M9 KILCULLEN MOTORWAY SERVICE AREA

Ministerial Direction Scheme Reference No.	A058
Registration No.	E4386
Site Name	Kilgowan 1
Townland	Kilgowan
County	Kildare
Excavation Director	Tim Coughlan
NGR	283529/204663

FINAL REPORT

ON BEHALF OF NRA

FEBRUARY 2013

IAC Irish Archaeological Consultancy

PROJECT DETAILS

Project	M9 Kilcullen Motorway Service Area
Ministerial Direction Reference No.	A058
Excavation Registration Number	E4386
Excavation Director	Tim Coughlan
Senior Archaeologist	Tim Coughlan
Consultant	Irish Archaeological Consultancy Ltd, 120b Greenpark Road, Bray, Co. Wicklow
Client	NRA
Site Name	Kilgowan 1
Site Type	Burnt Mound, troughs and pits
Townland(s)	Kilgowan
Parish	Kilcullen
County	Kildare
NGR (easting)	283529
NGR (northing)	204663
Height OD (m)	115
RMP No.	N/A
Excavation Dates	11th – 29th July 2011.
Project Duration	30th May – 10th October 2011.
Report Type	Final
Report Date	February 2013
Report By	Tim Coughlan
Report Reference	Coughlan, T. 2013 E4386 Kilgowan 1 Final Report. Unpublished Final Report. National Monument Service. Department of Arts, Heritage and the Gaeltacht, Dublin.

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Irish Archaeological Consultancy Ltd would like to acknowledge the assistance of the following in bringing the project to a successful conclusion:

NRA
Project Archaeologist Noel Dunne
Landowner Liaison John O'Donovan

Consulting Engineers: - Halcrow Barry
Peter Morehan
Michael Scully

ABSTRACT

This is the final report for an archaeological excavation of Kilgowan 1, which was located within the footprint of the M9 Kilcullen Motorway Service Area. Kilgowan 1 was discovered during advance archaeological testing carried out by James Kyle of Irish Archaeological Consultancy Ltd along the proposed scheme in May and June 2011 (Licence Ref.: E4373). The excavation was carried out by Tim Coughlan of Irish Archaeological Consultancy Ltd on behalf of the National Roads Authority. The work was carried out under Ministerial Direction number A058 and Licence Ref.: E4386. The fieldwork took place between 11th and the 29th July 2011.

The excavation at Kilgowan 1 comprised of early Bronze Age burnt mound activity. The mound, which was largely levelled, was made up of heat shattered stone and charcoal rich soil. The burnt mound measured 15.9m x 15.9m x 0.35m and sealed four earth cut pits and two troughs. It is also possible that, based on the size of the Trough C17, it was used for water storage or management rather than heating.

Oak, alder, hazel, willow, yew, ash and pomaceous woods were all identified in the charcoal remains retrieved from Kilgowan 1. These species are commonly identified in other burnt mound deposits especially alder and willow which are often located within marginal marshy land. Firewood is generally collected within proximity to the site therefore the nearby woodlands would have contained oak, ash and hazel.

Two samples of charcoal were chosen for dating from pit fill C9 and trough fill C16. Both of these dates returned early Bronze Age date ranges of 2295–2050BC and 2138–1947BC (UB 20518–9).

The site conforms broadly in terms of physical location, function and form to other known examples although its dating would be early in the typologically chronology, but not unknown. The site is important locally as it adds to the existing small and localised evidence of settlement dating to the period.

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1 INTRODUCTION

This report presents the results of the archaeological excavation of Kilgowan 1 carried out in the townland of Kilgowan, Co. Kildare (Figures 1–3). This work was undertaken as part of an archaeological mitigation program completed under the Archaeological Consultancy Services Contract for the M9 Kilcullen Motorway Service Area. Archaeological fieldwork was directed by Tim Coughlan of Irish Archaeological Consultancy Ltd (IAC) under Excavation Licence E4386 as issued by the Department of Arts, Heritage and the Gaeltacht (DoAHG) in consultation with the National Museum of Ireland. The work was untaken on behalf the National Roads Authority and it took place between the 11th and the 29th July 2011.

1.1 The Development

This development forms part of the NRA overall scheme for establishing service areas along lengths of motorway and high quality dual carriageways throughout Ireland, to promote safer driving. The service and rest areas will provide drivers with the opportunity to rest and avail of services between major urban centres and thereby reduce the risk of accidents along these routes due to driver fatigue. In accordance with the NRA policy of spacing service areas at intervals of approximately 50-60km where feasible, it would be appropriate to provide one service area on the M9 motorway. The scheme is located in the townlands of Halverstown and Kilgowan.

A Service Area is being planned adjacent to the M9 and located within the townlands of Halverstown and Kilgowan, parish of Kilcullen and Barony of Kilcullen, Co. Kildare. The nearest town, Kilcullen is located *c*. 4.5km to the north, whilst the village of Calverstown is, located *c*. 2.7km to the west. The area comprises 11.9 hectares of predominantly tillage land, with improved pasture. The overall landscape is undulating with the site being located on a predominantly well-drained south-east facing slope. The lower ground in the east and south east is wetter.

Kilgowan 1 is located within the townland of Kilgowan, Co. Kildare. The site was situated within the southern limit of the development to the immediate west of the existing M9 motorway in an area of wet marshy ground.

In terms of the Irish National Grid Kilgowan 1 was located at 283529/204663.

1.2 Previous Archaeological Work

1.2.1 EIS

An Environmental Impact Statement was prepared for the M9 Service Area in 2008 by Halcrow Barry. The Cultural Heritage chapter of this report confirmed that no recorded archaeological sites would be impacted by the proposed scheme (Margaret Gowan Ltd, 2008). The report concluded that given the potential for discovery of previously unknown sites or features in the proposed service area, that a programme of archaeological test excavation be undertaken within the land acquisition area of the proposed service area.

Additionaly this report highlighted two sections of the Kilgowan / Halverstown and Kilgowan / Killinane townland boundaries which would be impacted by the proposed development. The report recommended that these boundaries be recorded by a suitably qualified archaeologist prior to removal.

1.2.2 Testing

Testing was carried out along the length of the proposed development by James Kyle of IAC Ltd under excavation licence number E4373, as issued by the Department of Arts, Heritage and the Gaeltacht in consultation with the National Museum of Ireland. The work was untaken on behalf of the National Roads Authority and it took place between the 30th May and 3rd June 2011.

Six archaeological sites were discovered during the course of the works (Kilgowan 1–5 and Halverstown 1). Halverstown 1 was identified as a series of linear ditches, pits and areas of burning. A souterrain was further identified at Halverstown 1 during excavation (Coughlan, 2013a). Five areas of archaeological significance were identified in Kilgowan (Coughlan, 2011). A large burnt mound (Kilgowan 1) was identified at the very southern boundary of the development area, immediately to the west of the existing M9 motorway. A further burnt mound (Kilgowan 5) was found to the north of this on the eastern side of the motorway. At the west extent of the development two ditches containing medieval pottery (Kilgowan 3) and a number of further small features containing medieval pottery as well as a medieval lime kiln (Kilgowan 2) were identified while several isolated prehistoric pits (Kilgowan 4) were identified approximately 170m to the north east of this.

1.3 Excavation Methodology

The methodology adopted was in accordance with the approved Method Statement. The topsoil was removed to the interface between natural and topsoil using a 20 tonne mechanical excavator equipped with a flat toothless bucket under strict archaeological supervision across an area measuring 538.7m². The remaining topsoil was removed by the archaeological team with the use of shovels, hoes and trowels in order to expose and identify the archaeological remains. A site grid was set up at 10m intervals and was subsequently tied in to the national grid using GPS survey equipment.

All archaeological features were fully excavated by hand and recorded on *pro forma* record sheets using a variant of the single context recording system with plans and sections being recorded at a scale of 1:50, 1:20 or 1:10 as appropriate.

A complete photographic record was maintained throughout the excavation. Digital photographs were taken of all features and of work in progress.

An environmental strategy was devised at the beginning of the excavation which consisted of a combination of targeted and random bulk sampling. This ensured that noticeably rich contexts were sampled, but also allowed for samples where environmental remains may not have been obvious. Features exhibiting large amounts of carbonised material such as troughs and hearths were the primary targets as well as structural stakeholes and postholes. Wood samples were also taken where possible.

All artefacts uncovered on site were dealt with in accordance with the guidelines as issued by the NMI and where warranted in consultation with the relevant specialists. All artefacts, ecofacts and paper archive are currently stored in IAC's facility in Lismore, Co Waterford and will ultimately be deposited with the National Museum of Ireland.

Dating of the samples from the site was carried out by means of AMS (Accelerator Mass Spectrometry). Radiocarbon Dating of two charcoal samples from Kilgowan 1 was undertaken. All calibrated radiocarbon dates in this report are quoted to two Sigma.

All excavation and post excavation works were carried out in accordance with the relevant approvals and in consultation and agreement with the National Roads Authority (NRA) Project Archaeologist, the National Monuments Section of the DoAHG and the National Museum of Ireland. Where necessary licences to alter and export archaeological objects were sought from the National Museum of Ireland.

Final Report Date Ranges

The following date ranges for Irish prehistory and medieval periods are used for all final reports for the M9 Kilcullen Motorway Service Area excavations.

Mesolithic: 7000–4000BC
Neolithic: 4000–2500BC
Early Bronze Age: 2500–1700BC
Middle Bronze Age: 1700–1200BC
Late Bronze Age: 1200–800BC
Iron Age: 800BC–AD500
Early medieval period: AD500–1100
Medieval period: AD1100–1600
Post-medieval: AD1600–1800

Source:
Carlin, N., Clarke, L. & Walsh, F. 2008 *The M4 Kinnegad-Enfield-Kilcock Motorway: The Archaeology of Life and Death on the Boyne Floodplain*. NRA Monograph Series No. 2, Wordwell, Bray.

2 EXCAVATION RESULTS

2.1 Natural Geology

The natural subsoil at the site comprised compact grey yellow silt C2.

2.2 Early Bronze Age Activity

Bronze Age activity at the site comprised a burnt mound with four associated pits and two troughs, consistent with those typical of the 2nd millennium BC.

2.2.1 Trough C14

Contexts

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C14	N/A	1.9	1	0.35	Sub rectangular, steep sides, flat base	Cut of trough
C15	C14	1.9	1	0.1	Compact black silt clay 20% burnt stones	Fill of trough
C16	C14	1.9	1	0.25	Loose black silt clay 80% burnt stone	Fill of trough

Finds: None

Interpretation

Trough C14 was located to the north-west of the centre of the site (Figure 4). It was sealed by the burnt mound deposit C3. It was sub-rectangular in plan with steep sides and a flat base and was filled by C15 and C16 (Plate 2). Primary fill C16 was made up of 80% burnt stones in a loose black silt clay. A quantity of burnt stone (2126g) was retrieved from samples of C16. The trough is believed to have been used to hold water which was heated by adding hot stones from a fire. This heated water could then be used for a number of purposes such as cooking or bathing. While no stakeholes were noted in the base or at the corners it is possible that the steep sides of the trough were plank-lined.

A sample retrieved from trough fill C16, which was processed during post-excavation and produced a charcoal-rich flot (106.9g). This sample contained remains of five wood charcoal species, including alder (*Alnus glutinosa*), oak (*Quercus* sp.), pomaceous wood (*Maloideaea* spp.), ash (*Fraxinus excelsior*) and willow (*Salix* sp.). These species are commonly identified within burnt mound material especially alder and willow which often grow within marginal marshy land (Lyons, Appendix 2.1)

A sample of willow (*Salix Sp.*) charcoal (0.2g) from C16, the fill of trough C14, was chosen for AMS dating. The charcoal returned an AMS result of 3777±32BP (UB 20519). The 2 Sigma calibrated result for this was 2295–2050BC (Appendix 2.4), indicating a date in the early Bronze Age period for this feature.

2.2.2 Pit C12

Contexts

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C12	N/A	1.6	0.9	0.55	Oval, steep sides, flat base	Cut of pit
C13	C12	1.6	0.9	0.55	Loose black silt charcoal, burnt stones	Fill of pit

Finds: None

Interpretation

Pit C12 was located towards the centre of the site, 0.4m to the south-east of trough C14, sealed beneath burnt mound C3 (Figure 4). It was sub-oval in plan and was filled by C13, a loose black silt clay (Plate 7). A quantity of burnt stone (3436g) was retrieved from samples of C13. The function of this pit is unclear.

A sample was retrieved from pit fill C13 which was processed during post-excavation and produced a charcoal-rich flot (17.1g). This sample contained remains of five wood charcoal species, including alder (*Alnus glutinosa*), oak (*Quercus* sp.), pomaceous wood (*Maloideaea* spp.), ash (*Fraxinus excelsior*) and willow (*Salix* sp.). These species are commonly identified within burnt mound material especially alder and willow which often grow within marginal marshy land (Lyons, Appendix 2.1)

2.2.3 Trough/Pit C17

Contexts

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C17	N/A	2.22	2.1	1	Sub rectangular, steep sides, flat base	Cut of pit
C18	C17	1.46	1.29	0.43	Light grey clay burnt stone, charcoal	Fill of pit
C19	C17	1.85	1.7	0.5	Yellow brown clay, stones, charcoal	Fill of pit
C20	C17	1.4	1.29	0.43	Hard white/grey clay, very occ charcoal	Fill of pit

Finds: None

Interpretation

Trough C17 was located towards the south-east corner of the site and was sealed by the burnt mound deposit C3 (Figure 4). It was sub-rectangular in plan and orientated roughly north–south and was 1m deep (Plate 3). It contained three fills - C18, C19 and C20. Its primary fill, C18, was a light grey clay containing frequent burnt stones and occasional charcoal. This was sealed by C19, a mid yellow brown clay that contained frequent large stones and occasional charcoal, which was in turn sealed by a hard, compact white-grey clay with occasional charcoal and stones. This trough may have been used for similar water heating purpose as trough C14, although its greater depth (up to 1.00m) and volume may indicate that it had an alternative function or that the heated water was used for a different purpose. The fact that none of the fills contained blackened clay suggests that the pit/trough had been infilled before the mound material was across the site. It is also possible that, based on the size of the trough, it was used for water storage or management rather than heating.

2.2.4 Pit C7

Contexts

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C7	N/A	1.5	1.4	0.5	Oval, steep sides, concave base	Cut of pit
C8	C7	1.5	1.4	0.15	Loose black silty clay, mod. burnt stone	Fill of pit
C9	C7	1.5	1.4	0.35	Loose black silty clay, 90% burnt stone	Fill of pit

Finds: None

Interpretation

Pit C7 was located towards the south-east of the site, 2.00m to the north-west of trough/pit C17 and was also sealed by burnt mound deposit C3 (Figure 4). It was oval in plan with steep sides and a concave base (Plate 4). There was two fills recorded in this pit, C8 and C9. A quantity of burnt stone (5472g) was retrieved from samples of C9. The function of this pit is unclear.

A sample was retrieved from pit fill C9 which was processed during post-excavation and produced a charcoal-rich flot (12.6g). This sample contained remains of six wood species, including alder (*Alnus glutinosa*), oak (*Quercus* sp.), hazel (*Corylus Avellana*), ash (*Fraxinus excelsior*), willow (*Salix* sp.) and yew (*Taxus baccata*). These species are commonly identified within burnt mound material especially alder and willow which often grow within marginal marshy land (Lyons, Appendix 2.1).

A sample of alder (*Alnus Glutinosa*) charcoal (0.3g) from C9, the fill of pit C7, was chosen for AMS dating. The charcoal returned an AMS result of 3663±33BP (UB 20518). The 2 Sigma calibrated result for this was 2138–1947BC (Appendix 2.4), indicating a date in the early Bronze Age period for this feature.

2.2.5 Pit C10

Contexts

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C10	N/A	1.25	1.22	0.19	Sub circular, gradual sides, flat base	Cut of pit
C11	C10	1.25	1.22	0.19	Firm black rich peaty silt with grey hue, frequent burnt stones and charcoal	Fill of pit

Finds: None

Interpretation

Pit C10 was located towards the north-west of the site *c.* 2.5m NNE of trough C14 and was sealed by the burnt mound deposit C3 (Figure 4). The pit was sub-circular and was filled by single fill C10, a firm black peaty silt with a grey hue that contained frequent burnt stones and charcoal (Plate 5). Its function is unclear.

2.2.6 Pit C4

Contexts

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C4	N/A	1.9	1.7	0.4	Irregular in plan, irregular sides, uneven base	Cut of pit
C5	C4	1.9	1.7	0.35	Compact yellow silt	Fill of pit
C6	C4	1.9	1.7	0.05	Moderately compact black silt, frequent charcoal	Fill of pit

Finds: None

Interpretation

Pit C4 was located towards the south-west of the site and was sealed beneath the burnt mound deposit C3 (Figure 4). The northern end of the pit was sub circular and the feature continued as an irregular narrow sub-oval to the south (Plate 6). The primary fill of the pit was C6, a moderately compact black silt with frequent charcoal inclusions. The secondary fill, C5, comprised of a compact yellow silt. The function of this pit is unclear.

2.2.7 Burnt Mound

Contexts

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C3	N/A	15.9	15.9	0.35	Loose black sandy clay, 60% burnt stone, frequent charcoal	Burnt mound material

Finds: None

Interpretation

The burnt mound measured 15.9m in diameter and was a maximum 0.35m deep. It consisted of loose black sandy clay with 60% burnt stones and frequent charcoal inclusions (Plate 1). A quantity of burnt stone (5472g) was retrieved from samples of C3. The mound sealed all of the cut features on the site. The mound is presumed to be made up of waste stones used in the troughs to heat water. The burnt mound C3 was largely levelled through agricultural ploughing.

A sample was retrieved from burnt mound C3 which was processed during post-excavation and produced a charcoal-rich flot (12.6g). This sample contained remains of three wood species, including alder (*Alnus glutinosa*), oak (*Quercus* sp.) and pomaceous wood (*Maloideaea* spp.). These species are commonly identified within burnt mound material especially oak which has a high calorific value (Lyons, Appendix 2.1).

2.3 Topsoil and Modern Drains

2.3.1 Modern Drain

Contexts

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C21	N/A	N/A	N/A	N/A	Modern drain cutting across site	Drain

Finds: None

Interpretation
This (C21) was a modern agricultural drain that cut across the burnt mound site.

2.3.2 Furrows

Contexts

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C20	N/A	N/A	N/A	N/A	Modern Furrows extending across site	Furrows

Finds: None

Interpretation
A series of modern plough furrows (C20) extended across the site.

2.3.3 Topsoil

Contexts

Context	Fill of	L(m)	W(m)	D(m)	Basic Description	Interpretation
C1	N/A	N/A	N/A	0.35	Loose mid brown sandy clay	Topsoil

Finds:

Interpretation
The topsoil/ ploughsoil that covered the site was a loose mid brown sandy clay. It was 0.35m deep on average.

3 SYNTHESIS

The synthesis presents the combined results of all of the archaeological analysis carried out at Kilgowan 1. This includes the analysis of the physical and archaeological landscape, the compilation of information gathered during research into the site type, date, and function, and the results of the excavation and specialist analysis of samples taken during the course of on-site works.

3.1 Landscape Setting

The proposed service area is located in the townlands of Halverstown and Kilgowan in the parish of Kilcullen and the barony of Kilcullen, Co. Kildare. The nearest town, Kilcullen is located *c*. 4.5km to the north, whilst the village of Calverstown is, located *c*. 2.7km to the west. The area comprises 11.9 hectares of predominantly tillage land, with improved pasture. The overall landscape is undulating with the site being located on a predominantly well-drained south-east facing slope. The lower ground in the east and south east is wetter. Kilgowan 1 was situated within the southern boundary of the development area in wet marshy ground.

3.2 The Bronze Age Landscape surrounding Kilgowan 1

The footprint of the M9 Kilcullen Motorway Service Area is situated within *c*. 2km of a number of recorded Bronze Age burial sites and recently excavated settlement sites. The Bronze Age (*c.* 2500-800BC) in Ireland was marked by the use of metal for the first time. As with the transition from Mesolithic to Neolithic, the transition into the early Bronze Age was accompanied by changes in society. Megaliths were replaced in favour of individual, subterranean cist or pit burials that were either in isolation or in small cemeteries. These burials contained inhumed or cremated remains and were often, but not always, accompanied by a pottery vessel. The Bronze Age landscape was also defined by other monuments such as standing stones, stone rows and stone circles.

A cist burial site (RMP KD028-055) is recorded within the townland of Halverstown *c*. 520m west of the M9 Kilcullen Motorway Service Area. A cist burial typically consists of a small trapezoidal space, defined by standing slabs which were inserted into the sides of the pit. The floor of the cist is often paved and the roof of the cist may consist of several capstones. The short rectangular cist at KD028-055 contained the cremated remains of an adult female, a foetus and three teeth of a year old child; however no visible surface indications remain (Price 1938, 293; Waddell 1970, 119). Large scale Bronze Age habitation evidence is recorded at Knockaulin (KD028-08803) within *Dún Ailinne* hillfort, *c*. 3km north of the M9 Kilcullen Motorway Service Area. This multi-period royal site was excavated by Bernard Wailes between 1968–1975 (Johnston and Wailes, 2007).

Further evidence of Bronze Age activity in the form of three crouched inhumation burials (KD028-054) situated on a gravel ridge were recorded within the townland of Halverstown *c*. 900m north-west of the M9 Kilcullen Motorway Service Area. A slightly tapering granite pillar stone (KD032-01201) situated at the end of a low gravel ridge is recorded *c*. 1km south-west within the townland of Kilgowan.

Recent excavations in the townland of Kilgowan as part of Phase 3 of the N9/N10 Kilcullen to Waterford scheme revealed the remains of a *fulacht fiadh c.* 840m south-east of the M9 Kilcullen Motorway Service Area (Hacket 2007, Licence Ref.: E2886). The site comprised of a burnt mound, a trough and several associated pits (ibid.). This burnt mound site was located on the banks of the stream located to the south of Kilgowan 1. The trough associated with this burnt mound contained timber fragments

and 12 stakeholes along the base which would suggest it was wood lined (ibid.). Similar to Kilgowan 1 no finds were retrieved from this excavation.

Kilgowan 4 and 5, located *c*. 250m north of Kilgowan 1, were also excavated in advance of the M9 Kilcullen Motorway Service Area. These sites comprised of a group of pits and postholes (Kilgowan 4) and a burnt mound site (Kilgowan 5) (Coughlan, 2013b and 2013c). Neolithic, early Bronze Age and late Bronze Age dates have been returned for pits and a posthole at Kilgowan 4 (2 Sigma Ca. 3780–3651BC [UB 20524], 2549–2298BC [UB 20522] and 795–543BC [UB 20523]). The burnt mound at Kilgowan 5 has been dated to the transition period between the later Neolithic and early Bronze Age (2463–2207BC [UB 20525] and 2569–2236BC [UB 20526]). The Kilgowan area appears to have been settled intermittently for a number of centuries.

3.3 Site Typology – *Fulachta Fiadh* / Burnt Mounds

The burnt mound excavated at Kilgowan 1 fits in well with other previously excavated burnt mounds around the country of which increasing numbers have been excavated in recent years. The last published survey (Power et al., 1997), carried out over a decade ago, recorded over 7,000 *fulachta fiadh* sites and in excess of 1,000 sites have been excavated in recent years through development led archaeological investigations. In spite of this no clear understanding of the precise function of these sites has been forthcoming. Burnt mound sites are typically located in areas where there is a readily available water source, often in proximity to a river or stream or in places with a high water table. In the field burnt mounds may be identified as charcoal-rich mounds or spreads of heat shattered stones, however, in many cases the sites have been disturbed by later agricultural activity and are no longer visible on the field surface. Nevertheless even disturbed spreads of burnt mound material often preserve the underlying associated features, such as troughs, pits and gullies, intact.

Ó Néill (2003–2004, 82) has aptly identified these sites as the apparatus and by-product of pyrolithic technology. This technology involved the heating or boiling of water by placing fire-heated stones into troughs of water. Small shallow round-bottomed pits, generally referred to as pot boiler pits or roasting pits, are often associated with burnt mound sites. The purpose of these pits remains unclear. Occasionally large pits are also identified and may have acted as wells or cisterns. Linear gullies may extend across the site, often linked to troughs and pits, and demonstrate a concern with onsite water management. Post and stakeholes are often found on burnt mound sites and these may represent the remains of small structures or wind breakers.

Burnt mound sites are principally Bronze Age monuments and reach their pinnacle of use in the middle/late Bronze Age (Brindley et al. 1989−90; Corlett 1997). Earlier sites, such as Enniscoffey Co. Westmeath (Grogan et al. 2007, 96), have been dated to the Neolithic and later sites, such as Peter Street, Co. Waterford (Walsh 1990, 47), have been dated to the medieval period. Thus although burnt mound sites generally form a component of the Bronze Age landscape, the use of pyrolithic technology has a long history in Ireland.

Although there is a general consensus that burnt mound sites are the result of pyrolithic technology for the heating or boiling of water, the precise function of these sites has, to date, not been agreed upon. Several theories have been proposed but no single theory has received unanimous support. The most enduring theory is that burnt mounds sites were used as cooking sites. O'Kelly (1954) and Lawless (1990) have demonstrated how joints of meat could be efficiently cooked in trough of boiling water. The use of burnt mound sites for bathing or as saunas has been suggested as

an alternative function (Lucas, 1965; Barfield and Hodder, 1987; O' Drisceoil, 1988). This proposal is largely influenced by references in the early Irish literature to sites of a similar character and is very difficult to prove, or disprove. Others, such as Jeffrey (1991), argue that they may have been centres of textile production for the fulling or dyeing of cloth. More recent demonstrations by Quinn and Moore (2007) have shown that troughs could have been used for brewing, however, this theory has been criticised by leading Irish environmentalists due to the absence of cereal remains from most burnt mound sites (McClatchie et al., 2007).

3.4 Summary of the Excavation Results

The excavation at Kilgowan 1 comprised of a burnt mound made up of heat shattered stone and charcoal rich soil, which is consistent with burnt mounds typical of the 2nd millennium BC. The site was largely levelled through ploughing. The burnt mound measured 15.9m x 15.9m x 0.35m and sealed four earth cut pits and two troughs. Both troughs were sub-rectangular; trough C14 measuring 1.9m x 1m x 0.35m deep and trough C17 measuring 2.22m x 2m x 1m deep. Trough C14 was filled by material similar to that which made up the burnt mound while C17 was filled by grey/brown clays. The four pits on the site were all sub ovals and measured between 1.25m and 1.9m in length.

3.5 Summary of the Specialist Analysis

A number of specialists provided analysis of samples and artefacts recovered from the site as part of the post-excavation works. This work in part formed the basis for the dating evidence for the site. The detailed reports on the results of all analysis are in Appendix 2.

3.5.1 Charcoal and Plant Remains Analysis – Susan Lyons

A total of four samples of charcoal from C3, C9, C13 and C16 were submitted for analysis from Kilgowan 1. Charcoal is a common occurrence on burnt mound sites and represents the woods that were burnt as fuel within these features. Oak, alder, hazel, willow, yew, ash and pomaceous woods were all identified at Kilgowan 1. These woods would be commonly identified in burnt mound deposits, especially alder and willow which often grow within marginal marshy land. Firewood is generally collected within proximity to the site therefore the nearby woodlands would have contained oak, ash and hazel. No evidence for archaeobotanical remains were identified within the charcoal-rich flots from Kilgowan 1.

3.5.2 AMS Radiocarbon Dating – Queens University Belfast

A sample of alder (*Alnus Glutinosa*) charcoal (0.3g) from C9, the fill of pit C7, was chosen for AMS dating. The charcoal returned an AMS result of 3663±33BP (UB 20518). The 2 Sigma calibrated result for this was 2138–1947BC (Appendix 2.4), indicating a date in the early Bronze Age period for this feature.

A sample of willow (*Salix Sp.*) charcoal (0.2g) from C16, the fill of trough C14, was chosen for AMS dating. The charcoal returned an AMS result of 3777±32BP (UB 20519). The 2 Sigma calibrated result for this was 2295–2050BC (Appendix 2.4), indicating a date in the early Bronze Age period for this feature.

4 DISCUSSION AND CONCLUSIONS

4.1 Discussion

The excavated remains at Kilgowan 1 consisted of a burnt mound that has been dated to the early Bronze Age period with a date range of 2295–2050BC and 2138–1947BC (2 Sigma Cal., UB 20518–9). The site is located within a gently undulating landscape that was under tillage at the time of excavation *c*. 4km south of the River Liffey. Kilgowan 1 was situated at 115m OD in marginal ground at the interface between higher dry land to the west and lower, wetter land to the east. This site is shown as adjacent to a stretch of boggy marginal land on the first edition OS map (1839) and a stream forms the townland boundary *c*. 160m to the south and east. Burnt mounds are typically identified in wetter, marginal landscapes or adjacent to a stream or water sources so the identification of this type of activity in this landscape would not be unexpected

The remains of a burnt mound formed of heat-shattered stone and charcoal-rich soil is consistent with our typological understanding of burnt mounds as a site type. The burnt mound measured 15.9m x 15.9m x 0.35m and sealed two troughs and four pits. It would originally have extended around the periphery of the troughs, possibly in a horseshoe shape but had been substantially levelled through agricultural ploughing, and modern plough furrows were evident across the site. As identified in the typological background to the site type (Section 3.3), it is common to find single or multiple troughs in association with smaller pits, postholes and stakeholes, so none of the features identified on the site would be particularly unusual. Both troughs were sub-rectangular although Trough C17 was substantially larger and notably was 1.00m deep. This may suggest a different use or function of the troughs - the larger Trough C17 may have facilitated bathing rather than cooking as the relatively larger volume of water contained within it would have been more easily warmed rather than boiled as would be required for cooking. It is not clear if the lack of blackened burnt mound material within Trough C17 is of particular significance. It may just indicate that it was deliberately in-filled by material other than the burnt mound waste. It was possibly abandoned after use and the primary deposit of heat shattered stone and silty clay represents material used for heating the water. Subsequent deposits may then represent deliberate infilling with the up-cast from the trough excavation. It is also possible that, based on the size of the trough, it was used for water storage or management rather than heating.

Two AMS dates were returned from the site and while they confirm that the activity on the site was all likely to be dated to the early Bronze Age it is possible that there may be two separate phases of activity, with that in the north-west of the burnt mound area centred around Trough C14 being slightly earlier in date than that in the south-east area around trough C17.

Oak, alder, hazel, willow, yew, ash and pomaceous woods were all identified in the charcoal remains retrieved from Kilgowan 1 (Lyons, Appendix 2.1). These species are commonly identified in other burnt mound deposits especially alder and willow which are often located within marginal marshy land. Firewood is generally collected within proximity to the site therefore the nearby woodlands would have contained oak, ash and hazel (*ibid*.).

Analysis of the surrounding archaeological landscape has identified further evidence of activity dating to the early Bronze Age in the area. No previously recorded monuments are recorded in the immediate vicinity of Kilgowan 1 although a cist burial (KD028-055) is recorded approximately 600m to the north-west in Halverstown. Also in Halverstown, three crouched inhumations are recorded

approximately 1.2km north-west of Kilgowan 5 (KD028-054). Recent excavations in the townland of Kilgowan as part of Phase 3 of the N9/N10 Kilcullen to Waterford scheme revealed the remains of a *fulacht fiadh c.* 800m south-east of Kilgowan 1 (Hacket, 2007). Other excavations were carried out in tandem with those at Kilgowan 1 as part of the M9 Kilcullen Motorway Service Area. These have identified early Bronze Age burnt mound activity *c*. 250m north-east at Kilgowan 5 (Coughlan, 2013b), and isolated pits 250m to the north-west at Kilgowan 4 (Coughlan, 2013c). The Kilgowan 1 site is slightly later in date than Kilgowan 5. Kilgowan 4 produced a range of dates from the Neolithic to the early Iron Age including early Bronze Age activity predating that at Kilgowan 1 (2549–2298 BC, UBA 20522).

4.2 Conclusions

Burnt mound activity dating to the early Bronze Age has been recorded at Kilgowan 1. The site conforms broadly in terms of physical location, function and form to other known examples although its dating would be early in the typologically chronology, but not unknown. The site is important locally as it adds to the existing small and localised evidence of settlement dating to the period.

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APPENDIX 1 CATALOGUE OF PRIMARY DATA

Appendix 1.1 Context Register

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Finds
C1	N/A	N/A	N/A	0.35	Topsoil	Loose mid brown sandy clay	
C2	N/A	N/A	N/A	N/A	Natural subsoil	Compact grey yellow silt	
C3	N/A	15.9	15.9	0.35	Burnt mound material	Loose black sandy clay, 60% burnt stone, frequent charcoal	
C4	N/A	1.9	1.7	0.4	Cut of pit	Irregular in plan, irregular corners, gradual break of slope top, irregular sides, irregular brake of slope bottom, uneven base	
C5	C4	1.9	1.7	0.35	Fill of pit	Compact yellow silt	
C6	C4	1.9	1.7	0.05	Fill of pit	Moderately compact black silt, frequent charcoal	
C7	N/A	1.5	1.4	0.5	Cut of pit	Oval, rounded corners, sharp break of slope bottom, steep sides, sharp break of slope top, concave base	
C8	C7	1.5	1.4	0.15	Fill of pit	Loose black silty clay, moderate burnt stone	
C9	C7	1.5	1.4	0.35	Fill of pit	Loose black silty clay, 90% burnt stone	
C10	N/A	1.25	1.22	0.19	Cut of pit	Sub circular, gently break of slope top, gradual sides, gradual break of slope bottom, flat base	
C11	C10	1.25	1.22	0.19	Fill of pit	Firm black rich peaty silt with grey hue, frequent burnt stones and charcoal	
C12	N/A	1.6	0.9	0.55	Cut of pit	Sub oval, sharp break of slope top, steep sides, sharp break of slope bottom, flat base	
C13	C12	1.6	0.9	0.55	Fill of pit	Loose black silt clay 70% charcoal, frequent burnt stones	
C14	N/A	1.9	1	0.35	Cut of trough	Sub rectangular, rounded corners, sharp break of slope top, steep sides, sharp break of slope bottom, flat base	
C15	C14	1.9	1	0.1	Fill of trough	Moderate compact black silty clay, 20% burnt stones	
C16	C14	1.9	1	0.25	Fill of trough	Loose black silt clay 80% burnt stone	
C17	N/A	2.22	2.1	1	Cut of trough	Sub rectangular, rounded corners, sharp break of slope top, steep sides, sharp break of slope bottom, flat base	
C18	C17	1.46	1.29	0.43	Fill of trough	Very firm light grey clay frequent burnt stone, occasional charcoal	
C19	C17	1.85	1.7	0.5	Fill of trough	Mid yellow brown clay, frequent large stones, occasional charcoal	
C20	C17	1.4	1.29	0.43	Fill of trough	Very firm white/grey clay, occasional large stone, very occasional charcoal	

Context	Fill of	L(m)	W(m)	D(m)	Interpretation	Description	Finds
C21	N/A				Furrows	Series of modern Furrows cutting Burnt Mound Spread orientated NE-SW	
C22	N/A				Drain	Modern Drain extending across the site	

Appendix 1.2 Catalogue of Artefacts

No artefacts were retrieved from Kilgowan 1.

Appendix 1.3 Catalogue of Ecofacts

During post excavation works specific samples were processed with a view to further analysis. The following are the ecofacts recovered from these samples.

Context #	Sample #	Feature type i.e. Structure A, hearth C45	charcoal	Seeds & Hazelnut	Animal bone	Burnt animal bone	human bone	Shell	Burnt Stone
3	1	Burnt mound material	17.2g						1903g
9	2	Pit C7	12.6g						5472g
13	3	Pit C12	17.1g						3436g
16	4	Trough C14	106.9g						2126g

Appendix 1.4 Archive Register

Project: M9 Kilcullen Motorway Service Area		
Site Name: Kilgowan 1		
Licence Number: E4386		
Site director: Tim Coughlan		
Date: July 2012		
Field Records	**Items (quantity)**	**Comments**
Site drawings (plans)	1 post ex plan	On GPS
Site sections, profiles, elevations	4 sections	on same sheet
Other plans, sketches, etc.	0	
Timber drawings	0	
Stone structural drawings	0	
Site diary/note books	0	
Site registers (folders)	1 folder	
Survey/levels data (origin information)	on original drawings	
Context sheets	20	
Wood Sheets	0	
Skeleton Sheets	0	
Worked stone sheets	0	
Digital photographs	23	
Photographs (print)	0	
Photographs (slide)	0	
Security copy of archive	digital	on IAC server

APPENDIX 2 SPECIALIST REPORTS

Appendix 2.1 Charcoal and Plant Remains Report – Susan Lyons

Appendix 2.2 AMS Radiocarbon Dating Results – QUB Laboratory

ARCHAEOBOTANICAL & CHARCOAL ANALYSIS
KILGOWAN 1 – E4386

SUSAN LYONS MSC MIAI

JULY 2012

1 Introduction

The archaeological excavations at Kilgowan 1 comprised a burnt mound made up of heat shattered stone and charcoal rich soil, which is consistent with burnt mounds typical of the 2nd millennium BC. The burnt mound sealed four earth-cut pits and two troughs. Four soil samples were selected for archaeobotanical and charcoal analysis:

Context no.	Sample no.	Context description	Flot weight (grams)
C3	1	Burnt mound material	17.2 grams
C9	2	Pit C7	12.6 grams
C13	3	Pit C12	17.1 grams
C16	4	Trough C14	106.9 grams

Two radiocarbon dates was obtained for the site:

Context no.	Sample no.	Context description	Material for C14 dating	UBA lab no.	C14 date	C14 date (2 sigma Cal)
C9	2	Pit C7	Alder charcoal	20518	3663+/-	2138–1947BC
C16	4	Trough C14	Willow charcoal	20519	3777+/-32	2295–2050BC

2 Methodology

2.1 Sample processing (after IAC Ltd)

Bulk dry soil samples are processed by a system of floatation. This is where each sample is soaked in water and agitated by hand to loosen any charred remains from the soil particles which allows for this material to be separated and float to the surface. This floating material (flot) is poured off and trapped in a sieve (mesh size 250 µm) and, once dried, scanned for plant remains using a binocular microscope. The larger residual material left behind (retent) is washed through a 1mm, 2mm and 5mm mesh or sieve and air-dried. Once dry, each retent is sorted by eye and any material of archaeological significance removed.

2.2 Archaeobotanical analysis

The flot samples were viewed under a low powered binocular microscope (magnification x0.8 to x5). Where preservation allowed, the charred plant macro-remains were identified to species level and recorded using an abundance scale based on the universal DAFOR system, which is a quantitative definition of frequency for counting plant communities - Dominant (>250) = D, Abundant (51-250) = ++++, Frequent (21-50) = +++, Occasional (6-20) = ++ and Rare (1-5) = +

Plant species are made using reference to the author's seed collection and standard seed atlases and references; Flora of the British Isles (Clapham, A R, Tutin, T G, Warburg, E F, 1957), Zadenatlas der Nederlandsche Flora (Beijerinck, W.1976), New Flora of the British Isles 2nd Edition (Stace, C, 1997) and Digital Seed Atlas of the Netherlands (Cappers, R.T.J., R.M. Bekker and J.E.A. Jans, 2006).

2.3 Charcoal analysis

Due to the potential for a very high number of charcoal fragments from the samples, a representative sample of 30-50 charcoal fragments (Keepax, 1988) were randomly chosen from each sample for identification and assessment.

Wood charcoal identifications were undertaken in accordance with Section 25 of the National Monuments Act, 1930, as amended by Section 20 of the National Monuments Amendment Act 1994, to alter an archaeological object. The wood species identifications were conducted under a binocular microscope using incident light and viewed at magnifications of 100x, 200x and 400x where applicable.

Wood species identifications are made using wood reference slides and wood keys devised by Franklin and Brazier (1961), Schweingruber (1978), Hather (2000) and the International Association of Wood Anatomists (IAWA) wood identification manuals and (www.lib.ncsu/edu/insidewood) by Wheeler, Bass and Gasson (1989).

3 Results

3.1 Archaeobotanical results

There was no carbonised plant macro-remains recovered from the features at Kilgowan 1.

3.2 Charcoal results

The charcoal identifications from Kilgowan 1 are presented in Table 1. The percentage of wood species recorded is presented in Figure 1.

Seven wood species totalling 119 identifications were recorded from Kilgowan 1. Oak (Quercus sp.) dominated the charcoal assemblage (37%) especially from burnt mound C3 and pit C12. Alder (Alnus glutinosa) made up 26% of the charcoal identified and was commonly recorded from trough C14. Almost equal values for ash (Fraxinus excelsior) (13%) and willow (Salix spp.) (12%), were recorded, while lesser incidences of hazel (Corylus avellana) (3%) and yew (Taxus baccata) (1%) were also present.

Table 1. Charcoal identifications from Kilgowan 1

Context number	Sample number	Flot weight (grams)	Context description	Wood Identification	No. of fragments	Weight (grams)
C3	001	17.2 grams	Burnt mound material	Quercus sp. (oak)	22	1.3 grams
				Alnus glutinosa (alder)	5	0.4 grams
				Maloideaea spp. (pomaceous woods)	2	0.1 grams
C9	002	12.6 grams	Pit C7	Fraxinus excelsior (ash)	11	0.8 grams
				Alnus glutinosa (alder)	8	0.8 grams
				Salix sp. (willow)	5	0.5 grams
				Corylus avellana (hazel)	4	0.3 grams
				Quercus sp. (oak)	1	0.1 grams
				Taxus baccata (yew)	1	0.1 grams
C13	003	17.1 grams	Pit C12	Quercus sp. (oak)	12	1 gram
				Alnus glutinosa (alder)	8	0.6 grams
				Salix sp. (willow)	6	0.5 grams
				Maloideaea spp. (pomaceous woods)	2	0.2 grams
				Fraxinus excelsior (ash)	2	0.2 grams
C16	004	106.9 grams	Trough C14	Alnus glutinosa (alder)	10	1 gram
				Quercus sp. (oak)	9	0.7 grams
				Maloideaea spp. (pomaceous woods)	5	0.5 grams
				Fraxinus excelsior (ash)	3	0.2 grams
				Salix sp. (willow)	3	0.2 grams

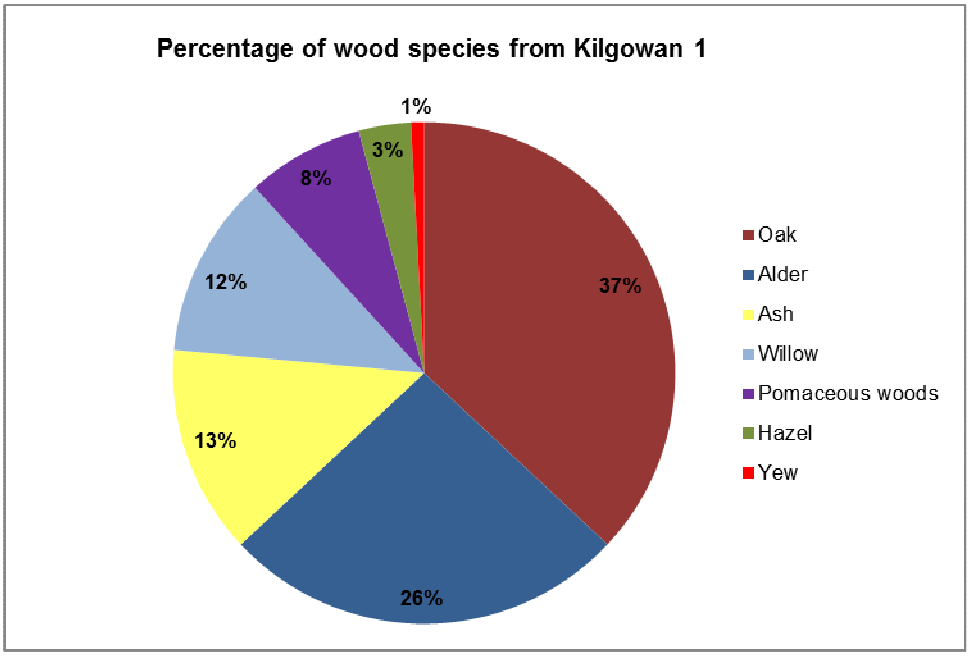

Figure 1

3.3 Discussion of results

The only environmental remains recovered from Kilgowan 1 were charcoal remains. This follows a similar trend recorded from Bronze Age burnt mound deposits at nearby Kilgowan 5. Charcoal is a common occurrence on burnt mound/*fulacht fiadh* sites and represents the woods that were burnt as fuel within these features. A mixed wood assemblage of alder, oak, willow, pomaceous woods, ash, hazel and yew are all species identified from other burnt mound sites in Ireland (O'Donnell, 2007) and many were also recorded from similar deposits at Kilgowan 5. The presence of water-tolerant species alder and willow from *fulachta fiadh* sites would not be an unusual occurrence, especially since these site types were generally located close to waterlogged or marshy areas (Waddell 1998, 174). Firewood is generally collected from as close to the site as possible and based on this premise oak is also likely to have been growing close to the site, along with ash and hazel. Yew is often a component of oak woodland and suggests that it was in the vicinity, along with pomaceous woods, which denote marginal areas and hedgerows. The periodic dumping of charred remains associated with *fulachta fiadh*/burnt mound activity would inevitably enter other nearby species, which would account for a similar wood assemblage from pits (C7 and C12).

4 Summary of M9 Kilcullen Motorway Service Area Scheme Results

The only sites along the M9 that contained evidence for medieval arable agriculture, in the form of crop drying, were Halverstown 1 and Kilgowan 2. While barley was the dominant crop being dried at Halverstown 1, oat was the main cereal recorded at Kilgowan 2. Radiocarbon dating has shown that Kilgowan 2 post-dated Halverstown 1 by *c.* 300 years. The grain being dried at each site was a relatively clean crop, indicating that initial coarse processing had already been carried out. Interestingly, the weed seeds identified, along with rye from Kilgowan 2, suggest that winter-sown crops were being dried in the area, implying that the winters were mild enough for cereal growing.

The charcoal assemblage identified from the M9 contained wood species were burnt at these sites from the Bronze Age to medieval period. The composition of wood

species recorded indicates that for the most part woods were selected for specific functions. Bronze Age burnt mound deposits at Kilgowan 1 and Kilgowan 5 contained a similar mixed wood assemblage, which is consistent with other such sites excavated in Ireland. The high oak content from Bronze Age and Iron Age activity at Kilgowan 4 suggests that oak was used perhaps in construction works or specialized activities. Oak continued to play a part in domestic activities during the medieval period (Halverstown 1 and Kilgowan 2), which suggests that is was still a component of the local woodland.

5 Recommendations

1. There is no further identification work required on these samples.
2. All ecofacts removed from these samples should be retained permanently in accordance with the National Monuments Act 1930 (Section 2) and the National Monuments Act 1994 (Section 9) (see accompanying retention document)
3. This report should be included in any final report.

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Appendix 2.2 Radiocarbon Dating Results – QUB Laboratory

The "Measured radiocarbon age" is quoted in conventional years BP (before AD 1950). The error is expressed at the one-sigma level of confidence.

The "Calibrated date range" is equivalent to the probable calendrical age of the sample material and is expressed at the one Sigma (68.3% probability) and two-Sigma (95.4% probability) level of confidence.

Calibration dataset: intcal09.14c

Calibration programme: CALIB REV5.0.2 - used in conjunction with Stuiver, M., and Reimer, P.J., 1993, Radiocarbon, 35, 215–230.

Context	Sample	Material	Species id/ Weight	Lab	Lab Code	Date Type	Calibrated date ranges	Measured radiocarbon age (BP)	13C/12C Ratio ‰
C9, fill of pit	2	Charcoal	Alder (*Alnus* Sp.), 0.3g	QUB	UB 20518	AMS (Std)	2130–1977BC (1 sigma), 2138–1947BC (2 sigma)	3663±33	-23.1
C16, fill of trough	4	Charcoal	Willow (*Salix* Sp.), 0.2g	QUB	UB 20519	AMS (Std)	2279–2141BC (1 sigma), 2295–2050BC (2 sigma)	3777±32	-24.3

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Northern Ireland

Radiocarbon Date Certificate

Laboratory Identification:	UBA-20518
Date of Measurement:	2012-06-08
Site:	E4386 Kilgowan 1
Sample ID:	C9 S2
Material Dated:	charcoal
Pretreatment:	AAA
Submitted by:	IAC

^{14}C Date: 3663±33 BP

AMS δ^{13}C: -23.1

Information about radiocarbon calibration

RADIOCARBON CALIBRATION PROGRAM*
CALIB REV6.0.0
Copyright 1986-2010 M Stuiver and PJ Reimer
*To be used in conjunction with:
Stuiver, M., and Reimer, P.J., 1993, Radiocarbon, 35, 215-230.
Annotated results (text) - -
Export file - c14res.csv

C9 S2
UBA-20518
Radiocarbon Age BP 3663 +/- 33
Calibration data set: intcal09.14c # Reimer et al. 2009

% area enclosed	cal AD age ranges	relative area under probability distribution
68.3 (1 sigma)	cal BC 2130- 2086	0.414
	2050- 2010	0.373
	2001- 1977	0.213
95.4 (2 sigma)	cal BC 2138- 1947	1.000

References for calibration datasets:
PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, PG Blackwell,
C Bronk Ramsey, CE Buck, GS Burr, RL Edwards, M Friedrich, PM Grootes,
TP Guilderson, I Hajdas, TJ Heaton, AG Hogg, KA Hughen, KF Kaiser, B Kromer,
FG McCormac, SW Manning, RW Reimer, DA Richards, JR Southon, S Talamo,
CSM Turney, J van der Plicht, CE Weyhenmeyer (2009) Radiocarbon 51:1111-1150.

Comments:
* This standard deviation (error) includes a lab error multiplier.
** 1 sigma = square root of (sample std. dev.^2 + curve std. dev.^2)
** 2 sigma = 2 x square root of (sample std. dev.^2 + curve std. dev.^2)
where ^2 = quantity squared.
[ ] = calibrated range impinges on end of calibration data set
0* represents a "negative" age BP
1955* or 1960* denote influence of nuclear testing C-14

NOTE: Cal ages and ranges are rounded to the nearest year which may be too precise in many instances. Users are advised to round results to the nearest 10 yr for samples with standard deviation in the radiocarbon age greater than 50 yr.

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Radiocarbon Date Certificate

Laboratory Identification: UBA-20519
Date of Measurement: 2012-06-08
Site: E4386 Kilgowan 1
Sample ID: C16 S4
Material Dated: charcoal
Pretreatment: AAA
Submitted by: IAC

^{14}C Date: 3777±32 BP
AMS δ^{13}C: -24.3

Information about radiocarbon calibration

```
                RADIOCARBON CALIBRATION PROGRAM*
                            CALIB REV6.0.0
          Copyright 1986-2010 M Stuiver and PJ Reimer
    *To be used in conjunction with:
    Stuiver, M., and Reimer, P.J., 1993, Radiocarbon, 35, 215-230.
             Annotated results (text) - -
             Export file - c14res.csv

C16 S4
UBA-20519
Radiocarbon Age BP   3777 +/-   32
Calibration data set: intcal09.14c                  # Reimer et al. 2009
  % area enclosed       cal AD age ranges               relative area under
                                                      probability distribution
  68.3 (1 sigma)     cal BC 2279- 2250                        0.267
                            2230- 2220                        0.082
                            2211- 2189                        0.214
                            2181- 2141                        0.437
  95.4 (2 sigma)     cal BC 2295- 2130                        0.947
                            2086- 2050                        0.053
   References for calibration datasets:
  PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, PG Blackwell,
  C Bronk Ramsey, CE Buck, GS Burr, RL Edwards, M Friedrich, PM Grootes,
  TP Guilderson, I Hajdas, TJ Heaton, AG Hogg, KA Hughen, KF Kaiser, B Kromer,
  FG McCormac, SW Manning, RW Reimer, DA Richards, JR Southon, S Talamo,
  CSM Turney, J van der Plicht, CE Weyhenmeyer (2009) Radiocarbon 51:1111-1150.

  Comments:
  * This standard deviation (error) includes a lab error multiplier.
  ** 1 sigma = square root of (sample std. dev.^2 + curve std. dev.^2)
  ** 2 sigma = 2 x square root of (sample std. dev.^2 + curve std. dev.^2)
  where ^2 = quantity squared.
  [ ] = calibrated range impinges on end of calibration data set
  0* represents a "negative" age BP
  1955* or 1960* denote influence of nuclear testing C-14

  NOTE:  Cal ages and ranges are rounded to the nearest year which
         may be too precise in many instances.  Users are advised to
         round results to the nearest 10 yr for samples with standard
         deviation in the radiocarbon age greater than 50 yr.
```

APPENDIX 3 RMP SITES WITHIN THE SURROUNDING AREA

RMP No.:	KD032-010
Townland:	Kilgowan
NGR:	282750, 204340
Parish:	Kilcullen
Barony:	Kilcullen
Distance from proposed development:	*c.* 880m south-west of Kilgowan 1
Classification:	Enclosure
Description:	'Raheens' is printed on the first edition OS map. It is situated in area of undulating glacial hillocks, now extensively quarried by Sponen cement. The site has been quarried for sand. There is no visible trace of any antiquity (hardly any of the original ground level still exists). The name 'Raheens' is not used locally.
Reference:	RMP Files

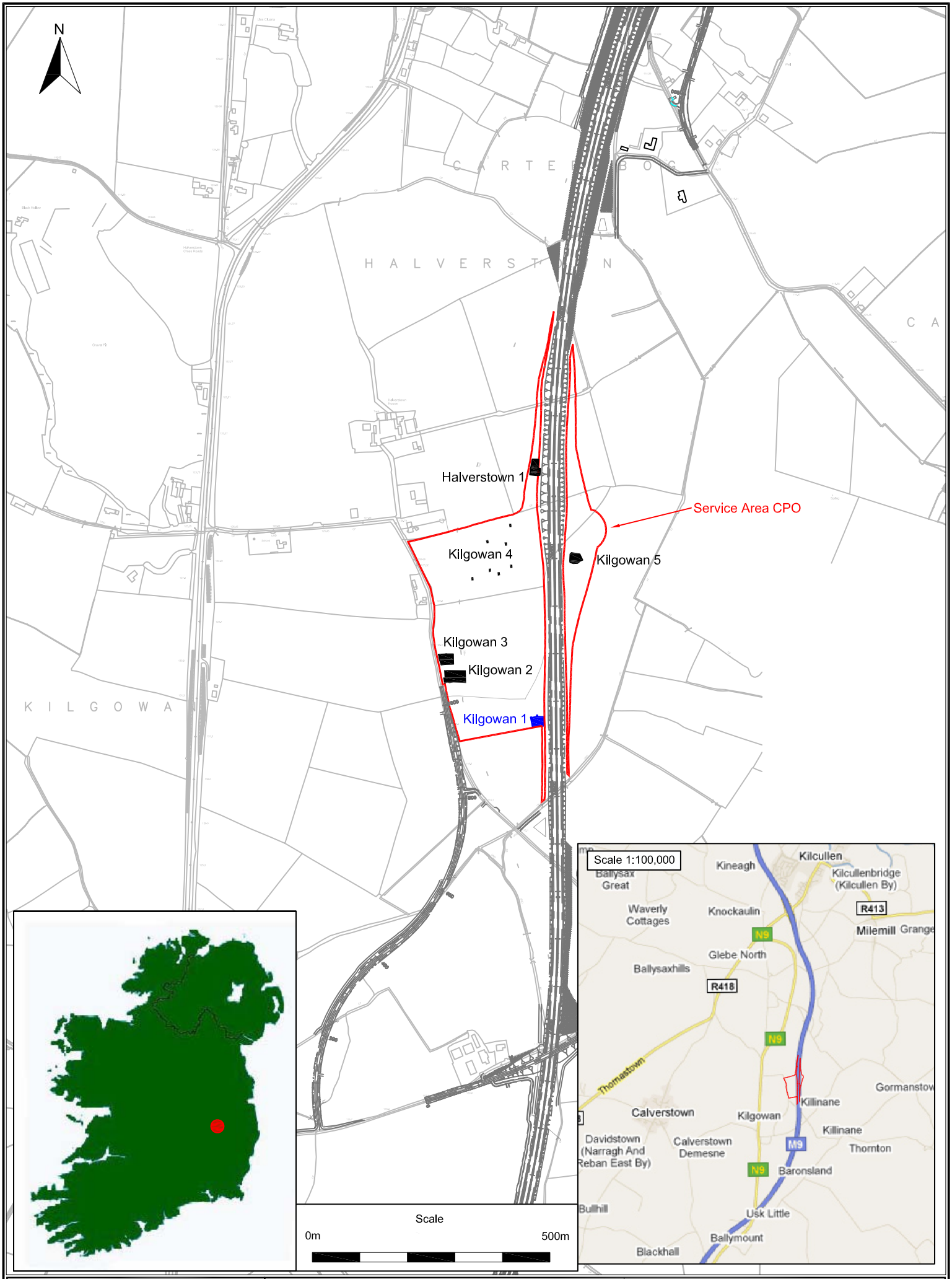
RMP No.:	KD028-055
Townland:	Halverstown
NGR:	282670, 205090
Parish:	Kilcullen
Barony:	Kilcullen
Distance from proposed development:	*c.* 900m north-west of Kilgowan 1
Classification:	Cist
Description:	Short rectangular cist (dimensions 0.6m x 0.08m) found during sand quarrying. It contained the cremated remains of an adult female, a foetus and three teeth of a year-old child (JRSAI 1938, 293-4; Waddell 1970, 119). The entire area has been quarried away. No visible surface indications.
Reference:	RMP Files

RMP No.:	KD028-056
Townland:	Castlefish
NGR:	284417, 205236
Parish:	Kilcullen
Barony:	Kilcullen
Distance from proposed development:	*c.* 1.04km north-east of Kilgowan 1
Classification:	Castle unclassified
Description:	According to O'Donovan, there were 'in the townland of Castlefish, the ruins of an old castle which belonged, it is said, to Admiral Fish' (OS Letters 1837, 70). The castle may have been a tower house. No visible surface traces.
Reference:	RMP Files

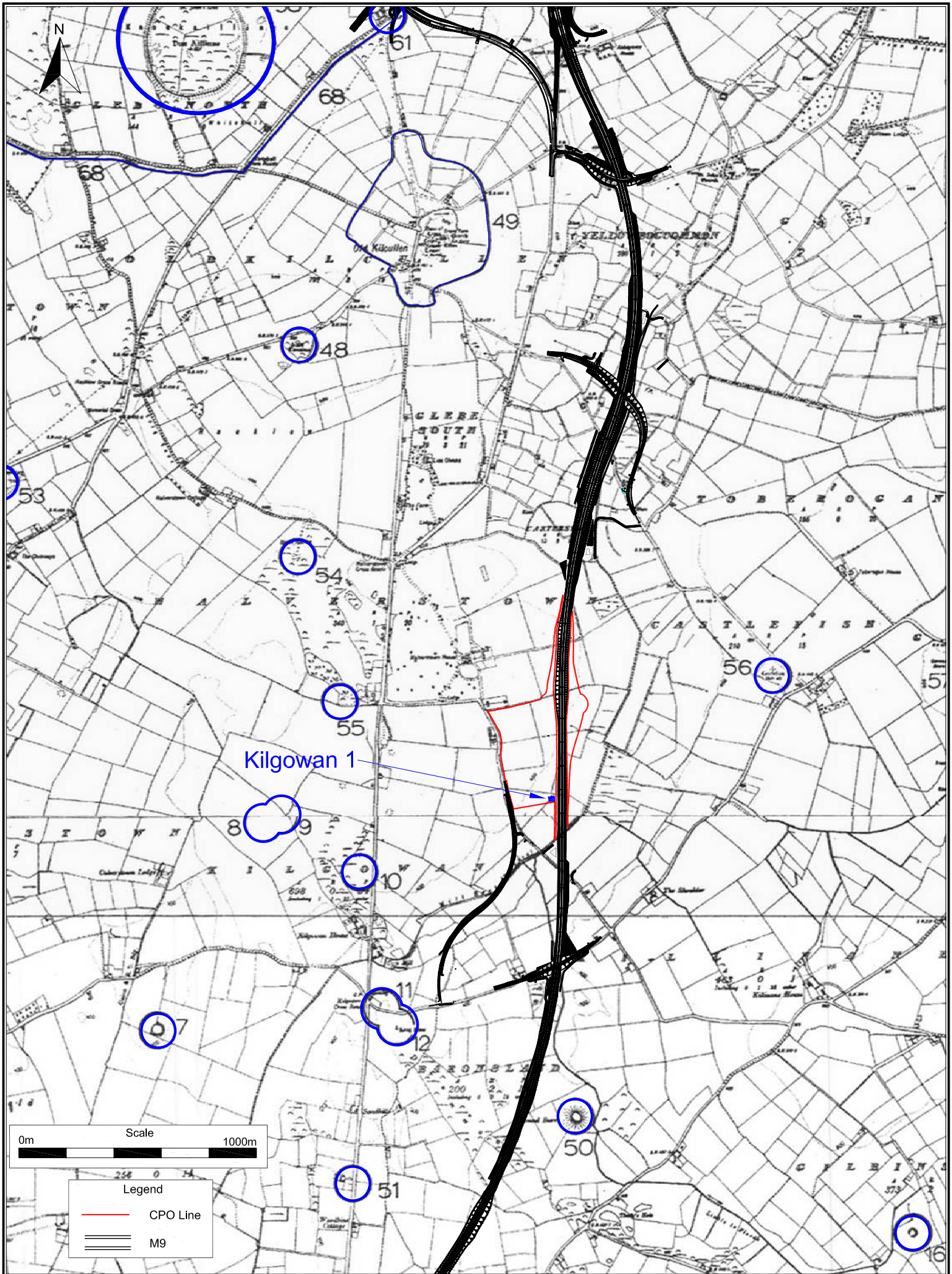
APPENDIX 4 COPY OF NRA DATABASE ENTRY

Database entry	Comment
Excavation number	E4386
Townland	Kilgowan
Site name	Kilgowan 1
County	Kildare
Project reference	N/A
Year of excavation	2011
Grid reference (Easting)	283529
Grid reference (Northing)	204663
OD Height (m)	115m
Landscape setting	The proposed service area is located in the townlands of Halverstown and Kilgowan in the parish of Kilcullen and the barony of Kilcullen, Co. Kildare. The nearest town, Kilcullen is located *c.* 4.5km to the north, whilst the village of Calverstown is, located *c.* 2.7km to the west. The area comprises 11.9 hectares of predominantly tillage land, with improved pasture. The overall landscape is undulating with the site being located on a predominantly well-drained south-east facing slope. The lower ground in the east and south east is wetter. Kilgowan 1 was situated within the southern boundary of the development area in wet marshy ground.
Project Archaeologist	Noel Dunne
Site Director	Tim Coughlan
Archaeological consultancy	Irish Archaeological Consultancy Ltd.
Identification technique	Archaeological Test Trenching
Site type	Burnt Mound, troughs and pits
Site activity	Early Bronze Age burnt mound activity
Dating period	Early Bronze Age
Radiocarbon dates	UB 20518, 2138–1947BC (2 sigma) UB 20519, 2295–2050BC (2 sigma)
Dendro-chronological dates	None
Descriptions	The mound, which was largely levelled, was made up of heat shattered stone and charcoal rich soil. The burnt mound measured 15.9m x 15.9m x 0.35m and sealed four earth cut pits and two troughs. Two samples of charcoal were chosen for dating from pit fill C9 and trough fill C16. Both of these dates returned early Bronze Age date ranges of 2295–1947BC (UB 20518–9). Burnt mound activity dating to the early Bronze Age has been recorded at Kilgowan 1. The site conforms broadly in terms of physical location, function and form to other known examples although its dating would be early in the typologically chronology, but not unknown. The site is important locally as it adds to the existing small and localised evidence of settlement dating to the period.
Artefacts	None

Environmental evidence	Oak, alder, hazel, willow, yew, ash and pomaceous woods were all identified in the charcoal remains retrieved from Kilgowan 1. These species are commonly identified in other burnt mound deposits especially alder and willow which are often located within marginal marshy land. Firewood is generally collected within proximity to the site therefore the nearby woodlands would have contained oak, ash and hazel.
Additional information	N/A
Publication	None

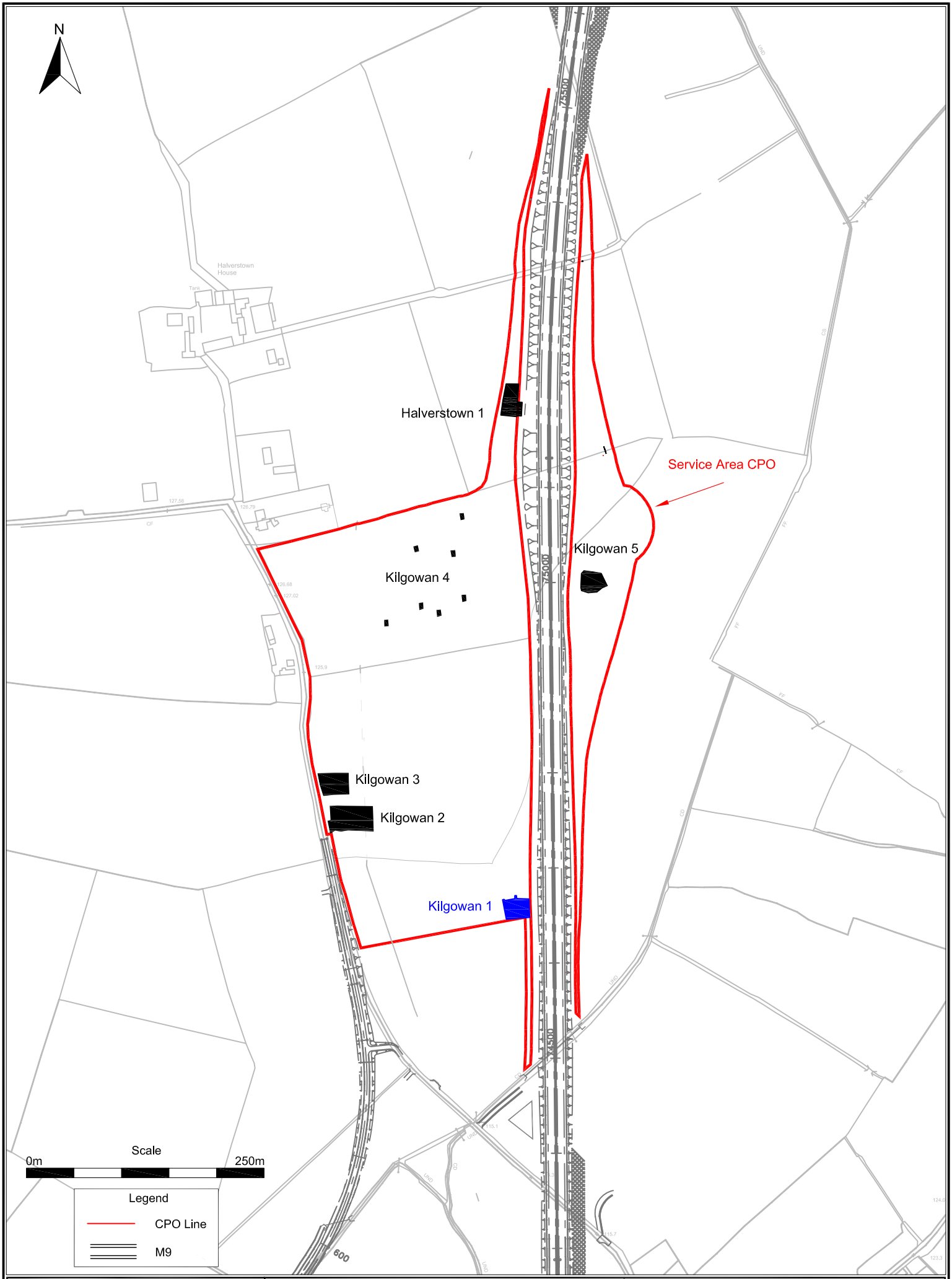


IAC Irish Archaeological Consultancy	Title:	E4386 Kilgowan 1 site location	Scale: 1:10,000 @ A4
	Project:	M9 Kilcullen Service Area, Advance Archaeological Works	Date: 24/10/11
	Client:	National Roads Authority	Produced by: G Kearney
			Job No: J2645
			Figure No: 1

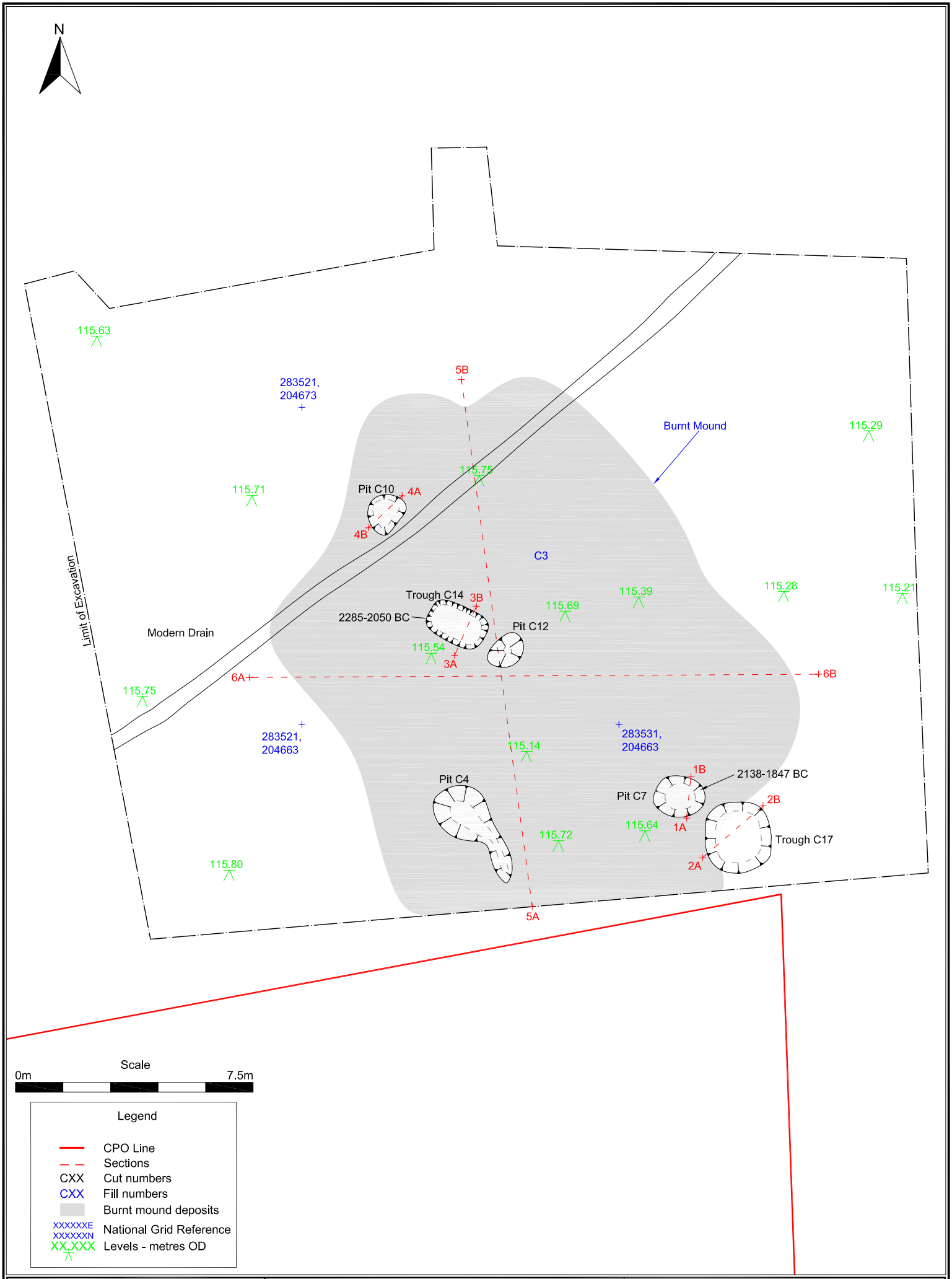


IAC Irish Archaeological Consultancy

Title:	E4386 Kilgowan 1 extract from the RMP map (based on the third edition OS map), showing location of site	Scale:	1:20000 @ A4
		Date:	12/09/12
Project:	M9 Kilcullen Service Area, Advance Archaeological Works	Produced by:	P Higgins
		Job No:	J2645
Client:	National Roads Authority	Figure No:	2



IAC Irish Archaeological Consultancy	Title:	E4386 Kilgowan 1 plan showing extent of site	Scale: 1:5000 @ A4
	Project:	M9 Kilcullen Service Area, Advance Archaeological Works	Date: 18/10/11
	Client:	National Roads Authority	Produced by: P Higgins
			Job No: J2645
			Figure No: 3

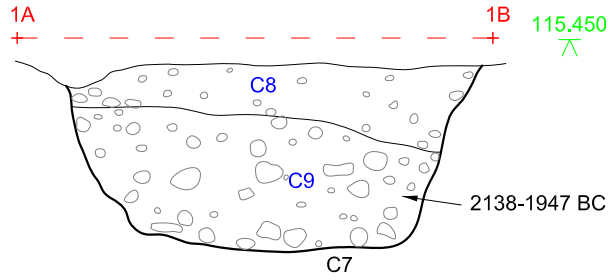


IAC Irish Archaeological Consultancy

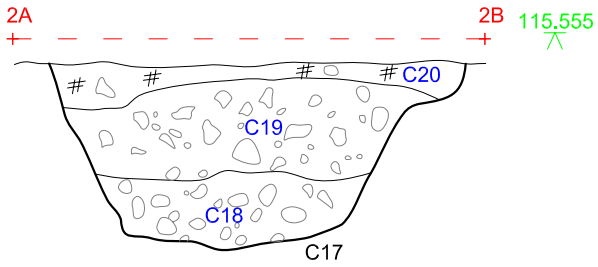
Title:	E4386 Kilgowan 1 plan of site
Project:	M9 Kilcullen Service Area, Advance Archaeological Works
Client:	National Roads Authority

Scale:	1:150 @ A4
Date:	18/10/11
Produced by:	P Higgins
Job No:	J2645
Figure No:	4

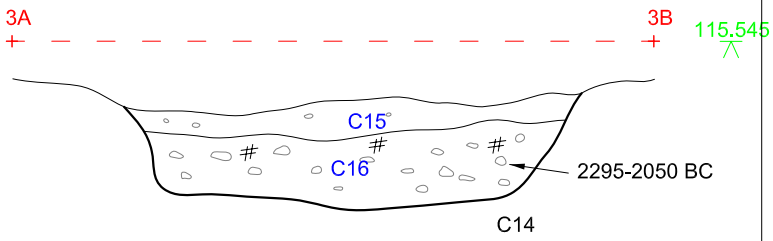
East facing section of Pit C7



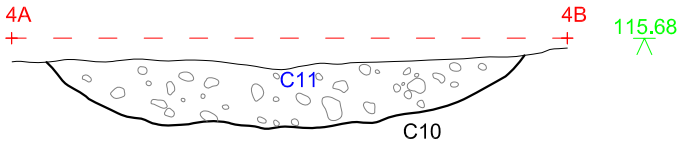
South-east facing section of Trough C17

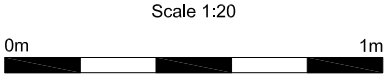


South-east facing section of Trough C14

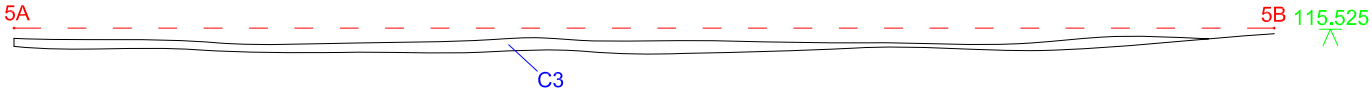


North-west facing section of Pit C10

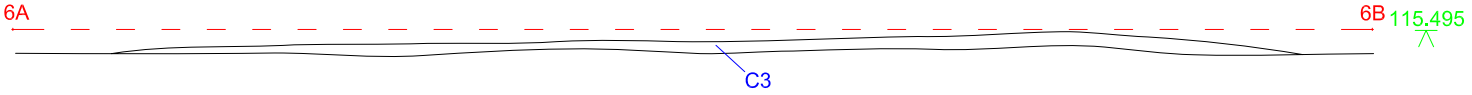


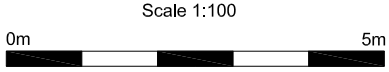


East facing section of Burnt Mound Spread C3



South facing section of Burnt Mound Spread C3





Legend

CXX	Cut Numbers
CXX	Fill Numbers
	Stone
#	Charcoal
XX.XXX	Levels - metres OD

IAC Irish Archaeological Consultancy

Title:	E4386 Kilgowan 1 sections
Project:	M9 Kilcullen Service Area, Advance Archaeological Works
Client:	National Roads Authority

Scale:	As Shown @ A4
Date:	18/10/11
Produced by:	P Higgins
Job No:	J2645
Figure No:	5

Plate 1: E4386 Kilgowan 1 burnt mound C3, mid-excavation, facing south.

Plate 2: E4386 Kilgowan 1 trough C14, post-excavation, facing south-east

Plate 3: E4386 Kilgowan 1 trough C17, post-excavation, facing north

Plate 4: E4386 Kilgowan 1 pit C7, mid-excavation, facing north-west

Plate 5: E4386 Kilgowan 1 pit C10, mid-excavation, facing south-east

Plate 6: E4386 Kilgowan 1 pit C4, post-excavation, facing south-west

Plate 7: E4386 Kilgowan 1 pit C12, mid-excavation, facing north-west