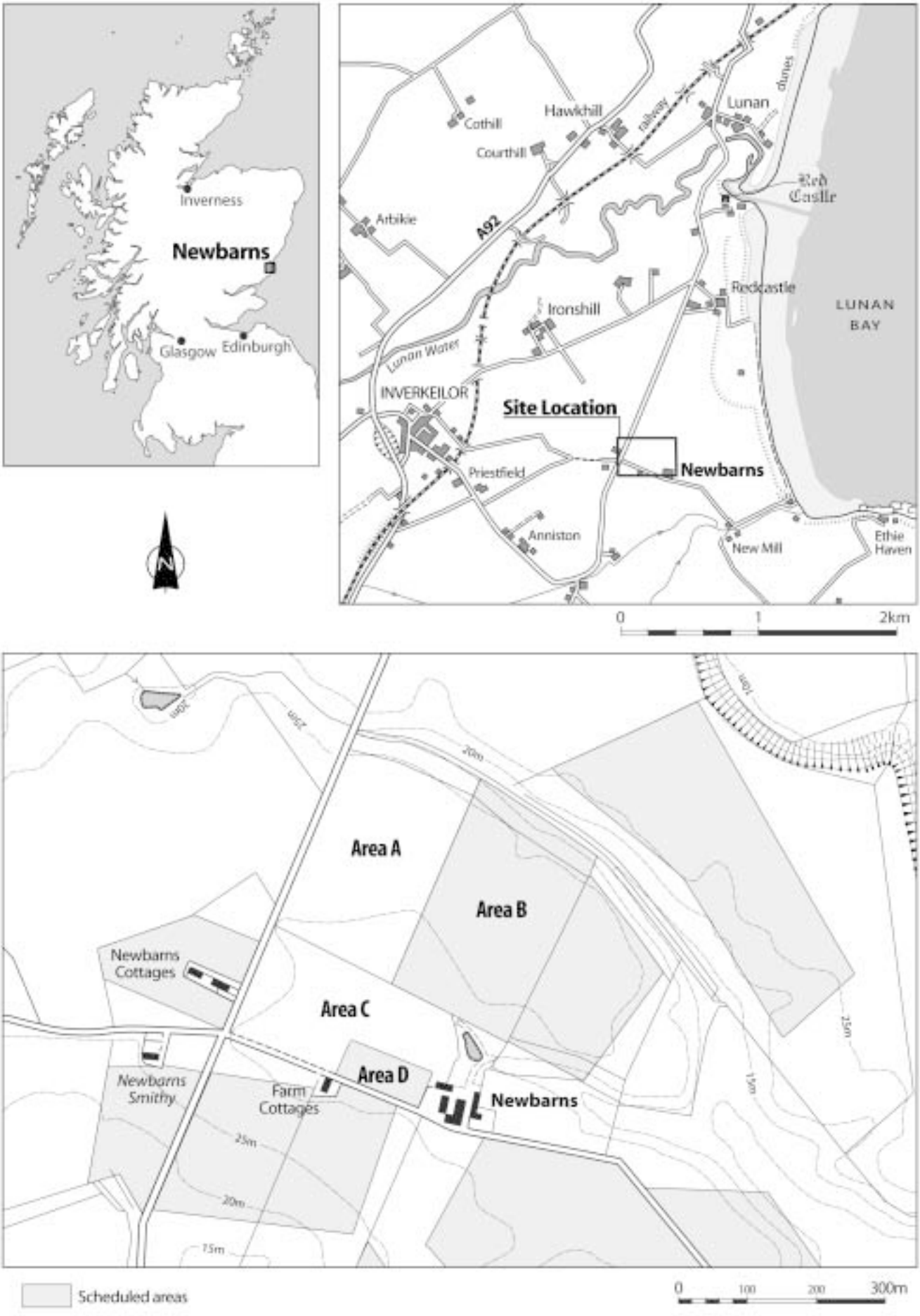


Illus 1 *Location maps, based upon Ordnance Survey maps. (Crown Copyright)*

Excavations of cropmarks at Newbarns, near Inverkeilor, Angus

Catherine McGill

with contributions by Mike Church and Mike Cressey

Introduction

Two seasons of trial trenching were undertaken by the Centre for Field Archaeology (CFA) and the Department of Archaeology, University of Edinburgh, during September 1998 and 1999, on a series of cropmarks at Newbarns, by Inverkeilor, Angus (NGR NO 680 503, centred). The project was sponsored by Historic Scotland and the University of Edinburgh and then formed part of the University of Edinburgh Department of Archaeology Angus and South Aberdeenshire Field School (Finlayson *et al* 1999). Parts of the investigation areas are protected as Scheduled Ancient Monuments.

Newbarns is located on a raised beach forming an extensive, low-lying plateau overlooking Lunan Bay (Illus 1). The major part of this plateau is covered in a swathe of cropmarks representing activity from a variety of periods. The extensive landscape of clear cropmarks revealed through aerial photography has led to considerable areas being scheduled. Historic Scotland has tended to schedule entire, or large sections of, fields containing numerous clearly defined and/or morphologically diagnostic features. The principal motive of these excavations was to compare the quality, quantity and range of archaeological remains in adjoining scheduled and unscheduled areas, in order to provide information relevant to the future selection of cropmarks for scheduling and the management of scheduled cropmark sites.

This report summarises the overall findings of the excavations and presents the results only of the more significant archaeological discoveries. Details of all features excavated during the project are contained in the site archive deposited with the National Monuments Record of Scotland (McGill 1998, 1999). The management-related findings of the results will be considered elsewhere.

The site

The area selected for the trial trenching programme lies immediately to the west and north of Newbarns Farm (Illus 2). Two adjoining fields, each containing a suite of clear cropmarks, have been partially scheduled by Historic Scotland on the basis of the presence of apparently interesting features in certain areas within them. The cropmarks lying within the unscheduled areas (A and C) include several small ring-ditches, thought to be the remains of small Bronze Age round barrows and/or later prehistoric houses, as well as many pit-like features, occurring both in clusters and dispersed. Comparable features were recorded in the scheduled areas (B and D), but there more unusual features appeared in addition. Within Area B (Illus 3) there are two large enclosures, one rectilinear (c 30m across) and one C-shaped (c 20m across). Photographs of Area D (Illus 4; plotted on Illus 2) show at least two putative square barrows as well as a sub-rectangular enclosure or structure and a pit circle. The whole area is also covered in a network of irregular linear cropmarks, some of which were produced by ice wedges (cf Gemmell and Ralston 1984; 1985), although others potentially constitute parts of a relict field system.

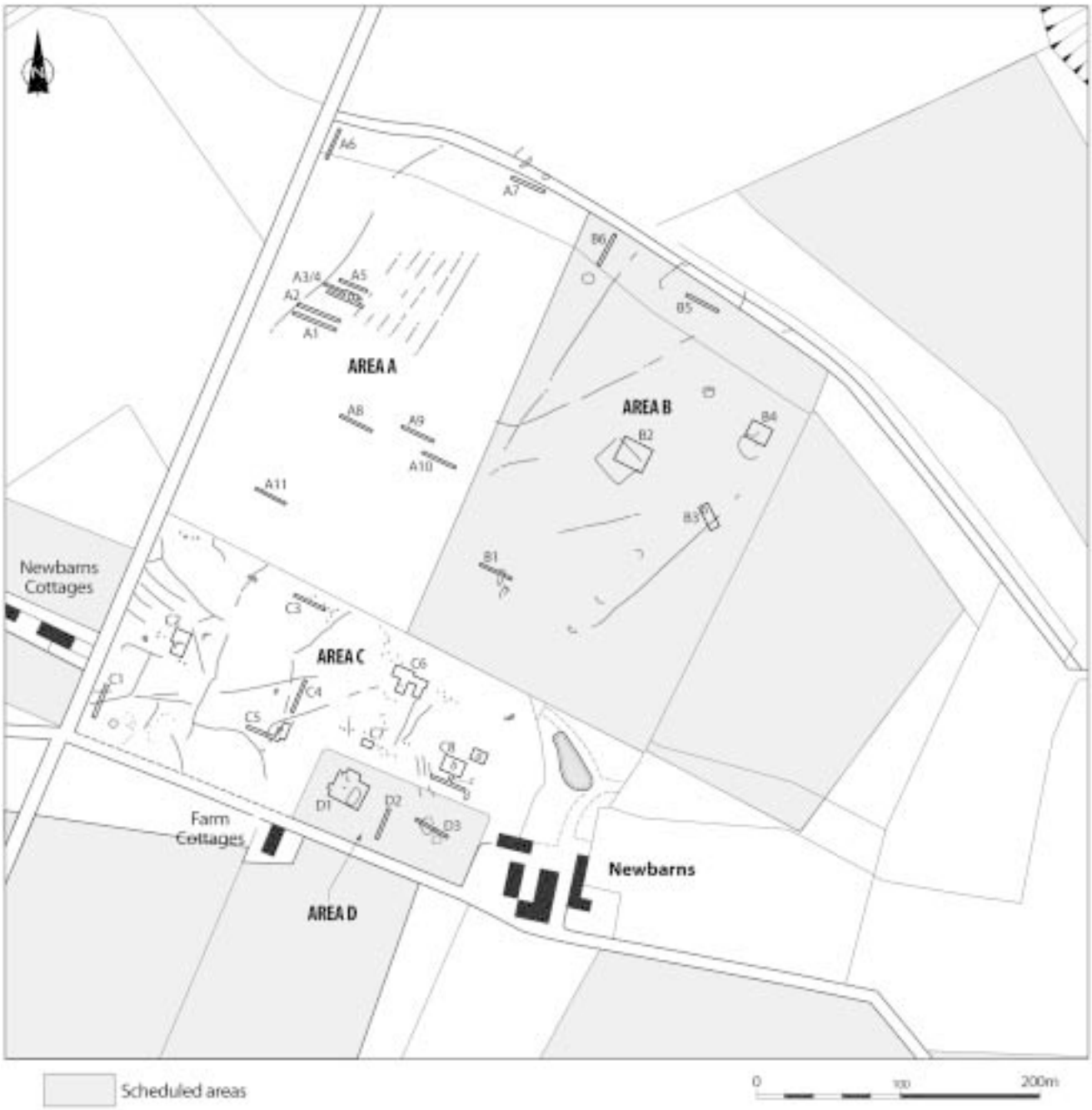
Summary

29 trenches were excavated, nine in the scheduled areas and the remainder in the unscheduled land (Illus 2). A combination of strip trenches, intended to make a cursory examination of features and assess the surviving depth of deposits, and area trenches were excavated. The latter targeted a selection of the more coherent and potentially interesting cropmark features, allowing a better assessment of archaeological and palaeoenvironmental potential and, where possible, providing indications of date and function.

A large number of archaeological and natural features were excavated, with remains appearing in 23 trenches. A representative sample of small features was excavated and several sections were dug through each of the larger and more complex examples. In all but a few cases, no stratigraphic relationships survived between any of the features within each trench and it was not possible to prove which co-existed.

In the strip trenches, a range of archaeological features was investigated. In Trench D3 (Illus 2) the V-shaped ditches of what is probably a square barrow similar to those at nearby Redcastle (Alexander forthcoming) were examined. Elsewhere a range of shallow pits, possible post-holes were detected (Illus 2, Trenches A6, C5, C6), and linear features probably related to a relict, possibly prehistoric, field system (Illus 2, Trenches A2 and C1) were examined. All of these features proved to be heavily truncated and all lacked complex fills. Most features had two fills, a thin layer of in-washed sand overlain by a dark organic fill similar to the ploughsoil.

Resistivity surveys were carried out in the vicinity of Trench B1 and across all of Areas C and D. These



Illus 2 *Plan showing rectified positions of cropmarks based upon plots generated by RCAHMS with additions, scheduled areas and trench locations.*

essentially replicated the information available from the aerial coverage. The survey of Areas C and D, as well as a limited amount of magnetic susceptibility testing, were carried out by Colin Davis as part of his undergraduate dissertation (Davis 2000).

In terms of agricultural attrition, significant observations were made at Newbarns. In the majority of trenches both subsoil and archaeological features were heavily plough-scored. The impact of this on the archaeological record cannot be understated in terms of both active destruction of features and contamination of stratified deposits. A number of features visible on the aerial photographs, taken in the early 1980s, were not detected where they were expected. It is possible that this is because the trenches were wrongly sited due to unrecognised distortions in rectifications of the aerial coverage. However, it seems as likely that ongoing agricultural attrition has led to the complete destruction of shallower features.

Illus 3 *Aerial photograph of Area B (scheduled). Crown Copyright: RCAHMS (ref AN/3230).*

Principal excavation results

Ring-ditch features

Ring-ditch 1 (Trench A3/4) Illus 5

This ring-ditch (cut A3429) was approximately 7.5m in maximum external diameter. The circuit of the ditch was unbroken and its surface width in plan was 2.4m to the east and 1.8m to the west. A section was excavated E–W across the ditch to give a complete profile. In both sections, the ditch was steep-sided with a flat bottom. The western and eastern sections had maximum depths of 0.6m and 0.8m respectively. The upper fills (A3406, A3407) were a dark brown, poorly-sorted silty sand, whilst the lower ones (A3420–A3428, A3430–3433, A3435) consisted of layers of re-deposited sands interspersed with layers of material similar to the upper fills. In section 1, a block of light grey, slightly greasy sand (A3427), preliminarily identified as decayed turf, appeared to have collapsed into the open ring-ditch. Unfortunately, Kubiena tin samples taken of this fill proved unsuitable for analysis. There was no indication of any features in the space contained by the ring-ditch, which was 3.5–4m wide. The only finds were heat-cracked stones recovered from the upper fills in both excavated sections.

Ring-ditch 2 (Trench B3) Illus 5 and 6

This scheduled feature (NMRS Ref: NO64NE 18) was almost identical in plan to Ring-ditch 1. It measured c 6.7m in maximum external diameter, over an unbroken ditch 1.3–1.7m wide. A section was excavated across

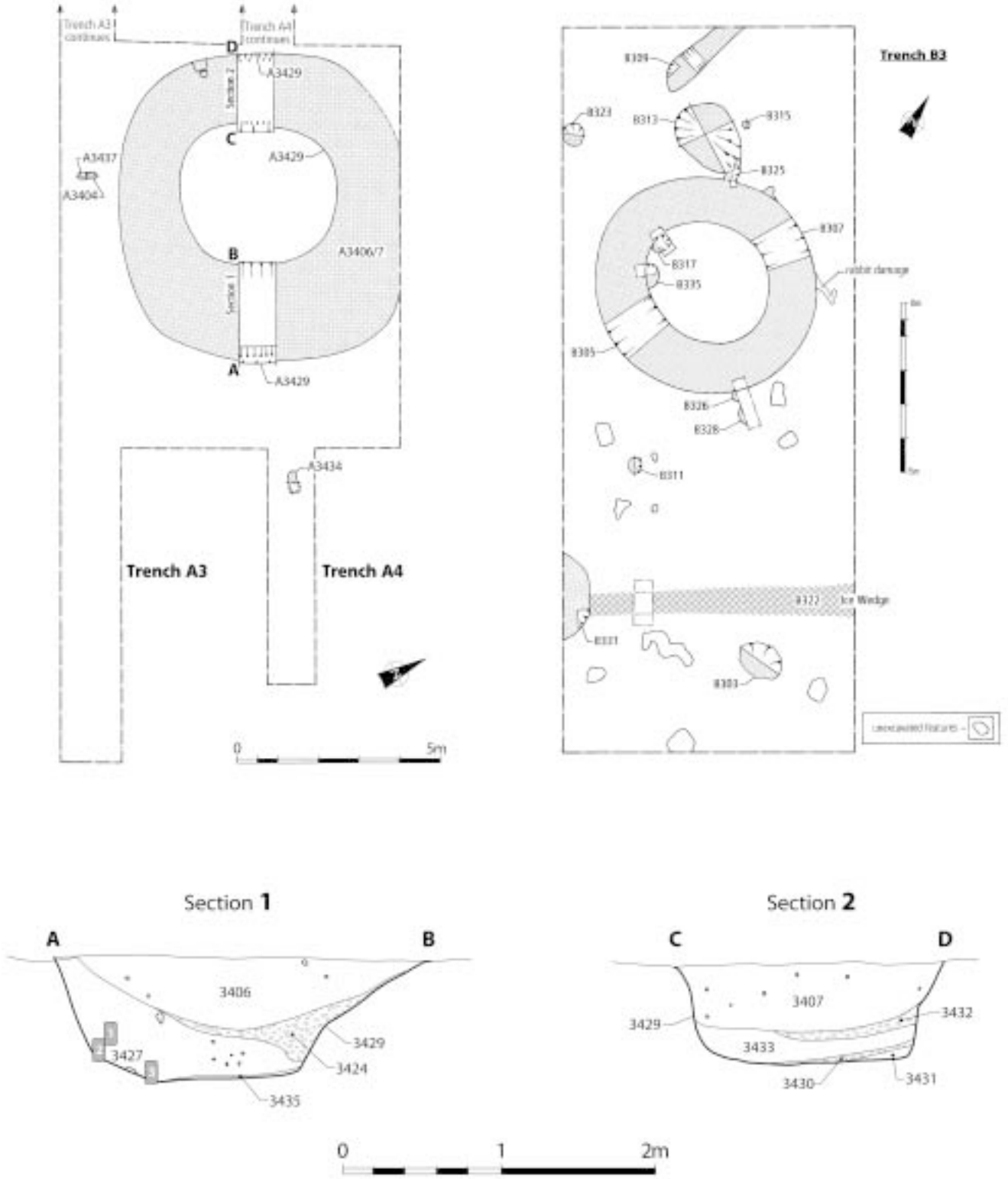
Illus 4 *Aerial photograph of Areas C (unscheduled) and D (scheduled). (Crown Copyright: RCAHMS, ref AN/3521)*

the feature to provide a profile, this time running NE–SW. The profile of this ring-ditch was similar to that of Ring-ditch 1, in that the sides of the ditch were fairly vertical and the base flat. However, the depth of the ditch was a maximum of only 0.45m, implying that either this ring-ditch was more truncated than the other, or it had been marginally shallower in its original form. This feature had a single fill, an homogenous dark brown silty sand, unlike the more complex fills of Ring-ditch 1. Again, many heat-cracked stones were found in the ditch fill.

Five possible post-holes post-dated the ring-ditch, cutting its upper fill. Approximately 20 other post-holes or pits and a ditch terminal were present outside the ring-ditch. These features were not datable, and their fills were identical to those of the ring-ditch. A larger trench would have been required to understand the patterning of these other remains. Not all of these smaller features are been discernible on aerial coverage (eg Illus 3).

Rectilinear enclosure (Trench B2) Illus 7 and 8

A trench was opened over the east corner of a cropmark rectilinear enclosure (NMRS Ref: NO64NE 17) measuring approximately 30m by 30m (Illus 2, 3). This enclosure was found to be defined by a U-shaped ditch up to 1.35m wide and 0.5m deep (cuts B208, B214, B218). It had two distinct fills; an initial layer of in-washed sand overlain by poorly sorted, dark brown silty sand. No



Illus 5 *Ring-ditches 1 and 2: plans and sections.*

Illus 6 *Ring-ditch 2; photograph taken from the south.*

stone packing or postpipes were present to indicate that the enclosure had been palisaded. A line of stake-holes, initially difficult to discern, was recovered 1–2m from the inside edge of the ditch (cut of excavated example; B234). The presence of a fence or a retaining façade for an upcast bank formerly running inside the ditch line might be implied. It is possible however that the stake-hole alignment continued south beyond the enclosure ditch (as far as B232 on Illus 7), thereby suggesting that the two alignments related either to different phases of activity or even to entirely different structures. These stake-holes were infilled with light brown sand almost identical to the subsoil and only became visible fleetingly, under very particular weather conditions, rendering them difficult to excavate. The one excavated example was estimated at 0.25m in depth.

There was an apparent entrance, just over 3m wide, at the east corner of the enclosure. The ditch narrowed at each terminus and turned slightly inwards. At the entrance, several small pits or post-holes were identified, each 0.25m in diameter and depth. One (cut B230) lay in the centre of the entrance and three (excavated example: cut B232) were immediately outside the entrance by the southern terminus. As noted above, these could form part of the stake-hole alignment, extending beyond the limits of the enclosure to the north-west. A resistivity survey was carried out over the unexcavated portion of the enclosure (Illus 8). The survey clearly located the continuation of the enclosure and produced evidence for two further possible entrance causeways, one by the southernmost corner and one half-way along the north-west side of the enclosure.

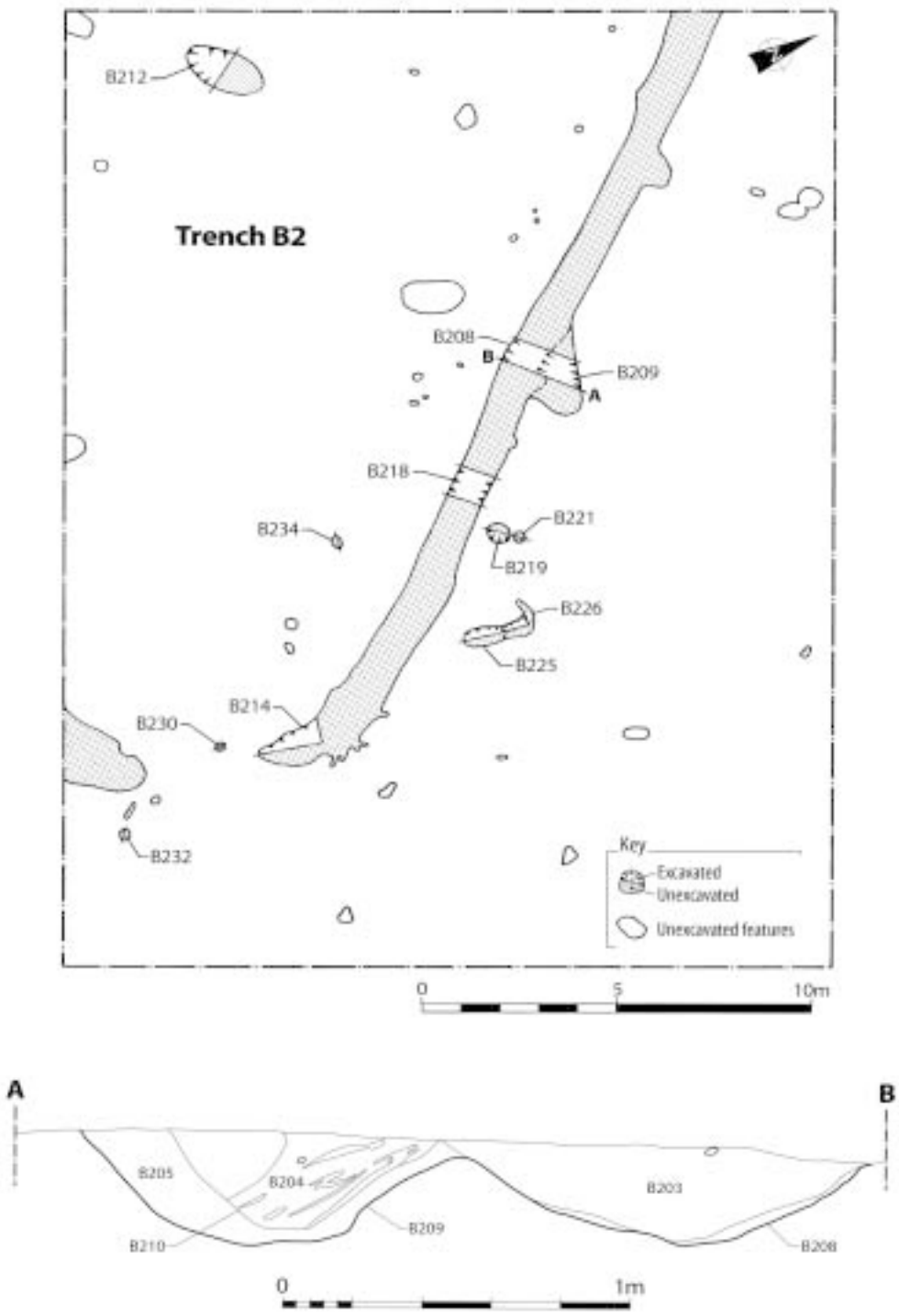
Two pits, of which one (B209) was excavated, appear to have been cut by the main ditch (Illus 7). The primary cut (B209) was infilled with a homogenous mid-brown silty sand (B205), which was then re-cut by B210. The fills of B210 consisted of poorly sorted, organic and charcoal-stained sand. The in-filled pit was later cut by the enclosure ditch.

Inside the excavated part of the enclosure were two large pits measuring 1.5m by 1m, one of which (cut B212) was excavated. This proved to be 0.6m deep, with a homogenous dark silty sand fill.

Curvilinear ditch and pits (Trench B4) Illus 9

A trench was excavated over the northernmost part of a C-shaped cropmark ditch (NMRS ref. NO64NE 18) with a diameter of c 20m (Illus 2, 3). Internal features are visible on the photographs (Illus 3), but their form cannot be discerned in any detail. Within the excavated area, the ditch was found to lie in the vicinity of several pits and post-holes or stake-holes. The ditch (cuts B407, B437) itself was 0.7m deep, with almost vertical sides and a flat base. It measured 2.2m in width where it entered the trench, from which point it narrowed steadily to just 0.5m at the terminus.

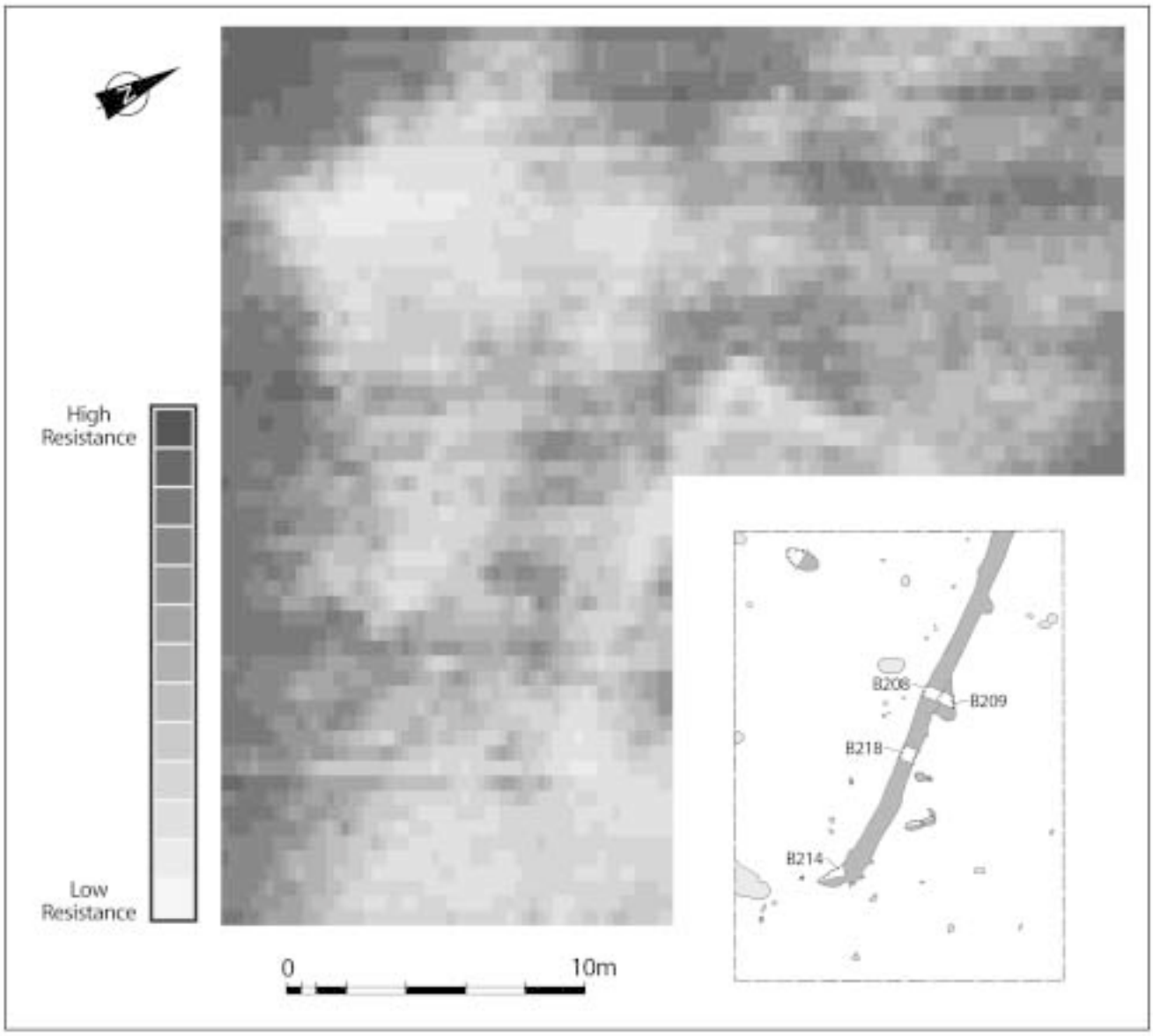
The fairly complex sequence of ditch fills, of which all but the upper, dark brown organic fill (B413), appeared to have been wind-blown (B438), included many



Illus 7 *Rectilinear enclosure: plan and section.*

charcoal-stained seams. These were sampled, but unfortunately proved too degraded for analysis. Neither stone packing nor post-holes were apparent within the surface of the ditch or the fragment of its base exposed. A section at the terminus revealed that the base of the ditch rose gently to the subsoil surface.

The only features in the trench to have comparable fills to the upper fill of the ditch were in the fills of two pairs of pits. Of these, two (excavated example; cut B405) were inside it and two (excavated example; cut B406) lay just beyond the terminus. The excavated pits were both approximately 0.4m deep and were filled with poorly sorted dark brown silty sand containing charcoal-stained lenses. Pit B405 contained three sherds of pottery, of which one, a rim sherd, came from an elaborately decorated beaker. Two sherds were recovered from B406. Although these were undecorated, they were in a very similar fabric to those from B405. A flint artefact from B406 was identified by Graeme Warren as being Late Neolithic / Early Bronze Age in form. Both the pits and the ditch contained heat-cracked stones in their upper fills. A sample of *Betula* roundwood from the fill of



Illus 8 *Rectilinear enclosure, excavation: plan and resistivity survey results.*

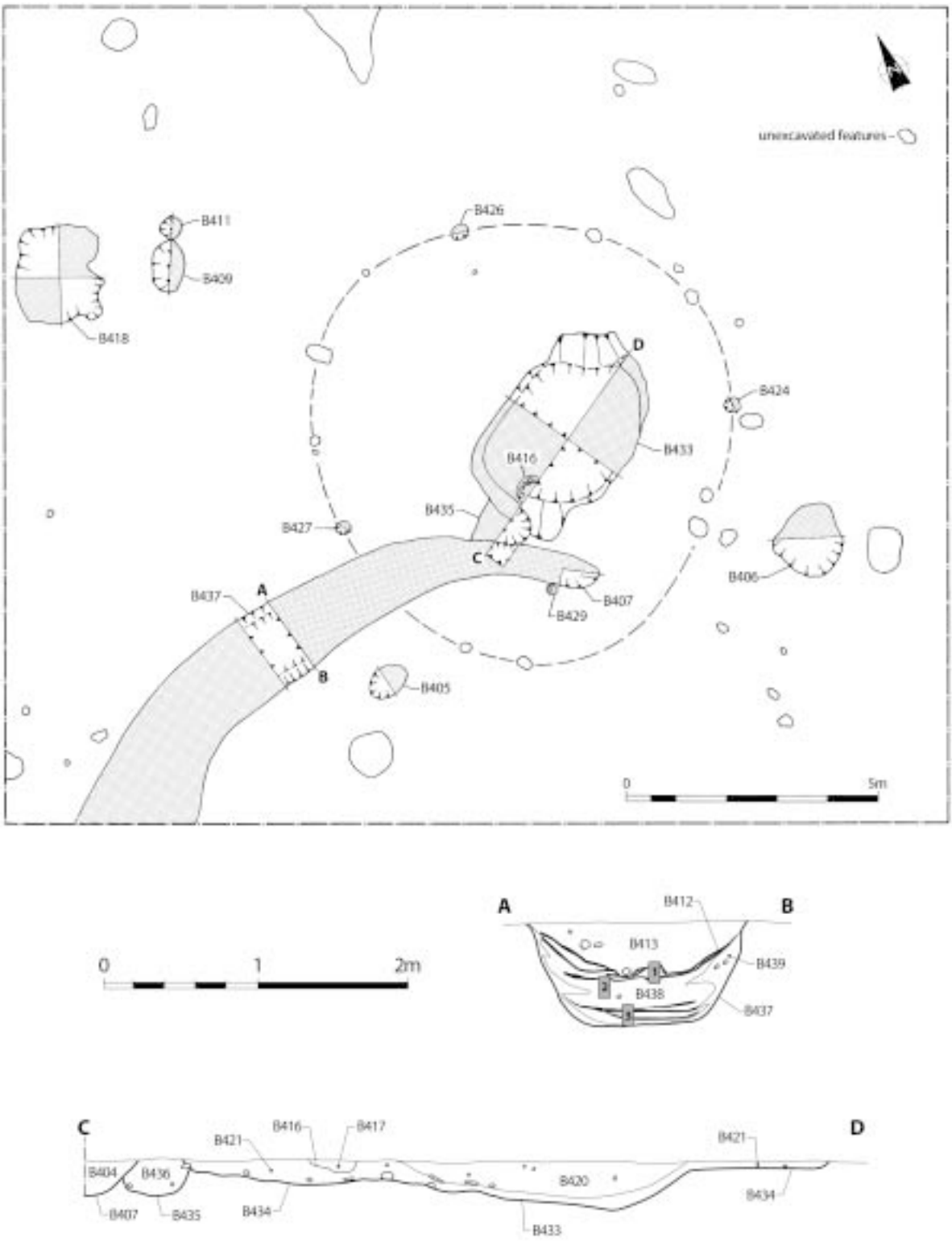
B406 was radiocarbon dated to 3645±85BP (AA-47749/GU-9753), which is calibrated to 2300–1700 BC at 2σ.

Post-hole ring and hollow (Trench B4) Illus 9

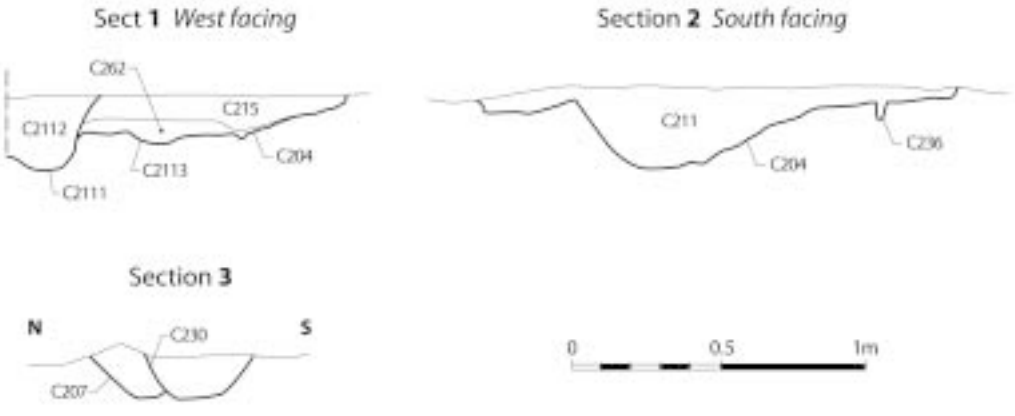
Immediately to the north of the terminus of the curvilinear ditch was an oval hollow (cut B433) measuring 4m (NE–SW) by 2.7m (SE–NW) and up to 0.35m deep. This feature had two fills, the lower of which (B421) seemed to line the hollow and was almost concrete-hard in consistency. The upper fill (B420) was mid-brown silty sand. A sample of carbonised heather stem from B420 was radiocarbon dated to 2350±50BP (AA-47750/GU-9754), calibrated to 800–200 BC at 2s. A small pit (cut B435) lay between the central hollow and the curvilinear ditch, and predated both features.
This hollow lay slightly off-centre within a sub-circular ring of at least 10 post-holes, of which three were excavated (cuts B424, B426, B427) and were found to be on average 0.25m in diameter and 0.25–0.4m deep.
A post-hole or stake-hole (cut B429) lying inside the post-hole ring was cut by the curvilinear ditch (cut B407). The structural associations of this feature could not be established, and thus the stratigraphic relationship between B429 and curvilinear ditch does not demonstrate the order of construction of post-hole ring and curvilinear ditch.

Ring-ditch structure (Trench C2) Illus 10

A trench targeted one of at least two possible souterrain or ring-ditch structures detected as cropmarks in the north-west part of Area C (Illus 2, 4). This example was selected as it appeared to have a cluster of pits or post-holes immediately to its south, possibly indicating the presence of either a souterrain with an associated post-built house or a ring-ditch house with some surviving internal features. These features appeared as dark crescent-shaped marks, oriented approximately the same way, with the open side facing south or south-east (Illus 2).



Illus 9 *Curvilinear ditch and pits, post-hole ring and hollow: plan and sections.*



Illus 10 *Ring-ditch structure: plan and sections.*

The excavation revealed a crescentic hollow (cut C204) and external groove (cuts C207, C219), as well as stake-holes and many pits and post-holes. No stratigraphic relationships between these different elements survived. Four sections were excavated in the crescentic hollow, which was c 6.5m long and c 1.7m wide. The profile was deeper (maximum 0.3m) on the outer side of the hollow, rising up to the inside (minimum 0.02m). Although no post-holes were identified in the ditch, oval depressions occurred intermittently along the deepest part, underlying the mostly homogenous dark brown fill (C211). Running just within the inside edge of the hollow and sealed beneath C211 were up to three rows of stake-holes (eg C236). A single pit (C2111) cut the fill of the hollow in section 1. Finds from the hollow comprised two possibly worked pieces of local agate and several rounded quartz pebbles.

A groove or palisade slot began 1.5m to the north of the hollow. The main cut (C207) was up to 0.4m wide and 0.2m deep and ran from an apparent terminus at the west to a point in the east of the trench where it narrowed and faded away. It appeared to re-start 0.2m to the south of this point (C219), but this continuation was so faint it proved impossible to trace or excavate in section. The main part of C207 was re-cut (C230). In section, the fills of the two cuts were not distinguishable, but a very thin (less than 0.01m thick) band of sand appeared intermittently between the two fills during excavation, revealing their stratigraphic relationship. The groove contained no stone packing for uprights.

49 small pits or post-holes occurred within the trench, of which 34 fell within the presumed floor area of the structure. Two of these (cuts 253, 209) could have been heavily truncated remnants of a formerly more extensive crescentic hollow, but this is not certain and they are equally likely to have been pits. A sample of 12 other features, of which 8 were inside the structure, was excavated, revealing a variety of depths and profiles, but relatively homogenous fills and no stone packing, much like the examples illustrated for House 5 at Douglasmuir (Kendrick 1995, 52). Of the excavated features, C2104 was the deepest post-hole at 0.37m, whilst C291 had the greatest diameter, 0.45m.

The remains in this trench have structural affinities with later prehistoric ring-ditch houses. Reconstruction of the original ground plan of this structure is considered separately below.

Sub-rectangular structure and adjacent pits (Trench D1) Illus 11 and 12

About three-quarters of a scheduled sub-rectangular structure (defined by cut D176), straight-sided with an apsidal end and defined by a shallow ditch, was uncovered in Trench D1 (Illus 2, 4). The ditch appeared to be severely truncated and its upper fills had been mixed with the sand subsoil by plough action. 14 sections were excavated across the ditch, which had been exposed over an area c 12m NE–SW by 6m. This feature had a maximum depth of 0.5m. Rectilinear and oval slots of varying dimensions, cut marginally deeper than the main ditch and filled with well-sorted mid-brown silty sand, appeared consistently in the bases of the excavated sections of the ditch. The primary ditch fill consisted of inwashed sand (D174) with occasional lenses of burnt material, comprising charcoal, carbonised hulled barley grains, chaff and seeds. A dark brown silty sand formed the upper fill (D171), which was demonstrated to be rich in ash by *in situ* magnetic susceptibility testing, carried out by Colin Davis.

Two apparent entrances were detected on the east side of the building. The northernmost was 2m wide, and defined to either side by very shallow post-holes with a rectangular ground plan (sections 12 and 13). Between the entrance post-holes and the ends of the wall slot (sections 5 and 10) were further rectangular post settings, the northern example (section 14) offset outside the wall line (Illus 12) and the southern (section 11) offset inside the wall line.

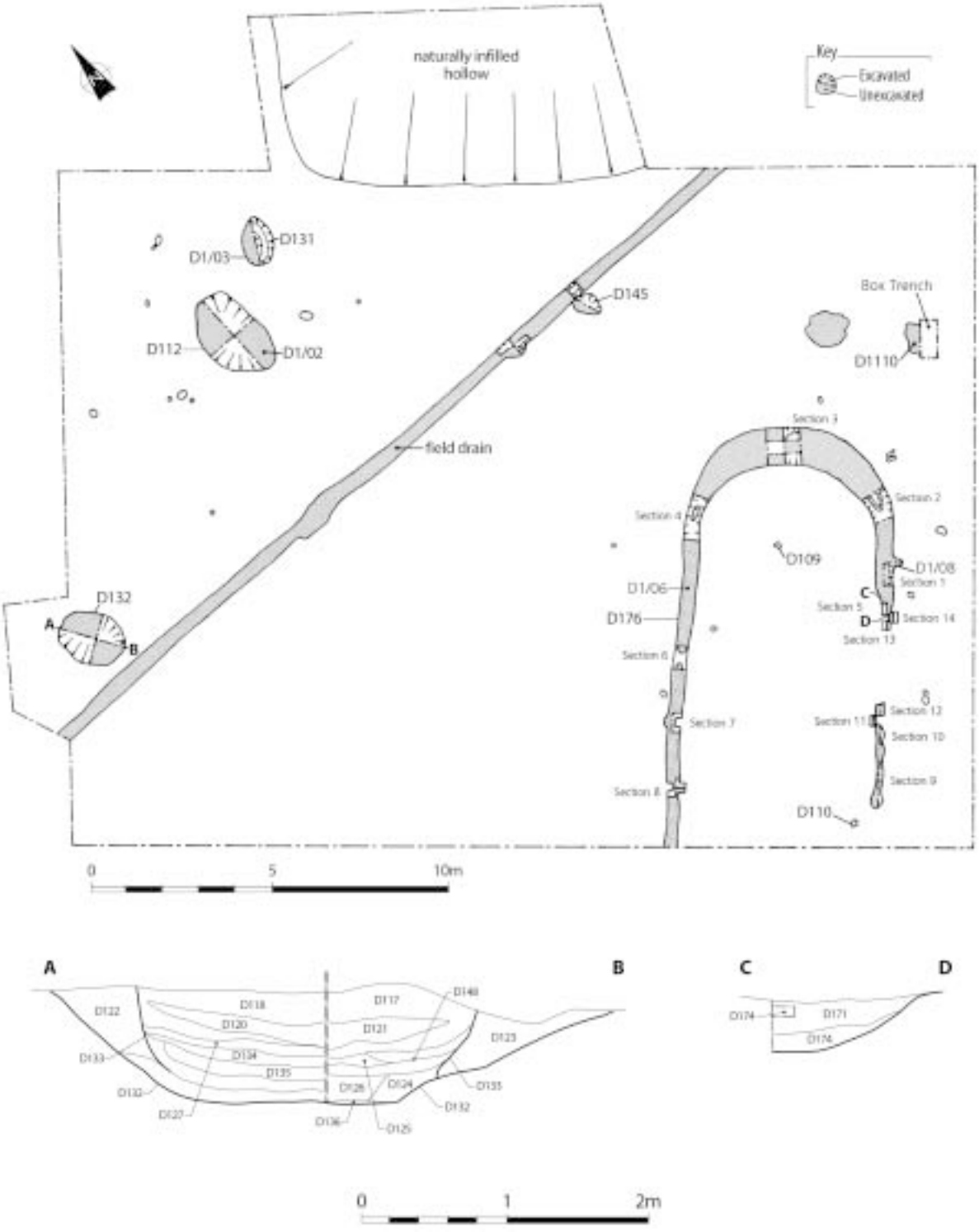
The southern entrance was not fully exposed, but was at least 1m wide. A pronounced bulge at the south end of ditch section 9 may indicate the position of an entrance post, although this possibility was not tested by excavation.

Two other post-holes offset from the wall line occurred directly opposite the ends of the length of ditch between the two putative entrances. Section 7 lay outside the wall line and directly opposed section 11, whereas section 8 lay inside the wall line and directly opposed the putative entrance post at the south end of section 9. Several irregularities of surface plan occurred elsewhere around the ditch, which may represent additional, poorly defined, offsets. All offset post-holes were very shallow, surviving to a depth of less than 0.02m. Sections 7 and 8 were partially cut into the fill of the ditch, demonstrating that these formed stratigraphically the latest phase in the construction of the building.

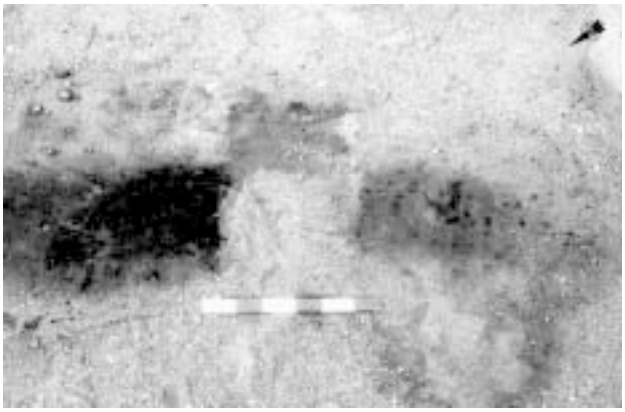
Only three features occurred in the floor area of the building. These were two shallow, rectangular post-holes (cuts D109, D110) and a single unexcavated stake-hole.

Radiocarbon dates of 1100±50BP (AA-47747/GU-9751) and 1085±45BP (AA-47748/GU-9752) were obtained from charred grains recovered from fill D174 of the ditch. These calibrate at 2s respectively to AD 780–1030 and AD 870–1030, indicating a late first millennium AD date for this context.

The cropmarks of at least six pits apparently forming a circle 25m in diameter were identified immediately to the west of the sub-rectangular structure (Illus 4). The pits are evenly spaced at 8 to 10m apart. Two of these pits (cuts D112 and D132) fell within trench D1. These were similar in size and fills. Both had a deep primary cut (maximum 0.8m) which in the case of D132 appears to have been completely in-filled with a homogenous brown silty sand (D122/123) and then re-cut (D133). This re-cut (D133) and the primary cut (D112)



Illus 11 *Sub-rectangular structure and pit circle: plan and sections.*



Illus 12 *Sub-rectangular structure: photograph of sections 5, 14 and 13.*

were in-filled with bands of burnt turf and charcoal-rich material, including cereal grains of which oats and barley predominated (Church, *infra*). *In situ* magnetic susceptibility testing by Colin Davis showed that this plant material had not been burnt whilst in the pits.

Samples of barley from D123, the fill of the primary cut of D132, were radiocarbon dated to 1180±50BP (AA-47743/GU-9747; AD 710–990 at 2s calibration) and 1145±45BP (AA-47744/GU-9748; AD 770–990 at 2s calibration). Barley from D120 and D127, both fills of the secondary cut of D132, were dated to 1150±60 BP (AA-44741/GU-9745; AD 720–1020 at 2s calibration) and 1145±55BP (AA-47742/GU-9746; AD 770–1020 at 2s calibration), and 1215±45BP (AA-47745/GU-9749; AD 680–950 at 2s calibration) and 1095±60BP (AA-47746/GU-9750, AD 770–1030 at 2s calibration) respectively, confirming that these features should be attributed to the late first millennium AD.

A third pit, D131, appeared loosely associated in plan with the above two, but differed in being shallow (0.35m maximum depth), with a sterile mid-brown homogenous fill. It is unlikely that this feature formed part of the pit circle.

Material recovered

Pottery Illus 13

The pottery assemblage consists of five sherds with a total weight of c 72g. The sherds, which varied in size but were relatively unabraded, derive from two pits (B405 and B406), associated in plan with a curvilinear ditch. Both pits were excavated in full and sieved. The single diagnostic sherd, from pit B405, came from a Beaker. Two additional body sherds came from B405 and two, of a slightly different fabric, from B406.

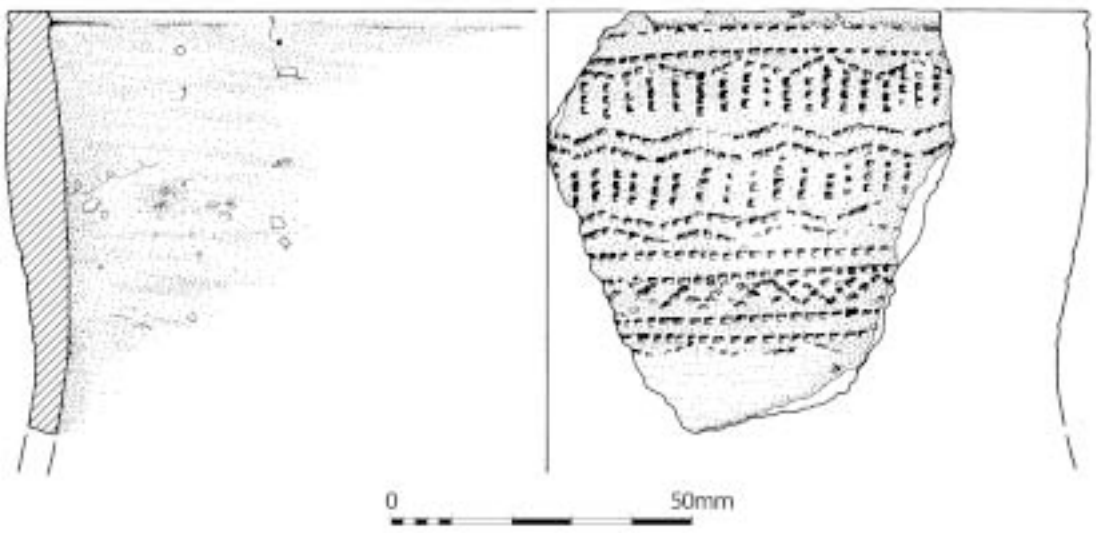
Fabric

The three sherds from B405 were constructed from a hard, sandy fabric, with a red exterior, dark grey core and light grey interior. The temper consists of very well sorted angular quartzite and basic dark igneous rock, less than 3mm in maximum extent. The profile of the fabric suggests the vessel has been reduced and cooled rapidly in air, rendering the core margins sharp. On the one diagnostic sherd, the fabric becomes marginally darker where the vessel begins to thicken below the decorated zone.

The fabric constituting the two body sherds from B406 is marginally different in that it has a red/brown exterior and is slightly darker in the core and the interior. The temper is also marginally less well-sorted. However, the differences are not sufficient enough to imply the sherds derive from a different vessel.

Form, construction and decoration

The single rim sherd comes from a vessel with a diameter of 240mm. The decoration on the neck of the rim sherd has been applied using either a three-toothed comb or a three- and a four-toothed comb. The combination of motifs include parallel lines, lattices and parallel zigzag lines. Each zone of decoration is delimited



Illus 13 *Beaker pottery.*

by a single line and most zones had single intermediate lines between them. The motifs employed are comparable to those on Step 4 vessel 725 N4 1503 from Upper Boyndlie, Aberdeenshire (Clarke 1970 no 1503; Shepherd 1986, 27).
Prior to the application of decoration the vessel was wet-smoothed in and out. The rim partially in-fills the uppermost line of impressions, indicating that it was formed or at least flattened after the application of the comb impressions. The lowest line on the sherd has also been partially in-filled prior to firing.

Discussion

The separation of the neck from the body by both the distribution of motifs and the sharp neck bend fits with Van der Waal's Step 4 of beaker development, which Shepherd (1989) demonstrated to be normally associated with female burials, and with Shepherd's (1986) late North-East Beaker. Such vessels are typically assigned dates early in the second millennium BC (cal), although detailed work relating to absolute chronologies of beakers has yet to be carried out in the area. This date is given support by the recovery of the B406 sherds from a feature containing charcoal dated to 2300–1700 cal BC at 2s (AA-47749), as well as a flint artefact which has been assigned a Late Neolithic / Early Bronze Age date (Graeme Warren, pers comm).

Carbonised plant macrofossils

Mike Church and Mike Cressey

Introduction

This report analyses the carbonised plant macrofossils recovered from bulk samples taken from the excavations at Newbarns. Palaeoenvironmental sampling was envisaged as an integral research aim of the project (Finlayson *et al* 1999). 65 samples were submitted, of which 26 produced carbonised remains included in this analysis.

A total sampling strategy was adopted (Jones 1991), meaning a sample was taken from every archaeological context, apart from deposits with clear bioturbation, modern contamination or those deposits that consisted of sterile redeposited sands and gravel. A 20% random sample of this population obtained in the field was then taken for wet sieving. This meant a statistically representative sample of all the archaeobotanical remains from the site was retrieved (van der Veen and Fieller 1982). All the samples from the structure in Trench C5 and the post-ring in Trench B4 were wet-sieved as these represented the most coherent domestic structures on the site. The bulk samples were processed using a flotation tank (Kenward *et al* 1980) with the residue held by a 1.0mm net and the flot caught by 1.0mm and 0.3mm sieves respectively.

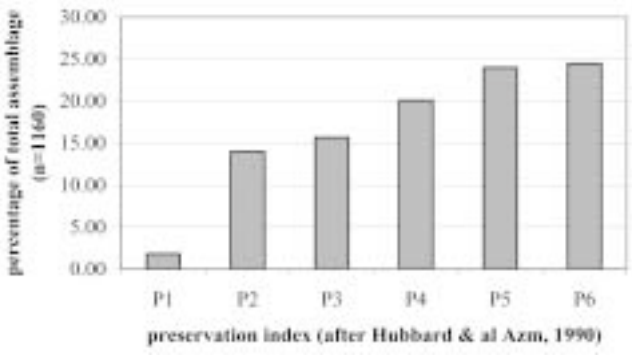
All the flots were dried and checked using a low-powered stereo/binocular microscope at x15–x80 magnification. An initial assessment was made of the flots prior to identification. This involved scanning the flots using a semi-quantitative scaling system recording the relative frequencies of the main classes of archaeobotanical remains. The full list and methodology of this assessment has been lodged with the site archive. Samples with over 10 quantifiable components were chosen for further analysis. This arbitrary selection strategy was utilised in the regional study undertaken by van der Veen (1992), with the samples containing few plant remains seen as unreliable (*ibid*, 25). All macrofossil identifications were checked against botanical literature and modern reference material from collections in the Department of Archaeology, University of Edinburgh. Charcoal identifications were made on all material recovered using a binocular microscope at magnifications ranging between x10–200, generally on transverse cross-sections on charcoal measuring between 4–6mm. Asymmetry and morphological characteristics were recorded (available in archive). Nomenclature follows Stace (1991) with ecological information taken from Schweingruber (1990), Clapham *et al* (1989) and *Flora Europaea* (Royal Botanic Garden Edinburgh 1998).

Results

Table 1 presents the charcoal and the carbonised plant macrofossils recovered from the bulk samples with greater than 10 quantifiable components noted during the assessment. Following the assessment, the samples with greater than 10 quantifiable components came from two sets of deposits. The first set derived from a sample from a fill of one of the post-holes in the structure in Trench C5 and a sample from the top fill of the pit complex within the same structure. The second set comprised the burnt lenses within the fills of the pits D1/01 and D1/02. The charcoal from the other samples and small finds were recovered from a variety of features across the area. The full results form part of the site archive, and this report concentrates hereafter upon two assemblages obtained from pits in Trench D1.

Taphonomy

Much of the carbonised material was concentrated in the fills of the two pits in Trench D1 and mineral magnetic profiles (Davis 2000) through the section of the fills demonstrated that the material had been dumped into the pit, rather than burnt *in situ* (cf Linford and Canti 2001). All these fills were rich in grain with proportionally small amounts of chaff, weed seeds and charcoal and so probably reflect the discard of accidents in the crop processing of the grain (cf Hillman 1981). The rest of carbonised plant material and possibly the charcoal rich layer at the bottom of pit D1/01 (Sample D1/24) was likely to have been dumped into the various negative features incorporated with ash from household fires. This taphonomic model is acknowledged as the principal charring mechanism in British archaeobotany (cf Hillman 1981; Jones 1984; van der Veen 1992; Jones 1996).



Illus 14 *Grain preservation from site assemblage.*

Illus 14 presents the preservation of the 1160 cereal grains identified, following the preservation indices outlined by Hubbard and al Azm (1990). Class P1 represents perfectly preserved grain through to class P6 representing severely degraded grain precluding even genus identification. Most of the grains came from the pit fills in Trench D1 and the range of preservation reflects the likely charring environment for a crop-processing accident. Over 40% of the total assemblage was in the three best preservation classes, meaning some chaff fragments and weed seeds usually lost in more hostile carbonisation environments were preserved (cf Boardman and Jones 1990). Hence, it is valid to estimate the stage in the crop-processing cycle and it is likely that the grain rich deposits in the pit were dumped from accidents in the latter stages (Hillman 1981).

Charcoal

The charcoal concentrations were very low and the fragments were generally of amorphous branchwood or timber. The species included Ling heather (*Calluna vulgaris* L. Vill), oak (*Quercus* sp.) hazel (*Corylus avellana* L.), birch (*Betula* sp.), alder (*Alnus glutinosa* L.) and willow (*Salix* sp.). The charcoal was too low in frequency to infer whether a given species had been selected in favour of another, though Ling heather was the dominant species in terms of weight and number of fragments. The timber could have been gathered from local woodland in a variety of habitats and the heather from moorland or heath. Unfortunately, no pollen diagrams have been produced from lowland Angus covering the later prehistoric and early historic periods, a function of the truncation and disappearance of suitable sites stemming from the intensive agriculture of the 19th and 20th centuries (Coles *et al* 1998).

Cultivated species

Most of the cereal remains were recovered from the fills of the two pits in Trench D1. It is likely that the deposits relate to the same archaeological period judging by the nature of the deposits and the similarities in the archaeobotanical assemblages and so the remains will be analysed as a single assemblage from each pit.

520 identifiable grains were recovered from Pit D1/02 (D112; Samples D1/2–8) and of these 68% were barley (*Hordeum* sp.) and 32% oat (*Avena* sp.). 465 identifiable grains were recovered from Pit D1/01 (D132; Samples D1/14–24), with 75% barley and 25% oat. Single grains of wheat (*Triticum* sp.) and rye (*Secale cereale* L.) were also recovered from two samples in Pit D1/02, which were probably weeds of the barley and oat crop. The barley was almost all hulled in both pits and only a few naked grains were identified. These could have stemmed from very small-scale experiments in growing the naked variety or represent what is in effect weed contaminants of a few naked plants in the hulled crop. It may also represent a phenomenon noted by Hillman (quoted in Holden and Boardman 1998), by which a small proportion of hulled grain does not fuse to the enclosing lemmas and paleas when the growing season has been shortened by early frost, drought or excessive rain. This results in a small proportion of the grain from the hulled crop resembling the naked variety. The few rachis internodes preserved in both pits were of the six-row species so it seems probable that the barley crop was almost exclusively of the six-row hulled variety (*Hordeum vulgare* var. *vulgare* L.). This was confirmed by the ratio of symmetric: asymmetric hulled grain being almost exactly 1:2 for both pits, the exact proportion expected in the six-row species (Zohary and Hopf 1994). Species identification is not possible for oat on the basis of the grain morphology. However, judging by the limited number of fragile oat floret bases in Samples D1/5 and D1/24, Common oat (*Avena sativa* L.) was being cultivated with a little weed contamination from Wild oat (*Avena fatua* L.). Two seeds of flax (*Linum usitassitissimum* L.) were also recovered from Pit D1/01. This may represent weeds of the barley crop rather than cultivation of flax in its own right. The remaining chaff consisted of a single fragment of awn and some culm nodes and culm bases of greater than 2mm diameter that could have derived from cereal straw. If this was the case, the presence of culm bases indicates harvesting by uprooting, a strategy that maximises the straw yield but can lead to soil erosion in friable soils. A mix of hulled six-row barley and some oat is common in assemblages dating from the Iron Age onwards in Scotland (Boyd 1988; Dickson and Dickson 2000), and so would be appropriate for the late first millennium AD contexts.

Wild species

The habitat for most of the wild components recovered from both pits in Trench D1 is damp cultivated ground or wet grassland. The most frequent remains are the small culm bases / rhizomes of probably grasses and seeds of the Common spike-rush (*Eleocharis palustris* (L.) Roemer and Schultes) and Fat-hen (*Chenopodium album* L.). Common spike rush was routinely associated with damp cultivated ground prior to large-scale

key to Table 1

sub-sampling
* 25% of grain identified so grain total multiplied by 4 for proportions of total assemblage
\# 50% of grain identified so grain total multiplied by 2 for proportions of total assemblage

context
pf pit fill

plant part

a achene	ch charcoal fragment	f fruit	qc quantifiable component
af awn fragment	chr charcoal	fb floret base	r rhizome
c caryopsis	roundwood fragment	n nutlet	ri rachis internode
cap capsule	cn culm node	ns nutshell fragment	s seed
cb culm base			

nb Charcoal fragments and weight are shown by number of fragments (total weight)

Table 1a *Charcoal and the carbonised plant macrofossils recovered from the bulk samples with greater than 10 quantifiable components (grain and chaff).*

sample	C5/9	C5/12	D1/2	D1/3	D1/4	D1/5*	D1/8	D1/14	D1/18	D1/20	D1/24#
context	C507	C527	D106	D105	D104	D105	D109	D118	D122	D124	D127
generic context type	pf	pf	pf	pf	pf	pf	pf	pf	pf	pf	pf
volume (litres)	7	5	5	5	5	5	2	4	2	3	2
charcoal											
Betula sp (ch)								9F(0.4)			11F(0.6)
Calluna vulgaris (L) Hull (chr)	1F(0.01)					1F(0.01)		10F(0.2)			50+F(4.5)
Corylus sp (ch)	1F(0.02)	1F(0.01)						3F(0.2)			5F(0.6)
Quercus sp (chr)							1F(0.03)				
Quercus sp (ch)											1F(0.01)
Salix sp (ch)											1F(0.01)
indeterminate (ch)						1F(0.02)					
grain											
Hordeum sp (c)	4		7	50	22	55	14	25	5	6	51
H naked (c)			1			3				1	
H naked asymmetric (c)						1					
H hulled (c)	3		11	26	19	42	8	22		8	65
H hulled symmetric (c)	1		1	6	1	21	2	14		9	32
H hulled asymmetric (c)			3	8	3	44	5	26	3	21	60
Triticum sp (c)						1					
Avena sp (c)			16	37	10	91	11	16	6	26	69
Secale cereale L (c)			1								
Linum usitatissimum L (s)											2
cereal indeterminate (c)	1	1	16	46	14	44	7	15		4	19
grain total	9	1	56	173	69	1192	47	118	14	75	592
chaff											
Hordeum sp (ri)								1			
Hordeum vulgare L (ri)				1		4		1			7
Avena sp (fb)						2					
Avena fatua L (fb)						1					
Avena sativa L (fb)						6					7
awn fragment (af)											1
cereal/monocotyledon (>2 mm.) (cn)				4		3		2			7
cereal/monocotyledon (>2 mm.) (cb)	3		2			4	2	20			6
chaff total	3	0	2	5	0	20	2	24	0	0	28

Table 1b *Charcoal and the carbonised plant macrofossils recovered from the bulk samples with greater than 10 quantifiable components (wild components).*

sample	C5/9	C5/12	D1/2	D1/3	D1/4	D1/5*	D1/8	D1/14	D1/18	D1/20	D1/24#
context	C507	C527	D106	D105	D104	D105	D109	D118	D122	D124	D127
generic context type	pf	pf	pf	pf	pf	pf	pf	pf	pf	pf	pf
volume (litres)	7	5	5	5	5	5	2	4	2	3	2
wild species											
Brassica rapa L (s)						1				2	10
Brassica/Sinapis spp (s)				1		1					2
Bromus spp (c)	1			1		8					3
Carex spp (trigonous) (n)								3			
Chenopodium album L (s)			2	3	9	12		2		1	30
Chenopodium/Atriplex spp. (s)	2		1	1		2		1		1	8
Chrysanthemum segetum L (a)											4
Convolvulus arvensis L (f)				1		2					
Eleocharis palustris (L) Roemer and Schultes (n)	2	1	3	31	6	69	6	4		16	40
Galeopsis tetrahit L (n)				2						1	2
Persicaria lapathifolia (L) Gray (n)	12			8		15		3		3	6
Persicaria maculosa Gray (n)				2		4			1	3	2
Plantago lanceolata L (s)				1		1		1			1
Poa annua L (c)		1									
Poaceae undiff (large) (c)			1			1					
Poaceae undiff (medium) (c)	2			3	1	4					2
Poaceae undiff (small) (c)	1		1	1	1	2		2			3
Polygonum aviculare L (n)	1					2	1				5
Polygonum spp (n)	8							2			2
Ranunculus repens L (a)				1		1					1
Raphanus raphanistrum L (f)											1
Rumex acetosa L (n)	7										
Rumex acetosella L (n)	3					2					
Rumex obtusifolius/ crispus L (n)				2		1		3			
Rumex spp (n)	1							1			1
Spergula arvensis L (s)						1				2	2
Stachys palustris L (f)						1		1			
Stellaria media L Vill (s)			1	1							1
Veronica hederifolia L (s)			5		2	1	1				
Viola palustris L (s)						1					
indeterminate (s/f)	3		2	13	3	10		2			4
indeterminate (trigonous) (s/f)						4					
cereal/monocotyledon				2	1	6		2			1
(<2 mm) (cn)				2	1	6		2			1
cereal/monocotyledon (<2 mm) (cb)	10	9	6	21	2	23		41		1	6
indeterminate (>2 mm) (r)	1			6	2			5			
indeterminate (<2 mm) (r)	3	1		20	7	1		2			
wild total	57	12	22	121	34	176	8	75	1	30	137
total qc	69	13	80	299	103	1388	57	217	15	105	757
qc/litre	9.9	2.6	16.0	59.8	20.6	277.6	28.5	54.3	7.5	35.0	378.5
grain proportion (%)	13.0	7.7	70.0	57.9	67.0	85.9	82.5	54.4	93.3	71.4	78.2
chaff proportion (%)	4.3	0.0	2.5	1.7	0.0	1.4	3.5	11.1	0.0	0.0	3.7
wild species proportion (%)	82.6	92.3	27.5	40.5	33.0	12.7	14.0	34.6	6.7	28.6	18.1

Table 2 *Radiocarbon dates from Newbarns.*

lab no	sample context	material	lab age	lab error±	2s range, cal BC/AD	d13C (%)
AA-47741 GU-9745	D120	*Hordeum* sp	1150	60	AD 720–1020	-24.8
AA-47742 GU-9746	D120	*Hordeum* sp	1145	55	AD 770–1020	-21.3
AA-47741, AA-47742	D120 combine		1147	41	AD 770–990	
AA-47743 GU-9747	D123	*Hordeum* sp	1180	50	AD 710–990	-23.7
AA-47744 GU-9748	D123	*Hordeum* sp	1145	45	AD 770–990	-23.4
AA-47745 GU-9749	D127	*Hordeum* sp	1215	45	AD 680–950	-22.7
AA-47746 GU-9750	D127	*Hordeum* sp	1095	60	AD 770–1030	-21.4
AA-47745, AA-47746	D127 combine		1172	36	AD 770–980	
AA-47747 GU-9751	D174	*Hordeum* sp	1100	50	AD 780–1030	-20.7
AA-47748 GU-9752	D174	*Hordeum* sp	1085	45	AD 870–1030	-21.4
AA-47749 GU-9753	B402	*Betula* sp	3645	85	2300–1700BC	-28.0
AA-47750 GU-9754	B420	*Calluna vulgaris*	2350	50	800–200BC	-27.2

drainage of the 20th century (Long 1929) and many of the other wild species recovered prefer areas of damp cultivation or wet grassland. These include Wild turnip (*Brassica rapa* L.), Common hemp nettle (*Galeopsis tetrahit* L.), Pale persicaria (*Persicaria lapathifolia* (L.) Gray), Creeping buttercup (*Ranunculus repens* L.), Wild radish (*Raphanus raphanistrum* L.) and Sheep's sorrel (*Rumex acetosella* L.). Some of these species could also have been found in heaths and bogs indicated by the recovery of Ling heather charcoal (*Calluna vulgaris* L. Hull) and seeds of sedges (*Carex* spp.), Marsh woundwort (*Stachys palustris* L.) and Marsh violet (*Viola palustris* L.). Other possible weeds of cultivated ground include Fat-hen (*Chenopodium album* L.), Field bindweed (*Convulvulus arvensis* L.) Corn marigold (*Chrysanthemum segetum* L.) Redshank (*Persicaria maculosa* Gray), Knotgrass (*Polygonum aviculare* L.), Common sorrel (*Rumex acetosa* L.), Broad leaved / Curled dock (*Rumex obtusifolius / crispus* L.), Ribwort plantain (*Plantago lanceolata* L.), Ivy-leaved speedwell (*Veronica hederifolia* L.) Cabbage/ Mustard (*Brassica*/*Sinapis* spp.), and grasses (Poaceae undiff.). The occasional seeds of Brome (*Bromus* spp.) and Corn-spurrey (*Spergula arvensis* L.) provide slight indications of drier soils.

Discussion

It seems likely that this assemblage represents a mix of weed seeds of the barley and oat crop with a smaller proportion of material associated with the burnt heather recovered from three of the samples. The heather itself could have been part of heathy turf used as fuel for the grain drying process or in household fires. The burning of heathy turf could also have introduced a number of the wet-loving species, such as the sedges, as well as the small culm bases and rhizomes (Dickson 1998). However, the majority of the wild components would have been weed contaminants of the crop and so provide interesting insights into the conditions of the fields. The presence of a few seeds of Chickweed (*Stellaria media* L. Villars) in both pits may indicate soil amendment with manure as Chickweed is nitrophilous. Also, the mix of species suggests damp and free-draining conditions existing in the same field or separate fields with differing soil conditions for the barley and oat crop that were mixed in the crop-processing cycle. In either case, this corresponds to the picture emerging from other archaeobotanical assemblages in lowland Angus that suggests expansion into more marginal areas was increasingly common from later prehistory onwards compared to the earlier cultivation in the Neolithic that was generally confined to the better soils (cf Church 2002).

There are few direct chronologically comparable archaeobotanical assemblages in the lowlands of the North East, with only the material at Easter Kinnear and Hawkhill near Leuchars, Fife dating to the mid to late first millennium cal AD. Dickson (1997) identified carbonised plant remains from both sites, noting the dominance of six-row hulled barley, the presence of a significant number of oat grains and a few seeds of flax from Easter Kinnear. Evidence for the gathering of plants included carbonised seeds of Sand leek, bramble

and raspberry as well as various types of material from heathland, including crowberry and possible peaty turfs for fuel. Smaller concentrations of material were recovered from Hawkhill, including grains of hulled six-row barley, emmer and bread wheat and evidence of various species of wood charcoal and a few fragments of burnt peat. Assemblages of burnt grain have also been recovered from a few corn-drying kilns of slightly later date, including Capo in Aberdeenshire, Abercairny in Perthshire (Fairweather 1988) and Lhanbryde in Moray (Holden 1997). At Abercairny, approximately 60% of the grain recovered was six-row hulled barley, with the other 40% comprised of a mix of black and wild oat. The wild components, interpreted as weed contaminants of the crop, pointed to a mix of well-drained and wetter land that could indicate separate areas for the crop to grow or mixed soil conditions within the fields. Black oat dominated the remains at both Capo and Lhanbryde and again a mixed ecological signal from the weed contaminants indicated a variety of soil conditions under which arable crops were grown. The assemblage from Newbarns therefore fits into a transitional phase in North East Scotland between a barley-dominated arable economy and a more diverse multi-cropping economy dominated by barley and oat grown within both optimum and marginal soil conditions.

Radiocarbon dating

Very few of the feature fills were securely sealed. Samples from only four of the feature groupings—the curvilinear ditch and pits (Trench B4), the hollow and post circle (Trench B4), the sub-rectangular structure and the pit circle (Trench D1)—were considered viable and submitted for radiocarbon dating. Ten radiocarbon accelerator dates were obtained from samples of carbonised cereal grain, birch and heather stem. The results are summarised below.

The samples were submitted to the Scottish Universities Research and Reactor Centre (SURRC), and were measured at the University of Arizona AMS Facility. Table 2 lists the radiocarbon dates and 2s calibrated ranges received from SURRC.

If the burnt deposits filling the secondary cut of pit D132 (contexts D120 and D127) represent single episodes of contemporary dumped material, then it is justifiable to combine the two dates within each context to provide tighter calibrated date ranges (cf Ward and Wilson 1978). The combined dates are included in Table 2 (using OxCal v. 3.5). At 95% confidence the combined dates indicate that both fills were deposited between the late 8th and the late 10th centuries cal AD and are statistically indistinguishable.

Discussion and interpretation

Ring-ditch features

In the absence of radiocarbon or artefactual evidence, the interpretation of these features has to be based on morphological parallels alone. There was no evidence to suggest that these features were ring-ditch houses as the ditches were too deep and there was a lack of associated features and no apparent entrance. They are also probably too small to have been enclosures, whether for domestic or ritual use. It seems more likely that they represent the vestiges of barrows. Round barrows are known in the vicinity, for example at Corbie Knowe (NMRS Ref: NO64NE 4) and are mentioned in the *Statistical Account of Scotland* (Carnegie 1794) as having been numerous in the area until the advent of more intensive cultivation. Many were investigated in the 18th century and were often found to contain beaker vessels and cists, hence their frequent interpretation as Late Neolithic/Early to Middle Bronze Age funerary monuments. Although no internal feature was found associated with the ring-ditch in Trench A3/4, as only the very lowest levels of the monument are preserved, it is conceivable that associated remains were located in either a shallow grave or an upcast mound whose remains have now been entirely removed by ploughing.

However, the very small size of the area enclosed within the outer ditch would make the construction of a round barrow impractical. An alternative interpretation, which could explain the very small dimensions of the feature, is that it represents a type of monument similar to the upstanding remains represented by Table Rings Cairn, East Lothian (Strachan 1998, 33). Here, a ring-ditch, similar but with a greater circumference than the present examples, surrounded a cairn. The upcast was on the outside of the ditch rather than the inside. There is, however, no record of such site types in the Newbarns area.

The presence of the heat-cracked stones in the upper fills of both features is unlikely to be of any great significance. These occurred in the upper fills of the ring-ditches (and indeed other investigated features such as the curvilinear ditch in Area B), and probably relate to cooking activity occurring when the monuments in question were largely silted up, and had presumably lost their primary significance.

Rectilinear enclosure

The appearance of the enclosure in plan is reminiscent of the square barrows common in the immediate area, such as at Redcastle (Alexander forthcoming). Breaks in the ditch at the corners are considered by Murray and Ralston (1997) to be a diagnostic characteristic of square barrows, and the Newbarns example is comparable in plan in this respect. Upstanding examples of this type of monument have external banks (eg Garbeg, Drumnadrochit, Highland; Wedderburn & Grime 1984), and although no such feature was present at

Newbarns its obliteration as a result of plough truncation can be countenanced.

However, there are other factors that suggest that this enclosure is not the remains of a square barrow. At c 30m across the scale of the structure is well beyond that normally recognised in that class of monument. Furthermore, if the line of internal stake-holes at Newbarns were to represent a revetment for a bank, this might suggest that this monument was of a different type. However, the stake-holes could equally represent an element present in addition to an external bank, or they may relate to an earlier phase or even marking out phase of monument construction.

Other examples, all unexcavated, of similar monuments of a comparable size are found in the field immediately to the east of Area B (NMRS ref. NO64NE 51) and elsewhere along the Lunan Valley, and have been suggested as potential medieval farm enclosures (Pollock 1985, 397). However, as no finds or datable materials were recovered from the Newbarns enclosure no firm conclusions can be made about the structure's date or function.

Curvilinear ditch, pits, post-hole ring and working hollow

It is difficult to come to any conclusions as to the interrelationships and functions of the features in Trench B4 based purely on the excavated evidence, particularly as it was not possible to determine which features co-existed. The radiocarbon date of 2300–1700 cal BC (AA-44749) from pit B406 provides an indication as to the date by which activity was taking place within the immediate area. Whether this pit is associated with the curvilinear ditch, as might be implied by the similarities in their upper fills, or whether the two are unconnected, cannot be decided on the evidence available.

The function of the curvilinear ditch, potentially the boundary of a site of funerary, agricultural or domestic character, could not be established from the limited areas exposed and excavated. The fills—seams of charcoal-stained sand interspersed with clean wind-blown sand—indicate it was left open for some time without vegetation covering it and without it being maintained, but these observations do not contribute to any possible interpretations. The surviving depth of the ditch suggests that the cropmark reflects the original extent of the feature, unless considerable localised variations in degree of agricultural attrition are proposed. On this basis the ditch had never formed a complete enclosure, unless it was used in conjunction with another type of barrier which has left no archaeological traces that can be detected remotely.

If one presumes that the off-centre hollow (B433) is associated with the putative post-hole ring, one could envisage a fairly flimsy structure or enclosure containing a working hollow. The Early Iron Age radiocarbon date of 800–200 cal BC from B420 suggests that at least the final fill of the hollow post-dates significantly the Beaker / Early Bronze Age activity.

Ring-ditch structure

It is difficult to reconstruct a secure approximation of the original ground plan of the structure represented in Trench C2. There is no obvious pattern to the post-holes in plan and it is as easy to reconstruct linear arrangements of posts as it is post-rings from the traces encountered. Morphologically, the structure is likely to be later prehistoric and has affinities with ring-ditch structures that occur widely in eastern Scotland. The fact that the Newbarns example lacks many features commonly occurring in ring-ditch structures, such as the ring-ditch encompassing all of the central floor area except along the entrance passage, an internal post-ring or detectable entrance posts, may reflect its exceptionally truncated condition. Better-preserved structures of ring-ditch houses have been excavated in Angus at nearby Ironshill (Pollock 1997), Douglasmuir (Kendrick 1995), Culhawk Hill (Rees 1998) and Auchlishie (Dick 1996, 12–13). Dates from these sites range from the mid 1st millennium cal BC for Douglasmuir to the early first millennium cal AD, although a Late Bronze Age example has recently been excavated at Deer's Den, Kintore, Aberdeenshire (Alexander 2000).

Whether the hollow of the Newbarns structure forms a ring-ditch only partially preserved as a result of plough truncation, or whether it perhaps reflects the combined effects of plough truncation and the deliberate deepening of the north-west side of the ring-ditch, is unclear. Why the structure would have had deeper foundations to the north-west, presumably directly opposing the entrance, is not obvious. At Douglasmuir Kendrick (1995, 54–6) identified three 'crescent-shaped hollows', each associated with pits and post-holes present within a putative floor area, in addition to the six more readily classifiable ring-ditch houses. She proposed that these structures, which resemble the Newbarns structure in ground plan, might be the remains of severely truncated ring-ditch houses. The same arguments could apply to the Newbarns structure.

The profile of the hollow, its outer edge steep-sided and its inner edge more gently sloping, are very similar to those of ring-ditch Houses 2 and 6 at Douglasmuir (Kendrick 1995, 48, 54). The elongate depressions in the base of the crescentic hollow are difficult to interpret: similar depressions were present in most of the ring-ditch structures at Douglasmuir (Kendrick 1995), but at that site the ring-ditches either contained or were covered by the cobbled surface. The stake-holes grouped around the inner edge of the hollow were a particular point of interest, perhaps representing the division of internal space by a wattle fence or screen.

There are three main possibilities for the function of the groove feature. Firstly, originally it may have continued concentric to the hollow, having functioned as the foundation slot of an outer wall to the ring-ditch structure: Kendrick (1995, 61–2), however, argued that the Douglasmuir ring-ditch houses were built of turf and ran immediately outside the ring-ditch. Second, it may

have been part of an enclosure associated with the structure. Finally, it may have been chronologically separate from the house, and of unknown date or function. The latter option seems unlikely as the curve of the groove at its easternmost end closely matches that of the hollow. Whether the western terminus of the groove feature was real, or simply reflected only the deepest part escaping plough truncation, is not apparent. The most interesting aspect of this feature is the fact that it was re-cut, demonstrating some length of occupation.

The unenclosed settlement represented by the putative row of three ring-ditch structures at Newbarns, of which only this one was excavated, is seen as fairly typical in Angus (Macinnes 1982), where no wholesale move towards enclosure occurred in the 1st millennium BC (ibid).

Sub-rectangular structure

Morphologically, this structure has broad similarities to Neolithic mortuary enclosures (eg Balfarg, Barclay and Russell-White 1993), Neolithic timber halls (eg Balbridie, Fairweather and Ralston 1993; and Claish Farm, Barclay *et al* 2002) and timber halls of Early Historic type (eg Yeavering: Hope-Taylor 1977 and Reynolds 1978; Dunbar, Perry 2000). Radiocarbon dates of cal AD 780–1030 (AA-47747) and cal AD 870–1030 (AA-47748), obtained from charred grains recovered from the basal fill of its ditch, place the Newbarns structure broadly within the late first millennium cal AD. Whilst it seems more likely that the dated deposit relates to the destruction and abandonment of this building rather than its construction, it is not possible to be definitive.

The details of construction of the Newbarns structure, particularly the rectangular offsets and sub-rectangular slots, find good parallels in other Early Historic buildings. Rectangular post- and plank-holes are a frequent occurrence on timber hall sites, such as Doon Hill, East Lothian and the post-and-plank buildings at Yeavering (Reynolds 1978). This latter site provides a good parallel for the appearance of slots at the base of a foundation ditch and for offset posts, although in this case the offsets were supporting posts in deep post-holes. The 12th century hall at Courthill, Dalry, had regularly-spaced rectangular posts, indicated by post-holes offset from the outside of the wall line; it was suggested the posts had held up roof beams (Scott 1989; although Barclay and Russell-White 1993, 180 cite alternative interpretations of this structure as a Neolithic mortuary enclosure). Both Doon Hill hall B and Yeavering have doorways with extra rectangular post-holes, although not in the same form as the Newbarns example. The two opposing sets of offset rectangular post-holes at Newbarns may represent the vestiges of crucks, used as roof supports, although again the roof could have been supported by obliterated post-holes or posts on post-pads. In North-East Scotland a good parallel for Newbarns can be seen in the first millennium AD hall at Green Castle, Portknockie, a rectangular structure 4m wide and at least 7m long with a rounded end and containing an internal post-pad for a roof support (Ralston 1987). The Pitcarmick-type buildings of Perthshire (Ralston 1997) also point to the widespread occurrence of elongate architectural building forms within the Early Historic settlement record.

It was hoped that a systematic magnetic susceptibility survey might reveal the location of a hearth within the Newbarns building, but no indications of such a feature were found. It could be, however, that a hearth existed at the unexcavated end of the structure, or that the fireplace was on a fairly thick bedding of stone slabs which might prevent heat affecting the underlying subsoil.

Possible pit circle

The functions of pit circles, which are recognised as cropmarks of considerable variability across Scotland, are not fully understood. The examples at Romancamp Gate, Fochabers, specifically excavated to address this question, proved to be Iron Age houses (Barclay 1993). The scale of the Newbarns example is reminiscent of the timber ring lying within the ditches of the early Bronze Age ceremonial feature at North Mains of Strathallan, eastern Scotland (Barclay 1983). The radiocarbon dating indicates that the Newbarns feature is more recent than both these examples. Moreover, the wide spacing between the pits, the large overall diameter of the circle, and the character of the pits themselves all point away from the features at Newbarns having been the foundations for a post-built structure.

The carbonised plant remains dumped in the pits may represent the discarding of household and/or agricultural rubbish after the pits had ceased to fulfil their original function. It seems possible that these features were created not simply as rubbish pits, but were grouped for example around a structure invisible on aerial coverage—the regularity of spacing suggests a more meaningful purpose than rubbish disposal. However, it is a reasonable assumption, based upon radiocarbon dating evidence, that the pits were related to the adjacent timber structure.

Conclusions

A broad range of features and structures was examined at Newbarns, demonstrating the range of domestic, funerary and ritual activities extending from at least the 2nd millennium BC (as represented by the barrow features and the beaker sherd) to the Early Medieval period (square barrows, timber hall).

Souterrains are notable in their apparent absence from the study area. With the possible example in Trench C2 having been revealed as a probable ring-ditch house, there are no obvious souterrains on the aerial coverage despite their apparent ubiquity in Angus cropmark landscapes, for example close by at Ironshill

East (McGill 2003) and Redcastle (Alexander, forthcoming). This might suggest that they occur in clusters rather than being evenly distributed throughout the contemporary settlement landscape. Alternatively, it could be an indication that the settlement vestiges within the study area do not date from the period when souterrains were in widespread usage.

These excavations highlighted the difficulties presented in excavating heavily truncated cropmark sites. With most features surviving less than 0.3m deep, there was almost a complete lack of stratigraphy and dating evidence. It was exceptional to find datable material that was associated securely enough with contexts and features to be worth presenting for radiocarbon dating. In many cases, the excavations did not reveal much information in addition to that visible on the aerial coverage. These excavations were primarily looking at the depth and condition of deposits within the study area, rather than considering the monuments themselves in great detail. However, the survival of stratified deposits in these features, many of which were difficult to interpret on the basis of these limited excavations, suggest there is potential for meaningful information to be gleaned from at least some of them.

Acknowledgements

The author would particularly like to thank the farmer, Jim Duncan, for granting access to the site, and the excavation team—student supervisors Tony Taylor, Gordon Cherrington and Ishbel Campbell, and the Edinburgh University first year archaeology students of 1997/98 and 1998/99. Valuable on-site and post-excavation advice was offered by Derek Alexander and Andrew Dunwell. Additional thanks are due to Sarah Govan (Historic Scotland), Andrew Dunwell and Ian Ralston for their comments on drafts of this paper. The illustrations accompanying this report are by Kevin Hicks. Final responsibility for the content of this paper rests with the author and CFA Archaeology Ltd.

References

Alexander, D 2000 'Excavation of Neolithic pits, later prehistoric structures and a Roman Temporary Camp along the line of the A96 Kintore and Blackburn Bypass', *Proc Soc Antiq Scot*, 130, 11–75.

Alexander, D forthcoming 'Redcastle, Lunan Bay, Angus: the excavation of an Iron Age timber-lined souterrain and a Pictish barrow cemetery'.

Barclay, G J 1983 'Sites of the third millennium BC to the first millennium AD at North Mains, Strathallan, Perthshire', *Proc Soc Antiq Scot*, 113, 122–281.

Barclay, G J 1993 'The excavation of pit-circles at Romancampgate, Fochabers, Moray, 1990', *Proc Soc Antiq Scot*, 123, 255–268.

Barclay G J, Brophy K and MacGregor G 2002 'Claish, Stirling: an early Neolithic structure and its context', *Proc Soc Antiq Scot*, 132, 65–137.

Barclay, G J and Russell-White, C J 1993 'Excavations at the ceremonial complex of the fourth to second millennium BC at Balfarg/Balbirnie, Glenrothes, Fife', *Proc Soc Antiq Scot*, 123, 43–210.

Boardman, S J and Jones, G E M 1990 'Experiments on the effects of charring on cereal plant components', *J Arch Sci*, 17, 1–11.

Boyd, W E 1988 'Cereals in Scottish antiquity', *Circaea*, 5, 101–10.

Carnegie, J 1794 'The Parish of Inverkeilor (County of Forfar)','in Sinclair, J (ed) *Statistical Account of Scotland 1791–1799*, Vol. XIII Angus, 280–6.

Church, M J 2002 'Carbonised plant macrofossils', in Cameron, K 'The excavation of Neolithic pits and Iron Age souterrains at Dubton Farm, Brechin, Angus', *Tayside Fife Archaeol J*, 8, 51–68.

Clapham, A R, Tutin, T G and Moore, D M 1989 *Flora of the British Isles*. 3rd Edition, Cambridge: Cambridge University Press.

Clarke, D L 1970 *Beaker pottery in Great Britain and Ireland*. Cambridge.

Coles, G, Church, M J and Milburn, P 1998 *An assessment survey of the palaeoecological record of the Eastern Angus and adjacent South Aberdeenshire Ploughlands*. Unpublished, Centre for Field Archaeology, University of Edinburgh, Report 448.

Davis, C 2000 *An assessment of the effectiveness of geophysical survey on cropmark sites in Angus*. Unpublished MA dissertation, Department of Archaeology, University of Edinburgh.

Dick, A M 1996 'Auchlishie, Kirriemuir parish, Angus: Neolithic/Early Bronze Age pottery, Iron Age settlement, ? souterrain', *Discovery Excav Scot 1996*, 12–13.

Dickson, C 1997 'Palaeobotanical analysis', in Driscoll, S T 'A Pictish settlement in north-east Fife: the Scottish Field School of Archaeology excavations at Easter Kinnear', *Tayside Fife Archaeol J*, 3, 107–111.

Dickson, C 1998 'Past uses of turf in the Northern Isles', in Mills, C and Coles, G (eds), *On the edge: settlement in marginal areas*, 105–109. Oxford: Oxbow.

Dickson, C and Dickson, J H 2000 *Plants and people in ancient Scotland*. Stroud: Tempus Publishing.

Fairweather, A D 1988 'Carbonised grain', in Gibson, A 'Medieval corn-drying kilns at Capo, Kincardineshire and Abercairny, Perthshire', *Proc Soc Antiq Scot*, 118, 227–229.

Fairweather, A D and Ralston, I B M 1993 'The Neolithic timber hall at Balbridie, Grampian Region, Scotland: the building, the date, the plant macrofossils', *Antiquity*, 67, 313–323.

Finlayson, B, Coles, G, Dunwell, A and Ralston, I 1999 'The Angus and South Aberdeenshire Field School of the Department of Archaeology, University of Edinburgh—research design', *Tayside Fife Archaeol J*, 5, 28–35.

Gemmell, A M D and Ralston, I B M 1984 'Some recent discoveries of ice-wedge cast networks in North-East Scotland', *Scott J Geol*, 20 (1), 115–118.

Gemmell, A M D and Ralston, I B M 1985 'Ice wedge polygons in North East Scotland: a reply', *Scott J Geol*, 21 (1), 109–111.

Hillman, G C 1981 'Reconstructing crop husbandry practices from charred remains', in Mercer, R (ed)'*Farming practice in British prehistory*, 123–62. Edinburgh: Edinburgh Univ Press.

Holden, T G 1997 'The carbonised plant remains', in Alexander, D 'A medieval grain-drying kiln and earlier mill-lade at Lhanbryde, Moray', *Proc Soc Antiq Scot*, 127, 681–684.

Holden, T and Boardman, S 1998 'Resource exploitation; crops', in Sharples, N, *Scalloway: a broch, Late Iron Age settlement and Medieval cemetery in Shetland*, 99–106. Oxford: Oxbow Monograph 82.

Hope-Taylor, B. K. 1977 *Yeavering. An Anglo-British centre of early Northumbria*. London: Dept Environment Archaeol Rep 7.

Hubbard, R N L B and al Azm, A 1990 'Quantifying preservation and distortion in carbonised seeds, and investigating the history of *frikÈ* production', *J Arch Sci*, 16, 103–106.

Jones, G E M 1984 'Interpretation of archaeological plant remains: ethnographic models from Greece', in van Zeist, W and Casparie, W A (eds) *Plants and ancient man*, 43–61. Rotterdam: Balkema.

Jones, M 1991 'Sampling in palaeoethnobotany', in Zeist, W van, Wasylikowa, K, and Behre, K-E (eds) *Progress in Old World Palaeoethnobotany*, 53–62. Rotterdam.

Jones, M 1996 'Plant exploitation', in Champion, T C and Collis, J R (eds)'*The Iron Age in Britain and Ireland: Recent trends*, 29–40. Sheffield: Collis Publications.

Kendrick, J 1995 'Excavation of a neolithic enclosure and Iron Age settlement at Douglasmuir, Angus', *Proc Soc Antiq Scot*, 125, 29–67.

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

Linford, N T and Canti, M G 2001 'Geophysical evidence for fires in antiquity: preliminary results from an experimental study', *Archaeological Prospection*, 8, 211–25.

Long, H C 1929 *Weeds of arable land*. London: HMSO.

Macinnes, L 1982 'Pattern and purpose: the settlement evidence', in Harding, D W (ed) *Later Prehistoric Settlement in South-East Scotland*, 57–73. Edinburgh University Department of Archaeology Occasional Paper 8.

McGill, C 1998 *Trial trenching programme at Newbarns, near Inverkeilor, Angus.* Unpublished report, Centre for Field Archaeology, University of Edinburgh, Report 442.

McGill, C 1999 *Second season of trial trenching programme at Newbarns, near Inverkeilor, Angus.* Unpublished report, Centre for Field Archaeology, University of Edinburgh, Report 500.

McGill, C 2003 'Excavation of a palisaded enclosure and associated structures at Ironshill East, near Inverkeilor, Angus', *Tayside Fife Archaeol J*, 9, 14–33.

Murray, D and Ralston, I 1997 'The excavation of a square-ditched barrow and other cropmarks at Boysack Mills, Inverkeilor, Angus', *Proc Soc Antiq Scot*, 127, 359–86.

Perry, D. R. 2000 *Castle Park Dunbar: two thousand years on a fortified headland*. Edinburgh: Soc Antiq Scot Monogr Ser 16.

Pollock, D 1985 'The Lunan Valley Project: medieval rural settlement in Angus', *Proc Soc Antiq Scot*, 115, 357–99.

Pollock, D 1997 'The excavation of Iron Age buildings at Ironshill, Inverkeilor, Angus', *Proc Soc Antiq Scot*, 127, 339–358.

Ralston, I B M 1987 'Portknockie: promontory forts and Pictish settlement in the North-East', in Small, A (ed) *The Picts: a new look at old problems*, 15–26. Dundee: University of Dundee.

Ralston, I B M 1997 'Pictish homes, in Henry, D (ed), *The Worm, the Germ and the thorn: Pictish and related studies presented to Isabel Henderson*, 18–34. Balneaves, Angus: The Pinkfoot Press.

Rees, T 1998 'Excavation of Culhawk Hill ring-ditch house, Kirriemuir, Angus', *Tayside Fife Archaeol J*, 4, 106–128.

Reynolds, N 1978 'Dark Age Timber Halls and the Background to excavation at Balbridie''*Scott Archaeol Forum*, 10, 41–60.

Royal Botanic Garden Edinburgh 1998 *Flora Europaea* (*http://www.rbge.org.uk/forms/fe.html*)

Schweingruber, F H 1990 *Microscopic wood anatomy*, 3rd edition. Swiss Federal Institute for Forest, Snow and Landscape Research.

Scott, J G 1989 'The hall and motte at Courthill, Dalry, Ayrshire', *Proc Soc Antiq Scot*, 119, 271–278.

Shepherd, A N 1989 'A note on the orientation of beaker burials in north-east Scotland' in Greig, C et al, 'A beaker cist from Chapelden, Banff and Buchan', *Proc Soc Antiq Scot*, 119, 79–80.

Shepherd, I A G 1986 *Powerful pots: Beakers in North-East Prehistory*. Aberdeen: Anthropological Museum, University of Aberdeen.

Stace, C 1991 *New flora of the British Isles*. Cambridge: Cambridge University Press.

Strachan, R 1998 'Table Rings cairn, Whittinghame parish, East Lothian', *Discovery Excav Scot 1998*, 33.

van der Veen, M and Fieller, N 1982 'Sampling seeds', *J Arch Sci*, 9, 287–298.

van der Veen, M 1992 *Crop husbandry regimes: an archaeobotanical study of farming in northern England, 1000 BC–AD 500*. Sheffield: Collis Publications, Sheffield Archaeological Monographs 3.

Ward, G K and Wilson, S R 1978 'Procedures for comparing and combining radiocarbon age determinations: a critique', *Archaeometry*, 20, 19–32.
Wedderburn, L M M and Grime, D M 1984 'The cairn cemetery at Garbeg, Drumnnadrochit', in Friell, J G P and Watson, W G (eds)'*Pictish studies. settlement, burial and art in Dark Age Northern Britain*, 151–68. Oxford: British Archaeol Rep, Brit Ser, 125.
Zohary, D and Hopf, M 1994 *Domestication of plants in the Old World*. Oxford: Clarendon Press.

Abstract

Trial excavations were carried out 1998 and 1999 on a series of cropmarks at Newbarns, by Inverkeilor, Angus, as part of the University of Edinburgh's Angus and South Aberdeenshire Field School, funded by Historic Scotland and the University of Edinburgh. The principal motive of these excavations was to compare the quality, quantity and range of archaeological remains in adjoining scheduled and unscheduled areas. The excavations revealed plough-truncated remains relating to a range of domestic and funerary activities extending from at least the second millennium BC to the later first millennium AD. Features sampled included Beaker-period pits, possibly associated with an enclosure; two possible Bronze Age barrows; an Iron Age working hollow; a ring-ditch house; a rectilinear enclosure, possibly a Pictish square barrow or Medieval farm enclosure; and an elongate rectilinear timber building of broadly 8th–10th century AD date.

Keywords
Newbarns
Ring-ditch
Barrow
Beaker
Timber hall

This paper was published with the aid of a grant from Historic Scotland.