

Romans in Ravenglass

Community Archaeology Project

Excavation Report 2013-15

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NON-TECHNICAL SUMMARY

This report presents the results of a community archaeology project 'Romans in Ravenglass', undertaken during two field seasons in autumn 2013 and 2014. The project was funded by the Heritage Lottery Fund, the Copeland Community Fund and Historic England, and was project managed by the Lake District National Park Authority's Strategy and Partnership team. The project comprised a programme of excavation, fieldwalking and geophysical survey at Ravenglass Roman fort and *vicus*. The fieldwork was supervised by archaeologists from York Archaeological Trust and its regional offices, ArchHeritage, Trent and Peak Archaeology, Northlight Heritage and the Dickson Laboratory for Bio-Archaeology.

Geophysical survey was undertaken across the site of the *vicus* and fort by GSB in 2013, with volunteer assistance. This demonstrated the presence and layout of buildings within the fort, as well as probable roads leading out to the north, south and east. Structures and anomalies associated with the *vicus* were recorded in the fields to the east and north-east of the fort. The excavation of three trial trenches in 2013 and 2014 confirmed the presence of buildings and activity associated with the *vicus*, primarily in the form of large timber buildings and evidence for industrial activity. Iron-working waste was noted in levelling deposits associated with the east-west road, though no *in situ* smithing activity was identified. The evidence for high-temperature activities in Trenches 2 and 3 appears to be industrial rather than domestic in nature, but the type of industry represented is unclear.

Domestic artefacts from the excavations suggest that the occupants of the *vicus* were not of a high status, but they had a clear preference for distinctly Roman pottery types, suggesting that they were keen to adopt a Roman lifestyle. The presence of pottery from the Midlands and southern England, as well as amphorae and samian from Europe, indicate that the settlement was tied into wider Roman trading routes via the fort, its garrison and port. It is possible that glass was recycled on the site, leading to a very fragmentary glass assemblage, and a few fragments of probable glass-making waste were also found. Occupation within the *vicus* appears to have commenced around AD150 and ended around AD300.

The 2013-2014 excavations and surveys have demonstrated that the Ravenglass *vicus* has significant archaeological potential. The investigation of the *vici* in the Hadrian's Wall area has been recognised as a priority, as research into these settlements lags behind the study of the associated forts. The Ravenglass site has the potential to contribute greatly to this research.

1 INTRODUCTION

1.1 Archaeological and historical background

Ravenglass lies on the Cumbrian coast, 30km north-west of Barrow-in-Furness and 20km south-east of Whitehaven. The modern village is situated between the Rivers Esk and Mite, at the point where the rivers breach a band of coastal sand dunes to reach the Irish Sea. The Roman fort lies some 500m south of the village (National Grid Reference SD 087 959), on low cliffs overlooking the River Esk (Fig. 2). To the east, a gentle slope leads to low hills below Muncaster Fell.

Roman Ravenglass is best known from the impressive standing remains of a Roman bath-house adjacent to the fort, known as Walls Castle. Excavations in 1881 revealed the full layout of the bath-house, and the upstanding remains were surveyed in the early 1980s (Brann 1985, 81-5). The fort was first identified during the construction of the Barrow to Carlisle railway in 1850 and investigations took place there during 1885-6. The only archaeological excavation of the fort using modern excavation and recording techniques took place during 1976-8 (Potter 1979) and was restricted to the west end. An earthwork survey of the fort was carried out in 1998 (Blood and Pearson 2004), but the layout and even the orientation of buildings inside the fort remains a matter of conjecture. Finds of Roman material north of the fort by the local archaeologist Mary Fair earlier in the 20th century suggested the presence of an associated *vicus* or civilian settlement (CWAAS 1925, 374-5; Fair 1948). In recent years, local archaeologists have noted archaeological deposits and finds eroding out of the western side of the fort.

The remains of
the Roman
bathhouse



The significance of Roman Ravenglass has been considered several times in the past (notably Collingwood 1928; Birley 1958; Potter 1979; Bidwell and Hodgson 2009),

therefore it is only summarised here. It has been conjectured that Ravenglass had been used as a harbour prior to the Roman period, perhaps for trade with Ireland as well as along the Cumbrian coast, although archaeological evidence for such a port is lacking. The presence of a harbour, if not a port, could explain the siting of a Roman fortlet there about AD120; Hardknott fort dates to about the same time, pointing to control of a route from the Lake District to Ravenglass for trading and/or strategic purposes (Fig. 1).

A fort replaced an earlier fortlet in about AD130; it was a standard cohort fort (for about 500 soldiers) and remained in use until the end of the formal Roman period. The turf and timber defences were rebuilt in stone around AD200, whereas the infantry barrack blocks that appear to have occupied the west end of the fort were built of timber throughout the Roman period (Potter 1979).

The site has long been identified as *Glannoventa* on documentary evidence (Rivet and Smith 1981, 367). However, the alternative name of *Itunocelum* has recently been proposed, following discoveries of a lead sealing at the fort and a bronze diploma (veteran discharge record) dating to AD158 on the shore below the fort (Holder 1997; 1998, 254-5). These finds suggest that the unit stationed at Ravenglass was Cohort I *Aelia Classica*, and there is documentary evidence that this unit was stationed at *Itunocelum* towards the end of the Roman period (Bidwell and Hodgson 2009, 118f). One possible solution to this conundrum is that Ravenglass was indeed called *Glannoventa* and the attested unit was stationed there before moving to *Itunocelum* later in the Roman period.

1.2 The project

The likely presence of *vicus* buildings to the east of the fort was first demonstrated in a geophysical survey in 2010, as part of a student project. This survey identified probable buildings lining a road north of the fort, probable buildings north-east of the fort, and various features immediately east of the fort (Kaspar 2011). The Lake District National Park Authority (LDNPA applied for funding to both the Heritage Lottery Fund and the Copeland Community Fund) for a two-year community archaeology project, Additional funding was also provided by English Heritage (now Historic England).

The fieldwork took place over two four-week seasons in the autumn of 2013 and 2014. The project was managed by ArchHeritage, which is part of the York Archaeological Trust. All four regional offices of the Trust took part in the project, giving community volunteers training in excavation and recording techniques, earthwork survey, fieldwalking, finds processing and environmental sampling. Geophysical Surveys of Bradford (GSB) undertook new geophysical surveys well as providing training to the volunteers. Over 100 volunteers participated in the project, most hailing from the Ravenglass area and the wider Lake District. Minerva Heritage were employed as consultants to deliver a programme of outreach. This included organising excavation open days, school visits and producing non-specialist interpretative material for the project.

An interim report on the 2013 season of fieldwork was compiled (Hunter-Mann 2014) and a more detailed assessment report on the results of both seasons was produced (Hunter-Mann 2015). GSB reported on the results of the geophysical surveys (Adcock 2013).

The project archive will be held by the landowners at Muncaster Castle, with the archive Accession Code: YORAT:2013.1.

1.2.1 *Aims*

The aims of the project as stated in the Heritage Lottery Fund and Copeland Community Fund applications were:

- 1 To undertake a community-led archaeological investigation of Ravenglass Roman Fort and its surrounding civilian settlement;
- 2 To promote opportunities for the discovery and understanding of the local Roman heritage and how it fits into the wider Roman context including Hadrian's Wall;
- 3 Provide the community with new information and skills to assist in the management of its local heritage;
- 4 To deliver activities and events as part of a programme of access for all, to include finds identification workshops, artefact handling sessions, events for local schools, presentations and talks;
- 5 Produce non-specialist interpretative material such as a new on-site panel, web-based information and a booklet or leaflet for the benefit of the wider community

1.2.2 *Excavation*

The excavations concentrated on the area that was subject to geophysical survey in 2010. As the 2010 geophysics evidence suggested there were three discrete areas of archaeological features, each area was investigated by a trial trench (Fig. 3, Trenches 1-3). These trenches, each 25m long by 4m wide, were excavated during both seasons. An additional trench measuring 20m by 2m wide was opened up in 2014 to provide an opportunity for more school children to experience archaeological excavation at first hand (Fig. 3, Trench 4). The overall area excavated was therefore a total of 340 square metres.

Most of the excavation and recording was carried out by the volunteers, under staff supervision throughout. The YAT 'single context recording system' was used to form the written and drawn record. A member of YAT staff supervised each trench, and a Finds Officer oversaw the artefact processing as well as providing training in washing, packaging and cataloguing archaeological assemblages.

All three main trenches encountered much greater depths of archaeological deposits than expected, and it was not possible to fully excavate them. Undisturbed natural deposits were reached at the north end of Trench 2 and in parts of Trench 3. The north end of Trench 1 was largely unexcavated, as it appeared to contain a long sequence of levelling and alluvial deposits. At a certain point most of the trenches were stepped in and excavation was confined to the middle 2m along their length, in order to focus efforts and to ease movement into and out of the trenches.

2013 team at
the end of a
hard season's
work



1.2.3 *Fieldwalking*

Fieldwalking involved walking over the beach below the fort in order to recover finds which had eroded from the exposed cliff-face sections. A grid of 20m squares was established, and artefacts collected within each square were labelled with the appropriate grid coordinate. A study of archaeological features exposed through erosion of the cliffs in the vicinity of the fort was also carried out. Earthwork surveying was carried out in the fields east of the fort, and possible Roman landscape features on the higher ground in Decoy Wood further east were investigated and located using a hand-held GPS.

1.2.4 *Geophysical survey*

The geophysical survey took place in 2013. Some 35 hectares were subject to magnetic survey, extending the 2010 survey to the north, east and south and

including the fort and bath-house (Fig. 3). In addition, resistivity survey was carried on about 5 hectares of land within the area of magnetic survey (Adcock 2013).

1.2.5 Outreach

Six official open days were held throughout the project, organised by Minerva Heritage and the LDNPA. Each of the open days consisted of a range of activities including excavation, mosaic making, finds handling, treasure hunt, display of finds, guided site tours and finds identification by the Portable Antiquities Scheme. During these open days just over 800 people visited the site.



Object display
from the
Portable
Antiquities
Scheme

Each fieldwork season also invited groups of local school children to get involved in the Romans in Ravenglass project, again these were organised by Minerva Heritage. Schools had a session in a classroom where they gained an understanding of Roman history with focus on Romans who lived in Ravenglass. Schools then visited and took part in an on-site session which consisted of a tour around Roman Ravenglass (including the bath house) and a mixture of on-site activities including finds handling, finds washing and excavation.

In 2014 a fourth trench was opened to provide further excavation opportunities to school and other groups, and to visitors on the open days. An additional member of YAT staff assisted with the training in Trench 4 during the open days.

Two short films, one for each season, were also made, by DX Films. These covered all the activities, including the post-excavation. The films are available to view online on the LDNPA website.

1.2.6 Visitors

The site was open to visitors throughout both seasons. Visitors were shown around the excavations and finds displays. The guiding was carried mostly by volunteers. Towards the end of each day, visitors and volunteers were given a guided tour of the excavation by the site director and trench supervisors, culminating in a presentation by the finds officer.



A site Open Day

2 RESULTS

2.1 Geophysical survey

The survey areas are shown on Fig. 3, with greyscale data in Figs. 12-13, interpretations on Figs. 14-15 and a topographic model of the *vicus* with greyscale data in Fig. 16.

2.1.1 *The fort and bath-house (Area 8)*

The surveys have produced a complex of geophysical responses and their interpretation, in specific archaeological terms, is not easy; there are several complicating factors. These include the build-up over a four-century period of multi-phased archaeological features within the fort and also the effect of past landscaping upon the site (until recently the field was afforested). Even past archaeological excavations have found the complex stratigraphy difficult to unpick and trying to carry out a similar exercise based on geophysical responses is, in places, impossible; the density of features has resulted in differing magnetic anomalies that ‘interact’ with each other creating a profusion of magnetic anomalies of ‘distorted’ shapes and strengths throughout much of the fort. Phases of burning, abandonment and rebuilding on top of buried or flattened foundations, add to the overall magnetic levels and in such circumstances it is impossible to identify small features such as pits and larger gullies, let alone post holes or beam slots. Unfortunately, burnt bricks *in situ* can result in positive magnetic anomalies that might normally be associated with cut features, like ditches.

Despite these complications, the results clearly indicate the survival of several main components of the fort such as the clearly defined sections of the eastern and northern ramparts with a potential intervallum road [R1] flanking them. Even though specific rooms or details may remain undecipherable, the footprints of barrack blocks [M1] and the roads between them [R2], the *principia* and other large buildings [M2, R3], including possibly granaries, are discernible. It has to be said that the interpretation is aided in part due to the classic ‘playing card’ arrangement of a fort.

There is a profusion of negative magnetic anomalies visible in the results within the fort. Many of these are simply a component of the overall magnetic response; archaeological features such as pits and ditches tend to result in a positive anomaly, with a much smaller, not always visible, negative anomaly to the north. Stronger positive anomalies result in stronger negatives; for example, with a ferrous pipeline, dipole anomalies are often visible along its length, usually at joints (as is the case in the fields outside of the fort – see next section). However, some archaeological features can result in ‘genuine’ negative responses and this is the case within the fort. Building foundations made of non-magnetic stones will stand out as having a lack of magnetic enhancement compared with the magnetically-enriched deposits that build up alongside them; consequently they appear as ‘negative’ responses. Many wall lines are visible in the barrack blocks and in the large buildings to the west.

Near the centre of the fort is a large anomaly [M3, R4] which looks like an enclosure with two ditches (or a wall line with magnetic material either side). Whatever the actual interpretation, the feature seems to sit on a slightly different alignment from the main fort ditches. The results could indicate the early Hadrianic fortlet dating from AD120s which existed prior to the construction of the fort itself.

Around the standing remains of the Bath House the magnetic response is very strong and without detail. This is likely to be the combined effect of the magnetic field of the standing remains, the surrounding metal fences and the buried remnants of fired materials (i.e. tile) and possibly underfloor heating systems. The resistance data are somewhat curious – there are clearly defined linear bands of high resistance, sitting on an altered alignment with respect to the standing walls. This increase in resistance must be a result of archaeological materials forming floors and foundations which have been affected by historic investigations.

2.1.2 *The vicus and beyond – east (Areas 3-6)*

Outside of the military defences there are numerous responses associated with the *vicus*. There are traces of at least two roads north-east of the fort and the limits of peripheral settlement are defined by a marked decrease in magnetic responses. Once again the complexity of the archaeology is resulting in a plethora of anomalies and this time the added complicating factor is due to the action of agriculture over the centuries since the *vicus* was abandoned. Part of the area had already been surveyed magnetically (Kaspar 2011) and the earlier results largely concur with those from the present survey. These results have been included and overlap the present survey, crucially filling-in the southwest corner of Area 4 which was too wet and overgrown with rushes to survey in September 2013.

Looking at the southern half of Area 4 first (and resistance Area iv), there is a short length of road [M4, R5] with intense magnetic responses flanking it, extending out from the north-east corner of the fort. The pattern of response is typical of a metallised surface (hence the high resistance) with road-side settlement and possible industrial activity (suggested by the magnetic anomalies). Why it should enter the corner of the fort is unclear but this would explain the unusual shape of the ramparts here, as indicated on the digital mapping provided and the topographic data collected.

There is no obvious road visible directly out of where one would traditionally expect the eastern gate, but there are clusters of responses indicating former settlement right across this zone, most notable in the magnetic data, with the contrast between potential archaeological features and the ‘background’ resistance having been suppressed by the wet weather. Despite this resistance anomalies either side of the two trenches appeared to correlate well with features being uncovered at the time of survey.

At first glance there appears to be little in the way of a formal layout to the responses east of the fort; that said, there is a slight perpendicular trend to the stronger magnetic anomalies with the axes being north-north-east and east-south-east. Whilst

this does not match the alignment of the fort or the aforementioned road [M4], it is similar to the line of a section of old field boundary [M5] which aligns with parallel linear responses [M6] (possibly road-side ditches). At the time of survey [M5] was highlighted as an unusual negative linear response and it was only at the report stage when comparisons were made with 1st Edition Ordnance Survey maps that it was revealed to be the position of a former field division. However, the response character is different from the bulk of other field boundaries highlighted in the data which appear either far less clearly or as a positive response. The negative nature of [M5] implies a stone feature and it has been suggested (Hunter-Mann, pers. comm.) that this could be a road that might turn to head down the coast, with the lie of the ground due south of the fort necessitating a south-easterly exit. Indeed, the high resistance linear anomaly [R6] in the southernmost corner of the survey area is consistent with a road, being more like [R5] and [R8] (see below). It is possible that this potential road remained as an earthwork feature in the landscape which was respected by subsequent field boundaries.

There is a marked but irregular fall-off in magnetic enhancement some 100m-130m from the fort's eastern rampart, which probably indicates the extent of the settlement. Beyond this there is evidence for ploughing, drains, old field boundaries and potentially ridge and furrow cultivation as well as a couple of pipelines. There are a few trends and several uncertain anomalies, but little of obvious interest. The one exception is a cluster of isolated very strong magnetic responses [M7] which could indicate small-scale industrial activity; there are few reasons to suspect a modern origin for the anomalies in such an isolated location. A block of resistance survey appears to have revealed a weak rectilinear shape [R7] in this area, the interpretation of which is tempered somewhat by a former boundary running through it. There is a faint suggestion of potential buttressing and, given that the hillside has a number of springs along it, it is entirely possible that this is a small building associated with the magnetic anomalies, indicative of small-scale industrial activity.

Further east again, Areas 5 and 6 were investigated magnetically to see if there was anything associated with the spring that flows through a relatively steep cutting. Nothing clearly archaeological has been recorded aside from ridge and furrow in Area 5 and anomalies to the west of that are thought to be a natural combination of quarrying and topographic effects over a change of slope aspect.

In the northern half of Area 4 (resistance Area i) there are definite indications of a road [M8, R8] following a north-easterly direction away from the fort. Similar to its counterpart in the southern half of Area 4 there are intense magnetic responses flanking the road-line, which appears to run past the fort rather than to it. It would probably meet with any road coming out of the fort to the north. At its western end there are numerous small, rectilinear anomalies in both the magnetic and resistance data sets. These have previously been interpreted as indicating a ribbon or strip settlement along the road (Kasper 2011). While this interpretation is certainly valid, it should be noted that magnetic surveys at Birdoswald (GSB 1999) and Binchester (GSB 2007) produced similar responses but they were interpreted as indicating mausolea

and this was subsequently confirmed by excavation. The very low resistance in these areas immediately adjacent to the road may simply be an effect of the metalled surface still effectively draining water (albeit groundwater) to either side. Faint linear anomalies in the magnetic data extending out away from the road, beyond the intense responses might indicate small farming plots or similar.

Immediately south of the roadside anomalies, two linear responses at right angles to each other [M9] were initially thought to indicate a potential enclosure, especially given the apparent pit-like features which they appeared to encompass. However, the east-west arm tallies with another former boundary (also well defined in the resistance data [R9]) on the OS maps, which comes round and joins up with another along the line of the west-end of the Roman road. As suggested previously this could be evidence of boundaries respecting the ancient earthworks; the first edition mapping seems to show a trackway along these boundaries and given that the line of the Roman road remains elevated and dry to this day, its continuity of use would be understandable. Similarly, up the hill to the east there are hints in the magnetic data of the road-line continuing on the same strike. This is corroborated further by the resistance results (Area ii) but again an old field boundary also runs along this line; as before, this boundary may have been respecting the archaeologically affected topography – there is a slight ‘hollow way’ up the hill (Fig. 16).

There is evidence for former ploughing, ridge and furrow cultivation, drains and pipes and other uncertain anomalies across the remainder of Area 4 and also Area 3. There are numerous trends and natural responses, including the broad high resistance zones which remain relatively unchanged between the shallow and deep unfiltered datasets, suggesting that they are a facet of the underlying subsoil or geology. It would seem that little of definite archaeological interest survives to a detectable level beyond what has been highlighted.

2.1.3 *The vicus and beyond – north (Areas 1, 2 & 7)*

In Area 2 anomalies along the eastern edge appear to be associated with the adjacent railway line, however, those at the southern edge of the block [M10] have more shape and form and as such could indicate archaeological features perhaps associated with any *vicus* flanking the northern egress from the fort. If this latter interpretation is correct then, at this distance, the settlement does not extend far towards the coast.

In Area 1 there is a strong linear magnetic anomaly [M11] of unknown function some 100m west of the railway line. This feature heads towards an old building on the north side of Area 2 which is also shown on the early OS mapping and the anomaly may be an historic pipe or drain. There is evidence for ploughing and drains across the northern half of Area 1.

Area 7 was surveyed in amongst trees and as such the vegetation restricted the survey; the few anomalies mapped could easily be associated with the *vicus*, lying in a zone delimited by the fort’s northern edge, the road identified in the northern half of Area 4 and any northerly route away from the fort.

2.1.4 *The vicus and beyond – south (Areas 9 & 10)*

Sample blocks on the southern side of the fort have revealed very little of archaeological potential, certainly nothing that would suggest the *vicus* extended this far away from the fort. Responses are, by and large, limited to old field boundaries, ploughing and drains. There are numerous trends, some of which form enigmatic curving shapes but the lack of any associated anomalies or definite form to their distribution makes a natural or agricultural interpretation just as likely as anything more significant.

2.1.5 *Discussion of geophysical survey results*

The geophysical survey results indicated that the *vicus* may have grown up preferentially along the major arterial routes out of the fort and into the landscape beyond. Where a more widespread area of settlement/activity has been recorded, east of the fort, the strength of response was lower and diminished rapidly within 150m from the fort. This would seem to be the case to the north and south, with sample blocks on the latter side not detecting any clearly discernible Roman archaeology.

Within the fort environs four potential roads were identified in the results: one runs south-east from the fort, one runs out of the north-east corner of the fort, and a third runs east to west beyond the northern edge of the defences. The latter example may well intersect a north to south aligned road heading north from the fort, and tentative evidence of the associated roadside activity was recorded in Area 2.

Inside the fort, evidence of barrack blocks, buildings (potentially part of the *principia*) and roads have been recorded as well as features towards the centre of the fort that lie on a slightly different alignment from the recorded ramparts. This could be evidence of the earliest phases of the fort's construction.

2.2 Excavations

The trench locations are shown in relation to the geophysical survey results in Fig. 3. In the absence of clear stratigraphic relationships in many areas, the trenches have been phased by grouping features into particular episodes of activity, such as constructing a road, or building a house. Each trench has a distinct phasing sequence, with the relationship of the activity phases for Trenches 1-3 shown in Fig. 10.

2.2.1 *Trench 1*

Trench 1 was intended to investigate the possible road running north-east from the Roman coastal road heading out the fort towards Maryport and Hadrian's Wall, and part of the roadside settlement thought to lie along the north-west side of the road.

The long axis of the trench was aligned north-north-west to south-south-east (Figs. 3 and 4). No deposits clearly identified as undisturbed superficial geology were encountered in this trench.

Phase 1.1 Possible road surface

Possibly the earliest deposit was a layer of medium and large cobbles, which was observed in a sondage at the south end of the trench (1063; Plate 4). It is possible that this was an earlier yard surface or road, lying at about 14.95m AOD. Finds included a small quantity of metalworking debris, principally cinders, and a sherd of gritty greyware, possibly indicating a 2nd century AD date.

Phase 1.2 Levelling/dumps

Overlying the Phase 1.1 cobble deposit were gritty, silty dumps containing much slag (1059, 1061; Plate 4); similar deposits were observed in another sondage slightly further north (1066-7). It is thought that they were levelling deposits, intended to form a level, drier ground surface. A large amount of metalworking debris was recovered from this phase, including smithing hearth bases and vitrified furnace or hearth linings, as well as quantities of non-diagnostic iron slag. This material indicates that smithing took place somewhere in the area, but as it was incorporated in levelling deposits it is likely to have been moved from its original location. Three sherds of pottery from 1061 included a bowl of possible Hadrianic date or later (early to mid-2nd-century) as well as a sherd of a dish possibly made at the Muncaster kilns and Roman brick fragments. Despite the early date of the bowl, the levelling may well have been part of the same activity as Phase 1.4, taking place in the later 2nd century; the pottery could be older material associated with the iron smithing activity.

Phase 1.3 Road

Above the levelling deposits at the south end of the trench was road 1025. This road comprised rubble 1056 and cobble layers 1036 and 1052. Overlying these layers was a gravel surface (1005), at about 15.25m AOD. This road extended into the trench for about 9m and was substantial; although it should be noted that the make-up did not form neat horizontal layers, but rather appeared to have been dumped in irregular piles, perhaps by the cartload. As with the Phase 1.2 levelling, the road make-up deposits contained much metalworking debris of a similar character, again probably relating to iron smithing taking place nearby but brought to this location for road construction purposes. The deposits also contained pottery, including local mortaria, greywares and oxidised wares, black-burnished bowls from Dorset, and imported samian and amphora sherds. Fragments of Roman bottles and vessels were also found, as well as fragments of Roman brick, roof tiles and nails, suggesting that structural rubble and domestic waste was included within the road make-up material. The road construction activity is dated by the pottery to no earlier than the later 2nd century, with a very late 2nd century date for some pottery perhaps representing episodes of road repairs.

Phase 1.4 Levelling/dumps

Deposits similar to those in Phase 1.2 were encountered in a sondage c.12m further north (1058); the top of these deposits was around 14.5m AOD. They contained similar iron-working debris, though in smaller quantities than Phase 1.2 and 1.3 deposits, and fragments of Roman brick and roof tile. Pottery included similar greywares, oxidised wares and a few fragments of samian, as well as the Dorset bowls, suggesting a later 2nd-century date for the activity. It may well have been part of the same activity as Phase 1.2.

Phase 1.5 Building 1/1 construction

North of the stone surface were the foundations of a building (1053), overlying levelling deposit 1058 (Plate 1). Walls 1022-23 and 1068 form the west side of a building apparently aligned east-west, as it was only about 4.1m deep (north-south) internally. The walls were built of granite boulders measuring on average 700x450x400mm, with some smaller stones inserted; there were traces of silty clay bonding. The south wall was less massive and was not free-standing, as it retained dump deposit 1062 (Plate 2). The top of these walls was a minimum of 15.2m AOD. These are thought to be sill walls for a timber-framed building. This phase is dated on stratigraphic grounds to the later 2nd century.

Phase 1.6 Floor/occupation in Building 1/1

Possibly associated with the construction of the building was an internal silty clay layer containing moderate slag and cinder from iron-working (1050), as well as a small quantity of pottery including Dorset black-burnished wares and a fragment of samian, a knife blade fragment and Roman brick; it was overlain by a possible hard standing or truncated clay floor (1046). Above that were silty deposits that may relate to occupation activity, with few inclusions (1043, 1045; Plate 1). They were in turn overlain by deposits containing greater quantities of slate (1035, 1040), perhaps indicating they are demolition deposits (from a collapsed roof) rather than occupation deposits.

The presence of much metalworking debris in this phase, again including smithing hearth bottoms, vitrified furnace or hearth linings and iron-working slag and cinders, could reflect such activity in the vicinity, although it could also represent the use of this material to form a dry floor. Charcoal from deposits 1043 and 1045 was mainly oak, ash and alder, all species commonly used for industrial purposes due to the high temperatures they burn at, and are more suggestive of industrial activity than domestic cooking. Structural nails and hob nails from shoes were also found in deposits from this phase, along with Roman vessel and bottle glass fragments and possible glass-making waste, an industry that would be expected within the *vicus*. Occupation deposit 1045 contained a fragment of an unusual Roman face jar, a further sherd of which was found in the ploughsoil, with an early 3rd-century date. Other pottery from this phase included Nene Valley colour-coated ware, samian fragments, Dorset black-burnished ware and greyware. The pottery dating and

stratigraphy indicate an occupation sequence dating to the late 2nd to 3rd century. The top of these deposits was about 14.95m AOD.

Phase 1.7 Hard standing/path

Continuing to the north of the Phase 1.5 road for about 3.5m was a layer of cobbles (1024/1044, 1037, 1052) partially covered with a gravel surface (1060). This surface extended up to the south wall of the Phase 1.5 building and continued along its north side. A similar cobble surface was found adjacent to the north side of the Building 1/1 (1055) and may well be a continuation of this feature. This path was patchy in appearance and only one layer of stone thick, over silty dump (1062), and is regarded as a separate structure from the road. It slopes down from c.15.15m AOD at the south end to c.14.65m AOD north of the Phase 1.5 building. The latest spot date for pottery from this phase is late 3rd century; as it is likely that the path was laid down soon after Building 1/1 was built in the later 2nd century, the late 3rd-century date suggests a repair, or artefacts trampled into a long-used surface. Finds from amongst the cobbles included fragments of pottery, Roman brick and roof tile as well as roofing slate, nails and only small quantities of iron-working debris. A piece of lead alloy sheet was recovered from path (1062), possibly indicative of lead working in the vicinity.

Phase 1.8 Build-up deposits

Overlying 1055 was a series of silty clay deposits, which are interpreted as build up deposits, possibly derived from activity within the Building 1/1 (1048-9, 1051). Fragments of Roman brick and roofing slate were recovered from many of these deposits, along with small quantities of iron-working debris and four sherds of pottery that included a decorated samian sherd showing a Maenad, probably dating to the late 2nd century, as well as greyware and oxidised ware.

Phase 1.9 Demolition of Building 1/1

Layers of rubble and slate inside (1008) and outside the building (1065) point to demolition or decay of the building, denoting collapse of the walls and roof. It is likely that this process took place no earlier the late 3rd century, as the adjacent Phase 1.7 path appeared to have remained in use until then. Finds from this phase included a Roman gaming counter, fashioned from a broken pot, as well as Roman brick and roofing slate fragments, and pottery including samian fragments, Dorset black-burnished ware, oxidised wares and a funnel-mouthed beaker in Lower Nene Valley colour-coated ware.

Phase 1.10 Alluvium

The rubble on the north side of the building was sealed by a sandy silt layer which is tentatively interpreted as alluvium (1034). An unusual jet melon-bead was recovered from this layer, probably dating to the late 1st to mid-2nd century AD and residual in this deposit.

Phase 1.11 Levelling

Following the deposition of dump deposits (1006, 1009), an extensive spread of rubble was laid down over the entire area of the building (1004). This could represent

the establishment of a new ground surface, at around 15.25m AOD. Fragments of Roman brick, roof tile and roofing slate, nails and a possible mosaic *tessera* were recovered from these levelling deposits, along with Roman bottle glass, including a funnel or bottle neck possibly indicative of glass working activity. Only two sherds of pottery were recovered from 1006: a piece of Gaulish amphora and part of an oxidised ware storage jar. A 4th-century date for the levelling is suggested on stratigraphic grounds.

Phase 1.12 Soil formation

Sandy silt layers (1002-3, 1007, 1038, 1054, 1057) are interpreted as soil formation deposits, presumably post-Roman in date. The only finds from these deposits were fragments of Roman brick and very small quantities of iron-working debris.

Phase 1.13 Post-medieval features

Overlying the road some 6m from the south end of the trench was a cobbled trackway some 2.4m wide, aligned east to west (1032). It comprised patchy layers mostly of cobbles (1039, 1041, 1047), similar to road 1025 but lacking the gravel surface. There is anecdotal evidence for a barn lying to the east into the 19th century, and this trackway appears to have provided access to the barn from Walls Drive. Cut into road 1025 to the south of the trackway was a small, irregular pit of unknown function (1064, fill 1033).

Roman brick and tile fragments were recovered from Phase 1.3 deposits, along with Roman and modern glass fragments. Significant quantities of non-diagnostic iron working slag, and some smithing hearth bottoms and vitrified hearth linings and cinders may indicate that Roman deposits were disturbed during the construction of the trackway.

Phase 1.14 Ploughsoil

The uppermost deposit across the entire trench was a silty ploughsoil (1001). Plough furrows approximately 0.5m apart and aligned east to west were observed at the north end of the trench (1010-21; 1026-1031) and apparently also cut into trackway 1032. They are thought to be modern in date.

2.2.2 Trench 2

This trench was located over an area thought to contain *vicus* buildings to the north-east of the fort, according to the 2010 geophysical survey. It was aligned approximately north-west to south-east (Figures 3, 5-7). The existing ground surface was about 16.35m AOD at the south-east end and sloped down steadily to about 15.0m AOD at the north-west end.

Phase 2.1 Natural

The earliest deposits encountered, at the north-west end of the trench, were light grey-brown sands and silts at least 0.3m thick, with no artefactual content (2052). The surface of these deposits was about 14.6m AOD. This phase is interpreted as alluvium in a post-glacial stream channel.

Phase 2.2 Drain and build up deposit

A little to the south of 2056, the earliest observed deposit was ashy sand layer 2070, which is interpreted as a build-up deposit.

Cut into the Phase 2.1 alluvium at about the same time was narrow linear cut 2056, which was aligned north-north-west to south-south-east and is thought to have been a drain. The fill of the drain (2055) contained small fragments of ceramic building material, two fragments of burnt bone of undetermined species, and a small quantity of oak charcoal.

Phase 2.3 Levelling and culvert; path and occupation/build-up deposits

Overlying deposit 2070 was fine gravel surface 2072, which probably formed a path at least 2.8m wide and aligned north-east to south-west (Plate 6). It was about 14.8m AOD.

Deposits 2067, 2065 and 2079 were extensive burnt red deposits that accumulated against the southern kerb of surface 2072. These deposits indicate a work area, presumably contemporary with the use of path 2072. A small patch of gravel (2090) and build-up/dump deposits (2087, 2091) appeared to overlie 2079. All the pottery from this phase comprised amphora fragments and samian, including a decorated sherd dating to the second half of the 2nd century. Roman brick and tile fragments and several nails were also found, and deposit 2065 contained charcoal, predominantly oak and alder with some probable kindling and tiny indeterminate chips of bone. There was very little metalworking debris from these contexts. The pottery suggests that this activity dated to later 2nd century. The surface of 2079 was about 15.3m AOD and the south-east side and sloped down to 14.9m AOD towards the north-west side.

Broadly contemporary with this surface was levelling deposit 2047, which sealed drain 2056. This deposit was cut by a regular linear feature (2046), which was in the same position as cut 2056 and may have been a timber-lined replacement for it (Plate 5). Its fill (2042) contained charcoal, again mainly oak and alder, suggestive of industrial rather than domestic processes; very little slag or bone was found, perhaps due to water flowing through the drain.

Phase 2.4 Possible industrial features

Cut into the top of the Phase 2.3 deposits were short linear west-north-west to east-south-east aligned gully 2077, perhaps a flue (fill 2078); larger south-west to north-east aligned cut 2008, possibly a drain; and post-holes 2075 and 2062 (fills 2069 and 2061 respectively). Patches of charcoal showing through below Phase 2.5 dump 2084

appear to be associated with these features and suggest industrial activity. No finds were recovered from these deposits.

Phase 2.5 Levelling/dumps

The Phase 2.4 features were sealed by dump/build-up deposits 2057-8, 2064, 2066, 2084-5 and 2089.

At the north end of the trench, levelling/dump deposits 2032, 3037 and 2040 overlaid the Phase 2.3 features; however, culvert 2046 may have still been in operation at this time. Path 2072 also remained in use. Pottery from the levelling dumps predominantly comprised Dorset black-burnished wares, with smaller quantities of samian, oxidised wares and grey wares, as well as a sherd of a beaker in Lower Nene Valley colour-coated ware, dating to no earlier than the 3rd century, indicating a likely date for the levelling activity. Other material recovered included structural nails, two fragments of Roman bottle glass (one dating to the late 2nd century) and fragments of Roman brick and roofing tile. Processed environmental samples from 2064 contained evidence for cereal processing, including bread wheat and ruderal weeds, as well as predominantly oak charcoal. It has been mentioned above that oak was primarily used for industrial purposes, but it is possible that it may also have been used domestically if large quantities were available. It is unlikely to have been used for processing cereals as it would burn at too hot a temperature. The charcoal and seeds may indicate a mixed industrial and domestic origin for the material in the levelling dumps and there was a general lack of iron-working debris from these deposits.

Phase 2.6 Structural and other features; levelling/dumps (Figure 6)

Further dumps (2026) were deposited at the north-west end of the trench, sealing the Phase 2.3 path and 2.5 levelling. A new path was then laid down (2054), in roughly the same position as its predecessor but extending further south and without as fine a surface (Plate 7). It was 14.95m AOD. Pottery from 2026 included Dorset black-burnished ware bowls typical of the late 2nd to early 3rd century AD, whilst 2054 contained a decorated samian sherd dated to c.140-160 AD. As this pottery was from dumped deposits, it is all likely to be earlier than the levelling activity, and to derive from material incorporated into the made ground. It does indicate that the levelling is no earlier than late 2nd century, and more likely 3rd century in date, corresponding with Phase 2.5 dating material. Bottle glass, structural nails and hob nails from shoes were also found, along with fragments of Roman brick and tile.

Post-holes 2015, 2043, 2049, 2080-1, 2099 (and unexcavated possible post-hole fill 2086) may have formed a structure aligned south-west to north-east and open on to surface 2054 to the north-west. A drainage gully lay within the building (2082). The fill of post-hole 2015 (2012) contained a fragment of a possible iron hinge as well as Roman brick and pottery including amphora and black burnished ware. Deposit 2050 appears to have been trample on surface 2054, which is supported by material recovered from environmental sampling, including many small pot and brick fragments, as well as small chips of bone and charcoal suggestive of industrial activity

(oak, alder, ash). Only very small quantities of metalworking waste were recovered from Phase 2.6 deposits.

Overlying build-up 2050 was a wall, comprising a single course of large rectangular stone blocks aligned south-west/north-east (2022); it was in the same position as the southern 'kerb' of path 2072 (Plate 8). It seems to have separated the industrial activity from path 2050 to the north-west.

Isolated post-hole 2025, cut into the top of 2026 towards the north-west end of the trench, is of uncertain function.

Phase 2.7 Structures, path and drain (Figure 7)

A levelling dump of large rubble (2003) was laid down in roughly the same position as surface 2054, possibly in response to slumping at the base of the slope. The remains of wall 2022 were incorporated into this surface, and it possible that the rubble was at least partially derived from the demolished upper part of wall 2022 (Plate 9). A fragment of a small unguent bottle was found in 2003, along with a pottery assemblage mainly composed of samian and black-burnished wares. Laid on top of 2003 was a narrow, rough path (2002) and, a little to the south-east, dump 2023. The path surface was at 15.15m AOD. Pottery and glass from dump (2023) indicated a 3rd-century date for this activity, and included predominantly mortaria, samian and black-burnished ware, along with heat-affected bottle glass. The pottery from the path (2002) was of similar composition, though a smaller assemblage. Structural and hob nails were recovered from Phase 2.7 deposits, along with Roman brick and tile fragments.

Cut into the south-east edge of rubble 2003 were post-holes 2039, 2034 and 2033/2048, forming a south-west to north-east alignment. Post-holes 2024 and 2051 may have been associated with them, perhaps forming a south-east return. Isolated post-hole 2025 to the north-west could also have been in use at this time. The small assemblage of pottery from the fills of these post-holes included Dorset black-burnished ware of probably late 2nd- to early 3rd-century date, as well as samian, greyware and oxidised wares and a single sherd of amphora.

An extensive dump deposit (2060) was laid down towards the south-east end of the trench, and included fragments of mortaria, including one of samian ware, as well as a colour-coated beaker, amphorae, black-burnished ware and oxidised ware. Cut into this deposit were post-holes 2006, 2009 and 2096, which appeared to form one side of a structure, with patchy gravel surface 2092 to the south-east (Plate 10). Post-holes 2017/2019, 2029 and 2098, on a similar alignment 2m to the north, may have formed part of the same structure; as could post-hole 2083, 2.3m further north-west. None of the post-hole fills for the possible structure contained pottery, apart from fill 2013 of post-hole 2083. This contained 14 sherds of Dorset black-burnished ware of probable later 2nd- to early 3rd-century date and a single amphora sherd, as well as a fragment of roof tile. Gully 2094 (fill 2093) cut through surface 2092 on the same alignment as the post-holes.

A small, circular cut (2063) was broadly contemporary with this structure, albeit external to it; this pit contained the shattered remains of an *in situ* amphora which presumably served as a container. It was suggested that this may have been used for quenching in a smithing workshop, but there was very little metalworking debris from associated deposits, and it may have been used for domestic storage or for a different type of industry. The cobble surface 2092 was at about 16.0m AOD, but as the post-holes were shallow it is likely that ploughing had removed the upper part of these features.

Phase 3.7 activity is thought to date to the later 3rd century.

Phase 2.8 Post-medieval to Modern

North-east to south-west aligned drainage ditch 2014 (fill 2011) cut through the Phase 2.7 features at the south end of the trench. The ditch was subsequently disturbed by plough furrow 2008 (fill 2005), the one distinct element of the ploughing that truncated Roman features and deposits in this part of the trench. Metalworking debris, Roman pottery, glass, brick and a pottery gaming counter found in the ploughsoil is presumably due to the ploughing disturbing Roman deposits.

2.2.3 Trench 3

Trench 3 was aligned north-west to south-east (Figs. 3 and 8). The trench was located on a ridge of high ground and the current ground surface sloped downwards from the south-east end (21.4m AOD) towards the north-west (20.0m AOD). It was positioned over an area of individual geophysical anomalies thought to be indicative of industrial features or perhaps burials.

Phase 3.1 Natural

The earliest deposit found was reddish clay 3070, which was encountered towards the centre of the trench at 20.4m AOD and in a sondage towards the north-west end of the trench at 19.6m AOD. It is interpreted as the natural subsoil.

Phase 3.2 Levelling (or subsoil)

Overlying the natural deposit was a yellow-orange clay layer up to 0.3m thick (3003, 3018 and 3041). This is regarded as a possible levelling deposit; occasional fragments of Roman pottery and brick from these deposits indicate that they are unlikely to be a variation in the natural subsoil. Two sherds of pottery from 3003 had a suggested date of 130 AD or later, whilst a brick fragment was recovered from 3018. The surface of this deposit was about 21.0m AOD at the south-east end of the trench and 19.7m AOD at the north-west end.

Phase 3.3 Building 3/1 construction

The most prominent features were two stone walls, 3006 and 3010, which appeared to form two sides of a building (Plate 11). The walls were constructed of angular chunks of limestone which appeared to be bonded with a pale clay deposit and were 0.8m in width and 0.2m in height. The upper surfaces of the walls was uneven, and it

was unclear if the top of the walls as exposed were originally the topmost layer, or whether this represented the remaining footings of a robbed or plough-damaged building. Some stones found within the topsoil did appear to represent material from wall 3006 which had been displaced by ploughing. Wall 3006 was aligned north-south, and wall 3010 aligned east-west. The presumed junction of the two walls was outside the trench, but it is highly likely that they joined at a point 0.7m south-east of the trench edge to form the north-east corner of a building. A possible south return was located at the western end of wall 3010. This corner had been cut by a later field drain (3065), but a row of larger stones to the west (3012) appeared to form the outer edge of the return wall. If this was the corner, the building would be approximately 5.6m in width internally. Its length is unknown, as the southern part of the building lay beyond the south-west limit of excavation.

Two irregular features appeared to be cut into levelling material 3018 (3058 and 3059), and were filled by a whitish clay deposit (3052 and 3057). Distinguishing the edges of the features was difficult, and it is possible that they represented variations in the clay, or the remains of an original floor in the building. At the north end of the structure, the surface of 3018 sloped downwards towards the base of wall 3010, and was overlain by a further deposit of whitish clay (3056), which supports the suggestion that the white clay was brought in to provide a level floor surface. Deposit 3057 included a fragment of Roman brick and two sherds of pottery of possible mid-2nd-century date, whilst 3052 contained one oxidised ware sherd and fragments of predominantly oak charcoal, suggesting that the levelling material was derived from close to some industrial processing.

Phase 3.4 Building 3/1 occupation

Overlying the Phase 3.3 features and extending across the interior of the building was mid-yellow-brown firm, gritty clay silt deposit (3004). This deposit appeared to at least partially cover the tops of the walls. It contained many small flecks of charcoal, and a series of features overlying and cutting this deposit suggest that it had been used as a surface. Two irregularly-shaped patches of pinkish, gritty pea gravel and larger pebbles (3008 and 3009) overlay 3004 towards the southeast side of the structure. These may be the remains of a single surface deposit, or possibly the remains of a hearth, though a sample from 3009 contained minimal carbonised material making the latter interpretation unlikely (Plate 12). A sherd of decorated samian, featuring a Venus design dating to the mid-2nd century, was found within deposit 3008 along with a sherd of black-burnished ware. Deposit 3004 contained fragments of Roman window and vessel glass, as well as a fragment of a knife blade, and a pottery assemblage predominantly comprising samian and Dorset black-burnished wares, as well as local mortaria, oxidised wares, grey wares and an amphora fragment. Processed environmental samples contained only a small quantity of iron-working waste, but with charcoal suggestive of industrial rather than domestic activity. Brick and tile fragments were found in many of the contexts from this phase.

A number of features were cut into 3004. Adjacent to the east wall was a roughly circular, concave feature about 1.5m in diameter (3051). It had a clay lining (3014)

and charcoal in the base (3021). This deposit contained more charcoal than any other sampled feature, with extensive oak including some small round wood, and smaller quantities of alder, ash, birch, hazel and poplar/willow. The quantity of oak was suggestive of an industrial use, though there was no indication of metalworking debris in either of the fills. The feature was initially interpreted as an oven, but the oak charcoal and a lack of food-waste remains makes this unlikely; it may have been used for some industrial activity requiring a high temperature but not associated with metalworking.

Several small cut features were also located in the area between the walls of building 3/1. Most of these were shallow pits, mainly less than 0.5m in diameter and up to 0.15m deep (cuts 3028, 3033, 3037). They were filled with mid-brown clay silt (3027, 3034, 3038 respectively). One small circular cut (3035), 0.45m in diameter and only 0.07m deep, had a fairly flat base which suggests that it may have housed a post for a temporary structure. The fill (3027) of cut 3028 contained a fragment of knife blade and part of a possible tool, and charcoal consistent with that found in surface 3004.

Phase 3.5 Early activity north of Building 3/1

Overlying levelling 3041 at the north-west end of the trench was a build-up deposit (3042). This was cut by a small, linear gully, aligned north to south and with a broad southern terminus (3047, fill 3046). This gully was cut by a small pit (3045) with a charcoal-rich fill (3043) at its north end. The purpose of the gully was unclear; it may have had an industrial function, though the only finds recovered from it were pottery, including Dorset black-burnished ware, samian and Lower Nene Valley colour-coated ware of early 3rd-century or later date, as well as fragments of Roman brick and glass. An alternative theory is that the gully represented part of a plot boundary or division, as it was on the same alignment as building 3/1. The southern edge of this feature was overlain by layer of cobbles, which possibly formed a path up to 5m wide and aligned east to west (3044/3067, Plate 14). Only a few fragments of pottery were recovered from this surface, mainly oxidised wares, and brick fragments.

Between the cobble surface 3044/3067 and the north end of building 3/1 were a group of associated features: a possible stone setting (3068) partially overlying a fired clay deposit 3069 which was also overlain by a deposit of industrial debris 3062, including slag and vitrified furnace linings. The fired clay and industrial debris may indicate *in situ* working, but these deposits were not fully excavated due to time constraints. Further to the south and adjacent to the north-west corner of Building 3/1 was a clay and charcoal feature (3013), possibly a hearth. This feature was not excavated, but pottery sherds (three of amphora and one black-burnished ware) and a brick fragment were recovered from its surface. Its upper surface looked very similar to that of possible oven/industrial hearth 3051 prior to excavation, and it was similarly situated against one of the walls of the building, though on the exterior rather than the interior. It is possible that both features date to the same period of activity.

The pottery provides an early 3rd-century date for this activity, although it could have commenced late in the 2nd century.

Phase 3.6 Later activity north of Building 3/1

Overlying the Phase 3.5 features between building 3/1 and the path was an extensive build-up deposit of brown silt with many charcoal flecks (3053-4). This deposit was very similar to occupation deposits 3004 within the building, and could represent 'raking out'. A similar deposit to the west (3040) partially overlaid the cobble surface. Deposit 3040 contained a relatively large pottery assemblage, mainly oxidised wares, black-burnished wares and fine greywares, as well as occasional colour-coated wares, amphora fragments and mortaria. A 3rd-century date is likely for this activity.

Phase 3.7 Activity east of Building 3/1

Several features were found cut into deposit 3003 to the east of the building. Part of a sub-rectangular pit at least 1.2m long (3055) is regarded as a rubbish pit; it was overlain by a gritty deposit, 3007, and contained fills 3023, 3030, 3048-50 and 3060. A reasonably mixed pottery assemblage from the pit fills included greywares, oxidised wares, samian, mortaria, a fragment of amphora and a sherd of Lower Nene Valley colour-coated ware, establishing a 3rd-century date for the infilling of the pit. The quantity of oxidised wares confirmed that this type of pottery was still in common use during this period. Brick fragments and a small quantity of glass were also recovered from the pit, and the environmental samples contained a significant quantity of cereal and weed grains suggestive of food processing (spelt, bread wheat, possible emmer, six-row barley and fat hen) and consistent with domestic-scale activity. Charcoal included a mixture of oak (predominant) and species more commonly used on domestic fires (birch, hazel, poplar/willow and holly), suggesting a mixture of domestic and industrial waste being dumped into the pit. A small glass bead and a sliver of red vessel glass were found in the overlying deposit 3007, along with a sherd of decorated samian of late 2nd-century date.

Parallel to and 0.3m from the east wall of the building was a narrow linear cut at least 3m long and 0.3m wide (3022). It was lined with upright stones on its southern side and had a base of small stone slabs, and was overlain by a fill deposit 3016 and sealed with pink clay (3005; Plate 13). This feature may continue further south as clay-filled linear cut 3024, though this was at a lower level; there was also a similar linear cut perpendicular to 3022 (3032, fill 3031). These features are regarded as drains, although it is possible they were structural, with the clay filled feature representing beam slots and the stone-lined feature a replacement east wall, alternatively the west wall of an adjacent building. The pink clay (3005) contained a sherd each of mortarium, amphora and oxidised ware.

Overlying these features was orange-brown clay silt 3002, interpreted as a build-up deposit, containing a small assemblage of pottery dominated by Dorset black-burnished ware with occasional samian and oxidised wares. An overlying charcoal deposit (3026) could be the fill of an (unexcavated) pit. A silty deposit (3029) had accumulated between wall 3006 and structure 3022.

Phase 3.8 Post-medieval activity

Running across the middle of the trench was a narrow, vertical-sided cut, aligned north-south (3065). It was lined with neatly-laid stone slabs, with the base and capping of similar slabs (structure 3064); and filled with silt 3063. A linear pinkish clay deposit (3011) overlay and sealed the capping of the drain, and was similar to Phase 3.7 deposit 3005 overlying structure/drain 3022. Structure 3064 is regarded as a post-medieval field drain. It cut through wall 3010 at the north-western corner of building 3/1.

Phase 3.9 Modern activity

A stony deposit (3039) adjacent to the north-west corner of building 3/1 could be disturbance of the building's wall due to ploughing. Overlying 3039 and field drain 3065 were silty deposits 3001 and 3015, up to 0.3m thick and regarded as ploughsoil. Much metalworking debris was recovered from the ploughsoil, indicating disturbance of Roman deposits. A tubular jet bead and part of an opaque white glass bangle, also of Roman date, were also recovered from the ploughsoil, the latter probably late 1st to mid-2nd century in date.

2.2.4 Trench 4

Trench 4 was positioned to straddle the line of a north-north-west to south-south-east aligned linear anomaly visible on the 2013 magnetic survey. The ground surface was around 16.5m AOD at the eastern end, sloping down to 14.9m at the western end.

The earliest deposit in the eastern half of the trench was a compact light orange brown sandy clay (5012), which is interpreted as undisturbed natural deposit of fluvio-glacial origin. This original ground surface was around 16.1m AOD at the east end of the trench and then sloped down towards the west, to 15.12m AOD, in the approximate centre of the trench. Deposit 5012 could not be traced any further towards the west as it was sealed beneath the eastern edge of a later deposit. The earliest deposit observed at the western end of the trench was a layer of bluish grey sandy clay (5007), which has been interpreted as a variation in the fluvio-glacial deposits infilling a palaeochannel. The top of deposit 5007 was observed at c.14.73m AOD within in a small area against the southern trench edge, c.5m west of the eastern end of the same. The top of 5007 and the western edge of deposit 5012 were sealed beneath context 5008, a dense orange-brown silt clay, which occupied the majority of the western end of the trench and has been interpreted as an alluvial clay build-up deposit within the top of the palaeochannel as it gradually dried out and ceased to flow.

Cut into natural 5008 towards the centre of the trench was a narrow linear cut, aligned north-north-west to south-south-east (5006). It measured 0.5m wide by 0.32m deep, and contained a sandy clay primary fill (5005) and a mixed upper fill of sand and clay sand (5004), the latter possibly backfill. This cut is interpreted as part of

a small drainage and/or boundary ditch which, as the geophysical survey suggested, was part of a rectilinear field enclosure ditch (Plate 15).

The top of natural 5012 was truncated by a linear cut feature (5009), whereas deposit 5008 was truncated by two further linear cuts (5010-11). These were all aligned north-north-west to south-south-east, measuring some 0.2m wide and at least 0.8m deep, with sandy clay backfills and containing ceramic horseshoe drains at their bases (5003, 5002 and 5001, respectively). These are interpreted as field drains.

Overlying the natural and these features, and forming the current ground surface, was clayey sandy silt some 0.3m thick (5000), which is interpreted as ploughsoil.

2.3 Beach surface collection

The gridded survey of the beach recovered Roman and later finds, which are likely to have washed onto the beach and so are not necessarily derived from the fort.

Find spots of previously collected Roman material, thought to have been derived from Roman deposits that eroded out of the cliffs were recorded below the fort (6002-5) and below Boat House Field north of the fort (6006).

During a separate walkover, a feature was observed in the cliff face in the Boat House Field. It was a large concave cut about 3m wide by 1m deep (6001), which is interpreted as a large pit or a ditch aligned east-west. This feature appeared to have slipped down bodily from the top of the cliff.

These findings confirm the impression of erosion taking place along the entire west side of the fort (Plates 16 and 17). Furthermore, there appear to be features to the north of the fort that represent Roman activity, presumably part of the *vicus*, and which are also eroding out of the cliffs.

2.4 Earthwork survey

The topography in the fields east of the fort was extreme and as such only the major and obvious landscape features were recorded. It is not possible to ascertain whether these are archaeological or part of the natural topography of the area.

The area surveyed in the Decoy Wood is clearly related to some sort of industrial process, although precisely what remains unclear. A large spoil heap of iron stone, several gullies and leats of varying size and a tentatively identified wheel pit were all surveyed and recorded (Plate 19). The date of these features is currently unknown.

3 DISCUSSION

3.1 The fort

As no excavation took place at the fort, no information regarding the construction date or the later history of the fort was found; however, some information on the layout and orientation of the fort was revealed by the geophysical surveys (Figs 12-15). The layout conforms to that of a typical auxiliary cohort fort, with a middle range of administrative buildings and (mostly) barrack blocks at the west and east ends. In the middle range, there are traces of a central building, normally the position of the *principia* (headquarters building). There are traces of buildings to either side of the central building, one of which is presumably the *praetorium* (commanders residence). The other building could have been granaries, a workshop, hospital or a combination of these (Campbell 2009, 32-4).

The east side of the central building is represented by two concentric curved anomalies, which could equally be the eastern defences of the preceding fortlet. If it is the east side of the fortlet, it offers a measurement of about 60m for one axis, putting it in the larger fortlet category rather than a smaller barrack fortlet or a watch tower (Walker 1989, 95-7).

The buildings in the range at the east end of the fort appear to be four large barrack blocks parallel to the *via principalis*. Their size suggests they accommodated four *turmae* of cavalry (a total of 128 men with their horses). Assuming the infantry barrack blocks were at the west end of the fort, it is likely that the garrison was a part-mounted *equitata* cohort for a time at least (Webster 1969, 149). This supports the suggestion that the diploma of 158 AD found near the fort refers to a cavalryman who had been stationed there (Holder 1997, 15).

A butt end in the north ditch of the fort, found during the 1970s excavations (Potter 1979, Fig. 3) could be taken to mark an opening in the ditch to the north gate. However, a natural stream currently occupies the position of the east end of the northern fort ditch before diverging from the line of the ditch closer to the sea; if this topography was the same during the Roman period, the artificial ditch found in the 1970s may have been confined to the part of the defences not protected by the stream. The RCHME 1998 earthwork survey identified a possible opening in the south rampart, suggesting that the south gate was positioned towards the east end of the fort, the implication being that the *via principalis* lay in the eastern part of the fort and therefore that the fort faced to the east (Blood and Pearson 2004, Fig. 4.1).

3.2 Development of the main road system

It is likely that a road connecting Ravenglass to the fort at Hardknott was constructed early in the reign of Hadrian (Bidwell and Hodgson 2009, 15-17). This road line is probably that identified in the geophysical survey (M8/R8) and located in Trench 1 (Fig. 17, Road 1); indeed it is possible that the original road surface was identified in

that trench (Phase 1.1). Road 1 does not run direct to the earlier fortlet, instead it is aligned some 200m further north; one reason for this could be that the road is aligned on another site, possibly the port.

A coastal road may have been built at this time, to connect with the coastal fortifications further north that formed part of the Hadrian's Wall frontier system (Fig. 17, Road 2). It is likely that this road entered the fort through the north gate. Usually such a road would have run across the fort, so that the *via principalis* would also have formed this route. However, the way south from the fort is effectively blocked by a deep ravine known as Swine Gill, and according to the geophysical survey the road was not constructed on that line south of Swine Gill. The road appears to have exited the east gate of the fort instead; the geophysical survey evidence indicates that the road from the east gate turns south-east about 100m from the fort and then turned south about 200m after that, apparently to cross Swine Gill at a more accessible point (Fig. 17, Road 3). The road may have returned to the coast at Brighthouse some 700m further south, where geophysical survey has revealed archaeological anomalies (Timescale Surveys 2007, Fig. 16).

3.3 Development of the *vicus*

No clear evidence for a pre-Hadrianic port or other settlement was found. It was not revealed in the geophysical survey in the Boat House Field, and the artefact assemblage does not suggest activity of this date. Evidence for earlier activity is restricted to the occasional geophysical anomaly that does not relate to the layout of the *vicus*; most notably a possible east-west ditch with a southern offshoot, which seems to have been overlain by Road 1 and is at an angle to it (Fig. 14).

The military *vicus* by definition would have developed in response to the establishment of the Roman fort in about AD130 (Sommer 2006; Bidwell and Hodgson 2009, 29). Clearly the main roads had a strong influence on the layout of the *vicus*, with occupation likely to have been concentrated along Roads 2 and 3 close to the fort to begin with. During the later 2nd century AD, the settlement extended further away from the fort along the main roads, running for about 100m along Road 3 and apparently for at least 200m along Road 2. This development is typical of the *vici* in northern England, and is particularly well represented in the recent geophysical survey at Maryport (Symonds and Mason 2009, Fig. 1.113). Occupation also extended along Road 1 for some 200m from its presumed junction with Road 2, apparently following the re-laying of the road on an extensive levelling deposit of metalworking waste.

The evidence from Trench 2 suggests that the area east of the fort and north of Road 3 also became built up during the later 2nd century. Presumably the area immediately outside the north and east sides of the fort soon became built up. The *vicus* in this form would have extended over an area of about 5 hectares. Streets would have developed within the settlement to provide access. One such street (Road 4) seems to have been identified in the geophysical surveys (M4/R5) and in Trench 2 (Phases 2.3

and 2.6); it is defined as a street in that it formed a route within the *vicus* but did not extend beyond it. It is likely that a street ran roughly parallel to the east side of the fort, connecting Road 3 to Road 1 without the need to travel through the fort.

Building 1/1 was not constructed alongside Road 1, instead it was set back by about 3m and the road was widened up to it (Phase 1.7); the road at this point was now in excess of 20m wide. This suggests that the road was widened to accommodate *vicus* activities without disrupting movement along the main thoroughfare, perhaps even forming a market place (Sommer 2006, 117-8).

The settlement seems to have remained concentrated around the fort. The only possible outlying structure of note is an apparently buttressed, rectangular building on the slopes east of the *vicus*, identified in the resistance survey, which may have had an industrial function but remains somewhat enigmatic (Figs. 13 and 15, Area v).

Past reports of archaeological features and Roman finds eroding out of the fort and nearby dunes are supported by the fieldwalking evidence. The *vicus* therefore may well have extended from Road 2 westwards to the estuary. While this could be seen as part of the expansion of the settlement away from the main roads, it is tempting to regard such activity along the coast as evidence for the port. Perhaps this is the site the road from Hardknott originally headed for, with the fortlet (and later the fort) subsequently placed immediately to its south.

The local topography had a strong influence on the layout of the *vicus*, in particular the streams that ran from the higher ground westwards to the estuary. All but Swine Gill are now culverted east of Walls Drive, but are still visible in small deep valleys along the coast, bridged over by the railway line. Swine Gill would have been a natural southern limit to the *vicus*, and Town Beck (at the south end of the modern village) may have formed the northern limit. Furthermore, two streams to the north of the fort appear to have separated the *vicus* into areas of higher ground separated by low-lying wetter ground. This would have restricted building space, but provided good access to water; it is probably no coincidence that the bath-house is situated between these two streams. There may have been another stream to the north of Road 1, as the original ground surface as seen in Trench 1 sloped down away from the road, indeed alluvial deposits were encountered at the north end of the trench. The restricted space between Road 3 and this possible stream could explain why Building 1/1 was parallel with rather than perpendicular to the road.

The *vicus* at Ravenglass seems to have declined during the later 3rd century AD, and evidence of 4th-century activity is limited at best. This is consistent with the situation observed at many *vici* in the Hadrian's Wall frontier area, and is thought to have been due to the reduction in the size of military units by half, if not more, during the later Roman period, reducing the demand for services from the *vicus* accordingly (Bidwell and Hodgson 2009, 33). It should be noted, however, that the excavations were located towards the extremities of the *vicus*; it is possible that the parts of the settlement closer to the fort, along Road 2 and along the coast remained in use beyond the 3rd century AD.

3.4 Buildings

The geophysical survey suggests the presence of a number of large rectangular buildings in the *vicus*, especially alongside Roads 1 and 3. Parts of two such buildings were investigated in Trenches 1 and 3. The length of their long axes could not be determined by excavation, but Building 1/1 was 5m wide and Building 3/1 was 6m wide. These large 'strip buildings' usually fronted end-on to a road or street, with a shop at the front and working and living space to the rear (Sommer 2006). Building 3/1 presumably fronted onto Road 3, in which case it would have been some 25m long. Building 1/1 lay parallel to Road 1, a less common arrangement but not unprecedented.

Sill walls, built of massive blocks of Eskdale granite in Building 1/1 and courses of the local sandstone in Building 3/1, would have supported a timber framed superstructure; the massive foundations of Building 1/1 at least could have supported a two-storey building. It is thought that Building 1/1 was roofed in slate, probably from the Skiddaw Group of rocks (A Smith and I Hartland pers comm, via L Watson), but tile was probably used on some buildings and it is likely that thatch was also employed. The floors were at best layers of clay, and were no more than functional; Building 3/1 contained one or two hearths or ovens, possibly domestic in function. However, it should be borne in mind that only a small part these buildings was excavated, and the rear part of Building 3/1 at that, so interpretation of their overall layout and use is not possible.

Smaller buildings or structures were represented in Trench 2 by groups of post-holes that would have held earth-fast posts; a less substantial and less permanent method of construction due to the ground rotting the timber uprights. These buildings were associated with heavily burnt floors and other features indicative of industrial activity, and may well have been open on at least one side. As was the case in Trench 3, these buildings tended to lie towards the rear of the more substantial frontage buildings.

Overall, the evidence suggests that the buildings in the *vicus* were functional and primarily industrial and domestic in character, but this is only a partial picture. Previous findings of tile and other building material north of the fort could mean that public and higher-status dwelling were concentrated along Road 2. The brick and tile, including hypocaust flue tile, and window glass in the excavations might also point to the presence of more substantial buildings elsewhere in the *vicus*.

3.5 Land division and properties

Evidence of land division within the *vicus* is limited, as the excavation trenches could investigate only a small portion of a property. Usually the plots lie perpendicular to the road, with the front largely occupied by one (or more) strip buildings and a space to the rear, as is the case in Trench 3. The resistance data for the south side of Road 4 points to properties about 10m wide and perhaps 50m long, separated by paths or

perhaps boundary walls (Figs 13 and 15). In the vicinity of Road 1, there is a suggestion of paths perpendicular to the road separating properties some 25m wide; one such cobble path was identified alongside Building 1/1 (Phase 1.7). However, this layout appears to be due to the limited space on either side of the road forcing the properties to be placed in an untypical arrangement, parallel to the road.

3.6 The function of the *vicus*

The primary function of a military *vicus* was by definition to supply the fort with materials, goods and services. The possible port would also have provided a market for the *vicus*, both as a trading place and as a market in itself; however, the fact that the *vicus* lies along the main roads and around the fort suggests that fort and the road system were its main foci.

The presence of a wide range of iron smithing debris and charcoal (the latter suggestive of high-temperature industrial activity) in all three trenches and extensive slag deposits in Trench 1 suggest smithing was a major activity (although at least some of this material could have been derived from metalworking in the fort). There is no clear evidence that the activity encountered in Trench 2 and to the rear of Building 3/1 was associated with iron smithing, but evidence for high temperature activities do point to some form of industrial activity taking place, perhaps not associated with metalworking. The acidity of the soil may be an explanation for the lack of evidence for the type of industry undertaken. The grain and probable ovens found in Trench 3 suggests food processing, though the excavated oven itself did not contain any food-related remains and the cereal and weed seeds from a pit in Trench 3 were consistent with domestic processing of grains. There is some limited evidence for glass working, and it would be a surprise if such activity did not take place in the *vicus*.

3.7 Material culture and status

As the excavations only covered a very small portion of the whole site, our analysis of the material culture may not be representative of the whole site. The majority of metalwork recovered relates to structural nails, but includes a number of hob nails derived from shoes (although quantity recovered across the site only equates to the number found within one shoe). Fragments of knife blades were found in occupation layers associated with Buildings 1/1 and 3/1, but are too incomplete to be diagnostic of the type of knife they represent.

Very few personal items were recovered, comprising jewellery items such as two jet beads, a tiny glass bead and glass bangles or hair rings. The majority of these are from post-demolition contexts, and two may be of 1st- to 2nd century date, earlier than most of the activity uncovered during the excavation. Two pottery gaming counters were found; these are common on Roman sites and indicate the use of board games as a recreational activity.

The glass recovered from the excavations was mainly small and fragmentary and predominantly derived from utilitarian 2nd- to 3rd-century bottles and vessels used for storing liquids and foodstuffs. Only two fragments of unguent bottles were found, which were normally used as containers for oils, and five fragments of Roman window glass. In the main, the glass assemblage suggests occupation of lower status, being everyday vessels with a lack of higher-status colourless glass table wares. The fragmentary nature of the assemblage may indicate that waste glass for recycling, which was often practiced in Roman settlements where glass was being made (Price and Cottam 1998). Tentative evidence for glass manufacture may indicate that the glass waste was recycled within the *vicus* for the production of new vessels.

Despite the small size of the pottery assemblage, it is important as fully-quantified assemblages from this period are rare in the region. There is a clear supply link with the Muncaster kilns, which appear to have provided a substantial proportion of the cooking wares at Ravenglass into the second half of the 2nd century AD, as well as one example of a fine-oxidised ware dish of probable Hadrianic date in an Upper German tradition. Black-burnished ware from south-east Dorset was common across the site, and indicates that this was an important supply source throughout the life of the *vicus*. Pottery from the Severn Valley, the West Midlands and the Lower Nene Valley was also well-represented in the assemblage, with a dominance of Mancetter-Hartshill mortaria in the 3rd century being a common feature in assemblages from north-west England (Hartley 1991, 173). Some of the thin-walled oxidised wares may be later 2nd- to 3rd-century local imitations of Severn Valley ware, similar to vessels found in a kiln dump at Carlisle (Swan *et al.* 2009).

The quantity of amphorae is typical of coastal sites, indicating the importance of sea trade and connections with the wider Roman trading network, and the ubiquity of samian across the site also testifies to this. The date range of the pottery indicates that occupation of the *vicus* continued until at least c.AD270, with an upper date limit suggested by the absence of East Yorkshire wares, which became common in forts along Hadrian's Wall from the late 3rd century AD. Two fragments of a face jar with applied bosses and incised lines offer a parallel with a hitherto unique face jar from Old Penrith (Braithwaite 2007), with the applied bosses distinguishing them from other face jars where the bosses are pushed out from the body of the vessel.

The range of artefacts, including jewellery, glass and pottery indicate only a modest level of wealth for the inhabitants of the *vicus*. Many of the artefacts, including the samian pottery demonstrate that the inhabitants of the *vicus* had a desire to use identifiably Roman material culture and to associate themselves with Roman lifestyles and eating practices. The range of pottery wares demonstrates significant trading links both nationally and as part of the wider Roman trading network, linked to the proximity to the fort and its port.

3.8 Wider land-use and hinterland

The presence of the fort and *vicus* would have had a major impact on the surrounding area. The garrison and *vicus* inhabitants would have required a large amount of food. Some 600 hectares of land may have been needed to provide the garrison and *vicus* with grain alone (Symonds and Mason 2009, 145-6). If there was an additional cavalry component, the horses would have required considerable grazing land and fodder. The need for large quantities of wood for building purposes and for fuel would have placed great pressure on the local resource; that, and the increasing food demand encouraging the expansion of farmland, would have resulted in a degree of deforestation, making access to wood and timber even more difficult. Coppicing and pollarding, perhaps of deliberately planted woodland, may have been practiced to maintain a reliable supply of wood.

The nearby Muncaster kilns supplied pottery to Ravenglass during the 2nd century AD, but seems to have been supplanted by major industries from further afield by the 3rd century as such industries and trade developed, perhaps reflecting the rise of civilian enterprises as military production diminished.

The presence of imported pottery from the continent, and from potteries in the province on the coast (or with access to the sea) strongly suggests coastal trade and presumably the importance of Ravenglass as a port. Other imported materials, such as jet and Skiddaw Slate probably also reached Ravenglass by river and sea rather than by road.

3.9 Conclusions

The combined geophysical surveys (including that of Kaspar in 2010), excavation and fieldwalking relating to the Romans in Ravenglass project have transformed our understanding of the Ravenglass *vicus* settlement. Previously, even its existence was based on circumstantial evidence. Now, its extent and chronology are much clearer, and invaluable insights into life at the *vicus* have been obtained. Nevertheless, it should be remembered that the 2013-14 excavations were exploratory in nature and were never expected to provide a complete picture of the *vicus*. Probably less than half of one percent of the *vicus* was excavated, and the results have raised more questions than they have answered. Further fieldwork would similarly transform our understanding of Roman Ravenglass.

It has been recognised that the investigation of the *vici* in the Hadrian's Wall area remains a priority, as research into these settlements lags behind the study of the associated forts (Symonds and Mason 2009, 15ff). The 2013-14 fieldwork has demonstrated that the Roman remains at Ravenglass have the potential to contribute greatly to this research.

Continued study of Roman Ravenglass would be worthwhile, as it has much potential and still remains less well understood than many sites in the region. Detailed

earthwork survey within the fields to the east of the fort could help to identify any slight earthworks associated with the *vicus*.

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The project archive will be held in perpetuity by the landowner, Mrs Iona Frost-Pennington, at Muncaster Cattle, Ravenglass. It has been assigned an accession number by York Archaeological Trust: **YORAT.2013.1**. The Trust will retain a copy of the paperwork detailing the deposition of the archive.

5 GLOSSARY

As (Latin): a small denomination copper-alloy coin used during the earlier Roman empire (1st and 2nd centuries AD)

Cohort (Latin *cohors*): a military unit of six centuries. As a century actually numbered 80 troops, the total number of soldiers in an infantry cohort was 480

Context: the basic stratigraphic unit identified and recorded during excavations, such as layer, a fill of a cut or a cut

Denarius (Latin): a silver coin issued until the 3rd century AD, worth 16 asses

Equitata (Latin): a military unit that consisted of a combination of infantry and cavalry

Hammerscale: tiny fragments or 'flakes' of slag driven off during iron smithing

Nummus (Latin): a later Roman (4th century) low denomination copper alloy coin

Residual: an artefact in use for a long period of time (or lost, unearthed and re-deposited) which suggests a falsely older date for a site or individual feature

Samian ware: high-quality pottery with a red slip, produced in Gaul (Modern France) during the earlier Roman period. The name is derived from the theory that the pottery was made on the Greek island of Samos – long disproved, but the name has stuck

Slag: the non-metallic waste expelled during iron production to reduce the impurities in the iron

Sondage: a small trench, dug within a larger excavation, to investigate a particular feature

Vicus (Latin): a type of settlement with a primary commercial or industrial function, that often grew up to serve a fort

6 REFERENCES

- Adcock, J. 2013. Romans in Ravenglass, Cumbria. Unpublished GSB Geophysical Survey Report G1341.
- Allason-Jones, L. 1996. *Roman Jet in the Yorkshire Museum*. York: Yorkshire Museum.
- Allason-Jones, L. 2011. 'Recreation', in L. Allason-Jones (ed.) *Artefacts in Roman Britain; Their Purpose and Use*. Cambridge: Cambridge University Press, 219-242.
- Allen, D. 2009., 'The Glass Vessels' in Rushworth, A (ed.), *Housesteads Roman Fort - the Grandest Station: Excavation and survey at Housesteads, 1954-95*. (EH), 568-571.
- Austen, P.S. 1991. *Bewcastle and Old Penrith. A Roman Outpost Fort and a Frontier Vicus*. Cumberland and Westmorland Antiquarian and Archaeological Society Research Series 6.
- Bayley, J., Crossley, D. and Ponting, M. 2008. *Metals and Metalworking. A Research Framework for Archaeometallurgy*. London: Historical Metallurgy Society, Occasional Publication 6.
- Beijerinck, W. 1947. *Zadenatlas der Nederlandsche Flora*. Wageningen: Veenman & Zonen.
- Bidwell, P. and Croom, A. 2010. 'The supply and use of pottery on Hadrian's Wall in the 4th century AD', in R. Collins, R. and L. Allason-Jones. (eds) *Finds from the Frontier. Material Culture in the 4th-5th Centuries*. CBA Research Report 162, 20-36.
- Bidwell, P. and Hodgson, N. 2009. *The Roman Army in Northern England*. The Arbeia Society.
- Bidwell, P. and McBride, R. 2010 'The coarse wares', in M. Snape, P. Bidwell and G. Stobbs 'Excavations in the military vicus south-west of the Roman fort at South Shields in 1973, 1988 and 2002', *Arbeia Journal*, 9, 42-132, 98-119.
- Bidwell, P., Snape, M. and Croom, A. 1999. *Hardknott Roman Fort, Cumbria*. Cumberland and Westmorland Antiquarian and Archaeological Society Research Series 9.
- Birley, E. 1958. 'The Roman Fort at Ravenglass', *Transactions of the Cumberland and Westmoreland Antiquarian and Archaeological Society* 58, 14-30.
- Bishop, R.R., Church, M.J. and Rowley-Conwy, P.A. 2009. 'Cereals, fruits and nuts in the Scottish Neolithic', *Proceedings of the Society of Antiquaries of Scotland* 139, 47-103.

- Blood, K. and Pearson, T. 2004. 'The Roman fort at Ravenglass: a survey by RCHME', In P. Wilson and I. Caruana (eds) *Romans on the Solway: Essays in Honour of Richard Bellhouse*, 95-101.
- Braithwaite, G. 1991. 'Face-pot', in Austen 1991, 173-5.
- Braithwaite, G. 2007. *Faces from the Past: A Study of Roman Face Pots from Italy and the Western Provinces of the Roman Empire*. British Archaeological Reports International Series 1651.
- Brann, M. 1985. 'A survey of Walls Castle, Ravenglass, Cumbria', *Transactions of the Cumberland and Westmoreland Antiquarian and Archaeological Society* 85, 81-5.
- Brodribb, G. 1979. *Markings on Tile and Brick*. British Archaeological Reports International Series 68, 211-220. [why page numbers if he is author?]
- Brodribb, G. 1989. *Roman Brick and Tile*. Wolfenboro, New Hampshire: Alan Sutton.
- Burnett, J.H. (ed.) 1964. *The Vegetation of Scotland*. Edinburgh: Oliver & Boyd.
- Campbell, D.B. 2009. *Roman Auxiliary Forts 27BC-AD378*. Osprey Publishing.
- Cappers, R.T.J., Bekker, R.M. & Jans, G.E.A. 2006. *Digital Seed Atlas of the Netherlands*. Groningen: Barkhuis Publishing.
- Carruthers, W. 1993. 'A charred grain deposit from Ambleside Roman Fort granary, Cumbria', *Ancient Monuments Laboratory Report* 11/93.
- Carson, S. 2015. *Ravenglass Environmental Report 2015*. Unpublished Dickson Laboratory Report DL02915.
- Chardon-Picault, P. and Pernot, M. 1999. *Un quartier antique d'artisanat métallurgique à Autun (Saône-et-Loire): Le site du lycée militaire*. Paris: dAf.
- Collingwood, R.G. 1928. 'Roman Ravenglass', *Transactions of the Cumberland and Westmoreland Antiquarian and Archaeological Society* 28, 353-66.
- Cool, H.E.M. and Price, J. 1998. 'The vessels and objects of glass', in H.E.M. Cool and C. Philo (eds.) *Roman Castleford Excavations 1974-85, Vol. I: The Small Finds*. Wakefield, 141-94
- Dickson, C. A. and Dickson, J. H. 2000. *Plants and People in Ancient Scotland*. Stroud: Tempus.
- Dobney, K., Jacques, D.S. and Johnstone, C.J. 1999. 'Protocol for recording vertebrate assemblages', *Reports from the Environmental Archaeology Unit, York* 99, 15, p. 1-12.
- Dungworth, D. and Wilkes, R. 2009. 'Understanding hammerscale: the use of high-speed film and electron microscopy', *Historical Metallurgy* 43/1, 33-46.
- Edlin, H. 1973. *Woodland Crafts of Britain*. Newton Abbot: David & Charles.
- English Heritage. 2001. *Archaeometallurgy*. English Heritage.
- Fair, M.C. 1948. 'Roman finds on the Cumberland coast', *Transactions of the Cumberland and Westmoreland Antiquarian and Archaeological Society* 48, 218-9.
- Gillam, J.P. 1970. *Types of Roman Coarse Pottery Vessels in Northern Britain*. 3rd edition. Newcastle upon Tyne: Oriel Press.
- Goodall, I.H. 2011. *Ironwork in Medieval Britain: An Archaeological Study*. Society for Medieval Archaeology Monograph 31.
- GSB. 1999. *Geophysical Survey Report 99/080: Birdoswald, Cumbria*. Unpublished report, GSB Prospection Ltd, Bradford.
- GSB. 2007. *Geophysical Survey Report 07/023: Binchester Roman Fort, County Durham*. Unpublished report, GSB Prospection Ltd, Bradford.

- Hartley, B.R. and Dickinson, B.M. 2008-12. *Names on Terra Sigillata: an Index of Makers' Stamps and Signatures on Gallo-Roman Terra Sigillata (Samian Ware)*. London: Institute of Classical Studies.
- Hartley, K.F. 1991. 'The mortaria', in Austen 1991, 156-73.
- Hartley, K.F., and Croom, A.T. 1999. 'The mortaria', in Bidwell *et al.* 1999, 96-9.
- Hartley, K.F. and Webster, P.V. 1973. 'Romano-British pottery kilns near Wilderspool', *Archaeological Journal* 130, 77-103.
- Hillman, G.C. 1981. 'Reconstructing crop husbandry practices from charred remains of crops', in R. Mercer (ed.) *Farming Practice in British Prehistory*. Edinburgh University Press, 123-162.
- Holbrook, N. and Bidwell, P. 1991. *Roman Finds from Exeter*. Exeter Archaeological Reports 4, Exeter.
- Holder, P.A. 1997. 'A Roman military diploma from Ravenglass, Cumbria', *Bulletin of the John Rylands University Library of Manchester* 79.1, 3-41.
- Holder, P. 1998. 'Auxiliary Units Entitled Aelia', *Zeitschrift für Papyrologie und Epigraphik* 122, 253-62.
- Hunter-Mann, K. 2014. Ravenglass Roman fort and Vicus, Romans in Ravenglass community archaeology project: Season 1, 2013: Interim Report. Unpublished ArcHeritage Report 2014/8.
- Hunter-Mann, K. 2015. Ravenglass Roman Fort and Vicus; 'Romans in Ravenglass' Community Archaeological Project 2013-14: Assessment Report. Unpublished ArcHeritage Assessment Report 2015/9.
- Jacomet, S. 1987. *Prähistorische Getreidefunde, Eine Anleitung zur Bestimmung Prähistorischer Gersten und Weizen Funde*. Basel: Herausgegeben im Eigenverlag.
- Johnson, M., Croom, A., Hartley, K.F. and McBride, R. 2012. 'Two Flavian to early Antonine Romano-British pottery kilns at 7a Fisher Street, Carlisle', *Journal of Roman Pottery Studies* 15, 96-139.
- Kaspar, B. 2011. *Reconstructing Roman Eskdale*. Unpublished MA thesis, University of Birmingham.
- Lockwood, H. 1979 'Coarse pottery', in Potter 1979, 237-68.
- Lockwood, H. and Turner, R.C. 1979. 'The coarse pottery', in Potter 1979, 106-22.
- Manning, W.H. 1985. *Catalogue of the Romano-British Iron Tools, Fittings and Weapons in the British Museum*. London: British Museum.
- McComish, J.M. 2012. *An Analysis of Roman Ceramic Building Material from York and its Immediate Environs*. Unpublished MA dissertation, University of York.
- Miller, J. and Ramsay, S. 2008. Archaeobotanical contributions in L. Lelong and G. MacGregor, *The Lands of Ancient Lothian: Interpreting the Archaeology of the A1*. Edinburgh: Society of Antiquaries of Scotland.
- Mould, Q. 2011. 'Domestic Life', in L. Allason-Jones (ed.), *Artefacts in Roman Britain. Their Purpose and Use*. Cambridge: Cambridge University Press, 153-179.
- O'Connor, T.P., YAT and CBA. 2003. *The Analysis of Urban Animal Bone Assemblages*. Council for British Archaeology in association with York Archaeological Trust.
- Oswald, F. 1936-37. *Index of Figure Types on Terra Sigillata*. University of Liverpool Annals of Archaeology and Anthropology, Supplement.
- Oswald, F. 1945. 'Decorated ware from Lavoye', *Journal of Roman Studies* 35, 49-57.

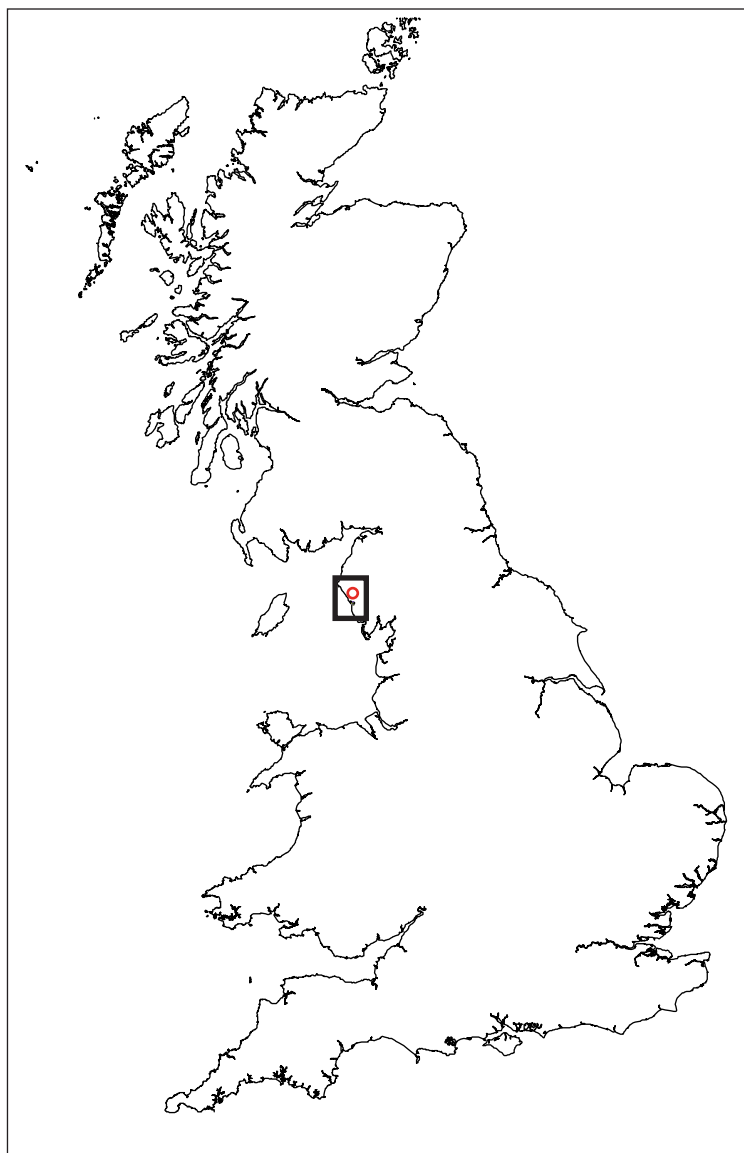
- Potter, T.W. 1979. *Romans in North-West England. Excavations at the Roman Forts Ravenglass, Watercrook and Bowness-on-Solway*. Cumberland and Westmorland Antiquarian and Archaeological Society Research Series 1: Kendal
- Price, J and Cottam, S. 1997, 'Roman Glass', in T. Wilmott (ed.), Birdoswald: Excavations of a Roman Fort on Hadrian's Wall and its Successor Settlements; 1987-92. English Heritage, 341-355.
- Price, J. and Cottam, S. 1998. *Romano-British Glass Vessels: A Handbook*. Practical Handbooks in Archaeology No 14. Council of British Archaeology.
- Rackham, O. 1980. *Ancient Woodland, its History, Vegetation and Uses in England*. London: Arnold.
- Ricken, H. 1934. 'Die Bilderschüsseln der Kastele Saaalburg und Zugmantel', *Saalburg Jahrbuch* 8, 130-182.
- Rivet, A.L.F. and Smith, C. 1981. *The Place-names of Roman Britain*. BCA/Batsford.
- Rogers, G.B. 1974. Poteries Sigillées de la Gaule Centrale I: les motifs non figurés. Gallia Supplément 28.
- Rogers, G.B. 1999. *Poteries Sigillées de la Gaule Centrale II: les Potiers*. Premier Cahier du Centre Archéologique de Lezoux.
- Schweingruber, F. H. 1990. *Anatomy of European Woods*. Haupt, Berne & Stuttgart.
- Sommer, C.S. 2006. 'Military vici in Roman Britain revisited', in R.J.A. Wilson (ed.) *Romanitas: Essays on Roman Archaeology in Honour of Sheppard Frere on the Occasion of his Ninetieth Birthday*, 95-146.
- Stace, C. 1997. *New Flora of the British Isles*. Cambridge: Cambridge University Press.
- Stanfield, J.A. and Simpson, G. 1958. *Central Gaulish Potters*, London.
- Starley, D. 1995. Hammerscale. The Historical Metallurgy Society: Archaeology datasheet No 10.
- Swan, V.G., McBride, R. and Hartley, K.F. 2009. 'The coarse pottery', in C. Howard-Davis, *The Carlisle Millennium Project. Excavations in Carlisle 1998-2001. Vol. 2, The Finds*. Lancaster Imprints 15, Oxford Archaeology North, 566-660.
- Swift, E. 2011. 'Personal ornament', in L. Allason-Jones (ed.) *Artefacts in Roman Britain. Their Purpose and Use*. Cambridge: Cambridge University Press, 194-218.
- Symonds, M.F.A. and Mason, D.J.P. (eds) 2009. *Frontiers of Knowledge: a Research Framework for Hadrian's Wall, Part of the Frontiers of the Roman Empire World Heritage Site*. Durham County Council and Durham University joint publication.
- TimeScape Surveys. 2007. Brighouse, Ravenglass, Cumbria: Geophysical Survey, September 2007. Unpublished TimeScape Surveys Report 106.07.
- Tomber, R. and Dore, J. 1998. *The National Roman Fabric Reference Collection: a Handbook*, MoLAS Monograph 2, London.
- Tylecote, R.F. 1962. *Metallurgy in Archaeology*. London: Arnold.
- Tylecote, R.F. 1986. *The Prehistory of Metallurgy in the British Isles*. London: The Institute of Metals.
- van der Veen, M. 1992. *Crop Husbandry Regimes*. Sheffield Archaeological Monographs 3. University of Sheffield.
- van der Veen M., Livarda, A. and Hill, A. 2008. 'New plant foods in Roman Britain – dispersal and social access. *Environmental Archaeology* 13/1, 11-35.

- Walker, J. 1989. 'The function of the Castleshaw Fortlet', In Walker, J. (ed.) *Castleshaw: the Archaeology of a Roman Fortlet*. University of Manchester, 79-108
- Ward, C. 1999. 'The Roman Ceramic and Stone Building Materials from the Romano-British Villa at Piddington'. *Iron Age and Roman Piddington Vol. 4*. The Upper Nene Archaeological Society.
- Warry, P. 2006. *Tegulae: Manufacture, Typology and Use in Roman Britain*. British Archaeological Reports British Series 417.
- Webster, G. 1969. *The Roman Imperial Army*. Adam and Charles Black.
- Webster, P.V. 1976. 'Severn Valley ware', Transactions of the Bristol and Gloucestershire Archaeological Society 94, 18-46.
- Welsby, D.A. 1985. 'Pottery production at Muncaster, Eskdale, in the second century AD', *Britannia* 16, 127-40.
- Wild, F. 1975. 'Samian ware', in A.S. Robertson, *Birrens (Blatobulgium)*. Edinburgh: The Dumfriesshire and Galloway Natural History and Antiquarian Society, 141-177.
- Wild, F. 2010. 'The Samian ware', in M. Snape, P. Bidwell and G. Stobbs, 'Excavations in the military vicus south-west of the Roman fort at South Shields in 1973, 1988 and 2002', *Arbeia Journal* 9, 89-99.
- Zohary, D. and Hopf, M. 2000. *Domestication of Plants in the Old World*. 3rd Edition. Oxford: Oxford University Press.

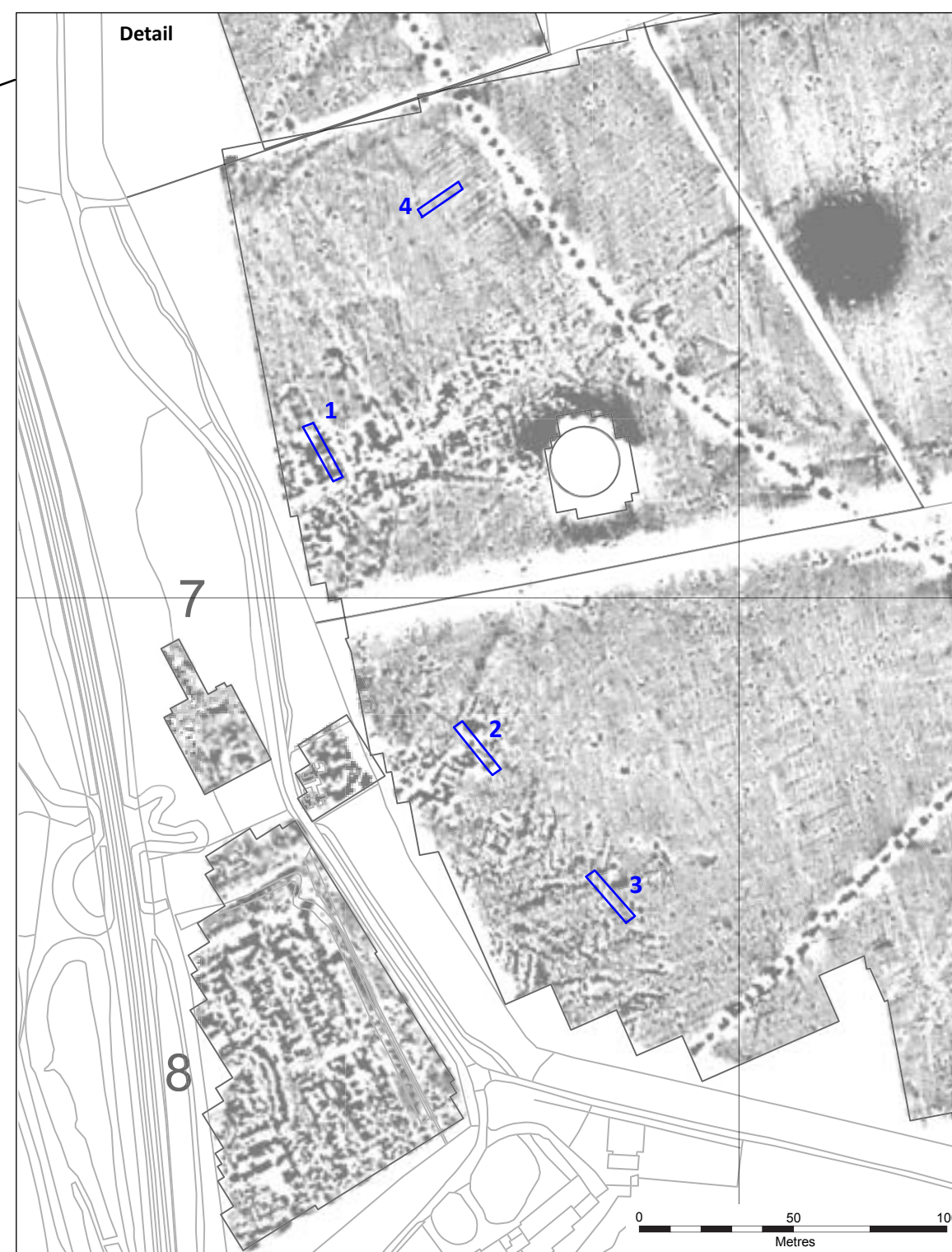
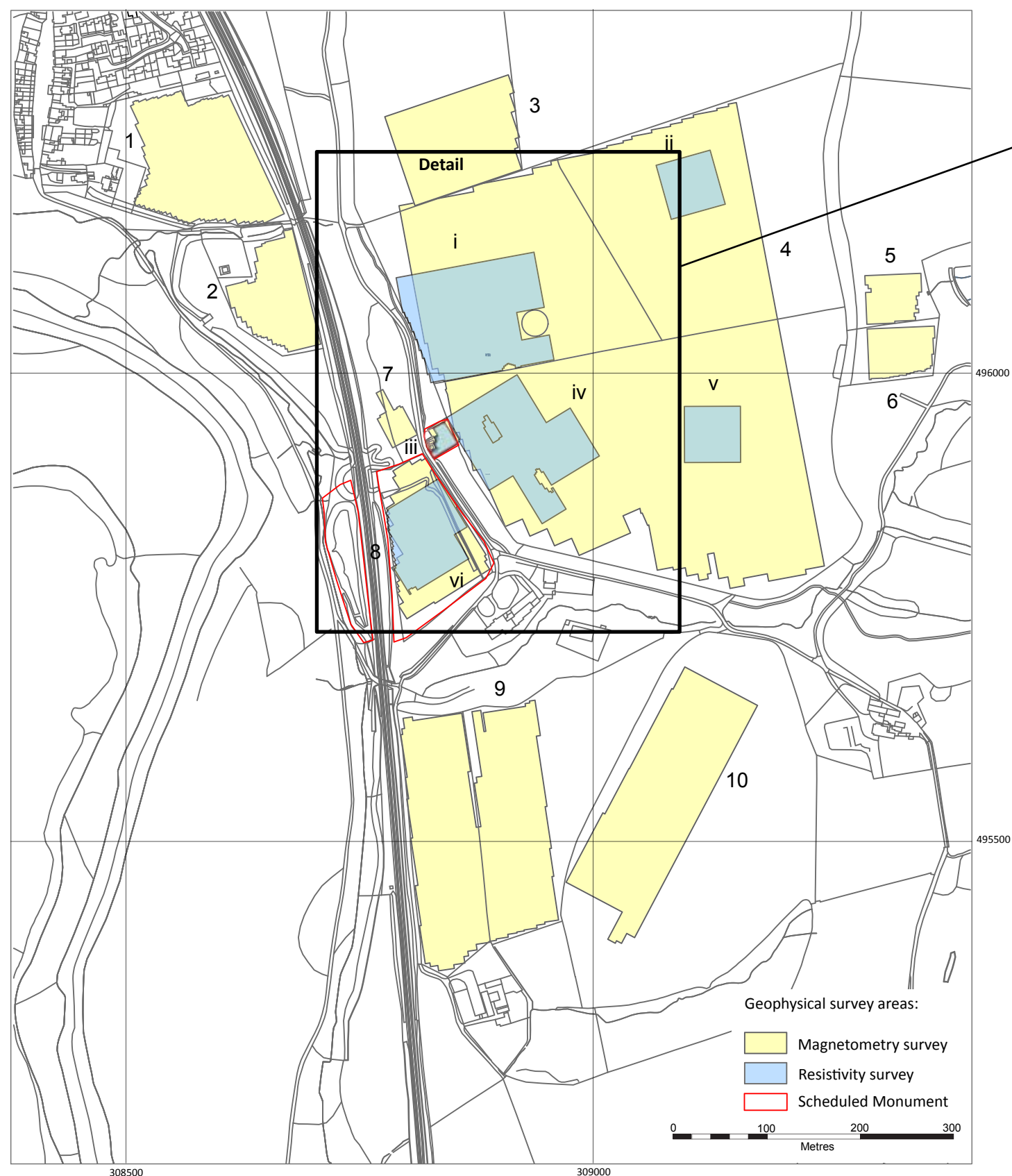
FIGURES



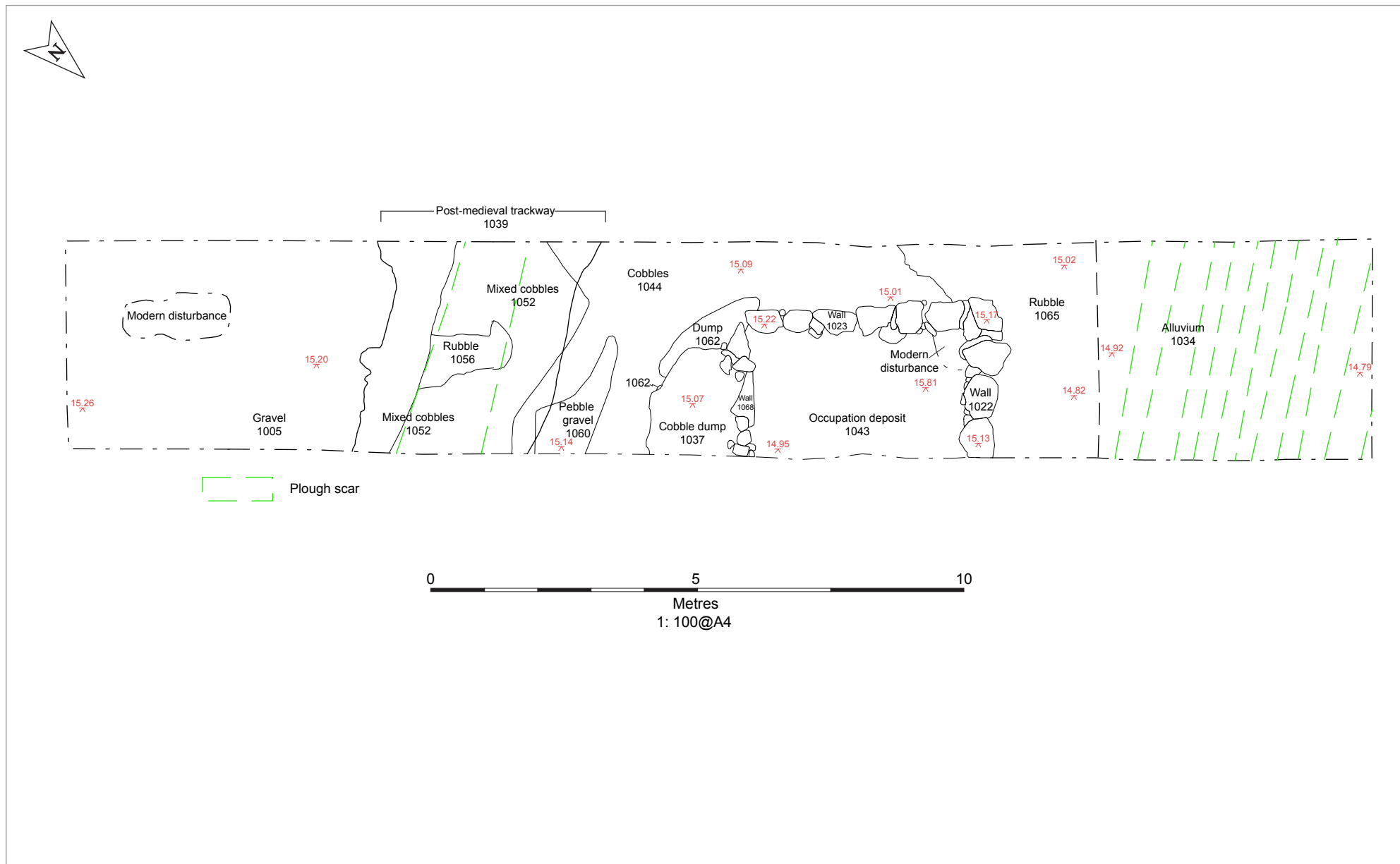
Figure 1: Ravensglass and the Hadrian's Wall frontier system

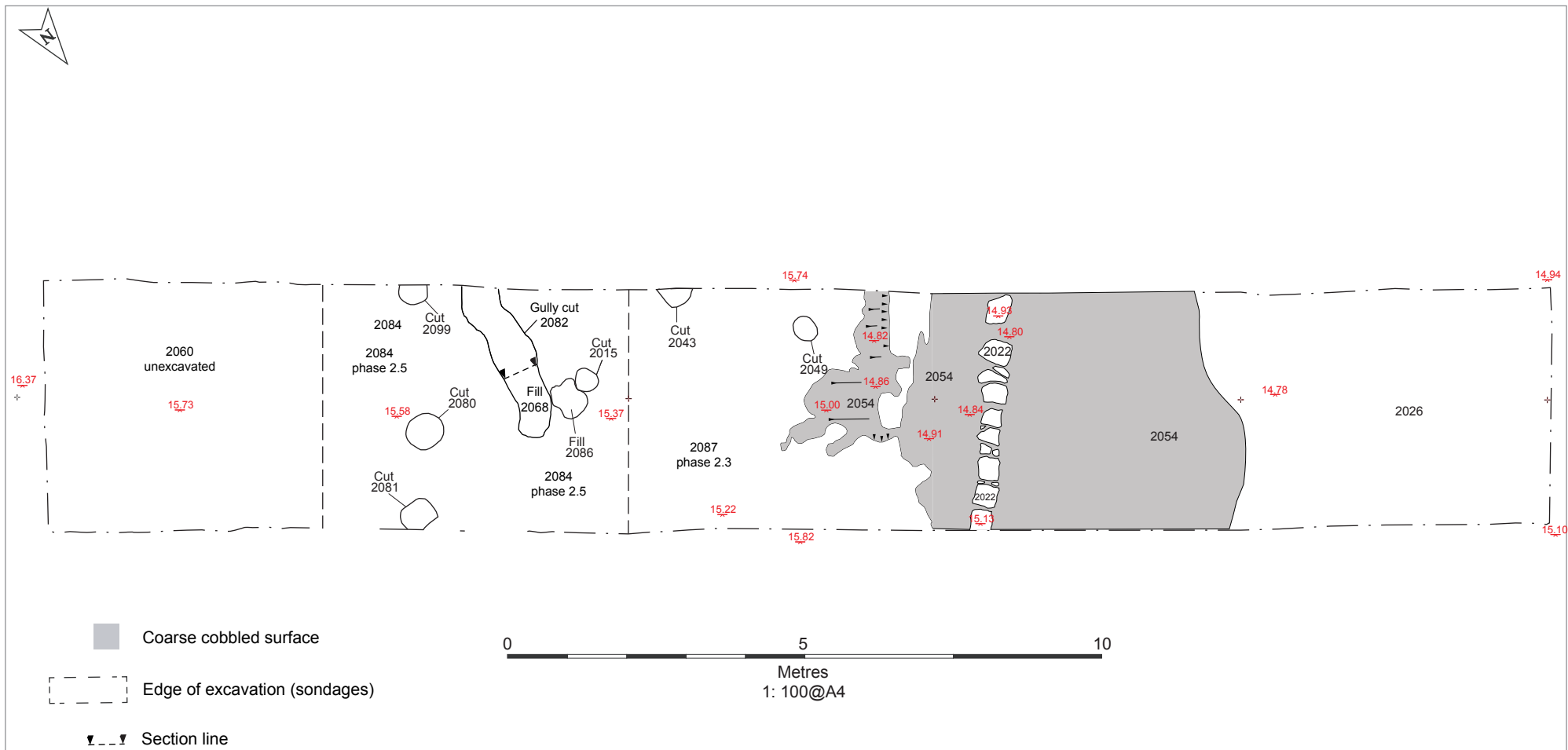


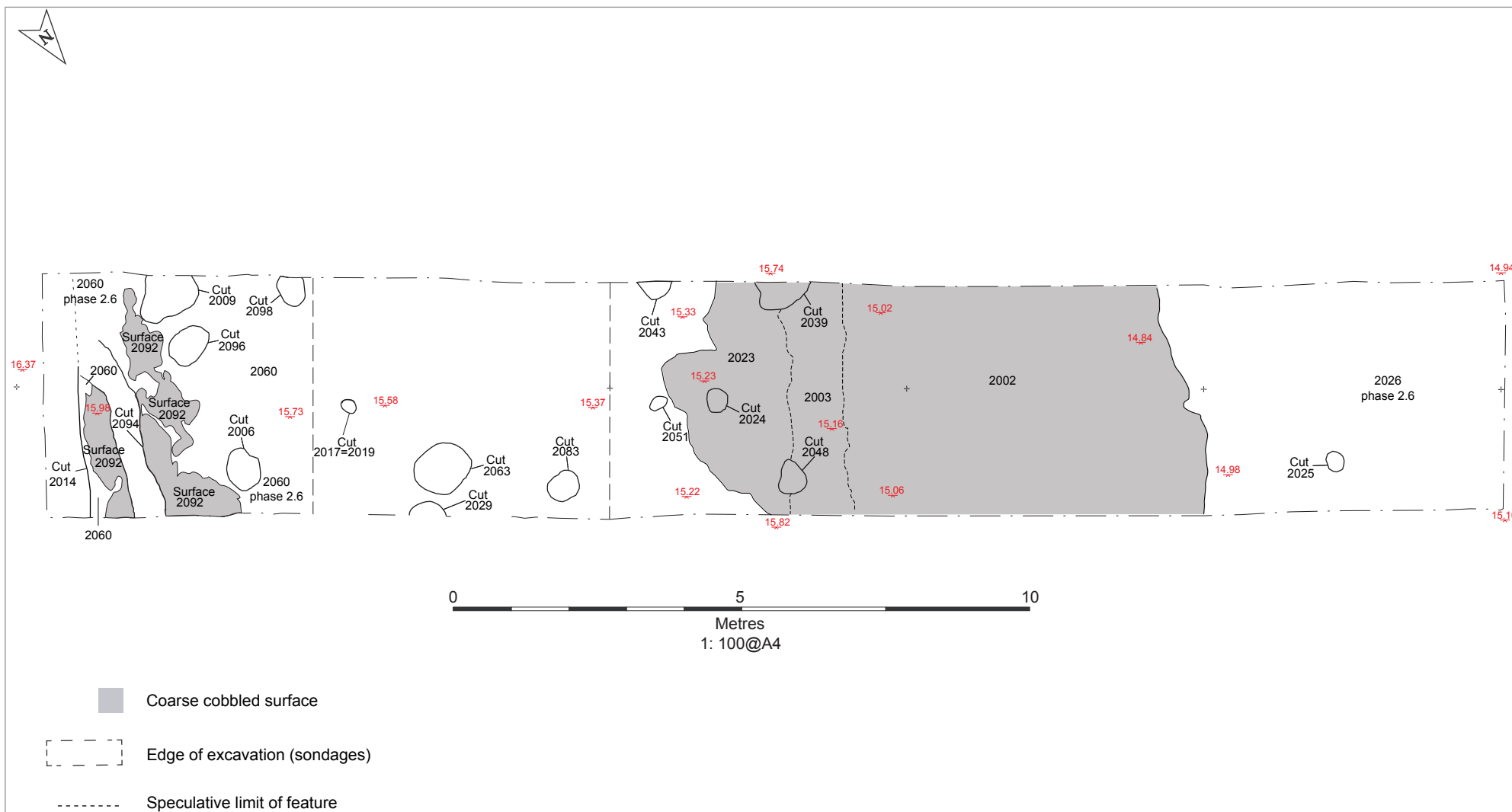
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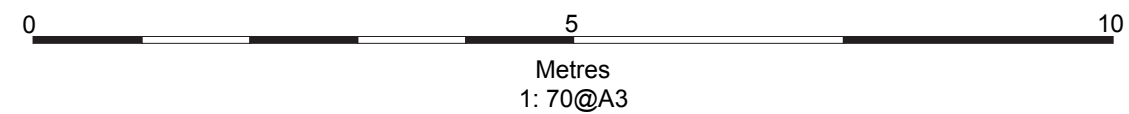
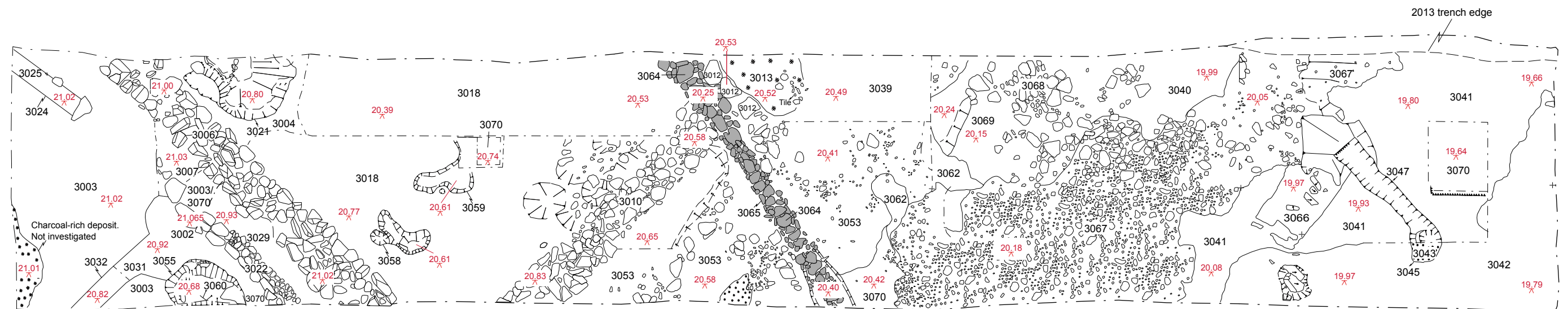


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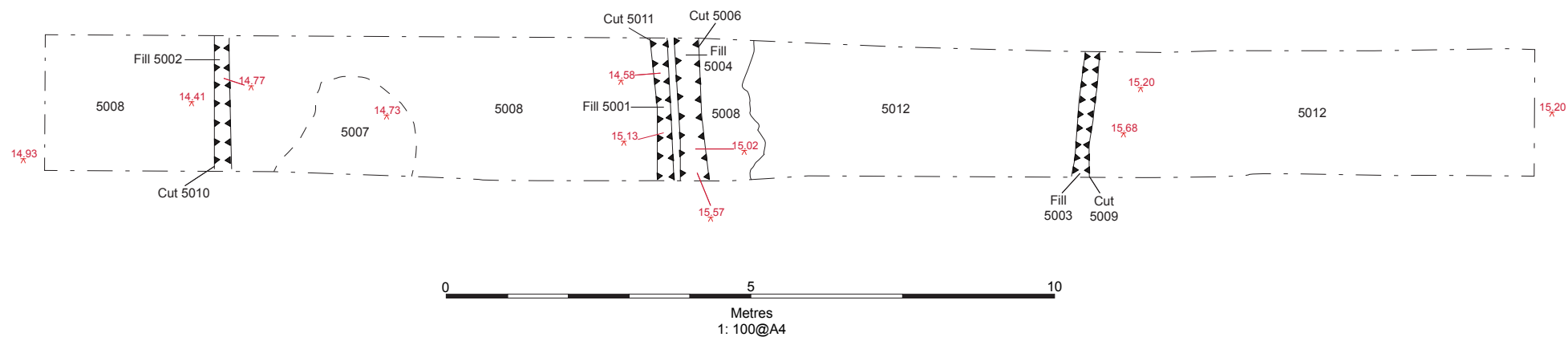








- ** Charcoal
- Post-medieval drain



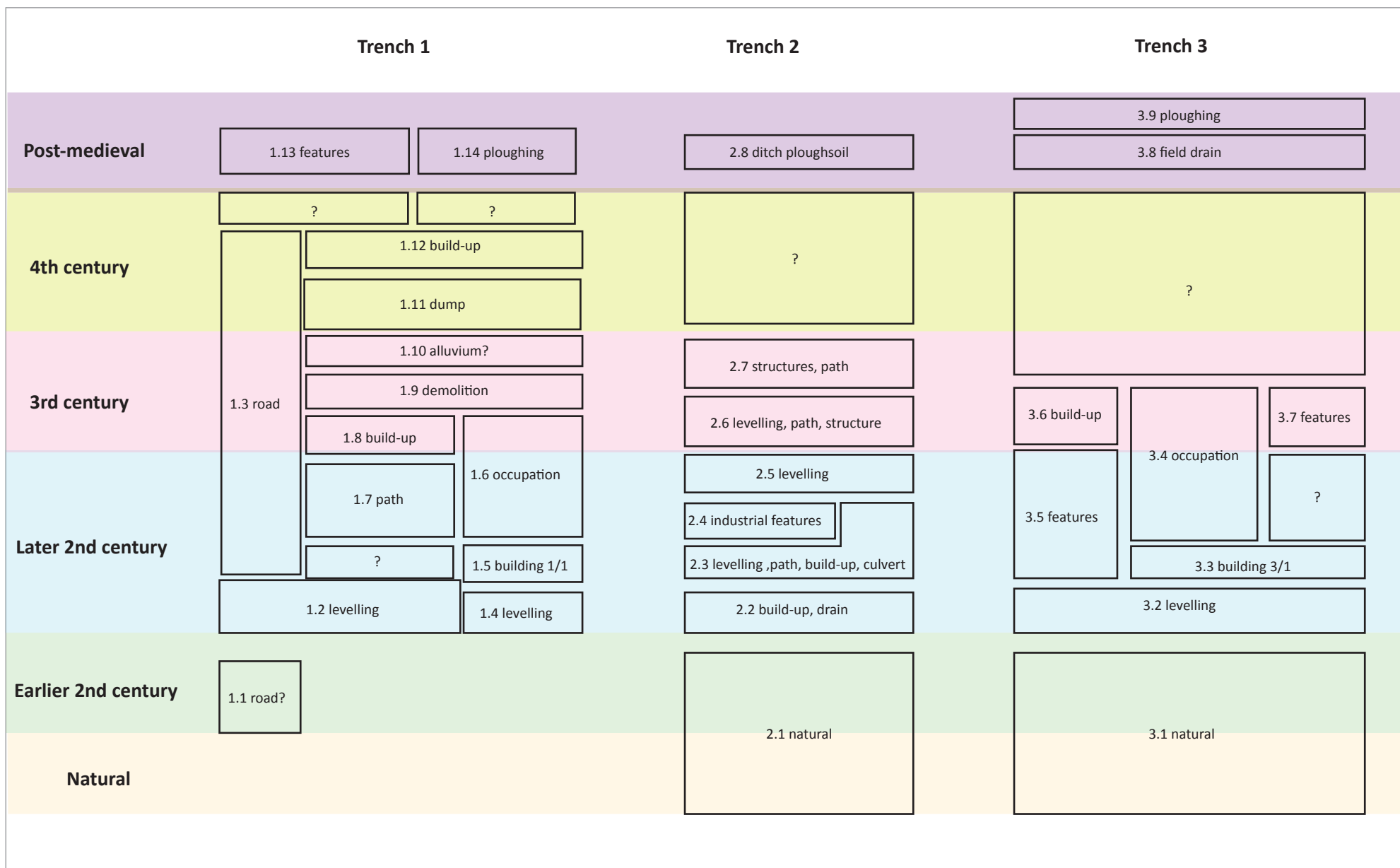
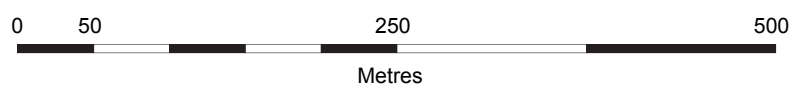


Figure 10: Diagram showing phases of activity in Trenches 1-3



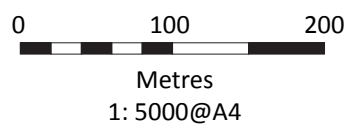
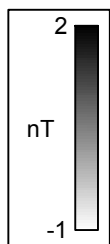
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- Location of cliff base September 2014
- Extent of findspot area 6000
- Centrepnt of findspot areas



(after GSB Prospection Ltd 2013, 12; figure 3)





(after GSB Prospection Ltd 2013, 20; figure 11)

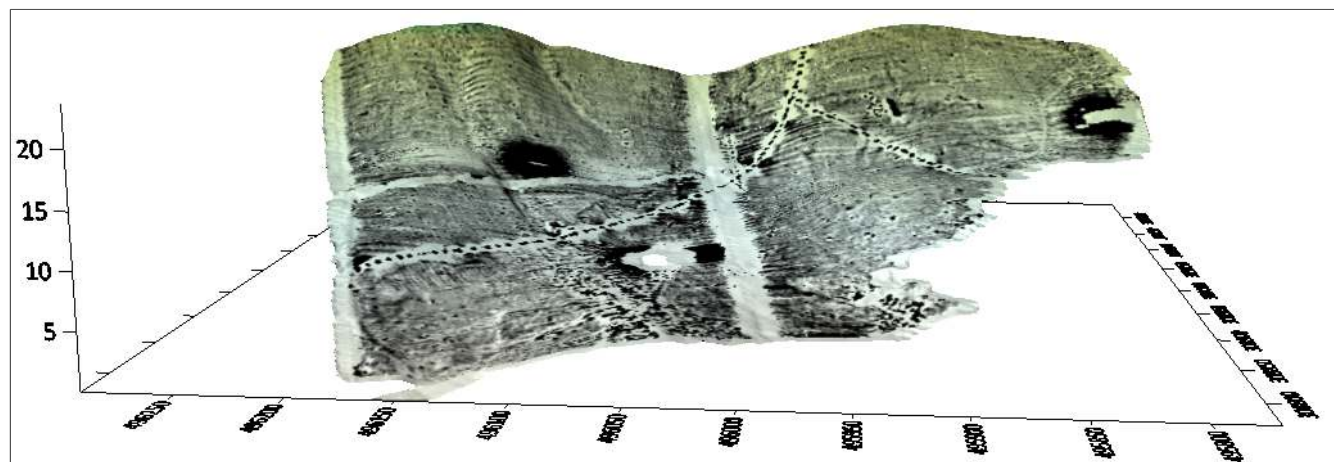
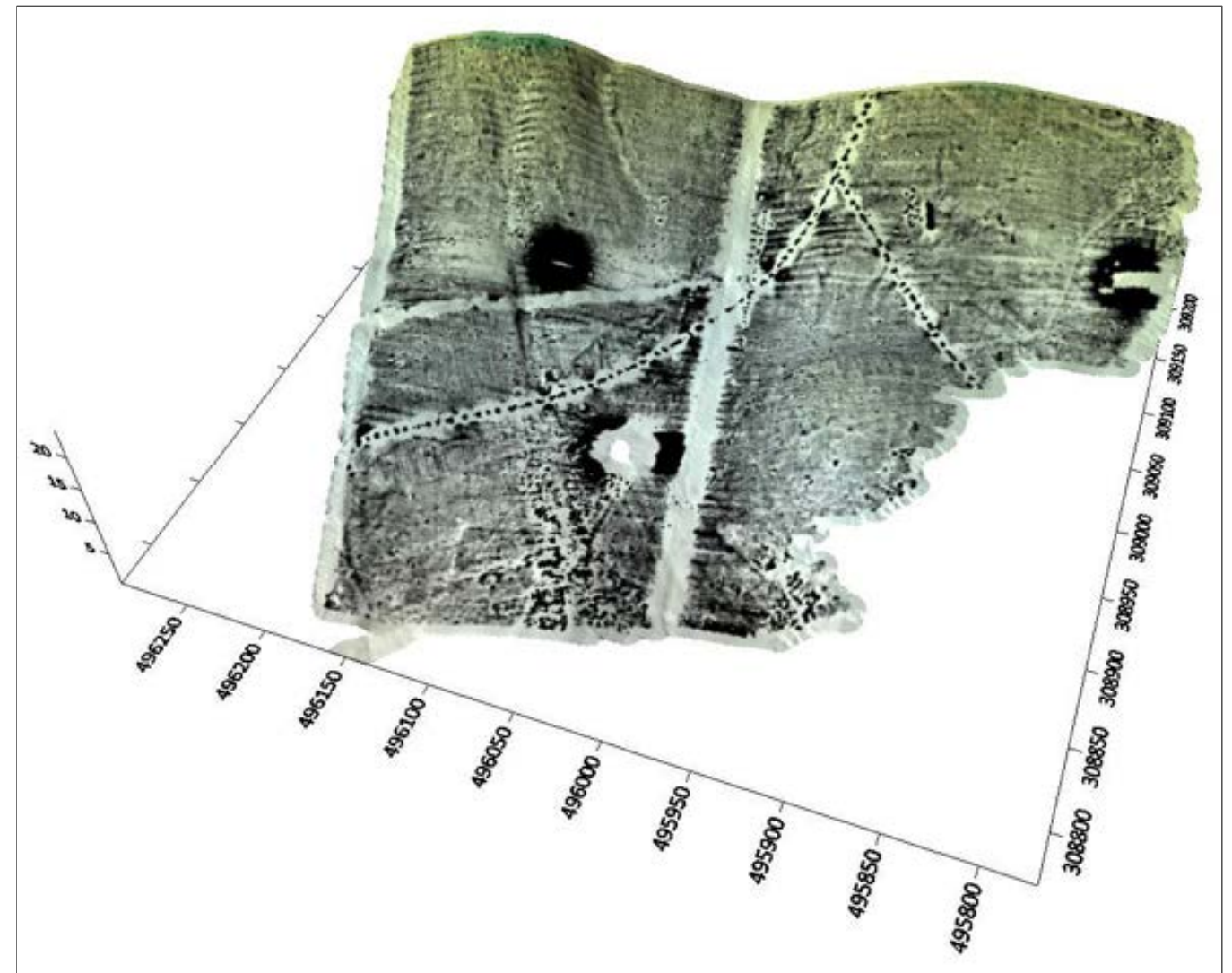
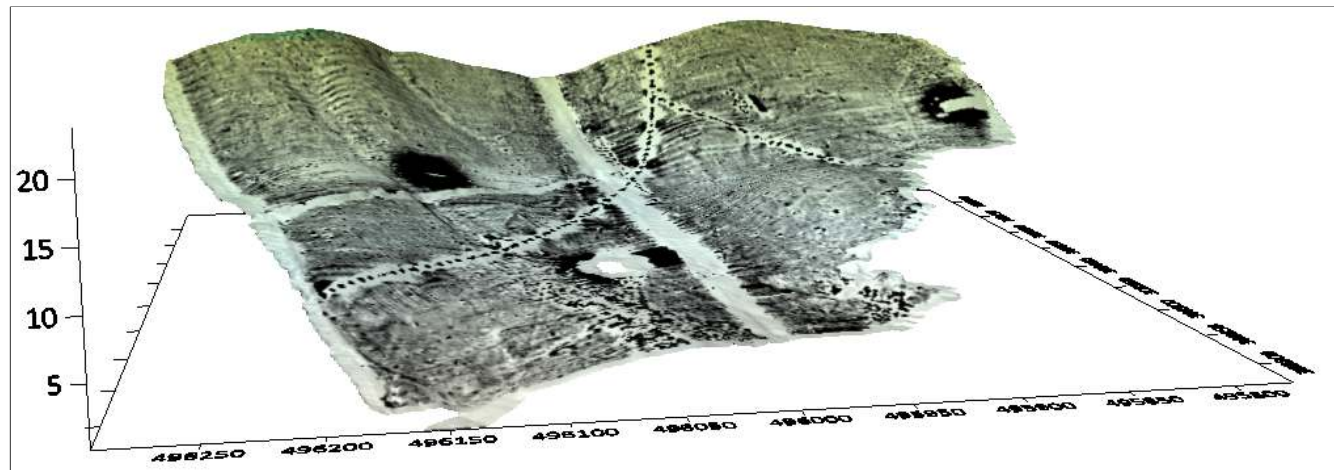
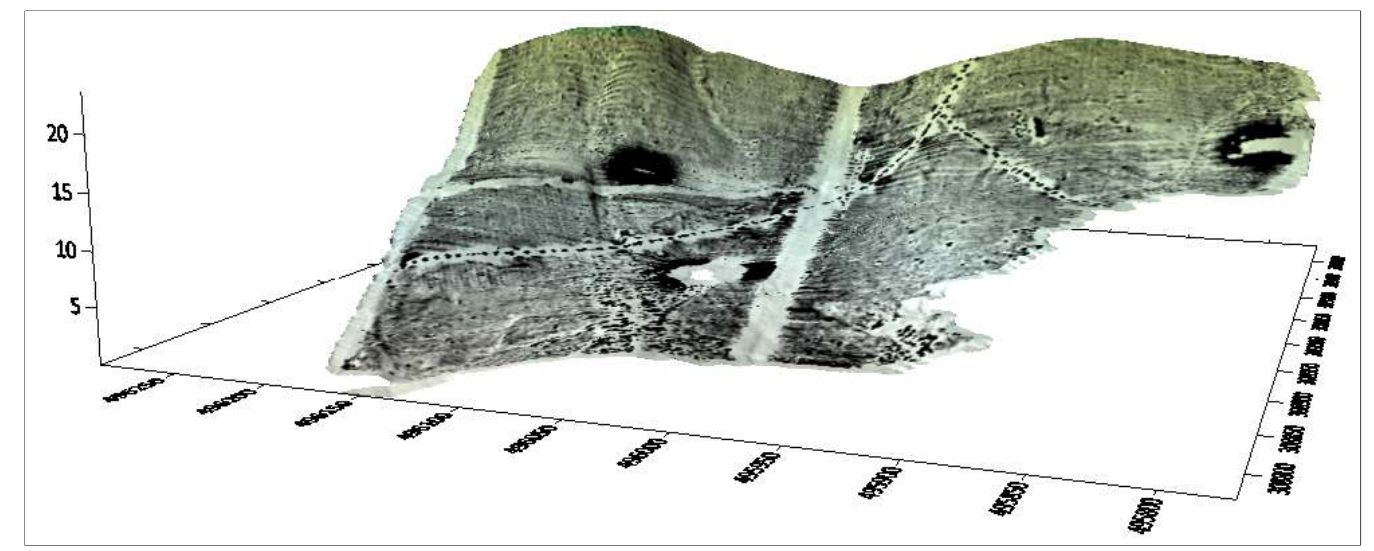
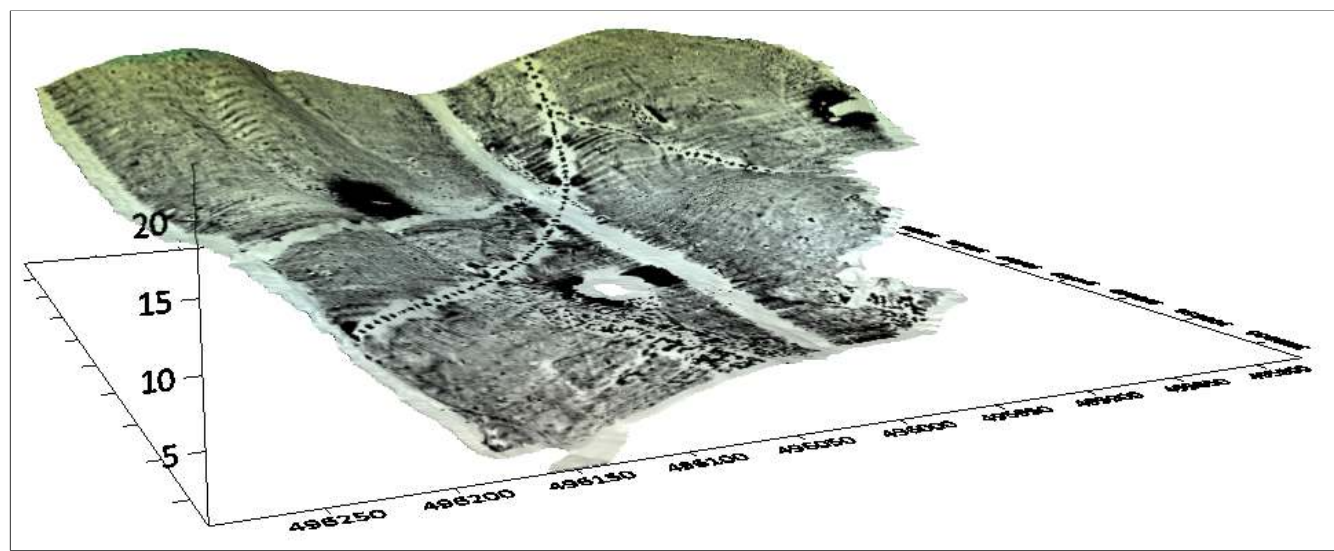
Figure 13: Resistance survey: greyscale plot, 'shallow' (high pass filtered data)



(after GSB Prospection Ltd 2013, 15; figure 6)

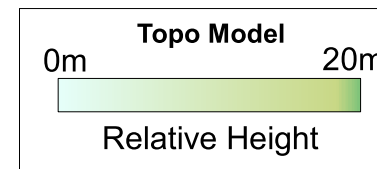
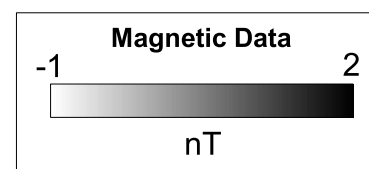
Figure 14: Magnetometer survey (Areas 1-8): interpretation plot





For scale see plot axes

Interpolated data



(after GSB Prospection Ltd 2013, 19; figure 10)



- Key:
- | | |
|--|---|
| — Existing/documented streams | — Limit of vicus |
| - - - Speculative Roman streams | - - - Speculative limit of vicus |
| — Known Roman road | - - - Speculative limit of Roman shoreline |
| - - - Speculative Roman roads | ■ Trench locations |
| — Edge of fort | Direction of reconstruction viewpoint |
| - - - Speculative edge of fort (lost to erosion) | |



Reconstruction of the fort (right) and *vicus*, viewed facing north-east. Image © Graham Sumner



1034

^
161



Not photographed



3001

^
103



3007

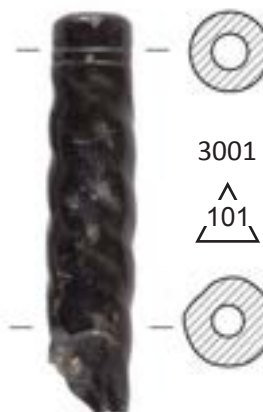


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147



2000

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159



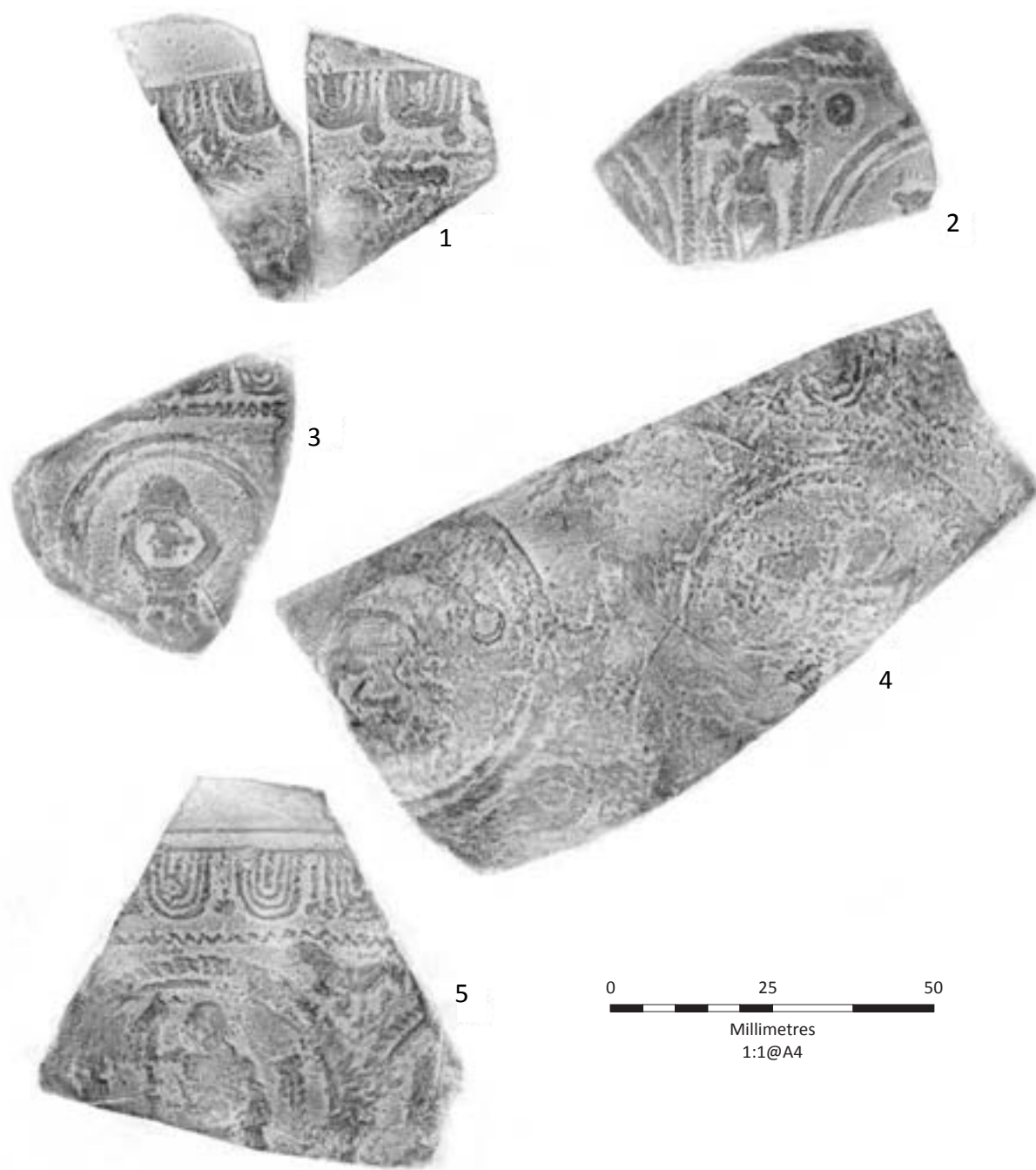
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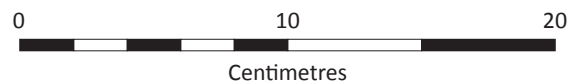
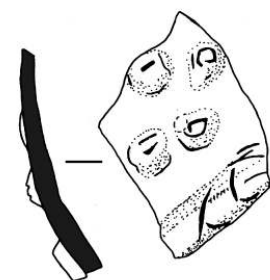
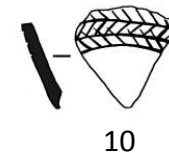
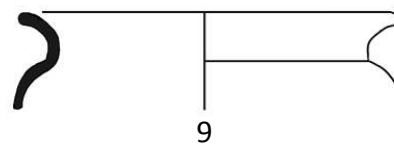
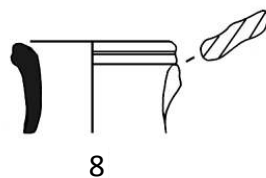
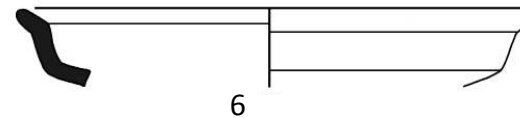
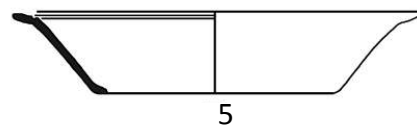
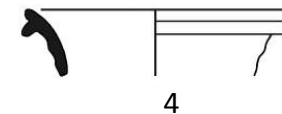
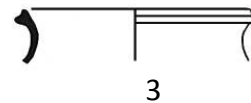
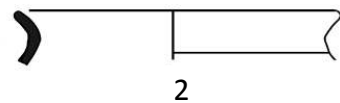
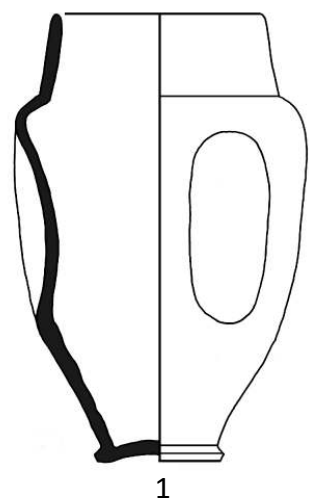
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101



0 10 20
Millimetres









Key (context numbers in brackets)

- 1: Possible pedalis (2004)
- 2: Tegula with lower cut away (2000)
- 3: Flue with incised keying (2002)
- 4: Possible ridge tile (3001)
- 5: Stone counter (2002)
- 6: Roof slate with polygonal edges (3002)
- 7: Roof slate with squared edges (1055)
- 8: Roof slate with indents (2028)
- 9: Tessera (1006)



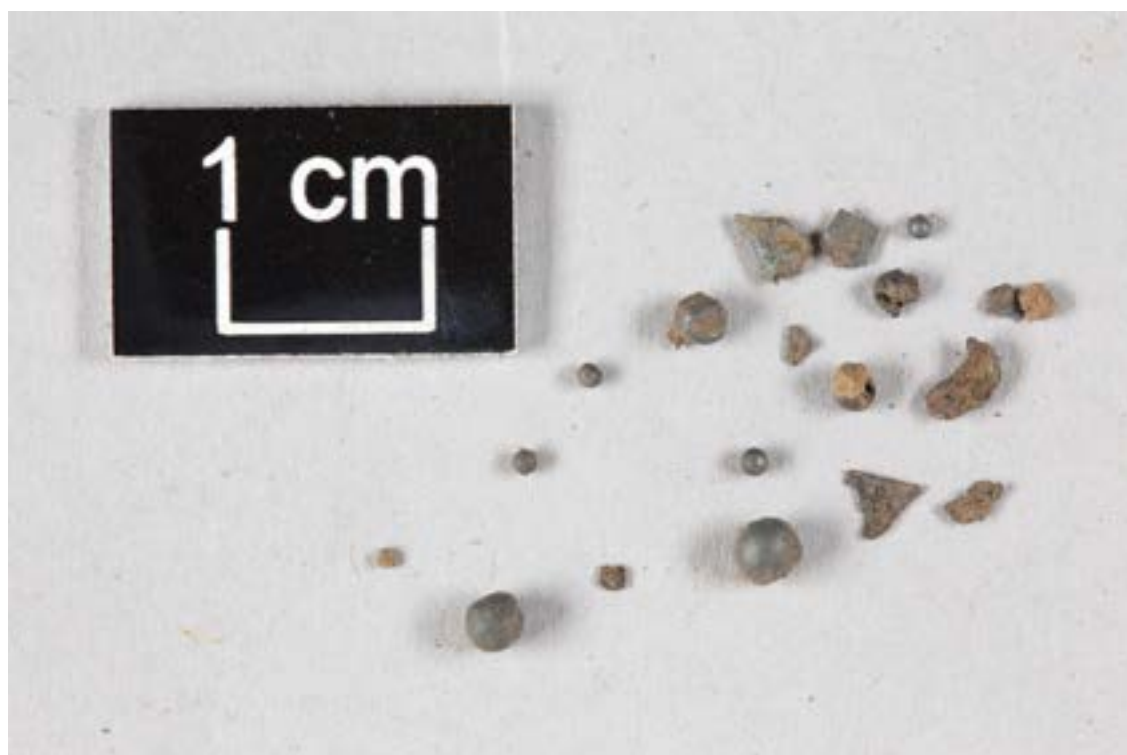
Beach finds



Nails



Hearth bottom



Hammerscale and droplets



Faustina II coin, SF37



Steelyard weight SF11



Quern fragment, context 2003 - sectional view



Quern fragment, context 2003 - plan view

PLATES



Plate 1: View south across Trench 1, with Building 1/1 in the foreground and road to the rear



Plate 2: Trench 1: Dumps and cobbles at the south end of Building 1/1, viewed facing west



Plate 3: Trench 1: dumps and cobbles to the north of Building 1/1, viewed facing east



Plate 4: Trench 1: road make-up under cobbles and gravel, viewed facing east



Plate 5: Trench 2: drain 2046 cut into 2047, with 2026 over (outside sondage) and surface 2054 (top right), viewed facing south-east



Plate 6: Trench 2: cobble surface 2072, with kerb on south-east edge, viewed facing south-east



Plate 7: Trench 2: cobbled surface 2054 over burnt occupation 2079 (bottom right) and levelling 2026 (top), viewed facing north-west



Plate 8: Trench 2: wall 2022, viewed facing south-west



Plate 9: Trench 2: rubble 2003 over surface 2054 (bottom right), and top of wall 2022 (right), viewed facing south-west



Plate 10: Trench 2: stone surface 2092, cut by gully 2094 (top left to bottom centre) and post-holes 2009 (top) and 2006 (right)



Plate 11: Trench 3: building 3/1 viewed facing south-east, with possible surface 3008/3009 over occupation deposit 3004



Plate 12: Trench 3: detail of possible surface or hearth 3008/3009, and levelling 3018 in sondages, viewed facing north-east



Plate 13: Trench 3: east wall of building 3/1 (left) and possible drain 3022 to right, viewed facing north



Plate 14: Trench 3: cobbled surface 3044/3067, with burnt clay 3069 and stone setting 3068 centre right, viewed facing east



Plate 15: Trench 4: ditch 5006 (left) and field drain 5011 (right), viewed facing south



Plate 16: Fieldwalking: sea wall 6001 and erosion, viewed facing east



Plate 17: Fieldwalking: fort erosion 6002, viewed facing east



Plate 18: Fieldwalking: industrial spoil heap in Decoy Wood, viewed facing north

APPENDIX 1: SMALL FINDS

By Nicola Rogers

Introduction and methodology

This report comments upon the finds of metalwork (excluding metalworking debris), and a selection of finds of other materials including glass, jet, pot and amber which are associated with Roman deposits, or are clearly of Roman date but in later contexts. All the iron, copper alloy and silver objects were X-rayed, and a selection of metal objects received further conservation investigation to enable identifications. This report has been written following these interventions.

The character of the small finds assemblage

The overwhelming majority of all the finds from the excavations comprise metalwork (250 finds) which made up 70% of the small finds; almost 80% of the metal objects are of iron, and 75% of the iron finds are made up of – or include – single or multiple structural nails. Non ferrous metals comprise the remainder of the metalwork. The finds of Roman date came predominantly from Trenches 1 and 2, with fewer deriving from Trench 3.

The finds reported upon here are dominated by structural ironwork (almost entirely composed of nails); a few tools, elements of jewellery, hob nails from shoes, gaming counters and coins make up the rest of this part of the assemblage.

Structural metalwork

As noted above, nails make up the bulk of the iron finds, and as Table 1 indicates, approximately 50% of the nails from Roman deposits were recovered from Trench 2, and almost 40% from Trench 1. Beyond the nails, the only other objects associated with the buildings comprise one key, and a possible hinge strap. SF68 was found in a modern context, and comprises the bit and part of the stem of a lever lock key, the bow having been broken off; the end of the stem is hollow to fit over a pin in the lock and the bit is to one side, with two rectangular cut-outs. This type of key probably operated the lock on a box or casket (Mould 2011, 177), and although similar keys were also used in the medieval period (Goodall 2011, 240-241, Type C), SF68 seems more likely to be a Roman key (cf. Manning 1985, 94-95, O62) because medieval material has not been identified elsewhere on this site. The possible hinge fragment SF57, of which only the terminal survives, was found in the backfill of a post hole associated with the Phase 2.6 structure.

Catalogue

NB the following abbreviations are used throughout the catalogue entries in this report: L. = length, W. = width, Th. = thickness, Ht. = height, Wt. = weight, Diam. = diameter.

Small find no	Context	Description
SF68	1001	Iron lever or rotary lock key fragment, bow broken off, stem appears solid, but hollow at end where bit is to one side with single rectangular cut-out on each side. Stem L.69mm W.6mm Bit L.23mm, W.13mm.
SF57	2012	Iron ?hinge terminal with rounded end and nail perforating it, plus separate but adjoining fragment which appears slightly curved and is probably incomplete. L.47mm, W.22mm.

Tools

Knife blade fragments were found in Phase 1.6 deposits associated with Building 1/1 (SFs234, 353) and in a Phase 3.4 occupation layer associated with Building 3/1 (SF48). Unfortunately none of the blade fragments are sufficiently complete to make any comments upon the types of knives they may derive from, but their occurrences in association with these buildings suggest they could have been involved in craft or industrial working activities. SF56 appears to be a possible iron tool shaft, on which the ends are unfortunately incomplete, so its original use is uncertain; this was found in a Phase 3.4 pit fill.

A lead alloy sheet fragment (SF340) was recovered from Context 1062 (a Phase 1.7 path associated with Building 1/1 construction); it is possible that lead alloy working was being undertaken during this period, and a number of lead alloy spillages were recovered from the site, but all were from modern or unstratified levels, so these could be of recent date.

A probable steelyard weight was found in the topsoil of Trench 3 (see Figure 24) demonstrating the use of weighing devices within the *vicus*.

Catalogue

Small find no	Context	Description
Part of SF234	1050	Iron, possible knife blade fragment. L.33mm, W.16.5mm.
SF353	1048	Iron, possible knife blade fragment. L.35.5mm, W.17.5mm.
SF48	3004	Iron knife blade fragment (with attached mineralised wood remains which are likely to be accidental). L.70mm, W.14mm.
SF56	3027	Iron, possible tool fragment, shaft of sub-rectangular section, tapering to one end (?working end), other end appears broken. L.94mm, W.24.5mm.
SF340	1062	Lead alloy folded sheet fragment. L.35mm, W. 27mm, Th. 8mm.
SF11	3001	Probably steelyard weight. Bi-conical form with an iron core.

Jewellery

An unusual jet melon bead (SF161) was found in a Phase 1.10 silt layer which post-dated the 3rd century demolition of Building 1; it may have originally been part of an armlet or necklace (Allason-Jones 1996, 28). Typically melon beads were made of glass or frit, and they were popular in the Flavian-Antonine period (late 1st to mid 2nd centuries), but then ceased to be produced, so SF161 must be residual. A tubular jet bead (SF101) with spiral carved decoration found in modern ploughsoil is also a residual find from the Roman period (see Allason-Jones 1996, 29, no.44). A simple globular glass bead (SF147) was found in a 3rd century (Phase 3.7) pit fill.

Two glass ring fragments (SF103, SF159) were both found in modern levels, but are probably contemporary with the jet melon bead. Both are opaque white and belong to a form conventionally called bangles which were in use during the later 1st to early to mid 2nd centuries, although it has been suggested that the plain opaque white form may be a specifically 2nd-century type (Cool and Price 1998, 189). These rings came in a variety of other sizes, colours and patterns, but quite how they were used has been a matter of great debate, as some are of too small a diameter for use as a wrist ornament; other possible uses include hair rings. The beads and bangles are shown in Figure 18 and Plate 19 (below).

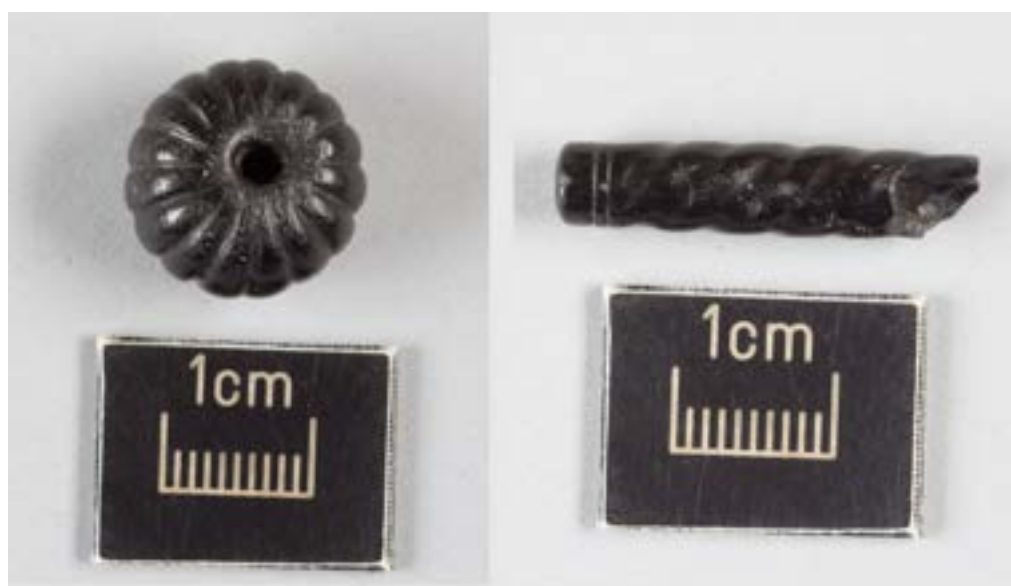


Plate 19: Jet melon bead SF161 and jet bead SF101

Catalogue

Small find no	Context	Description
SF161	1034	Jet melon bead, complete. Ht. 10.5mm Diam. 16mm.
SF101	3001	Jet bead, incomplete, tubular with spiral decoration, and two incised lines around complete end, broken at other end. L.26mm, Section diam. 5mm.

SF147	3007	Glass bead, globular, opaque, pale yellow . Ht. 3mm Diam. 3.5mm.
SF103	3001	Glass ring fragment, of plano-convex section, opaque off white. L.14mm Section Th.8mm.
SF159	2000	Glass ring fragment, of plano-convex section, opaque white. L.15mm Section Th.8mm.

Shoes (hob nails)

A total of 53 hob nails deriving from shoes were recovered from across the site (see Table 1). This relatively small number of nails was distributed across Trenches 1 to 3, with the majority coming from Trench 2 (31 hob nails) and Trench 3 (15 hob nails) deposits. Unfortunately almost 60% of the hob nails were from modern or unstratified deposits.

Gaming counters

Two probable gaming counters made from recycled Roman pot sherds were identified: the smaller counter (SF23) is made from a sherd of Samian ware, and was recovered from a Phase 1.9 demolition layer within Building 1/1. The other, SF20, was unstratified. It has been noted that almost every Roman site in Britain produces similar discs, usually interpreted as gaming counters; possible board games in which they were used include *ludus latrunculorum*, also known as ‘soldiers’, a battle type game of skill which was clearly popular within the army in particular, and *duodecim scripta*, which was similar to backgammon (Allason-Jones 2011, 234-5). The counters are shown in Figure

Catalogue

Small find no	Context	Description
SF23	1008	Pottery ?gaming counter, sub-discoidal, made from sherd of Samian, very worn. Diam. 20.5mm, Th. 5mm.
SF20	2001	Pottery ?gaming counter, sub-discoidal. Diam. 35mm, Th.5mm.

The significance of the assemblage

Analysis clearly shows the dominance of structural ironwork within the Roman assemblage, concentrated on the buildings in Trenches 1 and 2, and comprised predominantly of nails, with a key fragment and possible hinge fragment also found. A few knife fragments and a possible tool shaft were found in association with the Trench 1 and Trench 3 buildings; on its own, such a small group of tools fails to identify a particular use of these buildings but may be seen to complement the considerable ironworking evidence provided by the slag. Possible lead alloy working is also hinted at.

Very few personal items were recovered – only three necklace beads and fragments of two glass rings, a small number of individual hob nails, and two gaming counters.

Together these objects provide small glimpses of the population living and working in the areas of these buildings: the beads and glass rings almost certainly belonged to women (Swift 2011, 207) and all probably date to the 2nd century. Hob nail shoes were worn by both sexes, but it has to be pointed out that 53 hob nails in total may equate to less than one complete shoe, so few conclusions can be drawn from these. The single stratified gaming counter may indicate recreational activity in the vicinity of the buildings.

Table 1: Number of nails by phase (stratified nails only)

Phasing	Phase total
1.3 Road, late 2 nd C	6
1.5 Building 1 construction, late 2 nd C	1
1.6 Building 1 floor occupation, late 2 nd -3 rd C	22
1.7 Hard standing, ?late 2 nd -late 3 rd C	6
1.8 Build-up (?derived from activity in Building 1)	18
1.9 Building 1 demolition c.225+	2
1.11 Levelling/dumping, late 3 rd C	3
Trench 1 total	57
2.3 levelling, mid 2 nd C	2
2.5 levelling over possible industrial features, ?late 2 nd -3 rd C	15
2.6 mainly levelling, 3 rd C	29
2.7 industrial structures, path, drain, 3 rd C c.220+	32
Trench 2 total	78
3.4 building 3/1 occupation, mid 2 nd C+	7
3.5 activity north of building 3/1, 2 nd C	2
3.6 later activity north of building 3/1, 3 rd C	1
3.7 activity east of building 3/1, 3 rd C	5
Trench 3 total	15
Nails in all phases	150

Table 2: Number of hob nails by phase

Phasing	Phase total
1.6 Building 1 floor occupation, late 2 nd -3 rd C	7
Trench 1 total	7
2.6 mainly levelling, 3 rd C	2
2.7 industrial structures, path, drain, c.220+	1
Unstratified	28
Trench 2 total	31
3.7 activity e of building 3/1, 3 rd C	12
Unstratified	3
Trench 3 total	15

Roman coins

by Andrew R. Woods

Table 3: Catalogue of Roman coins

SF No	Context	Identification
37	2001	Copper-alloy As struck in the name of Faustina II in the period AD 147-75. Obv. FAVSTINA AV[] Bust right Rev. [] S/C Hilaritas standing left, holding long palm and cornucopiae RIC III, p. 345, no. 1643. Shown in Figure 24
73	4018	(Coin not seen – Identified from digital images) Copper-alloy nummus of Magnentius or Decentius, struck in the period AD 350-3. Obv. [] Bust right Rev. [victoriae dd nn avg et caes] Two victories standing holding inscription on column.
76	4014	Silver denarius, probably struck for the emperor Hadrian in the period AD 117-38. Specific further detail is uncertain given the poor condition of the coin. Obverse: [] M [] A I A N O [] Laureate bust right Reverse: [] Seated deity left.
84	4000	Silver Denarius of the emperor Trajan, dating from the period AD 103-111 and struck at the mint of Rome. Obverse: IMP TRAIANO [avg ger dac p m tr p] Laureate bust right, (draped on left shoulder?) Reverse: COS V P P S P Q R [optimo princ] Aequitas seated left, holding scales RIC II, p. 252, no. 119.
316	1000	Uncertain copper-alloy As, first to Third century AD. AD 41-260.
321	2000	Silver Denarius of the emperor Vespasian, dating to the period AD 72-3. Possibly struck in the mint of Antioch. Obv: [] AVG P M COS Laureate Head right Rev: [] Probably Vesta standing left, holding sipulum and sceptre RIC II, 1556?

Quern

About 50% of a beehive quern base was recovered from context 2003. This was not assigned a small find number due to its size and robustness. The fragment is divided across its diameter, and has an apparently convex grinding surface of c.32cm diameter and 11-13cm thick, with an unusually large c.45mm diameter, 40mm deep spindle hole. The rounded basal area has a central, 75mm diam, 20mm deep concavity. The fabric appears to be pick granite. See Figure 25.

APPENDIX 2: GLASS

By Karen Weston

Introduction

This report comments upon the vessel glass which is associated with Roman deposits, or is clearly of Roman date but in later contexts. A total of 96 stratified Roman glass sherds were recovered from excavations at Ravenglass, of which 16 were from Trench 1, 48 from Trench 2 and 32 from Trench 3 (see Table 4).

Trench 1

Of the 16 Roman glass sherds from Trench 1, 10 were from Roman deposits, five from post-medieval/modern deposits and one unstratified. The majority of the glass sherds from Trench 1 were recovered from the Roman road surface levelling/make-up deposit (Phase 1.2) and the road surface itself (Phase 1.3), comprising five bottle and vessel sherds and one fragment of window glass. Four glass fragments were recovered from the Roman building in Trench 1 (Phase 1.5), three from occupation layers (Phase 1.6) and one from the subsequent demolition (Phase 1.9). Two of these fragments may be glass slag and one shows evidence of heat damage. This, along with a sherd from a possible glass funnel (SF361) recovered from rubble around the Roman building, could be illustrative of glassworking in the vicinity. Five residual bottle and thin walled vessel fragments of Roman glass were recovered from the post-medieval cobbled trackway (Phase 1.13) and the modern ploughsoil (Phase 1.14). On one of the residual fragments, a square bottle base (SF359), the pontil mark made by the pontil rod during the glass blowing process was visible.

Trench 2

A total of 48 Roman glass sherds were recovered from Trench 2; 36 from Roman deposits and 12 residual sherds from post-medieval/modern ploughsoil deposits (Phase 2.8). One of these residual sherds is a dark blue glass fragment, possibly from a polychrome mosaic bowl dating to the early Flavian period (SF358; J. Price, pers. comm.). Excavation of the late 2nd-3rd century levelling deposits (Phase 2.5) revealed only two sherds of glass bottles. Two sherds included many bubbles, a sign that the firing temperature within the kiln was too low. The majority of the Roman glass from Trench 2 was recovered from the 3rd century levelling and build-up associated with structures and features (Phase 2.6). Of the 26 bottle and vessel sherds from this phase, 21 fragments were likely to have been from the same thin walled vessel. Eight sherds were recovered from 3rd century levelling and build-up associated with industrial structures, a path and drain in Trench 2 (Phase 2.7). Of these, one bottle sherd dates to the late 1st to mid-2nd century and is therefore clearly residual in a

3rd-century context. A further sherd is from the rim of an unguent bottle (SF357), which would have been used for perfumes and oils.

Trench 3

A total of 32 Roman glass sherds were recovered from Trench 3, of which 22 were from post-medieval/modern contexts and only 10 from Roman contexts. Three of the bottle sherds from the modern layers are, as would be expected, heavily abraded, one shows damage from heat and one again has many bubble inclusions, suggesting that the kiln was not hot enough during the glassmaking process. The 10 fragments from Roman contexts (2nd- and 3rd-century occupation layers and gully fills, Phases 3.1 and 3.2) are mainly body sherds of bottles, in addition to one sherd of window glass. The neck of a bottle was also recovered whose bubble inclusions had been elongated illustrating the process of drawing up the neck when the bottle was made (SF362).

Bottles and thin walled vessels

The majority of Roman glass sherds recovered from excavations at Ravenglass were from 2nd- and 3rd-century blue/green utilitarian bottles and thin walled vessels which would primarily have been used for storing liquids and foodstuffs (89 sherds which equates to 91% of the total Roman glass assemblage). Such bottles were very common and would have been present in most households. Later bottles such as these would have been blown in a mould as opposed to the mouth-blown method preferred in the 1st century (Price and Cottam 1998). The pontil mark on the bottom of the square bottle base recovered from Trench 1 (SF359) suggests that it was either an earlier bottle, or one of the few mouth blown bottles made in the 2nd and 3rd centuries. The blue/green colour of such bottles was not intentional. It is the result of iron oxide impurities in the sand which was used as the 'former' in the glassmaking process.

Unguent bottles

Two fragments of unguent bottle were recovered from excavations at Ravenglass, both from levelling deposits in Trenches 1 and 2 (SFs 357 and 362). Such bottles would have been primarily used as containers for oils although may have also been used for powdered substances. They are often found in burial contexts, and have been found in association with cremations, showing extreme heat damage.

Window glass

Roman window glass can easily be mistaken for small fragments of thin walled vessels or bottles. However, Roman window glass often has one rough and one smooth side, the rough side being the result of the glass sheet being put down onto a surface to

cool. Using this methodology, a total of five fragments of Roman window glass were recovered from all three trenches.

The significance of the assemblage

The Roman glass assemblage suggests occupation of lower status, being made up of utilitarian, everyday vessels which would have been in great abundance at the time of occupation of the *vicus*. A lack of any colourless glass tablewares within the assemblage also attests to this. The glass was very fragmented and no whole or even partially whole vessels were present. Most of the glass assemblage was recovered from levelling and makeup deposits, inferring a high level of residuality. In addition, no fresh breaks were noted on any of the fragments, with most being partially or heavily abraded. This suggests that the glass has been moved a number of times and is most certainly not in its primary context.

A further reason for the fragmented nature of the assemblage may be due to the practice of recycling glass in the Roman period. Areas of occupation were often subjected to the systematic collection of glass, with only the smallest of fragments being left behind (Price and Cottam 1998). Glass collection for recycling may well explain why the glass assemblage at Ravenglass is so fragmented.

Table 4: Number of Roman glass fragments by trench

	Bottle	Unguent	Other vessel	Window	Possible glassworking
Trench 1	12	1	2	1	2
Trench 2	9	1	37	1	0
Trench 3	20	0	9	3	0

APPENDIX 3: METALWORKING DEBRIS

By Rachel S. Cubitt

Introduction

Two seasons of excavation in the *vicus* outside the Roman Fort at Ravenglass produced a large quantity of metalworking debris which has been subjected to visual assessment. The results of this work are presented in Table 5 below. The following text briefly outlines the categories of evidence encountered before discussing what the debris tells us about metalworking activity at the site.

Metalworking processes produce a spectrum of waste products and a number of the fragments from Ravenglass had characteristics of more than one type of debris so were attributed to what was felt to be the most appropriate category. It must be noted that the fragments were very dirty and encrusted with mud so some items had to be washed to aid identification.

Table 5: The metalworking debris from Ravenglass

Activity	Classification	weight (g)	no. of items
Smithing	smithing hearth bottoms	10,426	36
	hammerscale	evidence discussed elsewhere	
Non-diagnostic ironworking	non-diagnostic iron slag	57,657	961
	iron-rich cinder	286	23
High temperature process residue	Vitrified furnace / hearth lining	4457	132
	furnace debris (semi vitrified)	56	6
	fired clay	1985	130
	cinder	19,313	1125
Non-slag items	concretion	3510	171
	glassy material	8	1
	coal	5	2
	charcoal	53	29
	haematite	626	8
	Total	98,382	2618

Outline of the debris encountered

By far the largest category was **non-diagnostic ironworking slag**, 57.7kg. It is not possible to determine by visual assessment whether this material relates to iron smelting or smithing. There is no definitely smelting residue among the assemblage.

Thirty-six **smithing hearth bottoms** (SHB) were recorded. These are formed from the droplets of slag that accumulate in the hottest part of the fire, near the air inlet, whilst an object or bloom is being worked. When furnaces were cleaned out the SHB would be removed and discarded. These items are therefore characteristic of smithing activity taking place.

It is informative to look at the range of sizes and weights of the SHB in an assemblage as this gives some idea of hearth size and therefore the range of smithing work being undertaken. Figures calculated for the Ravenglass SHB show that they are quite a close group in terms of size with a standard deviation of just a few cm from the average figures, 8.5 x 6.6 x 3.9cm. This is suggestive of a similar smithing operation being repeated. The variation in weights is much greater, however, with a standard deviation from the average weight (289g) of just over 200g. By far the heaviest hearth bottom was found to be adhering to a large fragment of the side of the hearth. This combined weight could be skewing the figures. The SHB are generally well consolidated, a feature often associated with charcoal-fuelled smithing.

Hammerscale provides a second category of evidence which is diagnostic of smithing. It is particularly important for interpreting smithing sites as it tends to remain where it falls. Previously, the pattern of hammerscale distribution within a smithy has been used to identify the location of the hearth, anvil and even where the smith may have stood when working (Starley 1995). There are two forms. **Flake hammerscale** derives from the thin layer of slag on the surface of an object in the hearth. It becomes detached as the object is worked by the smith. **Spheroidal hammerscale** is liquid slag that escapes from inside pieces of iron being welded at high temperatures. A third category, miscellaneous hammerscale, has been proposed to cover fragments of metal that do derive from smithing but do not have a classic hammerscale morphology (Dungworth and Wilkes 2009, 41-42).

Among the hand-collected slag it is possible to find hammerscale at the bottom of an object's bag among soil that has detached during storage. Using a magnet there were 22 instances in which flake hammerscale was identified in finds bags. The majority of these occurrences (20) were with debris that originated from Trench 1, with only one occurrence each from Trenches 2 and 3.

The majority of the hammerscale information from any site comes from the soil samples taken at the time of excavation. The presence of magnetic fragments among the material recovered from the soil samples was noted during the environmental assessment (Carson 2015). The magnetic material was separated out and once returned to this researcher was subjected to visual assessment to determine which types of hammerscale were present among the fragments. Table 6 presents the results, using the same quantification system as in the environmental report.

This shows that in general, true hammerscale is only a proportion of the magnetic material encountered. Other items are just small fragments of iron which cannot be definitely associated with metalworking; in fact, some of these pieces could be parts of hobnails. Roman ironworking technology is not thought to have advanced as far as

producing liquid iron, except by accident during smelting operations (Tylecote 1986, 177).

Table 6: Hammerscale identified amongst the magnetic material

Context	Quantity	Hammerscale type		
		Flake	Spheroidal	Miscellaneous
1001	2	Y		Y
1043	3	Y	Y	Y
1045	3	Y	Y	Y
2001	2	Y		
2010	2	Y	Y	
2011	1	Y		
2032	2	Y		
2040	0			
2042	1	Y	Y	
2047	0			
2064	1	Y		
2065	0			
3001	1	Y		
3002	1	Y		
3004	1	Y	Y	
3009	0			
3014	0			
3020	1	Y		
3021	0			
3027	1	Y		
3030	1	Y	Y	
3048	1	Y		
3050	1	Y		

(0=None, 1 Rare, 2 Occasional, 3 Frequent, 4 Abundant, 5 Dominant)

The excavations produced a large quantity of material relating to the structure of a hearth or furnace. This sort of debris can be produced by a range of high temperature processes, including domestic activity. Almost 4.5kg of **vitrified hearth or furnace lining** was recorded. This material forms as a result of high temperature reactions between the clay lining of the hearth/furnace and the alkali fuel ash, in the case of ironworking the fayalitic (iron) slag. In some cases this material preserves the shape of the tuyere, the pipe through which air was blown into the hearth. There were several instances of

tuyere impressions among the Ravenglass material, with diameters in the range 22-30mm.

Cinder is an associated material to vitrified hearth/furnace lining. These fragments are formed in the same way but have spalled away from the side of the hearth. 19.3kgs of this material was recovered from Ravenglass, including some quite sizeable lumps. The cinder seen here tended to be very glassy in appearance and black/grey or white in colour. There is a further category of cinder that can be linked to ironworking through its colour, which suggests that it is rich in iron. 286g of this **iron rich cinder** was recorded.

There is also a little less than 2kg of **fired clay**, plus a sample of fired clay from context 3069 which was not quantified. This material also relates to high temperature activity, whether industrial or domestic. Either the process was not hot enough to lead to vitrification or this group of material was located away from the main source of heat. A small group of related material which is here called furnace debris is material which has only just begun to vitrify (56g).

The archaeological context of the metalworking debris

The majority of the metalworking debris was recovered from Trench 1 (see Table 7), including all but one of the smithing hearth bottoms and the majority of the hammerscale evidence. Although indicative of smithing activity it is clear from examination of the site phasing that this material is not in its primary place of production. Much of the slag from the Trench 1 was found to be incorporated into road make up (Phases 1.2 and 1.3). The use of metalworking debris as hardcore is seen elsewhere in the Roman period, for example in road construction in the Weald (Bayley *et al.* 2008, 45). Slag was recovered from occupation deposits in Building 1/1 (Phase 1.6), but it was not associated with industrial activity and appears to have been used to form a floor. The hammerscale recovered from soils in Trench 1 occurs in relatively small quantities and might be the result of this material becoming detached from hearth bottoms in the burial environment.

In Trench 2 the majority of the metalworking debris, including the single smithing hearth bottom comes from the plough soil (context 2001, phase 2.8). The earlier phases excavated in the trench are described as having industrial features. Phase 2.4 included charcoal deposits, red burnt layers and a slot which was described as a flue (Hunter-Mann 2015, 5). However, this phase produced no hand-collected debris at all. Overall, very little metalworking debris came from the early phases of Trench 2. There were greater instances of cinder, fired clay, and vitrified hearth debris – all related to a high temperature process but not specifically metalworking. The excavated features therefore could be domestic activity or some other form of industry. It is noted that the environmental specialists identified domestic hearth waste in Phase 2.3 and raised the possibility of a corn drying facility in Phase 2.5 (Carson 2015a).

Phase 2.7 was also described as industrial (Hunter-Mann 2015, 9) but again produced only a small quantity of debris. As no samples from this phase were examined it is not

possible to comment on the presence/absence of hammerscale. An interesting feature in this phase was a whole amphorae buried in a pit and reused as a container (context 2059). This was initially thought to have been used to provide water for quenching. Although the interpretation of the features in Trench 2 as a smithy appears unlikely, the use of amphorae as water tanks in smithies is a known phenomenon; for example, at Autun, France (Chardron-Picault and Pernot 1999).

Examination of the debris by phase for Trench 3 presents a similar picture to that of Trench 2. Again the majority of the debris is from the latest levels relating to modern activity (Phase 3.9); the earlier levels are relatively clean of hand-collected material and have only rare occurrences of hammerscale. Phase 3.5 is worthy of brief mention as it contains several features described in assessment report as indicative of industrial activity (Hunter-Mann 2015, 8). A stone setting, a fired clay deposit and an oven which contained a thick charcoal deposit. However, looking at the individual contexts in question, these features produced almost no evidence for metalworking. The non-diagnostic ironworking debris from this phase was found among a cobble surface (contexts 3044 and 3056).

Conclusion

In summary the debris encountered is relatively homogeneous and characteristic of iron smithing. Although slags themselves are not independently dateable, the fact that part of the debris is built into a road constructed in the 2nd century means the smithing activity must therefore be contemporary with or earlier than that date and can be securely attributed to the Roman period. The presence of a smithy on a Roman site is almost to be expected, given that so many of the items of Roman daily life, be that military or civilian, were made of iron and would need periodic repair and replacement.

The discovery of much of the metalworking debris in construction deposits or modern disturbance levels suggests that the primary focus of this activity is elsewhere, either in another part of the *vicus* or perhaps in the fort itself. In this respect it is interesting to note an observation of the opposite paradox at the nearby fort at Ambleside, where there was evidence for smelting, in that case, but no slag was found during the excavation (Tylecote 1986, 161).

Features relating to high temperature processes were encountered in Trenches 2 and 3. However, on the balance of evidence, it appears that these are not connected to metalworking and could be from another industry or even domestic. Given these alternative activities taking place, it is not possible to link the non-process specific debris such as the hearth or furnace fragment to a particular activity on the Ravenglass site.

Table 7: Key types of metalworking debris by phase (quantity of fragments by weight)

Type/Phase	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.11	1.12	1.13	1.14
smithing hearth bottoms		15	6	1	1	7						6	
non-diagnostic iron slag	9 (1015g)	126 (14,430g)	269 (9664g)	65 (3653g)	4 (408g)	270 (15,252g)	16 (1408g)	5 (226g)	6 (538g)	2 (474g)	1 (156g)	109 (6763g)	8 (536g)
iron-rich cinder		1 (6g)	7 (68g)			9 (12g)		1 (1g)			1 (1g)	2 (6g)	
vitified furnace/hearth lining		34 (1976g)	11 (9182g)	15 (132g)	1 (550g)	36 (664g)			1 (73g)			6 (210g)	3 (80g)
furnace debris (semi vitrified)						2 (42g)							
fired clay	4 (238g)	7 (156g)	31 (374g)	13 (86g)		12 (80g)	6 (20g)	2 (26g)	4 (92g)	1 (49g)	1 (8g)	5 (28g)	
cinder	18 (572g)	56 (1432g)	241 (3660g)	90 (1885g)	32 (970g)	427 (6751g)	53 (1098g)	23 (256g)		3 (22g)	2 (22g)	84 (1192g)	25 (381g)
Type/Phase	2.3	2.6	2.7	2.8		3.3	3.4	3.5	3.6	3.7	3.9		
smithing hearth bottoms				1									
non-diagnostic iron slag		1 (230g)	3 (256g)	36 (1526g)		1 (20g)		11 (466g)	1 (10g)		18 (626g)		
iron-rich cinder							1 (16g)						
vitified furnace/hearth lining			1 (6g)	13 (576g)				1 (8g)					
furnace debris (semi vitrified)								3 (4g)					
fired clay	11 (384g)	1 (8g)		7 (36g)			2 (19g)		13 (188g)		10 (193g)		
cinder		6 (64g)	7 (292g)	20 (150g)			5 (26g)	18 (396g)	3 (22g)	3 (10g)	9 (112g)		

APPENDIX 4: THE ROMAN POTTERY

By Paul Bidwell and Alex Croom, with a contribution by Felicity Wild

Introduction

From Trenches 1-3 there were 14.30kg of stratified Roman pottery and approximately one and half times as much from topsoil and disturbed contexts; there were also small amounts of pottery from the beach below the fort. Much of the pottery, particularly the samian and oxidised wares, had been adversely affected by soil conditions, losing its surfaces and becoming soft and powdery. This applied particularly to the unstratified pottery which was also often abraded. Only the stratified pottery was catalogued in detail; the remainder was examined comprehensively and items important for dating or of intrinsic interest were noted. Decorated samian ware with surviving surfaces was catalogued in detail (see below); the other samian ware was not studied in detail because of its poor preservation, although a few recognisable sherds are noted in some of the following sections.

Details and quantifications of the stratified pottery were entered on a spreadsheet which will form part of the site archive; see also Tables 11-13. Fabric identifications were made with the assistance of a hand lens at x20 magnification.

The only large assemblage of coarse pottery previously published from Ravenglass is from excavations of the fort in 1976-8 (Lockwood and Turner 1979).

The decorated samian ware (by Felicity Wild)

The decorated samian ware is shown in Figure 19.

As is common on sites in north-west England, the samian ware is badly degraded by soil conditions. The six pieces examined were all of Antonine date, most if not all dating to the second half of the 2nd century AD. With the exception of no. 5 below, they were all Central Gaulish and from Lezoux. The only stamp, on form 38 or 44, was too damaged to be legible.

In the report below on the five decorated sherds, figure types are quoted from Oswald 1936-37 (O.), Central Gaulish decorated motifs from Rogers 1974 (Rogers) and parallels from Stanfield and Simpson 1958 (S&S). Potter numbers in lower case Roman numerals are from Hartley and Dickinson 2008-12.

1. Form 37, Central Gaulish. Three joining sherds, burnt, showing an ovolo with wavy-line border. The ovolo (Rogers B231) was used by Cinnamus ii, also by Pugnus ii and the potter X7. The wavy-line border may suggest X7 (cf. S&S, fig. 19, 3, 4), as Cinnamus always used the ovolo with a bead row. The panel decoration below the ovolo is too abraded for identification. c.AD 140-160. Phase 2.6, 2054.

2. Form 37, Central Gaulish. Panel decoration with the Venus (O.305) used by Divixtus i, probably slightly reduced in size, between panels containing medallions. The circular motif used as a junction mask and in the corner of the panel is typical of Divixtus' style. A stamped bowl from Corbridge (S&S, pl. 116, 10) shows the type, junction mask and medallion, also an ovolo (Rogers B11) which is probably the same as that used here. c.AD 145-175. Phase 3.4, 3008.

3. Form 37, Central Gaulish, showing a maenad (O.368) in an arcade or medallion. The maenad was used by Casurius ii (S&S, pl. 132, 3). The ovolo is probably Rogers B176, which he used with borders of rather large beads (S&S, pl. 133, 17), as here. c.AD 155-190. Phase 1.8, 1052.

4. Form 37, Central Gaulish, with very badly abraded decoration, making identification only tentative. The large ovolo (Rogers B1?) and row of large beads may suggest the work of Doeccus i. Decoration consists of panels containing medallions, the one on the left containing Doeccus' hare (O.2057A). The exact nature of the medallion is uncertain. Both rings appear to be beaded, though this may be due to surface degradation. On Doeccus' bowls only the outer ring is beaded (Rogers E8) or both rings are plain. A bowl by Doeccus from Lancaster (S&S, pl. 151, 54) shows decoration of plain medallions, one containing a cupid holding a vase (O.508), which might just possibly be the type in the right hand medallion here. Between the two medallions is a bead row ending in a leaf, possibly Rogers J149(?), though this does not show on the rubbing. The beaded circle in the bottom corner of the left hand panel appears to be larger than that used by Doeccus (Rogers E58). A bowl in the style of Doeccus (Rogers 1999, pl. 41, 15) shows the ovolo and beads, plain medallion with O.508, the hare, beaded circles and a similar leaf. If the connection with Doeccus is correct, and this is far from certain, the date would be c.AD 165-200. Phase 3.7, 3007.

5. Form 37, East Gaulish. The ovolo with wavy-line border (Ricken 1934, Taf. 13, ovolo A; Oswald 1945, fig. 6, i) was used at Lavoye. Decoration shows arcades, one containing Mars (O.144), with the top of a flat-topped leaf (Oswald 1945, fig. 6, xlv) to either side and an acanthus (ibid., fig. 6, vi) between arcades. A bowl from Lavoye (ibid., fig. 7, 1) shows the ovolo, arcades and Mars. Oswald links the style to Gesatus, Hartley and Dickinson's Cesatus ii, whom they date to c.AD 150-200, rather than Oswald's earlier estimate of c.AD 130-140. Work in this style occurs fairly frequently on sites in North Britain, at sites including Corbridge, Papcastle, Birrens (Wild 1975, fig. 59, 99) and South Shields (Wild 2010, fig. 39, 11). Phase 2.3, 2067.

Quantification of fabrics

The standard fabrics for pottery imported from beyond north-west England are listed in Tables 8 and 9 with cross-references (NRFRC) to the National Roman Fabric Reference Collection (Tomber and Dore 1998). Other fabrics, some certainly of local origin, are described below.

Mortaria: local (?) and unclassified

Seven sherds represented five vessels, but all but two were burnt or adversely affected by soils conditions. Two sherds in an orange fabric (1036, Phase 1.3, and 3004, Phase 3.4) had trituration grits consisting of cream and grey pebbles and were from local or North-Western mortaria (cf. Hardknott fabrics 3 and 4: Hartley and Croom 1999, 97).

Fine grey ware

A fabric with a fine, clean matrix and a slightly silky feel; frequently brown or buff in colour with mid-grey surfaces. Sparse inclusions, often not visible in a fresh break, mainly fine white quartz but also multi-coloured rounded inclusions up to 3mm in length. Some vessels are possibly in fine versions of the Muncaster fabrics (cf. Welsby 1985, 133, Fabric 4).

Gritty grey ware

Light- to mid-grey ware with quartz and other multi-coloured inclusions and occasional small pebbles. In many vessels the inclusions are abundant, but there are also finer, less heavily-gritted fabrics; the range of this ware is very wide and its finer and less distinctive versions grade off into the general category of unclassified reduced wares. The fabrics are generally equivalent to Fabric 1 at Hardknott (Bidwell et al. 1999, 84) and Welsby's (1985, 133) Fabrics 2-3 and 6, and the grittier examples can be confidently attributed to the Muncaster kilns.

Minor oxidised wares

This is a miscellaneous category which might include oxidised versions of the Muncaster fabrics as well as fabrics from other sources.

Minor reduced wares

These wares consist largely of unidentifiable fabrics usually represented by small sherds. They also include two or possibly three sherds of BB2 and one sherd apparently in South-Eastern Reduced Ware, probably from South Essex or North Kent, all from 3rd-century contexts.

'Decayed' and unclassified wares

Some of the pottery was so badly affected by soil conditions that its identification was impossible. Particularly noticeable were the large quantities of oxidised wares (13.5% by weight of all the pottery excluding amphorae). They probably included further examples of Severn Valley ware. Most of the sherds, however, seem to have come from smaller jars, some almost certainly Muncaster products. In addition, some of the oxidised ware might have been from one or more sources in north-west England operating in the later 2nd and 3rd centuries (Fig. 20, nos 3-4).

Table 8: Amphorae by fabric, shown as a percentage

Fabric	NRFRC	Weight (%)	No. (%)	EVE (%)
Dressel 20	BAT AM	99.8	99.2	100.0
Gaulish 1?	GAL AM 1	0.2	0.8	0.0
Total		8.548 (kg)	73 (no. sherds)	73 (%)

NRFRC: National Roman Fabric Reference Collection code (Tomber and Dore 1998)

EVE: Estimated Vessel Equivalent system for measurement

Table 9: Pottery assemblage by fabric (excluding amphorae), shown as a percentage

Fabric	NRFRC	Weight (%)	No. (%)	EVE (%)
Samian		14.2	15.8	14.2
Mortaria:				
Mancetter-Hartshill	MAH WH	3.9	2.0	4.9
Local?		3.2	0.5	1.0
Unclassified		0.5	0.4	0.0
Fine wares:				
Lower Nene Valley colour-coated	LVN CC	3.8	4.8	2.6
Central Gaulish black-slipped	CNG BS	0.2	0.3	0.0
Moselkeramik black-slipped	MOS BC	0.1	0.4	0.0
Unclassified		0.1	0.5	0.9
Coarse wares:				
Southeast Dorset black burnished 1	DOR BB 1	30.5	29.7	39.5
Fine grey ware		7.1	7.3	6.4
Gritty grey ware		4.0	5.0	10.8
Severn Valley ware	SVW OX	8.4	1.3	0.0
Minor oxidised wares		1.2	2.1	5.2
Minor reduced wares		1.8	2.7	1.8
'Decayed' oxidised wares		13.5	21.1	3.5
'Decayed' reduced wares		0.4	0.7	0.4
Unclassified oxidised wares		5.4	3.8	7.4
Unclassified reduced wares		1.8	1.7	1.3
Total		5.802 kg	767 sherds	768 %

The Muncaster pottery production site

Pottery from kilns at Muncaster has been published in detail by Welsby (1985) and had previously been identified at Ravenglass which lies only 5.1km west of the kilns (Lockwood and Turner 1979, 118-20, where the site is called Park House). Subsequent

publication of the pottery from the fort at Hardknott identified a wide range of Hadrianic wares and types which were clearly of local origin and were also attributed to the Muncaster kilns (Bidwell et al. 1999, 93-6). Welsby (1985, 133) distinguished seven fabrics amongst the pottery from the kiln site, the most common of which were heavily-gritted with oxidised or reduced finishes. There were also finer fabrics similar to that of Fig. 20, no. 6.

The stratified occurrences at Ravenglass of vessels attributed to Muncaster suggested to Lockwood and Turner (1979, 120) that their production continued until about the end of the 2nd century, throughout the phase 2 occupation which ended in c.190/210. Dating from the kiln site did not necessarily carry its use beyond the middle of the 2nd century (Welsby 1985, 137), and the small amounts from the excavations described here (4.0% by weight and 10% of the total EVEs of all the pottery excluding amphorae, and some of the unclassified and 'decayed' wares) might well indicate that production did not continue for more than a decade or so after the middle of the 2nd century.

Catalogue of illustrated vessels (fig. 20)

Trench 1:

1. Indented funnel-necked beaker. Lower Nene Valley colour-coated ware. Phase 1.9, 1008.
2. Cooking pot. Fine grey ware. Phase 1.6, 1043.
3. Flanged narrow-mouthed jar in fine oxidised ware. Phase 1.7, 1044.
4. Flanged narrow-mouthed jar in oxidised ware, soft orange fabric. Phase 1.7, 1055.
5. Flat-rimmed dish, with single groove on rim; for similar types but with notched rims, see Hardknott, Bidwell et al. 1991, fig. 36, nos 90 and 94-5. 'Decayed' oxidised ware. Phase 1.2, 1061.
6. Flat-rimmed dish; cf. Hardknott, Bidwell et al. 1991, fig. 34, no. 34. Gritty grey ware. Phase 1.7, 1055.
7. Face-jar, with applied bosses decorated with incised lines and a rectangular band decorated with incised herringbone decoration. Fabric very similar to fine grey ware, but with more plentiful inclusions, including soft red and brown inclusions. 1039 (unstratified, larger fragment), Phase 1.7, 1045.
8. Flagon. Gritty oxidised ware. Unstratified, 1047.

Vessels 3 and 4 are possibly in Severn Valley ware, although their fabrics are softer than the examples ascribed to this category in Table 9 and it is possible that they are imitations made in north-west England. Jars of this type, their out-turned rims finished with slight flanges, are certainly represented in the Severn Valley series

(Webster 1976, fig. 3, no. 10, 3rd-4th century, and no. 11, 3rd century, perhaps surviving into the 4th century). A similar example is already known from Ravenglass (Lockwood and Turner 1979, fig. 43, no. 68, context dating to c. 190/210 to 350/370), but it has a pie-crust flange and was possibly a Wilderspool product which would have been no later than the Antonine period (cf. Hartley and Webster 1973, fig. 4, nos 11-15). Plain flanged rims are also known from Watercrook (Lockwood 1973, fig. 109, no. 280, from a 3rd-century context) and from Old Penrith (Austen 1991, fig. 59, no. 220 and, described as similar to Severn Valley ware, nos 221-2).

Vessel 7 is probably a second example of the hitherto unique face-jar, RB Type 13K, from Old Penrith (Braithwaite 2007, 266-7, fig. J8, no. 4; larger-scale illustration in Braithwaite 1991, fig. 85). The fragment from Old Penrith was from a 'grey two-handled jar ... with frilled rim, and applied spiral bosses and a snake's head above the eyebrows'. On both jars the bosses were applied, which distinguishes them from other face jars where the bosses are pushed out from the body of the vessel. On the Ravenglass bosses the irregular depressions in the bosses are rough approximations of the spirals on the Old Penrith bosses. Bands with herring-bone hatching appear on both jars, and that at Old Penrith represents an eyebrow.

What particularly distinguishes the Old Penrith jar from other examples is the snake's head set amongst the bosses. Its presence led Braithwaite (2007, 267) to compare the jar with similarly-decorated examples from the Rhine and Danube which are thought to have been associated with the cults of Mithras, Sabazius, Bacchus-Liber, and possibly Mercury. Since Braithwaite's publication, another snake, applied to a handle, has been noted from a kiln-site at Fisher Street, Carlisle (Johnson et al. 2012, 123); it came from a possible stoke-pit together with coarse wares of Flavian and Flavian-Trajanic date which were made on the site. The vessel was in oxidised ware, however, and is too early to suggest a source for the Old Penrith jar. The latter was found unstratified in the area of the military *vicus*, and Braithwaite suggested that it was possibly late 2nd- or 3rd-century in date, which is supported by the 3rd-century context of the Ravenglass fragment. A frog, often found on jars with snakes, was found on an unpublished sherd in reduced ware from excavations in the 1930s at Benwell (publication forthcoming), but in a fabric with no obvious resemblance to the Ravenglass sherd. The source of these jars, apart from the oxidised example from Fisher Street, Carlisle, is uncertain, but their scarcity and wide distribution perhaps suggests that they were continental imports. A connection between the Ravenglass vessel and the Muncaster kilns is most unlikely; their products include a fragment of face-jar in grey ware with a representation of an eye (Welsby 1985, fig. 1, no. 19; not noted by Braithwaite), but it is much more crudely rendered than the decoration of the Ravenglass and Old Penrith jars.

Trench 2:

9. Cooking pot, sooted under the rim; body sherds have traces of acute-angled lattice; cf. Muncaster, Welsby 1985, fig. 1, nos 22-3, 25-6. Hard grey gritty fabric. Phase 2.7, 2003.

10. Closed vessel with herringbone decoration created by incised lines. Mid grey fabric with very obvious fine white quartz inclusions, thin margin to the interior and thin red margin to the exterior, darker surfaces and possible remains of a black burnished surface. This sherd is perhaps from a head-pot, the incised bands representing braided hair, but the vessel must have been unusually small and its identification must be regarded as uncertain. Phase 2.6, 2068.

The contexts of the pottery

Trench 1

This trench produced 1.860kg (EVEs 259%) of stratified Roman pottery excluding a small amount of amphorae (0.203kg; EVEs 0%) including a single sherd probably from a Gauloise vessel (1006).

From the levelling or dumps of Phase 1.2 there was a sherd of DOR BB 1, Hadrianic or later (1061) and a dish in fine oxidised ware, probably a Mancaster product (Fig. 20, no. 5). The road of Phase 1.3 was no earlier than the last decade or so of the 2nd century: it included a sherd from a Mancetter-Hartshill mortarium (1036), mid 2nd-century or later, and a flat-rimmed bowl in DOR BB 1 with arcaded decoration (1056; as Holbrook and Bidwell 1991, fig. 30, Type 39, late Antonine to mid 3rd-century, cf. especially Type 39.3; see also Gillam 1976, 68). There was nothing notable from Phases 1.4 and 1.5 apart from a sherd probably from a Severn Valley jar (1062).

Phase 1.6 is of particular importance because of the presence of part of a face-jar in a possible occupation deposit (1045) in Building 1/1 (Fig. 20, no. 7). The same context included a sherd from a Lower Nene Valley colour-coated beaker, the base of a jar probably in Seven Valley ware, a beaker, possibly indented, in fine grey ware, and DOR BB 1 including dishes with beaded rims. A sherd of Lower Nene Valley colour-coated ware came from an overlying deposit, perhaps a demolition layer (1040). The cobbling of Phase 1.7, extending up to the south wall of Building 1/1 and presumably laid down while the building was still in use, contained flanged bowls in DOR BB 1, no earlier than c.270 (1037, 1044). The context (1045) in which the sherd from a face-jar was found had a terminus post quem only of the early third century; a larger fragment of the same jar came from the topsoil (Fig. 20, no. 7). The remaining phases in the Roman sequence contained nothing later than what has already been described from the earlier phases, apart from a funnel-mouthed beaker in Lower Nene Valley colour-coated ware from Phase 1.9 (1008, Fig. 20, no. 1), no earlier than the second quarter of the 3rd century. The post-Roman deposits contained another two flanged bowls in DOR BB 1 (1047, 1054).

Trench 2

The pottery excluding amphorae weighed 1.681kg (EVEs 297%). The exceptionally large amounts of amphorae (5.745kg; EVEs 43%) are explained by the lower part of a Dressel 20 reused as a container (2059).

Pottery of significance for dating occurred only from Phase 2.3 onwards. From that phase there was an East Gaulish Form 37 of c. 150-200 (2067; Fig. 19, no. 5). The levelling or dumps of Phase 2.5 contained a sherd from a beaker in Lower Nene Valley colour-coated ware, probably no earlier than the 3rd century (2032). Nothing from Phase 2.6 was necessarily later than the pottery from the previous phase: there was another sherd of Lower Nene Valley colour-coated ware (2026) and DOR BB 1 included a bowl with a flat grooved rim and a plain-rim dish with arcaded decoration (2026, 2028), both typical of the end of the 2nd century and the earlier 3rd century. A sherd with incised herring-bone decoration was possibly from a small head-pot (2068, Fig. 20, no. 10).

Dumps in Phase 2.7 included a Mancetter-Hartshill mortarium with a hammer-head profile and traces of red paint on its flange, probably c.220 onwards, and another mortarium of the same date and from the same source (2023); a separate dump (2060) included a samian mortarium (Dr. 45) probably from Central Gaul, a sherd of BB2 and an indented beaker with scale decoration in Lower Nene Valley colour-coated ware. From the ploughsoil there were two flanged bowls in DOR BB 1, c.270 or later; this type was not present in this trench amongst the pottery stratified in Roman levels.

Trench 3

Excluding amphorae, Trench 3 contained 2.261kg (EVEs 212%) of stratified Roman pottery; the weight of amphora sherds was 2.600kg (EVEs 30%). The sequence began with levelling which contained two sherds, of grey ware and DOR BB 1, the latter Hadrianic or later (Phase 3.2, 3003). From Phase 3.4 (building occupation) there was a small group of 2nd-century pottery which included a Central Gaulish Form 37 of c. 145-75 (3008; Fig. 19, no.1) as well as samian with 'cut-glass' decoration, a local or north-western mortarium and fine grey ware (3004). From Phase 3.5 (earlier activity north of Building 3/1) there was a sherd of Lower Nene Valley colour-coated ware, probably no earlier than the beginning of the 3rd century (3046). A deposit associated with later activity in this area (Phase 3.6, 3040) included Lower Nene Valley colour-coated ware and a sherd of Moselkeramik (with narrow indentations as Gillam Types 44 and 45) and a sherd from a Mancetter-Hartshill mortarium.

The largest group of pottery from this trench came from a pit of Phase 3.7 (3007; filling 3023, 3030, 3048, 3050, 3060). Lower Nene Valley colour-coated ware and a Mancetter-Hartshill mortarium with a reeded hammer-head rim established a 3rd-century date for its filling. Excluding amphorae the group had a weight of 0.502kg and EVEs amounting to 31%. DOR BB 1 was well represented (0.182kg; EVEs 18%); more striking was the larger quantity of oxidised wares (0.246kg; EVEs 0%) which confirms the general impression that at Ravenglass these wares were still current in the 3rd century (see Discussion). Amongst the pottery from post-Roman levels was a flanged bowl in DOR BB 1, no earlier than c.270.

Trench 4

There was no Roman pottery from this trench.

Beach-walking

From context 4001 there were a few abraded scraps of Roman pottery including DOR BB 1; sherds of Lower Nene Valley colour-coated ware and oxidised gritty ware came from context 4004. There was also a fragment of a samian inkwell (Ritterling 13).

The assemblage

This assemblage is more important than its small size might suggest. In north-west England, south of Carlisle and north of Chester, there is an almost complete lack of fully-quantified pottery assemblages. The figures from Ravenglass provide a glimpse of the organisation of pottery supply and its development in the 2nd and 3rd centuries.

The pottery has little to contribute to confirming the date when the fort was established, replacing an earlier fortlet (probably at the end of Hadrian's reign: Bidwell et al. 1991, 66). The dish in fine oxidised ware (Fig. 20, no. 5), however, provides a link with the Hadrianic phase at the Muncaster kilns which saw the production of cups and small dishes and bowls in the tradition of Upper Germany and Raetia (Bidwell et al. 1999, 94-6). The coarser gritty wares are probably typical of a later strand of production at Muncaster and seem to have supplied a substantial proportion of the cooking wares at Ravenglass until well into the second half of the 2nd century.

The black-burnished ware industry of south-east Dorset (DOR BB1) was an important source of supply throughout the life of the military *vicus* (see Welsby 1985, 138, for some approximate quantifications of the coarse wares from the forts at Hardknott and Ravenglass). Another important source of pottery was the Severn Valley industry (SVW OX) which supplied 8.4% by weight of all the pottery excluding amphorae. The true figure was probably higher because there are almost certainly more sherds of the ware amongst the miscellaneous and 'decayed' oxidised wares (cf. Fig. 20, nos 3 and 4). The same supply routes from the Severn Valley and West Midlands might have been used to bring Mancetter-Hartshill mortaria to Ravenglass. The sample is small but the complete dominance of these mortaria in the 3rd century is not unexpected: K.F. Hartley (1991, 173), writing about the mortaria at Old Penrith, stated that 'the pattern of primary reliance on local supplies in the 2nd century, with the development of a Mancetter-Hartshill trade from small beginnings in the middle of the century to a virtual monopoly by the 3rd century, is the normal one in north-west England'.

Some of the unclassified oxidised sherds seem to be too thin-walled to represent Severn Valley wares, and their quantity perhaps suggests that manufacture of oxidised wares continued into the later 2nd and even perhaps the early 3rd century; there were small quantities of oxidised wares in the kiln dump at the English Damside site at Carlisle, representing pottery production that seems to have begun in the second half of the 2nd century (Swan et al. 2009, 594). It is also possible that the Ravenglass oxidised wares include 3rd-century imitations of Severn Valley ware made in north-west England (Fig.20, nos 3 and 4).

The amount of amphorae (59.1% by weight) is large but typical of sites such as South Shields and Carlisle where sea-borne cargos arrived for distribution onwards by road (Bidwell and McBride 2010, 104). Table 10 compares the occurrences of other vessel types; nothing stands out as exceptional, but the sample is very small.

Occupation in the military *vicus* at Ravenglass continued until at least c.270, though not necessarily on the same scale as earlier in the century. This is established by the presence of conical flanged bowls in DOR BB 1 in Trenches 1-3 (for the date at which this type first appeared, see Holbrook and Bidwell 1991, 98-9, admitting the possibility that the type might possibly have emerged in the mid-3rd century). An upper limit to the end date of the occupation is indicated by the absence of East Yorkshire wares, especially the grey wares which became increasingly common during the last quarter of the 3rd century (Bidwell and Croom 2010, 24), though the dating evidence comes mainly from forts along Hadrians' Wall.

Table 10: Vessel types by EVEs, shown as a percentage

Type	EVEs (%)
Flagon	1.4
Beaker	7.3
Small jar	4.2
Storage jar	13.4
Cooking pot	34.2
Bowl/dish	33.5
Mortarium	6.0
Total	768

Table 11: Full Roman pottery catalogue

ID	contxt	ph	fabric	pub fab	vessel	sub-type	type	part	dec	wt	sh no	EVE	diam	same	dr	comments
8	1045	1.6	DOR BB1	DOR BB1	b/d	bead rim		rim	lattice	15	1	4				
9	1045	1.6	DOR BB1	DOR BB1	b/d			base		10	1					red margin
10	1045	1.6	FW: LNV	FW: LNV	beak			bsh	barb	0	1					
11	1045	1.6	GW quartz gritted	minor RW	closed			bsh		4	1					
12	1045	1.6	GW sandy	minor RW	closed			bsh		1	1					
13	2060	2.7	amph: BAT AM	amph: BAT AM	amph		dr 20	handle		70	1					
14	1043	1.6	fine GW	fine GW	cp	everted		rim		5	1	10	12		d6	
15	1043	1.6	GW gritty	GW gritty	closed			bsh		2	1					C2 type
16	1043	1.6	DOR BB1	DOR BB1	cp	everted C2		rim		5	1	2				heavily sooted
19	2003	2.7	sam CG	sam	bowl		18/31R or 31R	base		18	1					repair slot
20	2003	2.7	sam CG	sam	bowl		18/31 or 31	rim		12	1	8	26			little slip
21	2003	2.7	sam CG	sam	bowl		18/31	bsh		21	2					
22	3004	3.4	DOR BB1	DOR BB1	b/d	flat		rim		4	1	2				
23	3004	3.4	DOR BB1	DOR BB1	b/d	flat?		rim		4	1	3				
24	3004	3.4	DOR BB1	DOR BB1	cp	everted		rim, bsh		7	2	3				
25	3004	3.4	DOR BB1	DOR BB1	cp			bsh		8	3					
26	3004	3.4	gritty brown	minor OW	closed			bsh		4	1					
27	1036	1.3	sam CG	sam	bowl	Lezoux		base		42	1					stamped
54	2003	2.7	GW gritty	GW gritty	cp	everted w shoulder		rim, bsh	lattice	111	20	58	14		d5	rim slightly rounded; some sooting; small sh not counted
55	2003	2.7	unk OW	unk OW	indet			bsh		8	2					
56	2003	2.7	GW gritty	GW gritty	cp			bsh	large lattice	16	1					
57	2003	2.7	fine GW	fine GW	bowl	hemi flanged		rim		17	1	5				
58	3040	3.6	amph: BAT AM	amph: BAT AM	amph		dr 20	bsh		66	2					
59	3040	3.6	mort: MH	mort: MH	mort			bsh		16	1					
60	3040	3.6	mort: unk white	mort: unk	mort			bsh		14	2					decayed
61	3040	3.6	FW: LNV	FW: LNV	beak			bsh	roul?	1	1					
62	3040	3.6	FW: LNV?	FW: LNV	beak			bsh	roul	8	4					orange fab, grey to int, bl cc
63	3040	3.6	FW: unk	FW: unk	beak	bead rim funnel neck		rim		3	3	4				small; hard buff fab, brown incl
64	3040	3.6	DOR BB1	DOR BB1	b/d			base, bsh	latt	46	4					
65	3040	3.6	DOR BB1	DOR BB1	cp			bsh		32	8					
66	3040	3.6	DOR BB1	DOR BB1	cp	long everted	H&B 20	rim		19	1	9	16			
67	3040	3.6	fine GW	fine GW	closed			bsh		46	18					
68	3040	3.6	decayed OW	decayed OW	closed			bsh, base		98	22					
69	3040	3.6	sam	sam	indet			scrap		1	1					
70	3040	3.6	decayed OW	decayed OW	indet			flange		8	8					triag x-section ridge
71	3040	3.6	flag B var	minor OW	flag	flanged		rim		10	1	11	10			grey int, orange ext
72	3040	3.6	decayed RW	decayed RW	cp	everted		rim		6	1	3				gritty black fab, oxid surfaces
73	3040	3.6	RW shiny black	minor RW	cp	everted, sub-lid-seated		rim		8	1	6	17			gritty black w shiny ?black inc/
74	1045	1.6	amph: BAT AM	amph: BAT AM	amph		dr 20	bsh		128	1					
75	1045	1.6	sam	sam	b/d			bsh		8	6					

ID	contxt	ph	fabric	pub fab	vessel	sub-type	type	part	dec	wt	sh no	EVE	diam	same	dr	comments
76	1045	1.6	sam	sam	bowl		dr 37 etc	bsh	dec	1	2					
77	1045	1.6	sam	sam	beak		dr 68 etc	bsh		2	1					
78	1045	1.6	sam	sam	bowl		Dr 37?	ir		1	1					
79	1045	1.6	flag B var	minor OW	flag			bsh		4	1					
80	1045	1.6	decayed OW	decayed OW	closed			bsh		28	6					
81	1045	1.6	SV?	SV	stor jar			bsh		23	1					thick; grey core
82	1045	1.6	fine GW	fine GW	beak?	indented??		bsh		2	1					
83	1045	1.6	fine GW	fine GW	closed			bsh		7	1					
84	1045	1.6	DOR BB1?	DOR BB1	dish	plain w groove		rim	wide latt	13	1	4				wiped slip under lattice
85	1045	1.6	DOR BB1	DOR BB1	cp			bsh, base		23	4					
86	1043	1.6	sam	sam	b/d			bsh		7	2					
87	1045	1.6	SV?	SV	stor jar			base		225	1					complete; grey core; small depression on ext
88	3004	3.4	mort: local	mort: local	mort			base, bsh		159	2					orange fab, cream & grey pebble trit grit
89	3004	3.4	amph: BAT AM	amph: BAT AM	amph		dr 20	bsh, scrap		99	3					
90	3004	3.4	decayed OW	decayed OW	indet			scraps		3	2					
91	3004	3.4	DOR BB1	DOR BB1	bowl	flat		rim, ir, bsh		32	3	8	20			
92	3004	3.4	DOR BB1	DOR BB1	cp			ir		9	1					
93	3004	3.4	fine GW	fine GW	closed			bsh		2	1					
94	2060	2.7	sam	sam	mort		Dr 45	base		74	1					
95	2060	2.7	sam	sam	b/d			bsh		4	1					
96	2060	2.7	unk OW	unk OW	stor jar	nmj flanged		rim		14	1	19	11			thin-walled
97	2060	2.7	unk OW	unk OW	closed			bsh		7	2					
98	2060	2.7	unk OW	unk OW	indet			bsh		2	1					
99	2060	2.7	fine GW	fine GW	closed			bsh		3	1					
100	2060	2.7	DOR BB1	DOR BB1	bowl	flat		rim		13	1	6				
101	2060	2.7	DOR BB1	DOR BB1	cp	everted		rim		9	1	7				
102	2060	2.7	DOR BB1	DOR BB1	cp			bsh, base		48	10					
103	2060	2.7	FW: LNV	FW: LNV	beak	indented scale		bsh		2	1					
104	2060	2.7	BB2	minor RW	small j	everted		rim		4	1	8	10			
105	2060	2.7	DOR BB1	DOR BB1	b/d	flat w groove		ir		3	1					
106	2060	2.7	DOR BB1	DOR BB1	dish	plain		rim		2	1	2				
107	2060	2.7	DOR BB1	DOR BB1	b/d			bsh, base		26	5					
108	2060	2.7	amph: BAT AM	amph: BAT AM	amph		dr 20	bsh, scrap		93	6					some burnt
109	2060	2.7	GW gritty	GW gritty	closed			bsh		2	1					
110	2060	2.7	unk GW	unk RW	stor jar			bsh		15	1					gritty light grey
111	2060	2.7	sam	sam	bowl		Dr 18/31	rim		5	1	3				no slip surviving
112	2060	2.7	sam	sam	b/d			bsh		1	1					no slip surviving
113	2060	2.7	decayed OW	decayed OW	closed	solid footing		base, bsh		34	7					
114	1051	1.8	sam	sam	indet			bsh		3	1					
115	1051	1.8	unk buff	unk OW	closed			bsh		3	1					
116	1044	1.7	sam	sam	bowl		Dr 18/31 or 31	rim		9	1	11	21			

ID	contxt	ph	fabric	pub fab	vessel	sub-type	type	part	dec	wt	sh no	EVE	diam	same	dr	comments
117	1044	1.7	decayed OW	decayed OW	stor jar	nmj flanged		rim		11	1	16	13			gritty fab, thin-walled
118	1044	1.7	fine OW	minor OW	stor jar	nmj flanged		rim		4	1	16	9		d7	fine pale orange
119	1044	1.7	unk OW	unk OW	beak			bsh		1	1					orange fab, grey surfaces
120	1044	1.7	decayed OW	decayed OW	closed			bsh		22	6					
121	1044	1.7	DOR BB1	DOR BB1	b/d	flat		rim	intersect arc	19	1	6				
122	1044	1.7	DOR BB1	DOR BB1	b/d	flanged	H&B 45	ir		28	1	5				thick & heavy
123	1044	1.7	DOR BB1	DOR BB1	b/d			base		28	1					
124	1044	1.7	fine GW	fine GW	cp			base, bsh		73	2					
125	3004	3.4	WW gritty	minor OW	closed			bsh		9	1					grey core, pink ext
126	3004	3.4	DOR BB1	DOR BB1	tank			hand		8	1					
127	3004	3.4	DOR BB1	DOR BB1	b/d			base		8	1					
128	3004	3.4	sam	sam	b/d			bsh		4	1					
129	3004	3.4	decayed OW	decayed OW	indet			bsh		6	2					
130	2067	2.3	sam	sam	b/d			bsh		22	4					
131	2067	2.3	amph: BAT AM	amph: BAT AM	amph			bsh		800	4					
132	1058	1.4	decayed OW	decayed OW	closed			bsh		10	4					
133	1058	1.4	sam	sam	b/d			bsh		7	4					
134	1058	1.4	DOR BB1	DOR BB1	cp	everted, anarrow at tip		rim		11	1	8	12			sooted
135	1058	1.4	DOR BB1	DOR BB1	cp			base		22	2					
136	1058	1.4	fine GW	fine GW	cp			base		8	1					
137	1058	1.4	decayed OW	decayed OW	indet			bsh		7	4					buff
138	2032	2.5	DOR BB1	DOR BB1	b/d	flat		rim		14	1	8				
139	2032	2.5	DOR BB1	DOR BB1	cp	everted		rim		7	1	9	13			
140	2032	2.5	DOR BB1	DOR BB1	cp	everted		rim		4	1	3				
141	2032	2.5	DOR BB1	DOR BB1	cp			bsh		18	4					
142	2032	2.5	DOR BB1	DOR BB1	b/d			bsh, base		33	3					
143	2032	2.5	BB2	minor RW	cp			bsh		1	1					
144	2032	2.5	FW: LNV	FW: LNV	beak			bsh		15	2					
145	2032	2.5	sam	sam	bowl		Dr 18/31	rim		3	1	6	16			
146	2032	2.5	sam	sam	b/d			bsh, footr		21	5					
147	2032	2.5	decayed OW	decayed OW	indet			bsh		10	5					
148	1036	1.3	mort: MH	mort: MH	mort			bsh		11	1					
149	1036	1.3	mort: local	mort: local	mort			bsh		11	1					cream & grey pebble trit grits
150	1036	1.3	sam	sam	bowl		Dr 18/31 or 31	bsh		14	1					
151	1036	1.3	amph: BAT AM	amph: BAT AM	amph		dr 20	bsh		54	3					
152	1036	1.3	unk RW	unk RW	indet			bsh		6	1					thick, gritty, oxid int
153	1036	1.3	unk buff	unk OW	bowl	flanged		bsh		5	1					soft, fine buff, stubby flange
154	2050	2.6	amph: BAT AM	amph: BAT AM	amph		dr 20	bsh		189	4					
155	2050	2.6	DOR BB1	DOR BB1	cp			bsh		7	2					
156	2050	2.6	amph: BAT AM	amph: BAT AM	amph	triag	dr 20	rim		196	1	33	17			
157	2050	2.6	amph: BAT AM	amph: BAT AM	amph			bsh		21	1					
158	2050	2.6	sam	sam	indet			bsh		4	1					no slip

ID	contxt	ph	fabric	pub fab	vessel	sub-type	type	part	dec	wt	sh no	EVE	diam	same	dr	comments
159	2067	2.3	sam	sam	bowl		Dr 37	bsh	dec	27	1					enough for ID
160	2003	2.7	amph: BAT AM	amph: BAT AM	amph		dr 20	bsh		20	1					
161	2003	2.7	DOR BB1	DOR BB1	cp	everted bent at tip		rim		7	1	10	12			
162	2003	2.7	DOR BB1	DOR BB1	b/d			base		11	2					2 x vessels, 1 oxid
163	2003	2.7	unk GW	unk RW	closed			bsh		12	1					thick, sandwich blue-grey core, red marg, pale grey surf
164	2003	2.7	GW gritty	GW gritty	closed			bsh		16	6					
165	2037	2.5	decayed OW	decayed OW	cp	everted, wide body		rim		11	1	5				mend hole w lead under the rim
166	1063	1.1	GW gritty	GW gritty	cp	stubby everted		rim		11	1	12	12			
167	3061	3.6	unk RW	unk RW	cp	squared everted		rim		10	1	10				
168	2026	2.6	sam	sam	b/d			bsh		2	1					
169	3007	3.7	decayed OW	decayed OW	closed			bsh		6	1					
170	1040	1.6	FW: LNV	FW: LNV	beak	indented		bsh		8	2					
171	1040	1.6	pink flag	minor OW	flag			bsh		5	1					
172	2036	2.7	sam	sam	b/d			bsh		2	1					
173	2020	2.7	unk RW	unk RW	indet			scrap		3	1					
174	3007	3.7	DOR BB1	DOR BB1	b/d			bsh	line	5	1					
175	3007	3.7	DOR BB1	DOR BB1	cp			bsh		3	1					
176	3007	3.7	sam	sam	indet			scrap		2	1					
177	3007	3.7	decayed OW	decayed OW	indet			scrap		3	2					
178	1044	1.7	DOR BB1	DOR BB1	bowl	flanged	H&B 45	rim		19	1	4				thick & heavy
179	1044	1.7	mort: MH	mort: MH	mort	hh		ir, scrap		9	2					
180	1044	1.7	DOR BB1	DOR BB1	cp			bsh		2	1					
181	1044	1.7	decayed OW	decayed OW	indet			bsh		5	3					
182	3002	3.7	unk OW	unk OW	flag?			bsh		3	2					pale pink, grey core
183	3048	3.7	unk OW	unk OW	flag?			bsh		2	2					buff
184	1049	1.8	decayed OW	decayed OW	indet			bsh		10	2					
185	3023	3.7	unk OW	unk OW	stor jar			bsh		66	1					soft buff, grey core
186	3023	3.7	decayed OW	decayed OW	indet			bsh		3	2					
187	3023	3.7	DOR BB1	DOR BB1	cp			bsh	o.a.l	27	4					
188	3057	3.3	DOR BB1	DOR BB1	cp			bsh		3	1					
189	3057	3.3	decayed OW	decayed OW	indet			bsh		5	1					
190	2023	2.7	DOR BB1	DOR BB1	cp			bsh		19	5					
191	2023	2.7	FW: LNV	FW: LNV	beak	indented		bsh		1	1					
192	2023	2.7	SERW	minor RW	cp			bsh		6	1					gritty, wide grey core
193	2023	2.7	sam	sam	b/d			bsh		4	3					
194	3002	3.7	DOR BB1	DOR BB1	cp			bsh		4	1					
195	3002	3.7	GW fine gritty	minor RW	indet			scrap		24	3					fine matrix, angular incl - not pot??
196	3014	3.4	DOR BB1	DOR BB1	small j	small upright		rim		5	1	5				
197	2023	2.7	sam	sam	bowl		Dr 31	rim		16	1	6	22			
198	1043	1.6	DOR BB1	DOR BB1	b/d	flat		rim		12	1	4				sooted
199	1043	1.6	GW gritty	GW gritty	cp			bsh		4	1					

ID	contxt	ph	fabric	pub fab	vessel	sub-type	type	part	dec	wt	sh no	EVE	diam	same	dr	comments
200	1043	1.6	SV?	SV	stor jar			bsh		22	1					grey core
201	3060	3.7	FW: LNV	FW: LNV	beak	indented funnel		bsh		5	1					
202	3060	3.7	DOR BB1	DOR BB1	cp			bsh		2	1					
203	3060	3.7	sam	sam	dish		Dr 18/31	rim		3	1	4				
204	3060	3.7	sam	sam	b/d			bsh		4	1					
205	3060	3.7	decayed OW	decayed OW	closed			bsh		2	1					
206	1006	1.11	amph: GAL AM?	amph: GAL AM?	amph			bsh		21	1					
207	3060	3.7	amph: BAT AM	amph: BAT AM	amph		dr 20	bsh, scrap		58	3					
208	3060	3.7	mort: MH	mort: MH	mort	wallside		rim		23	1	7	22			
209	3060	3.7	decayed OW	decayed OW	indet			bsh		5	2					
210	3060	3.7	DOR BB1	DOR BB1	b/d			base		8	1					
211	3060	3.7	DOR BB1	DOR BB1	cp			bsh		18	5					
212	2026	2.6	amph: BAT AM	amph: BAT AM	amph		dr 20	scrap		29	4					
213	2026	2.6	sam	sam	b/d			bsh		8	3					1 w burnt ext
214	2026	2.6	SV	SV	stor jar			bsh	cordon?	26	1					
215	2026	2.6	DOR BB1	DOR BB1	dish	plain		nearcop	arcaded	21	1	8	19			
216	2026	2.6	DOR BB1	DOR BB1	b/d			bsh		5	1					
217	2026	2.6	unk GW	unk RW	stor jar?			bsh		9	1					light grey fab
218	2026	2.6	BB2?	minor RW	cp			bsh	latt	2	1					
219	3048	3.7	pink flag	minor OW	flag			bsh		12	4					
220	3048	3.7	decayed OW	decayed OW	closed			bsh		1	1					
221	3048	3.7	DOR BB1	DOR BB1	cp	everted		rim		4	1	8				
222	3067	3.5	unk GW	unk RW	cp			bsh		7	1					
358	1044	1.7	fine GW	fine GW	cp			bsh		8	2					
359	2066	2.5	DOR BB1	DOR BB1	cp	everted		rim		4	1	7				
360	2066	2.5	DOR BB1	DOR BB1	b/d			bsh		2	1					
361	1050	1.6	fine GW	fine GW	cp			bsh		20	1					
362	1050	1.6	DOR BB1	DOR BB1	cp			bsh		6	1					
363	1052	1.3	sam	sam	bowl		37	bsh	dec	8	1					small vessel; dec recognisable
364	2026	2.6	amph: BAT AM	amph: BAT AM	amph		dr 20	bsh		13	1					
365	2026	2.6	decayed OW	decayed OW	closed			bsh		2	1					
366	2026	2.6	FW: LNV	FW: LNV	beak	indented		bsh		1	1					
367	1034	1.10	decayed OW	decayed OW	closed			bsh		5	1					
368	1034	1.10	DOR BB1	DOR BB1	cp			bsh		3	1					
369	1056	1.3	fine GW	fine GW	cp			bsh		14	3					
370	1056	1.3	unk GW	unk RW	stor jar			bsh		10	1					oxid ext
371	1035	1.6	DOR BB1	DOR BB1	cp			ir		5	1					incomplete repair hole
372	1035	1.6	OW gritty	minor OW	cp	long everted		rim, bsh		17	3	1				
373	1035	1.6	sam	sam	indet			bsh		0	1					
374	2003	2.7	sam	sam	bowl		37	bsh	dec	12	1					no slip, burnt, eroded
375	2003	2.7	DOR BB1	DOR BB1	b/d			base, bsh		9	2					
376	2002	2.7	sam	sam	cup		33	rim		5	1	6				

ID	contxt	ph	fabric	pub fab	vessel	sub-type	type	part	dec	wt	sh no	EVE	diam	same	dr	comments
377	2002	2.7	mort: MH	mort: MH	mort			scrap		7	1					
378	2002	2.7	FW: LNV	FW: LNV	beak			bsh		4	2					
379	2002	2.7	DOR BB1	DOR BB1	b/d			base		11	1					
380	2002	2.7	DOR BB1	DOR BB1	cp			base		8	1					
381	2012	2.6	amph: BAT AM	amph: BAT AM	amph			bsh		182	1					
382	2012	2.6	DOR BB1	DOR BB1	b/d			base	scribbled	26	1					
383	2012	2.6	GW gritty	GW gritty	cp			bsh		9	1					
384	2012	2.6	decayed OW	decayed OW	closed			bsh		4	1					
385	2012	2.6	decayed OW	decayed OW	mort?	wallside?		rim?		19	1					too eroded for ID
386	1008	1.9	DOR BB1	DOR BB1	bowl			bsh	arcaded	72	2					thick-walled
46	3040	3.6	FW: MOS BS	FW: MOS BS	beak	slit indent		bsh	roul	6	3					
47	3004	3.4	sam CG	sam	b/d			bsh, base		15	6					poor cond
48	3004	3.4	sam CG	sam	bowl			bsh	dec	5	2					
49	3004	3.4	sam CG	sam	bowl		37?	rim		16	1	4				
50	2003	2.7	amph: BAT AM	amph: BAT AM	amph		dr 20	hand, bsh		525	3					2 x vessels
51	2003	2.7	DOR BB1	DOR BB1	cp			bsh		6	3					
52	2003	2.7	DOR BB1	DOR BB1	cp	everted		rim		6	1	8				
53	2003	2.7	DOR BB1	DOR BB1	small j	upright	H&B 4	rim		10	1	9				prom shoulder
223	3067	3.5	decayed OW	decayed OW	closed			bsh		45	8					1 set in concretion
224	3067	3.5	sam	sam	b/d			bsh		6	1					
225	3046	3.5	DOR BB1	DOR BB1	small j			bsh, base		24	5					
226	3002	3.7	decayed OW	decayed OW	indet			bsh		8	3					
227	3002	3.7	unk cream	unk OW	indet			bsh		10	1					
228	3002	3.7	DOR BB1	DOR BB1	cp			bsh		7	1					
387	1008	1.9	fine OW	minor OW	beak	upright everted w shoulder		rim, bsh		2	1	12	7			oxid version of fine grey?
388	1008	1.9	sam	sam	bowl		30	rim		8	1					
389	1008	1.9	sam	sam	bowl		37?	rim		3	1	4				
390	1008	1.9	sam	sam	bowl			bsh	dec?	2	1					poor cond
391	1008	1.9	SV	SV	stor jar			bsh	paired grooves	39	2					
392	1008	1.9	decayed OW	decayed OW	cp			bsh		20	4					
393	1050	1.6	sam	sam	indet			scrap		0	1					
394	1050	1.6	DOR BB1	DOR BB1	cp			bsh		2	1					
395	3004	3.4	sam	sam	beak		68, 72	bsh	cut glass	1	1					cf 1042
396	1008	1.9	sam	sam	b/d			bsh		3	1					cut into disc; SF 23
397	1008	1.9	FW: LNV	FW: LNV	beak	indented funnel neck		nearcop		166	14	20	8		d8	large vessel
399	1008	1.9	DOR BB1	DOR BB1	b/d			bsh		2	1					
400	1008	1.9	fine GW	fine GW	cp			bsh		16	1					
401	1008	1.9	sam	sam	b/d			bsh		14	1					
402	3008	3.4	sam	sam	bowl		37	bsh	dec	10	1					good cond
403	3007	3.7	SV?	SV	stor jar			bsh		85	1					
404	2059	2.7	amph: BAT AM	amph: BAT AM	amph		dr 20	base, bsh		2229	31					burnt & shattered; small scraps not

ID	contxt	ph	fabric	pub fab	vessel	sub-type	type	part	dec	wt	sh no	EVE	diam	same	dr	comments
																counted
405	3030	3.7	DOR BB1	DOR BB1	cp			bsh		5	1					
406	3013	3.5	amph: BAT AM	amph: BAT AM	amph		dr 20	bsh		112	3					
407	3013	3.5	DOR BB1	DOR BB1	cp			bsh		3	1					
408	3008	3.4	DOR BB1	DOR BB1	b/d			base		7	1					
409	3002	3.7	DOR BB1	DOR BB1	cp	everted		rim		4	1	7				
410	3002	3.7	DOR BB1	DOR BB1	b/d	flat		rim		19	1	7	18			
411	3002	3.7	DOR BB1	DOR BB1	b/d			base, bsh		30	3					
412	3002	3.7	sam	sam	dish		18/31	rim		17	3	27	14			
413	3002	3.7	sam	sam	b/d			base, bsh		15	2					
414	2013	2.7	DOR BB1	DOR BB1	cp			bsh	r.a.l	68	14					
415	2013	2.7	amph: BAT AM	amph: BAT AM	amph			bsh		18	1					
416	3007	3.7	DOR BB1	DOR BB1	cp			bsh	o.a.l	39	3					
417	3007	3.7	fine GW	fine GW	indet			scrap		4	1					
418	3007	3.7	unk OW	unk OW	stor jar			bsh		42	1					pale fab, red core
419	3007	3.7	unk OW	unk OW	closed			bsh		8	1					
420	3007	3.7	decayed OW	decayed OW	indet			bsh		5	1					
421	3007	3.7	sam	sam	indet			scrap		2	3					no slip
422	3005	3.7	decayed OW	decayed OW	closed			bsh		20	1					
423	3005	3.7	mort: MH	mort: MH	mort			bsh		25	1					
424	3009	3.4	DOR BB1	DOR BB1	b/d			base		3	1					
425	3004	3.4	DOR BB1	DOR BB1	b/d	flat		rim		5	1	6				
426	3004	3.4	DOR BB1	DOR BB1	b/d			base, bsh		36	4					
427	3004	3.4	DOR BB1	DOR BB1	cp			rim		9	1	11	12			
428	3004	3.4	DOR BB1	DOR BB1	cp			bsh		11	4					
429	3004	3.4	fine GW	fine GW	cp			bsh		9	1					
430	3004	3.4	decayed OW	decayed OW	closed			bsh, base		25	3					
432	3039	3.9	amph: BAT AM	amph: BAT AM	amph			bsh, scrap		75	2					
433	3039	3.9	decayed OW	decayed OW	closed			bsh		47	11					
434	3039	3.9	FW: LNV	FW: LNV	beak			bsh	roul, barb	2	1					
435	3039	3.9	FW: LNV	FW: LNV	beak			bsh		3	1					
436	3039	3.9	DOR BB1	DOR BB1	cp	everted		rim		3	1	4				
437	3039	3.9	DOR BB1	DOR BB1	cp			bsh	o.a.l with groove	5	1					
438	3039	3.9	DOR BB1	DOR BB1	cp			bsh		21	3					
439	3039	3.9	DOR BB1	DOR BB1	b/d	flat w groove		rim		4	1	5				
440	3039	3.9	DOR BB1	DOR BB1	b/d			base, bsh		86	5					
441	3039	3.9	DOR BB1	DOR BB1	dish	plain		rim		9	1	3				
442	3039	3.9	unk WW	unk OW	flag			bsh		23	1					
443	3039	3.9	mort: MH	mort: MH	mort			bsh		10	1					
444	3039	3.9	mort: unk	mort: unk	mort	large bead		ir		13	1					white fab, brown core - burnt?
445	3039	3.9	GW speckled	minor RW	cp			bsh		15	3					

ID	contxt	ph	fabric	pub fab	vessel	sub-type	type	part	dec	wt	sh no	EVE	diam	same	dr	comments
229	1062	1.5	DOR BB1	DOR BB1	b/d			base		7	1					
230	1062	1.5	SV?	SV	stor jar			bsh		42	1					grey core
231	1062	1.5	sam	sam	bowl		Dr 31	ir		20	1					
232	1062	1.5	fine GW var	fine GW	closed			bsh		36	6					bit silky, but more incl than fine GW; grey ext
233	1062	1.5	fine GW	fine GW	cp	squat everted		rim		18	1	15	16			
234	2050	2.6	sam	sam	bowl		Dr 37	bsh	dec	7	1					1 x ovolo
235	1061	1.2	DOR BB1	DOR BB1	small j			bsh		2	1					shoulder
236	1061	1.2	GW black shiny?	minor RW	closed			bsh		9	1					
237	1061	1.2	decayed OW	decayed OW	dish	flat		nearcop	groove on rim	10	1	6			d10	thin-walled, flaring body
238	1055	1.7	GW gritty	GW gritty	dish	sloping flat		nearcop		35	2	13	20		d1	as Hardknott no. 34
239	1055	1.7	unk OW	unk OW	stor jar	nmj flanged		rim	neck cordon	9	1	19	10		d2	soft fine fab
240	1055	1.7	DOR BB1	DOR BB1	b/d			bsh	line	11	1					
241	1055	1.7	FW: CGBS	FW: CGBS	beak			bsh		2	1					
242	2059	2.7	sam	sam	dish		Dr 18/31	rim		21	1	14	17			
243	1040	1.6	FW: LNV	FW: LNV	beak			bsh		2	2					
244	1052	1.3	decayed OW	decayed OW	indet			scrap		2	2					
245	2066	2.5	SV	SV	stor jar	neck cordon		bsh		11	1					given 2 context nos 2066 & 2050 altho' fresh break
246	2037	2.5	sam	sam	indet			scrap		3	3					little slip
247	2037	2.5	decayed OW	decayed OW	indet			bsh		1	1					
248	2053	2.6	DOR BB1	DOR BB1	cp	everted		rim		6	1	3				
249	2053	2.6	DOR BB1	DOR BB1	cp			bsh, ir		21	3					
250	2053	2.6	unk OW	unk OW	cp			bsh		10	3					brown
251	2053	2.6	sam	sam	b/d		Dr 18/31?	ir		4	1					no slip
252	2053	2.6	sam	sam	b/d		Dr 18/31 or 31	bsh		11	1					
253	2053	2.6	unk OW	unk OW	stor jar	small nmj, grooved rim		rim		12	1	19	20			sort of flanged; soft orange fab
254	2068	2.6	unk GW	unk RW	closed			bsh	incised herringbone	8	1				d3	gritty grey fab; remains of black slip
255	2068	2.6	decayed OW	decayed OW	closed			bsh		4	1					
256	1045	1.6	fine GW var	fine GW	face pot	incised bosses		bsh	applique	14	1			1039	d4	another sh in US
257	3050	3.7	DOR BB1	DOR BB1	cp			base, bsh		46	4					1 sh burnt oxid
258	3050	3.7	DOR BB1	DOR BB1	cp	long everted	20.1	rim		20	1	10	18			
259	2023	2.7	sam	sam	b/d			bsh		3	1					
260	3052	3.3	decayed OW	decayed OW	indet			bsh		17	1					
261	1046	1.6	fine GW	fine GW	indet			base		11	1					thick base
262	2036	2.7	GW black incl	minor RW	indet			bsh		5	2					
263	2036	2.7	DOR BB1	DOR BB1	b/d	plain		ir		2	1	2				
264	3007	3.7	sam	sam	bowl		37	bsh	dec	8	1					little dec survives
265	1056	1.3	sam	sam	b/d			base		46	2					
266	1056	1.3	sam	sam	cup		33	rim		3	1	5				
267	1056	1.3	sam	sam	bowl		37 etc	bsh	dec	2	1					
268	1056	1.3	decayed OW	decayed OW	closed			bsh		5	2					

ID	contxt	ph	fabric	pub fab	vessel	sub-type	type	part	dec	wt	sh no	EVE	diam	same	dr	comments
269	1056	1.3	unk OW	unk OW	closed			bsh		5	2					fine fab
270	1056	1.3	DOR BB1	DOR BB1	cp	everted	15	rim		61	1	20	14			
271	1056	1.3	DOR BB1	DOR BB1	b/d	flat		rim	intersect arc	22	1	11	19			
272	1056	1.3	DOR BB1	DOR BB1	b/d			bsh		9	2					
273	1056	1.3	DOR BB1	DOR BB1	cp			bsh	lattice	2	1					
274	1056	1.3	mort: local	mort: local	mort	flange		flange		19	1	8	25			burnt
275	3007	3.7	sam	sam	bowl		37	bsh	dec	54	1					large sh; dec abraded
276	2020	2.7	sam	sam	cup		33	rim		3	1	6	11			
277	2020	2.7	FW: CGBS	FW: CGBS	beak			base		7	1					little slip surviving
278	1058	1.4	DOR BB1	DOR BB1	b/d	flat		rim		21	1	10	20			
279	1058	1.4	DOR BB1	DOR BB1	cp			base		16	1					
280	1058	1.4	Unk WW	unk OW	indet			scrap		3	1					mort??
281	1058	1.4	sam	sam	b/d			bsh		1	1					
282	1058	1.4	fine GW	fine GW	indet			bsh		5	1					poss broken disc; one edge seems rounded
283	1058	1.4	organic tempered	minor RW	indet			bsh		7	1					cream fab; pink ext; large pebble incl
284	3022	3.7	GW gritty	GW gritty	cp	everted bent tip		rim		17	2					plentiful white quartz; rim flat on int
285	3022	3.7	DOR BB1	DOR BB1	cp			bsh		4	1					
286	3022	3.7	fine GW	fine GW	indet			bsh		0	1					
287	2054	2.6	amph: BAT AM	amph: BAT AM	amph	triag	dr 20	rim, bsh		82	2	10				battered rim
288	2054	2.6	sam	sam	indet			bsh		1	1					
289	2054	2.6	DOR BB1	DOR BB1	cp	bead rim	3	rim, bsh		8	3	6				
290	1037	1.7	DOR BB1	DOR BB1	bowl	flat w groove		rim		52	1	13	27			thick-walled and large
291	1037	1.7	fine GW	fine GW	closed			bsh		5	1					fab like face pot
292	1037	1.7	DOR BB1	DOR BB1	cp			bsh		8	1					
293	3046	3.5	sam	sam	cup?		33?	bsh		3	1					
294	2030	2.7	amph: BAT AM	amph: BAT AM	amph			scrap		4	1					
295	2030	2.7	decayed OW	decayed OW	closed			bsh		17	5					
296	2030	2.7	DOR BB1	DOR BB1	cp			bsh		11	2					
297	2030	2.7	sam	sam	bowl		18/31R	bsh		31	1					repair hole w lead remains
298	2030	2.7	sam	sam	indet			bsh		2	2					
299	2064	2.5	sam	sam	indet			bsh		4	1					
300	2064	2.5	decayed OW	decayed OW	indet			bsh		2	1					
301	2064	2.5	DOR BB1	DOR BB1	b/d			bsh		12	2					
302	2064	2.5	DOR BB1	DOR BB1	cp	everted		rim		9	2	6				2 x vessels
303	2064	2.5	DOR BB1	DOR BB1	cp			bsh		3	1					
304	2064	2.5	DOR BB1	DOR BB1	small j	bead w shoulder	4	rim		8	1	10	9			
305	2064	2.5	smooth grey	minor RW	indet			bsh		0	1					fine pale grey, hard fab
306	2064	2.5	unk RW	unk RW	closed			bsh		3	1					sandwich sandy - SERW?
307	2064	2.5	unk GW	unk RW	closed			bsh	incised	2	1					multiple incised lines - head/face?? Too small
308	2059	2.7	amph: BAT AM	amph: BAT AM	amph		dr 20	scraps		999	20					shattered & burnt; small scraps not counted

ID	contxt	ph	fabric	pub fab	vessel	sub-type	type	part	dec	wt	sh no	EVE	diam	same	dr	comments
309	2059	2.7	DOR BB1	DOR BB1	cp			bsh		9	2					
310	2059	2.7	sam	sam	indet			scrap		0	1					
311	2054	2.6	decayed OW	decayed OW	closed			bsh		7	2					
312	2054	2.6	GW black incl	minor RW	closed			bsh		2	1					fine mic gey
313	2073	2.6	amph: BAT AM	amph: BAT AM	amph			scrap		4	1					
314	2073	2.6	fine GW	fine GW	b/d			base		6	1					good burnish on ext; sandwich
315	2053	2.6	DOR BB1	DOR BB1	b/d			base, bsh		11	2					
316	2053	2.6	amph: BAT AM	amph: BAT AM	amph		dr 20	bsh		9	1					sandwich
317	2053	2.6	gritty brown	minor OW	closed			bsh		4	1					
318	2023	2.7	DOR BB1	DOR BB1	cp			bsh	o.a.l	26	1					
319	2023	2.7	DOR BB1	DOR BB1	cp	everted		rim		5	1	2				
320	2023	2.7	fine GW	fine GW	cp			base		14	1					
321	2023	2.7	mort: MH	mort: MH	mort	hammerhead		rim	paint	32	1	10				traces of red paint, battered
322	2023	2.7	mort: MH	mort: MH	mort	hammerhead		ir		9	1					smaller vessel
323	2023	2.7	mort: MH	mort: MH	mort	grooved		ir		12	1	6				
324	2023	2.7	mort: MH	mort: MH	mort			bsh		6	1					burnt
325	2023	2.7	SV	SV	stor jar			base		20	1					
326	2023	2.7	unk OW	unk OW	stor jar			base		37	1					sandy OW
327	2023	2.7	decayed OW	decayed OW	indet			bsh		5	1					
328	2023	2.7	sam	sam	bowl	footring		base		6	1					
329	3048	3.7	DOR BB1	DOR BB1	cp			bsh		5	1					
330	2086	2.6	DOR BB1	DOR BB1	b/d	flat w groove		rim		5	1	4				droopy rim
331	3060	3.7	sam	sam	bowl		37	rim		7	1	5				
332	2057	2.5	fine GW	fine GW	b/d	bead rim		rim		8	1	5				
333	2057	2.5	DOR BB1	DOR BB1	cp			bsh		22	2					
334	2054	2.6	sam	sam	bowl		37	rim, bsh	ovolo	39	3					thick-walled & heavy; burnt
335	3003	3.2	DOR BB1	DOR BB1	cp			base		6	1					
336	3003	3.2	decayed GW	decayed RW	indet			bsh		2	1					
337	2040	2.5	DOR BB1	DOR BB1	cp			bsh		1	1					
338	2040	2.5	unk GW	unk RW	closed			bsh		16	1					grey to ext, brown to int
339	2044	2.7	GW gritty	GW gritty	cp			bsh		7	1					
340	2044	2.7	decayed GW	decayed RW	cp			bsh		2	1					
341	2044	2.7	decayed OW	decayed OW	indet			scrap		1	1					
342	2040	2.5	FW: unk	FW: unk	beak	bulky cornice		rim		2	1	3				soft pale orange, self-col?
343	1006	1.11	unk OW	unk OW	stor jar			base		40	1					gritty orange
344	3005	3.7	amph: BAT AM	amph: BAT AM	amph		dr 20	bsh		267	1					
345	2065	2.3	amph: BAT AM	amph: BAT AM	amph		dr 20	bsh		262	2					
346	2065	2.3	sam	sam	b/d			bsh		12	2					
347	2020	2.7	decayed OW	decayed OW	stor jar			bsh		32	1					
348	2020	2.7	DOR BB1	DOR BB1	cp			ir		6	1					
349	2020	2.7	decayed GW	decayed RW	closed			bsh		14	1					
350	3007	3.7	decayed GW	decayed RW	indet			scrap		0	1					

ID	contxt	ph	fabric	pub fab	vessel	sub-type	type	part	dec	wt	sh no	EVE	diam	same	dr	comments
351	3007	3.7	decayed OW	decayed OW	closed			bsh		18	2					
352	3046	3.7	FW: LNV	FW: LNV	beak			base, bsh		5	2					pink fab
353	3046	3.7	DOR BB1	DOR BB1	cp			bsh		1	1					
354	3046	3.7	unk GW	unk RW	cp			bsh		4	1					
355	1044	1.7	sam	sam	indet			scrap		1	1					
356	1044	1.7	FW: LNV	FW: LNV	beak			bsh		2	1					
357	1044	1.7	OW gritty	minor OW	indet			bsh		2	1					
446	3039	3.9	GW gritty	GW gritty	closed			bsh		3	1					
447	3039	3.9	fine GW	fine GW	stor jar	small nmj flanged		rim		7	2	14	12			all brown, no grey
448	3039	3.9	GW white incl	minor RW	closed			bsh		15	2					mid gre, wide dark grey core, obvious white incl
449	3039	3.9	amph: BAT AM	amph: BAT AM	amph			bsh		1787	21					smaller shh shattered; not counted
450	3039	3.9	decayed OW	decayed OW	closed			bsh		95	13					
451	3039	3.9	sam	sam	b/d			base, bsh		15	2					no slip left
452	3039	3.9	mort: MH	mort: MH	mort			bsh, scrap		6	2					
453	3039	3.9	DOR BB1	DOR BB1	cp			bsh		12	2					
454	3039	3.9	fine GW	fine GW	closed			bsh		3	1					
455	3039	3.9	fine GW	fine GW	closed			bsh		2	1					dark grey ext, brown fab
456	3039	3.9	mort: MH	mort: MH	mort	bead & flat flange		rim		63	1	15	23			burnt on end of rim
457	3039	3.9	amph: BAT AM	amph: BAT AM	amph	triag		rim		136	1	30	17			
458	3015	3.9	decayed OW	decayed OW	closed			bsh, base		87	10					
459	3015	3.9	DOR BB1	DOR BB1	cp			bsh		3	1					
460	3015	3.9	DOR BB1	DOR BB1	dish	plain		rim		13	1	7				
461	3015	3.9	DOR BB1	DOR BB1	dish	plain		rim		10	1	4				
462	3015	3.9	DOR BB1	DOR BB1	cp	long everted		ir		8	1					
463	3015	3.9	unk WW	unk OW	indet			scrap		4	1					
464	3015	3.9	sam	sam	b/d			base, bsh		28	3					
465	3039		fine GW var	fine GW	face pot			bsh	incised	55	1				d4	

Table 12: Unstratified Roman pottery

ID	contxt	period	fabric	vessel	sub-type	sh	dec	wt	comments	EVE	d	sh no
18	1042	1.14	sam	beak		bsh	cut glass	1				1
20	2000		sam	bowl	Curle 15	ir		49	in v good condition			1
21	2001		mort: M-H	mort	hammerhead	rim	painted stripes	89		15		1
22	2001		fine GW	beak	roulette dec	bsh		6				1
23	2001		amph: BAT AM	amph	triag, dr 20	rim		134	graffito IIIXII poor cond	18		1
24	1047		gritty OW	flag	squared, grooved	rim		20			d9	1

Table 13: Abbreviations used in Roman pottery catalogues

Abbreviation	Term
a.a.l	acute angle lattice
amph	amphora
Ant	Antonine
barb	barbotine
BAT AM s	BAT AM sandwiched fabric
BB1	black burnished ware fabric 1
BB1 SED	BB1 from South-east Dorset
BB1 SW	south-western BB1
BB2	black burnished ware fabric 2
b/d	bowl or dish
beak	beaker
bl	black
bl sand	black sand amphora
bsh	body sherd
B18	York Fabric B18
C&B	Corder and Birley 1937 type series
cal grit	calcite-gritted
cass	casserole
cc	colour-coat(ed)
CG	Central Gaulish
cp	cooking pot
cslhj	countersunk lug-handled jar
dec	decoration
diffrr	different
Dr	Dragendorff
dr	Dressel
dr	[in heading] drawing number
d[no.]	pot drawing number
e	early
EG	East Gaulish
EVE	estimated vessel equivalent (rim percentage)
ext	exterior
fab	fabric
flag	flagon
Flav	Flavian
FW	fine ware
Fulf	Fulford 1975 (New Forest ware)
GW	grey ware
G18	York Fabric G18 (unburnished fabric B18)
H&B	Holbrook and Bidwell 1991 type series
Had/Ant	Hadrianic or Antonine
hemi	hemispherical bowl

Abbreviation	Term
hi mic	highly micaceous
HPM	Howe, Perrin and MacKreth (Lower Nene Valley ware)
Hunt	Huntcliff-type rim (ie internal lid-seating, not a fabric description)
imit	imitation
incl	inclusions
indet	indeterminate
int	interior
intersect	intersecting arc
ir	incomplete rim
l	late
LNV	Lower Nene Valley
LTW	local traditional ware ('native')
MB	Mount Batten (Cunliffe 1988)
mic	micaceous
mica-d	mica-dusted
mort	mortarium
MH	Mancetter-Hartshill
NG	North Gaulish
nmj	narrow-mouthed jar
nns	no neck surviving
o.a.l	obtuse angle lattice
occ	occasional
OW	oxidised ware
oxid	oxidised
r.a.l	right angled lattice
r/c	roughcast
rust	rusticated
RW	reduced ware
sam	samian
scrap	both surfaces of sherd do not survive
SERW	south-west reduced ware
SG	South Gaulish
sh	sherd
stor jar	storage jar
ss	sandstone
Traj	Trajanic
triag	triangular
trit grit	trituration grits
type 1B	Corder and Birley 1937 type 1B (Crambeck ware)
unk	unknown (= unsourced)
vess	vessel(s)
w	with

Abbreviation	Term
wmb	wide-mouthed bowl
W26	Catterick fabric W26
0	(in context column) unstratified
	NRFC (Tomber & Dore 1998) fabric terms not included
tank	tankard

APPENDIX 5: CBM AND STONE ROOF TILES

By Jane McComish

Introduction

A total of 2,531 sherds of ceramic building material (CBM), weighing a total of 76.344kg, were examined from the Ravenglass 2013-2014 excavations. The CBM was of very poor quality, comprising highly fragmented, severely abraded sherds. The degree of fragmentation is reflected in the high proportion of small sherds present, with 59% of the total number of sherds weighing 10g or less. In addition, 91% of the sherds examined were so fragmented that they lacked any surviving original dimensions.

Eighty-four fragments of stone roof tile and roof slates were also examined, and these weighed a total of 31.245kg.

The various forms of CBM and stone roof tiles present are summarised by historical period on Table 14, while a summary of the forms present in relation to the relevant archaeological context is given on Table 15.

Methodology

The CBM and stone tile was recorded to a standard York Archaeological Trust methodology whereby each sherd is weighed, any complete surviving original dimensions are measured, its fabric and form are assessed and any additional characteristics are described. In terms of the form names, the term 'Roman brick' refers to all sherds which are of Roman date, but are too badly fragmented to determine the precise original form, while the term 'Other' refers to sherds of non-standard forms, and a question mark after the form (for example 'crested?') indicates that the identification of the form is tentative.

A fabric series for the site was devised based on the examination of the sherds using a x10 hand-lens. The fabrics in the series are numbered R1 to R27, with R standing for Ravenglass. In addition, the term R0 was used for sherds weighing less than 5g which were therefore too small to accurately assess the fabric, while the term R100 was used for any modern machine made sherds. The fabrics are described on Table 13.

Roman CBM

Roman CBM accounted for 96.13% of the total volume of CBM from the site. Roman CBM was usually made in a number of standardised forms, which were used for a variety of purposes, including bricks for use in walling and flooring, roofing tiles and tiles for heating systems. Tiles could also be cut down to make tesserae for use in mosaic floors.

Tile production was a seasonal occupation, with clay being dug in the autumn and left to overwinter, allowing the clay to be broken down by frost-action. Wood necessary for firing the kilns could also be collected in the winter and left to dry out (Warry 2006, 121). The clay was turned in spring and any temper required, such as additional sand, could be added at this stage. Evidence from graffiti in Britain suggests that tiles were manufactured in summer or autumn (McComish 2012, 271). The clay was mixed by hand and any impurities such as pebbles were removed. The wet clay was placed in suitably sized and shaped sanded moulds, and the upper surfaces of the tiles were often deliberately smoothed. The tiles were then removed from the moulds and laid out to dry either in open sided sheds or directly on the ground; this was an important stage of the process as insufficient drying could cause tiles to shatter when fired (McComish 2012, 272). Once the tiles were sufficiently dry they were loaded into square or rectangular shaped kilns and fired to a temperature of about 1000°C. After firing the kiln was allowed to cool before being unloaded. Estimates as to the length of time required to load, fire, cool, and unload kilns range from around eight days to several weeks (Warry 2006, 129).

Roman bricks

Roman bricks were usually square in shape and in a series of sizes based on a Roman foot, with *bessalis* being the smallest bricks at eight Roman inches square (equating to 197mm² in size), the next size being *pedalis* at a Roman foot (296mm) square in size, then *sesquipedalis* at one and a half Roman feet (444mm) square in size, while the largest bricks were *bipedalis* bricks at two Roman feet (591mm) square in size; the only rectangular bricks were *Lydion* bricks which were 1 x 1.5 Roman feet (296mm x 444mm) in size. Roman bricks can, however, vary in size often due to differential shrinkage during firing. All these bricks were made on sanded work benches using appropriately sized open-bottomed sanded moulds, giving rise to sand on the sides and bases of the bricks, and sometimes to lips of clay around the bottom of the tiles where clay had been squeezed between the mould and the work-bench (Betts 1985, 158). Sometimes the sanded undersides have drag-lines from wires which were used to separate the tile from the workbench (Betts 1985, 162).

Because the bricks from the Ravenglass excavation were so badly shattered and abraded there was only one example where the original breadth survived, and even this was broken into three sherds and had a highly abraded upper surface. The tile (Fig. 21:1) measured 290mm wide and 27mm thick, and it was in excess of 290mm long. If this brick was originally only slightly longer than 290mm it would clearly be a *pedalis*, however, if it was originally significantly longer it would have been a *Lydion* brick. Given that *pedalis* are slightly more common nationally than *Lydion* bricks this sherd has been identified as probably *pedalis*. *Pedales* were principally used as the base and capping tiles for hypocaust *pilae* columns (Brodribb 1989, 36). A hypocaust was a heating system whereby hot air from a furnace circulated beneath a floor which constructed on top of small piers called *pilae*, and floors of this type were present in baths buildings and for heated rooms such as dining rooms within villas.

The overwhelming bulk of the sherds from Ravenglass were identified as 'Roman brick'. These sherds ranged from 14-62mm in thickness (140 surviving measurements), but no original length or breadth measurements survived. Roman bricks sometimes have keying lines on one surface to aid the adhesion of mortar, and such keying lines were made while the clay was still wet, either using the fingers, a comb or a knife. Keying was seen on some of the Ravenglass bricks; there were two sherds with combed keying on the upper surface, one of which had at least five teeth in the comb, while the second example had nine teeth in the comb. Incised keying in a fret pattern was also seen on three sherds, possibly four (the additional sherd being severely eroded).

Most of the Roman brick sherds were too small and/or abraded to exhibit any features of particular interest, but one sherd had an accidental groove on the surface, three had smoothing lines on the upper surface and one sherd had a possible thumb print on the surface resultant from lifting the brick while wet. There were Roman brick sherds with reduced cores; reduction is caused by the exclusion of oxygen during the firing process (McComish 2012, 282). In addition, many of the sherds were very soft indicating that they had been underfired.

Roman roof tiles

The two commonest forms of Roman roofing tile are *tegulae* and *imbrices*, indeed these types of tile invariably represent the commonest forms of CBM found on Roman sites nationally (Warry 2006, 1).

Tegulae are roofing tiles which are usually rectangular in shape, though some taper inwards slightly towards the base of the tile. *Tegulae* have flanges on the upper face along each of the longer sides. They have a small cutaway area on the underside of the tile beneath the basal end of each flange, and an upper cutaway on the upper surface of each flange at the top of the tile (Betts 1985, 143). *Tegulae* were arranged in columns on a roof (McComish 2012, 214) and the upper and lower cutaways of adjacent tiles overlapped when fitted on the roof.

Tegulae were usually manufactured using a four-sided bottomless sanded mould on a sanded workbench. Blocks for the lower cutaways could either be integral to the mould, or fixed onto the workbench in the correct position, thereby holding the mould in place during manufacture. Alternatively, lower cutaways could be knife-cut after the tile was removed from the mould. Clay would be thrown into the mould and punched into the corners before running the hands along the flanges to smooth them, often creating a noticeable finger-groove adjacent to the flange. The upper cutaway would then be cut, and the surface of the tile sponged down to improve surface strength (McComish 2012, 214). Warry (2006, 7-32) has noted that *tegulae* could also be manufactured using five sided moulds with retractable sides and with an inverted box mould, with inserts for the upper cutaways. Sometimes *tegulae* have marks which are termed signatures on the upper surface, these do not comprise names or text, but rather take the form of simple designs drawn by the person making the tile while the clay was still wet. Signatures were usually drawn with the fingers, though nationally a few signatures are known which were drawn with a stick, a comb, or incised with a

knife (Warry 2006, 91; Brodribb 1989, 102). The function of these signature marks is unclear (McComish 2012, 325).

Twenty-two sherds of *tegulae* were present in the Ravenglass collection, and there were an additional nine sherds that were probably *tegulae*. The *tegulae* ranged in thickness from 18-39mm (19 surviving dimensions) with flanges 23-67mm high (12 surviving dimensions); no length or breadth measurements survived. Nationally *tegulae* range from 9-50mm in thickness (McComish 2012, 221), so the examples from Ravenglass fall comfortably within this range. Various features relating to manufacture were present on the *tegulae*; three of the sherds had smoothing lines on the upper surface and seven sherds had finger-grooves adjacent to the flange which were also resultant from smoothing. Two sherds had been knife trimmed on the outer edge of the flange, while one sherd had been trimmed on the top of the flange. Cutaways can vary in shape, and the various types have been categorised by (Warry 2006, 4); following this classification there was one *tegula* at Ravenglass with a Type A26 lower cut away and one with a Type B26 lower cut away (Fig 21.2). A single sherd had part of an arc-shaped signature on the upper surface; this is the commonest design of signature mark nationally (McComish 2012, 238). A single sherd had part of a nail hole present, which was 9mm in diameter; *tegulae* with nail holes have been noted across Britain, but they are rare (Brodribb 1989, 11). Two of the *tegulae* had reduced cores.

Imbrices are hollow half cylinders which taper inwards at the top. *Imbrices* were used to cover the junction between adjacent *tegulae* on a roof, with the wider basal end of one *imbrex* overlapping the narrower upper end of the adjacent *imbrex*, and they were mortared into place to ensure a sealed joint (Betts 1985, 143). *Imbrices* were made using a trapezoidal slab of clay, which was placed into a concave sanded former, or into a sanded convex former, in which case the sanded side would be uppermost and would require further smoothing (Warry 2006, 37).

Sixteen sherds of *imbrex* were present at Ravenglass, and there were an additional four sherds that were probably from *imbrex*. These sherds ranged in thickness from 14-18mm (12 surviving thicknesses) but no other original dimensions survived. The thickness range for *imbrices* nationally is 14-30mm (Brodribb 1989, 26), so the examples from Ravenglass are at the thinner end of the national spectrum. These *imbrices* were all abraded and the only notable features relating to manufacture were that one of the tiles had finger smoothing on the upper surface parallel to the length of the tile, and that a second sherd had a reduced core.

Tesserae

A single example of a *tessera* was present, which measured 29mm x 22mm x 23mm in size. The size of *tesserae* varied dependent upon the quality of the floor, with *tesserae* from mosaics in Britain ranging from 4-12.5mm square in size, while those in coarser tessellated pavements ranged from 12-38mm in size, with individual *tessera* being more irregular in shape than those used in mosaics (Ward 1999, 45). The size of the example from Ravenglass suggests that it was originally from a tessellated pavement rather than a mosaic.

Flue tiles

Flue tiles were used in hypocaust heating systems and two differing forms are known in Britain, half-box flue tiles and box flue tiles. As no half-box flues were found at Ravenglass this type is not described in detail here. Box flue tiles or *tubuli* are hollow rectangular or square cross-sectioned tiles, with sanded interior surfaces. Box flues have vents in two opposing sides, while the other two sides usually have keying lines which can be incised, finger drawn, combed or relief-patterned (McComish 2012, 152). Box flues were made by wrapping a slab of clay around a sanded former then joining the edges of the clay together with a single seam, and the vents were cut out after the tile was removed from the former (Rudling et al. 1986, 204). Box flues were usually positioned in vertical columns around the sides of a room to provide a lining, with the vents abutting one another, allowing heated air to circulate through the wall (McComish 2012, 152). The box flues attached were to the walls by metal clamps (Brodribb 1989, 71).

Six sherds of box flue tiles were present at Ravenglass, and there were an additional 31 sherds which were identified as probably flue tile on the basis of their thickness, or due to the presence of keying lines on the surface. All of the sherds were abraded. The flue tiles ranged from 10-23mm in thickness (31 surviving dimensions), but no other dimensions survived. Ten of these sherds had incised keying in a fret pattern on the exterior surface (Fig. 21.3). The presence of keying on the flue tiles is expected given that 95% of box flues in Britain are keyed, though combed keying is more common nationally than incised keying (Brodribb 1989, 78). No vents survived on the flue tiles from Ravenglass.

Non-standard Roman tiles

Three non-standard Roman sherds were present at Ravenglass, and these were recorded as 'Other' in terms of their form name. The first sherd, for which no surviving dimensions were present, was pierced by a hole 19mm in diameter, which may represent a firing hole. Firing holes on Roman bricks are known from elsewhere in Britain, for example in York (McComish 2012, 146, 205), though they are always rare. The second sherd had an almost triangular cross section; the original function of this sherd is unclear. The third sherd had a curving profile, but was far too thick to be an *imbrex*; this may represent part of a Roman ridge tile, though this is not certain (Fig. 21.4).

Medieval CBM

Only 0.6% of the CBM from the site was interpreted as being of medieval date. There were three sherds which were just 11mm thick; this thickness is suggestive of roofing tile of 13th- to 16th-century date. Two sherds of ridge tile 13mm thick were present, and again this thickness is suggestive of medieval ridge tile of 13th- to 16th-century date. There was a severely abraded sherd which seemed to be part of a crested ridge tile of 13th- to 16th-century date. The original shape of the crest was impossible to

determine due to the eroded nature of the sherd, but there were knife trimming lines adjacent to the crest indicating that the design had been cut out from the clay.

Post-medieval CBM

The post-medieval CBM accounted for just 1.28% of the total volume examined, and comprised two sherds of brick. Both bricks were slop-moulded, that is manufactured in a wetted as opposed to a sanded mould. Slop moulding was the dominant technique used in brick manufacture from the post-medieval period onwards. The bricks were 56mm and 60mm thick respectively, which is typical for post-medieval bricks. No other dimensions survived.

CBM post-dating 1850

Modern CBM accounted for 2% of the total volume of CBM examined, and comprised just eight sherds. The first of these was a single sherd of slop-moulded brick which was 108mm wide and 64mm thick, dating to 1750 or later. Four more bricks, with no surviving dimensions, were made from mechanically processed clay, and are therefore of modern date. There were also three sherds of machine made CBM dating to 1850 or later, including a fragment of brick, a sherd of wall tile and a sherd of nibbed roofing tile (a nib being a projecting lug of clay used to hook over the rafters of the roof).

The CBM fabrics

A total of 26 differing fabrics were identified on the basis of examination with a x10 hand lens, but it is possible that many of the differences seen relate to firing, or represent minor variations within a single source of clay. It should be noted that thin-section analysis would be required to provide a definitive description of the fabrics, and that where such analysis is undertaken it often results in smaller numbers of fabrics than those identified using a hand lens. At York the 19 fabrics identified using a hand lens (McComish 2012, 283-88) were reduced to five by thin section analysis (Finlay, 2011), while at Silchester the four differing fabrics that were seen when examining the tiles with a hand lens, were thought to derive from different clay sources when thin sectioned (Cram and Fulford 1979, 203).

The Roman brick sherds were in a wide range of fabrics, R0-3, R5-8, R10-15, R22, R24 and R26-27. Fabric R2 was the most commonly occurring fabric, but it is possible that fabrics R1, R3, R5-7 and R11-R12 all represent slight variations of fabric (for example R12 could simply represent a very highly fired version of R2). Similarly, fabrics R8, R10, R13, R15, R24, R26 and R27 may represent variations of a single fabric, while fabrics R14 and R22 may be related.

Fabrics R19-21 and R25 were only seen on material interpreted as being of medieval date, fabrics R17-18 were only seen on material identified as being of post-medieval

date and fabrics R4, R9, R16, R23 and R100 were only seen on material identified as being of modern date.

The stone and slate roof tiles

In addition to the CBM, 84 fragments of stone and slate which originated from stone roof tiles were also examined, and these weighed a total of 31.245kg.

Forty-three sherds of sandstone (which contained occasional mica flecks) were present, and these ranged from 5-30mm in thickness. One of these sherds was definitely originally from a stone roof tile as it was pierced by a circular nail hole 7mm in diameter, while the remaining 42 sherds were probably also originally from stone roofing tiles.

Eleven sherds of fine grained sandstone ranging from 12-21mm in thickness probably also represent stone roofing tiles, though one of these had been re-cut to form a circular counter or lid 23mm in diameter (Fig. 21.5). Two fragments of unidentified stone were present that were 10mm and 15mm thick respectively, and these again probably originated from roofing tiles.

Forty-one fragments of slate were present which ranged in thickness from 8mm to 20mm. Three of these were definitely originally from a slate roof tiles as they were pierced by nail holes which were 7mm, 9mm and 11mm in size respectively, and one of these had two surviving edges which suggested that it was of polygonal shape originally (Fig. 21.6). The remaining slate fragments were probably also originally from stone roofing tiles, and six of these had part of one or two original edges present, one of which was had a squared corner suggesting the slate had a rectangular shape originally (Fig. 21.7). Though no original dimensions survived, some of the slate fragments were large, the largest being in excess of 370mm x 290mm. One of the slates had sixteen small circular indentations on one face, each of which was 3mm in diameter, and these indentations were in a random pattern (Fig. 21.8).

One fragment of coarse-grained sandstone was present which lacked any surviving dimensions; this could represent general building material or roofing material. One of the sandstone fragments (Fig. 21.9) may originally have been a *tessera* measuring 20mm x 17mm in area (the original thickness did not survive); the upper surface of this sherd was eroded.

Summary

The collection of CBM and stone tiles from Ravenglass was of very poor quality overall, with relatively few diagnostic sherds being present. The forms present were for the most part standard Roman types of CBM (*pedalis*, *tegulae*, *imbrices*, flue tiles and *tesserae*), though there were also three non-standard Roman sherds present. The presence of forms usually associated with baths-buildings (flue tiles and *pedalis*) need not necessarily mean that a bath was present on the site, as it could simply represent the use of surplus or broken tiles manufactured for the nearby Roman baths-house.

As the cost of long term storage of artefacts in museums is prohibitive, the collection was split into two with a representative 37% of the CBM being retained including a selection of all the forms and fabrics from the site, while the remaining 63% of the CBM which comprised abraded material of limited research potential was discarded. Similarly a representative selection of the stone tiles and slates was retained amounting to 61% of the material examined, while the remaining smaller fragments were discarded.

Catalogue

Table 14: CBM in relation to period

Period	Form	No. of sherds	Weight in grams	% of total weight
Roman	Flue/Flue?	37	2056	2.69
	Imbrex/Imbrex?	20	1070	1.40
	Other	3	480	0.63
	Pedalis?	1	2500	3.27
	Roman brick	2422	61093	80.02
	Tegula/Tegula?	31	6140	8.04
	Tessera	1	50	0.07
Medieval	Crested?	1	30	0.04
	Plain?	3	300	0.39
	Ridge?	2	125	0.16
Post-medieval	Post-medieval brick	2	975	1.28
Modern	Brick	6	1430	1.87
	Nib	1	20	0.03
	Wall tile	1	75	0.10

Table 15: CBM in relation to context

Context	Dating by century AD	Keywords
1000	2-4th	Roman brick, Slate
1001	2-4th	Flue?, Roman brick, Ridge, Stone peg?, <i>Tegula?</i>
1002	2-4th	Roman brick, Stone peg?
1003	2-4th	Roman brick
1004	2-4th	<i>Imbrex</i> , Roman brick, Stone peg?, <i>Tegula?</i>
1005	13-16th	Roman brick, Ridge?
1006	2-4th	Roman brick, Slate, <i>Tessera?</i>
1008	2-4th	Roman brick, Slate, Stone peg, Stone peg?
1030	2-4th	Roman brick
1033	2-4th	Roman brick
1035	2-4th	Roman brick
1036	2-4th	Roman brick
1037	2-4th	Roman brick
1039	2-4th	Roman brick
1040	13-16th	Plain?, Roman brick
1041	2-4th	<i>Imbrex</i> , Roman brick, <i>Tegula</i>
1042	2-4th	Roman brick
1043	2-4th	Roman brick, Stone peg?
1044	13-16th	Crested?, <i>Imbrex</i> , Roman brick, Slate
1045	2-4th	Roman brick
1046	2-4th	Roman brick, Slate
1047	2-4th	Roman brick, <i>Tegula</i>
1048	2-4th	Roman brick
1049	2-4th	Roman brick, Stone Peg?
1050	2-4th	Roman brick
1051	2-4th	Roman brick, Slate
1052	2-4th	Roman brick
1055	2-4th	Roman brick, Slate
1056	2-4th	<i>Imbrex</i> , Roman brick, <i>tegula?</i>
1057	2-4th	Roman brick
1058	2-4th	<i>Imbrex</i> , Roman brick, <i>Tegula</i>
1061	2-4th	Roman brick
1062	2-4th	Roman brick, <i>Tegula</i>
2000	2-4th	<i>Imbrex?</i> , Roman brick, Stone peg?, <i>Tegula</i> , <i>tegula?</i>
2001	2-4th	Flue, Flue?, <i>Imbrex</i> , <i>Imbrex?</i> , Roman brick, Stone peg?, <i>Tegula</i> , <i>Tegula?</i>
2002	2-4th	Flue?, Roman brick, Stone peg?
2003	2-4th	<i>Imbrex</i> , Roman brick
2004	2-4th	Pedalis?
2005	2-4th	Roman brick
2007	2-4th	Roman brick
2012	2-4th	Roman brick

Context	Dating by century AD	Keywords
2013	2-4th	Roman brick, <i>Tegula</i> ?
2020	2-4th	Roman brick
2023	2-4th	Roman brick
2026	2-4th	Roman brick, <i>Tegula</i> ?
2027	2-4th	Roman brick
2028	2-4th	Slate
2030	2-4th	Roman brick
2036	2-4th	Roman brick
2037	2-4th	Roman brick, <i>Tegula</i>
2040	2-4th	Roman brick
2041	2-4th	Flue
2044	2-4th	Roman brick
2045	2-4th	Roman brick
2050	2-4th	Roman brick
2053	2-4th	Roman brick
2054	2-4th	Roman brick, <i>tegula</i>
2057	2-4th	Roman brick
2058	2-4th	Roman brick
2059	2-4th	Roman brick
2060	2-4th	<i>Imbrex</i> , Roman brick, Stone peg?
2064	2-4th	Roman brick
2066	2-4th	Roman brick
2067	2-4th	Roman brick, Stone Peg?, <i>Tegula</i>
2068	2-4th?	Other
2071	2-4th	Roman brick
2086	2-4th	Roman brick
3000	2-4th	Roman brick
3001	2-4th	Roman brick, Flue, Flue?, Other, Roman brick, Stone Peg?, <i>Tegula</i>
3002	13-16th	Flue?, Plain?, Roman brick, Slate
3004	2-4th	Other, Roman brick, <i>Tegula</i>
3005	2-4th	Roman brick
3007	2-4th	Roman brick, Stone peg?
3008	2-4th	Roman brick
3009	1850+	Brick, Roman brick
3013	2-4th	Roman brick
3014	2-4th	Roman brick, <i>tegula</i>
3015	2-4th	Roman brick, Stone peg, <i>Tegula</i>
3016	2-4th	Roman brick
3018	2-4th	Roman brick
3023	2-4th	Roman brick
3031	2-4th	Roman brick
3034	2-4th	Roman brick
3036	2-4th	Roman brick
3039	2-4th	Roman brick

Context	Dating by century AD	Keywords
3040	2-4th	Roman brick
3046	2-4th	Roman brick
3048	2-4th	Roman brick
3049	2-4th	Roman brick
3057	2-4th	Roman brick
3060	2-4th	Roman brick
3067	2-4th	Roman brick
4001	1850+	Brick, Roman brick
4002	1850+	Brick, Roman brick
4003	1850+	Brick, Post-medieval brick, Roman brick
4004	2-4th	Roman brick, Stone Peg?
4006	2-4th	Roman brick
4007	20th	Flue?, Nib, Roman brick
4008	2-4th	<i>Imbrex</i> , Roman brick, <i>tessera</i>
4009	2-4th	Roman brick, Stone peg?
4010	1850+	Brick, Roman brick, <i>Tegula</i> , Wall tile
5000	2-4th	Roman brick
5003	2-4th	Roman brick
6002	1750+	Brick

Table 16: Description of CBM fabric types

Fabric	Dating	Description
R1	Roman	Light orange fabric. Very soft often underfired. Frequent small quartz. Occasional small flecks mica.
R2	Roman	Light orange fabric. Very soft often underfired. Moderate medium quartz.
R3	Roman	Mid orange-red fabric. Moderate small quartz. Occasional small flecks mica.
R4	Modern	Dark red fabric. Frequent calcite precipitation into very small and small voids. Mechanically processed clay of modern date.
R5	Roman	Medium red with reduced grey core. Frequent medium to larger quartz. Occasional small flecks mica
R6	Roman	Light orange fabric. Frequent small to medium quartz. Occasional small flecks mica.
R7	Roman	Light orange fabric. Moderate medium to large quartz grains. Occasional linear voids up to 8mm x 2mm in size striated on inside, from grass or straw. Occasional small flecks mica and grog. Occasional medium black grains, possibly meta-sediment.
R8	Roman	Medium red fabric with reduced core. Moderate small quartz. Moderate quartz

Fabric	Dating	Description
		sandstone, up to 4mm x 3mm in size. Moderate linear voids up to 4mm x 0.5mm in size striated on inside, from grass or straw.
R9	Modern	Dark red, highly fired, vitrified. Mechanically processed clay of modern date.
R10	Roman	Medium red fabric with reduced core. Frequent small to medium quartz. Moderate small to medium quartz sandstone.
R11	Roman	Light orange fabric. Moderate small to medium quartz.
R12	Roman	Dark red, reduced core. Highly fired. Compacted fabric. Very fine, few visible inclusions. Occasional very small flecks mica. Occasional small linear and irregular voids.
R13	Roman	Light orange fabric. Frequent small and moderate medium quartz. Moderate quartz sandstone p to 8mm x 2mm in size.
R14	Roman	Dark red fabric on exterior surfaces, interior totally reduced. Moderate medium quartzite. Occasional medium quartz.
R15	Roman	Medium red fabric. Moderate small to medium quartz. Moderate small to medium quartz sandstone.
R16	Modern	Mid orange fabric. Moderate rounded to irregular voids u to 2mm x 0.5mm in size. Occasional medium quartz. Occasional medium quartzite. Mechanically processed clay of modern date.
R17	Post-medieval	Dark red fabric, exterior surfaces dark grey. Highly fired almost vitrified. Frequent small to medium quartz and quartzite. Occasional rounded voids up to 8mm x 5mm in size.
R18	Post-medieval	Mid orange fabric. Moderate small quartz. Occasional quartzite. Occasional grog.
R19	Medieval	Medium red fabric. Very fine. Few visible inclusions. Occasional small quartz.
R20	Medieval	Medium red fabric with reduced core. Moderate medium quartz. Occasional small linear voids. Very occasional quartzite up to 2mm x 2mm..
R21	Medieval	Light orange fabric. Moderate very small quartz. Occasional small flecks mica.
R22	Roman	Mid orange fabric with reduced core. Very occasional silty streaks. Moderate small to medium quartz and quartzite.
R23	Modern	Mid red fabric. Moderate small quartz. Occasional quartz sandstone up to 10mm x 8mm in size. Occasional silty streaks.
R24	Roman	Light brown fabric with reduced core. Moderate quartz sandstone up to 3.5mm x 3mm in size. Moderate small to medium quartz.
R25	Medieval	Light orange fabric. Very fine. Few visible

Fabric	Dating	Description
		inclusions. Occasional small quartz. Occasional small linear voids.
R26	Roman	Medium red fabric. Frequent small to medium quartz. Moderate irregular voids up to 17mm x 4mm in size. Occasional quartzite. Occasional grog.
R27	Roman	Medium red fabric. Frequent small to medium quartz. Frequent small to medium quartz sandstone.

APPENDIX 6: ENVIRONMENTAL REPORT

By J. Miller

Summary

Analysis of samples from various features within the Roman *vicus* confirms the presence of metalworking at the site. Synonymous with iron smithing, volumes of metallic slag, magnetic material and hammerscale were recorded consistently. The charcoal assemblage recorded across the site further corroborates this interpretation. Metalworking requires very high temperatures to be sustained over considerable periods, necessitating the use of the correct hardwood charcoal types within furnaces. As such, the predominance of oak and alder with some ash across the entire site is entirely to be expected.

Evidence for domestic activity was scant, although finds of bread wheat, spelt, six-row barley and possible emmer are consistent with the period of occupation and add insight to the human aspects of a workplace with strong industrial focus. Small quantities of tiny calcined bone chips (many considered probably mammalian but none further identifiable) were recovered from the majority of samples examined, supporting the domesticity implied tentatively from cereals. However, whether the chips were waste products from food processing on site or debitage from the industrial/craft processes (or both) remains uncertain.

Introduction

A total of 30 samples from various features from the excavations at Ravenglass were submitted to the Dickson Laboratory for analysis and interpretation. Initial assessment (Carson 2015) had included a programme of processing, scanning and more detailed analysis of one sample and several spot finds to determine potential, before 16 samples were selected by the project manager for full interpretative analysis. It was anticipated that this method would maximise the information recovered from the site in the most cost effective manner. Samples were considered likely to contain evidence indicative of the industrial processes including metalworking to corroborate initial interpretations, but it was anticipated that domestic practices might also be revealed. This report incorporates results from the previous assessment phase of work (Carson 2015).

Methodology

Standard (non-waterlogged) bulk sample processing

Many samples had been processed during the initial assessment phase or on site with the assistance of community volunteers (Carson 2015; Hunter-Mann 2015), with only

a few remaining to be processed for the current phase of analysis. Regardless of when this occurred, the methodology of processing remained consistent throughout.

Bulk samples were stored pending processing within 10 litre plastic tubs, sealed to exclude light and air. They were floted for the recovery of environmental evidence and artefacts using standard methods and a bespoke adapted Siraf flotation system including a pumped recycled water system with four settling tanks. Samples were disaggregated by agitating in water over a 500µm diameter mesh supported over a flotation drum. Light, primarily organic materials that floated as wash-over (flots) were retained on 500µm and 1mm calibrated mesh diameter Endicot sieves whilst other materials larger than 500µm that did not float remained on the mesh as the retent.

Wet retents were spread out on plastic trays and examined visually before being tagged and dried. The flot material was wrapped in blue acid-free paper, tagged and recorded before being air dried on trays in a warm drying room. Full paper records of processing were maintained throughout and will form part of the site archive.

Scan sorting

Samples were subjected to visual assessment to inform subsequent analysis. Once floted and dried, the retent and flot of each sample were visually examined for various artefacts and ecofacts and relative abundances of such were recorded. Abundances were tabulated following Hubbard & Clapham's abundance scale (1992).

Sorting of retents

Retents were sieved using 4mm and 2mm Endicot sieves and sorted using magnified illuminated lamps for artefacts and ecofacts. A magnet was employed to locate magnetized stone and metals.

Sorting of flots was undertaken using a Nikon 93756 binocular microscope with associated Schott KL-1500 LCD cold light source. Sorted materials were bagged and labelled for submission to specialists and weighed (where relevant) using an Ohaus CS200 digital scale calibrated to 0.01g. Sorted residues were weighed on a digital scale, bagged and stored pending decision for disposal.

Botanical Material Identification

Carbonised botanical material from each sorted retent was added to the corresponding flot before being sorted through a stack of 4mm and 500µm mesh diameter sieves. Charcoal identification was undertaken using the reflected light of a Zenith metallurgical microscope at X63 magnification. Depending upon volume present, 100% of the charcoal >4mm fragment size, or a representative sample thereof, was identified as completely as preservation would allow. Charcoal >2mm fragment size was scanned, and if necessary and feasible a selection was identified to ensure the identified material provided an accurate representation of the species composition for each sample analysed. The volume of charcoal present of each size and in total was recorded. Carbonised cereals, seeds and other macroplant remains within samples were 100% identified as specifically as preservation would allow using

a Zeiss Stemi 2000-C binocular microscope at variable magnifications of between X4-X45 with associated Schott cold light source.

Charcoal identification was undertaken with reference to Schweingruber (1990). Confirmation of cereal morphology reflects Jacomet (1987), whilst seed identification was confirmed by comparison with images within Beijerinck (1947) and Cappers (2006) and the Dickson botanical reference collection. Plant nomenclature follows Stace (1997) except cereals, which conform to Zohary & Hopf (2000).

Faunal Remains Identification

The faunal remains were examined in laboratory conditions and recorded with guidance from Dobney et al. (1999) and O'Connor/YAT (2003). Only very small bone chips (smaller than 10mm) were present in each case. Although many could be considered probably mammalian by the thickness of cortex, these were recorded as unidentifiable with this caveat and only tallied.

Results

Of 30 samples processed, 16 were fully analysed and the remainder scanned to determine their contents and record relative abundances of each component. Two spot finds were also examined. Results are given in the tables appended to this report. Samples numbers are contained in brackets <> in the text.

Scanned samples

All of the samples contained magnetic material or metallic slag. The magnetic material was analysed briefly and comprised burnt clay fragments, hammerscale, possible sprues and runners and other indeterminate magnetic objects. This assemblage was indicative of metalworking waste including iron smelting and smithing. The burnt clay may reflect structural waste but more probably furnace debitage. Charcoal, CBM, pottery and calcined bone were also noted in many of the samples, whether residual from the industrial processes or having derived from small scale domestic activities.

Fully sorted samples

Trench 1

Phase 1.5 Floor/occupation in Building 1/1. (1043) <025>; (1045) <032>

Occupation deposits 1043 and 1045 were primarily similar in origin, with small charcoal assemblages dominated by oak (*Quercus*) and alder (*Alnus*), with some ash (*Fraxinus*). This suggests high-temperature burning, supporting the interpretation that Building 1/1 played at least some role in metalworking rather than having a domestic provenance at the time of deposition of these materials. Alternatively, it may reflect levelling using waste from a working surface elsewhere. Metalworking activity is further supported by the large quantity of metallic slag (492.3g) recorded from 1043

and the magnetic particles and vesicles recovered from both deposits. Small numbers of calcined bone chips may reflect industrial debitage or food processing, although given the absence of other food remains, industrial/craft waste is perhaps at least equally likely. Bone could be worked into handles with debitage burned for disposal or to increase the carbon content of the iron bloom. Rare hazel (*Corylus*) charcoal from 1043 suggests kindling.

Trench 2

Phase 2.2 Drain. (2055) <037>

Context 2055 was the backfill of a drainage gully (2056) cut into the post-glacial alluvium within Trench 2. A large quantity of CBM and two indeterminate calcined bone fragments smaller than 5mm were recovered from the fill. The bone chips were well preserved although of insufficient size for more specific identification. A small quantity of oak charcoal was also recovered. The CBM and charcoal could reflect structural or industrial debitage.

Phase 2.3 Levelling & culvert; path and build up deposits. (2065) <040>; (2042) < 023>

Deposit 2065 was one of a series of accumulations against the southern kerb of path surface 2072. Interpreted on site as a build up of material within an active working area, magnetised material, CBM and the charcoal assemblage would support this assumption, with oak predominant within an assemblage that also included alder and ash, with small quantities of hazel and cherry type (*Prunoideae*). Hazel and cherry type may reflect kindling for an industrial furnace or could be residual from domestic hearth waste. Small quantities of tiny indeterminate calcined bone chips may reflect domestic butchery waste or industrial processes.

Context 2042 was the backfill of a possibly timber-lined culvert (2046) suggested by pottery typology to date to the 2nd century AD. The small charcoal assemblage was consistent with background scatter within an industrial area, including alder, indeterminate cinder and especially oak charcoal recovered. A single small fragment of poplar/willow (*Populus/Salix*) may reflect kindling or wattle waste. Notably, this drain/culvert fill contained only minimal small magnetised particles but no slag or bone, potentially reflecting passive transport of materials floating on water running into the drain. If so, this is further confirmation of the intensity of industrial activity at this site with background levels of charcoal underfoot.

Phase 2.5 Levelling/dumps. (2064) < 039>; (2040)<020>

Context 2064 was one of a series of dump/build up deposits that sealed the Phase 2.4 possible industrial features. This was of note in that it was one of only three contexts examined from this site to contain evidence of cereal processing waste. Four cereals were identified, two of which were fragmentary but a grain of bread wheat (*Triticum aestivum*) and one less well preserved wheat (*Triticum* sp) were also recorded. Additionally, carbonised ruderal weeds including self-heal (*Prunella vulgaris*) and buttercups (*Ranunculus* sp) were present, implying loss during daily processing ahead of consumption.

Dominated by oak, the charcoal assemblage from deposit 2064 also included hazel and poplar/willow. As such, the charcoal assemblage may have mixed origins, reflecting both industrial debitage and domestic hearth fuel. In other circumstances, valuable oak would perhaps be considered unlikely to have been used for domestic fuel; indeed the heat given out by large oak logs is too intense for daily cereal processing needs. As such, it may be that the accumulation layer includes both furnace debitage and domestic hearth waste. However, in a strongly industrial focus such as at the *vicus*, it is also quite feasible that this reflects merely availability; there was simply a great deal of oak around, whether as charcoal for the furnaces or as left-over young round wood branches for setting fires.

Context 2040 was one of a series of levelling deposits at the north end of Trench 2 that overlaid the Phase 2.3 deposits and suggested a date of late 2nd -3rd century AD. Others included 2032 which was scan assessed. The small charcoal assemblage within 2040 included alder, ash and especially oak plus magnetic particles. The small assemblage from both contexts supports the interpretation of levelling deposits from a working area.

Phase 2.6 Levelling dumps. (2050) <030>

Deposit 2050 was a trample layer that had accumulated over surface (2054) that opened from an industrial structure. Charcoal of alder, ash and oak with volumes of magnetic material and pot would support this interpretation. The presence of thirteen small chips of calcined bone may reflect industrial debitage of food waste, with industrial provenance considered quite likely given the rest of the materials found and the recurrence of such highly fragmented bone across the entire site with minimal other evidence for food processing.

Trench 3

Phase 3.3 Building 3/1 construction. (3052) <038>

The whitish clay fill (3052) of an irregular cut [3058] into levelling 3018 was interpreted on site as either part of the original floor or variation in the levelling material. Within this fill charcoal was in poor condition but primarily oak with some cinder and two tiny fragments of birch. Other than a few magnetic particles, nothing else was recorded. The assemblage concurs with the interpretation of levelling incorporating materials from an industrial working surface.

Phase 3.4 Building occupation. (3004) <06>; (3009) <09>; (3014) <010>; (3021) <027>; (3027) <011>

Deposit 3004 extended across the entire interior of Building 3/1 and was interpreted as an occupation surface. Pottery, metallic slag, magnetic particles, CBM and quantities of oak, alder and some ash charcoal within this spread would imply that the function of this structure was primarily industrial in nature. Calcined bone chips may also reflect this industrial provenance or could relate to disposal of kitchen waste. Pottery typology implies activity within the mid-2nd century AD onwards.

Overlying 3004, the fill of a possible hearth (3009) contained minimal carbonised material, all of it entirely consistent with industrial activities; alder, oak and indeterminate cinderised charcoal were recorded, together with some CBM and magnetised particles. This reflects continuation of function of this structure for industrial purposes.

Also cut into 3004, feature 3014 had a clay lining and charcoal fill. Interpreted during excavation as a possible oven due to the absence of clearly identifiable industrial debris, the processing record does not support this conclusion. The combination of alder, ash and cinder within charcoal assemblage together with magnetised particles, calcined bone, pot and CBM is entirely consistent with the rest of the industrial site, with only the very few chips of bone suggesting domestic occupation, albeit tentatively. Furthermore, processing of a charcoal spread (3021) below/within 3014 revealed notable quantities of small magnetic particles and metallic slag, in addition to volumes of burnt clay/CBM. The volume of charcoal was the largest recovered from the site, with small quantities of alder, birch, hazel, ash and poplar/willow dominated by the extensive oak assemblage. Some of the oak was fairly young round wood. Neither bone chips nor cereals were recorded to support any interpretation of domestic related burning and it is more likely to be related to the industry performed within the structure.

Several shallow pits cut into occupation surface 3004 in the area between the walls, of which fill 3027 was processed and analysed in an attempt to identify possible function. Charcoal of oak and alder with rare hazel, ash and cinder, CBM, magnetised particles and small calcined bone chips within the fill are consistent with the deposits across the site, including within 3004. As such, this may represent backfill for a post within the industrial working area.

Phase 3.7 Activity east of Building 3/1. (3048) <026>; (3050) <036>

Contexts 3048 and 3050 are two of seven fills of a sub-rectangular pit [3055] cut into context 3003 to the east of Building 3/1. Pit 3055 was interpreted as a rubbish pit, and both fills examined (3048, 3050) would support this interpretation. Comprising alder, ash, cinder and primarily oak, the charcoal assemblage, CBM and magnetised material within fill 3048 were similar to the industrial debitage reflected elsewhere on the site, although small quantities of poplar/willow and a single grain of spelt wheat imply also inclusions of domestic waste. Pottery and two tiny flecks of calcined bone could have provenance within either interpretation.

Fill 3050 contained an assemblage that also implied mixed provenances, although here with a botanical assemblage more strongly indicative of domestic practices. In addition to the industrial waste indicators found recurrently across the site, namely oak, alder and ash charcoal, magnetic particles and CBM, evidence of domestic fuel was recorded. Collectively, birch, hazel, poplar/willow and holly (*Ilex aquifolium*) charcoal imply collection of hearth waste from local scrub broadleaf woodland, the holly being the only instance of this broadleaf woodland understory taxon recorded from the site.

Of particular note were the cereals recovered from fill 3050, with spelt (*Triticum spelta*), bread wheat and possible emmer (*Triticum cf dicocum*) identified, plus a (probably hulled) grain of six-row barley (*Hordeum vulgare cf var vulgare*). Together with a carbonised seed of fat hen (*Chenopodium album*), the cereals are likely to reflect dumped hearth waste arising from a series of daily processing events. The grain assemblage is entirely in keeping with the known Romano-British diet within the 2nd and 3rd centuries AD.

Spot finds

Context (2052) Sample <035>

One large fragment of well preserved charcoal from the fill of a palaeochannel in Phase 2.1 was identified as oak.

Context (3006) Sample <042>

The spot find consisted of one fragment of sandstone. It was sub angular and light pinkish yellow in colour and presumably relates to wall 3006 of Building 3/1.

Discussion

Metal and magnetic material was frequent, synonymous with differing metalworking practices including smithing. Recurrent finds of CBM and/or burnt clay associated with these materials are likely to reflect debitage from furnace walls and bases. Smithing waste was represented by small hammerscale fragments. Hammerscale is important in the interpretation of a site because it is diagnostic of that specific metal working process and is often found in the immediate vicinity of the smithing hearth and anvil. Consequently, the presence of it can help identify locations on a site where this activity was being practiced (Starley 1995).

In order to achieve high enough temperatures to produce iron from ore, intense heat is required, with temperatures in excess of 2000°C needed to produce liquid iron (Tylecote 1962). Prior to the introduction of blast furnaces iron production was highly inefficient and well below this desired temperature, although the use of the correct hardwood charcoal types went a long way towards ensuring efficiency was as good as it could be.

Oak is usually the preferred type of wood for fuel that requires prolonged burning at very high temperatures. As such, oak charcoal is regularly associated with metalworking and industrial processes and has been the smelting fuel of choice since antiquity (Tylecote 1962, Dickson & Dickson 2000). Oak was the dominant charcoal taxon at Ravenglass, with alder also encountered recurrently. Alder charcoal is second only to oak for smelting purposes (Tylecote 1962; Edlin 1973) and has been observed by the author recurrently in contexts that require intense burning but where oak resources are not available (e.g. Miller & Ramsay 2008). The strong association with metalworking waste of these taxa at Ravenglass provides a compelling argument for the interpretation that oak and alder charcoal were being imported for metalworking.

To this day, oak timber is an expensive and valuable resource, because the hard, slow-growing wood has numerous uses for construction, burning and any function combining durability with aesthetic value. Evidence of the industrial heritage of oak charcoal can still be found in the long abandoned multi-trunked coppiced oak woodlands close to post-medieval and early modern bloomeries in the highlands of Scotland. The practice of coppice or coppice with standards (maintaining one trunk with others coppiced over a period) has been practiced in the UK since the Roman occupation (Rackham 1980), with the slow growing oak requiring significant management (Edlin 1973). Consequently, oak charcoal for smelting would also be expensive. Alder is faster growing and also tolerates wetter soil conditions than oak (Burnett 1964), meaning that alder charcoal would be cheaper and probably more plentiful than oak, albeit not quite so suited to metallurgy. It is quite plausible to suggest that oak charcoal was the preferred choice, but alder and indeed ash would be used additionally to supplement the more expensive oak as required or where it suited needs of the particular industrial process.

Birch, hazel, cherry type, holly and poplar/willow were also recorded, reflecting collection of kindling for domestic fuel and industrial fires from local scrub woodland. Kindling would be required to light the charcoal within furnaces, as confirmed by small fragments of especially birch and poplar/willow within contexts that were otherwise purely industrial. However, the assemblage from fills of rubbish pit 3055 provided more compelling evidence of domestic hearth waste that was at best ephemeral across the rest of the site. The charcoal assemblage of fill 3050 especially was suggestive of domesticity, implying small round wood collected from scrubland nearby. This fill also included the only find of holly from the site, suggesting the use of whatever fuel was available for such purposes. This may have been supplemented by charcoal intended for furnaces, potentially residual material from rake-out.

Cereals were very limited at Ravenglass, being recorded only from a levelling deposit (2064) and fills (3048; 3050) of rubbish pit 3055. This is suggestive of a site with a strong industrial focus, to imply that residential areas may have been ephemeral and/or situated marginally, evidence for which has disappeared over time. The assemblage included spelt and emmer wheat, possible emmer and six-row barley (probably hulled), with occasional indeterminate grain fragments. This is entirely consistent with the period (e.g. van der Veen 1992; van der Veen *et al* 2008) and provides a tentative glimpse of the diet of the community that worked at this site. The few grains recovered are not sufficient to imply further dietary preferences, although certainly bread but probably also potage and beer would have been consumed. Grain is likely to have been brought in from outside the immediate area; the large granaries at South Shields (Carruthers 1993) and elsewhere maintaining the needs of at least the garrisons but probably also the associated workers. Carbonised seeds of typically associated crop weeds tentatively suggest local small scale cereal processing. It is likely that the grains are residual from accidental loss during the parching stage of cereal processing since the taxa involved are all of similar size to the grains and could easily have been overlooked in the earlier stages of gleaning (Hillman 1981).

Pottery recorded in samples examined from this site is likely to have derived from a variety of functions relating to both industrial and domestic activities. The same may also be true of the small volumes of tiny calcined bone chips that were recorded from the majority of samples examined during this study. Many were considered probably mammalian by the thickness of the cortex and presence of cancellous bone, but without sufficient confidence to state them as such without caveat. Bone chips may reflect domestic butchery waste, although the absence of any fragments larger than 10mm long is of note in this respect, as is the fact that contexts suggestive of domestic hearth waste, including those with cereals, contained generally less bone than those that were confidently industrial in nature. All bone fragments were calcined and so it is possible that small butchery waste was disposed of on fires with larger bone dumped elsewhere, this being the reason why the chips have survived when bigger bones in middens have disappeared. However, the possibility cannot be excluded that the bone chips are debitage from working of bones to produce handles or shafts of implements, small tools or weapons. Waste chips may have been thrown into the furnace, whether for disposal or to increase the carbon content of the iron to make it harder, effectively making early steel. It is also entirely feasible that bones of animals butchered for meat were then used for an industrial/craft purpose.

Table 17: Flot analysis: botanical identification

	Context	2055	2064	2065	3021	1043	1045	2040	2042	2050	3004	3009	3014	3027	3048	3050	3052
	Sample	037	039	040	027	025	032	020	023	030	06	09	010	011	026	036	038
						occup floor	occup floor	levelling	drain backfill	trample layer	occup layer	poss hearth	poss oven	pit fill	below cobbles	pit fill	
Flot Composition (1-5 abund)	Flot volume	<5ml	20ml	5ml	400ml	20ml	25ml	10ml	<5ml	5ml	50ml	20ml	10ml	10ml	25ml	15ml	<2.5ml
Charcoal		++	++++	++++	+++++	+++	++	+	+	++	+	+	-	-	+++	+++	-
Cinder		-	-	-	+	-	-		-	-	-	-	-	-	-	-	-
Seeds (c)		-	++	-	-	-	-	-	-	-	-		-	-	-	+	-
Cereals		-	+	-	-	-	-	-	-	-	-	-	-	-	+	++	-
Bone		+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CBM		-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Mortar		-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Roots		++	++	++	++	++++	++++	++	+	+	+++++	+++++	+++++	+++++	+++++	-	+
metalworking drips/spheroids		-	-	-	-	5	>20	1	-	-	1	-	-	-	-	-	-
Charcoal																	
Total charcoal (F+R)		5ml	40ml	20ml	400ml	20ml	12.5ml	10ml	10ml	20ml	35ml	5ml	5ml	18ml	30ml	22.5ml	45ml
Total (F+R) charcoal >4mm		<5ml	20ml	10ml	200ml	15ml	7.5ml	7.5ml	>5ml	15ml	30ml	2.5ml	2.5ml	13ml	22.5ml	17.5ml	40ml
Total (F+R) charcoal <4mm		<5ml	20ml	10ml	200ml	5ml	5ml	2.5ml	<5ml	5ml	5ml	2.5ml	2.5ml	5ml	7.5ml	5ml	5ml
% ID >4mm		100	50	100	10	50%	100%	100%	100%	50%	33%	100%	100%	50%	50%	50%	25%
AMS option Y / N		N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y
Charcoal	Common Name																
<i>Alnus</i>	alder	-	-	2 (0.18g)	1 (0.12g)	10 (0.71g)	6 (0.87g)	3 (0.10g)	3 (0.11g)	7 (0.54g)	6 (0.87g)	5 (0.77g)	2 (0.09g)	6 (0.45g)	7 (1.78g)	3 (0.47g)	-
<i>Betula</i>	birch	-	-	-	1 (0.33g)	-	-	-	-	-	-	-	-	-	-	2 (0.14g)	2 (0.31g)
<i>Corylus</i>	hazel	-	1 (0.07g)	4 (0.18g)	2 (0.47g)	4 (0.83g)	-	-	-	-	-	-	-	1 (0.003g)	-	1 (0.05g)	-
<i>Fraxinus</i>	ash	-	-	1 (0.10g)	-	2 (0.22g)	3 (0.12g)	1 (0.01g)	-	5 (0.44g)	-	-	3 (0.24g)	2 (0.13g)	2 (0.12g)	2 (0.17g)	-
<i>Ilex aquifolium</i>	holly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2 (0.19g)	-
<i>Populus/Salix</i>	poplar/willow	-	1 (0.10g)	-	1 (0.23g)	-	-	-	1 (0.01g)	-	1 (0.13g)	-	-	-	4 (0.37g)	5 (0.54g)	-
Prunoideae	cherry type	-	-	1 (0.12g)	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Quercus</i>	oak	9 (1.05g)	18 (1.94g)	12 (0.70g)	15 (4.22g)	9 (0.83g)	11 (0.92g)	7 (0.83g)	11 (0.52g)	8 (0.89g)	17 (2.73g)	2 (0.10g)	-	14 (1.81g)	12 (2.44g)	10 (1.26g)	20 (8.26g)
Indet cinderised charcoal		-	-	-	-	-	-	-	3 (0.41g)	-	-	5 (1.11g)	4 (0.45g)	2 (0.21g)	4 (4.62g)	4 (1.15g)	4 (5.17g)
Cereals (carbonised)	Common Name																
<i>Hordeum vulgare</i> cf <i>var vulgare</i>	cf hulled 6-row barley	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
<i>Triticum aestivum</i>	bread wheat	-	1	-	-	-	-	-	-	-	-	-	-	-	-		-
<i>Triticum</i> cf <i>dicoccum</i>	cf emmer wheat		-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
<i>Triticum spelta</i>	spelt wheat		-	-	-	-	-	-	-	-	-	-	-	-	1	1	
<i>Triticum</i> sp	wheat	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-
ct <i>Triticum</i> sp	cf wheat		-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
Indet cereal fgmt.	cereal	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Seeds (carbonised)	Common Name																
<i>Chenopodium album</i>	fat hen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
<i>Prunella vulgaris</i>	self-heal	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Ranunculus</i> sp	buttercup	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Seeds (m)																	
<i>Betula pubescens</i>	downy birch	-	-	-	-	-	-	-	-	-	8	3	-	1	-	-	-
<i>Betula pendula/pubescens</i>	silver/downy birch	-	-	-	-	-	1	-	-	1	2	1	-	-	-	-	-
<i>Carex disticha</i>	brown sedge	-	-	-	-	-	-	-	-	-		-	2	-	-	-	-

	Context	2055	2064	2065	3021	1043	1045	2040	2042	2050	3004	3009	3014	3027	3048	3050	3052
	Sample	037	039	040	027	025	032	020	023	030	06	09	010	011	026	036	038
						occup floor	occup floor	levelling	drain backfill	trample layer	occup layer	poss hearth	poss oven	pit fill	below cobbles	pit fill	
Flot Composition (1-5 abund)	Flot volume	<5ml	20ml	5ml	400ml	20ml	25ml	10ml	<5ml	5ml	50ml	20ml	10ml	10ml	25ml	15ml	<2.5ml
Carex nigra	common sedge	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Juncus effusus capsule	soft rush seed capsule	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-
Persicaria lapathifolia	pale persicaria	-	-	-	-	1	-	-	-	-	-	-	2	-	-	-	-
Polygonum aviculare sl	knotgrass	-	-	-	-	1	-	-	-	-	1	-	2	-	-	-	-
Rubus fruticosus sl	blackberry aggregate	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
Veronica hederifolia	ivy-leaved speedwell	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Invertebrates (m)																	
Beetle carapace fgmt		-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
egg		-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Retent (from sorting records)																	
bone (c) chips <10mm NFI		2 (1.24g)	-	4 (0.12g)	7 (0.68g)	5 (0.15g)	8 (0.84g)	-	-	14 (0.44g)	13 (1.06g)	-	-	12 (0.68g)	2 (0.05g)	15 (0.24g)	-
CBM		376.92g	-	*'++	++	1 (0.75g)	-	++	+	-	-	+	+	+	++	++	-
Glass		-	-	-	-	-	-	-	-	1 (0.11g)	-	-	-	-	-	-	-
magnetic material		-	-	++ (2.67g)	+++ (4.87g)	++++ (5.22g)	++ (1.46g)	+(0.20g)	+(0.20g)	++ (0.59g)	+++ (3.31g)	++ (0.47g)	++ (0.74g)	+(0.43g)	++ (0.81g)	+(0.39g)	+(0.20g)
Pottery		-	-	-	-	-	-	-	-	-	2 (7.46g)	-	1 (4.34g)	-	-	-	-
Slag		-	-	+	+++	+++++ (492.23g)	-	-	-	-	-	-	-	-	+	-	-
*'+ visible when scanned																	

Table 18: Sample scan results

	2013													2014														
Context	1001	1002?	2001	2010	2011	3001	3004	3009	3014	3020	3026	3027	3030	1043	1045	2032	2040	2042	2047	2064	2065	3002	3021	3048	3050		Key	
Sample	03	01	05	12	13	02	06	09	10	08	14	11	07	025	032	016	020	023	029	039	040	033	027	026	036		1	rare
charcoal	2	2	3	3	3	2	3	1	1	3	3	3	1	3	2	3	2	2	3	3	3	3	5	3	3		2	occasional
bone	2	2	1	1	1	2	2	-	1	1	-	1	1	1	-	2	1	1	-	2	2	2	-	1	1		3	frequent
seeds	1	-	-	-	-	3	1	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-		4	common
CBM	3	2	3	1	1	3	2	1	1	3	-	1	2	3	-	3	2	1	1	3	2	2	-	2	2		5	abundant
pottery	1	-	1	-	-	1	1	-	-	-	-	-	2	-	-	1	-	-	-	-	-	1	-	1	-			
coal	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
metal	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-	-			
magnetic material	2	1	3	1	2	2	1	1	1	2	1	1	2	3	4	2	1	1	1	2	2	2	3	2	2			
worked stone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	-	-	-	-	-	1	1			
building material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-			
other	1 (clay pipe)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2 (burnt clay)	-	-	3 (burnt clay)	-	-			

Table 19: Retent sorting table

			Sample info (volumes in L)					Constituents weights (g)									
Context	Sample	Type	Tubs (no.)	Processed	Vol (L)	Sorted (no.)	Retent vol	Charcoal	Seed	Nutshell	Bone	Pot	magnetic	industrial	CBM	Glass	Other
1043	025	BS	3	3	30	1	1	4.86			0.15		5.22	492.28	8.75		
1045	032	BS	3	3	30	1	1	2.17			0.84		1.46				
2040	020	BS	3	3	30	1	1.1	0.50					0.2				
2042	023	BS	3	3	30	1	1.2	1.45			1.24g						
2050	030	BS	1	1	10	1	2	3.35			0.44		0.59			0.11	
2055	037	BS	1	1	10	1	2.0	0.94g									
3004	006	BS	4	1	10	1	4	21.52			1.06	7.46	1.27				
3009	009	BS	1	1	10	1	2.7	3.09					0.47				
3014	010	BS	1	1	10	1	1	1.10			1.10	4.34	0.74				
3027	011	BS	1	1	10	1	1.1	7.10			0.68		0.43				
3048	026	BS	3	3	30	1	1.4	4.3			0.05		0.81				<0.01 ?insect egg
3050	036	BS	4	4	40	1	1.5	3.8			0.24		0.39				
3052	038	BS	1	1	08	1	1	34.96					0.20				

Table 20: Bone identification from retents

Context	2055	1043	1045	2050	3004	3027	3048	3050	
Sample	037	025	032	030	06	011	026	036	Total
weight (g)	1.24	0.15	0.84	0.44g	1.06	0.68	0.05	0.24	4.26
unid bone chip	2	5	8	14	13	12	2	15	
Total NISP	2	5	8	14	13	12	2	15	71

APPENDIX 7: LIST OF CONTEXTS

Context no	Description
1000	Unstratified finds from Trench 1
1001	Ploughsoil
1002	Build-up/soil
1003	Build-up/soil
1004	Levelling/demolition
1005	Road surface
1006	Dump
1007	Build-up
1008	Levelling
1009	Dump
1010	Plough furrow fill
1011	Plough furrow fill
1012	Plough furrow fill
1013	Plough furrow fill
1014	Plough furrow fill
1015	Plough furrow fill
1016	Plough furrow fill
1017	Plough furrow fill
1018	Plough furrow fill
1019	Plough furrow fill
1020	Plough furrow fill
1021	Plough furrow fill
1022	wall
1023	wall
1024	Path
1025	road
1026	Plough furrow
1027	Plough furrow
1028	Plough furrow
1029	Plough furrow
1030	Plough furrow
1031	Plough furrow
1032	Path
1033	Backfill, pit 1064
1034	Levelling
1035	Dump
1036	Road
1037	Build-up
1038	Build-up
1039	Road

Context no	Description
1040	Occupation
1041	Road
1042	Occupation
1043	Occupation
1044	Levelling/demolition
1045	Occupation
1046	Occupation
1047	Road
1048	Build-up
1049	Build-up/Dump
1050	Occupation
1051	Build-up
1052	Dump
1053	Building (walls 1022-3, 1068)
1054	Dump
1055	Path/levelling
1056	Road make-up/levelling
1057	Dump
1058	Levelling
1059	Dump
1060	Path
1061	Dump
1062	Build-up
1063	Dump
1064	Pit cut
1065	Levelling/demolition
1066	Road make-up/levelling
1067	Road make-up/levelling
1068	wall
1069	Animal burrow
1070	Plough furrow
1071	Plough furrow
1072	Plough furrow
1073	Plough furrow
1074	Plough furrow
1075	Plough furrow
2000	Unstratified finds from Trench 2
2001	Ploughsoil
2002	Trackway
2003	Levelling
2004	Post-hole packing, fill of 2006
2005	Plough furrow fill
2006	Post-hole

Context no	Description
2007	Post pad, in 2009
2008	Plough furrow
2009	Post-hole
2010	Backfill of 2014
2011	Naturally occurring fill of 2014
2012	Backfill of 2015
2013	Backfill of 2083
2014	Drain/ditch
2015	Post-hole
2016	Backfill of 2017
2017	Post-hole
2018	Backfill of 2019
2019	Post-hole
2020	Packing of 2024
2021	Packing of 2025
2022	Wall (foundation)
2023	Build-up/dump
2024	Post-hole
2025	Post-hole
2026	Levelling/dump
2027	Backfill of 2029
2028	Packing of 2029
2029	Post-hole
2030	Backfill of 2034
2031	Packing/post pad in 2033
2032	Dump/levelling
2033	Post-hole
2034	Post-hole
2035	Packing of 2043
2036	Post-pipe fill in 2039
2037	Dump/levelling
2038	Packing of 2039
2039	Post-hole
2040	Levelling/alluvium
2041	Backfill of 2051
2042	Backfill of 2046
2043	Post-hole
2044	Backfill of 2048
2045	Backfill of 2049
2046	Drain
2047	Dump/levelling
2048	Post-hole
2049	Post-hole

Context no	Description
2050	Build-up
2051	Post-hole
2052	Naturally occurring (alluvium)
2053	Yard/path
2054	Yard/path
2055	Backfill of 2056
2056	Drain/ditch
2057	Dump/build-up
2058	Dump/build-up
2059	Use deposit, fill of 2063
2060	Build-up
2061	Backfill of 2062
2062	Post-hole
2063	Pit
2064	Dump/build-up
2065	Occupation/build-up
2066	Occupation/build-up
2067	Path?
2068	Backfill of 2082
2069	Backfill of 2075
2070	Occupation/build-up?
2071	Backfill of 2080
2072	Path/yard
2073	Backfill of 2081
2074	Backfill of 2099
2075	Post-hole
2076	Backfill of 2080
2077	Drain/flue
2078	Backfill of 2077
2079	Occupation/build-up
2080	Post-hole/pit
2081	Post-hole
2082	Drain?
2083	Post-hole
2084	Build-up/dump?
2085	Build-up?
2086	Packing of post-hole?
2087	Build-up/dump
2088	Backfill of drain?
2089	Build-up/dump
2090	Path?
2091	Build-up?
2092	Path?

Context no	Description
2093	Backfill of 2094
2094	Drain/ditch
2095	Backfill of 2096
2096	Post-hole
2097	Backfill of 2098
2098	Post-hole
3000	Trench 3 unstratified finds
3001	Topsoil
3002	Orange-brown clay silt subsoil deposit
3003	Orange clay subsoil deposit
3004	Occupation layer
3005	Discrete linear pinkish clay lens
3006	Stone wall
3007	Hard gritty deposit over possible pit 3055
3008	Gritty surface overlying 3004
3009	Gritty deposit, possible hearth, overlying 3004
3010	Stone wall
3011	Discrete linear pinkish clay lens
3012	Possible return of wall 3010
3013	Burnt clay and charcoal deposit - possible oven? (Not excavated)
3014	Burnt clay and charcoal deposit - probable oven
3015	Base of topsoil in northern end of trench
3016	Fill over wall/drain 3022, below 3005
3017	VOID
3018	Orange clay subsoil/levelling deposit
3019	Linear feature within 3018 (not excavated)
3020	Fill of hollow within oven 3014
3021	Thick charcoal deposit below/within 3014
3022	Linear stone alignment, possibly a wall or drain
3023	Cobbles around possible pit 3023
3024	Linear cut into 3003 (not excavated)
3025	Fill of cut 3024 (not excavated)
3026	Charcoal-rich lens within 3004 (not excavated)
3027	Fill of pit 3028
3028	Small pit cut into 3004
3029	Deposit below stones 3022
3030	Dark deposit within pit 3055, upper fill?
3031	Fill of linear cut 3032
3032	Linear cut into 3003
3033	Small pit cut into 3004
3034	Fill of cut 3033
3035	Possible post-hole cut into 3004
3036	Fill of cut 3035

Context no	Description
3037	Small pit cut into 3004
3038	Fill of cut 3037
3039	Disturbed cobbles/base of topsoil deposit
3040	Build-up deposit over cobbles 3044/3067
3041	Orange clay subsoil/levelling deposit
3042	Build-up deposit over 3041
3043	Fill of small pit 3045
3044	Cobbles – same as 3067
3045	Small pit cutting 3046, 3042
3046	Fill of gully 3047
3047	Linear gully cutting 3042
3048	Deposit below cobbles 3048 within pit 3055
3049	Clay packing around top of pit 3055
3050	Dark fill of pit 3055
3051	Cut for clay oven 3014/3021
3052	Fill of possible pit/hollow 3058
3053	Build-up deposit over 3062/3067
3054	Duplicate – same as 3053
3055	Pit cutting 3003
3056	Pale deposit filling hollow over 3018 and against wall 3010
3057	Fill of possible pit/hollow 3059
3058	Cut or hollow within clay 3018
3059	Cut or hollow within clay 3018
3060	Redeposited clay at base of pit 3055
3061	Build-up deposit over 3053
3062	Industrial residue? Slaggy deposit over 3067, 3069
3063	Fill of land drain 3064
3064	Stone-built land drain
3065	Cut for land drain 3064
3066	Fill of possible tree bole/animal burrows
3067	Cobbled surface north of 3010 (same as 3044)
3068	Large cobbles or stone setting overlying 3067 at south end
3069	Fired clay deposit under 3068, 3062
3070	Reddish clay – superficial geology?
4000	2013 fieldwalking unstratified finds
4002	2013 fieldwalking Grid Square 2 finds
4004	2013 fieldwalking Grid Square 4 finds
4018	2013 fieldwalking Grid square 18 finds
5000	Trench 4 ploughsoil
5001	Backfill of land drain 5011
5002	Backfill of land drain 5010
5003	Backfill of land drain 5009
5004	Backfill of ditch 5006

Context no	Description
5005	Silting in ditch 5006
5006	Ditch
5007	Undisturbed natural till/alluvium
5008	Undisturbed natural till/alluvium
5009	Field drain cut
5010	Field drain cut
5011	Field drain cut
5012	Undisturbed natural
6000	2014 fieldwalking, beach: unstratified finds
6001	Boathouse field finds
6002	North part of fort finds
6003	Central part of fort finds
6004	Southern part of fort finds
6005	Decoy Wood finds
6006	Boathouse field, fill of ditch 6007
6007	Boathouse field, ditch



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