

FINAL REPORT
ARCHAEOLOGICAL EXCAVATION
Multi-Period Site
01E0893
M4 CELBRIDGE INTERCHANGE SCHEME
COLLINSTOWN TOWNLAND, SITE 16/17
CO. KILDARE



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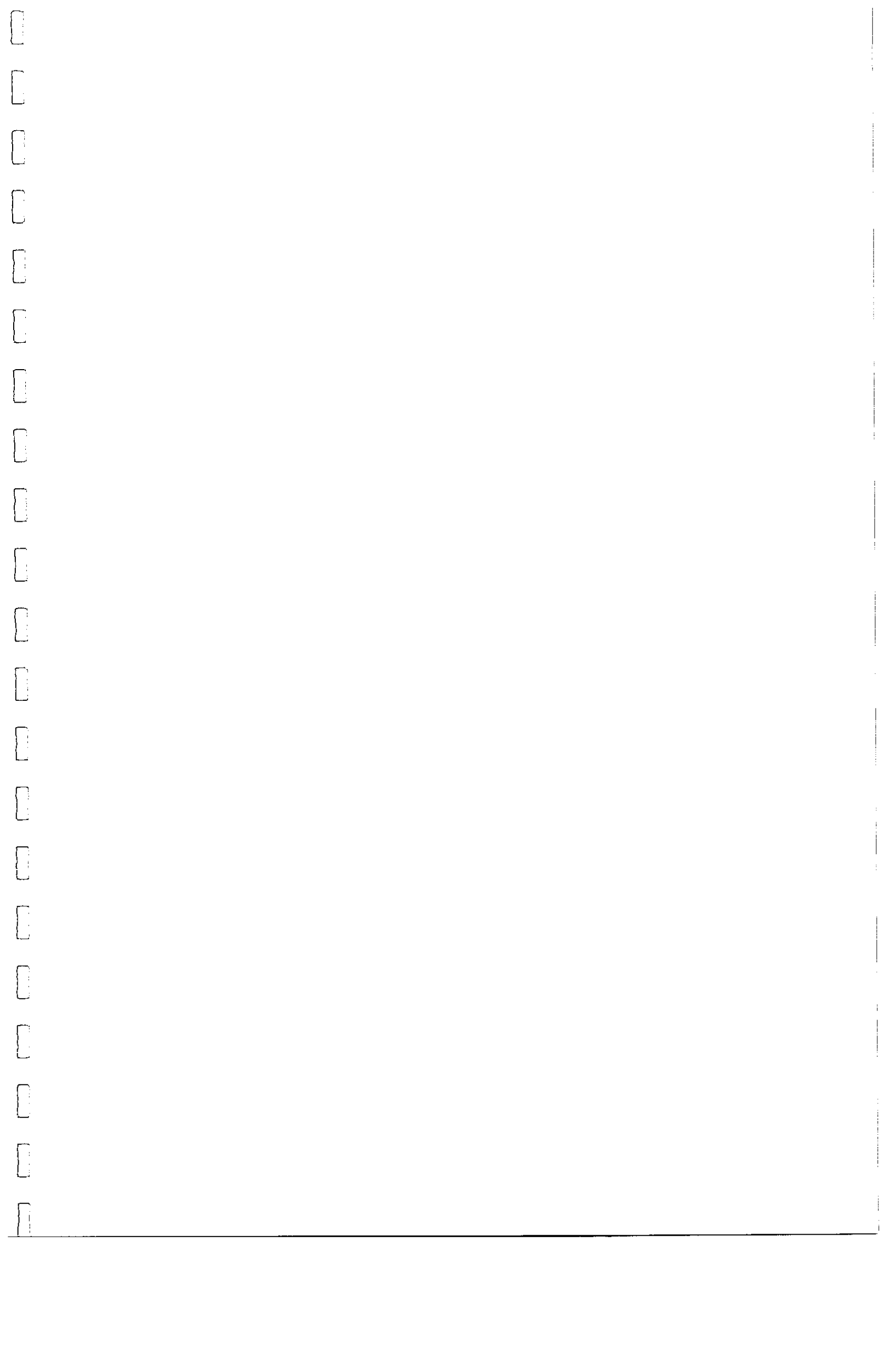
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Abstract

This report details the findings of the excavation of Site 16/17 on the M4 Celbridge Interchange Scheme, Co. Kildare. Eighteen sites were found during archaeological monitoring of the M4 Celbridge Interchange Scheme. The scheme was approximately 4km in length and ran through gently undulating land with a mixture of arable, pasture and woodland. Known Recorded Monuments in the immediate area included KD11-031 an enclosure visible in aerial photographs (tested under licence 97E175 and found to be non archaeological), KD11-001 a field system, KD11-002 Kilmacredock church, ecclesiastical enclosure, graveyard and road/track way and KD11-032 possible earthworks. The medieval boroughs of Celbridge and Leixlip are also in the vicinity. The southern part of the scheme runs through a landscape heavily influenced by eighteenth century landscape design with avenues, woodland and tree lined field boundaries centred on the early eighteenth century house at Castletown. The eighteen sites found during monitoring of topsoil removal have since been assigned RMP status.

Sites 16/17 sites were found within 15m of each other and excavated together under the same licence 01E0893. Four phases were identified: phase 1 was represented by two pits one containing beaker pottery; phase 2 consisted of a linear ditch possibly dating to the early medieval period or earlier; phase 3 had evidence of cereal grain processing activities including a possible corn-drying-kiln with associated posthole and a corn-drying-kiln that was radiocarbon dated to the late seventh or eight century AD. Phase 4 is represented by post medieval or modern plough furrows.

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1.0 INTRODUCTION

During licensed archaeological monitoring of topsoil stripping on the Northern Link of the Celbridge Interchange, two archaeological sites (Site 16 and Site 17) were uncovered in Collinstown townland in August 2001. Monitoring was conducted by Fiona Reilly for Valerie J. Keeley Ltd. under licence number 01E0306. The recommendation for archaeological monitoring was contained in *Archaeological Assessment, the Proposed Route of the Celbridge Interchange, Co Kildare*, (Valerie J. Keeley Ltd. 1998). Site 16 was found at chainage 2620, at NGR 2986648.770E, 236784.720N, and 58mOD (fig.1+2) on the 15th of August 2001. It was first noted as a possible hearth, several possible pits and a large north-south orientated ditch. The site measured 33m by approximately 20m. Site 17 was uncovered on the 16th August, located 15.4m to the southeast of Site 16 at chainage 2590, NGR298631.250E, 236739.200N. It measured 6m by 4m and contained charcoal rich deposits, which were thought to be the remains of a kiln. The sites have since been assigned the RMP numbers Site 16- KD011-054 and Site 17- KD011-055.

Since the two sites were in very close proximity they were excavated as one by Fiona Reilly for Valerie J. Keeley Ltd. under licence number 01E0893 from the 3rd September – 5th October 2001. The aim of the excavation was to fully excavate and accurately record all archaeological features and to produce a report to publication standard.

Location and Geology

The site was located in a pasture field to the immediate south of the Leixlip road. The underlying bedrock is Carboniferous limestone with boulder-clay deposited by glacial activity forming the subsoil (Aalen *et al* 1997). There were no known archaeological sites in the immediate vicinity but Recorded Monuments KD11-001 (earthworks), KD11-002 (Kilmacredock church, graveyard, road/track way and ecclesiastical enclosure) and KD11-032 (possible earthworks) were close-by (National Monuments Service files and Archaeological Survey of Ireland, on <http://www.archaeology.ie>). The medieval boroughs of Celbridge and Leixlip were to the south and southeast respectively. Excavated sites in the vicinity include sixteen other sites excavated on the same project. These sites varied in type and date from Bronze Age burnt stone mounds and ring ditch sites to various Early-medieval industrial sites such as a corn-drying kilns and a possible Early Medieval metal

smelting site. Outside of the project a possible *fulacht fiadh* was excavated in Rinawade Upper in 1995 (95E0264) (Bennett, I. (ed.) on <http://www.excavations.ie>).

NATIONAL MUSEUM OF IRELAND TOPOGRAPHICAL FILES

No artefacts were listed in these files for the townlands of Collinstown, Easton, Kilmacredock Upper, Castletown and Rinawade Upper.

2.0 STRATIGRAPHIC REPORT

SITE 16 and 17

Fifty-six contexts were identified on Site 16 and 11 contexts on Site 17. Contexts were fully excavated and recorded on plan and section/profile, by photography and on context sheets. Soil samples were taken where appropriate. The topsoil removed by machine was defined as context C30 and the natural subsoil was allocated C29. Once excavation was completed road construction commenced.

The site can be divided into four phases: **Phase 1**, the only feature that can positively be assigned to this phase is pit C23 as Beaker pottery was found in its fill. Three flint flakes dating to the late Neolithic-Early Bronze Age were found in the topsoil, plough furrows and upper fill of the ditch and presumably are contemporary with the pottery. Eight other features cut the subsoil but cannot be assigned definite periods without extensive radiocarbon dating. One of these features C67 has been assigned to phase 1 due to its proximity to C23 and the fact that both pits contained cremated bone; **Phase 2**, consisted of a corn drying kiln which produced a radio carbon date of early medieval date. **Phase 3** consisted of a large northeast-southwest orientated ditch of a slightly later date also in the early medieval period. The other seven features (hearth/kiln, post-holes and pits) have also been assigned to this phase; **Phase 4** was the final phase where northwest-southeast orientated cultivation furrows cut features in the earlier phases.

Phase 1 Two pits

Five contexts were identified in this phase (C67, C68, C69, C23 and C70). They represent the cuts of two pits and their fills in the southern area of the site.

C23 was a linear cut 0.92m by 0.27m and 0.10m deep (pl. 1). It was filled with C70, a deposit with frequent charcoal flecks and unidentifiable cremated bone (fig.5 + 13). Five sherds (one in two pieces) of Beaker pottery and three crumbs were found in the pit 01E0893:20, :23-29. Located 0.35m to the south of it was C67, an oval shaped cut, 0.74m long by 0.56m to 0.27m wide and 0.22m deep. It was filled with C69 and C68, greyish-brown and greyish-black sandy clay (fig.12). Burnt stones were found in the former while unidentifiable cremated bone, unburnt cattle tooth fragments (Evans, Appendix 3) and hazel and *prunus* charcoal (O Carroll, Appendix 10) were found in the latter.

Phase 2 Corn-drying-kiln

Nine contexts were identified in this phase (C53-C57, C71, C72, C16 and C62) and represent the remains of a corn-drying-kiln C16 (Site 17).

This feature was located 15.40m to the south of the southern edge of Site 16 (fig. 19-22, pls 8-10). The sub-rectangular cut was orientated northeast-southwest and had a narrow linear extension on the southwest side. The main cut was 2.80m long, 1.08m wide and 0.4m deep. The linear projection was 1.30m long, 0.25m wide and 0.15m deep. Both parts of the cut were dug into the natural subsoil C29. The cut had vertical sides in the 'flue' area and convex sides with gradual slopes in the main sub-rectangular section. The base was flat.

The main cut was filled with six fills (C53-57, C62). Some of these fills partly filled the 'flue' (C55, C56). Two more fills C71 and C72 were confined to the 'flue' only (fig. 19-22).

On the base of the main sub-rectangular chamber was an ash and burnt clay deposit C57. It was 6cm deep and confined to the base of the southwestern end of the sub-rectangular cut (pl. 9) and contained charred cereal remains. The highest proportion of which was barley but it also contained indeterminate cereal grains, and some oat and wheat grains. Above C57 was C56 a deposit made up of 90% charcoal (oak and *prunus*) with occasional fragments of burnt bone. It was also found in the southwestern part of the sub-rectangular section of the cut where it was 1cm deep but continued into the 'flue' where it was 5cm deep. A large proportion of barley and indeterminate cereal grains as well as some wheat, and oat grains were found in this deposit. C55 was a charcoal rich deposit with burnt clay

above C56, 6cm deep in the centre but deeper on the west side in the main part of the cut and continued into the flue as C56 did. Cereal grains were also present in this deposit but barley and oat were both found in almost equal proportions unlike the earlier fills C57 and C56. Some wheat, indeterminate cereal grains and weed seeds were also present. Cremated animal bone was also found in this fill. C54 was found above C55. It had an ash charcoal content and was 0.10m deep in the centre lensing to the north and south. It was not found in the flue. Burnt bone was found in the deposit (pl. 10) as well as oat and barley grains. The final fill of the sub-rectangular part of the cut was C53. It was 0.11m deep and continued into the flue. It had frequent charcoal flecks (alder and *pomoideae*), fragments of burnt bone, some wheat, barley and oat grains and occasional burnt clay and pebbles. A radiocarbon date of 1320 ± 35 BP, AD650-780 (95.4% probability, SUERC-5467, Appendix 11) was obtained from a charred barley grain from the base fill of the kiln (C57).

C62 was found at the base of the northern part of the cut. It was 4cm deep and had a 40% charcoal content. It also contained some burnt animal bone and some barley and oat grains. Two fills were confined to the flue C72 and C71. The lower fill C72 was 0.55m long and 0.14m deep but lensed to the south and contained occasional charcoal flecks. It contained holly and *pinus* and two of each barley and wheat grains and one oat grain. C71 was found to the northeast overlapping C72 slightly. It contained frequent charcoal flecks and occasional burnt clay.

Phase 3 Ditch, Hearth/Kiln, Postholes and Pits

Twenty nine contexts were identified in this phase (C4-C9, C14, C25, C26, C40, C41, C50-C52, C58, C63, C66, C73, C31-C35, C59, C61, C43, C1, C44 + C47). They represent the cuts of a large ditch and seven other features and their fills. Most of these features were concentrated in the northwestern area of the site.

The large northeast-southwest orientated ditch, C35, ran through the length of the site (fig. 5, pls 3-5). It was observed over a distance of approximately 50m and did not truncate any of the features attributed to Phase 1, which made it impossible to establish the exact relationship between it and those features. Charred cereal grains found in two fills of the ditch C31 and C59 possible originated from the cut features to the west C52 and C4. It is not possible to be more specific without extensive radiocarbon dating.

Initially five test-trenches (A-E) were dug across the ditch at regular intervals (fig.4). Two of these test-trenches were located to the south of the actual site area, where the ditch had been observed during the monitoring process. A section was drawn in each test-trench (Fig.6-10) and the fills recorded. The ditch fills were then excavated completely over a length of 30m. The cut of the ditch was on average 1.50m wide and just over 1m deep. At the northern end of the ditch, the profile of the cut was 'V'-shaped, with the sides sloping to a rounded point. Towards the southern end, the cut had a more 'U'-shaped profile with steep sides and a flat base.

Altogether eleven different fills were recorded in the ditch C1, C31, C32, C33, C34, C60, C59, C61, C43, C44, and C47. The stratigraphy of the fills was more complex at the northern end. Here, the top of the ditch was filled by C1, a mid-brown silty clay, which could be followed from the northern baulk over a length of 12.50m. Under C1, the deposits C31 and C59 were found, these fills had large amounts of charcoal (hazel, alder and *prunus*) and some charred cereal grains. Eight fragments of pig maxilla, seven fragments of animal cremated bone were also found in C31. C59 contained a sheep/goat molar and twelve fragments of cattle horn (Evans Appendix 3). In section A three different fills (C32, C33, C34) were observed under C31, while in section B a sandy fill C61 was located under C59.

Continuing on from C1 in southern direction, context C43 formed the upper fill of the ditch. It could be followed over a length of 35m to a point where the ditch ran in underneath the hardcore surface laid for the road construction. At this southern point, context C44 was found below C43 (fig.10). In some places near the southern end, deposit C47 formed a 0.15m thick deposit lining the cut of the ditch (fig.9). This deposit can be interpreted as slump from the sides and surface.

The fills of the ditch produced animal bone, cremated bone and two fragments of human skull. The skull fragments were found at the base of the ditch, in C44 (Section C, Grid 8, pl 4), along with twenty-three cattle sized vertebrae fragments. Other cattle parts, two of which had evidence of butchery, included a molar, a horn core, a humerus, a metacarpal and a metatarsal (Evans, Appendix 3). A radiocarbon date of 930 ± 28 , AD1027-1196 (95.4% probability, UBA no. 11577, Appendix 11) was obtained from a horn core and cattle tooth from this context. These disarticulated bones were dumped into the ditch

while it was still open and had possibly been cooked (J. McDonald pers comm.). Two artefacts were found in the ditch fills, an iron blade 01E0893:21 from C31 and a flint flake 01E0893:22 from C1.

There appears to be four main phases in the silting of the ditch: 1: the initial erosion and deposition of material from the sides of the ditch soon after it was dug represented by the C61, C34, C47 etc.; 2: the natural silting up of the ditch represented by C44 and C33, the clay nature of the fills suggests they were deposited by slow moving water characteristic of ditches. It is in this phase that the human skull fragments were deposited; 3: at the northern end of the ditch close to the cereal processing activity the presence of charred cereal grains in the middle fills of the ditch suggests that the ditch was open in this period; 4: the final silting up of the ditch represented by C1 and C43. Without a more extensive radiocarbon dating programme it is not possible to be more precise regarding the phasing of the ditch relative to the other features on site.

An area of burning was located in the northern quadrant (fig.4). The feature had been heavily truncated by the furrows from phase 4 therefore the identification of its identification function was hampered. It was first thought to be a hearth but a large quantity of charred cereal grains were found during post-excavation analysis in one of its fills C4. Taking into consideration and the proximity of another feature C52, 1.70m to the north which also contained a large amount of charred cereal grains it is possible that the feature was associated with cereal processing such as a form of corn-drying-kiln. The cut C63 was sub-circular in shape, with dimensions of 2.10m by 2.40m with a maximum depth of 0.20m. It had concave sides and an irregular base. It contained four different fills: C4, C5, C6 and C66 (fig.4+11, pl 2). C5 was the main fill and consisted of a loose, mid-grey silt with flecks of charcoal and inclusions of large pebbles. In the centre of the feature, over C5, a deposit of loose, dark grey to black, charcoal-rich silty clay C4, was found. Wheat, barley, oat, legume and various weed seeds (Johnston, Appendix 3) as well as *prunus* and alder charcoal (O Carroll, Appendix 10) were found in C4. It cut into the north edge of context C66, a loose, sandy clay of mid-grey colour with black and orange flecks and a moderate amount of sub-angular stones. A red clay with patches of charcoal, ash and inclusions of burnt clay, C6, was found near the southern edge of the feature. It displayed evidence of intense burning. The charcoal content of C6 was approximately 5%.

Two postholes C50 and C51 were found 0.30m to the southwest of the hearth. They were of similar size and shape. Their fill consisted of charcoal-flecked material, which suggests a possible relationship to the hearth feature (pl.7, fig.4, 5, 15+16).

Another possible posthole or small pit C73 was located 1.20m to the west of the hearth. It was 0.43m long by 0.23m wide and 0.15m deep. Charcoal-rich silt C25 was its only fill. However, no pattern of postholes emerged to indicate the size and shape of a possible structure (fig. 4+5).

A large pit C52 (1.10m by 1m and 0.5-0.18cm deep) was located 0.80m to the northwest of C63. It was filled with a charcoal deposit C7, which contained unidentifiable burnt bone and an unburnt cattle sized vertebrae and unidentifiable animal bone fragments. A high concentration of charred cereal grains were also contained in the fill- indeterminate cereal grains predominated followed by a high proportion of wheat, oats and barley. Weed seeds such as dock and goosefoot were also present. A plough-furrow C28 truncated the pit on its southern end (fig.4, 5+18).

A further pit C41 was found 1.80m to the southwest of the possible kiln. It was 0.55m by 0.40m in size and 0.19m deep. A black, sandy clay C14 filled formed the upper fill and a mid-brown, sandy clay containing some charcoal flecks formed the base fill C40. Both fills contained moderate amounts of charcoal (fig.4, 5+14). A low number of cereal grains (wheat and barley) in the primary fill suggests that this pit was open during the second period of cereal processing on site.

The final feature of this phase, C58, was located in the south-western corner of site 16. It was an oval cut 0.66m by 0.40m, 0.09m deep and filled with C26 (fig.4, 5 +17). Its fill C26 contained alder charcoal and unidentifiable cremated bone.

Phase 4 Linear Features

During the last phase of activity on Site 16, ploughing or cultivation bed digging created several linear features. Nine furrows were observed running in a northwest-southeast direction (fig.4). Their cuts and fills were given context numbers C2, C28, C64, C65, C12, C45, C38, C11=C22, C3, C37, C15, C46, C24, C36, C49, C48, C27 and C39. They varied in width from 0.80m (C28) to 0.30m (C48). C28, C45, C38, C37, C39 and

truncated the upper fills of the ditch C35. C28 also truncated the fill of pit C52 and C45 truncated the fills of C4 (possible hearth/kiln). A single furrow cut the fills of kiln C16 it was numbered C42 and was filled with C17.

Several post medieval artefacts were found in the furrow fills including post medieval pottery sherds, 01E0893: 9, :10, 12, :13, glass 01E0893:11, clay pipe fragments 01E0893:6, :14, :17 and a nail 01E0893: 7. A flint flake 01E0893:18 was found in fill C12. Other artefacts were found in the topsoil during the initial clean-back these included a silver button 01E0893:1, nails 01E0893:2 and :3 and a flint flake 01E0893:4.

3.0 DISCUSSION

Phase 1- Neolithic/Bronze Age transition

During the Neolithic/Bronze Age transition period we see a continuity of population in Ireland and continuing use of Neolithic material culture but also incorporating new high status goods such as Beaker pottery, transverse and barbed-and-tanged arrowheads, wrist-bracers and copper objects (Cooney and Grogan 1994, 90). Evidence from Lough Gur, Co. Limerick suggests that these new objects were acquired by 'an emerging social élite' (Cooney and Grogan 1994, 78) concentrated on the already established enclosed sites. We also see evidence of population expansion into other areas of the landscape such as the south and west and the incorporation of existing monuments such as Newgrange into new ritual and domestic areas.

No other Beaker activity was noted in the near vicinity of the Collinstown site (Bennett, I. (ed.) on <http://www.excavations.ie>). The closest sites where Beaker pottery has been found are: in Co. Dublin at Palmerstown Upper where just a few sherds were found associated with an area of burning at c. 8km distant; other sites are more substantial representing domestic activity at Newgrange and Knowth, burial and enclosure at Monknewtown and series of pits at several sites at Rathmullin near Drogheda and at Harlockstown near Ashbourne in Co. Meath are all over 30km distant and finally in Corbally, Co. Kildare at 27kms distance.

The two pits on this site attributed to the Late Neolithic/Early Bronze Age were located in the southern section (Reilly 2011). The hazel charcoal found in one of the pits suggests

that the inhabitants had access to free-draining, nutrient rich clays (O Carroll, Appendix 10). The narrower, longer pit contained eight sherds of Beaker pottery representing at least two if not three vessels as well as unidentifiable cremated bone. The second pit was assigned to the same phase due to its proximity to the first and because cremated bone fragments, also unidentifiable, were contained in the fills. The fills also contained unburnt cattle tooth fragments and hazel and *prunus* charcoal. It was not possible to determine whether the cremated bone was human or animal but it was burned at temperatures between 200 and 800 degrees Celsius. The base fill of the pit contained burnt stones suggesting that the pit may have had a cooking function or as will be discussed later burning may have had a ritual or symbolic function. Other artefacts found on site datable to this period were three flint flakes, two of which were broken, and a small flint fragment. These artefacts were found in disturbed contexts; in the topsoil and cultivation furrows. The flint knappers had utilised small flint pebbles from beach and glacial till to produce undiagnostic tools that can only be generally assigned to the Neolithic-Early Bronze Age (Moore Appendix 5) and suggest that domestic activities were carried out at this site or in the very near vicinity.

No evidence was found on site for domestic structures though it is likely that undiscovered examples exist in the vicinity. Pits are common features on domestic and ritual sites in the Neolithic and Early Bronze Age. On habitation sites they are generally regarded as waste disposal pits, cooking pits or food storage pits however there is growing evidence that they represent a more complicated relationship between the inhabitants, and diggers, and place. Small, shallow bowl shaped pits are unsuitable for food storage. Experiments with reconstructed Iron Age pits by Reynolds have shown that the mouth of the pit needs to be sealed with clay or dung and that the best results are achieved when the angle between the seal and the pit sides is not acute. A beehive shaped pit is therefore the most effective (in Thomas 1991, 60).

Neolithic and Early Bronze Age pits are also notable by their fills, often homogenous containing burnt material such as charcoal but with unburnt artefacts. Their sides are often fresh with no sign of weathering or subsidence (Calkin 1947, 30; Smith and Simpson 1964, 82 in Thomas 1991, 60) indicating that the pits were quickly backfilled.

Neolithic pits in Britain have been found to contain animal bone, human bone, broken pottery, fine flint artefacts and stones axes. Animal bone assemblages found in the pits are usually made up of meat rich parts of animals or have a peculiarity such as the assemblage found in a pit at King Barrow Ridge near Stonehenge which was made up of pig foot bones (Richards 1984, 183 in Thomas 1991, 62). The flint tools are often finely flaked complete pieces with a high ratio of tools to waste. In one case a scraper had been broken in two and half placed in two separate pits (Halpin 1984 in Thomas 1991, 62). The pottery is often of rare and highly decorated types and though whole vessels are sometimes found it is more usual for sherds from a number of vessels to be deposited as at Collinstown. This suggests the deliberate breaking and selection of pieces for deposition in the pits. At Collinstown the fills of pit C23 contained cremated bone, charcoal flecks and Beaker pottery sherds from more than one vessel type. Beaker pottery would have been a prestige object and its deposition in the pit does not represent the disposal of domestic refuse. Similar processes seem to have occurred at Rathmullen, 01E0294 and 00E0813, excavated by Ms T. Bolger and 01E0390 excavated by Mr D. Nelis where pits without associated structures contained sherds of Beaker pottery, including rare polypod examples, lithics and charcoal (Bennett, I. (ed.) on <http://www.excavations.ie>). The incorporation of burnt material or in situ burning is notable in pits and in examples from the Starčevo site of Lánycsók in western Hungary a complex stratigraphy indicated that each act of episodic deposition was sealed by a burning event (Chapman 2000, 70). Though the fills of British and Irish examples are more homogenous and likely to be single events the tendency was to use fire in some form during the procedure.

Thomas has suggested that the attitude to what we view as waste was different in the pre-historic period. That objects and material were deposited in pits as part of a complex relationship with the objects themselves and the habitation area. An Irish example is that of Goodlands, Co. Antrim where sherds, flints and charcoal were buried in pits. Case has interpreted this activity as representing a fertility ritual where 'the scraped-up debris of settlement sites' was deposited in pits on the site (Case 1969, 12-15 in Thomas 1991, 59). Chapman also argues that the act of pit digging and subsequent filling is a complex one whereby pits are dug not to dispose of refuse but 'can be seen as an exchange with the ancestors-of new material for old-when the pits are dug into earlier 'cultural layers' 'and if cut into new soil 'may access the remote past or merely the recent past,' (Chapman 2000, 64). Essentially the digger, in digging and depositing goods often of high status, is

accessing and forming a link to the past and the physical place they are in and in doing so legitimises or reinforces their claim to that place. This practice may be related to the phenomenon of depositing prestige goods such as maceheads and metal objects in lakes, and bogs.

Phase 2 and 3 Early Medieval- 7/8th century and 11/12th century

Two dates in the early medieval period were returned for features on site. The corn-drying kiln in the southern part of the site dates to the 7/8th century while the ditch was in use in the 11/12th century. Other features in which grain was found date to sometime after. The phases of the ditch will be discussed first followed by both phases of cereal production and a general discussion of cereal production in the early medieval period.

There appears to be four main phases in the silting of the ditch three of which will be discussed in this phase. Firstly soon after excavation the sides weathered and eroded into the ditch. Secondly the clay deposits were deposited by slow moving water characteristic of ditches and thirdly, fills at the northern end of the ditch probably associated with the cereal processing activity close-by.

As stated above without extensive radiocarbon dating it is not possible to determine exactly which features of the ditch, hearth/kiln, postholes and pits are contemporary but due to the existence of charred cereal grains in some of the higher ditch fills it can be suggested that those fills are contemporary with the kiln/hearth close-by. A radiocarbon date from the 11/12th century was returned from animal bone found in one of the lower fills of the ditch indicating that it was open and being dumped into at this time. It was then open long enough for a considerable amount of material to have built up in it before the near-by cereal processing took place.

The ditch ran through the entire length of the site and continued off site to the northeast and southwest. It was not completely uniform in depth or width but was on average 1.50m wide and just over 1m deep and varied from a 'V' profile in the north to a 'U' profile at its southern end. It can be interpreted as a boundary ditch. The soil from the ditch would have been piled on one side to form a linear bank. This may have been on the eastern side as there is a suggestion in the sections drawn through the ditch that more material built up on this side from the initial erosion of the sides and bank.

The human skull fragments and disarticulated cattle bones were found in the clay deposits which were deposited by slow moving water indicating that the ditch was still water filled and functional in the 11/12th century. Two of the cattle bones displayed evidence of butchery. A failed radiocarbon date from a piece of cattle bone suggested that the bone had been cooked (J. McDonald pers. comm.). This suggests that the animal bones were the discarded remains of a meal. The discovery of human skull bone in the same part of the ditch suggests that human remains were treated in a rather relaxed manner. The presence of food remains also suggests that an unknown habitation site was close-by.

During the later phase of cereal production the ditch was only 0.30-0.50m deep and it is unlikely that it still functioned as a drainage channel. The presence of some charred barley, wheat and oat cereal grains suggests that fills deposited in this phase of the ditch's life cycle are contemporary with the features close-by to the southwest that were used in cereal processing.

Though the two areas of cereal processing are not contemporary the percentage of weeds found in the samples of both areas suggests that two stages of cereal processing are evident though not contemporaneous. The earlier stage of cereal processing, though later in actual date, was carried out in the northern area and concentrated around the pit and possible kiln/hearth. The occurrence of a higher proportion of weed seeds such as dock, goosefoot and grass seeds as opposed to in the kiln in the south of the site might suggest that a stage earlier in the process was carried out at these two features. There is also a difference in the proportion of cereal types from the two areas with a higher proportion of wheat being found at the northern features and barley and oats dominating in the southern kiln. Since only the base of the features have survived cut into the subsoil it is difficult to determine their exact function. They might represent forms of kiln used to dry and ripen the grain before threshing and cleaning while the southern kiln might have been used in the final drying before milling or storage. Threshing did take place at kiln sites, one law tract records an accidental injury by a threshing stick at a kiln (Kelly 1997, 240), by placing the ears of corn on the ground (threshing floor) and using a stick to detach the grain from the stem.

A mixed farming economy existed in early medieval Ireland consisting of crop farming and animal husbandry. The alder, *prunus*, ash, hazel, holly, oak and *pomoideae* charcoal found in features from this phase indicate that wood from a variety of habitats was available as alder prefers wet conditions along river banks or peat bogs while the other species prefer drier conditions (O Carroll, Appendix 10). The local landscape would have been dotted with mixed woodlands.

The documentary sources of early medieval Ireland are a useful tool in furthering understanding of the archaeological record. Several classes of farmer are mentioned in the documentary sources such as *aire ócaire*, *bóaire* and *céle* to name but three as is an 'inventory of the chattels on the holding' of a grade of *bóaire*' (O'Loan 1963,45) which gives an indication of the tools and possessions of a farmer. The skills required to be taught to foster children of lower rank gives an idea of daily farming practices; these were the arts of herding lambs, calves and young pigs, kiln drying, combing grain and wood cutting. Girls of the same rank were taught how to grind corn, use a kneading trough and sieve and the herding of lambs and kids (O'Loan 1963, 35).

Cereal was usually harvested in September- the month of reaping (*mí búana*) (O'Davoren's Glossary in Kelly 1997). After it was harvested it had to be processed before it could be used as a foodstuff. In a climate as inclement as Ireland cereal was dried by use of fire at several points in the process- before threshing and again to harden the grain before milling. Kilns (*áith*) were also used in the processing of malted barley to make beer (Edwards 1990, 62). Though there is no mention in the early sources of the use of fire to separate the glume and chaff from the cereal grains this method was used in Ireland and at a later date and was forbidden by statute in 1634 (Joyce in Kelly 1997, 240). It is possible that this method could have been used in the early medieval period especially when we consider that it was a method employed by the Romans and presumable used in Roman Britain. Fire heated corn-drying-kilns were used into the late 19th century (Monk and Kelleher 2005) before electric dryers were available.

A *bóaire* class of farmer had his own kiln and a share in a mill (O'Loan 1963, 446) while less wealthy farmers had only a share in a kiln. From the written sources it seems that the grain was placed on a wicker tray and slotted into the wall of the structure. This suggests that the kiln had a stone wall. From available archaeological evidence it is apparent that

some at least did not have a stone component, though it is possible that since only the bases of these features are usually preserved cut into the subsoil that a stone structure above ground may not have survived. Kilns are defined by their shape; the keyhole kiln, L-shaped or comma-shaped, the figure-of-eight and dumb-bell-shaped kiln. Monk and Kelleher argue that the latter two being similar in shape belong to the same group. Common features of key-hole-shaped kilns are a bowl, a flue and a stokehole. A drying platform would have been erected over the bowl (O'Sullivan and Downey). No evidence for the superstructure or a wicker tray were found in the earlier kiln or other features at Collinstown however alder and oak, *prunus* and *pompideae* were found in the fills of the kiln and may have been part of the structure (alder is easily worked) or used as fuel though it has been suggested that peat was used as fuel in kilns as it is less likely to spark and set fire to the cereal grains (Edwards 1990, 63). Hazel, used for wattle, posts, trackways and baskets (O Carroll, Appendix 10), found in one of the fills of the ditch contemporary with the later kiln/hearth might suggest that hazel was used in the structures.

The earlier kiln at Collinstown did not have a characteristic keyhole, L or figure of eight shape. It may be a different type of kiln or it can also be argued that it is a derivative of the figure of eight-shape shape as though it is slightly different in shape it has comparable characteristics. Comparison to a fifth/sixth century AD kiln at Carmanhall (02E0076) (Reilly 2006) shows both types had a flue-like projection on the bowl side. The bowl in the Carmanhall example was deeper than the part of the cut opposite the flue unlike at Collinstown where the cut was the same depth throughout however the burnt fills and cereal grains were concentrated in this part of the kiln in the Collinstown example and equates to the bowl in the Carmanhall. The drying platform would have been placed above the bowl (the flue end of the main cut) and hot embers placed below. Perhaps the flue-like projection was to direct air into the kiln. Care was taken not to allow the grain to catch fire but inevitably some did and so are preserved in the archaeological record.

The dominant species in Carmanhall as in Collinstown was oats and barley which is typical of early historic assemblages (Johnston, Appendix 9). A mix of these grains was often planted so as to lessen the possibility of total crop failure as oats will grow in damper conditions than barley. These grains are included in the eighth-century law text *Bretha Déin Chécht* which lists cereals in order of prestige- *cruithnecht* (bread-wheat), *secal* (rye), *suillech* (spelt wheat?), *ibdach* (two-row barley), *rúadán* (emmer wheat?), *éornae* (six-row

barley) and *corcae* (common oat) (CIH vi 2305.6-13 in Kelly 1997, 219). Bread-wheat produces a light bread and is more difficult to grow in Ireland's damp climate takes first place while barley and oats are less prestigious but nonetheless were more important food crops for the general population and more easily grown. They were also more diverse crops as they could also be used as animal fodder (Monk *et al* in Monk *et al* 1998, 73) and in the case of barley also used for brewing beer. The relative high percentage of grains from the wheat species from the pit and kiln/hearth in the north of the site might suggest the kilns belonged to a relatively well off farm. Porridge in many forms was a staple of the early medieval diet and was made from oaten, barley or wheaten meal and combined with water, buttermilk or new milk (CIH 1759.36-1760.2 in Sexton in Monk *et al* 1998, 76).

After drying, grain was winnowed to separate the chaff from the grain then stored, milled for bread or porridge or malted for beer production. No evidence was found on site for how the grain was stored but we know from the written sources that barns were used (Kelly 1997, 243). The introduction of the water powered horizontal mill in the early medieval period allowed for grain to be more easily ground than by using hand rotary querns. A farmer of the *bóaire* class would be expected to have a part share in a mill (Kelly 1997, 245). It is likely that such a mill existed close-by perhaps on the Rye water river to the north.

Evidence for other foodstuffs found from this phase was the cremated bones of juvenile pigs and unknown animal parts from the earlier kiln fills. Since there was no evidence of butchery, haven been cremated, we can only guess that young pig was consumed on site.

The only artefact from this phase, an iron blade 01E0893:2 was found in the ditch fill C31.

Phase 4 Post Medieval

The ditch continued to be filled either naturally or back filled until it was level with the surrounding land. Nine cultivation furrows represent the final phase of the site. They ran in a northwest-southeast direction (fig.4) and truncated the highest fills of the boundary ditch C35, the hearth/kiln C63, the kiln C16 and the pit C52. Several post medieval artefacts were found in the furrow fills including post medieval pottery sherds, glass, clay pipe fragments and a nail. Pottery sherds and other rubbish were often thrown in manure piles and were subsequently deposited on the land during manure spreading. The ditch had

completely silted up by the early nineteenth century as it does not appear on the 1st edition O.S. map for the area (O.S. Sheet 11, Kildare).

CONCLUSION

This site at Collinstown has produced evidence for four phases of activity: Neolithic/Early Bronze Age activity in the form of pits, lithics and Beaker pottery; early medieval cereal grain processing in the form of corn-drying kiln/s and other features; early medieval boundary ditch with evidence for cattle butchery in the fills; and finally post medieval agricultural activities in the form of cultivation furrows and evidence for manure spreading.

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CARTOGRAPHIC SOURCES

1st edition Ordnance Survey 6", Co. Kildare, sheet 11, 1839

2nd edition Ordnance Survey 6", Co. Kildare, sheet 11

Sites and Monuments Record, Co. Kildare, sheet 11

Castletown House estate map 1/6m c. 1739, Irish Architectural Archive

Castletownhouse estate map 1/6, undated (probably late 18th/early 19th century), Irish Architectural Archive

APPENDIX 1

CONTEXT LIST

SITE 16

- Context 1** Mid brown, silty clay with moderate pebble inclusions. Top fill of ditch C35 at northern end.
- Context 2** Plough-furrow fill.
- Context 3** Plough-furrow fill.
- Context 4** Loose, dark grey to black, silty clay with 70% charcoal and occasional pebbles. 2m by 0.50m, 0.20m deep. Lense within C5. Hearth fill.
- Context 5** Loose, mid-brown to grey-orange, sandy clay with flecks of charcoal and frequent pebbles. Found under C4, C6 and C66. Main hearth fill.
- Context 6** Loose, red clay with patches of black charcoal, ash, burnt clay and pebbles. 1m by 0.50m, 0.06m deep. On south edge of hearth C63.
- Context 7** Moderately compacted, black charcoal fill with pieces of cremated bone and unburnt animal bone fragments. Fill of pit C52.
- Context 8** Loose, friable, brownish-grey, sandy clay with occasional charcoal flecks and pebbles. Possible posthole fill.
- Context 9** Loose, brownish-grey, sandy clay with occasional charcoal flecks and pebbles. 0.17m by 0.09cm. Possible posthole fill.
- Context 10** Cancelled.
- Context 11** Plough-furrow fill.
- Context 12** Plough-furrow fill.
- Context 13** Cancelled.
- Context 14** Friable, black, sandy clay with moderate charcoal flecks and occasional small rounded stones. 0.24m by 0.34m, 0.09m deep. Fill of pit C41.
- Context 15** Loose, thin charcoal spread mixed with dark brown silty clay and small stone inclusions. 2.20m by 0.40-1.10m, 0.06-0.18m deep.
- Context 22** Plough-furrow fill, same as C11.
- Context 23** Oval cut with flat base. 0.92m by 0.27m, 0.10m deep, in southeast corner of site. Filled by C70.
- Context 24** Plough-furrow fill.

- Context 25** Firm, dark brown silt with charcoal lumps and occasional pebbles. 0.35m by 0.28m, 0.13m deep. Fill of possible posthole cut or small pit C73.
- Context 26** Friable, brown, sandy clay with moderate flecks of charcoal and small stones. 0.66m by 0.40m, 0.09m max. depth. Fill of pit C58.
- Context 27** Plough-furrow fill.
- Context 28** Cut of plough furrow. Filled by C2.
- Context 29** Firm, yellow-brown clay. Natural sub-soil.
- Context 30** Topsoil, removed by machine.
- Context 31** Weakly cemented to loose, dark grey, silty clay with 80% charcoal-content. Fill of ditch C35.
- Context 32** Compact, dark to light brown, silty clay with frequent, medium-sized sub-angular stones. Fill of ditch C35.
- Context 33** Compact, mid to dark grey, stony clay with frequent, medium-sized sub-angular stones. Fill of ditch C35.
- Context 34** Loose, mottled, silty sand. Fill of ditch C35.
- Context 35** Linear cut orientated roughly north-south in centre of site. Excavated over length of 30m. 1.50m wide, 1m deep. Possible boundary ditch.
- Context 36** Cut of plough-furrow. Filled by C24.
- Context 37** Cut for plough-furrow. Filled by C3.
- Context 38** Cut for plough-furrow. Filled by C22 and C11.
- Context 39** Cut for plough furrow. Filled by C27.
- Context 40** Firm, mid-brown, sandy clay with moderate amount of charcoal flecks, occasional flecks of reddish brown clay and small pebbles. Fill of pit C41.
- Context 41** Oval cut. 0.55m by 0.40m, 0.19m deep. Small pit.
- Context 43** Firm, mid-brown, silty clay with frequent small stones and pebbles. Top fill of ditch C35 at southern end. 1.20m wide by 23m long, 0.5-0.7m deep.
- Context 44** Firm, dark grey, clayey silt with patches of yellow inclusions and stones. Bottom fill of ditch C35 at the southern end, 0.3-0.4m deep.
- Context 45** Cut of plough-furrow. Filled by C12.
- Context 46** Cut of plough-furrow. Filled by C15.
- Context 47** Soft, yellow, silty sand with moderate small, rounded pebbles and occasional angular stones. Fill of C35 at southern end. Identified in test section.
- Context 48** Cut of plough-furrow. Filled by C49.

- Context 49** Fill of plough-furrow C48.
- Context 50** Cut of posthole. Diameter 0.20m, 0.14m deep. Filled by C8.
- Context 51** Possible posthole cut with fill C9. 0.25m in diameter, 0.13m deep.
- Context 52** Circular pit with fill C7. 1.10m by 1m, 0.5-0.18cm deep.
- Context 58** Oval pit. 0.66m by 0.40m, 0.9m deep.
- Context 59** Firm, greyish-black silty clay with medium-sized stones, frequent inclusions of charcoal and occasional bone fragments. Fill of ditch C35 at northern end.
- Context 60** Soft, mid-brown, sandy clay with stones and charcoal flecks. 0.30m in depth. Ditch C35 fill at northern end.
- Context 61** Friable, mid-brown, coarse sand with stone inclusions. Average thickness 0.20m. Ditch C35 fill in northern sector.
- Context 63** Cut of hearth. 2.40m by 2.10m, max. depth 0.20m. Contained fills C4, C5, C6 and C66. Cut by plough furrow C45.
- Context 64** Cut of plough-furrow. Filled by C65.
- Context 65** Fill of plough-furrow C64.
- Context 66** Loose, mid-grey, sandy clay with black and orange flecks and inclusions of small, sub-angular pebbles. Fill of hearth C63, over C5, cut by furrow-fill C12.
- Context 67** Oval cut. 0.56m by 0.27m, 0.22m deep. Small pit.
- Context 68** Loose, greyish-black, sandy clay with frequent charcoal flecks and cremated bone fragments. Occasional unburnt animal bone and small rounded stones. Secondary fill of circular pit C67.
- Context 69** Soft, greyish-brown, sandy clay with moderate charcoal flecks, occasional burnt stones concentrated at the base of the context, frequent small rounded pebbles and occasional fragments of burnt bone. Primary fill of pit C67.
- Context 70** Loose, greyish-black, clayey silt with frequent charcoal flecks, occasional burnt bone fragments and moderate amount of small sub-angular stones. 0.92m by 0.27m, 0.10m deep.
- Context 73** Oval cut. 0.43m by 0.23m, 0.15m deep. Possible truncated posthole or small pit.

SITE 17

- Context 16** Sub-rectangular cut with narrow, linear extension on southern end. Total length 4m by 1.08m.
- Context 17** Plough-furrow fill.
- Context 18** Cancelled.
- Context 19** Cancelled.
- Context 20** Cancelled.
- Context 21** Cancelled.
- Context 42** Cut of plough-furrow. Filled by C17
- Context 53** Loose, black to brown, silty clay with frequent charcoal flecks, burnt bone, occasional burnt clay and pebbles. 3.83m by 1.08m maximum, 0.11m deep, getting thinner on eastern and southern ends. Upper fill of C16.
- Context 54** Loose, dark brown to black, silty clay with 85% charcoal-content. Inclusions of burnt bone and clay. 2.04m by 0.95m, 0.10m deep. Fill of C16.
- Context 55** Loose, mottled, red to yellow and black, silty clay with inclusions of occasional burnt bone and pebbles. 1.15m by 0.92m, narrowing to 0.20m in the narrow section of C16, 0.06m deep. Fill of C16 over C56 and 57.
- Context 56** Loose, black, silty clay with 90% charcoal-content. Occasional burnt bone. 1.11m by 0.65m, narrows to 0.15m in the narrow section of cut C16. 0.01m deep in main cut, 0.05m deep in flue area. Fill of C16.
- Context 57** Loose, greyish-white ash deposit, composed of 75% ash and 20% burnt clay with occasional charcoal flecks. 0.60m by 0.68m, 0.06m deep. Fill at base of C16.
- Context 62** Loose, dark brown to black, silty clay, with 40% charcoal inclusions and occasional sub-rounded stones. 0.70m by 0.58m, 0.04cm deep. Fill of C16 at north end.
- Context 71** Loose, mid brown, silty clay with frequent charcoal flecks and occasional burnt clay flecks. 0.55m by 0.25m, 0.16m deep. Fill of narrow section of the cut C16.

Context 72 Loose, mid grey to brown, silty clay with occasional charcoal flecks.
0.55m by 0.20m, 0.14m deep, with lenses to the south. Fill of narrow
section of cut C16.

APPENDIX 2

FINDS LIST

| Find no. | Context no. | Area | Grid | Simple name | Description | Material | Illustrated |
|----------|-------------|------|------|-------------|---|------------------------------|-------------|
| 1 | 30 | 16 | | Button | Button | Copper alloy and tin/silver? | No |
| 2 | 30 | 16 | 2 | Nail | Nail | Iron | No |
| 3 | 30 | 16 | 15 | Nail | Horseshoe nail | Iron | No |
| 4 | 30 | 16 | 2 | Lithic | Flint flake | Stone | No |
| 6 | 24 | 16 | 6 | Clay pipe | Clay pipe fragment | Ceramic | No |
| 7 | 24 | 16 | 6 | Nail | Nail | Iron | No |
| 8 | 49 | 16 | | Nail | Nail fragment | Iron | No |
| 9 | 2 | 16 | 4 | Pottery | Unidentified body sherd of Post Medieval pottery- white fabric/ white glaze | Ceramic | No |
| 10 | 2 | 16 | 4 | Pottery | Body sherd of Staffordshire Type Slipware | Ceramic | No |
| 11 | 2 | 16 | 4 | Glass | Body sherd Post Medieval green bottle glass | Glass | No |
| 12 | 3 | 16 | 6 | Pottery | Body sherd of Blackware | Ceramic | No |
| 13 | 3 | 16 | 6 | Pottery | Fragment of Red Earthenware | Ceramic | No |
| 14 | 24 | 16 | 6 | Clay pipe | Clay pipe fragment | Ceramic | No |
| 17 | 24 | 16 | 6 | Clay pipe | Clay pipe fragment | Ceramic | No |
| 18 | 12 | 16 | 4 | Lithic | Flint flake | Stone | No |
| 19 | ? | 17 | 17 | Lithic | Flint flake | Stone | No |
| 20 | 70 | 16 | 8 | Pottery | Body sherd of Beaker pottery with impressed comb decoration | Ceramic | Yes |
| 21 | 31 | 16 | 4 | Knife | Fragment of a knife blade | Iron | No |
| 22 | 1 | 16 | 8 | Lithic | Flint flake | Stone | No |
| 23 | 70 | 16 | 8 | Pottery | Rim sherd of Beaker pottery with impressed comb decoration | Ceramic | Yes |
| 24 | 70 | 16 | 8 | Pottery | Body sherd of Beaker pottery with one incised line decoration | Ceramic | Yes |
| 25 | 70 | 16 | 8 | Pottery | Rim sherd of Beaker pottery may be decorated with horizontal lines | Ceramic | Yes |
| 26 | 70 | 16 | 8 | Pottery | Body sherd of undecorated probable Beaker pottery in two pieces | Ceramic | No |

| | | | | | | | |
|----|----|----|----|------------|------------------------------|---------|----|
| 27 | 70 | 16 | 8 | Pottery | Crumb of prehistoric pottery | Ceramic | No |
| 28 | 70 | 16 | 8 | Pottery | Crumb of prehistoric pottery | Ceramic | No |
| 29 | 70 | 16 | 8 | Pottery | Crumb of prehistoric pottery | Ceramic | No |
| 30 | 44 | 16 | 10 | Human bone | Fragment of human skull | Bone | No |
| 31 | 44 | 16 | 10 | Human bone | Fragment of human skull | Bone | No |

Note on editing of appendices: additions in [] have been added for clarity by the director, Fiona Reilly, in post-excavation.

APPENDIX 3

Human and Animal Osteoarchaeological Report

Site 16

Emma-Jayne Evans

INTRODUCTION

Site 16 was excavated as one of a number of sites identified in Celbridge during the construction of the Celbridge Interchange. Excavated during August and September of 2001, by Fiona Reilly for Valerie J. Keeley Ltd, the site consisted of a number of pits, ditches, plough furrows and a hearth. The bone found on site was bagged and labelled with the context number of the feature being dug, some being given the fill number from which it came, and some being given the cut number of the feature.

Sieving was not carried out on site, which may have affected the bone recovery rate, particularly in association with cremated bone, small mammal, and juvenile bones. Due to the poor soil condition on site, the bones have survived in a moderate condition, resulting in the high fragmentation and fairly poor surface condition of the bone. These two factors may impede the Minimum Number of Individuals (MNI) count, and the study of animal butchery and taphonomy, as bone recovery, and evidence of surface modification of the bones will be diminished.

The aim of the report is to provide a full analysis of the bones from Site [16], including a species list, minimum numbers of individual species, evidence of butchery and animal husbandry.

Cremated bone will also be analysed, with a view to determining species, pyre temperatures, and disposal methods.

METHOD

Examination of the bone from Site 16 was carried out at the post-excavation office of Valerie J. Keeley Ltd, situated in Athy. The recording method used was devised at the Faunal Remains Unit at Southampton University. Having been in use since 1991, it is based on the method originally used for the recording of the faunal remains from the research excavations at Runnymede (Serjeantson, 1996). The recording of data was initially carried out on pro forma sheets, and later entered onto Microsoft Excel.

All the animal bones from the site were analysed and counted and, where possible, the bones were identified to species, element, side, and zone (Serjeantson, 1996). Also, fusion data, the presence of cut marks and chop marks, and evidence of animal gnawing was noted. The bones of sheep and goat were recorded as sheep/goat, as distinctions could not be made with the element present. Loose teeth were recorded as such, but were not used for dental aging. Without access to a reference collection, the siding and identification of loose teeth is difficult, which could affect the minimum numbers of animals assigned to each specific age category.

Bones that could readily be identified to species were recorded as such. Undiagnostic limb bones, ribs, skull and vertebrae fragments were either recorded as cattle sized (csz), or sheep sized (ssz), and fragments that could not be assigned a class were simply counted and added to the total fragment count for each context.

The total number of fragments of bone from the entire site was calculated, and this figure was broken down into the total number of bone fragments identifiable to species. The NISP (Number of Identifiable Specimens Present) has been calculated for all the species present. The NISP figures do not give the Minimum Number of Individuals (MNI), but are a count of the number of identifiable elements present. The MNI and MNE (Minimum Number of Elements) were calculated using the zoning method (Serjeantson, 1996), with zones recorded as present '1' or absent '0'.

The age at death was calculated using bone fusion data. Fusion stages were recorded as fused 'f', unfused 'u/f', or fusing 'f*'.

Gnawing, chop marks, and cut marks were recorded as present '1' or absent '0', with their positions being described and discussed in relation to butchery and disposal techniques.

Cremated bone fragments were counted, a minimum and maximum fragment size given for each sample, the probable temperature to which the bone had been exposed to, and, where possible identified as either animal or human.

Human bone was recorded as an identification of the elements present, and the dimensions of the fragments recorded.

The following methods were used for analysing the bones from Site 16:

Zones – Serjeantson (1996)

Fusion data – Silver, (1969)

Butchery – Binford, (1981)

ANIMAL BONE

Results

A total of 111 fragments of animal bone were excavated at Site 16, Collinstown, Celbridge. A total of 34 fragments (30.6%) could be identified to species (Table 1.). A full catalogue of the bones identified can be found in Appendix 1 of this report.

Table 1: The total number of commingled fragments of bone and teeth identifiable to species.

| Species | No. of fragments | % |
|------------|------------------|-------|
| Cattle | 25 | 73.53 |
| Sheep/goat | 1 | 2.94 |
| Pig | 8 | 23.53 |
| Total | 34 | 100 |

Table 2: Gives the NISP, MNE and MNI figures for all the species present on the site.

| | Cattle | | | Sheep/goat | | | Pig | | |
|------------|--------|------|-------|------------|------|-------|------|------|-------|
| | NISP | MNE | | NISP | MNE | | NISP | MNE | |
| Element | | left | right | | left | right | | left | Right |
| Skull | | | | | | | 1 | 1 | |
| Vertebra | | | | | | | | | |
| Humerus | 1 | | 1 | | | | | | |
| Metacarpal | 1 | | 1 | | | | | | |
| Metatarsal | 1 | 1 | | | | | | | |
| Horn core | 2 | | 1 | | | | | | |
| Teeth | 4 | | | 1 | | | | | |

| | | | | | | | | | |
|----------------|---|---|--|---|---|--|---|---|--|
| Total | 9 | | | 1 | | | 1 | | |
| Overall MNI | | 1 | | | 1 | | | 1 | |

The following table shows the age at death of cattle, derived from fusion stages, and expressed as a percentage of the total number of bones that could be used for this analysis.

Table 3: Fusion stages and age at death of cattle

| | Unfused | Fusing | Fused | Age | % |
|-------------------------|---------|--------|-------|--------------|---|
| D. Humerus | | | | | |
| P. Radius | | | | | |
| Acetabulum | | | | | |
| Glenoid | | | | | |
| Early Fusion Sub-total | 0 | 0 | 0 | 6-24 months | 0 |
| 1 st Phalanx | | | | | |
| D. Tibia | | | | | |
| D. Metacarpal | | | | | |
| D. Metatarsal | | | 1 | | |
| Mid Fusion Sub-total | 0 | 0 | 1 | 24-42 months | 0 |
| Calcaneum | | | | | |
| P. Femur | | | | | |
| P. Ulna | | | | | |
| P. Humerus | | | | | |
| P. Tibia | | | | | |
| D. Radius | | | | | |
| D. Femur | | | | | |
| Late Fusion Sub-total | 0 | 0 | 0 | 42-48 months | 0 |

Butchery marks were noted on two bones from the site, with Table 4 below identifying those bones and giving a brief description of the butchery marks observed.

Table 4: Incidence of butchery marks on animal bone

| Ref No. | Species | Element | Side | Description |
|---------|---------|----------|-------|---|
| 12 | Cattle | humerus | right | Chopped through shaft, cut on lateral aspect of anterior distal shaft, just above epiphyses |
| 2 | Csz | vertebra | - | Chopped |

DISCUSSION

Cattle

The cattle bone fragments identified from Site 16 numbered twenty-five, 73.53% of the total identified fragments. The minimum number of individuals is one, and using fusion data, it is noted that the cattle remains on the site come from cattle over the age of four years old.

Butchery marks were noted on a humerus and on a csz vertebra. The position of the cuts corresponds with the position of cut marks identified by Binford (1981) as characteristic butchery marks. It may therefore be possible that cattle were being utilised for meat.

Sheep/goat

The only evidence for sheep/goat on this site was one incisor. Loose teeth are not normally used for working out the minimum number of individuals, but as this is the only identifiable sheep/goat element, it can be assumed that a minimum number of 1 was present. No age structure of the sheep/goat can be estimated, and evidence of butchery is absent, therefore the husbandry of sheep/goat from this site cannot be inferred.

Pig

The number of pig bone fragments on the site numbered eight, 23.53% of the total fragments of bone identified. The eight fragments all come from a pig maxilla, which, although it has its 2nd and 3rd molar present, cannot be use to age the animal as the maxilla is not normally used for dental aging. However, the 3rd molar is in wear, so it can be suggested that the maxilla came from an

adult pig. As no age structure can be obtained and there is no evidence of butchery, the husbandry of pig from the site cannot be inferred.

Human Bone

Two fragments of human bone were found on the site (Ref No. 9). These fragments come from one portion of a human skull found in a ditch on the site. The dimensions of the fragments are 5.32cm x 4.62cm and 3.34cm x 2.34cm.

Cremated bone

The cremated bone from the site numbered some 224 fragments. A full catalogue can be found in Appendix 2. The cremated bone was exposed to temperatures averaging between 200°C and 800°C. The fragment size ranged from 0.2cm to 4.3cm and seven fragments could be identified as animal. No fragments were identified as human, but the very small fragment size limited identification of the majority of the fragments.

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Appendix 1: Catalogue of bone from Site 16

| Ref No. | Context | Species | Element | Side | Z1 | Z2 | Z3 | Z4 | Z5 | Z6 | Z7 | Z8 | Prox fused | Dist fused | Chopped | Cut | Gnawed | n | Comments |
|---------|---------|---------|------------|------|----|----|----|----|----|----|----|----|------------|------------|---------|-----|--------|----|--------------|
| 14 | 44 | cattle | 3rd molar | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | |
| 3 | 59 | cattle | horn core | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 12 fragments |
| 11 | 44 | cattle | horn core | r | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | |
| 12 | 44 | cattle | humerus | r | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | - | - | 1 | 1 | - | 1 | |
| 10 | 44 | cattle | metacarpal | r | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | f | - | - | - | - | 1 | |
| 13 | 44 | cattle | metatarsal | l | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | f | f | - | - | - | 1 | |
| 8 | 15 | cattle | molar | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | |
| 4 | 24 | cattle | premolar | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | |
| 7 | 68 | cattle | tooth | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 6 fragments |
| 1 | 7 | csz | vertebra | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | |
| 2 | 44 | csz | vertebra | - | - | - | - | - | - | - | - | - | f | f | 1 | - | - | 23 | 23 fragments |
| 9 | 44 | human | skull | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 | 2 fragments |

| Ref No. | Context | Species | Element | Side | Z1 | Z2 | Z3 | Z4 | Z5 | Z6 | Z7 | Z8 | Prox fused | Dist fused | Chopped | Cut | Gnawed | In | Comments |
|---------|---------|------------|---------|------|----|----|----|----|----|----|----|----|------------|------------|---------|-----|--------|----|-----------------|
| 5 | 31 | pig | maxilla | r | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 8 fragments |
| 6 | 59 | sheep/goat | incisor | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | |
| | 33 | unid | unid | | | | | | | | | | | | | | | 1 | 1 fragment |
| | 2 | unid | unid | | | | | | | | | | | | | | | 1 | 1 fragment |
| | 7 | | | | | | | | | | | | | | | | | 17 | total fragments |
| | 24 | | | | | | | | | | | | | | | | | 4 | total fragments |
| | 44 | | | | | | | | | | | | | | | | | 34 | total fragments |

Appendix 2. Cremated bone from Site 16

| Ref No. | Context | No of fragments | Temperature (Celsius) | Size (cm) | Human/Animal |
|---------|-------------|-----------------|-----------------------|-----------|----------------------------------|
| 1 | 31, s# 11 | 63 | 500-700 | 0.3 - 4.3 | 5 fragments identified as animal |
| 2 | 26, s#27 | 36 | 800 | 0.2 - 1.2 | ? |
| 3 | 30, topsoil | 34 | 200 | 0.3 2.3 | ? |
| 4 | 70, s#53 | 7 | 600-700 | 0.5 - 1.4 | ? |
| 5 | 68, s#39 | 69 | 600 | 0.3 - 1.8 | ? |
| 6 | 7 | 7 | 200 | 0.6 - 1.1 | ? |
| 7 | 31, s#5 | 8 | 800 | 0.6 - 1.4 | 2 fragments identified as animal |

APPENDIX 4

Human and Animal Osteoarchaeological Report

Site 17

Emma-Jayne Evans

INTRODUCTION

Site 17 was excavated as one of a number of sites identified in Celbridge during the construction of the Celbridge Interchange, which was excavated during July and August of 2001 by Valerie J. Keeley Ltd.

Sieving was not carried out on site, which may have affected the bone recovery rate, particularly in association with cremated bone, which makes up the majority of bone fragments from this site.

METHOD

Examination of the bone from Site 17 was carried out at the post-excavation office of Valerie J. Keeley Ltd, situated in Athy. The recording method used was devised at the Faunal Remains Unit at Southampton University. Having been in use since 1991, it is based on the method originally used for the recording of the faunal remains from the research excavations at Runnymede (Serjeantson, 1996). The recording of data was initially carried out on pro forma sheets, and later entered onto Microsoft Excel.

All the animal bones from the site were analysed and counted and, where possible, the bones were identified to species, element, side, and zone (Serjeantson, 1996). Also, evidence of fusion data, the presence of cut marks and chop marks, animal gnawing was analysed.

Cremated bone fragments were counted, a minimum and maximum fragment size given for each sample, the probable temperature to which the bone had been exposed to and, where possible, identified as either animal or human.

RESULTS

The Cremated Bone

The total number of cremated bone fragments from Site 17 was 271. This bone was highly fragmented and ranged in size from 0.3cm–3.8cm. The temperature to which these bones had been exposed ranged from 300°C – 600°C, with the majority being exposed to a temperature of 500°C – 600°C.

Out of the 271 fragments, only 7 fragments could be positively identified as animal. These included two juvenile pig teeth, a juvenile pig 3rd phalanx, an unfused animal distal humerus, and three unspecified fragments of animal bone. None of the bone that could be identified was human.

A full catalogue of the cremated bone from Site 17 can be found in Appendix 1.

Animal Bone

One fragment of unidentified, unburnt animal bone was found on Site 17. This bone is recorded in Appendix 2.

Bibliography

Serjeantson, D., 1996, *The Animal Bones, Runnymede Bridge Research Excavations, Vol.2, Refuse and Disposal at Area 16, East Runnymede*, eds, E.S. Needham and T. Spence, London, Thames and Hudson.

Appendix 1. Cremated bone from Site 17

| Ref No. | Context | No of fragments | Temperature (Celsius) | Size (cm) | Human/Animal |
|---------|---------|-----------------|-----------------------|-----------|--|
| 1 | 54 | 73 | 300-500 | 0.3 - 3.8 | 2 fragments identified as animal |
| 2 | 53 | 108 | 400-500 | 0.3 - 0.9 | juvenile pig tooth identified |
| 3 | 17 | 2 | 600 | 1.1 - 1.3 | ? |
| 4 | 53 | 68 | 600 | 0.4 - 3.0 | juvenile pig tooth identified, and unfused animal distal humerus |
| 5 | 55 | 14 | 600 | 0.3 - 2.3 | 1 fragment identified as animal |
| 6 | 62 | 1 | 300 | 1.1 | juvenile pig 3rd phalange |
| 7 | 56 | 5 | 600 | 1.0 - 2.1 | ? |

Appendix 2. Catalogue of animal bone from Site 17

| Ref No. | Context | Species | Element | Side | Z1 | Z2 | Z3 | Z4 | Z5 | Z6 | Z7 | Z8 | Prox fused | Dist fused | Chopped | Cut | Gnawed | n | Comments |
|---------|----------|---------|---------|------|----|----|----|----|----|----|----|----|------------|------------|---------|-----|--------|---|----------|
| 1 | 17, s#20 | unid | unid | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | |

APPENDIX 5

LITHICS

Dermot G. Moore

ABSTRACT

A series of small lithic assemblages were recovered from two sites at Celbridge. In general, the material would appear to represent domestic sedentary activities dating to the Neolithic – Early Bronze Age.

INTRODUCTION

A total of 34 pieces of lithic material were recovered from the excavations of a series of sites at Celbridge (2 sites). The assemblage was dominated by flint with a small amount of chert. The sites are discussed individually below.

THE LITHIC ASSEMBLAGES:

Celbridge Interchange (01E0306)

The lithic assemblage numbering 11 pieces recovered from the Celbridge Interchange (01E0306) site (Table 1) consisted of small pebble-based industry primarily derived from beach and glacial drift pebbles, most of which ranged from fresh to a weathered condition and all were patinated giving a range of colours from grey-cream to brown-red. A slight amount of residual cortex was present on a few pieces.

Table 1: Total lithic material from Celbridge Interchange (01E0306) and Collinstown (01E0893)

| | Celbridge Interchange (01E0306) | Collinstown (01E0893) |
|---------------------------|------------------------------------|-----------------------|
| FLINT | | |
| <i>Primary Material</i> | | |
| Flakes | 4 | 3 |
| Chunks/spalls | 2 | |
| Fragments | 1 | 1 |
| | | |
| <i>Secondary Material</i> | | |
| Simple modified flake | 1 | |
| Scrapers | 1 | |
| | | |
| CHERT | | |
| <i>Primary Material</i> | | |
| Chunks/spalls | 1 | |
| | | |
| <i>Secondary Material</i> | | |
| Simple modified blade | 1 | |
| | | |
| TOTAL | 11 | 4 |

Four small flint flakes were identified which ranged in length from 24 – 31mm with a breadth range of 14 – 26mm. Two of the flakes were quite irregular with the remaining two consisting of a small example with good evidence of dorsal scars and a pointed platform and the other was an irregular pebble flint flake which was heavily patinated with dorsal flake scars showing evidence of bipolar reduction. In addition, two irregular chunks and a small flint fragment were also recovered.

The secondary modified material consisted of a simple modified flake and a small endscraper. The small simple modified piece (01E0306:1) which measured 17mm x 21mm x 5mm and which exhibited a planar platform was made on a regular flint flake which exhibited good dorsal flake removals and platform edge preparation. The secondary working which was rather crude occurred on its dorsal right lateral edge.

The small endscraper (01E0306:3) which measured 27mm x 22mm x 13mm was made on a re-used polyhedral/dual-platformed core. The secondary working is semi-invasive consisting of fine small flakes. The original core still exhibits two good flake removals.

Chert

The chert component of the lithic assemblage consisted of a small fresh chunk and an irregular chert blade which measured 37mm x 12mm x 7mm with crude utilization along one of its dorsal lateral edge (01E0306:4). The blade which appears to be broken also exhibits dorsal scarring.

Collinstown (01E0893)

A total of four individual pieces were recovered from Collinstown (01E0893). These consisted of three flakes, two of which were broken and a small flint fragment. The unbroken flint flake retrieved from the topsoil was a small irregular fresh patinated example which measured 16mm x 20mm x 6mm.

Summary

A summary is provided below with a general overview at the end for each of sites.

Celbridge Interchange (01E0306)

The small flint assemblage retrieved from surface deposits at the excavation of Celbridge Interchange (01E0306) is rather undiagnostic in nature. The knapping debris identified and the small endscraper and simple modified flake were derived from a small pebble-based industry. The undiagnostic nature of the assemblage and the context provides little information as to a specific date for the pieces with only a general date range of Neolithic – Early Bronze Age being assigned. The range and

type of pieces recovered suggest a primarily domestic function for the material. The recovery of the four chert pieces indicates that other lithic material was collected and utilized.

Collinstown (01E0893)

The four pieces of lithic material recovered from Collinstown are undiagnostic and can only be assigned a general Neolithic – Early Bronze Age date.

Much of the small range lithic material recovered from the two individual sites is difficult to date due to the relative undiagnostic nature of the pieces and only a general Neolithic – Early Bronze Age date can be assigned. This is primarily due to the size of the resource which in this case was small flint pebbles derived from beach and glacial drift deposits (Woodman and Scannell 1993; Woodman 1994, Moore 1999). In this area of east Ireland, the small size of the flint pebbles utilized as the source of the raw material makes any distinction between periods rather arbitrary in the absence of specific diagnostic tools.

In conclusion, the lithic assemblages from the range of sites examined represents domestic sedentary activity with the small range of knapping debris and modified pieces indicating a date of activity at most of the sites in the Neolithic – Early Bronze Age. The occurrence of the chert pieces provides evidence of a range of raw materials, which would all be available locally, being utilized.

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APPENDIX 6

CLAY PIPE REPORT

Sheila Lane

STEM FRAGMENTS

There was a total of three stem fragments (01E089:6; 01E0899:17 and 01E0893:14) in the assemblage. All three fragments were examined for identification. In the absence of decoration or other diagnostic features, the origin and dates of these stem fragments remain uncertain.

APPENDIX 7

POST-MEDIEVAL POTTERY

Sarah Gormley

INTRODUCTION

Five sherds of pottery, weighing 35.99g, were recovered from Site 16, Collinstown on the Celbridge Interchange road scheme, Co. Kildare (licence no. 01E0893). The majority of the fragmented and abraded assemblage is Post-Medieval in date.

COMPOSITION AND DISTRIBUTION

Three are Post-Medieval in date;

A sherd of Red Earthenware was recovered and is likely to be locally produced. The fabric is thought to date to the 17th or 18th century (McCutcheon 1997, 94) and is orange-red and often has a clear glaze on the interior. Although it is not possible to estimate vessel type this fabric usually takes the form of kitchen and table wares.

A sherd of the distinctive Blackware was recovered, which may have been produced in the Liverpool/ North Wales area in the 18th or 19th centuries. The pottery has a red fabric and a shiny black glaze.

A small sherd of slipware which may have come from the Bristol or Staffordshire potteries was recovered. This type of pottery produced in the 18th century had a white slip trailed over a dark brown background slip which was then combed feathered or marbled to produce a pattern (Jennings 1981, 104).

Sherd 9 is too small to be positively identified but may be Pearlware which was produced in England in the late 18th and 19th centuries. A further abraded sherd may be prehistoric and is comparable with fabrics such as the Late Bronze Age coarse wares.

Four of the sherds were recovered from plough furrow fill and a single sherd (the possible prehistoric fabric) was recovered from context 70, the fill of a linear cut (Fig. 1).

| No. | Context | Grid | Fabric | Sherd | Th (mm) | W (g) |
|-----|---------|------|--|------------|---------|-------|
| 9 | 2 | 4 | Unidentified, white fabric/ white glaze | Body | 1 | 0.41 |
| 10 | 2 | 4 | Staffordshire Type Slipware | Body | 3 | 1.33 |
| 12 | 3 | 6 | Blackware | Body | 7 | 4.45 |
| 13 | 3 | 6 | Red Earthenware | Frag | 15 | 10.01 |
| 20 | 70 | 8 | Coarseware/ prehistoric poss. Bronze Age | Base angle | 10 | 19.79 |

Fig. 1 – Sherd catalogue

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APPENDIX 8

PRE-HISTORIC POTTERY

Anna Brindley

A small quantity of pottery was submitted for examination from the excavation carried out by F. Reilly on behalf of Valerie J. Keeley and Co. Ltd. The pottery had not been cleaned and the surfaces were obscured by a fine deposit of soil.

Please note: no part of this report may be altered without written consent of the author.

Context 70

01E0893:23 (Ill. 1)

Rim sherd of beaker pottery. The sherd has lines of lightly impressed comb on the outside and three very shallow lines (probably of comb) on the inside. Th. 5mm.

01E0893:25 (Ill. 1)

Rim sherd of beaker pottery, very small. This sherd may be decorated with horizontal lines. Th. 3mm.

01E0893:20 (Ill. 1)

Body sherd on beaker pottery. The sherd includes the slightly angled mid point of the belly. The decoration is above this point and consists of a band of oblique lines, and, separately, a pair of lines. All decoration is in lightly impressed comb. Max Th. At belly 7mm.

01E0893:24 (Ill. 1)

Body fragment of beaker pottery. One incised line.

01E0893:26

Body sherd, undecorated. Probably beaker pottery. Th 7mm.

01E0893:27, :28, :29

There are also three crumbs of pottery.

The comb impressions are all very shallow. This may be because a certain amount of the surface is missing from the pottery. Alternatively, the comb impressions may be very light. The style of decoration suggests a relatively early date within the *Beaker Tradition* but the small quantity of pottery makes it difficult to be more specific.

A.L. Brindley, M.A.

13th March 2003

APPENDIX 9
PLANT ANALYSIS
Penny Johnston

Illustrations

Figures

- Figure 1 Pie charts of percentage cereal composition from Collinstown 01E0999
- Figure 2 Pie charts of percentage cereal composition in samples from Collinstown 01E0893 Site 16
- Figure 3 Pie charts of percentage cereal composition in samples from Collinstown 01E0893 Site 17
- Figure 4 Pie charts of percentage cereal composition in samples from Collinstown 01E1225 Site 18

Tables

- Table 1 Plant remains from Kilmacredock Upper 01E0998 Site 9
- Table 2 Plant remains from Collinstown 01E0999 Site 14
- Table 3 Plant remains from Collinstown 01E0893 Site 16
- Table 4 Plant remains from Collinstown 01E0893 Site 17
- Table 5 Plant remains from Collinstown 01E1225 Site 18

Introduction

Samples of bulk soil were taken during excavations of five archaeological sites at Cellbridge Interchange in Co. Kildare, carried out by Fiona Reilly on behalf of Valerie J. Keeley Ltd. These samples were sent to the laboratory of Margaret Gowen and Co. Ltd. and were examined for environmental material. The results of this analysis are presented below.

Methodology

Samples were collected on site as bulk soil and these were processed using a simple flotation technique. The flots were collected in sieve meshes measuring 300 µm and retents were generally collected in meshes measuring 2 mm. One exception to this was a sample from Kilmacredock 01E0998 Site 9, C70 (S8), where there was a high concentration of cremated bone; the retent of this sample was processed using a 1 mm mesh sieve.

The flots were sorted for archaeobotanical material under magnification, and identification was carried out using a low-powered binocular microscope (magnification X4.8 to X56). Identification results are presented in Tables 1, 2, 3, 4 and 5. Taxonomic order is based on Scannell and Synnott (1987), apart from cereals and grasses, which are listed first. The common name is used for most types of plant, following the nomenclature used by Scannell and Synnott (1987). Where a plant is mentioned for the first time in the text, the scientific name follows in brackets. Both scientific and common names are listed in the tables of results.

Some of the samples with large flots were only partially sorted in order to save time. These are indicated by * in the tables of results. The results in these samples are multiplied-up to indicate seed density of the entire flot. In one sample from Collinstown 01E1225 Site 18 (C26 (S9)), the weed seed classified as probably Corn marigold (*Chrysanthemum segetum*), was so abundant that its frequency was merely noted in the table (Table 5) as XX. This is because the seeds are tiny, and sorting them, removing them from the sample, and counting the numbers present was considered unnecessarily time consuming.

Kilmacredock 01E0998 Site 9

Four samples from this site, a partially excavated structure associated with a human cremation, were selected for archaeobotanical analysis. These were C5 (S4), C69 (S6), C70 (S8) and C85 (S10). Only one of the samples contained charred seeds, this was C69 (S6), and this was merely a small fragment of a hazel nutshell (*Corylus avellana*). This result is listed in Table 1 at the end of this report.

Hazel nuts are a good source of fats, and as such are valuable nutritionally, as well as being readily available. They also contain proteins. They were a reliable source of nutrients in the past, and this fact, combined with the hard shell encasing the nut, which is resistant to decay, has ensured that fragments of hazel nutshells are commonly found in archaeobotanical assemblages (see Monk 2000). Although hazel nutshells, cereal grains and sometimes the remains of fruit stones from sloe and hawthorn are occasionally recovered from cremation deposits, there was no evidence for the presence of seeds in the cremation sample (C70 (S8)) from this site.

Collinstown 01E0999 Site 14

The samples examined from this small site were taken from two burnt fills of a linear cut, C3 (S2) and C5 (S4). The excavator suggests that this may have been used as a roasting pit [identified as a corn-drying kiln in post-excavation analysis] and, along with the bone that was retrieved at the site, there is considerable evidence for the presence of plant food waste at the site. The results of identification are presented in Table 2, and comparative pie charts, presenting the percentage cereal composition of both samples from this site, are found in Figure 1.

The pie-charts demonstrate that both samples contain relatively similar percentage values for each of the three main cereal types identified, and cereals that could not be classified to species or genus ("Cereal indet."), were present in roughly equal proportions in both samples (see Figure 1). Wheat (*Triticum* species), oat (*Avena* species) and barley (*Hordeum vulgare*) were among the identifiable grains recovered.

Most of the wheat from these Collinstown samples was probably free-threshing wheat (*Triticum durum/ turgidum/ compactum*), as the majority of identifiable wheat grains fell into this category. However, it is notoriously difficult to distinguish wheat on the basis of morphology alone and the only secure way of identifying wheat to species is through the use of genetic material (Hillman *et al.* 1995). Some of the grains were quite fragile and badly distorted, possibly due to high charring temperatures, and many grains were merely categorised as being a species from the wheat genus (*Triticum* species). Free-threshing wheat, bread wheat in particular was not introduced into Ireland until the historic period (Monk 1985/1986).

Oat was the dominant cereal type identified in both samples; the cereal grows well in the damp Irish climate, and is ultimately more suitable to grow in Ireland than either wheat or barley. It is commonly recovered in large quantities from deposits of charred grain dating from the historic period onwards (Monk 1985/1986).

The weed assemblage from this site was limited, suggesting that, apart from the inevitable and ubiquitous stray finds of seeds from the dock (*Polygonaceae*) and goosefoot (*Chenopodiaceae*) families, the crop that was carbonised at this site had already been processed and was probably being used in food preparation when it accidentally caught alight.

Another possible roasting pit [identified as a corn-drying kiln in post-excavation analysis, Reilly 2008] was analysed from the M4 Cellbridge Interchange site at Collinstown (01E0893, Site 17), but the charred grain assemblage from this site differs considerably from those from Collinstown, Site 14, as there was very little wheat from Site 17. There were also fewer weed seeds in the samples.

Pits containing large quantities of burnt plant remains are occasionally found at settlement sites. At Lisleagh, Co. Cork, Monk suggested that these may have general parallels to "fire pits" found at sites such as Thady's Fort, Co. Clare, Seacash, Co. Antrim and Narraghmore, Co. Kildare. The suggested use of these pits includes the possible use as a roasting pit, a charcoal burning kiln, a human cremation pit or as a pit for burning domestic waste (Monk 1993).

Collinstown 01E0893 Sites 16 and 17

This site was comprised of the remains of occupation material such as pits, a hearth, a boundary ditch and a [corn-drying-kiln]

. The charred seed assemblage from Site 16 is listed in Table 3, and the assemblage from Site 17 is found in Table 4. Of the seventeen samples from these two sites that were selected for analysis, only four did not contain seeds. These were C6 (S13) (1 litre was processed), C26 (S26) (1.5 litres were processed) and C70 (S52) (1.5 litres were processed) from Site 16 and C57 (S37) (2 litres were processed) from Site 17. The rest of the samples contained charred seeds, some in abundance.

Pie charts representing the percentage cereal composition of the richest samples from Sites 16 and 17 may be found in Figures 2 and 3 respectively. Only samples that contained over one hundred cereal grains were depicted in this way. It is worth noting that the percentages of indeterminate cereal grains recovered from some of the samples is quite high, exceeding 45% in some instances (C7 (S2), and C54 (S17) and C56 (S36)), perhaps due to high charring temperatures which may distort the surface and cellular structure of grains (Boardman and Jones 1990).

The samples from Site 17 were all taken from a bottle-shaped pit, which has been identified as a possible roasting pit [identified as a corn-drying kiln in post-excavation analysis, Reilly 2008]. The assemblages from these samples contained abundant cereal remains, although hardly any weed seeds were recovered. In each of the richest cereal assemblages (shown in Figure 3), the most dominant cereal type was the general category ("Cereal indet."). Oat and barley are the most common identifiable cereals, and very little wheat was recovered, differing, therefore from the other occupation material at Site 16, where a greater quantity of weed seed and wheat grains were found, along with oat grains and some barley grains (compare Figures 2 and 3).

The differences in the assemblages from these nearby contexts may be because the plant remains from the bottle-shaped pit at Site 17 were targeted for a specific purpose, associated specifically with the processing of oats and barley, whereas a larger range of cereals were processed or prepared and used at the rest of the site.

The dominant cereal species at Sites 16 and 17, oats followed by barley, are typical of assemblages dating to the early historic period, and sometimes later. Wheat, in particular bread wheat, is found with increasing frequency from deposits dating from the twelfth century onwards. If the deposit was a heterogeneous crop sample, it is possible that the combination of oats and barley found may have been a deliberate mixing of cereals. A maslin is a deliberately mixed grain crop, with two or more taxa, as opposed to a monocrop. This is a recognised practice in traditional farming societies where maslins were sown to reduce the risk of total crop failure (Jones and Halstead 1995). Barley prefers dry conditions, whereas oat thrives in damper climates; the cultivation of a mixture of these crops meant that one or the other would survive even if severe weather conditions occurred during the growth season. It has been suggested elsewhere that maslins were deliberately grown in early historic Ireland, for example the two deposits of carbonised grain found at Fishamble Street in Dublin that dated to the early medieval period and contained mixtures of oats and barley grains. The mix of cereal taxa was probably similar to "dredge" from Norman England, a deliberate mix of wheat or barley with oats, which were sown and harvested together (Geraghty 1996).

Collinstown 01E1225 Site 18

Four samples [were examined] from the site at Collinstown, 01E1225 Site 18, a keyhole shaped drying kiln. Drying kilns were used in the uncertain weather of the Irish harvest to finish off ripening of crops and to prepare them for storage, as well as being used prior to milling in order to ensure that the grains were hard enough to be ground into flour.

The assemblage from this drying kiln contained extremely large quantities of wheat grains (see Table 5 and the percentage cereal composition charts in Figure 4). These grains were identified as free-threshing wheat (*Triticum durum/turgidum/compactum*). It was noted during processing that the grains were extremely large, probably indicating that they were from a relatively advanced wheat type, that was selectively bred in order to produce large grains, probably therefore post-dating the twelfth century.

From the twelfth and thirteenth centuries onwards, patterns of Irish agriculture changed, with the arrival of the Anglo-Normans and the concomitant introduction of new systems of arable cultivation. The production of free-threshing wheat was emphasised and crop rotation systems were introduced, whereby cultivated legumes (peas, *Pisum* species, and beans, *Vicia* species) were alternated with the traditional cereal crop, allowing for more intensive harvesting on the available land (Mitchell and Ryan 2001). A few seeds from cultivated legumes, such as the pea, were also recovered from the kiln deposits at this site. The small number of legumes found in association with large quantities of wheat suggests that these seeds were possibly contamination of the crop in the field, for example, self-sown remnants of a crop grown in the same area in previous years.

There were several hundred weed seeds, probably from the Corn marigold, in samples from this kiln, in particular from C26 (S9), but also present in large quantities in C18 (S7). The results suggest that the plant was rampant in the crop; however, these plants do produce a high quantity of seeds. The corn marigold continues to grow copiously in Irish wheat fields, despite the use of modern fertilisers (Pilcher and Hall 2001), indicating its resilience. The fact that the tiny seeds were discovered in such abundance in this sample, although hardly any other weed seeds were found, indicates that the crop had been almost fully processed, but these seeds were too tiny to remove effectively.

Summary

In total, samples from five sites from the Cellbridge Interchange excavation were examined for charred plant remains and twenty samples contained the remains of charred seeds, cereals in particular. The richest samples were those taken from pits that were possibly used for roasting food, and from drying kilns, which were specifically used for processing cereals. Oats and wheat dominated the assemblages, although in some samples significant quantities of barley were also found. The numbers of weed seeds found were very low, apart from some very small seeds from kiln samples. These were probably associated with the crop. The recovery of legumes from the kiln suggests that peas were being cultivated nearby and dried at the kiln, although unfortunately the sample merely contains the remnants, of a legume crop, rather than large amounts of charred legumes.

Table 1: Plant Remains from Kilmacredock Upper 01E0998 Site 9

| | | |
|-----------------------------------|---------------------------|----|
| Context | | 69 |
| Sample | | 6 |
| Volume of bulk soil (litres) | | 3 |
| <i>Corylus avellana</i> fragments | Hazel nut shell fragments | 1 |

Other samples from Site 9 where no charred seeds were found included:

| | | | |
|------------------------------|---|----|----|
| Context | 5 | 70 | 85 |
| Sample | 4 | 8 | 10 |
| Volume of bulk soil (litres) | 2 | 3 | 2 |

Table 2: Plant Remains from Collinstown 01E0999 Site 14

| | | | |
|---|---|-----|-----|
| Context | | 3 | 5 |
| Sample | | 2 | 4* |
| Volume of bulk soil (litres) | | 4 | 4 |
| <i>Triticum dicoccum</i> | Emmer wheat | | 8 |
| <i>Triticum cf dicoccum</i> | Probable Emmer wheat | 6 | 32 |
| <i>Triticum durum/ turgidum/aestivum</i> | Macaroni/Bread wheat | 5 | 4 |
| <i>Triticum cf durum/turgidum/aestivum</i> | Probable Macaroni/Bread wheat | 23 | 12 |
| <i>Triticum dicoccum/ durum/turgidum/aestivum</i> | Emmer/ Macaroni/Bread wheat | 13 | 28 |
| <i>Triticum</i> species | Wheat species | 48 | 76 |
| <i>Hordeum vulgare</i> | Barley | 97 | 80 |
| <i>cf Hordeum vulgare</i> | Possible barley grains | | 60 |
| <i>Hordeum/Avena</i> | Barley/Oat grains | | 28 |
| <i>Avena</i> species | Oat | 81 | 404 |
| <i>cf Avena</i> species | Possible oat grains | 81 | 116 |
| Cereal indet. grains | Indeterminate cereal grains | 199 | 492 |
| Cereal indet. rachis internodes | Rachis material from indeterminate cereal types | | 4 |
| Poaceae indet. | Indeterminate grass seeds | 5 | |
| <i>Corylus avellana</i> nut shell fragments | Hazel nut shell fragments | 1 | |
| <i>Rumex cf acetosella</i> | Probable Sheep's sorrel | | 4 |
| <i>Polygonum convolvulus</i> | Black bindweed | 3 | |
| <i>Chenopodium album</i> | Fat hen | | 8 |
| Chenopodiaceae indet. | Indeterminate goosefoot seeds | | 12 |
| Legume indet. | Indeterminate legume seeds | 1 | |
| <i>Plantago</i> species | Plantain species | 1 | |
| Weed indet. | Indeterminate weed seeds | 1 | 8 |

Table 3: Plant Remains from Collinstown 01E0893 Site 16

| | | | | | | | | |
|---|-------------------------------|-----|-----|----|-----|----|----|----|
| Context | | 7 | 40 | 31 | 31 | 4 | 59 | 68 |
| Sample | | 2* | 5 | 8 | 12 | 14 | 35 | 41 |
| Volume of bulk soil (litres) | | 4 | 1.5 | 4 | 2.5 | 3 | 2 | 3 |
| <i>Triticum cf dicoccum</i> | Emmer wheat | | | | | 1 | | |
| <i>Triticum cf durum/turgidum/aestivum</i> | Probable Macaroni/Bread wheat | | | | | 11 | | |
| <i>Triticum dicoccum/ durum/turgidum/aestivum</i> | Emmer/Macaroni/Bread wheat | | | | 1 | 19 | | |
| <i>Triticum</i> species | Wheat species | 80 | 1 | | | 43 | | |
| <i>Hordeum vulgare</i> | Barley | 30 | 5 | | 1 | 53 | 2 | |
| cf <i>Hordeum vulgare</i> | Possible barley | | | | 1 | 1 | | |
| <i>Hordeum/Avena</i> | Barley/Oat | | | | | 2 | | |
| <i>Avena</i> species | Oat species | 60 | | 5 | 3 | 44 | | |
| cf <i>Avena</i> species | Possible oat grains | 20 | | | | 20 | | |
| <i>Avena/Secale</i> | Oat/Rye grains | | | | | 1 | | |
| Cereal indet. grains | Indeterminate cereal grains | 270 | 2 | 4 | 16 | 91 | 5 | 1 |
| Poaceae indet. | Indeterminate grass seeds | 70 | | | | | 1 | |
| <i>Corylus avellana</i> fragments | Hazel nut shell fragments | | | 7 | | | | |
| <i>Rumex cf acetosella</i> | Probable Sheep's sorrel | | | | | 1 | | |
| <i>Polygonum convolvulus</i> | Black bindweed | | | | | 1 | | |
| Polygonaceae indet. | Indeterminate dock seeds | 10 | | | | | | |
| Chenopodiaceae indet. | Indeterminate goosefoot seeds | 10 | | | | 1 | | |
| Legume indet. | Indeterminate legume seeds | | | | | 3 | | |
| <i>Lapsana communis</i> | Nipplewort | | | | | 1 | | |
| Weed indet. | Weeds | | | | | 2 | | |

Table 4: Plant Remains from Collinstown 01E0893 Site 17

| | | | | | | | | |
|--|-----------------------------|----|-----|----|-----|----|----|----|
| Context | | 53 | 54 | 55 | 56 | 57 | 62 | 72 |
| Sample | | 10 | 17* | 29 | 36* | 37 | 38 | 55 |
| Volume of bulk soil (litres) | | 3 | 3 | 3 | 1 | 2 | 2 | 2 |
| <i>Triticum cf dicoccum</i> | | | | | | 3 | | |
| <i>Triticum cf durum/turgidum/aestivum</i> | | | | | | 1 | | |
| <i>Triticum</i> species | Wheat species | 7 | | 7 | | 6 | 3 | 2 |
| <i>Triticum</i> /Secale | Wheat/Rye grains | 1 | | | | | | |
| <i>Triticum</i> /Hordeum | Wheat/Barley grains | | | 1 | 4 | 3 | | |
| <i>Hordeum vulgare</i> | Barley | 6 | 13 | 29 | 48 | 87 | 10 | 2 |
| cf <i>Hordeum vulgare</i> | Possible barley grains | | | 7 | 26 | | | |
| <i>Avena</i> species | Oat | 7 | 52 | 26 | 16 | 8 | 1 | 1 |
| cf <i>Avena</i> species | Possible oat grains | 9 | 26 | 7 | 6 | 3 | 1 | 1 |
| Cereal indet. | Indeterminate cereal grains | 41 | 104 | 40 | 84 | 28 | 20 | 9 |
| Poaceae indet. | Indeterminate grass seeds | | 13 | | | 1 | | |
| <i>Rumex cf acetosella</i> | Probable Sheep's sorrel | | | | | | 1 | |
| Polygonaceae indet. | Indeterminate dock seeds | 1 | | | | | | |
| Weed seed indet. | Indeterminate weed seeds | | | 8 | | 3 | | |

Table 5: Plant Remains from Collinstown 01E1225 Site 18

| | | | | | |
|---|-------------------------------|-----|------|----|-----|
| Context | | 6 | 18 | 24 | 26 |
| Sample | | 5 | 7* | 8 | 9 |
| Volume of bulk soil processed (litres) | | 4.5 | 5 | 4 | 4 |
| <i>Triticum cf dicoccum</i> | Probable Emmer wheat | 1 | 23 | | |
| <i>Triticum durum/turgidum/aestivum</i> | Macaroni/Bread wheat | | 207 | 1 | 159 |
| <i>Triticum cf durum/turgidum/aestivum</i> | Probable Macaroni/Bread wheat | 1 | 460 | | 14 |
| <i>Triticum dicoccum/ durum/turgidum/aestivum</i> | Emmer/Macaroni/Bread wheat | | 138 | 3 | |
| <i>Triticum</i> species | Wheat species | 2 | 1012 | 2 | 109 |
| <i>Avena</i> species | Oat | | | 1 | 24 |
| Cereal indet. | Indeterminate cereal grains | 4 | 3864 | 11 | 94 |
| Cereal indet. rachis material | Stalk material from cereals | | 483 | | |
| <i>Poaceae</i> indet. | Indeterminate grass seeds | 1 | | | 11 |
| <i>Polygonaceae</i> indet. | Indeterminate dock seeds | | 46 | | |
| <i>Raphanus raphanistrum</i> | Wild radish | | 23 | | |
| <i>Pisum</i> species | Pea species | 2 | | 1 | 2 |
| Large legume indet. fragments | Indeterminate legume seeds | 5 | | 1 | 10 |
| Small legume indet. | Indeterminate legume seeds | 1 | 230 | | |
| <i>Chrysanthemum cf segetum</i> | Probable corn marigold | | 230 | | XX |
| Weed seed indet. | Indeterminate weed seeds | | 322 | | 2 |

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Figure 1 - Pie-Charts of Percentage Cereal Composition in samples from Collinstown 01E0999
Site14

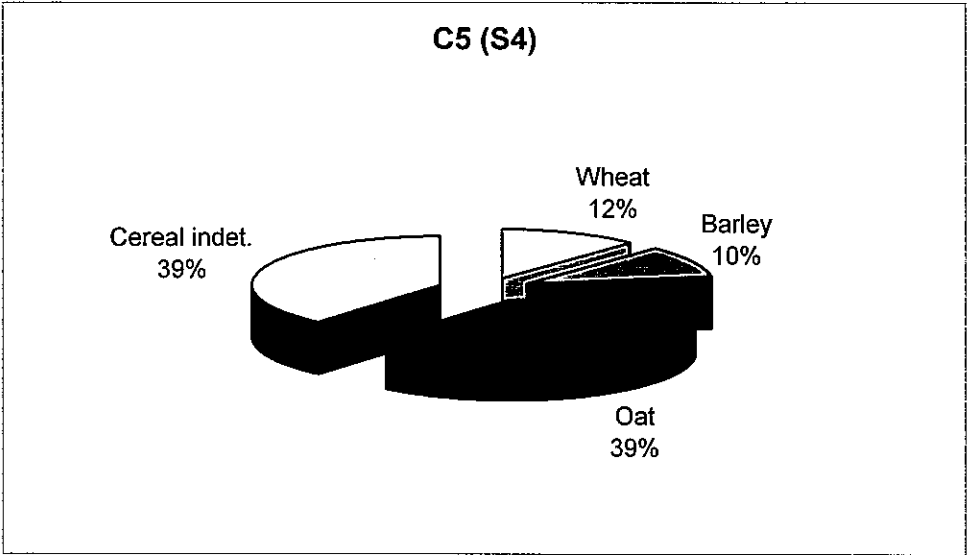
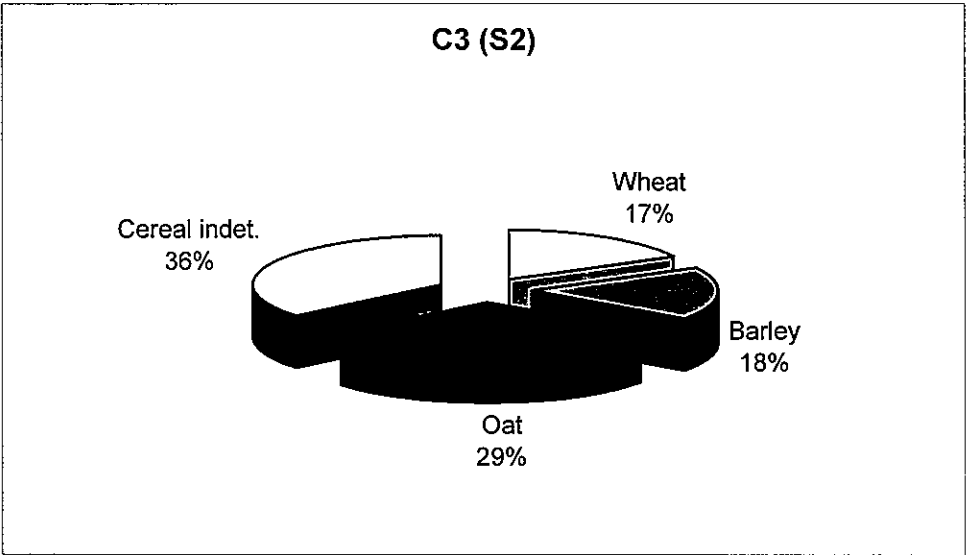


Figure 2 - Pie Charts of Percentage Cereal Composition in Samples from Collinstown 01E0893 Site

16

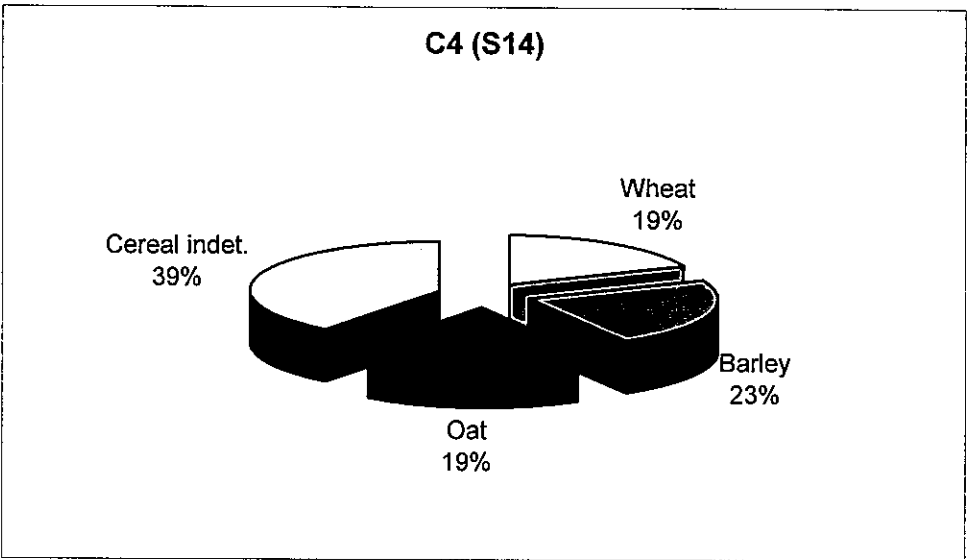
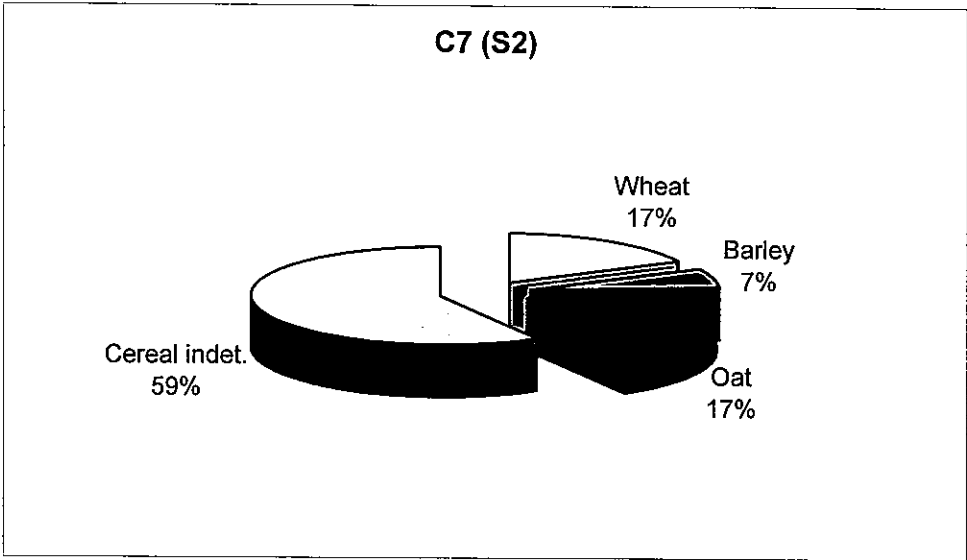


Figure 3 - Pie Charts of Percentage Cereal Composition in Samples from Collinstown 01E0893 Site
17

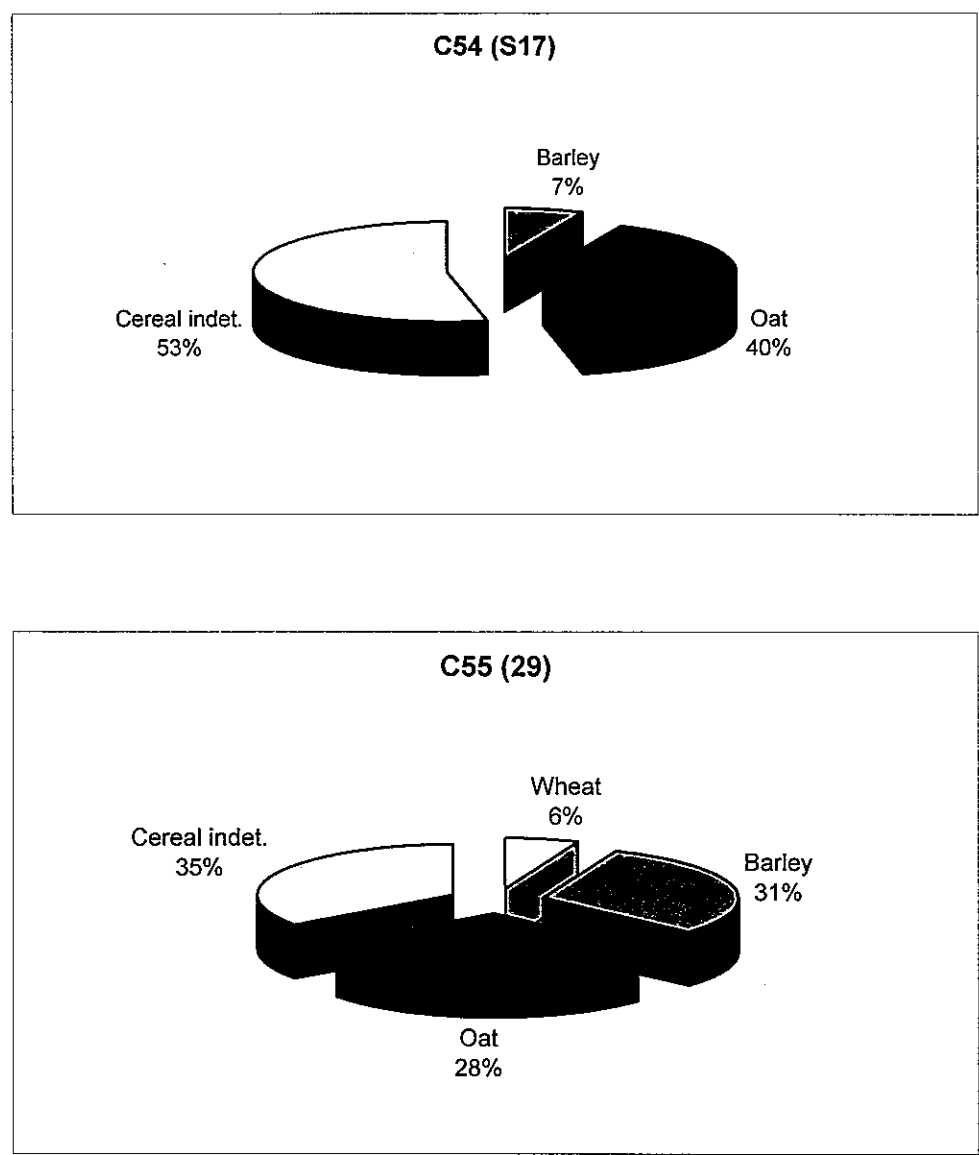


Figure 3 - Pie Charts of Percentage Cereal Composition in Samples from Collinstown 01E0893 Site
17 (continued)

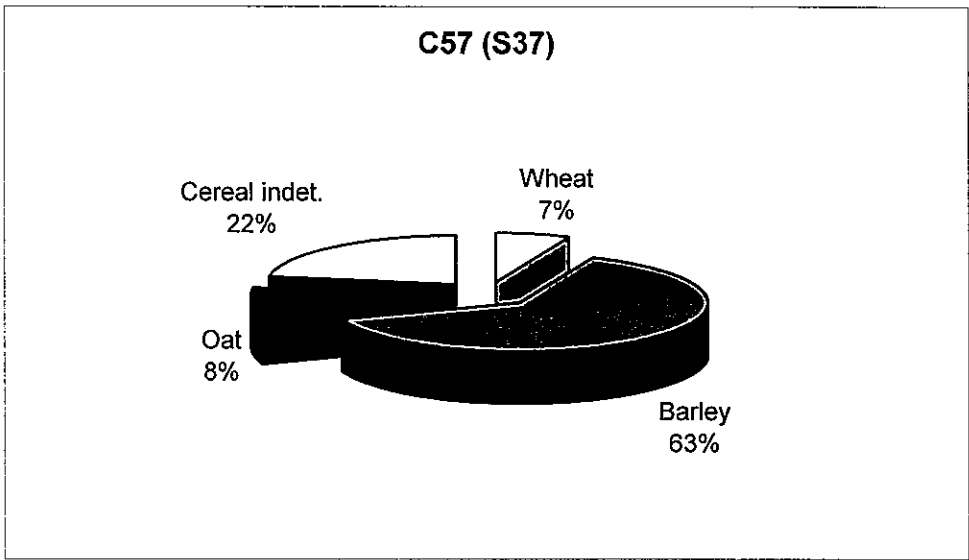
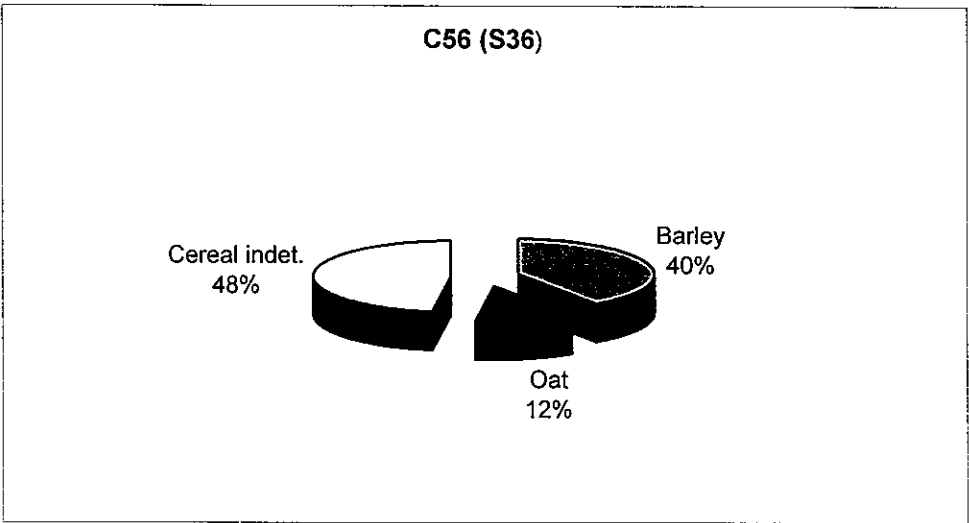
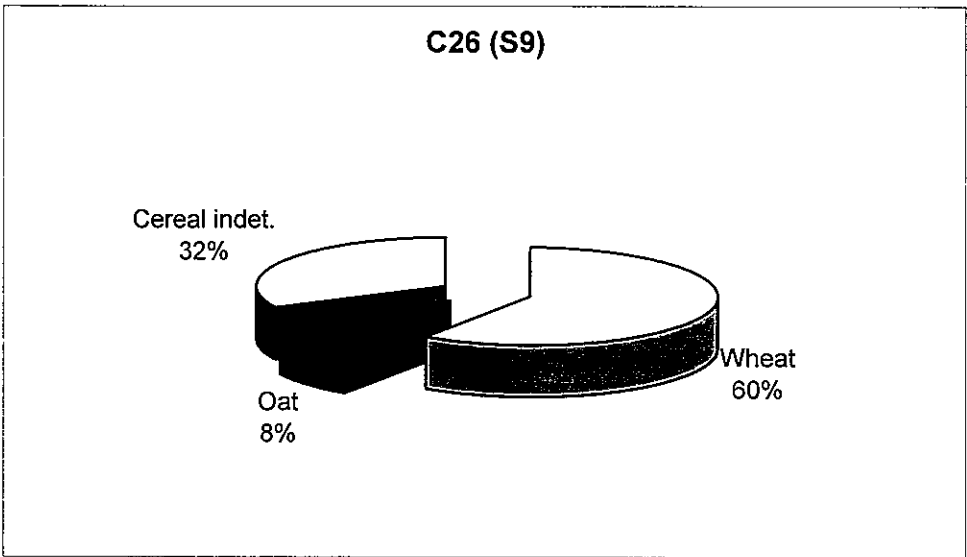
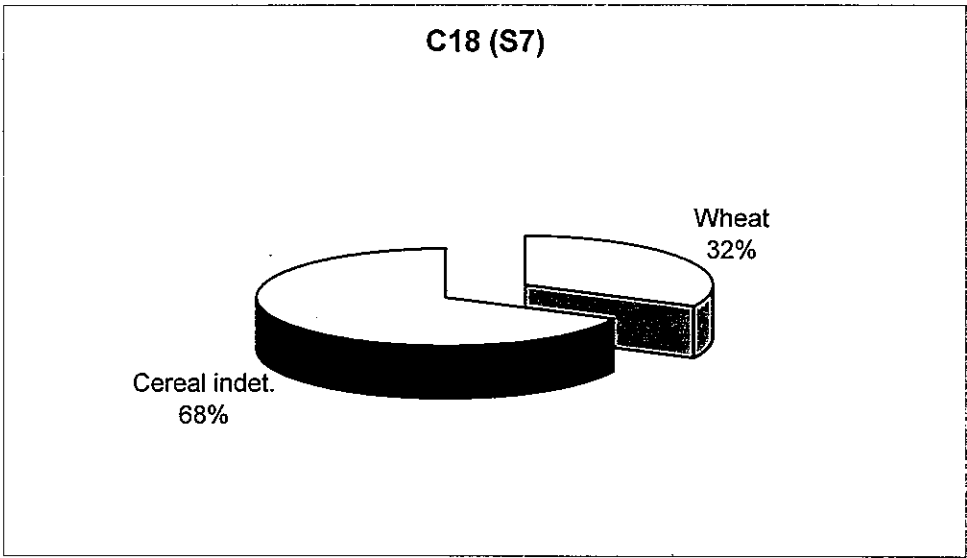


Figure 4 - Pie Charts of Percentage Cereal Composition in Samples from Collinstown 01E1225 Site
18

(the two richest samples were chosen)



APPENDIX 10

SPECIES IDENTIFICATION OF CHARCOAL SAMPLES

Ellen O Carroll

INTRODUCTION

Thirteen charcoal samples were submitted for analysis. The charcoal was sent for species identification prior to ^{14}C dating and also to give an indication of the range of tree species, which grew in the area. Charcoal analyses may also provide information on the utilization of certain species for various functions. Wood used for fuel at pre-historic sites would generally have been sourced at locations close to the site. Therefore charcoal identifications may, but do not necessarily, reflect the composition of the local woodlands. Larger pieces of charcoal, when identified, can provide information regarding the use of a species. The charcoal was excavated from two separate areas known as site 16 and site 17. Site 16 comprised of a possible hearth, pits and a large ditch feature. The site was divided up into three phases. Site 17 was uncovered as two charcoal rich deposits which may be the remains of a kiln.

METHODS

The process for identifying wood, whether it is charred, dried or waterlogged is carried out by comparing the anatomical structure of wood samples with known comparative material or keys (Schweingruber 1990). The identification of charcoal material involves breaking the charcoal piece so that a clean section of the wood can be obtained. This charcoal is then identified to species under an Olympus SZ3060 x 80-zoom stereomicroscope. By close examination of the microanatomical features of the samples the species were determined. The diagnostic features used for the identification of charcoal are micro-structural characteristics such as the vessels and their arrangement, the size and arrangement of rays, vessel pit arrangement and also the type of perforation plates.

RESULTS

Table 1: Results from Charcoal identifications at Site 16/17

| Site name | Site no. | Context | Sample | Context type | Species & Comment |
|---------------------|----------|---------|--------|----------------------|--|
| 01E0893 Collinstown | 16 | 59 | 51 | Fill of ditch | Alder |
| 01E0893 Collinstown | 16 | 70 | 52 | No sample?? | |
| 01E0893 Collinstown | 16 | 4 | 14 | Hearth fill | <i>Prunus</i> & Alder |
| 01E0893 Collinstown | 16 | 68 | 41 | Fill of circular pit | Hazel & <i>prunus</i> |
| 01E0893 Collinstown | 16 | 7 | 3 | Fill of pit C52 | Alder & Holly |
| 01E0893 Collinstown | 16 | 26 | 16 | Fill of pit C58 | Alder |
| 01E0893 Collinstown | 16 | 31 | 48 | Fill of ditch C35 | Alder |
| 01E0893 Collinstown | 16 | 61 | 32 | Ditch fill | Alder |
| 01E0893 Collinstown | 16 | 31 | 9 | Fill of ditch C35 | Hazel & <i>prunus</i> |
| 01E0893 Collinstown | 17 | 72 | 55 | Fill of cut | <i>Prunus</i> & Holly |
| 01E0893 Collinstown | 17 | 56 | 36 | Fill of cut C16 | Oak & <i>prunus</i> |
| 01E0893 Collinstown | 17 | 54 | 17 | Fill of cut C16 | Very stoney. Tiny pieces of ash charcoal |
| 01E0893 Collinstown | 17 | 53 | 10 | Upper fill of C16 | Alder & <i>pomoideae</i> (2 bags) |

DISCUSSION

There are seven species types present in the charcoal remains. Alder was particularly prevalent in the ditch material from site 16 while alder, *Prunus* spp., hazel and holly were present in the fill of the pits and hearths. Site 17 also produced a varied range of species. The fill of the cut C16 contained oak, *Prunus* spp, ash, alder and *pomoideae* charcoal.

The range of species identified from site 16 and 17 includes large (oak and ash) and smaller (alder, hazel & holly) trees and some scrubland type trees (*Prunus* sp-blackthorn type & *Pomoideae* - apple type). *Pomoideae* includes apple, pear, hawthorn and

mountain ash. It is impossible to distinguish these wood species anatomically but as wild pear is not native and crab apple is a rare native species to Ireland it is likely that the species identified from site 17 are hawthorn or mountain ash (rowan) (Nelson 194-200, 1993).

Alder (*Alnus glutinosa*) was the most prevalent species identified from the ditch material C35 but was also identified from the fill of a pit C52 & 58 and cut C16. It is a widespread native tree and occurs in wet habitats along streams and riverbanks. Alder also grows regularly on fen peat. It is an easily worked and split timber and does not tear when worked. Alder is commonly identified from wood remains associated with wet/boggy areas.

Oak was also identified from the fill of the cut C16 at site 17. The oak identified suggests that there was a supply of oak in the surrounding environment. Oak makes good firewood when dried and will grow in peat when conditions are dry. Throughout all periods of prehistory and history oak has been used for structural timbers. Oak also has unique properties of great durability and strength. Sessile oak (*Quercus petraea*) and pedunculate oak (*Quercus robur*) are both native and common to Ireland. The wood of these species cannot be differentiated based on its microstructure. Pendunculate oak is found on heavy clays and loams particularly where the soil is of alkaline pH. Sessile oak is found on acid soils often in pure stands and although it thrives on well-drained soils it is also tolerant of flooding (Beckett 1979, 40-41). Both species of oak grow to be very large trees (30-40m) and can live to an age of 400 years. The oak could have been selected from mixed woodlands nearby.

Ash (*Fraxinus excelsior*) was also identified in the fill of cut C16. It is a native species preferring lime-rich freely draining soils. It is not a very durable timber in waterlogged conditions but has a strong elastic nature. It is easily worked and lends itself well to a range of different requirements like the turning of wooden bowls.

A small amount of holly was identified from the fill of a pit C52. Holly (*Ilex aquilifolium*) is an evergreen tree which produces good firewood. It mostly occurs as an understorey in oak woodlands although it can be found in hedges surrounding fields. It also dislikes very wet soils.

Pomoideae was identified from site 17. Hawthorn (*Crataegus monogyna*) is a native species, and is found in many hedgerows throughout Ireland. Mountain ash (*Sorbus aucuparia*) is also a common tree to Ireland growing particularly well in rocky and hilly mountainous places. The species identified from the Site 17 are more likely to be hawthorn as it would have been readily available in the vicinity of the site.

Prunus was identified from most contexts analysed from site 16 and 17. This is not surprising as blackthorn is often found locally in hedges and is easy accessible. It is a very durable wood and is as strong as oak. Blackthorn (*Prunus spinosa*) is a thorny shrub found in woods and scrub on all soil types. There is very little archaeological evidence for the use of cherry wood in Ireland although the wild cherry tree is commonly found in many hedgerows (Nelson 1993, 167). It is a very durable wood and is as strong as oak. In a woodland situation it is more likely to occur in clearings and at the woodland edges. It is more likely that the charcoal identified from this assemblage was blackthorn rather than cherry.

Hazel (*Corylus avellana*) was identified from the fill of the circular pit. Hazel was very common up to the end of the 17th century and would have been used for the manufacture of many wooden structures such as wattle walls, posts, trackways and baskets. McCracken (1971, 19) points out that “it was once widespread to a degree that is hard to imagine today”. With the introduction of brick, steel and slate the crafts associated with hazel became obsolete, and today the woods that supplied hazel have diminished rapidly. Hazel is normally only about 3-5m in height and is often found as an understory tree in deciduous woods dominated by oak. It also occurs as pure copses on shallow soils over limestone as in The Burren in Co. Clare and survives for 30 to 50 years. Its main advantage is seen in the production of long flexible straight rods through the process known as coppicing.

CONCLUSIONS

A total of seven species were identified from the two sites investigated. The local environment of the sites includes a variety of different habitats. Alder indicates local wet condition along river banks or peat bogs. The ash, oak, holly and hazel would have grown in drier conditions preferring free-draining soils and nutrient rich clays although oak will grow on peaty soils during drier conditions. The hawthorn/mountain ash and *Prunus* spp.

identified from some of the analysed sites are indicative of those species, which may have grown locally in hedgerows or as scrub nearby to the sites.

RADIOCARBON DATING

All of the charcoal samples represent the inner part of a tree of unknown age and it was not possible to tell from identification how much larger, if at all, the whole piece was. As a result the old-wood effect may need to be taken into consideration when ^{14}C dates are returned (Warner 1979, 159-172). This is particularly true in the case of oak as it can grow to an age of 300 to 400 years. The samples identified could be of a more recent date than the rings represented on the sample. There is no problem sending the oak for ^{14}C dating as long as one takes into account that the date returned may (but not necessarily) be out by three hundred years or so. This is a problem for the medieval periods but not so much in the pre-historic period. Apart from the oak, which was identified in C56, all other samples are suitable for ^{14}C dating.

REFERENCES

- Beckett, J.K., 1979, *Planting Native Trees and Shrubs*. Jarrold & Sons Ltd, Norwich.
- Nelson E.C., 1993 *Trees of Ireland*. The Lilliput Press, Dublin.
- Warner, R.B., 1987, "A proposed adjustment for the « Old-Wood Effect »", in Mook, W. & Waterbolk, H. (eds) *Proc. 2nd Symp of ^{14}C & Archaeology, Groningen 1987*, 29, 159-172.
- Webb, D.A., 1977, *An Irish Flora*. Dundalgan Press Ltd, Dundalk.
- Schweingruber, F.H. 1990. *Microscopic Wood Anatomy*. 3rd edition. Birmensdorf: Swiss Federal Institute for Forest, Snow and Landscape Research

APPENDIX 11

RADIOCARBON DATING



Director: *Professor A E Fallick*

Scottish Universities Environmental Research Centre

Rankine Avenue
Scottish Enterprise Technology Park
East Kilbride Scotland UK G75 0QF

Email: **g.cook@suerc.gla.ac.uk**
Telephone: **01355 223332**
Direct Dial: **01355 270136**
Fax: **01355 229898**

RADIOCARBON DATING CERTIFICATE

15 March 2005

| | |
|--|---|
| Laboratory Code | SUERC-5467 (GU-12741) |
| Submitter | Fiona Reilly c/o Valerie J. Keeley Ltd. Brehon House, Kilkenny Road Castlecomer Co. Kilkenny, Ireland |
| Site Reference | Celbridge Interchange, Site 17, 01E0893 |
| Sample Reference | C57 |
| Material | Charred Grain : Barley |
| $\delta^{13}\text{C}$ relative to VPDB | -23.4 ‰ |
| Radiocarbon Age BP | 1320 \pm 35 |

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

Conventional age and calibration age ranges calculated by :- *R. Anderson*

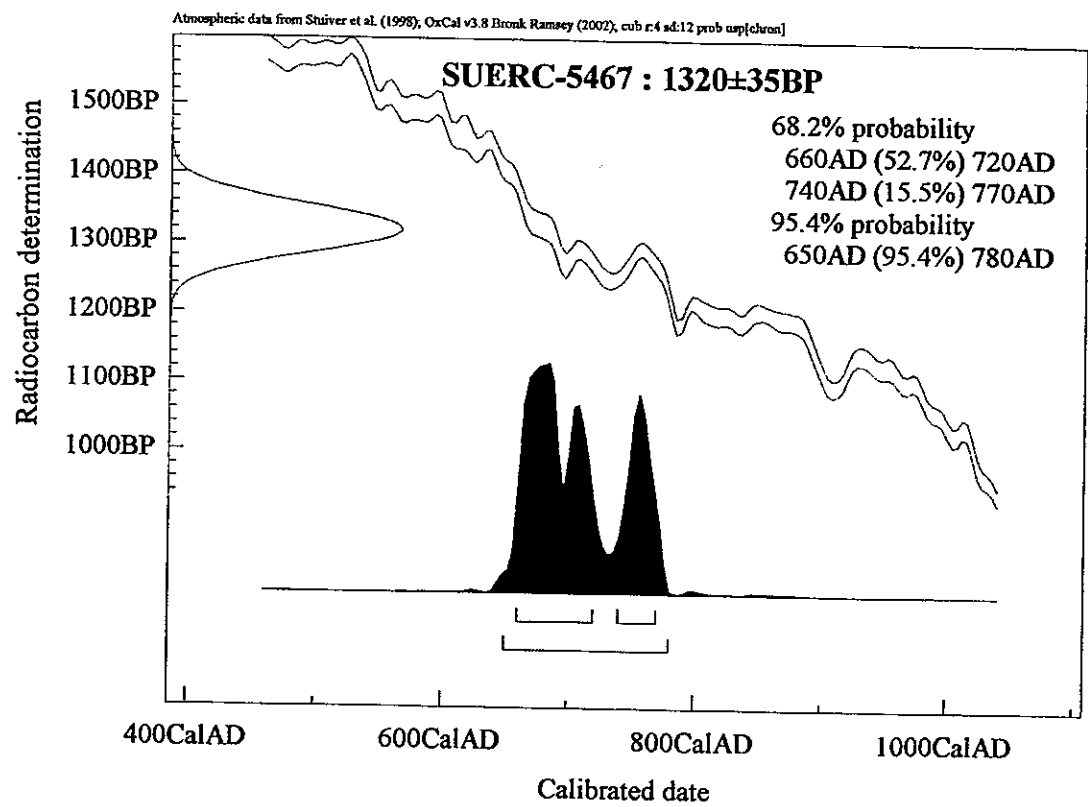
Date :- 15-3-05

Checked and signed off by :-

P. Naysmith

Date :- 15-3-05

Calibration Plot





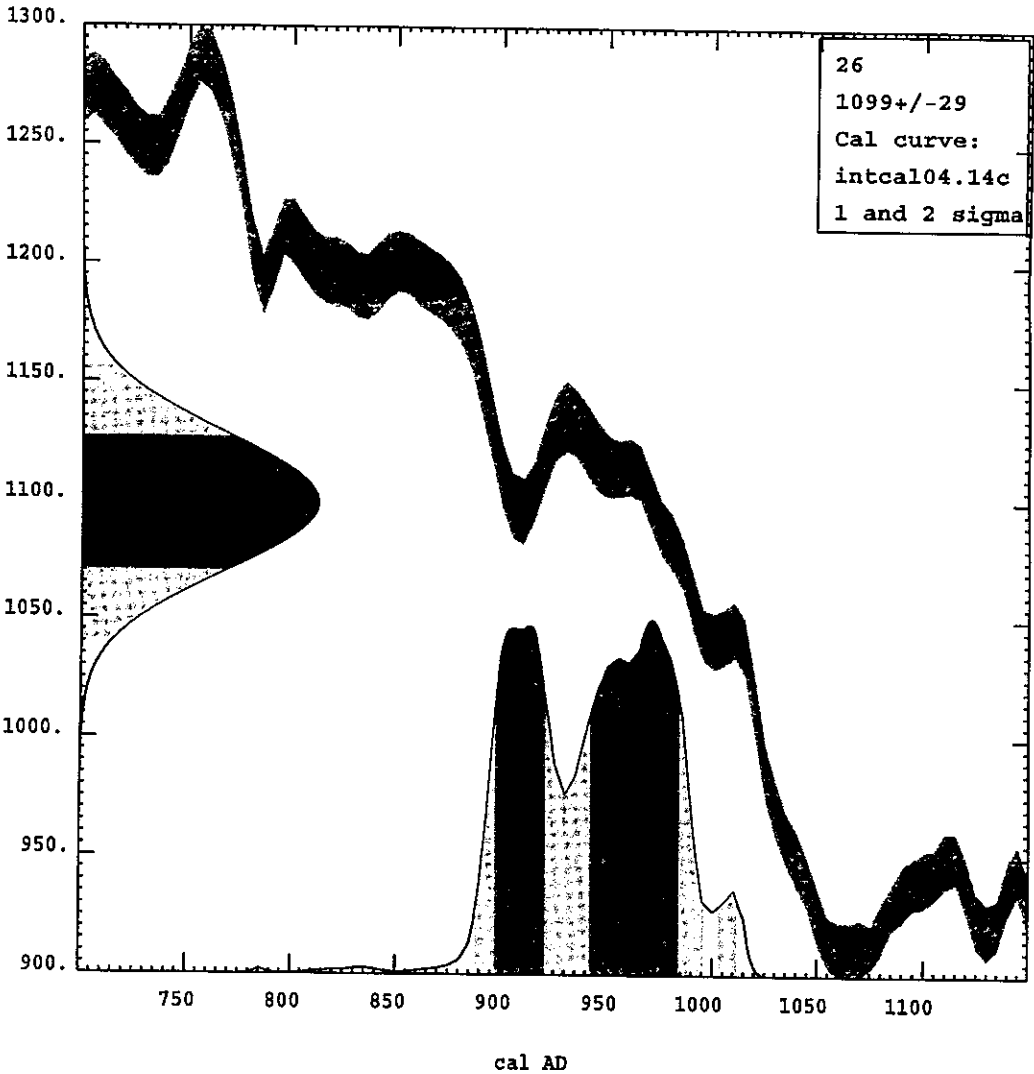
14CHRONO Centre
Queens University
Belfast
42 Fitzwilliam Street
Belfast BT9 6AX
Northern Ireland

| UBANo | Sample ID | 14C Age | ± | AMS δ13C | F14C | ± |
|-------|-----------|---------|----|----------|--------|--------|
| 11577 | c44 | 930 | 28 | -26.5 | 0.8907 | 0.0031 |

Radiocarbon Date Certificate

Laboratory Identification: UBA-11577
Date of Measurement: 2009-06-24
Site: 01E0893 Collinstown Site 16&17
Sample ID: c44
Material Dated: bone, antler or tooth root
Pretreatment: Collagen
Submitted by: Jason Marchant VJK Ltd
14C Date: 930±28
AMS δ13C: -26.5

Radiocarbon Age vs. Calibrated Age



Information about radiocarbon calibration
RADIOCARBON CALIBRATION PROGRAM*
CALIB REV5.0.2

Copyright 1986-2005 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

| | | | |
|-----------------------|--------------|-------------------|--|
| 26 | | | |
| UBA-11715 | | | |
| Radiocarbon Age BP | 1099 | +/- 29 | |
| Calibration data set: | intcal04.14c | | # Reimer et al. 2004 |
| % area enclosed | | cal AD age ranges | relative area under probability distribution |
| 68.3 (1 sigma) | | cal AD 897- 921 | 0.373 |
| | | 943- 984 | 0.627 |
| 95.4 (2 sigma) | | cal AD 888- 997 | 0.977 |
| | | 1004- 1012 | 0.023 |

References for calibration datasets:

PJ Reimer, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell,
CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich,
TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey,
RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor,
J van der Plicht, and CE Weyhenmeyer (2004), Radiocarbon 46:1029-1058.

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

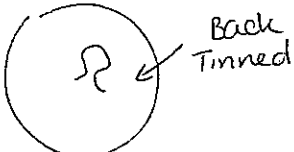
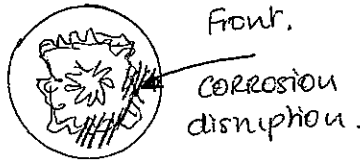
NOTE: Cal ages and ranges are rounded to the nearest year which may be too precise in many instances. Users are advised to round results to the nearest 10 yr for samples with standard deviation in the radiocarbon age greater than 50 yr.

Appendix 12





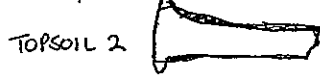
Artefact Conservation Records

| | | | | |
|---|-------------------|------------------|--|---|
| Object/Material: Cu alloy button, decorated and tinned. | | | Owner/Contractor: V.J.K. Fione | Cons. No: 2679 |
| Licence: ✓ | | | Photo/Slide: | Site details: Cellbridge Interchange |
| | | | Analysis: BM x 20 | 01E893: Site 1b Find 1 |
| Condition-pre: Tinning remains over most of surface. Partial disruption of surface & decoration by Cu (II) & (I) oxides. | | | Treatment: Mechanically cleaned Degreased in acetone Stabilized in 3% BTA in IMS. Rinsed IMS Lacquered with lucralac in toluene with fumed silica | |
| Condition-post: Stable, dull grey & green surface. Scarring from corrosion disruption | | | | |
| Date in: 24/1/03 | Date out: 2/03 | Time taken: 3 | | |

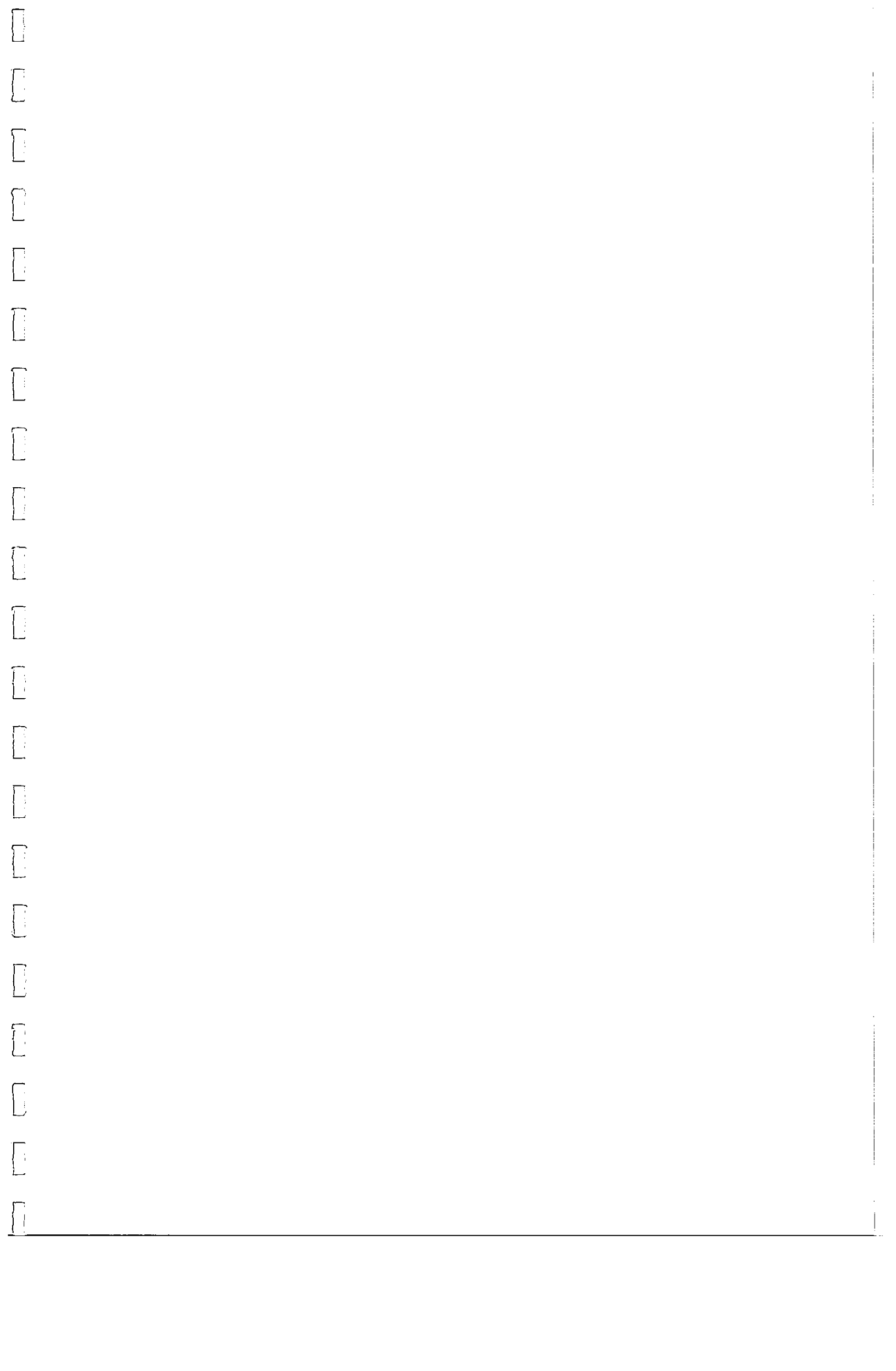
| | | | | |
|---|-------------------|--------------------------------|---|---|
| Object/Material: 31:21 Iron knife. Iron nails x 4 24:7, 49:8. 1:3, TOPSOIL. | | | Owner/Contractor: V.J.K. | Cons. No: 2680 |
| Licence: | | | Photo/Slide: | Site details: Cellbridge Interchange |
| | | | Analysis: BM x 20 | 01E893: Site 1b. |
| Condition-pre: Ferrous oxide corrosion products disrupt surface. Magnetite blistering | | | Treatment: Mechanically cleaned Desaturated in deionized H ₂ O baths @ 100°C Dried @ 35°C for 96 hr. Sealed in microcrystalline wax. | |
| Condition-post: Stable, dark brown surfaces No active corrosion | | | | |
| Date in: 24/1/03 | Date out: 2/03 | Time taken: 28 ⁺ | | |

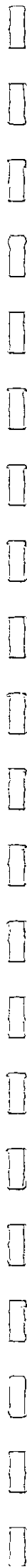
| | |
|---|--|
| <p>Display/Storage conditons:</p> <p>Store with silica gel.</p> <p>Humidity:</p> <p>735%</p> <p>Light:</p> <p>Temperature: <20°C</p> | <p>Description/Sketch:</p> <div><p>Back Tinned</p><p>Front. CORROSION disrupthion.</p></div> |
| <p>Other:</p> | |

Susannah Kelly M.A., M.I.C.H.A.W.I.

| | |
|--|---|
| <p>Display/Storage conditons:</p> <p>Store in an airtight container with silica gel.</p> <p>Humidity</p> <p>< 15 %</p> <p>Light:</p> <p>Temperature: <20°C</p> | <p>Description/Sketch:</p> <div><p>31:21</p><p>24:7</p><p>1:3</p><p>49:8</p><p>TOPSOIL 2</p></div> |
| <p>Other:</p> | |

Susannah Kelly M.A., M.I.C.H.A.W.I.

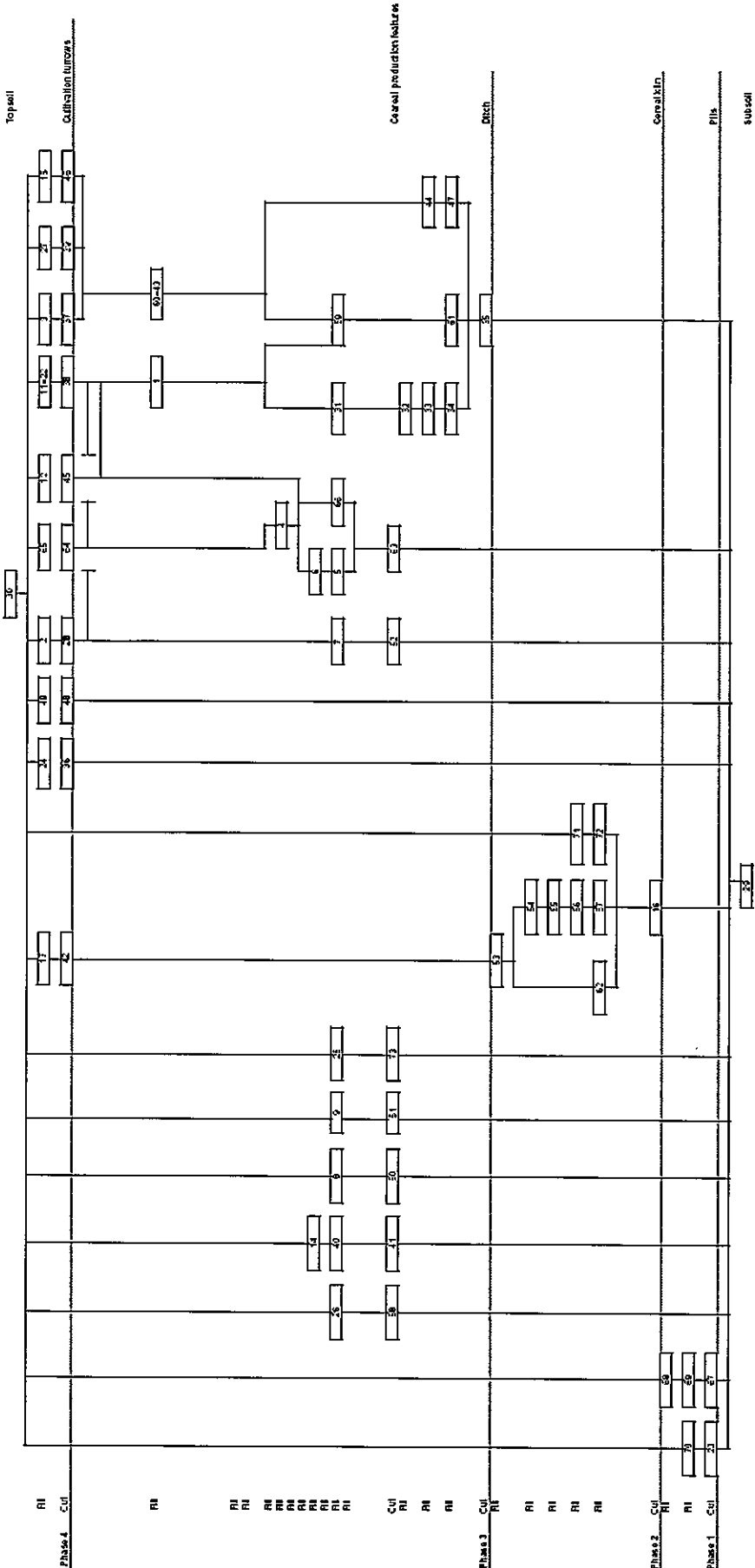


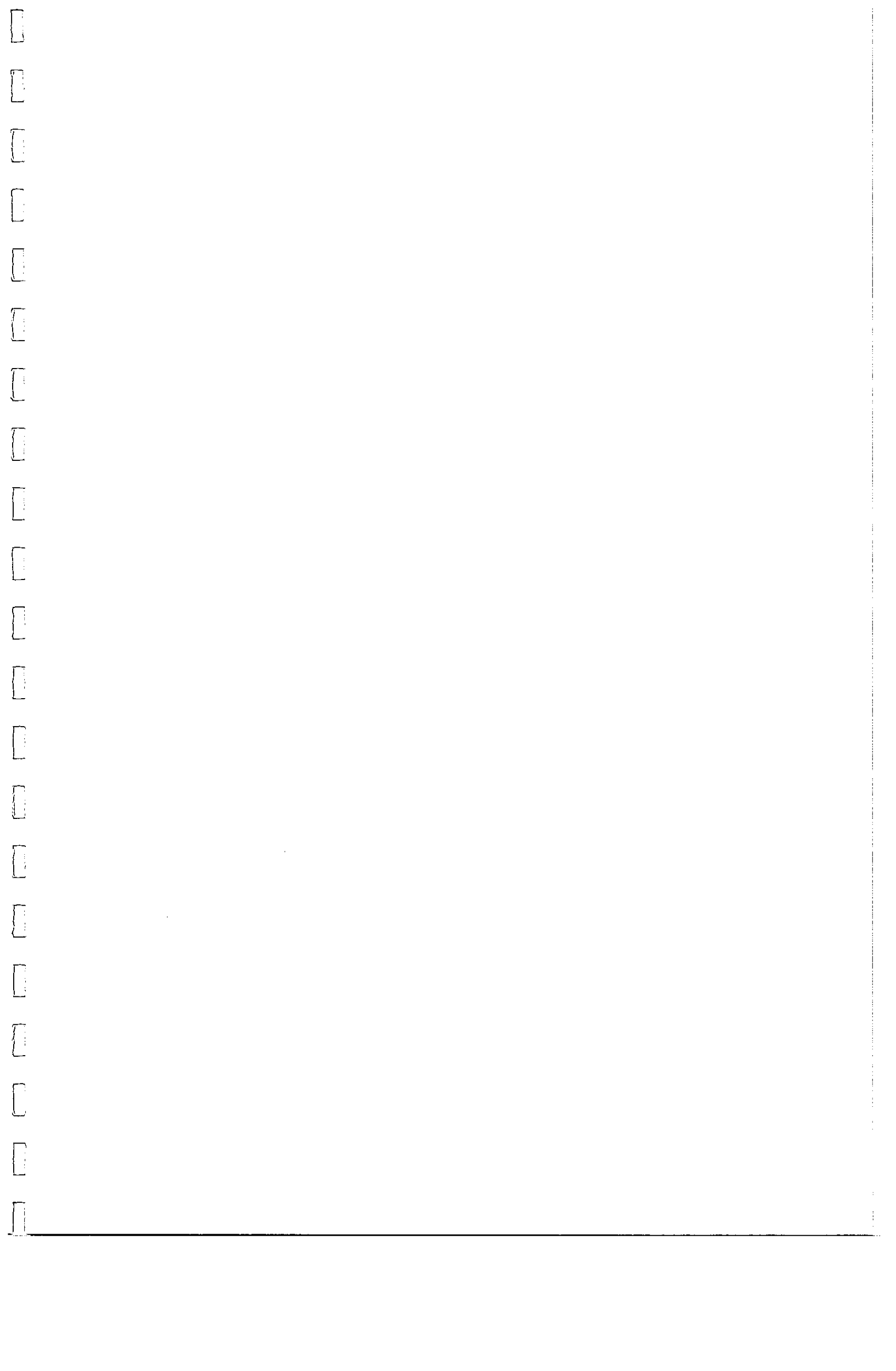


Appendix 13

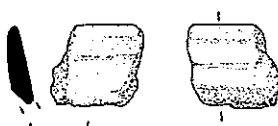
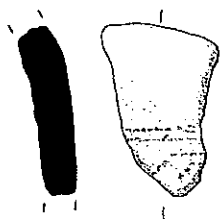
Site Matrix

Matrix Site 16/17 M4 Calbridge Interchange
01E0903





Illustrations



Scale 1:1

Illustration 1: Beaker pottery

Plates



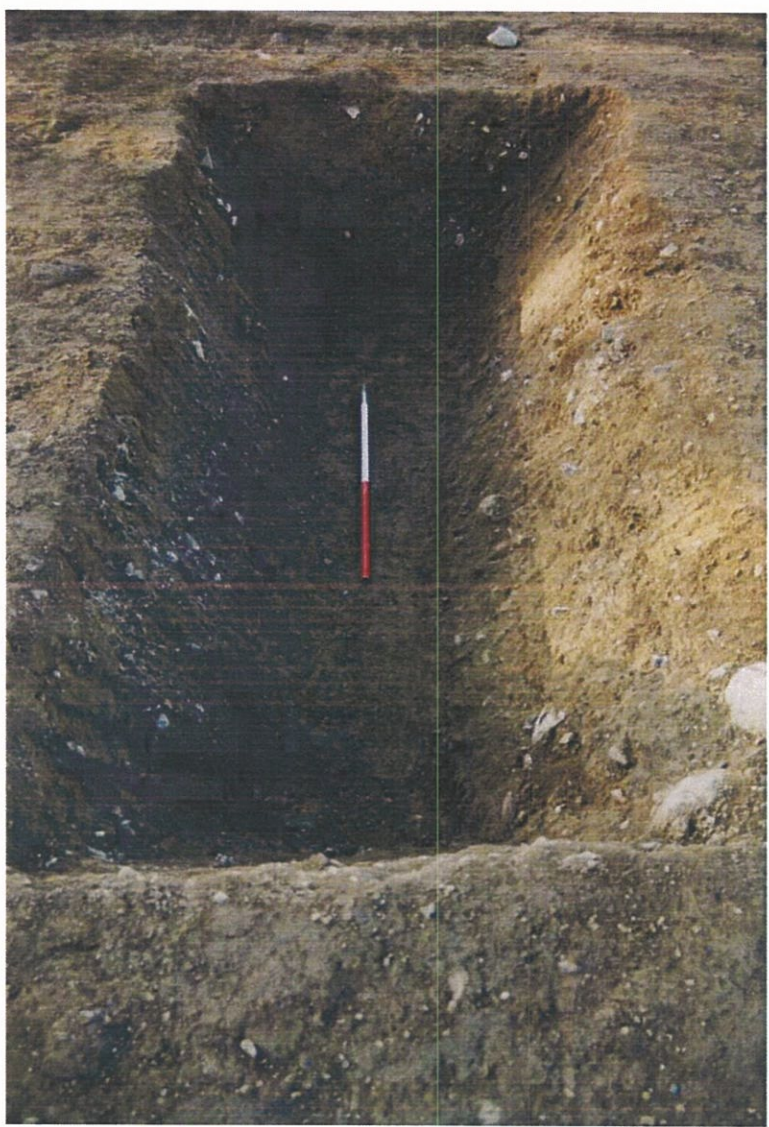
Pl. 1 Post-excavation of pit C23, contained Beaker pottery sherds



Plate 2: General view of northern part of Site 16, looking northeast. Partly excavated hearth C63 right of centre, cut by furrow C12. Postholes C50 and C51 bottom right. Pit C52 left of centre. Partly excavated ditch C35 centre left.



Plate 3: Partly excavated ditch C35. Section B showing fills C61 and C59.



Pl. 4 Post-excavation of section C of ditch C35,



Pl. 5 Post-excavation of waterlogged ditch C35, looking northwest



Plate 6: Section through hearth C83, fills C4, C5, C6 and C66.

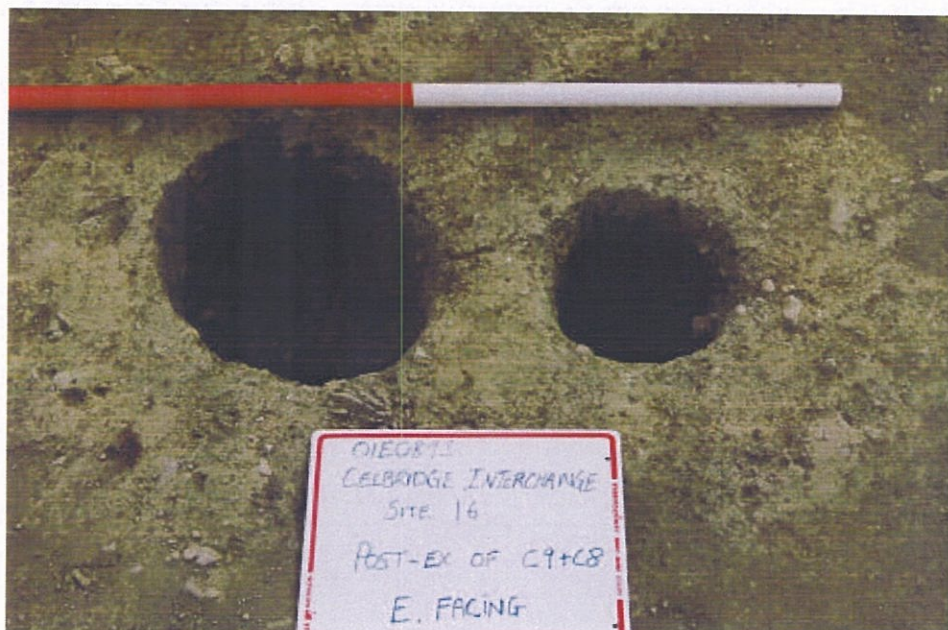


Plate 7: Postholes C50 and C51.



Pl. 8 Post-excavation kiln cut C16, looking south

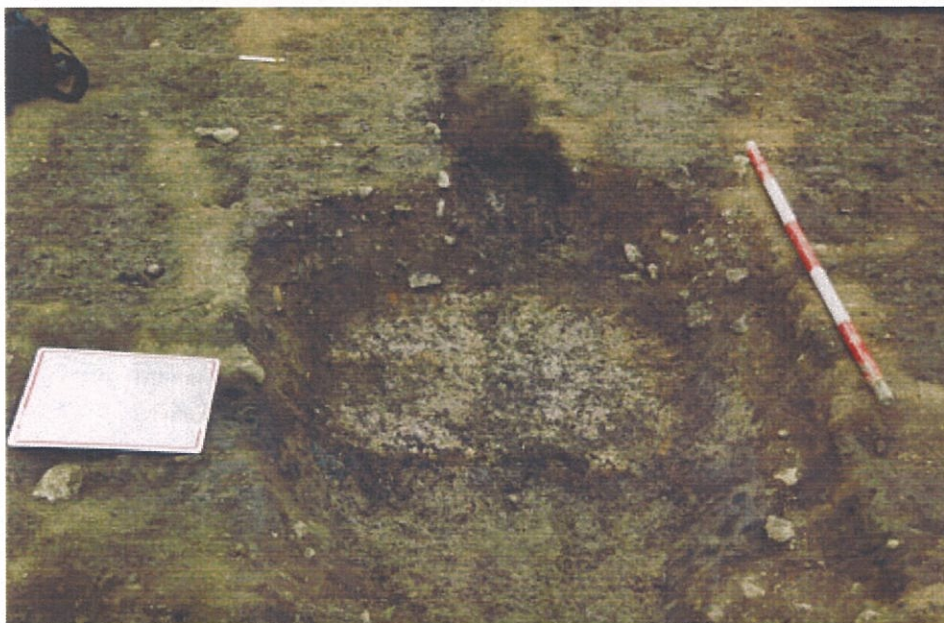
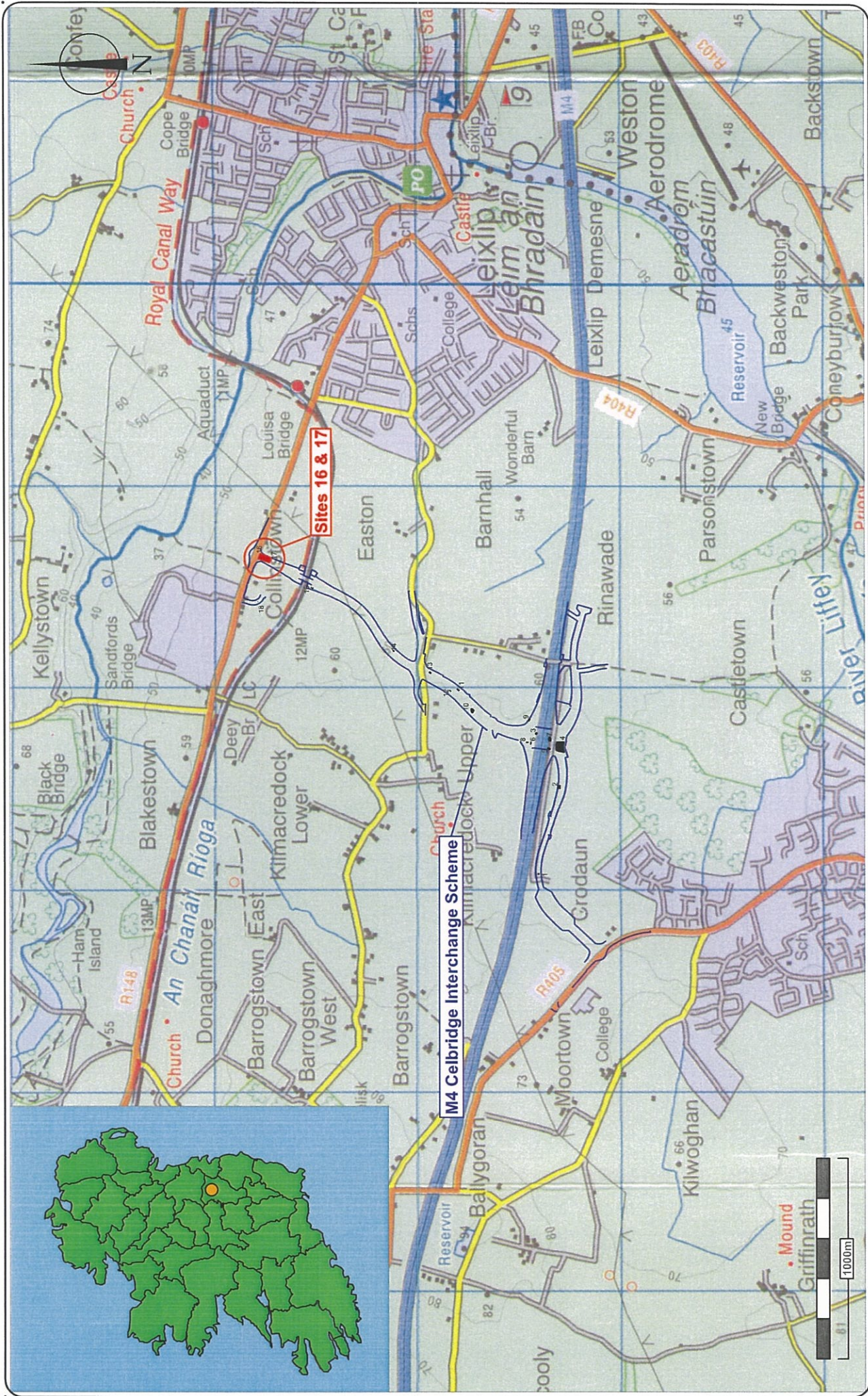


Plate 9: Partly excavated pit C16 showing base fill C57. Looking south.

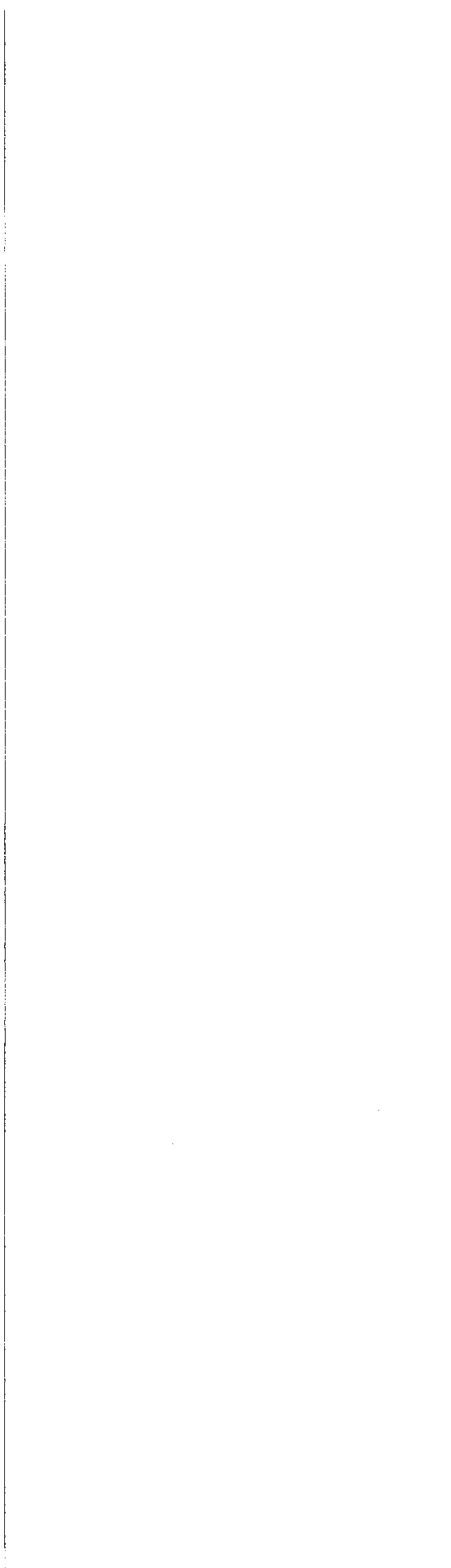


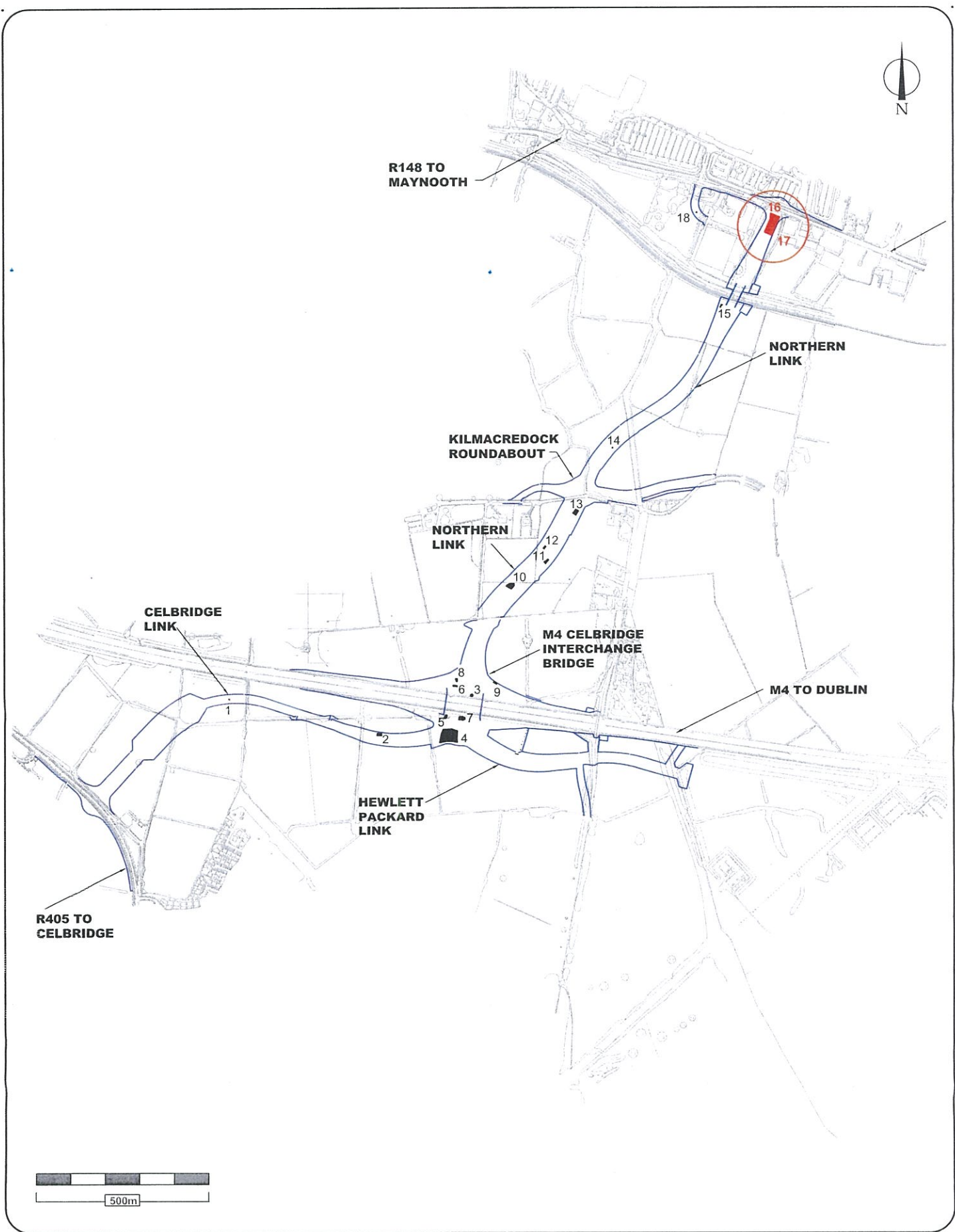
Plate 10: Partly excavated pit C16 showing fill C54. Looking south.




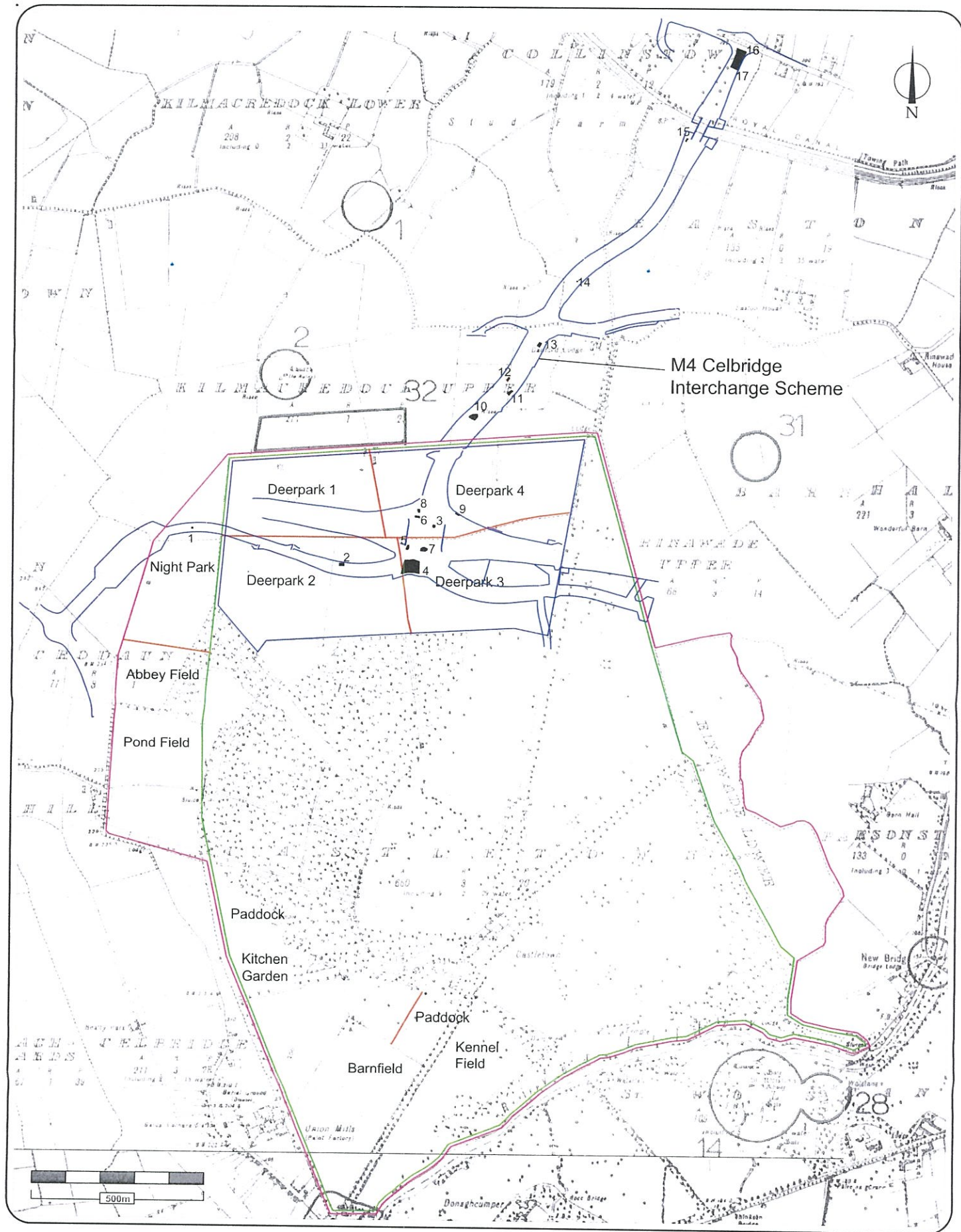


| Title | | Notes | | |
|---|--|----------------------|--------------------------|--|
| Overall location plan of the Scheme and surrounding area taken from the Discovery Series | | | | |
| | | | | |
| | | | | |
| Works/Exc No. 01E0893 | | Complied by SD/HK | CAD reference 1048-04 | Client Kildare County Council |
| Date November 13 | | Scale 1:25000 | Drawing No. Figure 1 | Project M4 Celbridge Interchange Scheme |
| | | | | |
| Brehon House Kilkenny Road Castlecomer Co. Kilkenny. Tel: (+353) 056 4440236 Fax: (+353) 056 4440237 Email: jjk@jk.ie Website: www.jk.ie | | | | |

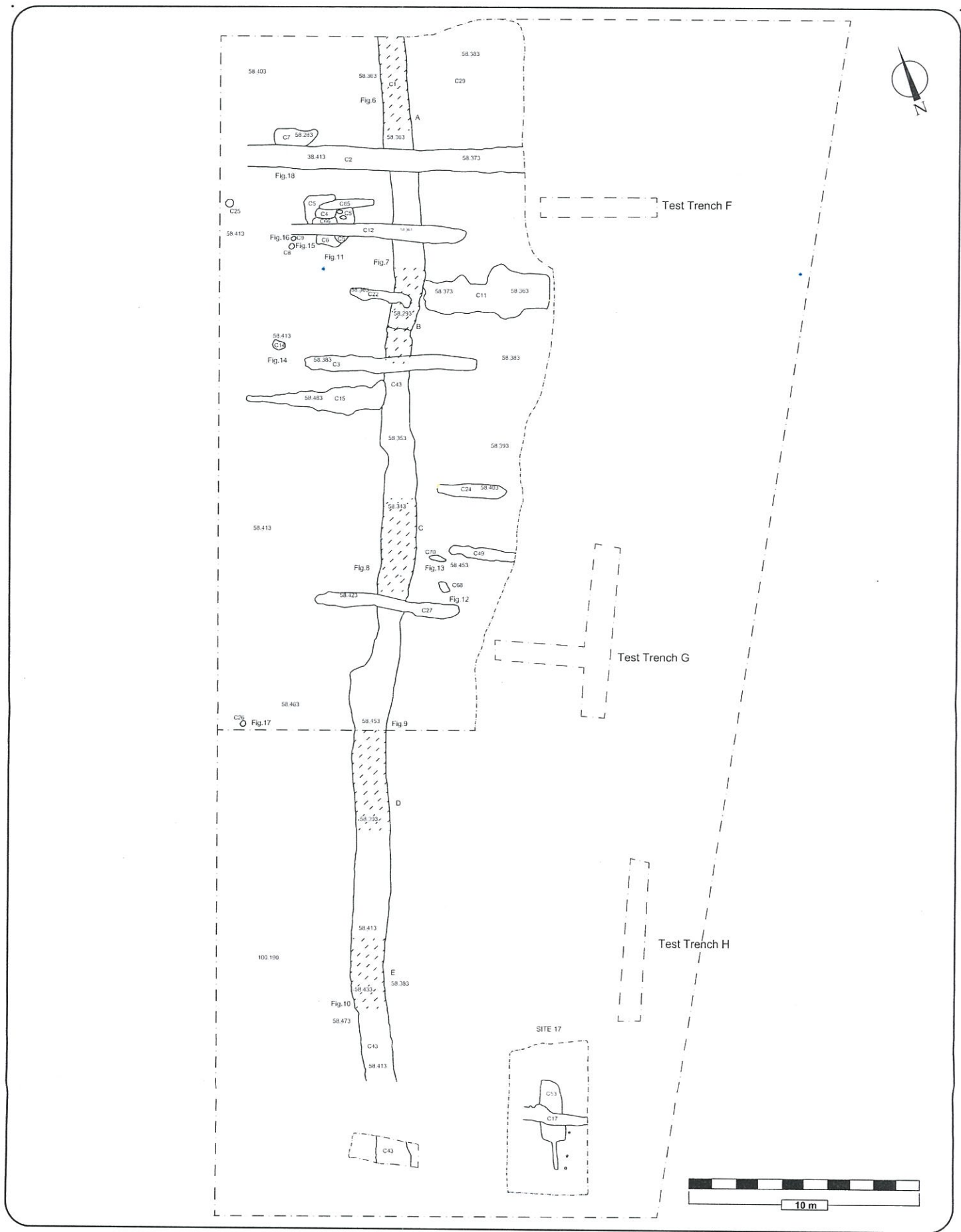






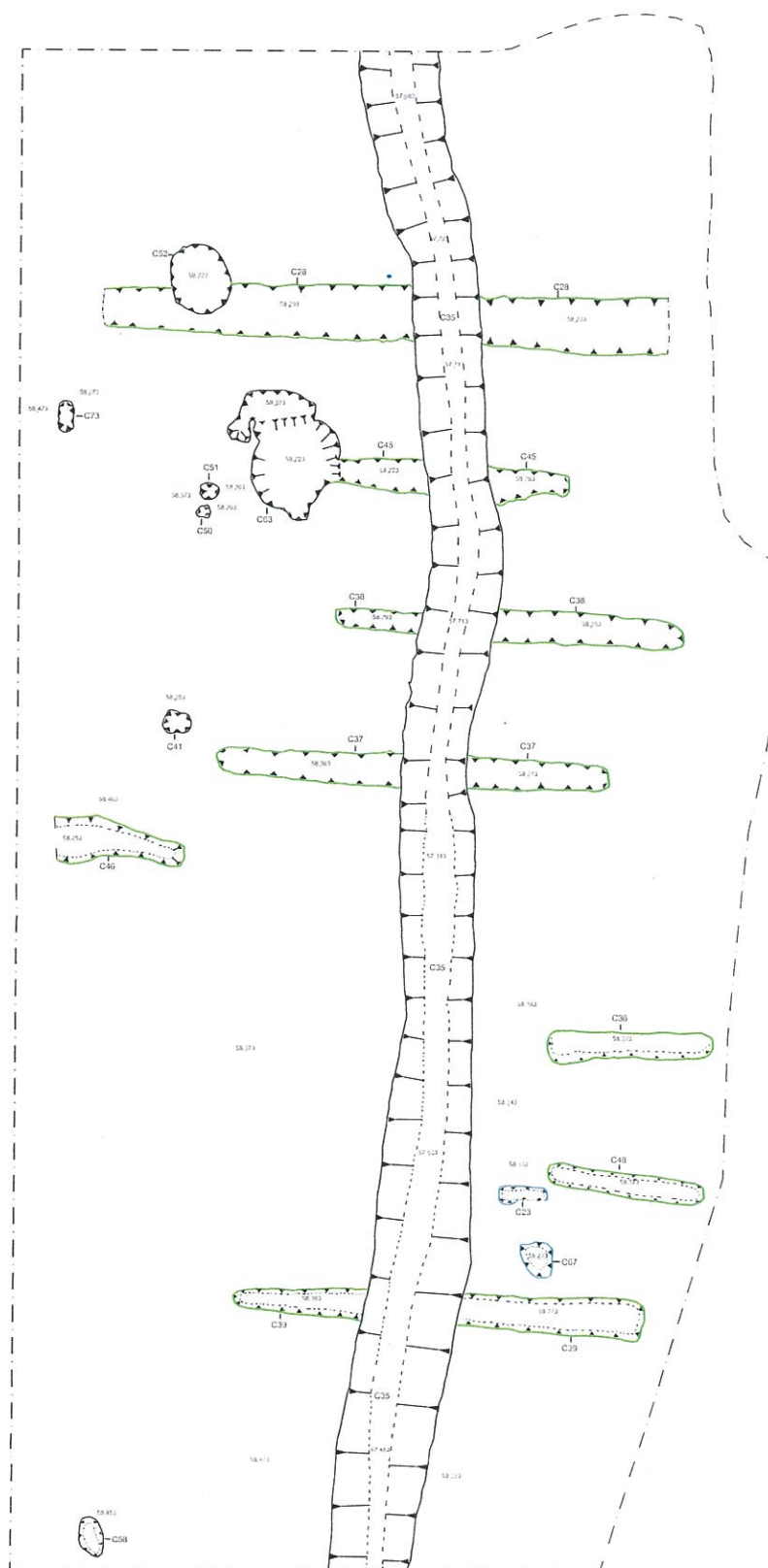
| | | | | | | | |
|---|--------------------------|---------------------------------|----------------------------|-------------------------|--------------------------------|--|---|
| Title Scheme layout showing all archaeology sites with sites 16 & 17 highlighted. | | | Notes | | |  Client Kildare County Council | Brehon House Kilkenny Road Castlecomer Co. Kilkenny. Tel: (+353) 056 4440236 Fax: (+353) 056 4440237 Email: vjk@vjk.ie Website: www.vjk.ie |
| Job No. 01E0893 | Drawn by SD/HK | CAD reference 1048-04 | Date November 13 | Scale 1:10000 | Drawing No. Figure 2 | | |




| | | | | | | | |
|--|--------------------------|---------------------------------|---|-------------------------|--------------------------------|---|--|
| Title Extract from RMP constraint map, kildare sheet 11, with detail from Castletown Estate map superimposed (Irish Architectural Archive) | | | Notes Key — Deer Park — Extent of Castletown Estate According to Estate Map 1/6, 18/19 Century — Extent of Castletown Estate According to Estate Map 1/6M c.1739 — Boundary of Abbey Field + Internal Divisions of Deer Park on Map 1/6 | | | VJK Valeria J. Keesley Ltd. ARCHAEOLOGICAL CONSULTANCY Brehon House Kilkenny Road Castletown Co. Kilkenny. Tel: (+353) 056 4440236 Fax: (+353) 056 4440237 Email: vjk@vjk.ie Website: www.vjk.ie | |
| Job No. 01E0893 | Drawn by SD/HK | CAD reference 1048-04 | Date November 13 | Scale 1:10000 | Drawing No. Figure 3 | Client Kildare County Council Project M4 Celbridge Interchange Scheme | |



| | | | | | | | | | |
|--|--------------------------|---------------------------------|---|-----------------------|--------------------------------|--|--|---|--|
| Title Pre-excavation plan showing phases 1-4 | | | Notes Stone  | | |  Client Kildare County Council | | Brehon House Kilkenny Road Castlecumber Co. Kilkenny. Tel: (+353) 056 4440236 Fax: (+353) 056 4440237 Email: vjk@vjk.ie Website: www.vjk.ie | |
| Job No. 01E0893 | Drawn by SD/HK | CAD reference 1048-04 | Date November 13 | Scale 1:150 | Drawing No. Figure 4 | Project M4 Celbridge Interchange Scheme | | | |



| | | | | | | | |
|---|--------------------------|--|----------------------------|--|--------------------------------|---|--|
| Title Post-excavation plan showing phases 1-4 | | Notes Phase 1 ——— Phase 2 ——— Phase 3 ——— Phase 4 ——— | |  Valerie J. Kaeloy Ltd. ARCHAEOLOGICAL CONSULTANCY Client Kildare County Council | | Brehon House Kilkenny Road Castlecomer Co. Kilkenny. Tel: (+353) 056 4440236 Fax: (+353) 056 4440237 Email: vjk@vjk.ie Website: www.vjk.ie | |
| Job No. 01E0893 | Drawn by SD/HK | CAD reference 1048-04 | Date November 13 | Scale 1:100 | Drawing No. Figure 5 | Project M4 Celbridge Interchange Scheme | |

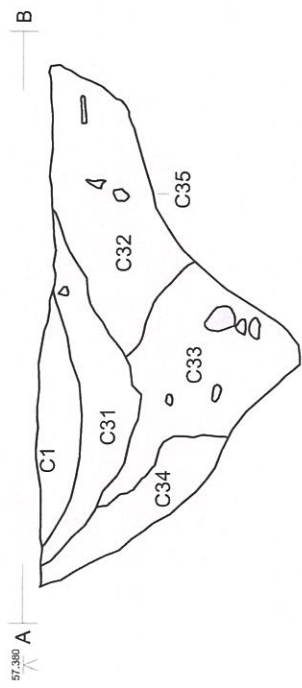


Figure 6 Section through ditch C35, section A south facing.

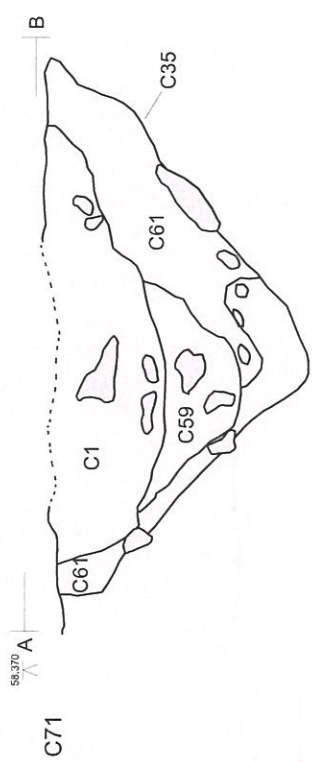


Figure 7 Section through ditch C35, section B south facing.

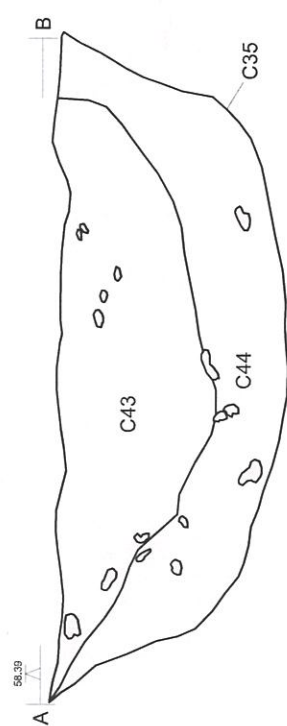


Figure 8 Section through ditch C35, section C south facing.

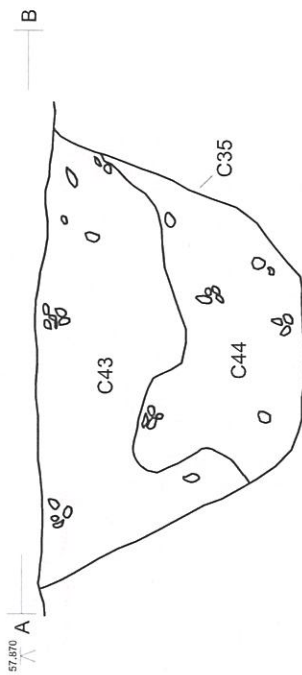



Figure 10 Section through ditch C35, section E south facing.



| | | | | | | |
|--|-----------------------|-------------------------------|-----------------------------|--|---|---|
| Title Site 16 - South-facing sections. Sections A, B, C & E through C35 | Notes Stone | Job/Exc No. 01E0893 | Compiled by SD/HK | CAD reference 1048-04 | Client Kildare County Council |  Brehon House Kilkenny Road Castlecomer Co. Kilkenny. Tel: (+353) 056 4440236 Fax: (+353) 056 4440237 Email: vjk@vjk.ie Website: www.vjk.ie |
| | | Date November 13 | Scale 1:20 | Drawing No. Figures 6, 7, 8 & 10 | Project M4 Celbridge Interchange Scheme | |



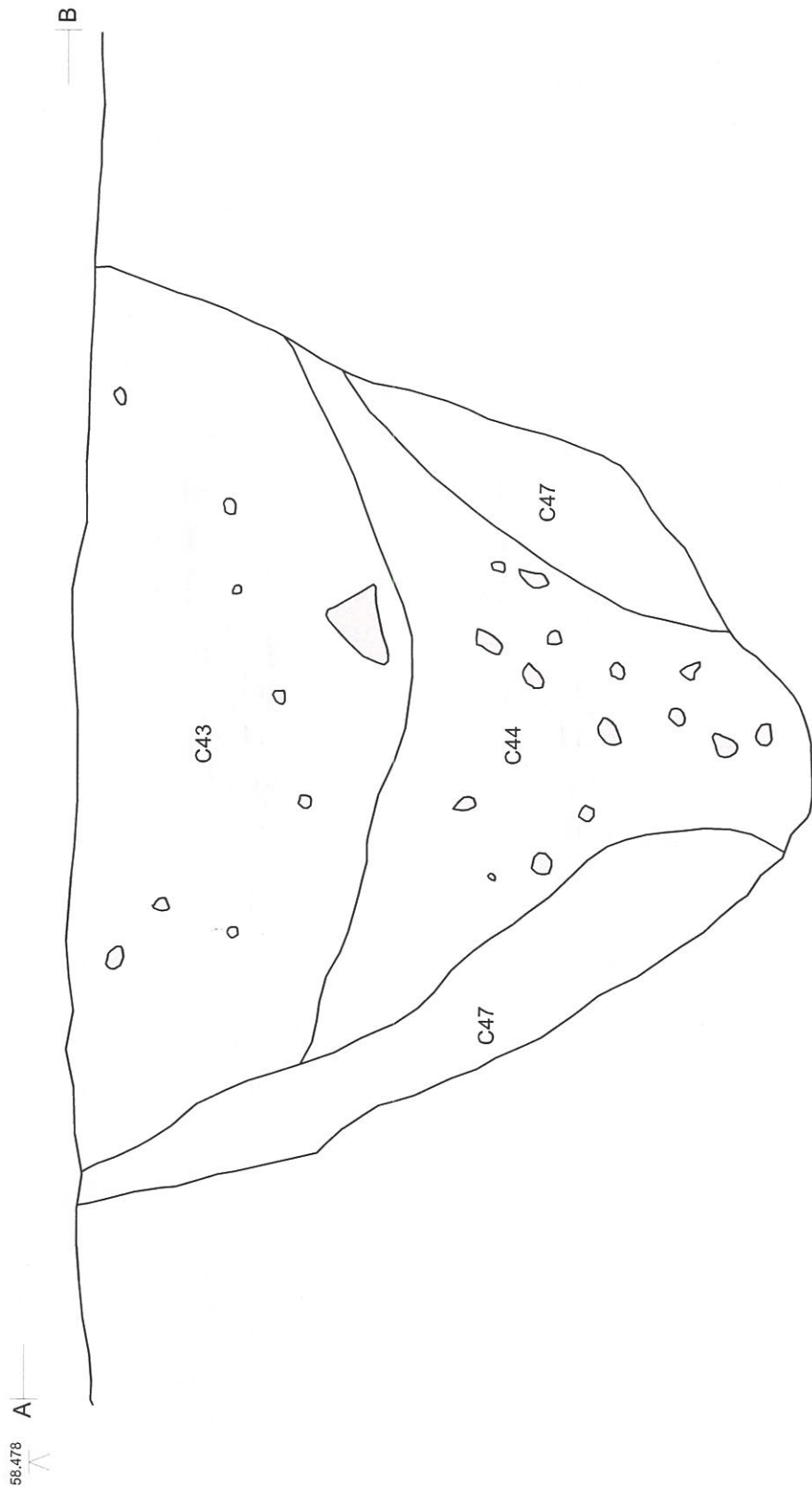



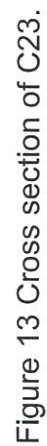
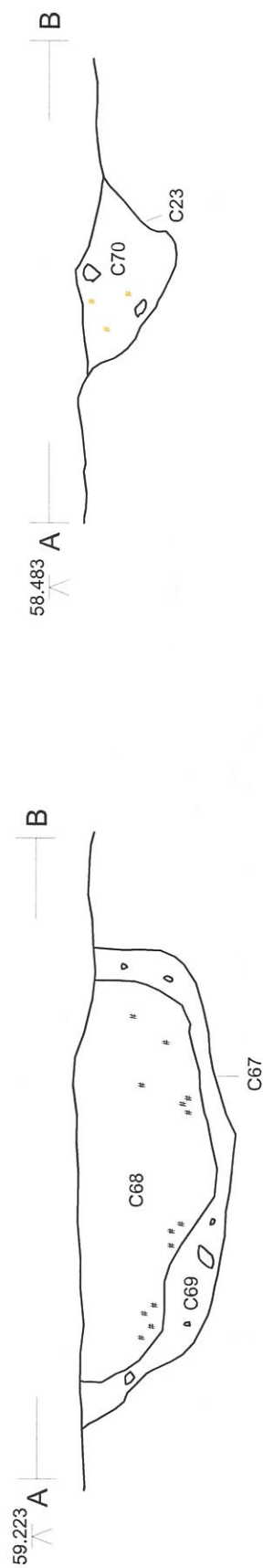
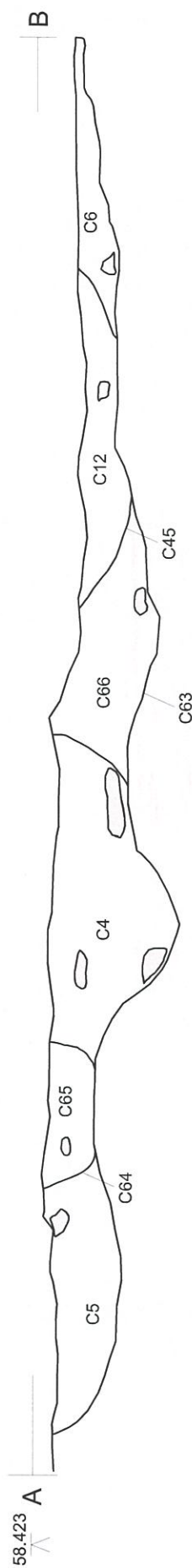




Figure 9 Section through ditch C35, end of fully excavated section of C35, north facing.

| | | | | | | |
|---|--|------------------------|----------------------|--------------------------|---|---------------|
| Title North facing section through ditch C35 | Notes Stone  | Job/Exc No. 01E0893 | Compiled by SD/HK | CAD reference 1048-04 | Client Kildare County Council | |
| | | | | | Project M4 Celbridge Interchange Scheme | |
| | | | | | Date November 13 | Scale 1:20 |
|  | | | | |  | |
| | | | | | Brehon House Kilkenny Road Castlesomer Co. Kilkenny. Tel: (+353) 056 4440236 Fax: (+353) 056 4440237 Email: vjk@vjk.ie Website: www.vjk.ie | |
| | | | | | Valerie J. Kinsley Ltd ARCHAEOLOGICAL CONSULTANCY | |





| | | | | | | | | |
|--|-----------------------------------|---|-------------------------------|-----------------------------|-------------------------------------|---|---|--|
| Title Site 16 - Cross-sections through C67, C23, hearth C63, C64 & C45. | Notes Charcoal Stone |  | Job/Exc No. 01E0893 | Compiled by SD/HK | CAD reference 1048-04 | Client Kildare County Council |  VJK Valerie J. Koney Ltd. ARCHITECTURAL CONSULTANCY | Tel: (+353) 056 4440236 Fax: (+353) 056 4440237 Email: vjk@vjk.ie Website: www.vjk.ie |
| | | | Date November 13 | Scale 1:10 | Drawing No. Figures 11-13 | Project M4 Celbridge Interchange Scheme | | |



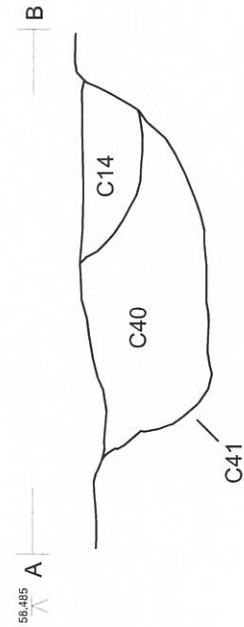


Figure 14 Cross section of C41.

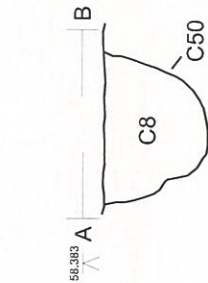


Figure 15 Cross section of C50.

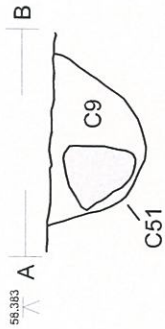


Figure 16 Cross section of C51.

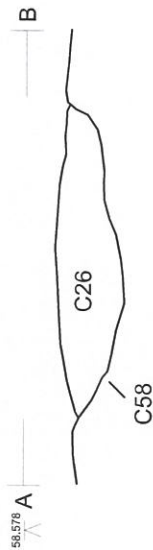


Figure 17 Cross section of C58.

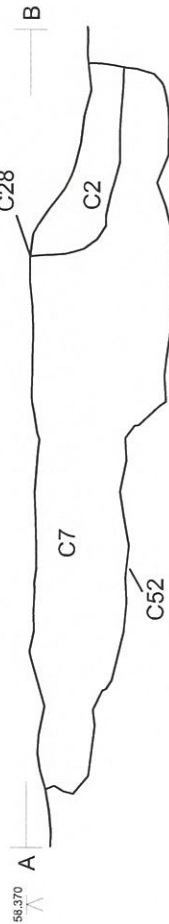


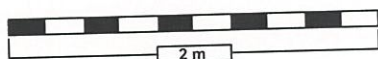
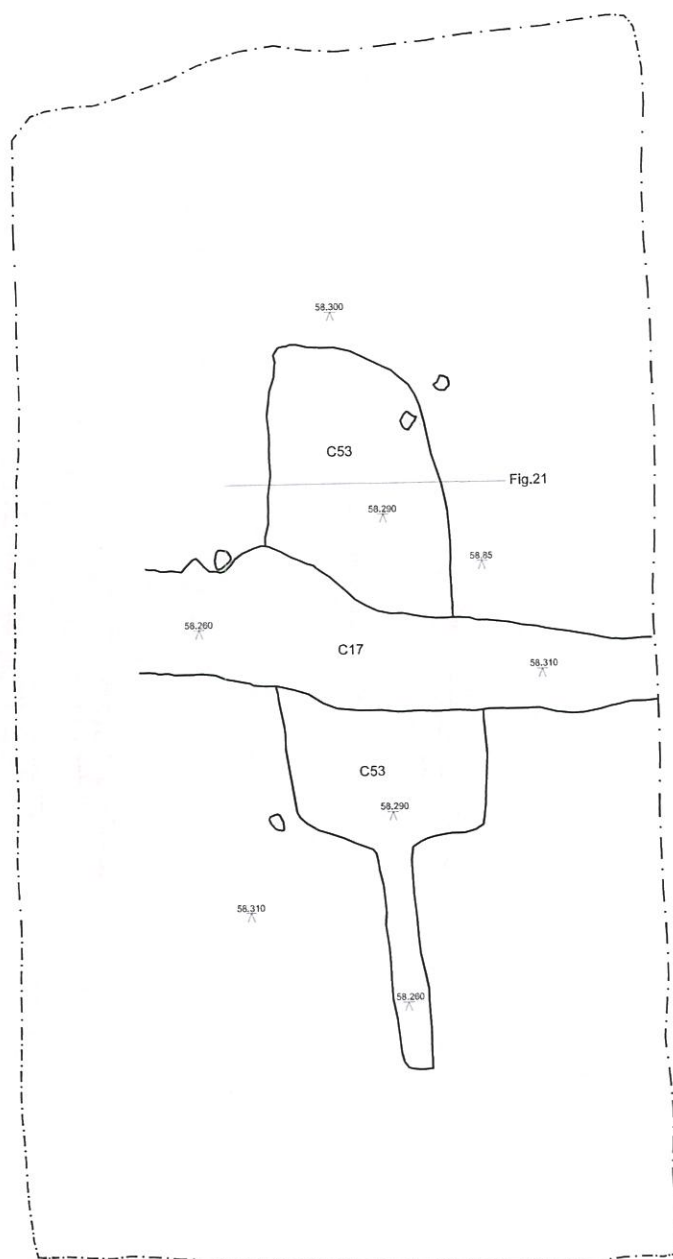


Figure 18 Cross section of C52 and truncating cultivation furrow C28.



| | | | | | | | |
|--|--|------------------------|---------------------|---------------|----------------------------------|--|--|
| Title Site 16 - Cross-sections through C41, C50, C51, C58, C58 & C28 | Notes Stone  | Job/Exc No. 01E0893 | Complied by | CAD reference | Client Kildare County Council |  Valerie J. Kennedy Ltd. ARCHAEOLOGICAL CONSULTANCY | Tel: +353) 056 4440236 Fax: +353) 056 4440237 Email: vjk@vjk.ie Website: www.vjk.ie |
| | | | SD/HK | 1048-04 | | | |
| | | | Date November 13 | Scale 1:10 | | | |





Title

Site 17 - Pre-excavation plan
showing phases 2 & 4

Notes

Stone



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Drawn by
SD/HK

CAD reference
1048-04

Date
November 13

Scale
1:40

Drawing No.
Figure 19

Project
M4 Celbridge Interchange Scheme

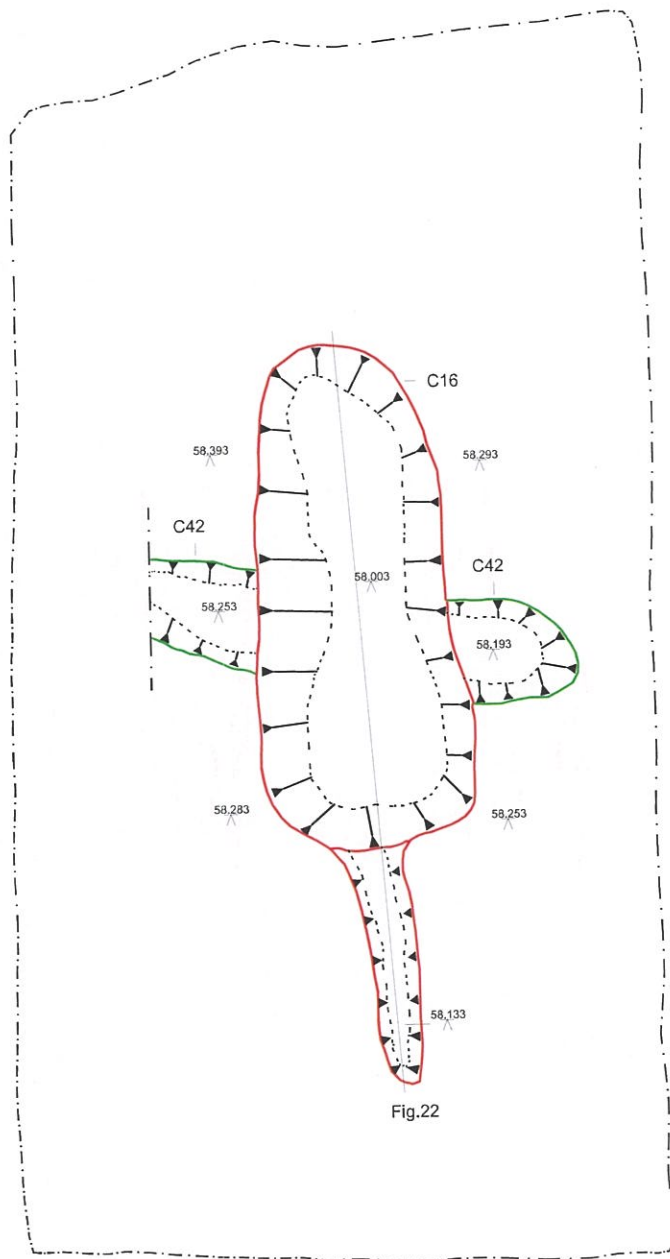
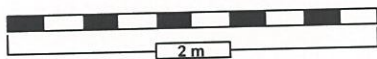


Fig.22



Title
Site 17 - Post-excavation plan
showing phases 2 & 4

Notes
Phase 2 ———
Phase 4 ———



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Date
November 13

Scale
1:40

Drawing No.
Figure 20

Project
M4 Celbridge Interchange Scheme

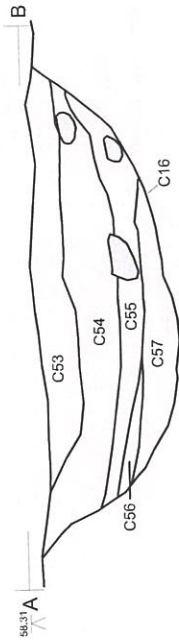



Figure 21 Section through fills



Figure 22 Longitudinal profile, also shows flue fills C71 and C72



| | | | | | | | | |
|--|--------------|-------------------------------|-----------------------------|---------------------------------------|---|---|---|--|
| Title Site 17 - Section through fills of C16 & longitudinal profile showing flue fills C71 & C72 | Notes | Job/Exc No. 01E0893 | Compiled by SD/HK | CAD reference 1048-04 | Client Kildare County Council |  | Brehon House Kilkenny Road Castlecomer Co. Kilkenny. | Tel: (+353) 056 4440236 Fax: (+353) 056 4440237 Email: vjk@vjk.ie Website: www.vjk.ie |
| | | Date November 13 | Scale 1:20 | Drawing No. Figures 21 & 22 | Project M4 Celbridge Interchange Scheme | | | |

