fills ((24) and (26)) of a trough (11). Though both contain charcoal, Sample 1 has more significant quantities. Sample 1 also contains burnt bone and burnt hazel nutshell fragments. The burnt bone, hazel nutshell and charcoal may represent domestic waste from cooking foodstuffs. As Sample 1 is taken from (24), the basal fill of (11), it is probable that this context represents the original use of the feature. This context returned a date of 2141 - 1944 cal BC, placing it firmly in the Bronze Age.

Samples 6 and 7 are both taken from fills of trough (8), fills (32) and (33) respectively. Sample 7 represents the basal fill of the feature. Both of these samples contained charcoal, though only Sample 7 in significant quantities. Sample 7 also contained chert debris, while the upper fill did not. Material from (32) was dated using AMS and returned a date of 1834 - 1664 cal BC placing it in the Bronze Age.

Sample 3 was also taken from the basal fill of a trough, in this case (13). It contained both charcoal and flint, implying at least that it is the product of human activity.

Sample 2 was taken from a burnt mound (3), which makes the low levels of charcoal somewhat surprising.

References

Cappers R.T.J., Bekker R.M. and Jans J.E.A (2206) *Digital seed atlas of the Netherlands* (Barkhuis Publishing and Groningen University Library, Groningen).

Kenward, H.K., Hall, A.R. and Jones, A.K.G (1980). A tested set of techniques for the extraction of plant and animal macrofossils from archaeological deposits. *Science and Archaeology* 22, 3-15.

Stuiver, M & Reimer P J 1993 'Extended 14C data base and revised CALIB 3.0 14C Age calibration program' *Radiocarbon* 35(1):215-230.

Appendix 5: Radiocarbon calibration data

Context Number	Lab Number	Radiocarbon Date BP	68.30% (1-sigma) calendar yrs	95.40% (2-sigma) calendar yrs AD	Relative area of 2-sigma under probability distribution	Calibrated range (2 sigma) calendar yrs
24	UB-8276	3668 +/- 36	1607 - 1499 BC	2190 - 1944 BC	0.989	2141 - 1944 BC
32	UB-8277	3438 +/- 36	1867 - 1689 BC	1880 - 1643 BC	0.819	1834 - 1664 BC

Appendix 6: Photographic Register

Shot	Type	Facing	Description
1	Pre ex	N	Ardan 2
2	Pre ex	W	Ardan 2
3	Pre ex	W	Ardan 2
4	Pre ex	S	Ardan 2
5	Pre ex	E	Ardan 2
6	Pre ex	NE	Ardan 2
7	Working	SW	Working shot
8	Working	NW	Working shot
9	VOID	SE	Sunrise
10	Mid ex	NW	Burnt spread (3)
11	Mid ex	W	Burnt spread (3)
12	Mid ex	NW	Burnt spread (3)
13	Mid ex	E	Burnt spread (3)
14	Mid ex	NE	Burnt spread (3)
15	Mid ex	N	Burnt spread (3)
16	Mid ex	SE	Burnt spread (3)
17	Mid ex	SE	Burnt spread (3)
18	Mid ex	SE	Burnt spread (3)
19	Mid ex	S	Burnt spread (3)
20	Mid ex	NE	Burnt spread (3)
21	Mid ex	NE	Burnt spread (3)
22	Mid ex	NW	Burnt spread (3)
23	Mid ex	NW	Burnt spread (3)
24	Mid ex	W	Burnt spread (3)
25	Mid ex	W	Burnt spread (3)
26	Mid ex	W	Burnt spread (3)
27	Pre ex	N	Burnt spread (3)
28	VOID	N	VOID
29	VOID	N	VOID
30	VOID	N	VOID
31	VOID	N	VOID
32	Pre ex	N	Pit (8)
33	VOID	N	VOID
34	VOID	N	VOID
35	VOID	N	VOID
36	Post ex	NW	Burnt spread (3)
37	Post ex	NW	Burnt spread (3)
38	Post ex	N	Burnt spread (3)
39	Post ex	N	Burnt spread (3)

Shot	Type	Facing	Description
40	Post ex	NE	Burnt spread (3)
41	Post ex	NE	Burnt spread (3)
42	Post ex	E	Burnt spread (3)
43	Post ex	E	Burnt spread (3)
44	Post ex	SE	Burnt spread (3)
45	Post ex	SE	Burnt spread (3)
46	Post ex	NE	Burnt spread (3)
47	Post ex	NE	Burnt spread (3)
48	Post ex	N	Burnt spread (3)
49	Pre ex	W	Trough (11)
50	Pre ex	W	Trough (11)
51	Pre ex	W	VOID
52	Pre ex	W	VOID
53	Pre ex	W	Trough (13)
54	Pre ex	W	Trough (13)
55	Pre ex	N	Pit (15)
56	Pre ex	N	Pit (15)
57	VOID	N	VOID
58	VOID	N	VOID
59	Pre ex	N	Pitt (15) and small trough (34)
60	VOID	N	VOID
61	VOID	N	VOID
62	Section	S	Burnt spread (3)
63	Section	S	Burnt spread (3), W end
64	Section	S	Burnt spread (3), middle
65	Section	S	Burnt spread (3), middle
66	Section	S	Burnt spread (3), E end
67	Section	N	Burnt spread (3), W end, Section 2
68	Section	N	Burnt spread (3), middle, Section 2
69	Section	N	Burnt spread (3), middle, Section 2
70	Section	N	Burnt spread (3), middle, Section 2
71	Section	N	Burnt spread (3), middle, Section 2
72	Section	N	Burnt spread (3), middle, Section 2
73	Mid ex	S	Scorched clay (18)
74	Mid ex	S	Scorched clay (18)
75	VOID	W	VOID
76	VOID	W	VOID
77	VOID	W	VOID
78	Section	N	Trough (11) with clay *in situ*, Section 4
79	Section	W	Trough (11) with clay *in situ*
80	Section	N	Trough (11) with clay *in situ*
81	Section	N	Trough (11) with clay *in situ*, E

Shot	Type	Facing	Description
82	Section	N	Trough (11) with clay *in situ*, W
83	VOID	W	VOID
84	VOID	W	VOID
85	Section	N	Trough (11)
86	Section	N	Trough (11)
87	Section	N	Trough (11)
88	VOID	W	VOID
89	VOID	W	VOID
90	Section	W	(21) and (22)
91	Section	W	(21) and (22)
92	Section	W	(21) and (22)
93	Section	W	Trough (13)
94	Section	W	Trough (13)
95	VOID	SE	VOID
96	VOID	SE	VOID
97	VOID	NW	VOID
98	Post ex	N	Trough (13), Plan 20
99	Post ex	S	Trough (13), Plan 20
100	VOID	NW	VOID
101	Post ex	NW	Trough (13), Plan 20
102	VOID	E	VOID
103	Section	S	Pit (8), Section 11
104	Section	S	Pit (8), Section 11
105	VOID	S	VOID
106	Section	S	Small trough (34), Section 14
107	Post ex	SE	Pit (15), Plan 17
108	Post ex	SE	Pit (15), Plan 17
109	Post ex	NW	Small trough (34), Plan 17
110	Section	N	Trough (11) at baulk
111	Post ex	S	Pit (15), Plan 17
112	Section	W	Trough (5) and pit (9), Section 15
113	Post ex	S	Pit (8), Plan 16
114	Post ex	N	Pit (8), Plan 16
115	Post ex	S	Pit (8), Plan 16
116	Post ex	W	Trough (5) and pit (9), Plan 16
117	Post ex	N	Trough (5) and pit (9), Plan 16
118	Post ex	S	Trough (5) and pit (9), Plan 16
119	Post ex	E	Trough (11), Plan 18
120	Post ex	NW	Trough (11), Plan 18
121	Post ex	N	Trough (11), Plan 18
122	Post ex	SE	Trough (11), Plan 18
123	Post ex	S	Trough (11), Plan 18
124	Post ex	N	Trough (11), Plan 18, detail of central depression
125	Post ex	W	Trough (11), Plan 18, detail of W edge
126	Post ex	W	Trough (11), Plan 18

Appendix 7: Drawing Register

Dwg	Type	Area	Scale	Description
1	Plan		1:50	Pre-ex plan of Ardan 2, Sheets 1-4
2	Section		1:10	S facing section of fulacht spread (3), Sheet 5
3	Plan		1:50	Mid ex plan of Ardan 2, Sheets 6-9
4	Section		1:10	S facing section of trough (11), Sheet 10
5	Section		1:10	VOID, Sheet11
6	Section		1:10	VOID, Sheet11
7	Section		1:10	W facing section of pit (15), Sheet 11
8	Plan		1:20	Pre ex plan of features, Sheets 12-14
9	Section		1:10	VOID
10	Section		1:10	S facing section of trough (13), (3) and (28), Sheet 11
11	Section		1:10	N facing section of (8), Sheet 15
12	Section		1:10	VOID, Sheet 15
13	Section		1:10	VOID, Sheet 15
14	Section		1:10	E facing section of (34), Sheet11
15	Section		1:10	E facing section of (5) AND (9), Sheet 10
16	Plan		1:20	Post ex plan of (5), (8) and (9), Sheet 16
17	Plan		1:20	Post ex plan of (trough (34) and pit (15), Sheet 16
18	Plan		1:20	Post ex plan of trough (11), Sheet17
19	Plan		1:50	Post ex plan of Ardan 2, Sheets 18-21
20	Plan		1:20	Post ex plan of trough (13), Sheet 17

Appendix 8: Charcoal Species Identification

Sample Number	Context Number	Material	*Taxon*	Common Name	Weight (g)
1	24	Charcoal	*Corylus avellana*	hazel	0.1
6	32	Charcoal	*Pomoideaea sp.*	apple/pear/hawthorn	0.3
7	33	Charcoal	*Quercus sp.*	oak	0.2

Appendix 9: Lithics Finds Report for E2846 Ardan, Co. Offaly

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Introduction

One lithic find from the archaeological investigations of a possible Bronze Age site along the route of the N52 Tullamore Bypass at Ardan was presented for analysis (Table 1). The find is associated with the remains of a *fulacht fiadh* with associated pits and troughs.

Find Number	Context	Material	Type	Cortex	Condition	Length (mm)	Width (mm)	Thickn. (mm)	Complete	Retouch
E2846:3:1	3	Flint	Flake	Yes	Reasonably Fresh	53	31	8	Yes	No

Table 1 Composition of the lithic assemblage from Ardan (E2846)

Methodology

All lithic artefacts were examined visually and catalogued using Microsoft Excel. The following details were recorded for each artefact which measured at least 2 cm in length or width: context information, raw material type, artefact type, the presence of cortex, artefact condition, length, with and thickness measurements, fragmentation and the type of retouch (where applicable). The technological criteria recorded are based on the terminology and technology presented in Inizan *et al.* 1999. The general typological and morphological classifications are based on Woodman *et al.* 2006. Struck lithics smaller than 2 cm were classed as debitage and not analysed further. The same was done with natural chunks.

Quantification

The lithic is a worked flint (Table 1).

Provenance

The artefact was recovered from the burnt *fulacht fiadh* spread (C3).

Condition:

The lithic survives in a reasonably fresh and complete condition.

Technology/Morphology:

The artefact which retains cortex on its platform is a large rectangular flake which measures 53 mm in length, 31 mm in width and 8 mm in thickness. It was produced using the bipolar percussion technique on a beach pebble core.

The flake is unretouched, but shows clear evidence of use in the form of wear along its left and right edges.

Dating:
The use of the bipolar technology is generally dated to the Late Neolithic and the Bronze Age (O'Hare 2005; Woodman *et al.* 2006). The technological character and large size of the flake would suggest a dating to the final stages of the Neolithic or Early Bronze Age date, which concurs with the excepted dating of the use of *fulachta fiadh*.

Conservation
Lithics do not require specific conversation, but should be stored in a dry, stable environment. Preferably, each lithic should be bagged separately and contact with other lithics should be avoided, so as to prevent damage and breakage, in particular edge damage which could later be misinterpreted as retouch. Larger and heavier items are best kept in individual boxes to avoid crushing of smaller assemblage pieces.

Comparative Material
It is not unusual to recover single finds from Irish burnt mounds. Recent excavations in the south-east of Ireland revealed a similar pattern of very small assemblages found in association with *fulachta fiadh*, e.g. the N25 Waterford By-Pass (Woodman 2006). These assemblages are dominated by the use of beach pebble flint which is often worked using the bipolar method (see also O'Hare 2005).

Discussion
The lithic find from the archaeological investigations at Ardan (E2846) along the route of the N52 Tullamore Bypass is a large rectangular flake which was produced using a bipolar percussion technique on beach pebble flint which is commonly associated with Final Neolithic and Bronze Age sites. The find is clearly associated with, perhaps domestic, activities that took place at the *fulacht fiadh*.

This site is of minor importance for Neolithic and Bronze Age settlement and related sites in Co. Offaly.

Recommendations for Illustration
- Flake (E2846:3:1)

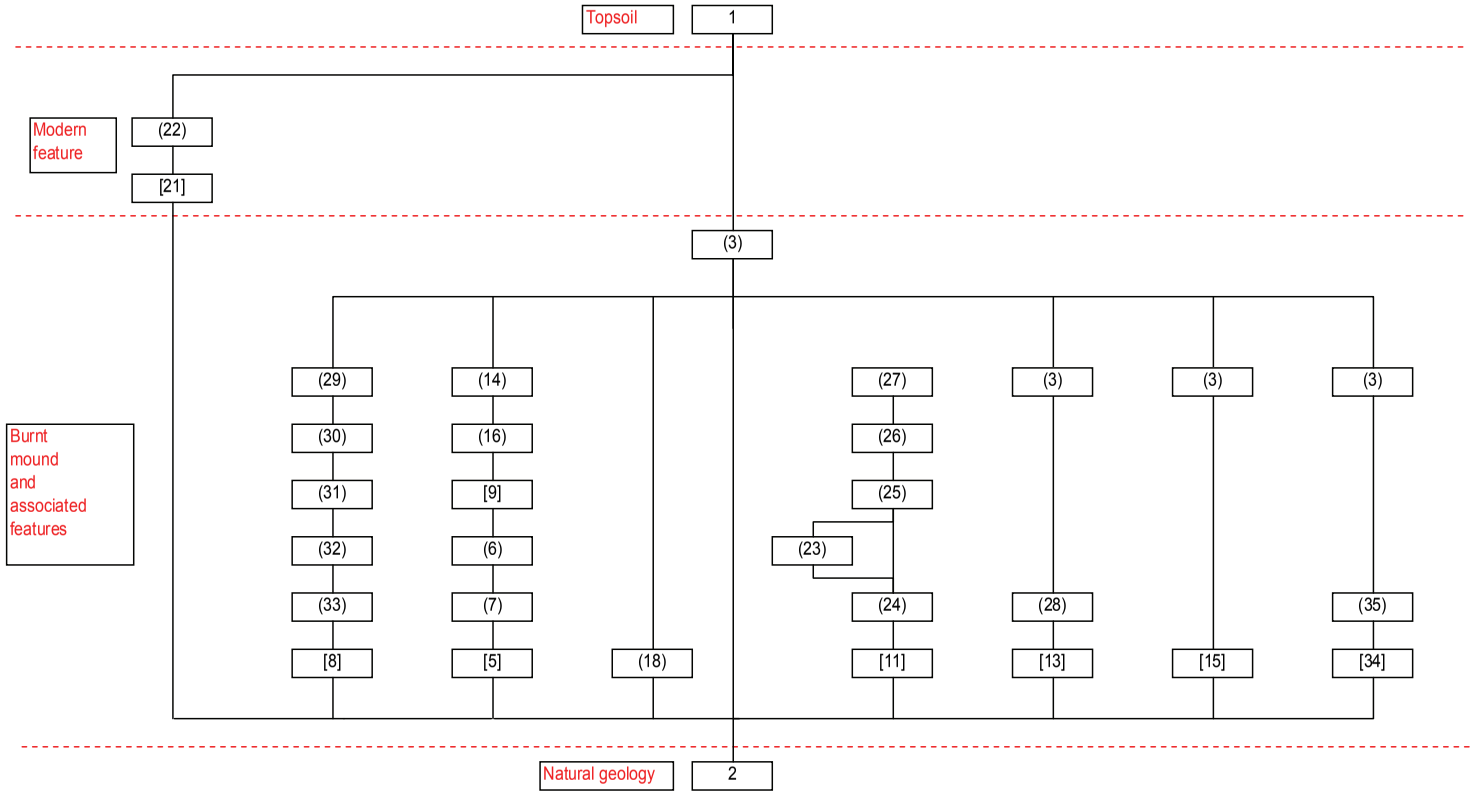
Bibliography
Inizan, M.-L., M. Reduron-Ballinger, H. Roche and J. Tixier 1999. *Technology and Terminology of Knapped Stone* 5. CREP, Nanterre.

O'Hare, M. B., 2005. *The Bronze Age Lithics of Ireland.* Unpublished PhD Thesis. Queen's University of Belfast.

Woodman, P.C. 2006. *The significance of the lithic assemblages from the archaeological excavations on the Waterford By-Pass.* Unpublished Report for Headland.

Woodman, P. C., Finlay, N. and E. Anderson 2006. *The Archaeology of a Collection: The Keiller-Knowles Collection of the National Museum of Ireland*. National Museum of Ireland Monograph Series 2. Wordwell, Bray.

Appendix 10: Site Matrix



Appendix 11: All sites on road scheme

Ardan 1	E2847
Ardan 2	E2846
Ardan 3	E2493*
Ballynasrah	E2493*
Cloncollog 1	E2849
Cloncollog 2	E2850
Clonminch	E2851
Mucklagh 1	E2845
Mucklagh 2	E2844
Puttaghan	E2493*
Screggan 2	E2848

*Fully excavated during Centreline Testing under Ministerial Direction A033 and NMS Registration No. E2493