The Magna Project
2025 Excavations

Edited by Rachel Frame and Franki Gillis

With contributions from Marta Alberti-Dunn, Fae Amiro, Andrew Birley, Barbara Birley, Cristina Crizbasan, Elizabeth M. Greene, Jacqui Huntley, Robert McCulloch, Eva Panagiotakopulu, Ian Smith, and Gillian Taylor

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Magna report ISBN: 978-1-0684084-2-7


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CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

ANDREW BIRLEY

The excavation of a 10m wide section through the northern ditches of the last stone fort at Magna showed the value of ground truthing the otherwise non-invasive surveys that had previously taken place on the site. Those surveys (LiDAR and topographical surveys) had indicated a much more substantial defensive system than was present, with only two fort ditches rather than the five that were suggested. The area to the north of the ditches had been heavily disturbed by Roman activities with the digging of peat and deposition of Roman rubbish into the old trenches. The excavations also proved that the ditches had been dug through the southern extension of the bog and that this very wet area extended below the platform on which the last stone fort had been constructed. Indeed, the rubble foundations for the fort wall had been dug through wet organic material and then directly into the boulder clay below it. No evidence of earlier Roman or Iron Age buildings, stone or timber, were found within the ditch edges, and this raises questions about the location of the timber Stanegate forts relative to the later stone fort which dominates the site today.

There was a notable difference between the organic silty fill of the secondary outer ditch and the multiple layers of dirty fill of the larger primary fort ditch. The primary fort ditch produced a wide range of materials including a fine collection of Roman leather shoes. It must be noted that those shoes were generally preserved in a much poorer state than many of their Vindolanda counterparts, a product of the more rapid decay that can be evidenced at Magna. The shoes are most remarkable for their size, with a higher percentage of larger items of footwear than is normal from Roman forts, including Vindolanda. This may suggest a difference in the size of the soldiers serving at Magna when compared with the evidence thus far from other forts along the Wall.

The 3rd century deposits also produced the first two writing tablets to have come from Magna. A small fragment of an ink on wood tablet and a larger and more robust, but still partial, stylus tablet. Their recovery reminds us of the importance and potential of the preservation layers at this site – the potential to offer a true comparison to the unparalleled archive of early written material from nearby Vindolanda – and of the pressing need to do whatever is possible to either protect or rescue this material before it is too late. The state of preservation of the tablets, like the leather, was poor, the wood sponge-like and degraded. It is unlikely that tablets in these deposits would have remained intact and therefore discoverable for many more years.

The primary ditch showed evidence for several significant recuts, but the intensity of the occupational fill appears to have dropped after the end of the 3rd century. It may be that the large-scale disturbances from multiple layers of post-medieval drainage had caused a significant loss of material from those later Roman periods. The post-Roman disturbances will have almost certainly resulted in the direct loss of organic material from the higher ditch deposits.

Roman fort ditch excavations can be a challenging endeavour. Running on the edge of a wet marsh or bog, the ditches at Magna did their best to continue to transport water through their systems irrespective of the weather above ground. The archaeological team is therefore extremely grateful to the dedication of the Magna volunteer community in undertaking this task with such patience and skill. This report is dedicated to them and the generous funders of the project, the National Lottery Heritage Fund.

2. EXCAVATION RESULTS

RACHEL FRAME

The 2025 excavation targeted the area immediately north of the current fort platform, to investigate the use of space between the fort and the peatland to the north. The primary ditch, to the north of the fort, was partially visible in the landscape prior to excavation, while LiDAR and topographic surveys carried out in 2019 indicated the potential for up to five ditches crossing this area, parallel to the north wall of the fort (Austrums and Stanford 2019: 8). The trench measured 45.9m N-S by 10.1m E-W (Fig. 1) and was located to the east of the fort's north gate.

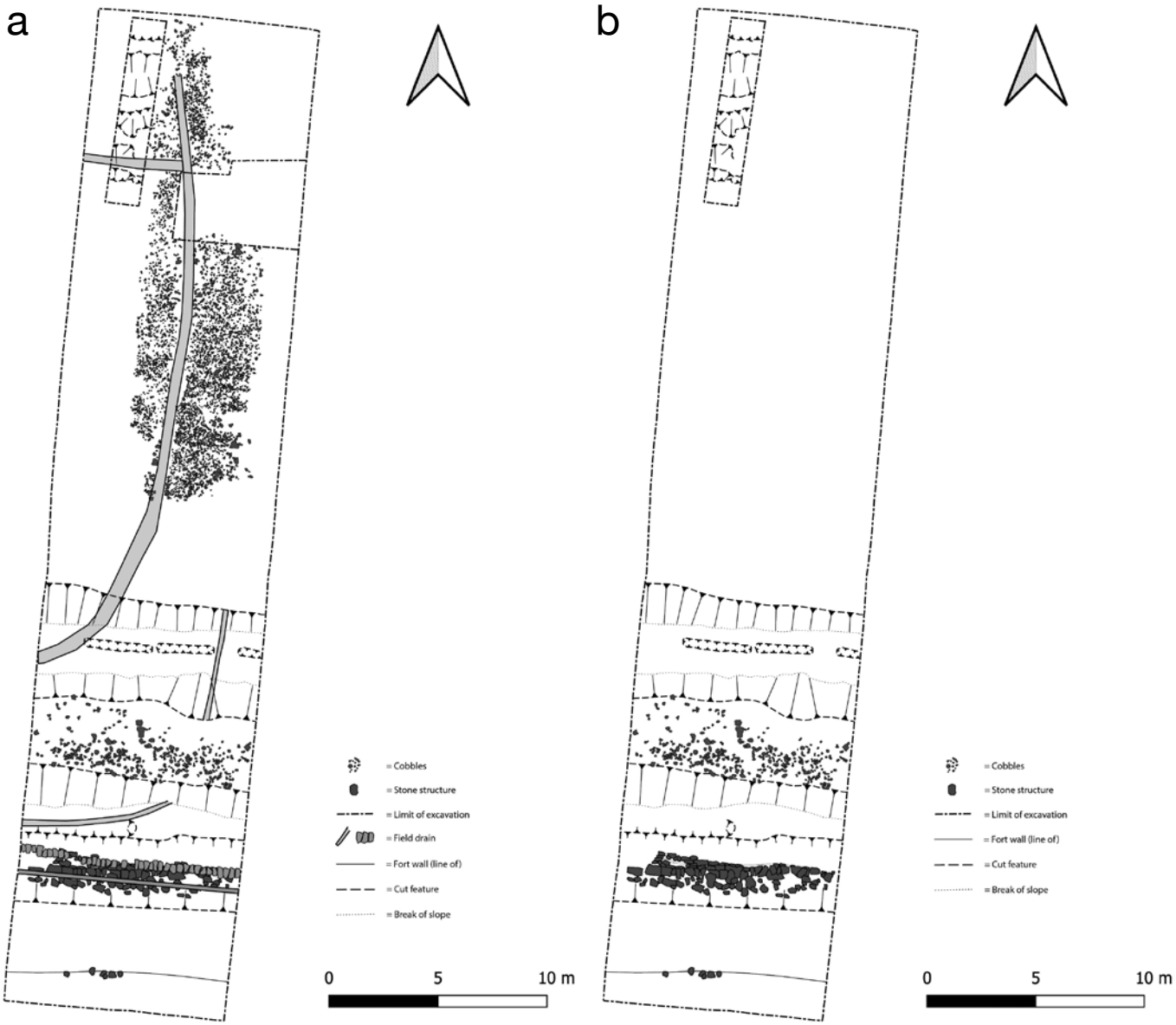
***Figure 1:** Plan of the 2025 excavation of the northern fort ditches showing a) all key features; b) key features of Roman date.*

2.1 FORT WALL

The southern end of the trench crossed the predicted location of the north wall for the last stone fort. The pronounced ridge in the landscape formed by the north edge of the fort platform indicated its likely position; however, it was unclear to what extent any *in situ* remains of the wall survived below ground.

2.1.1 4TH CENTURY

The final phase of the fort at Magna, whose buried remains form the visible earthwork, likely dates to the 4th century CE and would have been built in stone. Despite extensive damage, excavation located the *in situ* foundation course for the outer face of the



fort wall, confirming its position comparative to the visible earthworks. The foundations had a width of at least 1.28m, however the inner face of the fort wall was not located as it lay beyond the limit of the excavations to the south.

Excavation also revealed that the fort wall foundations had been cut through two naturally formed deposits that had a maximum vertical span of 0.45m total (Fig. 2). Further archaeobotanical analysis of these deposits (see Chapter 5.4 and Appendix 3) has contributed to further insights into the historic landscape at Magna and how the Romans interacted with this environment (see Chapter 2.5.1).

The outer face of the wall was located less than two metres from the southern edge of the primary fort ditch. Immediately to the north of the wall foundations, a densely packed stone surface was uncovered that covered the historic ground surface. This had been deliberately laid in an effort to consolidate the naturally wet ground surface, which created a better defined berm and provided a more robust support for the fort wall foundations.

Although previous excavation of the fort's north gate revealed surviving timber below the stone structures (Birley, A.R. 2022: 10), no clear evidence of earlier archaeological remains in either stone or timber were uncovered during the excavation of the fort wall.

2.1.2 POST-MEDIEVAL

Evidence for later activity in this area post-dating the Roman occupation of the site was limited and solely associated with stone robbing. As has been recorded in other excavated areas, such as at milecastle 46 (Frame *et al.* 2024: 4), almost all the usable stone had been removed from the fort's north wall in the medieval and post-medieval periods. This had led to the collapse of the wall's rubble core and inner rampart across the berm and the southern slope of the primary fort ditch. These highly mixed clay and rubble deposits contained large quantities of pottery, sand and animal bone (see Chapters 10 and 11). This mix of material now forms the bulk of the visible northern ridge of the fort platform.

2.2 PRIMARY FORT DITCH

The primary fort ditch was the only feature clearly visible pre-excavation, in the form of a clear dip in the landscape immediately north of the fort platform. Though the ditch could not be fully excavated due to extensive flooding, excavation revealed it measured 6.76m in width and at least 1.54m in depth.

Figure 2: *East facing section through the remains of the fort wall foundations and the dark organic deposits they have been cut through.*

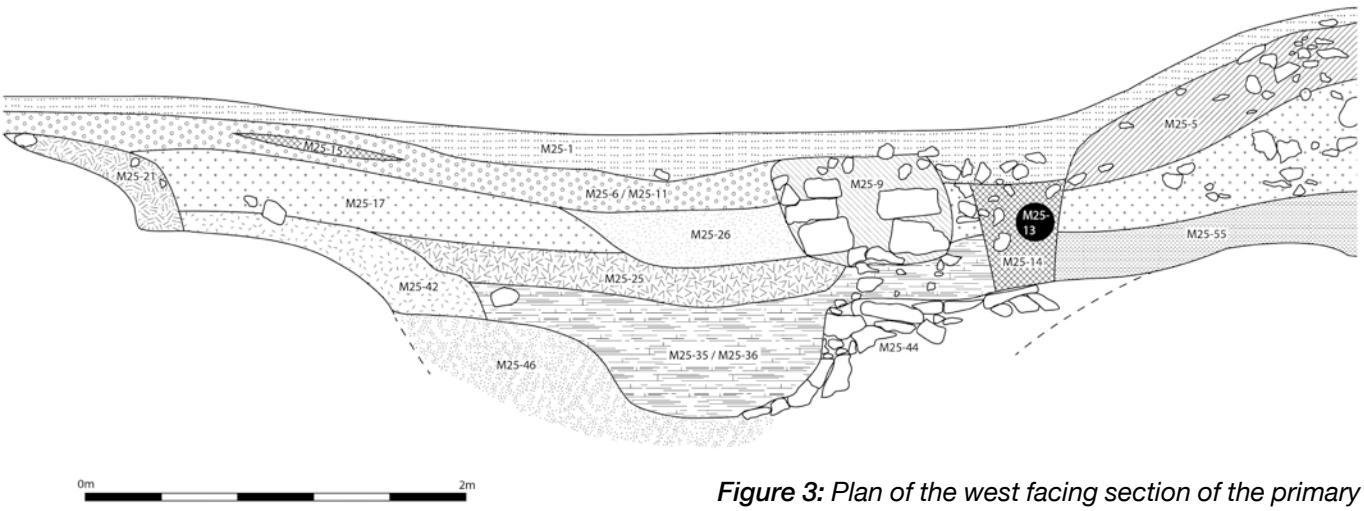


Figure 3: *Plan of the west facing section of the primary fort ditch, showing all major phases of infilling.*

2.2.1 2ND CENTURY

The original construction of the ditch is most likely to have occurred during the 2nd century CE, as part of the building of the first stone fort at Magna (Birley, R. 1998: 9-12). While the profile of this cut could not be established, the primary fill of the ditch proved to be a substantial layer of redeposited boulder clay (Fig. 3, M25-46). Although only partially excavated at the western end of the trench during the creation of a sump, it was found to contain both butchered animal bone and leather objects, confirming its anthropogenic origins. The clay, and several boulders found within it, was likely to have been intentionally deposited by the Romans as part of remodelling the ditch shortly after its initial construction. This may have been in response to erosion undercutting the south side due to the large volume of water that would have been flowing through the ditch in periods of flooding. The ditch was shown to have been cut through an already wet landscape, one that was connected to the wetland to the north of the fort (see Chapter 2.5.1).

A stone revetment built along the southern edge of the ditch was likely to have been inserted at the same time, indicated by the concentration of unworked boulders in the southern part of the clay deposit, which would have provided a foundation for the stone structure above. At least six courses of stonework remained *in situ* (Fig. 4) and while the revetment would have likely originally continued to the upper edge of the ditch cut, the insertion of a post-medieval stone box drain (see Chapter 2.2.4) had truncated the upper courses. This structure would have provided long-term reinforcement against further erosion of the ditch's south side, while also providing support to the stone fort wall above. That it was built as a specific response to the waterlogged environmental conditions at Magna can be determined from the lack of comparative revetments encountered thus far elsewhere on Hadrian's Wall.

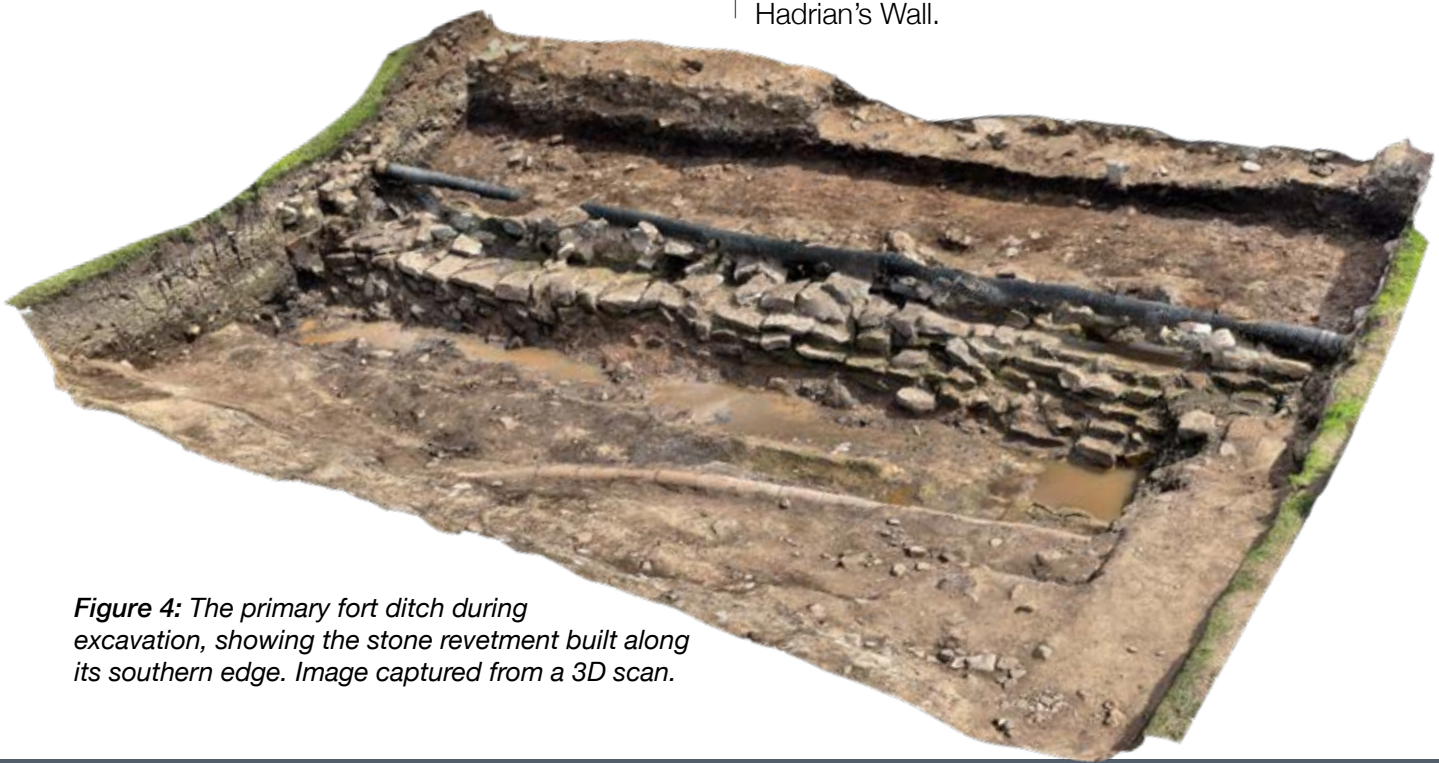


Figure 4: *The primary fort ditch during excavation, showing the stone revetment built along its southern edge. Image captured from a 3D scan.*

Following the remodelling, two phases of recutting or cleaning out of the ditch were identified during the excavations, both of which included the creation of ankle breakers in the base of the ditch, dug into the redeposited clay fill. These suggest ongoing maintenance of the fort's defences throughout the 2nd century CE, an interpretation supported by the low quantities of pottery dating to this period within the ditch fills (see Chapter 10).

2.2.2 3RD CENTURY

The main episode of backfilling took place during the 3rd century CE, with significant amounts of rubbish from the fort being discarded into the ditch at this time. Throughout this period, the ditch experienced consistent flooding, depositing a silty clay fill and creating a waterlogged preservation environment into which the fort's waste was thrown (Fig. 3, M25-35/M25-36). A wide range of material culture was represented in this, including pottery (see Chapter 10) and animal bone (see Chapter 11). Several classes of small finds (see Chapter 3) were also recovered, including a notable collection of leather objects (see Chapter 4).

In contrast to fort defences seen at other sites on the frontier, such as *Aesica* (Great Chesters), the bank between the first and second ditches showed no evidence of having been built up to form a rampart. Instead, it had been covered by a tightly packed cobbled surface. This may have been laid to help consolidate the clay bank and reduce the potential impact of erosion on the structure, as was the case with the stone revetment inside the ditch (see Chapter 2.2.1). However, the cobbled surface could also have functioned as a road or trackway surrounding the fort and linking the roads exiting the main gateways. This would have made the extramural landscape of Magna easier to navigate, particularly in areas where the surrounding ground was boggy or seasonally flooded (see Chapter 2.5.1).

2.2.3 4TH CENTURY AND POST-ROMAN

From the 4th century CE onward, the ditch showed more limited evidence for activity in and around the fort. There was no indication that further cleaning or recutting of the ditch had been carried out and the upper fills contained fewer bulk finds. These fills were primarily formed of silt which had accumulated over time through the movement of water into and along the ditch, although the lowest lying deposits in the centre of the ditch contained amorphous organic plant remains, clinker, charcoal fragments, and occasional peat. These low lying, central deposits also have evidence of being waterlogged for a significant amount of time before becoming dehydrated (see Chapter 5.4, samples <7> and <9> for more details). Several large blocks of Roman masonry from the fort wall were found within these layers (Fig. 5) and could be the result of either the general collapse of the fort or more deliberate stone robbing and demolition in later periods. The changes in the depositional patterns in this section of ditch between the 3rd and 4th centuries raises important questions about the nature of the occupation within the fort during these centuries. The geophysical surveys clearly show that a barrack block was situated to the south of the fort wall in this location; the primary fort ditch would have been a natural source for the causal discard of waste during their occupation. In the future it would be useful to see if the barrack buildings continued to be occupied or had been demolished or re-purposed for other uses by the 4th century CE.

2.2.4 POST-MEDIEVAL

As has been seen during the excavation of other major ditches on the site, such as the *vallum* (Frame and Gillis 2025: 19), several field drains were inserted into the uppermost fills of the primary fort ditch. In most cases these had been laid E-W along the length of the ditch, using the existing contours of the site to their advantage, though at least two were aligned N-S. These were no doubt intended to channel water from the north into the wetter, lower lying depression of the primary ditch where it could then be drawn off to the west by the E-W drainage network. At least three phases of drains were apparent, and they were made of both ceramic pipe segments and repurposed Roman stone, originally from the fort wall and other structures (Fig. 5).

2.3 SECONDARY FORT DITCH

The secondary fort ditch was not visible prior to excavation, though a trace of its location was suggested by LiDAR survey. It was notably shallower and narrower than the primary ditch (Fig. 6), measuring 1m in depth and 4.18m in width, and was fully excavated to the base of the original cut.

2.3.1 2ND CENTURY

The secondary fort ditch was also likely constructed in the 2nd century CE, during the building of the first stone fort at the site. Although it was broadly contemporary with the primary fort ditch, there were some differences in its construction. Beyond its smaller dimensions, the most notable difference

Figure 5: *Collapsed Roman masonry and a Victorian stone-built field drain within the upper fills of the ditch.*

Figure 6: *The fully excavated secondary fort ditch.*

between the two features was a series of small, segmented ditches dug into the base of this ditch (Fig. 7). Three of these were uncovered within the excavated area, the deepest of which was 0.27m and the longest of which was 3.07m. Their purpose remains uncertain, but they may have been intended as an additional defensive feature in the base of the ditch. The segmented design is not consistent with the typical form of an ankle breaker; however, it does bear close resemblance to features interpreted as *cippi* at the eastern end of Hadrian's Wall on sites such as Shields Road, Byker (Hodgson 2025: 102). These, based on descriptions by Caesar in *Bellum Gallicum*, could have been dug to act as emplacements for stakes, forked branches and other entanglements. Such an addition would have made the otherwise shallow ditch a more significant obstacle in the landscape, without the need for the more extensive engineering seen in the primary ditch.

The lower fills of this ditch, and the segmented ditches in the base, also proved to be semi-anaerobic. However, despite occurring at a similar depth to the equivalent material in the primary ditch, the deposits in this ditch were more desiccated in comparison and contained very little surviving organic material culture.

2.3.2 4TH CENTURY AND POST-ROMAN

The sequence of later infilling proved to be broadly similar to that observed in the primary fort ditch. Although both ditches are likely to have remained open during the late Roman period, there was no evidence to indicate they were being maintained as defensive features in the landscape at that time. Rather, a number of silty deposits organically formed within the cut feature over an extended period of time. This occurred predominantly via the movement of water through the landscape, as evidenced by the high levels of iron pan recorded in the upper layers.

2.3.3 POST-MEDIEVAL

In addition to the gradual build up of silty deposits within the ditch, a rough layer of cobbling was found to have been laid across the uppermost fill. This extended out from the berm between the two ditches and covered most of the deposit. The haphazard nature of the surface means it was unlikely this was intended to function as a road or track and was more likely an attempt to consolidate the soft, quaggy area formed by the ditch backfill.

Figure 7: *The westernmost of the small ditch segments in the base of the secondary ditch, mid-excavation.*

While field drains had also been inserted into the upper fills of the secondary ditch, they did not run E-W inside the cut. Instead, they were oriented N-S, crossing the ditch and channelling water into the drainage network within the primary fort ditch.

2.4 NORTH OF THE DITCHES

The northern half of the excavated area was not found to contain further defensive ditches as had been suggested by the pre-excavation survey. Instead, excavation of a sondage through the area provided further insight into the historic landscape and how the Roman inhabitants interacted with it.

2.4.1 2ND CENTURY

The earliest evidence for activity in this area was associated with the initial phases of Roman occupation of the site in the 2nd century. An assortment of irregular cuts were uncovered within the upper deposits of the peatland area (Fig. 8). These had not been recorded during excavations elsewhere within the peatland, suggesting that they had been caused by deliberate interventions in this area, as opposed to being a natural feature within the landscape. This, in combination with the mixed soil matrix containing Roman material culture spread over the peat (see Chapter 2.4.2), suggests that the Romans may have been harvesting peat logs to be used as fuel alongside other sources such as coal and wood.

This interpretation is further supported by radiocarbon dates obtained from cremation burials excavated in 2024. These were identified as Roman in date, with some radiocarbon dates corroborating this, but in several instances returned dates ranging from the Mesolithic to early Iron Age (Frame and Gillis 2025: 197). Further work on the identification of peat as a fuel source may be possible in the future through the analysis of samples from structures such as ovens and hearths within the fort.

2.4.2. 3RD CENTURY

The possible peat extraction in this area appears to have ended during the late 2nd or early 3rd century CE, after which it appears to have been left to silt up as well as being used as an additional dump for waste material from the fort. This sequence can be observed through the analysis of the deposit that overlaid the remaining peat, which contained a mixed Roman backfill of ceramics, animal bone,

Figure 8: *Aerial image of the sondage excavated at the north end of the trench and its east facing section (inset). Areas with evidence for peat removal have been highlighted in red.*

and a variety of small finds (see Chapters 9, 11 and 3 respectively).

The dumping of waste material from the fort into this area, carrying it beyond the more convenient disposal points offered by the fort ditches, must have been a deliberate decision made by the fort's inhabitants, perhaps using the cobbled trackway between the fort ditches to more easily access this area. Despite the silty deposits suggesting continuous flooding, the backfilling with rubbish may have been undertaken in an attempt to stabilise the boggy ground and to facilitate a different use of the space.

2.4.3 POST-ROMAN

The latest feature in the archaeological sequence of this area was a mettled road, that had a width that ranged from 2.88m to 5.79m. Starting to the immediate north of the fort ditches, it ran N-S through the centre of the trench and continued beyond the limit of excavation to the north (Fig. 9). The surface was made of tightly packed cobbles

Figure 9: *Aerial image of the post-Roman road under excavation as it extends north from the fort's ditches.*

with occasional pieces of CBM and Roman pottery throughout, suggesting it likely dates to the post-Roman period, or potentially to the very late Roman occupation of the site.

Unfortunately, it is unclear where this road led to or what function it served; within the trench it did not connect to any other roads, nor did it extend as far as the fort to the south. LiDAR suggests that this road headed to the northeast, however the peatland in the North Allotment field makes further interpretation difficult. Furthermore, the results of this excavation season have proven the limitations of non-invasive survey data in understanding the archaeology of the site.

2.4.4 POST-MEDIEVAL

No further activity following the end of the Roman period was evident in this part of the trench until the agricultural drainage works in the 19th century. Two of the N-S field drains, one ceramic and one rubble, were traced across this area during the excavation. An additional E-W rubble drain was also excavated in the northwest corner. This network of intercutting field drains is consistent with that of the North Allotment field, excavated in 2023 and 2024, and attests to the continued wet, boggy nature of this land.

2.5 DISCUSSION

2.5.1 RECONSTRUCTING THE HISTORIC ENVIRONMENT – FRANKI GILLIS

The excavation of the northern fort ditches has helped better reconstruct the historic landscape at Magna through analysis of archaeological features and soil deposits. Excavation has revealed the likely southern edge of the seasonal lake. The mor humus underlying the southern part of the trench was truncated by the Romans during construction of the 2nd-4th century fort wall and defensive ditches. As a humus form, mor humus is aero-hydromorphic, meaning that its O-horizon would be saturated during the winter but aerated during the summer (Frank, Brauckmann, and Broll 2023: 780). Radiocarbon dating of this deposit revealed that the deposit dated to 4615 - 4454 BCE. This furthers the theory that parts of the modern peatland area was a seasonal lake before and during Roman occupation of the site.

Additionally, the unique stone revetment feature suggests that the primary ditch experienced consistent flooding. Its likely insertion after the ditch was constructed indicates that the southern edge of the ditch required reinforcement to prevent the sides from becoming undercut as a result of strong water movement, something which would threaten the fort wall itself. A stone revetment, therefore, would serve as an efficient method to prevent ditch erosion. While it is likely that the revetment also had benefits as a defensive feature, the fact that no other known fort ditches along Hadrian's Wall contain such an element implies that this was not purely defensive.

The peatland also extended further south than was initially assumed. Prior to excavation, it was believed that the peatland area was confined to the field some 40m to the north of the fort; however, the secondary ditch was cut through a layer of peat and the fort wall foundations cut through the mor humus deposit: therefore, it is evident that the wetland area continued all the way to the fort, even if the peatland area ended below the rough cobbled surface between the primary and secondary ditches (M25-7). To the north, this same, large peat deposit was overlaid by clayey-silt (M25-48/M25-50, possibly the original infill of the primary and secondary ditches) which contained Roman waste material. As such, the underlying peat is a historical, pre-Roman and Iron Age deposit and is likely to have been the natural ground level prior to the construction of the stone fort and its associated ditches. This, in tandem with the likely northern edge of the peatland uncovered in 2024 (Frame and Gillis 2025: 27-28), has allowed the approximate northern and southern edges of the historical peatland area to be determined.

Overall, the evidence suggests seasonal flooding of the area just north of the stone fort foundations. This interpretation of the excavated features and deposits is strengthened with the addition of the archaeobotanical evidence (Chapter 5), insect analysis (Chapter 6), and fossil pollen evidence (Chapter 7). A more complete reconstruction of the historic environment at Magna will be published at the end of the project, once all of the excavations have been undertaken. That report will incorporate all the above analyses to allow a better understanding of the natural landscape at Magna before, during, and after Roman occupation.

3. SMALL FINDS

A total of 95 small finds were recovered during the 2025 excavation of the northern fort ditches, including those categorised under the separate headings of coins, leather, wood, and writing tablets. Material in the general small finds category includes glass beads, a terracotta votive head, a spindle whorl and stamped pottery alongside a range of other metal artefacts. The full catalogue can be found in Appendix 2.

3.1 COINAGE – FAE AMIRO

Two coins were found from the 2025 Magna northern fort ditch excavation. The first (MC-2025-2) was a Victorian half penny struck in 1860, located within the topsoil (M25-1). The second (MC-2025-3) was a republican *denarius* with an eagle obverse and temple reverse struck under the authority of Petillius Capitolinus in 43 BCE (RRC 487/2). The poor state of preservation obscures any reverse field marks, preventing the specification of the subtype. Its context, M25-48, consisted of a spread of other Roman material deposited in the 3rd century CE, which included pottery and bone. Republican *denarii* are attested in later contexts throughout Britain, both in hoards and as stray finds. While most found in 3rd century contexts are Marcus Antonius issues, others are also attested (Bland *et al.* 2020: 251-252). Republican *denarii* represent around one percent of the coin finds from Vindolanda, around one third of which are pre-Antony issues. The Republican *denarii* appear to have first arrived in Britain in the 1st century BCE and are commonly found in Roman military contexts (Bland *et al.* 2020: 238; Walton 2011: 107-142).

3.2 GLASS BEADS – BARBARA BIRLEY

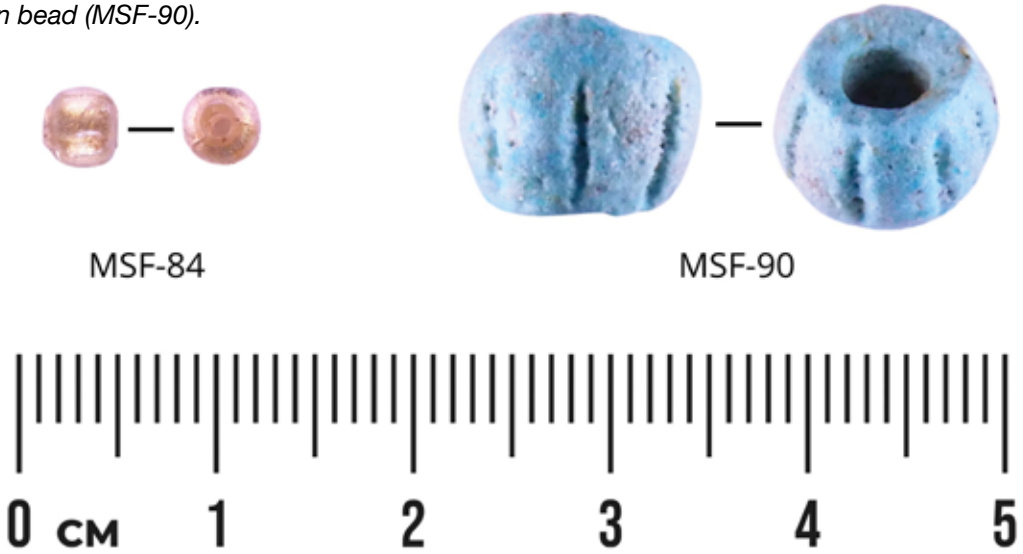
Five glass beads were recovered from the 2025 Magna ditch excavations. Three are melon beads made from faience and two are gold-in-glass beads. Both bead types are common finds from the frontier and across Roman Britain.

3.2.1 GOLD-IN-GLASS BEADS

MSF-68 was found broken into 2 fragments and is a spherical gold-in-glass bead. Its diameter measures 3.2mm with a height of 5.3mm. It was found in the primary fill of the second fort ditch (M25-24) and this context dates to the 2nd century CE. Another spherical gold-in-glass bead, MSF-84 was found in M25-41, the natural peat cut through by the fort ditches. It has dimensions of diameter: 4mm, height: 3.5mm and a perforation of: 1mm. A fragment of the outer encasing glass and gold foil is now missing. It is likely that this bead was also deposited in the 2nd century.

Comparative material can be found in Guido's segmented beads enclosing gold or white foil (Guido 1978: 205-206) They are also found in South Shields (Allason-Jones and Miket 1984: 278) and Brougham, Cumbria (Cool 2004: 386). In the Roman period, gold-in-glass beads are most commonly found in a spherical shape, as are the beads above. There are examples of gold-in-glass beads with multiple segments and there are often sharp edges around the perforation where the bead has been broken. They are generally seen as coming from the late Roman period in Britain but examples from Vindolanda show contexts dating from the 2nd to the 4th century CE (Birley and Greene 2006: 34).

***Figure 1:** Two complete beads from the Magna excavations 2025, a gold-in-glass bead (MSF-84) and a melon bead (MSF-90).*



3.2.2 MELON BEADS

MSF-90 is a complete blue faience melon bead that has an abraded surface and well-worn lateral impressions. The diameter is 11.6mm, height: 8.7mm and perforation: 3.5mm. It was found in context M25-53, the fill of a shallow gully directly below the Roman backfilling deposit to the north of the fort ditch which probably dates to the 3rd century CE.

MSF-89 and MSF-91 are both fragments of melon beads. MSF-89 measures diameter: 18mm, height: 18mm and perforation: 6.5mm. MSF-91 measures diameter: 10.4mm and height: 16.4mm. Both beads, like the example above, are made from blue faience, a mouldable glass paste of quartz powder with a vegetable or mineral binder (*ibid*). The contexts for both beads date to the 3rd century CE and are from a mixed silt deposit that is the result of a Roman backfill to the north of the ditches.

Comparative material can be found in Guido's glass melon beads (Guido 1978: 228-230). There are also a number of melon beads from sites along the Wall including Vindolanda (Birley and Greene 2006: 39-44), Arbeia (Allason-Jones and Miket 1984: 279), Birdoswald (Wilmott 1997: 273) and other sites in Britain including Ribchester (Buxton and Howard-Davis 2000: 291).

3.3 SPINDLE WHORL – MARTA ALBERTI-DUNN

MSF-73 is the only ceramic spindle whorl found in the extramural excavations at the site of Magna between 2023-2025. Comparatively, intramural excavations in the northeastern and southwestern quadrant of Roman Vindolanda between 2023-2025 revealed 24 spindle whorls, of which 16 were made of recycled pottery. A. Birley (2010: 166) indicated that, in 3rd century contexts at Vindolanda, most spindle whorls were found in extramural settlements, with a ratio of 9:1 compared with spindle whorls in 3rd century intramural contexts at Vindolanda. It is therefore interesting to note the lack of spindle whorls, ceramic or otherwise, in extramural contexts from the area to the north of the site of Magna.

MSF-73 was found in the tertiary fill (M25-25) of the primary ditch (see Chapter 2.2) and is therefore likely to date to the ditch's closing deposits. It was likely to have been discarded in the fill of the ditch together with a gaming counter (MSF-75) and a piece of worked antler (MSF-83), as well as some scrap leather and worked wood. The whorl is discoid and made of recycled pottery (Fig. 2). However, it is impossible to identify the form of the original vessel the whorl was created from, due to the lack of distinctive features.

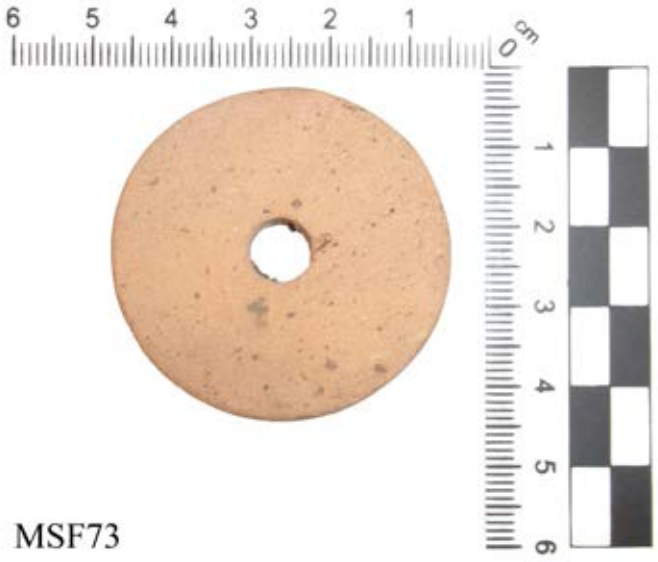


***Figure 2:** Ceramic spindle whorl MSF-73.*

The discoid shape of MSF-73 is in keeping with the predominance of discoid, undecorated recycled pottery spindle whorls found at both Vindolanda and Corbridge (Alberti 2018: 5). The whorl weighs 15g. Complete discoid whorls recorded at Vindolanda vary in weight between 4 and 47 grams, depending on the material they were made of. However, the mean recorded weight for a complete pottery discoid spindle whorl is 11.5g, making this example slightly heavier than the average. The weight of a spindle whorl is important because it might be associated with its use to produce different types of yarn (Mårtensson *et al.* 2006).

MSF-73 is 41.2mm in diameter, and 6.3mm thick. The mean recorded diameter for a complete pottery discoid at Vindolanda is 36mm, and the average thickness is 7.8mm making this spindle whorl slightly larger than average, but less thick. The spindle whorl is worn smooth on both sides, and no macroscopic examination of use-wear traces was possible (Alberti 2018: 9). The smooth wear could have also played a role in removing any trace of decoration which might have been present on the original vessel. Overall, no decoration was detected on the whorl, making it hard to establish which side of the object a cone of yarn could have rested on.

Intramural excavations at Magna, set to take place over the course of 2025-2027, will likely provide further comparative material, allowing a more in depth understanding of spindle whorls as a class of artefacts at the site.

3.4 STATUETTE HEAD – RACHEL FRAME

An unusual terracotta head (MSF-76) was recovered from the 3rd century fill of the primary fort ditch. The head measures 78mm in length and 67.1mm in width, and weighs 273g. It portrays a female figure, though it is broken off below the nose which has also fractured off in antiquity (Fig. 3). The head is sculpted out of orange terracotta and has been moulded in the round; however, the back of the head is plain. This indicates it was perhaps not intended to be viewed from behind, and that it could have been placed in a niche or alcove. The woman is shown with a centre parting and a 4-strand plaited hairstyle or headdress which tucks behind the ears. Her head is tilted slightly to the right in classical *contrapposto* form. Overall, though, the piece is rather crude, indicating that the figure was likely produced locally at the site (Allason-Jones pers. comm.). This is most obvious in the eyes, which are asymmetric and lopsided.

Figure 3: *Terracotta head of a woman MSF-76.*

Figure 4: *Terracotta bust held in the SANT collection at the Great North Museum: Hancock (left), alongside the newly discovered head from the 2025 excavations (right).*

A second comparable terracotta head, found at Magna in the 19th century, is now held in the Great North Museum: Hancock as part of the Society of Antiquaries of Newcastle-upon-Tyne's (SANT) collection (NEWMA : 1982.36). This example is more complete, with the full head and bust surviving, although broken in half at the neck (Fig. 4). It displays the same 4-strand hairstyle and there are further similarities in the form of the brow ridge, nose and ears. In addition, the figure features incised lines running from the shoulders to the centre of the bust, suggesting the top of a *stola* or other garment, along with several circular indents around the neck, likely intended to represent jewellery.

This example was almost certainly mould-made, featuring the same border around the edge of the head and plain, rounded back seen on other terracotta figures manufactured in this way (Cenci 2013: 387). These are generally described as votive figures and can represent several deities, though many examples are only identified as female/male heads.

The clear similarities with the head in the SANT collection suggest the new example found in 2025 would also likely have been part of a small bust and might have served some kind of votive or religious function. Terracotta votive figures are commonly found throughout the Roman world, however, further direct comparisons for these two heads have not so far been identified. Broader comparisons for the hairstyle include a marble head of a woman in the Kassel Antiquities Collection (housed in Wilhelmshöhe Palace, Kassel, Germany). She is described as having a braided turban made of hair and tied in place with a four-strand cord and a centre parting (Zimmermann-Elseify 2009). Although this is an elaborate and detailed figure, the centre parting and four-strand cord result in a clear visual resemblance to the hairstyle depicted on the two heads from Magna, suggesting they may be far more basic attempts to represent the same hairstyle.

This potential interpretation of the hairstyle provides not only stylistic information about the head but can also contribute to attempts to date the object. Terracotta votives, in a variety of forms, have a long tradition in the ancient Mediterranean, and while many examples date from the 6th to the 3rd centuries BCE (Cenci 2013: 385), their use is known to have continued as late as the 4th century CE at sites like Tarsus in Cilicia (Hasselin Rous and Yalçin 2018: 19). In contrast, the hairstyle provides a much narrower date range as the fashion for braided turbans is commonly associated with the Trajanic and Hadrianic period (Zimmermann-Elseify 2009). Although the head found at Magna in 2025 was recovered from a 3rd century CE deposit, it could easily have an earlier manufacture date; only being discarded into the ditch when it was eventually broken.

Thus far, no identification has been possible for either head recovered from Magna, though they may have been intended to represent an empress or a goddess who played an important role in the lives of the fort's inhabitants.

3.5 WOODEN COMBS – BARBARA BIRLEY

The excavations in the northern fort ditch at Magna produced two partial wooden hair combs. Both objects are made of boxwood (*Buxus sempervirens*) and are the simple H style combs which are ubiquitous on Roman sites where wooden objects survive.

MW-2025-9 is a standard H comb featuring coarse teeth on one side and fine teeth on the other (Fig.6). About half of the comb survives including one sinuous terminal. Overall dimensions of what remains are width: 42mm, height: 48mm, depth: 9mm. The central bar is wider towards the terminal at 11mm and narrows to 4mm at centre where it is broken. Per 10mm, there are six coarse teeth and nine fine teeth. The comb is well made with a good use of guidelines for filing the teeth. The comb is overall on the smaller size. The widening of the central bar towards the terminal is unlike a traditional compass cut comb. Usually on a compass cut comb, the guidelines used to cut the teeth are curved, whereas the guidelines on MW-2025-9 are straight. Other examples in the Vindolanda collection also show that compass cut combs have a wider central bar compared to the Magna example.

MW-2025-16 is a traditional Roman H comb with a straight, plain central bar and a sinuous terminal, one of which survives (Fig.7). Like the comb described above, about half of the comb is remaining. Its dimensions are height: 49mm, width: 60mm, depth: 10mm. The central bar is 12mm in width and the carving for the teeth is just slightly over the guidelines, although there is a consistency here showing an element of refinement by the craftsperson. There are three coarse teeth and eight fine teeth per 10mm. There is a small 'X' graffito on one side of the terminal near the fine teeth (Fig.8). This looks to be an intentional mark made probably to identify the owner of the comb.

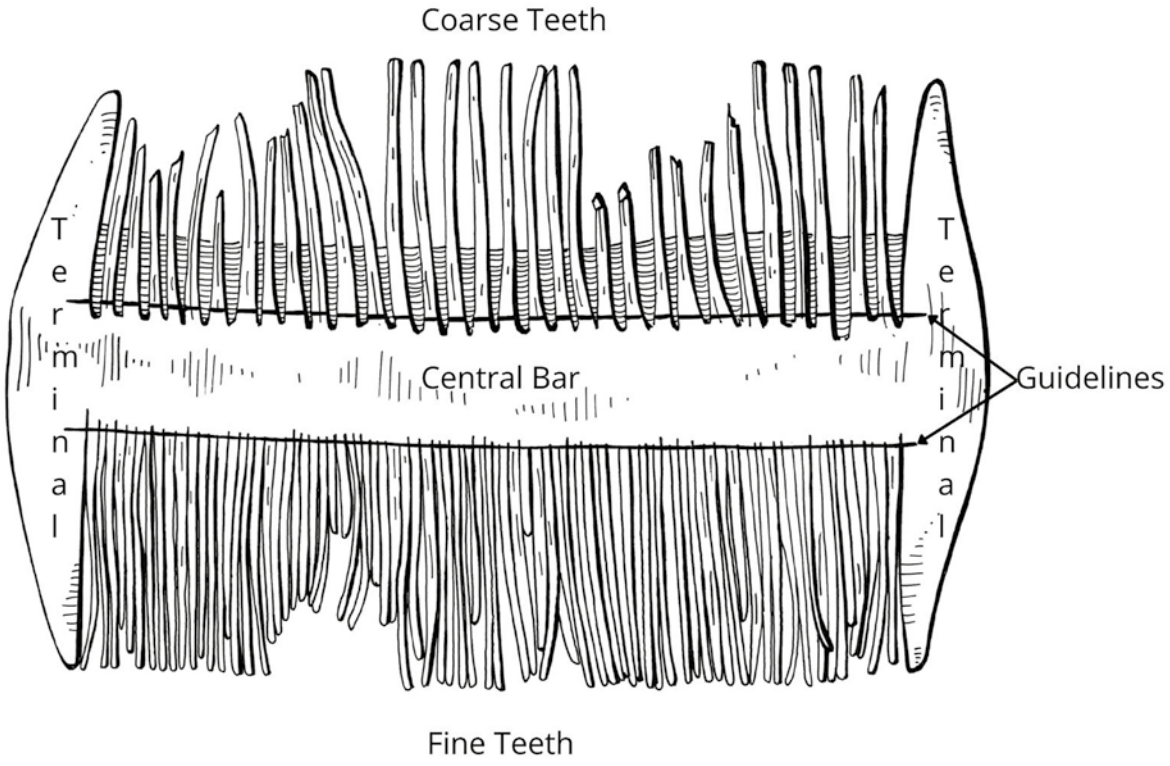


Figure 5: *Anatomy of a Roman H boxwood hair comb labelling the terms used to describe the 2025 Magna hair combs.*

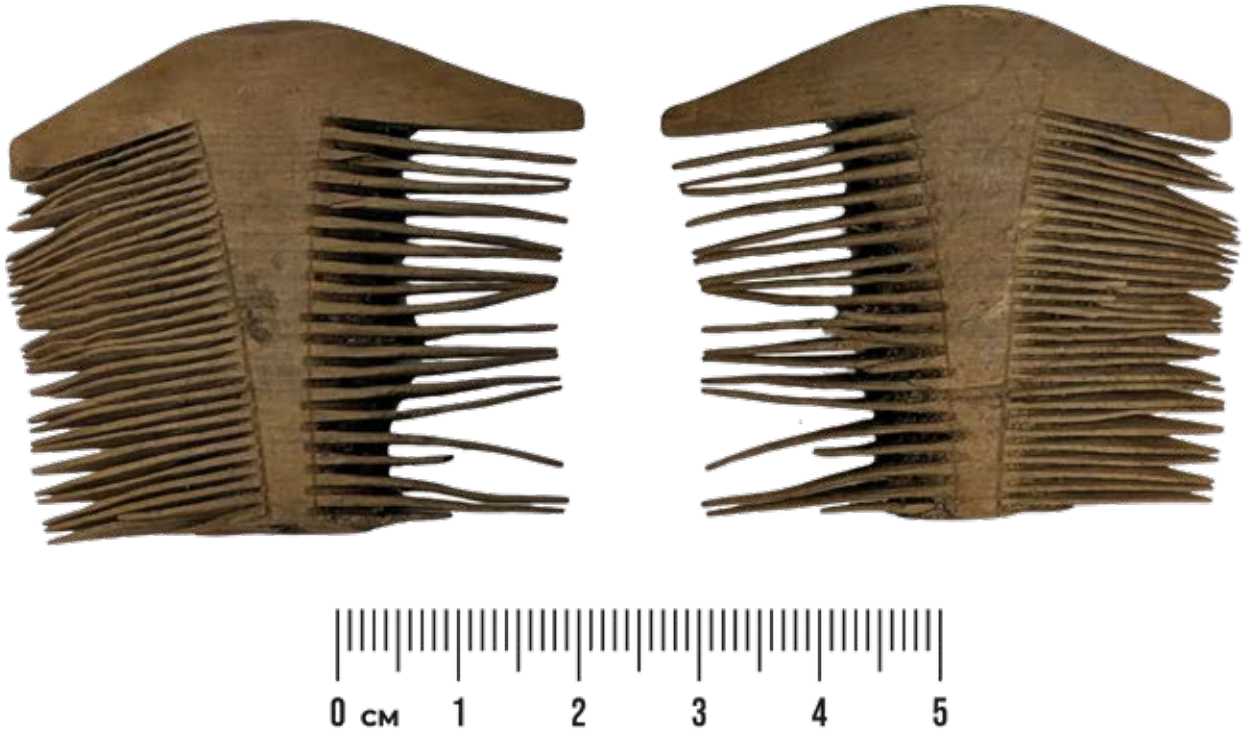


Figure 6: *MW-2025-9 Roman boxwood hair comb.*

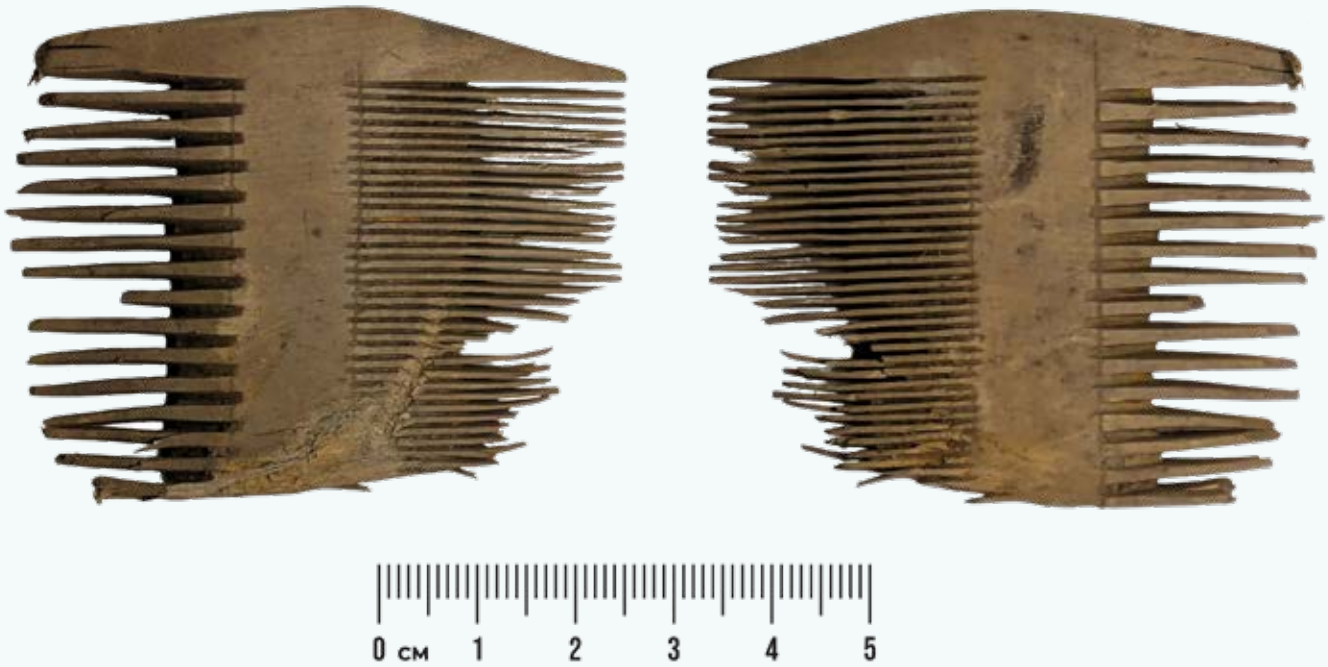


Figure 7: *MW-2025-16 Roman boxwood hair comb.*

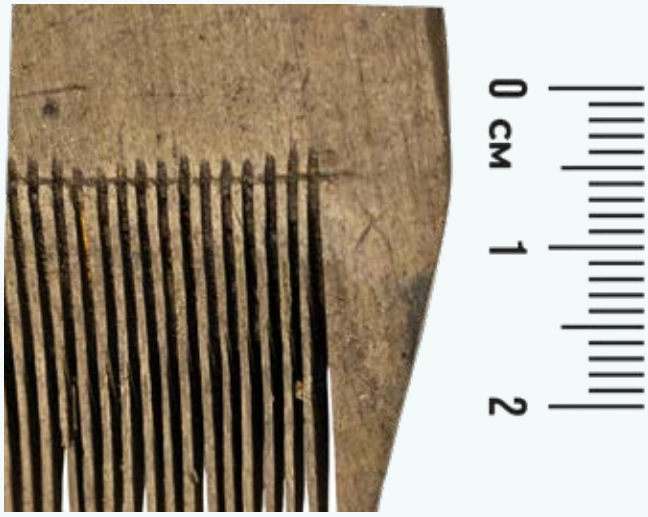


Figure 8: *Small 'X' graffito on the terminal of MW-2025-16.*

The combs were recovered from context M25-35. This is the active backfill of the primary ditch of the stone fort. The survival of the organic objects was best at the bottom of the context and included 34 leather shoes and a number of other wooden objects. The combs were the outstanding objects within the wooden finds. The stratigraphy indicates a 3rd century CE date, and the associated pottery supports this (see Chapter 10.3.1).

Both combs are very similar in the material and design to those found at other sites including Vindolanda (Birley, B. 2018: 198-195), Museum of London, Carlisle and other sites in Roman Britain (Pugsley 2003: 14-26) as well as sites in the wider Roman Empire including Vindonissa (Fellman 2009: 68-69), Köln (Tegtmeier 2016: 453) and Velsen (Lange 2021: 133). Although there are often small variations including decorations or modifications on the central bars or the additions of graffiti, as we see in the Magna examples, almost all of the Roman boxwood combs are the standard H combs. The most common terminal, as we see here, are the sinuous terminals and both combs show a standard of craftmanship similar to those from Vindolanda.

4. THE SHOES AND LEATHER OBJECTS FROM THE 2025 MAGNA EXCAVATIONS

ELIZABETH M. GREENE

4.1 INTRODUCTION

The leather recovered during the 2025 excavations more than triples the total number of leather objects from Magna and greatly enhances the small assemblage from the 2023-24 excavations on site (Greene 2025). In total, 47 object numbers were recorded during the excavation season, of which 34 were shoes and a further 9 were catalogued as shoe fragments. There were 3 bags of scrap leather and 1 knotted cord. Details of all objects can be found in the catalogue below.

All the leather comes from the defensive ditches outside the stone fort, and all but one object was recovered from the primary fort ditch located closest to the fort wall. This depositional location suggests that all objects were discarded into the ditch and that they represent refuse, objects that were thrown away by the inhabitants living on site at this time. The section of ditch excavated was only *c*. 10m long (see this volume, Chapter 2.2 for details), which is a small area to find such a concentration of shoes, but is not unusual for this type of discard context. The fort ditches at Vindolanda are also prolific in producing leather finds, especially shoes, suggesting the discard pattern is typical (Birley and Blake 2005, 2007; R. Birley 1994). This location appears to have been a common place for inhabitants of the fort to deposit rubbish or was perhaps a spot in the ditch system where objects clustered due to movement of water and mud. In comparison to the secondary fort ditch only 3.3 metres away, where just a single leather object was recovered, the primary fort ditch appears to have been a more popular location of disposal, although it also had better preservation of organic materials.

4.2 THE SHOES

The footwear examples are certainly the highlight of the assemblage and offer some interesting insight into who was in the habit of depositing refuse in this fort ditch. Of the 34 shoes that were complete enough to discern details about the potential owner in antiquity, 29 belonged to adult male wearers. A further 3 were worn by either a female or adolescent and 2 were certainly children's shoes (see catalogue for object numbers and details). A few of those catalogued as 'shoe fragments' also appear to be larger in size and were probably worn by adult males, but their details remain ambiguous. Therefore, the footwear probably represents the soldiers and other men living on site, with some representation of the women and children that inhabited the no-doubt extensive community living at this military fort (Greene 2016, 2020, 2025; van Driel-Murray 1993).

If we consider the 2024 shoes as well (7 in total), of which 3 belonged to children and 4 to adult males, we have a total of 41 shoes from areas to the north of the fort. Of those, 8 were probably owned by children, adolescents, or women (19%) and 33 by adult males (81%). However, the small area of recovery must be kept in mind and until we have a much larger assemblage of footwear from Magna, excavated from different representative areas of site, it is not wise to make any certain conclusions about how they reflect the population present on site. Moreover, the dating of the deposits where shoes were discovered in 2024 and 2025 appears to be vastly different, with at least a century or more between them. Comparing the community represented by 7 shoes from a pre-Hadrianic ditch found in 2024 (Frame and Gillis 2025) to a 3rd century deposit excavated in 2025 is not a worthwhile exercise.

The most noteworthy characteristic of the 2025 assemblage of footwear is the average size of the shoes recovered. Many of them are much larger than most shoes found in excavations and several of them constitute some of the largest shoes ever to be recovered from Magna and Vindolanda combined. Of the 29 shoes recovered that represent adult males, a full 17 of them fall into the 'extra-large' category, meaning they have a length of over 250mm. This constitutes 59% of the men's shoes and half of all shoes recovered in the 2025 season. To put this number into perspective, of all the shoes at Vindolanda for which we can make a relative size determination (3740 shoes), only 14% of them (512 shoes) are in the extra-large category. Therefore,

this small assemblage from the Magna primary ditch has over 3 times as many extra-large shoes as has been found at Vindolanda. Only 12 shoes (35%) were in the large category (211-249mm), while at Vindolanda the majority of shoes, a full 52% (1944 shoes), fall into the large size category. It seems that the tables have been turned between these two assemblages.

In terms of the size of the shoes based on precise measurements, the Magna assemblage also stands out significantly. Of the shoes that fall into the category of ownership by an adult male (over 210mm), the average insole length of those shoes that preserved the insole complete (or near enough to estimate the length with accuracy) was 265mm. This is a significant rise over the average of the shoes known to have been worn by an adult male from Vindolanda (861 examples where the insole was complete), which carries an average foot length from the insole measurement of 239mm. This is a significant difference of over 25mm for an average foot length.

The final comparison that shows the significance of the large size of the shoes in this small assemblage is the number of those that are over 300mm as measured on the outer sole. It is exceedingly rare to find shoes in Roman assemblages that are above this measurement. From the shoes that have a complete outer sole measurement in the Vindolanda assemblage (2226 shoes), only 16 measure over 300mm, which is less than 1% of shoes with a measurable outer sole. Conversely, just from this small assemblage at Magna, there are already 4 shoes of this very large size and a further 2 in which the outer sole was not preserved but the insole size indicates it would have been well over this measurement. That constitutes 17% of the 2025 Magna shoes sitting in this unusually large category.

What can we make of this interesting characteristic of the Magna shoes deposited into the fort ditch? First, we must emphasize the warning that this sample size is still very small and can only represent a preliminary glance at how the Magna footwear assemblage is shaping up against other large collections of shoes from Roman sites. The Vindolanda assemblage is much larger but at least offers a statistically significant sample from very nearby against which we can begin to compare other assemblages.

The easiest explanation for the unusually large size of so many shoes in the assemblage is simply that those who had access to deposit their refuse into this section of the ditch were from a population or particular group that were simply larger, probably taller, and with larger proportions overall. It is certainly true that discrete global populations today have different average heights, which can depend on genetics and socio-economic circumstances (e.g. food accessibility, available nutrition) (Grasgruber *et al.* 2014). Certainly, this was also true in antiquity. Because Hadrian's Wall was garrisoned almost entirely by auxiliary soldiers, including *numeri* starting in the 3rd century, we should consider the different and varied groups that may have lived at the fort at Magna. At this point we know little about the different units that were stationed here through its centuries-long history, except for a cohort of part-mounted Dalmatians (from the coast of the Adriatic Sea centred on modern Croatia and surrounding countries) that inhabited the site at an unknown point. Based on our knowledge of troops stationed on the Wall, we can assume that they hailed from different parts of the vast Roman empire. Whatever group is represented by the shoes deposited in this section of fort ditch, they appear to have been quite a bit larger than the average population in the region at the time. Moreover, this type of profile in the shoes from a discrete space has been seen elsewhere. At Vindolanda, the 2017 excavations in a cavalry barrack recovered 25 shoes that belonged to adult males, of which at least 16 were in the extra-large category. This was another distinct group of individuals that appear to have had an average size much larger than is typical for the time period.

Other ideas have been considered, such as that the owners of these shoes required more space in order to insulate their feet or to wear extra socks for warmth. This is certainly a possibility but ultimately impossible to prove. There is also the problem that we cannot apply an explanation based on habits of the owners only for very large shoes that does not then apply to smaller footwear. In other words, if we believe that the size of the shoe does not reflect the size of the owner because of how shoes were worn, then we need to apply that logic to all footwear. We would have to consider that all shoes had the potential to leave space for insulation, which would require us to subtract several centimetres from the size of every Roman shoe to determine possible ownership. This is an untenable prospect and is proven unlikely by 3D imaging work on shoe insoles currently underway at Vindolanda. 3D structured light scanning has been used to visualize footprint impressions on a sample of roughly 90 shoes in order to determine where on the insole the foot sat (Glanfield *et al.* forthcoming). This work has shown that the wearer's toes typically sat quite high in that

area of the shoe, with little space for movement, let alone insulation or thick socks. In the interest of imposing consistency across analyses, the notion that these particular shoes were large to allow for insulation in the shoe is considered unproven and unlikely.

4.3 DATING THE SHOES

Roman shoes carry a number of features that can be dated within a fairly tight chronology (van Driel-Murray 2001). However, this usually requires that the shoe uppers are preserved in order to determine the style and to assign it to a specific period. The shape of the sole can be useful in as much as the popularity of sole styles – whether the toe was pointed or more rounded – fluctuates through time with somewhat well understood patterns. The sole type that is most susceptible to understanding shifts in style are sandals. They have a clear evolution from narrow sandals with defined toes, worn predominantly by women and girls in the later 1st century CE, to a very wide toe area that looks almost triangular in shape, worn by men in the later 2nd, 3rd and even into the 4th centuries CE (van Driel-Murray 2001: 194).

Only a few shoes in the Magna assemblage can be dated with any precision. The most telling of the group are 3 distinctive wide-toed sandals in men's sizes (ML-2025-9, 22, 45). They are all essentially the same shape with a very wide toe, in addition to a small indent on the medial edge and a wavy upper edge that serve to define and accentuate the big toe (Plates 2, 4, and 6). The dating of these sandals is quite solidly in the 3rd century between about 225 to 275 CE (van Driel-Murray 2001: 192-5). It is also unusual that there were 3 (and possibly a heel fragment of a fourth, ML-2025-47) of these in this one small context. Of the nearly 4000 shoes in the entire assemblage from Vindolanda there are only 9 of these sandals identified, either whole or fragments, which are easy to recognize from their very distinctive style. It is significant that Magna has already produced 3 of this style, possibly 4, from only 41 shoes total.

Only a few shoes have enough uppers to betray their style and date. One is especially well preserved (ML-2025-21, Plate 3), with an almost complete set of uppers, but is somewhat enigmatic at the same time. It most resembles a Ramshaw boot, a style of boot with lace holes on half circles of leather protruding from the edge in front of the lower leg and below that a long lace extends from the leather of the upper. This boot style was popular in the late 2nd and into the 3rd century. This example, however, appears to be a variant that must be a later style of this boot because there is no vamp seam over the toes, but rather a solid piece of leather covers the toe and instep area. The lack of vamp seam is thought to be a much later construction detail that until recently would have been dated in very late antiquity at the earliest. Perhaps in this context it fits well with a later 3rd century date. Another shoe in the Magna group has poorly preserved uppers (ML-2025-8, Plate 1) but the small amount that survives, attached around the toe area, indicate that this too lacked a vamp seam over the toes. These shoes are perhaps pushing the date of this feature on footwear closer to the 3rd century rather than much later, as has been thought.

Three other shoes preserve the uppers, but none are a common style found at many sites affirming a clear date designation. Two shoes are relatively simple with solid leather on the sides and decorative elements created with the curving lines and shapes of the upper edge of the shoe (ML-2025-38 and ML-2025-42, Plate 6). A third has only a small amount of the upper preserved in the vamp area revealing narrow strips cut out of the leather to create a pattern. Not enough of this shoe is preserved to make a certain attribution. The rest of the shoe soles have no discerning details to determine a precise date. They form a fairly uniform group, all with an oval toe profile that varies slightly in the degree to which it is rounded or slightly elongated. Missing from the assemblage are the very pointed toe profiles on the insole that were popular in the second half of the 2nd century, perhaps pointing to a date of the late 2nd century at the very earliest, and more likely in the 3rd century, for this group of shoes. The soles without any uppers certainly form a cohesive group of shoes dating to the same chronological period, which was most likely sometime in the 3rd century CE.

4.4 PRE-CONSERVATION ANALYSIS AND SHRINKAGE FROM CONSERVATION

The 2025 Magna shoes were also used as a small test case to evaluate the role of shrinkage in leather objects during conservation. This debate has been ongoing for some time, especially when considering the size of shoes as representative of the wearer in antiquity. All shoes were photographed and measured after their initial tap wash and before they underwent any chemical conservation. After conservation the pre- and post-treatment photos were compared to determine if the object was a good sample for determining shrinkage. Some

objects were discarded from the study because of a change in shape and size during conservation (e.g. a fragment fell from a ragged edge, or the uppers of a shoe changed position significantly). The best categories for comparing measurements were on complete insoles, complete outer soles, and in a few cases the entire shoe with other parts intact such as a heel stiffener.

The first observation is that there is a good deal of variation in how much an object shrinks, and it is not dependent solely on the type of object. Sometimes, for instance, a single insole shrinks a very small amount, only a few millimetres, and other times the same type of object might shrink more than 10mm. Whole shoes seem very robust and sturdy, and appear as though they might resist significant shrinkage, especially when iron hobnails are still attached, but sometimes they shrink very little and other times more significantly. The amount of shrinkage might have something to do with the type of hide used, but we cannot determine that with certainty until species analysis is incorporated into a shrinkage study. Cowhide is a sturdier leather with a stronger fibre structure than sheep or goatskin, and in modern experiments is less susceptible to changing size and shape. However, at Vindolanda most Roman shoe soles so far sampled to determine species were made from cowhide, but we still see significant variation in shrinkage levels in sole layers.

The results suggest that the average amount of shrinkage is about the same, around 8-9mm, for insoles, outer soles, or whole shoes together. The strongest category in our small sample for this analysis was complete insoles, with 14 examples used in the study. The average shrinkage among these objects was 9.8mm. The greatest shrinkage was seen in a child's shoe with the insole and outer sole attached that lost 18.6mm during the conservation process, while another shoe with both sole layers attached only lost 2.8mm. These appear to be outliers, however, and one wonders if another factor was at play in these measurements. Otherwise, shrinkage amounts of insoles were between 5 and 14mm with the average around 9-10mm. The outer soles, of which only 5 were suitable for inclusion in the study, returned a similar average shrinkage of 8.6mm. The least amount of shrinkage at 3.3mm was seen in an outer sole with no hobnails, and the highest amount was 12mm in an outer sole with some insole parts and a few hobnails attached. The complete shoes or sole units measured (5 in total) averaged shrinkage of 8.1mm, ranging from only 1mm of loss in a shoe that may have changed shape during conservation, to 14.2mm in a shoe with insole, outer sole, and heel stiffener attached.

These studies are worthwhile and ought to be conducted on different samples of leather whenever possible. The lack of consistency in shrinkage of various objects—even those that appear to be quite similar—make it difficult to provide a recommendation about how much shrinkage to expect, and other factors may be at play such as leather species type or specific taphonomic processes in the burial environment (Halldórsdóttir *et al.* 2024, 2025). However, it is also true that leather may take in a fair bit of water while it sits in the ground, and therefore its shape and size upon recovery could be exaggerated in the first place. In this way, the conservation process could be returning the object to a more normal size. However, since we could never have observed the object entering the burial environment, it is impossible to confirm this notion. It is heartening to see that in all categories observed here–insoles, outer soles, and complete shoes or sole units–an average shrinkage rate of only 8-9mm was typical, which is commensurate, if not a bit less than other studies (Karsten and Graham 2011) and does not distort objects significantly.

4.5 2025 LEATHER AND SHOE CATALOGUE

Each object found during the 2025 excavation season is described below, accompanied by its description, measurements, archaeological context, and information about the shoe style, construction, and probable ownership.

All size measurements provided below were taken after conservation and are given in millimetres. All weights are in grams and include all fragments under a single number weighed together. Where necessary, the specific part of the object measured is indicated in parentheses. The specific parts of a shoe sole referenced in this report are labelled on the image in Figure 1 and the specific areas of a shoe upper are labelled in Figure 2.

1. ML-2025-1

Artefact type: Scrap leather

Measurements: Length: 95; Width: 30; Depth: 5; Weight: 5g

Context: M25-24 (Secondary fort ditch, primary fill)

Description: Single scrap of thick leather with one curved cut edge and another torn edge. No discernible features to suggest what it was originally a part. Possibly manufacturing offcut.

2. ML-2025-2

Artefact type: Shoe fragment

Measurements (midsole fragment): Length: 105; Width: 39; Depth: 4.5; Weight: 6g

Context: M25-29 (Primary fort ditch, fill of 'ankle breaker' at bottom)

Description: Single piece of narrow midsole layer with hobnail holes running down the centre line.

3. ML-2025-3

Artefact type: Shoe sole unit

Measurements (insole): Length: 235 (orig. 250-270); Tread width: 90; Waist width: 60; Seat width: 59; Depth: 18; Weight: 87g

Context: M25-29 (Primary fort ditch, fill of 'ankle breaker' at bottom)

Illustration: Plate 1

Description: Shoe sole unit is preserved in the seat, waist, and into the tread. It is torn in the tread area and missing the toes. The outer sole has a few hobnails intact in the seat, but mostly holes and iron residue. The insole is also missing the back of the seat on the lateral side. There are no uppers.

Shoe construction type: Nailed

Shoe style: Unknown

Sole shape: Tapering

Toe shape: Unknown

Hobnail pattern: Linear

Thong pattern: None

Foot side: Right

Size and probable owner: Extra-large, Adult male

4. ML-2025-4

Artefact type: Shoe outer sole

Measurements (outer sole): Length: 307; Tread width: 113; Waist width: 77; Seat width: 90; Depth: 7; Weight: 53g

Context: M25-36 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 1

Description: Outer sole only of a very large shoe. There is a large hole worn in the centre of the seat

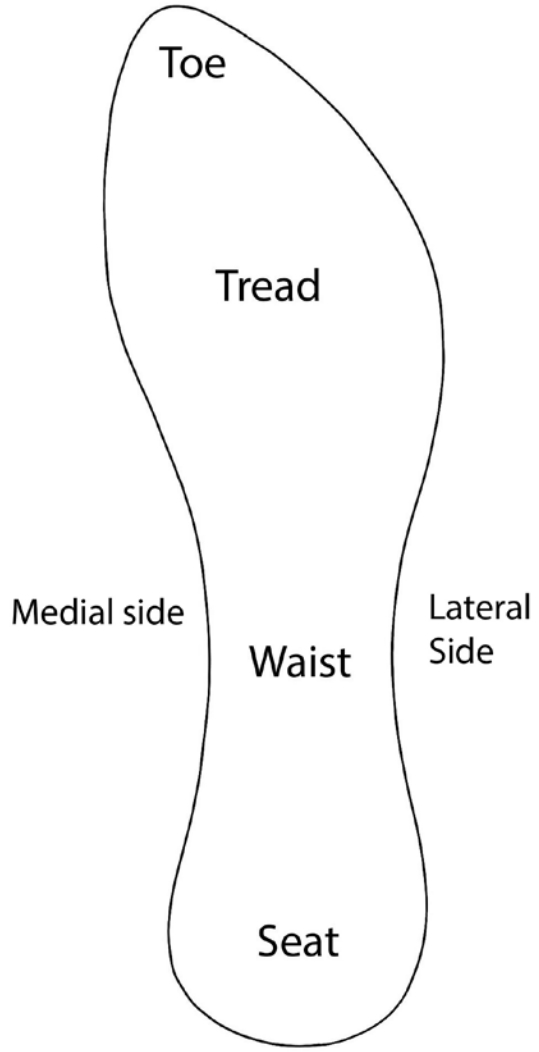


Figure 1: Parts of a shoe sole as referenced in this chapter (Illustration by Maria Glanfield).

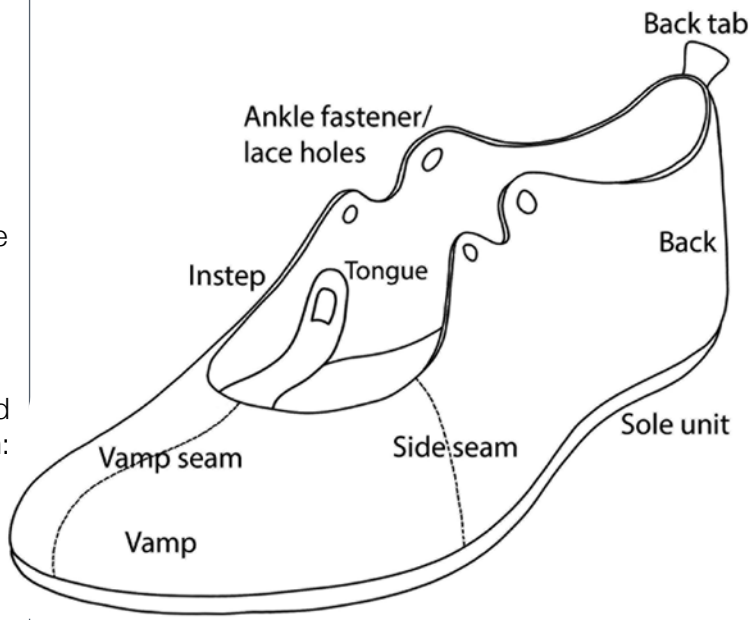


Figure 2: Parts of a shoe upper as referenced in this chapter (Illustration by Maria Glanfield).

and there are several holes from hobnails and surface wear from delamination. A few hobnails are intact.

Shoe construction type: Nailed

Shoe style: Unknown

Sole shape: Swayed

Toe shape: Oval

Hobnail pattern: Linear

Thong pattern: None

Foot side: Left

Size and probable owner: Extra-large, Adult male

5. ML-2025-5

Artefact type: Shoe sole unit

Measurements (insole): Length: 269; Tread width: 98; Waist width: 68; Seat width: 57; Depth: 10; Weight: 127g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 1

Description: Large insole basically complete but with minor tears around edges and surface. The outer sole is missing the seat, where there is a straight diagonal cut, and the edge at the toes is frayed. No hobnails are preserved but the hobnail holes are clear and preserve a decorative scrolling pattern. Two fragments of sole and heel stiffener are detached.

Shoe construction type: Nailed

Shoe style: Unknown

Sole shape: Tapering

Toe shape: Oval

Hobnail pattern: Decorative (scroll in tread, curved line through waist)

Thong pattern: None

Foot side: Right

Size and probable owner: Extra-large, Adult male

6. ML-2025-6

Artefact type: Shoe with detached parts

Measurements (insole): Length: 193 (orig. 195); Tread width: 71; Waist width: 43; Seat width: 42; Depth: 39; Weight: 72g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 1

Description: Insole, outer sole, and heel stiffener are all present but detached. The insole is complete but missing the very tip of the toe. The surface is cracked. Outer sole has a hole at the tread and missing a piece at the tread on the lateral edge. There is a small piece missing and torn at the tread on the lateral edge. The heel stiffener is complete. Fragments of midsole layers are detached and loose.

Shoe construction type: Nailed

Shoe style: Unknown

Sole shape: Tapering

Toe shape: Pointed

Hobnail pattern: Decorative (diamond at seat and tread)

Thong pattern: None

Foot side: Left

Size and probable owner: Medium, Female or adolescent

7. ML-2025-7

Artefact type: Shoe sole unit

Measurements (insole): Length: 190; Tread width: 70; Waist width: 43; Seat width: 42; Depth: 10; Weight: 48g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 1

Description: Complete insole layer but has tears and holes around the edges and surface. The outer sole is in two pieces, torn at the tread. The toe area is missing at the medial side and the very tip. The medial side is missing the edge from the waist down to the seat. There is a large tear through the seat from the lateral side.

Shoe construction type: Nailed and thonged

Shoe style: Unknown

Sole shape: Tapering

Toe shape: Oval

Hobnail pattern: Linear

Thong pattern: Down centre length of insole

Foot side: Left

Size and probable owner: Medium, Female or adolescent

8. ML-2025-8

Artefact type: Shoe sole unit with partial uppers

Measurements (outer sole): Length: 225; Tread width: 85; Waist width: 61; Seat width: 59 Depth: 17; Weight: 58g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 1

Description: The outer sole is complete and allows full measurement. A few hobnails are intact but mostly just the iron stains and holes. The insole is preserved only in the toe and tread and is torn before the waist. The uppers are attached to the insole portion, but just the outer edge of the uppers survives. These show that there was no vamp seam and the upper is rounded over the toes. The uppers are torn and along the sides only the reinforcement strap is preserved without any uppers.

Shoe construction type: Nailed

Shoe style: Unknown

Sole shape: Tapering

Toe shape: Oval

Hobnail pattern: Decorative (scroll at tread, diamond at seat)

Thong pattern: None

Foot side: Right

Size and probable owner: Medium, Female or adolescent

9. ML-2025-9

Artefact type: Almost complete sandal sole unit

Measurements (insole): Length: 287 (orig. 290); Tread width: 121; Waist width: 66; Seat width: 67; Depth: 12; Weight: 146g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 2

Description: Almost complete large sandal with the paddle shaped toe area. The very end of the toes are missing on the lateral side. It has the typical shape of paddle sandals with the wide toe box and narrow waist and seat (compare to ML-2025-22 and ML-2025-45). The big toe is defined with an indent on the medial side and the wavy upper edge to indicate the toe. The thong slit is intact. The outer sole (possibly a midsole layer) is damaged around the edges and missing most of the upper edge of the toes. No hobnails are intact, but the hobnail holes are clear. The stitch lines are clear around the outer edge of the sole. The insole is decorated with impressed lines around the outer edge, just inside of the stitch lines, but it is very worn and only apparent on close viewing in a few places.

Shoe construction type: Nailed and sewn

Shoe style: Sandal (paddle type)

Sole shape: Other

Toe shape: Wide toe box, defined toes

Hobnail pattern: Decorative (small clusters of 2-3 nails in 6 places on sole)

Thong pattern: None

Foot side: Right

Size and probable owner: Extra-large, Adult male

10. ML-2025-10

Artefact type: Incomplete shoe sole unit

Measurements (insole): Length: 215 (orig. 220-230); Tread width: 77; Waist width: 50; Seat width: not pres.; Depth: 9; Weight: 54g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 2

Description: Insole is the largest fragment of this shoe. It is almost complete, missing the very end of the toe and the back of the seat. There is a small tear near the waist. The outer sole is preserved with a piece from the waist and into the seat and a second fragment of the edge from the tread area. Other small fragments are detached.

Shoe construction type: Nailed and thonged

Shoe style: Unknown

Sole shape: Tapering

Toe shape: Pointed

Hobnail pattern: Unknown

Thong pattern: Diamond in tread-toe

Foot side: Right

Size and probable owner: Large, Adult male

11. ML-2025-11

Artefact type: Shoe insole and midsole fragments

Measurements (insole): Length: 195 (orig. 225-240); Tread width: 76; Waist width: 53; Seat width: not pres.; Depth: 9; Weight: 39g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 2

Description: Shoe insole missing the toes and the seat and generally in very poor condition. The surface has holes and is cracked. Midsole layers are attached and small pieces of the thong where they are inserted into slits still survive and are visible. A few fragments of the shoe are detached.

Shoe construction type: Nailed and thonged

Shoe style: Unknown

Sole shape: Tapering

Toe shape: Unknown

Hobnail pattern: Unknown

Thong pattern: Unknown

Foot side: Right

Size and probable owner: Large, Adult male

12. ML-2025-12

Artefact type: Shoe sole unit with uppers detached

Measurements (insole): Length: 240 (orig. 250-260); Tread width: 90; Waist width: 50; Seat width: covered by heel stiffener; Depth: 49; Weight: 140g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 2

Description: Shoe sole unit with intact heel stiffener. The toes are missing from just above the tread. The edges are torn and the back of the seat of the outer sole on the lateral side is missing. Many hobnails are intact. A large piece of uppers are detached. They are crumpled and folded over, but when laid out they are clearly from a Ramshaw boot. The upper lace holes protruding in front of the leg are intact and the start of the lace that extends from the instep is still part of the upper. The lace is torn after a few centimetres.

Shoe construction type: Nailed and thonged

Shoe style: Ramshaw boot

Sole shape: Tapering

Toe shape: Unknown

Hobnail pattern: Linear

Thong pattern: Unknown

Foot side: Left

Size and probable owner: Extra-large, Adult male

13. ML-2025-13

Artefact type: Shoe insole with midsole fragments

Measurements (insole): Length: 235 (orig. 240-250); Tread width: 90; Waist width: 59; Seat width: 58; Depth: 16; Weight: 84g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 2

Description: Insole of a shoe is almost complete, missing the toe area and torn in the tread and around the edges. Midsole layers are attached and construction thongs are visible on the underside. A large piece of the uppers by the ankle is separated, preserving the long upper lace loop and three u-shaped laced loops on the upper edge. They all have a decorative scheme with impressed lines following the shape of the loop. Heel stiffener and other small fragments are detached.

Shoe construction type: Nailed and thonged

Shoe style: Above ankle shoe

Sole shape: Tapering

Toe shape: Unknown

Hobnail pattern: Unknown

Thong pattern: Diamond in tread-toe

Foot side: Left

Size and probable owner: Large, Adult male

14. ML-2025-14

Artefact type: Incomplete shoe sole unit

Measurements (insole): Length: 142; Tread width: 48; Waist width: 29; Seat width: 28; Depth: 18; Weight: 27g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 2

Description: Insole with some midsole layers attached from a small child's shoe. The edges are curled over, especially on the lateral side, affecting the width measurements. The outer sole is delaminated and preserved in the toe, tread, and waist area, but the back of the seat is missing. Small areas missing from the edges on both sides at the tread. Heel stiffener is detached.

Shoe construction type: Nailed and thonged

Shoe style: Unknown

Sole shape: Tapering

Toe shape: Oval

Hobnail pattern: Decorative (diamond at tread, line down waist)

Thong pattern: Length of centre sole

Foot side: Right

Size and probable owner: Small, Child

15. ML-2025-15

Artefact type: Incomplete shoe with pieces detached

Measurements (insole): Length: 220 (orig. 240-250); Tread width: 90; Waist width: 55; Seat width: Not pres.; Depth: 6; Weight: 62g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Description: Fragmentary shoe sole with many pieces separated. The largest piece is from the insole with some midsole fragments attached. It preserves the area in the seat partially, the waist, and the area under the tread is torn and fragmentary. Toes are missing. The heel stiffener is detached and other fragments of sole with one upper fragment from the vamp detached.

Shoe construction type: Nailed and thonged

Shoe style: Unknown

Sole shape: Swayed

Toe shape: Unknown

Hobnail pattern: Unknown

Thong pattern: Unknown

Foot side: Left

Size and probable owner: Large, Adult male

16. ML-2025-16

Artefact type: Incomplete carbatina in pieces

Measurements: all varied fragments; Weight: 18g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Description: Fragmentary carbatina in several pieces. Two pieces from either side of the back are preserved with the back seam and leather next to the ankles. A large part of the toe and tread area remains with a good deal of strappy uppers that appear to have pulled up and over the toes on all sides. There is one long narrow piece from the uppers on one side with straps extending from the solid bottom. Other fragments are separated.

Shoe construction type: Single piece construction

Shoe style: Carbatina

Sole shape: Other

Toe shape: Other

Hobnail pattern: None

Thong pattern: None

Foot side: Unknown

Size and probable owner: Large, Adult male

17. ML-2025-17

Artefact type: Shoe insole

Measurements (insole): Length: 285; Tread width: 94; Waist width: 58; Seat width: 59; Depth: 8; Weight: 13g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 3

Description: Complete insole layer with no other parts of the shoe remaining. It is complete other than a few minor tears around the edges. Construction thongs are clear poking through the insole.

Shoe construction type: Nailed and thonged

Shoe style: Unknown

Sole shape: Swayed

Toe shape: Rounded point

Hobnail pattern: Unknown

Thong pattern: Length down centre of sole

Foot side: Left

Size and probable owner: Extra-large, Adult male

18. ML-2025-18

Artefact type: Almost complete shoe sole unit

Measurements (insole): Length: 267; Tread width: 99; Waist width: 61; Seat width: 60; Depth: 19; Weight: 174g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 3

Description: Almost complete shoe sole unit with all sole layers loosely intact. The insole has minor damage at the toes on the lateral side and a few holes in the seat. The outer sole has some hobnails intact and has a good deal of damage from the waist to the seat. Several fragments of sole and upper are detached and loose.

Shoe construction type: Nailed and thonged

Shoe style: Unknown

Sole shape: Tapering

Toe shape: Oval

Hobnail pattern: Linear

Thong pattern: Length of centre sole

Foot side: Left

Size and probable owner: Extra-large, Adult male

19. ML-2025-19

Artefact type: Shoe sole unit separated

Measurements (insole): Length: 232; Tread width: 84; Waist width: 50; Seat width: 50; Depth: 16; Weight: 94g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 3

Description: Insole is complete and outer sole is detached. The outer sole is missing the very end of the seat but is otherwise complete with several hobnails intact. One small fragment of midsole layer is detached.

Shoe construction type: Nailed and thonged

Shoe style: Unknown

Sole shape: Tapering

Toe shape: Oval

Hobnail pattern: Decorative (diamond at tread and above waist, vertical angled lines at seat)

Thong pattern: Length of centre sole

Foot side: Right

Size and probable owner: Large, Adult male

20. ML-2025-20

Artefact type: Shoe fragments

Measurements: All varied fragments; Weight: 12g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Description: Several torn scraps from a shoe insole. No measurements are possible. One fragment preserves the width of the tread, which appears to be in the size range of an adult male. One fragment preserves the thong holding the insole to midsole layers. No other details are discernible except that the shoe had nailed and thonged construction.

21. ML-2025-21

Artefact type: Insole with almost complete uppers

Measurements (insole): Length: 249; Tread width: 90; Waist width: 54; Seat width: 54; Depth: 112; Weight: 201g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 3

Description: This shoe is very well preserved with sole layers and most of the uppers standing. The outer sole is missing. The upper is quite unusual and possibly very late. The upper portion by the ankles looks like a boot with two protruding half circles of leather with a crescent moon lace hole, which would wrap around the front of the leg. The rest of the upper is solid leather. The instep and

vamp are unusual, with one solid piece of leather that covers the foot without a vamp seam. This is now detached from the back part of the upper, but it was certainly torn away and they must have been attached originally. The leather is split over the instep cut up to about the middle of the foot and that portion of leather closer to the leg tapers to form a long triangular lace. That lace is now torn off, but it probably extended into a longer lace originally, as we know of other late styles (like the Ramshaw boot) which then could have laced through the holes in front of the leg.

Shoe construction type: Nailed and thonged

Shoe style: Boot (similar to Ramshaw, possibly a variant)

Sole shape: Swayed

Toe shape: Oval

Hobnail pattern: Unknown

Thong pattern: Around the outer edge

Foot side: Right

Size and probable owner: Large, Adult male

22. ML-2025-22

Artefact type: Sandal sole unit

Measurements (insole): Length: 250 (orig. *c*. 255); Tread width: 120; Waist width: 54; Seat width: 55; Depth: 9; Weight: 125g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 4

Description: This is a very well-preserved man's sandal, almost complete. The big toe is missing. The style is like a paddle with a very wide toe box (compare to ML-2025-9 and ML-2025-45). The toes are demarcated by a wavy line at the top that defines the big toe, which is mirrored on the medial side with a small indent where the big toe ends. The thong slit is preserved in the surface. The insole surface has incised lines, one down the centre of the shoe and around the edge just inside the stitch lines that run around the outer edge. In the centre of the sole is a possible graffito with 5 etched lines, which may have purpose or may be manufacturing marks. The outer sole has only hobnail holes that show there was an outer line, with a line and small diamond under the tread and a small diamond of hobnails at the seat.

Shoe construction type: Nailed and sewn

Shoe style: Sandal (paddle type)

Sole shape: Swayed

Toe shape: Wide toe box, defined toes

Hobnail pattern: Decorative (diamond at seat and tread with outer line)

Thong pattern: None

Foot side: Left

Size and probable owner: Extra-large, Adult male

23. ML-2025-23

Artefact type: Shoe outer sole

Measurements (outer sole): Length: 291; Tread width: 95; Waist width: 69; Seat width: 69; Depth: 6; Weight: 97g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 4

Description: Large outer sole of a shoe with one midsole layer detached. The staining on the inside of the outer sole makes it quite clear where the midsole layer sat. This is an excellent example to show how much smaller the midsole and insole layers can be, and how much midsole layers can look like an insole. There are two fragments of uppers and two hobnails detached.

Shoe construction type: Nailed

Shoe style: Unknown

Sole shape: Tapering

Toe shape: Oval

Hobnail pattern: Linear

Thong pattern: None

Foot side: Right

Size and probable owner: Extra-large, Adult male

24. ML-2025-24

Artefact type: Child's shoe in pieces

Measurements (insole): Length: 165; Tread width: 59; Waist width: 40; Seat width: 39; Depth: 26; Weight: 61g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 4

Description: Child's shoe. The insole is complete with some midsole layers attached with the thong. The outer sole is detached and is partial, missing the end of the toes and most of the seat. The heel stiffener is complete but detached. A fragmentary piece of the upper with the portion that nailed into the sole and the very back area that covered the heel stiffener is also detached.

Shoe construction type: Nailed and thonged

Shoe style: Unknown

Sole shape: Tapering

Toe shape: Oval

Hobnail pattern: Decorative (simple diamond under tread)

Thong pattern: Length of centre sole

Foot side: Left

Size and probable owner: Small, Child

25. ML-2025-25

Artefact type: Shoe insole and midsole fragments

Measurements (insole): Length: 274; Tread width: 99; Waist width: 66; Seat width: 63; Depth: 15; Weight: 131g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 4

Description: Shoe sole unit with nearly complete insole and several layers of midsole. A small bit of the upper on the medial side at the seat survives. The insole is complete with only minor tears on the edges. The midsole layers are attached but all are frayed on the edges and fragmentary. There are bits of the outer sole, delaminated, but not enough to measure. A few hobnails are intact. One fragment of upper has impressed surface decoration and possibly some other symbols pressed into the surface.

Shoe construction type: Nailed and thonged

Shoe style: Unknown

Sole shape: Tapering

Toe shape: Oval

Hobnail pattern: Linear

Thong pattern: Diamond at tread-toe

Foot side: Right

Size and probable owner: Extra-large, Adult male

26. ML-2025-26

Artefact type: Incomplete shoe sole unit

Measurements (outer sole): Length: 170 (orig. 230-250); Tread width: 92; Waist width: not pres.; Seat width: not pres.; Depth: 5; Weight: 54g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Description: Incomplete shoe with the outer sole preserved down to the waist but with many holes throughout. The insole is preserved only very partially as it clings to a midsole layer. One thong is visible. The toe is cut off and the whole shoe is torn at the waist and missing the seat.

Shoe construction type: Nailed and thonged

Shoe style: Unknown

Sole shape: Unknown

Toe shape: Oval

Hobnail pattern: Unknown

Thong pattern: Unknown

Foot side: Right

Size and probable owner: Large, Adult male

27. ML-2025-27

Artefact type: Shoe fragments

Measurements: All varied fragments; Weight: 14g

Context: M25-29 (Primary fort ditch, fill of 'ankle breaker' at bottom)

Description: Eleven small scraps from shoes. The largest fragment is a torn heel stiffener. Otherwise, there are fragments of sole layer and bits from uppers. No details discernible except that some fragments had nailed construction.

28. ML-2025-28

Artefact type: Shoe fragments

Measurements: All varied fragments; Weight: 8g

Context: M25-36 (Primary fort ditch, lower level of main backfill)

Description: Five scraps of a shoe with no discernible features. One fragment from a sole layer has hobnail holes.

29. ML-2025-29

Artefact type: Incomplete carbatina

Measurements (insole): Length: 170 (orig. 250-280); Tread width: n/a; Waist width: n/a; Seat width: n/a; Depth: 6; Weight: 73g

Context: M25-40 (Primary fort ditch, fill of northern 'ankle breaker')

Illustration: Plate 4

Description: Carbatina in poor condition. Only the bottom half of the sole survives with the seat and waist. The tread and toe are missing. Some uppers survive with strappy leather at the ankle and triangular lace holes on the sides. The back heel seam is present on both sides but is splayed and flattened. The outer sole has evidence for a patch having been crudely attached with large haphazard stitch holes. It covers a large hole at the seat and a smaller hole on the edge.

Shoe construction type: Single piece construction

Shoe style: Carbatina

Hobnail pattern: None

Thong pattern: None

Foot side: Unknown

Size and probable owner: Large, Adult male

30. ML-2025-30

Artefact type: Incomplete carbatina

Measurements (insole): Length: 240 (orig. 260-280); Tread width: n/a; Waist width: n/a; Seat width: n/a; Depth: 12; Weight: 56g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Description: Carbatina in quite poor condition. The sole area survives in the waist and into the tread. It is torn at the tread and another piece of the sole from the toe area is dangling from it. The uppers survive in the two long lace holes that curl from the side of the ankle over in front of the leg, and one triangular lace hole survives on what is probably the medial side.

Shoe construction type: Single piece construction

Shoe style: Carbatina

Hobnail pattern: None

Thong pattern: None

Foot side: Right

Size and probable owner: Extra-large, Adult male

31. ML-2025-31

Artefact type: Shoe outer sole

Measurements (outer sole): Length: 313; Tread width: 113; Waist width: 82; Seat width: 90; Depth: 7; Weight: 191g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 5

Description: Very large shoe with the outer sole well preserved with only a minor tear and small missing area at the back of the seat. The midsole layers survive quite fragmentary and separated and there is no insole.

Shoe construction type: Nailed

Shoe style: Unknown

Sole shape: Swayed

Toe shape: Oval

Hobnail pattern: Linear

Thong pattern: Unknown

Foot side: Right

Size and probable owner: Extra-large, Adult male

32. ML-2025-32

Artefact type: Shoe sole unit

Measurements (insole): Length: 245 (orig. *c*. 255); Tread width: 90; Waist width: 59; Seat width: 57; Depth: 30.5; Weight: 172g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 5

Description: Shoe sole unit with all sole layers and heel stiffener attached. There is damage at the tip of the toes on all sole layers, and a piece is missing from the insole at the tread on the medial side. The heel stiffener is delaminated and crumpled. The outer sole is well preserved with many hobnails intact, but there is surface damage in areas.

Shoe construction type: Nailed

Shoe style: Unknown

Sole shape: Tapering

Toe shape: Pointed

Hobnail pattern: Linear

Thong pattern: None

Foot side: Right

Size and probable owner: Extra-large, Adult male

33. ML-2025-33

Artefact type: Shoe sole unit with partial uppers

Measurements (insole): Length: 288; Tread width: 111; Waist width: 73; Seat width: 69

Measurement (outer sole): Length: 320; Tread width: 117; Waist width: n/a; Seat width: n/a; Depth: 30; Weight: 267g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 5

Description: The sole unit is fairly well preserved with a small amount of the uppers intact on the lateral side at the toe. The uppers have some cut-out decoration. The insole is nearly complete. The outer sole has a good deal of damage with holes and missing areas at the lateral side of the seat, and under the ball of the foot. Several hobnails are intact at the medial edge and only a few elsewhere. The pattern is a double line of hobnails around the whole sole with only a few hobnails in any area of the centre.

Shoe construction type: Nailed and thonged

Shoe style: Unknown

Sole shape: Tapering

Toe shape: Oval

Hobnail pattern: Decorative (simple outer edge with few in centre).

Thong pattern: Diamond at tread-toe

Foot side: Right

Size and probable owner: Extra-large, Adult male

34. ML-2025-34

Artefact type: Scrap leather

Measurements: All varied fragments; Weight: 445g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Description: Bag of leather scraps with nothing discernible included. Many edges are sewn and hemmed, probably from tent panels, but all scraps are too small to identify with certainty. Some laces and other narrow scraps included.

35. ML-2025-35

Artefact type: Knotted cord

Measurements: Length: 48; Width: 42; Depth: 5; Weight: 1g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Description: A narrow cord is formed into a loop with a knot. The two tails that emerge from the knot are different sizes, one short and one longer.

36. ML-2025-36

Artefact type: Incomplete shoe in pieces

Measurements (insole): Length: 240 (orig. 270-290); Tread width: 101; Waist width: n/a; Seat width: n/a; Depth: 17; Weight: 108g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Description: A large shoe with most sole layers present but all detached and fragmentary. The insole is preserved in the waist, tread, and a bit into the toe area. It is torn at the waist and missing the seat, and most of the toes are missing. Midsole layers are fragmentary and separated. The outer sole is complete from the seat into the waist and tread, split at the tread and either frayed or missing the toes. A few hobnails are intact.

Shoe construction type: Nailed

Shoe style: Unknown

Sole shape: Tapering

Toe shape: Unknown

Hobnail pattern: Linear

Thong pattern: None

Foot side: Right

Size and probable owner: Extra-large, Adult male

37. ML-2025-37

Artefact type: Complete sole unit

Measurements (insole): Length: 267; Tread width: 105; Waist width: 66; Seat width: 65; Depth: 47.5; Weight: 214g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 5

Description: A complete sole unit with all sole layers and the heel stiffener attached. The outer sole is worn with only about half the hobnails intact. There is a large hole on the lateral side at the tread.

Shoe construction type: Nailed and thonged

Shoe style: Unknown

Sole shape: Tapering

Toe shape: Oval

Hobnail pattern: Linear

Thong pattern: Waist and seat only

Foot side: Left

Size and probable owner: Extra-large, Adult male

38. ML-2025-38

Artefact type: Complete shoe sole unit with uppers

Measurements (insole): Length: 255; Tread width: 98; Waist width: 65; Seat width: 50 (incomplete); Depth: 74.5; Weight: 295g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 6

Description: Complete shoe with all sole layers and uppers attached. It is a fairly simple above ankle shoe with two lace straps with holes extending from the ankle in front of the leg. There is some decoration around the edges of the straps and upper edge of the shoe by the instep, which is a series of impressed 'S' shapes in a long line. There is further cutout decoration at the instep with tear-drop shapes and lacey pattern. The vamp seam is intact. The outer sole is very worn, especially at the seat, which is completely worn down to a hole and the leather is pushed upward as though it was worn for a long time, worn right down to the stud shafts and beyond in places.

Shoe construction type: Nailed

Shoe style: Above ankle shoe

Sole shape: Tapering

Toe shape: Oval

Hobnail pattern: Linear

Thong pattern: None

Foot side: Left

Size and probable owner: Extra-large, Adult male

39. ML-2025-39

Artefact type: Shoe fragments

Measurements: All varied fragments; Weight: 437g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Description: Bag of several fragments from many different shoes. There are at least 12 heel stiffeners, several fragments of shoe soles, and other scraps from soles and uppers. Nothing can be counted as a single shoe, and all are torn and fragmentary. Several of the fragments show they were from nailed shoes, but no other details are discernible.

40. ML-2025-40

Artefact type: Shoe fragments

Measurements: All varied fragments; Weight: 5g

Context: M25-25 (Primary fort ditch, uppermost fill layer)

Description: Two fragments of shoe sole with holes from hobnails. No discernible features. No measurements possible.

41. ML-2025-41

Artefact type: Almost complete carbatina

Measurements (insole): Length: 245; Tread width: 55; Waist width: n/a; Seat width: n/a; Depth: 28; Weight: 54g

Context: M25-46 (Primary fort ditch, redeposited clay at bottom)

Illustration: Plate 6

Description: Sole area of a carbatina with some uppers. The toe area is separated but the whole sole area is complete. The very back of the uppers with the heel seam are preserved and some of the uppers toward the back half of the shoe are attached. This is a very low carbatina.

Shoe construction type: Single piece construction

Shoe style: Carbatina

Hobnail pattern: None

Thong pattern: None

Foot side: Right

Size and probable owner: Large, Adult male

42. ML-2025-42

Artefact type: Almost complete shoe with uppers

Measurements (insole): Length: 268; Tread width: 100; Waist width: 69; Seat width: 71; Depth: 107; Weight: 250g

Context: M25-46 (Primary fort ditch, redeposited clay at bottom)

Illustration: Plate 6

Description: Complete shoe with all sole layers and uppers intact. There is damage in most areas, especially torn at the toe/vamp area of the upper. The uppers have a peak at the back and a pull tab intact. Two long lace holes extend from the ankle in front of the leg above the instep. Another strap extends over the instep with two holes for securing, but where it would have secured on the medial side of the upper is torn away. At the end of all four straps on the solid part of the shoe upper is a florette stamp impressed into the surface. There are two small half circles extending from the upper edge on both sides at the ankle. Otherwise, there is no further decoration.

Shoe construction type: Nailed and thonged

Shoe style: Low shoe

Sole shape: Swayed

Toe shape: Oval

Hobnail pattern: Linear

Thong pattern: Extended diamond (2 on both tread sides)

Foot side: Left

Size and probable owner: Extra-large, Adult male

43. ML-2025-43

Artefact type: Shoe fragments

Measurements: All varied fragments; Weight: 64g

Context: M25-46 (Primary fort ditch, redeposited clay at bottom)

Description: Bag of scraps mostly from a carbatina. The largest fragments are certainly from a delaminated carbatina with typical raised triangular lace holes and back seam. A few other scraps are from a different shoe, including a fragment of nailed sole.

44. ML-2025-44

Artefact type: Scrap leather

Measurements: Varied fragments; Weight: 1g

Context: M25-39 (Primary fort ditch, redeposited clay at bottom)

Description: Two small scraps of leather, torn on all sides. No discernible features.

45. ML-2025-45

Artefact type: Sandal insole

Measurements (insole): Length: 142 (orig. 240-260); Tread width: 110; Waist width: n/a; Seat width: n/a; Depth: 10; Weight: 31g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Illustration: Plate 6

Description: The toe and tread from an insole of a large paddle-shaped sandal. The wavy upper edge of the toe and an indent on the medial side define the big toe. There are no surface decorations as is typical of this sandal type (compare ML-2025-9 and ML-2025-22). There are holes from hobnails around the outer edge and in the centre. The slit for the thong is present near the big toe.

Shoe construction type: Nailed

Shoe style: Sandal

Sole shape: Unknown

Toe shape: Wide toe box, defined toes

Hobnail pattern: Outer edge with few in centre

Thong pattern: None

Foot side: Left

Size and probable owner: Large or Extra-large, Adult male

46. ML-2025-46

Artefact type: Fragment of midsole sandal layer

Measurements: Length: 74; Width: 48; Depth: 5; Weight: 4g

Context: M25-35 (Primary fort ditch, lower level of main backfill)

Description: One piece from the seat of a midsole layer of a sandal survives in a 'u' shape. The layer only had leather around the outer edge and open in the middle. There are hobnail holes around the small piece that survives.

47. ML-2025-47

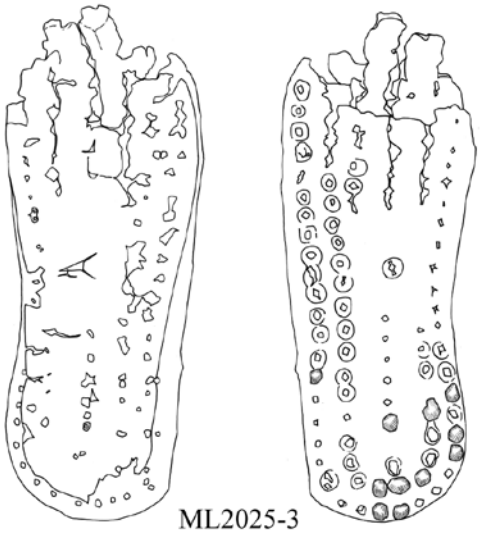
Artefact type: Sandal fragment

Measurements (insole): Length: 80; Seat width: 55; Depth: 4; Weight: 6g

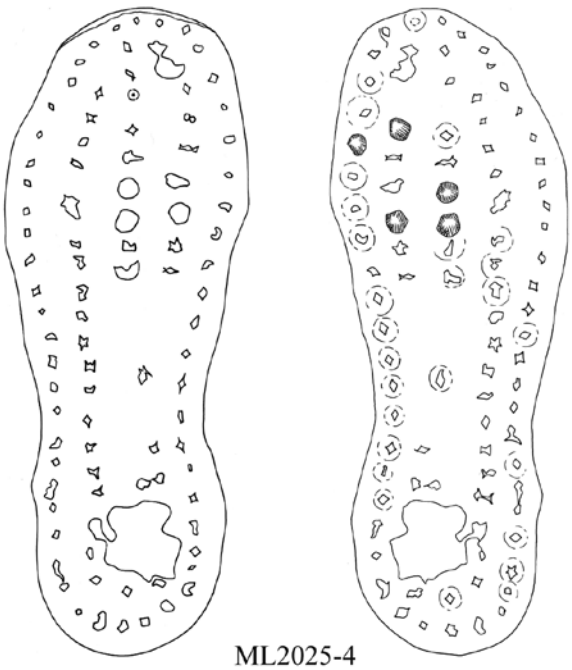
Context: M25-35 (Primary fort ditch, lower level of main backfill)

Description: Only the heel survives of a sandal insole. It is torn on one long side and only the left side of the seat is intact. The fragment shows it is from a sandal with typical shape with a bulbous seat, possibly also from a paddle-shaped sandal, but the toe is not present to confirm identification. The insole was decorated with a double incised line around the edge and a straight line down the centre of the seat. Hobnail holes are present.

***Plates 1-6:** Illustrations of the best shoe examples from the 2025 assemblage (Illustrations by Rebecca Nashan; Copyright of The Vindolanda Trust).*



ML2025-3



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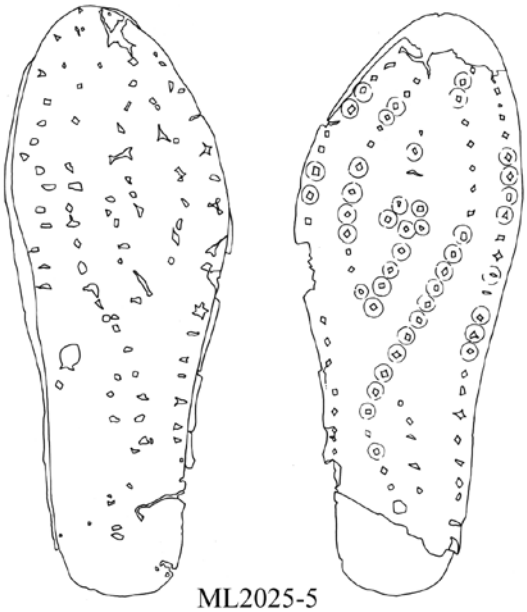

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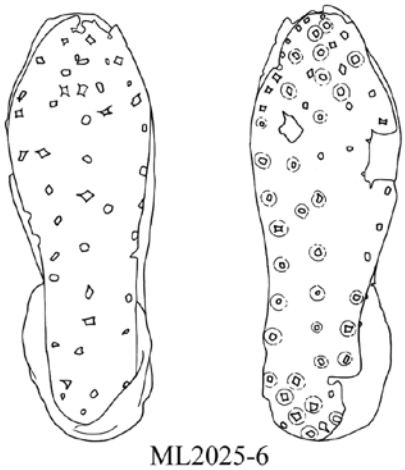

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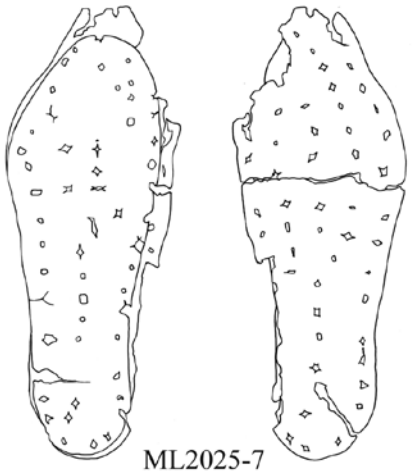

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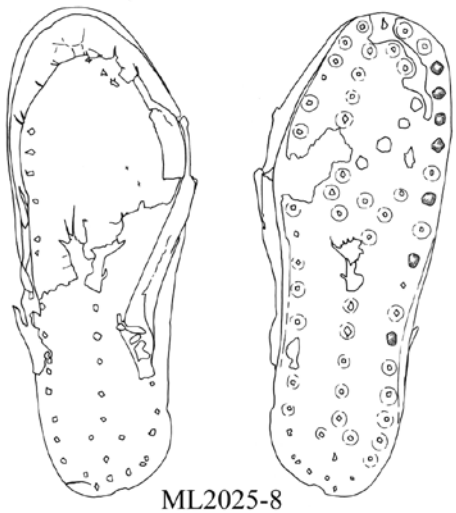

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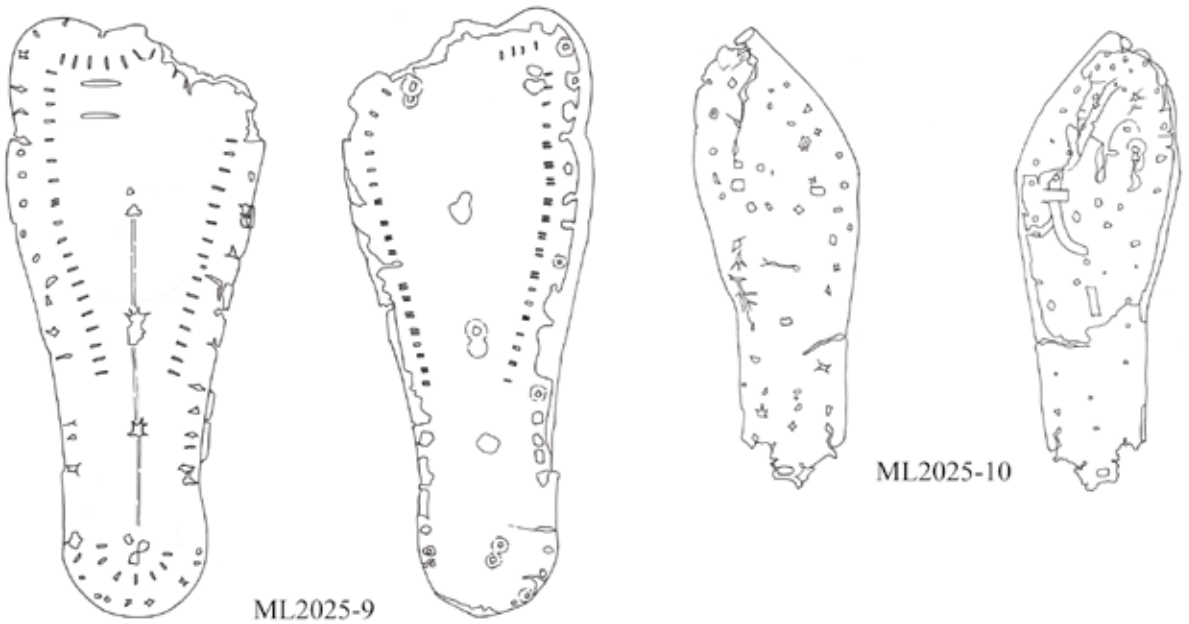
Shoes 1:3



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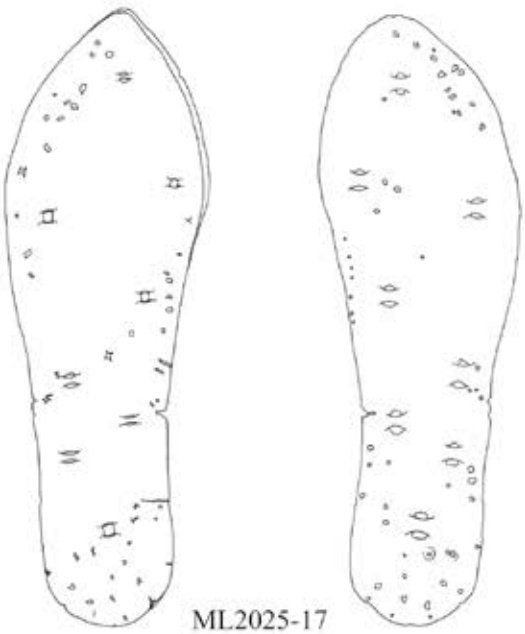

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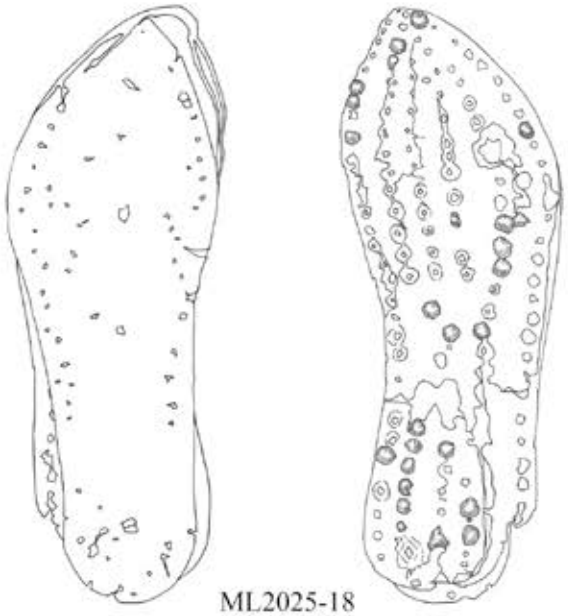

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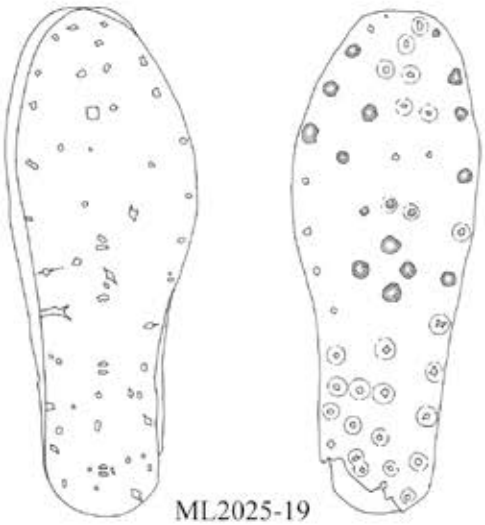

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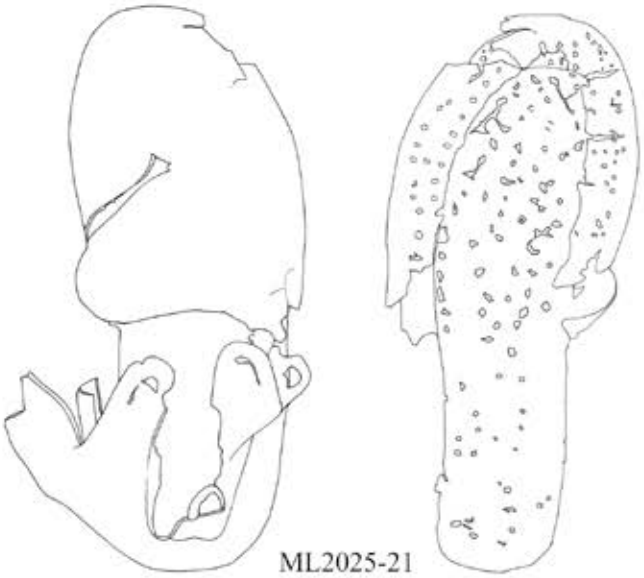

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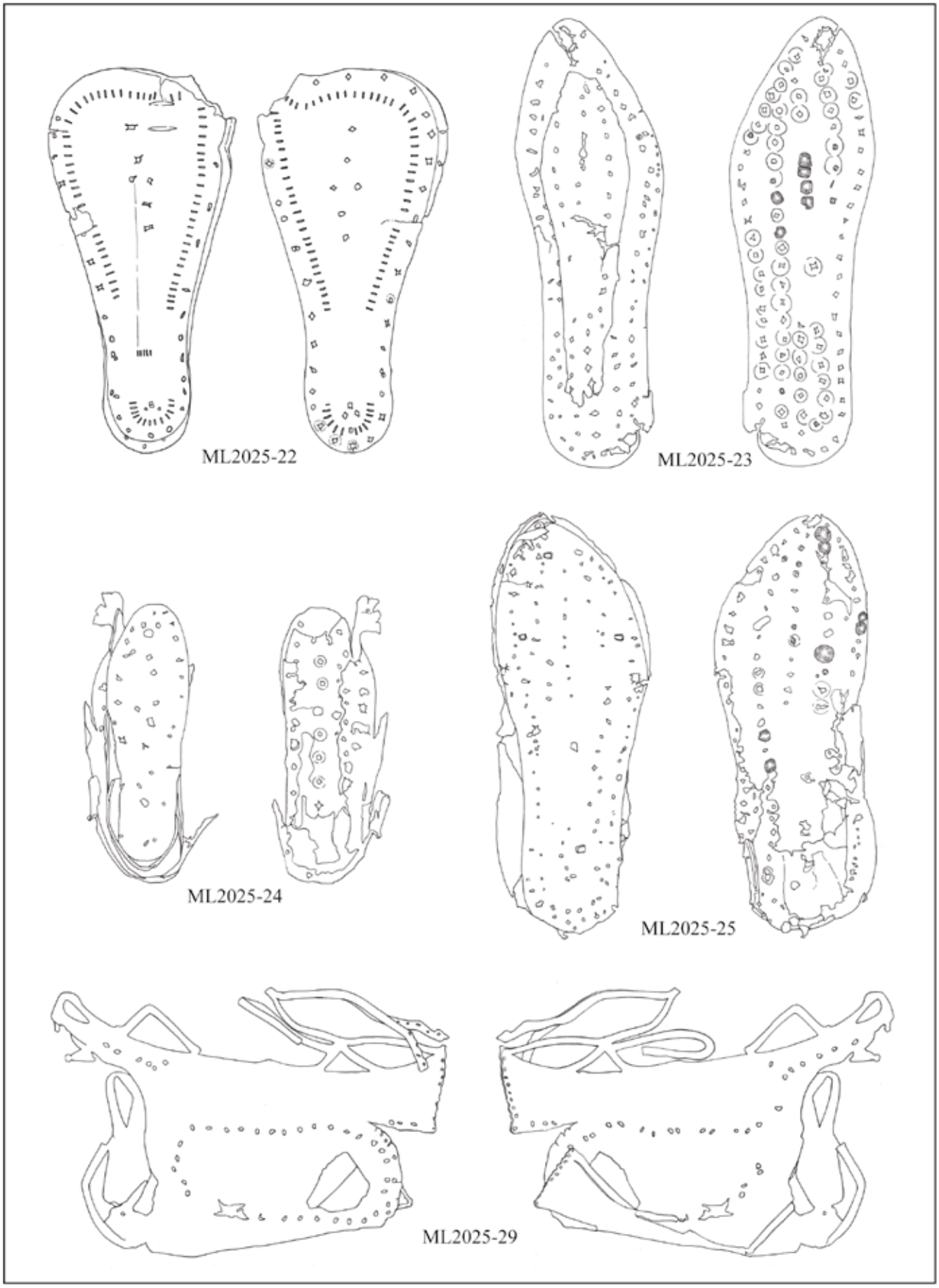
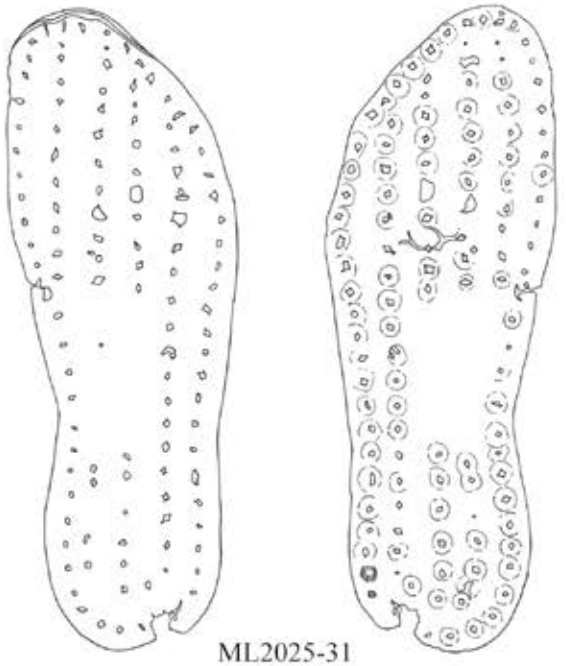
Shoes 1:3



Shoes 1:3



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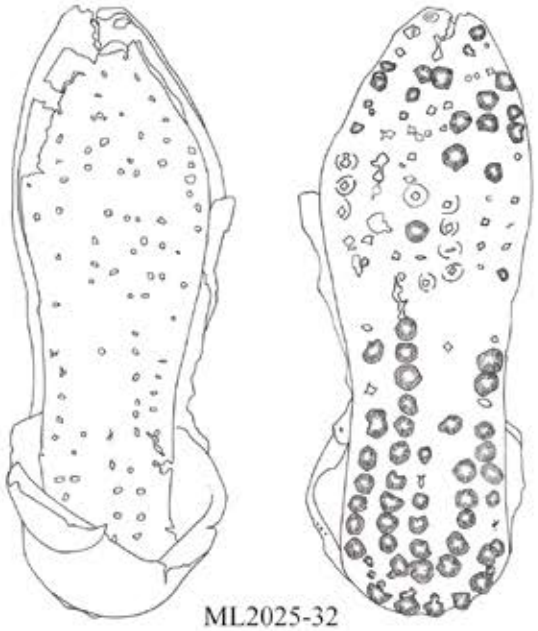

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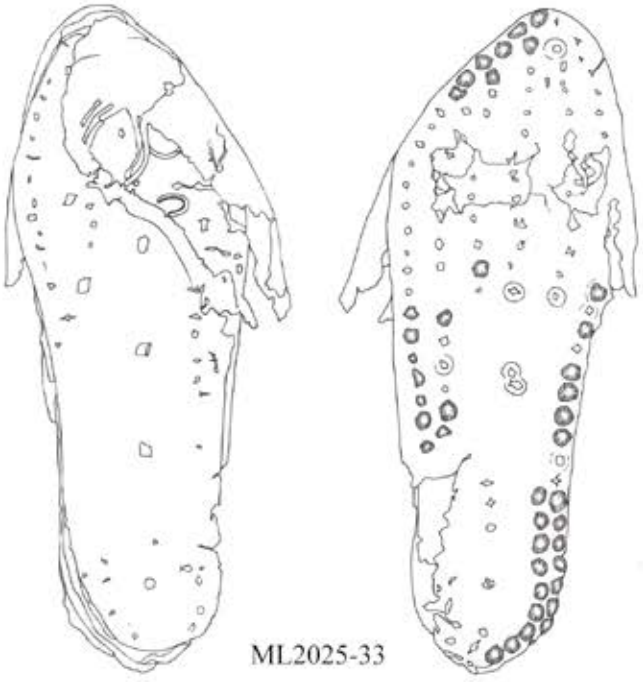

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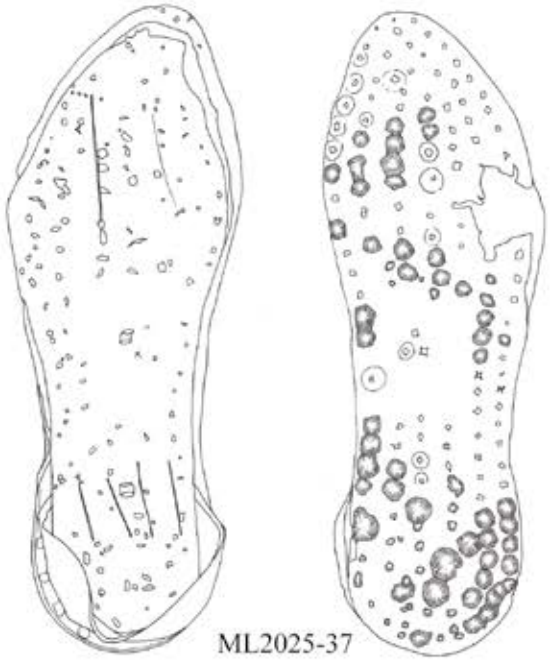

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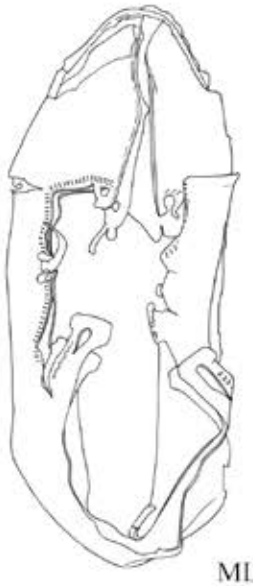
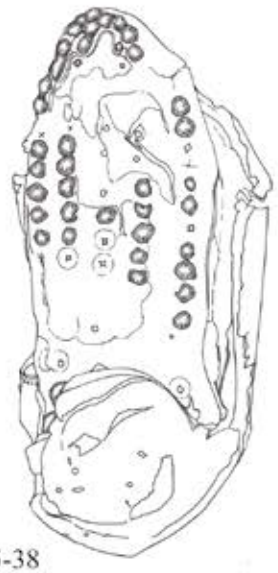
Shoes 1:3





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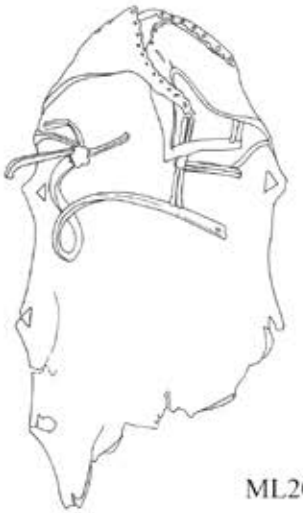

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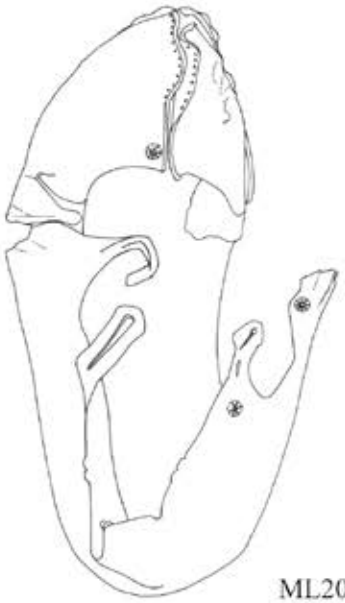

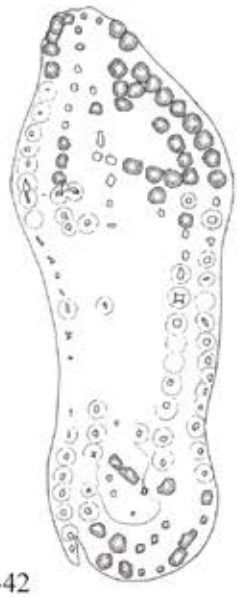

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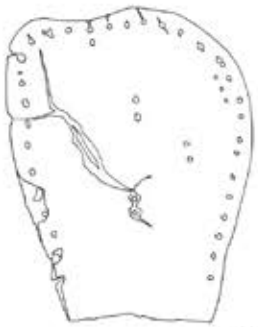


ML2025-45

Shoes 1:3

5. ARCHAEOBOTANICAL REPORT

JACQUI HUNTLEY

5.1 INTRODUCTION

This report presents the analyses of the samples excavated from the north ditches of the Roman fort of Magna (NY665 657) during 2025.

5.2 METHODS

The samples were all processed at Magna. They were floated manually to 250 microns. Preliminary work and that from some of the 2024 samples had demonstrated the presence of anaerobic waterlogged material (Russ 2024; Huntley 2025) and, as a result, the excavators were requested to keep any flots (light fractions) that looked like 'brown tea leaves' wet. Those that were essentially charcoal/clinker/mineral would be dried. All of the light fractions were sent to the author who measured the volumes and made brief notes of the overall appearance. The material was then sorted under a Wild M3 microscope at magnifications of x12-x100. Matrix components were noted and scored on a 1-4 scale (1 rare, 2 occasional, 3 frequent and 4 abundant). Seeds, in the broad sense, were also scored on this scale but charred seeds were counted. Initially all seeds were sorted but, as it became clear which taxa were especially abundant, the remainder of these were left in the flot. The rare taxa were sorted throughout. All of the material in the flots was sorted. Identification was by comparison with the author's reference collection and using illustrations in Cappers, Bekker and Jans (2006). Nomenclature follows Stace (2010).

5.3 RESULTS

Sixteen contexts were sampled (120 litres in total), ranging from prehistoric to post-medieval in date (Table 1). The light fractions ranged in size from 15 – 200ml with an average of nearly 76ml.

Seeds, in the broadest sense, were preserved

Sample	Context No.	Feature No.	Provisional Period
<30>	M25-41	[4]	Prehistoric
<47>	M25-55	Deposit	Prehistoric
<15>	M25-27	[3]	2nd century
<16>	M25-32	[31]	2nd century
<6>	M25-24	[3]	2nd century
<25>	M25-35	[2]	3rd century
<34>	M25-35	[2] duplicate	3rd century
<37>	M25-45	Burnt clay deposit	3rd century
<5>	M25-19	[3]	4th century
<9>	M25-25	[2]	4th century
<7>	M25-26	[2]	4th century
<24>	M25-38	[4]	4th century
<2>	M25-17	[2]	Post-Roman
<35>	M25-43	Fort Wall Rubble	Post-Roman
<3>	M25-16	[3]	Post-med
<1>	M25-6	[2]	Post-med
<4>	M25-11	[2]	Post-med

Table 1: *Contexts analysed and provisional dates (date order).*

through carbonisation or waterlogging, although the former were rare. They were only present in single numbers in three samples and represent indeterminate cereal grains, spelt wheat grain and a few ruderal, weedy taxa. Forty-four taxa survived through waterlogging although their distribution between the samples varied considerably. Eight samples contained no seeds at all. Whilst a variety of habitats are represented the majority reflect damp-wet conditions, often with standing water, at least at times, and many seeds are from biennials or perennials suggesting that the deposits were open to vegetation for some time. There are very few annuals and none of traditional cultivation except, perhaps, *Stellaria media* (chickweed) and the various categories of *Gramineae* (grasses) which grow everywhere. Again, more detailed interpretations are offered later on at the context/group level. Appendix 5 presents the full data by context, in context order. Taxa and matrix components are in alphabetical order.

Figure 1 presents the number of occurrence and the total scores, abundance in effect, of each of the matrix components for the assemblage as a whole. Modern roots were abundant in a few samples, but the major matrix components were charcoal and fine mineral fragments followed closely by cindery, clinker material. Organic materials were moderately common including fine, highly humified organic lumps as well as large pieces identified as wood, twigs, remains of *Calluna* (heather) and stems of plants. Earthworm egg cases were dominant in one context (M25-26) suggesting an active soil. Interpretation at the assemblage level provides little useful information given the variability of the contexts. Appendix 6 presents the matrix data with samples by feature then in provisional data order with components grouped to try to show if patterns are present. Details at the sample level are included in the later sections as they offer better opportunities to aid interpretation.

5.4 CONTEXT LEVEL RESULTS – BY FEATURE THEN PROVISIONAL DATE

This section outlines each individual context analysed with details about matrix components and seeds grouped by feature. Archaeological information was provided by Franki Gillis, Magna Project geoarchaeologist (italicised text below sample context and number). Appendix 7 presents the botanical data with samples by feature then provisional date and taxa in order to emphasise any patterns.

5.4.1 PRIMARY FORT DITCH

Six samples were taken from this ditch with M25-6 and M25-11 producing no seeds. The post-Roman M25-17 produced a simple assemblage dominated by seeds of the soft-rush in an organic matrix which strongly implies a natural, wet, *Juncus* rich grassland habit. The sample equates, in terms of seeds, with M25-41 and M25-55 although both of these have been provisionally dated to the prehistoric. It could be that they were the natural pre-Roman vegetation to a large extent and that the primary fort ditch post-Roman sample, M25-17, indicates a return to pre-occupation vegetation and conditions. The 4th century M25-25 suggested a drier community growing on an active soil with huge numbers of earthworm egg-cases and fragments thereof. The two earlier deposits, M25-26 and M25-35 were organic and rich in seeds comprising a mix of wetland taxa and longer-term, drier ruderal taxa.

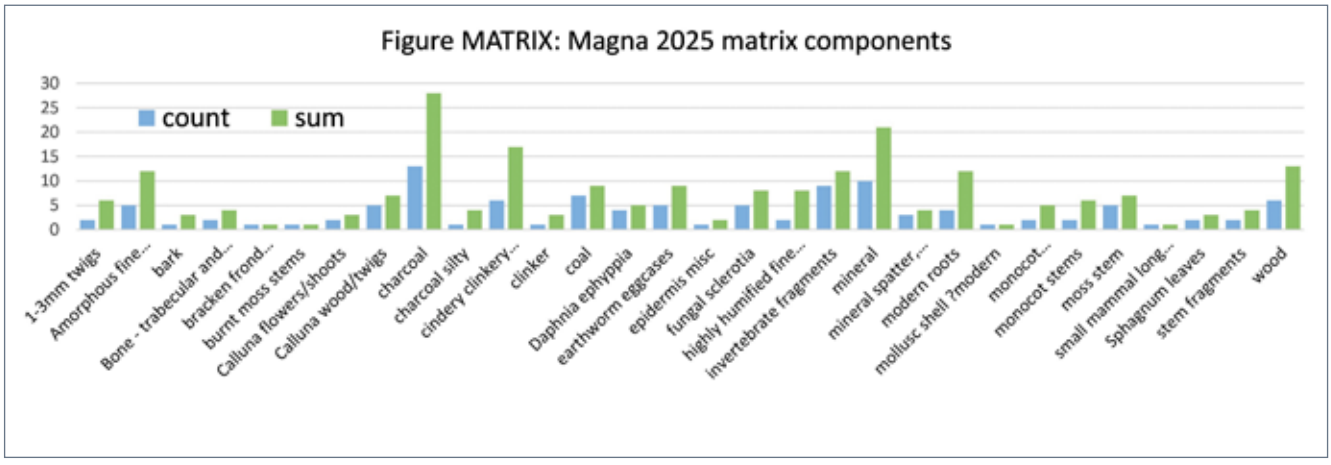
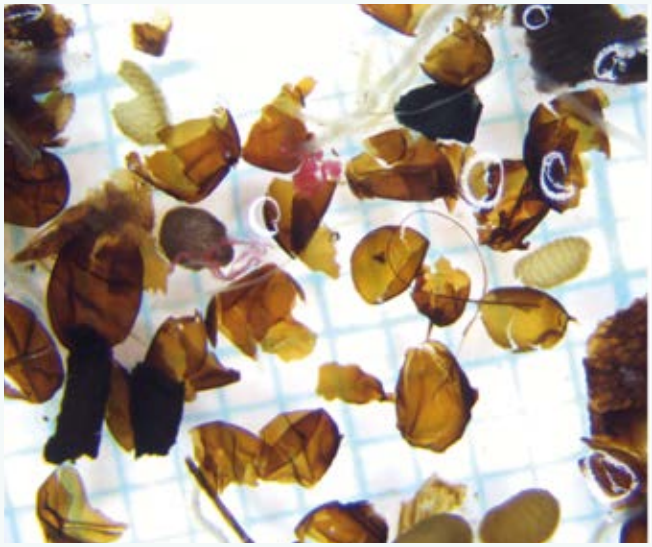
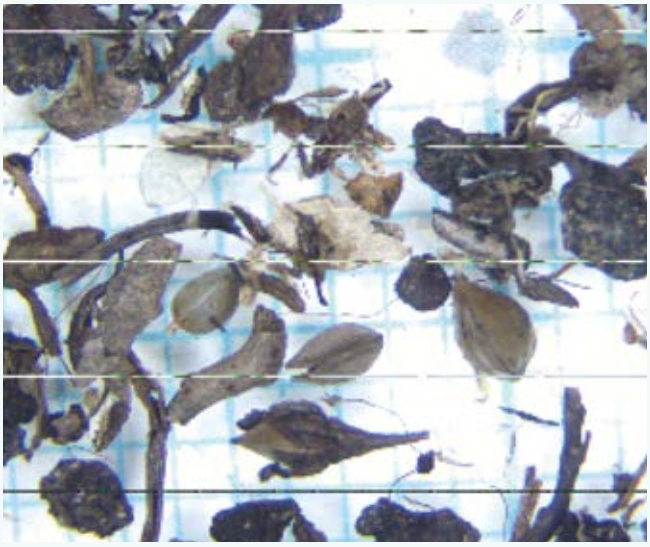


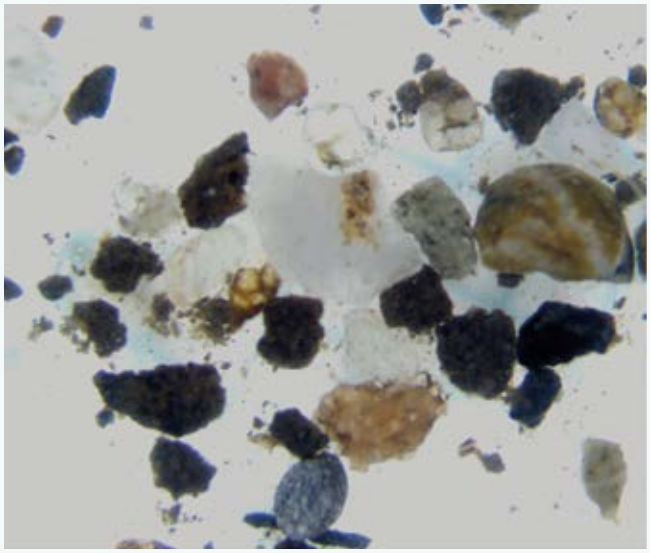
Figure 1: *Magna matrix components for 2025.*



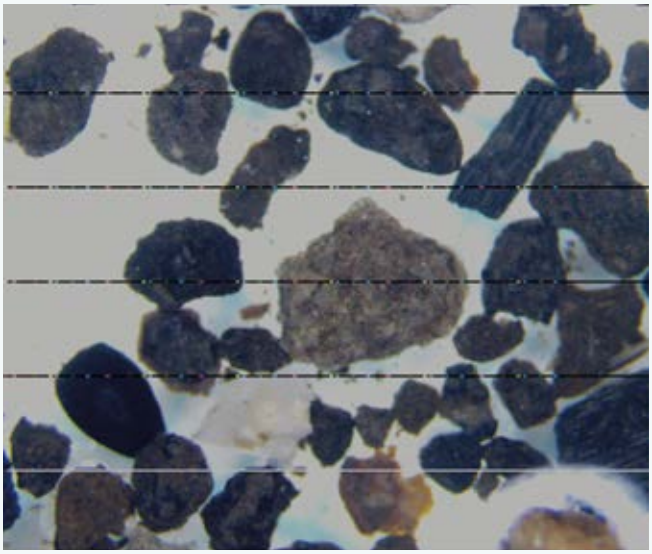
M25-26: matrix mostly earthworm egg-cases; *Ranunculus aquatilis*



M25-27: matrix organic remains and seeds



M25-25: matrix mineral and a little charcoal



M25-24: matrix charcoal, mineral and clinker material

Figure 2: *Examples of the different matrix components in some samples. Graph paper – mm for scale.*

M25-6, sample <1>, post-Medieval

Uppermost fill of the first ditch outside the fort wall; presumed to have formed in the post-Medieval period but has very occasional Roman pottery fragments.

Fine fraction: no seeds were recovered. The matrix comprised modern roots and charcoal fragments, all of the latter small.

M25-11, sample <4>, post-Medieval

Second latest fill of first fort ditch and underlies M25-6.

Fine fraction: no seeds recovered. The matrix comprised mineral and clinker fragments with some coal and charcoal. The coarse fraction/residue was also analysed. Whilst it comprised coal and charcoal there were only a few pieces of wood charcoal that might be identified but this was not considered worthwhile.

M25-17, sample <2>, post-Roman

Wet clay-silt of first fort ditch. M25-11 above it. Peaty material of M25-25 and M25-26 below it. Some finds within it, but interpretation is that it formed sometime after abandonment of the fort in the post-Roman period.

Light fraction essentially comprises lumps of a fine amorphous organic material, presumably

highly humified. There are moderate numbers of invertebrate fragments and earthworm egg cases. The former may well be a result of differential preservation since they are chitin and hence moderately resistant to decay. Egg cases suggest a stable aerobic environment. Seeds of *Juncus effusus* (soft rush) are dominant with thousands surviving in the very fine fraction. Moderate numbers of *Stachys palustris* (marsh woundwort) are also present, both of which indicate a mineral substrate that is wet/waterlogged at least at times.

M25-26, sample <7>, 4th century

Above M25-25 and below M25-17. Peat layer on top of M25-25 in the centre of the first fort ditch. Suggested to have formed during long term flooding after the abandonment of the fort.

The light fraction comprised of thousands of earthworm egg cases and fragments amongst an otherwise quite clinker matrix. Fine amorphous organic lumps are probably decomposed somewhat dehydrated remains, possibly well composted after deposition. Invertebrate fragments quite common and, again, may reflect some differential preservation. *Urtica dioica, Stachys palustris* and various aquatic buttercups were the dominant taxa indicating probably more standing water for much of the time than the underlying M25-25. An interesting find was that of *Callitriche* sp. (water starwort), a first for the author; there are several species of these aquatic plants but identifying to species using the fruits is generally considered not possible (Caroline Schaal, pers. comm.). The nettles certainly suggest high nutrient levels too.

M25-25, sample <9>, 4th century

Anthropogenic fill, semi anaerobic fill of first fort ditch. 4th century. M25-26 above it, M25-36 below it.

Light fraction comprised mainly mineral and charcoal fragments but with reasonable amounts of a wide variety of other matrix components – fine organic amorphous lumps, invertebrate fragments, earthworm egg-cases modern roots and fungal sclerotia, wood and heather flowers/shoots. Seeds from sixteen taxa were recovered. The frequent and abundant ones were (*Urtica dioica*) nettles, 2-4mm *Gramineae* (medium sized grasses) and *Stachys palustris* (marsh woundwort). Others of note were *Ranunculus aquatilis* (water crowfoot), *Lamium* cf L. *purpureum* (dead nettles, probably purple dead-nettle), *Rubus* cf. R. *idaeus* (probable raspberry) and *Rumex* spp. (docks). Occasional taxa included *Cerastium fontanum* (common mouse-ear), *Eriophorum angustifolium* (cottongrass spindles), *Hyoscyamus niger* (henbane), *Juncus cf conglomeratus* (cf. compact rush), *Persicaria maculosa*/P. *lapathifolia* (redshank/pale persicaria) and *Rumex acetosella* (sheep's sorrel) – an eclectic mix. Some clearly indicating a wet and/or mineral ground, others more peaty sediments. Many are biennials suggesting that the ground surface was not being maintained in any way but lying idle for some years at a time.

M25-35, sample <25>, (<34> duplicate not analysed), 3rd century

Anthropogenic fill; semi anaerobic peaty clay, abuts and underlies M25-26. Main aerobic fill of first fort ditch. Contained almost all of the organic finds and generally considered to be where rubbish was dumped.

A large flot that comprised mainly organic materials – wood, stem/root bases moss stems (mostly with few or no leaves surviving) but some charcoal and clinker material. *Daphnia ephippia* were present indicating some standing water at least at times. The waterlogged seeds were dominated by those of *Polygonum hydropiper* (water-pepper), *Stellaria media* (chickweed), *Ranunculus aquatilis* (common water-crowfoot) and other members of the dock family. These, again, suggest mixed habitats of standing/running water at times but drier and disturbed sediments. Moderate numbers of seeds of *Montia fontana* (blinks) were also recorded (Fig. 3). This taxon has had a varied taxonomic history (Walters 1953) but all are now considered to be *Montia fontana*. There are various types, once species, but the whole group is considered a continuum in seed variation. At least 7 *Montia fontana* ssp *fontana* were sorted, and 3 of the spiky *Montia fontana* ssp. *variabilis*. All are characteristic of damp to wet places from streams to seasonally damp hollows. Of the various buttercups, *Ranunculus sceleratus* would fit this habitat too with R. *aquatilis* (common water-crowfoot) favouring wetter conditions. *Hydrocotyle vulgaris* (marsh pennywort) would happily be growing with these too. *Ranunculus repens*-type includes R. *repens* (creeping buttercup), R. *acris* (meadow buttercup) and R. *bulbosus* (bulbous buttercup) but R. *repens* would fit better with the habitats otherwise represented here – namely damp ground. These are mostly shorter plants that favour edges of mud/silt but there are also taller plants represented in this assemblage. *Polygonum hydropiper* (water-pepper) – damp places, shallow water, *Rorippa amphibia* (great yellow-cress) – in and by ponds, ditches, rivers. Some tall plants favouring ruderal but somewhat drier ground include *Cirsium palustre* (marsh thistle), *Galeopsis tetrahit* (hemp

nettle), *Hyoscyamus niger* (henbane), *Sonchus asper* (prickly sow-thistle) and the various *Persicaria* types (redshanks etc.). It is easy to envisage a wet, possibly seasonal, area surrounded by damp ruderal communities with the shorter growing and more wet tolerant plants growing nearest to the water and the taller vegetation somewhat higher or, at least, drier. It seems to be quite a natural set of vegetation with very little evidence for dumping by people, the few fragments of hazelnut shell would be one example. Given the large number of organic finds, perhaps it was simply a wet ditch with natural to semi-natural vegetation growing in and around it and just been used as a convenient place to toss out rubbish but not disposal of, for example flooring material, spent animal bedding etc. It certainly is not a mix of material as far as the plants are concerned.

5.4.2 SECONDARY FORT DITCH

The secondary fort ditch lay to the north of the primary fort ditch with 3 samples analysed and dating from the 2nd century to post-Roman times. None of the samples contained any seeds and the light fractions were, essentially, mineral or charcoal.

M25-16, sample <3>, post-Roman

Upper fill of second fort ditch. Context M25-19 immediately below it. Large quantities of iron pan etc. *within it suggesting deposit was often wet during formation. No evidence for deliberate backfill.*

A charcoal and mineral light fraction with no seeds.

M25-19, sample <5>, 4th century

Secondary fill of second fort ditch. Natural silting after the ditch no longer being maintained. Fewer finds than equivalent deposits in first fort ditch because further away from the fort. M25-16 above it. Partly overlay the natural bog deposits M25-41.

The light fraction was essentially a large mat of modern roots with clinker cindery material, charcoal and a little coal and mineral spatter plus a few *Calluna* (heather) twigs. No seeds were recovered. The heavy fraction was also analysed and consisted of coal and charcoal. Much of the latter was cindery and very little "good" (for identification) charcoal was recovered.

M25-24, sample <6>, 2nd century

Primary fill of second fort ditch. Anaerobic but desiccated material, probably a combination of deliberate dumping and natural silting over a long period. M25-19 lies over it with M25-27 and M25-32 under it.

Figure 3: *M25-35* Montia *seeds. mm scale background. Lefthand side shiny and smooth =* Montia fontana *ssp* fontana*. Right hand side =* Montia fontana *ssp* variabilis*. Note the slight 'prickle' effect of cells along the edges.*

A light fraction comprising mostly mineral fragment and charcoal. No seeds.

5.4.3 UNDERLYING PRIMARY FILL OF THE SECONDARY FORT DITCH

The two samples described here, M25-27 and M25-32 (both 2nd century), are classed as fills of possible ankle-breakers within the base of the secondary fort ditch. Both were highly organic and rich in seeds. Nutrient rich and, perhaps, somewhat drier than the first ditch they also had a greater variety of seeds of biennials/perennials although wet ground taxa were still reasonably common.

M25-27, sample <15>, 2nd century

Below M25-24. Fill of the potential ankle breaker M25-28. Silty material suggests natural fill by water after cippi *pits stopped being maintained. Provisional 2nd century.*

The light fraction was one of the largest for the site with 200ml comprising wood, heather twigs, monocot (grass with maybe sedge and rush) stems and other organic remains; there was rather little in the way of mineral matrix components. Spindles from *Eriophorum angustifolium* (cotton grass) and sedge (*Carex*) nutlets were both abundant along

with ruderal *Rumex* (dock) nutlets, often within their perianths. This could suggest that they were growing locally on site. The cotton grass and sedge nutlets would also fit with the abundant monocot stems/roots and would suggest a wet, peaty soil. They are perennials, however, and would therefore need a long-lived deposit without disturbance for them to grow. The *Eriophorum* spindles form part of the base of the stems and their abundance might suggest disturbance. It might be that turves from local mires were cut and dumped in here, but the context information suggests otherwise. Some of the sedges were tentatively identified (name/number of nutlets identified): *Carex disticha/ovalis*-type 1, *Carex* cf *divulsa* 2; C. cf *hostiana* 2, C. *sylvatica*/C. *panicea* 27, C. cf *flacca* 2, C. *lasiocarpa* 1, C. cf *binervis* 2. However, they are an immensely complex and variable species and further work is needed (see Huntley 2013). The largest number were from the C. *sylvatica/panicea* group; C. *sylvatica* is, as its name suggests a woodland species, with C. *panicea* (carnation sedge) a very common and widespread species of marshy grassland. It seems reasonable to suggest that these nutlets were predominantly C. *panicea* given lack of any wood taxa (other than wood fragments in the matrix). C. *disticha*/C *ovalis* types includes many of the oval and very shiny lenticular nutlets (Fig. 4) which are impossible to separate. C. *disticha* favours wet meadows and marshes and areas of fluctuating water tables whereas C. *ovalis* (now C. *leporina*) frequents acidic upland grasslands with *Calluna* although it tolerates somewhat damper soil. C. *hostiana* prefers damp base-rich grasslands and wet places but this could reflect debris from mortar etc. enriching the groundwater in this context. *Carex lasiocarpa* favours wet acidic soils and would fit with the *Eriophorum*. *Carex flacca*-type includes the 'high-shouldered' trigonous nutlets (Fig. 5) of at least three species covering a range of damp habitats.

***Figure 4:** Lenticular* Carex *nutlets.* Carex disticha/C ovalis *type left two.* Carex *cf* divulsa *centre two.*

M25-32, sample <16>, 2nd century

Fill of ditch segment M25-31, a potential ankle breaker in the base of the second fort ditch; anaerobic fill. Below M25-24.

This is a rich and waterlogged deposit with a wide variety of matrix components: amorphous organic lumps, highly humified, wood fragments, twigs and a selection of less common mineral types. The seeds are dominated by those from *Urtica dioica* (stinging nettle), *U. urens* (small nettle) *Polygonum aviculare* (knotgrass), *Rumex longifolius*-type (docks) and *Carex* spp (sedges). *Rumex longifolius*-type includes several of the tall ruderal docks including *R. obtusifolius*, *R. conglomeratus* and

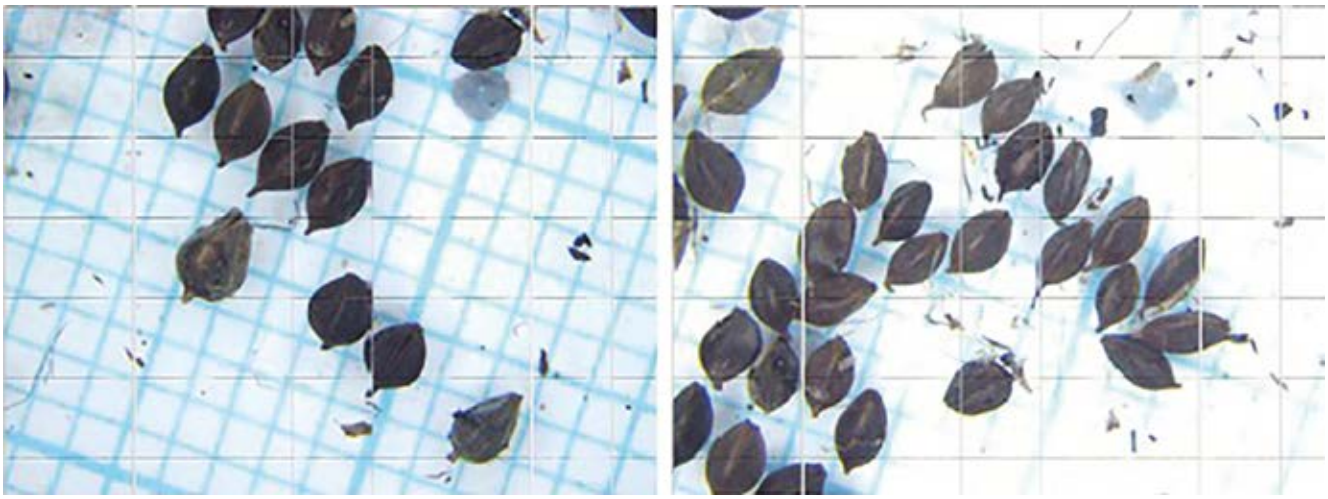


***Figure 5:** Various* Carex *trigonous.*

R. crispus as well as *R. longifolius*. The nutlets are all trigonous and quite varied in respect of the angles on the edges as well as their state of development. Most were not in their perianths which are more diagnostic. All have similar habitats. The sample is another mix of habitats but essentially dry to damp, not wet, and with plenty of nutrient enrichment. A smaller wetland component is present – the common crowfoots and blinks. One group is clearly *Montia fontana* ssp *fontana* – smooth and shiny faces and edges, slightly elongated cells in main body. There are also a few more like *M. fontana* ssp *variabilis* – similar cell patterns but with a few rows of broadly spiky tubercles along the edges. Sedges are a plenty: *Carex* cf *echinata* 1; *disticha/ovalis* type 5 plus the trigonous ones which need further investigation. The heavy fraction was also analysed and consisted primarily of cindery/clinker charcoal with a very few pieces that might be identifiable. One small fragment of hazelnut shell was recovered.

5.4.4 SHALLOW DITCH NORTH OF THE FORT DITCHES

M25-38, sample <24>, 3rd century

Fill of a shallow ditch lying to the north of the two fort ditches. Overlies M25-41 therefore making it the second upper most fill of this ditch. Diffuse boundary down to M25-41 suggesting gradual formation over time.

The light fraction was dominated by charcoal but with a large mat of modern roots and large numbers of fungal sclerotia. The charcoal was all small fragments with very few being over 4mm. It is not considered worth any attempts at identification for this reason, and no clear question either given that the feature is a ditch fill. A single seed of charred spelt wheat and one of waterlogged *Polygonum aviculare* (knotgrass) offers little for interpretation other than spelt wheat was probably used on site. As *Triticum spelta* is the most commonly found cereal grain on almost all Roman sites in northern Britain its presence here is quite expected.

M25-45, sample <37>, 3rd century

A dump of burnt clay and charcoal north of the second fort ditch. No clearly defined edge so not likely to have been an oven or other structure.

A mineral and clinkery cinder-like light fraction with some mineral spatter/heated material/globular remains but no seeds. As the context is a dump it would seem that this was clearance from somewhere else where activities involving high temperatures may have been carried out.

5.4.5 PEAT BOG UNDERLYING SHALLOW DITCH

M25-41, sample <30>, Prehistoric

Peat bog underlying M25-4, which included M25-38. Classed as natural peat deposit and very similar to that excavated around well complex in 2024. Lies to the north of the two main fort ditches.

The light fraction consisted almost entirely of small lumps of amorphous, highly humified organic material with a small amount of wood, stem fragments and the occasional Sphagnum (bog moss) leaf. The only seeds were even more thousands of *Juncus effusus* (soft rush) than those in M25-55 (below). Given the nature of the sediment and seeds recovered, M25-55 and M25-41 are almost certainly the same deposit that grew naturally over quite a wide area.

5.4.6 BELOW RUBBLE ON SOUTH BANK OF PRIMARY FORT DITCH

M25-43, sample <35>, post-Roman

Clay and rubble overlying the bank N of the fort wall, south of the main fort ditch. Probably originally part of the wall core and formed when that collapsed or from early robbing. Plenty of bulk finds in it.

The light fraction comprised an equal mix of small charcoal fragments and cindery, clinker material which could well have originated as charcoal. There were also moderate numbers of bone scraps – trabecular honeycomb like material from the inner side bones and a few pieces of small mammal long bone and pelvis. There was also plenty of evidence for modern material – mat of modern roots, a few fragments of modern shell (mollusc) and the only occurrence of *Sambucus nigra* (elderberry) considered modern from its appearance. It seems eminently reasonable to suggest that the deposit was originally from the core of the wall that had a selection of material incorporated and even, maybe, the remains of a few small mammals living and dying in the wall.

M25-55, sample <47>, prehistoric

Anaerobic layer beneath rubble on south bank of first fort ditch, cut by foundations of fort wall. Suggested to be natural build-up of sediments caused by seasonal flooding.

The light fraction comprised lumps of amorphous organic material and bark fragments as well as some numbers of stem/root-bases of monocots such as rushes, grasses or sedge. The sole

seeds were thousands of *Juncus effusus* (soft rush). This is a species favouring some organic but essentially mineral based soils. The seeds are tiny (<500 microns) and it is strange that no other, larger seeds were recovered. The matrix seems to reflect a high humified sediment however and could well reflect seasonal flooding as suggested by the archaeologists.

5.5 DISCUSSION

The 16 samples have provided a very useful set of data regarding the vegetation in and around the fort ditches, mainly, dating from prehistoric times through to post-medieval, although with a focus on the Roman period. It is always disappointing when samples are barren (6 here) but here, they make sense as they are often near the top of the sequences or in features, such as dumps of wall debris, where plant remains are less likely to have been present in the first instance. Other scenarios reflect layers in the ditches that did not have suitable conditions for survival of anaerobic material. The two prehistoric samples, M25-41 and M25-55 are considered to be almost certainly the same deposit – highly humified organic remains with thousands of *Juncus effusus* seeds. It is suggested that they represent an old ground surface that was covered by a wet rushy, tussocky vegetation. Although similar in appearance to M25-92 (see Appendix 3), that contained no *Juncus* seeds. Even though it was a small sample they would have been visible if present. It was considered to be a possible mor humus under open woodland and it is always possible that it merged into a wetter area downhill and that all three contexts are contemporary.

Although charcoal was present in many of the samples, the fragments were all small. Given the contexts, it is not considered worth the effort of trying to identify any charcoal. Local taxa are already known from previous excavations and identification would only be warranted from features such as hearths or ovens where a specific question could be asked of the charcoal.

The anaerobic contexts have well-preserved waterlogged fruits/seeds that, in fact, show quite a narrow range of habitats in the main. They are certainly not in receipt of rubbish from the fort. One habitat includes tall, biennial to perennial herbaceous plants characteristic of nutrient enriched, damp ground that is not regularly disturbed. The other main habitat is wet ground with standing although not necessarily permanent water, shorter vegetation, such as at the edges of ponds or field ditches, with others actually growing in water. Water flea remains (*Daphnia*) also indicate standing water. Given the numbers of seeds, there would have been flourishing flowering vegetation, certainly not an area where vegetation was cut down. In many respects the assemblage is quite similar to that for 2023 and 2024, excavated areas further north again and away from the fort. The occupants of the fort, obviously, were maintaining their ditches – no doubt for defensive purposes – but they were disposing most of their rubbish elsewhere; maybe in the ditches on the southern side.

In terms of sample processing, the modified method of keeping “tea leaf like” flots wet has worked admirably and must be continued in future excavations. However, one improvement would be the method of storage of these. The light fractions were moved from the sieves following processing into pieces of muslin for either drying or leaving wet and then into polythene bags. With some months between processing and sending to the author, the wet muslin bags had started rotting in the plastic bags making extraction difficult. It is recommended that the cotton muslin be replaced by a nylon one of similar fineness such as plain net curtain. This would not rot in the plastic bags.

6. FOSSIL INSECTS FROM MAGNA

EVA PANAGIOTAKOPULU

6.1 INTRODUCTION

Fossil insect research on the Roman period has tended to concentrate on urban and rural settlements, and studies from forts are comparatively limited. Systematic fossil insect research from the fort of Magna would provide new information on climate and environmental change. It could also give unique details on human activities in the fort and around it, unravelling living conditions, hygiene, death and disease, trade and economic activities, and the impact of the fort garrison on the hinterland. The preliminary research summarized below primarily attempts to establish the preservation of the insect assemblages on-site and to obtain the first insect results.

6.2 METHODOLOGY

Although samples with differing volumes were collected by the excavators, samples with a volume of *c.* 5L were chosen in order to establish a standardized methodology which will in the future allow comparisons both within the site and with other sites. Sample processing followed the method devised by Coope and Osborne (1968). Each sample was disaggregated in warm water over a 300-µm sieve to remove silt. After draining the residue, paraffin (kerosene) was mixed with it and cold water was added. The float was washed over a 300-µm sieve and the process was repeated three times. The residue was sorted under a binocular microscope and identified using the Osborne collection at the University of Edinburgh and identification keys. All *Coleoptera* remains were identified to the species level where possible, as this allows refined habitat reconstructions. Preservation of remains was good in most samples, although not all of the samples had preservation. BugsCEP (Buckland and Buckland 2006) and additional relevant references were used to collate habitat information.

6.3 RESULTS

Four samples were processed and sorted from milecastle 46. One of these came from the cist grave, another from the industrial pits, and two more samples, M23-091 and M23-088, were taken from the well. An additional sample, M24-133, was

Figure 1: *An aerial view of Magna excavation areas showing the locations of the samples taken for fossil insect research.*

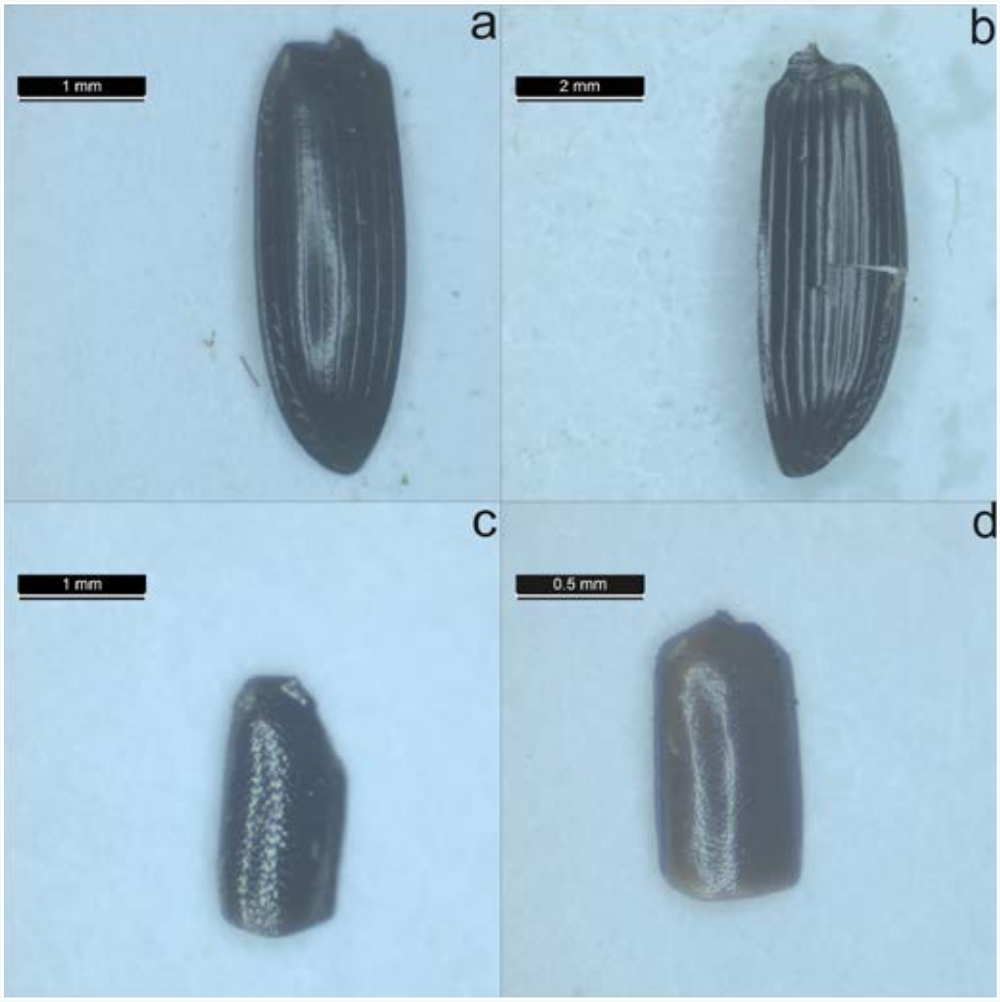


Figure 2: *Insect remains from Magna a. Left elytron of* Calathus melanocephalus *(L.) b. Right elytron of* Pterostichus nigrita/rhaeticus *(Payk.)/Heer c. Left elytron of* Quedius *sp. d. Left elytron of* Tachinus *sp.*

studied from pre-Hadrianic ditch M24-127; sample M24-215 was taken from the area immediately surrounding the post-medieval well. Sample M25-35, taken from the primary ditch in the northern ditches, was also studied (Fig. 1).

The sample from the primary fill of the cist, from the area where the human bones were recovered, produced a single fragment of a catopid elytron, indicating limited preservation in this part of the excavation. This find is not surprising, as catopids have been found from forensic contexts and some taxa are known to colonize bodies during winter months. However, the lack of preservation does not allow for interpretation of the context. The sample from the industrial pits had no preservation of organic materials. Insect remains were preserved from all other samples (Fig. 2).

From the milecastle 46 well, initially a sample was researched from the primary well fill in order to determine if it was in use during the period of occupation of the milecastle. Pieces of timber, hypothesized to be from timber floors, were found in the well together with well-preserved leather and rope. The sample from the primary fill produced a range of taxa (Table 1), including several species of carabids, such as *Nebria brevicollis* (F.) which is found in a variety of habitats, primarily associated with humid soils (Lott *et al.* 2011) and open habitats, for example grasslands or moorlands (Luff 2007). *Notiophilus aquaticus* (L.) also frequents open habitats, for example grasslands, moorlands, dunes, etc. (Luff *ibid*). Other species include *Bembidion lampros* (Hbst) associated with open ground and agricultural land (Langor and Larson 1983), and *Calathus melanocephalus* (L.), found on grassland, heath, gardens, and arable land (Luff *ibid*).

Taxa	M23-091	M23-088	M24-133	M24-215	M25-35
Insecta					
Coleoptera			2	2	1
Carabidae					
Carabidae indet.	2				
Nebria brevicollis (F.)	2	1			
Nebria salina Fairm. & Lab.		1			
Notiophilus aquaticus (L.)	1				
Loricera pilicornis (F.)			1		
Trechus obtusus/quadristriatus Er./(Schr.)	2	1			
Bembidion lampros/properans (Hbst)/(Steph.)					1
Bembidion stephensi (Crotch)	1				
Bembidion spp.					1
Patrobus septentrionis Dej.		1	1		
Acupalpus sp.	1				
Pterostichus diligens (Sturm)		1			
Pterostichus nigrita/rhaeticus (Payk.)/Heer	1				
Calathus melanocephalus (L.)	3				
Agonum fuliginosum (Panz.)			1	1	
Dytiscidae					
Hydroporus sp.				1	
Hydraenidae					
Ochthebius sp.					1
Limnebius truncatellus (Thun.)	3				
Helophorus grandis/aequalis Thoms./Ill.			2		
Hydrophilidae					
Cercyon haemorrhoidalis (F.)					1
Cercyon atricapillus (Marsham)					1
Cercyon pygmaeus (Ill.)	3				
Cercyon convexiusculus Steph.	1				
Cercyon analis (Payk.)	4				
Cercyon sp.					
Cercyon spp.				2	
Megasternum obscurum/immaculatum (Marsham)/(Steph.)	3				
Hydrobius fuscipes (L.)			1		
Histeridae					
Onthophilus striatus (Müll.)	1				
Silphidae					
Silpha (s.l.) sp.				1	
Catopidae					
Sciodrepoides watsoni (Spence)	1				

Taxa	M23-091	M23-088	M24-133	M24-215	M25-35
Catops sp.	3				
Clambidae					
Clambus sp.	1				
Ptiliidae					
Acrotrichis sp.				3	
Staphylinidae					
Micropeplus fulvus Er.	1				
Omalium rivulare (Payk.)				6	
Omalium spp.	2				
Olophrum fuscum (Grav.)				2	
Olophrum piceum (Gyll.)		1			
Olophrum sp.	1				
Acidota crenata (F.)				1	
Lesteva sp.					1
Omaliinae indet.					1
Anotylus rugosus (F.)			1		
Anotylus complanatus (Er.)					1
Platystethus arenarius (Geoff.)	2				
Stenus sp.	1				
Stenus spp.			1	9	
Rugilus rufipes (Germ.)				2	
Lathrobium (s.l.) sp.				4	
Xantholinus linearis (Ol.)				1	
Othius angustus Steph.		1			
Othius subuliformis Steph.				16	
Othius sp.	1				
Philonthus sp.	1			1	
Philonthus / Gabrius sp.	1				
Gabrius sp.	1				
Ocypus olens Müll.	1				
Quedius sp.			1	1	1
Quedius / Philonthus spp.				2	
Tachyporus sp.	1				
Tachinus rufipes (L.)	2				
Tachinus corticinus Grav.	1				
Aleocharinae indet.	1			2	
Cantharidae					
Rhagonycha testacea (L.)				1	
Elateridae					
Elateridae indet.	1				
Agriotes pallidulus (Ill.)				1	

Taxa	M23-091	M23-088	M24-133	M24-215	M25-35
Athous haemorrhoidalis (F.)				3	
Dascillidae					
Dascillus cervinus (L.)		1			
Scirtidae					
Scirtidae indet.				3	
Byrrhidae					
Simplocaria semistriata (F.)	1				
Brachypteridae					
Brachypterus urticae (F.)			1		
Nitidulidae					
Meligethes spp.	2				
Silvanidae					
Oryzaephilus surinamensis (L.)					4
Cucujidae					
Cryptolestes ferrugineus (Steph.)					4
Cryptophagidae					
Cryptophagus sp.	1	1			
Atomaria spp.					1
Ootypus globosus (Waltl)	1				
Latridiidae					
Latridius minutus (grp) (L.)	2				
Corticarina fuscula (Gyll.)			1		
Corticariinae indet.				1	
Coccinellidae					
Nephus redtenbacheri (Muls.)				1	
Tenebrionidae					
Tribolium sp.					3
Geotrupidae					
Geotrupes (s.l.) sp.			1		
Scarabaeidae					
Aphodius ater (Deg.)			2		
Aphodius luridus (F.)					1
Aphodius granarius (L.)					1
Aphodius spp.			2		1
Phyllopertha horticola (L.)			2		
Chrysomelidae					
Altica sp.		1			
Chaetocnema concinna (Marsham)					1
Alticinae indet.			1		
Curculionidae					
Apion (s.l.) sp.	1				

Taxa	M23-091	M23-088	M24-133	M24-215	M25-35
Sitona puncticollis Steph.	1				
Notaris acridulus (L.)			2		1
Sitophilus granarius (L.)					1
Ceutorhynchus contractus (Marsham)	2				
Ceutorhynchinae indet.	2				
Diptera					
Diptera indet. (puparia)			4		3
Hemiptera					
Saldidae indet.	1				
Homoptera indet.				1	3
Hymenoptera					
Formicidae					
Myrmica sp.	1				

***Table 1:** Insect remains from Magna. The numbers represent minimum numbers of individuals (MNIs) for each sample.*

The presence of the *hydraenid Limnebius truncatellus* (Thun.), which is found in mud near water bodies (Duff 2012a) and in general by margins of water bodies (Foster *et al.* 2020), was noted. The assemblage includes several *hydrophilids*, some of them associated with animal dung, e.g. *Cercyon pygmaeus* (Ill.) and *Cercyon analis* (Payk.) as are the small *histerid Onthophilus striatus* (Müll.) and the *cryptophagid Ootypus globosus* (Waltl). Various staphylinids in this assemblage, including *Micropeplus fulvus* Er. and *Platystethus arenarius* (Geoff.), frequent decaying vegetation (Duff 2024), while *Ocypus olens* Müll. is a generalised predator often found in plant litter (Duff 2024). *Simplocaria semistriata* (F.) has been recovered from moss and plant roots (Duff 2020). The weevil *Sitona puncticollis* Steph. has been collected from a variety of different habitats which range from meadows and pastures to woodland margins and fields with legumes (Koch 1992), while *Ceutorhynchus contractus* (Marsham) has been noted in tussocks and mosses and is recorded from *Brassicaceae* (Bullock 1993).

The residue from the second sample, from the secondary fill of the well, consisted exclusively of stable manure and straw and this was obvious during sorting. The insect assemblage produced was much smaller compared to the previous sample. It included carabids, N. *brevicollis* and N. *salina*, the latter found in dry soils and grasslands (Eyre and Luff 1990). It also included *Patrobus septentrionis* Dej., which prefers sites near water (Koch 1992), and *Pterostichus diligens* (Sturm) with a preference for wetland sites and peat (Eyre and Luff 1990). The staphylinid *Othius angustus* Steph. lives in moss and damp habitats (Duff 2024). *Dascillus cervinus* (L.) frequents grasslands, where the larvae feed at the roots while the adults are found in flowers (Baker 1981). A flea beetle, *Altica* sp., was also found from this sample, which despite the name, feeds on a range of plants.

An additional sample M24-133, dated to the 2nd century CE, taken from the anaerobic fill of ditch M24-127, was researched. Organics recovered from this ditch included leather shoes and timber. The preservation of the insects was relatively good, although the material was fragmented. In addition to *P. septentrionis* Dej., the assemblage included the eurytopic carabid *Loricera pilicornis* (F.) and *Agonum fuliginosum* (Panz.), which is associated with marshes, damp grassland, and moorland (Luff 2007). Other taxa include the similarly eurytopic small staphylinid *Anotylus rugosus* (F.), which is found in rotting vegetation, fungi, compost, and straw (Koch 1989). The small pollen beetle *Brachypterus urticae* (F.) is monophagous, feeding on the pollen of flowering nettles, *Urtica dioica*, and occasionally also on annual mercury *Mercurialis annua*, stonecrop, Sedum, and other herbs (Koch 1989). The green chafer beetle, *Phyllopertha horticola* (L.), is found in grasslands, sometimes in pest proportions, and the dung beetle *Aphodius ater* (Deg.) were also part of the assemblage, together with the weevil *Notaris*

acridulus (L.), which is associated with wet areas and semi-aquatic grasses (Morris 2002).

The late 2nd century CE peat deposit M24-215, which contained hair moss, bracken, branches, and other woody materials, was also sampled. In addition to the carabid A. *fuliginosum*, the water beetle *Hydroporus* sp., and the carrion beetle *Silpha* sp., evidence for decaying vegetation and fungi is provided by *Omalium rivulare* (Payk.), *Olophrum fuscum* (Grav.), and *Rugilus rufipes* (Germ.). *Xantholinus linearis* (Ol.) and *Othius subuliformis* Steph. are associated with litter (Duff 2024), while the largely subterranean *Acidota crenata* (F.) is often recovered from acid grasslands (Duff, *ibid*). Some species, such as *Agriotes pallidulus* (Ill.), have been found on young trees and shrubs in woods (Duff 1993a), while other taxa, for example *Nephus redtenbacheri* (Muls.), are associated with swamps and damp woodland margins (Koch 1989). *Athous haemorrhoidalis* (F.) is found on herbs, flowers, shrubs, and trees (Koch 1989).

Sample M25-35 was taken from well-preserved material from the fill of the primary ditch, which contained organic finds of wood, and leather, and is dated to the 3rd century CE. The assemblage included additional hydrophilids: the coprophilous *C. haemorrhoidalis*, which is found in herbivore dung and decaying vegetation (Duff 1993a), and *C. atricapillus*, which is more synanthropic, found around farms and in dung (Foster *et al.* 2018). Evidence for coprophagous taxa includes *A. luridus* (F.), which is recorded from herbivore dung, often from dung of sheep and cattle, and *A. granarius* (L.), also in herbivore dung and rotting vegetation, generally on well-drained soils (Duff 2020).

In addition, various pests were recovered from this context. *Sitophilus granarius* (L.) is an important known cosmopolitan pest of cereals, often infesting cereal mills, barns, storerooms, and warehouses (Koch 1992). *Oryzaephilus surinamensis* (L.), occasionally found in the wild under bark, is a cosmopolitan pest of cereals which also infests a wide range of other food commodities (Halstead 1993). *Cryptolestes ferrugineus* (Steph.) is similarly a pest in granaries, also found under the bark of deciduous trees (Duff 1993). The flour beetle, *Tribolium* sp., was also recovered from the sample.

6.4 DISCUSSION

The assemblage from the primary well fill from milecastle 46 has produced insect taxa which could be associated with the well during its active phase. As insects around the well would end up in it accidentally, with the structure acting like a pitfall trap, the taxa provide a broad overview not only of the well itself but of the immediately surrounding environments. The assemblage points to open environments and unimproved grasslands in the surrounding areas, while some of the taxa indicate herbivores in the vicinity. The secondary fill provides evidence for stable manure, perhaps accumulated during winter, when insect activity would have been limited. The taxa recovered could have been ingested accidentally by the animals with fodder (see Hall and Kenward 1998). As stable manure would pollute the water, it was probably packed in the well as part of the orderly abandonment of milecastle 46, perhaps in an attempt to make the water source unusable by others.

The insect results from ditch M24-127 and the peat deposit M24-215 provide some information for a broad reconstruction of the site. The assemblages point to open environments, the equivalent of undisturbed acid grassland, with some evidence for wetlands and habitats found on the margins of woodland and for herbivore dung. The peat deposit M24-215, with higher numbers of staphylinids, in particular *O. subuliformis*, provides further evidence for mosses and decaying vegetation.

From the primary fort ditch fill M25-35, the insect data indicates the disposal of midden material, including animal dung. This also included human faeces and/or infested cereals, evidenced by pests of stored products with *S. granarius, O. surinamensis*, and *C. ferrugineus*.

The grain weevil, *S. granarius*, is flightless, has its origins in the Fertile Crescent, and became synanthropic at the beginning of agriculture. Its earliest European record comes from Atlit Yam from the southeast Balkans, Dispilio, in northern Greece *c*. 5700 cal. BCE (Panagiotakopulu and Buckland 2018) and spread in Europe during the Neolithic. The first record for *O. surinamensis* also comes from around the same date from the southeast Balkans (Panagiotakopulu in press). As with much of the synanthropic fauna, its original habitat was probably under bark, and its earliest record comes from Saint Maximin la Sainte Baume in Neolithic France *c.* 3656 BCE. In Britain, it appears to have been the Romans who introduced all three pests, as part of a range of introductions, largely associated with food for the Roman army and other traded commodities, arriving on ships from various parts of the Empire (Panagiotakopulu and Buckland 2017). In the long term, their ecological impact in Britain was much greater than the military one.

6.5 CONCLUSIONS

Preliminary insect work from Magna has provided information for preservation conditions and the first results from the site. The data from the insects give evidence for open acid grassland environments and herbivores on site. Disposal of midden materials was taking place into the primary fort ditch. The assemblages from the ditch provide evidence for three cereal pests, *Sitophilus granarius* (L.), *Oryzaephilus surinamensis* (L.) and *Cryptolestes ferrugineus* (Steph.), all introduced during the Roman period, and for other synanthropic species. It is evident that there is differential preservation across the site, with some of the organic preservation, including those deposits with the preservation of insect remains, deteriorating, perhaps as a result of changes in the hydrology of the peat.

7. POLLEN ANALYSIS OF SECONDARY DITCH [3]

ROBERT D. McCULLOCH AND FRANKI GILLIS

7.1 INTRODUCTION

Here we present preliminary evidence from the 2025 excavation of waterlogged organic-rich sediments excavated from the secondary fort ditch (Fig. 1). The small size of pollen (typically between 10µm and 60µm), near ubiquitous presence in the landscape, its tough resistance to deterioration and preservation in waterlogged (i.e. anaerobic) deposits, such as peat and lake muds, means it is a useful microfossil for the reconstruction of landscape change, and human impacts on the landscape (Tipping 1995). It also offers the potential to support inferences regarding climatic changes, although disentangling human and climate signals can be problematic. The waterlogged and anaerobic conditions of the organic-rich soils/sediments of the ditch fills at Magna affords a rare opportunity to reconstruct the immediate landscape around the fort using pollen analysis.

7.2 METHODS

Sub-samples (1cm^3) were taken from two overlapping 50cm long kubiena tins (Fig. 2) and prepared for pollen analysis using standard techniques to remove plant detritus and mineral matter and concentrate the pollen content (Moore *et al.* 1991). Samples were first treated with Hydrochloric acid 10% v/v to remove any carbonates and then placed in a boiling bath in a solution of Sodium hydroxide 10% w/v for *c*.25 minutes to disaggregate the samples and remove the humic content. Then coarse (e.g. plant fibres, sand and grit) and fine (e.g. clay) material was removed by passing samples through 180µm and 10µm sieve mesh. Sample material retained on the 10µm mesh was then treated with 40% Hydrofluoric acid to dissolve mineral material and with acetolysis solution (9:1 ratio of Acetic anhydride and Sulphuric conc. acid) to digest plant cellulose. The remaining sample material was stored in silicone oil which

Figure 1: *An aerial view of the 2025 excavation and the location of the stratigraphical profile sampled for pollen analysis (blue dots). Samples were taken from the west facing section of the secondary fort ditch [3], which includes an ankle breaker/*cippi *pit cut into the base.*

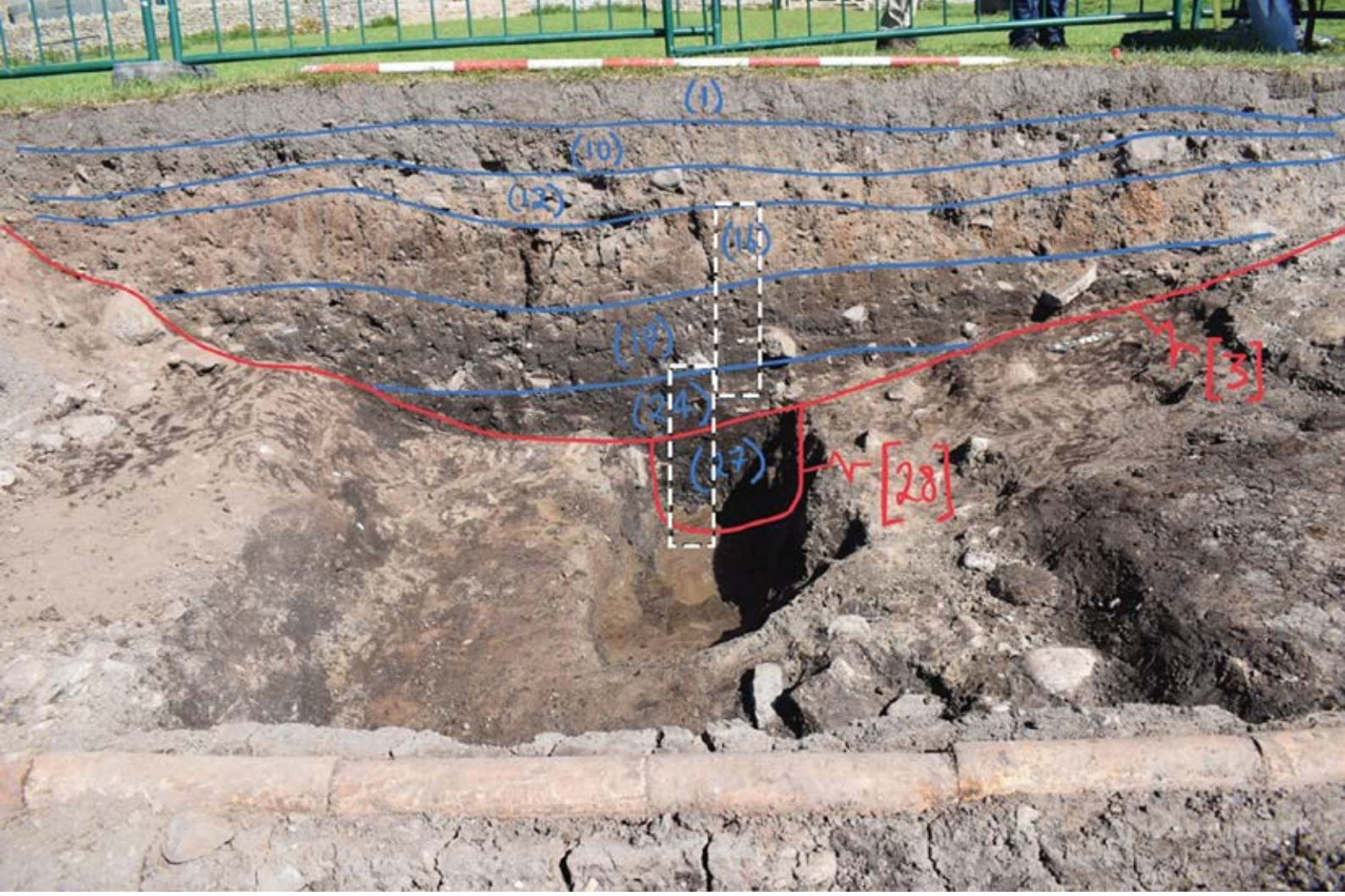


Figure 2: *Magna secondary ditch [3] section and position of kubiena tins for soil/sediment sampling (dashed boxes).*

has good optical qualities and allows for the partial movement of pollen under the microscope to facilitate identification. The identification of pollen grains and spores was supported by a pollen reference collection and supplemented by microphotographs (Moore *et al.* 1991).

To ensure a representative survey of the pollen content a minimum sum of 300 land pollen grains was identified from each sample (total land pollen, TLP). *Cyperaceae* and spores are counted but not included in this sum. Pollen concentrations (grains cm3) were estimated by adding a known quantity of *Lycopodium clavatum* to each sample obtained from the University of Lund (Stockmarr 1971). Charcoal particles between 10µm and 180µm were counted alongside the pollen and spores on the microscope slides as an indicator of past fire activity (Whitlock and Larsen 2001).

The physical condition of the pollen grains was also assessed as a further indicator of the environmental conditions in which it was deposited (Cushing 1967; Berglund and Ralska-Jasiewiczowa 1986; Tipping 1987). Pollen grains are well-preserved in acidic and anaerobic conditions such as lakes and waterlogged mires. Corroded and degraded pollen grains suggest degrees of chemical deterioration and microbial digestion indicating a drier aerobic environment. Broken and crumpled pollen suggest mechanical damage, most probably due to abrasion during transportation. The state of preservation of land pollen was assigned to a single hierarchical category: normal, broken, crumpled, corroded, and degraded from lowest (normal) to highest (degraded) (Fig. 3). This tends to emphasise the higher deterioration types (corroded/degraded) (Lowe 1982) but can be applied quickly and consistently and does not contain subjective elements (Tweddle and Edwards 2010).

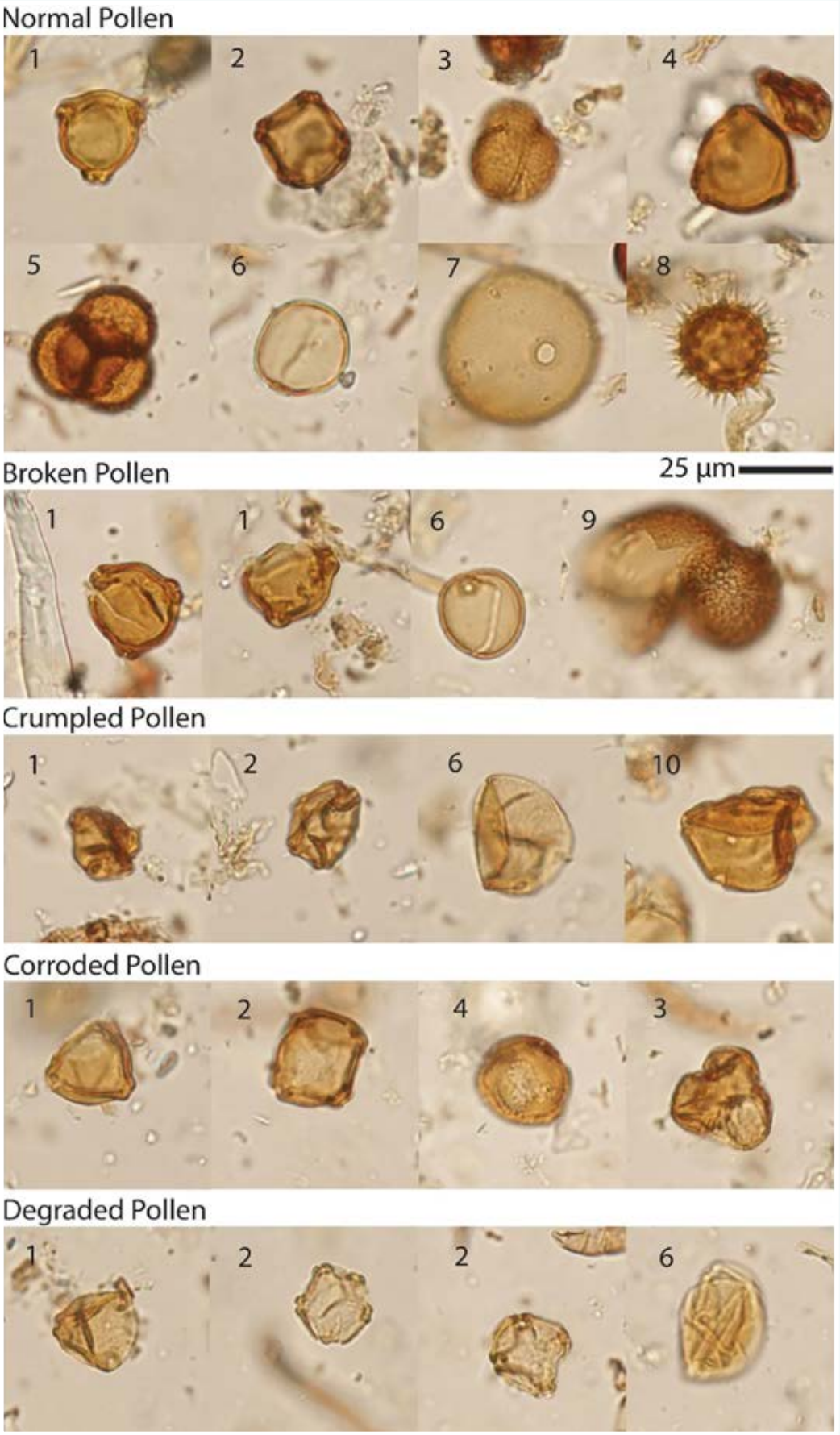


Figure 3: *Examples of pollen and states of preservation from the 2024 Magna pollen profile: 1* Betula *(birch), 2* Alnus *(alder), 3* Quercus *(oak), 4* Corylus avellana *type (hazel/bog-myrtle), 5* Calluna vulgaris *(ling, common heather), 6* Poaceae *(grasses), 7* Hordeum *type (barley), 8* Asteraceae *sub fam.* Asteroideae *(asters, daisies), 9* **Pinus** *(pine), 10* Juglans *(walnut).*

7.3 RESULTS AND INTERPRETATION

The percentage pollen results are shown in Figure 4 and the percentage classes of pollen preservation are shown in Figure 5.

Pollen samples 1, 2, 3, and 4 are from the soil/sediment fill M25-27 of the ankle breaker/*cippi* pit M25-28 and are believed to be 2nd century CE in date based on the contexts from which they were taken (Table 1, Fig. 2). Approximately 60% of the pollen is well-preserved (Normal) and the assemblage comprises *Betula* (birch) ~20% of TLP, *Alnus* (alder) ~30-40% of TLP and *Corylus avellana* type ~20% of TLP (probably hazel) with lesser amounts of *Poaceae* (grasses) and *Calluna vulgaris* (ling common heather). Overall trees and shrubs make up ~70-80% of the pollen assemblage which is typical of an alder carr. The high total pollen concentrations range from ~950,000 to 2,600,000 grains cm^3 which is consistent with the slow siltation of the ditch. The fen pollen probably derived from the large boggy area to the north of the fort. It is also likely that the boggy area extended closer to the fort during the 2nd century. The organic-rich waterlogged conditions may have favoured the colonisation of the ditch by fen vegetation although there is no evidence to suggest clearing of the ditch during this period (Table 1).

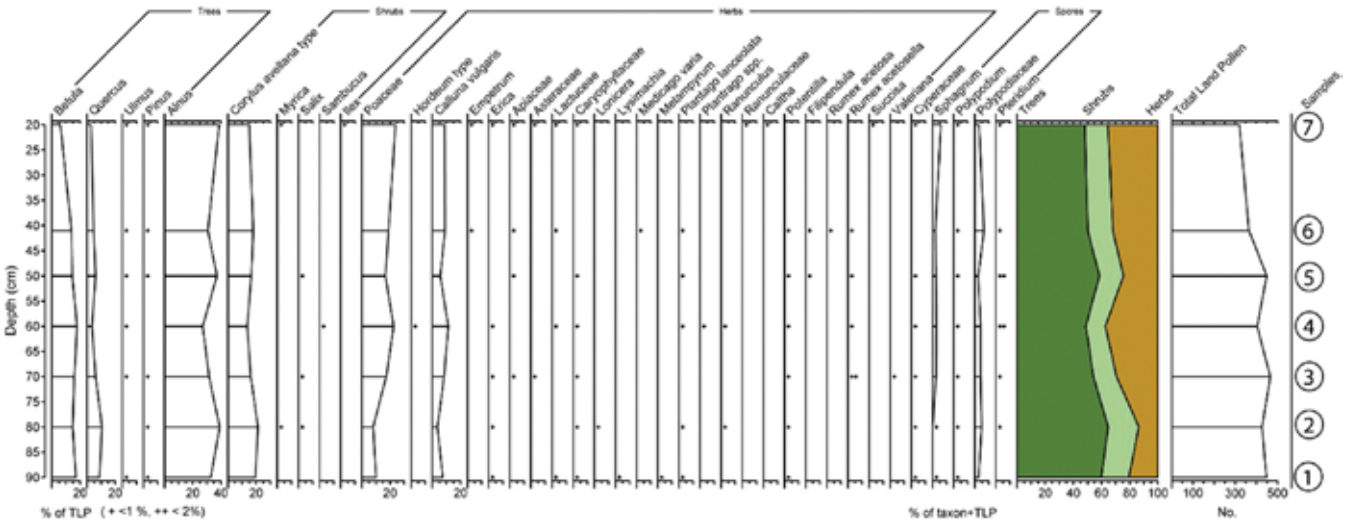


Figure 4: *Percentage pollen preservation diagram for selected major and all other land pollen taxa.*

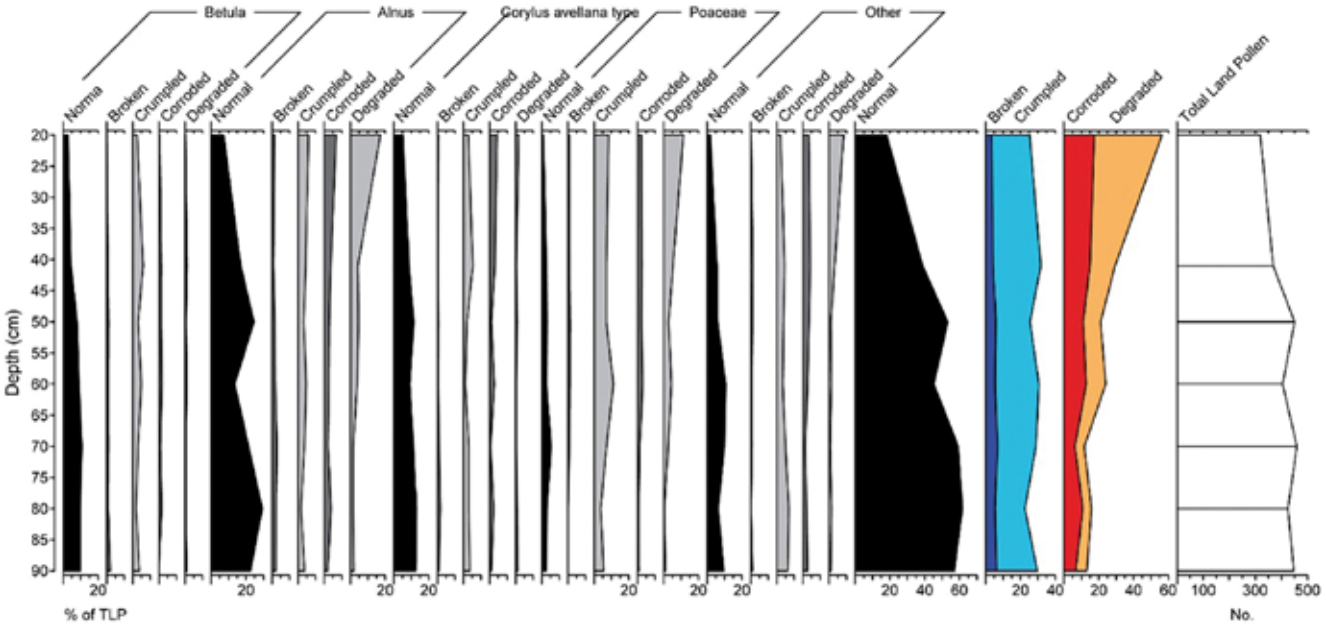


Figure 5: *Percentage pollen and spore diagram. Grey shading for individual taxa indicates x10 exaggeration.*

Context Number	Soil Matrix Description	Interpretation	Provisional Date
16	Colour: mid orangey grey. Compaction: dry, firm. Composition: clayey silt. Inclusions: frequent medium to very large angular platy iron ore, evenly distributed.	Upper fill of the second fort ditch, below the later cobbling M25-12. Large quantities of iron ore and iron pan throughout this fill, including some large conglomerations, suggesting this deposit was often wet when forming. No evidence of this being a deliberate backfilling; it is likely to be the last round of silting as material is washed into the hollow of the ditch. Cut by later field drains, two ceramic pipes and rubble drain M25-22. Occasional finds of Roman material but this is likely residual and may have entered the context by bioturbation or ploughing.	Post-Roman.
19	Colour: dark brownish grey. Compaction: moist, malleable. Composition: clayey silt.	Secondary fill of fort ditch [3]. Likely backfilled by natural siltation processes after the ditch fell into disuse. (Semi) anaerobic fill containing no organic material remains.	4th century.
24	Colour: dark blackish grey. Compaction: moist, malleable. Composition: peaty clay. Inclusions: 1) moderate small to large sub-rounded to rounded spheroidal cobbles, evenly distributed 2) occasional wood, some identifiable as silver birch, evenly distributed.	Primary fill of the second fort ditch. Anaerobic fill, but notably desiccated, reflected in the lack of organic artefacts found during excavation. This deposit was likely caused by both deliberate dumping of rubbish and natural siltation over a long period of time. Due to the anaerobic nature of the deposit this ditch must have been waterlogged and potentially flooded in antiquity. As with M25-19 above there is notably less finds within this deposit when compared to the equivalent deposits in the first ditch, due to its position further from the fort wall.	2nd century.
27	Colour: dark brownish black. Compaction: wet, spongey. Composition: clayey silt.	Fill of possible ankle breaker or *cippi* pit M25-28 in the base of the second fort ditch. One of three found in the excavated section of ditch. Silty nature suggests natural fill by water/wind over a long period of time, suggesting that these structures were not cleaned out or maintained after their initial construction. Anaerobic fill, similar to M25-36 in the first fort ditch, but no finds found within.	2nd century.
28	n/a	Cut for an ankle breaker/*cippi* pit	2nd century

Table 1: *The secondary fort ditch contexts sampled in kubiena tins: Soil/sediment description, interpretation and suggested ages.*

Pollen samples 4, 5 and 6 are from the soil/sediment fill M25-24 deposited during the 2nd century CE (Table 1). The pollen assemblages reflect the continuation of the alder carr and the accumulation of organic-rich sediments under anaerobic conditions. Sample 4 indicates a small decrease in the tree cover and corresponding increase in herbaceous taxa, largely grasses. There are trace amounts of grazing indicators such as *Plantago lanceolata* and *Rumex acetosella* but insufficient to reflect any purposeful management of the land surrounding the ditch. Sample 5 contains an extremely high pollen concentrations of ~8,200,000 grains cm^3, which likely indicates that the rate of infilling of the ditch was significantly slower, thus allowing a substantial accumulation of pollen. There is also a corresponding large peak in charcoal content in sample 5. There is no indication that fire altered the surrounding vegetation and so this peak may relate to the dumping of ash into the ditch as part of the fill. The pollen concentration of sample 6 lowers to ~840,000 grains cm^3, similar to the samples preceding sample 5, suggesting that the rate of soil/sediment accumulation above sample 5 increased, perhaps through the deliberate dumping of rubbish.

Pollen sample 7 is from the increasingly minerogenic ditch fill of context M25-19 deposited during the 4th century CE. The pollen assemblages indicate the continuation of the alder carr with a small expansion of the herbaceous taxa, again largely grasses, at this time. However, there is a decline in the proportion of well-preserved pollen (Normal). While the proportions of broken and crumpled pollen (mechanical damage) remain consistent throughout the profile there is an increase in corroded and degraded pollen (biochemical deterioration), largely the latter, suggesting a shift from the underlying waterlogged anaerobic to drier and more aerobic conditions (Fig. 5). This is also reflected in the reduction in organic material and corresponding increase in mineral content in the upper layers of the ditch. The soil/sediment in the post-Roman context M25-16 is very minerogenic and lacks sufficient organic material to provide a pollen sample.

8. ENVIRONMENTAL MONITORING

FRANKI GILLIS AND GILLIAN TAYLOR

The primary aim of the Magna Project is to establish how climate change is impacting preservation of archaeological artefacts *in situ*. In April 2022, a continuous environmental monitoring probe array and weather station was installed in the north field. The weather station and environmental probe array measures a wide variety of parameters, including ambient air temperature, daily rainfall, wind speed, relative humidity, soil moisture, electrical conductivity, groundwater level, pH, and redox. Measurements are recorded every fifteen minutes, and the system uploads the datapoints into a cloud server. The monitoring data allows consideration of chemical properties, which may impact the preservation of artefacts at Magna.

As evidenced by the 2024 and 2025 excavations, the monitoring system sits in the same peatland which extends into the northern ditches trench (See Chapter 2.5.1; Frame and Gillis 2025: 26). Peat is primarily composed of decomposed organic plant matter that has accumulated in a waterlogged, acidic, and oxygen-poor environment. However, organic material remains, such as leather, wood, and textiles, are well preserved in peat environments due to the lack of oxygen and acidic conditions (Gearey and Fyfe 2016: 98). Peat also preserves a variety of environmental remains such as flora, insects, and pollen which allow for a greater understanding of the historic landscape and environment (see Chapters 5, 6, and 7). Paradoxically, the acidic environment is not suitable for ferrous metals and bone, which is likely responsible for some of the 'jelly bones' found during excavation this year (see Chapter 11.4.4). In addition to the continuous monitoring system, visual observations help monitor the peatland at Magna. As part of the Trust's programme of monitoring, multi-spectral drone surveys of the site were completed in June and September 2025. These surveys will continue to be completed over the next few years to determine peat shrinkage and plant growth across site. The goal of these surveys is to establish if drone surveys can be used as a less expensive and simplified method of monitoring wetland heritage sites.

Figure 1: *Photograph from the well complex excavated in 2024 which demonstrates peat shrinkage.*

Figure 2: *Photograph of peat erosion around the fence encircling the monitoring system.*

Peat shrinkage has already had an impact at Magna, as evidenced during the 2024 excavations in the well complex where the North/South field drains showed significant disturbance as a result of peat shrinkage (Frame and Gillis 2025: 29). Figure 1 shows a field drain excavated in 2024 which is less than 10cm from the ground level. When these field drains were initially inserted in the 1850s, they would have been laid in trenches approximately 0.7m – 1m deep. Moreover, Figure 2 shows where the peat has eroded along the fence which encircles the monitoring system. This erosion is likely caused both by peat shrinkage as a result of climate change and livestock disturbance. Nevertheless, this 29cm drop along the peat's vertical face demonstrates the damage to the peat since the fence was inserted in April 2022.

8.1 RAINFALL

In 2025, the UK experienced a drier than average year (Met Office 2026). Figure 3 showcases a dry first two-thirds of the year (January through August) and a wet final third (September through December). From March 31 – May 22, the monitoring system recorded a total of 17.4mm of rainfall. In 2024, the same time period saw 196.6mm of rain, more than 11x the 2025 rainfall in the same period. Met Office data confirms this trend, recording the driest spring (March, April, May) in England since 1893 and the sixth driest spring in the whole of the UK since records began (Met Office 2025b). It was also the driest February to August on record in Northeast and central England (Environment Agency 2026).

This historically dry spring was compounded by a dry January and February, which led to a drought being declared in Cumbria from May until October (Murugesu 2025). Northumberland experienced 'prolonged dry weather' from May until December (Environment Agency 2026). Rainfall throughout the summer months (June, July, August), was 125%, 69% and 19% of the 1991-2020 long term-averages recorded at nearby Spadeadam Royal Airforce base, according to the 'Location-specific long-term averages' database from the Met Office. It is important to note, however, that this publicly available data is not meant for formal

climate monitoring purposes and therefore these averages are demonstrative for the geographic area. Regardless, calculating the percentage differences gives an idea of the abnormal rainfall patterns of 2025. For unprocessed monthly totals, see Appendix 8.

Winter		Spring		Summer		Autumn	
Jan	40%	**Mar**	45%	**Jun**	125%	**Sep**	179%
Feb	40%	**Apr**	22%	**Jul**	69%	**Oct**	67%
Dec	-	**May**	79%	**Aug**	20%	**Nov**	91%

Table 1: *Table showing the percent differences between the Spadeadam long-term monthly rainfall average from 1991-2020 and the 2025 monthly rainfall totals from Magna. December is missing due to an equipment malfunction.*

Autumn saw a significant increase in rain with September receiving 179% of the long-term average. November was slightly below the long-term average but still received the third highest monthly total rainfall at Magna in 2025. These two months helped ease the soil moisture deficit in Cumbria and Northumberland. As the 2025 weather data is examined more in depth by climatologists, more information on its position within long term trends will become available.

8.2 TEMPERATURE

Figure 4 shows temperature data from 2025 by month in the form of a boxplot. In Figure 4, the box itself represents the interquartile range, the horizontal line through the box represents the monthly median, the vertical line represents the minimum and maximum monthly temperature, and the points represent outliers in the data.

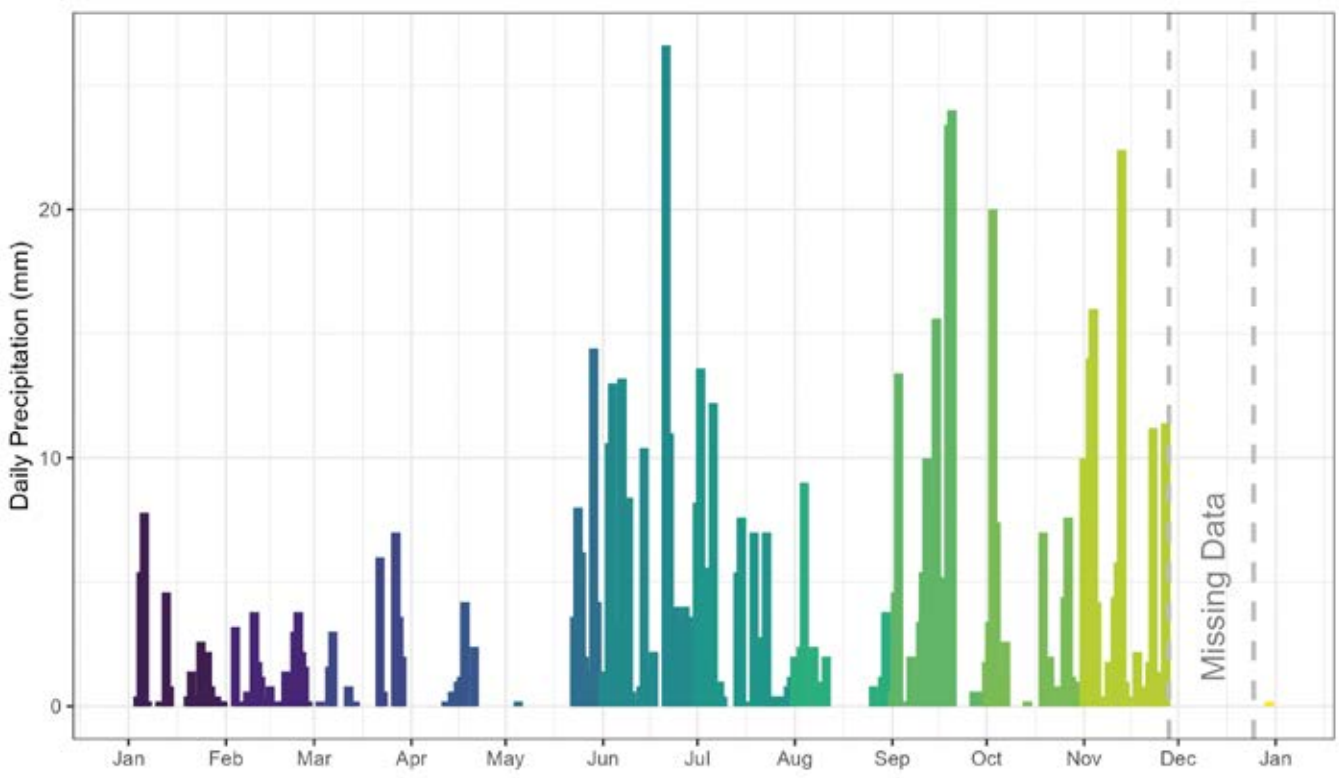


Figure 3: *Bar plot showing daily rainfall levels from January 1, 2025 – November 28, 2025, and December 26, 2025 – December 31, 2025. There was an equipment malfunction from November 29, 2025 – December 25, 2025, which caused a loss of data.*

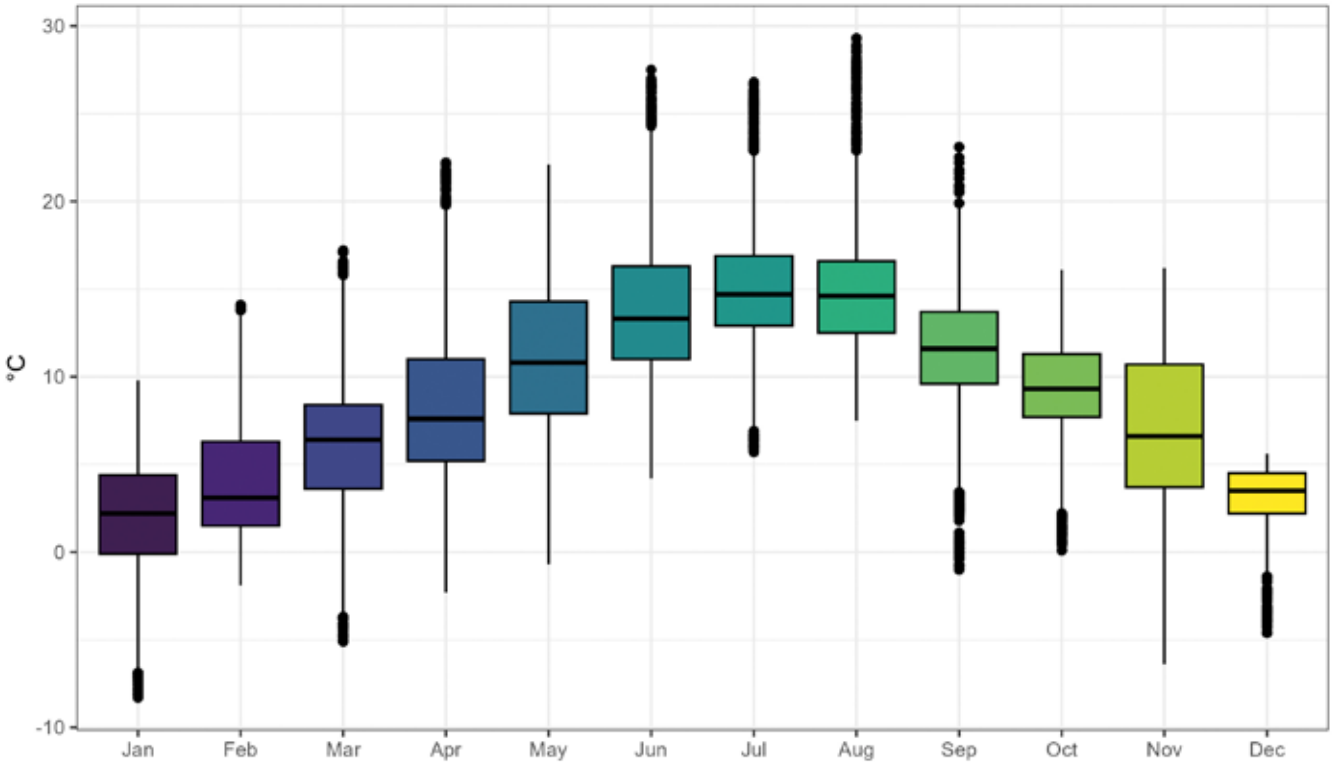


Figure 4: *Boxplot showing ambient temperature data from January 1, 2025 – December 31, 2025, from Magna. An equipment malfunction caused a loss of data from November 29, 2025 – December 25, 2025.As a result, the statistics for December are based on a more limited dataset.*

2025 is the hottest year in the UK since national records began to be kept in 1884 (Met Office 2026). The five warmest years in this record are all in the 21st century, "a statistic that would be virtually impossible without climate change" (Met Office 2026). It was also the sunniest year, a factor that might increase evapotranspiration of the soil in combination with the increased temperatures. Within that, 2025 saw multiple seasonal records broken. Spring (March, April, May) 2025 was the hottest on record, having surpassed the previous record holder, Spring 2024, by 0.13°C (Met Office 2025b). This mirrors averages at Magna which saw a slight increase in temperature in 2025 compared to 2024. It is worth noting that the three warmest springs in the UK have occurred since 2017 which indicates a quickly warming climate, likely as a result of human-caused climate change (Met Office 2025b).

Moreover, summer (June, July, August) 2025 was also the hottest on record. While the heat spikes themselves were not as high as in recent years, the persistent high temperatures, averaging 16.10°C, beat summer 2018 as the previous hottest summer on record (Logan, Ciavarella, and McCarthy 2025: 4). Additional analyses from the Met Office conclude that these summer temperatures will continue to rise as a direct result of human-caused climate change (Logan, Ciavarella, and McCarthy 2025:

Year	Mean Spring (March, April, & May) Ambient Temperature (°C)
2022	No data (instrument installed in April)
2023	7.5
2024	8.4
2025	8.4

Table 2: *Comparison of annual spring mean temperature at Magna.*

10). Because Magna is located in northern Britian, the mean summer temperature is lower than the UK average; nonetheless, the weather station recorded a summer mean temperature of 14.6°C which is higher than the previous three summers of data collected (see Table 3). Similar to the national data, 2025 has the highest mean despite the fact that 2022 had the highest recorded temperature at Magna (34.5°C, 19th July 2022). These rising global temperature levels will have a domino effect on the soil environment at Magna, impacting its evapotranspiration rates, plant growth, microbial diversity, and microbial activity, among other factors (Jansson and Hofmockel 2020: 38-39).

Year	Mean Summer (June, July, & August) Ambient Temperature (°C)
2022	14.5
2023	14.1
2024	13.2
2025	14.6

Table 3: *Comparison of annual summer mean temperature at Magna.*

8.3 GROUNDWATER LEVEL

In addition to the weather station and environmental probe array situated in the North Allotment field, Magna has four piezometers located across the site (Fig. 5). These piezometers measure the groundwater level and temperature once per hour and then require a manual download to view the data. The different locations allow for a greater understanding of the hydrology of the site as they sit within different geological and archaeological features. Site 1 sits within the *vallum* diversion, Sites 2 and 3 sit within the peatland area, and Site 4 is within a deep colluvial deposit.

The 2025 drought caused an approximate half metre drop in the groundwater level at Site 3. As a result, the 81cm peat deposit in this area was briefly above the water table twice this summer, as shown by the dotted line in Figure 6. When this happens, peat is exposed to oxygen and undergoes enhanced deterioration rates and shrinkage. Even though the water table only dropped below the entire peat deposit for approximately 23 days total, the upper portion of the peat deposit was dry for approximately 40% of 2025. The shrinkage this causes has been visually observed on site where the PVC pipe which maintains the borehole, having been inserted flush with the ground in 2021, now sits 2cm above ground. Continual drops in the groundwater level, such as that observed in the summer, will speed up the deterioration of organic archaeological remains preserved in the soil.

The other three piezometers had similar groundwater levels this year, having significant drops in late May and early September. This demonstrates that the droughts not only affect the peatland area, but the entirety of the site. The fluctuating groundwater level was likely impacted by the relatively dry winter as well. At Magna, 2025 had the most significant fluctuations in groundwater levels since 2022, when another notable drought occurred. The 2022 drought saw even lower water levels, but that is unsurprising seeing as that drought ranks among the most severe in the last half century, and it was also part of a wider European drought (Barker *et al.* 2024: 218).

8.4 PH AND REDOX

pH and redox (otherwise known as oxidation reduction potential, or ORP) are two key measurements. The following two figures are modelled using the generalised additive model (GAM) method of linear regression. This method demonstrates how a variable (like pH or redox) responds to an explanatory variable (like dates/time). GAM was chosen as a model as this is a large (1000+ points) dataset with no functional relationship.

pH measures the acidity or alkalinity of a material or environment, using a 0-14 scale where 7 is neutral and, therefore, less than 7 is acidic and more than 7 is alkaline. Figure 8 shows that the probes are located within an acidic soil environment.

Figure 5: *Aerial of site, taken in June 2025, with the piezometer locations demarcated.*

Figure 6: *Groundwater levels from Site 3 for January 1, 2025 – December 31, 2025.*

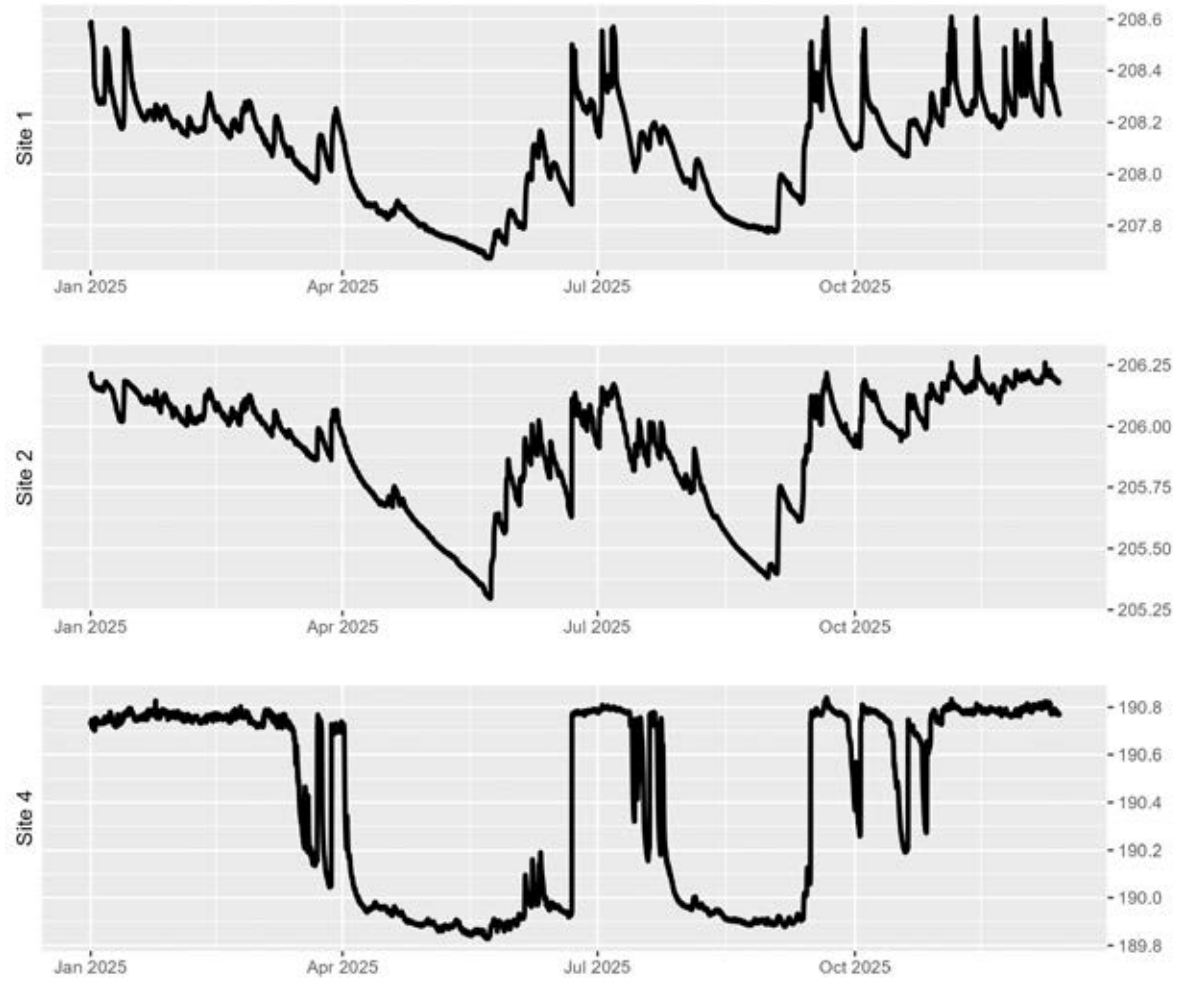


Figure 7: *Groundwater levels from the remaining site piezometers for January 1, 2025 – December 31, 2025.*

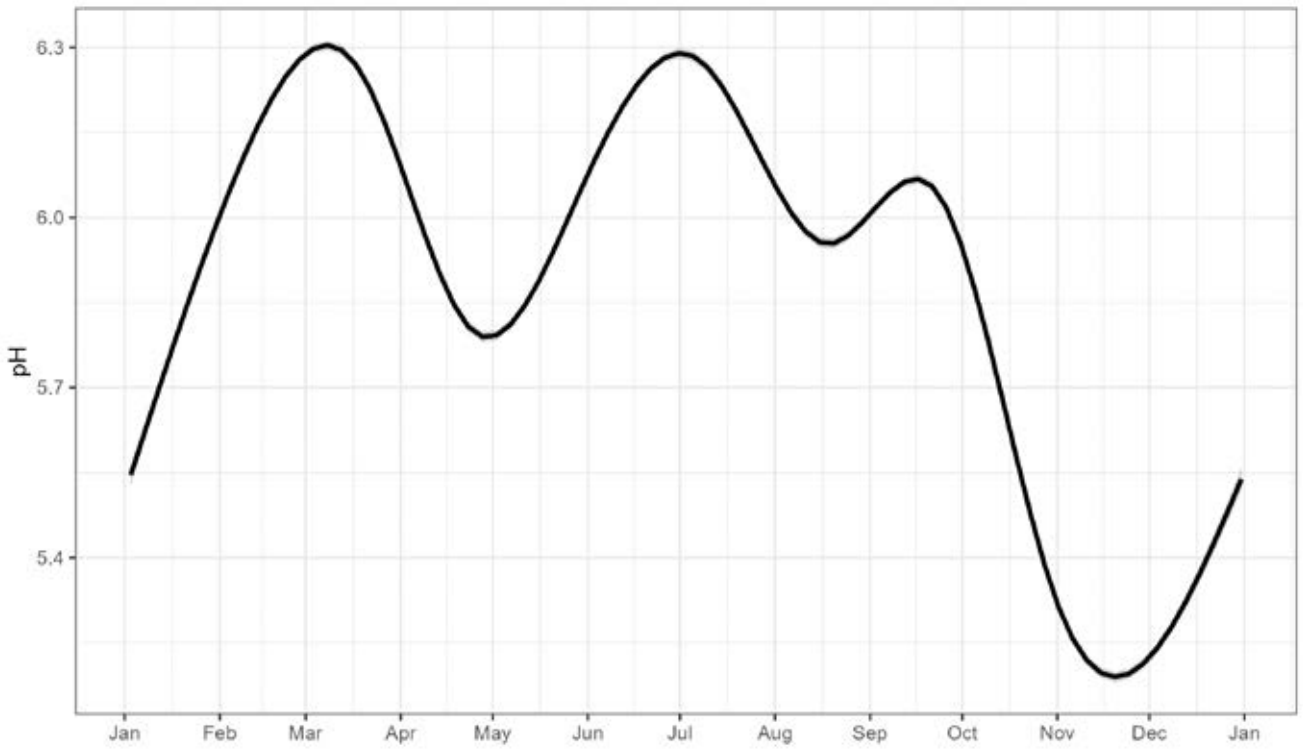


Figure 8: *Generalised additive model method of linear regression results for pH during January 1, 2025 – December 31, 2025.*

Figure 9: *Generalised additive model method of linear regression results for redox during January 1, 2025 – December 31, 2025*.

Redox measures the energy potential between oxidising and reducing agents and can be used to indicate microbial activity. Negative values indicate an anaerobic or reducing environment where artefact degradation is often significantly slower. In contrast, positive values indicate an aerobic or oxidising environment which can increase the rates of degradation. Figure 9 shows that Magna spent 51% of the year with known datapoints (325 out of 365 days) in an aerobic environment which therefore impacts upon the preservation of organic archaeological remains in situ. Moreover, 2025 is the first year that the soil environment continually sat around -200mV during the anaerobic period; in previous years, the soil environment would sit around -450mV.

For the previous three years of complete annual (January-December) data from Magna, the soil environment becomes aerobic in the winter and then anaerobic in the summer. The marked change in redox, electrical conductivity, and pH suggests that the peat is obtaining its water from different sources in the summer versus the winter. One theory suggests that the Magna peatland area is ombrotrophic during the winter and minerotrophic during the summer. This means that during the winter, the primary water source for the peatland is the rain, while groundwater is the primary water source during the summer.

During the winter, Northumberland has increased rainfall – rain has more dissolved oxygen and less nutrients compared to groundwater. As a result of the rain being absorbed into the peatland, the soil environment has a lower pH (normal rain has a pH of approximately 5.6) and increased oxygen which allows for more redox reactions, thus turning the soil environment aerobic. Paradoxically, the lack of rain during the summer causes the peatland to use groundwater as its primary water source. The groundwater is located above a calcium carbonate rich limestone substrate that is alkaline (BGS UKRI 2026). When the groundwater falls below the peat deposits, the clay underlying the peat is more alkaline and contains less oxygen. Further tests, more data points, and additional piezometer data are needed to help determine all the chemical events occurring at Magna.

8.5 CONCLUSIONS

Record breaking weather events and extreme climatic events are becoming standard in the UK due to human-induced climate change (Met Office 2025a, Hanlon *et al.* 2021). This statement is supported by nationwide Met Office data as well as data collected by the monitoring system at Magna and Roman Vindolanda.

Data from the Magna probes, as well as ground truthing though excavation at the site, is indicating that the peatland at Magna is unable to adjust to the rapidly changing weather and extreme climatic events. Changes to the peatland, in turn, affect archaeological preservation conditions. Aerobic conditions, as well as rapid fluctuations in pH values, increase the rate of degradation for organic material remains.

According to the data collected so far, the anaerobic environment within the peatland at Magna is likely to disappear within the next few decades. Through 3.5 years of data collection and over 2 million data points, the project can begin to understand how the future might look for the site, whilst acknowledging that the complexity of the hydrogeological environment which Magna sits in might make mitigation difficult at this stage.

Overall, the monitoring system provides invaluable information about the changing climate and soil environment at Magna. This data is undergoing constant analysis from varied approaches by Vindolanda Trust staff and colleagues around the globe. Data will continue to be collected from both sites for at least ten total years, allowing a robust interpretation of trends and relationships. These results, in combination with the archaeological excavations, will inform future excavation strategies and long-term land management plans. Preliminary reports, such as this, allow insight into the current soil environment, but more tangible analyses and determinative results are not yet possible because of the limited dataset.

9. BULK FINDS

CRISTINA CRIZBASAN

A total of 3,845 individual bulk finds were recorded during the 2025 northern fort ditch excavations, with a combined weight of 95,526 grams. This collection includes Roman and Medieval/post-Medieval pottery, animal bone and teeth, iron, slag and clinker, ceramic building material (CBM), glass, coal, and clay pipes. This varied collection of bulk finds provides valuable evidence for understanding the range of domestic, industrial, and post-Roman activities that took place at the site, contributing to a more complete picture of its long-term usage.

Overall, material was recorded for all bulk find categories. Table 1 shows the quantities from the northern fort ditches. The only numbers to remain low are associated with the post-medieval period (i.e. clay pipes and post-medieval pottery). This pattern reflects the location of the excavations: the 2025 trench targeted the northern ditches of the fort and associated features that produced a higher number of Roman-dated contexts which resulted in more Roman bulk finds.

The quantities shown here are consistently higher than those from 2024, reflecting a clear and expected trend as the excavations moved towards the centre of occupation. The previous season produced comparatively low quantities because excavations focused on areas with more ephemeral activity and fewer Roman deposits, such as the milecastle and its wider landscape, or the post-medieval well mound (Frame *et al.* 2024; Frame and Gillis 2025). Furthermore, some trenches excavated presented changing soil conditions that affected the quality and quantity of both organic and inorganic finds. In contrast, the transition to the fort and its associated features has produced a marked increase in bulk finds, consistent with excavation in and around a permanent, long-lived installation. For comparison, Table 2 exhibits the quantities of bulk finds from 2024 and highlights that the reduced post-medieval data from 2025 is a direct outcome of trench location and context type.

Category	Count	Weight (g)
Samian	209	2,872
Amphora	89	10,148
Mortaria	97	4,906
Other Roman pottery	1,109	16,747
Bone	1,349	18,442
Teeth	117	1,796
CBM	391	33,409
Iron	115	1,849
Slag	61	2,452
Glass	132	716
Coal	32	222
Medieval/ post-med pottery	135	1,933
Clay pipe	9	34

***Table 1**: Bulk finds quantities by category from the northern fort ditches.*

Category	Count	Weight (g)
Samian	141	684
Amphora	58	5,989
Mortaria	40	1,760
Other Roman pottery	550	5,504
Bone	98	1,968
Teeth	33	722
CBM	146	21,652
Iron	159	6,401
Slag	75	4,576
Glass	284	1,167
Coal	46	364
Medieval/ post-med pottery	665	9,576
Clay pipe	23	85

***Table 2:** Bulk finds quantities by category from the 2024 excavation season.*

10. POTTERY REPORT

CRISTINA CRIZBASAN

10.1 INTRODUCTION

The pottery assemblage analysed in this report consists of 976 sherds weighing 23,315 grams. Out of these, 250 sherds represented the minimum number of rims (MNR), with an average estimated number of vessels (ENVavg) – obtained as an average between a minimum and a maximum ENV – of 711 and an estimated vessel equivalent (EVE) of 25.045.

Overall, the assemblage from the northern fort ditches ranged extensively in terms of fabrics and forms in accordance with its chronological context. Not only could formal supply be identified from personal possessions, but local production also became evident through the diversity of specific fabrics within each fabric class, particularly throughout the 2nd century. These aspects will be discussed at length in the following sections.

The structure of the report covers the following key information. Firstly, an in-depth analysis of the overall quantities is given, based on chronology. Pottery from the fort ditches could be assigned to contexts belonging to the 2nd, 3rd and 4th centuries, and to the post-Roman period. The chronological criterion assesses the quantities of pottery per period as a way of understanding the overall fluctuation in supply and local production at the site. This approach will offer preliminary insight into the pottery consumption associated with the fort ahead of the next two seasons of excavation in its southwestern quadrant. Such a perspective will enhance the understanding of pottery consumption associated with various military installations such as milecastles and forts, acting as an ideal comparison for its neighbouring milecastle 46.

The second part of the report focuses on fabric supply, discussed by fabric class and individual fabrics. This approach highlights the relationship between fabric quantities and chronology, the diversity of fabrics and their link to organised supply and production patterns, and the functional analysis of forms within each fabric. These trends and patterns will then be analysed and discussed in their regional context by comparison with other assemblages from nearby milecastles and forts for alternative perspectives on pottery consumption on Hadrian's Wall as well as how Magna fits into this picture.

10.2 METHODOLOGY

The pottery data from this report has been collected and analysed qualitatively and quantitatively. The qualitative data refers to the descriptive information regarding the attributes of the pottery. Throughout this report, the main qualitative data employed are the following:

1. Fabric class: The fabric class refers to the broader categories of fabrics descriptive of various wares. This is the result of lumping specific fabrics into more flexible categories that can be employed in wider comparative studies. These categories follow a common

Fabric Class Code	Fabric Class
A	*Amphorae*
B	Black-burnished and its imitations
F	Finewares
G	Gritted wares
M	*Mortaria*
O	Oxidised wares
Q	White-slipped flagon fabrics
R	Reduced wares
S	Samian
W	Whitewares

Table 1: *Fabric class codes used to classify the pottery fabrics at Magna.*

northern typology series employed previously at sites such Catterick (Evans 2002), Binchester (Evans and Ratkai 2010) and Vindolanda (Alberti *et al.* forthcoming; Vindolanda North Field report forthcoming). The approach relies on nine broad fabric classes as listed above.

2. Fabric: Each fabric class comprises a series of independent fabrics, which have been categorised based on inclusions and surface treatment. Their description can be found in Appendix 9. This category is particularly enlightening for understanding the diversity of fabrics within each fabric class and the extent to which this phenomenon may be linked to supply and local production. Where the fabric has an already recognised equivalent (e.g. BB1, Derbyshire, Dales, Nene Valley colour-coated etc.), this has been mentioned in the description of the fabric.

3. Form class and form type: As additional methods of fabric analysis and interpretation, two more levels of assessment have been employed: form classes and form types. The former designates the main morphological categories of vessels: jars, bowls, dishes, beakers, flagons, cups, lids, *mortaria* and *amphorae*. They have been defined according to Webster's *'Romano-British coarse pottery: a student's guide'* (1976), except the author has merged the categories of 'dish' and 'platter' into the one of 'dish', to declutter the already abundant terminology existent on this matter.

The latter, form types, refers to specific vessel profiles that have been already identified, for example, the Gillam types (1968) or the established Dragendorff typology for Samian ware. These have been used to refer to the relevant vessels; where no precise comparisons are available, the author has drawn the profiles as seen in Appendix 11A.

The addition of form class and form type levels allows one to explore the range of vessels within each fabric category, enabling an understanding of the functional role of each fabric, by displaying the predominant vessels that were produced for each one. For example, cooking jars would be made mostly in reduced (R) greywares, while tablewares and flagons would be made in oxidised (O) and white (W) fabrics.

Quantitative data refers to the information which describes the amount of analysed data, and it is often expressed in a numerical form. The pottery data in this report has been quantified by five methods: number of sherds (NoSh) and weight (Wt) to understand the quantities of materials; minimum number of rims (MNR), estimated vessel equivalent (EVE), and average estimated number of vessels (ENVavg) to grasp the quantities of individual vessels.

The current assemblage has considered all pottery from the stratified, Roman-dated contexts, focusing particularly on the Roman occupation from the 2nd century throughout the 4th century and into the immediately post-Roman period. When residual fragments were identified, they have been left in the assemblage due to their potential to reveal pottery consumption trends over time. These provide their peak period of use, as well as a perspective on the gradual decline of fashions as they become residual and are replaced by other fabrics and form types.

10.3 BASIC QUANTITIES

The 2025 excavations of the Magna northern fort ditches produced a total of 57 contexts, of which 37 contained at least one Roman sherd. Additionally, of those containing Roman pottery, 11 contexts dated to the prehistoric, medieval or post-medieval periods. In short, out of 57 contexts overall, 41 were dated as Roman or post-Roman, and 26 of those contained at least one Roman pottery sherd (Table 2). These are the contexts to be analysed throughout this report. Their quantities have been exhibited in Table 3 below.

Context	Nos of contexts with Roman pottery	Nos of contexts without Roman pottery	Total no of contexts
Roman	26	15	41
Non-Roman	11	5	16
Total	**37**	**20**	**57**

***Table 2:** A breakdown of the number of Roman/non-Roman contexts which contained/did not contain Roman pottery.*

Context No	Date	NoSh	Wt (g)	EVE	MNR	ENVavg
8	post-Roman	7	69	0.060	1	6
16	post-Roman	16	289	0.665	7	15
17	post-Roman	155	4,275	4.055	31	109
18	post-Roman	4	40	0.000	0	3
19	4th c.	31	702	0.810	8	26
20	4th c.	37	470	0.900	9	31.5
21	4th c.	49	1,229	0.645	6	36
24	2nd c.	22	570	0.300	4	19.5
25	4th c.	115	3,152	3.020	25	89.5
26	4th c.	11	102	0.215	3	9
29	2nd c.	22	407	0.350	3	19
30	post-Roman	13	452	0.505	4	10
35	3rd c.	181	5,056	6.530	77	97
36	3rd c.	20	215	0.585	6	11.5
38	3rd c.	74	1,106	1.570	17	54
39	2nd c.	1	31	0.000	0	1
40	2nd c.	6	63	0.255	2	6
42	3rd c.	17	383	0.010	1	10
43	post-Roman	85	1,679	1.210	16	66.5
44	2nd c.	2	12	0.000	0	1
45	3rd c.	14	218	0.780	6	11.5
48	3rd c.	37	1,355	1.530	14	33.5
50	3rd c.	47	1,067	0.775	7	35.5
51	2nd c.	2	90	0.000	0	2
53	3rd c.	6	67	0.155	2	6
54	4th c.	2	216	0.120	1	2
Total		**976**	**23,315**	**25.045**	**250**	**711**

Table 3: *Breakdown of each Roman context containing pottery, its dating and the quantification of pottery by NoSh, weight, MNR, EVE and ENVavg.*

Period	NoSh%	Weight&	EVE%	MNR%	ENVavg%
2nd c.	5.5	5.0	3.6	3.6	6.7
3rd c.	40.6	40.6	47.7	52.0	36.4
4th c.	25.2	25.2	22.8	20.8	27.4
Post-Roman	28.7	29.2	25.9	23.6	29.5
Total	**976**	**23,315**	**25.045**	**250**	**711**

Table 4: *The distribution of pottery quantities (%) across the four periods in the northern fort ditches.*

10.3.1 QUANTITIES BY PERIOD

The 2025 Magna assemblage revealed pottery associated with four Roman periods: 2nd, 3rd and 4th century, followed by a post-Roman period. This section looks at the quantity distribution across each period to understand how chronology affects the flow of pottery supply. Table 4 exhibits the data based on five quantification methods as percentages. Overall, the 3rd century contexts contained most of the pottery across all the quantification methods, while the 2nd century revealed the least amounts. These results are likely connected to two factors: the nature of the excavated contexts as well as the historical background of the area.

10.3.1.1 ARCHAEOLOGICAL CONTEXT AND QUANTITIES

The 2nd century assemblage is relatively limited and derives from contexts associated with both the primary (M25-29; M25-40) and secondary fort ditches (M25-24; M25-51). The accumulation of the material is likely a result of discard. Quantities are higher in the primary ditch, likely due to its closer proximity to the fort which made it a more convenient location for waste disposal. The secondary ditch, situated further from the fort, appears to have been less frequently used for this purpose. These overall low quantities of pottery support the archaeobotanical evidence indicating that while these features functioned as refuse deposits, they did not represent the principal dumping area which was likely located elsewhere. The reduced ceramic quantities in this period should therefore be understood as a product of depositional location and context rather than an indication of lower levels of pottery consumption.

In contrast, the 3rd century contexts produced the highest pottery quantities across the Roman periods at Magna, continuing to reflect disposal tendencies. A substantial part of the material derived from the main fills of the first fort ditch (M25-35; M25-36) and its related contexts (M25-42). Given its proximity to the fort, this ditch is likely to have continued its function as an alternative rubbish dump. This interpretation is supported both by the volume of pottery and by the presence of other bulk finds and organic materials, including bone, leather and wood. The 3rd century quantities were also supplemented by the deposits spread to the north of the ditches (M25-48/M25-50; M25-53).

Moving into the 4th century and onwards into the post-Roman period, the quantities decline to almost half of those in the 3rd century. A quick glance at the nature of associated contexts sheds light on this situation. Many deposits from this period accumulated after the fort ditches had ceased to function as active features (M25-19; M25-20; M25-26), while others resulted from flooding, silting, or slumping (M25-25; M25-21). Post-Roman contexts, formed following the withdrawal of Roman administration, largely represent natural silting, structural collapse, and possible stone robbing associated with the fort's abandonment. The final decades of Roman occupation and the immediate post-Roman phase thus reflect reduced activity on the site, mirrored in the lower quantities of pottery recovered.

10.3.1.2 HISTORIC BACKGROUND AND QUANTITIES

Although the archaeological context affects how much pottery is recovered from each period, the historical background also shapes the assemblage quantity and diversity. For example, the low amount of pottery associated with the 2nd century could be related to the stone fort construction and the activities of the Antonine period. On the one hand, the construction of the stone fort at Magna

likely dates to 130s CE (Birley, R.E. 1998: 10). It is therefore likely that the use of the ditch as a rubbish dump began then and it remained open for a substantial period thereafter. On the other hand, the use of the fort ditches could have been affected by a mass transfer of the military further north into Scotland. The first half of the 2nd century is marked by the building of the Antonine Wall and the decision in 138 CE to move soldiers and units there. This would have left some parts of Hadrian's Wall abandoned or less occupied until the mid-160s (Breeze and Dobson 2000: 116). In the later 2nd century, the return to Hadrian's Wall did not necessarily result in drastic pottery increase, likely due to the military conflicts unravelling at that time.

Starting with Marcus Aurelius' reign, a series of campaigns were undertaken against the Britons, particularly on the coasts, to prevent boat invasions (Symonds 2020: 97). New conflicts emerged again in the 170s and 180s CE, all culminating with Septimius Severus' campaigns in Scotland, which ended the cycle of violence and resulted in fort developments and frontier work (Breeze and Dobson 2000: 140). Therefore, the pottery supply at the site seems to be affected in light of these events, with less reaching the site during periods of instability.

Although the overall quantities of 2nd century pottery are relatively low, the diagnostic sherds provide important chronological and supply-related insights. A closer look at this material indicates the presence of a late 1st to mid-2nd century upright rim of a jar made in black-burnished ware 1 (similar to JA59 in Rushworth 2009), as well as a late 2nd to early 3rd century beaded rim of a black-burnished ware 1 dish (see BO84/85 in Rushworth 2009). These sherds suggest an updated supply of pottery, covering both the beginning and the end of the 2nd century CE in correlation with the initial stone fort construction and the Antonine Wall retreat. The assemblage therefore reflects not a complete interruption in supply, but a contraction in the volume of material reaching the fort during the 2nd century due to a period of instability.

Moving into the 3rd century, as previously noted, the quantities increase drastically. In terms of number of sherds (NoSh), the amount goes from 5.5% to 40.6%, while the minimum number of rims (MNR) rises from 3.6% to 52%. This increase is likely tied to the region's military context. Following the Severan campaigns at the turn of the 2nd and 3rd centuries CE, the series of conflicts that began in the late 2nd century came to an end, leading to a more peaceful period for the remainder of the 3rd century (Symonds 2020: 108). This phenomenon can be translated into an increased pottery supply at the site. No conflicts meant a more flourishing community and therefore an increased flow of goods. It is in this period and throughout the 4th century that the black-burnished ware supply peaked, and new products from the East Yorkshire area entered the market (Bidwell and Croom 2010).

These results are in line with the overall 3rd century occupation in the wider environment of Magna. Excavations at the nearby milecastle 46 and *vallum* showed similar patterns, with a noticeable increase in the 3rd century CE (Crizbasan in Frame *et al.* 2024: 20; Crizbasan 2025a: 111). In the light of the results over the past three excavation seasons at the fort and wider environment of Magna, it has become clear that the 3rd century was a flourishing period in this area, showing a consistent increase in pottery amounts across all the analysed assemblages to date.

In the 4th century and into the post-Roman period, the quantities of pottery decline again, likely as a result of the gradual abandonment of the area, hence reducing occupation. The last anthropogenic fill of the first fort ditch (M25-25) shows that its use as a rubbish dump diminished from the previous period. These patterns of slow abandonment appear typical of this area and Hadrian's Wall overall at the time (Birley, R.E. 1998: 44). Evidence from milecastles supports this interpretation. At milecastle 54, pottery indicated continued occupation into at least part of the 4th century CE, notably marked by the presence of calcite-gritted ware jars, which reached their peak distribution during this period (Allason-Jones, Bennett and Welsby 1984: 234).

A comparable pattern has been recorded at milecastle 46, where calcite-gritted ware jars were recovered from context M23-22, a rubbish accumulation beginning in the 3rd century and continuing into the 4th. Further chronological support comes from context M23-58, which produced an almost complete jar of Gillam 147 type. This form has parallels at Housesteads Roman Fort and has been dated to 290–370 CE (Gillam 1968: 195). Although the date range is broad, it falls predominantly within the first three quarters of the 4th century. The evidence suggests that occupation persisted into the 4th century, but it was characterised by reduced deposition and changing patterns of activity. The Magna assemblage fits within this regional trend, reflecting continued but diminishing use of the site prior to its final abandonment.

The quantity and distribution of pottery from the 2025 excavations at Magna's northern fort ditches reflects a strong interplay between site formation processes and the wider historical landscape. The 3rd century stands out across all quantification methods as the period of highest ceramic deposition; a pattern closely tied to the use of the first fort ditch as a refuse area and to the relative stability following the Severan campaigns. In contrast, the 2nd century produced the lowest quantities, largely due to the nature of the excavated contexts. While some were peripheral, others were related to walls and clay deposition, which overall impacted the final quantities. The broader regional disruptions connected to the Antonine advance no doubt further impacted these results.

Pottery quantities declined in the 4th century and continued to fall into the post-Roman period, mirroring decreasing activity, the gradual disuse of the fort ditches, and the wider pattern of contraction along Hadrian's Wall. These trends are consistent with evidence from the surrounding landscape, including milecastle 46, milecastle 54 and other Wall installations, where activity peaks in the 3rd century before declining in the later Roman period. Overall, the assemblage from Magna reinforces a now well-established narrative: a disrupted 2nd century, a flourishing and well-supplied 3rd century, and a steady decline in ceramic deposition as occupation diminished toward the end of Roman occupation in Britain.

10.4 FABRIC SUPPLY

The following section analyses the fabric supply at the site over time, from the 2nd century until the post-Roman period inclusively. The material is presented according to the main fabric classes and their associated fabrics. Where necessary, further fabric analysis has been conducted as part of a series of selective case studies discussed more in-depth in Chapter 10.5.

Figure 1 below shows the overall fabric class quantities across the four periods altogether in the northern fort ditches, expressed in NoSh, weight, MNR, EVE, ENVavg and their associated percentages. The three top fabric classes which are consistently high across all periods are the black-burnished ware products (B), the reduced wares (R) and Samian ware (S). These results are typical of the general supply on Hadrian's Wall, especially the frequent supply of BB1/BB2 products (Bidwell and Croom 2010: 20). These results will be discussed by periods within each fabric class section below, to understand how fabric consumption changed at the site over time and identify residuality within the contexts.

10.4.1 CLASS A- *AMPHORAE*

In total, 49 sherds of *amphora* were recovered from the selected contexts. They came from an average estimated number of vessels of 31, which meant

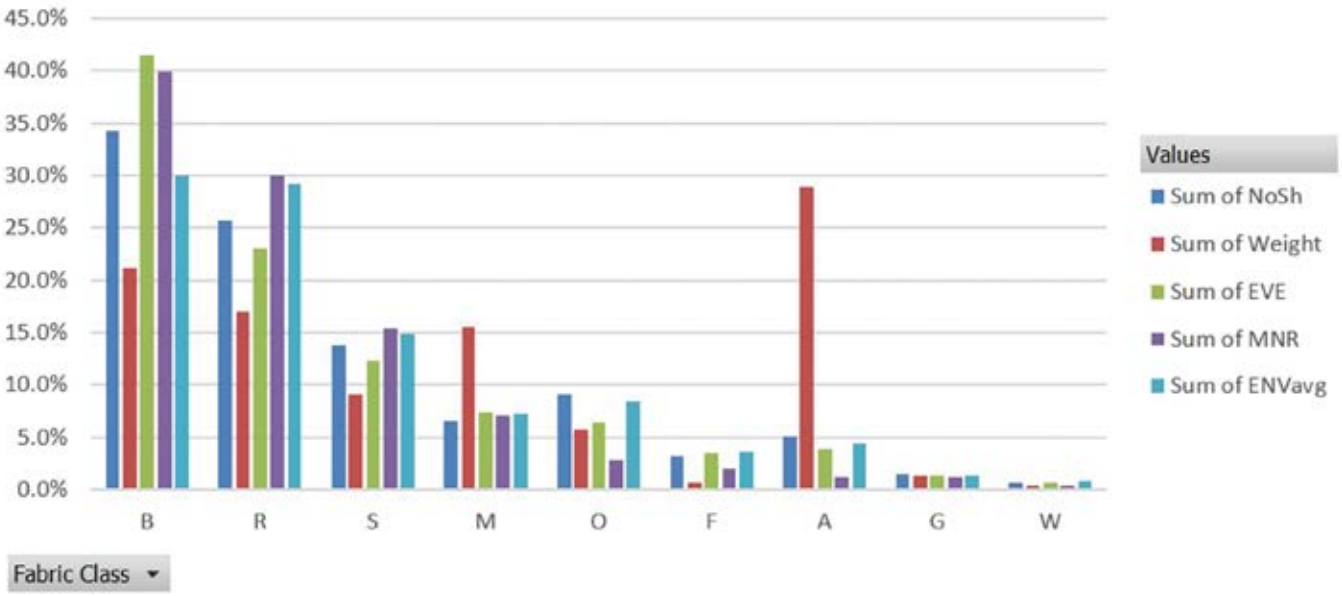


Figure 1: *Visual representation of the overall fabric class quantities at Magna from the Roman and post-Roman contexts.*

4.5% of the analysed assemblage. Table 5 focuses on the A fabric class, displaying the main fabrics and their distribution across the four periods. Three fabrics have been identified: the Baetican *amphora* (BAT AM), the Gauloise *amphora* (GAL AM), and lastly, an unknown miscellaneous category (AMPH).

The most abundant type is by far the Baetican *amphora*, which takes up most of the *amphora* quantities in each period, or, in the case of 4th century and post-Roman period, it is the only type of A fabric present in the associated contexts. However, it is likely that from the end of the 3rd century CE onwards, all the Dressel 20 *amphorae* are residual. According to Bidwell and Croom (2010: Fig. 4.1), the Baetican *amphorae* imports cease by 275 CE. Similarly, the potential Gauloise *amphora* sherd is likely to be residual by the 2nd century, as its production is associated mostly with the early 1st century CE despite some types continuing to be produced and exported to Britain into the 2nd and 3rd centuries (Tyers 1996: 95).

Overall, it appears that up to the end of the 3rd century CE, the category of *amphora* displayed a steady supply of products to the site. From the 4th century onwards however, most of the sherds are likely residual. This suggests that another form of transport may have taken over in this period. Bidwell and Speak (1994) mention the possibility of transporting wine in barrels from the Rhineland to South Shields. A similar situation is likely to have occurred at Vindolanda. Due to anaerobic preservation conditions at the site, evidence for barrels have been recovered from period I to period VII (Sands and Marliere 2020: 365). Therefore, this practice could have also existed at Magna from the very beginning and continued into the 4th century, except the aerobic conditions meant that no organic material survived from these upper levels.

10.4.2 CLASS B- BLACK-BURNISHED WARE

The black-burnished ware class includes both the original fabrics from southwest and southeast England, as well as the imitations made in black-burnished typical form or fabric style. Table 6 indicates that the highest consumption of black-burnished fabrics occurred throughout the 3rd century. Additionally, the most popular fabric is black-burnished ware 1 (BB1), with 32.0% out of a total of 44.9% in the 3rd century. This pattern has been recognised before, where BB1 consumption has overtaken other fabrics. Its supply peaks in the 3rd century, starting from the third quarter of the 2nd century and continuing into the middle of the 4th century (Gillam 1976: 59). Thus, the bulk of it spans the entire 3rd century.

These preliminary patterns seem to correlate with general supply patterns of black-burnished ware throughout Roman occupation in the North. Birley, Andrew R., Meyer and Greene (2016: 250) called the low quantities of black-burnished ware at Vindolanda a feature of the Flavian-Trajanic

Fabric/Period	NoSh%	Weight%	ENVavg%
2ND C.	**10.2**	**8.0**	**12.9**
AMPH	2.0	1.4	3.2
BAT AM	6.1	5.8	6.5
GAL AM?	2.0	0.7	3.2
3RD C.	**40.8**	**43.6**	**38.7**
AMPH	2.0	0.2	3.2
AMPH?	2.0	0.4	3.2
BAT AM	36.7	43.0	32.3
4TH C.	**22.4**	**23.9**	**29.0**
BAT AM	20.4	22.6	25.8
BAT AM?	2.0	1.3	3.2
POST-ROMAN	**26.5**	**24.6**	**19.4**
BAT AM	26.5	24.6	19.4
Total	**49**	**6,509**	**31**

Table 5: *The distribution of* amphora *(A) fabrics across the four periods at Magna.*

assemblages. It is only after the 120s CE that the supply and consumption of these products began to increase (Gillam 1976: 57). The 2024 excavations at Vindolanda revealed, through a chronological approach to fabric distribution, that period VII (213-300 CE) consumed 25.2% B fabrics, followed in period VIII and VIIIA at 20.9% and 19% respectively (Crizbasan 2025b: Table 10). Therefore, the association of B fabrics with the general 3rd century seems to be a trait typical of sites in northern England.

Table 6 also shows that across each period at Magna, the BB1 fabric or its associates (BB1.A, BB1.B, BB1GW) were supplied in visibly higher quantities than its southeastern counterpart, BB2. These patterns represent a previously identified trend which shows a clear supply difference between the specific segments of the Wall. While the western part received more BB1, the eastern end of the Wall was provided with the products from Thameside kilns (Bidwell and Croom 2010: 27-28). Considering these already known patterns, it is crucial to explore the central sector through the case-study of Magna and see where the two supply systems merge.

Within this framework, it appears that Magna aligns with the western end of the Wall, where supply of black-burnished products was dominated by the Dorset vessels. Table 6 shows that out of 44.9% of the total black-burnished NoSh in the 3rd century, 32.0% of those were BB1, 9.9% were likely BB1 from another source and 1.2% represented grey ware imitations of BB1 forms. Conversely, BB2 took up only 1.2%. This trend continued into the 4th century with 15.9% BB1, 7.2% BB1 from another source and only 0.9% BB2 products, rather residual at this stage. This is expected as Magna is positioned towards the western half of the Wall frontier. Vindolanda, which is more central, displays similar preferences for the BB1 products in the 4th century, but with a preference for BB2 in the earlier phases of the 3rd century (Bidwell 1985: table VII;

Fabric/Period	NoSh%	Weight%	ENVavg%
2ND C.	**5.4**	**3.7**	**6.4**
BB1	3.9	2.0	4.5
BB1.A	1.5	1.8	1.9
3RD C.	**44.9**	**46.8**	**39.9**
BB1	32.0	33.7	26.9
BB1.A	9.9	8.7	9.2
BB1?	0.6	0.8	0.5
BB2	1.2	1.6	1.9
BBGW	1.2	2.0	1.4
4TH C.	**25.4**	**23.6**	**25.9**
BB1	15.9	16.4	15.8
BB1.A	7.2	4.2	6.8
BB1.B?	0.3	0.3	0.5
BB2	0.9	1.6	1.4
BBGW	1.2	1.1	1.4
POST-ROMAN	**24.3**	**25.9**	**27.8**
BB1	14.4	14.0	13.7
BB1.A	5.4	5.3	8.5
BB2	2.7	4.8	3.3
BB2GW	0.6	0.7	0.9
BBGW	1.2	1.0	1.4
Total	**334**	**4,964**	**212**

***Table 6:** The distribution of black-burnished (B) fabrics across the four periods at Magna.*

Crizbasan 2025b: 47, Table 9). The preliminary results of the 2025 excavations at Magna align with previously identified patterns and show the importance of BB1 as a supplier in and around the central and western sectors of the Wall.

Figure 2 below presents the form classes made in black-burnished fabrics overall by ENVavg. Out of the total percentage, 62.0% were jars, 4.7% dishes, 15.1% bowls and 18.2% either a dish or a bowl. This produces an overall split of approximately 60:40 between cooking vessels (jars) and tableware-style vessels (dishes and bowls) in the northern fort ditches at Magna. The values align with the results from the neighbouring fort at Vindolanda, where a comparable ratio was encountered (Crizbasan 2025b), indicating similar functional consumption patterns across the two assemblages.

These results contrast with the evidence from milecastle 46, where the 2023-2024 excavations revealed a stronger preference for jars, with ratios of 70:30 by ENVavg, and 80:20 by EVE (Crizbasan 2024). This comparison highlights a more balanced use of black-burnished vessels at forts, in contrast to the more cooking-focused assemblages from milecastles. At Magna, this distinction is evident within the same site, with differing consumption patterns between the fort and the milecastle.

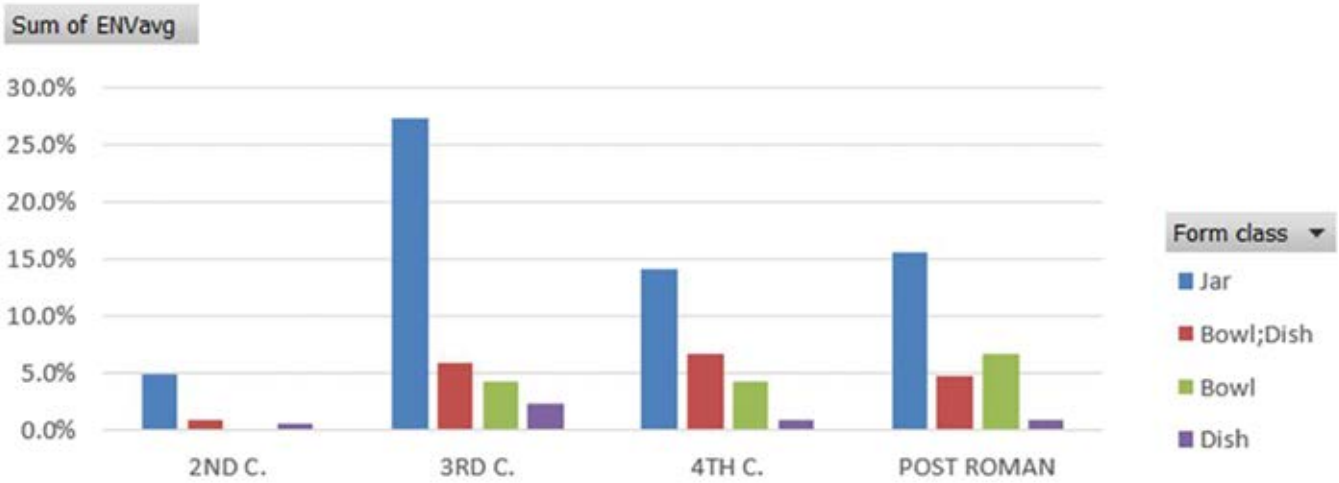


Figure 2: *Form class distribution in the B fabric class from the 2nd century to the post-Roman period.*

10.4.3 CLASS F- COLOUR-COATED AND FINEWARES

In total, 32 sherds of finewares were analysed in this report, originating from 26.5 ENVavg (Table 7). They derived predominantly from 4th century contexts, despite the 3rd century containing the highest quantities of vessels. However, most finewares were in fact residual. The CCM category contained predominantly rough-casted beakers. Where rim profiles were preserved, they corresponded to the Gillam 72 cornice rim beaker type, dated to the end of the 1st century CE and the first third of the 2nd century CE (Gillam 1968: 11). They dominated the market until the end of the Hadrianic period, after which barbotine-decorated vessels became increasingly prominent from the Antonine period onwards (Greene 1978: 53). Given this chronology, the presence of Gillam 72 forms in 3rd and 4th century contexts indicates residuality and redeposition rather than continued supply.

The presence of Lower Nene Valley colour-coated (LNV CC) beakers in the 4th century is expected. These products started supplying the British markets from about 150 CE (Frere 1972: 795-6; Greene 1978: 53). They are missing from the 3rd century contexts. However, this inconsistency could be due to the nature of the contexts as ditches, which unlike occupational levels, will reveal more sporadic patterns in material culture. Most of the LNV CC vessel forms are beakers (15.1%), which may be slightly residual. That is because the 4th century is characterised by the reduction of beaker production and the intensifying of flagons, dishes and other coarser types of vessels (Howe, Perrin and Mackreth 1980: 8-9). This pattern has already been observed at Vindolanda in both the southeastern (Evans in Alberti-Dunn forthcoming) and northeastern quadrant (Crizbasan 2025b). Therefore, the inconsistent patterns from the northern fort ditches at Magna are likely a result of their use as a rubbish dump as opposed to the occupational levels associated with the fort.

Period/ Fabrics	Form class ENVavg%			Total
	Beaker	Castor box	Other	
2ND C.	**15.1**	**0.0**	**0.0**	**15.1**
CCM	7.5	0.0	0.0	7.5
CCMS	3.8	0.0	0.0	3.8
LNV CC	3.8	0.0	0.0	3.8
3RD C.	**28.3**	**0.0**	**0.0**	**28.3**
CCM	20.8	0.0	0.0	20.8
CNG BS	3.8	0.0	0.0	3.8
FINE	3.8	0.0	0.0	3.8
4TH C.	**34.0**	**3.8**	**3.8**	**41.5**
CCM	11.3	0.0	0.0	11.3
CNG BS	3.8	0.0	0.0	3.8
LNV CC	15.1	3.8	3.8	22.6
LNV CC?	3.8	0.0	0.0	3.8
POST-ROMAN	**15.1**	**0.0**	**0.0**	**15.1**
CCM	3.8	0.0	0.0	3.8
LNV CC	11.3	0.0	0.0	11.3
Total	**92.5**	**3.8**	**3.8**	**100.0/26.5**

Table 7: *The chronological distribution of fineware (F) form classes and fabrics.*

10.4.4 CLASS G- GRITTED WARES

Within the gritted ware class (G), only 14 sherds were recovered and analysed which came from 19.5 average estimated number of vessels (ENVavg). These quantities are rather low, considering that the 4th century is generally dominated by gritted wares: Dales ware in the first half of the 4th century CE (Loughlin 1977: 86; Tyers 1996: 190) and calcite-gritted ware in its second half (Bidwell and Croom 2010: 29). Even if the overall quantities are low, their distribution across time suggests the existence of these patterns (Table 8). Hence, the 2nd and 3rd centuries present the lowest quantities, with only 10.5% ENVavg each. The amount spikes to 36.8% in the 4th century, consisting mainly of shell-gritted Dales ware (DAL SH) and calcite-gritted ware (HUN CG). The highest quantities, 42.1%, come from the post-Roman contexts. This is due to their prolonged consumption which likely continued into the 5th century (Collins 2013: 133-134). Therefore, the consumption at Magna fort appears to align with the general supply patterns existent on the Wall at the time.

Period/Fabric	NoSh%	Weight%	ENVavg%
2ND C.	**7.1**	**3.8**	**10.5**
GQTZ	7.1	3.8	10.5
3RD C.	**28.6**	**56.7**	**10.5**
HUN CG	28.6	56.7	10.5
4TH C.	**28.6**	**20.7**	**36.8**
DAL SH	7.1	7.2	10.5
HUN CG	21.4	13.5	26.3
POST-ROMAN	**35.7**	**18.8**	**42.1**
DER CO	7.1	5.0	10.5
GQTZ	7.1	4.4	10.5
HUN CG	21.4	9.4	21.1
Total	**14**	**319**	**9.5**

Table 8: *The distribution of gritted (G) fabrics across the four periods at Magna.*

10.4.5 CLASS M- *MORTARIA*

Within the *mortaria* class (M), 64 sherds have been recovered and analysed which came from 52 average estimated number of vessels (ENVavg). Most quantities came from the 3rd and 4th centuries CE, though this might be a reflection of the fact that a high quantity of the total assemblage came from these chronological timeframes, as well as the contexts representing mostly rubbish dumps. Thus, based on ENVavg, the consumption rises from 7.7% in the 2nd century CE, to 30.8% in the 3rd century and 38.5% in the 4th century.

Table 9 presents the chronological distribution of specific fabrics within the M class. The 2nd century is dominated by miscellaneous fabrics (MORT), followed by early local oxidised *mortaria* (MORTEL). Moving into the 3rd century, the miscellaneous fabrics continue to dominate, while the MORTEL category becomes residual and continues as residual into the 4th century. The 3rd century sees the emergence of Mancetter-Hartshill products (MAH WH), while the following century displays the consumption of Lower Nene Valley products (LNV WH). These patterns clearly reflect the chronological supply patterns at the time. The first part of the 4th century, in particular, received mostly Mancetter-Hartshill and Lower Nene Valley *mortaria* (LNV WH) (Bidwell and Croom 2010: 32). From about 350 CE, Crambeck *mortaria* (CRA PA and CRA WH with the mention that they were not contemporary) enter the market (Bidwell and Croom 2010: 33-34), though they do not seem to appear in the analysed contexts.

10.4.6 CLASS O- OXIDISED WARES

Overall, the oxidised sherds amounted to 8.4% of the total ENVavg. The chronological distribution of oxidised fabrics has been further explored in Table 10. The highest ENVavgs are associated with the miscellaneous oxidised fabrics (OXID AND OXCOAR), likely residual from later 1st and 2nd century deposits, as previously observed at the fort of Vindolanda (Evans in Alberti-Dunn forthcoming). The residuality is also supported by the distribution of form classes across oxidised fabrics by ENVavg in Table 11. As observed, a substantial proportion of the assemblage (71.1%) could not be identified to vessel form due to the high degree of abrasion, which obscured diagnostic features and limited interpretation of their functional role. Therefore, it appears that oxidised fabrics ceased to be imported, locally produced, or consumed at Magna by the 3rd and 4th centuries and, instead, the other fabric classes had taken over the supply.

Period/Fabric	NoSh%	Weight%	ENVavg%
2ND C.	**6.3**	**2.7**	**7.7**
MORT	4.7	1.5	5.8
MORTEL	1.6	1.2	1.9
3RD C.	**37.5**	**24.5**	**30.8**
MAH WH	3.1	1.8	3.8
MORT	18.8	10.5	7.7
MORTEL	15.6	12.1	19.2
4TH C.	**34.4**	**42.3**	**38.5**
LNV WH	4.7	8.6	5.8
MAH WH	1.6	0.3	1.9
MORT	18.8	25.1	23.1
MORTEL	9.4	8.3	7.7
POST-ROMAN	**21.9**	**30.5**	**23.1**
MAH WH	4.7	4.6	3.8
MORTEL	17.2	25.9	19.2
Total	**64**	**3,592**	**52**

Table 9: *The distribution of* mortaria *(M) fabrics across the four periods at Magna.*

Period/Fabric	NoSh%	Weight%	ENVavg%
2ND C.	**1.1**	**0.6**	**1.7**
OXID	1.1	0.6	1.7
3RD C.	**42.2**	**55.6**	**29.8**
FLAG2	8.9	7.8	5.0
OXCC	1.1	2.2	1.7
OXCOAR	21.1	40.6	8.3
OXID	6.7	3.5	8.3
OXRI	4.4	1.6	6.6
4TH C.	**30.0**	**19.4**	**38.0**
FLAG2	2.2	1.0	3.3
FLAG3	1.1	0.4	1.7
OXCC	1.1	0.7	1.7
OXCOAR	13.3	11.8	14.9
OXID	7.8	3.7	11.6
OXRI	4.4	1.9	5.0
POST-ROMAN	**26.7**	**24.3**	**30.6**
FLAG1?	1.1	0.9	1.7
FLAG2	1.1	2.0	1.7
OXCC	2.2	1.6	3.3
OXCOAR	12.2	13.7	12.4
OXID	7.8	4.6	8.3
OXRI	2.2	1.4	3.3
Total	**90**	**1384**	**60.5**

Table 10: *The distribution of oxidised (O) fabrics across the four periods at Magna.*

	Form class ENVavg%						Total%
Period	Bowl	Bowl/Dish	Dish	Flagon	Jar	U/I	
2ND C.	0.0	0.0	0.0	0.0	0.0	1.7	1.7
3RD C.	0.0	0.0	1.7	5.0	3.3	19.8	29.8
4TH C.	0.0	1.7	0.0	5.0	0.0	31.4	38.0
POST-ROMAN	1.7	1.7	0.0	5.0	4.1	18.2	30.6
Total%	**1.7**	**3.3**	**1.7**	**14.9**	**7.4**	**71.1**	**100.0**

***Table 11:** The distribution of form classes across O fabrics by ENVavg.*

10.4.7 CLASS R- REDUCED WARES

The reduced class was the second most prominent at Magna, accounting for an estimated 209.5 vessels. Based on ENVavg, the percentage was equivalent to 29.1, closely following B class at 30.0%. Table 12 below displays the chronological distribution of R fabrics. Overall, the miscellaneous fabrics (RWM and GWM) appear to be the most prominent across the assemblage.

In the 3rd century, more identifiable fabrics emerge, such as Crambeck reduced ware (CRA RE, CRA RE2) and Southeast Reduced Ware (SERW). The former is a later fabric and therefore its presence in the 3rd century contexts is likely either intrusive or dates to the very end of this period, at the transition with the 4th century, hence the small quantities (1.0%). The latter, despite quantities on the lower side (1.0%), is likely contemporaneous. Supplied from the Thameside kilns, they reached the Wall in the 3rd century and dominated its eastern end, especially at South Shields (Bidwell and Croom 2010: 27-28). However, it appears that little SERW reached Magna at the time. The fabric originated from a similar area to BB2 production, which also arrived in small quantities at the site. This may be a recognisable pattern, where products from the opposite west coast, such as the BB1 vessels from Dorset, reach Magna in greater quantities, as already discussed in the section on the B fabrics.

10.4.8 CLASS S- SAMIAN

In total, 133 sherds from an average estimated number of 104 vessels have been analysed in this section. The Samian assessment in this report focused on forms and form types, while a more in-depth, specialist analysis will be undertaken following an expected more substantial quantity of Samian over the next two excavation seasons.

Table 13 displays the Samian form class and type consumption over time at Magna. The 2nd century provided no identifiable form classes or types. Conversely, the 3rd century showed a wide variety, though some vessels are likely residual. The most consumed form class were the dishes at 17.3%. The most frequent types were the DR31 variations, which are typical of the chronological period assessed. This form type and its variations followed one after another chronologically: Dr. 18/31 covered the period 100-150 CE, while Dr. 31(R) followed immediately after, between 150-200+ CE (Willis 2004).

The second most prominent class in the 3rd century were bowls at 10.6%. Most sherds were identified through the presence of decoration, but no specific type could be assigned. Hence, 7.7% are unidentified, 1.9% come from DR37, and 1.0% from DR30. The first identified bowl type, DR37 becomes popular shortly after 90 CE and remains so until the end of production (Willis 2004). Similarly, DR30 type is also available throughout the Samian exporting period (Webster 1996: 43).

Residuality emerges already in the 3rd century. This is supported by the presence of a DR27 cup, which became a rare occurrence in Britain by 160 CE. Instead, DR33 imports accelerated and took over from the second half of the 2nd century (Willis 2004). By the 4th century, Samian consumption drops from 44.2% to 18.3% and the material becomes residual as its production and heavy supply to northern England and other areas in Britain ceases (Webster 1992: 13).

	Form class ENVavg%						Total%
Period/Fabric	Bowl	Bowl/Dish	Dish	Jar	Lid	U/I	
2ND C.	**1.0**	**0.0**	**0.5**	**1.9**	**0.0**	**3.8**	**7.2**
GWB	0.0	0.0	0.0	0.5	0.0	1.0	1.4
GWM	1.0	0.0	0.0	0.0	0.0	1.0	1.9
RW1	0.0	0.0	0.5	0.0	0.0	0.0	0.5
RWM	0.0	0.0	0.0	1.0	0.0	1.4	2.4
SGRIT	0.0	0.0	0.0	0.5	0.0	0.5	1.0
3RD C.	**1.0**	**0.5**	**0.0**	**8.8**	**0.5**	**22.2**	**32.9**
COAR	0.0	0.0	0.0	1.0	0.0	2.9	3.8
CRA RE?	0.0	0.0	0.0	0.0	0.0	0.5	0.5
CRA RE2	0.0	0.0	0.0	0.5	0.0	0.0	0.5
GWB	0.5	0.0	0.0	3.3	0.0	2.6	6.4
GWM	0.5	0.0	0.0	0.7	0.5	4.8	6.4
GWRC	0.0	0.0	0.0	1.0	0.0	0.0	1.0
RW1	0.0	0.0	0.0	0.0	0.0	0.5	0.5
RWM	0.0	0.0	0.0	1.9	0.0	9.5	11.5
SERW	0.0	0.0	0.0	0.5	0.0	0.0	0.5
SERW?	0.0	0.5	0.0	0.0	0.0	0.0	0.5
SGRIT	0.0	0.0	0.0	0.0	0.0	1.4	1.4
4TH C.	**1.0**	**0.0**	**1.0**	**5.5**	**0.0**	**18.1**	**25.5**
COAR	0.0	0.0	0.0	1.0	0.0	3.3	4.3
GWB	0.5	0.0	0.5	1.4	0.0	2.9	5.3
GWEY	0.0	0.0	0.0	0.0	0.0	0.5	0.5
GWM	0.5	0.0	0.0	0.0	0.0	6.2	6.7
RW1	0.0	0.0	0.5	0.0	0.0	0.5	1.0
RWM	0.0	0.0	0.0	0.5	0.0	4.3	4.8
SGRIT	0.0	0.0	0.0	2.6	0.0	0.5	3.1
POST-ROMAN	**0.5**	**0.5**	**1.0**	**4.8**	**0.0**	**27.7**	**34.4**
COAR	0.0	0.0	0.0	1.9	0.0	4.8	6.7
CRA RE	0.0	0.0	0.0	0.0	0.0	0.5	0.5
GWB	0.0	0.0	0.0	0.0	0.0	2.4	2.4
GWEY	0.0	0.0	0.5	0.0	0.0	1.9	2.4
GWM	0.5	0.0	0.0	1.0	0.0	10.5	11.9
RW1	0.0	0.0	0.5	0.0	0.0	0.0	0.5
RW1MIC	0.0	0.5	0.0	0.0	0.0	0.0	0.5
RWM	0.0	0.0	0.0	0.5	0.0	3.8	4.3
SERW	0.0	0.0	0.0	0.5	0.0	0.5	1.0
SGRIT	0.0	0.0	0.0	1.0	0.0	3.3	4.3
Total%	**3.3**	**1.0**	**2.4**	**21.0**	**0.5**	**71.8**	**100.0%/209.5**

Table 12: *The chronological distribution of reduced (R) fabrics across form classes at Magna by ENVavg.*

Period /Form class	Form types ENVavg%											
	DR27	DR30	DR31	DR31(R)	DR31?	DR31R	DR33	DR37	DR39	DR40	U/I	Total%
2ND C.	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**4.8**	**4.8**
U/I	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8	4.8
3RD C.	**1.0**	**1.0**	**2.9**	**11.5**	**0.0**	**1.0**	**1.9**	**1.9**	**1.0**	**1.0**	**21.2**	**44.2**
Beaker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0
Bowl	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	7.7	10.6
Cup	1.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	1.0	0.0	3.8
Dish	0.0	0.0	2.9	11.5	0.0	1.0	0.0	0.0	1.0	0.0	1.0	17.3
U/I	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.5	11.5
4TH C.	**1.9**	**0.0**	**1.0**	**1.9**	**0.0**	**1.9**	**0.0**	**0.0**	**0.0**	**0.0**	**10.6**	**18.3**
Beaker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0
Bowl	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	1.0	1.9
Cup	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9
Dish	0.0	0.0	1.0	1.9	0.0	1.9	0.0	0.0	0.0	0.0	2.9	7.7
U/I	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	5.8
POST-ROMAN	**0.0**	**1.9**	**4.8**	**12.5**	**1.0**	**0.0**	**1.9**	**0.0**	**0.0**	**0.0**	**10.6**	**32.7**
Bowl	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	5.8
Cup	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	1.9
Dish	0.0	0.0	4.8	12.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	18.3
U/I	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	6.7
Total%	**2.9**	**2.9**	**8.7**	**26.0**	**1.0**	**2.9**	**3.8**	**2.9**	**1.0**	**1.0**	**47.1**	**100.0**

Table 13: *The chronological distribution of Samian ware across form classes and types at Magna by ENVavg.*

10.4.9 CLASS W- WHITE WARES

White wares represented only a small percentage of the assemblage, 0.7% by NoSh and 0.8% by ENVavg. These small quantities seem to suggest that their presence is likely residual. However, the fabrics displayed in Table 14 are part of a wider repertoire present on the Wall, as they all have been previously identified at Vindolanda (Crizbasan 2025b: 60).

Period/Fabric	Form class ENVavg%		Total%
	Flagon	Jar	
3RD C.	**66.7**	**16.7%**	**83.3**
BPD PA	0.0	16.7%	16.7
FLAG4	33.3	0.0	33.3
FLAG6	16.7	0.0	16.7
FLAG7	16.7	0.0	16.7
4TH C.	**16.7**	**0.0**	**16.7**
FLAG6	16.7	0.0	16.7
Total%	**83.3**	**16.7**	**100.0**

Table 14: *The chronological distribution of whiteware (W) fabrics across form classes at Magna by ENVavg.*

10.5 TRENDS AND PATTERNS IN THE ASSEMBLAGE: FUNCTION, DISTRIBUTION AND PROVENANCE

10.5.1 FORM CLASS CONSUMPTION: A TEMPORAL APPROACH

This section focuses on the form class and form supply at Magna site over the four periods, to understand the chronological distribution of functional categories over time. Table 15 shows the chronological distribution of form classes by ENVavg. Overall, of the identified sherds, jars (JA) were the most prominent, with 26.7% average overall, followed by bowls and dishes (BO, DS, BO/DS) at 22.9%, *mortaria* (M) with 7.3% and beakers (BE) with 3.7% respectively. Generally, the form class consumption at Magna appears quite balanced, with a tendency towards cooking and food preparation through jars and dishes/bowls.

When focusing on specific periods to assess potential shifts in priorities over time, broadly consistent patterns emerge. Jars reach their highest proportion in the 3rd century (11.3%), declining in the 4th century (6.3%) and remaining similarly reduced in the post-Roman period (7.0%). Bowls and dishes follow the same pattern: bowls decrease from 3.1% in the 3rd century to 1.8% in the 4th, while dishes decline from 3.4% to 1.7% respectively.

These trends likely reflect the archaeological nature of the associated contexts rather than marked changes in consumption practices. The overall reduction in vessel quantities represents decreased activity in the researched area. In particular, the diminishing use of the northern fort ditches as rubbish dumps in the 4th century would have directly affected deposition frequency. This reduction in discard may correspond with the gradual contraction of military presence in the area during the later phases of Roman occupation.

10.5.1.1 LOCAL CONTEXTUALISATION: OTHER NORTHERN SITES THROUGHOUT TIME

While these trends may be slightly skewed by the archaeological contexts and pottery quantities, they do seem to fit into an overall recognised pattern on the northern frontier of the Empire. A previous study on the pottery consumption in the North identified low level of jars and high proportions of tablewares associated with the early Roman period, while by the 4th century, the levels of jars peaked (Evans 1993: 98).

The pottery form class consumption in the 2nd century at Magna is rather neutral with no obvious preference for either jars or bowls. Whilst this could be linked to the overall low quantities, they also point towards an already existing pattern. As mentioned, the early Roman period is generally characterised by tableware consumption. However, within this overall picture, variations do emerge. Table 16 displays pottery quantities at forts and fortresses in northern Britain in the 2nd century. While some sites such as the North Field at Vindolanda display a clear preference for tablewares, others, such as Corbridge, lean towards jar consumption. The rest hover in the middle, with less extreme variations.

These patterns are likely linked to the local pottery production and the arrival of the military in the area. At the time, the northern part of the frontier was aceramic, meaning that the beginnings of the local production and pottery imports were linked to the arrival of the Roman armies. The typical Iron Age consumption relied on communal practices

Period	Form class ENVavg%												
	A	BE	BO	BO/DS	CB	Cup	DS	FL	JA	Lid	M	U/I	Total%
2ND C.	0.6	0.6	0.3	0.3	0.0	0.0	0.3	0.0	2.0	0.0	0.6	2.1	6.7
3RD C.	1.7	1.2	3.1	1.9	0.0	0.6	3.4	1.0	11.3	0.1	2.3	9.9	36.4
4TH C.	1.3	1.4	1.8	2.1	0.1	0.3	1.7	0.6	6.3	0.0	2.8	9.0	27.4
POST-ROMAN	0.7	0.6	3.1	1.7	0.0	0.3	3.2	0.4	7.0	0.0	1.7	10.8	29.5
Total%	**4.2**	**3.7**	**8.3**	**6.0**	**0.1**	**1.1**	**8.6**	**2.0**	**26.7**	**0.1**	**7.3**	**31.9**	**100.0**

Table 15: *Form class consumption by ENVavg.*

supported by large jars. However, since no such background existed extensively at Magna, the first substantial quantities of pottery were introduced with the military. The repertoire included jars as well as drinking and serving vessels such as bowls, dishes, and flagons, which are characteristic of the period (Cooper, Johnson and Sterry 2018: 6). All of these vessels are typical of a Roman site, especially forts (Cool 2006: 54; Evans 1993).

Therefore, the resulting form class distribution at Magna reflects the adoption of Roman consumption practices. At the same time, broad patterns should not be treated as uniform templates, as shown by the pottery consumption at the other sites as well as proven by the archaeological contexts of the analysed pottery. These factors can significantly influence proportional representation, and thus interpretation must remain sensitive to both context and site type.

Site	MNR	BO%	DS%	JA%
Magna	9	22.22	22.22	55.56
Corbridge	227	29.0		42.7
Vindolanda North Field	37	18.9	46.0	16.2
Vindolanda fort (Hird 1977)	431	29.0	2.5	41.7
York (Blake Street)	230	16.1	10.8	36.1

***Table 16:** Jars and tablewares consumption at military sites in the 2nd century.*

Moving towards the 3rd and 4th centuries CE at Magna and its wider northern setting, new patterns seem to emerge on the market. Table 17 displays the jar, dish and bowl consumption at a series of civilian and military sites in northern England. Firstly, the consumption patterns at Magna have changed from the previous century through the obvious increase in jar consumption and a slight decrease in bowls and dishes. Moving into the 4th century, the quantities of pottery decrease to less than half, suggesting a less intensive occupation. Despite this overall decrease, the jars continue to dominate.

The 4th century at Magna presents a rather unusual situation, as despite the jar domination at 42.3%, the percentages of dishes and bowls increase notably. Generally, by the 4th century, the demands of the communities altered to require more jars than bowls (Bidwell and Croom 2010: 29). This is cogently displayed by the Vindolanda assemblages, which demonstrate the transition to a more jar-inclined consumption from the 3rd to the 4th centuries. However, the situation at Magna is different, likely due to the use of the associated contexts as rubbish dumps, which led to higher amounts of residual material. Table 18 shows that most of the dishes and bowls from the 4th century contexts are in fact residual from the earlier periods, thus explaining the unusually high percentages of bowls and dishes in the 4th century.

Several other sites have been included in Table 17 for a better understanding of form class consumption in northern England. The late 3rd and the 4th century contexts from the fortress at York show a more balanced consumption of form classes. This, however, could also be linked to residuality, especially when looking at the pottery from period 4b (280+ CE), whose associated contexts consist of clay dumps which yielded 'a large quantity of pottery of the late 2nd and early 3rd centuries' (Monaghan 1993: 694). When assessed by EVE%, the 4th century at York (Period 4c) consists of 38% jars, 27% dish/bowl and 14% bowls (Monaghan 1993: Table 106). While the percentages are still balanced, the consumption is in favour of the jars, likely a trait of fortresses.

Similarly, the civilian settlements seem to develop their own consumption style. Corbridge town shows a balanced consumption of jars, bowls and dishes from the mid-3rd century. Catterick town, however, shows a preference for jars in the 3rd century and an inclination towards bowls in the 4th century. Many bowls are made in Lower Nene Valley (LNV CC) and Crambeck ware, which are typical especially of the 4th century (Howe, Perrin and Mackreth 1980: 8-9; Bidwell and Croom 2010; Evans in Wilson 2002: 243). It is likely that the civilian character of the two sites may have created different consumption styles in response to the needs of those communities.

Overall, the pottery evidence from Magna aligns with broader trends observed along the northern frontier, while also revealing important local variations. In the 2nd century, Magna's neutral balance between

jars and tablewares fits within an early Roman pattern that promoted the consumption of a more diverse array of form classes outside jars. By the 3rd and 4th centuries CE, the shift towards higher jar consumption mirrors regional developments, likely a transition in culinary habits which required basic, multi-purpose jars capable of fulfilling several functions.

The unusually elevated proportions of bowls and dishes at Magna are best explained by residuality tied to rubbish-dump contexts. Comparisons with nearby military and civilian sites show that consumption patterns were shaped by a combination of supply, local production, site function, and depositional histories. Together, these observations demonstrate that while general trends can be identified across northern Britain, pottery form use remains highly context-dependent, underscoring the need to consider assemblage formation and site character when interpreting consumption behaviour.

Site	Data source	Site type	MNR	BO%	DS%	JA%
Magna 3rd c.	Author	Fort	130	9.2	13.1	62.3
Magna 4th c.	Author	Fort	52	21.2	15.4	42.3
Vindolanda 3rd c.	Author	Fort	13	38.5	15.4	30.8
Vindolanda 4th c.	Author	Fort	442	15.6	9.7	53.8
York 280+ CE	Monaghan 1993	Fortress	77	15.6	26.0	28.6
Corbridge 240+ CE	Bishop and Dore 1988	Town	54	33.3	22.2	27.8
Catterick 3rd c.	Wilson 2002	Town	51	9.8	11.8	62.7
Catterick 4th c.	Wilson 2002	Town	45	40.0	11.1	28.9

***Table 17:** Jars and tablewares consumption at military and civilian sites in the 3rd and 4th centuries by MNR.*

Bowl type	MNR%	Date	Dish type	MNR%	Date
DR37	1.9	Mid-3rd c. latest	Crizbasan2025.54	1.9	3rd c.
1.3.4	1.9	2nd-3rd c.	DR31	1.9	Mid-3rd c. latest
HS.BO22	7.7	Early-mid 2nd c.	DR31R	1.9	Mid-3rd c. latest
HS.BO23	1.9	Early-mid 2nd c.	DR31(R)	1.9	Mid-3rd c. latest
HS.BO27	1.9	Mid to late 2nd c.	1.1.11	1.9	3rd c.?
HS.BO39	1.9	160+ CE	Gillam329	1.9	190-340 CE
HS.BO42	1.9	140+ CE	HS.BO83	1.9	Early 3rd c.
HS.BO44	1.9	160+ CE	U/I	1.9	-
Total	**21.2**	**-**	**-**	**15.4**	**-**

***Table 18:** Bowl and dish form types at Magna in the 4th century.*

10.5.1.2 LOCAL CONTEXTUALISATION: MILECASTLES THROUGHOUT TIME

This year's assemblage represents the first sample to be strongly associated with the fort, unlike the previous two seasons when the focus was on milecastle 46 and its surrounding landscape. The following section will compare the assemblage from the northern fort ditches to that from milecastle 46 from three perspectives: overall quantities, fabric classes and form classes.

1. Overall quantities

The first aspect to be discussed when comparing the assemblages are the overall quantities of pottery. Table 19 shows the amount associated with the milecastle and the fort respectively, from Roman, stratified contexts only. The milecastle

assemblage has significantly less quantities across all quantification methods compared to the northern fort ditches. This is likely related to the status of the installation, particularly the relation between occupation style and pottery quantities.

Firstly, milecastles are associated typically with short-term occupation, while forts host the soldiers either permanently or long-term. Milecastles would have worked as a pair with turrets, rotating garrisons on a shift-based pattern (Breeze and Dobson 2000: 41; Symonds 2020: 60). This occupation style meant that its size was also decreased. The consensus is that milecastles could accommodate from eight men up to 32 in some cases (e.g. milecastles 47 and 48). Their size, however, would be too small to offer suitable long-term amenities for the turret soldiers finishing their shift (Breeze and Dobson 1972: 189). In the light of these traits associated with milecastles, including milecastle 46 considered here, the quantities of pottery would have been affected, due to less prolonged occupation and less space which required more efficient use of pottery.

Conversely, the forts would present the opposite situation. They were part of the Roman consolidation process of an area which ensured permanent military presence and consisted of bigger spaces and more people. For example, Housesteads covered 20,000m2 and accommodated 800 men (Rushworth 2009: 3). Similarly, Magna measured approximately 16,592.1m2 (Biggins and Taylor 2016: 29) and hosted auxiliaries of up to 600 men (Birley, R.E. 1998: 12-16). This comes in opposition to milecastles which, as mentioned, accommodated a maximum of 32 men and had an average surface area of 292m2 (Symonds 2017: 109). The difference in occupation style and size appear to have played a major role in the recovered quantities of Roman pottery.

Quantification	Milecastle 46-2023/2024	Northern Fort Ditches-2025
	Roman contexts	
NoSh	567	972
Weight (kg)	7.1	23.3
MNR	59	250
ENVavg	243	708
EVE	6.32	25.045

***Table 19:** Pottery quantitative totals from the fort ditches and milecastle.*

2. Fabric classes and form classes

Fabric classes represent an important element in understanding not only the economic side of supply, that is the wares that were imported the most at the site, but also the cultural side of it, which refers to the demands of the people in terms of form classes. Table 20 displays the fabric class quantities over time within the two assemblages. Several trends seem to arise: the strong presence of black-burnished wares at both sites, especially at the milecastle; and the strong presence of reduced wares particularly in the northern ditches of the fort. Both patterns will be discussed below.

Firstly, the prevalence of black-burnished wares in both assemblages is typical of the area and period assessed. Their supply spiked from the Hadrianic period onwards (Gillam 1976: 57), thus their presence at the fort and milecastle is expected for a Roman site in the North. The element that sets the assemblages apart, however, are the reduced wares, which appear in higher quantities at the fort. In pre-Hadrianic Roman Britain, pottery production was driven by soldiers upon their arrival in the area. The military would come with potters, and they would install a workshop to start producing vessels to satisfy the demand. This was particularly necessary at Magna, given the aceramic character of this region (Harding 2017: 24). As a result, a wide array of fabrics emerged, each associated with its specific military workshop. This created a less formal supply system with heterogenous fabrics. The high presence of miscellaneous reduced wares predominantly in the ditches associated with the fort indicates that more permanent activities took place here, such as pottery manufacture, as well as a wider variety of imports. By contrast, the use of primarily recognisable fabrics at the milecastle reflected short-term consumption, fulfilling the main basic needs of the soldiers using material they had brought with them, without the need for any other adjacent activities such as pottery production.

Fabric classes	Assemblage MNR%	
	MC46	N DITCHES
A	0.0	1.2
B	44.3	39.2
F	4.9	2.0
G	16.4	1.2
M	6.6	7.2
O	3.3	2.8
R	19.7	30.4
S	4.9	15.6
W	0.0	0.4
Total%	**100.0**	**100.0**

Table 20: *Pottery fabric class totals from the fort ditches and milecastle.*

Similar divisions appear between the two assemblages when looking at form classes. Table 21 displays the percentages of each class at the milecastle and fort. The former is dominated by jars at 57.4%, followed by bowls and dishes at 11.5% each. The latter shows a more balanced consumption, with jars at 50.4%, and dishes and bowls at 17.2% and 16.8% respectively. These results are indicative of different cooking practices and priorities within the assemblages.

In the case of the milecastle, jars are preferred over any other form, likely due to the efficiency and flexibility it provides. Table 22 further looks at the jar distribution across fabrics. It appears that half of the jar quantities arriving at the milecastle are black-burnished ware, while the fabric diversity across jars at the fort is slightly higher. This could be related to the functions of the two installations, as well as the occupational style: short-term versus long-term. The black-burnished ware cooking pots were practical, utilitarian vessels, suited for basic functions such as easy transport and storage of food, catering towards the short-term needs of the soldiers at the milecastles.

Conversely, the fort may have acted more as a satellite point, where the full range of domestic facilities could have been undertaken, such as meal preparation, supply and more significant periods of rest. This resulted in a more balanced consumption of form and fabric classes; a pattern previously identified on the northern frontier (Evans 1993). In addition, the range of duties was wider at the fort, involving the maintenance of buildings and equipment, on-going training, acquiring supplies of food and other materials, as well as looking after hundreds of animals and distributing mail (Birley, R.E. 1998:17). All of these aspects contributed to the results from the northern fort ditches assemblage.

Form classes	Assemblage MNR%	
	MC46	N DITCHES
Amphora	0.0	1.2
Beaker	4.9	2.0
Bowl	11.5	16.8
Bowl/dish	0.0	1.2
Bowl/jar	1.6	0.0
Cup	3.3	2.4
Dish	11.5	17.2
Fagon	3.3	1.2
Jar	57.4	50.4
Lid	0.0	0.4
Mortarium	6.6	7.2
Total%	**100.0**	**100.0**

Table 21: *Pottery form class totals from the fort ditches and milecastle.*

Fabric	Jars/Fabric MNR%	
class	MC46	N DITCHES
B	45.7	43.7
G	25.7	2.4
O	0.0	2.4
R	28.6	50.8
W	0.0	0.8
Total	**100.0**	**100.0**

Table 22: *Jar division over fabric class.*

10.5.2 POTTERY CONSUMPTION AND IDENTITY: PRELIMINARY RESULTS

10.5.2.1 ARCHAEOLOGICAL CONTEXT

The 2025 excavation season has produced some preliminary results regarding possible foreign culinary practices at Magna. A sherd of a possible North African style casserole came to light from the northern fort ditches (Appendix 11A-2.1.3). It originated from context M25-16 which was post-Roman in date, meaning that the sherd was likely residual. However, it reflects the existence of such vessels in the fort at some point in time, providing promising prospects for studying the identities of the communities living at Magna in the Roman period.

10.5.2.2 NORTH AFRICAN CONNECTIONS AT MAGNA

This section looks at possible links with North African culture which could have resulted in the arrival of casseroles at the site. This is a brief overview with the expectation that more material will come out over the next two excavation seasons and produce an independent piece of research. The strongest current connection with the African diaspora at the site could be related to the *cohors I Hamiorum sagittariorum*, specifically their journey over time. They are first attested at Magna, followed by Bar Hill on Antonine's Wall, before eventually returning to Magna. This journey will be discussed below, to show how the movement of units can lead to the infiltration of 'foreign' material in their material possessions.

The first known attestation of the unit at Magna dates to 136-137 CE as based on RIB 1778. The evidence represents a dedication made by the prefect of the unit, under his new name taken in 136 CE and who died on January 1st 138 CE. This means that the dating of the altar can be accurately put to either 136 or 137 CE. In the Antonine period, the unit moved onto the Antonine Wall in Scotland at Bar Hill, roughly between 158 and 163 CE (Birley, R.E 1998: 14). This moment is particularly important, as at this time a surge in African presence and material culture occurs in the area (Swan 1999), which likely was experienced by the members of the Syrian cohort.

The unit was stationed at Bar Hill, possibly jointly with cohort *I Baetasiorum* (Hassal 1998). North African influence at the site is suggested by the presence of an improvised pottery kiln, as well as its products. Firstly, the kiln was built into the stokehole of the bathhouse and produced about 900 sherds of a specific uniform pink fabric (Keppie 1985: 60). An estimate of 80% of the kiln products had North African affinities such as cooking-dishes and casseroles (Swan 1999: 456-457). This means that the likelihood of the Syrian cohort to have encountered these products was very high. Their posting on the Antonine Wall marked a crucial point in their interactions with North African material culture.

Additionally, while the unit originally came from Syria, this does not mean that all the soldiers were from that area. In fact, recruitment from other areas might have taken place, while also keeping some of the ethnic recruitment. It was previously believed that *auxilia* recruited only from provinces where they were stationed or other adjacent territories, especially from the 2nd century CE onwards (Campbell 1984: 12). More recent research has also argued for regular transfers of men to distant garrisons, along with their home families (van Driel-Murray 2012: 115). In the case of *cohors I Hamiorum sagittariorum*, it appears that the recruitment practice relied on the local reserves,

though possibly still maintaining some regular transfers. Evidence for such patterns is found elsewhere in the empire. For instance, a Syrian unit stationed in what is now Bulgaria recruited locally, as demonstrated by a military diploma recording a soldier whose origin was Montana (Mihailovgrad) in northwestern Bulgaria (Haynes 2013: 139).

Further evidence for recruitment beyond an exclusively Syrian origin is provided during the unit's stationing at Bar Hill Fort, where a dedication (RIB 2166) was set up by the *cives Galli* to a Gallic deity (Birley, A.R. 2012: 8). This inscription suggests the presence of individuals of Gallic origin within the cohort. While a Syrian core may initially have characterised the unit, the epigraphic evidence indicates that recruitment was not ethnically static but incorporated soldiers from other regions over time. In this context, and given the documented presence of African soldiers along the Antonine frontier, it is plausible that individuals of North African origin could have served within the cohort. Such a scenario would be consistent with broader Roman auxiliary recruitment practices, which increasingly drew on provincial populations rather than maintaining narrowly defined ethnic compositions.

When looking at the make-up of *cohors I Hamiorum sagittariorum*, it appears that not only rank-and-file soldiers but even the unit's prefect may have been of African origin. From Bar Hill, the Syrian cohort returned to Magna, by 163/166 CE, where it stayed until the second decade of the 3rd century (RIB1778; Birley, R.E 1998: 5). During this second stay at Magna, RIB 1791 recorded Marcus Caecilius Donatianus as the prefect of the unit. Although the inscription is not precisely dated, scholarly consensus places it in the reign of either Marcus Aurelius or Commodus (161-192 CE) (Birley, A.R. 2012: 13), indicating that Donatianus assumed command after the cohort's service at Bar Hill.

The prefect is likely to have been of African origin based not only onomastics, but also religious dedication. Both his cognomen and nomen are typical of the African provinces. The former, Donatianus, stems from past participle of a verb, which is a very common practice in the area (Jarrett 1963: 210). The latter, Caecilius, appears to be particularly common in North Africa (Jarrett 1963: 211). Although his *tria nomina* are entirely consistent with standard Roman naming conventions, their combination provides a strong indication of possible North African origin. While such evidence cannot be considered definitive proof, it aligns well with broader patterns of mobility and integration seen in other epigraphic evidence.

Additionally, his dedication is to, amongst many others, Virgo Caelestis, an African deity. Generally, the epithet *'caelestis'* refers to the Punic goddess Tanit, often syncretised with Roman Juno, and centred around Carthage (Wright 1969: 193). A similar dedication to Caelestis comes from the Antonine Wall, from Vibia Pacata, whose name and chosen epithet seem to suggest she was also of African descent, or heavily influenced by the African culture during her husband's stationing with the Numidian *Legio III* (Birley, E. 1984; Allason-Jones, van Driel-Murray and Greene 2020: 347). Therefore, this cult appears amongst the African or African-influenced communities in Britain in the second half of the 2nd century.

In short, Donatianus's name and religious dedication suggest that by the time the unit returned from Bar Hill, it may have come into contact with North African communities, their material culture and their beliefs. Following the unit's relocation to Magna, these influences may be reflected not only in the epigraphic record but potentially, albeit tentatively, in the material culture as well. That said, this interpretation rests on highly preliminary evidence, currently limited to a single sherd. Questions of recruitment, mobility, and cultural influence within the unit's identity must remain open, and any proposed connections should be treated as provisional pending further material and contextual analysis.

10.6 CONCLUSIONS AND FURTHER WORK

The pottery assemblage from the 2025 north ditches excavation at Magna reveals key aspects of both consumption and supply at the fort between the 2nd and 4th centuries. Qualitatively, the northern fort ditches assemblage showed a wide variety of fabrics arriving at the site, as displayed in the 'Fabric supply' section. This furthers the previous conclusions from the 2023 and 2024 excavation seasons which indicate that this part of the frontier was well-connected to varied supply lines to cover the needs of the soldiers stationed in the area.

However, when quantitative analysis has been employed, new results emerge regarding consumption patterns. The discussion was approached from a comparative perspective between this year's assemblage associated with the fort and last years' assemblages associated with the milecastle. While the former showed higher quantities of pottery overall and wider diversity of fabrics and form classes, the latter relied upon black-burnished jars.

These preferences could be linked to the nature of occupation at these sites. The milecastle was manned on shifts and therefore needed portable vessels to support their basic eating and drinking needs, likely relying on the fort for more extensive cooking. Conversely, the fort showed more diversity in form classes and fabrics, which showed that both imports and local production supported the consumption of its inhabitants, reflecting its comparative permanence.

Overall, these results shed light on the different functions of these military installations and the needs that soldiers would have had while living there. However, they represent only a glimpse into the daily consumption, especially the assemblage from the northern fort ditches. The small area excavated and the nature of the contexts – which likely accumulated over time through discarding unused pottery and other objects – meant that it is merely a glimpse into a more extensive and diverse consumption culture. Nonetheless, this sample has already confirmed the existing difference between the temporary and permanent installations in the area regarding their vessel supply.

Additional preliminary results from the 2025 pottery material indicate possible influences and connections to the African diaspora, showing that the more permanent character of the fort likely encouraged more visible display of vessel preferences. While only one such sherd came to light, a casserole, it indicates that future discussion around possible expressions of identity may be examined, should more such vessels emerge at the site.

11. AN ASSESSMENT OF THE ANIMAL BONES FROM EXCAVATIONS AT MAGNA FORT 2023-25

IAN SMITH

11.1 INTRODUCTION

This assessment report concerns animal bones recovered from Magna Fort, Hadrian's Wall during the excavations undertaken during the period 2023 to 2025. The assemblage includes two notably large groups, one a 3rd century ditch fill M25-35, and the other a post-Roman rubble deposit M25-43. All contexts assessed have been selected by staff of the Vindolanda Charitable Trust because they have been judged, based on the stratigraphy, and finds recovered, to be relatively secure. Animal bone groups from contexts dated to the post-medieval and modern periods from the 2023-2025 excavations at Magna were not included in the assessment due to the likely inclusion of modern bone specimens and loss of original context for ancient bone through activity such as stone robbing and ploughing.

The condition of the bone varies by context type, and some is in unusual states of preservation notably that from the ditch fills which include bones and teeth that have apparently been subject to some erosive process and some that bear encrustations of vivianite. The assessment reveals that the assemblage bears much of interest and will be worthy of detailed recording and comparisons with as yet unexcavated groups and assemblages from Vindolanda and elsewhere from the same periods.

11.2 AIMS

The assessment's aim is to reveal the potential of the assemblage to contribute to an understanding of the agricultural economy, including the management of the domestic stock, the supply of meat and other products or activities (such as leather, wool, milk, dung, ploughing or traction). It also aims to assess potential evidence for hunting and, for instance, for the presence of companion animals and to reveal evidence for status or craft-work.

The aim is to reveal the extent of such potential by period so that effort at an analysis stage can be most efficiently directed. Some periods from the assemblage may yield numerically significant groups and these are the most likely to be recommended for analysis. Since work is ongoing at both Magna and Vindolanda forts, periods currently represented by small groups of bone may yet warrant analysis, either alongside extant assemblages, or from the result of forthcoming excavations.

The assessment was carried out in a manner guided by Baker and Worley (2019: 28) and thus it concerned itself largely with the totals of useful data in each context. Following the conclusion of the assessment, some further preliminary conclusions regarding five "key" contexts were requested and text relating to these contexts is presented below. The latter goes beyond a typical assessment and includes some discussion of individual specimens.

11.3 METHODS

Data relating to the presence of the main domesticates, and to other fauna, was recorded for each bone bearing context. Amongst the mammals, the numbers of bones bearing diagnostic zones illustrated by Serjeantson (1996) were recorded (the atlas, axis, scapula, humerus, radius, ulna, pelvis, femur, tibia, astragalus, calcaneus, metapodials, first and second phalanges) and this suite of bones (which also includes the mandibles) are referred to as zone bearing (cf the A bones of Harland *et al.* 2003). Mandible zones follow Worley (2017: 1). The counted bird bone zones are as in Cohen and Serjeantson (1996: 110-12). The detailed recording of these mammal and bird bone zones (and any age related or other detailed data would be undertaken in an analysis phase (when appropriate and if agreed to). Numbers of age related epiphysial fusion states are based on elements listed by Reitz and Wing (1999: 767) excluding the fibula. Numbers of ageable mandibles or teeth are based on those that potentially can be aged following Grant (1982) for cattle and pigs, and Payne (1973; 1987) for sheep/goat. The count of measurable bones is based on the presence of standard measurements as in von den Driesch (1976), Davis (1992, 1996), and Payne and Bull (1988).

Identifications were attempted of all bones bearing some surviving morphological features, whether

amongst the zone bearing suite or not. The other, non-zoned, (or "B bones" cf Harland *et al.* 2003) here include fragmented and numerous small specimens identified to various levels including "mammal" and others unidentified to anatomical element.

11.4 RESULTS

11.4.1 PHASING AND PROVENANCE

A large proportion of the assemblage (856; 58% - inclusive of all bones) is from the north fort ditches and is of 3rd century date (Table 1). Other groups of the same provenance include bones of post-Roman date (359; 24%) (Table 2) and smaller groups of 4th century (96; 7%) and 2nd century (31; 2%) date. Additional small amounts of 3rd century bone (comprising cattle, large and medium mammal identifications) were recovered from the well mound, the pre-Hadrianic ditch and the *vallum*.

The pre-Hadrianic ditch produced the other notable group of bones (46; 3%), whilst there are small numbers from other contexts including of prehistoric, 1st century and medieval date.

11.4.2 SPECIES DIVERSITY

The 3rd century groups include a majority of cattle, pig and then sheep/goat with some dog, cat, domestic fowl and raven (Table 1).

The post-Roman taxa again include a majority of cattle, followed by pig and then sheep/goat and smaller numbers of dog, cat and deer identifications were made (Table 2).

Throughout, there are bones identified to large mammal or medium mammal (Appendix 12), including ribs and vertebral fragments which could possibly produce species identifications during an analysis. However, the total of zone bearing bones will not increase significantly, if at all.

11.4.3 REPRESENTATION OF SKELETAL ELEMENTS

There appears to be a majority of head, foot and vertebral fragments amongst the cattle from the 3rd century contexts. Some comment will be possible regarding the likelihood that cattle arrived at the site on the hoof in this period (and whether any parts might have been supplied as joints). However, the zone bearing totals for individual skeletal elements (such as the humerus) are not very large and ideally a larger assemblage of this date (additional data from future excavations here) would be analysed.

Head and foot parts appear to be most common in the 4th century contexts although the totals for individual elements are small.

11.4.4 CONDITION

The condition of the bones is relevant to whether they retain morphological features, fine cut marks, pathological evidence and intact dimensions relevant to standard measurements. Their state thus relates to the identification to species, the way that carcasses were butchered, whether the animals were healthy, and their size/stature.

Many bones from the largest 3rd century context group (M25-35) from the north fort ditch have good bone surface texture and yet the bones, in many cases, are thinned or hollowed out. Thus, there is a surviving cortical layer but much of the spongy (or cancellous/trabeculated) bone (Lyman 2001: 76) has been eroded or is lost. Some large mammal and cattle cranial bones from this context are flexible and many are paper thin, whilst vivianite is widespread. Other (mainly the smaller) fragments from M25-35 have poor bone surface condition. The latter appear largely to bear rough, non-helical fractures and to be the result of post-depositional damage and comprise small (insignificant and non-zone-bearing) fragments of larger bones and are judged to have little potential. The teeth, and their occlusal surfaces, are well enough preserved to produce ages. A small number of cattle cranial fragments are large enough from which to draw conclusions or comment regarding cattle cranial morphology.

Also from the north fort ditch, the relatively large post-Roman bone group M25-43 is variable in colour and preservation states. Fine cut marks certainly can be recognised on some surfaces and much has a good or moderate state of surface preservation. There is a small proportion of burnt bone, including of cattle metapodial ends which may possibly have been deliberately heated.

The teeth from M24-133 include specimens where the occlusal surfaces are damaged (perhaps by soil acidity and or fluctuating hydrological conditions) so that dentine is deeply eroded away (or is absent) and yet the enamel survives. Teeth in this condition may produce more tentative age estimates than better preserved specimens.

11.4.5 MANDIBLES THAT WILL PRODUCE AN AGE AT DEATH

Tooth wear and dental eruption states are a major source of information on the ages at death of the

Sum of Totals 3rd Century		
Species		**Total**
Cattle	*Bos taurus*	122
Sheep/goat	*Ovis/Capra sp.*	14
Pig	*Sus domesticus*	25
Horse	*Equus sp.*	5
Red deer	*Cervus elaphus*	1
Deer	*Cervus/Dama sp.*	4
Dog	*Canis familiaris*	5
Fox/dog	*Vulpes/Canis sp.*	1
Felis catus	*Felis catus*	1
Large mammal	Mammalia	547
Medium mammal	Mammalia	21
Mammal	Mammalia	121
Domestic fowl	*Gallus gallus*	2
Raven	*Corvus corax*	1
Total		**870**

Table 1: *Bone totals by species of 3rd century date (all contexts, although mainly from the north fort ditches).*

Sum of Totals Post-Roman		
Species		**Total**
Cattle	*Bos taurus*	134
Sheep/goat	*Ovis/Capra sp.*	6
Pig	*Sus domesticus*	10
Deer	*Cervus/Dama sp.*	1
Dog	*Canis familiaris*	1
Felis catus	*Felis catus*	2
cf Cat	*cf Felis catus*	1
Large mammal	Mammalia	202
Medium mammal	Mammalia	2
Total		**359**

Table 2: *Bone totals by species of post-Roman date (all from the north fort ditches).*

domesticated fauna. Such ages at death are a principal source of information on how the stock were managed and whether particular products (for instance meat, milk, wool, leather) might have been husbandry goals.

It is expected that from the 3rd century there will be five aged cattle mandibles from M25-35. The post-Roman period is expected to produce three such cattle ages, with a further two pre-Hadrianic and one 1st century cattle age at death. Two pig mandibles, one from the 3rd (again from M25-35) and one from the 4th century will produce further ages at death.

11.4.6 EPIPHYSIAL FUSION STATES

The epiphysial fusion states of the bones from the domesticated mammals are a further line of evidence for age at death and for interpreting husbandry goals. Just over half of the fusion evidence including from cattle (27 specimens), sheep/goat, pig, horse, dog, cat, and medium and large mammal is from

3rd century contexts (M24-86; M24-165; M24-188; M25-35; M25-36; M25-50; Appendix 12). Some of the medium mammal (sheep/goat or pig) and large mammal (mainly probable cattle) may be identified to species during analysis.

Groups of post-Roman fusion evidence again include cattle (26 specimens from M25-43) and a small number of other specimens including of pig, sheep/goat, dog and cat (M25-43 and M25-18; Appendix 12).

Fusion evidence from the other periods is insubstantial (in each case less than 10 specimens are present).

11.4.7 MEASURABLE A/ZONED BONES

There are nine measurable zoned bones from the 3rd century M25-35 and a further nine from the post-Roman M25-43, with small numbers from 1st century, pre-Hadrianic and 4th century contexts (Appendix 12).

11.4.8 MEASURABLE MANDIBLES AND MANDIBULAR (DP4/P4 TO M3) TEETH

The measurable cattle mandibular specimens comprise two from M25-43 and one from M24-133. A measurable pig mandible is present in M25-35. It is possible that further measurable isolated teeth might be recognised during analysis. These measurements become valuable when added to a growing dataset (including amongst multiple reports from Vindolanda) that may suggest improvements in breeding, imports of stock or sexual dimorphism.

11.4.9 PATHOLOGICAL CONDITIONS

Evidence for pathology is preserved in some cattle phalanges that bear evidence for lipping or slight extensions to their articular surfaces. Such conditions might be age or stress (ploughing, hard surfaces, traction) related. This was noted amongst single specimens from M25-35 and M25-43 and it is possible that some additional specimens bearing such evidence might be noted.

11.4.10 ANOMALOUS DENTAL CONDITIONS AND POST-CRANIAL NON-METRICAL TRAITS

Some of the cattle third mandibular molars have reduced hypoconulids (or third cusps), (a condition seen also in assemblages from Vindolanda) and which may perhaps relate to genetic insularity (Argant *et al.* 2013). This is a developing area of research which can only be progressed by records (and frequencies) of the condition.

Based on previous work at Vindolanda fort we can predict the possibility that some articular surfaces may bear linear slits or depressions (Baker and Brothwell 1980: 109-114) and which might be recognised during analysis. Again, this is a developing area of research and whilst some such conditions could be benign, others could be hereditary or might have pathological origins (Thomas and Johannsen 2011: 53) and are worthy of description and quantification.

11.4.11 FURTHER OBSERVATIONS AND CONCLUSIONS REGARDING FIVE KEY CONTEXTS

M24-133

From the 2024 excavations, the anaerobic ditch fill M24-133 includes a modestly sized number of bones (NISP 22) identified to species (Appendix 12). Cattle identifications are most frequent amongst the latter, and, amongst the non-specific bones, large mammal fragments are more frequent than those of medium mammal.

The cattle bones all comprise head and foot bones and include a complete mandibular cheek row (second premolar to third molar). The occlusal surfaces of this cattle mandible are distinctive, although not unique in this assemblage, in that the (softer) dentine is either missing or has been largely eroded away and so the (harder) enamel is surrounded by voids. This is interpreted to be the result of a post-depositional taphonomic process and may perhaps relate to soil conditions. Whether such a taphonomic process might also have affected the range of surviving cattle skeletal parts is not clear. Whilst the presence of cattle head and foot bones is suggestive of primary butchery waste, the numbers of specimens identified as cattle are admittedly rather small to be the basis of any firm statements.

Another taphonomic factor, dog gnawing, appears to have affected both a cattle and a sheep/goat metapodial and a horse scapula and such activity may have adversely affected numbers of epiphyses, (and in particular, perhaps, any unfused metaphyses and epiphyses). Dogs clearly had access to at least

some of the bones either through scavenging in the ditch or before the bones were deposited into the ditch.

The cattle bones include a hyoid which bears a fine cut mark, and this is judged probably to relate to removal (and retention for consumption) of the tongue.

The numbers of sheep/goat and horse bones are small, and few conclusions are drawn beyond their presence in the context group. The presence of a horse scapula and sheep/goat femur were noted. The horse identifications also include fragmented cranial specimens for which confirmation (through reference checks) can be carried out at analysis.

M24-141

In primary anaerobic ditch fill M24-141 cattle identifications are again most frequent (Appendix 12) and include two mandibular teeth, two vertebrae, a scapula, and a phalanx.

The cattle teeth comprise two mandibular molars, one of them judged to be a mandibular third molar with a missing hypoconulid (but with a slight ridge towards the base of the root). Both of these cattle teeth are affected by the condition (as described for the teeth in M24-133) in which the enamel at the occlusal surface survives and there are voids where dentine would usually be expected.

The cattle scapula bears at least one sign of butchery in that part of the spinous process is missing and was chopped away. In addition, it is possible that the missing tuber scapulae was chopped through and perhaps the blade of this scapula may have been perforated. Confirmation of these possible signs of butchery may be possible but are certainly complicated by the loss (or erosion) of some surface bone from this scapula through post-depositional processes.

The cattle (partial) atlas appears to bear at least one fine cut mark but also later (probable post-depositional) damage.

There is a section of antler tine identified to *Cervus/Dama* sp. This is a large antler fragment and is most probably from red deer (*Cervus elaphus*). However, it is not a basal part and there is no part of a junction, (between the beam and a tine for instance), and so arguably a robust identification to species cannot be attained through morphological criteria (cf Lister 1996). The antler surface is eroded and in poor condition with additional damage judged to be post-depositional.

A horse scapula from this context bears some surface splitting which is judged possibly to have taken place post-excavation. This form of surface splitting (or similar) is sometimes seen in specimens (when drying) from waterlogged deposits or sediments.

M25-25

From a peaty clay fill of the first fort ditch M25-25 cattle bones are most frequent (NISP 21) amongst the bones identified to species or genus (Appendix 12) with small numbers of horse (NISP 2) and pig (NISP 2).

Many of the bones have apparently well-preserved surfaces, although some have eroded trabecular spaces (in other words they are hollowed out) and many are thus fragile and, in addition, many are encrusted with patches of vivianite. Two burnt bones are present including a heavily burnt (white, calcined) small fragment from the shaft of a large mammal limb bone (plausibly from a cattle femur). The other fragment is similar but damage to much of its cortical surface complicates its identification.

The teeth from this context include at least one cattle tooth reduced to fragments and another (cattle maxillary molar) which is affected by eroded dentine as noted elsewhere. By way of contrast, a horse mandibular tooth retains much of its dentine, as does a pig third mandibular molar.

The cattle bones include parts of the head, fore and hind limb and feet and although the totals of individual anatomical parts are small, this suggests that the waste from all parts of butchered cattle carcasses found their way into the ditch.

One fragment of probable cattle thoracic vertebra bears a fairly deep butchery cut or chop mark across the base of the spinous process (Lauwerier 1988: code 12, 191) and this may perhaps have originated from dismemberment or jointing (*cf* Stokes 2000: 147). Further records, and scrutiny may reveal the frequency of such butchery marks in this location.

M25-35

The anaerobic 3rd century ditch fill M25-35 produced a good number (NISP 172) of bones (inclusive of bird bones) identified to species or genus, and cattle comprise NISP 113 or 66% of all such identifications (Appendix 12).

The bones include many with apparently moderately or well-preserved surfaces, but at the same time much of the bone is either hollowed out (many of

the limb bones for instance) or apparently thinned (cranial and flat bones) by some erosive process. Vivianite encrustation is widespread on both outer cortical bone and affects both sides of many fragments.

All parts of the cattle skeleton are clearly represented and the same appears to be true, although based on smaller numbers, for the sheep/goats and pigs.

The cattle bones include vertebrae which bear signs of butchery and for which fusion states can be recorded. The large mammal bones include some fragments with helical (and probably ancient) fractures and others, many of them small, with probable post-depositional fractures.

Beef, pork and perhaps bacon, mutton, and lamb are all plausibly represented here (in addition to other useful products such as milk and wool). The related profiles of ages at death may be established by period through detailed recording of the mandibular data for the cattle although there are only five relevant potential cattle ages from M25-35. A single pig age at death might also be expected but there is no potential mandibular data relating to sheep/goat from this context.

Two cattle teeth bear "spikes" which affect the mandibular third maxillary molars and which may possibly to relate to reduced hypoconulids in the opposing mandibular third molars (Argant *et al*. 2013).

One cattle phalanx is affected by "lipping" or extensions to the articular surface which may perhaps simply relate to age (amongst dairy cattle?) and/or perhaps to the stresses involved in ploughing or pulling a cart.

Some biometrical data can be recorded here but a relatively high rate of fragmentation determines that the potential for standard metrical information is small. The cattle bones include five specimens that will produce measurements and there are single potential measurements from sheep/goat, pig, red deer, dog and raven.

The latter red deer identification is tentative and although fallow deer is thought to be excluded, the proximal articular margins of this second phalanx are damaged and so it is difficult to ascertain whether there is any emargination of this facet, as typically seen in fallow deer (Lister 1996: 134). Further work with comparative specimens (and perhaps consideration of its dimensions, since these are thought to be greater than those expected in recent fallow deer) may prove decisive. Also, regarding deer, there are two fragments of (*Cervus/Dama* sp.) antler which relate to antler working. Whether this might relate to small scale craft work by individual soldiers or the work of a specialist is not clear and doubtless there were multiple pathways by which material might find its way into the ditch.

Domestic fowl (*Gallus gallus*) bones (NISP 2) were recorded from this context as was a complete raven (*Corvus corax*) humerus. Domestic fowl (or chicken) have been recovered from 3rd century deposits within the fort at nearby Vindolanda (Oxford Archaeology 2023: Table 1) and were relatively common from within the late 3rd to mid-4th century commandant's house at South Shields Fort (Stokes 2000: 148-9). Domestic fowl appears clearly to have been a highly regarded food in the Roman world (Edwards 1984: xvi) and it appears probable that some fowl were kept for their eggs, (at least in an earlier period) at Vindolanda (RIB *Tab. Vindol*. 193, 194, 302, 581, 592). This does not preclude the possibility that domestic goose, perhaps duck and wild bird eggs might also have been consumed. Domestic fowl also may have been used here in cockfighting (*cf* Doherty 2013) and the interpretation of a funerary inscription for Spes at Sea Mills (near Bristol) raises the possibility that some domestic fowl might have been kept as pets (RIB 137).

M25-43

Cattle bones are again most frequent in this post-Roman layer of rubble comprising (NISP 131 or 87%) of all identifications to species or genus (Appendix 12) and followed in frequency by pig and then sheep/goat with small numbers of dog, cat and deer (antler) also present. All parts of the cattle skeletons are judged to be represented and the same appears to be true of both pig and sheep/goat (although based on far fewer bones).

The cattle bones include high frequencies of scapula and mandible fragments (and loose teeth) followed by phalanges, maxillary parts and metapodia.

The bones from this context are mainly a pale yellowish-brown, although with some strong contrasts in colour. Gnawing by dogs is in evidence and some burnt bones are present. These bones are not affected by the loss of trabecular bone seen from the ditch contexts and there appear to be no obvious signs of vivianite.

The fragment of antler (*Cervus/Dama* sp.) is in a relatively poor condition, as compared to much of the bone, but bears signs of working. Whether this was from a hunted deer is not clear, but the

alternative possibility is that shed antler may have been collected and brought to the fort.

Burnt bones are not frequent but a small number of cattle metapodia are affected by some evidence of charring or heating. The sample of specimens affected is small but recording of such heat affected specimens (and synthesis of existing/past records) may reveal a pattern in the future. Although the evidence is scant at this stage, we can speculate that these metapodia may possibly have been cooked or exposed to heat for the extraction of fats and marrow.

Despite the relatively large size of this bone group, no bird bones were identified. It is thought improbable (but is possible) that small bird bone fragments could have been overlooked during assessment (and might be recognised in analysis). It is difficult to be sure that this represents a real absence of bird bones, although it is worthy of note that cat bones (many of which are similar in size to the bones of domestic fowl) were recovered. The presence or absence of bird bones from post-Roman deposits at Magna is worthy of further attention in future excavations.

Taphonomic considerations regarding the key contexts

Each of the key context groups are dominated by the bones of cattle with much smaller numbers of bones from sheep/goat and pig. A factor that must be considered here regarding the ratios of these domesticates is that the proportions of the smaller sheep/goat and pig have probably been adversely affected, as compared to the larger cattle, by several taphonomic processes. These include dog gnawing (Ioannidou 2003: 57) and hand recovery (Payne 1975) through which the larger bones have been demonstrated more likely to survive the attentions of dogs and are more likely to be hand recovered. In addition, dog gnawing introduces intraspecific biases in anatomical element frequency (Ioannidou 2003: 57) and although mandibles and teeth are more likely to survive such ravages (Behresmeyer 1991: 302), the mandibles of younger animals are more likely to be lost than those of adults (Munson and Garniewicz 2002).

The nature of the deposits from the ditch fills appears plausibly to have introduced a further source of bias since many large cattle bones are affected by missing or eroded trabecular (and sometimes thinned cortical) bone. It appears logical that this will have affected smaller bones (with more shallow cortical depths) more adversely than larger bones. This possible bias is poorly understood but it also appears possible that complete bones have been more adversely affected as compared to fractured bones (with exposed trabecular bone).

Conclusions

The assessment is based on raw fragment totals and, at the analysis stage, the additional recording of diagnostic zones (for each specimen that bears such zones) will undoubtedly add perspectives on quantification. Thus, for instance, it will be possible to add another perspective on the apparent frequency of scapulae from M25-43. A calculation of the minimum number of sided (left or right) scapulae will be possible and thus it will be possible to ascertain whether this frequency could plausibly relate to fragmentation (or whether it reflects a demonstrable high frequency in recorded non-replicable scapulae).

Some 59% of the potential here (based crudely on the total number of fragments) is from 3rd century deposits. However, based on the frequency of A bones the potential of the 3rd century and post-Roman period groups are similar, each comprising about 40% of the assemblage.

The potential to establish age structures from mandibular data is limited since although certainly there are some mandibles that can be assigned an age at death, their numbers will be insufficient from which to present reliable (or statistically significant) trends. (There are five ageable cattle mandibles and/or teeth from the 3rd century, and this is the greatest number by period and species).

The fusion (and metrical) data are relatively unsubstantial once assigned by anatomical element. In the cattle from the 3rd century, for instance, there are some phalanges, metapodia and vertebrae (NISP 22) from which fusion states can be recorded but the few other parts of the skeleton that will provide some fusion evidence (scapula, humerus, radius and tibia) comprise totals of two or less.

Ideally the data of all types from this assemblage might be amalgamated with the results of any further excavations at Magna and the potential for each data type by period can then be reassessed.

11.5 RECOMMENDATIONS

The bone groups assessed for this report were subject to a selection process, which took account of the stratigraphy and finds recovered and thus, no context groups with a clearly mixed origin were included. All the bone groups originate from periods of interest to an understanding of Magna

fort spanning prehistoric to post-Roman times. Thus, although some will yield only small numbers of a particular form of record, these data can be added to or considered alongside existing datasets. Thus, detailed recording of all of these groups is recommended. However, significant conclusions depend on sample size and so detailed analysis might most efficiently be undertaken, in stages and by period, once larger groups have been recovered. This does not preclude the possibility that we could record all of the detailed data from the context groups assessed here (and, subject to further discussions, we could shelve some analysis and final reporting, of smaller period groups, as necessary).

The potential can be fulfilled through detailed work on the numbers and parts of the skeleton present, the ages of death of the domestic stock, and any evidence regarding sex ratios, pathologies and differences in the species and anatomical element ratios by period, area and feature type. Groups of small fragments of large and medium mammal bone, in multiple contexts, are judged to originate from post-depositional processes, and will not be the subject of detailed work.

11.6 METHODS FOR THE ANALYSIS STAGE

Where necessary, bones will be identified with the aid of modern comparative skeletal reference material in addition to osteological identification manuals and papers (Halstead and Collins 1995; Sisson and Grossman 1938; Schmid 1972; Hillson 2005; Cohen and Serjeantson 1996; Tomek and Bocheński 2009; and Bacher 1967). Amongst the mammals, the diagnostic zones illustrated by Serjeantson (1996) will be recorded for the atlas, axis, scapula, humerus, radius, ulna, pelvis, femur, tibia, astragalus, calcaneus, metapodials, first and second phalanges, and this suite of bones (which also includes mandibles) are referred to as zoned bones (or "A bones" cf Harland *et al.* 2003). Mandibles will be zoned following Worley (2017: 1). Bird bones will be zoned as in Cohen and Serjeantson (1996: 110-12).

The separation of sheep (*Ovis aries*) from goat (*Capra hircus*) will be undertaken following Boessneck (1969), Payne (1985), and Halstead, Collins, and Isaakidou (2002).

Tooth wear and eruption states will be recorded following Grant (1982) for cattle and pigs and following Payne (1973; 1987) for sheep/goat with suggested ages from Halstead (1985) and Jones and Sadler (2012) for cattle and Halstead (1992) for pigs. Codes for permanent teeth (such as "M1" for the first mandibular molar) will be recorded in uppercase as in Grant (1982). Deciduous teeth, such as the fourth deciduous premolar (or "dp4") are recorded in lowercase as in Hillson (2005: 129, 136). Age related epiphysial fusion states will be recorded for elements listed by Reitz and Wing (1999: 767) except for the fibula.

Butchery evidence will be recorded following the butchery codes of Lauwerier (1988) and/or Binford (1981). Records will be made of bone surface preservation states, gnawing, burning, new breaks, and helical fractures. Pathological states, determinations of sex and possible associated bone groups will be recorded.

Measurable bones will be recorded following standard methods (von den Driesch 1976; Davis 1992, 1996; Payne and Bull 1988). "Large mammal" will be used to refer to bone fragments that are judged to have come from a cattle or horse-size mammal whilst "medium mammal" will mean sheep or possibly pig size (*cf* Dobney *et al.* 1999). Fragments identified only to the level of "mammal" are fragments that are judged to have come from either large or medium-sized mammals.

In recording NISP (number of identified specimens) any specimens that are judged to be adjoining or associated (such as refitting teeth and mandible fragments) will be counted as a single specimen (NISP 1).

The terms MNE (minimum number of anatomical elements) and MNI (minimum number of individuals) may be used in the text. Corrected frequency, which corrects for the fact that there are different numbers of anatomical elements in a single carcass (Reitz and Wing 1999: 213), is arrived at by dividing the number of zoned specimens for each anatomical element by the number of times that element occurs in one individual. Where cattle to sheep/goat to pig ratios are to be calculated, the sheep/goat group will include sheep as well as sheep/goat. The influence of taphonomic processes on these ratios (and for instance on the proportion of bird bones or other fauna), from recovery through to post-excavation will be considered.

During analysis, comparisons of several methods of quantification (including raw totals and totals of zoned bones, and, where sample sizes permit, the frequencies of epiphysial and shaft zones) will be undertaken.

12. FUTURE RESEARCH

RACHEL FRAME

Following the completion of the excavation of the northern fort ditches in July 2025, work moved into the final area of investigation for the Magna project, Area C. This trench is located over the southwest quadrant of the fort and is the first large scale excavation inside the fort since 1830. It targets the site of the antiquarian excavation of the *praetorium* along with a section of the fort's southern defences. During the 2025 season, approximately a third of the total area to be excavated was exposed (Fig. 1).

Archaeological features encountered within this trench included:

i. The antiquarian excavation rubble and backfill
ii. Wall foundations for the SW corner of the *praetorium*
iii. Packed clay floors, a large stone plinth and the fabric of the *praefurnium* within the *praetorium*
iv. A 4th century cobbled yard that was constructed over the west wing of the *praetorium*
v. The foundations of a post-Roman turf and stone rampart
vi. 4th century – post-Roman drains and potential toilet block
vii. The 4th century fort's *intervallum* road
viii. The 3rd century SW angle tower and toilet block

***Figure 1:** An aerial shot of the SW quadrant excavations in September 2025.*

The discovery of the antiquarian trench within the first month provided the opportunity to determine the extent of the destruction caused by the farmer in 1837 after 'removing' the bath suite excavated a few years prior. The confirmation of this trench's location, both within the quadrant and in the SW corner of the *praetorium*, indicates that most of the building has likely not been extensively disturbed beyond the stone robbing seen across the site.

Excavation across the predicted line of the fort walls has revealed greater potential for post-Roman occupation at the site, through the discovery of a turf and stone rampart partially overlying the earlier walls. Below these later deposits, the 3rd/4th century fort's SW angle tower, which contained a latrine, and substantial exit drains were found to survive.

Work will continue in the southwest quadrant during the 2026 season, and the results from these initial excavations, including detailed finds and environmental analysis, will be reported on fully in the subsequent interim report.

Two wooden writing tablets were recovered from the anaerobic fills of the primary fort ditch, comprising a small fragment of an ink tablet with visible letters and a more complete example of a wax stylus tablet. They are currently undergoing conservation and once this is complete, they will be submitted to the Vindolanda Writing Tablet Research Committee for further study and translation if possible.

Further analysis of the animal bone from the site is planned for later in the project once a larger assemblage has been recovered, which will allow for more significant conclusions to be drawn (see Chapter 11.5). In particular the animal bone recovered from the *praetorium* will undergo comparative analysis with the assemblage from the 1997/1998 excavation of the *praetorium* at Vindolanda to investigate potential patterns of consumption in these spaces.

13. CONCLUSION

ANDREW BIRLEY

The third year of the Magna project has produced some remarkable results. It proved that the stone fort and its northern ditches had been placed at the edge of a very wet landscape, one which regularly flooded or had sitting water on it. This created a rich dark and organic subsoil that sat above the layers of thick boulder clay. The building of the stone fort's northern wall required substantial rubble foundations, and the primary fort ditch to the immediate north of the wall had been reinforced with a stepped stone revetment to protect it from erosion. The lack of evidence for earlier, pre-Hadrianic timber fortifications in this part of the site suggests that the ground conditions that were overcome by later work had been poor enough to avoid for the first Roman occupants of the site. The ground truthing work of the excavations revealed two fort ditches rather than the five that were expected from non-intrusive ground survey work, and the challenges faced by geophysical survey in detecting even those two ditches (which they did not detect) was also complicated by the ground conditions on the site. It is a reminder, if any were needed, that non-intrusive surveys can miss a great deal and that they are a vital tool but not a replacement for the density and quality of information that can be won by a well-executed excavation.

The occupational fill from the ditches provided a wealth of artefactual evidence for occupation between the 2nd and later 4th centuries, with an intensity of material deposited between the 2nd and late 3rd century. The conditions within the primary ditch, near its base, were waterlogged and in some cases seasonally anaerobic. However, it is clear from the state of preservation of wood and leather artefacts that those conditions were in decline. The leather recovered from the primary fort ditch was in a relatively poor state of condition with very few of the shoes retaining any of their uppers, the more fragile leather parts of a shoe. Two writing tablets, one ink on wood fragment and another more robust stylus tablet were recovered from the primary ditch fill. Both of those were in a very poor state of preservation, the stylus tablet wood spongified and warped by decay. The state of preservation of material in the ditch matches the data trends that are currently being received from the underground probes and monitoring station some 70m to the north of the fort ditches. This shows a year-on-year increase in the amount of oxygen in the soil in the area to the north of the later fort. If this trend continues its current trajectory all of the organic artefacts and many of the insect remains and other delicate ecofacts from this part of the Magna site are likely to disappear from the archaeological record within the next two decades.

Beyond the ditches, further to the north, there was evidence that the Roman community had taken advantage of the build-up of peat and organic material and had harvested this material from the edge of the ancient lake. Those cuts were then filled with Roman rubbish deposits and cobbled roads or surfaces were eventually placed over the fill. It is clear that this part of the site was not densely populated or used and would likely have been harder to get to, despite the cobbled road surfaces between the ditches, than some of the more accessible parts of the site to the west (near the north gate of the fort) or the south where the major Roman highways of the Stanegate and Maiden way intersected. Even so, the successful excavation of a section of the Roman defences and the evidence for the way in which the Roman garrison had used and ultimately been challenged by the natural landscape of this area have provided invaluable information about the site's formation process and the increasingly perilous state of preservation at the site of Magna.

14. LIST OF ABBREVIATIONS

Cal. = calibrated radiocarbon date.

Pers. comm. = personal communication.

RIB = Roman Inscriptions of Britain https://romaninscriptionsofbritain.org/

RRC = Roman Republican Coinage; Crawford 1972.

Tab. Vindol. = Vindolanda writing tablet https://romaninscriptionsofbritain.org/tabvindol

U/I = unidentified.

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APPENDIX 1: CONTEXTS

Context No.	Description and Interpretation	Provisional Period
1	Colour: mid brown. Compaction: dry, firm. Composition: silty loam. Turf and topsoil covering the whole trench. Mix of post-medieval and Roman pottery within suggesting turnover by ploughing. Disturbed by animal burrows and mole hills in some places.	Modern.
2	Orientation: E-W. Shape in plan: regular, linear. Shape in profile: regular, deep. Break at top: sharp. Sides: steep. Original cut for the first defensive ditch immediately north of the last stone fort wall. This ditch may predate the last stone fort and have originally been dug as part of the defences for an earlier fort. Cut by at least two later Victorian field drains on the north side. Not fully excavated due to flooding so full dimensions and overall shape of cut are unknown.	2nd century.
3	Orientation: E-W. Shape in plan: regular, linear. Shape in profile: regular, deep U-shaped. Break at top: gradual. Break at base: sharp. Base: flat. Sides: 1) north: steep, straight; 2) south: stepped, convex. Cut for the second ditch north of the last stone fort. Smaller in width and depth than the first fort ditch to the south with a steep north side and more sloping/stepped south side. The rounded base is cut by a series of shallow segmented ditches, possibly intended as ankle breakers or *cippi* pits. Cuts through an earlier layer of anaerobic/peat deposits, visible in both the north and south edges of the ditch, which contains desiccated timber. The upper parts of these deposits also contain Roman finds such as beads, suggesting these were the original ground level. Very little evidence of any deliberate backfilling. Cut by two N-S ceramic field drains and a curving rubble drain.	2nd century.
4	Orientation: E-W. Shape in plan: regular, linear. Shape in profile: regular, shallow U-shaped. Break at top: gradual. Break at base: gradual. Base: rounded. Sides: gentle, straight. Shallow ditch initially thought to be a third defensive ditch for the fort. Significant presence of pottery within primary fill suggests it was associated with the Roman occupation and likely an intentional cut, but overall, it's a very shallow feature within the landscape and so unlikely to be part of the fort's defences. May have been dug to aid with drainage of the boggy area to the north or to prevent the bog encroaching on the main area of occupation.	2nd century.
5	Colour: mid yellowish brown. Compaction: dry, loose. Composition: pebbly silt. Inclusions: 1) frequent small to large sub-angular elongate limestone, evenly distributed 2) moderate small sub-angular spheroidal gravel, concentrated west. Rubble layer across the southern end of the trench, overlying the remains of the fort wall, the south edge of the first fort ditch and rubble backfill M25-18. This was probably formed in the post-medieval and modern periods during the final robbing of stones from the fort wall and is likely to be the collapsed remains of the rubble core of the wall. It may also include some stone from the former drystone field wall to the immediate south of the trench. Very frequent finds of bone throughout this deposit along with Roman pottery spanning a wide date range. These finds are no longer in situ and were likely disturbed and redeposited during later activity on the site.	Post-Medieval.

Context No.	Description and Interpretation	Provisional Period
6	Colour: dark brownish grey. Compaction: moist, firm. Composition: loamy silt. Inclusions: occasional flecks to small angular elongate charcoal, evenly distributed. Notes: thin (~1cm) lens of more orange soil near top of deposit. Uppermost fill of the first ditch outside the north wall and berm of Magna fort. Contemporary with stone field drain M25-9 and buried by collapsed rubble from the fort wall M25-5 on the south edge of the ditch. Thin layer which overlies a more clayey fill, likely formed in the post-medieval period and acts as the interface between the topsoil and lower fills of the ditch. Occasional finds of Roman pottery in this layer but not huge quantities, suggesting they are likely residual and may have been washed or dragged in over time.	Post-Medieval.
7	Colour: mid yellowish grey. Compaction: dry, loose. Composition: moderately sorted silty cobble. Rough cobbled road surface running E-W along the bank between the first and second fort ditches. Quality of the cobbling varies between areas with the occasional inclusion of large whinstone boulders along with smaller river rounded cobbles. Likely continues around the entire perimeter of the fort linking the roads exiting the fort gates, while still being protected by the second fort ditch to the north. Cut by several post-medieval ceramic drains, primarily at the eastern end of the trench.	3rd century.
8	Colour: dark blackish brown. Compaction: dry, loose. Composition: cobbly silt. Inclusions: frequent small to medium sub-angular platy gravel, evenly distributed. Loosely cobbled layer between the second fort ditch M25-3 and shallow ditch M25-4. Cobbles are not frequent enough to be a “good” surface like road M25-7 but certainly make the ground more solid and may be an attempt to consolidate an otherwise boggy area. Possibly post-Roman and might be related to road M25-30 further to the north though there is no direct link.	Post-Roman.
9	Colour: mid yellowish grey. Compaction: dry, loose. Composition: moderately sorted silty cobble. Post-medieval dry stone field drain. Inserted in the late 1800s, probably by Clayton, around the same time as a similar drain uncovered in the *vallum* and one north of the pre-Hadrianic ditch during the 2024 excavation season. A more modern ceramic drain has been inserted immediately to the south. Does not appear to still be functional as some capstones are missing at the west end and the spaces have filled with soil.	Post-Medieval.
10	Colour: mid greyish brown. Compaction: moist, firm. Composition: loamy silt. Uppermost fill of the second fort ditch. Still affected by post medieval ploughing and overlies rough layer of cobbling M25-12. Thin layer which overlies a more clayey fill to the north, likely formed in the post-medieval period and acts as the interface between the topsoil and lower fills of the ditch. Occasional finds of Roman pottery in this layer but not huge quantities, suggesting they are likely residual and may have been washed or dragged in over time.	Post-Medieval.

Context No.	Description and Interpretation	Provisional Period
11	Colour: dark brownish grey. Compaction: moist, firm. Composition: clayey silt. Lower layer of uppermost fill M25-6 of the first ditch of Magna fort. The colour of the fill changes slightly towards the south which was likely caused by organic matter. Towards the south the fill is disturbed by the Victorian drain. Within the fill are some facing stones from the Roman wall. The majority of finds were discovered to the north half of the fill (mainly pottery sherds and some nails). Based on the quantity, these finds are probably residual and may have been washed in or dragged in from the road surface/berm north of the ditch at a later point in time. Likely formed over time through the buildup of silt and other material washing into the ditch. Originally given separate number due to differential ground conditions during excavation.	Post-Medieval.
12	Colour: dark greyish brown. Compaction: dry, loose. Composition: poorly sorted silty cobble. Inclusions: moderate small to large angular platy iron ore, evenly distributed. Band of loose cobbling overlying the upper backfill M25-16 of the second fort ditch. Not compacted enough to form a proper road surface and does not extend across the full width of the ditch, only the southern two thirds. Likely inserted in the medieval or post medieval periods to consolidate the softer ditch fill and improve the field. Similar to M25-8 overlying the berm between the second and third ditches.	Post-Medieval.
13	Orientation: E-W. Shape in plan: regular, linear. Shape in profile: regular, deep U-shaped. Break at top: sharp. Break at base: sharp. Base: uneven. Sides: vertical, straight. Construction cut for ceramic field drain immediately south of stone field drain M25-9. Cuts through the upper fills of the first fort ditch M25-2, close to the original south edge of this ditch. Also truncates the upper courses of stone revetment M25-44 on the south side of the ditch. Likely post-dates the adjacent stone drain and may have been laid in the early 20th century as the main drain leaving Carvoran farmhouse.	Modern.
14	Colour: mid greyish brown. Compaction: moist, friable. Composition: clayey silt. Inclusions: frequent small to large sub-angular spheroidal limestone rubble, evenly distributed. Intentional backfill of cut M25-13 with stone rubble and soil after the insertion of a ceramic field drain. Generally loose fill which contains lots of voids between the rubble. Likely post-dates the adjacent stone drain and may have been laid in the early 20th century as the main drain leaving Carvoran farmhouse. Disturbed the upper courses of stone revetment M25-44 on the south side of the first fort ditch.	Modern.
15	Colour: dark greyish black. Compaction: moist, malleable. Composition: silty clay. Thins lens of dark humus, possibly a former layer of decayed organic material which was disturbed during the insertion of the stone field drain. only present towards the eastern edge of the trench. Entirely contained within the uppermost fill of the ditch M25-6.	Post-Medieval.

Context No.	Description and Interpretation	Provisional Period
16	Colour: mid orangey grey. Compaction: dry, firm. Composition: clayey silt. Inclusions: frequent medium to very large angular platy iron ore, evenly distributed. Upper fill of the second fort ditch, below the later cobbling M25-12. Large quantities of iron ore and iron pan throughout this fill, including some large conglomerations, suggesting this deposit was often wet when forming. No evidence of this being a deliberate backfilling it is likely to be the last round of silting as material is washed into the hollow of the ditch. Cut by later field drains, two ceramic pipes and rubble drain M25-22. Occasional finds of Roman material but this is likely residual and may have entered the context by bioturbation or ploughing.	Post-Roman.
17	Colour: mid bluish grey. Compaction: wet, firm. Composition: clayey silt. Fill of the first fort ditch, the first waterlogged deposit overlying semi anaerobic material. Wetter and closer to waterlogged when excavated in the eastern half of the trench, more dried out in the western half but this difference may be due to continuing drought conditions during excavation. Overlies a peaty deposit M25-26 and layer of wetter grey clay with more frequent stones. Some finds throughout it but not huge quantities, suggesting this has formed after the abandonment of the fort in the post-Roman period. Contained some further collapsed facing stones from the fort wall.	Post-Roman.
18	Colour: light brownish orange. Compaction: dry, loose. Composition: very poorly sorted silty cobble. Rubble backfill overlying the foundations of the fort wall M25-57, probably formed during the robbing of the facing stones in later periods. Mixed Roman and post-medieval material remains within the layer including a large amount of animal bone in the upper part of the deposit. Likely represents the collapsed remains of the wall's rubble core which wasn't desirable as building material in later periods. This material may be less disturbed than the overlying rubble spread M25-5, with the lowest layer of rubble potentially still partially in situ within the line of the wall.	Post-Roman.
19	Colour: dark brownish grey. Compaction: moist, malleable. Composition: clayey silt. Secondary fill of the second fort ditch. Likely formed by natural siltation processes after the ditch was no longer being maintained/cleaned out. Semi anaerobic fill containing no organic material remains. Lower density of finds overall compared to the equivalent deposits in the first fort ditch is expected due to its position further from fort wall. Partially overlay the natural bog deposits M25-41 present in the ditch edges where it was dug through the peat.	4th century.
20	Colour: very dark orangey brown. Compaction: moist, malleable. Composition: clayey silt. Inclusions: occasional small to medium sub-angular to rounded platy limestone, evenly distributed. Uppermost fill of shallow ditch M25-4. This is possibly an intentional backfill over a long period of time once the feature had fallen out of use. Overall, it is similar to the topsoil but is much more iron rich suggesting a wet formation environment. Contained several Roman artefacts including a stamped mortarium rim, but these were not frequent enough to suggest the feature had been used as a deliberate rubbish dump.	4th century.

Context No.	Description and Interpretation	Provisional Period
21	Colour: light yellowish grey. Compaction: dry, cemented. Composition: sandy clay. Inclusions: moderate small to large rounded spheroidal cobbles, evenly distributed. Thin layer of clayey silt with frequent cobbles sitting on the upper part of the north edge of the first fort ditch. Probably formed by part of the north edge slumping and collapsing into the ditch and very similar to the berm fabric above it. Sits above but does not interact with M25-42. Likely to have formed in the later Roman period, possible once the ditch is no longer being maintained, around the same time as M25-25.	4th century.
22	Orientation: NE-SW. Shape in plan: regular, curvi-linear. Shape in profile: regular, deep U-shaped. Break at top: sharp. Break at base: sharp. Base: uneven. Sides: vertical, straight. Cut for a curvilinear rubble field drain likely inserted in the 1800s. Square shaped cut filled with rubble to drain the field without a pipe. Runs predominantly N-S through the northern half of the trench, cutting through road M25-30 but curves to the west at its southern end where it crosses the second fort ditch.	Post-Medieval.
23	Colour: dark purplish grey. Compaction: moist, loose. Composition: very poorly sorted clayey cobble. Inclusions: frequent flecks to medium angular platy iron ore, evenly distributed. Rubble field drain likely inserted in the 1800s. Square shaped cut filled with rubble to drain the field without a pipe. Runs predominantly N-S through the northern half of the trench, cutting through road M25-30 but curves to the west at its southern end where it crosses the second fort ditch.	Post-Medieval.
24	Colour: dark blackish grey. Compaction: moist, malleable. Composition: peaty clay. Inclusions: 1) moderate small to large sub-rounded to rounded spheroidal cobbles, evenly distributed 2) occasional medium sub-angular elongate wood, evenly distributed. Primary fill of the second fort ditch. Anaerobic fill, but notably desiccated, reflected in the lack of organic artefacts found during excavation. This deposit was likely caused by both deliberate dumping of rubbish and natural siltation over a long period of time. Due to the anaerobic nature of the deposit this ditch must have been waterlogged and potentially flooded in antiquity. As with M25-19 above there is notably less finds within this deposit when compared to the equivalent deposits in the first ditch, due to its position further from the fort wall.	2nd century.
25	Colour: dark brownish grey. Compaction: moist, firm. Composition: peaty clay. Inclusions: moderate small to very large angular to rounded spheroidal stone rubble, evenly distributed. Semi-anaerobic peaty clay fill of the first fort ditch, abutting and underlying M25-26 in the centre of the ditch. Some finds including occasional preserved organic objects. Contains frequent stone rubble throughout, a mix of cobbles and pebbles from M25-7 to the north and stones from the fort wall to the south. This is the last fill forming during the Roman period but has a lower density of finds than M25-35 below, likely reflecting the reducing occupation of the fort during the 4th century.	4th century.
26	Colour: dark greyish brown. Compaction: wet, spongey. Composition: silty peat. Inclusions: frequent platy laminated organic material, evenly distributed. Peaty layer on top of M25-25, probably caused by long term flooding of the area which resulted in a peat-like buildup within the lowest part of the backfilled ditch. Likely formed after the abandonment of the fort before the final silting up of the ditch.	4th century.

Context No.	Description and Interpretation	Provisional Period
27	Colour: dark brownish black. Compaction: wet, spongey. Composition: clayey silt. Fill of possible ankle breaker or *cippi* pit M25-28 in the base of the second fort ditch. One of three found in the excavated section of ditch. Silty nature suggests natural fill by water/wind over a long period of time, suggesting that these structures were not cleaned out or maintained after their initial construction. Anaerobic fill, similar to M25-36 in the first fort ditch, but no finds found within.	2nd century.
28	Orientation: E-W. Shape in plan: irregular spread, terminus. Shape in profile: regular, deep U-shaped. Break at top: sharp. Break at base: sharp. Base: flat. Sides: steep, straight. Cut for possible ankle breaker or *cippi* pit within ditch M25-3. One of three such features found in the excavated section; they may have been intended as ankle breakers or *cippi* pits full of branches to entangle attackers. Continues beyond the LOE to the east, but much deeper than the other two excavated. Reason for differences between the three segmented ditches within the second fort ditch is unknown and difficult to determine in the narrow section excavated. M25-28 is more typical of ankle breakers in its depth and shape of the cut based on those excavated elsewhere on site.	2nd century.
29	Colour: very dark brownish black. Compaction: waterlogged, spongey. Composition: loamy peat. Inclusions: occasional small to large sub-rounded to rounded spheroidal cobbles, evenly distributed. Anaerobic fill of earlier and more northern ankle breaker dug into fill M25-46 of the first fort ditch. Covered by a layer of redeposited clay M25-39 and cut on the south side by second ankle breaker M25-37. Does not extend along the full length of the excavated section, this ankle breaker terminates roughly halfway across the trench. Overall similar to the other anaerobic fills of the first ditch, with little to no odour and a siltier composition. Same as M25-40, number originally issued during excavation of a sump.	2nd century.
30	Colour: light greyish brown. Compaction: very dry, loose. Composition: well-sorted silty cobble. Road which starts just north of shallow ditch M25-4 and continues beyond the north edge of the trench. Tightly packed cobbled surface suggests a well-made road. Sub-angular cobble throughout with occasional fragments of Roman pottery and CBM included in the surface, suggesting a very late Roman or post-Roman date for the surface. Purpose is unclear but overlies extensive earlier spreads of silt and Roman rubbish M25-48/50. Cut by later rubble drain M25-22.	Post-Roman.
31	Orientation: E-W. Shape in plan: regular, linear. Shape in profile: regular, shallow U-shaped. Break at top: 1) south: sharp 2) north: gradual. Break at base: sharp. Base: uneven. Sides: 1) south: steep, straight 2) north: moderate, straight. Cut for possible ankle breaker or *cippi* pit within ditch M25-3. Middle one of three such features found in the excavated section; they may have been intended as ankle breakers or *cippi* pits full of branches to entangle attackers. Cut for this example is shallower than M25-28 to the east, with a more uneven base which may be a sign of water erosion occurring. Reason for differences between the three segmented ditch sections within the second fort ditch is unknown and difficult to determine in the narrow section excavated.	2nd century.

Context No.	Description and Interpretation	Provisional Period
32	Colour: dark brownish black. Compaction: dry, spongey. Composition: clayey silt. Inclusions: occasional small to medium sub-rounded spheroidal stone, concentrated east. Fill of possible ankle breaker or *cippi* pit M25-31 in the base of the second fort ditch. One of three found in the excavated section of ditch. Silty nature suggests natural fill by water/wind over a long period of time, suggesting that these structures were not cleaned out or maintained after their initial construction. Anaerobic fill containing amorphous organic material and wood, similar to M25-36 in the first fort ditch, but no finds found within. Some evidence of erosion of this feature due to the uneven sides and base and chunks of boulder clay within the fill.	2nd century.
33	Orientation: E-W. Shape in plan: regular, linear. Shape in profile: regular, shallow V-shaped. Break at top: sharp. Break at base: sharp. Base: uneven. Sides: steep, straight. Cut for possible ankle breaker or *cippi* pit within ditch M25-3. Western one of three such features found in the excavated section; they may have been intended as ankle breakers or *cippi* pits full of branches to entangle attackers. Cut for this example is shallower than M25-28, with a slight V-shape in profile though the base is uneven overall which may be a sign of water erosion occurring. Longer than the other complete ditch segment M25-31 immediately to the east. Reason for differences between the three segmented ditch sections within the second fort ditch is unknown and difficult to determine in the narrow section excavated.	2nd century.
34	Colour: dark brownish black. Compaction: dry, spongey. Composition: clayey silt. Fill of possible ankle breaker or *cippi* pit M25-33 in the base of the second fort ditch. One of three found in the excavated section of ditch. Silty nature suggests natural fill by water/wind over a long period of time, suggesting that these structures were not cleaned out or maintained after their initial construction. Anaerobic fill containing amorphous organic material and wood, similar to M25-36 in the first fort ditch, but no finds found within. Some evidence of erosion of this feature due to the chunks of boulder clay within the fill.	2nd century.
35	Colour: very dark greyish black. Compaction: waterlogged, malleable. Composition: cobbly peat. Inclusions: frequent large rounded spheroidal large non facing stones, evenly distributed. Main anaerobic fill of the first fort ditch. This material has frequent cobbles throughout and is siltier than the typical Vindolanda anaerobic and has almost no odour. Contained almost all of the organic finds from this ditch including leather and wood objects as well as frequent bulk finds, indicating the expected use of this ditch as a rubbish dump by the fort's residents. Overlies the assumed primary deposit M25-46 and also revetment M25-44 and has formed after the recutting of the ditch. There were no signs of the ditch having been cleaned out or recut after this fill started to form. Same as M25-36, which was issued to denote the lower part of the fill within the ankle breaker.	3rd century.

Context No.	Description and Interpretation	Provisional Period
36	Colour: dark brownish black. Compaction: waterlogged, malleable. Composition: silty peat. Inclusions: frequent small to medium sub-angular platy stone, evenly distributed. Main anaerobic fill of the first fort ditch. This material has frequent cobbles throughout and is siltier than the typical Vindolanda anaerobic and has almost no odour. Contained almost all of the organic finds from this ditch including leather and wood objects as well as frequent bulk finds, indicating the expected use of this ditch as a rubbish dump by the fort's residents. Overlies the assumed primary deposit M25-46 and also revetment M25-44 and has formed after the recutting of the ditch. There were no signs of the ditch having been cleaned out or recut after this fill started to form. Same as M25-35, this number was issued to denote the lower part of the fill within the ankle breaker.	3rd century.
37	Orientation: E-W. Shape in plan: regular, linear. Shape in profile: regular, shallow U-shaped. Break at top: sharp. Break at base: sharp. Base: uneven. Sides: steep, straight. Cut for the later, southern ankle breaker within ditch M25-2. Possibly part of a massive recut of the ditch during the late 2nd century after repeated slumping/collapse of clay from the sides into the base of the ditch. Truncated the south edge of ankle breaker M24-47. The south side of the ankle breaker is formed by revetment wall M25-44, suggesting the two features are broadly contemporary. Filled by M25-35/36, the main anaerobic fill of this ditch. This appears to be the last major cleaning/recutting of the ditch before it was allowed to gradually infill with organic material and waste from the fort.	2nd century.
38	Colour: dark grey. Compaction: moist, malleable. Composition: silty clay. Inclusions: 1) occasional flecks of sub-angular charcoal, evenly distributed 2) occasional small to medium sub-rounded platy clay, concentrated along edges. Secondary fill of shallow ditch M25-4, mottled dark grey silty clay fill with frequent charcoal flecks and occasional pockets of beige clay. Very diffuse lower boundary going into underlying anaerobic deposit M25-41, suggesting this deposit formed gradually over time, likely through the movement of water through the ditch. Occasional Roman finds may have washed in or been dropped but no evidence of deliberate dumping of rubbish into the ditch. Northern edge contained frequent stones indicating a slumped northern edge, possibly related to nearby cobbled surfaces.	3rd century.
39	Colour: mid whitish pink. Compaction: wet, plastic. Composition: sandy clay. Inclusions: moderate small to medium sub-angular to sub-rounded spheroidal pebbles, evenly distributed. Thin layer of redeposited natural clay overlying M25-40/M25-29 the anaerobic fill of the northern ankle breaker. Cut on the south side by second ankle breaker M25-37. Forms a shelf/false bottom along the north edge of the ditch. Slightly disturbed by a 20th century field drain cut in above it. Very similar to the underlying redeposited clay M25-46 and probably formed through a similar slumping of material off the north edge of the ditch.	2nd century.

Context No.	Description and Interpretation	Provisional Period
40	Colour: very dark brownish black. Compaction: waterlogged, spongey. Composition: loamy peat. Inclusions: occasional small to large sub-rounded to rounded spheroidal cobbles, evenly distributed. Anaerobic fill of earlier and more northern ankle breaker dug into fill M25-46 of the first fort ditch. Covered by a layer of redeposited clay M25-39 and cut on the south side by second ankle breaker M25-37. Does not extend along the full length of the excavated section, this ankle breaker terminates roughly halfway across the trench. Overall similar to the other anaerobic fills of the first ditch, with little to no odour and a siltier composition. Same as M25-29, which was originally issued during excavation of a sump.	2nd century.
41	Colour: dark brown. Compaction: moist, spongey. Composition: peat Inclusions: frequent large sub-rounded elongate silver birch, evenly distributed. Natural peat deposit below and cut by shallow ditch M25-4. Very similar to peat excavated around well complex in 2024. Tree root system excavated in the western slot might explain the frequent bits of silver birch. Also visible in the sides of the second fort ditch M25-3 and to a lesser extent the north side of the first fort ditch M25-2 where they have been dug through this deposit.	Prehistoric.
42	Colour: mottled grey/white and black. Compaction: moist, malleable. Composition: banded clay and anaerobic. Inclusions: 1) moderate small to medium sub-rounded to rounded spheroidal cobbles, evenly distributed 2) frequent small to medium sub-rounded elongate wood, evenly distributed. Anaerobic and clay deposit on the north edge of the first fort ditch. Formed on the lower step of the ditch edge, below but not directly underlying M25-21. Truncated by a modern ceramic field drain running ENE-WSW close to the north edge of the ditch. This mixed deposit most likely formed around the same time as the other anaerobic fills M25-35/36 but with the inclusion of clay bands of slumped material from the ditch edge above.	3rd century.
43	Colour: mid pinkish orange. Compaction: dry, friable. Composition: sandy clay. Inclusions: frequent small to very large angular to sub-rounded spheroidal stone rubble, evenly distributed. Thick deposit of rubble immediately north of the heavily robbed out remains of the north wall for the last stone fort. Overlies much more compact rubble layer M25-54 and is similar to the rubble M25-18 overlying the fort wall foundation. The rubble and clay that make up this deposit would originally have been part of the core of the fort wall. This deposit was likely formed during the first collapse or very early robbing of the fort wall as it is overlain by later, much looser rubble M25-5 associated with later stone robbing. Lots of bulk finds within.	Post-Roman.

Context No.	Description and Interpretation	Provisional Period
44	Orientation: E-W. Form: superstructure of regular, linear wall. Direction of face(s): north. Materials: light yellowish grey limestone (L: 360.00 to 390.00 mm, W: 300.00 to 380.00 mm, H: 61.00 to 140.00 mm). Dressing: rough. Bonding: moist firm mid greyish pink sandy clay. Finish and coursing: stones featuring random coursed coursing with fair face finish. Preservation state: fair. Coursed stone revetment wall constructed on the south edge of the first fort ditch. Upper courses of the wall have likely been truncated by the insertion of later drains M25-9 and M25-13 which sat directly over the surviving stonework. This structure probably originally extended all the way to the top of the ditch edge to meet and reinforce the bank in front of the fort wall to prevent land slips. The stonework is primarily thin slabs of roughly dressed limestone set in courses with clay bonding and a north facing edge only, the south side being packed into the cut of the ditch. Appears to sit on top of M25-46 and was most likely constructed during the recutting of the ditch after the first slumping of one or both sides.	2nd century.
45	Colour: mid brownish orange. Compaction: dry, friable. Composition: silty clay. Inclusions: frequent flecks to small angular platy charcoal, evenly distributed. Irregular shaped deposit of burnt orange clay and charcoal to the west of road M25-30. There are no defined edges to the deposit, and it is partially mixed with the redeposited clay bank below. Occasional finds of Roman pottery from within the burnt material but not likely to be an oven or other *in situ* deposit.	3rd century.
46	Colour: mid orangey pink. Compaction: waterlogged, firm. Composition: clay. Inclusions: frequent medium to large sub-rounded to rounded spheroidal whinstone, evenly distributed. Large slump of redeposited natural clay filling the base of the first fort ditch M25-2. This is likely the primary fill of the ditch, formed by large scale slumping of clay from one or both of the sides of the ditch into the base of the original cut. Heavily waterlogged and capable of organic preservation as pieces of leather including partial shoes were recovered from within this layer. Later cut by the recutting of two ankle breakers, M25-37 and M25-47 to form a new base of the ditch. Also overlain on the south side by revetment M25-44. Not fully excavated due to flooding so depth is not known.	2nd century.
47	Orientation: E-W. Shape in plan: regular, linear. Shape in profile: regular, shallow U-shaped. Break at top: gradual. Break at base: imperceptible. Base: rounded. Sides: gentle, concave. Cut for the earlier and more northerly ankle breaker dug into M25-46 within the first fort ditch. Filled by M25-39 and M25-40 and cut by more central ankle breaker M25-36 on the south side. Most likely dug during the recutting of the ditch after its partial infilling with slumped clay. Only present in the western half of the trench, it gradually rises up into a rounded terminus roughly halfway across the excavated section of the ditch. This may suggest that the first fort ditch also had segmented ankle breakers like those seen in the second ditch which were replaced with the continuous M25-36.	2nd century.

Context No.	Description and Interpretation	Provisional Period
48	Colour: mid brownish grey. Compaction: moist, malleable. Composition: clayey silt. Inclusions: 1) moderate small to very large sub-rounded platy peat lenses, evenly distributed 2) occasional small to large sub-angular to sub-rounded spheroidal cobbles, evenly distributed. Large silty spread below the topsoil and road M25-30 at the north end of the trench, which likely formed during the Roman period as a natural build-up of material over the lower lying parts of the landscape. Area was also used as a dumping space by the Romans as demonstrated by frequent finds of Roman pottery and other material culture throughout. Not fully excavated due to time constraints and size of spread. Cut by post-medieval field drain M25-49 at west edge of trench. Same as M25-50 east of the road.	3rd century.
49	Colour: dark blackish grey. Compaction: wet, loose. Composition: poorly sorted clayey cobble. Post-medieval rubble field drain running E-W at the north end of the trench. Dug through M25-48 into the natural peat bog and may link up with the N-S drain to the east. Only seen in the N-S sondage to the west of road M25-30, not fully excavated. No ceramic pipes within this drain.	Post-Medieval.
50	Colour: mid brownish grey. Compaction: moist, malleable. Composition: clayey silt. Inclusions: 1) moderate small to very large sub-rounded platy peat lenses, evenly distributed 2) occasional small to large sub-angular to sub-rounded spheroidal cobbles, evenly distributed. Large silty spread below the topsoil and road M25-30 at the north end of the trench, which likely formed during the Roman period as a natural build-up of material over the lower lying parts of the landscape. Area was also used as a dumping space by the Romans as demonstrated by frequent finds of Roman pottery and other material culture throughout. Not fully excavated due to time constraints and size of spread. Same as M25-48 west of the road.	3rd century.
51	Colour: mottled grey/yellow/black. Compaction: wet, malleable. Composition: silty clay. Inclusions: 1) moderate small to large sub-rounded platy peat lenses, evenly distributed 2) frequent flecks to small sub-angular elongate charcoal, evenly distributed. Large bank of clay to the north of the second fort ditch, partially underlying large silty deposits M25-48 and M25-50 and sitting on top of the natural peat bog. Cut by post-medieval rubble field drain M25-22. Shallow gully M25-52 runs NW-SE across part of the platform but is likely natural erosion of the clay. Occasional Roman finds from within the clay. Likely natural clay excavated during the construction of the fort ditches and spread across the area to the north to help consolidate the underlying peat bog.	2nd century.
52	Orientation: NW-SE. Shape in plan: regular, curvi-linear. Shape in profile: regular, shallow U-shaped. Break at top: imperceptible. Break at base: imperceptible. Base: rounded. Sides: gentle, concave. Curvilinear gully running NW-SE across clay platform M25-51 to the west of road M25-30. Continues beyond the LOE to the west and under the road to the east. Overall, very shallow with slightly irregular base suggesting it was likely a water channel formed by erosion after the creation of the clay bank but before the road was built. Filled by M25-53, a single fill similar to the overlying silty layer that covers the area.	2nd century.

Context No.	Description and Interpretation	Provisional Period
53	Colour: mid greyish brown. Compaction: wet, loose. Composition: clayey silt. Inclusions: occasional small to medium rounded spheroidal cobbles, evenly distributed. Fill of a shallow gully eroded into clay bank M25-51. Overall, very similar to the overlying silty deposit M25-48 and both likely formed gradually over time through material being washed into the area as well as rubbish being dumped from the fort to the south. Contains occasional finds of Roman material, including a small melon bead.	3rd century.
54	Colour: light greyish yellow. Compaction: moist, cemented. Composition: moderately sorted clayey cobble. This context is a compacted layer of stone above anaerobic bank M25-55 immediately north of the fort wall. It forms part of the bank between the wall and the first ditch and may have been deliberately laid. The layer is composed of small and medium sharp stones set in yellowish clay. When removed, it revealed the face of the fort wall foundations to the south, and a layer of anaerobic material with twigs and other wood below.	4th century.
55	Colour: very dark black. Compaction: wet, friable. Composition: peaty silt. Inclusions: frequent medium to large sub-angular elongate silver birch, evenly distributed. This context is the anaerobic material north of, and cut by, the fort wall foundations M25-57. The material is directly below a layer of compacted rubble and is bordered to the south by what appears to be the foundations of the fort wall. Once removed, the anaerobic material terminates on a grey clayey layer M25-92. The fill appears peat-like but lacks some of the distinctive qualities and is siltier. Its matrix and stratigraphic location suggests this might be a natural build-up of sediment, possibly caused by seasonal flooding from the nearby lake to the north. This layer was formed prior to the Roman occupation of the site.	Prehistoric.
57	Orientation: E-W. Form: foundation of regular, linear wall. Direction of face(s): north. Materials: light grey limestone (L: 170.00 to 400.00 mm, W: 100.00 to 310.00 mm, H: 110.00 to 220.00 mm). Dressing: unworked. Bonding: moist cemented light orangey pink sandy clay. Inclusions: moderate small rounded to well-rounded river pebbles evenly distributed. Preservation state: poor. Foundation course for the north wall of the last stone fort. Only a single course of stone survives with a row of facing stones on the north edge and wall core behind made of packed boulder clay and stone rubble. Full width of the wall wasn't found as it continues beyond the trench edge to the south. The foundation appears to have been laid into anaerobic fill, potentially of an earlier ditch, and the natural peat bog forming the bank south of ditch M25-2. Overlaid by a large amount of rubble, M25-18, probably created during the demolition/robbing of the wall in later periods.	4th century.
92	Colour: mid whitish grey. Compaction: moist, malleable. Composition: clayey silt. Possible lakebed sediment underlying M25-55. No material remains within suggest this is a natural fill. The relative thinness and texture of the layer suggests sediment buildup due to water, possibly due to seasonal flooding of the area. M25-55 on top is somewhat peat-y but lacks some characteristics seen in other peat in the area.	Prehistoric.

APPENDIX 2: SMALL FINDS

Small Find No.	Context No.	Description
MSF68	M25-24	Gold-in-glass bead
MSF69	M25-1	Graffito *mortarium*
MSF70	M25-38	Stamped *mortarium*
MSF71	M25-29	Repaired samian
MSF72	M25-17	Stamped *mortarium*
MSF73	M25-25	Spindle whorl
MSF74	M25-5	Worked antler
MSF75	M25-25	Gaming counter
MSF76	M25-35	Ceramic statue head
MSF77	M25-35	Cosmetic palette
MSF78	M25-35	Iron object
MSF79	M25-35	Stamped samian
MSF80	M25-35	Worked antler
MSF81	M25-43	Iron stylus pen
MSF82	M25-43	Stamped *mortarium*
MSF83	M25-25	Antler
MSF84	M25-41	Gold-in-glass bead
MSF85	M25-1	Gaming counter
MSF86	M25-35	Bone tool
MSF87	M25-35	Rolled lead
MSF88	M25-38	Gaming counter
MSF89	M25-48	Melon bead
MSF90	M25-53	Melon bead
MSF91	M25-50	Melon bead
MSF92	M25-17	Lead object
MSF93	M25-43	Samian stamp
MSF94	M25-21	Samian graffito
MSF95	M25-54	Cu fitting
MC2	M25-1	Cu alloy
MC3	M25-48	Silver
ML2025-1	M25-24	Shoe scrap
ML2025-2	M25-29	Childs shoe scrap
ML2025-3	M25-29	Adult shoe
ML2025-4	M25-36	Adult shoe sole
ML2025-5	M25-35	Adult shoe sole
ML2025-6	M25-35	Shoe

Small Find No.	Context No.	Description
ML2025-7	M25-35	Shoe
ML2025-8	M25-35	Shoe
ML2025-9	M25-35	Shoe
ML2025-10	M25-35	Shoe
ML2025-11	M25-35	Shoe
ML2025-12	M25-35	Shoe
ML2025-13	M25-35	Shoe
ML2025-14	M25-35	Childs shoe
ML2025-15	M25-35	Shoe with upper
ML2025-16	M25-35	Shoe upper
ML2025-17	M25-35	Shoe
ML2025-18	M25-35	Shoe
ML2025-19	M25-35	Shoe
ML2025-20	M25-35	Shoe
ML2025-21	M25-35	Shoe
ML2025-22	M25-35	Stamped shoe
ML2025-23	M25-35	Shoe
ML2025-24	M25-35	Childs shoe
ML2025-25	M25-35	Shoe
ML2025-26	M25-35	Shoe
ML2025-27	M25-29	Scrap leather
ML2025-28	M25-36	Scrap leather
ML2025-29	M25-40	Openwork shoe
ML2025-30	M25-35	Shoe
ML2025-31	M25-35	Shoe
ML2025-32	M25-35	Shoe
ML2025-33	M25-35	Shoe
ML2025-34	M25-35	Scrap leather - 3 bags total
ML2025-35	M25-35	Knotted leather thong
ML2025-36	M25-35	Shoe
ML2025-37	M25-35	Shoe
ML2025-38	M25-35	Complete shoe
ML2025-39	M25-35	Shoe scrap
ML2025-40	M25-25	Scrap leather
ML2025-41	M25-46	Shoe
ML2025-42	M25-46	Shoe
ML2025-43	M25-46	Scrap leather
ML2025-44	M25-39	Scrap leather

Small Find No.	Context No.	Description
ML2025-45	M25-35	Partial paddle sandal
ML2025-46	M25-35	Reworked heel piece
ML2025-47	M25-35	Decorated heel piece
MW2025-1	M25-25	Tent peg
MW2025-2	M25-25	Hairpin
MW2025-3	M25-25	Tent peg
MW2025-4	M25-25	Tent peg
MW2025-5	M25-29	Stave
MW2025-6	M25-25	Tent peg
MW2025-7	M25-35	Stake?
MW2025-8	M25-25	Partial hairpin
MW2025-9	M25-35	Comb
MW2025-10	M25-35	Worked wood
MW2025-11	M25-25	Worked wood
MW2025-12	M25-35	Stave
MW2025-13	M25-35	Dowel
MW2025-14	M25-35	Bung
MW2025-15	M25-35	Stave
MW2025-16	M25-35	Hair comb
MWT2025-1	M25-42	Stylus tablet
MWT2025-2	M25-35	Ink tablet fragment

APPENDIX 3: M25-92, ASSESSMENT OF AN EXTENSIVE ORGANIC DEPOSIT FROM MAGNA

JACQUI HUNTLEY

INTRODUCTION

Excavations immediately to the north of the fort wall at Magna uncovered an extensive dark brown, organic-rich layer. This was cut by one of the major Roman ditches.

The surface appeared to follow underlying ground topography, i.e. was not apparently water lain when it would have been horizontal at the upper level.

A sample of the organic material and a piece of wood within it were taken to determine the possible origin of the material.

METHODS

About 80ml of the organic material was soaked for several days in warm water as it was very dry and crumbly with no obvious structure. After this the resultant lumpy slurry was thoroughly agitated and passed through a 500µ and then a 180µ sieve. A few millilitres of the material that had passed through both sieves was also collected. The small roundwood piece collected retained bark but was also rather degraded. It, too, was soaked for some days after which it was put in the domestic freezer for 48 hours.

Sections of the frozen wood were taken using a single edged razor blade – transverse (TS), tangential longitudinal (TLS) and radial longitudinal (RLS). These were mounted in water and examined using a Leitz DM/LM microscope at magnification of 200 and 400. Notes were made of the types, size and arrangements of cells in each of these three planes.

A few drops of the very fine fraction were put on a microscope slide and also examined at x200. Identification of pollen grains and other spores was made but only for a few scans of the slide.

Subsamples of the coarse fraction were put in a Petri dish and scanned through a Wild M3 stereomicroscope noting any seeds/fruits as well as the matrix components – types of organic material, mineral and so on.

RESULTS

Wood: TS – this was diffuse porous with the larger vessels being scattered across the section. The material was too rotten to get more than a very small section intact and therefore nothing else may be said about the general distribution pattern of the section. TLS showed only uniseriate rays that were quite long with rows of up to about 15 cells seen. There were a few aggregate rays but, again, preservation was too poor for detailed observations. RLS ray vessel pits small but obvious, rays themselves homogeneous and scalariform pits present. These were not abundant but had between 12 and 20 bars. This combination of features identifies the wood as being from alder, *Alnus*. The pits are too large for birch, much too small for hazel; the scalariform plates have too many bars for hazel (it has 5-6) although a similar number to those of birch; Willow/poplar have only simple scalariform plates.

Pollen: the smear on the slide produced a moderate number of pollen grains. *Alnus* 15, *Polypodiaceae undiff* 2, *Betula* 2, *Corylus* 1, *Quercus* 1, crumpled *Pinus* 1, *Gramineae* 3, Trilete spores 2, fungal spores 2, *Polypodium* 2 and possible pollen 6. Preservation was good but many of the grains seemed "thin". Numbers seen cannot be used to suggest vegetation as alder, in particular, is easily identified even if in a highly degraded state. The ferns and trilete spores do suggest some humification and it is most likely that the deposit formed under woodland with alder perhaps more prominent.

Macros: the >500µ sample comprised almost entirely small lumps of humified organic material with a very small amount of mineral and some fragments of epidermis or similar plant remain. Even the large lumps, when squashed, were simply aggregates of highly humified organic material. No seeds or fragments thereof were seen.

DISCUSSION

The highly humified and compressed, dry nature of the material suggests a mor humus rather than a more typical peat. This would be in accord with it

forming under a wooded, even if open woodland, environment and not saturated ground. This ties in with the surface of the layer apparent respecting underlying deposits. It was not water lain. Mor humus is, in effect, the gradual decomposition, in air, of leaf litter and ground vegetation where some plant chemicals, typically from conifers, inhibit bacterial activity leading to accumulation of unassimilated organic material. Fungi are able to develop in this environment. There should be stratification in a mor humus with relatively 'fresh' litter at the top, then further organic layers with differing levels of humification (increasing as moving down through the profile). There is no obvious mixing of mineral and organic as found in a mull humus. The lack of bacterial and later earthworm activity keeps the organic material separate from any underlying mineral. This stratification was not investigated in the grab sample analysed here.

As archaeologists, the team is interested in the date of the deposit. It clearly underlies the main Roman activity and is cut by it. All that the work above can say is that it is post alder-rise in the region but that still gives some thousands of years.

RECOMMENDATIONS

A radiocarbon date from the upper level of the deposit could help to say whether it was truncated by the building of the fort or not.

A full pollen count could be undertaken but is not recommended as mor humus is notorious in differential preservation of pollen and it is not clear what question in relation to Magna could be addressed. It is noted that monolith tins for pollen were taken through the main ditch and these are likely to provide pollen data of more relevance to the site.

It would be useful to have a few levelled-in points of the surface of the layer to confirm, or otherwise, that it follows the underlying ground rather than being horizontal.

ACKNOWLEDGEMENTS

The layer was discussed and samples taken at a regular HE and Magna Team on-site meeting on August 5th 2025. Don O'Meara, HE took the grab sample and wood sample, Andrew Birley provided the main photo and context info; the Magna Team plus Andrew, Don, Mike Collins HE, Brian Huntley and the author all contributed to a lively on-site discussion about the layer and its origins.

Drone image of trench; lines of stones on south side are remains of the victorian drain on the south edge of the primary fort ditch. Organic layer lay south of this and cut through by the ditch (photo Magna Dig Diary 2025 Week 1)

Looking south with a member of the archaeological team stood on the remains of the north wall of the fort. Ditch partially filled with water. Dark organic layer showing above main 'floor' of the trench (photo author)

Face of deposit with context 92 sampled outlined in blue. (photo Andrew Birley)

APPENDIX 4: ENVIRONMENTAL SAMPLES

2025 environmental samples from the northern ditch trench.

Sample No.	Context No.	Feature No.	Context Type	Sample Volume (L)
<1>	M25-6	[2]	Fill of ditch	10
<2>	M25-17	[2]	Fill of ditch	10
<3>	M25-16	[3]	Fill of ditch	10
<4>	M25-11	[2]	Fill of ditch	5
<5>	M25-19	[3]	Fill of ditch	10
<6>	M25-24	[3]	Fill of ditch	10
<7>	M25-26	[2]	Fill of ditch	10
<9>	M25-25	[2]	Fill of ditch	10
<15>	M25-27	[3]	Fill of ditch	10
<16>	M25-32	[31]	Fill of ankle breaker	5
<18>	M25-34	[33]	Fill of ankle breaker	5
<24>	M25-38	[4]	Fill of depression	10
<25>	M25-35	[2]	Fill of ditch	5
<29>	M25-35	[2]	Fill of ditch	5
<30>	M25-41	Layer	Natural layer	5
<31>	M25-41	Layer	Natural layer	5
<34>	M25-35	[2]	Fill of ditch	5
<35>	M25-43	Spread	Fort wall rubble	5
<37>	M25-45	Deposit	Burnt clay deposit	5
<47>	M25-55	Layer	Natural layer	10
<48>	M25-92	Layer	Natural layer	5

APPENDIX 5: COMPLETE ARCHAEOBOTANICAL DATA, 2025

feature	[2]	[2]	[3]	[2]	[3]	[3]	[2]	[2]	[28]	[31]	[2]	[4]	under [4]	rubble	dump	bank Nwall
context	M25-6	M25-11	M25-16	M25-17	M25-19	M25-24	M25-25	M25-26	M25-27	M25-32	M25-35	M25-38	M25-41	M25-43	M25-45	M25-55
sample	1	4	3	2	5	6	9	7	15	16	25	24	30	35	37	47
prov date	post-med	post-med	post-Roman	post-Roman	4th	2nd	4th	4th	1st	1st	3rd	4th	pre Hist	post-Roman	3rd	pre Hist

volume light fraction - mm	60	40	20	80	120	20	70	50	200	80	100	15	75	80	100	100
vol processed - litres	10	5	10	10	10	10	10	10	5	5	5	10	5	5	5	5

Charred taxa - counts

Indeterminate cereal grain														1		
Plantago lanceolata							1									
Polygonum aviculare														1		
Rumex longifolius some with perianth							1									
Triticum spelta grain												1		1		

Matrix components - scores

1-3mm twigs									3	3					
Amorphous fine organic lumps						2	2		2	2					4
bark															3
Bone - trabecular and large mammal							1						3		
bracken frond fragments										1					
burnt moss stems										1					
Calluna flowers/ shoots									2	1					
Calluna wood/ twigs		2			1		1		1				2		
charcoal	2	2	3	2	2	2	3	2	1	1	3	4		1	
charcoal silty													4		
cindery clinkery material					3			3			2	1	4	4	
clinker		3													
coal		2			1		1	2	1				1	1	
Daphnia ephyppia								1	2	1	1				
earthworm eggcases				2			1	4					1	1	

epidermis misc								2							
fungal sclerotia					1		1		1	2		3			
highly humified fine organic lumps				4								4			
invertebrate fragments	1			2		1	2	2	1	1	1				1
mineral	2	3	2	1		3	3	1		1		1			4	
mineral spatter, heated, globular					1							1			2	
modern roots	3				4		2					3				
mollusc shell ? modern														1		
monocot stem/ rootbase											3					2
monocot stems									3	3						
moss stem								1	1	2	2			1		
small mammal long bone/ vertebrae														1		
Sphagnum leaves									2				1			
stem fragments				2									2			
wood							1	2	2	3	4		1			

Waterlogged - scores

<2mm *Gramineae* (grasses)							1	2	2							
2-4mm *Gramineae* (grasses)				2			4		2	3	3					
Alnus glutinosa (alder)										1						
Callitriche sp. (water starworts)								1								
Caltha palustris (marsh marigold)									1							
Carex ovalis/C. disticha (oval/brown sedge)											1					
Carex spp. (sedges)								2	4	3	1					
Cerastium fontanum (common mouse-ear)							1	3	1		2					
cf *Molinia caerulea* (purple moor grass)										1						
Cirsium palustre (marsh thistle)								2	1	1						
Corylus avellana shell fragment (hazelnut)											2					
Eriophorum angustifoli-um spindle (common cottongrass)							1		4	2						
Fallopia convolvulus (black bind-weed)										1						
Galeopsis tetrahit (hemp nettle)									2	1	2					

Hydrocotyle vulgaris (marsh pennywort)										1						
Hyoscyamus niger (henbane)							1	1								
Juncus cf conglomeratus (compact rush)							1									
Juncus effusus (soft-rush)				5				1				5				4
Juncus sp (rush)									1							
Lamiun cf. purpureum (purple dead-nettle)							2	2			1					
Lapsana communis (nipplewort)										1						
Luzula sp (spije-rush)									1							
Montia fontana (blinks)									1	2	3					
Persicaria hydropiper (water-pepper)											4					
Persicaria maculosa (redshank)										2						
Persicaria maculosa/P. lapathifolia (redshank/ pale persicaria)							1		2	1	2					
Polygonaceae undiff (dock family)				1												
Polygonum aviculare (knotgrass)									2	4	1	1				

Potentilla erecta-type (tormentil)									3	1	1					
Prunella vulgaris (self-heal)									1							
Ranunculus aquatilis (common water-crow-foot)							2	4	3	2	3					
Ranunculus repens-type (buttercups various)								3	2	1	2					
Ranunculus sceleratus (celery-leaved buttercup)								3								
Rorippa amphibia (great yel-low-cress)											1					
Rubus cf. R. idaeus (cf raspberry)							2									
Rubus fruti-cosus agg. (blackberry s.l.)								1	2	1						
Rumex acetosella (sheep's sorrel)							1			1						
Rumex longifolius some with perianth (docks)							2	2	4	4	3					
Rumex obtusifo-lius-type (docks)										1						
Sonchus asper (prickly sow-thistle)										1						
Stachys palustris (marsh woundwort)				3			3	3								
Stellaria media (chickweed)									3	4	4					

Urtica dioica (stinging nettle)							4	4	3	4	1					
Urtica urens (small nettle)								3	3	2	2					

Modern intrusions

Sambucus nigra - modern probably														1		

APPENDIX 6: ARCHAEOBOTANY MATRIX COMPONENTS – SCORES.

Samples in order of feature then provisional date.

										below 24	below 24	over 41		1. under 38	rubble	bank Nwall
feature	[2]	[2]	[2]	[2]	[2]	[2]	[3]	[3]	[3]	[28]	[31]	[4]	dump	2. under [4]		
context	M25-6	M25-11	M25-17	M25-25	M25-26	M25-35	M25-16	M25-19	M25-24	M25-27	M25-32	M25-38	M25-45	3. M25-41	M25-43	M25-55
sample	1	4	2	9	7	25	3	5	6	15	16	24	37	4. 30	35	47
prov date	post-med	post-med	post-Roman	4th	4th	3rd	post-Roman	4th	2nd	2nd	2nd	4th	3rd	5. pre-Hist	post-Roman	pre-Hist
volume light fraction - mm	60	40	80	70	50	100	20	120	20	200	80	15	100	7. 75	80	100
vol processed - litres	10	5	10	10	10	5	10	10	10	5	5	10	5	8. 5	5	5

Matrix components - scores

modern roots	3			2				4				3				
fungal sclerotia				1				1		1	2	3				
earthworm eggcases			2	1	4								1		1	
mollusc shell ? modern															1	

charcoal	2	2	2	3	2	3	3	2	2	1	1	4	1			
mineral	2	3	1	3	1		2		3		1	1	4			
invertebrate fragments	1		2	2	2	1			1	1	1					1
Amorphous fine organic lumps				2					2	2	2					4
coal		2		1	2			1		1			1		1	
cindery clinkery material					3	2		3				1	4		4	
Daphnia ephyppia					1	1				2	1					
wood				1	2	4				2	3			22. 1		
1-3mm twigs										3	3					
monocot stems										3	3					
Calluna flowers/ shoots										2	1					
moss stem					1	2				1	2				1	
Calluna wood/twigs		2		1				1		1					2	
mineral spatter, heated, globular								1				1	2			
Bone - trabecular and large mammal				1											3	

clinker		3													
stem fragments			2										31. 2		
highly humified fine organic lumps			4										32. 4		
epidermis misc					2										
monocot stem/ rootbase						3									2
Sphagnum leaves										2			35. 1		
burnt moss stems											1				
bracken frond fragments											1				
small mammal long bone/ vertebrae														1	
charcoal silty														4	
bark															3

APPENDIX 7: BOTANICAL DATA

(ch = charred remains). Samples in order of feature then provisional date.

feature	[2]	[2]	[2]	[2]	[2]	[2]	[3]	[3]	[3]	[28]	[31]	[4]	dump	under [4]	rubl	bank Nwall
context	M25-6	M25-11	M25-17	M25-25	M25-26	M25-35	M25-16	M25-19	M25-24	M25-27	M25-32	M25-38	M25-45	M25-41	M25-43	M25-55
sample	1	4	2	9	7	25	3	5	6	15	16	24	37	30	35	47
prov date	post-med	post-med	post-Rom	4th	4th	3rd	post-Rom	4th	2nd	2nd	2nd	4th	3rd	Pre Hist	post-Rom	Pre Hist

volume light fraction - mm	60	40	80	70	50	100	20	120	20	200	80	15	100	75	80	100
vol processed - litres	10	5	10	10	10	5	10	10	10	5	5	10	5	5	5	5

Seeds - scores (waterlogged and charred (ch))

Juncus effusus (soft-rush)			5		1									5		4
Stachys palustris (marsh woundwort)			3	3	3											
<2mm *Gramineae* (grasses)				1	2					2						
Hyoscy-amus niger (henbane)				1	1											
2-4mm Gramineae (grasses)			2	4		3				2	3					

Persicaria maculosa/P. lapathifolia (redshank/ pale persicaria)				1		2				2	1					
Carex spp. (sedges)					2	1				4	3					
Cerastium fontanum (common mouse-ear)				1	3	2				1						
Ranunculus aquatilis (common water-crowfoot)				2	4	3				3	2					
Urtica dioica (stinging nettle)				4	4	1				3	4					
Rumex longifolius-type, some with peri-anth (docks)				2	2	3				4	4					
Lamiun cf. *purpure-um* (purple dead-nettle)				2	2	1										
Urtica urens (smallnettle)					3	2				3	2					
Ranunculus repens-type (buttercups various)					3	2				2	1					
Cirsium palustre (marsh thistle)					2					1	1					
Polygonum aviculare (knotgrass)						1				2	4	1				
Stellaria media (chickweed)						4				3	4					
Eriophorum angustifoli-um spindle (common cottongrass)				1						4	2					
Montia fontana (blinks)						3				1	2					

Potentilla erecta-type (tormentil)						1				3	1					
Galeopsis tetrahit (hemp nettle)						2				2	1					
Rubus fruticosus agg. (black-berry s.l.)					1					2	1					
Polyg-onaceae undiff (dock family)			1													
Juncus cf conglomer-atus (compact rush)				1												
Rumex acetosella (sheep's sorrel)				1							1					
Rubus cf. R. idaeus (cf raspberry)				2												
ch. *Plantago lanceolata*				1												
ch. *Rumex longifolius* some with perianth				1												
Ranunculus sceleratus (celery-leaved buttercup)					3											
Callitriche sp. (water starworts)					1											
Persicaria hydropiper (water-pepper)						4										
Corylus avellana shell fragment (hazelnut)						2										
Carex ovalis/C. disticha (oval/brown sedge)						1										

Rorippa amphibia (great yellow-cress)						1										
Prunella vulgaris (self-heal)										1						
Juncus sp (rush)										1						
Caltha palustris (marsh marigold)										1						
Luzula sp (spike-rush)										1						
cf *Molinia caerulea* (purple moor grass)											1					
Persicaria maculosa (redshank)											2					
Sonchus asper (prickly sow-thistle)											1					
Fallopia convolvulus (black bind-weed)											1					
Hydrocotyle vulgaris (marsh pennywort)											1					
Lapsana communis (nipplewort)											1					
Rumex obtusifolius (docks)											1					
ch. *Triticum spelta* grain												1			1	
ch. Indeterminate cereal grain															1	
ch. *Polygonum aviculare*															1	
count of taxa	**0**	**0**	**4**	**16**	**16**	**19**	**0**	**0**	**0**	**22**	**24**	**2**	**0**	**1**	**3**	**1**

APPENDIX 8: MONTHLY RAINFALL TOTALS

Magna monthly rainfall totals, 2025 (mm)							
Winter		Spring		Summer		Autumn	
Jan	28.6	**Mar**	25	**Jun**	120.8	**Sep**	123.6
Feb	26.2	**Apr**	9.8	**Jul**	79.6	**Oct**	63.0
Dec	NA	**May**	40.2	**Aug**	25.4	**Nov**	113.8

Spadeadam No 2 1991-2020 long-term rainfall average (mm)							
Winter		Spring		Summer		Autumn	
Jan	123.60	**Mar**	91.51	**Jun**	95.71	**Sep**	105.50
Feb	99.61	**Apr**	75.73	**Jul**	115.04	**Oct**	126.94
Dec	136.88	**May**	78.54	**Aug**	127.75	**Nov**	125.71

Spadeadam data available at:

https://www.metoffice.gov.uk/research/climate/maps-and-data/location-specific-long-term-averages

APPENDIX 9: FABRIC DESCRIPTION

Fabric class	Fabric code	Description
A	**BAT AM**	As in the Baetican fabrics from NRFRC.
	GAL AM	As found in the NRFRC.
	AMPH	A group of miscellaneous, unidentified *amphora* fabrics.
B	**BB1**	Found as DOR BB 1 in the NRFRC.
	BB1.A	BB1 other- possibly from the southwest but a different workshop. It produced the same BB1 forms, but it is highly micaceous, or the surface is not burnished to a generally 'acceptable' extent. Sometimes it has a reddish surface.
	BB1.B	BB1 Southwest slipped ware.
	BB2	As found in the NRFRC.
	BB2GW	Grey ware copies of black-burnished ware 2 forms.
	BBGW	Grey ware copies of black-burnished forms.
F	**LNV CC**	As found in the NRFRC.
	CCM	Miscellaneous colour-coated ware with a dull finish
	CCMS	Miscellaneous colour-coated ware with a shiny finish
	CNG BS	As found in the NRFRC.
	FINE	Miscellaneous reduced fine ware.
G	**DAL SH**	Dales ware- As found in the NRFRC.
	HUN CG	As found in the NRFRC.
	DER CO	As found in the NRFRC.
	GQTZ	A series of heavily quartz gritted fabrics.
M	**MAH WH**	As found in the NRFRC.
	LNV WH	As found in the NRFRC.
	MORT	A group of unrecognised fabrics.
	MORTEL	A group of early local, usually orange, *mortarium* fabrics.

Fabric class	Fabric code	Description
O	FLAG1	Thin-walled, grey core with a brown coat.
	FLAG2	Oxidised, orange, can sometimes have an orange slip.
	FLAG3	Oxidised exterior surface and reduced interior, the two fade into one another.
	OXMISC/OXID	A group of unspecific oxidised fabrics.
R	CRA RE	Crambeck reduced ware
	CRA RE2	White fabric similar to the original CRA RE. Distinctive patchy grey surface.
	COAR	Coarse, gritty fabric with abundant quartz inclusions. Surface is smooth with no visible inclusions.
	GWB	A series of greywares with burnished surface.
	SGRIT	A semi gritted fabric with abundant inclusions both in the fabric and on the surface.
	GWEY	East Yorkshire grey ware. A uniform grey ware with no inclusions and a glassy, highly fired feel. Burnished lines as typical decoration.
	RWM	A group of unspecific miscellaneous reduced fabrics.
	RW1MIC	A series of fabrics with highly micaceous usually dark grey/black surfaces. The core is typically brownish pink, sometimes grey, depending on the firing process.
	RW1	Like RW1MIC but not micaceous
	GWRC	Hard fired fabric, red core with light grey, smooth shiny surfaces.
	SERW	Southeast Reduced Ware
	GWM	A group of unspecific miscellaneous grey fabrics.
W	BPD PA	Black paint decorated parchment ware.
	FLAG4	White fabric with little inclusions, but sandy texture, buff surface with a reddish-brown slip.
	FLAG6	Light grey core with light orange margins and white surface.
	FLAG7	Thin-walled, pale brown exterior surface and dark grey interior surface, clear cut difference in the transition.

APPENDIX 10: FORM CLASSES AND TYPOLOGIES

Form classes

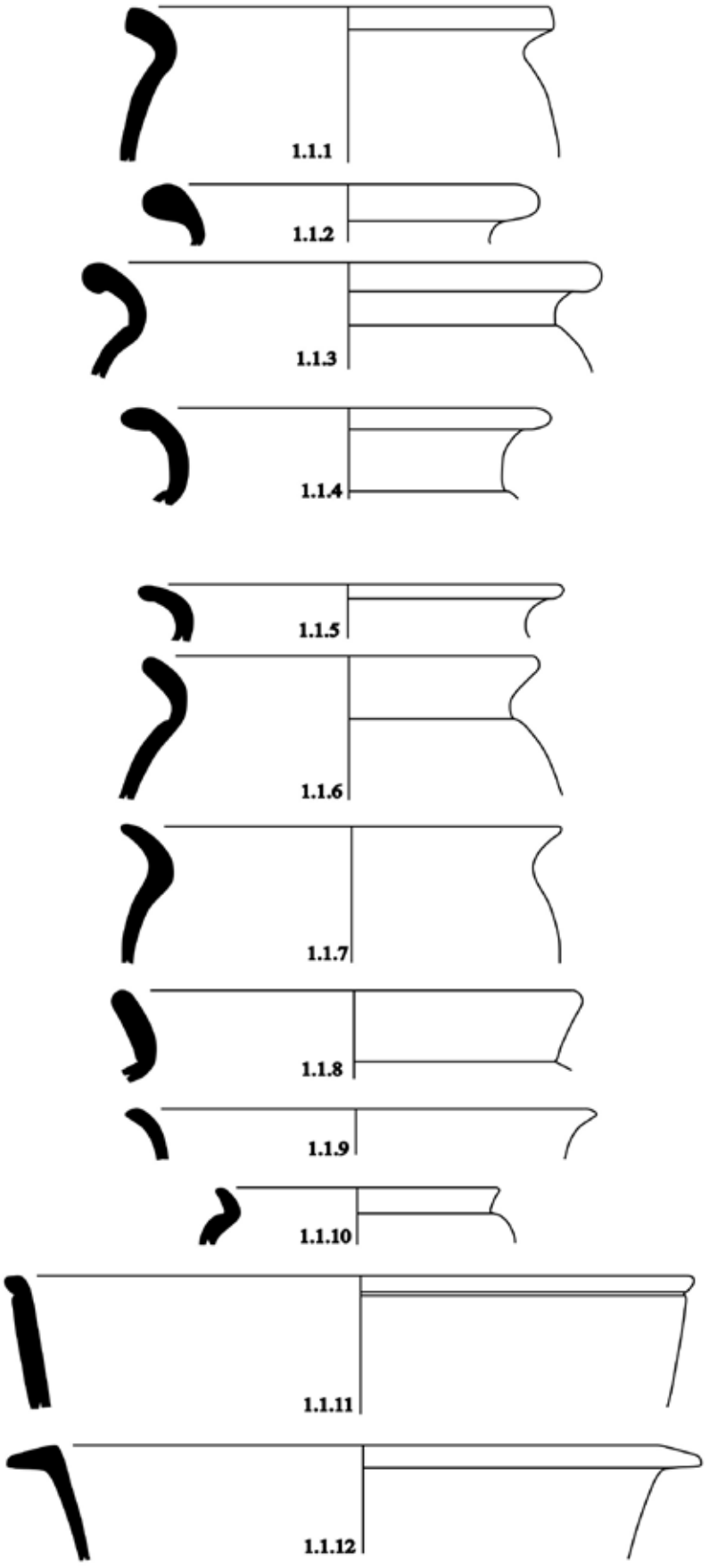
Form class	Code
Amphora	A
Beaker	BE
Bowl	BO
Dish	DS
Castor Box	CB
Flagon	FL
Jar	JA
Mortarium	M
Unidentified	U/I

Forms

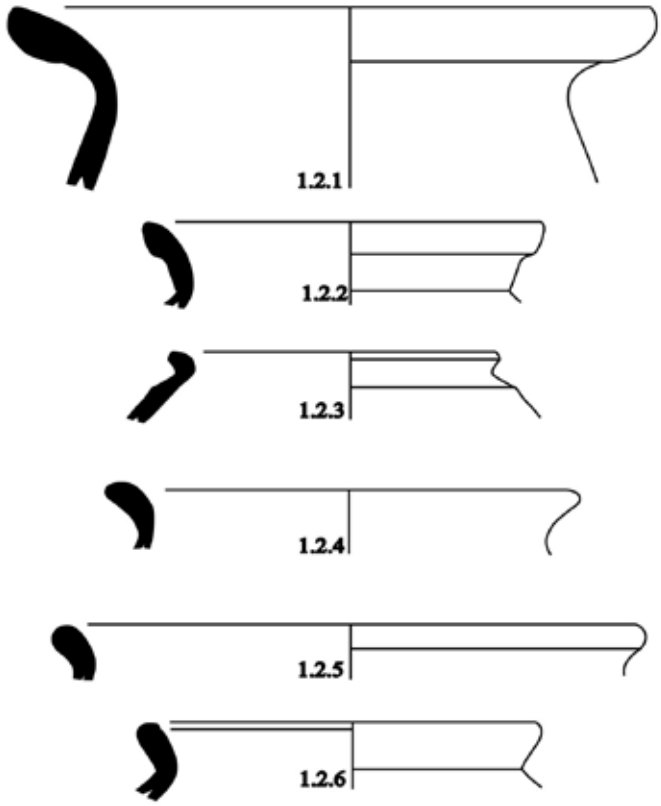
Form class	Form	Meaning
Beakers (BE)	BEC	Cornice beaker
	BECD	Devolved cornice beaker
	BEE	Everted beaker
	BEF	Folded beaker
Bowls (BO)	BC	Curved bowl
	BF	Flanged bowl
	BFR	Flat rim bowl
	BFRG	Flat rim bowl with a groove
	BEA	Almond rim bowl
	BM	Miscellaneous bowl
	BRR	Rounded rim bowl
	BRRP	Rounded rim P-shaped bowl
	BT	Triangular rim bowl
Dish (DS)	DP	Plain rim dish
	DPG	Plain rim dish with groove
	DRR	Dish with a round rim
Flagon (FL)	FR	Flagon with a ring neck
	FT	Flagon with a triangular rim
Jars (JA)	JE	Everted rim jar
	JEA	Almond everted rim jar
	JER	Rounded everted rim jar
	JES	Short everted rim jar
	JET	Triangular everted rim jar
	JFC	Collared jar
	JFR	Flat rim jar (Dales (type))
	JHT	Huntcliff-type jar (in HUN CG)
	JH	Hooked jar
	JL	Lid seated jar
	JN	Everted long-neck jar
	JC	Cupped jar
	JSQ	Squared rim jar
Mortaria (M)	MBF	Bead and flange *mortarium*
	MHH	Hammerhead *mortarium*
	MG	Grooved *mortarium*
	MWS	Wallsided *mortarium*

APPENDIX 11A: FORM CATALOGUE BY FABRIC

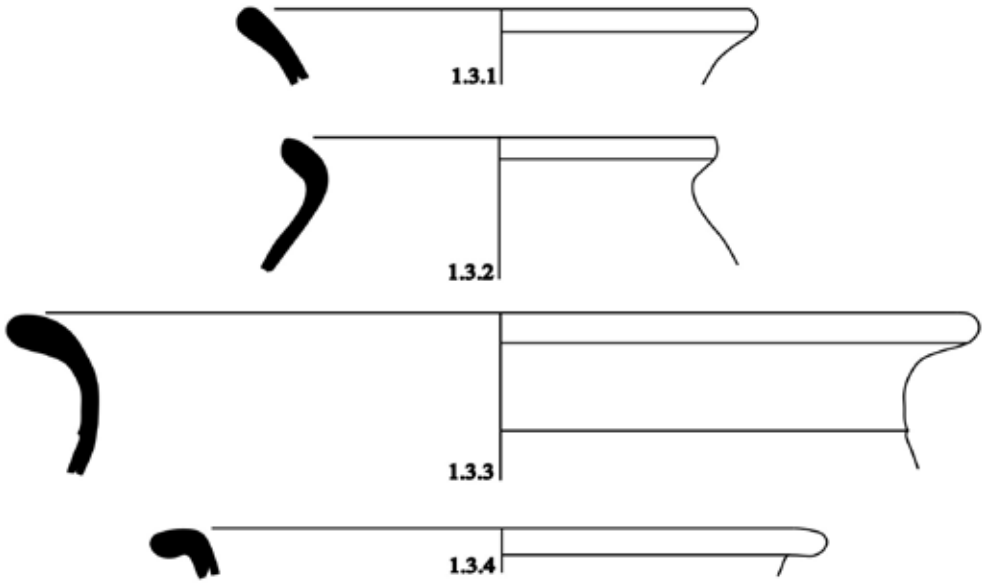
1.R-Reduced
1.1. GWB



1. R-Reduced
1.2. RWM

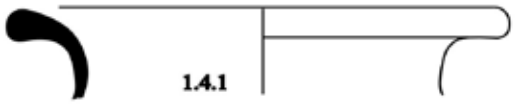


1. R-Reduced
1.3. GWM

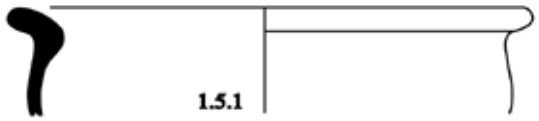


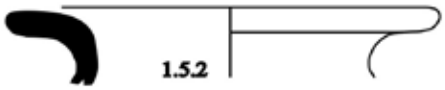
1. R- Reduced

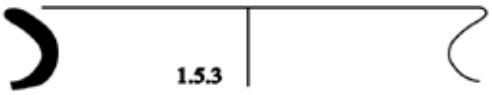
1.4. COAR

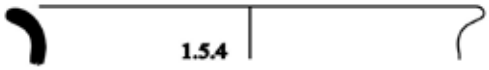


1.5. SGRIT

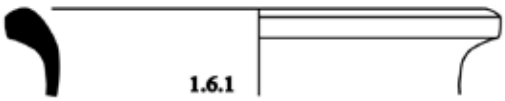




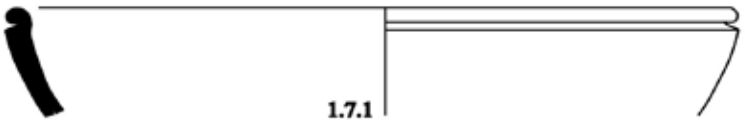




1.6. GWRC

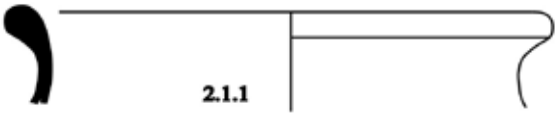


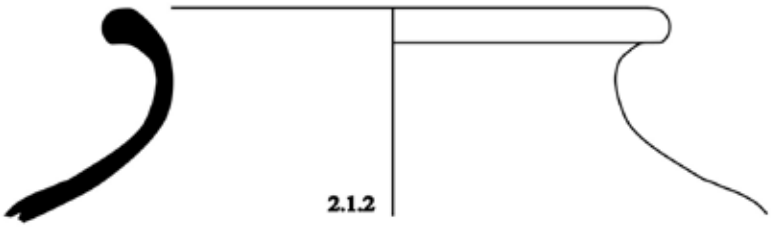
1.7. GWEY

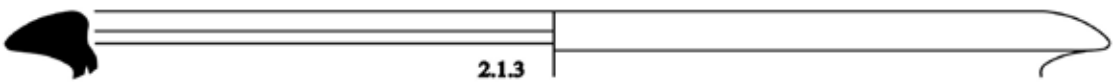


2. O- Oxidised

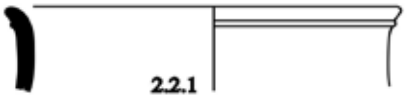
2.1. OXCOAR



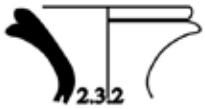


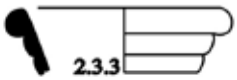


2. O- Oxidised
2.2. OXMISC

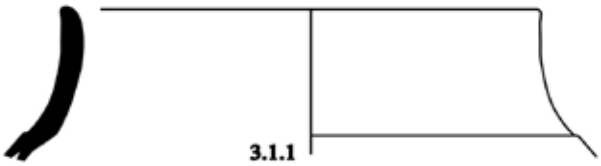


2.3. FLAG2

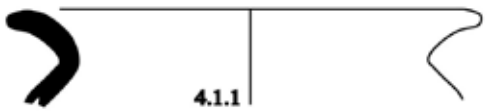


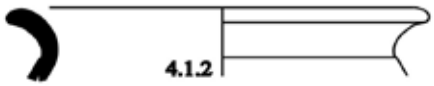


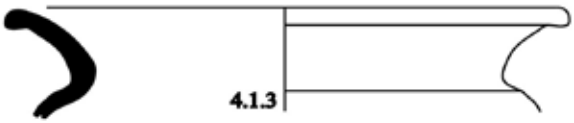
3. W- White wares
3.1. BPD PA



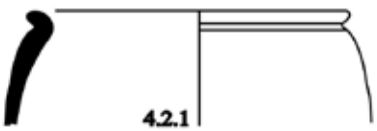
4. B- Black-burnished
4.1. BBGW



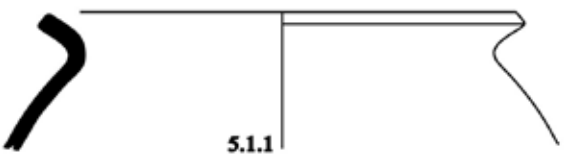




4.2. BB1



5. G- Gritted wares
5.1. GQTZ



APPENDIX 11B: FORM CATALOGUE DESCRIPTION

Cat. No.	Fabric	Description	Context	Context date
1.1.1	GWB	Rim of a squared jar (JSQ)	M25-38	3rd c.
1.1.2	GWB	Rim of an everted rounded jar (JER)	M25-25	2nd c.
1.1.3	GWB	Rim of an everted rounded jar (JER)	M25-35	3rd c.
1.1.4	GWB	Rim of an everted rounded jar (JER)	M25-35	3rd c.
1.1.5	GWB	Rim of an everted jar (JE)	M25-25	4th c.
	GWB		M25-26	4th c.
1.1.6	GWB	Rim of an everted jar (JE)	M25-35	3rd c.
1.1.7	GWB	Rim of an everted jar (JE)	M25-35	3rd c.
1.1.8	GWB	Rim of an everted jar (JE)	M25-35	3rd c.
1.1.9	GWB	Rim of an everted jar (JE)	M25-35	3rd c.
1.1.10	GWB	Rim of a short, everted jar (JES)	M25-25	4th c.
1.1.11	GWB	Rim of a plain dish with a groove (DPG)	M25-26	4th c.
1.1.12	GWB	Rim of a flat bowl (BFR)	M25-48	3rd c.
1.2.1	RWM	Rim of an almond jar (JEA)	M25-35	3rd c.
1.2.2	RWM	Rim of a squared jar (JSQ)	M25-35	3rd c.
1.2.3	RWM	Rim of a short, everted jar (JES)	M25-35	3rd c.
1.2.4	RWM	Rim of an everted rounded jar (JER)	M25-20	4th c.
1.2.5	RWM	Rim of an everted rounded jar (JER)	M25-38	3rd c.
	RWM		M25-40	2nd c.
1.2.6	RWM	Rim of a cupped jar (jc)	M25-50	3rd c.
1.3.1	GWM	Rim of an everted rounded jar (JER)	M25-16	Post-Roman
1.3.2	GWM	Rim of a squared jar (JSQ)	M25-45	3rd c.
1.3.3	GWM	Rim of a curved bowl (BC)	M25-29	2nd c.
1.3.4	GWM	Rim of a flat bowl (BFR)	M25-26	4th c.
1.4.1	COAR	Rim of an everted rounded jar (JER)	M25-17	Post-Roman
1.5.1	SGRIT	Rim of a curved bowl (BC)	M25-25	4th c.
1.5.2	SGRIT	Rim of a flat jar (JFR)	M25-25	4th c.
1.5.3	SGRIT	Rim of an everted jar (JE)	M25-21	4th c.
1.5.4	SGRIT	Rim of an everted jar (JE)	M25-54	4th c.
1.6.1	GWRC	Rim of a squared jar (JSQ)	M25-35	3rd c.
1.7.1	GWEY	Rim of a plain dish with a groove (DPG)	M25-43	Post-Roman
2.1.1	OXCOAR	Rim of an everted rounded jar (JER)	M25-43	Post-Roman

Cat. No.	Fabric	Description	Context	Context date
2.1.2	OXCOAR	Rim of an everted rounded jar (JER)	M25-35	3rd c.
2.1.3	OXCOAR	Rim of a miscellaneous bowl, a casserole made in North African style (BM)	M25-16	Post-Roman
2.2.1	OXMISC	Rim of a beaker (BE?)	M25-36	3rd c.
2.3.1	FLAG2	Rim of a ring neck flagon (FR)	M25-17	Post-Roman
2.3.2	FLAG2	Rim of a flagon (FF)	M25-25	4th c.
2.3.3	FLAG2	Rim of a ring neck flagon (FR)	M25-20	4th c.
3.1.1	BPD PA	Rim of a beaker (BE?)	M25-35	3rd c.
4.1.1	BBGW	Rim of an everted jar (JE)	M25-17	Post-Roman
4.1.2	BBGW	Rim of an everted jar (JE)	M25-19	4th c.
4.1.3	BBGW	Rim of an everted jar (JE)	M25-25	4th c.
4.2.1	BB1	Rim of a short, everted jar (JES)	M25-38	3rd c.
5.1.1	GQTZ	Rim of a squared jar (JSQ)	M25-17	Post-Roman

APPENDIX 12: IDENTIFICATION OF FAUNAL REMAINS

Summary by context of potential faunal age related and biometrical data (Totals are of zoned (or A) and other (or B) bones (see Chapter 11.3).

Context Totals by Year									
Year	**Context**	**Date**	**Species**		**Mandibles (ageable)**	**Fusion**	**Meas A bones**	**A Bones**	**Totals**
2023	M23-4	Medieval	Medium mammal	Mammalia	0	0	0	0	**3**
		Medieval Total			0	0	0	0	**3**
	M23-4 Total				0	0	0	0	**3**
	M23-32	Medieval	Cattle	*Bos taurus*	0	0	0	0	**3**
			Large mammal	Mammalia	0	0	0	0	**1**
		Medieval Total			0	0	0	0	**4**
	M23-32 Total				0	0	0	0	**4**
2023 Total					**0**	**0**	**0**	**0**	**7**
2024	M24-5	Hadrianic	Sheep/ goat	*Ovis/ Capra* sp.	0	0	0	1	**1**
		Hadrianic Total			0	0	0	1	**1**
	M24-5 Total				0	0	0	1	**1**
	M24-33	Pre-Hadrianic	Medium mammal	Mammalia	0	0	0	0	**0**
		Pre-Hadrianic Total			0	0	0	0	**0**
	M24-33 Total				0	0	0	0	**0**
	M24-86	3rd Century	Medium mammal	Mammalia	0	0	0	0	**2**
		3rd Century Total			0	0	0	0	**2**
	M24-86 Total				0	0	0	0	**2**

Year	Context	Date	Species		Mandibles (ageable)	Fusion	Meas A bones	A Bones	Totals
	M24-90	Medieval	Horse	*Equus* sp.	0	1	0	3	**3**
			Large mammal	Mammalia	0	0	0	0	**1**
		Medieval Total			0	1	0	3	**4**
	M24-90 Total				0	1	0	3	**4**
	M24-118	Medieval	Cattle	*Bos taurus*	0	0	0	1	**1**
			Large mammal	Mammalia	0	0	0	0	**3**
		Medieval Total			0	0	0	1	**4**
	M24-118 Total				0	0	0	1	**4**
	M24-119	4th Century	Medium mammal	Mammalia	0	0	0	0	**1**
		4th Century Total			0	0	0	0	**1**
	M24-119 Total				0	0	0	0	**1**
	M24-128	4th Century	Cattle	*Bos taurus*	0	0	0	0	**6**
		4th Century Total			0	0	0	0	**6**
	M24-128 Total				0	0	0	0	**6**
	M24-132	Late 2nd Century	Cattle	*Bos taurus*	0	0	0	0	**1**
			Large mammal	Mammalia	0	0	0	1	**4**
		Late 2nd Century Total			0	0	0	1	**5**
	M24-132 Total				0	0	0	1	**5**
	M24-133	Pre-Hadrianic	Cattle	*Bos taurus*	2	3	2	7	**15**
			Sheep/ goat	*Ovis/ Capra* sp.	0	0	0	2	**2**
			Horse	*Equus* sp.	0	1	0	1	**5**

Year	Context	Date	Species		Mandibles (ageable)	Fusion	Meas A bones	A Bones	Totals
			Large mammal	Mammalia	0	0	0	0	**9**
			Medium mammal	Mammalia	0	0	0	0	**3**
			Mammal	Mammalia	0	0	0	0	**1**
		Pre-Hadrianic Total			2	4	2	10	**35**
	M24-133 Total				2	4	2	10	**35**
	M24-141	Pre-Hadrianic	Cattle	*Bos taurus*	0	1	1	4	**6**
			Sheep/ goat	*Ovis/ Capra* sp.	0	1	0	1	**1**
			Horse	*Equus* sp.	0	0	0	2	**2**
			Deer	*Cervus/ Dama* sp.	0	0	0	0	**1**
			Large mammal	Mammalia	0	0	0	0	**1**
		Pre-Hadrianic Total			0	2	1	7	**11**
	M24-141 Total				0	2	1	7	**11**
	M24-165	3rd Century	Large mammal	Mammalia	0	0	0	0	**1**
			Medium mammal	Mammalia	0	0	0	0	**4**
		3rd Century Total			0	0	0	0	**5**
	M24-165 Total				0	0	0	0	**5**
	M24-169	Late 2nd Century	Cattle	*Bos taurus*	0	0	0	0	**1**
			Large mammal	Mammalia	0	0	0	0	**1**
			Medium mammal	Mammalia	0	0	0	0	**11**
		Late 2nd Century Total			0	0	0	0	**13**

Year	Context	Date	Species		Mandibles (ageable)	Fusion	Meas A bones	A Bones	Totals
	M24-169 Total				0	0	0	0	**13**
	M24-188	3rd Century	Cattle	*Bos taurus*	0	0	0	0	**7**
		3rd Century Total			0	0	0	0	**7**
	M24-188 Total				0	0	0	0	**7**
	M24-189	4th Century	Cattle	*Bos taurus*	0	1	1	1	**1**
			Large mammal	Mammalia	0	0	0	0	**3**
		4th Century Total			0	1	1	1	**4**
	M24-189 Total				0	1	1	1	**4**
	M24-190	4th Century	Horse	*Equus* sp.	0	0	0	0	**1**
			Large mammal	Mammalia			0	0	**1**
		4th Century Total			0	0	0	0	**2**
	M24-190 Total				0	0	0	0	**2**
	M24-207	Late 2nd Century	Medium mammal	Mammalia	0	0	0	0	**3**
		Late 2nd Century Total			0	0	0	0	**3**
	M24-207 Total				0	0	0	0	**3**
2024 Total					**2**	**8**	**4**	**24**	**103**
2025	M25-18	Post-Roman	Cattle	*Bos taurus*	0	0	0	1	**3**
			Pig	*Sus domesticus*	0	1	0	2	**2**
			Large mammal	Mammalia	0	0	0	1	**5**
		Post-Roman Total			0	1	0	4	**10**

Year	Context	Date	Species		Mandibles (ageable)	Fusion	Meas A bones	A Bones	Totals
	M25-18 Total				0	1	0	4	**10**
	M25-24	2nd Century	Mammal	Mammalia	0	0	0	0	**1**
		2nd Century Total			0	0	0	0	**1**
	M25-24 Total				0	0	0	0	**1**
	M25-25	4th Century	Cattle	*Bos taurus*	0	6	2	8	**21**
			Pig	*Sus domesticus*	1	1	1	1	**2**
			Horse	*Equus* sp.	0	0	0	1	**2**
			Large mammal	Mammalia	0	1	0	2	**54**
			Medium mammal	Mammalia	0	0	0	1	**4**
			Mammal	Mammalia	0	0	0	0	**4**
		4th Century Total			1	8	3	13	**87**
	M25-25 Total				1	8	3	13	**87**
	M25-29	2nd Century	Cattle	*Bos taurus*	0	0	0	0	**9**
			Mammal	Mammalia	0	0	0	0	**15**
		2nd Century Total			0	0	0	0	**24**
	M25-29 Total				0	0	0	0	**24**
	M25-35	3rd Century	Cattle	*Bos taurus*	5	27	5	36	**113**
			Sheep/ goat	*Ovis/ Capra* sp	0	6	1	11	**14**
			Pig	*Sus domesticus*	1	7	0	12	**25**
			Horse	*Equus* sp.	0	1	0	2	**5**
			Red deer	*Cervus elaphus*	0	1	1	1	**1**

Year	Context	Date	Species		Mandibles (ageable)	Fusion	Meas A bones	A Bones	Totals
			Deer	*Cervus/ Dama* sp.	0	0	0	0	**4**
			Dog	*Canis familiaris*	0	5	1	5	**5**
			Fox/dog	*Vulpes/ Canis* sp.	0	0	0	0	**1**
			Cat	*Felis catus*	0	1	0	1	**1**
			Large mammal	Mammalia	0	14	0	18	**546**
			Medium mammal	Mammalia	0	1	0	2	**14**
			Mammal	Mammalia	0	0	0	0	**93**
			Domestic fowl	*Gallus gallus*	0	0	0	2	**2**
			Raven	*Corvus corax*	0	0	1	1	**1**
		3rd Century Total			6	63	9	91	**825**
	M25-35 Total				6	63	9	91	**825**
	M25-36	3rd Century	Cattle	*Bos taurus*	0	0	0	0	**2**
			Mammal	Mammalia	0	0	0	0	**28**
		3rd Century Total			0	0	0	0	**30**
	M25-36 Total				0	0	0	0	**30**
	M25-38	4th Century	Mammal	Mammalia	0	0	0	0	**4**
		4th Century Total			0	0	0	0	**4**
	M25-38 Total				0	0	0	0	**4**
	M25-40	2nd Century	Large mammal	Mammalia	0	1	0	1	**4**
			Sheep/ goat	*Ovis/ Capra* sp.	0	0	0	1	**1**
		2nd Century Total			0	1	0	2	**5**

Year	Context	Date	Species		Mandibles (ageable)	Fusion	Meas A bones	A Bones	Totals
	M25-40 Total				0	1	0	2	**5**
	M25-43	Post-Roman	Cattle	*Bos taurus*	3	26	8	69	**131**
			Sheep/ goat	*Ovis/ Capra* sp.	0	2	0	6	**6**
			Pig		0	3	0	4	**8**
			Deer	*Cervus/ Dama* sp.	0	0	0	0	**1**
			Dog	*Canis familiaris*	0	1	1	1	**1**
			Cat	*Felis catus*	0	2	0	2	**2**
			cf Cat	*cf Felis catus*	0	0	0	0	**1**
			Large mammal	Mammalia	0	2	0	2	**197**
			Medium mammal	Mammalia	0	0	0	1	**2**
		Post-Roman Total			3	36	9	85	**349**
	M25-43 Total				3	36	9	85	**349**
	M25-44	2nd Century	Large mammal	Mammalia	0	0	0	0	**1**
		2nd Century Total			0	0	0	0	**1**
	M25-44 Total				0	0	0	0	**1**
	M25-46	2nd century	Cattle	*Bos taurus*	1	0	0	1	**1**
			Sheep/ goat	*Ovis/ Capra* sp.	0	1	1	1	**1**
			Pig	*Sus domesticus*	0	0	0	0	**6**
			Medium mammal	Mammalia	0	1	0	0	**3**
		2nd century Total			1	2	1	2	**11**
	M25-46 Total				1	2	1	2	**11**

Year	Context	Date	Species		Mandibles (ageable)	Fusion	Meas A bones	A Bones	Totals
	M25-50	3rd Century	Medium mammal	Mammalia	0	0	0	0	**1**
		3rd Century Total			0	0	0	0	**1**
	M25-50 Total				0	0	0	0	**1**
	M25-54	4th Century	Cattle	*Bos taurus*	0	0	0	0	**4**
			Large mammal	Mammalia	0	0	0	1	**1**
		4th Century Total			0	0	0	1	**5**
	M25-54 Total				0	0	0	1	**5**
	M25-55	Prehistoric	Cattle	*Bos taurus*	0	1	0	1	**1**
			Sheep/ goat	*Ovis/ Capra* sp.	0	1	0	1	**1**
			Large mammal	Mammalia	0	0	0	0	**1**
		Prehistoric Total			0	2	0	2	**3**
	M25-55 Total				0	2	0	2	**3**
2025 Total					**11**	**113**	**22**	**200**	**1356**
Total					**13**	**121**	**26**	**224**	**1466**

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