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ARO52: The long history of a palaeochannel at Ferniegair, Hamilton

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ARO52: The long history of a palaeochannel at Ferniegair, Hamilton

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Summary

Prehistoric settlement activities were noted on the north-west bank of a post-glacial palaeochannel, beside the Hamilton Golf Club in Ferniegair excavated by GUARD Archaeology Ltd in advance of development in 2016. The features, as well as the artefacts discarded or deposited in the palaeochannel, indicate the intermittent use of the area from the early Neolithic through to the middle Bronze Age. However, the relationship of the settlement and its use of the palaeochannel as a refuse dump is a rare find in Scotland.

In the beginning the palaeochannel was an open channel of water, possibly the result of a post-glacial course of the Avon Water that separated two distinct geological deposits: wet alluvial clay to the south-east and dry sand to the north-west. Archaeobotanical and pollen analyses indicated the location of mixed woodland close by making the dryer sands on the side of the palaeochannel attractive to early prehistoric people.

The earliest use of the north-western bank of the palaeochannel was identified by a small group of features and artefacts which were radiocarbon dated to the early Neolithic. Later, a horseshoe-shaped structure with a single entrance and a deposit of domestic debris was in use from the end of the 35th century BC to the middle of the 34th century BC – the middle Neolithic. Its occupation deposit contained flint microblades as well as pottery and pitchstone. A later and more extensive, mixed deposit that covered the structure was associated with numerous stakeholes, probably from windbreaks, and was dated to the early/middle Bronze Age. It contained flint tools including an arrowhead made from east-coast flint or 'jet'. This evidence suggests repeated use of the area from as early as the early Neolithic and indicates it was a favoured place for a stop on a routeway that used river networks such as the River Clyde and the Avon Water for traversing the landscape.

Other areas along the northerly bank of the palaeochannel indicated Neolithic and Bronze Age activity, with material cultural linked to material found in the palaeochannel.

A later stone-lined pit located on the edge of the palaeochannel was used during the latter part of the early Bronze Age and into the middle Bronze Age. It contained no material culture but could have been a large fire-pit and associated with seasonal gatherings of people.

Objects and other domestic debris from settlement use of the northern bank of the palaeochannel were discarded into the open water of the palaeochannel, with the earliest being dated from the early and middle Neolithic. The main period of deposition, however, was much later, from the early Bronze Age to the middle Bronze Age. Over this time period not only did the channel gradually fill in with debris, but the environment around it changed too, and by the end of it the palaeochannel no longer functioned as an open channel.

The artefacts within the lowest fill of the palaeochannel included raw materials from the Isle of Arran, and East Yorkshire used for tool manufacture, during the Neolithic period and possibly a personal item of a small cube of ochre from the later Neolithic. Some of these objects could have been 'ritual' depositions rather than the discarding of damaged or unwanted materials.

One of the most interesting and unusual finds in the lower fill of the palaeochannel was an exotic jet pendant shaped like a claw or possibly a bird's head, whose material is probably from Whitby in North Yorkshire. Although difficult to date, it was probably lost in the early Bronze Age. Another contemporary and rare piece is a roughout for a bangle, using local shale.

The majority of the sherds of pottery representing pots from the middle Neolithic to the middle Bronze Age were found in the lower deposits of the palaeochannel, some closely related to sherds found on the various occupied areas of the bank.

This seemingly ordinary camp site area took on an unexpected importance with the occurrence of exotic goods. In the use of the palaeochannel successive visitors to the site inadvertently created a reservoir of archaeological deposits and artefacts that have allowed us a glimpse of how they interacted with each other and with their environment across time.

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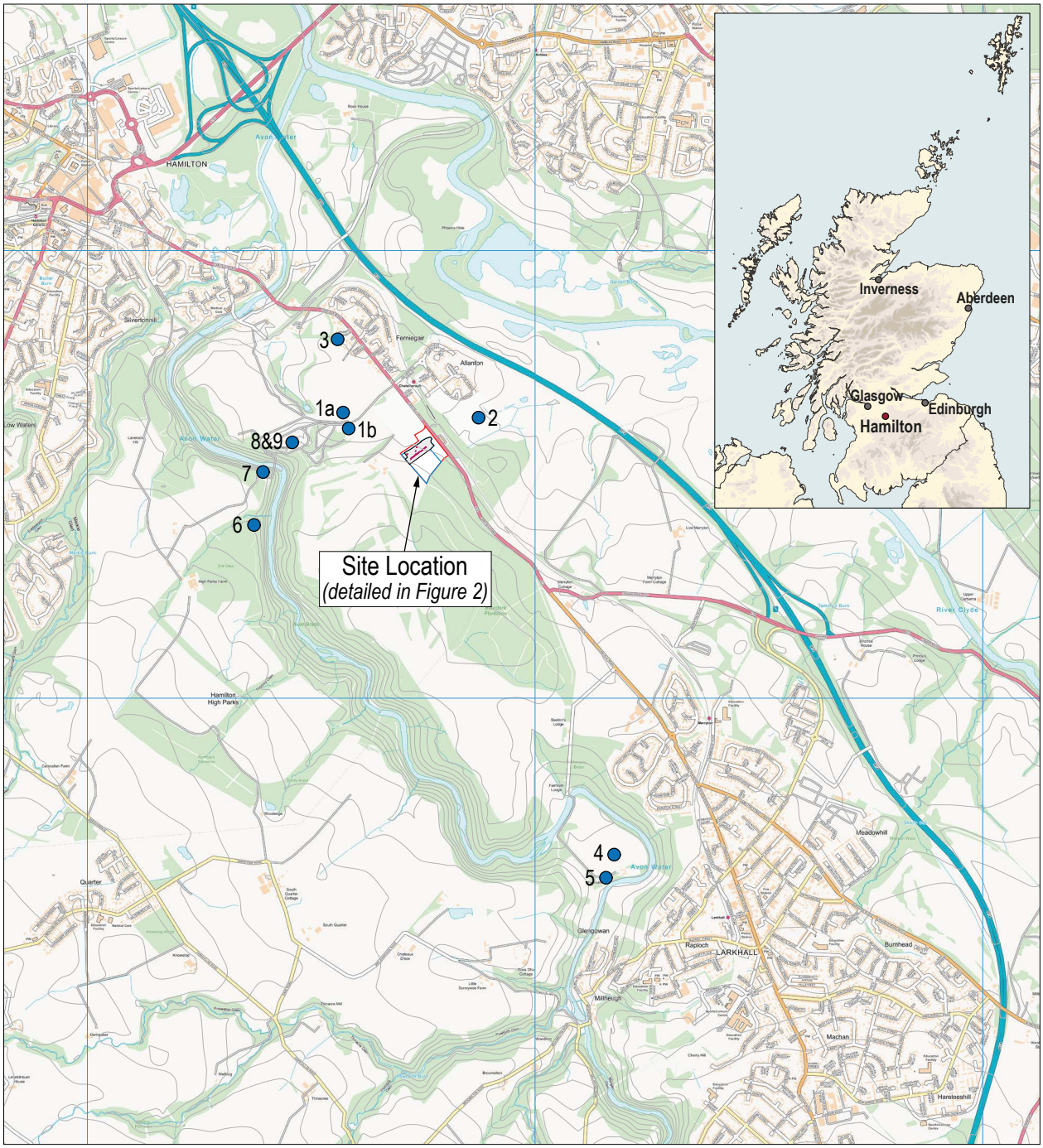

1a. Ferniegair – Bronze Age Cemetery excavated 1936
1b. Ferniegair – Bronze Age Cemetery excavated 1939
2. Ferniegair – Flint Scraper
3. Ferniegair – Fragment of a Stone Axe
4. Fairholm – Cairn
5. Fairholm – Burial cists
6. Cadzow – Roman Fort
7. Cadzow – Medieval Castle
8. Chatelherault – Hunting Lodge and Ornamental Gardens
9. Chatelherault Designed Landscape

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Figure 1: Location of the site and other archaeological features.

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KEYWORDS: Neolithic, Bronze Age, palaeochannel, exotic materials, environment

Introduction

An archaeological strip, map and excavation, was undertaken by GUARD Archaeology Ltd in 2016 on behalf Robertson Homes, across an area of ground due to be developed at Hamilton Golf Club, Ferniegair, Hamilton (NGR: NS 74347 53903). This followed a previous archaeological evaluation (McNicol 2016), which first revealed the presence of significant archaeological features surviving in the north-western part of the development area. Prior to the excavation, the development area was open grassland associated with the golf course.

The development area (Figure 1) is located in the village of Ferniegair on the south-eastern outskirts of Hamilton in South Lanarkshire at an elevation of c 65 to 75 m OD; the site sloped gently from the south-west down to the north-east. It is bordered along its eastern periphery by the A72 Carlisle Road, the southern part had an area of planted woodlands, to the west were further open grassland and practice greens associated with Hamilton Golf Course, and a new development of housing lay to the north. The underlying drift geology consisted of diamicton sand across the western extent and areas of alluvial clay across much of the eastern extent of the excavated area, but particularly beneath and along the line of the palaeochannel. The solid geology is Scottish Upper Coal Measures Formation (BGS 2023).

Archaeological Background

An evaluation (McNicol 2016) identified several known archaeological sites in the surrounding area close to the proposed development site. Two inhumation cists and four urned cremations were uncovered by an excavation conducted in April 1936, c. 380 m south and upslope from the development area (Figure 1, Site 1a). In September of 1939 a further two inhumation cists and a distinct inhumation were also unearthed, roughly 110 m south-east of the previous burial group (Figure 1, Site 1b). Together these represented a small Bronze Age cemetery (Welfare 1977).

According to the New Statistical Account of Scotland (1845, 270), a 'tumulus' had also been found in the Parish of Hamilton in which a "good many urns, containing the ashes of human bones, some of them accompanied with the tooth of a horse". If this account is to be believed it could suggest that other burials had also been found in the locale. Later writers suggest a tumulus (Figure 1, Site 4) was found approximately two miles south of Hamilton. Indeed, burials cists are said to have been discovered about the year 1830, while work was in progress on the foundations of the stables on the grounds of Fairholm – 2.5 km to the south-east of the development area on the banks of Avon Water (Figure 1, Site 5, see also Site 4, RCAHMS 1978, 72)

Given the proximity of the Bronze Age cemetery close to the present excavation, an evaluation was conducted for a separate development at Ferniegair, Allanton (Figure 1, Site 2, Arabaolaza 2012), which uncovered a possible flint scraper. A stone axe head was also recovered, 720 m to the north-west (Figure 1, Site 3), indicating further environment prehistoric activity in the immediate area. Evidence in the vicinity of the present site is not limited to prehistory as possible Roman activity at a promontory fort 920 m to the south-west of the development area, had been dated to the second century AD (Figure 1, Site 6, HES, SM10727).

Sustained medieval activity is also evident at Cadzow Castle, 780 m south-west of the development area (Figure 1, Site 7, SM90342). This site was an occasional residence of the kings of Scotland from the twelfth to fourteenth century, with the current stone castle likely being built in the 1540s and modified in the eighteenth and nineteenth centuries during landscaping works (Figure 1, Site 9). This period of landscaping is associated with the construction of Chatelherault Hunting Lodge and Ornamental Gardens (Figure 1, Site 8, Canmore ID 201854), 615 m to the west of the development area, and has remained largely unchanged since the eighteenth century except for interventions in the late nineteenth and twentieth centuries relating to quarrying and the building of a reservoir.

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The earliest map of the area showing Allanton is the Roy Military Survey of Scotland of 1747-1755, which refers to it as 'Allantown'. It appears as a very small settlement, essentially a small group of buildings with associated enclosures set within an agricultural landscape which includes the proposed development area, while Chatelherault Country House and grounds are depicted to the west. Forrest's 1816 map of Allanton revealed a small settlement although by then it had extended slightly along two intersecting roads surrounded by an agricultural landscape. This rural landscape continued with slight growth of the village noted in the 6 Inch to 1 Mile 1st edition OS map of 1843-1882. By 1885-1900 when the 2nd edition OS map was published the layout of Allanton still remained essentially the same except for the railway line which was present to the west and a colliery to the south-west, which was referred to as Merryton Colliery on the ½ Inch to the mile OS map published in 1926-1935. The development area appeared to be agricultural ground at this time. A further colliery, Ferniegair Colliery, is recorded to the immediate north-west of the development area, which operated from c. 1850 to 1947.

During the evaluation by GUARD Archaeology in August 2016 (McNicol 2016), a number of features of prehistoric date were uncovered, along with some early Neolithic pottery. This suggested possible settlement activity within the north-western area of the site. The potential for further archaeological discoveries was indicated by the presence of these known archaeological features and artefacts close to the development area. Indeed, the landscape, which encompassed the development area, was largely divorced from the agrarian improvements of the eighteenth and nineteenth centuries.

Excavation Results

The development area was stripped of overburden to reveal a number of features of archaeological importance cut into diamicton sand across the western extent of the site. The main feature (Area 1) was a palaeochannel that extended through the site at the junction of the sand and clay from the southern extent of the area stripped, and contained most of the artefacts found. Other features comprised the ephemeral remains of a horseshoe-shaped structure to the north-west (Area 2) with a hearth deposit, a shallow fire-pit, postholes and an extended area of stake-holes below an occupation layer; a group of pits and postholes to the south-west (Area 3); a central area of pits and postholes (Area 4); and an adjacent stone-lined feature situated on the north-western edge of the central part of the palaeochannel.

The discovered archaeological features are described below by Area (Figure 2):

Area 1: Palaeochannel

This area comprised the palaeochannel (155) that extended across the eastern-central part of the site from south-west to north-east and a related stone-lined feature (156) containing burnt material which was located beside the palaeochannel (Figure 3).

Palaeochannel

This feature was visible as a post-glacial channel that meandered for 135 m and dropped c. 9 m in height along its length. A 100 m long section, with numerous cross sections, was excavated through it encountering both ceramic and rubble field drains that aided drainage in this area. The down slope stretch of the palaeochannel to the north-east was a heavily truncated area that remained waterlogged due to the topography and the presence of an active field drain. In the more elevated extent of the site to the south-west, the area of the palaeochannel was revealed to be a shallow deposit that contained no archaeological remains (Figure 4).

The palaeochannel contained twelve deposits some of which were rich in archaeological material. The charcoal-rich basal fill (005) that extended along a 40 m section on the north-west side of the central and northern part of the exposed palaeochannel contained the greatest density of archaeological finds including prehistoric pottery sherds and lithic artefacts. Material cultural remains were not limited to this deposit as some artefacts were also recovered from a number of deposits including those above, and parallel to the basal deposit, and also further up slope to the south-west.

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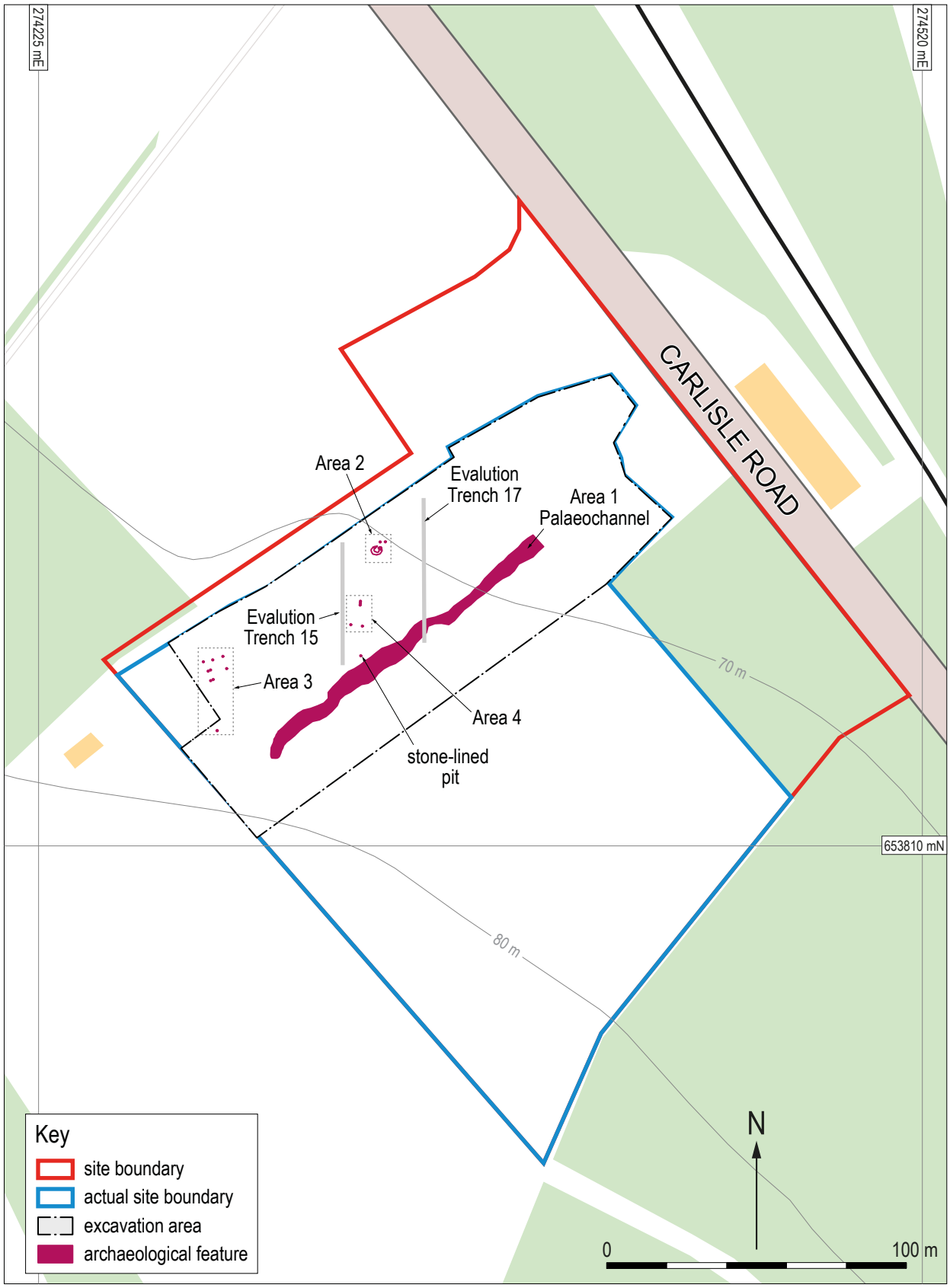

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Figure 2: Location of features by area.

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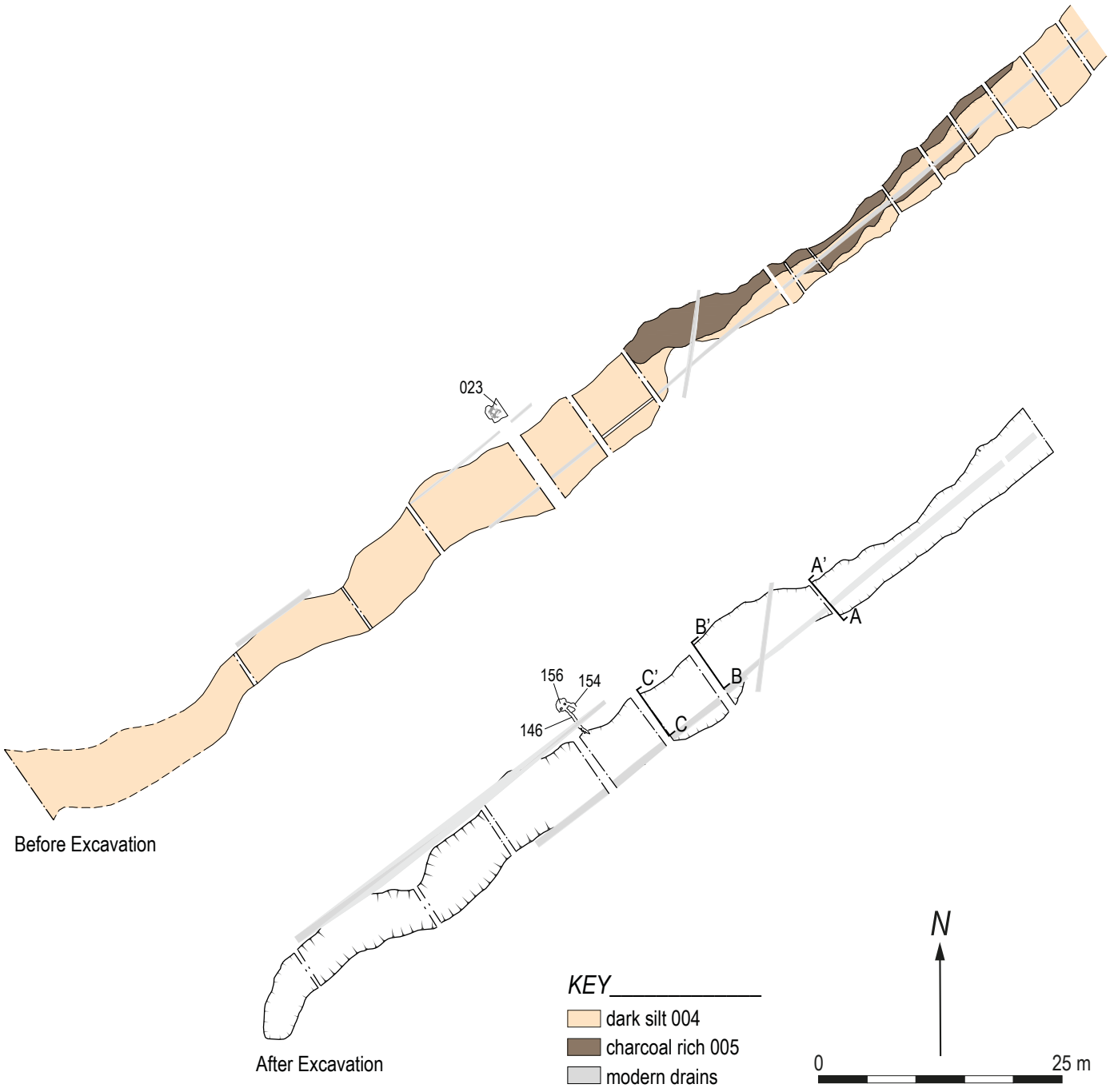

Figure 3: Area 1 the palaeochannel.

Figure 4: The palaeochannel identified and partly excavated.

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Above the basal fill of the palaeochannel was a silty clay deposit (004) containing some artefacts and limited charcoal (Figure 5 A-A'). Extending parallel and beneath this deposit for short stretches, were two similar deposits (008 and 009) of clay, silts and loam. The former produced limited charcoal and artefacts and the latter produced very little charcoal and no artefacts.

Beyond the basal fill (005) upslope, the stratification of the palaeochannel changed, into thin layers of clay (128), clay sand (129), darker clay sand (130), a gravel pocket (135), silty sand (131), clay sand (132), silty sand (133) and silt (134), all with small amounts of charcoal (Figure 5 B-B')

Above part of layer 130 was a thin band of silty sand containing gravel (135) and above both (130 and 135) lay a further four deposits. They consisted of friable light grey clay sand (131), reddish grey clay sand (132), reddish brown sandy silt (133) and a dark brown silt deposit (134), all containing small amounts of charcoal. These layers filled the palaeochannel to the level of the base of the topsoil.

A sequence of samples was taken from (005), the basal layer in the palaeochannel, for radiocarbon dating and also from the basal deposit (129) further up slope. This produced a number of dates (see Table 1) covering a range from 2205 – 2038 cal BC to 1638 – 1517 cal BC indicating a prolonged period of deposition and infill (Figures 6 and 7). A number of samples were also selected for pollen, micromorphological and palaeoentomological analyses (see below).

Artefacts and samples from the basal deposit (005) varied, both in type and in relative dating. Small fragments of burnt animal bone were retrieved, as well as almost 200 lithic artefacts (pitchstone, chert and flint) and two stone artefacts - a jet bead and an ochre cube. Approximately half of the total lithic artefacts from the excavation were found in the palaeochannel. The majority of sherds of pottery (c. 300 fragments) were also recovered from this feature. The pottery vessels identified included those from the late Neolithic to the early and middle Bronze Age. The specialists' sections (below) provide details on the artefacts.

The upper deposit (004) in the channel produced only a trace of alder charcoal with no other botanical remains present. Compared to the basal deposit, layer 004 produced a limited number of lithic artefacts and only a single sherd of pottery.

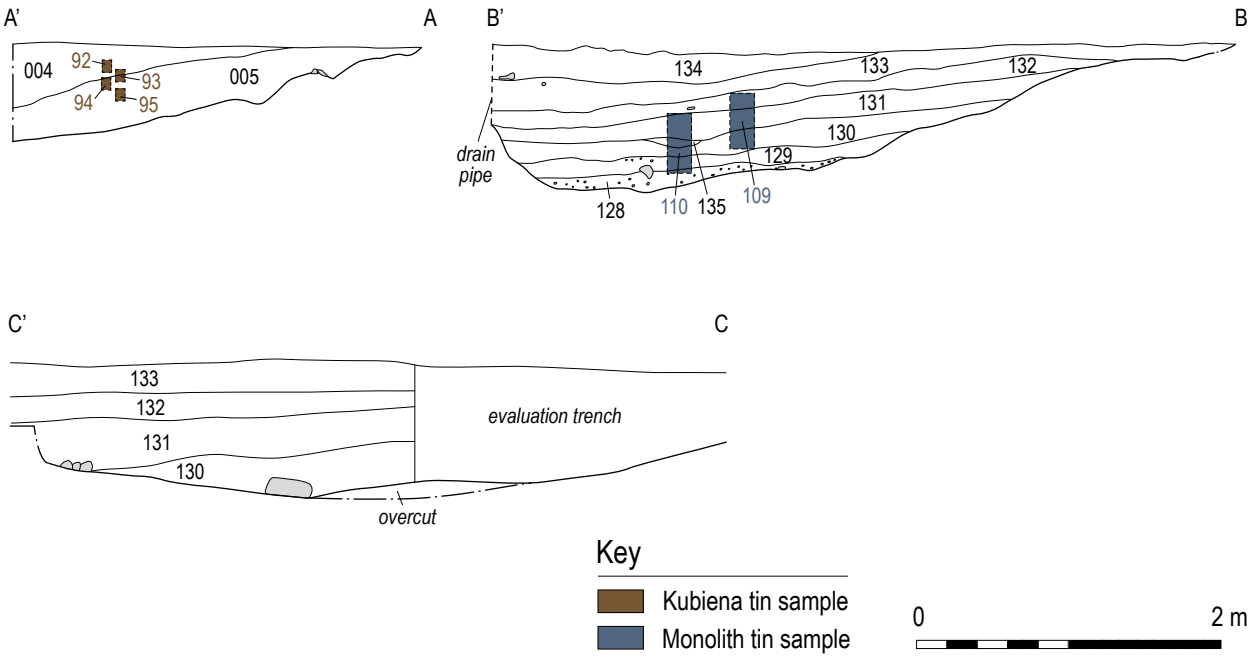

Figure 5: Sections through and across the palaeochannel (see Figure 3) with locations of kubiena and monolith samples.

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Figure 6: The palaeochannel after excavation.

Figure 7: Cross-section through Baulk A of the palaeochannel showing layers 004 (upper) and 005 (lower).

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The stone-lined feature

A pit (156) was dug into the sandy clay sub-soil beside the north-western edge of the palaeochannel (Figure 3) and a sub-rectangular stone-lined feature (150) was constructed within it (Figures 8 and 9). Two layers of horizontally laid sandstone slabs formed its base and three of its sides were made by five vertically positioned side slabs (019) of sandstone resting against the pit walls. The north-east side of the pit had lost its vertical stones but their outlines were noticed in the visibly heat-affected natural deposits of sand and clay that formed the pit sides, along with a shallow depression (153). Deposit (152) in the base of the pit contained alder, hazel and willow charcoal dating to 1607 – 1438 cal BC the early to middle Bronze Age (SUERC 77107, 3235 ± 24 BP, see Table 1).

Figure 8: The stone-lined feature cleaned before excavation.

Figure 9: The stone-lined feature with its base slabs exposed.

Two shallow features identified as channels (146 and 154) during the excavation seem to exit or enter NW/SE from the south-east corner of the side slabs (019) (Figure 10). The north-west extent of the longest channel (146), contained mixed deposits of clay silt (148), large amounts of alder charcoal with some hazel charcoal, and a fragment of hazel nutshell. The remainder of the channel was filled with mixed clay silt (147) that produced much smaller amounts of alder, hazel and willow charcoal but no material cultural evidence. A sample of charcoal from it produced a date range of 1608 – 1444 cal BC, the early to middle Bronze Age (SUERC 77106, 3240 ± 24 BP). Subsequent to the excavation these channels have been identified as probable animal burrows.

The radiocarbon dates from the stone-lined feature, its position relative to the palaeochannel suggest an intimate relationship between the two. With the proximity of burial cists in the wider area, the initial investigation of this feature was conducted with the view that it may have been one. On excavation, however, this interpretation was proven incorrect. Another suggestion, of it being a potential grain drying kiln (Atkinson 2017), was also dismissed as no cereals were present in the carbonised remains from it (see Ramsay, below). A small fragment of pottery was recovered from the feature (150), but it was a small undiagnostic sherd and did not contribute to the understanding of its function or provide a relative date.

Area 2: Prehistoric structure

The topsoil stripping and subsequent excavation of the central area towards the north-western part of the site boundary (see Figure 1 and 2), revealed a number of features indicating past occupation. The most prominent was a low horseshoe-shaped deposit (010), dug into, or accumulated against, the slope of the terrain and formed an outline of a possible temporary structure. It measured 3.6 m by 3.2 m in plan and had a depth of between 40 mm and 110 mm, with an entrance to the NNE (Figure 11).

It comprised dark grey/brown silty sand (010) with some stones, including burnt sandstone, frequent charcoal and some archaeological artefacts. The charcoal included alder, hazel and

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oak with a couple of fragments of hazel nutshell, and is considered consistent with deposits of domestic hearth and other waste materials (see Ramsay, below). Stakeholes and postholes were identified within its central space suggesting it was perhaps a temporary dwelling. A sample of alder charcoal from (010) deposit provided a radiocarbon date of 3499 – 3348 cal BC (SUERC 77088, 4608 ± 24 BP) of the middle Neolithic.

Towards the east end of the shallow deposit (010) and beneath it was a hearth deposit (032) with the remains of a fire-pit (031) to its immediate east and four postholes (034, 035, 036 and 037) to the north. The hearth deposit (032/025) loosely formed a figure-of-eight feature that measured c. 0.70 m by c. 0.40 m by 60 mm in depth. It comprised mixed sandy silt, charcoal and some small stones that had been affected by heat. A number of finds were recovered including SF 239, a small fragment of pitchstone. A sample of the charcoal from it produced an early Neolithic radiocarbon date of 3944 – 3715 cal BC (SUERC 77096, 5029 ± 24 BP).

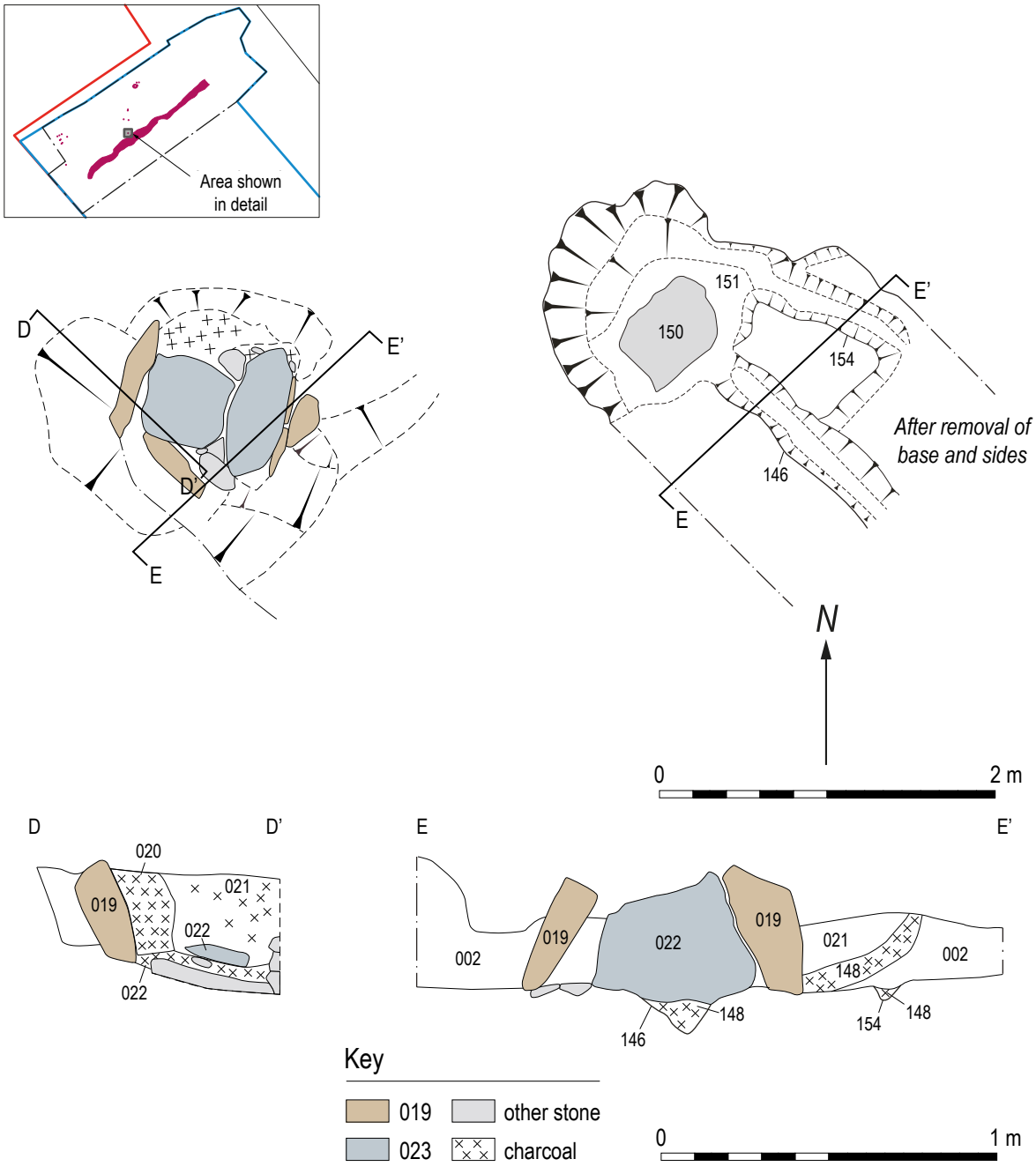

Figure 10: Plans and sections of the stone-lined feature.

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The remains of an almost circular fire-pit (031/030) lay to the immediate east of the hearth deposit, which measured 0.41 m by 0.38 m but was only 50 mm deep. It contained silty sand, some stone and a high concentration of charcoal (030), some of which was identified as alder type (see Ramsay, below). A sample of the latter produced a similar radiocarbon date, also of the early Neolithic, of 3911 – 3705 cal BC (SUERC 77094, 4994 ± 23 BP).

The truncated postholes to the immediate north-west of the fire-pit and hearth deposit showed a degree of uniformity. The most westerly (034/026) was c. 0.16 m in diameter but only 90 mm in depth. It also contained silty sand, small stones and charcoal (026). It was from slightly later in the earlier Neolithic than the fire-pit and hearth deposit as it produced a radiocarbon date of 3767 – 3662 cal BC (SUERC 77095, 4959 ± 25 BP). Two of the other postholes (036/028, and 035/027) were shallower, and the remaining posthole (037/029) was slightly more elongated, but all were of similar size to the first and had similar fills. No artefacts were found within them.

To the north of the structure were a group of 31 stakeholes, 20 mm-70 mm in diameter and 30 mm-125 mm in depth, with others to the north-west and north-east, covering an area 3.8 m by 2.9 m that were thought to be the remains of windbreaks during occupation of the structure.

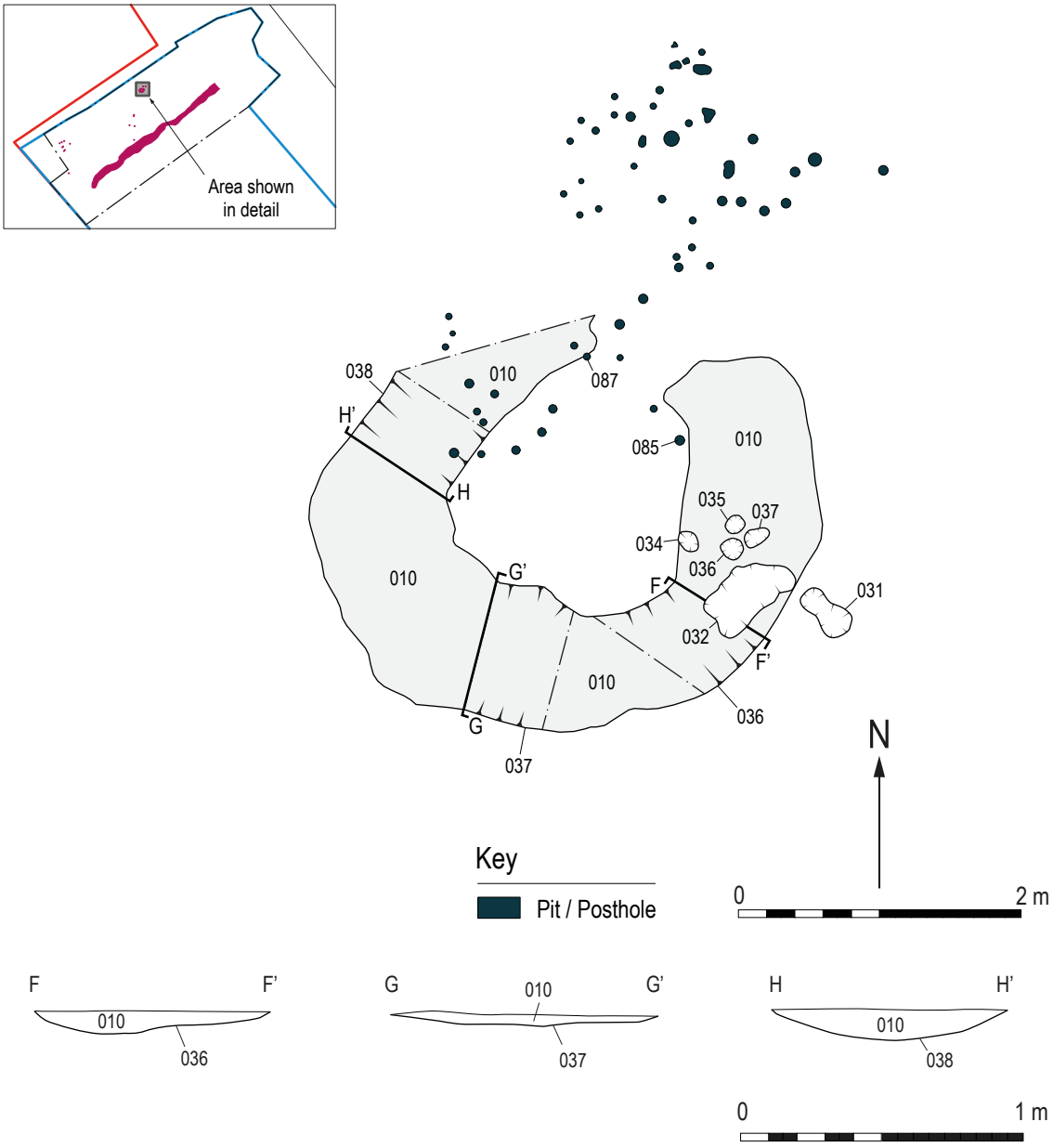

Figure 11: Area 2 structure and features.

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Only alder charcoal was found in some of their fills such as (087), and small amounts of hazel and oak charcoal in (085). The fill of the latter stakehole was radiocarbon dated to 1613 – 1460 cal BC (SUERC 77099, 3257 ± 23 BP) indicating the site was also used during the early to middle Bronze Age. The subsequent occupation layer (016) that covered the horseshoe-shaped deposit and the majority of the stakeholes was recorded as measuring 15 m by 8 m in extent, and was probably also of Bronze Age date. A leaf-shaped arrowhead (CAT 41) was recovered from it.

From the features of the structure 192 lithic artefacts and 71 pottery sherds were recovered, respectively c. 45% and c.18% of the total assemblages excavated from the development area. Correspondingly, the overlying occupation layer (016) contained 167 lithic artefacts (c. 39 %) and 41 sherds of pottery (c. 10%).

Area 3: South-west pit and posthole group

The southern extent of the development area revealed six pits, four postholes and the shallow remains of an occupation layer in the south-west during topsoil stripping. These features were located in a c. 10 by 10 m area west of the palaeochannel. They varied in size and depth and contained varying amounts of charcoal and artefacts.

The occupation layer or deposit (095) lay c. 1 m north of the largest of these features, a circular steep-sided pit (045/044), 1.2 m in diameter and 0.7 m in depth that contained sand and gravel and some charcoal (Figure 12). Approximately 3.5 m to the north-west was the slightly smaller pit 058/057 whose similar fill contained rounded stones, charcoal and animal bone. To the west and south-west were four smaller postholes (060/059, 047/046, 049/048 and 062/061), which were no more than 3 m distant from one another. Silty-sand and charcoal was found in all of them.

To the immediate south of the postholes was pit 051/050 that contained charcoal-rich silty-sand. It was 0.9 m long, 0.8 m wide and had a depth of 0.33 m. Abutting to the east of it was a shallow but larger curvilinear pit (141/142) that measured 2.1 m by 0.9 m by 0.21 m and contained silty-sand with charcoal. During the excavation these features were interpreted as a cooking pit (051) and its rake-out pit (141).

Approximately 22 m to the south of the above pits was another (144/136), measuring 1.58 m in length, 1.22 m in width that had a depth of 0.35 m. It containing silty-sand, charcoal and burnt bone.

Samples from two of the postholes (046 and 048) were radiocarbon dated. The former provided a date range of 1499 – 1407 cal BC (SUERC 77097, 3165 ± 24 BP) from hazel charcoal from the middle Bronze Age and was the latest date from the site (see Table 1). The date from (048), again using hazel charcoal was from the early to middle Bronze Age of 1611 – 1452 cal BC (SUERC 77098, 3249 ± 24 BP). A sample from alder wood from the rake out pit (141) situated beside the cooking pit (051) also produced a radiocarbon date. This was 1640 – 1516 cal BC (SUERC 77100, 3307 ± 23 BP). This early Bronze Age date in comparison with those from the other features in the vicinity suggests the area was visited on a number of occasions and it is possible that none of the pits and postholes were contemporary.

The material culture recovered from these features, included nine lithic artefacts of chips and flakes of chert, flint and agate. Two microblades came from the fill of pit (045/044). Very small amounts of pottery sherds and crumbs were also present but the best-preserved pottery was two sherds from the occupation deposit (095), which may have been part of Vessel 17 recovered from the palaeochannel (see Ballin Smith, below).

Area 4: Central pit and posthole grouping

Topsoil stripping of this area revealed the presence of two pits and three postholes extending across the central area of the site (Figure 13). The three postholes in this area formed a short linear alignment with the largest (055) to the south of the other two, which were partially conjoined at the surface. Posthole (055) measured 0.5 m by 0.4 m and was 0.3 m deep and contained silty sand with traces of charcoal (038). The remaining two postholes (054 and 053) were slightly smaller but similarly contained silty-sand and charcoal.

The two pits in this area lay 6.35 m to the south-east of the postholes, with the larger (139/140) containing silty sand and the much smaller (137/138) which was also was filled with silty-sand. Both of these features were very rich

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in carbonised remains. Pit (139) contained significant amounts of charcoal, with oak and alder being equally represented, while pit (137) only had small amounts of friable hazel and alder charcoal, and both could indicate the remains of hearth waste (see Ramsay, below). None of the pits was radiocarbon dated and only two lithic artefacts and pottery fragments were recovered from them. Their relationship with the other excavated areas of the site is not known, but it is likely they are prehistoric and indicate the widespread use of the area in prehistory.

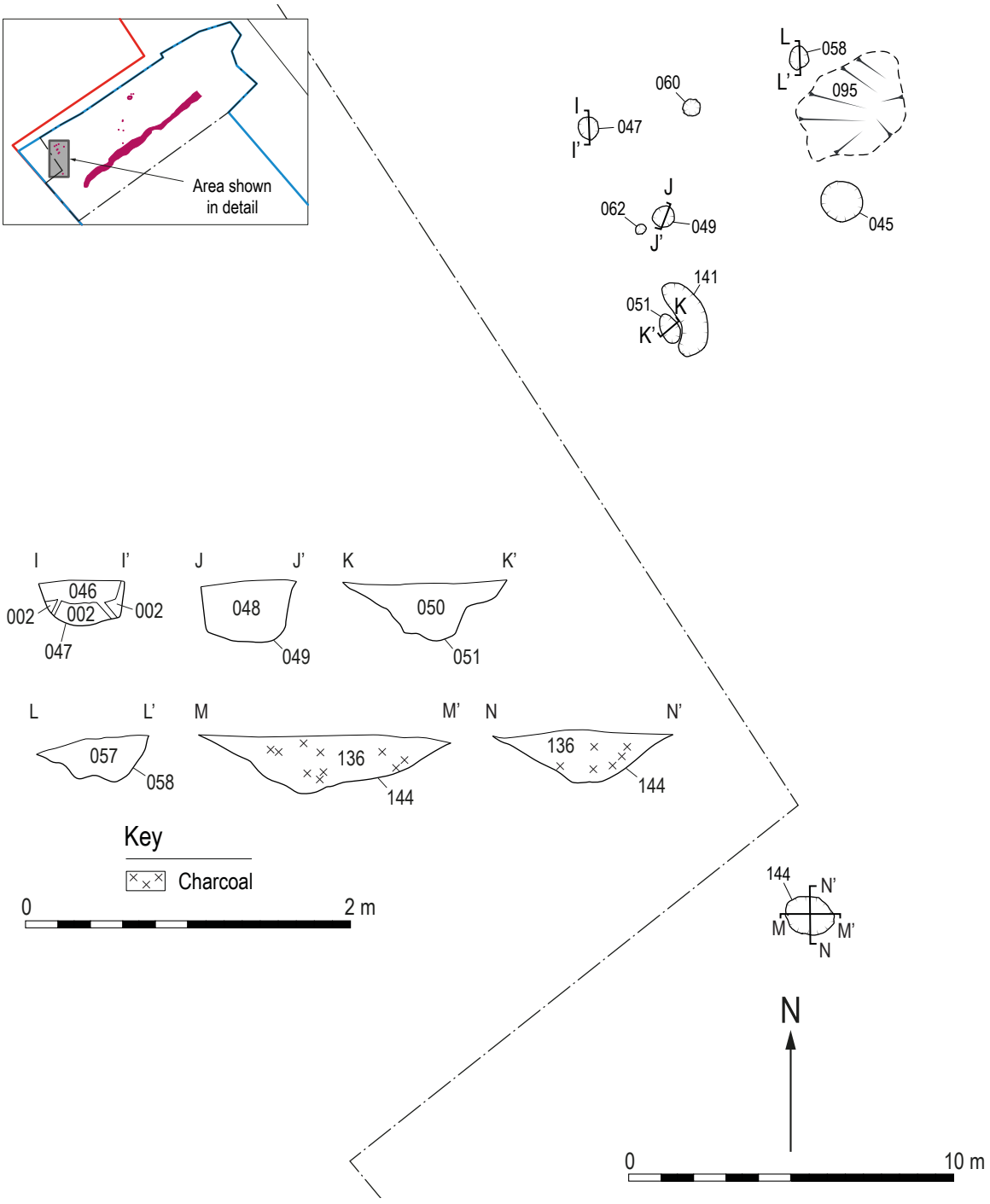

Figure 12: Area 3 features.

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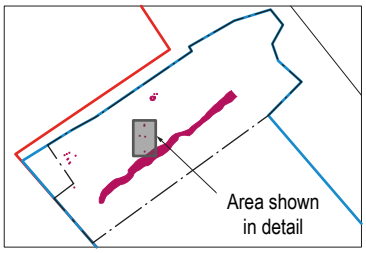

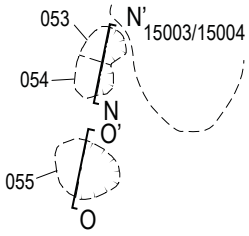

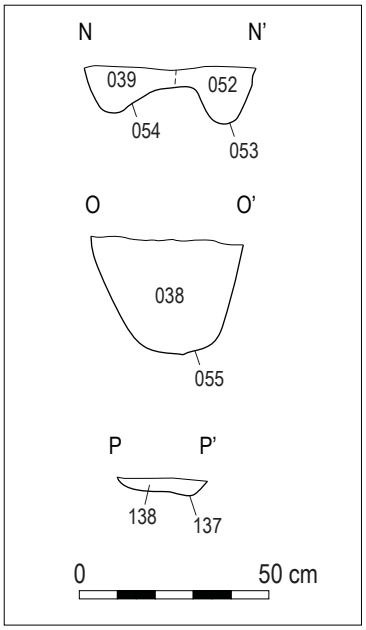

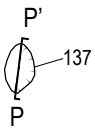

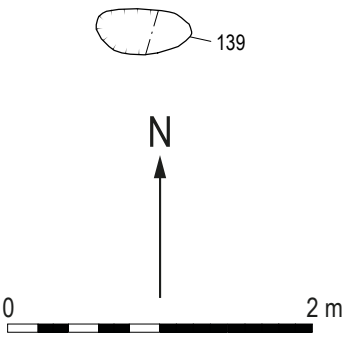

Figure 13: Area 4 features.

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Specialist Reports

Radiocarbon dates

A total of 20 radiocarbon dates were produced (see Table 1 for details) from the charcoal identified in the archaeobotanical report (below). Samples and dates were procured from Areas 1 to 3 but not from the sparse features in Area 4.

Six radiocarbon dates were produced from Area 2 giving an interesting timeframe for the use of the area. The grouping of a fire-pit, hearth deposits and postholes were clearly early Neolithic, and the deposit forming the outline of a temporary structure in the same area was later and it accumulated in the middle Neolithic. A later stakehole produced a radiocarbon date spanning the end of the early Bronze Age and the beginning of the middle Bronze Age, suggesting that this area was visited or occupied on several occasions over a long period of time.

Three radiocarbon dates from Area 3 suggested use of the area between the early Bronze Age and into the Middle Bronze Age.

The most interesting area from the aspect of dating was the palaeochannel for which six radiocarbon dates were recorded. These showed that most of the silting in it from the lowest deposits upwards took place during the early Bronze Age, with a single sample suggesting the silting carried on into the early part of the middle Bronze Age. The five dates from the stone-lined pit on the western edge of the channel indicated it was a later feature, possibly constructed as the upper parts of the palaeochannel were silting up. Deposits with one of its channels suggested it was open into the first half of the middle Bronze Age.

Environmental remains

Archaeobotanical report

By Susan Ramsay

Summary

The archaeological features recorded during the excavations produced mixed charcoal assemblages that were generally dominated by alder charcoal. This charcoal is thought to be the remains of hearth waste, rather than structural remains destroyed by fire. The charcoal in the basal fills of the palaeochannel is thought to originate from these same features. A stone-lined feature, initially identified as a possible grain drying kiln located next to the palaeochannel shows no evidence for the presence of cereal grains. It is not clear what this stone-lined pit may have been used for but it shows some similarities to pits that are associated with burnt mounds, although there is no obvious concentration of heat-affected stones in the vicinity. Pollen analysis of sediments from the palaeochannel indicates that the local area was wooded with alder being the main tree type present. There is little definitive indication of human activity recorded in the pollen diagram.

Methodology

Bulk Sample Processing

In total, 40 bulk samples taken during the excavation were analysed for the presence of botanical remains. The bulk samples were processed by flotation, using standard methods and sieves of mesh diameter 1 mm and 500 µm for flots and 2 mm and 4 mm for retents from flotation.

Macrofossil Analysis

Dried flots and sorted retents were examined using a binocular microscope at variable magnifications of x4 - x45. For each sample, estimation of the total volume of carbonised material >2 mm and >4 mm was made. For each sample, all the charcoal >4 mm was identified unless this proved to be too large an amount, in which case a known percentage of the total charcoal >4 mm was identified. All carbonised seeds were also identified and any other plant macrofossil remains were noted.

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Lab Code	Lab Code	Sample Nr	Context	Delta13C	Sample description (all charcoal)	Radiocarbon Age BP	Dates at 1 sigma (68.2% probability	Dates at 2 sigma (95.4% probability)
SUERC 77080	GU46262	50	005 lower deposit in palaeochannel, Area 1	-25.4 ‰	Alnus cf glutinosa	3631 ± 24	2026 – 1958 cal BC	2120 – 1920 cal BC
SUERC 77084	GU46263	98	005 lower deposit in palaeochannel, Area 1	-28.2 ‰	Alnus cf glutinosa	3394 ± 24	1738 – 1714 cal BC 1697 – 1660 cal BC	1745 – 1630 cal BC
SUERC 77085	GU46264	99	005 lower deposit in palaeochannel, Area 1	-26.9 ‰	Alnus cf glutinosa	3306 ± 23	1619 – 1600 cal BC 1586 – 1534 cal BC	1638 – 1517 cal BC
SUERC 77086	GU46265	100	005 lower deposit in palaeochannel, Area 1	-27.7 ‰	Alnus cf glutinosa	3735 ± 23	2198 – 2164 cal BC 2152 – 2132 cal BC 2085 – 2057 cal BC	2205 – 2038 cal BC
SUERC 77087	GU46266	183	005 lower deposit in palaeochannel, Area 1	-27.2 ‰	Alnus cf glutinosa	3378 ± 24	1692 – 1636 cal BC	1741 – 1621 cal BC
SUERC 77088	GU46267	37	010 structural deposits, Area 2	-26.6 ‰	Alnus cf glutinosa	4608 ± 24	3490 – 3471 cal BC 3373 – 3358 cal BC	3499 – 3348 cal BC
SUERC 77089	GU46268	39	021 fill within stone-lined pit, Area 1	-27.4 ‰	Alnus cf glutinosa	3226 ± 24	1518 – 1491 cal BC 1484 – 1451 cal BC	1600 – 1432 cal BC
SUERC 77090	GU46269	49	022 charcoal fill within stone-lined pit, Area 1	-26.7 ‰	Alnus cf glutinosa	3255 ± 24	1606 – 1583 cal BC 1558 – 1554 cal BC 1546 – 1498 cal BC	1612 – 1459 cal BC
SUERC 77094	GU46270	54	025 hearth layers, Area 2	-24.3 ‰	Alnus cf glutinosa	4994 ± 23	3792 – 3759 cal BC 3744 – 3714 cal BC	3911 – 3705 cal BC
SUERC 77095	GU46271	55	026 fill of posthole near hearth 025, Area 2	-26.5 ‰	Alnus cf glutinosa	4959 ± 25	3767 – 3704 cal BC	3767 – 3662 cal BC
SUERC 77096	GU46273	59	030 fill of shallow fire-pit, Area 2	-26.7 ‰	Alnus cf glutinosa	5029 ± 24	3932 – 3876 cal BC 3806 – 3781 cal BC	3944 – 3715 cal BC
SUERC 77097	GU46274	66	046 fill of shallow fire-pit or posthole, Area 3	-25.3 ‰	Corylus cf avellana	3165 ± 24	1492 – 1483 cal BC 1453 – 1416 cal BC	1499 – 1407 cal BC
SUERC 77098	GU46275	67	048 fill of posthole, Area 3	-24.3 ‰	Corylus cf avellana	3249 ± 24	1602 – 1585 cal BC 1543 – 1497 cal BC 1474 – 1462 cal BC	1611 – 1452 cal BC
SUERC 77099	GU46276	171	085 fill of stakehole, Area 2	-26.5 ‰	Corylus cf avellana	3257 ± 23	1605 – 1584 cal BC 1545 – 1500 cal BC	1613 – 1460 cal BC
SUERC 77100	GU46277	141	129 natural deposit in palaeochannel, Area 1	-27.5 ‰	Alnus cf glutinosa	3307 ± 23	1620 – 1600 cal BC 1586 – 1534 cal BC	1640 – 1516 cal BC
SUERC 77104	GU46278	129	142 fill of pit 141, Area 3	-24.1 ‰	Salix sp.	3510 ± 24	1886 – 1869 cal BC 1846 – 1775 cal BC	1904 – 1752 cal BC
SUERC 77105	GU46279	126	147 fill within channel 146, Area 1	-26.3 ‰	Corylus cf avellana	3218 ± 23	1506 – 1450 cal BC	1529 – 1433 cal BC
SUERC 77106	GU46280	127	148 charcoal-rich fill in channel 146, Area 1	-27.3 ‰	Alnus cf glutinosa	3240 ± 24	1594 – 1589 cal BC 1531 – 1494 cal BC 1479 – 1456 cal BC	1608 – 1444 cal BC
SUERC 77107	GU46281	132	152 clay fill beneath 150 and 151 in stone-lined pit, Area 1	-27.3 ‰	Alnus cf glutinosa	3235 ± 24	1529 – 1493 cal BC 1480 – 1455 cal BC	1607 – 1438 cal BC
SUERC 77187	GU46272	57	028 fill of posthole near hearth 025, Area 2	-24.2 ‰	Alnus cf glutinosa	5037 ± 29	3938 – 3861 cal BC 3812 – 3785 cal BC	3950 – 3715 cal BC

Table 1: The radiocarbon dates.

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The testa characteristics of small seeds and the internal anatomical features of all charcoal fragments were further identified at x200 magnification using the reflected light of a metallurgical microscope. Reference was made to Schweingruber (1990) and Cappers *et al.* (2006) to aid identifications. Vascular plant nomenclature follows Stace (1997) except for cereals, which conform to the genetic classification of Zohary and Hopf (2000).

Pollen analysis

Two 25 cm monolith tins were used to sample a section of baulk 'B' as part of the palaeochannel investigation. The upper monolith, sample 109, covered contexts (132, 131 and 130). The lower monolith, sample 110, covered contexts (131, 135, 130, 129 and 128). The monoliths were not located directly above or adjacent to one another and so it has not been possible to present the results as a single pollen sequence.

Each monolith was sub-sampled at 5 cm intervals between 3 - 23 cm total depth, with samples of 1 cm thickness removed for pollen and stratigraphic analysis. A portion of each sample was examined under low magnification to determine the main constituents of the sediment at each level. Pollen samples were prepared using the standard methodologies outlined in Moore, Webb and Collinson (1991).

Pollen identification and nomenclature follows Moore *et al.* (1991) and Punt (1976), whilst vascular plant nomenclature follows Stace (1997). A minimum of 500 land pollen grains were counted for each level. A pollen sum of Total Land Pollen (TLP) was used, which excluded all spores and unidentifiable grains. Percentage values for groups of taxa not included within the TLP sum were calculated as TLP + group.

AMS radiocarbon dating was undertaken on single charcoal fragments from bulk samples taken from alongside the monolith tins. Therefore the AMS dates do not directly equate to the pollen levels from the monolith tins.

Carbonised botanical results

Area 1: Palaeochannel and stone-lined feature

(Tables 2a and 2b)

The palaeochannel was visible on the surface of the topsoil stripped ground on the eastern side of the site. The richest deposit was the basal fill (005) that was noted along a 40 m section of the north and central part of the palaeochannel that produced significant amounts of charcoal and prehistoric artefacts. The charcoal assemblage was overwhelmingly dominated by alder charcoal, with smaller amounts of oak and willow also present, together with a few fragments of carbonised hazel nutshell. Above (005) was yellow/brown silty-clay (004) but this deposit produced only a trace of alder charcoal and no other botanical remains.

Further to the south-west, the basal fill of the channel became light grey sandy clay (128) but this did not produce any carbonised remains. At this point in the palaeochannel there was a sequence of eight fills overlying each other (contexts 128 to 135). However, these fills produced only low concentrations of charcoal, although alder, hazel, willow, oak and elm types were all recorded.

Immediately to the north-west of this in the middle section of the palaeochannel was a stone-lined feature (156), which had a shallow concave depression in the bottom of it that contained a brown/grey silty- clay deposit (153) that was overlain by another similar layer (152), which produced alder and traces of birch charcoal. Above 152 was a layer of flat stones (150), then sandy silt (149), followed by a further stone layer (023) that showed signs of burning. Above (023) were several charcoal rich layers. The first layer (022) contained large amounts of alder charcoal with smaller quantities of hazel also present. Atkinson (2017) suggested that carbonised grain was visible in this layer but no cereals were recorded during the analysis. Above (022) was a layer of orange silty-sand (021), again containing large amounts of alder charcoal but with traces of birch, hazel and oak also present.

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	Context	004	004/005	005	128	129	130	131	132	133	134	135
	Sample	096	097	050, 98, 99, 100, 183	142	141	140	138, 157	137	136	135	139
	Description	Upper fill of palaeo-channel (155)	Upper/ Lower fill of palaeo-channel (155)	Basal fill of palaeo-channel (155)	Natural deposit within palaeo-channel.	Natural deposit within palaeo-channel	Natural deposit within palaeo-channel	Natural deposit within palaeo-channel	Natural deposit within palaeo-channel	Natural deposit within palaeo-channel	Natural deposit within palaeo-channel	Natural deposit within palaeo-channel
Volume of charcoal 2-4 mm		-	<<2.5ml	180ml	-	<<2.5ml	<<2.5ml	<2.5ml	<2.5ml	<2.5ml	<<2.5ml	-
Volume of charcoal >4 mm		<<2.5ml	<<2.5ml	130ml	-	<2.5ml	<<2.5ml	<<2.5ml	<2.5ml	<2.5ml	<<2.5ml	-
% charcoal >4 mm ID		100%	100%	70%	-	100%	100%	100%	100%	100%	100%	-
Charcoal												
Alnus cf glutinosa	alder	1 (0.07g)	1 (0.02g)	278 (22.84g)	-	1 (0.02g)	2 (0.03g)	2 (0.04g)	-	-	-	-
Corylus cf avellana	hazel	-	-	-	-	-	-	-	-	-	1 (0.02g)	-
Quercus spp	oak	-	-	12 (1.10g)	-	-	-	-	18 (0.48g)	6 (0.15g)	3 (0.07g)	-
Salix spp	willow	-	-	2 (0.10g)	-	-	-	-	7 (0.18g)	-	-	-
Ulmus spp	elm	-	-	-	-	-	-	-	-	1 (0.08g)	-	-
Indet charcoal	indet charcoal	-	-	15 (1.08g)	-	3 (0.15g)	-	1 (0.01g)	-	-	-	-
Carbonised seeds etc					-							
Corylus avellana nutshell	hazel nutshell	-	-	12 (0.21g)	-	-	-	-	-	-	-	-

Table 2a: Botanical remains from Area 1 the palaeochannel.

	Context	021	022	147	148	152
	Sample	039, 045	043, 049	126	127	132
	Description	Fill of possible kiln (019)	Fill of possible kiln (019)	Fill in possible flue (146)	Fill in possible flue (146)	Fill of pit (156)
Volume of charcoal 2-4 mm		60ml	170ml	5ml	75ml	<2.5ml
Volume of charcoal >4 mm		35ml	420ml	10ml	140ml	5ml
% charcoal >4 mm ID		100%	30%	100%	25%	100%
Charcoal						
Alnus cf glutinosa	alder	143 (5.78g)	177 (21.69g)	21 (0.97g)	57 (8.76g)	20 (0.57g)
Betula spp	birch	2 (0.04g)	-	-	-	1 (0.06g)
Corylus cf avellana	hazel	4 (0.13g)	20 (1.72g)	8 (0.92g)	3 (0.24g)	-
Quercus spp	oak	3 (0.10g)	-	-	-	-
Salix spp	willow	-	-	1 (0.05g)	-	-
Carbonised seeds etc						
Corylus avellana nutshell	hazel nutshell	-	-	-	1 (<0.01g)	-

Table 2b: Botanical remains from Area 1 - the stone-lined feature.

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Two shallow channels (146 and 154) ran NW/SE from the south-east of the vertical slabs (019) lining feature (156). The longest channel (146) contained brown clay silt (148) at its north-west extent that produced large amounts of alder charcoal with smaller amounts of hazel charcoal and a single fragment of hazel nutshell. The remainder of the channel was filled with dark grey/brown clay silt (147) that produced much smaller amounts of charcoal, although alder, hazel and willow types were all present. Again no grain was recorded in (148) during the analysis. The excavator suggested that the most likely use for the feature (156) was as a grain-drying kiln but this interpretation is not supported by the archaeobotanical results.

Several samples of predominantly alder charcoal were used for radiocarbon dating from the basal fill (005) of the palaeochannel (see Table 1). The earliest date range was 2205 – 2038 cal BC (SUERC 77086, 3735 ± 23 BP) suggesting that some material accumulated in the early Bronze Age. The latest date from (005) indicated that that the channel was open until the end of the early Bronze Age and into the middle Bronze Age with a date range of 1638 – 1517 cal BC (SUERC 77085, 3306 ± 23 cal BC). Context (129), one of the lowest fills in the south-western part of the palaeochannel (Figure 7), produced a similar late date range to the latter of 1640 – 1516 cal BC (SUERC 77100, 3307 ± 23 BP), again of the early to middle Bronze Age.

Hazel charcoal from the fill (148) of channel (146) related to the stone-lined feature (156), and alder charcoal from the clay (152) in the base of it and from its upper layer (021) were all dated by radiocarbon dating to the latter part of the early Bronze Age and the earlier part of the middle Bronze Age (see Table 1). These three samples (SUERC 77106, 3240 ± 24 BP; SUERC 77107, 3235 ± 24 BP; SUERC 77089, 3226 ± 24 BP) produced similar date ranges (respectively 1608 – 1444 cal BC; 1607 – 1438 cal BC; 1600 – 1432 cal BC). However, another hazel sample from channel (146) produced a more definite middle Bronze Age date of 1529 – 1433 cal BC (SUERC 77105, 3218 ± 23 BP).

Area 2: Possible structure and occupation layer (Table 3)

This area had evidence for a hearth deposit (032) with a shallow fire-pit (031) immediately to the east and a group of four postholes (034, 035, 036 and 037) to the north-west. The hearth deposit (032) contained a fill (025) of charcoal and some heat affected stones, but the only type of charcoal present was alder type. The group of four postholes may have formed a structure associated with the hearth. Two posthole fills (026 and 028) were examined for the presence of carbonised remains. Small quantities of alder, hazel and oak charcoal were recorded but this charcoal is probably from hearth scatter rather than evidence for posts burnt *in situ*. The shallow fire-pit (031) contained a silty sand deposit (030) with charcoal all identifiable as alder.

The above features were all within the remains of a horseshoe-shaped deposit (010) that lay beneath an occupation layer (016). The deposit (010) was formed from silty sand, and included stones (some burnt), charcoal and prehistoric artefacts. The charcoal assemblage contained alder, hazel and oak charcoal with a couple of fragments of hazel nutshell indicating domestic hearth waste.

To the north of (010), but still beneath occupation layer (016), the group of stakeholes were filled with dark sandy-silt with small stones and charcoal. The fills of stakeholes (080, 083, 085, 088 and 090) were analysed but only traces of alder were found in (083) and small amounts of hazel and oak charcoal in (085). Again, this carbonised material is probably from hearth waste rather than evidence for the stakes themselves.

The fills of postholes (034 and 036), the fire-pit and the hearth deposit returned radiocarbon date ranges from 3940 to 3662 cal BC, the early Neolithic (Table 1) but the possible structure (010) provided a later date of the middle Neolithic - 3499 – 3348 cal BC (SUERC 77088, 4608 ± 24 BP). The fill of a stakehole (085) returned a date range of 1613 – 1460 cal BC (SUERC 77099, 3257 ± 23 BP) implying activity during the latter part of the early Bronze Age and the middle Bronze Age in this area.

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	Context	010	025	026	028	030	080	083	085	088	090
	Sample	037	054	055	057	059	091	169	171	174	176
	Description	Shallow crescent feature in occupational layer (016)	Possible hearth at the north-east extent of (010)	Possible posthole related to hearth (032)	Possible posthole related to hearth (032)	Shallow fire pit base	Possible stakehole	Possible stakehole	Possible stakehole	Possible stakehole	Possible stakehole
Volume of charcoal 2-4 mm		<2.5ml	5ml	<<2.5ml	2.5ml	10ml	<2.5ml	<<2.5ml	<<2.5ml	<<2.5ml	-
Volume of charcoal >4 mm		10ml	10ml	<<2.5ml	2.5ml	10ml	-	<<2.5ml	2.5ml	-	-
% charcoal >4 mm ID		100%	100%	100%	100%	100%	-	100%	100%	-	-
Charcoal											
Alnus cf glutinosa	alder	17 (1.09g)	22 (1.36g)	2 (0.12g)	7 (0.81g)	36 (2.63g)	-	1 (0.02g)	-	-	-
Corylus cf avellana	hazel	2 (0.04g)	-	-	1 (0.12g)	-	-	-	2 (0.21g)	-	-
Quercus spp	oak	3 (0.11g)	-	-	1 (0.05g)	-	-	-	2 (0.09g)	-	-
Indet cinder	indet cinder	10 (1.16g)	-	-	-	-	-	-	-	-	-
Carbonised seeds etc											
Corylus avellana nutshell	hazel nutshell	2 (0.02g)	-	-	-	-	-	-	-	-	-

Table 3: Botanical remains from Area 2 - structure and occupation layer.

Area 3: South-west pit and posthole grouping (Table 4)

Features recorded in this area included six pits and three postholes, although not all were examined for the presence of carbonised remains.

Pit (058/057) produced only traces of alder and hazel charcoal, whilst the fill of pit (060/059) contained only a trace of alder charcoal. These carbonised assemblages are probably residual scatter from hearth waste.

Posthole (047/046) produced a significant amount of charcoal. The carbonised assemblage was dominated by alder charcoal, with hazel, birch and oak also present. It is unlikely that this assemblage represents structural remains and is more likely to be the remains of hearth waste deposited once the post had rotted or been removed. Hazel charcoal was dated to 1499 – 1407 cal BC (SUERC 77097, 3165 ± 24 BP), the middle Bronze Age.

The fill of posthole (049/048) produced a significant amount of oak charcoal. However, alder and hazel charcoal were also present along with a fragment of hazel nutshell. Although the abundance of oak might suggest a post burnt *in situ*, the other carbonised remains tend to suggest that this feature contains at least a proportion of hearth waste. Hazel charcoal from this feature was dated to 1611 – 1452 cal BC (SUERC 77098, 3249 ± 24 BP), the latter part of the early Bronze Age and into the middle Bronze Age.

The fill of a shallow curvilinear pit (141/142) may be related to rake out from the abutting possible cooking pit (051). Small amounts of oak and willow charcoal were recorded from its fill. This is an unusual combination for cooking fuel and would tend to suggest the remains of structural elements, perhaps a windbreak.

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	Context	046	048	057	059	142
	Sample	066	067	070	073	129
	Description	Shallow pit/ posthole	Posthole	Fill of pit (058)	Fill of pit (060)	Fill of pit (141)
Volume of charcoal 2-4 mm		40ml	75ml	<<2.5ml	<<2.5ml	2.5ml
Volume of charcoal >4 mm		75ml	25ml	<<2.5ml	<<2.5ml	5ml
% charcoal >4 mm ID		100%	100%	100%	100%	100%
Charcoal						
Alnus cf glutinosa	alder	35 (20.07g)	9 (0.23g)	1 (0.03g)	2 (0.05g)	-
Betula spp	birch	2 (0.22g)	-	-	-	-
Corylus cf avellana	hazel	24 (1.70g)	17 (0.58g)	2 (0.07g)	-	-
Quercus spp	oak	11 (0.58g)	101 (4.80g)	-	-	7 (0.14g)
Salix spp	willow	-	-	-	-	9 (0.52g)
Carbonised seeds etc						
Corylus avellana nutshell	hazel nutshell	-	1 (0.01g)	-	-	-

Table 4: Botanical remains from Area 3 – south-west pit and posthole group.

Area 4: Central pit and posthole grouping (Table 5)

Although this area produced two pits and three postholes, only samples from the pits were analysed for the presence of carbonised remains. Pit (139/140) produced significant amounts of charcoal, with alder and oak being equally represented in the assemblage. To the south-west was a smaller pit (137/138). Although Atkinson (2017) suggested that its fill was very charcoal-rich, only small amounts of identifiable alder and hazel charcoal were recovered, suggesting that the majority of the charcoal must have been very friable.

	Context	138	140
	Sample	123	124
	Description	Charcoal rich fill of pit (137)	Fill of pit (139)
Volume of charcoal 2-4 mm		5ml	75ml
Volume of charcoal >4 mm		5ml	25ml
% charcoal >4 mm ID		100%	100%
Charcoal			
Alnus cf glutinosa	alder	15 (0.47g)	53 (2.52g)
Corylus cf avellana	hazel	1 (0.03g)	-
Quercus spp	oak	-	59 (2.94g)

Table 5: Botanical remains from Area 4 – central pit and posthole grouping.

Pollen results from the palaeochannel (Table 6a and 6b)

No identifiable botanical macrofossils were identified within the pollen sub-samples and all the mineral compositions were slight variations on grey/brown clay sand with only the proportions of sand to clay differing slightly.

The pollen analysis shows that the basal channel deposit (128) is dominated by alder, with over 80% of the total land pollen being alder, with a further 10-15% being hazel pollen and traces of birch, oak, willow and elm also present. Small quantities of open ground taxa are also present, with grass (c. 5%), sedge, meadowsweet, dandelion type, chamomile type, aster type and plantains all identified. These basal deposits have the lowest percentages of indeterminate pollen grains suggesting that this material was less affected by bioturbation than the upper deposits.

The pollen assemblage from context (129) is also dominated by alder but with a slightly lower percentage than in (128), but with hazel being at a similar level as in the lower samples and traces of birch and oak are also present. Grass pollen shows a slight increase suggesting some opening of the woodland canopy in the area. The herbaceous types of dandelion type, plantains, cleavers and devil's bit scabious were all present but in very low concentrations. The percentage of indeterminate pollen has increased to over 50%

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suggesting increased biological activity causing deterioration of the pollen.

Moving up the sequence to context (130), this is covered by four pollen samples: 18 – 19 cm and 23 – 24 cm from monolith sample 109 and 3 - 4 cm and 8 – 9 cm from monolith sample 110. There is a degree of variation in the pollen assemblages from within this context. In general, alder pollen is still high at 65-75%, but with increased amount of hazel (c.10-20%) and traces of birch, oak and willow also present. Small amounts of heather pollen are consistently present in this context indicating that small areas of heathland have developed nearby. Grass pollen has again increased slightly (c. 9-14%) and the diversity of other herbaceous types has also increased indicating a further slight opening of the woodland canopy. Indeterminate pollen grains range from 55 – 75% indicating a high degree of bioturbation and aerobic activity.

Ferniegair <109>	Depth	3 - 4 cm	8 - 9 cm	13 - 14 cm	18 - 19 cm	23 - 24 cm
	Context	-132	-131	-131	-130	-130
Pollen Taxon						
Trees & Shrubs (TLP)	Common name					
Alnus	alder	67.7	58.2	68.1	68	74.9
Betula	birch	0.8	-	0.6	-	0.2
Coryloid	hazel type	14.7	24.2	17.3	12.8	9.1
Quercus	oak	0.4	0.8	0.4	0.8	0.2
Salix	willow	0.2	-	-	0.2	0.2
Ulmus	elm	0.2	-	0.4	-	-
Heaths (Sum = TLP)						
Calluna vulgaris	heather	0.8	2	0.6	0.2	1
Herbs (Sum = TLP)						
Anthemis type	chamomile type	-	-	-	0.2	0.2
Aster type	daisy type	-	0.6	0.2	0.6	0.8
Caryophyllaceae	pink family	1.2	1.2	0.4	0.2	0.2
Cyperaceae	sedges	1	-	0.8	0.4	0.6
Filipendula	meadowsweet	2.5	3	0.2	1	1
Lactuceae	dandelion type	1.6	0.6	1.4	0.6	1
Plantago spp	plantains	0.2	0.2	-	0.4	1.8
Poaceae	grass	8.4	8.2	9.2	13.2	8.7
Potentilla type	cinquefoil type	-	-	-	0.4	-
Ranunculus acris type	buttercup type	-	-	-	-	0.2
Sinapis type	mustard type	0.2	-	-	0.2	-
Succisa	devil's bit scabious	0.2	0.8	0.4	0.8	-
Pteridophytes (Sum = TLP + P)						
Filicales	ferns	0.8	2.3	1.9	0.8	1.7
Polypodium	polypody fern	0.8	0.2	1.3	0.4	0.6
Pteridium	bracken	0.8	0.2	-	-	-
Moss (Sum = TLP + M)						
Sphagnum	bog moss	0.2	1.2	0.2	0.8	0.4
Other (Sum = TLP + O)						
Indeterminate	indeterminate	45.9	74	46.9	65.6	67.9
Total Land Pollen (TLP)		511	501	502	500	511

Table 6a: Pollen analysis from Monolith Sample 110.

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Context (131) is covered by sub-samples 8 - 9 cm and 13 – 14 cm from monolith sample 109. Alder pollen is still high but has declined somewhat to 58-68%, with hazel increasing to 17-24% of the total pollen, with traces of birch, oak and elm also present. Heather is again present at low percentages, with grass at 8-9% and a slight decline in the diversity of herbaceous types present. However, meadowsweet and ferns increase slightly suggesting damp areas, possibly in open areas within the woodland. Indeterminate types range from 45-75%.

The uppermost context examined was (132) and this showed a very similar pollen assemblage to that from (131). Alder pollen is still high at c. 68% with hazel at 15% and traces of birch, oak, willow and elm also present. Grass is relatively stable at 8% and meadowsweet is still present at >2% of the total pollen. Indeterminate pollen is still at c. 45% indicating bioturbation.

Ferniegair <110>	Depth	3 - 4 cm	8 - 9 cm	13 - 14 cm	18 - 19 cm	23 - 24 cm
	Context	-130	-130	-129	-128	-128
Pollen Taxon						
Trees & Shrubs (TLP)	Common name					
Alnus	alder	69.2	66.7	73.4	82.1	80.4
Betula	birch	0.2	0.4	0.2	0.4	0.4
Coryloid	hazel type	13	19.7	14.1	10.4	14.7
Quercus	oak	0.4	0.4	0.8	0.2	1
Salix	willow	-	0.2	-	0.2	-
Ulmus	elm	-	-	-	-	0.2
Heaths (Sum = TLP)						
Calluna vulgaris	heather	0.9	0.2	0.4	-	-
Herbs (Sum = TLP)						
Anthemis type	chamomile type	0.4	-	-	0.2	-
Aster type	daisy type	0.2	1	-	0.2	-
Caryophyllaceae	pink family	0.2	0.2	0.4	0.6	0.2
Cyperaceae	sedges	0.6	0.4	-	0.2	0.2
Filipendula	meadowsweet	0.2	0.8	-	0.2	0.8
Galium type	cleavers type	-	-	0.2	-	-
Lactuceae	dandelion type	0.4	0.2	0.8	0.8	0.4
Plantago spp	plantains	0.2	0.6	0.6	0.4	0.8
Poaceae	grass	13.8	9.2	8.5	4.4	5
Rosaceae	rose family	0.4	-	-	-	-
Succisa	devil's bit scabious	-	0.2	0.6	-	-
Pteridophytes (Sum = TLP + P)						
Filicales	ferns	1.1	1.7	1	1.1	1.7
Polypodium	polypody fern	0.6	1.3	1.9	0.6	0.6
Pteridium	bracken	0.7	-	1	-	0.2
Moss (Sum = TLP + M)						
Sphagnum	bog moss	-	0.2	0.6	-	-
Other (Sum = TLP + O)						
Indeterminate		56.6	68	53.9	38.9	37.7
Total Land Pollen (TLP)		530	523	503	521	505

Table 6b: Pollen analysis from Monolith Sample 110 continued.

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Discussion

Area 1: Palaeochannel and stone-lined feature

The majority of the palaeochannel deposits produced very little charcoal, with only the basal deposit (005) being rich in carbonised remains. Although the charcoal assemblage was dominated by alder, it is likely that this material is the remains of hearth waste. The charcoal assemblages suggest that alder was a common component of the local woodlands along the edges of the palaeochannel and would have provided a ready supply of fuel. This is confirmed by the pollen analysis undertaken.

The pollen results from the palaeochannel showed only slight changes throughout the sequences, indicating that the local vegetation did not change significantly during the period of sediment accumulation. The local area was wooded, with alder being the commonest tree type present. This is not surprising as alder is common in wetter areas, particularly along river and stream banks and in low-lying flood plain areas. In addition, hazel also was a significant component of the local woodland. Birch, oak, willow and elm pollen was recorded at trace levels, probably representing tree pollen from woodland growing on drier ground at a distance from the palaeochannel itself.

Grass pollen was present at varying percentages but always at less than 14% of the total land pollen, with a variety of other herbaceous types also present but usually at trace levels. However, meadowsweet was a more common component of the pollen spectrum than any other herbaceous type identified. Meadowsweet is particularly common alongside rivers and ditches on wetter ground suggesting some more open areas of ground may have bordered the channel and that the woodland did not extend to the channel edges. There is a slight decline in woodland between the basal deposits of the palaeochannel and the uppermost deposits that were examined, but these changes are not great. There is little indication of human activity in the pollen samples, with no evidence for cereal pollen and only slight evidence for open grassland that could have been used as pastureland. It may be that this location was only used periodically or seasonally rather than being continually inhabited and so there has been little impact on the natural woodland.

The high to very high numbers of indeterminate pollen grains that were recorded in the samples suggests a high degree of bioturbation and anaerobic activity in the sediments of the palaeochannel. These processes will cause various types of deterioration to the outer 'shell' of pollen grains, making them difficult or impossible to identify because the outer sculpturing has been destroyed or altered to a significant degree.

The stone-lined feature (156) that was adjacent to the palaeochannel produced significant amounts of charcoal, but again the assemblages were dominated by alder charcoal and so it may be the source of some of the charcoal recovered from the base of the palaeochannel. Atkinson (2017) suggests that charred grain was present in the pit fills and the channel fills running from the pit to the palaeochannel. However, no grain was recorded during this analysis and so it is possible that this 'grain' was small fragments of wood charcoal. There is no evidence from the carbonised remains that this was a grain-drying kiln and it would be unusual to have such a feature next to a water course. Bronze Age stone-lined pits next to water courses are often indications of the presence of a burnt mound in this part of Scotland. However, burnt mound deposits are also characterised by large amounts of heat affected stones and, although some heat affected stones were recorded on this site, there is no indication in the DSR that these were abundant.

Most of the radiocarbon dates from the channel fills suggest human activity from the beginning of the early Bronze Age, throughout that period and into the beginning of the middle Bronze Age. The activities around the stone-lined feature and its channels take place during the early-middle Bronze Age and into the middle Bronze Age proper.

Area 2: Possible structure and occupation layer

Again, it appears that alder was the main fuel source in the hearth and the charcoal recovered from the postholes and stakeholes in this area is probably from scattered hearth waste rather

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than evidence for the posts/stakes having been burnt *in situ.* The radiocarbon dates suggest that most of the activity around the fire-pit and postholes was early Neolithic with the deposits of the horseshoe-shaped feature (010) being slightly later, from the middle Neolithic. One of the postholes (085) indicates that some activity took place on the site into the early-middle Bronze Age.

Area 3: South-west pit and posthole grouping

The carbonised material from the features in this area is similar to that seen elsewhere on the site. The charcoal assemblages are dominated by alder, with a mix of other types present and so are generally thought to be the remains of scattered hearth waste. However, curvilinear pit (141) produced small amounts of oak and willow charcoal, which may represent the remains of structural elements, perhaps something relatively ephemeral such as a windbreak. The use of this pit took place during the early Bronze Age. The fill of posthole (048) was early to middle Bronze Age in date and that of posthole (046) was middle Bronze Age, suggesting a number of visits to this area.

Area 4: Central pit and posthole grouping

The charcoal assemblages from this area are again dominated by alder charcoal and so are likely to be further remains of hearth waste. It was not possible to radiocarbon date samples from this area, so it is not possible to confirm whether the features in this area are contemporaneous with the features recorded elsewhere on the site.

Coleoptera analysis

By Francis M. Rowney[1] and Nicki J. Whitehouse[2]

Introduction

The following report presents the results of palaeoentomological analyses of sedimentary sub-samples from the palaeochannel. A brief overview of laboratory methods is provided, followed by a summary of the identified fauna, and their palaeoenvironmental and sedimentary implications.

Methods

Sediments were soaked in hot water and sieved to 300µm, before concentrating chitinous material through paraffin (kerosene) floatation. The procedure broadly followed that detailed by Coope (1986) and Elias (2010), the efficacy of which has been demonstrated by Rousseau (2009). The volume and weight of processed material is detailed in Table 7. Taxonomy follows Duff (2012).

Sample	Approx. volume (litres)	Weight (kg)	Description
111	1	2.5	Grey-brown sandy clayey silts, with occasional fine gravel clasts. Dry.
112	1	2.81	Grey-brown sandy clayey silts, with occasional fine gravel clasts. Dry.
113	2	3.58	Red-brown clayey, sandy silt. Rare pebble clasts.
114	2	2.98	Red-brown clayey, sandy silt. Frequent rootlets. Rare pebble clasts.
115	1	2.34	Red-brown clayey, sandy silt. Occasional pebbles and fine gravels. Rare rootlets.
116	1	2.69	Red-brown silty, sandy clay.
117	1	2.66	Grey-brown clayey, sandy silt.
118	1	3.49	Grey-brown clayey, sandy silt.
119	1	3.19	Grey-brown clayey, sandy silt. Occasional gravels. Wet.
120	1	2.72	Grey-brown clayey, sandy silt. Occasional gravels and pebbles. Wet.

Table 7: Volume, weight and description of material processed for Coleoptera analysis.

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Taxa	Sample Nr									
	111	112	113	114	115	116	117	118	119	120
Staphylinidae										
Aleocharinae indet.				1						
Erirhinidae indet.	3						1	3		
Curculionidae										
Entiminae indet.	1	1				1				
Curculionoidea indet.		1								

Table 8: Coleoptera from Ferniegair (minimum number of individuals).

Results and Interpretation

Insect remains were rare in all samples, and those present were heavily degraded. Identifiable remains were present in six samples (111, 112, 114, 116-118), but identification was only possible to family or subfamily level, due to the degraded state of the material (Table 8).

One Aleocharinae (Staphylinidae) elytron was recovered from Sample 114. Species within this subfamily are generally inhabitants of decomposing organic matter (Harde 1984). Several pronota identified as Erirhinidae indet. were recovered from samples 111, 117 and 118. This family of weevils includes semi-aquatic species, such as Notaris acridulus L., which lives on various aquatic macrophytes at wetland edges (Harde 1984). However, given the state of preservation, genus (or species) level identification could not be undertaken confidently. Fragments of heads attributed to Entiminae indet. (Curculionidae) were recovered from samples 111, 112 and 116. This is a large family of weevils, with diverse ecological preferences.

It seems likely that the sediments were deposited in a damp environment, possibly close to a body of water with some aquatic vegetation. However, palaeoenvironmental inferences on the basis of this material must remain limited, given the paucity of insect remains and low taxonomic resolution.

Weevil (Curculionoidea) remains are amongst the most robust of insect remains, and so the apparent bias towards Curculionoidea in these samples is strongly indicative of poor conditions for the preservation of insect material. This is unsurprising given the low organic content of the material, red-brown colouration indicating oxidisation of the sediments, and frequent rootlets, which are suggestive of pedogenetic processes.

Micromorphological analysis

By Carol Lang[3]

Introduction

Four Kubiena tins sampled from a palaeochannel were submitted for the manufacture of thin sections and micromorphology analysis. The Kubiena samples were taken from segment C, baulk A of a 135 m long palaeochannel and they covered contexts (004 and 005). The micromorphological analysis sought to reconstruct the environmental sequence of the paleochannel, determine how it evolved and whether any changes related to human intervention or natural processes.

Methodology

Thin sections were prepared following international standard procedures (Murphy 1986) at the University of Stirling Thin section Micromorphology Laboratory and included acetone exchange of water, resin impregnation under vacuum, cutting, and precision lapping to 30 µm. Thin sections were described using an Olympus petrological microscope following the internationally accepted terminology in the *Handbook for Soil Thin Section Description* by Bullock *et al.* (1995) and also Stoops (2003). This allowed the systematic description of coarse and fine mineral materials, organic materials, microstructure and b-fabric carried out under a range of magnifications and different sources of light with the data recorded semi-quantitatively.

Results

The thin sections did not present a clear microstratigraphy so they were described as singular units. The summary of micromorphological descriptions is presented in Table 9. Thin sections 92 and 93 were of similar

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groundmass, microstructure and had similar pedofeatures. Likewise thin sections 94 and 95, shared many characteristics. These similarities between thin sections reflect the shared context of origin.

Thin Sections 92 and 93

The groundmass of thin sections 92 and 93 was formed by reddish-brown fine material and frequent/ dominant coarse mineral material formed predominantly by quartz grains (Figure 14). Coarse minerals were of angular, sub-angular and sub-rounded shape in thin section 92 and angular, sub-angular, sub-rounded and rounded shape in thin section 93. The mineral material was poorly sorted in thin section 92 with a variety of fragment sizes, whereas there was more uniformity in grain sizes in thin section 93.

The most common pedofeatures present in both thin sections were impregnative Fe (Iron)/Mn (Manganese) oxide nodules mostly typic but with some dendritic (Figure 15). The arrangement of

Thin section	Context	Coarse material					Fine material (PPL)	Groundmass b fabric	Pedofeatures	Microstructure	Sorting, arrangement	Related distribution
		Mineral	Phytoliths	Parenchymatic & amorphous	Fungal sclerotia	Charcoal						
92	004	•••		t		t	•••Rb; O/m	Ss	*** Fe-Mn, t pho, t clay c	Co: Ma/Chm/ Ch	P, Ra	Si-s-Po
93	004/005	•••	t			t	•••Rb; O/m	Ss	*** Fe-Mn, t pho	Co: Ch/Chm/ Gr	M, Ra	Si-s-Po
94	005	•••	t	t		t	••• Yb; O/m	Ss	t Fe-Mn, * pho, ** Silt coat, **exc	Co: Gr, Pe-gr, Ch	M, Ra	Chi
95	005	•••		t	7		** ••• Yb; O/m Ss	Ss	t Fe-Mn, **pho, **silt coat, ***exc	Co: Gr, Pe-gr, Ch	W, Ra	Chi

Frequency class refers to the appropriate area of section (Bullock et al. 1985)

- t Trace
- • Very few (<5%)
- •• Few (5-15%)
- ••• Frequent/common (15-50%)
- •••• Dominant/very dominant (>50%)

Abbreviations of micromorphology terms

Fine mineral material Abbreviations
- Reddish brown Rb
- Yellowish brown Yb
- O/m Organo-mineral

Groundmass b Fabric
- Stipple-speckled Ss

Pedofeatures
- Iron-manganese nodules and impregnations
- Fe-Mn
- Phosphatic Pho
- Clay coatings Clay c
- Silt coatings Silt coat
- Excremental Exc

Frequency class for textural pedofeatures (Bullock et al. 1985)

- t trace
- * Rare (<2%)
- ** Occasional (2-5%)
- *** Many (5-10%)
- **** Abundant (10-20%)
- ***** very abundant> 20%

Microstrocture
- Complex Co
- Chanel Ch
- Chamber Chm
- Granular Gr
- Pellicular grain Pe-gr
- Massive Ma

Sorting
- Moderately sorted M
- Poorly sorted P
- Well sorted W

Coarse material arrangement
- Random Ra

Related distribution
- Chitonic Ch
- Single-spaced porphyric Si-s Po

Table 9: Summary of micromorphology descriptions.

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coarse particles was random in both thin sections but in thin section 92 they were poorly sorted and in 93 moderately sorted.

Both thin sections had channel and chamber microstructure with some additional massive microstructure in 92 and some granular microstructure in 93. There were traces of charcoal in both thin sections and traces of phytoliths in thin section 93.

Thin Sections 94 and 95

Thin sections 94 and 95 were characterised by a groundmass of yellowish-brown fine organo-mineral material and abundance of quartz coarse minerals. Coarse materials of biological origin included fragments of charcoal (Figure 16a) particularly abundant in thin section 95, and fungal sclerotia (Figure 18b).

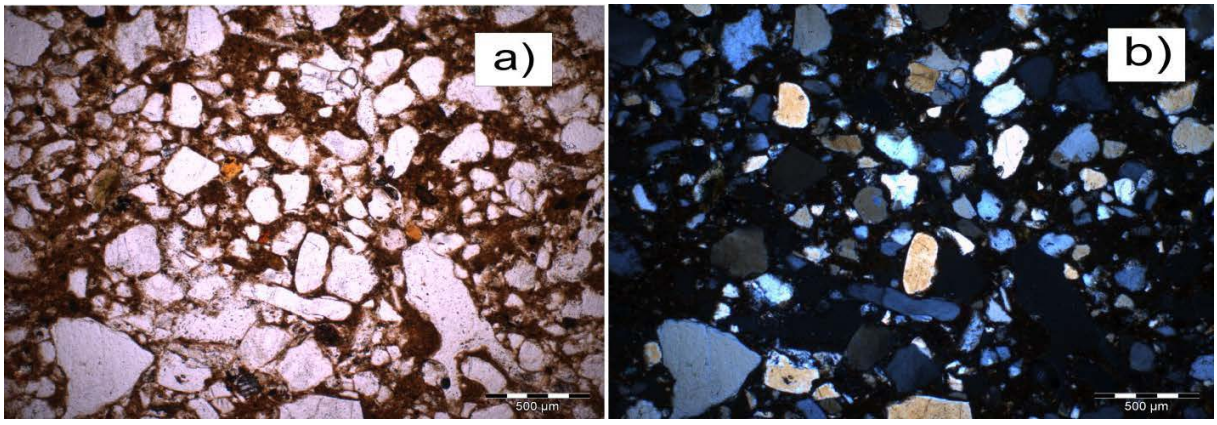

Figure 14: Groundmass of thin section 92 formed by reddish-brown fine material and frequent/dominant mineral material, prodominantly quartz grains, a) in PPL; b) in XPL. Note the different shapes of the grains going from angular to sub-rounded.

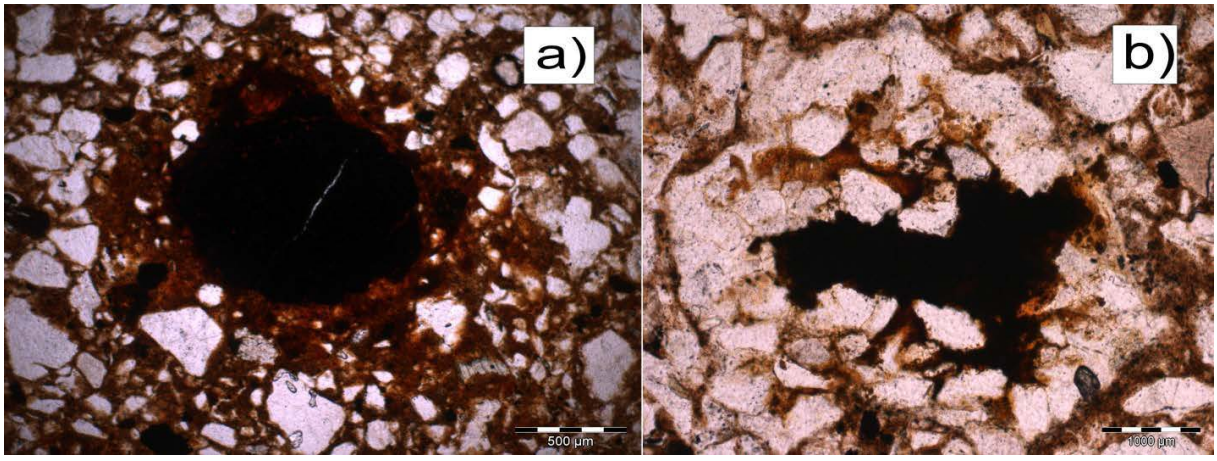

Figure 15: Redoximorphic pedofeatures, a) typic Fe/Mn oxide nodule; b) dendritic Fe/Mn oxide nodule. PPL.

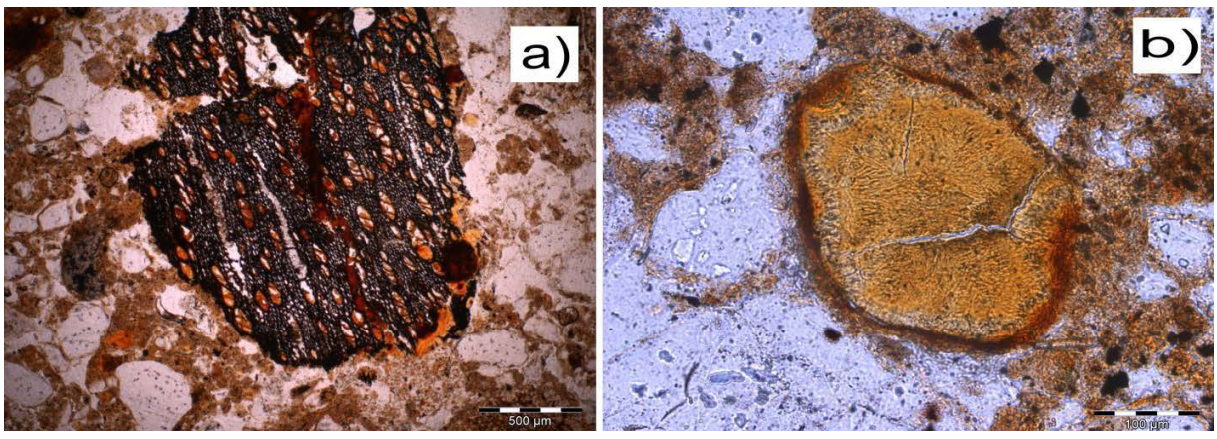

Figure 16: Charcoal fragment (a) and phosphatic pedofeature (b). PPL.

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The most common pedofeatures were silt coatings (Figure 17b), phosphatic features (Figure 16b) and excremental features (Figures 17a and 18a). The microstructure of both thin sections was complex with granular, pellicullar grain and channel microstructure.

Interpretation

The most important aspects for the interpretation of the thin sections are the types of pedofeatures present.

- Redoximorphic pedofeatures: redoximorphic pedofeatures are compounds formed by the reduction and oxidation of iron (Fe) and manganese (Mn) and are associated with wet conditions (Lindbo *et al*. 2010). These types of pedofeatures were more prevalent in thin sections 92 and 93 in the form of iron-manganese nodules and impregnations, contributing to the reddish-brown colour of the fine material. The occurrence of nodules and impregnations are indicative of in-situ formation. The absence of depletion pedofeatures suggests a short to medium duration of the water saturation. The fact that these features were more abundant in the thin sections higher in the profile suggests the presence of a barrier impeding the infiltration of water to lower layers in the profile although this possible barrier was not apparent in any of the thin sections. It is possible that this 'barrier' is simply formed by more compacted substrate.
- Textural pedofeatures: textural pedofeatures were more abundant in thin sections 94 and 95 in the form of silt coatings. Silt coatings can be formed by the detachment of particles caused by rapid wetting of dry soils or by drainage of saturated soil material (Kühn et al. 2010). In this case, given the evidence of saturated soil in upper layers it is indicative of drainage.

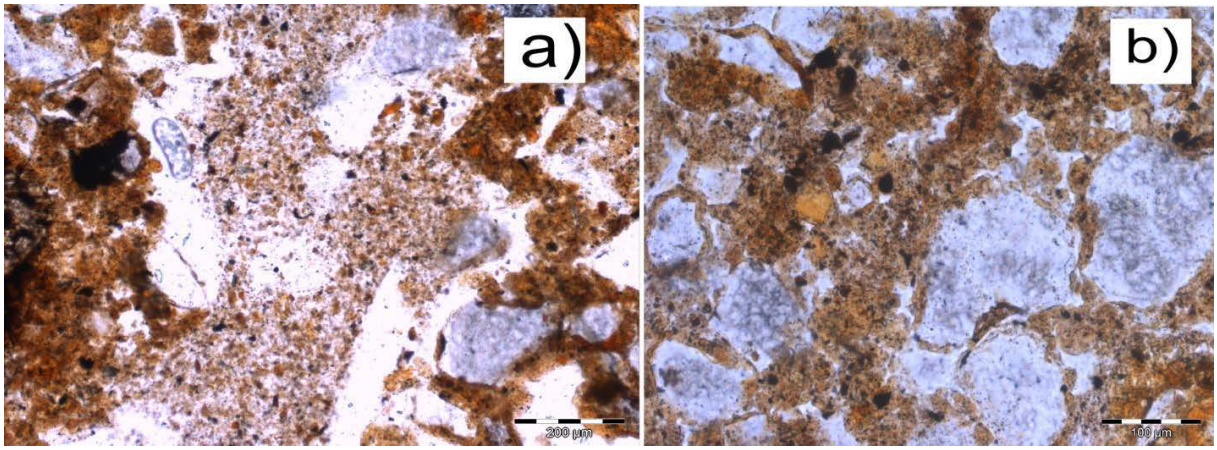

Figure 17: Excremental infill of enchytraeids in channel (a) and silt coating of quartz grains (b) both in PPL. Microphotographs from thin section 94.

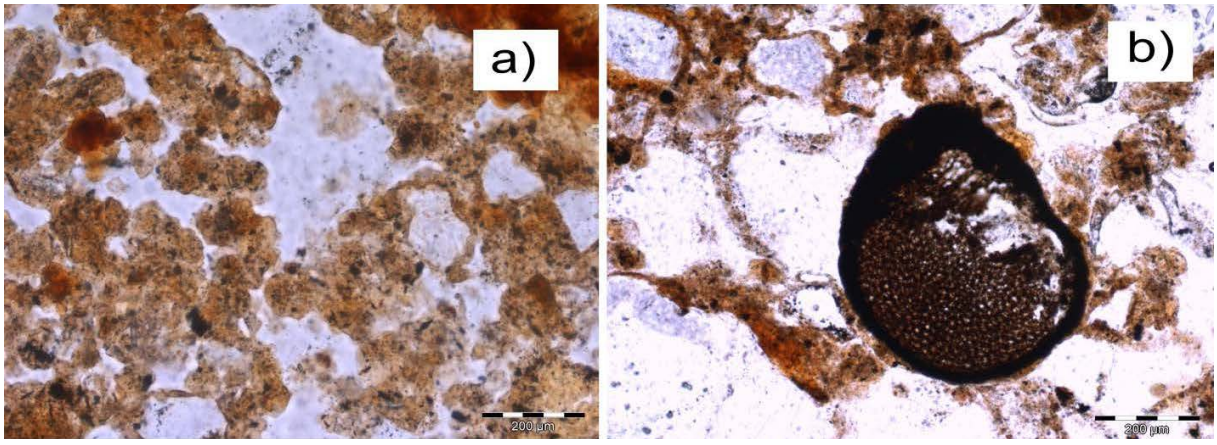

Figure 18: Signs of biological activity in thin section 95. Granular microstructure (a) and fungal sclerotia (b). Both microphotographs in PPL.

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- Phosphatic pedofeatures: phosphatic pedofeatures are often indicative of animal husbandry and other agricultural and human activities such as manuring, fertilizing and privy accumulations (Karkanas and Goldberg 2010). The weathering and recrystlization of bone can also give origin to these features. Phosphatice pedofeatures were more abundant in thin section 95.
- Excremental pedofeatures: excremental pedofeatures were present in the form of infillings and forming granular microstructure in thin sections 94 and 95. These types of excremental features are associated with soil mesofauna such as earthworms and enchytraeids.

The poorly sorted nature of the mineral material in thin section 92, together with the random arrangement of particles and the presence of angular and sub-angular minerals and rock fragments indicate a combination of in-situ weathering of rocks and slow movement of materials. In thin section 93 the sorting of minerals is a bit more homogeneous and there are more rounded minerals signalling more movement but still corresponding to a slow flow. The types of redoximorphic features in these upper samples indicate the channel was not permanently saturated with water.

There is no evidence of waterlogging in thin sections 94 and 95 but there is evidence of percolation (silt coatings). This suggests the channel was created by the compaction of material. Both thin sections showed signs of very high biological activity (e.g. granular microstructure, excremental infillings, fungal sclerotia and abundance of microchannels). The sediments in thin section 95 are most likely of anthropogenic origin given the abundance of charcoal, phosphatic features and high biological activity.

Conclusions

The micromorphological analyses of the thin sections suggest the creation of a drainage channel by compaction of silty material over anthropogenic sediments. The channel would have been of slow movement and not permanently waterlogged. The degree of bioturbation in the lower context makes it difficult to suggest if the anthropogenic sediments come from husbandry or domestic activities.

Bone samples

By Catherine Smith[4]

Bone was recovered from 12 contexts during the archaeological work at Ferniegair and appeared to be animal in origin with no obvious human bone identified. This was based on bone morphology including shape, cortical thickness, porosity and surface texture. Most of the bone fragments were very small with only three context (005) – the basal fill of the palaeochannel, (057) – a pit fill and (134) – the upper fill of the palaeochannel) containing bone. The samples were scrutinised as to whether any could be identified to taxon. All samples were small and affected by heat with surface cracking and erosion on many of the surfaces, with the exception of one unburnt Sample 70 from pit (058/057) in the south-west part of the site. Of the burnt samples, none retained any diagnostic characteristics which would allow them to be further identified as most were unidentified cortical fragments. The best which could be said is that they all appeared to be mammalian in origin.

The unburnt Sample 070 proved to be the partial remains of a rabbit, *Oryctolagus cuniculus,* and included a fragmentary maxilla, mandible and associated loose teeth. Other undiagnostic fragments in this sample, including a fragmentary long bone shaft, were presumed to be rabbit, representing one individual.

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Artefacts

Lithic artefacts

by Torben B Ballin

Introduction

During the archaeological investigation at Ferniegair, a relatively small lithic assemblage of 423 pieces was recovered, and the purpose of this report was to characterize the lithic artefacts in general terms, and to date and discuss them. The evaluation of the lithic material is based upon a detailed catalogue of the lithic finds and the artefacts are referred to by their catalogue number (CAT no.).

The assemblage

General overview

From the excavation at Ferniegair, 423 lithic artefacts were recovered[5]. They are listed in Table 10. In total, 88% of this assemblage is debitage, whereas 4% is cores and 8% tools.

Raw materials – types, sources and condition

The raw material composition of the assemblage is complex, involving a group of two 'main' raw materials (flint and chert), supplemented by a number of less intensely exploited raw materials (Table 11; Figure 19). The latter include quartz and quartzite, pitchstone, material of the jet family, as well as two agate chips, a fragment of an unidentified ground object in an indeterminate igneous material (CAT 314), and a piece of worked red ochre (CAT 319).

The flint includes a number of different types: 1) fine-grained, orange or honey-brown, homogeneous or slightly mottled flint; 2) fine-grained, light-grey, mottled flint; and 3) fine-grained, dark-grey, homogeneous flint. Objects of Group 1 are generally slightly smaller than those of groups 2 and 3, and it is thought that this flint may be local flint collected along the North Sea shores of the Scottish Borders. Objects of Groups 2 and 3 tend to be slightly larger, and their colours and patterning correspond to those associated with so-called Yorkshire flint (Ballin 2011b). Although the latter two forms of flint are traditionally thought of as deriving from north-east England, It should be borne in mind that Group 3 flint is almost identical to

5 The definitions of the main lithic categories are as follows:

Chips: All flakes and indeterminate pieces the greatest dimension (GD) of which is ≤ 10 mm.

Flakes: All lithic artefacts with one identifiable ventral (positive or convex) surface, GD > 10 mm and L < 2W (L = length; W = width).

Indeterminate pieces: Lithic artefacts which cannot be unequivocally identified as either flakes or cores. Generally the problem of identification is due to irregular breaks, frost-shattering or fire-crazing. *Chunks* are larger indeterminate pieces, and in, for example, the case of quartz, the problem of identification usually originates from a piece flaking along natural planes of weakness rather than flaking in the usual conchoidal way.

Blades and microblades: Flakes where L ≥ 2W. In the case of blades W > 8 mm, in the case of microblades W ≤ 8 mm.

Cores: Artefacts with only dorsal (negative or concave) surfaces – if three or more flakes have been detached, the piece is a core, if fewer than three flakes have been detached, the piece is a split or flaked pebble.

Tools: Artefacts with secondary retouch (modification).

GD: Greatest dimension.

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the flint usually referred to amongst gunflint researchers as 'black' flint, which was almost exclusively procured from East Anglia, and it cannot be ruled out that this type of flint could have been obtained from much further afield than Yorkshire. Type 2 flint was used throughout the middle and late Neolithic periods and Group 3 predominantly during the late Neolithic (ibid.).

Most of the chert is light bluish-grey chert, with some pieces having a greenish hue and some are almost black. This raw material is thought to be locally procured chert (Ballin and Ward 2013; Paterson and Ward 2013). The assemblage also includes rarer types of chert, such as chocolate brown and rust-brown/grey forms. The dominant form of bluish-grey chert has exceptionally poor flaking properties due to its numerous internal fault planes, and it was difficult to get any intact blanks out of this raw material.

The pitchstone is black, aphyric Arran pitchstone, most likely procured in eastern Arran (the Corriegills district) just south of Brodick (Ballin and Faithfull 2009). The white milky quartz and the grainy quartzite are also likely to be local raw materials (Ballin 2008).

	Flint	Chert	Quartz/ quartzite	Pitchstone	Jet family	Others	Total
Debitage							
Chips	39	52	10	1	1	2	105
Flakes	40	144	22	2	8		216
Blades	3	5					8
Microblades		4		3			7
Indeterminate pieces	1	24	2	1	1		29
Crested pieces		6					6
Total debitage	83	235	34	7	10	2	371
Cores							
Single-platform cores		2					2
Opposed-platform cores		1					1
Irregular cores		1					1
Bipolar cores	4	8		1			13
Total cores	4	12		1			17
Tools							
Scalene triangles		1					1
Crescents		1					1
Backed bladelets	2						2
Leaf-shaped arrowheads	1				1		2
Short end-scrapers	5	2					7
Blade-scrapers		1					1
Double-scrapers	2						2
End-/side-scrapers		1					1
Scale-flaked knives	1						1
Serrated pieces	1						1
Strike-a-lights	1						1
Combi-tools (scraper-knives)		1					1
Pieces w edge-retouch	1	7		3			11
Pounders			1				1
Grinders						1	1
Ground ochre lumps						1	1
Total tools	14	14	1	3	1	2	35
TOTAL	101	261	35	11	11	4	423

Table 10: General artefact list.

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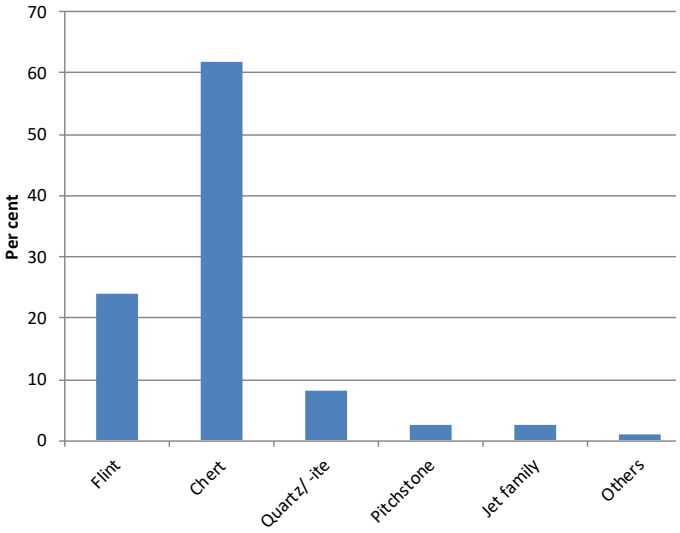

Figure 19: Diagrammatical expression of the recovered raw materials.

	Nr	%
Flint	101	23.9
Chert	261	61.7
Quartz/ -ite	35	8.3
Pitchstone	11	2.6
Jet family	11	2.6
Others	4	0.9
TOTAL	423	100.0

Table 11: Raw materials.

In total, 12 pieces were defined as belonging to the jet family. Jet, cannel coal, lignite, oil shale, and torbanite were all used in British prehistory to make jewellery and ornaments, but it is not possible to distinguish between smaller pieces of these materials without the application of FTIR analysis (Fourier Transform Infrared Spectroscopy) (Watts and Pollard 1998). If the pieces are in fact jet, they probably represent importation from north-east England (Whitby), whereas other jet-like materials are known from Scotland, such as Torbane Hill, near Bathgate (Paterson and Ward 2013, 39), and Brora in Sutherland (Shepherd 1985, 204). In Scotland, jet and related materials were predominantly used during the later Neolithic and early Bronze Age periods (ibid.). Below, these pieces are referred to as 'jet'.

Table 12 shows how large proportions of the various sub-assemblages are cortical and inner pieces, and Table 13 shows how many of the cortical pieces have pebble cortex and how many vein have cortex. Most of the flint, chert, quartz/ quartzite and 'jet' flakes have smooth, abraded pebble cortex, and only a small proportion of the flint and chert flakes have soft or rough vein cortex. One flint flake (and two flint tools) with soft cortex are thought to be based on Yorkshire flint or other forms of exotic flint; seven chert flakes (and two chert cores) with soft cortex are thought to have been quarried locally (cf. Ballin and Ward 2013); 14 quartz/quartzite flakes with abraded cortex were clearly collected as pebbles; and one piece of 'jet' (CAT 386) has a smooth outer surface, suggesting procurement in pebble form. No unmodified pitchstone blanks, or any cores or tools in this material, have cortex.

As mentioned above, a proportion of the flint may have been collected from Scottish beach walls; most of the chert was probably collected either from local streams or from boulder clay or as erratics (cf. Meldon Bridge; Ballin 1999b); the quartz/quartzite may, like the chert, have been collected from local streams or as erratics; and the 'jet' may have been collected as pebbles either (depending on what sort of 'jet' this material is) on beaches near Whitby in north-east England, or from streams or superficial deposits in Scotland.

	Quantity						
	Flint	Chert	Quartz/quartzite	Pitchstone	Jet family	Others	Total
Primary	2	10	4				16
Secondary	8	41	10		1		60
Tertiary	33	102	8	7	7		157
TOTAL	43	153	22	7	8		233
	Percent						
	Flint	Chert	Quartz/quartzite	Pitchstone	Jet family	Others	Total
Primary	4	6	18				7
Secondary	19	27	46		13		26
Tertiary	77	67	36	100	87		67
TOTAL	100	100	100	100	100		100

Table 12: Reduction sequence of all unmodified flakes and blades.

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	Quantity						
	Flint	Chert	Quartz/ quartzite	Pitchstone	Jet family	Others	Total
Pebble cortex	9	44	14		1		68
Vein cortes	1	7					8
TOTAL	10	51	14		1		76
	Quantity						
	Flint	Chert	Quartz/ quartzite	Pitchstone	Jet family	Others	Total
Pebble cortex	90	86	100		100		89
Vein cortes	10	14					11
TOTAL	100	100	100		100		100

Table 13: Characterization of the cortex of all cortical flakes and blades (less flint which is known to be entirely pebble-based).

Seventeen pieces of flint, one piece of quartz and one piece of chert are burnt (4.5%), indicating the presence at the prehistoric site of one or more hearths.

Debitage

The debitage (371 pieces) includes 105 chips, 216 flakes, eight blades, seven microblades, 29 indeterminate pieces, and six crested pieces (Tables 10 and 14). Due to the meticulous sieving of selected contexts, the debitage (Table 14) includes relatively large numbers of chips (28%), with small flakes making up more than half of the finds (58%). Blades and microblades only make up 4%, although the assemblage clearly includes material from several blade and microblade industries, such as the late Mesolithic, the early Neolithic, and the later Neolithic (see dating section). The low number of blades is difficult to explain, but the fact that most of the finds derive from a palaeochannel and not from actual settlement surfaces may be part of the explanation (see distribution section).

Table 15 shows that the production of blanks in the main raw materials was carried out by combining a number of technological approaches. Pitchstone was worked almost exclusively by the application of soft percussion. Most pieces defined as having been produced by indeterminate platform technique are thought to represent hard technique, and if those two categories are combined, flint, chert and quartz/ quartzite seem to have been worked in roughly the same way, namely by hard percussion (c. 63-77%) supplemented by bipolar technique (15-17%). As the site was clearly visited during late Mesolithic and early Neolithic times, when blades and microblades were manufactured in

	Quantity						
	Flint	Chert	Quartz/quartzite	Pitchstone	Jet family	Others	Total
Chips	39	52	10	1	1	2	105
Flakes	40	144	22	2	8		216
Blades	3	5					8
Microblades		4		3			7
Indeterminate pieces	1	24	2	1	1		29
Preparation flakes		6					6
TOTAL	83	235	34	7	10	2	371
	Percent						
	Flint	Chert	Quartz/ quartzite	Pitchstone	Jet family	Others	Total
Chips	47	22	29	14	10	100	28
Flakes	48	61	65	29	80		58
Blades	4	2					2
Microblades		2		43			2
Indeterminate pieces	1	10	6	14	10		8
Preparation flakes		3					2
TOTAL	100	100	100	100	100	100	100

Table 14: Relative composition of the debitage.

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soft percussion, it is difficult to understand the low number of soft percussion blanks in flint and chert, but the near-absence of blades and microblades at Ferniegair may be the cause (see above). The site's 'jet' was mainly reduced by the application of hard percussion.

Figure 20 indicates the greatest dimension of the site's intact unmodified flakes. The flakes in quartz and quartzite are relatively large, but this may partly be due to the quartzite flakes being linked to the production of large stone tools, such as for example the pounder CAT 315. The 'jet' flakes are too few in number to allow any inferences to be made. The flint and chert curves both fluctuate somewhat, but both curves are characterized by two main peaks, possibly indicating the presence of material from two different industries – the smaller flakes relating to the late Mesolithic/early Neolithic and the larger flakes to the middle/late Neolithic. The chert flakes may be slightly larger than the flint flakes, as it may have been very difficult to produce small intact chert flakes, due to the flawed nature of the local chert.

	Quantity						
	Flint	Chert	Quartz/quartzite	Pitchstone	Jet family	Others	Total
Soft percussion	1	2		1			4
Hard percussion	10	65	10		1		86
Indet. platf. technique	7	3					10
Platform collapse	5	12	1		2		20
Bipolar technique	4	17	2				23
TOTAL	27	99	13	1	3		143
	Per cent						
	Flint	Chert	Quartz/quartzite	Pitchstone	Jet family	Others	Total
Soft percussion	4	2		100			3
Hard percussion	37	66	77		33		60
Indet. platf. technique	26	3					7
Platform collapse	18	12	8		67		14
Bipolar technique	15	17	15				16
TOTAL	100	100	100	100	100		100

Table 15: Applied percussion techniques: definable unmodified flakes and blades.

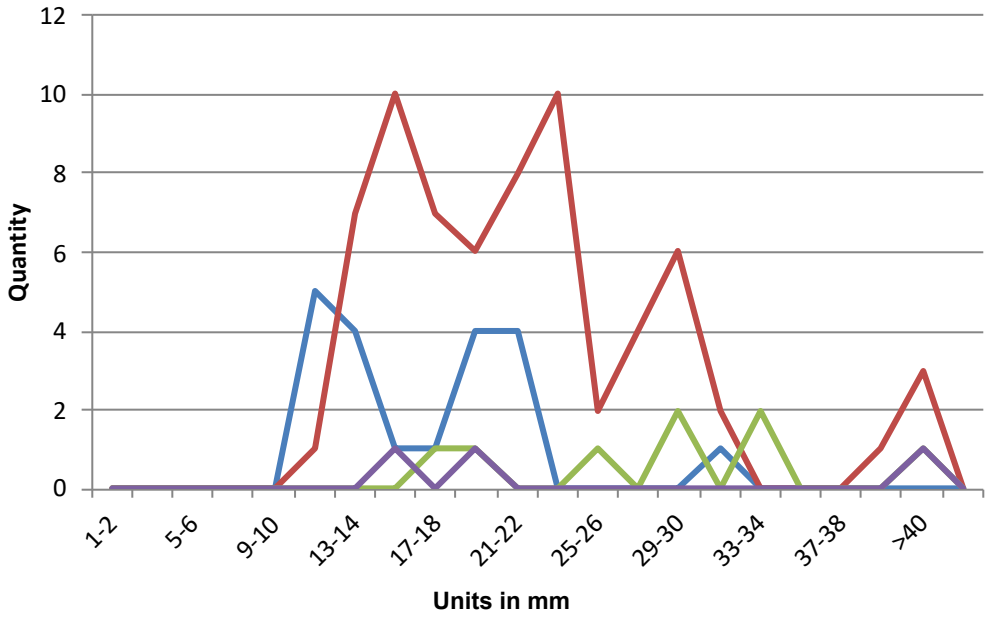

Figure 20: The greatest dimension of all intact unmodified flakes – flint (20 pieces; blue);chert (67 pieces; red); quartz/-ite (8 pieces; green); and jet family (3 pieces; purple).

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As shown in Tables 10 and 14, the assemblage includes very few blades, and Figure 21 shows the dimensions of all intact pieces. Due to the low numbers, this figure includes all blades, whether unmodified, modified or crested, and it also includes blades in different raw materials. The shorter pieces tend to be soft-hammer specimens, probably relating to the site's Mesolithic/early Neolithic settlers, whereas the longer blades tend to be hard-hammer specimens, probably relating to the site's middle/late Neolithic settlers.

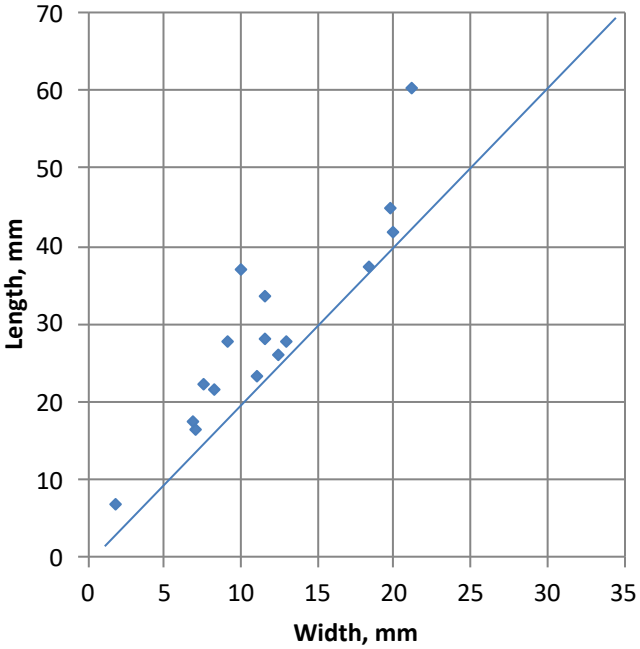

Figure 21: The length:width of all intact unmodified, modified and crested blades and microblades. The diagonal line through the diagram shows the border between blades and flakes, that is, blanks which are either longer or shorter than 2 widths.

Twenty-nine indeterminate pieces measure on average 25 mm across. A total of 83% of those are chert, probably indicating what a poor raw material this was. With its many internal fault planes, the local chert was more likely to disintegrate when struck than to produce intact flakes or blades.

In total, six crested pieces were found, all in chert. Cresting was clearly an integral part of the local settlers' operational schema when chert nodules were prepared for blank production. Four intact pieces measure on average 34 by 15 by 8 mm, e.g. CAT 187 (Figure 22).

Cores

The assemblage includes 17 cores: two single-platform cores, one opposed-platform core, one irregular core, and 13 bipolar cores. The assemblage is clearly dominated by bipolar cores (Table 10 and Figure 23), but as shown in Table 15, hard percussion blanks dominate the debitage notably (60%), with bipolar cores being relatively rare (16%). This suggests that most of the bipolar cores may be platform-cores which were exhausted completely by the application of anvil technique when they became too small to handle in free-hand style.

Single-platform cores: The site's two single-platform cores differ somewhat in terms of appearance. The larger, CAT 175, measures 36 by 33 by 24 mm and it is based on low-grade chert. Its 'back-side' is the surface of a fault-plane. The piece has a mostly cortical (pebble cortex), untrimmed platform, and along one of its lateral sides it has an almost entirely intact crest. It was probably abandoned due to its many internal fault-planes. CAT 277 (Figure 22) is somewhat smaller at 28 by 22 by 14 mm, and its 'back-side is the ventral surface of the waste flake on which the core is based. It has some vein cortex along one lateral side, defining this piece as one of very few chert objects from the Ferniegair site which are based on quarried raw material. This is most likely the exhausted remains of a small microblade core, and its platform is plain and untrimmed.

Opposed-platform cores: CAT 186 is an elongated, almost cylindrical opposed-platform core in chert, and it measures 39 by 24 by 18 mm (Figure 22). It has been reduced along the entire circumference of its two platforms, which are plain and trimmed. It was abandoned due to the formation of deep step fractures, again indicating the flawed nature of the local pebble chert.

Irregular cores: The site's solitary irregular core CAT 237 (29 by 28 by 26 mm) is in chert, and it has been reduced from at least three directions. Like the opposed-platform core, it was abandoned due to the development of several deep step fractures.

Bipolar cores: The 13 bipolar cores include four pieces in flint, eight in chert, and one in pitchstone (CAT 155, Figure 22). CAT 268 (Figure

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22) is based on so-called exotic 'black' flint, which is particularly common in Scottish assemblages from the late Neolithic period (Ballin 2011b). As shown in Figure 4, one of the chert cores is particularly large (CAT 273; 57 by 40 by 32 mm), and it is thought that this may be the only bipolar core from Ferniegair which was worked in bipolar technique from the outset, whereas most of the others are likely to be the exhausted remains of platform-cores (cf. Ballin 1999a). The average dimensions of the remaining bipolar cores are 23 by 16 by 8 mm e.g. CAT 131 (Figure 22). All but two of the anvil-struck cores are bifacial, and all but three have one reduction axis only (one set of opposed terminals). Two scrapers are based on recycled bipolar cores (CAT 132 and 278).

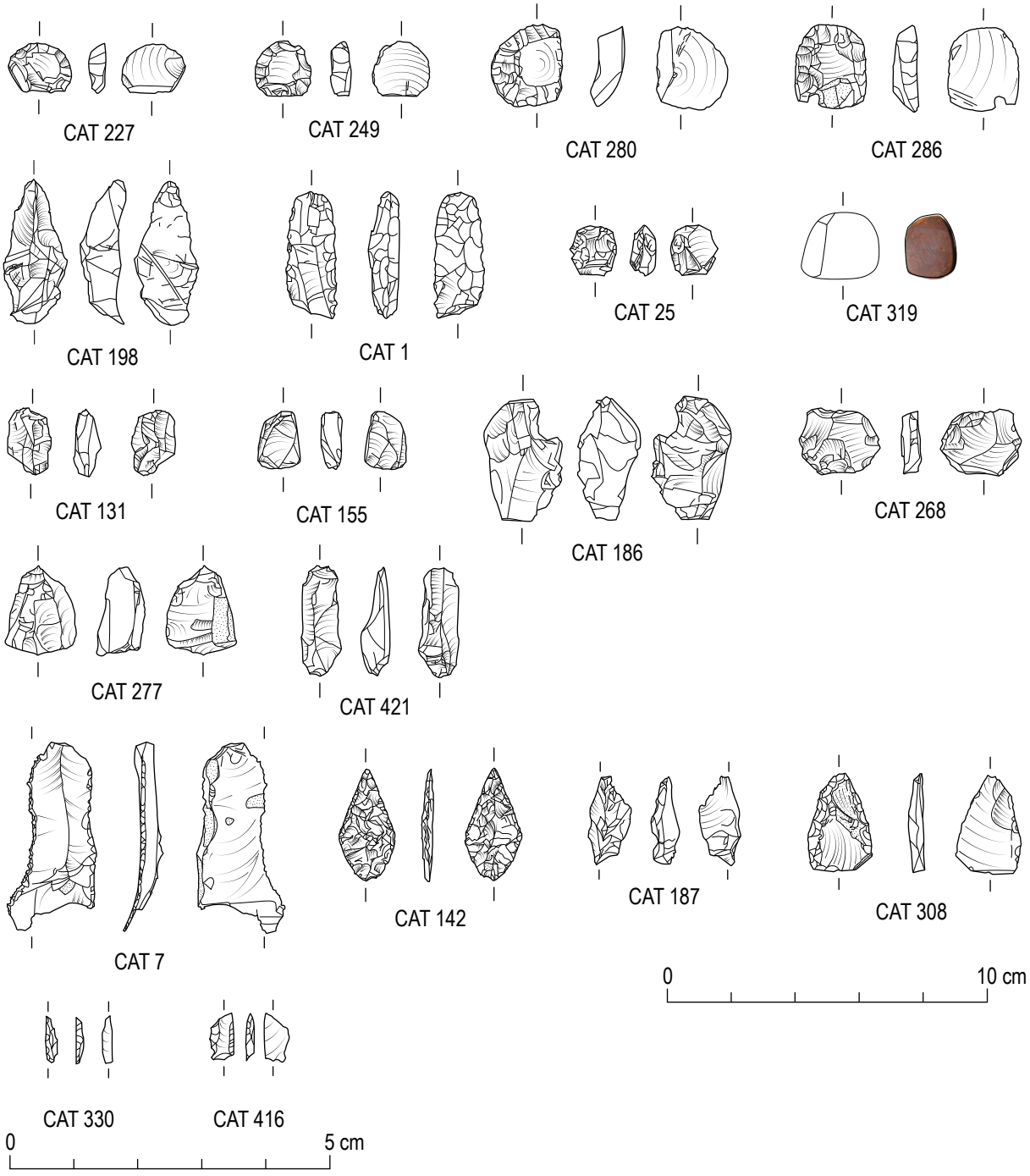

Figure 22: Crested piece CAT 187; single-platform core CAT 227; opposed-platform core CAT 186; bipolar cores CAT 131, 155, 268, 421; scalene triangle CAT 416; crescent CAT 330; leaf-shaped arrowhead CAT 142; scrapers CAT 198, 227, 249, 280, 286; scale-flaked knife CAT 308; serrated piece CAT 7; strike-a-light CAT 1/25; red ochre cube CAT 319.

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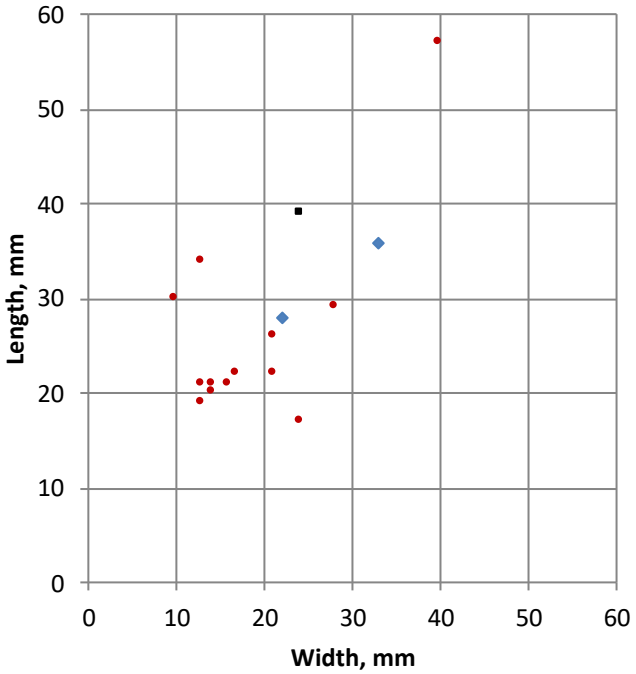

Figure 23: The length:width of all intact cores: Single-platform cores (blue), opposed-platform cores (black), and bipolar cores (red).

Tools

The 35 tools (Table 10) include a number of implement categories, such as four microliths and 'microlith-related pieces', two leaf-shaped arrowheads, 11 scrapers, one knife, one serrated piece, one strike-a-light, one combined scraper-knife, 11 pieces with edge-retouch, and three so-called coarse stone tools. With 11 pieces, the scrapers clearly dominate the formal tools (31% of all tools and 46% of the tools less edge-retouched pieces). The category mainly includes pieces in flint and chert (14 pieces each), supplemented by specimens in quartzite (one piece), pitchstone (three pieces), 'jet' (one piece), and 'other' raw materials (two pieces).

Microliths and 'microlith-related pieces': This category (four pieces) embraces a number of formal types, including one scalene triangle, one crescent, and two backed bladelets. In the archaeological literature, the term microlith is defined in a number of different ways, adding some confusion to the discussion of the category and its dating. In the present report, 'microlith' is defined as in previous reports on early prehistoric assemblages (e.g. Ballin *et al.* 2010; 2017a, 2017b):

> *Microliths are small lithic implements manufactured to form part of composite tools, either as tips or as edges/barbs, and which conform to a restricted number of well-known forms, which have had their (usually) proximal ends removed (Clark 1934, 55). This definition secures the microlith as a diagnostic (pre Neolithic) type. Below, microliths* sensu stricto *(i.e, pieces which have had their usually proximal ends removed) and backed microblades (with surviving proximal ends) are treated as a group, as these types are thought to have had the same general function.*

Scalene triangle CAT 416 (Figure 22) is a proximal fragment in chert (6.9 by 3.7 by 1.3 mm), and it has been modified along its entire circumference. Crescent CAT 330 (Figure 22) is an intact chert microlith (7.1 by 1.8 by 1 mm), and one lateral side has convex, steep retouch, whereas the other has straight, slightly acute retouch. The two backed bladelets CATs 252 and 253 are considerably larger (average dimensions: 19.9 by 7.2 by 2.4 mm), and they are both in light-grey mottled flint (Yorkshire flint?). Where the former two pieces are certainly late Mesolithic specimens, the raw material of the two latter indicates that they may be Neolithic. The backed bladelets both have one lateral side fully retouched.

Leaf-shaped arrowheads: The two points are based on probably local (i.e. Scottish east-coast) flint and 'jet', respectively (CATs 142 and 41, Figures 22 and 24). The former is missing its base, and it measures 21 by 13 by 2 mm, and the latter is intact and measures 35 by 17 by 3 mm. CAT 41 is based on a platform flake with the tip at the proximal end. It only has invasive retouch along its circumference and not across its two faces. CAT 142 is a kite-shaped piece with a rounded base. Due to its fragmented state, it is not possible to determine whether CAT 41 was drop-shaped or bi-pointed. In Green's terminology, CAT 41 is a Type 4B point and CAT 142 a Type 3C point.

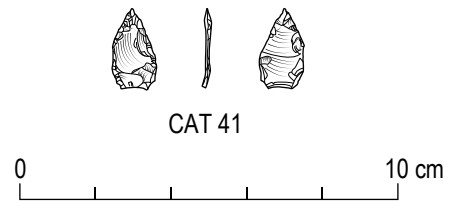

Figure 24: CAT 41 Leaf-shaped arrowhead.

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Scrapers: Eleven scrapers were recovered from the site, namely seven short end-scrapers, one blade-scraper, two double-scrapers, and one end-/side-scraper. The scrapers are notably dominated by flint (seven pieces), supplemented by four chert-scrapers. CAT 208 and CAT 286 (Figure 22) are probably in Yorkshire flint, and CAT 193 and CAT 249 (Figure 22) are in so-called exotic 'black' flint which is thought to date to the late Neolithic (Ballin 2011b). CAT 132 and CAT 278 are based on recycled bipolar cores.

As shown in Figure 25, all scrapers but blade-scraper CAT 198 (Figure 22) are fairly small, with the intact short end-scrapers, double-scrapers and end-/side-scrapers having average dimensions of 22 by 20 by 7 mm. The blade-scraper (CAT 198) measures 45 by 20 by 12 mm; it is based on an irregular chert blade. Most scraper-edges are convex and steep. Only two short end-scrapers in exotic flint have relatively acute scraper-edges which were formed by the application of pressure-flaking, which along with the choice of raw material indicates a date towards the end of the Neolithic period. End-/side-scraper CAT 227 (Figure 22) has a steep, pressure-flaked edge and probably dates to the same period.

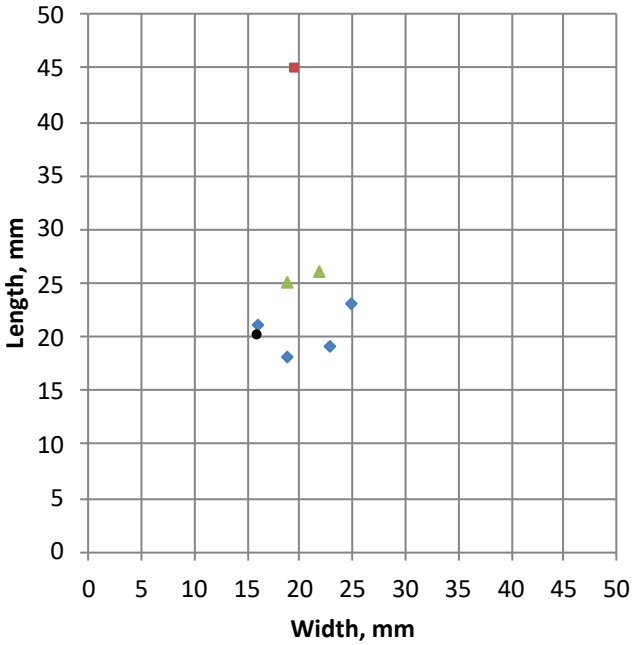

Figure 25: The L:W of all intact scrapers: Short end-scrapers (blue); blade-scrapers (red); double-scrapers (green), and end-/side-scrapers (black).

Scale-flaked knives: CAT 308 (Figure 22) is a scale-flaked knife based on a flake in local (i.e. Scottish east-coast) flint. The densely positioned Wallner-lines (ripples) suggest that the blank was a bipolar flake (Ono 2004). The piece has modification along both lateral sides. The right lateral edge is acute, and it is definitely a cutting-edge. It is uncertain whether the left lateral modification represents blunting or whether it is an additional cutting-edge.

Serrated pieces: The assemblage includes one serrated piece (CAT 7, Figure 22) based on a large hard-percussion blade (60.3 by 21.1 by 6.9 mm) in Yorkshire flint. This blade has soft- ish cortex along its left lateral side, and a finely faceted platform remnant, defining the tool blanks as a later Neolithic Levallois-like blade. The piece has fine serrated (c. 10 teeth per cm) along its entire right lateral side. The teeth are clearly worn. The depth and shape of the notches between the teeth suggest that the serration may have been made by the application of another flint blade or flake.

Strike-a-lights: One flint strike-a-light (CAT 1/25, Figure 22) was recovered during the excavation. The piece has been 'refitted' by joining a longer fragment (CAT 1) and a shorter one (CAT 25), and although a (probably short) medial segment is missing, the dimensions, shape and execution of these two pieces suggest that they almost certainly formed parts of the same implement. Both fragments are heavily burnt, and the original implement probably measured 55-60 by 16 by 10 mm. The piece has been retouched all-over, almost like an axehead, with a neat knapping seam running along both lateral sides. Its cross-section is approximately pointed oval. The piece has some abrasion/rounding of one end, probably indicating that it was used for fire-making by striking a piece of pyrite (Stapert and Johansen 1999). It is notably curved along its long axis, suggesting that the tool blank was a robust blade. Although both pieces are unstratified or are from the upper level of the palaeochannel, the heavy fire-crazing of both pieces indicates that they could have eroded out of a later Neolithic cremation.

Combi-tools: CAT 199 is the distal end of a combined end-scraper/scale-flaked knife in chert (23 by 16 by 6 mm). It has a convex, steep scraper-edge at the distal end, and a slightly convex to

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straight, acute scale-flaked cutting-edge along its right lateral side.

Pieces with edge-retouch: Eleven pieces with edge-retouch include seven pieces in chert, one in flint, and three in pitchstone. Seven are based on flakes, three are blades, and one is a microblade. These pieces differ considerably in shape and size (GD 13-37 mm), and it is thought that this tool group includes artefacts, or fragments of artefacts, with different functions.

Coarse stone tools: This group includes three objects, namely a fragment of a pounder (CAT 315), a fragment of an indeterminate ground object (CAT 314), and a piece of worked red ochre (CAT 319).

CAT 315 is a bipolar flake (70 by 49 by 22 mm) struck off a probably fist-sized pounder of quartzite. The flake's proximal end is at the working-end of the pounder, and it is quite likely that this flake was detached from its parent piece by use (i.e. pressure applied to the working-end of the pounder). At the proximal end of the flake, the piece has the remains of a pecked and ground, faceted surface (Figure 26).

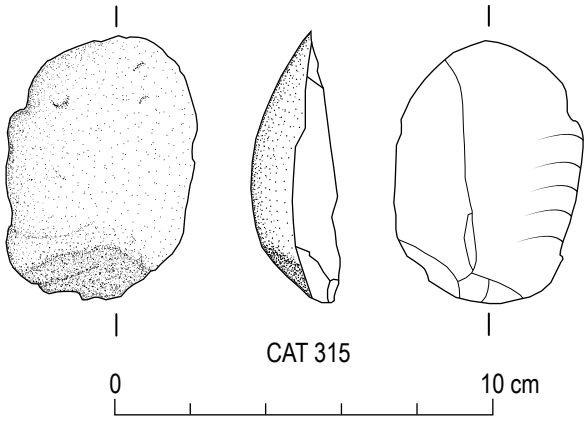

Figure 26: CAT 315 Bipolar flake.

CAT 314 is an indeterminate flake (54 by 35 by 15 mm) detached from a larger, presently unidentified, ground object. The raw material is a form of dense, porphyritic, igneous rock, and its dorsal face consists of two neatly ground facets which meet at a sharp bevel. The surfaces display fine striations from the shaping of the object, rather than from use. It has not been possible to fit this piece into any known categories of ground/polished axeheads, maceheads or battle-axes.

CAT 319 is a small cubic piece of worked red ochre. The piece has been ground all-over, and it has three main faces, supplemented by numerous smaller facets (Figure 22). All facets but one have parallel striations from attempts at scraping red ochre powder off the piece. Although ochre is an iron-oxide, this piece is not magnetic. One unstriated, domed surface appears to be an original, naturally abraded surface, suggesting that the ochre was collected in pebble form. It has some rust-like residue adhering to some surfaces.

In prehistory, ochre was used as a mainly red colour pigment, and it has been suggested that it was used for the colouring of human bodies, faces and hair, pottery, as well as clothes (skin) (Northam 2013; Rifkin 2015; Rosso *et al.* 2016). It is also commonly found in Palaeolithic and Mesolithic graves (e.g. Jensen 2006, 21-31). The distance between the grooves (striations) of this ochre cube corresponds roughly to the distance between the teeth of serrated piece CAT 7, and it is possible that red ochre was released from cubes like this by the application of serrated pieces, with the released ochre granules then ground into powder on slabs of sandstone or quartzite.

Technological summary

This technological summary is based on information presented in the raw material, debitage, core and tool sections above. Approximately 60% of all lithic and stone finds were recovered from the palaeochannel, and as shown in Table 16, these finds include Mesolithic, early Neolithic, as well as later Neolithic finds. These objects were mixed with each other in a way that would not allow them to be grouped securely according to their dates. The following is therefore simply a brief summary of technological attributes associated with the diagnostic pieces.

It was possible to identify the following industries:

Late Mesolithic/early Neolithic: In this region, the late Mesolithic and the early Neolithic periods are both characterized by the exploitation of local chert, supplemented by the use of some local flint (i.e. Scottish east-coast flint), as a rule of thumb probably with a chert:flint ratio of c. 90:10, occasionally with chert dominating entirely. However, towards the end

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of the early Neolithic (at the time of kite-shaped arrowheads), Yorkshire flint began to be imported into Scotland, at the same time as 'jet' became more commonly used (Shepherd 1985; catalogue ['Early Individual Burials'] in Clarke *et al.* 1985). In the early Neolithic, Arran pitchstone was also imported into southern and central Scotland, with this raw material being fairly common along the big rivers, the Clyde and the Tweed (Ballin 2009; 2015).

Throughout most of this period, microblades were produced from small single-platform cores, but towards the end of the early Neolithic blades grew larger. The blades and microblades of this period were generally produced by soft percussion, after trimming/abrasion of the edges of plain core platforms. The tools were generally fairly small, and during the Mesolithic period they were modified by the application of edge-retouch (e.g. microliths), whereas after the Mesolithic/Neolithic transition some were also modified by invasive retouch (e.g. leaf-points).

Later Neolithic: After the early/middle Neolithic transition, large volumes of Yorkshire flint was imported into the region, with this raw material probably amounting to *c*. 90% of all lithic raw material, supplemented by some Scottish flint and local chert. In the Grooved Ware (Late Neolithic) period, 'black' flint became widely used. At this time, the exchange in Arran pitchstone had dropped to a 'trickle'. 'Jet' had now become more common.

Although traditional reduction techniques were still applied, the Levallois-like technique had been introduced around the early/middle Neolithic transition and was in use until the end of the late Neolithic (Ballin 2011a; Suddaby and Ballin 2010). This technique typically left finely faceted platform remnants, like the platforms of some blanks and tools recovered at the present site. The blades were now predominantly robust hard percussion blades, and tools were made by a combination of edge-retouch and invasive retouch. Prior to the early/middle Neolithic

		Area 1 Palaeochannel					Area 2 Temporary dwelling and surroundings				Area 3 pits			
Types	Est. date	004	005	008	128 /9	130	010	012	016	025	044	136	Unstr.	Total
Yorkshire flint	MN/LN		15						2		2	1	1	21
Black' flint	LN?		4											4
Pitchstone	EN		7		1		1	1		1				11
Jet'	MN/LN	1	7	1	1				1					11
Levallois-like	MN/LN	1	3											4
Blades	MN/LN	2	10				1		4					17
Microblades	LM/EN		4		2	1	2		1		2			12
Single-platf cores	LM/EN		2											2
Scalene	LM					1								1
Crescent	LM		1											1
Leaf-points	EN								1					1
Backed bladelets	MN/LN										2			2
Blade-scrapers	MN/LN	1												1
Scrapers w pressure-fl. edges			5											5
Scale-fl. knives	Neo/EBA				1									1
Serrated pieces	MN/LN	1												1
Strike-a-lights	MN/LN	1												1
Pounders	Post Meso		1											1
Frags of ground obj.	Post Meso		1											1
Ground ochre	?	1												1
TOTAL		8	60	1	5	2	4	1	9	1	6	1	1	99

Table 16: Distribution of diagnostic elements across the Hamilton site.

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transition, scrapers were almost exclusively steep-edged specimens, but towards the end of the MN/LN period scrapers with pressure-flaked, acute working-edges became common.

Distribution and activities

Table 16 shows the distribution of more or less diagnostic lithic and stone objects across the site. Unfortunately, most of those are from the palaeochannel, which includes finds of Mesolithic, early Neolithic, as well as later Neolithic date (see dating section). It is possible that this channel is the now dried out remains of a small stream, at the time feeding into the River Clyde.

The horseshoe-shaped structure (with surroundings), includes artefacts traditionally associated with the early Neolithic period, such as a leaf-shaped point (CAT 142) and pitchstone blades and bladelets, but the presence of Yorkshire flint and 'jet' suggests that this structure may date to the later part of the period. The fact that some of the pitchstone blades are fairly broad (up to W = 12 mm) supports this suggestion.

The SW group of pits is difficult to date, but the presence of Yorkshire flint indicates a date in the middle/late Neolithic period, although it cannot be ruled out that it is as early as the latest part of the early Neolithic and thereby (more or less) contemporary with the horseshoe-shaped structure.

The MN/LN element has no actual spatial focus, and the inclusion of elements from this period in the fills of the palaeochannel suggests that a settlement from this period is located upstream and that finds from this period may have been washed downstream, for example in connection with flooding. A piece like the heavily burnt strike-a-light CAT 1/25 could represent a disturbed cremation burial from this period, as it is clearly based on a stout blade and it would probably – being quite well-executed – have been considered 'special'. The finds from the horseshoe-shaped building clearly represents domestic settlement in the middle Neolithic.

Dating

The assemblage includes a wealth of diagnostic elements, although most are associated with the palaeochannel's mixed contexts (Table 16). The diagnostic elements include raw material preferences, various core and tool types, and technological attributes.

Raw materials: The finds show the well-known 'split' between southern Scotland's Mesolithic/early Neolithic assemblages, and the region's middle/late Neolithic assemblages (Ballin and Barrowman 2015, Table 10), where the former tend to be heavily dominated (c. 90-100%) by local grey bluish-chert, occasionally supplemented by small amounts of Scottish coastal pebble flint (e.g. Ballin and Johnson 2005; Ballin and Ward 2013), whereas the latter tend to be heavily dominated (maybe c. 90%) by imported so-called Yorkshire flint, occasionally supplemented by small amounts of Scottish flint and local chert (e.g. Ballin 2011b). The site's microliths are in local chert, whereas large flint blades and blade tools (some of them struck from Levallois-like cores; Ballin 2011a) tend to be in light-grey Yorkshire flint. A small number of pieces are in so-called 'black' flint, which has been associated with ate Neolithic assemblages bearing oblique arrowheads and Grooved Ware pottery (Ballin 2011b).

Although Arran pitchstone was used on Arran throughout prehistory, the systematic exchange in pitchstone seems (in central and southern Scotland) to be a mainly early Neolithic phenomenon, probably coming to an almost complete stop in the earliest part of the middle Neolithic (Ballin 2015). Along the Scottish western seaboard, all the way to Orkney, pitchstone was traded into later periods, including the late Neolithic (Ballin 2013). Materials of the jet family (in this report referred to as 'jet') are usually linked to the latest part of the early Neolithic, as well as the middle and late Neolithic periods (Shepherd 1985).

Typology: Small chert single-platform cores, from which small bladelets were detached by the application of soft percussion, generally

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date to the late Mesolithic/early Neolithic (e.g. Ballin and Johnson 2005; Ballin and Ward 2013; Ballin and Barrowman 2015, Table 15). The tools include numerous diagnostic pieces, such as early Neolithic leaf-shaped arrowheads (Butler 2005), one blade-scraper on a hard percussion blade (probably later Neolithic; Ballin 2011b), a scale-flaked knife (post Mesolithic; Butler 2005), a serrated piece on a Levallois-like blade (later Neolithic; Suddaby and Ballin 2010), a strike-a-light based on a stout blade (probably later Neolithic; Ballin 2011b), a pounder (post Mesolithic; Ballin forthcoming), and a fragment of a polished stone object (post Mesolithic; ibid.).

Technological attributes: The presence of microblades and narrow broadblades based on soft percussion, as well as broadblades based on hard percussion suggest the presence at the site of elements dating to the two periods mentioned above, the late Mesolithic/early Neolithic and the middle/late Neolithic (cf. Ballin and Johnson 2005; Ballin and Ward 2013; Ballin 2011b; Ballin and Barrowman 2015, Table 10). The use of Levallois-like technique dates exclusively to the later Neolithic (Ballin 2011a; Suddaby and Ballin 2010).

Invasive retouch (as used in connection with the modification of the leaf-shaped points and the scale-flaked knife) is associated with the Neolithic-early Bronze Age periods (cf. Butler 2005), and the grinding/polishing of stone objects is also distinctly post Mesolithic (cf. Ballin forthcoming). Neat, pressure-flaked scraper-edges are usually associated with the later Neolithic/early Bronze Age period (cf. Manby 1974; Saville 2005).

Table 16 has been subdivided into three spatial groups: 1) the palaeochannel; 2) the horseshoe-shaped dwelling and its surroundings; and 3) a group of pits towards the south-west. Group 1 includes finds datable to the late Mesolithic, the early Neolithic, and the later Neolithic. Group 2 includes finds usually associated with the early Neolithic, and the inclusion of pieces in Yorkshire flint and 'jet' may simply suggest that this dwelling dates to the later part of the early Neolithic. Group 3 may be datable to the later Neolithic, and the fact that the two backed bladelets from Context 044 are both in Yorkshire flint, simply underlines the point made above in connection with the definition of microliths, namely that backed bladelets are not microliths *sensu stricto*, and that they may potentially be associated with any blade-producing industry.

Summary and conclusions

The assemblage from Ferniegair includes 423 lithic and stone artefacts. It is heavily dominated by chert (61.7%) and flint (23.9%), with small amounts of quartz and quartzite (8.3%), and even smaller amounts of pitchstone (2.6%), materials of the jet family (2.6%), and other raw materials. A relatively large amount of the flint is so-called Yorkshire flint.

A total of 371 pieces (88%) is debitage, with 17 pieces being cores (4%) and 35 pieces tools (8%). Although the assemblage includes numerous well-executed and/or interesting tools, the use-value (in terms of inference and interpretation) of this collection is limited, as most of these pieces were retrieved from various fills of a palaeochannel, which may have been a small stream feeding into the River Clyde. Based on raw material preferences and typo-technological attributes it was possible to date the finds to the late Mesolithic, early Neolithic, and later Neolithic periods. The sub-assemblage from the palaeochannel includes finds from all periods; those from the crescent-shaped dwelling are likely to date to the early Neolithic, possibly its later part; and the finds from the south-west pits are most likely to date to the later Neolithic, although a date in the later part of the early Neolithic cannot be ruled out.

One of the more interesting aspects of this site is its links to parts of Britain beyond the local area. Arran pitchstone was procured through an extensive early Neolithic exchange network covering northern Britain from (at least) Dublin, Isle of Man and southern Cumbria in the south to Orkney in the north (Ballin 2009). At a later stage, so-called Yorkshire flint was procured from the opposite direction through an equally extensive exchange network covering the area from Yorkshire to northern Scotland, but with the 'black' flint possibly having been procured from sources even further away, such as East Anglia. This latter possibility needs further investigation. And the site's 'jet' may have been procured from Whitby in north-east England, although Scottish sources cannot be ruled out.

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Note on use-wear analysis

by Peter Bye Jensen

A selection of 18 stone tool artefacts from an assemblage of 424 pieces was made available for use-wear analysis. The selected stone tools were well suited for use-wear analysis, and the flint artefacts seemed in relatively fresh condition. Consequently, there are no signs of weathering of the flint artefacts. The selection of stone tools came from contexts number 010, 016 and 044.

The application is done via a microscope in low and high magnification, e.g. x20 and x200. The lower magnifications inform about the edge-damage and edge-rounding a flint tool sustains through abrasive use, whilst the higher magnifications may convey what contact material the flint tool has worked in and how. The results can be seen in Table 17.

Catalogue Nr and tool identification			Area 2 structure and occupation layer			Description of use-wear
	Raw mat	Macro use-wear	Pit 044	010	016	
Pit 044 fill						
CAT 252: Backed bladelet	Flint		x			Has generic weak polish, mostly on dorsal lateral right. The polish could potentially be from cutting/ slicing meat, but the use-wear is very sporadic.
CAT 252: Backed bladelet	Flint		x			The bladelet displays three areas of generic weak polish on ventral lateral left which suggests apparent use of the tool.
C010 (penannular-shaped shallow ditch)						
CAT 168: Retouch	Flint	x?		x		No visible traces of use
CAT 216: Crested blade	Flint	x		x		Lower ventral edge/distal edge shows generic weak polish from use. Ventral edge has some edge-damage from working a hard material such as mature wood or antler/bone.
C016 (occupation layer)						
CAT 41: Leaf-point	Flint				x	The projectile has traces of being hafted, however, there are only weak traces of the artefact having been fired in the shape of linear polish on the dorsal lateral left. The linear polish forms as a part of the projectile breaks off and slides down the projectile. However, the polish can also be formed via an object in the projectiles way such as bone, rocks or whatever the projectile hit (Bye-Jensen 2011). There are no use-wear to suggest that the projectile has been used for other tasks.
CAT 49: Flake	Chert	x?			x	Has weak traces of use, sporadic on both ventral and distal side of distal lateral.
CAT 63: Flake	Chert	x?			x	Possible traces of use on ventral lateral distal.

Table 17: Use-wear.

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Catalogue Nr and tool identification			Area 2 structure and occupation layer			Description of use-wear
	Raw mat	Macro use-wear	Pit 044	010	016	
CAT 71: Bipolar core	Chert	x			x	Its dorsal lateral has traces of having been used to plane/scrape in fresh or soft wood.
CAT 72: Crested blade	Chert	x?			x	Has traces of having been used to whittle wood on its ventral left lateral.
CAT 74: Flake	Chert	x			x	Ventral lateral right has some edge-rounding that can have been possibly caused by use.
CAT 76: Flake	Chert	x?			x	Ventral lateral distal show a combination of weak hide and/or meat polish, which suggest that this tool has been involved in butchering.
CAT 93: Flake	Flint	x			x	No traces of use
CAT 95: Blade	Chert	x			x	The ventral lateral right shows possible hafting traces. Mid lateral has traces of possible hide processing mostly on ventral. Some striations from edge and circa 0.5 mm almost perpendicular from edge.
CAT 111: Flake	Flint				x	Ventral lateral right with generic weak polish. Also found on dorsal side. Striations suggest work cutting or scraping in a 20 degrees angle from the edge.
CAT 116: Flake	Chert	x			x	Generic weak polish or meat polish on ventral distal end of flake. The polish is weak and potentially from light ad hoc work. The ventral surface near the bulbus showed possible tar residue as mastics from hafting. The same position showed weak hafting traces.
CAT 127: Retouch	Chert				x	The microblade do not show any polishes after use. However, the microblade does have some edge-damage that could be use-related.
CAT 132: Scraper	Flint				x	Displayed dry hide polish on its ventral lateral.
CAT 141: Indet	Chert	x?			x	Has weak traces of use. Edge-rounding suggests work with harder material like dry hide or mature wood.

Table 17: (continued): Use-wear.

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The jet pendant

by Alison Sheridan[6]

The jet pendant (SF 329) found in the silts (005) infilling the palaeochannel is small and claw-shaped, measuring 25.5 mm in length, with a maximum width of 8.8 mm and a thickness of 5.9 mm (Figure 27). It has a transverse perforation through the centre of its broader end; the inner diameter of this perforation is c. 1.7 mm, and it broadens to 3.8 mm at its outer edge on one side. The outer edge of the pendant, which is minimally convex, describes an arc of a circle c. 40 mm in diameter, and the curving inner edge meets the outer in a fairly sharp point. The sides taper towards the inner edge as well defined facets, so that in cross-section the pendant is sub-rectangular with a V-shaped lower edge. The perforation appears to have been drilled from both sides, but mostly from one side. Its interior appears smooth (insofar as can be seen), and the edges of the perforation are also fairly smooth, suggesting that it had seen some use – though not enough to create a thread-pull wear groove. The pendant had been polished to a high sheen, but there are faint striations from the grinding and polishing process visible on the sub-rectangular end (Figure 27). Also at this end there is a small, ancient, shiny conchoidal spall scar; the loss of this circular spall probably occurred during manufacture and its edge has been smoothed by the polishing process.

The raw material has been identified through microscopic examination and through X-ray fluorescence spectrometry (XRF, undertaken by Dr Lore Troalen, NMS) as jet, and this is most likely to have originated around Whitby in North Yorkshire – Britain's only significant source of jet. It is black, light, and warm to the touch, and has the distinctive hairline criss-cross cracking that is seen in many archaeological artefacts of jet. It has an incipient lamination along what would have been the natural structure of the parent wood from which the jet formed. The conchoidal spall scar is also highly characteristic of jet. The composition, as determined through XRF analysis, is characterised by an appreciable amount of zirconium and low iron, with some calcium and barium and a trace amount of strontium. This is consistent with analysed raw material samples of Whitby jet.

Discussion

This is a most intriguing object as it is very hard to find exact *comparanda* and, given its discovery within the palaeochannel, it is also very hard to date. It does not, however, give the impression of having been rolled around and washed into the palaeochannel: despite its (modern) surface cracking, it was in fairly pristine condition when found. Whether it is contemporary with any the other artefactual material found in this segment of the palaeochannel—namely sherds, a piece of ochre CAT 319, an arrowhead CAT 142 (Figure

Figure 27: both sides of the jet piece.

6 c/o National Museums Scotland, Edinburgh

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22) and a possible shale bangle roughout SF 38—or with the alder charcoal that has produced radiocarbon dates ranging between 2205–2038 cal BC (GU-46265) and 1638–1517 cal BC (GU-46264) is impossible to tell, since the deposit formation process may have involved inwashing and/or deliberate deposition over a long period.

There are objects that superficially resemble this object, but these do not stand up to close comparison. An unperforated, talon-shaped object of cannel coal that was once thought to be a roughout for a terminal plate of an early Bronze Age spacer-plate necklace, found at Broughton Knowe, Skirling, Scottish Borders is around twice the size of the Ferniegair pendant, with a groove around its centre (Figure 28; Wilson 1887, 193–4 and fig. 8; Callander 1916, 232 and fig. 12; Clarke *et al*. 1985, fig. 5.43; Reg. No. NMS X.FN 60). Its only resemblance to the Ferniegair pendant is a general similarity of shape. The identification of the Skirling object as a terminal plate roughout can be challenged, and the absence of contextual information as to its date—it was found while excavating material to repair a road, probably during the 1880s—reduces its value as a *comparandum* further. As for the bone and marine ivory pendants in the shape of teeth and eagle talons from late Neolithic Orkney (e.g. Clarke *et al.* 1985, fig. 3.29), again they are larger than the Ferniegair pendant and any similarity in their shape is likely to be coincidental.

Figure 28: Claw-shaped object of cannel coal from Skirling, Scottish Borders. Photo: NMS.

There are examples of Iron Age bangle fragments of cannel coal and shale where perforations have been made, either as repair holes (so that the pieces could be held together by a thread or by some other joining mechanism) or as a way of converting them into pendants. Occasionally, in the latter case, the fracture end away from the perforated end may be smoothed off or otherwise shaped, giving the fragments a superficial similarity to the Ferniegair pendant. One of at least seven undated (but assumed to be Iron Age) examples from Glenluce, Dumfries and Galloway (NMS X.BH 8365–9, 8397–8) is illustrated by Callander (1916, 232, fig. 11) while Fraser Hunter mentions two of Roman Iron Age date from Newstead Roman fort, Scottish Borders, in his review of Roman Iron Age jewellery of jet-like materials in Scotland (Hunter 2014, 153 and fig. 19.3, no. 47: NMS X.FRA 1176). However, the Ferniegair object gives the impression of having been made *ab initio* in the shape of a claw, rather than having been a fragment of a bangle that has been re-shaped. Its sub-rectangular cross section shape is not associated with bangles, which often have D-shaped hoop sections.

Given the absence of well-dated and convincing *comparanda*, the Ferniegair pendant has to be regarded as a currently-undateable, but most likely to be prehistoric, object. It will have been a precious possession, imported (either as raw material or in finished form) from a considerable distance, around 260 km as the crow flies, and used to signal the status or wealth of its owner. An early Bronze Age date cannot be ruled out for it, since: a) jet jewellery and dress accessories are known to have been imported to Scotland during that period; b) activity dating to the first half of the second millennium BC is attested nearby, at the early Bronze Age cemetery at Ferniegair (Welfare 1977); c) among the jewellery that has been found in early Bronze Age cinerary urns in Scotland, there is a variety of bead and pendant forms; and iv) as noted above, alder charcoal from this part of the palaeochannel has produced several early Bronze Age dates. Furthermore, the presence of Beaker sherds in the palaeochannel confirms that there is artefactual material probably dating to the late third millennium present in the vicinity (although, as noted above, there is no way of knowing whether it was associated with the pendant).

Adopting a cautious view, it has to be admitted that, until and unless a well-dated *comparandum* turns up, this pendant must remain a chronological mystery.

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The shale bracelet roughout from Ferniegair

By Fraser Hunter[7]

From the middle infill (131) of the palaeochannel came a single roughout for a shale bracelet, SF 380, broken in the process of manufacture. The technology was a standard one, with the shaping of a blank block into a circle and then perforation, either by removing a central disc or by making a smaller hole for expansion. Traces of the precise technique used here are not distinctive, but it lacks any of the characteristic markers for disc removal, suggesting it was probably perforated and expanded. Once perforated successfully, the maker would start trimming and abrading it to its final shape; there are traces of this process all-round the interior though the original shaping is still clear, suggesting it broke early in this stage. The tools used cannot certainly be identified in the absence of more experimental work, but the exterior seems to have been flaked to shape and there are traces of a possible gouge on both interior and exterior; abrasion was probably with coarse sandstone (Figure 29).

While the roughout technology is quite standard, what makes it unusual is its likely date in the early-middle Bronze Age. This sits very much at the beginning of shale bangles as a phenomenon; they first occur, exceedingly rarely, in Beaker-associated burials (notably a near-unique decorated example from a female burial with Beaker and copper-alloy ear-ring from Redland Farm, Northants; Bradley 2011), and appear more frequently, but still sporadically, on early-middle Bronze Age settlements. The evidence has not been collated in detail, but there are examples from central England and from southern Scotland. The classic manufacturing sites apparently of this date come from the Derbyshire Peak District at Swine Sty and Totley Moor (Beswick 1975). In Scotland, on current evidence they are very much a southern Scottish phenomenon. Three further findspots are known to the writer: from Bodsberry Hill and Larkhall, Lanarkshire (the latter close to the current example) and Glenrath, Peeblesshire, all associated with early-mid second millennium BC dates. All these are finished items; the Glenrath bangle had been reworked after it broke (Terry 1993, 58-9; unpublished Larkhall report by F Hunter for GUARD and unpublished Glenrath report by D McLaren for AOC).

In the Chalcolithic and early Bronze Age the use of such black organic-rich stones was distinctively different: high-status complex necklaces, bracelets and V-perforated buttons, often of jet, occur mostly in status burials. Over the course of the earlier second millennium BC a different repertoire developed: bangles, simpler individual beads, and so-called 'napkin rings'. The latter were concave-sided rings that functioned as garment fasteners, and are by far the most abundant black stone find of this period, with c. 100 examples known from 30 sites, predominantly from the Humber to the Forth; (Hunter 1998; and forthcoming). Beads are sparser, and known examples are markedly more irregular than types known in the early Bronze Age (e.g. Hunter in O'Connell and Anderson 2020, 51, illus 28).

Figure 29: both sides of the shale roughout.

7 National Museums Scotland, Edinburgh

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There are rather few assemblages of this date from Scotland, but it is noteworthy that neither the small group of such finds from Blackford (Perth and Kinross) nor the rather larger one from Lairg (Sutherland) show bangles from early to middle Bronze Age contexts, though they do have beads and (at Blackford) napkin rings; in both cases, bangles first appear in the late Bronze Age (Sheridan et al 1998; Hunter in O'Connell & Anderson 2020, 30, 51, 78-9). Three of the four bangles or roughouts demonstrably of this date are from Lanarkshire, and the fourth (the Glenrath example) comes from an area lacking in raw material, with evidence of reuse suggesting it was a cherished import. On current evidence, Lanarkshire was at the forefront of bangle use and, as this find shows, manufacture in the earlier second millennium BC.

The laminar structure identifies this as an oil shale. Such raw materials are best attested in West Lothian, a minimum of 25 km away, but there are records of thin outcrops closer to hand; for instance, exposures are reported near Strathaven (Flett 1922, 50). It is thus plausible that quite local material was being worked.

Catalogue

SF 380 Around half of a roughout for a bangle, broken in the course of manufacture. The outer edge had been roughly shaped bifacially into a circle, with finer shaping and smoothing of this edge begun in one place. The perforation had been created, its biconical form indicating it had been worked from both sides, but it is impossible to say whether this involved removal of a solid circular disc, or the making of a smaller hole and its expansion to the desired size. The latter is more likely, as disc removal often leaves a residual ridge on the interior until this is smoothed off. The perforation is notably off-centre to the disc; there are traces of smoothing of the toolmarks around the interior. One face relied on the naturally smooth split surface; the other was more irregular with some abrasion to shape it. The shaping of the outer edge could have been by flaking, but on both outer edge and perforation there are series of scallops 5-7mm wide, suggesting quite a fine tool was used, perhaps some form of chisel or gouge (whether metal or flint is as yet unclear). Final shaping on the outer edge used abrasion. Highly laminar fracture identifies it as oil shale. External diameter 116 mm, internal diameter 55 mm; width 26.5-41.5 mm, thickness 15-19 mm, weight 99.2g. From context 131.

Prehistoric pottery

By Beverley Ballin Smith

Summary

From the radiocarbon dates the palaeochannel was in use for a long period of time from the early Bronze Age through to the beginning of the middle Bronze Age, but the analysis of the pottery from it pushes its use further back in time. The material culture of its contents reflects the domestic activities of settlement to its west, for which otherwise there is a paucity of evidence. The range of pottery vessels found there includes early Neolithic Carinated Bowls, middle Neolithic Impressed Wares, possibly late Neolithic Grooved Ware and both comb and cord impressed vessels from the middle part of the early Bronze Age. The vessels reflect pottery styles current at the time and some were adapted for domestic uses. The condition of the pottery is poor and highly fragmented due to the wet environment in the palaeochannel and because of this some of the identification of sherds is tentative.

Introduction

The assemblage is a collection of prehistoric pottery which was recovered mainly by hand from the site. A small number of smaller pieces came from the site's sieved soil samples. All the sherds were washed before analysis and were examined using a x6 hand lens. Their attributes and statistics have been compiled in an archivable table devised using Microsoft Excel. The pottery was analysed according to the revised guidelines of the Prehistoric Ceramics Research Group (2010), the CIfA's Standards and Guidance for the collection, documentation, conservation and research of archaeological materials (2014, updated 2020).

Analysis and description of the sherds

The pottery assemblage comprises 391 sherds and is dominated by body sherds and fragments, which amount to 85% of the total assemblage. The remaining 15% (Table 18) comprise diagnostic sherds of rims, bases, carinations and cordons. The total weight of the assemblage is 2605 g.

The pottery is all hand-built and was largely retrieved from the material infilling a damp or wet palaeochannel. The collection is generally

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considered to be in poor condition due it lying in water-logged soils or in water. The burial conditions and the resultant post-depositional changes have severely affected the condition of the pottery with many sherds having acquired deposits of iron-staining, or adhesions of iron-pan or concreted mud. In many cases these deposits have masked decoration and obscured surface finishes. Many of the sherds are laminated or have suffered loss of a surface or parts of one. Another problem is that over 90% of the pottery is either abraded or heavily abraded due to water movement within the palaeochannel.

With the post-depositional conditions dominating the condition of the pottery, and the limited number of contexts from which the collection was retrieved, the information on the practices of burial or discarding of vessels is weak. The analysis of the sherds has had to take into account this evidence, and therefore a general approach has been adapted. The assemblage has been analysed as a single unit with the identification of diagnostic sherds taking priority. Where a group of similar and distinctive sherds was retrieved together, these have been treated as a separate unit (see Table 19).

The statistics of sherd thicknesses and weights are displayed in Table 19. The sherds of early Neolithic Carinated Bowls are consistently thin-walled with some being the finest produced in the assemblage. However, the average weight of these sherds is not the lightest and this may be due to the use of rock quartz as a tempering mineral.

	Rims	Bases	Bodies	Carinations/ cordons	Fragments	Decorated	Total
Number	26	18	270	17*	62**	95***	390
Percentages	6.6	4.6	69.2	4.3	15.8	24.3	100.5

* Four are rims
** Includes fragments not counted
*** Decorated sherds include rim and body sherds

Table 18: Pottery sherd forms identified.

Type	Vessel Nos.	No. sherds	Average sherd thickness (mm)	Total Weight (g)	Average sherd weight (g)
Sherds attributed to vessels					
Early Neolithic Carinated Bowl	V1	19	6.2	143.6	7.6
Early Neolithic Carinated Bowl	V2	1	10	12.7	12.7
Early Neolithic Carinated Bowl	V3	2	12	31	15.5
Early Neolithic Carinated Bowl	V4	3	8.7	21	7
Modified Early Neolihic Carinated bowl	V6	4	8.1	30.6	7.6
MN Impressed Ware	V5	9	9.1	73.2	8.1
MN Impressed Ware	V13	4	11.4	97.5	24.4
Grooved Ware/possible Grooved Ware?	V8	29	9.7	152.4	8
Grooved Ware/possible Grooved Ware?	V9	12	9.5	122.2	10.2
Grooved Ware/possible Grooved Ware?	V10	9	10.4	105.3	11.7
EBA domestic Beaker	V7	5	7.9	31.5	6.3
EBA domestic Beaker	V11	2	11.8	13	6.5
EBA cord impressed Beakers	V14	8	9.6	139.4	17.4
EBA cord impressed Beakers	V15	6	8.3	34.9	5.8
EBA cord impressed Beakers	V16	2	12.3	55.5	27.7
MBA vessel	V12	1	15.2	26.2	26.2
MBA vessel	V17	5	17.6	243.8	48.8
Sherds not attributed to vessels					
Other incised sherds		59	8.9	269.8	4.6
Carinations/Cordons		11	9.6	61.2	8.7
Undecorated rim sherds		5	8.9	12.8	2.6
Base sherds		16	8.3	118.3	7.4
Plain body sherds		177	9.4	807.4	4.5

Table 19: Pottery sherd thickness and weight.

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The latticework incised vessel, V6 has a lower average sherd weight but the average sherd thickness suggests it was a slightly more robust vessel than the early Neolithic bowls. Middle Neolithic sherds with impressed decoration and those from the early Bronze Age with cord impressions have similar average sherd thicknesses of 9.1 mm and 9.7 mm respectively, but the latter has a heavier average sherd weight than the former suggesting the use of heavier mineral temper, or more of it. In general, Bronze Age pottery tends to be heavier than some earlier and later vessels.

The Bronze Age 'heavy vessel' is notably different than the rest of the assemblage, as it is twice the average sherd weight of vessel(s) with comb impressions and has the widest range of sherd wall widths in the assemblage. Its matrix contained quartz and other rock fragments as well as sand. Being robust, it has also fractured less than other sherds.

The base sherds that have survived, although not attributed to vessels, are relatively thin and light in weight, while the plain body sherds vary in thickness but have the lightest average sherd weight indicating their high fragmentation.

Most of the stone fragments added to the clay as temper, except quartz and degraded amphibolite, have not been identified due to taphonomic processes. The presence of quartz sand in some sherds implies that it was added deliberately to the clay as part of the ingredients needed to make pottery to aid the thermal properties of the clay. Another added ingredient to make the clay more plastic was cut straw or dried grasses.

Manufacture of the pottery

The raw materials of clay, stone and sand used in the manufacture of the pottery are most likely to have derived locally from the subsoil deposits of sand, gravels and silts laid down during the last Ice Age by melt-water deposits (BGS 2017). It is equally possible that the nearby River Clyde and Avon Water as well as small tributary streams may have also provided the raw material resources.

Due to the burial conditions in which the majority of pottery was found, only a small percentage (0.25%) of sherds retained evidence of how they were made or finished. Finger moulding marks survived on SF 90 a base sherd from the occupation deposits (context 016 in Area 2), and on plain body sherds of context (005) of the palaeochannel. Impressions of organic material were identified on some body sherds across the excavated area, whereas possible smoothing and wipe marks from surface treatment were noted on sherds from the palaeochannel deposit (005). Burnt or carbonised food residues were found on sherds with incised lines (SF 48, 125, 145 and 157), on sherds with cord impressed decoration (SF 268 and 262), and other plain sherds. Most of these were again from (005) of the palaeochannel or (010) in Area 2 to the north-west.

Vessel 1 the early Neolithic Carinated Bowl from Trench 15, context (003), which cut through Area 4 and also the palaeochannel is the most informative of the assemblage, as some sherds retained evidence of smoothing, burnishing and wipe marks, as well as carbonised food residues. Some of its sherds were also burnt.

Descriptions of vessels and other grouped sherds (all Figure 30)

The descriptions below, together with the catalogue, provide detail of vessels identified in the collection.

Vessel 1 – Early Neolithic Carinated bowl

This vessel, which was identified as being probably the earliest manufactured on the site, is round-bottomed, comprising rim and carinated sherds and possibly a burnt sherd from near the base of the vessel. It was found in an occupation layer (15003) in Trench 15 during the evaluation that is closely associated with a pit and postholes, which were excavated later as Area 4. A total of 19 sherds weighing 143.6 g survive of this predominantly grey-coloured pot. The occurrence of both fine rock and organic temper, have aided the pliability and resilience of the clay. The vessel, which is one of the thinnest found on the site, has sherds averaging 6.1 mm in thickness. It was not possible to determine the diameter of the everted rim due to its uneven form. However, this is one of the few vessels from the assemblage where evidence has survived of the finishing of the external surface by smoothing or burnishing to form a high polish. Other sherds of this vessel appear to have been wiped where the surface finish has been abraded

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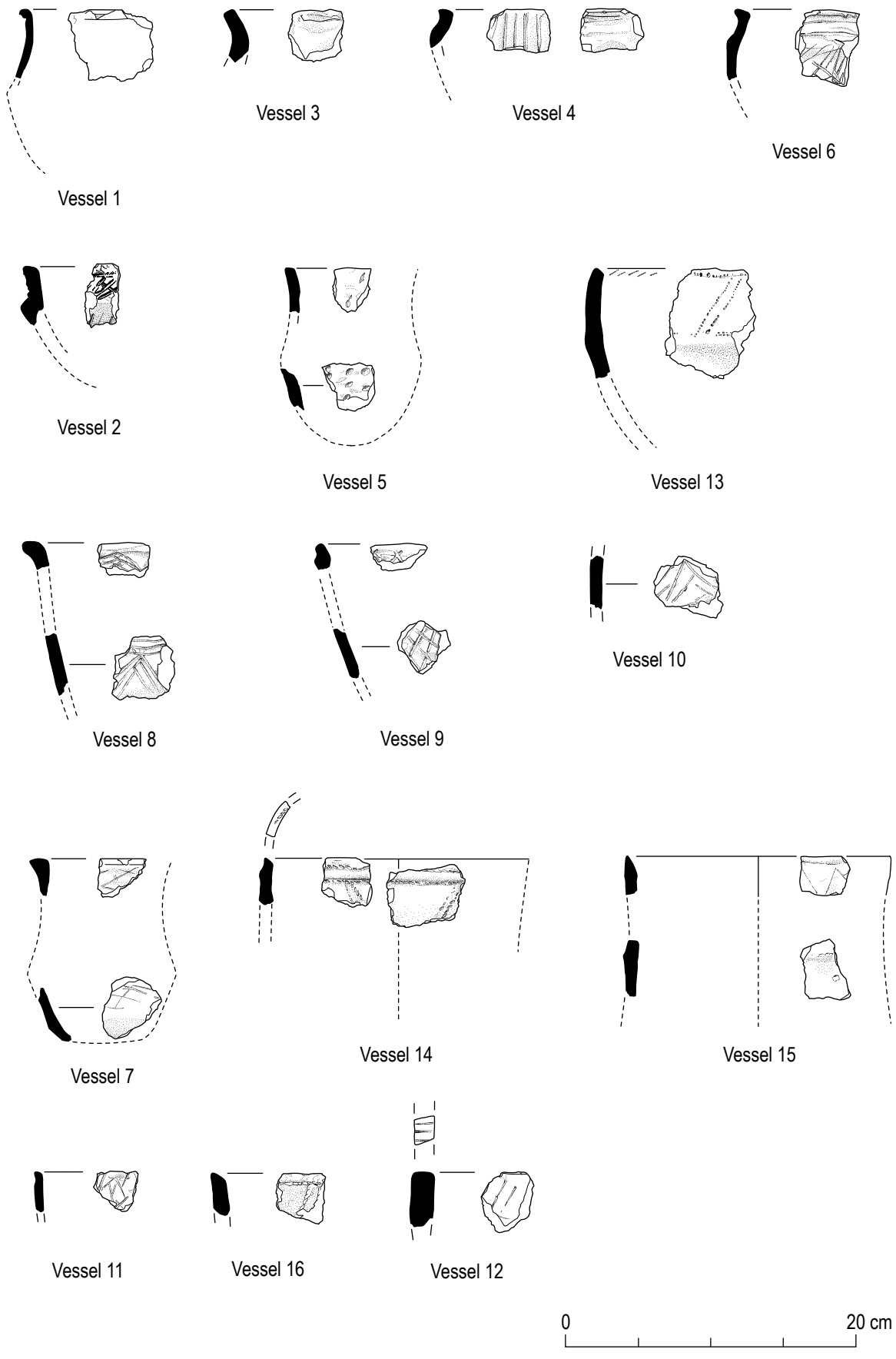

Figure 30: Early Neolithic Carinated Bowls - Vessel 1, 3, 4 and 6), Middle Neolithic Impressed Wares - Vessels 2, 5 and 13, Late Neolithic Grooved Ware - Vessels, 8, 9 and 10, Early Bronze Age Beakers - 7, 11, 14, 15, 16, Bronze Age Vessel 12.

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away. The presence of carbonised food residues on one of the sherds possibly indicates that this was a cooking vessel.

Vessel 2 – Middle Neolithic Impressed Ware bowl

A possible continuation of the occupation layer in Trench 15, (15004), produced SF 9 a decorated carinated rim sherd, weighing 12.7 g. The piece, which is heavily abraded and infiltrated by roots from the topsoil, contains a mixture of rock temper, but the presence of organic remains is uncertain.

The rim diameter could not be measured but it is slightly everted, with a possible internal bevel, but is 10 mm in thickness. The neck measures c. 10 mm from the base of rim fold to the top of the carination. The latter is applied and is moulded into a right-angled triangle in shape. The piece is decorated on the neck of the vessel with three deep oblique parallel incisions or grooves, crossed by two at right angles. The finishing of the sherd has been lost through abrasion and attrition but also because the sherd is possibly burnt.

Vessel 3 – Early Neolithic Carinated bowl

SF 179 and 202 are both from the horseshoe-shaped deposit context (010) in Area 2. Both are rim sherds and are likely to be from the same vessel. There are associated body sherds and fragments amounting to a total of 39 g. Only the wall thickness of one sherd could be measured and that was 12 mm. The sherds are heavily abraded and laminated due to iron infiltration. Rim 179 has two possible finger nail edge impressions below it where the rim has been folded over and rounded. The piece thickens towards the bottom where there might have been a cordon/carination. Has lost part of its interior surface but is from a thick-walled vessel. SF 202 is a small fragment of a rounded rim. The largest body sherd has the remains of the two parallel incised lines on its surface.

Vessel 4 – Modified early Neolithic Carinated bowl

This vessel SF 60 and SF 101 comprise three sherds, two are rims and the other is a small body sherd. Together they weigh 21 g and were found in Area 2, (016). The largest sherd, SF 60 has a sherd width of 11.1 mm. SF 101 is a small non-joining fragment of the same rim. The rim is flat-topped, slightly angled downwards, and everted with a short concave neck to a slightly protruding shoulder. The heavily abraded interior surface of the rim has 5 vertical incised and parallel lines. The other rim sherd is plain.

Vessel 5 – Middle Neolithic Impressed Ware vessel

SF 62 and 64, account for two body sherds and three base sherds, from context 016, an occupation deposit overlying the horseshoe-shaped deposits in Area2 structure and SF 135, 170 and 198a a single body sherd each and SF 217 a decorated rim, from the palaeochannel (005). Together they weight 73.2 g and their average sherd thickness is 9.1 mm. The pottery contains medium to coarse irregular but unidentified mineral fragments, but organic temper was noted as being present in one sherd. All the pottery is abraded but one has partial loss of its interior surface. The rare grass impressions could indicate that the vessel was organically tempered or that it was wiped with dry grass before it was decorated. They are all likely to be fragments of a single vessel.

Rim SF 217 is a slightly everted rim with an interior bevel and a concave neck. It has two misshapen incised marks on its surface. The upper one is a small slash and the bottom one is a scoop with a tail or drag mark. SF 135 is decorated with two small oval scoops and SF 170 has up to seven small oval scoops impressed into its surface as a decoration, possibly grain impressions. SF 62 carries three scoops as does SF 198a, in spite of lamination of their surfaces.

One base sherd of SF 64 has surface deposits. Another is incised with three deep grooves and a possible scoop, and the third sherd is plain. Approximately 20% present of the base is present, with a diameter of c. 60-80 mm.

This vessel was associated with a possible structure as well the palaeochannel and is likely to be middle Neolithic in date. The radiocarbon date from (010) indicates a middle Neolithic range for its use of 3499 – 3348 cal BC (SUERC 77088, 4608 ± 24 BP). It is not inconceivable that the vessel broke during use and the upper parts of it were discarded into the palaeochannel (see

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below), with the base and parts of the vessel wall becoming embedded the deposits of (010).

Sherds with incised lines

Sherds decorated with incised lines of various types form the largest group of pottery in the assemblage. An attempt has been made to differentiate the types of decoration and group sherds accordingly into likely vessels. This has not been an easy exercise, but six variations of the decoration have been identified.

Vessel 6 – Modified early Neolithic Carinated bowl

These four sherds (SF 18 and 25) from the palaeochannel (005) include a carinated rim and three body sherds. They represent a slightly finer vessel than most of rest of the sherds in this category. They weigh 30.6 g and average 8.2 mm in sherd width.

The majority of the sherds were heavily abraded although it was possible to identify medium-coarse rock temper but not the presence of organic material. SF 25 is a roughly flat-topped and everted rim, which has been moulded at a slightly oblique angle to the shallow neck and the carinated shoulder. It is possible that the top of the rim may have been decorated. The decorated above the carination and below the rim comprises two parallel, but wide spaced incised horizontal lines. The decoration on the body of the vessel and on the carination is formed of deeply incised oblique lines with some cross-hatching. The design appears to be somewhat random. The polished and burnished finish, this pottery received during manufacture, has not entirely eroded away. The vessel, with its narrowed mouth and out-turned rim, may have been vase-shaped.

Vessel 7 – Early Bronze Age domestic Beaker

Two rims, SF 185 and 186, and three body sherds including SF 125 and 188a are from the same vessel and weigh 35.1 g with an average sherd thickness of 7.9 mm. They were found in (005) of the palaeochannel. The presence of white quartz temper is clearly visible, although other unidentified stone has also been added to the clay prior to manufacture. The addition of organic matter is not confirmed. The rims are flat-topped to slightly rounded and everted, and although they are clearly from the same vessel, the moulding of the rim has not been consistent. In both examples the decoration below the rims comprises a single oblique incised line. One of the body sherds has four or five incised lines which would have been positioned close to the base edge. The distinctive aspect of the decoration is that it was only lightly incised into the clay.

Vessel 8 – Late Neolithic Grooved Ware?

This vessel comprises 29 sherds, SF 10, 116, 144, 148, 150, 160, 173, 184, 193, 207, 209, 225, 227 and Sample 50 that weigh a total of 152.4 g. These finds include three rims, two base sherds, a possible cordon and 14 decorated sherds. The average thickness of these sherds is 9.7 mm.

Apart from SF 10, which was found in Trench 15, (15004), an occupation layer related to a pit and postholes of a structure in Area 4, the remainder of the sherds came from the palaeochannel (005). Although a little quartz is noted in SF 227, the other medium-coarse mineral temper has not been identified and the presence of organic temper is not confirmed.

Rim SF 209 is a straight to slightly everted rim with deep interior bevel. It is decorated with deeply incised, broad grooves to form a chevron of three parallel lines crossing two lines which are not parallel. The design seems to continue with SF 148 which has three incised parallel grooves below which is a chevron. This comprises three parallel grooves which are crossed by two deeper incised parallel lines. SF 116 is a similar rim to SF 209, but where the interior bevel has evidence that it was incised with Vs. Its exterior decoration has three parallel lines below the rim with evidence of chevrons below. This change in order of the design might suggest a second vessel.

The chevron decoration on the body of the vessel(s) has survived also on SF 10 and 193, with the former having four parallel grooves forming its design. On other sherds only the remains of two or three parallel grooves remain. Base or base edge sherds survive in SF 173 and 184, with a possible cordon in the former.

The location of some of this pottery in the occupation layer may indicate that that it was in use in the late Neolithic.

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Vessel 9 – Late Neolithic Grooved Ware?

The 12 sherds of this vessel SF 192, 20, 131, 147, 153, 205, 208, 210, including one rim and 11 body sherds weigh 122.2 g. Nine of the sherds are decorated and their average thickness is 9.4 mm. They are all derived from the palaeochannel (005). The temper is unidentified mixed rock but it does include a little white quartz rock. The use of organic temper is not proven.

SF 192 the rim has an informal internal bevel, with a sharp rounded top, that is slightly everted. Beneath the rim are four incised grooves forming two small crosses. Its accompanying body sherd has a lattice of diamonds formed by four incised lines. Other sherds such as SF 205 have a lattice of three parallel lines crossed by another three at right angles. There is some loss of the exterior surface on some of the sherds. It is likely that this vessel is also a late Neolithic Grooved Ware pot.

Vessel 10 – Late Neolithic Grooved Ware?

This vessel comprises nine decorated body sherds from SF 145, 157, 183, 195, 198b and 200, which together weigh 105.3 g. The sherds have an average wall thickness of 10.4 mm and are heavier and more robust than the vessels described above with incised decoration. All the sherds were found in the palaeochannel (005). Their mineral content is largely unidentified but organic temper was noted in SF 198b and 200.

SF 145 is a sherd that would have lain close to the base of the pot, which probably broke just above the base-edge. The sherd carries three wide-spaced incised lines running obliquely up and down the sherd, with a horizontal line below them. SF 145 with SF 157 and 198b, have substantial carbonised food remains on the sherd interiors, and SF 183 appears polished. Slighter carbonised residues can be found on SF 183. SF 145 and 200 are also burnt, and together the evidence suggests that these sherds represent the lower portion of a vessel, but where the base is missing.

The decoration on these sherds is appears random. SF 195 Is decorated with four incised lines forming a lattice and SF 157 has six lines, where three of them form a large A. SF 183 has eight incised lines forming a diamond lattice resembling a star, possibly executed using a slightly ridged stick. SF 198b has three lines resembling a Z shape and SF 200 is a sherd with five incised lines, four forming apices of two nested triangles, plus one other line. It would appear that the decoration is a large all-over design of which only small elements survive on the sherd surfaces.

Vessel 11 – Early Bronze Age Domestic Beaker?

SF 124 and 136 are two thin-walled body sherds with an average thickness of 6.5 mm. Their total weight is 11.8 g and their mineral content is unidentified. They were both found in the palaeochannel (005).

These sherds are different from Vessel 7, in both colour and texture, in spite of the deposits that adhere to both sherds. SF 136 is from near the base of the vessel. They are both decorated by a fine sharp tool, such as a flint blade, with a denser overall design with lozenges or diamonds, than that found on Vessel 7.

Vessel 12 – Middle Bronze Age?

Rim SF 22 from the palaeochannel weighs 26.2g and has a wall width of 15.2 mm. It is flat-topped and straight but decorated on its top with three parallel deep incised lines running across the width of the rim. The exterior of the sherd has two oblique incised and parallel lines cut deeply into the fabric. The sherd has surface deposits and coarse, unidentified mineral temper.

Not attributed to vessels but with evidence of incised lines are the following sherds: SF 14, 33, 45, 49, 59, 60, 93b, 117, 143, 151, 163, 164a, 173a, 191, 196, 199, 202, 206, 214, 243, 278a, 309, 317, Sample 51 and 124.

Sherds with comb impressions

Vessel 13 – Middle Neolithic Impressed Ware

Four similar sherds weighing 97.5 g, including two rims and a cordon are derived from two areas of the site, the palaeochannel and Trench 4 (the fill of an adjacent linear feature), but are likely to be from the same vessel.

The pottery is heavily gritted with unidentified mineral content but with an average sherd width of 11.4 mm. Due to the addition of more grit added to the clay than in the previously

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described vessels, and the uncertainly of the presence of organic matter, this vessel was a substantially heavier pot than those of Neolithic date described above. The rim sherds do not join but both are from the same vessel, and both have an internal bevel, however the rim diameter could not be measured. The shape of this pot is determined by its straight neck with its narrowed, slightly reduced diameter rim, and by a slight moulded cordon 50 mm below. The form of the vessel suggests its belly narrowed slightly to its base, forming a bipartite pot.

The decoration comprises a single horizontal line of fine-toothed impressions pressed into the clay below the rim, and a corresponding horizontal line or two, of similar impressions was made just above the cordon. Between the rim and the cordon, evidence of a decorative motif survived, comprising two parallel oblique incised lines c. 5 mm apart of fine-toothed marks. This decoration is likely to have continued around the vessel every 40 to 50 mm. There is little of the vessel surviving below the carination and no additional evidence of the decoration continuing to the base. The absence of carbonised food residues on these four sherds may imply that this was a storage vessel rather than one used for cooking, but this is uncertain.

The decoration of fine comb impressions lies within the suite of motifs used during the later Neolithic and early Bronze Age on Beaker vessels. Although this is not a Beaker, it was probably manufactured sometime during the middle part of the Neolithic.

Vessel 14 – Early Bronze Age Beaker

A total of eight sherds represent this vessel. There are two rims, both with a cordon, a separate sherd with a cordon and five body sherds that together weigh 139.4 g. All sherds have decoration, and their average wall thickness is 9.7 mm. Most of the sherds are from the palaeochannel (005) with SF 371 coming from the lowest fill of the feature (129). Quartz temper was noted in about half the sherds, but the remaining mineral temper was not identified.

This vessel includes a heavily abraded rim sherd SF 268 that measured c. 180 mm in diameter, but only c. 3% of it is present. The straight rim has a moulded cordon 5.5 mm below the rim top which is c. 7.5 mm wide and is bordered below by a horizontal impressed line of 'S' twisted cord. Two or three oblique lines run from it down the body of the vessel but the sherd is particularly abraded at that point. There is also a faint suggestion that there was also a horizontal line of cord impression above the cordon, and possibly along the internal bevel of the rim.

SF 386 is a rim with a straight body and a sharp interior bevel, which may have supported a line of impressed cord. However, its cordon which is c. 8 mm wide is bordered by parallel and horizontal lines of cord impressions. From the line below the cordon, three parallel lines of impressed cord run obliquely down the vessel body.

SF 256 has a low cordon, c. 8 mm wide that has a horizontal line of impressed cord immediately above and below it. Two parallel lines of obliquely impressed cord, c. 5 mm apart run from the bottom of the cordon. SF 385 is decorated with two horizontal lines of cord impressions c. 6 mm apart, which form a slight cordon. Below that are two oblique parallel lines of chord impressions 10 mm apart.

The remaining sherds have either a single line of cord impressions, or the decoration runs along one side of a moulded cordon.

It is clear that most of the decoration of this largely straight-sided vessel is associated with its rim and one cordon is located a few millimetres below it. Another cordon may have been present lower down the vessel neck. The evidence also indicates that the oblique lines of parallel cord impressions run in opposite directions across the vessel body, suggesting that they cross at points around its circumference.

Vessel 15 – Early Bronze Age Beaker

SF 262, 333, 341, 390 and sample 181 produced a total of six sherds weighing 34.9 g. Of these sherds, one is a rim, one is a cordon and the remainder are body sherds. Five sherds are decorated with cord impressions. Their average sherd wall width is 8.3 mm. All the sherds were found in the palaeochannel (005). As with other vessels in this assemblage some quartz rock is present with unidentified stone temper.

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SF 341 rim sherd has an acutely sloping interior bevel that produced a narrow and almost sharp-edged rim top. The sherd is incised with a single horizontal line of impressed cord just below the rim, with one definite and one faint oblique line running from it. The rim is 130 mm in diameter (c. 5 % present) and its surfaces are badly cracked. SF 262 has a narrow cordon below which is a horizontal incised cord line that partly overlaps onto the cordon.

This vessel has a narrower rim diameter than Vessel 14, but it probably of similar type – a Beaker. The presence of carbonised food remains suggests it had a domestic use. It is probably also a near contemporary of Vessel 14, belonging to the early Bronze Age.

Vessel 16 – Early Bronze Age Beaker

This vessel comprises two decorated pieces, SF 380 and 373, a rim and a body sherd. They weigh 55.5 g and average 12.3 mm in sherd thickness and they are from a thicker walled and heavier vessel than either V14 or V15. Both sherds were found in the lowest deposit in the palaeochannel (129). The sherds are heavily water damaged and stained. The rim has a plain interior bevel and the piece is decorated with a horizontal cord impressed line below the rim with two parallel lines of oblique cordon below. SF 373 is decorated with one horizontal and two slightly oblique but parallel lines of impressed cord. Again the sherds are heavily stained with iron and other adhesions from being in water and are badly abraded.

This vessel is probably very similar in form and date to the previous two.

The occurrence of this type of cord impressed decorated pottery is linked to the appearance of Beakers at the transition of the end of the late Neolithic and the beginning of the early Bronze Age. However, it is likely that this pottery dates to around the middle and later part of the early Bronze Age, where a range of domestic vessels may have been produced (see Gibson 2002, 97)

Vessel 17 – Middle Bronze Age? (not illustrated)

A total of five sherds from the palaeochannel (005) and a possible occupation layer (095), Area 3 to the south-west of the excavated area, were identified as a separate vessel: SF 266, 267, 302, 330 and 332. The sherds comprise three base sherds and two body sherds. Quartz, sand and other unidentified rocks of medium to coarse grain size were mixed into the clay but the identification of organic temper is uncertain. Due to abrasion, the finishing of the vessel's surfaces is missing. The best preserved sherds are the base fragments, which indicate a vessel with an internal diameter of c.130 mm with about 40% of it surviving. They range in thickness from 17.5 mm to 21.4 mm, with body sherds from 13.5 mm to 15 mm. There is evidence of burning and wear on the base sherds. This is probably a vessel dating to the period of the latter part of the early Bronze Age into the middle Bronze Age.

Undecorated sherds unassigned to vessels

Total of three rims with two related body sherds (SF 224, 283 and 303) all derived from the palaeochannel (005). SF 224 is a slightly everted and rounded rim, with a plain body, and with loss of surface, which could relate to the middle Neolithic Impressed Ware Vessel 7. SF 283 is a small fragment of a rounded rim, with another fragmentary piece. SF 303 is a fragment of a rounded rim.

These rims are small sherds, with the largest weighing 5 g and measure on average 8.9 mm in thickness. It was not possible to measure the diameters of any of them.

There are a total of 10 base sherds and an additional six associated body sherds. SF 79, 90, 93a are from the occupation layer in Area 2 (016) and SF 166, 215, 226, 233 and 306 are from the palaeochannel (005).

SF 90 base sherd is the most informative. Its diameter measures c. 120 mm and c.10% of it is present. It is a finely made base with part of the vessel wall, but is abraded with surface deposits. It weighs 17.4 g and measures 8.5 mm in thickness. This and SF 79 could possibly be base sherds belonging to one or more of the Grooved Ware vessels.

In addition to the above, there are a total of seven carinated sherds with four associated body sherds and 117 plain body sherds from all areas of the site but mainly (005). SF 52, from the horseshoe-shaped feature (010), is two badly

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abraded carinated sherds. It is possible they are from one of the early Neolithic Carinated bowls.

Vessel form and function

Early Neolithic

The condition of the assemblage and the limits placed on the identification of individual vessels, have affected the surviving evidence of the size of pots and the uses to which they were put. However, the following information has been ascertained. The rim diameter of the best preserved vessel the early Neolithic Carinated Bowl (Vessel 1) could not be determined but the presence of burnished sherds indicates that it was well-finished well. The limited number of burnt sherds and food deposits suggest that it had been used on the hearth for cooking. Vessels 3 and 4 are also rims of early Neolithic Carinated bowls: the latter in particular has an extremely short neck and decoration, suggesting it is a modified carinated bowl. This evidence suggests that more than one type of early bowl were in use at the site.

Vessel 6 sherds preserved some of the fine finishing it received during its manufacture. The evidence of its narrow mouth with an everted rim, short neck and carination suggests it may have been a modified carinated bowl. The vessel was also decorated in part.

Middle Neolithic

The sherd representing (Vessel 2) the middle Neolithic Impressed Ware bowl is limited in information about the size and function of the pot. The fragments of Vessel 5 indicate that the pot was probably more of a tapering bowl, possibly with a flat base of up to 80 mm in diameter. The motifs of small oval scoops, perhaps with grooves may have been incised across the whole surface of the vessel. Its function could have been for storage of dried or liquid foods.

The sherds from Vessel 13, decorated with comb-tooth impressions, suggest that it was an open bowl that tapered to its base. It's slightly inturned rim and cordon as well as its neck and rim top decoration suggests it belongs in the middle Neolithic Impressed Ware tradition.

Late Neolithic

Vessels 8 and 9 are probably quite small open bowls with flat bases but carrying all-over grooved designs of chevrons and horizontal lines (Vessel 8) and lattices or diamonds (Vessel 9). There is a lack of evidence to indicate their actual function but they belong to the tradition of late Neolithic Grooved Ware pots.

The lower portion of decorated Vessel 10 with its carbonised food remains indicates it was a cooking vessel, possibly bucket-shaped, and potentially also belonging to the late Neolithic Grooved Ware tradition. Although Vessel 11 is a much finer pot, it could be contemporary with Vessel 10, but possibly was an open bowl like Vessels 8 and 9.

Early Bronze Age

Vessels 14, 15 and 16 are variations of Beakers with incised cord decoration. Vessel 15 is a smaller pot than Vessel 14 and both could have been associated with food preparation because of the presence of carbonised food remains. Vessel 16 is in very poor condition but it was a more robust vessel than the previous two. The type of decoration and its location is similar on each of the three vessels – below the rim (and above and below the cordon where present), with oblique lines of cord radiating from the rim or the cordon at c. 40-45˚.

Middle Bronze Age

Vessel 12 is a much heavier and more substantial pot than most of the other vessels. Its straight rim with its internal decoration could suggest it is a later dated vessel, perhaps from the Bronze Age.

The scant remains of a heavier vessel (Vessel 17) indicate it was flat-bottomed with an internal basal diameter of 130 mm. The robustness of the pottery suggests it was a larger vessel than those already described but the lack of a rim hampers interpretation of form and function.

Vessel distribution

The distribution of vessels is mostly centred on the palaeochannel as this is where the majority of the assemblage was recovered. However, a

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number of significant links can be made with pottery found in other contexts close to the western side of the channel. These links, which are not joins, but sherds identified as likely to be of the same vessel, are described below and also in Table 20, (see also Figure 2).

Two early Neolithic plain Carinated Bowls have been identified from, or related to, structures. The best preserved, Vessel 1, was found in context (15003) in Trench 15, which came from over the central pit and posthole grouping (Area 4) identified during the excavation, probably indicating the presence of a structure there. The other, Vessel 2, came from the remains of an occupation layer (context 15004) clearly associated with the same pit and postholes.

Vessel No.	Vessel type	Location found	Location found	Tr 15	Tr 17	Palaeo-channel	Area 2	Area 3	Area 4	
1	EN Carinated Bowl	Occupation layer (15004) – pit & postholes, Area 4	n/a	19						
2	EN Carinated Bowl modified	Occupation layer (15004) – pit & postholes, Area 4	n/a	1						
3	EN Carinated Bowl	Penannular-shaped deposit (010) Area 2	n/a				4			
4	EN Carinated Bowl modified	Occupation layer (016) Area 2	n/a				3			
5	MN Impressed Ware	Occupation layer (016) Area 2	palaeochannel (005)			4	5			
6	EN Carinated Bowl modified		palaeochannel (005)			4				
7	EBA domestic Beaker		palaeochannel (005)			5				
8	LN Grooved Ware?	Occupation layer (15004) – pit & postholes, Area 4	palaeochannel (005)			28			1	
9	LN Grooved Ware?		palaeochannel (005)			12				
10	LN Grooved Ware?		palaeochannel (005)			9				
11	EBA domestic Beaker		palaeochannel (005)			2				
12	MBA?		palaeochannel (005)			1				
13	MN Impressed Ware	Trench 17, (17004), Areas 1 and 2	palaeochannel (005)		1	3				
14	EBA Beaker		palaeochannel (005 and 129)			8				
15	EBA Beaker		palaeochannel (005)			6				
16	EBA Beaker		palaeochannel (129)			2				
17	MBA?	Area 3 (095)	palaeochannel (005)			3	2			
	Unattributed incised and plain sherds	Occupation layer (016) and penannular deposit (010) Area 2	palaeochannel (005)	5	3	191	61	3	5	
			Sherd nos	25	4	278	75	3	6	391
			Percentages	6.4%	1%	71%	19.2%	0.8%	1.5%	99.9%

Table 20: Vessel links across the site with numbers of sherds (right half of the table).

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The remains of two plain Neolithic vessel(s) Vessels 3 and 4 were found in association with Area 2, (010 and 016), where there was evidence of temporary structure(s). A carinated sherd (SF 52), is from context (010) and body sherds (SF 238 and 246) are from an earlier hearth (025) also linked to the building. Further cultural evidence from the occupation layer (016) associated with this structure includes sherds from a decorated middle Neolithic Impressed Ware pot Vessel 5.

Evidence of another pot, a possible Grooved Ware bowl (Vessel 8) came from the occupation layer (15004) of the central pit and posthole grouping in Area 4. Other unattributed incised sherds that could be from Vessels 6 to 11 are from contexts both from the temporary structure in Area 2 and the palaeochannel. All other vessels, including the sherds of early Bronze Age Beakers wares were only found in the palaeochannel. Sherds of Vessel 17 came from (095) in Area 3 in the south of the excavated area, as well as the palaeochannel.

Comparison with other sites and dating

The earliest pottery found at the site is the Early Neolithic Carinated bowls, from contexts that suggest they were used in structures to the west of the palaeochannel. Over recent years commercial archaeology across the Central Belt of Scotland, and especially in South Ayrshire and South Lanarkshire, has produced a number of sites with prehistoric pottery that has broadened our understanding of it and the settlements in which it was found. Work at Drumclog Quarry in South Lanarkshire produced several similar vessels to Vessels 3, 4 and 6 from Ferniegair (Ballin Smith 2015, Fig 12). Warehouse 37, Girvan, South Ayrshire is another site that has produced a range of early Neolithic Carinated bowls, and like at Ferniegair they were also found in a palaeochannel. The work has not currently been published but Sheridan (2009) has dated these pots to c. 3950-3700 cal BC. Early Neolithic Carinated bowls and modified versions were also identified by Sheridan (2021, 14-20) from Hillhouse Farm, Kilmarnock, in East Ayrshire, where the latter could date to the 38th and 37th centuries BC. Samples dated from beneath the temporary structure in Area 2 at Ferniegair are clearly early Neolithic in date with a range of 3950-3662 cal BC. Some of the modified bowls could have derived from some of the features there.

Vessels 2 which is clearly an example of the middle Neolithic Impressed Ware bowl tradition, influenced by new designs developing during the middle Neolithic from c. 3500 to c. 3000 BC.

An ornate rim (Pot 1) dated to the middle Neolithic from Knowes Farm in East Lothian, (see Sheridan archive in Lelong and McGregor 2007), is a suitable dated comparison to Vessel 2. Similar decorative motifs to Vessel 5 are noted at a number of sites such as Monkton (Ballin Smith 2015a, Figure 6, 13-20), the unpublished Ladywell (Vessel 9, Ballin Smith 2015b) and Ayr Academy (Ballin Smith 2019 Figure 9, 18-27), all in South Ayrshire. The decoration on Vessel 13 has not been noted in examples from the above sites.

Although the form of the Vessel 5 and Vessel 13 pots are different, they have characteristics of impressed designs and vessel shape which suggest they appeared at the end of the early Neolithic or during the middle Neolithic. All three have derived from Areas 1 or 2 and indicate further occupation of the site during the middle of the Neolithic. This is reinforced by a middle Neolithic radiocarbon date range of 3499 – 3348 cal BC (SUERC 77088, 4608 ± 24 BP) from deposit (010) in Area 2 outlining the temporary structure there.

Although radiocarbon dates of sediments in the palaeochannel at Ferniegair suggest a period of use from the early to middle Bronze Age (Table 1).

There is a possibility that Vessels 8 to 11 are all late Neolithic Grooved Ware vessels, although this is far from certain given the condition of the sherds. They share some characteristics with early Grooved Ware - their incised decoration and the form of their pots – simple open trunconic vessel forms from c 3300 BC (Sheridan 2016, 203) to as late as c 2500 BC. The Ferniegair vessels are characterised by their simple but often malformed rims, and their incised designs. In these examples the decoration includes variations of lozenges, latticework and chevrons, and simple lines, but without applied motifs. From the surviving rims it would appear

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that the vessels represent generally small but open mouthed bowls. The rims are missing from Vessels 10 and 11 but their designs are similar to the other vessels, and therefore are also likely to be Grooved Ware, although the designs are not deeply etched. The sherds from Vessel 10 represent a slightly heavier and probably larger vessel than Vessels 8 and 9, with a more random design. Generally there has been a paucity of Grooved Ware in the southern Scottish region until the 1990s when sherds were found at Hillend, Wellbrae and Carwood Hill in Biggar, South Lanarkshire, at Beckton II near Lockerbie in Dumfries and Galloway (Cowie and MacSween 1999, 51) and more recently at Laigh Newton, East Ayrshire (Ballin Smith 2011, 22, 24 and Illus 14). The vessels of this period found at Ferniegair, although fewer in number, are comparable to range of contemporary vessels found at Balfarg/ Balbirnie, Fife (Barclay and Russell-White 1993, 94-108).

Vessels 7, 14, 15 and 16 are all early Bronze Age Beakers. Vessel 7 also has an everted rim, but shallow sparse incised decoration. Sherds from the other pots are decorated with impressed cord. Their likely use is probably within the time period c. 2200-1750 of the early and middle part of the early Bronze Age. However, recent work at Northbar in Renfrewshire close to the River Clyde produced a large number of sherds from Beaker pots, mostly derived from a single large pit. The high positioned carination as on Vessel 14 from Ferniegair, is similar to those from Northbar and the latter were dated to the first half of the Chalcolithic 2462 – 2208 cal BC (UBA-49250, 3870 ± 29 BP), suggesting that they are early Beakers. Sherds from the Ferniegair vessels were found in the palaeochannel (005) which provided a date range from 2205 cal BC to as late as 1517 cal BC, which provides a wide time-frame for the use and deposition of these vessels.

The two remaining pots Vessel 12 and Vessel 17 represent heavy and presumably large domestic vessels, with the latter being a thick base sherd. In themselves they are not easily dateable nor are their good comparative examples. Vessel 12 has simple incised decoration on its flat rim top and below the rim, suggesting it was in use later in the Bronze Age, perhaps coinciding with the latter part of the early Bronze Age and the middle Bronze Age, when the latest dated deposits were infilling the palaeochannel and a the stone lining to a pit was constructed on the side of it. Radiocarbon dates suggest a time period of between 1638 cal BC to 1433 cal BC (Table 1) for these later activities there and on Area 2 and Area 3, where use of the site continued and then ended.

Conclusions

The Ferniegair assemblage is a difficult one as most of the pottery was discarded into what would have been a wet depression (the palaeochannel), where it was mixed and disturbed during the long time span of its use. The evidence implies that sometime between the middle of the fourth millennium BC through to the middle of the third millennium BC or later, pots typical of a widespread Neolithic culture were manufactured, used and discarded. The earliest evidence indicates there was a tendency to adapt shapes and decorative styles, but elements of common identities were still retained. By the beginning of the early Bronze Age, the functional requirements of pots perhaps necessitated their shapes to be adapted to the settlement's domestic needs, while retaining decorative elements that expressed their local identity and that of the wider regional cultures.

The excavations at Ferniegar were important in retrieving domestic wares rather than ritual ones. The assemblage has in many instances highlighted the importance of the settlement evidence that has been largely lost from the archaeological record, by recent deeper ploughing, by disturbance of the site, and to some extent by mechanical removal of the topsoil. The assemblage demonstrates the settlement and use of the landscape in South Lanarkshire in prehistory, and the role that pottery can play in clarifying the type of settlements established and the periods to which they belong.

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The fired clay

by Beverley Ballin Smith

Introduction

Fired clay found on excavation sites is a product of an abandoned and demolished structure(s). It could derive from something as small as a hearth or an oven, or as large as a wooden building that had light-weight walls daubed with a mixture of clay and organic material to provide a windproof and partly waterproof cladding. Fired clay is a softer material than pottery and does not necessarily survive taphonomic conditions and post-excavation processing of samples particularly well. However, its presence is important for site interpretation as it can support or enhance understanding.

A total of 67 fragments of burnt clay were found in the palaeochannel (005) in Area 1 except for one piece Sample 67 from the fill (048) of a posthole in Area 3. Together they weigh a total of 188.7 g, an average of c. 2.8 g each.

Description of the pieces

This assemblage comprises predominantly small, rounded or irregular shaped pieces of burnt clay, which can measure less than c. 10 by 10 mm, but with larger pieces surviving. The largest piece measures in excess of 40 by 30 by 20 mm. Most of the pieces have been recovered by hand from the excavation, but due to their burial conditions in the palaeochannel all are abraded. They can be flat, angular, sub-rounded and irregular in appearance or just slivers. The best preserved are SF 196a, 276 and 349 which are described below.

The colours of the clay range from reddish yellow to light brown and strong brown, and demonstrate the different burning temperatures and conditions that affected the clay pieces before they were discarded into the palaeochannel. Unlike the pottery which acquired deposits from its wet burial conditions, the more porous burnt clay does not appear to have been affected in the same way. However, unlike burnt clay found at other sites such as Larkhall (Ballin Smith forthcoming), the addition of organic matter to the clay is not noticeable in its matrix, but small stones are present and they may be a natural occurrence in the clay. It is not inconceivable that the clay used for structures may have been dug out of the sides of the palaeochannel or a nearby river channel.

This material is often referred to as *daub* (with dung or other organic matter) in the southern half of the UK, but in Scotland, its occurrence on archaeological sites is referred to as burnt or fired clay (Graham 2004, 27).

Only five pieces offer information on their use.

SF 113 is an irregularly shaped piece that weighs 13.5 g. It measures 38.5 by 34 by 17 mm and has wood charcoal embedded in one surface. The piece is burnt to a light red colour (2.5YR 6/8).

SF 196a is a single piece weighing 4.4 g and it measures 30.5 by 20 by 17.5mm. It is a corner piece with two smooth flattish surfaces, and was formed around a 15 mm thick rounded twig.

SF 276 comprises 4 pieces, which together weight 24.9 g. The largest, 42 by 31 by 24 mm, is an irregularly shaped piece formed around a rounded twig or branch 18 mm in diameter. The piece is particularly thick at one end and may have formed part of an uneven wall surface. Its colour is 7.5YR 3/8 strong brown (Figure 31).

Figure 31: Daub SF 276.

SF 342 comprises one piece weighing 10 g. Seems to have been moulded to a twig or lath and has a wedge-shaped moulded interior. The piece measures 36 by 30 by 12.5 mm and is 7.5YR 6/4 light brown in colour.

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SF 349 is a single piece that weighs 7.1 g and measures 33 by 21.3 by 18 mm. It is a shaped fragment with moulding where it had been pressed between one narrow and a sharp-edged piece of wood and one rounded 7 mm diameter twig or branch. The external form of the piece, although slightly curved suggests it could have had two external surfaces (at an angle) (Figure 32).

Figure 32: Daub SF 349.

Sample 67 from context (048), a posthole, is a single piece weighing 1.5g. It is shaped and smoothly curved and contains noticeable organic material.

Location, dating and conclusions

It is difficult to date these pieces as they were found in the palaeochannel and only SF 113 has carbon residues on it which could be used for independent dating purposes. However, the link with the remains of structures to the west of the channel can be made with Sample 67 (see Table 1: SUERC 77098, 3249 ± 24) from Area 3. The context from which the sample was taken returned a dating time frame of 1611 – 1452 cal BC, the end of the early Bronze Age and into the middle Bronze Age.

It is likely that much of the fired clay has derived from walls of wooden buildings or partitions daubed with clay, and that when they were burnt down or replaced, some of their remains were thrown or washed into the palaeochannel.

Discussion

The palaeochannel as a natural feature

The location of the palaeochannel and its relationship to human activity in the development area is crucial for understanding the changing character of the landscape over time. The origins and nature of the channel are, however, not entirely clear.

The palaeochannel is situated at the interface of two geological and geomorphologically distinct deposits: diamicton sand across much of the north-west and alluvial clay deposits to the south-east. The alluvial clay may have been the result of a post-glacial course of the Avon Water, which flows close to the present site to the west and north as it exits into the River Clyde. Current aerial mapping of the River Clyde c. 1 km to the east and north-east of Ferniegair shows recent meanders of the river that are now cut off from its course as oxbow lakes, and this could have been the scenario for rivers in the area in the past. Logically, the palaeochannel could have been a former channel or part of a remnant oxbow lake of the Avon Water over 6000 years ago.

During the period when prehistoric activity occurred close to the palaeochannel there was some indication of fluctuations in the rate of water discharge from it, with an initial or primary phase of increased aggradation (deposition of sediment) in the early Neolithic followed by a phase of relatively slow discharge, and a final or second phase of increased aggradation in the early Bronze Age. These fluctuations are likely due, in part, to climate change accelerating river activity in the British Isles during the late Mesolithic and early Neolithic (Johnstone, Macklin and Lewin 2006, 14-23; Anderson 1998, 97-103).

In terms of this site, increased aggradation likely occurred during a period of colder temperatures, with warmer periods typically having a reduced sediment yield with decreased water discharge variations (Lowe and Walker 1997, 70-71). The early Bronze Age was, however, substantially wetter than the present average (Barber *et al.* 1994, 198, 205; Anderson 1998, 97-103) and

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this would have likely effected the rate of water flow during the second phase of increased aggradation. It has been suggested that summer temperatures in Scotland during the middle and late Bronze Age were possibly around 1°C warmer than present with winters similarly being around 1°C colder (Davis *et al.* 2003, 170-174).

The accumulation of a high quantity of material culture, organic and charcoal-rich material in the palaeochannel is certainly suggestive of a low energy system at the time of deposition. Had the palaeochannel had a stronger flow then the material would not have accumulated so readily and may have washed down stream soon after the time of its deposition (Atkinson 2017, 19-20). The conditions within the palaeochannel were poor for the preservation of coleoptera remains, for example. Of those that did survive some species suggested that open water and aquatic vegetation may have existed within the palaeochannel at some stage, perhaps when water flow was noticeable. However, general conditions within the palaeochannel were explored further through micromorphological analysis of the juncture of contexts (004 and 005) and the lower part of the former and the upper part of the latter, but not the lowest sediments in the feature. The analysis indicated the slow movement of sediments that were not permanently under water during the time the channel was infilling. Human activity, especially in the lower parts of the sediments that were analysed, included the dumping of fuel waste (with alder charcoal), human and animal waste, as well as discarded artefacts. As the palaeochannel filled in there was much biological activity in the upper sediments indicating the drier conditions and the absence of permanent waterlogging.

The local environment around the palaeochannel

The two geomorphologically distinct deposits on either side of the palaeochannel may have resulted in slightly different vegetation straddling its sides. The archaeobotanical and pollen analysis indicated that woodlands local to the area, and possibly along the edges of the palaeochannel were predominantly of alder. Alder is an indicator of damp or wet areas and at Ferniegair the evidence indicates it was used as fuel from the early Neolithic to the beginning of the middle Bronze Age, perhaps with trees maintained as a timber resource by coppicing (Dickson and Dickson 2000, 221). Alder is referred to as a soft hardwood that can be easily split, is easy to light and gives off good heat (Meier 2023; Fitzpatrick Fuels 2023), and is an ideal fuel for camp fires. However, the charcoal-rich basal fill of the palaeochannel may have been washed down from upslope during the second phase of increased water discharge in the early Bronze Age.

The pollen record suggests that there were few changes in the composition of the local vegetation during the gradual infilling of the palaeochannel, with the commonest tree species being alder followed by hazel on drier ground. Pollen from other tree species such as birch, oak, willow and elm suggested there was mixed woodland in the vicinity and the palaeochannel itself was likely bordered by areas of open ground, with grass, meadowsweet and dandelions. The slight differences in the pollen record over time are perhaps indicated by thinning of the tree cover, although the effect of human interference in the local environment seemed to be almost negligible. Cereal crops do not appear to have been cultivated as there was a complete absence of both their pollen and grain from the samples from the site.

Ramsay's suggestion that the evidence may indicate only seasonal or occasional use of the site corresponds with the survival of a sparse number of archaeological features within the long time frame established by radiocarbon and artefact dating. The implication is that any permanent settlement or grazing land was not situated in the near vicinity of the palaeochannel, but most likely on the diamicton sands further to the north. The alluvial clay landscape to the south may have been unfavourable to habitation because of damp or wet conditions. However, the picture of the local environment may have been somewhat different as it is only based on the evidence from the palaeochannel that survived water movement, bioturbation and other taphonomic anaerobic conditions.

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The palaeochannel as a feature for waste-disposal

The radiocarbon dates associated with the period of artefact deposition within the palaeochannel place the anthropogenic activity in a time frame from the early Bronze Age (Table 1), from as early as the beginning of the 23rd century BC, to end approximately at the beginning of the 16th century BC (the middle Bronze Age). Although there is only slight evidence noted on Area 3 to the south-west of the palaeochannel of activity dated to the early Bronze Age (see below), there is confirmation of a small Bronze Age cemetery (Welfare 1977) in the wider locale.

Although radiocarbon dating evidence provides a timeframe for the use of the palaeochannel, this is only part of the story, a story which is explored further in the examination of some of the cultural material found within it.

Pitchstone artefacts

Among the lithic tools recovered from the charcoal-rich basal fill (005) of the palaeochannel was a finely re-touched blade (CAT 09) in aphyric pitchstone, a raw material that was most likely procured from the Corriegills district in eastern Arran just south of Brodick. The blade is indicative of trade but perhaps given that pitchstone is an exotic and potentially high status material there may be a 'ritual' element to the deposition of the tool in the palaeochannel. It is thought that this piece and a pitchstone microblade, (CAT 348) was produced during the early Neolithic, as almost all pitchstone from radiocarbon-dated pits date to this period. Arran pitchstone was also a raw material commodity that was traded in the early Neolithic along the major rivers – the Clyde and the Tweed (see Ballin, above) and further afield. The occurrence of pitchstone artefacts represents evidence of human visitors in the area, the earliest that is documented for this site. The question remains as to whether the pitchstone objects were deposited in the palaeochannel immediately after their use, or whether they were discarded in it at a later date when clearing out features, for example, and their original context of deposition was disturbed.

Yorkshire flint

Fifteen fragments of Yorkshire flint were also recovered from (005) infilling the palaeochannel. This material was likely procured from the north-east of England, and began to be imported into Scotland towards the end of the early Neolithic. Two flint tools were produced using Levallois-like technique. This technique was introduced around the early/middle Neolithic transition and was in use until the end of the late Neolithic (see Ballin, above), and therefore provides a rough timeframe for the objects. Together with the pottery types (below), it suggests a broad range of Neolithic activity at the site and at the palaeochannel that is not necessarily complemented by the radiocarbon dates or excavated features. Again, it poses the question of whether this is a contemporary or later disposal of cultural materials into the palaeochannel. The amount of flint and also pottery indicates deliberate clearing of fire-pits, with broken vessels and the disposal of waste materials put into a convenient hole in the ground.

The ochre cube

Unique to the project was a red ochre cube (CAT 319), which was also recovered from layer (005) in the palaeochannel. Ochre was mainly used as a pigment during prehistory, for the colouring of clothing, pottery, as well as human bodies, faces and hair - possibly for ritual purposes. Interestingly, the teeth of a large, serrated, Levallois-like blade made from Yorkshire flint (CAT 7), recovered from the upper layer (004) in the palaeochannel (see Ballin, above) roughly corresponded to the distance between the striations visible on the surface of the ochre cube. These are indications of attempts at scraping the surface of the ochre cube to produce ochre powder. If this is indeed the case, it is another example of activity in the middle and later Neolithic, but with the possibly accidental loss of a personal object.

The flint strike-a-light

Two heavily burnt flakes of flint (CAT 14/15), and one heavily burnt flint strike-a-light (CAT 1/25) were unusual in the context of the palaeochannel and especially where the intensity of heat in

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a domestic fire-pit was unlikely to cause the burning and damage noted on these pieces. One fragment of the strike-a-light came from the upper sediments of the palaeochannel (004), and the other was unstratified. Ballin (above), considered that these pieces may have been burnt in a later Neolithic cremation – possibly a cremation that was disturbed, the pieces picked up and then eventually discarded into the palaeochannel.

The jet pendant

Another interesting find from the lower sedimentary fill of the palaeochannel (005) was the unusual jet pendant SF 329, shaped like a claw or possibly a bird's head. Together with pitchstone and east-coast flint it is another example of an exotic material found at the site. The raw material is probably jet from Whitby, North Yorkshire, and therefore would have been a valuable possession. Sheridan (above) has considered it to be early Bronze Age in date but a later Iron Age date is also a possibility. However, given the radiocarbon dates from the palaeochannel and the occurrence of early Bronze Age Beaker pottery in the same contexts, the likelihood is that it is of the same period.

Sheridan (above) also remarked that activity at the nearby early Bronze Age cemetery at Ferniegair (Welfare 1977), upstream from the current site, is likely to be contemporary with the jet pendant piece and that jet jewellery in the form of beads and pendants has been found in cinerary urns in Scotland. The suggestion is that there could be some tentative relationship between the pendant lost in the palaeochannel and burials in the cemetery during the first half of the second millennium BC.

The shale bracelet roughout

This piece from a middle fill of the palaeochannel (131) is another rare find but indicated the use of a resource that may have been available locally. Of the small number of finds of bangles or their roughouts of the early second millennium BC in Scotland, Lanarkshire appears to have been a favoured area for their manufacture and use (see Hunter, above). A discarded piece, such as this would have not been transported far, and its deposition suggests that it was being made close to the palaeochannel. The radiocarbon dates from Area 3 indicate that that area could be a candidate, but the links are tenuous but not improbable.

The pottery

The vast majority of the pottery sherds (71%) and those attributed to vessels (V5-V17) were found in the palaeochannel (005) but not exclusively so. Sherds attributed to Vessels 5, 8, 13 and 17 also came from features of the other excavated areas (see below), which indicates deliberate clearance and disposal of broken pottery. In contrast to some of the other material cultural remains, the earliest type of pottery from the palaeochannel was two Impressed Ware bowls of middle Neolithic date (Vessels 5 and 13). Associated with them was Vessel 6 of Neolithic date, five vessels of late Neolithic Grooved Ware or possible Grooved Ware (Vessels 7-12), three early Bronze Age Beakers (Vessels 14-16) and fragments of Vessel 17, a heavy domestic vessel possibly of middle Bronze Age date. These vessels span approximately 1000 years of manufacture and use and indicate intermittent disposal of sherds into the palaeochannel from the surrounding area over that time period.

This collection of pottery most likely indicates the disposal of cultural material prior to and during the accumulation of sediment of (005) into which it became incorporated. The condition of most of the pottery is poor and indicates it acquired iron and other deposits from its deposition and long immersion in water. There is also the distinct possibility that pottery would fall to the bottom of the palaeochannel where sediments may have stayed waterlogged longer, and not scoured out with increasing water flow during wet periods.

It is obvious that the anthropogenic infilling of the palaeochannel began as soon as there were visitors to the site, perhaps as early as the early Neolithic but more certainly during and after the middle Neolithic, c. 3500 BC and later. It was a convenient receptacle for the disposal of accumulated debris, hearth-ashes and no doubt other organic matter such as food waste. There may have been ritualised practices in the disposal of certain materials but others such as the jet pendant and the ochre cube could have been accidental losses into a channel that had open or partly open water at that time. The burnt flint strike-a-light could have been returned to

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the earth, via the channel, from which it was recovered as a deliberate act of easy reburial. It is apparent that lighter weight materials such as charcoal were more likely to be held in suspension in the water and therefore more easily moved downstream than the heavier cultural objects and materials. This might be one reason that charcoal contemporary with the Neolithic artefacts was not present in the samples dated. It is also possible that some of the lithic pieces may have been dumped in the palaeochannel later in time than supposed, with subsequent visits to the same area disturbing deposits from earlier occupations and removing them to the channel. Although this is more than likely to have happened with small fragments of flint, perhaps accidentally and unnoticed, it is less likely to have occurred with sherds of pottery, being larger and more obvious.

From the artefactual evidence, the palaeochannel was gradually being filled in as early as the late Neolithic, but more so from the environmental and dating evidence during the early Bronze Age with human excrement and other debris. Its depth, water content and flow had decreased and materials that were dumped into it would have only gradually moved downstream. By the middle Bronze Age it had largely been filled in.

The stone-lined feature its dating and function

A feature (156) located on the edge of the palaeochannel, which was fully or partially stone-lined seems to have an obvious connection with it. However, what that function was has not been satisfactorily determined. It has been considered that it could have been a large fire-pit due to the significant amounts of alder charcoal found inside it and its burnt base and slide slabs. Ramsay (see above) considered the possibility that it was a pit associated with a burnt mound but there was no evidence for this. The five radiocarbon dates from elements of this feature indicate that its use was from the end of the early Bronze Age and into the middle Bronze Age, from the beginning of the 17th century BC to as late as the mid-15th century BC and therefore later than the radiocarbon dates from the lower silting deposits (005) in the palaeochannel (Table 1).

The palaeochannel's upper deposits were not dated and therefore it would seem possible that there was some contemporary later use of the channel and the feature, with the charcoal from the latter being a source of some of the charcoal in the upper deposit of the former. The clay subsoil in the pit was heavily compacted and heat affected suggesting sustained periods of use and therefore the structure could be interpreted as a stone-lined fire-pit. The two small diameter channels leading from the feature and into the palaeochannel were possibly animal burrows, as similar occurrences have been noted leading from (warm) hearths at many other excavations or dug through the softer stratigraphy of pits (see for example Kilpatrick 2021, 55), often causing problems of interpretation.

There was no material culture evidence associated directly with the stone-lined pit and therefore its use is in some doubt. However, if it was a large fire-pit positioned on the edge of the palaeochannel towards the end of the early Bronze Age, it may have been used for a large formalised fire(s) associated with seasonal gatherings of people for celebrations and feasting.

Activities on Areas 2, 3 and 4

The three areas to the north and west of the palaeochannel provided information on habitation, albeit temporary, that had some impact on the use and infilling of the channel.

The temporary structure

The most informative area from the point of view of amount of surviving archaeological and material cultural evidence is Area 2. From a small group of features including a fire-pit, hearth deposit and postholes, three radiocarbon dates from alder wood charcoal provided a fairly consistent date range of the early to middle 40th century BC to the beginning of the 38th century BC for the activities that took place there - the early Neolithic. A fourth radiocarbon date expanded the range of activity into the middle of the 37th century BC towards the latter part of the early Neolithic. A single piece of pitchstone from the hearth deposit is the only material cultural evidence from these features and is in keeping with the early Neolithic dates.

The sequence of the next events in Area 2 are not fully understood but a deposit (010) comprising

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domestic debris and artefactual material accumulated around the edges and towards the interior of what appears to have been a temporary structure, horseshoe-shaped with a single entrance. A sample of alder charcoal provided a middle Neolithic date for this material from the end of the 35th century BC to the middle of the 34th century BC. Within the deposit contemporary material included a flint blade but no pottery. The remains of earlier material from the layer comprised an early Neolithic carinated bowl (Vessel 3), two microblades of late Mesolithic/early Neolithic date and a piece of pitchstone attributed to the early Neolithic. The more extensive overlying deposit (016) covered much of Area 2 was not dated but it contained sherds of an early Neolithic carinated bowl (Vessel 4), sherds of a middle Neolithic Impressed Ware pot (Vessel 5) that was also found in the palaeochannel (005), as well as other undiagnostic sherds of prehistoric pottery. The lithic artefacts were also varied and included a late Mesolithic/early Neolithic microblade, an early Neolithic leaf-shaped point, two piece of Yorkshire flint and four blades of middle to late Neolithic date, and a similarly dated kite-shaped arrowhead (CAT 142) made from east-coast flint or 'jet'. The material found in these deposits is likely due to their reworking and the clearing out of features and the digging of new ones.

Associated with the use of the site are numerous stakeholes, possibly from windbreaks, with only one of them producing a radiocarbon date range of the early 17th century to the middle of the 15th century BC. There are several aspects to this area and one of the most important is the repeated use of the site from as early as the early Neolithic through to the latter part of the early Bronze Age/middle Bronze Age. This long time span and the repeated visits to the site suggest it was a favoured stopping point.

The other areas

Area 3 in the south-west of the investigated area contained a number of pits and postholes and a possible occupation deposit, but the radiocarbon dates indicate that only some of the features could have been contemporary. The earliest date from the ash rake out deposit (141/142) from a hearth was early Bronze Age, the early 20th century BC to the middle of the 18th century BC, with a nearby posthole producing an early-middle Bronze Age date range of the early 17th century BC to the middle 15th century BC, and a fire-pit (045/046) dated from the end of the 15th century BC to the early 15th century BC – the middle Bronze Age.

The limited material culture mainly came from pit (044/045) where late Mesolithic/early Neolithic blades were found, as well as two pieces of Yorkshire flint and two backed bladelets of middle to late Neolithic date. A single piece of Yorkshire flint came from pit (144/136) to the south. No pitchstone was found here. The pottery information was sparse indicating sherds from a later Bronze Age heavy vessel, Vessel 17 from the occupation deposit (095) that possibly linked with sherds from (005) in the palaeochannel.

The evidence from Area 4 was even more limited than that in Area 3, with no radiocarbon dates and no lithic artefacts. Trial Trench 17 ran across this area and probably produced pottery from these features: an early Neolithic carinated bowl sherds (Vessels 1 and 2), fragments of a middle Neolithic Impressed Ware vessel (Vessel 13) that linked to sherds in the palaeochannel, and Vessel 8, a late Neolithic Grooved Ware pot, some of which was found in the palaeochannel.

As with Areas 2 and 3, the evidence suggests there were a number of visits to the area but over a long time span.

The bigger picture

Whilst palaeochannels are fairly commonly encountered close to archaeological excavations, such as that at Hallmeadow Annan, Dumfries and Galloway, where it affected the location and use of two burnt mounds (Green forthcoming), finding other excavated examples similar to Ferniegair is difficult. There have been excavations of palaeochannels previously, such as the one at Cammo, Edinburgh (Atkinson *et al* 2019) that was possibly an early tributary of the River Almond and provided important environmental data concerning climate change. Detailed scientific analysis of the infilling of the palaeochannel at Cammo indicated, like at Ferniegair, increased precipitation, and water level changes were most noticeable during the early Neolithic and late Neolithic/early Bronze Age. However, where this palaeochannel differed from that at Ferniegair was the absence of anthropogenic activity in the

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area around it. There was no direct evidence of settlement in the vicinity that was contemporary with the infilling of the channel or of any contemporary artefacts.

An excavation of the area which became Warehouse 37 at Girvan, belonging to William Grant and Sons Distillers Ltd, has not been published in full, but provides perhaps the nearest equivalent to the human activities associated with the palaeochannel at Ferniegair. Two archaeological interventions in 2007 (Francoz 2007 and 2008) revealed many pits, postholes and deposits including burnt mound material, a lithic and a pottery assemblage, and the remains of a palaeochannel partly filled with material described as midden, and cut into by pits. The artefactual assemblages were assessed as being early and middle Neolithic in date. This analysis and fuller publication of this site has the potential to broaden our understanding of the sparse features and the temporary structure found at Ferniegair.

Conclusions

The long time span covered by artefactual and environmental evidence and the repeated visits to the area of the palaeochannel suggests it was a favoured stopping point or camping area but there was no evidence to support any permanent settlement in the immediate vicinity. Situated close to important river networks that enabled people to explore and move through the landscape, the palaeochannel marked the division between wet and dry land and provided water, firewood and possibly food. Another important aspect of this site was that travellers in the early Neolithic and later periods were passing on and transporting pitchstone, Yorkshire flint for the manufacture of tools and possibly jet for adornment. Some of these exotic and local materials were left at the site by people proficient in the knapping of tools or their repair, but the jet pendant, as well as some of the lithic objects, may have been personal items that were lost at the site or, in the case of the shale roughout, discarded as waste.

Travellers also carried ideas, customs and traditions, and the pottery sherds discovered in and beside the palaeochannel express the manufacturing techniques and designs of pottery goods commonly associated with widespread regional Neolithic and early Bronze Age identities. The large fire-pit, one of the latest features associated with the palaeochannel, may have been for communal use at specific seasonal events. Not long after its final use the palaeochannel was probably filled in as it was no longer a useful resource and probably disappeared beneath a covering of vegetation that hid its long history.

While the results of the analyses of the artefactual and ecofactual assemblage from the palaeochannel and its periphery can provide a window into the past activities on the site itself, the results may also hint at relationships with activities upstream such as the Bronze Age cemetery excavated in 1939, from which some of the material may be have derived. In reusing and re-shaping the palaeochannel at Ferniegair successive visitors to the site inadvertently created a reservoir of archaeological deposits and artefacts for us to recover and analyse, and in doing so they have allowed us a glimpse of how past communities interacted with each other and their natural environment across time.

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