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Doune Roman fort, Stirlingshire: excavations in 1999, 2008 and 2010

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LIST OF ILLUSTRATIONS

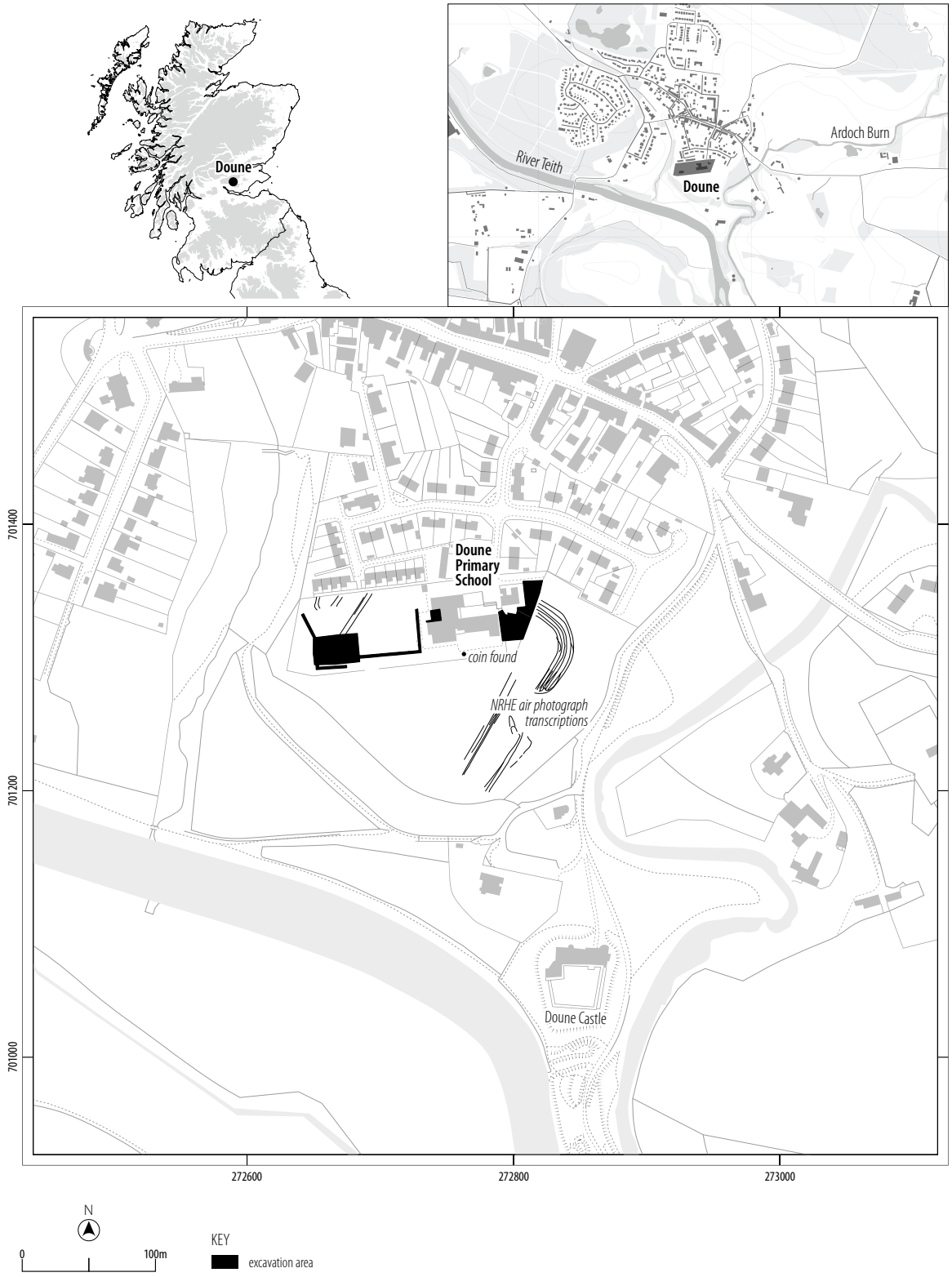
LIST OF TABLES

1. ABSTRACT

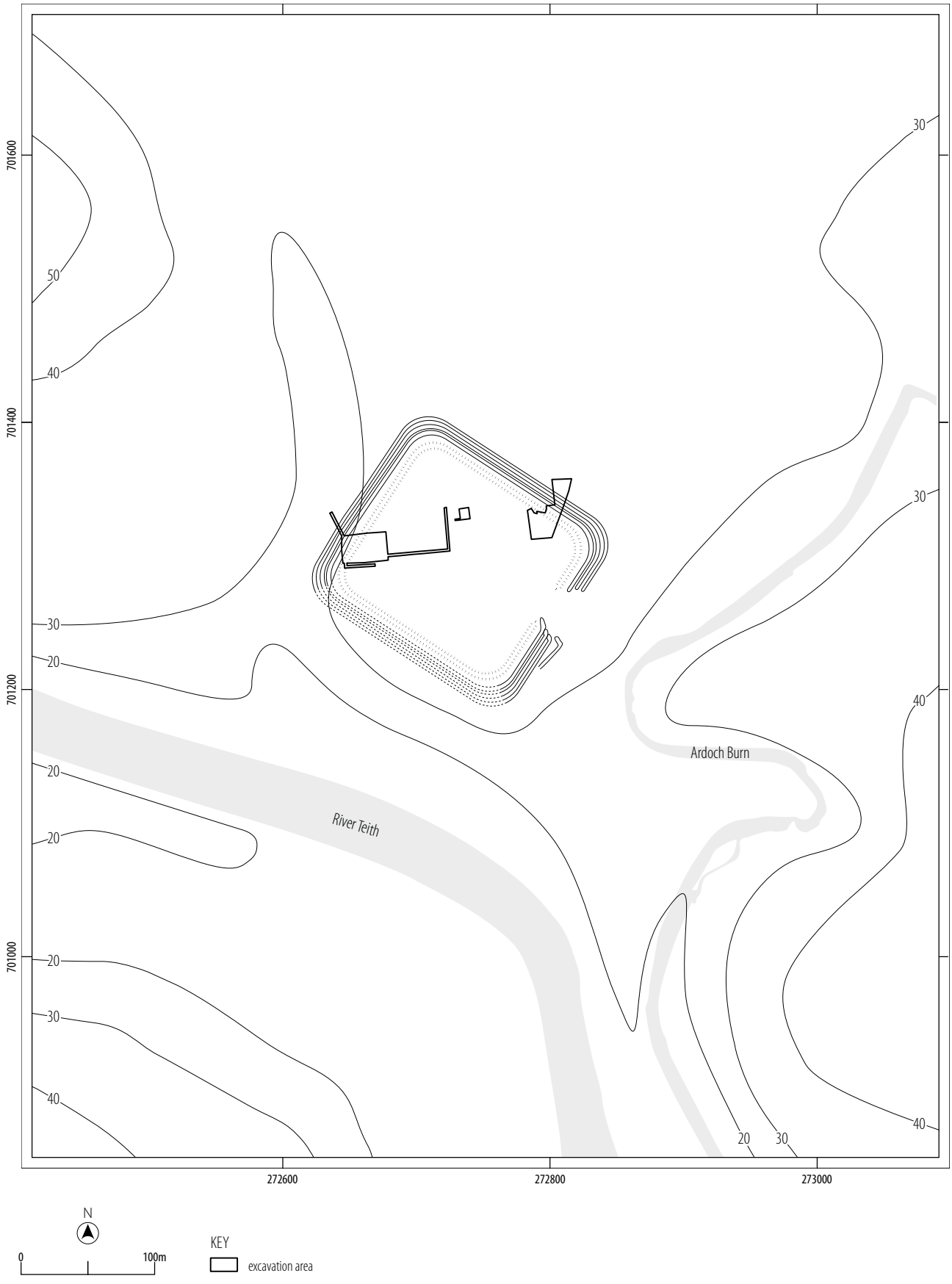
Three archaeological excavations were undertaken by Headland Archaeology (UK) Ltd within the grounds of Doune Primary School in Stirlingshire, each located on the site of Doune Roman fort. These excavations revealed sections through triple-ditched defences, elements of the turf rampart and the perimeter road (*via sagularis)* on both the west and east sides of the fort. Within the interior of the fort the partial foundations of seven buildings were recovered, including barracks blocks, a corridored building that may represent a workshop (*fabrica*) and a stable-barracks to accommodate a cavalry squadron (*turma*). The everyday life of the fort was also revealed, with a series of ovens and an iron-smelting shaft furnace, a first for Roman Scotland. A range of pits were also identified, including some which are likely to be related to the demolition of the fort as it was decommissioned. Artefacts confirm that the fort was built and occupied during the Flavian occupation of Scotland between AD 80 and 86–7.

2. INTRODUCTION

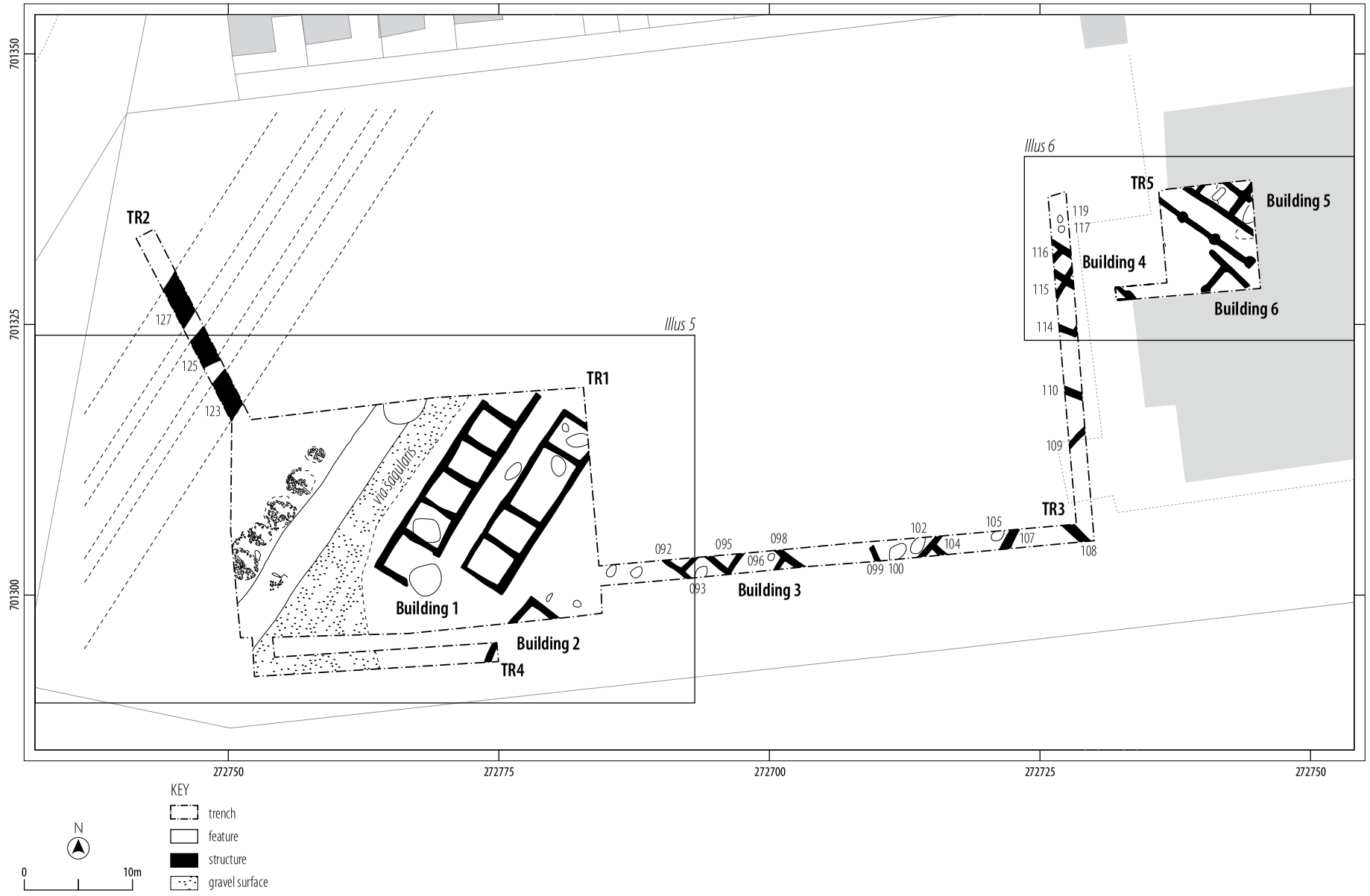
Archaeological excavations were carried out in 1999, 2008 and 2010 in advance of development within the grounds of Doune Primary School, which partially overlies the Roman fort at Doune (NGR: NN 7272 0130; NRHE No. NN70SW 36; Canmore ID 24767) (Illus 1 & 2). All phases of this work were commissioned by Stirling Council and undertaken by Headland Archaeology (UK) Ltd.



Illus 1 Site location. © Headland Archaeology (UK) Ltd



Illus 2 Setting and contour map. © Headland Archaeology (UK) Ltd



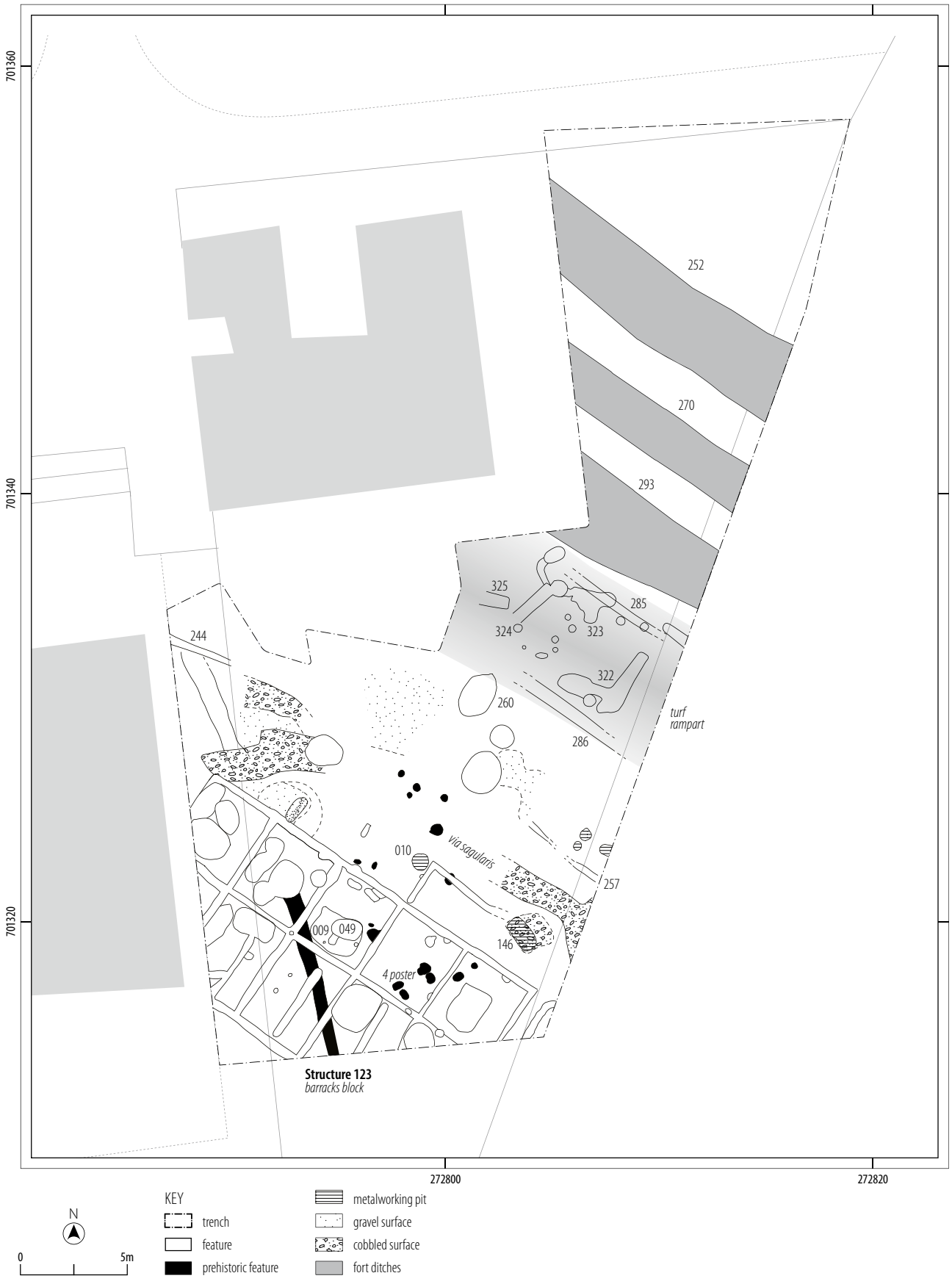
Illus 3 Plan of archaeological features: 1999 and 2008. © Headland Archaeology (UK) Ltd

The first phase of work was carried out in 1999 and was directed by Colm Moloney. This excavation covered the footprint and services of a new nursery located to the west of the main school building (Illus 3, Trenches 1–4). The excavation was located on the west side of the fort and revealed evidence for internal buildings, a row of ovens and a furnace. It also provided a section across the fort's defences and the intervallum road.

A second phase of work was undertaken in 2008 and was directed by Paul Masser. This small-scale excavation was undertaken prior to the construction of a classroom extension adjoining the existing school and revealed further evidence for buildings located within the interior of the fort (see Illus 3, Trench 5).

A third phase of work was undertaken in 2010, directed by Paul Masser. It was located within a garden to the east of the primary school, on the east side of the fort (Illus 4). The triple ditch defences of the fort and the remains of the turf rampart were exposed alongside cobbled surfaces relating to the intervallum road. A group of shallow pits between the road and the rampart contained evidence for metalworking. Within the interior of the fort, part of a timber building was excavated, which is interpreted here as a cavalry barracks block. Numerous large pits were identified within the building, and between it and the rampart. The pits located within the building may represent gravel quarrying or improvised latrines, probably excavated after the building's main phase of occupation was over and possibly evidence of the partial abandonment of the fort. Some features within this trench clearly pre-dated the fort and are thought to be prehistoric.

The 1999 excavation is archived with the NRHE with Project Code DPS99, the 2008 as DPSE07 and the 2010 as DPSX10.



Illus 4 2010 trench. © Headland Archaeology (UK) Ltd

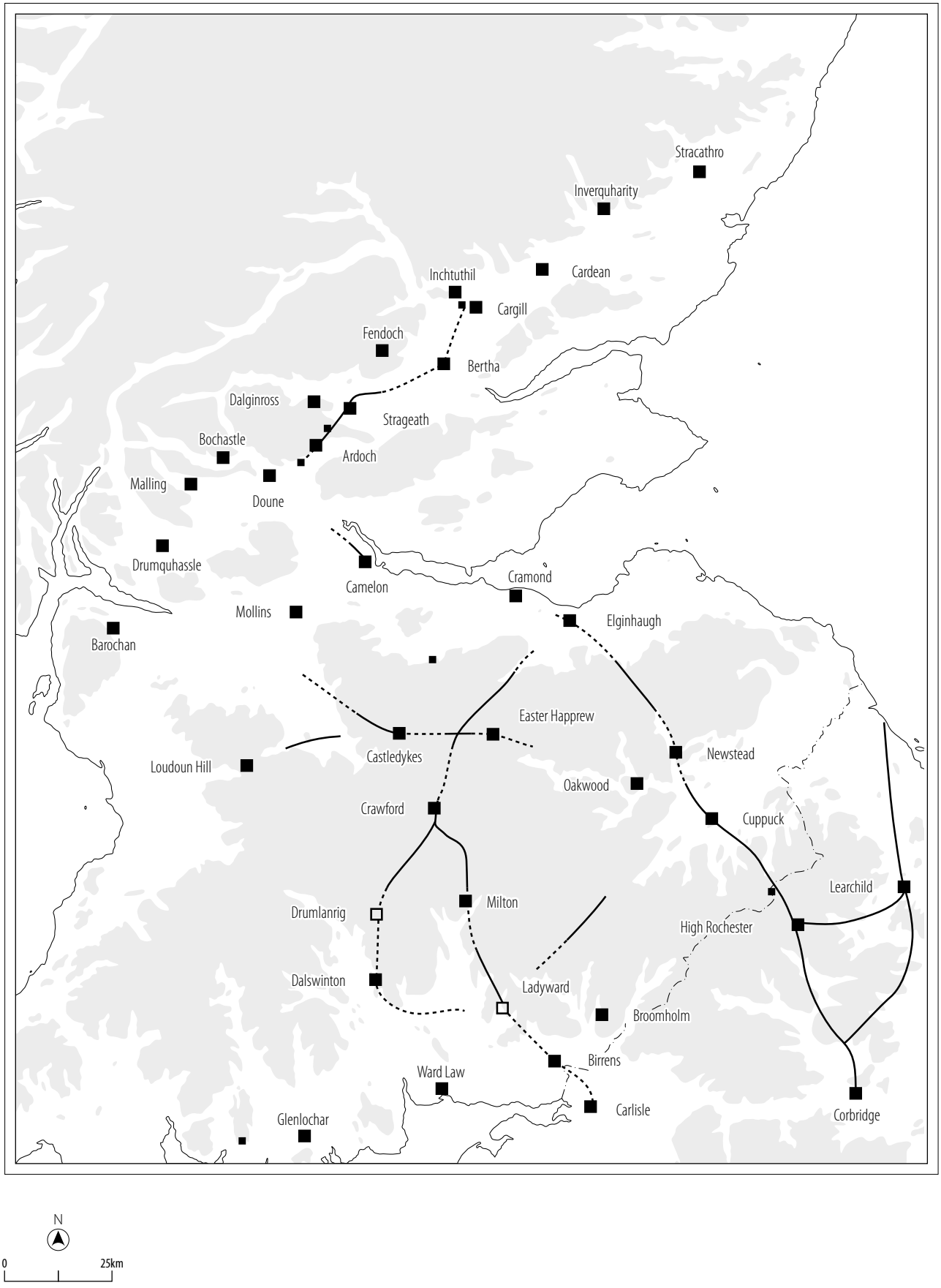
3. BACKGROUND TO THE FORT

The fort was initially identified during aerial survey by the RCAHMS in 1983 (Maxwell 1984). The aerial photographs identified one set of ditches on the south-east turned inwards to unite in what is known as a 'parrot's beak', indicating the position of the entrance. The probable location of the *via sagularis* was also identified during this survey. A small-scale investigation was carried out in 1984 by Gordon Maxwell, who identified a number of construction trenches associated with single-phase timber buildings, with 1st-century AD pottery recovered (Frere 1985: 275). The pottery confirmed the Flavian date of the fort, as previously suggested by the parrot's beak entrance (Maxwell 1998). An archaeological evaluation in 1999 confirmed that the foundations of buildings associated with the fort were located within the footprint of a proposed new nursery development (Moloney 1999a).

The Roman fort lies on a low promontory formed by the River Teith and the Ardoch Burn (see Illus 2), close to the medieval Doune Castle. The ground falls away sharply into the river valley on the south side of the fort and it is bounded to the east side by the burn. The interior of the fort occupies a level plateau and it is conceivable that it guarded a crossing of the Teith, which is fordable at this point. The significance of the fort has been discussed by Maxwell, who speculated that the Teith could be the Tameia / Tamia in Ptolemy's *Geography* (Maxwell 1984: 221–2).

Maxwell described the fort as a 'route blocker' (1984: 218), similar to the Flavian forts on the outer line from Drumquhassle to Stracathro (Illus 5). Here he also speculated that the forts of Drumquhassle, Malling, Bochastle and Doune could have formed a temporary frontier along the northern extremity of the Forth–Clyde isthmus (ibid). The fort at Doune also lies close to the presumed line of the Roman road north of Camelon, which is thought to have crossed the upper reaches of the River Forth close to Stirling (Crawford 1949: 18–26; RCAHMS 1963: 112–15). This Roman road is presumed to run into southern Stirling. Excavations across the probable line of the road at Beechwood Park in Bannockburn identified a cobbled surface (Cook 2014). Post-medieval pottery and coins were recovered which could indicate that this cobbling was a later surface, potentially built over the line of the Roman road. Alternatively, the cobbles could be the original Roman road surface with later material incorporated into it through later use. The road is identified again north-east of Dunblane, close to the Allan Water en route to Ardoch fort (Woolliscroft & Hoffmann 2006: 85).

There is enough uncertainty about the route of the Roman road between Stirling and Dunblane that alternative routes through the extensive mosses west of Stirling have been proposed, but none have been recognised on the ground so far (eg Crawford 1949: 18–21; Woolliscroft & Hoffmann 2006: 80–1).



Illus 5 Distribution of Flavian forts and fortlets in Scotland. © Headland Archaeology (UK) Ltd

4. BACKGROUND TO THE PUBLICATION

The publication of these excavations at the Roman fort of Doune has a convoluted history. The publication of the initial 1999 excavation (Moloney 1999a, 1999b) was in the process of being refereed by *Britannia* when the second phase of work was commissioned in 2008 (Masser 2008). It was therefore considered best practice to delay publication until the two phases of work could be combined into a single paper. During the final preparation of this combined 1999/2008 paper, a third phase of work was commissioned in 2010 and again publication was delayed, with the hope of incorporating all three phases into a single publication report. Unfortunately, due to no explicit reference being made by Stirling Council (as both the client and the curator) of a requirement to fund the publication of the 2008 and 2010 excavations, Headland Archaeology (UK) Ltd was only contracted to produce assessment reports for these phases of work (Masser 2008, 2010). In a bid to present here (at minimum) a summary of the results for the entire archaeological fieldwork undertaken within the fort between 1999 and 2010, this paper is a detailed report of the 1999 and 2008 excavations (an edited version of the combined 1999/2008 paper) with a summary of the results of the 2010 excavation.

5. RESULTS

5.1 Pre-fort features

A number of probable prehistoric features were identified within the 2010 trench. Some of these clearly pre-dated the fort, as they were cut by the foundation of the barracks block located within the excavation and were much lighter in colour than the Roman features. Other probable prehistoric features with no relationship to the Roman archaeology were identified by this colour difference (see Illus 4). Although none of these features produced finds, they were interpreted as prehistoric rather than representing an earlier phase of Roman activity on the site. Most obvious of these was a shallow linear ditch cut by the foundations of the barracks building, and a possible four-poster structure located within the footprint of the building.

5.2 The fort

5.2.1 Ditches and rampart

A section across the defences on the north-west side of the fort was excavated in Trench 2 (Illus 3). Three parallel ditches were identified here, which would have formed the outer defences of the fort (Contexts 123, 125, 127). These ditches were all a U-shaped profile with a maximum depth of 0.8m and *c* 4m wide. A spread of soil was recovered from the inner ditch, sealing the primary silting deposit of probable turves which could have come from the levelled remains of the rampart. The outer two ditches showed no evidence of silting and appeared to have been filled directly (and deliberately) with the spread from the rampart.

In the 2010 excavation the three ditches covered a total area of 13.5m from the inner edge of the inner ditch (C293) to the outer edge of the outer one (C252) (Illus 4). The inner and outer ditches were similar in size, approximately 3m wide and 1.5–1.6m deep, while the middle ditch (C270) was smaller, 2.3m wide and 1.1m deep. All three ditches had steep, V-shaped sections with vertical-sided 'ankle-breaker' slots, 0.35m wide, at the base. The inner ditch was markedly asymmetrical, sloping more gently on the inner edge towards the rampart.

The fills of all three ditches contained a comparable sequence of deposits, which suggested that they had been deliberately partially backfilled at some stage to leave shallow-sided ditches less than half the original depth. Following this partial backfilling, which must reflect the initial slighting of the fort's defences, fine silty deposits accumulated within all three ditches, reflecting gradual silting and soil development over an extended period.

To the south of these ditches were the remains of the turf rampart. The rampart was 6m wide and survived as an upstanding deposit up to 0.15m thick, with a distinctive soft, silty and almost stone-free texture. This material overlay a truncated buried soil no more than 0.1m thick, with no turf line visible, indicating that the area must have been de-turfed prior to the rampart's construction. While no structure could be discerned within the core of the rampart, which presumably consisted of randomly dumped turf, it was edged on either side by distinct lines of patchy, pale yellow silt approximately 0.5m wide (C285 and C286). These deposits must represent the facing or revetting of the rampart with clay or stacked turf.

5.2.2 The intervallum road (*via sagularis*)

A gravel surface, interpreted as the *via sagularis*, was identified running diagonally across Trenches 1 and 4 from north-east to south-west (Illus 6) and in two areas in the 2010 trench (Illus 4). In Trenches 1 and 4 it measured a maximum of 6.2m wide and appeared to turn towards the south-east. A narrow drainage ditch was identified running along the west edge of the road capped by stone slabs.

The surface of the intervallum road survived in two areas in the 2010 excavation, the central section truncated away. In both locations, a cobbled surface no more than 2m wide was flanked by much more extensive, though patchy and discontinuous, spreads of gravel. The cobbled surfaces were fairly loose and unconsolidated, and it is possible that the finer upper surface of the road had washed off, resulting in the spreads of gravel to either side. Several pits in the area between the turf rampart and barracks building would seem to predate the road surfaces, since layers of stone continuous with the cobbled surfaces were slumped into the upper fills of the pits.

Illus 6 Plan of Trenches 1 and 4. © Headland Archaeology (UK) Ltd

5.2.3 Metalworking

A group of very shallow pits, cut into a layer of gravel immediately north of the intervallum road in the 2010 excavation, contained concentrations of ironworking slag (Illus 4). No actual structures relating to metalworking (such as smithing hearths or smelting furnaces) were found and it is possible that the main focus of this activity lay further to the south-east, beyond the limit of excavation. Fragments of slag were also found in a very shallow but well-defined pit (C010), located approximately 7m further to the west; and in one of the fills of Pit C146 to the south: these may derive from the same source.

A narrow linear feature (C257) was excavated between the metalworking features and the cobbled road surface, running parallel to the line of the defences. This appeared to be a foundation trench similar to those defining buildings in the interior of the fort, with a square profile 0.4m wide. A similar feature (C244) was seen at the opposite end of the site and it is possible that these were the remains of timber buildings located between the *via sagularis* and the rampart.

5.2.4 Ovens and furnace

Parallel to the north-west side of the *via sagularis* in Trench 1 was a line of five ovens (C002, 006, 018, 023 and 024). These were in varied states of preservation, but all were roughly circular in plan, 2–3m in diameter, and of identical construction. The main structure in each case comprised a circular wall constructed of roughly squared stone blocks bonded with yellow clay. The ovens had paved floors which, in all cases, were sealed by the collapsed reddened clay domes that originally covered the structures. It is likely that the ovens had been built at the back (the south-east edge) of the turf rampart and may have been slightly set into it, as at Fendoch in Perthshire (Richmond & McIntyre 1939: 137–8). A large spread of burnt material was identified to the east of the ovens as the accumulated rake-out from the ovens (C008). This material built up to such a degree that it eventually encroached on the *via sagularis*. Analysis of the charcoal content of the rake-out demonstrated that oak and hazel were the dominant wood species present and were probably the main source of fuel. The only significant concentrations of charred grain (mostly barley) associated from the ovens came from within oven C024 and from the rake-out (C008). The grain may reflect that ovens were used for roasting grain as well as baking.

Adjacent to the ovens the badly disturbed remains of a metalworking furnace were identified (C003). This comprised a shallow irregular hollow 4.3 × 3.3m wide, no more than 0.2m deep, filled with slag and daub. Analysis of the industrial waste (6.5 'The industrial remains' below) suggests that the material derives from an ironworking shaft furnace. It would appear that the garrison had a smith among its ranks, and that iron was being smelted on site and not simply worked. The furnace also contained a deposit with several iron objects, including a spiked loop (SF202, probably from a timber structure) and a bar fragment (SF003). The presence of pottery sherds and concentrations of charred grain in the same deposit implies that the industrial waste was not in situ and this was a dump of material after the furnace was no longer in use.

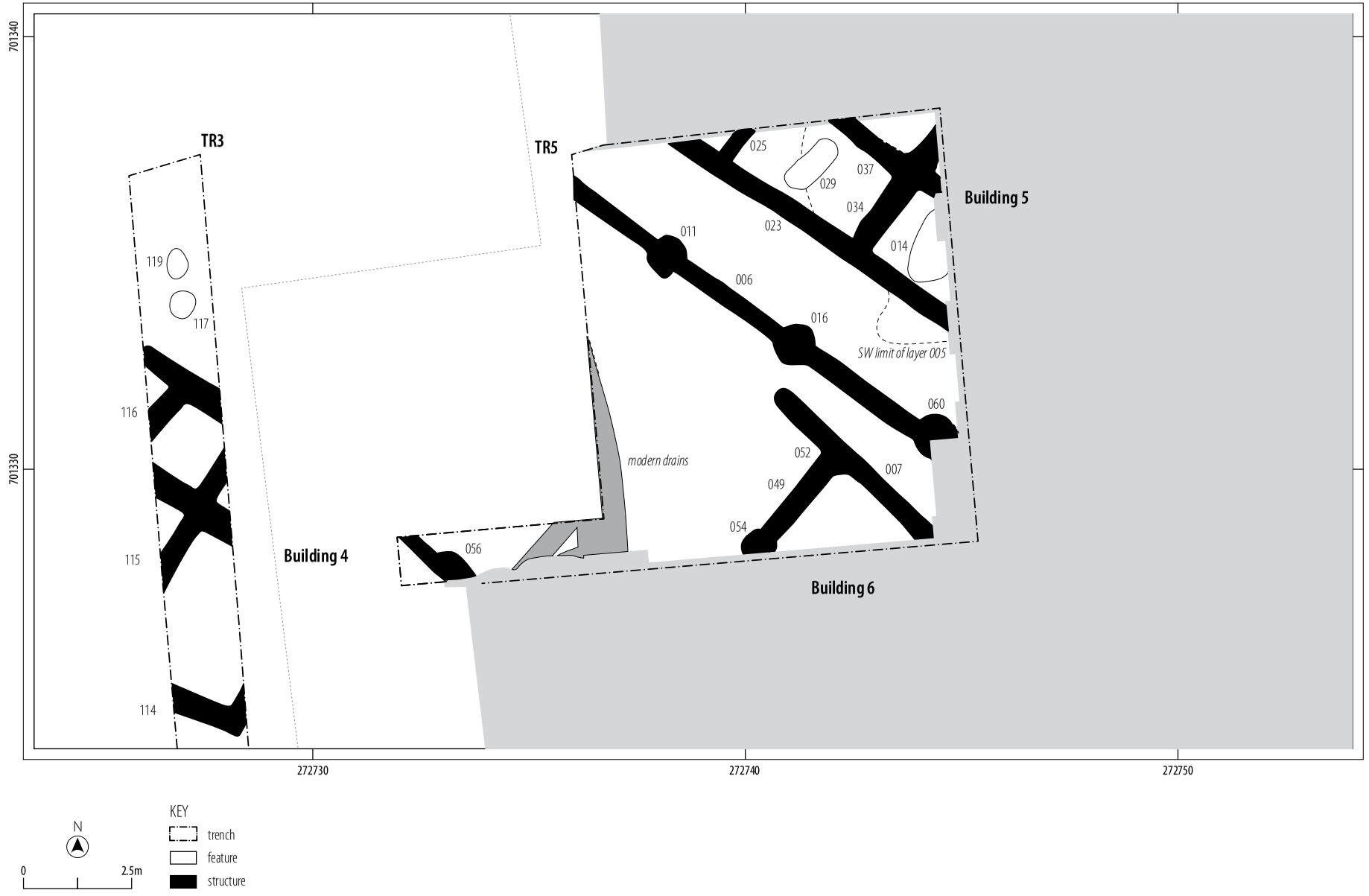
5.2.5 Buildings

The foundations of seven rectangular timber buildings (Illus 3, 4, 6 & 7) were clearly identified within the interior of the fort. These have each been interpreted as barracks blocks to house the soldiers, their equipment and horses. Fragments of further buildings were also exposed within the trenches.

5.2.5.1 Building 1

Immediately to the south-east of the intervallum in Trench 1, a series of construction trenches were identified which formed two rectangular structures aligned north-east to south-west (Illus 3 & 6). The west structure (C054) measured 23m in length but continued beyond the edge of the trench. It was 4.6m in width and subdivided into rooms each measuring 3.6m in length. The east structure (C036) was more complete and measured 18.2m in length by 4.6m in width, and was subdivided into rooms each measuring 3.6m in length, with one double room in the centre measuring 7.2m.

The similarity between the two structures is striking. They lie parallel to each other, separated



Illus 7 Plan of Trenches 3 and 5. © Headland Archaeology (UK) Ltd

by a central gap measuring 2.6m wide, and were divided into uniformly sized rooms. It seems likely that together they represent two wings of a corridored building. The construction trenches for both wings measured 0.4m in width and 0.2m in depth on average. In places the base of the cut had slight depressions, which were interpreted during the excavation as the impressions of the bases of upright timber posts. A single post pipe for a squared post was identified, measuring 0.13m square. Bent nails and charcoal fragments were recovered from the fill throughout the construction trenches of the building. A sample taken from the fill of C054 (C053) produced charcoal which was identified as hazel and oak with smaller quantities of alder, a probable indication of the types of wood used in the construction of this building.

5.2.5.2 Building 2

The north-west corner of a second building (defined by construction trenches C043 and C044 – Illus 3 & 6) was identified at the south-east corner of Trench 1 and in Trench 4. Two post holes associated with Building 2 contained structural evidence. One of these (C015) contained a post pipe, suggesting that the post had rotted in situ. The post pipe was square in plan and, as in Building 1, measured 0.13m square. The second post hole (C047) was elongated and may have held a double post setting. The posts here appear to have been removed and the feature was backfilled with a deposit (C046) containing burnt wattle and daub and a number of bent iron nails. A sample from C046 produced large quantities of carbonised cereal grain, which may represent food stored in the vicinity, if not in Building 2 itself.

5.2.5.3 Buildings 3 and 4

Features identified to the east in Trench 3 undoubtedly represent other buildings of similar construction to those seen in Trench 1. Less can be said about their layout due to their limited exposure in a 2m-wide trench. Linear construction trenches (C092, 095 and 098) appear to represent a building aligned north-west to south-east, divided along its length with larger rooms to the north-east and smaller rooms to the south-west (Illus 3 – Building 3). Another building with similar layout and dimensions was seen to the north-east (defined by construction trenches C056, 114, 115 and 116) (Illus 7 – Building 4). A number of other construction trenches which probably represent further buildings were recognised between Buildings 3 and 4.

5.2.5.4 Building 5

The foundations of a timber building covered the north-east half of Trench 5, consisting of vertical-sided trenches 0.35–0.50m deep (C023, 025, 034 and 037 – Illus 7). The foundation trench along the south-west side (C023) probably represents the front of the building. It was deeper than the others, with the variation in depths probably reflecting post-in-trench (rather than sleeper-beam) construction, although no trace of individual post holes or post pipes could be seen. From the limited area exposed, the foundations appear to define a row of rooms, at least one of which was 3.7m wide and 2.4m deep, across the front of the building, with another row of rooms to the rear.

Parallel with C023, 2.4m to the south-west, was another foundation trench (C006), only 0.25m deep, punctuated by three post holes 0.6m deep (C011, 016 and 060). Post holes C011 and C016 were exactly opposite the foundation trenches C025 and C034; this, along with the precise alignment and spacing of C006 with C023 (identical to the spacing between C023 and C037), strongly suggests they all formed part of the same building, with C006 perhaps representing an open veranda along its front. The backfill of all the foundation trenches was remarkably sterile, with no trace of charcoal or artefacts.

Two steep-sided, sub-rectangular pits (C014 and 029) were located centrally within two rooms of Building 5. Neither pit showed any sign of weathering; their primary fills consisted of black silt deposits with very high concentrations of charcoal in the base, which merged into paler upper fills containing lesser (though still appreciable) quantities of charred material. While numerous pits, thought to be related to the demolition of the fort, were identified in Trenches 1–4 (see 5.3.3 'Demolition pits' below), Pits C014 and C029 are distinctive in that they seem to be precisely located within the rooms of

the building and thus potentially related to its occupation, rather than destruction.

5.2.5.5 Building 6

Two linear features in Trench 5 (C007 and 049), located to the south-west of Building 5, are thought to be foundation trenches for another timber building (Illus 7). Both features were relatively slight, less than 0.3m deep, and contained backfill deposits barely distinguishable from the surrounding subsoil. Linear C007 terminated 4.8m from the south-east corner of the excavation, linear C049 adjoining it at right angles and extending to the south-west. A small circular depression at the junction of the two features (C052), and a pronounced widening and deepening (C054) at the south-west end of C049, may represent post holes related to the building.

Building 6 is unlikely to be contemporary with Building 5, since it has a markedly different orientation. It is also close enough that it would probably have interfered with access to this structure if they had been contemporary builds. The slight nature of the foundations of Building 6 and its pale colour may indicate that this was an earlier building, potentially a temporary structure occupied during the construction of the fort, or an early building within the fort that was abandoned before it was completed.

5.2.5.6 Building 123

The south end of the 2010 excavation contained the foundations of a timber building. Enough of the ground plan was exposed to give its overall dimensions as 18.2 × 9m. It was divided into five two-room units, each 3.6m wide.

Fifteen large pits were cut into the floor of Building 123, with only two of the eight rooms more than half-exposed not containing pits. These features had been dug within the rooms of the building and mainly respecting the line of the walls, indicating that they were excavated while the walls were still visible, even if only as a ruin. These pits were also characterised (as were those in the intervallum zone) by the complexity of their fills: all contained multiple deposits, which suggested that they had lain open for a time before being eventually backfilled, possibly in several stages and with occasional cases of recutting. One pit (C049) contained a large quantity of nails and other items including sling shots while another (C009) contained an early 1st-century AD strap junction decorated in the Mirror-style of southern England (see 6.3.2.2 '2010 finds' below; Illus 11).

Three rooms, fully or partially exposed on the south-west side of the building, each contained linear trenches aligned north-east to south-west, slightly offset from the centre of the room. These features were detached from the foundation trenches of the building at either end, and although they were a similar width, they tended to have more rounded profiles and had quite different fills, consisting of dark brown organic silt. These potentially represent drains in the floor of the building.

A section of foundation trench was identified to the south-east of Building 123. This may represent another building, or the continuation of Building 123.

5.3 Abandonment of the fort

There is strong evidence that the fort was abandoned, with some of the buildings showing signs of being removed and burnt, the ditches deliberately backfilled and the ramparts slighted. The identification of rubbish pits cutting through the foundations of Building 1 and within the interior of the fort, containing broken pottery, ironwork and sling shots, shows that there was effort put into concealing rubbish prior to departure.

5.3.1 Ditches and ramparts

The ditches on both sides of the fort appear to have been deliberately backfilled, which reduced their depth considerably and presumably made them ineffective as defensive works. Turf identified within the inner ditch suggests that the rampart was also slighted at this time. On the north-west side of the fort the rampart survived as a spread of soil which sealed the ditches, which may suggest that the bank may also have been deliberately slighted here during the evacuation of the fort.

5.3.2 Buildings

Some of the buildings appear to have been deliberately dismantled prior to abandoning the fort. The evidence of this is most striking in Building 5 where, overlying the majority of the cuts for the foundation trenches, was a layer of dark, charcoal-rich silt (C010, 012, 017, 032, 035, 038, 040, 042 and 059), nowhere more than 0.1m thick. This layer appears to represent an episode of burning that concluded the use of the building. Since no trace of posts was seen in the foundations, it seems likely that the superstructure of the building had been dismantled and the posts removed when the fire occurred. A dark brown layer (C005), up to 0.2m thick, overlay much of the dark charcoal-silt layer covering Building 5. This soil horizon was located within a slight hollow and remained unaffected by subsequent ploughing or modern disturbance and contained finds of exclusively 1st-century Roman date.

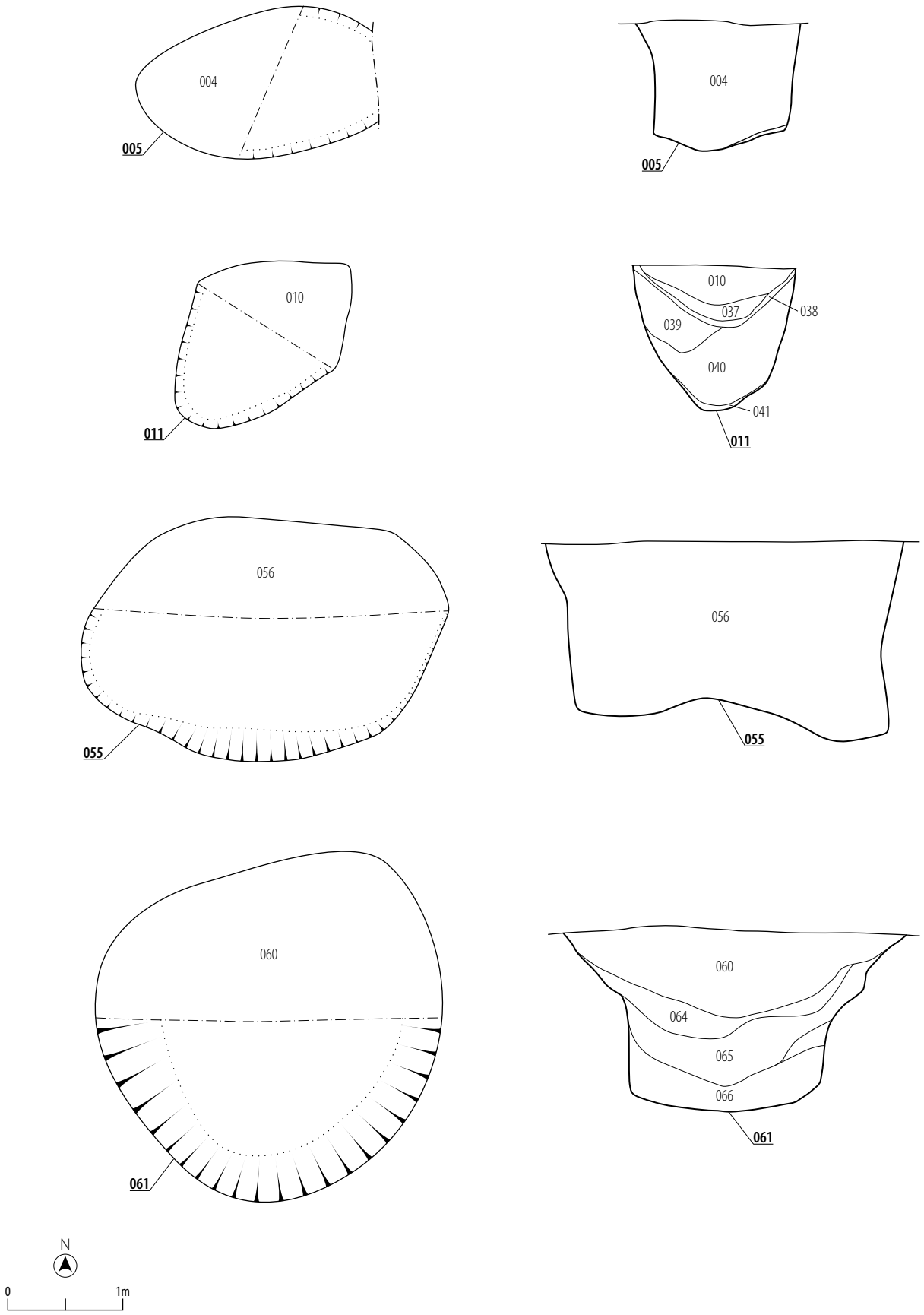
Almost all the finds from the 2008 excavation derive from the charcoal-rich destruction layer overlying the foundations of Building 5, the backfill of Pits C014 and 029, and from the overlying soil layer C005. The metalwork is of particular interest, including a number of items interpreted as tools – a blacksmith's punch (Illus 10:4), a fine file (Illus 10:5) and a thin knife blade tip (Illus 12:6), which may reflect activities carried out by occupants of the building. The punch and the file were both found in Pit C029, hinting at a possible use of the pit as a tool store, although their presence may be accidental. Concentrations of hobnails and *lorica hamata* chain mail links throughout the charcoal-rich destruction deposits were probably items of broken and discarded equipment not considered worth salvaging. A copper alloy carrying handle (Illus 10:2), possibly from a casket, came from C005. Quantities of nails, an iron T-clamp (Illus 12:12) and fragments of daub presumably derive from the structure of the building itself. The pottery assemblage included a high proportion of samian ware, which is consistent with identification of the building as living quarters where food preparation and consumption were taking place. Environmental samples from contexts relating to the charcoal-rich destruction layer produced high concentrations of cereal grain, mostly spelt wheat and barley, which probably reflect food preparation and/or storage within Building 5.

5.3.3 Demolition pits

Four large rubbish pits were identified cutting the construction trenches of Building 1, suggesting that they may be related to the abandonment of the building and of the fort (Illus 6 & 8). The majority of the artefacts from this trench came from these pits. Two of the pits were extremely large, very similar in shape, and are likely to relate to the destruction of Building 1. The backfill of oval Pit C055 (C056) comprised dark brown sandy silt with numerous sherds of pottery. The upper fill of oval Pit C061 (C060) comprised dark brown silty clay with moderate inclusions of gravel and charcoal, and contained quantities of pottery including samian and mortarium sherds and an iron intaglio ring (Illus 10:3).

Two less substantial rubbish pits also truncated Building 1. Pit C005 (Fill C004) contained large quantities of pottery and nails, and other finds included two javelin heads (Illus 12:8, cat no. 9 not illus) and a chain link (Illus 12:15). See 6.4.4 'Catalogue of iron' below. Charred barley and (less common) wheat grains recovered from the fill may relate to food production or storage within Building 1. Pit C011 lay in the corridor between the two wings of Building 1. As with some of the other pits, the upper fill of the pit (C010) contained the most finds, in this case a fragmentary catapult bolt head (cat no. 10), a C-shaped iron timber clamp (cat no. 13, not illus) and amphora sherds. See 6.4.4 'Catalogue of iron'. A sample of the fill contained significant quantities of charred cereal grain, principally barley, a similar assemblage to that from Pit C005.

Further pits were identified in a service trench adjacent to the north entrance to the school building (not illus), although the trench was only 0.5m wide and did not go deep enough to impact on the basal fills of the pits. However, the upper fills of two pits were investigated and these produced a number of clay sling shots (see Illus 9; 6.2 'Fired clay sling shots' below) which were presumably buried deliberately.



Illus 8 Sections through demolition pits (Trench 1). © Headland Archaeology (UK) Ltd

6. THE FINDS

6.1 Pottery

Jeremy Evans with Kay F Hartley, David F Williams, Steven H Willis & Gwladys Monteil

Some 284 sherds weighing 11,074g were recovered from the 1999 excavation, 271 from stratified contexts. The quantity of pottery is small but is just about adequate to give some broad outlines to the use of ceramics on the site. A further 29 sherds weighing 263g were recovered from the 2008 excavation, 24 from stratified contexts. The pottery from the 2010 excavation produced 513 sherds, which were assessed, but a full report was never commissioned. See Illus 13 and the catalogue in Appendix 2 'Catalogue of illustrated coarse pottery vessels'.

In summary, the pottery types identified in the collection include amphorae, samian ware, mortaria and Black Burnished Wares. The other sherds are mostly coarse vessels of sandy, red, cream and grey fabrics, although there are some finer redware examples. The fabric proportions from the 1999 and 2008 assemblages are combined in Table 1.

Sherds of amphora are by far the most common, at 155 sherds, with varying curvatures suggesting a range of shapes. Black Burnished Ware is the second most common type recovered, numbering 86 sherds. These vessels tend to have a light grey fabric with characteristic black surfaces and feature sherds including small flat bases and everted rims.

There is very little samian ware and few mortaria in the collection. The samian ware numbers only 18 sherds. They are mostly small bodysherds but there is a foot-ring base sherd and three decorated sherds. There are four sherds of mortaria, one of which is a large rim sherd stamped 'MAVIVE'.

Only the 1999 and 2008 assemblages are reported in detail below. The catalogue of samian ware is in Appendix 1, a catalogue of illustrated coarse pottery vessels is in Appendix 2 and a table of fabric descriptions (Table 5) is in Appendix 3.

Table 1 Doune fabric proportions (1999 and 2008 assemblages combined)

Fabric	% no. of sherds	% weight
A01	51.4	82.0
F01	0.3	0.2
F02	0.6	0.0
M01	0.3	0.5
M02	3.2	8.1
M03	1.6	3.4
M04	0.3	0.5
O01	8.6	1.2
O02	0.3	0.0
O03	1.6	0.2
O04	1.0	0.1
O05	0.6	0.4
O06	2.2	0.1
Q01	2.6	0.4
R01	2.6	0.3
R02	0.6	0.1
R03	2.6	0.2
R04	1.3	0.6
R05	0.3	0.2
S10	6.1	0.5
W01	9.0	0.5
W02	1.9	0.3
W03	1.0	0.3
Total	313	11,337g

6.1.1 Date

All the material appears to be of Flavian date, with the exception of the heirloom, Claudio-Neronian mortarium (Illus 13:6), a number of which seem to appear in Flavian contexts in northern England and Scotland, and the Neronian Dr 29 (samian catalogue, no. 4). There is also a sherd, probably of Cologne colour-coated ware, which perhaps post-dates AD 80. The samian ware (see Appendix 1 'Catalogue of samian ware' below) gives the closest dating evidence, although none of the material is very closely datable, and the best range is AD 65–90, although the historical context of the fort suggests that like Inchtuthil it should be dated *c* AD 83–86/7.

6.1.2 Fabric supply

The 1999 excavation assemblage is dominated by amphora sherds, unusually so even for a military site, with 56% by sherd count, 83% by weight, and even 14% by minimum numbers of rims. Although there is a concentration of amphorae in the 'destruction pit' (C060), even without this amphorae would comprise 47% by count and 71% by weight. Levels of amphorae from other military assemblages by count is normally in the 5–10% range, with weight figures in the range 30–45%, as can be seen at Binchester, Birdoswald, Catterick, Carlisle and Walton-le-Dale (Hird 1997; Ferris 2011). Notably higher figures by weight come from Flavian Brithdir (Evans 1997) at 64%. At Brithdir, in north Wales, the assemblage is associated with the rampart back, as is the assemblage here and the group with the higher amphora figure from Birdoswald (Hird 1997; Wilmott 1997). The consistent presence of high amphora levels in rampart back locations may partly explain the high amphora level in this assemblage.

The assemblage is completely dominated by Baetican Dressel 20 oil amphora sherds with no fish sauce amphorae present and no wine amphorae. Two fineware fabrics are present, making up only 1.1% of the assemblage; one is probably Central Gaulish Pompeian redware 3 and the other is probably from Cologne.

Mortaria are well represented in the assemblage, four sources being present: Noyon in north-east Gaul; a source perhaps in Central Gaul; Verulamium; and a local source, probably Doune itself. The commonest fabric is that of Noyon, followed by Verulamium region ware, with the local and possibly Central Gaulish sources represented by single pieces.

Some 13.3% of the assemblage is composed of oxidised wares. The commonest is fabric O01, which seems likely to be of local origin as may be fabrics O02 and O05, which with O01 may form a continuum. White-slipped oxidised flagon fabrics occur in only a single fabric Q01, at around 3%.

Greywares make up 7.1% of the group by count, a rather lower level than the oxidised wares, as might be expected in a northern military assemblage of this date. Forms represented are globular jars with short everted rims which can be paralleled at other Flavian forts in the region.

Whitewares apparently make up 9.9% of the assemblage by count, but most of these are accounted for by a large number of sherds from a single vessel in W01. Much of the oxidised ware, greyware and whiteware contain varying quantities of fine gold mica, like the sling shots, and all these fabrics are probably of very local origin.

Samian ware is surprisingly poorly represented in the group. Military assemblages usually contain 10% or more of samian ware (Evans 1993; Willis 1998).

The 2008 excavation pottery changes the overall site figures very little because the assemblage size is much smaller. As just discussed, the 1999 excavation group is heavily amphora-dominated, but this is not the case with the 2008 excavation group. Here amphorae levels are probably a little lower than those that might be found on a typical fort (cf Evans 2001: fig 11). Oxidised wares are well represented and outnumber greywares, as might be expected on a military site of this date, and whitewares are well represented. Mortaria sherds are absent. Samian ware is very strongly represented, both by count and weight, in contrast to the assemblage from the 1999 excavation (cf Willis 2006).

The basic differences between these two groups are probably not the result of sample size or happenstance. It has been becoming evident for some time that rampart back locations in forts seem to produce more amphorae. As Doune itself shows, these are the locations for bread ovens and seem likely to have been used for various elements of food preparation. That mortaria are also well represented here brings to mind the mortarium from Usk (Wright et al 1976: 391, no. 66 *Pe]lveis Contubernio Messoris*), showing they could be owned communally by the *contubernium*, presumably for their communal food preparation. That more samian comes from Trench 5, well in the interior of the fort, equally follows established patterns. Samian tends to be scarcer on rampart back locations, where it is not needed in food preparation, but commoner where status display and food consumption are located.

6.1.3 Samian ware from the 2008 excavation

Gwladys Monteil

Eight pieces of samian ware were recovered from three contexts at Doune Primary School in 2008.

Three decorated sherds, four plain sherds and a scrap, all South Gaulish in origin, make up this small assemblage. The samian group is quite fragmented and consists of fairly small sherds. No evidence of repair was recorded.

A single foot-ring fragment from a dish Dr 18, recovered from C010, is unfortunately too fragmentary to display a stamp. C018 yielded a slightly larger and more varied group. Two decorated fragments from a dish Dr 29 in the style of the T-1 decorative group are particularly interesting. They are pre-Flavian in date (see Appendix 1 'Catalogue of samian ware'). They do not display particularly distinctive signs of wear or use compared to the other samian sherds but could possibly be part of an heirloom. The rest of the samian group is more difficult to date as precisely. The presence of a Dr 37, unfortunately too small to provide a close date range, does suggest a Flavian date for the deposition.

6.1.4 Discussion

As noted above, amphorae levels are high, even for a military assemblage, and samian ware levels are low in the 1999 assemblage primarily associated with the rampart back. The small 2008 group from the fort interior shows neither of these features and, indeed, samian is very well represented.

The functional composition of the group (Table 2), although with a low number of vessels overall, also appears rather unusual (cf Evans 1993), with high levels of amphorae and mortaria, although the low jar level relative to tablewares is usual for early military assemblages. As noted above, there is some suggestion of higher amphora levels in forts from rampart back locations, and it might be that these and the mortaria reflect food preparation here (the rampart back ovens providing clear evidence for this taking place here). Although surfaces are often eroded, there is little evidence of sooting on vessels; a comparatively low level of sooting seems to be the case quite often on early military assemblages.

Table 2 Functional analysis of vessels from Doune

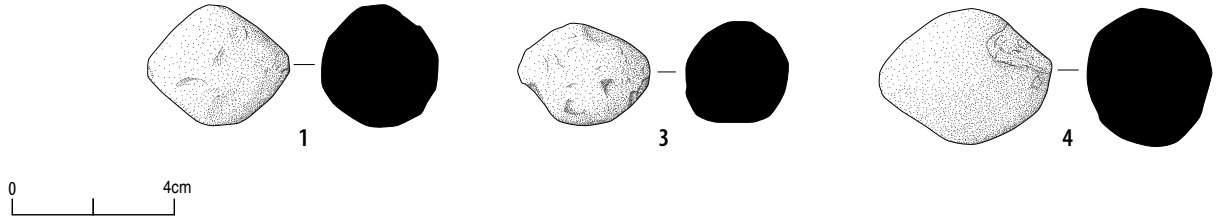
Vessel type	No.	Percentage
Flagons / constricted-necked jars	2	11.1
Jars	4	22.2
Bowls	2	11.1
Lids	1	5.6
Beakers and cups	2	11.1
Mortaria	5	27.8
Amphorae	2	11.1
No. of rims	18	

The limited evidence for supply here would suggest that only specialist vessels, such as amphorae, mortaria and finewares, were being brought in over large distances with any frequency. This picture appears to be typical for military installations of the mid-Flavian campaign period in Scotland. The coarsewares, including a minority of the mortaria, would seem likely to have been of fairly local manufacture (cf Darling 1985).

6.2 Fired clay sling shots

Jeremy Evans

Eight sling shots were recovered from the 1999 excavation, and an additional two from the 2008 excavation (Illus 9). A total of 135 were found in the 2010 excavation, mainly within the pits cutting the floor of Building 123. The report below only details the 1999 and 2008 finds. The catalogue for the sling shots is in Appendix 4.



Illus 9 Sling shots from 1999 and 2008. © Headland Archaeology (UK) Ltd

Nos 1–8 were all recovered from monitoring of a service trench adjacent to the north entrance to the school, rather than the main trenches. The weights of the reasonably complete sling shots vary from 15 to 39g, although their sizes are generally rather more consistent. A close set of parallels to these sling shots comes from Strageath (Frere & Wilkes 1989: 177), the second closest fort north from Doune, although the 91 Strageath examples all come from Antonine contexts. Many of the Strageath sling shots also share the double-cone form generally employed here.

Greep (1987) has reviewed the distribution of sling shots in Britain. Most clay sling shots from military sites have been recovered from Wales and Scotland, with shots of the double-cone form coming from sites north of the Antonine Wall and round shots coming from Antonine Wall sites. The Doune examples add to this pattern and would seem to suggest that the Strageath examples might be residual Flavian pieces rather than Antonine ones.

6.3 The metalwork

Nicholas M McQ Holmes, Fraser Hunter & Julie Lochrie

6.3.1 Coins

Five coins have been identified in total, one prior to the 2008 excavation by the school janitor (location shown on Illus 1) and four during the 2010 excavation.

6.3.1.1 The 2008 coin

Nicholas M McQ Holmes

This was a stray find, retrieved by the school janitor, Mr Robert Kinnaird, while laying lighting cables some time previously and handed in to the excavation team in 2008 for identification (Illus 10:1).

▸ **Domitian copper as**

28.5 × 27.5mm, 8.20g, die axis 180°; AD 86–7

Obv: [IMP C]AE[S] DOMIT AVG GERM COS XII[I?]; head laureate right

Rev: MONETA AVG[VST(I)]; Moneta standing left, holding scales and cornucopiae; S to left and C to right in field.

Surfaces oxidised, with some pitting and accretion; apparently unworn.

It is particularly unfortunate that an area of corrosion on the obverse of this coin coincides with the latter part of the obverse legend, commencing at the very point where the consular numeral potentially becomes extremely important for dating purposes. If the inscription reads COS XII, the coin falls into the long-recognised group of virtually unworn bronze coins minted in AD 86 which represent the latest found on a number of Flavian military sites in Scotland, including Inchtuthil, Stracathro, Dalginross, Strageath, Camelon and Crawford (Robertson 1983: 419) and Elginhaugh (Bateson 1989: 167). These coins have been quoted as evidence for the evacuation of these sites in AD 87 or very shortly after. It is impossible to be certain whether the consular numeral on this coin is XII or XIII, although the symbol following XII does look rather more like a vertical upright than the C of CENS. Were the coin to have been minted in AD 87, it would appear to be the most northerly find of a coin of this date on a Flavian site (Hobley 1989).

6.3.1.2 The 2010 coins

Fraser Hunter

The 2010 coins were two of silver denarii (SF137, SF972) and two of copper alloy (SF008, SF747). The silver coins were around 20mm in diameter and the copper alloy examples were larger at 27mm and 28mm respectively. SF008 is an as or dupondius but is unidentifiable. SF747 is a Flavian dupondius. The 2010 coins are in a terrible condition and no details can be discerned on their surface. No conservation has been untaken and none have been X-rayed.

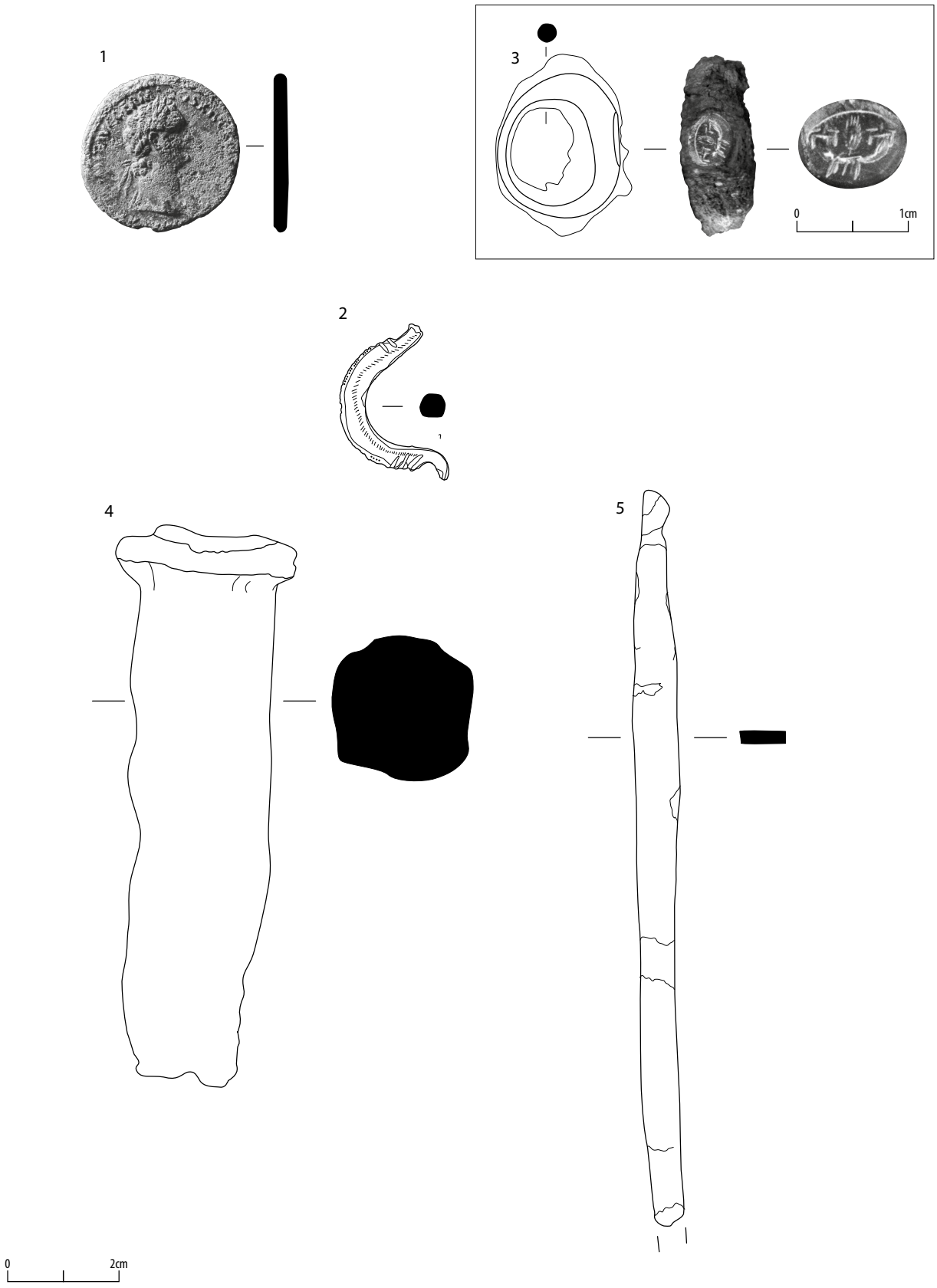
6.3.2 Copper alloy finds

Fraser Hunter

6.3.2.1 2008 finds

The only copper alloy find from the 1999/2008 excavations (aside from the coin described above) is a fine decorated handle, probably from a casket or an item of furniture.

▸ **Fine U-shaped decorated handle**, the terminals narrowed and out-turned, one broken. The facetted section bears punched decoration on the central and lateral spines, with chevron decoration on the latter and sinuous diagonals on the former. The concave



Illus 10 Copper alloy and iron finds: 1 coin; 2 handle; 3 intaglio ring; 4 punch; 5 file. © Headland Archaeology (UK) Ltd

Table 3 Copper alloy finds from 2010 excavation (excluding coins)

Small Find no.	Identification
804	Belt or strap mount
189	Enamelled circular harness mount with four-way distributor fixing
823	Unknown
829	Pin shank
876	Bent rivet
438	Headstud brooch
868/905	Two joining fragments of an enamelled headstud brooch

moulding where the loop narrows to the terminals is defined by two or three incised transverse grooves. A fine carrying loop, perhaps from a casket. L: 28.5mm; W: 17mm; Th: 4.3mm. DPSE07, SF001, C005 (Illus 10:2).

6.3.2.2 2010 finds

Aside from the two copper alloy coins, there were eight copper alloy finds in the 2010 excavation (Table 3). As with the entire 2010 assemblage these have been only briefly assessed and only the harness fitting (SF189) is commented on below.

The harness fitting (SF189) from C005/009 is undoubtedly the highlight of the assemblage (Illus 11). It is a strap junction decorated in the Mirror-style of southern England, typically early 1st century AD, so an heirloom by the time it came north, perhaps from a solider recruited from the south. There are two fastenings on the rear for the strap. It was originally four-armed but one arm has been broken off. It has a very nicely done decoration of a three-arm whirligig, engraved with parts highlighted with engraved basketry hatching and red enamel, around a central trefoil design. The arms have engraved scrolling designs, again with red enamel. This fits into a wider pattern of troops bringing material from previous postings, and also (by implication) of troops recruited in the south serving in the northern conquest. In this specific case of southern 'Celtic metalwork' on Scottish Roman sites, you can find parallels in 'lipped terrets' (a southern form) from Cargill and Newstead (former unpublished; from David Woolliscroft/Brigitta Hoffmann's work there; latter Macgregor 1976: no. 63).

6.3.3 Other non-ferrous finds

Julie Lochrie

The 2010 excavation identified 13 lead alloy finds and one possible silver find (SF968). The lead alloy finds all appear to be waste fragments, although SF806 is plano-convex in shape and may be an ingot.

6.4 Iron, glass and stone finds

Martin Goldberg, Fraser Hunter & Julie Lochrie

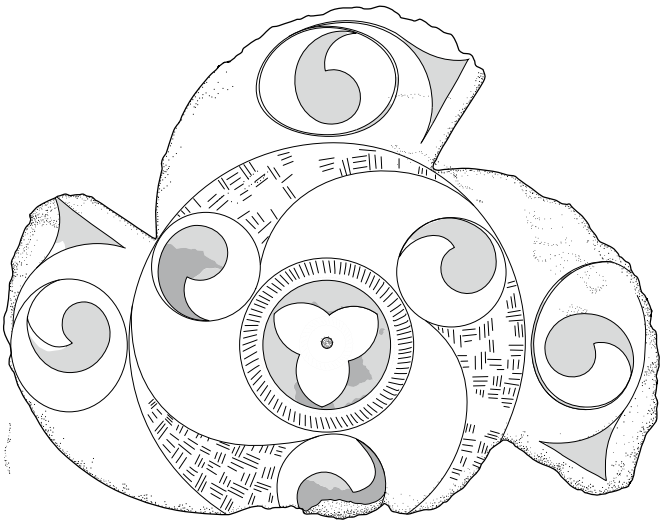
6.4.1 Iron

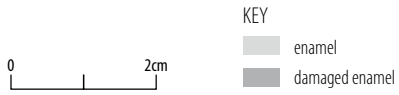
Martin Goldberg & Fraser Hunter

Below is a summary of the 1999 and 2008 assemblage. The 2010 excavation produced 641 iron finds, of which 453 are nails and 87 are hobnails. Much of the iron is currently unidentifiable due to corrosion but there may be knives, mail fragments and tools present. No further assessment has been undertaken of this assemblage.

The 1999/2008 excavations produced a small but diverse assemblage of ironwork. Notable finds include a ring complete with intaglio, a range of militaria and various tools. The assemblage (17 objects; 16 pieces of chain mail; 123 nails and 52 hobnails) is summarised in Table 4.

The most striking item of personal ornament is an iron finger ring which still retains its chalcedony intaglio (Illus 10:3). The design of two interlocked cornucopiae symbolises prosperity and fertility. Militaria are represented by loose chain mail links, javelins and catapult bolts. The type of light throwing spears found at Doune is typical of auxiliary equipment; they fall within Manning's





Illus 11 The harness fitting. © Headland Archaeology (UK) Ltd

Table 4 Summary of ironwork in the Doune assemblage divided by season of excavation

Season	Jewellery	Military equipment	Tools	Fixtures and fittings	Hobnails	Miscellaneous
1999	Intaglio	2 javelin heads; catapult bolt		Nails; clamp; chain link; spiked loop	1	Bar fragment; fragment
2008		Chain mail	Blacksmith's punch; file; ?file; knife	Nails; T-clamp; washer	51	Bar fragment; decorative mount

Group 1A (Manning 1985: 162–5), a common type with parallels *inter alia* from Newstead (Curle 1911: 188–9). More unusual is the evidence for artillery, in the form of the catapult bolt head; post-excavation fragmentation renders identification awkward, but it has all the characteristics of such a bolt head. This need occasion no surprise, as the discovery of catapult parts from Elginhaugh illustrates that artillery was not the sole preserve of the legionary (Allason-Jones 2007: 405–7; Hanson 2007: 658–9).

The range of tools indicates the variety of activities taking place within the fort. Metalworking is represented by the blacksmith's punch. There are one or two files; the identification of one is uncertain, but the fineness of the other suggests a role in metalworking. Carpentry is represented by nails and other structural fittings such as various clamps. The only knife fragment has a notably thin blade, suggesting it is not from a robust multi-purpose tool but a finer, more specialist implement.

Remarkably, only a single hobnail was recovered from the 1999 excavation, compared to 51 from the 2008 excavation; possible reasons are discussed below. The hobnails (Manning 1985: 135, type 10), have short shanks and small domed heads, suitable for sandals and boots. Those from DPSE07 C010 are smaller than the majority, suggesting a smaller or finer shoe than the normal military type. Notable concentrations came from DPSE07 C018, 036 and 010, the latter clearly representing deposition of an intact shoe, as several are fused together.

Structural fittings and fixtures are represented by a common range of types, including a double-spiked loop, a C-clamp and a T-clamp with anchor head (Manning 1985: 130–2). The fixtures and fittings are dominated by nails, as is normal. Most frequent are Manning's type 1B (below 15cm in length), square-sectioned with tapering shanks and a sub-rectangular flat head. The 1999 excavation had a fairly homogeneous nail assemblage of Manning type 1B, with C004, 010, 046 and 056 producing the highest numbers. Many were straight, indicating that they were deposited still in the wood. Two of these contexts (C004 and 056) come from features interpreted as rubbish/destruction pits; the nails presumably relate to the discard of wooden structural elements with intact nails. By contrast, DPSE07 C015 has several nails with bent shanks, suggesting removal from the wood and discard within the secondary deposit of Pit C014. DPSE07 C036 had high numbers of both nails and hobnails from the lowest levels of foundation slot 034; the nails may be structural, but the hobnails may represent the loss or deposition of a shoe during construction.

Most intriguing among the miscellaneous items is a fine broken diamond-shaped decorative mount with an ornamental terminal. No parallels have yet been noted, but it is likely to be a decorative mount from an organic item.

6.4.2 The 1999 and 2008 iron finds in context

While fixtures and fittings (especially the ubiquitous nail) are the most common finds from both excavation phases, there are notable differences between the two assemblages, as summarised in Table 4. Most obvious is that the 1999 excavation produced weapons but no tools, whereas the 2008 excavation produced tools but no weapons. However, these differences are more apparent than real; both assemblages are largely the product of just two pits, DPS99 Pit C005 and DPSE07 Pit

C029, interpreted as rubbish deposits. The relatively small scale of the assemblages should caution against drawing any radical conclusions.

Foundation trenches such as DPSE07 C034 (Building 5) occasionally contained nails and other items (eg fragmentary knife blade, SF103), but the majority of finds came from pits interpreted as discard or destruction deposits. The key significant difference between the finds from the two excavation phases is that significantly more hobnails and chain mail fragments were found in 2008. As sampling strategies were consistent, the patterns are likely to be meaningful, and probably indicate rather more intense activity in the barracks area, with the movement and everyday activities of the troops leading to the incidental loss of individual hobnails and loose chain mail links. The rear of the rampart either saw less activity, or the users were rarely armoured and booted.

6.4.3 Conclusion

While small, the Doune iron assemblage is an interesting one, with a wide range of ironwork. Little of it is surprising in itself, but it includes some striking finds (notably the intaglio and the militaria) which add colour to our picture of life on the frontier, while different loss patterns among the smallest of artefacts, the hobnails and chain mail links, suggest varying activity patterns in different areas of the fort. With the rest of the finds, it is only as larger samples of the site are dug, or more work is done on comparing assemblages from different sites, that any wider patterns will emerge.

6.4.4 Catalogue of iron

6.4.4.1 Jewellery

Fraser Hunter

▸ **Iron intaglio-set finger ring,** the circular-sectioned hoop swelling to the bezel (Henig 1978: fig 1, type III) in which is set an oval flat semi-translucent dark grey chalcedony intaglio with bevelled upper edges (10 × 12mm). The intaglio bears a pair of interlocked cornucopiae flanking an ear of corn. Both are standard symbols of fertility and prosperity, which are common on gemstones; for parallels to their use in combination (although with the corn set in a vessel), see Henig (1978: no. 401 and app 54). Unrelated traces of wood adhere to corrosion on one side. Max Diam: 27mm; inner Diam max: 19mm; band Diam 4mm; bezel W: 8mm. DPS99, SF1, C060, upper fill of Pit 061 (Illus 10:3).

6.4.4.2 Tools

Fraser Hunter

▸ **Blacksmith's punch,** rounded tip, tapering cylindrical shank, expanded head cracked in half. A common type (Manning 1985: 9–11), with parallels from the Blackburn Mill and Carlingwark Loch hoards (Piggott 1953: 38 & 48, cat C.64–7 & B.45–7). L: 96mm; Diam at tip: 21mm; Diam at top of shank: 30mm; head Diam: 34mm. DPSE07, SF101, C028, lower fill of Pit 029 (Illus 10:4).

▸ **Fine file.** No traces of teeth due to corrosion, as is often the case, but the form is typical of a file; parallel-sided rectangular-sectioned bar tapering towards tip and narrowing at one end to a broken tang. L: 132mm; 8 × 3mm, narrowing to 3 × 3mm at tang. DPSE07, SF102, C028, lower fill of Pit 029 (Illus 10:5).

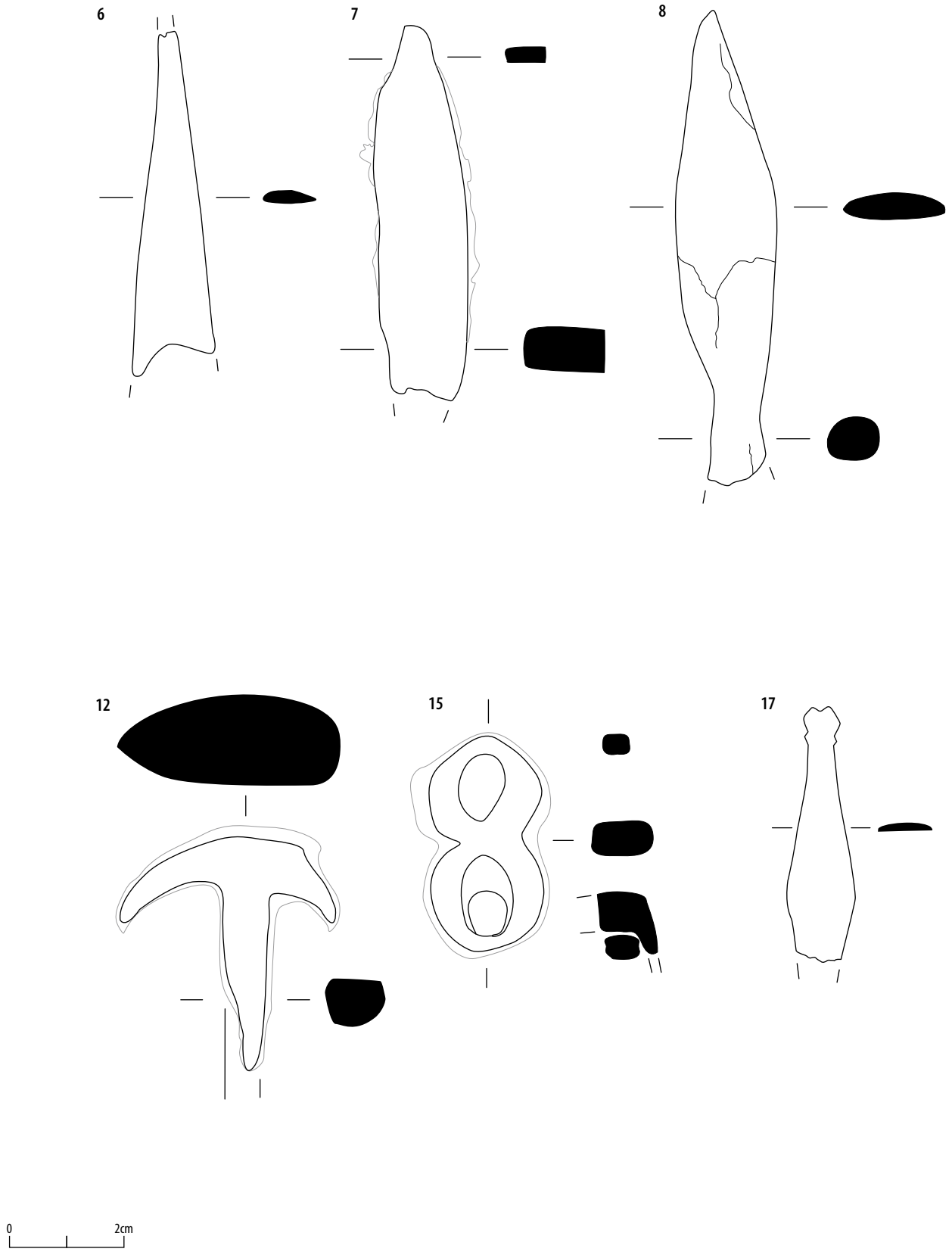
▸ **Fine knife blade tip.** Both edges of tip sharpened; fine blade, form unclear due to corrosion. L: 60mm; max H: 15mm tapering to 3.2mm at broken tip; Th: *c* 1mm. DPSE07, SF103, C036, lower (backfill) deposit in foundation trench 034 (Illus 12:6).

▸ **Tool?** Function unclear; form suggests tang and broken blade, possibly from a file. Rectangular-sectioned bar tapering and narrowing to a rounded end; other end broken, with a large corrosion blister. L: 64mm; 2.5 × 5mm at tip; 9 × 16mm at widest point. DPSE07, SF104, C042, upper (destruction) deposit in foundation trench 037 (Illus 12:7).

6.4.4.3 Military equipment

Fraser Hunter

▸ **Javelin head with damaged socket.** Approximately symmetrical diamond-shaped blade; socket fragmentary, with remains of wooden shaft. Manning group 1A; close parallel in a diamond-shaped blade from the Durden collection (Manning 1985: 164, no. V53). Overall L: 82mm; head L: 67mm; W: 22mm; Th: 3mm; socket surviving L: 15mm, outer Diam: 10mm; inner Diam: 5mm. DPS99, SF004, C004, fill of Pit 005 (Illus 12:8).



Illus 12 Iron finds: 6 knife blade; 7 tool; 8 javelin head; 12 T-clamp; 15 chain link; 17 decorative mount. © Headland Archaeology (UK) Ltd

▸ **Damaged javelin head.** Leaf-shaped blade with broken tip; a second non-joining fragment from the same context is probably from the same object. The lentoid-sectioned tip is blunted and bent from use. The blade has a low belly at *c* 10% of blade length (70mm from tip); no mid-rib; heavily laminated, making thickness difficult to determine. The tapering closed socket has no apparent rivet (Diam: 13mm at neck, flaring to 15mm); wooden shaft fragments in the socket. The leaf-shaped blade is more typical of Manning's Group 1A (Manning 1985: 162–5). Fragment 1, L: 127mm; spear head surviving L: 82mm; W: 26mm; socket L: 45mm; outer Diam: 15mm; inner Diam: 9mm. Fragment 2, L: 46mm; W: 20mm. DPS99, SF006, C004, fill of Pit 005.

▸ **Fragmentary remains of catapult bolt head.** Heavily corroded tapering socket with wooden shaft remains. Other fragments appear to form the neck of spear head, its original form uncertain, but the square section and short length suggest a tapering pyramidal point typical of artillery bolt heads (Manning 1985: pls 82–3). Post-excavation corrosion makes it too fragmentary to illustrate. Min L: 92mm; head L: min 34mm; D: min 14mm; socket outer Diam: 14mm; inner Diam: 9mm. DPS99, SF060, C010, upper fill of Pit 011.

▸ ***Lorica hamata* – chain mail links.** Two complete small punched rings (SF106, SF109); three riveted rings (SF108); fragments of 11 others (SF105). Diameters vary between 4.5 and 7mm but thickness of wire is consistently 1.5mm. These fragments were all from sample residues, generally from the upper levels of features (DPSE07 C010, 035, 046) or later deposits (C005). Pit C029 contained chain mail fragments from both its lower and upper fills (Sample 21 from the lower deposit C028, Sample 22 in its later fill C046). DPSE07, SF105, 106, 108, 109, C005, 010, 028, 035, 046.

6.4.4.4 Fixtures and fittings
Fraser Hunter

▸ **T-clamp with anchor-shaped head;** broken square-sectioned shank with perpendicular tapering down-curved arms. Intact, no wood traces and thus not in situ when buried. For parallels see Curle (1911: 289); Manning (1985: 132). Shank L: 42mm; W: 5mm. Head L: 40mm; W: 8mm. DPSE07, SF110, C042, foundation trench (Illus 12:12).

▸ **C-shaped timber clamp.** Formed from a rectangular-sectioned bar, the broad end turned through 90° and the tip a further 90°; bent 90° at other tapered end. Bar bowed from use. L: 134mm; W: 52mm; bar section 13 × 10mm; flattened end 24mm wide × 9mm thick; clamped round timber Th: 31mm. DPS99, SF201, C010, upper fill of Pit 011.

▸ **Spiked loop.** Heavily fragmented. A common type of fitting for timber architecture; compare Curle (1911: 289); Manning (1985: 130). L: 57mm; spike L: 38mm; head W: 27mm; loop Diam: 10mm. DPS99, SF202, C003, hollow containing iron-smelting debris.

▸ **Chain link.** Complete figure-of-eight link with a small fragment of a second link attached. For parallels see Manning (1985: 139). L: 39mm; W: 21.5mm; Diam: 6mm. DPS99, SF002, C004, fill of Pit 005 (Illus 12:15).

▸ **Nails.** There were 77 iron nails recovered in the 1999 excavation and 46 nails from the 2008 excavation, all of Manning type 1B (Manning 1985: 134): < 150mm in length with flat, sub-rectangular or slightly rounded heads. The 52 hobnails were all of Manning type 10. Only one came from DPS99; those from DPSE07 were found in concentrations (> 2) in C010, 018, 036 and 045. In a number of these, corroded organics indicate the deposition of complete or fragmentary shoes.

6.4.4.5 Miscellaneous
Fraser Hunter

▸ **Fine decorative mount.** Diamond-shaped fitting, broken at one end, with a decorative terminal which expands in angular bifurcated form; small triangular mouldings flank it. Flat or slightly plano-convex section, with no rivet holes surviving; probably a fine decorative clamp or mount for an organic object. L: 44mm; W: 4.5–12mm; Th: 1–2mm. DPSE07, SF113, C018, lower fill of Pit 014 (Illus 12:17).

6.4.5 Glass

Julie Lochrie

There were 32 glass finds recovered in the 2010 excavation, including three turquoise faience melon beads. Melon beads are a common type very popular during the Roman period.

The other glass sherds in the collection are very similar thin curving fragments of green or blue colour. It is unclear if they belong to bottles or vessels but a few of the sherds have raised ribs which may be decorative. A collection of larger sherds are likely to be from the same vessel and their retrieval from the primary fill of a pit located between the intervallum road and the edge of the rampart provides a Roman date. Similarly, three sherds were retrieved from the primary fill of a pit inside one of the buildings and are also certainly Roman in date.

6.4.6 Stone

Julie Lochrie & Fraser Hunter

There are 16 pieces of one or more Niedermendig lava stone querns, imported from the Rhineland, Germany identified in the 2010 excavation. Similar querns have been discovered before in Scotland. One complete example was found at Newstead, Roxburghshire (NMS Cat no. 000-100-037-477-C).

Other stone finds include two possible tool fragments, two whetstones, a weight, a pivot stone, a prehistoric flint tool and a worked shale fragment. The fragment was originally thought to be part of a large D-sectioned bangle but has been re-identified as a rim of a vessel (Hunter 2014: 158).

6.5 The industrial remains

Effie Photos-Jones

Significant quantities of industrial waste were recovered from only four contexts, all from the 1999 excavation. The majority (7.1kg) came from a shallow scoop (C003) cut into the surface of the intervallum road. Smaller quantities (less than 1.0kg each) were recovered nearby from the spreads of burnt material in front of the ovens (C008 and 029) and the fill of a large demolition pit (Pit C055, fill C056). Slag, likely to be derived from ironworking, was found in various contexts across the 2010 excavation. The levels are not large, 1,799g, but enough to suggest ironworking in the area. Three examples of likely furnace lining and three crucibles certainly seem to confirm this. All the crucibles were recovered from C029, strongly suggesting metalworking nearby, although surprisingly there was no associated industrial waste from this context. Only the 1999 industrial waste is reported on below.

The industrial waste was initially classified as slag from hand specimens. On sectioning the slag it became obvious that the majority was highly fired metallurgical ceramic rather than metallurgical slag proper. Metallurgical slag was peculiarly absent in any form other than small prills adhering to the surface of the metallurgical ceramic. SEM-EDX analysis showed that the metallurgical ceramic had been involved in an iron-making/smelting process due to the presence of metallic iron adhering to the surface of the ceramic. The molten metal had been deposited rather than reacted with the clay matrix; no reaction is obvious between matrix and metallic area other than iron-rich 'penetration' into the clay matrix.

A number of fragments of the ceramic showed a pronounced gradient from a black and glassy inner surface to a low-fired, red external one with a grey and vitrified area in between. This suggests that the original container or structure to which these fragments belonged was free-standing with its outer surface exposed to an oxygen-rich atmosphere and the source of heat contained within. The thickness of the fragments indicates that this was a furnace rather than a crucible. They could not have been part of a smithing hearth since these rarely tend to be vitrified apart from the area around the tuyère, the rest consisting simply of heated clay.

Thus the evidence points to the vitrified clay fragments being part of a small iron bloomery furnace. It could have been free-standing or embanked like those shown by Tylecote (1986) for the Roman period in England. However, no in situ remains of the furnace were found within the excavated area at Doune and it is not possible to base a detailed reconstruction on the recovered fragments of furnace wall. The only distinctive fragment was one piece resembling a tuyère (an identification based on its narrow inner diameter and the extent of vitrification). Alternatively, it may have served as an air inlet as part of the furnace construction.

The location of the majority of the furnace debris in C003, close to the back of the rampart, suggests that the furnace itself may have been built into the

rampart. This location was also used for the ovens, and for both furnace and oven this may reflect the need to keep processes involving fire away from the highly flammable timber buildings of the fort.

This is the first example of a shaft furnace from the Roman period in Scotland. The design is seen widely in England at this time but the local tradition in Scotland is simple bowl furnaces like that excavated at Tarras Farm, Forres (Will 1998; Photos-Jones 1999) and indicated at the Roman fort at Rough Castle on the Antonine Wall (MacIvor et al 1980). The evidence from Doune therefore indicates the presence of a smith in the fort using local materials to manufacture iron in a Roman-style furnace.

7. THE CHARRED PLANT REMAINS

Mhairi Hastie & Scott Timpany

The charred plant assemblages from the 1999 and 2008 excavations at Doune are presented here. Samples were taken in both excavations from the main features across the site(s), including identifiable buildings and associated pits, together with bread ovens and the base of a possible furnace. Charred cereal grains were present in most contexts from across the site, with particularly rich assemblages attained from contexts associated with Buildings 3 and 5.

7.1 Method

7.1.1 Plant macrofossil assessment and charcoal identifications

Samples were processed in laboratory conditions using a standard floatation method (cf Kenward et al 1980). Identifications were confirmed using modern reference material and seed atlases, including Cappers et al (2006). Plant taxonomic nomenclature used in Tables 6 and 7 follows the order of Stace (1997). Charcoal identifications were made using wood keys by Schweingruber (1990) and IAWA (1989).

7.2 Results

The results for the two phases of excavation are presented in Tables 6 & 7 (in Appendix 5: Composition of plant remains from Doune Primary School) and Table 8 (in Appendix 6: Composition of the charcoal from Doune Primary School), which show the materials recovered from both the retent and flot samples and take into account the suggestions of van der Veen et al (2007). All plant material was preserved through charring.

7.2.1 Charred cereals

Charred cereal grains dominate the charred plant assemblage from both phases of excavation (see Tables 6 & 7). Grains of hulled barley (*Hordeum vulgare*), including rare quantities of naked barley (*Hordeum vulgare* var *nudum*) were recovered, together with oat (*Avena* sp), club/bread wheat (*Triticum aestivo-compactum*), emmer wheat (*Triticum dicoccum*) and spelt wheat (*Triticum spelta*). Where possible the hulled barley has been recorded as either having a 'straight' or 'twisted' central groove to potentially differentiate the presence of two-row (straight) and six-row (twisted) barley. A number of degraded cereal grains were also present, which could not be identified to species or family level; these are recorded as indeterminate cereal grains (Cereal indet). Together with the cereal grain, rare quantities of barley and possible spelt wheat rachis fragments were recovered from two samples (see Tables 6 & 7).

7.2.2 Wild taxa

A wide variety of wild taxa are present within the assemblage, with generally increased numbers in those contexts containing large numbers of cereal grains. In general the wild taxa fall into two categories; those relating to agricultural weeds and those relating to damp/boggy ground. Agricultural weeds are present in samples from both phases of excavations and include taxa such as ribwort plantain (*Plantago lanceolata*), corn spurry (*Spergula arvensis*), sheep's sorrel (*Rumex acetosella* agg), buttercups (*Ranunculus* sp) and corn marigold (*Chrysanthemum segetum*). A number of taxa relating to damp/boggy ground are present in the assemblage, including a suite of sedge species (*Carex* sp), wood-rushes (*Luzula* sp), violets (*Viola* sp) and spike-rushes (*Eleocharis* sp). Grasses (*Poaceae* sp) are also well represented in the assemblage, with meadow grass (*Poa* sp), brome/false brome (*Bromus/Brachypodium* sp) and heath grass (*Sieglingia decumbens* sp) present, together with a number of grains, which could not be identified to species level and are listed as indeterminate. The only arboreal taxon present is hazel (*Corylus avellana*), through charred nutshell recovered from two contexts (see Table 8).

7.2.3 Charcoal

A small number of arboreal species were identified during the charcoal analysis. The assemblage is largely dominated by oak (*Quercus* sp) and hazel charcoal. Present in lesser quantities are: alder (*Alnus glutinosa*), birch (*Betula* sp), willow (*Salix* sp) and plum/rowan (*Rosaceae* indet). The results are shown in Table 8.

7.2.4 Discussion

7.2.4.1 The intervallum: bread ovens and furnace

Samples were taken from contexts relating to each of the five bread ovens present on the site (DPS99 C002, 006, 012, 018 and 023), together with the associated rake-out deposits (C008 and 029) surrounding the ovens. The assemblages recovered from the ovens are generally poor, with all but two contexts (C012 and 023) being sterile. C023 contained only a single charred indeterminate cereal grain. The greatest concentration of cereal grain was recovered from C012 (relating to oven C024), which contained in excess of 70 grains of hulled barley, together with a significant number of wheat grains, some of which have been identified as spelt wheat. Wild taxa are also present in this assemblage. A similar grain assemblage is also shown in one of the rake-out deposits (C008) although in smaller quantities (see Table 7).

The charred cereal grains present in bread oven C024 are likely to reflect the last use of the oven: with bread ovens being cleaned out on a regular basis there would be less build-up of grains and associated wild taxa accumulating within them (Clapham 2007). As the primary use of the bread ovens would have been for baking rather than cooking, the cereals present within bread oven C024 are likely to have derived from secondary sources, such as adhering to the sides of bread (Clapham 2007) or accidental transfer from people. However, roasting of grain in the ovens to prevent spoilage cannot be ruled out entirely (eg Robertson 1941–2) and this may well explain the presence of arable weeds within the assemblage.

It is likely that both barley and wheat were being used in bread production at Doune, as is reflected in the overall grain assemblage recovered from the site. Barley bread is thought to have been inferior to wheat bread but was used by the Roman military, particularly to feed lower ranked soldiers, while higher ranking soldiers would have consumed the wheat bread (Davies 1971). The higher proportion of barley at Doune could suggest bread was largely being produced for the lower ranked soldiers or it could simply reflect local availability of cereal types. It is thought cereals would have been requisitioned from the local population by the Roman army (Johnson 1983). Barley is known to have been the more common cereal produced in the north of Britain (Dickson 1989) and has been evidenced from other Roman sites in Scotland dating to around the time of the occupation of the fort at Doune such as Bearsden (Knights et al 1983), Cramond (Hastie 2006) and Elginhaugh (Clapham 2007). Wheat such as spelt wheat is inferred to have been grown in Scotland during this period from its presence at Iron Age sites such as Culduthel, near Inverness (Timpany 2007). However, it is likely it was grown in smaller quantities than barley and thus the spelt wheat at Doune may reflect a combination of wheat brought to the site by the Roman army together with local production (Dickson 1989; Boardman & Dickson 1995; Dickson & Dickson 2000). Together with the baking of bread it is suggested that cereals would also have been used to make foodstuffs such as porridge and soups (Dickson 1989).

Charcoal fragments recovered from the bread ovens and the rake-out show an oak and hazel dominated assemblage (see Table 8), with smaller quantities of willow, alder and plum/rowan, indicating the use of local wood for fuel. The high number of sedge nutlets within the assemblage from bread oven C024 (C012) suggest that turf/peat may also have been used on occasion to fuel the ovens.

One sample was taken from the base of the possible furnace (DPS99 C003), which is thought to have been used primarily for metalworking and the manufacture of iron products on site (see below). However, the presence of over 100 cereal grains dominated by barley, together with occasional wild taxa of arable weeds such as buttercups, knotgrass and chickweed (*Stellaria* sp cf *S media*) from this context (see Table 7) would seem out of place for a furnace assemblage. Given the close proximity of this context to that of the oven rake-out deposits (C008), it seems more likely that this context contains a mix of both oven and furnace waste. Thus the shallow pit feature containing C003 may represent an accumulation of rake-out material from both the ovens and furnace. The charcoal assemblage from this context is dominated by oak fragments with rare quantities of hazel, plum/rowan and possible alder (see Table 8), all of which were likely to come from local sources. The dominance of oak charcoal, which burns at high temperatures, reflects the industrial nature of this area of the site for both metalworking and baking.

7.2.4.2 Buildings and pits in the interior of the fort
Five samples have been analysed from Building 1. These were taken from one of the construction trenches (DPS99 C053), Pit C005 (C004 and 005), the top fill of Pit C011 (C010), and Pit C055 (C056). Samples were also analysed from the fill of the construction trenches of Building 2 (C042) and Building 3 (C094), and Pit 105 (C106).

The samples associated with Building 1, the most substantial structure excavated, show a general spread of grain across the interior of the structure, with grain becoming trapped in the fills of demolition pits and beam slots, following the destruction of the structure. The grain assemblage for the structure is dominated by barley, with lesser incidences of spelt wheat and oat (see Table 6). The wild taxa present are all indicative of arable weeds. Identification of charcoal fragments from this structure show utilisation of oak and hazel together with wood of alder, willow and plum/rowan (see Table 8). The absence of any charcoal fragments of substantial size suggests they are more likely to represent the remnants of fuel wood rather than building timbers, although it is likely that oak and hazel would have also have been the main arboreal taxa used to provide construction materials for the buildings.

The arboreal taxa represented are suggestive of utilisation of mixed dryland/wetland woodland, with species such as oak, hazel and plum/rowan preferring drier areas, and alder and willow indicative of damp/wet areas. It is generally observed that by the Roman period large-scale clearance of woodland had already taken place to make way for agricultural land (eg Tipping 1997; Clapham 2007). However, the location of the fort near to the River Teith suggests that all of these species may have been growing locally on the wetland around the river and the immediate dryland. The presence of oak woodland in this area during the time of the Antonine Wall has been noted by Tipping & Tisdall (2005), who suggest that where this woodland persisted it would have been a managed resource by local people to provide wood for fuel and timber.

The assemblage from Building 2 (C042) is extremely limited, particularly in contrast to that from the rubbish pit outside this structure (see below). Only a very limited number of barley and spelt wheat grains were recovered from this building (see Table 6). Charcoal fragments analysed from this structure show that oak, hazel and cf plum/rowan timbers were utilised, probably for fuel.

The Building 3 assemblage (C094) is much more diverse and far richer than that of either of the previous two buildings. A large quantity of both charred cereal grain and wild taxa were recovered. Over 1,500 grains were identified from the fill, with barley grains dominating the assemblage and smaller amounts of spelt wheat and oat also present (see Table 6). On the whole, the assemblage is similar to that from Building 1, but on a much larger scale. The large number of grains from this single context suggests that Building 3 may have been used as, or was near to, a granary on the site before it was burnt down. Together with the grain, rachis fragments of barley and possible spelt wheat were present in rare amounts. This small quantity of chaff-related material suggests the crop was relatively clean and had thus been processed elsewhere. However, seeds of arable weeds such as ribwort plantain, buttercups, docks (*Rumex* sp) and pale persicaria (*Persicaria lapithifolia*) within the assemblage indicate that the remains of some ruderals were able to survive the cleaning process. A large quantity of grass caryopses also occur within the assemblage, the large majority of which have been identified as small-grained grasses (see Table 6). The presence of such large numbers of grasses may relate to one or a combination of: grasses growing as arable weeds and being collected with the crop during harvesting; grasses being used as bedding or flooring; grasses present in turf being burnt as fuel and/or used as a construction material. Of particular note is the presence of heath grass in the assemblage, which does not commonly grow in arable fields today, but is thought to have been a common agricultural weed in the past, until it was removed from the field ecosystem as a result of the change from the ard to the mould-board plough during the medieval period (Hillman 1981). Charcoal analysis from this structure indicates that oak and hazel were the primary fuel woods used (see Table 8).

The assemblage from C106, the fill of pit C105, within a potential structure was similar to that of Building 3, containing a large quantity of cereal grain. However, the assemblage here is dominated by oat rather than barley, and wheat is absent altogether (see Table 6). The presence of a large quantity of

oat grain, compared to the other plant assemblages from the site, could suggest that the grain stored in an associated building was being used for a different purpose. One possibility is that the oat may have been used for feeding livestock such as horses, thus indicating the potential presence of a cavalry unit housed at Doune. However, Huntley & Stallibrass (1995) considered this regarding other Roman forts and could not find an obvious correlation between sites with oat grain and those which housed cavalry units.

Only a small number of wild taxa were recovered from C106, which include sorrel, wild radish (*Raphanus raphinistrum*) and hemp-nettle (*Galeopsis* sp). These again are largely indicative of arable weeds, with wild radish in particular notorious as a troublesome weed (Clapham et al 1962). Charcoal fragments identified from this structure show that alder is the dominant wood type used, with oak and hazel present together with possible birch and plum/rowan wood.

Two contexts from individual pits located between Buildings 2 and 3 were sampled. The fill of Pit 090 (C091), that closest to Building 3, was found to contain only a single grain of possible spelt wheat (*Triticum* cf *spelta*) together with a rare quantity of oak and possible hazel charcoal fragments, and as such offers little insight into the function of the pit. The fill of Pit 047 (C046) just outside of Building 2, however, contains a much larger assemblage of cereals, dominated by barley (see Table 7). It is thought this pit may have been a post hole relating to Building 2 that had the post removed during the destruction of this structure. The assemblage from the pit fill contains a larger number of grains than was recovered from the building itself. Together with hulled barley, the assemblage also contains a small number of oat grains and wild taxa associated with arable land such as ribwort plantain, buttercups, grasses and sheep's sorrel. The pit is also noted to contain fragments of burnt wattle and daub relating to the destruction of the building and thus the grain may relate to storage of cereals within Building 2, the majority of which was not exposed during excavation. Charcoal fragments from Pit C047 were found to consist only of oak, which may relate to fuel; oak was also recovered from Building 2 C042.

Samples were analysed from 12 contexts (C005, 009, 012, 015, 017, 018, 021, 028, 035, 044, 045 and 046) relating to Building 5. Charred cereal grain within the building appears to be concentrated within the rectangular pits C014 (C015 and 018) and C029 (C028, 044, 045 and 046), a buried soil layer (C005) and the upper fill of construction trench 034 (C035), situated between the two pits. There is a general scatter of grain across the other contexts sampled, with grains present in low quantities, together with occasional wild taxa of largely arable weed species including fat-hen (*Chenopodium* sp cf *C album*), mustards (*Sinapis* sp) and buttercups. The grain assemblages from pits C014 and 029, occupation layer C005 and construction trench C034 are dominated by a mixture of spelt wheat and hulled barley. The Pit C014 assemblage is seen to be dominated by spelt wheat, with over 120 grains present in one context (015), while that from Pit C029 is dominated by hulled barley, with two-row barley in particular appearing to be the favoured variety used (see Table 7). The assemblages from construction trench C035 and buried soil C005 are a mixture of both spelt wheat and hulled barley, with spelt wheat being the most abundant species present.

The high numbers of spelt wheat found within Building 5 contrasts with that of the assemblages from the DPS99 excavation, where hulled barley was generally the dominant taxon (with the exception of Pit C105 (C106) where large numbers of oat grains were recovered). The large quantity of spelt wheat recovered from Building 5 may reflect a shift in cereal production between the lives of the buildings or differential storage of cereals within Building 5. Along with spelt wheat and hulled barley, smaller quantities of bread/club wheat, emmer wheat and oat are also present in the assemblage from Building 5. A post hole from this building (C017) contained only two cereal grains: one of naked barley (*Hordeum vulgare* var *nudum*) and one of emmer wheat. The presence of naked barley, which is more prevalent on prehistoric sites, may represent either reworked material or a remnant crop.

The two pits (C014 and 029) together with high concentrations of grain also contain rich wild taxa assemblages (see Table 7). The assemblages contain a number of arable weed species, such as buttercups, ribwort plantain, corn marigold, sheep's sorrel and fumitories (*Fumaria* sp), which are likely to have been transported with the grain during

harvesting. Together with the arable component of the assemblages, a significant quantity of taxa from wet/damp habitats is present. These are particularly well illustrated by the diverse sedge assemblage recovered, with species present including possible downy-fruited sedge (*Carex* sp cf *C filiformis*), large yellow-sedge (*Carex* sp cf *C flava*) and slender sedge (*Carex* sp cf *C elongata*), which grows in wet places such as reed beds (Clapham et al 1962). Other damp ground taxa present include cinquefoil (*Potentilla* sp cf *P erecta*), great wood-rush (*Luzula* sp cf *L sylvatica*) and common spike-rush (*Eleocharis* sp cf *E palustris*). Also of note is the significant number of grasses recovered within the pits. This mixture of charred grain, arable weeds and damp/wet ground taxa is likely to reflect the mixing of the occupation and destruction layers following the destruction of the building, which is thought to have been burnt down. The sedges and other wet plant taxa are likely to represent the use of turf/peat in the construction of Building 5, such as for the wattle (shown by the presence of daub) and/or for the roofing of the building. The concentration of sedges and grasses within the pits could also relate to some form of lining, but the separation of materials from the occupation and destruction layers is extremely difficult (eg Gustafsson 2000) and thus it is difficult to say with any certainty to which they may relate.

One context (C021) was sampled from a construction trench fill within the partially exposed Building 6 (see Table 6). The assemblage from Building 6 contains only a very limited number of charred plant remains consisting of a single hulled barley grain and a single mustard fruit. As such, the assemblage does not provide any information on the function or construction of the building.

8. DISCUSSION

The 1999, 2008 and 2010 excavations have allowed for important evidence to be recovered which will assist our understanding of the activities of the Roman army in Doune in the latter part of the 1st century AD.

The true extent of the fort can now be extrapolated from a combination of the cropmark evidence, topography and excavated features. The main entrance to the fort was already identified as a cropmark, and now the ditches forming the north-west and north-east side of the fort have been revealed during the excavations. The southern extent of the site is curtailed by a sharp drop in ground level into the valley of the Teith and defines a maximum extent to the fort in this direction (see Illus 2). It would therefore appear that the maximum area of the fort was 2.8–3ha, but it is possible that the area contained within the ramparts was much smaller, perhaps only 1.4ha.

8.1 Defences

The fort was provided with three ditches, identified in excavation on the north-west and north-east sides, and visible as cropmarks on air photographs at the north-east corner and main entrance. Although it may seem reasonable to suggest that the fort had three ditches around its entirety, not all forts demonstrate this level of consistency. For example, the Flavian fort at Cargill (Perthshire) appears to have three ditches around part of its perimeter and two ditches elsewhere (RCAHMS 1994: 84–5). In Britain in the 1st century it was common for forts to be protected with double ditches (Jones 1975: 112), although triple ditch systems on at least one side are known from a number of forts in Scotland, including Stracathro (St Joseph 1961: 123). Furthermore, both Cardean (Robertson 1977: 67; Woolliscroft & Hoffmann 2006: 160) and Elginhaugh (Hanson 2007: 124–33) had at least four ditches on one side.

The ditch system appears to have extended less than 18m beyond the rampart, thereby placing it well within the norm for 1st-century forts (Jones 1975: 112). The width of the ditches, between 3m and 4m, is also within the norm, and the depth between 0.8m and 1.6m. The north-west ditches are shallow on the north-west and, unlike the ditches on the north-east, had no evidence for ankle breakers. Although the natural defence offered by the river valley on this side may have reduced the need for deep ditches on this side, and ditches in multiple systems tend to be slightly smaller (Jones 1975: 112; Johnson 1983: 48), it is equally likely that their depth is due to a considerable degree of later truncation, or that they were not completely excavated in 1999.

The ditches on the north-east side appear to have been deliberately backfilled at a point when the sides had weathered to some extent, but when they would still have posed a serious obstacle. The backfilling would have reduced the depth of the ditches to around 0.8m and was perhaps intended to make them ineffective as defensive works. The presence of turf fragments in the inner ditch at the same level suggests that the rampart was also slighted at this time. From this point onwards the ditches seem to have been left to silt up naturally over an extended period.

There was evidence of a rampart on both the north-west and north-east sides. The only direct evidence indicative of the rampart on the north-west was a spread of soil which sealed the ditches, thought to be the levelled remains of the bank, which may indicate that it had been slighted during the evacuation of the fort. The position of the five ovens here could indicate the location of the inner face of the rampart, as these were frequently built into the lee of the rampart. If it is assumed that the berm between rampart and ditch measured 1.5–2m in width, this could give a rampart width of about 7m. On the north-east side the rampart survived as a 6m-wide upstanding deposit, likely the remnants of a dumped turf-and-earth structure on a surface that had been previously de-turfed. The material forming the rampart base was remarkably stone-free, so if any foundation was provided it must have been of organic material (eg brushwood). Evidence of facing or revetting, either of turf or clay, was seen on both edges of the rampart.

No evidence for gates was recovered during the excavations, but the cropmark evidence showing the uniting of the ditches on the south-east side into a 'parrot's beak' shows the location of the north side of this entrance.

8.2 Intervallum structures

Evidence was identified for the *via sagularis* on both the north-west and north-east. No other internal roads were seen. The curve recorded at the southern extent of the *via sagularis* in the north-west may respect a corresponding curve of the defences and therefore indicate the position of the corner of the fort. The position of the ovens and associated working area here appears to have encroached on the width of the *via sagularis* in the area of excavation and seems to have truncated its original width. On the north-east the road is a heavily truncated spread of cobbled and gravel surfaces. A cropmark visible on the south-east side of the fort probably indicates the position of the *via sagularis* on this side.

A row of ovens built into the inner face of the rampart adjacent to the *via sagularis* on the north-west side appears to have been intensively used primarily for bread production, and the identification of large quantities of amphorae together with mortaria here would suggest that this area of the fort was related to food production. The ovens were heated by burning wood, turf or peat inside. When the required temperature was reached the fuel would have been raked out and the dough placed inside. The door would then be sealed until the bread was baked (Johnson 1983: 200).

Similar examples of ovens between the rampart base and *via sagularis* are known from a number of forts, and their location within the intervallum area is common (Jones 2011: 81). At Elginhaugh fort in Midlothian the excavator suggested that up to two ovens may have served each barracks (Hanson 2007: 191–3), a more realistic ratio than the single oven per century as suggested for Fendoch Fort in Perthshire (Richmond & McIntyre 1939: 138) and the fortress at Inchtuthil, Perthshire (Pitts & St Joseph 1985: 200). Ovens of similar construction have been found around the perimeter of forts at Fendoch Fort in Perthshire (Richmond & McIntyre 1939: 138) and in pairs at the rear of the rampart at Inveresk, Midlothian (Leslie 2002: 24). These were associated with spreads of burnt material and could be interpreted as the rake-out of the ovens (Leslie & Will 1999). At Strageath, Perthshire, the rake-out appears to have been piled against the back of the rampart (Frere & Wilkes 1989: 62–3). At Birrens, Dumfriesshire, a well-preserved oven of Antonine date was excavated which was similar to the Doune examples. The stone wall for the structure survived over half a metre high and, as at Doune, part of the clay dome had collapsed onto the floor (Robertson 1975: 19–20).

On the north-east side pits underlying the road suggest that the area was heavily used prior to the laying of the *via sagularis.* Between the road and the turf rampart here, there was evidence that ferrous metalworking was taking place, in an area which must have afforded some shelter from the wind. This may have taken place in a small building or shelter represented by a foundation trench running alongside the road. This use of the back rampart area can also be seen in the north-west where a metalworking furnace, probably an ironworking shaft furnace, was built into the back edge of the turf rampart and suggests that this area was used for industry. Indeed, the presence of a furnace is noteworthy, and indicates the level of industrial activity that may have taken place within the fort. A possible bowl furnace was proposed at Rough Castle on the Antonine Wall (MacIvor et al 1980), and a putative furnace indicated at nearby Inveravon (Dunwell & Ralston 1995). A bowl furnace was also located at Inchtuthil, and the large *fabrica* contained a smithing hearth (Pitts & St Joseph 1985: 108, 199). If the remains at Doune are those of a shaft furnace, this is the first example from the Roman period in Scotland.

8.3 Buildings

All the identified structures were extremely regular and appear to have been of post-trench construction with upright timbers placed at intervals and wattle and daub forming the wall in between. Hanson (2007: 40) has suggested that the normal spacing between posts was 0.6–0.9m, and recent excavations at Carlisle recorded similar dimensions (Zant 2009). The squared post pipes identified in Buildings 1 and 2 both measured 0.13m square, well within the average range for such posts and close to five Roman inches (Hanson 1978: 303). Although no trace of posts could be located in Building 5, the dimensions of the foundation trenches are consistent with post-trench construction found elsewhere. No evidence was recovered for the roofing material, although evidence for turf/peat was recovered from the pits

in Building 5 which may have come from the roof.

With regard to the function of the corridored Building 1, similar structures have been interpreted as hospitals in the auxiliary forts of Fendoch (Richmond & McIntyre 1939: 132–4), Corbridge (Richmond & Gillam 1952: 241–3), and at Oberstimm and Künzing 1 in Germany (Johnson 1983: 163), and this was the initial interpretation of the building at Doune (Moloney 1999b). However, none of the artefacts recovered during the excavation can support this interpretation. Furthermore, a similar building at Red House, Corbridge, was interpreted as a workshop or *fabrica*, due to its association with industrial activity (Hanson et al 1979: 80–1). Building 1 at Doune is a little larger than the *fabrica* at Red House, but the presence of nails and charcoal fragments in the fill of the trenches, combined with the evidence for a possible furnace, row of ovens and layers of industrial waste in the immediate vicinity, suggests that this building was located within an industrial quarter of the fort and its interpretation as a workshop is more likely.

Several of the other buildings may represent the remains of stores and barracks, aligned north-west to south-east. Building 5 appears to be part of a barracks block fronted by a veranda. Each group of eight soldiers (*contubernium*) would have been housed in a pair of rooms, with parts of three sets of rooms excavated in Building 5. It is interesting to note that the size of the rooms of Building 5 (3.7m length and 2.4m in width) appears to be much smaller than the average barracks block rooms. At Elginhaugh the rooms were on average 4.1 × 3.3m, with similar sizes seen in Building 1 at Doune (4.6 × 3.6m) and at other Flavian-period barracks (Davison 1989: 89, 97; Hanson 2007: fig 5.2). For Building 5, however, the front rooms (*arma*) would have opened onto the veranda and housed the possessions and equipment of the men who slept in the room to the rear (*papilio*). With this arrangement the smaller than average size for these rooms is clearly due to separate sleeping and kit rooms. Two large pits in two of the front rooms of Building 5 could represent internal latrines, possibly lined and covered (Johnson 1983: 171–2).

Building 123 shows the typical layout of a barracks block, comprising a long rectangular building divided into paired rooms (Johnson 1983: 166–76). It appears to be adjoined to another building to the south-east which may have formed part of the same barracks block. A barracks building which consisted of only five paired rooms (as seen in Building 123) would be unusually small. In theory, an infantry century was typically divided into ten *contuberniae*, each occupying a pair of rooms, while a cavalry barracks housed two *turmae* in at least eight pairs of rooms, although Johnson (1983: 172) notes that the number of barracks rooms in known cavalry barracks blocks in fact varies from six to ten. Taking into account the cropmark evidence (see Illus 1), it is clear that if the adjoining building was the same length as Building 123 it would have reached almost as far as the rampart on the south-east side, with little room for the intervallum road. Alternatively, this unseen building may have formed the officers' quarters, which typically occupied a much shorter block, either adjoining the main barracks, or slightly detached from it.

Building 5 was a different form of barracks block. It was fronted by an open veranda and, although the rooms were identical in width to those of Building 123, the front rooms were only 2.4m deep. The orientation of the two buildings is the same, but they clearly form part of two separate ranges of buildings. The presence of two different types of barracks blocks suggests two different troop types – perhaps Doune accommodated a part-mounted cohort, with infantry occupying buildings such as Building 5, and cavalry the alternative type such as Building 123. Buildings in some forts have been interpreted as cavalry barracks which would have accommodated the soldiers in the room to the rear of the building, and their mounts in the room to the front (Johnson 1983: 176–82). While the front rooms of Building 5 are surely too small to be anything other than store rooms (*arma*), the rooms along the south-west side of Building 123 might have been large enough to function as stables, with the horses facing along the long-axis of the building.

The size of the rooms in Building 123, at 3.8 × 3.2m, is similar to those elsewhere interpreted as stable-barracks (eg Elginhaugh: Hanson 2007; Wallsend: Hodgson 2003). It is assumed that in order to accommodate a cavalry squadron (*turma*) in a stable-barracks, three horses would be stabled together in the front room. Hodgson (2003: 83) has argued for a minimum of 1.2m to be allocated to each horse. The gullies excavated in the floor of

the south-west row of rooms in Building 123, if correctly interpreted as drains, would support this interpretation, as drains, pits or soakaways were commonly provided to collect the horses' urine and keep the floor dry. Pits similar to those seen within Building 123 have been seen on Hadrian's Wall, and elsewhere have been interpreted as urine pits connected with the stabling of horses (eg Hodgson 2003: 71–84). The finding of an ornamented horse harness strap junction (SF007) in the building is convincing evidence for a cavalry unit in the fort, whether or not the horses were kept within the building itself.

The foundation trenches which make up Building 6 are slighter than those recorded elsewhere in the fort, and it was difficult to distinguish the features from the surrounding subsoil. This pale sterile backfill perhaps suggests that the building was only used for a short period, with no cultural material getting into the backfill. Sited next to Building 5, it was located on a slightly different alignment. If both buildings were upstanding at the same time, Building 6 would have blocked access to part of Building 5. Building 6 may therefore represent an earlier phase of use of the fort or a temporary structure possibly erected during the initial construction of the fort.

8.4 Material culture

The Flavian date of the fort, previously attributed by Maxwell, was confirmed through analysis of the pottery. However, as none of this material is very closely datable, the best date range gained from the pottery for the fort is between AD 65 and 90. While the foundation date of the fort is unknown, conventional analogies would suggest that it was founded in the early 80s AD, although debate currently rages on the dating of the first Roman conquest of this area (Breeze et al 2009). It is particularly frustrating that the as found by the school janitor cannot be dated with any certainty to either AD 86 or 87 – if it dates to AD 86 it fits the general pattern of finds from Flavian forts in Scotland (see 6.3.1.1 'The 2008 coin' above). However, if it dates to AD 87, it is the most northerly find of this date in Scotland and would be a very significant find indeed.

8.5 Conclusion

The excavations in advance of the development of the primary school at Doune have provided supporting evidence for the Flavian date initially given to the fort on its discovery through aerial survey. It has also furthered our understanding of the internal organisation of the fort, including different building forms, the location of an industrial quarter and the main road. The finds recovered through this work have added detail to our understanding of life in this frontier region. The excavations have also shown that within the school grounds, and potentially even below the school buildings, the preservation of the Roman fort at Doune is good.

APPENDIX 1: CATALOGUE OF SAMIAN WARE

Steven H Willis (1999) & Gwladys Monteil (2008)

Each sherd was examined, after breaking, under a ×20 binocular microscope in order to identify the fabric. Each archive catalogue entry consists of a context number alongside fabric, form and decoration identification, sherd count, rim or base EVE when appropriate, and weight. Rubbings of the interesting decorated fragments were undertaken during analysis.

The Inventory Numbers (Inv No.) quoted for the decorated South Gaulish vessels are taken from European intake of Roman samian ceramics. https://www1.rgzm.de/samian/home/frames.htm

A.1.1 Dr 18

▸ 1. DPSE07 Context 010, upper fill of foundation trench 006
South Gaulish, Dr 18, base, one sherd, AD 50–100.

A.1.2 Dr 27

▸ 2. DPS99 Context 004, fill of Pit 005
Two joining sherds, Dr 27, South Gaulish, La Graufesenque, AD 65–90.

▸ 3. DPS99 Context 004, fill of Pit 005
A cup bodysherd, South Gaulish, La Graufesenque, either Ritt 9 or Dr 27, possibly the same vessel as above, AD 65–90.

A.1.3 Dr 29

▸ 4. DPSE07 Context 018, lower fill of Pit 014
South Gaulish, Dr 29, two sherds.

T-1 style, AD 55–75

The sherds do not join but both have the same decoration of a 13-petal rosette in a festoon. The 13-petal rosette belongs to a style found with stamps of Bassus ii-Coelus (cf K52, Taf 58, T, V and Z). The rosette is on a Dr 29 stamped by Bassus ii-Coelus from la Graufesenque (serial no. 0000168) and on a Dr 29 from Colchester (Monteil 2008: vessel E6-E2048, EL222). The rosette with the same festoon is on a Dr 29 from Colchester whose style is attributed to T-1 (Dannell 1999: no. 549). The festoon with the poppyhead is found on stamped Dr 29s by Bassus ii-Coelus (K19, Taf 13 and Serial number 0000163 from Vienne). The wreath of trifid motifs is on a stamped Dr 29 from Rottweil (K52 Taf 58, Y) and on a bowl from Colchester attributed to the style of T-1 as stamped by Bassus ii-Coelus (Dannell 1999: no. 553). There is a possibility that this vessel is later and the work of Coelus ii when he worked alone. The rosette is on a Dr 29 stamped by Coelus ii from York? (serial no. 0000328) and the festoon with the poppyhead on a Dr 29 stamped by Coelus ii (serial no. 0000342). Coelus ii might have taken over some of the moulds used by Bassus i, or obtained his moulds from the same supplier (Polak 2000).

A.1.4 Dr 35

▸ 5. DPS99 Context 004, fill of Pit 005
A Dr 35 rim fragment, South Gaulish, La Graufesenque, AD 65–90.

▸ 6. DPS99 Context evaluation 014, pit fill
A Dr 35 cup rim, South Gaulish, La Graufesenque, *c* AD 65–90.

▸ 7. DPS99 Context 060, upper fill of Pit 061
Three South Gaulish sherds: one rim, one foot-ring fragment and one bodysherd. The rim is a Dr 35 cup and the other two sherds are also from cup(s) and probably the same vessel. *c* AD 65–90.

A.1.5 Dr 37

▸ 8. DPS99 Unstrat
A Dr 37 bodysherd, South Gaulish, La Graufesenque, decoration unattributable, *c* AD 70–85/90.

▸ 9. DPSE07 Context 018, lower fill of Pit 014
South Gaulish, Dr 37, one sherd.

The sherd is small and only part of the ovolo survived. The tongue is missing, which renders close identification impossible. AD 70–100.

▸ 10. DPSE07 Context 018, lower fill of Pit 014
South Gaulish, dish, one sherd.

South Gaulish, bowl, one sherd, possibly from the base of a Dr 37.

A.1.6 Unidentified forms

▸ 11. DPS99 Context 003, hollow containing iron-smelting debris

A South Gaulish samian dish bodysherd, La Graufesenque, AD 65–90.

▸ 12. DPS99 Context 008, rake-out from ovens
An eroded samian sherd, unidentifiable form, South Gaulish, La Graufesenque, AD 40–100.

▸ 13. DPSE07 Context 035, upper fill of foundation trench 034
South Gaulish, one very small chip.

APPENDIX 2: CATALOGUE OF ILLUSTRATED COARSE POTTERY VESSELS

A.2.1 Amphorae

▸ 1. DPS99, Unstrat, 'Service trench' (Illus 13:1)
Fabric A01. A single sherd representing approximately 20% of the rim. A similar form at Augst was found in contexts dated AD 70–110 (Martin-Kilcher 1987: no. 534).

▸ 2. DPS99, Context 010, upper fill of Pit 011 (Illus 13:2)
Fabric A01. Two joining sherds representing approximately 20% of the rim. Close parallels to this form in Martin-Kilcher's scheme occur in the period AD 70–110 (Beilage D, nos 64–71). A similar form of Dressel 20 rim has been found at the nearby legionary fortress of Inchtuthil, which was probably occupied from AD 83–86 (Darling 1985, no. 72).

A.2.2 Flagon

▸ 3. DPSE07, Context 004, topsoil (Illus 13:3)
Fabric O06. A rimsherd and three chips from a ring-necked flagon with a fairly straight, vertical neck. Lid?

▸ 4. DPS99, Context 007, base of oven C002 (Illus 13:4)
Fabric F01. A brown colour-coated bead-rimmed lid(?). M Darling and B Precious (pers comm) suggest that this is a Pompeian Redware 3 lid from Central Gaul. There are sherds from 10 vessels, including a lid, from Inchtuthil (Darling 1985: nos 67–71).

A.2.3 Mortaria

▸ 5. DPS99, Context 007, base of oven C002 (Illus 13:5)
Fabric M01. An oxidised mortarium with bead set well below flange. The fabric, together with the provenance, date and form, indicate manufacture in Scotland. We know little about the production of mortaria in 1st century Scotland except at Inchtuthil and Elginhaugh, but there is no doubt that it occurred. There is no parallel for this form in this period, but fortunately the context leaves no doubt of its Flavian date. Nevertheless, the form, given the fabric and context, fits well with Neronian-Flavian production in a military workshop not far from Doune. Variety of rim-profile, often unusual, and unusual fabric is, in fact, characteristic of mortaria made by the army in Britain, in the pre-Flavian and early Flavian periods. The workshops involved were small and served very local markets (eg Longthorpe, Metchley, Trent Vale, Exeter, Wroxeter, Usk, Inchtuthil and Elginhaugh).

▸ 6. DPS99, Context 008, rake-out from ovens (Illus 13:6)
Fabric M02. A Claudio-Neronian mortarium rim, AD 40–60, cf Strageath (Frere & Hartley 1989: no. 1). Other examples of these vessels occurring as heirlooms are known from Strageath, Camelon (Frere & Hartley 1989: no. 1), Binchester (Evans & Rátkai 2010: type M091.1), and York (Monaghan 1997: no. 3406).

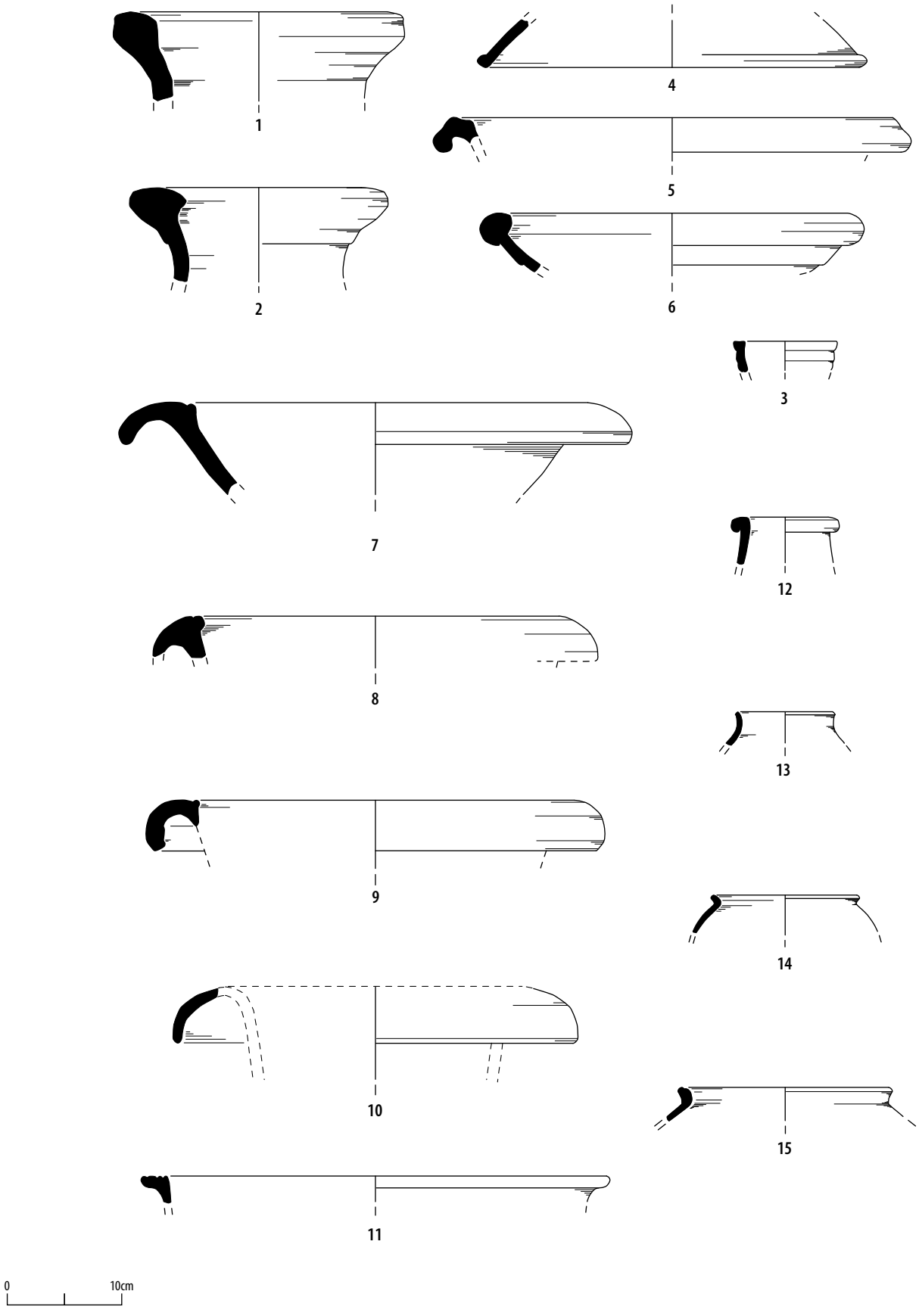
▸ 7. DPS99, Context 008, rake-out from ovens (Illus 13:7)
Fabric M02. A Gillam (1970) type 238 mortarium rim, from Noyon, Oise, AD 70–100.

▸ 8. DPS99, Context 060, upper fill of Pit 061 (Illus 13:8)
Fabric M03. A Verulamium region ware mortarium with evenly curving, down-pointing flange (incomplete). AD 60–90.

▸ 9. DPS99, Context 001, Unstrat (Illus 13:9)
Fabric M03. A burnt Verulamium region ware mortarium with evenly curving down-pointing flange. AD 60–90.

A.2.4 Bowls

▸ 10. DPS99, Context 060, upper fill of Pit 061 (Illus 13:10)
Fabric M04. A segmental bowl flange/or a mortarium flange. The form of the flange fragment and the fact that it becomes thinner at the point where it meets the normal bead would better fit a segmental bowl than a mortarium. There are, however, a very few mortaria which could be cited as parallels, notably an unpublished mortarium, stamped by one of the Sexti Valerii who worked at Colchester in the 1st century. The slight distal bead and the fabric would certainly fit with its



Illus 13 Pottery from 1999 and 2008 excavations. © Headland Archaeology (UK) Ltd

being a mortarium, but the form is exceptional for a mortarium, wherever it was made. The fabric would fit best with production at some such centre as the Aoste (Isère), but there is, as yet, no parallel there for this form. A date of AD 55–85 is indicated by the form and the similarity to mortaria made by one of the Sexti Valerii (Hartley 1999: 203, die as S110–111).

▸ 11. DPS99, Context 060, upper fill of Pit 061 (Illus 13:11)
Fabric O01. A reeded-rimmed bowl rim fragment, cf Inchtuthil (Darling 1985: no. 50), Flavian-Trajanic.

A.2.5 Jars

▸ 12. DPS99, Context evaluation 014, pit fill (Illus 13:12)
Fabric O01. A constricted-necked jar with a beaded, undercut rim, perhaps cf Strageath (Anderson 1989: no. 53).

▸ 13. DPS99, Context 004, fill of Pit 005 (Illus 13:13)
Fabric R01. A small jar with everted, rising rim.

▸ 14. DPS99, Context 010, upper fill of Pit 011 (Illus 13:14)
Fabric R01. A small globular jar, with short, everted rim, cf Inchtuthil (Darling 1985: nos 7–11), and Strageath (Anderson 1989: nos 39–45), Flavian.

▸ 15. DPS99, Context evaluation 005, intervallum road make-up (Illus 13:15)
Fabric R05. A jar with a short, fairly vertical, grooved rim and globular form, cf Strageath (Anderson 1989: no. 50) and Inchtuthil (Darling 1985: nos 7–9), Flavian.

APPENDIX 3: FABRIC DESCRIPTIONS

Table 5 Fabric descriptions

Fabric	Description
F01	A colour-coated fabric with buff-orange core and margins, with a thin reddish-brown slip. The fabric has abundant fine gold and silver mica *c* 0.1–0.2mm. Possibly Pompeian Redware 3, Central Gaul.
F02	A colour-coated roughcast fabric, probably Cologne. A hard, white, 'clean' fabric with white clay pellet roughcasting, with a brown, rather metallic, slip. Anderson (1981: 327–30) would suggest a date range of AD 80–180/190 for this.
M01	An oxidised mortarium fabric with blue-grey core and orange margins and surfaces, with some/common sand *c* 0.2–0.4mm and very occasional sub-rounded white quartz *c* 1–3mm and very occasional sub-rounded igneous rock inclusions. Geological note by Dr G Gaunt (pers comm): The best indicator of likely provenance on geological grounds is the coarse-grained micro-conglomeratic sandstone, supported by the fine to medium grained sandstone. These occur in the following Devonian outcrop regions: 1) South-east Wales and Welsh borders, the region within the Brecon – Caerleon – Hereford – Bridgnorth areas. 2) Northern and southern bordering areas of the Scottish 'Midland Valley', ie a) north side – from just north of Cardross on the Clyde estuary, north-eastwards past Callander, Doune, Crieff and Perth to the North Sea between Carnoustie and Stonehaven b) south side – the Maybole area in Ayrshire, a narrow belt from just north-east of New Cumnock north-eastwards via Crawfordjohn and Roberton to Wiston, the Dolphinton–Carlops area, and the small area around Coldingham south of St Abbs Head.
M02	A buff mortarium fabric with some fine sand temper *c* 0.2mm and occasional coarse sand *c* 0.3–0.5mm. Source: NE France, Noyon, Oise.
M03	Verulamium region mortaria; white core, margins and surfaces, with abundant moderate-coarse sand temper *c* 0.3–0.5mm. Trituration grits; angular grey and white flint.
M04	A whiteware with white core, margins and surfaces, with occasional sand *c* 0.2–0.5mm, occasional red ironstone *c* 0.2–1mm, and occasional rounded white clay pellets *c* 4mm. Either a whiteware or a mortarium, possibly Central Gaul.
O01	An oxidised fabric, soft, 'soapy' with orange core, margins and orange to orange-yellow surfaces, 'clean', with some voids *c* 0.5–3mm, possibly for vegetable temper.
O02	An oxidised fabric, fairly hard, with orange core, margins and surfaces, 'soapy' and 'clean' with no visible temper.
O03	An oxidised fabric with orange core, margins and surfaces, with common moderate sand temper *c* 0.3mm.
O04	An oxidised fabric with orange-brown core, margins and surfaces, with common fine sand *c* 0.05–0.1mm.
O05	An oxidised fabric with orange-brown core, margins and surfaces with common very fine silver mica, and occasional rounded brown ironstone *c* 0.5–2mm, and very occasional sand *c* 0.2mm.
O06	An oxidised fabric with orange-brown core, margins and surfaces with some sand temper *c* 0.3–0.5mm.

Table 5 *cont*

Fabric	Description
Q01	An oxidised flagon fabric with a thick white slip, fabric has an orange core and margins with some sand *c* 0.05–0.1mm.
R01	A reduced fabric with black core, grey or black margins, and brown or black surfaces, with occasional sand *c* 0.1–0.2mm and very common very fine silver mica.
R02	A greyware with a grey core, sometimes orange margins, and grey surfaces, with common coarse angular translucent sand *c* 0.3–0.5mm.
R03	A reduced, handmade fabric with grey-brown core and margins and black-grey surfaces, 'soapy', 'clean' with some very fine silver mica, some brown ironstone *c* 0.5–2mm and occasional large carbonised inclusion *c* 5mm.
R04	A reduced fabric with dark, blue-grey core, sometimes orange margins and dark grey surfaces, with occasional rounded translucent sand *c* 0.3–0.5mm and occasional organic voids and carbonised inclusions *c* 0.5–2mm.
R05	A reduced fabric with blue-grey core and mid-grey margins and surfaces, fairly 'clean' with occasional-some moderate sand temper *c* 0.3mm.
S10	South Gaulish, La Graufesenque, samian ware.
W01	A whiteware with a buff-white core, margins and surfaces with common fine sand *c* 0.1–0.2mm.
W02	A buff whiteware with buff-white core, margins and surfaces with some fine sand *c* 0.1–0.2mm.
W03	A buff whiteware with white core and pinkish-white margins and surfaces, 'soapy' with occasional sand *c* 0.2mm and occasional rounded clay pellet(?) *c* 2mm.

APPENDIX 4: CATALOGUE OF SLING SHOTS

A.4.1 1999 excavation

▸ A complete reduced fired clay sling shot. L: 34mm; Diam: 31mm; W: 25g. Unstratified (Illus 9:1).

▸ A slightly damaged fired clay sling shot, core reduced, surfaces oxidised. Diam: 30mm; W: 25g. Unstratified.

▸ A slightly damaged fired clay sling shot, core reduced, surfaces oxidised. L: 34mm; Diam: 27mm; W: 15g. Unstratified (Illus 9:3).

▸ A slightly damaged fired clay sling shot, core reduced, surfaces oxidised. L: 41mm; Diam: 33mm; W: 36g. Unstratified (Illus 9:4).

▸ A slightly damaged fired clay sling shot, core reduced, surfaces oxidised. L: 39mm; Diam: 29mm; W: 23g. Unstratified.

▸ About two-thirds of a fired clay sling shot, core reduced, surfaces oxidised. L: 32mm; Diam: 28mm. Unstratified.

▸ About half of a fired clay sling shot, core reduced, surfaces oxidised. L: 33mm; Diam: 30mm. Unstratified.

▸ About half of a fired clay sling shot, core reduced, surfaces oxidised. L: 36mm; Diam: 29mm. Unstratified.

A.4.2 2008 excavation

▸ A complete biconical sling shot, surfaces oxidised. L: 41mm; Diam: 26mm; W: 20g. C010, upper fill of foundation trench 006, Building 5.

▸ A complete biconical sling shot of much more squat circular form than the others, surfaces oxidised. L: 29mm; Diam: 34mm; W: 39g. C005, layer overlying Building 5.

Table 6 Composition of plant remains from Doune Primary School: Buildings 1–6

	Building 1					Building 2	Building 3	Building 5					Building 6
Context no.	004	005	010	053	056	042	094	005	009	010	012	017	035	021
Sample no.	–	–	–	–	–	–	–	1	13	12	8	14	6	24
Orig vol (litres)	20	10	10	10	10	10	10	30	10	20	10	10	10	10
Latin name	Plant part	Common name												
Wild taxa														
Corylus avellana L	nutshell	hazel											2	
Ranunculus sp cf *R sardous*	achene	hairy buttercup									1			
Ranunculus acris/ repens	achene	meadow/ creeping buttercup			1		39							
Chenopodiaceae indet	seed	fat hen family					2							
Chenopodium sp cf *C album*	seed	fat hen									1			
Spergula arvensis L	seed	corn spurrey		1										
Persicaria lapithifolia	achene	pale persicaria					12							
Rumex spp	achene	dock					19							
Rumex acetosella agg	achene	sheep's sorrel					4							
Sinapis sp	fruit	mustards						1		1			1	1
Raphanus raphinistrum L	siliqua	wild radish					2							
Potentilla sp cf *P erecta*	achene	cinquefoil					1							

Table 6 *cont*

	Building 1					Building 2	Building 3	Building 5						Building 6
Context no.	004	005	010	053	056	042	094	005	009	010	012	017	035	021
Sample no.	–	–	–	–	–	–	–	1	13	12	8	14	6	24
Orig vol (litres)	20	10	10	10	10	10	10	30	10	20	10	10	10	10

Latin name	Plant part	Common name													
Vicia hirsuta	fruit	hairy tare												1	
Trifolium repens L	fruit	white clover					2								
Plantago lanceolata L	seed	ribwort					71							1	
Carex sp cf *C lasiocarpa*	nutlet	slender sedge						1							
Carex sp cf *C acutiformis*	nutlet	lesser pond-sedge												2	
Juncus/Poaceae sp	culm	rush/grass					10								
Poaceae indet (large)	caryopsis	large-grained grass					6								
Poaceae indet (medium)	caryopsis	medium-grained grass					9	2							
Poaceae indet (small)	caryopsis	small-grained grass				1	180								
Bromus/ Brachypodium sp	caryopsis	brome/ false-brome			1	1	5								
Poa spp	caryopsis	meadow grass					3								
Sieglingia decumbens (L) Bernh	caryopsis	heath grass				1	2								
Indeterminate	seed	indeterminate			2										

Table 6 *cont*

	Building 1					Building 2	Building 3	Building 5						Building 6
Context no.	004	005	010	053	056	042	094	005	009	010	012	017	035	021
Sample no.	–	–	–	–	–	–	–	1	13	12	8	14	6	24
Orig vol (litres)	20	10	10	10	10	10	10	30	10	20	10	10	10	10
Latin name	**Plant part**	**Common name**												
Cereals														
Avena sp	caryopsis	oat	2		2	1		34	2	1	4	1			
cf *Avena* sp	caryopsis	oat						7							
Hordeum vulgare indet	caryopsis	barley indet	42	11	5		2	559							
cf *Hordeum vulgare* indet	caryopsis	barley indet	2	5				2	32						
Hordeum vulgare var *nudum*	caryopsis	naked barley											1	1	
Hordeum vulgare (hulled)	caryopsis	hulled barley	71	24	22	21	6	1	1250					6	
Hordeum vulgare L (hulled – straight)	caryopsis	hulled barley							25	19	1	19	3	17	1
Hordeum vulgare L (hulled – twisted)	caryopsis	hulled barley			1					19		5		6	
Hordeum vulgare indet	rachis internodes	barley indet							1						
Triticum sp	caryopsis	wheat	6	3					48						
cf *Triticum* sp	caryopsis	wheat	2						20						
Triticum aestivo-compactum	caryopsis	bread/club wheat								14		9		10	
Triticum dicoccum	caryopsis	emmer wheat								4		9		1	1

Table 6 *cont*

	Building 1					Building 2	Building 3	Building 5						Building 6
Context no.	004	005	010	053	056	042	094	005	009	010	012	017	035	021
Sample no.	–	–	–	–	–	–	–	1	13	12	8	14	6	24
Orig vol (litres)	20	10	10	10	10	10	10	30	10	20	10	10	10	10

Latin name	Plant part	Common name													
Triticum spelta L	caryopsis	spelt wheat	6	4		1		1	27	85		33			33	
Triticum cf *spelta*	caryopsis	spelt wheat		3					12							
Triticum cf *spelta*	chaff fragments	spelt wheat							1							
Triticum sp	chaff fragments	wheat							2							
Cereal indet	caryopsis	cereal indet	11		1	3				66		27			28	
Straw	culm nodes									1						1

Type	Percentages													
Cereals	100	100	88	87	100	100	84	98	100	99	57	100	94	50
Wild taxa	0	0	12	13	0	0	16	2	0	1	43	0	6	50
Chaff fragments	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0
Wheat	10	20	0	4	0	25	5	49	0	48	0	50	43	0
Barley	81	80	91	80	100	75	93	18	50	23	75	50	30	100
Oat	1	0	6	4	0	0	2	1	50	4	25	0	0	0
Indet	8	0	3	12	0	0	0	32	0	25	0	0	27	0
No. of cereals per litre	7.1	5.0	3.1	2.6	0.8	0.4	201.5	7.0	0.2	5.3	0.4	0.2	10.2	0.1

Table 7 Composition of plant remains from Doune Primary School: other contexts

	Possible structure	Pit 14 fill		Pit 29 fill				Pit 47 fill	Pit 90 fill	Oven fills		Oven rake-out	Furnace base	Fill of defensive ditch
Context no.	106	015	018	028	044	044	045	046	091	012	023	008	003	122
Sample no.	–	4	5	21	19	22	20	–	–	–	–	–	–	–
Orig vol (litres)	10	10	10	10	10	10	10	10	10	10	10	80	40	30
Latin name	Plant part	Common name													
Wild taxa															
Corylus avellana L	nutshell	hazel			3										
Ranunculus sp	achene	buttercup/ crowfoot								2					
Ranunuculus sp cf *R sardous*	achene	hairy buttercup			8	2	15	2							
Ranunculus acris/ repens	achene	meadow/ creeping buttercup							1					1	
Fumaria sp	achene	fumitories		1											
Urtica dioica	fruit	common nettle				1									
Chenopodiaceae indet	seed	fat hen family													3
Chenopodium sp cf *C album*	seed	fat hen		1											
Stellaria sp cf *S media*	seed	chickweed				1								1	
Persicaria lapithifolia	achene	pale persicaria	1					1							
Polygonum aviculare	achene	knotgrass		1											
Polygonum spp	achene	knotgrass	1							2		1	1		
Rumex spp	achene	dock	1						1	1					
Rumex acetosella agg	achene	sheep's sorrel			1	1									
Viola sp	fruit	violets			2										
Sinapis sp	fruit	mustards					5								

Table 7 *cont*

	Possible structure	Pit 14 fill		Pit 29 fill				Pit 47 fill	Pit 90 fill	Oven fills		Oven rake-out	Furnace base	Fill of defensive ditch
Context no.	106	015	018	028	044	044	045	046	091	012	023	008	003	122
Sample no.	–	4	5	21	19	22	20	–	–	–	–	–	–	–
Orig vol (litres)	10	10	10	10	10	10	10	10	10	10	10	80	40	30
Latin name	Plant part	Common name													
Brassica/Raphunus sp	fruit	black mustard/ wild radish										1		
Raphanus raphinistrum L	siliqua	wild radish	2											
Potentilla sp cf *P erecta*	achene	cinquefoil				1		3						
cf *Vicia* sp	fruit	vetches		1										
Vicia hirsuta	fruit	hairy tare			1		1							
cf *Lythrum hyssopifolia*	fruit	grass-poly						1						
Galeopsis sp	fruit	hemp-nettle	5											2
Plantago lanceolata L	seed	ribwort		1	3		8	1	1					
Chrysanthemum segetum	achene	corn marigold				1								
cf *Luzula* sp	nutlet	wood-rushes				1								
Luzula sp cf *L sylvatica*	nutlet	great wood-rush			2									
Eleocharis sp cf *E palustris*	nutlet	common spike-rush				1	5	1						
Schoenoplectus sp	nutlet	club-rushes						1						
Carex sp indet	nutlet	sedge						1		40				
Carex sp cf *C echinata*	nutlet	star sedge				1		1						

Table 7 *cont*

	Possible structure	Pit 14 fill		Pit 29 fill				Pit 47 fill	Pit 90 fill	Oven fills		Oven rake-out	Furnace base	Fill of defensive ditch
Context no.	106	015	018	028	044	044	045	046	091	012	023	008	003	122
Sample no.	–	4	5	21	19	22	20	–	–	–	–	–	–	–
Orig vol (litres)	10	10	10	10	10	10	10	10	10	10	10	80	40	30
Latin name	Plant part	Common name													
Carex sp cf *C elongata*	nutlet	elongated sedge				1									
Carex sp cf *C curta*	nutlet	white sedge			1										
Carex sp cf *C lasiocarpa*	nutlet	slender sedge				1	1								
Carex sp cf *C pseudocyperus*	nutlet	cyperus sedge						1							
Carex sp cf *C flava*	nutlet	large yellow-sedge		1		1	3								
Carex sp cf *C filiformis*	nutlet	downy-fruited sedge			3										
Juncus/Poaceae sp	culm	rush/ grass													10
Poaceae indet (medium)	caryopsis	medium-grained grass	2	1		8	6	9	1	1			1		
Poaceae indet (small)	caryopsis	small-grained grass		1	5	4	6	2							
Bromus/ Brachypodium sp	caryopsis	brome/ false-brome	1	2			2								
Sieglingia decumbens (L) Bernh	caryopsis	heath grass										1			
Indeterminate	seed	indeterminate	1							5					
Cereals															
Avena sp	caryopsis	oat	297	4	3	2	3		6				1		
cf *Avena* sp	caryopsis	oat	46												

Table 7 *cont*

	Possible structure	Pit 14 fill		Pit 29 fill				Pit 47 fill	Pit 90 fill	Oven fills		Oven rake-out	Furnace base	Fill of defensive ditch
Context no.	106	015	018	028	044	044	045	046	091	012	023	008	003	122
Sample no.	–	4	5	21	19	22	20	–	–	–	–	–	–	–
Orig vol (litres)	10	10	10	10	10	10	10	10	10	10	10	80	40	30
Latin name	Plant part	Common name													
Hordeum vulgare indet	caryopsis	barley indet	116						32		32		9	71	
cf *Hordeum vulgare* indet	caryopsis	barley indet	7						2		6			14	
Hordeum vulgare (hulled)	caryopsis	hulled barley	69						97		70		8	36	
Hordeum vulgare L (hulled – straight)	caryopsis	hulled barley	1	18	4	21	12	40	7	1		2			
Hordeum vulgare L (hulled – twisted)	caryopsis	hulled barley		13	1	5	5	8		3					
Hordeum vulgare indet	rachis internodes	barley indet	1												
Triticum sp	caryopsis	wheat									18		1		
Triticum aestivo-compactum	caryopsis	bread/ club wheat		27	6	4	1	2	1						
Triticum dicoccum	caryopsis	emmer wheat		9	1		1								
Triticum spelta L	caryopsis	spelt wheat		127	59	6	17	3	2			16			
Triticum cf *spelta*	caryopsis	spelt wheat								1	2				
Cereal indet	caryopsis	cereal indet	16	118	41	16	18	12	7	3	1	22	1	3	39	
Straw	culm nodes				1		2		1							1

Table 7 *cont*

	Possible structure	Pit 14 fill		Pit 29 fill				Pit 47 fill	Pit 90 fill	Oven fills		Oven rake-out	Furnace base	Fill of defensive ditch
Context no.	106	015	018	028	044	044	045	046	091	012	023	008	003	122
Sample no.	–	4	5	21	19	22	20	–	–	–	–	–	–	–
Orig vol (litres)	10	10	10	10	10	10	10	10	10	10	10	80	40	30
Type	Percentages													
Cereals	97	97	100	64	69	57	41	97	100	77	100	87	98	0
Wild taxa	3	3	0	36	31	43	59	3	0	23	0	13	2	0
Chaff fragments	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	0	52	57	20	34	7	18	0	50	22	0	5	0	0
Barley	35	10	4	50	17	71	41	93	0	66	0	81	75	0
Oat	62	1	3	0	4	4	0	4	0	0	0	0	1	0
Indet	3	37	36	30	32	18	41	3	50	13	100	14	24	0
No. of cereals per litre	55.3	31.6	1.2	5.2	5.6	6.8	1.7	14.8	0.2	16.8	0.1	0.2	4	0

APPENDIX 6: COMPOSITION OF THE CHARCOAL FROM DOUNE PRIMARY SCHOOL

Table 8 Composition of the charcoal from Doune Primary School, 1999 excavation samples (+ = rare; ++ = occasional; +++ = common; ++++ = abundant; ~ = only very small fragments of charcoal, not large enough for charcoal identifications; cf = tentative identifications)

Feature	Context no.	*Alnus* (alder)	*Betula* (birch)	*Corylus* (hazel)	*Quercus* (oak)	*Rosaceae* indet (plum/rowan)	*Salix* (willow)	Comments
Building 1	005				+			
	010			++	+			
	053	+		+	+	+	cf +	
	056	+		+	+			
Building 2	042			+	+	cf +		
Building 3	094			++	+			
Possible structure	106	++	cf +	+	+	cf +		
Pit fill	004	+		+	+		+	
	046				+			
	065	+		+	+			
	089		+			+		
	091			cf +	+			
	101				+		cf +	
Post hole	031			cf +				
	063				+			
Oven fill	002	~	~	~	~	~	~	~
	006			+	+	+		
	012	~	~	~	~	~	~	
	018			+	+			
	023			+	+			
Oven rake-out	008	+		++	++		+	Bark + Cinders +
	029			++	+	+		Bark +
Furnace base	003	cf +		+	++++	+	+	
Clay fill	058	~	~	~	~	~	~	~
Ditch fill	122	~	~	~	~	~	~	~
	124	~	~	~	~	~	~	~
	126	~	~	~	~	~	~	~

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