

## Excavation of two ditches and a medieval grain-drying kiln, Inverness, Highland

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with contributions by A Crone, G Haggarty, D Smith & P Vandorpe

### ABSTRACT

*Excavations on the east side of Inverness revealed a portion of the defensive burgh ditch, a second large ditch perpendicular to the burgh ditch and a late 12th- or 13th-century grain-drying kiln. The route followed by the burgh ditch has been shown to lie some 20 to 30m further east than the southern end of Academy Street. A grain-drying kiln was constructed at the end of a backland rig, the length of the rig curtailed by the burgh ditch. These excavations have demonstrated that the lateral extent of medieval Inverness was greater than previously thought and that it actually contracted in size from the late 15th to 18th century. The function of the second ditch is elusive; it is unlikely to be defensive given its orientation but is rather too large to be solely for drainage.*

### INTRODUCTION

Prior to the commercial development of the Eastgate Centre, Inverness (NH 6687 4543) AOC Archaeology undertook a desk-based assessment, a two phased evaluation and an excavation in late 1999 and early 2000 (Ellis 2000). The work was funded by Royal Sun Alliance Property Investments Limited. The development area measured approximately 2.6ha and was bounded by Millburn Road and the Eastgate Shopping Centre to the south-east, Inverness Station to the north-west and a new Safeway retail store on the north-east (illus 1). Inverness lies upon the floodplain and alluvial fan of the River Ness, which bisects the town, and natural sands and gravels with occasional interbedded silts underlie the Eastgate Centre.

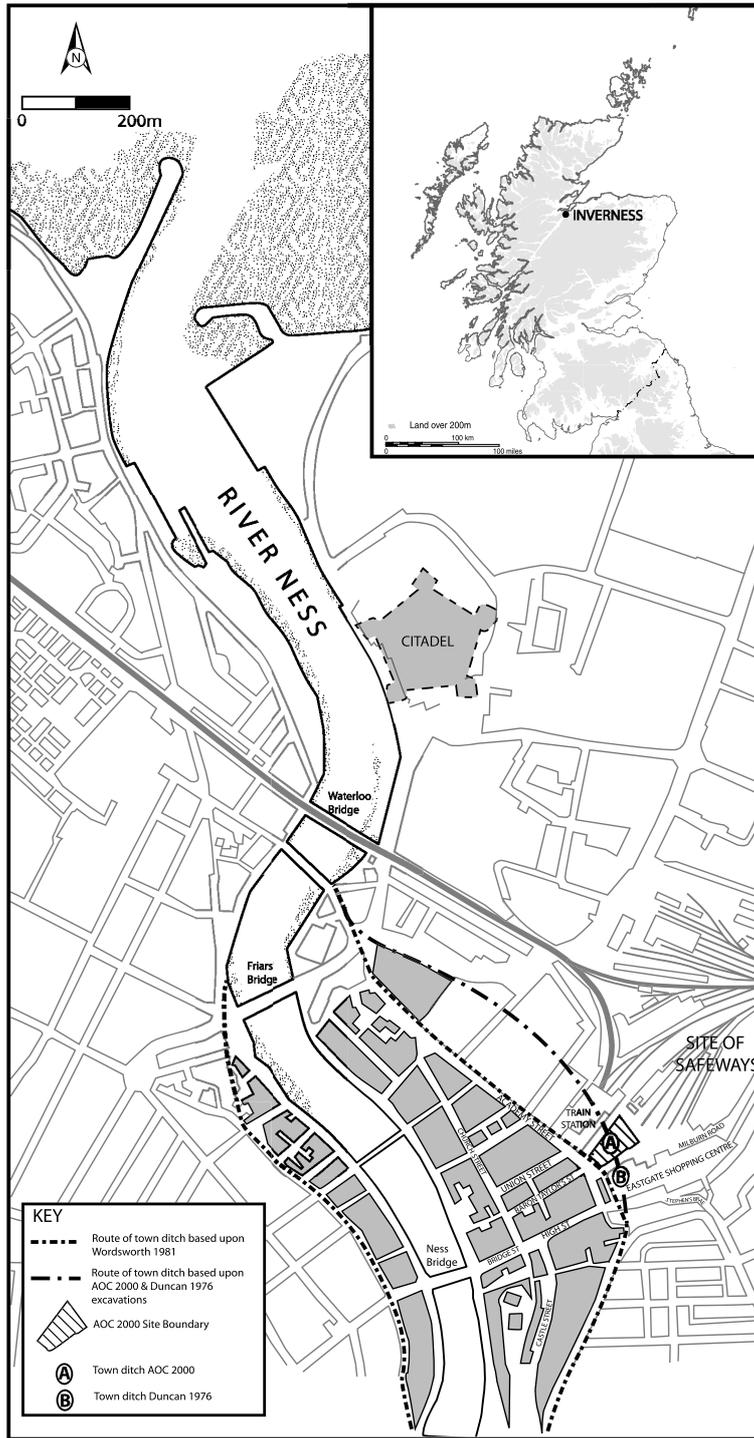
Trackways, platforms and buildings associated with the former Nairn to Inverness railway and later additions were identified and

recorded. In the southern area various foundations and cellars relating to buildings dating between 1765 and the 1930s were also recorded. A full account of the 18th- to 20th-century features is lodged in the National Monuments Record for Scotland. The focus of this paper is the excavation of a portion of the possible burgh defensive ditch (Ditch 1), a second later ditch (Ditch 2) and a grain-drying kiln (illus 2).

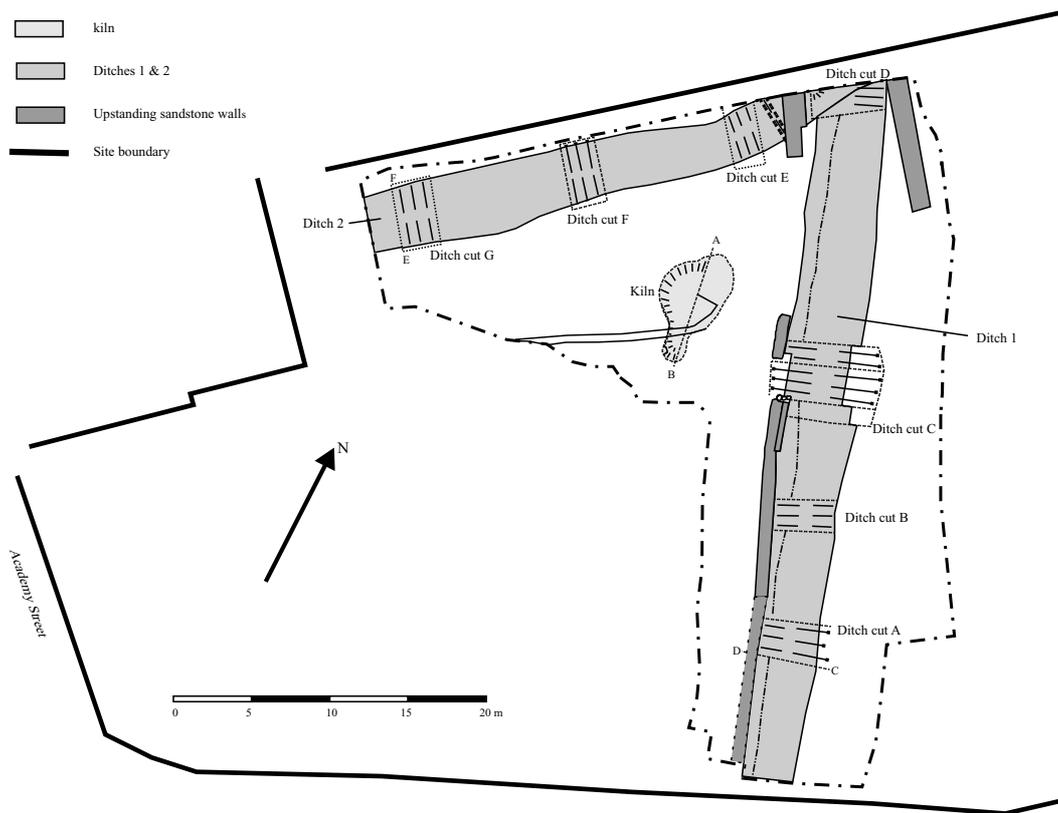
### HISTORICAL BACKGROUND

The burgh of Inverness was probably founded by David I after the death of Angus, Earl of Moray in 1130, when Moray was annexed to the Crown in an attempt to control the rebellious area. However, Inverness is not recorded as a burgh before 1179x82 (Barrow 1971, 11, 199, 262). The town is thought to have developed along a route between the parish church located at the north end and the castle located at the southern end (Perry 1998). The

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ILLUS 1 The location of the site and suggested boundaries of the medieval burgh. (Based on the Ordnance Survey map © Crown copyright)



ILLUS 2 The site

medieval town would have been roughly organized in burgh plots, comprising frontage buildings and rigs, that may have initially stretched back from the four main streets, Kirkgate (now Church Street), East Gate (now High Street), Bridgegate (now Bridge Street) and Doomsdale (now Castle Street) (Gourlay & Turner 1977; Perry 1998). The rigs or backlands may have contained an assortment of smaller dwellings, byres, sheds, rubbish and latrine pits, ovens and gardens (Ewan 1990). One vennel that ran off the Kirkgate towards the town ditch corresponds with the present-day Baron Taylor Street (Gourlay & Turner 1977), the eastern end of which lies directly opposite the development area. During the 13th and 14th centuries economic prosperity saw the lateral expansion of Inverness largely within the confines of its defences; it was only

to expand significantly beyond these in the second half of the 18th century (Gourlay & Turner 1977; Perry 1998).

The town defences appear to be late 12th-century in origin. A charter dating to around 1179 records that William the Lion instructed that the burgh would be surrounded by a ditch on the condition that the local people, the burgesses, built and maintained an accompanying palisade (Barrow 1971, 262). The line of the medieval ditch on the east side of the River Ness is thought to have run in a straight line from the present Waterloo Bridge along the line of Academy Street and Hamilton Street to the foot of Stephen Brae (Gourlay & Turner 1977, 6). The ditch appears to have lost its defensive function by 1462 when it is referred to as ‘the old ditch called “ye foule poule”’ in which the refuse from malt-kilns

and tanpits that covered the land on the east side of Church Street was dumped (Fraser-Mackintosh 1875, 3, 142). It is likely that the ditch was completely backfilled by the early 18th century, as it is not depicted upon a 1718 map of Inverness (Pelite 1718). There are documentary references to the palisade as a defence in 1689, but no further reference to the defences after this date could be found (Fraser-Mackintosh 1875, 3). Excavation in a car park on the eastern side of Hamilton Street (now occupied by a Marks and Spencer store) identified a ditch some 6m wide and 1.14m deep (Duncan 1976). Three probably late medieval pits cut this ditch, indicating that the ditch was either a re-cut of the original town ditch, or a much later ditch. Unfortunately no radiometric dates or pottery associated with these features have been published. A ditch was dug by the Covenanting forces to defend the town against the Marquis of Montrose in 1644; it was subsequently destroyed by royalists in 1649 (Pollitt 1981, 72).

The development area during the early 18th century comprised cultivated fields with a row of structures just to the north fronting the eastern side of what is now Academy Street (Pelite 1718). By 1821 substantial buildings occupied land to the east of the junction of Academy Street and Theatre Lane (later to become Hamilton Street) (Wood 1821). In 1855 the north-eastern portion of the development area was occupied by the newly completed Nairn to Inverness railway (London Midland & Scottish Railway), the focus for the subsequent development of this part of the town. The First Edition OS map (1867) shows Falcon Foundry occupying the western portion of this site, Edward's Court in the south-western central area (including Smithy) and a City of Glasgow bank facing onto Academy Street. The bank was formerly the town house of the MacKintoshes of Aberarder (Pollitt 1981) with a formal garden to the rear. During the 1930s a hall and club faced onto Academy Street, behind which lay a cinema and numerous other warehouses. The building plan on

the 1905 OS map is similar to that of 1930, except for the addition of the cinema, the footprint of which was occupied in the earlier period by a series of buildings set around a courtyard.

## EXCAVATION RESULTS

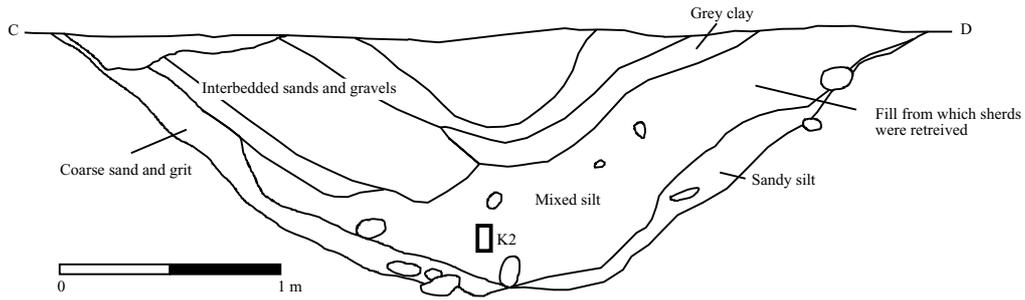
### THE DITCHES

Ditch 1 (illus 2) was U-shaped, up to 5m broad and up to 1.78m deep, cut into coarse alluvial sand and gravel. It extended from the southern edge of the excavation area to the northern edge in a NNW/SSW orientation; approximately 45m of its length was fully exposed. Four sections (A–D) were cut through this ditch (illus 2 & 3). The lower gravel deposits are the result of natural sand and gravel slippage back into the ditch following initial excavation or subsequent re-cutting. The primary fill comprised mixed silt rich in organic matter which appeared to have been dumped into the ditch from the western, that is, the town side. At the southern end of the ditch the mixed silt was interbedded with clay clasts. The upper fills comprised interbedded sand and gravel.

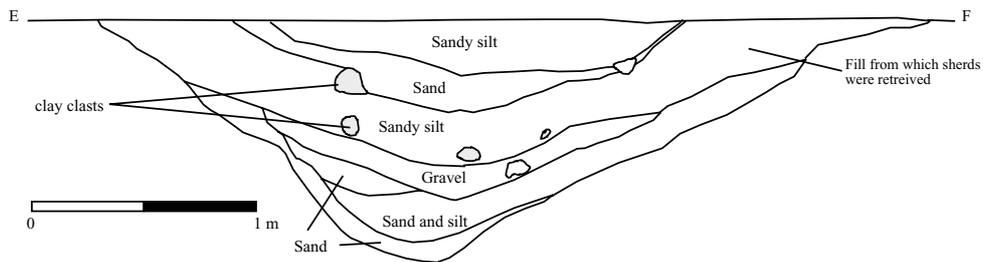
A broad V-shaped ditch, Ditch 2, ran approximately E/W along the northern edge of the development area (illus 2). Three sections (G, F & E) were cut through this ditch (illus 4). There was subtle lateral variation in the fills, the lowest comprising sandy silt or sand with up to six overlying silt, sand and gravel fills.

### THE GRAIN-DRYING KILN

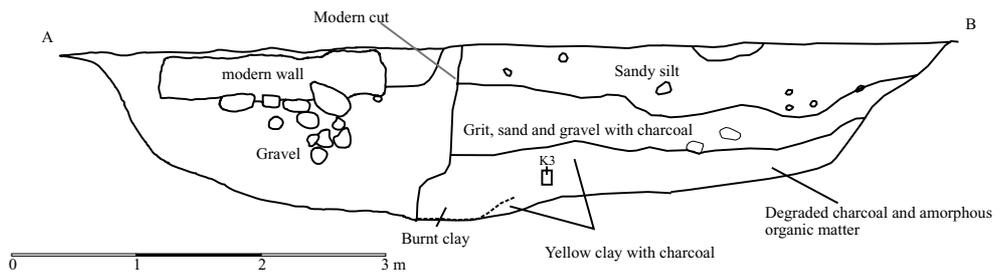
On plan (illus 2), the kiln was keyhole-shaped and measured up to 4m in diameter and up to 6m in length. However, its precise length could not be ascertained due to the insertion of a modern soakaway. The base of the kiln-bowl comprised irregularly placed cobbles and a spread of yellow and red (burnt) clayey silt. Overlying this was a thick layer of charcoal and charred organic matter that spread along the base of the flue. A further layer of yellow clayey silt, which contained thin horizontal layers of charcoal, overlay this. The upper layers consisted of a mixed sand and gravel with charcoal-rich organic laminations capped by a greyish-brown silt with sand. The kiln-bowl and flue wall comprised natural gravel that had been periodically lined with



ILLUS 3 Section through Ditch 1



ILLUS 4 Section through Ditch 2



ILLUS 5 Section through kiln

mixed yellow clayey silt and charcoal following episodes of collapse and slumping.

POST-EXCAVATION ANALYSES

The reports on pottery, insect and plant remains, soil analysis and micromorphology are abridged versions of the full reports lodged with the site archive in the National Monuments Record of Scotland.

RADIOCARBON DATES

Three samples were dated using the accelerator mass spectrometry method (AMS) at the Arizona

AMS Facility via the Scottish Universities Research and Reactor Centre (SURRC). The radiocarbon dates were calibrated using the University of Washington, Quaternary Isotope Laboratory, Radiocarbon Dating program, Rev 4.0 1998. The *Hordeum vulgare* was identified by Dorothy Rankin and the *Triticum dicocum* and *Stellaria media* by Patrice Vanderpe. The results are listed in Table 1.

The determination from the waterlogged seed places the infilling of Ditch 1 between the late 15th and late 18th century, although the dates from the carbonized grain indicate that the material used to backfill the ditch may have its origins in the 14th to early 15th century. The date of the carbonized

TABLE 1  
Radiocarbon dates

Lab code	Sample material	Yrs BP	$\delta^{13}\text{C}$	Calibrated dates	
				1 sigma	2 sigma
AA-40760	Waterlogged seed <i>Stellaria media</i> from Ditch 1	280 $\pm$ 40	-25‰	AD 1525–1656	AD 1488–1796
AA-40746	Carbonized <i>Triticum dicoccum</i> primary fill Ditch 1	560 $\pm$ 40	-22.7‰	AD 1326–1417	AD 1302–1436
AA-39113	Carbonized <i>Hordeum vulgare</i> from Pit 1	830 $\pm$ 35	-23.4‰	AD 1189–1258	AD 1159–1278

barley grain from the kiln suggests that it was in use some time between the late 12th and late 13th century.

#### THE CERAMIC MATERIAL

George Haggarty

##### *Ditch 1*

Two ceramic sherds were recovered from the mixed silt of Ditch 1 (illus 3). One, recovered from Ditch cut D, was a badly abraded red ware body sherd from a small jug probably 14th or 15th century in date. The other, recovered from Ditch cut B, was a very small, gritty, green glazed, body sherd, in a reduced slightly micaceous fabric, which had an exterior oxidized margin, and is probably 14th or 15th century in date.

##### *Ditch 2*

Three ceramic sherds were retrieved from a central fill (illus 4). One was a small 13th-century body sherd of Scottish White Gritty Ware, slipped on the exterior with a red slip. The second was a small 13th- or 14th-century body sherd (Scottish Medieval Red Ware) in a brick red fabric with splashes of lead glaze on the exterior. The third sherd was a badly abraded strap handle, from a jug, in a red sandy slightly micaceous fabric. The upper surface has traces of a clear lead glaze over a white slip. It is possibly 14th-century in date. A very small 13th- or 14th-century body sherd in a brick red fabric covered on the exterior with a clear lead glaze was retrieved from a stony fill with a grey silt matrix.

##### *Kiln*

Three potsherds were recovered from the mixed sand and gravel with charcoal. A single rim sherd of Scottish White Gritty Ware came from a tall straight-sided jar/cooking pot. This possibly dates from the third quarter of the 12th century and is

almost certainly not local. It has all the characteristics of the material from Kelso Abbey, some of which we know reached the area and was found stratified in levels of this date at Duffus Castle (Haggarty 1984). There was one small, unglazed cooking pot body sherd of Scottish White Gritty Ware, which probably dates to the late 12th or early 13th century. There was one strap-handle fragment from a smallish jug, which has a thick oxidized surface over a heavily reduced core. There is also a white slip over the upper surfaces under a clear lead glaze. This sherd is hard to date, but again possibly from the late 12th or early 13th century, when the local potters who had no significant access to white firing clays wished to imitate the more fashionable white pottery from further south.

One body sherd of typical Scottish Post-medieval Red Ware was retrieved from the lower fill. This sherd is probably late 16th- or early 17th-century.

#### THE INSECT REMAINS

David Smith

Eight samples were selected at the excavator's discretion for macroplant and invertebrate assessment. Only the invertebrate assessment results from one sample of the mixed silt from Ditch 1 are given here. The sample was processed using the paraffin flotation method in order to extract insect remains following the process outlined in Kenward et al (1980). The insect remains were 'scanned' as outlined by Kenward et al (1985) The taxonomy used for the insect remains is that of Lucht (1987). The moderately-sized fauna present consisted mainly of Coleoptera (beetles) and a few Diptera (fly) puparia. The remains were very eroded and showed the surface-pitting characteristic of fungal damage. This poor degree of preservation implies that the assemblage recovered is likely to be incomplete and biased. The insect fauna contained a number of species of beetle that probably indicates the presence of pastureland in the vicinity. This includes the

*Aphodius* dung beetles and other species, such as *Sitona*, *Hypera* and *Mecinus* that feed on pasture and grassland plants. The assemblage also contained a number of species of Carabidae, 'ground beetle' and water beetles that are associated with slow flowing bodies of water. Unfortunately, there are no taxa present that could provide us with more specific information as to the nature of the surrounding environment.

## THE PLANT REMAINS

Patrice Vanderpe

### *Introduction and method*

Following the preliminary assessment (Grinter & Smith 2000), five samples were selected for full archaeobotanical analysis, one sample from the lower fill of the kiln and four samples from Ditch 1. All samples contained charred plant remains but only one sample (414), from the mixed silt of Ditch 1 in Ditch cut B, contained waterlogged plant remains, whereas that obtained from Ditch cut A (505) contained none. The samples were processed by means of bucket flotation (Pearsall 1989). The flots were collected in sieves of 0.3mm and 1mm. For all samples, a sub-sample of 500ml was taken in order to investigate the presence of waterlogged material. This sub-sample was processed by means of the wash-over method (Pearsall 1989). Material was sorted and identified using a low power binocular microscope with x10 and x40 magnifications. All identifications were made using the reference collection at AOC Archaeology, Edinburgh. The botanical nomenclature follows *Flora Europaea* (Tutin et al 1964, 80). A standardized counting method was used involving counting the embryo ends for cereal and gramineae, and whole seeds for all other. Habitat information for the plant species was taken from Hanf (1983).

### *Results*

Charred plant remains were recovered from all samples. Preservation of the assemblage was varied. A large number of the remains could not be identified to species due to poor preservation of the grains, either through charring or post-depositional processes and microbial activity.

**Ditch 1** All four contexts (506, 414, 505 & 818) had very few cereals, comprising barley (*Hordeum vulgare* indet), oat (*Avena* sp) and one possible emmer grain (*Triticum* cf *dicoccum*). The charred weed seeds, comprising fat hen (*Chenopodium album*), common chickweed (*Stellaria media* L) and sun spurge (*Euphorbia helioscopia*), are typical arable weeds, whereas the single ribwort plantain (*Plantago lanceolata*) from the mixed silt is common in meadows and pasture. Waterlogged plant remains were recovered from the mixed silt, 414. All the waterlogged species were non-domesticated and typical of arable land as well as wasteland. There is no ecological evidence that any of these weeds were growing in the ditch at the time of deposition.

**Kiln** The sample from the kiln contained a high density of charred remains. Oat grains (*Avena* sp) dominated this assemblage. Two of these were still enclosed by the flower base and could be identified as bristle oat (*Avena strigosa* Schrebb). The majority of the oat grains were naked, or did not have the diagnostic parts of the flower base preserved, which restricted identification to genus level. On the basis of size and general shape the poorly preserved grains were classified as large *gramineae*, and are assumed to be oat grains (*Avena* sp).

Other cereals present included hulled barley (*Hordeum vulgare*, hulled), rye (*Secale cereale*) and wheat (*Triticum* sp). Of these, barley grains were most common with only a small number identified as hulled barley and the remainder as indeterminate cultivated barley. Rye grains were almost as common as barley, but wheat grains were rare. A large number of grains had to be classified as indeterminate cereal due to poor preservation. Parts of cereal other than grain, for example, culm nodes and rachis fragments, were present in small numbers.

The non-domesticated species (referred to as weeds) were mainly those of arable land including curled dock (*Rumex crispus*), fat hen (*Chenopodium album*), corn spurry (*Spergula arvensis*) and hemp nettle (*Galeopsis* sp). It is most likely that these were brought in with the harvested crops. Curled dock is common on nutrient-rich soils whereas fat hen is characteristic of nitrogen-rich soils, and corn spurry is indicative of acidic soils. The differing ecological preferences of these weeds are a possible indicator of different soil conditions on which the crops were grown (Holden 1997). Other weeds

present are nipplewort (*Lapsana communis*) and ribwort plantain (*Plantago lanceolata*), both indicative of grassland, and sedge (*Carex* sp) which is indicative of marshland. These weeds could have been growing on grass patches along the fields and may have been harvested with the crops and brought to site as contaminants. Alternatively, they could have been brought in with turfs which were used as fuel for the kiln (see Ellis, below).

### Discussion

All plant remains recovered from the fills of Ditch 1 are likely to have been derived from adjacent fields or waste material. The habitat information of the species present indicates that there were no plants growing within the ditch at the time of deposition of the mixed silt. Micromorphology indicates that the mixed silt is the remnant of redeposited turfs (Ellis, below). It is therefore possible that the plant material present in this fill could have been deposited with the turfs. However, the large variety of habitats of the weeds prevents firm conclusions being drawn on the exact conditions of deposition of the plant remains in the mixed silt.

The charred remains recovered from the base of the kiln are probably the remnants of the crops that were being dried. The cereals represented were all common in medieval Scotland (Boyd 1988). The assemblage is dominated by oat grains of which only a very few were still enclosed by their hulls. No evidence was found for the presence of cultivated oats (*Avena sativa*), but preservation was too poor to presume that none were present. Because of the variety of cereals (oat, barley and wheat) and the small size of the assemblage it is probable that this sample is the result of the accumulation of charred waste from various drying episodes of different cereals prior to storage. The assemblage is similar to a deposit from a corn-drying kiln at Lhanbryde, Moray where the assemblage was also interpreted as a function of the accumulation of waste derived from a number of crops dried in the kiln (Holden 1997).

### CHARCOAL

Anne Crone

A wide range of species was present from the lower charcoal-rich fill of the kiln (Table 2). It is possible to identify oak (*Quercus* sp) by eye without the use

of a microscope, hence the percentage value rather than individual identifications. The oak was very slow-grown, as was the single piece of ash (*Fraxinus excelsior*), and all were fragments of larger timbers. In contrast, the alder (*Alnus glutinosa*) and hazel (*Corylus avellana*) were mainly fragments of small roundwood. The range of species present suggests that this assemblage is primarily fuel used in the grain-drying kiln. However, large oak timber would always have been valued for building and other purposes and it seems unlikely that it would have been used as fuel. The oak may have formed part of the superstructure of the kiln.

### ROUTINE SOIL ANALYSES & SOIL MICROMORPHOLOGY

Clare Ellis

#### Routine analysis

Samples were subjected to four analyses: pH, loss on ignition, easily available phosphate, and calcium carbonate content. The level of easily available phosphate was also determined from two monolith samples taken from Ditch 1 and the kiln; it was measured at 2cm intervals.

The soils and sediments sampled from the site are predominantly acidic. The available phosphate ranges from medium to low.

**Ditch 1** Medium levels of easily available phosphate dominate the lower fills while the upper fills and the overlying topsoil exhibit low levels. The implication is that the lower sediments were affected by human and/or animal activity prior to their deposition and that activities leading to the enhancement of phosphate (eg manuring, dumping of domestic refuses etc) were no longer taking place during and after the deliberate back-filling of the ditch. The organic content of mixed silt is variable

TABLE 2  
Species found in the kiln

Species	Percentage of total assemblage
<i>Quercus</i> sp	40
<i>Alnus glutinosa</i>	6
<i>Corylus avellana</i>	5
<i>Betula</i> sp	5
<i>Ilex aquifolium</i>	3
<i>Fraxinus excelsior</i>	1

2.19–8.32%, a reflection of the mixed nature of the context.

**Ditch 2** Medium levels of phosphate dominate the V-shaped ditch and given the generally coarse nature of the fills and low level of organic matter it is possible that the ditch acted as a foul-water drain.

**Kiln** As expected the charcoal-rich lower fill of the kiln has a relatively high organic content, 7.52% and 11.22%. The medium to high level of easily available phosphate within the kiln is indicative of anthropic induced enhancement. The source of the phosphate is perhaps turfs or animal dung used to fuel the kiln.

#### *Soil micromorphology*

One thin section K2 was derived from the primary mixed silt fill of Ditch 1 (illus 3) and the second, K3, was derived from the lower charcoal fill of the kiln (illus 5). Sample K2 was collected to address a series of questions relating to the formation processes of Ditch 1, postulated to be the original 12th–13th century burgh ditch. It is hypothesized that the primary silt fill either comprised re-deposited turf fragments derived from cultivated land on the town side of the ditch, or is the remnants of a collapsed turf wall, again located on the town side of the ditch. Sample K3 was collected to address the function of the kiln. It was hypothesized that the pit was the remnants of a grain-drying kiln, or perhaps linked to some form of industrial activity. It was postulated that the charcoal and basal organic layer was the product of fuel waste, or the remnants of an accidental burning of a turf superstructure.

The samples were prepared for thin section analyses by G McLeod at the Department of Environmental Science, University of Stirling using the methods of Murphy (1986). The samples were analysed using the descriptive terminology of Bullock et al (1985) and FitzPatrick (1993).

**Sample K2** The fill comprised a single context but with micromorphological variation down its length. Four ill-defined layers were noted. The bottom Layer 1 comprised a predominately well-sorted silt with organic matter. Layer 2, some 63mm from the top of the slide, comprised a layer rich in horizontally oriented organic matter. Layer 3 consisted of

20–25mm of silt, rich in colloidal organic matter. The boundary between this silt and the overlying layer (Layer 4) was poorly defined. The uppermost layer (Layer 4) comprised poorly sorted fine sand and silt with occasional rock fragments and small (ie 1cm) soil blocks.

The sediment is interpreted as comprising re-deposited turf blocks that were deliberately thrown or tumbled into the ditch. The lowermost of the four ill-defined layers is interpreted as the remnant of a largely undisturbed silt loam. The organic layer overlying this is thought to be the remnants of a thin layer of vegetation that would have grown upon the silt loam. The mixed nature of Layers 3 and 4 indicate that these formed from damp, small, and broken silt loam clods that had partially fused through compaction and the post-depositional mixing activities of soil biota. Layer 3 contained a higher proportion of phytoliths and charcoal fragments; this material is possibly the remnants of grass ash. The fine disseminated nature of much of the organic matter within the discrete soil blocks of Layers 3 and 4 and within the less disturbed silt loam of Layers 1 and 2 is likely to be partially the result of soil preparation activities such as digging, or even ploughing to enable arable cultivation. One particularly distinct soil block, which was 1cm in diameter, contained charcoal fragments and one bone fragment, demonstrating that these components were present in the soil before its inclusion within the ditch. Furthermore, the general scatter throughout the sample of charcoal, bone (some burnt) and two possible burnt turf clasts can be interpreted as the remnants of manuring.

**Sample K3** Sample K3 comprises a yellow silt and an organic layer rich in silt. The organic layer rich in silt had three laminations: O1 (the uppermost), O2 (the central) and O3 (the basal). O1 and O3 have a complex structure, while O2 exhibits a crumb structure. The three organic layers rich in silt dip slightly towards the northern end of the pit. The layering and the horizontal orientation of much of the organic matter indicate that all three layers had been deliberately spread within the confines of the pit. The layers each comprise varying quantities of mineral matter, charred amorphous organic matter, clasts and fragments of burnt loam, and charcoal. A small proportion of the charcoal in O3 appears

to derived from plant stalks, while a greater proportion of the charcoal in O1 is oval to spherical clasts and is likely to be burnt seeds (Vandorpe, above). Given the relatively high mineral content of O3 and O2 it is clear that the material was not derived from a fire fuelled solely by wood, the latter identified by Crone (above). The presence in Layer O3 of frequent diatom frustles is intriguing within the context of the pit, given that diatoms are generally associated with damp or wet conditions. The integration of the separate strands of micromorphological evidence (small but significant mineral component, charcoal, a high proportion of organic matter, diatoms frustles and other biogenic silica, and in situ sclerotia) indicates that turf was used as a fuel. The rounded nature of the mineral grains and the relatively frequency of diatom frustles within layer O3 suggests that the turf may have been locally sourced from the alluvial floodplain of the Ness. The three layers, O1 to O3, show slightly different compositions. This variation could represent different 'firings' of the structure in which a slightly different source of fuel was used; O3 perhaps derived from a gleyed alluvium, O2 from a slightly more silt rich and drier turf and O1 from a more organic rich turf. The low mineral content and the nature of the organic residue of O1 indicate that this layer was probably derived from silty peat. It is also feasible, though less likely given the laminations, that the sampled material (O1 to O3) could have been produced if a turf and wood superstructure was destroyed in an accidental fire. The overlying yellow silt may be interpreted as a capping to the underlying 'ash'. The silt would have sealed the base of the pit providing a clean and fireproof surface or lining to the pit.

Micromorphological analysis confirms the in-field hypothesis that the primary ditch fill comprised a composite of re-deposited soil clods and turf derived from the town side of the ditch. The sediment had been dug over and cultivated and it may have been manured prior to its incorporation into the ditch. Micromorphological analysis indicates that the lower organic layers of the keyhole-shaped pit comprised the remnants of burnt turf that was apparently used to fuel the kiln. It is suggested that the slight difference in the composition of the three organic layers is a consequence of separate firings that used slightly different fuel sources.

## DISCUSSION

As revealed by excavation, the location and orientation of Ditch 1 varies from the projected course of the original late 12th-century burgh ditch by 20–30m (see Gourlay & Turner 1977) (illus 1). However, the route followed by the burgh ditch has largely been defined through the use of historical sources and will therefore be subject to inaccuracies. The broad U-shape of the ditch is curious given its supposed defensive function. However, the uselessness of the ditch as a defensive structure is perhaps borne out by the historical records, with Inverness being captured 14 times between 1163 and 1500 (Wordsworth 1982, 322). It is possible that its function may have been more to delimit the royal burgh and also to serve as a means of controlling the movement of taxable goods.

Micromorphological analysis has demonstrated that the primary fill of this ditch comprised redeposited soil and turf clods. The sediment contained both physical and chemical remnants of cultivation, manuring and even surface burning. The charred weed seeds are predominantly characteristic of arable cultivation and were either incorporated into the soil following the deliberate burning of surface vegetation, or within manure derived from household and byre waste. The paucity of charred cereal grains and the variation in species concentrations at two sampling points along the ditch indicate that these too were probably incorporated through the deliberate dumping and spreading of manure. The radiocarbon date AA-40746 shows that areas of the backlands on the town side of the ditch were probably cultivated during the 14th or early 15th century. The two small and abraded sherds recovered from the primary ditch fill maybe taken as further evidence of 14th- or 15th-century manuring practices.

A radiocarbon date from a waterlogged chickweed seed (AA-40760) indicates that the sods either entered the ditch, or remained exposed to the elements within the ditch,

between the late 15th to 18th century. It has not been possible to distinguish whether these sods were derived from a collapsed turf bank edging the town side of the ditch, or from the erosion of topsoil and the occasional sod from roughly cultivated or pasture land. However, no trace of an earthen wall or bank was recorded during the evaluation or excavation. Given the ceramic, archaeological, cartographic and documentary evidence, a late 15th-century date for the abandonment of the ditch is the most plausible and therefore it is unlikely to be part of the 1644 Covenanting force's defences. Assuming the ditch was cut in the late 12th century it was kept clean for a considerable period of time, although no evidence for recutting was found during the excavation.

The remaining ditch fills comprised a series of clean, well-sorted, interbedded sands and gravels. This material was probably extracted locally, with loads tipped into the ditch from its eastern side. This final act of backfilling may have been instigated by the Duke of Cumberland during his clean-up of Inverness during the mid-18th century.

The function of the second large V-shaped ditch, Ditch 2, is not immediately apparent given its E/W trend and proximity to the probable burgh ditch. Joseph Mitchell writing in 1826 described the evidence for an open drain which ran from the 'Foul Pool' down near School Lane and then through to the river. He also recounts the uncovering of another possible outlet, which was some 5 feet (c 1.5m) in diameter, which led from Academy Street down to Church Street. Amongst the backfill refuse associated with the construction of Academy Street was recovered a copper plate engraved with '1778 or thereabout' (Pollit 1981, 101–2). Given the predominance of stony silts at its eastern end and coarse gravels at its western, and the medium level of easily available phosphate, this ditch may have functioned as a filter and outlet for foul water stagnating within the burgh ditch. Ditch 2 cut Ditch 1, demonstrating that it cannot have

been constructed before the late 15th century. The pottery sherds retrieved from the ditch are 13th- or 14th-century in date, but given their rarity must be regarded as taphonomically suspect and probably redeposited.

Analyses have established that the kiln was isolated and was probably used to dry grain prior to milling or storage. Sealed deposits at its base have produced a single date of AD 1159–1278 (AA-39113). The 12th- to 13th-century pottery sherds recovered from an overlying deposit corroborate this date. Similar 11th- to 13th-century keyhole-shaped grain-drying kilns, with stone-flagged floors and turf superstructures have been excavated at Abercairny, Perthshire and Capo, Kincardineshire (Gibson 1989) and the remnants of another have been excavated at Lhanbryde, Moray (Alexander 1997). Nearly every farm or small group of farms from the medieval to early-modern period in Scotland had its own grain-drying kiln (Fenton 1978). On the presumption that Ditch 1 is, or is on the site of, the first burgh ditch the kiln was probably located at the far end of a rig, the choice of location presumably as a precautionary measure against the spread of accidental fires. Its location and size indicates that the kiln was used by an extended family unit and probably near neighbours.

The walls of the kiln comprised clay-lined gravel and coarse sands, but there was no convincing evidence for a roof structure. The kiln was re-used on a number of occasions, with at least three firing and cleaning episodes identified in the basal fill. The kiln contained waste products of roundwood and turf fuel, the latter derived from slightly different sources for each firing, charred grain derived from different crops and finally possible remnants of an oak rack or raised floor. Early 20th-century farm kilns, documented from the Western and Northern Isles and Ireland, used wooden racks upon which straw and then sheaths of oats or threshed grain were laid (eg Scott 1951). Such a technique often led to the

over-roasting or burning of drying crops (Fenton 1978, 380). What may be interpreted as a particularly destructive firing resulted in the renewal of the clayey silt floor.

The location of the late 12th-century burgh ditch (if indeed it were dug soon after it was ordered) on the eastern side of Inverness was determined either by an existing settlement, or conversely, an existing settlement with substantial rigs expanded to fill the enclosed land. A grain-drying kiln was constructed in the late 12th or 13th century at the end of a backland rig, the length of the rig possibly curtailed by the burgh ditch. The burgh ditch, which defined the extent of the town and ensured the controlled movement of goods via its ports or gates, ceased to function by the mid to late 15th century, when it was a repository for industrial and domestic refuse. During the late 15th or 16th century a further ditch perpendicular to and cutting into the burgh ditch was constructed. The function of this second ditch is unclear but it may have acted as an outlet to foul water trapped within the burgh ditch. By the mid-17th to early 18th century both ditches had been deliberately backfilled and the land given over to small-scale cultivation.

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*This paper is published with the assistance of a grant from  
Royal Sun Alliance Property Investments Ltd*